SPXFLOW

INSTRUCTION MANUAL

Universal II Series

ROTARY POSITIVE DISPLACEMENT PUMP

FORM NO.: 95-03015 REVISION: 01/2017

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.

Waukesha Cherry-Burrell®

SPXFLOW
FOOD+BEVERAGE

ADDING A POWERFUL NEW TOOL TO YOUR MAINTENANCE PROGRAM

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- Product Descriptions and General Operating Specifications
- Maintenance Manuals and Documentation
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Waukesha Cherry-Burrell®

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Warranty

LIMITED WARRANTY: Unless otherwise negotiated at the time of sale, SPX FLOW US, LLC (SPX FLOW) goods, auxiliaries and parts thereof are warranted to the original purchaser against defective workmanship and material for a period of twelve (12) months from date of installation or eighteen (18) months from date of shipment from factory, whichever expires first. If the goods or services do not conform to the warranty stated above, then as Buyer's sole remedy, SPX FLOW shall, at SPX FLOW's option, either repair or replace the defective goods or re-perform defective services. Third party goods furnished by SPX FLOW will be repaired or replaced as Buyer's sole remedy, but only to the extent provided in and honored by the original manufacturer's warranty. Unless otherwise agreed to in writing, SPX FLOW shall not be liable for breach of warranty or otherwise in any manner whatsoever for: (i) normal wear and tear; (ii) corrosion, abrasion or erosion; (iii) any good or services which, following delivery or performance by SPX FLOW, has been subjected to accident, abuse, misapplication, improper repair, alteration, improper installation or maintenance, neglect, or excessive operating conditions; (iv) defects resulting from Buyer's specifications or designs or those of Buyer's contractors or subcontractors other than SPX FLOW; or (v) defects resulting from the manufacture, distribution, promotion or sale of Buyer's products.

THE WARRANTIES CONTAINED HEREIN ARE THE SOLE AND EXCLUSIVE WARRANTIES AVAILABLE TO BUYER AND SPX FLOW HEREBY DISCLAIMS ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE FOREGOING REPAIR, REPLACEMENT AND RE-PERFORMANCE OBLIGATIONS STATE SPX FLOW'S ENTIRE AND EXCLUSIVE LIABILITY AND BUYER'S EXCLUSIVE REMEDY FOR ANY CLAIM IN CONNECTION WITH THE SALE AND FURNISHING OF SERVICES, GOODS OR PARTS, THEIR DESIGN, SUITABILITY FOR USE, INSTALLATION OR OPERATIONS.

Shipping Damage or Loss

If equipment is damaged or lost in transit, file a claim at once with the delivering carrier. The carrier has a signed Bill of Lading acknowledging that the shipment has been received from SPX FLOW in good condition. SPX FLOW is not responsible for the collection of claims or replacement of materials due to transit shortage or damages.

Warranty Claim

Warranty claims must have a **Returned Material Authorization (RMA)** from the Seller or returns will not be accepted. Contact 800-252-5200 or 262-728-1900.
Claims for shortages or other errors must be made in writing to Seller within ten (10) days after delivery. This does not include transit shortage or damages. Failure to give such notice shall constitute acceptance and waiver of all such claims by Buyer.

Safety

Warnings and cautions are provided in this manual to help avoid serious injury and/or possible damage to equipment:

DANGER: *marked with a stop sign.*
Immediate hazards which WILL result in severe personal injury or death.

WARNING: *marked with a warning triangle.*
Hazards or unsafe practices which COULD result in severe personal injury or death.

CAUTION: *marked with a warning triangle.*
Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.

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

SPX FLOW recommends users of our equipment and designs follow the latest Industrial Safety Standards. At a minimum, these should include the industrial safety requirements established by:

1. Occupational Safety and Health Administration (OSHA)
2. National Fire Protection Association (NFPA)
3. National Electrical Code (NEC)
4. American National Standards Institute (ANSI)

Attention: *Severe injury or death can result from electrical shock, burn, or unintended actuation of equipment. Recommended practice is to disconnect and lockout industrial equipment from power sources, and release stored energy, if present. Refer to the National Fire Protection Association Standard No. NFPA70E, Part II and (as applicable) OSHA rules for Control of Hazardous Energy Sources (Lockout-Tagout) and OSHA Electrical Safety Related Work Practices, including procedural requirements for:*

- Lockout-tagout
- Personnel qualifications and training requirements
- When it is not feasible to de-energize and lockout-tagout electrical circuits and equipment before working on or near exposed circuit parts

Locking and Interlocking Devices: These devices should be checked for proper working condition and capability of performing their intended functions. Make replacements only with the original equipment manufacturer's OEM renewal parts or kits. Adjust or repair in accordance with the manufacturer's instructions.

Periodic Inspection: Equipment should be inspected periodically. Inspection intervals should be based on environmental and operating conditions and adjusted as indicated by experience. At a minimum, an initial inspection within 3 to 4 months after installation is recommended. Inspection of the electrical control systems should meet the recommendations as specified in the National Electrical Manufacturers Association (NEMA) Standard No. ICS 1.3, Preventative Maintenance of Industrial Control and Systems Equipment, for the general guidelines for setting-up a periodic maintenance program.

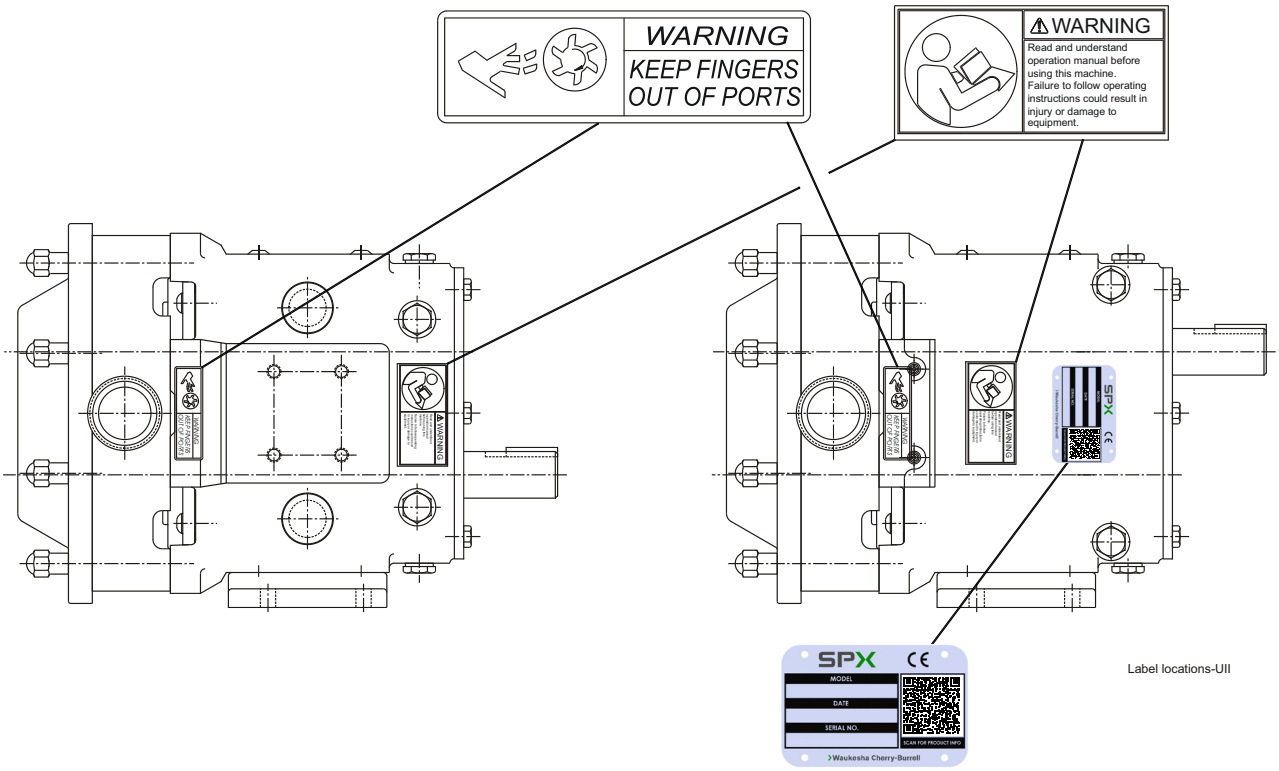
Replacement Equipment: Use only replacement parts and devices recommended by the manufacturer to maintain the integrity of the equipment. Make sure the parts are properly matched to the equipment series, model, serial number, and revision level of the equipment.

Replacement Labels

WARNING: *The following labels are installed on your equipment. If these labels are removed or become unreadable, contact SPX FLOW customer service at 1-800-252-5200 or 262-728-1900, or refer to "Parts List" on page 56 for replacement part numbers.*

Application Instructions

Apply to a clean, dry surface. Remove the backing from the label, place it in proper position, protect it with a cover sheet and burnish it. (A soft rubber roller also may be used to press the label into place.) Apply all labels to be readable from the front of the pump.



Label locations-UII

IMPORTANT

1. Pump and Drive are factory aligned.
2. Recheck alignment after installation and before start-up.
3. Recheck alignment periodically, to maximize service life.

33-95

PD100-235b

IMPORTANT

To avoid damage to the shaft seals and/or pump parts:

DO NOT START this pump unless Seal Flush has been installed and is turned ON.

PD100-236a

Care of Stainless Steel

NOTE: *SPX FLOW recommends the use of an FDA-approved anti-seize compound on all threaded connections.*

Stainless Steel Corrosion

Corrosion resistance is greatest when a layer of oxide film is formed on the surface of stainless steel. If film is disturbed or destroyed, stainless steel becomes much less resistant to corrosion and may rust, pit or crack.

Corrosion pitting, rusting and stress cracks may occur due to chemical attack. Use only cleaning chemicals specified by a reputable chemical manufacturer for use with 300 series stainless steel. Do not use excessive concentrations, temperatures or exposure times. Avoid contact with highly corrosive acids such as hydrofluoric, hydrochloric or sulfuric. Also avoid prolonged contact with chloride-containing chemicals, especially in presence of acid. If chlorine-based sanitizers are used, such as sodium hypochlorite (bleach), do not exceed concentrations of 150 ppm available chlorine, do not exceed contact time of 20 minutes, and do not exceed temperatures of 104°F (40°C).

Corrosion discoloration, deposits or pitting may occur under product deposits or under gaskets. Keep surfaces clean, including those under gaskets or in grooves or tight corners. Clean immediately after use. Do not allow equipment to set idle, exposed to air with accumulated foreign material on the surface. Corrosion pitting may occur when stray electrical currents come in contact with moist stainless steel. Ensure all electrical devices connected to the equipment are correctly grounded.

Alloy 88

Waukesha Alloy 88 is the standard rotor material for Universal I, Universal II, Universal Lobe, Universal 420/ 520 and 5000 Series Rotary PD pumps. This alloy was developed specifically for corrosion resistance and close operating clearance requirements of high performance rotary positive displacement pumps. Alloy 88 is a nickel based, corrosion-resistant, non-galling or seizing material. The ASTM designation is A494 Grade CY5SnBiM (UNS N26055), and the material is listed in the 3-A Sanitary Standards as acceptable for product contact surfaces.

The above properties make Alloy 88 the ideal material for Waukesha Cherry-Burrell brand stainless steel PD pumps. The non-galling rotors permit close operating clearances in the liquid end. This provides low slip and minimum shear damage. The rotors will not gall or seize if they come in contact with the body or cover during operation.

The corrosion resistance of Alloy 88 is approximately equal to AISI 300 Series Stainless Steel. However, Alloy 88 has limited resistance to certain aggressive chemicals that may be commonly used in contact with AISI 300 Series Stainless Steel.

Do not use Alloy 88 in contact with nitric acid. Nitric acid is commonly used to passivate new installations of stainless steel equipment. Do not allow nitric acid based passivation chemicals to contact Alloy 88 rotors. Remove the rotors during passivation and use a separate pump to circulate the passivation chemicals. Also, if nitric acid-based CIP cleaning chemicals are used, remove the rotors prior to CIP cleaning and clean them separately by hand in a mild detergent. If you have questions regarding other aggressive chemicals, please contact SPX FLOW Application Engineering for assistance.

Elastomer Seal Replacement Following Passivation

Passivation chemicals can damage product contact areas of this equipment. Elastomers (rubber components) are most likely to be affected. Always inspect all elastomer seals after passivation is completed. Replace any seals showing signs of chemical attack. Indications may include swelling, cracks, loss of elasticity or any other noticeable changes when compared with new components.

Introduction

Pump Receiving

DANGER: *The pump contains internal moving parts. DO NOT put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, DO NOT install, clean, service, or repair the pump unless all power is off and locked out.*

All ports are covered at the factory to keep out foreign objects during transit. If covers are missing or damaged, remove the pump cover (if damaged) and thoroughly inspect the fluid head. Be sure that the pumping head is clean and free of foreign material before rotating the shaft.

Each standard Waukesha Cherry-Burrell brand pump is shipped completely assembled and lubricated. Review “Operation” on page 22 before operating the pump.

Pump Characteristics

Waukesha Cherry-Burrell brand Universal II pumps are positive-displacement, low-slip, stainless steel pumps designed with larger diameter shafts for greater strength and stiffness, mounted on a heavy- duty cast iron bearing frame (stainless steel option available) with double-tapered roller bearings.

- Designed for continuous operation.
- Rotor hubs are sealed from the product zone; rotors are locked with belleville-style washers and torqued nuts that can rotate securely in either direction (bi-directional).
- Non-galling “88” alloy rotors are standard; 316 material rotors are optional.
- Single mechanical seals are standard. Bodies can be pre-drilled with flush ports if double seals are required.

Equipment Serial Number

All Waukesha Cherry-Burrell brand pumps are identified by a serial number on the gear case nameplate, which is stamped on the pump body and cover.

CAUTION: *The gear case, body, and cover must be kept together as a unit due to backface, rotor and cover clearances. Failure to do so will damage the pump.*

Pump Shaft Location

There are two pump drive shaft locations:

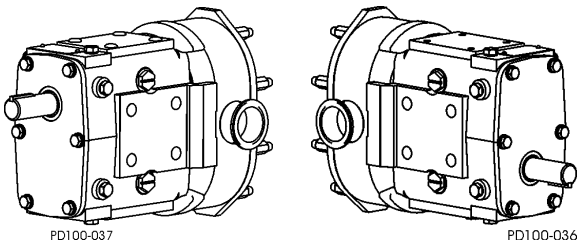


Figure 1 - Upper and Lower Shaft Mount

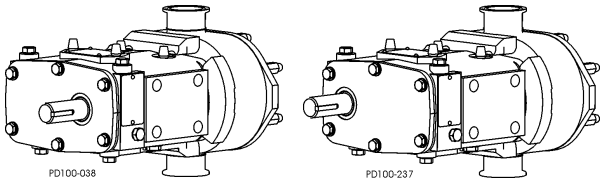


Figure 2 - Sidemount Left Hand and Right Hand (as viewed from pump cover)

Operating Parameters

UII Model	Nominal Displacement per revolution	Maximum Nominal Capacity	Inlet/ Outlet	Optional Inlet/ Outlet	Maximum Pressure Range	Max. RPM	Temp Range*
006	.0082 gal (.031 liter)	8 gpm (1.8 m^3/hr.)	1"	1-1/2"	300 psi (20.7 bar)	1000	Std: -40°F (-40°C) to 180°F (82°C); FF: 180°F (82°C) to 200°F (93°C); Hot & XHot: -40°F (-40°C) to 300°F (149°C)
015	.0142 gal (.054 liter)	11 gpm (2.5 m^3/hr.)	1-1/2"	-	250 psi (17.2 bar)	800	
018	.029 gal (.110 liter)	20 gpm (4.5 m^3/hr.)	1-1/2"	2"	200 psi (13.8 bar)	700	
030	.060 gal (.227 liter)	36 gpm (8.2 m^3/hr.)	1-1/2"	2"	250 psi (17.2 bar)	600	
040	.076 gal (.288 liter)	46 gpm (1.4 m^3/hr.)	2"	-	150 psi (10.3 bar)	600	
045	.098 gal (.371 liter)	58 gpm (13.2 m^3/hr.)	2"	-	450 psi (31.0 bar)	600	
060	.153 gal (.579 liter)	90 gpm (2.4 m^3/hr.)	2-1/2"	3"	300 psi (20.7 bar)	600	
130	.253 gal (.958 liter)	150 gpm (34.1 m^3/hr.)	3"	-	200 psi (13.8 bar)	600	
180	.380 gal (1.438 liter)	230 gpm (52.2 m^3/hr.)	3"	-	450 psi (31.0 bar)	600	
210, 213	.502 gal (1.900 liter)	300 gpm (68.1 m^3/hr.)	4"	-	500 psi (34.5bar)	600	
220	.521 gal (1.972 liter)	310 gpm (7.4 m^3/hr.)	4"	-	300 psi (20.7 bar)	600	
320, 323	.752 gal (2.847 liter)	450 gpm (102 m^3/hr.)	6"	-	300 psi (20.7 bar)	600	
370	1.099 gal (4.160 liter)	660 gpm (150 m3/hr.)	6"	-	200 psi (13.8 bar)	600	

Rectangular Flange Models

UII Model	Nominal Displacement per revolution	Maximum Nominal Capacity	Inlet W x L Inches	Outlet	Maximum Pressure Range	Max. RPM	Temp Range*
014	.0142 gal (.054 liter)	5.68 gpm (1.3 m^3/hr.)	1.44 x 4.94	1-1/2"	250 psi (17.2 bar)	400	Std: -40°F (-40°C) to 180°F (82°C); FF: 180°F (82°C) to 200°F (93°C); Hot & XHot: -40°F (-40°C) to 300°F (149°C)
034	.060 gal (.227 liter)	24 gpm (5.5 m^3/hr.)	1.81 x 6.84	2"	250 psi (17.2 bar)	400	
064	.153 gal (.579 liter)	61 gpm (13.9 m^3/hr.)	2.44 x 9.0	2-1/2"	300 psi (20.7 bar)	400	
134	.253 gal (.958 liter)	101 gpm (22.9 m^3/hr.)	3.19 x 9.38	3"	200 psi (13.8 bar)	400	
184	.380 gal (1.438 liter)	152 gpm (34.5 m^3/hr.)	3.28 x 11.25	3"	450 psi (31.0 bar)	400	
214	.502 gal (1.900 liter)	200 gpm (45.4 m^3/hr.)	3.45 x 12.70	4"	500 psi (34.5bar)	400	
224	.521 gal (1.972 liter)	208 gpm (47.2 m^3/hr.)	4.06 x 11.25	4"	300 psi (20.7 bar)	400	
324	.752 gal (2.847 liter)	300 gpm (68.1 m^3/hr.)	4.25 x 12.70	6"	300 psi (20.7 bar)	400	

Std = Standard Clearance Rotors; FF = Front Face Clearance Rotors; Hot = Hot Clearance Rotors; XHot = Extra Hot Clearance Rotors

Other inlet/outlet sizes are available. Contact SPX FLOW Application Engineering.

* Contact SPX FLOW Application Engineering for higher pressures or higher temperature applications. Pump max temperature is 300°F (149°C).

"Standard" and "Wine" clearance rotors may be used with liquid temperatures up to 180°F (82°C). However, between 160°-200°F (71°-93°C), consider other application factors such as:

- speed of operation
- differential pressure
- lubricating properties of liquid being pumped
- product viscosity

If these factors trend toward a difficult application (high speed, high pressure, non-lubricating) then "Front Face" or "Hot" clearance rotors are recommended. Wine clearance rotors (same operating parameters as listed for standard rotors) provide additional clearance between the rotor hub and the cover bore area only. They give extra protection against contact in this area.

"FF" (Front Face) clearance rotors provide additional clearance in the front face area only. They are recommended for use with liquid temperature between 180°F (82°C) to 200°F (93°C). They give better pumping efficiency (less slip) than "Hot" clearance rotors when used with low viscosity liquids. However, do not use "FF" rotors if they will be subjected to temperature shock (extreme, rapid temperature change.)

"Hot" clearance rotors are recommended for use with liquid temperatures between 180°F (82°C) to 300°F (149°C). They provide additional clearance in the front face area plus rotor to body areas. Because of this additional clearance there is more slip (inefficiency) with low viscosity liquids, which the pump must overcome with higher operating speed (rpm.) VHP (viscous horsepower) is slightly lower when using hot clearance rotors. Hot clearance rotors are also used when the product viscosity is above 200 CPS.

"316SS" clearance rotors are made from 316 stainless steel material (in place of standard non-galling alloy 88) and recommended for use at temperatures up to 200°F (93°C). These rotors provide additional clearance all around (more than Hot clearance alloy 88 rotors) to ensure no running contact between the 316 SS rotors and other 316 SS pump components. Because of this additional clearance, there is more slip (inefficiency) with low viscosity liquids, which the pump must overcome with higher operating speed (rpm). VHP (viscous horsepower) is slightly lower when using "316SS" clearance rotors.

Some models in some series have a "316SS Hot" clearance rotor option for temperatures above 200°F (93°C).

NOTE: *Consult SPX FLOW Technical Services for applications near 300°F or above 200°F with 316SS rotors.*

"Extra Hot" clearance rotors are recommended for use with products such as chocolate, which tend to "plate out" and build up on rotor surfaces. These rotors require special selection procedures. Contact SPX FLOW Technical Services for assistance.

Single wing rotors are available for certain pump models. They are recommended for applications pumping particulates with minimal damage. These rotors perform the same as standard twin wing rotors. DO NOT USE ABOVE 300 RPM. Single wing rotors are not available for use with RF (rectangular flange) models.

For clearance data, see Table 2, “Rotor Clearances,” on page 41.

Factory Remanufacturing Program

Waukesha Cherry-Burrell brand Universal II pumps are designed so that they may be factory remanufactured twice and backed with a new pump warranty each time.

Factory remanufacturing involves replacement of all shafts, bearings, oil seals, gears, etc. The pump body and cover are re-machined and new oversized rotors are installed. The pumps are stamped R-1 or R-2, after the serial number, designating that they have been reconditioned once or twice.

Contact your SPX FLOW Customer Service Representative at 1-800-252-5200 or 262-728-1900 and furnish the 3 serial numbers (serial tag, pump body, and cover) of any pump being considered for remanufacturing.

Installation

Install the pump and piping system in accordance with local codes and restrictions. Practices described in this manual are recommended for optimum performance.

All system equipment, such as motors, sheaves, drive couplings, speed reducers, etc., must be properly sized to ensure satisfactory operation of your Waukesha Cherry-Burrell brand pump within its limits.

CAUTION: *These pumps are positive displacement, low slip design and will be severely damaged if operated with closed valves in discharge or inlet lines. The pump warranty is not valid for damages caused by a hydraulic overload from operation or start-up with a closed valve in the system.*

Install Pump and Drive Unit

In a typical installation configuration, the pump and drive unit are mounted on a common base plate. The unit can be installed in any of the arrangements shown in Figure 3 through Figure 6 (the shaded area indicates the guard location).

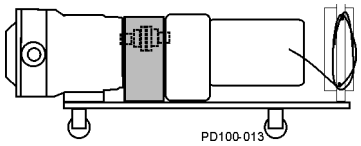


Figure 3 - Portable Base

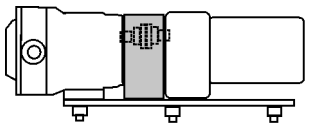


Figure 4 - Adjustable Leg Base

WARNING: *Full guards must be installed to isolate operators and maintenance personnel from rotating components. Guards are provided as part of a complete pump and drive package. The gap between the pump body and gearcase is required for 3-A sanitary standards.*

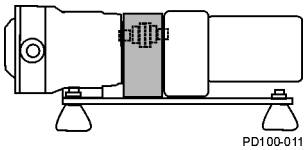


Figure 5 - Leveling and/or Vibration Isolation Pads

WARNING: *Pumps are not intended to be coupled directly to a motor; a speed reducing gear motor should be used. Direct coupling to a motor will damage the pump as the speed will be too fast.*

NOTE: *When installing unit as shown in Figure 6, level the unit before installing the bolts.*

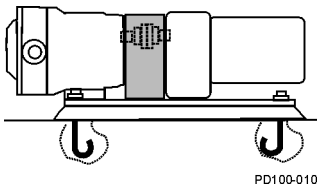


Figure 6 - Permanent Installation on Foundation

Install Connections and Piping

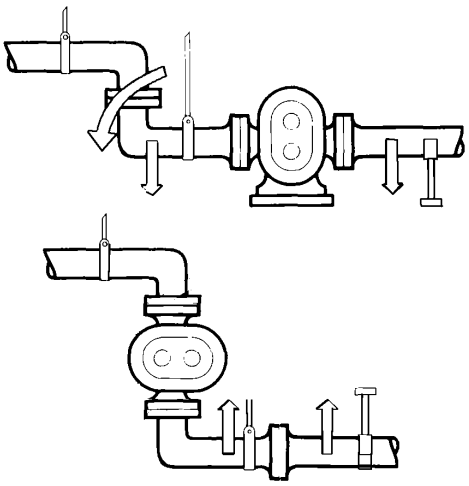


Figure 7 - Piping Support

Piping Support

To minimize forces exerted on the pump, support all piping to the pump independently with hangers or pedestals. Such forces can cause misalignment of the pump parts and lead to excessive wear of rotors, bearings, and shafts.

Figure 7 shows typical supporting methods used to independently support each pipe, reducing the weight effect of piping and fluid on the pump.

⚠ ***WARNING:*** *Do not exceed 50 lb (22.7 kg) load on pump inlet or discharge ports. Exceeding this limit may cause damage to the pump*

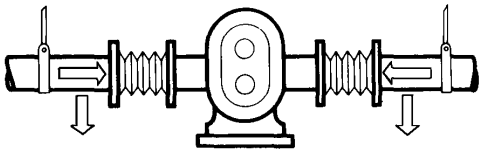


Figure 8 - Flexible Connections and Supports

Expansion Joints

Thermal expansion of piping can cause tremendous forces. Use thermal expansion joints to minimize these forces on the pump.

Flexible joints can be used to limit transmission of mechanical vibration. Ensure that the free ends of any flexible connections in the system are anchored.

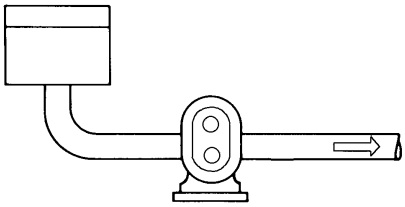


Figure 9 - Pump Below Supply (recommended)

Inlet Piping

Install the pump below the supply liquid level to reduce the air in the system by flooded suction, to prevent the pump from becoming air-bound (Figure 9).

If the pump is installed above the supply liquid level, the piping on the inlet side must slope up toward the pump, preventing air pockets in the pipes (Figure 10).

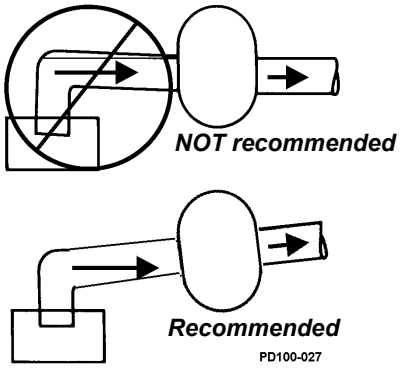
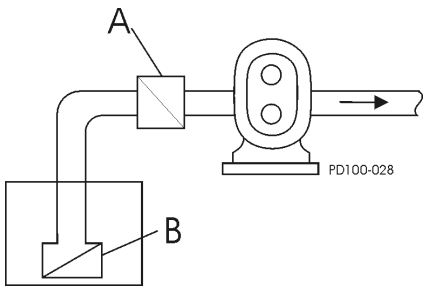


Figure 10 - Piping Slope

Install Check Valves

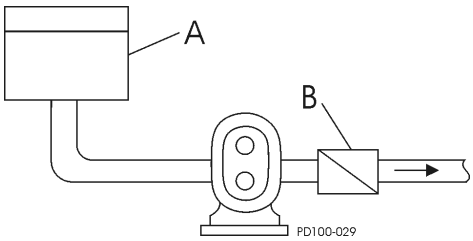


A. Inlet Check Valve
B. Foot Check Valve

Figure 11 - Inlet Check Valve

Inlet Side on Lift Applications

Use check valves to keep the inlet line full, particularly with low-viscosity fluids (Figure 11).



A. Closed Tank - produces vacuum on liquid (Low Absolute Pressure)
B. Check Valve (outlet)

Figure 12 - Discharge Check Valve

Discharge Side

For systems with liquid under a vacuum, install a check valve on the discharge side of the pump. The check valve prevents backflow (air or fluid) to aid in the initial start-up by minimizing the required differential pressure supplied by the pump to start the flow (Figure 12).

Install Isolation Valves

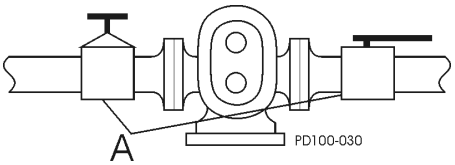


Figure 13 - Isolation Valves

Isolation valves permit pump maintenance and safe pump removal without draining the system (Figure 13, item A).

NOTE: *Make sure the inlet flow is not restricted. Don't start the pump deadheaded, e.g., operated with no flow through it.*

Install Relief Valves

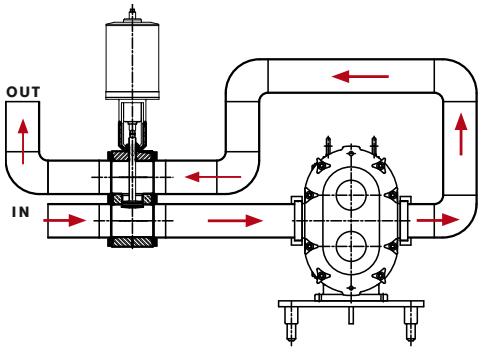


Figure 14 - WR63 Reverse-Acting Over-Pressure Relief Valve

Install relief valves to protect the pump and piping system against excessive pressure. We recommend installing an external relief valve designed to bypass fluid from the pump outlet to the inlet side of the system (See Figure 15, Figure 16, Figure 14).

NOTE: *Integral relief valves built into the pump covers, also known as "vented covers" (not shown), are available. These covers are not "CIP-able" and must be disassembled for cleaning. They are not recommended on applications with viscosities over 5000 cP or where the discharge must be closed for more than a few minutes.*
Prolonged operation of the pump with closed discharge will cause heating of fluid circulating through the relief valve. If this is the case, install an external relief valve to discharge externally through the piping connected to the fluid source, or into inlet piping near the source. Contact applications for sizing an external relief valve.

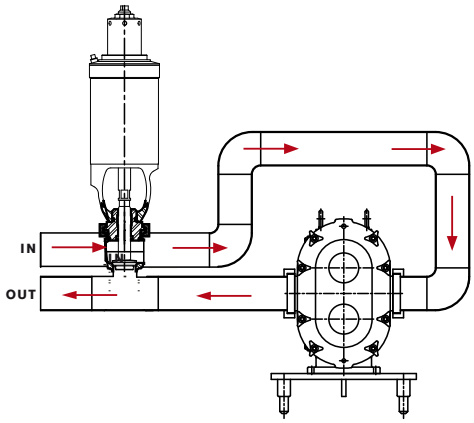


Figure 15 - WR61C Air-to-Raise Valve with Adjustable-Spring Actuator

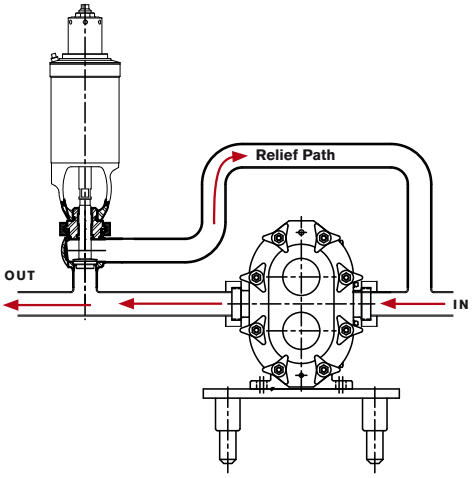
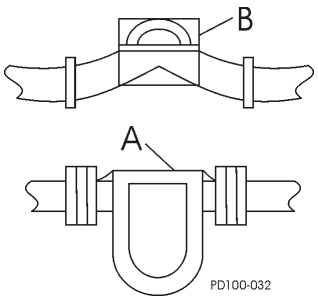


Figure 16 - WR61T 4RHAR Valve

Inlet Side Strainers and Traps



A. Strainer B. Magnetic Trap

Figure 17 - Inline Strainers and Traps

Inlet side strainers and traps (Figure 17, items A and B, respectively) can be used to prevent foreign matter from damaging the pump. Select carefully to prevent cavitation caused by the restriction of the inlet. If inlet strainers are used, they must be serviced regularly to prevent clogging and flow stoppage.

Install Pressure Gauges

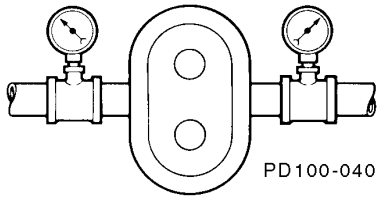


Figure 18 - Pressure and Vacuum Gauges

Pressure and vacuum gauges provide valuable information about pump operation (Figure 18). Wherever possible, install the gauges to help provide information on the following:

- Normal or abnormal pressures
- Indication of flow
- Changes in pump condition
- Changes in system conditions
- Changes in fluid viscosity

Seal Flush Connections

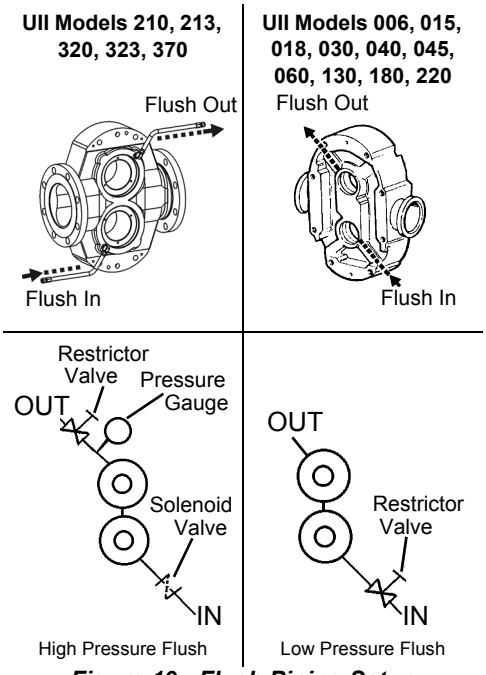


Figure 19 - Flush Piping Setup

Pumps with double seals require flushing. The flush media (water or lubricating fluid compatible with the product) must be connected and flowing whenever the pump is operated.

WARNING: *Operating pump without flush will damage the seal and pump parts due to excess heat from dry running.*

Pump bodies have two 1/8-inch female pipe thread (NPT) flush connections located near the bottom and top of the body.

1. Connect the flush inlet to the lower connection, and outlet to upper connection to flood the flush area completely.
2. Connect the flush outlet for unrestricted flow to the drain.

NOTE: *If steam is used as a flush media, connect the inlet at the upper connection, and the outlet at the lower connection to ensure condensation removal.*
If steam condensate is used as a flush media, connect the inlet at the lower connection, and the outlet at the upper connection.

3. Use cool, filtered flush media to obtain maximum service life of the seal components. If the pumped product is sticky or solidifies at room temperature, use warm or hot flush media.
4. Install a pressure reducing valve and flow control valve (needle valve) on the flush supply line. Set the supply pressure at a maximum of 30 psi (2 bar) and adjust the flow rate to approximately 1/4 gpm (more for high temperature applications).

5. Also install a solenoid valve in the flush supply and wire it in series with the motor starter to provide an automatic start/ stop of the flush media flow before the motor turns on and after the motor turns off.

Universal II High-Pressure Barrier (HPB) Seals

NOTE: *If the pumped product contains abrasive solids or hardens on the seal faces, an alternate high pressure barrier (HPB) flush arrangement may be used. A very small amount of flush liquid enters the pumped liquid, therefore the flush media must be compatible with the product.*

The Universal II High Pressure Barrier (HPB) Seal is available in the Double Mechanical Seal Design only.

The maximum barrier pressure is 100 psi.

Recommended seal flush flow is 1/8 gpm.

To calculate the barrier pressure to ensure that the barrier fluid is on the seal instead of the product:

((Dp - Sp) X 30%) + Sp + 30 psi = Bp

Dp = pump discharge pressure
Sp = pump suction pressure
Bp = flush water pressure

Contact SPX FLOW Application Engineering for assistance.

CIP (Clean-In-Place) Features

Universal II pumps with optional CIP features are designed to provide complete access of the CIP solutions to all product contact surfaces.

Standard CIP features include

- Flat body profile (minimum requirement for standard CIP installations) which allows complete draining of the side-mounted pump, and provides the CIP solution access to the entire cover o-ring groove.

Particulate CIP features include

NOTE: *Particulate CIP is also known as "Full" CIP. This option decreases the pump efficiency.*

- Flat body profile (minimum requirement for standard CIP installations) which allows complete draining of the side-mounted pump, and provides the CIP solution access to the entire cover o-ring groove
- Holes in the rotor hubs and body hubs provide additional “Full CIP” solution access to the cover hub/shaft seal areas for difficult cleaning applications.

Guidelines

Use the following guidelines when designing and installing the CIP system to ensure successful cleaning:

- Ensure that the velocity rate of CIP solutions is adequate to clean the entire circuit. For most applications, a velocity of 5 ft/sec is sufficient. For the CIP solution to achieve the proper velocity, the pump drive must have enough speed range and horsepower. The required inlet pressure also must be satisfied. If the pump does not supply enough CIP solution velocity, a separate CIP supply pump with an installed bypass may be used. To determine the appropriate bypass arrangement, contact SPX FLOW Application Engineering.
- Ensure that a differential pressure is created across the pump. Differential pressure will push CIP solutions through close-clearance areas of the pump, resulting in better cleaning action. The high pressure side may be either the inlet or outlet side. 30 psi (2 bar) differential pressure is adequate for most applications. For difficult cleaning applications, higher pressure or longer cleaning cycles may be required.

CAUTION: *In order to avoid temperature shock after the introduction of hot CIP fluid, stop the pump prior to, or immediately after filling with hot CIP fluid. Once the hot CIP fluid has filled the pumphead, allow 15 minutes for the pump fluid components to thermally expand, then re-start the pump.*

- The pump must be operated during CIP to increase turbulence and cleaning action within the pump.
- If complete draining is required, the pump must be in the side mount position.

Check Coupling Alignment

Figure 20 - Lovejoy Coupling

Figure 21 - T.B. Woods® Coupling

Pumps and drives ordered from the factory and mounted on a common base plate are aligned before shipment. Alignment **must** be re-checked after the complete unit has been installed and piping completed. Periodic re-checking is advisable during the pump service life.

- SPX FLOW recommends using a flexible coupling to connect the drive to the pump. Several different types are available, including couplings with slip or overload provisions. SPX FLOW provides Lovejoy (Figure 20) or T.B. Woods® (Figure 21) couplings unless otherwise specified when ordering. Flexible couplings can be used to compensate for end play and small differences in alignment.
- Align the pump and drive shaft as closely as possible:
  - Pump and Drive are factory aligned.
  - Re-check alignment after installation and before start-up.
  - Re-check alignment periodically, to maximize service life.

Check Angular Alignment

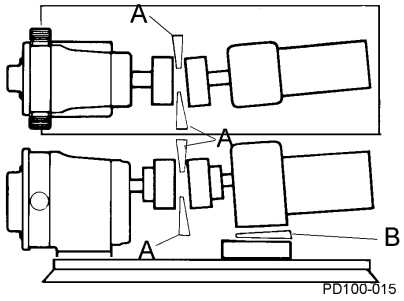


Figure 22 - Check Angular Alignment

1. Using feeler gauges or taper gauges (Figure 22, items A and B), check the alignment at four points every 90 degrees around the coupling; **adjust to equal dimension at all points.**
2. Set the space between the coupling halves to the manufacturer's recommended distance.
3. Install shims to bring the system into alignment.

Check Parallel Alignment

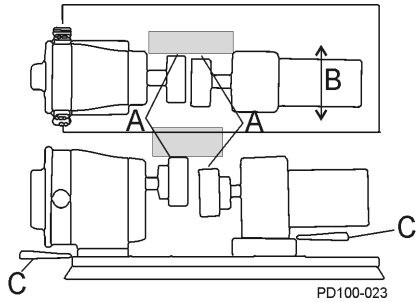


Figure 23 - Check Parallel Alignment

1. Check both the horizontal and vertical alignment of the pump and drive using a straight edge.
2. Using a feeler gauge at location "A" in Figure 23, determine the direction and amount of movement needed (Figure 23, item B).
3. If necessary, shim at location "C" and/or move drive as needed.

Check Belt and Chain Drive Alignment

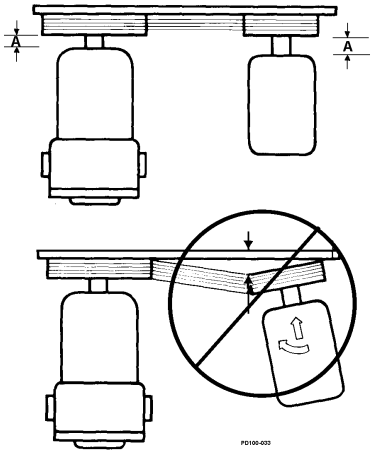


Figure 24 - Aligning Belt and Chain Drives

Use a straight edge to visually check the belt or chain alignment. Keep the shaft distance to a minimum (Figure 24, item A).

After the piping is complete and before the belts are installed, manually turn the pump shaft to ensure it turns freely.

Check Pump Rotation

Check the direction of the drive rotation to determine the rotation direction of pump (Figure 25). After the correct drive rotation is verified, connect the coupling and assemble the pump and coupling guards.

NOTE: *The pump is bidirectional unless it is supplied with optional suction vents.*

NOTE: *The pump covers in the following figures have been removed to view the rotor rotation. Never operate the pump with the covers removed.*

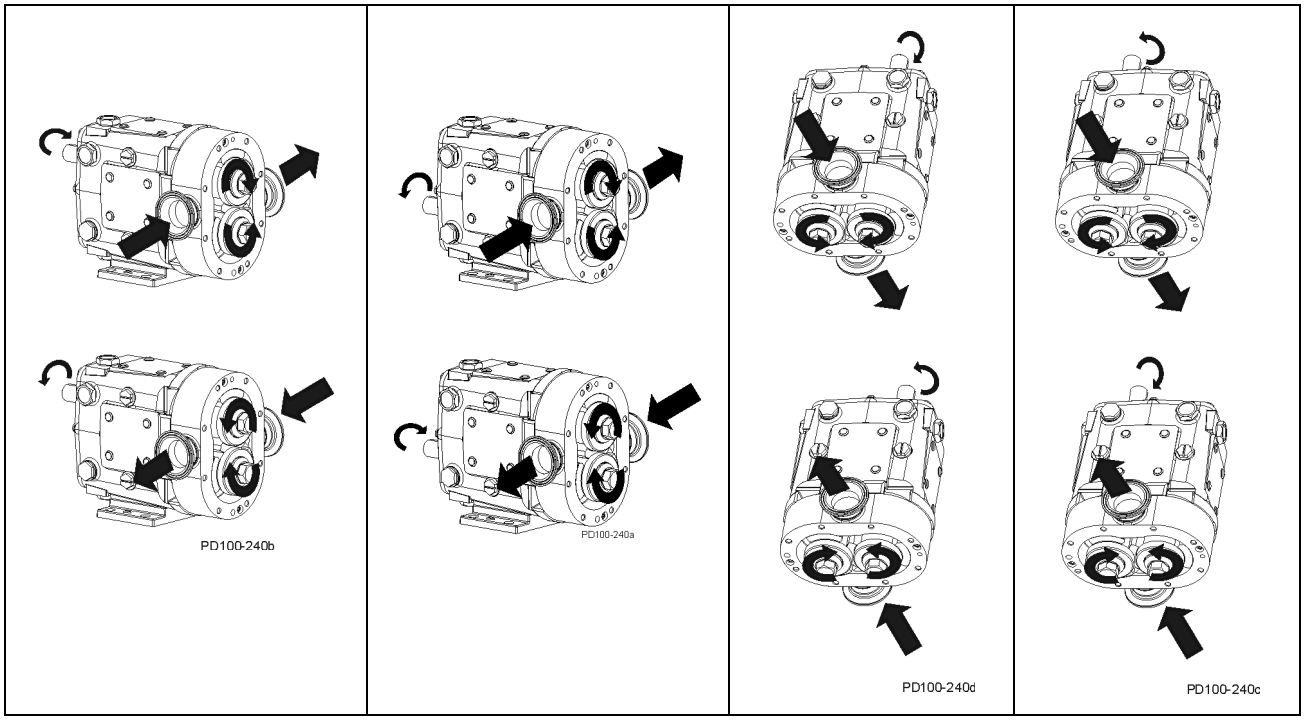


Figure 25 - Upper Shaft Drive Flow, Lower Shaft Drive Flow and Vertical Porting Flow and Pump Rotation (Liquid End Shown)

Operation

DANGER: *The pump contains internal moving parts. DO NOT put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, DO NOT install, clean, service, or repair the pump unless all power is off and locked out.*

CAUTION: *These pumps are positive displacement, low slip design and will be severely damaged if operated with closed valves in the discharge or inlet lines. The pump warranty is not valid for damages caused by a hydraulic overload from operation or start-up with a closed valve in the system.*

Pre-Startup Checklist

1. Ensure that the pump is correctly installed as described in "Installation" on page 13. Review "Install Relief Valves" on page 16 and install relief valves as needed.
2. Check the coupling alignment. See "Check Coupling Alignment" on page 20.
3. Ensure that the pump and piping are clean and free of foreign material such as welding slag, gaskets, etc.
4. Ensure that all piping connections are tight and leak-free. Where possible, check the system with non-hazardous fluid.
5. Ensure that the pump and drive are lubricated. See "Lubrication" on page 23.
6. Ensure that all guards are in place and secure.
7. Double mechanical seals require adequate supply and flow of clean flushing fluids.
8. Ensure that all valves are open on the discharge side and a free flow path is open to the destination.
9. Ensure that all valves are open on the inlet side and fluid can fill the pump. A flooded suction installation is recommended.
10. Check the direction of pump and drive rotation to ensure that the pump will rotate in the proper direction. See "Check Pump Rotation" on page 21.

CAUTION: *Do not use this pump to flush a newly-installed system. Severe damage may occur to the pump and system if the pump is used to flush the system.* ***Remove the rotors during system flushing, to prevent debris from being trapped between the rotors and the pump body. This debris may damage the pump upon startup.***

WARNING: *Full guards must be installed to isolate the operators and maintenance personnel from the rotating components. Guards are provided as part of a complete pump and drive package. The gap between the pump body and gearcase is required for 3-A sanitary standards.*

WARNING: *Do not start a pump with seal flush unless the seal flush is installed and on.*

Startup Procedure

1. Start the pump drive. Where possible, start at a slow speed or jog.
2. For sanitary applications, sanitize the pump per customer requirements before putting the pump into service.
3. Check to make sure that the liquid is reaching the pump. If pumping does not begin and stabilize, check "Troubleshooting" on page 51.

CAUTION: *.In order to avoid temperature shock after the introduction of hot product, stop the pump prior to, or immediately after filling with hot product. Once the hot product has filled the pumphead, allow 15 minutes for the pump fluid components to thermally expand, then re-start the pump.*

Shutdown Procedure

1. Shut off the power to the pump drive.
2. Shut off the supply and discharge lines.

Maintenance

Important Safety Information

DANGER: *The pump contains internal moving parts. DO NOT put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, DO NOT install, clean, service, or repair the pump unless all power is off and locked out.*

Before detaching port connections to the pump:

- Close the suction and discharge valves.
- Drain the pump and clean or rinse, if necessary.
- Disconnect or shut off the electrical supply and lock out all power.

Lubrication

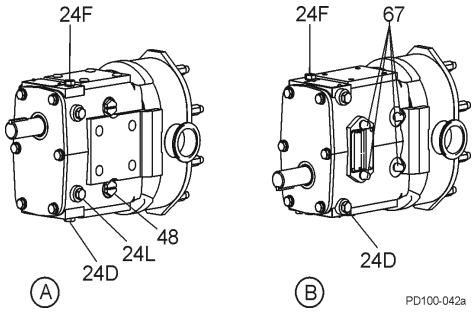


Figure 26 - Lubrication Points

A. Upper Shaft Drive Pump (Standard)
B. Lower Shaft Drive Pump (Optional)
24D. Oil Drain Plug
24F. Oil Fill Plug
24L. Oil Level Check Plug, Sightglass
48. Grease Clean-out Plug
67. Grease Fittings

Drive Lubrication

Refer to the manufacturer's manual shipped with the drive for proper drive lubrication and frequency.

Gears

Gears are factory-lubricated with gear oil at the quantity shown in Table 1 on page 24. **Change the oil every 750 hours.** *Aggressive washdown or extreme running conditions may require more frequent lubrication intervals.*

When the pump is not running, the gear oil level is correct when the oil level is visible in the sight glass.

When the pump is running, the oil level may be difficult to see and may appear cloudy.

Universal pumps are shipped with the oil level at or slightly above the sight glass.

Gear Oil Specification
ISO Grade 320, SAE 140 or AGMA Number 6EP, part number 118402+. If food-grade oil is required, use part number 000140003+.

Bearings

Bearings are factory-lubricated with grease. Re-lubricate them at the quantity shown in Table 1 on page 24. **Grease the bearings every 750 hours.** *Aggressive washdown or extreme running conditions may require more frequent lubrication intervals.*

Excess grease will accumulate in the gear case and must be removed through the cleanout hole covered with a plastic plug (Figure 26, item 48).

Best practice is to clean out this area every time you grease the pump. Water can accumulate in the gearcase from condensation or from aggressive washdown. If water is found in the gearcase, clean out this area more frequently.

Bearing Lubricant Grease
NLGI Grade No. 2, EP, Lithium-based lubricant is standard, part number 118401+. If food-grade grease is required, use part number 000140002+.

Table 1: Lubrication Quantities

Universal II Model	Oil Capacity (Gears)		Grease Quantity (per Bearing)	
	Top or Bottom	Side Mount	Front	Rear
006, 014, 015, 018	1.3 oz (40 ml)	3.3 oz (100 ml)	.37 oz (11 cc)	.13 oz (4 cc)
030, 034, 040	2.0 oz (60 ml)	4 oz (120 ml)	.60 oz (18 cc)	.21 oz (6 cc)
045, 060, 064, 130, 134	6.0 oz (170 ml)	9.5 oz (280 ml)	.84 oz (25 cc)	.76 oz (22 cc)
180, 184, 220, 224	11 oz (320 ml)	20 oz (600 ml)	1.33 oz (39 cc)	1.03 oz (30 cc)
210, 213, 214, 320, 323, 324, 370	17 oz (500 ml)	44 oz (1300 ml)	1.96 oz (58 cc)	1.16 oz (34 cc)

Maintenance Inspections

***DANGER:** The pump contains internal moving parts. DO NOT put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, DO NOT install, clean, service, or repair the pump unless all power is off and locked out.*

Detecting wear in the early stages can reduce repair costs and down time. A simple “look-feel” inspection of the pump during breakdown cleaning is recommended to detect signs of trouble at an early stage.

A detailed maintenance inspection should be scheduled annually. See “Annual Maintenance” on page 27.

Refer to the “Maintenance Inspection Chart” on page 26 for possible causes and solutions to common issues discovered during inspection.

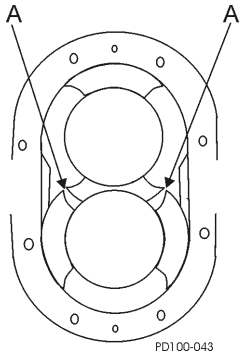


Figure 27 - Rotor to Rotor Tip Clearance

Inspection of Rotor Tips

Remove the cover (see “Remove Cover” on page 28) and check for metal-to-metal contact between the rotor wings. When contact is detected, repair or replace the pump.

Visually inspect the rotors for rotor tip to rotor tip contact and rotor tip to rotor hub contact. Manually rotate the pump drive shaft and ensure that the rotor tip clearance is equal on both sides as indicated in Figure 27.

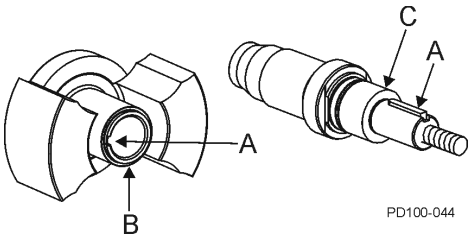


Figure 28 - Rotor and Shaft Inspection

Inspection of Rotor, Shaft Key and Keyway

Visually inspect the rotor, shaft key and rotor keyway (Figure 28, item A) for excessive wear; replace them as necessary.

***NOTE:** The shaft key or keyway should not show signs of wear. The key is not a load-carrying device and is used for proper alignment only. If wear is observed on or near the keyway, this indicates that the rotor nuts may be torqued incorrectly. Torque the rotor nuts to specifications. See Table 6 on page 49.*

Inspection of Shaft

Visually inspect the shaft for twists or bends; replace it as necessary.

Inspection of Rotor Hub End

Visually inspect the rotor hub end (Figure 28, item B) for excessive wear; replace it as necessary. Each time the rotors are removed, replace the o-rings on the hub.

Inspection of Shaft Shoulder

NOTE: *Rotor hub and shaft shoulder wear are caused by operating with a loose rotor nut(s) for extended periods.*

Visually inspect the shaft shoulder (Figure 28, item C) for excessive wear; replace it as necessary. If the shaft shoulder has a sharp edge, remove the edge with a file to prevent cutting the shaft o-ring on installation

Inspection of Gears and Bearings

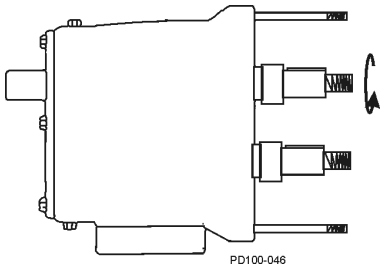


Figure 29 - Backlash Check

Gear backlash

With the fluid head and seals removed, feel for gear backlash by rotating either shaft by hand. The other shaft must engage immediately. Perform this check three times at 60-degree intervals. If play (backlash) is evident, remove the gear case cover, check the gear teeth for wear, and ensure that the gear is not loose on the shaft. If the gear teeth are worn, replace the gears. If the gear is loose on the shaft, inspect the shaft key and keyway; replace as necessary.

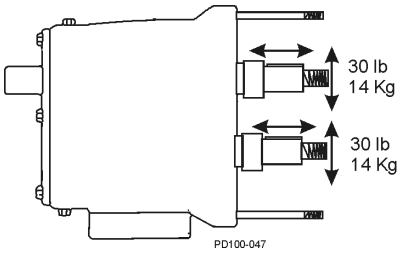


Figure 30 - Bearing Deflection Check

Check bearing condition

With the fluid head and seals removed, check the bearing condition by applying (by hand) an up or down force of approximately 30 lbs (14 kg). If movement is detected, the bearing may be failing. Also check the shaft movement forward or backward. If the bearing is failing, replace the bearing and review the lubrication section starting on page 23.

Maintenance Inspection Chart

Problem	Possible Causes	Possible Solutions
Rotor tip to rotor tip contact or uneven rotor tip to rotor tip clearance.	Hard object jammed into rotors and twisted shafts.	Replace shafts. Install strainers if necessary. Check and replace gears if necessary.
Rotor tip to rotor hub contact.	Loose rotor nut(s). Belleville-style washer(s) on backwards. Backface clearances not even. Bearings need replacing.	Torque rotor nut(s) properly. Install belleville-style washers correctly. Verify backface clearances are even. Check and replace bearings.
Worn rotor or shaft keyway(s). Worn or damaged rotor key(s).	Loose rotor nut(s). Belleville-style washer(s) on backwards.	Replace rotors, shafts and keys. Torque rotor nut(s). See “Torque Values” on page 49. Install belleville-style washer(s) correctly.
Worn rotor hub end or shaft shoulder.	Loose rotor nut(s). Belleville-style washer(s) on backwards. Rotors slammed against shoulder when installed.	Torque rotor nut(s). See “Torque Values” on page 49. Install belleville-style washer(s) correctly. Replace rotors and shafts or shim front bearing(s) to maintain proper backface clearances.
Sharp edged shaft shoulder.	Loose rotor nut(s). Belleville-style washer(s) on backwards. Rotors slammed against shoulder when installed. Backface clearances not even.	Torque rotor nut(s). See “Torque Values” on page 49. Install belleville-style washer(s) correctly. Remove sharp edge with file to prevent cutting shaft o-ring. Verify backface clearances are even.
Gear backlash.	Lack of lubrication. Excessive hydraulic loads. Loose gear locknuts.	Check lubrication level and frequency. Reduce hydraulic loads. Torque locknuts to specified torque values. See “Torque Values” on page 49. Check and replace gears if necessary.
Worn or broken gear teeth.	Lack of lubrication. Excessive hydraulic loads. Loose gear locknuts.	Check lubrication level and frequency. Reduce hydraulic loads. Torque locknuts to specified torque values. See “Torque Values” on page 49. Check and replace gears if necessary.
Loose gears.	Gear locknuts not torqued properly. Locking assembly not torqued properly. Worn gear key.	Torque gear nut to specified torque value. See “Torque Values” on page 49. Check and replace gears if necessary. Inspect gear key, shaft keyway and shaft, replace if necessary.
Loose bearings, axially or radially.	Lack of lubrication. Excessive hydraulic loads. Product or water contamination.	Check lubrication level and frequency. Reduce hydraulic loads. Ensure no excess grease build-up. Replace bearings if necessary.
Damaged front grease seals.	Seal may be old and worn. No grease on lips to lubricate. Shaft worn under seals.	Replace seals. Properly lubricate with grease when installing. Inspect shaft surface under seals.
Damaged rear oil seals.	Seal may be old and worn. No grease on lips to lubricate. Shaft worn under seals. Not centered on shaft when installed.	Replace seals. Properly lubricate with grease when installing. Inspect shaft surface under seals.

Annual Maintenance

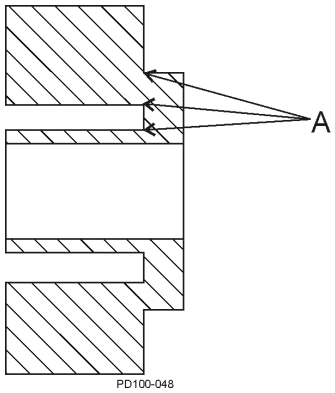


Figure 31 - Rotor Stress Points

DANGER: *The pump contains internal moving parts. DO NOT put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, DO NOT install, clean, service, or repair the pump unless all power is off and locked out.*

At least annually, perform the procedures and corrective measures outlined in "Maintenance Inspections" on page 24, in addition to the following preventive maintenance:

- Check the bearings with a dial indicator for shaft radial play. If the deflection is equal to or greater than the rotor-to-body diametrical clearance ("Checking for Proper Clearance" on page 40), replace the bearings.
- Remove the gear cover and inspect the gears for wear, backlash and looseness. Loosen and torque the gear retaining nuts to the proper torque.
- Thoroughly inspect the rotors for worn keyways, hub wear and stress cracks (Figure 31, item A). Use the dye check method to detect any fatigue-type cracks at rotor stress points.
- Review the performance record on the pump, and check the radial and backface clearances to determine wear and effect on performance. Adjustment to the operating speed can compensate for wear in some applications.

CAUTION: *When bearings or shafts are replaced in the field, take care to correctly position the shaft by shimming it to maintain sufficient running clearances between the rotor wing faces and the pump body faces (backface and cover face). It is important to hold the same backface dimension for both rotors to avoid crossover interference.*

Cleaning

Determine the pump cleaning schedule on-site for materials being processed and plant maintenance schedule. For CIP models, see "CIP (Clean-In-Place) Features" on page 19.

To disassemble the fluid head, see "Fluid Head Disassembly" on page 28. Remove and clean the cover o-ring, pump seals, and the rotor nut assembly. Inspect and replace them as necessary.

NOTE: *Always replace the rotor nut o-rings and rotor hub o-rings when reassembling the pump. If the area behind these seals becomes soiled, contact SPX FLOW Application Engineering for a specific cleaning and sanitizing procedure validated to remove bacteria. If a chlorine solution (200 ppm available chlorine) is used, it should leave no residual deposits which would remain in the pump.*

Also, acid cleaners have a much higher metal corrosion rate and pump parts should remain in acid cleaning solutions no longer than necessary. Any strong inorganic mineral-based acids that are harmful to your hands would be harmful to pump parts. See "Care of Stainless Steel" on page 9.

In applications where material can harden in the pump during shutdown, a CIP cleaning, flush or disassembly of the fluid head and manual cleaning is strongly recommended.

Fluid Head Disassembly

Universal II Wrench Size	
Model	**Cover Nut**
006, 014, 015, 018	5/8"
030, 034, 040	
045, 060, 064, 130, 134	7/8"
180, 184, 220, 224	
210, 213, 214, 320, 323, 324, 370	1"

DANGER: *The pump contains internal moving parts. DO NOT put hands or fingers into the pump body ports or drive area at any time during operation. To avoid serious injury, DO NOT install, clean, service, or repair pump unless all power is off and locked out.*

DANGER: *To avoid serious injury, shut off and drain product from the pump prior to disconnecting the piping.*

Remove Cover

1. Remove the cover nuts (Figure 32, item 11) from the cover (Figure 32, item 1).Using a soft hammer, tap the cover (Figure 32, item 2) off the body studs and dowel pins.
2. Place the cover on a protected surface with the finished surfaces facing up.
3. Remove and inspect the cover o-ring (Figure 32, item 36).

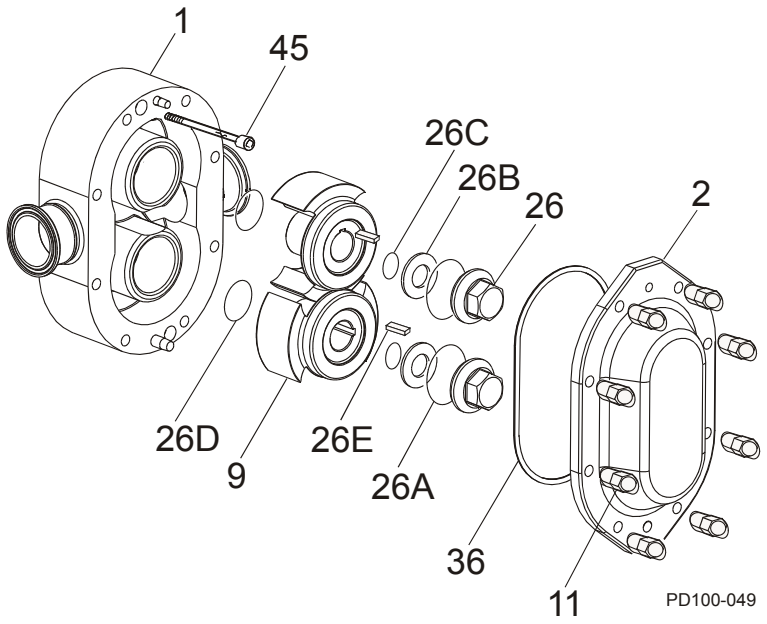


Figure 32 - Exploded View of Fluid Head

1. Body
2. Cover
9. Rotor
11. Cover Nut
26. Rotor Nut
26A. Rotor Nut O-ring*
26B. Belleville-style washer
26C. Retainer O-ring
26D. Rotor O-ring*
36. Cover O-ring
45. Body Retaining Cap Screw

* Discard the o-rings from the rotor and rotor nut; these are intended for one-time use only.

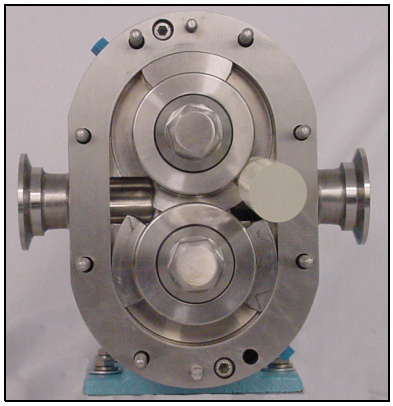


Figure 33 - Loosen Top Rotor

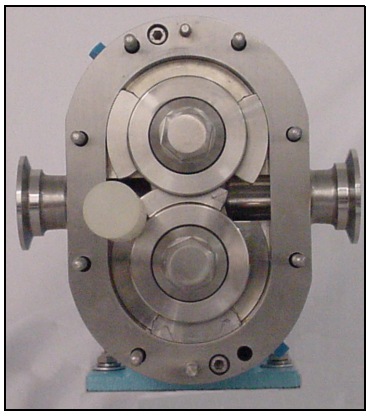


Figure 34 - Loosen Bottom Rotor

Remove Rotor Nut Assemblies

1. Use a blocking dowel to keep the rotors from turning when removing the rotor nuts.

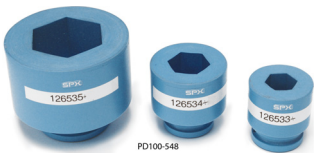
NOTE: *When working on a rotor, always use a dowel to block the rotor against the body, not against the other rotor. See Figure 33 and Figure 34.*

Blocking Dowel Diameter	
UII Model	**Dowel Dia.**
006, 014, 015, 018	.75 in (19 mm)
030, 034, 040	1.00 in (25 mm)
045, 060, 064, 130, 134	1.50 in (38 mm)
180, 184, 220, 224	1.875 in (48 mm)
210, 213, 214, 320, 324, 370	2.00 in (51 mm)

NOTE: *This dowel is not available from SPX FLOW. FDA-approved nylon in these sizes is readily available from supply houses.*

2. Using a wrench, remove the rotor nuts, belleville-style washers, rotor nut o-rings and rotor hub o-rings.:

Non-Marring Socket Tool for Rotor Nuts



Model UII Pumps	Part Number
006, 014, 015, 018	126533+
030, 034, 040	126534+
045, 060, 064, 130, 134	126257+
180, 184, 220, 224	126535+
210, 213, 214, 320, 323, 324	126536+

PL5060-CH116

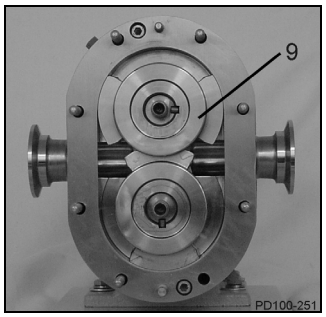


Figure 35 - Remove Overlapping Rotor First

Remove Rotors

Using only your hands, remove the rotor with the hub overlapping the other rotor wing (Figure 35, item 9). Place the rotors in the upturned cover to prevent damage to close-tolerance parts.

If the rotors cannot be removed by hand:

- Use plastic or hardwood dowels to pry out the rotors.
- Remove the body retaining cap screws. Tap the body forward and backward with a soft hammer to loosen the rotors.
- If necessary, use a puller. Use care with the puller or dowels to avoid damaging the rotors.

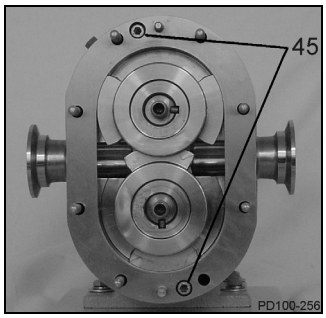


Figure 36 - Location of Cap Screws

Model	Body Retaining Cap Screw
006, 014, 015, 018	3/16"
030, 034, 040	
045, 060, 064, 130, 134	1/4"
180, 184, 220, 224	5/16"
210, 213, 214, 320, 323, 324, 370	

Remove Pump Body

1. Remove the two body retaining cap screws (Figure 36, item 45).
2. Using a plastic mallet, tap the body off the gear case, dowel pins and body studs.
3. Slide the body straight off the body studs to prevent damaging mechanical seal parts.
4. Place the body on a protected surface with seals facing up to protect the seals.

Remove Mechanical Seal

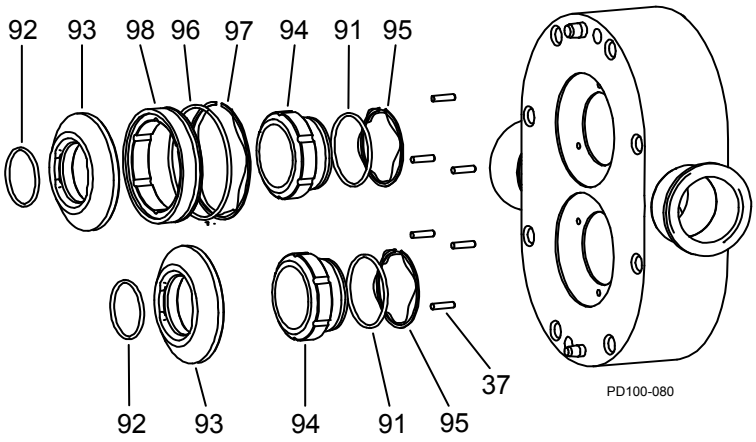


Figure 37 - Single (Bottom) and Double (Top) Mechanical Seal

37. Stop Pin
91. Inner Seal O-ring
92. Shaft O-ring
93. Seal Seat
94. Inner Seal
95. Inner Wave Spring
96. Outer Seal O-ring
97. Outer Wave Spring
98. Outer Seal

1. Remove the stationary seals from the pump body, using care not to damage the seals on the three body pins.
2. Remove the mechanical seal springs and o-rings on the stationary seals.
3. Inspect the three seal body pins for damage and repair or replace them as necessary. If the pins are loose, replace them with new ones.
4. Remove the rotary seal from each shaft. Use caution not to damage the seals during removal. Use a steady, even force behind the seal in multiple locations. After the rotary seals are removed, remove and replace the shaft o-rings. Before installing the new o-rings, inspect the shaft's o-ring groove(s) for damage and repair or replace them if required.
5. Inspect the flats on the shaft shoulder and repair or replace the shafts if required.

Gear Case Disassembly

***DANGER:** To avoid serious injury, DO NOT install, clean, service, or repair the pump unless all power is off and locked out.*

***DANGER:** To avoid serious injury, shut off and drain product from the pump prior to disconnecting piping.*

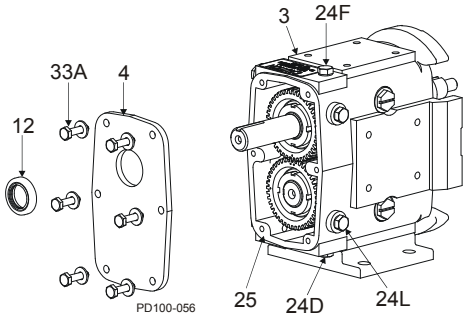


Figure 38 - Remove Gear Case Cover

3. Gear Case
4. Gear Case Cover
12. Oil Seal
24D. Oil Drain Plug
24F. Oil Fill Plug
24L. Oil Level Check Plug, Sight glass
25. Silicone Sealant
33A. Cap Screw

Remove Gear Case Cover

1. Remove the oil drain plug (Figure 38, item 24D); drain the oil.
2. Remove the cap screws from the gear case (Figure 38, item 33A).
3. Pull the cover (item 4) off the shaft extension. If the cover sticks, use a soft hammer to loosen it.
4. Remove the silicone sealant (item 25) from the gear case and cover.
5. Using an arbor press, remove the oil seal (item 12) from the cover. Discard the used oil seal.

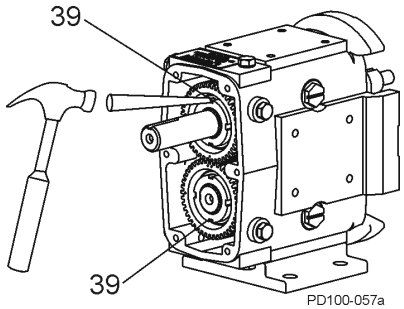


Figure 39 - Straighten Lock Tab on Lock Washers

6. Straighten the tab on the lock washers (Figure 39, item 39).

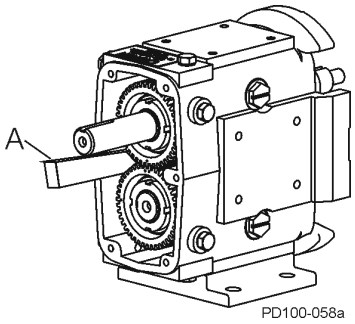


Figure 40 - Block Shaft Rotation

Remove Shaft

1. Prevent the shafts from turning by placing a wedge between the gears (Figure 40, item A). Use a spanner wrench or drift punch to remove the gear lock nut. The gears will be removed later.

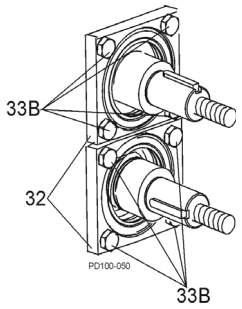


Figure 41 - Remove Bearing Retainers

2. Remove the front bearing retainer screws (Figure 41, item 33B) and pull off the bearing retainers (item 32). (If a retainer is stuck, leave it in place; it will press out when the shaft is removed.)

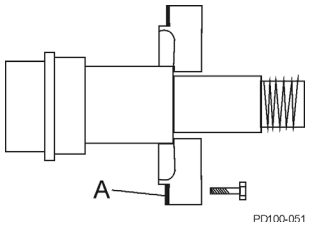


Figure 42 - Remove Sealant from Retainer

3. Remove the silicone sealant (Figure 42, item A) from the bearing retainer and gear case.

NOTE: *Protect the liquid end of the shafts by wrapping them with tape.*

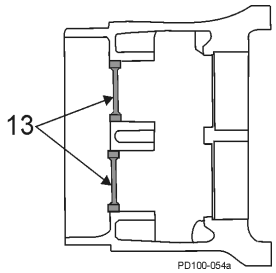


Figure 43 - Remove Rear Oil Seals

4. Place the gear case on an arbor press with the liquid end facing down. Protect the shaft ends with a wood or plastic block (Figure 44, item C) and press the shafts out of the gear case.
5. Remove the gear spacers and gear keys from the shafts.
6. Remove the gears from the gear case.
7. Press out and discard the front bearing seals from the front bearing retainers. Clean and reuse the bearing isolators, if installed.
8. Remove the shims. If the shafts and bearings will be reused, identify the shims and bearings that belong with each shaft.
9. Press out and discard both rear oil seals in the gear case (Figure 43, item 13).

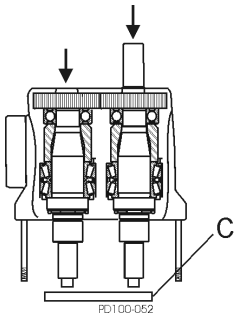


Figure 44 - Press Shafts from Gear Case

10. Use a hydraulic press and V-blocks (Figure 45, item B) to remove the bearings (items 15 and 16) and spacer (item 30)

NOTE: *Make sure both ends of the shaft are protected when removing the shaft.*

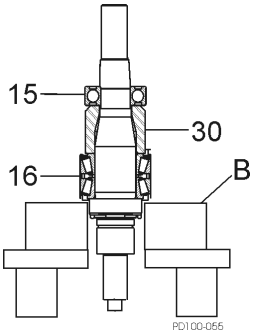


Figure 45 - Remove Bearings From Shaft

Shaft Assembly

NOTE: *SPX FLOW now offers shaft assemblies with pressed-on bearings.* *See page 96.*

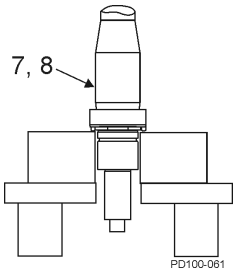


Figure 46 - Grease Shaft

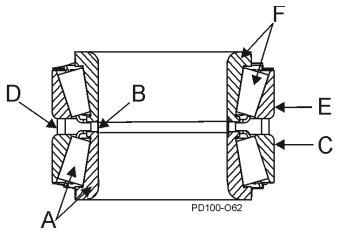


Figure 47 - Bearing assembly

A. Lower Cone / Roller Assembly
B. Inner Spacer
C. Lower Cup
D. Outer Spacer
E. Upper Cup
F. Upper Cone / Roller Assembly

Front Bearing Assembly

SPX FLOW PD Precision Pumps require bearing assemblies with very tight internal tolerances. In fact, the internal tolerances of "off-the-shelf" bearings can be many times larger than required. Although they are considered in-spec in the bearing industry, they can cause internal damage within an SPX FLOW PD Pump.

SPX FLOW's proprietary bearing "MATCHING" process starts with top quality bearing assemblies, then sorts, measures, pairs, grinds and adds spacers to them to ensure the matched bearing sets meet the required tight internal tolerances.

SPX FLOW bearings can be cross-referenced and appear to be the same, but competitive bearings are omitting the Matching process, which is imperative to achieve the required internal tolerances. Once a bearing set is matched, it must remain together as a set for the life of the pump, in order to maintain the tight internal tolerances.

NOTE: *The following instructions cover the assembly of a six-piece front bearing assembly. For a four-piece assembly, only one spacer and cup is used.*

1. Lubricate the front bearing area of the shaft (Figure 46, item 7, 8) with oil or grease. Place it upright in a hydraulic press with the liquid end down.

2. Unwrap the front bearing assembly.

NOTE: DO NOT *interchange the parts of one bearing assembly with another. The parts are precisely matched during manufacturing and must be installed as a matched assembly. See Figure 47.*

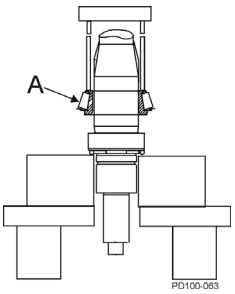


Figure 48 - Press Lower Cone onto Shaft

3. Lift the lower cone and roller assembly (Figure 48, item A) out of the bearing stack and place it on the shaft with the radius facing down. Press it onto the shaft until it is seated against the shaft shoulder. **Press only on the inner cone**.

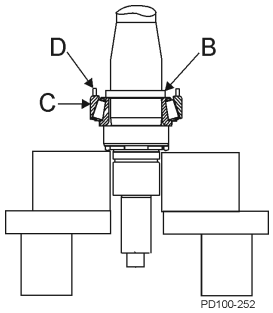


Figure 49 - Install Inner & Outer Spacer and Lower Cup

4. Place the inner spacer (Figure 49, item B) over the shaft onto the lower cone and roller assembly.
5. Place the lower cup (item C) over the lower cone and roller assembly, keeping the cup opening toward the assembly.
6. Place the outer spacer (item D) over the shaft and onto the lower cup.

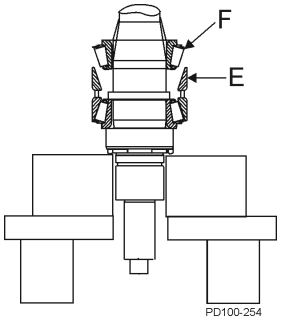


Figure 50 - Install Upper Cup & Upper Cone

7. Place the upper cup (Figure 50, item E) on top of the outer spacer.
8. Lubricate the remaining upper cone and roller assembly (Figure 50, item F) with oil or grease and slip it over the shaft with the roller radius facing up. Press it onto the shaft and into the upper cup.

NOTE: *Make sure all components are aligned before pressing.* ***Press only on the inner cone.***

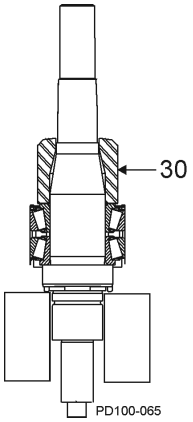


Figure 51 - Install Bearing Spacer

9. Install the bearing spacer (Figure 51, item 30).

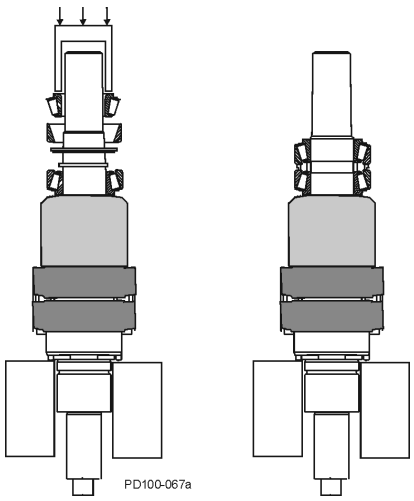


Figure 52 - Rear Tapered Roller Bearing Assembly

Rear Bearing Assembly

Models 006, 014, 015, 018, 030, 034 and 040 use a single ball bearing assembly for the rear bearing. All other models use a tapered roller bearing assembly similar to the front bearings.

NOTE: *PD Pump shaft assemblies with pressed-on bearings are available. See page 96.*

1. Unwrap the rear bearing assembly.

NOTE: DO NOT *interchange the parts of one bearing assembly with another. These parts are precisely matched during manufacturing and must be installed as a matched assembly.*

- **For models with ball bearing assemblies:**
  Lubricate the shaft inner bearing race with oil or grease. Press the bearing into place. The shielded side of the bearing fits against the bearing spacer. Press only on the inner race.
- **For models with tapered roller bearing assemblies:**
  Lubricate the shaft bearing area with oil or grease. Follow the “Front Bearing Assembly” procedures 33.

NOTE: *Heating the bearings is* ***NOT*** *recommended.*
If bearings are heated, do not exceed 300°F (149°C).

Gear Case Assembly

Suggested Shims			
UII Model	**Std Shaft**	**Replace-ment Shaft**	**Shim kit**
006, 014, 015, 018	.113 in (2.87 mm)	.110 in (2.79 mm)	117889+
030, 034, 040	.105 in (2.27 mm)	.102 in (2.59 mm)	117890+
045, 060, 064, 130, 134	.093 in (2.36 mm)	.088 in (2.24 mm)	117891+
180, 184, 220, 224	.115 in (2.92 mm)	.110 in (2.79 mm)	117892+
210, 213, 214, 320, 324, 370	.125 in (3.18 mm)	.120 in (3.05 mm)	117893+

Shimming

1. When installing the shafts in the gear case, shim behind the front bearing to achieve the proper backface clearance between the back of the rotors and the body. The backface clearance must be equal for both rotors to prevent the rotors from hitting each other during operation.

NOTE: *Do not install bearing retainer sealant, gears, or gear locknuts until the correct shimming has been verified.*

2. **If the shafts and/or bearings do not need to be replaced and** the **shims are marked indicating the shaft and bearing they are matched with,** a shim adjustment probably will not be necessary. Reuse the existing tagged shims, shafts and bearings in the same gear case bores.
3. **If existing shims are lost and/or a standard shaft is used,** determine the required shims from the chart.
4. **If it is necessary to calculate the required shims for replacement shafts, bearings or both,** refer to Figure 53 and Figure 54; carry measurements and calculations to three decimal places (i.e. .059).

NOTE: *Arrange with thicker shims on outside of the shim pack.*

5. Determine the shim thickness required for the front bearing:
   - Measure “B” in the gear case and “C” on the shaft (Figure 53).
   - Measure “D” and “E” on the body (Figure 54).
   - Determine the proper backface clearance. Refer to Table 2, “Rotor Clearances,” on page 41.
   - Required Shims = Backface clearance - C + B + D - E.
6. Place the shims in the body, resting against the shoulder in the front bearing bore.

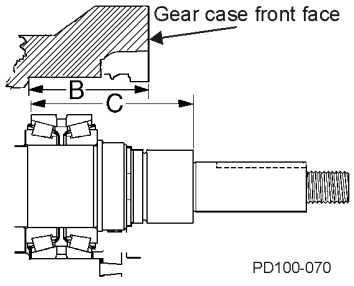


Figure 53 - Measure B and C

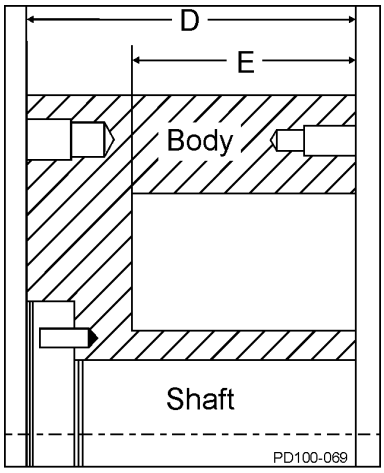


Figure 54 - Measure D and E

B. Front face of gear case to back of bearing bore
C. Shaft shoulder to back of bearing race
D. Body thickness
E. Depth of rotor cavity

Install Shaft

1. With the shims in place, install the shaft assembly in the front bearing bore with the fluid end facing up. Ensure that the shaft is installed in its original location.

NOTE: *The shafts may need to be removed for a final shim adjustment.*

2. Lubricate the outside diameter of the bearing.
3. Press the shaft into place until it is seated against the shim pack. **Press only against the outer race of the bearing.**

NOTE: *A tube of the same diameter as the outer race of the bearing also can be used to press the shaft into place.*

4. Temporarily secure the shaft/bearing in place with bearing retainers to aid in checking the clearances. **DO NOT** install silicone sealant at this time.
5. The bearing retainer must rest firmly against the bearing. Leave a .010 to .050 in (.25 to 1.25 mm) clearance between the back of the bearing retainer and the front of the gear case (Figure 55). If this clearance is not met, place shims between the bearing and retainer.
6. Temporarily mount the body on the gear case.
7. Secure the body to the gear case using the body retaining screws.
8. Install the rotors and rotor nuts. Rotor nut o-rings, belleville-style washers and retainer o-rings are not required at this time.

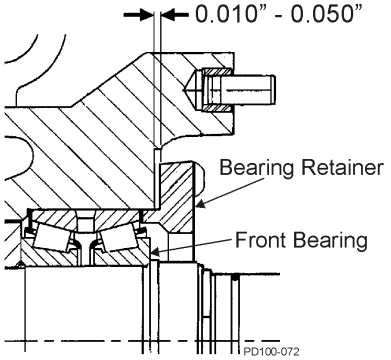


Figure 55 - Bearing Retainer Clearance

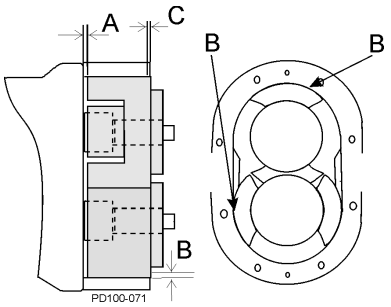


Figure 56 - Measure Clearance

NOTE: *“B” dimension is below the face of the casing.*

9. Measure the rotor backface clearance (Figure 56, item A) through the port or from the front. The backface clearance for both rotors must be the same to prevent rotor crossover contact and must be ±.0005" of the value found in Table 2, “Rotor Clearances,” on page 41.
10. Check the rotor front face clearance (Figure 56, item C).
11. Check the rotor to body clearance (Figure 56, item B).
12. Check the clearances against Table 2, “Rotor Clearances,” on page 41. For other non-standard rotors, check with customer service.

NOTE: *If the process uses special clearance rotors, contact customer service with the serial number of the pump for clearance tolerance values.*

13. If the backface clearance is not met, disassemble the pump and adjust the shimming to achieve the correct backface clearance.
14. If the rotor to body clearance is not met or is uneven, contact SPX FLOW Application Engineering for proper adjustment procedures.
15. After obtaining proper clearance, remove the rotor nuts, rotors, body, and bearing retainers.

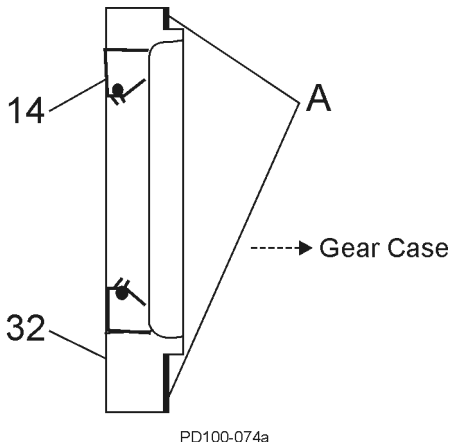


Figure 57 - Install Bearing Retainer

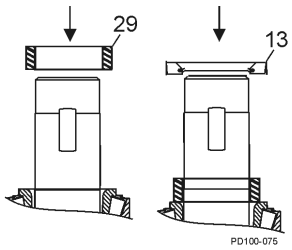


Figure 58 - Install Rear Seal

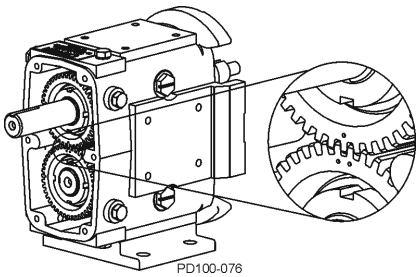


Figure 59 - Timing Gear Marks

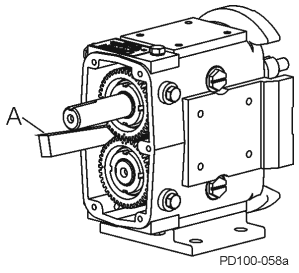


Figure 60 - Block Shaft Rotation

16. Grease the front and rear bearing through the grease fittings until grease is visible around the bearing assemblies. The amount of grease required is listed in “Grease Quantity (per Bearing)” on page 24. Rotate the shafts while greasing to disperse the grease.
17. Lubricate the seal lips and install the grease seals in the bearing retainers (compression spring on inside).
18. Coat the retainer flanges with silicone sealant (Figure 57, item A). (Gore-Tex® sealing tape can be used on silicone free models.) The grease seal (item 14) will be flush with the front of the bearing retainer. On 030 models, the grease seal will be against the step on the inside diameter of the retainer.
19. Install the bearing retainers (Figure 57, item 32).

Install Rear Seal Assembly

NOTE: *Place tape or other material over the shaft end to prevent cutting the seal during installation.*

1. Install the gear spacers (Figure 58, item 29).
2. Lubricate the inside and outside diameters of the oil seals with oil or grease.
3. Install the oil seals with the spring facing out (Figure 58, item 13).

Install Timing Gears

1. Place the gear keys into the shaft key slots. Angle the keys out for easier installation of the gears.

NOTE: *To aid in timing setup, rotate the rotors until they are at right angles to each other before installing the gears.*

2. Slide the spur drive gear onto the drive shaft. The spur drive gear has one punch mark on the gear.
3. Slide the short shaft gear onto the short shaft. The short shaft gear has two punch marks on the gear. Straddle the single punch mark of the spur drive gear with the two punch marks on the short shaft gear (Figure 59).
4. Use a wood or nylon block (Figure 60, item A) to keep the shafts from turning. If a block is not available, use rags to block the gears, or with one rotor on the shaft, block the rotor with a nylon dowel.
5. Slide the lock washers onto the shaft. Lubricate the threaded area on the shafts and face of the locknuts with oil or grease.

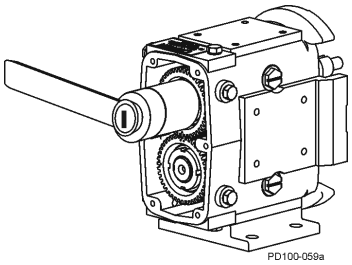


Figure 61 - Install Gear Locknuts

6. Tighten the gear locknuts using a spanner wrench or drift.

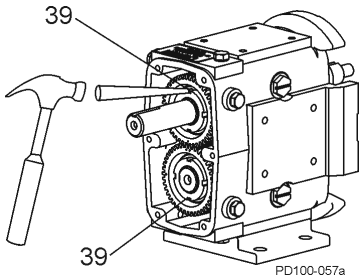


Figure 62 - Bend Lock Tab on Lock washers

7. Bend the locking tab on the lock washers into the locking nut slots, securing the gear locknut into place (Figure 62).

Checking for Proper Clearance

Waukesha Cherry-Burrell brand pumps are designed with close running clearances. Backface clearances are set with shims during assembly.

Shafts are positioned with shims behind the front bearing and locked into gear case with the bearing retainers. Rotors lock against the shaft shoulder. Clearance between the body backface and the back of the rotor wing is called backface clearance.

NOTE: *It is generally best to keep backface clearance to a minimum.*

1. To check backface clearance, first mount the body (less seals) onto the housing. Assemble the rotors and secure them with rotor jam nuts.

⚠ ***CAUTION:*** *Backface clearance for both rotors must be equal to avoid crossover interference with the adjacent rotor hub.*

2. With feeler gauges, measure the rotor backface clearance (Figure 63, item A), through the port or from the front.

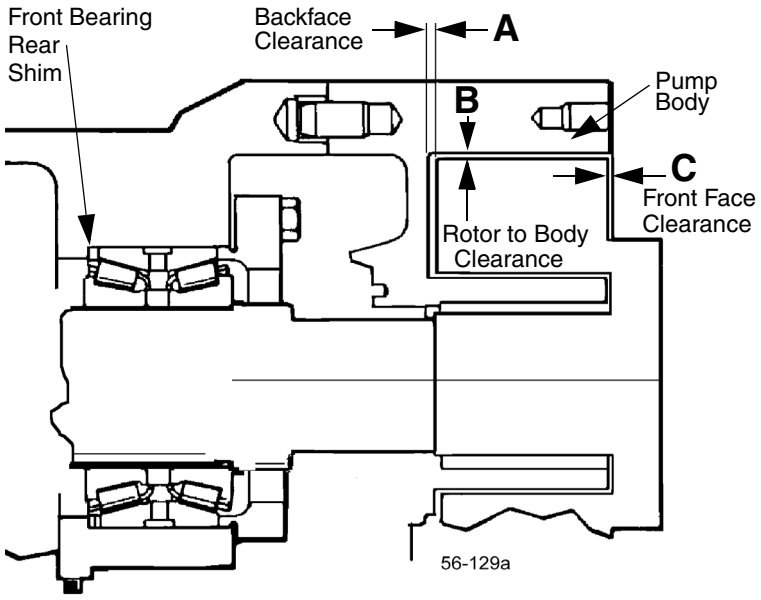


Figure 63 - Clearance Measurements

3. Measure the rotor front face clearance (Figure 63, item C).

4. Measure the rotor to body clearance (Figure 63, item B).

5. Check the measured clearances against Table 2, “Rotor Clearances,” on page 41.

6. Make corrections as required and follow examples in Table 3, “Backface Clearance Corrections,” on page 41, to determine the exact adjustment to make and to avoid unnecessary assembly/disassembly.

7. To make shim adjustments, first remove the rotors, body and shafts. Make the required shim adjustment and reassemble.

8. Re-check the backface clearances. Be sure both rotors have the same clearance to avoid crossover interference with the adjacent rotor hub.

Table 2: Rotor Clearances

Universal II Model	A - Back Face in (mm)		B - Rotor to Body in (mm)		C - Front Face in (mm)	
Rotor Type:	Std & FF	Hot	Std & FF	Hot	Standard	FF & Hot
006	0.0015 - 0.002 (0.04 - 0.05)	0.0015 - 0.002 (0.04 - 0.05)	0.001 - 0.004 (0.03 - 0.10)	0.0025 - 0.0055 (0.06 - 0.14)	0.004 - 0.006 (0.10 - 0.15)	0.0055 - 0.0075 (0.14 - 0.19)
014, 015, 018	0.0015 - 0.002 (0.04 - 0.05)	0.0015 - 0.002 (0.04 - 0.05)	0.001 - 0.004 (0.03 - 0.10)	0.0025 - 0.0055 (0.06 - 0.14)	0.004 - 0.0065 (0.10 - 0.17)	0.006 - 0.0085 (0.15 - 0.22)
030, 034, 040	0.002 - 0.0025 (0.05 - 0.06)	0.002 - 0.0025 (0.05 - 0.06)	0.001 - 0.005 (0.03 - 0.13)	0.0025 - 0.006 (0.06 - 0.15)	0.0035 - 0.006 (0.09 - 0.15)	0.0065 - 0.009 (0.17 - 0.23)
045, 060, 064	0.003 - 0.0035 (0.08 - 0.09)	0.003 - 0.0035 (0.08 - 0.09)	0.003 - 0.0075 (0.08 - 0.19)	0.005 - 0.010 (0.13 - 0.25)	0.0045 - 0.009 (0.11 - 0.23)	0.0085 - 0.014 (0.22 - 0.36)
130, 134	0.003 - 0.0035 (0.08 - 0.09)	0.003 - 0.0035 (0.08 - 0.09)	0.0035 - 0.0075 (0.09 - 0.19)	0.0055 - 0.0095 (0.14 - 0.24)	0.0045 - 0.009 (0.11 - 0.23)	0.009 - 0.015 (0.23 - 0.38)
180, 184, 220, 224	0.004 - 0.005 (0.10 - 0.13)	0.004 - 0.005 (0.10 - 0.13)	0.0055 - 0.0095 (0.14 - 0.24)	0.009 - 0.013 (0.23 - 0.33)	0.005 - 0.010 (0.13 - 0.25)	0.010 - 0.015 (0.25 - 0.38)
210, 213, 214, 320, 323, 324	0.005 - 0.006 (0.13 - 0.15)	0.005 - 0.006 (0.13 - 0.15)	0.008 - 0.012 (0.20 - 0.30)	0.010 - 0.014 (0.25 - 0.36)	0.007 - 0.012 (0.18 - 0.30)	0.013 - 0.018 (0.33 - 0.46)
370	0.005 - 0.006 (0.13 - 0.15)	0.005 - 0.006 (0.13 - 0.15)	0.009 - 0.013 (0.23 - 0.33)	0.011 - 0.015 (0.28 - 0.38)	0.007 - 0.012 (0.18 - 0.30)	0.013 - 0.018 (0.33 - 0.46)

Std = Standard Clearance Rotors; FF = Front Faced Clearance Rotors; Hot = Hot Clearance Rotors PD100-600a

Standard Rotors: -40°F (-40°C) to 180°F (82°C); FF Clearance Rotors: 180°F (82°C) to 200°F (93°C); Hot Clearance Rotors: -40°F (-40°C) to 300°F (149°C). Contact SPX FLOW Application Engineering if alternate rotors are needed. ***NOTE:*** *The assembly clearances stated above are for reference only. Actual pump clearances may vary based on pump performance testing*

Table 3: Backface Clearance Corrections

Problem	Condition	Correction
Too Much Backface Clearance (A)	Dimension A is greater than the value in Table 2.	A (measured) minus Column A (Table 2) = shims to remove from the rear outer race of the front bearing
	Rotor wing face projects past the body front face	C (measured with depth micrometer) plus C (Table 2) = shims to remove from the rear of the front bearing
Not Enough Backface Clearance (A)	Dimension A is less than the value in Table 2.	Column A (Table 2) minus A (measured) = shims to add to the rear outer race of the front bearing

NOTE: *If the clearance corrections in Table 3 have been performed and desired performance is not achieved, contact SPX FLOW technical services for guidance.*

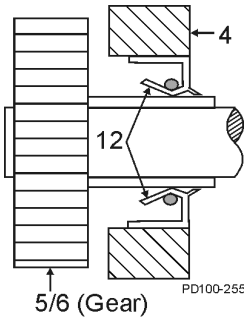


Figure 64 - Orientation of Oil Seal

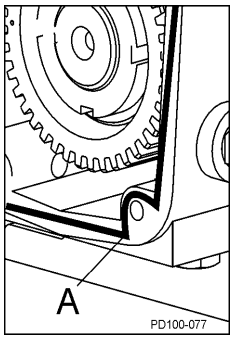


Figure 65 Sealant Placement

Install Gear Case Cover

1. Lubricate the inside diameter of a new oil seal.
2. Press the new oil seal (Figure 64, item 12) into the gear case cover (item 4) flush with the outside face, with the spring facing in.
3. Apply silicone sealant to the back of the gear case. (Gore-Tex® sealing tape can be used on silicone-free models.) Place tape on the inside of the screw holes. (Figure 65, item A).
4. Tape the shaft end to prevent cutting the seal on the keyway. Mount the cover assembly on the gear case. Secure it with cap screws and washers.
5. Remove the tape from the shaft end.

NOTE: *Make sure that the shaft is centered in the lip seal before securing the cap screws.*

6. Install the oil drain plug.
7. Fill gear case with gear oil to proper level. Refer to “Lubrication” on page 23.

Fluid Head Assembly

Install Mechanical Seal

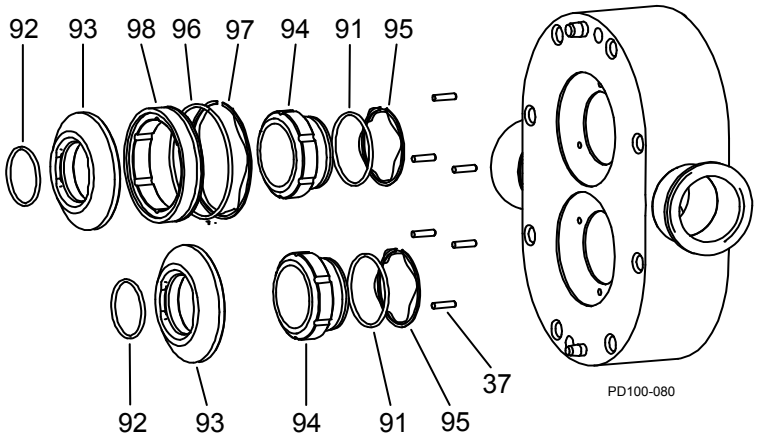


Figure 66 - Single (Bottom) and Double (Top) Mechanical Seal

37. Stop Pin
91. Inner Seal O-ring
92. Shaft O-ring
93. Seal Seat
94. Inner Seal
95. Inner Wave Spring
96. Outer Seal O-ring
97. Outer Wave Spring
98. Outer Seal

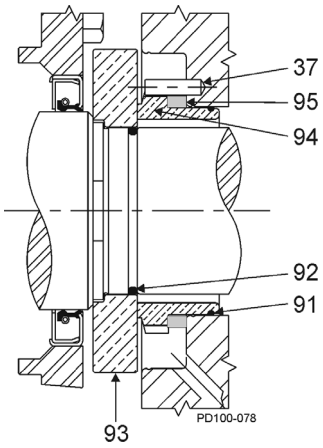


Figure 67 - Single Mechanical Seal

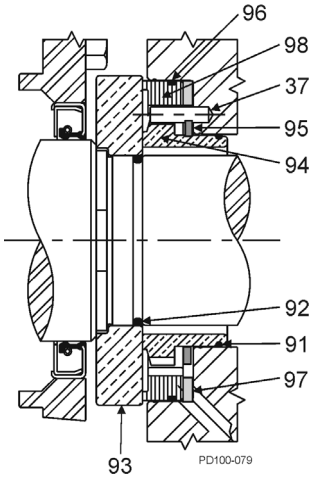


Figure 68 - Double Mechanical Seal

1. Lubricate the shaft o-ring (Figure 67, item 92) with a lubrication compound compatible with the o-ring material and process fluid(s). Place the o-ring on the shaft.
2. Install the rotating seal seat (item 93) on the shaft. Align the drive flats on the seat with the drive flats on the shaft.
3. Push the seat squarely against the shaft shoulder.
4. Install the inner wave spring (item 95) onto the inner seal (item 94).
5. Lubricate the inner seal o-ring (item 91) with a lubrication compound compatible with the o-ring material and process fluid(s). Install the inner seal o-ring into the groove of the inner seal.
6. Place the inner seal into the back of the pump body. Ensure that the notches are aligned in the inner seal with the stop pins in the body. Press firmly and evenly into place.
7. If a double mechanical seal is used, install the outer wave spring (Figure 68, item 97) in the body and the outer o-ring (item 96) in the outer seal groove (item 98). Place the outer seal in the pump body around the inner seal, aligning the notches in the outer seal with the stop pins in the body.
8. Inspect the seal faces for cleanliness. Ensure that the faces have no nicks or scratches. Lubricate the seal faces with a lubricant compatible with the process fluid(s).
9. Perform steps 1 through 5 on both shafts.

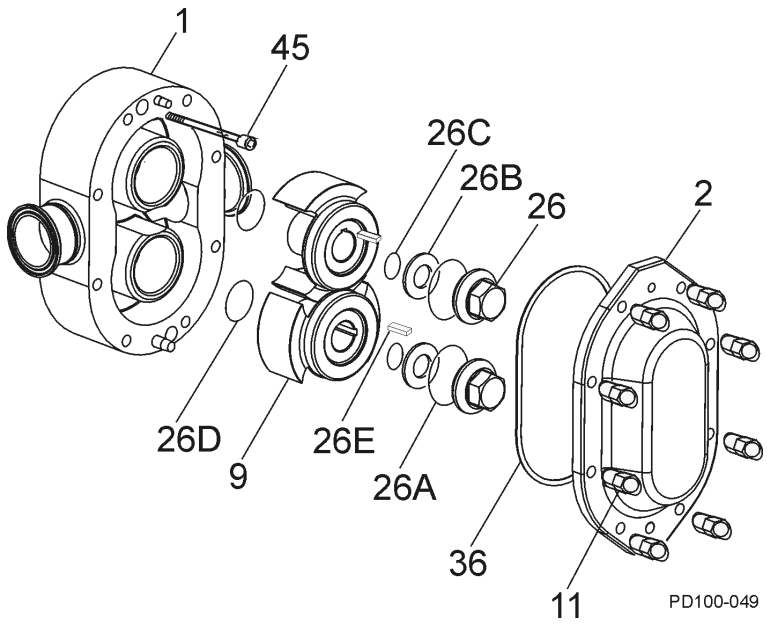


Figure 69 - Exploded View of Fluid Head

1. Body	26B. Belleville-style Washer
2. Cover	26C. Retainer O-ring
9. Rotor	26D. Rotor Hub O-ring*
11. Cover Nut	26E. Rotor Key
26. Rotor Nut	36. Cover O-ring
26A. Rotor Nut O-ring*	45. Body Retaining Cap Screw

* Discard rotor nut and rotor hub o-rings; these are one-time use only.

Install Pump Body

1. Match the large and small dowel pin sizes on the pump body with the dowel pin holes in the pump gear case.
2. Install the body (Figure 69, item 1) to the gear case assembly, aligning the body with the body studs. Avoid damaging the seals as the body is drawn over the shafts.
3. Secure the body to the gear case using two cap screws (Figure 69, item 45).

Install Rotors

1. Lubricate the rotor hub o-ring (Figure 69, item 26D) with a lubrication compound compatible with the o-ring material and process fluid(s).
2. Install new rotor hub o-rings (item 26D) into the groove on the rotor hubs.
3. Install the rotors (item 9) onto the shafts.
4. Align the keyways in the rotors with the keyways on the shafts and install the keys (item 26E).

NOTE: *For rotor nut assembly detail, including orientation of the belleville-style washer (item 26B), see Figure 70 and Figure 71 on page 45.*

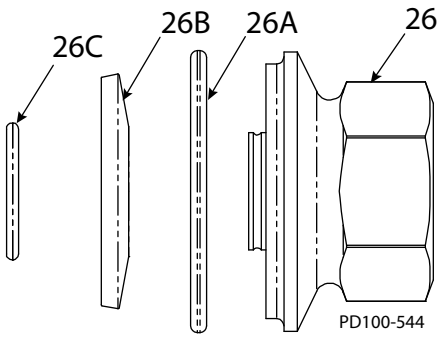


Figure 70 - Detail View of Rotor Nut Assembly

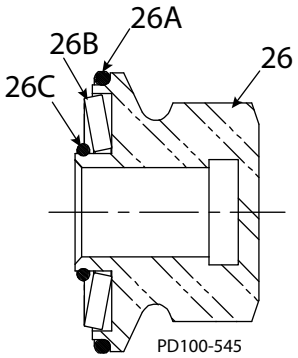


Figure 71 - Cross-Section View of Rotor Nut Assembly, as Assembled

Install Rotor Nut Assemblies

See Figure 69 on page 44, and Figure 70 and Figure 71 on this page.

1. Install a belleville-style washer (item 26B) into the rotor nut (26) with the raised side of the washer facing **toward** the rotor nut.
2. Place the retainer o-ring (item 26C) into the rotor nut to retain the belleville-style washer. The washer should **not** be tight against the o-ring.
3. Lubricate a new rotor nut o-ring (item 26A) with a lubrication compound compatible with the o-ring material and process fluid(s). If the o-ring is not lubricated, it will pucker when tightening the rotor nut.
4. Install the rotor nut o-ring onto the rotor nut.
5. Prior to assembling the rotor nuts, apply an anti-seize compound to the shaft threads.
6. Use a blocking dowel to prevent the rotors from turning during installation. See “Blocking Dowel Diameter” on page 29 for rotor blocking dowel size.

NOTE: *Always use a dowel to block the rotor against the body, not against the other rotor.*

7. Screw the rotor nuts (item 26) onto the shafts (clockwise) and tighten them to the required torque.

CAUTION: *Use a torque wrench to tighten the rotor nuts to proper torque. (See page 49 for torque values.) Failure to tighten nuts properly could result in the nuts loosening during operation, causing damage to the pump.*

Install Cover

1. Clean the cover o-ring (See Figure 69 on page 44, item 36) and install it in the groove in the cover.
2. Match the large and small dowel pin sizes on the pump body with the dowel pin holes in the cover.
3. Install the cover (See Figure 69 on page 44, item 2) on the pump body.
4. Prior to assembling the cover nuts, apply an anti-seize compound compatible with the product to the threads of the body studs.
5. Tighten the cover securely using the cover nuts (See Figure 69 on page 44, item 11). *(See page 49 for torque values)*

CAUTION: *Failure to tighten the cover nuts to the proper torque (See page 49) could cause the body studs to fail prematurely under high pressure.*

CAUTION: *If a double seal arrangement is used, the seals must be provided with a clean, compatible barrier fluid. Make certain that the flush ports in the pump body are clean and clear.*

Relief Cover Option (Vented Cover)

The optional Relief Cover Feature (also called Vented Cover) is an adjustable, internal by-pass arrangement which can be used for control of the pressure and/or flow. It is bidirectional; that is, the pump flow or rotation can be in either direction.

This option does not provide full flow relief for all pumping situations.
The pressure downstream of the pump may increase with increasing amount of by-pass through the Relief Cover. Actual downstream pressure will depend on the pump speed, product viscosity, and the relief set point (spring adjustment or air pressure). Avoid high flow rates through the cover with high viscosity products. The resulting pressure may be greater than the maximum rating of the pump or other system components. Install a pressure gauge and measure the pressure under the worst conditions of maximum flow and maximum viscosity to determine the maximum pressure for your process. **Under any conditions, if there is a complete flow shut off downstream, stop the pump as soon as possible.** Continued pump operation with the entire flow by-passing will rapidly build heat within the pump body. Contact SPX FLOW Application Engineering for assistance.

NOTE: *The vented cover is not CIP-able. It must be manually disassembled for cleaning.*

Three types of Relief Covers are available:

Manual

By-pass pressure is adjusted by a threaded adjusting screw (2) which compresses a spring (5). Several spring sizes are available, to cover a range of operating pressures.

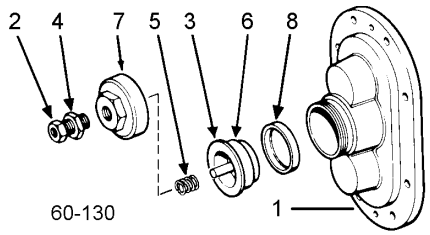


Figure 72 - Manual Vented Cover

Pneumatic Diaphragm

By-pass pressure is adjusted by regulated air or gas pressure, operating on the side of a diaphragm (9) opposite the pumped fluid.

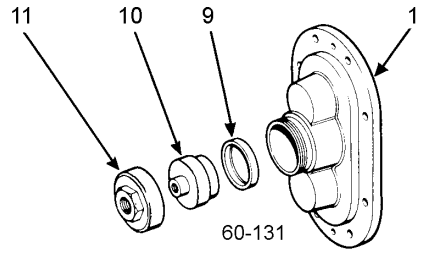


Figure 73 - Pneumatic Vented Cover

Pneumatic Piston

By-pass pressure is adjusted by regulated air or gas pressure, operating on the side of a metal piston (12), opposite the pumped fluid. An extended pressure range is possible.

NOTE: *On all types of relief covers, the temperature and chemical resistance of the elastomer diaphragms and O-rings determine the useful range:*
Buna-N: Material supplied as standard
Silicone Rubber: Optional material upon request

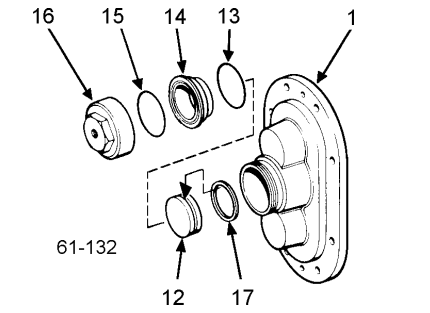


Figure 74 - Piston Vented Cover

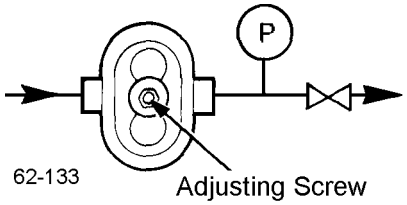


Figure 75 - Manual Adjustment

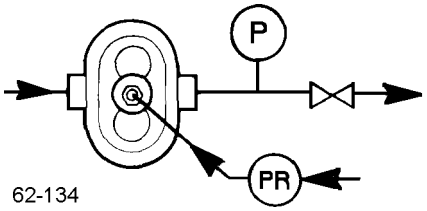


Figure 76 - Adjustment with a Pressure Gauge

Installation Adjustment

Manual

Turn the adjusting screw counterclockwise to its farthest position, then clockwise until a light spring pressure is felt.

Pneumatic Diaphragm

1. Set air/gas pressure to 2-5 psig.
2. Turn on the pump.

   A. With the pressure gauge and valve in the discharge line:

      - Close the discharge valve.
      - Turn the adjusting screw clockwise until the desired relief pressure registers on the gauge. Lock the adjusting screw with a lock nut.
      - Open the valve in the discharge line. The relief cover is set and will open if the system pressure exceeds the preset limit.

   B. Without a pressure gauge in the discharge line:

      - Turn the adjusting screw clockwise and observe the product flow at the discharge of the system.

When the product flow reaches the maximum or desired flow rate, lock the adjusting screw with a lock nut.

Pneumatic Piston

1. With a pressure gauge and valve in the discharge line:

   - Close the discharge valve slowly and observe the gauge pressure. **DO NOT ALLOW PRESSURE TO EXCEED 200 psi.**
   - Increase the air/gas pressure, until the desired relief pressure registers on the gauge. Lock the air/gas pressure regulator adjusting screw with a lock nut.
   - Open the valve in the discharge line.The relief cover is set and will open if the system pressure exceeds the preset limit.

2. Without a pressure gauge in the discharge line:

   - With a regulator, increase the air/gas pressure to the relief valve and observe the product flow at the discharge of the system.

When the product flow reaches a maximum or desired flow rate, lock the regulator adjusting screw with a lock nut.

Jacketed Cover

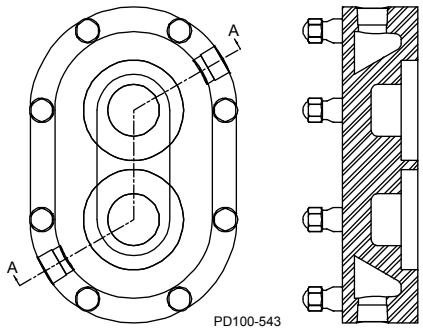


Figure 77 - Jacketed Cover

Table 4: Pipe Tap

Model Number	Pipe Tap
006, 014, 015, 018, 030, 034, 040	3/4"
045, 060, 064, 130, 134, 180, 184, 220, 224, 210, 213, 214, 320, 323, 370	1"

The jacketed cover is designed to allow circulation of a heating or cooling medium. The purpose is to help preheat or cool the pumping head and sustain operating temperature during short shutdown periods. It should not be used as a heat exchanger to control pumping temperature during operation. The temperature rating is dependent on the rotor selection. See Table 2, “Rotor Clearances,” on page 41.

NOTE: *Pressure limit for cover media is 60 PSI.*

NOTE: *Jacketed covers require longer mounting studs in the gear case.*

Low Pressure Flush

1. Set flow rate of approximately 1/4 GPM for most applications. For high temperature applications, increase flow. (See “Universal II High-Pressure Barrier (HPB) Seals” on page 18.)

2. The flush media (water or lubricating fluid compatible with the product) must be connected and flowing whenever the pump is operated. Flushing media is restricted on the inlet side and has free flow to drain on the outlet side.

3. Typical flushing connections are 1/8" NPT female pipe taps.

See also “Seal Flush Connections” on page 17 and “Universal II High-Pressure Barrier (HPB) Seals” on page 18.

Flushing Connection - Aseptic Series

All connections are 1/8" female pipe taps. The pump has double "barriers" or seals at every opening to the pump chamber. Live steam or a sterile fluid is circulated between these double seals at the ports, in the cover and at the shaft seals.

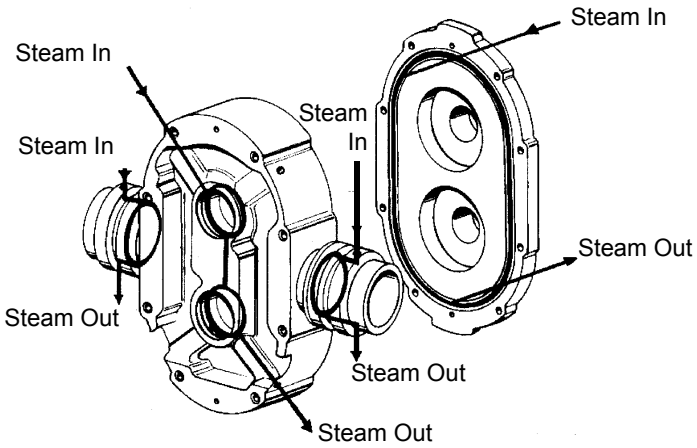


Figure 78 - Flushing Connection - Aseptic Series

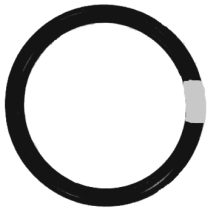
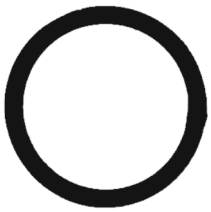
Reference Tables

Table 5: Universal II Wrench Size			
Model	**Rotor Nut**	**Body Retaining Cap Screw**	**Cover Nut**
006, 014, 015, 018	15/16"	3/16"	5/8"
030, 034, 040	1-1/4"		
045, 060, 064, 130, 134	1-5/8"	1/4"	7/8"
180, 184, 220, 224	2-1/4"	5/16"	
210, 213, 214, 320, 323, 324, 370	2-3/8"		1"

Table 6: Torque Values				
Model	**Gear Nut**	**Rotor Nut**	**Cover Nut**	**Gear Nut Driver Tool**
006, 015, 018	75 ft lbs 102 N·m	50 ft lbs 68 N·m	7 ft lbs 10 N·m	109281+
030, 040	100 ft lbs 136 N·m	120 ft lbs 163 N·m	11 ft lbs 15 N·m	109282+
045, 060	140 ft lbs 190 N·m	250 ft lbs 339 N·m	56 ft lbs 76 N·m	109283+
130			25 ft lbs 34 N·m	
180, 220	230 ft lbs 312 N·m	325 ft lbs 441 N·m	110 ft lbs 149 N·m	110304+
210, 213, 320, 323, 370	320 ft lbs 434 N·m	375 ft lbs 508 N·m	158 ft lbs 214 N·m	114702+

Table 7: Arbor or Hydraulic Press Tonnage (Approximate)						
Model	**Shaft**		**Front Bearing**		**Rear Bearing**	
	IN	OUT	ON	OFF	ON	OFF
006, 014, 015, 018	.25	.50	.50	1.00	.50	1.00
030, 034, 040	.25	1.00	.50	1.00	.50	1.00
045, 060, 064, 130, 134	.50	1.00	2.00	5.00	3.00	5.00
180, 184, 220, 224	.50	1.00	5.00	15.00	5.00	15.00
210, 213, 214, 320, 323, 324, 370	.50	1.00	5.00	2.00	5.00	2.00

Table 8: Standard O-Ring Selections, Descriptions and Color Codes for WCB Brand Pumps

Nitrile (Buna-N) (NBR) Compound Color: Black Color Code: Yellow FDA Compliant to 21CFR177.2600 3A Sanitary 	Silicone (Si) Compound Color: Orange Color Code: Black FDA Compliant to 21CFR177.2600 3A Sanitary 
Ethylene Propylene Diene Rubber (EPDM) Compound Color: Black or Purple Color Code: Green FDA Compliant to 21CFR177.2600 	Perfluoroelastomer (FFKM) Compound Color: Black Color Code: None Individually packaged with size and material noted. 
Ethylene Propylene Diene Rubber (Sulfur Free) (EPDM) Compound Color: Black or Purple Color Code: Blue FDA Compliant to 21CFR177.2600 	PTFE Encapsulated Compound Color: Translucent coating over Orange or Black Silicone or FKM core Color Code: None FDA Compliant to 21CFR177.2600 
Fluorocarbon Rubber (FKM) Compound Color: Rust, Brown or Black Color Code: White FDA Compliant to 21CFR177.2600 3A Sanitary 	

Troubleshooting

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
No flow, pump rotors are not turning	Drive motor not running.	Check resets, fuses, circuit breakers.
	Keys sheared or missing.	Replace.
	Drive belts, power transmission components slipping or broken.	Replace or adjust.
	Pump shaft, keys, or gears sheared.	Inspect: and replace parts as necessary.
No flow, pump rotors are turning	Rotors turn in the wrong direction.	Check motor hookup to reverse motor rotation.
	Relief valve not properly adjusted, or held open by foreign material.	Adjust or clear valve.
	Suction port is blocked, not allowing flow to the pump.	Check all inlet valves, strainers, tank outlet ports.
No flow, pump not priming	Valve closed in inlet line.	Open valve.
	Inlet line clogged or restricted.	Clear line, clean filters, etc.
	Air leaks due to bad gaskets or pipe connections.	Replace gaskets; check lines for leakage (can be done by air pressure or by filling with liquid and pressurizing with air).
	Pump speed too slow.	Increase pump speed.
	Pump speed too fast for high-viscosity liquid.	Decrease pump speed.
	Liquid drains or siphons from system during off periods.	Use foot valve or check valves. Filling inlet lines with material before startup may solve startup priming problems due to no material in system.
	"Air" lock caused by fluids which "gas off", or vaporize, or allow gas to come out of solution during off periods.	Install and use a manual or automatic air bleed from pump or lines near pump.
	Extra clearance rotors, worn pump.	Increase pump speed, use foot valve to improve priming.
		Replace worn rotors.
	Net inlet pressure available too low.	Check Net Inlet Pressure Available & Net Inlet Pressure Required. Change inlet system as needed.

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
No flow, pump not priming, cont'd	On "Vacuum" inlet system: On initial start-up, atmospheric "blow back" prevents pump from developing enough differential pressure to start flow.	Install check valve in discharge line.
Insufficient flow	Speed too low or too high to obtain desired flow.	Check flow-speed curve (available from SPX FLOW website) and adjust as necessary.
	Air leak due to bad seals, pipe connections, or other equipment.	Replace seals, check inlet fittings.
Insufficient flow—flow being bypassed somewhere	Flow diverted in branch line, open valve, etc.	Check system and controls
	Relief valve not adjusted or jammed.	Clear or adjust valve.
Insufficient flow—high slip	Hot (HC) or extra clearance rotors on "cold" fluid and/or low viscosity fluid.	Replace with standard clearance rotors.
	Worn pump.	Increase pump speed (within limits). Replace rotors, have pump remanufactured.
	High pressure.	Reduce pressure by adjusting system settings or hardware.
Fluid vaporization ("starved" pump inlet)	Strainers, foot valves, inlet fittings or lines clogged.	Clear lines. If problem continues, inlet system may require changing.
	Inlet line size too small, inlet line too long. Too many fittings or valves. Foot valve, strainers too small.	Increase inlet line size. Reduce length, minimize direction and size changes, reduce number of fittings.
	NIPA - Net Inlet Pressure Available at Pump is too low.	Raise liquid level in source tank to increase Net Inlet Pressure (NIPA).
		Increase Net Inlet Pressure Available at Pump by raising or pressurizing source tank.
		Select larger pump size with lower Net Inlet Pressure Required.
	Fluid viscosity greater than expected.	Reduce pump speed and accept lower flow, or change system to reduce line losses.
		Change temperature of product to reduce viscosity.

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
Fluid vaporization, cont'd	Fluid temperature higher than expected (vapor pressure higher).	Reduce temperature, reduce speed and accept lower flow or change system to increase Net Inlet Pressure Available.
Noisy operation	**Cavitation**	
	High fluid viscosity. High vapor pressure fluid. High temperature.	Slow down pump, reduce temperature, change system setup.
	Net Inlet Pressure Available less than Net Inlet Pressure Required.	Increase NIPA - Net Inlet Pressure Required or reduce NIPR - Net Inlet Pressure Required. Contact SPX FLOW if necessary.
	Air or gas in fluid	
	Leaks in the pump or piping.	Correct leaks.
	Dissolved gas or naturally aerated products.	Minimize discharge pressure (also see "Cavitation," above).
Noisy operation caused by mechanical problems	**Rotor to body contact**	
	Improper assembly of pump.	Check clearances and adjust shimming.
	Distortion of pump due to improper piping installation.	Change piping installation to eliminate piping stress and distortion on body.
	Pressures required higher than the pump is rated for.	Reduce discharge pressure required.
	Worn bearings.	Rebuild with new bearings and lubricate regularly.
	Rotor to Rotor Contact	
	Loose or incorrectly-timed gears.	This has caused severe damage to components - rebuild with new parts.
	Sheared keys.	This has caused severe damage to components - rebuild with new parts.
	Worn gear splines.	This has caused severe damage to components - rebuild with new parts.
	Drive noise caused by gear trains, chains, couplings, bearings.	Repair or replace drive parts. Check bearings for damage and replace as necessary.

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
Pump requires excessive power (overheats, stalls, high current draw, breakers trip)	Higher than expected viscosity losses.	If within pump rating, increase drive size.
	Higher than expected pressures.	Reduce pump speed. Increase line sizes.
	Fluid is colder with a higher viscosity than expected.	Heat fluid, insulate lines or heat trace lines.
		Increase line sizes.
	Fluid sets in line and pump during shutdown.	Insulate lines or heat trace lines.
		Install a “soft start” drive.
		Install a recirculating bypass system.
		Flush system with a nonsetting fluid.
	Fluid builds up on pump surfaces.	Replace the pump with more running clearances.
Short pump service life	Pumping abrasives	Larger pumps at slower speeds.
	Speeds and pressures higher than rated.	Reduce speeds and pressures by making changes in the system.
		Replace pump with a larger model with higher pressure ratings.
	Worn bearings and gears due to lack of lubrication.	Check and replace bearing and gears as necessary. Adjust lubrication schedule to decrease time between lubrication.
		Modify external wash down method to reduce water entering into gear case.
	Misalignment of drive and piping. (Excessive overhung load or misaligned couplings.)	Check alignment of piping and drive. Adjust as necessary.

Long Term Storage

Long-term storage (greater than six months) of Waukesha Cherry-Burrell brand pumps

Before Storage

1. Lubricate all bearings and seals, including:
   - Rubber o-rings and mechanical seal faces (new pump bearings installed from the factory are already lubricated).
   - Motors and drives (see manufacturer's instructions)
2. Be sure the pump contains no water. Make sure to disassemble the wet end and wipe it dry if necessary.
3. Use rust inhibitor on any exposed metal surfaces:
   - Any unpainted surfaces
   - Shafts, nuts/bolts
4. Cover the inlet/outlet connections of the pumps to keep out foreign materials.
5. Put all related instruction manuals in a separate water tight envelope or container and store them with the equipment.
6. Completely enclose the equipment to prevent contamination from moisture, dust and other possible contaminants. Certain types of plastic wrap materials, when properly used, make excellent storage enclosures.
7. Rotate the pump and drive shafts several turns every 3 months.

Storage

1. Store in a dry location. Indoor storage is preferred. If stored outdoors, the equipment must be in a weather-tight enclosure and shielded from direct sunlight.
2. Maintain even temperatures to prevent condensation.

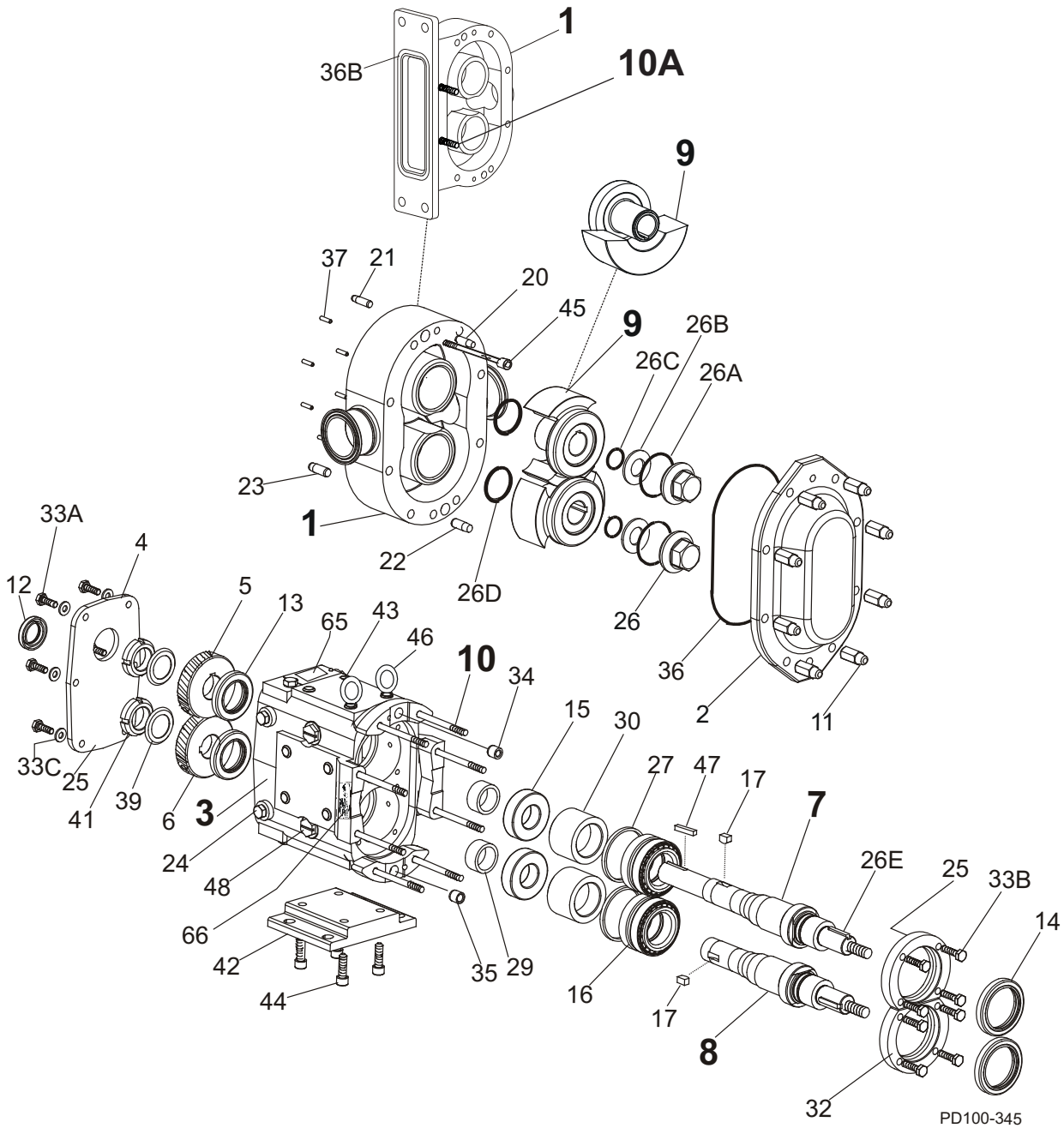
After Storage

NOTE: *Do not start the motor if there is any indication of water contamination. Have the motor checked by a qualified electrician before starting.*

1. Remove the equipment from the enclosure and repair or replace any damaged items before using equipment.
2. Check the electric motor (if applicable) per the manufacturer's instructions.
3. Pumps:
   - Completely disassemble the product contact liquid end per the instruction manual.
   - Clean and inspect all parts, including seals and o-rings.
   - Replace rubber parts with any sign of age or damage, such as cracks, taking a set, or loss of elasticity.
4. Lubricate the seal and o-rings and reassemble the liquid end per the instruction manual.
5. Purge pump bearings with fresh grease.
6. Lubricate the motor/drive (if applicable) per the manufacturer's instructions.
7. If the pump has been in storage longer than 1 year, change the oil in the pump and driver.

Parts List

006, 014, 015, 018-UII Pump Parts



006, 014, 015, 018-UII Pump Parts

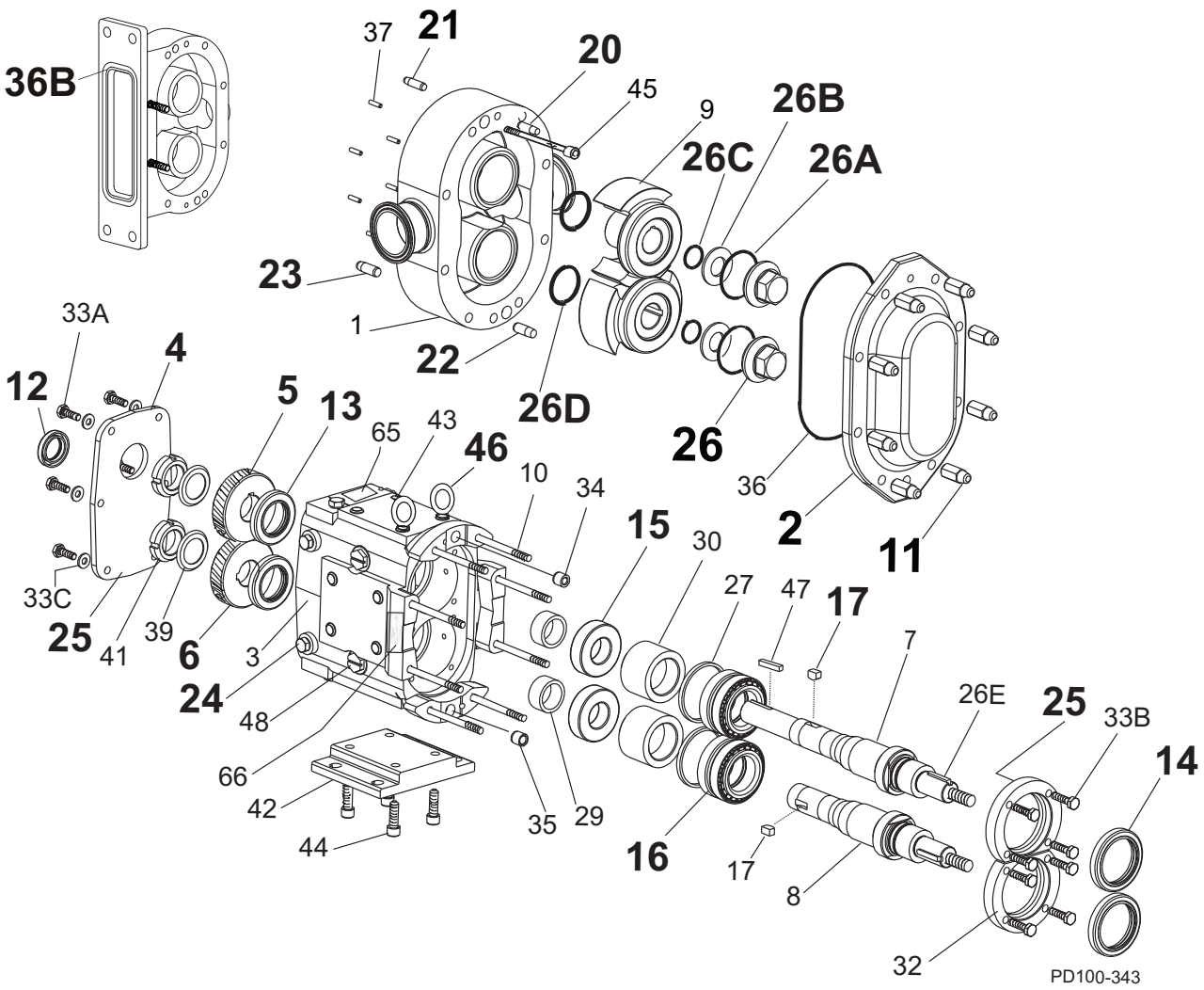
ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
1	006-UII Pump Body	1	See Note 1	1
	006-UII Pump Body with Flush	1	See Note 1	1
	014-UII Rectangulary Flange Inlet Body	1	See Note 1	1
	014-UII Rect. Flange Inlet Body with Flush	1	See Note 1	1
	015-UII Pump Body	1	See Note 1	1
	015-UII Pump Body with Flush	1	See Note 1	1
	018-UII Pump Body	1	See Note 1	1
	018-UII Pump Body with Flush	1	See Note 1	1
3	Gear Case Assembly, CI, Model 006/015	1	102901-C	3
	Gear Case Assembly, SS; Model 006/015 (Optional)	1	102905-C	3
	Gear Case Assembly, CI, Model 018	1	102907-C	3
	Gear Case Assembly, SS; Model 018 (Optional)	1	102911-C	3
7	006-014-015-UII Drive Shaft	1	108405+	43, 47
	018-UII Drive Shaft	1	108407+	43, 47
8	006-014-015-UII Short Shaft	1	108406+	47
	018-UII Short Shaft	1	108408+	47
9	006-UII Rotor, Twin Wing, Alloy 88	2	101870+	2
	006-UII Rotor, Twin Wing, 316SS	2	102199+	2
	014-015-UII Rotor, Twin Wing, Alloy 88	2	101882+	2
	014-015-UII Rotor, Twin Wing, 316SS	2	102205+	2
	015-UII Rotor, Single Wing, Alloy 88	2	117060+	2, 13
	018-UII Rotor, Twin Wing, Alloy 88	2	101894+	2
	018-UII Rotor, Twin Wing, 316SS	2	102211+	2
	018-UII Rotor, Single Wing, Alloy 88	2	117072+	2, 13
10	006-015-UII Stud	8	AD0011000	
10	006-015-UII Stud, Jacketed Cover	8	AD0011J00	
10	014-UII Stud	6	AD0011000	45
10A	014-UII Stud	2	35547+	45
10	014-UII Stud, Jacketed Cover	6	AD0011J00	45
10A	014-UII Stud, Jacketed Cover	2	35548+	45
10	018-UII Stud	8	101721+	
10	018-UII Stud, Jacketed Cover	8	107754+	

PL5060-CH67

Notes:

1. Contact customer service with Serial Number of pump for Part Number.
2. Standard clearances and finishes for Rotor Part Numbers shown. Contact customer service for optional clearances and finishes.
3. Gear Case Assemblies listed are upper drive, side mount left hand, and include shafts and timing gears. CI assemblies are painted WCB blue. Contact customer service for other options.
13. Single wing rotors cannot be used with Rectangular Flange Inlet Pumps.
43. Tru-Fit drive shaft is longer than the standard drive shaft listed here. See page 100.
45. For RF models, qty. 6 of item 10 and qty. 2 of item 10A are required.
46. For Tru-Fit parts, see page 100.
47. For Shaft & Bearing assembly part numbers, see page 96.

006, 014, 015, 018-UII Common Parts



006, 014, 015, 018-UII Common Parts

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
	2	Pump Cover	1	101842+	
		Jacketed Cover	1	107664+	
		Pump Cover Vented - Complete Assembly			1
	4	Gear Case Cover, Steel	1	020106000+	
		Gear Case Cover, SS; Optional	1	102280+	
	5	Gear, Drive Shaft, Spur	1	107997+	
	6	Gear, Short Shaft, Spur	1	107997+	
	11	Hex Nut	8	108369+	
		Wing Nut; Optional	8	105850+	
	12	Oil Seal, Gear Case Cover	1	000030016+	
	13	Oil Seal, Gear Case Rear	2	000030017+	
	14	Grease Seal, Bearing Retainer, standard gearcase	2	121679+	3, 4
		Grease Seal, Bearing Retainer, SS Gearcase or Bearing Isolator	2	101716+	4
	15	Bearing, Rear	2	015035000+	
	16	Bearing, Front	2	101714+	
	17	Key, Gear	2	015037000+	
	20	Dowel Pin, Upper Cover Side	1	137001+	43
	21	Dowel Pin, Upper Gear Case Side	1	124581+	44
	22	Dowel Pin, Lower Cover Side	1	137002+	43
	23	Dowel Pin, Lower Gear Case Side	1	124582+	44
	24	Oil Plug, M20 x 1.5"	5	115798+	40
		Oil Level Indicator, M20 x 1.5"	1	115799+	
		Oil Level Indicator, ATEX, M20 x 1.5	1	131417+	
	25	Silicone Sealant	1	000142301+	
	26	Nut, Rotor	2	101804+	
	26A	**O-Ring, Rotor Nut, Buna N**	2	N70126	
*		**O-Ring, Rotor Nut, EPDM**	2	E70126	
		O-Ring, Rotor Nut, FKM	2	V70126	
	26B	Washer, Belleville	2	101691+	
	26C	**O-Ring, Retainer, Buna N**	2	N70112	
*		**O-Ring, Retainer, EPDM**	2	E70112	
		O-Ring, Retainer, FKM	2	V70112	
	26D	**O-Ring, Rotor Hub, Buna N**	2	N70121	
*		**O-Ring, Rotor Hub, EPDM**	2	E70121	
		O-Ring, Rotor Hub, FKM	2	V70121	

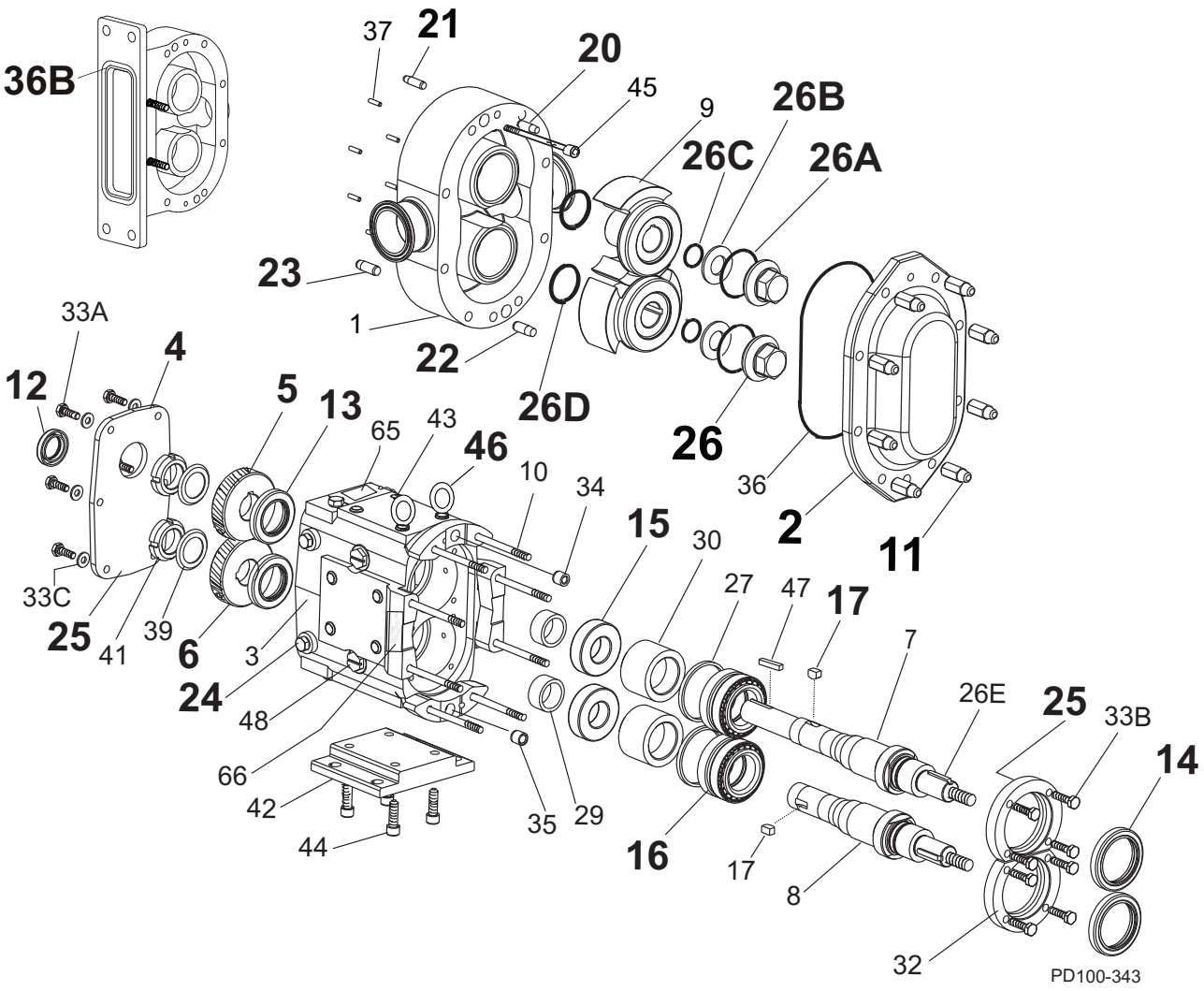
PL5060-CH68

Notes:

* Recommended Spare Parts

1. Please configure in E-Sales.
3. Pumps manufactured prior to June 2004 use 000030018+ for the grease seal.
4. Pumps with bearing isolators use 101716+ as the grease seal and 101810+ as the bearing retainer. For bearing isolator kit, and pumps older than 7/12/04, see page 99.
40. Applies to pumps shipped after October 2003. Pumps shipped prior to October 2003 used qty 6 of plug w/washer, part number 000046002+.
43. Exposed length of dowel pin: .444" (11.3 mm)
44. Exposed length of dowel pin: .563" (14.3 mm)
47. For Shaft & Bearing assembly part numbers, see page 96.

006, 014, 015, 018-UII Common Parts, cont'd



006, 014, 015, 018-UII Common Parts, cont'd

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
	26E	006-014-015-UII Key, Rotor	2	101817+	
		018-UII Key, Rotor	2	101819+	
	27	Shim Kit	2	117889+	
	29	Spacer, Gear to Rear Bearing	2	015055000+	
	30	Bearing Spacer	2	101814+	
	32	Bearing Retainer, Front SS, for standard gearcase	2	120332+	4
		Bearing Retainer, Front SS, for SS Gearcase or Bearing Isolator	2	101810+	4
	33A, 33B	1/4-20 x .75" HHCS, SS	14	30-58	
	33C	1/4" Flat Washer	6	43-27	
	34	Dowel Bushing, Upper	1	AD0116000	
	35	Dowel Bushing, Lower	1	AD0116 100	
	36	**O-Ring, Pump Cover, Buna N**	1	N70249	
*		**O-Ring, Pump Cover, EPDM**	1	E70249	
		O-Ring, Pump Cover, FKM	1	V70249	
	36B	**014-UII O-Ring, Rectangular Flange, Buna N**	1	N70241	
*		**014-UII O-Ring, Rectangular Flange, EPDM**	1	E70241	
		014-UII O-Ring, Rectangular Flange, FKM	1	V70241	
	37	Stop Pin, Seal	6	101718+	
	39	Lockwasher, Gear	2	STD136005	
	41	Locknut, Gear	2	STD236005	
	42	Gear Case Shim, CI	1	020110000+	
		Gear Case Shim, SS; Optional	1	102284+	
		Pump Pedestal, 6.75", Optional	1	014110675+	
	43	Plastic Cap Plug	8	000121003+	
	44	5/16-18 x 1" SHCS, SS	4	30-525	
	45	006-014-015-UII Body Retaining Screw, 1/4-20 x 1-1/4"	2	30-523	
		018-UII Body Retaining Screw, 1/4-20 x 2"	2	30-211	
	46	Eye Bolt, 5/16-18 x .50" ZP 2	2	30-722	
	47	Key, Coupling - 3/16 x 3/16 x 1-1/8"	1	000037001+	
		Key, Coupling - Tru-Fit	1	119714+	
	48	Cleanout Plug	2	35824+	15
	61	Name Plate, Sanitary	1	135623+	
	62	#2 x .187" RHDS	4	30-355	
	65	Caution Plate	2	121694+	
	66	Warning Label	2	33-63	
	67	006-015-018-U1 Grease Fitting, 1/8"	4	BD0092000	2
		014-U1 Grease Fitting, 1/8"	4	BD0092100	3
	68	Plastic Cap, Grease Fitting	4	BD0093000	

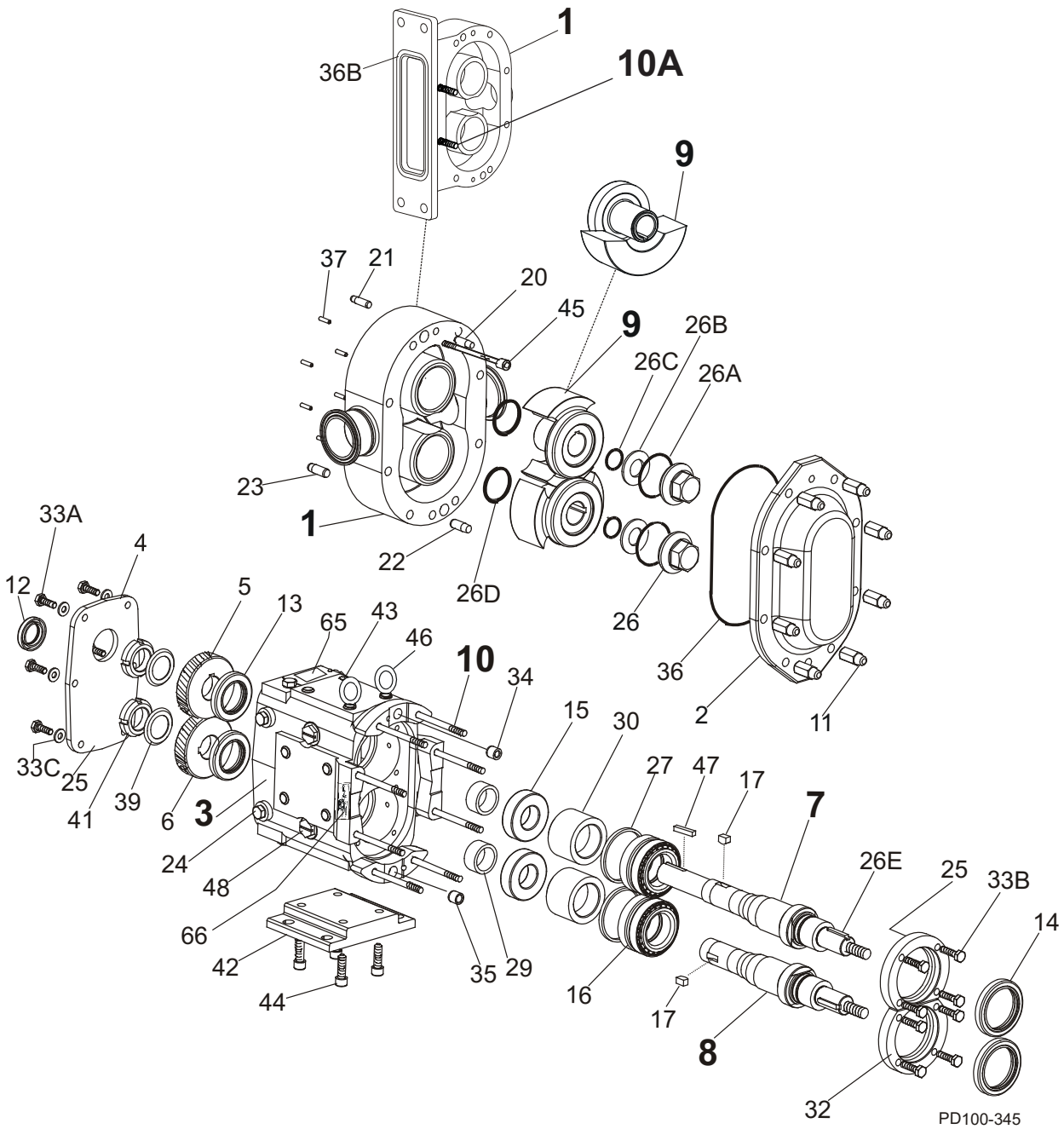
PL5060-CH69

Notes:

* Recommended Spare Parts

2. This grease fitting is the straight style. Part number BD0092100 is the angled style.
3. This grease fitting is the angled style. Part number BD0092000 is the straight style.
4. 101810+ bearing retainer is used with 101716+ grease seal. For bearing isolator kit, and for pumps older than 7/12/04, see page 99.
15. For an older gearcase without a threaded plug hole, use plug p/n 000121003+.
16. For seals, see page 89.
17. For vented covers, see page 97.

030, 034, 040-UII Pump Parts



030, 034, 040-UII Pump Parts

ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
1	030-UII Pump Body	1	See Note 1	1
	030-UII Pump Body with Flush	1	See Note 1	1
	034-UII Rectangular Flange Inlet Body	1	See Note 1	1
	034-UII Rectangular Flange Inlet Body with Flush	1	See Note 1	1
	040-UII Pump Body	1	See Note 1	1
	040-UII Pump Body with Flush	1	See Note 1	1
3	030-034-UII Gear Case Assembly, CI	1	102913-C	3
	030-034-UII Gear Case Assembly, SS; Optional	1	102917-C	3
	040-UII Gear Case Assembly, CI	1	120370-C	3
	040-UII Gear Case Assembly, SS; Optional	1	125943-C	3
7	030-034 UII Drive Shaft	1	108409+	43
	040 UII Drive Shaft	1	118722+	43
8	030-034 UII Short Shaft	1	108410+	
	040-UII Short Shaft	1	118723+	
9	030-034-UII Rotor, Twin Wing, Alloy 88	2	102151+	2
	030-034-UII Rotor, Twin Wing, 316SS	2	102217+	2
	030-UII Rotor, Single Wing, Alloy 88	2	117084+	2, 12, 13
	030-UII Rotor, Single Wing, 316SS	2	117088+	2, 12A, 13
	040-UII Rotor, Twin Wing, Alloy 88	2	118766+	2
	040-UII Rotor, Twin Wing, 316SS	2	118779+	2
	040-UII Rotor, Single Wing, Alloy 88	1	124255+	2, 13
	040-UII Rotor, Single Wing, 316SS	1	124268+	2, 13
10	030-UII Stud	8	108842+	
10	030-UII Stud, Jacketed Cover	8	108845+	
10	034-UII Stud	6	108842+	45
10A	034-UII Stud	2	35555+	45
10	034-UII Stud, Jacketed Cover	6	108845+	45
10A	034-UII Stud, Jacketed Cover	2	35549+	45
10	040-UII Stud	8	118897+	
10	040-UII Stud, Jacketed Cover	8	118898+	

PL5060-CH72

Notes:

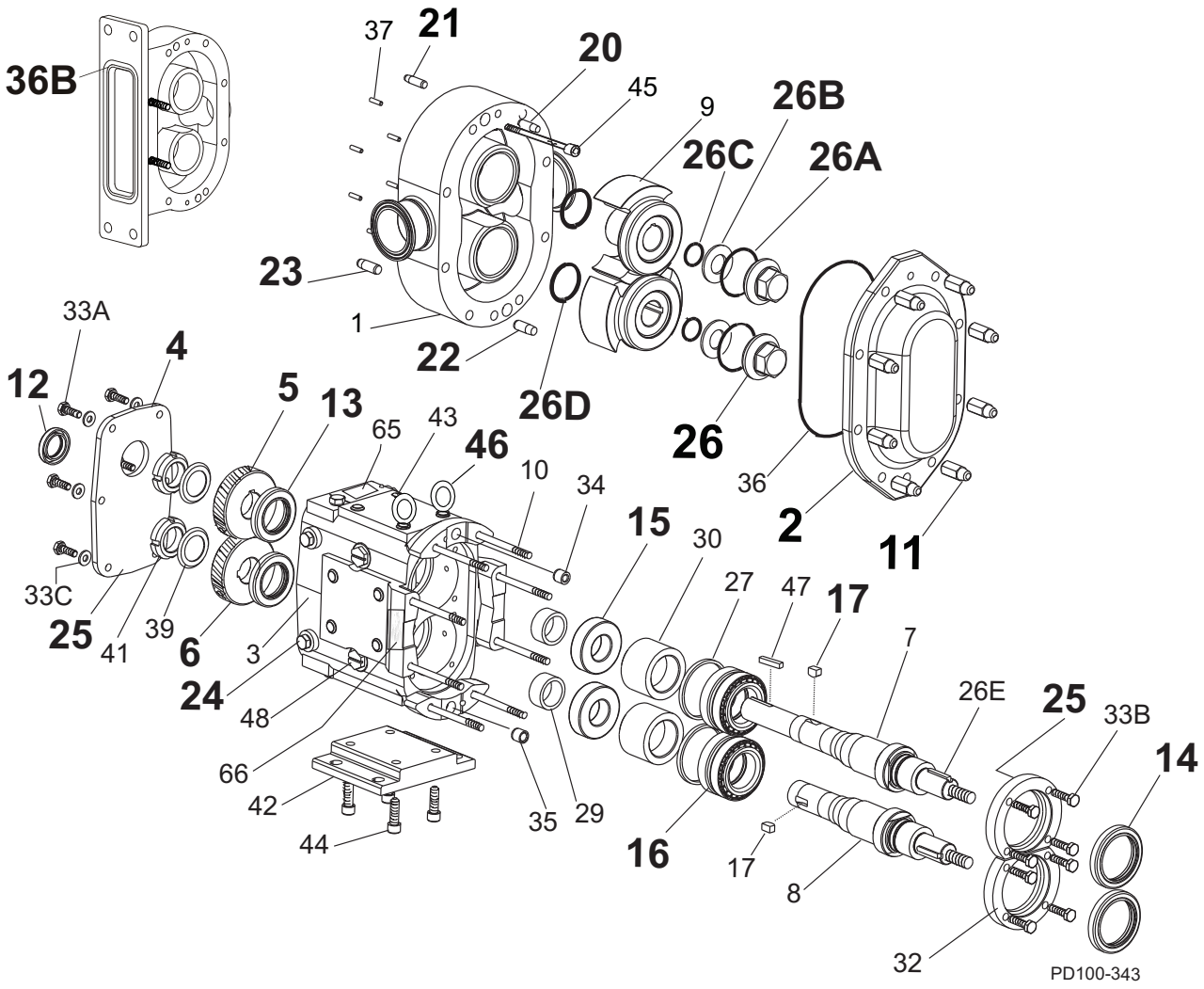
1. Contact customer service with Serial Number of pump for Part Number.
2. Standard clearances and finishes for Rotor Part Numbers shown. Contact customer service for optional clearances and finishes.
3. Gear Case Assemblies listed are upper drive, side mount left hand, and include shafts and timing gears. CI assemblies are painted WCB blue. Contact customer service for other options.

12. Replaces P/N 104707 (straight) and P/N 104836 (90 degree) rotors.

12A. Replaces P/N 104719 (straight) and P/N 104848 (90 degree) rotors.

13. Single wing rotors cannot be used with Rectangular Flange Inlet Pumps.
43. Tru-Fit drive shaft is longer than the standard drive shaft listed here. See page 100.
45. For RF models, qty. 6 of item 10 and qty. 2 of item 10A are required.
47. For Shaft & Bearing assembly part numbers, see page 96.

030, 034, 040-UII Common Parts



030, 034, 040-UII Common Parts

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
	2	Pump Cover	1	101845+	
		Jacketed Cover	1	107666+	
		Pump Cover Vented - Complete Assembly			1
	4	Gear Case Cover, Steel	1	040106000+	
		Gear Case Cover, SS; Optional	1	102281+	
	5	Gear, Drive Shaft, Spur	1	107999+	
	6	Gear, Short Shaft, Spur	1	107999+	
	11	Hex Nut	8	108370+	
		Wing Nut; Optional	8	105851+	
	12	Oil Seal, Gear Case Cover	1	000030013+	
	13	Oil Seal, Gear Case Rear	2	000030014+	
	14	Grease Seal, Bearing Retainer	2	121680+	2
	15	Bearing, Rear	2	030035000+	
	16	Bearing, Front	2	101715+	
	17	Key, Gear	2	BD0037000	
	20	Dowel Pin, Upper Cover Side	1	137001+	43
	21	Dowel Pin, Upper Gear Case Side	1	124582+	44
	22	Dowel Pin, Lower Cover Side	1	137002+	43
	23	Dowel Pin, Lower Gear Case Side	1	124583+	44
	24	Oil Plug, M20 x 1.5"	5	115798+	40
		Oil Level Indicator, M20 x 1.5"	1	115799+	40
		Oil Level Indicator, ATEX, M20 x 1.5	1	131417+	
	25	Silicone Sealant	1	000142301+	
	26	Nut, Rotor	2	101805+	
	26A	**O-Ring, Rotor Nut, Buna N**	2	N70130	
*		**O-Ring, Rotor Nut, EPDM**	2	E70130	
		O-Ring, Rotor Nut, FKM	2	V70130	
	26B	Washer, Belleville	2	101692+	
	26C	**O-Ring, Retainer, Buna N**	2	N70115	
*		**O-Ring, Retainer, EPDM**	2	E70115	
		O-Ring, Retainer, FKM	2	V70115	
	26D	**O-Ring, Rotor Hub, Buna N**	2	N70127	
*		**O-Ring, Rotor Hub, EPDM**	2	E70127	
		O-Ring, Rotor Hub, FKM	2	V70127	

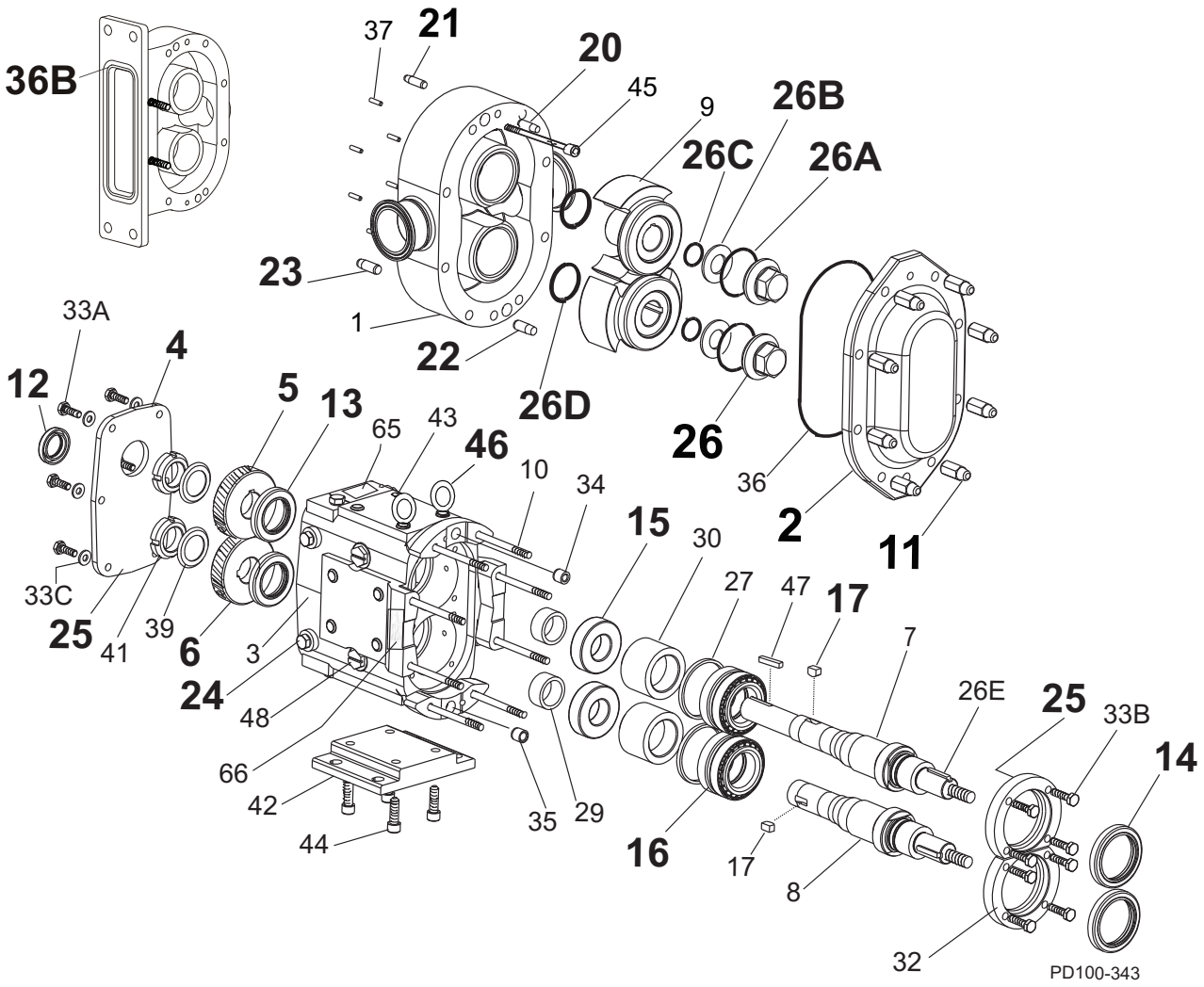
PL5060-CH73

Notes:

* Recommended Spare Parts

1. Please configure in E-Sales.
2. Pumps manufactured prior to June 2001 use 000030015+ for the grease seal. See page 99.
40. Applies to pumps shipped after October 2003. Pumps shipped prior to October 2003 used qty 6 of plug with washer, part number 000046003+.
43. Exposed length of dowel pin: .444" (11.3 mm)
44. Exposed length of dowel pin: .563" (14.3 mm)
47. For Shaft & Bearing assembly part numbers, see page 96.

030, 034, 040-UII Common Parts, cont'd



030, 034, 040-UII Common Parts, cont'd

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
*	26E	**Key, Rotor**	2	101821+	
	27	Shim Kit	2	117890+	
	29	Spacer, Gear to Rear Bearing	2	030055000+	
	30	Bearing Spacer	2	101815+	
	32	Bearing Retainer, Front SS, for std. lip seal	2	120333+	3
	33A	5/16-18 x 3/4" HHCS, SS	6	30-623	
	33B	5/16-18 x 3/4" BSHCS, STD	8	30-296	
		5/16-18 x 3/4" SHCS, SS	8	30-29	
	33C	5/16" Flat Washer	6	43-246	
	34	Dowel Bushing, Upper	1	BD0116000	
	35	Dowel Bushing, Lower	1	BD0116100	
	36	**O-Ring, Pump Cover, Buna N**	1	N70259	
*		**O-Ring, Pump Cover, EPDM**	1	E70259	
		O-Ring, Pump Cover, FKM	1	V70259	
	36B	**034-UII O-Ring, Rectangular Flange, Buna N**	1	N70357	
*		**034-UII O-Ring, Rectangular Flange, EPDM**	1	E70357	
		034-UII O-Ring, Rectangular Flange, FKM	1	V70357	
	37	Stop Pin, Seal	6	101719+	
	39	Lockwasher, Gear	2	CD0036 W00	
	41	Locknut, Gear	2	CD0036 N00	
	42	Gear Case Shim, CI	1	040110000+	
		Gear Case Shim, SS; Optional	1	102285+	
		Pump Pedestal, 6.25", Optional	1	BD0110SM0	
	43	Plastic Cap Plug, 3/8"	8	000121002+	
	44	3/8-16 x 1" SHCS	4	30-189	
	45	030,034-UII Body Retaining Screw, 1/4-20 x 2"	2	30-211	
		040-UII Body Retaining Screw, 1/4-20 x 2.5"	2	30-543	
	46	Eye Bolt, 3/8-16 x 1.0" ZP 2	2	30-723	
	47	Key, Coupling - 1/4 x 1/4 x 1-3/4"	1	000037002+	
		Key, Coupling - Tru-Fit	1	119715+	
	48	Cleanout Plug	2	41013+	15
	61	Name Plate, Sanitary	1	135624+	
	62	#2 x .187" RHDS	4	30-355	
	65	Caution Plate	2	121694+	
	66	Warning Label	2	33-63	
	67	030-UII and 040-UII Grease Fitting, 1/8"	4	BD0092000	1
		034-UII Grease Fitting, 1/8"	4	BD0092100	2
	68	Plastic Cap, Grease Fitting	4	BD0093000	

PL5060-CH74

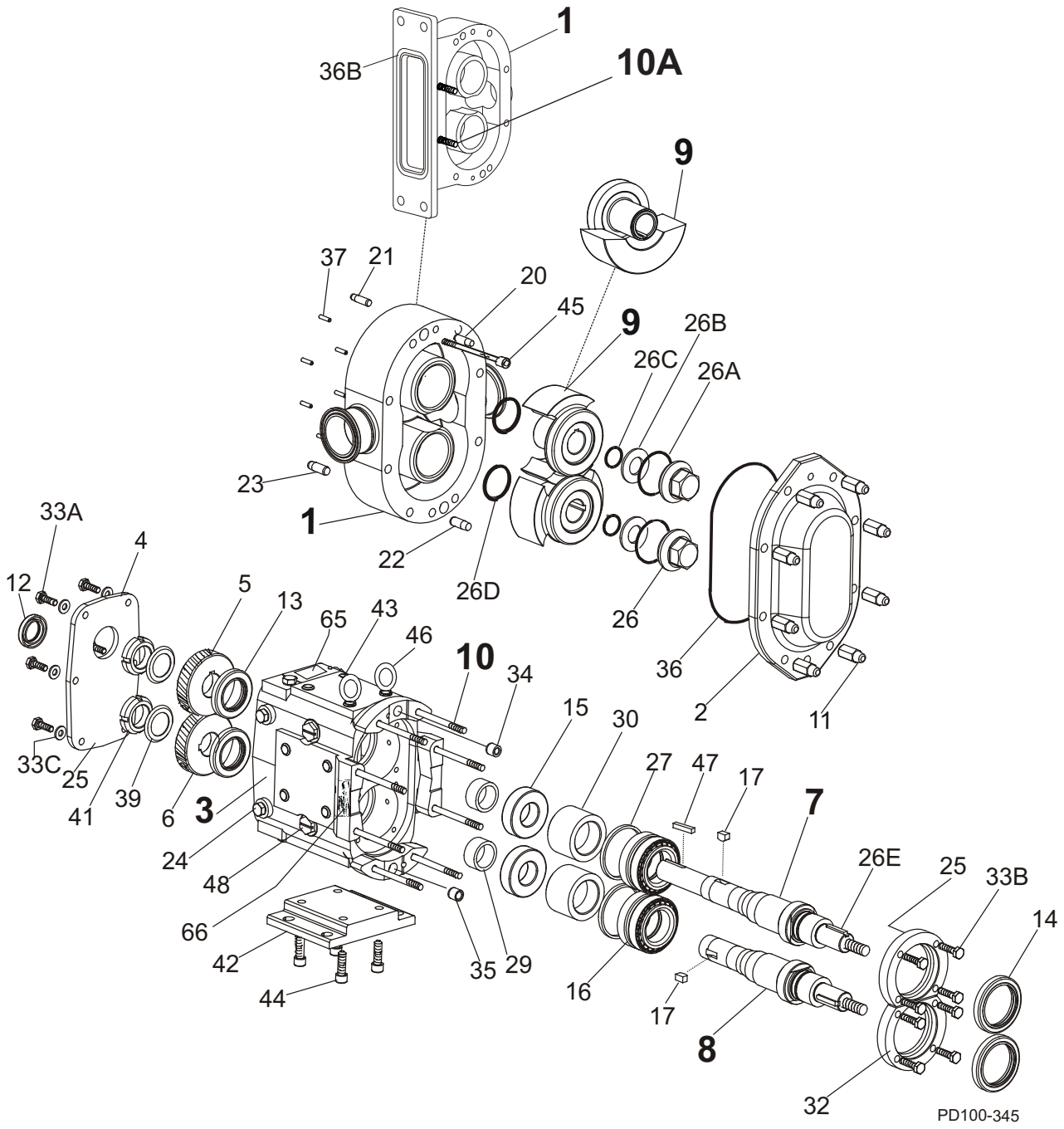
Notes:

***** Recommended Spare Parts

1. This grease fitting is the straight style. Part number BD0092100 is the angled style.
2. This grease fitting is the angled style. Part number BD0092000 is the straight style.
3. For bearing retainer for SS gearcase or for bearing isolator, for bearing isolator kit, and for pumps manufactured prior to July 2004, see page 99.

15. For an older gearcase without a threaded plug hole, use plug p/n 000121002+.
16. For seals, see page 89.
17. For vented covers, see page 97.
47. For Shaft & Bearing assembly part numbers, see page 96.

045, 060, 064, 130, 134-UII Pump Parts



Notes: (See "Notes" column on page 69)

1. Contact customer service with Serial Number of pump for Part Number.
2. Standard clearances and finishes for Rotor Part Numbers shown. Contact customer service for optional clearances and finishes.
3. Gear Case Assemblies listed are upper drive, side mount left hand, and include shafts and timing gears. CI assemblies are painted WCB blue. Contact customer service for other options.

12. Replaces (obsolete) P/Ns 104728 (straight) and 104857 (90 degree) rotors.

12A. Replaces (obsolete) P/Ns 104746 (straight) and 104875 (90 degree) rotors.

13. Single wing rotors cannot be used with Rectangular Flange Inlet Pumps.
43. Tru-Fit drive shaft is longer than the standard drive shaft listed here. See page 100.
45. For RF models, qty. 6 of item 10 and qty. 2 of item 10A are required.
46. For Tru-Fit parts, see page 100. For Shaft & Bearing assembly part numbers, see page 96.

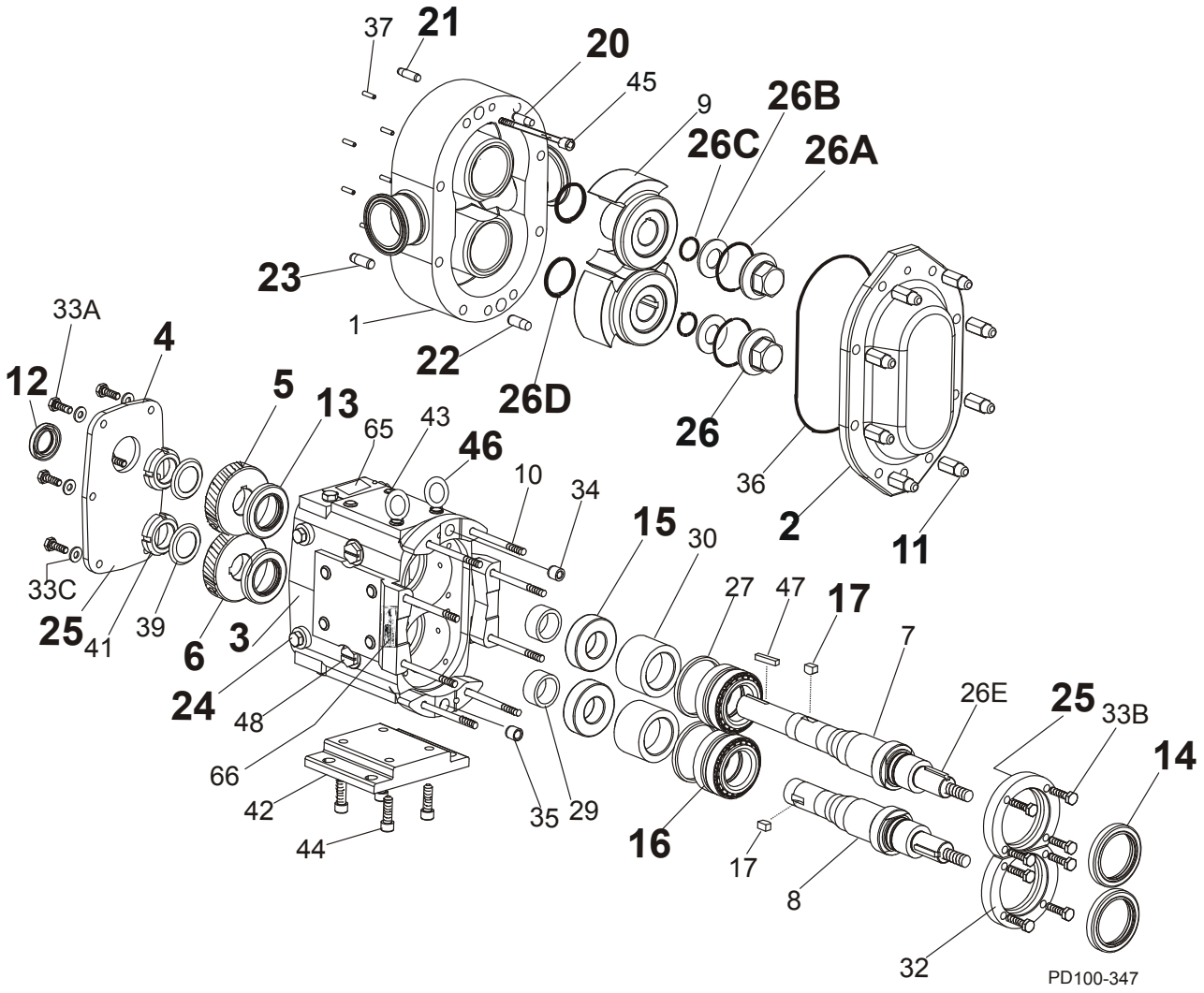
045, 060, 064, 130, 134-UII Pump Parts

ITEM NO.	DESCRIPTION	QTY PER PUMP	PART NO.	NOTES
1	045-UII Pump Body	1	See Note 1	1
	045-UII Pump Body with Flush	1	See Note 1	1
	060-UII Pump Body	1	See Note 1	1
	060-UII Pump Body with Flush	1	See Note 1	1
	064-UII Rectangular Flange Inlet Body	1	See Note 1	1
	064-UII Rect. Flange Inlet Body with Flush	1	See Note 1	1
	130-UII Pump Body	1	See Note 1	1
	130-UII Pump Body with Flush	1	See Note 1	1
	134-UII Rectangular Flange Inlet Body	1	See Note 1	1
	134-UII Rect. Flange Inlet Body with Flush	1	See Note 1	1
3	Gear Case Assembly, CI, Model 045	1	111141-C	3
	Gear Case Assembly, SS; Model 045 (Optional)	1	113167-C	3
	Gear Case Assembly, CI, Model 060	1	102919-C	3
	Gear Case Assembly, SS; Model 060 (Optional)	1	102923-C	3
	Gear Case Assembly, CI, Model 064	1	115704-C	3
	Gear Case Assembly, CI, Model 130	1	102925-C	3
	Gear Case Assembly, SS; Model 130 (Optional)	1	102929-C	3
	Gear Case Assembly, CI, Model 134	1	115706-C	3
7	045-UII Drive Shaft	1	110021+	43
	060-064-UII Drive Shaft	1	108411+	43
	130-134-UII Drive Shaft	1	108413+	43
8	045-UII Short Shaft	1	110022+	
	060-064-UII Short Shaft	1	108412+	
	130-134-UII Short Shaft	1	108414+	
9	045-UII Rotor, Twin Wing, Alloy 88	2	107252+	2
	045-UII Rotor, Twin Wing, 316SS	2	107264+	2
	045-UII Rotor, Single Wing, Alloy 88	2	117105+	2, 13
	060-064-UII Rotor, Twin Wing, Alloy 88	2	102163+	2
	060-064-UII Rotor, Twin Wing, 316SS	2	102226+	2
	060-UII Rotor, Single Wing, Alloy 88	2	117117+	2, 12, 13
	130-134-UII Rotor, Twin Wing, Alloy 88	2	102175+	2
	130-134-UII Rotor, Twin Wing, 316SS	2	102232+	2
	130-UII Rotor, Single Wing, Alloy 88	2	117129+	2, 12A, 13
10	045-UII Stud	8	107242+	
10	045-UII Stud, Jacketed Cover	8	111584+	
10	060-UII Stud	8	108843+	
10	060-UII Stud, Jacketed Cover	8	108846+	
10	064-UII Stud	6	108843+	45
10A	064-UII Stud	2	0C1050000	45
10	064-UII Stud, Jacketed Cover	6	108846+	45
10A	064-UII Stud, Jacketed Cover	2	35556+	45
10	130-UII Stud	8	101722+	
10	130-UII Stud, Jacketed Cover	8	130011001+	
10	134-UII Stud	6	101722+	45
10A	134-UII Stud	2	0C1050000	45
10	134-UII Stud, Jacketed Cover	6	130011001+	45
10A	134-UII Stud, Jacketed Cover	2	35556+	45

PL5060-CH82

Notes: See "Notes" on page 68

045, 060, 064, 130, 134-UII Common Parts



045, 060, 064, 130, 134-UII Common Parts

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
	2	Pump Cover	1	101848+	
		Jacketed Cover	1	107668+	
		Pump Cover Vented - Complete Assembly			1
	4	Gear Case Cover, Steel	1	070106000+	
		Gear Case Cover, SS; Optional	1	102282+	
	5	Gear, Drive Shaft, Spur	1	107404+	
	6	Gear, Short Shaft, Spur	1	107404+	
	11	Hex Nut	8	108371+	
		Wing Nut, Optional	8	105852+	
	12	Oil Seal, Gear Case Cover	1	000030012+	
	13	Oil Seal, Gear Case Rear	2	000030011+	
	14	Grease Seal, Bearing Retainer	2	101829+	3
	15	Bearing, Rear	2	107186+	
	16	Bearing, Front	2	060036000+	
	17	Key, Gear	2	060037000+	
	20	Dowel Pin, Upper Cover Side	1	124586+	43
	21	Dowel Pin, Upper Gear Case Side	1	124584+	44
	22	Dowel Pin, Lower Cover Side	1	137003+	43
	23	Dowel Pin, Lower Gear Case Side	1	137002+	44
	24	Oil Plug, M20 x 1.5"	5	115798+	40
		Oil Level Indicator, M20 x 1.5"	1	115799+	40
		Oil Level Indicator, ATEX, M20 x 1.5	1	131417+	
	25	Silicone Sealant	1	000142301+	
	26	Nut, Rotor	2	101806+	
*	26A	O-Ring, Rotor Nut, Buna N	2	N70227	
*		O-Ring, Rotor Nut, EPDM	2	E70227	
*		O-Ring, Rotor Nut, FKM	2	V70227	
	26B	Belleville Washer	2	101693+	
*	26C	O-Ring, Retainer, Buna N	2	N70119	
*		O-Ring, Retainer, EPDM	2	E70119	
*		O-Ring, Retainer, FKM	2	V70119	
*	26D	O-Ring, Rotor Hub, Buna N	2	N70224	
*		O-Ring, Rotor Hub, EPDM	2	E70224	
*		O-Ring, Rotor Hub, FKM	2	V70224	

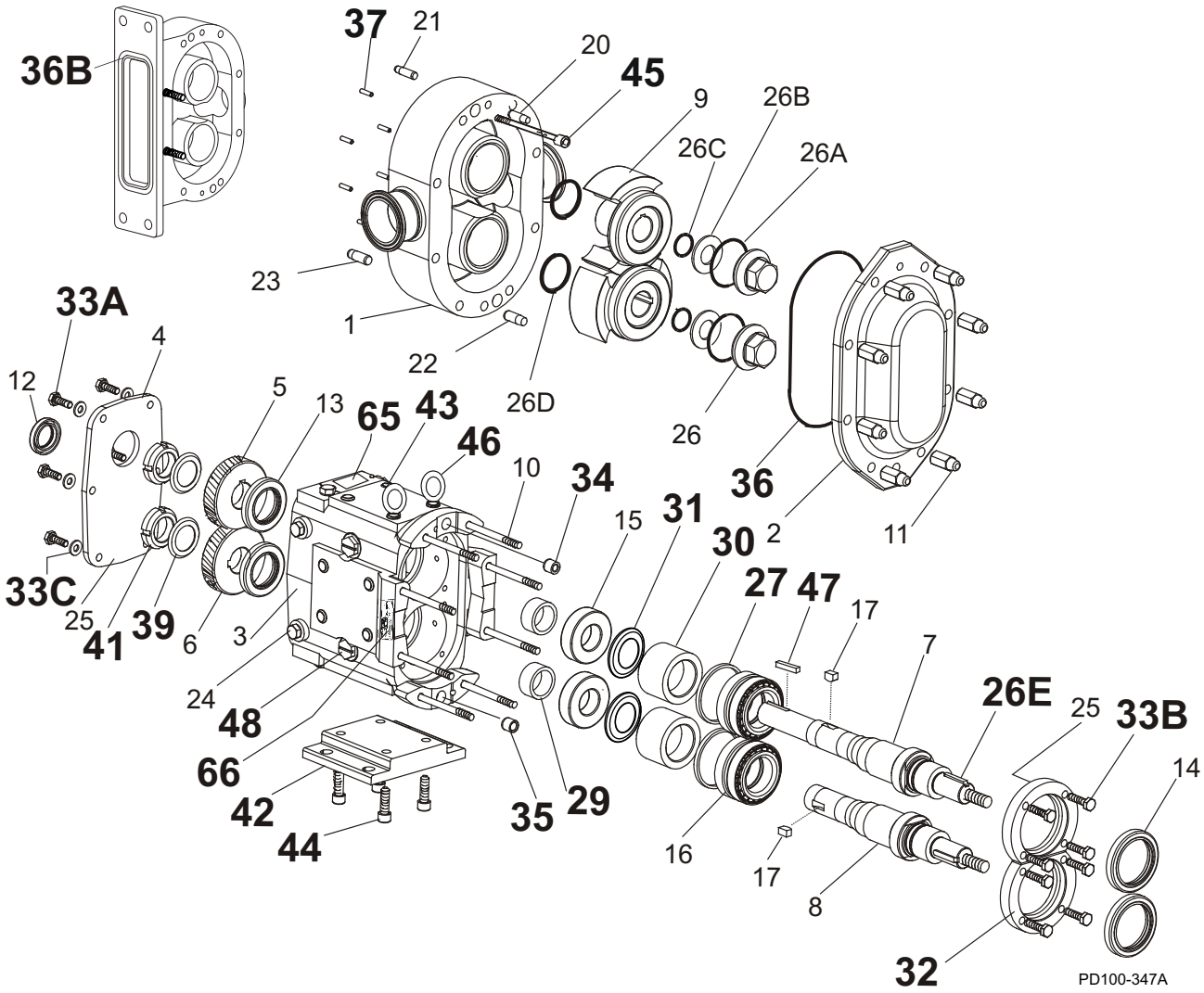
PL5060-CH83

Notes:

* Recommended Spare Parts

1. Please configure in E-Sales.
3. For bearing isolator kit, see page 99.
40. Applies to pumps shipped after October 2003. Pumps shipped prior to October 2003 used qty 6 of plug w/washer, part number 000046004+.
43. Exposed length of dowel pin: .444" (11.3 mm)
44. Exposed length of dowel pin: .563" (14.3 mm)
47. For Shaft & Bearing assembly part numbers, see page 96.

045, 060, 064, 130, 134-UII Common Parts, cont'd



ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
26E	045-UII Key, Rotor	2	110926+	
	060-064-UII Key, Rotor	2	101823+	
	130-134-UII Key, Rotor	2	101825+	
27	Shim Kit	2	117891+	
29	Spacer, Gear to Rear Bearing	2	107187+	
30	Bearing Spacer	2	060055003+	
31	Grease Retainer, Rear Bearing	2	STD091002	
32	Bearing Retainer, Front, CTD	2	123531+	5, 7
	Bearing Retainer, Front SS, for std. lip seal	2	121828+	6, 7
	Bearing Retainer, Front SS, used with bearing isolators.	2	101812+	6, 7

PL5060-CH84

Notes:

5. 123531+ is available until stock is depleted, then will be replaced by 121828+. CTD = Coated Steel
6. 101812+ is used with bearing isolators; for std. lip seal, use part # 121828+. SS = Stainless Steel
7. For bearing isolator kit, and for pumps older than 7/12/04, see page 99.

045, 060, 064, 130, 134-UII Common Parts, cont'd

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
	33A	3/8-16 x 3/4" HHCS, SS Gear Case Cover	6	30-50	
	33B	3/8-16 x 1-1/4" HHCS, SS Bearing Retainer	8	30-60	
	33C	3/8" Flat Washer, Gear Case Cover	6	43-30	
	34	Dowel Bushing, Upper	1	CD0116000	
	35	Dowel Bushing, Lower	1	CD0116 100	
	36	**O-Ring, Pump Cover, Buna N**	1	N70373	
*		**O-Ring, Pump Cover, EPDM**	1	E70373	
		O-Ring, Pump Cover, FKM	1	V70373	
		O-Ring, Pump Cover, Silicone	1	S75373	
	36B	**064-UII O-Ring, Rectangular Flange, Buna N**	1	N70366	
		064-UII O-Ring, Rectangular Flange, EPDM	1	E70366	
*		**064-UII O-Ring, Rectangular Flange, FKM**	1	V70366	
*		**134-UII O-Ring, Rectangular Flange, Buna N**	1	N70369	
		134-UII O-Ring, Rectangular Flange, EPDM	1	E70369	
		134-UII O-Ring, Rectangular Flange, FKM	1	V70369	
	37	Stop Pin, Seal	6	101720+	
	39	Lockwasher, Gear	2	STD136009	
	41	Locknut, Gear	2	STD236009	
	42	Gear Case Shim, CI	1	070110000+	
		Gear Case Shim, SS; Optional	1	102286+	
		Pump Pedestal, 5.5", Optional	1	CD0110SM5	
		Pump Pedestal, 10", Optional	1	CD0110SM1	
	43	Plastic Cap Plug	6	000121001+	
	44	1/2-13 x 1-1/4" SS SHCS	4	30-503	
	45	045-UII Body Retaining Screws, 5/16-8 x 2-1/2"	2	30-615	
		060-064-UII Body Retaining Screws, 5/16-8 x 3"	2	30-319	
		130-134-UII Body Retaining Screws, 5/16-8 x 4"	2	30-423	
	46	Eye Bolt, 1/2 -13	2	30-360	
	47	Key, Coupling - 3/8 x 3/8 x 1-5/8"	1	000037003+	
		Key, Coupling - Tru-Fit	1	119716+	
	48	Cleanout Plug	2	41013+	15
	61	Name Plate, Sanitary	1	135624+	
	62	#2 x .187" RHDS	4	30-355	
	65	Caution Plate	2	121694+	
	66	Warning Label	2	33-60	
	67	045-060-130-UII Grease Fitting, 1/8" (straight)	4	BD0092000	
		064-134-UII Grease Fitting, 1/8" (angled)	4	BD0092 100	
	68	Plastic Cap, Grease Fitting	4	BD0093000	

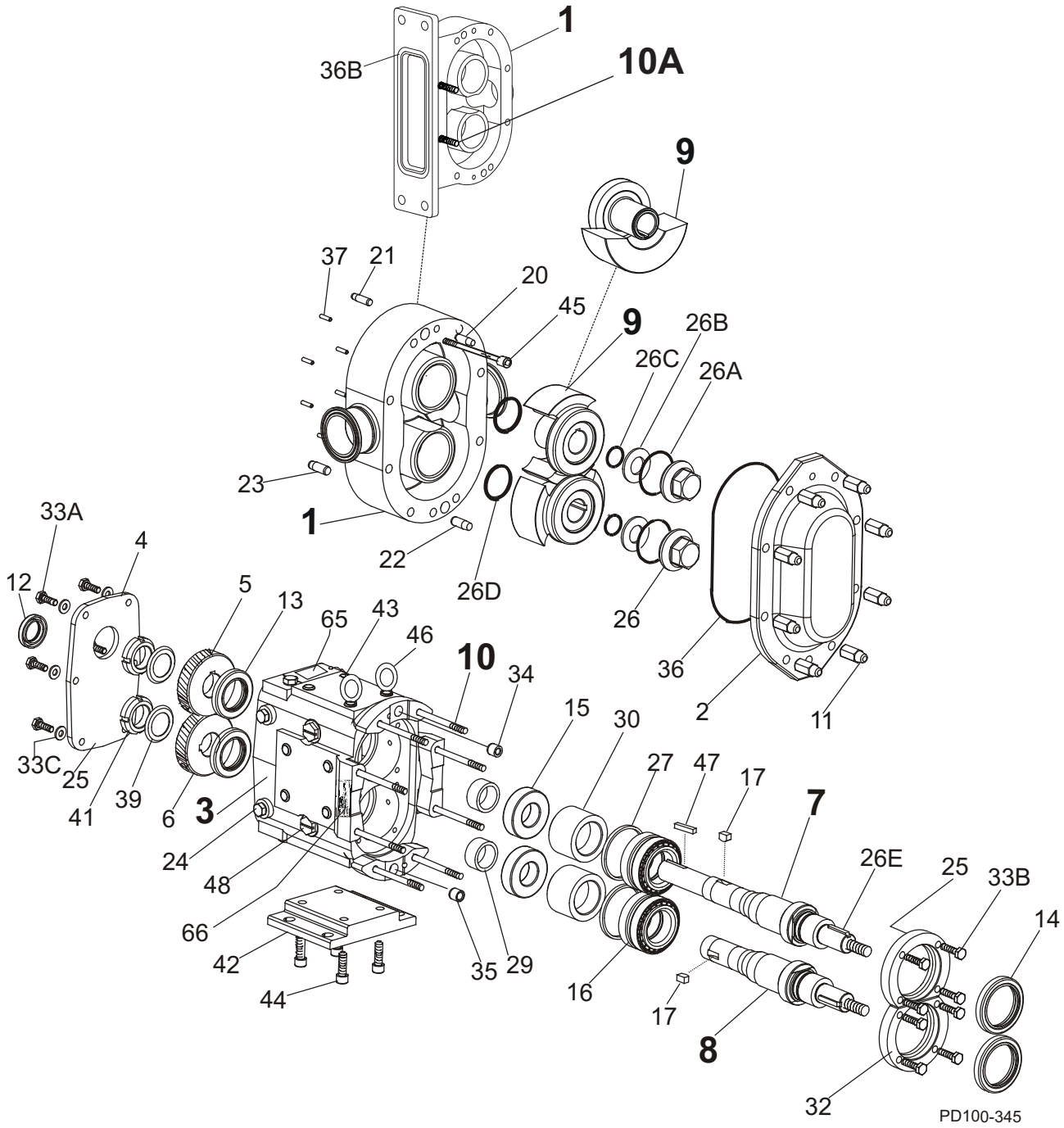
PL5060-CH85

Notes:

* Recommended Spare Parts

15. For an older gearcase without a threaded plug hole, use plug p/n 000121001+
16. For seals, see page 89.
17. For vented covers, see page 97.
47. For Shaft & Bearing assembly part numbers, see page 96.

180, 184, 220, 224-UII Pump Parts



180, 184, 220, 224-UII Pump Parts

ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
1	180-UII Pump Body	1	See Note 1	1
	180-UII Pump Body with Flush	1	See Note 1	1
	184-UII Pump Body	1	See Note 1	1
	184-UII Pump Body with Flush	1	See Note 1	1
	220-UII Pump Body	1	See Note 1	1
	220-UII Pump Body with Flush	1	See Note 1	1
	224-UII Rectangular Flange Inlet Body	1	See Note 1	1
	224-UII Rect. Flange Inlet Body with Flush	1	See Note 1	1
3	Gear Case Assembly, CI, Model 180-184	1	111143-C	3
	Gear Case Assembly, SS; Model 180-184 (Optional)	1	112654-C	3
	Gear Case Assembly, CI, Model 220	1	102931-C	3
	Gear Case Assembly, SS; Model 220 (Optional)	1	102935-C	3
	Gear Case Assembly, CI, Model 224	1	115708-C	3
7	180-184-UII Drive Shaft	1	110023+	43
	220-224-UII Drive Shaft	1	108415+	43
8	180-184-UII Short Shaft	1	110024+	
	220-224 Short Shaft	1	108416+	
9	180-184-UII Rotor, Twin Wing, Alloy 88	2	107273+	2
	180-184-UII Rotor, Twin Wing, 316SS	2	107285+	2
	220-224 -UII Rotor, Twin Wing, Alloy 88	2	102187+	2
	220-224 -UII Rotor, Twin Wing, 316SS	2	102238+	2
	220-UII Single Wing, Alloy 88	2	117141+	2, 12, 13
10	180-UII Stud	8	107243+	
10	180-UII Stud, Jacketed Cover	8	112629+	
10	184-UII Stud	6	107243+	45
10A	184-UII Stud	2	35550+	45
10	184-UII Stud, Jacketed Cover	6	112629+	45
10A	184-UII Stud, Jacketed Cover	2	36144+	45
10	220-UII Stud	8	108844+	
10	220-UII Stud, Jacketed Cover	8	108847+	
10	224-UII Stud	6	108844+	45
10A	224-UII Stud	2	35550+	45
10	224-UII Stud, Jacketed Cover	6	108847+	45
10A	224-UII Stud, Jacketed Cover	2	36144+	45

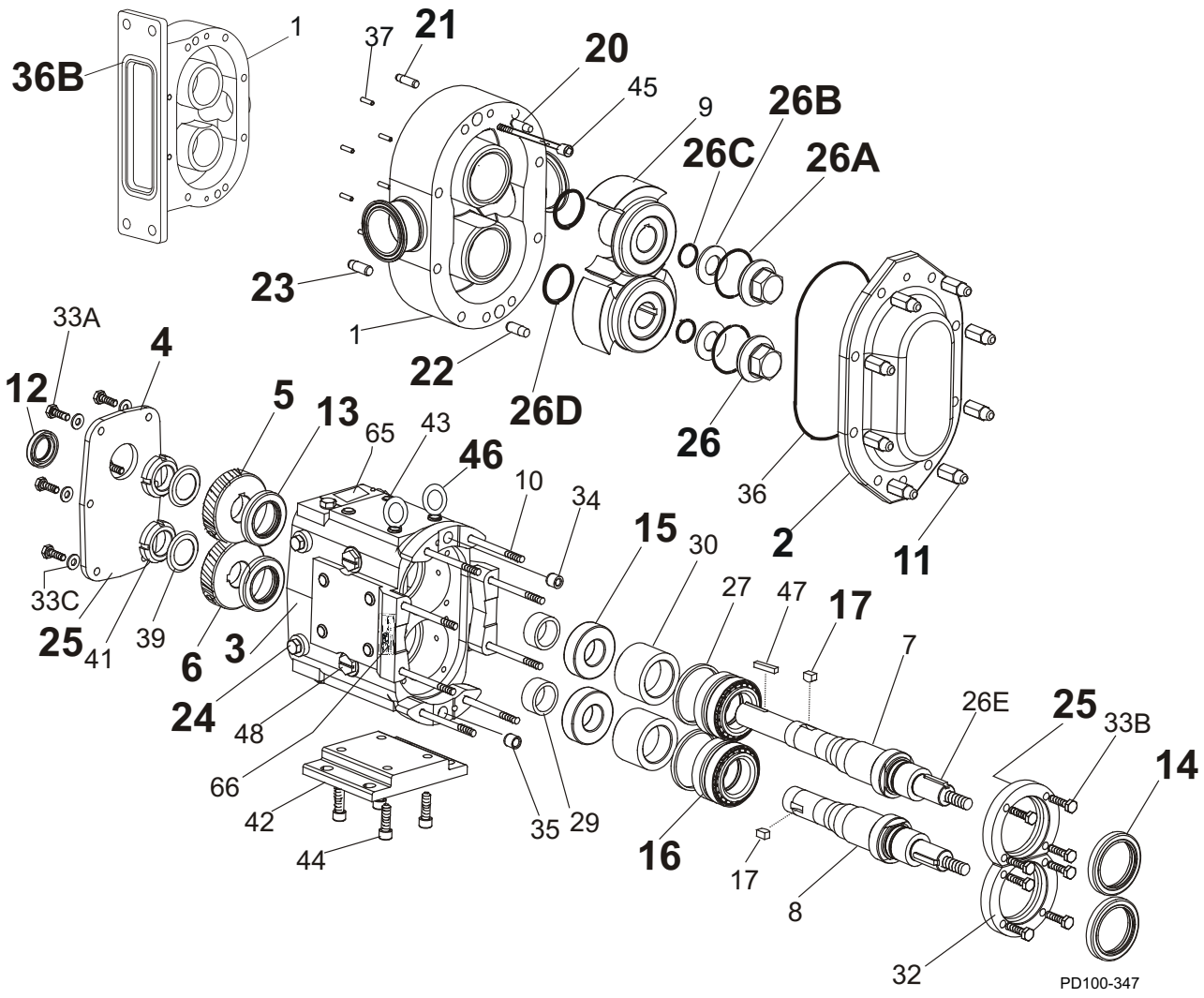
PL5060-CH88

Notes:

1. Contact customer service with Serial Number of pump for Part Number.
2. Standard clearances and finishes for Rotor Part Numbers shown. Contact customer service for optional clearances and finishes.
3. Gear Case Assemblies listed are upper drive, side mount left hand, and include shafts and timing gears. CI assemblies are painted WCB blue. Contact customer service for other options.

12. Replaces (obsolete) P/Ns 104764 (straight) and 104893 (90 degree) rotors.
13. Single wing rotors cannot be used with Rectangular Flange Inlet Pumps.
43. Tru-Fit drive shaft is longer than the standard drive shaft listed here. See page 100.
45. For RF models, qty. 6 of item 10 and qty. 2 of item 10A are required.
47. For Shaft & Bearing assembly part numbers, see page 96.

180, 184, 220, 224-UII Common Parts



180, 184, 220, 224-UII Common Parts

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
	2	Pump Cover	1	101851+	
		Jacketed Cover	1	107670+	
		Pump Cover Vented - Complete Assembly			1
	4	Gear Case Cover, Steel	1	230106000+	
		Gear Case Cover, SS; Optional	1	102283+	
	5	Gear, Drive Shaft, Spur	1	110932+	
	6	Gear, Short Shaft, Spur	1	110932+	
	11	Hex Nut	8	108372+	
		Wing Nut, Optional	8	105853+	
	12	Oil Seal, Gear Case Cover	1	STD030006	
	13	Oil Seal, Gear Case Rear	2	STD119002	
	14	Grease Seal, Bearing Retainer	2	121681+	3
	15	Bearing, Rear	2	200035000+	
	16	Bearing, Front	2	200036000+	
	17	Key, Gear	2	200037000+	
	20	Dowel Pin, Upper Cover Side	1	124586+	43
	21	Dowel Pin, Upper Gear Case Side	1	124584+	44
	22	Dowel Pin, Lower Cover Side	1	137005+	43
	23	Dowel Pin, Lower Gear Case Side	1	137004+	44
	24	Oil Plug, M20 x 1.5"	5	115798+	40
		Oil Level Indicator, M20 x 1.5"	1	115799+	40
	25	Silicone Sealant	1	000142301+	
	26	Nut, Rotor	2	101807+	
	26A	**O-Ring, Rotor Nut, Buna N**	2	N70235	
*		**O-Ring, Rotor Nut, EPDM**	2	E70235	
		O-Ring, Rotor Nut, FKM	2	V70235	
	26B	Belleville Washer	2	101694+	
	26C	**O-Ring, Retainer, Buna N**	2	N70122	
*		**O-Ring, Retainer, EPDM**	2	E70122	
		O-Ring, Retainer, FKM	2	V70122	
	26D	**O-Ring, Rotor Hub, Buna N**	2	N70230	
*		**O-Ring, Rotor Hub, EPDM**	2	E70230	
		O-Ring, Rotor Hub, FKM	2	V70230	

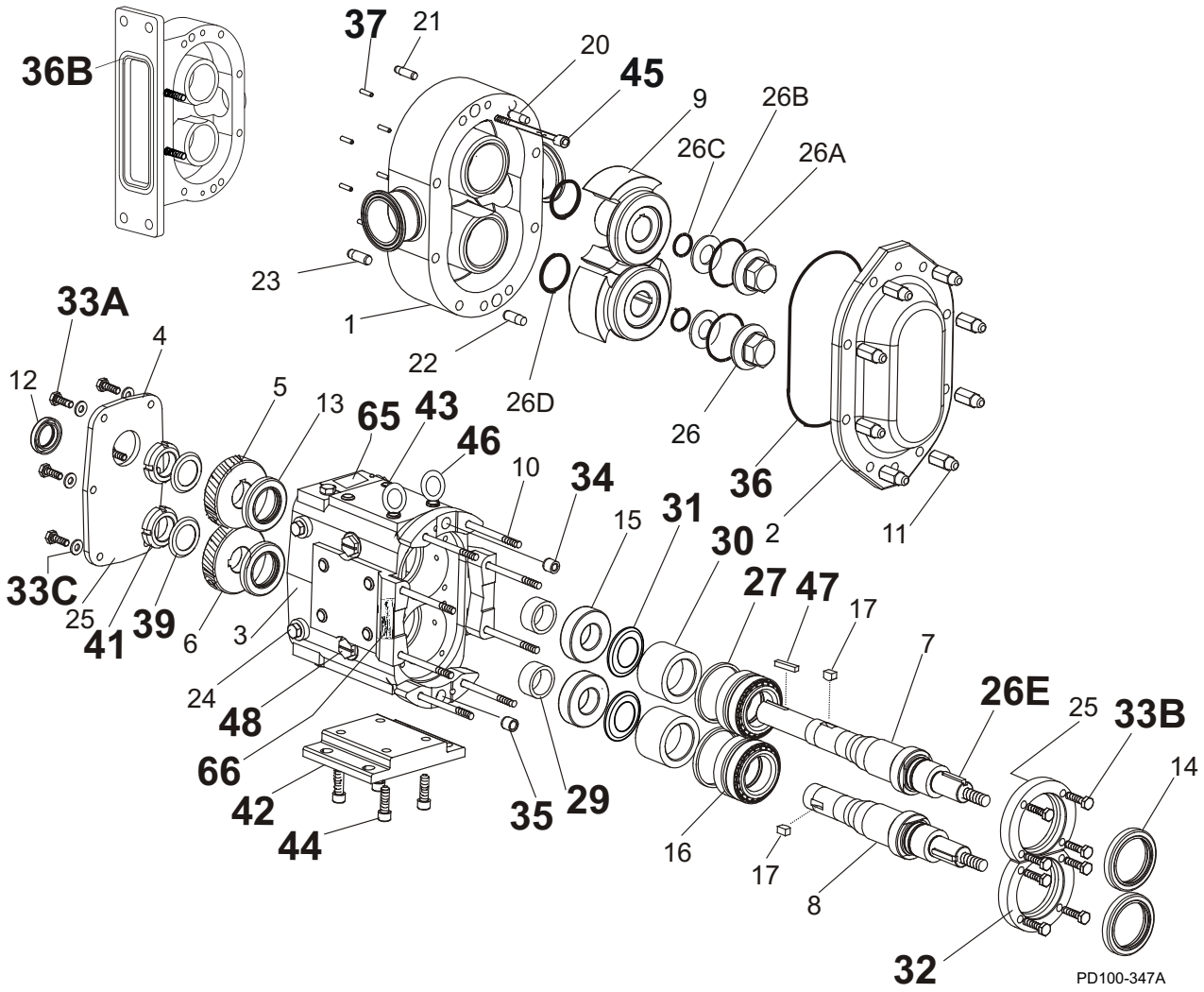
PL5060-CH89

Notes:

* Recommended spare parts

1. Please configure in E-Sales.
3. For bearing isolator kit, see page 99.
40. Applies to pumps shipped after October 2003. Pumps shipped prior to October 2003 used qty 6 of plug w/washer, part number 000046004+.
43. Exposed length of dowel pin: .444" (11.3 mm)
44. Exposed length of dowel pin: .563" (14.3 mm)
47. For Shaft & Bearing assembly part numbers, see page 96.

180, 184, 220, 224-UII Common Parts, cont'd



Notes: (See "Notes" column on page 79)

* Recommended Spare Parts

1. For pumps purchased before about 1990, replace both spacers, as 40878+ will not work correctly with the old design spacer (200055000).
3. For pumps manufactured after July 2004. For bearing isolator kit, and for pumps prior to July 2004, see page 99.
15. For an older gearcase without a threaded plug hole, use plug p/n 000121001+
16. For seals, see page 89. For vented covers, see page 97.
47. For Shaft & Bearing assembly part numbers, see page 96.

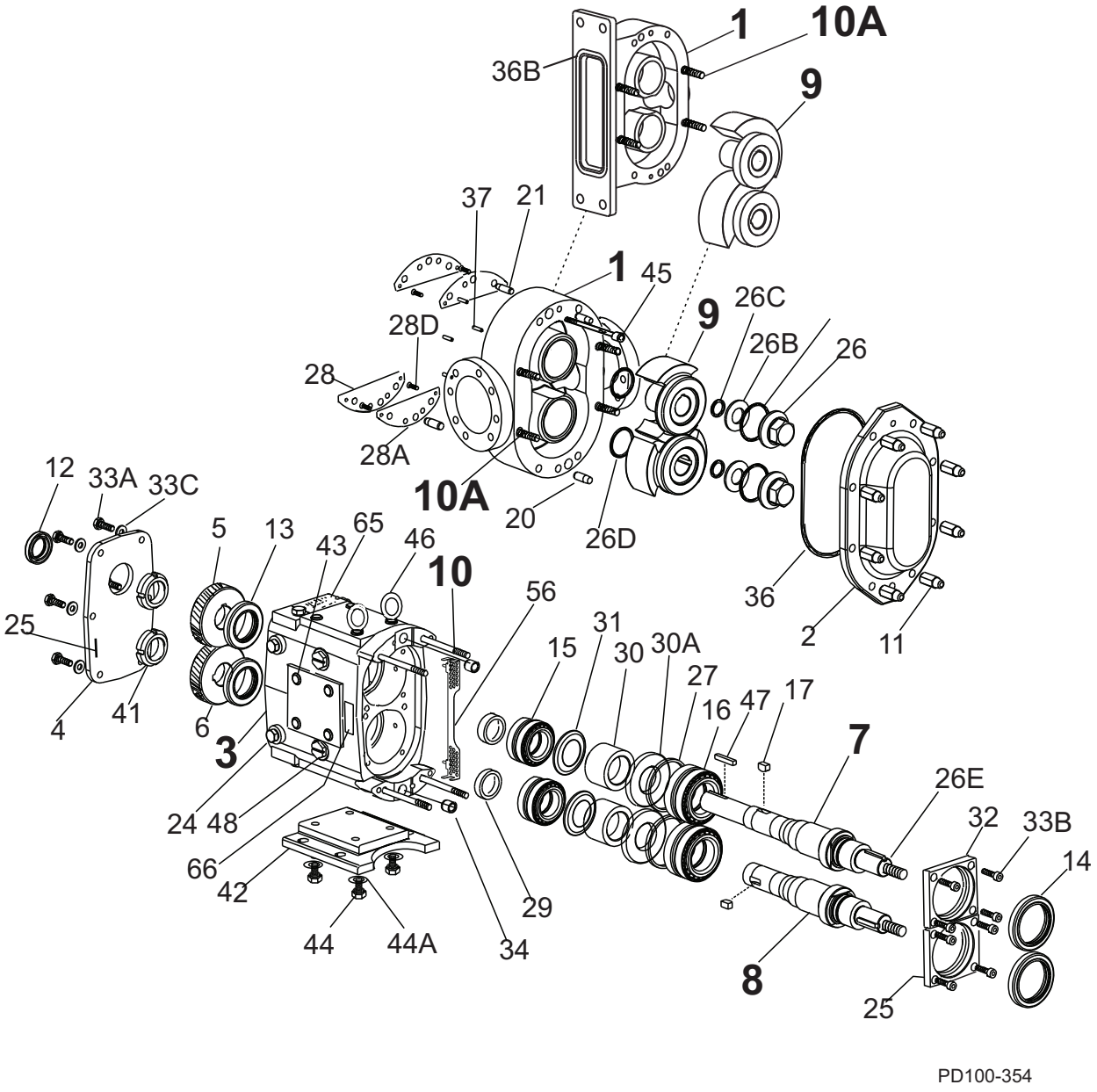
180, 184, 220, 224-UII Common Parts, cont'd

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
	26E	180-184-UII Key, Rotor	2	101828+	
		220-224-UII Key, Rotor	2	101827+	
	27	Shim Kit	2	117892+	
	29	Spacer, Gear to Rear Bearing	2	40878+	1
	30	Bearing Spacer	2	40752+	
	32	Bearing Retainer, Front, SS	2	121829+	3
		Bearing Retainer, Front, SS, used with bearing isolators	2	101813+	3
	33A	3/8-16 x 3/4" HHCS, SS Gear Case Cover	8	30-50	
	33B	3/8-16 x 1-1/4" HHCS, SS Bearing Retainer	8	30-60	
	33C	3/8" Flat Washer, Gear Case Cover	8	43-30	
	34	Dowel Bushing, Upper	1	CD0116000	
	35	Dowel Bushing, Lower	1	CD0116100	
	36	**O-Ring, Pump Cover, Buna N**	1	N70381	
*		**O-Ring, Pump Cover, EPDM**	1	E70381	
		O-Ring, Pump Cover, FKM	1	V70381	
		O-Ring, Pump Cover, Silicone	1	S75381	
	36B	**184-UII O-ring, Rectangular Flange, Buna N**	1	N70374	
		184-UII O-ring, Rectangular Flange, EPDM	1	E70374	
*		**184-UII O-ring, Rectangular Flange, FKM**	1	V70374	
		224-UII O-Ring, Rectangular Flange, Buna N	1	N70376	
		224-UII O-Ring, Rectangular Flange, EPDM	1	E70376	
		224-UII O-Ring, Rectangular Flange, FKM	1	V70376	
	37	Stop Pin, Seal	6	101720+	
	39	Lockwasher, Gear	2	STD136011	
	41	Locknut, Gear	2	STD236011	
	42	Gear Case Shim, CI	1	230110000+	
		Gear Case Shim, SS; Optional	1	102287+	
		Pump Pedestal, 9", Optional	1	GD0110SM9	
		Pump Pedestal, 13", Optional	1	GD0110SM1	
	43	Plastic Cap Plug	6	000121001+	
	44	1/2-13 x 2" SS SHCS	4	30-44	
	45	180-184-UII Body Retaining Screws, 3/8-16 x 4"	2	30-323	
		220-224-UII Body Retaining Screws, 3/8-16 x 4-1/2"	2	30-499	
	46	Eye Bolt, 1/2 -13	2	30-360	
	47	Key, Coupling - 1/2 x 1/2 x 1-7/8"	1	000037004+	
		Key, Coupling - Tru-Fit	1	119717+	
	48	Cleanout Plug	2	41013+	15
	61	Name Plate, Sanitary	1	001061015+	
	62	#2 x .187" RHDS	4	30-355	
	65	Caution Plate	2	121694+	
	66	Warning Label	2	33-60	
	67	180-184-220-UII Grease Fitting, 1/8" (straight)	4	BD0092000	
		224-UII Grease Fitting, 1/8" (angled)	4	BD0092100	
	68	Plastic Cap, Grease Fitting	4	BD0093000	

PL5060-CH90

Notes: See page 78.

210, 213, 214, 320, 323, 324, 370-UII Pump Parts



Notes (see "Notes" column on page 81):

1. Contact customer service with Serial Number of pump for Part Number.
2. Standard clearances and finishes for Rotor Part Numbers shown. Contact customer service for optional clearances and finishes.
3. Gear Case Assemblies listed are upper drive, side mount left hand, and include shafts and timing gears. CI assemblies are painted WCB blue. Contact customer service for other options.

12. Replaces (obsolete) P/Ns 107662 (straight) and 107663 (90 degree) rotors.
43. Tru-Fit drive shaft is longer than the standard drive shaft listed here. See page 100.
47. For Shaft & Bearing assembly part numbers, see page 96.

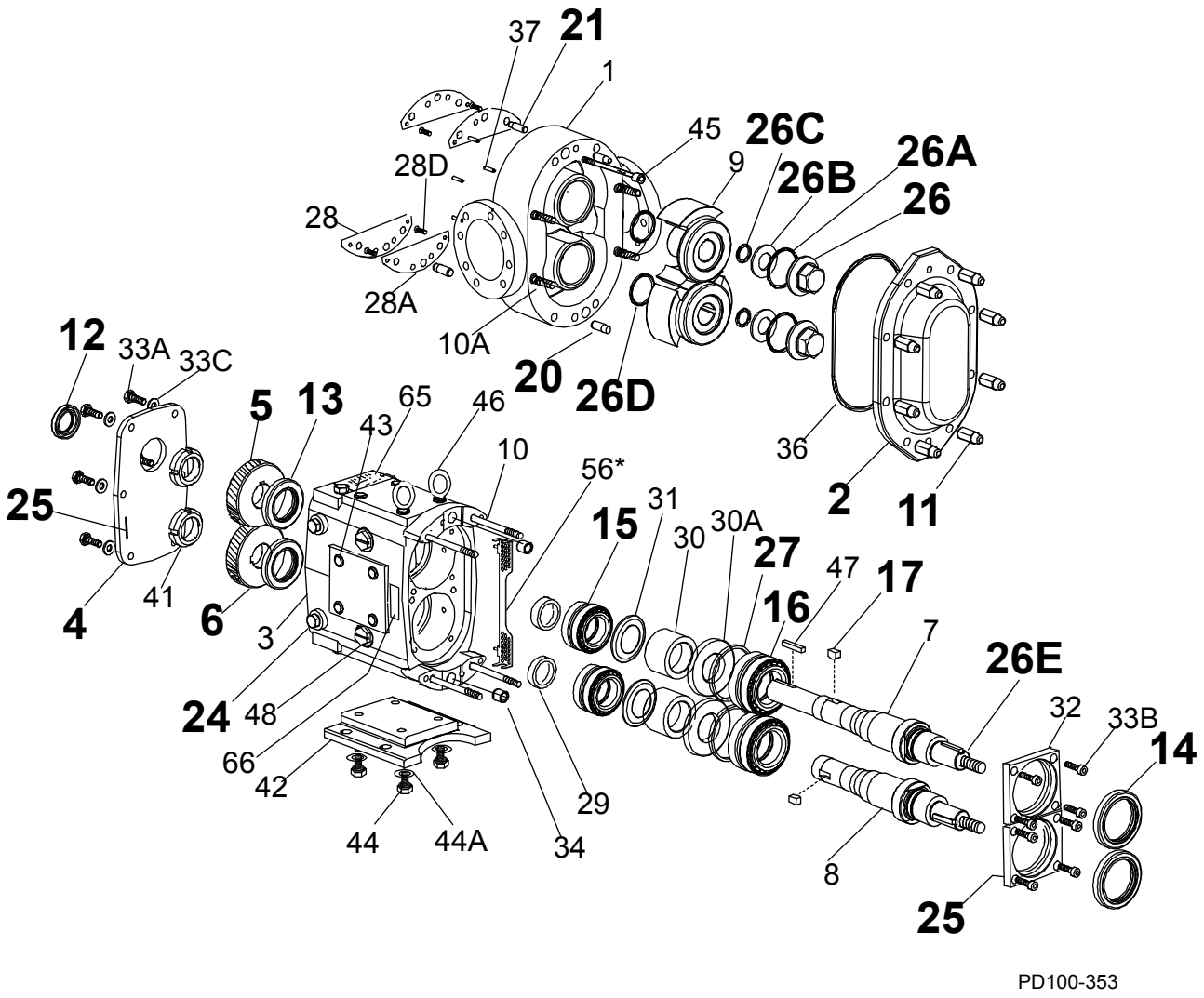
210, 213, 214, 320, 323, 324, 370-UII Pump Parts

ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
1	210-UII Pump Body	1	See Note 1	1
	210-UII Pump Body with Flush	1	See Note 1	1
	213-UII Pump Body	1	See Note 1	1
	214-UII Pump Body	1	See Note 1	1
	214-UII Pump Body with Flush	1	See Note 1	1
	320-UII Pump Body	1	See Note 1	1
	320-UII Pump Body with Flush	1	See Note 1	1
	323-UII Pump Body	1	See Note 1	1
	324-UII Pump Body	1	See Note 1	1
	324-UII Pump Body with Flush	1	See Note 1	1
	370-UII Pump Body	1	See Note 1	1
	370-UII Pump Body with Flush	1	See Note 1	1
3	Gear Case Assembly, CI, Model 210-213	1	112709-C	3
	Gear Case Assembly, CI, Model 214	1	112709B-C	3
	Gear Case Assembly, CI, Model 320-323-370	1	105479-C	3
	Gear Case Assembly, CI, Model 324	1	105479B-C	3
7	210-214-UII Drive Shaft	1	112186+	43
	213-UII Drive Shaft	1	112188+	43
	320-324-UII Drive Shaft	1	108417+	43
	323-UII Drive Shaft	1	113960+	43
	370-UII Drive Shaft	1	124839+	43
8	210-214-UII Short Shaft	1	112187+	
	213-UII Short Shaft	1	112189+	
	320-324-UII Short Shaft	1	108418+	
	323-UII Short Shaft	1	113961+	
	370-UII Short Shaft	1	124840+	
9	210-213-214-UII Rotor, Twin Wing, Alloy 88	2	112199+	2
	210-213-214-UII Rotor, Twin Wing, 316SS	2	112211+	2
	210-213-214-UII Rotor, Single Wing, Alloy 88	2	117220+	2
	320-324-UII Rotor, Twin Wing, Alloy 88	2	105427+	2
	320-324-UII Rotor, Twin Wing, 316SS	2	105439+	2
	320-324-UII Rotor, Single Wing, Alloy 88	2	117153+	2, 12
	323-UII Rotor, Twin Wing, Alloy 88	2	114022+	2
	370-UII Rotor, Twin Wing, Alloy 88	2	124849+	2
	370-UII Rotor, Twin Wing, 316SS	2	124861+	2
10	210-213-214-320-323-324-UII Stud, Long	4	112191+	
	370-UII Stud, Long	4	124838+	
10A	214-324-UII Stud, Short	2	111292+	
		2	40699+	
	210-213-320-323-370-UII Stud, Short	4	111292+	

PL5060-CH93

Notes: See page 80.

210, 213, 214, 320, 323, 324, 370-UII Common Parts



PD100-353

210, 213, 214, 320, 323, 324, 370--UII Common Parts

	ITEM NO.	DESCRIPTION	QTY PER PUMP	PART NO.	NOTES
	2	210-224-UII Pump Cover	1	112865+	
		210-224-UII Jacketed Cover	1	116342+	
		320-324-370-UII Pump Cover	1	109974+	
		320-324-370-UII Jacketed Cover	1	114359+	
		213-323-UII Pump Cover	1	114020+	
	4	Gear Case Cover, Steel	1	40669+	
	5	Gear, Drive Shaft, Spur	1	102470+	
	6	Gear, Short Shaft, Spur	1	102470+	
	11	Hex Nut	8	108373+	
		Wing Nut, Optional	8	110858+	
	12	Oil Seal, Gear Case Cover	1	STD030004	
	13	Oil Seal, Gear Case Rear	2	102475+	3
	14	Grease Seal, Bearing Retainer	2	121681+	4
	15	Bearing, Rear	2	0H1036000	
	16	Bearing, Front	2	0H1036003	
	17	Key, Gear	2	0H1037000	
	20	Dowel Pins, Cover Side	2	0H1040000	43
	21	Dowel Pins, Gear Case Side	2	105871+	44
	24	Oil Plug, M20 x 1.5"	5	115798+	40
		Oil Level Indicator, M20 x 1.5"	1	115799+	40
		Oil Level Indicator, ATEX, M20 x 1.5	1	131417+	
	25	Silicone Sealant	1	000142301+	
	26	Nut, Rotor	2	105409+	
	26A	**O-Ring, Rotor Nut, Buna N**	2	N70237	
*		**O-Ring, Rotor Nut, EPDM**	2	E70237	
		O-Ring, Rotor Nut, FKM	2	V70237	
		O-Ring, Rotor Nut, Silicone	2	S75237	
	26B	Washer, Belleville	2	105411+	
	26C	**O-Ring, Retainer, Buna N**	2	N70125	
*		**O-Ring, Retainer, EPDM**	2	E70125	
		O-Ring, Retainer, FKM	2	V70125	
		O-Ring, Retainer, Silicone	2	S75125	
	26D	**O-Ring, Rotor Hub, Buna N**	2	N70232	
*		**O-Ring, Rotor Hub, EPDM**	2	E70232	
		O-Ring, Rotor Hub, FKM	2	V70232	
		O-Ring, Rotor Hub, Silicone	2	S75232	
	26E	210-213-224-UII Key, Rotor	2	105422+	
		320-323-324-370-UII Key, Rotor	2	105421+	
	27	Shim Kit	2	117893+	

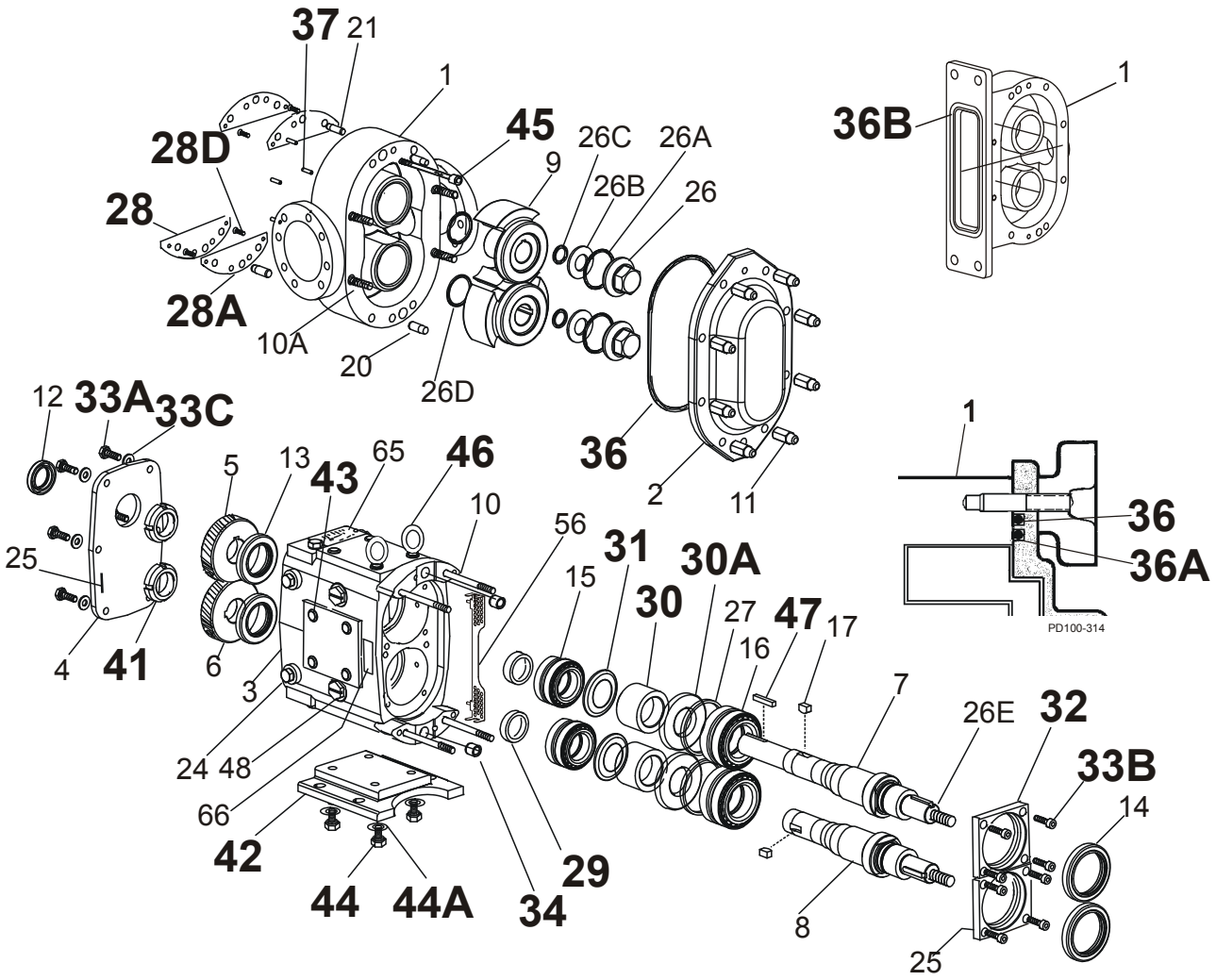
PL5060-CH94

Notes:

* Recommended Spare Parts

3. Applies to pumps shipped after July 2001. Prior to this date, this part was not required. Check the pump serial number to verify the date of manufacture and identify the part number required.
4. For pumps manufactured after July 2004. For bearing isolator kit, and for pumps prior to July 2004, see page 99.
40. Applies to pumps shipped after October 2003. Pumps shipped prior to October 2003 used qty 6 of plug with washer, part number 000046004+.
43. Exposed length of dowel pin: .75" (19 mm)
44. Exposed length of dowel pin: 1.125" (28.6 mm)
47. For Shaft & Bearing assembly part numbers, see page 96.

210, 213, 214, 320, 323, 324, 370-UII Common Parts, cont'd



PD100-352

ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
28	Shim Plate	2	105426+	
28A	Shims, Body, .002	AR	105866+	
	Shims, Body, .003	AR	105867+	
	Shims, Body, .005	AR	105868+	
	Shims, Body, .010	AR	105869+	
	Shims, Body, .020	AR	105870+	
28D	5/16-18 x 1" FHSCS	4	30-612	

PL5060-CH95

Notes: (See "Notes" column on page 85)

* Recommended Spare Parts

3. Pumps shipped prior to July 30, 2001.
4. Pumps shipped starting July 30, 2001
5. For pumps older than July 2004, and for bearing isolator kit, see page 99.
11. Used on 213-UII and 323-UII only.
16. For seals, see page 89.
17. For vented covers, see page 97.
47. For Shaft & Bearing assembly part numbers, see page 96.

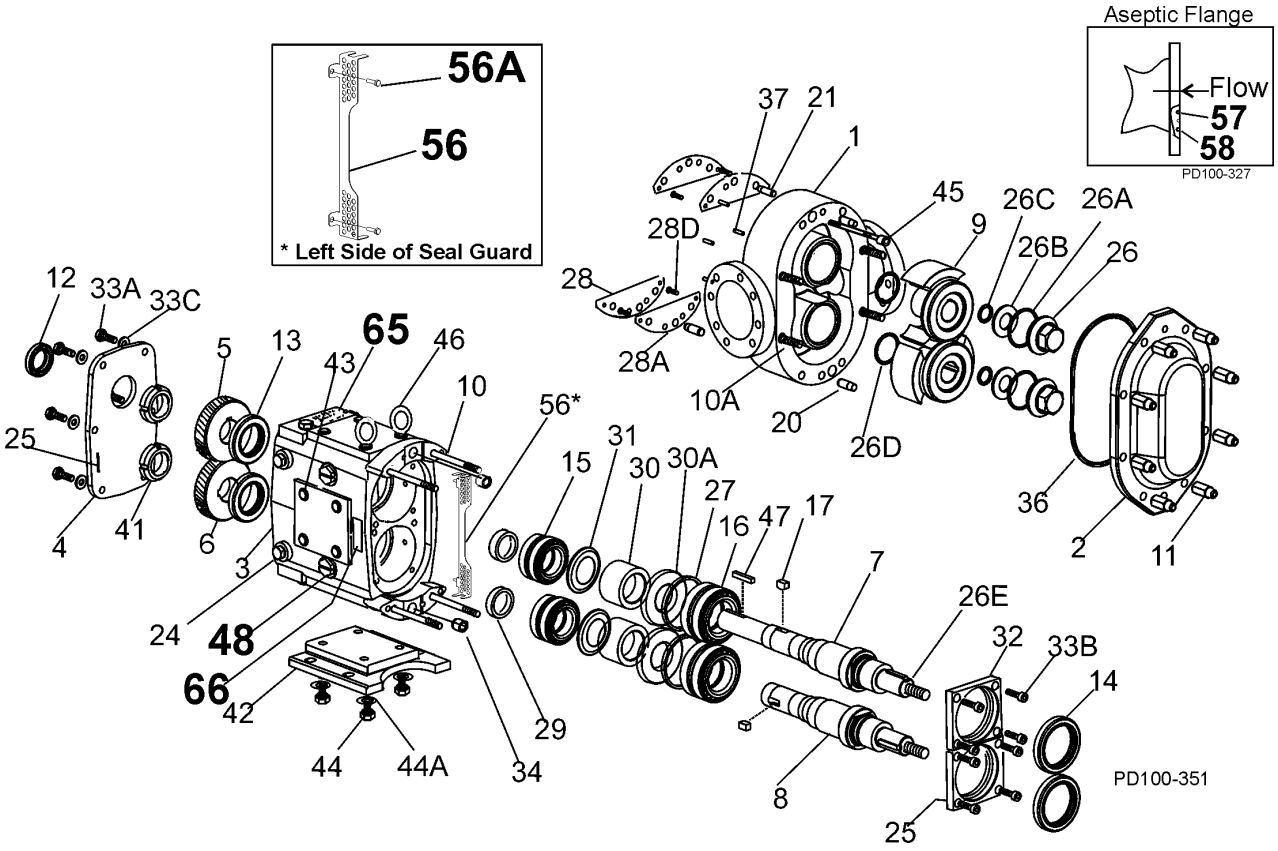
210, 213, 214, 320, 323, 324, 370-UII Common Parts, cont'd

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO.	NOTES
	29	Spacer, Gear to Rear Bearing	2	102474+	4
		Spacer, Gear to Rear Bearing		117691+	3
	30	Bearing Spacer	2	102472+	
	30A	Spacer Seal	2	102473+	
	31	Retainer, Grease	2	STD091000	
	32	Bearing Retainer, Front	2	123533+	5
		Bearing Retainer, Front, SS, used with bearing isolators		121141+	5
	33A	3/8-16 x .75" HHCS	6	30-50	
	33B	5/16-18 x 1" HHCS	8	30-34	
	33C	3/8" Flat Washer	6	43-30	
	34	Dowel Bushings	2	0H1116000	
	36	**210-224-UII O-Ring, Pump Cover, Buna N**	1	N70382	
		210-224-UII O-Ring, Pump Cover, EPDM	1	E70382	
		210-224-UII O-Ring, Pump Cover, FKM	1	V70382	
		210-224-UII O-Ring, Pump Cover, Silicone	1	S75382	
		320-324-370-UII O-Ring, Pump Cover, Buna N	1	N70383	
*		**320-324-370-UII O-Ring, Pump Cover, EPDM**	1	E70383	
		320-324-370-UII O-Ring, Pump Cover, FKM	1	V70383	
		320-324-370-UII O-Ring, Pump Cover, Silicone	1	S75383	
		213-323-UII O-Ring, Pump Cover, Outer, EPDM	1	323117012+	11
		213-323-UII O-Ring, Pump Cover, Outer, Silicone	1	323117013+	11
		213-323-UII O-Ring, Pump Cover, Outer, FKM	1	323117014+	11
	36A	**213-323-UII O-Ring, Pump Cover, Inner, EPDM**	1	323117002+	11
*		**213-323-UII O-Ring, Pump Cover, Inner, Silicone**	1	323117003+	11
		213-323-UII O-Ring, Pump Cover, Inner, FKM	1	323117004+	11
	36B	**214-UII Flange O-ring, Buna N**	1	N70377	
		214-UII Flange O-ring, EPDM	1	E70377	
*		**214-UII Flange O-ring, FKM**	1	V70377	
		324-UII Flange O-ring, Buna N	1	N70378	
		324-UII Flange O-ring, EPDM	1	E70378	
		324-UII Flange O-ring, FKM	1	V70378	
	37	Stop Pin, Seal	6	102438+	
	41	Locknut, Gear	2	105697+	
	42	Gear Case Shim, CI	1	40288+	
		Pump Pedestal, 22", Optional	1	324110226+	
	43	Plastic Cap Plug	8	000121001+	
	44	1/2-13 x 1-3/4" HHCS	4	30-127X	
	44A	Lock Washer, 1/2"	4	43-16	
	45	210-213-214-UII Body Retaining Screws - 3/8-16 x 3-1/2"	2	30-326	
		320-323-324-UII Body Retaining Screws - 3/8-16 x 4-1/2"	2	30-323	
		370-UII Body Retaining Screws - 3/8-16 x 6"	2	30-717	
	46	Eye Bolt	3	30-360	
	47	Key, Coupling - 5/8 x 5/8 x 2-3/4"	1	000037005+	
		Key, Coupling - Tru-Fit	1	119718+	

PL5060-CH95a

Notes: See page 84.

210, 213, 214, 320, 323, 324, 370-UII Common Parts, cont'd



210, 213, 214, 320, 323, 324, 370-UII Common Parts, cont'd

ITEM NO.	DESCRIPTION	QTY. (per pump)	PART NO.	NOTES
48	Cleanout Plug	2	41013+	15
56	210-213-UII Seal Guard	2	113503+	
	214-UII Seal Guard	1	113503+	
		1	126361+	
	320-323-370-UII Seal Guard	2	113504+	
	324-UII Seal Guard	1	113504+	
		1	126360+	
56A	1/4 - 20 x 3/8" HHCS	4	30-68	
60A	1/8-27 Aseptic Connection Pipe Plugs	10	STD128500	11
61	Name Plate, Sanitary	1	135624+	
62	#2 x .187" RHDS	4	30-355	
65	Caution Plate	2	121694+	
66	Warning Label	2	33-60	
67	Grease Fitting, 1/8"	4	BD0092000	1
68	Plastic Cap, Grease Fitting	4	BD0093000	

Notes: PL5060-CH96

* Recommended Spare Parts

1. This grease fitting is the straight style. Part number BD0092100 is the angled style.

11. Used on 213-UII and 323-UII only.

15. For an older gearcase without a threaded plug hole, use plug p/n 000121001+

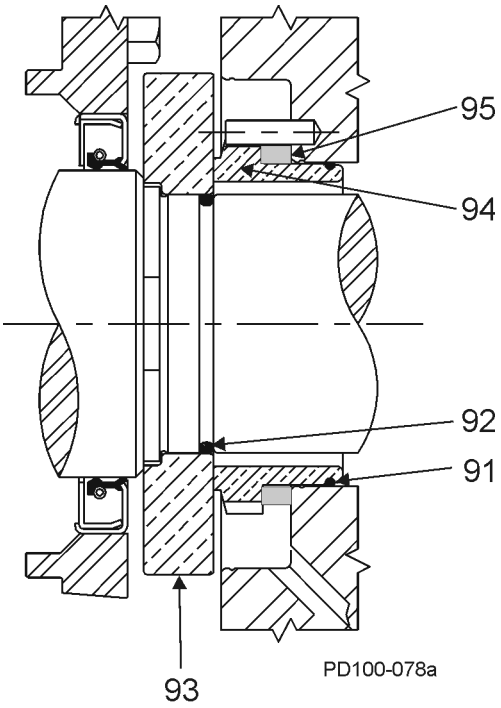
Aseptic Flange

	ITEM NO.	DESCRIPTION	QTY. (per pump)	PART NO.		NOTES
				213-UII	323-UII	
*	**57**	**O-Ring, Port, Inner, EPDM**	2	E70245	E70261	11
		O-Ring, Port, Inner, FKM	2	V70245	V70261	11
		O-Ring, Port, Inner, Silicone	2	S75245	S75261	11
*	**58**	**O-Ring, Port, Outer, EPDM**	2	E70251	E70265	11
		O-Ring, Port, Outer, FKM	2	V70251	V70265	11
		O-Ring, Port, Outer, Silicone	2	S75251	S752565	11

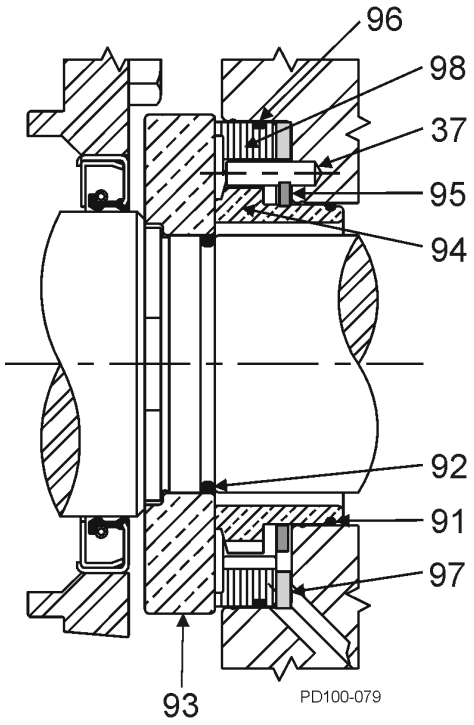
Notes: PL5060-CH96a

11. Used on 213-UII and 323-UII only.

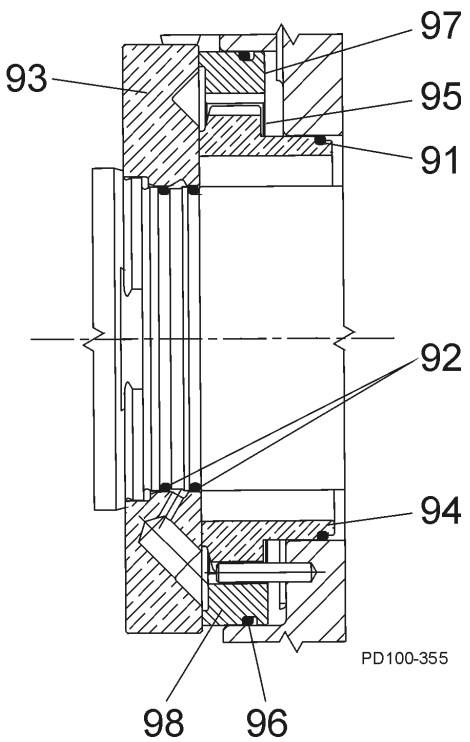
Universal II Standard Seals



Standard Single Mechanical Seal



Standard Double Mechanical Seal



Aseptic Design Double Mechanical Seal (213, 323 UII ONLY)

Universal II Standard Seals

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO. (by model)						NOTES
				006, 014, 015, 018 UII	030, 034, 040 UII	045, 060, 064, 130, 134 UII	180, 220, 224 UII	210, 214, 320, 324, 370 UII	213, 323 UII (see Note 5)	
*	91	**O-Ring, Inner Seal, Buna N**	2	N70028	N70031	N70035	N70041	N70154		
*		**O-Ring, Body, EPDM**		E70028	E70031	E70035	E70041	E70154		
*		**O-Ring, Body, FKM**		V70028	V70031	V70035	V70041	V70154		
*	92	**O-Ring, Shaft, Buna N**	2 (see Note 1)	N70024	N70029	N70133	N70145	N70149		1
*		**O-Ring, Shaft, EPDM**		E70024	E70029	E70133	E70145	E70149		
*		**O-Ring, Shaft, FKM**		V70024	V70029	V70133	V70145	V70149		
*	93	**Seal Seat, Ceramic**	2	101667+	101670+	101673+	101676+	105416+		
*		**Seal Seat, Silicon Carbide**		101668+	101671+	101674+	101677+	105417+	112192+	
*	94	**Seal Inner, Carbon**	2	101651+	101655+	101659+	101663+	105412+		
*		**Seal Inner, Ceramic**		101652+	101656+	101660+	101664+	105413+		
*		**Seal Inner, Silicon Carbide**		101653+	101657+	101661+	101665+	105414+		
*		**Seal Inner, Tungsten Carbide**		101654+	101658+	101662+	101666+	105415+		
	95	Wave Spring, Inner Seal	2	101683+	101685+	101687+	101689+	105419+		
*	96	**O-Ring, Outer Seal, Buna N**	2	N70035	N70041	N70043	N70046	N70160		2
*		**O-Ring, Outer Seal, EPDM**		E70035	E70041	E70043	E70046	E70160		
*		**O-Ring, Outer Seal, FKM**		V70035	V70041	V70043	V70046	V70160		
	97	Wave Spring, Outer Seal	2	101684+	101686+	101688+	101690+	105420+		2
*	98	**Outer Seal, Carbon**	2	101679+	101680+	101681+	101682+	105418+		2

Notes: PL5060-CH75b

* Recommended Spare Parts

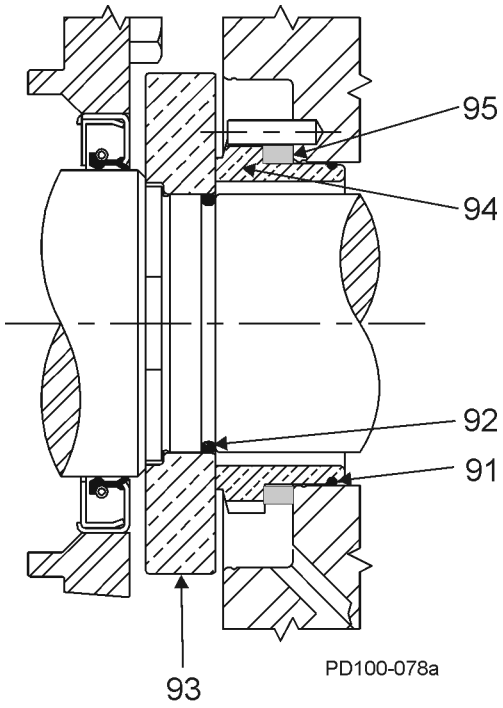
1. Qty. (4) needed per pump on 213-UII and 323-UII.
2. Double Mechanical Seal design only.
5. Aseptic 213 and 323-UII pumps are available only with a double mechanical seal.
6. See page 50 for o-ring selections, descriptions and color codes.

Universal II Specialty Seals

Universal II Narrow Face (NF) Seals

The Universal II Narrow Face (NF) Seal is available in the Single Mechanical Seal Design only. The smaller diameter rotating seal seat (item 93) is only used with the NF Seal.

(Standard Single Mechanical Seal shown for reference)



Standard Single Mechanical Seal

Universal II High-Pressure Barrier (HPB) Seals

The Universal II High Pressure Barrier (HPB) Seal is available in the Double Mechanical Seal Design only.

The maximum barrier pressure is 100 psi.

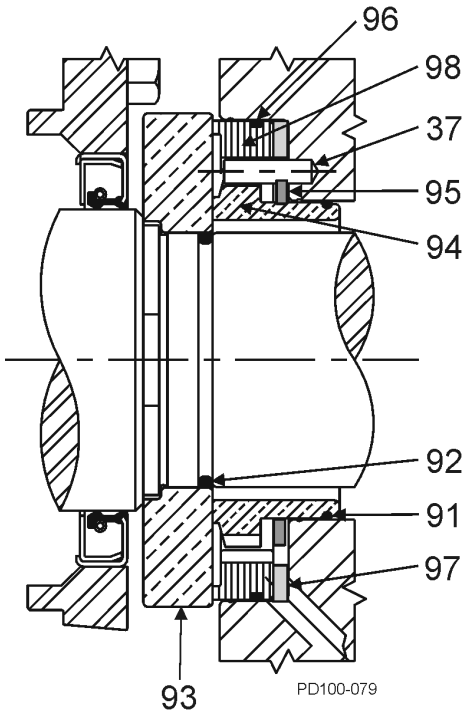
Recommended seal flush flow is 1/8 gpm.

To calculate the barrier pressure to ensure that the barrier fluid is on the seal instead of the product:

((Dp - Sp) X 30%) + Sp + 30 psi = Bp

Dp = pump discharge pressure
Sp = pump suction pressure
Bp = flush water pressure

(Standard Double Mechanical Seal shown for reference)



Standard Double Mechanical Seal

Universal II Specialty Seals

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO. (by model)					NOTES
				006, 014, 015, 018 UII	030, 034, 040 UII	045, 060, 064, 130, 134 UII	180, 220, 224 UII	210, 214, 320, 324. 370 UII	
*	91	O-Ring, Inner Seal, Buna N	2	N70028	N70031	N70035	N70041	N70154	
*		O-Ring, Body, EPDM		E70028	E70031	E70035	E70041	E70154	
*		O-Ring, Body, FKM		V70028	V70031	V70035	V70041	V70154	
*	92	O-Ring, Shaft, Buna N	2	N70024	N70029	N70133	N70145	N70149	
*		O-Ring, Shaft, EPDM		E70024	E70029	E70133	E70145	E70149	
*		O-Ring, Shaft, FKM		V70024	V70029	V70133	V70145	V70149	
*	93	NF Seal Seat, Silicon Carbide	2	124743+	124745+	124747+	124749+	124751+	3, 4
*		NF Seal Seat, Tungsten Carbide		124744+	124746+	124748+	124750+	124752+	
*		HPB Seal Seat, Ceramic		101667+	101670+	101673+	101676+	105416+	2, 4
*		HPB Seal Seat, Silicon Carbide		101668+	101671+	101674+	101677+	105417+	
*	94	NF Seal, Inner, Silicon Carbide	2	124734+	124736+	124738+	124740+	124742+	3, 4
*		NF Seal, Inner, Tungsten Carbide		124733+	124735+	124737+	124739+	124741+	
*		HPB Seal, Inner, Silicon Carbide		110821+	110823+	110825+	110827+	110829+	2, 4
*		HPB Seal, Inner, Tungsten Carbide		122324+	122325+	122326+	122327+	122328+	
	95	Wave Spring, Inner Seal	2	101683+	101685+	101687+	101689+	105419+	
*	96	O-Ring, Outer Seal, Buna N	2	N70035	N70041	N70043	N70046	N70160	2
*		O-Ring, Outer Seal, EPDM		E70035	E70041	E70043	E70046	E70160	
*		O-Ring, Outer Seal, FKM		V70035	V70041	V70043	V70046	V70160	
	97	Wave Spring, Outer Seal	2	101684+	101686+	101688+	101690+	105420+	2
*	98	Outer Seal, Carbon	2	101679+	101680+	101681+	101682+	105418+	2

Notes: PL5060-CH75a

* **Recommended Spare Parts**

2. Double Mechanical Seal design only.
3. Single Mechanical Seal design only.
4. HPB and NF seals are NOT available on the 213-UII or 323-UII.
6. See page 50 for o-ring selections, descriptions and color codes.

Seal Kits - 006, 015, 018-UII, 014-UII, 030, 040-UII, 034-UIII

UII Model	Description	Kit Part#
006, 015, 018-UII	SEAL KIT SM C/CE B	131420+
	SEAL KIT SM C/SC B	133247+
	SEAL KIT SM SC/SC B	133357+
	SEAL KIT SM TC/SC B	133496+
	SEAL KIT SM TC/SC	133497+
	SEAL KIT SM C/CE E	133164+
	SEAL KIT SM C/SC E	133249+
	SEAL KIT SM SC/SC	133358+
	SEAL KIT SM C/CE V	133163+
	SEAL KIT SM C/SC V	133248+
	SEAL KIT SM SC/SC V	126889+
	SEAL KIT SM TC/SC V	125945+
	SEAL KIT SM TCNF/SC V	137232+
	SEAL KIT DM C/CE/C B	133820+
	SEAL KIT DM SC/SC-C/SC B	133900+
	SEAL KIT DM SCNF/SC-C/SC B	133956+
	SEAL KIT DM SCNFC-C/SC B	122956+
	SEAL KIT DM TCNF/SC-C/SC B	134019+
	SEAL KIT DM C/CE-C/CE E	133821+
	SEAL KIT DM SC/SC-C/SC E	133901+
	SEAL KIT DM SCNF/SC-C/SC E	133958+
	SEAL KIT DM TCNF/SC-C/SC E	134021+
	SEAL KIT DM SCNF/SC-C/SC V	133957+
	SEAL KIT DM TCNF/SC-C/SC V	134020+
	SEAL KIT DM C/CE V	130840+
	SEAL KIT DM SC/SC-C/SC V	130847+
	SEAL KIT DM TC/SC-C/SC V	137908+
014-UII	SEAL KIT SM C/CE B	133165+
	SEAL KIT SM C/SC B	133250+
	SEAL KIT SM C/SC B	134297+
	SEAL KIT SM SC/SC B	133359+
	SEAL KIT SM TC/SC B	133498+
	SEAL KIT SM C/CE V	133166+
	SEAL KIT SM C/SC V	133255+
	SEAL KIT SM C/SC V	134298+
	SEAL KIT SM SC/SC V	133360+
	SEAL KIT SM TC/SC V	133499+
	SEAL KIT DM C/CE/C B	133822+
	SEAL KIT DM SC/SC-C/SC B	133902+
	SEAL KIT DM SCNF/SC-C/SC B	133959+
	SEAL KIT DM TCNF/SC-C/SC B	134022+
	SEAL KIT DM C/CE/C E	133824+
	SEAL KIT DM SC/SC-C/SC E	133904+
	SEAL KIT DM SCNF/SC-C/SC E	133961+
	SEAL KIT DM TCNF/SC-C/SC E	134024+
	SEAL KIT DM C/CE/C V	133823+
	SEAL KIT DM SC/SC-C/SC V	133903+
	SEAL KIT DM SCNF/SC-C/SC V	133960+
	SEAL KIT DM TCNF/SC-C/SC V	134023+
	SEAL KIT SM C/CE	133167+
	SEAL KIT SM C/SC E	133256+
	SEAL KIT SM SC/SC E	133361+
	SEAL KIT SM TC/SC E	133500+

UII Model	Description	Kit Part#
030, 040-UII	SEAL KIT SM C/CE B	129648+
	SEAL KIT SM C/SC B	134300+
	SEAL KIT SM SC/SC B	133362+
	SEAL KIT SM TC/SC B	133501+
	SEAL KIT SM C/CE E	133168+
	SEAL KIT SM C/SC E	134302+
	SEAL KIT SM SC/SC E	133363+
	SEAL KIT SM TC/SC E	133503+
	SEAL KIT SM C/CE V	123985+
	SEAL KIT SM C/SC V	134301+
	SEAL KIT SM SC/SC V	125019+
	SEAL KIT SM TC/SC V	133502+
	SEAL KIT DM SC/SC-C/SC B	133905+
	SEAL KIT DM SCNF/SC-C/SC B	133962+
	SEAL KIT DM TCNF/SC-C/SC B	134025+
	SEAL KIT DM C/CE-C/CE B	133825+
	SEAL KIT DM SC/SC-C/SC E	133906+
	SEAL KIT DM SCNF/SC-C/SC E	133964+
	SEAL KIT DM TCNF/SC-C/SC E	134027+
	SEAL KIT DM C/CE-C/CE E	133826+
	SEAL KIT DM C/CE-C/CE V	123986+
	SEAL KIT DM SCNF/SC-C/SC V	133963+
	SEAL KIT DM TCNF/SC-C/SC V	134026+
	SEAL KIT DM SC/SC-C/SC V	130841+
	SEAL KIT DM TC/SC-C/SC V	137907+
034-UII	SEAL KIT SM C/CE B	133169+
	SEAL KIT SM C/SC B	134303+
	SEAL KIT SM SC/SC B	134294+
	SEAL KIT SM TC/SC B	133504+
	SEAL KIT SM C/CE V	133170+
	SEAL KIT SM C/SC V	134304+
	SEAL KIT SM SC/SC V	134295+
	SEAL KIT SM TC/SC V	133505+
	SEAL KIT DM C/CE/C B	133827+
	SEAL KIT DM SC/SC-C/SC B	133907+
	SEAL KIT DM SCNF/SC-C/SC B	133965+
	SEAL KIT DM TCNF/SC-C/SC B	134028+
	SEAL KIT DM C/CE/C E	133829+
	SEAL KIT DM SC/SC-C/SC E	133909+
	SEAL KIT DM SCNF/SC-C/SC	133967+
	SEAL KIT DM TCNF/SC-C/SC	134030+
	SEAL KIT DM C/CE/C V	133828+
	SEAL KIT DM SC/SC-C/SC V	133908+
	SEAL KIT DM SCNF/SC-C/SC V	133966+
	SEAL KIT DM TCNF/SC-C/SC V	134029+
	SEAL KIT SM C/CE	133171+
	SEAL KIT SM C/SC E	134305+
	SEAL KIT SM SC/SC E	134296+
	SEAL KIT SM TC/SC E	133506+

PL5060-CH131

Key

SM Single Mechanical
DM Double Mechanical
C Carbon
CE Ceramic
SC Silicon Carbide
TC Tungsten Carbide
NF Narrow Face
B BUNA
E EPDM
V FKM

Seal Kits - 045, 060, 130-UII, 180, 220-UIII

UII Model	Description	Kit Part#
045, 060, 130-UII	SEAL KIT SM C/CE B	131422+
	SEAL KIT SM C/SC B	133257+
	SEAL KIT SM SC/SC B	133364+
	SEAL KIT SM TC/SC B	133507+
	SEAL KIT SM C/CE E	133172+
	SEAL KIT SM C/CE E	133178+
	SEAL KIT SM C/SC E	133258+
	SEAL KIT SM SC/SC E	133365+
	SEAL KIT SM TC/SC E	133508+
	SEAL KIT SM C/CE V	126890+
	SEAL KIT SM C/SC V	128193+
	SEAL KIT SM SC/SC V	125020+
	SEAL KIT SM TC/SC V	125023+
	SEAL KIT DM C/CE-C/CE B	133830+
	SEAL KIT DM SC/SC-C/SC B	133910+
	SEAL KIT DM SCNF/SC-C/SC B	133968+
	SEAL KIT DM TCNF/SC-C/SC B	134031+
	SEAL KIT DM C/CE-C/CE E	133832+
	SEAL KIT DM SC/SC-C/SC E	133912+
	SEAL KIT DM SCNF/SC-C/SC E	133970+
	SEAL KIT DM TCNF/SC-C/SC E	134033+
	SEAL KIT DM C/CE-C/CE V	133831+
	SEAL KIT DM SC/SC-C/SC V	128040+
	SEAL KIT DM SCNF/SC-C/SC V	133969+
	SEAL KIT DM TC/SC-C/SC V	136951+
	SEAL KIT DM TCNF/SC-C/SC V	134032+
	SEAL KIT DM TCNF/TC-C/TC V	135752+
064-UII	SEAL KIT SM C/CE B	133173+
	SEAL KIT SM C/SC B	134306+
	SEAL KIT SM SC/SC B	134099+
	SEAL KIT SM TC/SC B	133512+
	SEAL KIT SM C/CE V	133174+
	SEAL KIT SM C/SC V	134307+
	SEAL KIT SM SC/SC V	134100+
	SEAL KIT SM TC/SC V	133513+
	SEAL KIT DM C/CE/C B	133836+
	SEAL KIT DM SC/SC-C/SC B	133916+
	SEAL KIT DM SCNF/SC-C/SC B	133974+
	SEAL KIT DM TCNF/SC-C/SC B	134037+
	SEAL KIT DM C/CE/C E	133838+
	SEAL KIT DM SC/SC-C/SC E	133918+
	SEAL KIT DM SCNF/SC-C/SC E	133976+
	SEAL KIT DM TCNF/SC-C/SC E	134039+
	SEAL KIT DM C/CE/C V	133837+
	SEAL KIT DM SC/SC-C/SC V	133917+
	SEAL KIT DM SCNF/SC-C/SC V	133975+
	SEAL KIT DM TCNF/SC-C/SC V	134038+
	SEAL KIT SM C/CE E	133175+
	SEAL KIT SM C/SC E	134308+
	SEAL KIT SM SC/SC E	134101+
	SEAL KIT SM TC/SC E	133514+

PL5060-CH132

UII Model	Description	Kit Part#
134-UII	SEAL KIT SM C/CE B	133179+
	SEAL KIT SM C/SC B	134309+
	SEAL KIT SM SC/SC B	134105+
	SEAL KIT SM TC/SC B	133518+
	SEAL KIT SM C/CE V	133180+
	SEAL KIT SM C/SC V	134310+
	SEAL KIT SM SC/SC V	134106+
	SEAL KIT SM TC/SC V	133519+
	SEAL KIT DM C/CE/C B	133839+
	SEAL KIT DM SC/SC-C/SC B	133922+
	SEAL KIT DM SCNF/SC-C/SC B	133980+
	SEAL KIT DM TCNF/SC-C/SC B	134043+
	SEAL KIT DM C/CE/C E	133841+
	SEAL KIT DM SC/SC-C/SC E	133924+
	SEAL KIT DM SCNF/SC-C/SC E	133982+
	SEAL KIT DM TCNF/SC-C/SC E	134045+
	SEAL KIT DM C/CE/C V	133840+
	SEAL KIT DM SC/SC-C/SC V	133923+
	SEAL KIT DM SCNF/SC-C/SC V	133981+
	SEAL KIT DM TCNF/SC-C/SC V	134044+
	SEAL KIT SM C/CE E	133181+
	SEAL KIT SM C/SC E	134311+
	SEAL KIT SM SC/SC E	134107+
	SEAL KIT SM TC/SC E	133520+
180, 220-UII	SEAL KIT SM C/CE B	131423+
	SEAL KIT SM C/SC B	134318+
	SEAL KIT SM TC/SC B	133530+
	SEAL KIT SM C/CE V	133196+
	SEAL KIT SM C/SC V	134319+
	SEAL KIT SM SC/SC V	125021+
	SEAL KIT SM TC/SC V	125024+
	SEAL KIT SM TC/TC V	136745+
	SEAL KIT SM SC/SC B	133368+
	SEAL KIT DM C/CE-C/CE B	133848+
	SEAL KIT DM SC/SC-C/SC B	133928+
	SEAL KIT DM SCNF/SC-C/SC B	133989+
	SEAL KIT DM TCNF/SC-C/SC B	134049+
	SEAL KIT DM C/CE-C/CE E	133850+
	SEAL KIT DM SC/SC-C/SC E	133929+
	SEAL KIT DM SCNF/SC-C/SC E	133991+
	SEAL KIT DM TCNF/SC-C/SC E	134071+
	SEAL KIT DM C/CE-C/CE V	133849+
	SEAL KIT DM SC/SC-C/SC V	129647+
	SEAL KIT DM SCNF/SC-C/SC V	133990+
	SEAL KIT DM TCNF/SC-C/SC V	134050+
	SEAL KIT SM C/CE E	133197+
	SEAL KIT SM C/SC E	134320+
	SEAL KIT SM TC/SC E	133531+
	SEAL KIT SM SC/SC E	133369+

Key

SM Single Mechanical
DM Double Mechanical
C Carbon
CE Ceramic
SC Silicon Carbide
TC Tungsten Carbide
NF Narrow Face
B BUNA
E EPDM
V FKM

Seal Kits - 184-UII, 210, 213-UII, 214-UII, 224-UIII

UII Model	Description	Kit Part#
184-UII	SEAL KIT DM SC/SC-C/SC E	133935+
	SEAL KIT DM C/CE/C V	133855+
	SEAL KIT SM C/CE B	133201+
	SEAL KIT SM C/SC B	134549+
	SEAL KIT SM SC/SC B	134111+
	SEAL KIT SM TC/SC B	133535+
	SEAL KIT SM C/CE V	133202+
	SEAL KIT SM C/SC V	134550+
	SEAL KIT SM SC/SC V	134112+
	SEAL KIT SM TC/SC V	133536+
	SEAL KIT DM C/CE/C B	133854+
	SEAL KIT DM SC/SC-C/SC B	133933+
	SEAL KIT DM SCNF/SC-C/SC B	133995+
	SEAL KIT DM TCNF/SC-C/SC B	134075+
	SEAL KIT DM C/CE/C E	133856+
	SEAL KIT DM SCNF/SC-C/SC E	133997+
	SEAL KIT DM TCNF/SC-C/SC E	134077+
	SEAL KIT DM SC/SC-C/SC V	133934+
	SEAL KIT DM SCNF/SC-C/SC V	133996+
	SEAL KIT DM TCNF/SC-C/SC V	134076+
	SEAL KIT SM C/CE E	133203+
	SEAL KIT SM C/SC E	134551+
	SEAL KIT SM SC/SC E	134113+
	SEAL KIT SM TC/SC E	133537+
210, 213-UII	SEAL KIT SM C/CE B	131424+
	SEAL KIT SM C/SC B	134561+
	SEAL KIT SM SC/SC B	133547+
	SEAL KIT SM C/CE V	133213+
	SEAL KIT SM C/SC V	134562+
	SEAL KIT SM SC/SC V	125022+
	SEAL KIT SM SC/SC B	133374+
	SEAL KIT DM C/CE-C/CE B	133866+
	SEAL KIT DM SC/SC-C/SC B	133945+
	SEAL KIT DM SCNF/SC-C/SC B	134007+
	SEAL KIT DM TCNF/SC-C/SC B	134087+
	SEAL KIT DM C/CE-C/CE E	133868+
	SEAL KIT DM SC/SC-C/SC E	133946+
	SEAL KIT DM SCNF/SC-C/SC E	134009+
	SEAL KIT DM TCNF/SC-C/SC E	134089+
	SEAL KIT DM C/CE-C/CE V	133867+
	SEAL KIT DM SC/SC-C/SC V	129787+
	SEAL KIT DM SCNF/SC-C/SC V	134008+
	SEAL KIT DM TCNF/SC-C/SC	134088+
	SEAL KIT SM C/CE E	133214+
	SEAL KIT SM C/SC E	134563+
	SEAL KIT SM SC/SC E	133548+
	SEAL KIT SM SC/SC E	133375+

UII Model	Description	Kit Part#
214-UII	SEAL KIT SM C/CE B	133215+
	SEAL KIT SM C/SC B	134564+
	SEAL KIT SM SC/SC B	133552+
	SEAL KIT SM C/CE V	133216+
	SEAL KIT SM C/SC V	134565+
	SEAL KIT SM SC/SC V	134124+
	SEAL KIT SM SC/SC V	134124+
	SEAL KIT DM C/CE/C B	133872+
	SEAL KIT DM SC/SC-C/SC B	133950+
	SEAL KIT DM SCNF/SC-C/SC B	134013+
	SEAL KIT DM TCNF/SC-C/SC B	134093+
	SEAL KIT DM C/CE/C E	133874+
	SEAL KIT DM SC/SC-C/SC E	133952+
	SEAL KIT DM SCNF/SC-C/SC E	134015+
	SEAL KIT DM TCNF/SC-C/SC E	134095+
	SEAL KIT DM SC/SC-C/SC V	133951+
	SEAL KIT DM TCNF/SC-C/SC V	134094+
	SEAL KIT SM C/CE E	133217+
	SEAL KIT SM C/SC E	134566+
	SEAL KIT SM SC/SC E	133554+
224-UII	SEAL KIT SM C/CE B	133207+
	SEAL KIT SM C/SC B	134555+
	SEAL KIT SM SC/SC B	134117+
	SEAL KIT SM TC/SC B	133541+
	SEAL KIT SM C/C E	133209+
	SEAL KIT SM C/SC E	134557+
	SEAL KIT SM SC/SC E	134119+
	SEAL KIT SM TC/SC E	133543+
	SEAL KIT SM C/CE V	133208+
	SEAL KIT SM C/SC V	134556+
	SEAL KIT SM SC/SC V	134118+
	SEAL KIT SM TC/SC V	133542+
	SEAL KIT DM C/CE/C B	133860+
	SEAL KIT DM SC/SC-C/SC B	133939+
	SEAL KIT DM SCNF/SC-C/SC B	134001+
	SEAL KIT DM TCNF/SC-C/SC B	134081+
	SEAL KIT DM C/CE/C E	133862+
	SEAL KIT DM SC/SC-C/SC E	133941+
	SEAL KIT DM SCNF/SC-C/SC E	134003+
	SEAL KIT DM TCNF/SC-C/SC E	134083+
	SEAL KIT DM C/CE/C V	133861+
	SEAL KIT DM SC/SC-C/SC V	133940+
	SEAL KIT DM SC/SC-C/SC V	133943+
	SEAL KIT DM SCNF/SC-C/SC V	134002+
	SEAL KIT DM TCNF/SC-C/SC V	134082+

PL5060-CH133

Key

SM Single Mechanical
DM Double Mechanical
C Carbon
CE Ceramic
SC Silicon Carbide
TC Tungsten Carbide
NF Narrow Face
B BUNA
E EPDM
V FKM

Seal Kits - 320-UII, 370-UII, 324-UII

UII Model	Description	Kit Part#
320, 370-UII	SEAL KIT SM C/CE B	133218+
	SEAL KIT SM C/SC B	134567+
	SEAL KIT SM SC/SC B	133376+
	SEAL KIT SM SC/SC B	133549+
	SEAL KIT SM C/CE V	133219+
	SEAL KIT SM C/SC V	134568+
	SEAL KIT SM SC/SC V	133377+
	SEAL KIT SM SC/SC V	133550+
	SEAL KIT DM C/CE-C/CE B	133869+
	SEAL KIT DM SC/SC-C/SC B	133947+
	SEAL KIT DM SCNF/SC-C/SC B	134010+
	SEAL KIT DM TCNF/SC-C/SC B	134090+
	SEAL KIT DM C/CE-C/CE E	133871+
	SEAL KIT DM SC/SC-C/SC E	133949+
	SEAL KIT DM SCNF/SC-C/SC E	134012+
	SEAL KIT DM TCNF/SC-C/SC E	134092+
	SEAL KIT DM C/CE-C/CE V	133870+
	SEAL KIT DM SC/SC-C/SC V	133948+
	SEAL KIT DM SCNF/SC-C/SC V	134011+
	SEAL KIT DM TCNF/SC-C/SC V	134091+
	SEAL KIT SM C/SC E	134569+
	SEAL KIT SM SC/SC E	133378+
	SEAL KIT SM SC/SC E	133551+
324-UII	SEAL KIT SM C/CE B	133221+
	SEAL KIT SM C/SC B	134570+
	SEAL KIT SM SC/SC B	134126+
	SEAL KIT SM C/CE V	133222+
	SEAL KIT SM C/SC V	134571+
	SEAL KIT SM SC/SC V	133556+
	SEAL KIT DM C/CE/C B	133875+
	SEAL KIT DM SC/SC-C/SC B	133953+
	SEAL KIT DM SCNF/SC-C/SC B	134016+
	SEAL KIT DM TCNF/SC-C/SC B	134096+
	SEAL KIT DM C/CE/C E	133877+
	SEAL KIT DM SC/SC-C/SC E	133955+
	SEAL KIT DM SCNF/SC-C/SC E	134018+
	SEAL KIT DM TCNF/SC-C/SC E	134098+
	SEAL KIT DM C/CE/C V	133876+
	SEAL KIT DM SC/SC-C/SC V	133954+
	SEAL KIT DM SCNF/SC-C/SC V	134017+
	SEAL KIT DM TCNF/SC-C/SC V	134097+
	SEAL KIT SM C/CE E	133223+
	SEAL KIT SM C/SC E	134572+
	SEAL KIT SM SC/SC E	133557+

PL5060-CH134

Key
SM Single Mechanical
DM Double Mechanical
C Carbon
CE Ceramic
SC Silicon Carbide
TC Tungsten Carbide
NF Narrow Face
B BUNA
E EPDM
V FKM

Shaft & Bearing Assemblies

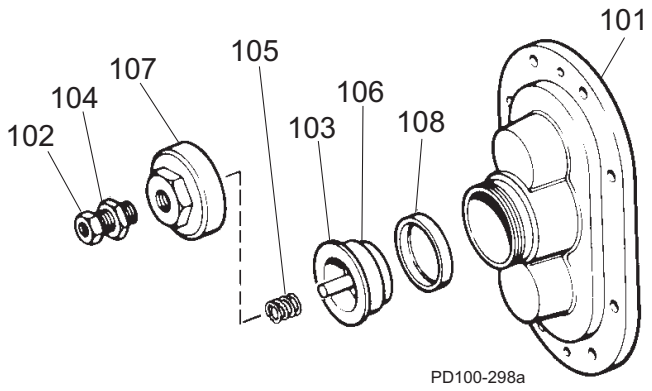
DESCRIPTION	QTY. PER PUMP	PART NO.
006-014-015-UII Drive Shaft & Bearing Assy.	1	137289+
006-014-015-UII Short Shaft & Bearing Assy.	1	137291+
018-UII Drive Shaft & Bearing Assy.	1	137290+
018-UII Short Shaft & Bearing Assy.	1	137292+
30-34 UII Drive Shaft & Bearing Assy.	1	137293+
30-34 UII Short Shaft & Bearing Assy.	1	137294+
045-UII Drive Shaft & Bearing Assy.	1	137296+
045-UII Short Shaft & Bearing Assy.	1	137497+
060-064-UII Drive Shaft & Bearing Assy.	1	137297+
060-064-UII Short Shaft & Bearing Assy.	1	137299+
130-134-UII Drive Shaft & Bearing Assy.	1	137298+
130-134-UII Short Shaft & Bearing Assy.	1	137300+
180-184-UII Drive Shaft & Bearing Assy.	1	137301+
180-184-UII Short Shaft & Bearing Assy.	1	137304+
220-224-UII Drive Shaft & Bearing Assy.	1	137303+
220-224-UII Short Shaft & Bearing Assy.	1	137305+
210-214-UII Drive Shaft & Bearing Assy.	1	137330+
210-214-UII Short Shaft & Bearing Assy.	1	POA
320-324-UII Drive Shaft & Bearing Assy.	1	137306+
320-324-UII Short Shaft & Bearing Assy.	1	137307+

Notes: PL5060-CH128

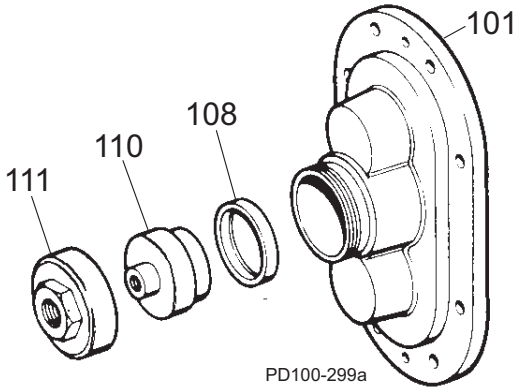
Assembly includes items 7 or 8 (Drive or Short Shaft), 15 (Rear Bearing), 16 (Front Bearing), 17 (gear key), and 29 (gear to rear bearing spacer). See model-specific parts list page for drawing.

Universal II PD Pump Vented Covers

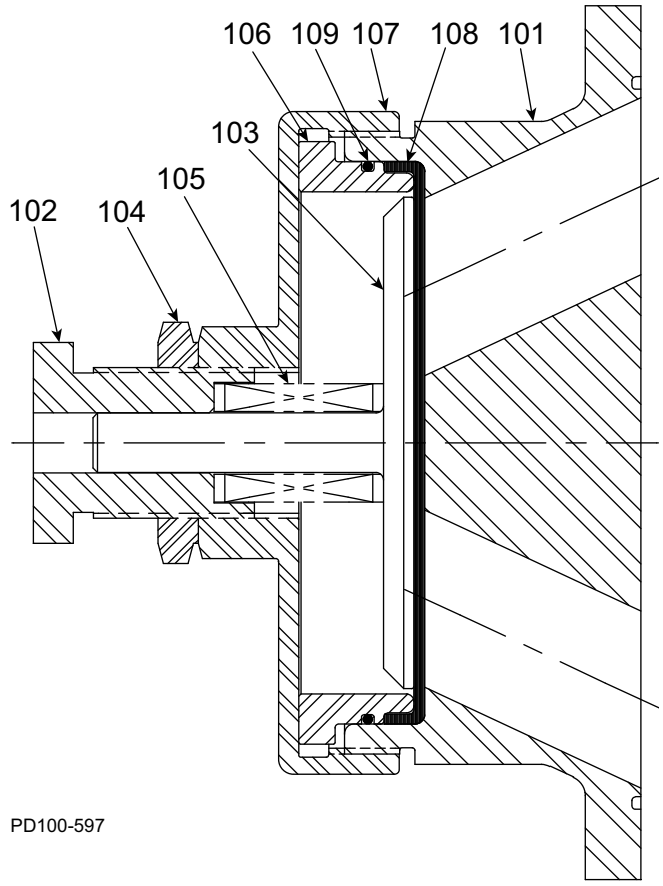
Manual Vented Cover, 006-134-UII



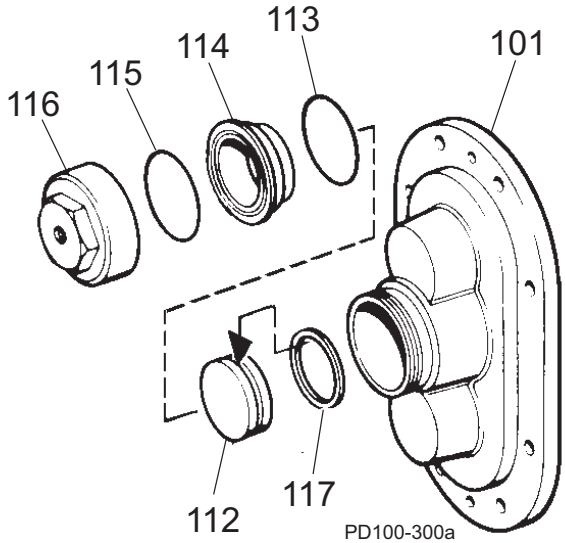
Pneumatic Diaphragm Vented Cover



Manual Vented Cover, 180-220-224 UII



Pneumatic Piston Vented Cover



Universal II PD Pump Vented Covers

	ITEM NO.	DESCRIPTION	QTY. PER PUMP	PART NO. 006-014-015-018-UII	PART NO. 030-034-040-UII	PART NO. 045-060-064-130-134-UII	PART NO. 180-220-224-UII	NOTES
		MANUAL VENTED COVER						
	101	Vented Cover	1	103669+	103670+	103671+	103672+	
	102	Adjusting Screw	1	AD0072000		113657+	GD0072100	1
	103	Spring Plunger	1	AD0073000		113397+	GD0073000	2
	104	Locknut	1	AD0074000		GD0074000		
	105	Spring, Medium (< 150 psi)	1	AD0076000		113523+	113400+	3
		Spring, High (> 150 psi)		ABB076100		113400+	113524+	4
	106	Diaphragm Bushing	1	AD0077000		CD0077000	GD0077000	
	107	Cover Nut	1	AD0075000		113398+	GD0075000	5
*	**108**	**Rubber Diaphragm, Buna N**	1	AD0078000		CD0078000	GD0078000	
	109	**O-ring, Buna N**	1	N/A		N/A	N70261	12
*		**O-ring, FKM**					V70261	
		O-ring, Silicone					S75261	
		PNEUMATIC DIAPHRAGM VENTED COVER						
	101	Vented Cover	1	103669+	103670+	103671+	N/A	
*	**108**	**Diaphragm, Buna N**	1	AD0078000		CD0078000	N/A	
	110	Diaphragm Bushing	1	AD0077P00		CD0077P00	N/A	
	111	Cover Nut	1	AD0075P00		CD0075P00	N/A	
		PNEUMATIC PISTON VENTED COVER						
	101	Vented Cover	1	103669+	103670+	103671+	103672+	
	112	Piston	1	AD0073P10		CD0073P10	GD0073P10	
*	**113**	**O-Ring, Bushing Seal, Buna N**	1	N70223		N70239	N70381	
	114	Diaphragm Bushing	1	AD0077P10		CD0077P10	GD0077P10	
*	**115**	**O-Ring, Nut Seal, Buna N**	1	N70224		N70240	N70381	
	116	Cover Nut	1	AD0075P10		CD0075P10	GD0075P10	
*	**117**	**Piston Seal, Quad Ring**	1	AD0133000		CD0133000	GD0133000	9
		Piston Seal, O-Ring		N70218		N70236	N70258	9

PL5060-CH112

Notes:

*** Recommended Spare Parts**

1. 045-060-064-130-134-UII: for pumps older than approx March 2000, use p/n AD0072000.
2. 045-060-064-130-134-UII: for pumps older than approx March 2000, use p/n CD0073000.
3. 045-060-064-130-134-UII: for pumps older than approx March 2000, use p/n AD0076000"
   180-220-224-UII: for pumps older than approx March 2000, use p/n ABB076200.
4. 045-060-064-130-134-UII: for pumps older than approx March 2000, use p/n ABB076200.
   180-220-224-UII: for pumps older than approx March 2000, use p/n GD0076100
5. 045-060-064-130-134-UII: for pumps older than approx March 2000, use p/n CD0075000.
9. Quad Ring and O-Ring can be interchanged.
12. Applies to 180, 220, and 224-UII models only

Grease Seals, Bearing Retainers, and Bearing Isolator Kits

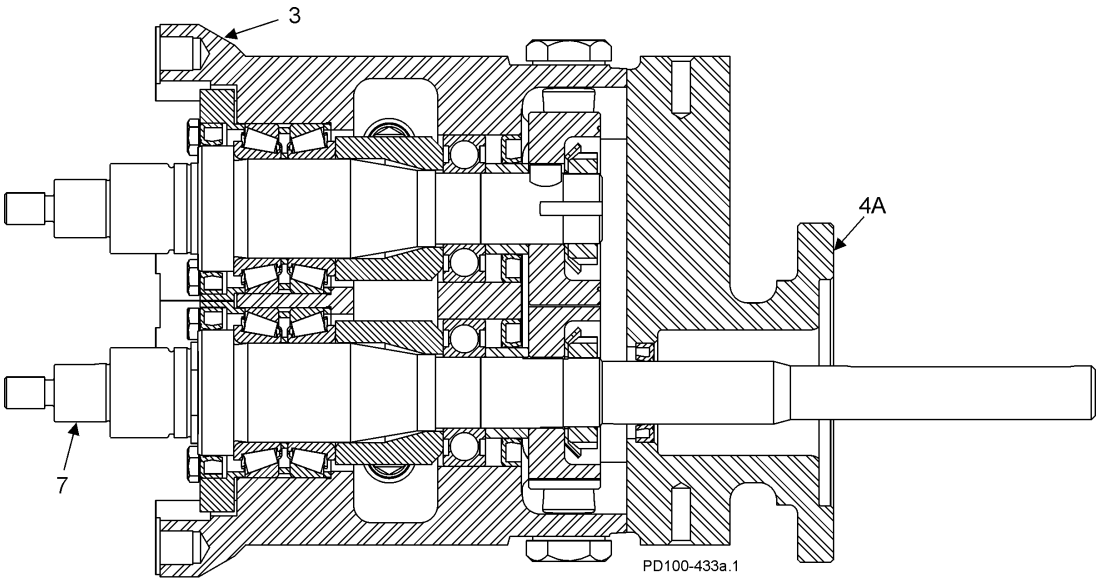
UII Model Number	Item	Description	For pumps manufactured: before 7/12/04	For pumps manufactured: after 7/12/04 (Newest)	Notes
006, 014, 015, 018, 024	14	Grease Seal, Bearing Retainer, standard gearcase	000030018+	121679+	8
	14	Grease Seal, Bearing Retainer, SS gearcase	101716+		4
	32	Bearing Retainer, Front SS, for standard gearcase	015080000+	120332+	8
	32	Bearing Retainer, Front SS, for SS Gearcase or Bearing Isolator	101810+		4
		Bearing Isolator Kit, SS	X06638-1		8
030, 034, 040	14	Grease Seal, Bearing Retainer	121680+		8
	32	Bearing Retainer, Front SS, for std. lip seal	120333+		8
	32	Bearing Retainer, Front SS, for SS Gearcase or Bearing Isolator	101811+	122337+	2, 8
		Bearing Isolator Kit	N/A	X06639-1	2, 8
045, 060, 064, 130, 134	14	Grease Seal, Bearing Retainer	101829+		
	32	Bearing Retainer, Front CTD	N/A, use 123531+	123531+	5
	32	Bearing Retainer, Front SS, for std. lip seal	121828+		6
	32	Bearing Retainer, Front SS, used with bearing isolators.	101812+		6
		Bearing Isolator Kit, SS	X06640-2		
180, 184, 220, 224	14	Grease Seal, Bearing Retainer	N/A; use 121681+	121681+	1
	32	Bearing Retainer, Front CTD	220080000+	N/A use 121829+	
	32	Bearing Retainer, Front SS, for std. lip seal	121829+		8
	32	Bearing Retainer, Front SS, used with bearing isolators.	101813+		3, 7, 8
		Bearing Isolator Kit, SS	X06634-2		3, 7, 8
210, 213, 214, 320, 323, 324	14	Grease Seal, Bearing Retainer	N/A; use 121681+	121681+	1
	32	Bearing Retainer, Front CTD	0H1080000	N/A, use 123533+	8
	32	Bearing Retainer, Front SS	118365+	123533+	8
	32	Bearing Retainer, Front SS, used with bearing isolators.	121141+		3, 7
		Bearing Isolator Kit, SS	X06634-3		3, 7, 8

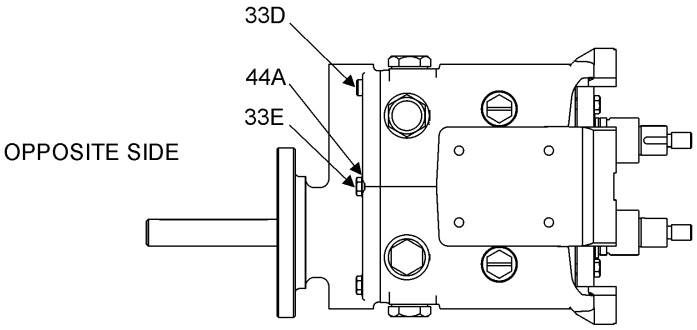
PL5060-CH113

Notes: CTD = Coated Steel; SS = Stainess Steel

1. Pumps manufactured up through 1993 may take STD030005 instead (used old-style shafts). Verify serial no. to confirm.
2. 101811+ is used with bearing isolators. If isolator is needed, use part # X06639 (no kit available). Check gearcase serial no. Kit X06639-1 contains bearing retainer 122337+
3. Isolator kit X06634-2 contains 101813+ bearing retainer. Isolator kit X06634-3 contains 121141+ bearing retainer."
4. 101810+ bearing retainer is used with 101716+ grease seal.
5. 123531+ is available until stock is depleted, then will be replaced by 121828+
6. 101812+ is used with bearing isolators; for std. lip seal, use part # 121828+
7. When changing to this bearing isolator, if it rubs and is very difficult to turn over, add a .010 shim to each shaft, on top of the bearing in the pump, between the bearing and the retainer.
8. When changing a pump supplied WITHOUT a bearing isolator, to one WITH a bearing isolator, order the isolator kit.

Tru-Fit™ Universal II PD Pump





Item No.	Description	Pump Size			
		006, 014, 015	018, 024	030, 034	040
3	Gear Case, CI	118986+		121687+	
4A	Gear Case Cover, Adapter	118982+		Serial # Req'd	
7	Drive Shaft	119182+	119183+	119184+	119185+
33D	1/4-20 x 1" HHCS	30-93		N/A	
	5/16-18 x 1-1/8" HHCS	N/A		30-237	
33E	5/16" x 3/4" lg. SHSB	30-690		N/A	
	3/8" x 3/4" lg. SHSB	N/A		30-691	
44A	Flat Washer, 5/16"	43-246		N/A	N/A
	Flat Washer, 3/8"	N/A		43-30	

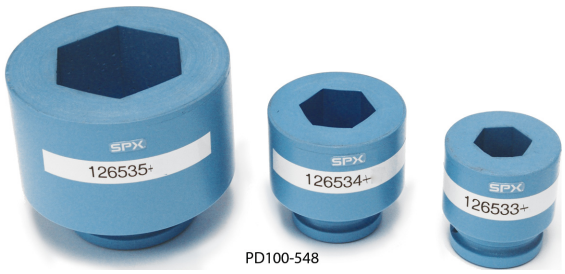
Item No.	Description	Pump Size							
		045	060, 064	130, 134	180, 184	220, 224	210, 214	320, 324	370
3	Gear Case, CI	118987+			118988+		119009+		
4A	Gear Case Cover, Adapter	Serial Number Required							
7	Drive Shaft	119186+	119187+	119188+	119189+	119190+	119191+	119192+	124841+
33D	3/8-16 x 1-1/2" HHCS	30-50					N/A		
	1/2-13 x 1-1/2" HHCS	N/A					30-103		
33E	1/2" x 1" lg. SHSB	30-692					N/A		
	5/8" x 1" lg. SHSB	N/A					30-693		
44A	Flat Washer, 1/2"	43-31							

Note: PL5060-CH66

Oil seal, gear case cover (Item 12 on previous pages) is not included with item 4A; it is re-used from the existing gearcase seal. See parts lists/diagrams on previous pages for the various pump models.

Special Tools

Non-Marring Socket Tool for Rotor Nuts



PD100-548

Model UII Pumps	Part Number
006, 014, 015, 018	126533+
030, 034, 040	126534+
045, 060, 064, 130, 134	126257+
180, 184, 220, 224	126535+
210, 213, 214, 320, 323, 324	126536+

PL5060-CH116

Gear Nut Driver, Gear End Shaft Thread Chaser

Description	Model UII Pumps	Part Number
Gear Nut Driver	006, 014, 015, 018	109281+
Gear Nut Driver	030, 034, 040	109282+
Gear Nut Driver	045, 060, 064, 130, 134	109283+
Gear Nut Driver	180, 184, 220, 224	
Gear Nut Driver	210, 213, 214, 320, 323, 324	
Gear End Shaft Thread Chaser	006, 014, 015, 018	109287+
Gear End Shaft Thread Chaser	030, 034, 040	109288+
Gear End Shaft Thread Chaser	045, 060, 064, 130, 134	109289+
Gear End Shaft Thread Chaser	180, 184, 220, 224	110305+
Gear End Shaft Thread Chaser	210, 213, 214, 320, 323, 324	

PL5060-CH129

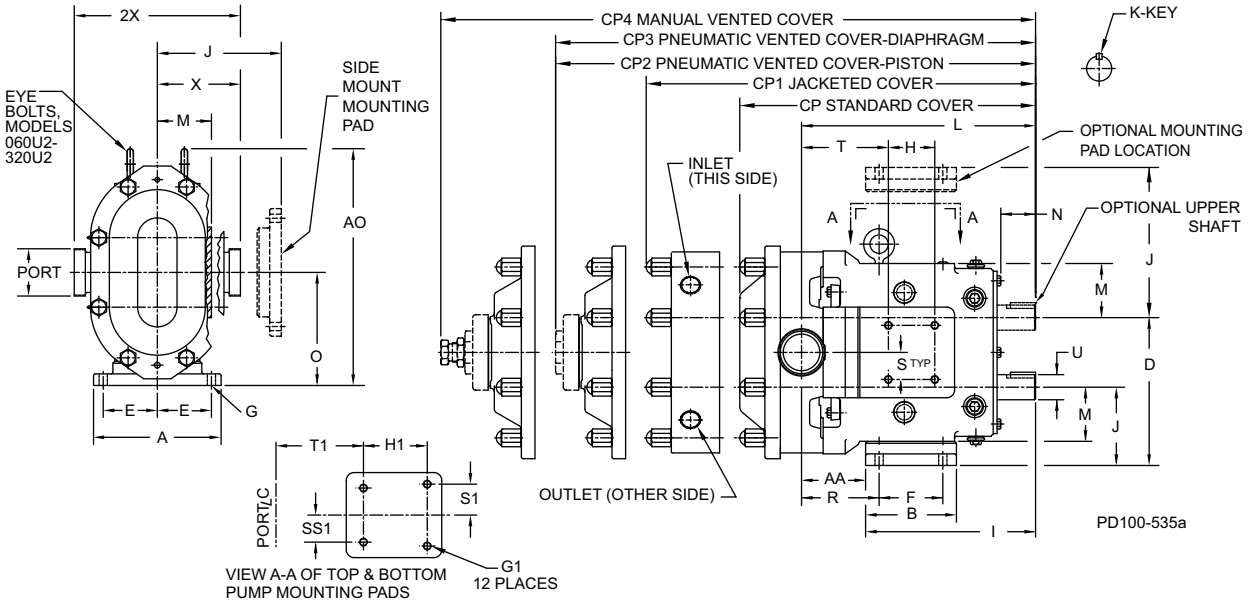
O-ring Removal Tool

Description	Part Number
O-ring removal tool	AD0096001

PL5060-CH130

Pump Dimensions

Universal II PD Pump Dimensions



UII Model		A	AA	AO	B	CP	CP1	CP2	CP3	CP4	D	E	F	G	G1
6	inch	4.75	1.95	8.3	3.75	11.71	13.92	13.2	13.29	14.92	5.5	1.94	2.31	.41, slot	5/16-18x.62
	mm	121	50	211	95	297	354	335	338	379	140	49	59	10, slot	-
15	inch	4.75	1.95	8.3	3.75	11.71	13.92	13.2	13.29	14.92	5.5	1.94	2.31	.41, slot	5/16-18x.62
	mm	121	50	211	95	297	354	335	338	379	140	49	59	10 slot	-
18	inch	4.75	2.18	8.3	3.75	12.37	14.59	13.86	13.95	15.58	5.5	1.94	2.31	.41, slot	5/16-18x.62
	mm	121	55	211	95	314	371	352	354	396	140	49	59	10 slot	-
30	inch	6.25	2.78	10.29	4.25	14.49	16.49	15.89	15.98	17.58	6.86	2.31	2.56	.41, slot	3/8-16x.62
	mm	159	71	261	108	368	419	404	406	447	174	59	65	10 slot	-
40	inch	6.25	2.99	10.29	4.25	14.87	16.87	16.27	16.36	17.96	6.86	2.31	2.56	.41, slot	3/8-16x.62
	mm	159	76	261	108	378	428	413	416	456	174	59	65	10 slot	-
45	inch	8.25	3.86	15.31	5.87	18.59	20.7	20.68	20.97	22.28	9.56	3.50	4.12	.53, slot	1/2-13x.88
	mm	210	98	389	149	472	526	525	533	566	243	89	105	13, slot	-
60	inch	8.25	4.14	15.31	5.87	19.14	21.25	21.23	21.52	22.83	9.56	3.50	4.12	0.53	1/2-13x.88
	mm	210	105	389	149	486	540	539	547	580	243	89	105	13	-
130	inch	8.25	4.78	15.31	5.87	20.15	22.27	22.25	22.53	23.84	9.56	3.50	4.12	0.53	1/2-13x.88
	mm	210	121	389	149	512	566	565	572	606	243	89	105	13	-
180	inch	8.5	3.45	19.13	9	23.26	25.32	26.71	N/A	28.51	12.38	3.75	7.25	.53, slot	1/2-13x.88
	mm	216	88	486	229	591	643	678	-	724	314	95	184	13, slot	-
210	inch	12	3.45	22.38	11.63	27.08	28.58	-	-	-	13.88	5.25	8.00	0.66	1/2-13x.88
	mm	305	88	568	295	688	726	-	-	-	353	133	203	17	-
213	inch	12	3.45	22.38	11.6	27.08	-	-	-	-	13.88	5.25	8.00	0.66	1/2-13x.88
	mm	305	88	568	295	688	-	-	-	-	353	133	203	17	-
220	inch	8.5	3.69	19.13	9	24	26.06	27.45		29.25	12.38	3.75	7.25	.53, slot	1/2-13x.88
	mm	216	94	486	229	610	662	713		743	314	95	184	13, slot	-
320	inch	12	3.84	22.38	11.6	27.66	29.16	-	-	-	13.88	5.25	8.00	0.66	1/2-13x.88
	mm	305	97	568	295	703	741	-	-	-	353	133	203	17	-
370	inch	12	4.53	22.38	11.63	29.16	30.66	-	-	-	13.88	5.25	8.00	0.66	1/2-13x.88
	mm	305	115	568	295	741	779	-	-	-	353	133	203	17	-

PD100-534

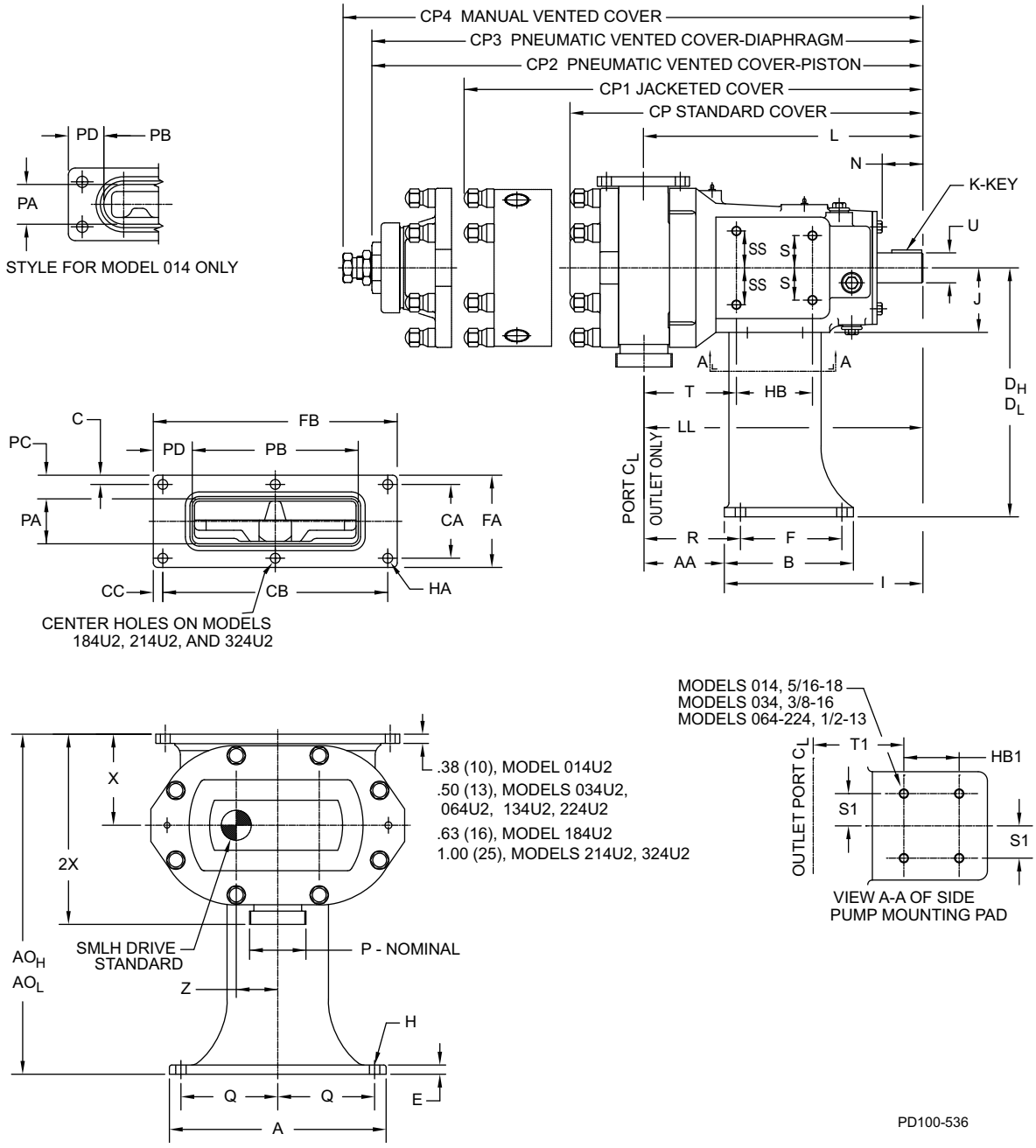
Universal II PD Pump Dimensions

UII Model		H	H1	I	J	K +002 -.000	L	M	N	O	Port Size	R	S	S1	SS1	T	T1	U +002 -.000	X	2X
6	inch	2.50	2.50	7.66	2.93	.1875	9.61	2.12	2	4.21	1"	2.79	1.00	1.00	1.00	2.51	2.51	0.88	3.49	6.97
	mm	64	64	194	74	4.76	244	54	51	107	--	71	25	25	25	64	64	22.2	89	177
15	inch	2.50	2.50	7.66	2.93	.1875	9.61	2.12	2.00	4.21	1-1/2"	2.79	1.00	1.00	1.00	2.51	2.51	0.88	3.49	6.97
	mm	64	64	194	74	4.76	244	54	51	107	--	71	25	25	25	64	64	22.2	89	177
18	inch	2.50	2.50	7.66	2.93	.1875	9.84	2.12	2.00	4.21	1-1/2"	3.02	1.00	1.00	1.00	2.74	2.51	0.88	3.55	7.09
	mm	64	64	194	74	4.76	250	54	51	107	--	77	25	25	25	70	64	22.2	89	177
30	inch	1.81	2.75	8.83	3.56	0.25	11.61	2.62	2.32	5.21	1-1/2"	3.84	1.12	1.12	1.12	4.00	3.59	1.25	4.25	8.50
	mm	46	70	224	90	6.35	295	67	59	132	--	98	28	28	28	102	91	31.8	108	216
40	inch	1.81	2.75	8.83	3.56	0.25	11.99	2.62	2.32	5.21	2"	4.00	1.12	1.12	1.12	4.38	3.97	1.25	4.31	8.62
	mm	46	70	224	90	6.35	305	67	59	132	--	102	28	28	28	111	101	31.8	109	219
45	inch	3.00	4.13	10.99	5.06	0.38	14.86	3.50	2.25	7.31	2'	4.73	1.75	2.00	1.75	5.34	5.01	1.63	5.37	10.75
	mm	76	105	279	129	9.525	377	89	57	186	--	120	44	51	44	136	127	41.3	136	273
60	inch	3.00	4.13	10.99	5.06	0.38	15.14	3.50	2.25	7.31	2-1/2"	5.01	1.75	2.00	1.75	5.62	5.01	1.63	5.4	10.75
	mm	76	105	279	129	9.53	385	89	57	186	--	127	44	51	44	143	127	41.3	136	273
130	inch	3.00	4.13	10.99	5.06	0.38	15.77	3.50	2.25	7.31	3"	5.65	1.75	2.00	1.75	6.25	5.66	1.63	5.4	10.75
	mm	76	105	279	129	9.53	401	89	57	186	--	144	44	51	44	159	144	41.3	136	273
180	inch	5.38	5.38	14.80	6.38	0.5	18.25	4.50	2.75	9.38	3"	4.20	2.69	2.69	2.69	5.76	6.00	2.00	6.53	13.06
	mm	137	137	376	162	12.7	464	114	70	238	--	107	68	68	68	146	152	50.8	168	332
210	inch	5.38	5.38	17.80	6.88	0.63	21.24	5.06	4.06	10.38	4"	4.70	2.69	2.69	2.69	7.83	7.83	2.38	7.37	14.73
	mm	137	137	452	175	15.9	539	129	103	264	--	119	68	68	68	199	199	60.45	187	374
213	inch	5.38	5.38	17.80	6.88	0.625	21.24	5.06	4.06	10.38	4" 300# FLG	4.70	2.69	2.69	2.69	7.83	7.83	2.38	8.6	17.3
	mm	137	137	452	175	15.9	539	129	103	264	--	119	68	68	68	199	199	60.5	219	438
220	inch	5.38	5.38	14.80	6.38	0.50	18.49	4.50	2.75	9.38	4"	4.44	2.69	2.69	2.69	6.00	6.00	2.00	6.63	13.25
	mm	137	137	376	162	12.7	470	114	70	238	--	113	68	68	68	152	152	50.80	168	337
320	inch	5.38	5.38	17.80	6.88	0.63	21.63	5.06	4.03	10.38	6" 150# FLG	5.09	2.69	2.69	2.69	8.22	8.22	2.38	8.00	16.00
	mm	137	137	452	175	15.9	549	129	103	264	--	129	68	68	68	209	209	60.5	203	406
370	inch	5.38	5.38	17.80	6.88	0.63	22.32	5.06	4.06	10.38	6" 150# FLG	5.78	2.69	2.69	2.69	8.91	8.91	2.38	8.50	17.00
	mm	137	137	452	175	15.9	567	129	103	264	--	147	68	68	68	226	226	60.5	216	432

PD100-534b

Note:
Dimensions 'X' and '2X' apply for bevel seat, 'S' Clamp, 'Q' Clamp, 15I and 14I fittings (except 213UII & 320UII).
CP= Standard Cover, CP1= Jacketed Cover, CP4= Manual Vented Cover.
Connection Sizes for Jacketed Covers are 3/4" NPT on Models 006 to 030UII; 1" NPT on Models 045 to 370UII.

Rectangular Flange Universal II PD Pump Dimensions



Rectangular Flange Universal II PD Pump Dimensions

UII RF Model		A	AA	AOL	B	C	CA	CB	CC	CP	CP1	CP4	DL	E	F	FA
14	inch	6.75	1.95	12.5	4.13	0.5	1.62	6.5	0.5	11.71	13.92	14.92	8.88	0.38	2.31	2.63
	mm	171	50	318	105	13	41	165	13	297	354	379	226	10	59	67
34	inch	8	2.88	12.75	4.25	0.62	1.88	10.75	0.62	14.49	16.49	17.58	8.88	0.38	3	3.12
	mm	203	73	324	108	16	48	273	16	368	419	447	226	10	76	79
64	inch	11.75	4.35	13.94	7	0.5	4	12.2	0.52	19.14	21.25	22.83	9	0.5	5.5	5
	mm	298	110	354	178	13	102	310	13	486	540	580	229	13	140	127
134	inch	11.75	5	13.94	7	0.78	3	14	0.63	20.15	22.27	23.84	9	0.5	5.5	4.55
	mm	298	127	354	178	20	76	356	16	512	566	606	229	13	140	116
184	inch	15	4.32	20.75	9.5	0.63	5.75	16.75	0.63	23.26	25.32	28.51	13.5	0.63	8.25	7
	mm	381	110	527	241	16	146	425	16	591	643	724	343	16	210	178
214	inch	18	4.38	35.94	12	0.75	7.5	16.5	0.75	27.08	28.58	-	27.13	0.75	9.5	9
	mm	457	111	913	305	19	190	419	19	688	726	-	689	19	241	229
224	inch	15	4.75	19.75	9.5	0.63	4.37	16.75	0.63	24	26.06	29.25	13.5	0.63	8.25	5.62
	mm	381	121	502	241	16	111	425	16	610	662	743	343	16	210	143
324	inch	18	4.79	35.94	12	0.81	8	16.5	0.75	27.66	29.16	-	27.13	0.75	9.5	9.63
	mm	457	122	913	305	21	203	419	19	703	741	-	689	19	241	245

UII RF Model		FB	H	HA	I	J	L	P	PA	PB	PC	PD	U	X	2X
14	inch	7.5	0.41	0.41	7.66	2.12	9.61	1-1/2"	1.44	4.94	0.59	1.28	0.875	3.63	7.11
	mm	191	10	10	195	54	244	--	37	125	15	33	22.23	92	181
34	inch	12	0.44	0.53	8.49	2.62	11.36	2"	1.81	6.84	0.66	2.58	1.25	3.88	8.12
	mm	305	11	13	216	67	289	--	46	174	17	66	31.75	99	206
64	inch	13.23	0.56	0.53	10.77	3.5	15.16	2-1/2"	2.44	9	1.28	2.11	1.625	4.94	10.31
	mm	336	14	13	274	89	385	--	62	229	33	54	41.28	125	262
134	inch	15.25	0.56	0.53	10.77	3.5	15.78	3"	3.19	9.38	0.68	2.94	1.625	4.94	10.31
	mm	387	14	13	274	89	401	--	81	238	17	75	41.28	125	262
184	inch	18	0.56	0.53	13.74	4.5	18.31	3"	3.28	11.25	1.86	3.38	2	7.25	13.78
	mm	457	14	13	349	114	465	--	83	286	47	86	50.8	184	350
214	inch	18	0.69	0.69	16.86	5.06	21.26	4"	3.45	12.7	2.78	2.65	2.375	8.81	16.17
	mm	457	18	18	428	129	540	--	88	323	71	67	60.33	224	411
224	inch	18	0.56	0.53	13.74	4.5	18.49	4"	4.06	11.25	0.78	3.38	2	6.25	12.87
	mm	457	14	13	349	114	470	--	103	286	20	86	50.8	159	327
324	inch	18	0.69	0.69	16.86	5.06	21.63	6"	4.25	12.7	2.69	2.65	2.375	8.81	17.81
	mm	457	18	18	428	129	549	--	108	323	68	67	60.33	224	452

PD100-537

Note:

Dimension '2X' applies for bevel seat, 'S' Clamp, 'Q' Clamp, 15l and 14l fittings.

CP= Standard Cover, CP1= Jacketed Cover, CP4= Manual Vented Cover.

Connection Sizes for Jacketed Covers are 3/4" NPT on Models 014 to 034; 1" NPT on Models 064-324.

Tru-Fit ™ Universal II PD Pump Dimensions

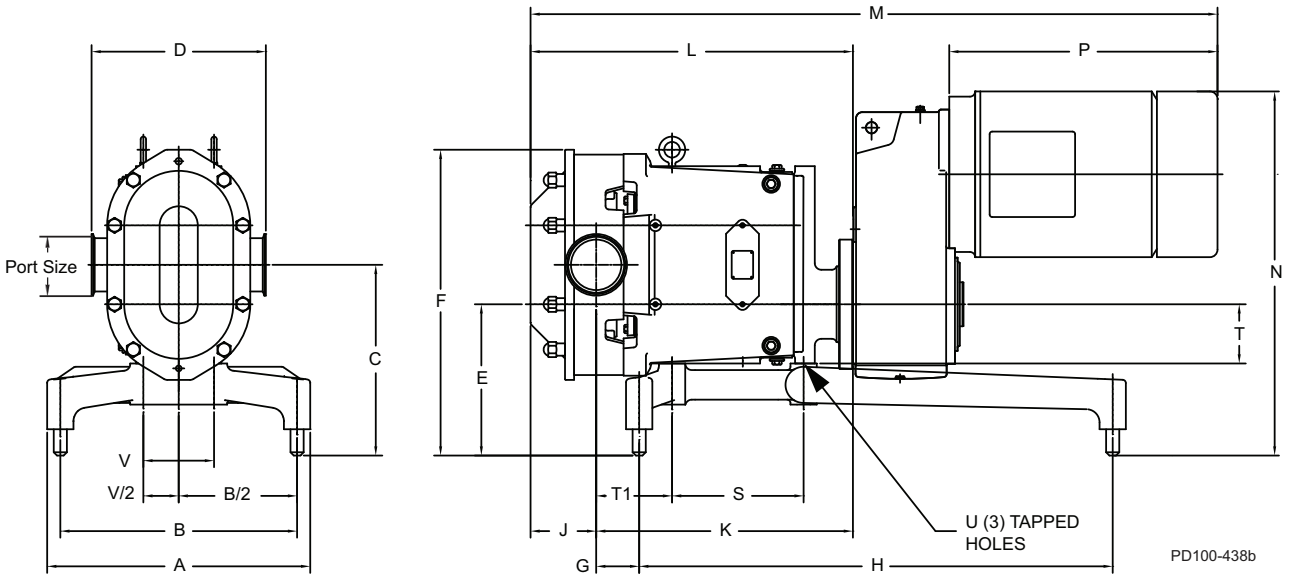


Table of Dimensions

UII Model		A	B	C	D [2]	E	F	G	H	J	K	L	M [1]	N [1]	P [1]	S	T	T1	Port Size	U	V
006	in.	12.0	10.0	9.15	6.97	7.87	13.25	2.01	18.0	2.11	10.08	12.19	27.31	15.56	10.92	5.44	2.12	2.51	1-1/2"	5/16-18 x .62	2.0
	mm	305	254	232	177	200	337	51	457	54	256	310	394	395	227	138	54	64	--	N/A	51
015	in.	12.0	10.0	9.15	6.97	7.87	13.25	2.01	18.0	2.11	10.08	12.19	27.31	15.56	10.92	5.44	2.12	2.51	1-1/2"	5/16-18 x .62	2.0
	mm	304	254	232	177	200	337	51	457	54	256	310	694	395	227	138	54	64	--	N/A	51
018	in.	12.0	10.0	9.15	7.10	7.87	13.25	2.25	18.0	2.54	10.31	12.85	27.31	15.56	10.92	5.44	2.12	2.51	1-1/2"	5/16-18 x .62	2.0
	mm	304	254	232	180	200	337	57	457	65	262	326	694	395	227	138	54	64	--	N/A	51
030	in.	14.0	12.0	10	8.51	8.37	15.11	2.59	20.0	2.87	12.47	15.34	33.57	18.65	13.74	5.81	2.62	3.59	1-1/2"	3/8-16 x .62	2.25
	mm	356	304	255	216	213	384	66	508	73	317	390	853	474	349	148	67	91	--	N/A	57
040	in.	14.0	12.0	10	8.62	8.37	15.11	2.97	20.0	2.87	12.84	15.71	33.94	18.65	13.74	5.81	2.62	3.97	2"	3/8-16 x .62	2.25
	mm	356	305	255	219	213	384	75	508	73	326	399	862	474	349	148	67	101	--	N/A	57
045	in.	18.0	16.0	12.0	10.74	9.75	20.0	2.73	28.0	4.0	17.11	21.11	43.72	22.02	17.16	8.13	3.5	5.01	2"	1/2-13 x .88	3.5
	mm	457	406	305	273	248	508	69	711	102	435	536	1110	559	436	207	89	127	--	N/A	89
060	in.	18.0	16.0	12.0	10.74	9.75	20.0	3.01	28.0	4.0	17.39	21.39	44.0	22.02	17.16	8.13	3.5	5.01	2-1/2"	1/2-13 x .88	3.5
	mm	457	406	305	273	248	508	76	711	102	442	543	1118	559	436	207	89	127	--	N/A	89
130	in.	18.0	16.0	12.0	10.74	9.75	20.0	3.64	28.0	4.38	18.02	22.4	45.01	22.02	17.16	8.13	3.5	5.66	3"	1/2-13 x .88	3.5
	mm	457	406	305	273	248	508	92	711	111	458	569	1143	559	436	207	89	144	--	N/A	89
180	in.	20.0	18.0	14.5	13.06	11.5	23.25	3.27	36.0	4.99	19.52	24.51	50.02	25.91	18.82	10.0	4.5	6	3"	1/2-13 x 1.0	5.38
	mm	508	457	368	332	292	591	83	914	127	496	623	1271	658	478	254	114	152	--	N/A	137
220	in.	20.0	18.0	14.5	13.25	11.5	23.25	3.51	36.0	5.49	19.76	25.25	50.76	25.91	18.82	10.0	4.5	6	4"	1/2-13 x 1.0	5.38
	mm	508	457	368	337	292	591	89	914	139	502	641	1289	658	478	254	114	152	--	N/A	137

PD100-439

[1] Dimensions affected by motor frame size

[2] Dimensions affected by connection type

ATEX Supplement to Universal II Operational Manuals

1. ATEX declaration of conformity must be included with operational manual.
2. Sight glass in gear case is not approved; black plugs must be installed on all drain/level ports.
3. Only Waukesha Cherry-Burrell brand spare parts are allowed to be installed into the pump. Use of non-Waukesha Cherry-Burrell brand parts will void ATEX approval.

SPXFLOW

CE Declaration of Conformity (ATEX)

Manufacturer: SPX FLOW, Inc.

Address: 611 Sugar Creek Road
Delavan, WI 53115
USA

Machine or Product: Rotary Positive Displacement Pumps

Model or Type: Universal II

We hereby declare that the described machine complies with the requirements of Directive 2006/42/EC. With reference to Appendix 1 of the Directive on essential safety and health requirements, we also declare the machine (equipment) complies with the requirements of Directive 94/9/EC.

Applicable EU Directives:
Directive 2006/42/EC - Machinery
Directive 94/9/EC - Equipment and Protective Systems intended for use in potentially explosive atmospheres (ATEX)

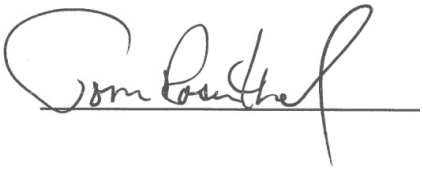
Applicable Harmonized Standards:
EN 292-1 Safety of Machinery
EN 292-2 Safety of Machinery
EN 809 Pump Safety
EN 1050 Risk Assessment
EN1127-1 Explosive Atmospheres
EN13463-1 Use in Explosive Atmospheres
EN 13463-5 Use in Explosive Atmospheres

ATEX documentation is archived at the Notified Body shown below under:
File Number 968/Ex-Ab 355/03

TUV Rheinland
Am Grauen Stein
51105 Köln
Germany

Marking: CE Ex **II 2 G c IIB T4**

SPX FLOW, Inc.:
Name: Tom Rosenthal Title: Component and Aftermarket Director
Date: November 15, 2016

Signature: 

Universal II Maintenance Summary Reference Sheet

Universal II Model	Change oil every 750 hours* ISO Grade 320, SAE 140 or AGMA Number 6EP		Grease bearings every 750 hours* NLGI Grade No. 2, EP, Lithium-based grease.	
	** Aggressive washdown or extreme running conditions may require more frequent lubrication intervals.*			
	Oil Capacity (Gears)		Grease Quantity (per Bearing)	
	Top or Bottom	Side Mount	Front	Rear
006, 014, 015, 018	1.3 oz (40 ml)	3.3 oz (100 ml)	0.37 oz (11 cc)	0.13 oz (4 cc)
030, 034, 040	2.0 oz (60 ml)	4 oz (120 ml)	0.60 oz (18 cc)	0.21 oz (6 cc)
045, 060, 064, 130, 134	6.0 oz (170 ml)	9.5 oz (280 ml)	0.84 oz (25 cc)	0.76 oz (22 cc)
180, 184, 220, 224	11 oz (320 ml)	20 oz (600 ml)	1.33 oz (39 cc)	1.03 oz (30 cc)
210, 213, 214, 320, 323, 324, 370	17 oz (500 ml)	44 oz (1300 ml)	1.96 oz (58 cc)	1.16 oz (34 cc)

Universal II Model	Torque Values - Locknuts		Universal II Wrench Size		
	Rotor	Cover	Rotor Nut	Body Retaining Cap Screw	Cover Nut
006, 015, 018	50 ft lbs (68 N·m)	7 ft lbs (10 N·m)	15/16"	3/16"	5/8"
030, 040	120 ft lbs (163 N·m)	11 ft lbs (15 N·m)	1-1/4"		5/8"
045, 060	250 ft lbs (339 N·m)	56 ft lbs (76 N·m)	1-5/8"	1/4"	7/8"
130		25 ft lbs (34 N·m)			
180, 220	325 ft lbs (441 N·m)	110 ft lbs (149 N·m)	2-1/4"	5/16"	7/8"
210, 213, 320, 323, 370	375 ft lbs (508 N·m)	158 ft lbs (214 N·m)	2-3/8"		1"

Universal II Model	A - Back Face in (mm)		B - Rotor to Body in (mm)		C - Front Face in (mm)	
Rotor Type:	Std & FF	Hot	Std & FF	Hot	Standard	FF & Hot
006	0.0015 - 0.002 (0.04 - 0.05)	0.0015 - 0.002 (0.04 - 0.05)	0.001 - 0.004 (0.03 - 0.10)	0.0025 - 0.0055 (0.06 - 0.14)	0.004 - 0.006 (0.10 - 0.15)	0.0055 - 0.0075 (0.14 - 0.19)
014, 015, 018	0.0015 - 0.002 (0.04 - 0.05)	0.0015 - 0.002 (0.04 - 0.05)	0.001 - 0.004 (0.03 - 0.10)	0.0025 - 0.0055 (0.06 - 0.14)	0.004 - 0.0065 (0.10 - 0.17)	0.006 - 0.0085 (0.15 - 0.22)
030, 034, 040	0.002 - 0.0025 (0.05 - 0.06)	0.002 - 0.0025 (0.05 - 0.06)	0.001 - 0.005 (0.03 - 0.13)	0.0025 - 0.006 (0.06 - 0.15)	0.0035 - 0.006 (0.09 - 0.15)	0.0065 - 0.009 (0.17 - 0.23)
045, 060, 064	0.003 - 0.0035 (0.08 - 0.09)	0.003 - 0.0035 (0.08 - 0.09)	0.003 - 0.0075 (0.08 - 0.19)	0.005 - 0.010 (0.13 - 0.25)	0.0045 - 0.009 (0.11 - 0.23)	0.0085 - 0.014 (0.22 - 0.36)
130, 134	0.003 - 0.0035 (0.08 - 0.09)	0.003 - 0.0035 (0.08 - 0.09)	0.0035 - 0.0075 (0.09 - 0.19)	0.0055 - 0.0095 (0.14 - 0.24)	0.0045 - 0.009 (0.11 - 0.23)	0.009 - 0.015 (0.23 - 0.38)
180, 184, 220, 224	0.004 - 0.005 (0.10 - 0.13)	0.004 - 0.005 (0.10 - 0.13)	0.0055 - 0.0095 (0.14 - 0.24)	0.009 - 0.013 (0.23 - 0.33)	0.005 - 0.010 (0.13 - 0.25)	0.010 - 0.015 (0.25 - 0.38)
210, 213, 214, 320, 323, 324	0.005 - 0.006 (0.13 - 0.15)	0.005 - 0.006 (0.13 - 0.15)	0.008 - 0.012 (0.20 - 0.30)	0.010 - 0.014 (0.25 - 0.36)	0.007 - 0.012 (0.18 - 0.30)	0.013 - 0.018 (0.33 - 0.46)
370	0.005 - 0.006 (0.13 - 0.15)	0.005 - 0.006 (0.13 - 0.15)	0.009 - 0.013 (0.23 - 0.33)	0.011 - 0.015 (0.28 - 0.38)	0.007 - 0.012 (0.18 - 0.30)	0.013 - 0.018 (0.33 - 0.46)

Std = Standard Clearance Rotors; FF = Front Faced Clearance Rotors; Hot = Hot Clearance Rotors PD100-600a

Standard Rotors: -40°F (-40°C) to 180°F (82°C); FF Clearance Rotors: 180°F (82°C) to 200°F (93°C); Hot Clearance Rotors: -40°F (-40°C) to 300°F (149°C). Contact SPX FLOW Application Engineering if alternate rotors are needed. ***NOTE:*** *The assembly clearances stated above are for reference only. Actual pump clearances may vary based on pump performance testing*

Universal II Maintenance Summary Reference Sheet - Copy for optional removal

Universal II Model	Change oil every 750 hours* ISO Grade 320, SAE 140 or AGMA Number 6EP		Grease bearings every 750 hours* NLGI Grade No. 2, EP, Lithium-based grease.	
	* *Aggressive washdown or extreme running conditions may require more frequent lubrication intervals.*			
	Oil Capacity (Gears)		Grease Quantity (per Bearing)	
	Top or Bottom	Side Mount	Front	Rear
006, 014, 015, 018	1.3 oz (40 ml)	3.3 oz (100 ml)	.37 oz (11 cc)	.13 oz (4 cc)
030, 034, 040	2.0 oz (60 ml)	4 oz (120 ml)	.60 oz (18 cc)	.21 oz (6 cc)
045, 060, 064, 130, 134	6.0 oz (170 ml)	9.5 oz (280 ml)	.84 oz (25 cc)	.76 oz (22 cc)
180, 184, 220, 224	11 oz (320 ml)	20 oz (600 ml)	1.33 oz (39 cc)	1.03 oz (30 cc)
210, 213, 214, 320, 323, 324, 370	17 oz (500 ml)	44 oz (1300 ml)	1.96 oz (58 cc)	1.16 oz (34 cc)

Universal II Model	Torque Values - Locknuts		Universal II Wrench Size		
	Rotor	Cover	Rotor Nut	Body Retaining Cap Screw	Cover Nut
006, 015, 018	50 ft lbs (68 N·m)	7 ft lbs (10 N·m)	15/16"	3/16"	5/8"
030, 040	120 ft lbs (163 N·m)	11 ft lbs (15 N·m)	1-1/4"		5/8"
045, 060	250 ft lbs (339 N·m)	56 ft lbs (76 N·m)	1-5/8"	1/4"	7/8"
130		25 ft lbs (34 N·m)			
180, 220	325 ft lbs (441 N·m)	110 ft lbs (149 N·m)	2-1/4"	5/16"	7/8"
210, 213, 320, 323, 370	375 ft lbs (508 N·m)	158 ft lbs (214 N·m)	2-3/8"		1"

Universal II Model	A - Back Face in (mm)		B - Rotor to Body in (mm)		C - Front Face in (mm)	
Rotor Type:	Std & FF	Hot	Std & FF	Hot	Standard	FF & Hot
006	0.0015 - 0.002 (0.04 - 0.05)	0.0015 - 0.002 (0.04 - 0.05)	0.001 - 0.004 (0.03 - 0.10)	0.0025 - 0.0055 (0.06 - 0.14)	0.004 - 0.006 (0.10 - 0.15)	0.0055 - 0.0075 (0.14 - 0.19)
014, 015, 018	0.0015 - 0.002 (0.04 - 0.05)	0.0015 - 0.002 (0.04 - 0.05)	0.001 - 0.004 (0.03 - 0.10)	0.0025 - 0.0055 (0.06 - 0.14)	0.004 - 0.0065 (0.10 - 0.17)	0.006 - 0.0085 (0.15 - 0.22)
030, 034, 040	0.002 - 0.0025 (0.05 - 0.06)	0.002 - 0.0025 (0.05 - 0.06)	0.001 - 0.005 (0.03 - 0.13)	0.0025 - 0.006 (0.06 - 0.15)	0.0035 - 0.006 (0.09 - 0.15)	0.0065 - 0.009 (0.17 - 0.23)
045, 060, 064	0.003 - 0.0035 (0.08 - 0.09)	0.003 - 0.0035 (0.08 - 0.09)	0.003 - 0.0075 (0.08 - 0.19)	0.005 - 0.010 (0.13 - 0.25)	0.0045 - 0.009 (0.11 - 0.23)	0.0085 - 0.014 (0.22 - 0.36)
130, 134	0.003 - 0.0035 (0.08 - 0.09)	0.003 - 0.0035 (0.08 - 0.09)	0.0035 - 0.0075 (0.09 - 0.19)	0.0055 - 0.0095 (0.14 - 0.24)	0.0045 - 0.009 (0.11 - 0.23)	0.009 - 0.015 (0.23 - 0.38)
180, 184, 220, 224	0.004 - 0.005 (0.10 - 0.13)	0.004 - 0.005 (0.10 - 0.13)	0.0055 - 0.0095 (0.14 - 0.24)	0.009 - 0.013 (0.23 - 0.33)	0.005 - 0.010 (0.13 - 0.25)	0.010 - 0.015 (0.25 - 0.38)
210, 213, 214, 320, 323, 324	0.005 - 0.006 (0.13 - 0.15)	0.005 - 0.006 (0.13 - 0.15)	0.008 - 0.012 (0.20 - 0.30)	0.010 - 0.014 (0.25 - 0.36)	0.007 - 0.012 (0.18 - 0.30)	0.013 - 0.018 (0.33 - 0.46)
370	0.005 - 0.006 (0.13 - 0.15)	0.005 - 0.006 (0.13 - 0.15)	0.009 - 0.013 (0.23 - 0.33)	0.011 - 0.015 (0.28 - 0.38)	0.007 - 0.012 (0.18 - 0.30)	0.013 - 0.018 (0.33 - 0.46)

Std = Standard Clearance Rotors; FF = Front Faced Clearance Rotors; Hot = Hot Clearance Rotors PD100-600a

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Notes

Universal II Series

ROTARY POSITIVE DISPLACEMENT PUMP

SPXFLOW

SPX FLOW, Inc.
611 Sugar Creek Road
Delavan, WI 53115
P: (262) 728-1900 or (800) 252-5200
F: (262) 728-4904 or (800) 252-5012
E: wcb@spxflow.com

ISSUED: 01/2017