Ampco Pumps Company

Ampco AL Series

Positive Displacement Pumps

Installation and Maintenance Manual

Original Instructions

M-001 H 02.25

Safety Notices

IMPORTANT: Read and understand this manual BEFORE installation, operation, or maintenance of the pump. Improper installation, operation, or maintenance may result in severe injury or death. Equipment damage caused by user neglect will invalidate the pump warranty.

Definitions

There are safety symbols used throughout this manual identifying safety concerns.

⚠ DANGER

Indicates a hazardous situation that, if not avoided, will result in death or serious injury. This applies to the most extreme situations.

⚠ Warning

Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

⚠ Caution

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

Notice

Indicates information considered important, but not hazard-related (e.g. messages relating to property damage).

NOTE: Indicates useful, extra information about the procedure you are performing.

Intended Use

This pump is intended for pumping liquids, especially in food and beverage applications. Do not use the pump in any manner that exceeds the specifications that appear in this manual.

⚠ Warning

Use of this pump in a capacity outside the instructions in this manual could result in death or serious injury, along with property damage.

General Safety Instructions

⚠ Warning

- Do not remove safety labels; doing so may result in injury to users.
- During installation, operation, and maintenance, keep fingers out of the pump's ports.
- Follow any provided lifting recommendations when lifting heavy pumps or components.
- Shut off and lockout all power and relieve system pressure before servicing to prevent accidental start-up and injury caused by rotating components.
- Before performing maintenance, make sure the pump is secured. As components are removed or added, tipping could occur, resulting in serious injury.

⚠ Caution

- Only trained personnel should perform installation, operation, and maintenance.
- After operation, allow the gear case to warm or cool before handling. Temperatures vary depending on product.
- Shut off product supply to the pump and drain the pump before piping disconnection and pump disassembly.
- During maintenance, handle the rotors, piping, and other pump components carefully as edges may be sharp. Wear personal protective equipment according to the requirements established by applicable directives.
- Protect hands when in contact with strong cleaning solutions.

Notice

- Do not rapidly cool or heat the pump.
- Do not run the motor with the pump dry, which causes damage to pump components.
- Do not obstruct the outlet of the pump, which results in system pressure above the pump's specified maximum.
- To avoid damage to metal and seal parts, do not use abrasive cleaning tools and chemicals.
- Do not use sharp tools to pry components during disassembly.

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Section 1
General Information

Introduction

To ensure the best results and service, please read and fully understand this manual prior to putting this pump into service. For any questions regarding operation, maintenance, or installation, please contact your local distributor or Ampco Pumps Company:

Ampco Pumps Company
2045 W. Mill Road, Glendale, WI 53209
Phone: (800) 737-8671 or (414) 643-1852
Fax: (414) 643-4452
Email: ampcocs@ampcopumps.com

General Information

Each Ampco AL pump is fully assembled, lubricated, and tested at the factory and shipped ready for use. Standard maintenance practices are outlined in this manual. For more information, please refer to the Maintenance section on *page 17*. Following these guidelines will provide long-lasting, trouble-free service when the pump(s) is incorporated in a properly designed system.

If deemed necessary to return a product under warranty, or for any other reason, contact Ampco Pumps to receive a Returned Material Authorization (RMA) number to allow us to expedite this request as quickly as possible.

Pump Receiving

Ampco covers the pump inlet and discharge ports prior to shipping, ensuring that foreign matter does not enter the pump during shipment. If the protective covers are missing upon arrival, remove the pump cover and inspect to ensure it is free from contaminates before turning the shafts. Please make note of the pump serial number; this will assist in the process of ordering replacement parts and/or a warranty claim. For more information regarding shipment damage or warranty, please refer to Terms and Conditions (*page 54*).

Shipping Damage or Loss

Upon receiving equipment that is damaged or if your shipment is lost in transit, immediately file a claim with the carrier. At time of pick-up, the carrier signed the bill of lading, acknowledging that they have received the product from Ampco in good condition.

Label Information

⚠ Warning

The label is installed on the pump at the factory to ensure proper warning to users.

Do not remove this label; doing so may result in injury.

The pump is installed with a simple, but effective identification plate. The identification plate is applied at the factory to help track the life of the pump. The customer should be aware of the pump's serial number and model number prior to contacting Ampco with any concerns. This identification plate can be seen in *Figure 1*.

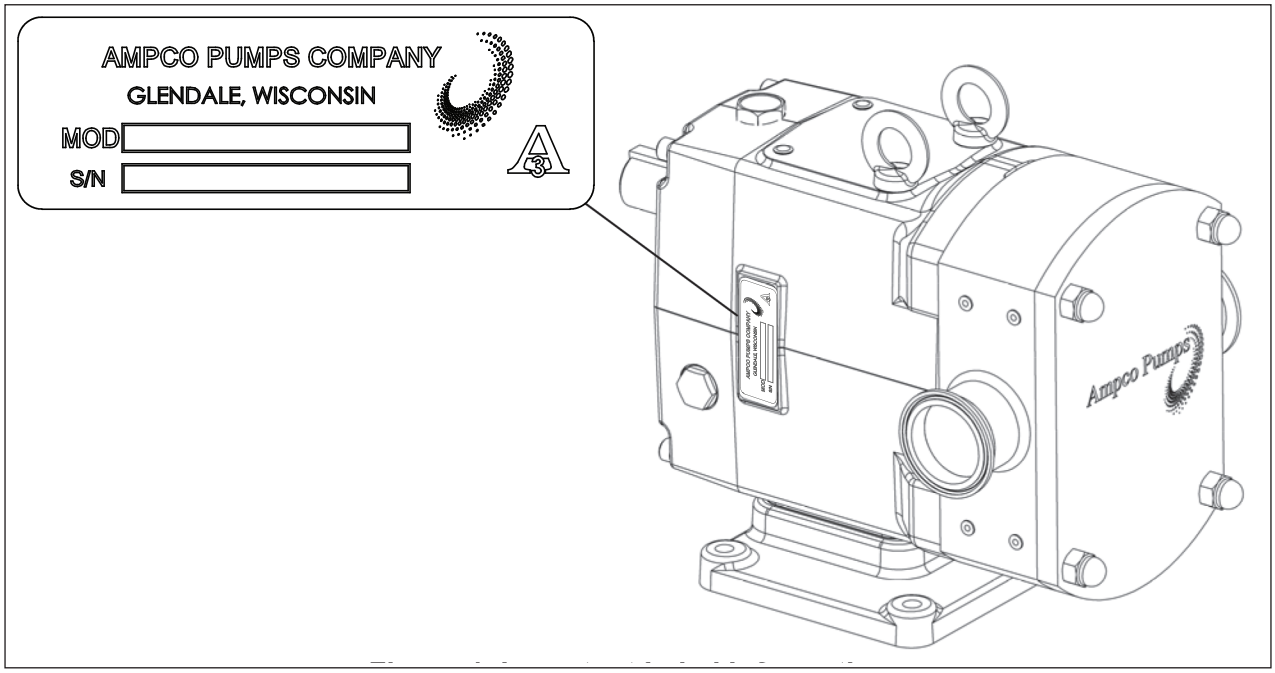

Figure 1. Important Label Information

Pump Design

The design of the AL pump gear case allows for the shaft location to be universal in order to fit any system requirement. This can be seen in *Figure 2 and Figure 3*.

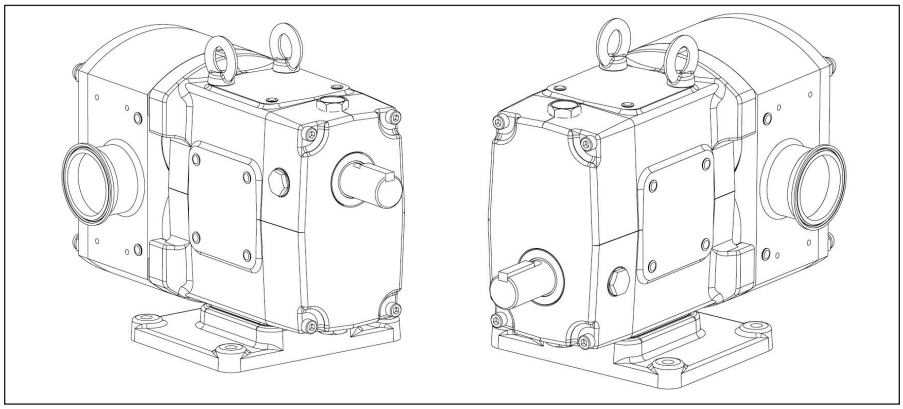

Figure 1. Horizontal Ports (Upper Shaft and Lower Shaft Mounts)

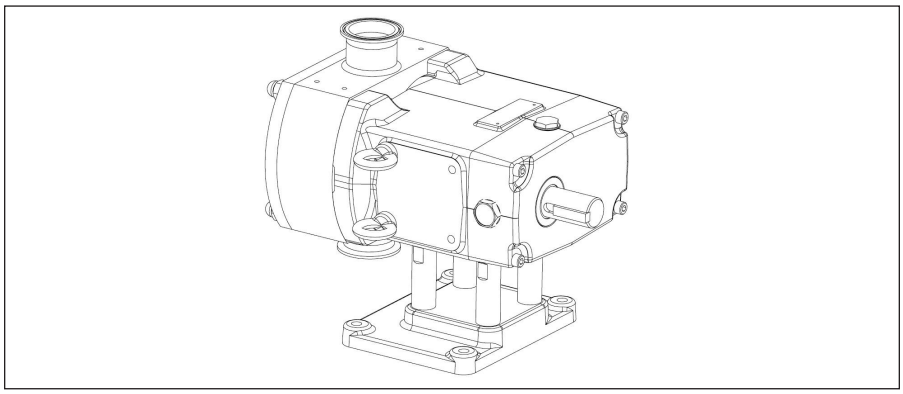

Figure 2. Vertical Ports (Right Side Shaft Mount)

Operating Parameters

Table 1. Standard Operating Parameters

Model	Displacement		Maximum Differential Pressure		Temperature Range		Standard Connection Size		Maximum Speed
	Gal./ 100 rev	Liters/ rev	PSI	Bar	° F	° C	in.	mm	RPM
AL05	0.53	0.02	290	20	-40° to 250°	-40° to 121°	1"	25	1000
AL10	0.85	0.03	290	20			1.5"	38	1000
AL15	2.50	0.09	175	12			1.5"	38	800
AL20	5.00	0.19	115	8			1.5"	38	800
AL22	10.56	0.40	175	12			2"	51	700
AL25	16.37	0.62	115	8			2.5”	64	700
AL33	26.90	1.02	175	12			3"	76	600
AL34	37.98	1.44	115	8			4”	102	600
AL44	59.88	3.34	175	12			4”	102	500
AL46	88.10	3.34	115	8			6”	152	500

- For operating parameters that fall outside the standard values defined in *Table 1*, please contact the Engineering Department at Ampco Pumps Company (414-643-1852).
- Standard rotors operate within a temperature range of -40°F to 250°F. Hot clearance rotors operate between 250°F to 375°F. Consult Ampco Pumps for questions on application factors such as temperature, operational speed, and differential pressure.

⚠ Caution

Noisy pump operation may result from cavitation, air/gas in product, rotor to body contact, rotor to rotor contact, or external mechanical problems. See the Troubleshooting section, under “Noisy Operation” for corrective measures that may be taken to avoid injury from excessive sound pressure. Wear ear protection when levels may exceed 80 dBA.

Rectangular Flange Model

The AL series pump can be modified to have a rectangular inlet (*Figure 4. Rectangular Inlet Option*). Please consult Ampco Pumps for questions on application factors and dimensional information.

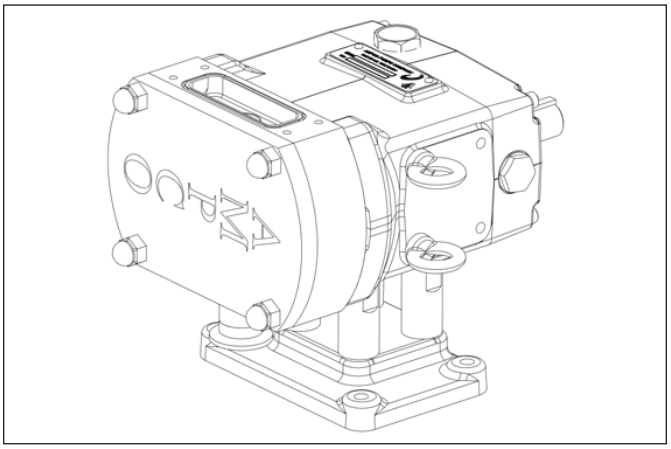

Figure 3. Rectangular Inlet Option

Section 3
Installation

Installation

Follow local codes and restrictions when installing the pump and piping system. The practices outlined in this manual are intended to ensure the most optimal performance of the pump.

> **⚠ Caution**
>
> Use vibration isolation pads to reduce noise and vibration. Failure to reduce vibration as needed could cause minor or moderate injury.

Base Arrangement

The standard installation arrangement for a pump of this type consists of both the pump and drive unit mounted on the same base plate. Typical base plate arrangements consist of permanently fixed bases, bases with leveling and/or vibration isolation pads, bases with attached adjustable legs, or portable/wheeled bases. All base arrangements must be level during operation. Standard base configurations (base, pump, coupling, coupling guard, gear reducer, and motor) can be seen in *Figure 5*.

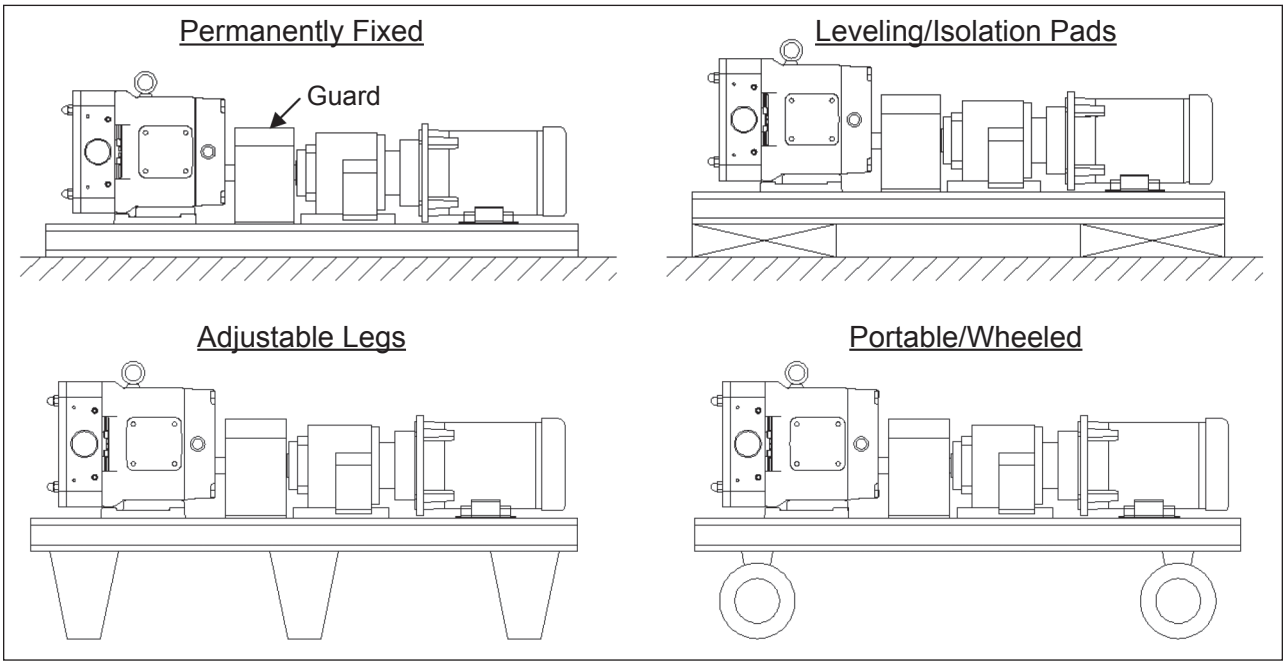

Figure 1. Base Layout Examples

> **⚠ Warning**
>
> To ensure safety, protective guards must be properly installed over all external rotating parts and components. Failure to do so may result in injury. Ampco Pumps provides protective guards for complete base packages (pump and drive unit).

Piping and Connections

It is important to minimize forces imposed on the pump. This can be done by independently supporting the piping going to and from the pump. Excessive force applied to the pump can cause misalignment of internal parts which leads to the premature wear of rotors, bearings, and shafts. The use of hangers and pedestals on connecting pipes will help avoid such misalignment. Examples of such supports can be seen in *Figure 6*.

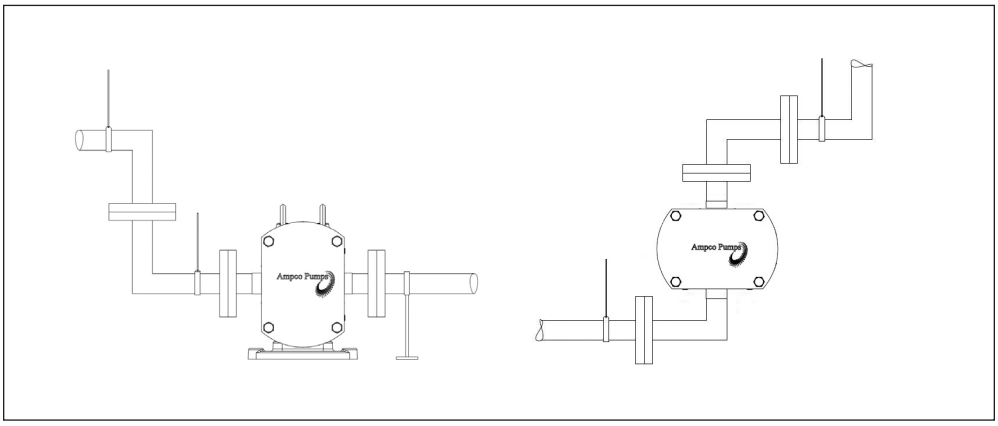

Figure 2. Piping Support Example

It is not recommended to weld custom fittings outside the factory. Shrinkage and warpage can occur to the pump housing which will affect the life and performance of the pump.

To prevent air pockets from entering the pump from the inlet, install the pump below the supply (*Figure 7*). This will create a constant supply of product on the suction side, and reduce the chance for air to enter the pump. Sloping the piping on the inlet side away from the pump will prevent air pockets if the pump is installed above the supply (*Figure 8*).

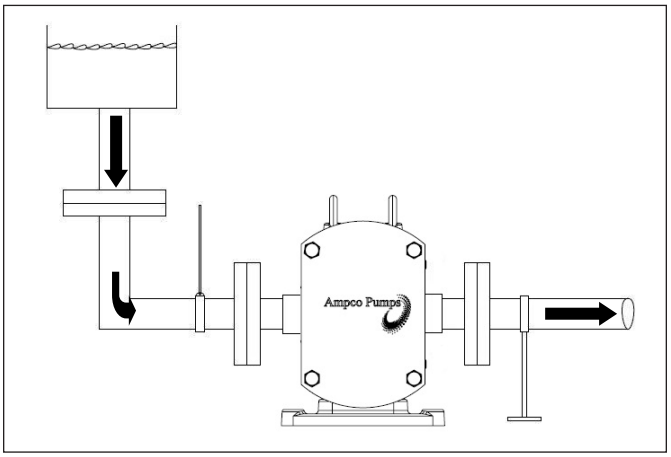

Figure 3. Correct Piping (Supply Above)

Always verify all electrical devices connected to the equipment are properly grounded to avoid risk of potential corrosion from stray current.

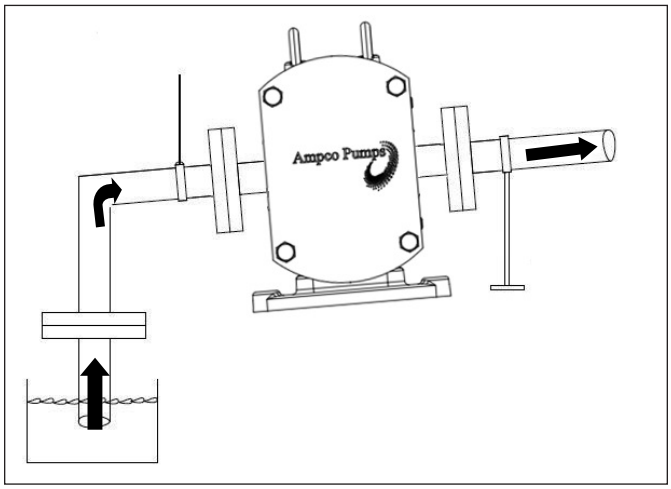

Figure 4. Correct Piping (Supply Below)

Check/Isolation/Relief Valves

Check valves should be used on the inlet side for any application when the product is lifted (*Figure 9*). This is to ensure a full inlet and is especially important with low-viscosity fluids. If the system has liquid under a vacuum, such as closed tank applications, it is important to have a check valve on the discharge side to prevent backflow during initial start-up (*Figure 10*).

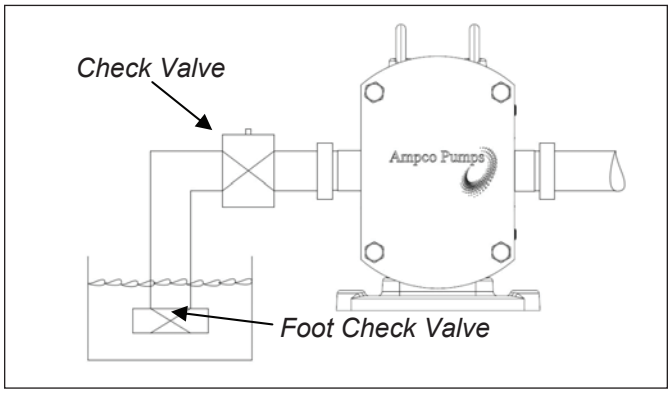

Figure 5. Check Valve (Inlet Side)

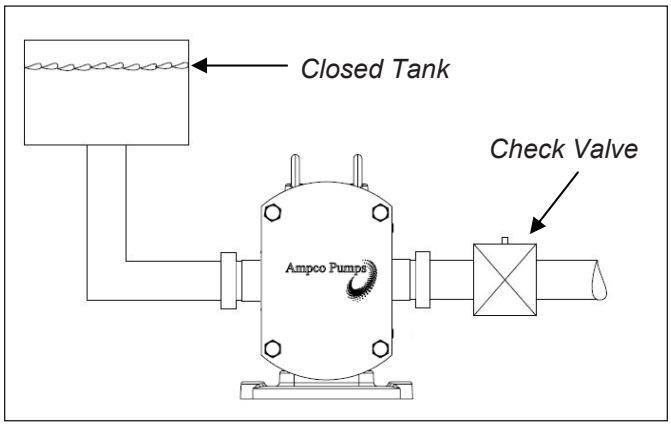

Figure 6. Check Valve (Discharge Side)

When shutdown time is not possible, a bypass system may be installed with a backup pump in parallel series to allow production to continue while maintenance is performed on the down pump. Isolation valves may also be used on both the inlet and discharge sides of the pump to shut down the flow of product to the pump. This will allow for maintenance and removal of the pump without draining the entire system and risking the loss of product.

Notice

Ampco's AL positive displacement pumps are designed with extremely tight tolerances allowing only low slip internally between rotors and pump housing. DAMAGE will occur if the pump is operated with discharge or inlet lines closed. DO NOT operate pump with lines closed.

In order to prevent damage to the pump, it is recommended that a relief valve be installed on the pump's discharge side. The relief valve can either divert flow into a drain or back to the inlet side (*Figure 11*).

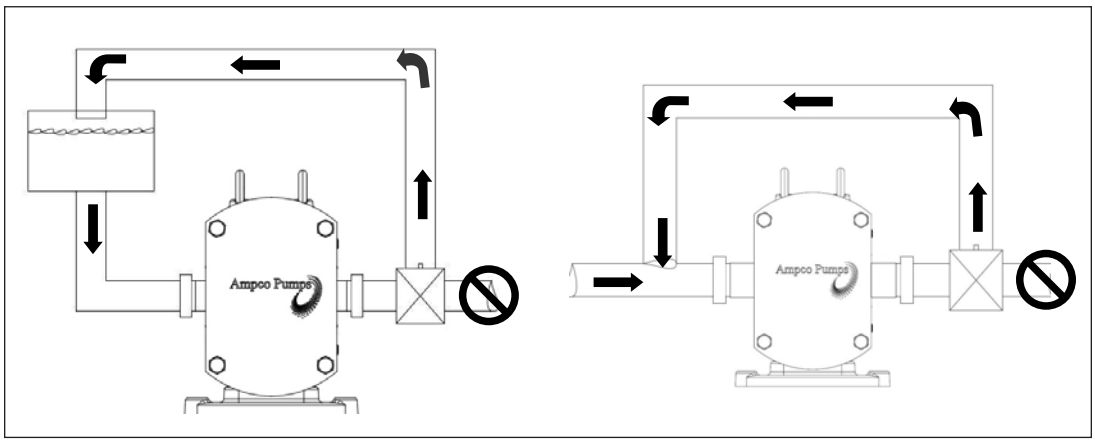

Figure 7. Relief Valve Examples

Strainers and Gauges

Strainers and magnetic traps should be used to prevent foreign matter from entering the pump. It is essential to service strainers and traps regularly to prevent restriction of flow. To determine the performance of the pump, install pressure and vacuum gauges on the inlet and discharge piping (*Figure 12*).

Proper Gauging:

- Shows unusual pressure variations
- Indicates flow
- Shows changes in pump performance
- Shows variations in the system
- Shows differences in fluid viscosities

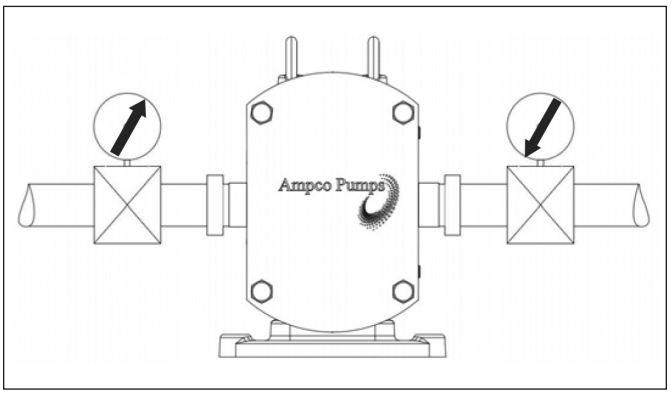

Figure 8. Proper Gauging

Base Alignment

Pump and base assemblies sent directly from Ampco's factory are aligned prior to shipment. Assemblies must be checked once they are installed and prior to operation. Misalignment may cause unnecessary wear and shorten the life of the pump. If couplings are not specified, Ampco will use a flexible coupling which permits minor compensation for alignment and endplay.

To check the coupling alignment, start with checking the angular alignment by measuring the gaps between the couplings on both the pump and motor side (*Figure 13*, Angular Alignment). Shim the assembly accordingly so the gap is equal distance at all points. Next, using a straight edge, check the horizontal and vertical alignment of the coupling. Place the straight edge along the coupling to ensure that both sides are concentric (*Figure 13*, Parallel Alignment).

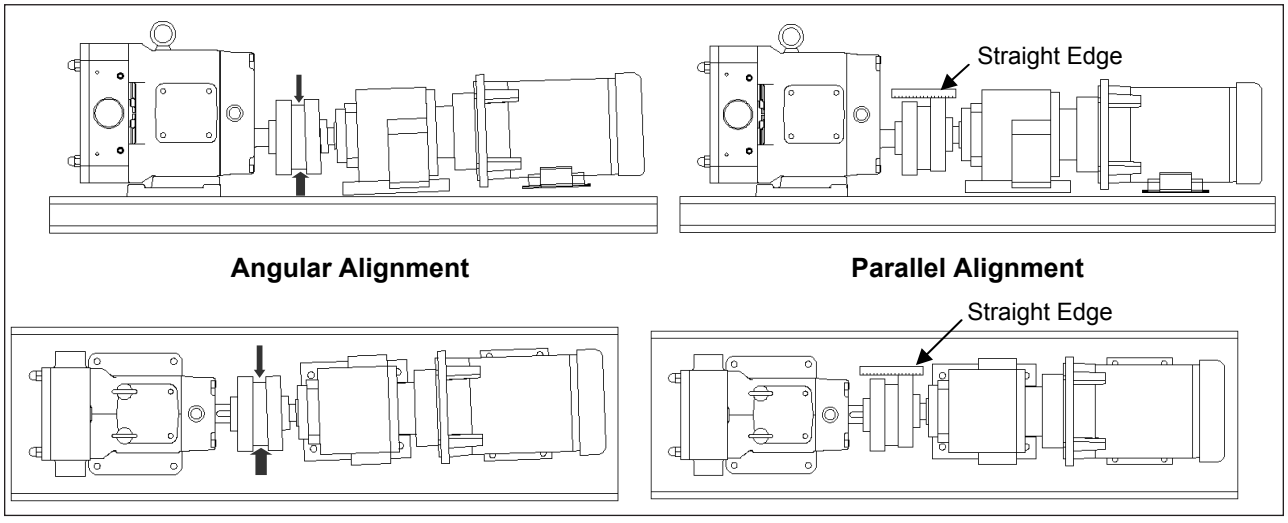

Figure 9. Check Alignment

Pump Rotation

Check the direction of rotation (both on drive unit and pump) prior to connecting the pump to the drive. This will ensure correct product flow at start-up (*Figure 14* and *Figure 15*). Also check that the pump turns freely and is free of any foreign contaminates. Connect the pump and check to make certain all guards are in place.

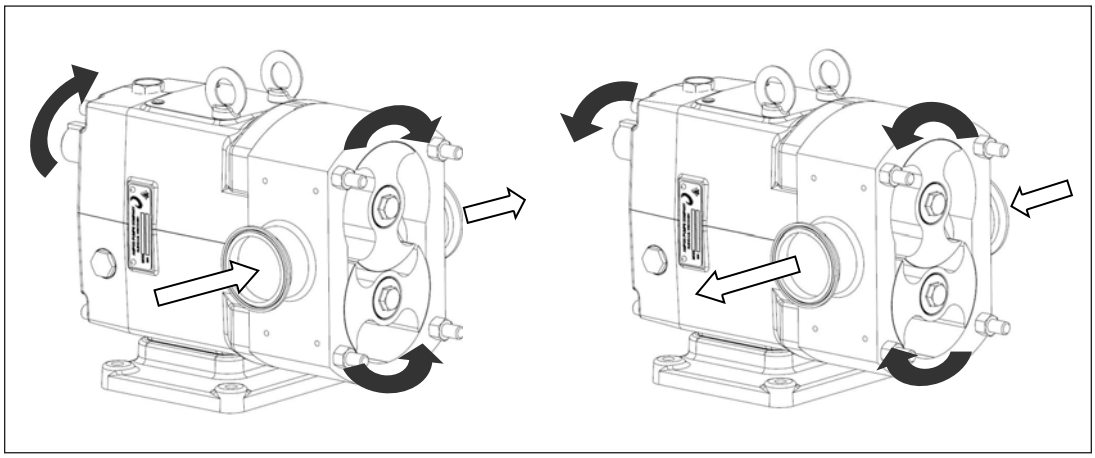

Figure 10. Top Drive Shaft

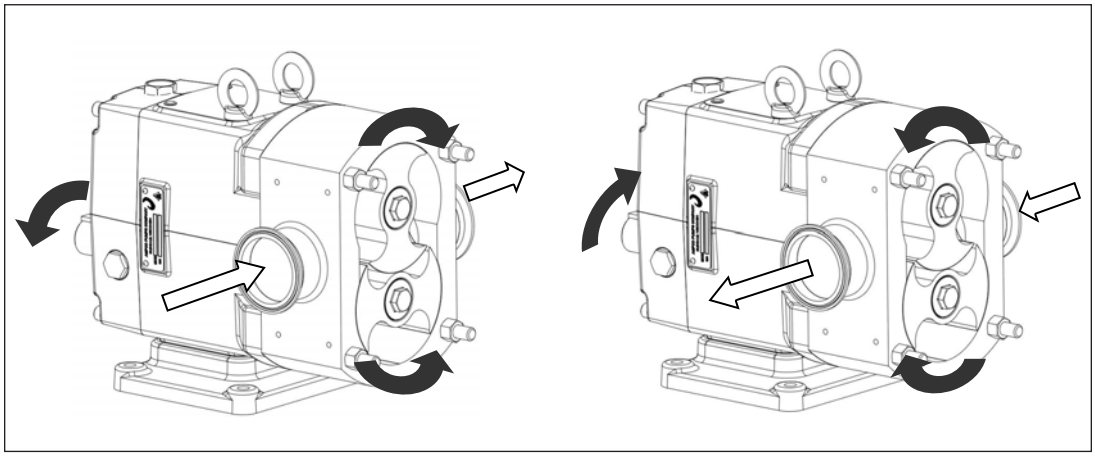

Figure 11. Bottom Drive Shaft

Seal Flushing

For pumps with a double seal or a flush lip seal, connect seal flushing before operation. Operation of the pump without proper flushing will damage seal faces. Flushing connections are typically 1/8" female NPT with one side being the inlet and the other the discharge. Flush from the bottom to the top, using the lower connection as the inlet and the upper connection as the discharge. This ensures that air is removed from the flush line with the flush area completely flooded (*Figure 16*). Flush flow rate should be 1/4 GPM (30 psi max pressure). For high temperature applications flush flow may be increased to remove excess heat.

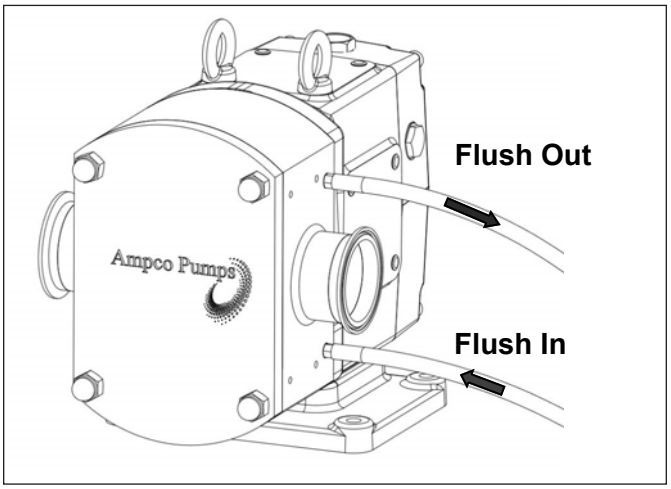

Figure 12. Proper Flushing for AL Double Seal

Pre-Start-Up Checklist

⚠ Caution

DO NOT flush a new system for the first time with this pump. Severe damage may be caused to the pump from debris during start-up, which could result in injury. Remove the rotors during system flushing to prevent any debris from getting trapped between rotors and pump body.

⚠ Warning

All guards must be installed to protect operators and maintenance personnel from the rotating components. Guards are supplied as part of pump and motor full assemblies. The gap between the pump body and gearcase is required for 3A Sanitary Standards.

⚠ Warning

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

1. Review setup and make sure the pump is correctly installed as described on *page 9*. Review “Check/Isolation/Relief Valves” on *page 11* and install valves as needed.
2. Check the coupling alignment. See Base Alignment on *page 12*.
3. Check the pump and piping and make sure they are clean and free of any foreign material.
4. Make sure that all piping connections are secure and leak-free. If possible, checking the system with a non-hazardous fluid like water is advisable.
5. Double check the pump and drive to see if they are adequately lubricated. See “Pump Lubrication” on *page 17*.
6. Check that all guards are secured properly and are in place.
7. Ensure double mechanical seals have proper supply and flow of clean fluids when flushing.
8. Make sure all valves are open on discharge side and a free flowing path is open to the destination.
9. Inlet side valves should be open and allow fluid to fill the pump. Flooding the suction is recommended on installation.
10. Check the pump and drive rotation to verify the correct product flow at start-up. See “Pump Rotation” on *page 13*.

Start-Up Procedure

⚠ Warning

Pump damage could result in death or serious injury.

- Do not run the motor with the pump dry, which causes damage to pump components.
- Do not obstruct the outlet of the pump. Obstruction will result in increased system pressure, above the specified maximum pressure of the pump.
- Do not introduce sudden extreme product temperature changes to the pump (temp flashing). Gradually adjust the temperature of the pump components or the product.

NOTE: Sanitize the pump before start-up for sanitary applications.

1. Start the pump slowly.
2. When the pumphead is filled with product, stop the pump and allow the pump's fluid components to thermally adjust to the product temperature for 15 minutes.
3. Re-start the pump.

Shutdown Procedure

1. Disconnect the pump from the drive.
2. Disconnect the supply and discharge lines.

Emergency Shutdown Procedure

Emergency Shutdown is dependent on system requirements. Document the procedure after assessment of the application.

Section 4
Maintenance

Maintenance

⚠ Warning

Shut off and lockout all power and relieve system pressure before servicing to prevent accidental start-up and injury.

⚠ Warning

Make sure the pump is secured prior to performing maintenance. As components are removed or added, tipping could occur.

⚠ Caution

Only trained personnel should perform maintenance.

The Ampco AL pump is designed to be easily disassembled for cleaning and maintenance purposes. When performing maintenance on the pump, it is important to inspect all wetted parts for standard wear and damage. For inspection instructions, please see *page 18*. Prior to disconnecting pump, shut off all inlet and discharge valves, drain the pump (rinse if necessary), and turn off all electrical supply to the pump (follow standard lockout procedures).

Pump Lubrication

Proper lubrication of gears and bearing is vital to the life of the pump. For pumps assembled on bases with a gear reducer and motor, please refer to the proper manufacturer manual for lubrication requirements. These manuals are sent with the pump from the factory. Important pump lubrication points can be seen in *Figure 17*.

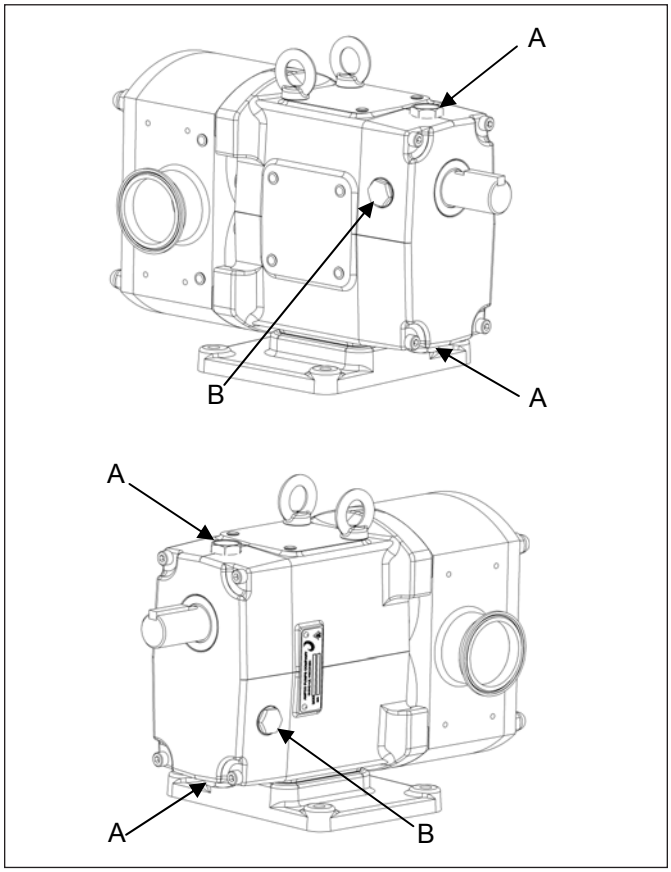

Figure 1. Lubrication Points

Item No.	Part	Qty.
A	Oil Plug (Drain and Fill)	2
B	Sight Glass	2

The gears and bearings are shipped factory-lubricated with the gear case filled to proper oil capacity. The oil used to lubricate the gears should be changed every 500 hours with the quantities shown in *Table 2*. Correct oil quantity can easily be achieved by filling the gear case with oil to half way up the sight glass (*Figure 18*).

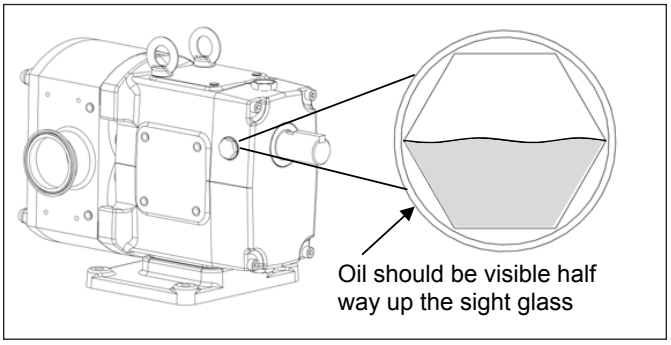

Figure 2. Sight Glass

Table 1. Oil Capacity

AL Model	Top/Bottom Shaft	Side Mount
5,10,15,20	~16 oz.	3.3 oz.
22, 25	~48 oz.	4.0 oz.
33, 34	~128 oz.	9.5 oz.
44, 46	~264 oz.	9.5 oz.

Oil Specifications:

ISO Grade 150 or SAE 40

*Replacement oil and grease is available from Ampco.

Preventive Maintenance/Inspection

⚠ Caution

Handle the rotors, piping, and other pump components carefully as edges may be sharp. Wear gloves to avoid injuries.

While performing standard maintenance or cleaning, check for signs of damage or extreme wear. A simple inspection may show signs of a problem long before it becomes serious. Detection of such problems can avoid costly repairs and reduce down time.

Remove the cover and inspect the rotor tips to ensure that there is no metal-to-metal contact between the rotors. Measure the clearance between the rotor tips as seen in *Figure 19*. The clearance should be equal on both sides. If contact is detected, rotors may require replacement.

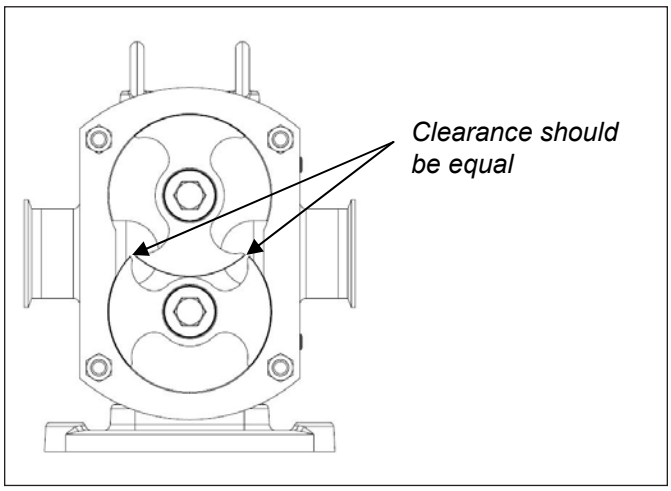

Figure 3. Clearance Between Rotor Tips

Inspect the shaft shoulder and splines (*Figure 20*) for wear and replace, if necessary.

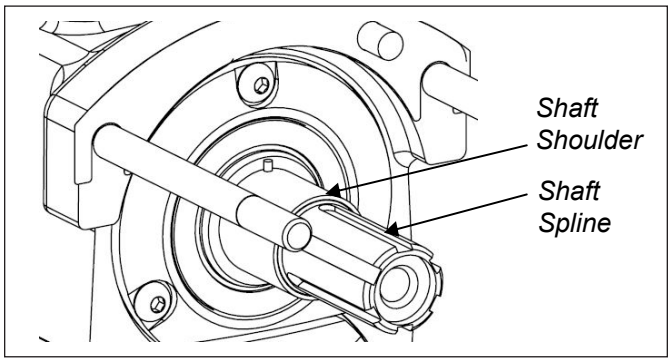

Figure 4. Shaft Inspection Points

Inspect the rotor hub (*Figure 21*) for wear and replace, if necessary. Rotor and shaft wear at these locations is caused by extended operation with loose rotor nuts.

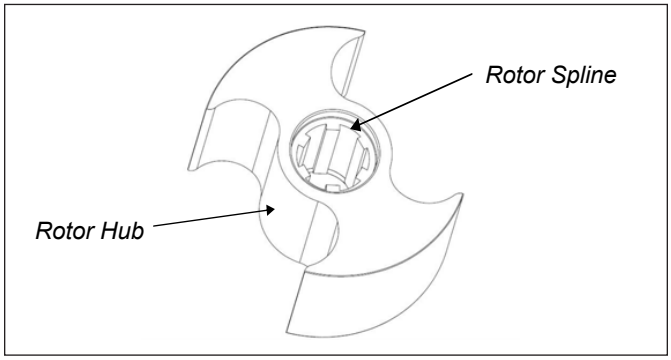

Figure 5. Rotor Inspection Points

Gear and Bearing Inspection

> **⚠ Caution**
>
> Temperatures may vary depending on product. To avoid injury, allow the gear case to warm or cool before handling.

While the fluid end is disassembled, feel for gear backlash (movement between the gears) by rotating either shaft. Once turning has started, the other shaft must engage (*Figure 22*). If gear backlash is present, remove the gear casing cover (drain oil first, see *page 30* for gear case disassembly information) and check for wear around the gear teeth. If evidence of gear teeth wear is present, replacement is recommended. If gear(s) are loose, check the shaft key and keyway. Either may require replacement.

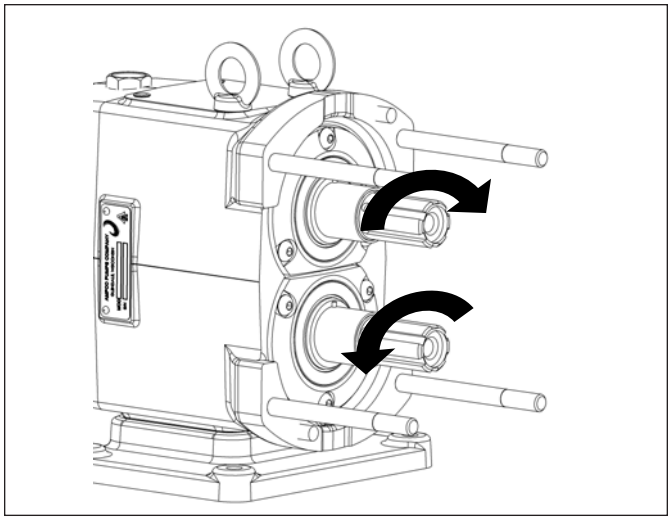

Figure 6. Check for Gear Backlash

Next, check the condition of the bearings. Do this by applying force in an up-and-down motion by hand on both shafts (*Figure 23*). Also check for any horizontal movement by pushing and pulling on the shaft. If any movement is felt, the bearing may need replacing. If disassembly of the entire gear case is required, please refer to *page 30* for instructions.

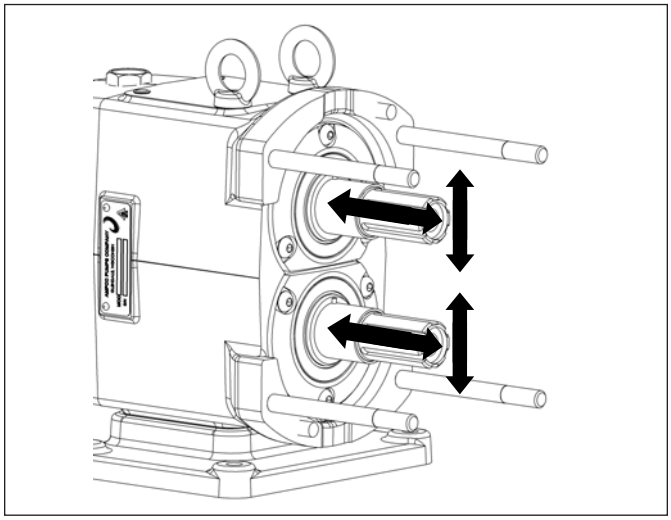

Figure 7. Check for Bearing Movement

Annual Maintenance

> **⚠ Caution**
>
> Handle the rotors, piping, and other pump components carefully as edges may be sharp. Wear gloves to avoid injuries.

> **⚠ Caution**
>
> Temperatures may vary depending on product. To avoid injury, allow the gear case to warm or cool before handling.

It is important to perform an annual maintenance check of the pump in addition to the preventive maintenance procedures listed on *page 18*. Annual maintenance practices are as follows:

- Check the gear case bearings by measuring the shaft's radial movement with a dial indicator (*Figure 24*, A). If the movement is greater than or equal to the rotor-to-body clearance found on *page 40* (*Table 5*) the bearings should be replaced.
- Remove the gear casing cover (see *page 30* for disassembly information) and inspect the gears for wear and damage (*Figure 24*, B). Also check for backlash and looseness.
- Inspect the rotors for signs of wear and stress cracks around the areas defined in *Figure 24*, C. Replace, if necessary.
- Check the pump clearances detailed on *page 40* to determine pump wear. Pump wear can be compensated by increasing pump speed.

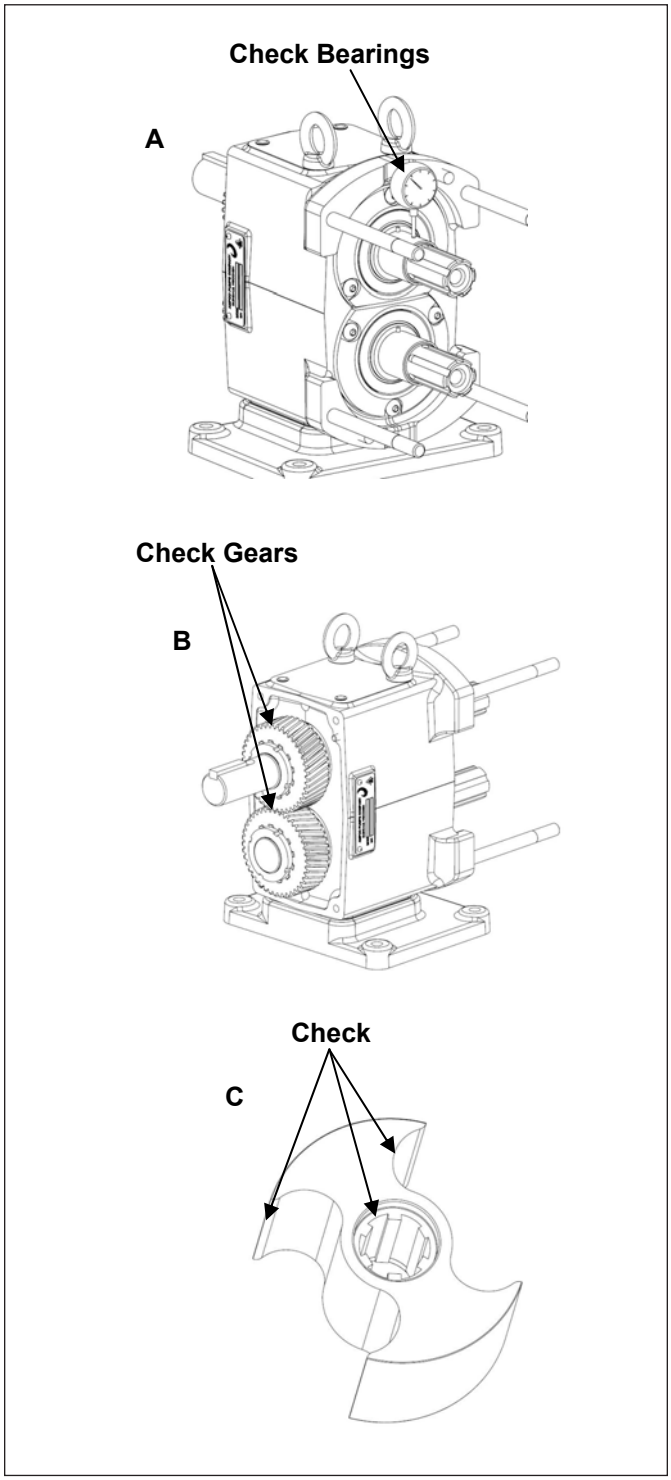

Figure 8. Annual Maintenance Checks

Cleaning

All wetted parts are designed and manufactured to be acceptable by 3A Sanitary Standards. The body, rotors and seals can be easily disassembled and cleaned simply by removing the cover and rotor nuts. See Pump Disassembly below.

AL series pumps are designed for clean-in-place (CIP) capabilities, ensuring that CIP solution reaches all surfaces inside the pump. The fluid velocity (typically 5 ft./sec) and differential pressure (30 psi recommended) are critical components of a correct CIP setup. For additional support, please contact the Engineering Department at Ampco Pumps 414-643-1852.

If for any reason the rotor o-ring should fail and the external threads of the rotor nut become soiled, a soft bristle brush and appropriate cleaning solution should be used to clean them.

⚠ Caution

Strong cleaning solutions are harmful to hands. Wear appropriate gloves to avoid injury.

Notice

Do not use abrasive cleaning tools and chemicals. Wire brushes or pads will physically damage metal and seal parts.

Once the fluid end is disassembled, follow standard practices for cleaning the product being pumped. Pump parts should not be exposed to harsh acids for longer than necessary. Once the parts have been removed from a cleaning solution, rinse the parts so no residual deposits remain.

Pump Disassembly

⚠ Warning

Shut off and lockout all power and relieve system pressure before servicing to prevent accidental start-up and injury.

⚠ Caution

Shut off product supply to the pump and drain the pump before disconnecting piping and disassembly.

⚠ Caution

Handle the rotors, piping, and other pump components carefully as edges may be sharp. Wear gloves to avoid injuries.

1. Start by removing the cover nuts using an appropriate wrench (*Figure 25*). During disassembly, place all parts on a clean, protected surface with finished surfaces and seal faces facing up. Tap the cover off using a soft mallet. Remove the cover o-ring and inspect.

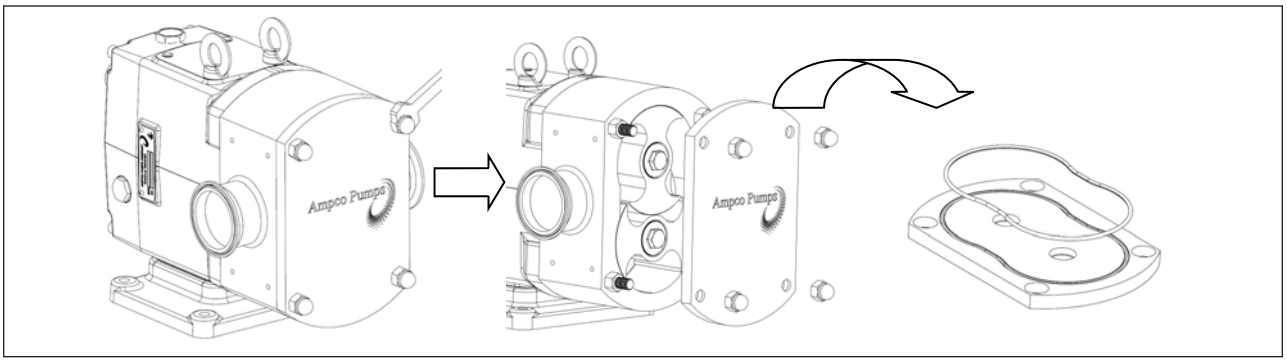

Figure 9. Removing AL Cover

Notice

If the cover is stuck, DO NOT use a screwdriver or pry bar to break open the cover. Damage may occur.

2. Remove the rotor bolts using the appropriate size wrench and a non-metallic wedge to prevent the rotors from moving (*Figure 26*). Remove the rotor bolt o-ring and lock washers.

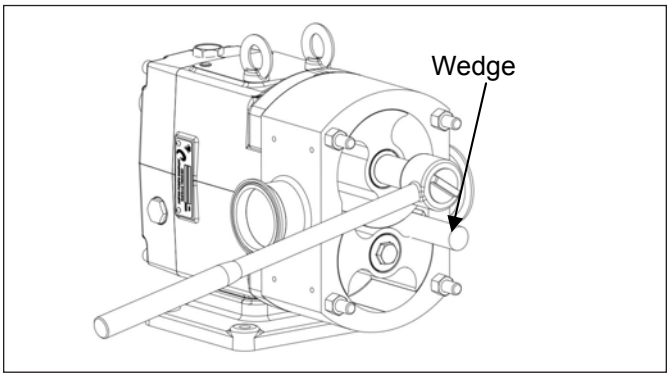

Figure 10. Removing Rotor Nuts

3. Remove the rotors by orientating them perpendicular to each other and then pulling them out. If rotors are difficult to remove, use a nylon or wood lever to pry them out without damaging the body or the rotors. If necessary, remove the body hold down nuts and tap the body forward to loosen the rotors. See *Figure 27* to ensure that all parts are removed.

> **⚠ Caution**
>
> It is important to be cautious with the rotors so that they are not damaged. For mechanical seals, the rotating seal typically stays in the rotor during removal.

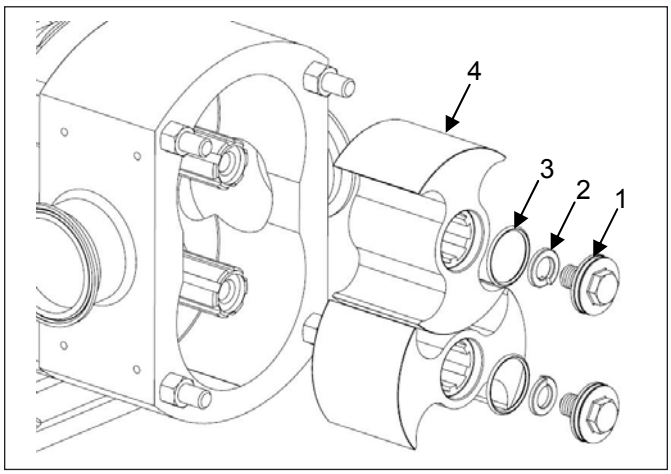

Figure 11. Fluid End Exploded View

Item No.	Part
1	Rotor Bolt
2	Lock Washer
3	Rotor Bolt O-Ring
4	AL Rotor

4. Remove the four body hold-down nuts using the appropriate wrench. Pull the pump body off by sliding it along the studs (*Figure 28*). If the body is stuck, use a soft mallet to tap the body. Inspect the body for excessive wear, clean and continue on to Seal Maintenance, *page 23*. It is important to keep track of the top and bottom shims and which shafts they are associated with. They are installed accordingly at the factory for that particular body.

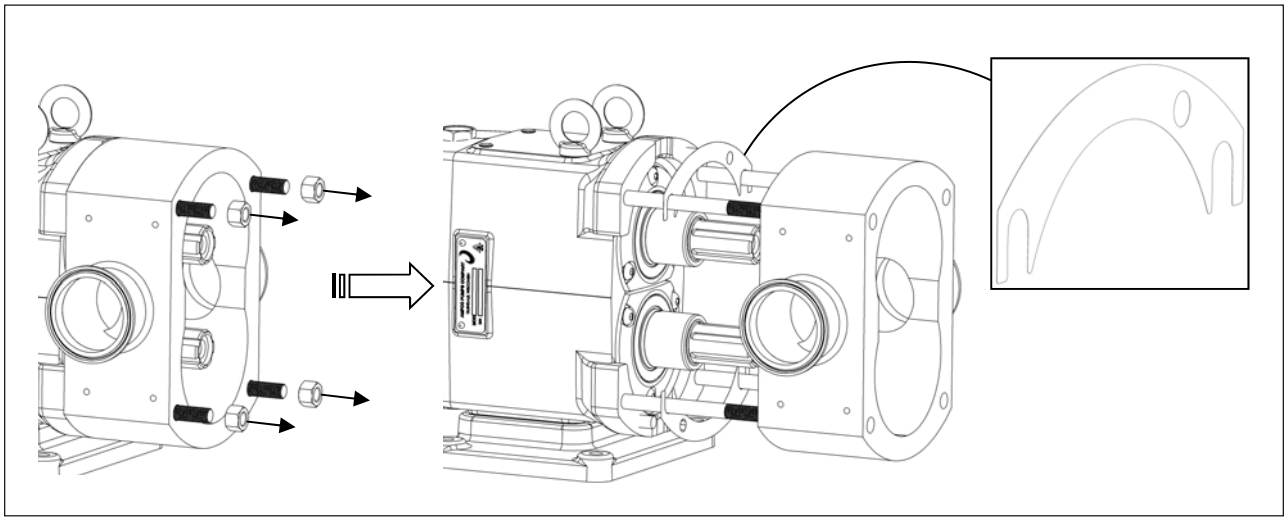

Figure 12. Removal of Pump Body

Seal Maintenance

SINGLE O-RING SEAL

Disassembly: The single o-ring seal option is shown in *Figure 29*. Remove the body and rotor o-rings using the tool provided by Ampco (if damaged, replace o-rings). Slide the shaft sleeves off the shafts and inspect for damage. Do not re-use sleeves that are damaged (sleeve surface grooved or scratched).

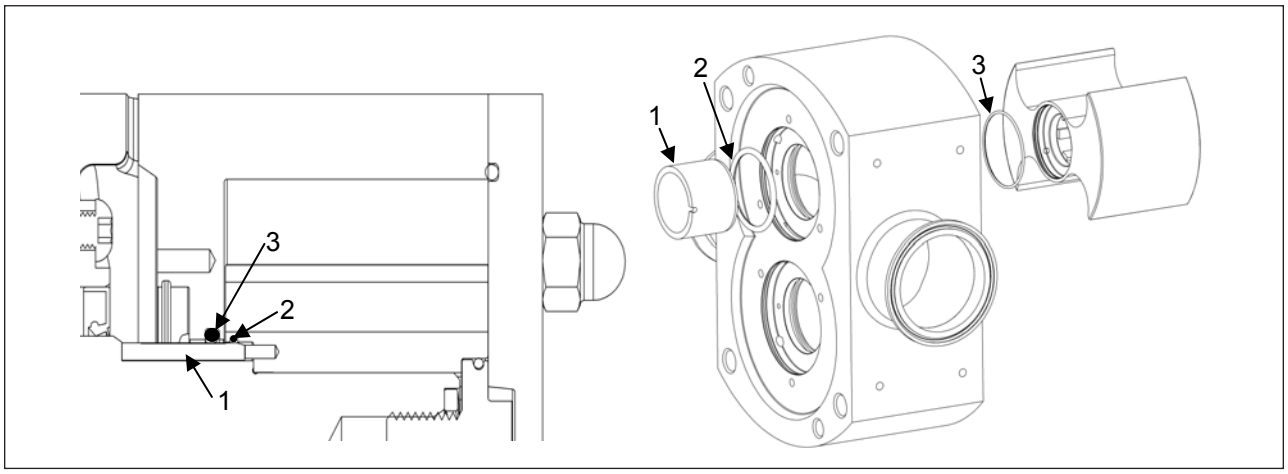

Figure 13. Single O-Ring Seal

Item No.	Part	Qty
1	Shaft Sleeve	2
2	O-Ring, Body	2
3	O-Ring, Rotor	2

Assembly: Clean both shaft ends and the body before assembling. Slide the shaft sleeves onto the shafts until they seat on the shaft shoulder. Align the slot in the shaft sleeve to the drive pin on the shaft (*Figure 30, A*). Apply a light film of lubricant to NEW o-rings and insert them in the body and rotors (*Figure 30, B*). See Pump Assembly on *page 38* to continue.

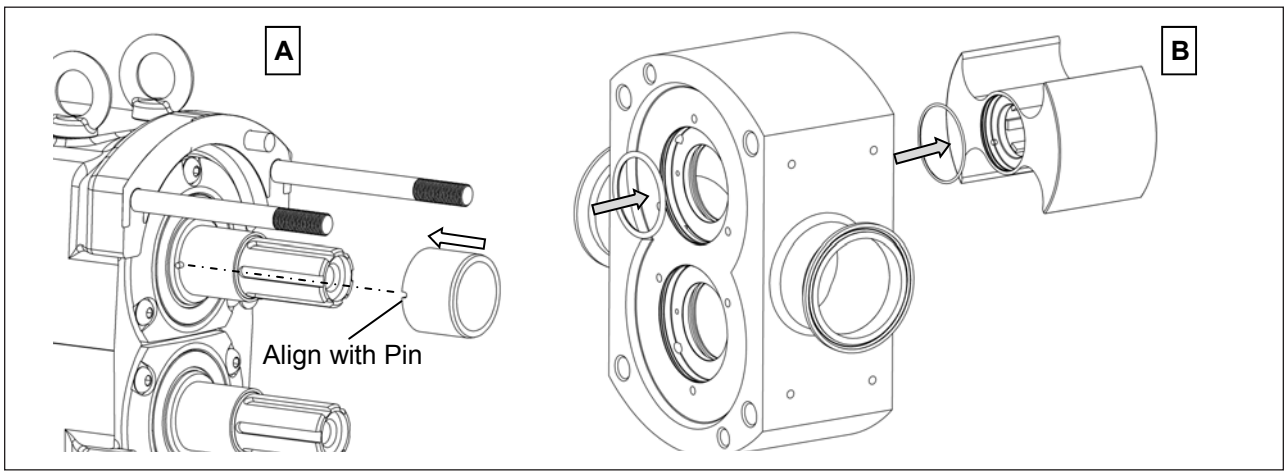

Figure 14. Single O-Ring Seal Assembly

DOUBLE O-RING SEAL

Disassembly: The double o-ring seal option is shown in *Figure 31*. Remove the retaining bolts and washers using the appropriate driver and slide the o-ring carrier out of the body. Remove the o-rings from the body, o-ring carrier and rotor (*Figure 31, items 4, 5, 6*). If damaged, replace o-rings. Slide the shaft sleeves off the shafts and inspect for damage. Do not re-use sleeves that are damaged (sleeve surface grooved or scratched)

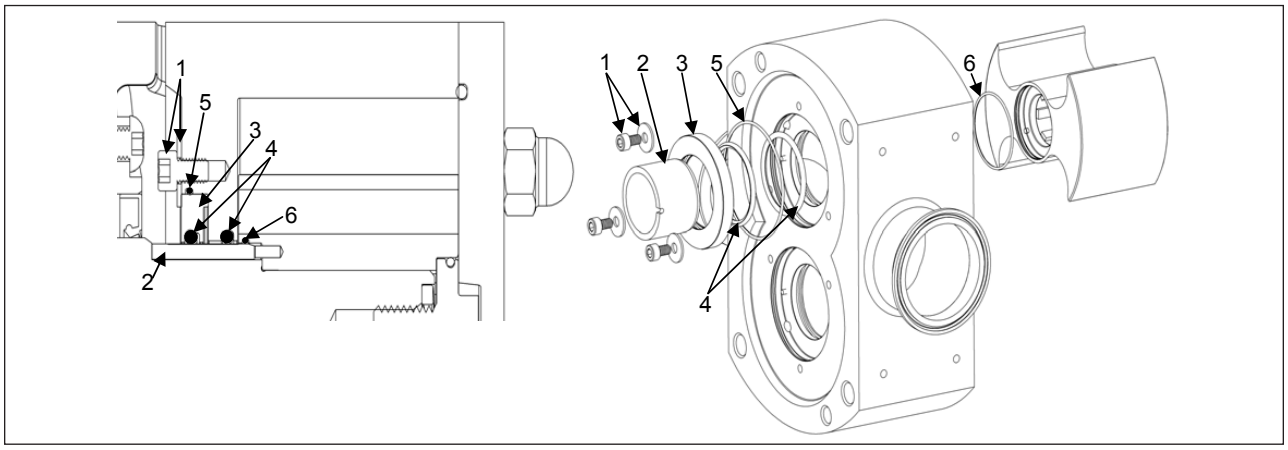

Figure 15. Double O-Ring Seal

Item No.	Part	Qty
1	Retaining Bolt and Washer	6
2	Shaft Sleeve	2
3	O-Ring Carrier	2
4	O-Ring, Body	4
5	O-Ring, O-Ring Carrier	2
6	O-Ring, Rotor	2

Assembly: Clean both shaft ends and the body before assembling. Slide the shaft sleeves onto the shafts until they seat on the shaft shoulder. Align the slot in the shaft sleeve to the drive pin on the shaft (*Figure 32*, *A*). Apply a light film of lubricant to NEW o-rings and insert them in the body, o-ring carriers, and rotors (*Figure 32*, *B*). Once all of the o-rings are installed, slide the o-ring carriers into the body making sure to align the holes in the carriers to the pin in the body. The o-ring carrier should sit flush with the back of the body. Secure the carriers in place with the retaining bolts and washers. See Pump Assembly on *page 38* to continue.

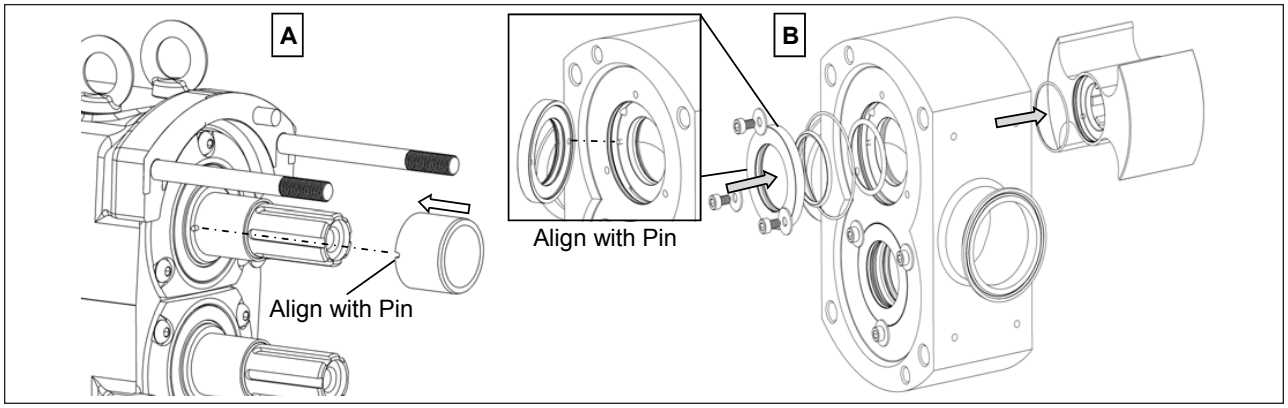

Figure 16. Double O-Ring Seal Assembly

SINGLE MECHANICAL SEAL

Disassembly: The single mechanical seal option is shown in *Figure 33*. The AL single mechanical seal is designed to be a front pull out without the need to remove the pump body. Using the o-ring tool provided by Ampco remove the mechanical seal from the rotor and body. Inspect the seals for chipping, scratches, or any evidence of cracks on the seal face (the mechanical seals are interchangeable). Remove the o-rings from the body and rotor (*Figure 33, items 3, 5*). If damaged, replace o-rings. If any of the seals are damaged do not re-use them. To remove the mechanical seal base, loosen the retaining bolts and washers using the appropriate driver and slide the single mechanical seal bases out of the body.

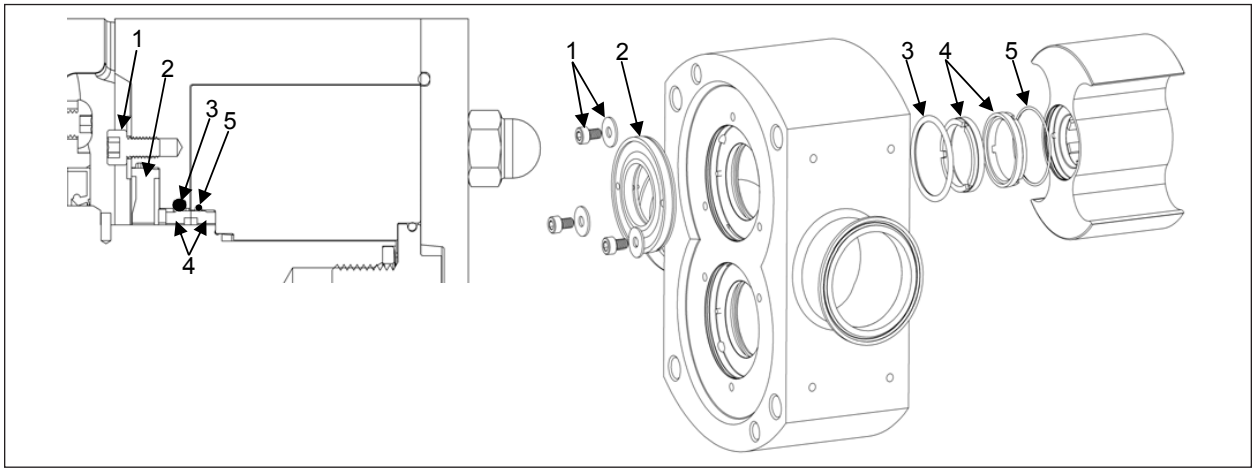

Figure 17. Single Mechanical Seal

Item No.	Part	Qty
1	Retaining Bolt and Washer	6
2	Single Mechanical Seal Base	2
3	O-Ring, Body	4
4	Mechanical Seal	2
5	O-Ring, Rotor	2

Assembly: Clean both shaft ends and the body before assembling. Slide the mechanical seal bases into the body and secure them with the retaining bolts and washers (*Figure 34, A*). Apply a light film of lubricant to NEW o-rings and insert them into the body (*Figure 34, B*) and rotors (*Figure 34, C*) along with the mechanical seal faces. Make sure to align the slot on the seal to the pins in the body and rotor. See Pump Assembly on *page 38* to continue.

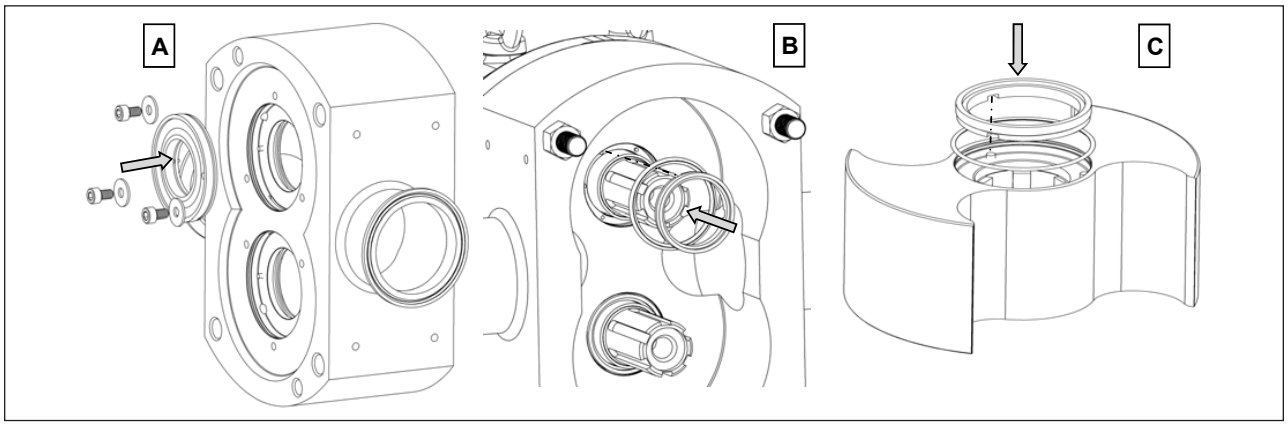

Figure 18. Single Mechanical Seal Assembly

DOUBLE MECHANICAL SEAL

Disassembly: The double mechanical seal option is shown in *Figure 35*. Using the o-ring tool provided by Ampco, remove the mechanical seal and o-rings from the rotor and body. Slide the double mechanical seal base out of the body and remove the seal base o-ring. Slide the rotating seal from the shaft and remove the rotating seal o-ring. Inspect the seals for chipping, scratches, or any evidence of cracks on the seal face. If damaged, replace o-rings. If any of the seals are damaged do not re-use them.

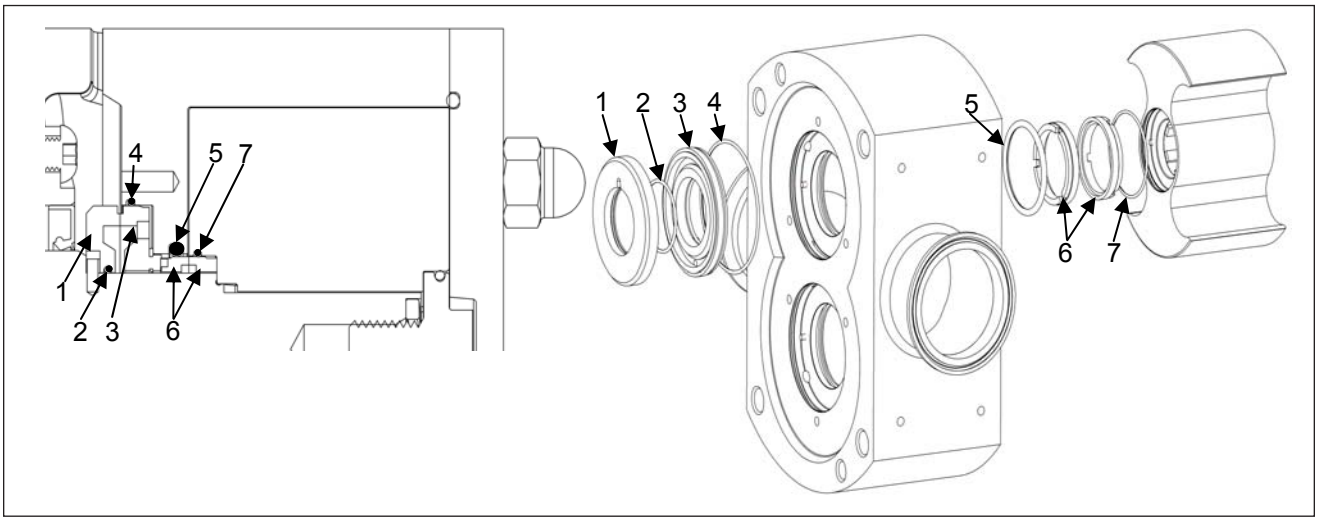

Figure 19. Double Mechanical Seal

Item No.	Part	Qty	Item No.	Part	Qty
1	Rotating Seal	2	5	O-Ring, Body	2
2	O-Ring, Rotating Seal	2	6	Mechanical Seal	2
3	Double Mechanical Seal Base	4	7	O-Ring, Rotor	2
4	O-Ring, Seal Base	2			

Assembly: Clean both shaft ends and the body before assembling. Lubricate the rotating seal o-ring and install it in the rotating seal. Slide the rotating seal onto the shaft *(Figure 36, A)* making sure to line the slot on the rotating seal to the pin in the shaft. Install the seal base o-ring in the back of the body and apply a light film of lubricate. Push the double mechanical seal base in the body, making sure to line up the holes in the base with the pins in the body (*Figure 36, B*).

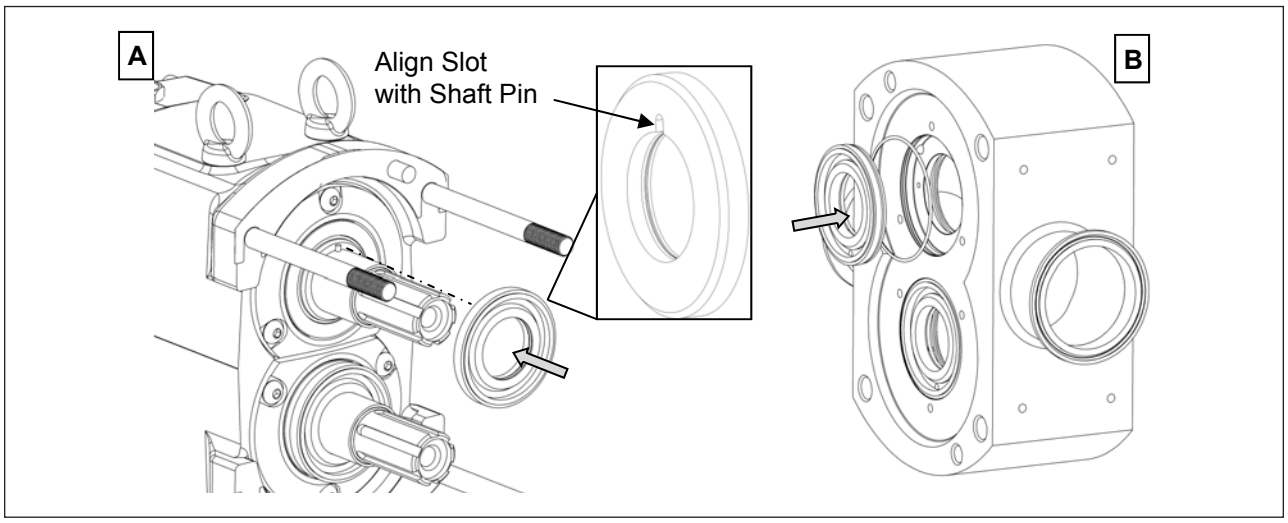

Figure 20. Double Mechanical Seal Assembly

Apply a light film of lubricant to the body o-rings and insert them in the body along with the mechanical seal (*Figure 37, A*). The mechanical seals in the product zone are interchangeable. Lubricate the rotor o-rings and insert them in the rotors along with the mechanical seals (*Figure 37, B*) . Make sure to align the slot on the seal to the pins in the body and rotor. See Pump Assembly on *page 38* to continue.

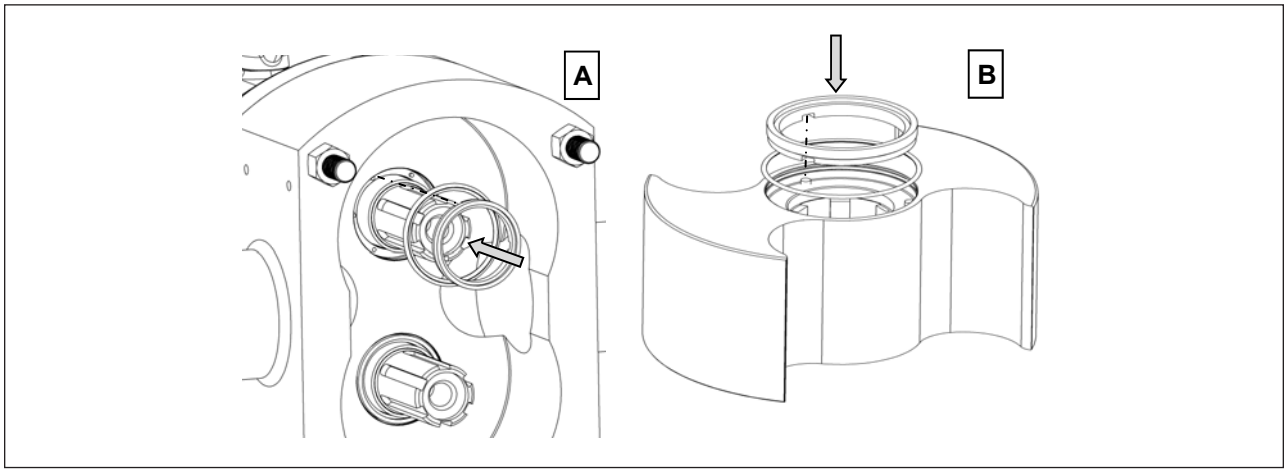

Figure 21. Double Mechanical Seal Assembly

LIP SEAL (DOUBLE OR TRIPLE)

Disassembly: The lip seal option is shown in *Figure 38*. Remove the retaining bolts using the appropriate driver and slide the lip seal out of the body. Check the lip seal for damage around the lips, if any of the lips are damaged, discard the lip seal and replace it. Remove the o-rings from the lip seal and rotor (*Figure 38, items 5, 6*). If damaged, replace o-rings. Slide the shaft sleeves off the shafts and inspect for damage. Do not re-use sleeves that are damaged (sleeve surface grooved or scratched).

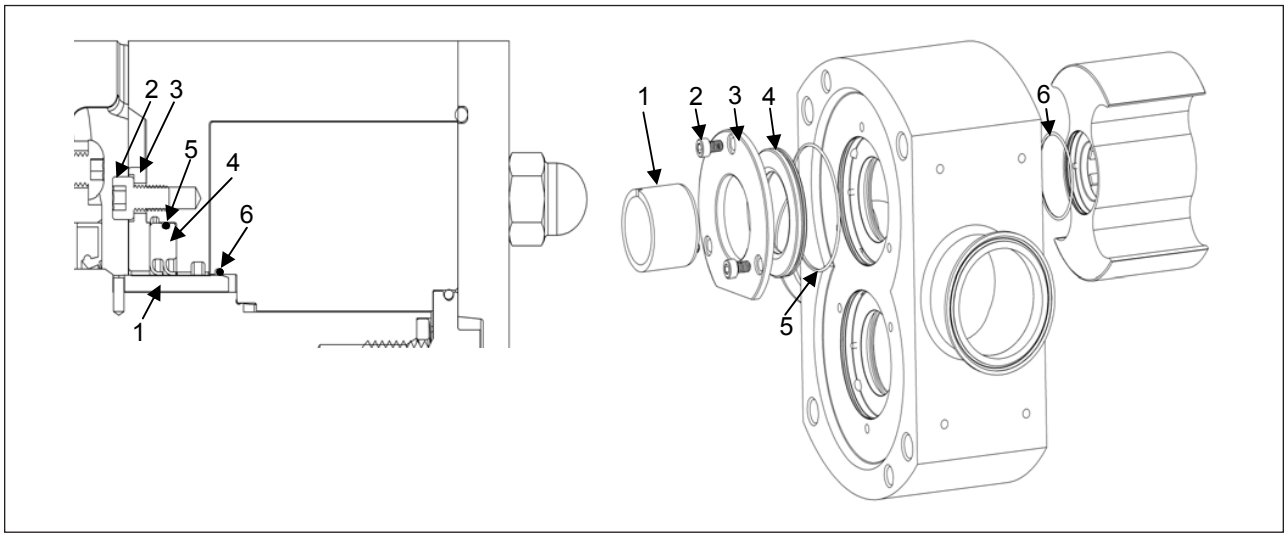

Figure 22. Lip Seal (*Double or Triple*)

Item No.	Part	Qty	Item No.	Part	Qty
1	Shaft Sleeve	2	4	Lip Seal (Double or Triple)	2
2	Retaining Bolt	6	5	O-Ring, Lip Seal	2
3	Lip Seal Retaining Plate	2	6	O-Ring, Rotor	2

Assembly: Clean both shaft ends and the body before assembling. Slide the shaft sleeves onto the shafts until they seat on the shaft shoulder. Align the slot in the shaft sleeve to the drive pin on the shaft (*Figure 39, A*). Apply a light film of lubricant to the NEW o-rings and insert them on the lip seal and in the rotors (*Figure 39, B*). Once all of the o-rings are installed, slide the lip seals into the body. Secure the lip seals in place with the retaining bolts. See Pump Assembly on *page 38* to continue.

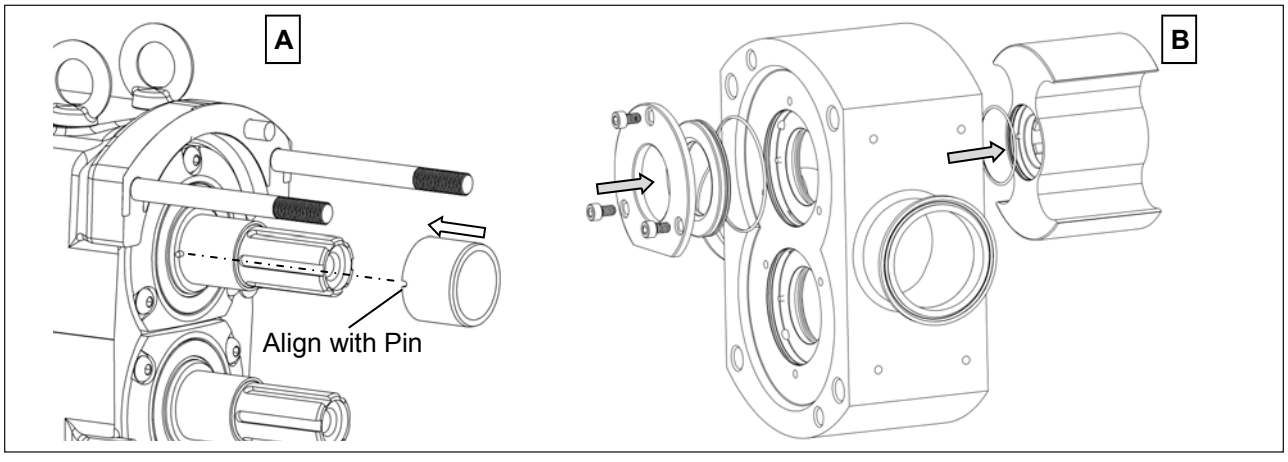

Figure 23. Lip Seal (*Double or Triple*) *Assembly*

MECHANICAL SEAL WITH FLUSH (LIP SEAL)

Disassembly: The mechanical seal with flush option is shown in *Figure 40*. Remove the mechanical seals and o-rings from the rotor and body. Remove the retaining bolts using the appropriate driver and slide the retaining plate, lip seal, and mechanical seal base out of the body. Check the lip seal for damage around the lip and replace if damaged. Slide the ceramic flush sleeve from the shaft and inspect for damage. Do not re-use sleeves that are damaged (sleeve surface grooved or scratched). Remove the o-rings from all components (*Figure 40, items 3, 5, 8, 9, 11*). If damaged, replace o-rings.

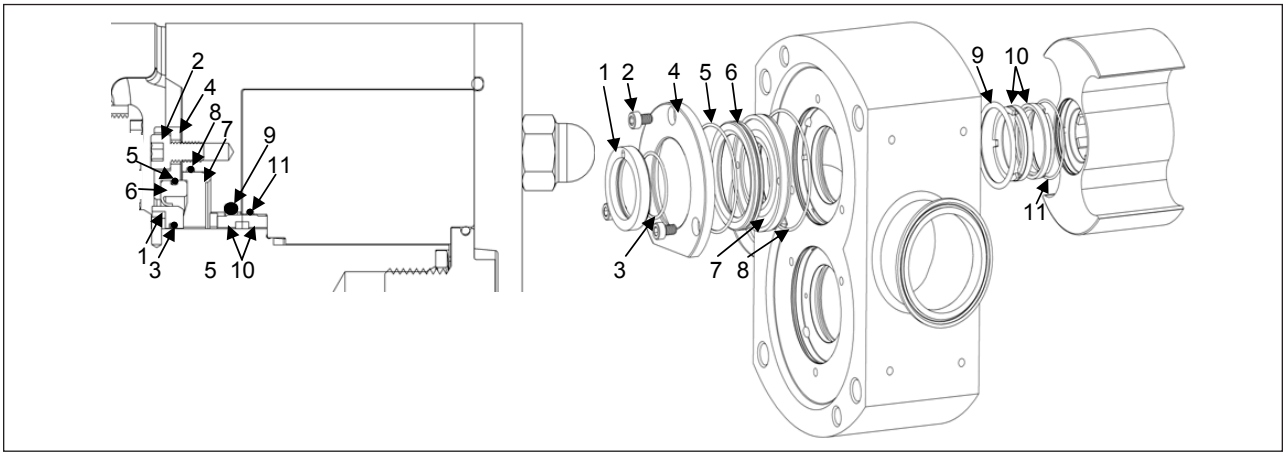

Figure 24. Mechanical Seal with Flush (*Lip Seal*)

Item No.	Part	Qty	Item No.	Part	Qty
1	Ceramic Flush Sleeve	2	7	Mechanical Seal Base	2
2	Retaining Bolt	6	8	O-Ring, Seal Base	2
3	O-Ring, Flush Sleeve	2	9	O-Ring, Body	2
4	Lip Seal Retaining Plate	2	10	Mechanical Seal	4
5	O-Ring, Lip Seal	2	11	O-Ring, Rotor	2
6	Flush Lip Seal (Single)	2			

Assembly: Apply a light film of lubricant to the o-rings and insert them into all components. Slide the ceramic flush sleeve on the shaft until it seats on the shaft shoulder. Align the slot in the sleeve to the drive pin on the shaft (*Figure 41, A*). Slide the mechanical seal bases and lip seals into the body and secure them with the retaining plate and bolts. Install the mechanical seals in the body and rotors, being sure to align the slot on the seals with the pins in the rotor and seal base. See Pump Assembly on *page 38* to continue.

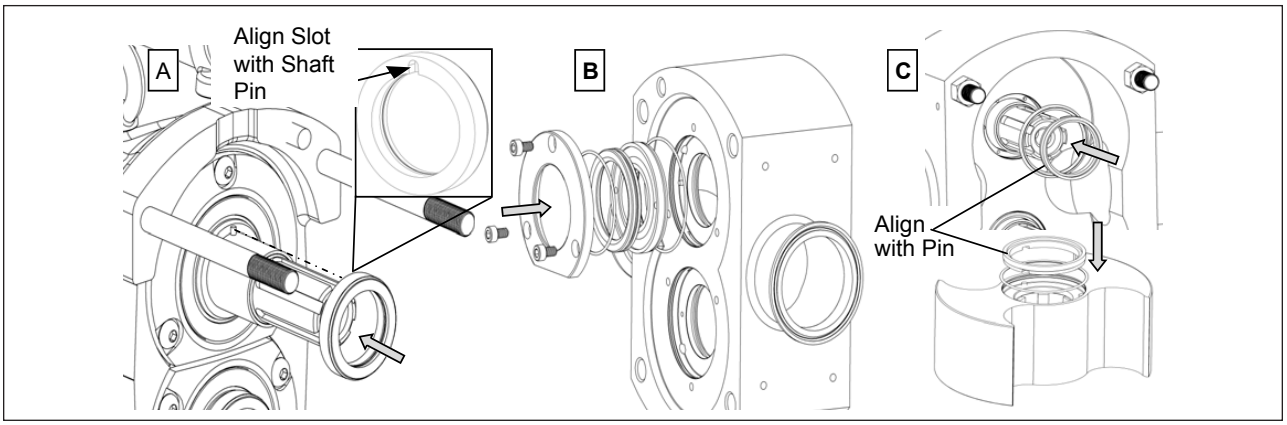

Figure 25. Mechanical Seal with Flush (*Lip Seal*) *Assembly*

Gear Case Maintenance

⚠ Warning

Shut off and lockout all power and relieve system pressure before servicing to prevent accidental start-up and injury.

⚠ Caution

SHUT OFF product supply to the pump and drain the pump before disconnecting piping and disassembly.

DISASSEMBLY

1. Remove the pump head as described on *page 21* (Pump Disassembly). Remove the bottom oil plug and drain the oil from the gear case (remove oil fill plug for faster drain). Remove the four socket head cap screws from the gear case cover and slide the cover off the drive shaft (*Figure 42*). If the cover is stuck, use a soft mallet to tap around the edges until it breaks free. Using a straight edge, remove the liquid gasket used to seal the cover to the gear case. Remove and discard the oil seal from the cover using an arbor press.

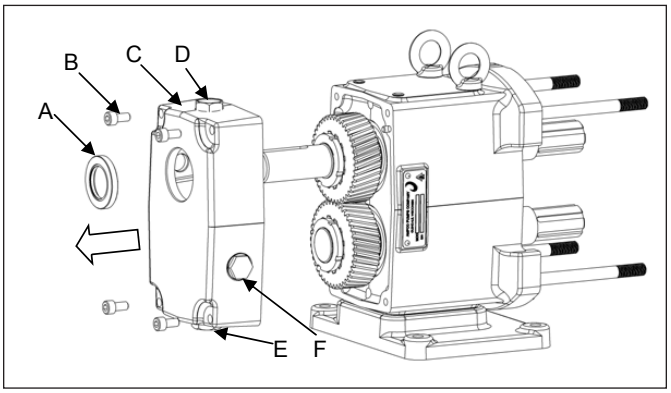

Figure 26. Gear Case Disassembly (*Gear Case Cover*)

	Part
A	Oil Seal
B	Socket Head Cap Screws
C	Gear Case Cover
D	Oil Plug (Fill)
E	Oil Plug (Drain)
F	Sight Glass

2. Using a hammer and a punch, bend the tabs straight on the lock washers (*Figure 43*). Use a wedge (wood or plastic) to prevent the shafts from turning while removing the lock nuts (*Figure 44*). Using a spanner wrench or punch, remove the gear lock nuts. Slowly remove the gears from the shafts. Remove the gear keys and gear spacers from the shafts.

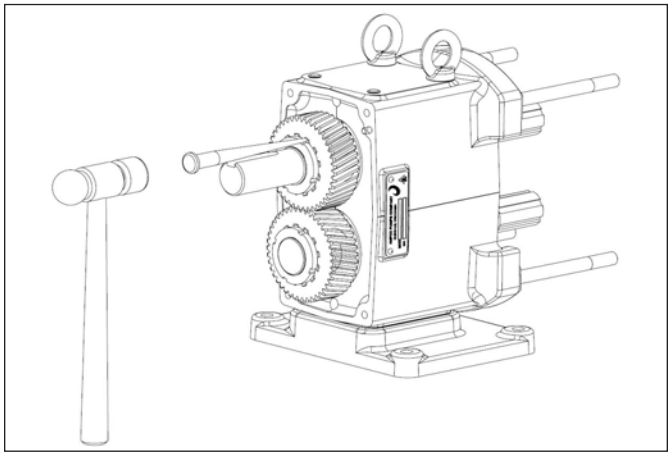

Figure 27. Bending Tabs on Lock Washers

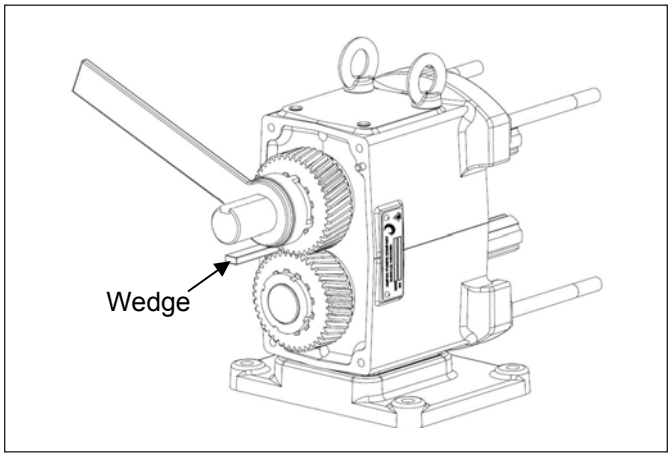

Figure 28. Removing Lock Washers

3. To prevent damage to the shafts, wrap the shaft splines with electrical tape (*Figure 45*, A). Any damage to the shaft splines may require the shaft to be replaced. Remove the screws holding the bearing retainers in place and slide both bearing retainers off the shaft (*Figure 45*, B). If they are stuck, use a flat head screwdriver as a wedge to pry them from the gear case, or leave them in place and when the shafts are removed they will press off with the shafts. Remove the o-rings from the bearing retainers and replace if damaged.

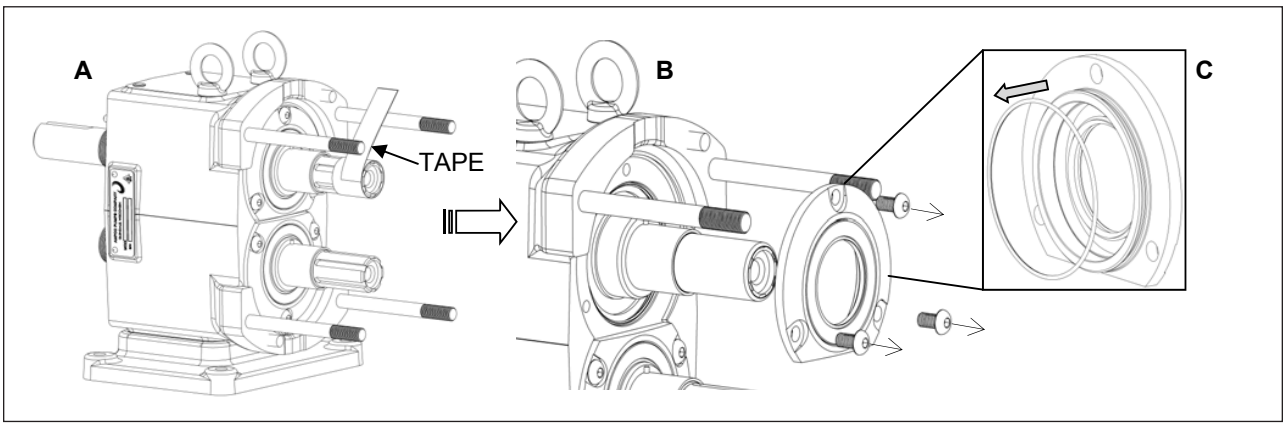

Figure 29. Tape Shafts and Remove Bearing Retainers

4. Remove the gear case studs and set the gear case in a press with the fluid end side facing down (*Figure 46*). Use a wooden block to protect the shafts from hitting the ground when pushed out. Once the protective block is in place, push the shafts out of the gear case.

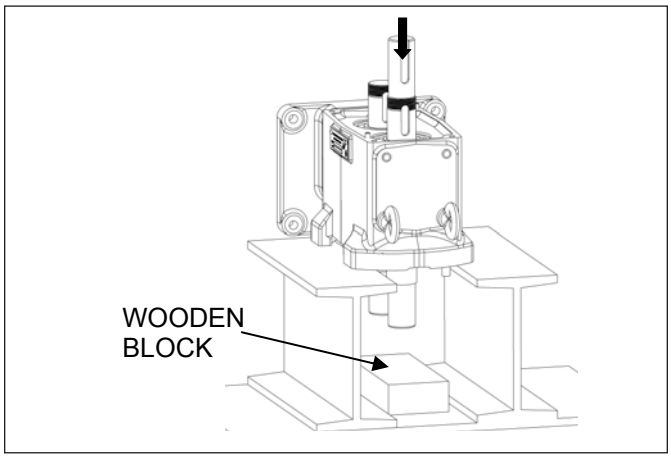

Figure 30. Pressing Shafts from Gear Case

5. Remove and discard the front bearing seals from the bearing retainers, by pressing them out (*Figure 47*). Clean the bearing retainers as they will be reused.

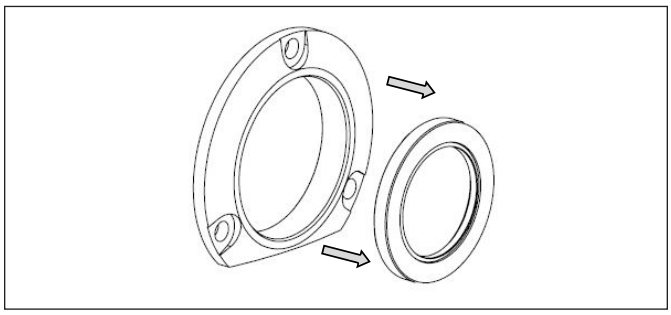

Figure 31. Removing Oil Seals

6. Using a press and equally sized blocks, remove the front and rear bearings along with the bearing spacer. To prevent damage to the shafts make sure that both ends are protected (*Figure 48*). The bearings are press fit on the shaft and will require a press to be removed.

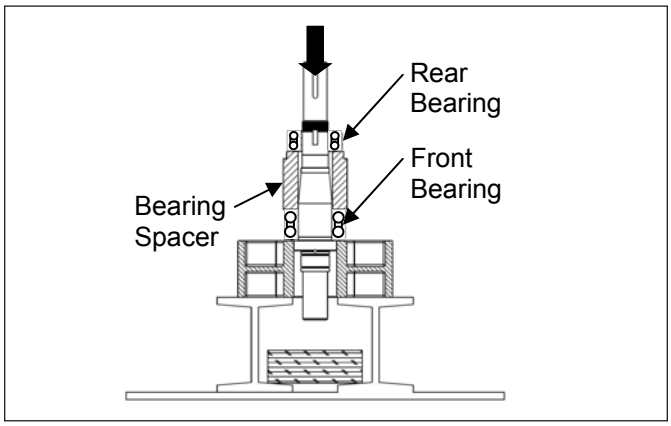

Figure 32. Removing Bearings and Sleeve from Shaft

ASSEMBLY

1. Clean all reusable parts prior to reassembly. Apply a light coat of lubricant on the shaft area where the front bearing will sit. Position the shaft upright in the press with the rotor end facing down (*Figure 49, A*). Ball bearings are used on all models except for the AL40 series. For the AL40 series it is important to not interchange any parts of the bearing assembly since all bearings are manufactured as sets and assembled to have a precise overall length. Open the new front bearing assembly and place it over the shaft along with the bearing spacer (*Figure 49, B*). Make sure the bearing and spacer are aligned before pressing them on. Using a sleeve that rests on the bearing spacer and rides over the shaft, press the bearing on until it seats against the shaft shoulder. A shim can be used to ensure that the bearing is fully rested on the shaft shoulder (*Figure 49, C*).

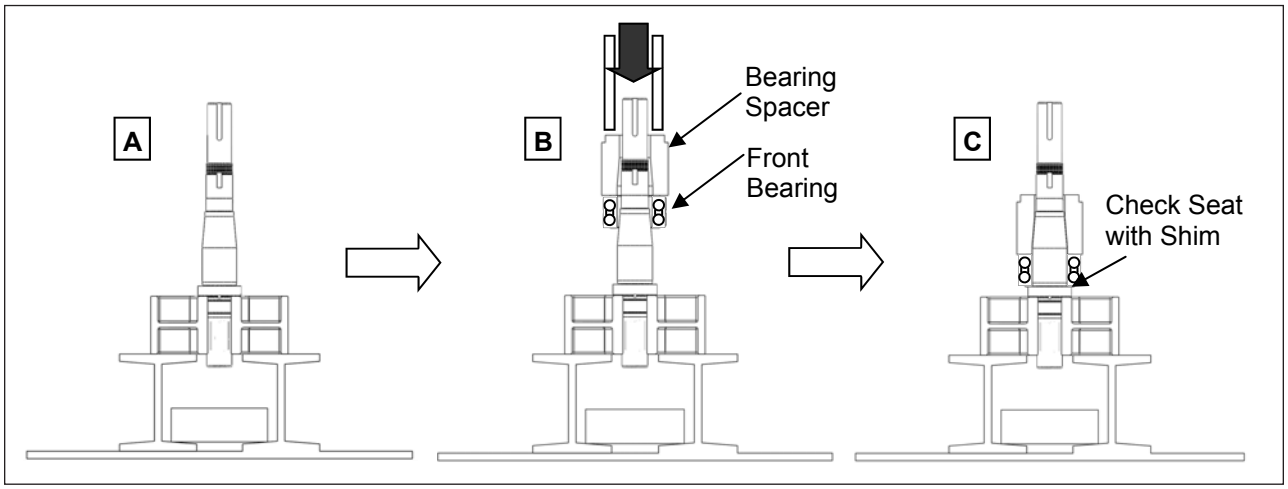

Figure 33. Pressing Front Bearing onto Shaft

2. Apply a light coat of lubricant on the shaft. Open the new rear bearing and place it over the shaft, above the bearing spacer (*Figure 50, A*). Using a sleeve that rests on the bearing's inner race and over the shaft, press the bearing on until it seats against the bearing spacer. For the AL40 series it is important to keep all assemblies together as they come packaged. Make sure the bearing is rested on the bearing spacer using a shim (*Figure 50, B*).

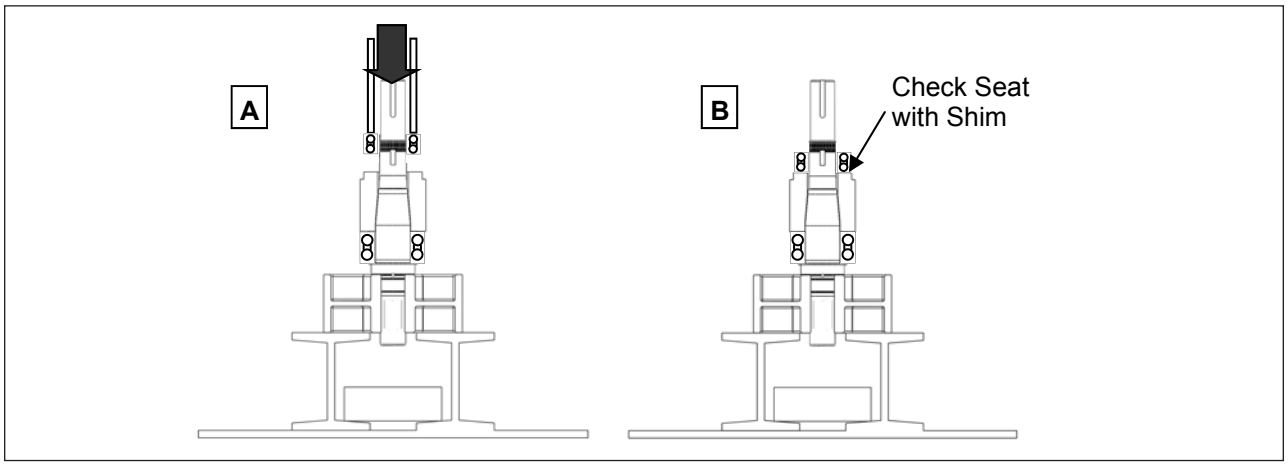

Figure 34. Pressing Rear Bearing onto Shaft

3. Set the gear case on a press with the fluid end side facing up. Apply lubricant to the outside of the bearings. Place shaft assembly (one shaft at a time) in the gear case with the rotor end facing up. Making sure that the drive and the short shafts are in the correct bores, press the shafts into the gear case until bearings are fully seated (*Figure 51*).

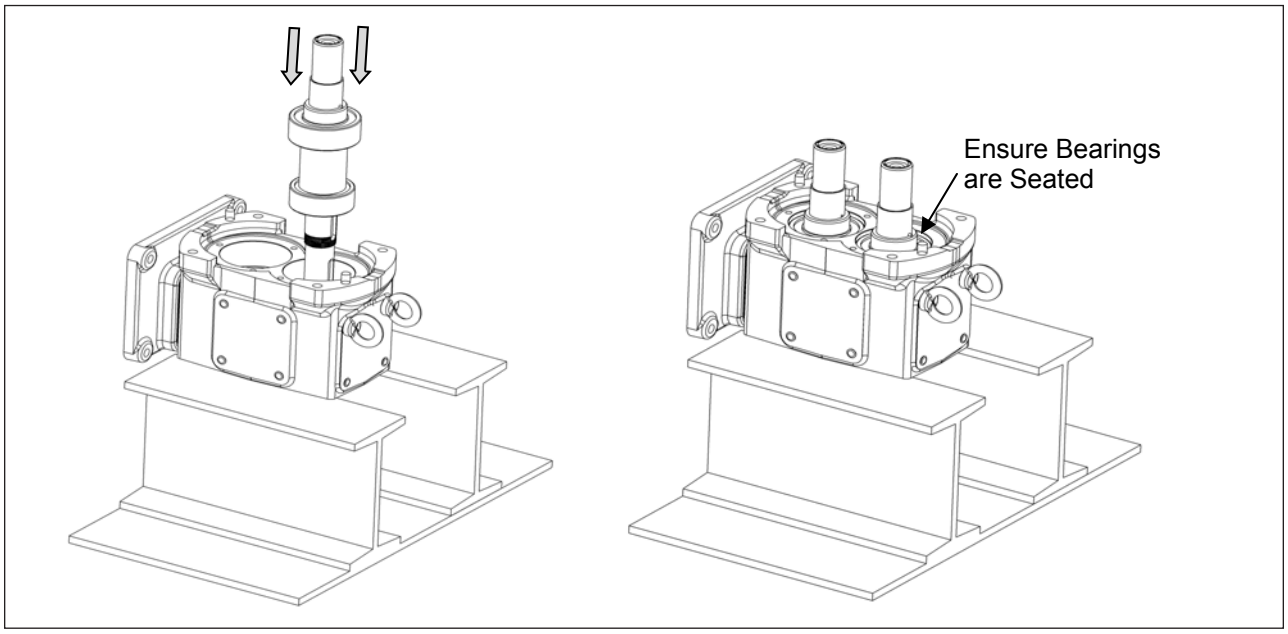

Figure 35. Pressing Rear Bearing onto Shaft

4. Press new oil seals into the bearing retainers, making sure the top of the seal is flush with the top of the retainer (*Figure 52,A*). Apply a light film of lubricant to the new bearing retainer o-rings and install them to the bearing retainers (*Figure 52,B*). After lubricating the lip of the oil seal, slide them over the shaft and fasten them to the gear case using the retaining screws.

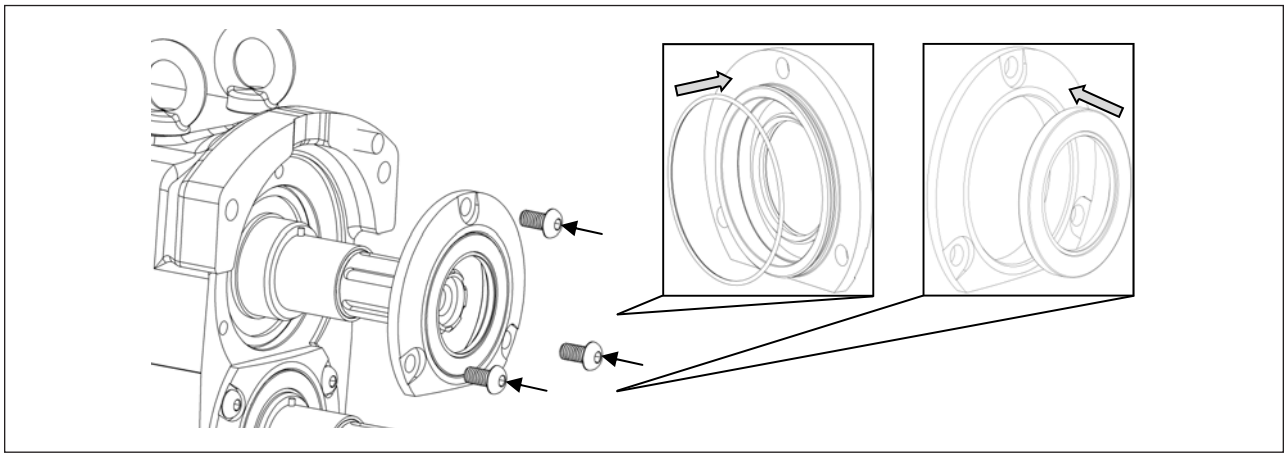

Figure 36. Bearing Retainer Installation

5. Thread the gear case studs into the front of the gear case as shown in *Figure 53*. Install the stud short side in.

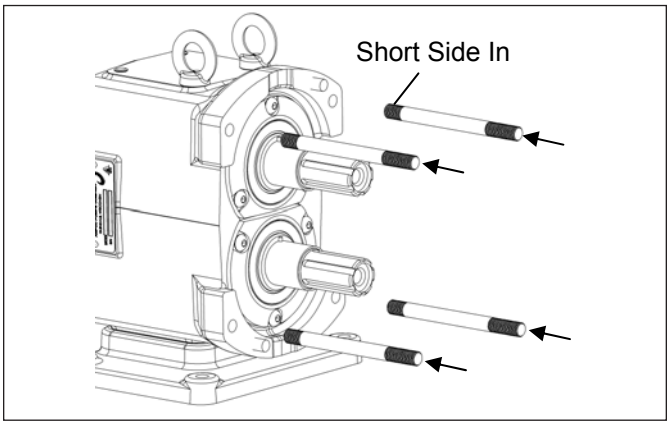

Figure 37. Gear Case Stud Installation

6. Align the shafts so that the gear key slots are pointing up. Slide the gear spacers on the shafts and insert the gear keys in the key slots (*Figure 54*).

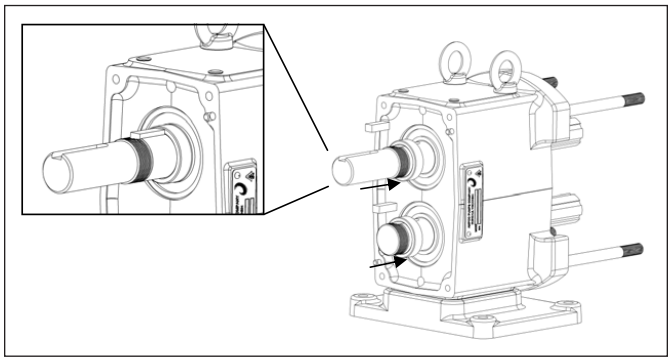

Figure 38. Gear Spacer and Key Installation

7. In order to ensure proper rotor timing, the gears must be installed along with the rotors. Slide the gears on the shafts, aligning the slot on the gear with the gear key (*Figure 55, A*). Secure them in place using the gear lock nuts, making sure that the dots on the gears line up (*Figure 55, B*).

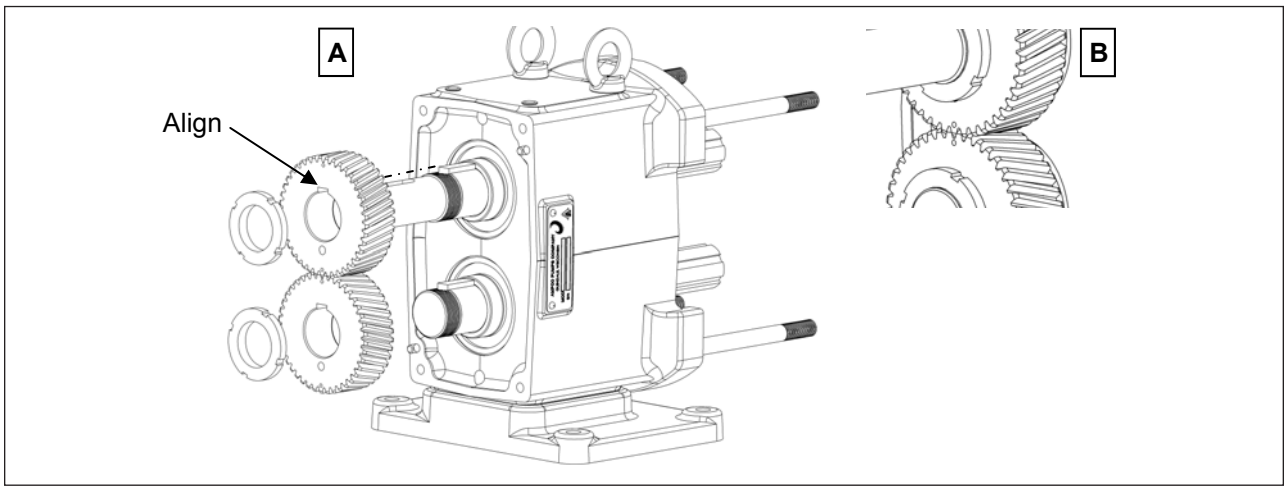

Figure 39. Installing Gears to Check Timing

8. Rotor timing is critical for the proper pump operation. Once the gears are locked in place, install the rotors to the bare shafts and secure them with the rotor screws. For bi-wing rotors, the distance between the rotor tips should be equal (*Figure 56, A*). For tri-lobe rotors, measure the clearance between the lobes (*Figure 56, B and C*). Correct rotor clearance can be found in *Table 5* on *page 40*. If the clearances are incorrect, proceed to step 9, otherwise skip to step 10.

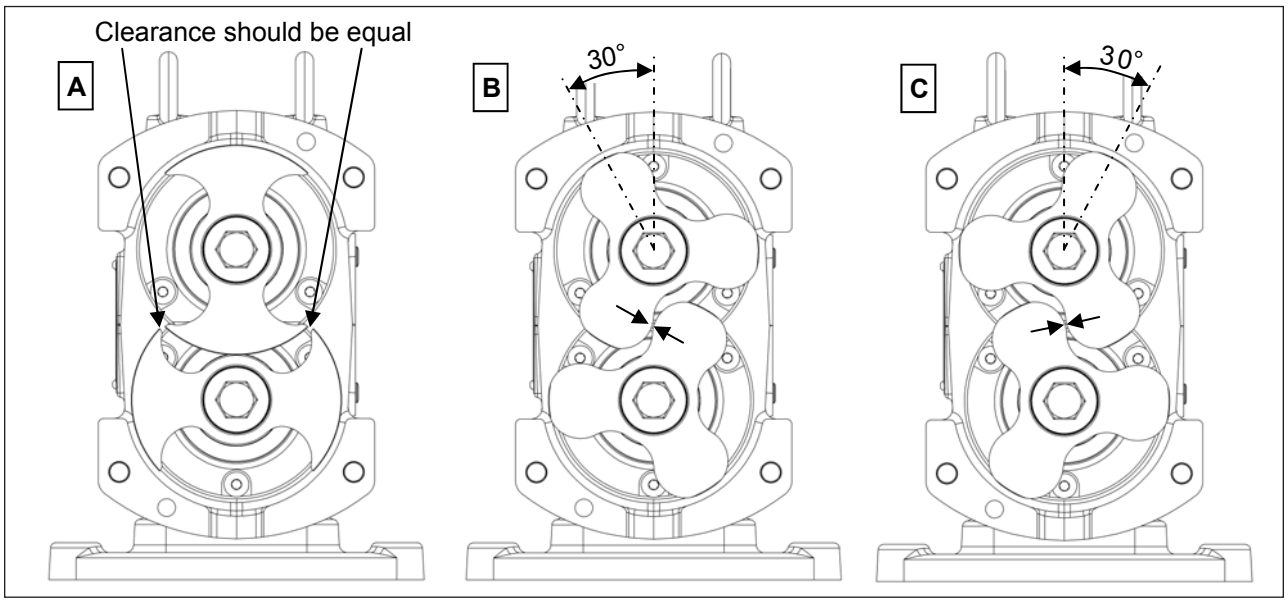

Figure 40. Checking Rotor Timing

9. If the clearances are incorrect, they can be adjusted by shimming one gear. Remove the gear lock nuts and gears, and add gear shims to one shaft (*Figure 57*). The gear being shimmed is determined after checking the clearances, some trial and error may be necessary. Once the shims are in place, reassemble the gears and ensure the correct clearances are met. Remove the rotors from the shafts.

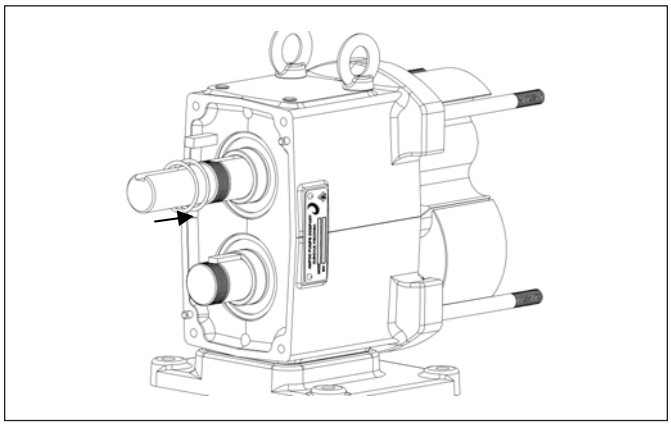

Figure 41. Gear Shim Installation

10. With the gears on the shafts, slide the lock washer on the shaft (*Figure 58, A*). Align the tab inside the lock washer with the hole on the gear (*Figure 58, B*).

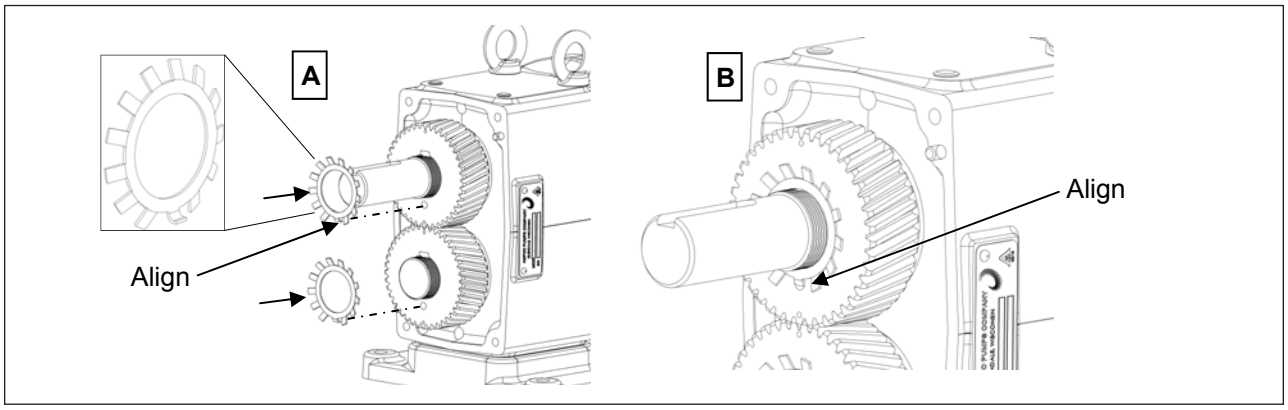

Figure 42. Lock Washer Installation

11. Lubricate the threads of the lock nuts and thread them on the shafts (*Figure 59, A*). Using a spanner wrench, tighten them to the specified torque in *Table 3*. Use a wedge (wood or plastic) between the gear teeth to keep the shafts from turning while tightening the lock nuts (*Figure 59, B*). Secure the nut in place by bending the locking tabs on the lock washer into the lock nut slots (*Figure 59, C*).

Table 2. Recommended Lock Nut Torque Values

AL Model	ft-lbs	N-m
05, 10, 15, 20	75	102
22, 25	100	136
33, 34	140	190
44, 46	230	312

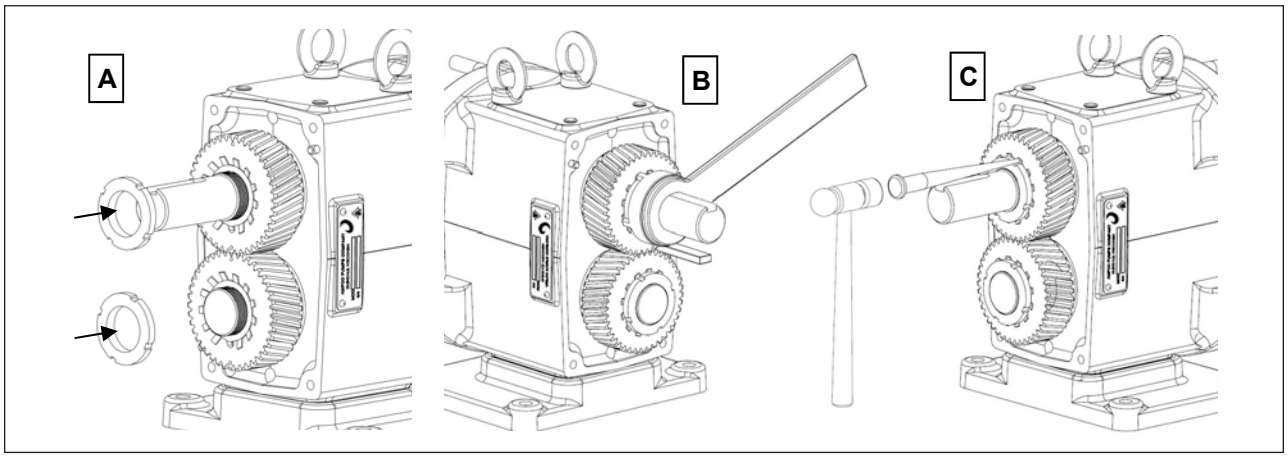

Figure 43. Gear Installation

12. Press the new oil seal into the gear case cover so the seal is flush with the outside of the cover and so that the spring will face the gears (*Figure 60, A*). Apply a silicone sealant to the edges on the back of the gear case, making sure there are no gaps (*Figure 60, C*). Wrap the shaft keyway with tape to avoid cutting the lip seal on the shaft keyway. Apply a light film of lubricant to the inside and outside diameters of the gear case cover oil seal. Slide the back cover onto the gear case, and secure it with the retaining bolts (*Figure 60, B*). Install the oil plugs and fill the gear case with the recommended amount of oil using *Table 2* on *page 18*.

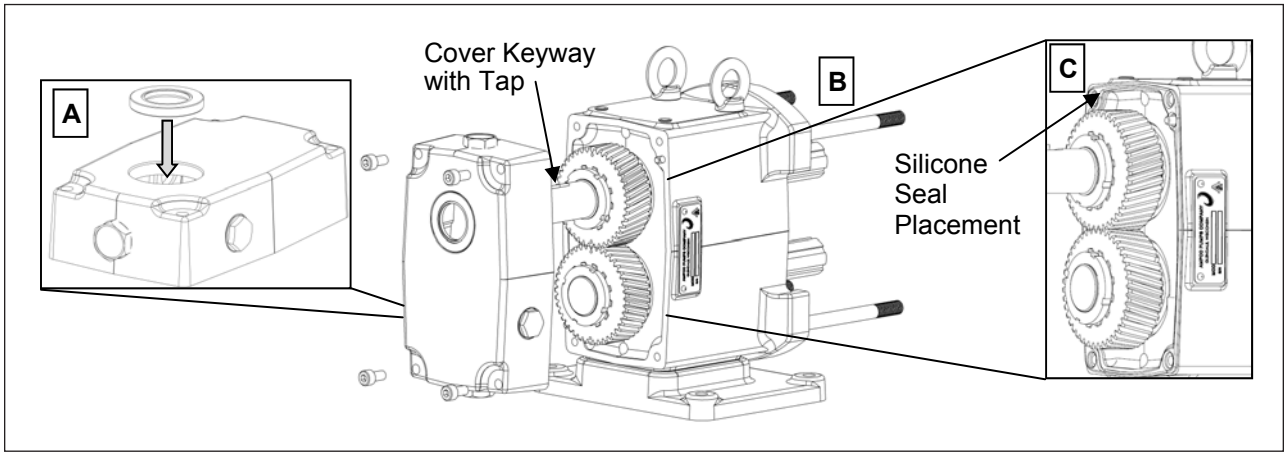

Figure 44. Gear Case Cover Assembly

Pump Assembly

⚠ Caution

Handle the rotors, piping, and other pump components carefully as edges may be sharp. Wear gloves to avoid injuries.

⚠ Warning

The body must be re-assembled to existing sub-assembly from which it was removed. Reference serial numbers on the body and sub-assembly to verify the match. Failure to correctly re-assemble the pump could result in damage and severe injury.

1. Make sure all seal components are installed by following the “Seal Assembly” instructions appropriate for your pump starting on *page 23*. Ensure all dowels are in place and that all parts including body, rotors, and rotor nuts are clean and free of foreign matter. Install the correct shims on the gear case using grease to hold them in place, if needed. Slowly slide the body over the gear case studs and shafts, ensuring the seals are kept in place and not damaged (*Figure 61, A*). Install the four hold down nuts and tighten the body against the gear case to ensure the dowels are engaged (*Figure 61, B*). Rotate the shafts to make sure there is no interference with the seals. Ensure that the shims have not fallen out.

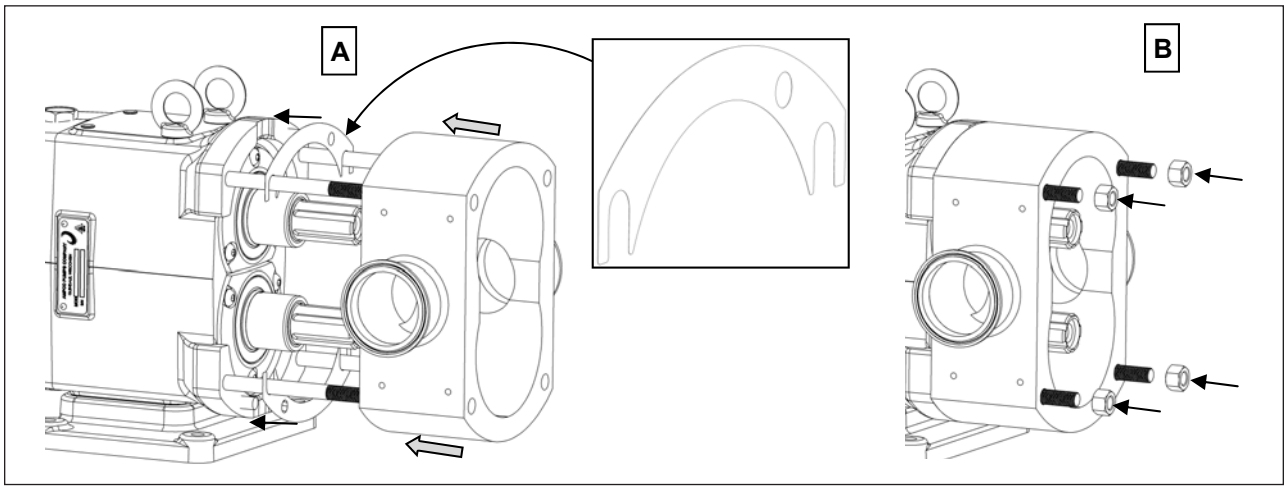

Figure 45. Installing Shims and Pump Body

2. Align the short spline in the rotor with the short spline on the shaft and slide the rotor on the shaft (*Figure 62, A*). Install a new rotor bolt o-ring in the o-ring grove on the rotor bolt. Slide the lock washer on the rotor bolt and thread the rotor bolt into the shaft, tightening it down using the appropriate wrench and a non- metallic wedge to hold the rotor in place (*Figure 62, B*). See *Table 4* for required torque values. Repeat with the second rotor.

Table 3. Recommended Rotor Bolt Torque Values

AL Model	ft-lbs	N-m
05, 10, 15, 20	20	27
22, 25	32	43
33, 34	47	64
44, 46	65	88

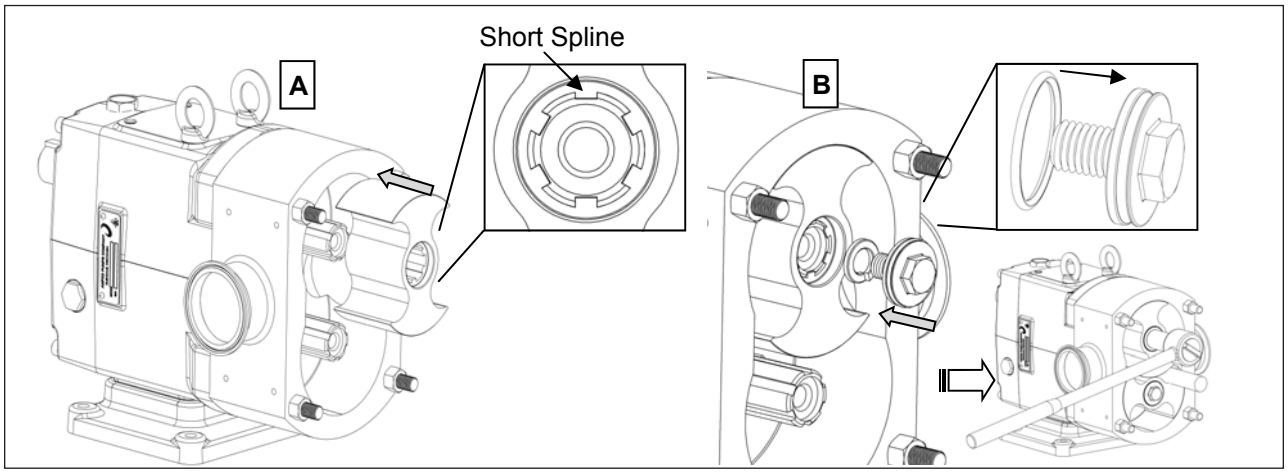

Figure 46. Rotor Installation

3. Install the new cover o-ring and slide the cover over the studs (*Figure 63, A*). Visually inspect to ensure that the cover o-ring remained in place. Using an appropriate wrench, thread the cover nuts on the studs and tighten them in an opposing manner so that the cover is evenly tightened to the body *(Figure 63, B)*.

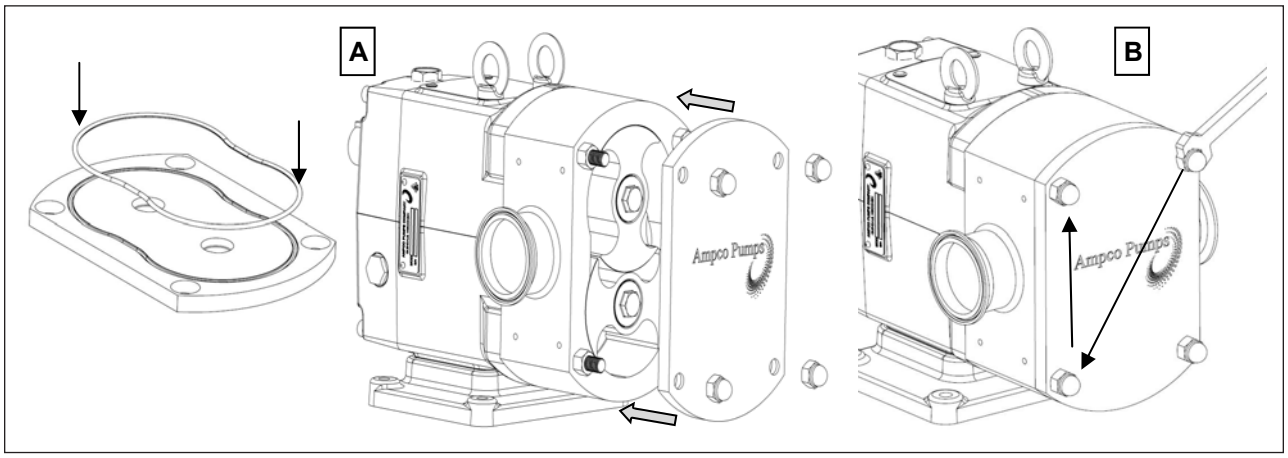

Figure 47. Cover Installation

Pump Clearances

The performance of an AL pump is based on the tight clearances between the pump body and the rotors. These clearances are critical to ensure the pump performs up to the system requirements. The back face clearances are set when the body is assembled to the gear case (*page 38*) using shims placed between the gear case and the front bearing. Other clearances are shown in *Figure 64* and should be in accordance to *Table 5*. Use shims and a depth micrometer to measure the clearances.

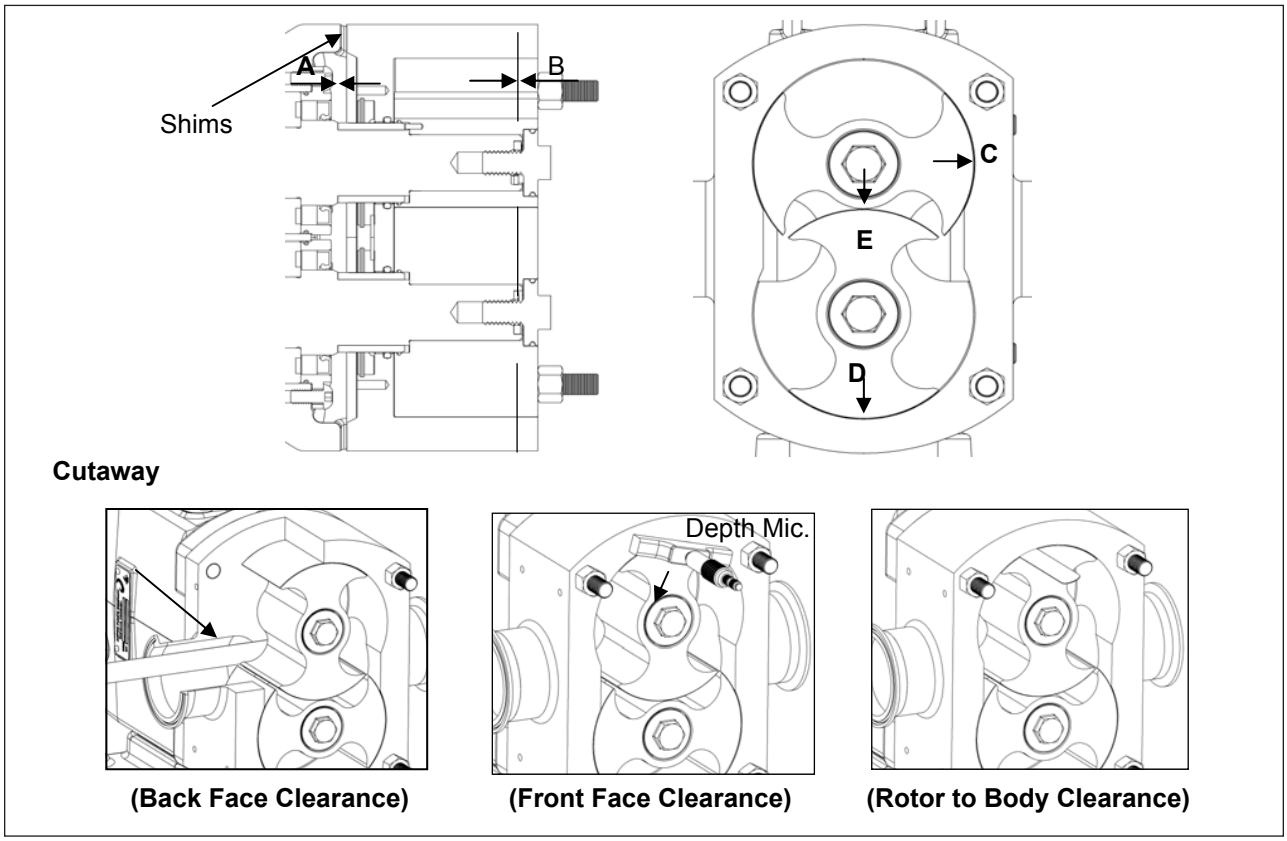

Figure 48. Critical Pump Clearances

Table 4. Critical Pump Clearance Dimensions (Standard Rotors)

	A (Back Face Clearance)		B (Front Face Clearance)		C (Radial Sides Clearance)		D (Radial Top/Bottom Clearance)		E (Rotor to Rotor Clearance)	
AL Model	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
5, 10	.006	.15	.006	.15	.006	.15	.005	.12	.005	.12
15	.006	.15	.006	.15	.011	.27	.005	.12	.006	.15
20	.006	.15	.006	.15	.012	.30	.006	.15	.006	.15
22	.008	.20	.008	.20	.012	.30	.006	.15	.008	.20
25	.008	.20	.008	.20	.016	.40	.008	.20	.008	.20
33	.012	.30	.012	.30	.016	.40	.008	.20	.012	.30
34	.012	.30	.012	.30	.020	.50	.012	.30	.012	.30
44	.018	.45	.018	.45	.022	.55	.012	.30	.016	.40
46	.018	.45	.018	.45	.028	.70	.018	.45	.016	.40

Note: For non-standard rotors contact Ampco.

Ampco Pumps Available Options

JACKETED COVER AND CASING

The jacketed cover and casing option (*Figure 65*) allows for heating or cooling fluid to be circulated around the pump's fluid end to match the demands of certain products. This fluid (media) can preheat or cool the product and sustain temperature during operation and short shut downs. The jacketed cover is not a heat exchanger and is not designed to primarily control the product temperature. Internal pressure of the heating jacket should not exceed 50 PSI. Please contact Ampco Pumps for replacement information.

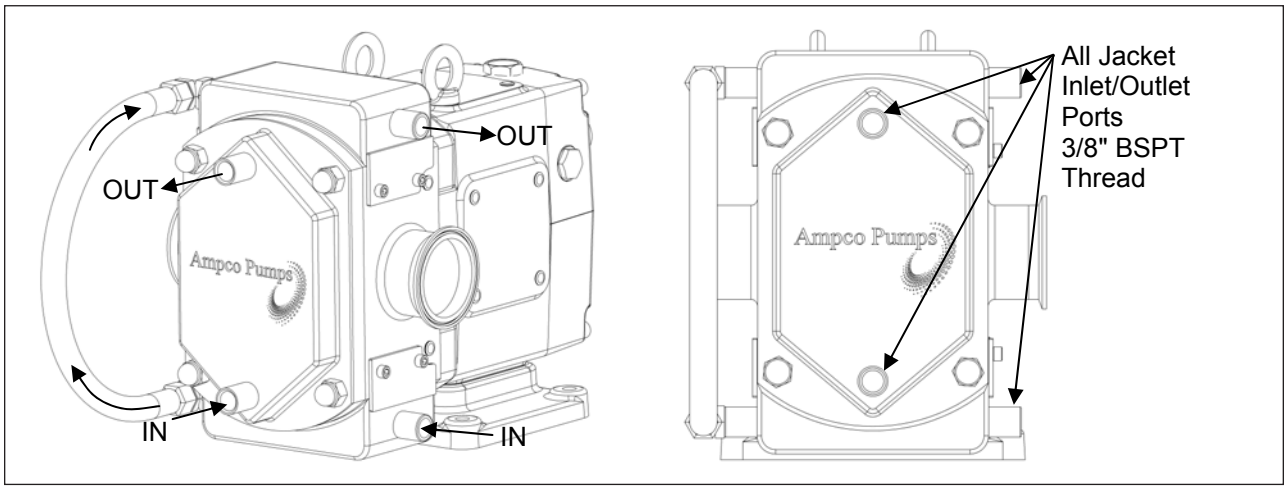

Figure 49. Jacketed Cover

Installation:

Install the casing jackets to the pump casing and fasten them using the jacket bolts. Connect the two jackets with the supplied tube by installing the elbow connections first and then connecting the tube to the elbows (*Figure 66, A*). The jacketed cover sits over the standard AL cover and uses the same cover nuts to fasten it to the pump. Slide the standard cover and jacketed cover over the studs and secure them using the cover nuts (*Figure 66, B*).

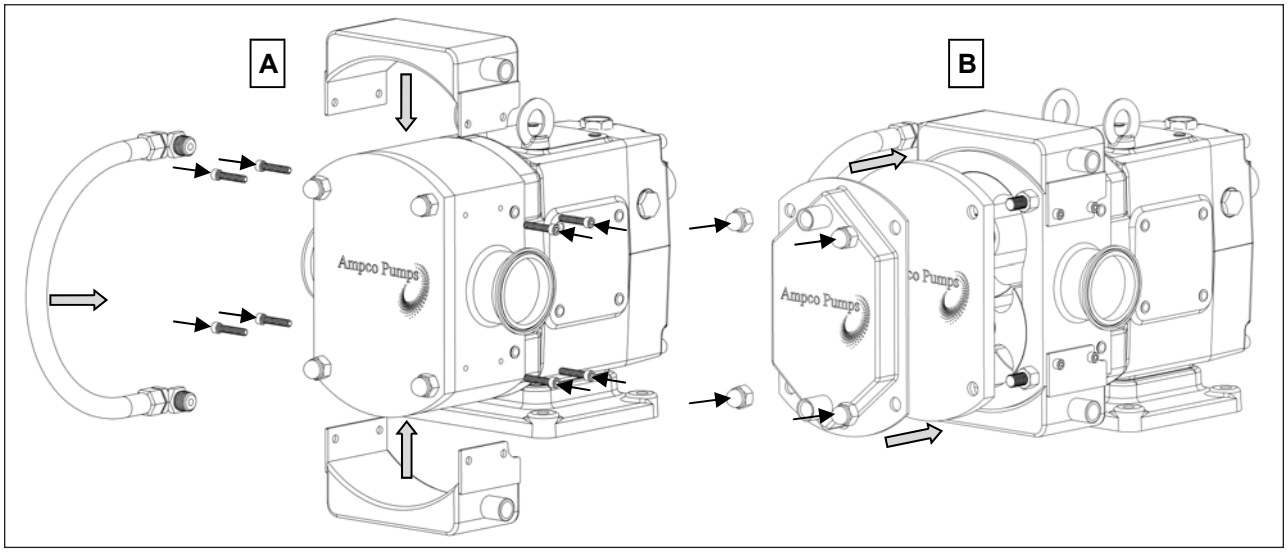

Figure 50. Jacketed Cover Installation

VENTED COVER (PRESSURE RELIEF)

The vented cover option is an internal pressure and flow control which works independently of flow (rotational direction). The complete assembly can be seen in *Figure 67, A*. The relief pressure is set with the adjustment screw and may require in-line pressure gauges for calibration. Non-standard rotor bolts MUST be used so no contact is made with the cover (*Figure 67, B*). Once the cover is assembled, install it on the pump and fasten it using the standard cover nuts (*Figure 67, C*).

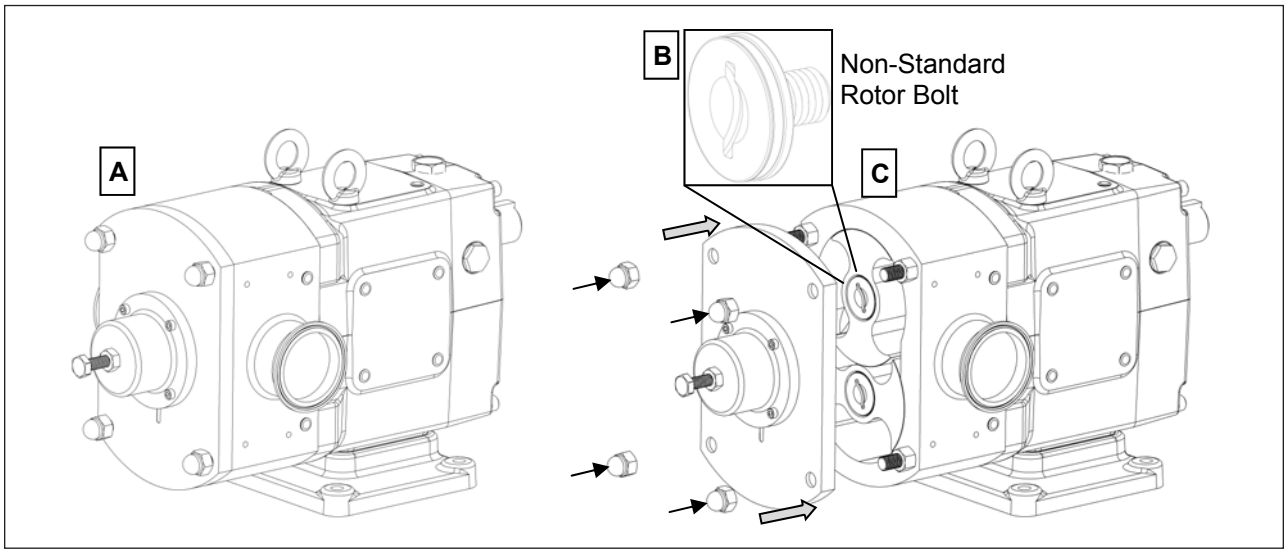

Figure 51. Vented Cover

Installation:

The vented cover assembly can be seen in *Figure 68*. Assemble on a flat surface and start by inserting the o-rings in the diaphragm. Slide the diaphragm in the cover and set the spring and adjusting plate on it. Set the relief housing on the cover and secure it using the housing bolts. Thread the lock nut onto the adjusting bolt and thread the bolt in the relief housing. Adjust relief pressure accordingly.

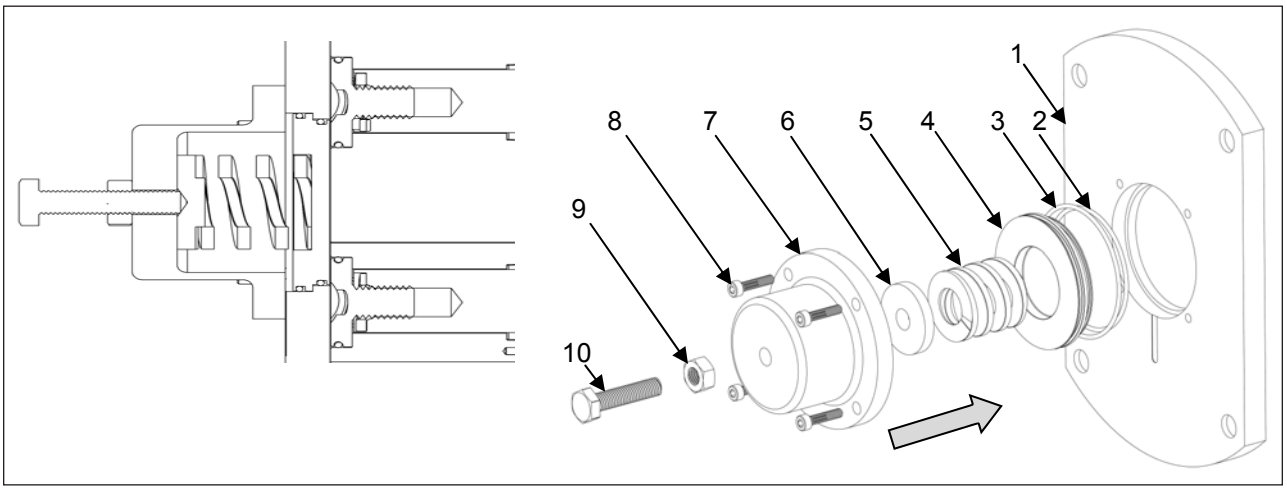

Figure 52. Vented Cover Assembly

Item No.	Part	Item No.	Part
1	Vented Cover	6	Adjusting Plate
2	Diaphragm O-Ring, #1	7	Relief Housing
3	Diaphragm O-Ring, #2	8	Housing Bolts
4	Diaphragm	9	Lock Nut
5	Spring	10	Adjusting Bolt

BEARING FRAME BREATHER

With every pump order, a breather is supplied with the shipping materials. Due to high temperatures or pressures inside the bearing frame, oil seals can be pushed out of their seats causing an oil leak. In the event that this happens, the breather can be installed to mitigate these conditions.

To install, first orient the pump in which it will be used when installed into the process line. Using the appropriately sized hex key or Allen wrench, remove the top most 1/8" NPT plug from the bearing frame. Save this plug in a secure location. Apply thread tape or pipe sealant to the threads on the breather. Insert breather and tighten until tape or sealant have formed a secure seal.

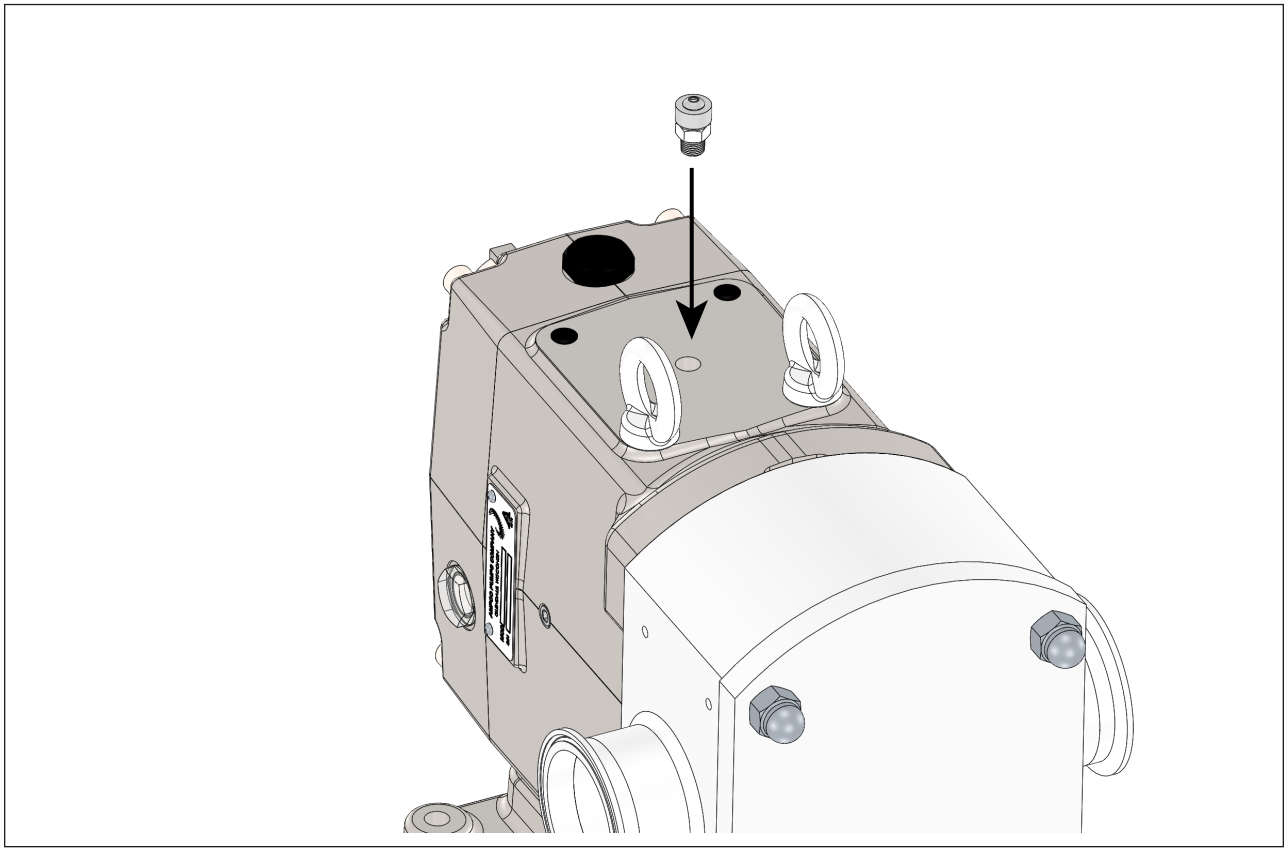

Figure 53. Bearing Frame Breather

Section 5
Troubleshooting

Troubleshooting

Each Ampco AL pump is assembled and tested at the factory, and is designed to have trouble-free operation. Problems may occur over the life of the pump due to system variations, standard wear, or user error. The following table has information that may help identify and solve a problem. For additional technical assistance, please contact Ampco with the pump's serial number.

Symptom	Cause	Solution
NO FLOW (rotors are not turning)	Drive motor is not running or connected	Check connection and power source to pump motor drive
	Keys (gear, drive shaft) are sheared or missing	Check or replace
	The pump's drive (gearbox, belts, transmission) is broken or slipping	Check, replace, or adjust
	Pump shafts or gears are broken	Check and replace, if necessary
NO FLOW (rotors are turning)	Rotors are turning in the wrong direction	Check motor connections for correct hookup (see "Pump Rotation" on *page 13*)
	Discharge port/valve is closed or blocked	Check and open, if necessary
	Inlet port/valve is closed or blocked	Check and open, if necessary
	Pump relief valve (optional) is not set correctly, or is held open by foreign matter	Check and clean, if necessary. Check system so that unwanted debris doesn't enter pump
NO FLOW (pump is not priming)	Inlet valve closed	Open valve, if necessary
	Inlet line restricted or clogged	Clean lines and check system
	Too much air in the inlet line	Check lines for leaks, replace gaskets or pipes, if needed
	The pump's speed is too low	Increase speed of pump
	The pump's speed is too high	Check viscosity of product, and reduce speed as needed
	No product in the inlet lines (lines drain or siphon when pump is off)	Foot valves or check valves may be used. Having product in the line is necessary for the pump to prime
	Pump is air locked	Install air bleeds to the pump and lines
	Pump may be worn out	Increase the pumps speed or replace worn out rotors.
	Inlet pressures too low	Check pressure required. Change, if necessary
	Differential pressure differences not developing	Install check valves on discharge to prevent large back pressures
Inadequate Flow	Speed is too low or too high	Check published pump curve and adjust speed, if necessary
	Air leaks in inlet line	Check for bad seals, bad gaskets and piping connections
Inadequate Flow and Flow Is Bypassing Pump	Open valve (inlet drain, trap valve)	Check valves and close, if needed
	Relief valve not adjusted correctly or stuck	Check relief valve and adjust, if necessary
Inadequate Flow, Pump Is Noisy During Operation (slipping)	Non-standard rotors (Hot clearance) are being used on low viscous fluids	Use appropriate rotors for product (contact Ampco for additional support, if needed)
	Body and rotors are worn	Increase speeds, replace rotors
	Pressures are too high for pump	Adjust system

Symptom	Cause	Solution
Starved Pump Inlet (fluid vaporization)	Strainers, valves (inlet side), fittings, or lines are plugged or restricted	Check and clean lines/valves
	The Inlet line is too small (inside diameter), to long, or both.	Increase inlet pipe size and/or decrease pipe length
	Too many valves or fittings	Reduce number of fittings or valves
	Valves or strainers are too small	Check and change, if necessary
	The net inlet pressure is too low	Check pump and system requirements and change system or pump, if necessary.
	Product viscosity greater than expected	Change system parameters (temperature, flow, pressure)
	Product temperature is higher than expected	Reduce speed, temperature, and flow, if necessary
Excessive Power Is Required (pump overheats, stalls, draws high current, fuses/ breakers are tripping)	Viscosity losses higher than expected	Increase pump speed, if needed
	Pressures higher than expected	Decrease pump speeds and modify inlet line sizes
	Viscosity is higher than expected	Heat product or change system parameters
	Viscous product sits in line during shutdown	Install a soft start on motor drive, clean lines, or change system to avoid problem
Noisy Operation (cavitation)	Product's viscosity, vapor pressure and temperature are too high	Check system setup. Change speeds and temperatures accordingly
	The inlet pressure available is less then required	Check inlet pressure requirements and adjust accordingly
Noisy Operation (air or gas in fluid)	Air leaks in the system	Check for leaks and correct, if needed
	Product emits gases	Install pressure relief valves
Noisy Operation (rotor to body contact)	Assembly without checking fluid end clearances	Check pump clearances and adjust, if necessary (*page 40*)
	Internal stresses in pump caused by improper piping support	Adjust system to eliminate stresses (*page 10*)
	Pressures are higher than what the pump is rated for	Reduce pressures
	Bearings are worn	Check for bearing movement (*page 19*) and replace, if necessary
Noisy Operation (rotor to rotor contact)	Gears are loose or incorrectly timed (damage to rotor may be severe)	Rebuild pump with new parts
	Keys are sheared	Inspect and rebuild, if necessary
	Gears are worn	Inspect and replace gears, if needed. Inspect damage to rotors and rebuild, if necessary
Noisy Operation (external mechanical problems)	Gear drive, drive belts, coupling or bearings are worn or not correctly adjusted	Check and replace. Adjust, if needed
Short Pump Life	Product is abrasive	Check system, and possibly implement a larger pump at lower speeds
	Pump speeds and pressures are higher than pump rating	Check system and change, if necessary. Reduce speeds and pressure of pump
	Improper gear case lubrication	Check and replace worn out gears and bearings *(page 20)*; follow procedures on *page 17* for proper lubrication
	Water build up in gear case	Check that all gear case plugs are in place
	Misalignment in system (piping or pump drive)	Check and modify system to eliminate alignment issues

Section 6
Appendix

ATEX Certification Information

1. Ampco Pumps DOC (declaration of conformity) must be included with the pump. The declarations starting on *page 48* are provided for example purposes only. Please see the certificate you received with your pump.
2. ATEX certified pumps will be sent with black plugs on all drain and level ports at the rear of the gear case.
3. ATEX approval becomes void if non-Ampco replacement parts are used in the pump.

For additional support regarding ATEX certification, please contact the Engineering Department at Ampco Pumps Company, (414) 643-1852.

(1) **REGISTRATION CERTIFICATE**

(2) Equipment and Protective Systems intended for Use in Potentially Explosive Atmospheres – Directive 94/9/EC

(3) **Registration Number:**

TUVNA 12 ATEX 7223
File No. 31271925.001

(4) **Documentation:** **Technical Construction File (TCF) dated May 12, 2012**

(5) **Equipment:** **ZP1, ZP2, ZP3, and AL Series Mechanical Pumps**

(6) **Manufacturer:** **Ampco Pumps Company**

(7) **Address:** **2045 West Mill Road Glendale, WI 53209**

(8) The aforementioned technical construction file has been received by TUV Rheinland of North America and has been registered under Registration No. TUVNA 12 ATEX 7223, File No. 31271925.001 on behalf of our sister organization TÜV Rheinland Industrie Service GmbH, a Notified Body with ref-no NB 0035.

(9) This equipment and any acceptable variations thereto are specified in the aforementioned technical construction file.

(10) With respect to the ATEX Directive (94/9/EC), the manufacturer has declared compliance with the following standards.

EN 1127-1: 2007 **EN 13463-1: 2009** **EN 13463-5: 2003**

(11) The marking of the equipment shall include the following:

II 2 G Ex c IIB T4

(12) Other requirements as may be applicable are not covered by this Registration Certificate.

Jim Dolphin 2012-09-10

Conformance Certificate for Material Shipped

Customer	Ampco Pumps GmbH
Date Signed	11/25/2024
Customer PO No.	PO20240361
Ampco Order No.	117577
Date Ordered	6/6/2024

Ampco Pumps Co. certifies that all items; including this report and the results of tests and values listed hereon are in full conformance with all purchase order and specification requirements. Further, the values shown represent the actual values obtained during testing, using the sample selection and test methods specified in the applicable material specification. It is also understood that knowingly and willfully falsifying or concealing a material fact on this form, or making false, fictions or fraudulent statements or representations herein could constitute a felony punishable under Federal Statutes. All material supplied is also free from mercury alpha or radium contamination and are animal derived ingredient free.

Line No.	Item Number	Description	Qty
3	AL15-M	PUMP, AL15, MECH SEAL	1
		Specification	
		Bi-Wing Rotors	
		Single Mechanical Seal	
		Mech Seals - TC/TC	
		EPDM Elastomers	
		Standard Rotor Case	
		DIN 11851 (DN 40)	
		Port to Port = 212mm (Standard)	
		Top Drive	
		Standard Cover	
		EPDM Cover O-Ring	
		Standard Finish (32Ra)	
		INFO: Replacement Seal Kit P/N	
		AL15-SGL-TC	
6	AL15-M	PUMP, AL15, MECH SEAL	1
		Specification	
		Bi-Wing Rotors	
		Single Mechanical Seal	
		Mech Seals - TC/TC	
		EPDM Elastomers	
		Standard Rotor Case	
		DIN 11851 (DN 40)	
		Port to Port = 212mm (Standard)	
		Top Drive	
		Standard Cover	
		EPDM Cover O-Ring	
		Standard Finish (32Ra)	
		INFO: Replacement Seal Kit P/N	
		AL15-SGL-TC	
9	MISC-CERT OF ORIGIN	CERTIFICATE OF ORIGIN	1
12	MISC-CERT	EC1935/2004 CERTIFICATE	1
15	MISC-CERT	2023/2006 GMP CERTIFICATE	1
18	MISC-ELASTOMER CERT	FDA ELASTOMER CERTIFICATE	1

Conformance Certificate for Material Shipped

Customer	Ampco Pumps GmbH
Date Signed	11/25/2024
Customer PO No.	PO20240361
Ampco Order No.	117577
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Ampco Pumps Co. certifies that all items; including this report and the results of tests and values listed hereon are in full conformance with all purchase order and specification requirements. Further, the values shown represent the actual values obtained during testing, using the sample selection and test methods specified in the applicable material specification. It is also understood that knowingly and willfully falsifying or concealing a material fact on this form, or making false, fictions or fraudulent statements or representations herein could constitute a felony punishable under Federal Statutes. All material supplied is also free from mercury alpha or radium contamination and are animal derived ingredient free.

Line No.	Item Number	Description	Qty

Issued by Ampco Pumps Company Inc.
Glendale, WI

Authorized Representative

Ampco Pumps Company

EC Declarations for
ZP/AL Positive Displacement Pump

This document contains two declarations, only one of which is valid for the pump supplied.
The EC Declaration of Incorporation is valid only for pumps sold ***without*** a motor.
The EC Declaration of Conformity is valid only for pumps sold ***with*** a motor.

Manufactured by: Ampco Pumps Company
Address: 2045 West Mill Road
Glendale, WI 53209
Tel.: (414) 643-1852
Fax.: (414) 643-4452
E-Mail: info@ampcopumps.com

CE

EC Directives:

All products listed below comply with EC Machinery Directive 2006/42/EC
All products listed below have used Harmonized Standard EN 809:1998+A1:2009 to verify conformance.
For the most specific risks of this machine, safety and compliance with the essential requirements of the Directive has been based on elements of:
• EN ISO 12100-1:2003 / Safety of Machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology.
• EN ISO 12100-2:2003 / Safety of Machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications.
• EN 294:1992 / Safety of machinery - Safety distances to prevent hazard zones being reached by upper limbs
• EN ISO 13857:2008 / Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards
• EN 809:1998 +A1:2009 / Pumps and pump units for liquids – Common safety requirements

EC Declaration of Incorporation

Valid only for pumps supplied without a motor

We herewith declare that the Ampco Pumps Company product to which this declaration relates is in conformity with the provisions of the Machinery Directive 2006/42/EC. The equipment is a pump designed for liquid transfer applications. The device is not intended to act as a safety accessory.

Per Annex II.B of the Machinery Directive (2006/42/EC):
The machinery, product, assembly or sub-assembly covered by this Declaration of Conformity must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the applicable Directive(s).

EC Declaration of Conformity

Valid only for pumps supplied with a motor

We herewith declare that the Ampco Pumps Company product to which this declaration relates is in conformity with the provisions of the Machinery Directive 2006/42/EC. The equipment is a pump designed for liquid transfer applications. The device is not intended to act as a safety accessory.

The Technical Construction File required by this Directive is maintained at the corporate headquarters of Ampco Pumps Company, 2045 West Mill Road, Glendale, Wisconsin, USA

The authorized representative located within the Community is:
Martin Zierer
[Ampco Pumps GmbH, Gewerbepark West II 7, 76863 Herxheim, Germany, +49 (+9436) 307-710, Martin.Zierer@Evoguard.com

Authorized / Approved By:

Full Name: Martin Zierer Position: Managing Director

Signature: _____ Date: 04.07.2024

Ampco Pumps Company EC Declaration of Conformity / Declaration of Incorporation

Series:	Model Number:	Description:
ZP	ZP1-006	
ZP	ZP1-015	
ZP	ZP1-018	
ZP	ZP1-030	
ZP	ZP1-034	
ZP	ZP1-040	
ZP	ZP1-060	
ZP	ZP1-064	
ZP	ZP1-130	
ZP	ZP1-134	
ZP	ZP1-220	
ZP	ZP1-224	
ZP	ZP1-320	
ZP	ZP1-324	
ZP	ZP1+-030	
ZP	ZP1+-034	
ZP	ZP1+-040	
ZP	ZP1+-060	
ZP	ZP1+-064	
ZP	ZP1+-130	
ZP	ZP1+-134	
ZP	ZP1+-220	
ZP	ZP1+-224	
ZP	ZP2-006	
ZP	ZP2-015	
ZP	ZP2-018	
ZP	ZP2-030	
ZP	ZP2-034	
ZP	ZP2-040	
ZP	ZP2-045	
ZP	ZP2-060	
ZP	ZP2-064	
ZP	ZP2-130	
ZP	ZP2-134	
ZP	ZP2-180	
ZP	ZP2-210	
ZP	ZP2-214	
ZP	ZP2-320	
ZP	ZP3-006	
ZP	ZP3-015	
ZP	ZP3-018	

ZP	ZP3-030	
ZP	ZP3-034	
ZP	ZP3-040	
ZP	ZP3-045	
ZP	ZP3-060	
ZP	ZP3-064	
ZP	ZP3-130	
ZP	ZP3-134	
ZP	ZP3-180	
ZP	ZP3-184	
ZP	ZP3-184	
ZP	ZP3-210	
ZP	ZP3-214	
ZP	ZP3-220	
ZP	ZP3-224	
ZP	ZP3-320	
AL	AL5	
AL	AL10	
AL	AL15	
AL	AL20	
AL	AL22	
AL	AL33	
AL	AL34	
AL	AL44	
AL	AL46	

U.S. Terms and Conditions

AMPCO PUMPS
Made of SELECTED corrosion-resistant alloys
U.S. TERMS AND CONDITIONS

1. **ENTIRE AGREEMENT.** This document contains all of the terms and conditions of the agreement ("the agreement") between Ampco Pumps Company, Inc. ("Seller") and the purchaser ("Purchaser") of the Products ("Products") to be sold to Purchaser, to the exclusion of any other statements and agreements, and to the exclusion of any terms and conditions incorporated in Purchaser's order or other documents of Purchaser. Seller's acceptance of Purchaser's order is expressly conditioned on Purchaser's acceptance of the terms and conditions contained herein, and Purchaser, upon placing an order, is presumed to have accepted all the terms and conditions without modification. No alteration, waiver, modification of or addition to the terms and conditions herein shall be binding on Seller unless set forth in writing and specifically agreed to by an officer of Seller No course of dealing, usage of trade or course of performance will be relevant to supplement or explain any terms used in the agreement. All offers to purchase, quotations and contracts of sale are subject to final acceptance by Seller at its home office at Milwaukee, Wisconsin.
2. **PRICES.** Prices for Products manufactured by Seller pursuant to written accepted orders will remain firm for thirty (30) days from the date of any subsequent price change.
3. **TERMS OF PAYMENT.** Standard terms are ½% 10 days, 30 days net, from date of invoice unless otherwise stated. If, in the judgment of Seller, the financial condition of Purchaser at any time does not justify continuance of production or shipment on the terms of payment specified, Seller may require full or partial payment in advance. In cases of delays in payment, Seller reserves the right to charge interest on delinquent balances at the rate of 1 ½% per month.
4. **DELIVERY.** Except as otherwise provided expressly stated in the agreement, Products are sold F.O.B. Milwaukee. Seller will use reasonable commercial efforts to fill orders within the time stated, but the stated delivery date is approximate only, and Seller reserves the right to readjust shipment schedules without liability. Acceptance by Purchaser of the Products waives any claim for loss or damage resulting from a delay, regardless of the cause of the delay. Except as otherwise provided herein, Seller will not be responsible for freight, transportation, insurance, shipping, storage, handling, demurrage or similar charges. Claims by Purchaser for shortages in the Products must be made to Seller in writing within ten (10) days after date of receipt of the Products. No such shortage shall entitle Purchaser to withhold payment for Products which were received by Purchaser. Each such claim shall set forth in detail the basis and amount of such claim.
5. **TAXES AND FEES.** Seller shall pay all present and future sales, excise, privilege, use or other taxes, customs duties, and all other fees or other costs, imposed by any federal, state, foreign, or local authorities arising from the sale, purchase, transportation, delivery, storage, use or consumption of the Products or will, if applicable, provide Seller with an appropriate exemption certificate. Seller shall be under no obligation to contest the validity of any such taxes or to prosecute any claims for refunds or returns.
6. **INSTALLATION.** The Products shall be installed by and at the expense of Purchaser.
7. **LOSS, DAMAGE OR DELAY.** Seller will not be liable for loss, damage or delay resulting from causes beyond its reasonable control, including, without limitation, strikes or labor difficulties, lockouts, acts or omissions of any governmental authority or Seller, insurrection or riot, war, fires, floods, Acts of God, breakdown of essential machinery, accidents, embargoes, cargo or material shortages, delays in transportation, lack of production capacity or inability to obtain labor, materials or parts from usual sources. In the event of any such delay, performance will be postponed by such length of time as may be reasonably necessary to compensate for the delay. In the event performance by Seller under the agreement cannot be accomplished by Seller due to any of the foregoing causes within a reasonable period of time, Seller may, at its option, terminate the agreement without liability.
8. **RETURNS.** No Products or parts may be returned by Purchaser without the prior written consent of Seller.
9. **WARRANTY.** Seller warrants that the Products manufactured by Seller will be free from defects, material and workmanship under normal use and service for a period of one (1) year from date of shipment. In addition, the specified rating of each pump is warranted; however, the characteristic shape of the performance curves may vary from the published standards, and the capacity, head and efficiency guarantees are based on actual shop tests using clear cold water, and therefore the rating is specified in equivalent units of clear cold water. The sole obligation of Seller and the exclusive remedy of Purchaser for breach of this warranty shall be the repair (at Seller's facility) or replacement by Seller (F.O.B. Milwaukee, Wisconsin), at Seller's option, of any parts found to be defective, without charge and shall be conditioned upon Seller receiving written notice of any alleged breach of this warranty within a reasonable time after discovery of the defects, but in no event later than the end of the warranty period. The parts alleged to be defective shall be returned to Seller upon its request, freight prepaid. This warranty does not cover ordinary wear and tear, abuse, misuse, overloading, alteration or Products or parts which have not been installed, operated or maintained in accordance with Seller's written instructions. Seller shall not be liable for any expenses for repairs, additions or modifications to the Products outside of Seller's factory without its prior written consent, and any such repairs without such consent shall void this warranty. THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Seller may from time to time provide its facilities, personnel and experience to assist customers in the selection of materials, design, installation and operation of Products for maximum resistance to corrosion and abrasion with due consideration to the economy of the installation. This service is provided in an advisory capacity only and the final selection and operation of the Products and ancillary equipment shall be the sole responsibility of Purchaser or any user thereof. Accessories and parts manufactured by third parties are warranted only to the extent of such third party's warranty. IN NO EVENT SHALL SELLER BE LIABLE UNDER ANY CIRCUMSTANCES FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, ANY LOST PROFITS OR LABOR COSTS) ARISING FROM THE BREACH OF THIS WARRANTY OR OTHERWISE ARISING FROM OR RELATING TO THE PRODUCTS OR THEIR SALE, USE

OR INSTALLATION.

10. **CHANGES.** Changes in any work to be performed hereunder may be made only upon Purchaser's written instructions and acceptance by Seller in its discretion. Any change in drawings, materials or design of the Products, or to tools, fixtures or other items used to produce the Products, which affects Seller's cost to produce the Products will entitle Seller to adjust the price to take into account any additional costs. If work has been started, Seller shall be properly reimbursed for work already performed; if Products already produced are not accepted by Purchaser, Seller has the right to adjust the price to take into account any additional costs caused by an increase or decrease in quantities or in the time required for performance under the agreement.
11. **TERMINATION.** After Seller has commenced work, ordered any materials or made any other commitments pursuant to the agreement, it may be terminated only with the prior written agreement of Seller providing for equitable cancellation charges. Such charges shall reimburse Seller for any completed items at the contract price, and for any work-in-process items at the contract price less the cost to complete. Termination on any other basis must be specifically agreed on in writing in advance between Purchaser and Seller.
12. **DEFERRED DELIVERIES.** Orders or deliveries will be deferred only upon the prior written agreement of Seller in its discretion, and then only upon the following conditions:
    (a) The deferral period may not exceed sixty (60) days. At the end of the deferral period, if no release is provided by Purchaser, Seller reserves the right to render an invoice for and ship the completed portion of the order to the destination specified in Purchaser's order, or to store such material at Purchaser's expense at Seller's standard storage charges then in effect.
    (b) For the portion of the order that is not completed, if no release is provided by Purchaser at the expiration of the deferral period, Seller reserves the right to render an invoice for any completed items at the contract price, and for any work-in-process items at the contract price less the cost to complete.
    (c) Purchaser shall bear the risk of loss or damage to materials held at Purchaser's request.
13. **LIMITATION OF LIABILITY.** IN NO EVENT SHALL SELLER BE LIABLE UNDER ANY CIRCUMSTANCES: (a) FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, ANY LOST PROFITS OR LABOR COSTS) ARISING FROM OR RELATING TO THE PRODUCTS OR THEIR SALE, USE OR INSTALLATION; (b) FOR DAMAGES TO PROPERTY (OTHER THAN THE PRODUCTS PURCHASED FROM SELLER); (c) FROM ANY BREACH OF ITS WARRANTY OR ANY OTHER OBLIGATIONS TO BUYER; OR (d) FOR ANY OTHER CAUSE WHATSOEVER, WHETHER BASED ON WARRANTY (EXPRESSED OR IMPLIED) OR OTHERWISE BASED ON CONTRACT, OR ON TORT OR OTHER THEORY OF LIABILITY, AND REGARDLESS OF ANY ADVICE OR REPRESENTATIONS (WHETHER OR NOT IN WRITING) THAT MAY HAVE BEEN RENDERED BY SELLER CONCERNING THE DESIGN, MANUFACTURE, SALE, USE OR INSTALLATION OF THE PRODUCTS.
14. **INFRINGEMENT.** Seller at its expense will defend and hold Purchaser harmless from and against all damages, costs and expenses arising from any valid claim of infringement by a third party with respect to any patent or other intellectual property rights (collectively, the "Intellectual Property Rights") caused by Products originally manufactured by Seller, provided Purchaser
    (a) has not modified such Products,
    (b) gives Seller immediate notice in writing of any claim or commencement or threat of suit, and (c) permits Seller to defend or settle the same, and gives all immediate information, assistance and authority to enable Seller to do so. In the event any such originally manufactured Products are held to infringe an Intellectual Property Right and if Purchaser's use thereof is enjoined, Seller will, at its expense and option: (1) obtain for Purchaser the right to continue using the Products, (2) supply non-infringing Products, (3) modify the Products so that they become non- infringing, or (4) refund the then market value of such Products. In no event shall Seller's liability exceed the sale price of the infringing Products. THE FOREGOING REPRESENTS SELLER'S ENTIRE AND EXCLUSIVE OBLIGATION WITH RESPECT TO ANY CHARGE OF INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT AND IS IN LIEU OF ANY STATUTORY WARRANTY RELATING TO INFRINGEMENT. Notwithstanding the foregoing, Seller shall have no liability as to any Products or parts thereof that are manufactured or modified by Purchaser or a third party, or that are manufactured or modified by Seller in accordance with Purchaser's specifications. Purchaser will defend and hold Seller harmless from and against all damages, costs and expenses whatsoever arising from any claim for infringement of any Intellectual Property Rights relating to Products that have been manufactured or modified by Seller according to specifications provided by Purchaser.
15. **CERTAIN LAWS.** Seller will comply with the applicable requirements of the Fair Labor Standards Act of 1938, as amended, Executive Order 11246, and THE rules, regulations and orders of the Secretary of Labor relating thereto.
16. **PERIOD FOR ACCEPTING QUOTATIONS.** Unless accepted without modification within thirty (30) days of issuance, or prior to withdrawal by Seller if earlier, all quotations automatically expire at the end of such thirty (30) day period.
17. **PROVISIONS FOR INTERNATIONAL TRANSACTIONS.** The following provisions shall apply if the Products are to be shipped to Purchaser at a location outside the United States, and apply regardless of other provisions set forth in these Terms and Conditions:
    (a) The 1980 United Nations Convention on Contracts for the International Sale of Products shall not apply.
    (b) Except as otherwise provided expressly stated in the agreement, terms of delivery are Ex-Works (within the meaning of INCOTERMS 2000) and all customs fees, import duties, cargo insurance, taxes and other charges imposed on or relating to the purchase or sale of the Products shall be paid by Purchaser in addition to the stated price.
    (c) Except as otherwise provided expressly stated elsewhere in the agreement, payment shall be made by issuance to Seller of an irrevocable letter of credit which (i) is issued and confirmed by a U.S. bank acceptable to Seller, (ii) is governed by the Uniform Customs

and Practice for Documentary Credits (UCP 600) and otherwise acceptable in form and substance to Seller, and (iii) provides for payment to Seller of the purchase price in U.S. dollars upon presentation by Seller of Seller's certification and/or such other documents as shall be required by the letter of credit. All banking and other charges for such letter of credit shall be for the account of Purchaser.

(d) Prices include Seller's standard commercial export packaging which may vary depending on whether shipment is made by air, land or sea. Except as otherwise provided expressly stated in the agreement, Purchaser will bear any additional expenses required to satisfy Purchaser's packaging requirements. Packages will be marked in accordance with Purchaser's instructions, if any. Seller shall furnish packing lists and such other information as may be necessary to enable Purchaser's agent to prepare documents required for export shipment.

(e) All shipments hereunder are subject to compliance with the U.S. Export Administration Act, as amended, regulations thereunder and all other U.S. laws and regulations concerning exports. Purchaser shall comply with all such laws and regulations concerning the use, disposition, re-export and sale of the Products provided hereunder.

18. **GENERAL.** No modification or waiver of the agreement or any of its provisions is valid unless expressly agreed to by Seller in writing, and no waiver by Seller of any default under the agreement is a waiver of any other or subsequent default. The unenforceability or invalidity of one or more of the provisions of the agreement will not affect the enforceability or validity of any other provision of the agreement. Purchaser may not assign any of its rights, duties or obligations under the agreement without Seller's prior written consent and any attempted assignment without such consent, even if by operation of law, will be void. The agreement is governed by and shall be construed in accordance with the laws of the State of Wisconsin, including the Uniform Commercial Code as enacted by such state, without giving effect to its conflict of laws principles.

GmbH Terms and Conditions

GmbH General Terms and Conditions of Service, Sale and Delivery

I. Content of the contract, scope of application, offer

1. All deliveries and services of Ampco Pumps GmbH are made exclusively on the basis of the General Terms and Conditions of Performance, Sale and Delivery of Ampco Pumps GmbH described here. Deviating terms and conditions of the Client shall not be recognised by Ampco Pumps GmbH unless Ampco Pumps GmbH has expressly agreed to their validity in writing. These General Terms and Conditions of Performance, Sale and Delivery of Ampco Pumps GmbH shall also apply if Ampco Pumps GmbH executes the delivery to the Client without reservation in knowledge of the Client's terms and conditions that conflict with or deviate from these Terms and Conditions.
2. These terms and conditions apply to all services of Ampco Pumps GmbH, regardless of the legal nature of the contract on which the service is based. They therefore apply to purchase contracts as well as to contracts for work, contracts for the supply of work and for combined contracts.
3. Individual agreements on the rights and obligations of the contracting parties take precedence over these Terms.
4. All agreements made between Ampco Pumps GmbH and the Client for the purpose of executing the contract must be recorded in writing.
5. These terms and conditions only apply to entrepreneurs, legal entities under public law and special funds under public law (in each case within the meaning of § 310 BGB).
6. These terms and conditions shall also apply to all future transactions between Ampco Pumps GmbH and the Client.
7. If the order qualifies as an offer according to § 145 BGB, Ampco Pumps GmbH can accept it within four weeks of receipt.

II. Documents, preparatory work, trade secrets

1. Ampco Pumps GmbH reserves all rights, in particular the right of ownership and copyright, to cost estimates, calculations, plans, illustrations, design work, preliminary work, drawings and other documents. They may only be made available to third parties with the written consent of Ampco Pumps GmbH. Ampco Pumps GmbH may only make documents designated as confidential by the Client accessible to third parties with the Client's written consent. Documents transmitted by Ampco Pumps GmbH may only be used for the preparation of the conclusion of the contract and thereafter only for the execution of the contract. Any further use is prohibited.
2. The Client may not disclose to third parties trade secrets of Ampco Pumps GmbH and Ampco Pumps GmbH (within the meaning of Section 15 of the German Stock Corporation Act) of affiliated companies that have become known to him. Ampco Pumps GmbH may not disclose to third parties trade secrets of the client and its affiliated companies (within the meaning of § 15 of the German Stock Corporation Act) that have become known to Ampco Pumps GmbH.
3. Both Ampco Pumps GmbH and the Client are obliged to ensure in an appropriate manner that their bodies and employees also comply with the obligations listed above.

III. Delivery time, force majeure, delay, acceptance

1. The delivery period begins with the dispatch of the order confirmation and clarification of all technical questions, but not before the production of the plans, documents, permits, approvals, permits to be procured by the customer and before receipt of an agreed down payment.
2. The performance owed by Ampco Pumps GmbH shall be deemed to have been performed in good time if the subject matter of the contract has been properly dispatched by the expiry of the delivery period or if the Client has been notified of the readiness for dispatch.
3. Disruptions in performance caused by force majeure do not give rise to any claims (in particular no claims for contractual penalties or damages) against Ampco Pumps GmbH. Force majeure is defined as any unforeseeable event or such events which, even if foreseeable, are beyond the control of Ampco Pumps GmbH and the effects of which cannot be prevented by reasonable efforts on the part of Ampco Pumps GmbH. These include, but are not limited to, delayed performance by subcontractors/suppliers, war (declared or not), war-like condition, riot, revolution, rebellion, military or civil coup, insurrection, riot, riot, blockade, embargo, government order, sabotage, strikes, slow strikes, lockouts, epidemics, fire, floods, storm surges, typhoons or other severe weather, general shortage of materials, shipwreck, lack of port and unloading capacity, transport-related Delays, unavailability of required vessel space, proper change/replacement of forwarder and/or carrier and/or shipowner and/or other commercial transport companies, transport accidents, earthquakes, radioactive accidents, physical or artificial obstacles of any kind on the construction site/production site.
4. In all cases of hindrances for which Ampco Pumps GmbH is not responsible, regardless of the kind, Ampco Pumps GmbH is entitled to demand an appropriate extension of the delivery periods and additional payments from the customer to compensate for additional services and/or costs.
5. If dispatch is delayed at the request of the Client, the Client shall reimburse the costs actually incurred by the storage of the object of the contract. In the event of storage in a company of Ampco Pumps GmbH, the latter is entitled to demand a flat-rate minimum amount of 0.5% of the agreed price for each month as compensation for the additional costs. The proof of higher (by Ampco Pumps GmbH) or lower (by the client) costs is not excluded by this regulation.
6. Number 5 shall also apply to any other case of default of acceptance by the contracting authority. If the Client is in default of acceptance or violates other obligations to cooperate, the risk of an accidental loss or accidental deterioration of the subject matter of the contract shall also pass to the Client at the time when the latter is in default of acceptance.
7. Further rights of Ampco Pumps GmbH are not excluded by this agreement.
8. Compliance with the delivery deadline presupposes the timely and proper fulfilment of the Client's contractual obligations.
9. Partial deliveries by Ampco Pumps GmbH can only be rejected if they cannot be reasonably expected of the customer.

10. Insofar as acceptance is to take place, the subject matter of the contract shall be deemed to have been accepted if:
    10.1. the delivery and, if Ampco Pumps GmbH is also responsible for the installation, the installation has been completed,
    10.2. Ampco Pumps GmbH has informed the Client of this with reference to the deemed acceptance pursuant to this number 10 and has requested the Client to accept,
    10.3 two weeks have passed since the delivery or installation or the Client has started using the purchased item (e.g. has put the delivered system into operation) and in this case one week has passed since delivery or installation, and
    10.4. the Client has failed to accept the goods within this period for a reason other than a defect notified to Ampco Pumps GmbH that makes the use of the goods impossible or significantly impairs.

IV. Price, transport packaging, payment, price adjustment

1. The agreed prices are ex-works. The shipping costs, including the costs of packaging, loading, stowage and unloading, shall be borne by the Client. In addition to the prices, the VAT in force at the time of delivery is added.
2. Insofar as Ampco Pumps GmbH is obliged under the Packaging Ordinance to take back the packaging used for transport, the Client shall bear the costs for the return transport of the packaging used and the reasonable costs of its recycling. If the returned packaging cannot be reused, the Client shall bear the costs incurred by Ampco Pumps GmbH for its material recycling. In addition, the Client may have to pay the customs duties, customs clearance costs, taxes and duties incurred as a result of the return of the transport packaging.
3. Transport containers are not the subject of the contract and are not considered packaging. They remain the property of Ampco Pumps GmbH. They are to be imported, re-exported and returned to Ampco Pumps GmbH by the Client at the Client's expense (transport costs, customs duties, customs clearance costs, taxes and duties) and risk.
4. Tools, surplus material, welding gas cylinders and other aids are not the subject of the contract. They remain the property of Ampco Pumps GmbH. They are to be imported, re-exported and returned to Ampco Pumps GmbH by the Client at the Client's expense (transport costs, customs duties, customs clearance costs, taxes and duties) and risk.
5. The agreed price is to be credited by the Client at his own risk and expense to one of the bank accounts specified by Ampco Pumps GmbH, without any deduction.
6. Ampco Pumps GmbH is entitled to interest on due dates and arrears in accordance with the statutory provisions. This does not affect the possibility of asserting further damages and rights of Ampco Pumps GmbH.
7. The Client shall only be entitled to rights of set-off and retention if his counterclaims have been legally established, are undisputed or recognised by Ampco Pumps GmbH and their assertion has been notified to Ampco Pumps GmbH at least one month in advance.
8. If, after the conclusion of the contract, Ampco Pumps GmbH becomes aware of circumstances that give rise to doubts about the creditworthiness of the client, Ampco Pumps GmbH may, at its discretion, demand advance payment or suitable security.
9. Ampco Pumps GmbH is entitled to increase the agreed price appropriately if cost increases occur after the conclusion of the contract, in particular due to collective bargaining agreements, material price increases or the increase in transport and packaging costs. Ampco Pumps GmbH will provide proof of this to the Client upon request.
10. Ampco Pumps GmbH is entitled to increase the agreed price appropriately if, after the conclusion of the contract, the Client wishes to make changes to the subject matter of the contract and these result in additional expenses. Ampco Pumps GmbH will provide the Client with proof of the additional expenditure upon request.

V. Transfer of risk, transport damage, insurance

1. The risk of accidental loss and accidental deterioration of the subject matter of the contract shall pass to the Client upon handing over the object of the contract to the first carrier. This also applies if partial deliveries are made or if Ampco Pumps GmbH has assumed further costs, e.g. the shipping costs, or other services, e.g. transport, installation or assembly of the contractual object itself.
2. If the subject matter of the contract or parts thereof are ready for dispatch and the dispatch or handover is delayed for reasons caused by the Client, the risk of accidental loss and accidental deterioration shall pass to the Client from the day of readiness for dispatch.
3. If Ampco Pumps GmbH arranges for the transport of the object of the contract and if transport damage or a transport-related material defect occurs on it after it has been handed over to the carrier, Ampco Pumps GmbH shall assign any resulting claims against the transport insurance(s) and the carriers to the customer at the request of the customer – to the exclusion of liability for the existence of these claims, Step by step against payment of the total price agreed for the subject matter of the contract and all costs owed. Further claims against Ampco Pumps GmbH due to transport damage or transport-related material defects are excluded. This also applies if the subject matter of the contract includes assembly services or the construction of a turnkey plant.
4. Limitation periods under transport law and maritime law, limitation periods, exclusions of liability and limitations of liability in favour of the (natural and legal) persons entrusted with the transport/loading/unloading/storage of the subject matter of the contract in the relationship between them and Ampco Pumps GmbH, shall apply equally to corresponding circumstances in the contractual relationship between the client/ Ampco Pumps GmbH in favour of Ampco Pumps GmbH.
5. The Client undertakes to inspect the subject matter of the contract for damage immediately upon unloading at the port of destination and, in the event of the existence or suspicion of damage, to acknowledge receipt only with reservations and to notify Ampco Pumps GmbH of the damage immediately. In the event of non-compliance with the aforementioned obligations, the obligation to pay the transport insurance(s) does not apply. If the obligation to pay the transport insurance(s) ceases to apply for the aforementioned reason, the liability of Ampco Pumps GmbH for such damages covered by the exclusion of liability of the transport insurance(s) also ceases to apply.

VI. Retention of title and securities

1. Ampco Pumps GmbH retains ownership of the subject matter of the contract until the irrevocable, unconditional receipt of all payments owed by the Client. Until this date, the Client shall not be entitled to encumber or resell the subject matter of the contract with a security interest (e.g. security property, lien, mortgage, land charge, etc.). In the event that the law applicable at the place of installation (lex rei sitae) does not know the means of security “retention of title”, the means of security that comes closest to a “retention of title” according to the law applicable at the place of installation or the means of security that represents the typical means of security (e.g. “lien” or “security interest, attached and perfected”) according to this law is agreed instead. The Client is obliged to cooperate (in particular to make declarations of intent) that are necessary under the law applicable at the installation site for the agreement and establishment of a fully effective retention of title or a fully effective other means of security.
2. In the event of seizures, seizures or other measures taken by third parties in relation to the subject matter of the contract, the Client must point out the ownership of Ampco Pumps GmbH and notify Ampco Pumps GmbH immediately in writing – handing over the documents necessary for an intervention – so that Ampco Pumps GmbH can enforce its property rights.
3. As long as Ampco Pumps GmbH has rights of the kind referred to in number 1 to the subject matter of the contract, Ampco Pumps GmbH shall be entitled to take back the delivered subject matter of the contract after a reasonable period of time has been set in the event of breaches of duty by the Client, in particular in the event of endangerment of Ampco Pumps GmbH’s property in the subject matter of the contract, in the event of improper treatment of the delivered object of the contract by the Client or in the event of default of payment by the Client. The transport costs incurred for the return shall be borne by the Client. If Ampco Pumps GmbH withdraws the subject matter of the contract, this constitutes a withdrawal from the contract. If the Client does not comply with the reclaim, personnel of Ampco Pumps GmbH shall hereby be entitled to enter the Client’s installation site (or construction site/production facility) in the required number, to dismantle the delivered object of the contract and to take it with them; all costs incurred for this purpose shall be borne by the Client. The seizure of the subject matter of the contract by Ampco Pumps GmbH always constitutes a withdrawal from the contract.
4. Ampco Pumps GmbH is entitled to recycle the object of the contract after it has been taken back, and the proceeds of the sale are to be offset against the liabilities of the client – less reasonable exploitation costs.
5. The Client must treat the subject matter of the contract with care during the ownership and insure it at its own expense against fire, water and theft damage sufficiently at its replacement value. If maintenance and inspection work becomes necessary, the Client must carry it out in good time at its own expense.
6. The processing or transformation of the subject matter of the contract by the customer is always carried out for Ampco Pumps GmbH. If the subject matter of the contract is processed with other items that do not belong to Ampco Pumps GmbH, Ampco Pumps GmbH acquires co-ownership of the new item in the ratio of the value of the object of the contract (invoice amount) to the other processed items at the time of processing. Incidentally, the same applies to the object resulting from processing as to the subject matter of the contract delivered under reservation.
7. If the subject matter of the contract is inseparably connected or mixed with other objects not belonging to Ampco Pumps GmbH, Ampco Pumps GmbH acquires ownership of the new item in proportion to the value of the object of the contract (invoice amount) to the other combined or mixed items at the time of the combination or mixing. If the combination or mixing takes place in such a way that the Client’s property is to be regarded as the main action, it shall be deemed to have been agreed that the Client shall transfer co-ownership to Ampco Pumps GmbH on a pro rata basis. The Client shall hold the sole ownership or co-ownership thus created for Ampco Pumps GmbH.
8. In order to secure the claims of Ampco Pumps GmbH against the Client, the Client shall also assign to Ampco Pumps GmbH the claims which the Client accrues against a third party as a result of the connection of the subject matter of the contract with a piece of land.
9. Ampco Pumps GmbH undertakes to release the securities to which it is entitled at the request of the Client to the extent that the value of the realizable securities of Ampco Pumps GmbH exceeds the claims to be secured by more than 20%; the selection of the securities to be released is the responsibility of Ampco Pumps GmbH.

VII. Rights of the Client in the event of defects

1. Ampco Pumps GmbH shall be liable to the Client for ensuring that the subject matter of the contract is free of material defects and defects of title at the time at which the risk passes to the Client. Insignificant deviations from the agreed quality do not constitute a defect. Customary deviations and deviations that occur due to legal regulations or represent technical improvements, as well as the replacement of components by equivalent parts, are also permissible, provided that they do not impair the usability for the contractually intended purpose.
2. Ampco Pumps GmbH is not liable for defects or damages caused by the following reasons:
   Defects that are based on constructions specified or specified by the Client or on materials specified, determined or provided by the Client, including sample materials, or on other provisions provided by the Client.
   Defects or damage that occur after the transfer of risk as a result of incorrect or negligent handling, operation by untrained personnel, excessive stress, unsuitable equipment, defective construction work, unsuitable building ground or that occur due to special external influences that are not required by the contract, as well as in the case of non-reproducible software errors.
   If improper modifications or repair work are carried out by the client or by third parties, any liability of Ampco Pumps GmbH is excluded for these and the resulting consequences.
3. Ampco Pumps GmbH is also not liable for wear parts (definition to follow) of the subject matter of the contract. Wear is the progressive loss of material from the surface of a solid body, caused by mechanical causes, i.e. contact and relative motion of a solid, liquid or gaseous counterbody. Wear part is a part that is used in places where wear and tear is unavoidable due to operational reasons in order to protect other viewing units from wear and tear and is designed to be replaced.
4. Due to a defect in the subject matter of the contract, which, taking into account numbers 1 to 3 above, gives rise to corresponding claims for defects by the Client, the Client shall initially only have the right to subsequent performance within a reasonable period of time, whereby Ampco Pumps GmbH may choose at its equitable discretion between remedy of defects or replacement delivery. If claims for defects are based on the fact that Ampco Pumps GmbH has fraudulently concealed a defect or has assumed a guarantee for the quality of the object of the contract, the Client shall have the right to choose between remedy the defect or replacement delivery. The expenses required for the purpose of supplementary performance will be borne by Ampco Pumps GmbH. Replaced parts become the property of Ampco Pumps GmbH.

5. Unless the defect requires repair at the installation site, the customer must send the defective parts to Ampco Pumps GmbH for repair or replacement delivery upon request by Ampco Pumps GmbH and at the expense of Ampco Pumps GmbH. In such a case, the obligation of subsequent performance of the Ampco Pumps GmbH with regard to the defective part, if Ampco Pumps GmbH returns the properly repaired part to the customer at its own expense or sends a corresponding spare part. Claims by the Client on account of the expenses necessary for the purpose of subsequent performance, in particular transport, travel, labour and material costs, shall be excluded to the extent that the expenditure increases because the object of the delivery has subsequently been moved to a place other than the Client's establishment, unless the transfer corresponds to its intended use.
6. If the defective part is a product delivered by a third party, the liability of Ampco Pumps GmbH is initially limited to the assignment of the liability claims to which Ampco Pumps GmbH is entitled against the third party. Only after a prior legal claim against the third party by the Client shall the personal liability of Ampco Pumps GmbH be revived. This limitation of liability does not apply if the liability of Ampco Pumps GmbH is based on the fact that Ampco Pumps GmbH has fraudulently concealed a defect or has assumed a guarantee for the quality of the product supplied by the third party.
7. The Client is obliged to inspect the subject matter of the contract immediately upon receipt and to notify Ampco Pumps GmbH of any recognisable defects without delay. This obligation to notify immediately also applies if a defect becomes apparent later. The fact that Ampco Pumps Company is certified according to ISO 9001 does not release the customer from his obligation to inspect and complain in accordance with § 377 HGB. If the Client fails to notify the Client, the subject matter of the contract shall also be deemed to have been approved with regard to the defect.
8. If the Client does not accept the supplementary performance offered by Ampco Pumps GmbH in accordance with the contract, Ampco Pumps GmbH shall be released from liability with regard to the defect complained of after the setting and fruitless expiry of a grace period.
9. In the event of failure of subsequent performance, the Client shall be entitled to assert its other claims for defects in compliance with the contractually agreed conditions, including those resulting from the present General Terms and Conditions of Performance, Sale and Delivery of Ampco Pumps GmbH. In particular, a failure of supplementary performance shall occur if Ampco Pumps GmbH allows a reasonable period of time set by the Client for subsequent performance to elapse without success, or if Ampco Pumps GmbH unduly delays or refuses subsequent performance, or if a reasonable number of attempts at subsequent performance have not been successful.
10. Ampco Pumps GmbH may refuse to remedy the defect if the customer does not meet the agreed payment obligations. The Client may only withhold payments on the merits if a notice of defects is asserted, the justification of which can be beyond doubt. The amount of this right of retention is limited to four times the costs required to remedy the defect. If the Client asserts a claim for defects and it subsequently turns out, in particular after a corresponding investigation by Ampco Pumps GmbH, that the claim for defects asserted by the Client does not exist for factual or legal reasons, Ampco Pumps GmbH shall be entitled to appropriate remuneration and reimbursement of all expenses for its services, in particular in connection with the inspection.
11. For claims for damages, the following limitations, modifications and exclusions in accordance with Section VIII apply.

VIII. Limitation or exclusion of liability of Ampco Pumps GmbH

1. The Client is obliged to carefully observe both the instructions for use and operation as well as the safety instructions of Ampco Pumps GmbH. In particular, the Client must follow the instructions of Ampco Pumps GmbH on how the subject matter of the contract is to be used risk-free, which precautionary measures are to be taken regularly and in individual cases and which misuse is to be avoided. If the Client violates this obligation, Ampco Pumps GmbH shall not be liable for the resulting damage.
2. The limitation of the liability of Ampco Pumps GmbH in the event of defect damage and consequential damage:
   Ampco Pumps GmbH is not liable for defect damages (including damages due to loss of profit) and not for consequential damages, regardless of the legal grounds. This exclusion of liability does not apply to claims by the Client for compensation for damages based on gross negligence (intent/gross negligence).
3. The limitation of liability of Ampco Pumps GmbH in the event of simple/slight negligence:
   Any claims by the client for compensation for damages, regardless of the legal grounds, which are not based on gross negligence (intent/gross negligence) on the part of Ampco Pumps GmbH, are excluded, provided that the damages are not due to the existence of a defect or to a breach of essential contractual obligations, the fulfilment of which is due to the proper execution of the contract, performance of the contract in the first place and on the compliance with which the client regularly relies and may rely (so-called "cardinal obligations").
4. The limitation of the liability of Ampco Pumps GmbH in the event of damages that are not typically foreseeable:
   Any claims by the Client for compensation for damages, regardless of the legal grounds, which are not based on gross negligence (intent/gross negligence) on the part of Ampco Pumps GmbH, shall be limited in amount to the compensation of the damage, unless these are already excluded in accordance with the limitation of the liability of Ampco Pumps GmbH in the case of defect damage and consequential damage (number 2) and in the case of simple slight negligence (number 3). Ampco Pumps GmbH at the time of conclusion of the contract, taking into account the circumstances surrounding the Ampco Pumps GmbH knew or should have known, as a possible consequence of the breach of duty and/or contractinjury (typically foreseeable damage).
5. The limitation of Ampco Pumps GmbH's liability in the event of a failure to perform:
   If the Client asserts a claim for damages against Ampco Pumps GmbH due to a breach of duty or in lieu of performance and if this is not based on gross negligence (intent/gross negligence), this claim for damages is not already excluded in accordance with the limitations of liability in favour of Ampco Pumps GmbH with regard to defect damage and consequential damage (number 2) and in the case of simple slight negligence (number 3) Beyond the limitation of liability of Ampco Pumps GmbH to the typically foreseeable damage (number 4), the amount is limited to a maximum of 10% of the agreed price. A disruption of performance occurs if obstacles arise in the execution of the contractual relationship that make it difficult or impossible to properly fulfil contractual obligations, or if one party to the contract is damaged by the other.

6. The limitation of Ampco Pumps GmbH's liability in the event of damage caused by delay:
   The above limitations of liability for the benefit of the Ampco Pumps GmbH with regard to defect damages and consequential damages (number 2), in the case of simple slight negligence (number 3), damages that are not typically foreseeable (number 4) and disruptions to performance (number 5), shall also apply to claims of the Client against Ampco Pumps GmbH for compensation for damage caused by delay, provided that this is not based on gross negligence (intent/gross negligence). In addition, claims for damages by the Client due to delay in delivery as well as claims for damages in lieu of delivery, in all cases of delayed delivery, even after the expiry of any deadline set by Ampco Pumps GmbH for delivery, shall be limited in amount to 0.5% for each completed week of delay, but in total to a maximum of 5% of the price for that part of the deliveries, which could not be put into proper operation due to the delay.
7. The limitation of Ampco Pumps GmbH's liability for its vicarious agents:
   Any liability for vicarious agents (§ 278 BGB) of Ampco Pumps GmbH, regardless of the legal grounds, is excluded, unless contractual obligations have been violated by gross negligence (intent/gross negligence) of the vicarious agent, the fulfilment of which makes the proper execution of the contract possible in the first place. In no event shall the liability of Ampco Pumps GmbH for a vicarious agent exceed the liability of Ampco Pumps GmbH for its own negligence, as it arises taking into account the limitations of liability listed above. According to Section 278 of the German Civil Code, a vicarious agent is a natural or legal person whom the debtor uses to meet his obligations.
8. The Client's withdrawal from the contract due to non-performance or non-contractual performance by Ampco Pumps GmbH is excluded. This does not apply if Ampco Pumps GmbH has not provided its services in accordance with the contract intentionally or through gross negligence.
9. The above limitations of liability (numbers 1 to 8) do not apply to claims of the Client due to intentional or grossly negligent conduct, for guaranteed characteristics, for injury to life, body or health or under the Product Liability Act.
10. If the carrier is determined by the customer, Ampco Pumps GmbH shall not be liable for costs arising from additional safety inspections or for time delays resulting from the requirements of the German Aviation Security Act and the EU Regulations (EC) No. 300/2008, (EC) No. 272/2009, (EU) 2015/1998 in their respective valid versions, as well as all other current national and international legal provisions. The Client shall indemnify Ampco Pumps GmbH against all costs and damages on first request, which result from additional safety checks and the resulting time delays.

IX. Prescription

1. If claims for defects are subject to a limitation period of two years under the law (e.g. § 438 para. 1 no. 3 BGB; § 634a para. 1 no. 1 BGB), this limitation period is reduced to one year. Excluded from this shortening of the limitation period are claims for defects by the client due to the assumption of a guarantee for the quality. The limitation period begins with the delivery of the object of the contract and, in the case of an installation obligation on the part of Ampco Pumps GmbH, with the completion of the installation. If the Client is in default of acceptance, the limitation period begins with the occurrence of the default of acceptance.
2. Recourse claims in the supply chain pursuant to Section 445b (1) of the German Civil Code (BGB) shall become statute-barred one year after delivery of the item by Ampco Pumps GmbH to the Client. The suspension of expiry under § 445b.2 of the Civil Code remains unaffected; it ends no later than five years after delivery.
3. In all other respects, the statutory limitation periods apply.

X. Software

Insofar as Ampco Pumps GmbH makes software available to the Client, the following shall apply:

1. Ampco Pumps GmbH grants the Client a non-exclusive right of use to the software provided in accordance with § 31 (2) of the Copyright Act. Section 31 (2) of the Copyright Act reads: "The non-exclusive right of use entitles the owner to use the work alongside the author or other entitled persons in the manner permitted to him." Ampco Pumps GmbH remains the sole owner of all intellectual property rights with regard to the software at all times.
2. The Client shall be entitled to use the software provided to him only on the subject matter of the contract.
3. The Client has no claim to the transfer of the source program/source code.
4. The Client shall be entitled to use the provided software for an indefinite period of time for the entire economic life of the object of the contract.
5. The Client is not entitled to transfer its right of use to third parties, in particular the Client is not entitled to distribute, rent, grant sublicenses to third parties or make them available to third parties in any other way. If the Client transfers its business in its entirety to a third party, the Client is entitled to transfer the granted right of use to the third party. If the customer sells the delivery item in its entirety to a third party in the normal course of business and this third party is not a competitor of Ampco Pumps GmbH, Ampco Pumps GmbH is obliged to agree to a transfer of the granted right of use upon request, unless Ampco Pumps GmbH substantiates that there is a risk that competitors of Ampco Pumps GmbH will become aware of secret knowledge (trade secrets) of Ampco Pumps GmbH.
6. The Client's right of use is not exclusive. Ampco Pumps GmbH is entitled to grant any number of other customers rights of use of any kind with regard to the software provided.
7. The Client may not make the software available or accessible to any third party, except for its employees, not even temporarily or free of charge.
8. The Client may not change the markings, copyright notices and ownership of the software provided in any way.
9. The Client may not make a copy of the provided software, except for the creation of a backup copy by a person authorized to use the program, if this is necessary to secure future use. The backup copy may not be used at the same time as the original software.
10. The Client may not reproduce the documentation belonging to the software in whole or in part by photocopying, microfilming, electronic storage or any other process.
11. Disassembly, reverse engineering or decompilation of the software is prohibited and the Client will neither initiate nor permit this, unless the requirements of § 69e of the Copyright Act are met.

12. All ownership, copyright and other industrial property rights to the software, updates and documentation are owned by Ampco Pumps GmbH. The same applies to changes and translations of the programs.
13. Ampco Pumps GmbH is entitled to carry out necessary software changes at its own expense on the basis of third-party claims of property rights at the Client. The client cannot derive any claims from this.

XI. Export and import controls, embargo regulations

1. The subject matter of the contract may be subject to export and import restrictions, in particular there may be licensing requirements or the use of the object of the contract abroad may be subject to restrictions. In this respect, the Client undertakes to comply with the applicable legal provisions relating to export controls and sanctions lists of the Federal Republic of Germany, the EU and the USA as well as all other relevant regulations. This includes, in particular, the relevant embargo regulations relating to goods, persons and use. These provisions only apply to the extent that they do not contradict the applicable German foreign trade law, the European Blocking Regulation (e.g. § 7 AWV and Art. 5.1 (EC) 2271/96) or national legal bases applicable to the contracting authority.
2. The fulfilment of the contract by Ampco Pumps GmbH is subject to the proviso that there are no obstacles due to national and/or international regulations of export and import law or any other statutory provisions.
3. The resale and/or transfer of the object of the contract, directly or indirectly, to Russia or Belarus is generally prohibited and can only be permitted after a case-by-case examination by Ampco Pumps GmbH .
4. Client further confirms that at this time (a) it has no knowledge of future uses of the subject matter of the Agreement by military customers or customers with military end-uses; (b) there is no knowledge of future uses of the subject matter of the treaty in connection with NBC weapons and launchers; (c) there is no knowledge of future uses of the subject matter of the contract in connection with the construction or operation of nuclear facilities; (d) there is no knowledge of future uses of the subject matter of the contract in connection with the violation of human rights or in connection with actions supporting terrorism.
5. Ampco Pumps GmbH reserves the right to require the Client to sign end-user declarations as part of its own compliance checks, insofar as this is required due to business policy decisions of Ampco Pumps GmbH or legal requirements.

XII. Data protection and data use

1. Ampco Pumps GmbH processes personal data in accordance with the provisions of the European General Data Protection Regulation (GDPR) and the German Federal Data Protection Act (BDSG). Further information on the handling of customer data at Ampco Pumps GmbH can be found at www.krones.com . The Client is obliged to comply with all applicable data protection regulations.
2. Ampco Pumps GmbH is entitled to collect, store, process and evaluate machine data and duly anonymised personal data. This data may be disclosed to the companies affiliated with Ampco Pumps GmbH for the purpose of use for product optimization, performance improvement applications and other services of Ampco Pumps GmbH and/or its affiliates.
3. Ampco Pumps GmbH is entitled to transfer customer data to third parties (including companies affiliated with Ampco Pumps GmbH) if and to the extent that this is necessary to fulfil pre-contractual obligations and to provide contractually agreed deliveries and services (e.g. for shipping, invoicing or customer service) or to comply with legal requirements.

XIII. Place of jurisdiction, applicable law, place of performance, severability clause

1. In the event of all disputes arising out of and in connection with the contractual relationship, the exclusive place of jurisdiction shall be the registered office of Ampco Pumps GmbH if the Client is a domestic merchant, a domestic legal entity under public law or a domestic special fund under public law. For actions against Ampco Pumps GmbH by clients who do not have a general place of jurisdiction in the Federal Republic of Germany, the exclusive place of jurisdiction is also the registered office of Ampco Pumps GmbH. For lawsuits brought by Ampco Pumps GmbH against clients who do not have a general place of jurisdiction in the Federal Republic of Germany, the additional place of jurisdiction is the registered office of Ampco Pumps GmbH in addition to the statutory places of jurisdiction. Any arbitration agreements made by the parties shall take precedence.
2. With regard to the inclusion of these General Terms and Conditions of Performance, Sale and Delivery of Ampco Pumps GmbH and for all legal relationships arising for the contracting parties and their legal successors from the contract and from any ancillary business and/or follow-up business, only the law of the Federal Republic of Germany shall apply. This choice of law and the above jurisdiction agreement are also subject to the law of the Federal Republic of Germany.
   The application of the UN Convention on Contracts for the International Sale of Goods (United Nations Convention of 11 April 1980 on Contracts for the International Sale of Goods) is not precluded by the above choice of law.
3. The place of performance is the registered office of Ampco Pumps GmbH.
4. Should the contract or any of the above provisions of these General Terms and Conditions of Service, Sale and Delivery of Ampco Pumps GmbH be or become invalid, this shall not affect the validity of the remaining provisions. Rather, the contracting parties will work together to replace the invalid provision with a legally permissible and effective provision that is suitable for achieving the intended result of the invalid provision. The same applies to the filling of contractual gaps.

Origin of goods (USP): O = goods from third countries 1 = EU origin 2 = EFTA origin

Return Policy

This policy is intended for returns that are not covered by product warranty, i.e. wrong pump or part was ordered, customer canceled order, etc. Before returning any product, contact us for a Returned Material Authorization Number (RMA#). This will eliminate confusion when the parts are received and facilitate processing the return. No action will be taken on returned parts without an RMA.

Type of Return	Restocking Charge
Standard pump with a replacement order	10%
Standard pump without a replacement order	20%
Standard parts with a replacement order	5%
Standard parts without a replacement order	10%

Additional restocking charges may be assessed for any of the following circumstances.

1. Special order motors and seals are not returnable unless we have a use for them. Credit will be determined on a case-by-case basis.
2. Impellers that are trimmed to a diameter that we don't regularly use are not returnable. Credit will be determined on a case-by-case basis.
3. Used seals and motors are not returnable.
4. For any pumps and/or parts purchased over (1) year ago, credit will be determined on a case-by-case basis.

CREDITS

Credit will be issued only after parts are returned and inspected. Customer is responsible for packaging parts so they are returned in "as new" condition. Any labor required by Ampco to return the parts to "as new" condition will be deducted from the credit.

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