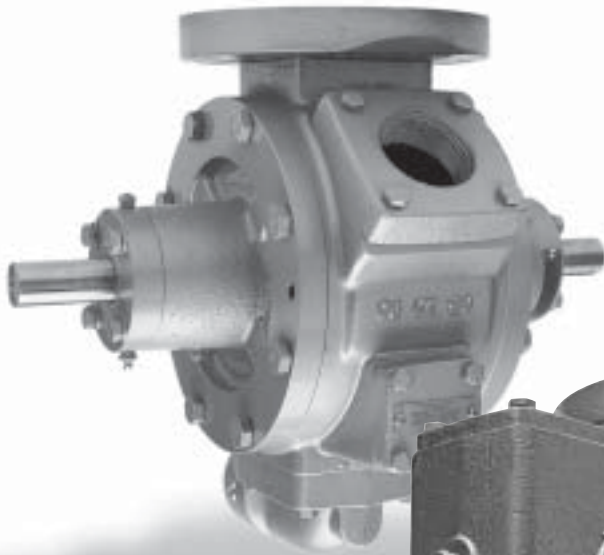
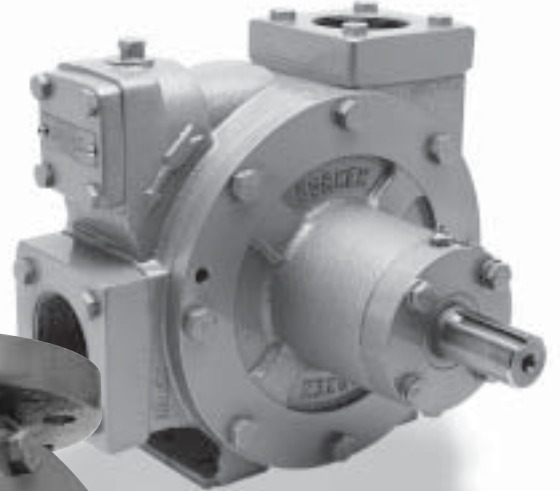


# Installation, Operation & Maintenance Manual

## Z-Series Truck Pumps



Z3200



Z2000



Z4200

Warning: (1) Periodic inspection and maintenance of Corken products is essential. (2) Inspection, maintenance and installation of Corken products must be made only by experienced, trained and qualified personnel. (3) Maintenance, use and installation of Corken products must comply with Corken instructions, applicable laws and safety standards (such as NFPA Pamphlet 58 for LP-Gas and ANSI K61.1-1972 for Anhydrous Ammonia). (4) Transfer of toxic, dangerous, flammable or explosive substances using Corken products is at user's risk and equipment should be operated only by qualified personnel according to applicable laws and safety standards.

*Solutions beyond products...*

**CORKEN**<sup>®</sup>  
**IBEX**<sup>®</sup>

---

## Warning

Install, use and maintain this equipment according to Corken's instructions and all applicable federal, state, local laws and codes. Periodic inspection and maintenance is essential.

## Corken One Year Limited Warranty

Corken, Inc. warrants that its products will be free from defects in material and workmanship for a period of 12 months following date of purchase from Corken. Corken products which fail within the warranty period due to defects in material or workmanship will be repaired or replaced at Corken's option, when returned, freight prepaid to Corken, Inc., 3805 N.W. 36<sup>th</sup> Street, Oklahoma City, Oklahoma 73112.

Parts subject to wear or abuse, such as mechanical seals, blades, piston rings, packing and other parts showing signs of abuse are not covered by this limited warranty. Also, equipment, parts and accessories not manufactured by Corken but furnished with Corken products are not covered by this limited warranty and purchaser must look to the original manufacturer's warranty, if any. This limited warranty is void if the Corken product has been altered or repaired without the consent of Corken.

All implied warranties, including any implied warranty of merchantability or fitness for a particular purpose, are expressly negated to the extent permitted by law and shall in no event extend beyond the expressed warranty period.

Corken disclaims any liability for consequential damages due to breach of any written or implied warranty on Corken products. Transfer of toxic, dangerous, flammable or explosive substances using Corken products is at the user's risk. Such substances should be handled by experienced, trained personnel in compliance with governmental and industrial safety standards.

## Important notes relating to the European Union (EU) Machinery Directive

Pumps delivered without electric motors are not considered as machines in the EU Machinery Directive. These pumps will be delivered with a Declaration of Incorporation. The fabricator of the machinery must assure and declare full compliance with this Directive before the machine in which the pump will be incorporated, or of which it is a part, is put into service.

## Contacting the Factory

Before you contact the factory, note the model number and serial number of your pump. The serial number directs us to a file containing all information on material specifications and test data applying to your specific pump. When ordering parts, the Corken service manual or Operations, Installation and Maintenance (IOM) manual should be consulted for the proper part numbers. **ALWAYS INCLUDE THE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS.**

The model and serial numbers are shown on the nameplate of the unit. Record this information for future reference.

Model no. \_\_\_\_\_

Serial no. \_\_\_\_\_

Date purchased \_\_\_\_\_

Date installed \_\_\_\_\_

Purchased from \_\_\_\_\_

Installed by \_\_\_\_\_

---

# Table of Contents

Principles of the Z-Series Coro-Vane® Truck Pump .....	4
Exclusive Features of Your Z-Series Coro-Vane® Truck Pump .....	4
Installation of the Z-Series Coro-Vane® Truck Pumps .....	4
Outlet Piping Should Include the Following .....	5
By-Pass System .....	5
Power Take-off Drive Systems .....	5
Hydraulic Drive Systems .....	6
Operation of Your Z-Series Coro-Vane® Truck Pump .....	6
How to Transfer From the Truck Tank at Full Capacity .....	6
Maintenance of Your Z-Series Coro-Vane® Truck Pump System .....	7
Pump Maintenance Schedule .....	7
Preventive Maintenance Program .....	8
Z-Series Coro Vane® Seal Replacement Instructions .....	9
Repair/Re-build Kits .....	11
Assembly Instructions For Z-Series Truck Pumps .....	12
Parts Details .....	13
Appendix A	
Model Number and Identification Code .....	16
Appendix B	
Operating, Material and Flange Specifications .....	17
Appendix C	
Performance Curves and Charts .....	18
Appendix D	
Outline Dimensions .....	22
Appendix E	
Troubleshooting Guide .....	28
Appendix F	
Storage of the Z-Series Coro-Vane® Truck Pumps .....	29
Appendix G	
Hydraulic Motor Specifications .....	30

# Principles of the Z-Series Coro-Vane® Truck Pumps

The Corken Z-Series truck pump is a special type of rotary positive displacement pump, known as a sliding vane pump.

The sliding vane pump has many of the positive displacement advantages of the gear pump, plus the ability to compensate for wear, and operate at a lower noise level.

The sliding vane pump consists of a rotor turning in a cam (liner) machined eccentrically in relation to the rotor; thereby displacing the liquid trapped between the rotor, cam and vanes. The Corken Z-Series pumps are made with vanes produced from advanced polymers which exhibit extremely low coefficients of friction. The vanes are self-adjusting for wear which gives the pump long life.

## Exclusive Features of Your Z-Series Coro-Vane® Truck Pumps

The pumping of volatile liquids is one of the most difficult of all pumping jobs, and pumping from a delivery truck makes it even more difficult, so more attention must be given to the design and manufacture of the pump and to its installation and operation.

In addition to being especially suited for handling volatile liquids, your Z-Series pump has a number of features to help make it more easily operated and maintained.

This model has been registered and listed by the UNDERWRITERS' LABORATORIES, INC. for use in the handling of LP-Gas and Ammonia.

The CASE AND HEADS are made of ductile iron for extra strength and toughness.

The VANES are manufactured of advanced polymers to provide excellent life and quiet operation. After long service, the vanes are simply and inexpensively replaced.

Both the CAM and the SIDEPLATES are easily replaced should the need arise. Sideplates may be reversed for extended service life.

The MECHANICAL SEAL is designed for longer life under greater loads and may be inspected or replaced without disturbing the piping of the pump. No special tools are needed.

BEARINGS are heavy-duty roller type for long bearing life.

PRESSURE GAUGE connections, 1/4" pipe thread, are provided.

The RELIEF VALVE is built-in and nonadjustable. The valve is preset at the factory.

**NOTE: EVEN WITH THIS INTERNAL SAFETY VALVE, AN EXTERNAL BY-PASS VALVE MUST BE INSTALLED.**

## Installation of Your Corken Z-Series Coro-Vane® Pump

The installation of the Z-Series CORO-VANE® pump is simple. However, in order for the pump to deliver optimum performance, the principles discussed in this book should be followed. The piping details are furnished to illustrate methods proved by hundreds of installations. Your own needs may require slight variations, but every effort should be made to follow the recommendations identified in this manual.

For the transfer of flammable liquids like LPG, the pump must be installed according to the applicable local safety and health regulations. The installer and/or the user must take into account the following:

- Potential risk due to local conditions regarding the installation and operation (e.g. poor ventilation and additional risks due to other elements in the vicinity, etc.).
- Qualification of the personnel.
- Type of liquid being transferred.
- Specific safety measures to be applied (e.g. gas detection, automatic shut-off valves, personal protection equipment, etc.).

The following table shows the weight of the bare pump for each model. For handling a bare pump, lifting slings should be used. Web slings are preferred over metal slings to minimize damage to the paint.

Model	Shipping Weight	
	lb	kg
Z2000	100	45.4
Z3200	140	63.5
Z4200	275	124.7

See Appendix D for outline dimensions.

A rotation arrow is located on the side of the pump so check the PTO to determine its direction of rotation. The Z-Series pump will match either PTO rotation. Connect the drive shaft to the pump shaft that turns the pump in the direction of the arrow.

The PTO selection is important. The pump requires a PTO with an average output speed of 500 to 800 RPM when the truck engine is operating at the proper speed to maintain oil pressure and water circulation.

The DRIVESHAFT connecting the pump to the PTO should be of the "splined" or slip type. This type driveshaft permits the shaft to adjust for PTO movement and twisting of the truck

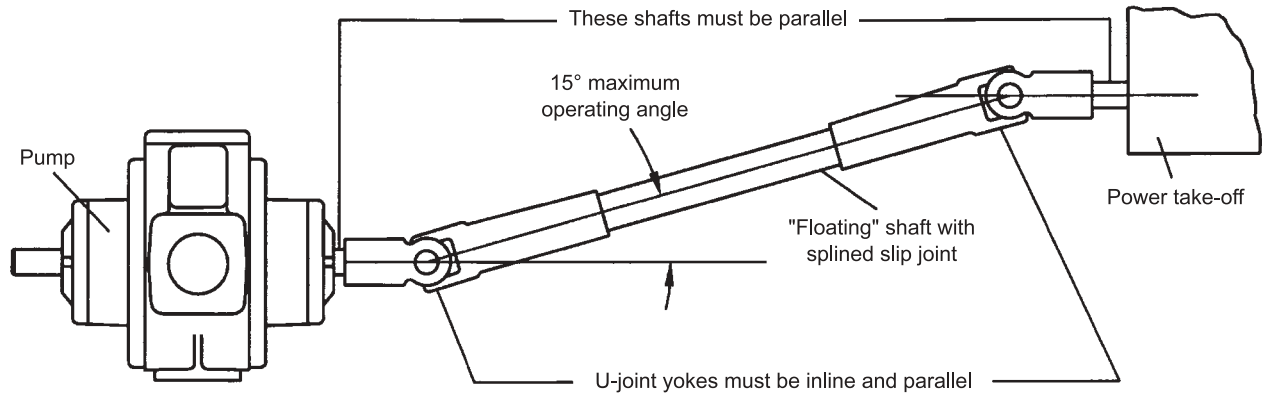


Figure 1: Shaft Alignment

frame. A fixed driveshaft transfers the forces directly into the pump and PTO and will shorten the life of both considerably. The yokes of the driveshaft universal joints must be positioned as shown. Improper positioning will soon wear them out and potentially destroy the bearings in the pump and PTO.

INLET PIPING should be as short as possible with minimum restrictions so that the pressure drop is limited. Inlet Piping is not generally required on the Z3200 or Z4200. These pumps are bolted directly to the tank internal valve and must be installed in accordance with the valve manufacturer's instructions.

**The Outlet Piping Should Include the Following:**

1. A pressure gauge should be installed in the pump outlet or near it. A pressure gauge is necessary to determine the efficiency of your pumping system.
2. A hydrostatic relief valve is required by most state laws and for your own safety.
3. If a meter with a vapor eliminator is installed, pipe the eliminator outlet to the top of your tank. Never pipe the eliminator into the pump inlet piping or into the liquid part of the system at any point.
4. The meter back-pressure valve may be piped into the tank top or into the pump inlet piping.
5. The discharge piping should be at least the same size as the meter.

**The By-Pass System**

The internal safety relief valve is intended as a safety device and not as an operational by-pass valve. If the pump will be operated regularly against a closed discharge hose or near the pressure setting of the internal relief valve, a separate by-pass valve (such as a 1-1/4" Corken T-166 Valve) must be installed in the discharge piping system between the pump and the meter. The by-pass valve should be set at a differential pressure lower than the internal relief valve (which is set near 150 psid) and may be connected to the truck tank at any convenient point, liquid or vapor.

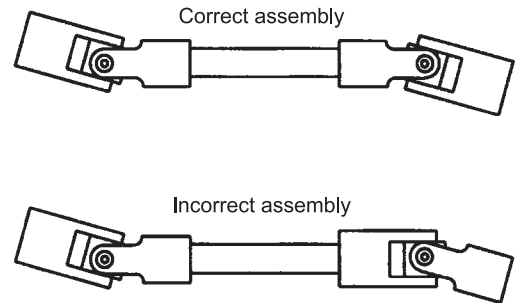


Figure 2: Universal Joint Alignment

**Power Take-off Drive Systems**

Proper pump operation and long life are directly dependent upon a good drive system. Many truck pumps utilize a power train consisting of shafts and universal joints from a power take-off shaft on the truck engine to the pump.

There are several basic principles that should be followed in laying out a PTO drive. These principles should not be violated. Following them will produce a workable power train that results in long pump life and reduced drive wear.

First, the driver shaft and the driven shaft must be parallel to one another within plus or minus one degree. Improper alignment will cause jerking and back and forth "whip" to the pump shaft, thereby imparting a surging pulsation to the liquid flow, which results in noise, vibration and abnormal wear.

Second, the angle of the "floating" shaft should be within the limits for the particular equipment being used (usually a maximum of 15° at pump speeds up to 800 RPM). To ensure that shaft expansion or contraction does not distort the drive system, a splined slip joint should be placed between the two universal joints. The drive shaft should be of the "splined" or slip type to permit the shaft to adjust for PTO movement and twisting of the truck frame. A fixed drive shaft transmits the forces directly to the pump and PTO which will shorten the life of both considerably.

Third, the yokes of the drive shaft universal joints must be in a parallel position. Figures 1 and 2 illustrate the proper arrangement.

---

**Improper installation of the U-joints will soon destroy them along with the bearings in the pump and PTO.**

Properly mounted, the second universal gives uniform motion to the drive shaft by compensating for the rotational error introduced by the first U-joint. An even number of universal joints (2, 4, 6 etc.) should always be used. An odd number of U-joints will cause unbalanced pump shaft rotation. This problem becomes greater with increased angularity.

Other points to consider include the proper sizing of the shaft components with a maximum horsepower load to be expected, good alignment of hanger bearings and proper pump coupling alignment. Improper PTO systems count for a high percentage of truck pump failures. Always remember to disengage the clutch before shifting the PTO into gear. Shifting the PTO into gear without disengaging the clutch imparts an enormous shock on the PTO, drive shaft, pump and meter and will soon damage one or all of them.

For proper installation of pump drives, follow the rules listed below:

1. Driver shaft and pump shaft must be parallel, plus or minus one degree.
2. Operating angle of the "floating" shaft must be fifteen degrees maximum.
3. Universal yokes must be in line and parallel.
4. Splined slip joints must be used where needed.
5. Use an even number of universal joints.
6. Always use the least practical number of shafts.

PTO selection and drive system design is extremely important. The PTO should have an average output speed of 500 to 800 RPM when the truck engine is operating at the recommended speed.

The designer of the drive system must select a PTO drive shaft capable of meeting the torque requirements of the pumping system,

## Hydraulic Drive Systems

Truck pumps are also driven by hydraulic systems, consisting of an adaptor, a motor, a pump, a cooler and connecting hoses.

The truck pump's shaft must be properly aligned with the hydraulic motor's shaft to avoid excessive stress on the truck pump's main and thrust absorbing bearings. See Appendix D for outline dimensions.

The sizing of the hydraulic motor, the hydraulic pump and the hydraulic oil cooler must be done using the operational requirements of the truck pump, i.e., flow rate, differential pressure, pump speed, required torque and power. These data are on the performance charts in Appendix C.

Information on the Char-Lynn hydraulic motor is found in Appendix H.

## Operation of Your Z-Series Coro-Vane® Truck Pump

Performance curves and charts are provided in Appendix C.

The following steps should be performed for the initial pumping operation:

1. Close the shutoff valve on the end of the delivery hose.
2. Follow the instructions of the internal valve manufacturer for putting the valve into operation.
3. Start the pump and circulate liquid through the external by-pass system.
4. If your system has a Corken T-166 By-Pass Valve, adjust the valve by turning the adjusting screw counter clockwise until the pump discharge pressure gauge shows nearly the same pressure it did before you started the pump. Turn the adjusting screw clockwise until the gauge indicates about 100 to 115 psid above the tank pressure. If a by-pass valve of another make is used, follow the instructions provided for adjusting the valve.
5. You may increase the speed of your pump as long as it increases the capacity of the pump and does not exceed the excess flow valve or external by-pass valve setting. The one exception occurs when the pump is used to "Pump On" or to load the truck tank. In this case, the pump inlet conditions are poor at best so the pump should be operated at a slower RPM.

**NOTE: IF PUMP SPEED IS INCREASED, BE CERTAIN THE METERING SYSTEM WILL HANDLE THE INCREASED FLOW.**

**WHEN PROPERLY INSTALLED AND OPERATED, Z-SERIES CORO-VANE® TRUCK PUMPS DO NOT EXCEED AN 88 dBA NOISE LEVEL AT A DISTANCE OF ONE METER (3.281 ft) FROM THE SURFACE OF THE PUMP.**

## How to Transfer From the Truck Tank at Full Capacity

To move volatile liquids rapidly from a truck tank requires that a condition be maintained within the truck tank that keeps the liquid and the vapors above the liquid in equilibrium—to prevent violent boiling of the liquid. As liquid is removed from the tank, some of the liquid boils to form vapor to fill the space created as the liquid leaves. If this action becomes too violent, the pump will begin to make noise, and the capacity will be reduced.

Truck pumps can lower the truck tank pressure from 5 psi to 10 psi (below the starting tank pressure) if there is no means provided for equalizing—and then the trouble starts! As the weather gets colder, the worse this condition will become. You can detect this "pull down" in pressure by observing your truck tank pressure gauge as the pump is operating.

To prevent this violent liquid boiling, pressure in some form must be introduced into the truck tank. The simple way to accomplish this is to "equalize" between the truck tank and the receiving tank. Equalizing takes the higher pressure vapors from the receiving tank and returns them to the truck tank. As a result, the void left by the receding liquid is filled. This in turn lessens the need for the liquid to boil excessively. The equalizing principle is necessary for volatile liquids.

**NOTE: EQUALIZING BETWEEN TANKS OR THE ADDITION OF PRESSURE IS NOT A LEGAL TRANSFER IN MOST STATES. IF EQUALIZING LINES ARE NOT PERMITTED REMEMBER THAT A QUIET PUMP IS AN EFFICIENT PUMP. A NOISY PUMP IS NOT EFFICIENT AND THE CONDITIONS THAT CAUSE THE NOISE ALSO CAUSE WEAR TO INTERNAL PARTS. OPERATE THE PUMP AT SPEEDS THAT RESULT IN A "QUIET" TRANSFER.**

## Maintenance of Your Z-Series Coro-Vane® Truck Pump System

All repairs to the pump must be performed by qualified personnel in a safe manner, utilizing tools and/or equipment that are free of hazards, and follows the applicable safety codes of practice set by the local authorities having jurisdiction. Make sure the system pressure has been relieved before attempting any repair to the pump.

Your Corken Z-Series Pump requires regular maintenance and care like all mechanical equipment. A neglected or improperly repaired pump will result in premature failure and cause unsafe conditions. To promote product longevity and safety, maintenance must be performed by properly trained technicians. Make sure all safety systems are in place and the system pressure has been relieved before attempting **ANY** maintenance.

Make sure the transfer hoses are not "kinked" which can cause excessive pump discharge pressure. Always make sure your hoses are not out of date.

There are two lubrication points in which to grease the pump bearings; one zerk per bearing cap located at opposite ends of the pump. Four grease relief and seal ventilation fittings have been provided, two at each end of the pump, to prevent overgreasing the bearings. Overgreasing can cause seal failure if grease passageways are blocked in some way. Clean each fitting before lubricating the bearings. This practice helps to prevent foreign material contamination of the bearings and accidental over-pressurization of the mechanical seals. Use only ball bearing grease (MIL-G-10924C) with a temperature rating of -70°F.

Normal wear parts are the mechanical shaft seals, bearings, vanes and sideplates. All of these parts plus O-rings and grease seals are offered in the Corken "repair kit" listed in this manual directly after the Seal Replacement Instruction on page 9. Use only genuine Corken replacement parts when repairing your Corken Z-Series pump. Follow the instructions provided with the parts.

When it becomes necessary to repair your pump or remove it from the system, you must be absolutely certain that all propane, anhydrous ammonia or whatever product being pumped is bled from the pump and connecting piping. Once all the product has safely been bled from the pump and connecting piping, make certain no pressure is left in the system. **SPECIAL CARE MUST BE TAKEN DURING THE BLEED DOWN PROCESS TO AVOID DANGER TO PERSONNEL AND PROPERTY IN THE AREA.** Bleeding a system too fast is a common mistake and may result in "refrigerated" liquid being left in the pump and piping even though the pressure gauge shows no pressure. As the "refrigerated" liquid begins to warm, more gas will escape causing a dangerous condition. Take your time in bleeding your system and make proper provisions to vent or capture the gas in accordance with local regulations. **ONLY A PROPERLY TRAINED INDIVIDUAL SHOULD BE ALLOWED TO BLEED A PUMPING SYSTEM.**

### Pump Maintenance Schedule

	Daily	Monthly	3 Months
Lubricate bearings		X	
Inspect drive coupling			X
Clean inlet strainer		X	
Check for leaks	X		
Inspect hose and fittings	X		

Figure 3

---

## Preventative Maintenance Program for Z-Series LPG Pumps

### Purpose

By following an effective preventive maintenance program, unscheduled downtime can be eliminated. This program should be used by the Operation Manager to get a maximum utilization of manpower and equipment as well as to prevent possible unsafe situations and/or production delays due to equipment breakdown.

### Scope

The Preventive Maintenance chart in figure 3, page 7, includes the items to be regularly checked and inspected with a recommended time schedule. These are basic maintenance recommendations, and each company should develop their own comprehensive preventive maintenance program schedule, tailor-made to their individual operational procedures and requirements.

Maintenance must only be performed by a properly trained and qualified individual that follows all the applicable safety procedures.

### Procedures

Every procedure herein recommended must be performed in a safe manner (utilizing tools and/or equipment which are free of hazards) and following the safety codes of practice set by the authorities having jurisdiction. These are general guidelines and are not intended to cover all the safety aspects that must be considered and followed while performing these procedures.

#### 1. Visual Inspection:

This includes checking for leaks, corroded areas, condition of hoses, piping and fittings, and any unsafe condition which may hinder the safety of the personnel and/or the facility.

#### 2. Clean Inlet Strainer Screen:

A clogged strainer screen will create too much flow restriction and vapor will be formed causing the pump to cavitate. This reduces the pump's capacity and accelerates the wear of the internal parts.

#### 3. Inspect Drive Coupling and Driveline:

Check the coupling alignment and the condition of the union for cuts, broken sections and wear.

#### 4. Lubricate Pump Bearings:

Use only ball bearing grease, applied with a manual lubrication pump or gun. Always clean the grease openings thoroughly before greasing.

#### 5. Lubricate Motor Bearing:

Follow the recommendations of the electric motor manufacturer for the type of grease to use and the lubrication frequency.

#### 6. Performance Test:

a. While transferring liquid with the pump, check the pressure at the pump's inlet port. The pressure drop in the inlet piping should not be greater than 3 psi.

b. While transferring liquid with the pump, close the discharge valve(s) so the full flow will be directed back to the storage tank through the by-pass valve. Then slowly close the valve downstream of the by-pass valves. The discharge pressure of the pump should increase to the maximum differential pressure of the pump at no flow conditions (see Appendix C: Performance Curves).

c. If the maximum differential pressure is not obtained, the pump must be serviced. See Appendix F Troubleshooting Guide for additional help.

d. Replace vanes or sideplates if worn.

#### 7. Tighten all holdown bolts.

#### 8. Inspect motor starter contact points.

This must be performed by an authorized and qualified electrician, based on the electric motors manufacturer's guidelines.

---

# Z-Series Coro-Vane® Seal Replacement Instructions

Please Note: The photos listed below contain a Z2000; however, all Z-Series pumps use the same procedures for seal replacement.

To determine the parts needed for repair, refer to Appendix A, page 16 for model number and identification code and pages 13 through 15 for parts details.

**CAUTION!** Bleed all pressure from the pump and piping before starting to install your seal assembly.

## Cleanliness

Even the smallest amount of dirt on your new seal can cause early failure. Keep all parts, tools and your hands clean

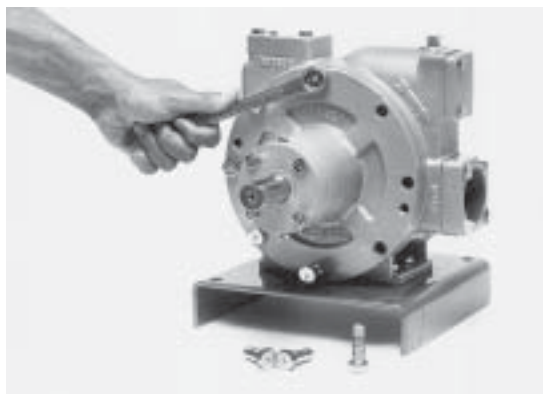
while installing the seal. Never touch the smooth lapped faces of the carbon rotor or seal seat. For LP-Gas, anhydrous ammonia and similar liquids, you are trying to seal a fluid that is 5 to 10 times thinner than water! Your new seal needs every chance it can get, so keep it clean.

## Workmanship

Your Corken pump is a precision piece of equipment with very close clearances. Treat it as such. Never use force during assembly or disassembly (see steps 1 through 10).

### Step 1

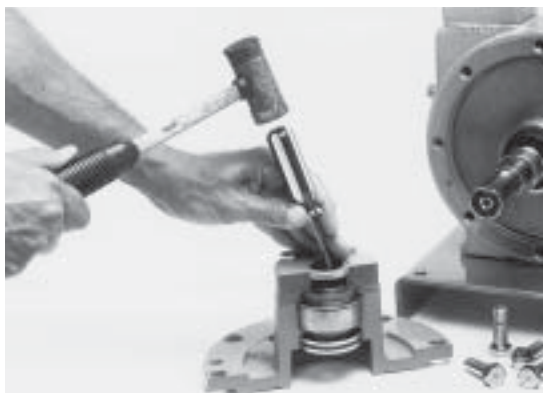
#### Depressurize and open the pump



Loosen the head bolts and remove one head with the bearing cap attached, while holding in on the shaft.

### Step 2

#### Seal seat and grease seal removal



**NOTE:** The above photo is of a cutaway for better details. Remove the head O-ring and place head on the workbench as shown. Lightly tap the seal out of the head with a long screwdriver by reaching through the bearing cap opening. Inspect the inner lip seal and remove, if necessary, using same process.

### Step 3

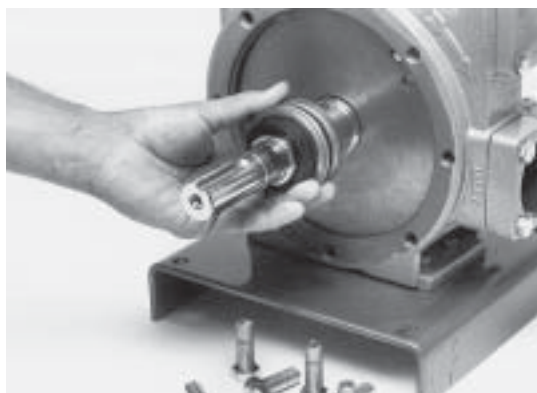
#### Seal seat and grease seal installation



**NOTE:** The above photo is of a cutaway for better details. Turn the head over and install the new grease seal face down by pressing into the bore behind the main bearing. This can best be accomplished using the old seal seat with the O-ring removed. Apply a generous amount of light oil to the new seal seat. Using the protective disc, gently press seal into place.

### Step 4

#### Seal retainer and carbon removal



Remove the old seal assembly from the pump shaft while pressing against the sideplate. This will allow the seal retainer assembly to be removed without pulling the rotor-shaft out of the pump.

---

# Z-Series Coro-Vane® Seal Replacement Instructions

## Step 5

### Seal retainer and carbon installation

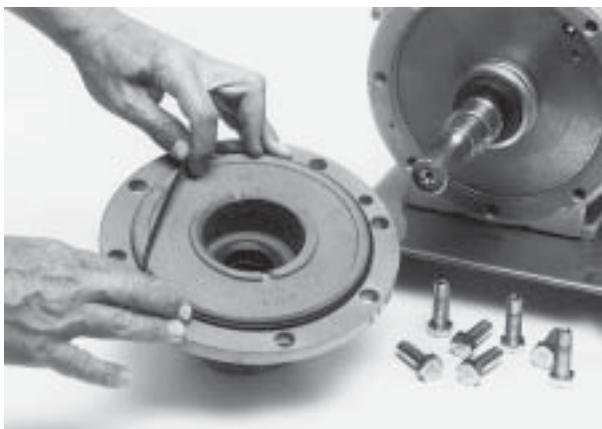


Clean the pump and apply a generous amount of light oil.

Install the new seal assembly by aligning the seal retainer slot with the seal drive pin on the shaft.

## Step 6

### Mechanical seal installation

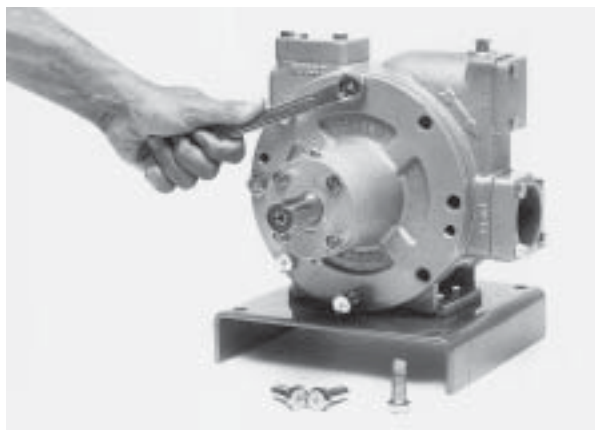


Install the new case O-ring onto the head.

Apply a generous amount of light oil to each seal face and carefully install the head assembly over the pump shaft.

## Step 7

### Completing installation



Torque the head bolts in a crossing pattern. There is no need to disassemble or re-shim the bearing caps. Repeat all of the above steps when replacing the seal assembly on the opposite side.

## Step 8

### Lubrication & re-pressurizing

Note: Both sides of the pump are identical; duplicate procedure to change the seal on the opposite side.

#### Lubrication

Regrease the bearing after thoroughly cleaning the grease opening and fittings. If dirt is forced into the bearings, early failure will result.

Special relief fittings have been provided to help prevent over-greasing the bearings. Excessive grease may drip out after lubrication. Over-greasing can damage the pump bearings and cause seal leaks.

Use only a recommended ball bearing grease. If you use a hand grease gun, put the grease in slowly and stop as soon as the relief fitting opens.

Grease the U-joints and the spline of the drive shaft when greasing the pump.

#### Re-pressurize

For best results, slowly pressurize with vapor pressure.

Please note: If you pressurize with liquid, it will sometimes refrigerate even though it enters the pump slowly. As a result, the seal elastomers will not seal properly thereby causing them to leak.

# Repair/Re-build Kits

## Z2000 Repair Kit 3193-X1

2-224A	O-ring, Buna-N	1
2-231A	O-ring, Buna-N	2
2754-X	Roller bearing	2
4262-X	Vane driver	3
4428	Vane	6
4431-XA2	Seal assembly	2
4432	Thrust bearing	2
4435	Thrust bearing mounting ring	2
4439	Bearing cap shim (0.002)	8
4439-1	Bearing cap shim (0.010)	2
4439-2	Bearing cap shim (0.020)	2
4441	Grease seal	2
2270	Shaft key	1

## Z3200 Repair Kit 3195-X1

2-224A	O-ring, Buna-N	1
2-234A	O-ring, Buna-N	2
2754-X	Roller bearing	2
4262-X	Vane driver	3
4232	Vane	6
4431-XA2	Seal assembly	2
4432	Thrust bearing	2
4435	Thrust bearing mounting ring	2
4439	Bearing cap shim (0.002)	8
4439-1	Bearing cap shim (0.010)	2
4439-2	Bearing cap shim (0.020)	2
4441	Grease seal	2
2270	Shaft key	1

## Z4200 Repair Kit 3197-X1

2-231A	O-ring, Buna-N	1
2-234A	O-ring, Buna-N	2
4460-X	Roller bearing	2
4449-X	Vane driver	3
4448	Vane	6
4464-XA2	Seal assembly	2
4453	Thrust bearing	2
4454	Thrust bearing mounting ring	2
4458	Bearing cap shim (0.002)	8
4458-1	Bearing cap shim (0.010)	2
4458-2	Bearing cap shim (0.020)	2
4463	Grease seal	2
4459	Shaft key	1

## Z2000 Re-Build Kit 3194-X1

Includes all items in the Repair Kit plus the following:

4414	Cam	1
4427	Sideplate	2

## Z3200 Re-Build Kit 3196-X1

Includes all items in the Repair Kit plus the following:

4242	Cam	1
4231	Sideplate	2

## Z4200 Re-Build Kit 3198-X1

Includes all items in the Repair Kit plus the following:

4443	Cam	1
4446	Sideplate	2

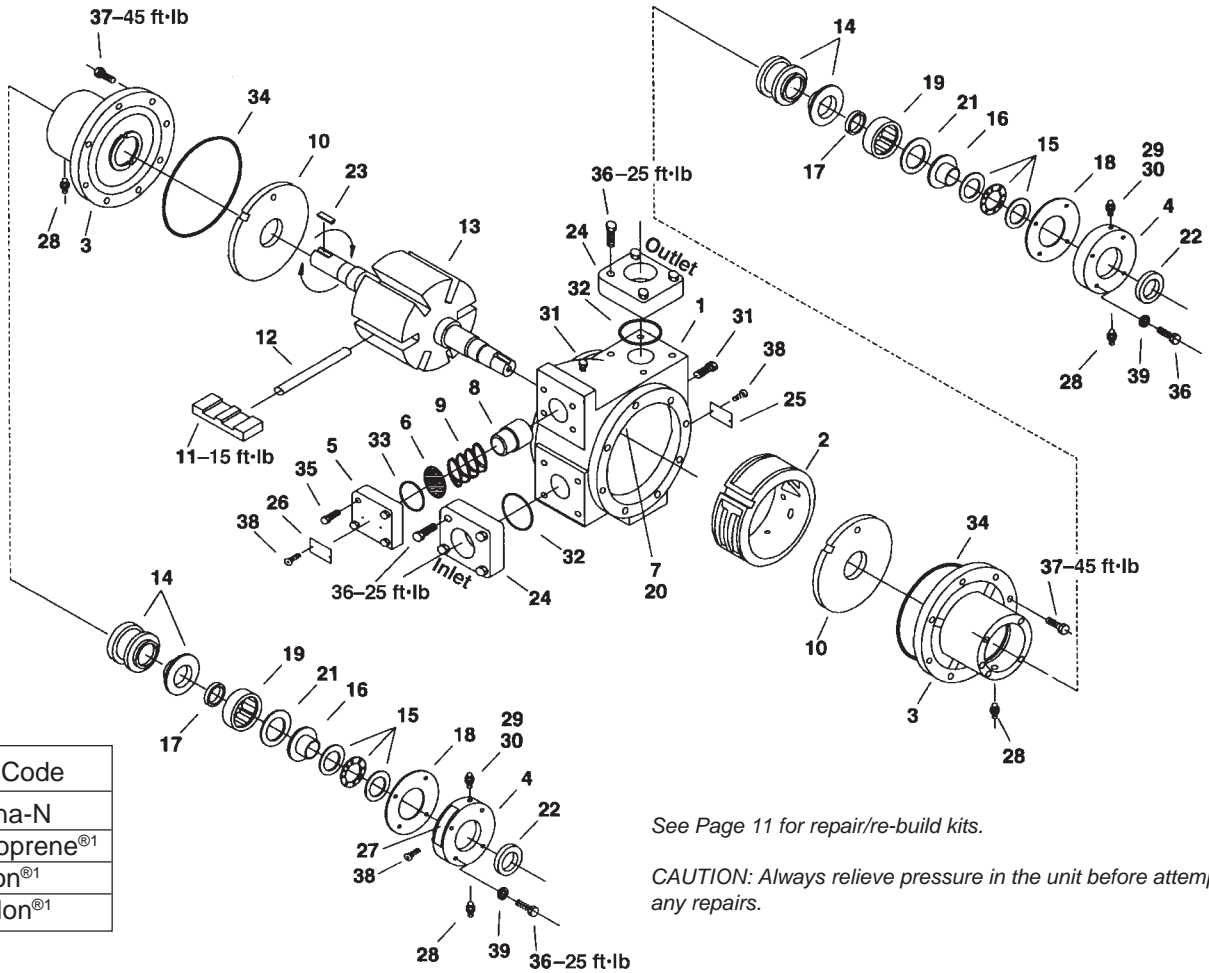
*All repair and re-build kits have Buna-N O-rings which are suitable for both LPG and NH<sub>3</sub> applications.*

---

# Pump Assembly Instructions For Z-Series Truck Pumps

1. Place the pump head on a clean work surface with the bolting flange down.
2. Press the inner grease seal in through the main bearing cavity until flush with the bottom of the bore. Seal lips must be oriented down as shown in each parts detail drawing.
3. Press the main bearing into the head and install the retainer ring.
4. Install the relief fitting into 1/8" NPT threaded hole and turn the head over.
5. After lubricating the mechanical seal seat with light oil, press the seal seat into the head using your fingers. Make sure the seal seat is fully seated and the shiny side faces up. Apply a generous amount of light oil to the seal seat to remove any remaining debris and fingerprints. Install the case O-ring around the pilot OD of the head.
6. Press the outer grease seals into each of the bearing caps.
7. Press the spring pins into each of the cam key holes.
8. Install the cam key into the pump case. Slide the cam into the pump case aligning the long inlet slots to the inlet portion of the case.
9. Install one sideplate and bolt one head into place with two bolts.
10. Turn the pump onto the assembled head. Ensure there is enough room to allow the shaft to extend through the assembled head by 6 inches.
11. While holding the rotor-shaft vertical, install the vane drivers. Vertically install the rotor-shaft into the unit. Slide the vanes into each rotor slot ensuring the rounded tip contacts the cam and the vane slots face into the direction of rotation as shown in each parts detail drawing.
12. Install the remaining sideplate.
13. Lubricate the pump shaft and seal carbon with light oil. Install the seal retainer assembly by aligning the retainer slot onto the seal alignment pin. Carefully press the seal carbon into the retainer assembly with the polished face oriented outward by aligning the carbon notches to the retainer pins. Again, apply a generous amount of light oil to remove any remaining debris and fingerprints.
14. Carefully install the head over the pump shaft and seal assembly and torque the bolts in accordance with the appropriate bolt torque pattern drawing. This pattern ensures even bolting of the head into the case without deforming the cam inlet port. This is done by bolting those bolts over the solid portion of the cam port.
15. Turn the pump over and remove the first head.
16. Install the seal retainer assembly and carbon as outlined in step 13 above.
17. Bolt head to case as described in step 14 above. Ensure the rotor shaft turns freely in either direction.
18. Slide the bearing race mounting ring onto one end of the shaft until contact with the main bearing inner race. Mount the thrust bearing assembly onto the bearing race mounting ring and install the bearing cap.
19. Lightly tighten the bearing cap with two opposed bolts until the rotor shaft cannot be freely turned. Measure the gap between the head and bearing cap at four points around the bearing cap. Adjustment may be necessary to contain the gap within .001". Round up the average measurement to the nearest even number. This is the measured amount of bearing cap shims. Refer to parts pages for shim measurements.
20. Remove the two bearing cap bolts and install the measured amount of shims plus .006". Install the four bearing cap bolts and torque in a crossing pattern.
21. Install the remaining bearing race mounting ring and thrust bearing assembly on the opposite side of the pump.
22. Perform step 19 again on the opposite side and install the measured shims plus .002". Install the four bearing cap bolts and torque in a crossing pattern.
23. Install the shaft key and ensure shaft rotates smoothly.

# Parts Details for Model Z2000



O-ring Code	
A	Buna-N
B	Neoprene <sup>®1</sup>
D	Viton <sup>®1</sup>
E	Teflon <sup>®1</sup>

See Page 11 for repair/re-build kits.

**CAUTION:** Always relieve pressure in the unit before attempting any repairs.

Ref. no.	Part no.	Description	Qty.
1.	4413	Case	1
2.	4414	Cam	1
3.	4416	Head	2
4.	4417	Bearing cap	2
5.	1174-3	Relief valve cap	1
6.	4282	Shim	1
7.	4424	Cam key	1
8.	4425	Relief valve	1
9.	4426	Relief valve spring	1
10.	4427	Sideplate	2
11.	4428	Vane <sup>2</sup>	6
12.	4262-X	Vane driver	3
13.	4430-X2R	Rotor—shaft assembly	1
14.	4431-X_2	Seal assembly <sup>4</sup>	2
15.	4432	Thrust bearing assembly	2
16.	4435	Bearing race mounting ring	2
17.	4438	Grease seal	2
18.	4439	Bearing cap shim (.002) red	As req.
	4439-1	Bearing cap shim (.010) brown	
	4439-2	Bearing cap shim (.020) yellow	
19.	2754-X	Bearing	2

Ref. No.	Part No.	Description	Qty.
20.	3253	Cam key pin	2
21.	2760-244	Retainer ring	2
22.	4441	Grease seal	2
23.	2270	Shaft key—1/4" x 1-9/16"	2
24.	4479-2	Flange—2" NPT <sup>3</sup>	2
25.	2649	Nameplate	1
26.	4248	Relief valve nameplate	1
27.	1359	Lubrication instruction plate	2
28.	1343	1/8" NPT relief fitting	4
29.	2158	1/8" NPT grease zerk	2
30.	2159	Lubricap	2
31.	3442	1/4" NPT pipe plug	2
32.	2-231_	O-ring—flange <sup>4</sup>	2
33.	2-224_	O-ring—relief valve cap <sup>4</sup>	1
34.	2-261_	O-ring—case <sup>4</sup>	2
35.	7001-031-NC125A	Bolt—hexagon head	4
36.	7001-037-NC150A	Bolt—hexagon head	16
37.	7001-043-NC125A	Bolt—hexagon head	16
38.	7012-006-SF025E	Screw	8
39.	7206-037A	Lockwasher	8

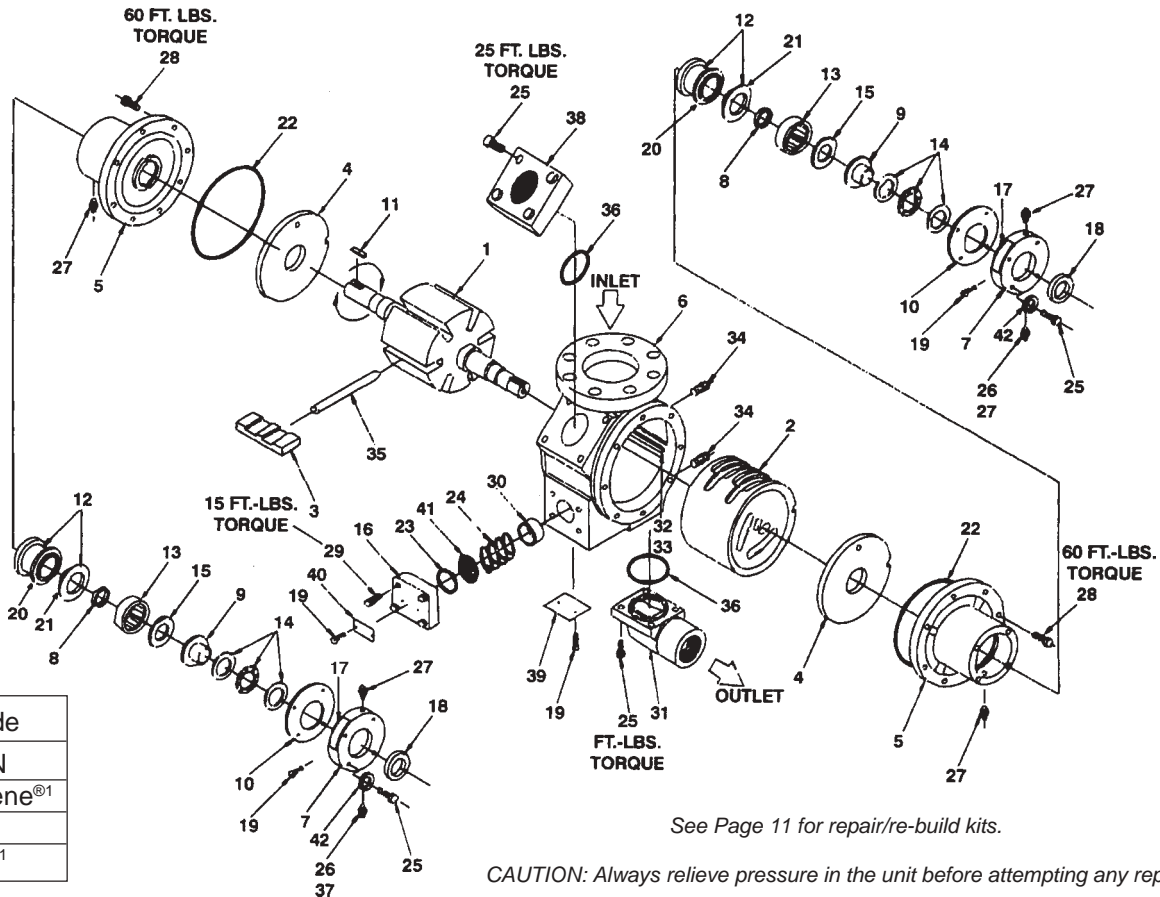
<sup>1</sup>Registered trademarks of the DuPont company.

<sup>2</sup>Slots in blades must face TOWARDS the direction of rotation

<sup>3</sup>Optional: 4479-2S 2" welded

<sup>4</sup>\_ denotes O-ring code. See chart above.

# Parts Details for Model Z3200



O-ring Code	
A	Buna-N
B	Neoprene <sup>®1</sup>
D	Viton <sup>®1</sup>
E	Teflon <sup>®1</sup>

See Page 11 for repair/re-build kits.

CAUTION: Always relieve pressure in the unit before attempting any repairs.

Ref. No.	Part No.	Description	Qty
1.	4495-X2R	Rotor shaft assembly	1
2.	4242	Cam	1
3.	4232	Vane <sup>4</sup>	6
4.	4321	Sideplate	2
5.	4488	Head	2
6.	4239	Case	1
7.	4417	Bearing cap	2
8.	4438	Grease seal	2
9.	4435	Mounting ring	2
10.	4439	Bearing shim (.002) red	As req.
	4439-1	Bearing shim (.010) brown	
	4439-2	Bearing shim (.020) yellow	
11.	2270	Shaft key	2
12.	4431-X_2	Seal assembly <sup>3</sup>	2
13.	2754	Bearing outer race	2
14.	4432	Thrust bearing assembly	2
15.	2760-244	Retainer ring	2
16.	1174-2	Relief valve cap	1
17.	1359	Lubrication instruction plate	2
18.	4441	Grease seal	2
19.	7012-006SF019E	Screw	8
20.	2-223_	O-ring—seal <sup>3</sup>	2

Ref. No.	Part No.	Description	Qty
21.	2-227_	O-ring—seal seat <sup>3</sup>	2
22.	2-262_	O-ring—case <sup>3</sup>	2
23.	2-224_	O-ring—relief valve cap <sup>3</sup>	1
24.	1240	Relief valve spring	1
25.	7001-037NC150A	Bolt—3/8-16 x 1-1/2" hex head	16
26.	2158	1/8" NPT grease zerk	2
27.	1343	1/8" NPT relief fitting	4
28.	7001-050NC150A	Bolt—1/2-13 x 1-1/2" hex head	16
29.	7001-031NC125A	Bolt—5/16-16 x 1-1/4" hex head	4
30.	1241	Relief valve	1
31.	4243	Flanged elbow—2" <sup>2</sup>	1
32.	4241	Cam key	1
33.	3253	Cam key pin	1
34.	3442	1/4" NPT pipe plug	1
35.	4262-X	Vane driver	3
36.	2-234_	O-ring—flange <sup>3</sup>	1
37.	2159	Lubricap	2
38.	1172-2	Flange—2" NPT	1
39.	2649	Nameplate	1
40.	4248	Relief valve nameplate	1
41.	4282	Relief valve shim	As req.
42.	7206-037A	3/8" lockwasher	8

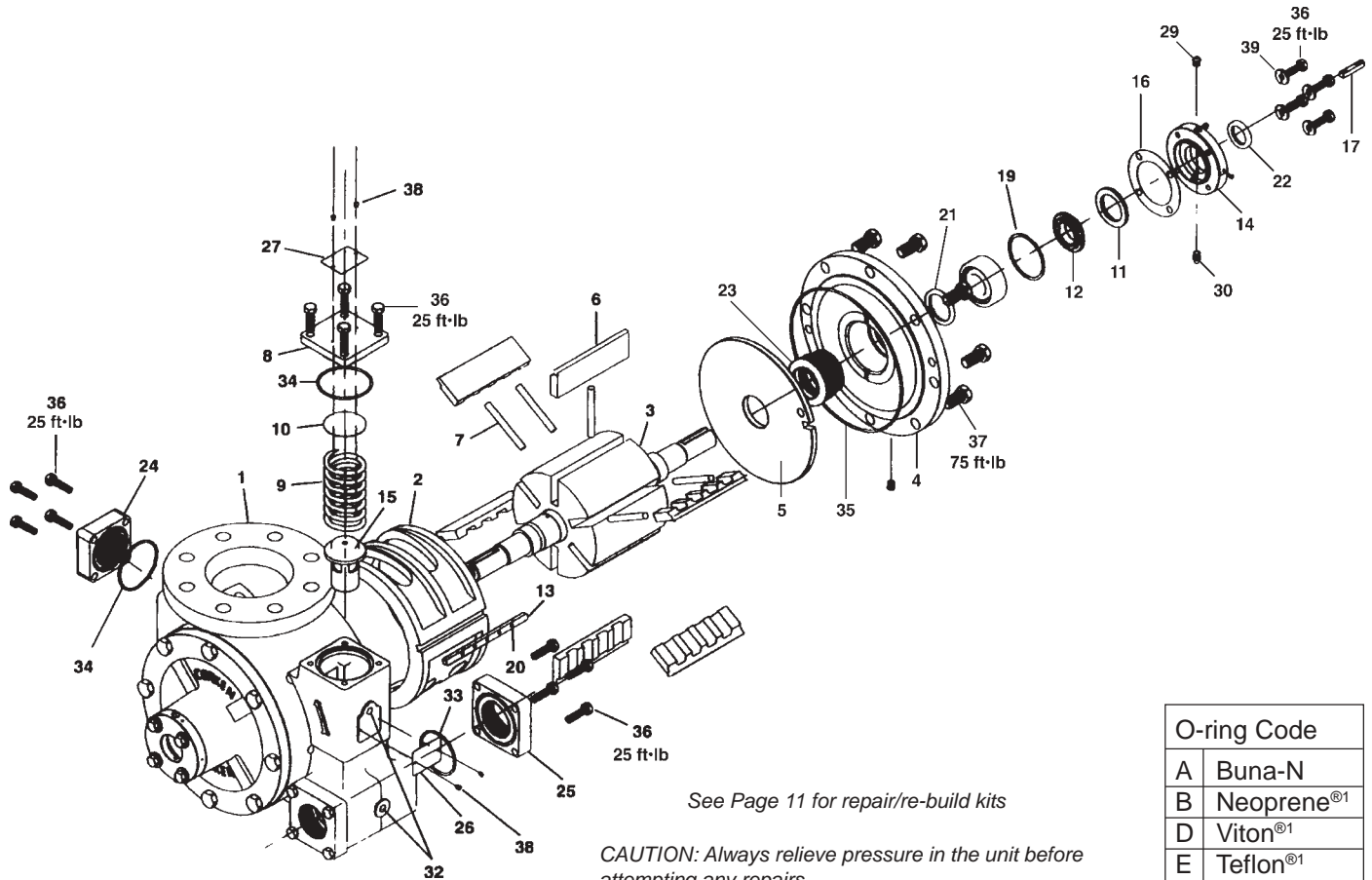
<sup>1</sup>Registered trademarks of the DuPont company.

<sup>2</sup>See flange chart on page 17 for options

<sup>3</sup>\_ denotes O-ring code. See chart above.

<sup>4</sup>Slots in blades must face TOWARDS the direction of rotation

# Parts Details for Model Z4200



O-ring Code	
A	Buna-N
B	Neoprene <sup>®1</sup>
D	Viton <sup>®1</sup>
E	Teflon <sup>®1</sup>

Ref. No.	Part No.	Description	Qty
1.	4442	Case	1
2.	4443	Cam	1
3.	4444-X2R	Rotor-shaft assembly	1
4.	4445	Head	2
5.	4446	Sideplate	2
6.	4448	Vane <sup>4</sup>	6
7.	4449-X	Vane driver	5
8.	4450	Relief valve cap	1
9.	4451	Relief valve spring	1
10.	4452	Shim	1
11.	4453	Thrust bearing assembly	2
12.	4454	Bearing race mounting ring	2
13.	4455	Cam key	1
14.	4456	Bearing cap	2
15.	4457	Relief valve	1
16.	4458	Bearing cap shim (.002) red	As req.
	4458-1	Bearing cap shim (.010) brown	
	4458-2	Bearing cap shim (.020) yellow	
17.	4459	Shaft key—5/16 x 1-3/4	1
18.	4460-X	Roller bearing	2

Ref. No.	Part No.	Description	Qty
19.	2760-281	Retainer ring	2
20.	3253	Cam key pin	5
21.	4462	Grease seal	2
22.	4463	Grease seal	2
23.	4464-X_2	Seal assembly <sup>3</sup>	2
24.	1172-2	Aux. inlet flange—2" NPT <sup>2</sup>	1
25.	4479-2	Discharge flange—2" NPT <sup>2</sup>	2
26.	2649	Nameplate	1
27.	4248	Relief valve nameplate	1
28.	1359	Lubrication instruction plate	2
29.	1343	1/8 NPT relief fitting	4
30.	2158	1/8 NPT grease zerk	2
31.	2159	Lubricap	2
32.	3442	1/4 NPT pipe plug	2
33.	2-231_	O-ring—discharge flange <sup>3</sup>	2
34.	2-234_	O-ring—auxiliary inlet flange <sup>3</sup>	1
35.	2-270_	O-ring—case <sup>3</sup>	2
36.	7001-037NC150A	Bolt—hexagon head	24
37.	7001-062NC125A	Bolt—hexagon head	16
38.	7012-006SF019E	Screw	8
39.	7206-037A	Lockwasher	8

<sup>1</sup>Registered trademarks of the DuPont company.

<sup>2</sup>See flange chart on page 17 for options

<sup>3</sup>\_ denotes o-ring code. See chart above.

<sup>4</sup>Slots in blades must face TOWARDS the direction of rotation

# Appendix A—Model Number and Identification Code

Models Involved	Description	Code	Feature	Example
Z2000 Z3200 Z4200	Foot mounted (NPT connections) 300# inlet flange for direct mounting to truck outlet 180° from inlet	Z	General construction	<b>Model Number</b> Z 2000 H G A E E U
All	Sliding vane pump with floating rotor and two shaft extensions Flow rate 41–85 gpm 63–121 gpm 200– 400 gpm	2000 3200 4200	Pump size	
All	6 vanes with vane drivers	H	Vane type	
All	GCB-50	G	Vane material	
All	Buna-N Neoprene <sup>®1</sup> Viton <sup>®1</sup> Teflon <sup>®1</sup>	A B D E	O-ring material	
Not all port sizes are available with each pump. size. See flange options for more details	2" NPT flange 2" slip-on weld flange 4" 300 lb ANSI flange	E F S	Inlet flange	
See flange options for more details	1-1/2" NPT flange 1-1/2" slip-on weld flange 2" NPT flange 2" slip-on weld flange 2" NPT elbow	C D E F G	Outlet flange	
See flange options for more details	1-1/2" NPT flange 1-1/2" slip-on weld flange 2" NPT flange 2" slip-on weld flange 2" NPT elbow Blind flange No auxiliary inlet port	C D E F G T U	Auxiliary inlet flange	

<sup>1</sup> Viton®, Teflon® and Neoprene® are registered trademarks of the DuPont company.

# Appendix B—Specifications

## Operating Specifications

Maximum RPM	Minimum temperature	Maximum temperature	Maximum working pressure	Maximum differential pressure	Internal relief valve
800	-25°F (-32°C)	225°F (107°C)	400 psig (28.6 bar)	125 psid (8.6 bar)	Yes

## Material Specifications

Part	Material
Case, head, rotor, relief valve cap, bearing cap	Ductile iron ASTM A536
Cam	Gray iron ASTM A48, Class 50
Sideplate	Gray iron ASTM A48, Class 30
Welding flange	Steel
Seal seat	Gray iron (standard) Stainless steel & Ni-Resist (optional)
Seal metal parts	Steel (Z2000 and Z3200) Stainless steel (Z4200)
Shaft	8620 steel
Vanes and vane drivers	Advanced polymers
Relief valve spring	Steel, cadmium plated (Z3200) Stainless steel (Z2000 and Z4200)
Relief valve	Steel (Z3200) Stainless steel (Z2000 and Z4200)
Bearing	Steel
Thrust bearing	Steel
O-rings	Buna-N (standard) Teflon®, Viton®, Neoprene® <sup>1</sup> (optional)
Retainer rings	Steel

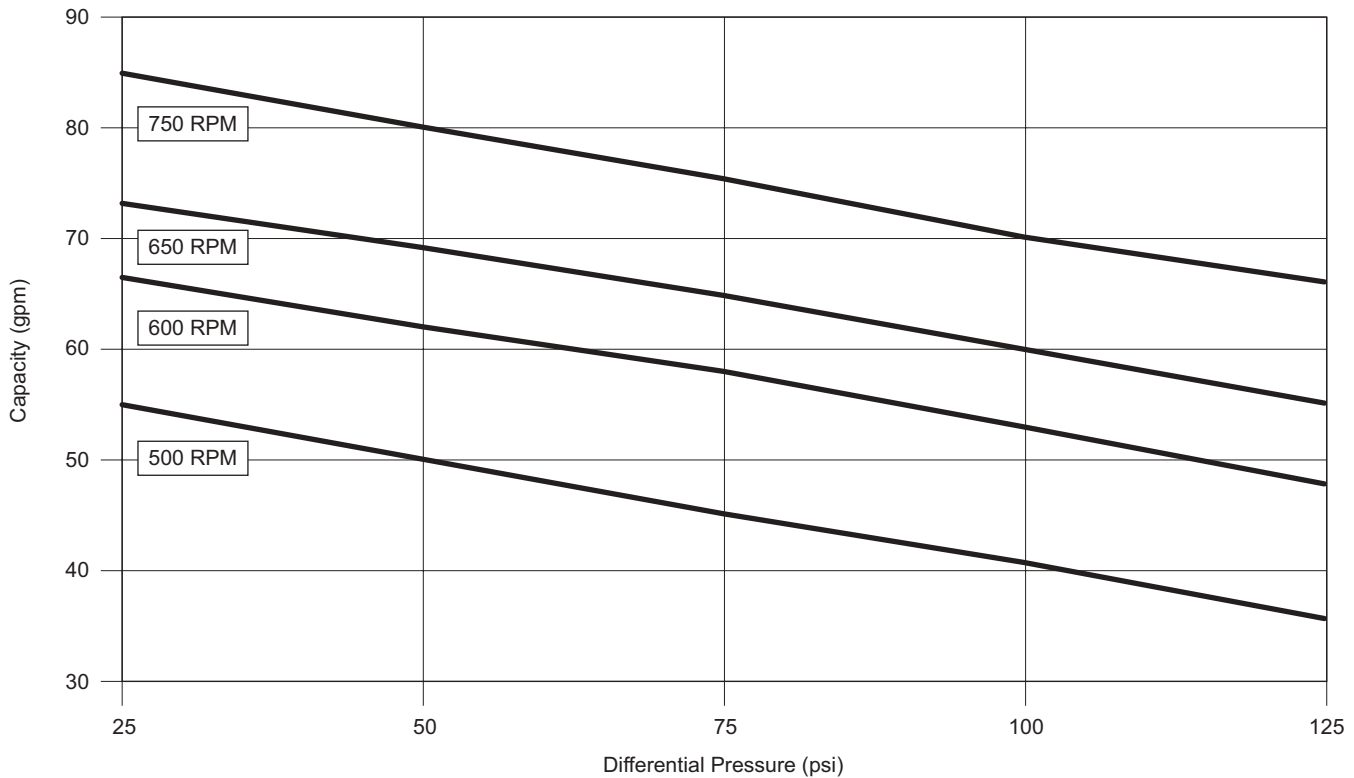
<sup>1</sup> Teflon®, Viton® and Neoprene® are registered trademarks of the DuPont company.

## Flange Specifications

Ports	Z2000 Flanges		Z3200 Flanges		Z4200 Flanges	
	Standard	Optional	Standard	Optional	Standard	Optional
Inlet	2" NPT <sup>2</sup>	None	3" mounting 300# ANSI	None	4" mounting 300# ANSI	None
Outlet	2" NPT <sup>2</sup>	None	2" NPT ell <sup>2</sup>	2" or 1-1/2" NPT <sup>1</sup>	2" Dual NPT <sup>2</sup>	None
Auxil. Inlet	None	None	2" NPT <sup>2</sup>	1-1/2" NPT, 2" NPT ell or blind <sup>2</sup>	2" NPT <sup>2</sup>	2" NPT ell, 3" NPT, or blind <sup>2</sup>

<sup>2</sup> Steel slip-on welding flanges are available at extra cost.

## Appendix C—Z2000 Performance Curves



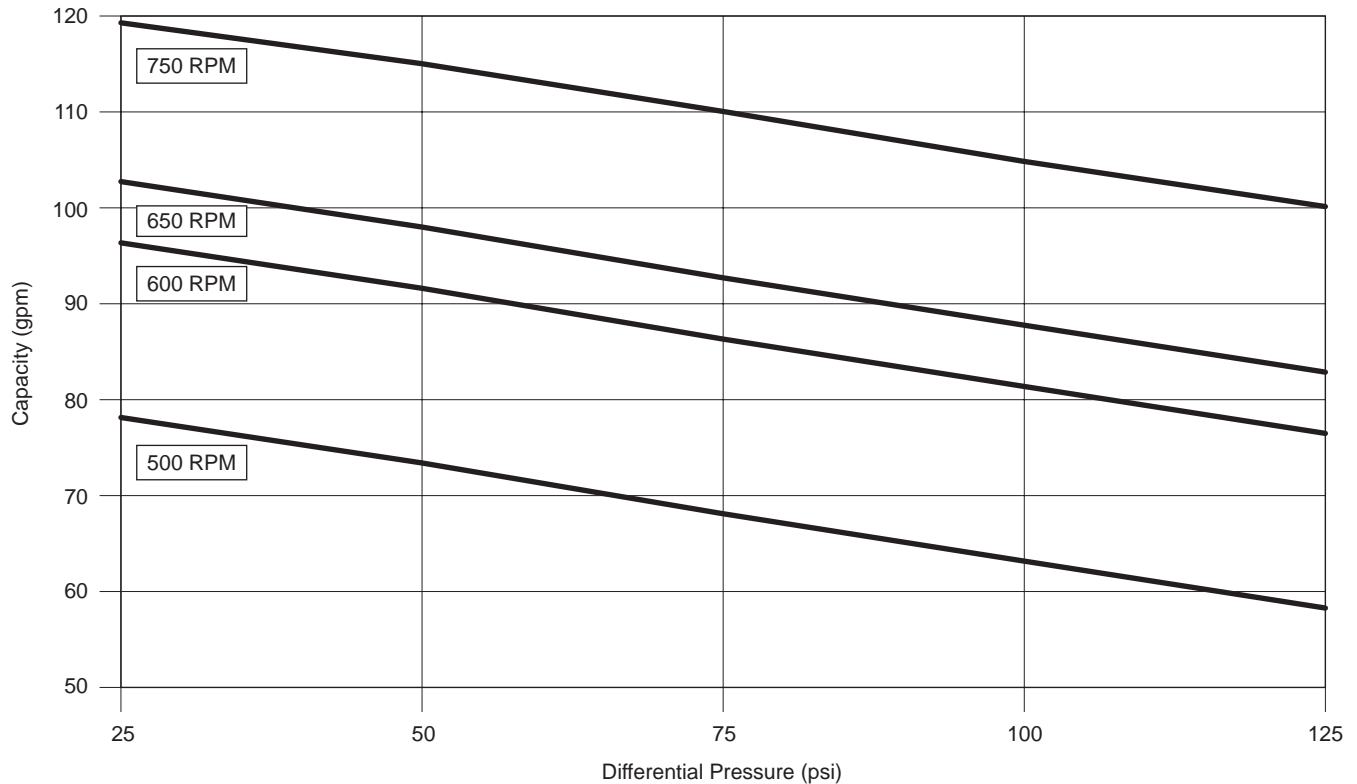
The chart shows approximate delivery rates as seen in vapor equalized propane systems at 70°F (21°C) with no pressure loss in pump suction piping.

The following will cause increased vaporization of the liquid in the pump suction, adversely affecting the delivery:

1. Restrictions in the suction piping such as internal valves, excess flow valves, elbows, etc.
2. Restriction or lack of a vapor return line
3. Temperatures below 70°F (21°C)

This loss of delivery is not caused by the pump but is a result of the natural thermodynamic properties of liquefied petroleum gases. See the *"GUIDE TO CORKEN LIQUEFIED GAS TRANSFER EQUIPMENT"* (CP226) for additional information.

## Appendix C—Z3200 Performance Curves



The chart shows approximate delivery rates as seen in vapor equalized propane systems at 70°F (21°C) with no pressure loss in pump suction piping.

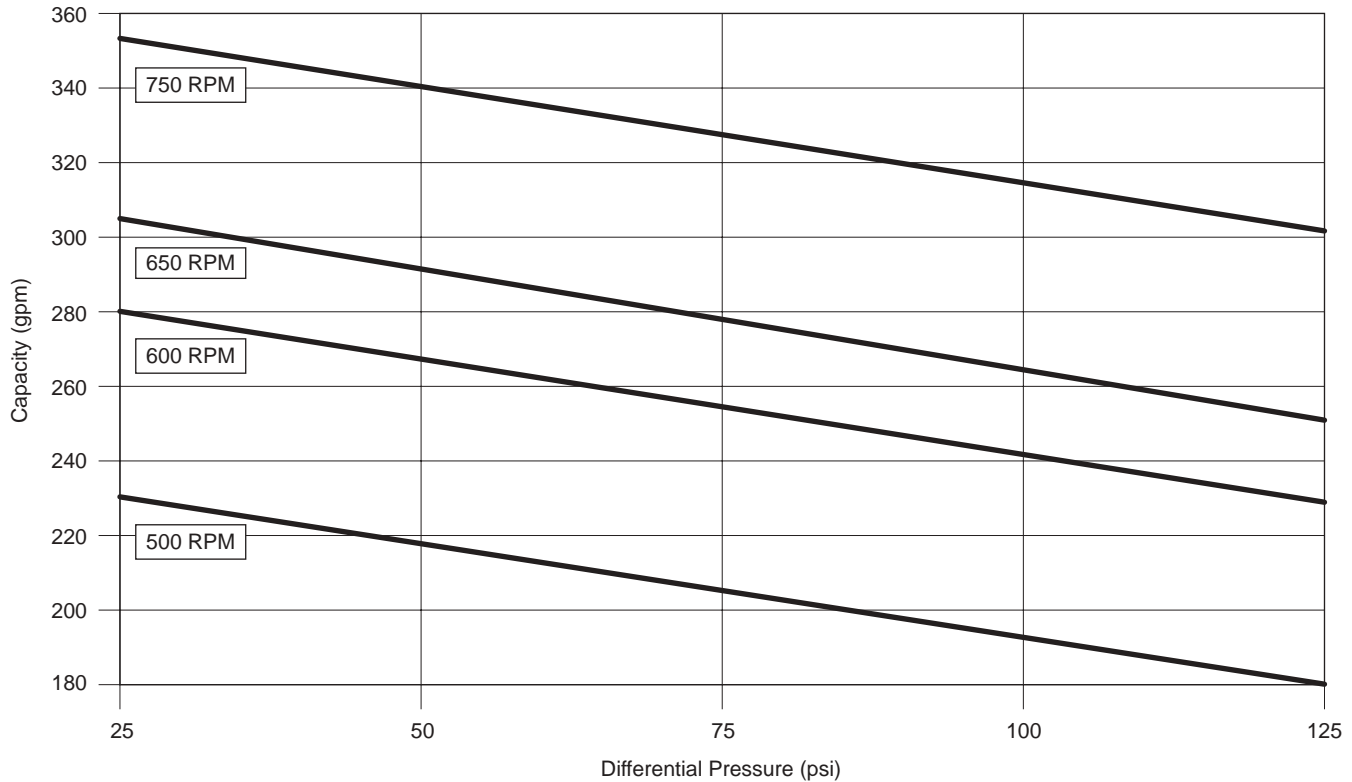
The following will cause increased vaporization of the liquid in the pump suction, adversely affecting the delivery:

1. Restrictions in the suction piping such as internal valves, excess flow valves, elbows, etc.
2. Restriction or lack of a vapor return line
3. Temperatures below 70°F (21°C)

This loss of delivery is not caused by the pump but is a result of the natural thermodynamic properties of liquefied petroleum gases. See the *“GUIDE TO CORKEN LIQUEFIED GAS TRANSFER EQUIPMENT”* (CP226) for additional information.

---

## Appendix C—Z4200 Performance Curves



The chart shows approximate delivery rates as seen in vapor equalized propane systems at 70°F (21°C) with no pressure loss in pump suction piping.

The following will cause increased vaporization of the liquid in the pump suction, adversely affecting the delivery:

1. Restrictions in the suction piping such as internal valves, excess flow valves, elbows, etc.
2. Restriction or lack of a vapor return line
3. Temperatures below 70°F (21°C)

This loss of delivery is not caused by the pump but is a result of the natural thermodynamic properties of liquefied petroleum gases. See the *“GUIDE TO CORKEN LIQUEFIED GAS TRANSFER EQUIPMENT”* (CP226) for additional information.

## Appendix C—Performance Charts

### Z2000 Coro-Vane® Truck Pump

Pump Speed	Differential Pressure	Approximate Delivery of Propane <sup>1</sup>	Brake hp Required	Pump Torque Required
RPM	psi (kPa)	gpm (L/min)	bhp (kW)	ft•lb (N•M)
750	50 (345)	80 (303)	2.9 (2.2)	20.4 (27.7)
750	100 (689)	71 (269)	5.8 (4.3)	40.8 (55.3)
650	50 (345)	69 (261)	2.5 (1.9)	20.4 (27.7)
650	100 (689)	60 (227)	5.1 (3.8)	40.8 (55.3)
600	50 (345)	64 (242)	2.3 (1.7)	20.4 (27.7)
600	100 (689)	57 (216)	4.6 (3.5)	40.8 (55.3)
500	50 (345)	50 (189)	1.9 (1.4)	20.4 (27.7)
500	100 (689)	41 (155)	3.9 (2.9)	40.8 (55.3)

### Z3200 Coro-Vane® Truck Pump

Pump Speed	Differential Pressure	Approximate Delivery of Propane <sup>1</sup>	Brake hp Required	Pump Torque Required
RPM	psi (kPa)	gpm (L/min)	bhp (kW)	ft•lb (N•M)
750	50 (345)	114 (431)	6.2 (4.6)	43.4 (58.9)
750	100 (689)	104 (394)	9.9 (7.4)	69.3 (94.0)
650	50 (345)	98 (371)	5.2 (3.9)	42.0 (57.0)
650	100 (689)	88 (333)	8.2 (6.1)	66.3 (89.9)
600	50 (345)	91 (344)	5.0 (3.7)	41.3 (56.0)
600	100 (689)	83 (315)	7.8 (5.9)	64.8 (87.9)
500	50 (345)	73 (276)	3.8 (2.8)	39.9 (54.1)
500	100 (689)	63 (238)	5.8 (4.3)	60.9 (82.6)

### Z4200 Coro-Vane® Truck Pump

Pump Speed	Differential Pressure	Approximate Delivery of Propane <sup>1</sup>	Brake hp Required	Pump Torque Required
RPM	psi (bar)	gpm (L/min)	bhp (kW)	ft•lb (N•M)
750	50 (345)	376 (1394)	12.5 (9.3)	87 (118.0)
750	100 (689)	326 (1209)	25.1 (18.6)	175 (237.3)
650	50 (345)	326 (1209)	10.8 (8.0)	87 (118.0)
650	100 (689)	283 (1070)	21.7 (16.1)	175 (237.3)
600	50 (345)	301 (1116)	9.9 (7.3)	87 (118.0)
600	100 (689)	261 (968)	20.0 (14.8)	175 (237.3)
500	50 (345)	235 (888)	8.3 (6.2)	87 (118.0)
500	100 (689)	200 (756)	16.7 (12.4)	175 (237.3)

<sup>1</sup> The chart shows approximate delivery rates as seen in vapor equalized propane systems at 70°F (21°C) with no pressure loss in pump suction piping. The following will cause increased vaporization of the liquid in the pump suction, adversely affecting the delivery.

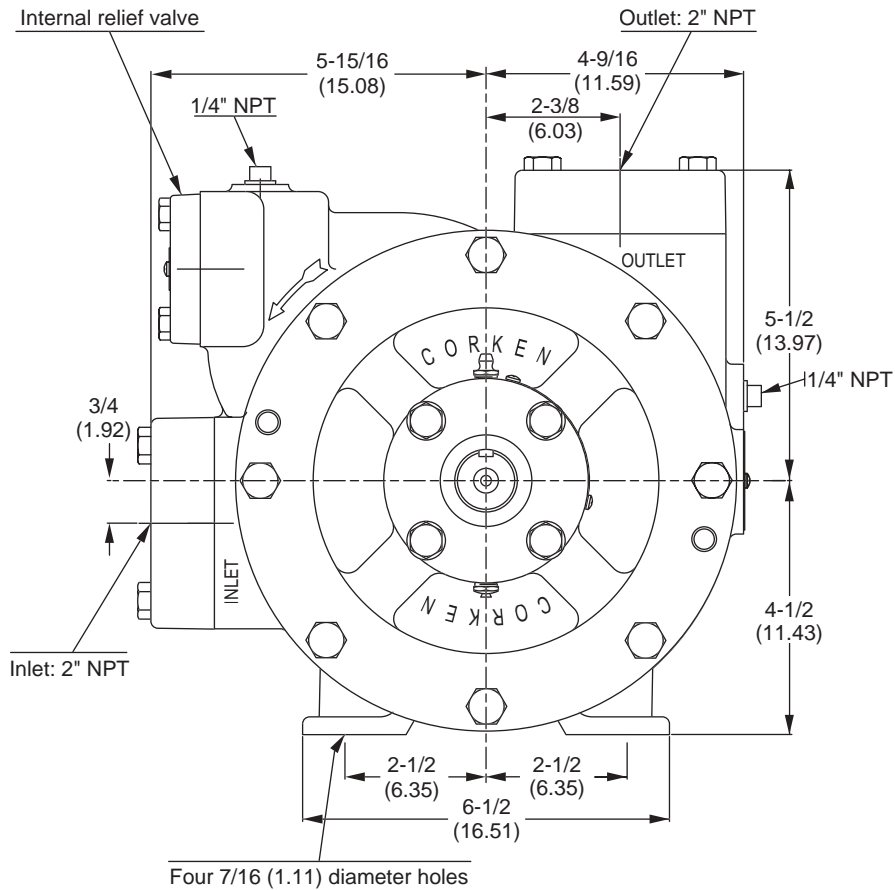
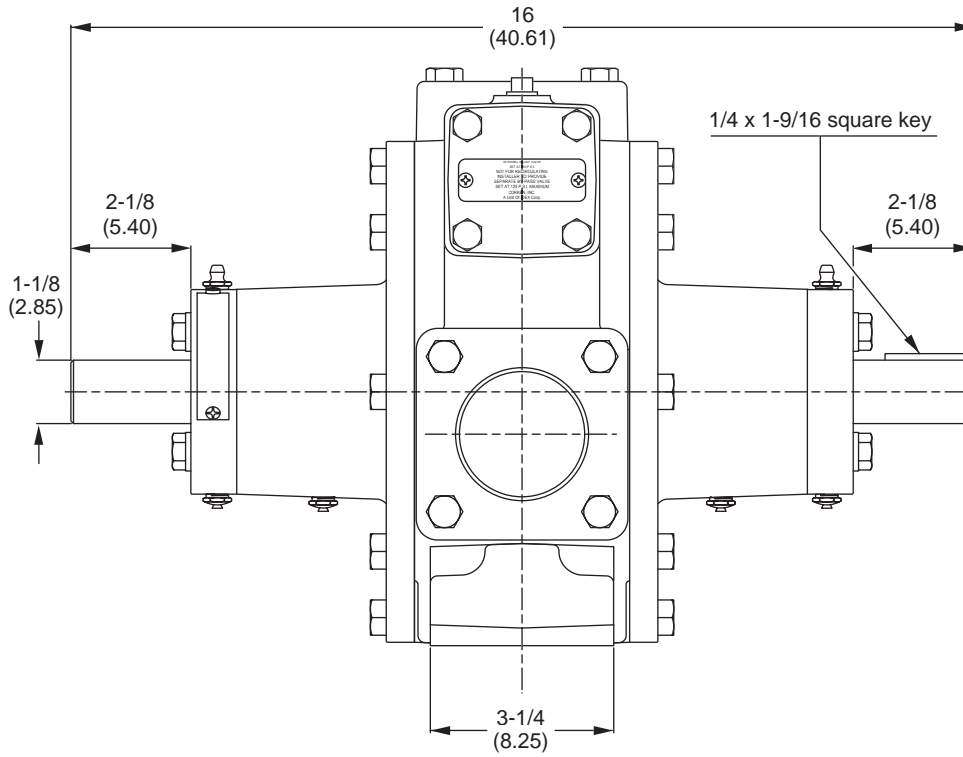
1. Restrictions in the suction piping such as internal valves, excess flow valves, elbows, etc...

2. Restriction or lack of a vapor return line.

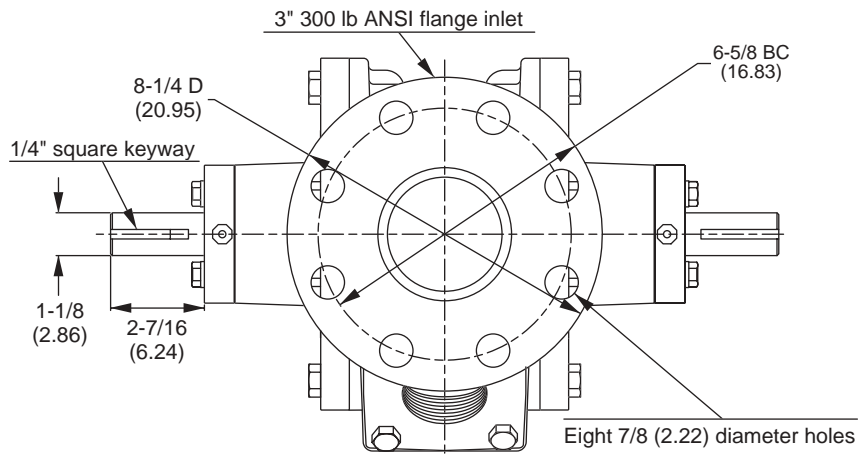
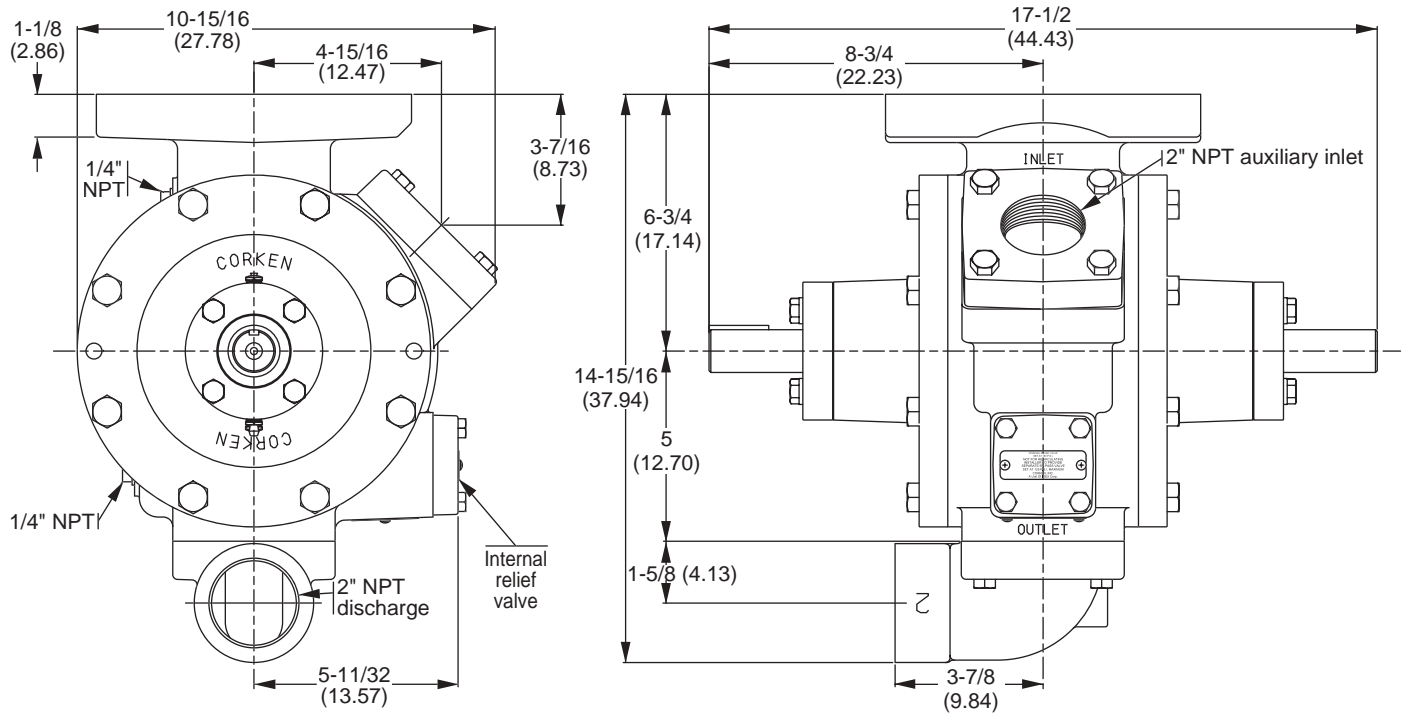
3. Temperatures below 70°F (21°C).

This loss of delivery is not caused by the pump but is a result of the natural thermodynamic properties of liquified petroleum gases. See the “GUIDE TO CORKEN LIQUEFIED GAS TRANSFER EQUIPMENT” (CP226) for a complete description of these phenomena.

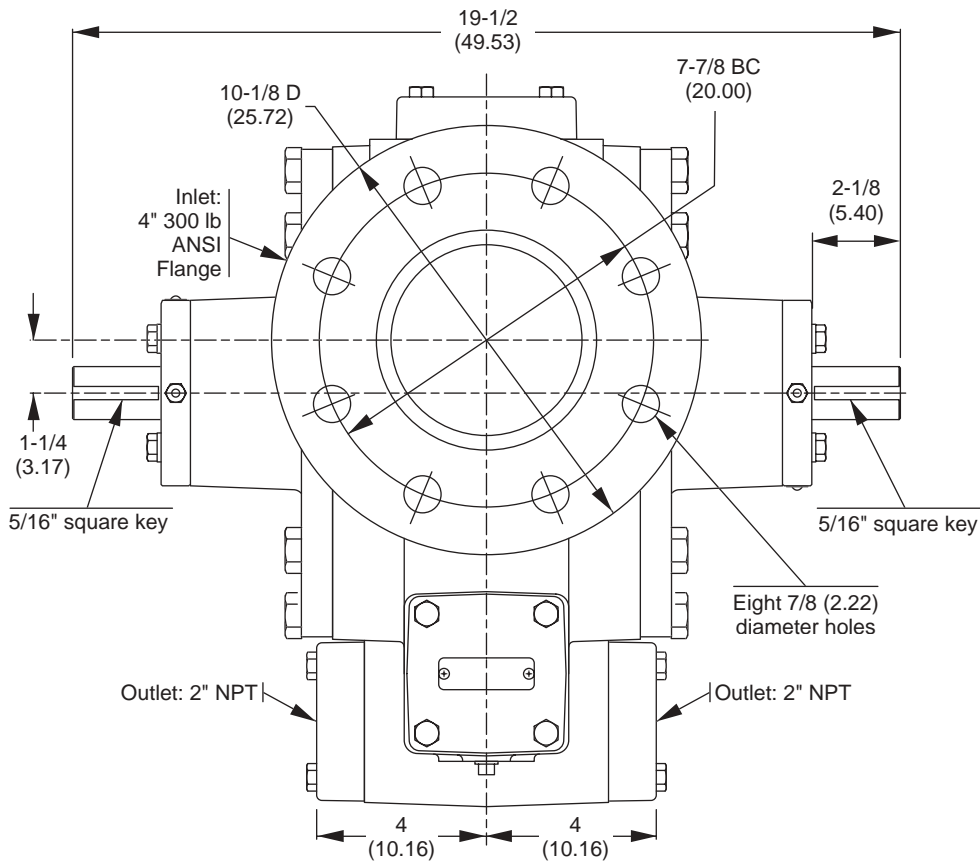
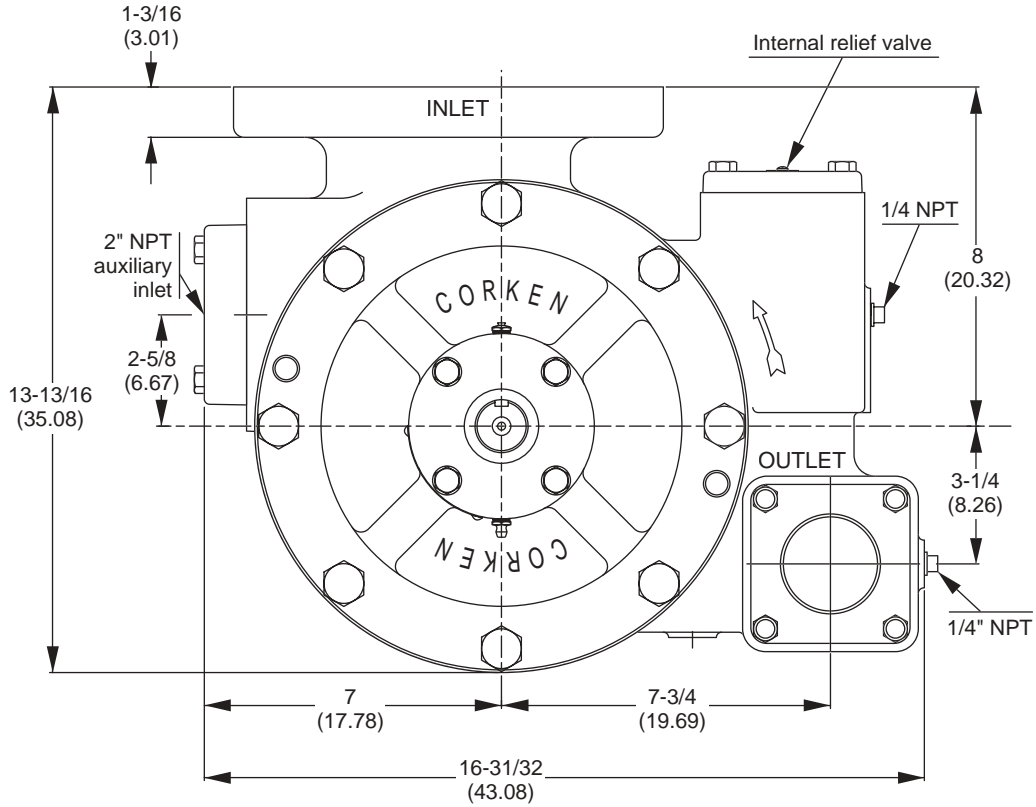
# Appendix D—Outline Dimensions for Model Z2000



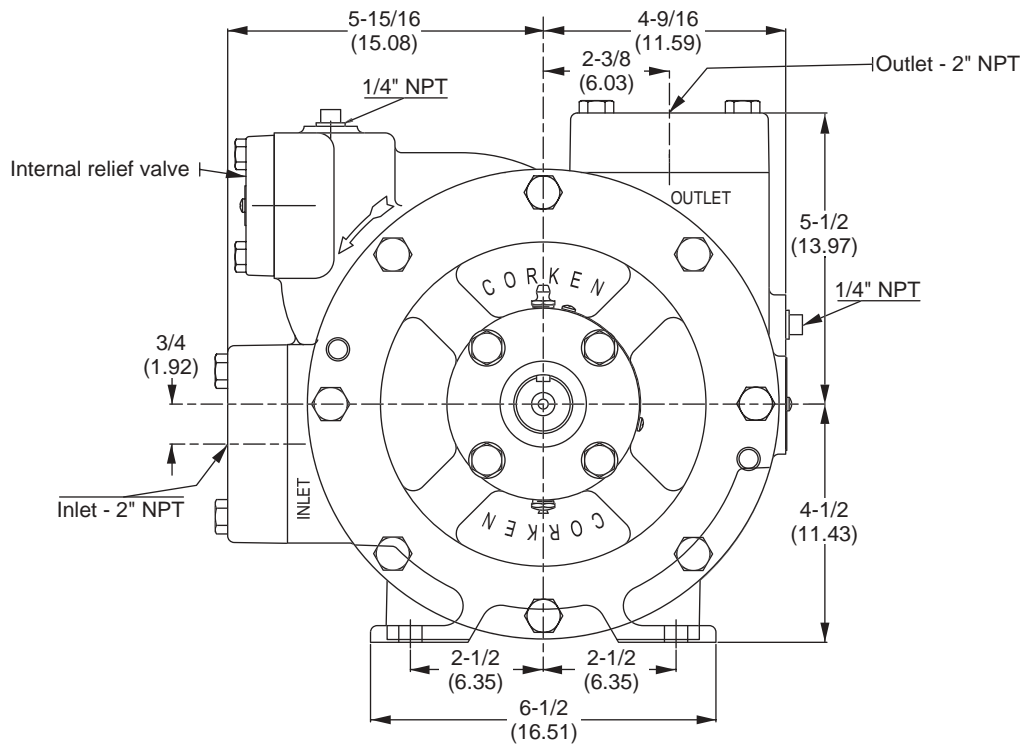
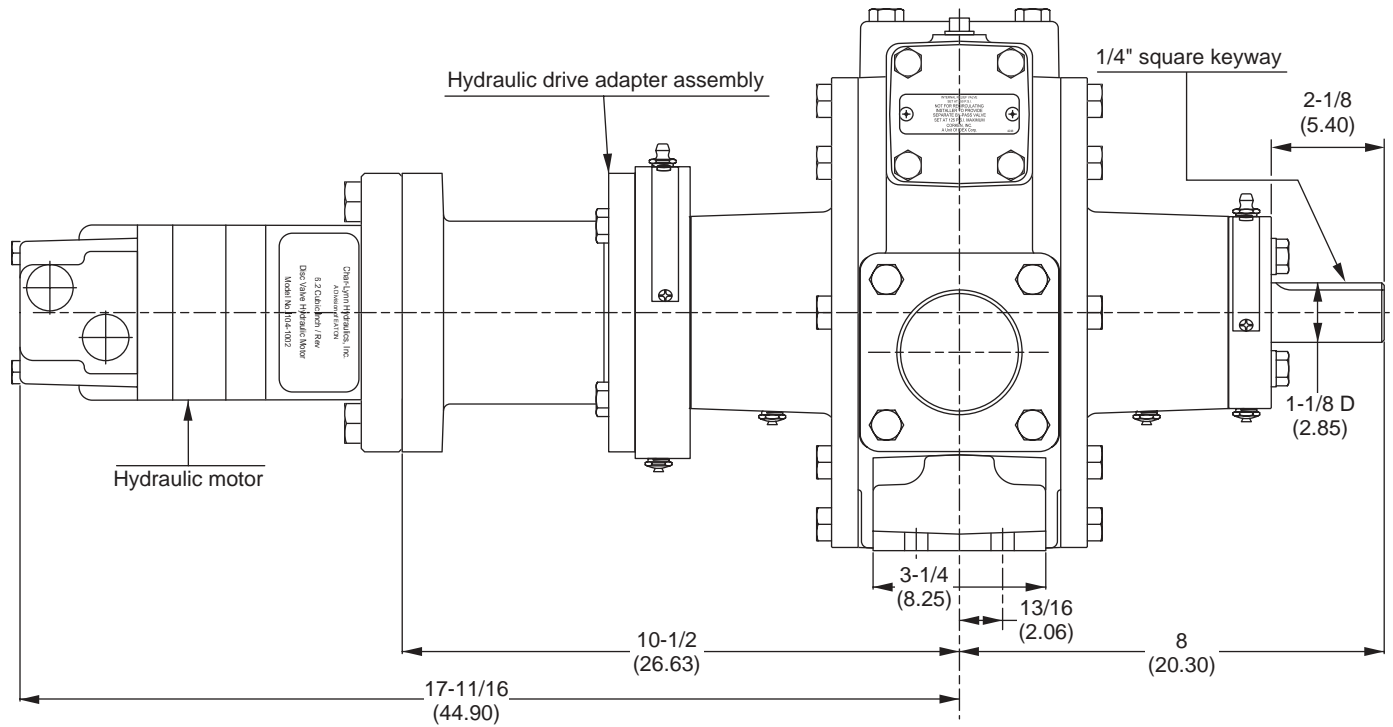
# Appendix D—Outline Dimensions for Model Z3200



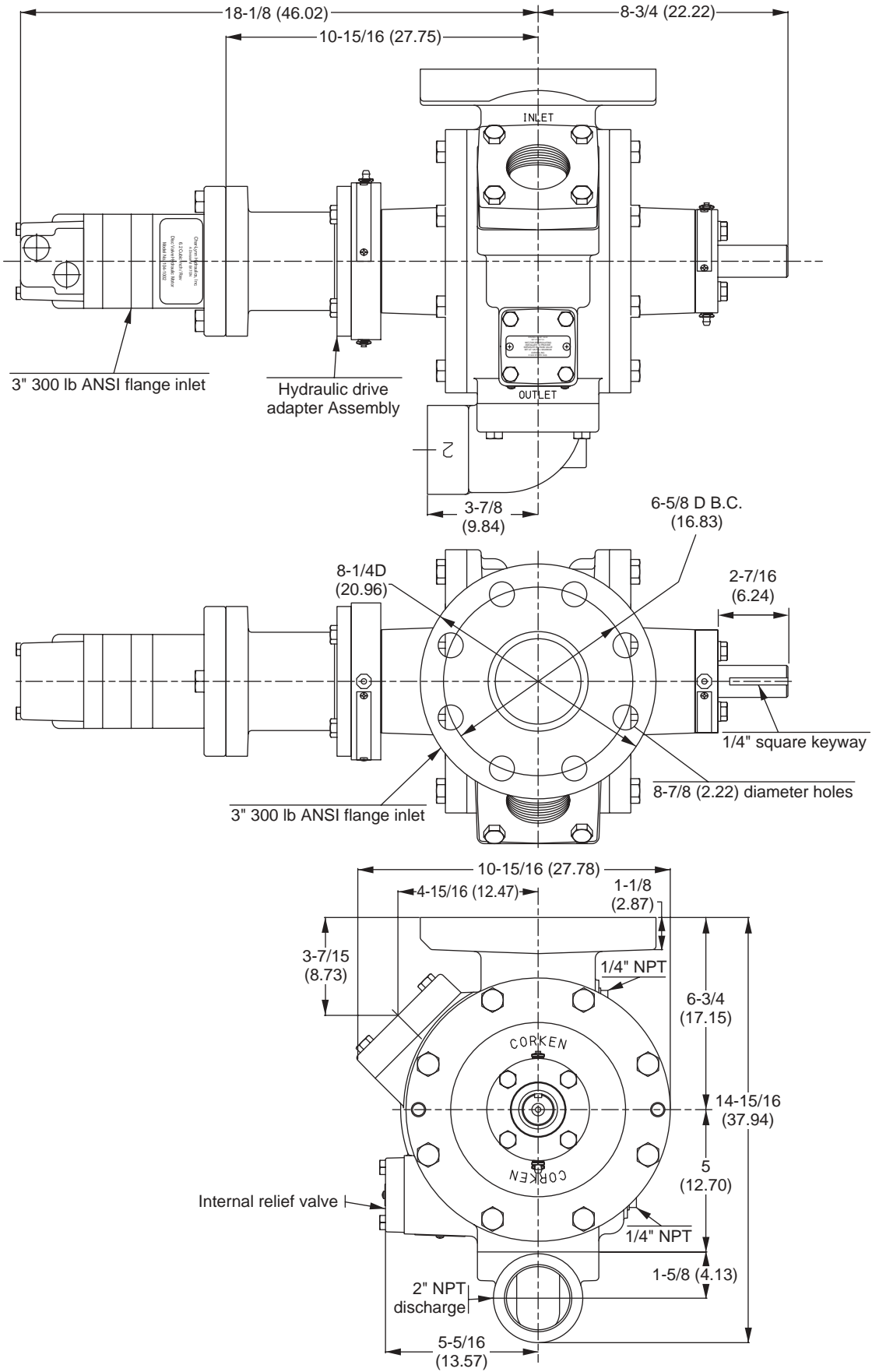
# Appendix D—Outline Dimensions for Model Z4200



# Appendix D—Outline Dimensions for Model ZH2000



# Appendix D—Outline Dimensions for Model ZH3200





# Appendix F—Troubleshooting Guide

In diagnosing pump and system troubles, record the following data during product transfers:

1. Pressure at pump suction.
2. Pressure at pump discharge.
3. Pressure in truck tank.
4. Pressure in tank being filled.
5. Pipe size and length of suction and discharge lines.
6. Size and length of vapor equalizing line.
7. Pump speed if practical.

Problem	Cause	Solution
Low capacity	Pump speed too slow	Check engine speed and PTO ratio. Consult pump performance curve. Use tachometer on pump if speed is questionable.
	High differential pressure	Restriction in discharge piping or hose too small. Vapor equalization lines too small or not used.
	External bypass valve stuck open or set too low	Readjust, repair, or replace valve.
	Clogged strainer	Clean strainer.
	Suction pipe too small or restricted	Indicated by pump inlet pressure dropping several pounds when pump is started. Remove restriction or modify piping.
	Worn vanes	Replace.
	Pump without vapor return	Without vapor equalization, a pump can remove only about 3% of the truck tank capacity per minute without severe cavitation and capacity loss.
	Worn sideplates	Reverse or replace sideplates. Check universal drive assembly to make sure angularity is within limits, yokes are parallel and slip-joint is greased. Check bearings.
Pump runs but no flow	Vanes sticking	Remove vanes and clean out foreign matter (check strainer). Replace vanes if swollen.
	Valve closed	Check valves. Make sure internal tank excess flow valve is open! Refer to manufacturer's instructions.
	Excess flow valve slugged	Stop pump until valve opens. If problem continues, slow pump down or install a new or larger excess flow valve.
	Broken shaft	Disassemble and inspect pump. Repair if necessary.
Pump will not turn—locked up	Defective meter	Service meter.
	Foreign matter in pump	Clean out the pump—check strainer in suction line.
	Vanes broken	Clean out pump carefully and replace vanes. Has pump been operated dry? Then, check for damage to cam and rotor shaft assembly.
	Bearing seized	Replace pump bearings. Grease monthly. Use ball bearing grease manufactured for intended service.
Will not build pressure	Moisture frozen in pump	Let thaw and break loose carefully. Add alcohol to tank (on LP-Gas). Check with product supplier about possibility of water in gas.
	Poor suction conditions	Clean inlet strainer. Increase pipe size.
	External bypass valve set too low	Set valve for higher pressure—see instructions.
	Worn vanes and/or sideplates	Disassemble, inspect and repair as necessary. Do not run pump dry!

## Appendix F—Troubleshooting Guide (continued)

Pump is noisy	Cavitation from poor suction conditions	As above.
	Vanes sticking	As above.
	Bearings worn	Replace if necessary—grease monthly.
	Very high differential pressure	Check for restriction in discharge line. Delivery hose too small and too long. Slow down pump!
		Check vapor release float assembly on meter and meter differential valve.
PTO shaft vibration	Inspect and repair driveline component.	
Pump leaks around shaft	Seal or O-rings failed	Inspect seal assembly and replace if necessary. Keep new seal very clean when replacing seal. Recommend a light oil film on O-rings. Do not run pump dry!

## Appendix G—Storage of the Z-Series Coro-Vane® Truck Pumps

If your Corken Z-Series pump is to be removed from service for some time, the pump must be protected as propane, butane and anhydrous ammonia all leave the metal "bare" and open to corrosion. Piping and tanks not in service should also be protected, as the rust particles can destroy the pump's seals almost immediately after startup.

1. Fill or thoroughly flush the pump with a light rust inhibiting oil. (If the pump is flushed with oil, placing some desiccant packets inside the pump will provide added protection.)
2. Plug all pump openings.
3. Store in a dry location.
4. Before placing the pump back into service, drain the oil and remove any desiccant packets.
5. Refer to the "OPERATION OF YOUR PUMP SYSTEM" section of this manual.

---

## Appendix H—Hydraulic Motor Specifications

### Operating Specifications for Char-Lynn Hydraulic Motor

Mounting flange	2 bolt SAE A
Input shaft	1" diameter straight keyed
Port 'A'	7/8-14 O-ring
Port 'B'	7/8-14 O-ring
Pilot diameter	3.250/3.245 in (57.15/57.02 mm)
Motor displacement	6.2 cubic inches per revolution
Maximum speed continuous duty	742 RPM
Flow continuous duty	20 gpm (76 L/min)
Torque continuous duty	3,500 in•lb (395.5 N•M)
Case drain	7/16-20 O-ring
Recommended fluids	premium quality anti-wear
Minimum viscosity	70 SSU (13 cSt)
Maximum operating temperature	180°F (82°C)



*Solutions beyond products...*  
**CORKEN**<sup>®</sup>  
**IDEX**<sup>®</sup>

Corken, Inc. • A Unit of IDEX Corporation

P.O. Box 12338, Oklahoma City, OK 73157 U.S.A.

3805 N.W. 36th St., Oklahoma City, OK 73112

Phone (405) 946-5576 • Fax (405) 948-7343

Visit our website at <http://www.corken.com>

or e-mail us at [info.corken@idexcorp.com](mailto:info.corken@idexcorp.com)