



**Waukesha  
Cherry-Burrell**

Read and understand this manual prior to installing, operating or maintaining this pump.



Effective Date  
October 9, 1999

# **Waukesha Centrifugal Pumps Model 200 Series**

**OPERATION  
MAINTENANCE  
& PARTS LIST**

---

**THIS PAGE IS INTENTIONALLY LEFT BLANK**

# SAFETY

---

## General Safety Instructions:

Waukesha Centrifugal pumps has been designed to be safe and reliable when properly used and maintained.

- Do Not operate pump beyond the rated conditions for which the pump was sold.
- Do Not use heat to remove impeller or disassemble pump due to risk of explosion of trapped liquid.
- Do Not operate pump without guards correctly installed.
- Do Not run pump when \*dry.  
*\*Requires Double Seal*
- Wear protective apparel to prevent injuries when handling equipment or product.
- Always lock out power prior to servicing equipment.
- Ensure pump is isolated from system and pressure is relieved before disassembling pump, removing plugs, or disconnecting piping.
- Use proper lifting and supporting equipment to prevent injuries.
- Observe proper decontamination procedures.
- Know and follow safety regulations
- Maintain proper safe working areas.
- Flanged Connections: *Never force piping to make a connection with a pump.*
- Do Not operate below minimum rated flow, or with suction/discharge valves closed.
- Do Not open vent or drain valves, or remove plugs while system is pressurized.
- Do Not remove casing clamp while system is pressurized.
- Do Not overtighten casing clamp. *(Moderate tightening only)*

# SAFETY

---

Operators and maintenance personnel must follow safety measures. Failure to observe the instructions in this manual could result in severe personal injury or machine damage.

- Throughout this manual the words Warning, Caution, and Note are used to indicate procedures or situations which require special operator attention.

## WARNING

Identifies a serious hazard and how to avoid it. Failure to avoid this hazard can cause serious personal injury.

## CAUTION

Identifies a potential hazard and how to avoid it. Failure to avoid this hazard could result in personal injury and/or machine damage.

## NOTE

Important information pertaining directly to the subject. (Information to be aware of when completing the task.)

### WARNING

Do Not operate pump without CASING clamped securely in place.

### WARNING

TO AVOID POSSIBLE SERIOUS INJURY, SHUT OFF AND DRAIN PRODUCT FROM PUMP PRIOR TO DISCONNECTING PIPING.

### WARNING

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

### WARNING

TO AVOID SERIOUS INJURY, DO NOT INSTALL OR SERVICE PUMP UNLESS ALL POWER IS OFF AND LOCKED OUT.



33-61

### CAUTION

To avoid possible injury; SHUT OFF and LOCK OUT all power; relieve system pressure before servicing. 33-62

33-62

Read and understand this manual prior to installing, operating or maintaining this pump.

# WARRANTY

---

## WAUKESHA CHERRY-BURRELL WARRANTY

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

Seller's sole obligation under this warranty shall be to repair or replace any products that Seller determines, in its discretion, to be defective. Seller reserves the right either to inspect the products in the field or to request their prepaid return to Seller. Seller shall not be responsible for any transportation charges, duty, taxes, freight, labor or other costs. The cost of removing and/or installing products which have been repaired or replaced shall be at Buyer's expense. Seller expressly disclaims all other warranties, express or implied, including without limitation any warranty of merchantability of fitness for a particular purpose. The foregoing sets forth Seller's entire and exclusive liability, and Buyer's exclusive and sole remedy, for any claim of damages in connection with the sale of products. In no event shall Seller be liable for any special consequential incidental or indirect damages (including without limitation attorneys' fees and expenses), nor shall Seller be liable for any loss of profit or material arising out of or relating to the sale or operation of the products based on contract, tort (including negligence), strict liability or otherwise.

## GENERAL INFORMATION

---

### MANUAL FORMAT

This manual is laid out in sections. Each section addresses specific subjects. Familiarize yourself with the subjects by scanning through the manual. Whether installing, operating, troubleshooting, maintaining or ordering parts, read through that section and follow instructions.

### ORDERING/RETURNING PARTS

See page 50 for complete information on ordering and returning parts. Record EQUIPMENT and DISTRIBUTOR INFORMATION immediately.

### SHIPPING DAMAGE

Inspect your shipment immediately. If damage is found, note it on the driver's copy (packing slip) and request the driver to ask the Inspector to call. You are responsible for initiating shipping damage claims.

### HIDDEN DAMAGE OR WARRANTY CLAIM

If during installation, you discover apparent shipping damage, contact the Shipper immediately and ask for an Inspector to call. Notify your Distributor of the problem. In warranty claims you must have a returned goods authorization from the manufacturer before any returns will be accepted. Your Distributor will help you with a warranty problem. Please read the Warranty statement.

# LIST OF CONTENTS

# WAUKESHA 200 SERIES CENTRIFUGAL PUMPS

<b>SAFETY</b> .....	<b>2-3</b>	<b>SEALS</b> .....	<b>26</b>
General Safety Instructions .....	2	Seal Kits .....	26
Warnings, Cautions, Notes .....	3	Seals; All Pumps.....	28
<b>WARRANTY</b> .....	<b>4</b>	<b>Recommended Spare Parts</b> .....	<b>28</b>
		Commercial Seals .....	29
<b>INTRODUCTION</b> .....	<b>4</b>	<b>Metric Pump Notes</b> .....	<b>27- 28</b>
General Information .....	4	<b>Motor Shims</b> .....	<b>28</b>
Ordering/Returning Parts .....	4-50	<b>PARTS LISTS</b>	
Shipping Damage .....	4	2045 COMPONENTS .....	30
Hidden Damage or Warranty Claim .....	4	2065 COMPONENTS .....	31
<b>Pump and Seal Identification</b> .....	<b>6-7</b>	2065LV-2065HV COMPONENTS .....	32
		2085 COMPONENTS .....	33
<b>SPECIFICATIONS</b> .....	<b>8</b>	2085LV-2085 HV COMPONENTS .....	34
Capacities .....	8	2105 COMPONENTS .....	35
		<b>Recommended Spare Parts</b> .....	<b>30-35</b>
<b>INSTALLATION</b>		<b>INDUSTRIAL CASINGS</b> .....	<b>36</b>
<b>Weights - Pump</b> .....	<b>51</b>	<b>PEDESTAL BASE MOUNTS</b> .....	<b>37</b>
<b>Dimensions</b> .....	<b>9-10</b>	Description/Specifications .....	37
Installing Pump .....	11-12	<b>INSTALLATION</b> .....	
Discharge Position .....	12	Motor HP and RPM .....	38
<b>Water Cascade Option</b>		Base .....	38
Type 1C SEAL .....	13	<b>Dimensions</b>	
Hose Fitting .....	13	STYLE A.....	39
Type 4 Flush Housing.....	13	STYLE B & C .....	40
<b>Pump Rotation</b> .....	<b>14</b>	<b>Weights - Pedestal</b> .....	<b>51</b>
<b>Electrical Connections, Motor</b> .....	<b>14</b>	<b>MAINTENANCE</b>	
Motor Overload Conditions .....	18	Disassembly .....	41
Ammeter Test .....	18	Cartridge Seals .....	43
		Pump Assembly .....	43-44
<b>OPERATION</b>		Housing Lubrication .....	44
<b>Prior to first operation</b> .....	<b>14</b>	<b>PARTS LISTS</b>	
Clean Pump and Piping .....	14	Cartridge Seals .....	45
Final Pump Check .....	14	Small Bore Assembly .....	46-47
Seal Flush .....	15	Large Bore Assembly .....	48-49
Priming Pump .....	15	<b>Recommended Spare Parts</b> .....	<b>47, 49</b>
<b>Operation Considerations</b> .....	<b>16</b>	<b>HOW TO ORDER PARTS</b> .....	<b>50</b>
		How to Return Parts.....	50
<b>CLEANING SAFETY PROCEDURES</b> .....	<b>16</b>	<b>EQUIPMENT INFORMATION</b> .....	<b>50</b>
<b>TROUBLESHOOTING GUIDE</b> .....	<b>17</b>	<b>DISTRIBUTOR INFORMATION</b> .....	<b>50</b>
<b>MAINTENANCE</b>			
Cleaning and Repair Disassembly .....	19		
Water Cascade .....	19		
Type 1 Seal .....	20		
Backplate Assembly .....	21		
Backplate/Impeller Assembly Clearance ...	21		
Type 4 Seal .....	21		
<b>MOTORS</b>			
Baldor® Motor Maintenance .....	24		
U.S. Electrical Motors Maintenance .....	25		

# INTRODUCTION

The Waukesha 200 Series Pump is built for extremely durable service. The casing, backplate and intrigal impeller/stub shaft are cast 316L stainless steel for extra strength and resistance to line shock and corrosion. Large bearings and shaft provide positive alignment and minimize vibration.

The casing is clamped to the motor adapter bracket (close coupled) or bearing housing (base mount) for easy disassembly while permitting 360 degree rotation of the discharge port.

200 Series pumps are available with three standard seal types.

Type 1- Single mechanical seal, external mounted and balanced.

Type 1C- Single mechanical seal with water cascade flush.

Type 4 - Double mechanical seal with flush housing.

All seal components are interchangeable between models. All seal assemblies utilize an externally mounted, balanced rotary seal for longer seal life and better sealing capability. The stationary seal face is reversible and replaceable.

200 Series pumps are designed for a broad range of sanitary and industrial applications. Sanitary models are designed for clean-in-place and meet U.S.D.A. and 3A Standards.

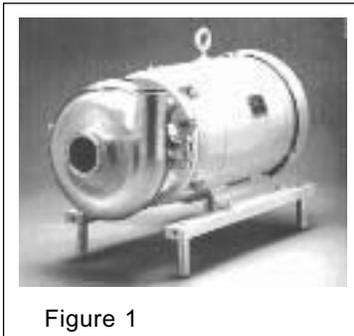


Figure 1

### MANUAL CONTENT NOTE:

*This Manual addresses metric impeller shaft diameter and contains basic information on total metric pump system requirements (page 26-27).*

*Maintenance procedures do not cover Aseptic or High Pressure pump applications. These are covered in special addendums.*

**Use Figures 2, 3 and 4 for identification only. See PARTS LIST for Model/Part Number selection.**

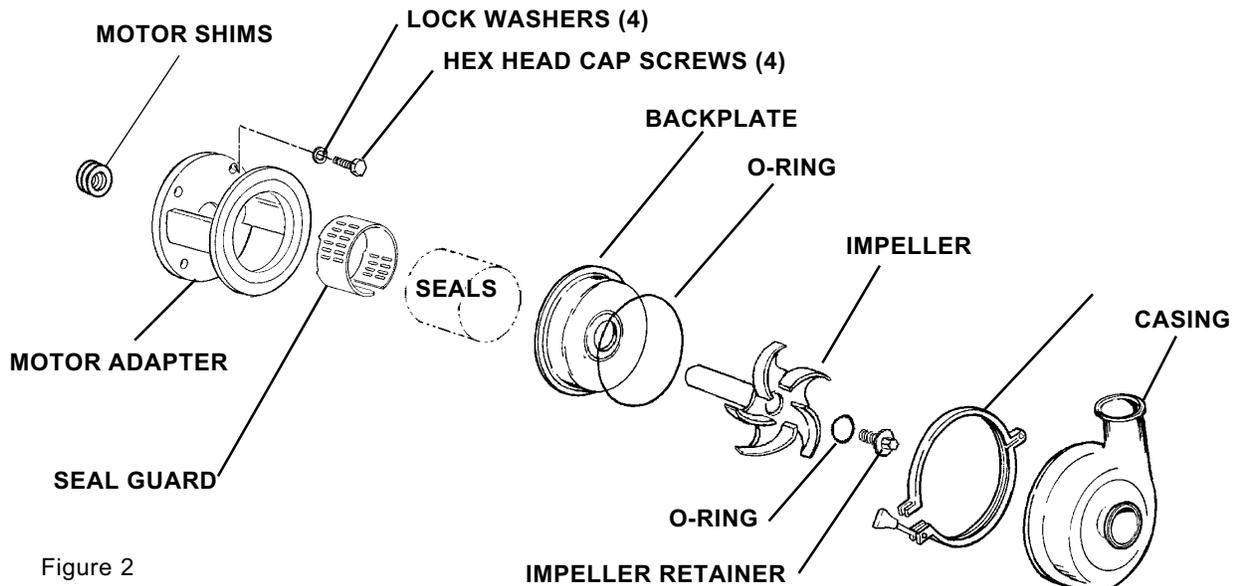
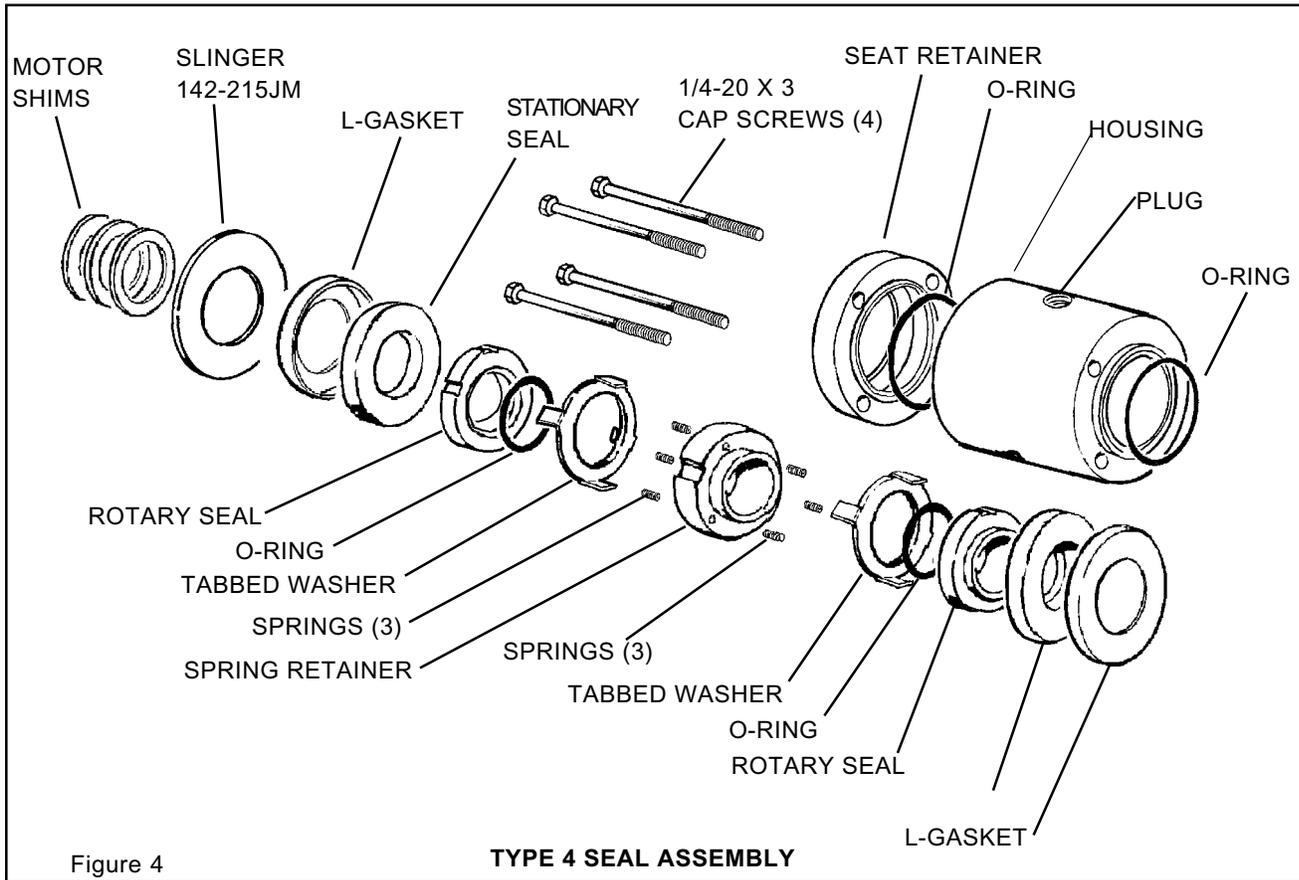
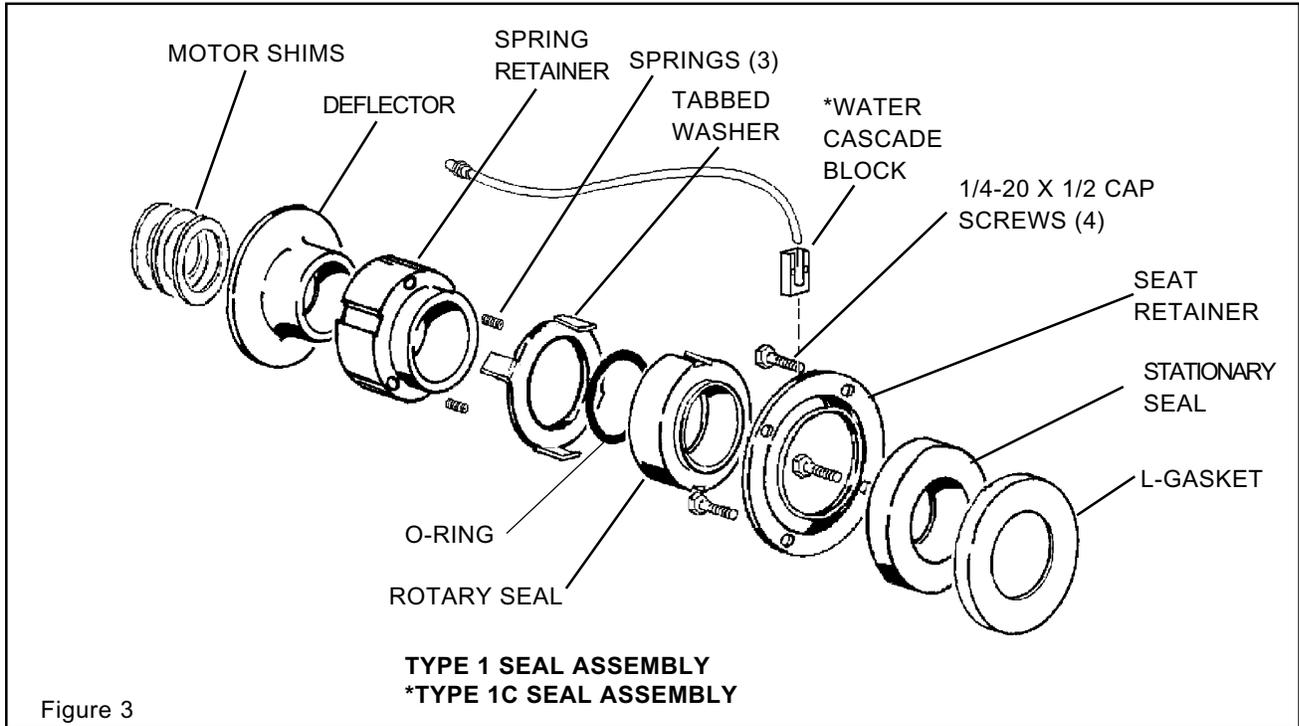


Figure 2



# SPECIFICATIONS

# WAUKESHA CENTRIFUGAL 200 Series PUMPS

## PERFORMANCE CHARACTERISTICS

**Nominal Capacity:** To 1150 U.S. GPM  
(260 Cubic Meters/Hr.)

**Viscosity:** To 1500 CPS

**Differential Pressure:** To 340 Feet (100 Meters)

**Temperature:** To 450°F (230°C)

**Nominal Speeds:** 1450 or 2900 RPM - 50HZ;  
1750 or 3500 RPM - 60HZ.

## QUALITY CONTROL:

Each pump undergoes a performance test for design flow rate and design pressure prior to shipment.

**AUTHORIZATION:** 3A/USDA (SANITARY MODELS)

## STANDARD CONSTRUCTION:

**Casing:** 316L Stainless Steel

**Port Connections:** S-Line

**Backplate:** 316L Stainless Steel

**Impeller W/Integral Shaft:** 316L Stainless Steel

**Impeller Retainer:** 316L Stainless Steel

**Shaft Seal:** Single Mechanical, external balanced (Type 1)

**Rotary Seal Material:** Carbon

**Stationary Seal:** Siliconized Graphite

**Elastomers:** FDA approved Viton

**Finish:** All product contact surfaces provided with a sanitary polish (150 Grit) (*Industrials, unpolished*) Motor Adapter Bracket: Cast Iron Paint: Two-part epoxy, TNEMEC 104, Sky-Blue #104-BB-42 - on motor bracket and motor (if ordered)

**Mounting:** Close coupled for JM shafted motors

## OPTIONS:

**Ports:** Bevel Seat  
Female I-Line  
Male I-Line  
Q-Line  
Butt-weld  
Female or Male N.P.T  
150 Lb. Flange, DIN or SMS

## Seal Type:

- Water Cascade (Type 1C)
- Double Mechanical w/flush (Type 4 Shaft Seal)
- WFI - Special Type 4 Shaft Seal for Water for Injection applications
- Aseptic Shaft Seal - barrier flush design
- Commercially available seals (CALL DISTRIBUTOR)

## Rotary Seal Material:

Purebide, Silicone Carbide, Tungsten Carbide

## Stationary Seal:

Silicone Carbide, Tungsten Carbide

## Elastomers:

\*EPDM, \*Silicone, \*Teflon Encapsulated or Kalrez (\*FDA approved)

## Finishes/Product Contact Surfaces:

25RA, 20RA, Electropolish, (Unpolished -Industrial)

## Casing Drain

**Leg Kit** SEE PAGE 34

**Base Mounting to:** Footless C-face motors; Footed C-face motors; T-Frame motors.

**(NOTE:** *With or without bases, couplings or coupling covers.*)

**Pedestal Mounted:** Three types on stands (See Page 37)

## Motors:

NEMA JM (standard) totally enclosed fan cooled (TEFC) for close-coupled pumps.  
1750 or 3500 RPM Single phase 115/230 volt and 3 phase 230/460 volt.

## Optional Enclosures:

Washdown, Explosion proof,  
Severe Duty/Chemical Duty

## CAPACITIES 200 SERIES

SANITARY MODEL	INDUSTRIAL MODEL	INLET SIZE inch (mm)	OUTLET SIZE inch (mm)	MAXIMUM IMPELLER SIZE inch (mm)	MAXIMUM CAPACITY GPM (M3/HR)
2045	U2045	1.5 (40)	1.5 (40)	4.5 (115)	TO 190 GPM (43)
2065LV	U2065LV	2.0 (50)	1.5 (40)	4.5 (115)	TO 190 GPM (43)
		1.5 (40)	1.5 (40)	6.5 (165)	TO 200 GPM (45)
		2.0 (50)	1.5 (40)	6.5 (165)	TO 200 GPM (45)
		2.5 (65)	1.5 (40)	6.5 (165)	TO 200 GPM (45)
2065	U2065	2.5 (65)	2.0 (50)	6.5 (165)	TO 400 GPM (91)
2065HV	U2065HV	3.0 (75)	2.0 (50)	6.5 (165)	TO 500 GPM (114)
2085LV	U2085LV	2.0 (50)	1.5 (40)	8.5 (215)	TO 143 GPM (33)
2085	U2085	3.0 (75)	2.5 (65)	8.5 (215)	TO 840 GPM (191)
		4.0 (100)	2.5 (65)	8.5 (215)	TO 840 GPM (191)
		4.0 (100)	4.0 (100)	10.5 (265)	TO 1400 GPM (318)
2105	U2105	6.0 (150)	4.0 (100)	10.5 (265)	TO 1400 GPM (318)

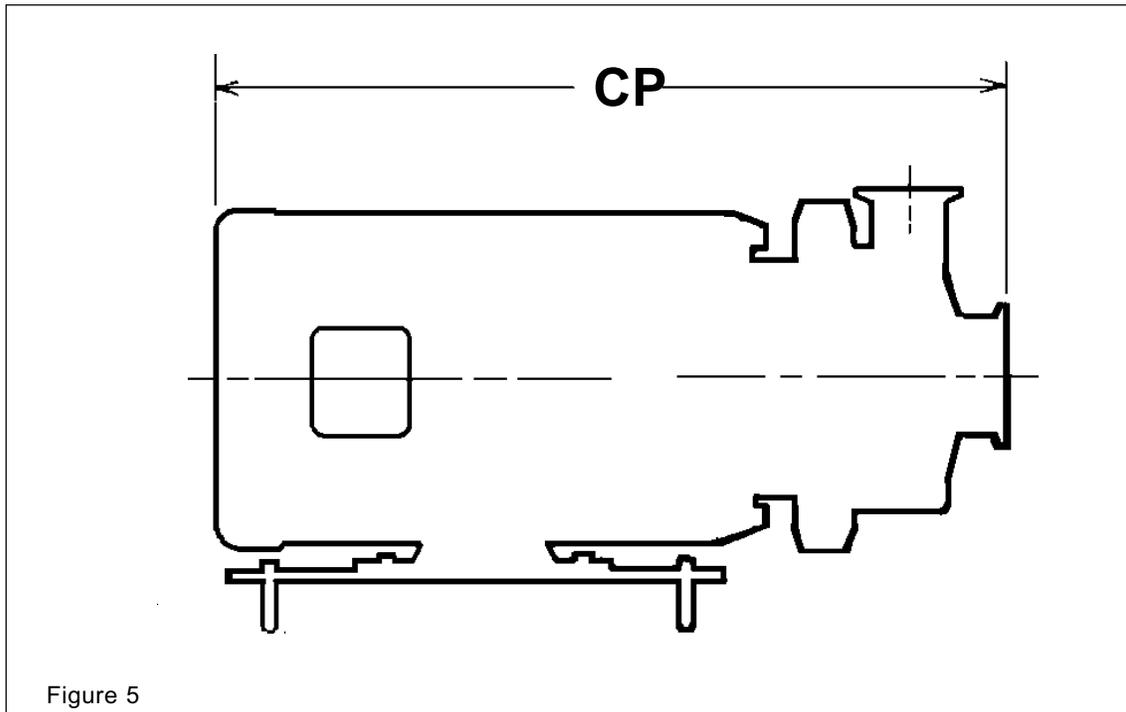
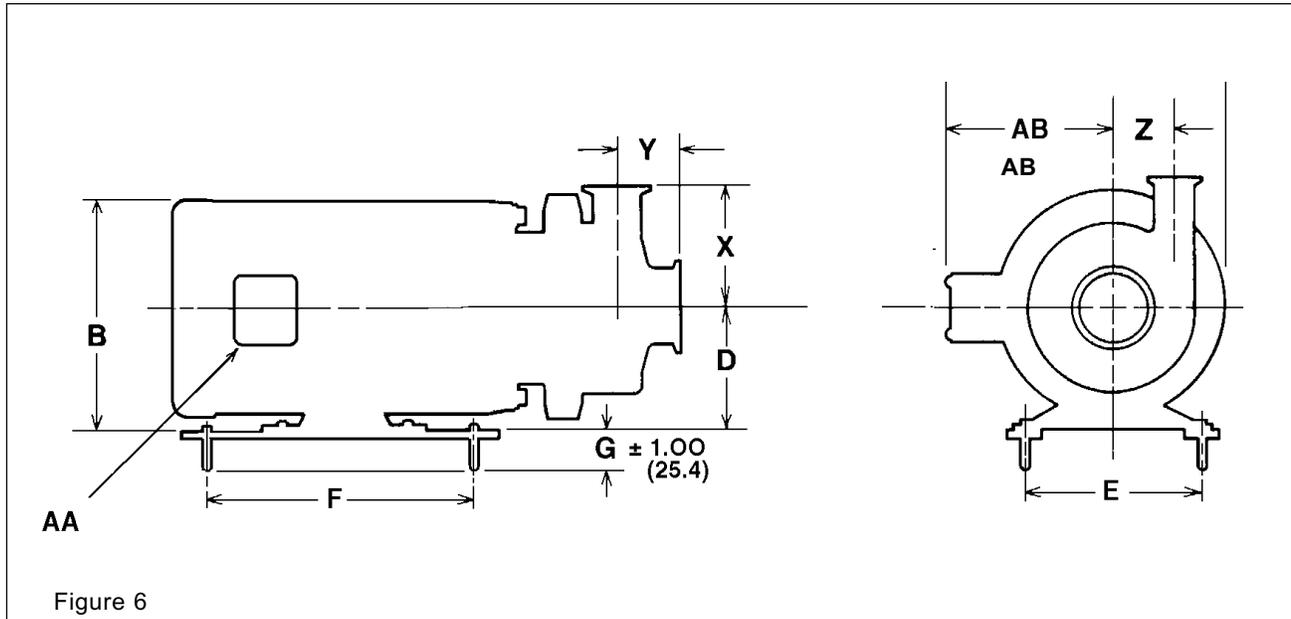


Figure 5

MOTOR FRAME	SANITARY /INDUSTRIAL MODEL/SIZE (INLET X OUTLET)								
	2045 ALL	2065LV ALL	2065 2-1/2X2	2065HV 3X2	2085LV 2X1-1/2	2085 3X2-1/2	2085 4X2-1/2	2105 4X4	2105 6X4
	CP	CP	CP	CP	CP	CP	CP	CP	CP
	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)	inch (mm)
145JM	18.94 (481)	16.35 (415)	16.94 (430)	17.04 (433)	16.16 (410)	17.50 (445)	17.05 (433)		
182JM	21.81 (554)	19.66 (500)	20.25 (514)	20.35 (517)	18.09 (459)	19.43 (494)	18.96 (482)		
184JM		19.66 (500)	20.25 (514)	20.35 (517)	18.09 (459)	19.43 (494)	18.96 (482)	25.13 (638)	25.16 (639)
213JM		21.91 (557)	22.50 (572)	22.60 (574)	21.72 (552)	23.05 (585)	22.55 (573)	23.88 (607)	23.91 (607)
215JM		21.91 (557)	22.50 (572)	22.60 (574)	21.72 (552)	23.05 (585)	22.55 (573)	26.56 (675)	26.59 (675)
254JM		25.47 (647)	26.06 (662)	26.17 (665)	25.53 (648)	26.87 (682)	26.43 (671)	27.63 (702)	27.66 (703)
256JM			27.81 (706)	27.92 (709)	25.53 (648)	26.87 (682)	26.43 (671)	29.38 (746)	29.41 (747)
284JM				28.44 (722)	27.66 (703)	29.00 (737)	28.50 (724)	29.94 (760)	29.97 (761)
286JM				29.94 (760)	29.16 (791)	30.50 (775)	30.00 (762)	31.44 (799)	31.47 (799)
324JM					29.97 (761)	31.31 (795)	30.81 (782)	31.63 (803)	31.66 (804)
326JM					31.47 (799)	32.81 (833)	32.31 (821)	32.87 (835)	32.91 (836)

SEE PAGE 34 FOR MOTOR MOUNTS



FRAME	A INCH (MM)	B INCH (MM)	D INCH (MM)	AA INCH (MM)	AB INCH (MM)	F INCH (MM)	E INCH (MM)	G INCH (MM)
145JM	8.56 (218)	6.87 (174)	3.5 (89)	.50 (13)	5.25 (133)	12.50 (317)	5.50 (140)	2.00 (51)
182JM	9.81 (249)	8.44 (214)	4.50 (114)	.75 (19)	5.87 (149)	12.50 (317)	7.50 (190)	
184JM	9.81 (249)	8.44 (214)	4.50 (114)	.75 (19)	5.87 (149)	12.50 (317)	7.50 (190)	
213JM	12.18 (309)	10.06 (256)	5.25 (133)	.75 (19)	7.38 (187)	12.50 (317)	8.25 (209)	
215JM	12.18 (309)	10.06 (256)	5.25 (133)	.75 (19)	7.38 (187)	16.0 (406)	8.25 (209)	
254JM	14.68 (373)	12.0 (305)	6.25 (159)	1.0 (25.4)	8.94 (227)	16.0 (406)	10.0 (254)	
256JM	14.68 (373)	12.0 (305)	6.25 (159)	1.0 (25.4)	8.94 (227)	25.5 (648)	10.0 (254)	2.50 (64)
284JM	18.87 (225)	13.63 (346)	7.0 (178)	1.5 (38)	12.25 (311)	25.5 (648)	11.0 (279)	
286JM	18.87 (225)	13.63 (346)	7.0 (178)	1.5 (38)	12.25 (311)	25.5 (648)	11.0 (279)	
324JM	20.75 (527)	15.56 (395)	8.0 (203)	1.5 (38)	13.18 (335)	25.5 (648)	12.5 (317)	
326JM	20.75 (527)	15.56 (395)	8.0 (203)	1.5 (38)	13.18 (335)	25.5 (648)	12.5 (317)	

MODEL (**)	INLET INCH (MM)	OUTLET INCH (MM)	X INCH (MM)	Y INCH (MM)	Z INCH (MM)
2045	1.5 (40)	1.5 (40)	3.88 (98)	1.81 (46)	2.25 (57)
2045	2.0 (50)	1.5 (40)	3.88 (98)	1.81 (46)	2.25 (57)
2065LV	1.5 (40)	1.5 (40)	4.75 (120)	1.94 (49)	3.19 (81)
2065LV	2.0 (50)	1.5 (40)	4.75 (120)	1.94 (49)	3.19 (81)
2065LV	2.5 (65)	1.5 (40)	4.75 (120)	1.94 (49)	3.19 (81)
2065	2.5 (65)	2.0 (50)	4.44 (113)	1.94 (49)	3.94 (100)
2065HV	3.0 (75)	2.0 (50)	4.44 (113)	1.94 (49)	3.94 (100)
2085LV	2.0 (50)	1.5 (40)	6.69 (170)	1.75 (44)	4.5 (114)
2085	3.0 (75)	2.5 (65)	5.63 (143)	2.53 (64)	5.06 (129)
2085	4.0 (100)	2.5 (65)	5.63 (143)	2.03 (52)	5.06 (129)
2105	4.0 (100)	4.0 (100)	6.94 (176)	2.86 (73)	6.75 (171)
2105	6.0 (150)	4.0 (100)	6.94 (176)	2.90 (74)	6.75 (171)

INCHES (MM)

**Note:**

- (1) Dimensions X, Y & C apply to pumps with clamp connection.
- (2) (\*\*)SANITARY and INDUSTRIAL MODELS (Industrial models begin with "U")

SEE PAGE 34 FOR MOTOR MOUNTS

### PREPARATION

Check quantities and inspect all parts of your equipment prior to beginning installation.

### PUMP LOCATION

1. Locate pump as near as practical to the liquid supply.
2. Keep supply piping short and straight to keep pump supplied with liquid and prevent damaging cavitation.
3. Pump should be accessible for service and inspection during operation.
4. Motor must be protected from flooding.

### PUMP LEVELING

Level pump by loosening set screws and adjusting leg height. (Figure 7)

### SUCTION ( inlet supply) AND DISCHARGE PIPING/VALVES

**NOTE:** Properly support supply and discharge piping to the pump to prevent strain on the pump casing. (Figure 8)

### LINE SIZE

Use line size equal to, or larger than connection size on pump, especially the inlet supply line.

### LINE LENGTH

Keep supply line \*short and straight as possible. \*Maintain a straight length of pipe at least 8 diameters long to pump inlet. (Figure 9). To avoid up and down loops which will trap air, use as few as possible elbows, valves or other types of restriction.

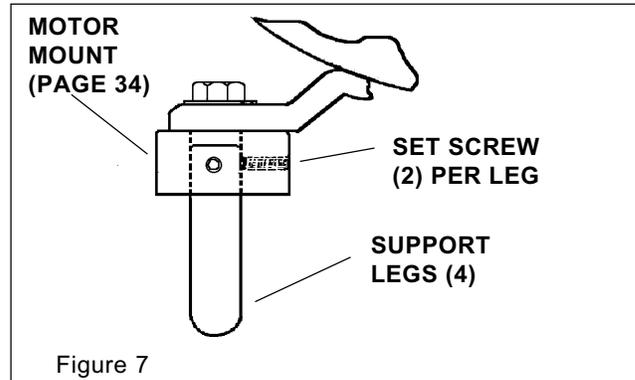


Figure 7

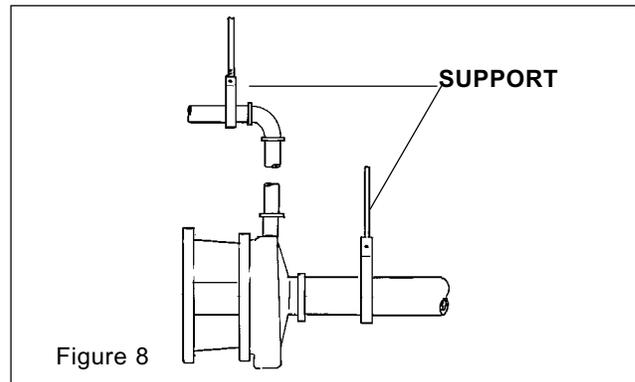


Figure 8

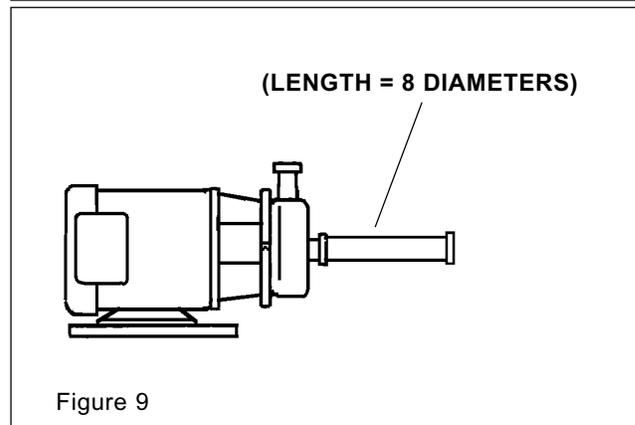


Figure 9

## AIR SUCTION

All joints in suction line must be well sealed.

## DISCHARGE POSITION

The pump casing may be rotated with the discharge connection pointing in any direction; best pump performance will be with the outlet up, to the left or positions in between; these positions insure a flooded casing and prevent lock. (Figure 10)

## EXPANSION JOINT

If an expansion joint is used, install a pipe support anchor between it and the pump.

## REDUCER

If a reducer is connected to inlet, use eccentric type (Figure 11) to prevent problems due to trapped air.

## SUPPLY LINE SLOPE

Slope of supply piping will depend on application requirements; best pump operation is with supply line sloped slightly upward toward pump to prevent trapped air; if system must drain into pump casing, keep downward slope to a minimum or priming problems may occur.

## SHUTOFF (ISOLATION) VALVES

Install shutoff valves to isolate pump from supply and discharge lines to allow pump service without draining system. (Figure 12)

## FOOT VALVE

If pump is installed above supply liquid level, install a check valve system to keep casing flooded for priming. (Figure 12)

**NOTE:** Priming methods are shown on page 15

## THROTTLING VALVE

A throttling valve may be required to control pump flow rate to prevent motor overload; if a throttling valve is used always install in discharge piping, never in supply piping and at least 10 diameters from pump outlet. (Figure 12)

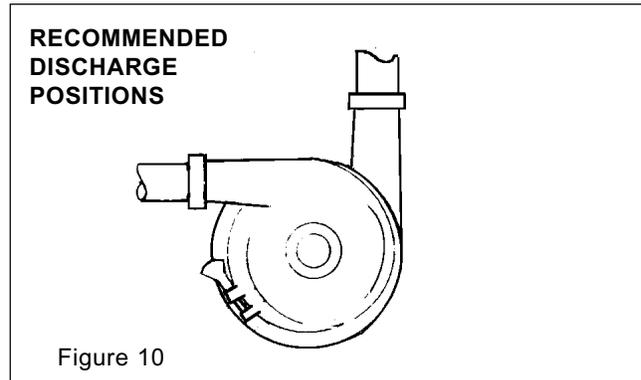


Figure 10

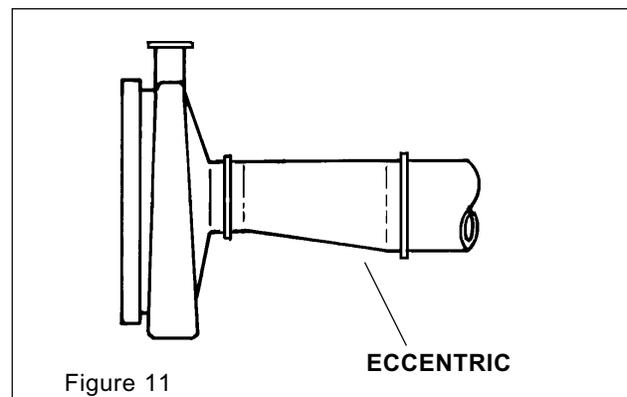


Figure 11

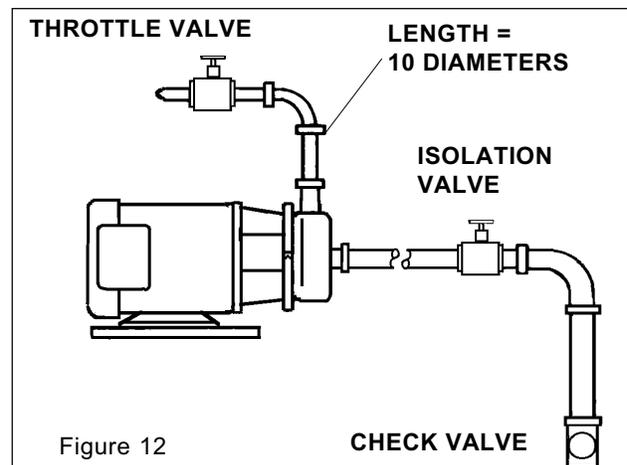


Figure 12

**CAUTION**  
Wear gloves to avoid cutting injuries from sharp pump and piping parts.

## WATER CASCADE OPTION TYPE 1C SEAL

A fitting for 1/4 inch O.D. plastic tubing is supplied for directing a flow of water onto the backplate/seal area. Use cool and filtered water. *(If product solidifies at cool temperature, use warm or hot water.)*

Required flow is approximately 5 U.S. gallons per hour. Insert plastic hose through a hole in top of seal guard and into water cascade block and tighten socket head cap screws. (Figure 13)

**NOTE:** Length of plastic hose between the water cascade block and first fitting must be enough to allow removal of impeller and backplate assembly with hose attached.

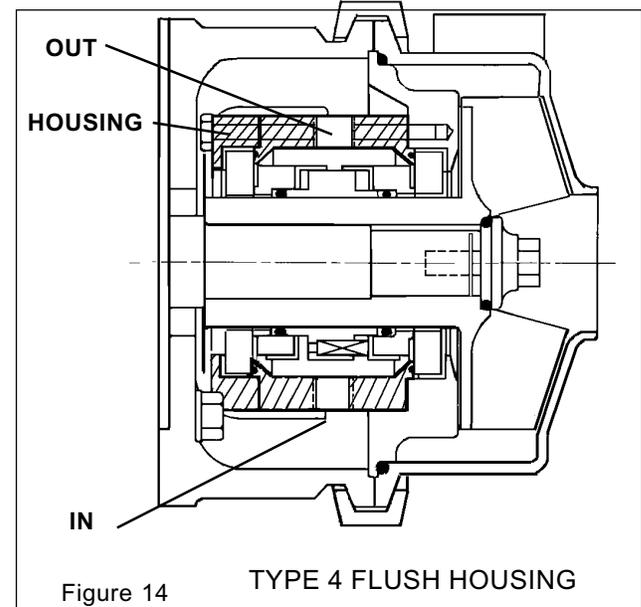
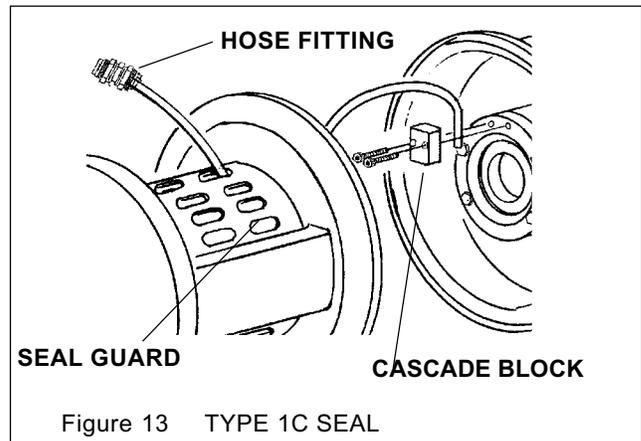
The water cascade block must be above the seal on the assembled backplate to flow water onto the seal face.

**NOTE:** To prevent hose contact with rotating shaft and seal parts during operation, pull excess hose to outside of seal guard.

## TYPE 4 SEAL

(Double mechanical with flush)

Attach seal flush supply to the bottom 1/4-inch pipe threaded hole in the flush housing. Drain tubing attached to the top hole allows moderate pressure to be supplied to the seals and continuous flooding. (See Figure 14)



## ELECTRICAL CONNECTIONS

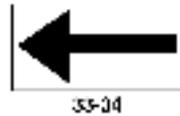
### WARNING

To avoid electrocution, **ALL** electrical installation should be done by a registered Electrician, following Industry Safety Standards.

All power must be **OFF** and **LOCKED OUT** during installation.

## MOTOR

1. Read motor manufacturer's instructions before making installation.
2. Read nameplate to be certain that motor is compatible with electrical supply and that all wiring, switches, starters, and overload protection are correctly sized.
3. Following electrical installation, check pump rotation. **Facing pump, the correct rotation is counterclockwise.** (Figure 15) Do this procedure after disassembly for final cleaning and prior to **FINAL PUMP CHECK**.



ROTATION LABEL ON MOTOR

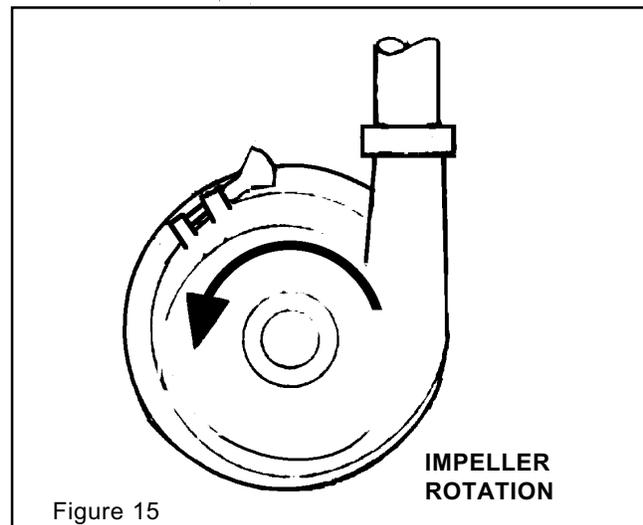


Figure 15

## AFTER INSTALLATION AND PRIOR TO FIRST OPERATION

### WARNING

TO AVOID SERIOUS INJURY, DO NOT INSTALL OR SERVICE PUMP UNLESS ALL POWER IS OFF AND LOCKED OUT.

### CLEAN PUMP AND PIPING

Disassemble pump and clean all product contact parts and seal parts prior to first operation. Follow instructions **Disassembly for Cleaning and Repair** in the **MAINTENANCE** section of this manual. Flush and clean all system piping and process equipment separately. This will eliminate any foreign material which could have accumulated during installation. Plant workers will also become familiar with pump parts.

### FINAL PUMP CHECK

After connecting the piping to pump:

- Rotate shaft several times by hand to be sure that there is no binding and all parts are free.
- Check alignment to determine absence of pipe strain. If pipe strain exists, correct piping.

**Pump must have been correctly installed as described in "INSTALLATION" section.**

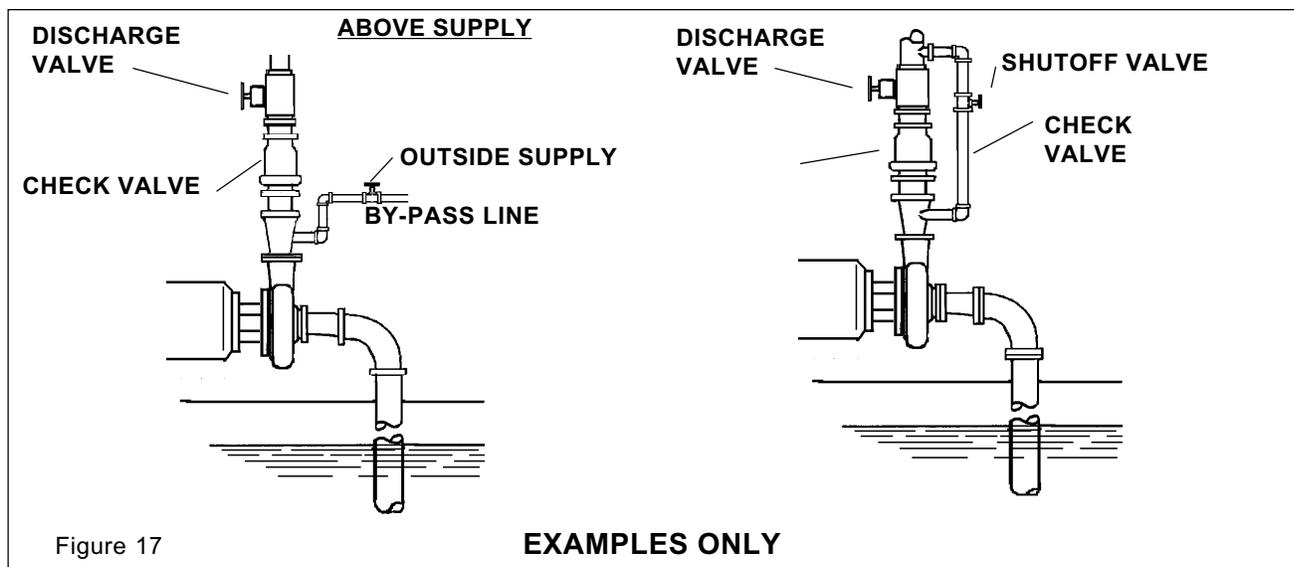
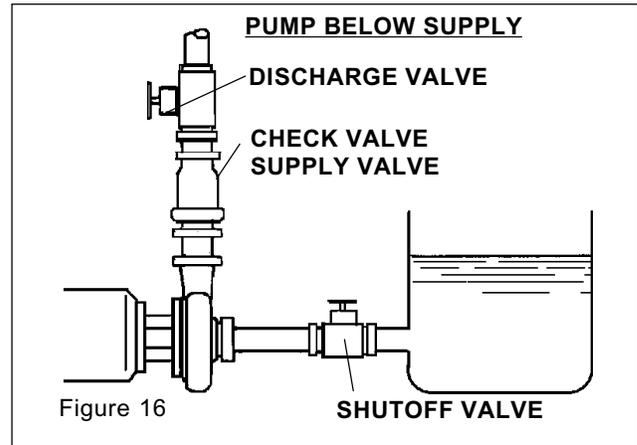
### SEAL FLUSH

1. If pump has the flush seal option, start flow of flush water (approximately 5 US gallons per hour recommended rate).

### PRIME PUMP

2. Flood pump casing with liquid **BEFORE** starting pump to avoid damage to pump parts. Fill supply tank with liquid; open supply line valve (suction). Any air trapped in supply line or casing should be vented. (Figure 16)

### PRIMING WITH OUTSIDE SOURCE



The pump will not self prime if liquid supply is **below** pump level. (Figure 17)

3. Close discharge valve and open air vents.
4. Open valve in outside supply line until liquid flows from vent valves.
5. Close vent valves; then outside supply line. Use a type of check valve system to keep supply line and pump casing flooded with liquid. Otherwise the pump must be primed before each operation. (See Figure 12)

6. Start pump motor.

### PUMP CHECK

7. Check to see that liquid is flowing and that all piping connections and seals are leak free.

*The pump may be operated against a closed discharge for a short time, however continued operation will heat liquid in casing to boiling and lead to pump damage.*

8. Slowly open discharge valve until desired flow is obtained. Observe pressure gages and if pressure is not attained quickly, stop pump and prime again.

# OPERATION

---

## CAUTION

When handling hazardous or toxic fluids, skin and eye protection are required.

## CAUTION

If pump is being drained, take necessary precautions to avoid personal injury.

**NOTE:** Disposal of drainage must be in conformance with environmental regulations.

## STOP PUMP

9. **To stop pump, shut off power to pump motor.** Liquid in system can flow freely through the pump; the pump does not act as a shut off valve. **Shut off supply and discharge lines.**

## OPERATION CONSIDERATIONS

- Any system devices to control flow rate must be installed in the discharge line; not the supply line. *Restriction in the supply line may cause cavitation and pump damage.*

- "Water hammer" in the system can damage the pump and other system components. Water hammer often occurs when valves are suddenly closed causing lines to move violently and with a loud noise. When this condition is present, find and eliminate the source of the water hammer. *One way to eliminate water hammer is to slow down the actuation speed of the valve.*

- Do not expose pump to freezing temperatures with liquid in casing. Frozen liquid in casing will damage pump. Drain casing before exposing to freezing temperatures.

---

## CLEANING SAFETY PROCEDURES

See "Disassembly for cleaning and repair" in MAINTENANCE section

### MANUAL CLEANING:

- DO NOT USE TOXIC AND/OR FLAMMABLE SOLVENTS.
- LOCK OUT ELECTRICAL POWER AND SHUT OFF ALL AIR PRIOR TO CLEANING EQUIPMENT.
- KEEP ELECTRICAL PANEL COVERS CLOSED AND POWER OFF WHEN WASHING EQUIPMENT.
- CLEAN UP SPILLS AS SOON AS POSSIBLE.
- NEVER ATTEMPT CLEANING EQUIPMENT WHILE IT IS OPERATING.
- WEAR PROPER PROTECTIVE APPAREL.

### Cleaning-In-Place:

- All connections in cleaning circuit must be **properly applied and tight** to avoid contact with hot water or cleaning solutions.

## CAUTION

When cleaning cycle is controlled from remote or automated cleaning center establish all manual safe procedures to avoid automatic start-up while servicing equipment in the circuit.

# **TROUBLESHOOTING GUIDE**

---

This guide has been prepared on the assumption that the pump has been installed properly. If problems arise and are not listed in the chart, pump cavitation may be the problem. Symptoms of pump cavitation, such as noisy operation, insufficient discharge and vibration, can result when a pump is not properly applied. Check the system and application. If assistance is required, contact Waukesha Cherry-Burrell Application Engineering at 800-252-1218.

## **NOT ENOUGH LIQUID DELIVERED**

- Impeller diameter too small for duty.
- Discharge head too high.
- Suction lift too high.
- Air leak in supply or at seal area.
- Wrong direction of rotation.
- Pump not primed.
- Speed too slow (low voltage, wrong frequency, wrong motor).
- Suction or discharge plugged or closed.
- Air entrained in liquid.
- Insufficient NPSH (Net Positive Suction Head) available.

## **NOT ENOUGH PRESSURE**

- Impeller diameter too small for duty.
- Air leak in supply or at seal area.
- Wrong direction of rotation.
- Speed too slow (low voltage, wrong frequency, wrong motor).
- Air entrained in liquid.

## **MOTOR OVERLOAD**

- Discharge head too low allowing pump to deliver too much liquid.
- Impeller diameter too large for duty.
- Liquid heavier or more viscous than rating.
- Electrical supply, voltage or frequency incorrect.
- Impeller interference
- Seal binding
- Defective motor.
- Faulty electrical connections.
- Overload heaters too small for motor.

## **VIBRATION/NOISE**

- Insufficient NPSH (Net Positive Suction Head) available.
- Supply line too long; too small; blocked
- Air entrained in liquid
- Liquid too hot, too viscous
- Impeller out of balance.
- Motor bearings worn.
- Pump not level; legs not touching floor.
- Foreign material in pump.
- Piping not supported.

## **RAPID SEAL WEAR**

- Excessive spring loading.
- Abrasive product.
- Water hammer.
- Prolonged "dry" running.
- Abrasive solids (unfiltered) in water flushed seal supply.

## **SEAL LEAKS**

- Gasket damaged or worn.
- Seal not installed correctly.
- Carbon seal worn or damaged.
- Inlet/Outlet connection loose or no gasket.
- Casing clamp loose.

## **WARNING**

**TO AVOID SERIOUS INJURY, DO NOT  
INSTALL OR SERVICE PUMP UNLESS  
ALL POWER IS OFF AND LOCKED OUT.**

## MOTOR OVERLOAD CONDITIONS

Centrifugal pump motors may overload (*draw excessive electrical current*) under certain conditions. This will trip motor overload protection or burn out motor.

Certain combinations will overload motor when operated with open, unrestricted discharge which results in too high flow rate. Additional discharge restriction may be required to lower flow rate and lower horsepower requirements with . **DO NOT** add restriction to supply line. (*If pump was incorrectly selected, a smaller impeller may be required or a higher motor horsepower may be required.*)

## AMMETER TEST

If uncertain about pump selection and application, the electrician should temporarily install an ammeter in the electrical service to determine motor load.

Operate pump under process conditions and check motor amp draw versus nameplate full load rating. If amp draw exceeds motor rating, a system change or pump change is required.

If process conditions and/or liquid changes (higher viscosity, higher specific gravity) recheck motor amp draw.

Contact your authorized Waukesha Cherry-Burrell Distributor for assistance.

(See PARTS ORDERING page 50 for information.)

## WARNING

TO AVOID SERIOUS INJURY, DO NOT INSTALL OR SERVICE PUMP UNLESS ALL POWER IS OFF AND LOCKED OUT.

### TYPE 1 SEAL

1. Shut off and lock out power supply to motor.
2. Close both suction and discharge valves.
3. Disconnect the suction and discharge piping.
4. Remove casing clamp and casing. Slide O-ring off of backplate.
5. Remove impeller retainer bolt and shaft O-ring. (See Figure 18)

**NOTE:** Retainer bolt has standard right hand threads.

### WATER CASCADE

Loosen socket head screws holding water cascade block on the stationary seat retainer and remove plastic hose. (See Figure 19)

6. Pull off impeller/backplate assembly and place on a clean flat surface with impeller shaft up. (INSET, Figure 20) Locate shims on motor shaft and remove.

### NOTES:

- A. Consult Waukesha Cherry-Burrell if assembly cannot be removed from motor shaft by hand. Telephone ((800) 252-1218
- B. Motor shaft shims may fall off motor shaft or hang-up inside the deflector. **BE SURE TO PLACE ALL SHIMS BACK ON MOTOR SHAFT.**
- C. Handle the impeller/backplate assembly with care to prevent damage to seal components.

7. Remove deflector, loosen set screws (2) in spring retainer and slide retainer and washer off shaft. Save springs (3). (Figure 20)
8. Use backplate to slide rotary seal up the impeller shaft approximately 1-1/2 inches. With the backplate resting on the impeller, push the rotary seal toward the backplate until the O-ring is free. Remove O-ring then lift rotary seal off shaft. (See Figure 20)

**To avoid seal failure, DO NOT place fingers on the carbon seal face.**

Lift the backplate off the impeller, Remove four 1/4" hex bolts and stationary seat retainer ring. Pull the stationary seal and L-gasket out of backplate. (Figure 21)

**Note:** The stationary seal is brittle. Prying or hammering on the seal plate can shatter the seal. If the stationary seal cannot be removed by hand, place a 2-1/4 inch diameter plastic or wood rod on the impeller side of the seal and apply even pressure to dislodge the seal.

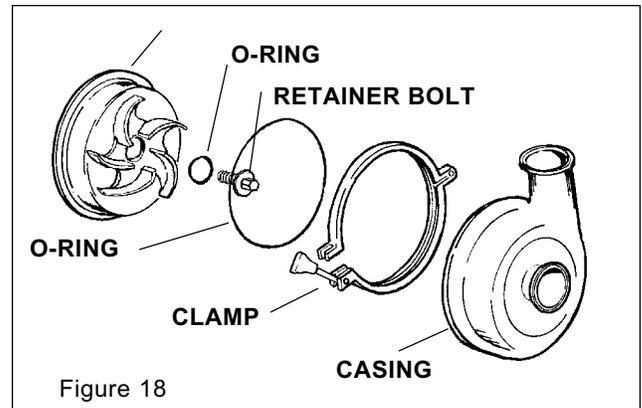


Figure 18

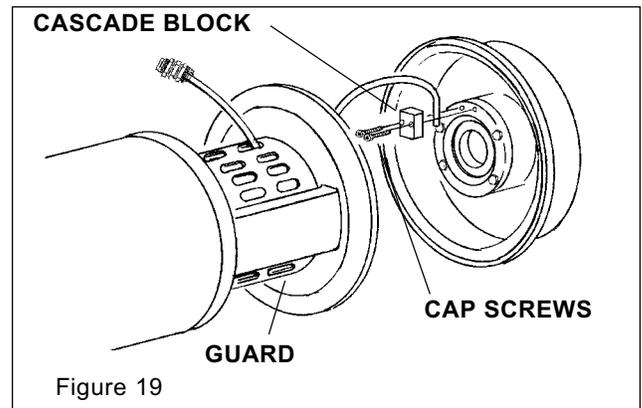


Figure 19

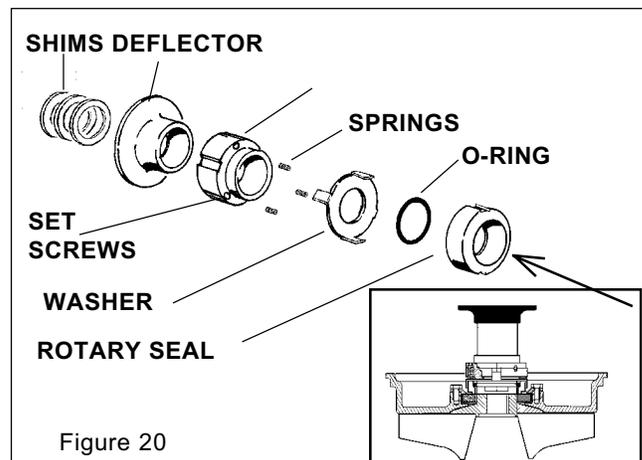


Figure 20

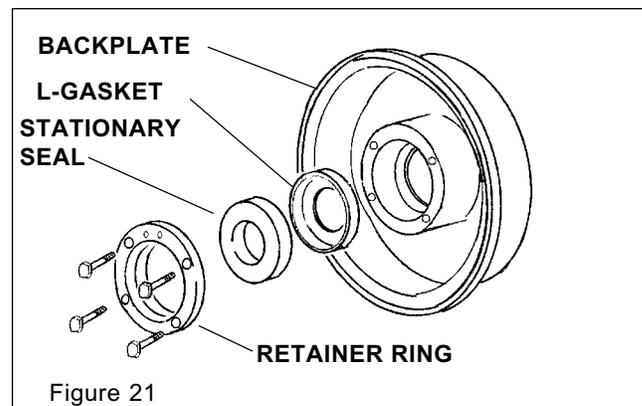


Figure 21

# MAINTENANCE

## INSPECTION TYPE 1 SEAL ASSEMBLY

### INSPECTION OF PARTS

**SEAL SURFACES:** Examine and replace seals that become scratched, cracked and/or braised.

**NOTE:** **A. STATIONARY SEALS** are **REVERSIBLE**. Use **BOTH SIDES** before replacing.

**B.** Replace the **rotary seal** when the seal face extends less than 1/32 inch (1mm) from the body.

(See figure 22)

**C.** Inspect all **O-rings** and **O-ring seats** for abrasions, cuts or other wear that could cause leakage. **CLEAN ALL SEAT AREAS AND ALIGNMENT SURFACES.**

### ASSEMBLY OF TYPE 1 SEAL PUMP

1. Slide the motor shims onto the shaft. *The same number of shims must be used.*

### BACKPLATE ASSEMBLY

2. Lightly lubricate both sides of the L-gasket with a sanitary lubricant and insert into the backplate seal cavity.

3. Place the stationary seal into the L-gasket. Place the seat retainer over the stationary seal and secure retainer with four 1/4-20 x 1/2 inch hex head cap screws. Tighten the cap screws evenly. (Figure 23)

### BACKPLATE/IMPELLER ASSEMBLY

4. Place impeller on a clean flat surface, shaft end up, and slide the assembled backplate onto the impeller shaft. (Figure 24)

**Note:** *Avoid hitting the stationary seal against the impeller shaft. It could break the seal.*

5. Carefully place the rotary seal in position over the impeller shaft and down against the stationary seal. (Figure 24)

4. Lubricate and slide the seal O-ring onto the impeller shaft. (Use the spring retainer as a tool to push the O-ring into the rotary seal.) (Figure 24)

5. Slide the tabbed washer over the impeller shaft and engage the tabs of the washer into notches on the outside of rotary seal. (Figure 25)

6. Install the three seal springs into holes in the spring retainer. *Hold the springs in place with RTV silicone sealant.* Slide the spring retainer over the impeller shaft until the slots in the spring retainer engage the drive tabs on washer and springs rest against the washer. (Figure 25)

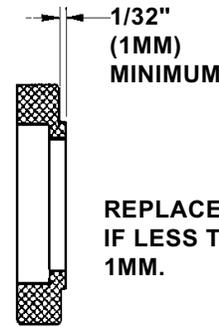


Figure 22

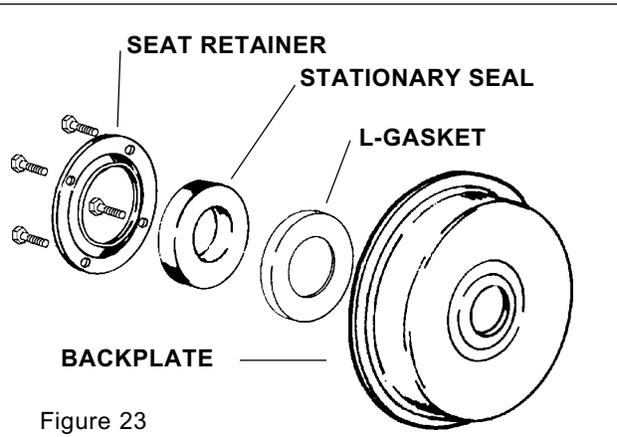


Figure 23

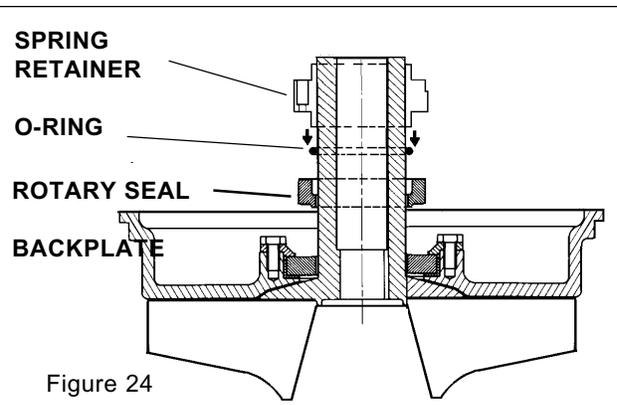


Figure 24

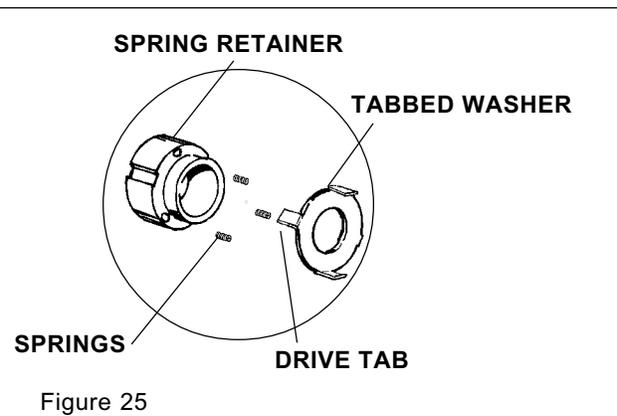


Figure 25

## TYPE 4 DOUBLE SEAL

The Type 4 Seal is essentially two type 1 seals assembled back to back in a chamber which bolts to the backplate in place of the stationary seat retainer. Except for the additional components, (e.g. chamber, seals,) Type 1 and Type 4 components are interchangeable. (Figure 31)

**CAUTIONS REGARDING HANDLING DAMAGE TO TYPE 1 APPLY EQUALLY TO THE FOLLOWING PROCEDURES.**

## DISASSEMBLY TYPE 4 SEAL

1. Shut off and lock out power supply to motor.

2. Close both suction and discharge valves. Remove seal flush lines from flush housing. Disconnect the suction and discharge piping from casing.

3. Remove casing clamp and casing. Remove backplate O-ring. Remove the impeller retainer bolt and O-ring. (Figure 32)

3. Pull impeller, backplate and seal off motor shaft as a unit. BE SURE NO SHIMS ARE LOST FROM MOTOR SHAFT.

4. Place impeller assembly FACE DOWN (on impeller vanes) and remove hex head screws (4) from back of seal chamber, then carefully lift off seat retainer and flush housing. (Figure 33)

5. Loosen (2) set screws in the spring retainer and lift off rotating seal components: rotary seal, O-ring, washer, spring retainer, springs and washer. **There ARE SIX SPRINGS (3 UP and 3 DOWN.)**

6. Use backplate to slide rotary seal (next to backplate) up the impeller shaft approximately 1-1/2 inches. With the backplate resting on the impeller push the rotary seal toward the backplate until the O-ring is free. Remove the O-ring and lift rotary seal off shaft. (See Figure 33)

7. Remove stationary seals and L-gaskets from backplate and seat retainer.

**Note:** The stationary seal is brittle. Prying or hammering on the seal plate can shatter the seal. If the stationary seal cannot be removed by hand, place a 2-1/4 inch diameter plastic or wood rod on the impeller side of the seal and apply even pressure to dislodge the seal.

8. Inspect and replace all damaged and worn parts.

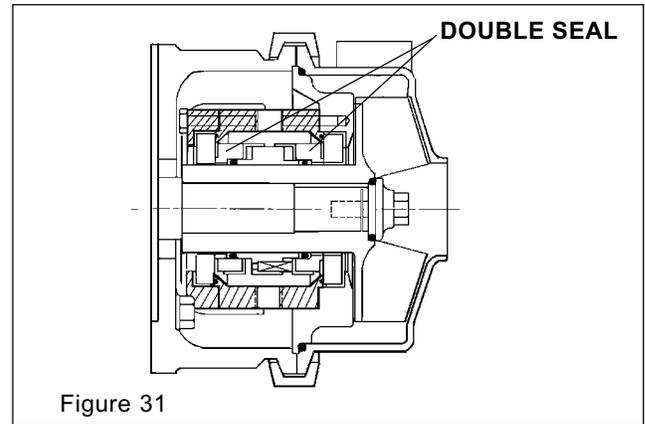


Figure 31

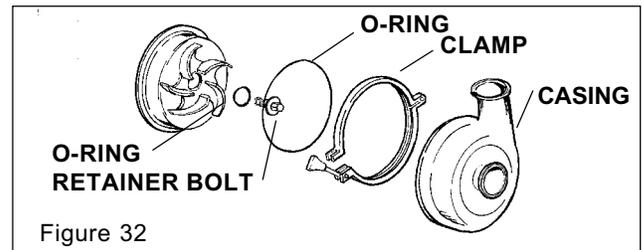


Figure 32

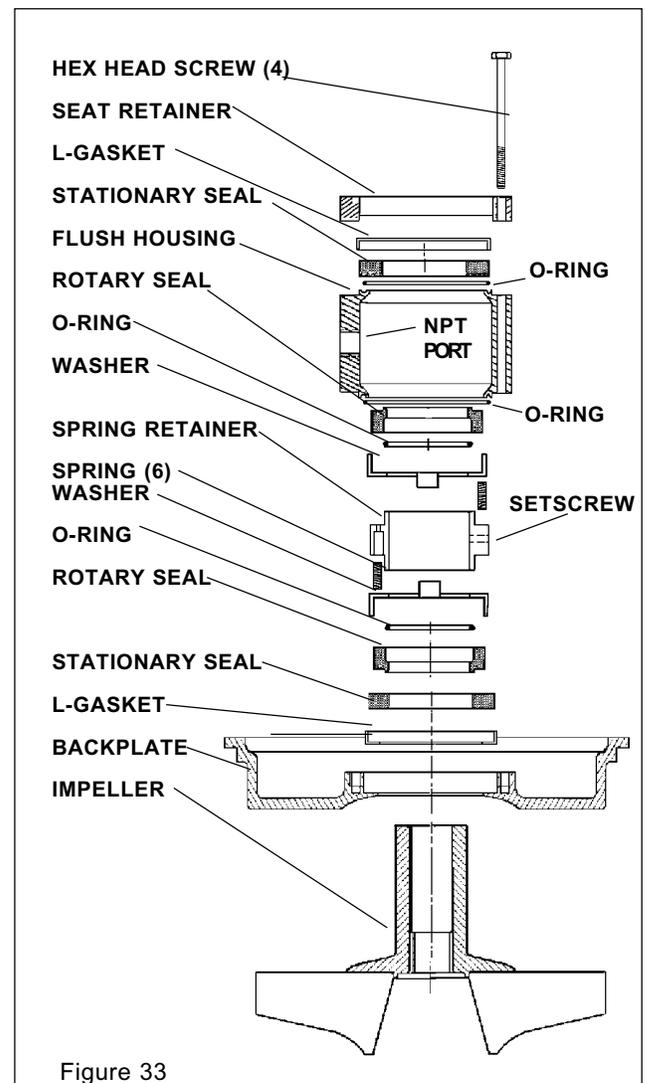


Figure 33

## TYPE 4 DOUBLE SEAL

The Type 4 Seal is essentially two type 1 seals assembled back to back in a chamber which bolts to the backplate in place of the stationary seat retainer. Except for the additional components, (e.g. chamber, seals,) Type 1 and Type 4 components are interchangeable. (Figure 31)

**CAUTIONS REGARDING HANDLING DAMAGE TO TYPE 1 APPLY EQUALLY TO THE FOLLOWING PROCEDURES.**

## DISASSEMBLY TYPE 4 SEAL

1. Shut off and lock out power supply to motor.
2. Close both suction and discharge valves. Remove seal flush lines from flush housing. Disconnect the suction and discharge piping from casing.
3. Remove casing clamp and casing. Remove backplate O-ring. Remove the impeller retainer bolt and O-ring. (Figure 32)
3. Pull impeller, backplate and seal off motor shaft as a unit. **BE SURE NO SHIMS ARE LOST FROM MOTOR SHAFT.**
4. Place impeller assembly **FACE DOWN** (on impeller vanes) and remove hex head screws (4) from back of seal chamber, then carefully lift off seat retainer and flush housing. (Figure 33)
5. Loosen (2) set screws in the spring retainer and lift off rotating seal components: rotary seal, O-ring, washer, spring retainer, springs and washer. **There ARE SIX SPRINGS (3 UP and 3 DOWN. )**
6. Use backplate to slide rotary seal (next to backplate) up the impeller shaft approximately 1-1/2 inches. With the backplate resting on the impeller push the rotary seal toward the backplate until the O-ring is free. Remove the O-ring and lift rotary seal off shaft. (See Figure 33)
7. Remove stationary seals and L-gaskets from backplate and seat retainer.
 

**Note:** The stationary seal is brittle. Prying or hammering on the seal plate can shatter the seal. If the stationary seal cannot be removed by hand, place a 2-1/4 inch diameter plastic or wood rod on the impeller side of the seal and apply even pressure to dislodge the seal.
8. Inspect and replace all damaged and worn parts.

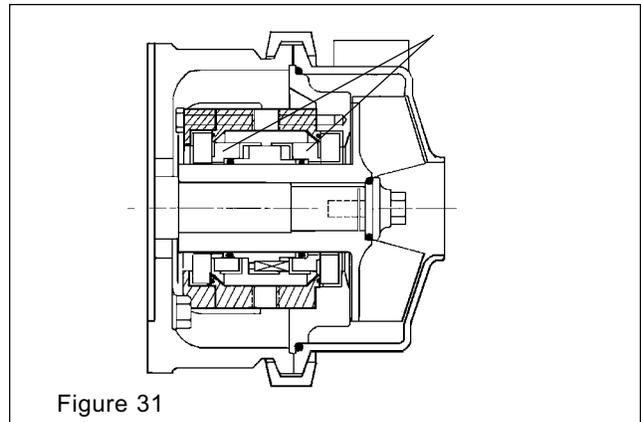


Figure 31

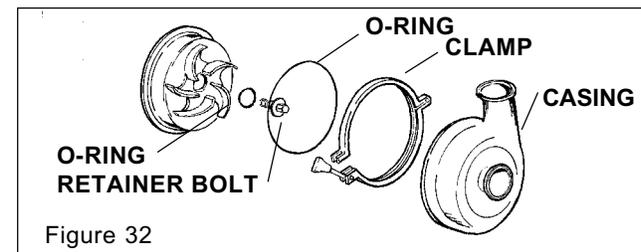


Figure 32

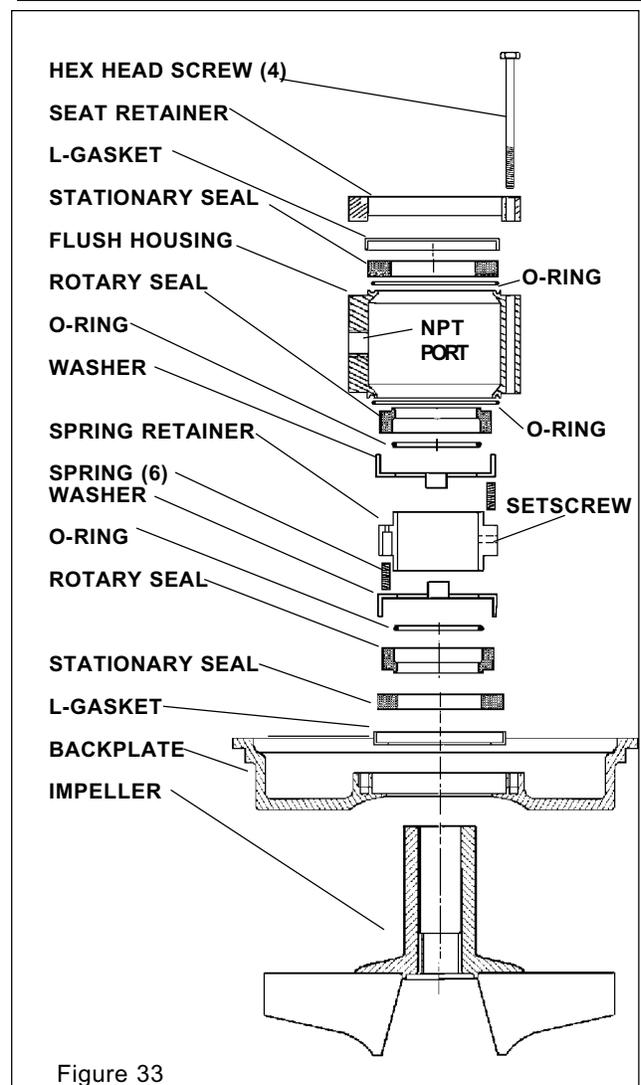


Figure 33

## ASSEMBLY OF TYPE 4 SEAL

1. Clean all parts and lubricate all elastomer (Rubber like) parts.

2. Install L-gaskets in backplate, flush housing and seat retainer. Install stationary seals in L-gaskets. (Figure 34)

3. Place backplate and rotary seal onto impeller shaft. Temporarily put 0.03" shims between the impeller vane and back plate to preset clearance. **Besure to remove shims befor final assembly** . see figure 34 Place O-ring on shaft and use spring retainer as tool to push O-ring into rotary seal.

4. Place washer over rotary seal with tabs in O.D. notches. Place three springs in one side of spring retainer (*hold them in place with silicone sealer*) and slide the spring retainer onto impeller shaft against washer.

5. Place the remaining three (3) springs in the spring retainer. Slide the washer and O-ring onto the shaft against the spring retainer. Use the the seat retainer to press the O-ring into rotary seal.

6. Remove 1/4 NPT plug from center port on flush housing and install an O-ring in both ends of housing. Install housing over seal assembly. With flush ports facing away from the backplate place seat retainer on housing and tighten in place with four (4) hex screws. **BE SURE TO TIGHTEN SCREWS EVENLY UNTIL FULL METAL TO METAL CONTACT IS MADE ON BACKPLATE AND SEAT RETAINER.**

7. Check impeller/backplate clearance with the backplate held firmly in position against motor adapter, the clearance between the backplate and impeller vanes should be .030-inch. (Figure 35) *See shims, page 28 and Pump Assembly, page 43.* Be sure preset shime are in place before thightening. Add or remove shims to motor shaft as required and tighten set screws in the spring retainer through 1/4 NPT center port in flush housing. Insert plug in port and tighten. (See Figure 34)

8. Remove backplate/impeller assembly and apply anti-seize or equal compound to the motor shaft and install key. Install backplate/ impeller assembly and lock in place using O-ring and impeller retainer bolt. (Figure 35)

9. Install casing O-ring on backplate and clamp casing in place.(Figure 36)

**Note:** Rotate impeller manually to insure it does not rub on the backplate or casing.

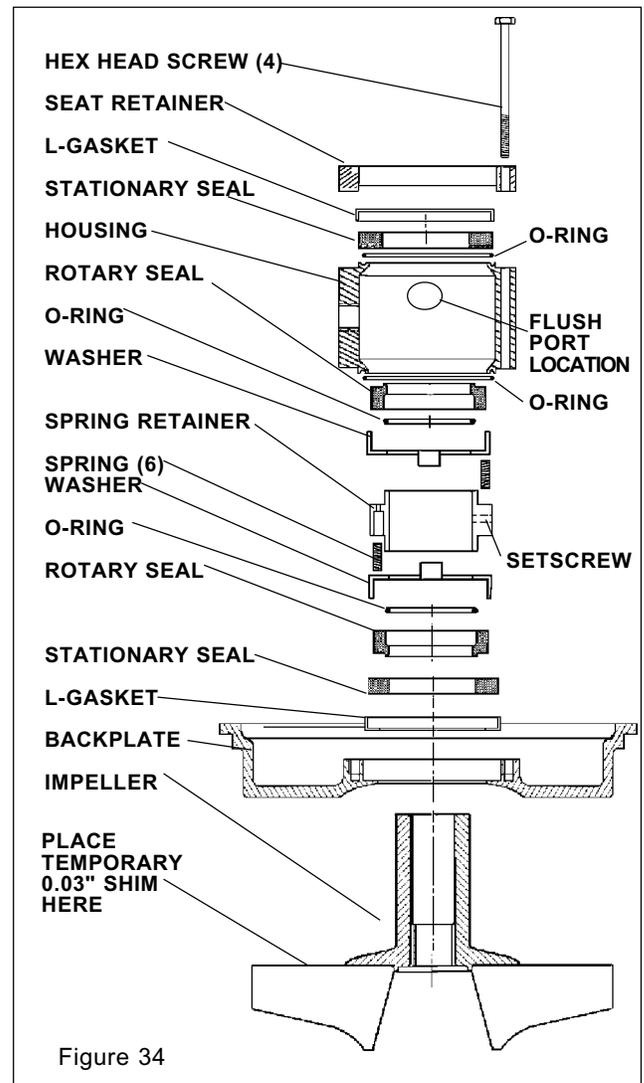


Figure 34

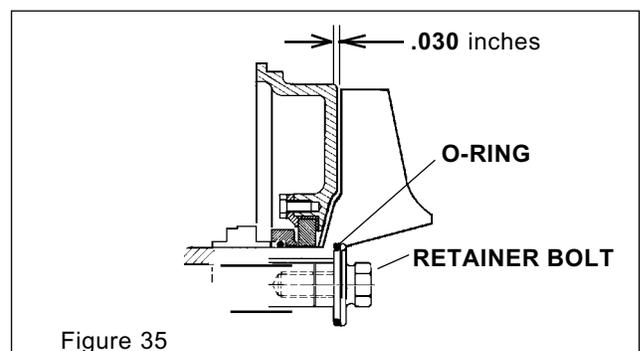


Figure 35

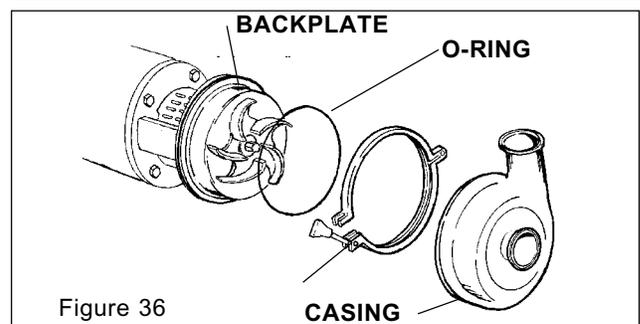


Figure 36

**LUBRICATION INSTRUCTIONS  
FOR BALL BEARING MOTORS**

**LUBRICATION**

This is a ball bearing motor. No lubrication need be added before start up. The bearings have been lubricated at the factory.

**RELUBRICATION INTERVALS**

The following intervals are suggested as a guide:

HOURS OF SERVICE PER YEAR	H.P. RANGE	SUGGESTED RELUBE INTERVAL
5,000	1/4 to 7 1/2	5 years
	10 to 40	3 years
	50 to 150	1 year
Continuous Normal Applications	1/4 to 7 1/2	2 years
	10 to 40	1 year
	50 to 150	9 months
Seasonal Service Motor is idle for 6 months or more	All	1 year (beginning of season)
Continuous High ambients, dirty or moist locations, high vibrations, or where shaft end is hot (pumps - fans)	1/4 to 40	6 months
	50 to 150	3 months

**LUBRICATION**

Use high quality ball bearing grease. Use consistency of grease suitable for class of insulation stamped on nameplate as follows:

INSULATION CLASS	CONSISTENCY	TYPE	TYPICAL GREASE	FRAME TYPE
A & B	Medium	Polyurea	Shell Dolium R	215T & Smaller
A & B	Medium	Polyurea	Shell Dolium R	254 & Larger
F & H	Medium	Polyurea	Shell Dolium R	All

**PROCEDURE**

If motor is equipped with Alemite fitting, clean tip of fitting and apply grease gun. Use 1 to 2 full strokes on motors in NEMA 215 frame and smaller. Use 2 to 3 strokes on NEMA 254 thru NEMA 365 frame. Use 3 to 4 strokes on NEMA 404 frames and larger. On motors having drain plugs, remove grease drain plug and operate motor for 20 minutes before replacing drain plug.

On motors equipped with slotted head grease screw, remove screw and apply grease tube to hold. Insert 2 to 3 inch length of grease string into each hole on motors in NEMA 215 frame and smaller. Insert 3 to 5 inch length on larger motors. Motors having grease drain plugs, remove plug and operate motor for 20 minutes before replacing drain plug.

**CAUTION:** Keep grease clean. Lubricate motors at standstill. Remove and replace drain plugs at standstill. Do not mix petroleum grease and silicone grease in motor bearings.

SEE PAGE 34 MOTOR MOUNTS



PHONE 501-646-4711  
TELEX 53-7425 — TWX 910-723-7650  
FORT SMITH, ARKANSAS 72902 USA

## MAINTENANCE

Inspect units at regular intervals. Keep units clean and ventilation openings clear of dust, dirt or other debris. Lubricate units per this operating instruction folder and instruction plate on Unit. Excessive lubrication may damage the unit. Do not over grease! **WARNING:** Disconnect all power sources to the unit and discharge all parts which may retain an electrical charge before attempting any maintenance or repair. Screens and covers must be maintained in place when unit is in operation. Motor for use in hazardous locations - Class I & II Installation: Repairs of these motors must be made by the manufacturer or authorized service station approved by the manufacturer and U.L. to maintain the U.L. Listing. The U.L. Listing applies to the electrical motor only and not to the belt or gear transmissions or other devices that may be connected to the motor.

## RENEWAL PARTS AND WARRANTY SERVICE

When inquiring for renewal parts, call the U.S. Electrical Motors Service Department (Milford, Conn.) or Parts Stocking Distributors. For warranty service call the nearest U.S. Electrical Motors Service Station. Give them complete Nameplate data including serial number, etc.

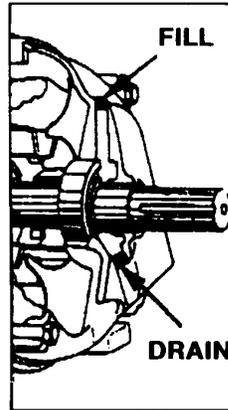
## LUBRICATION INSTRUCTIONS

Some small motors have sealed-for-life bearings which require no relubrication. Regreasable bearings are shipped with a high quality, wide temperature-range grease in the bearings.

Motors can be regreased by stopping the motor, removing drain plug and pumping new grease into fillhole. Run motor with drain plug removed to discharge excess grease. Replace drain plug.

Units that operate at speeds greater than 1800 RPM should be lubricated on a more frequent maintenance schedule depending on duty cycle. Use a low pressure grease gun and avoid overgreasing.

SERVICE	SUGGESTED REGREASING INTERVALS		
	MOTOR HORSEPOWER		
	UNDER 50	50-100	100 UP
A	1-2 Yrs.	1-2 Yrs.	1 Yr.
B	1 Yr.	1 Yr.	6 Mos.
C	1 Yr.	6 Mos.	3 Mos.
D	4 Mos.	3 Mos.	3 Mos.
SERVICE SYMBOL	TYPES OF SERVICE		
A	Infrequent operation or light duty in clean atmosphere.		
B	8-16 Hrs./Day in clean, relatively dry atmosphere.		
C	12-24 Hrs./Day, heavy-duty, or if moisture is present.		
D	Heavy duty in dirty, dusty locations; high ambients; moisture laden atmosphere; vibration.		



## RECOMMENDED GREASES

The following table lists recommended products which should be used for regreasing motors.

MANUFACTURER	TRADE NAME OF GREASE	MANUFACTURER	TRADE NAME OF GREASE
U.S. Electrical Motors	(Syn) 83343	Lubriplate Div. Fishe Bros. Refining	(L) Multi Lube A
American Oil Co.	(L) Amolith - 2	MacMillan Petroleum Co.	(L) All Purpose Grease 2 (802)
Atlantic Richfield Co.	(L) Litholine EP2	Master Lubricants Co.	(L) Lubriko L 206
Cities Service Oil Co.	(L) Citgo Trojan H2	Mobile Oil Co.	(L) Mobilus 2
Continental Oil Co.	(L) Conoco Super STA Grease	Pennzoil United	(L) Multi Purpose Lube 705
Getty Oil Co.	(L) Veedol All Purpose	Phillips Petroleum Co.	(L) Phillips 18 & RB Grease 2
Gulf Coil Corp.	(L) Gulfcrown 2 or Gullies A	Shell Oil Co.	(L) Alvanis - 2
E F Hovrion & Co.	(L) Cosmolube 2	Standard Oil Co. of Calif. Inc.	(Syn) SRI 2 or BRB 2
Exxon	(L) Unitex N2	Standard Oil Co. of Ohio	(L) Bearing Gard
Jet Lube Inc.	(L) CB 2 Grease	Sun Oil Co.	(L) Prestige 42
Keystone Div. Pennwalt Corp.	(L) Keystone Grease - 81 Light	Texaco Inc.	(L) Premium RB - 2
Lubricator Engineers, Inc.	(L) 187 Almasol Elec. Mtr. Lube	Valvoline Div. Ashland Oil Inc.	(L) Val Lith - 2 EP
			(L) Lithium (Syn) Synthetic

## WORLD HEADQUARTERS

### CONNECTICUT

125 Old Gate Lane, MILFORD, CT 06460 (203) 783-5200 SEE PAGE 34 MOTOR MOUNTS

### CALIFORNIA

1740 West Katella Ave., Suite G., Orange, CA 92667 (714) 639-9752

### ILLINOIS

2050 South Carboy Road, Mt. Prospect, Ill. 60056 (312) 952-3500

### TENNESSEE

3276 Democrat Road, Memphis, TN 38118 (901) 365-2360

### TEXAS

1400 South Sherman, Suite 216, Richardson, TX 75081 (214) 644-0470



**U.S. ELECTRICAL MOTORS**

DIVISION OF EMERSON ELECTRIC CO.

125 OLD GATE LANE

MILFORD, CONNECTICUT 06460



© 1984 U.S. Electrical Motors  
Prices, construction and ratings subject to change without notice.

### WAUKESHA 200 SERIES CENTRIFUGAL PUMPS

#### BASIC SEAL KIT - TYPE 1 SEAL - SANITARY - INDUSTRIAL PUMP MODEL

KIT CONTAINS	QTY	MODEL			
		2045	2065*	2085*	2105
CARBON SEAL	1	9-225A	9-225A	9-225A	9-225A
SEAL O-RING	1	V70224	V70224	V70224	V70224
CASING O-RING	1	V70252	V70439	V70446	V70450
IMPELLER O-RING	1	V70214	V70220	V70220	V70220
<b>KIT ORDER #</b>		<b>309-241</b>	<b>309-242</b>	<b>309-243</b>	<b>309-244</b>

#### COMPLETE SEAL KIT - TYPE 1 SEAL - SANITARY - INDUSTRIAL PUMP MODEL

KIT CONTAINS	QTY	MODEL			
		2045	2065*	2085*	2105
CARBON SEAL	1	9-225A	9-225A	9-225A	9-225A
SEAL O-RING	1	V70224	V70224	9 10V	V70224
CASING O-RING	1	V70252	V70439	V70446	V70450
IMPELLER O-RING	1	V70214	V70220	V70220	V70220
STATIONARY SEAL	1	23-17	23-17	23-17	23-17
"L" GASKET	1	9-37	9-37	9-37	9-37
<b>KIT ORDER #</b>		<b>309-245</b>	<b>309-246</b>	<b>309-247</b>	<b>309-248</b>

#### BASIC SEAL KIT - TYPE 4 SEAL - SANITARY - INDUSTRIAL PUMP MODEL

KIT CONTAINS	QTY	MODEL			
		2045	2065*	2085*	2105
CARBON SEAL	2	9-225A	9-225A	9-225A	9-225A
SEAL O-RING	2	V70224	V70224	V70224	V70224
CASING O-RING	1	V70252	V70439	V70446	V70450
IMPELLER O-RING	1	V70214	V70220	V70220	V70220
HOUSING O-RING	2	V70039	V70039	V70039	V70039
<b>KIT ORDER #</b>		<b>309-249</b>	<b>309-250</b>	<b>309-251</b>	<b>309-252</b>

#### COMPLETE SEAL KIT - TYPE 4 SEAL - SANITARY - INDUSTRIAL PUMP MODEL

KIT CONTAINS	QTY	MODEL			
		2045	2065*	2085*	2105
CARBON SEAL	2	9-225A	9-225A	9-225A	9-225A
SEAL O-RING	2	V70224	V70224	V70224	V70224
CASING O-RING	1	V70252	V70439	V70446	V70450
IMPELLER O-RING	1	V70214	V70220	V70220	V70220
HOUSING O-RING	2	V70039	V70039	V70039	V70039
STATIONARY SEAL	2	23-17	23-17	2317	23-17
"L" GASKET	2	9-37	9-37	9-37	9-37
<b>KIT ORDER #</b>		<b>309-253</b>	<b>309-254</b>	<b>309-255</b>	<b>309-256</b>

\*INCLUDES LV AND HV MODELS

#### Metric dimensions on the outer diameter of the impeller shaft require metric seals.

Systems using NEMA standard motors may have metric dimensions on the outer diameter of the impeller shaft to allow use of metric seal assemblies in areas where only metric seal replacements are available on short notice or where a larger system uses all metric seal materials in its operations.

To determine if you have a metric (43mm) impeller, measure the outside diameter of the impeller shaft.  $1.693 \begin{smallmatrix} +.000 \\ -.004 \end{smallmatrix}$  " (43mm)

*Refer to page 27 for 43mm impellers  
Refer to page 28 for metric seal components.*

## TOTAL METRIC SYSTEM REQUIREMENTS

METRIC IMPELLERS	
PART NO.	MODEL
5-224X	2045
5-230X	2065
5-242X	2085
5-234X	2065HV
5-238X	2085LV
5-226X	2065LV
5-246X	2105

### USING METRIC MOTORS REQUIRES :

- \* METRIC KEY
- METRIC IMPELLER
- \* METRIC ADAPTER
- \* METRIC FASTENERS
- \*\*METRIC SEAL COMPONENTS
- \* METRIC IMPELLER BOLT

\*For item part numbers not listed, contact your Distributor.

\*\* 43mm impeller shaft seals are listed on page 28.

Listed Small bore and Large bore pedestal pumps are not metric. (Page 36)

METRIC MOTORS
FRAME SIZE
200
180
160
132
112
100
90

## \*43mm (shaft diameter) IMPELLERS

PART NO.	MODEL	PEDESTAL	TYPE	DIAMETER
5-170XA	2045	SM. BORE	INDUSTRIAL	4.500
5-170X	2045	SM. BORE	SANITARY	4.500
5-172XA	2065LV	SM. BORE	INDUSTRIAL	6.500
5-172X	2065LV	SM. BORE	SANITARY	6.500
5-174XA	2065LV	LG. BORE	INDUSTRIAL	6.500
5-176XA	2065	SM. BORE	INDUSTRIAL	6.500
5-176X	2065	SM. BORE	SANITARY	6.500
5-178XA	2065	LG. BORE	INDUSTRIAL	6.500
5-178X	2065	LG. BORE	SANITARY	6.500
5-180XA	2065HV	SM. BORE	INDUSTRIAL	6.500
5-180X	2065HV	SM. BORE	SANITARY	6.500
5-182XA	2065HV	LG. BORE	INDUSTRIAL	6.500
5-182X	2065HV	SM. BORE	SANITARY	6.500
5-184XA	2085LV	SM. BORE	INDUSTRIAL	8.500
5-184X	2085LV	SM. BORE	SANITARY.	8.500
5-186XA	2085LV	LG. BORE	INDUSTRIAL	8.500
5-186X	2085LV	LG. BORE	SANITARY	8.500
5-188XA	2085	SM. BORE	INDUSTRIAL	8.500
5-188X	2085	SM. BORE	SANITARY	8.500
5-190XA	2085	LG. BORE	INDUSTRIAL	8.500
5-190X	2085	LG. BORE	SANITARY.	8.500
5-192XA	2105	SM. BORE	INDUSTRIAL	10.500
5-192X	2105	SM. BORE	SANITARY	10.500
5-194XA	2105	LG. BORE	INDUSTRIAL	10.500

\*43MM SHAFTS MEASURE  $1.693 \begin{smallmatrix} .000 \\ +.004 \end{smallmatrix}$  OUTSIDE SHAFT DIAMETER

# PARTS LIST

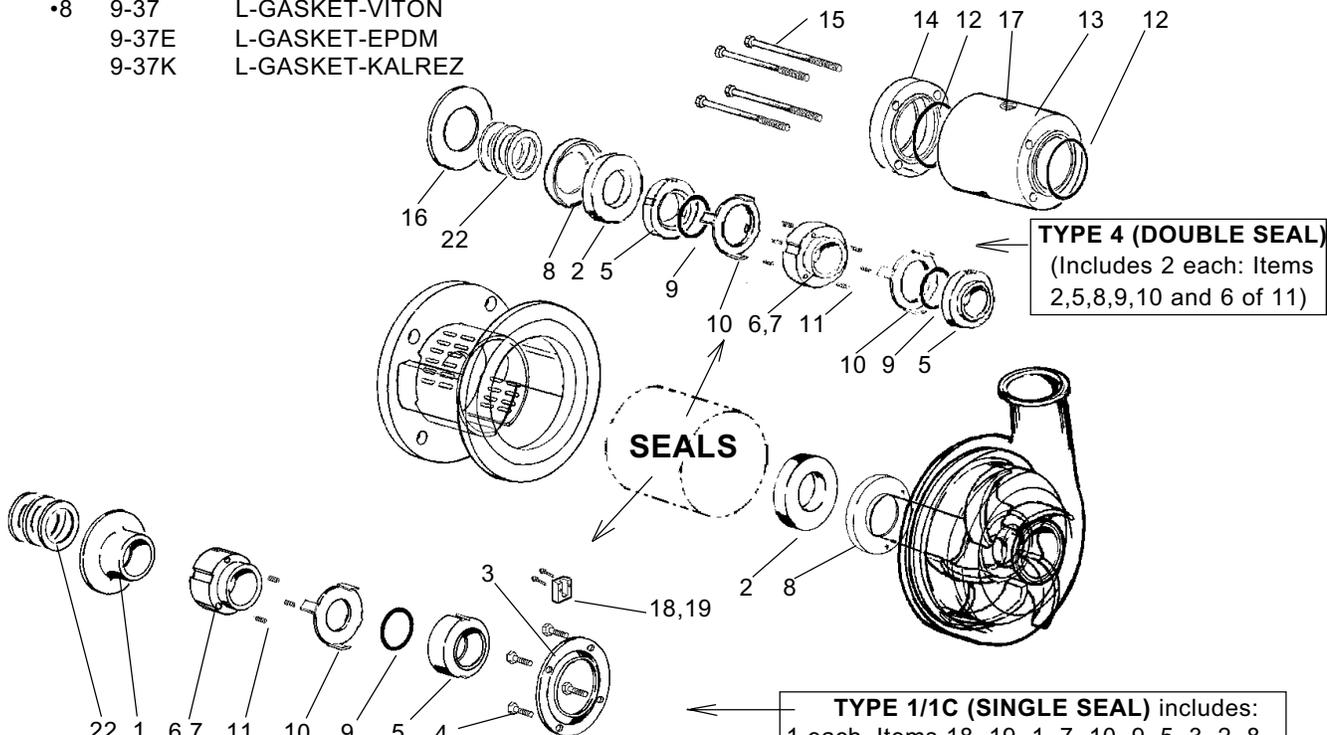
# SEALS

## SEAL COMPONENTS ALL PUMPS

ITEM	PART NO.	NAME
1	69-1	DEFLECTOR
*2	23-17	STATIONARY SEAL -PURBIDE (1.75")
	23-17A	STATIONARY SEAL -S/CARBIDE (1.75")
	23-17E	STATIONARY SEAL -CERAMIC (1.75")
	23-17F	STATIONARY SEAL -T/CARBIDE (1.75")
	23-111	STATIONARY SEAL -PURBIDE (43mm)
	23-111A	STATIONARY SEAL -S/CARBIDE (43mm)
	23-111B	STATIONARY SEAL -CERAMIC (43mm)
	23-111F	STATIONARY SEAL -T/CARBIDE (43mm)
3	23-78	SEAL RETAINER
4	30-62	1/4-20 X 1/2 BOLT (4 each)
*5	9-225A	ROTARY SEAL-CARBON (1.75")
	9-225B	ROTARY SEAL-PURBIDE (1.75")
	9-225C	ROTARY SEAL- S/CARBIDE (1.75")
	9-225F	ROTARY SEAL- T/CARBIDE (1.75")
	9-262A	ROTARY SEAL-CARBON (43mm)
	9-262B	ROTARY SEAL-PURBIDE (43mm)
	9-262C	ROTARY SEAL-S/CARBIDE (43mm)
	9-262F	ROTARY SEAL-T/CARBIDE (43mm)
*6	30-178	1/4-20 X 3/8 SET SCREW (2 each)
*7	23-77	SPRING RETAINER (1.75)
	23-110	SPRING RETAINER (43mm)
*8	9-37	L-GASKET-VITON
	9-37E	L-GASKET-EPDM
	9-37K	L-GASKET-KALREZ

ITEM	PART NO.	NAME
*8	9-37R	L-GASKET-SILICONE
*9	V70224	O-RING-VITON (1.75)
	E70224	O-RING-EPDM (1.75)
	C75224	O-RING-CHEMREZ (1.75)
	K75224	O-RING-KALREZ (1.75)
	S75224	O-RING-SILICONE (1.75)
	V70223	O-RING-VITON (43mm)
	K75223	O-RING-KALREZ (43mm)
	S75223	O-RING-SILICONE (43mm)
*10	43-87	WASHER, TABBED
*11	24-65	SPRING
*12	V70039	O-RING, HOUSING
13	23-80	HOUSING, SEAL
14	23-79	RETAINER, SEAT
15	30-175	1/4-20 X 3 CAP SCREW (4 each)
16	69-4	SLINGER, 142-215JM
17	78-72	1/4 N.P.T. PLUG
18	134-2	BLOCK, WATER CASCADE
19	30-176	8-32 X 1/4 SOCKET HEAD
20	74-1	1/4" PLASTIC HOSE
21	78-18	1/4" HOSE FITTING

**RECOMMENDED SPARE PARTS**

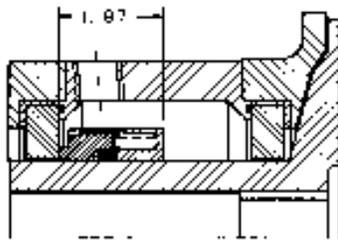


(22) MOTOR SHAFT SHIM	QTY. PER ASS'Y.	PART NO.	MOTOR NEMA FRAME SIZE
.005" THK.	A	35-4	254JM-326JM
.010" THK.	S	35-5	254JM-326JM
.020" THK.	R	35-6	254JM-326JM
.005" THK.	E	35-1	143JM-215JM
.010" THK.	Q	35-2	143JM-215JM
.020" THK.	D	35-3	143JM-215JM

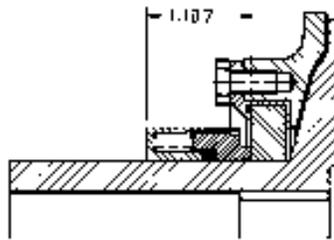
To determine if you have a metric impeller, measure the outside diameter of the impeller shaft.  $1.693 \pm_{.004}^{.000}$  " (43mm)

SEE PAGE 26 FOR ADDITIONAL METRIC INFORMATION

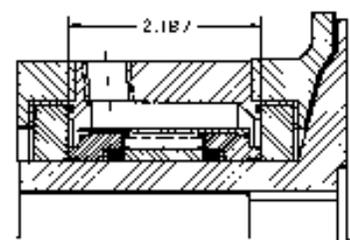
The following seal assemblies are available with the 200 Series Pumps. These sketches provide the installed length dimension for each seal to facilitate assembly.



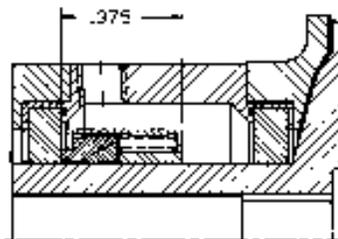
**JOHN CRANE TYPE 8-1  
INSIDE MOUNTED SEAL**



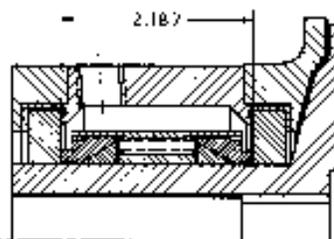
**JOHN CRANE TYPE 8B2  
OUTSIDE MOUNTED SEAL**



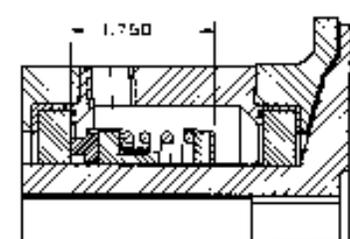
**JOHN CRANE TYPE 8-1 DOUBLE SEAL  
(Length is set by seal chamber)**



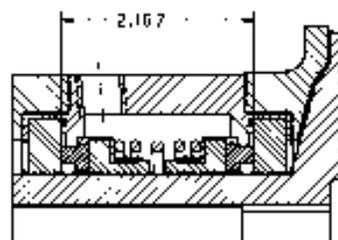
**JOHN CRANE TYPE 9  
INSIDE MOUNTED SEAL**



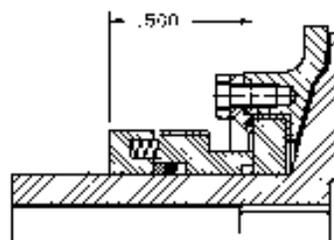
**JOHN CRANE TYPE 9 DOUBLE SEAL  
(Length is set by seal chamber)**



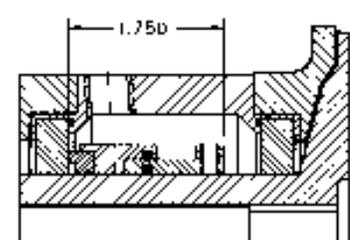
**JOHN CRANE TYPE 21  
INSIDE MOUNTED SEAL**



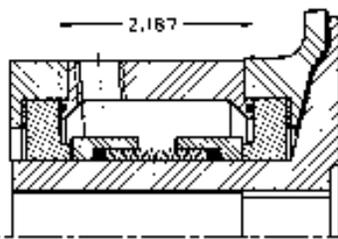
**JOHN CRANE TYPE 21 DOUBLE SEAL  
(Length is set by seal chamber)**



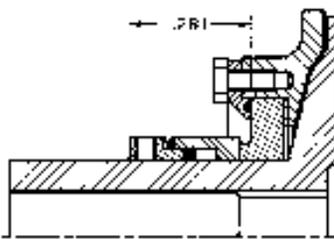
**CHESTERTON 440  
OUTSIDE MOUNTED SEAL**



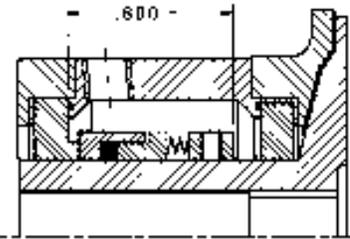
**CHESTERTON 660  
INSIDE MOUNTED SEAL**



**DURAMETALLIC TYPE "CR0"  
OUTSIDE SEAL**



**DURAMETALLIC TYPE "RA"  
EXTERNALLY MOUNTED**



**DURAMETALLIC TYPE "RO"  
INTERNALLY MOUNTED**

Figure 38

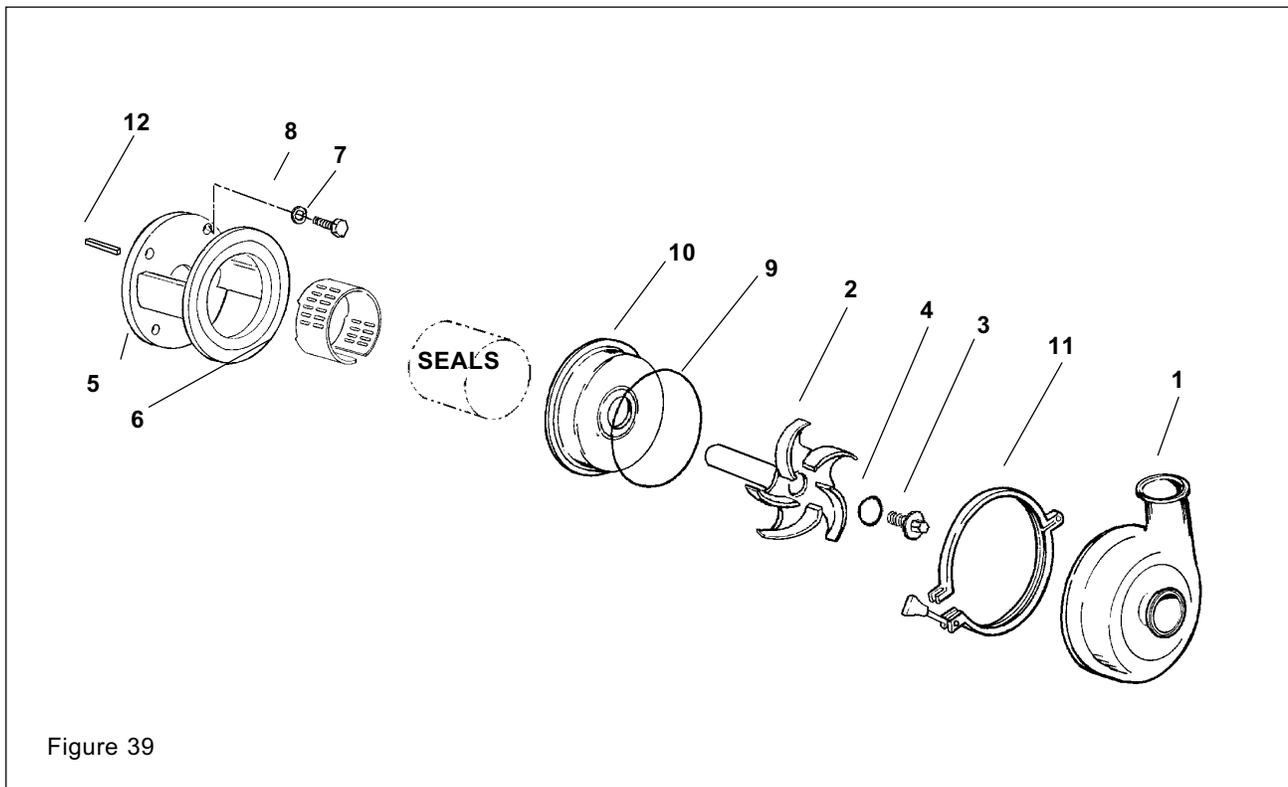


Figure 39

**2045 COMPONENTS (CLOSE-COUPLED)**

ITEM	PART NO.	NAME
1	301-57BX	CASING 1-1/2 X 1-1/2 BEVELED SEAT
	301-57EX	CASING 40mm X 40mm DIN
	301-57FX**	CASING 1-1/2 X 1-1/2 FLANGED
	301-57HX	CASING 1-1/2 X 1-1/2 FEMALE I-LINE
	301-57JX	CASING 1-1/2 X 1-1/2 MALE I-LINE
	301-57KX	CASING 1-1/2 X 1-1/2 "S" CLAMP
	301-57NX**	CASING 1-1/2 X 1 1/2 N.P.T MALE
	301-57MX**	CASING 1-1/2 X 1-1/2 N.P.T. FEMALE
	301-57WX	CASING 1-1/2 X 1-1/2 WELD
	301-57QX	CASING 1-1/2 X 1-1/2 "Q" CLAMP
	301-58BX	CASING 2 X 1-1/2 BEVELED SEAL
	301-58EX	CASING 50mm X 40mm DIN
	301-58FX**	CASING 2 X 1-1/2 FLANGED
	301-58HX	CASING 2 X 1-1/2 FEMALE I-LINE
	301-58JX	CASING 2 X 1-1/2 MALE I-LINE
	301-58KX	CASING 2 X 1-1/2 "S" CLAMP
	301-58NX**	CASING 2 X 1-1/2 N.P.T. FEMALE
	301-58MX**	CASING 2 X 1-1/2 N.P.T. MALE
	301-58WX	CASING 2 X 1-1/2 WELD
	301-58QX	CASING 2 X 1-1/2 "Q" CLAMP
2	5-80X	*IMPELLER, 4-1/2 DIA.
	5-170X	*IMPELLER, 114mm DIA
3	129-773X	RETAINER, IMPELLER

\*Trimmed impellers are same part number; specify diameter to 1/16-inch(1.59mm) increments.

ITEM	PART NO.	NAME
*4	V70214	O-RING, VITON
	E70214	O-RING, EPDM
	K75214	O-RING, KALREZ
5	2-235	ADAPTER, MOTOR
6	70-27	SEAL GUARD
7	30-50	3/8-16 X 3/4 HEX SCREW
8	43-28	3/8 LOCK WASHER
*9	V70252	O-RING, VITON
	E70252	O-RING EPDM
	S75252	O-RING SILICONE
	T80252	O-RING, PTFE encap.
	K75252	O-RING, KALRAZ
10	1-59X	BACKPLATE
11	119-71	CASING CLAMP
12	65-3	KEY -3/16" 184-215JM FRAME MOTOR

**•RECOMMENDED SPARE PARTS**

\*\* These casings do not meet the requirements of 3A Sanitary Standards

PAGE 26 - SEALS KITS  
 PAGE 26-28 - METRIC NOTES  
 PAGE 34 - INDUSTRIAL CASINGS

11-14-96

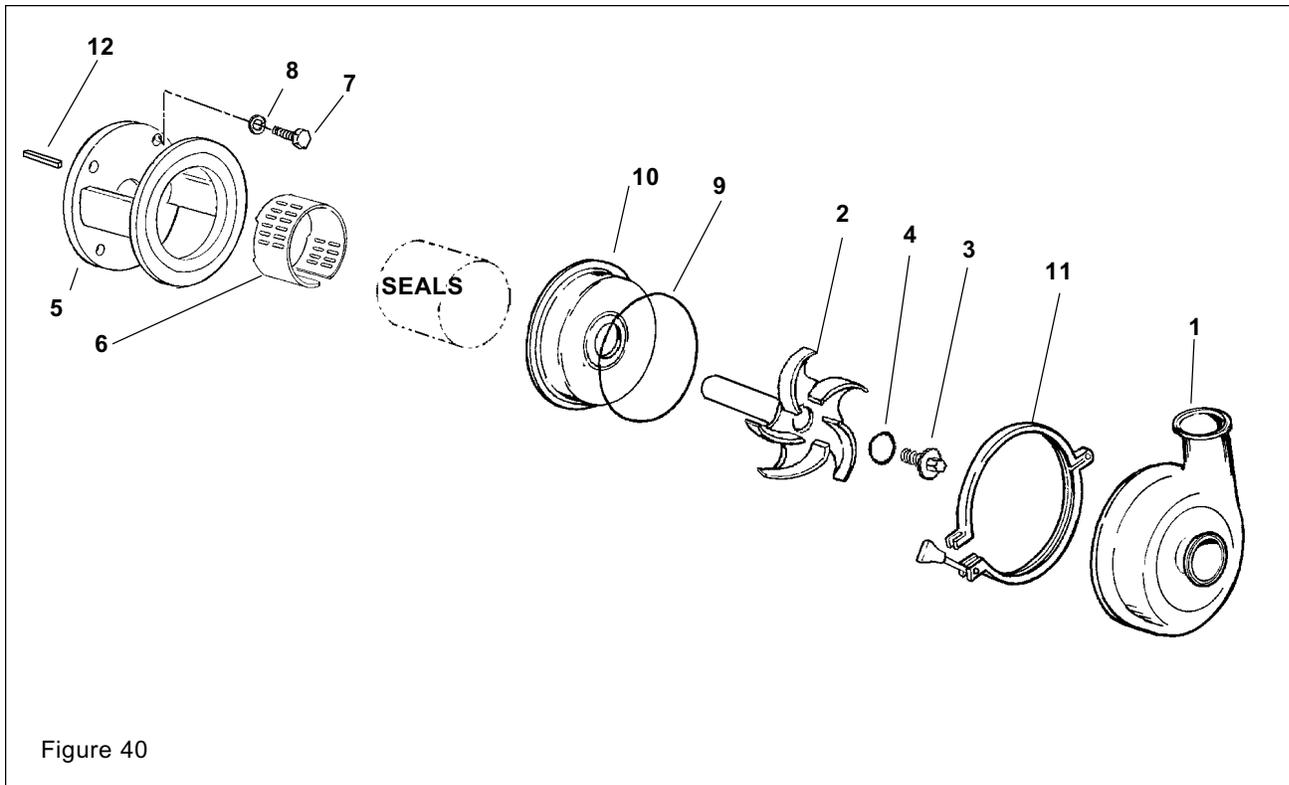


Figure 40

**2065 COMPONENTS (close coupled)**

ITEM	PART NO.	NAME	ITEM	PART NO.	NAME
1	301-8KX	CASING 2-1/2 X 2 "S" CLAMP (MP)	7	30-21	1/2-13 X 1-1/4 BOLT
	301-8BX	CASING 2-1/2 X 2 BEVELED SEAT		30-30	213-256JM MOTORS
	301-8HX	CASING 2-1/2 X 2 FEMALE I-LINE			3/8-16 X 1 BOLT
	301-8JX	CASING 2-1/2 X 2 MALE I-LINE			143-184JM MOTORS
	301-8QX	CASING 2-1/2 X 2 "Q" CLAMP		30-105	5/8-11 X 1-1/2 BOLT
	301-8WX	CASING 2-1/2 X 2 WELD			284-326JM MOTORS
	301-8MX**	CASING 2-1/2 X 2 N.P.T MALE	8	43-28	3/8 LOCK WASHER
	301-8NX**	CASING 2-1/2 X 2 N.P.T FEMALE		43-16	1/2 LOCK WASHER
	301-8FX**	CASING 2-1/2 X 2 150 LB FLANGE		43-33	5/8 LOCK WASHER
2	109260	*IMPELLER 6-1/2 DIA	*9	V70439	O-RING, VITON
		143-THRU-215JM MOTOR		E70439	O-RING, EPDM
	5-83X	*IMPELLER 6-1/2 DIA		S75439	O-RING, SILICONE
		254JM AND LARGER MOTOR		K75439	O-RING, KALREZ
3	129-771X	RETAINER, IMPELLER	10	1-60X	BACKPLATE
		143-THRU-215JM MOTOR	11	119-70	CASING CLAMP
	129-772X	RETAINER, IMPELLER	12	65-3	KEY -3/16" ; 143-215JM FRAME MOTOR
		254JM AND LARGER MOTOR		65-4	KEY -1/4" ; 254-326JM FRAME MOTOR
*4	V70220	O-RING, VITON	*RECOMMENDED SPARE PARTS		
	E70220	O-RING, EPDM	* Trimmed impellers are same part number;		
	S75220	O-RING, SILICONE	specify diameter to 1/16-inch (1.59mm) increments.		
	K75220	O-RING, KALREZ	** These casings do not meet the requirements of 3A Sanitary Standards		
5	2-168	ADAPTER, MOTOR	PAGE 26 - SEALS KITS		
		143-184JM FRAME	PAGE 26-28 - METRIC NOTES		
	2-169	ADAPTER, MOTOR	PAGE 34 - INDUSTRIAL CASINGS		
		213-215JM FRAME			
	2-170	ADAPTER MOTOR			
		254-256JM FRAME			
	2-196	ADAPTER MOTOR			
		284-326JM FRAME			
6	70-24	SEAL GUARD			
		143-215 MOTORS			
	70-26	SEAL GUARD			
		254-284 MOTORS			

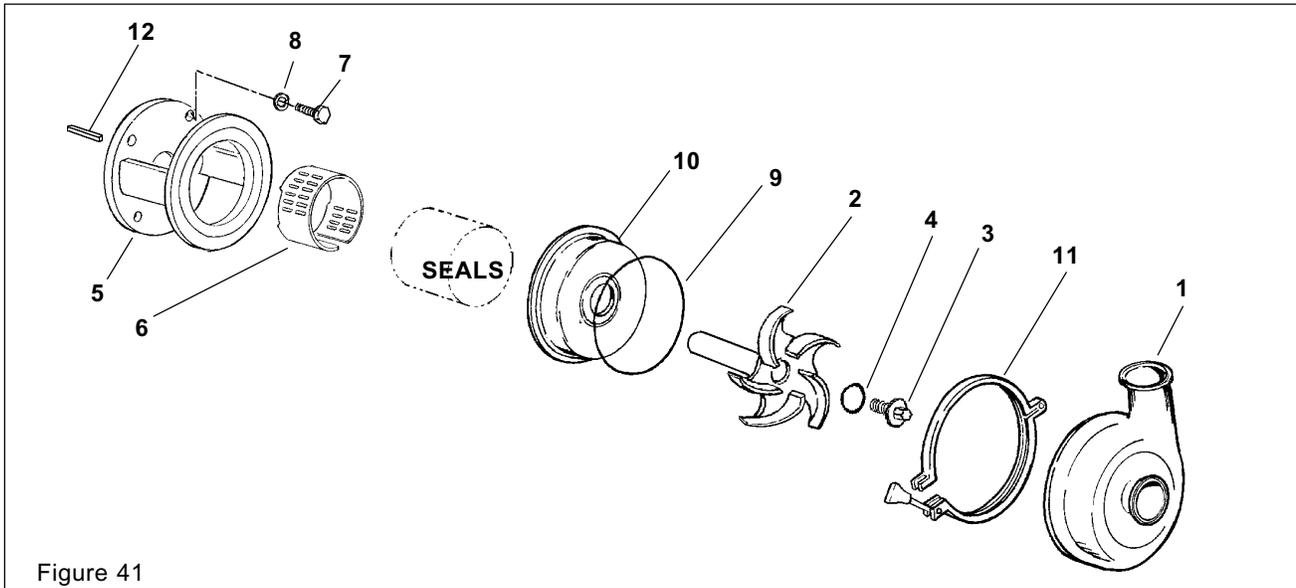


Figure 41

**2065LV COMPONENTS (close coupled)**

ITEM	PART NO.	NAME
1	301-62-X	CASING 1-1/2 X 1-1/2 "S" CLAMP
	301-62BX	CASING 1-1/2 X 1-1/2 BEVELED SEAT
	301-62EX	CASING 40mm X 40mm DIN
	301-62NX**	CASING 1-1/2 X 1-1/2 N.P.T FEMALE
	301-62MX**	CASING 1-1/2 X 1-1/2 N.P.T MALE
	301-62FX**	CASING 1-1/2 X 1-1/2 FLANGE
	301-62WX	CASING 1-1/2 X 1-1/2 WELD
	301-62HX	CASING 1-1/2 X 1-1/2 FEMALE I-LINE
	301-62JX	CASING 1-1/2 X 1-1/2 MALE I-LINE
	301-62QX	CASING 1-1/2 X 1-1/2 "Q" CLAMP
	301-63KX	CASING 2 X 1-1/2 "S" CLAMP
	301-63EX	CASING 50mm X 40mm DIN
	301-63BX	CASING 2 X 1-1/2 BEVELED SEAT
	301-63NX	CASING 2 X 1-1/2 N.P.T FEMALE
	301-63MX	CASING 2 X 1-1/2 N.P.T MALE
	301-63FX	CASING 2 X 1-1/2 FLANGE
	301-63WX	CASING 2 X 1-1/2 WELD
	301-63HX	CASING 2 X 1-1/2 FEMALE I-LINE
	301-63JX	CASING 2 X 1-1/2 MALE I-LINE
	301-63QX	CASING 2X 1 1/2 "Q" CLAMP
	301-64KX	CASING 1-1/2 X 1-1/2 "S" CLAMP (MP)
	301-64BX	CASING 2-1/2 X 1-1/2 BEVELED SEAT
	301-64EX	CASING 65mm X 40mm DIN
	301-64NX**	CASING 2-1/2 X 1-1/2 N.P.T FEMALE
	301-64MX**	CASING 2-1/2 X 1-1/2 N.P.T MALE
	301-64FX**	CASING 2-1/2 X 1 1/2 FLANGE
	301-64WX	CASING 2-1/2 X 1-1/2 WELD
	301-64HX	CASING 2-1/2 X 1-1/2 FEMALE I-LINE
	301-64JX	CASING 2-1/2 X 1-1/2 MALE I-LINE
	301-64QX	CASING 2-1/2 X 1-1/2 "Q" CLAMP
2	1-1/2 X	*IMPELLER 6-1/2 DIA 143-215JM MOTOR
	1-1/2 X	*IMPELLER 165mm DIA 143-215JM MOTOR
	5-160X	*IMPELLER 6-1/2 DIA 254JM AND LARGER MOTOR
	5-174X	*IMPELLER 165mm DIA 254JM AND LARGER MOTOR

**2065HV COMPONENTS (close coupled)**

ITEM	PART NO.	NAME
1	301-17BX**	CASING 3 X 2 BEVELED SEAT
	301-17EX**	CASING 80mm X 50mm DIN
	301-17FX**	CASING 3 X 2 FLANGED
	301-17HX**	CASING 3 X 2 FEMALE I-LINE
	301-17JX**	CASING 3 X 2 MALE I-LINE
	301-17KX**	CASING 3 X 2 "S" CLAMP
	301-17NX**	CASING 3 X 2 N.P.T. FEMALE
	301-17MX**	CASING 3 X 2 N.P.T MALE
	301-17QX**	CASING 3 X 2 "Q" CLAMP
2	1-1/2 X	*IMPELLER 6-1/2 DIA 143-215JM MOTOR
	5-180X	*IMPELLER 165mm DIA 143-215JM MOTOR
	5-130X	*IMPELLER 6-1/2 DIA 254JM AND LARGER MOTOR
	5-82X	*IMPELLER 165mm DIA 254JM AND LARGER MOTOR

**REFER TO 2065 FOR ALL OTHER COMPONENTS**

\*Trimmed impellers are same part number; specify diameter to 1/16-inch(1.59mm) increments.

\*\* These casings do not meet the requirements of 3A Sanitary Standards

PAGE 26 - SEALS KITS  
PAGE 26-28 - METRIC NOTES  
PAGE 34 - INDUSTRIAL CASINGS

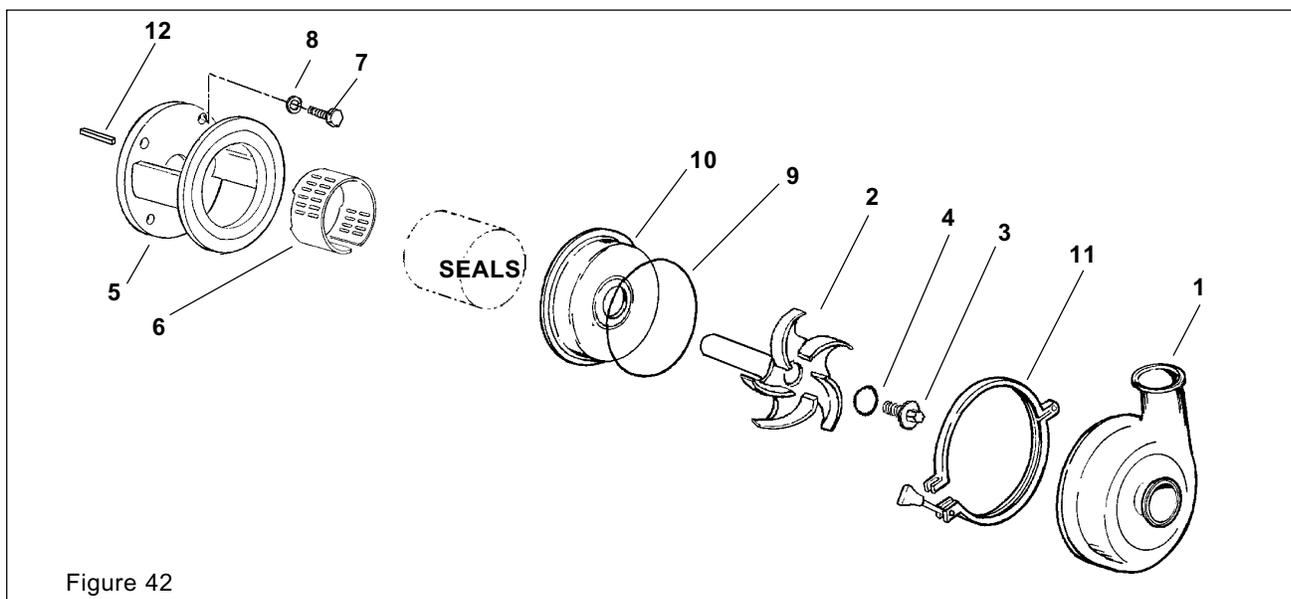


Figure 42

**2085 COMPONENTS (close coupled)**

ITEM	PART NO.	NAME	ITEM	PART NO.	NAME
1	301-5BX	CASING 3 X 2-1/2 BEVELED SEAT	5	2-171	ADAPTER, MOTOR
	301-5EX	CASING 80mm X 65mm DIN		143-184JM	FRAME
	301-5FX**	CASING 3 X 2-1/2 FLANGE	2-172		ADAPTER, MOTOR
	301-5HX	CASING 3 X 2-1/2 MALE "I" LINE		213-215JM	FRAME
	301-5JX	CASING 3X 2-1/2 FEMALE "I" LINE	2-173		ADAPTER, MOTOR
	301-5KX	CASING 3X2-1/2 CLAMP		254-256JM	FRAME
	301-5NX**	CASING 3 X 2-1/2 N.P.T FEMALE	2-174		ADAPTER, MOTOR
	301-5MX**	CASING 3X2-1/2 N.P.T MALE		284JM AND LARGER	MOTOR
	301 -5WX	CASING 3 X 2-1/2 WELD	6	70-24	SEAL GUARD
	301-5QX	CASING 3 X 2-1/2 "Q" CLAMP		143-215JM	MOTOR
	301-7BX	CASING 4 X 2-1/2 BEVELED SEAT	70-26		SEAL GUARD
	301-7EX	CASING 100mm X 65mm DIN		254-324JM	MOTOR
	301-7FX**	CASING 4 X 2-1/2 FLANGE	70-25		SEAL GUARD
	301-7HX	CASING 4 X 2-1/2 MALE "I" LINE		284JM AND LARGER	MOTOR
	301-7JX	CASING 4 X 2-1/2 FEMALE "I" LINE	7	30-30	3/8-16 X 1 BOLT
	301-7KX	CASING 4 X 2-1/2 "S" CLAMP		143-184JM	MOTOR
	301-7NX**	CASING 4 X 2-1/2 N.P.T. FEMALE	30-36X		1/2-13 X 1 1/4 BOLT
	301-7MX**	CASING 4 X 2-1/2 N.P.T. MALE		213-256JM	MOTOR
	301 -7WX	CASING 4 X 2-1/2 WELD	30-105		5/8-11 X 1-1/2 BOLT
	301-7QX	CASING 4 X 2-1/2 "Q" CLAMP		284JM AND LARGER	MOTOR
2	5-86X	*IMPELLER 8-1/2 DIA. 143-215JM MOTOR	8	43-28	3/8 LOCK WASHER
	5-188X	*IMPELLER 216mm DIA. 143-215JM MOTOR		43-16	1/2 LOCK WASHER
	5-87X	*IMPELLER 8-1/2 DIA. 254JM AND LARGER MOTOR		43-33	5/8 LOCK WASHER
	5-190X	*IMPELLER 216mm DIA.) 254JM AND LARGER MOTOR	•9	V70446	O-RING, VITON
3	129-771X	RETAINER, IMPELLER 143-215JM MOTOR		E70446	O-RING, EPDM
	129-772X	RETAINER, IMPELLER 254JM AND LARGER MOTOR		S75446	O-RING, SILICONE
•4	V70220	O-RING, VITON		K75446	O-RING , KALREZ
	E70220	O-RING, EPDM	10	1-61X	BACKPLATE
	S70220	O-RING, SILICONE	11	119-69	CASING CLAMP
4	K75220	O-RING, KALREZ	12	65-3	KEY -3/16" ; 143-215JM FRAME MOTOR
				65-4	KEY -1/4" ; 254-326JM FRAME MOTOR

•RECOMMENDED SPARE PARTS

\* Trimmed impellers are same part number; specify diameter to 1/16-inch(1.59mm) increments.  
 \*\* These casings do not meet the requirements of 3A Sanitary Standards

PAGE 26 - SEALS KITS  
 PAGE 26-28 - METRIC NOTES  
 PAGE 34 - INDUSTRIAL CASINGS

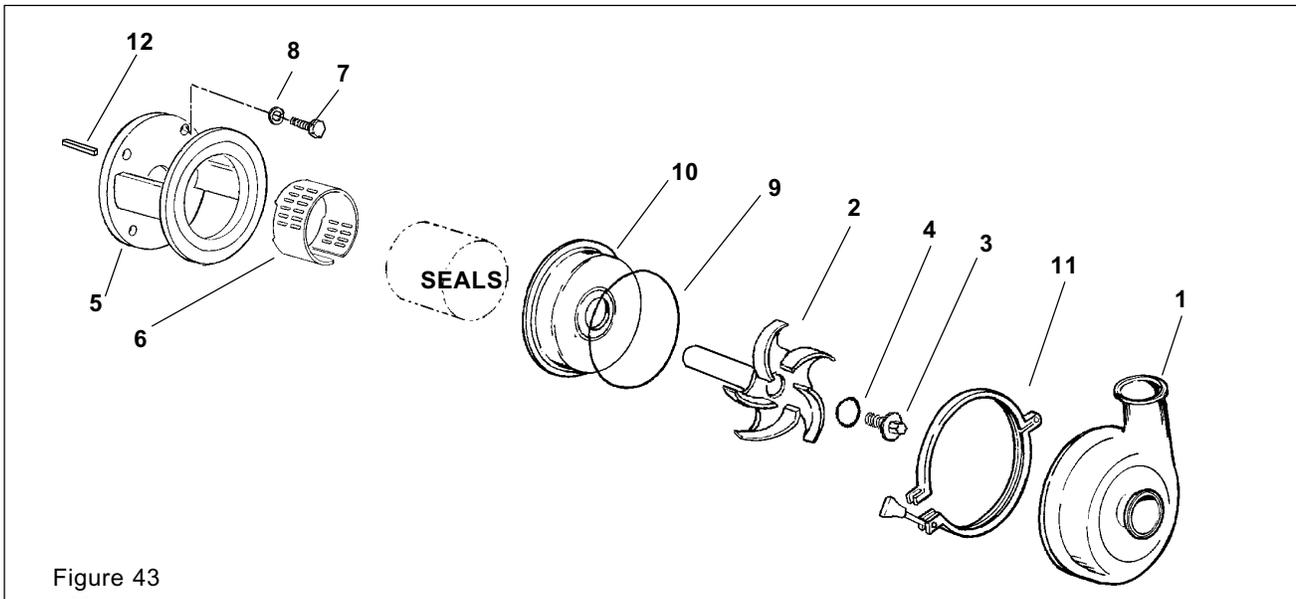


Figure 43

**2085LV COMPONENTS (CLOSE COUPLED)**

ITEM	PART NO.	NAME
1	301-18BX	CASING 2 X 1-1/2 BEVELED SEAT
	301-18EX	CASING 50mm X 40mm DIN
	301-18FX**	CASING 2 X 1-1/2 FLANGE
	301-1 8HX	CASING 2 X 1-1/2 FEMALE "I" LI N E
	301-18JX	CASING 2 X 1-1/2 MALE "I" LINE
	301-18KX	CASING 2X 1-1/2 "S" CLAMP
	301 -18NX**	CASING 2 X 1-1/2 N.P.T FEMALE
	301-18MX**	CASING 2 X 1-1/2 N.P.T MALE
	301-18WX	CASING 2 X 1-1/2 WELD
	301-18QX	CASING 2 X 1-1/2 "Q" CLAMP
	2	1-1/2 X
1-1/2 X		*IMPELLER 216mm 143-215JM MOTOR
1-1/2 X		*IMPELLER 8-1/2 DIA. 254JM AND LARGER MOTOR
1-1/2 X		*IMPELLER 216mm 254JM AND LARGER MOTOR

\* Trimmed impellers are same part number; specify diameter to 1/16-inch(1.59mm) increments.  
 \*\* These casings do not meet the requirements of 3A Sanitary Standards

PAGE 26 - SEALS KITS  
 PAGE 26-28 - METRIC NOTES  
 PAGE 34 - INDUSTRIAL CASINGS

REFER TO 2085 FOR OTHER COMPONENTS

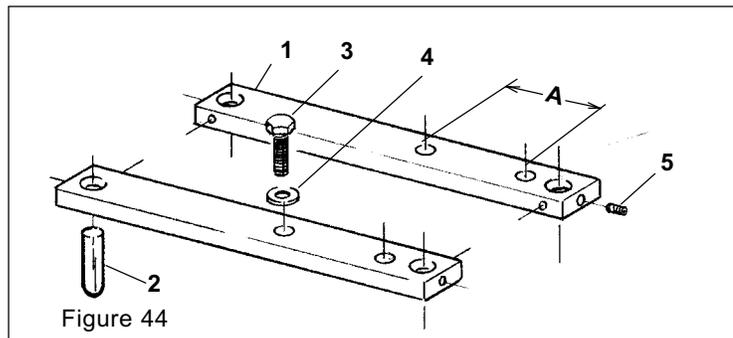


Figure 44

**MOTOR MOUNTS**

PART NO.	FRAME	1	2	3	4	5	A INCH
355-1	56	55-1	4-1	30-30	43-28	30-22	3
355-2	143	55-2	4-1	30-30	43-28	30-22	4
355-3	145	55-3	4-1	30-30	43-28	30-22	5
355-4	182	55-4	4-1	30-30	43-28	30-38	4-1/2
355-5	184/213	55-5	4-1	30-30	43-28	30-38	5-1/2
355-6	215	55-6	4-1	30-30	43-28	30-38	7
355-7	254	55-7	4-1	30-36	43-16	30-38	8-1/4
355-8	256	55-8	4-2	30-36	43-16	30-23	10
355-9	284	55-9	4-2	30-36	43-16	30-23	9-1/2
355-10	286	55-10	4-2	30-36	43-16	30-23	11
355-11	324	55-11	4-2	30-24	43-33	30-23	10-1/2
355-12	326	55-12	4-2	30-24	43-33	30-23	12

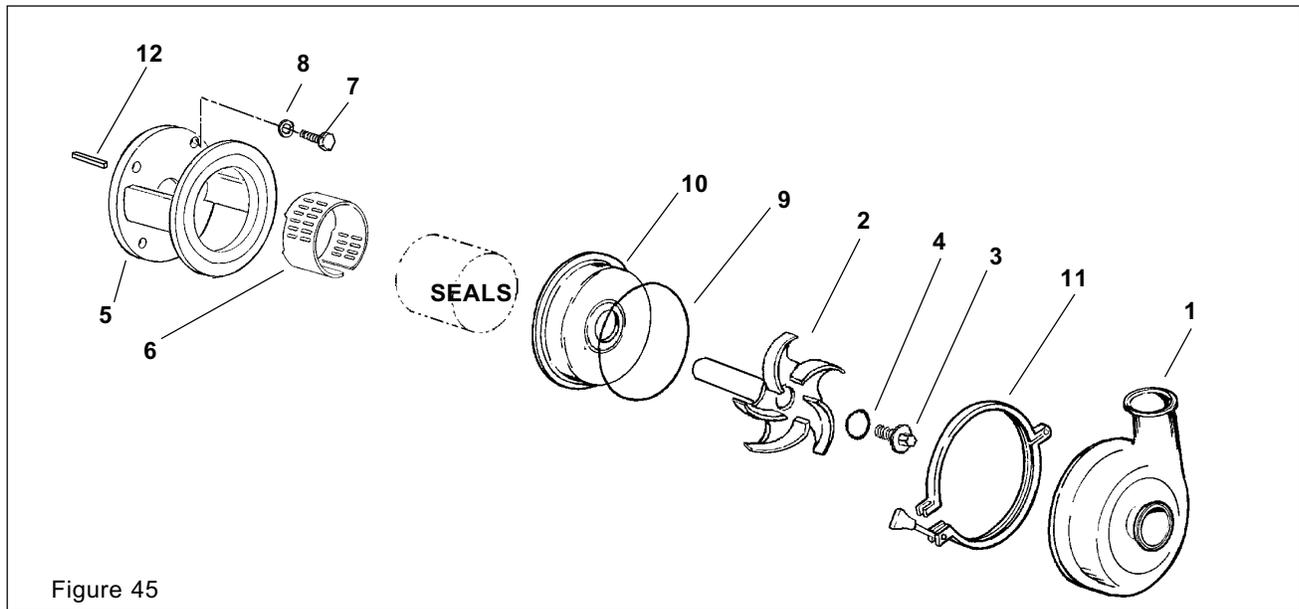


Figure 45

**2105 COMPONENTS (Close coupled)**

ITEM	PART NO.	NAME
1	301-28BX	CASING 4 X 4 BEVELED SEAT
	301-28EX	CASING 100mm X 100mm DIN
	301-28FX**	CASING 4 X 4 FLANGE
	301-28HX	CASING 4 X 4 FEMALE I-LINE
	301-28JX	CASING 4 X 4 MALE I-LINE
	301-28KX	CASING 4 X 4 "S" CLAMP
	301-28NX**	CASING 4 X 4 N.P.T FEMALE
	301-28MX**	CASING 4 X 4 N.P.T. MALE
	301-28WX	CASING 4 X 4 WELD
	301-28QX	CASING 4 X 4 "Q" CLAMP
	301-56EX	CASING 150mm X 100mm DIN
	301-56BX	CASING 6 X 4 BEVELED SEAT
	301-56FX**	CASING 6 X 4 150 LB FLANGE
	301-56NX**	CASING 6 X 4 NPT; FEMALE
	301-56MX**	CASING 6 X 4 NPT; MALE
	301-56HX	CASING 6 X 4 FEMALE I-LINE
	301-56JX	CASING 6X 4 MALE I-LINE
301-56KX	CASING 6 X 4 "S" CLAMP	
301-56WX	CASING 6 X 4 WELD	
2	5-72X	*IMPELLER 10-1/2 DIA 184215JM MOTORS
	5-192X	*IMPELLER 267mm DIA) 184-215JM MOTORS
	5-70X	*IMPELLER 10-1/2 DIA 254JM AND LARGER MOTOR
	5-194X	*IMPELLER (267mm DIA) 254JM AND LARGER MOTOR
	3	129-771X
	129-772X	RETAINER, IMPELLER 245JM AND LARGER MOTOR
• 4	V70220	O-RING, VITON
	E70220	O-RING, EPDM
	S75220	O-RING, SILICONE
	K75220	O-RING, KALREZ

ITEM	PART NO.	NAME	
5	2-233	ADAPTER, MOTOR 143-184JM FRAME	
	2-230	ADAPTER, MOTOR 213-215JM FRAME	
	2-231	ADAPTER, MOTOR 254-256JM FRAME	
	2-232	ADAPTER, MOTOR 284JM AND LARGER FRAME	
	6	70-23	SEAL GUARD 143-215JM MOTOR
		70-24	SEAL GUARD 254-256JM MOTOR
		70-25	SEAL GUARD 284-324JM MOTOR
	7	30-30	3/8-16 X 1 BOLT 143-184JM MOTOR
		30-36X	1/2-13 X 1-1/4 BOLT 213-256JM MOTOR
		30-105	5/8-11 X 1-1/2 BOLT 284JM AND LARGER MOTOR
8		43-28	3/8 LOCK WASHER
		43-16	1/2 LOCK WASHER
	43-33	5/8 LOCK WASH ER	
•9	E70450	O-RING, EPDM	
	S75450	O-RING, SILICONE	
	K75450	O-RING, KALREZ	
10	1 -29X	BACKPLATE	
11	119-223	CASING CLAMP	
12	65-3	KEY -3/16" ; 143-215JM FRAME MOTOR	
	65-4	KEY -1/4" ; 254-326JM FRAME MOTOR	

•RECOMMENDED SPARE PARTS

\*Trimmed impellers are same part number; specify diameter to 1/16-inch (1.59mm) increments.

PAGE 26 - SEALS KITS  
PAGE 26-28 - METRIC NOTES  
PAGE 34 - INDUSTRIAL CASINGS

\*\* These casings do not meet the requirements of 3A Sanitary Standards

# PARTS LIST

# INDUSTRIAL CASINGS

These casings do not meet the requirements of 3A Sanitary Standards

## U2045 1-1/2 X 1-1/2 INDUSTRIAL

301-57KXA	CASING 1-1/2 X 1-1/2 "S" CLAMP (MP)
301-57BXA	CASING 1-1/2 X 1-1/2 BEVELED SEAT
301-57HXA	CASING 1-1/2 X 1-1/2 FEMALE I-LINE
301-57JXA	CASING 1-1/2 X 1-1/2 MALE I-LINE
301-57QXA	CASING 1-1/2 X 1-1/2 "Q" CLAMP
301-57WXA	CASING 1-1/2 X 1-1/2 WELD
301-57MXA	CASING 1-1/2 X 1-1/2 N.P.T MALE
301-57NXA	CASING 1-1/2 X 1-1/2 N.P.T FEMALE
301-57FXA	CASING 1-1/2 X 1-1/2 150 LB FLANGE

## U2045 2 X 1-1/2 INDUSTRIAL

301-58KXA	CASING 2 X 1-1/2 "S" CLAMP (MP)
301-58BXA	CASING 2 X 1-1/2 BEVELED SEAT
301-58HXA	CASING 2 X 1-1/2 FEMALE I-LINE
301-58JXA	CASING 2 X 1-1/2 MALE I-LINE
301-58QXA	CASING 2 X 1-1/2 "Q" CLAMP
301-58 WXA	CASING 2 X 1-1/2 WELD
301-58MXA	CASING 2 X 1-1/2 N.P.T MALE
301-58NXA	CASING 2 X 1-1/2 N.P.T FEMALE
301-58FXA	CASING 2 X 1-1/2 150 LB FLANGE

## U2065 2-1/2 X 2 INDUSTRIAL

301-8KXA	CASING 2-1/2 X 2 "S" CLAMP (MP)
301-8BXA	CASING 2-1/2 X 2 BEVELED SEAT
301-8HXA	CASING 2-1/2 X 2 FEMALE I-LINE
301-8JXA	CASING 2-1/2 X 2 MALE I-LINE
301-8QXA	CASING 2-1/2 X 2 "Q" CLAMP
301-8WXA	CASING 2-1/2 X 2 WELD
301-8MXA	CASING 2-1/2 X 2 N.P.T MALE
301-8NXA	CASING 2-1/2 X 2 N.P.T FEMALE
301-8FXA	CASING 2-1/2 X 2 150 LB FLANGE

## U2065HV 3 X 2 INDUSTRIAL

301-17KXA	CASING 3 X 2 "S" CLAMP (MP)
301-17BXA	CASING 3 X 2 BEVELED SEAT
301-17HXA	CASING 3 X 2 FEMALE I-LINE
301-17JXA	CASING 3 X 2 MALE I-LINE
301-17QXA	CASING 3 X 2 "Q" CLAMP
301-17WXA	CASING 3 X 2 WELD
301-17MXA	CASING 3 X 2 N.P.T MALE
301-17NXA	CASING 3 X 2 N.P.T FEMALE
301-17FXA	CASING 3 X 2 150 LB FLANGE

## U2065LV 1-1/2 X 1-1/2 INDUSTRIAL

301-62KXA	CASING 1-1/2 X 1-1/2 "S" CLAMP (MP)
301-62BXA	CASING 1-1/2 X 1-1/2 BEVELED SEAT
301-62HXA	CASING 1-1/2 X 1-1/2 FEMALE I-LINE
301-62JXA	CASING 1-1/2 X 1-1/2 MALE I-LINE
301-62QXA	CASING 1-1/2 X 1-1/2 "Q" CLAMP
301-62WXA	CASING 1-1/2 X 1-1/2 WELD
301-62MXA	CASING 1-1/2 X 1-1/2 N.P.T MALE
301-62NXA	CASING 1-1/2 X 1-1/2 N.P.T FEMALE
301-62FXA	CASING 1-1/2 X 1-1/2 150 LB FLANGE

## U2065LV 2 X 1-1/2 INDUSTRIAL

301-63KXA	CASING 2 X 1-1/2 "S" CLAMP (MP)
301-63BXA	CASING 2 X 1-1/2 BEVELED SEAT
301-63HXA	CASING 2 X 1-1/2 FEMALE I-LINE
301-63JXA	CASING 2 X 1-1/2 MALE I-LINE
301-63QXA	CASING 2 X 1-1/2 "Q" CLAMP
301-63WXA	CASING 2 X 1-1/2 WELD
301-63MXA	CASING 2 X 1-1/2 N.P.T MALE
301-63NXA	CASING 2 X 1-1/2 N.P.T FEMALE
301-63FXA	CASING 2 X 1-1/2 150 LB FLANGE

## U2065LV 2-1/2 X 1-1/2 INDUSTRIAL

301-64KXA	CASING 2-1/2 X 1-1/2 "S" CLAMP (MP)
301-64BXA	CASING 2-1/2 X 1-1/2 BEVELED SEAT
301-64HXA	CASING 2-1/2 X 1-1/2 FEMALE I-LINE
301-64JXA	CASING 2-1/2 X 1-1/2 MALE I-LINE
301-64QXA	CASING 2-1/2 X 1-1/2 "Q" CLAMP
301-64WXA	CASING 2-1/2 X 1-1/2 WELD
301-64MXA	CASING 2-1/2 X 1-1/2 N.P.T MALE
301-64NXA	CASING 2-1/2 X 1-1/2 N.P.T FEMALE
301-64FXA	CASING 2-1/2 X 1-1/2 150 LB FLANGE

## U2085 3 X 2-1/2 INDUSTRIAL

301-5KXA	CASING 3 x 2-1/2 "S" CLAMP (MP)
301-5BXA	CASING 3 x 2-1/2 BEVELED SEAT
301-5HXA	CASING 3 x 2-1/2 FEMALE I-LINE
301-5JXA	CASING 3 x 2-1/2 MALE I-LINE
301-5QXA	CASING 3 x 2-1/2 "Q" CLAMP
301-5WXA	CASING 3 x 2-1/2 WELD
301-5MXA	CASING 3 x 2-1/2 N.P.T MALE
301-5NXA	CASING 3 x 2-1/2 N.P.T FEMALE
301-5FXA	CASING 3 x 2-1/2 150 LB FLANGE

## U2085 4 X 2-1/2 INDUSTRIAL

301-7KXA	CASING 4 x 2-1/2 "S" CLAMP (MP)
301-7BXA	CASING 4 x 2-1/2 BEVELED SEAT
301-7HXA	CASING 4 x 2-1/2 FEMALE I-LINE
301-7JXA	CASING 4 x 2-1/2 MALE I-LINE
301-7QXA	CASING 4 X 1-1/2 "Q" CLAMP
301-7WXA	CASING 4 X 1-1/2 WELD
301-7MXA	CASING 4 X 1-1/2 N.P.T MALE
301-7NXA	CASING 4 X 1-1/2 N.P.T FEMALE
301-7FXA	CASING 4 X 1-1/2 150 LB FLANGE

## U2085LV 2 X 1-1/2 INDUSTRIAL

301-18KXA	CASING 2 X 1-1/2 "S" CLAMP (MP)
301-18BXA	CASING 2 X 1-1/2 BEVELED SEAT
301-18HXA	CASING 2 X 1-1/2 FEMALE I-LINE
301-18JXA	CASING 2 X 1-1/2 MALE I-LINE
301-18QXA	CASING 2 X 1-1/2 "Q" CLAMP
301-18WXA	CASING 2 X 1-1/2 WELD
301-18MXA	CASING 2 X 1-1/2 N.P.T MALE
301-18NXA	CASING 2 X 1-1/2 N.P.T FEMALE
301-18FXA	CASING 2 X 1-1/2 150 LB FLANGE

## U2105 4 X 4 INDUSTRIAL

301-28KXA	CASING 4 X 4 "S" CLAMP (MP)
301-28BXA	CASING 4 X 4 BEVELED SEAT
301-28HXA	CASING 4 X 4 FEMALE I-LINE
301-28JXA	CASING 4 X 4 MALE I-LINE
301-28QXA	CASING 4 X 4 "Q" CLAMP
301-28WXA	CASING 4 X 4 WELD
301-28MXA	CASING 4 X 4 N.P.T MALE
301-28NXA	CASING 4 X 4 N.P.T FEMALE
301-28FXA	CASING 4 X 4 150 LB FLANGE

## U2105 6 X 4 INDUSTRIAL

301-56KXA	CASING 6 X 4 "S" CLAMP (MP)
301-56BXA	CASING 6 X 4 BEVELED SEAT
301-56HXA	CASING 6 X 4 FEMALE I-LINE
301-56JXA	CASING 6 X 4 MALE I-LINE
301-56QXA	CASING 6 X 4 "Q" CLAMP
301-56WXA	CASING 6 X 4 WELD
301-56MXA	CASING 6 X 4 N.P.T MALE
301-56NXA	CASING 6 X 4 N.P.T FEMALE
301-56FXA	CASING 6 X 4 150 LB FLANGE

CONTINUED

## DESCRIPTION/SPECIFICATIONS

The Waukesha 200 Series Modular Base Mounted Centrifugal Pump design consists of 4 components (in addition to pump and motor). These components are used in various combinations and arrangements to provide flexibility to meet various needs:

- \* **Bearing Housing** (Pump adapter)
  - epoxy coated cast iron w/316 SS shaft, ball bearings
  - adapter mounts to pump components (same components used for close coupled pumps)
  - includes coupling for motor shaft plus guards
  - used in style "B" & "C" arrangements

- \* **Motor Adapter**
  - epoxy coated cast iron
  - mounts std. NEMA C-face motor onto bearing housing
  - provides accurate, rigid shaft alignment
  - used in style "B" arrangements

- \* **Stand**
  - epoxy coated cast iron stand (pedestal)
  - stand attaches under motor adapter or bearing housing.

### Base (OPTIONAL)

- epoxy coated channel base - used in style "B" & "C" arrangements (See page 39)

**WARNING**

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

**WARNING**

Do Not operate pump without CASING clamped securely in place.

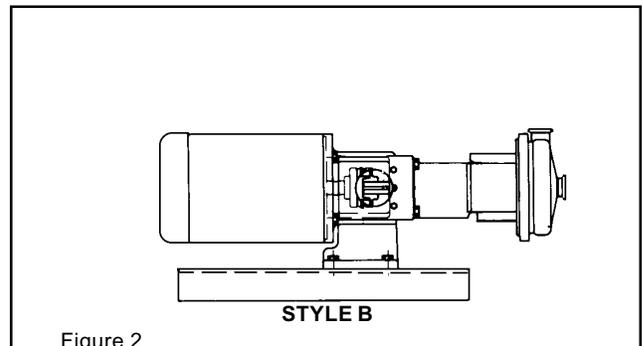


Figure 2

### STYLE "B" Figure 2

Bearing housing, motor adapter and base with stand attached to bearing housing; for use with NEMA C-face motors. All motors must have feet for attachment of supports.

### STYLE "C" Figure 3

Bearing housing and base with stand attached to bearing housing; for use with foot mounted T-frame motors. Pump and motor are mounted and supported independently.

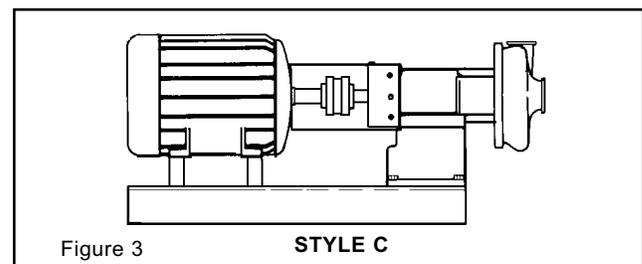
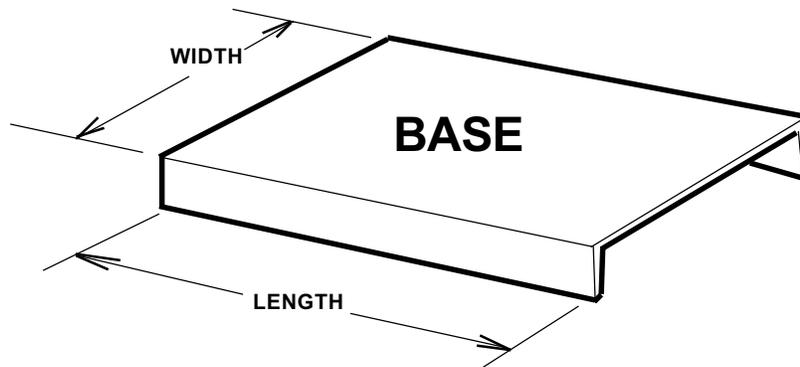


Figure 3

MOTOR HP & RPM	SANITARY & INDUSTRIAL MODELS						
	P2045	P2065LV	P2065	P2065HV	P2085LV	P2085	P2105
UP TO 5HP 1750 RPM	SM.B.	SM.B.	SM.B.	SM.B.	SM.B.	SM.B.	SM.B.
UP TO 5HP 3500 RPM	SM.B.	SM.B.	SM.B.				
7½HP 1750 RPM						SM.B.	LG.B.
7½HP 3500 RPM		SM.B.	SM.B.	SM.B.	SM.B.	SM.B.	
10HP 1750 RPM						SM.B.	LG. B.
10HP 3500 RPM		SM.B.	SM.B.	SM.B.	SM.B.	SM.B.	
15HP 1750 RPM							LG.B.
15HP 3500 RPM			SM.B.	SM.B.	SM.B.	SM.B.	
20HP 1750 RPM							LG.B.
20HP 3500 RPM			SM.B.	SM.B.	SM.B.	SM.B.	
25HP 1750 RPM							LG.B.
25HP 3500 RPM				LG.B.			LG.B.
30HP 1750 RPM							LG.B.
30HP 3500 RPM				LG.B.		LG.B.	
40HP 1750 RPM							LG.B.
40HP 3500 RPM						LG.B.	
50HP 1750 RPM							LG.B.
50HP 3500 RPM						LG.B.	
60HP 3500 RPM						LG.B.	
75HP 3500 RPM						LG.B.	

NOTE: SM.B. = SMALL BORE  
 LG.B. = LARGE BORE



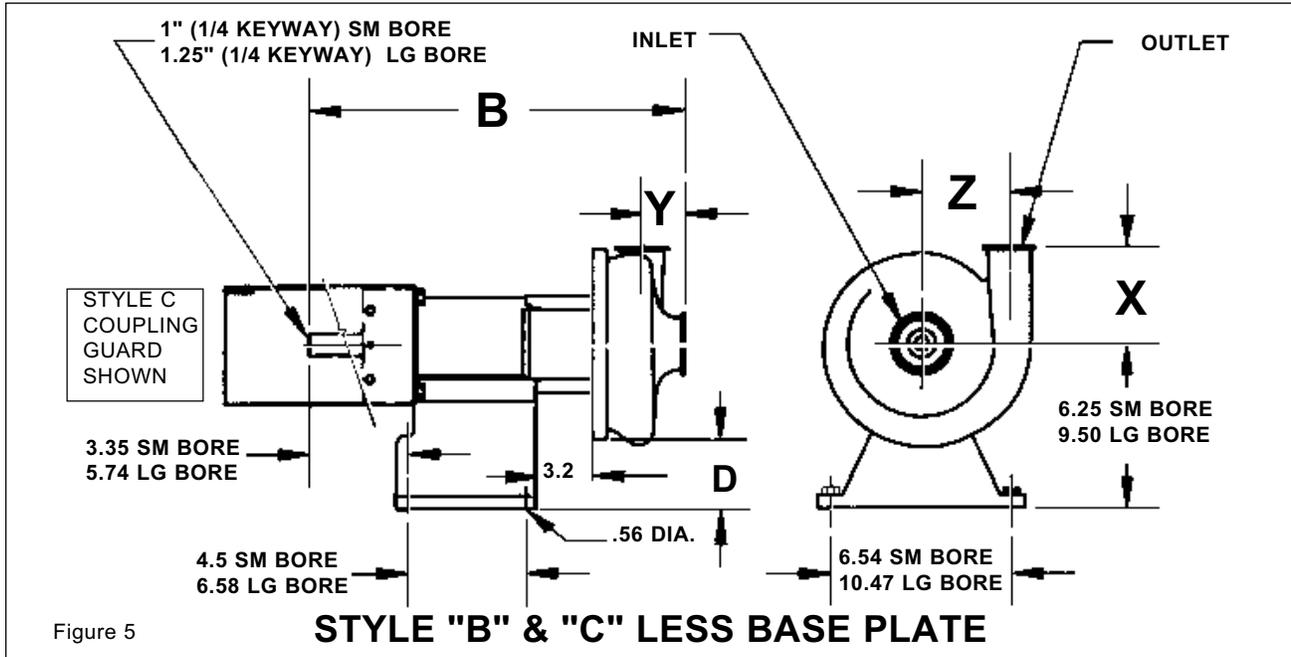
Base plates (OPTIONAL) are provided in three widths and five lengths (*depending on motor frame and pump model.*)

**WIDTH**  
 10  
 15  
 18

**LENGTHS:**  
 20 (STYLE A Only)  
 24  
 32  
 38  
 50

THIS PAGE IS INTENTIONALLY LEFT BLANK

ALSO REFER TO PUMP INSTALLATION PROCEDURES IN FRONT OF BOOK



MODEL	INLET	OUTLET	B		D		X	Y	Z
			SM BORE	LG BORE	SM BORE	LG BORE			
P2045	1.5	1.5	16.39	---	3.0	---	3.88	1.81	2.25
P2045	2.0	1.5	16.39	---	3.0	---	3.88	1.81	2.25
P2065LV	1.5	1.5	16.71	---	2.0	5.2	4.75	1.94	3.19
P2065LV	2.0	1.5	16.71	---	2.0	5.2	4.75	1.94	3.19
P2065LV	2.5	1.5	16.71	---	2.0	5.2	4.75	1.94	3.19
P2065	2.5	2.0	17.30	---	2.0	5.2	4.44	1.94	3.94
P2065HV	3.0	2.0	17.93	21.30	2.0	5.2	4.44	1.94	3.94
P2085LV	2.0	1.5	17.19	20.42	1.0	4.2	6.69	1.75	4.50
P2085	2.0	2.5	18.41	21.90	1.0	4.2	5.63	2.53	5.06
P2085	4.0	2.5	17.91	21.40	1.0	4.2	5.63	2.03	5.06
P2105	4.0	---	---	22.57	---	3.2	6.94	2.86	6.75
P2105	6.0	---	---	22.60	---	3.2	6.94	2.90	6.75

NOTE: DIMENSIONS X , Y , B APPLY TO PUMPS WITH CLAMP CONNECTIONS

NOTE: Style C - Position motor to align with bearing housing shaft according to coupling instructions.

### DISASSEMBLY

Refer to pages 19-23 for Type 1, 1C and Type 4 pump seal procedures.

#### WARNING

TO AVOID SERIOUS INJURY, DO NOT  
INSTALL OR SERVICE PUMP UNLESS  
ALL POWER IS OFF AND LOCKED OUT.

1. Release clamp and remove casing. Remove impeller retainer bolt and O-ring. Pull impeller/backplate assembly off bearing housing shaft. (Figure 4)

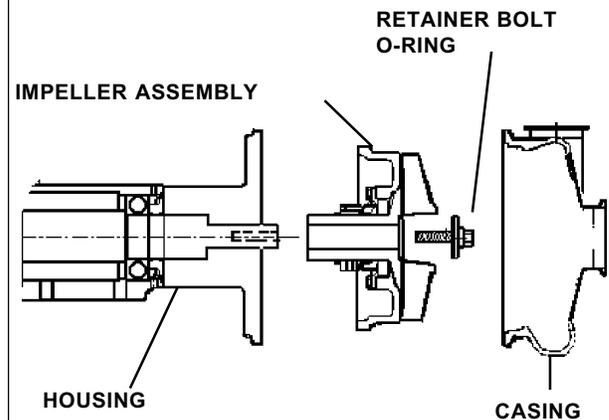


Figure 4

2. Remove the coupling covers (cap screws). Loosen the set screws on the pump coupling. (Figure 5)

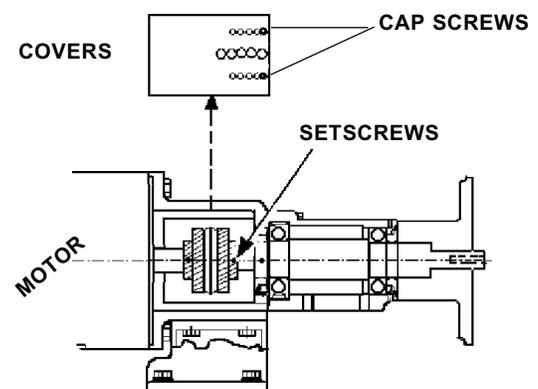


Figure 5

3. **Style B**; Remove bolts from adapter and stand. Remove housing and stand as a unit.

**Style C**; Remove stand/housing assembly, then remove end cap. (See Figure 10 for end cap).

3. Push the shaft and bearing assembly out of the housing from the impeller end. (Figure 7)

4. Remove the retaining ring and press the bearings off the shaft. (Figure 7)

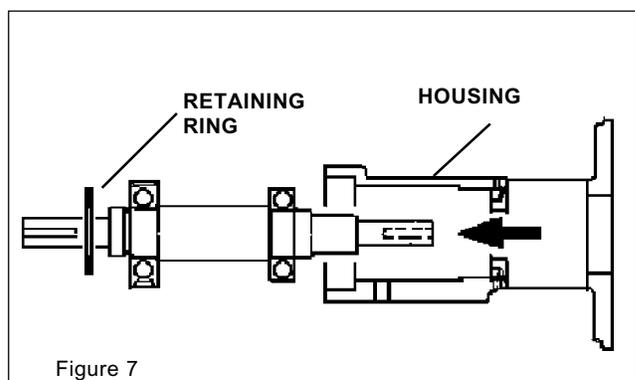


Figure 7

## OUTER SEAL ASSEMBLIES

5. Using an 1/8" hex wrench, loosen set screws (opposite the grease fittings in the adapter or end cap) and the impeller end of the bearing housing. Remove the outer seal ring assemblies: (Remove the inner seal ring and O-rings.) (Figure 8 and Figure 9).

## ASSEMBLY

Reverse the above disassembly procedure with the added step of installing new O-rings in the seal rings on Small Bore Units and Large Bore Units. (Figure 10 shows seal position at motor end. Seals at pump end face inward.) **TIGHTEN SETSCREWS WHEN INSTALLING OUTER SEAL ASSEMBLIES.** (Figure 9)

**NOTE:** It is recommended that all rubber parts be replaced whenever a unit is dismantled for inspection or repair. Lubricate with an approved/ sanitary lubricant prior to assembly.

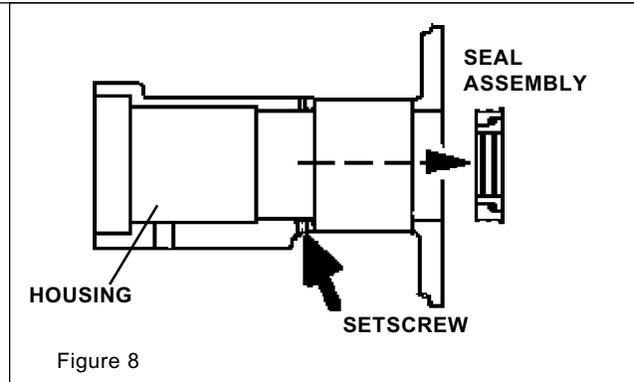


Figure 8

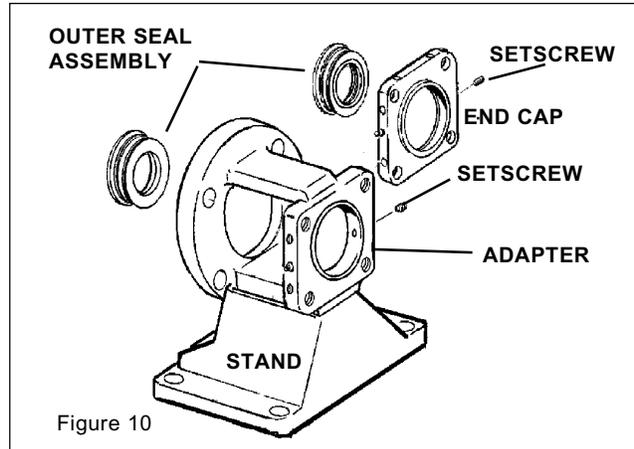


Figure 10

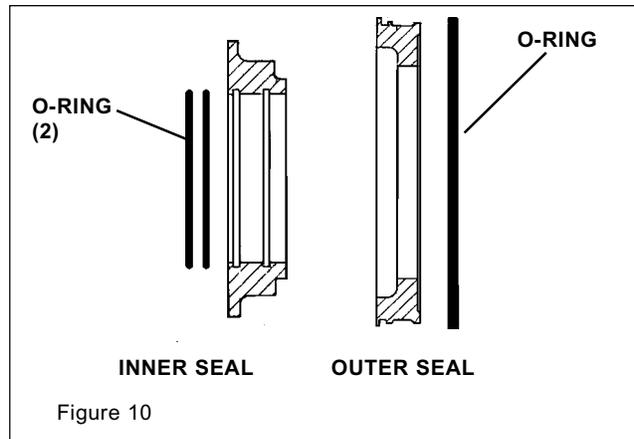


Figure 10

## PRE-ASSEMBLED SEALS

Pre-assembled (Cartridge) Seals have all of the seal components mounted to a flange. They are pre adjusted at factory. Follow the Seal Manufacturers's (John Crane, A. W. Chesterton, etc.) recommendations regarding application, operation and maintenance.

The following procedures apply to this type of seal:

## DISASSEMBLY

1. Remove all flush connections and fittings. Remove the casing clamp, casing and O-ring from the housing flange. (Figure 11)

2. Remove the impeller retainer bolt and O-ring; then loosen the seal setscrews-and pull the impeller, backplate and seal off the bearing shaft as a unit. Set the assembly face down (*on the impeller*). (Figure 11-12)

**Note:** *The clearance shims that position the impeller within the casing are at the end of the impeller hub (inside the seal.) Keep shims together as a set for reassembly.* (Figure 12)

3. Remove the seal unit from the backplate assembly by removing the cap screws holding the seal flange to the seal adapter. Pull seal from seal adapter. Remove seal adapter by removing socket head cap screws holding adapter to the back plate. (Figure 12)

## PUMP ASSEMBLY

1. Place shims, backplate and impeller on the shaft assembly. Hand tighten the impeller retainer bolt on the shaft.

2. Check the space between the back of the impeller and the backplate with a feeler gage (.030 nominal) while holding the backplate tight against the bearing housing flange. (*Any axial movement of the shaft should not be added to the .030 nominal clearance.*) If needed, change this clearance by adding or removing shims. (Figure12-13) Confirm operating clearances by clamping the casing to the bearing housing flange and rotating the shaft/impeller manually to be sure the impeller does not touch the casing or backplate. When proper shim pack is confirmed **remove** the casing, impeller and backplate leaving the shim pack on the shaft.

3. Insert L-gasket into the backplate. Insert cartridge adapter into the backplate and tighten with four socket head cap screws. (Figure 14)

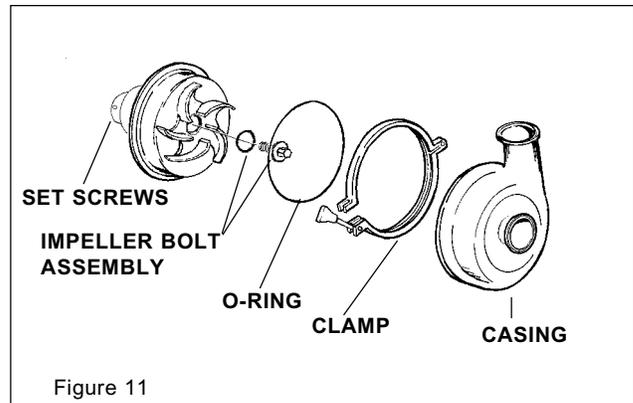


Figure 11

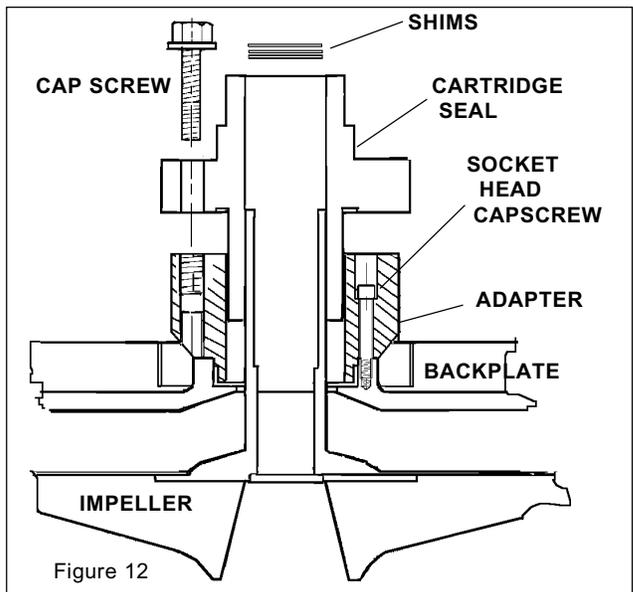


Figure 12

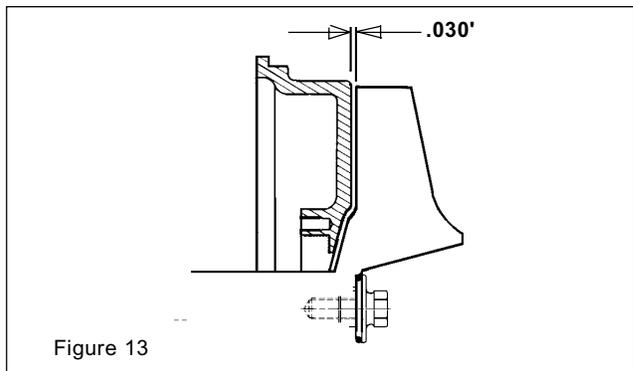


Figure 13

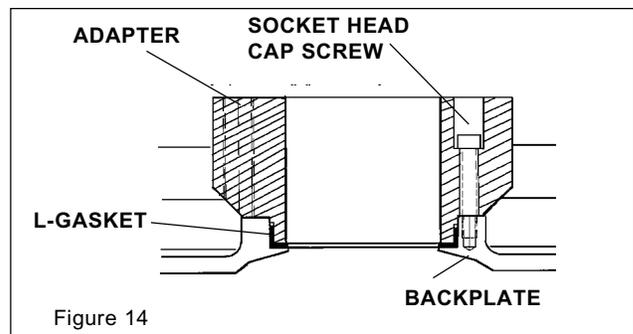


Figure 14

4. Install the cartridge seal unit and use retaining bolts and flat washers to secure unit to the cartridge adapter. (Figure 15) **DO NOT TIGHTEN-BE SURE THE REMOVABLE LUGS/ SPACERS THAT POSITION THE ROTATING PART OF THE SEAL IN THE HOUSING ARE IN PLACE AT THIS TIME.**

5. Apply FDA approved anti-seize compound to the shaft. Install and position the seal guard. (Figure 16)

6. Slide the impeller, backplate and seal unit onto the shaft. Be sure the flushing ports in the seal flange are positioned with the inlet toward the bottom and the outlet toward the top. Install the impeller key and O-ring. Install impeller retainer bolt and tighten. (Figure 17)

7. Hold the backplate in place and tighten the cartridge seal into the cartridge adapter. *The backplate and seal can be rotated to give access to the bolts through the holes in the guard.*

8. Install O-ring and casing; clamp in place. Tighten the (two setscrews) to the shaft and remove the LUGS/SPACERS. (Figure 18) Connect flushing fluid and flood seal. Turn the shaft manually to be sure shaft rotates without the impeller hitting.(Figure 18)

## LUBRICATION

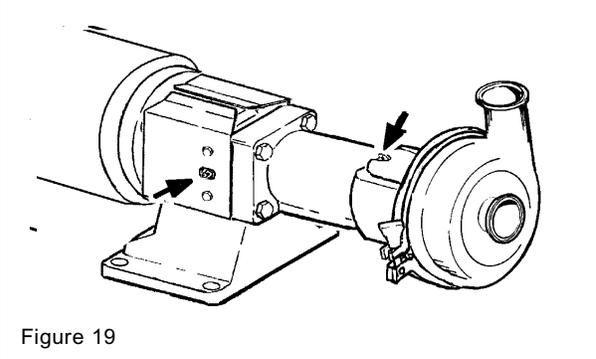
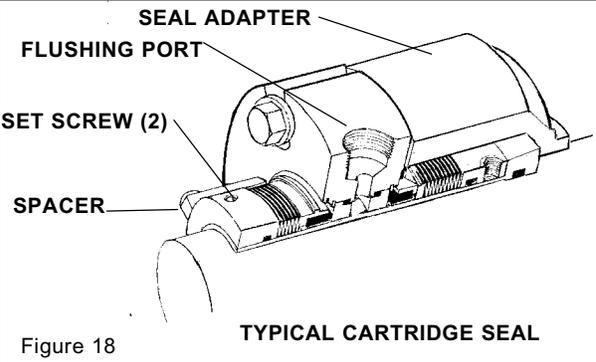
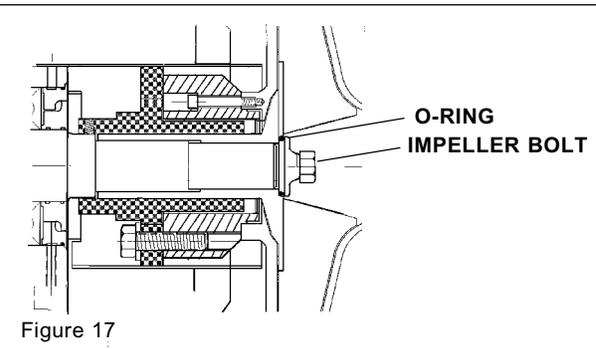
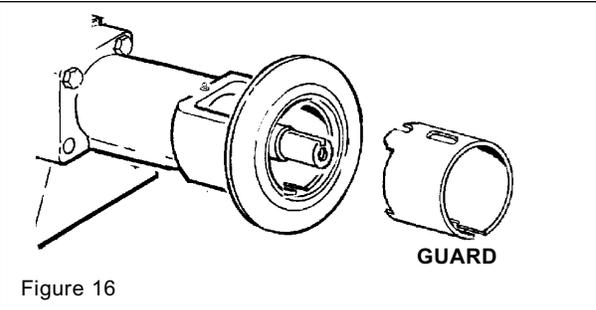
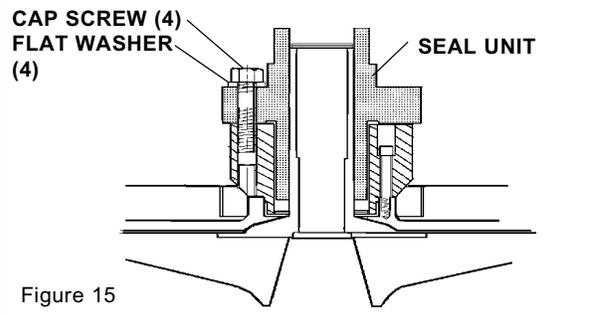
Waukesha Series 200 Pedestal Pumps are lubricated with GOA Micro-Plate 555 Lithium Complex Grease. Use only NLGI grade 2 Lithium Complex thickened greases to replenish bearing grease supply. Grease fittings in Figure 19.

**NOTE:** *Mixing greases that are not miscible with the above products can change the viscosity/consistency of the grease resulting in bearing damage. If there is doubt remove the bearings, clean and re-pack. Contact Waukesha Application Engineering for compatible lubricants. (414-728-1900)*

## LUBRICATION SCHEDULE:

SIZE/RPM	Hours
Small Bore/1750 RPM	4400
Small Bore/3500 RPM	2000
Large Bore/1750 RPM	2000
Large Bore/3500 RPM	1000

**NOTE:** *If operating temperatures are over 158°F. (70°C.) reduce hours by half for every 27°F.(15°C.) over the operating temperature.*



The following pictorial list of cartridge seals is provided to assist in identifying some of the seals provided with the Model 200 centrifugal pumps. Use of these cartridges requires a cartridge seal adapter. A typical installation layout is shown at the bottom of the page. See page 43 for assembly instructions.

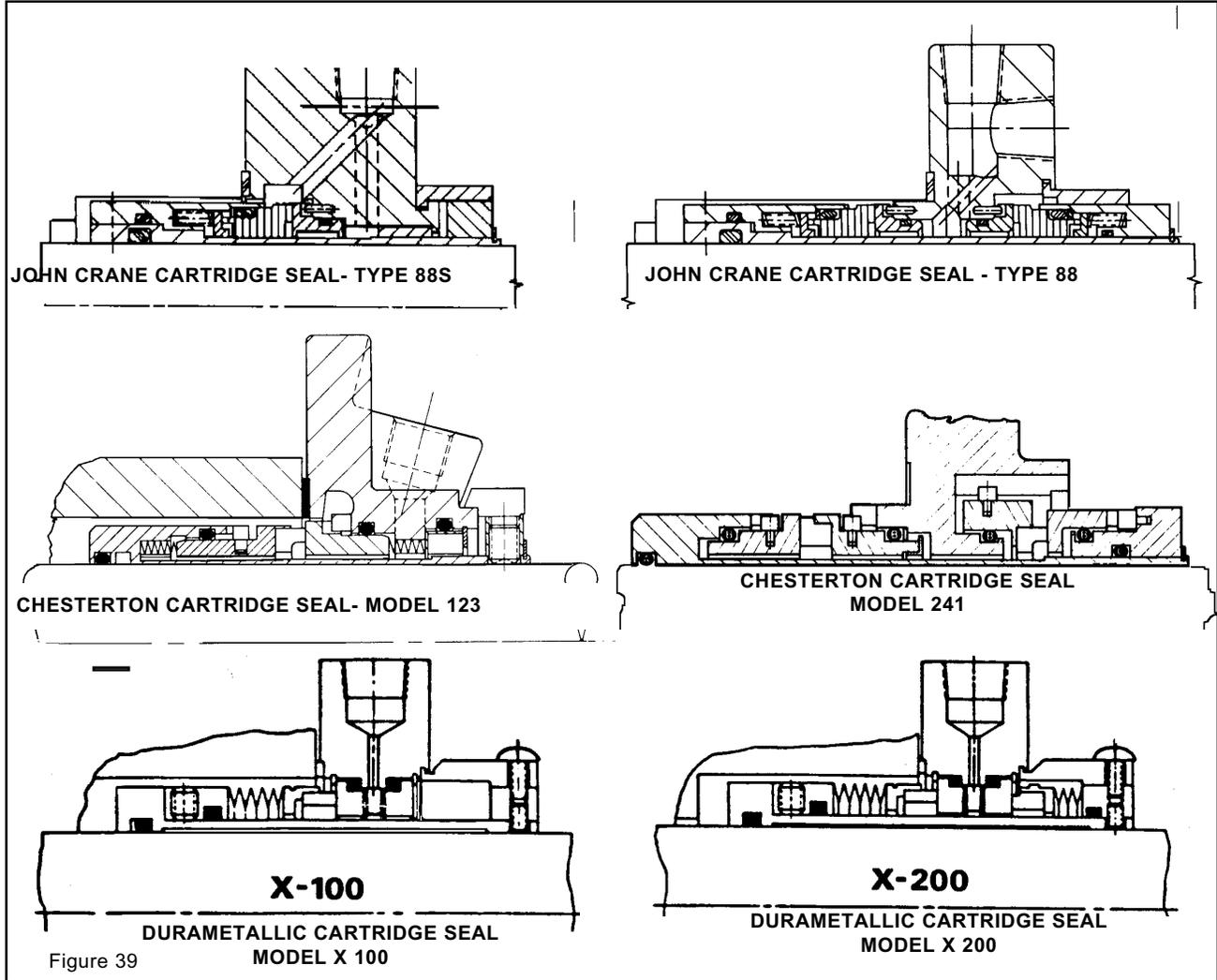


Figure 39

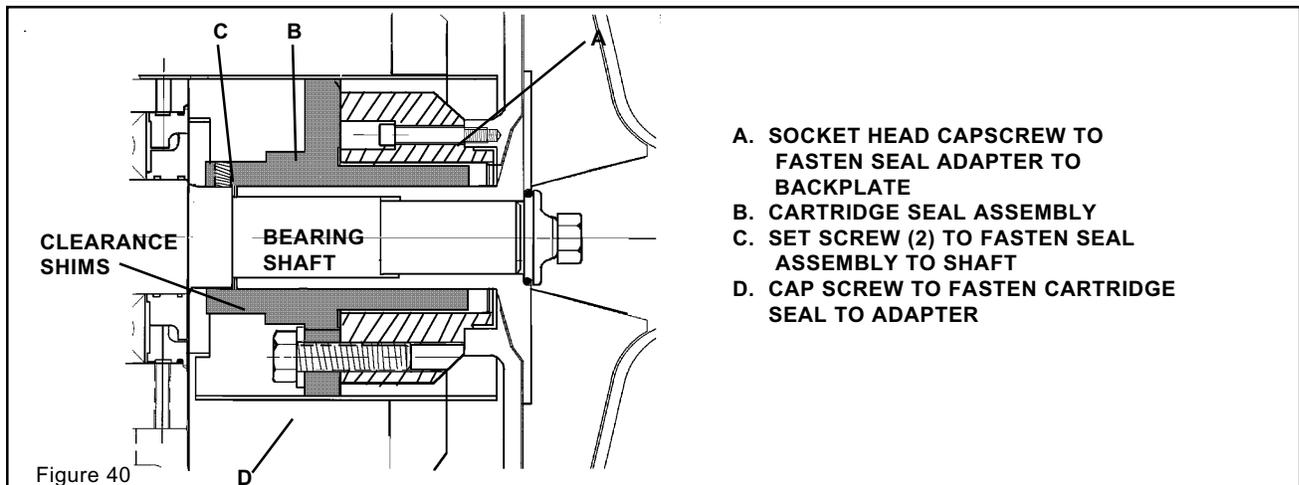


Figure 40

- A. SOCKET HEAD CAPSCREW TO FASTEN SEAL ADAPTER TO BACKPLATE
- B. CARTRIDGE SEAL ASSEMBLY
- C. SET SCREW (2) TO FASTEN SEAL ASSEMBLY TO SHAFT
- D. CAP SCREW TO FASTEN CARTRIDGE SEAL TO ADAPTER

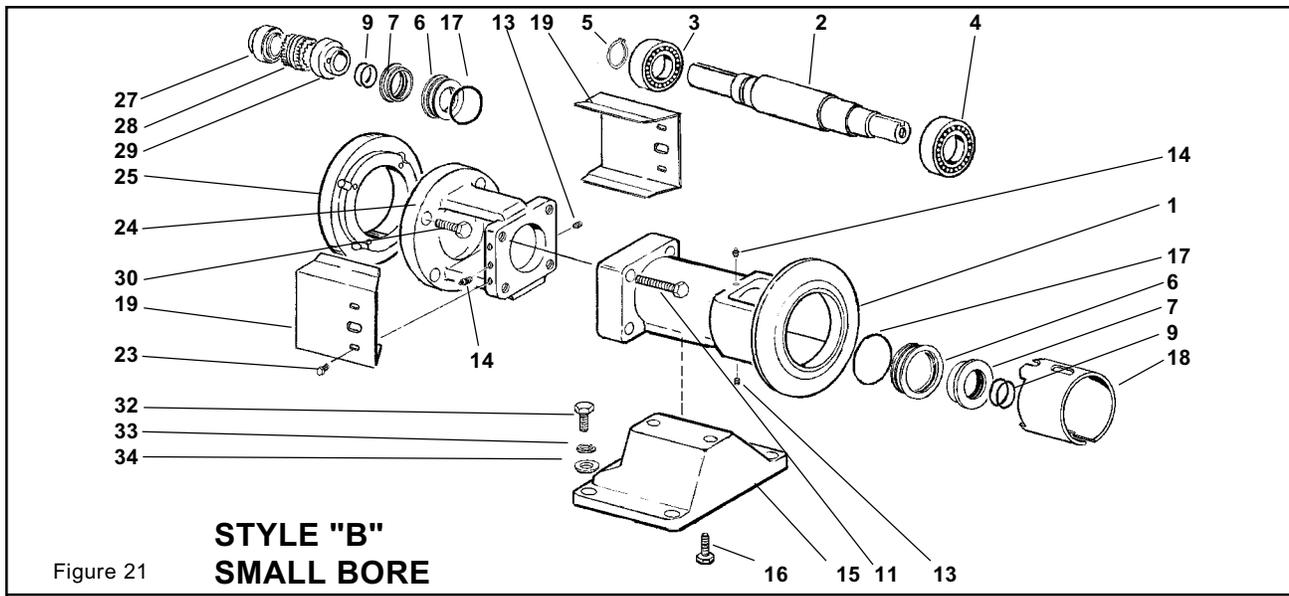


Figure 21

## STYLE "B" SMALL BORE

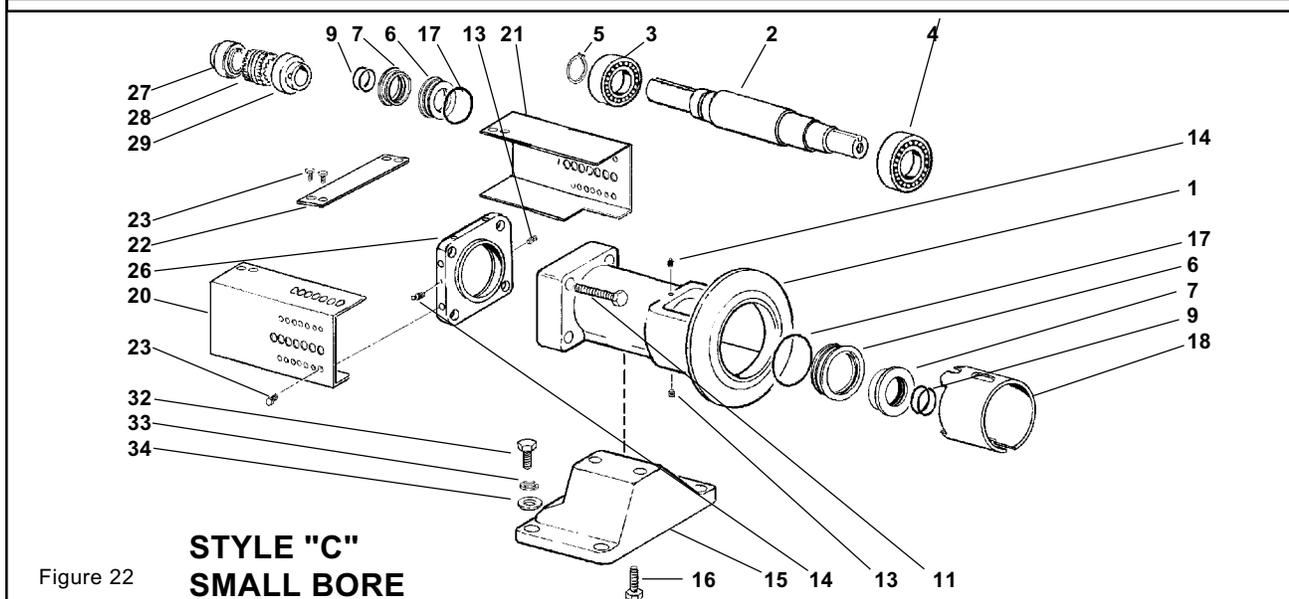


Figure 22

## STYLE "C" SMALL BORE

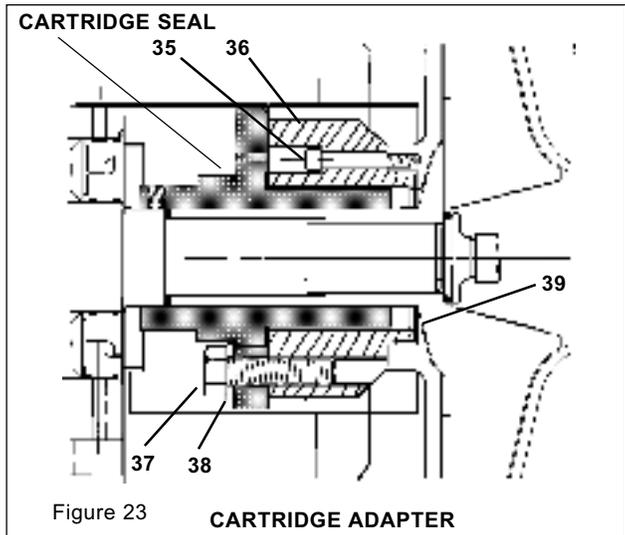
ITEM	STYLE	MOTOR	PART NO.	DESCRIPTION
1	B,C	ALL	68-6	BEARING HOUSING 2045
	B,C	ALL	68-7	BEARING HOUSING 2065
	B,C	ALL	68-8	BEARING HOUSING 2085
2	B,C	ALL	62-528X	SHAFT
•3	B,C	ALL	23-101	BEARING 6309
•4	B,C	ALL	23-100	BEARING 6209
•5	B,C	ALL	43-139	RETAININGRING
6	B,C	ALL	23-90	SEAL OUTER
7	B,C	ALL	23-89	SEAL INNER
•9	B,C	ALL	N70031	031 O-RING INNER
11	ALL	ALL	30-138X	HHCS 1/2-13 X 2
13	B,C	ALL	30-178	SHSS 1/4-20 X 3/8
14	B,C	ALL	BD0092000	GREASE FITTING
15	B,C	ALL	4-34	STAND
16	B,C	ALL	30-78X	HHCS 1/2-13 X 1
•17	B,C	ALL	N70041	041 O RING OUTER
18	B,C	ALL	70-33	COVER SEAL 2065/2085
	B,C	ALL	70-32	COVER SEAL 2045
19	B	ALL	70-31	COVER COUPLING ADAP
20	C	ALL	70-29	COVER COUPLING L.H.
21	C	ALL	70-30	COVER COUPLING R. H.
22	C	ALL	2-251	BRACE, COVER COUPLING
23	B,C	ALL	30-62	HHCS 1/4-20 X 1/2 LG.
24	B	56C	2-247	ADAPTER 56C
	B	143TC	2-247	ADAPTER 56C
	B	145TC	2-247	ADAPTER 56C
	B	182TC	2-248	ADAPTER 182TC
	B	184TC	2-248	ADAPTER 182TC
	B	213TC	2-248	ADAPTER 182TC
	B	215TC	2-248	ADAPTER 182TC
	B	254TC	2-248	ADAPTER 182TC
	B	256TC	2-248	ADAPTER 182TC
25	B	213TC	43-134	SPACER ADAPTER 213TC
	B	215TC	43-134	SPACER ADAPTER 213TC
	B	254TC	43-135	SPACER ADAPTER 254TC
	B	256TC	43-135	SPACER ADAPTER 254TC
26	C	ALL	23-92	END CAP HOUSING SB

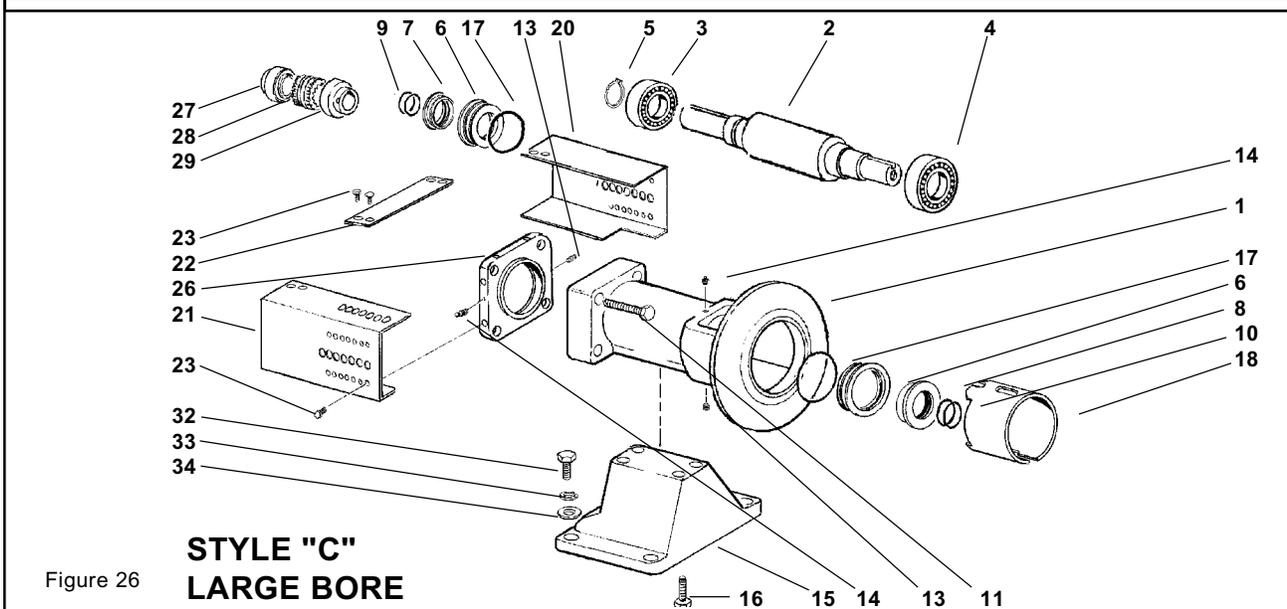
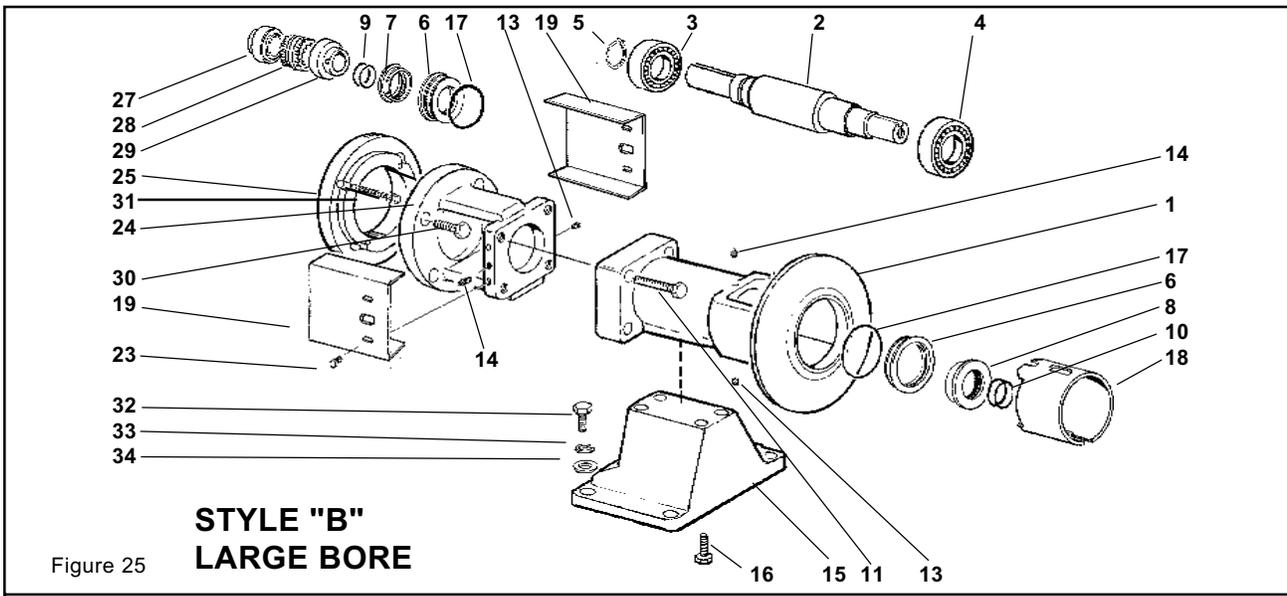
ITEM	STYLE	MOTOR	PART NO.	DESCRIPTION
27	B,C	56	11-37	COUPLING HALF .625 W
	B,C	143	11-101	COUPLING HALF .875 5S
	B,C	145	11-101	COUPLING HALF .875 5S
	B,C	182	11-102	COUPLING HALF 1.125 5S
	B,C	184	11-102	COUPLING. HALF 1.125 5S
	B,C	213	11-103	COUPLING. HALF 1.375 6S
	B,C	215	11-103	COUPLING HALF 1.375 6S
	B,C	254	11-41	COUPLING HALF 1.625 7S
	B,C	256	11-41	COUPLING. HALF 1.625 7S
•28	B,C	56	11-29	COUPLING SLEEVE 4J
	B,C	143/184	11-30	COUPLING SLEEVE 5JE
	B,C	213/215	11-31	COUPLING SLEEVE 6JE
	B,C	254/256	11-32	COUPLING SLEEVE 7JE
29	B,C	56	11-95	COUPLING HALF 1.0 4J
	B,C	143/184	11-94	COUPLING HALF 1.0 5S
	B,C	213/215	11-96	COUPLING HALF 1.0 6S
	B,C	254/256	11-97	COUPLING HALF 1.0 7S
30	B	56/145	30-35	HHCS 3/8-16 X 1
	B	182/184	30-78X	HHCS 1/2-13 X 1
	B	213/215	30-127X	HHCS 1/2-13 X1-3/4
	B	254/256	30-87X	HHCS 1/2-13 X 2-1/2
32	B,C	ALL	30-103	HHCS 1/2-13 X 1-1/2
33	B,C	ALL	43-31	WASHER 1/2
34	B,C	ALL	43-16	LOCK WASHER 1/2
35	B,C	ALL	30-222X	SHCS 1/4-20 X 1-1/2
36	B,C	ALL	23-91X	ADAPTER, CART. SEAL
37	B,C	ALL	30-127X	HHCS 1/2-13 X 1-3/4
38	B,C	ALL	43-31X	FLAT WASHER 1/2
•39	B,C	ALL	9-37	L-GASKET VITON
	B,C	ALL	9-37E	L-GASKET EPDM
	B,C	ALL	9-37K	L-CASKET KALREZ

**•RECOMMENDED SPARE PARTS**

Page 26-36 pump components

NOT SHOWN	33-34	ARROW LABEL	1
	33-61	WARNING LABEL	1
	001 061 002	NAMEPLATE	1
	30-355	DRIVE SCREW	4





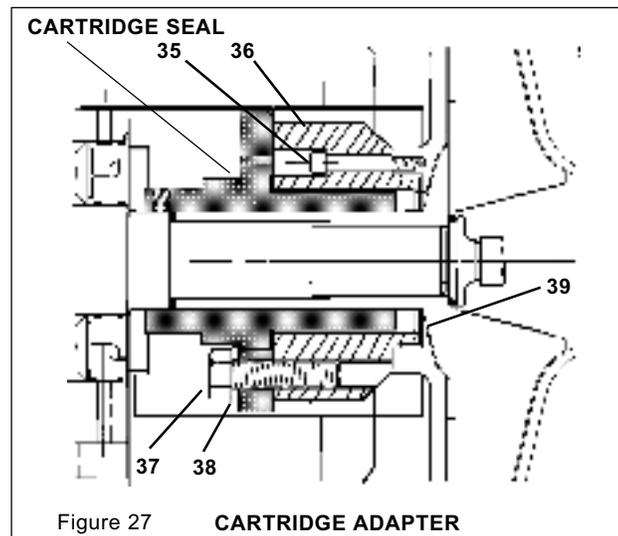
ITEM	STYLE	MOTOR	PART NO.	DESCRIPTION
1	B,C	ALL	68-9	BEARING HOUSING 2065
1	B,C	ALL	68-10	BEARING HOUSING 2085
1	B,C	ALL	68-11	BEARING HOUSING 2105
2	B,C	ALL	62-539X	SHAFT
•3	B,C	ALL	23-98	BEARING 6309
•4	B,C	ALL	23-99	BEARING 6209
•5	B,C	ALL	43-138	RETAININGRING
6	B,C	ALL	23-95	SEAL OUTER
7	B,C	ALL	23-94	SEAL INNER MOTOREND
8	B,C	ALL	23-93	SEAL INNER IMP. END
•9	B,C	ALL	N70035	035 O-RING INNER
•10	B,C	ALL	N70033	033 O-RING INNER IMP.
11	ALL	ALL	30-221X	HHCS 1/2-13 X 3-1/4
13	B,C	ALL	30-178	SHSS 1/4-20 X 3/8
14	B,C	ALL	BD0092000	GREASE FITTING
15	B,C	ALL	4-35	STAND
16	B,C	ALL	30-21	HHCS 1/2-13 X 1-1/4
•17	B,C	ALL	N70045	045 O-RING OUTER
18	B,C	ALL	70-37	SEAL GUARD 2105
	B,C	ALL	70-33	SEAL GUARD 2065/2085
19	B	ALL	70-34	COVER COUPLING ADAP.
20	C	ALL	70-35	COVER COUPLING L.H.
21	C	ALL	70-36	COVER COUPLING R. H.
22	C	ALL	2-252	BRACE, COVER COUPLING
23	B,C	ALL	30-62	HHCS 1/4-20 X 1/2 LG.
24	B	213TC	2-249	ADAPTER 213TC
	B	215TC	2-249	ADAPTER 213TC
	B	254TC	2-249	ADAPTER 213TC
	B	256TC	2-249	ADAPTER 213TC
	B	284TC	2-250	ADAPTER 284TC
	B	286TC	2-250	ADAPTER 284TC
	B	324TC	2-250	ADAPTER 284TC
	B	326TC	2-250	ADAPTER 284TC
	B	364TC	2-250	ADAPTER 284TC
	B	365TC	2-250	ADAPTER 284TC
25	B	254TC	43-134	SPACER ADAPTER 213TC
	B	256TC	43-134	SPACER ADAPTER 213TC
	B	324TC	43-136	SPACER ADAPTER 324TC
	B	326TC	43-136	SPACER ADAPTER 324TC

ITEM	STYLE	MOTOR	PART NO.	DESCRIPTION
25	B,C	364TC	43-137	SPACER ADAPTER 364TC
	B,C	365TC	43-137	SPACER ADAPTER 364TC
26	C	ALL	23-97	END CAP HOUSING LB
27	B,C	213	11-103	COUP. HALF 1.375 6S
	B,C	215	11-103	COUP. HALF 1.375 5S
	B,C	254	11-41	COUP. HALF 1.625 7S
	B,C	256	11-41	COUP. HALF 1.625 7S
	B,C	284	11-105	COUP. HALF 1.875 7S
	B,C	286	11-105	COUP. HALF 1.875 7S
	B,C	324	11-106	COUP. HALF 2.125 8S
	B,C	326	11-106	COUP. HALF 2.125 8S
	B,C	364	11-107	COUP. HALF 2.375 8S
	B,C	365	11-107	COUP. HALF 2.375 8S
•28	B,C	213/215	11-31	COUP. SLEEVE 6JE
	B,C	254/286	11-32	COUP. SLEEVE 7JE
	B,C	324/326	11-33	COUP. SLEEVE 8JE
	B,C	364/365	11-108	COUP. SLEEVE 8H
29	B,C	213/215	11-98	COUP. HALF 1.250 6S
	B,C	254/286	11-99	COUP. HALF 1.250 7S
	B,C	324/365	11-100	COUP. HALF 1.250 8S
30	B	213/215	30-21	HHCS 1/2-13 X 1-1/4
	B	324/365	30-21	HHCS 1/2-13 X 1-1/4
31	B	324/326	30-227X	SHCS 5/8-11 X 1
	B	364/365	30-228X	SHCS 5/8-11 X 1-3/4
32	B,C	ALL	30-103X	HHCS 1/2-13 X 1-1/2
33	B,C	ALL	43-31	WASHER 1/2
34	B,C	ALL	43-16	LOCK WASHER 1/2
35	B,C	ALL	30-222X	SHCS 1/4-20 X 1-1/2
36	B,C	ALL	23-91X	ADAPTER, CART. SEAL
37	B,C	ALL	30-127X	HHCS 1/2-13 X 1-3/4
38	B,C	ALL	43-31X	FLAT WASHER 1/2
•39	B,C	ALL	9-37	L-GASKET VITON
	B,C	ALL	9-37E	L-GASKET EPDM
	B,C	ALL	9-37K	L-CASKET KALREZ

**•RECOMMENDED SPARE PARTS**

NOT SHOWN	PART NO.	DESCRIPTION	QTY
	33-34	ARROW LABEL	1
	33-61	WARNING LABEL	1
	001 061 002	NAMEPLATE	1
	30-355	DRIVE SCREW	4

Page 26-36 pump components



2-25-98

# PARTS ORDERING

---

## HOW TO ORDER PARTS

### By Phone

Telephone your repair parts or fittings order to your Distributor. To speed your order and avoid delays, please have your **equipment model** and **serial number** and the **part numbers** from the parts list before you call your Distributor.

If you do not know your Distributors number, call Waukesha Cherry-Burrell Customer Service at:

Phone: **800-252-5200** or **262-728-1900**

Fax: **800-252-5012** or **262-728-4904**

Your call will be directed to a specialist who can provide you with Distributor information for your area.

### How to Return Parts

Parts may be returned for credit, subject to the conditions of our return goods policy. To obtain authorization to return a part, contact your Distributor.

Please give the following information:

- Invoice number and date
- Quantity
- Part Number (from parts list)
- Exact reason for return

Your Distributor will provide a Return Goods Authorization. (Returns will not be accepted without advance authorization.)

### EQUIPMENT INFORMATION

Any correspondence concerning pump will require the following information be documented:

PRODUCT NAME/

MODEL\_\_\_\_\_

SERIAL NUMBER:\_\_\_\_\_

DATE OF PURCHASE:\_\_\_\_\_

INVOICE NUMBER: \_\_\_\_\_

INVOICE DATE: \_\_\_\_\_

---

DISTRIBUTOR:\_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY:\_\_\_\_\_ STATE:\_\_\_\_\_ ZIP:\_\_\_\_\_

CONTACT: \_\_\_\_\_

PHONE: \_\_\_\_\_

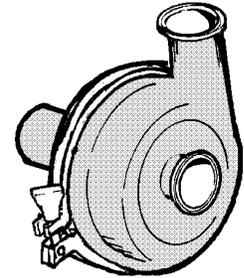
# WEIGHTS

## CENTRIFUGAL 200 SERIES PUMP AND PEDESTAL WEIGHTS

CLOSE COUPLED PUMP ( LESS MOTOR AND LEGS)

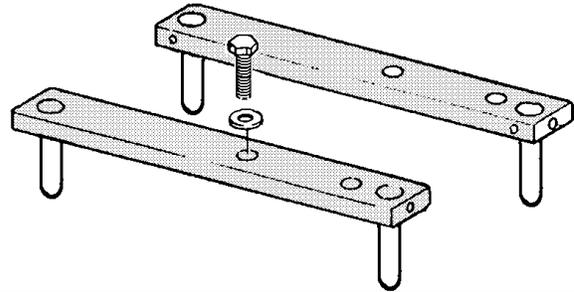
MOTOR FRAME	PUMP MODEL						
	2045	2065LV	2065	2065HV	2085LV	2085	2105
143-184JM	21 LBS.	31 LBS.	33 LBS.	35 LBS.	57 LBS.	51 LBS.	60 LBS.
213-215JM		35 LBS.	37 LBS.	39 LBS.	60 LBS.	54 LBS.	78 LBS.
254-256JM		37 LBS.	39 LBS.	41 LBS.	63 LBS.	57 LBS.	79 LBS.
284-326JM			51 LBS.	53 LBS.	71 LBS.	64 LBS.	82 LBS.

(ADD 5 LBS. FOR PUMPS WITH DOUBLE SEAL)



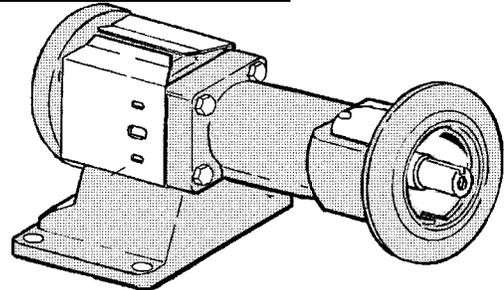
ADD FOR MOTOR MOUNTS

MOTOR FRAME	
143-213JM	10.5 LBS.
215-254JM	12.5 LBS.
254-326JM	42.5 LBS.



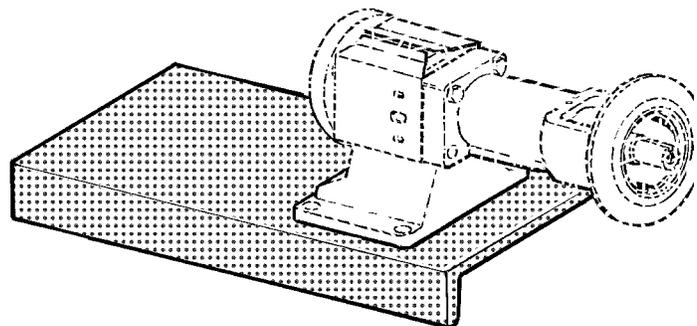
PEDESTAL PUMP SMALL BORE/LARGE BORE -MODELS B,C (LESS BASE & MOTOR)

PEDESTAL	PUMP MODEL						
	2045	2065LV	2065	2065HV	2085LV	2085	2105
SMALL BORE	92 LBS.	106 LBS.	108 LBS.	110 LBS.	131 LBS.	125 LBS.	
LARGE BORE						235 LBS.	240 LBS.



BASE WEIGHT (ADD TO PEDESTAL WEIGHT)

MOTOR	SMALL BORE	LARGE BORE
48	30 LBS.	
56	30 LBS.	
143/145T	31 LBS.	
182/184T	32 LBS.	50 LBS.
213/215T	33 LBS.	50 LBS.
254/256T	40 LBS.	52 LBS.
284/286T	35 LBS.	62 LBS.
284/286TS		64 LBS.
324/326T		65 LBS.
324/326TS		65 LBS.
364TS		65 LBS.



ADD 40LBS FOR SHIPPING MATERIALS



**Waukesha  
Cherry-Burrell**

®

611 SUGAR CREEK ROAD  
DELAVAN, WI 53115 U.S.A.  
CUSTOMER SERVICE TELEPHONE  
1-800-252-5200 OR 262-728-1900  
TOLL FREE TELEFAX  
1-800-252-5012 OR 262-728-4904

---

95-03009

Effective Date:  
October 7, 1999