45053382

APV CREPACO
Instruction and Parts Manual

"W" Series High Efficiency Centrifugal Pump

Model Number W 40/20
Serial Number _____
Order Number H-9341
General Assembly Number 05BP478687

Single Mechanical Seal

_____Type S Carbon/Silicon Carbide
_____Type S Silicon Carbide/Silicon Carbide
_____Type S Tungsten Carbide/Tungsten Carbide

Double Mechanical Seal

__✓__Type F Carbon/Silicon Carbide
_____Type F Silicon Carbide/Silicon Carbide
_____Type F Tungsten Carbide/Tungsten Carbide

Shaft Seal Gasket Material

__✓__Nitrile (Std.)
_____EPDM
_____Viton

Casing O-ring Material

__✓__Nitrile (Std.)
_____EPDM
_____Viton

Impeller Nut O-ring Material

__✓__Nitrile (Std.)
_____EPDM
_____Viton

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Introduction

Congratulations, you are the owner of a quality built item of APV Crepaco. This machine was manufactured by the skilled personnel of a company which has served the needs of the dairy, food, and process industries for more than 100 years.

The purpose of this manual is to provide instructions for the safe installation, operation, and maintenance of your APV Crepaco equipment.

Read and understand the entire manual before removing from the crate and installing the equipment.

APV Crepaco is committed to provide quality equipment and customer satisfaction. We have a unique network of sales and service support throughout the world, which are listed on the following page. Note the office nearest you. Should you have any questions concerning any information contained in this manual, contact the nearest office or our Lake Mills, Wisconsin office for assistance.

APV Crepaco Offices

Engineering and Manufacturing Facilities

100 S. CP Ave.
Lake Mills, WI 53551
Tel: (414) 648-8311
Fax: (414) 648-3418

Factory Direct Service Parts Sales, Toll Free (800) 358-4100

Regional Sales Offices

Central Region
9525 West Bryn Mawr Ave.
Rosemont, IL 60018
Tel: (708) 678-4300
Fax: (708) 678-5037

6663 Huntley Rd.
Suite L
Columbus, OH 43229
Tel: (614) 846-8503
Fax: (614) 846-4932

4226 Park Glen Rd.
St. Louis Park, MN 55416
Tel: (612) 927-4910
Fax: (612) 927-6895

Western Region
16641 Valley View Ave.
Cerritos, CA 90701
Tel: (310) 926-9700
Fax: (310) 926-1179

4380 S. 500 West
Salt Lake City, UT 84123
Tel: (801) 262-8494
Fax: (801) 262-9467

1138 Industry Drive
Seattle, WA 98188
Tel: (206) 575-8900
Fax: (206) 575-1221

Southern Region
P.O. Box 166199
2920 Skyway Circle N.
Irving, TX 75038
Tel: (214) 257-3455
Fax: (214) 594-1339

Eastern Region
110 Summit Ave.
Montvale, NJ 07645
Tel: (201) 930-0001
Fax: (201) 930-9788

2252 Northwest Parkway
Suite B
Marietta, GA 30067
Tel: (404) 956-9110
Fax: (404) 956-8993

Canada

APV Canada, Inc.
Central Region-Toronto
30 Whitmore Rd.
Woodbridge, Ont. L4L 7Z4
Tel: (905) 850-1852
Fax: (905) 850-1863

APV Canada, Inc.
Eastern Region-Montreal
6555 Cote De Liesse
Montreal, Quebec H4T 1E6
Tel: (514) 737-0006
Fax: (514) 737-1310

APV Canada, Inc.
Western Region-Vancouver
Unit #10-8075 Enterprise Street
Burnaby, B.C. V5A 1V5
Tel: (604) 420-4344
Fax: (604) 420-2419

International

APV Crepaco (Far East) Inc.
Hoko Bldg., Ginza 1-18-19
Chuo-Ku, Tokyo 104, Japan
Tel: 03-562-3921
Fax: 03-561-1719
Telex: 02523295

APV de Mexico
Periferico Sur 4225-106
Colonia Jardines en la Montana
CP 14210, Mexico, D.F., Mexico
Tel: 52(5)-644-2439
Fax: 52(5)-644-2730

APV Crepaco Service GmbH
Spinnereistrasse 11
D-88239 Wangen/Allgau
Germany
Tel: 07522-80024
Fax: 07522-80010

STANDARD WARRANTY

Obligations of Seller

During the warranty period, Seller shall repair, or at Seller's option, replace parts determined by Seller to be defective in material or workmanship. The warranty period is one (1) year from the date of delivery to Buyer F.O.B. point of manufacture. The foregoing shall be the sole obligation of Seller under this warranty with respect to the equipment and other property included in this Agreement. With respect to equipment, materials, parts and accessories manufactured by others, Seller's sole obligation shall be to use reasonable efforts to obtain for Buyer the full benefit of the manufacturers' warranties.

Warranty Exclusions

Repair or replacement of parts required because of misuse, improper care or storage, negligence, alteration, accident, use of incompatible supplies or lack of specified maintenance are excluded from Seller's warranty obligations.

DISCLAIMER OF WARRANTIES

THE FOREGOING WARRANTY EXPRESSIONS ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND EXISTENCE OF ANY SUCH OTHER WARRANTY IS HEREBY DENIED.

Limitation of Liability and Remedies

The liability of Seller for breach of any warranty obligation hereunder is limited to:

1. The repair or replacement of the equipment on which the liability is based; or,

2. At Sellers option, the refund to Buyer of the amount paid by Buyer to Seller for said equipment.

All other liability of Seller with respect to this Agreement, or from the manufacture, installation, maintenance, repair or use of any equipment covered by or furnished under this Agreement, whether in contract or in tort, or otherwise, is limited to the amount paid by Buyer to Seller pursuant to the terms hereon: SELLER SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND WHATSOEVER. THE REMEDIES SET FORTH HEREIN ARE EXCLUSIVE.

Breach

Any breach by Seller with respect to any items or unit of equipment shall be deemed a breach with respect to that item or unit only.

Infringement

Seller will not be liable for the infringement of any patent by the Buyer's use of any equipment or materials delivered hereunder.

POLICY REGARDING AVAILABILITY OF SERVICE PARTS

APV Crepaco will attempt to remain in a position to supply replaceable service parts during the normal life of any item of APV Crepaco equipment. This will be contingent upon availability of tools, material, and facilities of our own as well as of our suppliers.

After expiration of this period, supply of service parts will be limited to available stock of completed parts. If unable to supply the service part, drawings will be furnished when available to permit local manufacturing, if desired.

APV Crepaco reserves the right to improve, change or modify the construction of its equipment or any parts thereof without incurring any obligation to provide like changes to equipment previously sold.

A Word About APV Crepaco Service Parts

We want to raise your awareness to the problem associated with purchase of parts not manufactured to the high quality specifications of APV Crepaco, INC.

In addition to our high quality, APV Crepaco parts are manufactured to meet regulatory agency authorizations, approvals and certification (3-A Sanitary Standards, USDA, ASME, BISSC and OSHA). Where applicable, materials used in construction of APV parts conform to FDA regulations.

WARNING

PARTS NOT MANUFACTURED TO OUR SPECIFICATIONS MAY CAUSE DAMAGES TO YOUR APV CREPACO EQUIPMENT AND VOID ALL WARRANTIES. USE OF PARTS THAT DO NOT MEET APV CREPACO, INC. SPECIFICATIONS MAY CAUSE PROPERTY DAMAGES AND SERIOUS BODILY INJURY.

Types of equipment include, but are not limited to, rotary pumps, centrifugal pumps, homogenizers, ice cream freezers, scrape surface heat exchangers, plate heat exchangers, ingredient feeders, process tank and contact plate freezers.

We bring this potentially serious problem to your attention in order to safeguard your best interest and those of your employees.

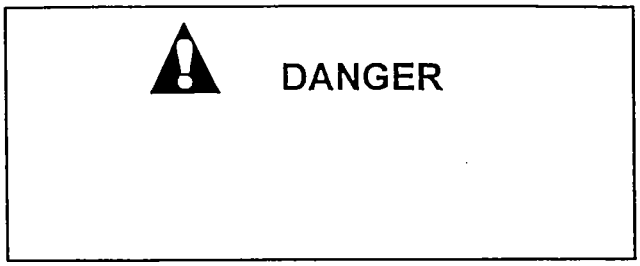
If you have any questions, please feel free to call 1-800-358-4100 or your local APV Crepaco Regional Sales Office.

Safety Information

Definitions

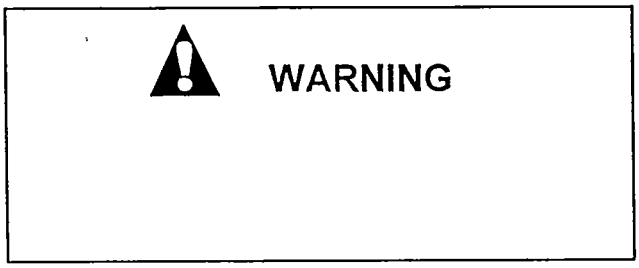
DANGER

An immediate hazard with a possibility of severe personal injury or death if instructions, including recommended precautions, are not followed.



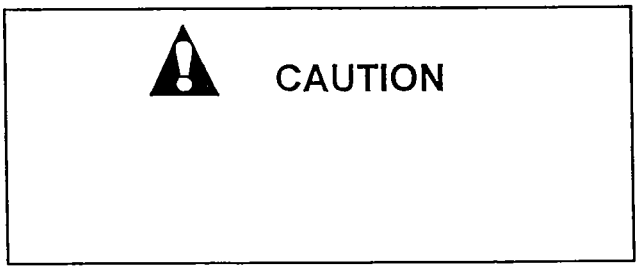
WARNING

Hazards or unsafe practices which could result in severe personal injury or death if instructions, including recommended precautions, are not followed.



CAUTION

Possible hazards or unsafe practices which could result in minor injury or damage to product or property if instructions, including recommended precautions, are not followed.



Lock Out

A positive means of securing the main electrical disconnect in the Off position, where only the person involved in the maintenance procedure has possession of the key.

Safety Information

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

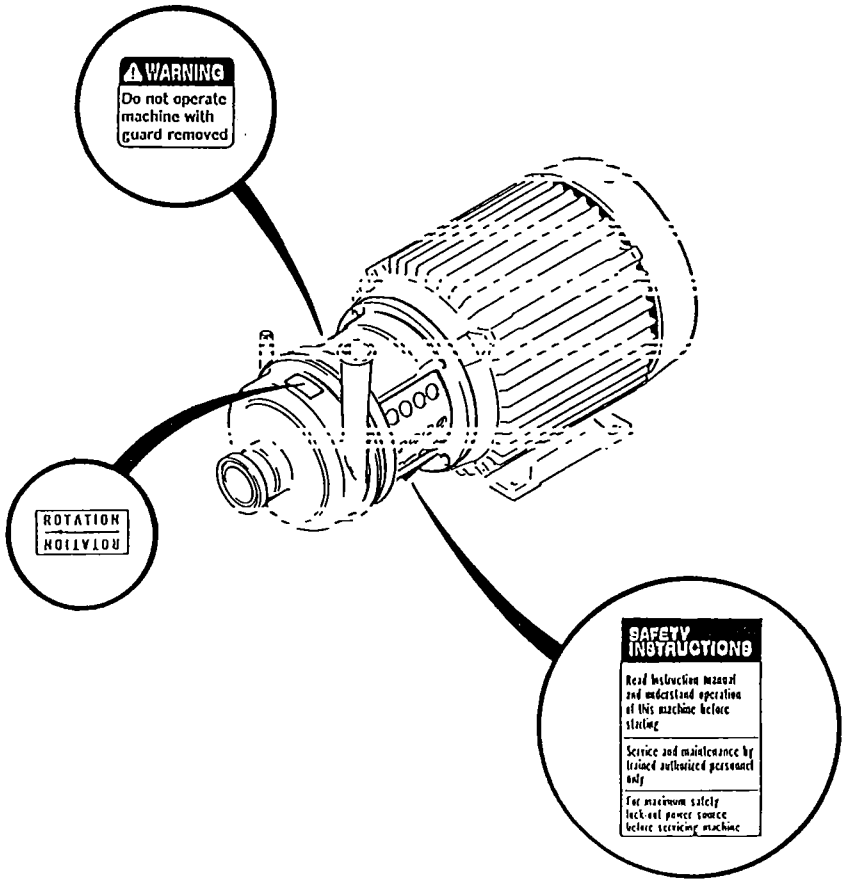
A pump has high speed rotating parts and works with fluids under pressure. These fluids may be hot, chemical solutions, or otherwise harmful if contacted. This creates certain unavoidable hazards. Safe installation, operation, and maintenance requires proper training of all personnel and their supervisors.

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

APV Crepaco equipment is designed to provide minimum operator access to hazardous areas while providing adequate access for service by trained personnel. Hazardous areas are provided with guards. Various types of fasteners may be used for the guards depending on how frequently routine access is required. Regardless of the type of fastener used, the existence of a guard should alert personnel to the presence of a hazard. Never operate or test run the equipment with a guard removed, unless under the supervision of properly trained and authorized personnel. Then use extreme caution to avoid the hazard.

Safety Decal Location

The illustration below shows the location of the safety information decals attached to the pump. If any decal is removed or becomes unreadable, replace it immediately with a new decal.

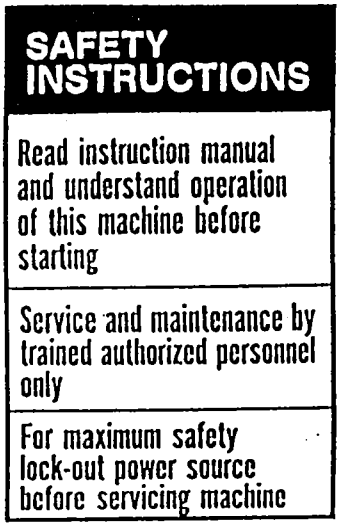


Safety Decal Location

Safety Information

Safety Decals

The following safety decals are attached to your pump. The wording is shown below. If any decal is removed or becomes unreadable, replace immediately with a new decal. Order from APV Crepaco using the part number shown.



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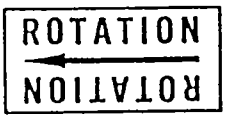

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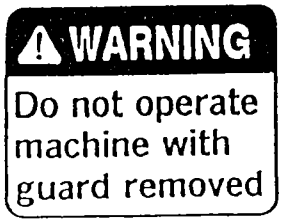

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Safety Decals

WARNING

Cleaning/Sanitizing Chemical Hazard

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

Clean-In-Place (CIP) cleaning and sanitizing:

1. Refer to the Cleaning and Sanitizing section.
2. Check all line connections in the cleaning circuit to be certain they are connected and tightened before starting.
3. Never disconnect any lines or fittings or disassemble pump until it is known that the CIP cleaning sequence is completed and no chemical solutions or high temperature fluids are present.

Manual cleaning methods:

1. Refer to the Cleaning and Sanitizing section.
2. Turn the power source off and Lock Out, using a locking device for which only the person involved in the maintenance procedure has the key, before doing any disassembly of the pump.
3. Equip all personnel using cleaning/sanitizing solutions with protective clothing, including eye protection.

3. Thoroughly train all personnel using cleaning/sanitizing solutions in their safe handling and disposal after use.

4. Never use toxic and/or flammable solvent for cleaning.

Safety Information

WARNING

Electrical Hazard

A pump is normally powered by an electric motor. This creates a hazard of electrical shock which could cause severe injury or even loss of life.

To minimize the risk of this hazard:

1. All electric/electronic installation, maintenance, and service must be performed by trained and authorized electricians only.

2. All electric/electronic installation must comply with all applicable codes and standards including those established by OSHA.

3. **Do Not** perform any maintenance or service on the motor or any other electrical devices unless the electric power source has been turned off and Locked Out using a locking device for which only the person involved in the maintenance procedure has possession of the key.

4. Make installation suitable for a wet environment, including:

   a. A power disconnect which can be locked in a power Off position and the key removed. This will allow maintenance or service to be performed with no possibility of power being accidentally turned on.

   b. Protection of all electric connections within a sealed junction box.

   c. Proper grounding of the motor.

   d. Protection from flooding. Do not install in an area which could fill with water to a level which would contact the motor.

WARNING

Rotating Parts Hazard

Routine cleaning and maintenance procedures require pump disassembly. The pump contains close fitting parts which rotate during operation. Should the pump start unexpectedly while disassembled, severe injury could result.

To minimize the risk of this hazard:

1. **Do Not** assemble or disassemble the pump---

2. **Do Not** remove the guard from the adapter---

3. **Do Not** perform any maintenance or service on the motor or pump---

---- unless the power source has been turned off and Locked Out, where only the person involved in the maintenance procedure has possession of the key.

WARNING

High Temperature Hazard

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

To minimize the risk of this hazard:

1. All installation, maintenance, and service of piping, valves, and other controls must be performed by trained and authorized plumbers only. This applies to process piping and cleaning/sanitizing piping.

2. All plumbing installation must comply with all applicable codes and standards including those established by OSHA.

Safety Information

3. All high temperature lines must be labeled, leak free, and insulated or otherwise protected from direct contact.

4. Never disconnect any lines or fittings (whether process or cleaning/sanitizing) or disassemble the pump until the line is not under pressure and the fluid inside is not hot or harmful.

5. Operating personnel must be authorized and trained.

WARNING

High Pressure Hazard

Fluids processed by a pump are under pressure. This creates a hazard to personnel working in the area should a leak occur. Leaking high pressure fluid may cause injury by startling personnel or from actual contact with the leaking fluid.

To minimize the risk of this hazard:

1. All installation, maintenance, and service of piping, valves and other controls must be performed by trained and authorized plumbers only. This applies to process piping and cleaning/sanitizing piping.

2. All plumbing installation must comply with all applicable codes and standards including those established by OSHA.

3. Never disconnect any lines or fittings (whether process or cleaning/sanitizing) or disassemble the pump when lines are under pressure.

4. Should a leak occur, immediately find the cause and stop the leak.

WARNING

Leaking Fluid Hazard

Fluid leaks or spills may occur in any pumping system. This creates a hazard to personnel in the area due to slippery floor conditions or contact with possibly hazardous fluids.

To minimize the risk of this hazard:

1. Always clean up leaks and spills immediately.

2. Find and correct the cause of the leak immediately.

Important Cautions

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

 CAUTION

Cavitation

Cavitation is a condition within the pump which results in extreme hydraulic forces which can create a risk of severe damage to pump components. Cavitation makes a characteristic "rattling" noise. It is caused by operation with too low fluid pressure at the pump inlet.

To minimize this risk:

Install and operate the pump so that NPSH (net positive suction head) available to the pump equals or exceeds the "NPSH required" as shown on the pump performance curve. To increase NPSH available:

1. Decrease the temperature of the liquid being pumped.
2. Increase the height of liquid supply level.
3. Decrease the suction line length and remove restrictions to flow such as elbows, valves, etc.
4. Increase the suction line size (diameter).
5. Reduce the pump flow rate (throttle discharge).

 CAUTION

Corrosion Pitting

Stainless steel is subject to a risk of corrosion when improperly cleaned or sanitized.

To minimize this risk:

1. Never use steel wool or a wire brush to clean stainless steel surfaces. Iron particles will embed and cause corrosion pits. Use a non-metallic brush or scrub pads for stubborn soil.
2. Never allow prolonged contact of sanitizing solutions or other corrosive cleaning chemicals with stainless steel. Use sanitizers only immediately prior to processing. Do not use sanitizers on exterior, non-product contact surfaces.

 CAUTION

Motor Overload

Depending on the impeller diameter and motor horsepower, there is a risk the pump motor will overload if operated with a fully opened, unrestricted discharge.

To minimize this risk:

1. BEFORE operating the pump, review performance curve and application giving consideration to motor horsepower and impeller diameter versus expected discharge flow rate and pressure. If the pump is operated with less than expected discharge pressure, the flow rate will increase and the load on the motor will increase.
2. Install a throttling type valve in the discharge piping to allow control of pump discharge flow rate during initial operation. The valve may be removed later when the system is proven to supply adequate discharge pressure to prevent overload.

Important Cautions

 CAUTION

Impeller Shaft Location

The location of the impeller shaft on the motor shaft is critical for correct pump operation and to obtain maximum operating efficiency.

APV Crepaco Centrifugal Pumps are designed to achieve excellent operating efficiency. This efficiency is possible, in part, because of precision manufacturing of the pump components. The impeller must be precisely located between the casing and backplate to take full advantage of the pump's operating efficiency.

Incorrect location of the impeller shaft may cause the impeller to contact the casing or the backplate during operation and cause extensive damage to the pump.

The procedures for correctly locating the impeller shaft are described in the Maintenance section. This should be referred to whenever:

1. A new pump is installed onto a motor or pedestal.
2. The impeller shaft is loosened or removed from the motor or pedestal shaft.
3. A replacement casing or backplate is installed.

General Information

Receiving and Inspection

1. APV Crepaco equipment is run tested or inspected prior to shipment. When leaving the factory, it is well crated for normal transportation procedures. APV Crepaco cannot, however, guarantee safe arrival. Therefore, upon receipt of this equipment, check the received items against the packing list for damage or missing parts. Check the packing material thoroughly for small parts.

2. Visually inspect for damage or loss. Damage or loss should be reported immediately to the delivery carrier while present. Following the immediate notification of the lost or damaged parts, a detailed description including quantity, description of the loss or damage, and a cash value should be claimed against the carrier with respect to the guidelines set forth by the responsible carrier's policies. APV Crepaco's responsibility terminates F.O.B. point of manufacture unless otherwise specified per the General Terms and Conditions of Sale as published by APV Crepaco and amended from time to time. Contact APV Crepaco Order Services if shipping information is required for handling claims.

3. In the case of damage or loss to the equipment, APV Crepaco may perform three major functions:

   a. **Manufacturer Function** - APV Crepaco manufactures quality equipment and stands behind the APV Crepaco Standard Warranty. Refer to the Standard Warranty.

   b. **Assessor Function** - APV Crepaco offers assessment services for filing claims. The APV Crepaco assessor will accurately determine the extent of the damage (or loss), and cost of repairs to the equipment. Reimbursement for this service will be agreed upon prior to the assessment.

   c. **Repair House Function** - APV Crepaco offers services for repairing the damage(s) or replacement of loss(es) to the equipment. APV Crepaco has the option to alter the Standard Warranty on refurbished or replacement parts. The cost of this service will be dependent upon the assessment that is made.

General Information

General Description

The "W" Series Centrifugal Pumps are designed for pumping low to medium viscosity liquids. The design is a horizontal, single volute, single stage, end suction, top discharge with a radially split casing and open (or semi-open), one-piece impeller.

The pump casing is circular with the volute formed into the backplate. This is a patented feature which provides high operating efficiency and reduces axial and radial loading on motor bearings.

Sanitary Design

Units are designed and constructed to meet the requirements of the 3-A Sanitary Standards for cleanability of dairy processing equipment.

Meeting these standards requires, in part, that materials of construction in product contact areas be stainless steel or other materials approved for food contact. All product contact surfaces must be smooth, free draining, and accessible for cleaning. The mechanical product components must be easy to disassemble for cleaning and/or inspection for cleanliness. The outer construction must prevent outside contaminants from draining or dripping into the product area.

Materials of Construction

All metal product contact parts are type 316 stainless steel. Standard gaskets and seal materials are food grade nitrile rubber, EPDM, Viton, Kalrez carbon or silicon carbide.

All models are designed with corrosion resistant smooth surfaces and crevice free construction expressly for being easy to clean. In addition, they are easy to disassemble either for manual cleaning methods or for inspection for cleanliness.

Serial Number

A nameplate is attached to each pump with a serial number. Use the serial number for reference whenever requesting information or service parts. The serial number is a letter followed by four numbers (for example, A-1234). Each pump has a unique serial number.

Rated Performance

Performance ratings are based on pumping water at 70 F (21 C). Performance data is at the BEP (Best Efficiency Point), not the maximum performance. For specific applications contact your APV Crepaco sales representative.

Impeller Size

Listed data is for maximum impeller diameter. Alternate, trimmed impeller diameters are available for lower performance requirements.

Pump RPM

Performance is rated at 1750 rpm and 3500 rpm, the two most common motor speeds used. Alternate, lower speed operation is possible (for example, 1450 or 2900 rpm with 50 hz motors). For specific applications contact your APV Crepaco sales representative.

Design Pressure

Design Pressure is the maximum permissible operating pressure at the pump outlet.

General Information

Specifications

Pump Model	Pump Casing		Maximum Impeller Diameter in. (mm)	Performance at Best Efficiency Point (BEP)					Design Pressure psig (bar)
				3500 rpm		1750 rpm		Efficiency	
	Inlet Size in. (mm)	Outlet Size in. (mm)		Capacity gpm (cu. m/hr)	Head ft. (m)	Capacity gpm (cu. m/hr)	Head ft. (m)		
W 20/20	2.0 (51)	2.0 (51)	5.3 (135)	105 (24)	95 (29)	53 (12)	24 (7.3)	65%	260 (18)
W 25/75	4.0 (102)	3.0 (76)	5.9 (150)	352 (80)	118 (36)	176 (40)	29 (8.8)	72%	260 (18)
W 30/25	2.5 (64)	2.0 (51)	6.3 (160)	155 (35)	141 (43)	78 (18)	35 (10.7)	67%	260 (18)
W 30/50	3.0 (76)	2.5 (64)	6.3 (160)	280 (64)	130 (40)	140 (32)	33 (10)	70%	260 (18)
W 30/100	4.0 (102)	3.0 (76)	6.9 (175)	650 (148)	141 (43)	325 (74)	35 (10.7)	82%	200 (14)
W 40/20	2.0 (51)	1.5 (38)	7.1 (180)	120 (27)	190 (58)	60 (14)	47 (14.3)	50%	200 (14)
W 50/25	2.5 (64)	1.5 (38)	7.7 (195)	174 (40)	236 (72)	87 (20)	59 (18)	62%	200 (14)
W 50/50	3.0 (76)	2.0 (51)	7.9 (200)	346 (79)	236 (72)	173 (39)	59 (18)	72%	200 (14)
W 80/50	3.0 (76)	2.0 (51)	10 250	315 (72)	400 (121)	200 (46)	96 (30)	66%	200 (14)
W 50/100	4.0 (102)	3.0 (76)	7.9 (200)	528 (120)	236 (72)	264 (60)	59 (18)	76%	200 (14)
W 70/30	2.5 (64)	1.5 (38)	9.4 (240)	190 (43)	350 (107)	95 (22)	88 (27)	48%	200 (14)
W 100/130	4 (102)	3 (76)	10.6 (270)	670 (152)	400 (121)	380 (86)	110 (33)	78%	200 (14)
W 25/200	6 (152)	4 (102)	11.4 (290)	-	-	1140 (259)	102 (31)	77%	200 (14)
W 60/300	6 (152)	4 (102)	10.2 (260)	-	-	860 (195)	80 (24)	75%	200 (14)

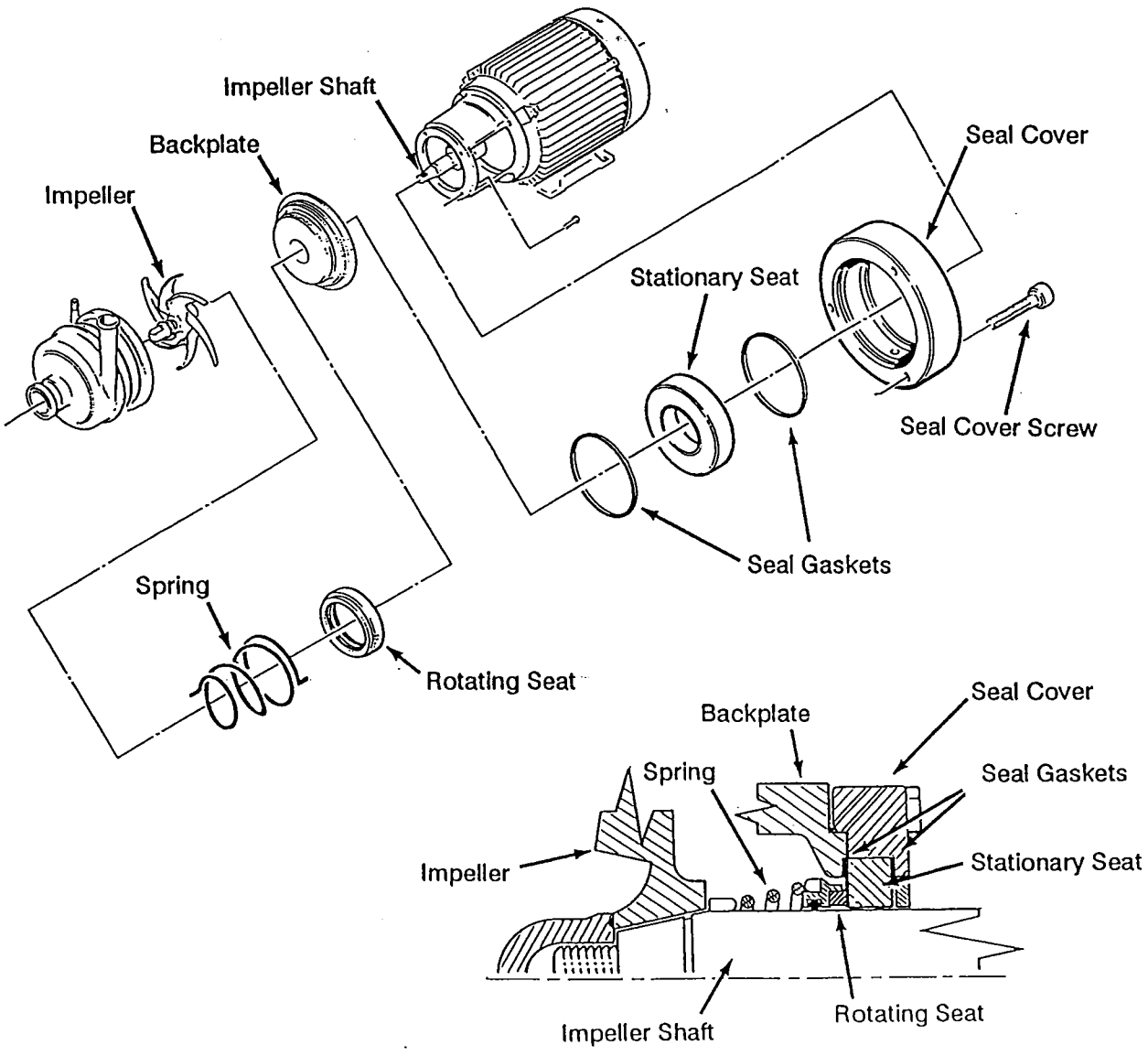
General Information

Shaft Seals

Basic Seal Types

"W" Series Pumps are offered with two basic shaft seal arrangements, Type S and Type F.

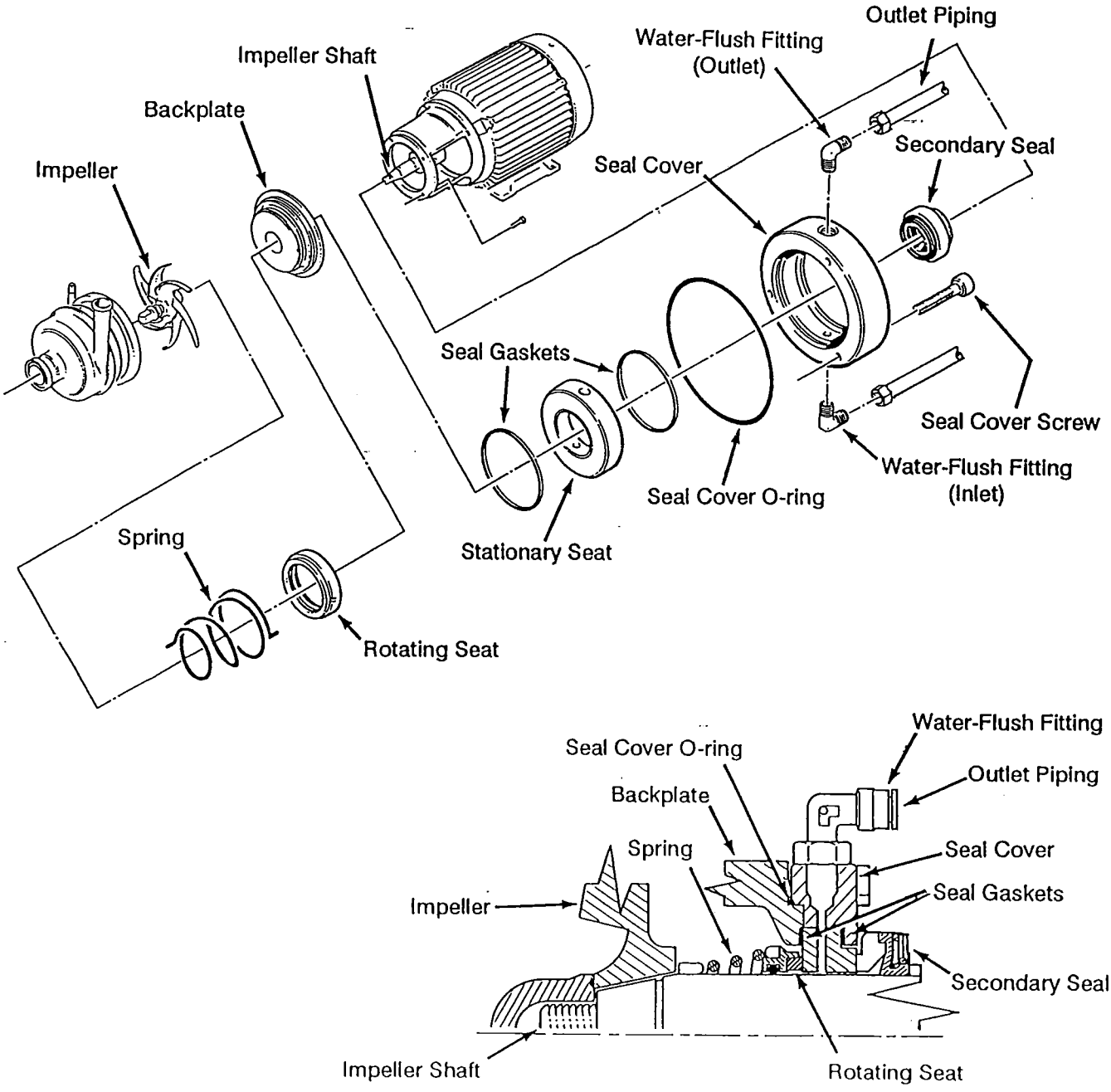
The Type S seal is an internal, unbalanced, single mechanical seal with a replaceable stationary seat.



Type S Shaft Seal

General Information

The Type F seal has the same internal seal components as the Type S, except with a modified stationary seat to provide a flush chamber. Also, a secondary seal is added to contain the flush media. The chamber has an inlet connection at the bottom and an outlet connection at the top. This arrangement keeps the seal area flooded with flush media and allows the flush media to be recirculated or routed to a drain. Connectors for a plastic tube are provided, attached to the seal cover.



Type F Shaft Seal

General Information

CAUTION

Handle seal components carefully. Seal seats may break if mishandled or dropped. Keep the backplate centered during removal to avoid contacting the shaft. Contact may damage the shaft or stationary seat.

Seal Seat Materials

The metal parts of the seal are 316 stainless steel. The O-rings and gaskets are nitrile as standard (std), with EPDM and Viton available as alternates.

The seal seats are available with a choice of material combinations as indicated in the following tables.

Seal Type	Available Seal Seat Material Combinations	
	Rotating Seat (primary)	Stationary Seat
Type S	carbon (std)	silicon carbide (std)
	silicon carbide	silicon carbide
	tungsten carbide	tungsten carbide

Seal Type	Available Seal Seat Material Combinations		
	Rotating Seat (primary)	Stationary Seat	Secondary Seal Seat
Type F	carbon (std)	silicon carbide (std)	carbon (std)
	silicon carbide	silicon carbide	carbon
	tungsten carbide	tungsten carbide	carbon

General Information

Pump Mounting

The pump attaches directly to the motor (close coupled). A C-face, foot-mounted, motor is required for attaching to the pump adapter. The pump and motor are supported by legs attached to the motor feet and to the pump adapter.

The number and location of the legs varies with pump model and motor frame size. This mounting makes the pump compact and simple.

Components and Services Furnished by Customer

Drive

The drive for the pump is to be supplied and installed by the purchaser unless otherwise specified at the time of purchase.

Electrical Service

Provide correctly sized electrical service to the motor including a motor starter, overload protection, and Lock Out capability.

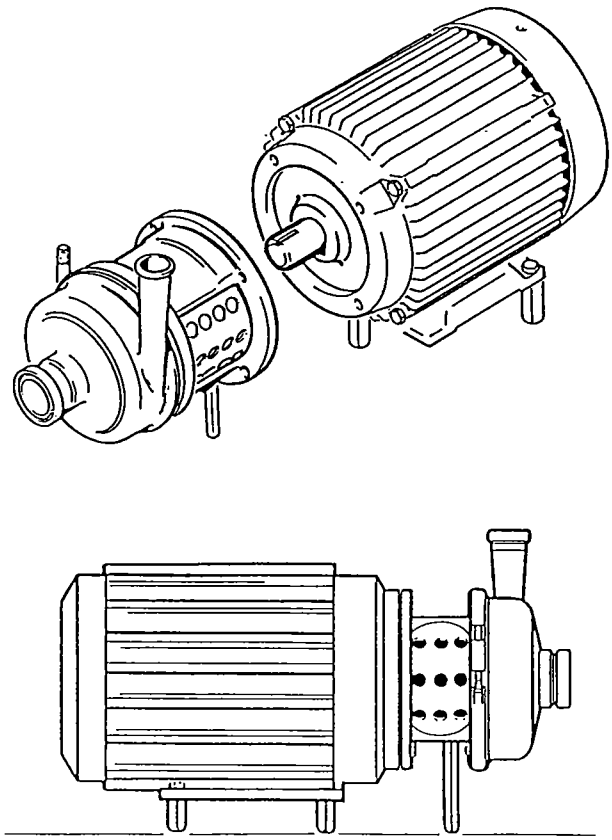
If an alternate, non-electrical drive is furnished as an option, special instructions will be included.

Process Piping

All process piping, fittings, and valves is to be supplied and installed by the purchaser.

Seal Flush Media and Media Piping

If the seal requires flush media, the media supply and the purchase and installation of piping, fittings, and valves for the media are the responsibility of the purchaser.



Flange Mount

Installation

Location

Locate the pump according to the following:

1. Close to a liquid source to keep suction piping to a minimum.
2. Suction and discharge piping are direct with minimum elbows and fittings to minimize head loss due to friction.
3. Pump and pump drives are accessible for inspection and service.
4. Low in relation to product supply to provide maximum static suction head.
5. The motor is protected from flooding.
6. Near a floor drain.
7. With space available for lifting equipment if components or complete unit weigh more than 50 lbs. (22 kg).

Mounting Pump to Motor

Pumps supplied without a motor require field mounting to the motor.

Motor Requirements

"W" Series Pumps are designed to be mounted (close coupled) onto NEMA C-face, foot-mounted motors. The motor's mounting face, shaft, and feet must match standard NEMA dimensions for the motor frame size specified when the pump was ordered.

The motor must also have locked front bearings. The high operating efficiency of "W" Series Pumps is achieved, in part, because of closely controlled clearances between the impeller, pump casing, and backplate. These close clearances require that the motor have locked front bearings to limit axial movement of the motor shaft and prevent damage due to running contact of the parts. Many motor manufactures supply locked front bearings as their standard design. Check with your motor supplier to be certain that the motor used has locked front bearings.

Mounting Pump

1. Check the motor C-face surface and the mounting surface of the pump adapter. Clean the surfaces, if necessary, to ensure they are smooth and flat. Remove any high spots due to excess paint.
2. Attach the adapter to the motor using the hex head screws provided.
3. Assemble the remaining pump components as described in the Maintenance section.

CAUTION

Follow instructions for impeller shaft location on the motor shaft. Incorrect location of the impeller shaft may cause the impeller to contact the casing or the backplate during operation and cause extensive damage to the pump.

Installation

Leveling

All "W" Series Pump models are supplied with legs as standard. The number and location of the legs varies with pump model and motor frame size. Install the pump so that the motor and pump are level and all legs support equally. If the floor area is not level, disassemble the motor support leg and add stainless steel shim washers to the top of the leg as needed. Secure washers in place by tightening the leg bolt.

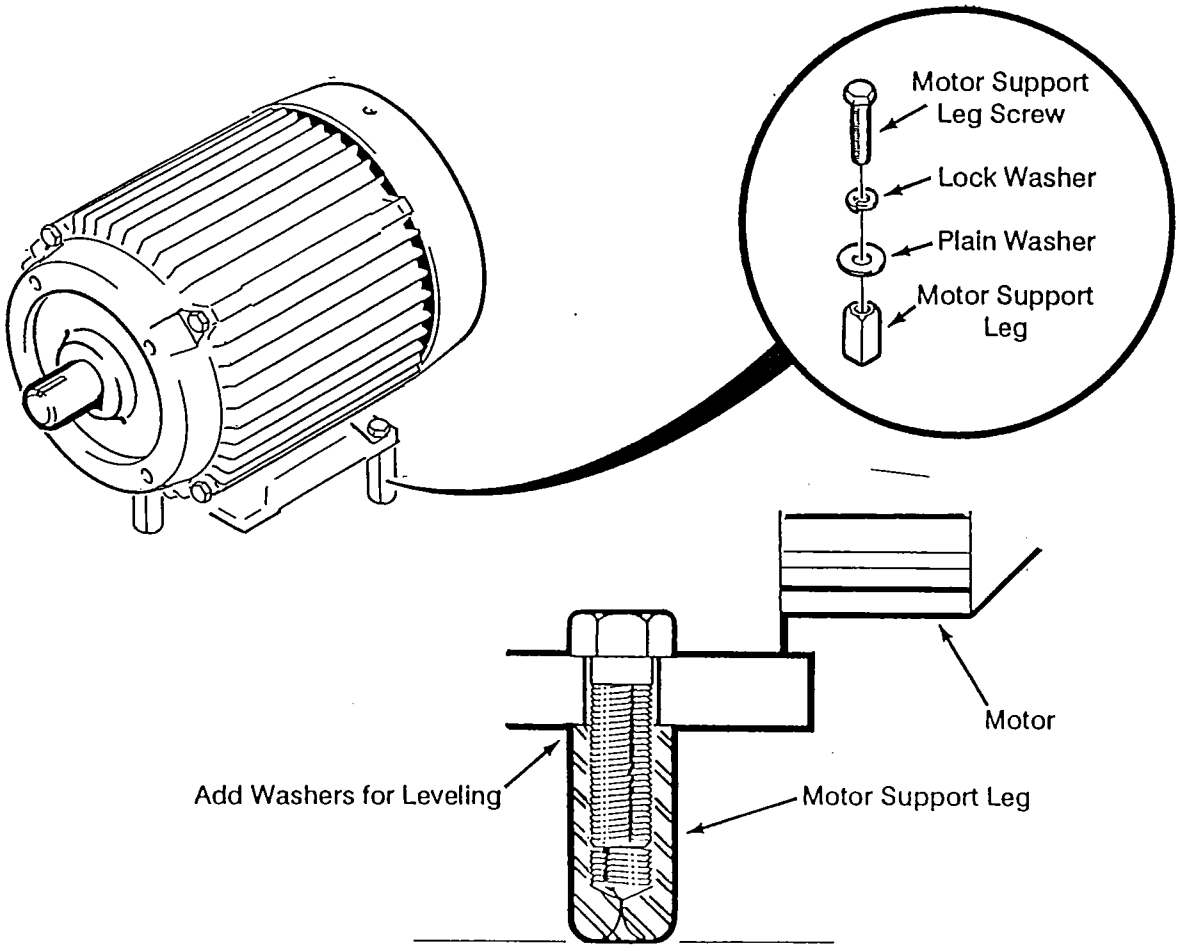
If the pump is to be installed without legs, attach the motor feet firmly to a rigid, level surface.

Weld Ferrules to Casing

Pumps supplied with butt weld type inlet and outlet require welding to the process piping or to connection ferrules. Use TIG welding method and correct procedure to obtain a "sanitary" weld, free of pits, cracks, or crevices when processing food products.

CAUTION

Excessive heat during welding may distort the casing and change critical clearances within the pump. Use a heat sink and welding technique for minimum heating of the casing.



Shimming Legs for Leveling

Installation

Piping

1. Support the suction and discharge piping. Use sturdy supports, near the pump and in line with connection fittings so that no strain is transmitted to the pump casing. If expansion joints are used in the piping, install a support between the expansion joint and the pump.

2. Align joints and use reliable fitting gaskets to prevent leaks.

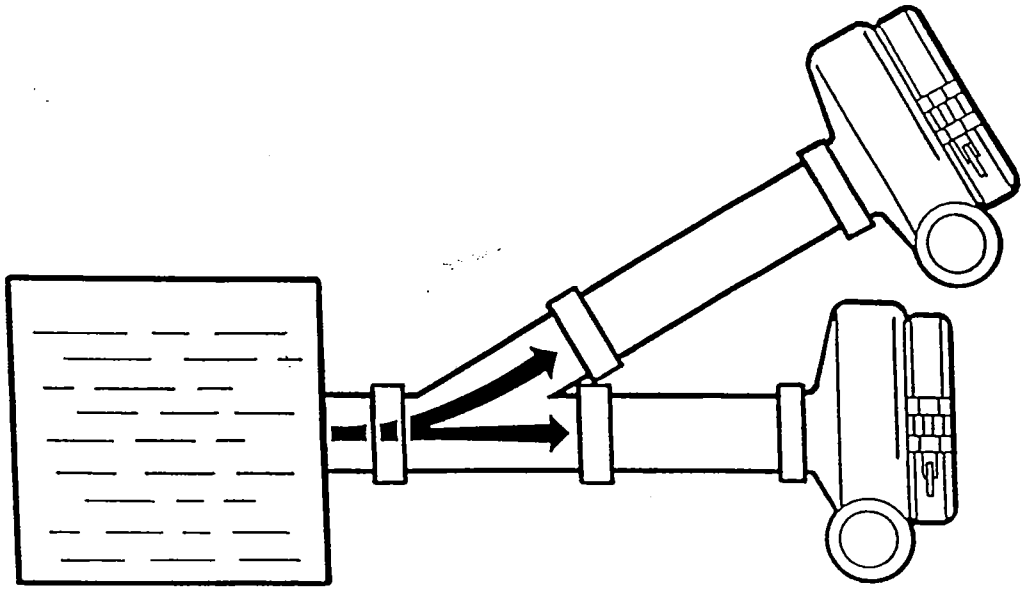
3. Install suction piping to minimize suction friction loss. This will also maximize pump suction performance and reduce possibility of damaging cavitation. Keep the line short and use few as possible elbows and other fittings. Use a pipe size equal to or larger than the suction connection on the pump.

4. Install a straight length of piping at least ten diameters long at the suction and discharge connections before any elbows or other change-of-direction fittings.

5. If branching is necessary in the suction line, a "Y" fitting is preferable to a tee.

6. Install a throttling type valve in the discharge piping (either permanently or temporarily until start-up is completed). Throttling discharge during initial start-up is required to guard against potential motor overload.

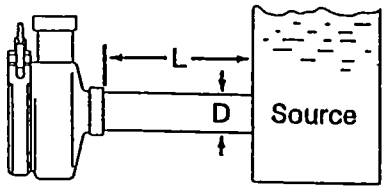
   Throttling discharge during starting protects against "water hammer" which is most prevalent when using long pipe runs at high flow velocity.



"Y" Pipe for Suction Line

Installation

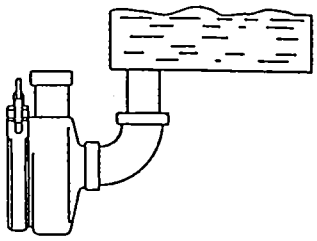
Good Arrangements



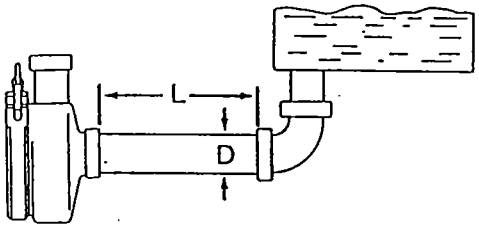
10xD = L

10x2 in. = 20 in.

Poor Arrangements



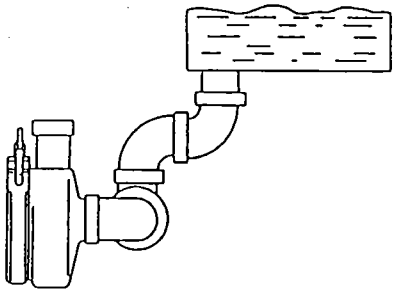
Ideal Piping Configuration



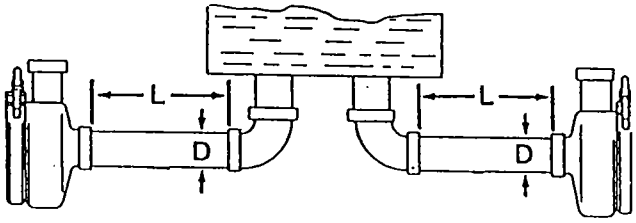
10xD = L

10x2 in. = 20 in.

Elbow Connected Directly to Pump Section



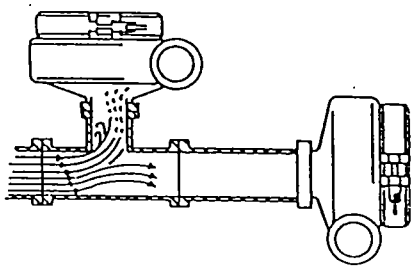
Minimum Elbows, Piping All in One Plane



10xD = L

10x2 in. = 20 in.

Too Many Elbows in Different Planes



Two Pumps from a Common Source Preferred Configuration

Pump Suction Too Close to Tee

Piping Arrangements

Installation

Electrical Connections

1. Provide a main power disconnect with Lock Out capability. That is, a disconnect which can be locked in the power Off position and key removed. This will allow service and maintenance to be performed with no possibility of the power being accidentally turned on.

2. Make sure installation is suitable for a wet environment.

3. Thoroughly read the motor manufacturer's instructions prior to installation.

4. Check the motor nameplate data and make sure that it matches the electrical supply, and that all wiring, switches, starters, and overload protection are correctly sized.

5. Make sure the impeller rotation is counterclockwise when viewed from the suction connection end.

DANGER

Incorrect electrical installation could cause an electric shock which could result in severe injury or even loss of life. All electrical/electronic installation must be performed by trained and authorized electricians only. All electrical/electronic installation must comply with all applicable codes and standards including those established by OSHA.

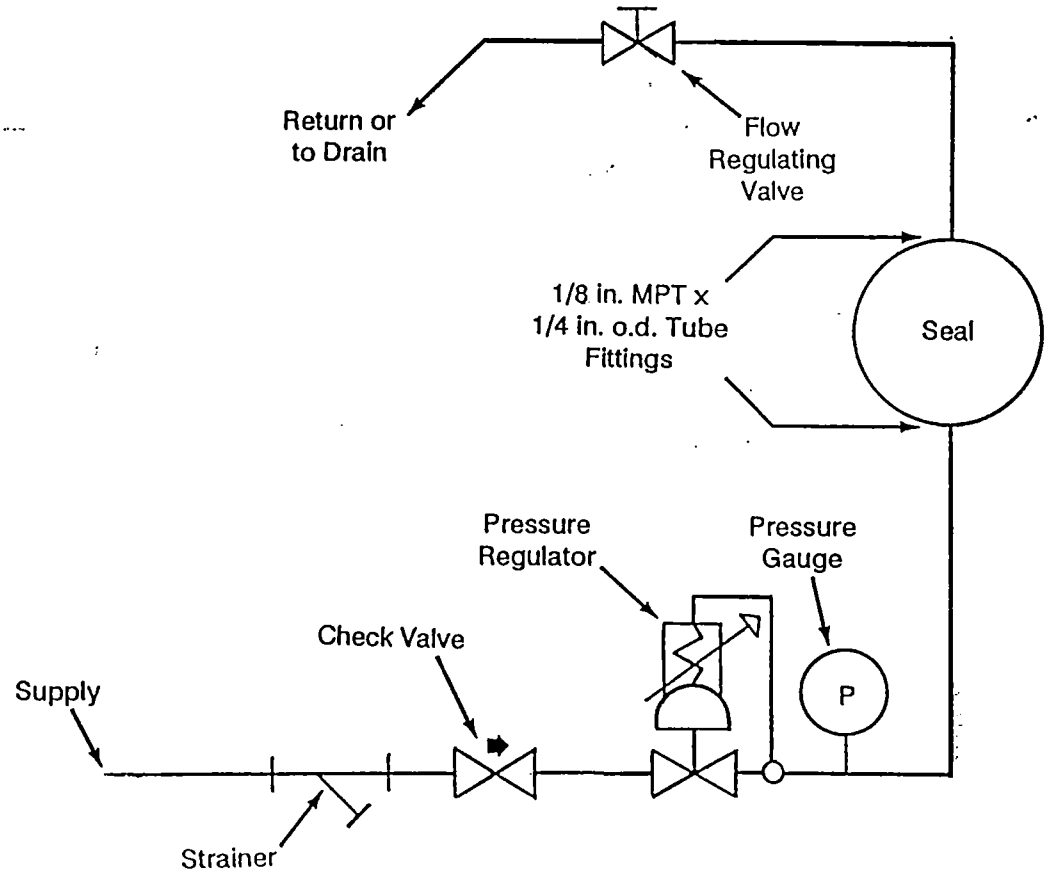
Installation

Double Seal with Flush

Double mechanical seals are specifically designed for flushing between the two seals. Inlet and outlet fittings are provided so that the flush media leaving the seal may be routed to a drain or recovered for other use.

Use flush media which is cool and filtered free of abrasive impurities to obtain maximum service life of seal components. If the product is sticky or crystalline at cool temperatures, use warm or hot media instead.

When using the "W" Series **Aseptic** double mechanical seal, pressure is restricted to 60 psig maximum and a flow of 5 to 10 gallons/hour. When using the "W" Series **Standard** mechanical seal, the pressure is restricted to 15 psig maximum and a flow of 5 to 10 gallons/hour.



Recommended Seal Flush Piping - Double Seal with Flush

Pre-Start-Up Procedures

First Cleaning

Disassemble and manually clean all product contact parts and seal parts prior to the first operation. This gives the plant personnel an opportunity to become familiar with the pump assembly. Also, this procedure will eliminate possible foreign materials that may have accumulated during shipment or installation.

See the Maintenance section for complete disassembly and assembly instructions.

See the Cleaning and Sanitizing section for complete cleaning and sanitizing procedures.

Motor

1. Prepare the motor (or other drive) for operation according to instructions provided by the motor manufacturer.
2. Check the electrical supply to see that it matches the nameplate rating.
3. Check for correct direction of rotation (counterclockwise when facing the pump inlet).
4. Lubricate the motor bearings per manufacturer's instructions.

Check Impeller Diameter vs Motor Horsepower

Before operating the pump, review the performance curve and application, giving consideration to motor horsepower and impeller diameter compared to expected discharge flow rate and pressure. If pump is operated with less than expected discharge pressure, flow rate will increase and load on motor will increase.

CAUTION

The pump may overload the motor if operated with a fully open, unrestricted discharge (depending on the impeller diameter and motor horsepower). Prevent motor damage by checking before first operation.

To determine if there is sufficient discharge pressure to prevent motor overload, perform the following test:

1. If there is no valve in the system downstream of the pump, temporarily install one at a convenient location. The valve should not restrict flow in any way when fully open (for example, a ball valve).

DANGER

Only a qualified electrician should install an ammeter.

2. Temporarily install an ammeter in the electrical service for the motor.
3. Adjust fluid levels, valves, controls, etc. in the system to simulate anticipated process conditions or cleaning circuits which will result in lowest discharge pressure and highest pump flow rate.
4. Close the valve in the discharge line.
5. Start the pump.
6. Gradually open the valve while monitoring the ammeter. If the ammeter indicates full motor load before the valve is fully open, the impeller diameter must be trimmed or additional restriction is required to prevent motor overload.

CAUTION

Do Not add restriction to the suction line. Operation with restricted suction may cause cavitation and serious damage to pump parts.

CAUTION

When product conditions change (viscosity, density, temperature) or when the process changes (capacity, suction or discharge pressure), the motor load changes also. Recheck the motor load to prevent motor damage.

Pre-Start-Up Procedures

Impeller Trimming

When a reduced diameter impeller is required, use a factory pretrimmed impeller. These are available through your authorized APV Crepaco representative in a range of standard sizes as detailed in the Service Parts manual.

If field trimming of an impeller is unavoidable, the work must be performed by a skilled machinist using high quality equipment and procedures. An arbor is required to hold the impeller in a lathe.

This arbor may be obtained from APV Crepaco. A common machine screw and flat washer is also required to hold the impeller onto the arbor.

The material of the impeller is cast type 316 stainless steel, ACI grade CF8M. Turn the outside of the impeller down to the required diameter and deburr. Do not trim the impeller diameter below 70% of the maximum diameter shown in the General Information section.

Pump Model	Arbor Part Number	Required Screw Size
W 20/20, W 25/75, W 30/25 W 30/50, W 40/20, W 50/25	05HP458468	3/8-24 UNF x 1 in. lg.
W 30/100, W 50/50, 80/50 W 50/100, W 70/30	34HP458467	1/2-20 UNF x 1 in. lg.
W 100/130, 25/200, 60/300	34HP458467	1/2-20 UNF x 1 in. lg.

Arbor for Impeller Trimming

Cleaning and Sanitizing

Introduction to Cleaning and Sanitizing

WARNING

Using unclean or unsanitary equipment could produce contaminated food products. Always clean and sanitize equipment before producing product for human consumption. See the Cleaning/Sanitizing Chemical Hazard in the Safety Information section.

Cleaning and sanitizing of equipment is necessary on a routine basis whenever processing food products.

The frequency of cleaning and the chemicals and procedures used will vary depending on the product and process. It is the responsibility of the user to establish a suitable, well defined cleaning and sanitizing program. This program must take into consideration all applicable laws, regulations, and standards relative to the protection of public health and the safe use and disposal of chemicals.

For assistance in developing your program, contact your local health authority and a reputable supplier of cleaning and sanitizing chemicals for the food processing industry. You may also contact your local APV Crepaco sales representative for recommendations.

The "W" Series Centrifugal Pumps have sanitary design and construction. They are designed with corrosion resistant smooth surfaces and crevice free construction for easy cleaning. In addition, it is easy to disassemble either for manual cleaning methods or for inspection for cleanliness. Depending on the product and cleaning solutions used, it may be possible to satisfactorily clean solely by circulation of chemical detergents and water rinses through the pump (CIP).

WARNING

Direct contact with cleaning/sanitizing solutions may cause chemical or high temperature burns. Equip all personnel performing cleaning/sanitizing operations with protective clothing (including eye protection). Thoroughly train these personnel in the safe handling and disposal of the chemical and high temperature solutions they are using.

CAUTION

When cleaning more than one centrifugal pump in series in a closed system, the discharge pressures are additive. Pressures higher than normal process pressures are possible. Make sure that all system components are rated for the total pressure of all centrifugal pumps in the cleaning circuit.

CAUTION

During Clean-In-Place (CIP) cleaning procedures the pump may start unexpectedly from a remote signal. This may cause severe injury to anyone in contact with pump parts. Do not contact any part of the pump during Clean-In-Place cleaning procedures. Before disassembling product contact parts for manual cleaning turn off the electric power supply and Lock Out using a locking device for which only the person performing the maintenance procedure has the key.

Cleaning and Sanitizing

Definitions

Rinse

The purpose of rinsing is to remove excess residual product and reduce the load required for detergent removal. At the end of washing, rinsing removes residual chemical solutions. Without the rinse, the chemicals could be corrosive or react unfavorably with other chemical solutions.

Use a rinse water temperature which rapidly removes the excess product or residual chemical solutions. Generally this means warm water near 100 F (40.0 C). Use potable water for the final rinse.

Detergent Solution

The customer is responsible for using the correct chemical solutions. Your supplier of cleaning chemicals should recommend the type of chemical, concentration, temperature, and time of exposure for cleaning with your conditions.

Acid Rinse

Do not use any type of acid in the final rinse water.

Sanitizing

Sanitizing treatments are used to kill microorganisms on product contact surfaces prior to processing food products. Check local health and food regulatory agencies for required minimum sanitizing treatments.

Hot water may be used for sanitizing to avoid the corrosive effect of chemical solutions.

Methods for Cleaning and Sanitizing

General Procedure

The general sequence of steps for cleaning and sanitizing includes:

1. Rinse - Preliminary removal of excess residual product.
2. Wash - Use of detergent solution to remove residual product.
3. Rinse - Removal of residual detergent solution.
4. Sanitize - Treatment with heat or chemical solution prior to product processing to kill bacteria.

CAUTION

Sanitizing solutions are extremely corrosive, especially those which contain halogen compounds (chlorine, bromine, iodine) or strong acids (nitric, hydrochloric). When left in prolonged contact, solutions of these chemicals will attack the stainless steel pump parts. To prevent serious damage:

Do Not sanitize the pump more than 15 minutes immediately prior to starting product processing.

Do Not leave sanitizing solutions in prolonged contact with any surface - product contact or exterior. As droplets dry out they become more concentrated and may cause corrosion pitting.

Do Not use higher concentration, temperature, or exposure time than necessary for effective sanitizing treatment.

CIP Cleaning Method

Clean-In-Place (CIP) is cleaning solely by flowing rinse, detergent, and sanitizing solutions through the product contact areas at high velocity. The solutions must be supplied from a separate source such as a central CIP system.

When using CIP methods for cleaning and sanitizing it is necessary to operate the pump during circulation of solutions.

At the end of cleaning, thoroughly rinse all pump parts with clean water.

With CIP methods, it is necessary to periodically disassemble the pump to check for cleanliness and the effectiveness of the CIP cleaning. Manual clean when necessary.

Cleaning and Sanitizing

Manual Cleaning Method

Manual cleaning means that the application of rinses, detergents, and sanitizing solutions is done by hand. For example, rinse water may be sprayed over product contact surfaces with a hose and detergent solution may be scrubbed on with a brush.

CAUTION

Using the wrong cleaning tools will damage product contact surfaces. Never use steel wool or a wire brush. Use a nonmetallic brush.

Theory of Operation

The "W" Series Centrifugal Pumps are designed for pumping low to medium viscosity fluids.

1. The pump design is horizontal, with fluids entering the casing through an end suction inlet.

2. The casing is attached to the backplate with a one piece clamp ring assembly for convenient access to the impeller. The circular design of the casing aids the flow of fluid through the impeller.

3. The backplate has a volute design to improve pumping efficiency, reduce forces on the impeller, and decrease motor bearing wear.

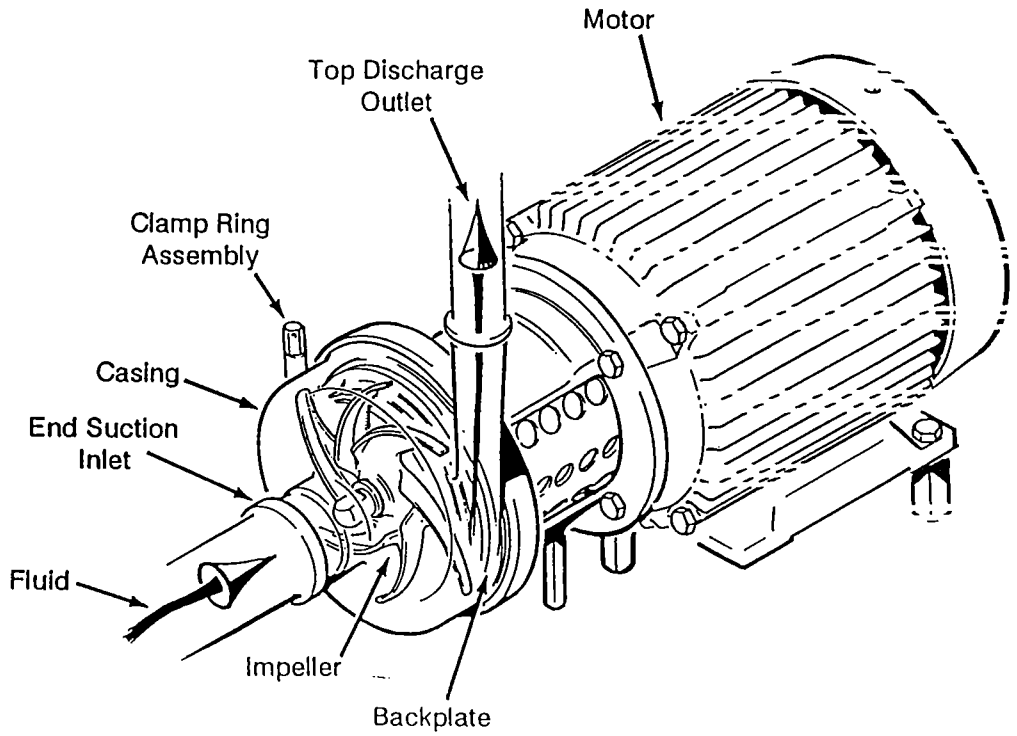
4. The impeller propels the fluid to a top discharge outlet. The impeller is open or semi-open for cleanability.

5. The impeller is driven by a tapered drive impeller shaft with a split sleeve clamp for rigid mounting on a motor shaft.

6. The pump is designed for a variety of operating speeds. Electric motors that operate at 3500 or 1750 rpm are generally used.

7. Fluid is sealed by an internal, mechanical seal. The seal is cooled and lubricated by the fluid being pumped. Various seal seat material combinations are available to correspond to the pump application.

8. A contained flush, double mechanical seal is available as an option.



Pump Design

Operation

Pump Operation

After all the procedures in the Pre-Start-Up section have been performed, the pump is ready to start.

1. If the pump is equipped with a Type F shaft seal, start the flush media flowing. See the Installation section for recommendations on flow rate, pressure, and water quality.

2. Open the suction line and flood the pump casing with liquid before starting the pump drive.

> **CAUTION**
>
> *Continuous operation of the pump without liquid present will damage the shaft seal. Starting the pump "dry", then admitting liquid will cause mechanical damage to the pump and drive.*

3. Start the pump drive. Check to see that flow is established and that connections and seals are not leaking.

Operating the pump with closed discharge is permissible for short periods depending on the type of product and its temperature. Under these conditions, mechanical heat is added to the product and it eventually will vaporize (boil).

> **CAUTION**
>
> *Do Not allow the pump to operate continuously with closed discharge. Heat will build up, leading to damage of pump parts.*

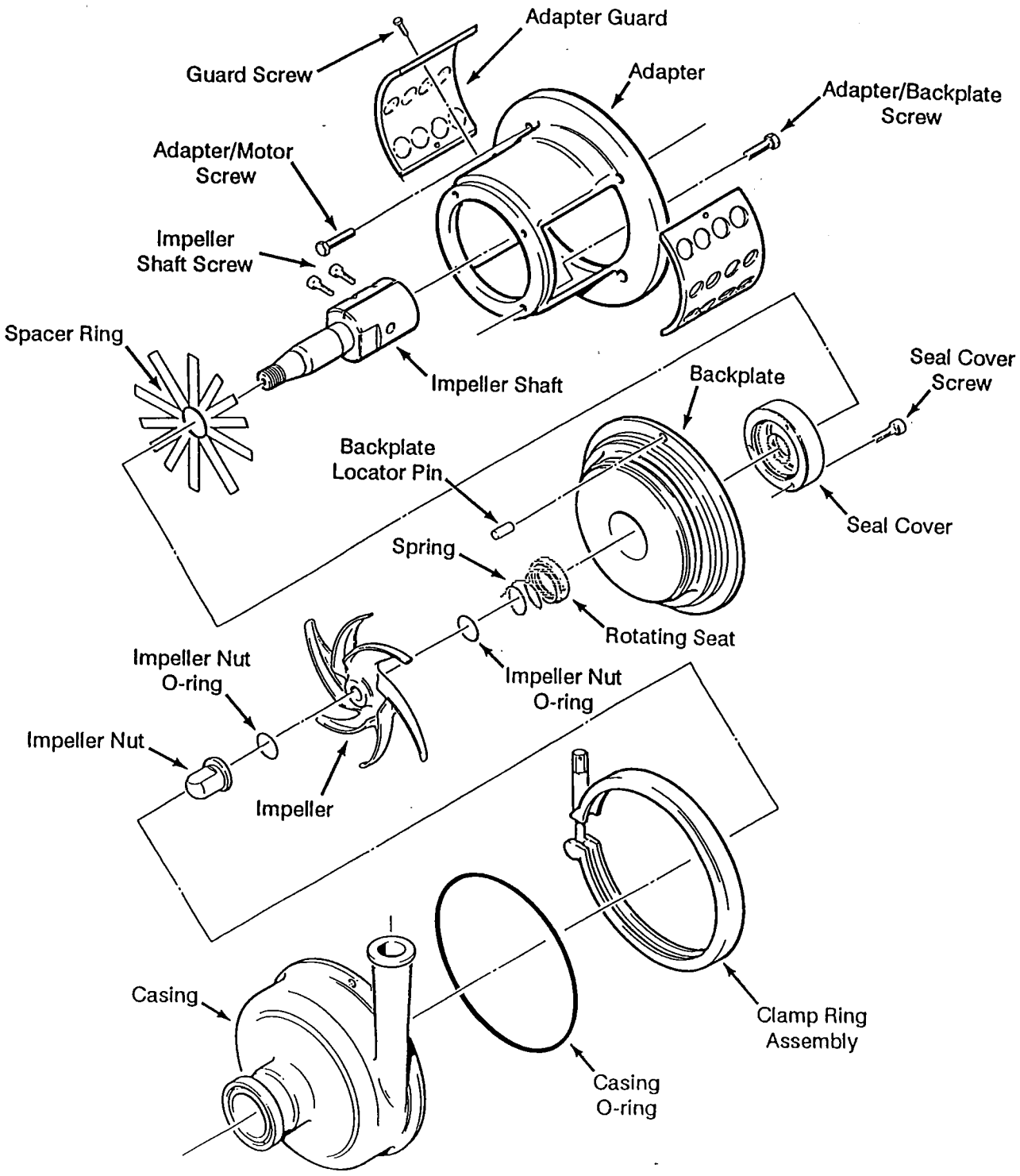
4. If normal pump operation includes valve openings and closures (especially automatic air or solenoid operated valves) check for evidence of water hammer. Water hammer is a sudden, extreme increase in pressure due to rapid changes in the velocity of a liquid flowing through a pipe line. If damaging water hammer is present, there will be noticeable line or pump movements and noise when valves are operated. Any water hammer detected must be corrected to prevent unwarranted mechanical failures. One method of preventing water hammer is to slow the rate of valve operation to provide gradual openings and closings.

> **CAUTION**
>
> *The pressure caused by water hammer could far exceed normal operating discharge pressure and may be mechanically damaging to the pump and other system components.*

5. Stop the pump drive when pumping is completed. **Do not allow the pump to continue running "dry".**

Maintenance

Component Identification



Pump Component Identification

Maintenance

WARNING

Liquid in the pump casing may be under pressure. Some liquids may be harmful if contacted (hot liquids, chemical cleaning solutions, etc.). Pump disassembly will allow any pressurized liquid present to spray out and possibly contact personnel in the area. Shut off all sources of liquid to the pump and drain the casing before starting pump disassembly. Remember that liquid may "Backup" through the discharge line.

DANGER

The pump shaft and impeller operate at high speed and can cause severe injury or even loss of life if contacted when operating.

The electric motor creates a hazard of electric shock which can cause severe injury or even loss of life if contacted while energized.

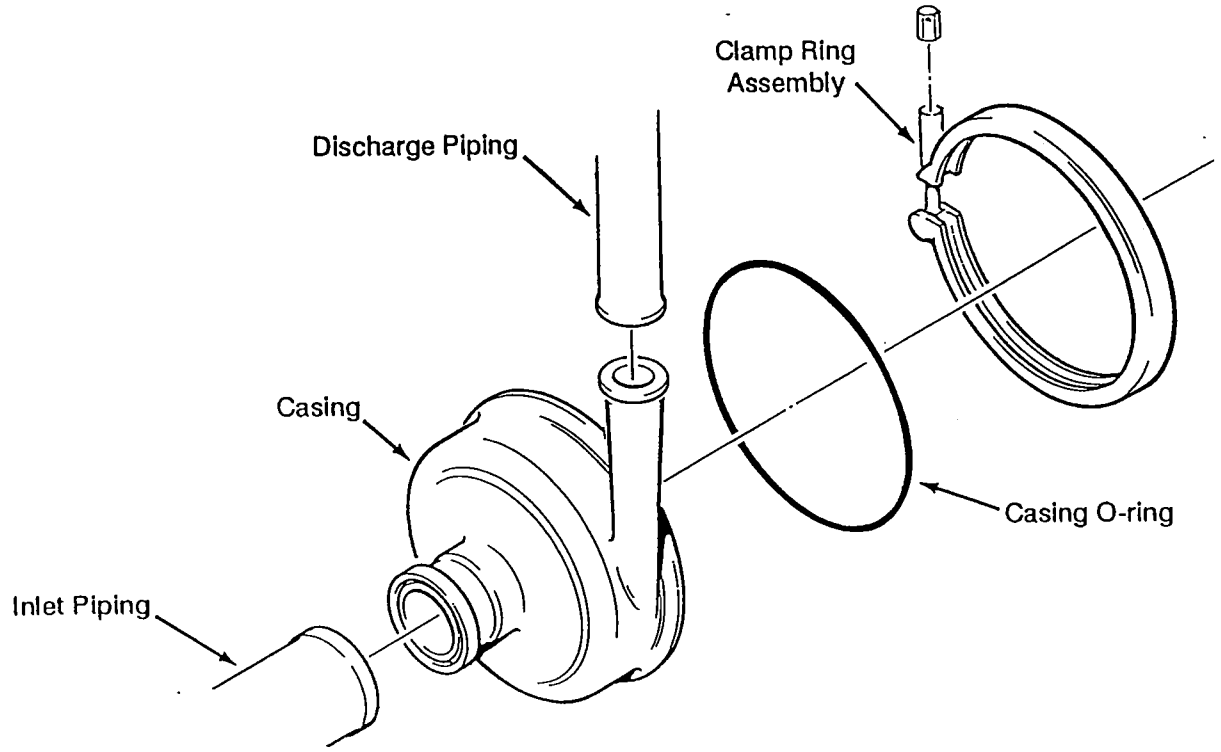
Turn off the drive power supply and Lock Out to prevent accidental starting before disassembling the pump or drive to perform maintenance.

Use a Lock Out device for which only the person performing the maintenance procedure has the key.

Disassembly

Casing and Impeller

1. Disconnect the inlet and discharge piping.
2. Loosen the clamp ring assembly.
3. Gently pull off the casing and casing O-ring.



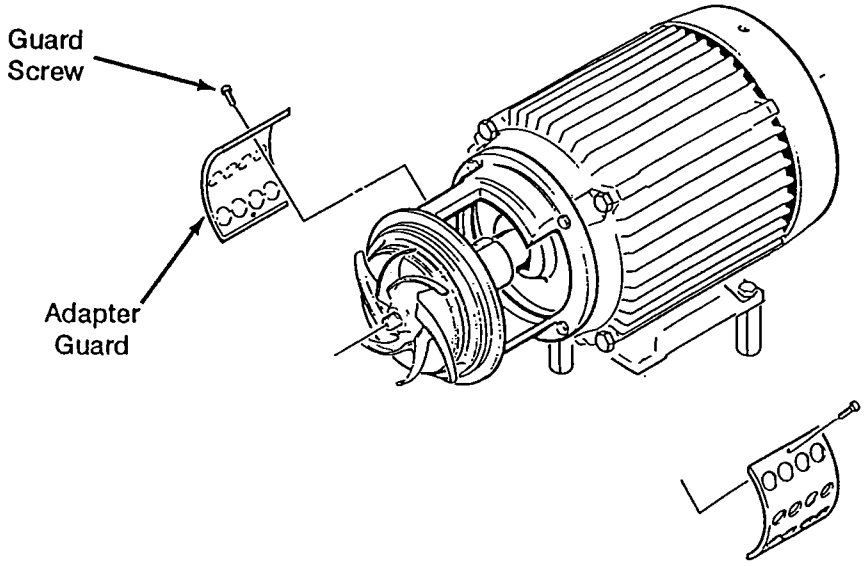
Casing Disassembly

Maintenance

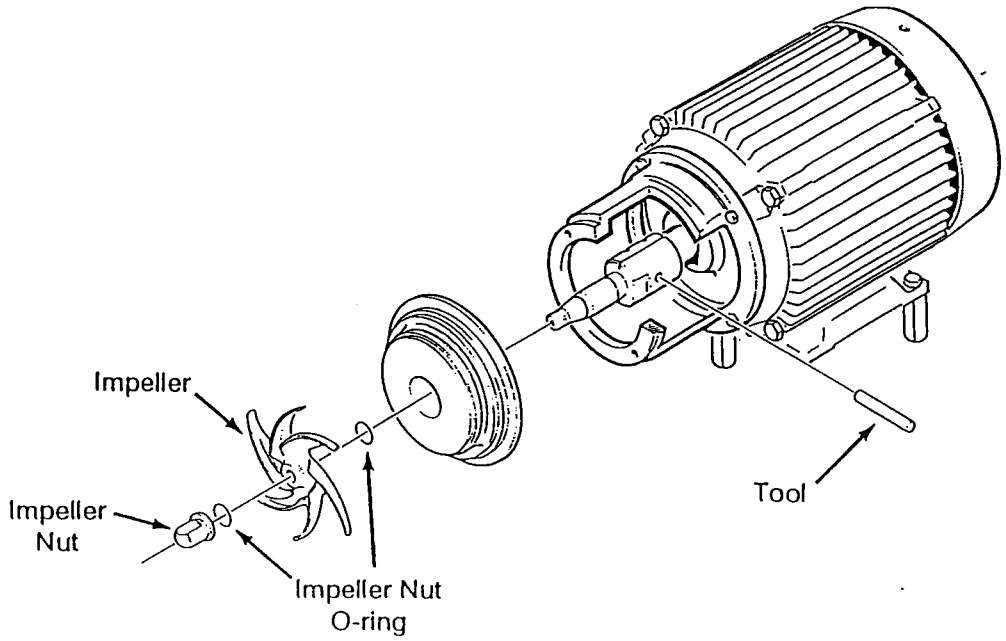
4. Remove the guard screws and adapter guard to access the impeller shaft.

5. Remove the impeller nut and impeller nut O-ring. Use a rod or similar tool in the hole in the impeller shaft to keep it from rotating while loosening the impeller nut counterclockwise (right hand thread).

6. Remove the impeller by grasping the impeller vane tips. Tap with a soft faced mallet if necessary to loosen. Do not pry between the impeller and the backplate. Remove the second impeller nut O-ring.



Adapter Guard Disassembly



Impeller Disassembly

Maintenance

Backplate and Shaft Seal

1. Remove the casing and impeller as described in the disassembly procedure.

2. If the pump is equipped with a Type F seal, disconnect the inlet and outlet flush fittings.

3. Remove the spring and rotating seat.

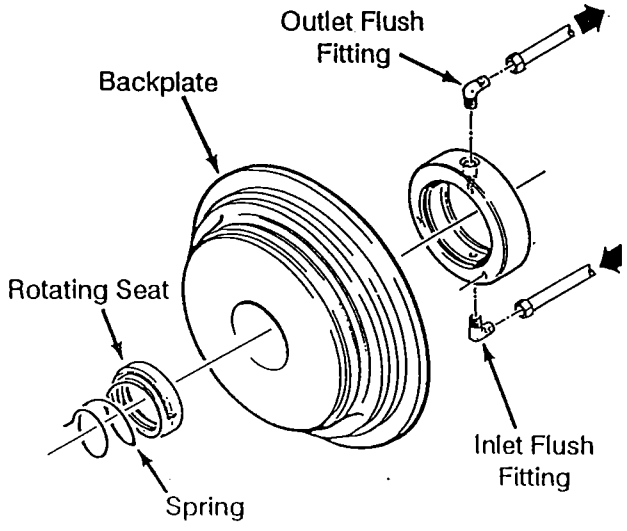
   If the rotating seat cannot be reached, remove it with the backplate using extreme care not to drop or damage parts.

> **CAUTION**
>
> *Handle seal components carefully. Seal seats may break if mishandled or dropped. Keep the backplate centered during removal to avoid contacting the shaft. Contact may damage the shaft or stationary seat.*

4. Hold the backplate against the adapter while removing the adapter/backplate screws.

5. Remove the backplate with the attached seal cover and stationary seat.

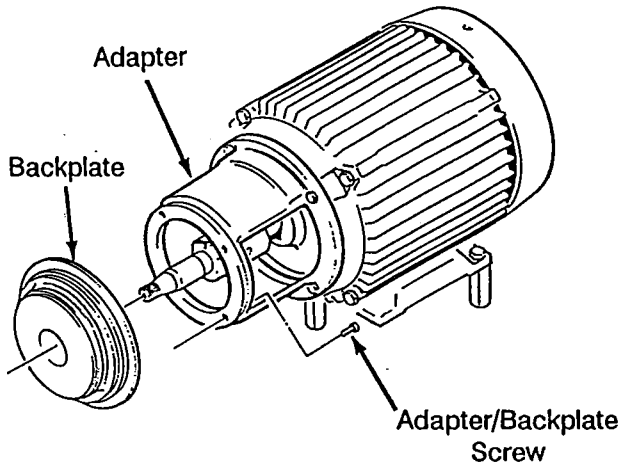
6. Remove the seal cover screws and seal cover from the backplate.



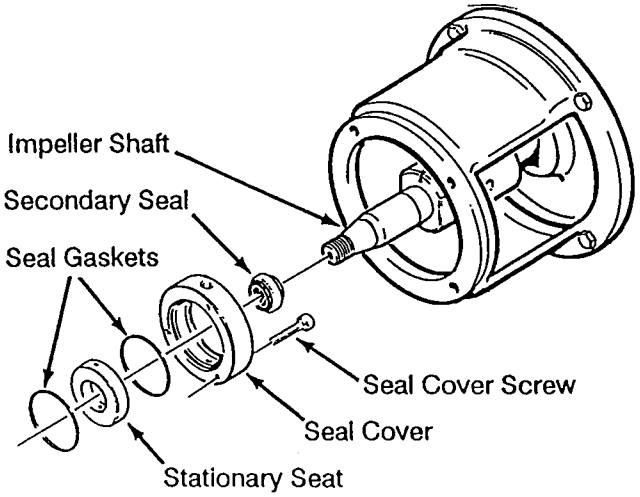
Backplate and Shaft Seal Disassembly

7. Remove the stationary seat and gaskets.

8. If the pump is equipped with a Type F seal, remove the secondary seal from the impeller shaft. Apply soapy water to the impeller shaft to aid in removal of the seal if it is stuck to the impeller shaft.



Backplate Disassembly



Shaft Seal Disassembly

Maintenance

Impeller Shaft

Disassembly

1. Remove the casing and the impeller as described in the disassembly procedure.

2. Remove the backplate and shaft seal components as described in the disassembly procedure.

3. Loosen the impeller shaft screws and remove the impeller shaft from the motor shaft.

   If the impeller shaft is tight on the motor shaft, remove a shaft screw, reverse and put the shaft screw into the threaded hole side first. Put a solid metal strip into the slot of the impeller shaft and tighten the shaft screw against the metal strip to slightly open and loosen the impeller shaft.

> **CAUTION**
>
> *Correct location of the impeller shaft on the motor shaft is critical to prevent damage to pump parts and to obtain maximum operating efficiency.*

Assembly

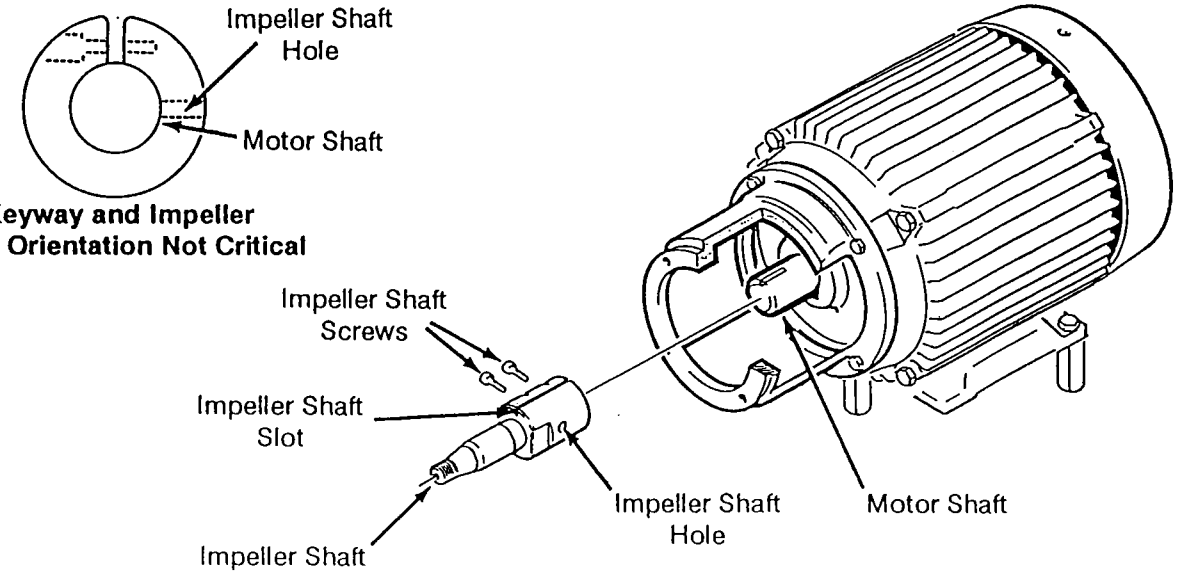
1. Check the motor shaft and the inside bore of the impeller shaft. Clean both if they are not completely free of grease.

2. Install the impeller shaft over the motor shaft, aligning the hole in the impeller shaft with the keyway in the motor shaft (for correct dynamic balance).

   If the impeller shaft does not slide on easily, open slightly as described for disassembly.

3. Install the shaft screws in the impeller shaft and tighten just enough so the impeller shaft is snug yet able to be moved in or out on the motor shaft.

4. Push the impeller shaft all the way onto the motor shaft.



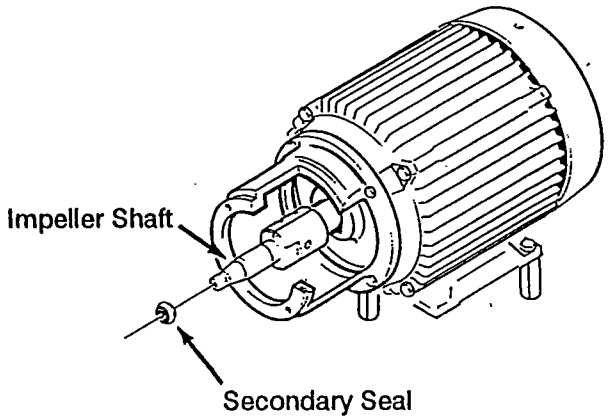
Impeller Shaft Disassembly and Assembly

Maintenance

Assembly

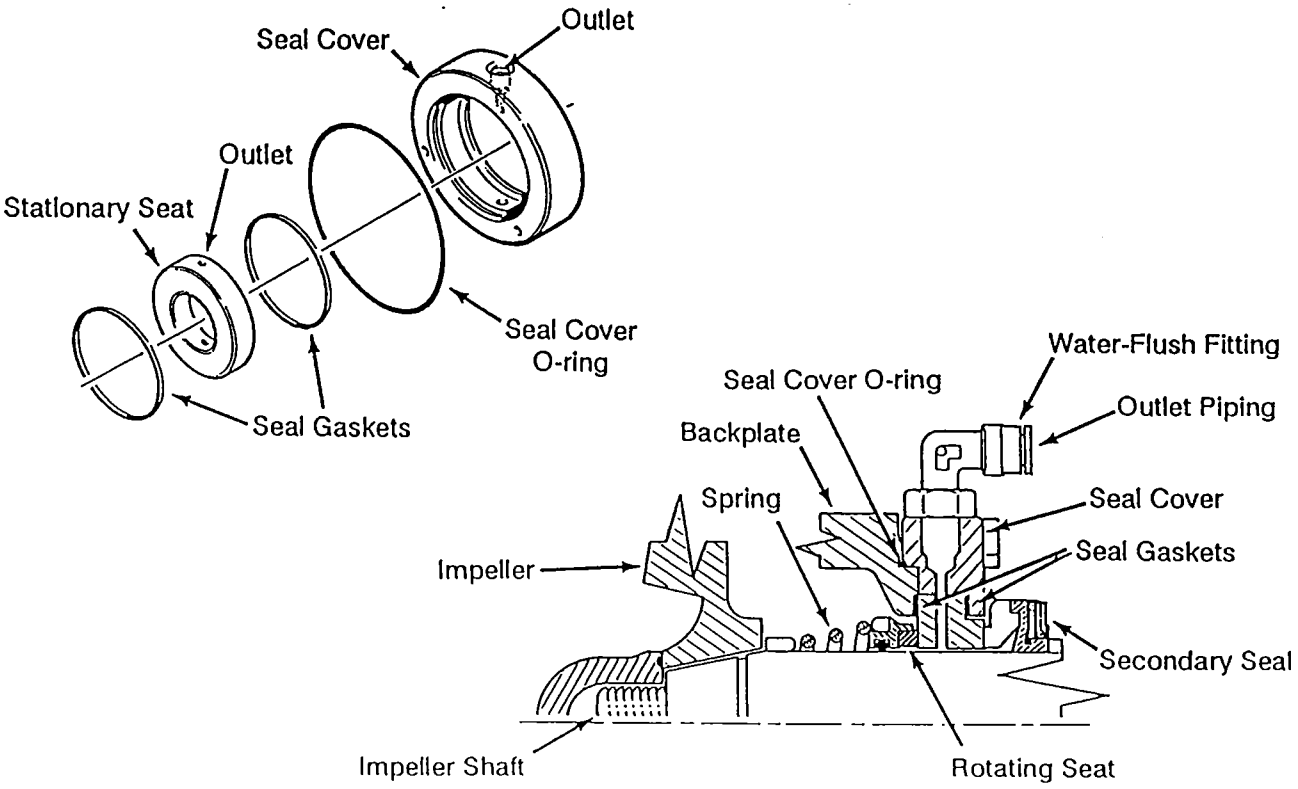
Backplate and Shaft Seals

1. If the pump is equipped with a Type F seal, lubricate the secondary seal and impeller shaft with soapy water. Do not use oil or grease.
2. Install the secondary seal onto the impeller shaft.



Secondary Seal Assembly

3. Lubricate the remaining seal gaskets, O-ring and seal seat faces with light oil. Do not use grease.
4. Align the hole in the seal cover outlet and the stationary seat outlet to provide passage through the two parts for the flush media flow.



Shaft Seal Assembly

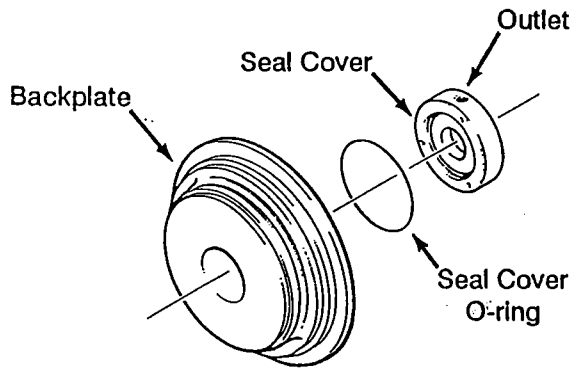
Maintenance

5. Insert the gasket, stationary seat, and gasket into the seal cover.

6. Position the O-ring in the backplate.

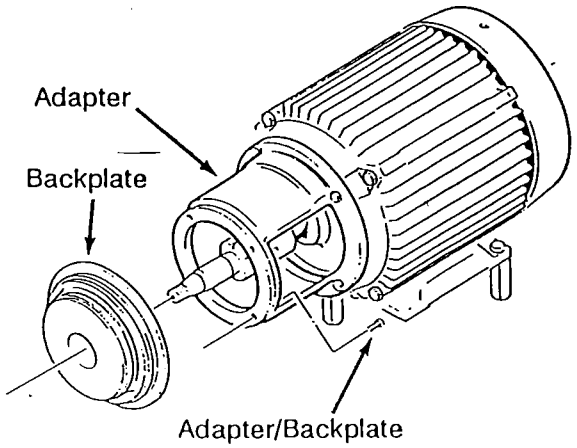
7. Attach the seal cover onto the backplate. Tighten the seal cover screws.

   If the pump is equipped with a Type F seal, position the seal cover with the inlet at the bottom and the outlet at the top (within 15 degrees of vertical). Align the holes in the stationary seat with the holes in the seal cover during assembly.



Seal Cover Assembly

8. Attach the backplate to the adapter, tightening the adapter/backplate screws alternately and evenly.



Backplate Assembly

9. Install the rotating seat carefully over the impeller shaft.

10. Install the spring onto the impeller shaft. Insert the spring tang into the slot of the rotating seat.

11. If the pump is equipped with a Type F seal, connect the inlet and outlet flush fittings.

DANGER

The pump shaft and impeller operate at high speed and can cause severe injury or even loss of life if contacted when operating.

The electric motor creates a hazard of electric shock which can cause severe injury or even loss of life if contacted while energized.

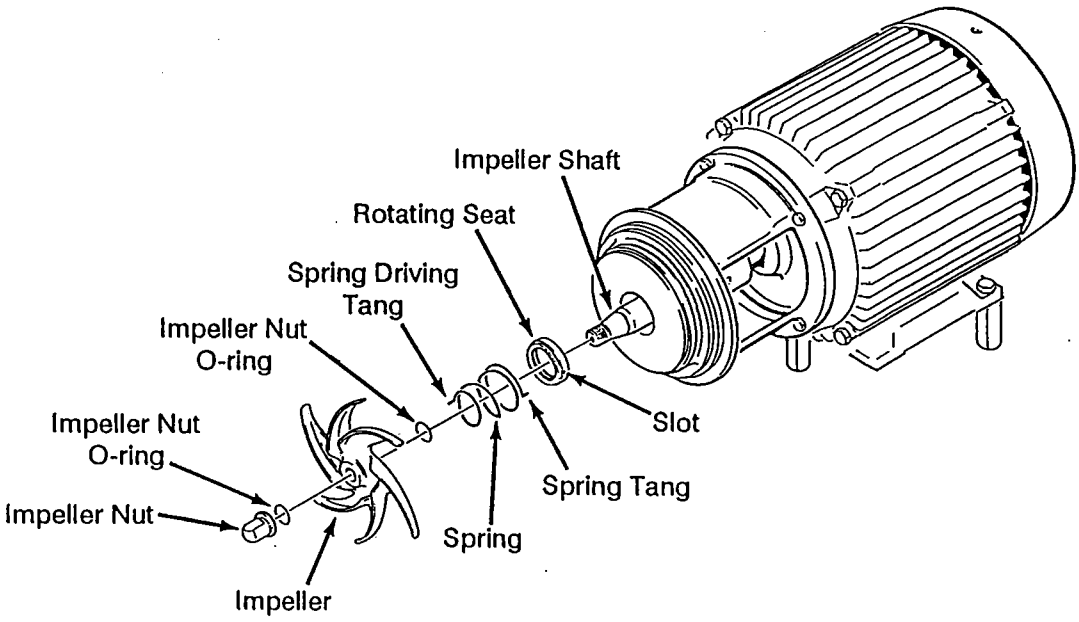
Turn off the drive power supply and Lock Out to prevent accidental starting before disassembling the pump or drive to perform maintenance.

Use a Lock Out device for which only the person performing the maintenance procedure has the key.

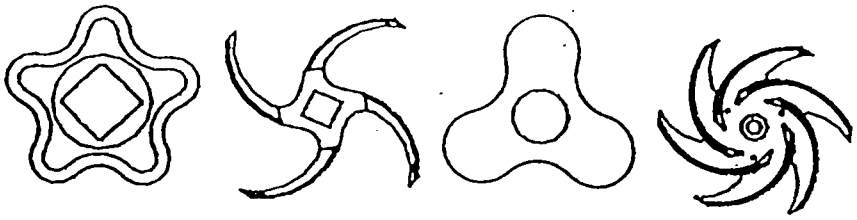
Maintenance

Impeller and Casing

1. Check the tapered area of the impeller shaft and the impeller hub. Clean if necessary so that both are completely clean and free of grease.
2. Lubricate the impeller nut O-rings.
3. Install one impeller nut O-ring in the groove located on the taper of the impeller shaft.
4. Install the impeller.
5. Align the driving tang of the spring in the groove in the rear of the impeller hub.
6. Install the second impeller nut O-ring in the groove located on the taper of the impeller shaft.



Impeller and Rotating Seat Assembly



PUMP NOTES

DISTRIBUTION: PUMP MANUAL HOLDERS
SUBJECT: ADDENDUM TO THE "W" PUMP INSTRUCTION MANUAL
WI INDUCER PUMP IMPELLER ASSEMBLY

Number 024 **Effective October 14, 1993**

Because of the inducer which replaced the impeller nut, it is necessary to follow the impeller shaft assembly procedures found in your instruction manual to properly install and set the impeller. The impeller nut must be substituted for the inducer in order to use the plastic star shaped impeller spacing gauge. An impeller nut is provided with the pump. After the impeller shaft has been positioned to provide the necessary 0.020" clearance between the casing and impeller, and after being secured to the motor shaft, remove the clamp ring, casing, casing O-ring, impeller nut and plastic spacing gauge. Re-install the inducer, torquing to the same rating as the standard impeller nut. Finish the assembly by installing the casing O-ring, casing, and clamping ring assembly.

APV CREPACO FLUID HANDLING DIVISION
100 South CP Avenue, Lake Mills, WI 53551
Tel: (414) 648-8311 / Fax: (414) 648-1441

The UNIversal Inducer Helps Solve Cavitation Problems

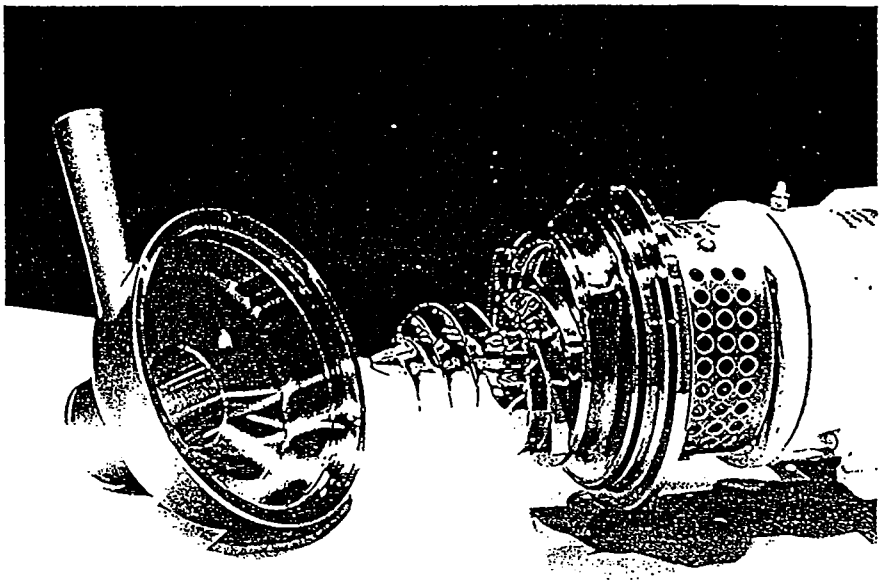
APV's Wi Series UNIversal Inducer pump is available as a complete close coupled centrifugal pump assembly. It features a UNIversal Inducer to lower the NPSH required. This can greatly reduce the effects of cavitation.

Advantages of The UNIversal Inducer. The UNIversal Inducer raises the pump suction pressure and delivers liquid to the eye of the impeller more effectively. This results in:

- **50-70% lower NPSH required.**
- **Improved pumping performance with viscous products.**
- **Quieter operation on vacuum applications.**
- **Improved air handling capability.**
- **Longer impeller, casing and backplate wear life on applications with insufficient NPSH, aerated or viscous products.**
- **An alternative to completely redesigning a system experiencing cavitation.**

In addition:
Only one inducer size is required for the entire capacity range of a given model.

Field Conversion Kits.
The Inducer feature can also be provided as an option to other W Series models and is available as a kit for field conversion of existing W Series pumps.



How It Works. A helical screw rotates at impeller speed in a specially designed casing inlet. This raises the inlet pressure above the vapor pressure of a given liquid. The risk of cavitation is reduced by the resulting lower NPSH required.

Applications. Vacuum operations such as evaporators, deaerators and crystallizers are natural applications for the Wi Series pump. Viscous products, beyond the nominal 500 centipoise (2500 ssu) limit, common for many centrifugal pump applications, may be pumped with only a small increase in motor horsepower. The Wi Series will provide improved performance when pumping high vapor pressure liquids (i.e. most solvents) and products at high system temperatures (at or above the boiling point).

Wi Series pumps feature 316 stainless steel product contact surfaces to meet 3A and FDA sanitary requirements.

Maintenance

7. Install the impeller nut.

   a. Use a torque wrench to tighten the impeller nut to the value listed in the table below.

   b. Use a rod or similar tool in the hole in the impeller shaft to keep it from rotating while tightening the nut.

8. Place the plastic, star-shaped impeller spacer ring over the impeller nut so it is resting in place in front of the impeller vanes.

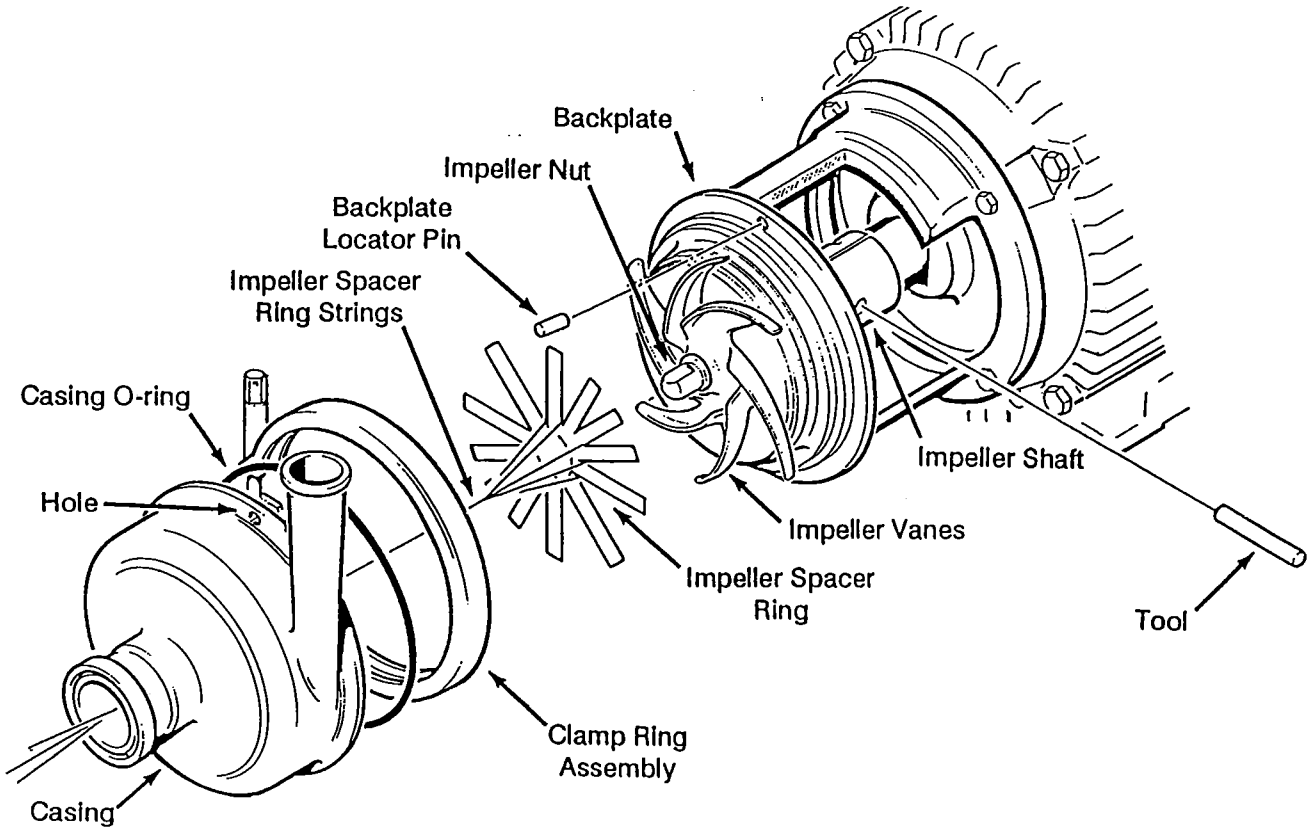
9. Install the casing O-ring into the casing.

10. Align the locator pin with the hole in the casing.

11. Install the casing.

12. While installing the casing, pass the strings on the spacer ring through the inlet opening.

13. Tighten the casing in place with the clamp ring.



Impeller Assembly

Pump Models	Impeller Nut Size	Impeller Nut Tightening Torque	
		ft-lbs	N•M
W 20/20, W 25/75, W 30/25 W 30/50, W 40/20, W 50/25	M14	52	70
W 30/100, W 50/50, 80/50 W 50/100, W 70/30	M20	148	200
W 100/130, W 25/200, 60/300	M20	148	200

Impeller Nut Tightening Torque

Maintenance

14. Use two prying tools, one on each side, to push the impeller shaft away from the motor.

15. Move the impeller shaft forward until the spacer ring is held tight between the impeller and the inside of the casing.

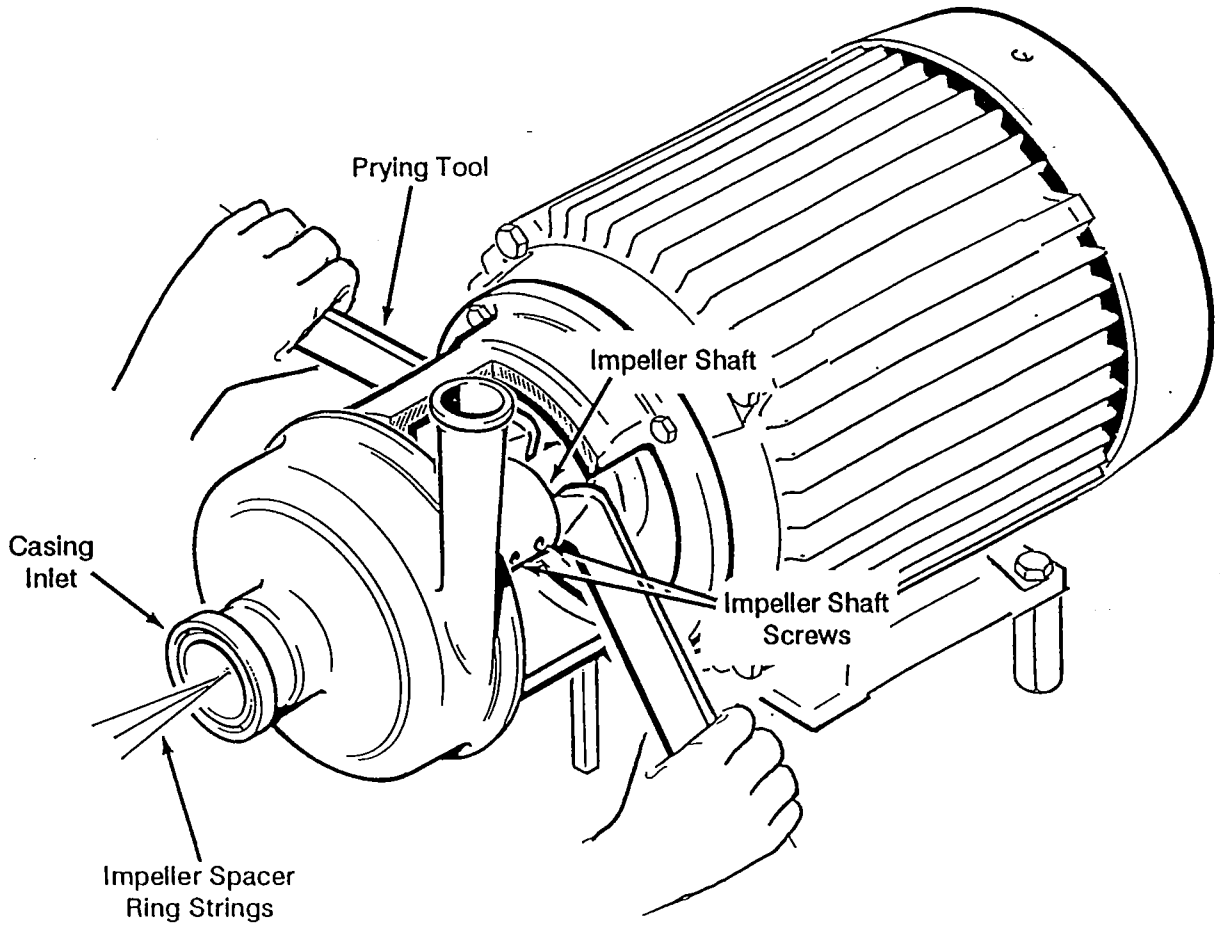
    This establishes the correct clearance between the impeller and the casing which is the thickness of the spacer ring material, 0.020 in. (.05 mm).

16. Tighten the impeller shaft screws while holding the impeller shaft in place.

17. Torque the impeller shaft screws (size M8 socket hex head) to 22 ft-lb (30 N· m).

18. Remove the impeller spacer ring by pulling the strings out through the casing inlet connection.

19. Reconnect the suction and discharge piping.



Impeller Shaft Positioning

Maintenance

DANGER

The pump shaft and impeller operate at high speed and can cause severe injury or even loss of life if contacted when operating.

The electric motor creates a hazard of electric shock which can cause severe injury or even loss of life if contacted while energized.

Turn off the drive power supply and Lock Out to prevent accidental starting before disassembling the pump or drive to perform maintenance.

Use a Lock Out device for which only the person performing the maintenance procedure has the key.

Routine Wear Checks

Routinely check the pump components for wear and deterioration.

O-ring Seals (Casing, Impeller Shaft, and Impeller Nut)

Replace at any sign of leaking, deterioration, cracking, loss of elasticity, or change in dimension.

Impeller Nut

Check the threads. Replace the impeller nut if the threads are damaged or worn.

Shaft Seal Components

1. Check the rotating seat and stationary seat. If using a Type F shaft seal, also check the secondary seal.
   a. Replace the shaft seal when raised seat face is worn away or if there is any sign of cracking or chipping.
   b. Replace the shaft seal when the stainless steel or carbide seat(s) are worn so that a smooth, flat surface for sealing cannot be assured.

WARNING

Liquid in the pump casing may be under pressure. Some liquids may be harmful if contacted (hot liquids, chemical cleaning solutions, etc.). Pump disassembly will allow any pressurized liquid present to spray out and possibly contact personnel in the area. Shut off all sources of liquid to the pump and drain casing before starting pump disassembly. Remember that liquid may "backup" through the discharge line.

2. Check the O-ring seals and gaskets. Replace the shaft seal at any sign of leaking, deterioration, cracking, loss of elasticity, or change in dimension.
3. Check the spring. Replace the shaft seal if the spring is deformed or if surface cracks are present.
4. If using a Type F Shaft seal, check the flush seal area and connections.
   a. Tighten or replace leaking connections.
   b. Remove any mineral deposits or other accumulated material.

Impeller Shaft

1. Check the location of the impeller shaft on the motor shaft as described in the Assembly-Impeller and Casing section. Relocate if incorrect.
2. Check the tapered section under the impeller hub.
   a. If worn or scored, review the assembly procedure to be sure the impeller nut is being torqued to correct tightness.
   b. Replace the shaft seal when the silicon or carbide seat(s) are worn so that a smooth, flat surface for seal cannot be assured.
   c. If scored, smooth the scored area with a fine emery cloth.
   d. Be sure to install new O-rings under cap nut and on groove in impeller shaft.

Maintenance

Impeller

1. Check the impeller hub.

   a. If worn or scored, refer to the assembly procedure to be sure the impeller nut is being torqued to the correct tightness.

   b. If worn so that a tight fit cannot be obtained between the impeller shaft and the impeller hub, replace the impeller.

   c. If scored, smooth the scored area with a fine emery cloth.

2. Check the impeller vanes. If rough eroded areas are present, cavitation during operation is likely.

   a. Review the application and operation of the pump to correct the source of cavitation.

   b. Very light surface erosion may be removed by grinding and polishing.

   c. Check impeller shaft balance as described in the Assembly-Impeller Shaft section.

   d. Replace the impeller if erosion is moderate to severe.

Lubrication

Motor

Lubricate motor (or other drive) according to instructions provided by the manufacturer.

CAUTION

When pumping product above 200 F (93 C), consult the motor manufacturer for high tem-

Seal Components

When processing food products use a sanitary grade lubricant in product contact areas. Use a lubricant approved for incidental contact with edible products (USDA Classification H1).

1. Lubricate seal seat face areas (rotating and stationary) when assembling. Use a small amount of light oil. Do not use solid or grease type lubricants.

2. Lubricate the O-rings used to seal the casing, impeller shaft and impeller nut when assembling. An oil or grease type lubricant is satisfactory.

Problem Solving Guide

Problem	Possible Cause	Possible Reason
Not enough liquid delivered	Impeller diameter too small for application	
	Discharge head too high	
	Suction lift too high	
	Air leak in suction 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 in liquid	
	Insufficient NPSH (net positive suction head) available	
Not enough pressure	Impeller diameter too small for application	
	Air leak in suction or at seal area	
	Wrong direction of rotation	
	Speed too slow	Low voltage
		Wrong frequency
		Wrong motor
	Air in liquid	
Rapid seal wear	Abrasive product	
	Incorrect seal selection for application	
	Abrasive solids (unfiltered) in seal flush media	
	Incorrect seal assembly	
	Loose impeller shaft	
	Prolonged "dry" running	

Problem Solving Guide

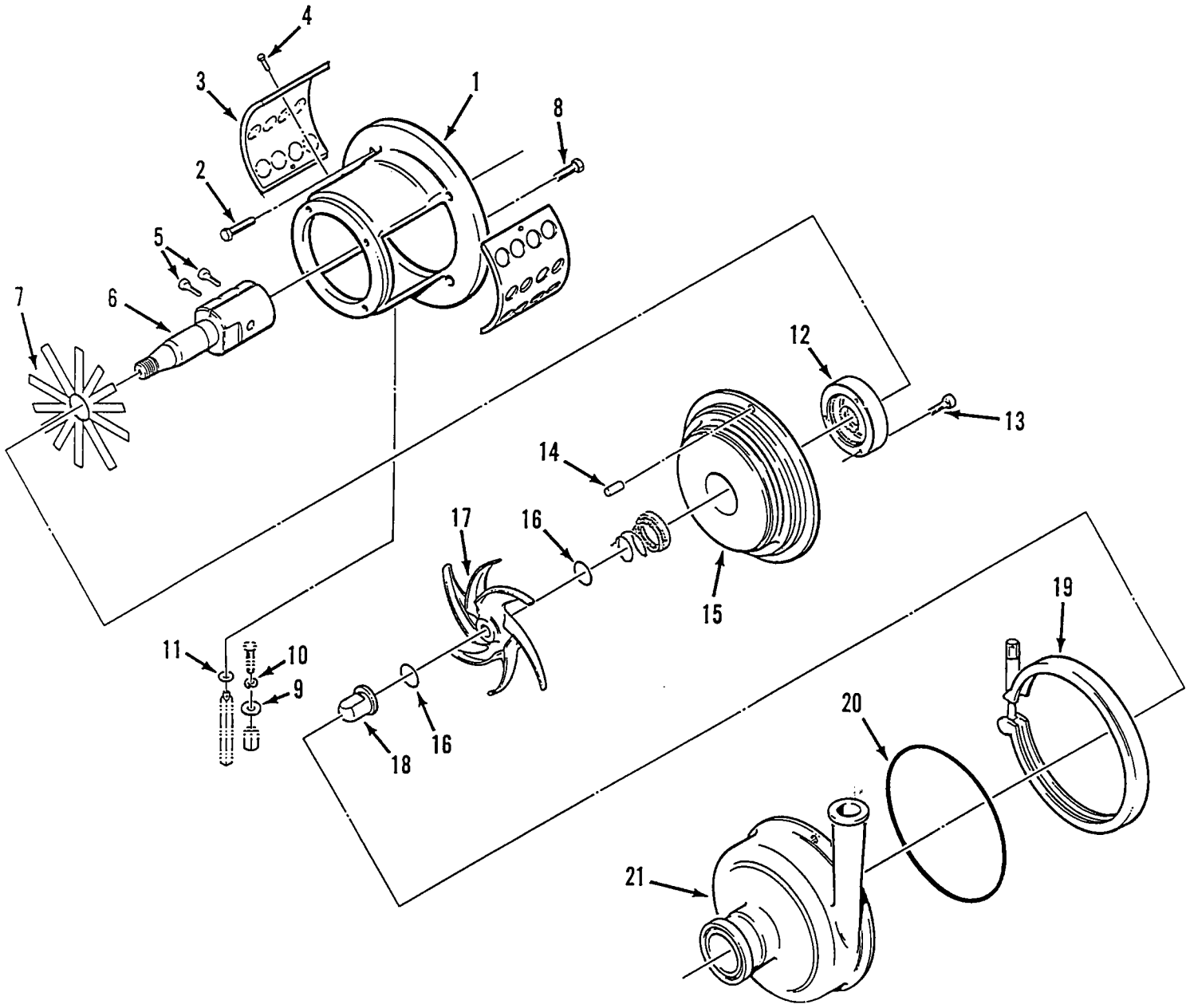
Problem	Possible Cause	Possible Reason
Motor overload	Discharge head too low allowing pump to deliver too much liquid	
	Impeller diameter too large for application	
	Liquid heavier or more viscous than rating	
	Voltage or frequency incorrect	
	Mechanical abnormality in pump	Impeller interference
		Seal binding
	Defective motor	
	Faulty electrical connections	
	Overload heaters too small for motor	
Vibration	Starved suction	Insufficient NPSH (net positive suction head) available
		Suction line too long
		Suction line too small
		Suction line blocked
		Air in liquid
	Impeller shaft loose or bent	
	Impeller out of balance	
	Impeller loose on impeller shaft	
	Motor bearings worn	
	Base not level, legs not touching floor	

Parts Manual

"W" Series High Efficiency Centrifugal Pump

Models W 20/20, W 25/75, W 30/25, W 30/50, W 40/20, W 50/25, W 30/100

STANDARD



Note. Order by part number, not by item number.

"W" Series High Efficiency Centrifugal Pump
Models W 20/20, W 25/75, W 30/25, W 30/50, W 40/20, W 50/25, W 30/100
STANDARD

ITEM	DESCRIPTION	W 20/20 PART NO.	QTY	W 25/75 PART NO.	QTY	W 30/25 PART NO.	QTY	W 30/50 PART NO.	QTY	W 40/20 PART NO.	QTY	W 50/25 PART NO.	QTY	W 30/100 PART NO.	QTY
1	ADAPTER	*	1	*	1	*	1	*	1	*	1	*	1	*	1
2	SCREW - Adapter/Motor	*	4	*	4	*	4	*	4	*	4	*	4	*	4
3	GUARD - Adapter	*	2	*	2	*	2	*	2	*	2	*	2	*	2
4	SCREW - Guard	521V006679	4	521V006679	4	521V006679	4	521V006679	4	521V006679	4	521V006679	4	521V006679	4
5	SCREW - Shaft, (M8 x 25, M10 x 35)	522V771199	2	522V771199	2	522V771199	2	522V771199	2	522V771199	2	522V771199	2	522V771199	2
6	SHAFT - Impeller	*	1	*	1	*	1	*	1	*	1	*	1	*	1
7	RING - Spacer	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-	05HP259781	1
8	SCREW - Adapter/Backplate, (M8 x 20, M8 x 25)	N/A	4	522V702234	4	522V702234	4	522V702234	4	522V702234	4	522V702234	4	522V702234	4
9	WASHER - Plain	*	2	*	2	*	2	*	2	*	2	*	2	*	2
10	WASHER - Lock	*	2	*	2	*	2	*	2	*	2	*	2	*	2
11	WASHER - Plain, 3/8	523V007178	1	523V007178	1	523V007178	1	523V007178	1	523V007178	1	523V007178	1	523V007178	1
12	**COVER - Seal	549P260408	1	549P260408	1	549P260408	1	549P260408	1	549P260408	1	549P260408	1	549P260407	1
13	SCREW - Seal Cover, M6 x 30	522V700910	3	522V700910	3	522V700910	3	522V700910	3	522V700910	3	522V700910	3	522V700910	3
14	PIN - Backplate Locator	N/A	1	525V771331	1	525V771331	1	525V771331	1	525V771331	1	525V771331	1	525V771331	1
15	BACKPLATE	05HP168547	1	05HP260872	1	05HP260873	1	05HP260874	1	05HP260876	1	05HP260877	1	05HP260875	1
16	O-RING - Impeller Nut	*	2	*	2	*	2	*	2	*	2	*	2	*	2
17	IMPELLER	*	1	*	1	*	1	*	1	*	1	*	1	*	1
18	NUT- Impeller	05HP260504	1	05HP260504	1	05HP260504	1	05HP260504	1	05HP260504	1	05HP260504	1	05HP259714	1
19	ASSEMBLY - Clamp Ring	05AP182909	1	05AP182903	1	05AP182903	1	05AP182903	1	05AP182904	1	05AP182905	1	05AP182905	1
20	O-RING - Casing	*	1	*	1	*	1	*	1	*	1	*	1	*	1
21	CASING	*	1	*	1	*	1	*	1	*	1	*	1	*	1

*Refer to OPTIONS in this section for options.
**Refer to SHAFT SEAL - TYPE F in this section for options.

"W" Series High Efficiency Centrifugal Pump
Models W 20/20, W 25/75, W 30/25, W 30/50, W 40/20, W 50/25, W 30/100
OPTIONS

ITEM	DESCRIPTION	W 20/20 PART NO.	QTY	W 25/75 PART NO.	QTY	W 30/25 PART NO.	QTY	W 30/50 PART NO.	QTY	W 40/20 PART NO.	QTY	W 50/25 PART NO.	QTY	W 30/100 PART NO.	QTY
1	ADAPTER - 56TC	05HP182591	1	N/A		05HP168876	1	N/A	1	05HP182596	1	N/A	1	N/A	1
	ADAPTER - 143TC-145TC	05HP182591	1	05HP168881	1	05HP168876	1	05HP168876	1	05HP182596	1	05HP182594	1	05HP182594	1
	ADAPTER - 182TC-184TC	05HP182592	1	05HP168874	1	05HP168873	1	05HP168873	1	05HP168875	1	05HP168877	1	05HP168882	1
	ADAPTER - 213TC-215TC	05HP182592	1	05HP168874	1	05HP168875	1	05HP168873	1	05HP168875	1	05HP168877	1	05HP168882	1
	ADAPTER - 254TC-256TC	N/A		05HP168873	1	05HP168878	1	05HP168875	1	05HP168878	1	05HP168883	1	05HP168883	1
	ADAPTER - 284TSC-286TSC	N/A		N/A		N/A		N/A		N/A		N/A		05HP168879	1
	ADAPTER - 324TSC-326TSC	N/A		N/A		N/A		N/A		N/A		N/A		05HP182593	1
2	SCREW - Adapter/Motor, 56C-145TC	522V006752	4	522V006752	4	522V006752	4	522V006752	4	522V006752	4	522V006752	4	522V006752	4
	SCREW - Adapter/Motor, 182TC-256TC	522V006788	4	522V006788	4	522V006788	4	522V006788	4	522V006788	4	522V006788	4	522V006788	4
	SCREW - Adapter/Motor, 324TSC-326TSC	N/A		N/A		N/A		N/A		N/A		N/A		522V006816	4
6	SHAFT - Impeller, 56TC	05HP261404	1	N/A		05HP261405	1	N/A		05HP261404	1	N/A		N/A	
	SHAFT - Impeller, 143TC-145TC	05HP261338	1	05HP261327	1	05HP261326	1	05HP261327	1	05HP261338	1	05HP261327	1	05HP261407	1
	SHAFT - Impeller, 182TC-184TC	05HP261324	1	05HP261324	1	05HP261329	1	05HP261324	1	05HP261324	1	05HP261324	1	05HP261322	1
	SHAFT - Impeller, 213TC-215TC	05HP261325	1	05HP261325	1	05HP261325	1	05HP261325	1	05HP261325	1	05HP261325	1	05HP261321	1
	SHAFT - Impeller, 254TC-256C	N/A		N/A		N/A		N/A		N/A		N/A		05HP261330	1
	SHAFT - Impeller, 284TSC-286TSC	N/A		N/A		N/A		N/A		N/A		N/A		05HP261323	1
	SHAFT - Impeller, 324TSC-326TSC	N/A		N/A		N/A		N/A		N/A		N/A		05HP261331	1
9	WASHER - Plain, 56TC-145TC	523V007177	2	523V007177	2	523V007177	2	523V007177	2	523V007177	2	523V007177	2	523V007177	2
	WASHER - Plain, 182TC-215TC	523V007178	2	523V007178	2	523V007178	2	523V007178	2	523V007178	2	523V007178	2	523V007178	2
	WASHER - Plain, 254TC-286TSC	523V007179	2	523V007179	2	523V007179	2	523V007179	2	523V007179	2	523V007179	2	523V007179	2
	WASHER - Plain, 324TSC-364TSC	N/A		N/A		N/A		N/A		N/A		N/A		523V007196	4
10	WASHER - Lock, 56TC-145TC	523V007185	2	523V007185	2	523V007185	2	523V007185	2	523V007185	2	523V007185	2	523V007185	2
	WASHER - Lock, 182TC-215TC	523V007192	2	523V007192	2	523V007192	2	523V007192	2	523V007192	2	523V007192	2	523V007192	2
	WASHER - Lock, 254TC-286TSC	N/A		N/A		N/A		N/A		N/A		N/A		523V007193	2
	WASHER - Lock, 324TSC-364TSC	N/A		N/A		N/A		N/A		N/A		N/A		523V007191	4
16	O-RING - Impeller Nut, Nitrile	543S771620	2	543S771620	2	543S771620	2	543S771620	2	543S771620	2	543S771620	2	543S771623	2
	O-RING - Impeller Nut, EDPM	543S771621	2	543S771621	2	543S771621	2	543S771621	2	543S771621	2	543S771621	2	543S771624	2
	O-RING - Impeller Nut, Viton	543S771622	2	543S771622	2	543S771622	2	543S771622	2	543S771622	2	543S771622	2	543S771625	2
17	IMPELLER - 3.7 in. (95 mm)	05HP260487	1	N/A		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 4.1 in. (105 mm)	05HP260486	1	N/A		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 4.3 in. (110 mm)	N/A		05HP261357	1	N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 4.5 in. (115 mm)	05HP260485	1	N/A		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 4.7 in. (120 mm)	N/A		05HP261356	1	05HP261361	1	05HP261365	1	N/A		N/A		N/A	
	IMPELLER - 4.9 in. (125 mm)	05HP260484	1	N/A		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 5.1 in. (130 mm)	N/A		05HP261355	1	05HP261360	1	05HP261364	1	N/A		N/A		N/A	
	IMPELLER - 5.3 in. (135 mm)	05HP261339	1	N/A		N/A		N/A		N/A	1	N/A		05HP261369	1
	IMPELLER - 5.5 in. (140 mm)	N/A		05HP261354	1	05HP261359	1	05HP261363	1	05HP261373		05HP261373	1	N/A	
	IMPELLER - 5.7 in. (145 mm)	N/A		N/A		N/A		N/A		N/A		N/A		05HP261368	1
	IMPELLER - 5.9 in. (150 mm)	N/A		05HP261340	1	05HP261358	1	05HP261362	1	05HP261372	1	05HP261372	1	N/A	
	IMPELLER - 6.1 in. (155 mm)	N/A		N/A		N/A		N/A		N/A		05HP261377	1	05HP261367	1

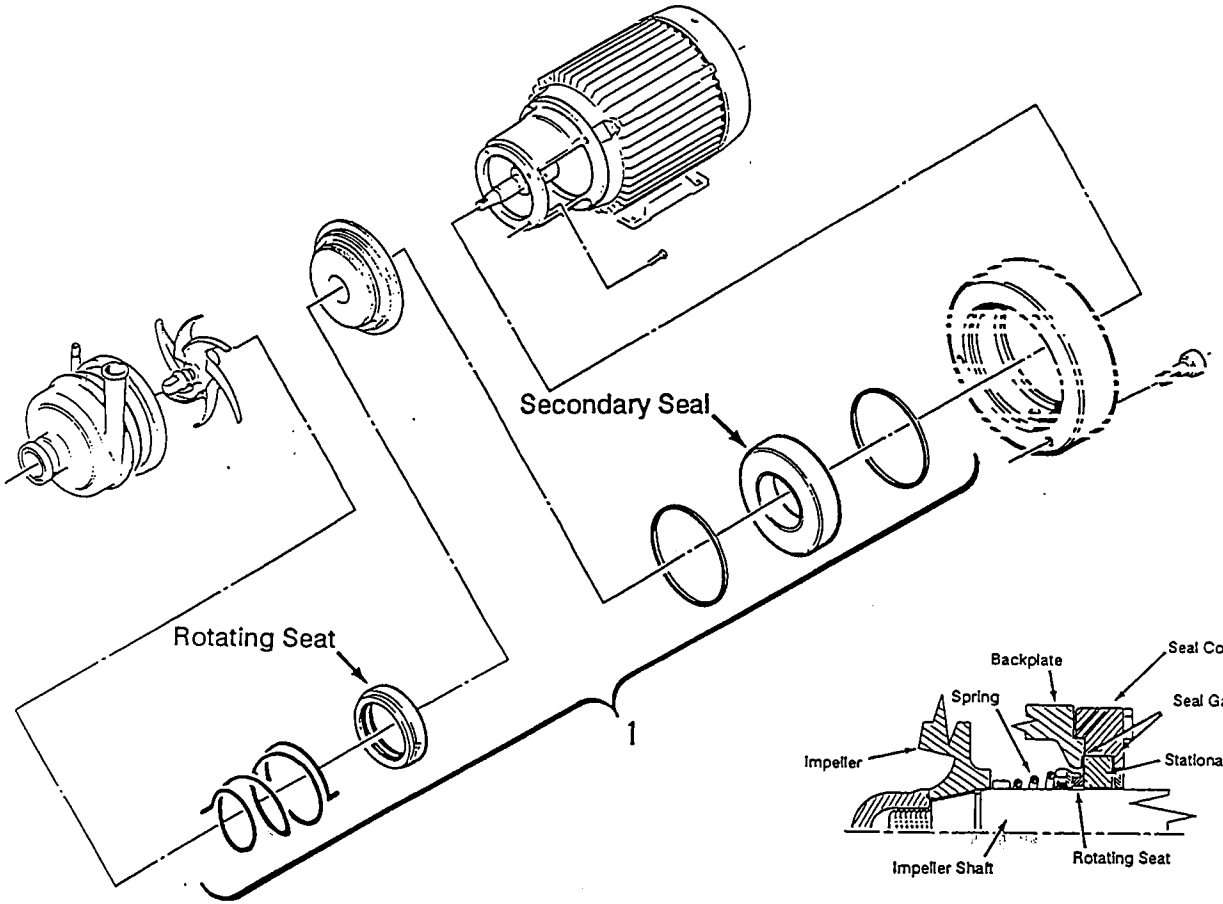
"W" Series High Efficiency Centrifugal Pump
Models W 20/20, W 25/75, W 30/25, W 30/50, W 40/20, W 50/25, W 30/100
OPTIONS

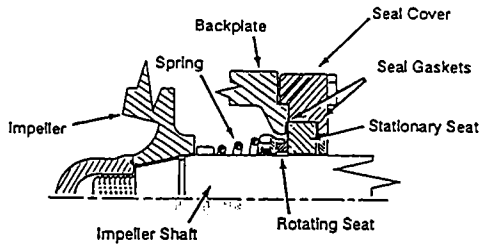
ITEM	DESCRIPTION	W 20/20 PART NO.	QTY	W 25/75 PART NO.	QTY	W 30/25 PART NO.	QTY	W 30/50 PART NO.	QTY	W 40/20 PART NO.	QTY	W 50/25 PART NO.	QTY	W 30/100 PART NO.	QTY
17	IMPELLER - 6.3 in. (160 mm)	N/A		N/A		05HP261341	1	05HP261342	1	05HP261371		05HP261371	1	N/A	
	IMPELLER - 6.5 in. (165 mm)	N/A		N/A		N/A		N/A		N/A		05HP261376	1	05HP261366	1
	IMPELLER - 6.7 in. (170 mm)	N/A		N/A		N/A		N/A		05HP261371	1	N/A		N/A	
	IMPELLER - 6.9 in. (175 mm)	N/A		N/A		N/A		N/A		N/A		05HP261375	1	05HP261343	1
	IMPELLER - 7.1 in. (180 mm)	N/A		N/A		N/A		N/A		05HP261344	1	N/A		N/A	
	IMPELLER - 7.3 in. (185 mm)	N/A		N/A		N/A		N/A		N/A		05HP261374	1	N/A	
	IMPELLER - 7.5 in. (190 mm)	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 7.7 in. (195 mm)	N/A		N/A		N/A		N/A		N/A		05HP261345	1	N/A	
	IMPELLER - 7.9 in. (200 mm)	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 8.3 in. (210 mm)	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 8.7 in. (220 mm)	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 9.1 in. (230 mm)	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 9.4 in. (240 mm)	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
20	O-RING - Casing, Nitrile	543S770005	1	543S771626	1	543S771626	1	543S771626	1	543S771710	1	543S771629	1	543S771629	1
	O-RING - Casing, EPDM	543S770006	1	543S771627	1	543S771627	1	543S771627	1	543S771711	1	543S771630	1	543S771630	1
	O-RING - Casing, Viton	543S770007	1	543S771628	1	543S771628	1	543S771628	1	543S771712	1	543S771631	1	543S771631	1
21	CASING - Butt Weld	05HP182511	1	05HP182507	1	05HP182508	1	05HP168541	1	05HP168543	1	05HP182509	1	05HP168542	1
	CASING - Bevel Seat	05AP454101	1	05AP454109	1	05AP454117	1	05AP454125	1	05AP454141	1	05AP454149	1	05AP454133	1
	CASING - APC-PV Threaded	05AP454102	1	05AP454110	1	05AP454118	1	05AP454126	1	05AP454142	1	05AP454150	1	05AP454134	1
	CASING - Tri Clamp	05AP454103	1	05AP454111	1	05AP454119	1	05AP454127	1	05AP454143	1	05AP454151	1	05AP454135	1
	CASING - Cherry Burrell I-Line	05AP454104	1	05AP454112	1	05AP454120	1	05AP454128	1	05AP454144	1	05AP454152	1	05AP454136	1
	CASING - ISS Threaded	05AP454105	1	05AP454113	1	05AP454121	1	05AP454129	1	05AP454145	1	05AP454153	1	05AP454137	1
	CASING - APC-PV Clamp	05AP454106	1	05AP454114	1	05AP454122	1	05AP454130	1	05AP454146	1	05AP454154	1	05AP454138	1
	CASING - MPT (Non-Sanitary)	05AP454107	1	05AP454115	1	05AP454123	1	05AP454131	1	05AP454147	1	05AP454155	1	05AP454139	1
	CASING - 150 lb. Flange (Non-Sanitary)	05AP454108	1	05AP454116	1	05AP454124	1	05AP454132	1	05AP454148	1	05AP454156	1	05AP454140	1

"W" Series High Efficiency Centrifugal Pump

Models W 20/20, W 25/75, W 30/25, W 30/50, W 40/20, W 50/25, W 30/100

Shaft Seal - Type S





Note: Order by part number, not by item number.

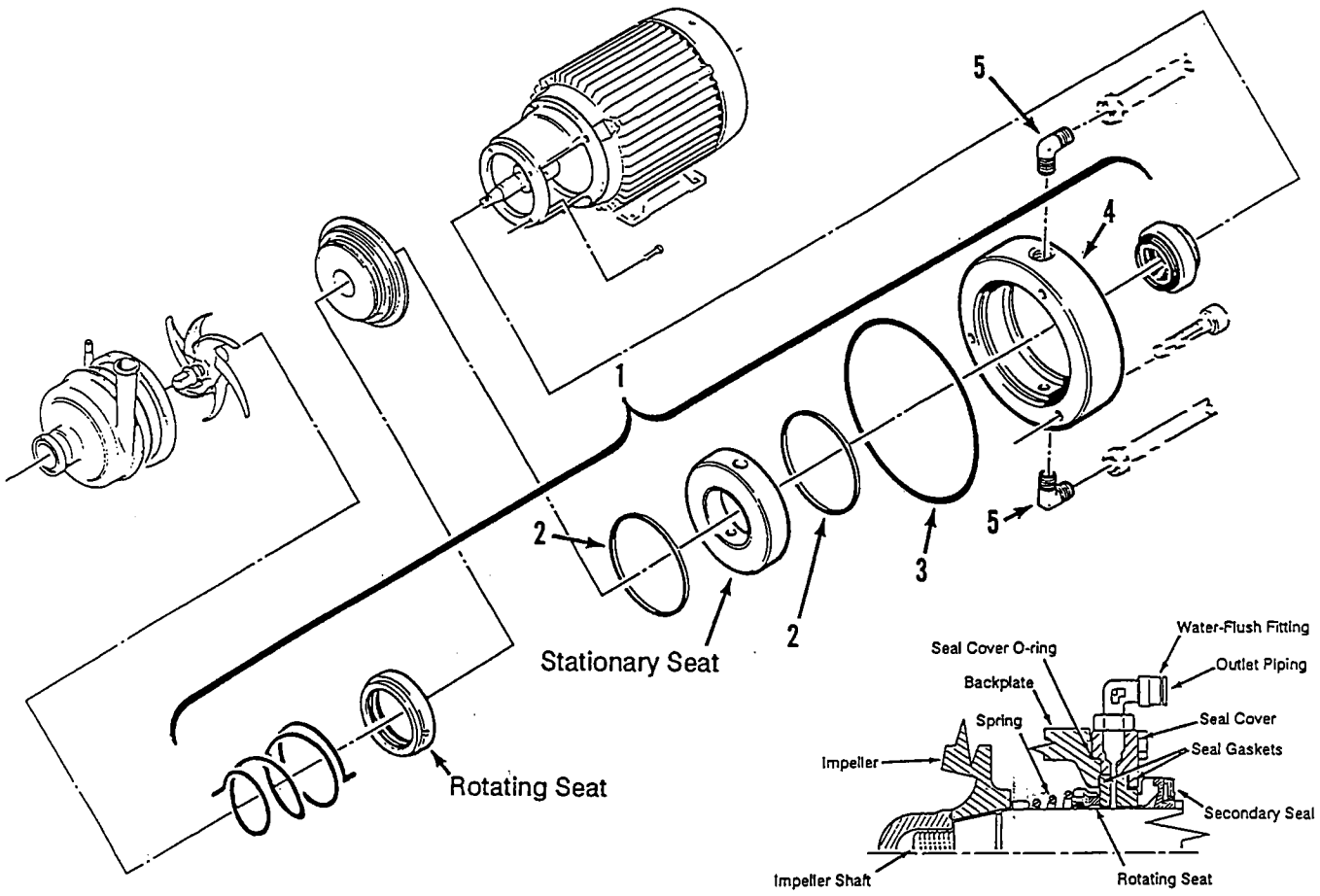
"W" Series High Efficiency Centrifugal Pump

Models W 20/20, W 25/75, W 30/25, W 30/50, W 40/20, W 50/25, W 30/100

Shaft Seal - Type S

ITEM	DESCRIPTION	W 20/20 PART NO.	QTY	W 25/75 PART NO.	QTY	W 30/25 PART NO.	QTY	W 30/50 PART NO.	QTY	W 40/20 PART NO.	QTY	W 50/25 PART NO.	QTY	W 30/100 PART NO.	QTY
1	(Carbon) Rotating Seat - Nitrile (Silicon Carbide) Stationary Seat - Nitrile	549P771661	1	549P771661	1	549P771661	1	549P771661	1	549P771661	1	549P771661	1	549P771670	1
	(Carbon) Rotating Seat - EPDM (Silicon Carbide) Stationary Seat - EPDM	549P179644	1	549P179644	1	549P179644	1	549P179644	1	549P179644	1	549P179644	1	549P179650	1
	(Carbon) Rotating Seat - Viton (Silicon Carbide) Stationary Seat - Viton	549P179647	1	549P179647	1	549P179647	1	549P179647	1	549P179647	1	549P179647	1	549P179653	1
	(Silicon Carbide) Rotating Seat - Nitrile (Silicon Carbide) Stationary Seat - Nitrile	549P771662	1	549P771662	1	549P771662	1	549P771662	1	549P771662	1	549P771662	1	549P771671	1
	(Silicon Carbide) Rotating Seat - EPDM (Silicon Carbide) Stationary Seat - EPDM	549P179645	1	549P179645	1	549P179645	1	549P179645	1	549P179645	1	549P179645	1	549P179651	1
	(Silicon Carbide) Rotating Seat - Viton (Silicon Carbide) Stationary Seat - Viton	549P179648	1	549P179648	1	549P179648	1	549P179648	1	549P179648	1	549P179648	1	549P179654	1
	(Tungsten Carbide) Rotating Seat - Nitrile (Tungsten Carbide) Stationary Seat - Nitrile	549P770033	1	549P770033	1	549P770033	1	549P770033	1	549P770033	1	549P770033	1	549P770035	1
	(Tungsten Carbide) Rotating Seat - EPDM (Tungsten Carbide) Stationary Seat - EPDM	549P179781	1	549P179781	1	549P179781	1	549P179781	1	549P179781	1	549P179781	1	549P179777	1
	(Tungsten Carbide) Rotating Seat - Viton (Tungsten Carbide) Stationary Seat - Viton	549P179774	1	549P179774	1	549P179774	1	549P179774	1	549P179774	1	549P179774	1	549P179778	1

"W" Series High Efficiency Centrifugal Pump
Models W 20/20, W 25/75, W 30/25, W 30/50, W 40/20, W 50/25, W 30/100
Shaft Seal - Type F



Note: Order by part number, not by item number.

"W" Series High Efficiency Centrifugal Pump

Models W 20/20, W 25/75, W 30/25, W 30/50, W 40/20, W 50/25, W 30/100

Shaft Seal - Type F

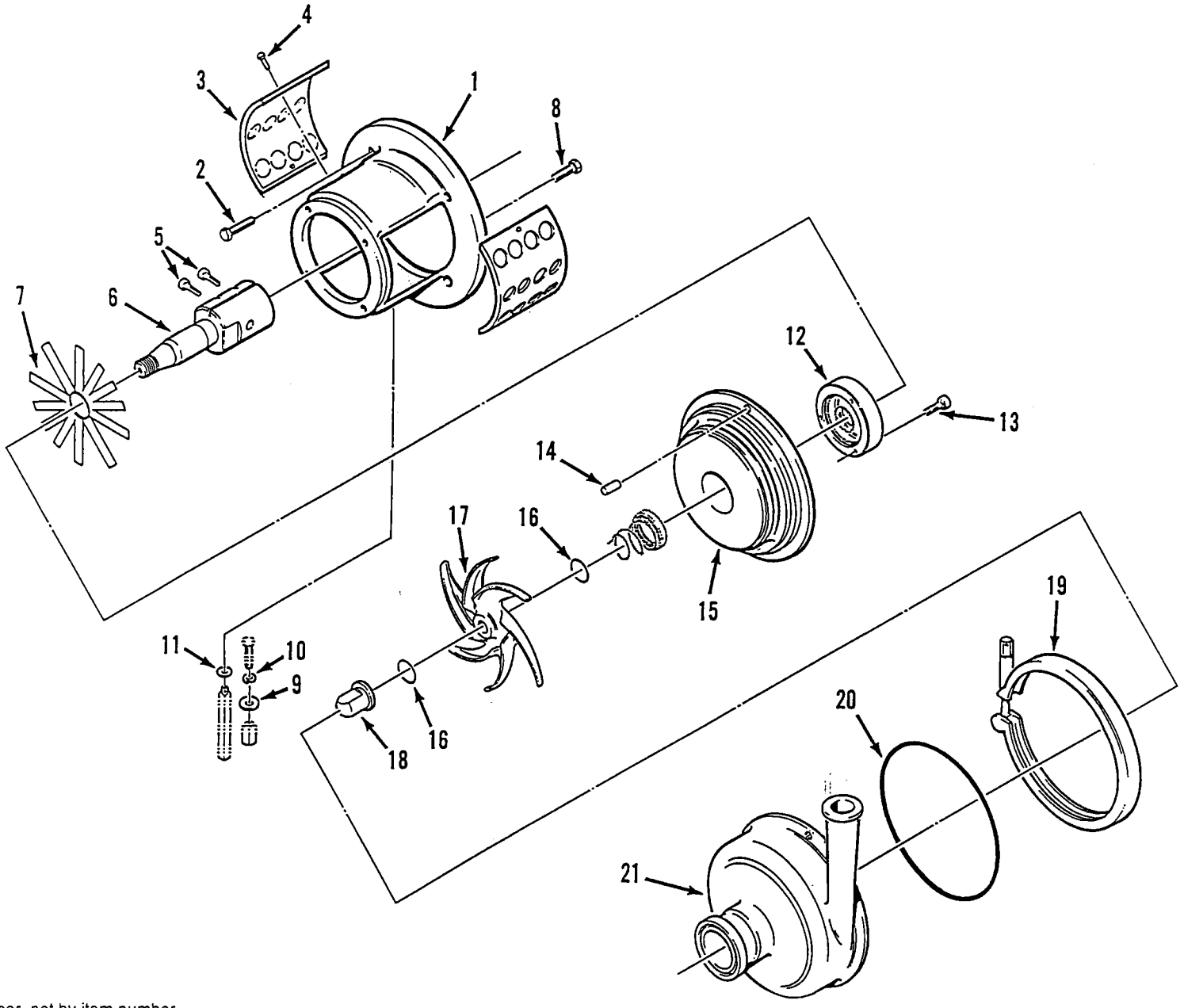
ITEM	DESCRIPTION	W 20/20 PART NO.	QTY	W 25/75 PART NO.	QTY	W 30/25 PART NO.	QTY	W 30/50 PART NO.	QTY	W 40/20 PART NO.	QTY	W 50/25 PART NO.	QTY	W 30/100 PART NO.	QTY
1	(Carbon) Rotating Seat - Nitrile (Silicon Carbide) Stationary Seat - Nitrile	549P771679	1	549P771679	1	549P771679	1	549P771679	1	549P771679	1	549P771679	1	549P771688	1
	(Carbon) Rotating Seat - EPDM (Silicon Carbide) Stationary Seat - EPDM	549P179656	1	549P179656	1	549P179656	1	549P179656	1	549P179656	1	549P179656	1	549P179662	1
	(Carbon) Rotating Seat - Viton (Silicon Carbide) Stationary Seat - Viton	549P179659	1	549P179659	1	549P179659	1	549P179659	1	549P179659	1	549P179659	1	549P179665	1
	(Silicon Carbide) Rotating Seat - Nitrile (Silicon Carbide) Stationary Seat - Nitrile	549P771680	1	549P771680	1	549P771680	1	549P771680	1	549P771680	1	549P771680	1	549P771689	1
	(Silicon Carbide) Rotating Seat - EPDM (Silicon Carbide) Stationary Seat - EPDM	549P179657	1	549P179657	1	549P179657	1	549P179657	1	549P179657	1	549P179657	1	549P179663	1
	(Silicon Carbide) Rotating Seat - Viton (Silicon Carbide) Stationary Seat - Viton	549P179660	1	549P179660	1	549P179660	1	549P179660	1	549P179660	1	549P179660	1	549P179666	1
	(Tungsten Carbide) Rotating Seat - Nitrile (Tungsten Carbide) Stationary Seat - Nitrile	549P770034	1	549P770034	1	549P770034	1	549P770034	1	549P770034	1	549P770034	1	549P770036	1
	(Tungsten Carbide) Rotating Seat - EPDM (Tungsten Carbide) Stationary Seat - EPDM	549P179775	1	549P179775	1	549P179775	1	549P179775	1	549P179775	1	549P179775	1	549P179779	1
	(Tungsten Carbide) Rotating Seat - Viton (Tungsten Carbide) Stationary Seat - Viton	549P179776	1	549P179776	1	549P179776	1	549P179776	1	549P179776	1	549P179776	1	549P179780	1
2	GASKET - Seal, Water-Flush, EPDM	549P771663	2	549P771663	2	549P771663	2	549P771663	2	549P771663	2	549P771663	2	549P771665	2
	GASKET - Seal, Water-Flush, Viton	549P771664	2	549P771664	2	549P771664	2	549P771664	2	549P771664	2	549P771664	2	549P771666	2
3	O-RING - Seal Cover, Nitrile	543P771648	1	543P771648	1	543P771648	1	543P771648	1	543P771648	1	543P771648	1	543P771648	1
4	COVER - Seal, Water-Flush	549P260428	1	549P260428	1	549P260428	1	549P260428	1	549P260428	1	549P260428	1	549P260427	1
5	FITTING - Water-Flush	568SH682B	1	568SH682B	1	568SH682B	1	568SH682B	1	568SH682B	1	568SH682B	1	568SH682B	1

Item 1 does not include items 3, 4, and 5.

"W" Series High Efficiency Centrifugal Pump

Models W 50/50, W 50/100, W 70/30, W 80/50, W 100/130, W 25/200, W 60/300

STANDARD



Note: Order by part number, not by item number.

"W" Series High Efficiency Centrifugal Pump

Models W 50/50, W 50/100, W 70/30, W 80/50, W 100/130, W 25/200, W 60/300

STANDARD

ITEM	DESCRIPTION	W 50/50 PART NO.	QTY	W 50/100 PART NO.	QTY	W 70/30 PART NO.	QTY	W 80/50 PART NO.	QTY	W 100/130 PART NO.	QTY	W 25/200 PART NO.	QTY	W 60/300 PART NO.	QTY
1	ADAPTER	*	1	*	1	*	1	*	1	*		*		*	
2	SCREW - Adapter/Motor	*	4	*	4	*	4	*	4	*		*		*	
3	GUARD - Adapter	*	2	*	2	*	2	*	2	*		*		*	
4	SCREW - Guard	521V006679	4	521V006679	4	521V006679	4	521V006679	4	521V006679	4	521V006679	4	521V006679	4
5	SCREW - Shaft, M10 x 35	522V771199	2	522V771199	2	522V771199	2	522V771199	2	522V771199	2	522V771199	2	522V771199	2
6	SHAFT - Impeller	*	1	*	1	*	1	*	1	*		*		*	
7	RING - Spacer	05HP259781	1	05HP259781	1	05HP259781	1	N/A	-	N/A		N/A		N/A	
8	SCREW - Adapter/Backplate, M8 x 20	522V702234	4	522V702234	4	522V702234	4	522V702233	8	522V701669		522V701509		522V771857	
9	WASHER - Plain	*	2	*	2	*	2	*	2	*		*		*	
10	WASHER - Lock	*	2	*	2	*	2	*	2	*		*		*	
11	WASHER - Plain, 3/8	523V007178	1	523V007178	1	523V007178	1	523V007178	1	523V007178	1	523V007178	1	523V007178	1
12	**COVER - Seal	05HP260407	1	05HP260407	1	05HP260407	1	05HP260407	1	05HP260407	1	05HP260407	1	05HP260407	1
13	SCREW - Seal Cover, M6 x 30	522V700910	3	522V700910	3	522V700910	3	522V700910	3	522V700910	3	522V700910	3	522V700910	3
14	PIN - Backplate Locator	525V771331	1	525V771331	1	525V771331	1	525V771331	1	525V771331	1	525V771331	1	525V771331	1
15	BACKPLATE	05HP260878	1	05HP260879	1	05HP260880	1	05HP260881	1	05HP260882	1	05HP260883	1	05HP260884	1
16	O-RING - Impeller Nut	*	2	*	2	*	2	*	2	*		*		*	
17	IMPELLER	*	1	*	1	*	1	*	1	*		*		*	
18	NUT- Impeller M20 (35mm)	05HP259714	1	05HP259714	1	05HP259714	1	05HP259714	1	05HP259714	1	05HP259714	1	05HP259714	1
19	ASSEMBLY - Clamp Ring	05AP182905	1	05AP182906	1	05AP182907	1	05AP182908	1	N/A		N/A		N/A	
20	O-RING - Casing	*	1	*	1	*	1	*	1	*		*		*	
21	CASING	*	1	*	1	*	1	*	1	*		*		*	

*Refer to OPTIONS in this section for options.
**Refer to SHAFT SEAL - TYPE F in this section for options.

"W" Series High Efficiency Centrifugal Pump

Models W 50/50, W 50/100, W 70/30, W 80/50, W 100/130, W 25/200, W 60/300

OPTIONS

ITEM	DESCRIPTION	W 50/50 PART NO.	QTY	W50/100 PART NO.	QTY	W 70/30 PART NO.	QTY	W 80/50 PART NO.	QTY	W 100/130 PART NO.	QTY	W 25/200 PART NO.	QTY	W 60/300 PART NO.	QTY
1	ADAPTER - 143TC-145TC	05HP182595	1	05HP182595	1	05HP182595	1	N/A		N/A		N/A		N/A	
	ADAPTER - 182TC-184TC	05HP168883	1	05HP168883	1	05HP168883	1	05HP168893	1	N/A		N/A		N/A	
	ADAPTER - 213TC-215TC	05HP168883	1	05HP168883	1	05HP168883	1	05HP168893	1	05HP182573	1	05HP182572	1	05HP182577	1
	ADAPTER - 254TC-256TC	05HP168884	1	05HP168884	1	05HP168884	1	05HP168894	1	05HP182574	1	05HP182571	1	05HP182624	1
	ADAPTER - 284TSC-286TSC	05HP168880	1	05HP168880	1	05HP168880	1	05HP168895	1	05HP182575	1	05HP182570	1	05HP182625	1
	ADAPTER - 324TSC-326TSC	05HP168890	1	05HP168890	1	05HP168890	1	05HP168896	1	05HP182576	1	05HP182569	1	05HP182626	1
2	SCREW - Adapter/Motor, 56C-145TC	522V006752	4	522V006752	4	522V006752	4	N/A		N/A		N/A		N/A	
	SCREW - Adapter/Motor, 182TC-286TSC	522V006788	4	522V006788	4	522V006788	4	522V006788	4	522V006788	4	522V006788	4	522V006788	4
	SCREW - Adapter/Motor, 324TSC-326TSC	522V006816	4	522V006816	4	522V006816	4	522V006816	4	522V006816	4	522V006816	4	522V006816	4
6	SHAFT - Impeller, 143TC-145TC	05HP261408	1	05HP261408	1	05HP261408	1	N/A	1	N/A		N/A		N/A	
	SHAFT - Impeller, 182TC-184TC	05HP261322	1	05HP261322	1	05HP261322	1	05HP261322	1	N/A		N/A		N/A	
	SHAFT - Impeller, 213TC-215TC	05HP261321	1	05HP261321	1	05HP261321	1	05HP261321	1	05HP261321	1	05HP261321	1	05HP261321	1
	SHAFT - Impeller, 254TC-256TC	05HP261330	1	05HP261330	1	05HP261330	1	05HP261330	1	05HP261330	1	05HP261330	1	05HP261330	1
	SHAFT - Impeller, 284TSC-286TSC	05HP261323	1	05HP261323	1	05HP261323	1	05HP261323	1	05HP261323	1	05HP261323	1	05HP261323	1
	SHAFT - Impeller, 324TSC-326TSC	05HP261331	1	05HP261331	1	05HP261331	1	05HP261331	1	05HP261331	1	05HP261331	1	05HP261331	1
	SHAFT - Impeller, 364TSC							05HP261337		05HP261331		05HP261331		05HP261331	
9	WASHER - Plain, 56TC-145TC	523V007177	2	523V007177	2	523V007177	2	523V007177	2	523V007177	2	523V007177	2	523V007177	2
	WASHER - Plain, 182TC-215TC	523V007178	2	523V007178	2	523V007178	2	523V007178	2	523V007178	2	523V007178	2	523V007178	2
	WASHER - Plain, 254TC-256TC	523V007179	2	523V007179	2	523V007179	2	523V007179	2	523V007179	2	523V007179	2	523V007179	2
	WASHER - Plain, 324TSC-364TSC	523V007196	4	523V007196	4	523V007196	4	523V007196	2	523V007196	2	523V007196	2	523V007196	2
10	WASHER - Lock, 56TC-145TC	523V007185	2	523V007185	2	523V007185	2	523V007185	2	523V007185	2	523V007185	2	523V007185	2
	WASHER - Lock, 182TC-215TC	523V007192	2	523V007192	2	523V007192	2	523V007192	2	523V007192	2	523V007192	2	523V007192	2
	WASHER - Lock, 254TC-286TSC	523V007193	2	523V007193	2	523V007193	2	523V007193	2	523V007193	2	523V007193	2	523V007193	2
	WASHER - Lock, 324TSC-364TSC	523V007191	4	523V007191	4	523V007191	4	523V007191	2	523V007191	2	523V007191	2	523V007191	2
16	O-RING - Impeller Nut, Nitrile	543S771623	2	543S771623	2	543S771623	2	543S771623	2	543S771623	2	543S771623	2	543S771623	2
	O-RING - Impeller Nut, EDPM	543S771624	2	543S771624	2	543S771624	2	543S771624	2	543S771624	2	543S771624	2	543S771624	2
	O-RING - Impeller Nut, Viton	543S771625	2	543S771625	2	543S771625	2	543S771625	2	543S771625	2	543S771625	2	543S771625	2
17	IMPELLER - 6.3 in. (160 mm)	05HP261381	1	05HP261385	1	N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 6.5 in. (165 mm)	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 6.7 in. (170 mm)	05HP261380	1	05HP261384		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 6.9 in. (175 mm)	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 7.1 in. (180 mm)	05HP261379	1	05HP261383	1	N/A		N/A		N/A		N/A		N/A	
	IMPELLER - 7.5 in. (190 mm)	05HP261378	1	05HP261382	1	05HP261390	1	N/A		N/A		N/A		05HP260773	1
	IMPELLER - 7.7 in. (195 mm)	N/A		N/A		N/A		05HP261396	1	N/A		N/A		N/A	
	IMPELLER - 7.9 in. (200 mm)	05HP261346	1	05HP261347	1	05HP261389	1	N/A		05HP261416	1	N/A		05HP260772	1
	IMPELLER - 8.1 in. (205 mm)	N/A		N/A		N/A		05HP261395	1	N/A		N/A		N/A	
	IMPELLER - 8.3 in. (210 mm)	N/A		N/A		05HP261388	1	N/A		05HP261415	1	05HP261420	1	05HP260771	1
	IMPELLER - 8.5 in. (215 mm)	N/A		N/A		N/A		05HP261394	1	N/A		N/A		N/A	
	IMPELLER - 8.7 in. (220 mm)	N/A		N/A		05HP261387	1	N/A		05HP261414	1	N/A		05HP260770	1

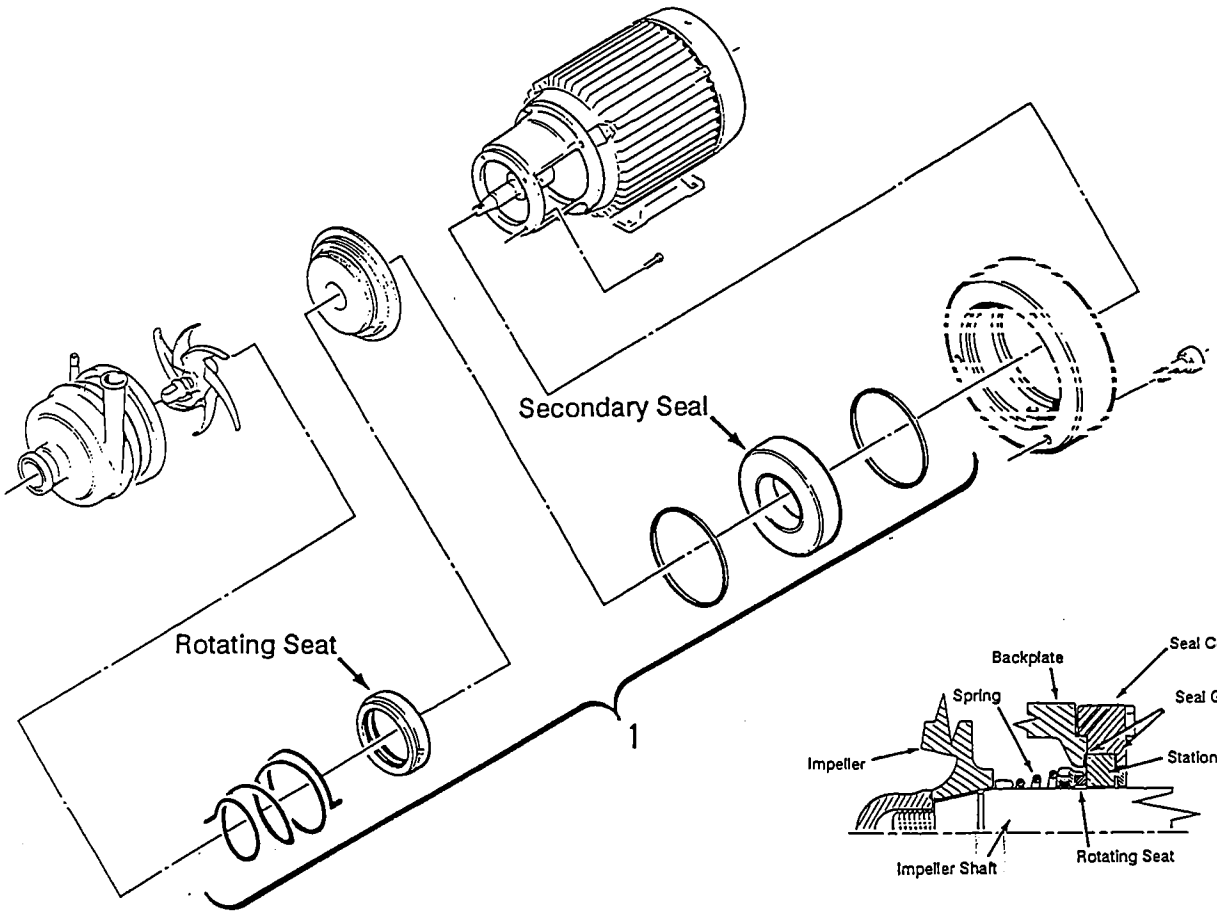
"W" Series High Efficiency Centrifugal Pump

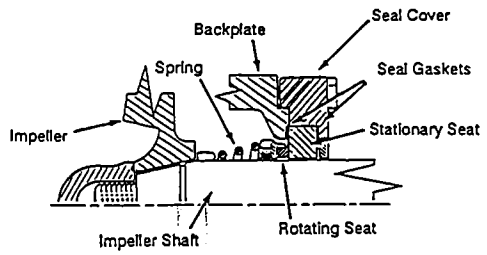
Models W 50/50, W 50/100, W 70/30, W 80/50, W 100/130, W 25/200, W 60/300

OPTIONS

ITEM	DESCRIPTION	W 50/50 PART NO.	QTY	W 50/100 PART NO.	QTY	W 70/30 PART NO.	QTY	W 80/50 PART NO.	QTY	W 100/130 PART NO.	QTY	W 25/200 PART NO.	QTY	W 60/300 PART NO.	QTY
17	IMPELLER - 8.9 in. (225 mm)	N/A		N/A		N/A		05HP261393	1	N/A		N/A		N/A	
	IMPELLER - 9.1 in. (230 mm)	N/A		N/A		05HP261386	1	N/A		05HP261413	1	05HP261419	1	05HP260769	1
	IMPELLER - 9.3 in. (235 mm)	N/A		N/A		N/A		05HP261392	1	N/A		N/A		N/A	
	IMPELLER - 9.4 in. (240 mm)	N/A		N/A		05HP261348	1	N/A		05HP261412	1	N/A		05HP260768	1
	IMPELLER - 9.5 in. (245 mm)	N/A		N/A		N/A		05HP261391	1	N/A		N/A		N/A	
	IMPELLER - 9.8 in. (250 mm)							N/A		05HP261411		05HP261418		05HP260767	
	IMPELLER - 10.0 in. (255 mm)							05HP261349		N/A		N/A		N/A	
	IMPELLER - 10.2 in. (260 mm)							N/A		05HP261410		N/A		05HP260899	
	IMPELLER - 10.6 in. (270 mm)							N/A		05HP261409		05HP261417		N/A	
	IMPELLER - 11.4 in. (290 mm)							N/A		N/A		05HP260898		N/A	
20	O-RING - Casing, Nitrile	543S771629	1	543S771704	1	543S771707	1	543S771713	1	543S771716	1	543S770040	1	543S770014	1
	O-RING - Casing, EPDM	543S771630	1	543S771705	1	543S771708	1	543S771714	1	543S771717	1	543S770041	1	543S770015	1
	O-RING - Casing, Viton	543S771631	1	543S771706	1	543S771709	1	543S771715	1	543S771718	1	543S770042	1	543S770016	1
21	CASING - Butt Weld	05HP182510	1	05HP168544	1	05HP168545	1	05HP168546	1	05HP253429	1	05HP253430	1	05HP253431	1
	CASING - Bevel Seat	05AP454157	1	05AP454165	1	05AP454173	1	05AP472323	1	05AP472331	1	05AP472347	1	05AP472339	1
	CASING - APC-PV Threaded	05AP454158	1	05AP454166	1	05AP454174	1	05AP472324	1	05AP472332	1	05AP472348	1	05AP472340	1
	CASING - Tri Clamp	05AP454159	1	05AP454167	1	05AP454175	1	05AP472325	1	05AP472333	1	05AP472349	1	05AP472341	1
	CASING - Cherry Burrell I-Line	05AP454160	1	05AP454168	1	05AP454176	1	05AP472326	1	05AP472334	1	05AP472350	1	05AP472342	1
	CASING - ISS Threaded	05AP454161	1	05AP454169	1	05AP454177	1	05AP472327	1	05AP472335	1	05AP472351	1	05AP472343	1
	CASING - APC-PV Clamp	05AP454162	1	05AP454170	1	05AP454178	1	05AP472328	1	05AP472336	1	05AP472352	1	05AP472344	1
	CASING - MPT (Non-Sanitary)	05AP454163	1	05AP454171	1	05AP454179	1	05AP472329	1	05AP472337	1	05AP472353	1	05AP472345	1
	CASING - 150 lb. Flange (Non-Sanitary)	05AP454164	1	05AP454172	1	05AP454180	1	05AP472330	1	05AP472338	1	05AP472354	1	05AP472346	1

"W" Series High Efficiency Centrifugal Pump
Models W 50/50, W 50/100, W 70/30, W 80/50, W 100/130, W 25/200, W 60/300
Shaft Seal - Type S





Note: Order by part number, not by item number.

"W" Series High Effic[illegible]y Centrifugal Pump

Models W 50/50, W 50/100, W 70/30, W 80/50, W 100/130, W 25/200, W 60/300

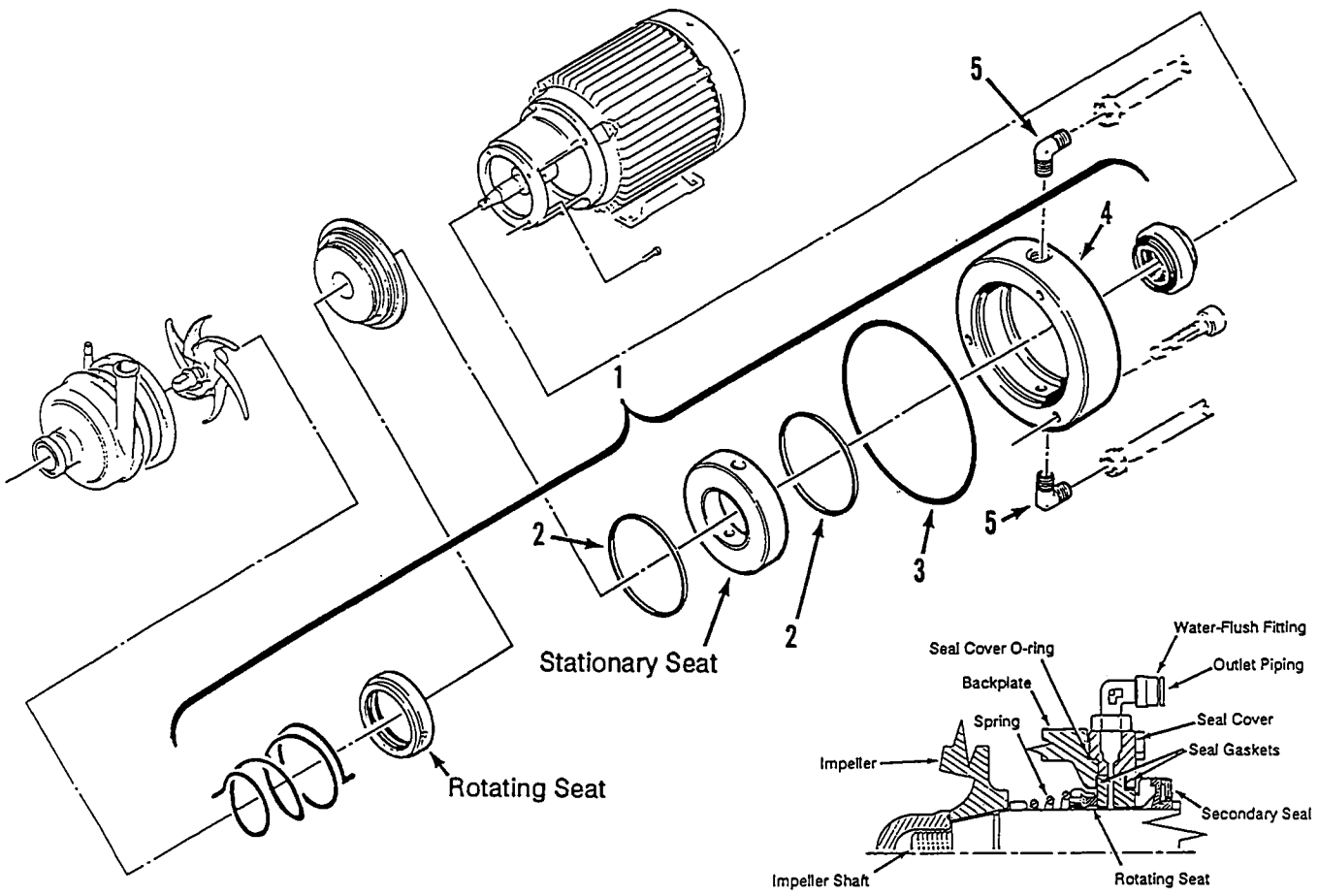
Shaft Seal - Type S

ITEM	DESCRIPTION	W 50/50 PART NO.	QTY	W 50/100 PART NO.	QTY	W 70/30 PART NO.	QTY	W 80/50 PART NO.	QTY	W 100/130 PART NO.	QTY	W 25/200 PART NO.	QTY	W 60/300 PART NO.	QTY
1	(Carbon) Rotating Seat - Nitrile (Silicon Carbide) Stationary Seat - Nitrile	549P771670	1	549P771670	1	549P771670	1	549P771670	1	549P771670	1	549P771670	1	549P771670	1
	(Carbon) Rotating Seat - EPDM (Silicon Carbide) Stationary Seat - EPDM	549P179650	1	549P179650	1	549P179650	1	549P179650	1	549P179650	1	549P179650	1	549P179650	1
	(Carbon) Rotating Seat - Viton (Silicon Carbide) Stationary Seat - Viton	549P179653	1	549P179653	1	549P179653	1	549P179653	1	549P179653	1	549P179653	1	549P179653	1
	(Silicon Carbide) Rotating Seat - Nitrile (Silicon Carbide) Stationary Seat - Nitrile	549P771671	1	549P771671	1	549P771671	1	549P771671	1	549P771671	1	549P771671	1	549P771671	1
	(Silicon Carbide) Rotating Seat - EPDM (Silicon Carbide) Stationary Seat - EPDM	549P179651	1	549P179651	1	549P179651	1	549P179651	1	549P179651	1	549P179651	1	549P179651	1
	(Silicon Carbide) Rotating Seat - Viton (Silicon Carbide) Stationary Seat - Viton	549P179654	1	549P179654	1	549P179654	1	549P179654	1	549P179654	1	549P179654	1	549P179654	1
	(Tungsten Carbide) Rotating Seat - Nitrile (Tungsten Carbide) Stationary Seat - Nitrile	549P770035	1	549P770035	1	549P770035	1	549P770035	1	549P770035	1	549P770035	1	549P770035	1
	(Tungsten Carbide) Rotating Seat - EPDM (Tungsten Carbide) Stationary Seat - EPDM	549P179777	1	549P179777	1	549P179777	1	549P179777	1	549P179777	1	549P179777	1	549P179777	1
	(Tungsten Carbide) Rotating Seat - Viton (Tungsten Carbide) Stationary Seat - Viton	549P179778	1	549P179778	1	549P179778	1	549P179778	1	549P179778	1	549P179778	1	549P179778	1

"W" Series High Efficiency Centrifugal Pump

Models W 50/50, W 50/100, W 70/30, W 80/50, W 100/130, W 25/200, W 60/300

Shaft Seal - Type F



Note: Order by part number, not by item number.

"W" Series High Efficiency Centrifugal Pump

Models W 50/50, W 50/100, W 70/30, W 80/50, W 100/130, W 25/200, W 60/300

Shaft Seal - Type F

ITEM	DESCRIPTION	W 50/50 PART NO.	QTY	W 50/100 PART NO.	QTY	W 70/30 PART NO.	QTY	W 80/50 PART NO.	QTY	W 100/130 PART NO.	QTY	W 25/200 PART NO.	QTY	W 60/300 PART NO.	QTY
1	(Carbon) Rotating Seat - Nitrile (Silicon Carbide) Stationary Seat - Nitrile	549P771688	1	549P771688	1	549P771688	1	549P771688	1	549P771688	1	549P771688	1	549P771688	1
	(Carbon) Rotating Seat - EPDM (Silicon Carbide) Stationary Seat - EPDM	549P179662	1	549P179662	1	549P179662	1	549P179662	1	549P179662	1	549P179662	1	549P179662	1
	(Carbon) Rotating Seat - Viton (Silicon Carbide) Stationary Seat - Viton	549P179665	1	549P179665	1	549P179665	1	549P179665	1	549P179665	1	549P179665	1	549P179665	1
	(Silicon Carbide) Rotating Seat - Nitrile (Silicon Carbide) Stationary Seat - Nitrile	549P771689	1	549P771689	1	549P771689	1	549P771689	1	549P771689	1	549P771689	1	549P771689	1
	(Silicon Carbide) Rotating Seat - EPDM (Silicon Carbide) Stationary Seat - EPDM	549P179663	1	549P179663	1	549P179663	1	549P179663	1	549P179663	1	549P179663		549P179663	1
	(Silicon Carbide) Rotating Seat - Viton (Silicon Carbide) Stationary Seat - Viton	549P179666	1	549P179666	1	549P179666	1	549P179666	1	549P179666	1	549P179666	1	549P179666	1
	(Tungsten Carbide) Rotating Seat - Nitrile (Tungsten Carbide) Stationary Seat - Nitrile	549P770036	1	549P770036	1	549P770036	1	549P770036	1	549P770036	1	549P770036	1	549P770036	1
	(Tungsten Carbide) Rotating Seat - EPDM (Tungsten Carbide) Stationary Seat - EPDM	549P179779	1	549P179779	1	549P179779	1	549P179779	1	549P179779	1	549P179779	1	549P179779	1
	(Tungsten Carbide) Rotating Seat - Viton (Tungsten Carbide) Stationary Seat - Viton	549P179780	1	549P179780	1	549P179780	1	549P179780	1	549P179780	1	549P179780	1	549P179780	1
2	GASKET - Seal, Water-Flush, EPDM	549P771665	2	549P771665	2	549P771665	2	549P771665	2	549P771665	2	549P771665	2	549P771665	2
	GASKET - Seal, Water-Flush, Viton	549P771666	2	549P771666	2	549P771666	2	549P771666	2	549P771666	2	549P771666	2	549P771666	2
3	O-RING - Seal Cover, Nitrile	543P771648	1	543P771648	1	543P771648	1	543P771647	1	543P771647	1	543P771647	1	543P771647	1
4	COVER - Seal, Water-Flush	549P260427	1	549P260427	1	549P260427	1	549P260427	1	549P260427	1	549P260427	1	549P260427	1
5	FITTING - Water-Flush	568SH682B	1	568SH682B	1	568SH682B	1	568SH682B	1	568SH682B	1	568SH682B	1	568SH682B	1

Item 1 does not include items 3, 4, and 5.

Recommended Inventory

Class I Duty
Suggested for domestic service and where some interruption in service is possible. Supplies typical service parts usage for 6 months or 1000 hours of service whichever occurs first.

Class II Duty
Suggested for export service or for domestic service where minimum loss of service is essential. Supplies typical service part usage for 1 year or 2000 hours of service whichever occurs first.

Item Number
The listed item number refers to exploded views on preceding pages where applicable. Order by part number not by item number

Item numbers which do not appear in the list are not recommended inventory.

		Class I	Class II
ITEM	DESCRIPTION	QUANTITY	QUANTITY
1	*SHAFT SEAL	1	2
5	SCREW - Shaft	-	2
6	SHAFT - Impeller	-	1
16	O-RING - Impeller Nut	8	16
17	IMPELLER	-	1
18	NUT - Impeller	-	1
20	O-RING - Casing	2	4

*Refer to SHAFT SEAL Section.

W-00028