



# Industrial Sump Pump – Series 8196 VSP

## Instructions

- Installation
- Operation
- Maintenance

### ***Read this entire book***

before attempting to install, operate or repair this pump. Properly installed, your Peerless sump pump will give you satisfactory, dependable service. We urge that you read carefully these step-by-step instructions, to simplify any problem of installation, operation, or repair. Failure to read and comply with installation and operating instructions will void the responsibility of the manufacturer and may also result

in bodily injury as well as property damage.

This book is intended to be a permanent part of your pump installation and should be preserved in a convenient location for ready reference. If these instructions should become soiled, obtain a new copy from Peerless Pump. Include model and/or serial number with your request.

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## WARRANTY

New equipment manufactured by Seller is warranted to be free from defects in material and workmanship under normal use and service for a period of one year from date of shipment; Seller's obligation under this warranty being limited to repairing or replacing, at its option, any part found to its satisfaction to be so defective provided that such part is, upon request, returned to Seller's factory from which it was shipped, transportation prepaid. This warranty does not cover parts damaged by decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, accident, neglect, or from improper operation, maintenance, installation, modification or adjustment. This warranty does not cover parts repaired outside Seller's factory without prior written approval. Seller makes no warranty as to starting equipment, electrical apparatus, or other material not of its manufacture, since the same are usually covered by warranties of the respective manufacturers thereof.

In the event, notwithstanding the terms of this agreement, it is determined by a court of competent jurisdiction that an express warranty has been given by Seller to Purchaser with respect to the head capacity or other like performance characteristics of said equipment, Seller's liability for breach of the same shall be limited to accepting return of such equipment F.O.B. plant of manufacture, refunding any amount paid thereon by Purchaser (less depreciation at the rate of 15% per year if Purchaser has used equipment for more than thirty (30) days) and canceling any balance still owing on the equipment.

**WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND SELLER SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

# Important Safety Precautions

Pump parts, and the tools and rigging equipment used in installing pumps are heavy and may easily cause personal injury if dropped or carelessly handled. The normal precautions and safety rules associated with the erection of heavy machinery, in regard to manual lifting, use of power equipment, and handling of tools, must be observed in the installation of this pump.

Do not work under a heavy suspended object unless there is a positive support under it to stop its fall in the event of sling or hoist failure. Disregard of this warning could result in grave personal injury.

Petroleum-base cleaning solvents are flammable. Open flame or smoking by personnel in the vicinity of these solvents is extremely hazardous and must not be permitted.

Before handling any wiring or performing any wiring connections, be certain that the electric power supply source is shut off. An electrical shock from contact with live wires or leads can be fatal.

Due to automatic switch or controller operation of sump pumps, tie the main disconnect switch open or remove fuses from main lines before attempting lubrication, mechanical and electrical examinations, or repairs. Attach a card "**DO NOT CLOSE SWITCH – PUMP REPAIR IN PROGRESS.**" Disregard of this warning may result in serious personal injury or death.

One piece shafts are up to 19 feet long and are heavy. Provide good support and use care while withdrawing (inserting) to keep from bending.

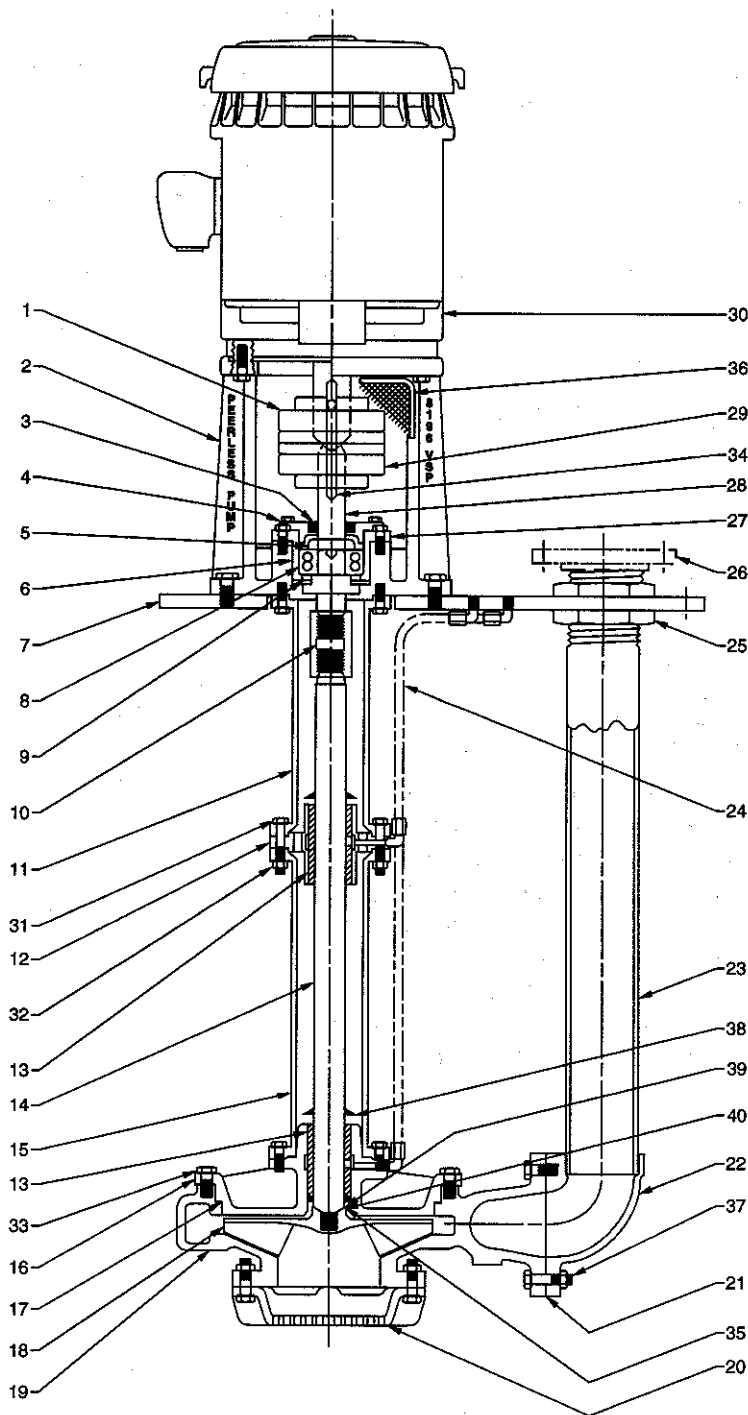
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## **WARNING**

The pumps described in this bulletin must not be installed in any manner except as specified herein. Liquids pumped must be compatible or within corrosion limits of standard or optional materials of construction. Maximum fluid temperature is 180°F (82°C) for standard construction. Pumping element must be submerged at all times. Refer to attached notes for other applicable limits of this equipment. Violation of this warning will void the warranty and may result in serious property damage or grave personal injury.

# 8196 Vertical Sump Pump Basic Configuration

## Typical for a Two Column Section Pump



NO.	DESCRIPTION
1	Coupling, Flex, Motor
2	Pedestal, Motor
†3	Seal, Oil, Bearing Cover
4	Cover, Bearing
5	Locknut, Bearing
†6	O-ring, Bearing Housing
7	Plate, Mounting
†8	Bearing, Thrust
†9	Seal, Oil, Bearing Housing
10	Coupling, Shaft
11	Column, Top
12	Retainer, Bearing
†13	Bearing
†14	Shaft, Pump
15	Column, Bottom
16	Adapter
†17	Gasket, Adapter to Casing
†18	Impeller
19	Casing
20	Strainer
†21	Gasket, Elbow to Casing
22	Elbow, Discharge
23	Pipe, Discharge
*24	Lubrication Lines
25	Locknut, Discharge Pipe
26	Flange
27	Housing, Bearing
†28	Shaft, Head
29	Coupling, Flex. Pump
30	Motor
31	Bolts, Column Flange
32	Nuts, Column Flange
33	Bolts, Adapter to Casing
34	Key, Pump Coupling
†35	O-ring, Impeller
*36	Guard, Coupling
37	Bolts, Discharge Elbow
38	Deflector
39	Impeller Seal Retainer Group ST & MT1 Only
40	Impeller Seal Retainer O-Ring

Figure 1.

\* Optional Features

† Recommended Spare

# Introduction

## **UPON RECEIPT OF 8196 VSP SUMP PUMP:**

Check carefully to see that all of the equipment has been received. Report immediately any shortages or damages to the transportation company handling the shipment, noting the extent of the damage or shortage on the freight bill and bill of lading.

Do not leave the unit exposed to weather or construction hazards. The pump may become mechanically damaged. This pump is a well designed

and carefully manufactured unit. It should be given the same attention accorded to any precision machine.

The satisfactory operation of a pump depends to a large extent upon proper installation. These instructions cannot answer every question that may arise as each installation will be different. The installer and the operator of this equipment must use good judgment to adapt these procedures to the installation.

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## Installation

### **WARNING**

Pump parts, and the tools and rigging equipment used installing pumps, are heavy and may easily cause personal injury if dropped or carelessly handled. The normal precautions and safety rules associated with the erection of heavy machinery, in regard to manual lifting, use of power equipment, and handling of tools, must be observed in the installation of this pump.

The 8196 VSP Sump Pump is shipped completely assembled with the exception of the motor and the internal portions of the flexible coupling. All of the pump parts were carefully inspected before leaving the factory, but may have become soiled or damaged in shipping and handling. Therefore, the unit must be inspected by the installer to ascertain that they are clean and undamaged before installing in the sump. All external fasteners should be checked to ensure that they are tightened securely.

**A. INSTALLING THE PUMP IN SUMP BASIN:** The mounting plate (7) comes equipped with two  $\frac{3}{4}$ "-1 UNC tapped holes to aid in the installation of the unit. Utilizing two eye bolts, carefully install the unit in the sump, ensuring clearance all around the unit. There should be at least 4" of clearance from the bottom of the pump to the bottom of the sump after installation. With the pump hanging from the hoist, orient the discharge outlet in the desired direction by rotating the

entire pump as necessary. Then, slowly lower the pump into sump basin, aligning mounting holes in the mounting plate (7) to the desired orientation with the mounting surface. The pump unit must hang freely plumb in the sump basin for a smooth operation and trouble free installation. Shim as necessary to achieve proper alignment. Bolt mounting plate to mounting surface.

**B. INSTALLING THE MOTOR:** The motor (30), if supplied by Peerless Pump, will be shipped loose. The pump flexible coupling half will be installed on the pump head shaft (28). The internal coupling parts and the motor half coupling will be shipped loose, see **Figure 3**. If the motor is shipped direct or furnished by the customer, the motor half coupling (1) must be installed on the motor shaft.

Install motor (30) on the motor pedestal (2) by orienting the motor with the conduit box (motor) in the desired position and the mounting holes with the mating holes in the pedestal (2). Lower the motor until the registers engage and the motor rests firmly on the pedestal. Install the motor mounting cap screws and tighten them gradually and uniformly. **Do not connect the pump half coupling (29) to the motor half coupling (1).**

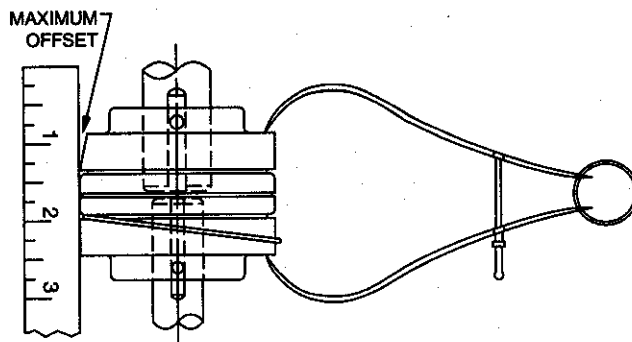
# Installation (continued)

**C. CHECK ROTATION:** Pump rotation is clockwise looking downward; see arrow on motor pedestal (2). Prior to coupling pump and motor half couplings, check motor for rotation. **Damage to pump parts is likely if pump is operated in reverse rotation.** If the rotation is not correct, reverse it by changing the wiring connections to the motor. For three-phase motor, interchange any two of the three leads. If the motor is single-phase, directions for reversing rotation are given on the nameplate. Mark leads to indicate the correct connections.

**D. IMPELLER CLEARANCE ADJUSTMENT:** Impeller clearance is set at the factory, but should always be verified prior to unit initial start-up and after all maintenance. See *Maintenance Section A* of this manual for method of impeller adjustment.

**E. PUMP/MOTOR COUPLING ASSEMBLY:** Refer to **Figure 3**. Position the flanges on the shaft to approximately achieve the 'X' dimension shown in **Table A**. It is best to have an equal length of shaft extending into each flange. Tighten one flange in its final position. Slide the other flange far enough away to install the sleeve. With a two piece sleeve, do not move wire ring to its final position; allow it to hang loosely in the groove adjacent to the teeth.

Slide the loose flange on the shaft until the sleeve is completely seated in the teeth of each flange. (The 'X' dimension is for reference and not critical). Secure the flange to the shaft.



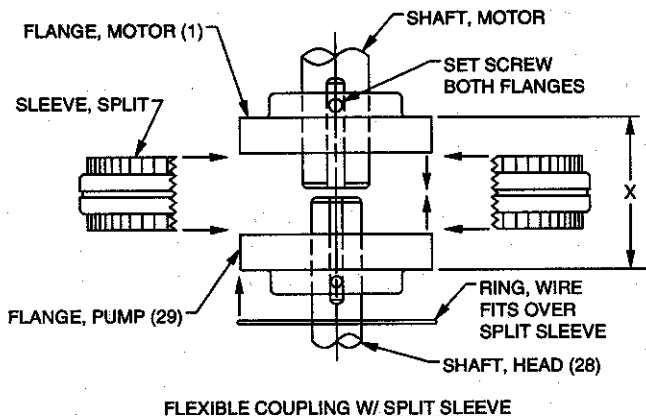
**Figure 2.**

If coupling employs the two piece sleeve with the wire ring, force the ring into its groove in the center of the sleeve. It may be necessary to pry the ring into position with a blunt screwdriver.

**F. PUMP/MOTOR COUPLING ALIGNMENT:** Proper alignment between the pump and motor shafts is essential for smooth operation. See **Figure 2**.

Check parallel alignment by placing a straightedge across the two coupling flanges, and measuring the maximum offset at various points around the periphery of the coupling without rotating the coupling. Maximum offset is shown under 'Parallel' in **Table A**.

Check angular alignment with a micrometer or caliper. Measure from the outside of one flange to the outside of the other at intervals around the periphery of the coupling. Determine the maximum and minimum dimensions without rotating the coupling. The difference between maximum and minimum must not exceed the figure given under 'Angular' in **Table A**.



**Figure 3.**

Coupling Size	Parallel	Angular	Dimension X
4J	.010	.043	1.188
5S	.015	.056	1.938
6S	.015	.070	2.437
8S	.020	.094	2.938
9S	.025	.103	3.500
10S	.025	.128	4.063
11S	.032	.151	4.875

**Table A: Max. Allowable Misalignment (INS)**

# Installation (continued)

**G. LUBRICATION – PUMP SHAFT BEARINGS:** Pump shaft bearings (13) are either product lubricated or externally lubricated from a clean source. When specified, individual lubrication lines are provided from beneath the mounting plate (7) to each pump shaft bearing (13) as shown in **Figure 4**. Connections for the supply of the external lubrication are located on the top surface of the mounting plate.

The 8196 VSP Sump Pumps are provided with carbon bearings as standard. Other bearing materials are available as detailed below.

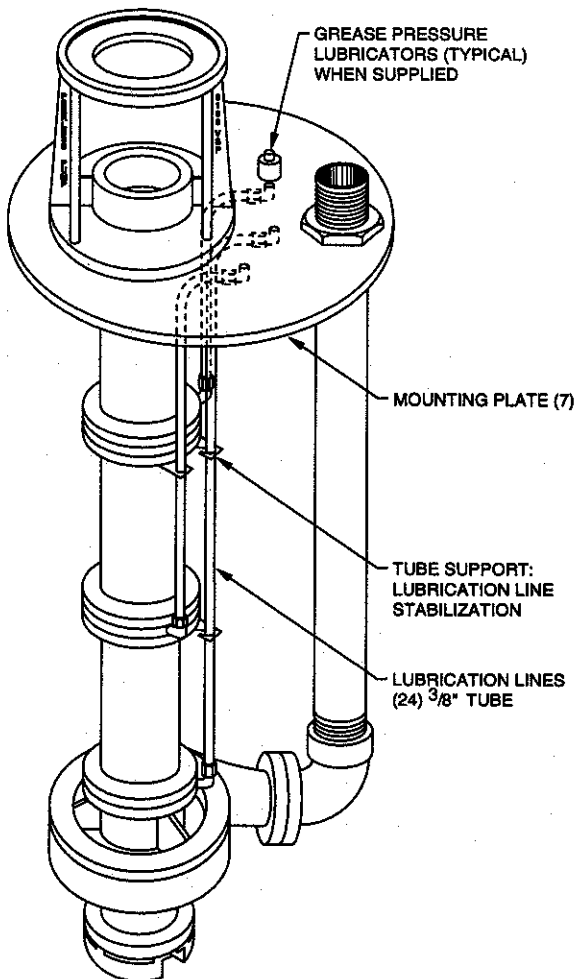
**Carbon Bearing** – Although carbon bearings offer “dry” operation capability, it is recommended that for long life the bearings be lubricated. Most pumped

products will provide sufficient lubrication properties for the carbon bearings. The noted exception is that lubrication medium must not contain abrasives or solid particles. Lubrication must be clean flush.

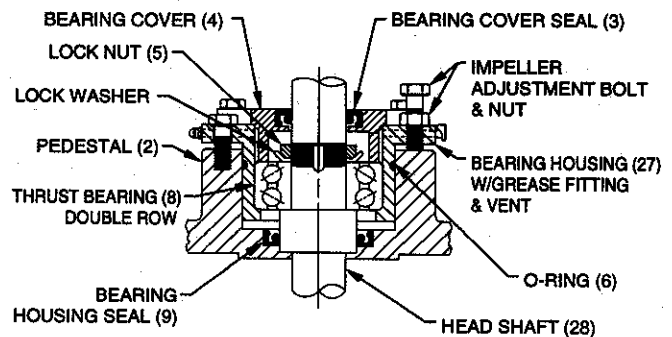
**Carbon Bearing, Sealed** – The Carbon bearing is sealed within the bearing retainer (12) or adapter (16) by two grease seals; refer to **Figure 9**. The lubrication lines as shown in **Figure 4** are filled with grease by pressure lubricators located above the mounting plate (7). The pressure lubricators must be kept full of grease.

**Metallic Bearing** – Both cast iron and bronze metallic bearings are available and must be externally lubricated at all times as shown in **Figure 4**. External lubrication may be grease or clean flush.

**H. LUBRICATION – THRUST BEARING:** The 8196 VSP Sump Pump is supplied with a double-row ball bearing (8) located within the motor pedestal (2), below the pump/motor coupling. The thrust bearing is factory lubricated. Prior to start-up, inject a small amount of grease into the alemite fitting located on the bearing housing (27); see **Figure 5**. Use grease sparingly. **DO NOT OVERFILL.**



**External Lubrication System  
Figure 4.**



**Figure 5.**

# Operation

## A. BEFORE STARTING

### Check the following items:

1. Verify correct motor rotation; see "Installation" – Section C.
2. Turn shaft by hand and see that it rotates freely. Failure of shaft to turn freely may be caused by improper impeller adjustment. See "Maintenance" – Section A of this manual for method of impeller adjustment.
3. Check that voltage and frequency on motor name plate are the same as service provided.
4. Check that the external lubrication, when utilized, to the pump shaft bearings (13) is activated and flowing. See "Installation" – Section G.

5. Check the liquid level in the sump basin to ensure that sufficient submergence exists to operate the pump unit.

6. Close discharge valve.

## B. AFTER STARTING

### Note the following:

1. Slowly open the discharge valve. Centrifugal pumps should not be operated at or near zero flow for long periods of time.
2. Verify that pump and motor are operating in a clockwise direction. See arrow on motor pedestal.
3. Check pipe connections for leaks.

# Maintenance

## A. ADJUSTING IMPELLER CLEARANCE:

This instruction applies to the recommendation for setting up impeller clearance at installation prior to start up, or if there is a gradual loss in head occurring during field operations. If performance cannot be restored by adjustment, pump should be disassembled and the impeller and casing inspected for wear. To adjust the impeller clearance, see **Figure 6**.

1. Disconnect the pump/motor coupling, see **Figure 3**.
2. Loosen adjustment bolts and jam nuts (D).
3. Tighten bearing housing bolts (C) while rotating the pump shaft (14) by hand until the impeller lightly contacts the casing (19).
4. Loosen each bolt (C) until a .015" (0.38mm) feeler gauge can be placed between the bearing housing flange (27) and underside of head of bolts (C).
5. Be sure jam nuts on bolts (D) are loose. Tighten each bolt (D) a flat at a time until bearing housing (27) is tight against bolts (C). Be sure all bolts (C&D) are tight. Tighten jam nuts on bolts (D).

6. Rotate pump shaft (14) by hand several times to check for free turning. If unit does not rotate freely, repeat adjustment procedure.
7. Reconnect pump/motor coupling. See "Installation" - Section E.

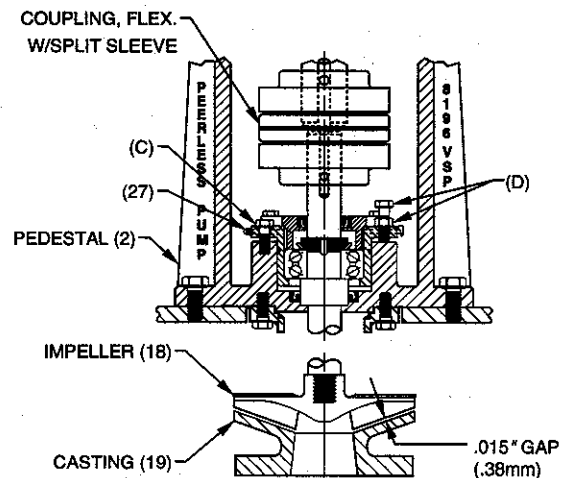


Figure 6.

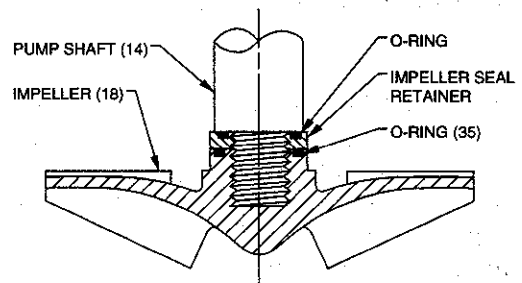


# Maintenance (continued)

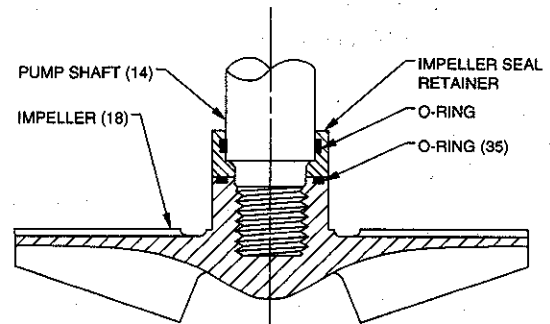
## B. DISASSEMBLY OF VSP SUMP PUMP:

The Sectional Parts list, Page 3, contains a complete sectional view of the 8196 VSP Sump Pump with proper part identification numbers. Refer to this list as required during maintenance procedures and when ordering spare or repair parts. To prepare the pump for disassembly, proceed as follows:

1. Please review section on **"Important Safety Precautions"** prior to removal and disassembly of the sump pump.
2. Disconnect the pump/motor coupling, see Figure 3.
3. Disconnect the motor (30) and remove from the pedestal (2).
4. Disconnect discharge piping at the discharge flange (26).
5. Disconnect mounting plate tie-down bolts.
6. Remove pump from sump basin and lay in horizontal position for further disassembly, with proper support of columns to prevent damage to shaft.
7. Remove all lubrication lines (24).
8. Remove pump half coupling (29) and key (34) from the head shaft (28).
9. Remove suction strainer (20).
10. Disconnect discharge elbow (22) from casing (19).
11. Remove casing (19).
12. Remove adapter to casing gasket (17).
13. Unscrew impeller (18) from pump shaft (14). The threads are right handed. Prevent the pump shaft from turning by placing a wrench at the pump/motor coupling shaft location. Do not misplace or damage the O-ring (35) which seals the impeller and the pump shaft.
14. Groups ST and MT1 are equipped with impeller seal retainers; see **Figure 7** for **"Impeller Seal Construction"**. Remove impeller seal retainer and O-ring.
15. Remove adapter (16).



GROUP (ST)  
1-1/4" DIA SHAFT FOR TYPE (ST) IMPELLERS



GROUP (MT-1)  
1-1/4" DIA SHAFT FOR TYPE (MT) IMPELLERS

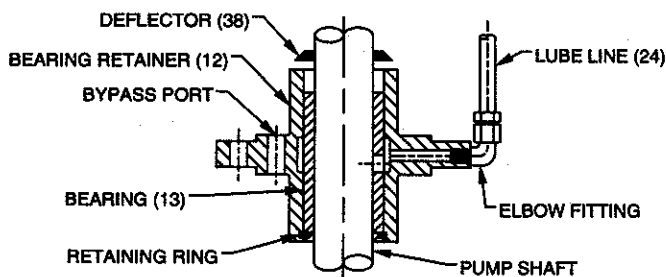
**Figure 7.**

16. "Match-Mark" column flanges before disassembly. Remove column flange bolts (31) and slide column from pump shaft (14). Most units come with more than one column and bearing retainer, (12). Remove each column and retainer, starting at the bottom, while supporting the pump shaft throughout the removal process.
17. Remove pump shaft (14) from coupling (10).
18. Remove coupling (10) from head shaft (28).
19. Remove bearing housing bolts and slide thrust bearing assembly from pedestal (2).
20. Remove impeller adjustment bolts and nuts from the bearing housing (27).
21. Remove bearing cover (4) from the bearing housing (27).
22. Remove bearing housing (27).
23. Remove bearing locknut (5) and lock washer. Pull thrust bearing (8) from the head shaft (28).

## C. INSPECTION AND OVERHAUL:

1. **Casing** – Replace if casing shows significant erosion, corrosion or wear. The pump is designed to have 0.030 to 0.065 total clearance. If the clearance exceeds 0.065, replace the casing.
2. **Impeller** – Replace if impeller shows significant erosion, corrosion, wear, or vane breakage. O-ring groove and impeller hub must be in good condition. **Check impeller balance.**
3. **Shaft** – Check for runout to see that the shaft has not been bent. Bearing seats, O-ring locations, and oil seal areas must be free of scratches or grooves. Shaft threads must be in good condition. Replace shaft if necessary.
4. **Ball Bearings** – Replace if worn, loose, or rough and noisy when rotated. **New bearings should not be unwrapped until ready for use.**
5. **Pump Shaft Bearings** – Check bearing bore for excessive wear and roughness. If bearing clearance exceeds 0.020, this indicates excessive wear. Replace worn or damaged bearings. To replace bearings, refer to **Figure 8**.

- a) Remove retaining ring at the bottom of the bearing retainer (12) or adapter (16).
- b) Press bearing (13) from housing.
- c) Check housing bores for damage; clean as necessary.

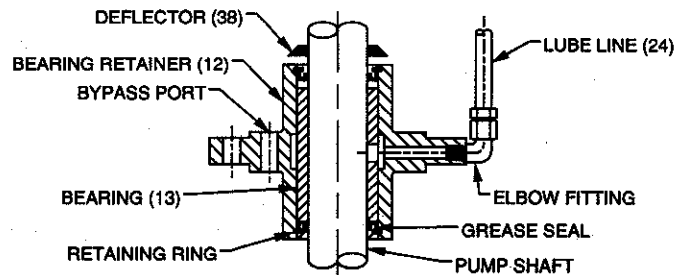


**Figure 8.**

- d) Reinstall retaining ring in housing bore.
- e) Install new bearing (13) in housing by carefully pressing until bearing locates against the retaining ring.

For sealed bearing arrangement, refer to **Figure 9**, repeat steps (a) through (d) above, then:

- f) Press new grease seal in housing until it locates against the retaining ring.



**Sealed Bearing Arrangement  
Figure 9.**

- g) Press new bearing (13) down, to grease seal.
- h) Press top grease seal down, to bearing.
- i) Install top retaining ring in housing bore.

6. **Oil Seals** – Replace if torn or otherwise damaged.
7. **O-rings** – Replace if torn or otherwise damaged.
8. **Deflector** – Replace if damaged.
9. **Gasket** – Replace if torn or otherwise damaged.

10. **General** – All parts should be clean before assembly. This is especially important at retaining ring and O-ring grooves, threads, lock fits, gasket surfaces, and bearing and bearing lubricated areas. Any burrs should be removed with Emery cloth.

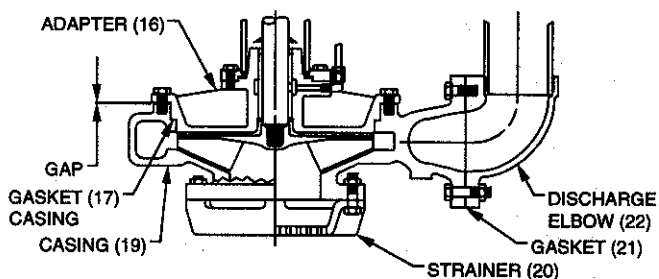
# Maintenance (continued)

## D. REASSEMBLY OF THE VSP SUMP PUMP

This section covers reassembly of the 8196 VSP Sump Pump after complete disassembly. **Make sure all directions in "Inspection and Overhaul" have been followed.**

1. Oil the thrust bearing seat on the head shaft (28). From pump/motor coupling end of head shaft, slide thrust bearing (8) on shaft as far as possible by hand. Place pipe or driving sleeve over head shaft, making sure it rests against inner bearing race only. Make sure bearing is "square" on shaft. Press evenly until bearing is seated firmly against the shaft shoulder. Do not mar the shaft, especially where it contacts the oil seal.
2. Place lock washer and bearing locknut (5) on head shaft (28) and tighten firmly. Bend "tang" of lock washer into slot in locknut.
3. Slide bearing housing (27) with O-ring (6) in place, on head shaft (28) and over thrust bearing (8) as far as possible.
4. Install bearing cover (4), complete with oil seal (3), onto bearing housing (27).
5. Install impeller adjustment bolts and nuts. Tighten jam nuts finger tight.
6. Install bearing housing oil seal (9) into pedestal (2).
7. Install thrust bearing assembly into pedestal (2). Do not damage oil seal in pedestal.
8. In the vertical position, install the thrust bearing/pedestal assembly onto the mounting plate (7).
9. Install shaft coupling (10) onto head shaft (28).
10. Install pump shaft (14) into pump coupling (10). Support pump shaft after installing.
11. Install top column (11) to underside of pedestal (2) by sliding up through the pump shaft (14). Note the **overflow hole** in the top column should be positioned near the mounting plate (7).

12. Lightly grease shaft at bearing location. Install deflector (38), slide bearing retainer assembly (when supplied) against the top column flange.
13. Install all additional intermediate and lower columns, and bearing retainer assemblies, along with each deflector (38). Lightly grease shaft at all bearing locations.
14. Install deflector (38), and then bolt adapter (16) to lower column (15).
15. On Groups ST and MT1, install impeller seal retainer and O-ring onto pump shaft (14); see **Figure 7**.
16. Screw impeller (18), with O-ring (35), in place on the pump shaft (14). Make sure that shaft assembly extends through the adapter (16) so that the impeller will not contact face of adapter.
17. Place casing gasket (17) against shoulder of adapter (16).
18. Install casing (19) onto adapter and tighten bolts (33) evenly to assure that gap between adapter and casing is even. Check gap with feeler gauge in several points around the adapter. See **Figure 10**.



**Figure 10.**

## Maintenance (continued)

19. Reset impeller clearances as outlined in **"Maintenance" – Section A.**
20. Install discharge elbow (22) and gasket (21).
21. Install discharge pipe (23) and locknuts (25). Ensure that no strain is imposed on the pump casing by tightening the locknuts. Check freedom of shaft rotation.
22. Install all lubrication lines.
23. Lubricate thrust bearing as outlined in **"Installation" – Section H.**
24. Install pump half coupling (29) and key(34).
25. The 8196 VSP Sump Pump is now ready for installation. Follow instructions as outlined in the **Installation Section** of this manual.

## Spare Parts

For maximum life and trouble free operation, it is recommended that only original Peerless Pump spare parts be installed in your 8196 VSP Sump Pump. The following instructions should be used when ordering spare parts for your 8196 VSP Sump Pump.

1. Specify pump serial number, pump group and pump size.
2. Specify part name, part item number and quantity required. Refer to Parts List included with pump shipment.
3. If Parts List is not available, refer to part item number shown in **Figure 1** when ordering.

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## Troubleshooting Chart

### A. PUMP DOES NOT RUN

1. Check for correct voltage at pump panel.
2. Check fuses for continuity.
3. Check circuit breakers; reset if necessary.
4. Check motor starter overloads.

### B. MOTOR RUNS BUT PUMP DOES NOT DELIVER LIQUID.

1. Inlet strainer completely clogged.
2. Coupling or shaft sheared.
3. Wrong direction of rotation.
4. Speed too low.
5. No liquid in sump basin.

### C. PUMP RUNS BUT AT REDUCED PRESSURE.

1. Impeller clearance too great.
2. Impeller diameter too small.
3. Wrong direction of rotation.
4. Speed too low.
5. Sump level too low.

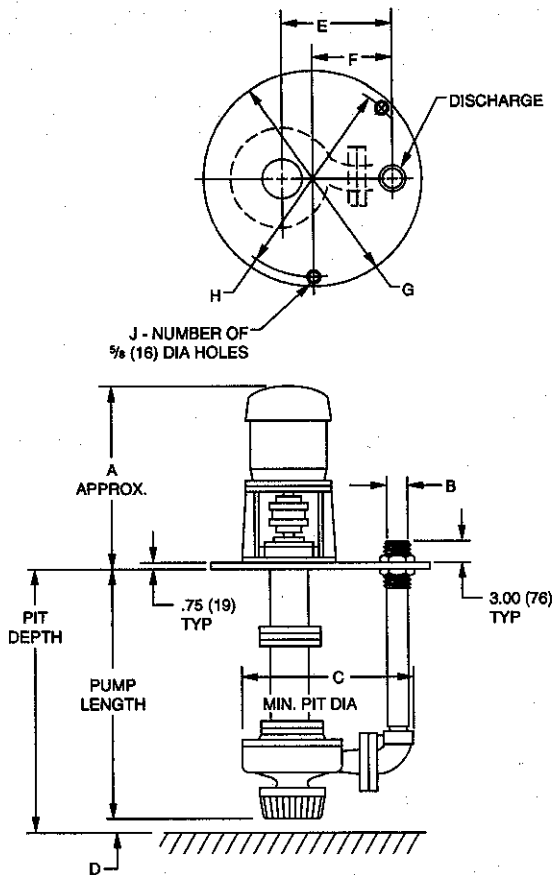
### D. PUMP RUNS BUT AT REDUCED CAPACITY.

1. Wrong direction of rotation.
2. Inlet strainer or impeller passage partially clogged.
3. Impeller clearance too great.
4. Speed too low.
5. Discharge piping or valve leaking.

### E. HIGH VIBRATIONS

1. Motor to pedestal hold down bolts inadequately torqued.
2. Motor to pump misaligned.
3. Pump/Motor out of balance.

# Series 8196 VSP Sump Pump Dimensions



A' DETERMINED BY MOTOR		
Motor Frame	A' Std.	Pump Group
143	23.50	ST
145	(597)	
182	26.75	MT1
184	(673)	
213	30.50	MT2
215	(775)	
254	31.75	STH
256	(806)	
284	36.75	
286	(933)	
324	40.50	
326	(1029)	
364	43.50	MTH
365	(1105)	

Pumps are arranged for pit depths from 24.00 (.61m) to 240.00 (6.1m) in 6.00 (152) pit depth increments.

"D" dimension is based on even 6.00 (152) pit depth increments only, otherwise the "D" dimension will vary

To Calculate Pump Length:

Pump length equals the pit depth minus "D"

example: 2x3-8 MTH installed in a 10 ft (3.05m) deep pit.

Pit Depth: 120.00 (3.05m)

Minus "D": 4.00 (102)

Equals: 116.00 (2.95m)

Pump Group	PUMP OUTLINE DIMENSIONS								
	Pump Size	B	C	D	E	F	G	H	J
ST	1x1-½-6	2.00 (51)	17.75 (451)	5.23 (133)	10.00 (254)	7.25 (184)	22.00 (559)	20.50 (521)	6
	1x1-½-8	2.00 (51)	18.00 (457)	5.25 (133)	10.00 (254)	7.25 (184)	22.00 (559)	20.50 (521)	6
	1-½x3-6	2.00 (51)	17.75 (451)	5.00 (127)	10.00 (254)	7.25 (184)	22.00 (559)	20.50 (521)	6
	1-½x3-8	2.00 (51)	18.00 (457)	5.00 (127)	10.00 (254)	7.25 (184)	22.00 (559)	20.50 (521)	6
	1x3-6	2.00 (51)	18.00 (457)	5.00 (127)	10.00 (254)	7.25 (184)	22.00 (559)	20.50 (521)	6
MT1	1x2-10	2.00 (51)	21.50 (546)	4.00 (102)	12.00 (305)	9.00 (229)	26.50 (673)	25.00 (635)	6
	1-½x3-10	2.00 (51)	21.50 (546)	4.00 (102)	12.00 (305)	9.00 (229)	26.50 (673)	25.00 (635)	6
	2x3-8	2.00 (51)	21.50 (546)	4.00 (102)	13.00 (330)	9.50 (241)	26.50 (673)	25.00 (635)	6
	2x3-10	2.00 (51)	22.75 (578)	4.00 (102)	15.50 (394)	9.50 (241)	26.50 (673)	25.00 (635)	6
	3x4-8G	4.00 (102)	26.00 (660)	4.00 (102)	15.50 (394)	10.50 (267)	31.00 (787)	29.50 (749)	8
	3x4-8	4.00 (102)	26.00 (660)	4.00 (102)	15.50 (394)	10.50 (267)	31.00 (787)	29.50 (749)	8
MT2	1-½x3-13	2.00 (51)	24.75 (629)	4.00 (102)	14.00 (356)	10.50 (267)	31.00 (787)	29.50 (749)	8
	2x3-13	2.00 (51)	28.75 (730)	4.00 (102)	15.00 (381)	11.50 (292)	36.00 (914)	34.50 (876)	8
	3x4-13	4.00 (102)	31.00 (787)	4.00 (102)	17.00 (432)	12.00 (305)	36.00 (914)	34.50 (876)	8
	4x6-10	4.00 (102)	28.75 (730)	4.00 (102)	17.00 (432)	12.00 (305)	36.00 (914)	34.50 (876)	8
	4x6-13	4.00 (102)	31.00 (787)	4.00 (102)	17.00 (432)	12.00 (305)	36.00 (914)	34.50 (876)	8
STH	1x1-½-8	2.00 (51)	18.50 (470)	5.25 (133)	10.50 (267)	7.75 (197)	26.50 (673)	25.00 (635)	6
	1-½x3-8	2.00 (51)	18.50 (470)	5.00 (127)	10.50 (267)	7.75 (197)	26.50 (673)	25.00 (635)	6
MTH	2x3-8	2.00 (51)	21.50 (546)	4.00 (102)	13.00 (330)	9.50 (241)	26.50 (673)	25.00 (635)	6
	2x3-13	2.00 (51)	28.75 (730)	4.00 (102)	15.00 (381)	11.50 (292)	36.00 (914)	34.50 (876)	8
	3x4-13	4.00 (102)	31.00 (787)	4.00 (102)	17.00 (432)	12.00 (305)	36.00 (914)	34.50 (876)	8
	4x6-10	4.00 (102)	28.75 (730)	4.00 (102)	17.00 (432)	12.00 (305)	36.00 (914)	34.50 (876)	8
	4x6-13	4.00 (102)	31.00 (787)	4.00 (102)	17.00 (432)	12.00 (305)	36.00 (914)	34.50 (876)	8

All Dimensions in Decimal/Inches And (mm).

Not To Be Used For Construction.

# Materials of Construction

Part-Item No./Material Group	Iron	316 SS	CD4MCU	Alloy 20
Casing (19)	Ductile Iron	316 SS	CD4MCU	Alloy 20
Impeller (18)	Ductile Iron	316 SS	CD4MCU	Alloy 20
Adapter (16)	CL 30 CI	316 SS		Alloy 20
Strainer (20)	CL 30 CI	316 SS		Alloy 20
Discharge Elbow (22)	CL 30 CI	316 SS		Alloy 20
Bearing Retainer (12)	CL 30 CI	316 SS		Alloy 20
Column 11/15, Discharge Pipe (23)	Steel	316 SS		Alloy 20
Pump Shaft (14), Shaft Coupling (10)	Steel	316 SS		Alloy 20
Head Shaft (28)	Steel	316 SS		Alloy 20
Below Plate (Wetted) Bolting	Steel	18-8 SS		Alloy 20
Bearing Deflector (38)	Buna N			
Impeller Seal (See Figure 7)	Teflon O-ring			
Locknut Discharge Pipe (25)	Cast Iron			
Motor Pedestal (2)	Cast Iron			
Bearing Housing (27), Bearing Cover (4)	Cast Iron			
Mounting Plate (7)	Steel, Standard or as Specified			
Above Plate Bolting	Steel			
Sleeve Bearing (13)	Carbon Standard, or as Specified			

**Table B: Standard Construction – Standard Material Groups**

Part-Item No./Material Group	Optional Materials of Construction
Lubrication Lines and Fittings (24)	Steel, 316 SS
Discharge Flange (26)	Cast Iron, 316 SS
Optional Sleeve Bearing (13)	Glass - Filled Teflon
	Carbon Sealed - Grease
	Metallic Bearing

**Table C: Optional Features – Standard Optional Materials**

## LUBRICATION REQUIREMENTS VSP VERTICAL PUMPS

Rotating equipment requires proper and regular lubrication to attain expected service life and required levels of reliability. An understanding of all the points of lubrication will aid the operating and maintenance personnel in appropriate care of the equipment. Refer to lubrication chart.

Mixing lubricants of different types (bases) or from different manufacturer's is not recommended. The best practice is to select a grease and continue use as long as satisfactory service is obtained. If it is necessary to switch grease manufacturer or type of grease, purge all old grease from the bearing cavity until fresh grease is noted at the relief port. At the earliest available maintenance period the bearing and bearing cavity should be cleaned of residual greases and re-packed with fresh grease. Refer to the Maintenance Section for information regarding condition of used bearings.

### LUBRICATION CHART

<b>Lube Point</b>	<b>Qty (in<sup>3</sup>)</b>	<b>Recommended Lubricants</b>
<b>Thrust Bearing</b>		
ST, MT1	1.0 Qtrly	See Chart
STH, MT2, MTH	1.5 Qtrly	See Chart
<b>Adapter &amp; Intermediate Bearings</b>		
Product Lube	Cont.	Lubricated by pump fluid.
External Lube	Cont.	Lubricated by external source.
External Grease Lube	0.5-0.75 weekly	Use grease chemically compatible with pumped fluid.

### Acceptable Thrust Bearing Grease Manufactures

<b>NGLI GRADE 2</b>	<b>(350 DEGREES F. MAX)</b>
Mobil	Mobilux EP2
Exxon	Unirex N2
Sunoco	Multipurpose EP
SKF	LGMT 2
<b>NGLI GRADE 3</b>	<b>(500 DEGREES F. MAX)</b>
Exxon	Unirex 3
SKF	LGMT 3

