



'S' PUMPS for self-priming centrifugal pumps

OPERATION AND
SERVICE GUIDE
O-1700_Q
DEC. 2000

Before reading or using this manual be certain of the material of construction of your pump. Check the model number label on the pump as follows:

Polyester pumps have model numbers beginning with **SE** and price codes beginning with **58-2**.

Polypropylene pumps have model numbers beginning with **SP** and price codes beginning with **58-2**.

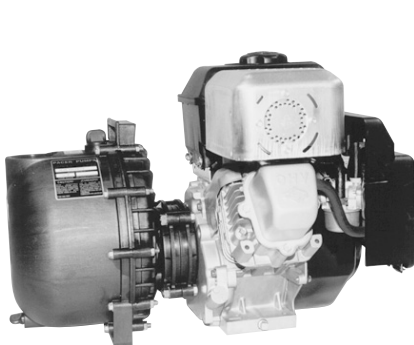
Ryton® Pumps have model numbers beginning with **SY** and price codes beginning with **58-3**.

SAFETY WARNING

Verify the chemical compatibility of the materials of your pump with the liquid you want to pump. If you are uncertain regarding chemical compatibility, contact your dealer for applications assistance and request a copy of our Corrosion Resistance Charts. Do not use a pump that is not chemically compatible with the liquid you intend to pump or serious bodily injury, death, fire, explosion, or environmental damage could result.

ALSO, PLEASE READ SECTIONS I, II, AND III BEFORE OPERATING PUMP.

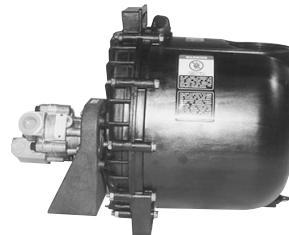
I. Safety Precautions	2
II. Preparing the Pump for Operation	3
III. Pump Operating Instructions	4



**2" Gasoline Engine Drive
with PROTEK System**



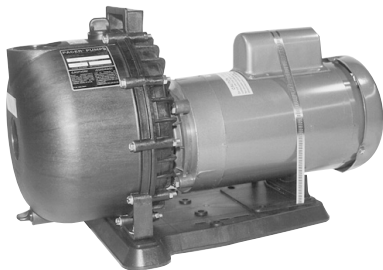
3" Pedestal Mount



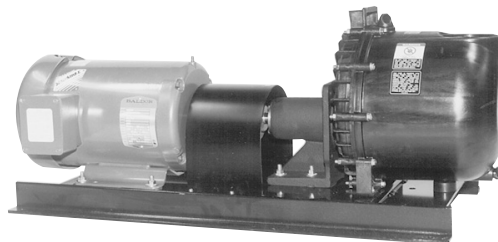
**3" Hydraulic Drive
Close coupled**



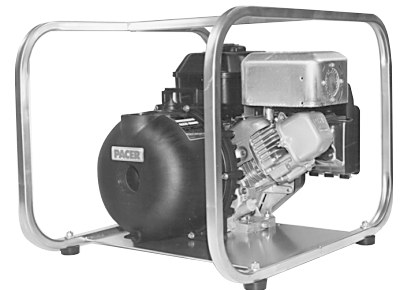
**3" Gasoline Engine
Drive Close Coupled**



**2" Electric Drive
Close coupled**



**2" Electric Drive
flexible (Long) Coupled**



**2" Gasoline Engine Drive
with Optional roll Cage**

 **SAFETY WARNING**

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I. Safety Precautions	2
II. Preparing the Pump for Operation	3
III. Pump Operating Instructions	4

Please read sections I, II, and III before operating pump

TABLE OF CONTENTS		Page no.
IV. Pump Troubleshooting and Repair		5
V. Pump Disassembly and Repair		3, 4
VI. Special Information		5
A. Flexible - coupling: Coupling Alignment		7
1. Couplings		
2. Baseplates		
B. Close-coupled Electric Motor and Pneumatic Motor Driven Pumps . . .		8
C. Pedestal Pump Dimensions		8, 9
VII. Pump Parts List and Part Diagram		10-15
VIII. Pump Accessories and Options List		16-19

I. SAFETY PRECAUTIONS
WARNING

- A. Never use these pumps for pumping flammable liquids such as gasoline. An EXPLOSION AND SERIOUS INJURY MAY RESULT IF THIS WARNING IS IGNORED.
- B. In pumping corrosive materials, extreme caution should be exercised. Provide safety guards, ventilation, and drains to protect people and property in case of a leak in the pump. Handling instructions from the manufacturer(s) of the liquids being pumped should be closely followed.
- C. Before starting the pump, follow all of the instructions in this manual and any supplemental instructions supplied with the pump.
- D. Any person operating the pump and its power unit should be fully aware of its safe operation before they start using it.
- E. Never operate an engine driven unit in an explosive atmosphere, near combustible materials, or where insufficient ventilation exists unless specific provisions have been made regarding the power unit so as to prevent possible injury and damage. Be certain any other power unit is safe for the area in which it is to be operated.
- F. Always be sure that the pump is on secure footing so that it cannot slide, shift, or tip over. If the pump is sitting beside a pit, secure it so that it does not fall in. Pump and engine units have slots and holes for fastening to a secure base. Baseplate, skid rail, and roll cage kits are available from your pump dealer.
- G. Never operate the unit with any guards removed.
- H. With engine driven pumps:
 - 1. In refueling engine, observe all safety precaution for the handling of fuel.
 - 2. Never refuel the engine while running, and care should be exercised so that no fuel is spilled on a hot engine. Always allow engine to cool at least two minutes before refueling.
- I. Before working on this pump, make sure that the power unit cannot inadvertently be started.
- J. Be sure that the power unit, pump, wiring and piping installations are suitable for the liquid being pumped, and comply with all applications codes and regulations.
- K. Do not use torches or apply fire or flames to this pump for any reason.
- L. This pump must not be subjected to more than 65 pounds per square inch internal pressure for polyester pumps . . . 55 psi maximum for Ryton and polypropylene pumps. The pump itself, normally cannot develop more than 55 pounds per square inch pressure. The pump must not be used under any of the following unusual conditions which can result in excessive pressures being developed:
 - 1. Pump shaft speed over 3600 RPM.
 - 2. Quick closing valves in suction or discharge line or any other device which may introduce hydraulic shock into the system.
 - 3. Possible sudden obstruction of discharge line such as vehicle driving over hose.
 - 4. High positive suction pressures (such as with a flooded suction) which would increase the total system pressure to 65 psi or above . . . 55 psi maximum for polypropylene and Ryton pumps.
 - 5. Do not pump liquids with specific gravities exceeding the following values:

Impeller Number	Maximum Specific Gravity* at 3450 RPM		
	Polyester	Polypropylene	Ryton
58-0667	1.8	1.5	1.5
58-0704	1.3	1.1	1.1
58-0706	1.2	1.0	1.0
58-0974	1.8	1.5	1.5
58-0975	1.8	1.5	1.5

* The specific gravity is the ratio of the weight of the liquid to be pumped to the weight of an equal volume of water. Water has a specific gravity of 1.0. therefore, a liquid which is heavier than water has a specific gravity greater than 1.0.

- M. Do not overtighten the drain or filler plugs. Hand tighten only. Excessive force may damage the heads or the pump body. Do not use metal plugs.
- N. Use at least one foot of flexible hose to make plumbing connections to the pump body. Rigid piping may put stresses on the pump causing damage. If rigid piping must be used, properly support it so as to eliminate stresses on the pumps.
- O. Do not tighten inlet and discharge fittings more than one turn beyond handtight. Excessive force will damage the pump or fittings. **Use Teflon sealing tape on all threaded fittings.**
- P. Long suction and discharge hoses or pipes must be supported so that the weight of the hoses or pipes filled with liquid does not damage the pump or tip it over.
- Q. Use replacement parts supplied by the manufacturer only.
- R. Do not run the pump dry. Always fill the body with the liquid to be pumped before starting the pump. It is not necessary to drain the pump body after use, unless there is danger of freezing, settling of solids, or crystallization.
- S. Do not restrict flow through the pump such as with a closed discharge valve or "starved" suction line. Harmful heat build up will result. If it is necessary to restrict flow through the pump for longer than 5 minutes, either the pump must be stopped or a discharge bypass line installed to keep liquid temperatures below the maximum recommended operating temperatures.
- T. Do not subject pump to extreme conditions of acidity or basicity. Consult factory for specific recommendations concerning chemicals and temperature.

II. PREPARING PUMP FOR OPERATION

- A. Pump preparation
 1. Inspect unit for shipping damage immediately upon receipt and before signing for merchandise. If any visible damage exists, note damage on shipping bill of lading or receiving document(s) before signing. Also notify your dealer of distributor immediately of any damage to the shipment.
 2. Read these instructions and the power unit instructions until you are sure you can operate it safely and correctly.
 3. IMPORTANT INFORMATION ABOUT PUMP ELASTOMERS ("RUBBER PARTS")

Buna N Elastomers

This pump is equipped with Buna-N elastomers ("rubber parts"). Buna N material is suitable for use with water (clean and dirty) and other non-hazardous liquids. Consult factory for additional specific non-hazardous application recommendations.

EPDM Elastomers

This pump is equipped with EPDM shaft seal and EPDM static seal. These elastomers ("rubber parts") are suitable

for use with water (clean or dirty) and many non-hazardous agricultural and industrial chemicals. Consult the factory for specific non-water application recommendations.

Viton Elastomers

This pump is equipped with Viton elastomers ("rubber parts"). Viton material is suitable for use with water (clean or dirty), and many non-hazardous agricultural and industrial chemicals. However, due to the wide range of chemical solutions, it is not possible to list them all here. Consult the factory for specific non-water application recommendations.

- B. Power unit preparation-Gasoline engine driven pumps:
 1. For complete operating and maintenance information consult the engine manufacturer's instructions included with the pump.
 2. Before starting, fill crankcase with oil specified by the engine manufacturer. Use a high quality detergent SAE 30 oil classified for service SE, SF, or SG. Do not add anything to the recommended oil.
 3. Before starting, fill fuel tank with clean, fresh, unleaded grade automotive gasoline. Leaded gasoline may be used if unleaded is not available. Do not mix oil with gasoline. Refer to engine manufacturers operating manual for further instructions.



CAUTION: Always remove spark plug or spark plug wire before working on unit to prevent accidental starting.



WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.



CAUTION: The engine governor is set at the factory. Do not tamper with any part which may increase the governed engine speed.

- C. Power unit preparation - Electric Motors:
 1. Make certain the input power to your electric motor is proper, single phase or three phase, and is of the proper voltage according to the motor specification plate.
 2. Be sure of the proper motor rotation. Pump impeller should rotate counterclockwise, looking from the suction inlet side. For single phase motors consult the motor manufacturer's instructions for wiring for counterclockwise rotation. Three phase motor rotation may be reversed by interchanging any two of the three power leads.
 3. Make certain that wiring for your electric motor complies with all existing local codes.
- D. Power unit preparation-Hydraulic and Pneumatic Motors:

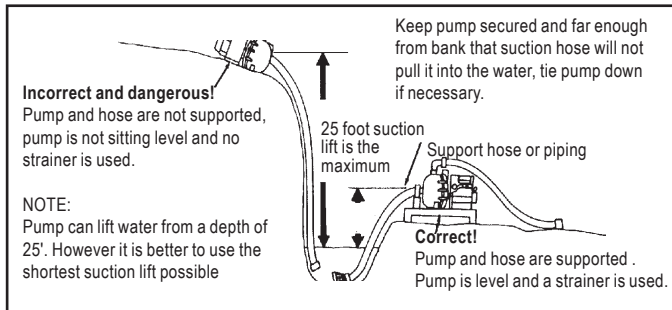
Consult the separate instruction sheet supplied with each hydraulic or pneumatic motor powered unit.

Power requirements:

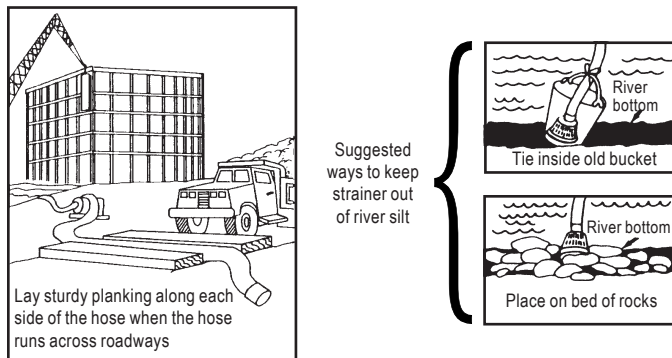
NOTE: For liquids having specific gravities greater than 1.0, increase the rated horsepower (from catalog) by a factor equal to the specific gravity of the liquid being pumped.
(ex. Catalog HP x Specific Gravity = Actual HP required)

III. PUMP OPERATING INSTRUCTIONS

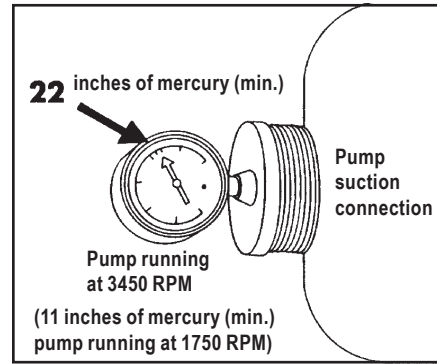
- A. Fill the pump body with liquid before starting. Do not run the pump dry: damage to the seal may result. There are no points on the pump which need lubrication. The shaft seal is self lubricating, and designed to handle clean liquids.
- B. Make certain that all hose and pipe connections are air-tight. **IMPORTANT:** An air leak in the suction line may prevent priming, and will reduce the capacity of the pump.
- C. Always place the pump as close to the liquid to be pumped as possible. Keep all lines as short and straight as possible. Avoid sharp bends in hoses. Keep the pump on a level foundation. See Figure #1.
- D. If flexible hose must be laid across a roadway, protect it with planking. Instantaneous shut off pressures applied when a vehicle runs across an unprotected hose will cause "hydraulic shock". This shock can damage the pump and/or damage the hose. See Figure #2.
- E. When pumping dirty water or other liquids which may contain solids, always use a pump strainer specified by the manufacturer on the end of the suction line. If the suction strainer is likely to clog with dirt and debris, do one of the following:
 - a. Prepare a bed of stones on which to rest the strainer. (See figure #3).
 - b. Tie the strainer so that it stays off the bottom of the pit, excavation, etc. (see Figure #3)
 - c. Tie the strainer inside a basket or pail (see Figure #3)
- F. Drain the pump body whenever there is a danger of freezing.
- G. Always use rubber feet under portable pump when operating on a hard surface. This will prevent damage to the pump and power unit.
- H. Always flush out the pump at the end of operation if the liquid being pumped may leave a solid or sticky residue in the pump. If this is not done, damage to the pump may result.



IV. PUMP TROUBLESHOOTING AND REPAIR



A. Pump does not prime



1. Fill pump with clean liquid and try priming again.
2. Shut off power source to pump. Shut off valves to and from pump. While observing all safety precautions for the liquid being pumped, disconnect suction and discharge lines and drain the pump completely. Fill the pump with water. Install a vacuum gauge in the suction port (see Figure 4). Turn on power source. Vacuum should exceed 22" of mercury when pump shaft is rotating at 3450 RPM and should equal or exceed 11" of mercury with pump shaft at 1750 RPM. If vacuum is below these values, check the following:
 - a. Leak at suction fitting
 - b. Pump rotation. Impeller should rotate counterclockwise when viewing through suction end.
 - c. Pump speed. (Maximum vacuum performance drops off rapidly with decreasing RPM).
 - d. Sealing of check valve gasket between body and volute.
 - e. Check for worn impeller and/or volute. If necessary, replace these parts. (see items B.5, B.6, & B.7 of section V).
 - f. Worn shaft seal.
3. If pump suction tests OK, attach suction line and check suction at end of suction line. Failure to get suction here indicates leaking connections, leaking hoses, pipes, or obstructions in the lines. Liners of suction hose will occasionally collapse inside the hose.

B. Pump has insufficient flow

1. Check same items as in 1, 2, and 3 above
2. Replace any worn or broken components; check clearance between impeller vanes and volute face.

(See section V #B.5).

V. PUMP DISASSEMBLY AND REPAIR

A. DISASSEMBLY

NOTE: Pump may be disassembled and repaired using single "screwdriver maintenance".

1. Remove the ten 1/4" body screws and remove the pump body.
2. Remove the rubber check valve from the volute and the large "O"-ring from around the perimeter of the bracket.
3. Remove large self-tapping screw at the top of the volute and the two smaller screws at the sides of the volute and remove the volute.
4. Unscrew the impeller screw and remove it along with the small "O"-ring. Slide the impeller and the key off the shaft. (to facilitate removal of impeller, gently force two screw drivers 180° apart, under the back of the impeller and gently pry the impeller off the shaft.)
5. One half of the shaft seal is in the impeller hub, the other half is around the shaft, inside the bracket. The impeller portion of the seal can be carefully pried out with a screw driver. If you

plan to reuse the seal, be careful not to nick or scratch either of its flat polished faces.

6. Remove the four bracket screws* and the small "O"-rings on each screw and remove the 9" "O"-ring segment which forms an arc over the shaft seal. Pull the bracket off of the engine. The stationary portion of the shaft seal can now be pressed out from the back side of the bracket. Use a round wooden plug 1-3/16" in diameter and carefully press the seal out straight if it might be reused. (Be careful not to damage the seal face). Remove the "O"-ring from around the seal.
*NOTE: If plugs are installed over the bracket screws on your pump remove the plugs by screwing a body screw into the hose and carefully pulling them out.

B. ASSEMBLY

1. Put all parts back together in the reverse of the order used in disassembly.
2. When installing a new seal, always replace both elements of the seal and put the "O"-ring in place around the bracket half of the seal. Protect the smooth, lapped sealing surfaces from damage when pressing in the new parts. To press the bracket portion of the seal into place, use a piece of pipe that will bear only on the flange of the metal seal case. Be sure both seal halves are fully seated and square with respect to the pump shaft.
3. During final assembly, it is recommended that all of the screwhead "O"-ring seals (item #8, fig. 7) be replaced. Lubricate these with vegetable oil (Do Not use petroleum base oil) before assembly.
4. Use a thread locking compound such as Loctite #242 on the bracket screws (Item #9 in fig. 7), and on the impeller screw (Item #16 in fig. 7).
5. The clearance between the impeller vanes and the volute face should be about .015" to .025" for good performance. This front clearance can be attained by shimming. The impeller can be shimmed away from the bracket face by:
 - a. Adding one or more washer type shims (Item #30, fig. 7) from under the impeller hub.
 The impeller can be shimmed closer to the bracket by:
 - b. Removing one or more washer type shims (Item #30, fig. 7) from under the impeller hub (if any were used on your pump).

After shimming turn the impeller to ensure that the impeller is not touching the bracket. If necessary, add or remove more shims.

Be sure that the impeller is completely on the shaft when checking shimming. Put pressure only on the hub when pressing impeller on the shaft.

6. Check the impeller vanes for proper height. The following measurements should be found when measuring the vane height on the outside perimeter of the impeller.

* Impeller Number	Vane height at tip of vane
58-0667	.535"
58-0704	.535"
58-0706	.535"
58-0974	.600"
58-0975	.975"

* See parts list for further description

NOTE: If the vane thicknesses are less than noted above, shimming up to .090 (Item #30, fig. 7) is acceptable. If more shimming than .090 is required, the impeller should be replaced.

7. Check volute face for excessive wear. Slight scoring is acceptable.
8. The four bracket screws (with "O"-ring on each) holding pump bracket to engine should be tightened securely with a large screwdriver.

9. The screws holding the volute in place do not have to be tightened any more than needed to secure the volute during assembly. Overtightening will cause these self-tapping screw threads to strip. (Note: if the screw threads strip, carefully assemble the pump. The bracket and the pump body when assembled will hold the volute in place).
10. Lubricate the body "O"-ring before replacing it in the pump, with a vegetable based lubricant.
11. When assembling nipples, fittings, and elbows into the pump body, wrap the male threads with Teflon sealing tape. Proper tightness is hand tight plus on e full turn with a pipe wrench.
CAUTION: After pump is assembled and before starting, rotate the shaft by hand and listen for possible scraping noises. A scraping noise indicates improper clearances, requiring disassembly and reshimming.
12. With pump running and with pump body full of water, put vacuum gauge over suction opening and check suction ability according to section IV.

VI. SPECIAL INFORMATION

**A. FLEXIBLE COUPLED PUMPS:
COUPLING ALIGNMENT**

Measure the diameter of the pump shaft and power unit shaft. Choose the appropriate coupling for your pump and power unit. (See flexible couplings chart number V1-A). Proper shaft and coupling alignment reduces vibration and prevents premature coupling failure. The following 8 steps help in obtaining proper shaft alignment.

1. Make sure you use a rigid base plate large enough for the assembly of the pump and the drive-unit. We offer kits, 58-0028 and 58-0016, for this purpose. (See baseplate kits listed after couplings chart V1-A)**
2. Place the pump and drive-unit on the base plate.
3. Measure the distance between the centerline of the pump shaft and the base plate surface.
4. Measure the distance between the centerline of the driveunit shaft and base plate.
5. Compare measurements obtained from steps 3 and 4 and use spacer blocks for height adjustment to insure alignment of both shafts.
6. Place the coupling halves over each shaft, put the "spider" between the two halves and couple the two halves together.
7. To assure parallel alignment (Figure 5) place a straight edge along the side of both coupling halves in two different locations, 90 ° apart. The coupling is aligned when the straight edge rests squarely on the sides of both coupling halves.

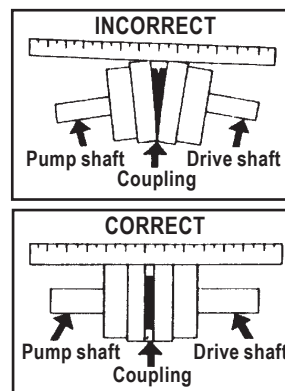
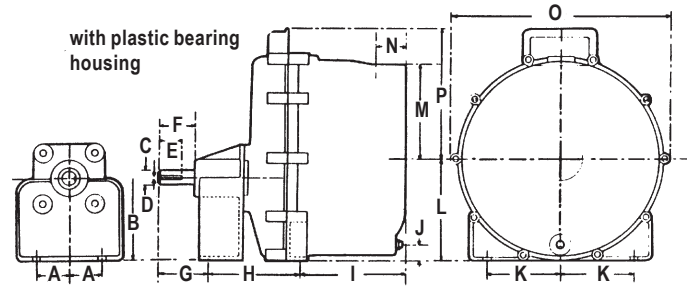
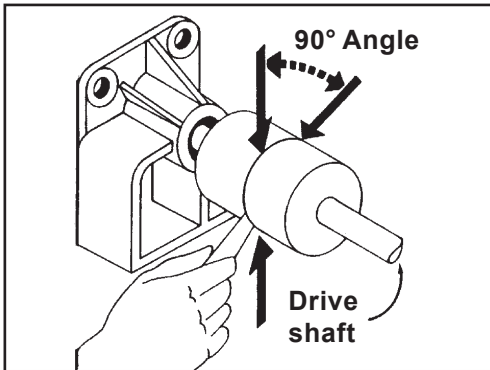


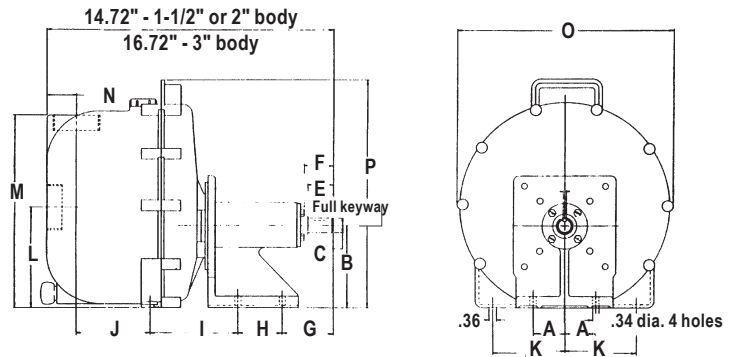
Figure 5

8. To avoid angular misalignment, insert a measuring device (taper gauge or feeler gauge) between the coupling faces at four locations 90° apart (See arrows in Figure 6) and measure the gap at each of the four locations. For proper alignment all four measurements should be equal. Reshimming may be required to achieve this alignment.



Pump Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1½"	1.61	4.17	.75	.188	1.0	1.8	2.78	4.6	5.44	.8	3.7	5.17	4.77	1.5	11.0	6.7
2"	1.61	4.17	.75	.188	1.0	1.8	2.78	4.6	5.44	.8	3.7	5.17	4.77	1.5	11.0	6.7
3"	1.61	4.17	.75	.188	1.0	1.8	2.78	4.6	5.44	.8	3.7	5.17	4.77	2.0	11.0	6.7

with cast metal bearing housing



Pump Size	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1½"	1.61	4.17	.75	.188	1.34	1.44	2.58	2.25	4.50	3.94	3.7	5.17	9.94	1.5	11.0	11.88
2"	1.61	4.17	.75	.188	1.34	1.44	2.58	2.25	4.50	3.94	3.7	5.17	9.94	1.5	11.0	11.88
3"	1.61	4.17	.75	.188	1.34	1.44	2.58	2.25	4.50	3.94	3.7	5.17	9.94	2.0	11.0	11.88

COUPLING PART NUMBER	POWER UNIT SHAFT* DIAMETER	ELECTRIC MOTOR FRAME SIZES
58-0785	.625"	56
58-0786	.875"	143t-145t 182-184
58-0787	1.125"	182t-184t
58-0788	1.375"	213-215 213t-215t
58-0875	1"	-
58-0876	.75"	-

FLEXIBLE-COUPLINGS CHART VI-A

* One-half of each coupling has a .750" diameter bore to fit the pedestal pump shaft.

** Baseplate kits

These kits contain a baseplate, coupling guard, shims and hardware for mounting a pedestal pump to the power units listed.

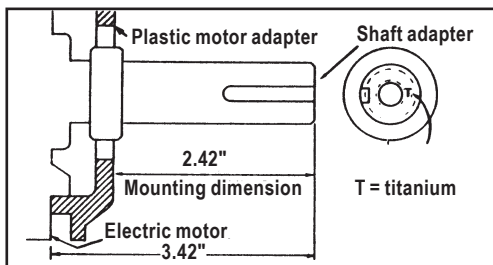
All necessary mounting holes are provided in the baseplate 58-0028 - light duty baseplate for these electric motor frame sizes: 56, 143T, 145t, also can be used to mount a 3 to 6.5 HP gasoline powered engine.

58-0016 - heavy duty baseplate for these electric motor frame sizes: 184, 182T, 184T, 213T, 215T, also can be used to mount 8 HP Briggs & Stratton engine.

C. PEDESTAL PUMP DIMENSIONS

B. CLOSE-COUPLED ELECTRIC AND PNEUMATIC MOTOR DRIVEN PUMPS

If the motor shaft adapter is replaced, use the mounting dimensions shown below when installing the new part.



NOTE 1. You will note a multiple choice of impellers, volutes, and top volute screws. Once you have identified the impeller (from the fourth digit on the pump model number, or by comparing your impeller to the descriptions given the various impellers) you can make your choice of impeller, volute, and volute screws by following the same letter grouping. For example: if your impeller is the open type, 5 vane, .535" wide, then it is part number 58-0706 30 and has an "A" designation, under the column marked "grouping". You now now can choose one of the three volutes also designated "A", depending on your choice of volute facing. You can also choose the proper top volute screw (see reference number #19)

NOTE 2. Impellers (Ref. #15) may be ordered with the seal (Ref. #14) installed. The part number for these assemblies is the same same as the impeller part number except that the last digit is a "1" for BUNA-N seal, a "2" for EPDM seal and a "3" for VITON seal. For example; assembly 58-0704 31 consists of impeller 58-0704 30 (item #15) and a BUNA-N seal half (item #14).

NOTE 3. Bracket assemblies are available with the shaft seal (Ref. 313), shaft seal "O"-ring (Ref. #11) and "O"-ring segment (Ref # 10) installed. In BUNA order part number 58-0703 31, EPDM - part number 58-0703 32 and Viton part number 58-0703 32.



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