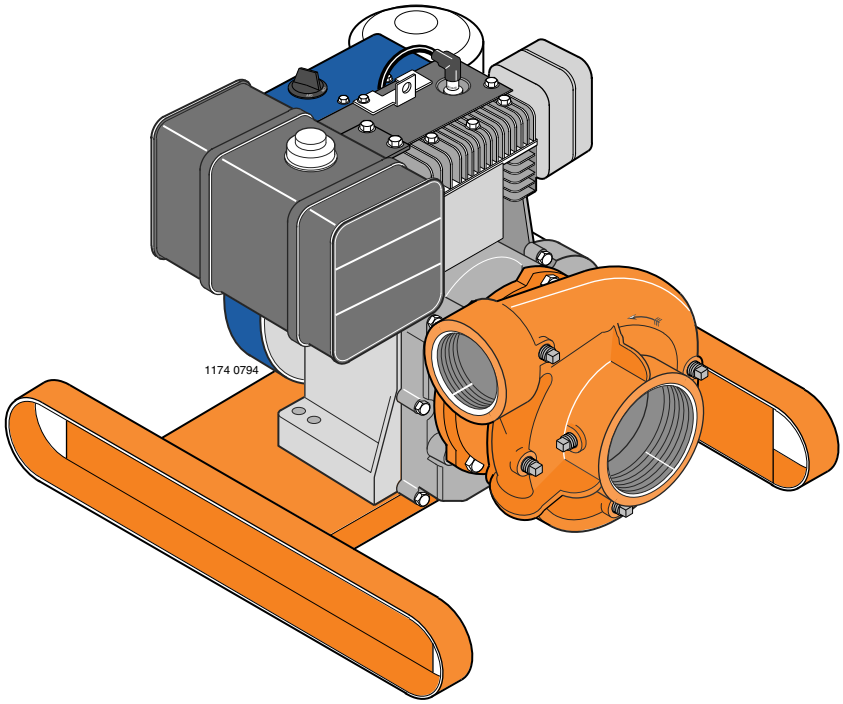
OWNERS MANUAL

INSTALLATION AND OPERATING INSTRUCTIONS
REPAIR PARTS LIST

Air Cooled Engine Drive Centrifugal Pump



IMPORTANT

For best possible performance and continuous, satisfactory operation, read these instructions before installing your new pump.
Should service be required, this manual can be a valuable guide.
It should be kept near the installation for ready reference.
Record nameplate data from pump on blank nameplate inside this manual for future reference.

Berkeley Pumps / 293 Wright Street / Delavan, WI 53115

PRINTED IN U.S.A.

F00635 (Rev. 8/12/02)

Safety First

General Information

Pump Location

READ AND FOLLOW SAFETY INSTRUCTIONS!

This is the safety alert symbol. When you see this symbol on your pump or in this manual, look for one of the following signal words and be alert to the potential for personal injury:

DANGER warns about hazards that **will** cause serious personal injury, death or major property damage if ignored.

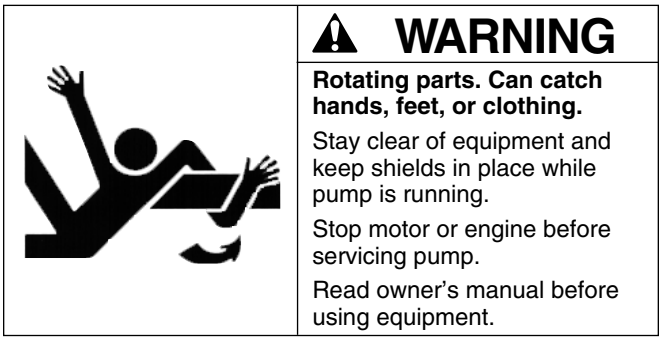
WARNING warns about hazards that **will** or **can** cause serious personal injury, death or major property damage if ignored.

CAUTION warns about hazards that **will** or **can** cause minor personal injury or property damage if ignored.

The label **NOTICE** indicates special instructions which are important but not related to hazards.

Carefully read and follow all safety instructions in this manual and on pump.

Keep safety labels in good condition.
Replace missing or damaged safety labels.



General Safety

Do not allow pump, piping, or any other system component containing water to freeze. Freezing may damage system, leading to injury or flooding. Allowing pump or system components to freeze will void warranty.

Pump approved liquids only with this pump.

Periodically inspect pump and system components.

Wear safety glasses at all times when working on pumps.

Keep work area clean, uncluttered and properly lighted; store properly all unused tools and equipment.

Keep visitors at a safe distance from the work areas.

LOCATION:

Locate the pump as near the water source as practical. Make the pipe run as short and straight as possible with as few pipe fittings as possible to keep total friction loss to a minimum.

Install pump in a clean, dry and drained location if possible and protect against moisture and adverse weather conditions. Pump should be located on a level, hard surface to prevent shifting or tipping. Locate to be readily accessible for inspection and maintenance.

Because of the portable nature of this style pump, careful attention should be taken to assure that Net Positive Suction Head Available (NPSHA) exceeds Net Positive Suction Head Required (NPSHR) by the pump or reduced performance and severe pump damage may result.

Figure 1, Page 3, illustrates where these terms (NPSHA / NPSHR) come from, and how to determine if the pumping conditions at which you want to operate meet the proper criteria. When in doubt, consult your nearest Berkeley Professional Dealer.

NOTE: If pump site is 1000 feet above sea level, subtract 1.2 feet from the NPSHA equation and an additional 1.2 feet for each additional 1000 feet of elevation.

Installation
General Information

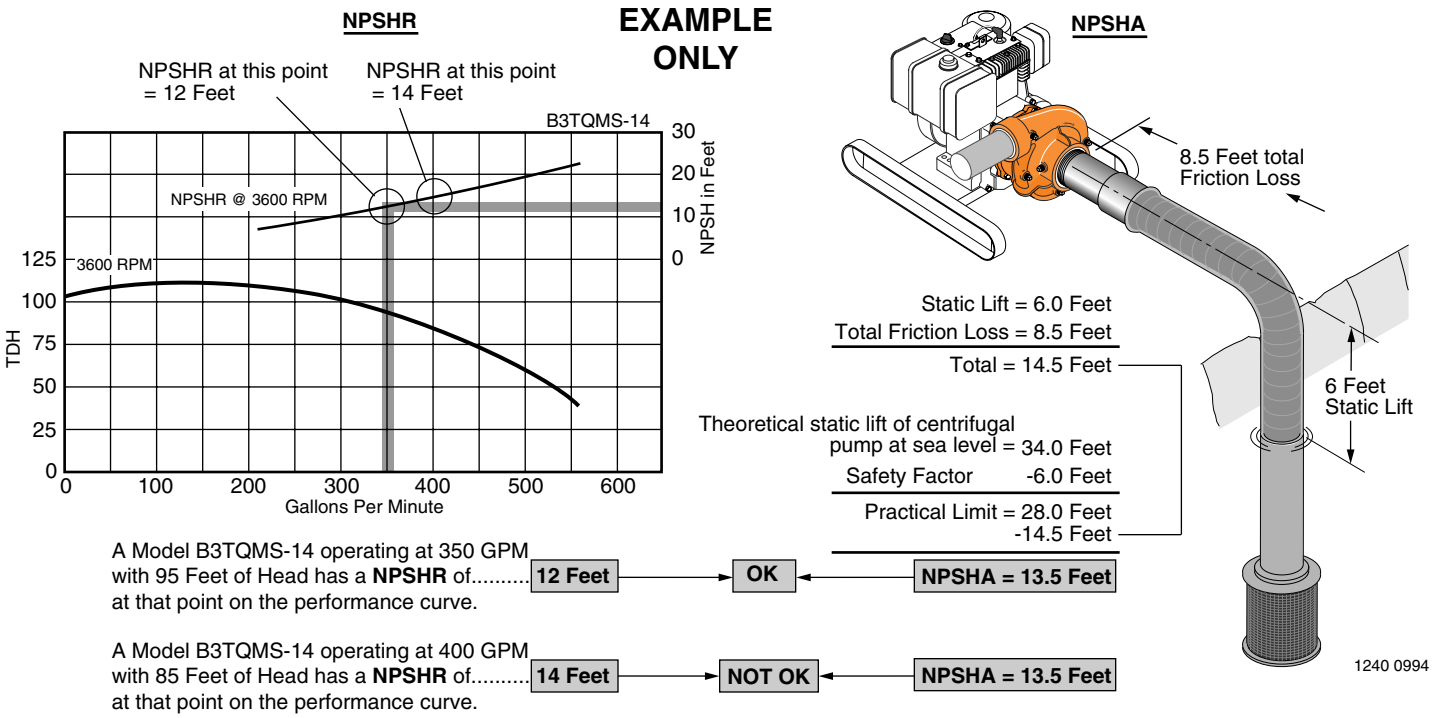


Figure 1

PUMP FOUNDATION:

⚠ WARNING **CRUSHING WEIGHT.** Models with higher horsepower engines are extremely heavy. Use care and proper equipment when handling pump for installation.

PORTABLE INSTALLATION:

Pump should be placed on an area that will provide a solid foundation substantial enough to support the weight of pump and engine and also to provide stability while the pump is running. Engine vibration will cause shifting on any type of loose surface and cause piping strains and possible damage.

NOTICE: Settling and/or shifting during operation can cause piping to place excessive strain on the pump and may damage pump case.

PERMANENT INSTALLATION:

Pump should be set on a concrete foundation which is sufficiently substantial to absorb vibration and which will provide a permanent and rigid support. Bolt pump base directly to concrete.

PIPING:

System piping should be at least one commercial pipe size larger than pump connections and flow velocity should not exceed eight (8) feet per second.

⚠ CAUTION Misalignment of piping with pump case or excessive pipe strain can cause distortion of pump components resulting in rubbing, breakage and reduced pump life.

Insure that piping is supported in a manner that prevents the exertion of force on pump connections. This can be checked by the following procedure. With the pump shut down, remove pipe flange bolts. If the mating flanges come apart or shift, misalignment is present and causing pressure on the connections. Adjust pipe supports until flanges mate without any force. This procedure can be done throughout piping system.

SUCTION PIPING:

Refer to illustrations on Page 4 and 5 for recommended and not recommended practices in suction connections.

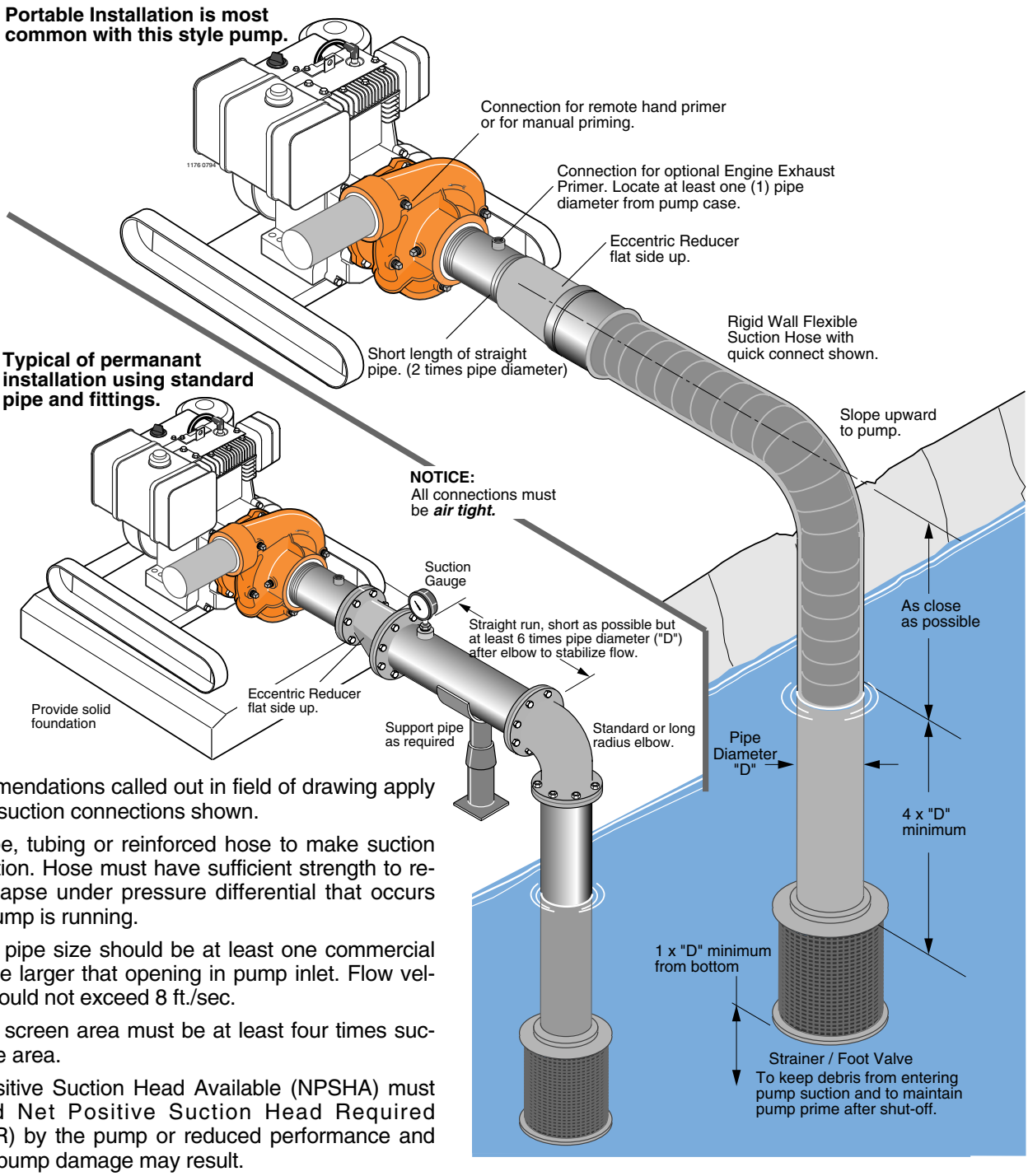
DISCHARGE PIPING:

Refer to illustrations on Page 6 and 7 for recommended and not recommended practices in discharge connections.

Installation

Suction Connection

Portable and Permanent



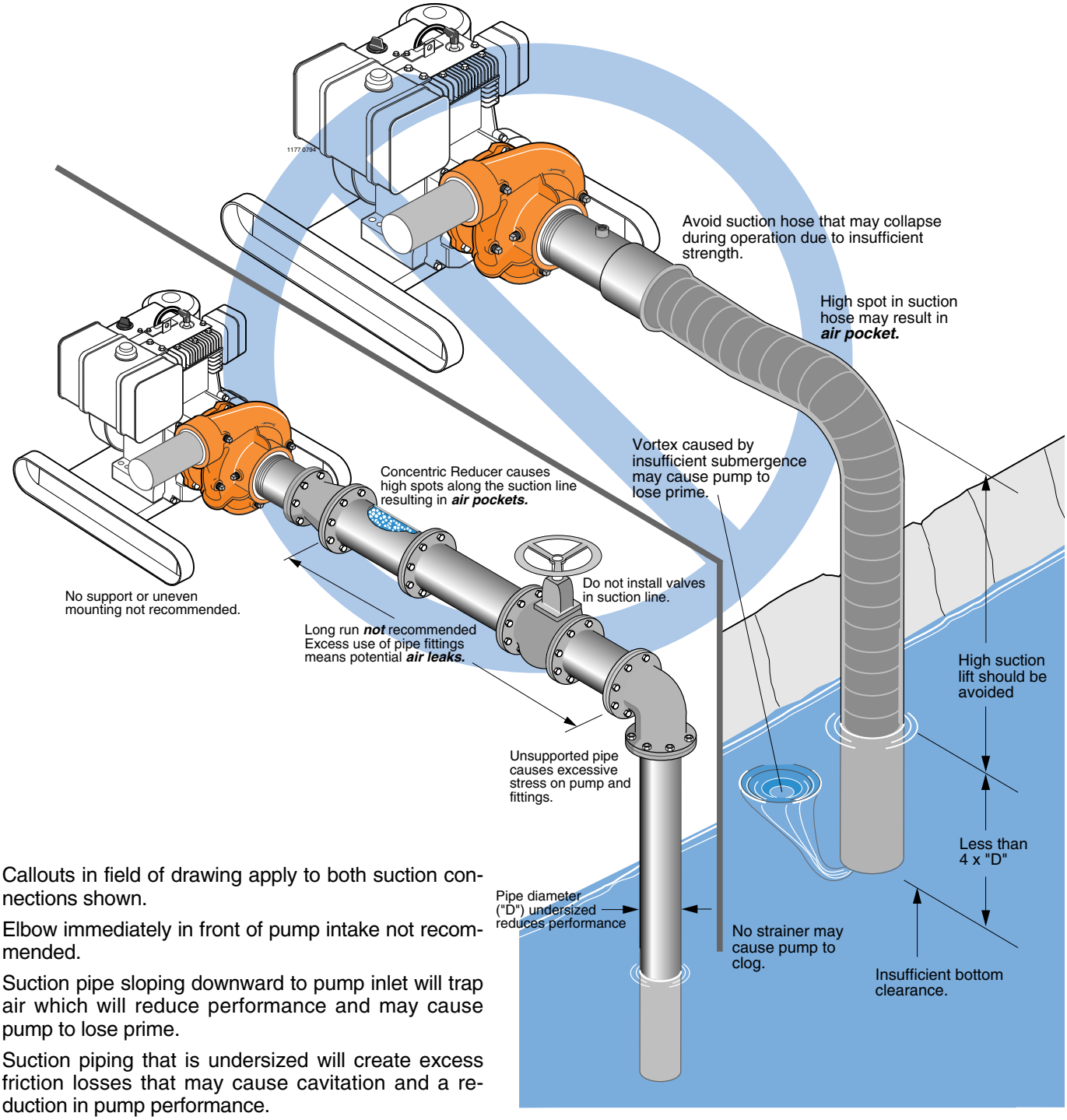
- Recommendations called out in field of drawing apply to both suction connections shown.
- Use pipe, tubing or reinforced hose to make suction connection. Hose must have sufficient strength to resist collapse under pressure differential that occurs while pump is running.
- Suction pipe size should be at least one commercial pipe size larger that opening in pump inlet. Flow velocity should not exceed 8 ft./sec.
- Suction screen area must be at least four times suction pipe area.
- Net Positive Suction Head Available (NPSHA) must exceed Net Positive Suction Head Required (NPSHR) by the pump or reduced performance and severe pump damage may result.
- All suction piping must have a continuous rise to the pump suction inlet. For rigid pipe or tubing, a 1/4 inch per foot minimum slope is recommended.

Recommended

Installation

Suction Connection

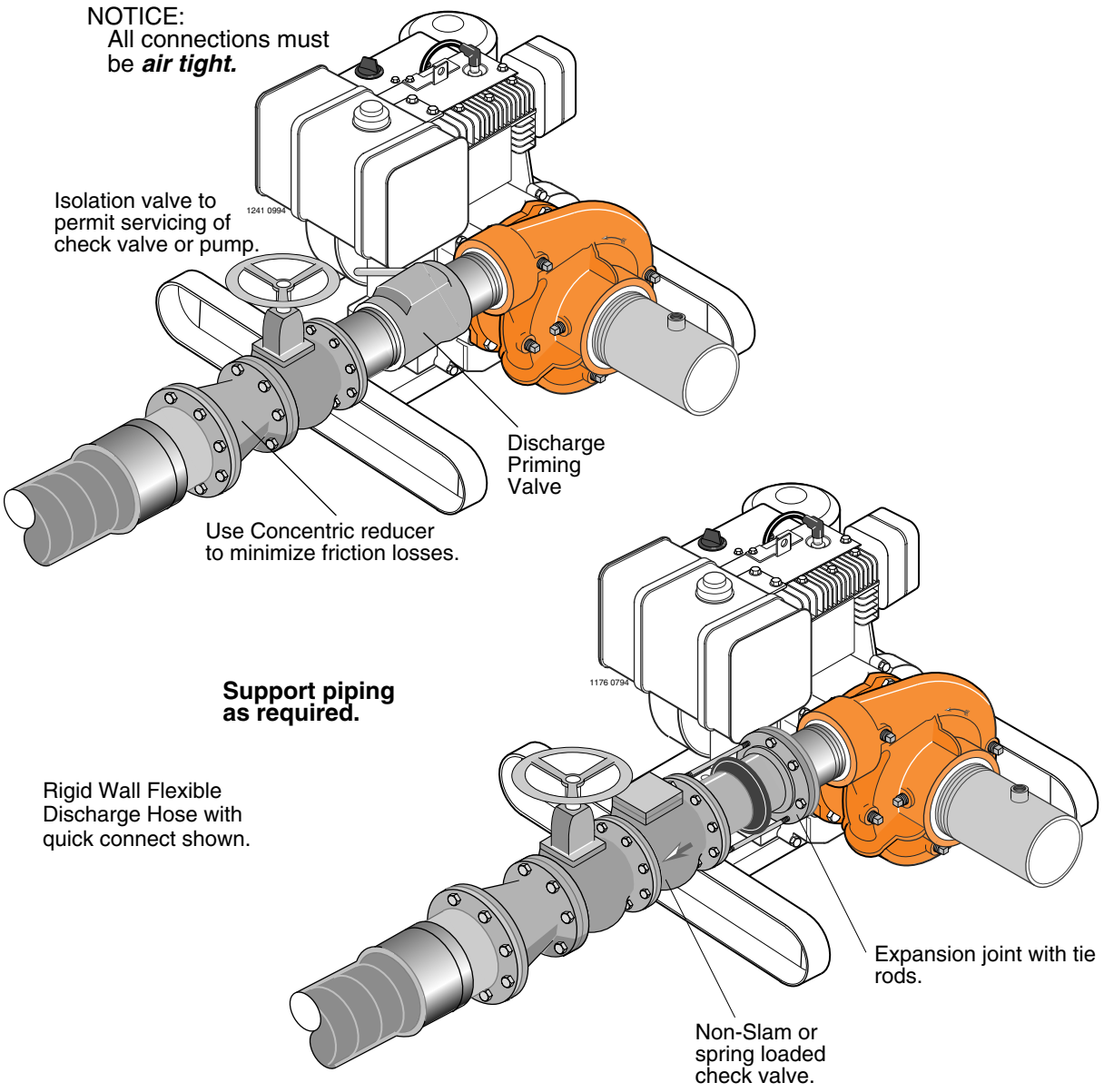
Portable and Permanent



- Callouts in field of drawing apply to both suction connections shown.
- Elbow immediately in front of pump intake not recommended.
- Suction pipe sloping downward to pump inlet will trap air which will reduce performance and may cause pump to lose prime.
- Suction piping that is undersized will create excess friction losses that may cause cavitation and a reduction in pump performance.
- Excess fittings and bends in suction line results in trapped air, reduced performance, and high friction losses which may cause cavitation.

Not Recommended

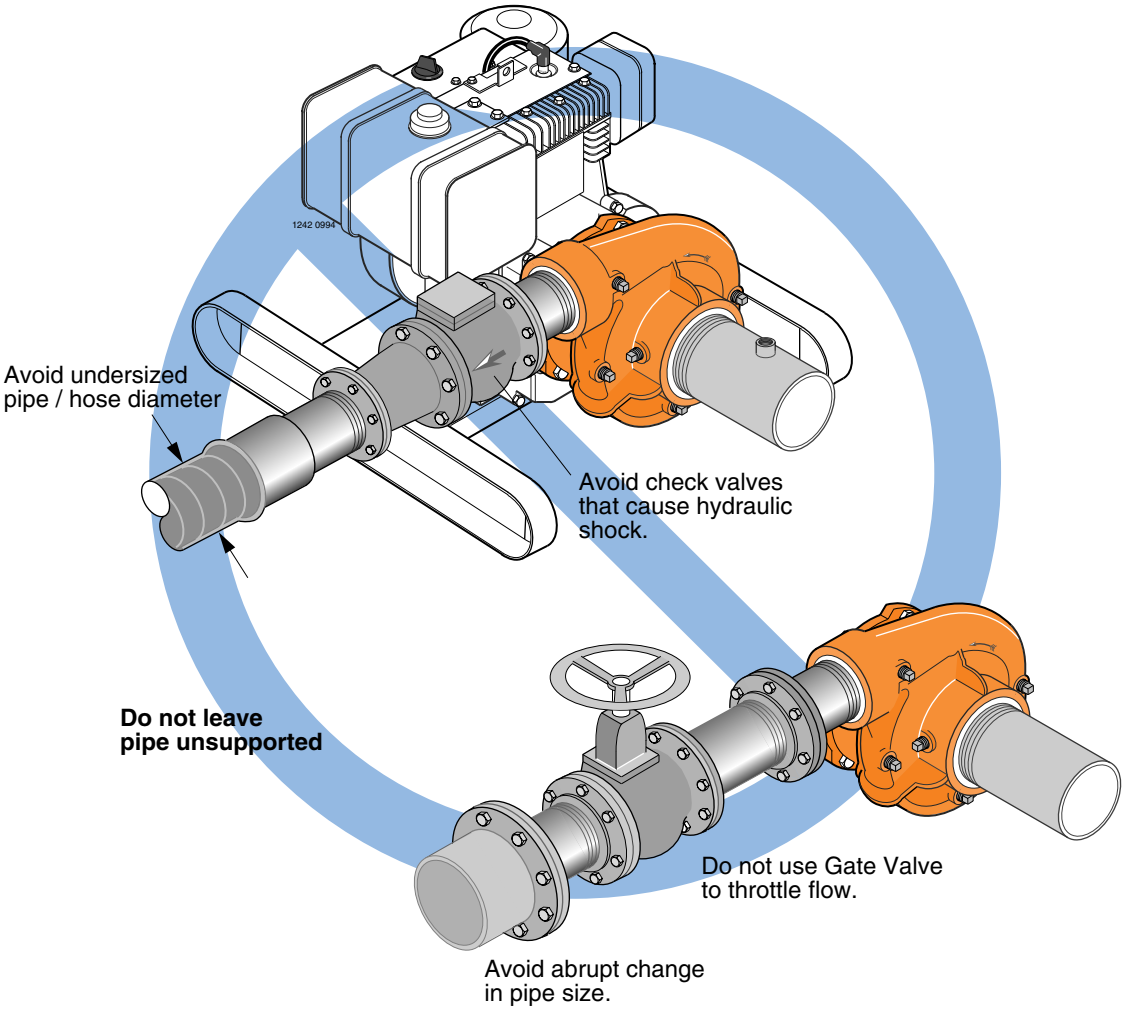
Discharge Connection



- Use pipe, tubing or reinforced hose to make discharge connection. Hose must have sufficient strength to contain the pump discharge pressure.
- Discharge pipe diameter should be at least one nominal pipe size larger than discharge opening in pump and sized so that flow velocity is below 8 ft./sec.
- Use only non-slamming check valves to prevent hydraulic shock (water hammer).
- Use gate, ball or butterfly valve for isolation. Valve should be full open during operation.
- Maintain proper size throughout discharge system, using as few elbows and tees as possible to keep friction loss to a minimum.
- Install pressure gauge after reducer to check operating pressure.

Recommended

Discharge Connection

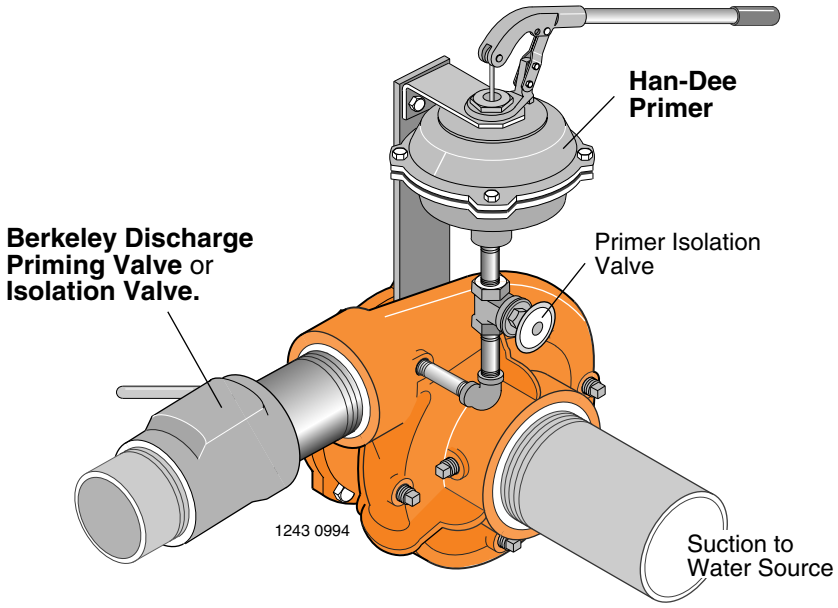


- Avoid excess friction loss caused by numerous fittings, insufficient pipe diameter, and sharp turns in pipe run.
- Some swing type check valves may permit build-up of reverse velocity before closing, causing hydraulic shock (water hammer).
- Do not force pipe alignment that can cause flange stress.

Not Recommended

Start-up

Pump Priming



PRIMING:

Pump priming is the displacement of air with water in the pump and suction piping. Pump **MUST BE** completely filled with water when operating.

Refer to instruction on the following conditions:

1. Suction lift with priming pump (water source below pump).
2. Suction lift with foot valve (water source below pump).
3. Flooded suction (water source above pump, or incoming water pressure is greater than atmospheric pressure).

Installations With Suction Lift and Foot Valve.

- Close air tight valve on discharge.
- Remove pipe plug from highest opening on pump case.
- Completely fill pump and suction piping with water.
- Rotate shaft slowly allowing any air trapped in impeller to escape.
- When all air has been forced out of pump, replace pipe plug. Use pipe joint compound on plug threads and tighten as necessary to prevent leakage.

Installations With Suction Lift and Priming Pump.

- Close air tight valve.
- Han-Dee Primer operation:

1. Open Han-Dee Primer isolation valve.
2. Work handle of Han-Dee primer up and down to evacuate air from the suction line.

   (Refer to primer owner's manual for proper procedure).
3. When water flows freely from primer, close Han-Dee Primer isolation valve.

   (Pump case should now be filled with water).

- Immediately start pump.
- Slowly open isolation valve (if used).

  (Discharge Priming Valve will open automatically).

Installations With Flooded Suction.

- Open air vent (or pipe plug) in the highest tapped opening in pump case.
- Open inlet isolation valve, allowing water to fill the pump completely and force all air out through vent.
- Rotate shaft slowly allowing any air trapped in impeller to escape.
- Close vent opening when water without air emerges.

STARTING:

NOTICE: Never run pump dry. Running pump with-out water will overheat pump and damage internal parts. Always make sure pump is primed prior to start-up.

Prime pump by one of the previous procedures. Start engine. Slowly open discharge valve.

NOTICE: Engine Damage. Operating pump at lower than rated head will cause excessive load on engine.

RUNNING THE ENGINE:

Refer to engine owner/operator manual supplied with pump for starting and operating instructions.

Pump performance varies depending on engine RPM. Refer to engine operator's manual to adjust engine speed.

⚠ CAUTION Pump has the capability of overloading engine if allowed to run continuously at an RPM or flow rate that is above specified hydraulic performance.

It is important to check the engine load setting when putting the pump into operation, or after any speed change. Do this as follows.

When operating under load it must be possible to push the throttle to a full open position and hear a noticeable increase in engine RPM (approximately 5%).

Upon release, throttle should return to original position and a decrease in engine speed should be noticed.

Under this condition, engine has sufficient power reserve to safely operate at continuous duty.

MAINTENANCE

PUMP LUBRICATION: Pump liquid end does not require any grease or oil for lubrication.The mechanical seal is lubricated by water when the pump is operating. Do not run pump dry!

ENGINE: Refer to the engine manufacturer's operating manual for complete maintenance.

⚠ WARNING

Rotating parts. Can catch hands, feet, or clothing.

Stay clear of equipment and keep shields in place while pump is running.

Stop motor or engine before servicing pump.

Read owner's manual before using equipment.

PERFORMANCE CHECK:

Periodically check the output of the pump. If performance is noticeably reduced, refer to Troubleshooting Chart.

OBSERVATIONAL MAINTENANCE:

When the pump and system operation have been stabilized, verify that pump unit is operating properly. Observe the following:

VIBRATION: All rotating machines can be expected to produce some vibration, however, excessive vibration can reduce the life of the unit. If the vibration seems excessive, discontinue operation, determine cause of the excessive vibration, and correct.

NOISE: When the unit is operating under load, listen closely for unusual sounds that might indicate that the unit is in distress. Determine the cause and correct.

OPERATING TEMPERATURE: During operation, heat is dissipated from the pump and the driver. After a short period of time, the surface of the pump bracket will be quite warm), which is normal. If the surface temperature of the pump bracket or driver is excessive, discontinue operation, determine cause of the excessive temperature rise, and correct.

MECHANICAL SEAL:

Adjustment or maintenance is normally not required. The seal is enclosed within the pump and is self adjusting. Seal is cooled and lubricated by the liquid being pumped. Refer to illustration on Pages 10 and 11 for removal and replacement. Do not run dry!

PUMP PROTECTION-COLD WEATHER/ WET WEATHER INSTALLATIONS:

SYSTEM DRAINS: Provide drain valves to empty system, including pump case, to prevent freezing damage.

SHELTER: If possible, provide shelter for unit to protect from weather. Allow adequate space around pump unit for service. When effectively sheltered, a small amount of heat will keep temperature above freezing. Provide adequate ventilation for unit when running.

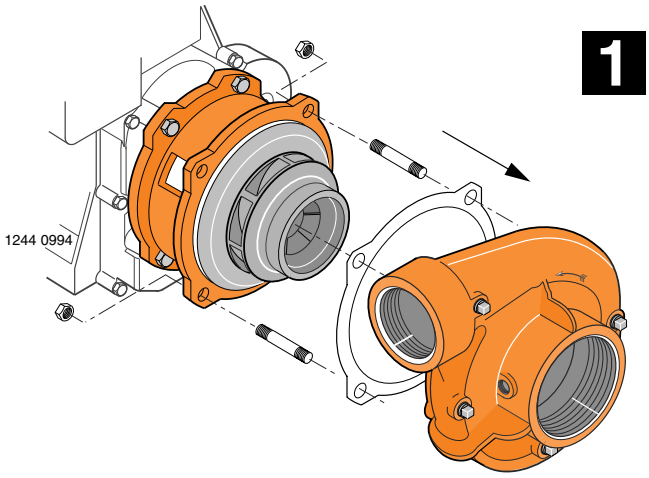
CONDENSATION: When the temperature of metal parts is below dew point and the surrounding air is moist, water will condense on the metal surfaces and can cause corrosion damage. In severe situations, a space heater can be considered to warm the unit.

Maintenance

Mechanical Shaft Seal

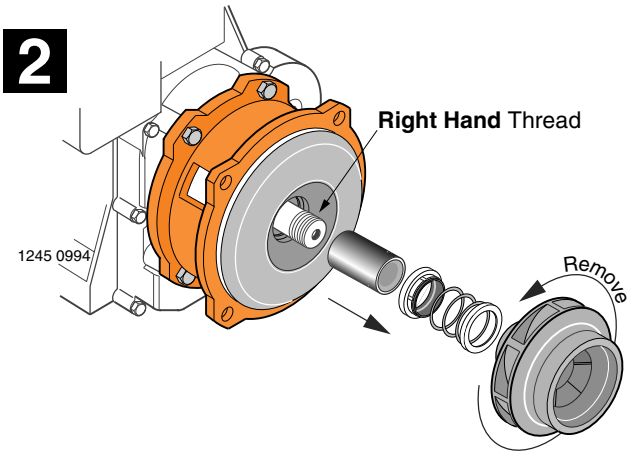
Removal

1



- Unfasten hardware holding volute to bracket.
- Remove volute to expose impeller.
- Peel off old gasket and discard.

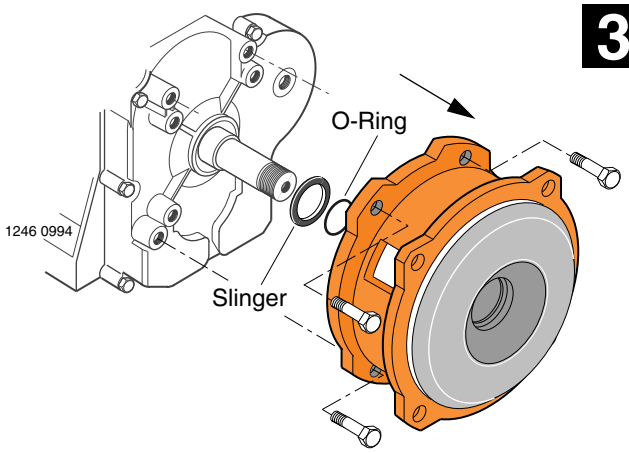
2



- Remove impeller by turning in the direction shown. A strap wrench is recommended for this procedure. Seal spring will come off with impeller.

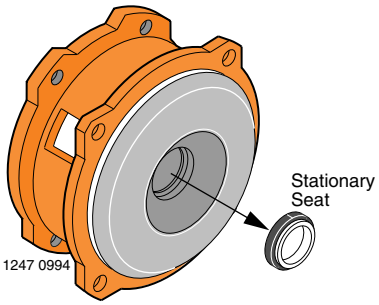
  NOTE: Do not place screwdriver or similar tool into impeller vanes to loosen impeller. Damage may occur.
- Remove rotating seat and shaft sleeve.

3



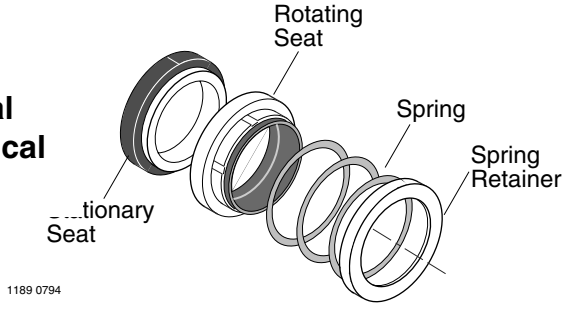
- Remove capscrews holding bracket to engine. Remove Bracket.
- Remove O-Ring and water slinger from engine shaft.

4



- Push stationary seat out of seal cavity from the back of bracket.
- Clean seal cavity in bracket thoroughly.

Typical Mechanical Seal



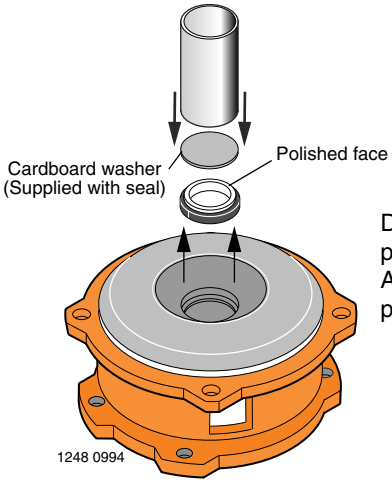
Procedure and parts may vary slightly from model shown.

Maintenance

Mechanical Shaft Seal

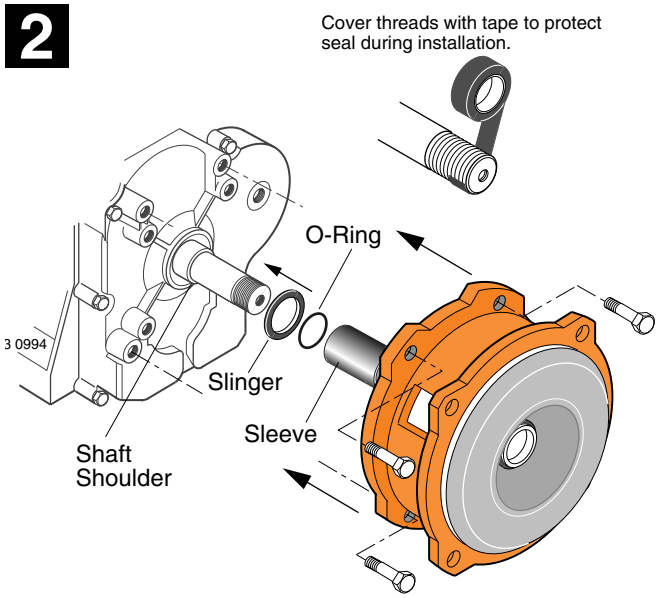
Installation

1



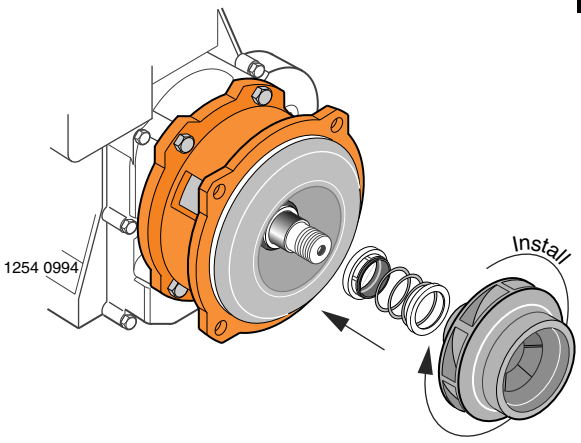
Do not scratch or chip polished ceramic face. Also . . .do not touch polished surface

2



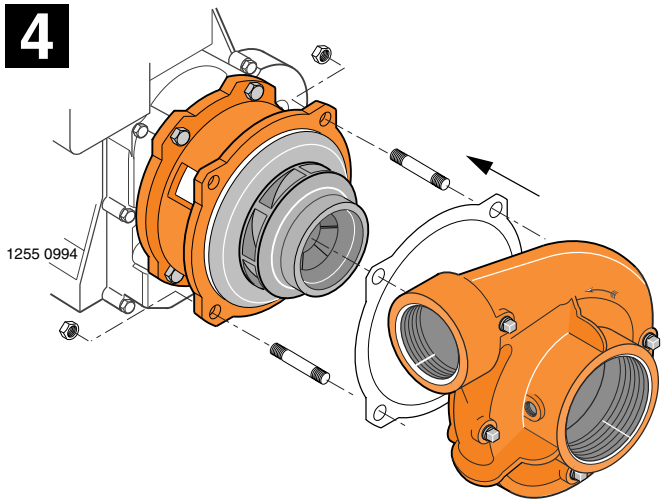
- Place bracket on a smooth, flat surface, pump side up.
- Apply a small amount of mineral oil to O-Ring on stationary seal and press into seal cavity. Cover ceramic face with cardboard washer and press straight in using a piece of pipe or tubing. Then be sure to discard the cardboard washer.

3



- Apply a small amount of mineral oil to inside diameter of rubber ring in rotating seal and to the outside of shaft sleeve. Slide rotating seat onto shaft, polished face first, until it is tight against ceramic face.
- Slide spring and retainer onto shaft.
- Install impeller by turning onto shaft in direction shown until tight.

4



- Install gasket and volute onto bracket. Use new gasket when reassembling to prevent leakage (a coat of grease on gasket will aid in future disassembly and maintenance).
- Apply anti-seizing compound to hardware threads and tighten securely.

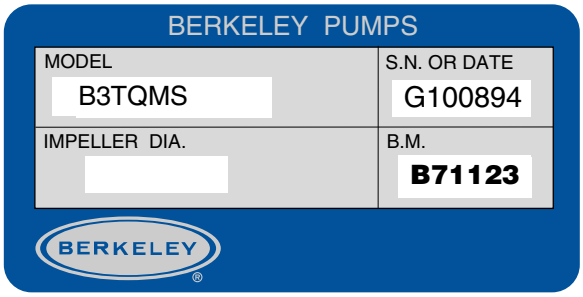
General Information

ORDERING REPLACEMENT PARTS:

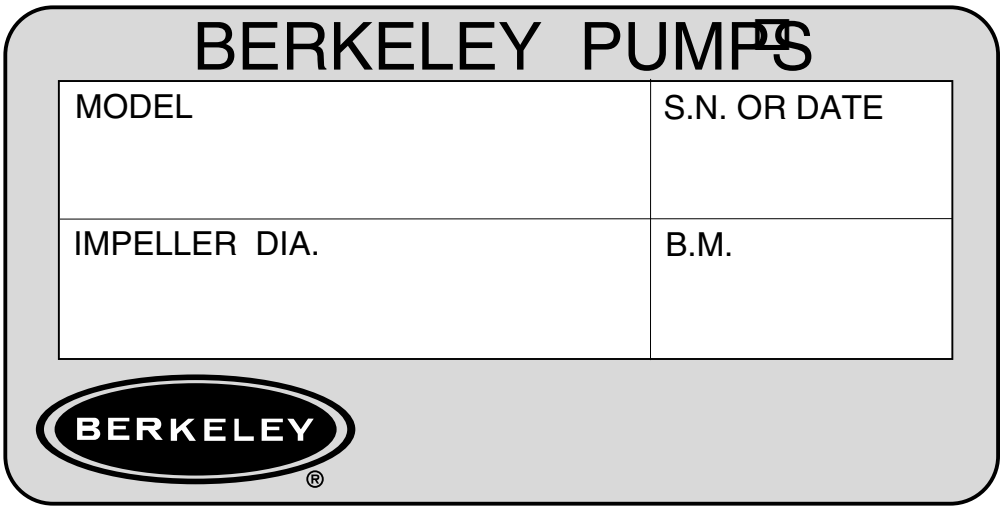
Locate the Berkeley nameplate on the pump, plate is normally on the pump case or engine bracket. Information found on this plate is shown below. To be sure of receiving correct parts, provide all nameplate data when ordering. The **BM (Bill of Material)** number is most important. Write your nameplate information on the blank nameplate below for future reference as nameplates can become worn or lost.

The illustration on Page 13 shows typical components used in the assembly of air cooled engine drive centrifugal pumps. Refer to this drawing when ordering any re-placement parts.

SAMPLE ONLY



788 0394



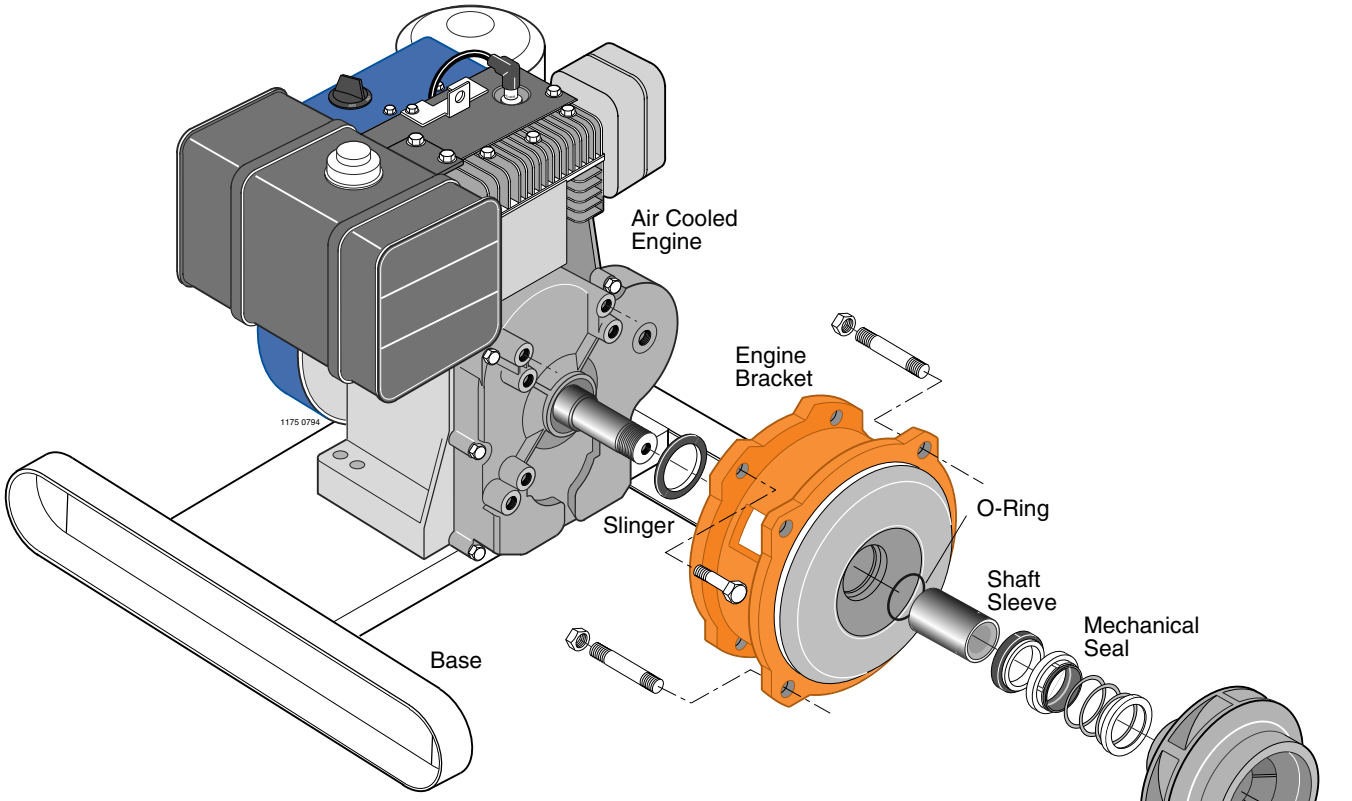
344 1093

Record your nameplate data here.

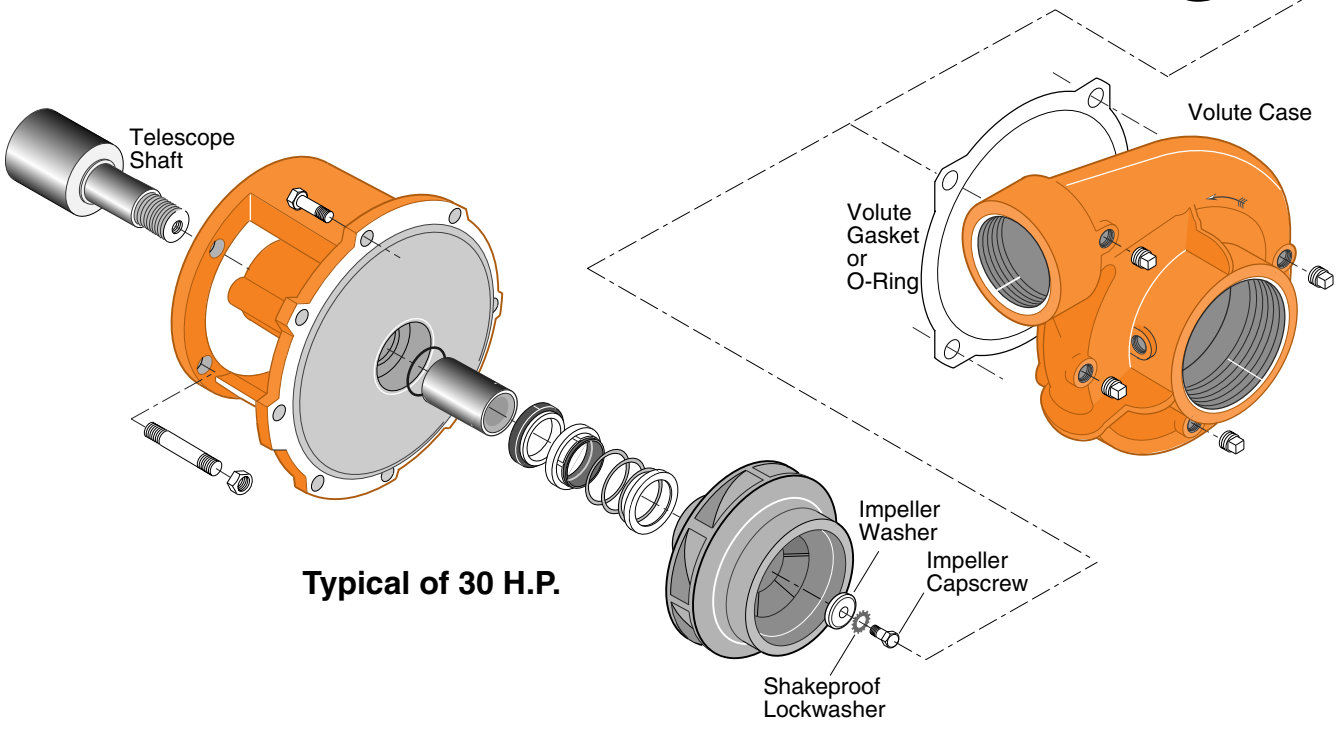
Pump Nomenclature

Air Cooled Engine Drive

Exploded View



Typical of 8-18 H.P.



Typical of 30 H.P.

Maintenance
Troubleshooting

CAUSE	CORRECTIVE ACTION
I. NO WATER DELIVERED	
A. Pump not primed	See Priming Instructions (check air leaks in suction line).
B. Speed too low	Check engine troubleshooting chart.
C. Discharge head too high	Refer to Discharge Installation drawings on Pages 6 & 7.
D. Suction lift too high	Refer to Suction Installation drawings on Pages 4 & 5.
E. Impeller, suction line and/or strainer completely clogged	Locate and remove obstruction. Refer to Repair Instructions.
II. NOT ENOUGH WATER DELIVERED	
A. Air leaks in suction line	Locate and seal any air leaks in suction piping.
B. Speed too low	Check engine troubleshooting chart.
C. Discharge head higher than anticipated	Rework discharge piping. Higher horsepower engine may be required.
D. Suction lift too high	Refer to Suction Installation drawings on Pages 4 & 5.
E. Impeller, suction line and/or strainer completely clogged	Locate and remove obstruction. Refer to Repair Instructions.
F. Mechanical defects Wear rings and suction eye impeller worn. Impeller damaged.	Locate and repair/replace worn or damaged parts.
G. Foot valve or suction inlet not immersed deep enough	Relocate foot valve or suction inlet to a greater depth. Refer to Suction Installation drawings on Pages 4 & 5.
H. Gas in water	
III. NOT ENOUGH PRESSURE	
A. Speed too low	See engine owner's manual for speed adjustment.
B. Air or gas in water (leak in suction pipe)	Locate and seal any air leaks in suction piping.
C. Mechanical defects Wear rings and suction eye impeller worn. Impeller damaged.	Locate and repair/replace worn or damaged parts.
D. Impeller diameter insufficient for conditions	Check with manufacturer (provide Bill of Material number of pump).
IV. ENGINE HEATS EXCESSIVELY	
A. Excessive engine heat	Refer to manual furnished by engine manufacturer. Make certain engine speed is within limits recommended. Discharge head too low – pumps too much water.
B. Mechanical drag, pump or engine. Shaft bent, impeller rubs case, rotating element binds, wearing rings and suction eye impeller worn.	Inspect pump and engine for listed causes and correct.
IV. UNIT PRODUCES WATER FOR A PERIOD OF TIME, THEN FAILS	
A. Leaky suction line admitting air	Locate and seal any air leaks in suction piping.
B. Air in water (Suction inlet or foot valve not immersed deep enough)	Relocate foot valve or suction inlet to a greater depth. Refer to Suction Installation drawings on Pages 4 & 5.
C. Suction lift too high	Refer to Suction Installation drawings on Pages 4 & 5.
D. Suction pipe valve and fittings not completely freed of air when priming (Air collects at high points in suction line)	Refer to Suction Installation drawings on Pages 4 & 5.

Berkeley
Warranty

Berkeley/Wicor Canada, Inc. (“Wicor”) warrants to the original consumer purchaser (“Purchaser”) of its products that they are free from defects in material or workmanship.

If within twelve (12) months from the date of installation or twenty-four (24) months from the date of manufacture any such product shall prove to be defective, it shall be repaired or replaced at Berkeley’s/Wicor’s option, subject to the terms and conditions set forth below.

General Terms and Conditions

Purchaser must pay all labor and shipping charges necessary to replace product covered by this warranty. This warranty shall not apply to products which, in the sole judgement of Berkeley/Wicor, have been subject to negligence, abuse, accident, misapplication, tampering, alteration; nor due to improper installation, operation, maintenance or storage; nor to other than normal application, use or service, including but not limited to, operational failures caused by corrosion, rust or other foreign materials in the system, or operation at pressures in excess of recommended maximums.

Requests for service under this warranty shall be made by contacting the installing Berkeley/Wicor dealer as soon as possible after the discovery of any alleged defect. Berkeley/Wicor will subsequently take corrective action as promptly as reasonably possible. No requests for service under this warranty will be accepted if received more than 30 days after the term of the warranty.

The warranty on all three phase submersible motors is void if three-leg overload protection of recommended size is not used.

This warranty sets forth Berkeley’s/Wicor’s sole obligation and purchaser’s exclusive remedy for defective products.

BERKELEY/WICOR SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, OR CONTINGENT DAMAGES WHATSOEVER.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE DURATION OF THE APPLICABLE EXPRESS WARRANTIES PROVIDED HEREIN.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on how long an implied warranty lasts, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

In the U.S.: Berkeley, 293 Wright St., Delavan, WI 53115

In Canada: Wicor Canada, Inc., 4544 Fieldgate Parkway, Mississauga, Ontario L4W 3W6