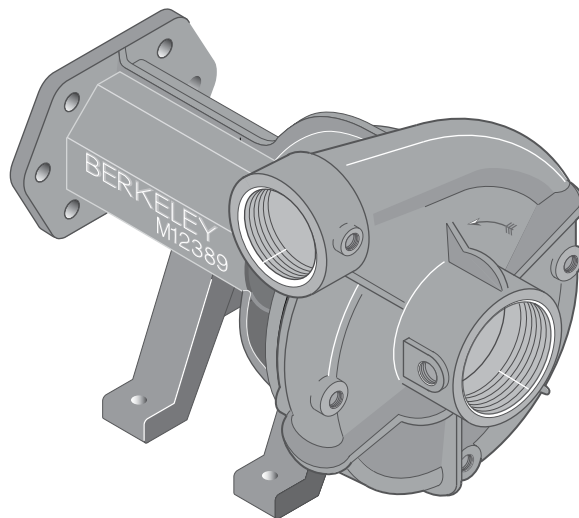


**Hydraulic-Motor Frame Mounted  
Centrifugal Pump Direct Coupling Drive**

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**BERKELEY®****INSTALLATION AND OPERATING INSTRUCTIONS  
REPAIR PARTS LIST****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.

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# Safety First

## General Information

### 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.

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.

#### California Proposition 65 Warning

**⚠ WARNING** This product and related accessories contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

### LOCATION:

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. See Figure 3, Page 5.

**NOTE:** Subtract 1.2 feet from the NPSHA for each 1000 feet of elevation above sea-level.

**⚠ WARNING** **Heavy weights; risk of crushing toes or feet.** Use care and proper lifting equipment when handling pump for installation. Size and weight of some units will require hoists for safe handling.


When properly positioned, the unit will be level, and the suction and discharge openings of the pump will be aligned with system piping.

### 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. Suction and discharge pipes must be naturally aligned with pump connections.

**NOTICE:** 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.

	<p><b>⚠ WARNING</b></p> <p><b>Rotating parts. Can catch hands, feet, or clothing.</b></p> <p>Stay clear of equipment and keep shields in place while pump is running.</p> <p>Stop motor or engine before servicing pump.</p> <p>Read owner's manual before using equipment.</p>
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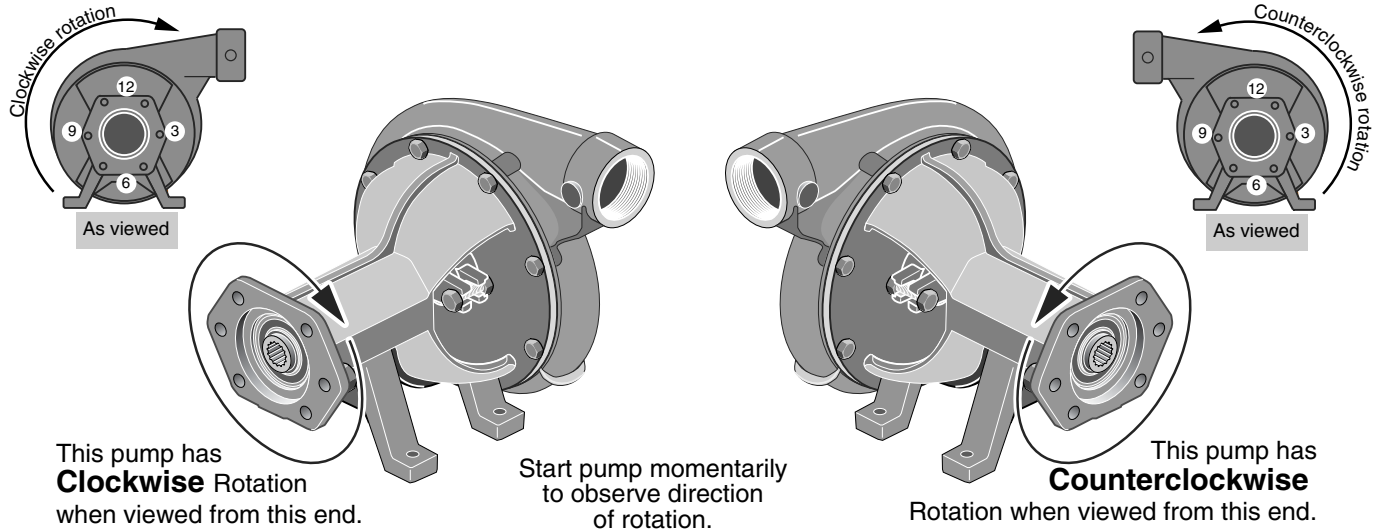
# Safety First

## General Information

### SUCTION PIPING:

### CHECK ROTATION:

Before pump is put into operation, rotational direction must be checked to assure proper performance of pump. See Figure 1.



**FIGURE 1: Check rotation of Pump.**

### ORDERING REPLACEMENT PARTS:

Locate the Berkeley nameplate on the pump. The plate is normally on the bearing bracket. Information found on this plate is shown below. To be sure of receiving correct parts, provide all nameplate data when ordering. The **B.M. (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.

Refer to the exploded view drawing on Page 12 when ordering any replacement parts.

MODEL <b>B3TPMS</b>	S.N. OR DATE <b>G100894</b>
IMPELLER DIA. <b>6-1/8"</b>	B.M. <b>B54598</b>

Sample Nameplate

MODEL	S.N. OR DATE
IMPELLER DIA.	B.M.

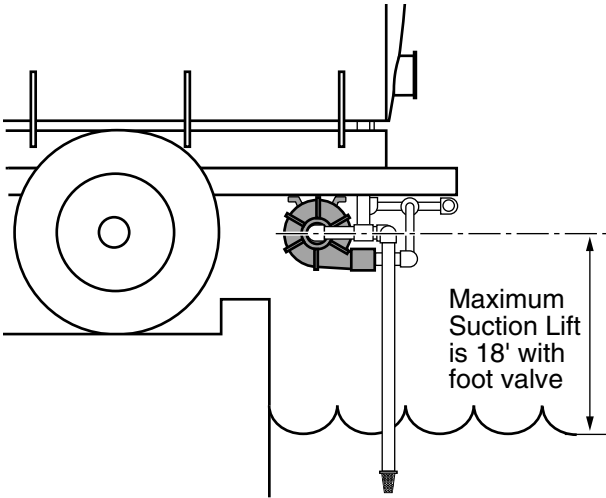
Record Your Nameplate Data Here

# 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.



**FIGURE 2**

Refer to Page 6 for instruction on priming the pump with suction lift (water source below pump), using the Han-Dee Primer.

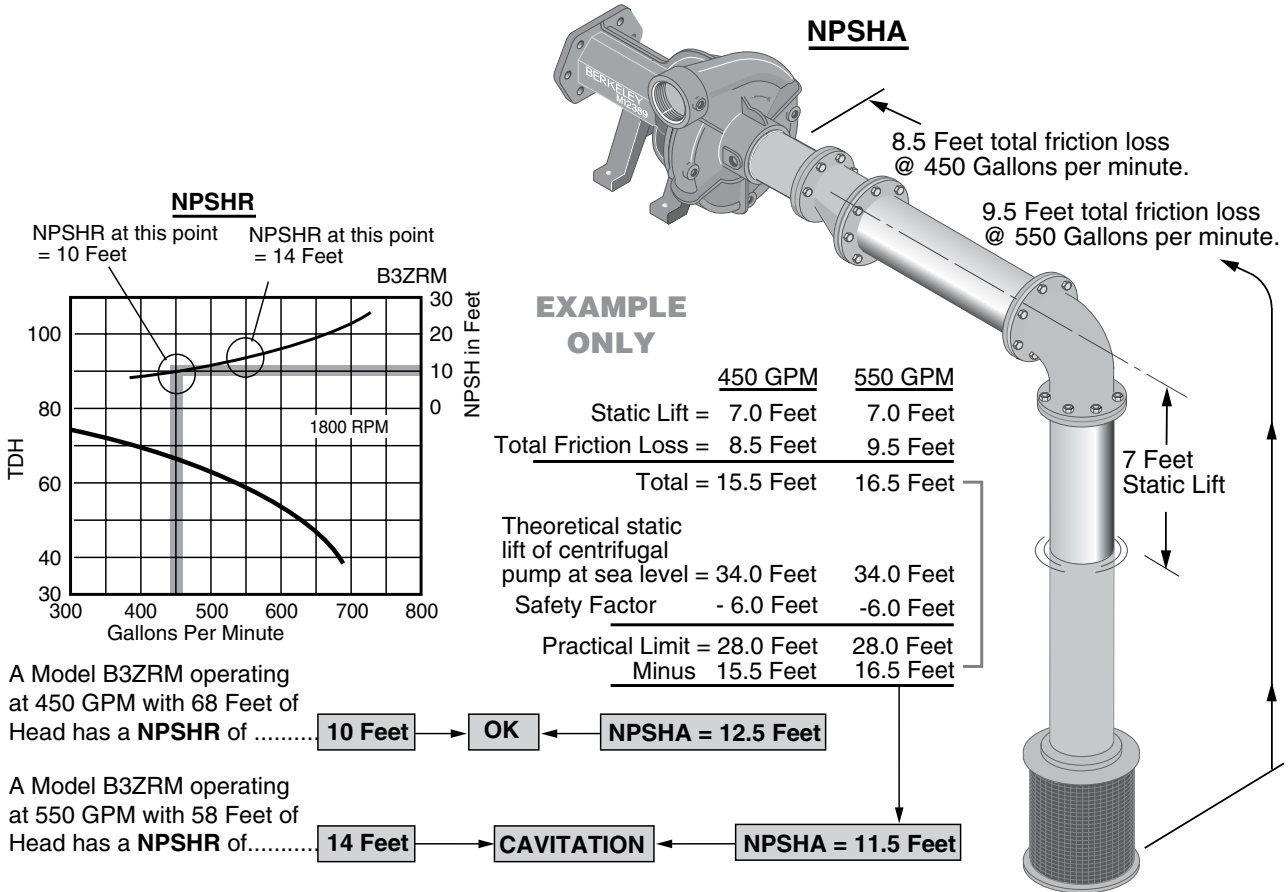
**STARTING:**

**NOTICE:** Never run pump dry. Running pump without water will overheat pump and damage internal parts. Always make sure pump is primed prior to start-up.

**NOTICE:** If pump has packing, refer to maintenance section for adjustment prior to start-up.

Prime pump. Turn on power to pump.

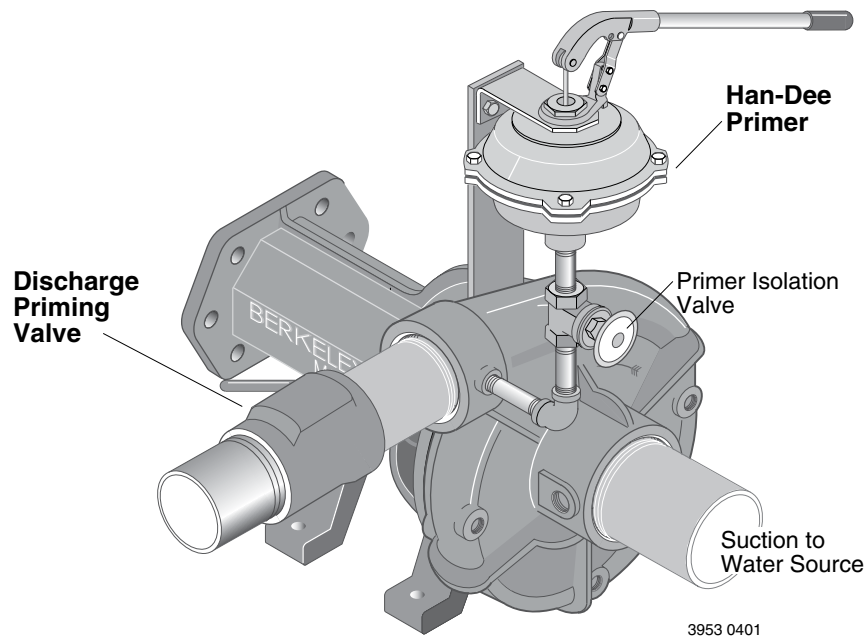
Check with motor instruction and operation manual or motor manufacturer to determine how rotation is defined, then use illustration on Page 4 for proper connection.



**FIGURE 3: Example showing how to calculate Net Positive Suction Head.**

# Start-up

## Pump Priming



### 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. This will 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.

### With Lifting Suction and Han-Dee Primer.

**NOTICE:** Pump must be primed before operation. Use engine vacuum or hand primer when water source is below pump.

- Close discharge priming 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 discharge valve (if used) until desired flow is achieved.  
(Discharge Priming Valve will open automatically).

# Maintenance

## General Information

### LUBRICATION:

LIQUID END of pump requires no lubrication. Wear rings and packing rings are lubricated by the liquid being pumped. Do not run dry!

### 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 (as high as 150°F), 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. Bearings will run hotter for a brief run-in period after packing which is normal. However, worn bearings will cause excessive temperatures and need to be replaced. The pump unit is cooled by the water flowing through it, and will normally be at the temperature of the water being pumped.

**STUFFING BOX:** After a short period of operation, verify that the stuffing box area and gland are not hot. If heating is detected, loosen the gland nuts evenly until water is just running out of stuffing box in a *DROPLET* form (approximately 40-60 drops per

minute). Water must not be streaming or spraying out. Verify cool operation periodically. Adjust gland nuts *EVENLY* as necessary for lubrication and cooling of the packing. If packing has been tightened to the limit of the packing gland travel, additional packing is necessary.

**NOTICE:** Only adjust packing gland nuts when pump is running. If the pump is stopped and you think that the packing gland needs adjusting, start the pump before adjusting the nuts.

**PACKING:** *Starting new pump.*

Before starting pump for the first time, loosen gland nuts and retighten finger tight. Proceed with pump start-up procedure. Allow packing to leak liberally for a few moments. Then, with pump running, tighten gland nuts one complete turn at a time each until leakage is reduced to 40 to 60 drops per minute.

### REPACKING:

Refer to illustration on Page 9.

### 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 it 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. Protect truck-mounted pumps from flying debris.

**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 installed to warm the unit.

# Maintenance

## General Pump Care

### ROUTINE MAINTENANCE

A well maintained pumping system will extend the life of the unit and will require fewer repairs. This means less down time which can be very critical when a constant delivery of water is required.

A routine maintenance and inspection schedule should be set up on a weekly, quarterly, and annual basis with records kept of these actions. For weekly checks see observational maintenance on Page 7. For quarterly and annual maintenance, refer to check list on the following page. Copy page as necessary for continual usage.

### RECOMMENDED SPARE PARTS

It is recommended that the following spare parts be kept on-site as a minimum back-up to service your pump and reduce down-time. Check your model/style against parts breakdown drawing on Page 12 when selecting spares.

- Packing Set and Packing Hooks
- Shaft Sleeve(s)
- Shaft Kit
- Retaining Rings

If having a pump non-operational has severe consequences, a back-up pump should be considered. Otherwise, a back-up impeller, volute case, bearings and shaft, would be prudent.

### WINTERIZING

If pump is to be out of service for an extended period of time, such as the winter months, the following storage procedures should be followed.

- Remove exterior dirt and grime or any substance that may trap moisture. Exposed metal is subject to oxidation, prime and repaint if necessary. If this is not possible, coat with grease or heavy oil.
- Flush suction and discharge lines. Check for leaks at this time and replace any worn gaskets.
- Remove lowest plug in pump and drain pump casing and suction and discharge lines.
- If possible, keep unit clean and dry during storage period to guard against corrosion.
- Seal all open ports to keep out foreign objects such as insects, rodents, dust and dirt.
- Rotate driver shaft periodically to prevent freeze-up of internal components.
- Shelter unit from elements if possible.
- Work oil into impeller wear ring by dripping oil into the gap while rotating by hand.

### SPRING START-UP

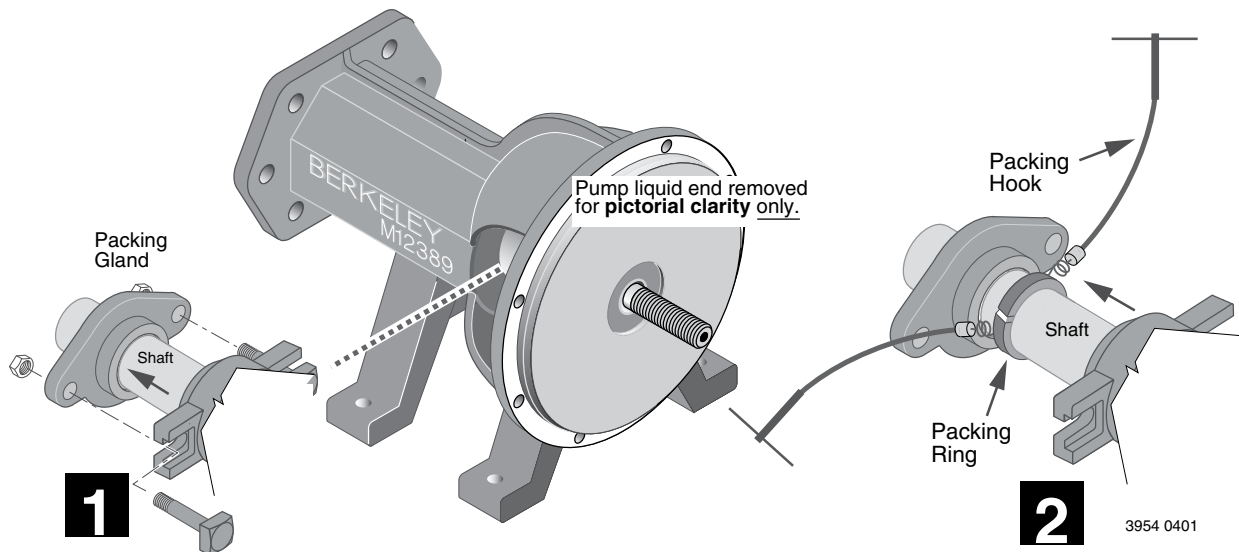
- Visual inspection.
- Rotate by hand, if any binding occurs, disassemble and inspect.



# Maintenance

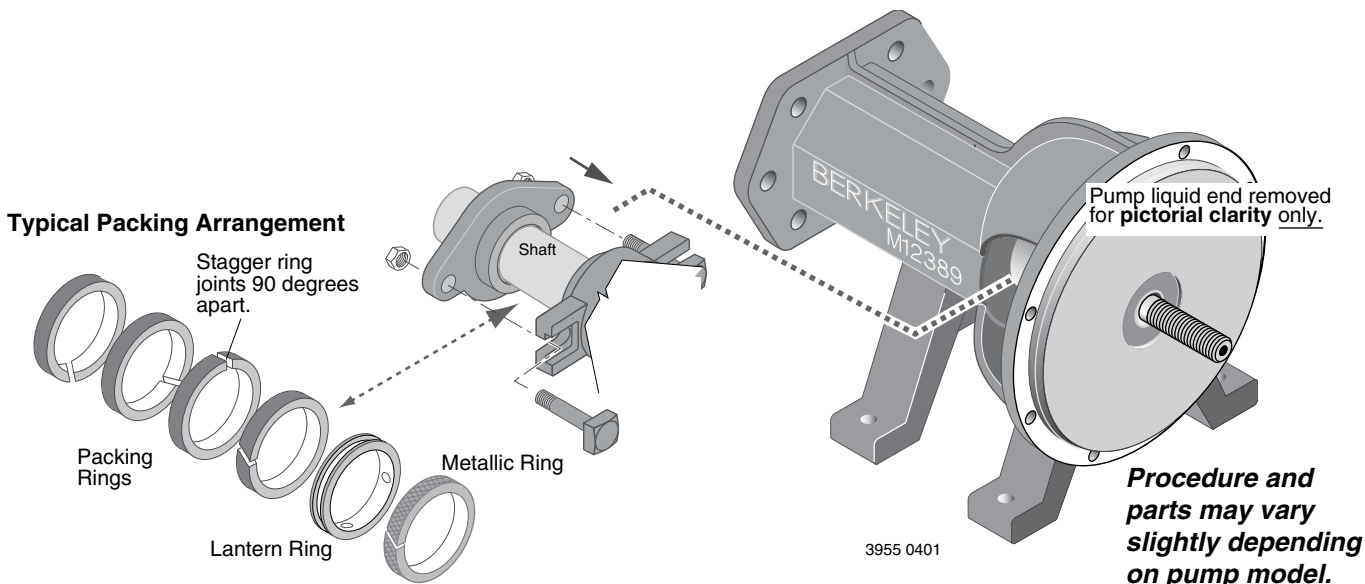
## Packing Ring Replacement

### Removal



- Unfasten hardware holding Packing Gland in place and slide back on shaft to expose packing rings. A solid Packing Gland with bolts is shown.
- Remove packing rings from Stuffing box using two commercially available Packing Hooks as shown.
- Slide Lantern Ring (if used) back to expose any remaining rings, including metallic. Remove them in the same manner.

### Installing New Rings

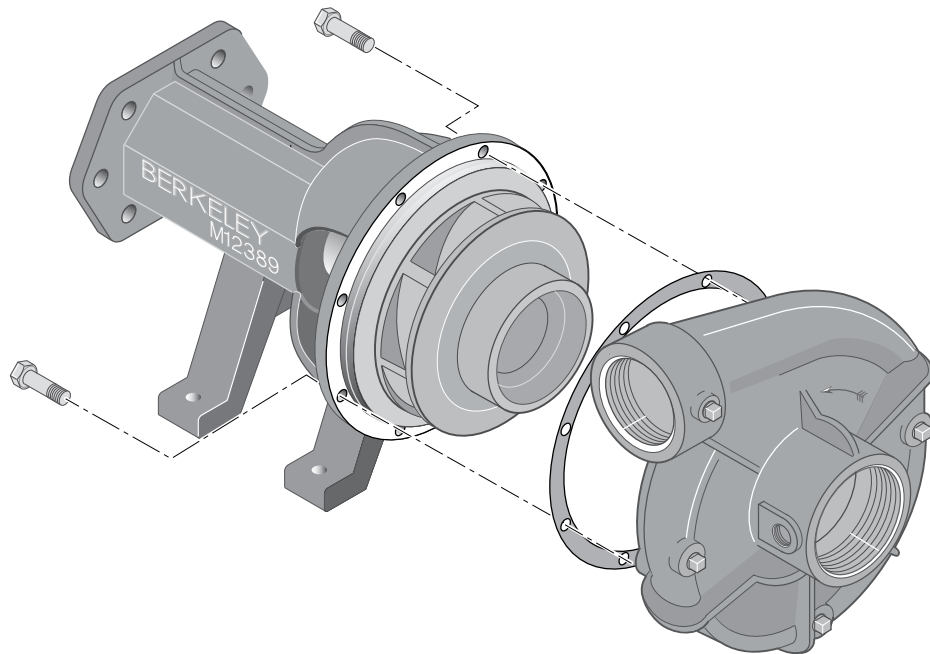


- Clean shaft sleeve and Packing Gland.
- Inspect shaft sleeve for wear, replace if needed.
- Install new packing rings in stuffing box by placing them over shaft sleeve and pushing them in as far as they will go.
- Rotate ring joint 90 degrees when installing each ring as shown.
- Slide packing gland into position, then gently and evenly tighten nuts to force rings into place and seat (do not overtighten). Loosen nuts again to hand tight.
- Start primed pump and allow packing to leak liberally.
- While pump is running, tighten gland nuts one complete turn at a time each until leakage is reduced to 40 to 60 drops per minute.

# Maintenance

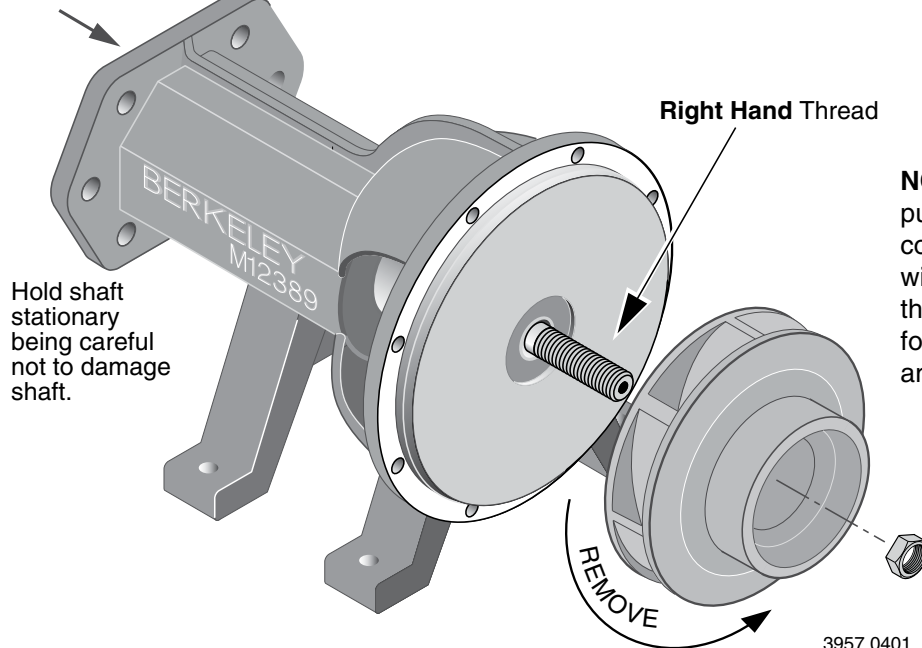
## Impeller Replacement

### Threaded Shaft



- Remove volute to expose impeller.
- Peel off old gasket or O-Ring and discard.

**Clockwise rotation** as viewed from shaft end.



Hold shaft stationary being careful not to damage shaft.

**NOTICE:** A pump that rotates counterclockwise will have a left-hand thread on the shaft for both the impeller and the locknut.

3957 0401

- Hold impeller stationary and remove impeller screw and associated hardware.
- Hold shaft stationary and remove impeller by turning the direction shown for either clockwise or counterclockwise pump rotation.

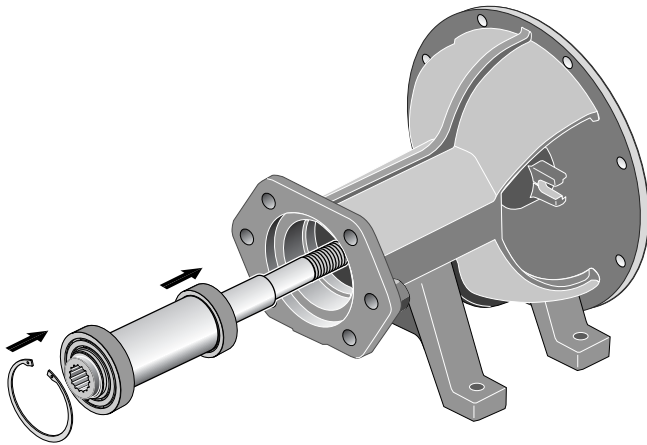
- **NOTE:** Do not use impeller vanes for leverage.
- Reverse steps for reassembly. Use a new gasket or O-Ring when reassembling to prevent leakage (a coat of grease on gasket will aid in future disassembly and maintenance).

## Maintenance

# Shaft Maintenance/Replacement

### GENERAL

- Periodically tear down the bearing frame shaft assembly to check shaft, sleeve and bearings for pitting or wear. At the same time, inspect the shaft for worn parts, and clean and re-grease it. Replace worn components as necessary. Parts may be ordered separately as required, or for some models, shaft kits are available that are completely assembled and ready for installation.



**Install shaft assembly in bracket's bearing bore. Be sure to add the bearing cap over the inner bearing. Secure shaft assembly with large C-clip.**

***Procedure and parts may vary slightly depending on pump model.***

### PUMP DISASSEMBLY

- Remove pump volute and impeller as described on Page 10.
- Remove packing gland and packing arrangement as described on Page 9.
- Remove the hydraulic motor from the bracket flange.

**⚠ WARNING Hazardous pressure when running.**

Be sure to relieve all pressure on hydraulic lines before breaking connections or removing lines.

- Remove the large C-clip from the bearing housing. Remove the bearing cap from the bracket and slide the shaft and bearing assembly out of the bracket.
- Clean and inspect all components.

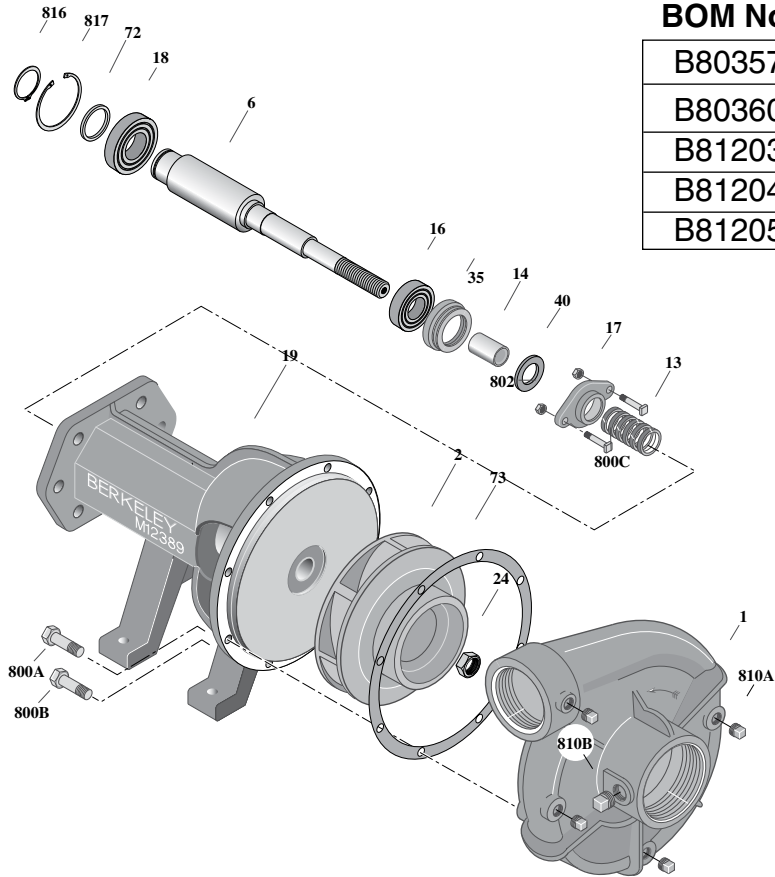
### SHAFT INSTALLATION

- Thoroughly steam clean or solvent wash the bearing cavity in the bearing bracket to remove old grease and dirt. Check surface of bracket for cracks, extreme corrosion, or other defects that may make replacement of the bracket necessary.
- Coat the bearing bores of bracket with oil. Orient shaft assembly in the direction shown above. Slide shaft and bearing assembly into bearing bracket. When threaded end of pump shaft comes through inner bearing bore, place the bearing cap, packing gland and lantern ring over the end of the shaft. Slide shaft on through stuffing box until the first bearing makes contact with the bracket. Carefully align bearing with the bearing bore and press or tap bearing assembly into place. Do not use excessive force.
- Reassemble pump parts and reinstall unit in piping system. Refer to Installation section in this manual for correct procedure.
- Reinstall hydraulic motor on bracket. Follow procedures in motor owner's manual.

# Pump Nomenclature

## B3ZRM Bearing Frame Mount

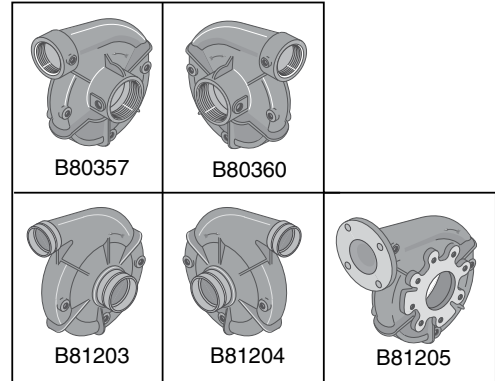
### Parts Breakdown



BOM No.	Rotation	Volute	Connection
B80357	CW	H00689	NPT
B80360	CCW	H00698	NPT
B81203	CW	H04040	Victaulic
B81204	CCW	H04041	Victaulic
B81205	CW	H05130	Flanged

### Replacement Shaft Kits

B80519	CW
B80518	CCW



Key No.	Part Description	Qty.	Part Number
1	Volute	1	See Chart
2	Impeller (Clockwise Rotation)	1	M13582
2	Impeller (Counterclockwise Rotation)	1	M13583
6	Shaft (Clockwise Rotation)	1	1000000880*
6	Shaft (Counterclockwise Rotation)	1	1000000879*
13	Packing Ring	6	S08281
14	Shaft Sleeve	1	S05127*
16	Single Row Ball Bearing - Small	1	M12395*
17	Packing Gland	1	S04948
18	Single Row Ball Bearing - Large	1	M12394*
19	Bracket	1	M12389
24	Impeller Nut (Clockwise Rotation)	1	M10220
24	Impeller Nut (Counterclockwise Rotation – LH Thread)	1	U36-189SS
35	Inner Bearing Cap	1	S19033
40	Slinger	1	S12260
72	Washer	1	M12392*
73	Volute Gasket	1	S05126
800A	3/8-16x7/8" Lg. Hex Hd. Capscrew	6	S26825
800B	3/8-16x1-1/8" Lg. Hex Hd. Capscrew	2	S26827
800C	3/8-16 Sq. Hd. Machine Bolt	2	S23761
802	3/8-16 BRS Hex Nut	2	S23343
810A	1/4" NPT Sq. Hd. Pipe Plug	4	S23715
810B	1/2" NPT Sq. Hd. Pipe Plug	1	S23717
816	Bearing Retaining Ring	1	M12486*
817	Shaft Retaining Ring	1	M12487*

\* Items included in the Shaft Replacement Kit.

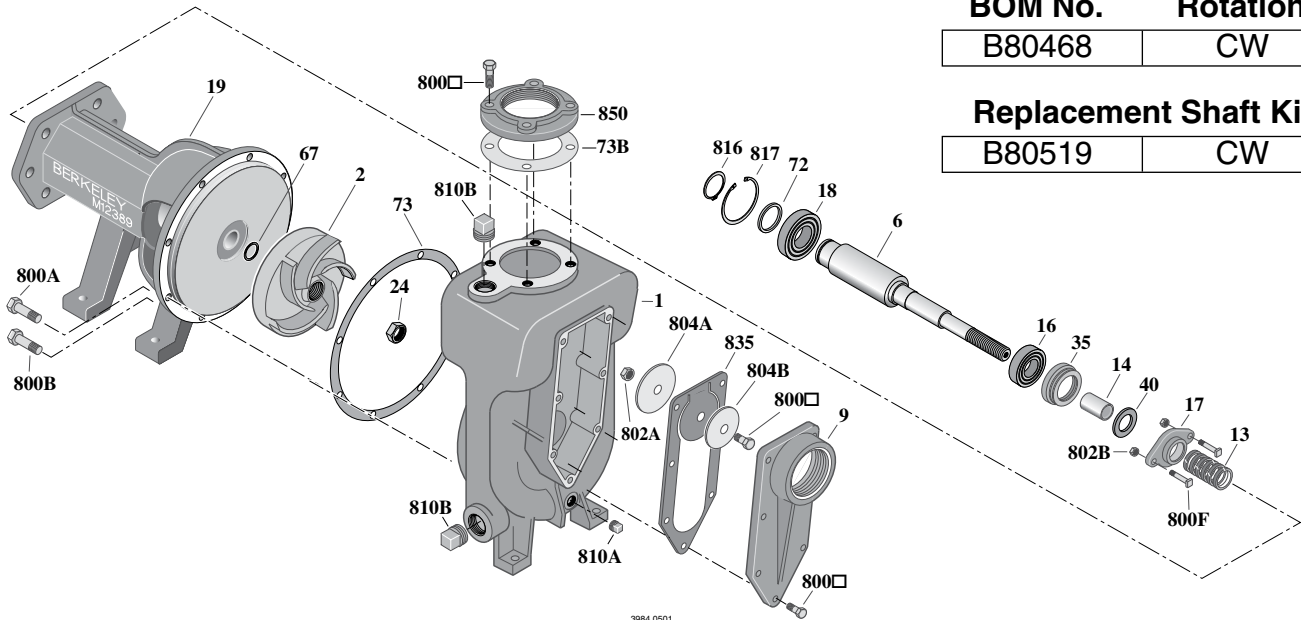
# Pump Nomenclature

## B4ZRK Bearing Frame Mount

### Parts Breakdown

<b>BOM No.</b>	<b>Rotation</b>
B80468	CW

<b>Replacement Shaft Kit</b>	
B80519	CW



Key No.	Part Description	Qty.	Part Number
1	Volute	1	H02505
2	Impeller	1	M13584
•	Impeller Spacer	1	S15405
6	Shaft (Clockwise Rotation)	1	1000000880*
9	Suction Cover	1	L04108
13	Packing Ring	6	S08281
14	Shaft Sleeve	1	S05127*
16	Single Row Ball Bearing - Small	1	M12395*
17	Packing Gland	1	S04948
18	Single Row Ball Bearing - Large	1	M12394*
19	Bracket	1	M12389
24	Impeller Nut (Clockwise Rotation)	1	M10220
35	Inner Bearing Cap	1	S19033
40	Slinger	1	S12260
72	Washer	1	M12392*
73A	Volute Gasket	1	S05126
73B	Blind Gasket	1	S10364
800A	3/8-16 x 1" Lg. Hex Hd. Capscrew	6	S26826
800B	3/8-16 x 1-1/8" Capscrew	2	S26827
800C	3/8-16 x 3/4" Capscrew	1	S26824
800D	5/8-11 x 1-3/4" Capscrew	4	S27001
800E	3/8-16 x 1-1/4" Lg. Hex Hd. Capscrew	7	S26828
800F	3/8-16 X 2-1/2" Sq. Hd. Machine Bolt	2	S23762
802A	3/8-16 Hex Nut, SS	1	S23103
802B	3/8-16 BRS Hex Nut	2	S23343
804A	Clack Weight	1	S14842
804B	Clack Weight	1	S15325
810A	1/2" NPT Sq. Hd. Pipe Plug	1	S23717
810B	1-1/2" MPT Sq. Hd Pipe Plug	2	S23695
816	Bearing Retaining Ring	1	M12486*
817	Shaft Retaining Ring	1	M12487*
835	Rubber Clack	1	L04119
850	Companion Flange	1	S15933

• Not Illustrated.

\* Items included in the Shaft Replacement Kit.

# Maintenance

## Troubleshooting

### Engine Drive Pumps

SYMPTOM	PROBABLE CAUSE														
	GROUP I ENGINE				GROUP II MECHANICAL						GROUP III SYSTEM				
	A	B	C	D	A	B	C	D	E	F	A	B	C		
Pump runs, but no water delivered	X	X			X		X				X	X			
Not enough water delivered	X	X			X	X		X			X	X			
Not enough pressure	X	X			X	X		X			X	X			
Excessive vibration			X	X	X	X			X			X	X		
Abnormal noise			X	X	X	X	X		X	X		X	X		
Pump stops		X		X											
Overheating		X	X	X		X		X	X	X			X		

CAUSE	CORRECTIVE ACTION
<b>I. ENGINE</b>	
A. Speed too low	Refer to engine manufacturer's manual.
B. Rotating and/or reciprocating parts drag	Refer to engine manufacturer's manual.
C. Speed too high	Refer to pump and engine power curves. Adjust.
D. Loose or broken parts	Refer to engine manufacturer's manual.
<b>II. MECHANICAL</b>	
A. Flow through pump completely or partially obstructed	Locate and remove obstruction. Refer to Repair Instructions for disassembly.
B. Wrong direction of rotation	Reverse rotation of three phase motor by interchanging any two leads. See manufacturer's Instructions for reversing single phase motor.
C. Pump not primed	Reprime. Inspect suction system for air leaks.
D. Internal leakage	Check impeller for wear of controlled clearances (See Repair Instructions).
E. Loose parts	Inspect. Repair.
F. Stuffing box not properly adjusted	Adjust gland.
<b>III. SYSTEM</b>	
A. Pressure required by system at design flow rate exceeds pressure rating of pump	Compare pump pressure and flow rate against pump characteristic curve. Check for closed or partially closed valve in discharge piping system. Reduce system pressure requirement. Increase pressure capability of pump.
B. Obstruction in suction piping	Locate and remove obstruction.
C. Pressure rating of pump exceeds pressure requirement of system at design flow rate	Compare pump pressure and flow rate against pump characteristic curve. Inspect discharge piping system for breaks, leaks, open by-pass valves, etc. If necessary, reduce flow rate by partially closing discharge valve.

# Berkeley Warranty

## Limited Warranty

BERKELEY warrants to the original consumer purchaser ("Purchaser" or "You") of the products listed below, that they will be free from defects in material and workmanship for the Warranty Period shown below.

Product	Warranty Period
<b>Water Systems:</b>	
Water Systems Products — jet pumps, small centrifugal pumps, submersible pumps and related accessories	whichever occurs first: 12 months from date of original installation, or 18 months from date of manufacture
Pro-Source™ Composite Tanks	5 years from date of original installation
Pro-Source™ Steel Pressure Tanks	5 years from date of original installation
Pro-Source™ Epoxy-Lined Tanks	3 years from date of original installation
Sump/Sewage/Effluent Products	12 months from date of original installation, or 18 months from date of manufacture
<b>Agricultural/Commercial:</b>	
Centrifugals – close-coupled motor drive, frame mount, SAE mount, engine drive, VMS, SSCX, SSHM, solids handling, submersible solids handling	12 months from date of original installation, or 24 months from date of manufacture
Submersible Turbines, 6" diameter and larger	12 months from date of original installation, or 24 months from date of manufacture

Our limited warranty will not apply to any product that, in our sole judgement, has been subject to negligence, misapplication, improper installation, or improper maintenance. Without limiting the foregoing, operating a three phase motor with single phase power through a phase converter will void the warranty. Note also that three phase motors must be protected by three-leg, ambient compensated, extra-quick trip overload relays of the recommended size or the warranty is void.

Your only remedy, and BERKELEY's only duty, is that BERKELEY repair or replace defective products (at BERKELEY's choice). You must pay all labor and shipping charges associated with this warranty and must request warranty service through the installing dealer as soon as a problem is discovered. No request for service will be accepted if received after the Warranty Period has expired. This warranty is not transferable.

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

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

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on the duration of an implied warranty, 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.

This Limited Warranty is effective June 1, 2011 and replaces all undated warranties and warranties dated before June 1, 2011.

**In the U.S.: BERKELEY, 293 Wright St., Delavan, WI 53115  
In Canada: 269 Trillium Dr., Kitchener, Ontario N2G 4W5**

