

Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Self-Priming Engine-Driven Centrifugal Pumps

Description

These centrifugal pumps include a precision mechanical seal with stainless steel spring, EPDM seals, carbon face and ceramic seat, and a built-in check valve for better self-priming capabilities (up to 20 ft. suction lift). Clog resistant impeller is capable of handling solids up to 7/16" diameter. Pumps include molded carrying handle, rubber foot pads, and two 2" NPT pipe nipples. Handle liquids from 40° to 130° F (4° to 54° C). For use with nonflammable, non-abrasive liquids compatible with pump component materials.

Applications include pumping clear, clean water, salt water, and some liquid fertilizers and herbicides. An optional Buna N Seal/O-ring/Flapper Kit (see Repair Parts List) is available for pumping additional liquids. If the liquid is not compatible with Buna-N (optional) or EPDM (standard) rubber materials, do not use these pumps.

Specifications

Suction inlet 2" †
 Discharge outlet 2" †
 (†) Standard NPT (female) pipe thread.

Dimensions (overall)
 020598 13" H x 15" W x 18" L
 020599 18¾" L x 17¾" W x 15¼" H

Engine
 020598 3.5 HP B&S
 020599 5.5 HP B&S OHV Intek

Oil type SAE 30W Detergent

Weight
 020598 38 lbs.
 020599 43 lbs.

Material Glass-filled polypropylene

stand. This information is provided for SAFETY and to PREVENT EQUIPMENT PROBLEMS. To help recognize this information, observe the following symbols:

⚠ DANGER *Danger indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.*

⚠ WARNING *Warning indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.*

⚠ CAUTION *Caution indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.*

NOTE: *Indicates important information that, if not followed, may cause damage to equipment.*

Unpacking

After unpacking the unit, inspect carefully for any damage that may have occurred during transit. Make sure to tighten fittings, bolts, etc., before putting unit into service.

Safety Guidelines

⚠ DANGER *Failure to follow any warnings/ cautions can result in personal injury, pump damage, and/or property damage.*

This manual contains information that is very important to know and under-

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Unpacking (continued)

⚠ CAUTION *Do not operate unit if damaged during shipping, handling or use. Damage may cause injury or property damage.*

General Safety Information

1. Know the pump application, limitations, and potential hazards. Read all manuals included with this product carefully. Be thoroughly familiar with the pump and the proper use of the equipment.

⚠ DANGER *Do not use to pump flammable or explosive fluids such as gasoline, fuel oil, kerosene, etc. Do not use in flammable and/or explosive atmospheres. Pump should only be used with liquids compatible with pump component materials. Failure to follow this warning can result in death, serious personal injury and/or property damage.*

2. Make certain that the power source (gas engine) conforms to the requirements of your equipment.
3. Provide adequate protection and guarding around moving parts.
4. Release all pressure within the system before servicing any component.
5. Drain all liquids from the system before servicing.
6. Secure the discharge line before starting the pump. An unsecured discharge line will whip, possibly causing personal injury and/or property damage.
7. Check hoses for weak or worn condition before each use, making certain that all connections are secure.
8. Periodically inspect pump and system components. Perform routine maintenance as required (See Maintenance section).

9. Provide a means of pressure relief for pumps whose discharge line can be shut-off or obstructed.

10. Personal Safety:

- a. Wear safety glasses at all times when working with pumps.
 - b. Wear a face shield and proper apparel when pumping hazardous chemicals.
 - c. Keep work area clean, uncluttered and properly lighted; replace all unused tools and equipment.
 - d. Keep visitors at a safe distance from the work area.
 - e. Make workshop child-proof – with padlocks, master switches, and by removing starter keys.
11. Carefully read instruction manuals supplied by engine manufacturer before attempting to assemble, operate, or service the engine or any part. The WARNING statements indicate potentially hazardous conditions for operator or equipment. TAKE NECESSARY STEPS TO PROTECT PERSONNEL AND EQUIPMENT.

⚠ WARNING *Gasoline is a highly combustible fuel. The improper use, handling, or storage of gasoline can be dangerous. Prevent accidents by following these safety rules:*

- a. Use gasoline only as fuel, never as a cleaning fluid.
- b. Use only an approved container to hold or store gasoline. Never store gasoline in familiar containers such as milk containers or soda pop bottles.
- c. Store gasoline in a cool location, out of reach of children. Never store gasoline near heat or an open flame.
- d. Add gasoline to a cool engine only.

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General Safety (continued)

Spilled gasoline on a hot engine may cause fire or an explosion. Fill gasoline tank out-of-doors and wipe up any spills.

- e. Provide a fire extinguisher nearby when working with gasoline. Be sure extinguisher is in operating condition – check the pressure gauge or indicator. Be familiar with its proper use. Consult local fire department for the correct type of extinguisher for your application. Extinguishers rated ABC by the National Fire Protection Association are appropriate for most applications.

IMPORTANT: Positively no smoking!

- 12. DO NOT RUN THE ENGINE IN AN ENCLOSED AREA!! Exhaust fumes contain carbon monoxide which is an odorless and poisonous gas. If equipment is located in an enclosed area, use an exhaust line to the outside and regularly check the exhaust system for leaks. Be sure the area is well ventilated.
- 13. Check engine oil and fuel levels before initial start up each day. Stay away from moving parts. Avoid wearing loose jackets, shirts, and ties. Make sure all nuts and bolts are secure. Keep power shields and guards in place. If adjustments must be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.
- 14. Do not operate this equipment when mentally or physically fatigued.

▲ CAUTION *Be careful not to touch the exterior of the engine, especially the muffler and the surrounding area. The engine is hot enough to be painful or cause injury!*

- 15. Prevent accidental starting by always removing spark plug or by disconnecting and grounding spark plug wire before working on engine or the equipment driven by engine.
- 16. Familiarize yourself with all controls. Learn how to stop an engine quickly in an emergency.
- 17. Keep the equipment and surrounding area clean. Remove all oil deposits from equipment and surrounding area. Accumulations of grease and oil may present a fire hazard and can cause engine damage. Cleaning rags and other flammable waste materials must be stored in approved metal containers.
- 18. All visitors should be kept at a safe distance from the working area. Keep children away from power equipment. Keep work area clean. Cluttered areas invite accidents.
- 19. When shutting off a gasoline engine, be sure it is completely stopped before leaving the work area.

Installation

IMPORTANT: For installations where property damage might result from an inoperative or leaking pump due to power outages, discharge line blockage or any other reason, a back-up system(s) and/or warning system(s) should be used.

- 1. Locate pump as close to the fluid source as possible, making the suction line as short and direct as possible.

▲ CAUTION *The unit should be placed where the pump/engine is protected from the weather and extremes of heat, cold and humidity.*

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Installation (continued)

2. Mount the unit on a solid foundation. On fixed installation, install both a union and a gate valve (not furnished) on the discharge side of the pump for service convenience.

▲ CAUTION *Do not use a globe or other restricting type of valve at the discharge, as this would seriously restrict the capacity of the pump.*

3. Attach suction line piping to the suction inlet and discharge line piping to the discharge outlet. The suction line should be positioned such that there is a continual upward slope from the fluid source to the pump. Avoid using loops or sections of pipe or fittings which might permit air to become trapped.

IMPORTANT: If plastic or fabric hose is used for the suction piping, it should be of a reinforced type so as not to collapse under suction. The discharge piping should be at least the same size as the discharge connection. Suction piping should be the same size as the discharge piping or one size larger. Unless long horizontal runs are involved, discharge piping should not be larger than suction piping. Avoid using looped sections of pipe which might permit air to become entrapped. Assure air-tight pipe connections with the use of a pipe joint sealant.

4. A foot-valve may be used on the suction line to assist in faster pumping. The foot-valve should be installed when the suction lift is over 10 feet or when the suction line is over 10 feet long.
5. A suitable suction strainer should be attached to the suction line so that large pieces of foreign material are not drawn into the pump. The maximum opening in the suction strainer

should not be greater than 25% of the suction inlet size for solid handling pumps and 50% of the suction inlet size for trash pumps.

Operation

1. Fill the engine crankcase with oil as specified in the engine manual. If the engine has no dipstick, then fill the crankcase with oil until the oil overflows (starts spilling out of the crankcase). Periodically check oil level thereafter.
2. Fill the gasoline tank as required. Refer to engine instruction booklet.

▲ WARNING *Never add gasoline to a hot engine!*
See General Safety Information for proper handling of gasoline.

3. Fill the pump with liquid through the pump discharge or the priming port supplied with these units. It may be convenient to screw in a service tee or a tee with a nipple into the discharge, so that the pump can be filled (using the upper leg of the tee) without disconnecting the discharge hose or pipe. The vertical leg must be closed with a pipe plug during pumping. Remember, the pump is self-priming only when the pump casing has been filled. The pump should prime and re-prime without refilling. Refilling is necessary occasionally if an unusual siphoning has occurred, if the fluid has been lost by evaporation, and when the unit is moved to a new location.

▲ CAUTION *Do not run pump dry, as permanent damage to the mechanical seal will result.*

4. Start the engine, following instructions in the engine manual.
5. With a suction lift of 5 to 10 feet, the pump should discharge liquid within

Models 020598 and 020599

Operation (continued)

one or two minutes. A suction lift of 20 feet can take 5 minutes running time to pick up a prime. If pumping does not start within this time, shut off the engine, let unit cool down about 5 minutes, refill pump casing and retry. If engine does not start, refer to Engine Manual. If pump does not prime after 2 tries, refer to "Troubleshooting Chart" in this manual.

6. Properly fueled and lubricated, the pump/engine unit will run automatically without attention to the controls. The gasoline engine has a built-in governor and will adjust the speed of the engine automatically depending on the volume of water being delivered.

⚠ WARNING *Even though this unit will operate with minimal supervision, it should not be left operating by itself. Depending on the application and area unit is operating (high traffic, people in area, etc.) will dictate the necessity of having someone watching over the unit.*

Maintenance

⚠ WARNING *To prevent accidental starting always remove spark plug, or disconnect and ground spark plug wire before attempting to service or remove any component.*

1. If the pump is located in an area subject to freezing temperature, the pump should be drained when not in operation. Also, the pump should be

flushed after each use.

2. Clean the suction line strainer at regular intervals.
3. If the gas engine is equipped with a spark arrestor screen in the muffler, it should be inspected for wear periodically, and replaced when necessary.

NOTE: For information pertaining to the engine and engine parts, consult the Engine Manual or contact the nearest authorized service representative or the manufacturer.

4. Periodically check nuts and bolts on engine, mounting frame and pump. Since this is a gas engine pump, vibration levels tend to loosen nuts and bolts faster than normal. Use Loctite (thread sealant) on threads or lockwashers if necessary.

MECHANICAL SEAL REPLACEMENT

Refer to Figures 1, 2, and 3.

IMPORTANT: Replace seal seat, (Ref. No. 22) and seal head (Ref. No. 23) at the same time to ensure proper mating of mechanical seal components!

1. Unthread fasteners (Ref. No. 16), nuts (Ref. No. 25) and remove casing (Ref. No. 15) and casing seal (Ref. No. 7) from adapter (Ref. No. 3). Unthread fasteners (Ref. Nos. 11 and 19) and remove volute (Ref. No. 20) and volute seal (Ref. No. 6) from adapter.
2. Unthread impeller fastener (Ref. No. 10) and remove impeller (Ref. No. 9), impeller seal (Ref. No. 4) and shims (Ref. No. 21).

Performance Chart

Model	GPH of Water at Total Head in Feet									Max. Head*
	10'	20'	30'	40'	50'	60'	70'	80'	90'	
020598	8460	7680	6840	6000	5100	4140	3180	2100	840	94 ft.
020599	8460	7920	7440	6960	6360	5760	5040	4200	3360	125

(*) Shut-off; to convert to psi, divide by 2.31

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Maintenance (continued)

NOTE: To keep shaft from turning, hold impeller while unthreading impeller fastener.

3. Pry seal seat from impeller recess with a screwdriver (See Figure 1).

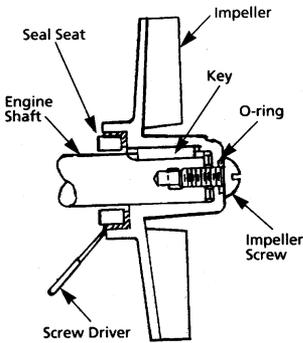


Figure 1 – Mechanical Seal Replacement

4. Remove adapter by unthreading adapter fasteners (Ref. No. 5) and fastener seals (Ref. No. 4). Press old seal head and adapter seal (Ref. No. 24) out of adapter by pushing from engine side.
5. Clean adapter and impeller seal recesses before installing new pieces.
6. Carefully wipe polished surface of new seal seat with a clean cloth.
7. Wet rubber portion of seal seat with a light coating of soapy water.
8. Press seal seat squarely into recess in impeller. If seal seat does not press squarely into recess, it can be adjusted by pushing on it with a piece of pipe. Always use a piece of cardboard between pipe and seal seat to avoid scratching lapped, highly polished surface of seal seat (handle it carefully).

9. After seal seat is in place, ensure that it is clean and has not been marred.
10. Using a clean cloth, wipe shaft and make certain that it is completely clean.
11. Place adapter seal (o-ring) onto seal head behind flange and press assembly into adapter as shown in Figure 2.

CAUTION Do not touch or wipe polished face of seal head.

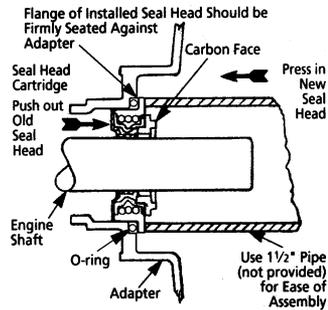


Figure 2 – Mechanical Seal Replacement

12. Secure adapter on engine mounting face, using fasteners and fastener seals. Be sure to replace gasket (Ref. No. 31) between engine and adapter, if removed during disassembly.

CAUTION Tighten adapter fasteners evenly to avoid cocking or damaging adapter.

13. Replace impeller and shims, ensuring that key (Ref. No. 8) is in place and lock impeller to shaft with fastener and impeller seal on fastener.
14. Replace volute seal and volute with fasteners, ensure that check valve (Ref. No. 12) is in place then remount casing seal and pump casing with fasteners and nuts.

Models 020598 and 020599

Maintenance (continued)

IMPORTANT: Always inspect all seals when unit is disassembled. Replace when rubber is hard, cracked, or worn. When reassembling parts with o-ring seals or gaskets, it is sometimes helpful to apply a small amount of soapy water on o-ring so that parts slide over o-ring without pinching or shaving it.

SHIM ADJUSTMENT

When installing a replacement impeller or mechanical seal, it may be necessary to vary the number of shims (Ref. No. 21) that will be required. This is easily done by adding one 0.010" shim more than was removed, and reassembling pump as described.

Ensure that casing is snugly in place and check shaft to make sure it is turning freely. If it turns freely, check to ensure that adapter (Ref. No. 3) and casing (Ref. No. 15) are fitted tight together. If they are not, tighten fasteners (Ref. No. 16) and recheck shaft for free turning. Tighten carefully, turning shaft while tightening. If shaft seizes before fasteners (Ref. No. 16) are completely tight, disassemble pump and remove one shim and repeat reassembly.

If any time during above operation shaft does not turn free, follow procedure indicated above and repeat procedure.

Above procedure ensures that pump will have proper running clearance (less than 0.010") between impeller and casing and perform like a new unit with new impeller or motor.

Troubleshooting Chart

Symptom	Possible Cause(s)	Corrective Action
Little or no discharge and unit will not prime	1. Casing not filled with water	1. Fill pump casing. Using a foot-valve will extend pump life and facilitate immediate priming.
	2. Total head too high.	2. Shorten suction lift and/or discharge head
	3. Suction head exceeds that for which pump is designed	3. Shorten suction line and/or vertical distance from liquid to pump, install foot-valve and prime
	4. Impeller partially or completely plugged	4. Disassemble pump and clean out impeller
	5. Hole or air leak in suction line	5. Repair or replace suction line
	6. Foot-valve too small	6. Match foot-valve to piping or install one size larger foot-valve
	7. Impeller damaged	7. Disassemble pump and replace impeller
	8. Foot-valve or suction line not submerged deep enough in water, pulling air	8. Submerge lower in water
	9. Insufficient inlet pressure or suction head	9. Increase outlet pressure by adding more water to tank or increasing back pressure by turning gate-valve on discharge line to partially closed position
	10. Suction piping too small	10. Increase pipe size to pump inlet size or larger
	11. Casing gasket leaking	11. Replace
	12. Suction or discharge line valves closed	12. Open
Loss of suction after satisfactory operation	1. Air leak in suction line	1. Repair or replace suction line
	2. When unit was last turned off, water syphoned out of pump casing	2. Refill (reprime) pump casing before restarting
	3. Suction head exceeds that for which pump was designed	3. Shorten suction line and/or vertical distance from liquid to pump, install foot-valve and prime

Troubleshooting Chart (continued)

Symptom	Possible Cause(s)	Corrective Action
Loss of suction after satisfactory operation (continued)	4. Insufficient inlet pressure or suction head	4. Increase inlet pressure by adding more water to tank or increasing back pressure by turning gate valve on discharge line to partially closed position
	5. Clogged foot-valve, strainer or pump	5. Unclog, clean or replace as necessary
Pump overloads driver (gas engine shuts off before complete hose fill)	1. Total head lower than pump rating. Unit delivering too much water	1. Increase back pressure on pump by turning gate valve on discharge line to partially closed position that will not overload motor
	2. Specific gravity and viscosity of liquid being pumped different than the pump rating	2. Pump is designed for water, use only for liquids which have similar characteristics.
	3. Speed too high	3. Check and correct, lower speed
Pump vibrates and/or makes excessive noise	1. Mounting plate or foundation not rigid enough	1. Reinforce
	2. Foreign matter in pump causing unbalance	2. Disassemble pump and remove
	3. Impeller bent	3. Replace impeller
	4. Cavitation present	4. Check suction line for proper size and check valve in suction line if completely open, remove any sharp bends before pump and shorten suction line
Pump runs but no fluid	1. Faulty suction piping (air leak)	1. Replace
	2. Pump located too far from fluid source	2. Relocate
	3. Gate valve closed	3. Open
	4. Clogged strainer	4. Clean or replace
	5. Fouled foot-valve	5. Clean or replace
	6. Discharge height too great	6. Lower the height

Troubleshooting Chart (continued)

Symptom	Possible Cause(s)	Corrective Action
Pump Leaks at shaft	Worn mechanical seal	Replace
Engine will not start or run (or when you pull rope to start, it will not move)	<ol style="list-style-type: none">1. Stone or foreign object lodged in impeller2. No oil in crank case	<ol style="list-style-type: none">1. Disassemble pump and remove stone or foreign object2. Fill oil to overflowing, or check dipstick. See engine manual

For Repair Parts, contact dealer where pump was purchased.

Please provide following information:

- Model number
- Serial number (if any)
- Part description and number as shown in parts list

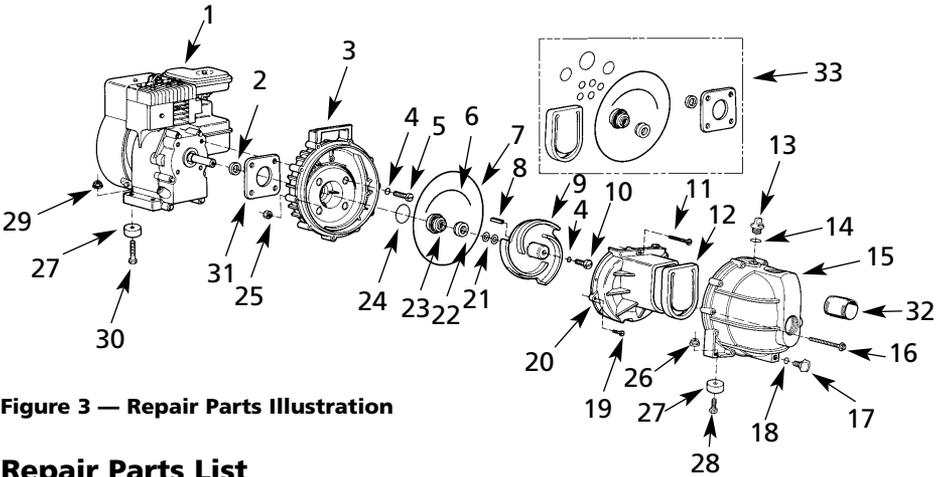


Figure 3 — Repair Parts Illustration

Repair Parts List

Ref. No.	Description	3/4HP B&S 020598	5/4HP B&S 020599	Qty.
2	Slinger washer -EPDM	020631	020631	1
3	Adapter	020632	020632	1
5	Adapter fastener	020633	020633	4
8	Key	020634	020634	1
9	Impeller	020635	020636	1
10	Impeller fastener	020637	020637	1
11	Volute fastener	020638	020638	1
13	Fill plug	020639	020639	1
15	Casing	020640	020640	1
17	Drain plug	020641	020641	1
19	Volute fastener	020642	020642	2
20	Volute	020643	020643	1
21	Impeller shim set (.005", .015", .030"; one each)	020644	020644	1
31	Gasket	020645	020645	1
33	† Seal kit -EPDM (standard)	020646	020646	

(*) Standard hardware item, available locally.

(†) Includes all required seals, Ref. Nos. 2, 4, 6, 7, 12, 14, 18, 22, 23, 24, 31.

