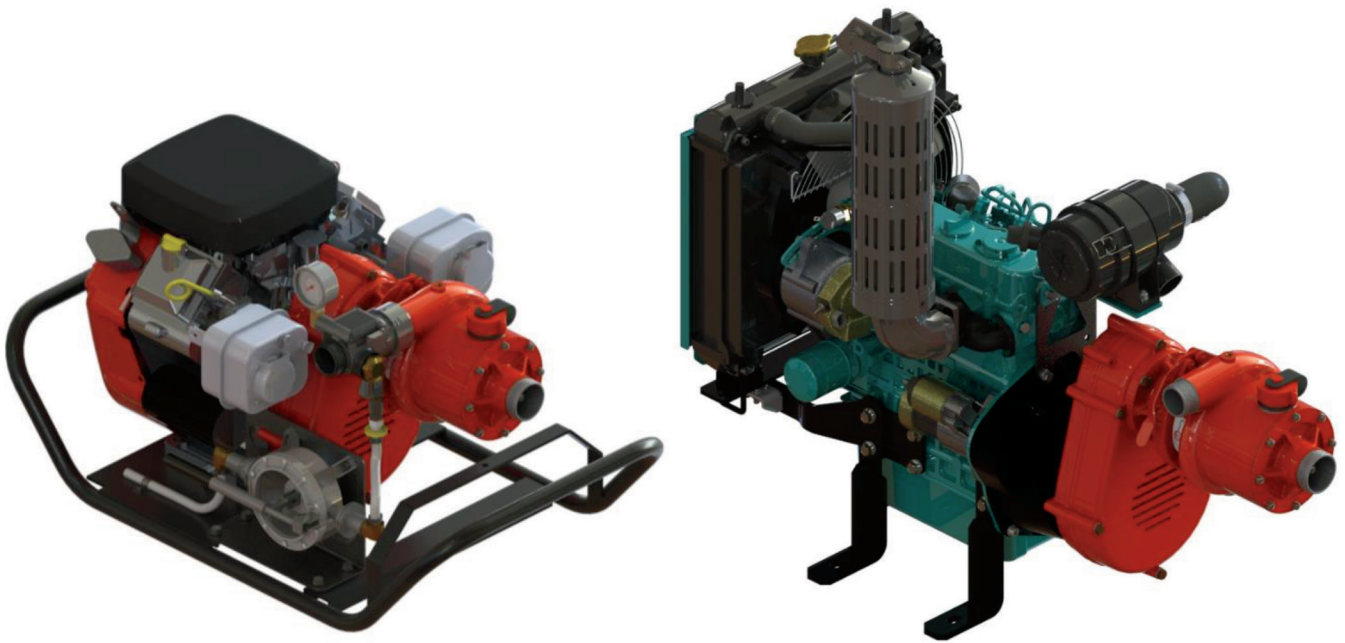


# **WATERAX**



## **BB-4<sup>®</sup>**

# **Owner's Manual**

Publication Date : 04/2015  
Publication Number: 701225, Rev. 2



**WE MOVE  
WATER**

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***WE MOVE  
WATER***

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# Important Safety Instructions

It is recommended that all information provided in this manual be carefully read and understood before performing any operation of or maintenance to the pump.

The procedures listed in this manual are general operating and maintenance procedures. They should be taken in addition to any procedures, policies and guidelines established by the authority having jurisdiction or the apparatus manufacturer. Where conflicts arise, all parties (authority having jurisdiction, the apparatus manufacturer, and *WATERAX Inc.*) will need to be contacted to determine the best resolution. The solution will need to address the safety of the operator along with the proper performance and life expectancy of the unit.

## Personal Safety Advisory

**READ YOUR ENGINE MANUAL FIRST!**

Before proceeding further, locate and read the engine manufacturer's manual. It contains very important safety information that **MUST** be read, understood and followed to safeguard you and your equipment from harm, as well as specific information on the proper use and care of your engine.

**READ THIS MANUAL BEFORE OPERATING YOUR PUMP!**

The improper use of the *WATERAX* pump could result in serious injuries as well as damage to the pump. Any operator should familiarize himself with the apparatus and its capabilities before trying to operate the equipment in an emergency situation. Please read this entire manual before using your *WATERAX* pump and follow all Personal Safety Advisories.

## Warnings



- Always wear eye and ear protection when operating the pump unit.
- Do not operate if mentally or physically fatigued.
- Always inspect hoses and piping to avoid burst injuries.
- Use only pipe, hose, and fittings that are rated at or above the maximum pressure rating of the pump shown below, or according to what maximum pressure the system was designed for, whichever is lower.
  - Maximum Allowable Pressure: 600 PSI (41 bar)
  - Maximum Allow Pump Intake Pressure: 150 PSI (10 bar)
- No modifications and/or alterations may be made to the pump. Any such modifications not only void the pump warranty but can make the unit dangerous to anyone operating the pump.
- Do not operate the pump higher than the maximum rated pressure. Always run the unit at the lowest pressure required for the application to enhance operator and equipment safety.
- Slowly close valves and use slow close valves wherever possible to prevent danger to other line operators and to prevent water hammer which could damage the pump and its piping components.
- Relieve all system pressure before doing any service work on the pump.
- Never run the pump in a closed or confined area. Exhaust gas contains carbon monoxide which is poisonous to humans. Avoid inhalation of exhaust gas.
- Refuel engine with care. Gasoline and diesel are flammable, and gasoline vapor can explode. Refuel in a well-ventilated area, with the engine stopped.
- Be alert and never touch any part of the engine exhaust system (muffler, shield, header pipes, etc.) while the engine is running. Always allow enough time, after stopping the unit, for proper cooling of the muffler and surrounding parts.

- Do not ground the battery (if applicable) through the pump's frame members; always ground to a bare metal (unpainted) part of the engine block to ensure proper ground.

## Preventing Damage to Equipment

The following recommendations will help avoid damage to your equipment:

- Flush the pump with fresh water if the pump has been used to pump salty, brackish, high mineral content water, water containing debris, or foam injected water. Check that debris is cleared before using pump again.
- Always draft water using a suction hose strainer.
- During freezing weather, drain the pump, manifolds, and lines of all water. You can also pour some antifreeze into the pump and circulate it through the pump and plumbing system.
- Let the engine warm up before using the unit at full speed.
- Always use the proper unleaded gasoline or diesel fuel as recommended in the engine manufacturer's manual.
- Always check for sufficient oil quantity in the engine crankcase before use (see engine manual for details on checking the oil level, as well as for the type of oil to use).
- If applicable, always check for sufficient coolant quantity in the engine radiator before use (see engine manual for details on checking the coolant level, as well as for the type of coolant to use).
- Pumps should not be operated without water for any extended period of time or without discharging water. Operating the pump in such a manner can overheat the pump causing damage to seals, or pump internals.
- It is recommended that all fasteners be replaced with genuine *WATERAX* parts.
- When mounting manifolds to the pump, the manifolds must be self-supporting and coupled to the pump by means of a flex coupling such as a Victaulic® coupling or flex hose.
- When hoisting the pump onto an apparatus, take care when using lifting hooks (if applicable) and avoid any contact with components adjacent to the fixation points.
- Never disconnect the battery (if applicable) while the engine is running, as this may damage the control panel's electrical components.



# Introduction

## About this Manual

This manual contains general operation, care and servicing procedures for the following *WATERAX* BB-4 high pressure 4-stage centrifugal pumps:

Pump designation	Engine used
BB-4-18	Briggs&Stratton 18 HP gasoline engine
BB-4-23	Briggs&Stratton 23 HP gasoline engine
BB-4-21	Honda GX630 21 HP gasoline engine
BB-4-D902	Kubota D902 25 HP diesel engine

These instructions cover most wildland and municipal pump applications. If the application the pump is being used for does not fall into these general guidelines, consult *WATERAX* Inc. for any additional safeguards, operating, or maintenance considerations that may be required.

For full service and maintenance instructions regarding the pump, please refer to the Service section. For maintenance instructions regarding the engine, as well as for oil and fuel recommendations, refer to the engine manufacturer's manual.

Please see [www.waterax.com](http://www.waterax.com) additional documentation related to this product such as the *WATERAX* product guide, technical notes, links to the engine manufacturer's manuals, news and other updates about *WATERAX* and its goods and services.

## Abbreviations and Terms

The following terms and abbreviations are used in this manual:

Cavitation	Formation of air bubbles in a liquid inside a centrifugal pump, causing low pressure points and loss of pump capacity.
Dead-heading	Also called shut-off. Leaving the pump running with all the discharge valves closed. The pump should not be left in this mode for more than a minute since the pump can overheat and become damaged. To avoid this, a re-circulation line (if provided) should be opened or a discharge line left slightly open to allow fresh water to continue to enter the pump.
Drafting	Process of using vacuum (suction) to take water from a stream or impoundment.
NH	National Hose. This is a type thread specified in NFPA 1963. Formerly known as NST (National Standard Thread).
NPSH	National Pipe Straight Hose. This is a type of thread that is slightly smaller in diameter than NH, with more threads per inch than the same nominal size of NH thread. NPSH is also called IPT (Iron Pipe Thread).
RPM	Revolutions Per Minute.



## About the BB-4 Series

### Features

For full specifications and performance curves, see the Product Data Sheet for your pump end model.

Applications of the *WATERAX* BB-4 series include:

- Slip-on units
- Attack line firefighting
- Long hose lay for remote watering during firefighting operations
- High elevation firefighting in mountainous areas
- Accuracy in flow trajectory when structure firefighting
- Tandem pumping over long distances
- Parallel pumping for higher volumes

Features and Benefits of the *WATERAX* BB-4 series include:

- Quick release clamp and swappable pump ends for minimal equipment downtime and inventory
- Sealed bearing to eliminate pump end greasing in the field
- Belt drive system for reliable, low maintenance performance
- Aluminum alloy pump components and anodized parts for lighter weight and greater resistance to corrosion
- Compatible with foam applications
- Blister resistant mechanical rotary seal
- Comprehensive manuals
- EPA Certified

### Configurations

The BB-4 series is used for a variety of wildland and municipal firefighting applications. Your model may be configured as a **portable**, standalone pump installed on a carry frame, or it may be purchased in the **vehicle-mount** configuration which includes a mounting frame or legs to fasten the pump onto a fire apparatus.

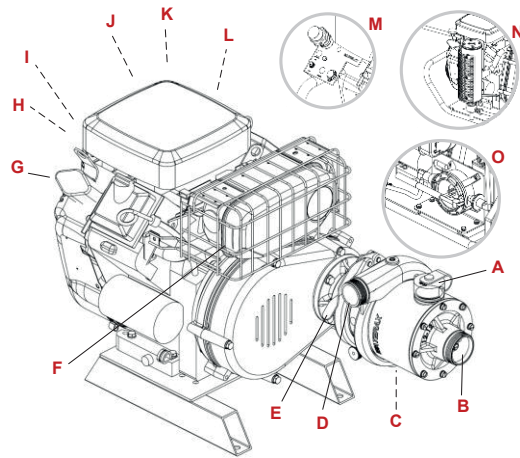




## Parts Identification

### BB-4-18/23<sup>(1)</sup>

- A. Priming cap
- B. Pump intake (suction)
- C. Pump drain port (not shown)
- D. Pump discharge
- E. Quick release pump clamp
- F. Low-tone muffler
- G. Fuel pump (not shown)
- H. Fuel valve (not shown)
- I. Starter key switch\*\* (not shown)
- J. Rewind starter (not shown)
- K. Throttle\*\* (not shown)
- L. Choke (not shown)
- M. Control panel\*† (option)
- N. Exhaust primer\*\*‡ (option)
- O. Guzzler primer\* (option)



(1) BB-4-18H vehicle-mount model shown.

\* Denotes optional components

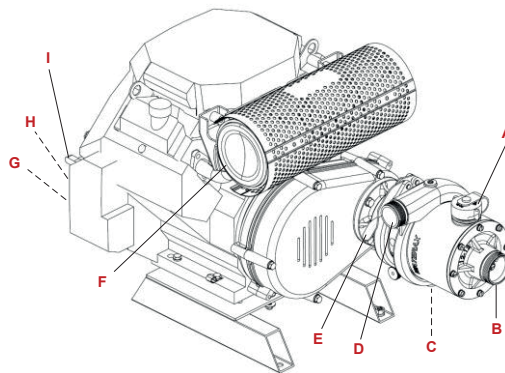
\*\* Items not available when Control Panel Option is selected

† Engine mounted control panel shown. Other options are panel mount control panels and skid mount panels

‡ Replaces low-tone muffler

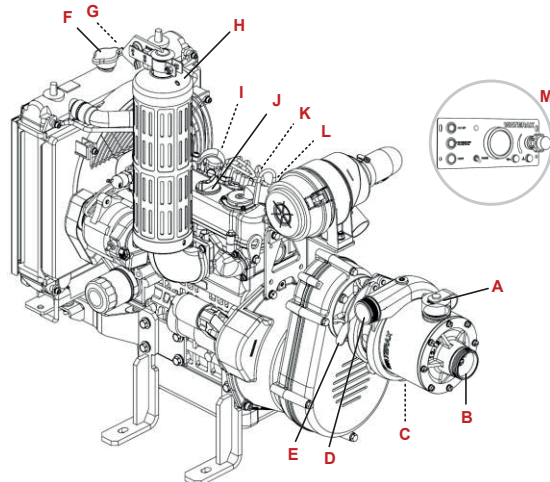
### BB-4-21

- A. Priming cap
- B. Pump intake (suction)
- C. Pump drain port (not shown)
- D. Pump discharge
- E. Quick release pump clamp
- F. Muffler
- G. Starter key switch (not shown)
- H. Choke (not shown)
- I. Throttle



### BB-4-D902

- A. Priming cap
- B. Pump intake (suction)
- C. Pump drain port (not shown)
- D. Pump discharge
- E. Quick release pump clamp
- F. Radiator coolant cap
- G. Coolant overflow (not shown)
- H. Muffler
- I. Throttle (not shown)
- J. Oil fill plug
- K. Oil dipstick (not shown)
- L. Fuel valve (not shown)
- M. PMSCP-DIESEL control panel\*



\* Please refer to your control panel user instructions for installation and wiring procedures



# Installation

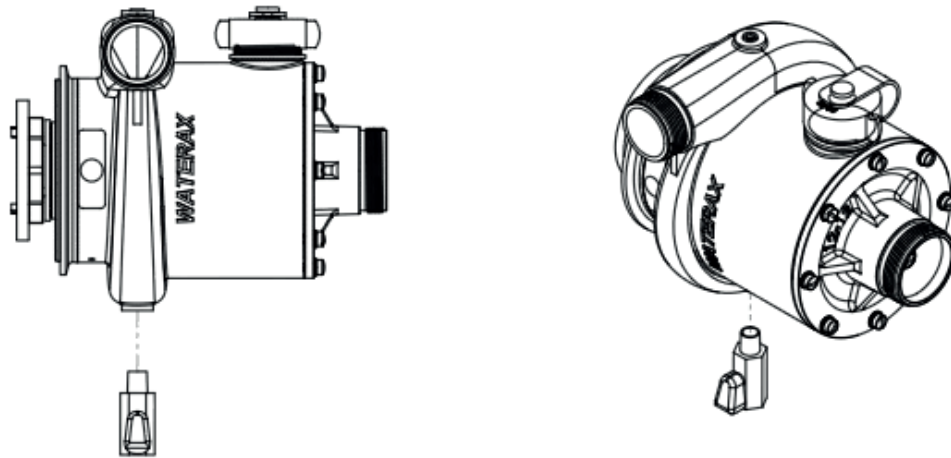
Depending on your model and configuration ordered, you may require additional accessories from *WATERAX* or from third-party vendors, for example, control panels, batteries, and fuel lines. You will also require hoses and nozzles as well as other fire apparatus plumbing which can be purchased through your *WATERAX* representative. Follow the instructions and heed all warnings in any documentation that you receive with the accessories you purchase.

## Plumbing

When mounting manifolds to the pump, the manifolds must be self-supporting and coupled to the pump by means of a flex coupling such as a Victaulic® coupling or flex hose.

## Pump End Mounting

The pump end can be rotated to aid with the apparatus piping connections. The quick release pump clamp securely holds the pump end in the desired position. Always ensure that the water can be drained from the pump end to keep it from cracking in freezing weather. A drain valve is available from *WATERAX* (item no 801104).



## Fastening to Truck/Apparatus

When adding any equipment to a vehicle, follow all instructions and heed all warnings provided by manufacturers of the apparatus and any third-party accessories. *WATERAX* provides certain accessories used in vehicle-mount configurations of the BB-4 series pumps. Follow all documentation that ships with any accessories you have ordered such as vibration mounts or rails. Your company's internal policies and guidelines must also be followed.

Before installing the pump in a vehicle, plan for adequate access to any fill caps such as those for oil, fuel or coolant (if applicable), as well as any other part of the pump or engine that is frequently accessed or inspected (valves, panels, primers, filters, etc.). Make note of components that become hot when operating such as mufflers and engine blocks, and always ensure a safe clearance around them.

## **Installing a Control Panel**

See User Instructions shipped with the specific model of control panel you ordered for your pump.

## **Using a Battery for Electric Starters and Control Panels**

Some BB-4 pumps require a battery to power electrical and electronic components such as starters, pump primers and control panels. Make sure to follow all instructions and heed all warnings provided by your battery manufacturer. Refer to the engine manual for battery requirements. Always follow safety guidelines set out by your company. Never connect or disconnect a battery to a pump that is operating.

## **Supplying Fuel to the Engine**

BB-4 pumps without an integrated fuel tank must be connected to a safety-compliant fuel tank. Follow your company's guidelines on connecting fuel lines to gas- or diesel-operated pumps. Always use safe work practices in the presence of flammable products such as fuel.



# Operating BB-4 Series Pumps

## Pre-Operation Checklist

Before using your pump, follow this verification procedure:

1. Visually inspect product

When you first receive your BB-4 pump, inspect the product and check for any damage. Notify the supplier if any damage is found.

2. Check all fluid levels regarding the pump and any related equipment. Before first use, you must prepare the engine which is shipped dry. Before each subsequent use, check levels and top up as needed.

- Engine/apparatus fuel level
- Engine/apparatus oil level
- Engine/apparatus coolant level (if applicable)
- All batteries electrolyte level (not required for sealed batteries)

***Refer to the engine manufacturer's manual for specific instructions regarding the engine.***

3. Check that all suction and discharge hoses are structurally sound and do not leak.

4. Visually inspect any electrical or electronic components for damage.

5. Inspect all safety features and verify that they are in good order before using the pump.

6. Visually inspect the pump's drive belt and ensure it is in good condition without cracks or excessive wear.

7. Each time you plan to use the pump, check for damage that may have occurred during previous use. Notify your manager that the equipment requires repair. Remember that damaged equipment can expose you to safety hazards.

## Flooded Suction

Use this procedure if you are taking water from a hydrant, another pump, or a closed tank. Be sure to understand and follow all related equipment, apparatus, departmental, and governmental procedures, policies, recommendations, and guidelines concerning hydrant connecting and operation before performing this mode of operation.

1. Connect the intake hose to the pump intake or intake piping.

2. Connect opposing end of the hose to the hydrant or water source (a tank may already be connected). Make sure that all connections are strong and tight and that all pump valves are closed.

3. Check that all equipment is rated to the proper pressure limits that they will be exposed to during this mode of operation. DO NOT exceed the maximum intake pressure of the pump (150 PSI).

4. Slowly open the pump inlet valves allowing the water into the pump body.

5. Slowly open the discharge valves to allow for entrapped air in the piping to escape.

6. Once all the air has escaped, close any opened valves so that the unit may be started.

7. Go to the *Startup and Discharge* section of this manual to begin pumping water.

**The pump will not discharge more water than the capacity of the water source (hydrant). The pressure reading on the pump's master intake gauge should never fall below 0 PSI during the pump operation in this mode.**

## Drafting

### Before you draft

Pumps should not be run dry, and therefore the pump ends require priming prior to operation. Use this procedure if you are drafting water from an open tank or natural water source.

To maintain optimum performance from your pump, follow these recommendations for selecting and installing your suction hose or pipe:

- Use the shortest length possible, i.e., place the pump as close to the water as possible.
- Select reinforced crush resistant (non-collapsible) hose or pipe.
- Make sure that all pipes have air tight fittings.
- To avoid air locks, flexible hose should rise gently from the water source to the suction/inlet port without excessive dips, bumps, sharp angles or rise in its lay.
- Pipes should be equal to or larger than the diameter of the suction/inlet port.
- Suction strainers should be fitted to prevent foreign matter from entering the pump.
- Where practicable, the installation and use of a suction float will aid in the performance of your pump, by keeping suction away from the debris on the bottom of the dam or river.
- Ensure that the suction hose is completely submersed.

### Limitations

Several factors can affect the pump's ability to efficiently draft water. The following limitations should be taken into account.

- Water temperatures above 35 °C (95 °F) can cause noticeable loss in pump performance.
- Barometric pressures below 98 kPa (29 in of Hg) can also cause noticeable loss in pump performance (specifically elevations >2000 feet above sea level).
- Pump performance curves are based off a 5 foot lift (top of water source to impeller center). Lifts greater than 5 feet will decrease the pump's performance.
- Hose and strainer sizes that are too restrictive can significantly decrease the pump's performance.
- Intake hose runs in excess of 10 feet can also reduce pump performance.

### Drafting connections

1. Connect a suction line to the pump intake.
2. Install a footvalve suction strainer on the other end of the suction hose and place in the water source.

**Note:**

To provide proper operation of the pump, the suction hose/strainer should be submerged a minimum of 4 to 6 times the hose diameter into the water source.

**DO NOT** allow footvalve strainer to rest on bottom of lake or riverbed. Check strainer frequently to make sure that it is not clogged with moss, leaves, etc.

**DO NOT** lift strainer from water while the pump is operating. Use a rope or other means to keep strainer at proper height, approximately 1 foot (30 cm) below water surface. If strainer is too close to the water surface, it will draw air and pump may lose prime.

## Priming the Pump

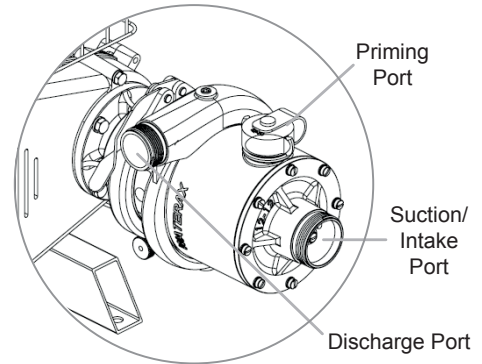
Before priming the pump, discharge hoses should be installed. Several options are available to prime a pump when you are drafting water, depending on the priming equipment you have.

**Note:** The priming line must be connected to a port on the pump that allows the eye of the impeller to completely fill with water. A shut off valve should also be placed between the pump and the primer to shut off the priming line once the pump has been primed.

**WATERAX Hand Primer:** Connect hand primer to discharge port and pump until water is drawn into the pump.

**Manual Priming:**

1. Open the priming cap and fill pump with water manually.
2. Firmly tighten priming cap.
3. Pump can also be primed by “jerking” the suction hose until water flows from the pump’s discharge port.



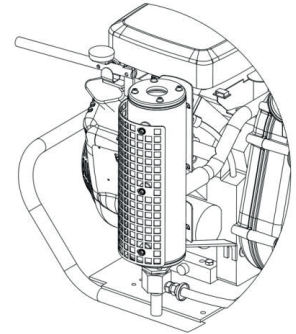
**Guzzler Priming:**

1. Open the priming valve (located under the check valve on portable units).
2. On vehicle mount units, ensure that the discharge valves are closed.
3. Pump until water is drawn into the pump.

**Electric Priming:** See instructions for your electric primer. Note that most electric primer motors are intended to be used only for a short duration of time (about 20 seconds). If pump fails to prime, see the troubleshooting section.

**Exhaust Priming:** With the engine running (see *Startup and Discharge* section):

1. Open priming valve.
2. Adjust THROTTLE to full speed position.
3. Close and press down firmly on muffler-lever-handle or pull priming knob (if supplied with a panel mount control panel) until a solid stream of water flows from priming ejector.
4. **Close the priming valve** and re-open the muffler-lever-handle/butterfly valve. The check valve (on portable units) will open automatically under the water pressure when priming occurs.
5. **Slowly** open a discharge valve to validate that the pump has been primed. If pressure does not build in the discharge hose, the pump has not been fully primed. The valve should be closed and the pump primed again. Continue this process until the pump has been fully primed.
6. Reduce throttle setting and allow engine to warm up for at least 2 minutes before using full throttle.



**Note:** **Close the priming valve after priming.** Failure to close the priming valve could cause the pump to lose prime or water to be pumped through the priming system.

## Startup and Discharge

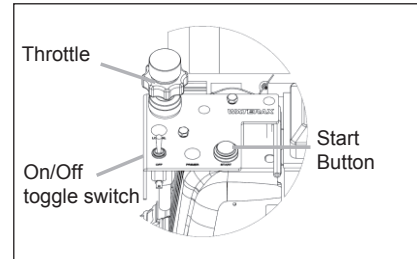
### 1. Fill fuel tank with recommended fuel grade.

- For models with an integral fuel tank, fill tank and securely replace cap.
- For models without an integral fuel tank, fill external fuel tank and connect fuel supply line to the fuel filter. Pump fuel to fill supply line. For the diesel pump model, refer to the engine manual for fuel system air bleeding instructions.

### 2. Start the engine.


For BB-4-18, BB-4-23, and BB-4-21:

- With all discharge valves closed, turn the on/off ignition key or switch to the "ON" position.
- Open fuel valve.
- Close/engage choke, if engine is cold.
- Increase the throttle past the idle position.
- Start the engine using the key switch or the start button. Hold until engine starts. DO NOT HOLD for more than 5 seconds. If starting using the rewind starter, ensure that the key switch or ignition switch is on the "ON" position. Give starter rope a quick and steady pull until engine starts.
- Open/disengage choke
- Allow engine to warm up for a minimum of 2 minutes before using full throttle.



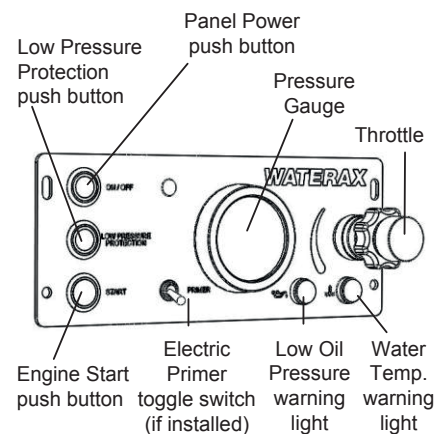
For BB-4-D902 using the PMSCP-DIESEL control panel:

If equipped with a LOFA control panel, refer to LOFA's Panel Operation and Troubleshooting Guide for instructions.

- Push the control panel's ON/OFF button. A green ring on the button will light up indicating that the panel is powered. You can now use the electric primer if equipped (see Priming section).
- Warm up: The electric starter's glow plugs require a 10-second warm-up period which begins as soon as you push the ON/OFF button on the control panel. During the warm-up period, the START button is deactivated and the engine cannot be started. As soon as the warm-up period is over, the low oil pressure (  ) light will turn on, indicating that the engine is ready to start.

**Important:** If low oil pressure light does not turn off after engine has started, stop the engine and check the oil level.

- Make sure all discharge valves are closed.
- Once the pump is primed, push and hold the START button until the engine starts.
- Turn the Vernier throttle counter-clockwise to increase engine speed past the idle position. Pressure should build up in the system.
- Press the LOW PRESSURE PROTECTION button to activate the protection. If pressure drops below 7 psi (loss of prime condition), the engine will automatically shut down to protect the pump.



### Note:

Leaving the pump running with all the discharge valves closed is called **deadheading** the pump. The pump should not be left in this mode for more than a minute. Leaving in this condition for any length of time will cause the pump to overheat and damage the pump. To avoid overheating the pump, a re-circulation line (if provided) should be opened or a discharge line left slightly open to allow fresh water to continue to enter the pump.

### 3. Discharge water.

Once the pump is primed, and with the engine running, you can begin to discharge water.

- a. Slowly open the discharge valve. If pressure does not build in the discharge hose, the pump has not been fully primed. The valve should be closed and the pump primed again.
- b. Adjust the pump performance by throttling the engine up or down, or opening or closing discharge valves at various positions, or any combination of the two.

**Note:** If the engine throttle is increased and the engine RPM increases without an increase in pump pressure, the pump may be cavitating. Refer to the limitations listed at the beginning of this section, and see the troubleshooting section for a verification checklist and possible solutions.

## Shutdown

1. After completing the pump operation, gradually reduce the engine RPM and slowly close the discharge valves (preferably in the order listed).
2. Whenever the unit has been run at full throttle for most of the operation, allow the valves to remain slightly open and run the engine at idle for approximately 5 minutes before shutting down the unit.
3. If the pump was last run with foam or water that is salty, brackish or high in mineral content, flush the pump with fresh water for a minimum of 2 minutes or until the water is clear.
4. Close off the hydrant or water supply to the pump.
5. Open all valves to relieve any pressure left in the system.

## Cold Weather Operation

The pump can be run in below freezing temperatures if certain precautions are taken to avoid the formation of ice in the pump.

1. After priming the pump, the unit should be run at low speed for a short period of time to allow all components to warm up before continuing with the remaining operating procedures.
2. Unless wrapped in a heater, drain the pump of all water if it is stopped for any length of time. The engine/drive unit should be turned over a few revolutions to make sure all water has been removed from the pump. Drain the pump priming line if a primer has been used.
3. After use, drain the pump, manifolds, and lines of all water. You can also pour some antifreeze into the pump and circulate it through the pump and plumbing system.





## Basic Care and Storage

The basic care described in this section does not require any disassembly of the pump. For any servicing procedures that require removing any part of the pump to access a component, please see the Service section.



**WARNING:** Before doing any maintenance to the pump, always ensure that the equipment cannot be accidentally started. Follow any apparatus and/or departmental procedures or guidelines in regards to locking out the equipment.

### Regular maintenance

After each use:

1. Visually inspect the pump unit.
2. Make sure the mechanical rotary seal is not leaking.
3. Check the pump for external leaks.
4. Check the engine for leaks.
5. Check the condition of the flexible buffer coupling. Replace if worn. See instructions for removing the pump end from the engine using the quick release pump clamp.
6. Clean any dirt or debris from the pump unit. If necessary, a mild soap and water solution can be used.
7. Note and report any performance irregularities or any abnormal mechanical sounds.
8. Check all fluid levels and add as needed.
9. Make sure all necessary tools, spares, and accessories are with the pump.

### Long-term storage

1. Completely drain the pump of all water.
2. Drain the carburetor. The engine can be run with the fuel valve lever in the OFF position to drain the system.
3. Drain the fuel tank (if applicable).
4. Close all valves and plug all openings.
5. Follow any other products, components, apparatus, and departmental procedures and/or guidelines before placing the unit in storage.

## Troubleshooting

This section provides brief troubleshooting instructions for verifying the set-up and operation of the pump. Each section describes a condition and lists possible causes along with a list of items to check to identify the source of the problem and resolve it.

### Pump Loses Prime or Will Not Prime

<b>Air Leaks</b>	<p>Attempt to locate and correct the air leaks by isolating each system component.</p> <ul style="list-style-type: none"> <li>■ Disconnect the pump priming system and test. Check that the priming system is pulling its rated vacuum.</li> <li>■ Cap the pump discharge and prime the pump. If the pump primes, the leak is in the pump discharge components. If the pump does not prime, the leak may be in the pump, or the pump intake system.</li> <li>■ Cap the pump intake and discharge and then perform a vacuum test on the pump (15 to 30 in Hg). If the prime holds, then the leak is in the pump intake components. If the pump does not hold prime, leakage could come from a port or drain line attached to the pump.</li> <li>■ Before repeating the test above, disconnect the drain line from the pump and plug. If the pump holds vacuum, the leak is in the drain line or drain valve. If the pump does not hold prime, leakage could be from another component attached to a port in the pump.</li> <li>■ Before repeating the test above one last time, remove any other component connection from the pump and plug. Re-test the pump under vacuum. If the pump holds prime, leakage was in one of the components removed. If the pump does not hold prime, leakage is in the pump.</li> </ul>
<b>Air Trapped in Suction (Pump Intake) Line</b>	<ul style="list-style-type: none"> <li>■ Check that no part of the suction hose or piping is higher than the pump intake. Pump suction hose and piping must be laid out with a continuous decline to the water source from the pump intake.</li> <li>■ If the pump intake piping above the pump intake cannot be avoided, priming taps must be added to the raised section of piping for the removal of trapped air.</li> <li>■ If the suction hose cannot be laid out in a manner to avoid raised sections in the hose, wiggle and raise the hose while priming to allow the entrapped air to work its way from the raised region.</li> <li>■ Check the priming port location. If the port is not located in a position that will allow the eye of the impeller to fill with water, it will need to be moved to a location that will do so.</li> </ul>
<b>Blocked or Restricted Intake Hose or Strainer</b>	<ul style="list-style-type: none"> <li>■ Remove blockage from the intake hose or strainer.</li> <li>■ Strainer should not be sitting at the bottom of the water source where debris can be picked up. Clean off the strainer and raise to a position that is off the bottom of the water source (floating strainers are available).</li> <li>■ If the strainer is new, check that the strainer hole size is not too restrictive for the demands of the pump.</li> </ul>
<b>Pump Suction Lift Requirements are Too High</b>	<ul style="list-style-type: none"> <li>■ DO NOT attempt pump lifts exceeding 22 feet (6.7 meters) except at elevations lower than 2000 feet above sea level.</li> <li>■ As elevation increases above 2000 feet above sea level, maximum lift heights will diminish. Check that the lift for the elevation the pump is being required to operate at is achievable.</li> </ul>
<b>Inoperative Priming System</b>	<ul style="list-style-type: none"> <li>■ Check and service the priming system as outlined in the documentation from the priming system's supplier.</li> </ul>



## Pump Does Not Meet Performance

<b>Incompatible Installation</b>	<ul style="list-style-type: none"> <li>■ Piping size and configuration may be too restrictive. Contact a <i>WATERAX</i> Inc. representative if assistance is needed in evaluating the unit's piping.</li> </ul>
<b>Gauge or Instrument Failure</b>	<ul style="list-style-type: none"> <li>■ Check that all gauges are calibrated and that all equipment is in proper condition. Nozzles with dented edges and bent or damaged pitot tubes will produce faulty readings.</li> </ul>
<b>Blockage</b>	<ul style="list-style-type: none"> <li>■ Check all hoses, tank, piping, etc. Remove any obstructions found.</li> <li>■ Check for debris wedged or caught in the impeller or diffusers. Remove any obstructions found.</li> </ul>
<b>Insufficient Power to the Pump</b>	<ul style="list-style-type: none"> <li>■ Check engine compression and complete engine repairs if required.</li> <li>■ An engine tune up may be needed to bring engine back to peak performance.</li> <li>■ An engine will lose approximate 3.5% of its power per every 1000 feet above sea level. If the elevation of operation was not considered when the unit was selected, a unit of higher horsepower may be required to make the needed performance.</li> </ul>
<b>Restriction</b>	<ul style="list-style-type: none"> <li>■ If a new strainer and/or intake hose was purchased, check that they provide adequate supply to the pump to meet the performance desired.</li> <li>■ If the pump was purchased used, check that the actual configuration will achieve the desired performance. A <i>WATERAX</i> Inc. representative can be contacted for assistance.</li> <li>■ Check pump lift. Refer to "Pump Loses Prime or Will Not Prime: Suction Lift Too High" section.</li> </ul>

## Pump Cavitating

<b>Lift Too High</b>	<ul style="list-style-type: none"> <li>■ Move pump closer to water source.</li> <li>■ Decrease pump's intake hose length.</li> <li>■ Increase pump's intake hose size (inner diameter).</li> </ul>
<b>Water Temperature</b>	<ul style="list-style-type: none"> <li>■ Water temperature may be too high. Water temperatures approaching 35°C (95°F) or higher are likely to cavitate the pump. Decrease engine speed and/or gate the discharge valve to decrease pump flow until the cavitating stops.</li> <li>■ Locate a cooler water source.</li> </ul>
<b>Restrictions</b>	<ul style="list-style-type: none"> <li>■ Refer to "Restrictions" in the "Pump Does Not Make Performance" section.</li> <li>■ Check that the bottom of the suction hose is at a minimum of 2 feet (0.6 meters) from the bottom of the water source and correct if necessary.</li> <li>■ Check that the bottom of the suction hose/strainer is 4 to 6 times the hose diameter below the water supply surface level and correct if necessary.</li> </ul>

## Engine Speed Too High for Required Capacity and Pressure

<b>Air Leaks</b>	<ul style="list-style-type: none"> <li>■ Refer to "Pump Loses or Will Not Prime: Air Leak" section.</li> </ul>
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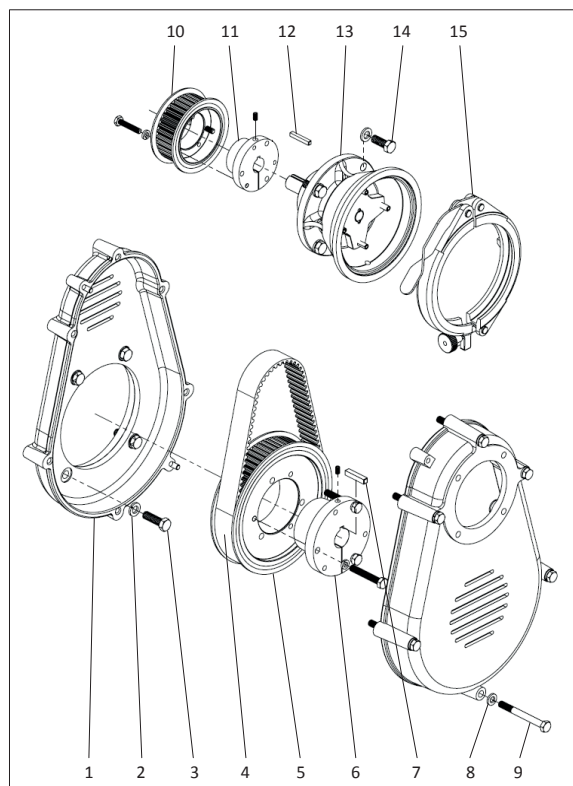


# Service

This section includes instructions for overhaul and maintenance requiring disassembly of the **WATERAX** 4-stage pump end model 12-16S that is integrated in the BB-4 series pumps. It *does not* include engine maintenance. For maintenance instructions regarding the engine, as well as for oil and fuel recommendations, please refer to the engine manufacturer's manual.

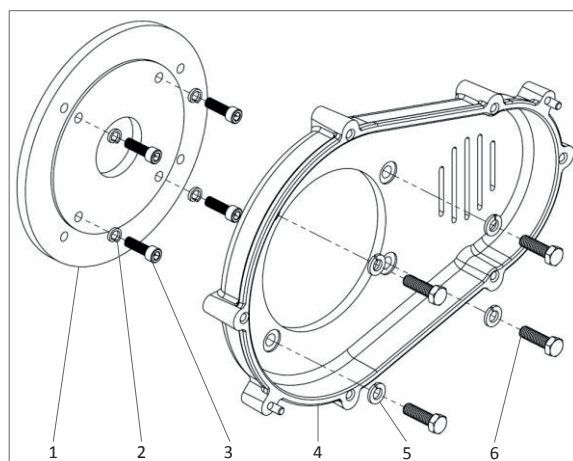
Note: It is recommended that all fasteners be replaced with genuine **WATERAX** parts.

## Drive Assembly Parts Breakdown



ID	ITEM NO	DESCRIPTION	QTY
1	600101	C-7221 SPEED INCREASER HOUSING, ALU. PAINTED	1
2	800512	FAST-502 LOCKWASHER 3/8 SPLIT ZINC	8
3	800524	FAST-23 SCREW 3/8-16X1-1/4 HEX CAP ZINC	4
4	800803	PART-1 TIMING BELT, 8MMP X 30W X 720LG	1
5	800825	PART-2 PULLEY 64T X 8MM P X 30MM W	1
6	801011	PART-4 BUSHING FOR 1" SHAFT	1
7	600176	PART-7 KEY 1/4" SQUARE, S.S.	1
8	800513	FAST-501 LOCKWASHER 5/16 SPLIT ZINC	6
9	800534	FAST-1 SCREW 5/16-18X3 HEX CAP ZINC DICHROMATE	6
10	800856	PART-3 PULLEY 34T X 8MM P X 30MM W	1
11	800852	PART-5 BUSHING FOR 3/4" SHAFT	1
12	600151	PART-6 KEY 3/16" SQUARE, S.S.	1
13	600124	B-7544 DRIVE CARRIER ASSEMBLY COMPLETE	1
14	800527	FAST-2 SCREW 3/8-16X1 HEX CAP ZINC DICHROMATE	4
15	600063	212-170P CLAMP ASSEMBLY, ALU. PAINTED	1

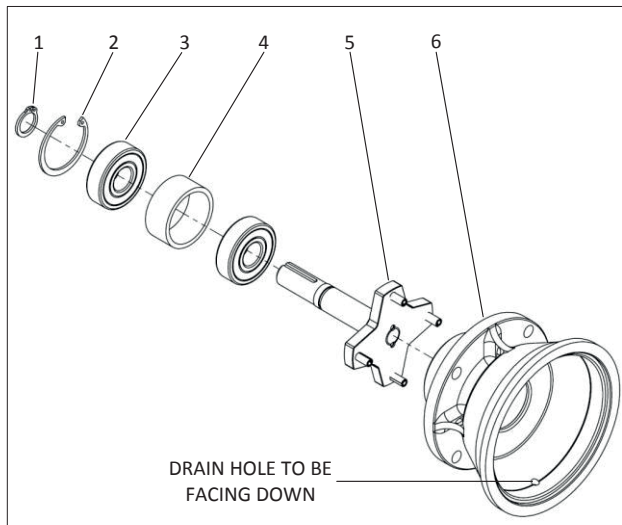
Figure 1: Exploded view of drive assembly



ID	ITEM NO	DESCRIPTION	QTY
1	700079*	A-7594 TRANSFER PLATE FOR HORIZONTAL DRIVE BOX	1
2	800392*	FAST-747 LOCKWASHER 5/16 SPLIT HIGH-COLLAR ZINC	4
3	800384*	FAST-743 SCREW 5/16-24X1 HEX SOCKET SS	4
4	600045*	C-7225 SPEED INCREASER MODIFIED FOR TRANSFER PLATE	1
5	800512	FAST-502 LOCKWASHER 3/8 SPLIT ZINC	4
6	800524	FAST-23 SCREW 3/8-16X1-1/4 HEX CAP ZINC	4

\*The horizontal drive assembly requires a transfer plate (700079), a modified speed increaser housing (drive box) (600045) and related hardware.

Figure 2: Exploded view of horizontal drive assembly



ID	ITEM NO	DESCRIPTION	QTY
1	800538	PART-8 RETAINING RING EXT.	1
2	800541	PART-9 RING RETAINING INT.	1
3	800836	PART-10 BEARING, 4 POINT CONTACT, SEALED	2
4	700083	A-6956 SPACER FOR C-7220, ALU.	1
5	700086	A-7239 SHAFT ASSEMBLY FOR C-7220	1
6	600130	C-6955 FLANGE FOR DRIVE HUB ONLY, ALU.	1

Figure 3: Exploded view of drive hub assembly (item no 600124)

## Installing the Drive Assembly

### Before Installation

- Read and follow all instructions thoroughly and carefully.
- Ensure shaft, bores, screws, etc. are free of burrs and lubricant.

### Tools and Materials Required

- Torque wrench
- SAE Socket wrench with the following sockets to be used on the drive box cap screws and bushing cap screws:
  - 7/16"
  - 1/2"
  - 9/16"
- SAE Allen keys to be used on the bushing set screws:
  - 1/8" or 3/32"
  - 5/32"
- Medium-strength threadlocker solution (e.g. Loctite® 243)

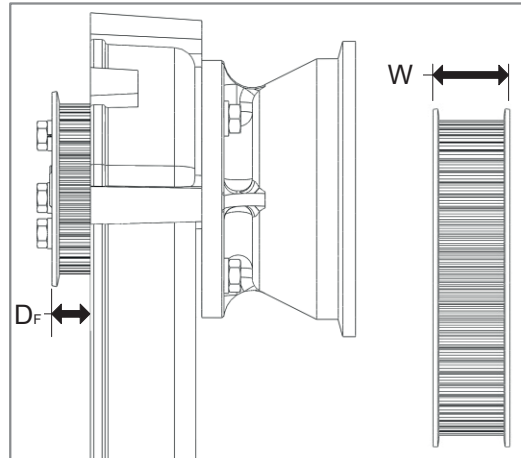
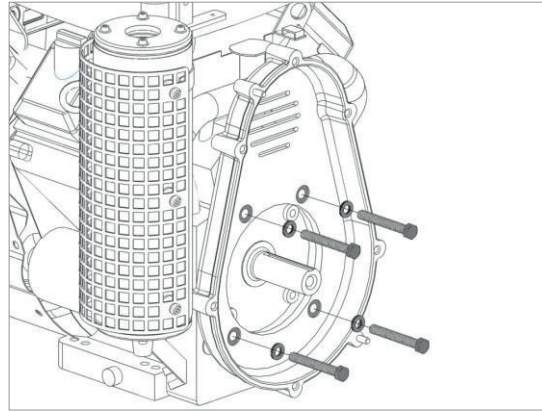
## Procedure

1. Place the rear cover on engine. Make sure the rear cover is properly positioned and lying flat against the engine face. Securely tighten the four cap screws and lock washers.

If the drive assembly is installed horizontally (see Fig. 2), start by installing the transfer plate on the rear cover. Then install the transfer plate with the rear cover on the engine by securely tightening the four cap hex socket head cap screws and lock washers.

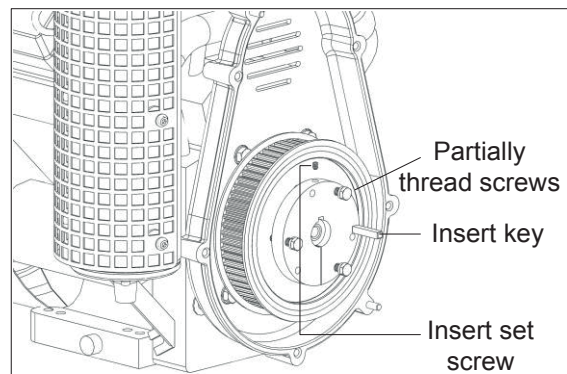
**Important:** The drive hub assembly has a drain hole. Ensure that the drain hole is facing down.

2. Measure and make note of the driver pulley's width (**W**) and distance between driven pulley (small) and the front cover mating face (**D<sub>F</sub>**). These dimensions will be used later on to properly position the driver pulley (large) and ensure proper alignment.



3. Align the non-threaded holes of the bushing to the threaded holes of the driver pulley. Insert the cap screws into the threaded holes of the pulley and turn them by hand three to four turns.
4. Put the bushing and driver pulley on the shaft and align the keyways.
5. Insert the key. Make sure key runs the entire length of the bushing bore.
6. Apply medium-strength threadlocker such as Loctite® 243 on the set screw. Install and **hand tighten only**.
7. Using a torque wrench and the appropriate socket, tighten the cap screws with lock washers sequentially until each is tightened to **180 in-lbs**. When the cap screw is at the recommended torque value, make at least two more sequential rounds to ensure all cap screws are at the adequate torque value.

**IMPORTANT:** Make sure the engine shaft is long enough to safely accommodate the bushing and pulley. The bushing should not protrude more than 3/8" from the end of the engine drive shaft.





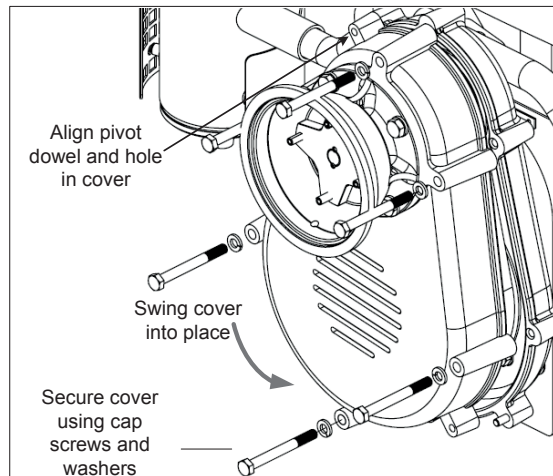
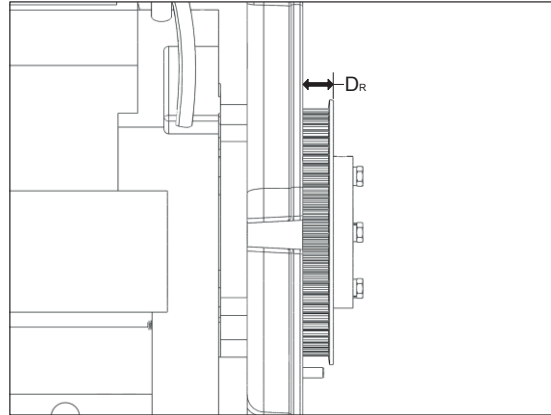
8. Since tightening the cap screws will affect the axial position of the pulley, make sure pulleys are properly aligned:

$$D_R = W - D_F$$

If adjustment is required, determine the new position of the bushing and reposition the pulley assembly. See page 21 for the *Removal of Pulley Assembly* procedure.

9. Loop the timing belt around the large driver pulley.
10. To install the front cover, loop the timing belt around the small driven pulley. Make sure the timing belt is seated properly on the pulleys.
11. Align the top dowel pin with the corresponding hole on the front cover, and partially insert the front cover onto the dowel pin.
12. Using the top dowel pin as a pivot point, swing the front cover and align the second dowel pin with the corresponding hole.
13. Insert the front cover fully onto the dowel pins and flat against the back cover mating surface.
14. Fasten the front cover and the rear cover using the six cap screws and lock washers. To help seat the cover properly, tighten the top screw, then the bottom screw, and then alternate the screws on either side, crisscrossing the cover. Securely tighten.
15. Make sure the pulley assembly turns smoothly by tugging on the recoil starter or turning over the engine a couple of times with the electric start.

**IMPORTANT:** The torque value for the driven pulley (small) cap screws is **108 in-lbs**, not 180 in-lbs.

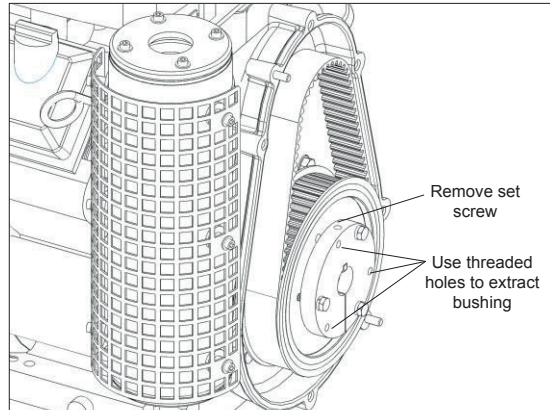


**Make sure you take all safety precautions specified for your engine.**



## Removal of Pulley Assembly

1. Remove all the cap screws sequentially.
2. Remove the set screw.
3. For the large driver pulley, insert the cap screws into the threaded holes of the bushing. For the small driven pulley, insert the cap screws into the threaded holes of the pulley.
4. Tighten the cap screws against the face until the screw force releases the pulley from the bushing.



## Removing or Attaching the Pump End

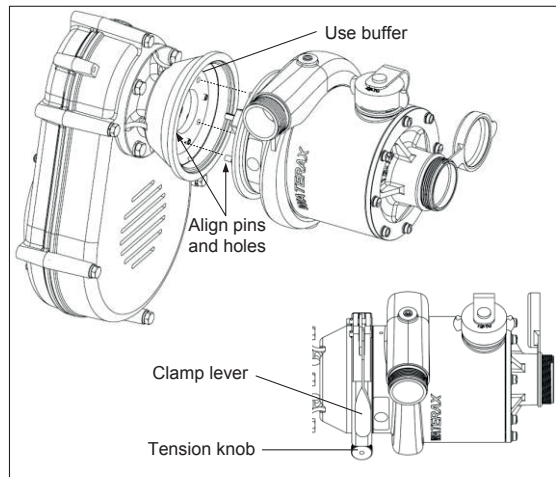
All of the BB-4 series pump ends have a quick release pump clamp and detachable pump end which facilitates the servicing of pump units and minimizes down-time in the field by allowing the quick replacement of pump ends.

### To remove pump from engine:

1. Lift pump clamp lever.
2. Release tension-adjusting knob at bottom of clamp.
3. Remove clamp by tapping bottom end of each half clamp.
4. Remove pump from engine.

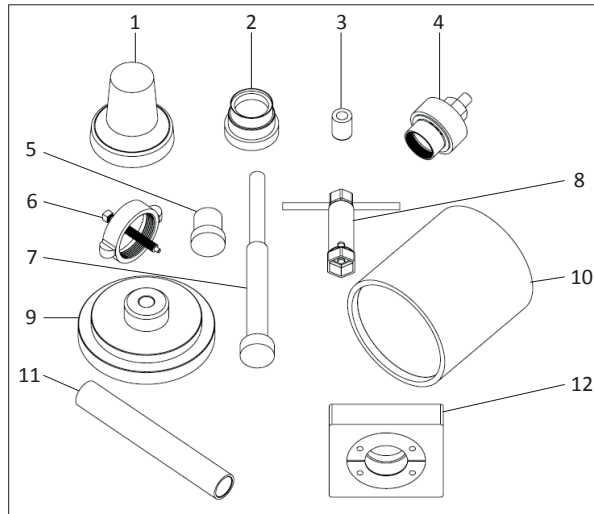
### To attach the pump end to the engine:

1. Place flexible buffer coupling on engine coupling pins.
2. Align flexible buffer coupling holes to pump end coupling pins and install.
3. Install pump clamp with the lever on the top side (tension knob at the bottom).
4. Finger tighten tension knob located at bottom of clamp to obtain a light pressure on clamp ring.



**CAUTION:** Apply FINGER PRESSURE ONLY to close pump clamp lever. Excessive pressure will damage or break the clamp link.

## Pump Tool Kit



ID	ITEM NO	DESCRIPTION	QTY
1	700540	A-1884 PRESSING SLEEVE DISTRIBUTOR	1
2	700531	A-4329 PRESSING SLEEVE ROTARY SEAL	1
3	700532	A-4097 PROTECTOR SHAFT	1
4	700090	A-7644 SEAL PULLER FOR 12-28NS	1
5	700642	A-7711 SEAL REMOVAL PRESS TOOL, 12-28N	1
6	600079	A-1888 PULLER FOR SUCTION COVER, ALU. & PLATED	1
7	600077	A-1886 PRESSING PIN FOR DISTRIBUTOR, STEEL	1
8	600175*	R-904L SPARK PLUG WRENCH C/W ROD	1
9	600078	A-1887 ALUMINUM GUIDE FOR SHAFT INSTALLATION	1
10	700588	A-5297 SUPPORT TOOL	1
11	600052	B-4084 PUMP BEARING PRESSING SLEEVE	1
12	600123	B-4085 PUMP BEARING EXTRACTOR TOOL	1

\* 600175 contains 800084 (R-904) and 800082 (R-905)

## Disassembly Procedure for Pump End 12-16S

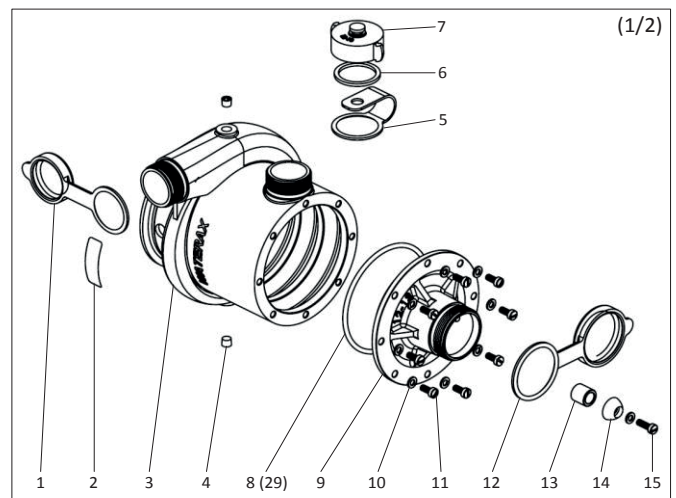
ID	ITEM NO	DESCRIPTION	QTY
1	700023	A-5536 PROTECTIVE CAP FOR 1-1/2" DISCHARGE	1
2	700994	DECAL-35 NO GREASE DECAL	1
3	700068	12-8 PUMP BODY FOR 12-16	1
4	800366	12-73 PLUG, 1/8" BRASS	2
5	700024	A-5538 RETAINER FOR PRIMING CAP	1
6	700651	12-43 HOSE THREAD GASKET 38 MM NPSH	1
7	700048	12-10 CAP FOR PRIMING PORT, ALU	1
8	800363	12-27 O-RING	1
9	600380	12-12A SUCTION COVER - INCLUDES 12-40	1
10	800360	12-38 LOCKWASHER 1/4 SPLIT SS	9
11	800359	12-39 SCREW 1/4-28X9/16 SLOT FILLISTER SS	8
12	700022	A-5537 PROTECTIVE CAP FOR 2" SUCTION	1
13	700029	12-40 BUSHING BEARING, BRONZE	1
14	700069	12-13 NOSE FOR SHAFT, ALU.	1
15	800343	12-42 SCREW 1/4-28X3/4 SLOT FILLISTER NYLONLOCK SS	1

1. Remove shaft nose #14, by removing screw #15 and lockwasher.
2. Remove screws #11, and lockwashers #10.
3. With tool 600079, remove suction cover #9.
4. Bend down lockwasher #26 from lock nut #27. Secure the shaft #17 from rotating and remove lock nut using tool 600175 or a 19 mm (3/4") wrench. Discard lockwasher.
5. Remove screws #18.
6. Using an arbor press and tools 700532 and 700588, press out shaft assembly.
7. Using seal puller 700090, remove mechanical rotary seal.

8. Using an arbor press and tools 600077 and 700588, remove all impellers and distributors. This operation is done in jogging strokes of press ram.
9. To remove bearing from shaft, use an arbor press and tool 600123.

**Important:** It is recommended to discard all O-rings, lockwashers and nylon lock screws.

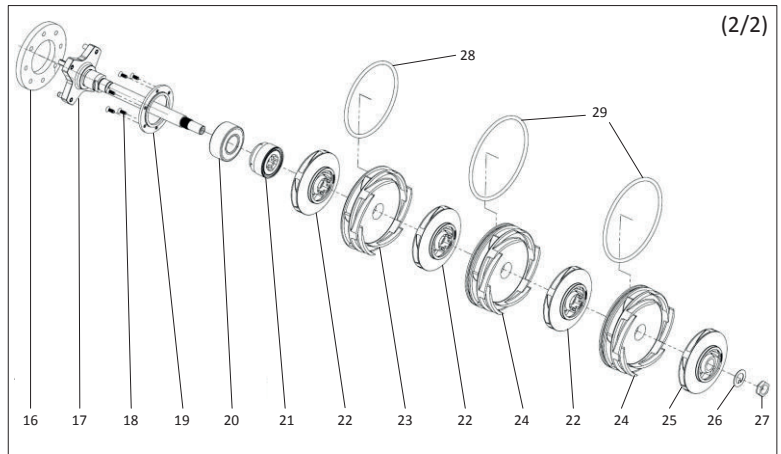
Kit containing replacements O-rings, lockwashers and nylon lock screws is available from **WATERAX** (item no 250228).



## Assembly Procedure for Pump End 12-16S

ID	ITEM NO	DESCRIPTION	QTY
16	700006	12-17 COUPLING BUFFER	1
17	700037	12-2C PUMP SHAFT FOR 12-16	1
18	800364	12-25 SCREW #8-32X7/16 PHILLIPS FLAT NYLON LOCK SS	6
19	700032	12-3 RETAINING RING FOR BEARING, ALU.	1
20	700044	12-48S DOUBLE ROW BALL BEARING WITH SEAL	1
21	700008	12-28NS MECHANICAL ROTARY SEAL	1
22	700036	12-7 IMPELLER, ALU.	3
23	700014	12-6 DISTRIBUTOR, ALU.	1
24	700065	12-9 DISTRIBUTOR, ALU.	2
25	700074	12-11 IMPELLER, ALU	1
26	600089	12-49 LOCKWASHER SS	1
27	700012	12-50 LOCK NUT SS	1
28	800450	12-26 O-RING	1
29	800363	12-27 O-RING	2
-	701169	GASKET BURASIL FOR 12-28NS SEAL	-
-	701170	O-RING FOR 12-28NS SEAL	-

**NOTE:** The sealed bearing eliminates pump failure dangers related to improper greasing by completely removing the need to grease the pump end bearing.



**Important:** When reusing components, carefully inspect the parts. Ensure that key dimensions are within acceptable limits. Visually inspect the parts for pitting, worn vanes, damaged threads, damaged gasket faces, excessive corrosion, deformation, etc. Discard any component that is not within acceptable standards. Ensure that the components are clean before installing.

**Mechanical Rotary Seal:** The mechanical rotary seal requires careful inspection. The seal should be discarded if there are signs of leaks or if the internal drive bushing is excessively deformed. The drive bushing must be free to rotate without contact with the brass housing. If there is contact between the drive bushing and the housing, the seal must be discarded.



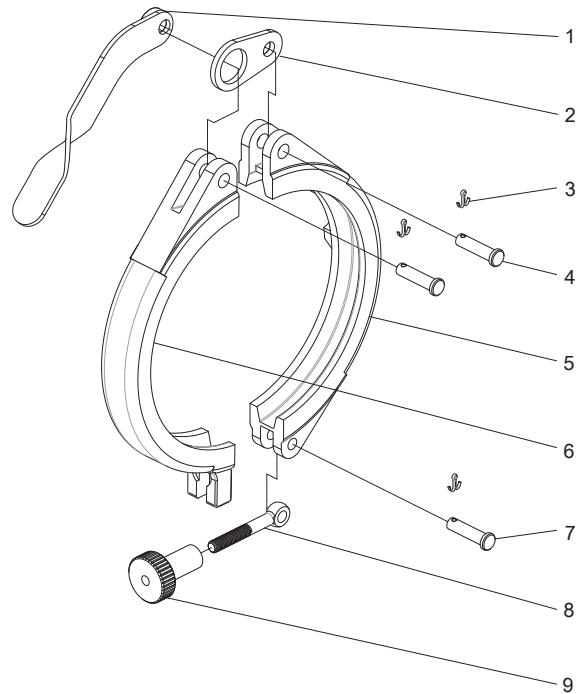
- Slide bearing retaining ring #19 on shaft #17 with plain face toward coupling collar.
- Press bearing #20 on shaft using tool 600052.
- Carefully** press rotary seal #21 in pump body #3 using pressing sleeve tool 700531.
- Apply a small amount of dish soap on mechanical rotary seal O-ring to facilitate installation of pump shaft. Carefully pass end of shaft assembly through mechanical rotary seal bore. Make sure that flat sections of shaft line up with rotary seal drive bushing flat sections. Gently press down shaft until ball bearing rests firmly against shoulder in pump body. To verify that shaft has been properly installed, slowly rotate shaft by hand; rotary seal drive bushing should rotate with shaft.
- Attach retaining ring #19 to pump body with six screws #18 to a torque value of **22-25 in-lbs / 2.5-2.8 Nm**. Tighten evenly.
- A small amount of marine grease can be applied onto shaft to facilitate future disassembly.
- Slide impeller #22 onto shaft, and engage with mechanical rotary seal.
- Smear the O-rings with a suitable lubricant to facilitate assembly.
- Place O-ring #28 in groove of distributor #23.
- With open end of pump body in vertical position, carefully lower distributor #23 until it rests on bottom of body. Ensure that O-ring did not fall out of position during installation of distributor.
- Slide impeller #22 into position, aligning with previous impeller.
- Place O-ring #29 in groove of distributor #24.
- Using arbor press and assembly tool 700540, apply several light, downward strokes of press ram until distributor "drops" into body and rests on previous distributor.

14. Slide impeller #22 into position, aligning with previous impeller.
15. Repeat steps 12 and 13 for remaining distributor.
16. Slide impeller #25 into position, aligning with previous impeller.
17. Place lockwasher #26 on shaft with locating tab in milled groove. Slightly bend lockwasher tab downwards to facilitate insertion. Lockwasher tab should still prevent it from rotating on shaft.
18. Apply a small amount of Loctite 290 on lock nut #27 and screw onto shaft with round surface facing lockwasher. Tighten to a torque value of **250-260 in-lbs / 28-29 Nm**. To secure lock nut and prevent from rotating, bend one side of lockwasher up onto one flat side of hexagon lock nut. Bend the lockwasher side that is at the opposite side of the milled slot in the shaft.
19. Place O-ring #8 in groove of suction cover. Press cover into pump body until it rests on distributor.
20. Install suction cover using screws #11 and lockwashers #10. Tighten screws evenly and firmly to a torque value of **32-36 in-lbs / 3.6-4.1 Nm**.
21. Attach shaft nose #14. Tighten screw firmly to a torque value of **32-36 in-lbs / 3.6-4.1 Nm**.
22. Reinstall remaining protective caps and adaptors.

## Pump Clamp

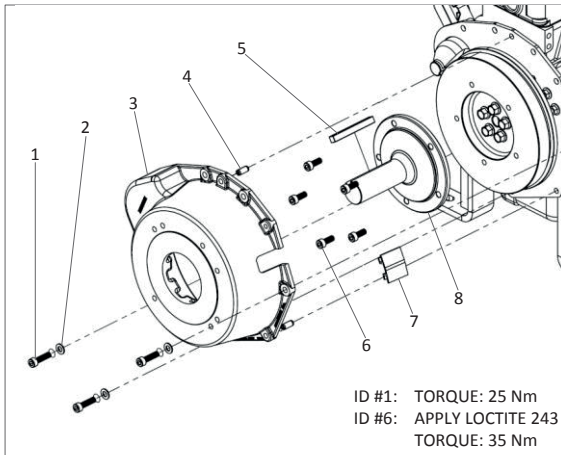
### Parts breakdown

ID	ITEM NO	DESCRIPTION	QTY
1	700581	A-4460 LEVER, ZINC PLATED	1
2	600122	A-4452 SIDE LINK FOR LEVER, ZINC PLATED	1
3	800426	C-4462-5 COTTER PIN DIN 94 2.5MM X 16MM	3
4	800263	A-4455 CLEVIS PIN FOR LEVER SIDE	2
5	700889	B-4457 PUMP CLAMP BOTTOM HALF	1
6	600110	B-4461 PUMP CLAMP TOP HALF	1
7	800405	A-4454 CLEVIS PIN	1
8	700004	A-4453 EYE BOLT, PLATED STEEL	1
9	700035	A-4456 KNOB FOR TENSION ADJUSTMENT, ALU.	1



The quick release pump clamp should be inspected on a regular basis. If components appear to be worn, replace them immediately.

## Assembly of BB-4-D902 Stub Shaft and Engine Housing

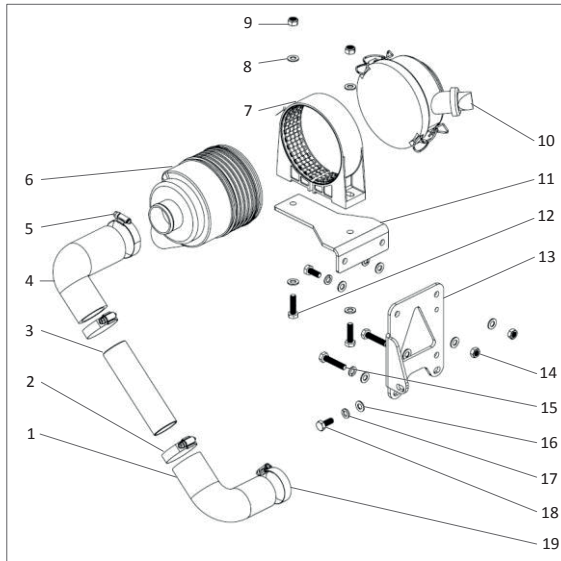


ID	ITEM NO	DESCRIPTION	QTY
1	600572-2**	SCREW M8 X 30 HEX SOCKET	3
2	600572-1**	FLAT WASHER M8	3
3	600572	BELL HOUSING K106 ALU SAE "A" PILOT, HARDWARE INCL	1
4	600572-3**	GUIDING PIN	2
5	600582	KEY 3/8" SQUARE X 3-1/4" LG, STEEL	1
6	600571-1*	SCREW M8 X 20 HEX SOCKET	5
7	600572-4**	PROTECTIVE COVER	1
8	600571	STUB SHAFT FORGED K106 1-7/16 X 5, HARDWARE INCL.	1

\* Parts come included in kit 600571

\*\* Parts come included in kit 600572

## Assembly of BB-4-D902 Air Filter

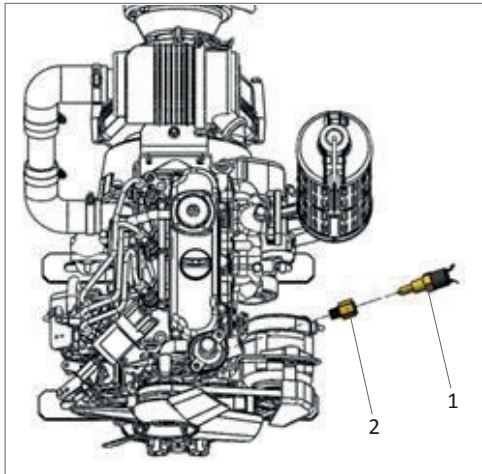


ID	ITEM NO	DESCRIPTION	QTY
1	1G952-11621-1*	HOSE, INLET	1
2	801225	HOSE CLAMP DOUBLE WIRE 2-1/2"	2
3	701211	SLEEVE 1-3/4"OD X .065"TH X 5.5"LG ALU	1
4	1G952-11621-2*	HOSE, INLET	1
5	15221-11722*	BAND, PIPE	1
6	1G657-11011-2*	ASSY CLEANER, AIR	1
7	1G657-11011-1*	ASSY CLEANER, AIR	1
8	04015-50080*	WASHER, PLAIN	4
9	02156-50080*	HEX, NUT	2
10	1G657-11011-3*	ASSY CLEANER, AIR	1
11	1G659-11571*	STAY, AIR CLEANER	1
12	01123-50832*	BOLT, SEMS	2
13	701210	BRACKET MAIN SUPPORT AIR CLEANER	1
14	800040	R-120 HEX NUT M8 X 1.25	2
15	801229	SCREW M8X1.25X40 HEX CAP ZINC	2
16	800539	R-206 WASHER M8 FLAT ZINC	7
17	800548	R-119 LOCKWASHER M8 SPLIT ZINC	5
18	800520	R-414 SCREW M8X1.25X20 HEX CAP CADM	3
19	15261-11721*	BAND, PIPE	1

\* Parts included in kit 801248 (air filter); Kubota D902 part nos. listed



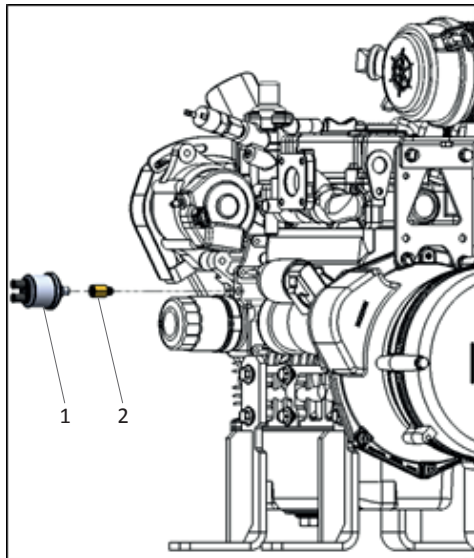
## Assembly of BB-4-D902 Engine High Temp. Sending Unit



ID	ITEM NO	DESCRIPTION	QTY
1	801232	TEMPERATURE SENDER & SWITCH 120 DEG	1
2	801252	ADAPTER BUSHING 3/8" FNPT TO 3/8" MBSPT HEX BRASS	1

## Assembly of BB-4-D902 Low Oil Pressure Sending Unit

The following parts are required if equipped with LOFA Control Panel EP250G7 (228-7808-54)



ID	DESCRIPTION	SUPPLIER ITEM NO.	SUPPLIER
1	OIL PRESSURE SENDER	560-3150-00	LOFA INDUSTRIES INC.
2	ADAPTOR BUSHING 1/8" FNPT TO 1/8" MBSPT	4860K141	MCMaster-CARR*
-	LOW WATER PRESSURE PROTECTION SWITCH 20 PSI***	MM-1B-20F/QC	NASON**

Note the following are suggested supplier/manufacture

\* [www.mcmaster.com](http://www.mcmaster.com)

\*\* <http://www.nasonptc.com>

\*\*\*20 PSI is chosen to match the USDA Spec' for the 643P and 643U models

### Installation:

1. Remove oil pressure switch that comes pre-installed on the Kubota D902 engine.
2. Install the adaptor bushing (2).
3. Install the oil pressure sender (1).

(Note: use sealing tape or putty to create a good seal on all tapered threads)

**Wiring:**

Refer to FASTWIRE Wiring Diagram section (Wiring for Diesel Pump).

*Note: All blunt wires are found at the end of the FASTWIRE harness.*

**A - OIL PRESSURE SENDER:**

1. Connect the **yellow/orange wire (M)** to the “**WK**” stud on the Oil Pressure Sender.
2. Connect the **orange wire (E)** to the “**G**” stud on the Oil Pressure Sender.

**B - LOW WATER PRESSURE PROTECTION SWITCH:**

*An extension might be required from the FASTWIRE harness to the Low Water Pressure Protection Switch.*

1. Connect the **yellow wire (K)** to one of the terminals on the Low Water Pressure Protection Switch (AUX. SHUTDOWN 1)
2. Connect the **black wire** (blunt) to the remaining terminal on the Low Water Pressure Protection Switch (GND).

## BB-4 Wiring

**Standard WATERAX wiring configuration:**

All vehicle BB-4 pumps are wired from the factory to work with an XCP control panel. To revert to the original engine controls, refer to the next section for instructions.

**XCP vs. Engine Controls:**

A WATERAX XCP control panel should not be operated simultaneously with the original engine controls; undesired behaviors may occur. It is recommended to remove the key switch from the engine and store it in a safe location if equipped with an XCP.


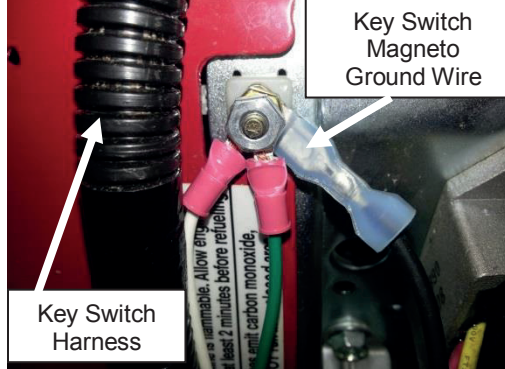
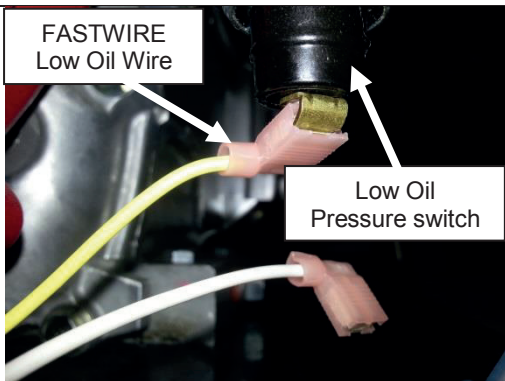
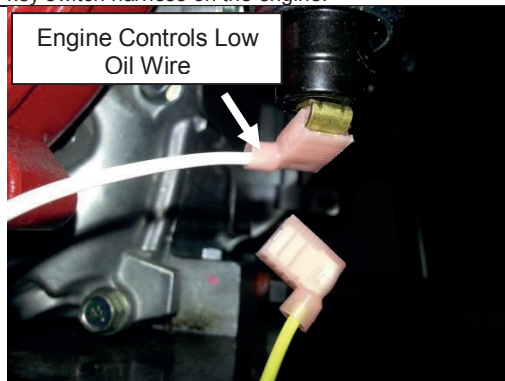
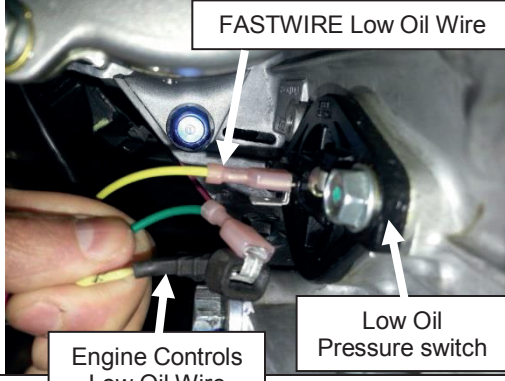
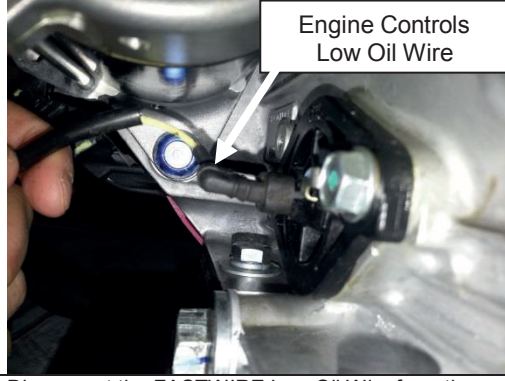
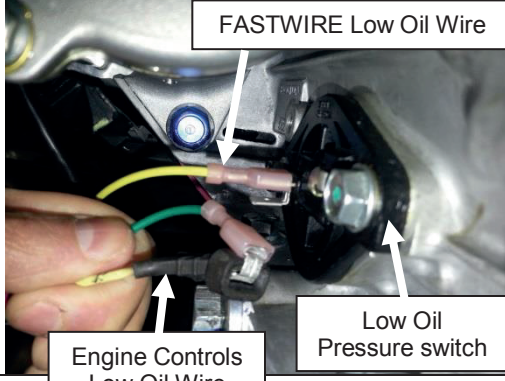
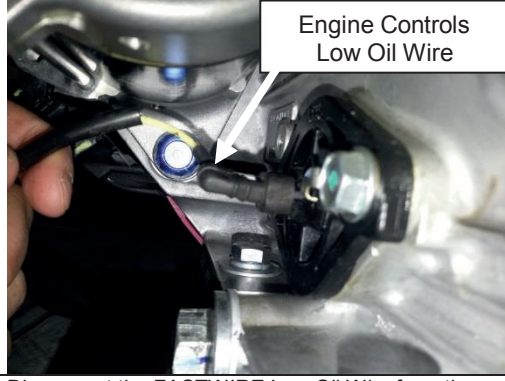
**Warning LED Indicators:**

The BB-4-21H (GX630) comes equipped with a Honda Engine Controls Box (ECB) which has a Low Oil LED indicator. When operating the pump with an XCP control panel, the Honda ECB Low Oil LED will turn on when the stop toggle switch or the Low Pressure Protection turns off the engine. The Honda ECB Low Oil LED indicator **MUST** be ignored. To turn off the ECB Low Oil LED, cut the power to the engine. **Only the warning indications on the XCP panel are to be considered when operating the pump with an XCP panel.**



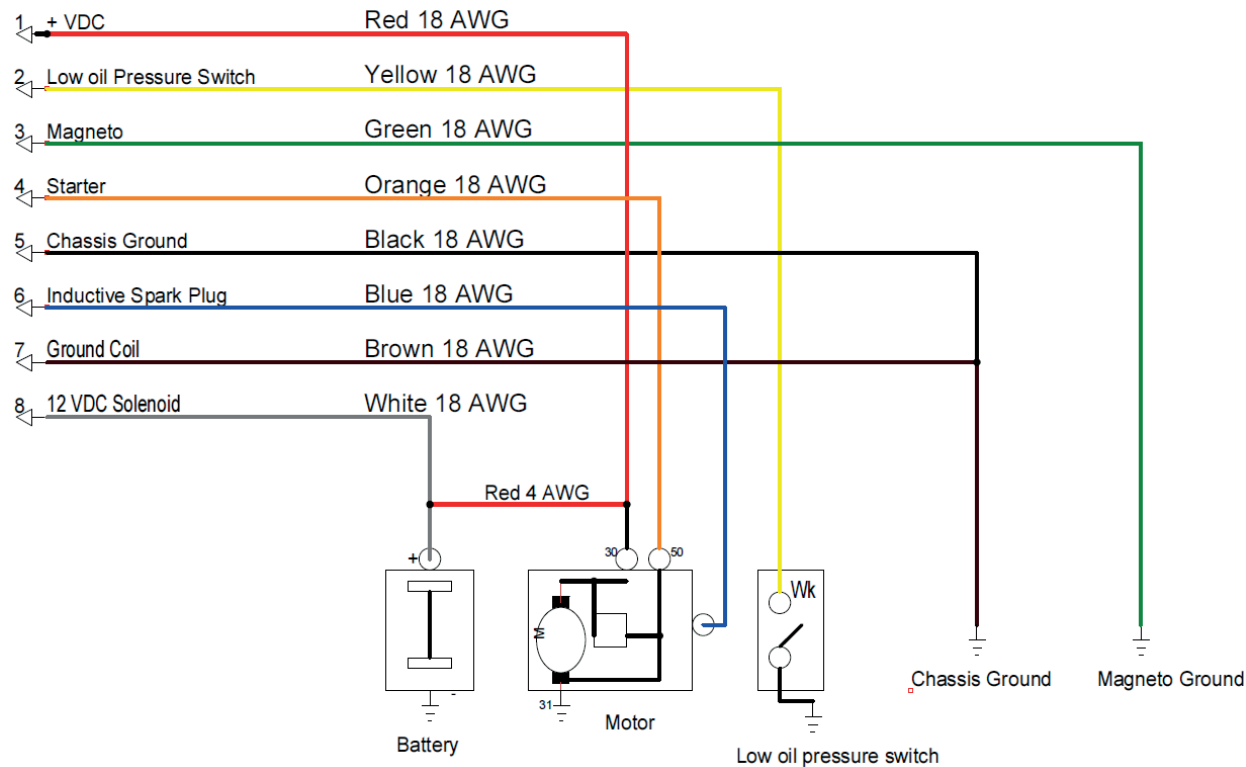
### Original Engine Wiring Configuration:

To revert back to the Original Engine Controls refer to the instructions below.

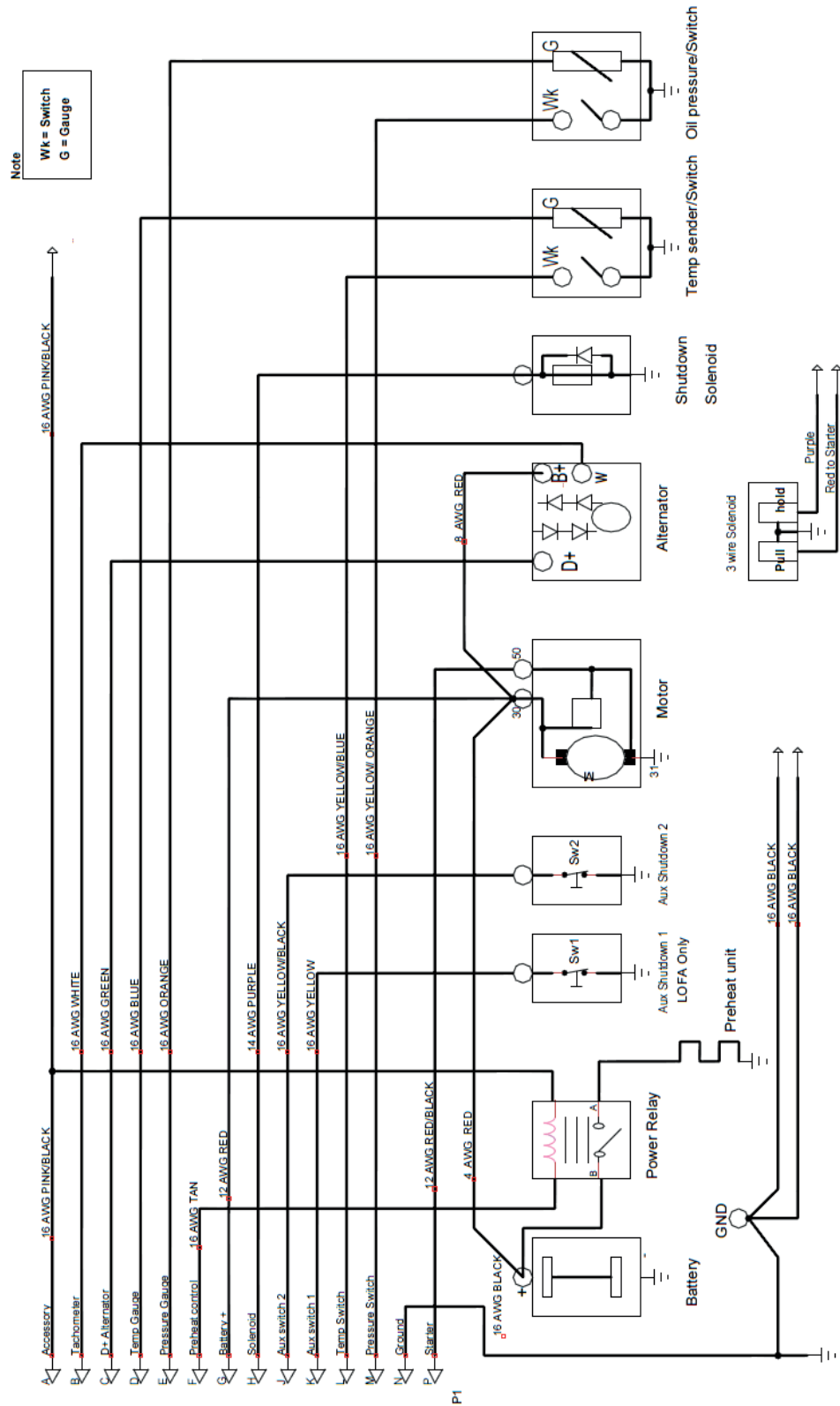
ENGINES	FOR XCP	FOR ENGINE CONTROLS
BRIGGS & STRATTON 18/23 HP	 <p>Magneto Grounding Stud</p>	 <p>Key Switch Magneto Ground Wire</p> <p>Key Switch Harness</p>
	 <p>FASTWIRE Low Oil Wire</p> <p>Low Oil Pressure switch</p>	 <p>Engine Controls Low Oil Wire</p> <p>Connect the Key Switch Magneto Ground Wire to the Magneto Grounding Stud. The wire is found in the key switch harness on the engine.</p>
	 <p>FASTWIRE Low Oil Wire</p> <p>Engine Controls Low Oil Wire</p> <p>Low Oil Pressure switch</p>	 <p>Engine Controls Low Oil Wire</p> <p>Disconnect the FASTWIRE Low Oil Wire (yellow) and connect the Engine Controls Low Oil Wire (white). Secure the remaining wire.</p>
HONDA GX630 21 HP	 <p>FASTWIRE Low Oil Wire</p> <p>Engine Controls Low Oil Wire</p> <p>Low Oil Pressure switch</p>	 <p>Engine Controls Low Oil Wire</p> <p>Disconnect the FASTWIRE Low Oil Wire from the Low Oil Pressure Switch and connect the Engine Controls Low Oil Wire. Secure the remaining wires.</p>

# FastWire Wiring Diagrams

## WIRING FOR GASOLINE PUMPS



WIRING FOR DIESEL PUMP



# Pump End Technical Data

## Threads

Discharge port	1-1/2" [38 mm] NPSH male
Suction (intake) port	2" [51 mm] NPSH male
Priming port	1-1/2" [38 mm] NPSH male

## Torque Values

Retaining ring screw	22-25 in-lbs	2.5-2.8 Nm
Shaft nose screw	32-36 in-lbs	3.6-4.1 Nm
Suction cover screw	32-36 in-lbs	3.6-4.1 Nm
Lock nut 12-50	250-260 in-lbs	28-29 Nm

## Clearance Data and Limits

Impeller outside diameter	3.660-3.675 in	92.96-93.35 mm
Impeller hub outside diameter	2.105-2.113 in	53.47-53.67 mm
Impeller bore	0.669-0.671 in	16.99-17.04 mm
Impeller rear shroud diameter	0.908-0.918 in	23.06-23.32 mm
Impeller height (12-7)	1.525-1.532 in	38.74-38.91 mm
Impeller height (12-11)	1.334-1.343 in	33.88-34.11 mm
Distributor vane diameter	3.740-3.770 in	95.00-95.76 mm
Distributor bore	0.938-0.957 in	23.83-24.31 mm
Distributor rear hub diameter	2.127-2.140 in	54.03-54.36 mm
Pump body (volute) ball bearing housing bore	2.047-2.049 in	51.994-52.045 mm
Pump body (volute) mechanical rotary seal housing bore	1.810-1.812 in	45.974-46.025 mm
Suction cover hub diameter	2.127-2.140 in	54.03-54.36 mm
Suction cover bronze bearing bushing bore	0.7495-0.7505 in	19.037-19.063 mm
Suction cover rear face & bronze bushing perpendicularity	0.004 in	0.10 mm
Shaft ball bearing diameter	0.9844-0.9847 in	25.004-25.011 mm
Shaft bronze bushing bearing diameter	0.4980-0.5000 in	12.649-12.700 mm
Shaft maximum run-out	0.0035 in	0.089 mm
Bronze bushing bearing bore	0.501-0.503 in	12.725-12.776 mm



## Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

# Warranty

**WHEREAS** subject to the following general and specific terms and conditions, WATERAX Inc. (the “**Seller**”) hereby warrants to the original purchaser of the products from WATERAX, (the “**Purchaser**”) that its products, including any pump parts products manufactured by WATERAX (the “**Products**”) sold under Seller’s brands will be free of defects in material and workmanship for the applicable Warranty Period (as set out in full at [www.waterax.com/eng/warranty](http://www.waterax.com/eng/warranty)).

Product	Warranty Period	Coverage
4-Stroke Powered Pumps	Two (2) Years	Limited
2-Stroke Powered Pumps	Earlier of One (1) Year or One hundred (100) run hours	Limited
Backpack Pumps	One (1) Year	Limited
Skid Units	One (1) Year	Limited
Control Panels, Electronics Manifolds	One (1) Year	Limited
Genuine Parts	Ninety (90) Days	Limited

## 1. Limitations, exclusions and other terms and conditions applicable for all Products:

- a. The Warranty shall be voided upon the occurrence of any of the following events: (a) the Product is used for an application, with products or in a manner other than the application, products and manner for which such Product is designed and intended; (b) the Product is subjected to a use, service, condition or environment other than a use, service, condition or environment for which such Product is designed and intended; (c) the Product is not properly installed by the Purchaser or its agent or representative; (d) the Product is not properly tested and maintained in accordance with Seller’s product manuals and supplemental instructions and guidelines, applicable industry standards and guidelines, and applicable legal and regulatory requirements; (e) the Product is altered, modified, serviced (with the exception of routine maintenance performed in accordance with the Seller’s product manuals and supplemental instructions as set out in full at [www.waterax.com/eng/warranty](http://www.waterax.com/eng/warranty), and industry accepted standards and guidelines), or repaired by a person other than the Seller or a person authorized by the Seller to make such alteration or modification or perform such service or repair; (f) the Seller is not paid the full amount of the purchase price for the Product when due; (g) any bad faith invocation of a warranty claim or breach of a purchase agreement by the Purchaser.
  - b. The following are excluded from Warranty coverage: (a) non-defective parts worn, exhausted or consumed through normal usage of the Product; (b) any consumable parts normally subject to routine replacement, including but not limited to pump packing, O-rings, gaskets, intake screens, anodes or filters; (c) routine maintenance as specified and in accordance with the Seller’s product manuals and supplemental instructions and guidelines as set out in full at [www.waterax.com/eng/warranty](http://www.waterax.com/eng/warranty); (d) failure due to compliance with a specification or design provided or required by Purchaser; (e) failure due to improper operation, excess pressure, excess voltage, abuse, misuse, negligence or accidents or other similar causes; (f) failure due to operator error; (g) damage during or after shipment and failure attributable thereto or resulting there from; (h) failure attributable to or resulting from the failure or substandard, inadequate or improper performance of any part, component or equipment not supplied by the Seller; (i) failure attributable to or resulting from the failure or substandard, inadequate or improper performance of any third party part, component, product or equipment, whether or not combined, packaged, incorporated, installed or used with a Seller brand part, component, product or equipment.
- 2. Claim Procedure.** The claim procedure applicable under this warranty, including any applicable notice and documentation requirements, are set out in full at [www.waterax.com/eng/warranty](http://www.waterax.com/eng/warranty) and constitute an essential term of this Warranty.
- 3. Repaired and Replacement Product.** If requested to do so by the Purchaser the Seller may, at its sole option and in its sole discretion, supply a replacement Product or part to the Purchaser prior to making a final determination as to whether Warranty Coverage is available.

If the Seller ultimately determines that no Warranty Coverage is available for a Product claimed to be defective, the Purchaser shall have the option of either (a) having the Product returned to it freight collect without repair or replacement; or (b) if Seller determines that the Product is repairable, have the Product repaired by Seller or another party designated by it on a time and materials basis at Seller’s then current standard charges for non-warranty repairs and then returned to Purchaser freight collect. The Seller reserves the right to use reconditioned parts for Warranty repairs and to use reconditioned Products for Warranty replacements. Repaired Product and replacement Product shall be warranted only for the remainder of the original Warranty Period.

- 4. Limitation of Liability:** SELLER’S WARRANTY AS SET FORTH HEREIN IS SELLER’S SOLE AND EXCLUSIVE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ALL WARRANTIES OF MERCHANTABILITY, QUALITY, COURSE OF DEALING, USAGE OF TRADE, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT. THE RIGHTS AND REMEDIES SET FORTH HEREIN ARE THE SOLE AND EXCLUSIVE RIGHTS AND REMEDIES AGAINST SELLER, EXCEPT FOR THE SPECIFIC LIABILITIES AND OBLIGATIONS PROVIDED HEREIN, SELLER SHALL HAVE NO LIABILITY OR OBLIGATION WITH RESPECT TO ANY PRODUCT CLAIMED TO BE DEFECTIVE IN ANY MANNER.



# **WATERAX**

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**waterax.com**

To help you stay **#ReadyForWildfires**, we've made a few changes, placing 100% of our focus on manufacturing our core products, portable fire pumps.

To do so, we've established a network of trusted supply and distribution partners that can help us provide *WATERAX* pumps quickly in addition to water-handling equipment and accessories.

For immediate assistance when it comes to pumps and water-handling accessories, please contact your local dealer.

For genuine spare parts, visit our online store.

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WATER**