Operator’s Manual

Pump

PTS 4V
PTK 4

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Manufacturer

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Original instructions

This Operator's Manual presents the original instructions. The original language of this Operator's Manual is American English.

Foreword

Machines covered in this manual

Machine	Item Number
PTS 4V	0007683, 0007691
PTK 4	0007692

Machine documentation

- Keep a copy of the Operator's Manual with the machine at all times.
- Use the separate Parts Book supplied with the machine to order replacement parts.
- Refer to the separate Repair Manual for detailed instructions on servicing and repairing the machine.
- If you are missing any of these documents, please contact Wacker Neuson Corporation to order a replacement or visit www.wackerneuson.com.
- When ordering parts or requesting service information, be prepared to provide the machine model number, item number, revision number, and serial number.

Expectations for information in this manual

- This manual provides information and procedures to safely operate and maintain the above Wacker Neuson model(s). For your own safety and to reduce the risk of injury, carefully read, understand, and observe all instructions described in this manual.
- Wacker Neuson Corporation expressly reserves the right to make technical modifications, even without notice, which improve the performance or safety standards of its machines.
- The information contained in this manual is based on machines manufactured up until the time of publication. Wacker Neuson Corporation reserves the right to change any portion of this information without notice.

CALIFORNIA Proposition 65 Warning

Engine exhaust, some of its constituents, and certain vehicle components, contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Laws pertaining to spark arresters

NOTICE: State Health Safety Codes and Public Resources Codes specify that in certain locations spark arresters be used on internal combustion engines that use hydrocarbon fuels. A spark arrester is a device designed to prevent accidental discharge of sparks or flames from the engine exhaust. Spark arresters are qualified and rated by the United States Forest Service for this purpose. In order to comply with local laws regarding spark arresters, consult the engine distributor or the local Health and Safety Administrator.

Manufacturer's approval

This manual contains references to *approved* parts, attachments, and modifications. The following definitions apply:

- **Approved parts or attachments** are those either manufactured or provided by Wacker Neuson.
- **Approved modifications** are those performed by an authorized Wacker Neuson service center according to written instructions published by Wacker Neuson.

- **Unapproved parts, attachments, and modifications** are those that do not meet the approved criteria.

Unapproved parts, attachments, or modifications may have the following consequences:

- Serious injury hazards to the operator and persons in the work area
- Permanent damage to the machine which will not be covered under warranty

Contact your Wacker Neuson dealer immediately if you have questions about approved or unapproved parts, attachments, or modifications.

1 Safety Information

This manual contains DANGER, WARNING, CAUTION, *NOTICE,* and NOTE signal words which must be followed to reduce the possibility of personal injury, damage to the equipment, or improper service.

This is the safety alert symbol. It is used to alert you to potential personal hazards.

- ▶ Obey all safety messages that follow this symbol.

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

- ▶ To avoid death or serious injury from this type of hazard, obey all safety messages that follow this signal word.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

- ▶ To avoid possible death or serious injury from this type of hazard, obey all safety messages that follow this signal word.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

- ▶ To avoid possible minor or moderate injury from this type of hazard, obey all safety messages that follow this signal word.

NOTICE: Used without the safety alert symbol, NOTICE indicates a situation which, if not avoided, could result in property damage.

Note: *A Note contains additional information important to a procedure.*

1.1 Operation / Intended Use

This machine is a centrifugal trash pump. The Wacker Neuson Trash Pump consists of a tubular steel frame surroundnig a gasoline or diesel engine, a fuel tank, and an impeller pump with ports for water suction and discharge. The engine rotates the impeller during operation. Waste water is drawn into the pump through the suction port and expelled through the discharge port. The operator connects hoses to the pump and routes them so that water and solids are drained from the work area and discharged into an appropriate location.

This machine is intended to be used for general de-watering applications. This machine is intended for the pumping of clear water, or water containing solids up to the size stated within the product specifications, and up to the flow, head, and suction lift limits also stated within the product specifications.

This machine has been designed and built strictly for the intended use described above. Using the machine for any other purpose could permanently damage the machine or seriously injure the operator or other persons in the area. Machine damage caused by misuse is not covered under warranty.

The following are some examples of misuse:

- Pumping flammable, explosive, or corrosive fluids
- Pumping hot or volatile fluids that result in pump cavitation
- Operating the pump outside of product specifications due to incorrect diameter hoses, incorrect length hoses, other inlet or outlet restrictions, or excessive suction lift or head
- Using the machine as a ladder, support, or work surface
- Using the machine to carry or transport passengers or equipment
- Operating the machine outside of factory specifications
- Operating the machine in a manner inconsistent with all warnings found on the machine and in the Operator's Manual

This machine has been designed and built in accordance with the latest global safety standards. It has been carefully engineered to eliminate hazards as far as practicable and to increase operator safety through protective guards and labeling. However, some risks may remain even after protective measures have been taken. They are called residual risks. On this machine, they may include exposure to:

- Heat, noise, exhaust, and carbon monoxide from the engine
- Fire hazards from improper refueling techniques
- Fuel and its fumes

- Personal injury from improper lifting techniques
- Projectile hazard from discharge
- Crushing hazards from a tipping or falling pump

To protect yourself and others, make sure you thoroughly read and understand the safety information presented in this manual before operating the machine.

1.2 Operating Safety

WARNING

Familiarity and proper training are required for the safe operation of the machine. Machines operated improperly or by untrained personnel can be hazardous. Read the operating instructions contained in this manual and the engine manual, and familiarize yourself with the location and proper use of all controls. Inexperienced operators should receive instruction from someone familiar with the machine before being allowed to operate it.

Operator qualifications

Only trained personnel are permitted to start, operate, and shut down the machine. They also must meet the following qualifications:

- have received instruction on how to properly use the machine
- are familiar with required safety devices

The machine must not be accessed or operated by:

- children
- people impaired by alcohol or drugs

Personal Protective Equipment (PPE)

Wear the following Personal Protective Equipment (PPE) while operating this machine:

- Close-fitting work clothes that do not hinder movement
- Safety glasses with side shields
- Hearing protection
- Safety-toed footwear

1.2.1 Do not allow anyone to operate this equipment without proper training. People operating this equipment must be familiar with the risks and hazards associated with it.

1.2.2 Do not use accessories or attachments that are not recommended by Wacker Neuson. Damage to equipment and injury to the user may result.

1.2.3 Do not touch the engine or muffler while the engine is on or immediately after it has been turned off. These areas get hot and may cause burns.

1.2.4 Do not pump volatile, flammable, or low flash point fluids. These fluids could ignite or explode.

1.2.5 Do not pump corrosive chemicals or water containing toxic substances. These fluids could create serious health and environmental hazards. Contact local authorities for assistance.

1.2.6 Do not open the priming plug when the pump is hot. Do not loosen or remove inlet or discharge hose fittings when the pump is hot. Hot water inside could be pressurized much like the radiator on an automobile. Allow the pump to cool to the touch before loosening the plug and before loosening or removing the inlet or discharge hose fittings.

1.2.7 Do not open pump housing cover while pump is operating, or start pump with the cover off. The rotating impeller inside the pump can cut or sever objects caught in it.

1.2.8 Do not block or restrict flow from inlet line or discharge line. Remove kinks from discharge line before starting pump. Operation with a blocked inlet line or discharge line can cause water inside pump to overheat.

1.2.9 Be sure operator is familiar with proper safety precautions and operation techniques before using machine.

1.2.10 Read, understand, and follow procedures in the Operator's Manual before attempting to operate the machine.

1.2.11 Be sure the machine is on a firm, level surface and will not tip, roll, slide, or fall while operating.

1.2.12 Close fuel valve on engines equipped with one when machine is not being operated.

1.2.13 Store the machine properly when it is not being used. The machine should be stored in a clean, dry location out of the reach of children.

1.2.14 Wear hearing protection when operating equipment.

1.2.15 Do not pump fluid into an inappropriate location.

1.2.16 Do not place hoses where they may become a tripping hazard.

1.2.17 Do not operate the pump without the strainer or with an incorrect strainer.

1.2.18 Do not operate the machine with unapproved accessories or attachments.

1.2.19 Do not transport the machine while it is running.

1.3 Operator Safety while using Internal Combustion Engines

WARNING
Internal combustion engines present special hazards during operation and fueling. Failure to follow the warnings and safety standards could result in severe injury or death.

- Read and follow the warning instructions in the engine owner's manual and the safety guidelines below.

DANGER
Asphyxiation hazard. Using a pump indoors CAN KILL YOU IN MINUTES. Pump exhaust contains carbon monoxide. This is a poison you cannot see or smell.

- NEVER use this pump inside a home or garage, EVEN IF doors and windows are open. Only use OUTSIDE and far away from windows, doors, and vents.
- NEVER use a pump inside an enclosed area, such as a tunnel or a trench, unless adequate ventilation is provided through such items as exhaust fans or hoses.

Operating safety

When operating the pump:

- Keep the area around exhaust pipe free of flammable materials.
- Check the fuel lines and the fuel tank for leaks and cracks before starting the engine.

When operating the pump:

- Do not smoke while operating the machine.
- Do not run the machine if fuel leaks are present or the fuel lines are loose.
- Do not run the engine near sparks or open flames.
- Do not touch the engine or muffler while the engine is running or immediately after it has been turned off.
- Do not operate a machine when its fuel cap is loose or missing.
- Do not start the engine if fuel has spilled or a fuel odor is present. Move the machine away from the spill and wipe the machine dry before starting.

Refueling safety

When refueling the engine:

- Clean up any spilled fuel immediately.
- Refill the fuel tank in a well-ventilated area.
- Replace the fuel tank cap after refueling.

When refueling the engine:

- Do not smoke.
- Do not refuel a hot or running engine.
- Do not refuel the engine near sparks or open flames.
- Do not refuel if the machine is positioned in a truck fitted with a plastic bed liner. Static electricity can ignite the fuel or fuel vapors.

1.4 Service Safety

WARNING

A poorly maintained machine can become a safety hazard! In order for the machine to operate safely and properly over a long period of time, periodic maintenance and occasional repairs are necessary.

Personal Protective Equipment (PPE)

Wear the following Personal Protective Equipment (PPE) while servicing or maintaining this machine:

- Close-fitting work clothes that do not hinder movement
- Safety glasses with side shields
- Hearing protection
- Safety-toed footwear

In addition, before servicing or maintaining the machine:

- Tie back long hair.
- Remove all jewelry (including rings).

1.4.1 Do not attempt to clean or service the machine while it is running. Rotating parts can cause severe injury.

1.4.2 Do not crank a flooded engine with the spark plug removed on gasoline-powered engines. Fuel trapped in the cylinder will squirt out the spark plug opening.

1.4.3 Do not test for spark on gasoline-powered engines if the engine is flooded or the smell of gasoline is present. A stray spark could ignite the fumes.

1.4.4 Do not use gasoline or other types of fuels or flammable solvents to clean parts, especially in enclosed areas. Fumes from fuels and solvents can become explosive.

1.4.5 Always operate machine with all safety devices and guards in place and in working order. Do not modify or defeat safety devices. Do not operate machine if any safety devices or guards are missing or inoperative.

1.4.6 Keep the area around the muffler free of debris such as leaves, paper, cartons, etc. A hot muffler could ignite the debris and start a fire.

1.4.7 When replacement parts are required for this machine, use only Wacker Neuson replacement parts or those parts equivalent to the original in all types of specifications, such as physical dimensions, type, strength, and material.

1.4.8 Disconnect the spark plug on machines equipped with gasoline engines, before servicing, to avoid accidental start-up.

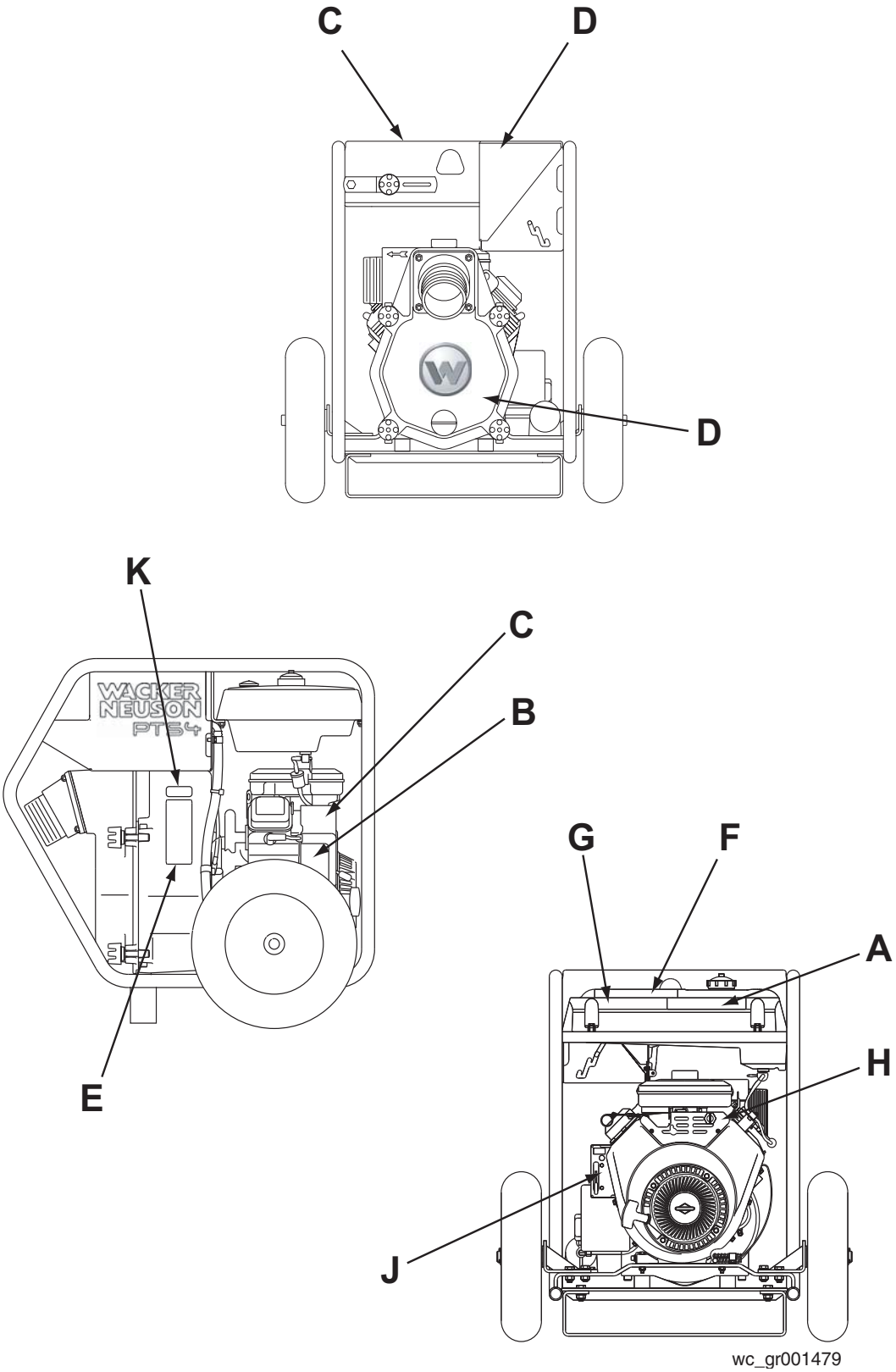
1.4.9 Keep the machine clean and labels legible. Replace all missing and hard-to-read labels. Labels provide important operating instructions and warn of dangers and hazards.

1.4.10 Handle impeller carefully. The impeller can develop sharp edges which can cut.

1.4.11 Do not tip the machine for cleaning or for any other reason.

2 Labels

2.1 Label Locations



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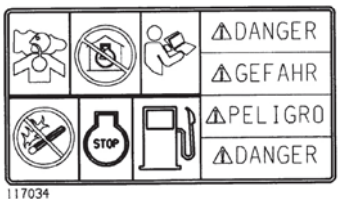
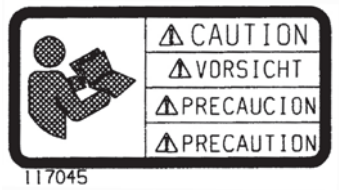
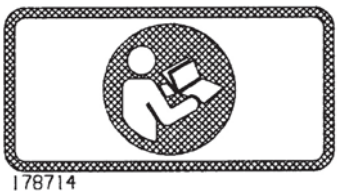
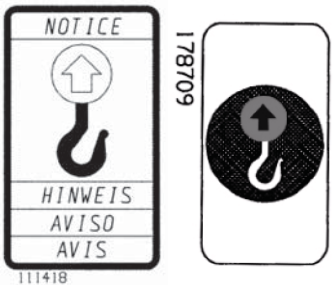
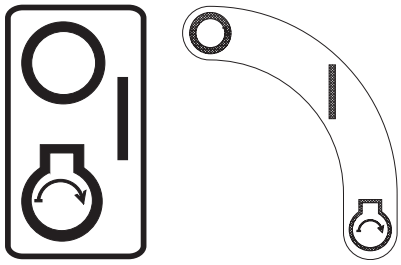
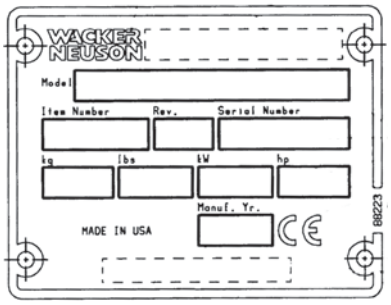
2.2 Safety Labels

Wacker Neuson machines use international pictorial labels where needed. These labels are described below.

	Label	Meaning
A	 	DANGER! Asphyxiation hazard. ■ Engines emit carbon monoxide. ■ Do not run the machine indoors or in an enclosed area. ■ NEVER use inside a home or garage, EVEN IF doors and windows are open. ■ Only use OUTSIDE and far away from windows, doors, and vents. ■ Read the Operator's Manual. ■ No sparks, flames, or burning objects near the machine. ■ Stop the engine before refueling.
B	 	WARNING! Hot surface!
C	 	CAUTION! Read and understand the supplied Operator's Manual before operating this machine. Failure to do so increases the risk of injury to yourself and others.

	Label	Meaning
D		WARNING! Do not open if pump is hot. Hot water and/or steam inside could be pressurized.
E		WARNING! Never pump volatile, flammable, or low-flash-point fluids. These fluids could ignite or explode.
F		CAUTION Lifting point.
G		Guaranteed sound power level in dB(A).

	Label	Meaning
H		Key switch: off on start
J		Throttle control lever: Rabbit = Full or Fast Turtle = Idle or Slow
K		This machine may be covered by one or more patents.
—		A nameplate listing the model number, item number, revision number, and serial number is attached to each unit. Please record the information found on this plate so it will be available should the nameplate become lost or damaged. When ordering parts or requesting service information, you will always be asked to specify the model number, item number, revision number, and serial number of the unit.

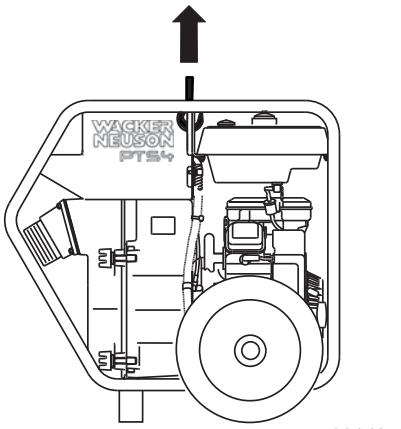
3 Lifting and Transporting

WARNING
Personal injury hazard. This pump is heavy enough to cause injury if proper lifting techniques are not used.

▶ Observe the guidelines below when lifting the pump.

Lifting the machine

- Do not attempt to lift the pump unassisted. Use appropriate lifting equipment such as slings, chains, hooks, ramps, or jacks.
- Make sure lifting equipment is attached securely and has enough weight-bearing capacity to lift or hold the pump safely.
- Remain aware of the location of other people nearby when lifting the pump.
- To lift the pump, attach a hook, harness, or cable through the lifting eye.



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Transporting the machine

Observe the following guidelines when transporting the pump to and from the job site.

- Drain the fuel tank before transporting the pump.
- Ensure that the pump is securely strapped down in the transport vehicle to prevent it from sliding or tipping.
- Do not refuel the pump in or on the transport vehicle. Move the pump to its operating location and then fill the fuel tank.

4 Operation

4.1 Preparing the Machine for First Use

Preparing for first use

To prepare your machine for first use:

4.1.1 Make sure all loose packaging materials have been removed from the machine.

4.1.2 Check the machine and its components for damage. If there is visible damage, do not operate the machine! Contact your Wacker Neuson dealer immediately for assistance.

4.1.3 Take inventory of all items included with the machine and verify that all loose components and fasteners are accounted for.

4.1.4 Attach component parts not already attached.

4.1.5 Add fluids as needed and applicable, including fuel, engine oil, and battery acid.

4.1.6 Move the machine to its operating location.

4.2 Recommended Fuel

The engine requires regular grade unleaded gasoline. Use only fresh, clean gasoline. Gasoline containing water or dirt will damage fuel system. Consult engine owner's manual for complete fuel specifications.

4.3 Before Starting

See Graphic: wc_gr000013

4.3.1 Read safety instructions at the beginning of this Operator's Manual.

4.3.2 Place pump as near to water as possible, on a firm, flat, level surface.

4.3.3 To prime pump, remove prime plug **(a)** and fill pump housing with water. If the pump housing is not filled with water before starting, it will not begin pumping.

WARNING

Do not open priming plug, discharge plug, or loosen hose fittings if pump is hot! Water or vapor inside pump may be under pressure.

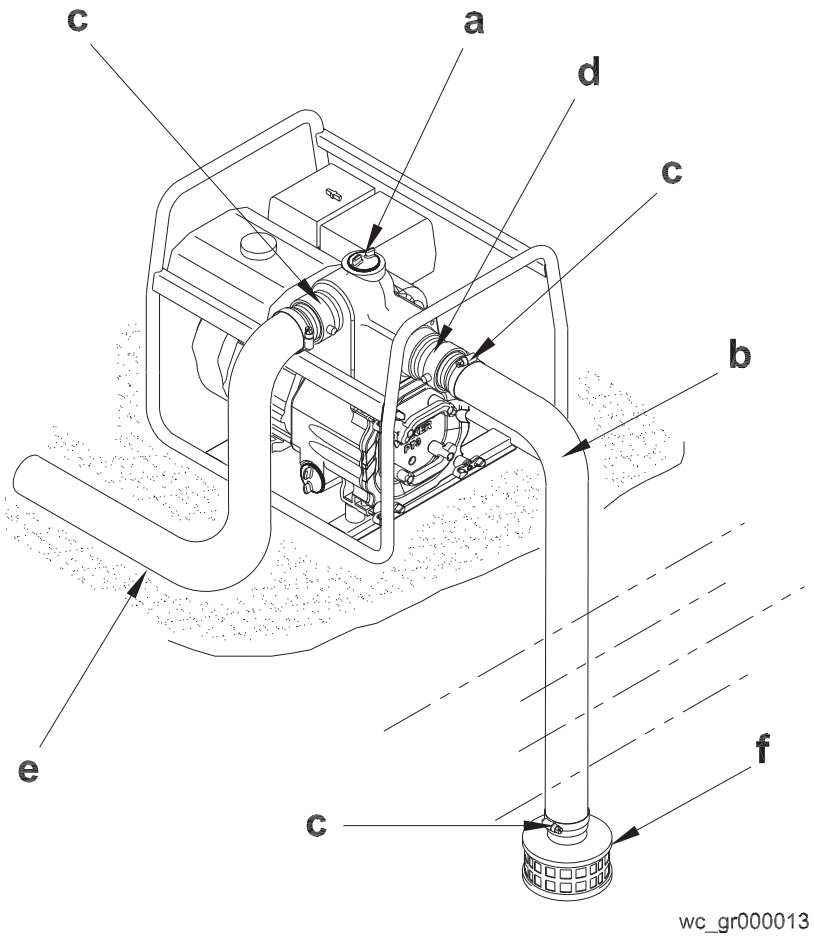
4.3.4 Check for leaks between pump and engine. If water is leaking, the seal inside pump is worn or damaged. Continued operation may cause water damage to engine.

4.3.5 Check that hoses are securely attached to pump. Suction hose **(b)** must not have any air leaks. Tighten hose clamps **(c)** and couplings **(d)**. Check that discharge hose **(e)** is not restricted. Lay hose out as straight as possible. Remove any twists or sharp bends from hose which may block the flow of water.

4.3.6 Make sure suction strainer **(f)** is clean and securely attached to end of hose. The strainer is designed to protect the pump by preventing large objects from being pulled into the pump.

NOTICE: Strainer should be positioned so it will remain completely under water. Running the pump with the strainer above water for long periods can damage the pump.

4.3.7 Check fuel level, engine oil level, and condition of air cleaner.



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4.4 To Start

See Graphic: wc_gr001480

Follow the instructions below and read starting and stopping instuctions found in the engine owner's manual.

4.4.1 Open the fuel valve **(b1)**.

4.4.2 If the engine is cold, pull out the choke control **(a1)**. If the engine is hot, push in the choke control **(a2)**.

4.4.3 Move the throttle control to the fast position **(c1)**.

4.4.4 Turn the key switch to the start position **(d3)** and hold it until the engine starts.

***NOTICE*:** Do not crank engine longer than 15 seconds at a time. Extended cranking can damage the starter motor.

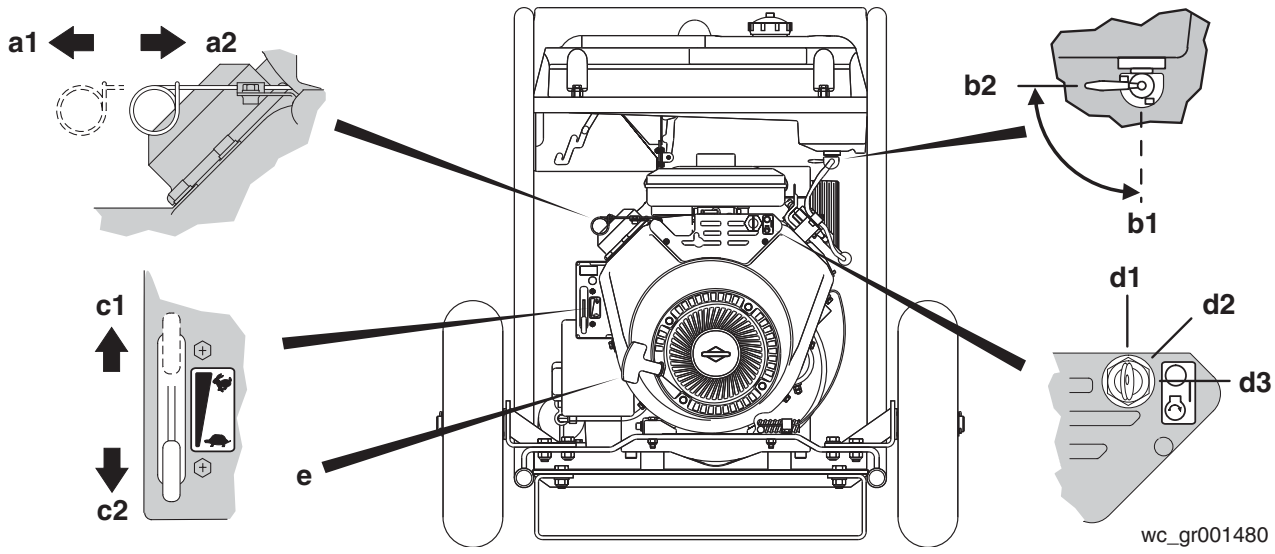
4.4.5 To start the engine using manual start:

- Turn the key switch to the run position **(d2)**.
- Rapidly pull the starter rope **(e)** to start the engine.
- Leave key in run position **(d2)** while engine is running.

Note: *The engine is equipped with a low oil protection system, which does not allow the engine to start if the oil level is low. This device will not protect the engine if a low oil level occurs while running. The switch opens on a pressure rise of 4 psi ±1.5 psi.*

4.4.6 Push the choke in as the engine warms **(a2)**.

4.4.7 Keep the engine throttle in the fast position while operating pump.



4.5 To Stop

See Graphic: wc_gr001480

4.5.1 Reduce engine RPM by moving the throttle completely to the idle position **(c2)**.

4.5.2 Turn the engine switch to the stop position **(d1)**.

4.5.3 Close the fuel valve **(b2)**.

4.6 Operation

Pump should begin pumping water within a minute depending on length of suction hose and height of pump above water. Longer hoses will require more time.

If pump does not prime, check for loose fittings or air leak in suction hose. Make sure strainer in water is not blocked.

Run engine at full speed while operating pump.

WARNING

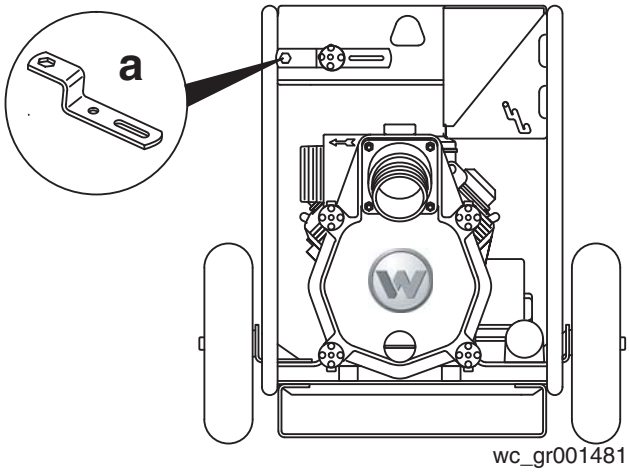
Do not pump corrosive chemicals or water containing toxic substances. These fluids could create serious health and environmental hazards. Contact local authorities for assistance.

4.7 Pump Wrench

See Graphic: wc_gr001481

The wrench **(a)** supplied with the pump can be used to loosen and tighten: hose couplings, knobs on pump cover, priming plug, and drain plug on front cover.

Store wrench on pump frame.



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4.8 Accessories

Wacker Neuson offers a complete line of fittings, hoses, and clamps to properly connect the pump to match various job conditions.

4.9 Hoses and Clamps

See Graphic: wc_gr000021

Suction hoses **(a)** must be rigid enough not to collapse when pump is operating.

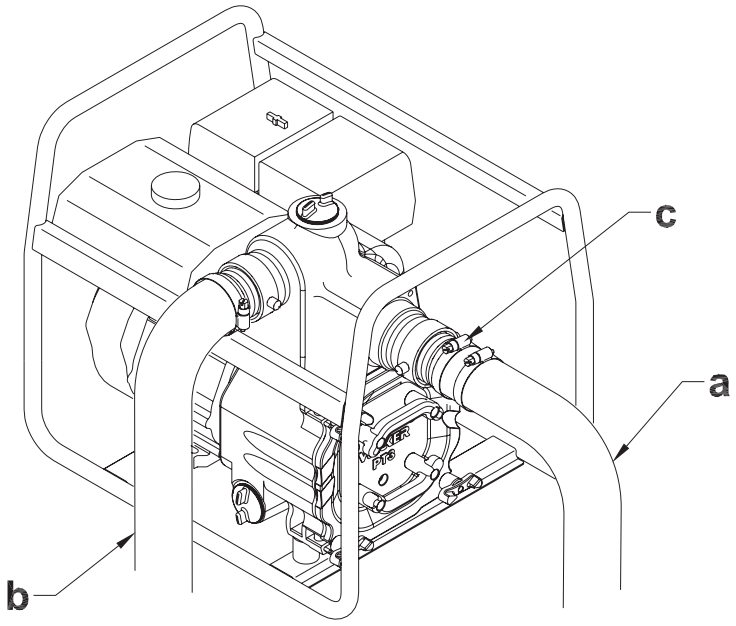
Discharge hoses **(b)** are usually thin-walled collapsible hoses. Rigid hoses similar to those used as suction hoses may also be used as discharge hoses.

Note: *Suction and discharge hoses are available from Wacker Neuson. Contact your nearest dealer for more information.*

Two clamps **(c)** are recommended for connection of suction hoses to inlet coupling.

Note: *This connection is important. Even a small air leak on the suction side of pump will prevent the pump from priming.*

For other hose connections, one T-bolt or worm-gear-type clamp is usually sufficient to hold hoses in place. In some cases, slight variances in hose diameters may make it necessary to add more clamps in order to maintain tight connections.



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4.10 Emergency Shutdown Procedure

If a breakdown/accident occurs while the machine is operating, follow the procedure below.

4.10.1 Stop the engine.

4.10.2 Turn off the fuel supply.

4.10.3 Remove the obstruction.

4.10.4 Unkink the hoses.

4.10.5 Allow the machine to cool.

4.10.6 Contact the rental yard or machine owner.

5 Maintenance

5.1 Periodic Maintenance Schedule

The chart below lists basic machine and engine maintenance. Refer to your engine operator's manual for additional information on engine maintenance.

	Daily before starting	After first 5 hrs.	Every 50 hrs.	Every 100 hrs.	Every year
Check fuel level.	■				
Check engine oil level.	■				
Inspect for leaks between pump and engine.	■				
Inspect air filter. Clean as needed.	■				
Check external hardware.	■				
Inspect shock mounts for damage.			■		
Change oil in pump housing.			■		
Change engine oil and replace filter.		■	■		
Replace air cleaner.				■	
Check and clean spark plug.				■	
Replace in-line fuel filter.					■
Check and adjust valve clearances. *					■

** This procedure requires special training and equipment.*

5.2 Engine Lubrication

See Graphic: wc_gr000562

Check engine oil level daily before starting engine. Add oil as required.

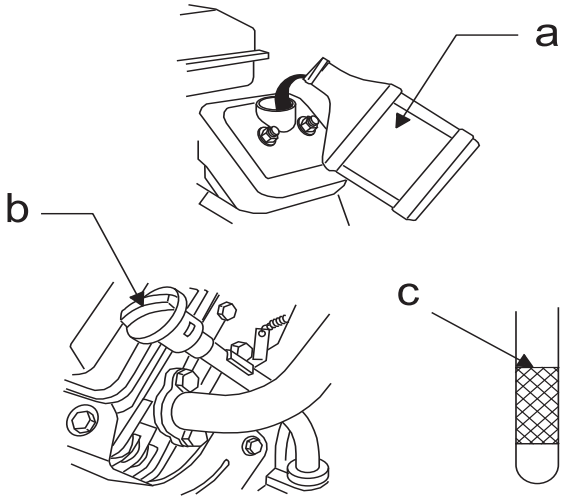
5.2.1 To check oil level, place machine on a level surface.

5.2.2 Clean area around oil fill and remove dipstick.

5.2.3 Pour oil **(a)** slowly, checking oil level occasionally with dipstick.

5.2.4 Fill to full mark on dipstick **(b)**. Do not overfill.

5.2.5 When measuring oil level, screw dipstick **(c)** firmly in place until cap bottoms on tube.



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5.3 Changing Oil Filter

See Graphic: wc_gr001482

Replace the oil filter after every 100 hours of operation.

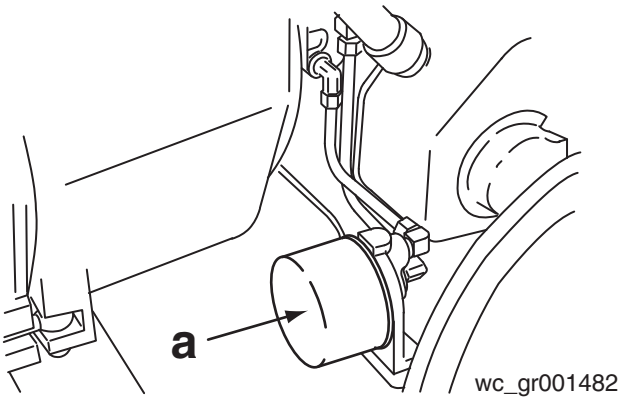
5.3.1 Drain the engine oil and replace it with fresh oil before removing the used oil filter. See *Technical Data* for oil quantity and type.

Note: *In the interests of environmental protection, place a plastic sheet and a container under the machine to collect any liquid which drains off. Dispose of this liquid in accordance with environmental protection legislation.*

5.3.2 Remove the used filter before installing a new filter. Lightly oil the filter gasket with fresh, clean engine oil.

5.3.3 Screw the filter **(a)** on by hand until the gasket makes contact, then tighten an additional 1/2 to 3/4 turn.

5.3.4 Start and run the engine to check for leaks. Stop the engine. Recheck the oil level and add oil if required. See *Technical Data*.



5.4 Air Cleaner

See Graphic: wc_gr000564

Service air cleaner frequently to prevent carburetor malfunction.

***NOTICE*:** Do not run the engine without the air cleaner. Severe engine damage will occur.

Do not use gasoline or other types of low flash point solvents for cleaning the air cleaner. A fire or explosion could result.

The engine is equipped with a dual element air cleaner. To service air cleaner:

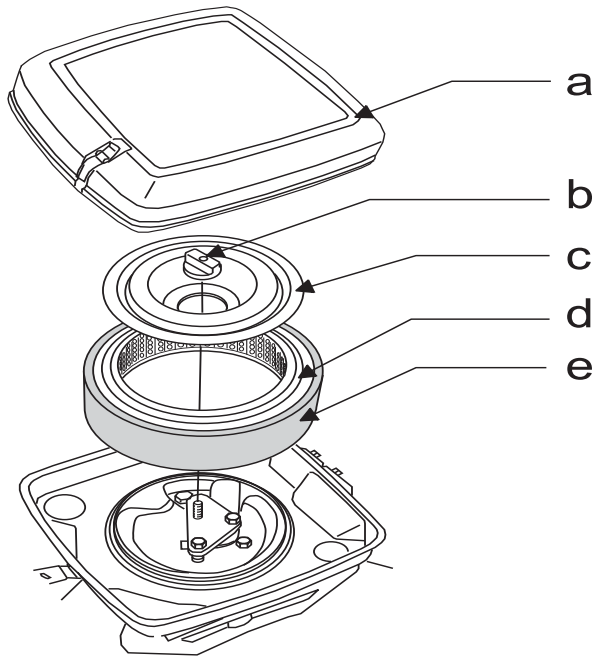
5.4.1 Remove cover **(a)**, knob **(b)**, and retaining plate **(c)**.

5.4.2 Remove foam precleaner **(d)** from filter cartridge **(e)**.

5.4.3 Wash precleaner in liquid detergent and water. Squeeze dry in a clean cloth. Saturate precleaner in engine oil, squeeze out excess oil. Replace precleaner if it is damaged or heavily soiled.

5.4.4 To clean cartridge, remove and tap lightly on a flat surface. Replace cartridge if it is damaged or heavily soiled.

Note: *To avoid damage to precleaner or cartridge when cleaning them, do not use petroleum solvents or pressurized air.*



wc_gr000564

5.5 Spark Plug

See Graphic: wc_gr000028

Clean or replace the spark plug as needed to ensure proper operation. Refer to your engine operator's manual.

WARNING

The muffler becomes very hot during operation and remains hot for a while after stopping the engine. Do not touch the muffler while it is hot.

Note: *Refer to section "Technical Data" for the recommended spark plug type and the electrode gap setting*.

5.5.1 Remove the spark plug and inspect it.

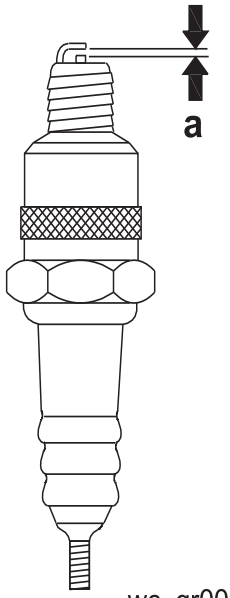
5.5.2 Replace the spark plug if the insulator is cracked or chipped.

5.5.3 Clean the spark plug electrodes with a wire brush.

5.5.4 Set the electrode gap **(a)**.

5.5.5 Tighten the spark plug securely.

***NOTICE*:** *A loose spark plug can become very hot and may cause engine damage*.



wc_gr000028

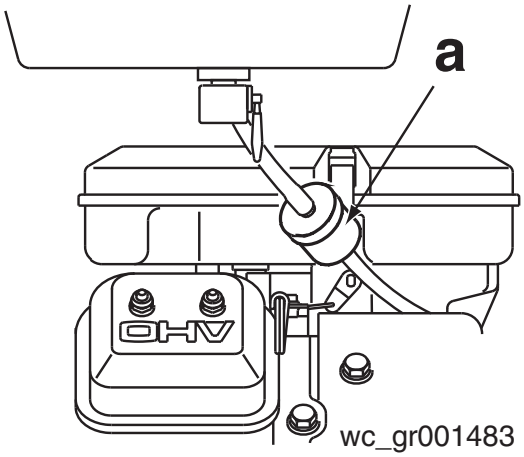
5.6 Fuel Filter

See Graphic: wc_gr001483

5.6.1 Change in-line fuel filter **(a)** once a year.

5.6.2 Check fuel lines and fittings frequently for cracks or leaks. Replace as needed.

Allow engine to cool and close fuel valve before replacing fuel filter.



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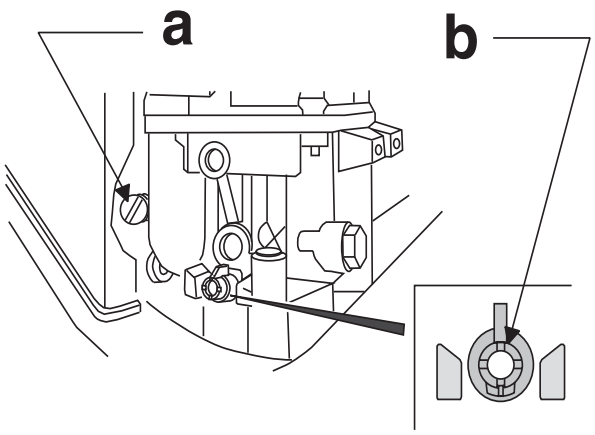


wc_gr000566

5.7 Carburetor Adjustment

See Graphic: wc_gr000566

Note: *The air cleaner must be in place and the engine warm when making adjustments to carburetor.*

5.7.1 With engine running, place throttle in SLOW position and rotate carburetor throttle lever against the idle speed screw **(a)** and hold it there.

5.7.2 Turn the idle speed screw to obtain 1300 to 1500 rpm.

5.7.3 While still holding the throttle lever against the idle speed screw, turn the idle mixture valve **(b)** midway between the limits.

5.7.4 Readjust the idle speed to 1200 rpm and release carburetor throttle lever. Engine should accelerate smoothly when throttle is opened. If it does not, turn idle mixture valve slightly counterclockwise to readjust.

5.8 Changing Mechanical Seal Coolant

See Graphic: wc_gr001484

Change mechanical seal coolant every 50 hours using SAE 30W oil.

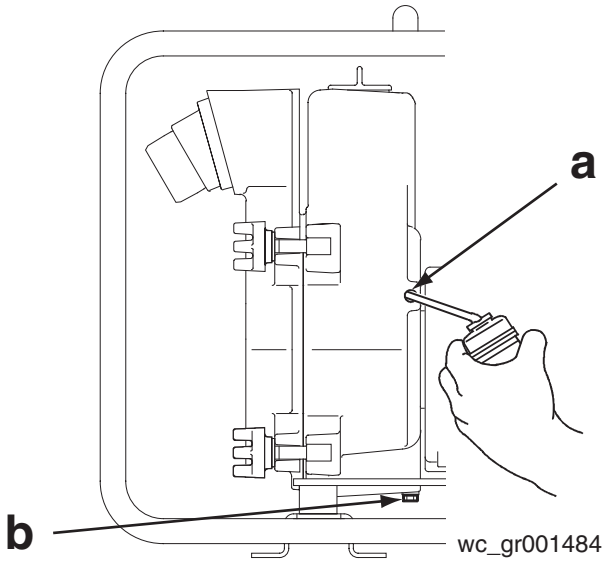
5.8.1 Remove plugs **(a)** from both sides of pump housing for venting.

5.8.2 Remove bottom plug **(b)** and allow oil to drain from oil cavity.

5.8.3 Install bottom drain plug.

5.8.4 Fill oil cavity through one of the side plug **(a)** holes until oil is level with top of hole or flows out hole on opposite side.
Oil quantity - approximately 150 ml (5 ounces).

5.8.5 Install all plugs before operating pump.



5.9 Adjusting Impeller Clearance

See Graphic: wc_gr001485

If it is necessary to replace impeller or volute insert, be sure clearance between impeller and insert is adjusted correctly.

The impeller **(e)** should be as close to the insert **(a)** as possible without rubbing against it. Clearance is adjusted by adding or removing shims **(b)** from behind insert. Inserts are attached to the pump cover and must be unbolted **(c)** before they can be removed.

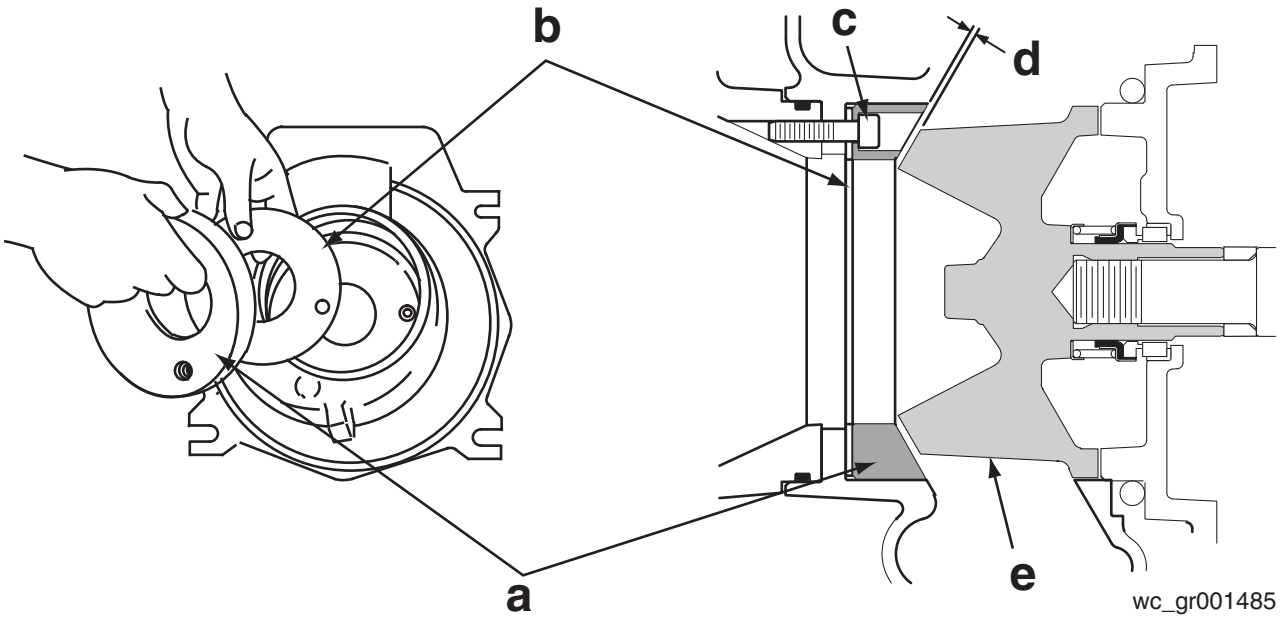
Check clearance **(d)** between impeller and insert by slowly pulling starter rope to turn impeller.

Note: *Remove spark plug to make it easier to turn impeller. On diesel engines, open decompression device before cranking engine.*

If starter or crank is difficult to turn, or rubbing is heard from inside pump, the impeller and insert are too close to each other. Remove a shim from behind insert and check again for rubbing. Continue removing shims until impeller turns easily.

Note: *It is important not to remove too many shims or the clearance between the impeller and insert will become too wide and pump performance will be reduced.*

As the impeller wears down, additional shims may be required to maintain the clearance between the impeller and insert.



5.10 Cleaning Pump

See Graphic: wc_gr001486

After pumping water containing a large amount of dirt or debris, clean out inside of pump housing.

5.10.1 Remove drain plug **(a)** from pump housing and drain any water left in pump.

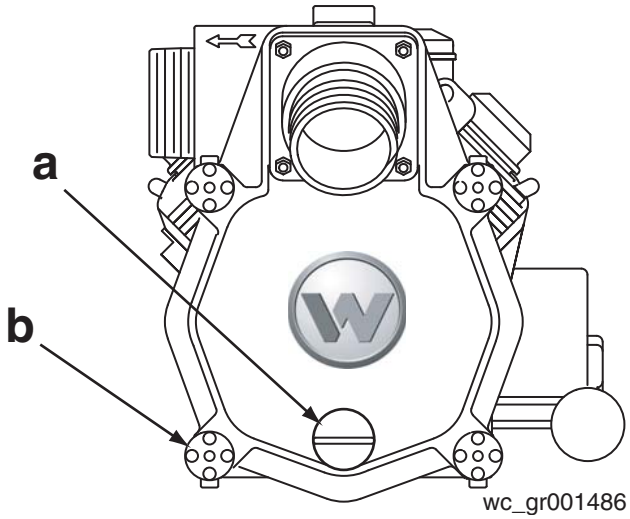
5.10.2 Loosen the four knobs **(b)** holding the pump cover and remove cover.

5.10.3 Clean out dirt and debris. Inspect impeller and volute insert for wear.

Note: *Tighten cover evenly at all four corners using a wrench*.

CAUTION

The impeller may develop sharp edges. Use care when cleaning around impeller to prevent getting cut.



wc_gr001486

5.11 Storage

If pump is being stored for more than 30 days:

WARNING

Do not open priming plug, discharge plug, or cover when pump is hot.

5.11.1 After pump has cooled, remove discharge plug from pump housing and drain out any water left in the housing.

5.11.2 Remove pump cover and clean inside of pump housing. Coat inside of pump with a light film of oil to reduce corrosion. A spray can of oil works well for this.

5.11.3 Tape up suction and discharge ports to prevent anything from falling into pump.

5.11.4 Change engine oil and follow procedures described in engine manual for engine storage.

5.11.5 Cover pump and engine and store in a clean, dry area.

5.12 Troubleshooting

Problem / Symptom	Reason / Remedy
Pump does not take in water.	• Not enough priming water in housing. • Engine speed too low. Adjust speed. • Strainer plugged. Clean strainer. • Suction hose damaged. Replace or repair suction hose. • Air leak at suction port. Check that fittings are tight and sealing properly. • Pump too high above water. • Debris collecting in pump housing. Clean pump housing. • Too much clearance between impeller and insert.
Pump takes in water; little or no discharge.	• Engine speed too low. Adjust engine speed. • Suction strainer partially plugged. Clean suction strainer. • Impeller worn. Adjust clearance by adding shims or replace impeller. • Volute insert worn or damaged. Adjust clearance or replace volute insert.
Suction hose leaks at inlet.	• Clamps are not sealing properly. Tighten, replace, or add clamps. • Suction hose diameter is too large. • Suction hose is damaged.
Discharge hose does not stay on coupling.	• Pressure may be too high for clamps being used. Add another clamp. • Discharge hose kinked or end blocked. Check discharge hose.
Impeller does not turn; pump is hard to start.	• Impeller jammed or blocked. Open pump cover and clean dirt and debris from inside of pump housing. • Impeller and insert binding. Adjust clearance by removing shim from behind insert.
Engine does not start or stops during operation.	• Debris in pump housing, blocking impeller. • Low oil level in engine. • Impeller rubbing on insert.

6 Technical Data

6.1 Engine

Engine power rating

Gross power rating per SAE J1995. Actual power output may vary due to conditions of specific use.

Item No.		**PTS 4V** 0007683 Rev. 115 & lower 0007691 Rev. 116 & lower	**PTS 4V** 0007683 Rev. 116 & higher 0007691 Rev. 117 & higher
Engine			
Engine make		Briggs and Stratton	
Engine model		Vanguard 303447-1256-E2	Vanguard 305447-0144-E1
Max. rated power @ rated speed	kW (hp)	12 (16) @ 3600 rpm	
Spark plug		Champion RC12YC	
Electrode gap	mm (in.)	0.76 (0.030)	
Operating speed	rpm	3600	
Air cleaner	type	Dual element	
Battery	V/CCA/ Ah/size	12 / 230 / 32 / 22NF	
Engine lubrication	oil grade / service class	>5°C (40°F) SAE 10W30 / SG, SF, or SE <5°C (40°F) SAE 30W / SG, SF, or SE	
Engine oil capacity	l (qt)	1.6 (1.7)	
Fuel	type	Regular unleaded gasoline	
Fuel tank capacity	l (gal)	17 (4.5)	

6.2 Pump

Item number:		PTS 4V, PTK 4
Pump		
Weight	kg (lb)	163 (360)
*Max. suction lift	m (ft)	7.5 (25)
Max. total head	m (ft)	32 (106)
Mechanical seal lubrication	oil grade ml (oz.)	SAE 30 150 (5)
Suction / discharge diameter	mm (in.)	100 (4)
Max. solid size	mm (in.)	50 (2)

*Based on pump operating at sea level. Maximum suction lift will be less at higher altitudes.

6.3 Sound Measurements

The required sound specifications per Appendix 1, Paragraph 1.7.4 of the EC-Machine Regulations, is:

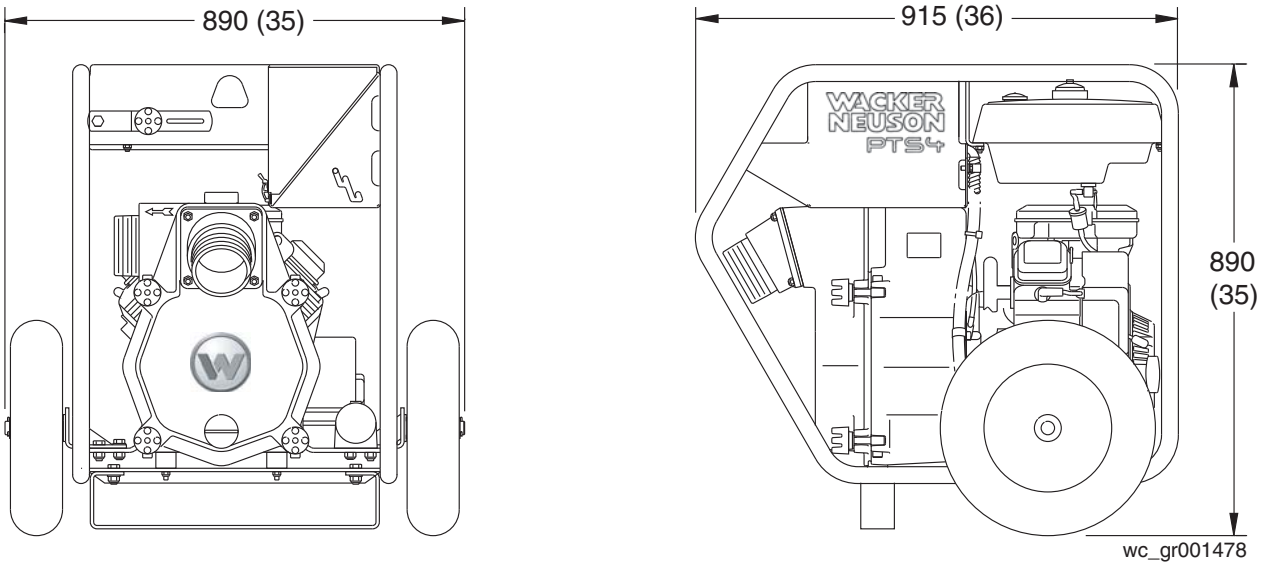
- the guaranteed sound power level (L_{WA}) = 104 dB(A)

These sound values were determined according to ISO 3744 for the sound power (L_{WA}).

The sound measurements were obtained with the unit operating on pavement at nominal speed.

6.4 Dimensions

mm (in.)



7 Emission Control Systems Information and Warranty

The Emission Control Warranty and associated information is valid only for the U.S.A., its territories, and Canada.

7.1 Emission Control System Background Information

Introduction

Wacker Neuson spark-ignited engines/equipment must conform with applicable Environmental Protection Agency (EPA) and the State of California emissions regulations. There are two types of emissions that fall under these regulations: 1) exhaust, and 2) evaporative. These regulations require that manufacturers warrant the emission control systems for defects in materials and workmanship.

Furthermore, EPA and California regulations require all manufacturers to furnish written instructions describing how to operate and maintain the engines/equipment including the emission control systems. This information is provided with all Wacker Neuson engines/equipment at the time of purchase.

Exhaust Emissions

The combustion process produces carbon monoxide, oxides of nitrogen, and hydrocarbons. Control of hydrocarbons and oxides of nitrogen is very important because, under certain conditions, they react to form photochemical smog when subjected to sunlight. Carbon monoxide does not react in the same way, but it is toxic.

Wacker Neuson utilizes lean carburetor settings and other systems to reduce the emissions of carbon monoxide, oxides of nitrogen, and hydrocarbons.

Evaporative Emissions

Evaporative emissions are fuel emissions and generally include emissions that result from permeation of fuel through the fuel-system materials or from ventilation of the fuel system.

Wacker Neuson utilizes low-permeation fuel lines and fuel tanks where applicable to reduce evaporative emissions.

Problems that may affect Emissions

If any of the following symptoms arise, have the engine/equipment inspected and repaired by a Wacker Neuson dealer/service center.

- Hard starting or stalling after starting
- Rough idling
- Misfiring or backfiring under load
- Afterburning (backfiring)
- Presence of black exhaust smoke during operation
- High fuel consumption

Tampering and Altering

Tampering with or altering the emission control system may increase emissions beyond the legal limit. If evidence of tampering is found, Wacker Neuson may deny a warranty claim. Among those acts that constitute tampering are:

- Removing or altering of any part of the air intake, fuel, or exhaust systems.
- Altering or defeating the speed-adjusting mechanism causing the engine to operate outside its design parameters.

7.2 Limited Defect Warranty for Exhaust Emission Control System

See the supplied engine owner's manual for the applicable emission warranty statement.

7.3 Limited Defect Warranty for Wacker Neuson Evaporative Emission Control Systems

The Emission Control Warranty is valid only for the U.S.A., its territories, and Canada.

Wacker Neuson Sales Americas, LLC, N92 W15000 Anthony Avenue, Menomonee Falls, WI 53051, (hereinafter “Wacker Neuson”) warrants to the initial retail purchaser and each subsequent owner, that this engine/equipment, including all parts of its evaporative emission control system, have been designed, built, and equipped to conform at the time of initial sale to all applicable evaporative emission regulations of the U.S. Environmental Protection Agency (EPA), and that the engine/equipment is free of defects in materials and workmanship which would cause this engine/equipment to fail to conform to EPA regulations during its warranty period.

Wacker Neuson is also liable for damages to other engine/equipment components caused by a failure of any warranted parts during the warranty period.

Limited Defect Warranty Period for Wacker Neuson Evaporative Emission Control Systems

The warranty period for this engine/equipment begins on the date of sale to the initial purchaser and continues for a minimum of two (2) years. For the warranty terms for your specific engine/equipment, visit wackerneuson.com.

Any implied warranties are limited to the duration of this written warranty.

What is covered

Wacker Neuson recommends the use of genuine Wacker Neuson parts, or the equivalent, whenever maintenance is performed. The use of replacement parts not equivalent to the original parts may impair the effectiveness of the engine/equipment emission controls systems. If such a replacement part is used in the repair or maintenance of the engine/equipment, assure yourself that such part is warranted by its manufacturer to be equivalent to the parts offered by Wacker Neuson in performance and durability. Furthermore, if such a replacement part is used in the repair or maintenance of the engine/equipment, and an authorized Wacker Neuson dealer/service center determines it is defective or causes a failure of a warranted part, the claim for repair of the engine/equipment may be denied. If the part in question is not related to the reason the engine/equipment requires repair, the claim will not be denied.

For the components listed in the following table, an authorized Wacker Neuson dealer/service center will, at no cost to you, make the necessary diagnosis, repair, or replacement necessary to ensure that the engine/equipment complies with the applicable EPA regulations. All defective parts replaced under this warranty become property of Wacker Neuson.

System Covered	Components
Evaporative emissions	Fuel tank (if applicable)
	Fuel tank cap (if applicable)
	Fuel line (if applicable)
	Fuel line fittings (if applicable)
	Clamps (if applicable)
	Carbon canister (if applicable)
	Purge port connector (if applicable)
Miscellaneous parts associated with the evaporative emission control system	Clamps
	Gaskets
	Mounting brackets

What is not covered

- Failures other than those resulting from defects in material or workmanship.
- Any systems or parts which are affected or damaged by owner abuse, tampering, neglect, improper maintenance, misuse, improper fueling, improper storage, accident and/or collision; the incorporation of, or any use of, add-on or modified parts, or unsuitable attachments, or the alteration of any part.
- Replacement of expendable maintenance items made in connection with required maintenance services after the item's first scheduled replacement as listed in the maintenance section of the engine/equipment operator's manual, such as spark plugs and filters.
- Incidental or consequential damages such as loss of time or the use of the engine/equipment, or any commercial loss due to the failure of the engine/equipment.
- Diagnosis and inspection charges that do not result in warranty-eligible service being performed.
- Any non-authorized replacement part, or malfunction of authorized parts due to use of-non authorized parts.

Owner's Warranty Responsibility

The engine/equipment owner, is responsible for the performance of the required maintenance listed in the Wacker Neuson engine/equipment operator's manual. Wacker Neuson recommends that all receipts covering maintenance on the engine/equipment be retained, but Wacker Neuson cannot deny warranty coverage solely for the lack of receipts or for the failure to ensure the performance of all scheduled maintenance.

Normal maintenance, replacement, or repair of emission control devices and systems may be performed by any repair establishment or individual; however, warranty repairs must be performed by an authorized Wacker Neuson dealer/service center.

The engine/equipment must be presented to an authorized Wacker Neuson dealer/service center as soon as a problem exists. Contact Wacker Neuson Product

Support Department (1-800-770-0957) or visit wackerneuson.com to find a dealer/service center in your area, or to answer questions regarding warranty rights and responsibilities.

How to Make a Claim

In the event that any emission-related part is found to be defective during the warranty period, you shall notify Wacker Neuson Product Support Department (1-800-770-0957), and you will be advised of the appropriate dealer/service center where warranty repair can be performed. All repairs qualifying under this limited warranty must be performed by an authorized Wacker Neuson dealer/service center.

You must take your Wacker Neuson engine/equipment along with proof of original purchase date, at your expense, to the authorized Wacker Neuson dealer/service center during their normal business hours.

For owners located more than 100 miles from an authorized dealer/service center (excluding the states with high-altitude areas as identified in 40 CFR Part 1068, Appendix III), Wacker Neuson will pay for pre-approved shipping costs to and from an authorized Wacker Neuson dealer/service center.

Claims for repair or adjustment found to be caused solely by defects in material or workmanship will not be denied because the engine/equipment was not properly maintained and used.

The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

EC DECLARATION OF CONFORMITY

WACKER NEUSON CORPORATION, N92W15000 ANTHONY AVENUE, MENOMONEE FALLS, WISCONSIN USA

AUTHORIZED REPRESENTATIVE IN THE EUROPEAN UNION	**Axel Häret** **WACKER NEUSON SE** **Preußenstraße 41** **80809 München**

hereby certifies that the construction equipment specified hereunder:

1. Category:
   Centrifugal Trash Pump

2. Machine function:
   This machine is a centrifugal trash pump intended to be used for general de-watering applications.

3. Type / Model
   Pump PTS 4V(I)

4. Item number of equipment:
   0007691

5. Net installed power:
   11,9 kW

has been sound tested per Directive 2000/14/EC:

Conformity Assessment Procedure	Measured sound power level	Guaranteed sound power level
ANNEX V	**103 dB(A)**	**104 dB(A)**

6. This machinery fulfills the relevant provisions of Machinery Directive 2006/42/EC and is also produced in accordance with these standards:
   2000/14/EC
   2002/88/EC
   89/336/EC
   98/37/EEC

18.12.09
Date

William Lahner
Vice President of Engineering

Dan Domanski
Manager, Product Engineering

WACKER NEUSON CORPORATION

The original language of this EC Declaration of Conformity is American English.

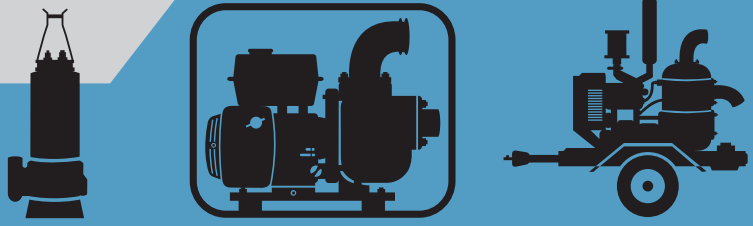
PORTABLE PUMPS

www.aem.org

ASSOCIATION OF AEM EQUIPMENT MANUFACTURERS

SAFETY MANUAL

FOR OPERATING AND MAINTENANCE PERSONNEL



SAFETY ALERT SYMBOL

This Safety Alert Symbol means ATTENTION is involved!

The Safety Alert Symbol identifies important safety messages on machines, safety signs, in manuals, or elsewhere. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety message.

Why is SAFETY important to YOU?

3 BIG REASONS

- **Accidents KILL or DISABLE**
- **Accidents COST**
- **Accidents CAN BE AVOIDED**

REFERENCES

The following is a partial list of referenced material on safe operating practices:

U.S. Department of Labor publishes safety and health regulations and standards under the authority of the Occupational Safety and Health Act for the general construction and mining industries.
U.S. Department of Labor
Washington, DC 20210

NFPA — National Fire Protection Association
P.O. Box 9101
1 Battery March Park
Quincy, MA 02269-9101

SAE — Society of Automotive Engineers, Inc.
400 Commonwealth Drive
Warrendale, PA 15096
Publishes a list, "Operator Precautions" SAE J153 MAY 87.

AEM — Association of Equipment Manufacturers
111 East Wisconsin Avenue
Milwaukee, WI 53202

CONTENTS

FOREWORD

This safety manual is intended to point out some of the basic situations which may be encountered during the normal operation and maintenance of your equipment, and to suggest possible ways of dealing with these conditions.

Additional precautions may be necessary, depending on application, pump type, configuration and attachments used, conditions at the work-site or in the maintenance area. The manufacturer has no direct control over pump application, operation, inspection, lubrication or maintenance. Therefore, it is your responsibility to use good, safe, practices in these areas.

The information provided in this manual supplements the specific information about your pump that is contained in the manufacturer's manual(s). Other information which may affect the safe operation of your pump may be contained on safety signs, decals, markings, insurance requirements, employer's safety programs, safety codes, local, state/provincial and federal laws, rules and regulations, contracts, agreements and warranties.

It is your responsibility to read and understand this safety manual and the manufacturer's manual(s) before operating your pump. This safety manual takes you step-by-step through your working day. If you do not understand any of this information, or if errors or contradictions seem to exist, consult with your supervisor before operating your pump.

IMPORTANT: If you do not have the manufacturer's manual(s) for your particular pump, get a replacement manual from your employer, equipment dealer, or manufacturer of your pump. Keep this safety manual and the manufacturer's manual(s) with your pump.

Unauthorized modifications of pumps create hazards. Pumps must not be modified or altered unless prior approval is obtained from the manufacturer.

DO NOT PUMP VOLATILE/FLAMMABLE OR CAUSTIC/CORROSIVE LIQUIDS.

REFER TO THE OWNER'S MANUAL OR CONSULT WITH THE MANUFACTURER FOR THE PROPER PUMP MATERIALS IF YOU ARE TO PUMP HAZARDOUS CAUSTIC/CORROSIVE LIQUIDS.

KNOW THE RULES

Every employer is concerned about safety. Safe operation and proper maintenance of your pump can prevent accidents. KNOW the rules — LIVE by them. (FIG. 1)

When starting work at a new site, check with the designated safety coordinator for specific safety instructions. DON'T LEARN SAFETY THE HARD WAY.

Know the meaning of all hand signals, signal flags, signs and markings.

Know the traffic rules used at the work site. Know who the signal man is; watch and obey his signals.

Know where the fire extinguishers and first aid kits are kept and how to use them. Know where to get proper aid and assistance when needed.

Use common sense to avoid accidents. If an accident does occur, be prepared to react to it quickly and effectively.

NEVER PANIC.

Remember that **YOU are the key to safety**. Good safety practices not only protect you but also protect the people around you. Study this manual and the manufacturer's manual(s) for your specific pump. Make them a working part of your safety program. Keep in mind that this safety manual is written for only this type of equipment. Practice all other usual and customary safe working precautions, and above all (FIG. 1).

REMEMBER — SAFETY IS UP TO YOU

YOU CAN PREVENT SERIOUS INJURY OR DEATH

FIG. 1

FOLLOW A SAFETY PROGRAM

1

KNOW WHAT IT IS?

Consult your supervisor for specific instructions and personal safety equipment required.

For instance, you may need:

- Hard Hat
- Safety Shoes
- Eye Protection
- Respirators
- Heavy Gloves
- Reflector Vests
- Hearing Protection
- Face Protection
- Back Supports
- Other job related specific items

Do not wear loose clothing or any accessory — flopping cuffs, untied shoe-laces, dangling neckties and scarves, rings, wrist watches, or other jewelry — that can catch on protruding or moving parts or controls. Long hair should be securely bound to prevent entanglement with moving parts. (FIG. 3)

FIG. 2

FIG. 3

FIG. 4

BE ALERT!

Know where to get assistance. Know how to use a first aid kit and fire extinguisher or fire suppression system. (FIG. 4)

BE AWARE!

Take advantage of training programs offered.

Safety programs should require that one person at each jobsite be assigned the overall responsibility and authority for safety. Know who the person is, and COMMUNICATE with them.

Know what the jobsite rules are, and FOLLOW THE RULES. Be safety conscious, responsible and reliable. Think about safety BEFORE something happens.

BE CAREFUL!

Human error is caused by many factors: carelessness, fatigue, overload, preoccupation, incompatibility between operator and the equipment, drugs, and alcohol to name a few. Damage to the equipment can be fixed in a short period of time, but injury, or death has a lasting effect.

For your safety and safety of others, encourage your fellow workers to act within safety rules.

CLOTHING AND PERSONAL PROTECTIVE ITEMS

ALWAYS wear appropriate safety glasses, goggles or face shield when working. (FIG. 2) Proper eye protection can keep flying particles from grinding, drilling or hammering operations, or fluids such as fuel, solvents, lubricants and brake fluids from damaging your eyes. Normal glasses do NOT provide adequate protection.

ALWAYS wear a hard hat and safety shoes. (FIG. 2) ALWAYS wear hearing protectors when exposed to high noise levels for extended periods. ALWAYS wear a respirator when painting or exposed to dusty conditions. ALWAYS keep your pockets free of loose objects which can fall out and drop into machinery. (FIG. 5) Heavy gloves should be worn for many operations.

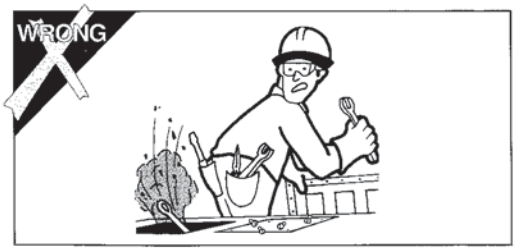


FIG. 5

EXHAUST FUMES

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension. If you do not have an exhaust pipe extension, be positive the area is adequately ventilated. (FIG. 6)

FIG. 6

HEAVY PARTS

Handle tools and heavy parts sensibly — with regard for yourself and other persons. Lower items — don't throw or drop them.

ALWAYS use proper hoisting equipment for lifting heavy loads.

ALWAYS use a back brace when lifting by hand.

PERFORM MAINTENANCE SAFELY

FIRE PREVENTION

Whenever possible use a nonflammable solvent to clean parts. Do not use gasoline or other fluids that give off harmful vapors.

If flammable fluids, such as gasoline or diesel fuel, must be used, extinguish open flames or sparks and DO NOT smoke.

Store dangerous fluids in a suitable place, in approved containers which are clearly marked. NEVER smoke in areas where flammable fluids are used or stored. (FIG. 7)

Use proper nonflammable cleaning solvents. Follow solvent manufacturer's instructions for use.

Always remove all flammable material in the vicinity of welding and/or burning operations.

ALWAYS keep the floor in the work area clean and dry. Oily, greasy floors can easily lead to falls. Wet spots, especially near electrical equipment, can be hazardous. (FIG. 7)

Know where fire extinguishers are kept — how they operate — and for what type of fire they are intended.

Check readiness of any fire detectors and fire suppression systems.

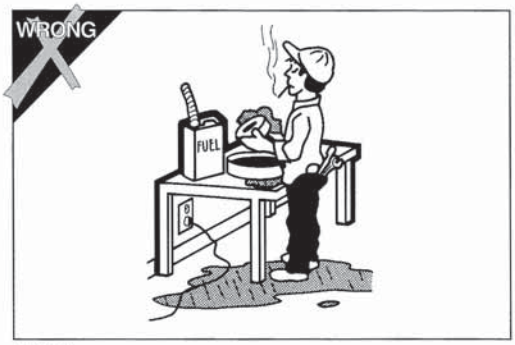


FIG. 7

LEARN TO BE SAFE

NEVER operate a pump which is new to you without first being instructed in it's proper operation. READ the operator's manual. If one has not been provided, GET ONE AND STUDY IT BEFORE OPERATING THE PUMP.

Know the meaning of all identification symbols on your controls and gauges. (FIG. 8)

Know the location of the emergency shut-down control if the machine is so equipped.

Before attempting to operate the pump, know the capabilities and limitations of the pump. Familiarize yourself with controls and instruments — their locations and functions.

Keep hands, levers and knobs clean of oil or grease to prevent slipping.

Carefully read and follow the instructions on all safety signs and decals on the pump. Keep safety signs in good condition. Replace missing or damaged safety signs.

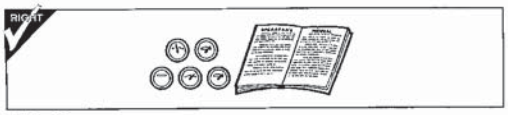


FIG. 8

CHECK IT OUT!

Know what safety devices your machine is equipped with ... and see that each item is securely in place and in operating condition. (FIG. 9)

For example:

- Drawbar Coupling Chains and Pins
- Alarms and Warning Lamps
- Reflectors
- Guards and Shields
- Drain Covers, Plugs, and Caps
- Shut-Down Devices
- Leveling Jacks
- Pressure Relief Devices
- Lifting Devices

FIG. 9

NEVER START OR OPERATE A PUMP KNOWN OR SUSPECTED TO BE DEFECTIVE OR MALFUNCTIONING.

If your daily check uncovers any items that need attention — repair, replacement, or adjustment — report them promptly. The most minor malfunction could be the result of more serious trouble — or can cause it, if pump is operated. When in doubt, attach an OSHA Lockout/Tagout device tag to the control panel to disconnected electrical power supply at breaker, on electrically driven pumps and disconnect the battery and/or spark plug wire on engine driven pumps.

WORK SAFELY — Pumps In General

SAFE WORKING PROCEDURES

USE COMMON SENSE! Most accidents can be avoided by using common sense and concentrating on the job to be done.

ONLY EXPERIENCED AND QUALIFIED personnel should install and operate pump equipment.

KNOW THE PROPER starting procedure for your equipment. Follow the manufacturer's operation manual ... to the letter.

DO NOT operate a pump without all guards and shields in place. (If OSHA required guards are damaged or misplaced, contact the manufacturer for a replacement.)

When **lifting pump** use only lifting equipment in good repair and with adequate capacity. Follow manufacturer's lifting recommendation.

Check all lubricant levels before pump installation in accordance with manufacturer's maintenance programs.

Keep hands and feet clear of moving parts. DO NOT stick fingers into a pump when in operation. Check suction strainer and hose regularly for proper submergence and to be sure it is free of obstructions.

NEVER operate a self-priming pump unless the volute is filled with liquid. The pump will not prime when dry.

PUMP only liquids for which the pump has been designed to handle.

DO NOT pump flammable, corrosive or caustic materials unless the pump and piping are explicitly designed for that purpose.

NOTE the direction of rotation — operation of a pump in the wrong direction can cause the impeller to unscrew and damage the volute case.

A pump should not be operated against a closed valve or other no flow conditions. Refer to the pump manufacturer's recommended practice for start-up, operation and shut-down procedures. **DO NOT** close down or restrict a discharge hose. **Be careful** of discharge hose whipping under pressure.

MAKE CERTAIN that whatever is to be connected to he pump is not subjected to pressures greater than those given in the manufacturer's instructions.

MAKE CERTAIN all connections are securely made and hoses under pressure are secured, with appropriate safety devices, to prevent whipping.

BE AWARE OF LIGHTNING. Stay clear of the pumping equipment during electrical storms. It can attract lightning. (FIG. 10)

OVERHEATING PRECAUTIONS

Overheated pumps can cause severe damage to the equipment and can cause severe physical burns and injury.

Operating a pump with the suction and/or discharge valve closed is a principal cause of overheating. Approach cautiously any pump that has been in operation.

DO NOT remove hoses from a pump until the system is properly cooled to ambient temperature.

DO NOT remove the cover plate or drain plugs from any overheated pump. Allow the pump to cool. Check pump temperature before opening fill port or drain plug.

If overheating of the pump casing occurs:

- **STOP** the pump immediately.
- Allow the equipment to **cool completely**.
- Slowly and cautiously **vent the pump**.
- **Refer to the manufacturer's instruction** manual before restarting the unit.
- Remove hoses carefully. Heated water can be in hoses and static head produces pressure.

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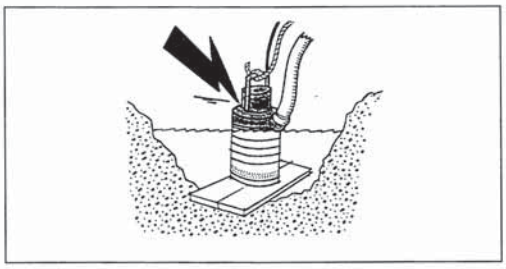

FIG. 10

WORK SAFELY — Pumps In General

BEFORE STARTING

Check the pump thoroughly at delivery for any shipping damage.

Locate the pump in an accessible location, as close to the liquid as possible.

Secure the pump after it is placed in its intended operating position so it does not tip, roll, slide or fall.

IMMEDIATELY ON STARTING THE PUMP

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Observe gauges, instruments and warning lights to ensure that they are functioning and their readings are within the normal operating range.

- Be sure the immediate work area is safe for operation.
- Operate controls; make certain all operate properly and "feel" right. Accustom yourself to the "feel" of the equipment.
- Listen for any unusual noises, smell for any unusual odors; look for any signs of trouble.
- Be sure to open all manual valves slowly to prevent WATER HAMMER.
- Check all warning and safety devices and indicators.
- If safety-related defects or malfunctions are detected, SHUT DOWN the equipment. Correct the problem, or notify your supervisor. DO NOT OPERATE EQUIPMENT WITH DEFECTS OR MALFUNCTIONS UNTIL CORRECTED.
- **If an unsafe condition cannot be remedied immediately, notify your supervisor and tagout/lockout** the pump on the start switch and/or appropriate, prominent location. (FIG. 11)

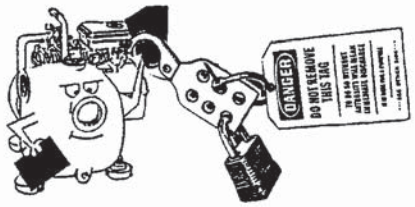

FIG. 11

SAFE WORKING PROCEDURES

Do not jump start engine battery.

When operating internal combustion engines in an enclosed area, always make provisions to pipe exhaust fumes to the outside.

EXHAUST FUMES CAN KILL: Do not operate engine driven pump equipment in a confined or enclosed space without adequate ventilation.

Exhaust gases are odorless and deadly poison.

DO NOT TOUCH: The exhaust system components get very hot and stay hot for some time after shutting the engine off.

Follow engine manufacturer's instructions explicitly on hand cranking.

Do not shut down high head pumps quickly:

A) Throttle back slowly

B) Open by-pass line

C) Should have a check valve

D) Slowly close gate valve on discharge if so equipped.

Check for fuel, oil and hydraulic fluid leaks, worn and damaged hoses/lines or power cables.

Refueling

When refueling, the following precautions must be followed:

- Add fuel of proper type and grade, only when the pump is not running and engine is cool.
- Fuel in well ventilated area.
- Turn off all electrical switches.
- Keep lighted smoking materials, flames or spark producing devices at a safe distance while refueling.
- Keep fuel nozzle in contact with tank being filled, or provide a ground to prevent static sparks from igniting fuel.
- **Do not spill fuel on hot surfaces.**
- Clean up spillage immediately.
- Do not start engine until fuel cap is secured to the fuel tank.
- **Always** make sure that fuel is being put in the fuel tank, motor oil in the proper location and hydraulic oil into hydraulic oil reservoirs.

5

WORK SAFELY — Engine Driven Pumps

Maintenance and Repair

All installations, operations and maintenance should be in accordance with pump and engine manufacturer's recommended operation and maintenance program. These manuals should be kept available with the equipment.

Maintenance work can be **hazardous** if not done in a careful manner. All personnel should realize the hazards and strictly follow safe practices.

NEVER perform any work on the equipment unless authorized to do so.

BEFORE ANY maintenance **work** is to be done, a LOCKOUT/TAGOUT standard device and procedure should be implemented. Prior to removal of LOCKOUT/TAGOUT, the equipment must be fully operational and all personnel accounted for. Except in cases of emergency, the removal of the LOCKOUT/TAGOUT should be done ONLY by the initiating person prior to the return to start-up (see page 12, Fig. 11).

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BEFORE doing any major work, disconnect the ignition and battery if so equipped.

Always replace safety devices removed during service or repair before returning pump to operation.

Battery Servicing

- **Always wear** safety glasses and gloves when servicing or working with batteries.
- **Before servicing battery,** turn off electrical systems, then disconnect ground terminal clamp. Before installing a battery, turn off electrical equipment, then connect the battery ground clamp **last.**
- **Maintain** electrolyte at the recommended level. Check level frequently. Add distilled water to batteries only when starting up, never when shutting down.
- **Use a flashlight** to check level. **NEVER** use a flame.
- **Do not short** across battery terminals — the spark could ignite the battery gases.

  Battery acids will **burn skin**, eat holes in clothing, and can **cause blindness** if splashed in eyes.

  If you spill acid on yourself flush skin immediately with lots of water. Apply baking soda to help neutralize the acid. ***If acid gets into the eyes, flush immediately with large amounts of water and seek proper medical treatment immediately.***

SAFE WORKING PROCEDURES

***Allow only qualified personnel* to INSTALL, WIRE AND OPERATE** electric motor driven pumps. Whenever electricity is present there is the possibility of **electrocution.**

NEVER use a pump/motor in an explosive atmosphere if it is not exclusively designed for the application.

Always ground electrical units.

Make certain to connect pump motor to the right phase and voltage.

Do not run pump if voltage is not within limits.

Make sure motor rotation is in accordance with impeller rotation (which should be indicated somewhere on the pump — check the manufacturer's manual).

Make all electrical installations in accordance with National Electric Code, State and Local electrical codes.

Never use gas piping as an electrical ground.

Make sure the related electrical circuits are dead and locked out before performing any maintenance.

Follow motor manufacturer's recommended maintenance and operation instructions.

If circuit breaker or fuse is tripped, examine the system for the problem before restarting pump.

NEVER use the power cord to aid lifting the pump.

NEVER operate a pump with a plug-in type power cord without a ground fault circuit interrupter.

NEVER use cords with frayed, cut or brittle insulation. Check the cord on the pump for nicks in the insulation and for sound connections to the ground fault interrupter plug and motor.

NEVER let extension cords or the plug connections lay in water. Locate the pump so that the cord cannot fall into any water or be submerged by rising water, unless the pump is designed for such use.

NEVER handle energized power cords with wet hands.

MOTOR OVERLOAD: do not exceed the manufacturer's recommendation for maximum lift or discharge head. See manufacturer's published curve for proper sizing of motors. A misapplied motor can overheat.

6

WORK SAFELY – Electric Motor Driven Pumps

Pump Maintenance and Repair

MAKE SURE the pump is disconnected from the power source or the appropriate circuits are dead and OSHA Lockout/Tagout is applied before doing any maintenance or repair work on the pump.

Maintenance work can be **hazardous** if not done in a careful manner. All personnel should realize the hazards and strictly follow safe practices.

NEVER perform any work on the equipment unless authorized to do so. (FIG. 11) Before performing any maintenance or repair work, consult the manufacturer's instruction manual for recommended procedures.

Pumps with float switches or other automatic devices can start without warning if not properly locked out.

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BEFORE ANY maintenance **work** is to be done, a LOCKOUT/TAGOUT standard device and procedure should be implemented. Prior to removal of LOCKOUT/TAGOUT, the equipment must be fully operational and all personnel accounted for. Except in cases of emergency, the removal of the LOCKOUT/TAGOUT should be done ONLY by the initiating person prior to the return to start-up.

ALWAYS replace safety devices removed during the service or repair before returning pump to operation.

NEVER use the power cord to aid in lifting the pump.

Sizing Extension Cords

Use the following chart to select the correct size extension cord to prevent excessive amperage draw or voltage drop which would cause the motor to overheat. **Cables that are too long or coiled** can cause a voltage drop. **Be aware** that strong sunlight can cause a voltage drop.

	Wire Gauge and Cord Length (in feet)		
Amperes	50	100	150
6	16	16	14
8	16	14	12
10	16	14	12
12	14	14	12
14	14	12	10
16	12	12	10

SAFE WORKING PROCEDURES

***ALLOW only qualified personnel* to INSTALL, WIRE and OPERATE** submersible pumps.

Whenever electricity is present there is the possibility of **electrocution.**

NEVER use a pump/motor in an explosive atmosphere, if it is not exclusively designed for that application.

ALWAYS ground the pump.

Make certain to connect the pump to the right phase and voltage.

DO NOT run the pump if voltage is not within limits. **Make all electrical installations** in accordance with National Electric Code, State and Local electrical codes.

Mount electrical control box in a vertical position, protected from the elements.

NEVER attempt to use the power cord or hydraulic hoses as a lifting or lowering device for submersibles. Attach a lifting cable to the manufacturer's recommended attachment point on the pump for lowering and lifting the pump. (FIG. 12)

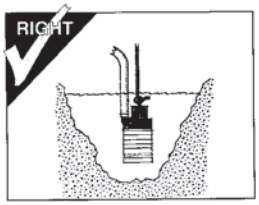


FIG. 12

NEVER position the pump directly on a soft, loose bottom. To attain maximum capacity and prevent excessive wear, position the pump so it will not burrow itself into sand or clay. Stand the pump on a plank, a bed of coarse gravel, within a perforated container, on a suitable floatation device, or retain it hanging freely by a lifting cable. (FIG. 13)

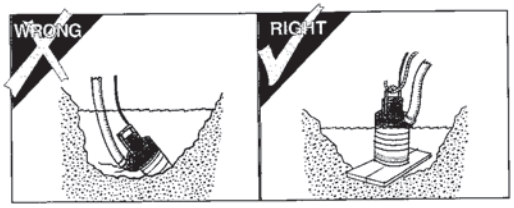


FIG. 13

WORK SAFELY — Submersibles

Pump Maintenance and Repair

MAKE SURE the pump is disconnected from the power source or the appropriate circuits are dead and OSHA Lockout/Tagout is applied before doing any maintenance or repair work on the unit.

Maintenance work can be **hazardous** if not done in a careful manner. All personnel should realize the hazards and strictly follow safe practices.

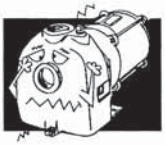
NEVER perform any work on the equipment unless authorized to do so. Before performing any maintenance or repair work, consult the manufacturer's instruction manual for recommended procedures.

BEFORE ANY maintenance **work** is to be done, a LOCKOUT/TAGOUT standard device and procedure should be implemented. Prior to removal of LOCKOUT/TAGOUT, the equipment must be fully operational and all personnel accounted for. Except in cases of emergency, the removal of the LOCKOUT/TAGOUT should be done ONLY by the initiating person prior to the return to start-up.

Check oil level ONLY when pump is cool.

USE ONLY recommended oil per manufacturer's recommendation.

INSPECT ELECTRICAL WIRING for worn or damaged insulation. **INSTALL** new wiring if wires are damaged. **After repairs are made, clean the equipment before putting the pump back into position.**



TEST YOUR KNOWLEDGE

Do you understand this AEM SAFETY MANUAL AND ITEMS SUCH AS ...

- Your safety program?
- Your pump manufacturer's manual(s)?
- Proper clothing and personal safety equipment?
- Your pump's controls, warning signs and devices, and safety equipment?
- How to properly inspect, mount, and start your pump?
- How to check your pump for proper operation?
- Your work area and any special hazards that may exist?
- Proper operating procedures?
- Proper shutdown procedures?
- Proper maintenance procedures?
- Proper loading and unloading procedures for transporting?
- Under what conditions you should not operate your pump?

If you do not understand any of these items, consult with your supervisor BEFORE operating your equipment!

FINAL WORD TO THE USER

Remember that **YOU are the key to safety**. Good safety practices not only protect you but protect the people around you.

You have read this safety manual and the manufacturer's manual(s) for your specific pump. Make them a working part of your safety program. Keep in mind that this safety manual is written for only this type of equipment.

Practice all other usual and customary safe working precautions, and above all —

REMEMBER
SAFETY IS UP TO YOU

YOU CAN PREVENT SERIOUS INJURY OR DEATH

This manual is another in a series on the safe operation of machinery published by AEM.
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