WARTON®

PROTEGE PUMPS®

Petrol/Diesel Powered Water Pumps

User Manual

[Revision 9.0 December 2018]

READ THIS MANUAL CAREFULLY BEFORE USE – FAILURE TO DO SO MAY RESULT IN INJURY, PROPERTY DAMAGE AND MAY VOID WARRANTY. • KEEP THIS MANUAL FOR FUTURE REFERENCE. • Products covered by this manual may vary in appearance, assembly, inclusions, specifications, description and packaging.

Diesel and 4-stroke engine products are NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use – see Engine Oil. **Failure to add engine oil will void the product warranty**.

Safety

Safety messages are designed to alert you to possible dangers or hazards that could cause death, injury or equipment or property damage if not understood or followed. Safety messages have the following symbols:

 You WILL be KILLED or SERIOUSLY INJURED if you do not follow instructions.	 You CAN be KILLED or SERIOUSLY INJURED if you do not follow instructions.	 You CAN be INJURED if you do not follow instructions or equipment damage may occur.

It is vital that you read and understand this user manual before using the product, including safety warnings, and any assembly and operating instructions. Keep the manual for future reference.

Safety precautions and recommendations detailed here must be fully understood and followed to reduce the risk of injury, fire, explosion, electrical hazard, and/or property damage.

Safety information presented here is generic in nature – some advice may not be applicable to every product. The term "equipment" refers to the product, be it electrical mains powered, battery powered or combustion engine powered.

- **Before Use** - If you are not familiar with the safe operation/handling of the equipment, or are in any way unsure of any aspect of suitability or correct use for your application, you should complete training conducted by a person or organization qualified in safe use and operation of this equipment, including fuel/electrical handling and safety.
- Do NOT operate the equipment in flammable or explosive environments, such as in the presence of flammable liquids, gases or dust. The equipment may create sparks or heat that may ignite flammable substances.
- Keep clear of moving parts.
- Equipment may be a potential source of electric shock or injury if misused.
- Do NOT operate the equipment if it is damaged, malfunctioning or is in an excessively worn state.
- Do NOT allow others to use the equipment unless they have read this manual and are adequately trained.
- Keep packaging away from children - risk of suffocation! Operators must use the equipment correctly. When using the equipment, consider conditions and pay due care to persons and property.

General Work Area Safety

- Work areas should be clean and well it.
- Do not operate the equipment if bystanders, animals etc are within operating range of the equipment or the general work area.
- If devices are provided for connecting dust extraction / collection facilities,

General Personal Safety

- Wear appropriate protective equipment when operating, servicing, or when in the operating area of the equipment to help protect from eye and ear injury, poisoning, burns, cutting and crush injuries. Protective equipment such as safety goggles, respirators, non-slip safety footwear, hard hat, hearing protection etc should be used for appropriate equipment / conditions. Other people nearby should also wear appropriate personal protective equipment. Do not wear loose clothing or jewellery, which can be caught in moving parts. Keep hair and clothing away from the equipment.
- Stay alert and use common sense when operating the equipment. Do not over-reach. Always maintain secure footing and balance.
- Do not use the equipment if tired or under the influence of drugs, alcohol or medication.
- This equipment is not intended for use by persons with reduced physical, sensory or mental capabilities.

General Fuel Safety

- Petrol/fuel/gasoline is extremely flammable – keep clear of naked flames or other ignition sources.
- Do not spill fuel. If you spill fuel, wipe it off the equipment immediately – if fuel gets on your clothing, change clothing.
- Do NOT smoke near fuel or when refuelling.
- Always shut off the engine before refuelling.
- Do NOT refuel a hot engine.
- Open the fuel cap carefully to allow any pressure build-up in the tank to release slowly.
- Always refuel in well ventilated areas.
- Always check for fuel leakage. If fuel leakage is found, do not start or run the engine until all leaks are fixed.

General Carbon-Monoxide Safety

- Using a combustion engine indoors **CAN KILL IN MINUTES**. Engine exhaust contains carbon-monoxide – a poison you cannot smell or see.

General Equipment Use and Care

- The equipment is designed for domestic use only.
- Handle the equipment safely and carefully.
- Before use, inspect the equipment for misalignment or binding of moving parts, loose components, damage or any other condition that may affect its operation. If damaged, have the equipment repaired by an authorised service centre or technician before use.
- Prevent unintentional starting of the equipment - ensure equipment and power switches are in the OFF position before connecting or moving equipment. Do not carry equipment with hands or fingers touching any controls. Remove any tools or other items that are not a part of the equipment from it before starting or switching on.
- Do not force the equipment. Use the correct equipment for your application. Equipment will perform better and be safer when used within its design and usage parameters.
- Use the equipment and accessories etc. in accordance with these instructions, considering working conditions and the work to be performed. Using the equipment for operations different from those intended could result in hazardous situations.
- Always keep equipment components (engines, hoses, handles, controls, frames, housings, guards etc) and accessories (cutting tools, nozzles, bits etc) properly maintained. Keep the equipment clean and, where applicable, properly lubricated.
- Store the equipment out of reach of children or untrained persons. To avoid burns or fire hazards, let the equipment cool completely before transporting or storing. Never place or store the equipment near flammable materials, combustible gases or liquids etc.
- The equipment is not weather-proof, and should not be stored in direct sunlight, at high ambient temperatures or locations that are damp or humid.
- Do not clean equipment with solvents, flammable liquids or harsh abrasives.

ensure these are connected and used properly. Dust collection can reduce dust-related hazards.

- Use combustion engines OUTSIDE only, and far away from windows, doors and vents.
- For specific equipment safety use and care, see Equipment Safety.

General Electrical Safety

- Inspect electrical equipment, extension cords, power bars, and electrical fittings for damage or wear before each use. Repair or replace damaged equipment immediately.
- Ensure all power sources conform to equipment voltage requirements and are disconnected before connecting or disconnecting equipment.
- When wiring electrically powered equipment, follow all electrical and safety codes.
- Wherever possible, use a residual current device (RCD).
- High voltage / high current power lines may be present. Use extreme caution to avoid contact or interference with power lines. Electrical shock can be fatal.

General Electrical Safety

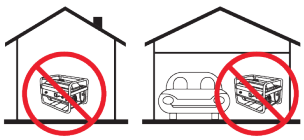
- Electrically grounded equipment must have an approved cord and plug and be connected to a grounded electrical outlet.
- Do NOT bypass the ON/OFF switch and operate equipment by connecting and disconnecting the electrical cord.
- Do NOT use equipment that has exposed wiring, damaged switches, covers or guards.
- Do NOT use electrical equipment in wet conditions or in damp locations.
- Do NOT use electrical cords to lift, move or carry equipment.
- Do NOT coil or knot electrical cords, and ensure electrical cords are not trip hazards.

General Service Information

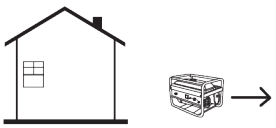
- The equipment must be serviced or repaired at authorised service centres by qualified personnel only.
- Replacement parts must be original equipment manufacturer (OEM) to ensure equipment safety is maintained.
- Do NOT attempt any maintenance or repair work not described in this manual.
- After use, the equipment and components may still be hot – allow the equipment to cool and disconnect spark plugs and/or electrical power sources and/or batteries from it before making adjustments, changing accessories or performing repair or maintenance.
- Do NOT make adjustments while the equipment is running.
- Perform service related activities in suitable conditions, such as a workshop.
- Replace worn, damaged or missing warning/safety labels immediately.

⚠ DANGER ⚠

Using an engine or wood/charcoal/gas fuelled appliance indoors CAN KILL YOU IN MINUTES. Engine exhaust and wood/charcoal/gas fumes contain carbon monoxide. This is a poison you cannot see or smell.



NEVER use inside a building, home, garage, boat, caravan or tent EVEN IF doors and windows are open.



Only use OUTSIDE and far away from windows, doors, and vents.

Avoid other hazards - READ MANUAL BEFORE USE.

GENERAL:
- Do not operate in a hazardous location. Such areas include where there is a risk of explosion of petrol fumes, leaking gas or explosive dusts.
- Do not operate in a confined area where exhaust gases or wood/charcoal/gas fumes could reach dangerous concentrations.

PRODUCTS FEATURING AN ENGINE
- Follow all warnings in the section titled "GENERAL".
- Explosion hazard - never smoke while refuelling.
- Take care not to spill fuel. When refuelling the engine, ensure that the engine has been allowed to cool. Prevent spilling of fuel as this may also ignite with a hot engine.
- Never refuel while engine is running.

GENERATORS
- Follow all warnings in the sections titled "GENERAL" and "PRODUCTS FEATURING AN ENGINE".
- The output of this generator is potentially lethal. The generator should not be connected to a fixed electrical installation except by an appropriately licensed person.
- Not weatherproof – protect your machine. This machine is not weatherproof and should not be exposed to direct sunlight, high ambient temperature, damp conditions, wet conditions or high humidity conditions.

Safety Symbols

The product may have safety warning labels attached to it, explained below. Understand the symbols on your product and their meanings. If any stickers become unreadable, unattached etc, replace them.

 **Flammable Material Hazard** Flammable liquids, gases or substances etc may present. Avoid ignition sources and open flames. Danger of fire.	 **Read User Manual** Read and fully understand product safety warnings, operation, procedures etc before using the product.	 **Use Hand Protection** Wear appropriate hand protection and take due care as the product or use of the product may present hand hazards.	 **Carbon-Monoxide Hazard** Do not use the product in confined areas or without adequate ventilation. Carbon-monoxide poisoning can be fatal.
 **Electrocution / Electrical Shock Hazard** High voltage or high current electricity may be present or required by the product. Take due care when handling electrical products, cables, plugs and leads. Electrical shock can be fatal.	 **Toxic Fumes / Dust Hazard** Using the product or by-products from use may produce fumes, smoke or particles that could be harmful if inhaled. Wear appropriate breathing protection and have adequate ventilation.	 **Explosive Material Hazard** Combustible liquids, gases or substances etc may be present. Avoid ignition sources and open flames. Danger of explosion.	 **Cutting / Amputation Hazard** The product may have blades, edges or mechanical devices that can cause severe cut injury to fingers, limbs etc. Take due care when handling and using the product.
 **Crush Hazard** The product may have blades, edges or mechanical devices that can cause severe crush injury to fingers, limbs etc. Take due care when handling and using the product.	 **Single Operator Only** The product must be operated by a single person only. More than one person operating the product may introduce additional hazards.	 **Use Face Protection** Wear appropriate full-face protection and take due care as the product or use of the product may present face and eye hazards.	 **Use Foot Protection** Wear appropriate foot protection and take due care as the product or use of the product may present foot hazards.
 **Use Eye / Ear / Head Protection** Wear appropriate eye and / or ear and / or head protection and take due care as the product or use of the product may present eye, hearing and head hazards.	 **Running Hazard** Do not run on or near the product as doing so may present a fall hazard.	 **Diving Hazard** Do not dive into the product as doing so may present a neck / head injury hazard.	 **Adult Supervision Required** Always supervise children and other users of a product to prevent drowning or injury.
 **Skin Penetration / Puncture Hazard** The product may produce pressure, emit liquids or objects that can cause severe injury to fingers, limbs, blood etc. Take due care when handling and using the product.	 **Hot Surface Hazard** Be aware that the product may produce high temperatures and hot surfaces that can cause burn injuries.	 **Flying Debris Hazard** Be aware that the product or use of the product may present hazards produced by flying debris. Wear appropriate clothing and protectiove devices.	 **Moving Parts Hazard** Be aware that the product contains or uses mechanical devices that move or rotate. Always wait for moving parts to stop fully before handling the product, adjusting, maintenence etc.

 **Carbon-Monoxide Hazard** Do not use the product in confined areas or without adequate ventilation. Carbon-monoxide poisoning can be fatal.	 **Pull Hazard** Be aware that the product contains or uses mechanical devices that can pull in objects and can cause severe injury to fingers, limbs etc. Take due care when handling and using the product.	 **Slope / Fall Injury Hazard** Be aware that using the product on sloping surfaces or in slippery conditions may present additional dangers from falls and contact with blades, moving parts, hot surfaces etc.	 **"Slam Dunk" Warning** Do NOT attempt "slam dunk" maneouvres as this may result in severe injury due to falling, product breakage or collapse etc.
 **Electrocution / Electrical Shock Hazard - Outdoor** High voltage or high current electricity may be present or required by the product. Do NOT use in rain, damp or wet conditions. Electrical shock can be fatal.	 **Electrocution / Electrical Shock Hazard - Disconnect** High voltage or high current electricity may be present or required by the product. Always disconnect the product from the electrical supply before handling the product, adjusting, maintenence etc.	 **Power Line Electrocution Hazard** High voltage / high current power lines may be present. Use extreme caution to avoid contact or interference with power lines. Electrical shock can be fatal.	 **"Kick-Back" Hazard** High level of "kick-back" hazard that can cause the machine to suddenly rotate towards operator. Kick-back injury can be fatal.
 **Winch Operator Position Hazard** Do NOT stand between winch and load. Do NOT use winch to move people.	 **Winch Lift Hazard** Do NOT LIFT load vertically. Use machine to PULL only.	 **Cable Hazard** Ensure that load bearing cable is not kinked or knotted.	 **Winch Cable Hazard** Ensure that there is a minimum number of cable coils on winching mechanism.
 **Winch Hook Hazard** Carry hook to load – do NOT throw or run.	 **Flash / Blinding Hazard** Wear appropriate eye protection for welding. Dorect exposure to weld arcs may cause permanent eye injury.	 **Laser Hazard** Laser may be in use – do NOT look directly at laser, or allow others to.	

Equipment Safety

Water pumps produce high pressures that can cause serious injury if proper safety precautions are not followed. **It is extremely important that you read and fully understand the information in this section and all other safety warnings / recommendations and usage instructions before using the equipment**.

Operator

- If you are untrained in the use of a motorised, high-pressure water pump, it is highly recommended that you be trained/instructed by a suitably qualified or experienced person before using the machine.
- NEVER operate the machine when tired, or under the influence of any substance (medication, alcohol, drugs etc) that may impair your judgement, alertness, physical strength, vision or dexterity.
- Maintain sure-footing and balance always when using or handling the machine and have full awareness of your surroundings and any possible hazards.
- Prolonged machine use may lead to health complications, such as carpal tunnel syndrome, due to vibration. To help reduce the possibility of such conditions, wear gloves, take breaks frequently, keep fingers and hands warm, and maintain the equipment for optimal operation and minimal vibration. It is recommended to seek medical advice if you feel numbness or burning sensations in fingers/hands.

Clothing and Protective Equipment – All Operators and Assistants

- Wear approved safety goggles, or safety glasses with adequate top and side protection.
- Wear suitable hearing protection.
- Wear heavy-duty, non-slip leather or protective gloves.
- Wear approved heavy-duty safety boots, with steel toe-caps and non-slip soles.
- Wear suitable overalls or work clothing that fits snugly, but does not restrict movement. Avoid loose fitting clothing, scarves, jewellery etc and keep long hair contained to avoid getting caught or pulled by the machine etc.

Work Area Safety

- Be aware of fire risks resulting from machine use. Ensure that the machine exhaust and spark arrestor (if equipped) is well maintained and that engine is tuned correctly.
- Refuel outdoors only. Avoid fuel spillage. Start the machine at least 3m (10') away from the fuelling location.
- Operate the pump on solid, level surfaces only. Do not hold or suspend the pump by hoses or other unstable means.

Operational Safety

- Do NOT use the machine if the throttle or any safety guard or mechanism is not installed or is not operating correctly – have the machine inspected and repaired at an authorised service centre before using it again.
- Pump only liquids compatible with pump component materials. Do not pump flammable or explosive liquids such as fuels, oil, kerosene, solvents or thinners. Failure to follow to this warning can result in serious personal injury, death and/or property damage.
- The water pump creates high pressures. Do not disconnect the pump or pipework until internal pressure has been released.
- Do NOT operate the pump without a liquid source to draw in.
- Improper duty cycle and/or rapid start/stop conditions caused by undersized outlets may cause internal thermal overload protection (if equipped) to trip or can cause premature motor failure due to excessive heat.

Transportation Safety

- Always STOP the engine before transporting or working on it (refuelling, adjusting etc).
- When transporting the machine in a vehicle, ensure the engine is OFF, the tillers and digging attachments are disconnected, and the machine is secured in an upright position to prevent tip-over, machine damage or fuel spills.

Table of Contents

Applicable Models

This manual applies to the following Protégé and Warton water pumps:

1.5" High Pressure Water Pump, 4-Stroke Diesel with Electric Start

2" Water Pump, 4-Stroke Diesel with Electric Start

4" Water Pump, 4-Stroke Diesel with Electric Start

2" High Flow Water Transfer Pump, 4-Stroke

2" High Pressure Water Pump, 4-Stroke

3" High Flow Water Transfer Pump, 4-Stroke

3" High Flow Water Trash Pump, 4-Stroke

1.5" High Pressure Water Pump, 4-Stroke

1" Water Pump, 2-Stroke

4" Self-Priming Water Pump, 4-Stroke

3" Self-Priming Water Pump, 4-Stroke

4-Outlet (2x1.5"/2x1") Water Pump, 4-Stroke

1" Water Pump, 4-Stroke

2" Water Pump, 4-Stroke

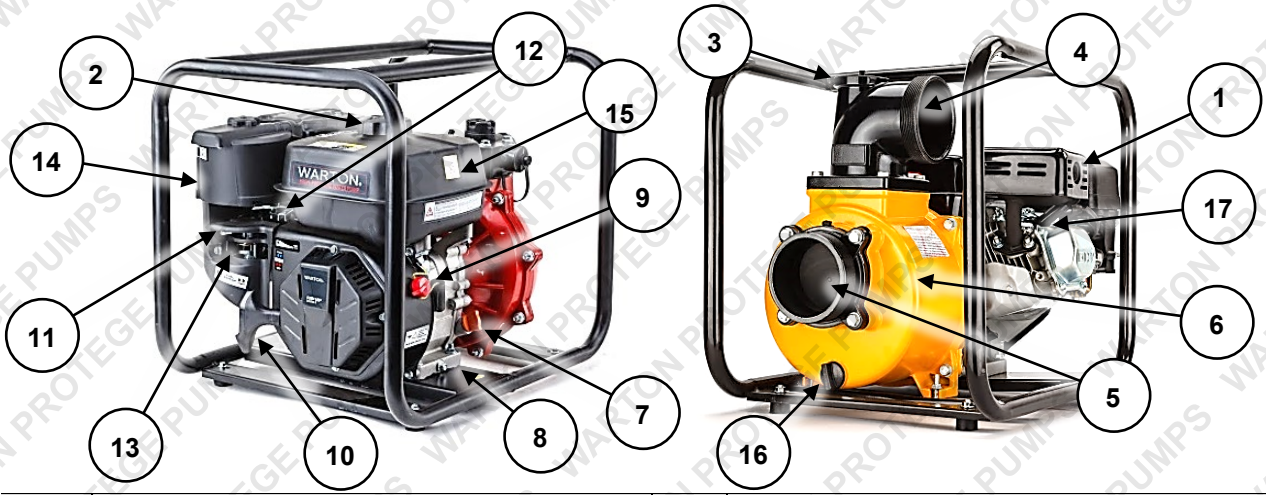
Parts Identification

All pumps include fittings as applicable for the size and number of pump connections. For example, a pump with a single 2" (50mm) inlet and 2 x 1" (25mm) outlets will include 1 x 2" hose connector, rubber seal, collar and hose clamp and 2 x 1" hose connectors, rubber seals, collars and hose clamps. Similarly, a basic hose connector, filter and hose clamp for the inlet hose is also included. A basic toolkit may also be included. The following example shows included fittings for PMPPTLPROA15P model:

It is strongly recommended that you familiarise yourself with all major components of the machine before using it or performing any maintenance tasks.

Petrol 4-Stroke Engines

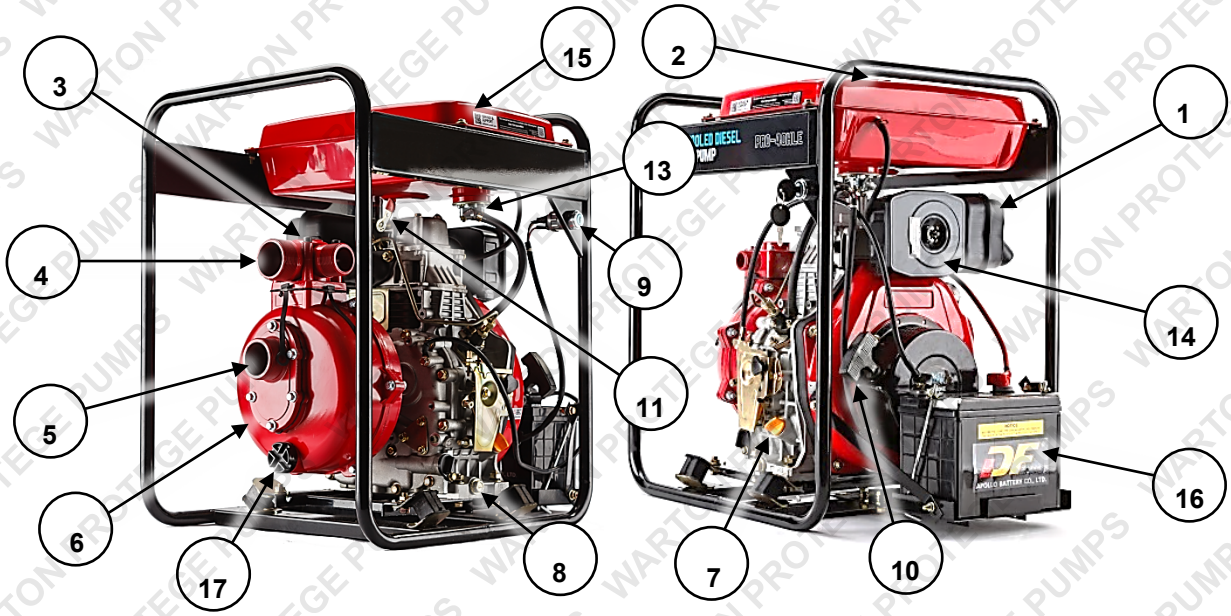
Products detailed in this manual may vary in appearance, inclusions, description and packaging from those shown or described. This section shows typical major components common to most 4-stroke petrol powered water pumps.



No.	Name	No.	Name
1	Exhaust	10	Starter Cord
2	Fuel Filler	11	Choke
3	Pump Priming Port	12	Throttle
4	Pump Outlet	13	Fuel Tap
5	Pump Inlet	14	Air Intake Assembly (filter inside)
6	Pump Body	15	Fuel Tank
7	Oil Filler/Dipstick	16	Pump Drain Plug
8	Oil Drain Plug	17	Spark plug
9	Engine ON/OFF Switch		

Diesel 4-Stroke Engines

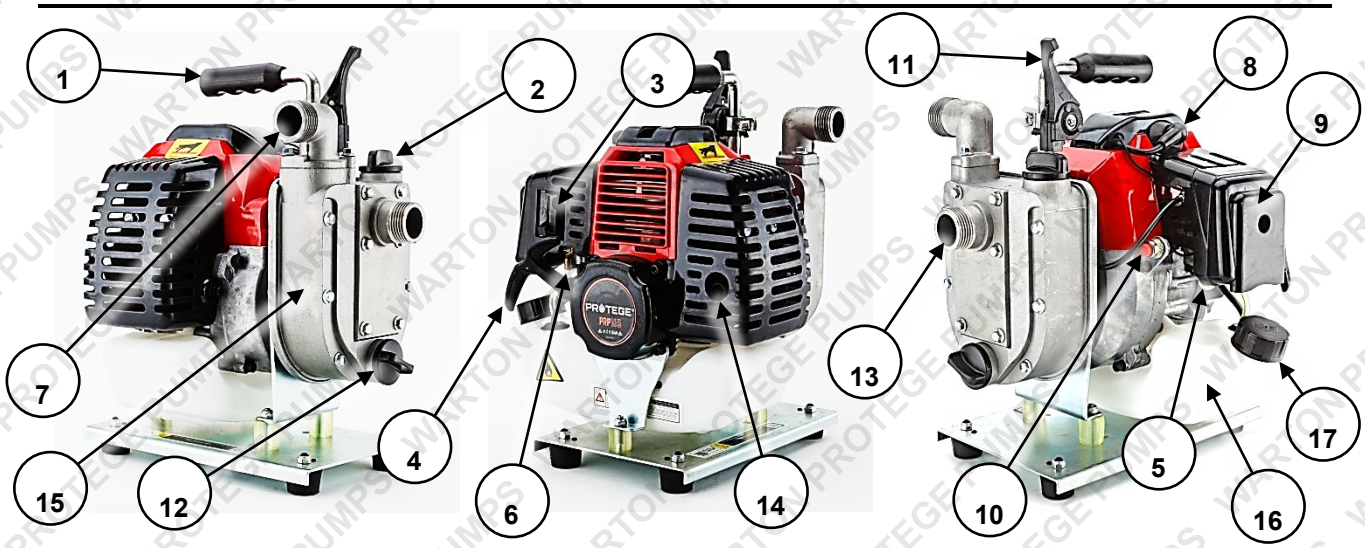
Products detailed in this manual may vary in appearance, inclusions, description and packaging from those shown or described. This section shows typical major components common to most 4-stroke diesel powered water pumps.



No.	Name	No.	Name
1	Exhaust	10	Starter Cord
2	Fuel Filler	11	Decompression Lever
3	Pump Priming Port	12	Throttle
4	Pump Outlet	13	Fuel Tap
5	Pump Inlet	14	Air Intake Assembly (filter inside)
6	Pump Body	15	Fuel Tank
7	Oil Filler/Dipstick	16	Battery
8	Oil Drain Plug	17	Pump Drain Plug
9	Engine ON/OFF Switch		

2-Stroke Engines

Products detailed in this manual may vary in appearance, inclusions, description and packaging from those shown or described. This section shows typical major components common to most 2-stroke petrol powered water pumps.



No.	Name	No.	Name
1	Carry Handle	10	Engine OFF Switch
2	Pump Priming Port	11	Throttle
3	Choke	12	Pump Drain Plug
4	Starter Cord	13	Pump Inlet
5	Fuel Primer	14	Exhaust
6	Fuel Tap	15	Pump Body
7	Pump Outlet	16	Fuel Tank
8	Spark Plug	17	Fuel Filler
9	Air Intake Assembly (filter inside)		

Before Use Checklist

Ensure that you carry out all procedures below before starting the engine or operating the water pump. **Failure to follow the checklist and carry out the procedures correctly may result in making the product warranty void**.

4-Stroke Engine Oil

Four-stroke engines require engine oil in the crankcase for lubrication of internal components. Severe or irreparable damage may occur if the engine is allowed to run without engine oil. The engine oil level requires regular maintenance. Check the engine oil level and ensure that the oil level is at or just under the maximum level indicator.

Always check the engine oil level before starting the engine. See Engine Oil.

Air Filter

The air filter is used to prevent dirt and other particles from possibly entering the engine and causing internal damage to it. The air filter requires regular maintenance.

Always check the air filter before starting the engine. See Air Filter.

Fuel

Petrol/fuel/gasoline is extremely flammable – keep clear of naked flames or other ignition sources. • The engine must be cool before refuelling.

Adequately fill the fuel tank with the correct fuel type.

- For 4-stroke engines, use non-ethanol unleaded petrol (higher RON values will provide best engine performance). Do not use old or contaminated fuel.
- For diesel engines, use commercial non-bio diesel fuel. Do not use old or contaminated fuel.
- For 2-stroke engines, use non-ethanol unleaded mixed at a 25:1 ratio with 2-stroke engine oil (higher RON values and good quality 2-stroke oil will provide best engine performance). Do not use old or contaminated fuel/oil. Fuel/oil mix ratio examples are shown below.

Petrol (Litre)	1	2	5	10
Oil (Millilitre)	40	80	200	400

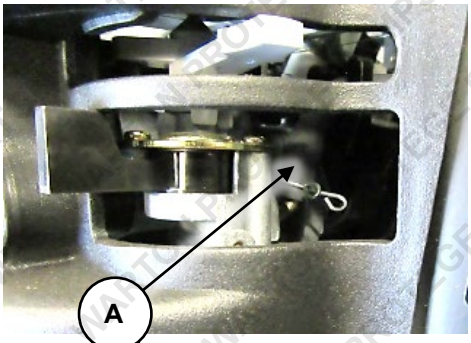
Gas (US Gal)	0.5	1	2	3
Oil (Fl. Oz)	2.56	5.12	10.24	15.36

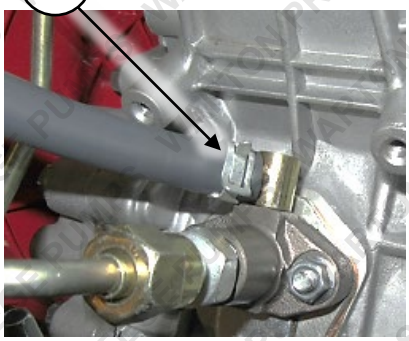
To fill or top up fuel:

1. Place the machine in an upright position on a flat and level surface.
2. Clean the machine around the fuel filler so that no dirt or other material enters the engine when the cap is removed.
3. Remove (rotate left) the fuel filler cap.
4. Using a funnel, carefully fill the tank with fuel. Do not fill above the top of the strainer (if equipped) or otherwise overfill the tank.
5. When finished, reinstall (rotate right) the fuel filler cap until firm. Wipe away any residual fuel from the machine. If fuel has been spilt, move the pump away from the spillage before starting the engine.

Priming the Fuel System

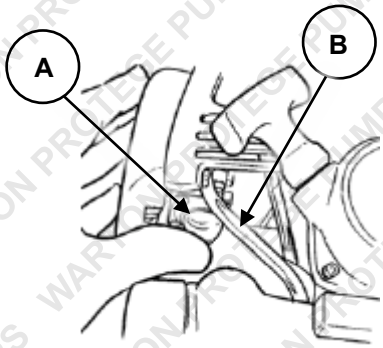
When an engine is new or has been completely run out of fuel it may be necessary to "prime" the fuel system before attempting to start the engine. This means removing any air from the fuel line. To prime 4-stroke engines:





1. Fill the fuel tank with fuel.
2. Remove the fuel line (**A**) from the carburettor or fuel injector using pliers to loosen the hose-clamp. Hold a container beneath the fuel line to catch any spilt fuel.
3. Place the fuel tap in the "ON" position and allow fuel to flow out (into the container) until no air bubbles can be seen in the fuel stream.
4. Push the fuel line back onto its connection point and re-fasten the hose clamp.
5. Clean up any spilled fuel. If fuel has been spilt, move the pump away from the spillage before starting the engine.
6. Start the engine.

To prime 2-stroke engines:



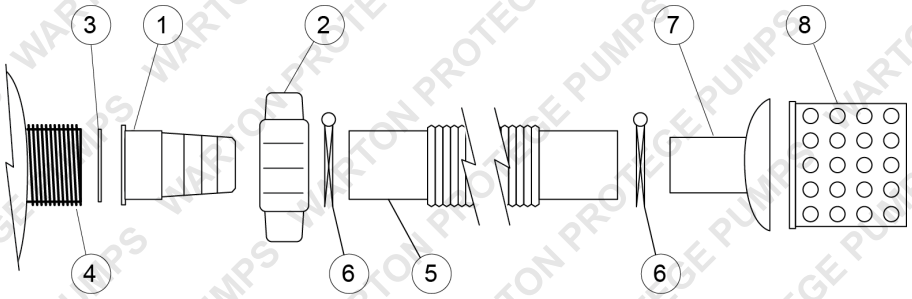
1. Fill the fuel tank with fuel.
2. Place the fuel tap in the "ON" position.
3. Locate the fuel primer (**A**).
4. Press the fuel primer repeatedly until fuel can be seen in the fuel return tube (**B**).
5. Start the engine.

Connecting Hoses

Always use the correct diameter hose. • Ensure all hoses, joints and clamps are of adequate construction to handle the inlet suction and outlet pressure. • Hoses should be free from damage, kinking or creasing. • All hose connectors and connections must be secure and properly sealed to ensure correct and reliable pump operation. • The pump should be located no more than the maximum suction distance as per the Pump Specifications.

Inlet

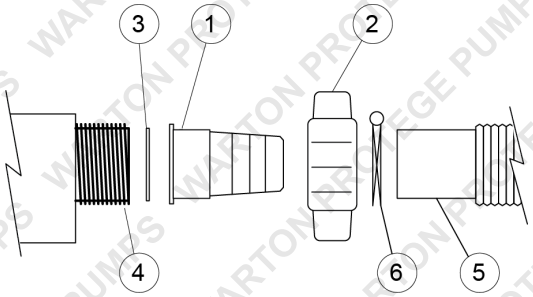
For best performance, the inlet hose should be kept as short as possible. In other words, place the pump as near the water source as safe and practical – the further the distance from the water source or longer the inlet hose, the longer it will take for the pump to initially draw. To connect the inlet hose:



1. Insert the hose connector (**1**) through the collar (**2**).
2. Insert the rubber seal (**3**) so it sits between the end of pump inlet port (**4**) and the hose connector (**1**).
3. Install the hose connector/seal/collar assembly to the pump inlet port and firmly tighten (rotate right) the collar by hand.
4. Place a hose clamp (**6**) onto the end of the inlet hose (**5**), then push the hose over the hose connector.
5. Tighten the hose clamp so the hose is securely installed on the hose connector.
6. On the other end of the inlet hose, install the filter (**7**, **8**) and secure it to the inlet hose with a hose clamp.

Outlet

For best performance, always use outlet fittings that are designed for the general water pump application; for example, high pressure, water transfer etc. Poorly matched hose sizes may affect pump efficiency by either increasing pumping resistance (hose diameter too small) or reduced outlet pressure (hose diameter too large). Some water pumps have multiple outlet ports. When multiple outlets are connected, a reduction in available pressure through each outlet should be expected. To connect the outlet hose:



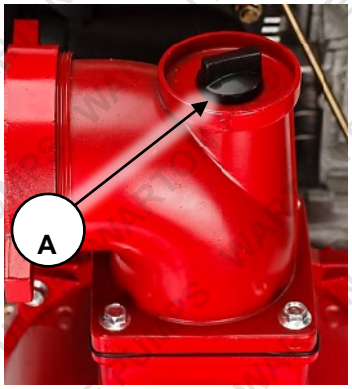
1. Insert the hose connector (**1**) through the collar (**2**).
2. Insert the rubber seal (**3**) so it sits between the end of pump outlet port (**4**) and the hose connector.
3. Install the hose connector/seal/collar assembly to the pump outlet port and firmly tighten (rotate right) the collar by hand.
4. Place a hose clamp (**6**) onto the end of the outlet hose, then push the hose over the hose connector.
5. Tighten the hose clamp so the hose is securely installed on the hose connector.
6. On the other end of the outlet hose, install the necessary fittings as required.

Water Pump Priming

Never activate the water pump without it being primed first and piped to a water source. If the pump is not primed, it will not draw water from the source, overheat and become damaged. Before priming, connect all hoses to the water pump.

Before using the machine, the pump must be "primed" with water. The priming process is basically to remove air from the pump body which allows it to begin drawing water from the water source. To prime the pump:

1. Remove (rotate left) the pump priming port cap (**A**). The priming pump is usually located at the top of the pump housing.
2. Fill the pump body and inlet hose with as much water as possible.
3. Reinstall (rotate right) the pump priming port cap.
4. Fully open any shut-off valves in the inlet/outlet hoses (nozzles etc) so that water can be pumped and any air in the system is expelled.

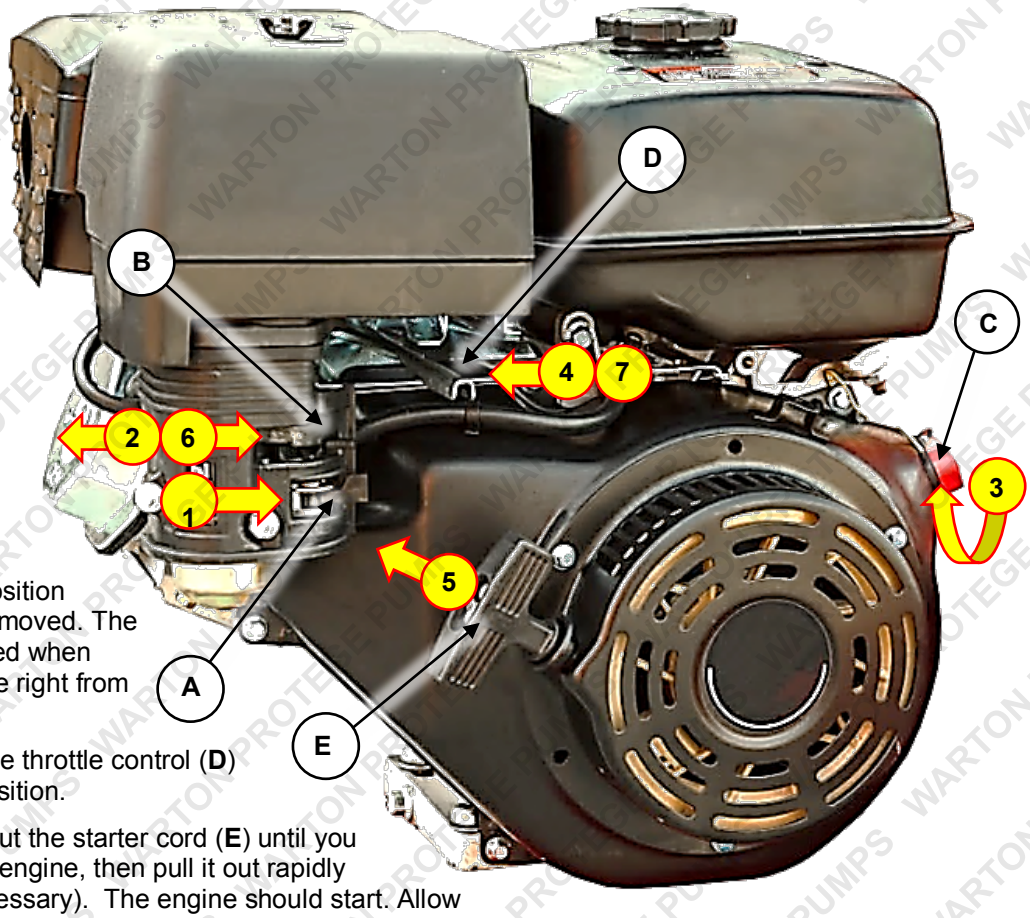


Engine Starting and Water Pump Operation

Before starting the engine, ensure that you have followed all procedures described in the Before Use Checklist. The product is NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use – see Engine Oil. **Failure to add engine oil will void the product warranty**. • An engine should not be operated more than 4 hours continuously without being stopped to cool before being used again.

Different models may feature variations in design; for example, some have different engine types, electric start options etc. The following procedures and images are typical to all models, however, the position or appearance of controls etc may vary. All major engine controls are identified on the machine by way of stickers or other markings.

Starting Petrol Engines



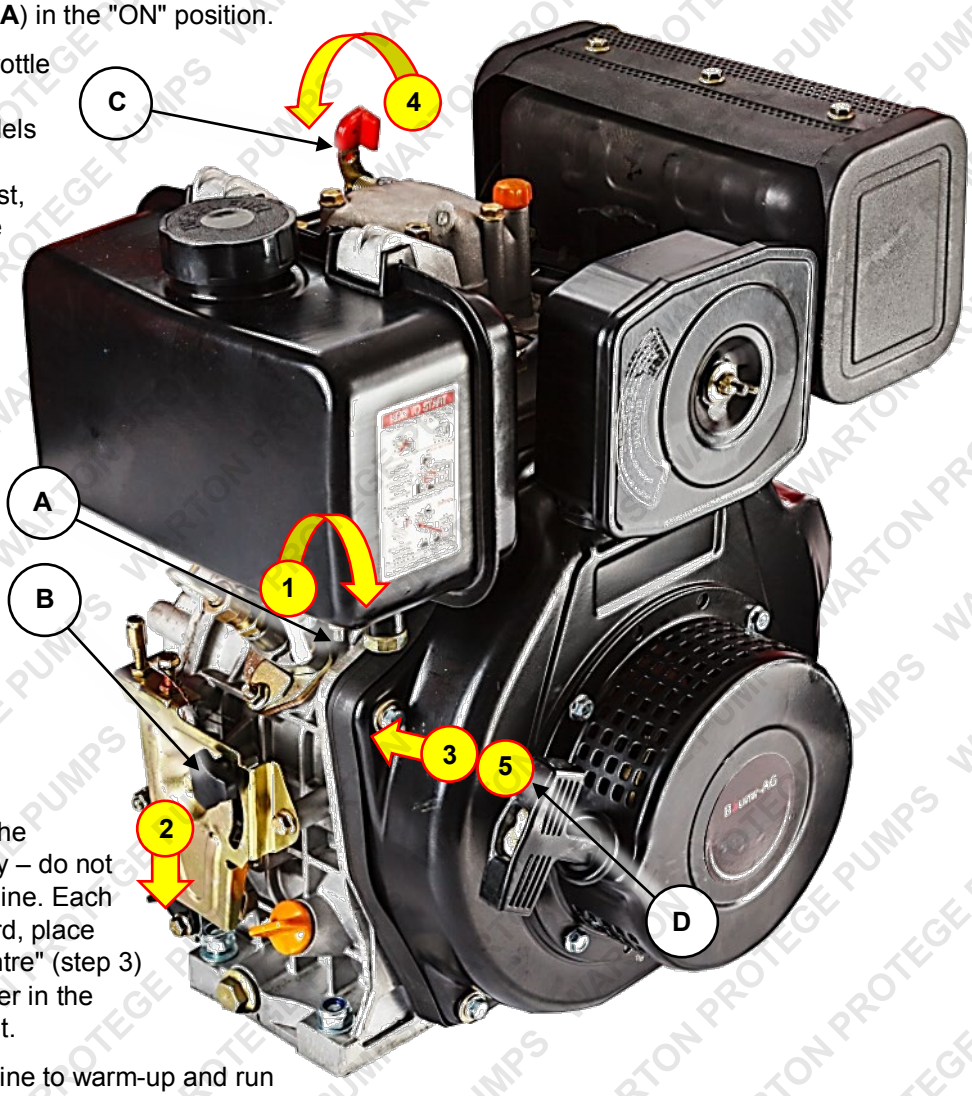
1. **FUEL** – Place the fuel tap (**A**) in the "ON" position (to the right).
2. **CHOKE** – If the engine is cold, place the choke (**B**) in the "COLD" position (to the left). If the engine is warm or ambient temperature is high, place in the "HOT" position (to the right).
3. **IGNITION** – Place the engine ON/OFF switch (**C**) or key switch (if equipped) in the "ON" ("**I**") position. For key switches, the "OFF" position allows the key to be removed. The "ON" position is reached when the key is rotated to the right from the "OFF" position.
4. **THROTTLE** – Place the throttle control (**D**) just off the "SLOW" position.
5. **START** – Slowly pull out the starter cord (**E**) until you feel it engage with the engine, then pull it out rapidly (use both hands if necessary). The engine should start. Allow the starter cord to rewind slowly – do not let it "snap" back.
6. **WARM-UP** – Allow the engine to warm-up and run smoothly. If choke is being applied, place the choke (**B**) in the "HOT" position.
7. **THROTTLE** – Adjust the throttle control (**D**) for the required engine speed.

If the engine does not start, repeat step 5 onward. If the engine fails to start after several attempts, refer to Troubleshooting.

Video Tutorial:
Starting Petrol Engines

Starting Diesel Engines

1. **FUEL** – Place the fuel tap (**A**) in the "ON" position.
2. **THROTTLE** – Place the throttle control (**B**) in the "RUN" position (down). Some models use a screw to secure the throttle in position – to adjust, loosen the screw and move it to the required position, then tighten it again.
3. **TOP DEAD CENTRE** – Slowly pull out the starter cord (**D**) until you feel it engage with the engine, then allow it to return to the retracted position.
4. **DECOMPRESS** – Place the decompression lever (**C**) in the "down" position, otherwise you may not be able to start the engine.
5. **START** – Rapidly pull the starter cord (**D**) (use both hands if necessary). The engine should start. Allow the starter cord to rewind slowly – do not let it "snap" back to the engine. Each time you use the starter cord, place the engine at "top dead centre" (step 3) and the decompression lever in the "down" position (step 4) first.



6. **WARM-UP** – Allow the engine to warm-up and run smoothly.
7. **THROTTLE** – Adjust the throttle control (**B**) for the required engine speed. Some models use a screw to secure the throttle in position – to adjust, loosen the screw and move it to the required position, then tighten it again.

If the engine does not start, repeat step 3 onward. If the engine fails to start after several attempts, refer to Troubleshooting.

Video Tutorial:
Pull-Starting Diesel Engines

Electric Starting

For models equipped with an electric start option, charge the battery then connect a suitable battery cable (cables may be supplied) between the battery POSITIVE ("**+**") terminal and the starter solenoid POSITIVE terminal (this usually has rubber caps for the connectors). Then, connect a battery cable between the battery NEGATIVE ("**-**") terminal and an engine case stud / bolt.

1. Follow steps 1 to 5 as per manual/pull starting.
2. **START** – Turn the ignition key fully to the right to engage the starter motor. The engine should start.
3. **WARM-UP** – Allow the engine to warm-up and run smoothly.
4. **THROTTLE** – Adjust the throttle control for the required engine speed. Some models use a screw to secure the throttle in position – to adjust, loosen the screw and move it to the required position, then tighten it again.

If the engine does not start, repeat step 2 onward. If the engine fails to start after several attempts, refer to Troubleshooting.

Jump-Starting

If the battery does not have enough charge to sufficiently crank the engine, the engine can be jump-started. Use a fully charged battery (the "jump" battery) and suitable jump-starting cables. To jump-start:

1. Ensure the ignition is OFF (for some models, this is the position that allows the key to be removed).
2. Connect the jump battery positive ("**+**") terminal to the engine battery positive ("**+**") terminal.
3. Connect the jump battery negative ("**-**") terminal to the engine battery negative ("**-**") terminal.
4. Follow the normal electric start procedure from step 2 onward.

Stopping the Engine

Stopping in an Emergency

1. To stop the engine immediately, move the fuel pump knob to the OFF position.

Stopping in Normal Use

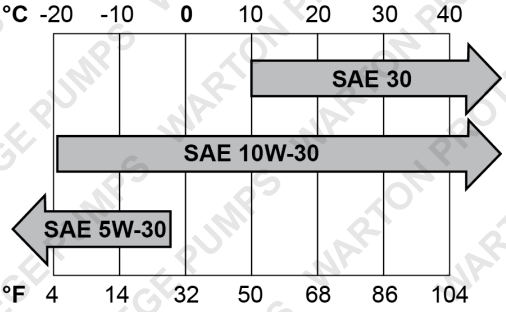
1. Place the throttle control in the "SLOW" position.
2. Place the engine ON/OFF switch.
3. Move the fuel pump knob to the OFF position. The key is only used to start the engine.

Environmental Considerations

Altitude – If the engine is being used in altitudes at or above 1500m (approximately 5000'), adjustments to the carburettor may be required. This is because there is less oxygen in the air as altitude increases, which effectively "enriches" the ratio of fuel to air going into the engine and the higher the altitude, the richer the fuel mixture becomes. If the engine is being permanently operated at high altitude, it is recommended to have an authorized service centre make the necessary carburettor adjustments. If the engine is used occasionally at altitude (not extreme altitudes), no adjustments should be required, however, a slight decrease in engine performance can be expected.

Temperature – *The following information applies to 4-stroke engines only.*

If the engine is being used in extremely cold or hot environments; for example, desert or snow conditions, the type of engine oil may need to be changed to suit environmental temperatures. Oil thickens as the temperature decreases and thins as temperature increases, which means that if the engine oil is not suited to the temperature its ability to properly lubricate the engine may be affected. Use the following chart to determine the correct engine oil:



Water Pump Operation

Be aware that once the engine is running, the pumping action of the machine activates. When the engine is idling (slowest continuous running speed), the pumping action is minimal. As you increase engine speed (use the engine throttle control), the pumping action increases. Note the following recommendations:

- Operate the engine at a sufficient speed to provide the desired pumping action (inlet suction and output pressure). This may vary on the work being performed and the fluid being pumped etc.
- Always use an inlet hose filter and do not deliberately allow excessive debris through the pump.
- After use, wash out the pump and hoses to remove corrosive substances, debris or other impurities carried by the pumped fluid; for example, sea water and waste water.

Maintenance

Running combustion engines in confined areas **CAN KILL IN MINUTES**. Engine exhaust fumes contain carbon-monoxide – a deadly gas that you cannot smell or see. NEVER run a combustion engine in confined areas EVEN IF windows and doors are open. ONLY run combustion engines OUTDOORS and away from doors, windows and vents. • Petrol / fuel / gasoline is extremely flammable – keep clear of naked flames or other ignition sources. • Do not have the engine running during inspection and maintenance unless specifically required. • The engine should be cool enough to touch before performing maintenance activities. • Some maintenance activities may be beyond the scope of some users. Do NOT attempt procedures that you are not comfortable with, or do not have the necessary tools, experience or knowledge for – take the unit to an authorised service centre or qualified technician for servicing. • Harsh operating environments such as extreme temperatures, dust etc may necessitate more frequent maintenance. • **Failure to follow the maintenance schedule, using incorrect or non-compatible accessories or replacements parts, or general negligence may result in making the product warranty void**.

To keep the machine performing at optimal efficiency, regular checks and maintenance is required. The maintenance schedule below specifies preventative maintenance checks and necessary maintenance tasks and how often they should be performed. The schedule applies to multiple engines; some engines may not include some components, so maintenance on those components is not applicable.

Maintenance Schedule

Use the following maintenance schedule for a list of regular maintenance tasks and how often they need to be performed. Maintenance frequency is based on average usage. Be aware of how much the machine is used and be sure to follow the schedule according to time or usage, whichever comes first.

Towards the end of this document is a form you can use for maintenance record keeping. It is recommended that you keep a reference of all maintenance.

Major Servicing and "Heavy-Duty" Usage - For engines that are subject to "heavy-duty" use, which can be defined as being used under loads of 85% or more and / or in use more than approximately 300 hours per year (for example, generators and water pumps), more frequent "Major Service" maintenance is required. In addition to normal service requirements, and as with many smaller machine and off-road bike engines, the following parts (as applicable for petrol, diesel or 2-stroke engines) may require replacement during a major service:

- Piston rings.
- Big-end bearings.
- Small-end bearings.
- Gudgeon pin.
- Oil rings.
- Gaskets and seals.
- Valve seats.

Inspection of the following items is required:

- Piston for cracks and stress fractures.
- Bore for wear requiring reconditioning.
- Full machine for broken, worn or loose parts.

Failure to follow the maintenance schedule, using incorrect or non-compatible accessories or replacements parts, or general negligence may result in making the product warranty void.

Maintenance Schedule – Petrol Engines / Machines

Component / Task	Every Use	After First 5 Hours Use	3 Months / 25 Hours Use	6 Months / 50 Hours Use	12 Months / 100 Hours Use	Major Service – Normal Use 24 Months / 200 Hours Use	Major Service – Heavy-Duty Use Every 200 Hours Use
Engine Oil ****	Check level. Adjust as necessary	Replace					
Engine Oil Filter *					Replace		
Loose Engine / Machine Fasteners	Check. Tighten as necessary						
Air Filter	Check	Clean. Replace as necessary				Replace	
Spark Plug			Check		Replace		
Spark Arrestor *							
Fuel Filter *			Clean. Replace as necessary			Replace	
Fuel Strainer *	Check						
Float Bowl *					Clean		
Fuel Lines / Hoses	Check	Replace as necessary					
Fuel injector *					Check. Clean		
Fuel Pump *							
Fuel Tank					Flush and clean		
Idle Speed					Check. Adjust as necessary		
Valve Clearance					Check. Adjust as necessary		
Cylinder Head Fasteners					Check. Tighten as necessary		
Combustion Chamber					Check. Clean / de-coke as necessary		
Battery Electrolyte *					Check level. Adjust as necessary		
Major Service						Perform	
Cutting Blade / Chain *	Check			Sharpen. Replace as necessary			
Water Pump Oil **	Check level. Adjust as necessary					Replace	
Hydraulic Fluid ***	Check level. Adjust as necessary				Replace		
Drive Belt *	Check tension. Adjust as necessary					Check. Replace as necessary	

* Where applicable. ** Pressure washers with non-sealed water pumps. *** Log splitters only.
**** Briggs & Stratton "EXi" engines do NOT require engine oil changes; just ensure that oil level is correct.

Maintenance Schedule – Diesel Engines / Machines

Component / Task	Every Use	After First 5 Hours Use	3 Months / 25 Hours Use	6 Months / 50 Hours Use	12 Months / 100 Hours Use	Major Service – Normal Use 24 Months / 200 Hours Use	Major Service – Heavy-Duty Use Every 200 Hours Use
Engine Oil	Check level. Adjust as necessary	Replace					
Engine Oil Filter *			Clean. Replace as necessary				
Loose Engine / Machine Fasteners	Check. Tighten as necessary						
Air Filter	Check	Clean. Replace as necessary				Replace	
Spark Arrestor *							
Fuel Filter *		Clean. Replace as necessary				Replace	
Fuel Strainer *	Check						
Fuel Lines / Hoses	Check	Replace as necessary					
Fuel injector *					Check. Clean		
Fuel Pump *							
Fuel Tank					Flush and clean		
Idle Speed					Check. Adjust as necessary		
Valve Clearance					Check. Adjust as necessary		
Cylinder Head Fasteners						Check. Tighten as necessary	
Combustion Chamber					Check. Clean / de-coke as necessary		
Battery Electrolyte *		Check level. Adjust as necessary					
Major Service						Perform	
Cutting Blade / Chain *	Check	Sharpen. Replace as necessary					
Water Pump Oil **	Check level. Adjust as necessary					Replace	
Hydraulic Fluid ***	Check level. Adjust as necessary					Replace	
Drive Belt *	Check tension. Adjust as necessary					Check. Replace as necessary	

* Where applicable. ** Pressure washers with non-sealed water pumps. *** Log splitters only.

Maintenance Schedule – 2-Stroke Engines / Machines

Component / Task	Every Use	After First 5 Hours Use	3 Months / 25 Hours Use	6 Months / 50 Hours Use	12 Months / 100 Hours Use	Major Service – Normal Use 24 Months / 200 Hours Use	Major Service – Heavy-Duty Use Every 200 Hours Use
Loose Engine / Machine Fasteners	Check. Tighten as necessary						
Air Filter	Check		Clean. Replace as necessary			Replace	
Spark Plug			Check		Replace		
Spark Arrestor *							
Fuel Filter *			Clean. Replace as necessary			Replace	
Fuel Strainer *	Check						
Float Bowl *					Clean		
Fuel Lines / Hoses	Check		Replace as necessary				
Fuel Tank					Flush and clean		
Idle Speed					Check. Adjust as necessary		
Engine Tune			Check. Adjust as necessary				
Cylinder Head Fasteners					Check. Tighten as necessary		
Combustion Chamber					Check. Clean / de-coke as necessary		
Major Service						Perform	
Cutting Blade / Chain *	Check		Sharpen. Replace as necessary				
Chain Lubricant *			Check. Add as necessary.				
Chain Lubricant Strainer *					Clean. Replace as necessary		

* Where applicable.

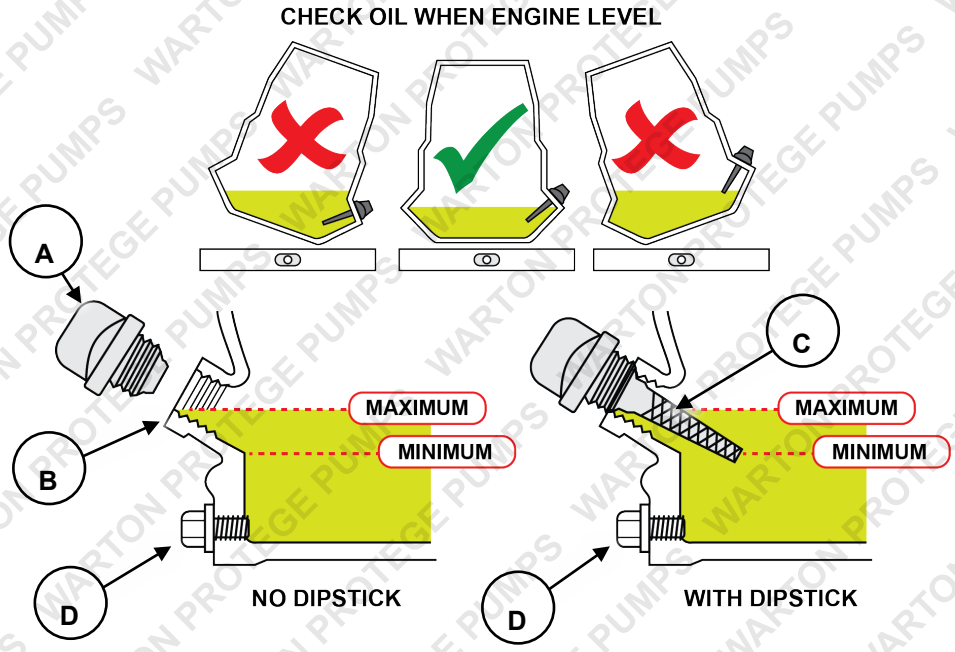
Engine Oil

Diesel and 4-stroke engines are NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use. **Failure to add engine oil will void the product warranty**. • Always check engine oil level when the machine is in an upright position on a flat and level surface. • Do not use used or contaminated engine oils. • Use only engine oils of the correct type (see Specifications). • Perform the first oil change within the first 20 hours of use. Subsequently, change the oil every 20 hours of use. • It is recommended that the engine be warm, but not hot, when performing oil changes. When the oil is warm it drains faster. • Using dirty or incorrect engine oil may cause engine damage and void any warranty • Always use suitable tools. • Always dispose of used oil in an environmentally responsible manner and according to regulations. • Some engines feature oil level detection, which will prevent the engine being started or automatically stop a running engine if there is insufficient oil. • **Always check the oil level and ensure is at or near the "MAX" indicator before using the machine**. • Some models may have 2 oil drain plugs and fillers on either side of the engine – it does not matter which one is used. • Engine oil maintenance is not applicable to 2-stroke engines.

4-stroke engines require engine oil in the crankcase for lubrication of internal components. Severe or irreparable damage may occur if the engine is allowed to run without engine oil. The engine oil level requires regular maintenance as per the maintenance schedule.

To check engine oil level:

1. Place the machine in an upright position on a flat and level surface.
2. Clean the machine around the oil filler cap (**A**) so that no dirt or other material enters the engine when the cap is removed.
3. Remove the oil filler cap (rotate left) until fully unscrewed. For machines without a dipstick, the oil level is determined by how close the oil is to the edge of the filler hole (**B**). For machines equipped with an oil level dipstick:
   a. Remove the dipstick (**C**) and wipe clean with a piece of cloth or paper.
   b. Insert the dipstick into the oil filler but do not screw it in.
   c. Remove and inspect the dipstick – the oil level is determined by where oil can be seen on it.
4. Ensure that the oil level is at or just under the "maximum". If the oil level is low, add additional oil until the correct level is reached. If the oil level is too high, drain some oil until the correct level is reached.
5. When finished, re-install (rotate right) the oil filler cap until firm. Wipe off any residual oil from the machine.



To change the engine oil:

1. Place the machine on a suitable work surface that is flat and level and have a container ready to catch drained oil.
2. Clean the machine around the oil drain plug (**D**) and oil filler cap/dipstick so that no dirt or other material enters the engine when the plug or cap is removed.
3. Unscrew (rotate left) and remove the drain plug and washer.
4. Tilt the machine and drain all oil from the engine. Once drained, allow the machine to sit level again.
5. Clean the drain plug and washer and then reinstall them. Screw in fully (rotate right) and firmly tighten.
6. Remove the oil filler cap (rotate left) until fully unscrewed. Wipe the oil level indicator clean with a piece of cloth or paper.
7. Using a funnel, carefully add oil to the engine until the "maximum" level is reached. Double- check the oil level (described above).
8. When finished, re-install (rotate right) the oil filler cap until firm. Wipe off any residual oil from the machine.

Air Filter

Operating the machine without a functional air filter may cause severe engine damage and will void any warranty. • A dirty or oil saturated air filter will restrict air flow, which can be mistaken as fuel system problems. Check the condition of the air filter before adjusting engine idle speed, where applicable. • If the air filter is damaged (torn, broken, disintegrating), replace it.

The air filter is used to prevent dirt and other particles from possibly entering the engine and causing internal damage to it. The air filter requires regular maintenance as per the maintenance schedule.

Inspection and Cleaning

Inspect the air filter for dirtiness and debris, damage etc. Clean or replace the filter element as necessary. To clean air filters:

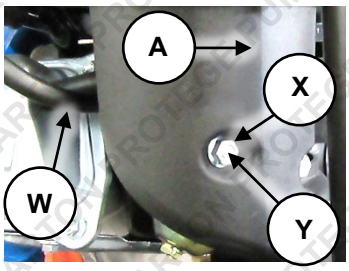
- For foam filters, wash the filter in warm water and mild detergent, then rinse and allow to dry.
- For paper filters, use compressed air to blow particles from it. The air should be blown from the engine side of the filter.
- Clean all other air filter assembly components using water and mild detergent, then dry them.
- For foam filters, place a few drops of clean engine oil on the filter then squeeze it a few times to spread the oil through the filter material and remove any excess oil.

Removal/Installation for Petrol 4-Stroke Engines

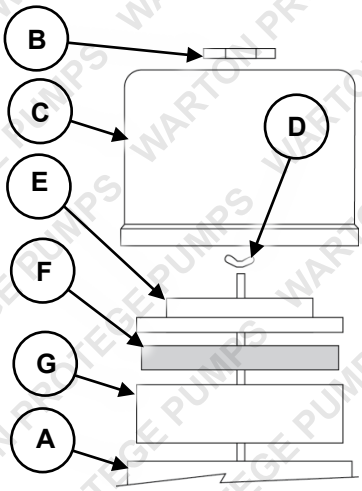
To remove the air filter:

1. Unscrew (rotate left) the nut (**B**) securing the air filter cover (**C**) and remove the cover from the air intake assembly (**A**).

NOTE: For some water pump models, the machine frame may make it difficult to remove the air filter cover without further disassembly. In such cases:



   a. Remove (rotate left) the nuts (**X**) from the air intake assembly (**A**) mounting studs (**Y**).
   b. Disconnect the breather hose (**W**) from the air intake assembly, then gently pull the intake assembly off the mounting studs. Be careful not to damage the gasket that sits between the engine and air intake assembly. The air intake assembly does not need to be fully removed from the machine, rather, just off the studs so that it can be rotated.
   c. Rotate the air intake assembly left until it is possible to remove the air filter cover.



2. Unscrew (rotate left) the wing nut (**D**) and remove the filter spacer (**E**), filter element (**F**) and filter base (**G**).

To install the air filter:

1. Assemble the air filter components to the air intake assembly, filter base first, then filter element, then filter spacer. Ensure that the filter base is correctly positioned in relation to the air intake assembly as it will seat and seal properly in one position only.
2. Re-install (rotate right) the wing nut and tighten by hand so that all filter components are secure. Do not over-tighten.
3. Re-install the filter cover and secure it with the nut (rotate right). Tighten the nut by hand. Do not over-tighten.

NOTE: If the air intake assembly had to be loosened:

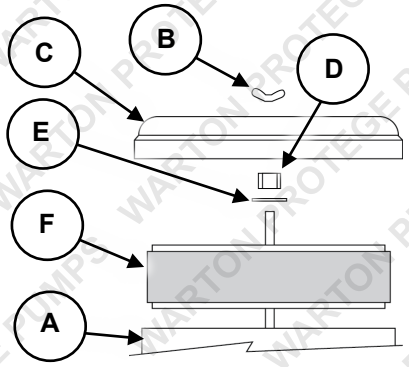
   a. Ensure that the gasket between the engine and air intake assembly is undamaged and is correctly sitting on the mounting studs. Rotate the air intake assembly (with all filter components re-attached) so that it is within the machine frame and upright.
   b. Carefully move the air intake assembly onto the mounting studs and push it up against the engine.

c. Re-install the air intake assembly nuts (rotate right) to the mounting studs and tighten.

d. Re-attach the breather hose.

Removal/Installation for Diesel 4-Stroke Engines

Some engine may feature a 2-stage air filter, with a foam "envelope" around a paper element. Cleaning procedures are as per Air Filter Inspection and Cleaning.



To remove the air filter:

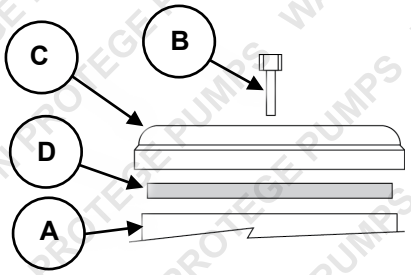
1. Unscrew (rotate left) the wing nut (**B**) securing the air filter cover (**C**) and remove the cover from the air intake assembly (**A**).
2. Unscrew (rotate left) the nut (**D**) and washer (**E**) and remove the filter element (**F**).

To install the air filter:

1. Push the filter element onto the mounting screw and secure with the washer and nut (rotate right) and tighten. Do not over-tighten.
2. Place the air filter cover in position. Re-install the wing nut (rotate right) and tighten by hand so that all filter components are secure. Do not over-tighten.

Removal/Installation for 2-Stroke Engines

Cleaning procedures are as per Air Filter Inspection and Cleaning.



To remove the air filter:

1. Unscrew (rotate left) the nut (**B**) securing the air filter cover (**C**) and remove the cover from the air intake assembly (**A**).
2. Remove the filter element (**D**).

To install the air filter:

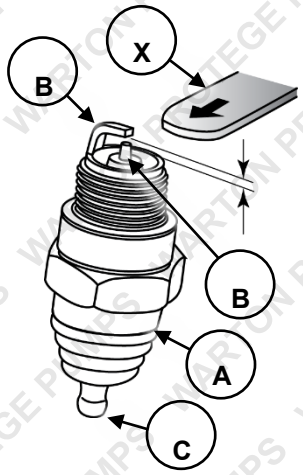
1. Push the filter element onto the mounting screw and secure with the washer and nut (rotate right) and tighten. Do not over-tighten.
2. Place the air filter cover in position. Re-install the wing nut (rotate right) and tighten by hand so that all filter components are secure. Do not over-tighten.

Spark Plug

If the spark plug is damaged (cracked insulator, broken or eroded electrodes etc), replace it. • Always use spark plugs of the correct "heat range" - see Specifications. Spark plug maintenance is not applicable to diesel engines.

The spark plug is used to ignite the air/fuel mixture inside the engine. The spark plug has electrodes on one end and an electrical terminal on the other. The spark plug requires regular maintenance.

Cleaning and Gap Checking



The spark plug should be checked and cleaned as per the maintenance schedule.

1. Remove any carbon deposits on the spark plug (**A**) electrodes (**B**) with a wire brush.
2. Clean the spark plug threads and the electrical terminal (**C**) on the top.

To check and adjust the spark plug "gap":

1. Use "feeler" or "thickness" gauges (**X**) to measure the existing gap. The gauge must drag a little when being slid between the electrodes (**2**) – this means the measurement is fairly accurate.
2. Adjust the gap to within specification (see Specifications). If the gap needs to be reduced, gently tap the electrode as required. If the gap needs to be increased, use pliers to gently pull the electrode as required.
3. Measure the gap again and ensure it is within the specified range before re-installing the spark plug.

Removal/Installation

1. Pull the electrical lead from the terminal on top of the spark plug.
2. Clean the area around the spark plug so that no dirt or other material can enter the engine when the spark plug is removed.
3. Use the spark plug tool to remove the spark plug (rotate left).

To re-install the spark plug:

1. Place the spark plug in its hole and screw it in (rotate right) until "finger tight".
2. Use the spark plug tool to tighten the spark plug approximately one quarter turn (do not over-tighten).
3. Place the electrical lead over the spark plug terminal and push it down so that it connects firmly with the terminal.

Transportation and Storage

Always ensure that the machine is cool enough to touch before transporting or storing. • Petrol/fuel/gasoline is extremely flammable – keep clear of naked flames or other ignition sources. • Always transport the machine with the fuel tap and engine ON/OFF switch in the "OFF" position. • Drain the fuel tank before transportation or storage.

Preparing for Transport and Storage

- Clean the interior of the water pump housing, hoses etc before storing them. This can quickly be accomplished by connecting the pump to a clean water source and running it until the discharged water is clean.
- Drain the pump housing by unscrewing (rotate left) the drain plug and allowing all liquid to drain from the pump housing. Then, re-install the drain plug (rotate right) and tighten. Do not over-tighten.
- Drain the fuel system by allowing the engine to run until it stops. It is advised to have the fuel tank as empty as possible before draining.
- Store the unit in a dry, well-ventilated area and out of the reach of children.

Long Term Storage

Follow the normal procedures for storage, then:

- Unscrew (rotate left) the carburettor drain plug. Use a suitable container to catch the draining fuel, and allow the fuel to drain. Store the drained fuel in a properly sealed container.
- Re-install (rotate right) the carburettor drain plug and tighten.
- Remove the spark plug and put 10ml of clean engine oil into the cylinder. Pull the starter cord slowly to distribute the oil. Re-install the spark plug.
- Cover the equipment to protect it.

Troubleshooting

Running combustion engines in confined areas **CAN KILL IN MINUTES**. Engine exhaust fumes contain carbon-monoxide – a deadly gas that you cannot smell or see. NEVER run a combustion engine in confined areas EVEN IF windows and doors are open. ONLY run combustion engines OUTDOORS and away from doors, windows and vents. • Petrol/fuel/gasoline is extremely flammable – keep clear of naked flames or other ignition sources. • The product is NOT supplied with engine oil, although traces of oil from the manufacturing process may be present. It is essential to add adequate engine oil of the correct type to the engine before use – see Engine Oil. **Failure to add engine oil will void the product warranty**. • Do not have the engine running during inspection and maintenance unless specifically required. • The engine should be cool enough to touch before performing maintenance activities. • Some maintenance activities may be beyond the scope of some users. Do NOT attempt procedures that you are not comfortable with, or do not have the necessary tools, experience or knowledge for – take the unit to an authorised service centre or qualified technician for servicing.

The following information may assist in identifying a problem and rectifying it.

Difficulty starting the engine.

Possible Fault	Action
Lack of fuel	Check that there is sufficient fuel in the tank and the fuel tap (if equipped) is in the "ON" position. • To further check if fuel is reaching the carburettor, remove the carburettor drain plug and check if fuel drains.
Engine "OFF"	Ensure engine ON/OFF switch is in the "ON" position.
Carbon build-up on spark plug	Perform a spark plug service. Not applicable to diesel engines.
Spark plug faulty	Remove the spark plug, then reconnect the plug lead to it. Place the fuel tap (if equipped) in the "OFF" position and the engine ON/OFF switch (if equipped) in the "ON" position. Touch the spark plug electrode to a part of the engine crankcase, away from the spark plug hole, and attempt to start the engine – a spark should be visible across the electrodes as the engine is rotated. If no spark is visible, replace the spark plug. Not applicable to diesel engines.
Engine "flooded" with fuel	Place the choke (if applicable) in the "HOT" or "RUN" position. Leave the engine ON / OFF switch (if equipped) in the "OFF" position. Pull the starter cord several times to assist clearing excess fuel from engine before attempting to start engine.
Not enough or too much engine oil	Check oil level and ensure that the level is at or just below the recommended maximum level. For some engines, an engine oil sensor will automatically switch off the engine or prevent starting if a low engine oil level is detected.

Electric engine start not working.

Possible Fault	Action
Battery fuse blown	Check and replace fuse if required.

Battery no longer serviceable	Replace battery.

Engine starts but does not idle.

Possible Fault	Action
Blocked air filter	Perform an air filter service.
⬇	
Idle speed requires adjustment	Adjust idle speed (if applicable) until engine runs smoothly and at a reasonable speed when idling.

Engine starts but runs erratically.

Possible Fault	Action
Spark plug lead loose	Ensure the spark plug lead is undamaged and is securely connected to the spark plug terminal. Not applicable to diesel engines.
⬇	
Choke ON	Set the choke (if applicable) to the "HOT" or "RUN" position.
⬇	
Blocked fuel line or stale fuel.	Clean the fuel line. Fill the tank with clean, fresh fuel.
⬇	
Water or dirt in fuel system	Drain fuel tank and carburettor. Refill with fresh fuel.
⬇	
Dirty air filter	Perform an air filter service.

Difficulty restarting the engine after use or engine stops suddenly during use.

Possible Fault	Action
No fuel or engine oil	Check fuel level and ensure adequate fuel is available. For some 4-stroke engines, an engine oil sensor will automatically switch off the engine or prevent starting if a low engine oil level is detected. For 2-stroke engines, this may also indicate incorrect fuel to oil ratio.
⬇	
Overheating	Allow engine to cool before restarting. If possible, improve engine cooling, such as operating in lower temperatures. For 2-stroke engines, this may also indicate incorrect fuel to oil ratio.
⬇	
Carbon build-up on spark plug	Perform a spark plug service. Not applicable to diesel engines.
⬇	
Carburettor blocked	Clean fuel lines / fuel filter / carburettor / fuel injector.

Reduced engine speed/power during use.

Possible Fault	Action
Blocked air filter	Check and clean air filter.

Carbon build-up in engine and/or entry to exhaust silencer	Remove the engine cylinder head and clean any carbon from the combustion chamber. For the exhaust silencer, remove it and clean any carbon deposits from the exhaust entry port.

Carbon build-up on spark plug	Perform a spark plug service. Not applicable to diesel engines.

Carburettor blocked	Clean fuel lines / fuel filter / carburettor / fuel injector.

Engine overheats.

Possible Fault	Action
Engine oil level low	Fill the crankcase with the correct engine oil type to the "MAX" indicator or just under.
Dirty air cleaner	Perform an air filter service.

Water pump not pumping.

Possible Fault	Action
Lack of water in pump	Prime water pump.
Inlet hose blocked or not submerged	Ensure inlet hose is submerged and is inlet filter/hose is not blocked. Ensure inlet hose is not buried in mud etc. Ensure hose is not kinked or obstructed. Replace damaged hoses.
Air leaks or damaged hose	Ensure all hose clamps are tight and rubber seals at pump connections are installed and in good condition. Replace unserviceable seals and hose clamps.
Suction height between water source and pump too great	Move the pump closer to water source to reduce suction height and inlet hose length.

Specifications

220cc Petrol Engines

Engine Type	4-stroke, single cylinder
Fuel Type	Unleaded non-ethanol petrol
Fuel Tank Capacity	3.6l
Spark Plug Type	F7TC, F7RTC
Spark Plug Gap	0.7 to 0.8mm (0.028 to 0.032")
Valve Clearance	Inlet: 0.15mm ± 0.02mm (0.006" ± 0.001") Exhaust: 0.2mm ± 0.02mm (0.008" ± 0.001")
Engine Oil Type	SAE 10W-30 automotive engine oil recommended for general use
Engine Oil Capacity	Approximately 0.5l (always check level)

235cc Petrol Engines

Engine Type	4-stroke, single cylinder
Fuel Type	Unleaded non-ethanol petrol
Fuel Tank Capacity	4.5l
Spark Plug Type	F7TC, F7RTC
Spark Plug Gap	0.7 to 0.8mm (0.028 to 0.032")
Valve Clearance	Inlet: 0.15mm ± 0.02mm (0.006" ± 0.001") Exhaust: 0.2mm ± 0.02mm (0.008" ± 0.001")
Engine Oil Type	SAE 10W-30 automotive engine oil recommended for general use
Engine Oil Capacity	Approximately 0.5l (always check level)

296cc Diesel Engines

Engine Type	4-stroke, single cylinder, diesel
Fuel Type	Unleaded non-bio diesel
Fuel Tank Capacity	12.5l
Valve Clearance	Inlet: 0.15mm ± 0.02mm (0.006" ± 0.001") Exhaust: 0.15mm ± 0.02mm (0.006" ± 0.001")
Engine Oil Type	SAE 10W-30 automotive engine oil recommended for general use
Engine Oil Capacity	Approximately 1l (always check level)
Battery	6-MF-18Ah (electric start models only)

406cc Diesel Engines

Engine Type	4-stroke, single cylinder, diesel
Fuel Type	Unleaded non-bio diesel
Fuel Tank Capacity	12.5l
Valve Clearance	Inlet: 0.15mm ± 0.02mm (0.006" ± 0.001") Exhaust: 0.15mm ± 0.02mm (0.006" ± 0.001")
Engine Oil Type	SAE 10W-30 automotive engine oil recommended for general use
Engine Oil Capacity	Approximately 1.2l (always check level)
Battery	6-MF-18Ah (electric start models only)

65cc 2-Stroke Engines

Engine Type	2-stroke, single cylinder
Fuel Type	Unleaded non-ethanol petrol
Fuel Tank Capacity	1.2l
Spark Plug Type	L7T
Spark Plug Gap	0.7 to 0.8mm (0.028 to 0.032")

Pump Specifications

Model	Inlet	Outlet	Capacity	Max. Lift	Max. Suction
PMPTLPROA165	25mm (1")	25mm (1")	12000l/hour	30m	7m
PMPPTLPROA01F	25mm (1")	25mm (1")	15000l/hour	30m	7m
PLTPMP-154095 / **PMPPTLWTNA15P**	40mm (1.5")	40 (1.5") 2 x 25mm (1")	12000l/hour	120m	7m
PMPPTLPROAW45 / **PMPPTLWTNAW45**	40mm (1.5")	2 x 40mm (1.5") 2 x 25mm (1")	12000l/hour	160m	7m
PMPDSLPROAI40 / **PMDSLWARB/CI40**	40mm (1.5")	2 x 25mm (1")	17000l/hour	55m	8m
PMPPTLPROA15P	40mm (1.5")	40mm (1.5") 2 x 25mm (1")	30000l/hour	140m	7m
PTLPMP-225095 / **PMPPTLPROA02P** / **PMPPTLPROB02P**	50mm (2")	2 x 40 (1.5") 50mm (2")	20000l/hour	150m	7m
PMPPTLPROB02F	50mm (2")	50mm (2")	30000l/hour	50m	7m
PMPPTLWTNAHD2	50mm (2")	2 x 40 (1.5") 50mm (2")	30000l/hour	150m	7m
PMPPTLPROA02F / **PMPPTLPROB02F** / **PMPPTLPROC02F**	50mm (2")	50mm (2")	33000l/hour	30m	7m
PMPDSLPROAI50 / **PMPDSLWARB/CI50**	50mm (2")	2 x 40mm (1.5")	35000l/hour	85m	8m
PMPPTLPROAW80 / **PMPPTLPROBW80**	80mm (3")	80mm (3")	45000l/hour	30m	7m
PMPPTLPROA03T	80mm (3")	80mm (3")	45000l/hour	40m	7m
PTLPMP-308095 / **PMPPTLPROA03F** / **PMPPTLPROB03F**	80mm (3")	80mm (3")	40000l/hour	60m	7m
PMPTLPROAW1K	100mm (4")	100mm (4")	80000l/hour	25m	7m
PMPDSLPROAI1K	100mm (4")	100mm (4")	85000l/hour	50m	8m

Engine Service and Maintenance Record

Use the following tables as a record of machine servicing and maintenance. Keeping accurate records will help ensure longest machine service life and may simplify fault diagnosis and any possible warranty claims. Fill out date, number of hours of use and the activity performed, as required (see Maintenance Schedule).

Date	Hours Use	Maintenance Task / Notes

Some experts believe the incorrect or prolonged use of almost any product could cause serious injury or death. For information that may reduce your risk of serious injury or death, consult the points below and additionally, the information available at www.datastreamserver.com/safety

- Consult all documentation, packaging and product labelling before use. Note that some products feature online documentation which should be printed and kept with the product.
- Check product for loose / broken / damaged / missing parts, wear or leaks (if applicable) before each use. Never use a product with loose / broken / damaged / missing parts, wear or leaks (if applicable).
- Products must be inspected and serviced (if applicable) by a qualified specialist every 6 months assuming average residential use by a person of average weight and strength, above average technical aptitude, on a property matching average metropolitan specification. Intended use outside these guidelines could indicate the product is not suitable for intended use or may require more regular inspection or servicing.
- Ensure all possible users of the product have completed an industry recognized training course before being given access to the product.
- The product has been supplied by a general merchandise retailer that may not be familiar with your specific application or your description of the application. Be sure to attain third-party approval for your application from a qualified specialist before use regardless of prior assurances by the retailer or its representatives.
- This product is not intended for use where fail-safe operation is required. As with any product (take an automobile, aircraft, computer or ball point pen for example), there is always a small chance of technical issues that needs to be repaired or may require replacement of the product or a part. If the possibility of such failure and the associated time it takes to rectify could in any situation inconvenience the user, business or employee then the product is not suitable for your requirements. This product is not for use where incorrect operation or a failure of any kind, including but not limited to a condition requiring product return, replacement, service by a technician or replacement of parts could cause a financial loss, loss of employee time or an inconvenience requiring compensation.
- If this item has been purchased in error after considering the points above, simply contact the retailer directly for details of their returns policy, if required.