Bäumr-AG

Stationary Engine

User Manual

[Revision 4.0 March 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.

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**.

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

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.
- Use combustion engines OUTSIDE only, and far away from windows, doors and vents.

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.
- 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

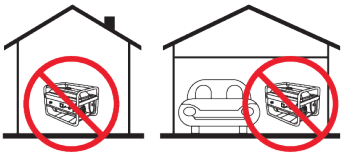
- Electrically grounded equipment must have an approved cord and plug and be connected to a grounded electrical outlet.
- Do NOT bypass the ON/OFF switch and operate equipment by connecting and disconnecting the electrical cord.
- Do NOT use equipment that has exposed wiring, damaged switches, covers 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

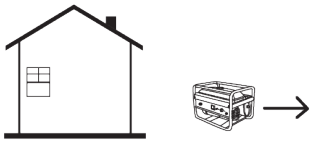
- The equipment must be serviced or repaired at authorised service centres by qualified personnel only.
- Replacement parts must be original equipment manufacturer (OEM) to ensure equipment safety is maintained.
- Do NOT attempt any maintenance or repair work not described in this manual.
- After use, 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

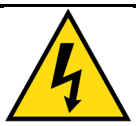
- Follow all warnings in the section titled "GENERAL".
- Explosion hazard - never smoke while refuelling.
- Take care not to spill fuel. When refuelling the engine, ensure that the engine has been allowed to cool. Prevent spilling of fuel as this may also ignite with a hot engine.
- Never refuel while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

Table of Contents

Applicable Models

This manual applies to the following stationary engines:

PFX407 407cc Petrol

ST389 389cc Petrol

PFX210 210cc Petrol

ST196 196cc Petrol

PFX163 163cc Petrol

RX305 305cc Diesel

PFX305 305cc Diesel

PFX419 418cc Diesel

RX460E 460cc Diesel

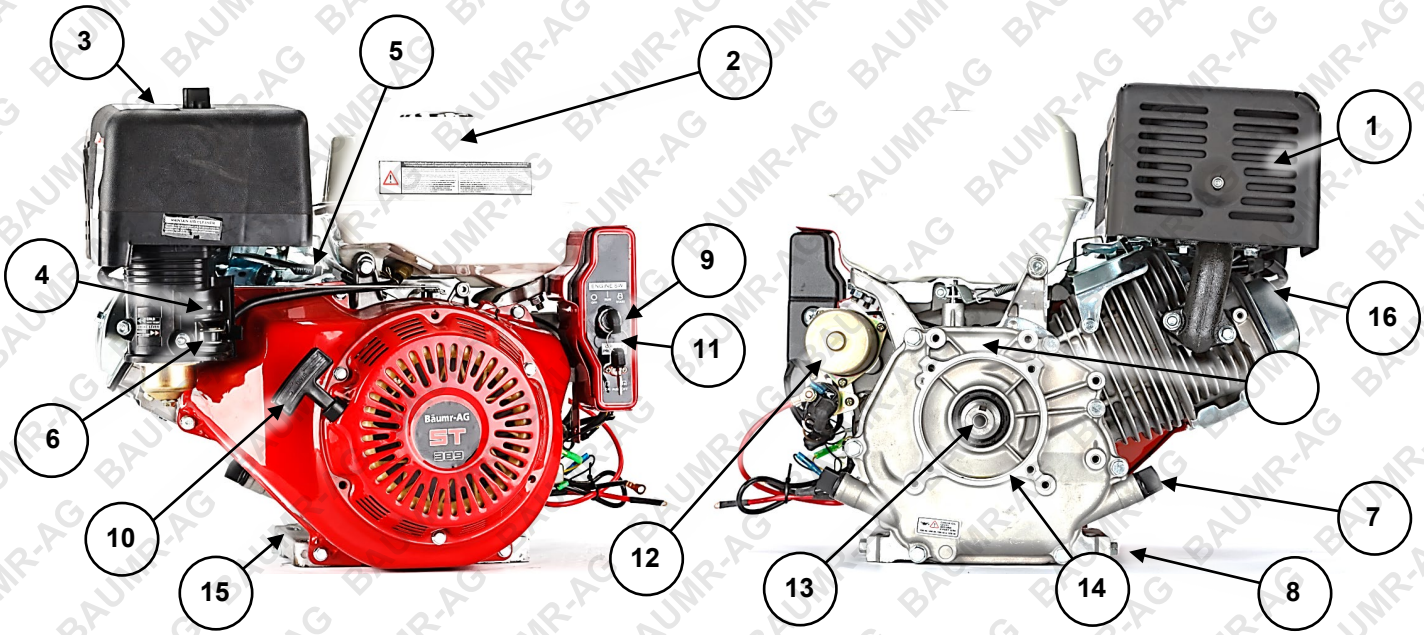
SX450E 448cc Petrol

Parts Identification

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

Petrol Engines

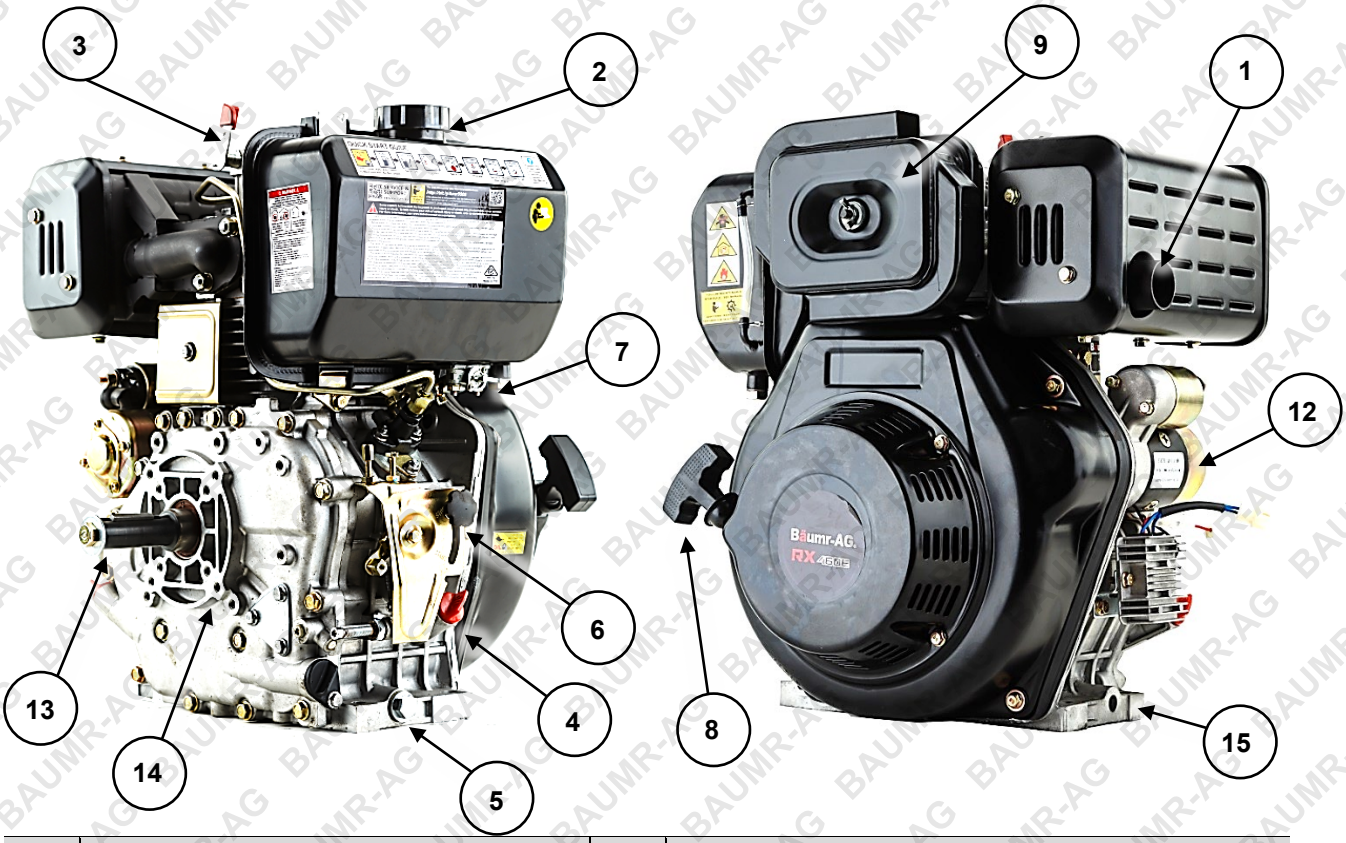
Products detailed in this manual may vary in appearance, inclusions, description and packaging from those shown or described. This section shows typical major components common to most 4-stroke petrol engines.



No.	Name	No.	Name
1	Exhaust	9	Engine ON/OFF Switch
2	Fuel Tank (fuel filler on top)	10	Starter Cord
3	Air Intake Assembly (filter inside)	11	Electric Start Module (electric start models)
4	Choke	12	Starter Motor (electric start models)
5	Throttle	13	Output Shaft (output shaft drive key supplied)
6	Fuel Tap	14	Output Shaft Mounting Flange
7	Oil Filler/Dipstick (some models have 2)	15	Engine Mounting Hole (4)
8	Oil Drain Plug (some models have 2)	16	Spark plug (not visible)

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 engines.



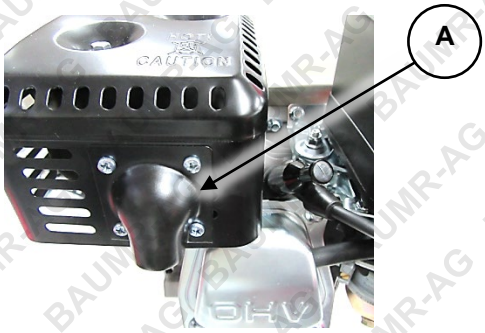
No.	Name	No.	Name
1	Exhaust	9	Air Intake Assembly (filter inside)
2	Fuel Filler	10	Fuel Tank
3	Decompression Lever	11	Electric Start Module (electric start models) (not shown)
4	Oil Filler/Dipstick (some models have 2)	12	Starter Motor (electric start models)
5	Oil Drain Plug (some models have 2)	13	Output Shaft (output shaft drive key supplied)
6	Throttle	14	Output Shaft Mounting Flange
7	Fuel Tap	15	Engine Mounting Hole (4)
8	Starter Cord		

Assembly

Typically, most engines are fully assembled, however, some models may require the following assembly (as applicable). The image below shows an unassembled electric start petrol model with exhaust shroud.

Exhaust Shroud

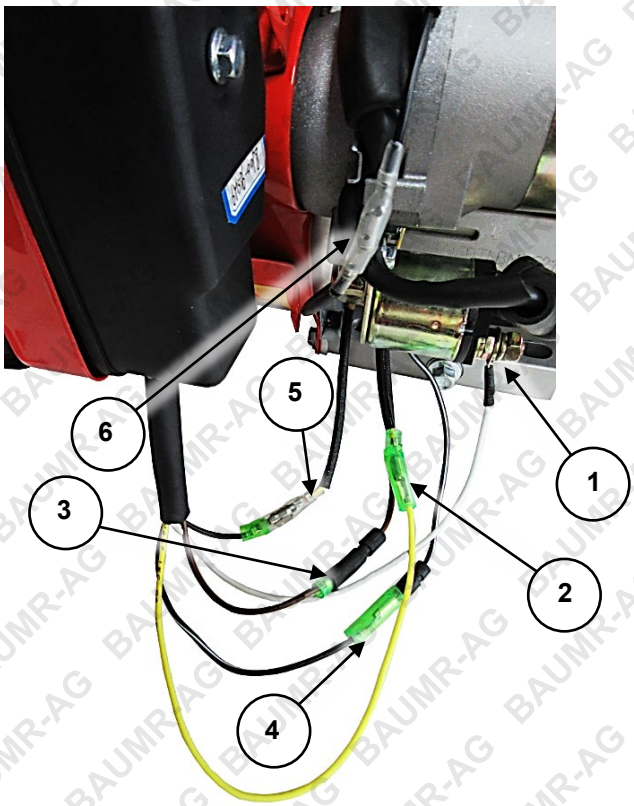
Place the shroud (**A**) over the exhaust port – generally with the opening facing down, and attach it using the 4 supplied screws.



Electric Start

For some models with electric start, if the switch block has been supplied unassembled, it will require attachment to the engine and the wiring connected. Attach the switch block (**B**) to the brackets on the engine using the 2 supplied bolts. The mounting brackets on the engine may vary slightly between models, however, the switch block is always located next to the starter motor. Connect wires as follows:

Switch Block	Engine	Ref.
WHITE	Starter Solenoid Terminal	**1**
YELLOW	**YELLOW** to Oil Level Sensor	**2**
BROWN	**BROWN**	**3**
BLACK / **WHITE**	**BLACK** / **WHITE**	**4**
BLACK	**YELLOW** to Rectifier	**5**
	BLACK from Rectifier to **BLACK** from Coil	**6**
	NEGATIVE (-) Battery terminal to engine mounting bolt or case stud	
	POSITIVE (+) Battery terminal to Starter Solenoid Terminal	**1**



Before Use Checklist

Ensure that you carry out all procedures below before starting the engine or operating the equipment. All procedures described are generic in nature and slight variations between different models may exist. **Failure to follow the checklist and carry out the procedures correctly may result in making the product warranty void**. 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**.

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.

Some machines may feature an oil level sensor that will prevent the engine being started or automatically stop the engine if the oil level falls below an acceptable level. This system, however, is not to be solely relied upon. **Always check that the engine oil level is at or near the "MAX" indicator 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 petrol 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.

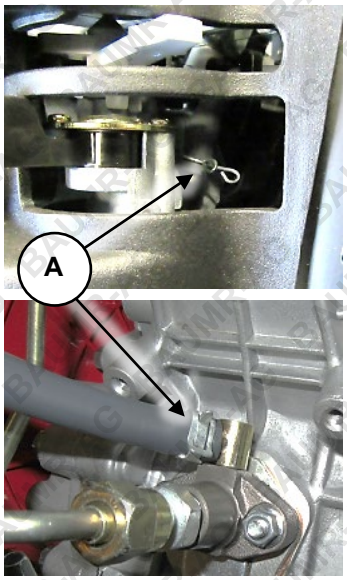
To fill or top up fuel:

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:

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.

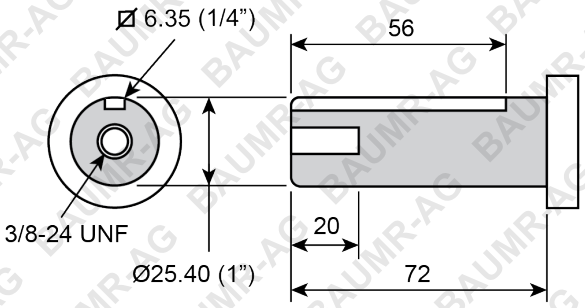
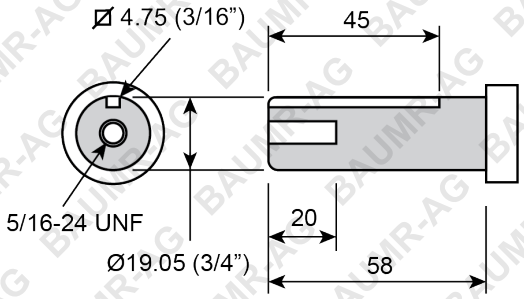
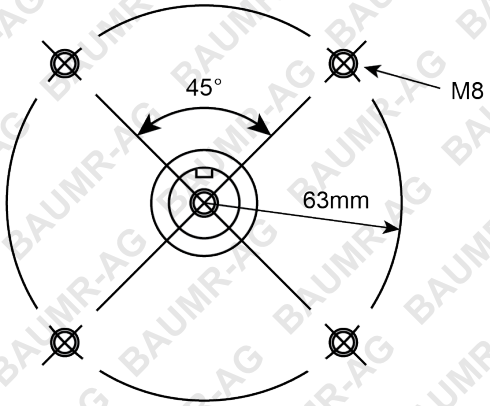
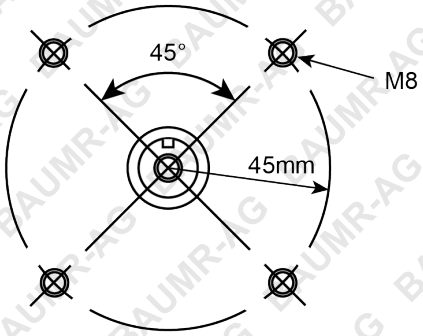
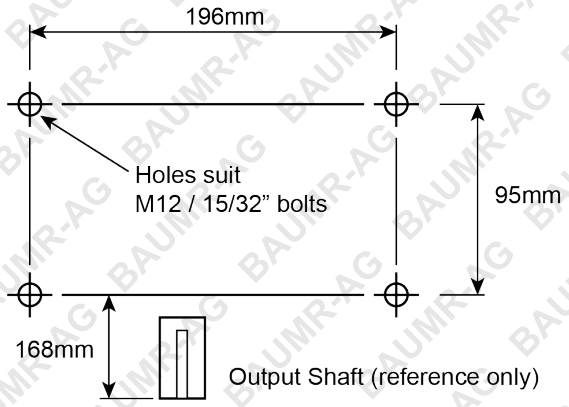
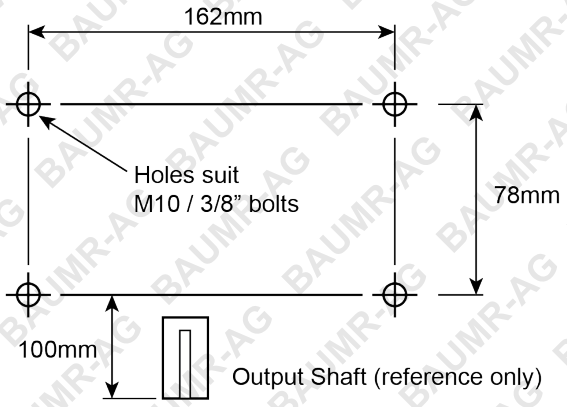


Mounting and Connecting to the Engine

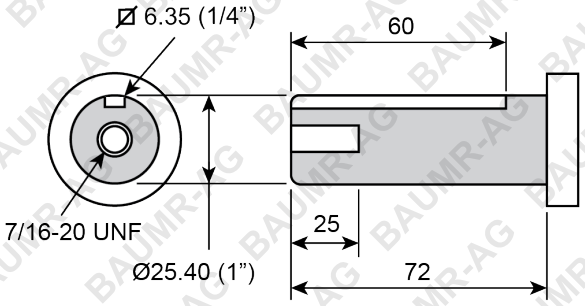
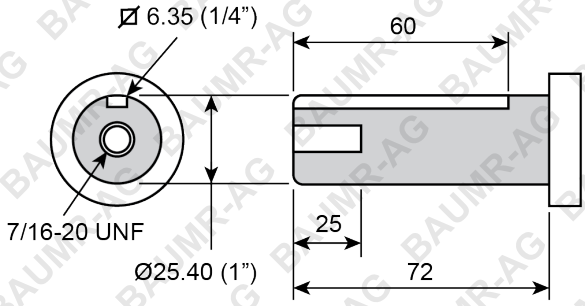
Always measure the actual unit before building or drilling mounting frames, drive pulleys etc.

Each engine features a set of holes in the base for mounting and a keyed output shaft. It is essential that the engine be mounted to a suitable surface, frame etc that is capable of supporting the weight of the engine as well as any twisting forces it generates.

Petrol Engines

25.4mm / 1” Output Shaft (Not to Scale)	19.05mm / 3/4” Output Shaft (Not to Scale)
Output Shaft	**Output Shaft**
	
Output Shaft Flange	**Output Shaft Flange**
	
Engine Mounting	**Engine Mounting**
	

Diesel Engines

< 400cc Diesel Engine (Not to Scale)	> 400cc Diesel Engine (Not to Scale)
Output Shaft	**Output Shaft**
	
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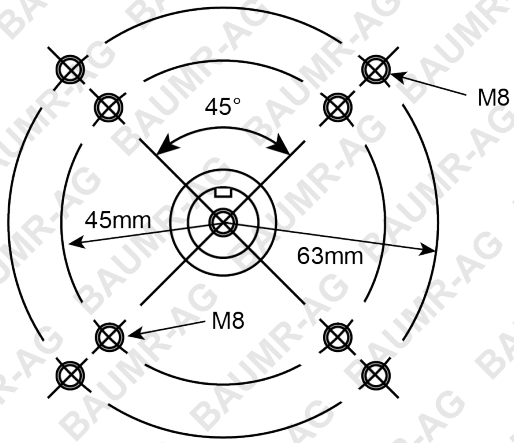	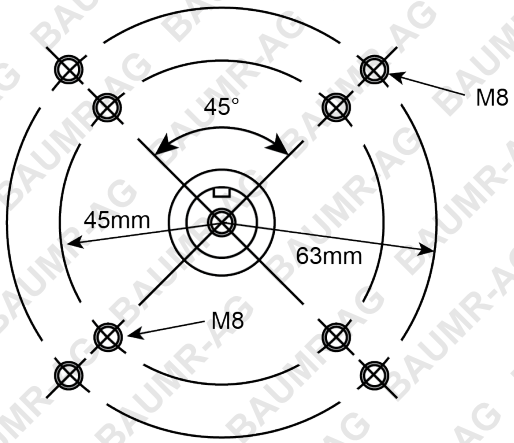
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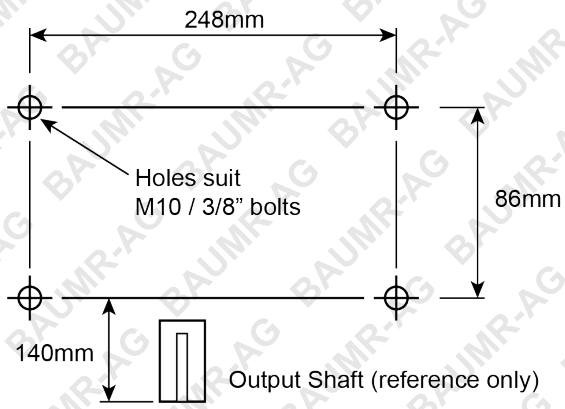
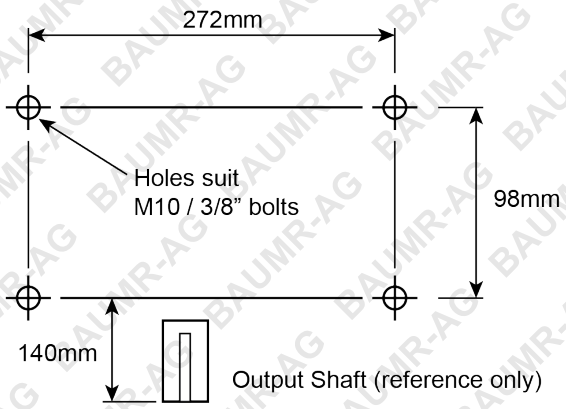
	

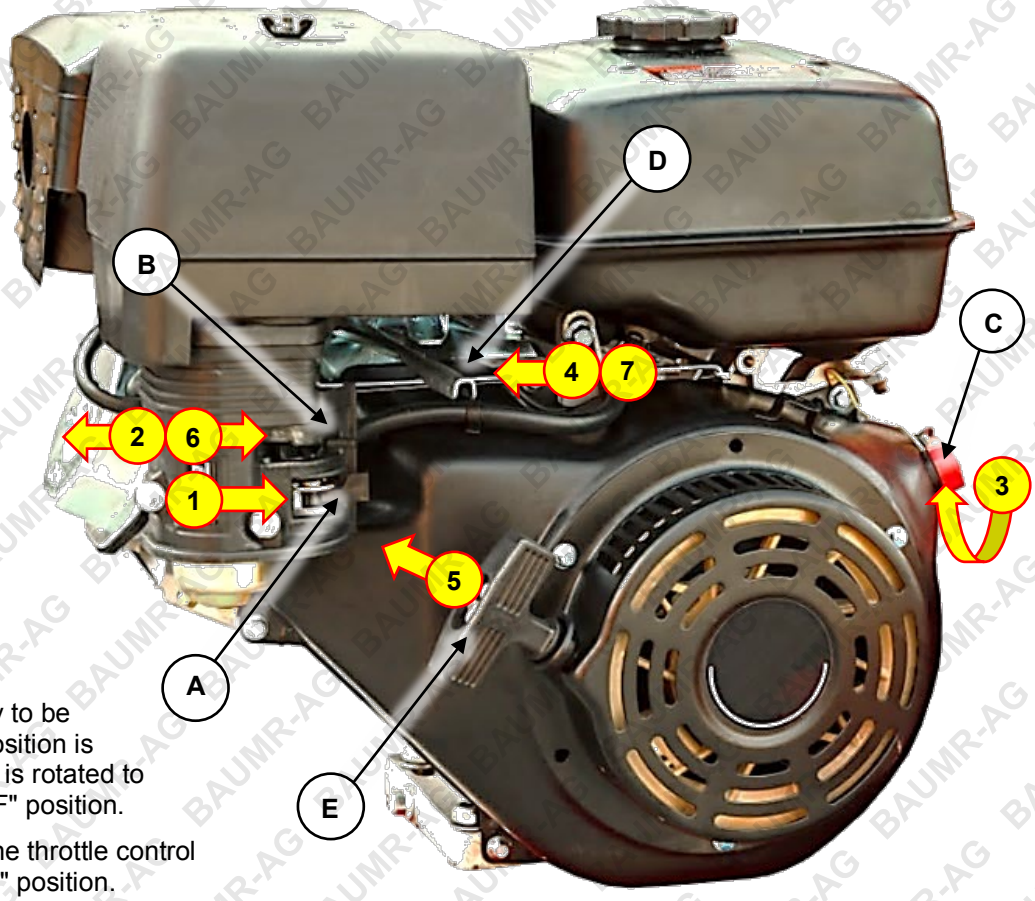
Engine Starting and Operation

Video Tutorial:
Starting 4-Stroke Engines

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**.

Different models may feature variations in design; for example, some have different engine types, electric start 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.

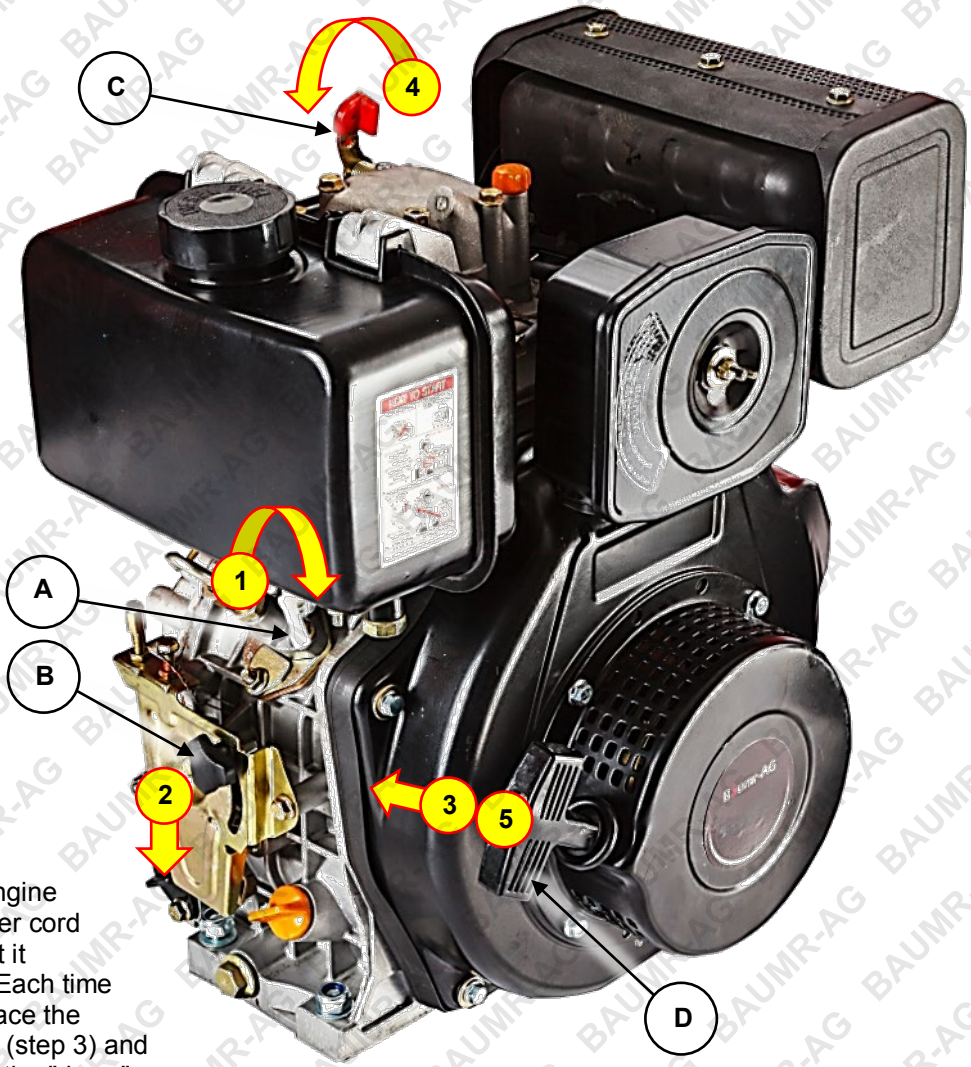
Starting Petrol Engines



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.

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, place the engine ON/OFF switch or key switch in the OFF position.

Stopping in Normal Use

1. Place the throttle control in the "SLOW" position.
2. Place the engine ON/OFF switch or key switch in the "OFF" position.
3. Place the fuel tap in the "OFF" position.

Engine Operation

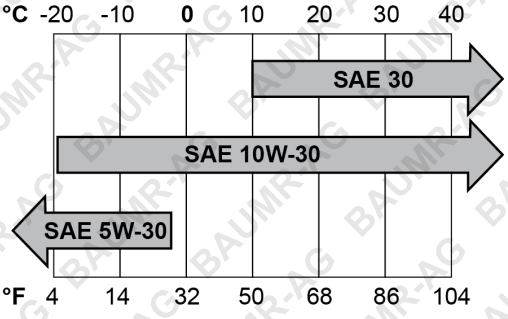
Once the engine is running and has warmed up, adjust the engine speed as required by moving the throttle lever. In most applications generally, the engine is used at full throttle.

For electric start models, when the engine is running, normal battery charging will occur. The engine must run for several hours to fully charge the battery.

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 - 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:



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.

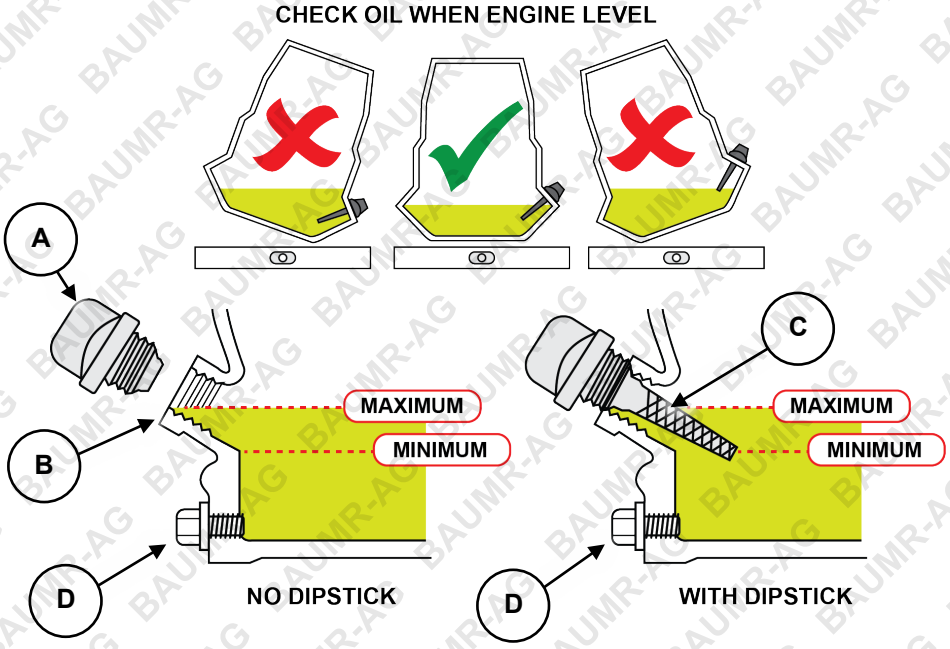
Engine Oil

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. **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.

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 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 (**A**) 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

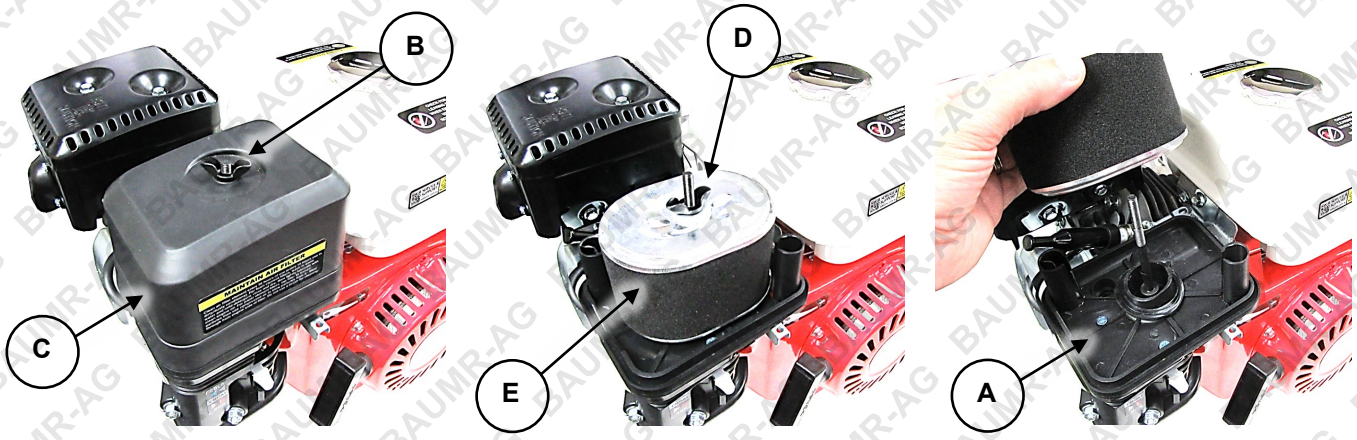
Inspect the air filter for dirtiness and debris, damage etc. Clean or replace the filter element as necessary. To clean air filters:

- 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 – 4-Stroke Petrol Engines

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 wing nut (**D**) and remove the filter element (**E**).

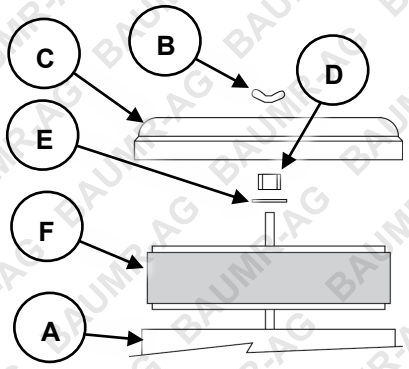


To install the air filter:

1. Re-install the filter element and ensure it is seated correctly on the air intake assembly.
2. Re-install (rotate right) the wing nut and tighten by hand so that the filter element is secure. Do not over-tighten.
3. Re-install the filter cover and secure it with the wing nut (rotate right). Tighten the nut by hand. Do not over-tighten.

Air Filter Removal/Installation – 4-Stroke Diesel 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:

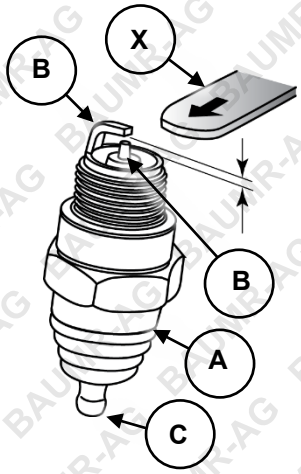
1. Push the filter element onto the mounting screw and secure with the washer and nut (rotate right) and tighten. Do not over-tighten.
2. Place the air filter cover in position. Re-install the wing nut (rotate right) and tighten by hand so that all filter components are secure. Do not over-tighten.

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.

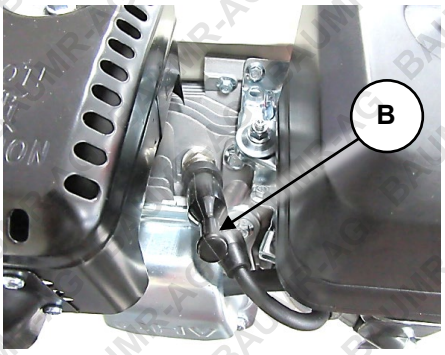
1. Remove any carbon deposits on the spark plug (**A**) electrodes (**B**) with a wire brush.
2. Clean the spark plug threads and the electrical terminal (**C**) on the top.

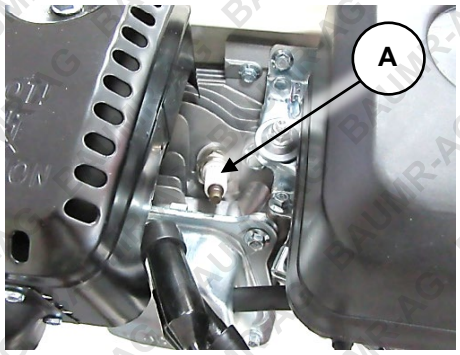
To check and adjust the spark plug "gap":

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 (**B**) from the terminal on top of the spark plug (**A**).
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 (**C**) 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 (where applicable) in the "OFF" position. • Drain the fuel tank before transportation or storage.

Preparing for Transport and Storage

- 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.
- Ensure that the fuel tap (if applicable), engine ON/OFF or key switch (where applicable) is in the "OFF" position.
- Disconnect the spark plug lead.
- Avoid exposing the equipment to direct sunlight, particularly during transportation.
- Ensure the equipment is secure and upright during transport.
- 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 the engine ON / OFF switch (if equipped) 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 engines, an engine oil sensor will automatically switch off the engine or prevent starting if a low engine oil level is detected.
Overheating	Allow engine to cool before restarting. If possible, improve engine cooling, such as operating in lower temperatures.
Carbon build-up on spark plug	Perform a spark plug service. Not applicable to diesel engines.
Fuel system blockage	Clean fuel lines / fuel filter / carburettor / fuel injector.

Reduced engine speed/power during use.

Possible Fault	Action
Blocked air filter	Perform an air filter service.
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.
⬇	
Fuel system blockage	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.

Specifications

163cc / 196cc / 210cc 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 0.6l (always check level)

389cc / 407cc Petrol Engines

Engine Type	4-stroke, single cylinder
Fuel Type	Unleaded non-ethanol petrol
Fuel Tank Capacity	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 1.1l (always check level)

305cc Diesel Engines

Engine Type	4-stroke, single cylinder, diesel
Fuel Type	Unleaded non-bio diesel
Fuel Tank Capacity	3.5l
Valve Clearance	Inlet: 0.15mm ± 0.02mm (0.006" ± 0.001") Exhaust: 0.15mm ± 0.02mm (0.008" ± 0.001")
Engine Oil Type	SAE 10W-30 automotive engine oil recommended for general use
Engine Oil Capacity	Approximately 1.1l (always check level)

418cc / 460cc Diesel Engines

Engine Type	4-stroke, single cylinder, diesel
Fuel Type	Unleaded non-bio diesel
Fuel Tank Capacity	5.5l
Valve Clearance	Inlet: 0.15mm ± 0.02mm (0.006" ± 0.001") Exhaust: 0.15mm ± 0.02mm (0.008" ± 0.001")
Engine Oil Type	SAE 10W-30 automotive engine oil recommended for general use
Engine Oil Capacity	Approximately 1.6l (always check level)

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.

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