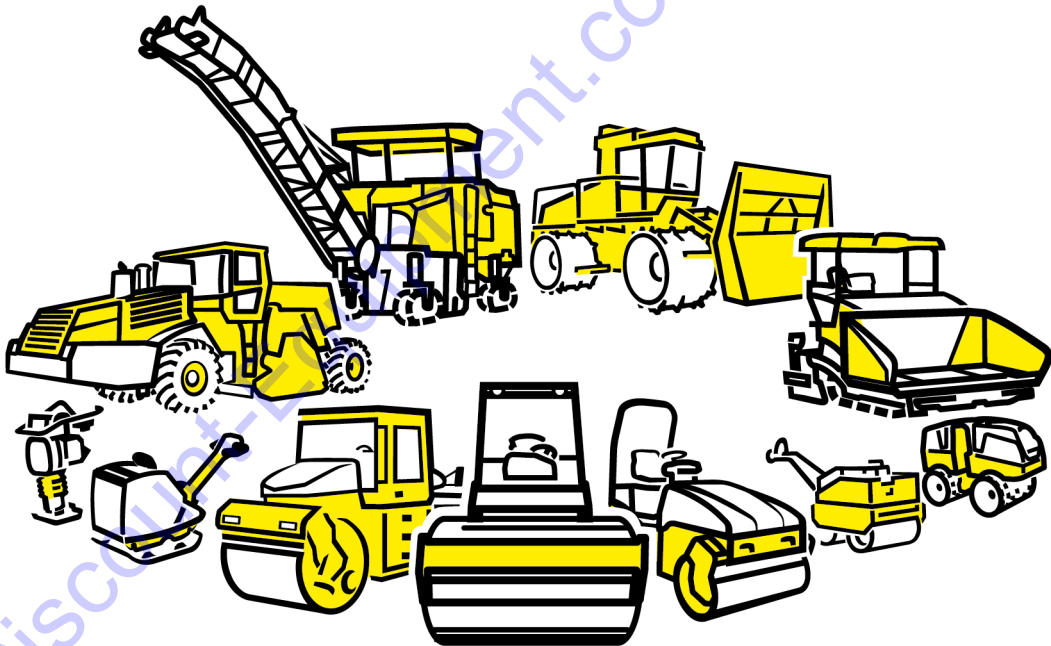


BOMAG

FAYAT GROUP

Service Manual

**BP 10/35 / BP 12/40 / BP 12/50 / BVP 10/36 /
BVP 12/50 / BVP 18/45**



S/N 101 230 21 1001 / S/N 101 230 23 1001 / S/N 101 230
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Vibratory plate

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1.1 Introduction

General

This manual:

- addresses the BOMAG Customer Service and professionally trained personnel.
- provides support for repair work or maintenance procedures on the machine.

This manual describes the deinstallation, dismantling, assembly, installation as well as the repair of components and assembly groups as far as this makes sense with respect to tools and spare parts supply.

Index

The index is a reference register that will help you to find information in this Service Manual. The index lists keywords in alphabetical order. Cross references (keywords related to page numbers) enable quick and convenient search/navigation.

Keywords concerning the following subjects are listed in the index:

- Electrical operating means
- Plug designations
- Overviews
- Fault codes
- Troubleshooting
- ...

Documentation

For the BOMAG machines described in this manual the following documentation is additionally available:

- Operating and maintenance instructions
- Spare parts catalogue
- Service information (if necessary)

Maintenance/parts service

- Specialist teams are available for you in Germany, Europe and overseas. This tight network ensures close customer contact all over the world.
- Parts for maintenance, service and repair are available from our branch offices and dealers at very short notice.
- BOMAG guarantees long-term availability of all common parts.
- Well-designed catalogues provide an easy guide to finding and ordering the required parts.
- Only use genuine BOMAG parts. These have been specially adapted to the corresponding machine. In this way, you will prevent any problems arising and unnecessary downtimes of your machine.

Updating service

This manual is not subject of an updating service. For this reason we would like to draw your attention to the additionally published service informations.

In case of a new release all necessary changes will be included.

In the course of technical development we reserve the right for technical modifications without prior notification.

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1.2 Concerning your safety

1.2.1 Basic prerequisites

1.2.1.1 General

This machine has been built in compliance with the latest technical standard and complies with the applicable regulations and technical rules.

However, dangers for persons and property may arise from this machine, if:

- it is used for purposes other than the ones it is intended for,
- it is operated by untrained personnel,
- it is changed or converted in an unprofessional way,
- the safety instructions are not observed.

Each person involved in the operation, maintenance and repair of the machine must therefore read and comply with these safety regulations. If necessary, the operating company must obtain the relevant signatures as confirmation.

Furthermore, the following obviously also applies:

- applicable accident prevention instructions,
- generally accepted safety and road traffic regulations,
- country/state specific safety regulations.

It is the duty of the operator to be acquainted with the safety regulations and to apply these accordingly. This also applies for local regulations and regulations concerning different types of handling activities. Should the recommendations in these instructions be different from the regulations valid in your country, you must comply with the safety regulations valid in your country.

1.2.1.2 Explanation of signal words used:



DANGER!

Danger to life if failing to comply!

Sections marked accordingly indicate an extremely dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.



WARNING!

Danger to life or danger of severe injuries if failing to comply!

Sections marked accordingly indicate a dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.

General – Concerning your safety



CAUTION!

Danger of injury if failing to comply!

Sections marked accordingly indicate a dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.



NOTICE!

Danger of material damage if failing to comply!

Sections marked accordingly indicate possible dangers for machines or components.



Sections marked accordingly indicate technical information or notes on using the machine or its components.






ENVIRONMENT!

Environmental damage if failing to comply!




Paragraphs marked accordingly indicate practices for safe and environment-friendly disposal of fuels and lubricants as well as replacement parts.

1.2.1.3 Personal protective equipment

Depending on the work to be carried out, personal protective equipment is required (to be provided by the operating company):

	Working clothes	Tight fitting working clothes with low tear resistance, tight sleeves and without any projecting parts protect against being caught by moving components.
	Safety shoes	To protect against heavy falling parts and slipping on slippery ground.
	Protective gloves	To protect the hands against excoriation, punctures or deep injuries, against irritating and caustic substances as well as against burns.

General – Concerning your safety

	Safety goggles	To protect the eyes against airborne particles and squirting fluids.
	Face protection	To protect the face against airborne particles and squirting fluids.
	Hard hat	To protect the head against falling parts and to protect against injuries.
	Hearing protection	To protect hearing against excessive noise.
	Respiratory protection	To protect respiratory tracts against substances or particles.

1.2.1.4 Intended use

This machine must only be used for:

- Compaction of all types of soils
- Repair work on all types of soil
- Paving of walkways
- Work in trenches
- Underfilling and compaction of hard shoulders

Intended use also includes compliance with the specified operating, maintenance and repair measures.

1.2.1.5 Improper use

Dangers may arise from the machine when it is used for purposes other than the one it is intended for.

Any danger caused by improper use is the sole responsibility of the operating company or driver/operator, the manufacturer cannot be made liable.

Examples for improper use are:

- dragging the machine along as a measure of transportation
- throwing the machine off the transport vehicle
- attaching an additional weight to the machine

It is not permitted to stand on the machine while working.

Lifting tackle must be removed before starting work.

Starting and operating the machine in explosive environments and in underground mining is prohibited.

The lifting and lashing points specified in these instructions must be used. It is prohibited to use other lifting and lashing points (e.g. guide handle, steering rod).

1.2.2 Definition of responsible persons

1.2.2.1 Operating company

The operating company is the natural or juridical person who uses the machine or in who's name the machine is used.

The operating company must make sure that the machine is only used for the purpose it is intended for and in strict compliance with the safety regulations mentioned in these operating and maintenance instructions.

The operating company must determine and assess the danger in its company. It must then take appropriate action to ensure health and safety at work for its employees and point out any remaining dangers.

The operating company must determine whether there are special operational hazards such as a toxic atmosphere or limiting soil conditions. Such conditions require special, additional measures to remove or reduce the hazard.

The operating company must make sure that all users read and understand the information concerning safety.

The operating company is responsible for the planning and professional execution of regular safety inspections.

1.2.2.2 Expert / qualified person

An expert / qualified person is a person who, based on his/her professional education and experience, has profound knowledge in the field of construction equipment and the machine in question in particular.

This person is acquainted with the applicable governmental industrial safety regulations, accident prevention instructions, guidelines and generally acknowledged technical rules and regulations (standards, directives, technical rules of other member states of the European Union or other contractual states concerning the agreement about the European Economic Area) in as far as is necessary to be able to judge the safe condition of this machine.

General – Concerning your safety

1.2.2.3 Driver / operator

This machine must only be operated by trained, instructed persons entrusted by the operating company aged 18 or more.

Observe your local laws and regulations.

Rights, obligations and rules of conduct for driver or operator:

The driver or operator must:

- be instructed about his rights and obligations,
- wear protective equipment as appropriate for the application,
- have read and understood the operating instructions,
- have made himself familiar with the operation of the machine,
- be physically and psychologically able to drive and operate the machine.

Persons under the influence of alcohol, medication or drugs are not allowed to operate, service or repair the machine.

Maintenance and repair work requires specific knowledge and must therefore only be performed by trained specialists.

1.2.3 Basic safety regulations for safe operation

1.2.3.1 Remaining dangers, remaining risks

Despite careful work and compliance with standards and regulations it cannot be ruled out that further dangers may arise when working with and handling the machine.

Both the machine as well as all other system components comply with the currently valid safety regulations. Nevertheless, remaining risks cannot be ruled out completely, even when using the machine for the purpose it is intended for and following all information given in the operating instructions.

A remaining risk can also not be excluded beyond the actual danger zone of the machine. Persons remaining in this area must pay particular attention to the machine, so that they can react immediately in case of a possible malfunction, an incident or failure etc.

All persons remaining in the area of the machine must be informed about the dangers that arise from the operation of the machine.

1.2.3.2 Regular safety inspections

Have the machine inspected by an expert / qualified person as required for the conditions the machine is working under, but at least once every year.

1.2.3.3 Modifications and alterations to the machine

Unauthorized changes to the machine are prohibited for safety reasons.

Original parts and accessories have been specially designed for this machine.

We wish to make explicitly clear that we have not tested or approved any parts or accessories not supplied by us.

The installation and/or use of such products may have an adverse effect on the active and/or passive safety.

1.2.3.4 Damage, defects, misuse of safety devices

Machines which are not safe to operate or in traffic must be immediately taken out of service and shall not be used, until these deficiencies have been properly rectified.

Safety installations and switches must neither be removed nor must they be made ineffective.

1.2.4 Handling fuels and lubricants

1.2.4.1 Preliminary remarks

The operating company must ensure that all professional users have read and follow the corresponding safety data sheets for the individual fuels and lubricants.

Safety data sheets provide valuable information about the following characteristics:

- name of substance
- possible dangers
- composition / information on constituents
- first-aid measures
- fire fighting measures
- measures in case of accidental release
- handling and storage
- limitation and monitoring of exposure / personal protective equipment
- physical and chemical properties
- stability and reactivity
- toxicological data
- environmental data
- notes on waste disposal
- information on transport
- legislation
- other data

General – Concerning your safety

1.2.4.2 Safety regulations and environmental protection regulations for handling oil

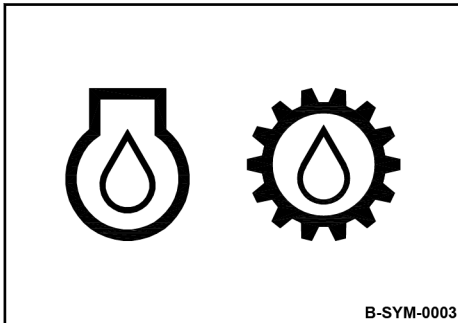


Fig. 1



WARNING!

Danger of burning by ignited oil!

- Do not allow oil to come into contact with hot components.
- Smoking and open fire is prohibited!
- Wear your personal protective equipment (protective gloves, protective clothing).



CAUTION!

Health hazard caused by contact with oil!

- Wear your personal protective equipment (protective gloves, protective clothing).
- Do not inhale any oil vapours.
- Avoid contact.



CAUTION!

Danger of slipping on spilled oil!

- Immediately bind spilled oil with an oil-binding agent.



ENVIRONMENT!

Oil is an environmentally hazardous substance!

- Always keep oil in proper containers.
- Immediately bind spilled oil with an oil-binding agent.
- Dispose of oil and oil filter according to regulations.

1.2.4.3 Safety regulations and environmental protection regulations for handling gasoline

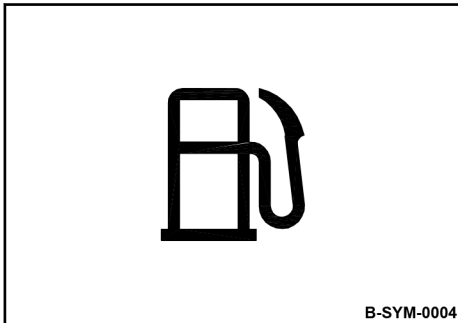


Fig. 2



DANGER!

Danger to life caused by explosive gas-air mixes!

- Do not allow gasoline to come into contact with hot components.
- Smoking and open fire is prohibited.
- Keep away from heat sources, sparks and other sources of ignition.
- Do not spill any gasoline.



WARNING!

Health hazard caused by contact with gasoline!

- Wear your personal protective outfit (protective gloves, protective clothing).
- Do not inhale any fuel fumes.
- Do not swallow gasoline.
- Avoid contact with gasoline.



ENVIRONMENT!

Gasoline is an environmentally hazardous substance!

- Always keep gasoline in proper containers.
- Immediately bind spilled gasoline with an oil-binding agent and dispose of in accordance with regulations.
- Dispose of gasoline and fuel filter according to regulations.

General – Concerning your safety

1.2.4.4 Safety regulations and environmental protection regulations for handling fuel stabiliser



WARNING!

Danger of burning by ignited fuel stabilizer!

- Do not allow fuel stabilizer to come into contact with hot components.
- Smoking and open fire is prohibited.



WARNING!

Health hazard caused by contact with fuel stabilizer!

- Wear your personal protective outfit (protective gloves, protective clothing).
- Do not inhale any fuel stabilizer fumes.
- Do not swallow fuel stabilizer.
- Avoid contact with fuel stabilizer.



ENVIRONMENT!

Fuel stabilizer is an environmentally hazardous substance!

- Immediately bind spilled fuel stabilizer with an oil-binding agent and dispose of according to regulations.
- Dispose of fuel stabilizer according to regulations.

1.2.5 Loading/transporting the machine

Make sure that persons are not endangered by the machine tipping or sliding off.

Do not use damaged or in any other way impaired lashing points.

Always use appropriate lifting and lashing means on the lifting and lashing points.

Use lifting and lashing gear only in the prescribed direction of load application.

Lifting tackle must not be damaged by machine components.

Secure the machine on the transport vehicle against rolling, slipping and turning over.

Loads must only be attached and hoisted by an expert / capable person.

Use only lifting gear and lifting tackle with sufficient load bearing capacity for the weight to be loaded.

Fasten the lifting gear only at the specified lifting points.

Danger to the life of persons if they step or stand under a suspended load.

When lifting the machine avoid uncontrolled movements of the load. If necessary hold the load with guide ropes.

1.2.6 Start-up procedure

1.2.6.1 Prior to starting up

Use only machines which are serviced at regular intervals.

Become acquainted with the equipment, the indicators and control elements, the working principle of the machine and the working area.

Use your personal protective equipment (hard hat, safety boots, if necessary also goggles and ear protection).

Do not take any loose objects with you or fasten them to the machine.

Before start up, check whether:

- persons or obstructions are beside or in front of the machine,
- the machine is free of oily and combustible materials,
- all safety elements are in place,
- all grips are free of grease, oils, fuel, dirt, snow and ice.

Before start up, carry out all required visual inspections and function tests.

If the following tests reveal damages or other faults, the machine must not be operated, until these deficiencies have been corrected.

Do not operate the machine with defective indicators and control elements.

1.2.6.2 Spark protection

The spark protection is optional.

In some areas of use operation of an engine without spark protection is not permitted.

Check the locally valid legislation and regulations.

1.2.6.3 Starting the engine

Do not use any starting aids like start pilot or ether.

The machine must not be operated with damaged, missing or non-functional safety installations.

Before starting and moving the machine make sure that there are no persons inside the danger zone.

Operate the machine only with the steering bow mounted and lowered.

General – Concerning your safety

Always keep an eye on the machine when the engine is running and hold it by the steering bow.

Do not inhale exhaust fumes, because they contain toxic substances, which could cause damage to health, unconsciousness or even death.

Avoid operation in closed or partly closed rooms, or ensure adequate ventilation when working in trenches.

1.2.6.4 Operation in trenches



Applies only to Germany.

The vibratory tamper or the vibratory plate were tested outdoors by BG Bau (Germany) regarding CO emissions. The tests were carried out in a trench with a width of 1.5 metres, a depth of 3 metres and a length of 10 metres.

These test showed CO emissions below the occupational exposure limit (OEL) according to TRGS 900 when operating a maximum of 4 times 15 minutes per shift (8 hours).

For this reason, take care to ensure sufficient ventilation when operating the vibratory tamper or vibratory plate in more than shoulder-deep trenches which have a width of less than 1.5 metres, a maximum depth of less than 3 metres or a maximum length of less than 10 metres.

1.2.7 Operation

1.2.7.1 Persons in the danger area

Before taking up work, also after breaks, you should always convince yourself that the danger zone is free of persons or obstructions.

Give warning signals, if necessary. Stop work immediately if persons remain in the danger zone, despite the warning.

1.2.7.2 Operation

Guide the machine only by the guide handle.

Guide the machine so that your hands do not hit against solid objects.

Watch out for unusual noises and development of smoke. Perform trouble shooting and have the fault corrected.

Always keep a safe distance to excavation pit borders, embankments and edges.

Refrain from any work that could adversely affect the stability of the machine.

Observe the daily vibration load (work safety acc. to 2002/44/EC).

1.2.7.3 Parking the machine

Park the machine on horizontal, level, firm ground.

Before leaving the machine:

- Shut down the engine,
- Secure the machine against accidental tipping over,
- Secure the machine against unauthorized use.

Mark machines, which could be in the way, with a clearly visible sign.

1.2.8 Refuelling

Do not inhale any fuel fumes.

Refuel only with the engine shut down.

Do not refuel in closed rooms.

No open fire, do not smoke.

Keep away from ignition and heat sources.

Apply measures against electrostatic charging.

Do not spill any fuel. Catch running out fuel, do not let it seep into the ground.

Wipe off spilled fuel. Keep dirt and water away from the fuel.

A leaking fuel tank can cause an explosion. Ensure tight fit of the fuel tank cover, if necessary replace immediately.

1.2.9 Maintenance work

1.2.9.1 Preliminary remarks

Adhere to the specified operating, maintenance and repair measures.

The machine must only be serviced by qualified personnel authorised by the operating company.

Keep unauthorised persons away from the machine.

Perform maintenance work only with the engine shut down and the spark plug connector disconnected.

Make sure that the engine cannot be accidentally started during maintenance work.

General – Concerning your safety

1.2.9.2 Working on the engine

Drain the engine oil at operating temperature – danger of scalding!

Wipe off spilled oil, catch running out oil and dispose of environmentally.

When working on the air filter no dirt should fall into the air duct.

Do not work on the hot exhaust - danger of burning!

Store used filters and other oil contaminated materials in a separate, specially marked container and dispose of environmentally.

1.2.9.3 Cleaning work

Do not perform cleaning work while the motor is running.

Allow the engine to cool down before starting cleaning work.

Do not use gasoline or other easily inflammable substances for cleaning.

1.2.9.4 After maintenance work

Reassemble all guards and protections.

1.2.10 Repair

Identify a defect machine with a warning sign.

Only operate the machine after it has been repaired.

When replacing safety relevant components, only original spare parts must be used.

Repairs must only be performed by an expert/qualified person.

When performing welding work on the machine you should cover the fuel tank with insulating material.

1.2.11 Signage

Keep stickers and signage in good and legible condition and comply with their meaning.

Replace damaged and illegible stickers or signage immediately.

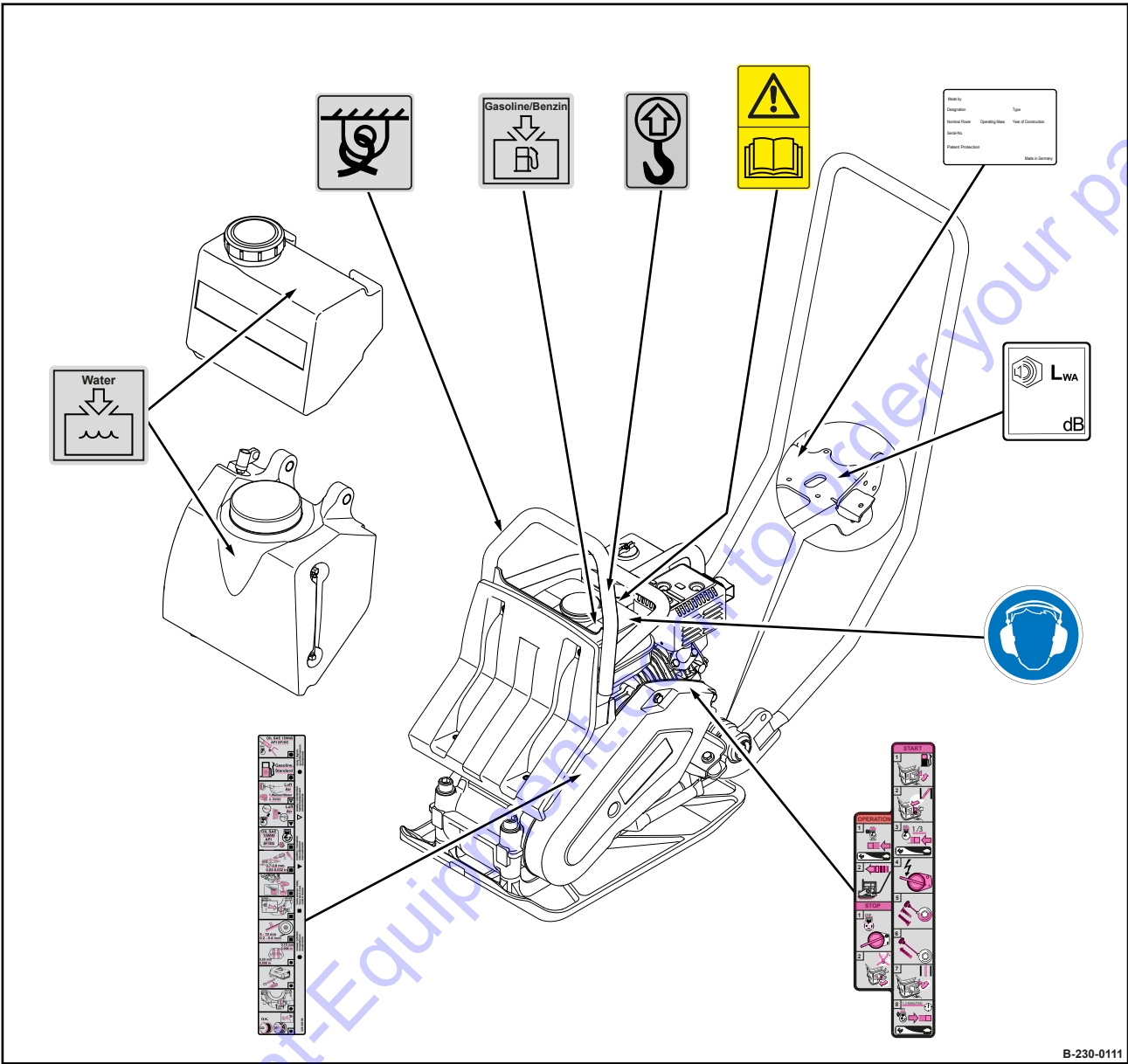


Fig. 3

General – Concerning your safety

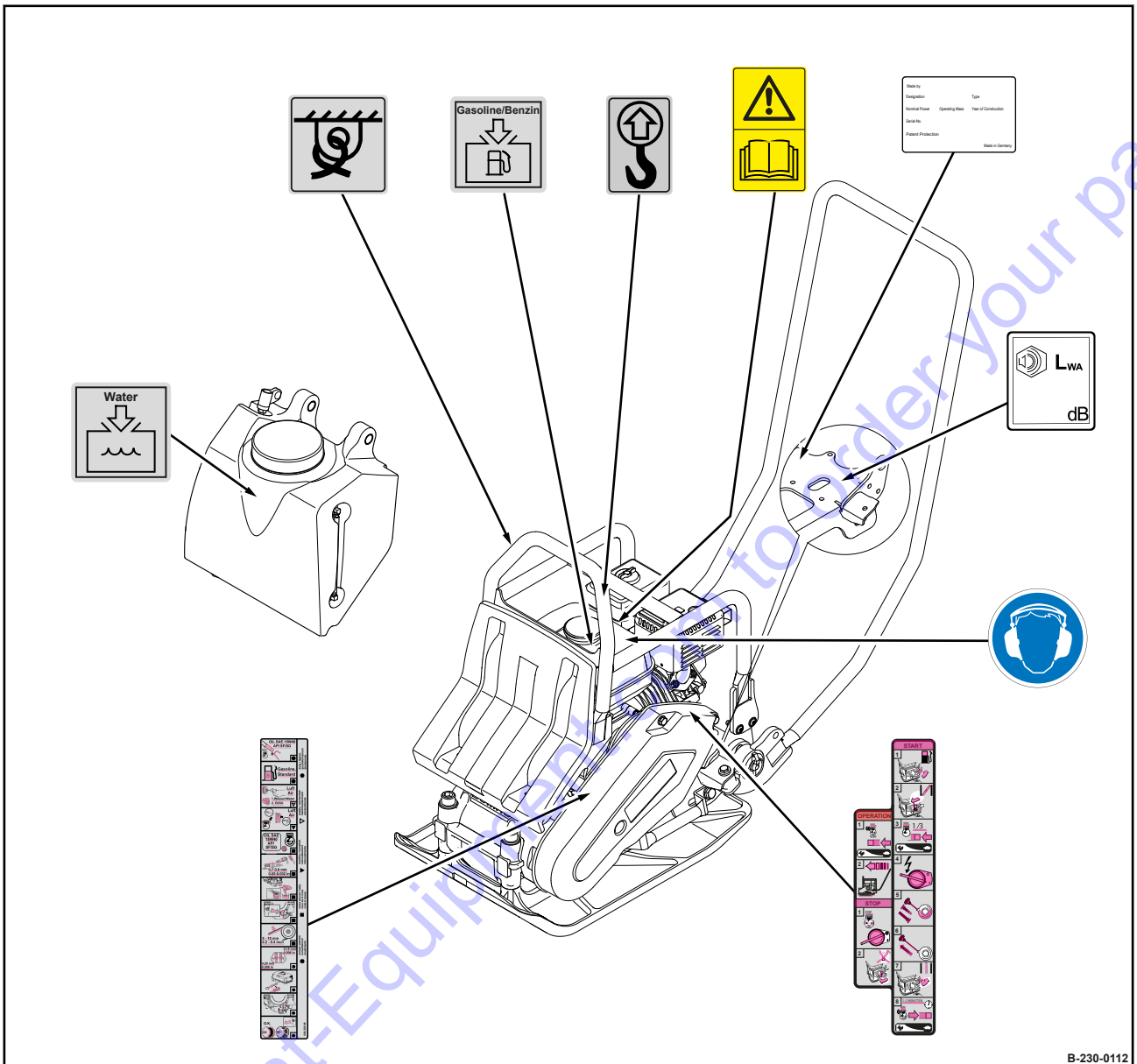


Fig. 4

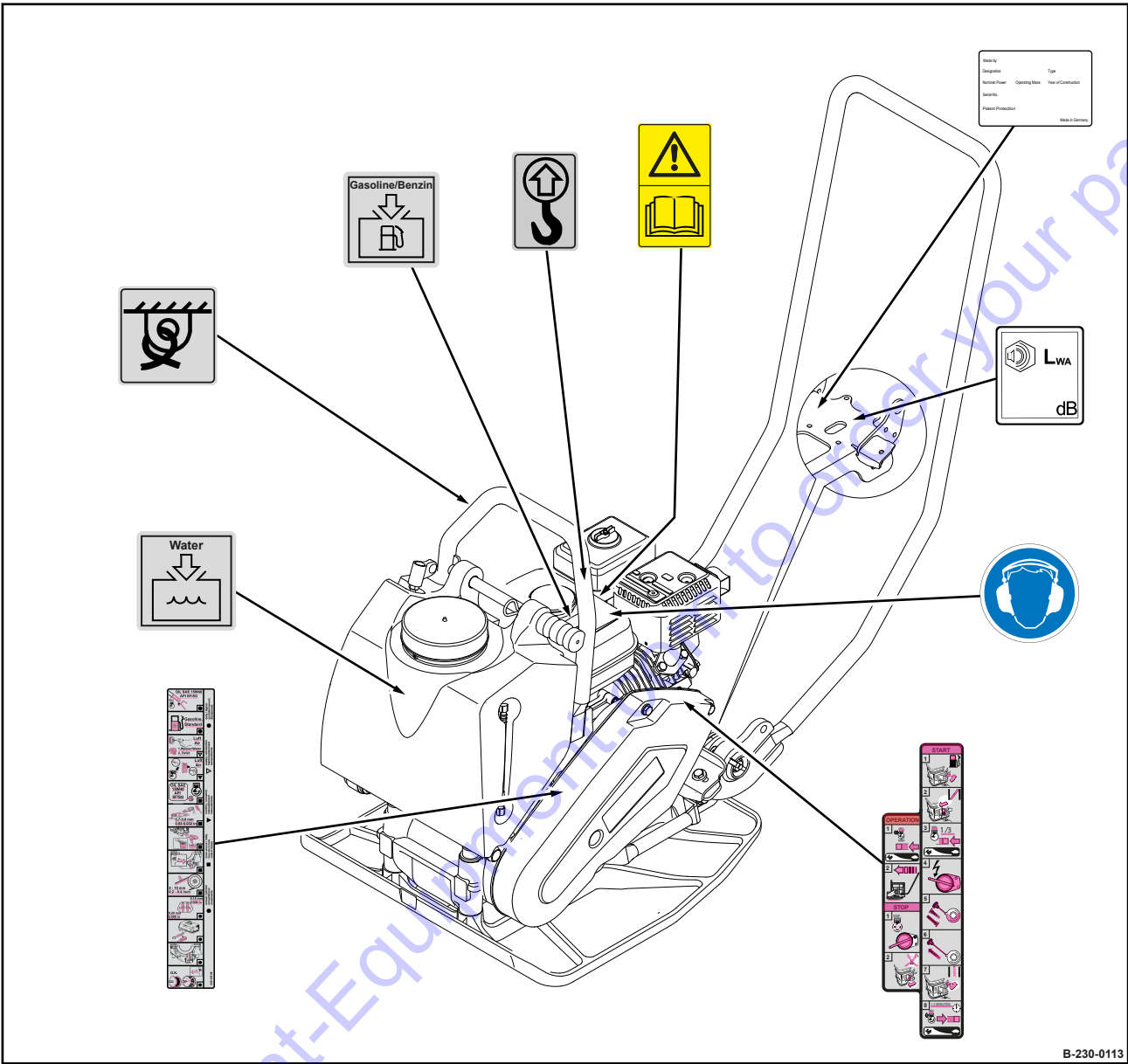
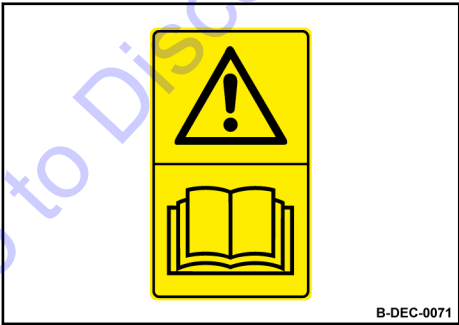


Fig. 5



Warning sticker - Follow operating instructions

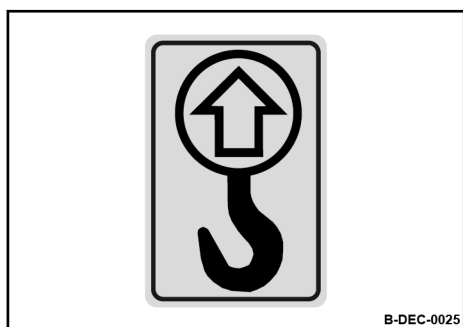
Fig. 6

General – Concerning your safety



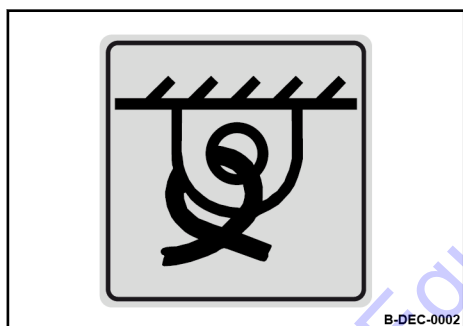
Instruction sticker - Wear ear defenders

Fig. 7



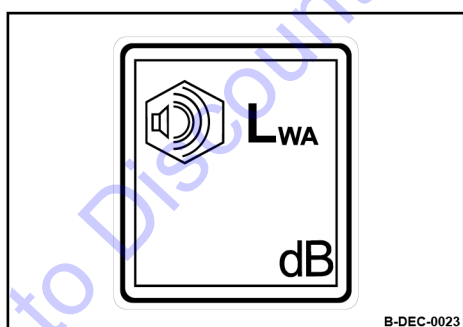
Information sticker - Lifting point

Fig. 8



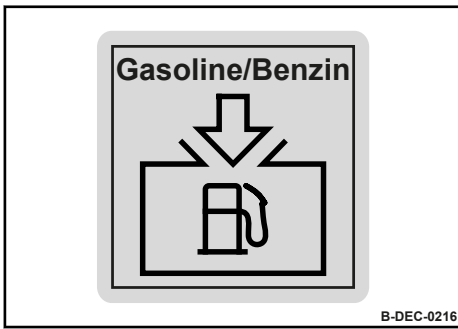
Information sticker - Lashing point

Fig. 9



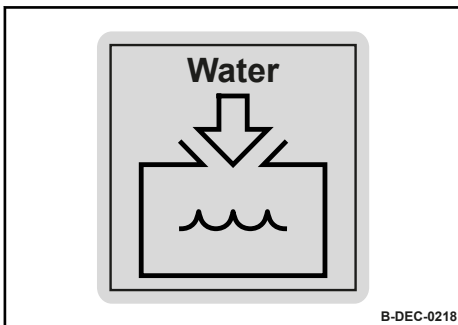
Information sticker - Guaranteed sound capacity level

Fig. 10



Information sticker - Filler opening for petrol

Fig. 11



Information sticker - Filler opening for water

Fig. 12

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General – Concerning your safety

Brief operating instructions

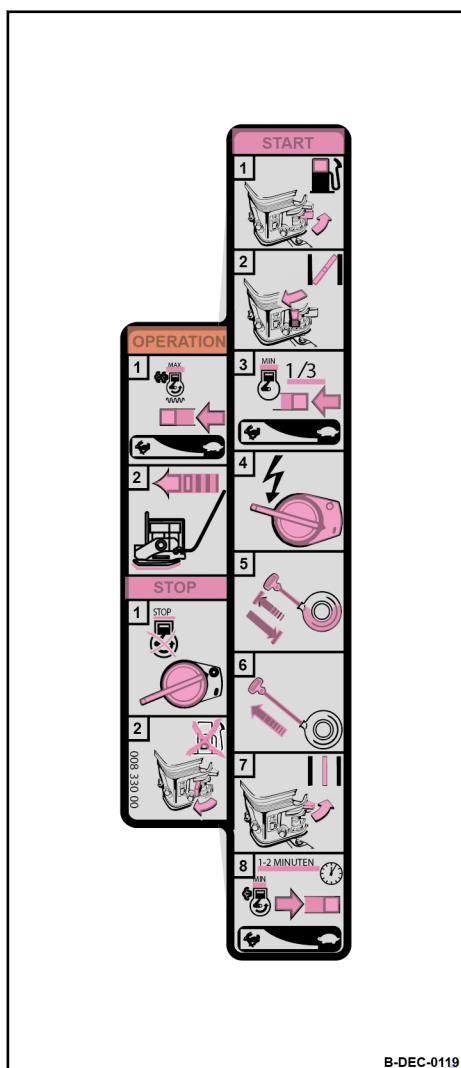
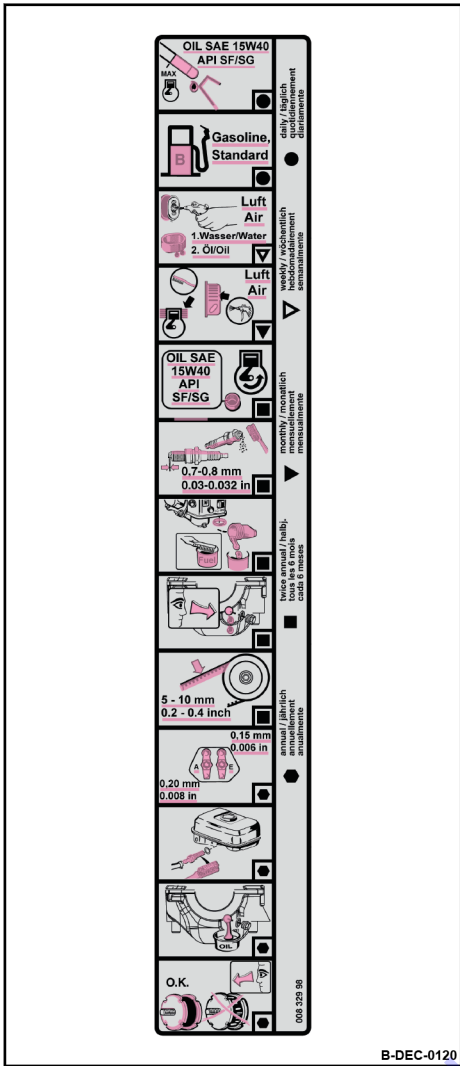


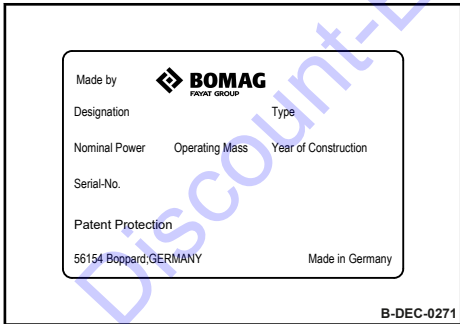
Fig. 13

Go to Discount-Equipment.com to order your parts



Maintenance sticker

Fig. 14



Machine type plate (example)

Fig. 15

1.3 Maintenance and repair

1.3.1 Notes on repair

1.3.1.1 General repair instructions



NOTICE!

Ensure strict cleanliness when performing repair work!

- No foreign objects should enter into open systems.
- Thoroughly clean the area around the affected components.
- Dry off wet locations with compressed air.

Before removing or disassembling parts, assembly groups, components or hoses mark these parts for easier assembly.

1.3.1.1.1 Repair notes for electrics

Electrics and welding



NOTICE!

Electrical components may get damaged by welding work!

- Always remove the main battery switch.
- Disconnect the batteries and connect negative and positive cables.
- Pull the plugs off the control units.

Always fasten the earth clamp of the welding unit in the immediate vicinity of the welding location.

When choosing the location for the earth clamp make sure that the welding current will not pass through joints or bearings.

Battery



Maintenance free batteries also need care. Maintenance free only means that the fluid level does not need to be checked.

Every battery has a self-discharge, which may, if not checked occasionally, even cause damage to the battery as a result of exhaustive discharge.

Exhausted batteries (batteries with formation of sulphate on the plates) are not covered under warranty!

- When removing a battery always disconnect the minus pole before the plus pole. When installing the battery connect the minus pole after the plus pole to avoid short circuits.
- Assemble the battery terminal clamps without force.

- Always keep battery poles and terminal clams clean to avoid high transition resistances when starting and the related development of heat.
- Make sure the battery is properly fastened in the vehicle.

Generator

- Before removing the generator you must disconnect the ground cable from the minus pole of the battery while the ignition is switched off. Do not disconnect the generator while the engine is running, because this may cause extremely high voltage peaks in the vehicle wiring system ("Load Dump"), which could possibly damage control units, radios or other electronic equipment.
- When removing the battery cable, the B+-nut underneath on the generator side may also be loosened. This nut must in this case be retightened.
- When connecting e.g. the battery cable to the terminal of the generator you must make sure that the polarity is correct (generator B+ to the + pole of the battery). Mixing up the polarities by mistake causes short circuit and damage to the rectifier elements - the generator will be out of function.
- The generator can only be operated with the battery connected. Under special conditions emergency operation without battery is permitted, the lifetime of the generator is in such cases especially limited.
- Plus and minus cables must be disconnected during rapid charging of the battery or electric welding on the vehicle.
- When cleaning the generator with a steam or water jet make sure not to direct the steam or water jet directly on or into the generator openings or ball bearings. After cleaning the generator should be operated for about 1 - 2 minutes to remove any deposits of water from the generator.

Starter

- So-called jump starting (using an additional external battery) without the battery connected is dangerous. When disconnecting the cables from the poles high inductivities (arcs, voltage peaks) may occur and destroy the electrical installation.
- For purposes like e.g. purging the fuel systems, starters may be operated for maximum 1 minute without interruption. Then you should wait for at least 30 minutes (cooling down) until trying again. During the 1 minute starting period this process should not be interrupted.
- Starter motors must not be cleaned with high pressure steam cleaning equipment.
- The contacts on starter terminals 30, 45, 50 must be protected against unintended shorting (jump protection).
- When replacing the starter the ring gear on the engine flywheel must be checked for damage and its number of teeth - if necessary replace the ring gear.
- Always disconnect the battery before starting assembly work in the starter area of the engine or on the starter itself.

1.3.1.1.2 Repair notes for gaskets and mating surfaces

Leaking sealing faces can mostly be traced back to incorrect assembly of seals and gaskets.

- Before assembling a new seal or gasket make sure that the sealing surface is free of pitting, flutes, corrosion or other damage.
- Inappropriately stored or handled seals (e.g. hanging from hooks or nails) must under no circumstances be used.
- Install seals and gaskets only with sealing compound, grease or oil, if this is specifically specified in the repair instructions.
- If necessary remove any old sealing compound before assembling. For this purpose do not use any tools that could damage the sealing surfaces.
- Sealing compound must be applied thin and evenly on the corresponding surfaces; take care that the compound does not enter into oil galleries or blind threaded bores.
- Examine the contact faces for scratches and burrs, remove these with a fine file or an oilstone; take care that no grinding dust and dirt enters into tapped bores or enclosed components.
- Blow out lines, ducts and gaps with compressed air, replace any O-rings and seals that have been dislodged by the compressed air.

Assembly of radial seals

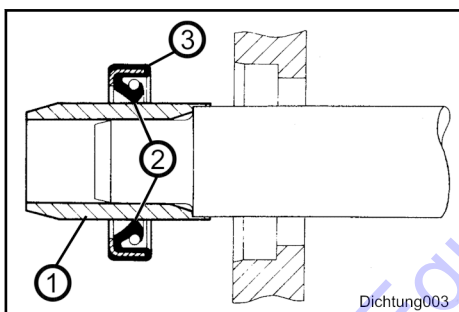


Fig. 16

1. Lubricate sealing lips (2) with clean grease; in case of double seals fill the space between the sealing lips with a generous amount of grease.
2. Slide the seal over the shaft, with the lip facing towards the fluid to be sealed.



NOTICE!

Use an assembly sleeve.

If possible, use an assembly sleeve (1) to protect the lip from being damaged by sharp edges, threads or splines. If no assembly sleeve is available, you should use a plastic tube or adhesive tape to prevent the sealing lip from being damaged.

3. Lubricate the outer rim of the seal (3) and press it flat on the housing seat.

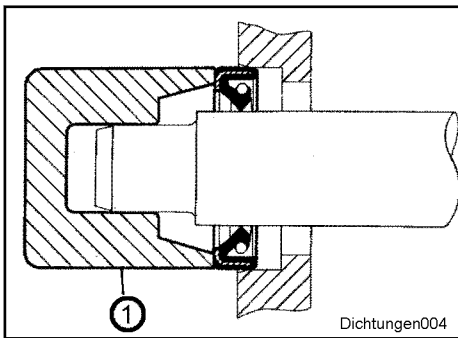


Fig. 17

4. Press or knock the seal into the housing, until it is flush with the housing surface.



NOTICE!

Use an assembly bell.

If possible, use an "assembly bell" (1), to make sure **that the seal will not skew**. In some cases it may be advisable to assemble the seal into the housing first, before sliding it over the shaft. Under no circumstances should the full weight of the shaft rest on the seal.

If you have no proper service tools at hand, use a suitable drift punch with a diameter which is about 0.4 mm smaller than the outer diameter of the seal. Use **VERY LIGHT** blows with the hammer if no press is available.

1.3.1.1.3 Repair notes for ball and roller bearings



Fig. 18

- If one bearing of a pair of bearings shows defects, we highly recommend the replacement of both bearings.
- Remove any lubricant residues from the bearing to be examined by washing it with a suitable degreasing agent.
- Check balls or rollers, running surfaces, outer faces of outer races and inner faces of inner races for visible damage. If necessary, replace the bearing.
- Check the bearing for clearance and resistance between the inner and outer races, replace if necessary.
- Lubricate the bearing with the recommended type of grease before assembly or reassembly.
- On greased bearings (e.g. wheel bearings) fill the space between the bearing and the outer seal with the recommended type of grease before assembling the seal.
- Check shaft and bearing housing for discolouration or other signs of movement between bearing and seats.
- Make sure that shaft and housing are free of burrs before assembling the bearing.
- Always mark the individual parts of separable bearings (e.g. taper roller bearings) to enable correct reassembling. Never assemble the rollers to an outer race that has already been used, replace the complete bearing instead.

General – Maintenance and repair

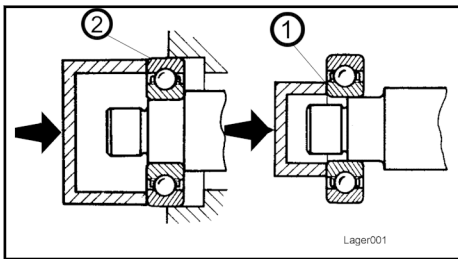


Fig. 19



NOTICE!

When assembling the ball or roller bearing to the shaft load must only be applied to the inner race (1).

When fitting the bearing into the housing load must only be applied to the outer race (2).

1.3.1.1.4 Feather keys and keyways

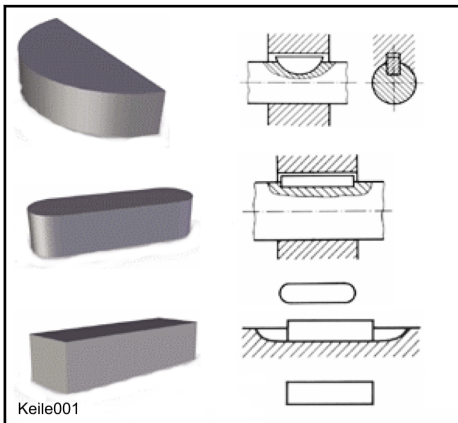


Fig. 20

1. Clean the feather key, examine it and only use it again if it had not been damaged.
2. Deburr and clean the edges of keyways thoroughly before reassembling the feather key.

1.3.1.1.5 Repair notes for cotter pins

Cotter pins

In places where cotter pins are used, these must be reassembled. Cotter pins must generally be renewed after disassembly.

Cotter pins must be assembled as shown in the illustration, unless specified differently.

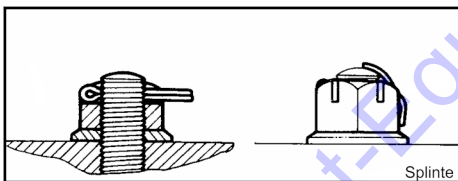


Fig. 21

1.3.1.1.6 Repair notes for screws and nuts



NOTICE!

Tighten screws and nuts in accordance with the values in the following tables. Tightening torques deviating from the ones in the table are specially mentioned in the repair instructions.

Damaged screws must not be used again.

Recutting threads with thread cutters or taps adversely affects the strength and leak tightness of the screw joint. Damaged or corroded thread pitches can cause incorrect torque value readings.

Self-locking nuts must generally be replaced after disassembly.

The use of screws with too high strength can cause damage!

- Nuts of a higher strength can generally be used instead of nuts of a lower strength classification.
- When checking or retightening screw joints to the specified tightening torque you should first relieve by a quarter turn and then tighten to the correct torque.
- Before tightening you should slightly oil the thread, in order to ensure low friction movement. **This, however, does not apply for self-locking nuts.**
- Make sure that no oil or grease will enter into blind tapped bores. The hydraulic power generated when turning in the screw could cause breakage of the part in question.

1.3.1.1.7 Strength classes, metric screws and nuts

Strength classes, metric screws

The strength classes (from 3.6 to 12.9) are specified for all strength classes from a nominal diameter of 5 mm. The corresponding identification can be found where the shape of the screw permits it.

Example: A screw is marked with 12.9.

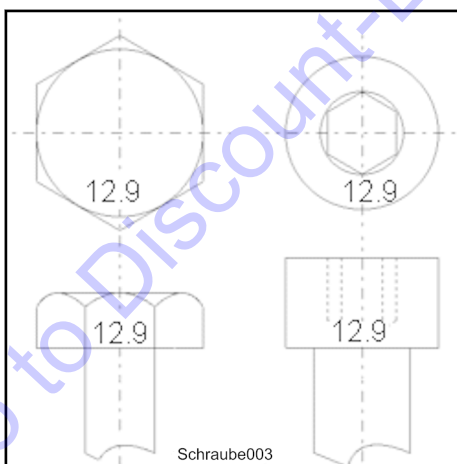


Fig. 22: Identification of screws

Strength classes of metric nuts

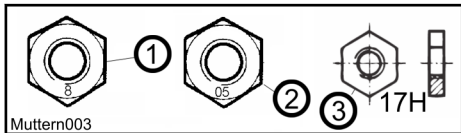


Fig. 23: Identification of nuts

Nuts are differentiated by three load groups. Each load group has a special designation system for the strength class assigned, so that the load group can be clearly identified.

Nuts (1) for screw connections with full load capacity

In a connection with a screw, these nuts (1) must be able to bear the full pre-load at the yield point.

Nut height above 0.8 d (d = nominal dimension).

Strength class of nut	Strength class of associated screw
4	3.6, 4.6, 4.8
5	3.6, 4.6, 4.8 5.6, 5.8
6	6.8
8	8.8
9	9.8
10	10.8
12	12.8

Nuts (2) for screw connections with limited load capacity

The preceding "0" indicates that, due to their low height, nuts 2 ↪ Fig. 23 in this group are only able to withstand the force of a screw to a limited extent.

Nut height below 0,8 d (d = nominal dimension).

Nuts (3) for screw connections without specified load capacity

This standard contains strength classes (hardness classes) for nuts 3 ↪ Fig. 23, for which no load values can be specified, e.g. because of their shape and dimensions, but which can only be classified by their hardness.

Nut height below 0,5 d (d = nominal dimension).

Identification in clock system

For small nuts ↪ Fig. 24 the clock system can be used for identification.

- The 12 o'clock position is identified by a dot or the manufacturer's symbol.
- The strength class is identified by a dash (b).

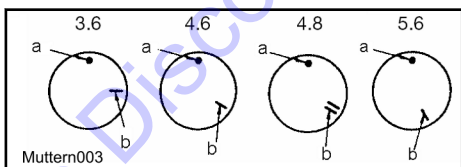


Fig. 24: Identification of nuts in clock system

1.3.1.1.8 Identification of UNF-threads

Identification of UNF-threads

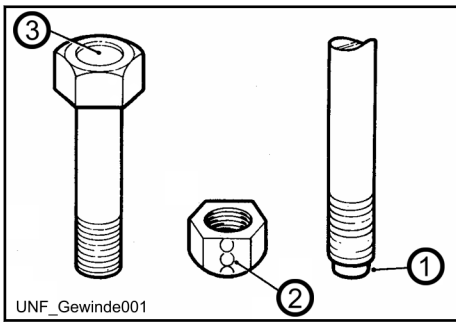


Fig. 25

Studs (1)

At the outmost end a short end of the component is reduced to its core diameter.

Nuts (2).

An uninterrupted series of stamped in circles parallel to the axis of the nut on a hexagon area.

Screws (3)

The screw head is marked with a stamped in, round cavity.

1.3.1.2 Tightening torques

The values specified in the table apply for screws:

- black oiled
- with surface protection A4C
- with surface protection DACROMET



DACROMET is a surface protection that mainly consists of zinc and aluminium in a chromium oxide matrix. DACROMETIZATION provides excellent corrosion protection for metal surfaces by applying a mineral coating with metallic-silver appearance.

The difference between Withworth and UNF/UNC threads is the fact that UNF and UNC threads have 60° flanks, as the metric ISO-thread, whereas Withworth has a flank of only 55°.

Tightening torques for screws with metric unified thread

Screw dimension	Tightening torques Nm (Coefficient of friction μ tot. = 0.14)		
	8.8	10.9	12.9
M4	3	5	5
M5	6	9	10
M6	10	15	18
M8	25	35	45
M10	50	75	83
M12	88	123	147
M14	137	196	235
M16	211	300	358
M18	290	412	490
M20	412	578	696
M22	560	785	942

General – Maintenance and repair

Screw dimension	Tightening torques Nm (Coefficient of friction μ tot. = 0.14)		
	8.8	10.9	12.9
M24	711	1000	1200
M27	1050	1480	1774
M30	1420	2010	2400

Tightening torques for screws with metric unified fine thread

Screw dimension	Tightening torques Nm (Coefficient of friction μ tot. = 0.14)		
	8.8	10.9	12.9
M8 x 1	26	37	48
M10 x 1.25	52	76	88
M12 x 1.25	98	137	162
M12 x 1.5	93	127	152
M14 x 1.5	152	216	255
M16 x 1.5	225	318	383
M18 x 1.5	324	466	554
M20 x 1.5	461	628	775
M22 x 1.5	618	863	1058
M24 x 2	780	1098	1294
M27 x 2	1147	1578	1920
M30 x 2	1568	2254	2695

Tightening torques for screws treated with anti-seizure paste OKS 240 (copper paste)

Screw dimension	Tightening torques Nm		
	8.8	10.9	12.9
M16	169	240	287
M16 x 1.5	180	255	307
M18	232	330	392
M18 x 1.5	260	373	444
M20	330	463	557
M20 x 1.5	369	502	620
M22	448	628	754
M22 x 1.5	495	691	847
M24	569	800	960
M24 x 2	624	879	1036

General – Maintenance and repair

Screw dimension	Tightening torques Nm		
	8.8	10.9	12.9
M27	840	1184	1520
M27 x 2	918	1263	1536
M30	1136	1608	1920
M30 x 2	1255	1804	2156
3/4" - 10 UNC	276	388	464
3/4" - 16 UNC	308	432	520



Anti-seizure paste (copper paste) is used for the assembly of screw connections, which are exposed to high temperatures and corrosive effects. Prevents seizure and corrosion.

Tightening torques for wheel nuts (fine thread)

Thread diameter	Tightening torques Nm (Coefficient of friction μ tot. = 0.14)
	10.9
M12 x 1.5	100
M14 x 1.5	150
M18 x 1.5	300 - 350
M20 x 1.5	400 - 500
M22 x 1.5	500 - 600

Tightening torques for screws with UNC thread, UNC Unified Coarse Thread Series, American Unified Coarse Thread

Screw dimension	Tightening torques Nm (Coefficient of friction μ tot. = 0.14)		
	8.8	10.9	12.9
1/4" - 20	11	15	19
5/16" - 18	23	32	39
3/8" - 16	39	55	66
7/16" - 14	62	87	105
1/2" - 13	96	135	160
9/16" - 12	140	200	235
5/8" - 11	195	275	330
3/4" - 10	345	485	580

General – Maintenance and repair

Screw dimension	Tightening torques Nm (Coefficient of friction μ tot. = 0.14)		
	8.8	10.9	12.9
7/8" - 9	560	770	940
1" - 8	850	1200	1450
1 1/8" - 7	1200	1700	2000
1 1/4" - 7	1700	2400	2900
1 3/8" - 6	2200	3100	3700
1 1/2" - 6	3000	4200	5100

Tightening torques for screws with UNF thread, UNF Unified National Fine Thread Series = American Unified Fine Thread

Screw dimension	Tightening torques Nm (Coefficient of friction μ tot. = 0.14)		
	8.8	10.9	12.9
1/4" - 28	13	18	22
5/16" - 24	25	35	42
3/8" - 24	45	63	76
7/16" - 20	70	100	120
1/2" - 20	110	155	185
9/16" - 18	155	220	260
5/8" - 18	220	310	370
3/4" - 16	385	540	650
7/8" - 14	620	870	1050
1" - 12	930	1300	1600
1 1/8" - 12	1350	1900	2300
1 1/4" - 12	1900	2700	3200
1 3/8" - 12	2600	3700	4400
1 1/2" - 12	3300	4600	5600

General – Maintenance and repair

Tightening torques for hydraulic fittings with metric thread - series "L" (pressures up to 250 bar)

Thread	Spanner width	Tightening torque [Nm]
M12 x 1.5	14	15
M14 x 1.5	17	20
M16 x 1.5	19	30
M18 x 1.5	22	35
M22 x 1.5	27	65
M26 x 1.5	32	80
M30 x 2	36	130
M36 x 2	41	160
M45 x 2	50	200
M52 x 2	60	250

Tightening torques for hydraulic fittings with metric thread - series "S" (pressures up to 400 bar)

Thread	Spanner width	Tightening torque [Nm]
M14 x 1.5	17	14
M16 x 1.5	19	25
M18 x 1.5	22	27
M20 x 1.5	24	48
M22 x 1.5	27	55
M24 x 1.5	30	65
M30 x 2	36	110
M36 x 2	46	140
M42 x 2	50	180
M52 x 2	60	220

Tightening torques for hydraulic fittings with UNF-thread (Unified Fine Thread)

Thread	Spanner width	Tightening torque [Nm]
7/16" - 20	14	15
1/2" - 20	17	20
9/16" - 18	19	27
3/4" - 16	22	55
7/8" - 14	27	80
1 1/16" - 12	32	110

General – Maintenance and repair

Thread	Spanner width	Tightening torque [Nm]
1 3/16" - 12	36	125
1 5/16" - 12	41	160
1 5/8" - 12		220
1 7/8" - 12		270

1.3.2 Preliminary remarks and safety notes



DANGER!

Danger to life caused by an operationally unsafe machine!

- The machine must only be serviced by qualified and authorized personnel.
- Follow the safety regulations for maintenance work ↪ *Chapter 1.2.9 „Maintenance work“ on page 19.*



WARNING!

Health hazard caused by fuels and lubricants!

- Safety regulations and environmental protection regulations must be followed when handling fuels and lubricants ↪ *Chapter 1.2.4 „Handling fuels and lubricants“ on page 13.*

Wear your personal protective equipment.

Do not touch hot components.

Park the machine on horizontal, level, firm ground.

Perform maintenance work only with the engine shut down and the spark plug connector disconnected.

Make sure that the engine cannot be accidentally started during maintenance work.

Thoroughly clean machine and engine before starting maintenance work.

Do not leave any tools or other objects, that could cause damage, in or on the machine.

After maintenance work has been completed, dispose of fuels and lubricants, filters, sealing elements and cleaning cloths in an environmentally friendly way.

After all maintenance work is completed reinstall all guards and safety installations.

1.3.3 Parking the machine in secured condition

Components can be very hot during or immediately after operation.



WARNING!

Danger of burning on hot components!

- Wear your personal protective equipment (protective gloves, protective clothing).
- Avoid touching hot components.

- Protective equipment:
- Hearing protection
 - Working clothes
 - Protective gloves
 - Safety shoes

1. Park the machine on level and firm ground.
2. Set the throttle lever to “MIN” position (idle speed).

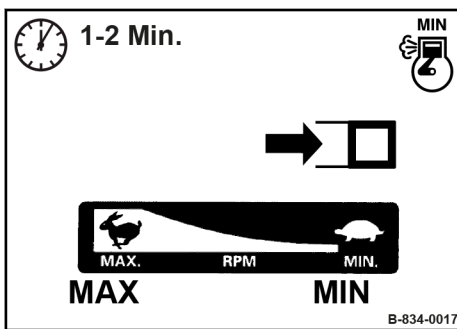


Fig. 26

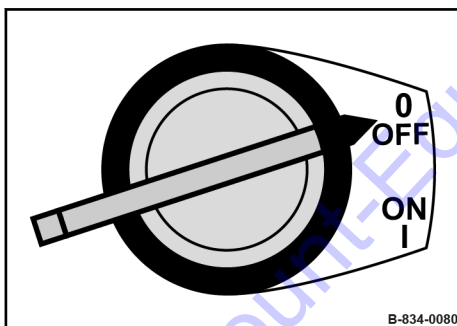


Fig. 27

3.



NOTICE!

Danger of engine damage!

- Do not shut down the engine all of a sudden from full load speed, but let it idle for about two minutes.

Turn the starter switch to “OFF” position.

⇒ The engine is shut down.

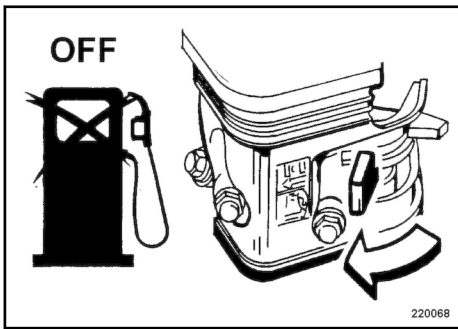


Fig. 28

1.3.4 Running-in instructions

1.3.4.1 General

4. Close the fuel valve completely.
5. secure the machine against unauthorized use.

The following maintenance work must be performed when running in new machines or overhauled engines.

1.3.4.2 After 25 operating hours

1. Change the engine oil ↪ *Chapter 4.1.2 „Changing the engine oil“ on page 70.*
2. Check engine and machine for leaks.
3. Retighten the fastening screws on air filter, exhaust and other attachments.
4. Retighten the bolted connections on the machine.
5. Checking the V-belt ↪ *Chapter 4.1.8 „Servicing the V-belt“ on page 81.*
6. Check the oil level in the vibrator housing.

1.3.5 Cleaning the machine



NOTICE!

Danger of engine damage caused by reduced cooling!

- Immediately seal any oil or fuel leaks near fuel tank, cylinder or cooling air intake.

1. Park the machine in secured condition ↪ *Chapter 1.3.3 „Parking the machine in secured condition“ on page 41.*
2. Allow the engine to cool down for at least 30 minutes.



NOTICE!

Components can be damaged by water entering into the system!

- Do not direct the water jet directly into the air filter, carburettor, recoil starter, air intake or starter switch.

3. Clean the machine with a water jet.
4. Run the engine warm for a while to avoid corrosion.

Go to Discount-Equipment.com to order your parts

2.1 BP10/35

2.1.1 Technical data

Dimensions

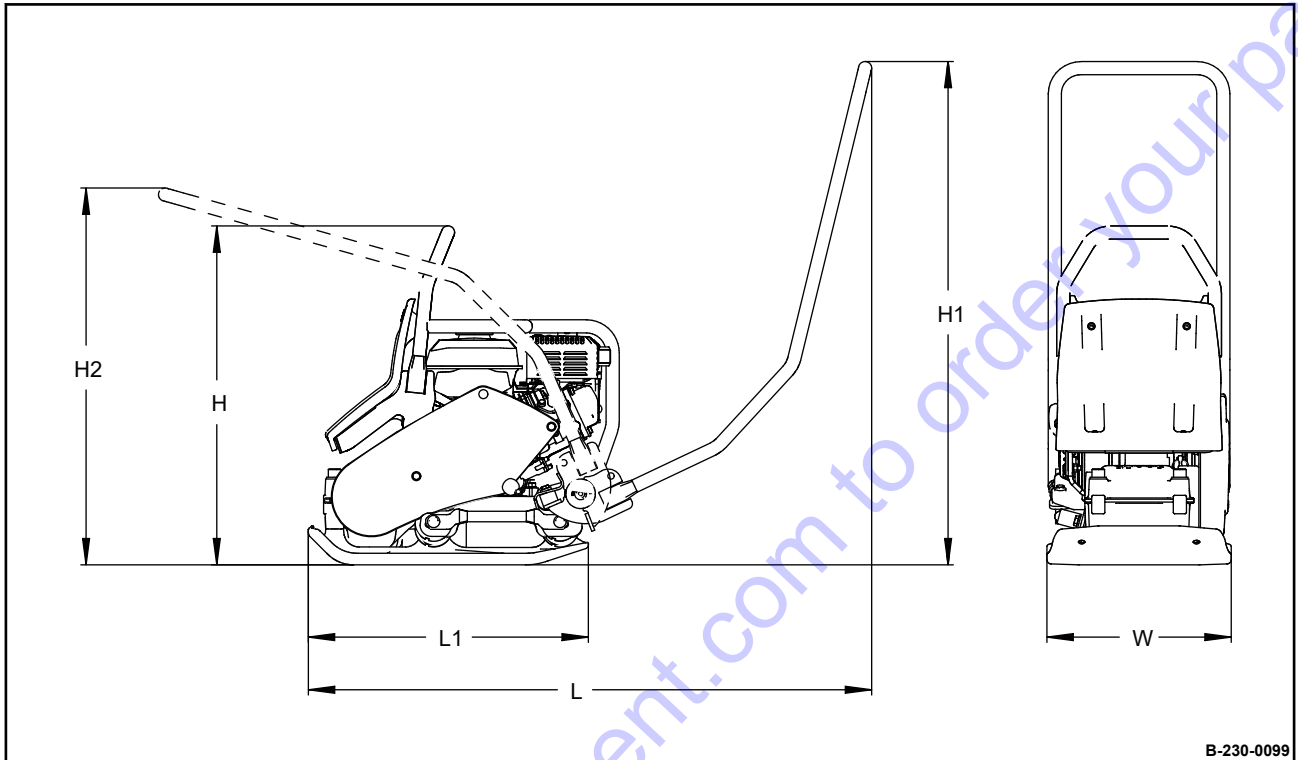


Fig. 29

H	H ₁	H ₂	L	L ₁	W
658	962	700	1084	532	350
(25.9)	(37.9)	(27.6)	(42.7)	(20.9)	(13.8)

Dimensions in millimetres
(Dimensions in inch)

Weights			
Operating weight (CECE)		65	kg
		(143)	(lbs)
Basic weight		64	kg
		(141)	(lbs)
Water spraying system 13.5 l (3.6 gal us, <i>optional equipment</i>)		+ 10	kg
		(+ 22)	(lbs)

Technical data – BP10/35

Weights		
Compact water spraying system (<i>optional equipment</i>)	+ 4 (+ 8.8)	kg (lbs)
Transport wheels (<i>optional equipment</i>)	+ 4 (+ 8.8)	kg (lbs)
Plastic mat (<i>optional equipment</i>)	+ 3 (+ 6.6)	kg (lbs)

Travel characteristics		
Max. working speed	25 (82)	m/min (ft/min)
Max. gradability (depending on soil)	30	%

Drive		
Engine manufacturer	Honda	
Type	GX 120	
Cooling	Air	
Number of cylinders	1	
Rated power SAE J 1349	2.6 (3.5)	kW (hp)
Rated speed	3600	min ⁻¹
Drive system	mechanical	

Exciter system		
Frequency	90 (5400)	Hz (vpm)
Centrifugal force	10 (2250)	kN (lbf)
Amplitude	1.33 (0,052)	mm (in)

Water sprinkling system (<i>optional equipment</i>)		
Type of sprinkling	Gravity feed	

Technical data – BP10/35

Filling capacities		
Fuel (gasoline)	2.0 (0.5 each)	l (gal us)
Water spraying system	13.5 (3.6 each)	l (gal us)
Compact water spraying system	6 (1.6 each)	l (gal us)

2.1.1.1 Noise and vibration data

The following noise and vibration data were determined in accordance with the following guidelines under equipment specific conditions and by using harmonized standards:

- EU Machine Directive edition 2006/42/EU
- Noise Emission Directive 2000/14/EU, Noise Protection Directive 2003/10/EU
- Vibration Protection Directive 2002/44/EU

During operation these values may vary because of the prevailing operating conditions.

2.1.1.1.1 Noise data

Sound pressure level at the operator's stand

$L_{pA} = 90$ dB(A), determined acc. to ISO 11201 and EN 500.



WARNING!

Loss of hearing caused by too high noise burdens!

- Wear your personal protective equipment (ear protection).

Guaranteed sound power level

$L_{WA} = 105$ dB(A), determined acc. to ISO 3744 and EN 500

2.1.1.1.2 Vibration data

Hand-arm vibration

Vector total of the weighted effective acceleration in three orthogonal directions:

Total vibration value $a_{hv} = 4.4$ m/s² on crushed rock determined acc. to ISO 5349 and EN 500.

Associated uncertainty $K = 0.4$ m/s², determined acc. to EN 12096.

Observe the daily vibration load (work safety acc. to 2002/44/EC).

**Hand-arm vibration with comfort
guide handle (optional equipment)**

Vector total of the weighted effective acceleration in three orthogonal directions:

Total vibration value $a_{hv} \leq 2.5 \text{ m/s}^2$ on crushed rock determined acc. to ISO 5349 and EN 500.

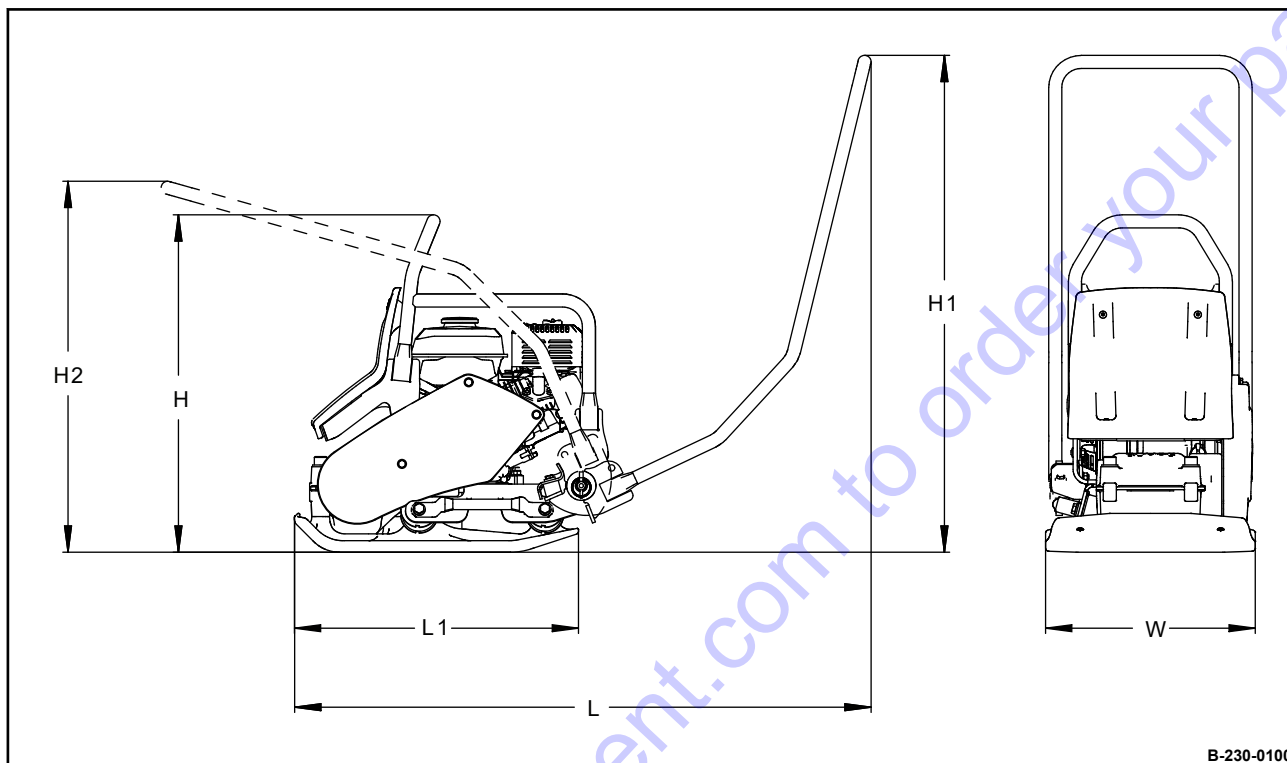
Associated uncertainty K = 0.4 m/s^2 , determined acc. to EN 12096.

Observe the daily vibration load (work safety acc. to 2002/44/EC).

2.2 BP12/40

2.2.1 Technical data

Dimensions



B-230-0100

Fig. 30

H	H ₁	H ₂	L	L ₁	W
658	962	700	1084	542	400
(25.9)	(37.9)	(27.6)	(42.7)	(21.3)	(15.8)

Dimensions in millimetres
(Dimensions in inch)

Weights			
Operating weight (CECE)		72	kg
		(159)	(lbs)
Basic weight		71	kg
		(157)	(lbs)

Technical data – BP12/40

Weights		
Water spraying system (<i>optional equipment</i>)	+ 10 (+ 22)	kg (lbs)
Transport wheels (<i>optional equipment</i>)	+ 4 (+ 8.8)	kg (lbs)

Travel characteristics		
Max. working speed	25 (82)	m/min (ft/min)
Max. gradability (depending on soil)	30	%

Drive		
Engine manufacturer	Honda	
Type	GX 120	
Cooling	Air	
Number of cylinders	1	
Rated power SAE J 1349	2.6 (3.5)	kW (hp)
Rated speed	3600	min ⁻¹
Drive system	mechanical	

Exciter system		
Frequency	90 (5400)	Hz (vpm)
Centrifugal force	12 (2698)	kN (lbf)
Amplitude	1.42 (0,056)	mm (in)

Water sprinkling system (<i>optional equipment</i>)		
Type of sprinkling	Gravity feed	

Technical data – BP12/40

Filling capacities		
Fuel (gasoline)	2.0 (0.5 each)	l (gal us)
Water sprinkling system	13.5 (3.6 each)	l (gal us)

2.2.1.1 Noise and vibration data

The following noise and vibration data were determined in accordance with the following guidelines under equipment specific conditions and by using harmonized standards:

- EU Machine Directive edition 2006/42/EU
- Noise Emission Directive 2000/14/EU, Noise Protection Directive 2003/10/EU
- Vibration Protection Directive 2002/44/EU

During operation these values may vary because of the prevailing operating conditions.

2.2.1.1.1 Noise data

Sound pressure level at the operator's stand

$L_{pA} = 92$ dB(A), determined acc. to ISO 11201 and EN 500.



WARNING!

Loss of hearing caused by too high noise burdens!

- Wear your personal protective equipment (ear protection).

Guaranteed sound power level

$L_{WA} = 105$ dB(A), determined acc. to ISO 3744 and EN 500

2.2.1.1.2 Vibration data

Hand-arm vibration

Vector total of the weighted effective acceleration in three orthogonal directions:

Total vibration value $a_{hv} = 4.0$ m/s² on crushed rock determined acc. to ISO 5349 and EN 500.

Associated uncertainty $K = 0.3$ m/s², determined acc. to EN 12096.

Observe the daily vibration load (work safety acc. to 2002/44/EC).

**Hand-arm vibration with comfort
guide handle (optional equipment)**

Vector total of the weighted effective acceleration in three orthogonal directions:

Total vibration value $a_{hv} \leq 2.5 \text{ m/s}^2$ on crushed rock determined acc. to ISO 5349 and EN 500.

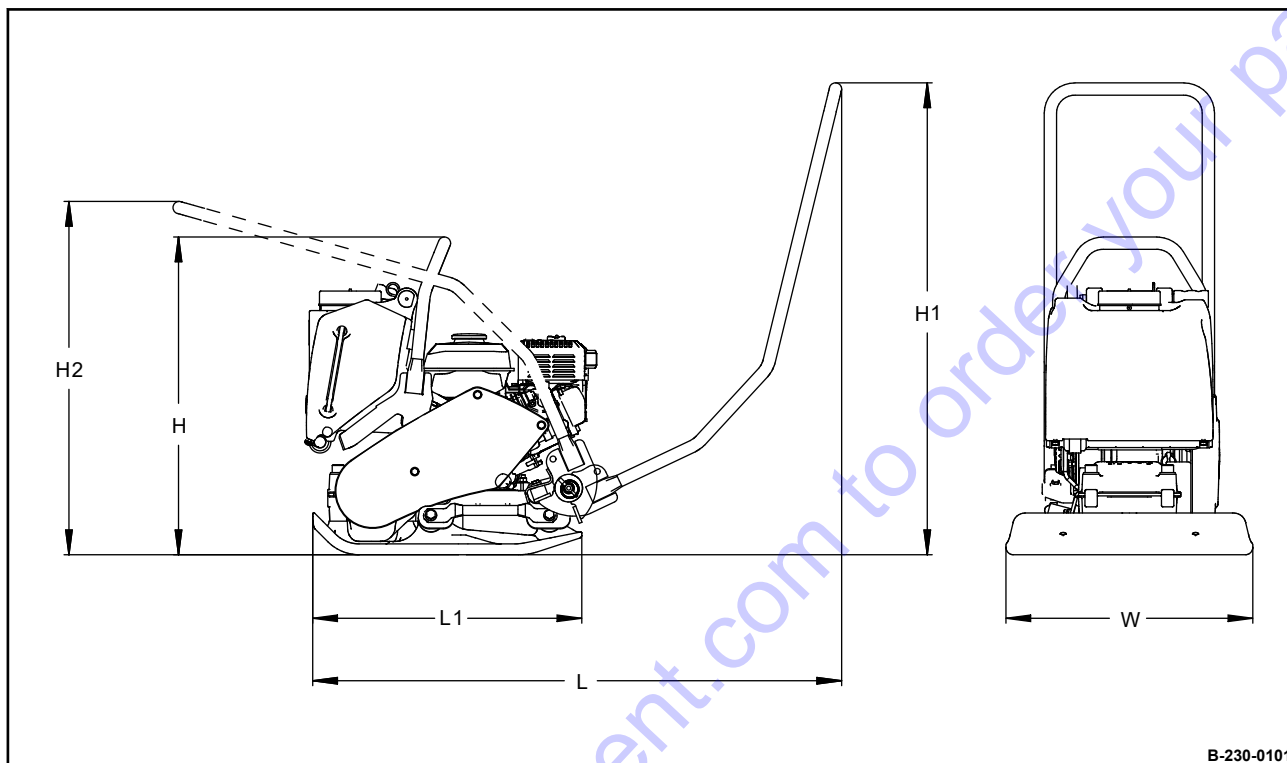
Associated uncertainty K = 0.2 m/s², determined acc. to EN 12096.

Observe the daily vibration load (work safety acc. to 2002/44/EC).

2.3 BP12/50

2.3.1 Technical data

Dimensions



B-230-0101

Fig. 31

H	H ₁	H ₂	L	L ₁	W
658	962	700	1084	545	500
(25.9)	(37.9)	(27.6)	(42.7)	(21.5)	(19.7)

Dimensions in millimetres
(Dimensions in inch)

Weights			
Operating weight (CECE)		82	kg
		(181)	(lbs)
Basic weight		74	kg
		(163)	(lbs)
Transport wheels (<i>optional equipment</i>)		+ 5	kg
		(+ 11)	(lbs)

Technical data – BP12/50

Travel characteristics		
Max. working speed	30 (98)	m/min (ft/min)
Max. gradability (depending on soil)	30	%

Drive		
Engine manufacturer	Honda	
Type	GX 120	
Cooling	Air	
Number of cylinders	1	
Rated power SAE J 1349	2.6 (3.5)	kW (hp)
Rated speed	3600	min ⁻¹
Drive system	mechanical	

Exciter system		
Frequency	100 (6000)	Hz (rpm)
Centrifugal force	12 (2698)	kN (lbf)
Amplitude	1.10 (0,043)	mm (in)

Water spraying system		
Type of spraying	Gravity feed	

Filling capacities		
Fuel (gasoline)	2.0 (0.5 each)	l (gal us)
Water sprinkling system	13.5 (3.6 each)	l (gal us)

2.3.1.1 Noise and vibration data

The following noise and vibration data were determined in accordance with the following guidelines under equipment specific conditions and by using harmonized standards:

- EU Machine Directive edition 2006/42/EU
- Noise Emission Directive 2000/14/EU, Noise Protection Directive 2003/10/EU
- Vibration Protection Directive 2002/44/EU

During operation these values may vary because of the prevailing operating conditions.

2.3.1.1.1 Noise data

Sound pressure level at the operator's stand

$L_{pA} = 92 \text{ dB(A)}$, determined acc. to ISO 11201 and EN 500.



WARNING!

Loss of hearing caused by too high noise burdens!

- Wear your personal protective equipment (ear protection).

Guaranteed sound power level

$L_{WA} = 105 \text{ dB(A)}$, determined acc. to ISO 3744 and EN 500

2.3.1.1.2 Vibration data

Hand-arm vibration

Vector total of the weighted effective acceleration in three orthogonal directions:

Total vibration value $a_{hv} = 4.3 \text{ m/s}^2$ on crushed rock determined acc. to ISO 5349 and EN 500.

Associated uncertainty $K = 0.4 \text{ m/s}^2$, determined acc. to EN 12096.

Observe the daily vibration load (work safety acc. to 2002/44/EC).

Hand-arm vibration with comfort guide handle (optional equipment)

Vector total of the weighted effective acceleration in three orthogonal directions:

Total vibration value $a_{hv} \leq 2.5 \text{ m/s}^2$ on crushed rock determined acc. to ISO 5349 and EN 500.

Associated uncertainty $K = 0.4 \text{ m/s}^2$, determined acc. to EN 12096.

Observe the daily vibration load (work safety acc. to 2002/44/EC).

2.4 Fuels and lubricants

2.4.1 Engine oil

2.4.1.1 Oil quality

The following engine oil specifications are permitted:

- Engine oils for four-stroke engines acc. to API-classification SJ or higher

Avoid mixing of engine oils.

2.4.1.2 Oil viscosity

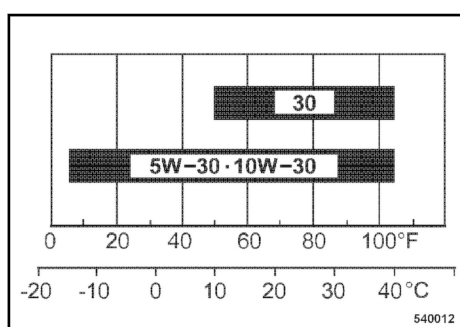


Fig. 32

Since engine oil changes its viscosity with the temperature, the ambient temperature at the operating location of the engine is of utmost importance when choosing the viscosity class (SAE-class).

The temperature data of the SAE-class always refers to fresh oils. In travel operation engine oil ages because of soot and fuel residues. This adversely affects the properties of the engine oil, especially under low ambient temperatures.

SAE 10W-30 is recommended for general use.

You may alternatively use 15W-40 (except under low temperatures).

2.4.1.3 Oil change intervals

Oil change interval: semi-annually or every 100 operating hours.

2.4.2 Fuel

2.4.2.1 Fuel quality

Use unleaded gasoline with a research octane number of 91 or higher (or octane number 86 or higher).

Use unleaded standard grade gasoline with maximum 10 percent by volume of ethanol (E10) or maximum 5 percent by volume of methanol.

Methanol must also contain co-solvents and corrosion inhibitors.

Do not use any fuel with a higher ethanol or methanol content.

The use of fuels with a higher ethanol or methanol content will cause starting and/or power problems or even cause damage in the fuel system.

2.4.2.2 Fuel stabilizer

If the machine is only occasionally used (if it is out of use for longer than four weeks), mix in the correct amount of fuel stabilizer directly after you have purchased fresh fuel.

The fuel stabilizer has a limited shelf life.

Please follow the instructions of the manufacturer concerning the correct mixing ratio and shelf life.

Mixing in fuel stabilizer does not regenerate old fuel.

2.4.3 Oil for exciter shaft housing

Use only engine oils according to the following specifications:

- API CI-4 or higher quality

Avoid mixing engine oils.



NOTICE!

Components may get damaged!

- Do not use low-ash engine oils for the exciter shaft housing.

2.5 List of fuels and lubricants

Assembly group	Fuel or lubricant		Spare parts number	Filling quantity
	Summer	Winter		Observe the level mark!
Engine oil	SAE 10W-30 Specification: ↗ Chapter 2.4.1 „Engine oil“ on page 57			0.6 l (0.16 gal us)
	SAE 30			
Fuel	Gasoline (unleaded) Specification: ↗ Chapter 2.4.2 „Fuel“ on page 57			2.0 l (0.5 gal us)
	Fuel stabilizer Specification: ↗ Chapter 2.4.2.2 „Fuel stabilizer“ on page 58			
Exciter shaft housing	SAE 10W-40 Specification: ↗ Chapter 2.4.3 „Oil for exciter shaft housing“ on page 58 Components may get damaged! Do not use low-ash engine oils for the exciter shaft housing.			0.15 l (0.04 gal us)
	SAE 15W-40			
	SAE 10W-30			
Water tank	Water			13.5 l (3.6 gal us)
Compact water tank	Water			6.0 l (1.6 gal us)

Technical data – Terms and basis of calculation

2.6 Terms and basis of calculation

The following terms and basis of calculation serve as a quick guide to help you understand the technical data provided:

Seq. no.	Term	Units	EXPLANATION
1	Dimensions	mm	■ All dimensions given in mm
2	Axle load	kg	■ Specification of the static weight in (kg) affecting each axle
3	Drive system	-	<ul style="list-style-type: none"> ■ Mechanically from the diesel/petrol engine via V-belt, toothed belt or chain, gears, or cardan shaft ■ Hydrostatically from the diesel/petrol engine via hydraulic pump and hydraulic motor(s)
4	Amplitude	mm	■ Half the excursion in millimetres (mm) covered by the compaction body (plate or drum) per revolution of the exciter shaft
5	Working speed	m/min	■ Path covered by the machine in metres (m) in a minute (min)
6	Operating weight CECE	kg	<ul style="list-style-type: none"> ■ Static weight of the machine, including <ul style="list-style-type: none"> - fuels and lubricants - 50% fuel tank content x 0.84 specific weight - 50% water tank content - 75 kg for the driver (only in the case of sit-on machines)
7	Rated speed	min ⁻¹	■ Number of revolutions per minute of the diesel/petrol engine
8	Basic weight	kg	■ Static weight of the machine without fuels and lubricants
9	Travel speed	km/h	■ Path covered by the machine in kilometres (km) in an hour (h)
10	Frequency	Hz min ⁻¹	<ul style="list-style-type: none"> ■ Number of revolutions made by the exciter shaft per second (Hz) ore minute (min⁻¹) For example: 50 Hz = 50 rev./sec = 50 x 60 = 3000 rev./min (•/min)
11	Fuel consumption	l/h	■ Average engine fuel consumption at 70% capacity utilisation
12	Rated power SAE J 1349/ISO 3046	kW	■ Effective output at the engine flywheel in kilowatts (kW) at the set nominal speed
13	Track radius	mm	■ Radius in mm which the machine achieves at full steering angle; measured from the theoretical circle midpoint to the inner edge of the drums/wheel
14	Static surface load	kg/m ²	■ Relates to the machine operating weight in kg divided by the base plate contact area
15	Static linear load	kg/cm or kg/m	■ Axle load in kg divided by the working width of the drums in cm or m
16	Centrifugal force	kN	<ul style="list-style-type: none"> ■ Force generated by the exciter shaft in kilonewton (kN) which makes the compaction body (drum or plate) oscillate. It depends on the vibrating mass of the compaction body and the frequency. Attention: Specification of a greater centrifugal force is no guarantee of high compaction power.

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Machine overview

Total overview

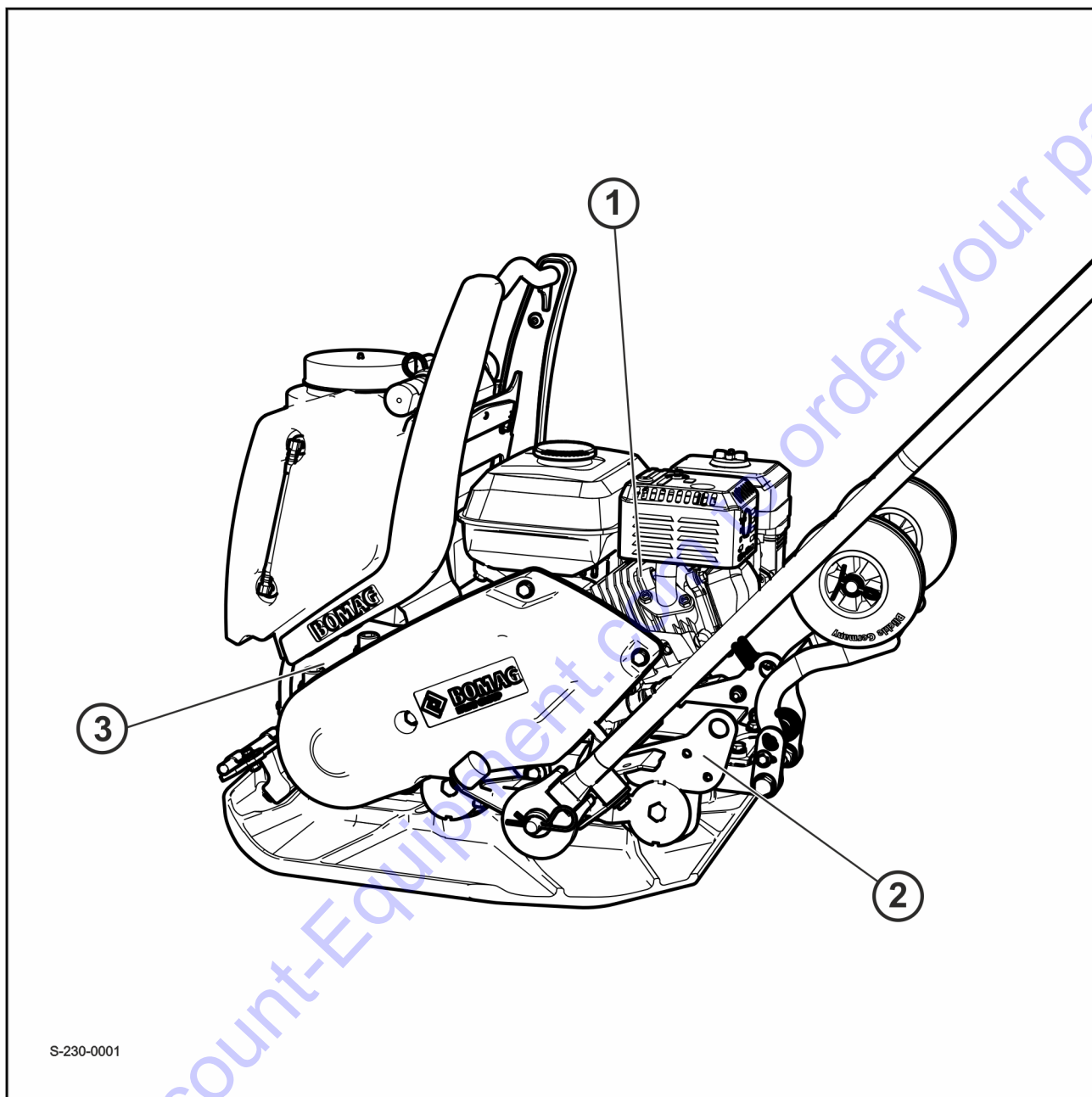


Fig. 33

- 1 Engine
- 2 Chassis
- 3 Exciter unit

Engine

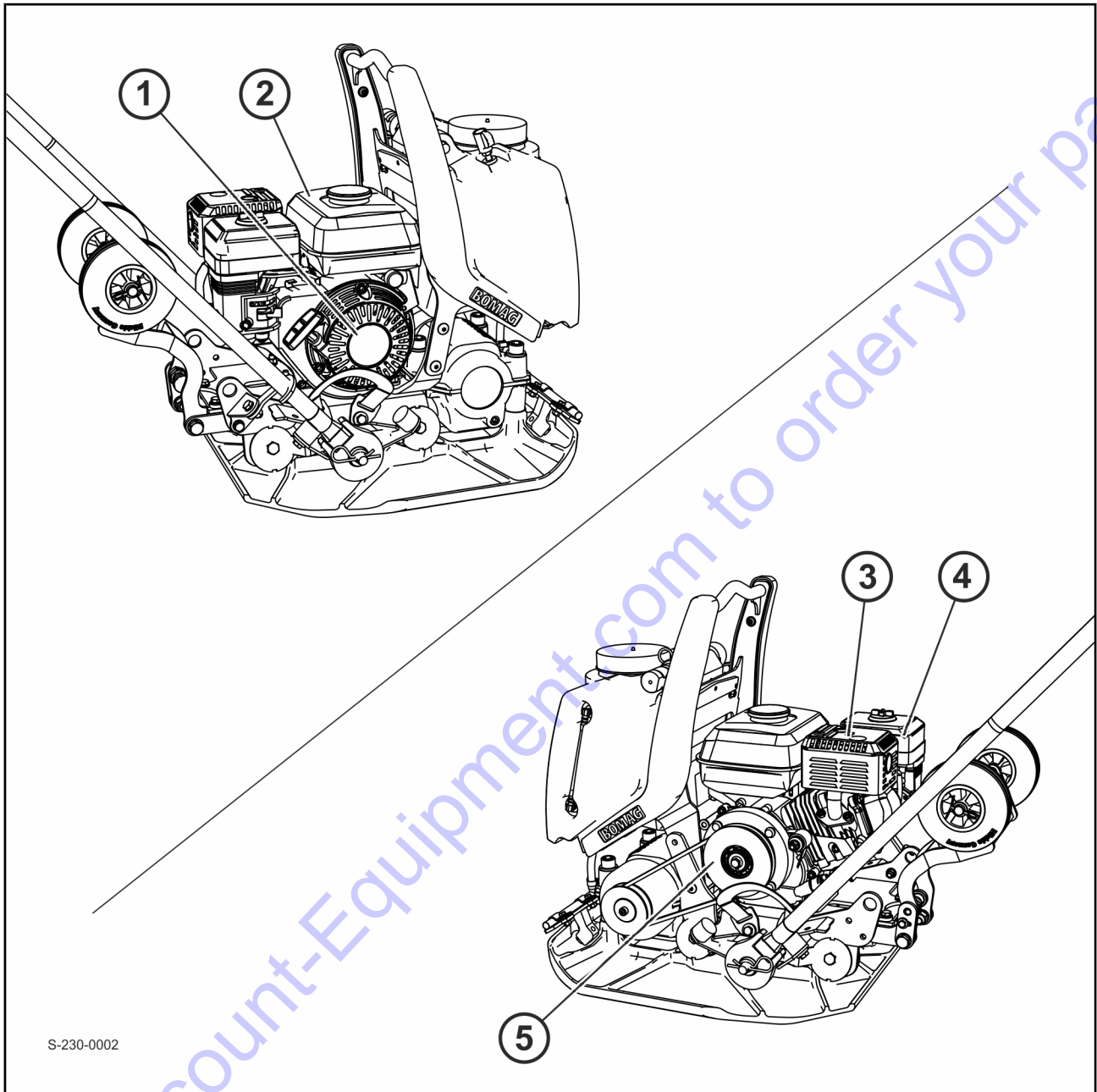


Fig. 34

- 1 Recoil starter
- 2 Fuel tank
- 3 Exhaust silencer
- 4 Air filter
- 5 Centrifugal clutch

Exciter unit

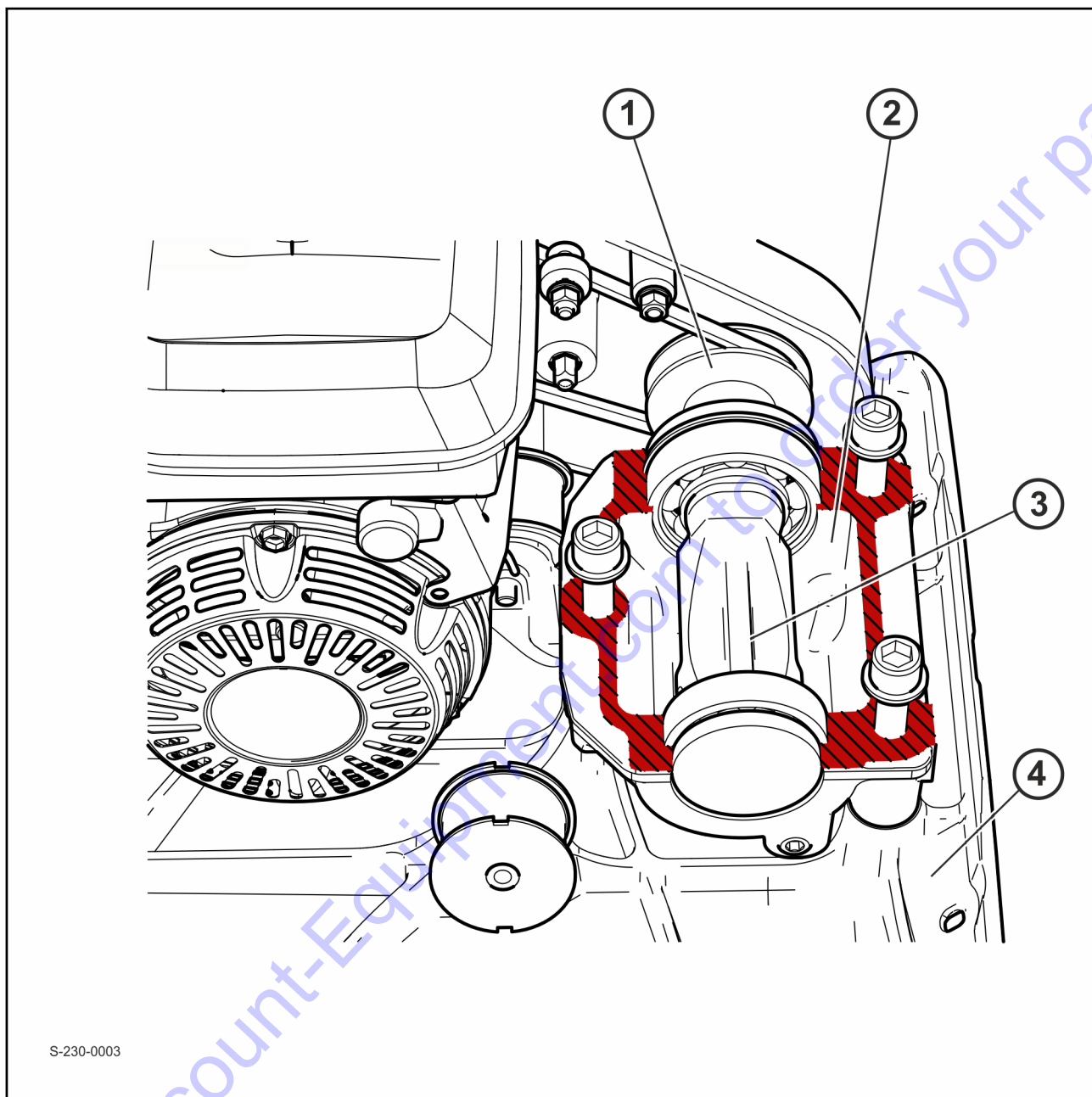


Fig. 35

- 1 V-belt pulley
- 2 Exciter shaft housing
- 3 Exciter shaft
- 4 Base plate

Chassis

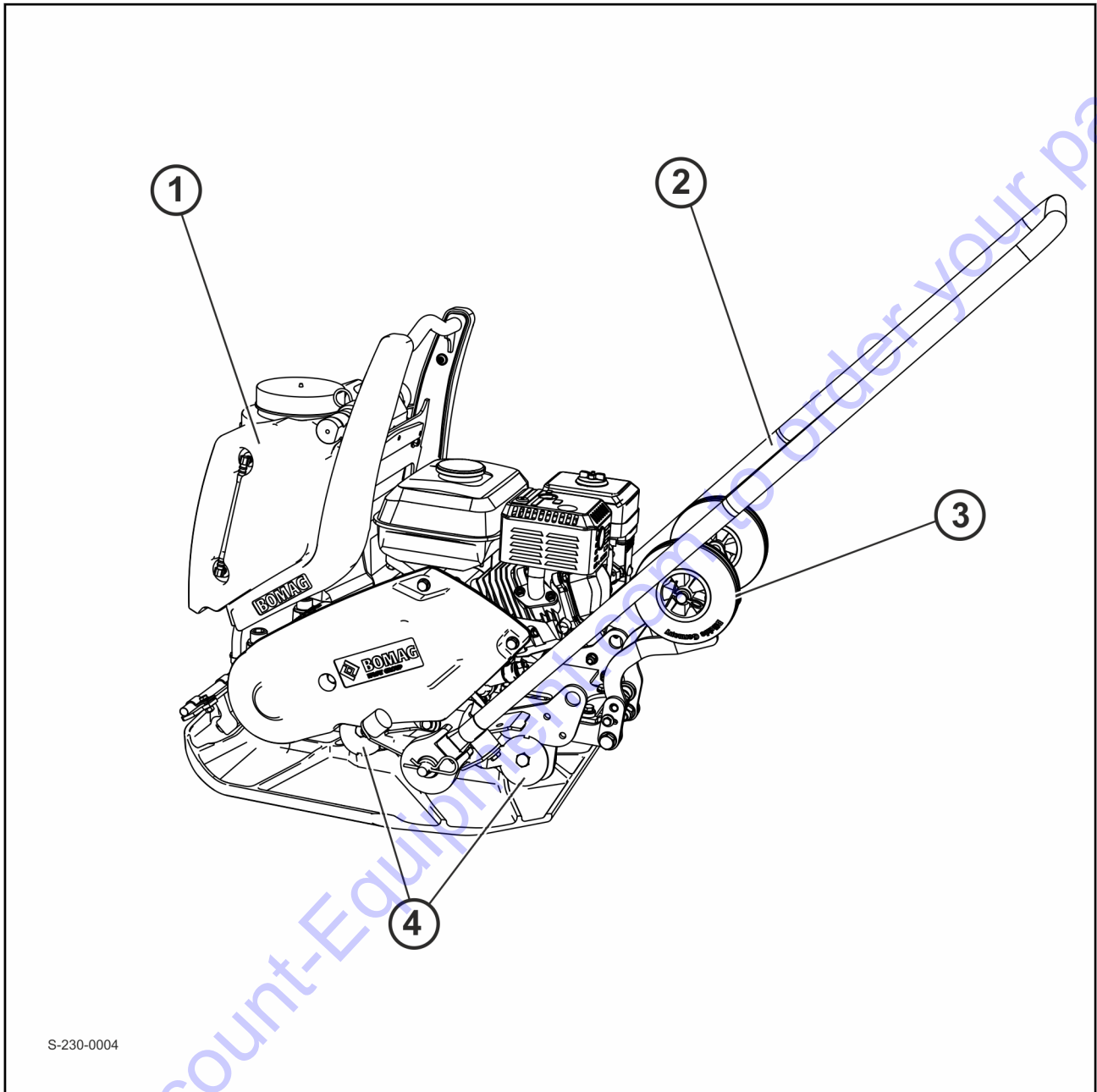


Fig. 36

- 1 Water tank
- 2 Guide handle
- 3 Transport wheels
- 4 Rubber buffer

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4.1 Engine

Overview

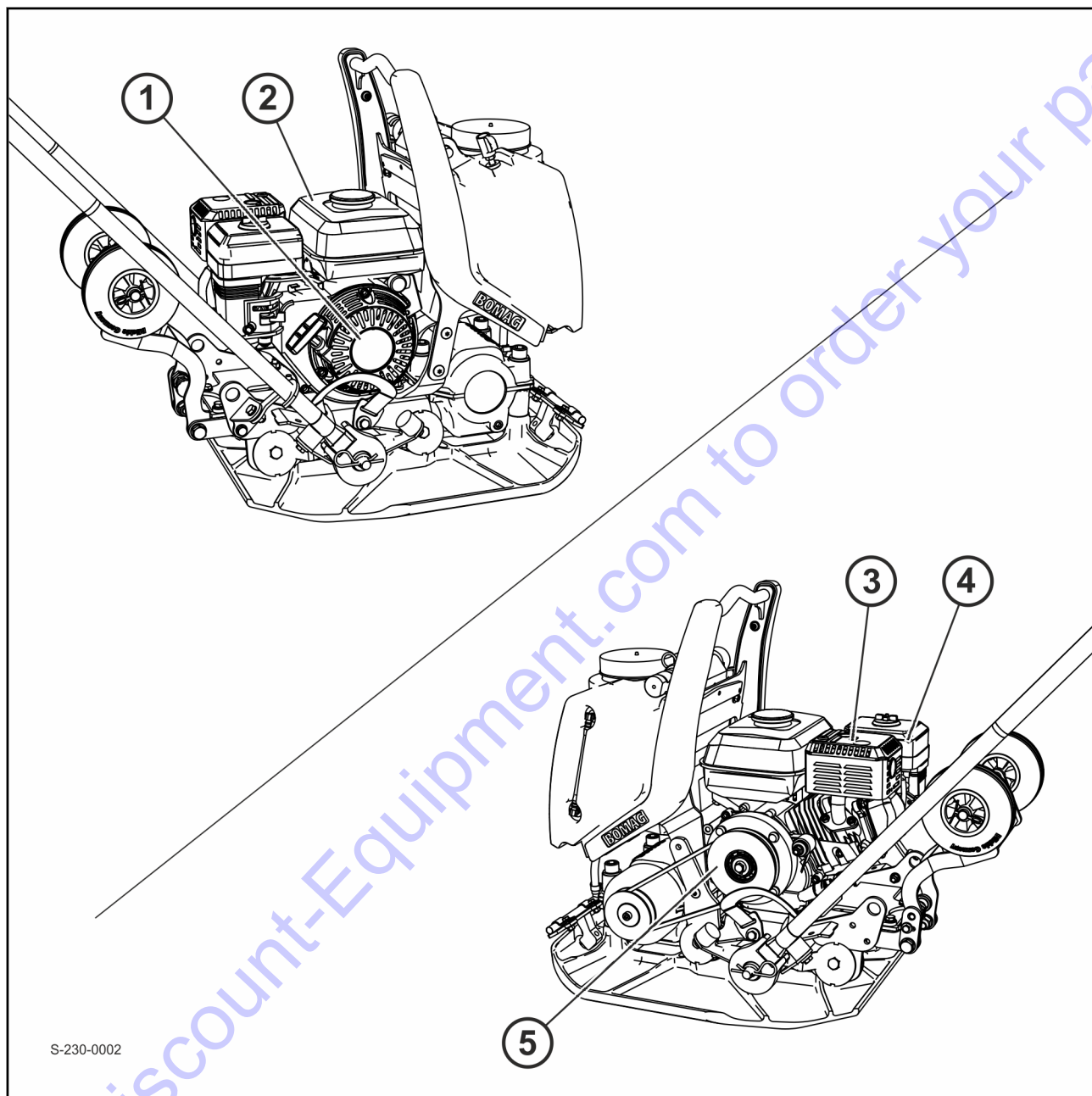


Fig. 37

- 1 Recoil starter
- 2 Fuel tank
- 3 Exhaust silencer
- 4 Air filter
- 5 Centrifugal clutch

4.1.1 Checking the engine oil level

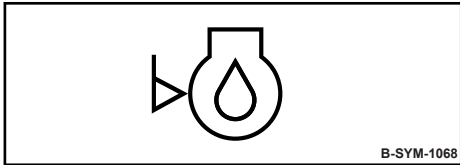


Fig. 38



NOTICE!

Danger of engine damage!

- +Use only oil of the permitted specification
↳ Chapter 2.4.1 „Engine oil“ on page 57.

Protective equipment: ■ Working clothes
■ Safety shoes
■ Protective gloves

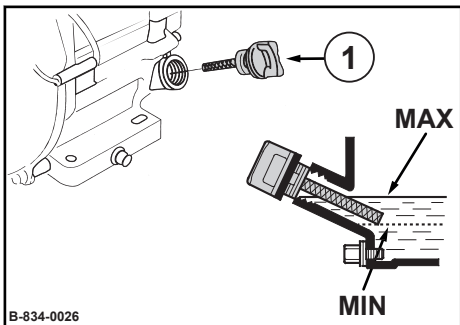


Fig. 39

1. Clean the area around the oil dipstick (1).
2. Unscrew the dipstick and wipe it clean with a lint-free, clean cloth.
3. Insert the dipstick into the oil filler socket, do not screw it in, but pull it out again to check the oil level.
⇒ The oil level must be between the “MIN” and “MAX” marks.

4.



NOTICE!

Danger of engine damage!

- Do not fill in too much engine oil.

If the oil level is too low, top up oil to the “MAX” mark.

5. Screw the oil dipstick in.

4.1.2 Changing the engine oil

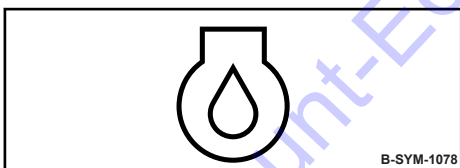


Fig. 40



NOTICE!

Danger of engine damage!

- Change the oil only with the engine at operating temperature.
- Use only oil of the permitted specification
↳ Chapter 2.4.1 „Engine oil“ on page 57.
- Filling quantity: ↳ Chapter 2.5 „List of fuels and lubricants“ on page 59

- Protective equipment:
- Working clothes
 - Safety shoes
 - Protective gloves

1. Park the machine safely ↪ *Chapter 1.3.3 „Parking the machine in secured condition“ on page 41.*

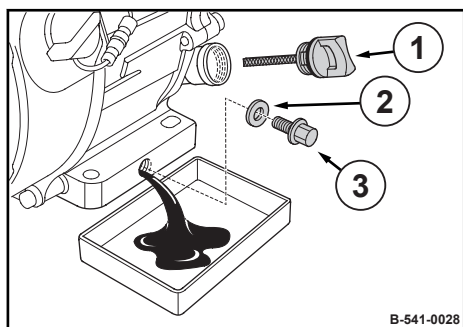


Fig. 41

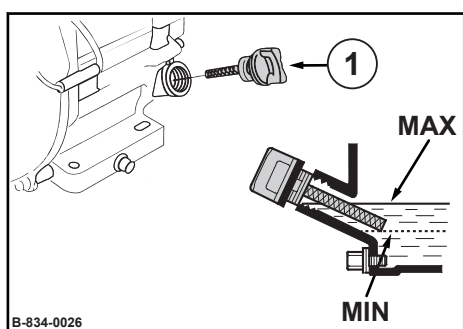


Fig. 42

4.1.3 Checking, cleaning the air filter

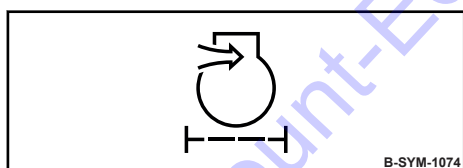


Fig. 43



WARNING!

Danger of burning on hot components!

- Wear your personal protective equipment (protective gloves, protective clothing).
- Avoid touching hot components.

Clean the area around oil dipstick (1) and drain plug (3).

3. Unscrew the oil dipstick.
4. Unscrew the drain plug and collect any oil running out.
5. Clean the oil drain plug and screw it back in with a new seal ring (2).
6. Fill in fresh oil up to the bottom edge of the filler bore.
7. Push the oil dipstick (1) back in.
8. Check for leaks after a short test run.
9. Check the oil level on the dipstick, correct if necessary.
10. Dispose of oil in line with environmental regulations.



NOTICE!

Danger of engine damage!

- Do not start the engine after having removed the air filter.
- If necessary, the air filter may be cleaned up to six times.
- Cleaning does not make sense if the air filter element is covered with a sooty deposit.
- Do not use gasoline or hot fluids to clean the filter element.
- After cleaning, the air filter must be inspected for damage using a torch.
- Do not continue to use a damaged air filter element. If in doubt use a new air filter.

- Protective equipment:
- Working clothes
 - Safety shoes
 - Protective gloves
 - Safety goggles

1. Park the machine safely ↗ *Chapter 1.3.3 „Parking the machine in secured condition“ on page 41.*
2. Allow the engine to cool down.

Disassembling the air filter

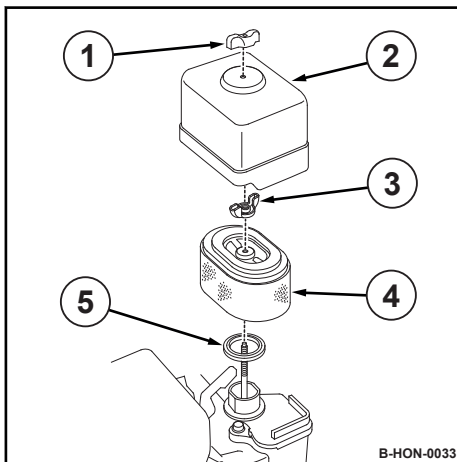


Fig. 44

Checking, cleaning the air filter

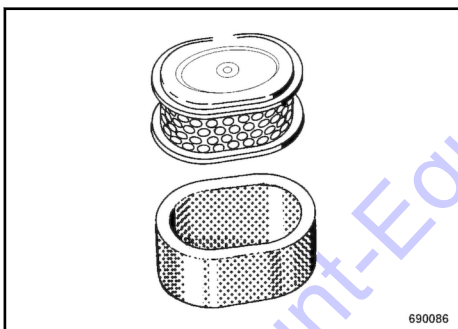


Fig. 45

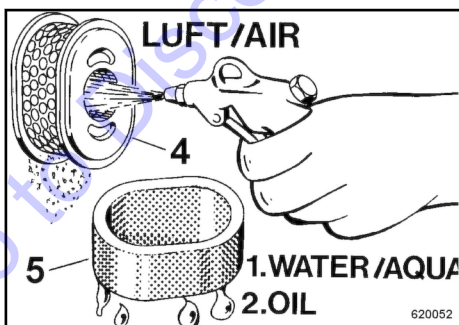


Fig. 46

i *The rubber seal frequently sticks to the filter element.*

7. Separate paper element and foam element.

8.



CAUTION!

Danger of eye injuries caused by particles flying around!

- Wear your personal protective equipment (safety gloves, protective working clothes, goggles).

Blow the paper element (4) out with dry compressed air (max. 2 bar (29 psi)) from inside to outside by moving the gun up and down inside the element, until it is free of dust.

9. In case of excessive dirt, replace the paper element.

10. Clean the foam element (5) in warm soapy water, rinse it and let it dry thoroughly.
11. Soak the foam element in clean engine oil and press excessive oil out.
12. Check both elements thoroughly for holes and cracks.
13. Replace if damaged.
14. Pull the foam rubber element over the paper element.

Assembling the air filter

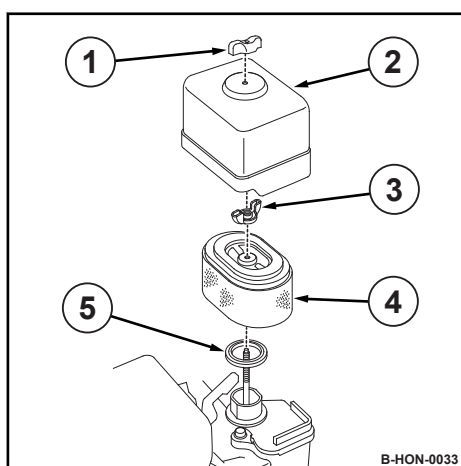


Fig. 47

4.1.4 Air filter maintenance



NOTICE!

Danger of engine damage!

- Insert the filter element correctly.

15. Install the rubber seal (5).
16. Insert the filter element (4) correctly and tighten it with the wing nut (3).
17. Tighten the cover (2) with the wing nut (1).
18. Dispose of the filter element (if replaced) in an environmentally friendly way.



Contamination of the air filter depends mainly on the proportion of dust in the intake air, if necessary clean several times a day.




NOTICE!

Danger of engine damage!

- Do not start the engine after having removed the air filter.
- Do not let dirt drop into the air duct.
- The air filter may be cleaned up to three times, if required. The air filter must be replaced at the latest after one year or 300 operating hours.
- In case of wet or sticky contamination replace the air filter.
- Do not use gasoline or hot fluids to clean the filter element.
- Do not continue to use a damaged air filter element. If in doubt use a new air filter.

Protective equipment: ■ Working clothes
■ Protective gloves
■ Safety goggles

1. Park the machine in secured condition  Chapter 1.3.3 „Parking the machine in secured condition“ on page 41.
2. Allow the engine to cool down.

Disassembling the air filter

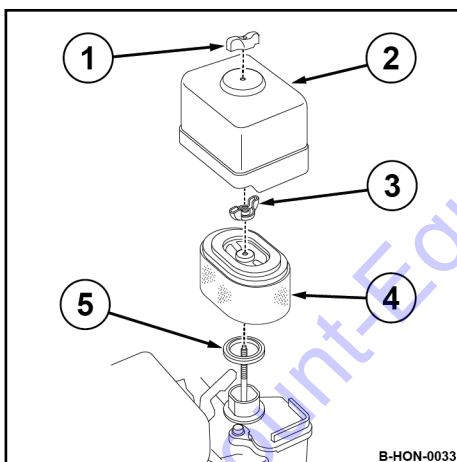


Fig. 48

3. Disassemble wing nut (1) and air filter cover (2).
4. Clean the air filter cover.
5. Disassemble wing nut (3) and filter element (4).
- 6.



The rubber seal frequently sticks to the paper element.

Check the rubber seal (5), replace if necessary.

Checking, cleaning the air filter

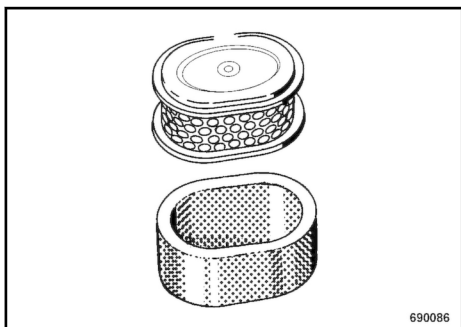


Fig. 49

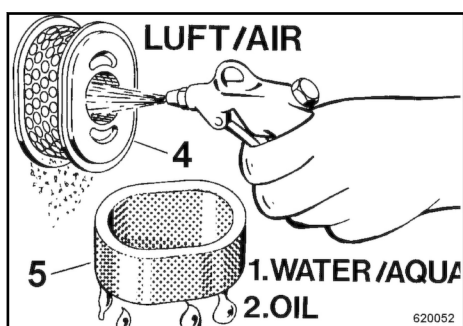


Fig. 50

7. Separate paper element and foam element.

- 8.



CAUTION!

Danger of eye injuries caused by particles flying around!

- Wear your personal protective equipment (safety gloves, protective working clothes, goggles).

Blow the paper element (4) out with dry compressed air (max. 2 bar (29 psi)) from inside to outside by moving the gun up and down inside the element, until it is free of dust.

9. In case of excessive dirt, replace the paper element.
10. Clean the foam element (5) in warm soapy water, rinse it and let it dry thoroughly.
11. Soak the foam element in clean engine oil and press excessive oil out.
12. Check both elements thoroughly for holes and cracks.
13. Replace if damaged.
14. Pull the foam rubber element over the paper element.

Assembling the air filter

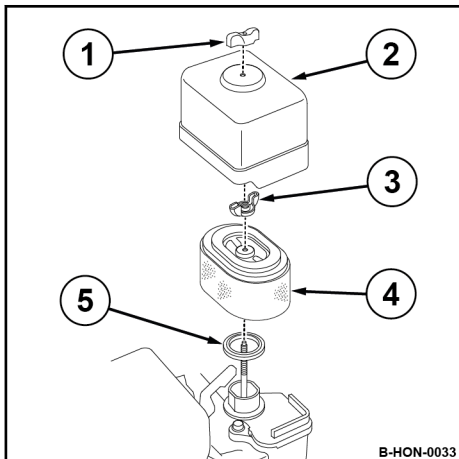


Fig. 51



NOTICE!

Danger of engine damage!

- Insert the filter element correctly.

15. Install the rubber seal (5).
16. Insert the filter element (4) correctly and tighten it with the wing nut (3).
17. Reassemble the air filter cover (2) with the wing nut (1).

4.1.5 Cleaning the cooling fins and the cooling air intake openings



How dirty the cooling fins and cooling air intake openings are depends very much on the daily operating conditions; clean daily if necessary.



NOTICE!

Danger of engine damage caused by reduced cooling!

- For this reason you should always seal any oil or fuel leaks in the vicinity of the cooling fan or the coolers and clean the cooling fins after.

Protective equipment: ■ Working clothes
■ Protective gloves
■ Safety goggles

1. Park the machine in secured condition ↪ Chapter 1.3.3 „Parking the machine in secured condition“ on page 41.
2. Allow the engine to cool down.

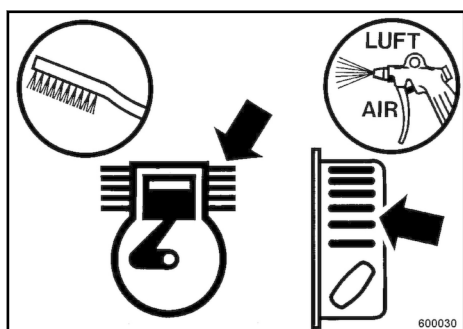


Fig. 52

3. Remove dried dirt with a suitable brush from all cooling fins and cooling air intake openings.

4.



CAUTION!

Danger of eye injuries caused by particles flying around!

- Wear your personal protective equipment (safety gloves, protective working clothes, goggles).

Blow out the cooling fins and cooling air intake openings with compressed air.

Cleaning with cold cleansing agent

If the engine is oily, use a cold cleansing agent for cleaning.



NOTICE!

Components can be damaged by water entering into the system!

- Do not direct the water jet directly into the air filter, carburettor, recoil starter, air intake or starter switch.

1.



CAUTION!

Danger of eye injuries caused by particles flying around!

- Wear your personal protective equipment (safety gloves, protective working clothes, goggles).

Spray the engine with a suitable, non-inflammable cleansing agent, let it soak in for a while, clean it off with water and blow out with compressed air.

2. Warm up the engine for a while to avoid corrosion.

3. Look for the cause of oily contamination and have any leaks sealed by our customer service.

4.1.6 Cleaning the fuel strainer



DANGER!

Danger to life caused by explosive gas-air mixes!

- Do not allow gasoline to come into contact with hot components.
- Smoking and open fire is prohibited.
- Keep away from heat sources, sparks and other sources of ignition.
- Do not spill any gasoline.

Protective equipment: ■ Working clothes
■ Protective gloves

1. Park the machine in secured condition ↪ *Chapter 1.3.3 „Parking the machine in secured condition“ on page 41.*
2. Allow the engine to cool down.
3. Close the fuel valve.

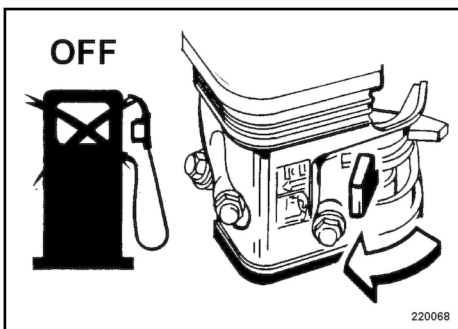


Fig. 53

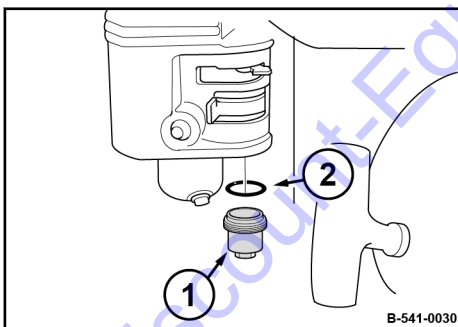


Fig. 54

4. Disassemble the filter bowl (1) and the O-ring (2).

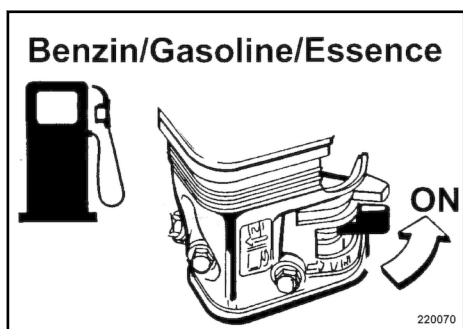


Fig. 55

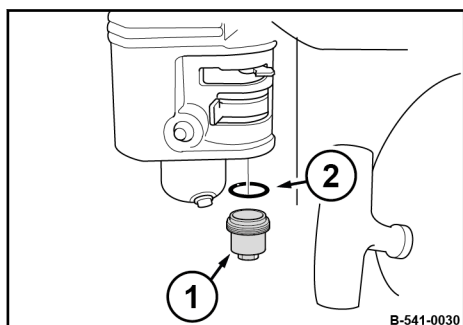


Fig. 56

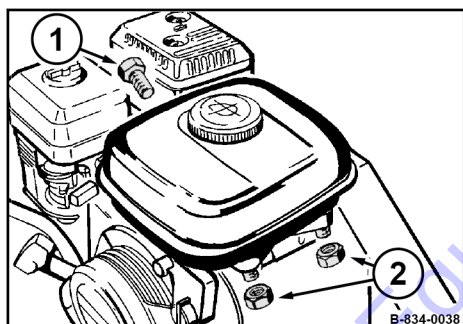


Fig. 57

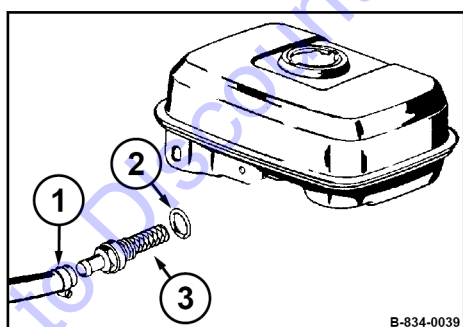


Fig. 58

5. Open the fuel valve and collect running out fuel.
6. Close the fuel valve.

7. Check the O-ring (2) for damage, replace if necessary.
8. Assemble the filter bowl (1) with the O-ring.

9. Unscrew the hexagon nuts (2) and the hexagon screw (1) and take off the fuel tank.

10. Loosen the hose clamp (1) and pull off the fuel hose.
11. Unscrew the fuel strainer (3) with the seal (2).
12. Clean the fuel strainer, check the condition of the screen, replace if necessary.
13. Turn the fuel strainer tightly in with the new seal.
14. Assemble the fuel hose with the hose clamp.

Machine assemblies – Engine

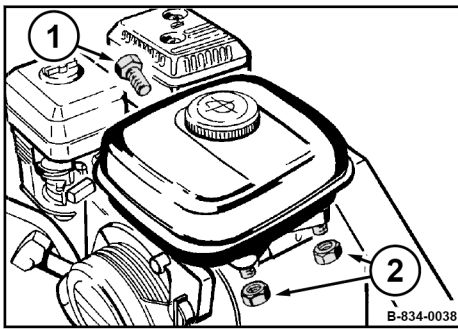


Fig. 59

15. Assemble the fuel tank with hexagon nuts (2) and hexagon screw (1).
16. Check the fuel system for leaks.
17. Dispose of fuel in an environmentally friendly way.

4.1.7 Cleaning the slurry filter



DANGER!

Danger to life caused by explosive gas-air mixes!

- Do not allow gasoline to come into contact with hot components.
- Smoking and open fire is prohibited.
- Keep away from heat sources, sparks and other sources of ignition.
- Do not spill any gasoline.

Protective equipment: ■ Working clothes
■ Protective gloves

1. Park the machine in secured condition ↪ *Chapter 1.3.3 „Parking the machine in secured condition“ on page 41.*
2. Close the fuel valve.



Fig. 60

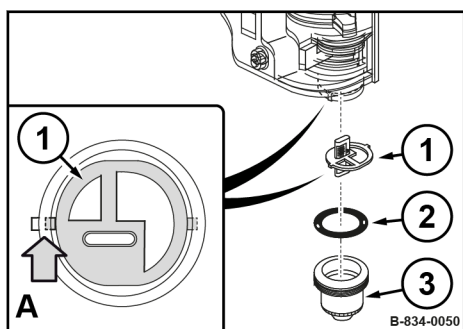


Fig. 61

A View from underneath: Alignment of filter during installation

3. Disassemble filter bowl (3), O-ring (2) and filter (1).
4. Clean filter bowl and filter in a non-inflammable solvent, dry thoroughly after.
5. Check the O-ring for damage, replace if necessary.
6. Assemble the filter.
Observe the alignment (A) of the filter on the housing.
7. Assemble the filter bowl with the O-ring.

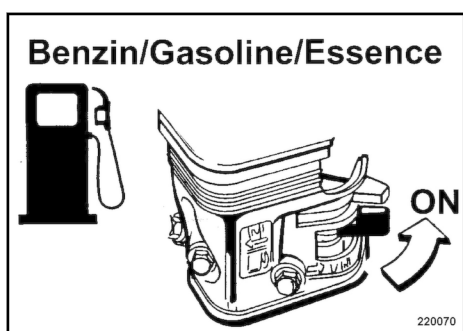


Fig. 62

8. Open the fuel valve and check the filter bowl for leaks.
9. Close the fuel valve again.
10. Dispose of fuel environmentally.

4.1.8 Servicing the V-belt

Protective equipment: ■ Working clothes
■ Safety shoes
■ Protective gloves

1. Park the machine safely ↪ Chapter 1.3.3 „Parking the machine in secured condition“ on page 41.
2. Allow the engine to cool down.
3. Loosen the fastening screws (2) and remove the V-belt guard (1).

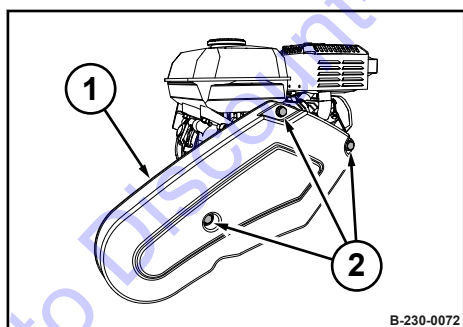


Fig. 63

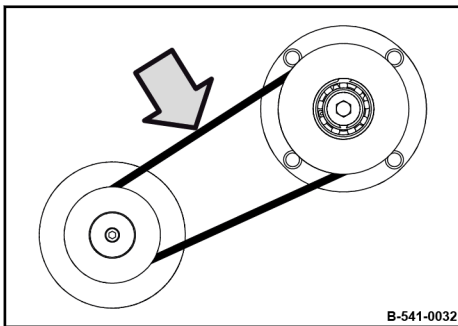


Fig. 64

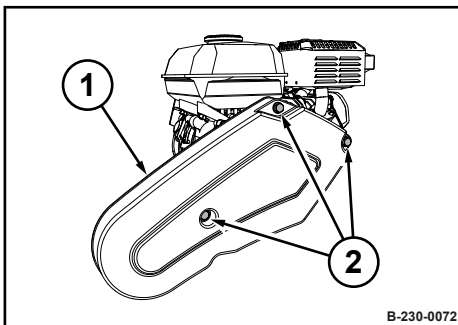


Fig. 65

4.1.9 Replacing the starter rope

1. Check condition and tension of the V-belt, tighten if necessary.
⇒ **Compression measurement:** 5 - 10 mm (0.2 - 0.4 in).
2. If necessary, tighten the V-belt; if damaged, replace the V-belt.

3. Assemble the V-belt guard (1) with fastening screws (2).

Protective equipment: ■ Working clothes
■ Protective gloves

1. Park the machine in secured condition ↪ *Chapter 1.3.3 „Parking the machine in secured condition“ on page 41.*
2. Allow the engine to cool down.
3. Disassembling the recoil starter.

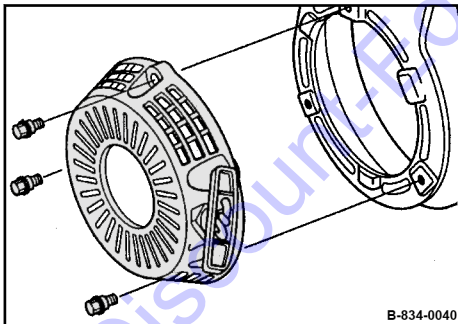


Fig. 66

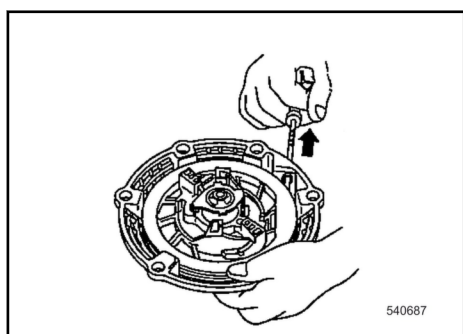


Fig. 67

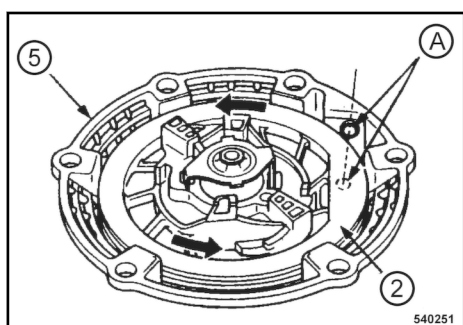


Fig. 68

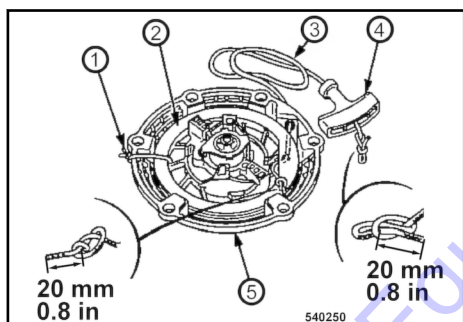


Fig. 69

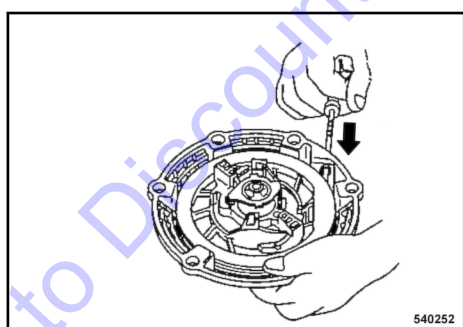


Fig. 70

4. Pull the starter rope with the starter handle out completely.

5. If the starter rope has been torn or the coil has recoiled completely:

- Before assembling the rope, turn the coil (2) 5 revolutions in anti-clockwise direction and align the rope openings in coil and housing (5) to one another (A).

6. Secure the coil against winding up. For this purpose tie the coil (2) to the housing (5) with a cable strap (1).

7. Untie the knots of the starter rope at both ends and remove the old starter rope.

8. Thread in the new starter rope (3) and fix it with knots on both ends.

9.



CAUTION!

Danger of injury caused by the starter handle hitting against your body!

- Do not let the starter handle hit back.

Remove the fixing of the coil and run the starter handle slowly back to initial position.

10. Pull the starter handle to check the function and light movement of the recoil starter.

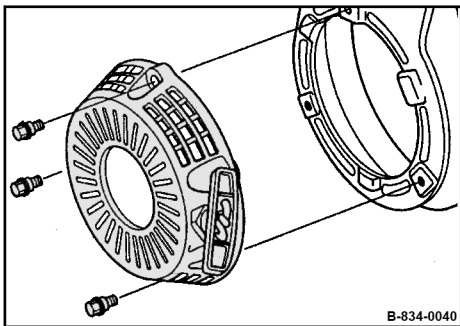


Fig. 71

11. Assemble the recoil starter.

4.1.10 Checking, adjusting the valve clearance



Perform this maintenance work at the latest after 250 operating hours



NOTICE!

Danger of engine damage!

We recommend to have this work carried out by trained personnel or our after sales service.

- Before checking the valve clearance let the engine cool down.

Preparations

Protective equipment: ■ Working clothes
■ Protective gloves

1. Park the machine in secured condition ↗ *Chapter 1.3.3 „Parking the machine in secured condition“ on page 41.*
2. Let the engine cool down to 20 °C (68 °F).
3. Unscrew the fastening screws (1).
4. Remove valve cover (2) with seal (3).

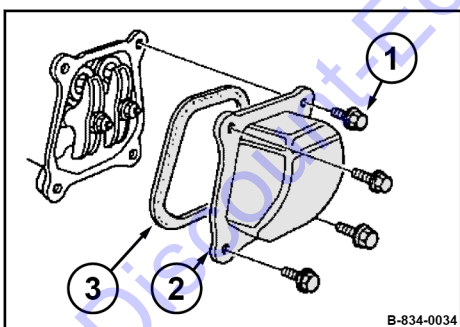


Fig. 72

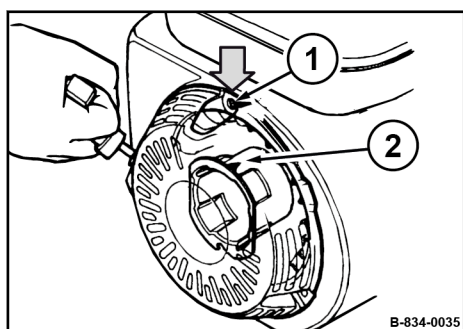


Fig. 73

Checking the valve clearance

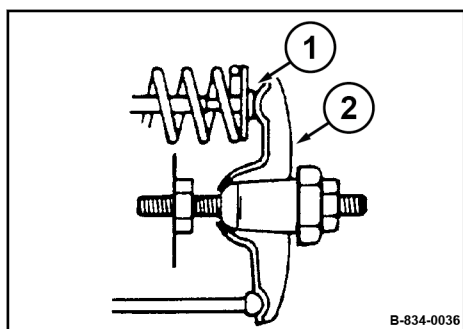


Fig. 74

Adjusting the valve clearance

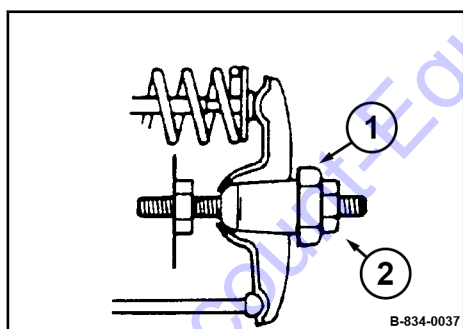


Fig. 75

5. Set the piston to the top dead centre position of the compression stroke.

For this purpose align the alignment mark (2) on the starter disc to the top bore (1).

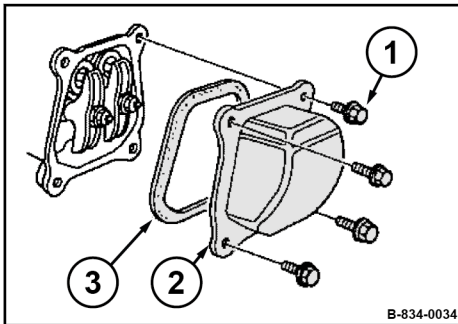
Valve clearance:

Intake valve (IN)	0.15 mm (0.006 in)
Exhaust valve (EX)	0.20 mm (0.008 in)

1. Check the valve clearance with a feeler gauge between rocker arm (2) and valve shaft (1) on both valves, adjust if necessary.

1. Hold the hexagon nut (1) on the rocker arm and loosen counter nut (2).
2. Adjust the hexagon nut, until the feeler gauge can be inserted and pulled out with little resistance after retightening the counter nut.

Final work



1. Install the valve cover (2) with a new seal (3).
2. Tighten the fastening screws (1) evenly.

Fig. 76

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4.2 Exciter unit

Overview

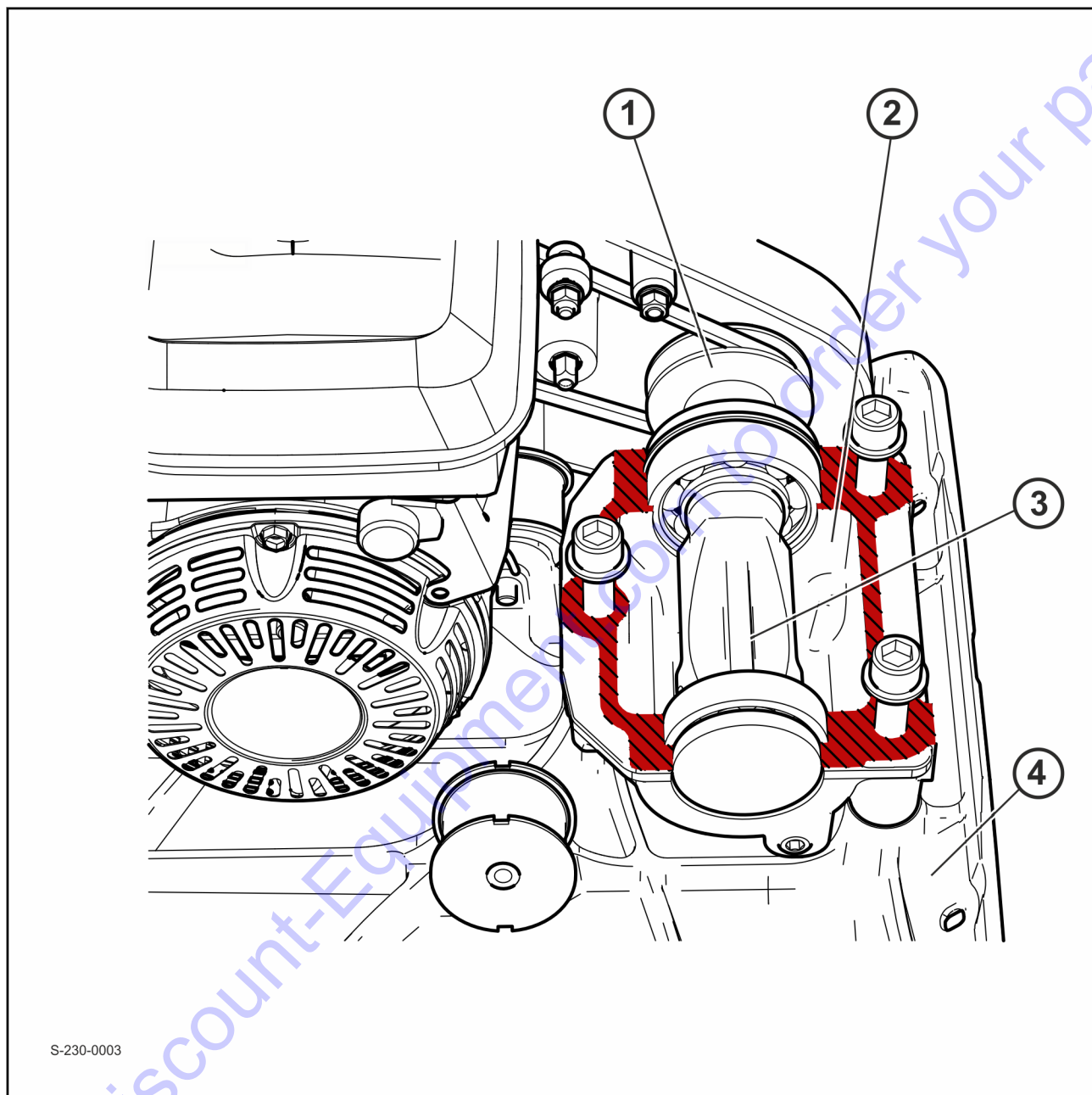


Fig. 77

- 1 V-belt pulley
- 2 Exciter shaft housing
- 3 Exciter shaft
- 4 Base plate

4.2.1 Changing the oil in the exciter housing



NOTICE!

Components may get damaged!

- Use only oil of the permitted specification
↳ Chapter 2.5 „List of fuels and lubricants“ on page 59.

Protective equipment: ■ Working clothes
■ Safety shoes
■ Protective gloves

1. Park the machine on level ground.
2. Park the machine safely ↳ Chapter 1.3.3 „Parking the machine in secured condition“ on page 41.
3. Tilt the machine slightly towards the oil drain side and secure it properly.
4. Unscrew the oil drain plug (1) and collect running out oil.

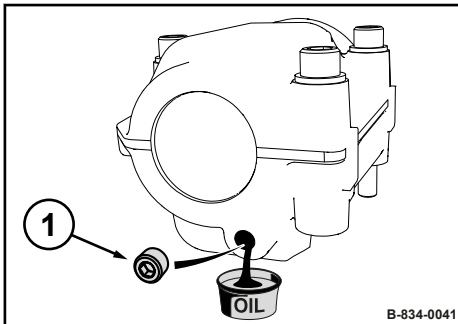


Fig. 78

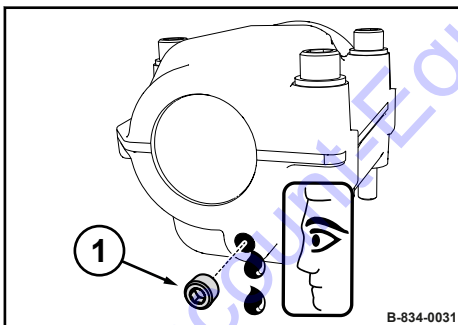


Fig. 79

5. Stand the machine upright.



NOTICE!

Components may get damaged!

Do not use low-ash engine oils for the exciter shaft housing.

6. Fill in fresh oil up to the bottom edge of the opening.
7. Screw in the plug (1).
8. Dispose of oil in line with environmental regulations.

4.2.2 Exciter repair

Preliminary remarks

The tasks required to repair the exciter unit depend on the damage to the respective components.

In order to cover as many repair scenarios as possible, the complete installation of the exciter unit, including pre-assembly, is shown in this manual.

Pre-assembly is not necessary if the components are already pre-assembled and they were not disassembled to repair the exciter unit.

Overview of exciter unit

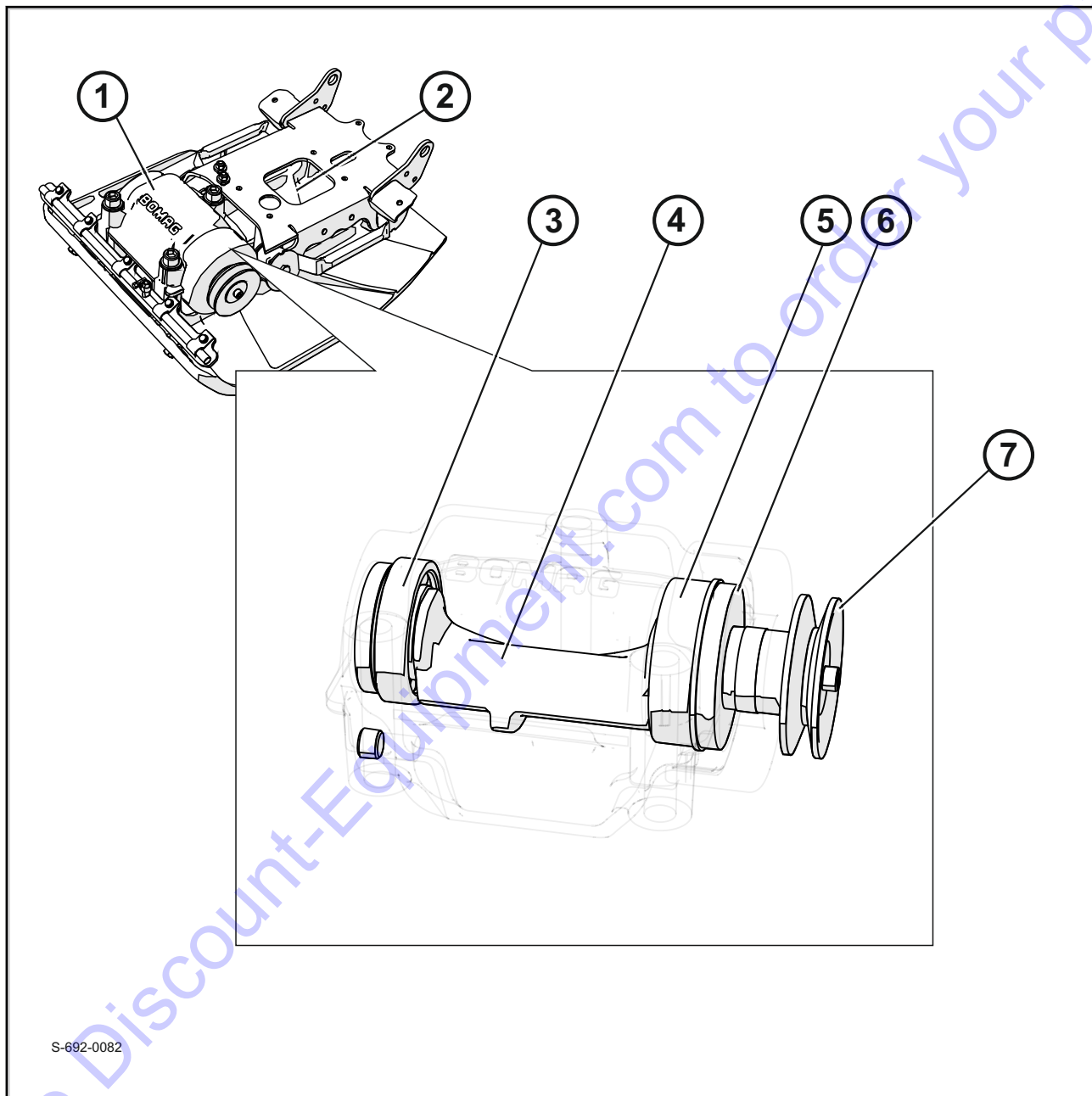


Fig. 80

- 1 Exciter unit
- 2 Base plate
- 3 Grooved ball bearing
- 4 Exciter shaft

Machine assemblies – Exciter unit

- 5 Grooved ball bearing
- 6 Radial seal
- 7 V-belt pulley

Pre-assembling the exciter shaft

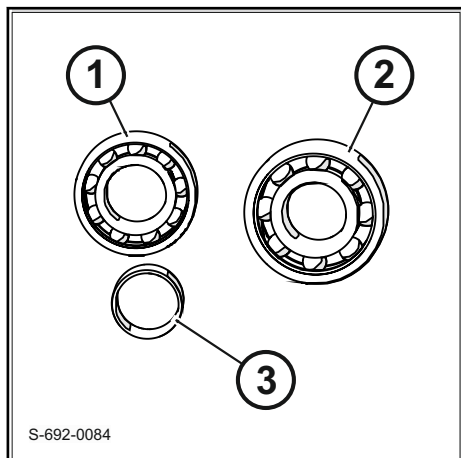


Fig. 81

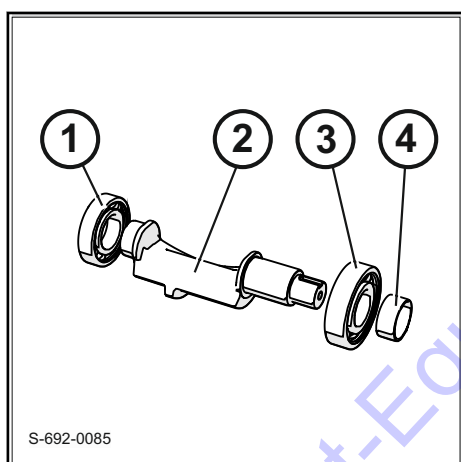


Fig. 82

1. Preheat the grooved ball bearing (1) ↘ Fig. 81, grooved ball bearing (2) and the inner ring (3).

2. Install the preheated grooved ball bearing (1) ↘ Fig. 82 and the grooved ball bearing (2) on the exciter shaft.
3. Install the inner ring (4) on the exciter shaft.

Assembling the exciter shaft housing

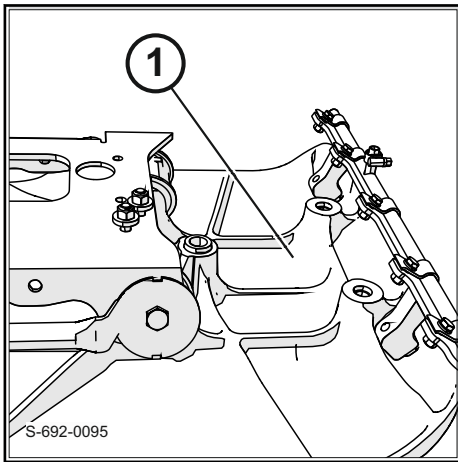


Fig. 83

1. Clean the base plate (1) ↪ Fig. 83.

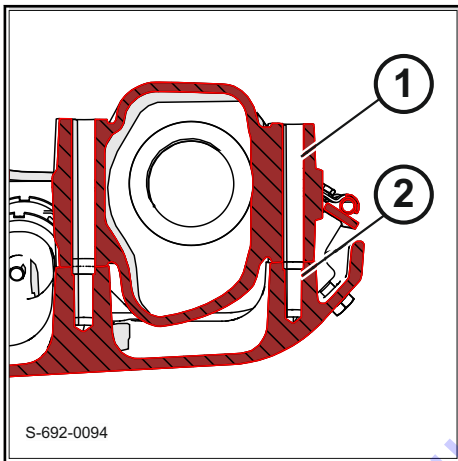


Fig. 84

2. Place the exciter shaft housing on the base plate and align the bore (1) ↪ Fig. 84 for fastening screws with the threaded bores (2).

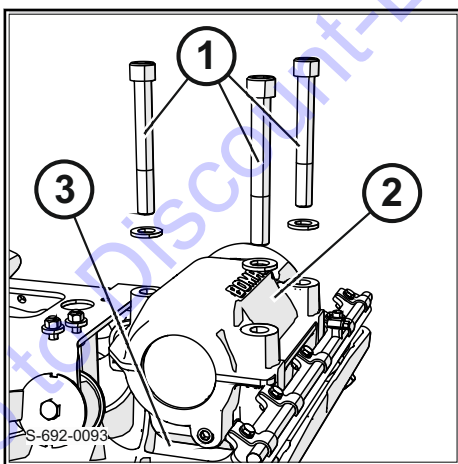


Fig. 85

3. Position the screws (1) ↪ Fig. 85 with washers.

Machine assemblies – Exciter unit

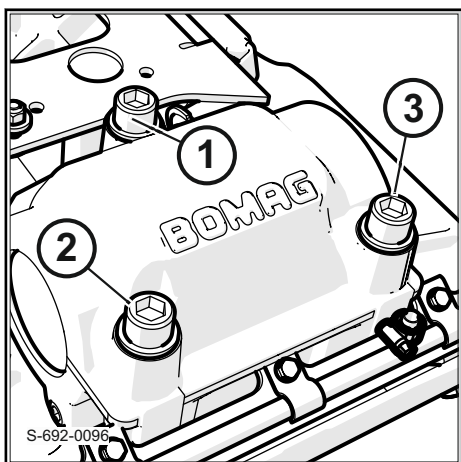


Fig. 86

Installing the exciter shaft

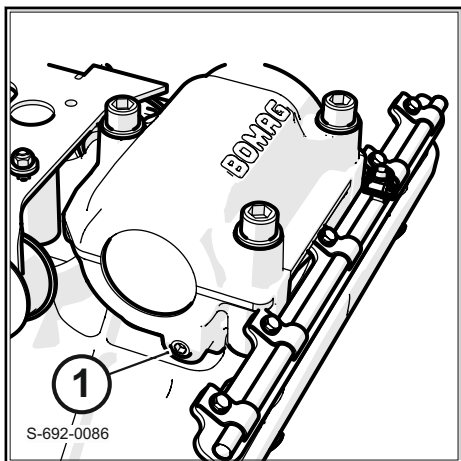


Fig. 87

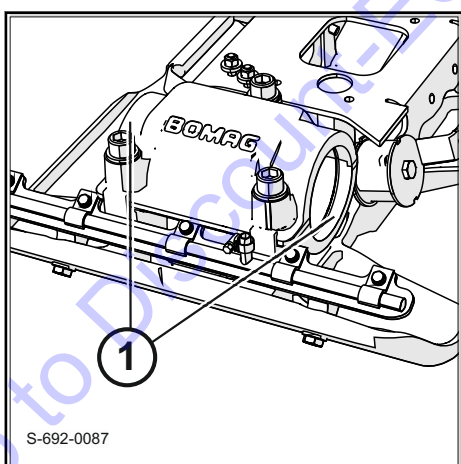


Fig. 88

4. Tighten the screw (1) ↪ Fig. 86.
Tighten the screw (2).
Tighten the screw (3).
Observe the tightening torque.
Assembling the exciter shaft housing has been completed.

1. Insert the oil drain plug (1) ↪ Fig. 87 with sealing compound.

2. Clean the bearing seat (1) ↪ Fig. 88 and the bearing seat (2) thoroughly with grease solvent (e.g. thinner / brake cleaner).

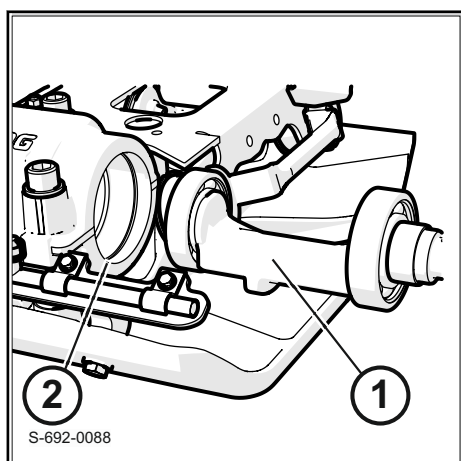


Fig. 89

3. Insert the pre-assembled exciter shaft (1) ↗ Fig. 89 into the exciter housing (2) and position the bearing.

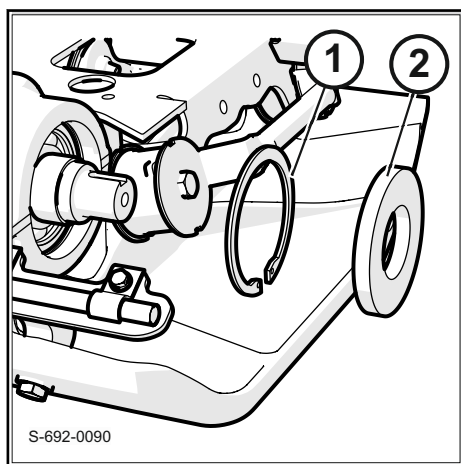


Fig. 90

4. Assemble the circlip (1) ↗ Fig. 90.
5. Install the radial seal (2).

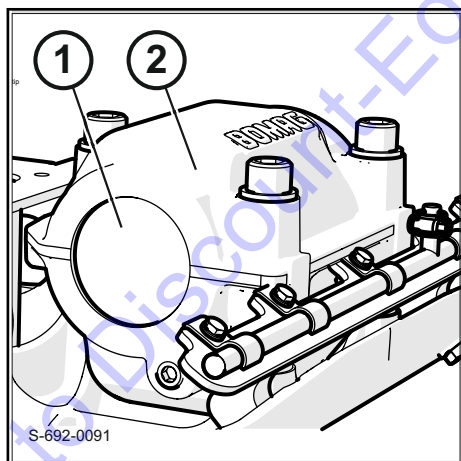


Fig. 91

6. Install the locking cap (1) ↗ Fig. 91 in the bore of the exciter housing (2).

Machine assemblies – Exciter unit

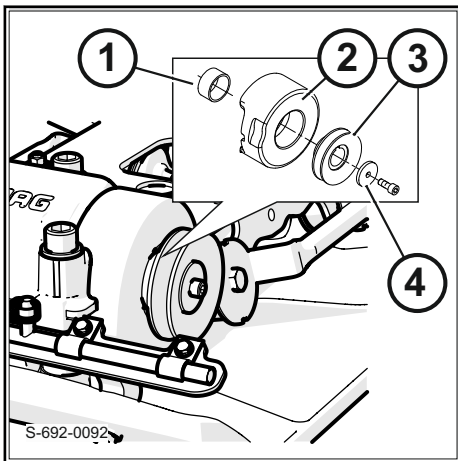


Fig. 92

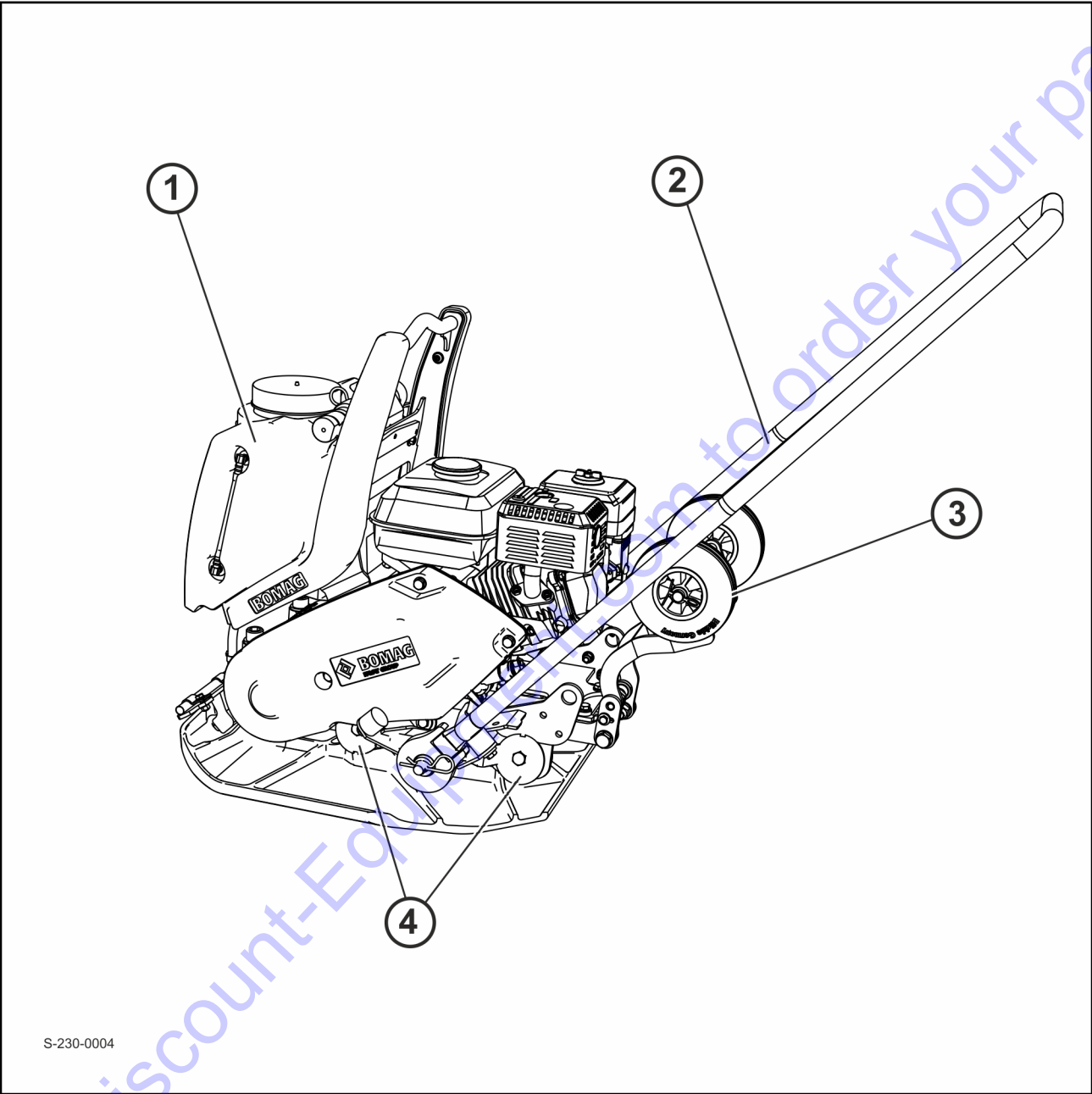
7. Install the bushing (1) ↪ Fig. 92, the sealing (2), the V-belt pulley (3) and the washer (4).

Assembling the exciter shaft has been completed.

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4.3 Chassis

Overview



S-230-0004

Fig. 93

- 1 Water tank
- 2 Guide handle
- 3 Transport wheels
- 4 Rubber buffer

4.3.1 Checking the rubber buffers

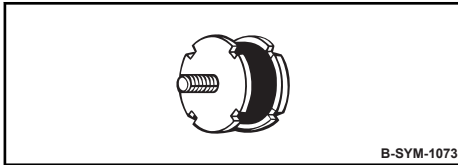


Fig. 94

Protective equipment: ■ Working clothes
■ Safety shoes
■ Protective gloves

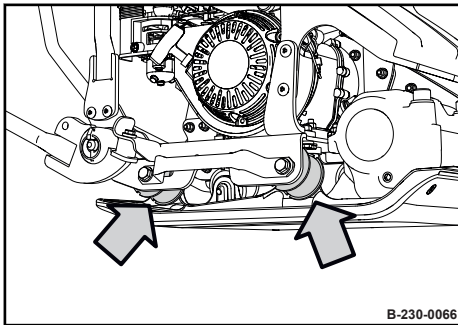


Fig. 95

1. Check the rubber buffer pairs, left and right, for tight fit, cracks and tear-offs.
⇒ Have damaged rubber buffers replaced by authorised service personnel immediately.

4.3.2 Checking the water level, topping up



NOTICE!

Components may get damaged by frost!

- Drain all water off if there is a risk of frost.

Protective equipment: ■ Working clothes
■ Safety shoes
■ Protective gloves

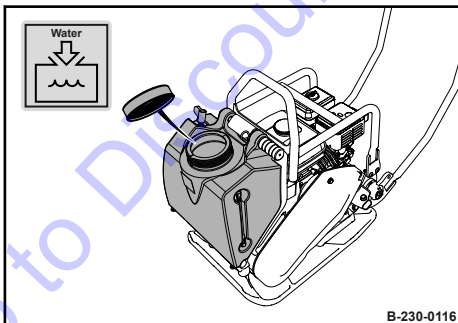


Fig. 96

1. Clean the area around the filling port.
2. Remove the cap and check the water supply in the water tank.



NOTICE!

Dirty or contaminated water can block the bore-holes!

- Fill only with clean water.

3. If necessary, fill in clean water.
4. Close the cap.

Alternatively, the water tank can also be removed and transported for filling.

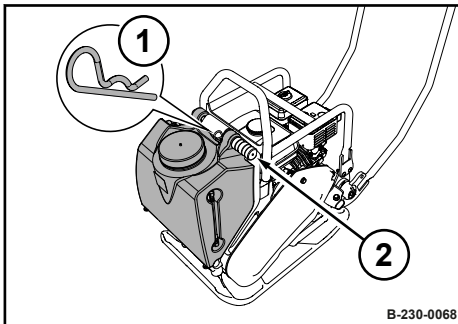


Fig. 97

1. Pull out the split pin (1).
2. Pull out the bolt (2) and take off the water tank.
3. Insert the bolt through the guides on the water tank and insert the split pin to lock.
 - ⇒ The water tank can now be carried by the bolt.

4.3.3 Check water supply, refill (compact water tank)



NOTICE!

Components may get damaged by frost!

- Drain all water off if there is a risk of frost.

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

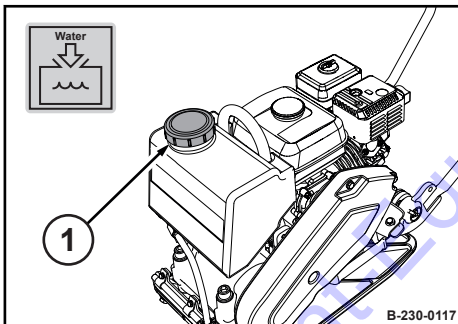


Fig. 98

1. Clean the area around the filling port.
2. Remove the cap (1) and check the water supply in the water tank.



NOTICE!

Dirty or contaminated water can block the bore-holes!

- Fill only with clean water.

3. If necessary, fill in clean water.
4. Close the cap.

Alternatively, the water tank can also be removed and transported for filling.

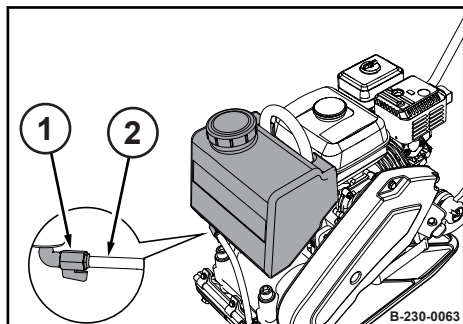


Fig. 99

1. Close the shut-off valve (1).
2. Pull the hose (2) off the shut-off valve.
3. Lift off the water tank upwards.

4.3.4 Cleaning the water spraying system

Protective equipment: ■ Working clothes
■ Safety shoes
■ Protective gloves

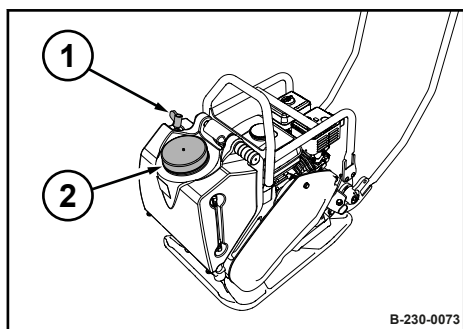


Fig. 100

1. Remove the cap (2).
2. Open the rotary button (1) completely and let all water run out.



Alternatively you may also remove the water tank for cleaning.

3. Flush the water tank with a strong water jet, until all dirt has run out.
4. Fill the water tank with clean water and close the cap.

4.3.5 Cleaning the compact water spraying system

Protective equipment: ■ Working clothes
■ Safety shoes
■ Protective gloves

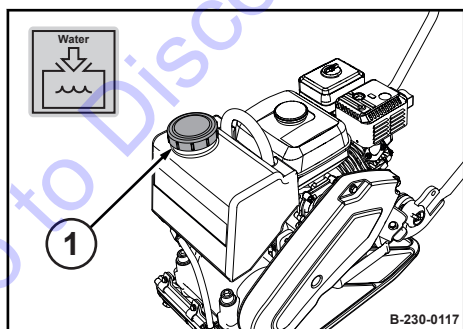


Fig. 101

1. Remove the cap (1).

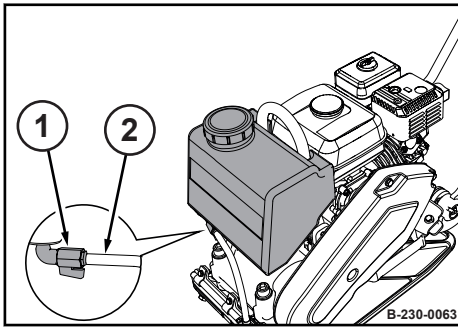


Fig. 102

2. Pull the hose (2) off the shut-off valve.
3. Open the shut-off valve (1) completely and let all water run out.



Alternatively you may also remove the water tank for cleaning.

4. Flush the water tank with a strong water jet, until all dirt has run out.
5. Connect the hose to the shut-off valve.
6. Fill the water tank with clean water and close the cap.

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5.1 Preliminary remarks

Malfunctions are frequently caused by incorrect operation of the machine or insufficient maintenance. Whenever a fault occurs you should therefore thoroughly read these instructions on correct operation and maintenance.

If you cannot locate the cause of a fault or rectify it yourself by following the trouble shooting chart, you should contact our customer service department.

Go to Discount-Equipment.com to order your parts

5.2 Engine malfunctions

Malfunction	Possible cause	Remedy
Engine does not start	Fuel tank empty	Check, fill up if necessary
	Fuel valve closed	Open the fuel valve
	Fuel system clogged	Clean the fuel screen
		Check the fuel screen in the carburettor Have checked by qualified expert personnel
	Set the starter switch to “OFF” position	Set the starter switch to “ON” position
	Engine oil level too low	Check the engine oil level, correct if necessary
	No ignition spark	Clean the spark plug, replace if necessary
	Starter switch defective	Have checked by qualified expert personnel
	No fuel in carburettor	Check the fuel supply
Have checked by qualified expert personnel		
Engine does not crank when operating the recoil starter	Recoil starter defective	Replace the recoil starter
	Spring broken	Replace the recoil starter
Starter rope of recoil starter does not return to initial position	Recoil starter dirty	Clean the recoil starter
	Insufficient pre-tension of the spring	Check the pre-tension of the spring, adjust if necessary
	Spring broken	Replace the recoil starter
Low engine power	Air filter clogged	Clean the air filter, replace if necessary
	Throttle cable defective	Have checked by qualified expert personnel
	Engine defective	Have checked by qualified expert personnel
	Carburettor defective	Have checked by qualified expert personnel
Engine overheats	Lack of cooling air	Clean the air filter, replace if necessary Cleaning the cooling fins and the cooling air intake openings
Engine stops	Fuel system clogged	Clean the fuel screen
		Check the fuel screen in the carburettor Have checked by qualified expert personnel
	Fuel tank empty	Check, fill up if necessary

Troubleshooting – Engine malfunctions

Malfunction	Possible cause	Remedy
	Poor fuel quality	Check the fuel quality, if necessary change the fuel
	Engine oil level too low	Check the engine oil level, correct if necessary
Engine runs with high speed, but no vibration	Centrifugal clutch defective	Have checked by qualified expert personnel
	V-belt broken	Replacing the V-belt

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5.3 Power transmission

Fault	Possible cause	Remedy
Engine runs with high speed, but no vibration	V-belt jumped off	Installing and tensioning the V-belt
	V-belt jumped off and is worn	Replacing the V-belt
Vibration fails during operation Engine runs with high speed	V-belt jumped off	Incorrect operation: The upper carriage of the machine was twisted so much causing the V-belt to jump off. Not pushing the upper carriage too hard to the belt side in working operation Installing and tensioning the V-belt

5.4 What to do if the engine has flooded



DANGER!

Danger to life caused by explosive gas-air mixes!

- Do not allow gasoline to come into contact with hot components.
- Smoking and open fire is prohibited.
- Keep away from heat sources, sparks and other sources of ignition.
- Do not spill any gasoline.

Protective equipment: ■ Working clothes
■ Protective gloves
■ Safety goggles

Special tool: ■ 13/16 inch spark plug spanner

1. Allow the engine to cool down.
2. Close the fuel valve.

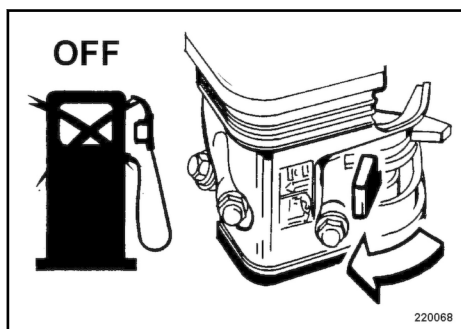


Fig. 103

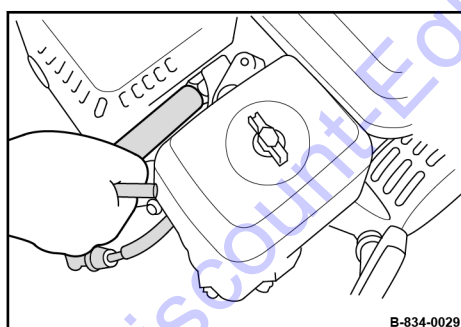


Fig. 104

3. Pull off the spark plug socket.
4. Unscrew the spark plug using a 13/16 inch spark plug spanner.
5. Have a cloth ready to soak up the fuel.

Troubleshooting – What to do if the engine has flooded

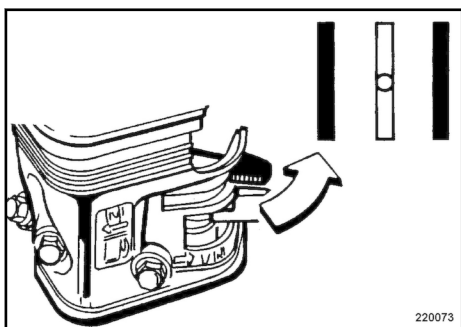


Fig. 105

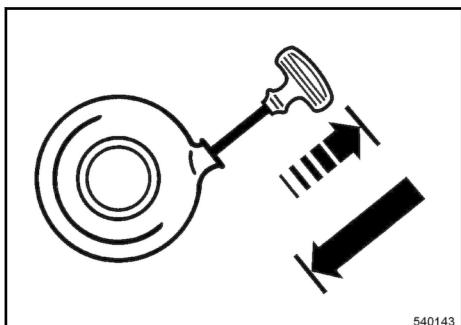


Fig. 106

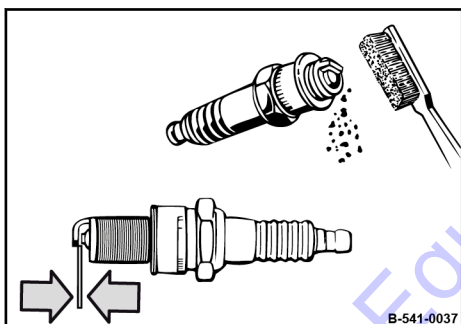


Fig. 107

6. Open the choke.

7.



CAUTION!

Danger of eye injuries caused by particles flying around!

- Wear your personal protective equipment (safety gloves, protective working clothes, goggles).

Crank the engine several times with the recoil starter to remove excessive fuel from the combustion chamber.

8. Dry the spark plug with a clean cloth or blow it dry with compressed air.
9. If necessary, clean the spark plug with a wire brush.
10. In case of excessive combustion residues or burned off electrodes, replace the spark plug.
11. Check the electrode gap of the spark plug with a feeler gauge, if necessary, adjust the gap.
⇒ **Nominal value:** 0.7 - 0.8 mm (0.028 - 0.032 in)
12. Screw the used spark plug carefully in by hand and once the sealing surface of the used spark plug is in contact, tighten it for another 1/8 to 1/4 turn with the spark plug spanner.
13. Once the sealing surface of the new spark plug is in contact, tighten for another 1/2 turn with the spark plug spanner.



NOTICE!

Danger of engine damage caused by a loose spark plug!

- Always screw the spark plug in correctly.

14. Plug the spark plug socket back on.
15. Start the engine.
16. Dispose of the cloth soaked with the leaked fuel in an environmentally friendly way.

Appendix

Go to Discount-Equipment.com to order your parts

PARTS FINDER

**Search Website
by Part Number**



**Search Manual
Library For Parts
Manual & Lookup Part
Numbers – Purchase
or Request Quote**

Search Manuals

Enter your information to help us find the right parts manual for your machine.

* Brand:

* Model:

* Serial:

* Part Number:

SEARCH

**Can't Find Part or
Manual? Request Help
by Manufacturer,
Model & Description**

Parts Order Form

Please fill in the following information to help us find the right part for your machine.

Manufacturer:	<input type="text"/>
Model:	<input type="text"/>
Description:	<input type="text"/>
Part Number:	<input type="text"/>
Quantity:	<input type="text"/>
Notes:	<input type="text"/>

SEARCH

Discount-Equipment.com is your online resource for quality parts & equipment.

Florida: **561-964-4949** Outside Florida TOLL FREE: **877-690-3101**

Need parts?

Click on this link: <http://www.discount-equipment.com/category/5443-parts/> and choose one of the options to help get the right parts and equipment you are looking for. Please have the machine model and serial number available in order to help us get you the correct parts. If you don't find the part on the website or on one of the online manuals, please fill out the request form and one of our experienced staff members will get back to you with a quote for the right part that your machine needs.

We sell worldwide for the brands: Genie, Terex, JLG, MultiQuip, Mikasa, Essick, Whiteman, Mayco, Toro Stone, Diamond Products, Generac Magnum, Airman, Haulotte, Barreto, Power Blanket, Nifty Lift, Atlas Copco, Chicago Pneumatic, Allmand, Miller Curber, Skyjack, Lull, Skytrak, Tsurumi, Husquvarna Target, Stow, Wacker, Sakai, Mi-T-M, Sullair, Basic, Dynapac, MBW, Weber, Bartell, Bennar Newman, Haulotte, Ditch Runner, Menegotti, Morrison, Contec, Buddy, Crown, Edco, Wyco, Bomag, Laymor, EZ Trench, Bil-Jax, F.S. Curtis, Gehl Pavers, Heli, Honda, ICS/PowerGrit, IHI, Partner, Imer, Clipper, MMD, Koshin, Rice, CH&E, General Equipment, Amida, Coleman, NAC, Gradall, Square Shooter, Kent, Stanley, Tamco, Toku, Hatz, Kohler, Robin, Wisconsin, Northrock, Oztec, Toker TK, Rol-Air, APT, Wylie, Ingersoll Rand / Doosan, Innovatech, Con X, Ammann, Mecalac, Makinex, Smith Surface Prep, Small Line, Wanco, Yanmar