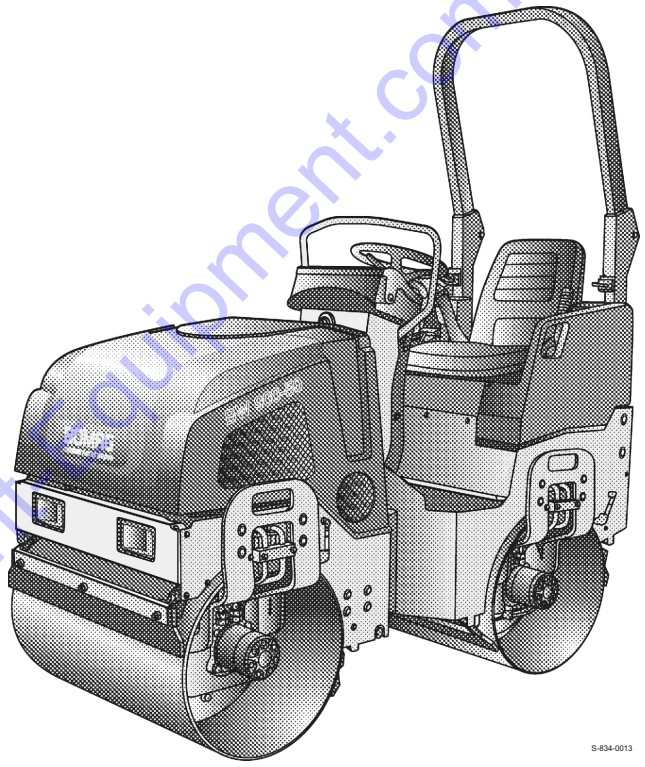
BOMAG

FAYAT GROUP

Service Manual

BW 900-50



S/N 101 834 51 1001> / S/N 861 834 07 2170>

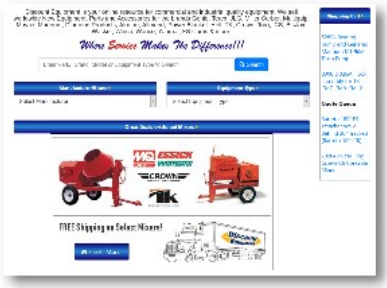
Tandem vibratory roller

008 403 18 EN

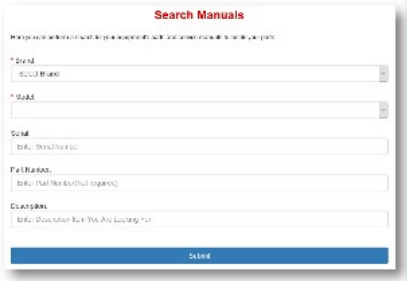
PARTS FINDER

Search Website by Part Number

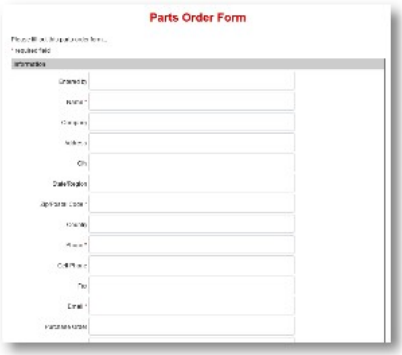
Discount Equipment



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



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



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

Table of contents

Table of contents

1 General information

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 described 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.

Copyright

1.2 Safety regulations

General

This BOMAG 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, this must be confirmed by obtaining the signature of the customer.

Furthermore, the following obviously also applies:

- applicable accident prevention instructions,
- generally accepted safety and road traffic regulations,
- country specific safety regulations. It is the duty of the operator to be acquainted with these instructions and to apply these accordingly. This applies also for local regulations concerning different types of handling work. 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.

Intended use

This machine must only be used for:

- Compaction of bituminous material, e.g. road surface layers,
- light to medium compaction work in earth construction or road sub-bases.

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:

- work with vibration on hard concrete, cured bitumen layers or extremely frozen ground
- cleaning the drums while driving or changing nozzles during travel.
- driving on subsoils with too low load bearing capacity
- driving on slippery subsoils (e.g. ice and snow)
- driving on surfaces of insufficient size (danger of turning over)
- Passing over too high borders (e.g. curbstones, embankments, trenches, potholes)
- unauthorized use of public roads
- Using the machine for towing

transporting persons, except the machine driver, is prohibited.

starting and operation of the machine in explosive environments and in underground mining is prohibited.

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 ion the area of the machine must be informed about the dangers that arise from the operation of the machine.

Regular safety inspections

Have the machine inspected by an expert (capable person) as required for the conditiosn the machine is working under, but at least once every year.

Who is allowed to operate the machine?

Only trained, instructed and authorized persons of at least 18 years of age are permitted to drive and operate this machine. For operation of the machine the responsibilities must be clearly specified and complied with.

Persons under the influence of alcohol, medicine 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.

Changes and conversions 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.

The manufacturer explicitly excludes any liability for damage caused by the use of non-original parts or accessories.

Damage, deficiencies, misuse of safety installations

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.

Notes on safety in the operating and maintenance instructions

WARNING!

Paragraphs marked like this highlight possible dangers for persons.

NOTICE!

Paragraphs marked like this highlight possible dangers for machines or parts of the machine.

Paragraphs marked like this contain technical information for the optimal economical use of the machine.

ENVIRONMENT!

Paragraphs marked like this point out practices for safe and environmental disposal of fuels and lubricants as well as replacement parts.

Observe the regulations for the protection of the environment.

Loading the machine

Check the fastening of the central lifting hook before each use.

Use only stable loading ramps of sufficient load bearing capacity. The ramp inclination must be less than the gradability of the machine.

Secure the machine against tipping or slipping off.

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

Persons are highly endangered if

- they step or stand under loads being lifted
- they remain in the drive range of the machine during an instruction and during loading.

The machine must not swing about when being lifted.

Use only safe lifting gear of sufficient load bearing capacity

Fasten the lifting gear only at the specified lifting points.

Towing the machine

Apply appropriate measures (e.g. with metal wheel chocks, to be provided by the operating company) to secure the machine against rolling away before releasing the parking brake.

Use a tow bar (tobe provided by the operating company).

Use a towing vehicle with sufficient traction and braking power for the unbraked towed load.

The machine cannot be steered.

Tow the machine only after having released the parking brake.

Max. towing speed 1 km/h (0.6 mph), max. towing distance 500 m (0.3 mi).

Checking the Roll Over Protective Structure (ROPS)

The frame of the machine must not be warped, bent or cracked in the area of the ROPS fastening.

The ROPS must not show any rust, damage, hairline cracks or open fractures.

The real machine weight must never exceed the testing weight for the ROPS.

The ROPS must not rattle about when driving. This indicates that it is not properly fastened. All bolted connections must comply with the specifications and should be absolutely tight (observe the tightening torques). Screw and nuts must not be damaged, bent or deformed.

No accessories may be welded or bolted on and no additional holes must be drilled without the consent of the manufacturer, since this will impair the strength of the unit.

The ROPS must therefore also not be straightened or repaired if it is damaged.

A defect ROPS must generally be replaced with an original spare part in close coordination with the manufacturer.

Starting the machine

Before starting

Use only machines which are serviced at regular intervals.

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

Wear your personal protective outfit (hard hat, safety boots, etc.). Wear ear defenders.

Before mounting the machine check whether:

- persons or obstructions are beside or under the machine.
- the machine is free of oily and combustible material.
- all grips, steps and platforms are free of grease, oils, fuel, dirt, snow and ice.
- the engine hood is closed and locked.

Use steps and grips to mount the machine.

Before starting the machine check whether:

- the machine shows any obvious faults.
- all guards and safety elements are in place.
- steering, brakes, control elements, light system and warning horn work correctly.

- the seat is correctly adjusted
- mirrors (if present) are clean and correctly adjusted.

Do not start the machine with defective gauges, control lights or control elements.

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

On machines with roll over protection system you must always wear your seat belt!

Starting

Start and operate the machine only from the driver’s seat.

For starting set all control levers to 'neutral position'.

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

After starting check all display instruments.

Starting with jump wires

Connect plus to plus and minus to minus (ground cable) – always connect the ground strap last and disconnect it first! A wrong connection will cause severe damage in the electric system.

Do not start the engine by shorting the electric terminals on the starter motor, because the machine may start to drive immediately.

Starting and operation of the machine is closed rooms and trenches

Exhaust gases are extremely dangerous! Always ensure an adequate supply of fresh air when starting and operating in closed rooms and trenches!

Driving the machine

Persons in the endangered area

Before starting or resuming work and especially when reversing, check that there are not any persons or obstructions in the endangered area.

If necessary give warning signals. Stop work immediately if persons remain in the danger area despite the warning.

Do not step or stand in the articulation area of the machine when the engine is running. Risk of squashing!

Driving

In events of an emergency operate the emergency stop switch immediately. Do not use the emergency stop switch as a service brake.

Restart the machine only after the danger, that has caused the actuation of the emergency stop, has been eliminated.

If the machine has come in contact with high-voltage power lines:

- do not leave the operator's stand
- warn others from coming too close to the machine or touching it
- if possible drive the machine out of the danger zone
- have the power shut off

Operate the machine only from the operator's seat.

Do not adjust the seat while driving.

Do not climb onto or off the machine while driving.

Change the travel direction only while the machine is standing.

Do not use the machine to transport persons.

Stop the machine if you notice unusual noises or the development of smoke. Investigate the cause and have the fault corrected.

Keep a sufficient distance to excavations and embankments and make sure that your work does not impair the stability of the machine.

Do not work with vibration on hard concrete, on a cured bitumen surface or heavily frozen ground.

When passing under flyovers, bridges, tunnels, electric power lines etc. keep a sufficient distance.

Driving on slopes and gradients

Do not drive up and down gradients, which exceed the max. gradability of the machine.

Always drive extremely carefully on slopes and always straight up and down the slope. Change to the lower speed range before approaching the slope.

Wet and loose soils reduce the ground adhesion of the machine on gradients and slopes. Higher risk of accident!

Behaviour in traffic

Match the speed of the machine to the working conditions.

Always allow loaded transport vehicles to pass.

Switch the lights on when the visibility is poor.

Keep clear of edges and embankments.

Check the effect of vibration

When compacting with vibration check the effect of the vibration on nearby buildings and underground supply lines (gas, water, sewage, electric power supply), stop vibratory compaction if necessary.

Do not activate the vibration on hard (frozen, concrete) ground. Risk of bearing damage!

Parking the machine

Park the machine on horizontal, level, firm ground.

Before leaving the machine:

- return the control lever to neutral position
- apply the parking brake
- shut down the engine, pull off the ignition key

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

Parking on slopes and inclinations

Apply appropriate measures (e.g. with metal wheel chocks, to be provided by the operating company) tp secure the machine against rolling away.

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.

Monitor the entire refuelling process.

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.

Fire protection measures

Familiarise yourself with the location and the operation of fire fighting equipment. Observe all fire reporting and fire fighting possibilities.

Maintenance work

Comply with the maintenance work described in the operating and maintenance instructions, including the information concerning the replacement of parts.

Maintenance work must only be performed by qualified and authorized persons.

For overhead maintenance and assembly work use the access steps and working platforms provided or other secure means. Do not use machine parts as access steps.

Keep unauthorized persons away from the machine.

Do not perform maintenance work while the machine is driving or the engine is running.

Park the machine on horizontal, level, firm ground.

Pull the key out of the ignition switch.

Secure the articulated joint with the articulation lock.

Work on hydraulic lines

Relieve hydraulic pressures before working on hydraulic lines. Hydraulic oil escaping under pressure can penetrate the skin and cause severe injury. When being injured by hydraulic oil consult a medical doctor immediately, as otherwise this may cause severe infections.

Do not step in front of or behind the drums/wheels when performing adjustment work in the hydraulic system.

Do not change the setting of pressure relief valves.

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

Catch running out hydraulic oil and dispose of environmentally.

Always catch and dispose of hydraulic oils separately.

Do not start the engine after draining the hydraulic oil.

Once all work is completed (with the system still depressurized!) check all connections and fittings for leaks.

Changing hydraulic hoses

Hydraulic hoses must be visually inspected at regular intervals.

Hydraulic hoses must be immediately replaced if:

- the outer layer is damaged down to the inlay (e.g. chafing, cuts, cracks)
- the outer layer is brittle (formation of cracks in the hose material)
- the hose shows deformations in pressurized and depressurized condition, which do not comply with the genuine shape of the hydraulic hose
- the hose shows deformations in bends, e.g. squeezing, buckling, layer separation, formation of blisters
- parts of the hose are leaking.
- hoses are not correctly installed.
- the hydraulic hose has separated from the fitting
- the fitting shows corrosion that impairs both function and strength.
- hoses are mixed up by mistake.
- fittings are damaged or deformed, whereby the function and strength of the hose/hose connection is impaired.

Only genuine BOMAG replacement hydraulic hoses ensure that the correct hose type (pressure range) is used at the right location.

Working on the engine

Shut the engine down before opening the engine hood.

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

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

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

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

Working on electric parts of the machine

Before starting to work on electric parts of the machine disconnect the battery and cover it with insulating material.

Do not use fuses with higher ampere ratings and do not repair fuses with a piece of wire. Fire hazard!

Disconnect the battery before starting welding work on the machine.

Working on the battery

When working on the battery do not smoke, do not use open fire!

Do not let acid come in contact with hands or clothes! When injured by acid flush off with clear water and seek medical advice.

Metal objects (e.g. tools, rings, watch straps) must not come in contact with the battery poles – danger of short circuit and burning!

When recharging serviceable batteries remove all plugs, to avoid the accumulation of explosive gases.

Observe the applicable instructions when starting with an auxiliary battery.

Dispose of old batteries according to regulations.

Switch off the charging current before removing the charging clamps.

Ensure sufficient ventilation, especially if the battery is to be charged in a closed room.

Working on the fuel system

Do not inhale any fuel fumes.

Avoid open fire, do not smoke, do not spill any fuel.

Catch running out fuel, do not let it seep into the ground and dispose off environmentally.

Cleaning work

Do not perform cleaning work while the motor is running.

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

When cleaning with steam cleaning equipment do not subject electrical parts and insulation material to the direct jet of water, or cover it beforehand.

- Do not guide the water jet into the exhaust and into the air filter.

After maintenance work

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

Repair

Mark a defective machine by attaching a warning tag to the steering wheel.

Repair work must only be performed by qualified and authorized persons. Use our repair instructions for this work.

Exhaust gases are highly dangerous! Always ensure an adequate supply of fresh air when starting in closed rooms!

Test

The safety of compaction equipment must be checked by a specialist as required in dependence on the application and the operating conditions, however at least once every year.

1.2.1 Signage

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

Replace damaged and illegible stickers or signage immediately.

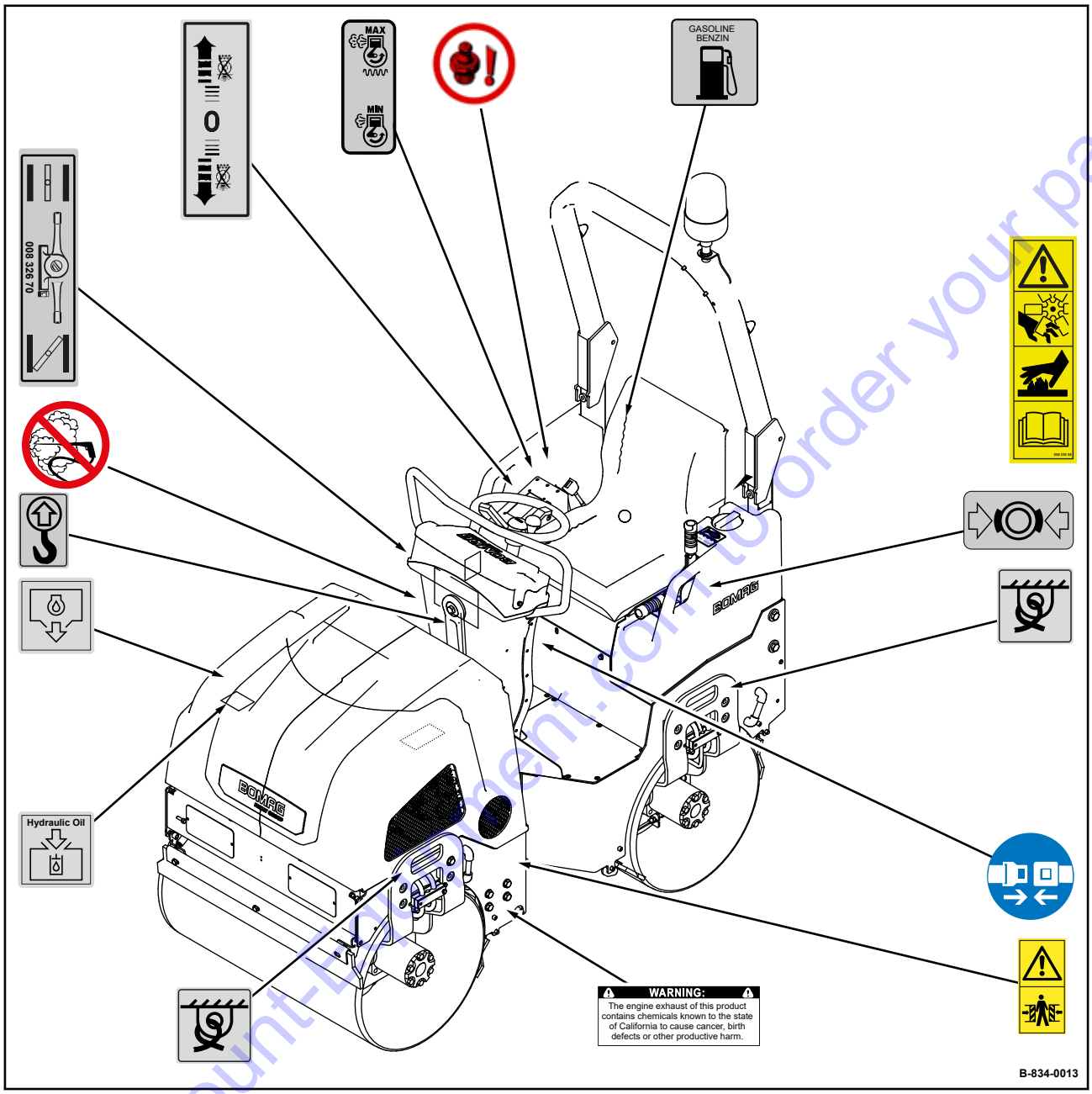
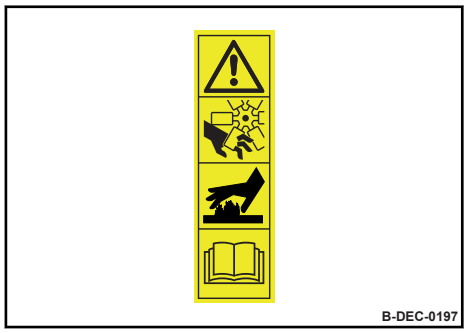


Fig. 1

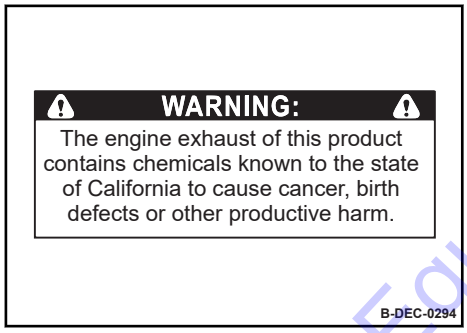


Warning sticker - Danger of being pulled in by cooling fan, and hot surface Follow operating instructions

Fig. 2

Warning sticker - Danger of crushing

Fig. 3

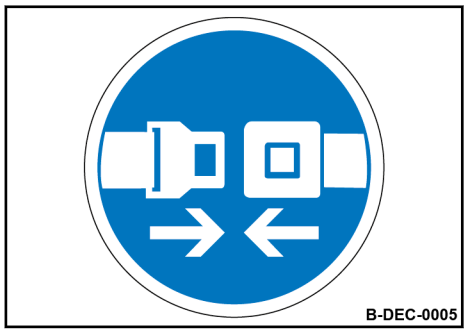


Warning sticker - Warning of engine exhaust gases

Fig. 4

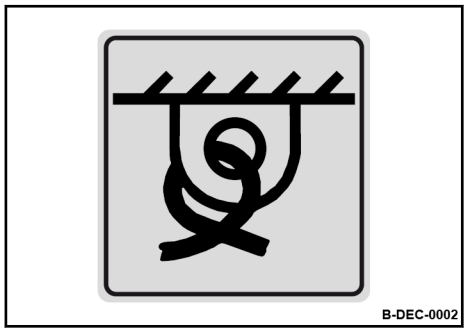
Prohibition sticker - High pressure cleaning

Fig. 5



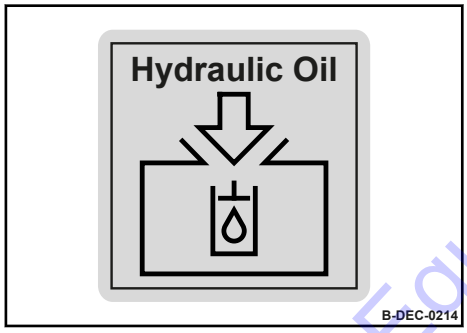
Instruction sticker - Always wear your seat belt

Fig. 6



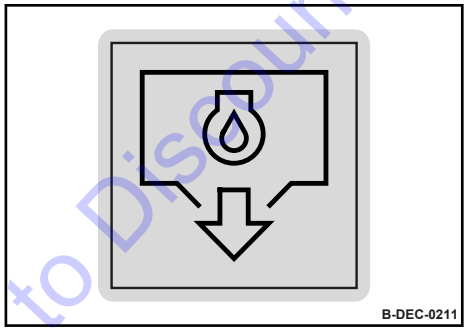
Information sticker - Lashing point

Fig. 7



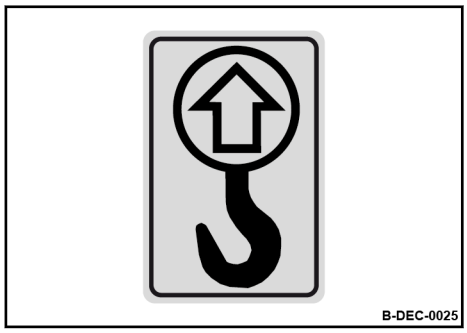
Information sticker - Filler opening for hydraulic oil

Fig. 8



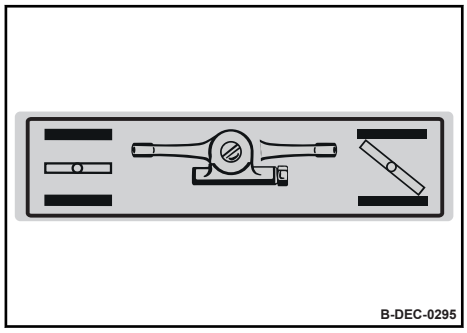
Information sticker - Engine oil drain

Fig. 9



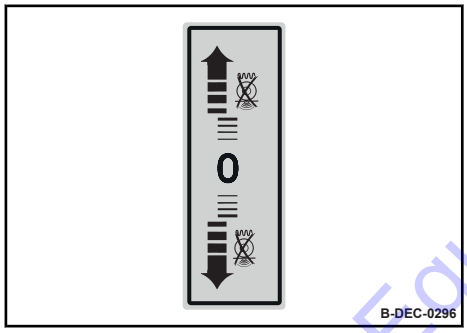
Information sticker - Lifting point

Fig. 10



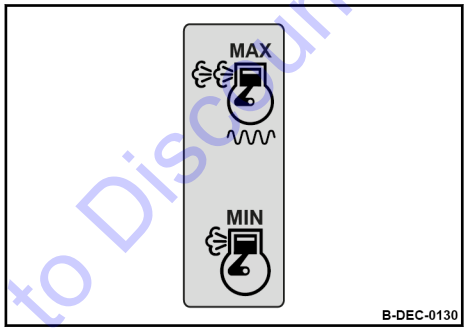
Information sticker - Choke control

Fig. 11



Information sticker - Travel lever control

Fig. 12

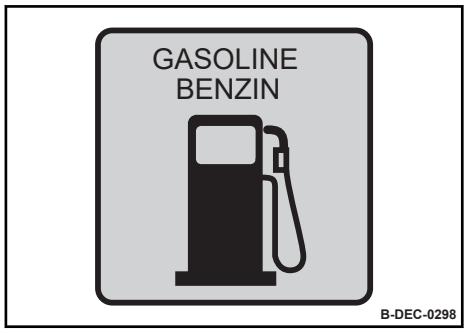


Operation sticker - Throttle lever

Fig. 13

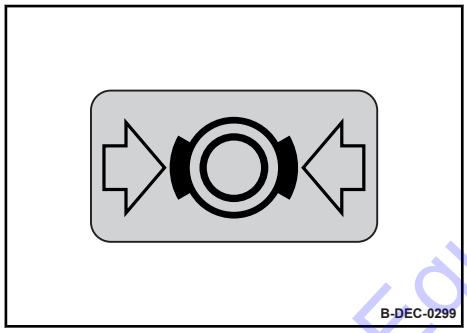
Information sticker - Lubrication nipple

Fig. 14



Information sticker - Gasoline

Fig. 15



Information sticker - Travel lever control

Fig. 16

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 hydraulics

Please note

Cleanliness is of utmost importance. Dirt and other contaminations must strictly be kept out of the system.

- Connections and screw fittings, filler neck covers and their immediate surrounding areas must be cleaned before removal.
- Before loosening hoses, pipe lines etc. relieve all pressure from the system.
- During repair work keep all openings closed with clean plastic plugs and caps.
- Never run pumps, motors and engine without oil or hydraulic oil.
- When cleaning hydraulic components take care not to damage any fine machined surfaces.
- Chemical and rubber dissolving cleansing agents may only be used to clean metal parts. Do not let such substances come in contact with rubber parts.
- Rinse of cleaned parts thoroughly, dry them with compressed air and apply anti-corrosion oil immediately. Do not install parts that show traces of corrosion.
- Avoid the formation of rust on fine machined parts caused by hand sweat.
- Use new O-rings or seal rings for reassembly.
- Use only hydraulic oil as sliding agent when reassembling. Do not use any grease!
- Use only the specified pressure gauges. Risk of damaging the pressure gauges under too high pressure.
- Check the hydraulic oil level before and after the work.
- Use only clean hydraulic oil in strict compliance with the specification in the operating and maintenance instructions to fill the hydraulic system.
- Check the hydraulic system for leaks, if necessary find and rectify the cause.
- Before taking new hydraulic components into operation fill these with hydraulic oil as specified in the operating and maintenance instructions.
- After changing a hydraulic component thoroughly flush, refill and bleed the complete hydraulic system.
- Perform pressure tests at operating temperature of the hydraulic oil (approx. 40 °C).
- After the completion of all tests perform a test run and then check all connections and fittings for leaks with the engine still stopped and the hydraulic system depressurized.

Before commissioning

- Fill the housings of hydraulic pumps and motors with hydraulic oil. Use only hydraulic oils according to the specification in the maintenance instructions.
- After changing a component flush the hydraulic system as described in the flushing instructions.

Taking into operation

- Bleed the hydraulic circuits.
- Start up the hydraulic system without load.
- Check the hydraulic oil level in the tank, if necessary top up with hydraulic oil as specified in the operating and maintenance instructions or drain oil off into a suitable container.

After taking into operation

- Check fittings and flanges for leaks.
- After each repair check all adjustment data, system pressures, rotational speeds and nominal values in the hydraulic system, adjust if necessary.
- Do not adjust pressure relief valves and control valves to values above their specified values.

1.3.1.1.3 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

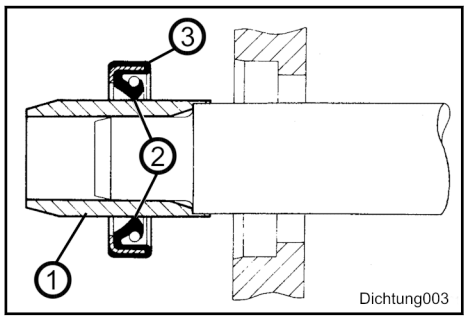


Fig. 17

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

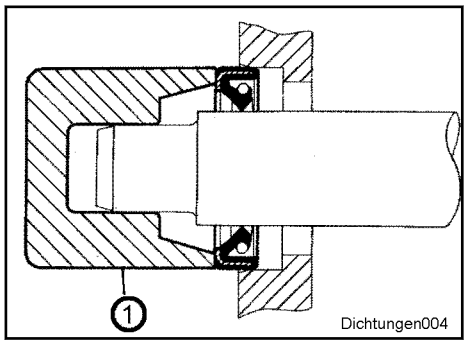


Fig. 18

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.

1.3.1.1.4 Repair notes for ball and roller bearings

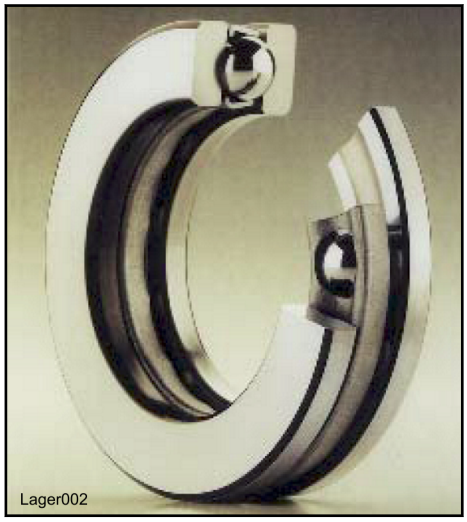


Fig. 19

- 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.

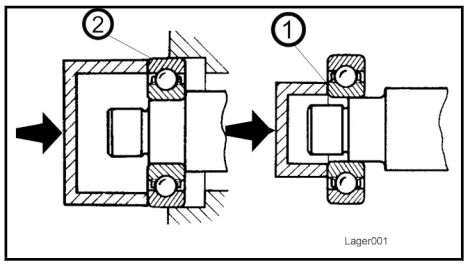


Fig. 20

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).

1.3.1.1.5 Feather keys and keyways

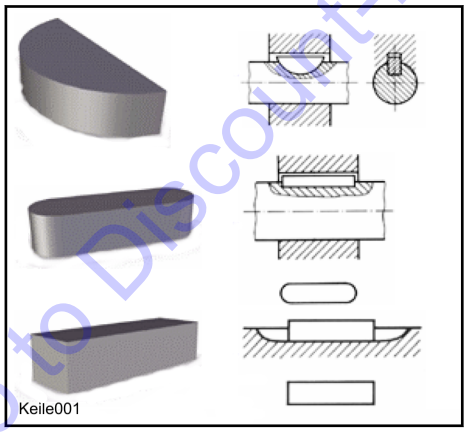


Fig. 21

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.

1.3.1.1.6 Repair notes for cotter pins

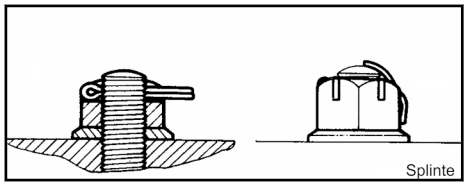


Fig. 22

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.

1.3.1.1.7 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.

1.3.1.1.8 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.

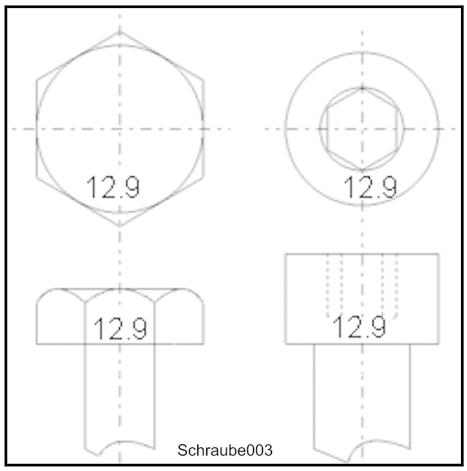


Fig. 23: Identification of screws

Example: A screw is marked with 12.9.

Strength classes of metric nuts

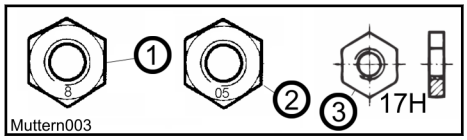


Fig. 24: Identification of nuts

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. 24 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. 24, 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. 25 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).

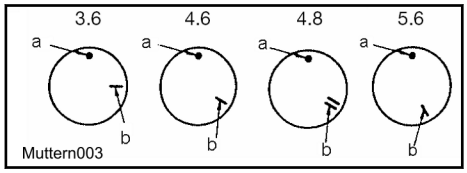


Fig. 25: Identification of nuts in clock system

1.3.1.1.9 Identification of UNF-threads

Identification of UNF-threads

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.

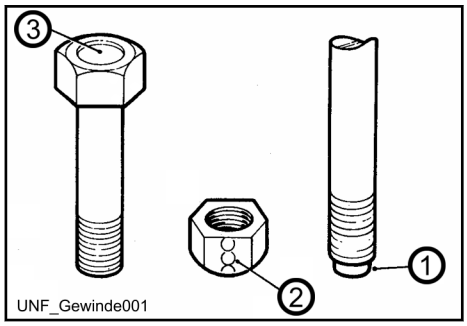


Fig. 26

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
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
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
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

Screw dimension	Tightening torques Nm (Coefficient of friction μ tot. = 0.14)		
	8.8	10.9	12.9
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

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

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 General notes on maintenance

When performing maintenance work always comply with the appropriate safety regulations.

Thorough maintenance of the machine guarantees far longer safe functioning of the machine and prolongs the lifetime of important components. The effort needed for this work is only little compared with the problems that may arise when not observing this rule.

The terms right/left correspond with travel direction forward.

1. Always clean machine and engine thoroughly before starting maintenance work.
2. For maintenance work stand the machine on level ground.
3. Perform maintenance work only with the engine shut down.
4. Relieve hydraulic pressures before working on hydraulic lines.
5. Before working on electric parts of the machine disconnect the battery and cover it with insulation material.
6. When working in the area of the articulated joint attach the articulation lock (transport lock).

ENVIRONMENT!

During maintenance work catch all oils and fuels and do not let them seep into the ground or into the sewage system. Dispose of oils and fuels environmentally.

Keep used filters in a separate waste container and dispose of environmentally.

Catch biodegradable oils separately.

Notes on the fuel system

The lifetime of the engine mainly depends on the purity of the fuel.

1. Keep fuel free of contaminants and water, since this will damage the injection elements of the engine.
2. Drums with inside zinc lining are not suitable to store fuel.

3. Keep used filters in a separate waste container and dispose of environmentally.
4. The fuel drum must rest for a longer period of time before drawing off fuel.
5. Under no circumstances must the drum be rolled to the tapping point just before drawing out fuel.
6. When choosing the storage place for fuel make sure that spilled fuel will not harm the environment.
7. Do not let the hose stir up the slurry at the bottom of the drum.
8. Do not draw off fuel from near the bottom of the drum.
9. The rest in the drum is not suitable for the engine and should only be used for cleaning purposes.

Notes on the performance of the engine

On engines both combustion air and fuel injection quantities are thoroughly adapted to each other and determine power, temperature level and exhaust gas quality of the engine.

If your engine has to work permanently in "thin air" (at higher altitudes) and under full load, you should consult the customer service of BOMAG or the customer service of the engine manufacturer.

Notes on the hydraulic system

During maintenance work on the hydraulic system cleanliness is of major importance. Make sure that no dirt or other contaminating substances can enter into the system. Small particles can produce flutes in valves, cause pumps to seize, clog nozzles and pilot bores, thereby making expensive repairs inevitable.

1. If, during the daily inspection of the oil level the hydraulic oil level is found to have dropped, check all lines, hoses and components for leaks.
2. Seal leaks immediately. If necessary inform the responsible customer service.
3. We recommend to use our filling and filtering unit with fine filter to fill the system. This ensures finest filtration of the hydraulic oil, prolongs the lifetime of the hydraulic oil filter and protects the hydraulic system.
4. Clean fittings, filler covers and the area around such parts before disassembly to avoid entering of dirt.
5. Do not leave the tank opening unnecessarily open, but cover it so that nothing can fall in.

2 Technical data

2.1 Technical data

Dimensions

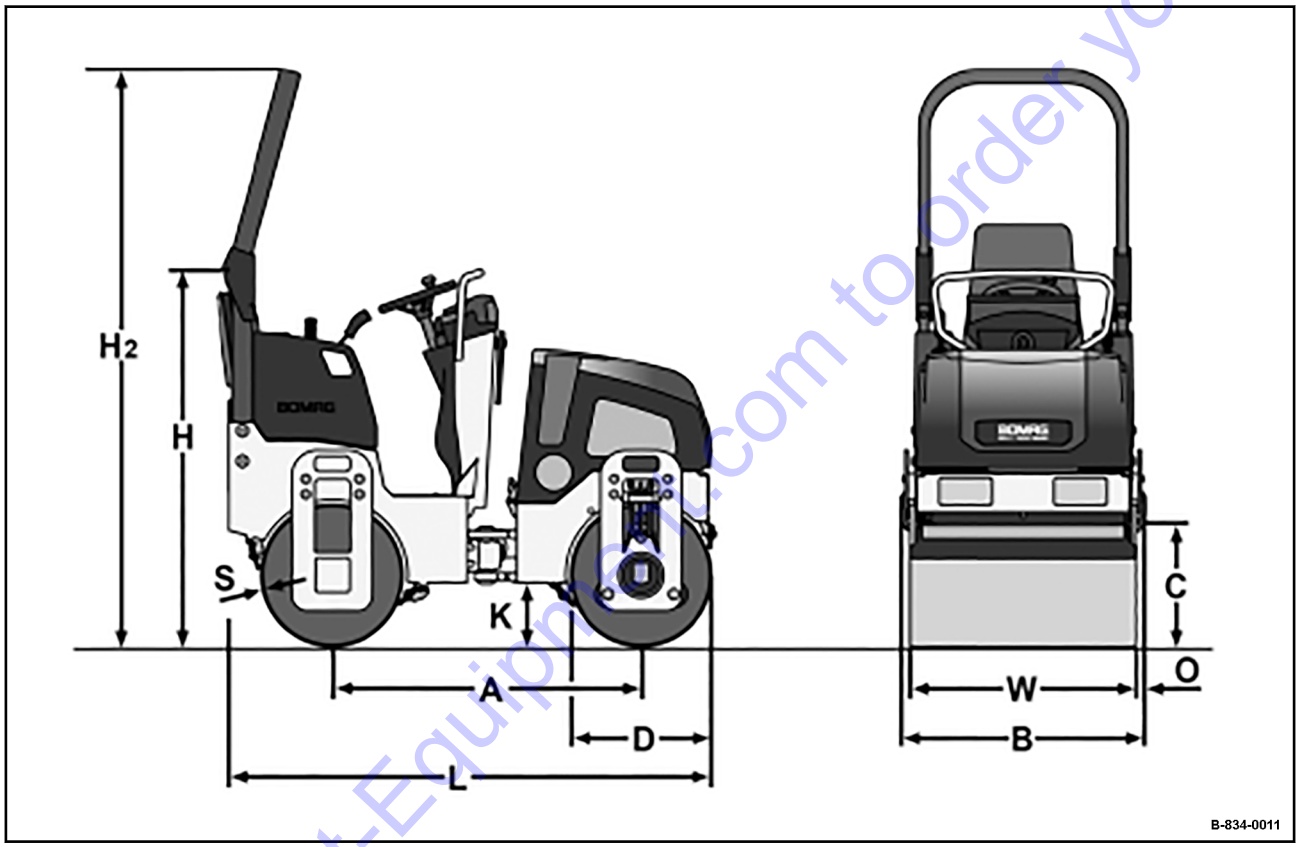


Fig. 27

A	B	C	D	H	H_2	K	L	O	S	W
1223 (48)	961 (38)	450 (18)	560 (22)	1727 (68)	2290 (90)	250 (10)	1967 (86)	31 (1.2)	8 (0.3)	900 (35)

Dimensions in millimetres
(Dimensions in inch)

Weights		
Max. operating weight	1200 (2646)	kg (lbs)
Operating weight (CECE)	1600 (3527)	kg (lbs)
Average static linear load (CECE)	6.7 (37.5)	kg/cm (pli)

Travel characteristics		
Travel speed	0 – 8.7 (0 – 5.4)	km/h (mph)
Working speed with vibration	0 – 4 (0 – 2.5)	km/h (mph)
Max. gradeability without/with vibration (soil dependent)	40/30	%

Drive		
Engine manufacturer	Honda	
Type	GX 630	
Cooling system	Air	
Number of cylinders	2	
Rated power SAE J 1349	14.9	kW
Rated speed	3300	min^{-1}
Driven drum	front + rear	

Electric system		
Voltage	12	V

Brakes		
Service brake	hydrostatic	
Parking brake	hydro-mechanical	

Steering		
Type of steering	Oscill.-articul.	
Steering operation	hydrostatic	

Steering		
Steering angle	+/- 33	°
Oscillation angle	+/- 6	°
Inner track radius	1647 (65)	mm (in)

Exciter system		
Vibrating drum	front	
Drive system	hydrostatic	
Frequency	70 (4200)	Hz (vpm)
Amplitude	0.50 (0.020)	mm (in)
Centrifugal force	15 (3372)	kN (lbf)

Water sprinkler system		
Type of sprinkling	Pressure	

Filling capacities		
Fuel (gasoline)	27 (7)	l (gal us)
Water	137 (36)	l (gal us)

2.2 Additional technical data

Additional engine data		
Engine type		Four-stroke two-cylinder engine with suspended valves
Valve clearance intake		0.0031 in ± 0.0079 in (0.08 ± 0.02 mm)
Valve clearance exhaust		0.0039 in ± 0.0079 in (0.10 ± 0.02 mm)
Spark plug electrode gap	mm	0.7 to 0.8
Low idle speed	min^{-1}	1050 ± 50
High idle speed	min^{-1}	3300
Travel pump		
Type		VO 13
System		Axial piston/swash plate
Max. displacement	cm^3/rev	19
High pressure limitation	bar	300
Charge pressure, high idle	bar	20
Drum drive motor		
Type		TG405
System		Gerotor motor
Displacement	cm^3/rev	405
Perm. leak oil rate	l/min	0.5
Steering / charge / vibration pump		
System		Gear pump
Max. displacement	cm^3/rev	5.5
Starting pressure	bar	220
Operating pressure (soil dependent)	bar	50 to 100
Vibration motor		
System		Gear motor
Displacement	cm^3/rev	4
Perm. leak oil rate	l/min	0.5
Steering valve		

Technical data – Additional technical data

Type		OSPM 80 ON
Manufacturer		Sauer-Danfoss
System		Rotary spool valve

2.3 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	-	■ 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	■ Static weight of the machine, including - 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}	■ 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	■ 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.

2.4 Fuels and lubricants

Engine oil

Quality

The oil is an essential factor for the performance and lifetime of the engine.

Use engine oil for four-stroke engines which meets or even exceeds the requirements for API-service class SJ or higher (or equivalent).

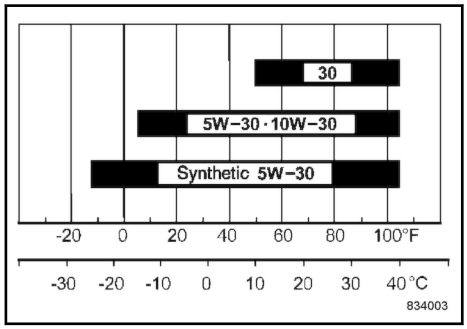


Fig. 28

Viscosity

Since lubrication 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) (see diagram ↳ Fig. 28).

SAE10W-30 or 5W-30 is recommended for general use under any temperature.

For starting/operating temperatures between 14 °F (-10 °C) and -13 °F (-25 °C) you should use a fully synthetic oil 5W-30.

When using single purpose oil you must choose the correct viscosity for the average temperature in the area of use.

Change intervals

The longest permissible time the lubrication oil should remain in an engine is 1/2 year or 100 operating hours.

Fuel

Quality

The engine has been approved for operation with unleaded gasoline with a octane number of 91 or higher (or Pump Octane Number" 86 or higher).

Use only commercially available brand fuel.

You can use unleaded standard grade petrol 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.

Using fuels with higher ethanol or methanol contents exceeding the values specified above may cause starting difficulties and/or performance problems. Damage may also occur to metal, rubber or plastic parts in the fuel system.

Engine damage and performance problems caused by the use of fuels with higher ethanol or methanol percentages than the ones specified above are not covered under warranty.

Mineral oil based hydraulic oil

The hydraulic system is operated with hydraulic oil HV 46 (ISO) with a kinematic viscosity of 46 cSt (46 mm^2/s) at 104 °F (40 °C) and 8 cSt (8 mm^2/s) at 212 °F (100 °C). For topping up or for oil changes use only high-quality hydraulic oil, type HVLP according to DIN 51524, part 3, or hydraulic oils type HV according to ISO 6743/3. The viscosity index (VI) should be at least 150 (observe information of manufacturer).

Lubrication grease

For lubrication purposes use an EP-high pressure grease, lithium saponified (penetration 2), acc. to DIN 51502 KP 2G.

2.5 Table of fuels and lubricants

Assembly	Fuel or lubricant		Quantity
	Summer	**Winter**	**Attention** **Observe the level marks**
motor			
- Engine oil	Engine oil API SJ or higher		approx. 0.5 gal (approx. 1.9 l)
	SAE 5W-30 (-4 °F to +86 °F) (-20 °C to +30 °C)		
	SAE 10W-30 (5 °F to +86 °F) (-15 °C to +30 °C)		
	SAE 30 (+50 °F to +104°F) (+10 °C to +40 °C)	Synthetic SAE 5W-30 (-13 °F to +104°F) (-25 °C to +40 °C)	
- Fuel	Gasoline (unleaded)		approx. 7 gal (approx. 27 l)
Hydraulic system	Hydraulic oil (ISO), HLP 46 or ester based biodegradable hydraulic oil		approx. 5 gal (approx. 19 l)
Sprinkler system	Water	Anti-freeze mixture water Mix water and anti-freeze agent by following the instructions of the manufacturer.	approx. 36 gal (approx. 137 l)
Rear drum bearings	High pressure grease (lithium saponified)		as required

3 Overview of machine

3.1 General information

Fig. 29

Areas of application: Earthwork and asphalt construction.

New build and repair work in medium to small construction projects, car parks, pavements and paths, bicycle lanes, playgrounds and sports grounds, as well as finishing work in road construction.

3.2 Electric systems

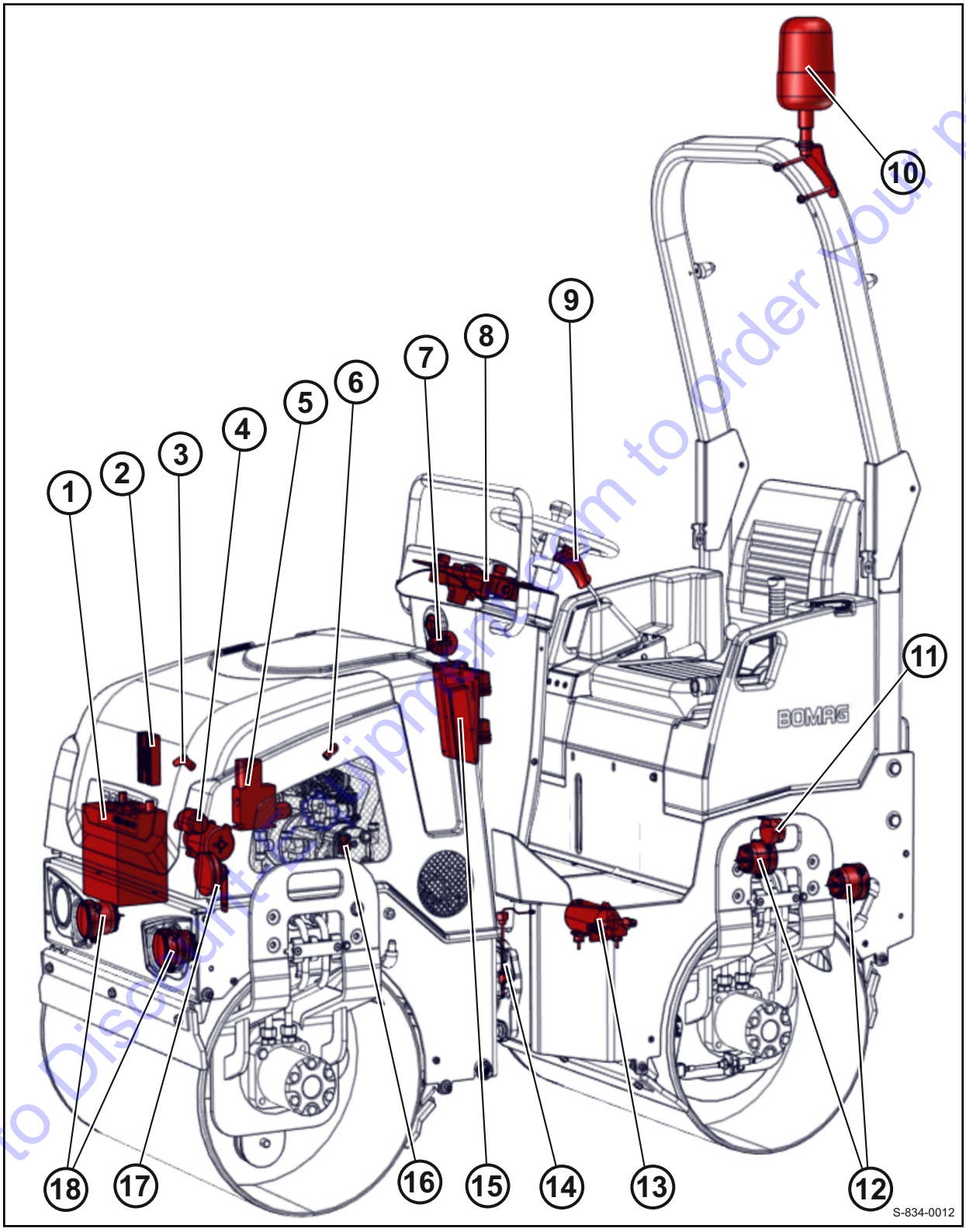


Fig. 30

1 Battery (G01) and fuse for charge regulator (F148)

2 Charge regulator (A61)
3 Spark plug, right (A62)
4 Starter (M01)
5 Vibration valve (Y22)
6 Spark plug, left (A63)
7 Starter switch (S00)
8 Operating console
9 Push button for vibration (S13)
10 Flashing beacon (E32)
11 Warning buzzer for reverse travel (H14)
12 Working head lights, rear (E27 and E28)
13 Spraying pump (M02)
14 Float switch for fuel (B201)
15 Central electrics
16 Proximity switch, reversing monitoring (B32)
17 Warning horn (B11)
18 Working head lights, front (E24 and E26)

3.3 Hydraulic system

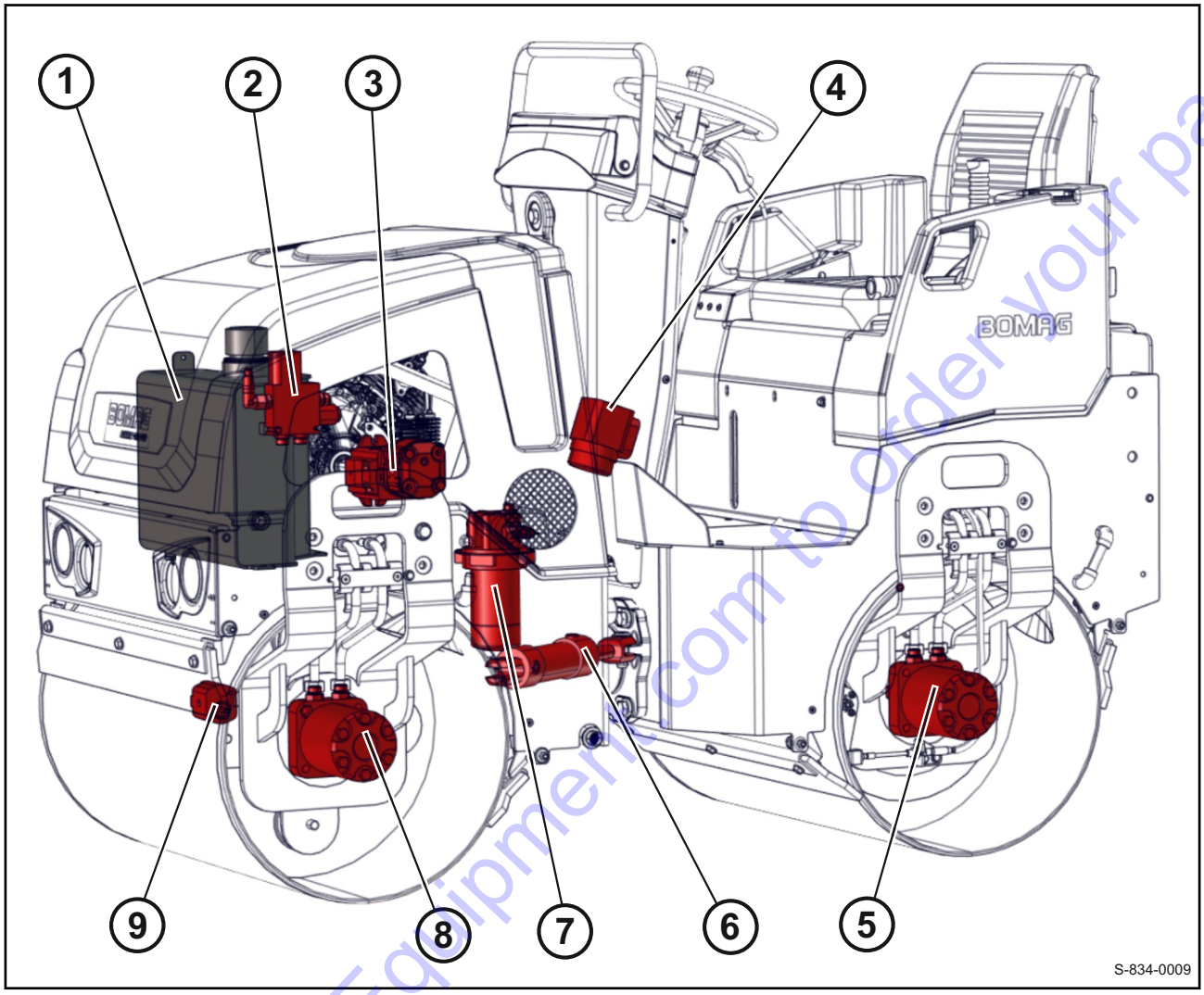


Fig. 31

1 Hydraulic oil tank
2 Vibration valve (Y22)
3 Pump unit, travel pump with steering / charge / vibration pump
4 Steering valve
5 Rear drum drive motor
6 Steering cylinder
7 Charge circuit filter
8 Front drum drive motor
9 Vibration motor

3.4 Machine assemblies

3.4.1 Engine

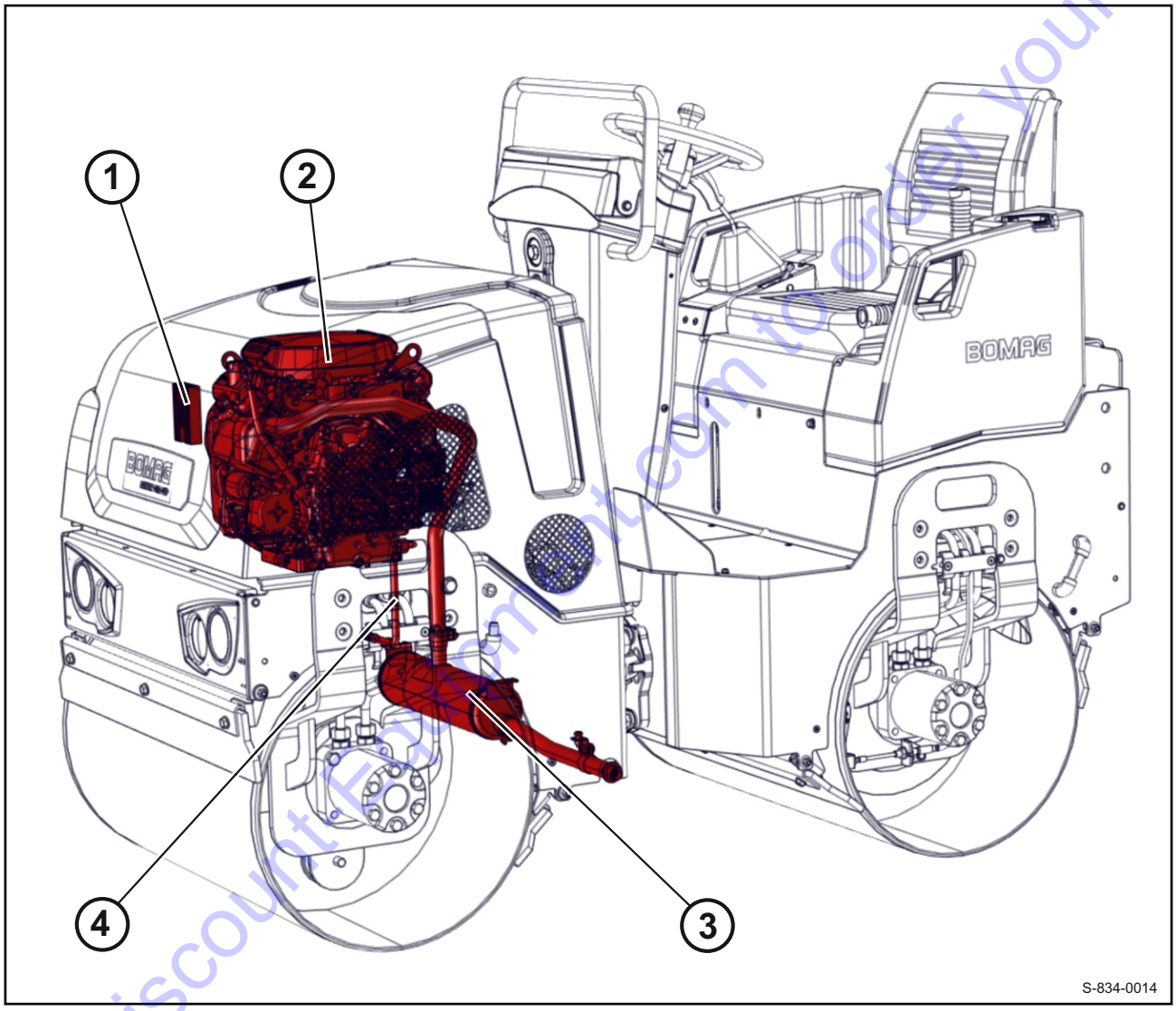


Fig. 32

1 Charge regulator (A61)
2 Engine
3 Exhaust system
4 Oil drain hose

3.4.2 Oscillating articulated joint

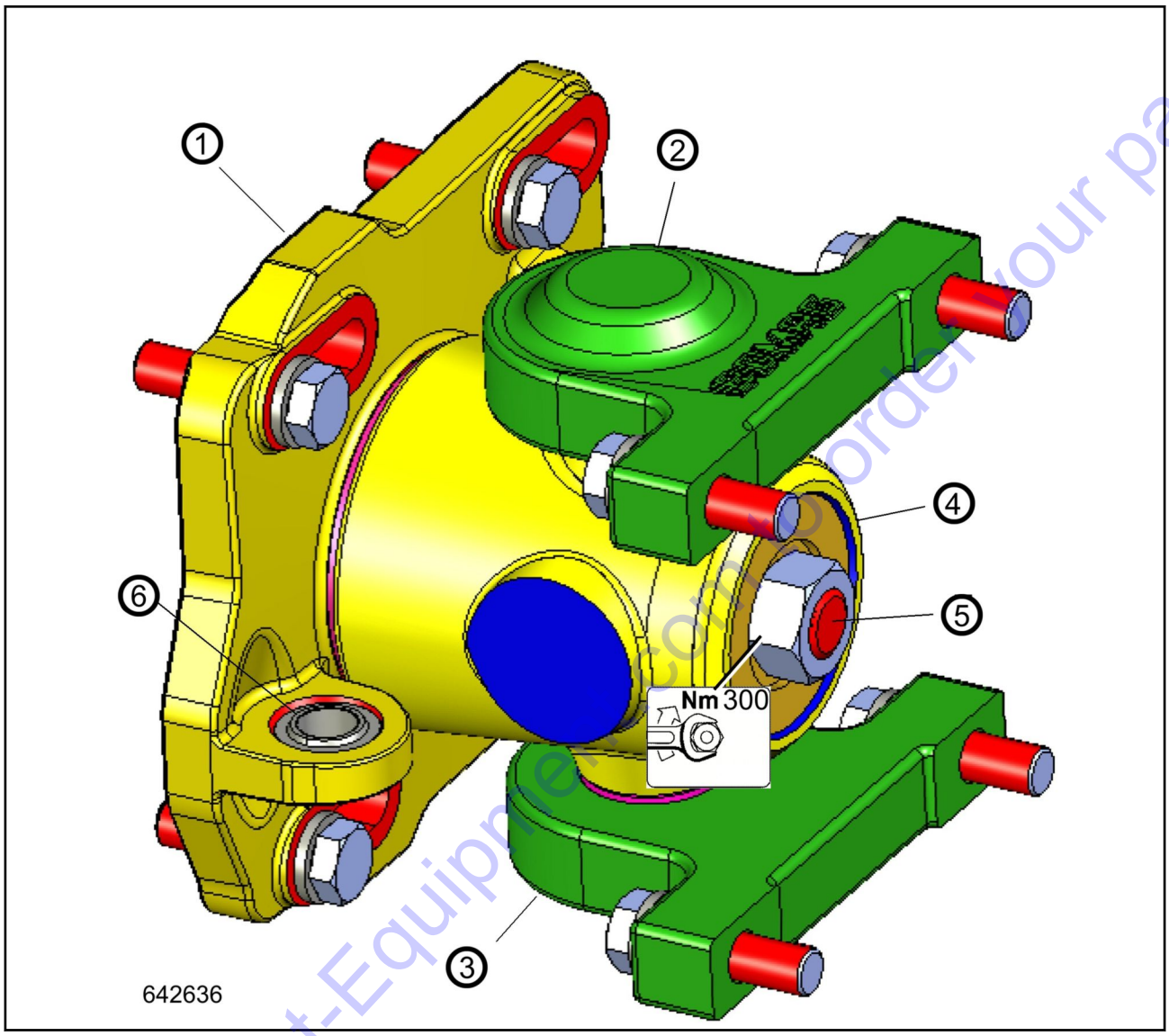


Fig. 33

1 Housing
2 Bearing block, top
3 Bearing block, bottom
4 Bearing housing
5 Bearing journal
6 Rocker bearings for steering cylinder

When tightening the bearing housing (4) move the bearing housing slightly to and fro to ensure a uniform wear pattern of the individual bearing rollers.

Oscillating articulated joints are used to establish a moveable connection between the rear and front frames of agricultural and construction equipment. The machine can be steered around the vertical axis by means of an articulated movement; the rear frame can oscillate on the horizontal axis. The advantage of the oscillating articulated joint is the fact that front and rear frame move in the same track.

The oscillation compensates for uneven surfaces and creates an even drum pressure. Both the pivot point of the oscillating joint, which was purposely designed to be low, as well as the low centre of gravity of the machine ensure good stability.

3.4.3 Drums

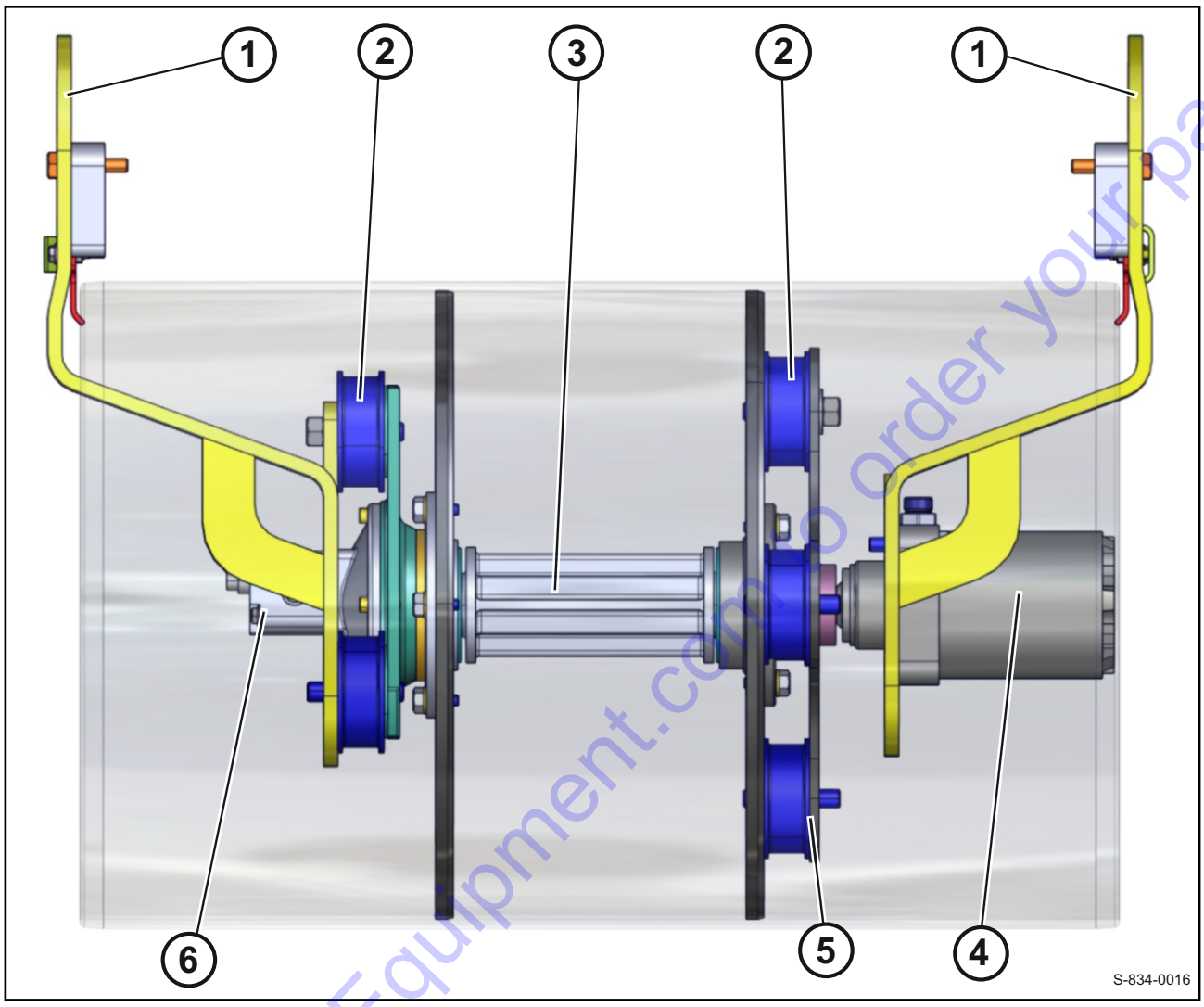


Fig. 34: Vibratory drum, front

1 Support legs
2 Rubber buffer
3 Exciter shaft
4 Travel motor
5 Drive disc
6 Vibration motor

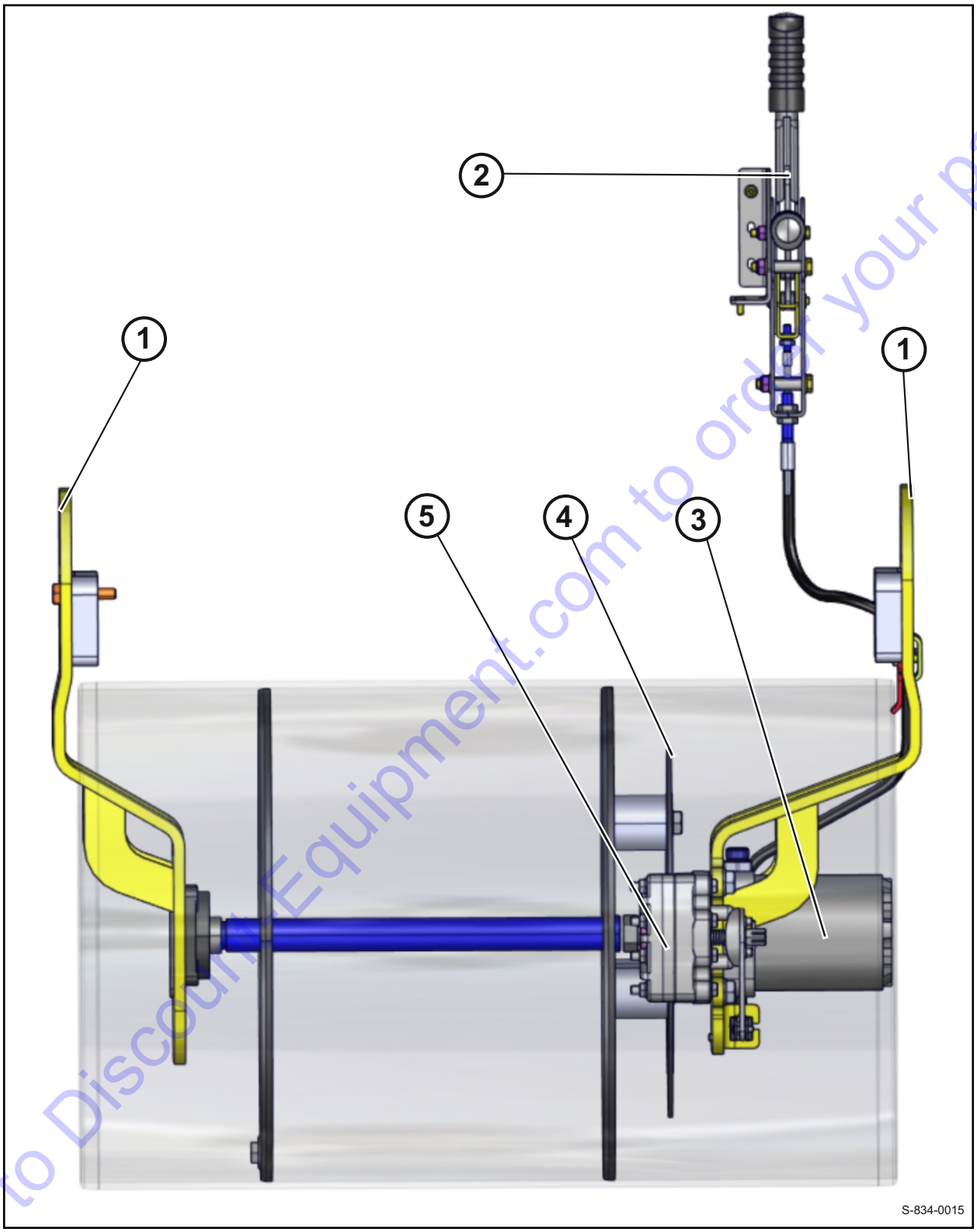


Fig. 35: Rear drum

1 Support legs
2 Brake operation

3 Travel motor
4 Drive disc
5 Parking brake

4 Electric systems

4.1 Basic principles

4.1.1 Measuring technology

Test lamp

Fig. 36: Test lamp

NOTICE!

This type of tester must not be used for testing on electronic components. The high power consumption of the test lamp may destroy electronic components in the control units.

Voltage tester

Fig. 37: Voltage tester

It is used to perform simple voltage measurements. The tester consists of two probes. The negative measuring line is connected to ground; the positive measuring line is connected to the relevant measuring point.

When voltage is applied, the corresponding LED lights up.

Multimeter

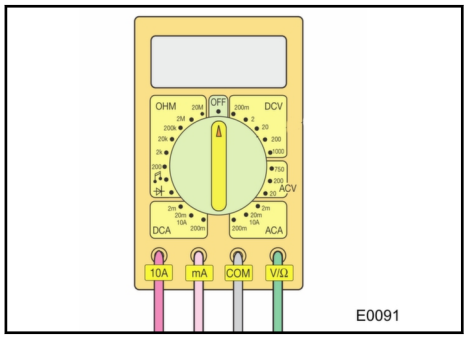


Fig. 38: Multimeter

This tester is a multimeter and can be used to measure e.g. current, voltage and resistance. Furthermore, depending on the design you must carry out transistor and frequency tests.

In order to avoid damage:

- the range selector switch must be correctly set for the corresponding measurement.
- the test cable must be plugged into the correct socket.
- the voltage type (AC/DC) must be set.
- In case of direct voltage the correct polarity must be assured.
- the measuring range should be chosen higher at the beginning of the test.
- In order to avoid any influence on the circuitry to be measured, the internal resistance of the voltage tester should be as high as possible.

Resistance and continuity measurement with multimeter

The continuity tester of the multimeter can be used to measure whether there is a connection between 2 measuring points.

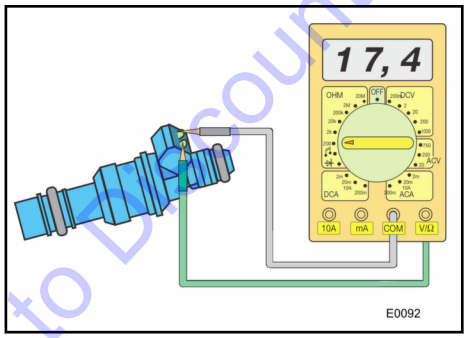


Fig. 39

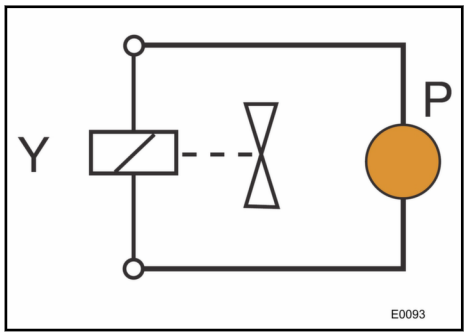


Fig. 40

The following information should be observed when measuring resistance and continuity:

- The component to be measured must not be connected to the power supply during the measurement.
- At least one side of the component to be measured must be disconnected from the circuitry, as otherwise the measuring result may be influenced by parallel components.
- Polarity is of no significance.

Voltage and voltage drop measurement with multimeter

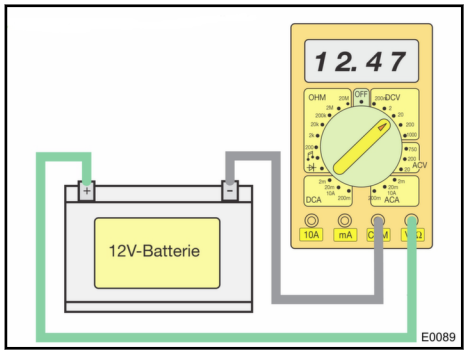


Fig. 41: Measuring voltage

- Measurement at the voltage source measures the currently available voltage.
- The meter is always connected parallel to consumer, component or power source.

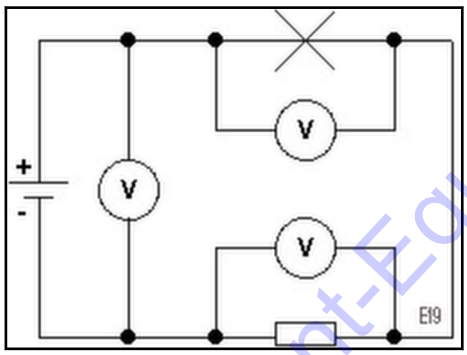


Fig. 42: Voltage measurement

- A measurement at the consumer measures the voltage drop at this component.

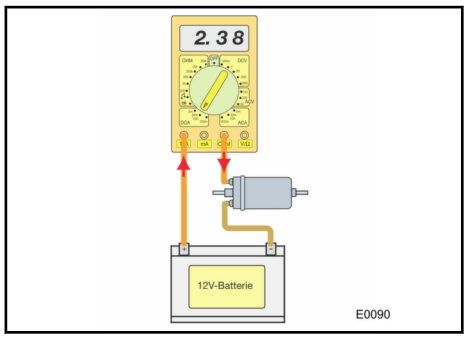


Fig. 43: Measuring current

Current measurement with the multimeter

- The meter is connected in series with the consumer.
- During the measurement the current must be able to flow through the meter, i.e. the electric circuit must be opened.

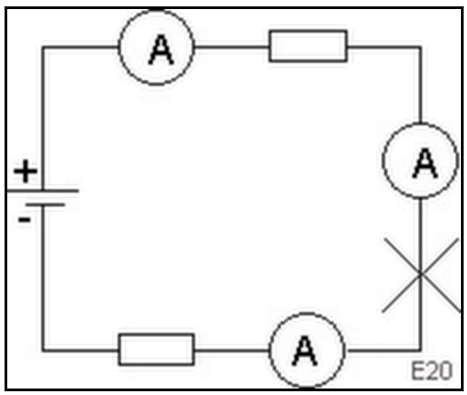


Fig. 44: Current measurement

Advice

If the electric circuit is difficult to access and the internal resistance of the consumer is known, the voltage may also be measured at the consumer.

The current value can then be calculated with the help of Ohm's law.

Clip-on measuring instrument

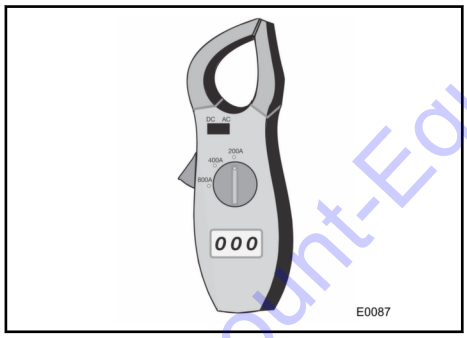


Fig. 45: Clip-on measuring instrument

The clip-on measuring instrument can be used to measure current, voltage and resistance.

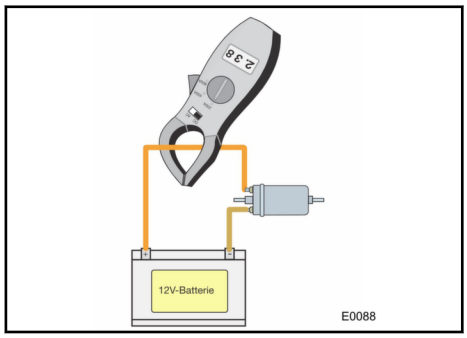


Fig. 46

- For measuring current the individual conductor must be fully enclosed by the measuring tongs, the actual measurement takes place without contact.

Magnet tester

Fig. 47: Magnet tester

The magnet tester is used to test solenoid valves and magnetic coils.

The test lamp responds to the magnetic fields of A.C-voltage, D.C.-voltage and permanent magnets.

- The component to be tested does not need to be removed.
- The magnetic coil can also be tested under a protective cap.

Power measurement

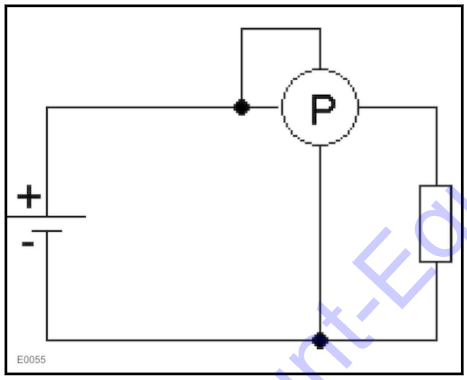


Fig. 48

The electric power of a module within a circuit can be indirectly determined (calculated) by separate measuring of current and voltage.

However, there are also pure power meters with 4 connections available. The power meter has a electro-dynamic measuring mechanism. The current circuit must be opened for measuring. Take care when performing power measurements: Voltage or current path may already be overloaded during the measurement, even though the end stop in the meter has not yet been reached.

4.1.2 Understanding circuit diagrams

4.1.2.1 Circuit diagrams

Circuit diagrams provide information on the logical, electrical functions of BOMAG machines and currently do not provide any information on how and in which order electrical components are wired together, even if some directional wiring symbols are occasionally used.

Wiring information is currently defined exclusively in the corresponding wiring drawings or wiring loom drawings.

A circuit diagram is indispensable for effective and systematic trouble shooting in the vehicle wiring system. This diagram provides the following information:

- Number and type of individual elements in the examined electric circuit, such as plug connectors, fuses, switches, consumers, relays, etc.
- The sequence in which current flows through the individual elements in the electric circuit.
- Connections between the examined electric circuit and other circuits in the vehicle wiring system.
- Pin assignment of plug-in connections.

Structure of circuit diagram

The circuit diagram consists of following individual parts:

- Cover sheet (with general information) *'Cover sheet' on page 69*
- Table of contents *'Table of contents' on page 70*
- Overview of structural symbols (only if the structural view is used) *'Overview of structural symbols' on page 70*
- Overview of installation locations (only if the structural view is used) *'Overview of installation locations' on page 71*
- Electric circuit documents for electrical engineering (functional diagrams) *'Functional diagrams' on page 72*
- List of components for electrical engineering (without terminals and plugs) *'List of components' on page 73*
- Overview of terminal strips (form type: terminal diagram) *'Overview of terminal strips' on page 74*
- Overview of pins (form type: PLC diagram) *'Overview of pins' on page 75*
- Overview of plugs (form type: plug diagram) *'Overview of plugs' on page 75*
- Additional graphical information (e.g. CAN structure, overview of central electrics and control boxes).

Cover sheet

The cover sheet contains general information.

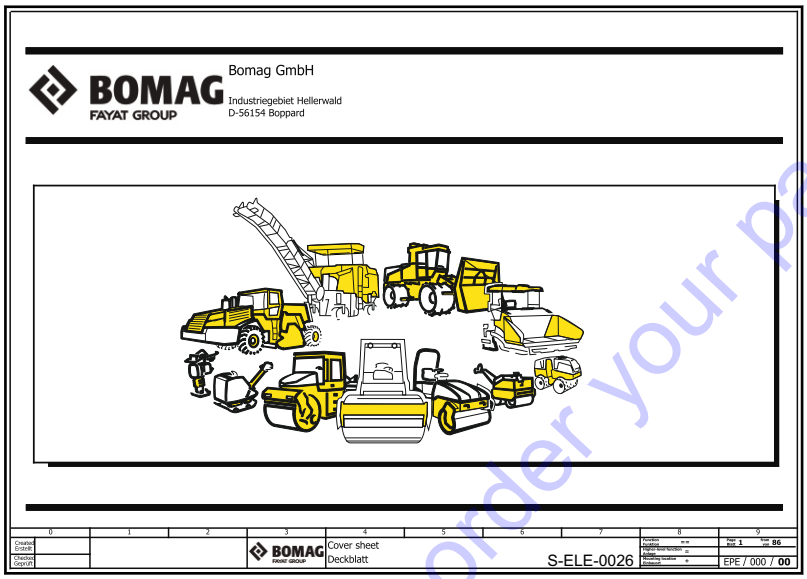


Fig. 49: Cover sheet

Table of contents

The table of contents lists the individual functions.

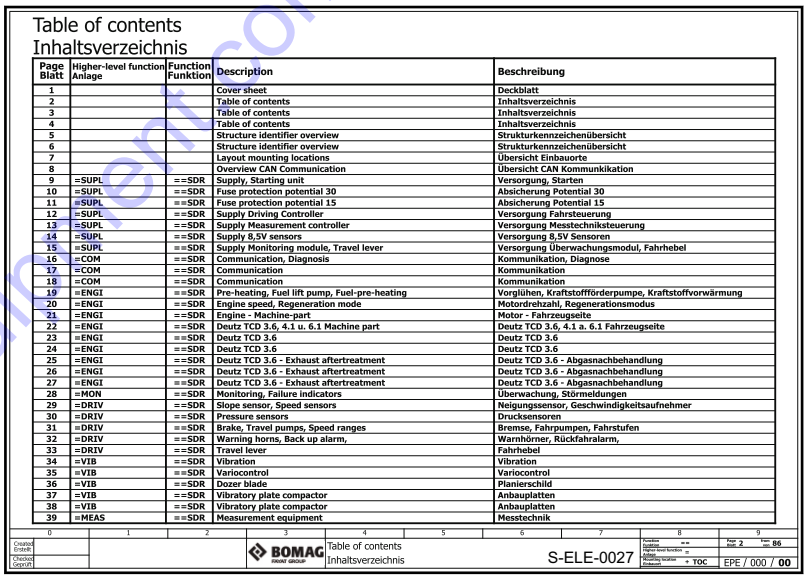


Table of contents
Inhaltsverzeichnis

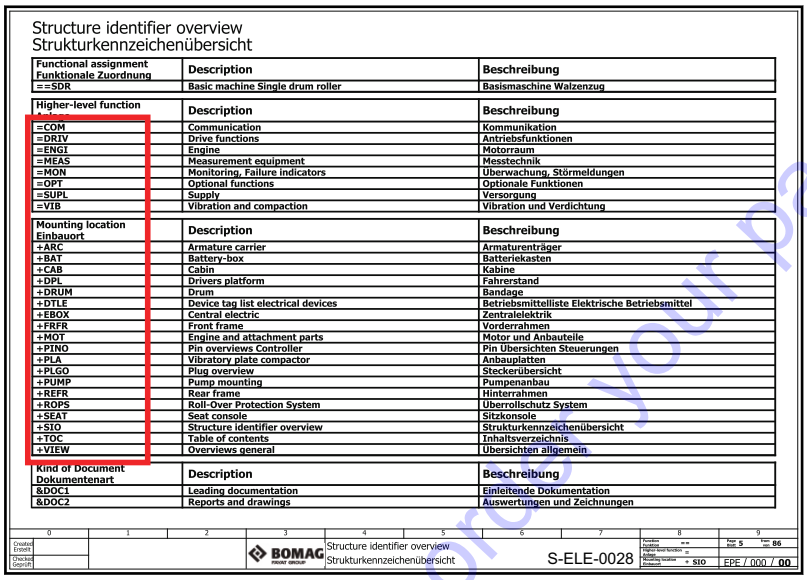
Page Blatt	Higher-level function Anlage	Function Funktion	Description	Beschreibung
1			Cover sheet	Deckblatt
2			Table of contents	Inhaltsverzeichnis
3			Table of contents	Inhaltsverzeichnis
4			Table of contents	Inhaltsverzeichnis
5			Structure identifier overview	Strukturkennzeichenübersicht
6			Structure identifier overview	Strukturkennzeichenübersicht
7			Layout mounting locations	Übersicht Einbauorte
8			Overview CAN Communication	Übersicht CAN Kommunkikation
9	=SUPL	==SDR	Supply, Starting unit	Versorgung, Starten
10	=SUPL	==SDR	Fuse protection potential 30	Absicherung Potential 30
11	=SUPL	==SDR	Fuse protection potential 15	Absicherung Potential 15
12	=SUPL	==SDR	Supply Driving Controller	Versorgung Fahrsteuerung
13	=SUPL	==SDR	Supply Measurement controller	Versorgung Messtechniksteuerung
14	=SUPL	==SDR	Supply 8,5V sensors	Versorgung 8,5V Sensoren
15	=SUPL	==SDR	Supply Monitoring module, Travel lever	Versorgung Überwachungsmodul, Fahrhebel
16	=COM	==SDR	Communication, Diagnosis	Kommunikation, Diagnose
17	=COM	==SDR	Communication	Kommunikation
18	=COM	==SDR	Communication	Kommunikation
19	=ENGI	==SDR	Pre-heating, Fuel lift pump, Fuel-pre-heating	Vorglühen, Kraftstofförderpumpe, Kraftstoffvorwärmung
20	=ENGI	==SDR	Engine speed, Regeneration mode	Motordrehzahl, Regenerationsmodus
21	=ENGI	==SDR	Engine - Machine-part	Motor - Fahrzeugseite
22	=ENGI	==SDR	Deutz TCD 3.6, 4.1 u. 6.1 Machine part	Deutz TCD 3.6, 4.1 a. 6.1 Fahrzeugseite
23	=ENGI	==SDR	Deutz TCD 3.6	Deutz TCD 3.6
24	=ENGI	==SDR	Deutz TCD 3.6	Deutz TCD 3.6
25	=ENGI	==SDR	Deutz TCD 3.6 - Exhaust aftertreatment	Deutz TCD 3.6 - Abgasnachbehandlung
26	=ENGI	==SDR	Deutz TCD 3.6 - Exhaust aftertreatment	Deutz TCD 3.6 - Abgasnachbehandlung
27	=ENGI	==SDR	Deutz TCD 3.6 - Exhaust aftertreatment	Deutz TCD 3.6 - Abgasnachbehandlung
28	=MON	==SDR	Monitoring, Failure indicators	Überwachung, Störmeldungen
29	=DRIV	==SDR	Slope sensor, Speed sensors	Neigungssensor, Geschwindigkeitsaufnehmer
30	=DRIV	==SDR	Pressure sensors	Drucksensoren
31	=DRIV	==SDR	Brake, Travel pumps, Speed ranges	Bremse, Fahrpumpen, Fahrstufen
32	=DRIV	==SDR	Warning horns, Back up alarm,	Warnhörner, Rückfahralarm,
33	=DRIV	==SDR	Travel lever	Fahrhebel
34	=VIB	==SDR	Vibration	Vibration
35	=VIB	==SDR	Variocontrol	Variocontrol
36	=VIB	==SDR	Dozer blade	Planierschild
37	=VIB	==SDR	Vibratory plate compactor	Anbauplatten
38	=VIB	==SDR	Vibratory plate compactor	Anbauplatten
39	=MEAS	==SDR	Measurement equipment	Messtechnik

Fig. 50: Table of contents

Overview of structural symbols

Overview of structural symbols (only if the structural view is used).

The overview of structural symbols represents the structure of the machine with respect to equipment, functions and installation locations as a summary. Structural symbols are mainly abbreviations for machine parts/machines, functions and installation locations, which were derived from designations in English.



Structure identifier overview
Strukturkennzeichenübersicht

Functional assignment Funktionale Zuordnung	Description	Beschreibung
==SDR	Basic machine Single drum roller	Basismaschine Walzenzug

Higher-level function	Description	Beschreibung
=COM	Communication	Kommunikation
=DRIV	Drive functions	Antriebsfunktionen
=ENGI	Engine	Motorraum
=MEAS	Measurement equipment	Messtechnik
=MON	Monitoring, Failure indicators	Überwachung, Störmeldungen
=OPT	Optional functions	Optionale Funktionen
=SUPL	Supply	Versorgung
=VIB	Vibration and compaction	Vibration und Verdichtung

Mounting location Einbauort	Description	Beschreibung
+ARC	Armature carrier	Armaturenträger
+BAT	Battery-box	Batteriekasten
+CAB	Cabin	Kabine
+DPL	Drivers platform	Fahrerstand
+DRUM	Drum	Bandage
+DTLE	Device tag list electrical devices	Betriebsmittelliste Elektrische Betriebsmittel
+EBOX	Central electric	Zentralelektrik
+FRFR	Front frame	Vorderrahmen
+MOT	Engine and attachment parts	Motor und Anbauteile
+PINO	Pin overviews Controller	Pin Übersichten Steuerungen
+PLA	Vibratory plate compactor	Anbauplatten
+PLGO	Plug overview	Steckerübersicht
+PUMP	Pump mounting	Pumpenanbau
+REFR	Rear frame	Hinterrahmen
+ROPS	Roll-Over Protection System	Überrollschutz System
+SEAT	Seat console	Sitzkonsole
+SIO	Structure identifier overview	Strukturkennzeichenübersicht
+TOC	Table of contents	Inhaltsverzeichnis
+VIEW	Overviews general	Übersichten allgemein

Kind of Document Dokumentenart	Description	Beschreibung
&DOC1	Leading documentation	Einleitende Dokumentation
&DOC2	Reports and drawings	Auswertungen und Zeichnungen

BOMAG
Structure identifier overview
Strukturkennzeichenübersicht
S-ELE-0028
+SIO
EPE / 000 / 00

Fig. 51: Overview of structural symbols

+BAT Battery box
+EBOX Electrics box
+MOT Engine and attachment parts
+SEAT Driver's seat
+FRFR Front frame
+REFR Rear frame
+CONV Conveyor belt
+MIBO Milling box
+PUMP Pump module
+DRUM Drum
+DPL Driver's stand
+ARC Dashboard
+ROPS Roll over protection structure
+ROOF Weather protection roof
+PLA Attachment plates
+HOOD Rotor hood
+CAB Cabin and attachment parts
+SPR Spraying module
+PUM Pump module
+RWT Reaction water tank
+FRA Frame
+LBOX Side-mounted driver's stand, left
+RBOX Side-mounted driver's stand, right
+SBOX Screed driver's stand
+SCRD Screed
+ROOF Roof structure

Overview of installation locations

Overview of installation locations (only if the structural view is used).

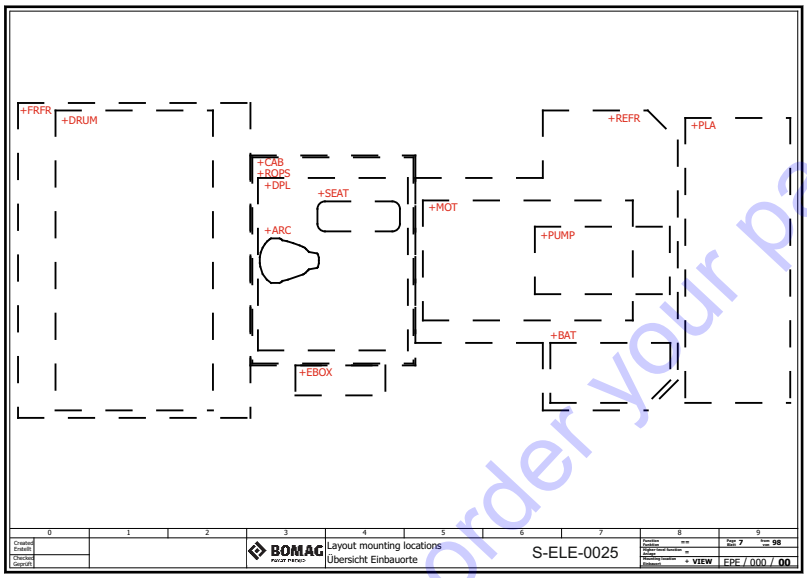


Fig. 52: Installation locations with structural symbols

Overview of structural symbols ↳ Fig. 51

Functional diagrams

- The main reading direction is sheet by sheet, from top to bottom and from left to right.
- All sheets are numbered successively.
- BOMAG uses the resolved type of representation. In this case parts and components with different functions, which belong to the same components (e.g. relay coil and relay contact), can be represented on different sheets. Cross-references, which refer to the sheet and current path, connect these partial components.

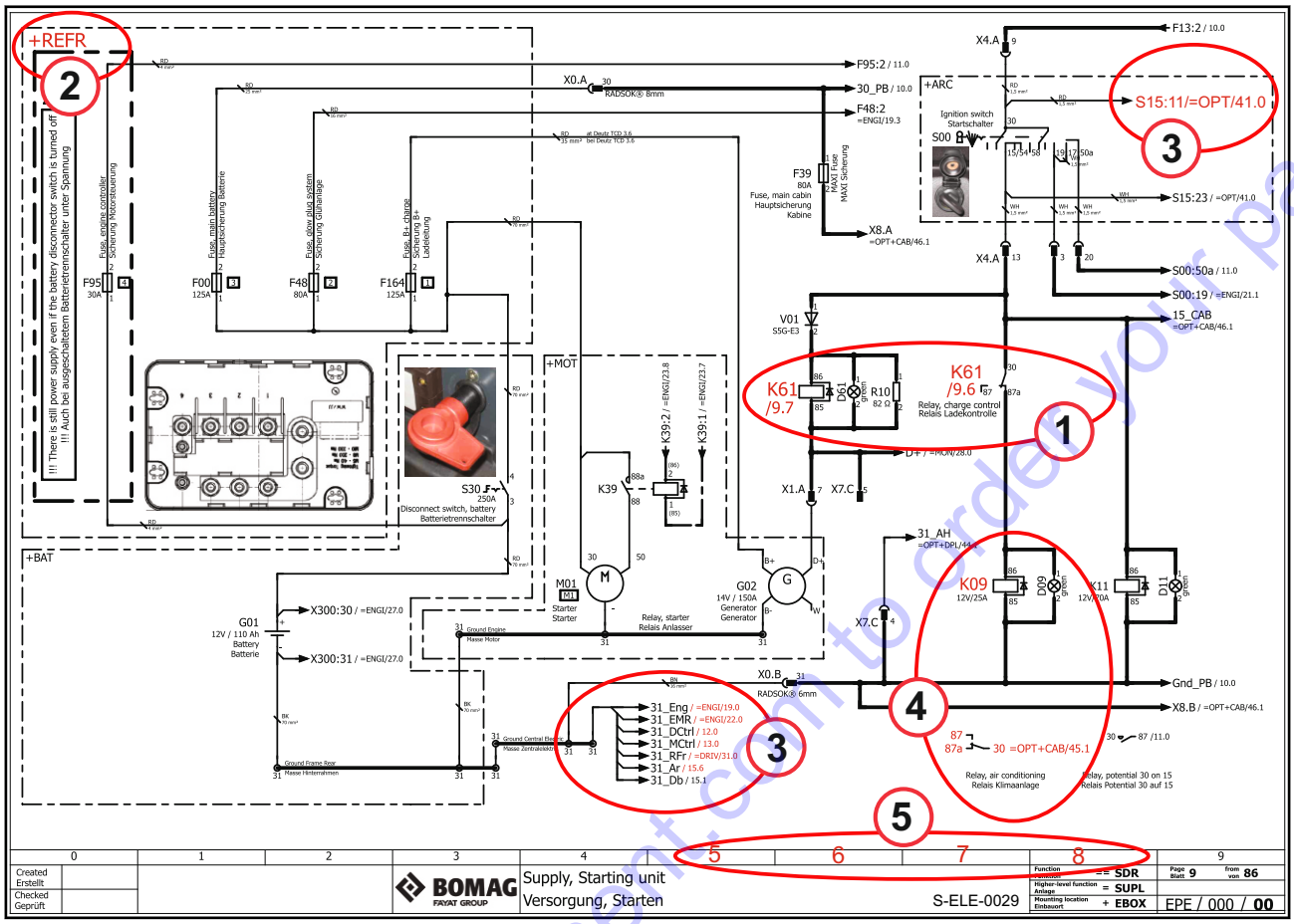


Fig. 53: Functional diagrams

1 Relay cross references are used to track signals, which need to be tracked for components with outgoing contacts. A contact overview with information about the contact types of a relay and their positions in the circuit diagram is additionally attached to the bottom of each relay coil. **Example: (K61/9.6)** indicates that the relay coil on page 9 is found in current path 6.
2 Structural symbols **example: +REFR** ↳ Fig. 51.
3 Potential cross references serve the purpose of tracking signals, which are transmitted from one functional diagram to another. Potential cross-references may additionally have structural symbols assigned to them. **Example: → S15:11/=OPT/41.0** is continued to the right to page 41, current path 0. **OPT** stands for option.
4 Contact overview of relay
5 Current paths are numbered successively from 0 to 9.

List of components

The list of components is the first evaluation list that follows the functional diagrams. This list contains all components used in the circuit diagram, except terminal strips and plugs.

Device tag list
Betriebsmittelliste

Device tag BMK	Page Path Blatt	Pfad	Mounting location Einbauort	Higher-level function Anlage	Function text	Funktionstext	characteristics Techn.-Kenngrößen
A02	41	8	+EBOX		Flasher unit	Blinkgeber	
A12	51	4	+CAB		Radio	Radio	
A15	15	2	+ARC		Monitoring module	Überwachungsmodul	
A16	51	0	+CAB		Electronic system, tachograph	Elektronik Tachograph	
A34	12	3	+EBOX		Driving Controller	Fahrsteuerung	----> Pin Overview
A48	22	0	+EBOX		Engine-controller EMR4 (EDC 17-CV52)	Motorsteuergerät EMR4 (EDC 17-CV52)	
A67	42	5	+DPL		Keyboard	Tastatur	
A83	13	3	+EBOX		Measurement controller	Messtechnik Steuerung	
A87	52	2	+CAB		USB-CAN Interface BCM	USB-CAN Schnittstelle BCM	
A93	52	7	+CAB		GPS receiver	GPS Receiver	
A108	45	2	+CAB		Heating climatic unit	Heiz-Klima-Einheit	
A124	43	3	+EBOX		Electronic system, BOMAG Telematics	Elektronik BOMAG Telematik	
A138	43	5	+ARC		Antenna, BOMAG Telematics	Antenne BOMAG Telematik	
B03	28	4	+MOT		Maintenance switch, air cleaner	Wartungsschalter Luftfilter	
B11.1	32	1	+REFR		Warning horn	Signalhorn	max. 3,5A
B11.2	32	2	+REFR		- " -	- " -	max. 3,5A
B21	28	5	+REFR		Differential pressure switch, hydraulic oil filter	Differenzdruckschalter Hydraulikölfilter	
B51.L	51	4	+CAB		Speaker radio	Lautsprecher Radio	
B51.R	51	5	+CAB		- " -	- " -	
B55	28	2	+MOT		Floating switch, coolant expansion tank	Schwimmerschalter Kühlmittelausgleichsbehälter	
B57	29	1	+EBOX		Slope sensor, speed range selection	Neigungssensor Stufenumschaltung	0,5-4,5V
B59	29	7	+DRUM		Speed sensor, drum	Drehzahlsensor Bandagengeschwindigkeit	
B60	29	4	+REFR		Speed sensor, axle	Drehzahlsensor Achsgeschwindigkeit	
B62	39	1	+DRUM		Transducer, acceleration	Aufnehmer Beschleunigung	
B88	24	4	+MOT		EMR engine oil pressure	EMR Motoröldruck	
B93	23	6	+MOT		EMR Fuel pressure rail	EMR Kraftstoffdruck Rail	
B97	35	4	+DRUM		Sensor, adjustable motor	Sensor Verstellmotor	
B104	45	1	+REFR		Pressure switch, air conditioning	Druckschalter Klimaanlage	
B113	24	2	+MOT		EMR Temperature sensor, coolant	EMR Temperatursensor Kühlmittel	
B114	23	4	+MOT		EMR Sensor, engine speed 1	EMR Motordrehzahlsensor 1	
B124	22	1	+MOT		Sensor, water trap fuel	Sensor Wasserabscheider Kraftstoff	
B130	23	5	+MOT		EMR Sensor, engine speed 2	EMR Motordrehzahlsensor 2	
B133	24	3	+MOT		EMR Sensor, charging air pressure / -temperature	EMR Sensor Ladeluftdruck / -temperatur	
B145	24	5	+MOT		EMR Low pressure Fuel	EMR Niederdruck Kraftstoff	
B171	39	3	+DRUM		Transducer, acceleration	Aufnehmer Beschleunigung	
B208	24	8	+MOT		EMR Sensor, delta p venturi	EMR Sensor Delta p Venturi	
B209	24	8	+MOT		EMR Sensor, temperature EGR behind venturi	EMR Sensor Temperatur EGR nach Venturi	

Device tag list
Betriebsmittelliste
S-ELE-0030
DTLE
EPE / 000 / 00

Fig. 54: List of components

An electric component is a part, assembly or device in an electrical installation.

- Components are marked with a combination of letters and numbers. The identification with letters follows the standard DIN - EN 61346 T1-T2. A component identification (BMK) e.g.: “S04” always describes the same component. In this context the term “component” is always considered a function specific assignment and does not represent a parts- or article number. This ensures that the component with the designation “S04” always refers to the “Brake switch”, irrespective of whether the abbreviation is used in a circuit diagram for a single drum roller, a tandem roller, a paver or a planer.
- The component identifications are alphabetically sorted in the list of components. Each component has the corresponding cross-references assigned, identifying where it can be found in the circuit diagram, which installation location it is assigned to and to which part of the system it belongs to. Moreover, the functions (function text) and the technical characteristics are also described.

Component identifications are used in both the electrical and the hydraulic documentation and are identical.

Overview of terminal strips

The overview of terminal strips contains all terminal strips used in the machine. Each terminal strip starts on a new page and can be localized via the cross-reference in the circuit diagram.

Terminal strip overview
Klemmleistenübersicht

X1

WAGO
WAGO

Mounting location
Einbauort

Device tag BMK	Page Blatt	Path Pfad
X1:1-1	4	5
X1:1-2	4	5
X1:2-1	27	7
X1:2-2	27	7
X1:3-1	26	5
X1:3-2	26	5
X1:4-1	28	1
X1:4-2	28	1
X1:5-1	27	0
X1:5-2	27	0
X1:6-1	6	8
X1:6-2	6	8
X1:7-1	26	4
X1:7-2	26	4
X1:8-1	26	3
X1:8-2	26	3
X1:9-1	5	4
X1:9-2	5	4
X1:10-1	5	3
X1:10-2	5	3
X1:11-1	5	4
X1:11-2	5	4
X1:12-1	5	1
X1:12-2	5	1
X1:13-1	4	8
X1:13-2	4	8
X1:14-1	5	5
X1:14-2	5	5
X1:15-1	21	1
X1:15-2	21	1
X1:16-1	27	2
X1:16-2	27	2
X1:17-1	27	3
X1:17-2	27	3
X1:18-1	6	5
X1:18-2	6	5

X1:19-1	6	4	X1:50	32	7	X1:113	28	5	X1:152	19	2	X1:183	14	9
X1:19-2	6	4	X1:51	6	6	X1:114	27	2	X1:153	19	2	X1:184	14	8
X1:20-1	28	2	X1:52	10	4	X1:115	27	3	X1:153	21	3	X1:185	12	8
X1:20-2	28	2	X1:53	32	6	X1:116	20	4	X1:154	14	3	X1:186	12	8
X1:21-1	27	6	X1:54	4	5	X1:117	27	7	X1:154	14	5	X1:187	12	5
X1:21-2	27	6	X1:54	34	0	X1:118	6	8	X1:154	19	3	X1:188	12	6
X1:22-1	6	3	X1:55	10	8	X1:119	27	7	X1:155	19	4	X1:189	20	2
X1:22-2	6	3	X1:55	33	4	X1:121	15	6	X1:156	7	9	X1:190	20	1
X1:23-1	30	6	X1:61-1	15	9	X1:122	15	6	X1:156	12	5	X1:191	21	3
X1:23-2	30	6	X1:61-2	15	9	X1:123	15	6	X1:156	20	1	X1:192	21	4
X1:24-1	6	6	X1:62-1	15	8	X1:124	17	2	X1:157	12	8	X1:193	21	5
X1:24-2	6	6	X1:62-2	15	8	X1:125	21	0	X1:157	28	0	X1:195	18	2
X1:25-1	6	5	X1:63-1	15	8	X1:126	27	8	X1:157	28	8	X1:196	14	4
X1:25-2	6	5	X1:63-2	15	8	X1:127	20	5	X1:159	17	6	X1:197	14	3
X1:26-1	6	1	X1:64-1	15	8	X1:128	13	3	X1:160	17	7	X1:205	12	2
X1:26-2	6	1	X1:64-2	15	8	X1:128	27	8	X1:161	14	6	X1:206	12	1
X1:27-1	6	2	X1:65-1	15	7	X1:129	17	2	X1:162	7	8	X1:207	12	2
X1:27-2	6	2	X1:65-2	15	7	X1:130	20	5	X1:163	7	8	X1:208	12	1
X1:31	4	4	X1:71-1	4	3	X1:131	27	6	X1:164	11	3	X1:209	12	0
X1:32	4	4	X1:71-2	4	3	X1:132	27	6	X1:165	11	3	X1:210	12	1
X1:33	11	5	X1:72-1	6	9	X1:133	28	4	X1:166	4	3	X1:211	26	3
X1:34	11	6	X1:72-2	6	9	X1:134	28	5	X1:167	30	7	X1:212	26	4
X1:35	11	3	X1:73-1	4	8	X1:135	27	2	X1:168	7	6	X1:213	26	3
X1:36	11	4	X1:73-2	4	8	X1:136	27	3	X1:169	4	7	X1:214	26	4
X1:37	28	2	X1:76-1	30	6	X1:137	18	4	X1:170	4	8	X1:215	17	2
X1:38	28	2	X1:76-2	30	6	X1:138	18	5	X1:171	15	6	X1:215	18	7
X1:39	15	8	X1:103	15	5	X1:139	27	6	X1:172	15	5	X1:216	18	6
X1:40	15	4	X1:104	15	6	X1:139	37	4	X1:173	15	4	X1:216	21	9
X1:41	6	3	X1:105	15	5	X1:140	27	6	X1:174	15	2	X1:217	17	2
X1:42	6	3	X1:106	18	3	X1:141	13	1	X1:175	14	8	X1:219	17	1
X1:43	13	1	X1:107	18	3	X1:142	13	2	X1:176	14	9	X1:219	17	3
X1:44	14	9	X1:109	6	8	X1:144	13	1	X1:177	13	5	X1:220	21	9
X1:45	14	8	X1:109	20	4	X1:149	5	1	X1:178	13	5	X1:221	21	7
X1:46	24	2	X1:109	27	0	X1:151	19	1	X1:179	15	6	X1:222	21	7
X1:47	12	8	X1:110	27	0	X1:151	21	5	X1:180	15	5	X1:231	27	6
X1:48	12	8	X1:111	27	1	X1:152	14	4	X1:181	15	4	X1:232	27	6
X1:49	27	1	X1:112	28	3	X1:152	18	2	X1:182	15	2	X1:233	28	2

Created / Erstellt
Checked / Geprüft
BOMAG
Terminal strip overview X1
Klemmleistenübersicht X1
S-ELE-0031
Page / Blatt 46 Total / 65
EPE/ 000 / 00

Fig. 55: Overview of terminal strips

Overview of pins

The overview of pins ↳ Fig. 56 informs about the type of inputs and outputs of the components used in the machine ↳ Fig. 54, as well as their signals and potentials.

Pin overview
Pin Übersicht

S55

Travel lever
Fahrhebel

Plug Stecker	Pin Kontakt	Page Blatt	Path Pfad	Description Beschreibung	Signal	Signal
X23	1	14	6	Power supply (8...32V)	Power supply	Stromversorgung
X23	2	14	5	Ground	Ground	Masse
X23	3	29	9	BTS signal "Brake catch"	BTS brake	BTS Bremse
X23	4			BTS signal "warning horn" (prepared)		
X23	5	29	3	Output voltage supply "+5V"	Supply analog selectors	Versorgung Analoge Wahlschalter
X23	6	16	4	CAN bus high		
X23	7	16	5	CAN bus low	CAN low	CAN low
X23	8	29	2	Ground / 0V / reference to PIN 5	Ground analog selectors	Masse Analoge Wahlschalter
X23	9	14	6	Adressing 1	Ground	Masse
X23	10	14	7	Adressing 2	- " -	- " -
X23	11	29	1	Analog IN 1	Switch, speed range selector 2	Schalter Fahrstufen 2
X23	12	29	4	Analog IN 2	Frequency adjustment plates	Frequenzverstellung Anbauplatten
X24	1	29	7	Digital IN 1	Switch, vibration low/off (on/off)	Schalter Vibration klein/aus (an/aus)
X24	2	29	8	Digital IN 2	Switch, vibration off/high	Schalter Vibration aus/groß
X24	3	29	6	Digital IN 3	Floating position plates	Schwimmstellung Anbauplatten
X24	4	29	5	Digital IN 4	Vibration plates	Vibration Anbauplatten
X24	5			Digital IN 5		
X24	6			Digital IN 6		
X24	7			Output supply voltage +Ub		
X24	8			Output supply voltage "ground" (0V)		

Created / Erstellt
Checked / Geprüft
BOMAG
Pin overview S55
Pin Übersicht S55
S-ELE-0032
Page / Blatt 74 Total / 98
+ PINO
EPE / 000 / 00

Fig. 56: Overview of pins, S55

Overview of plugs

The plug diagram is at the end of the list evaluations. The plug diagram contains all plugs used in the machine. The list is sorted in numerical order. Behind each connector designation is a reference to the installation location, a function text and information about the plug type used. For each individual connector pin used, a note is given where the PIN is shown in the circuit diagram.

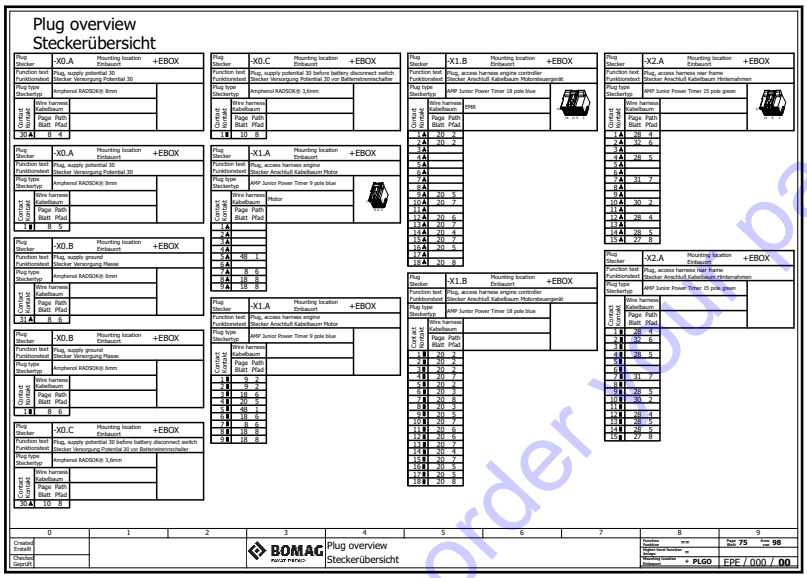


Fig. 57: Overview of plugs

4.1.2.2 Circuit symbols in E-Plan

Circuit symbol

Circuit symbols are standardized representations for electrical appliances. They serve the purpose of a simplified representation of complete systems, from which, however, the function can be clearly identified. This standardization is in compliance with the globally valid regulations of the IEC (International Electrical Commission). The standardization serves the purpose of global understanding and fault free connection of appliances, especially in vehicle repairs. Since the wiring diagram is intended to show only the most essential aspects, the circuit symbol only shows as much of the function, as is needed for easy recognition and for the avoidance of mistakes.

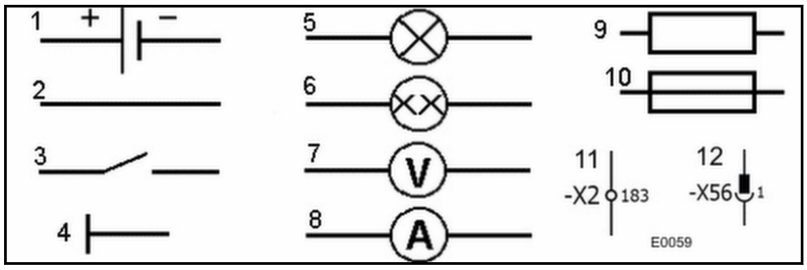


Fig. 58: For example: Circuit symbol

1 Current source
2 Conductor
3 Switches
4 Ground
5 Filament lamp
6 Filament lamp with two luminous elements
7 Voltmeter
8 Ammeter
9 Resistance

10 Fuse
11 Terminal strip
12 Plugs

Different symbols are used to simplify the differentiation of terminal strips 11 ↳ Fig. 58 and plugs (12) in a wiring diagram.

Plugs are mainly used to connect two wiring looms or to connect a wiring loom with a component with cable connection and mating plug.

Representation of electric devices

Electronic devices and components are increasingly used in the construction equipment industry. Controls with software, control elements (e.g. joystics and man / machine interfaces, such as e.g. screens, LC-Displays) are frequently used to represent and control machine functions. The internal construction of such components is in most cases protected or just too complex to be illustrated in the wiring diagram within the context of the actual machine function. There are two different ways to simplify the representation of such devices in the diagram.

Black-Box representation

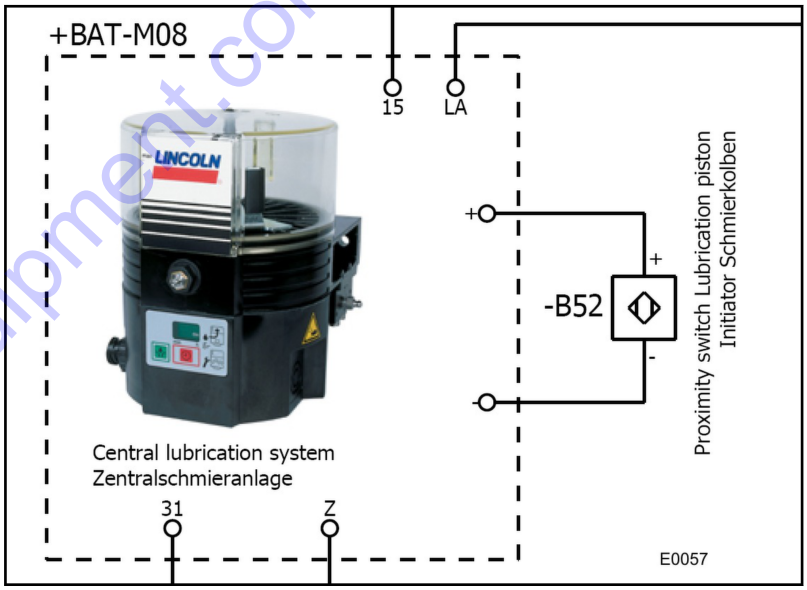


Fig. 59: Example: Central lubrication system

The Black-Box representation shows the device as a Box with the connections required for the machine function. Connections which are not needed do not need to be represented.

The Blackbox representation is mainly used if there is no differentiated information (e.g. signals from pins) available from the sub-supplier.

Identification of externally supplied documentation

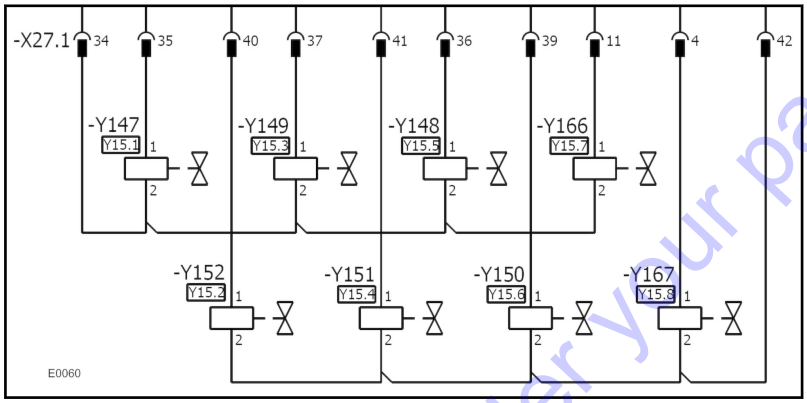


Fig. 60: Example: Identification of externally supplied documentation

In industrial technology of today it is quite common to integrate externally supplied electric sub-systems into the projecting of machines. These systems may be composed of various components and wirings. For easier differentiation of BOMAG designation and manufacturer identification the latter appears under the BOMAG designation with a text frame and a reduced character height.

PLC box representation (-A66)

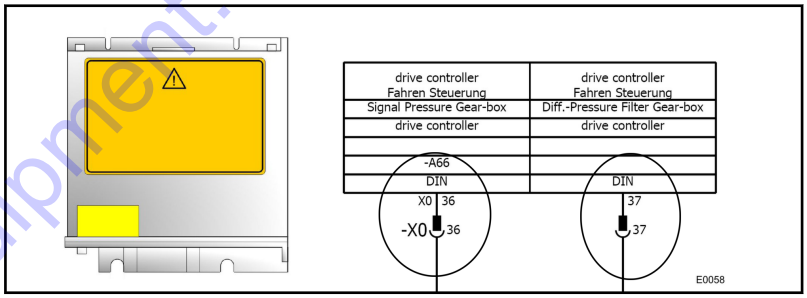


Fig. 61: PLC box representation

The PLC box representation of connecting pins uses a table with associated connecting plugs, which are used in connection with the machine functions. The table symbols can be arranged in a line, if necessary. Connections which are not used do not need to be represented. The PLC box representation enables the representation of further reaching functional descriptions to the individual component connections.

The PLC box representation is mainly used for controls with BOMAG software, or for electronic devices which were specified accordingly, and where information on the assignment of signals is available.

Identification of similar, adjacent circuit symbols

In circuit diagrams, symbols of the same type are often arranged in series or close to each other. In such cases it is common practice to reduce the identification on the subsequent symbol to the criteria, which are different from the previous symbol on the left.

For example:**-X0 36** and **-X0 37**. In the example illustrated here the component identification **"-X0"** for the left plug symbol is also valid for the right plug symbol.

4.1.2.3 Identification of switch blocks

Switches of modular design

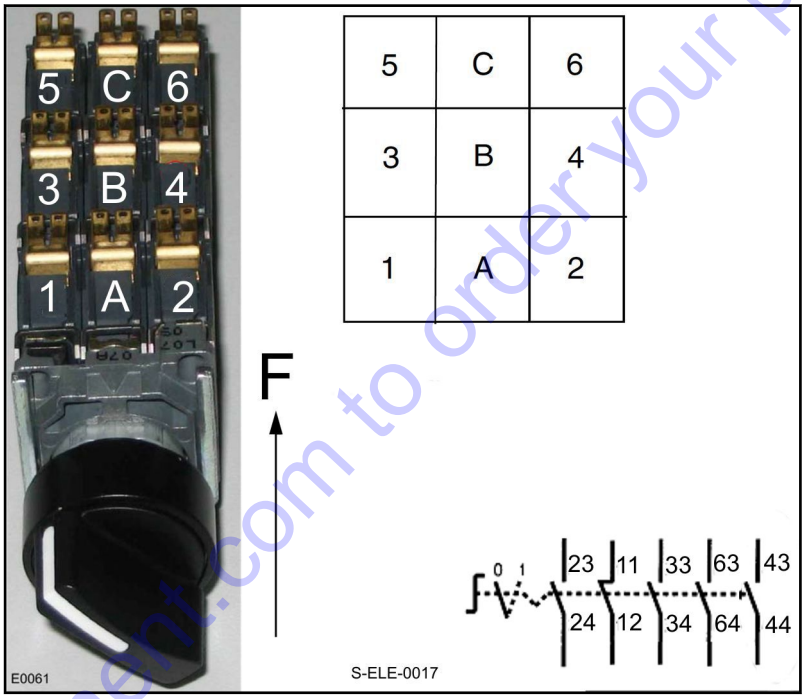


Fig. 62

F Direction

- For normally open contacts the contact symbols **_3/_4** are used.
- For normally closed contacts the contact symbols **_1/_2** are used.

In combination with the contact block numbering described above each individual connection is clearly defined.

Example:

The contact block marked with ***4*** is called ***4***3/44, if it is a normally open contact and ***4***1/42, if it is a normally closed contact.

The contact block marked with ***2*** is called ***2***3/24, if it is a normally open contact and ***2***1/22 , if it is a normally closed contact.

The contact block marked with ***1*** is called ***1***3/14, if it is a normally open contact and ***1***1/12, if it is a normally closed contact.

The contact block marked with ***5*** is called ***5***3/54, if it is a normally open contact and ***5***1/52, if it is a normally closed contact.

4.1.3 Telemecanique switch

Dismantling

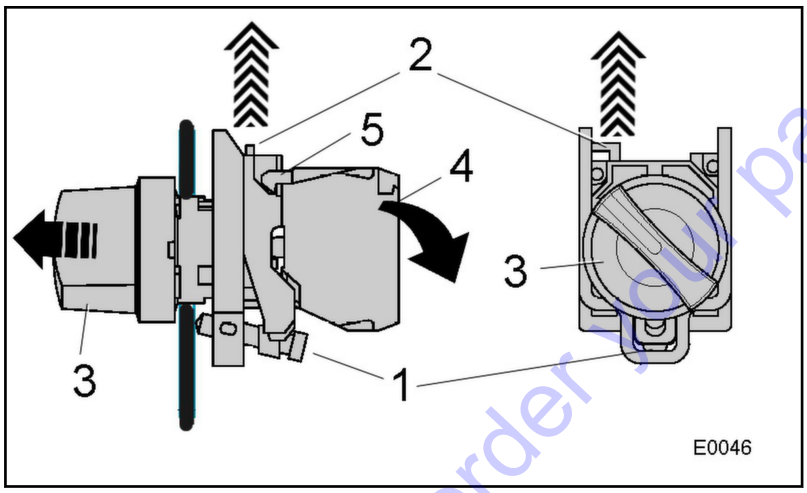


Fig. 63

1. Lift up the interlock (5).
2. Fold down the switch block (4).
3. Loosen the screw (1).

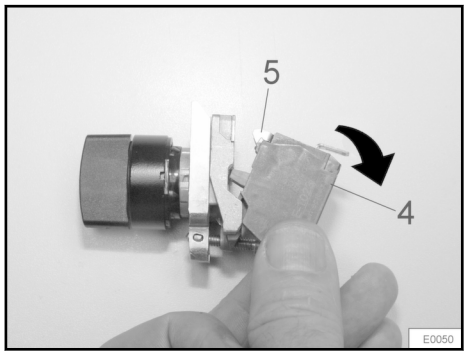


Fig. 64: Folding down the switch block

4. Lift up the interlock (2) and pull out the front element (3).

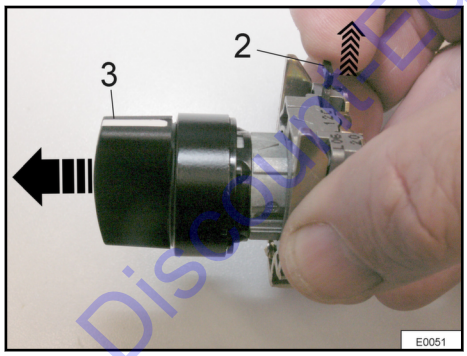


Fig. 65: Pulling out the front element

Assembly

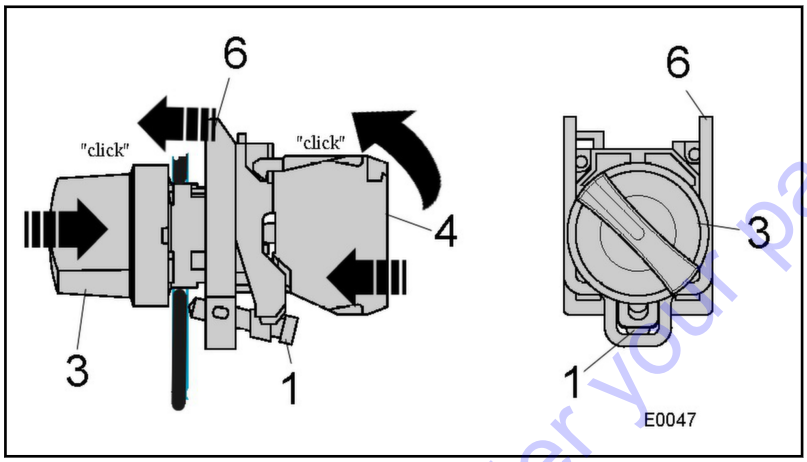


Fig. 66: Assembly

1. Insert the front element (3) into the bore in the control panel.

2. Clip the fastening adapter (6) onto the front element (3).

Watch the marks on front element and fastening flange.

3. Tighten the screw (1) with a tightening torque of 0.6 Nm.

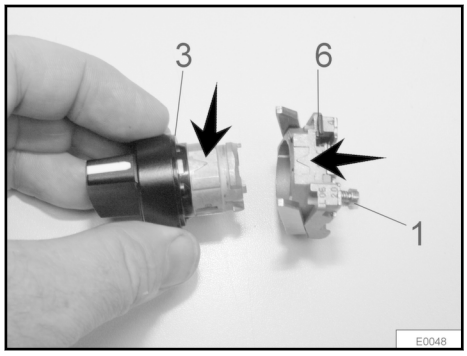


Fig. 67: Observe the marks.

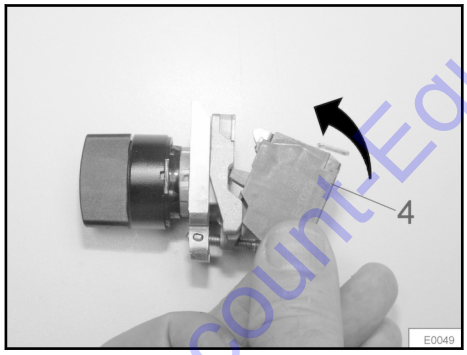


Fig. 68: Install the switch block

4. Clip on the switch block (4).

Hook in the switch block at the bottom first.

4.2 Starting the engine with jump leads

NOTICE!

A wrong connection will cause severe damage in the electric system.

– Bridge the machine only with a 12 Volt auxiliary battery.

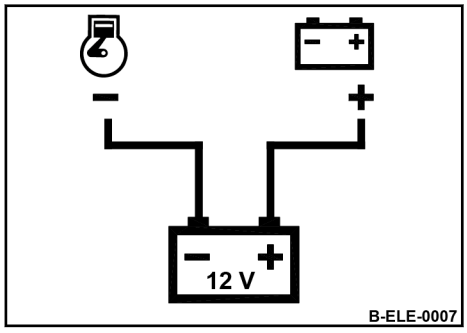


Fig. 69

1. Connect the plus pole of the external battery first with the plus pole of the vehicle battery using the first jump lead.
2. Then connect the second battery cable first to the minus pole of the current supplying auxiliary battery and then to engine or chassis ground, as far away from the battery as possible.
3. Start the engine.

NOTICE!

Danger of damage to the electronic system!

If no powerful consuming device is switched on, voltage peaks may occur when separating the connecting cables between the batteries, which could damage electrical components.

4. Once the engine is running switch on a powerful consumer (working light, etc.).
5. After starting disconnect the negative poles first and the positive poles after.
6. Switch off the consumer.

4.3 Overview of electric system

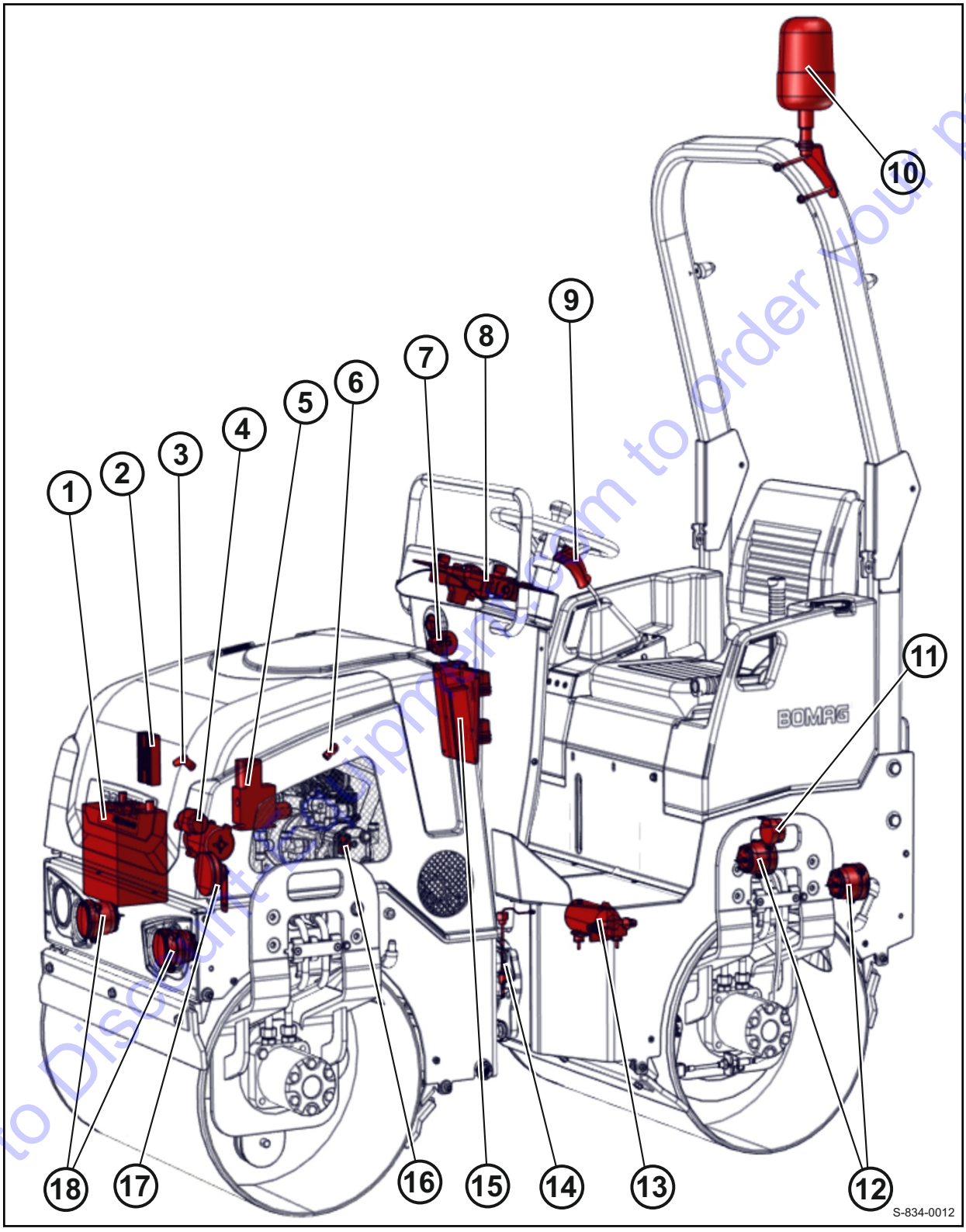


Fig. 70

1 Battery (G01) and fuse for charge regulator (F148)

2 Charge regulator (A61)
3 Spark plug, right (A62)
4 Starter (M01)
5 Vibration valve (Y22)
6 Spark plug, left (A63)
7 Starter switch (S00)
8 Operating console
9 Push button for vibration (S13)
10 Flashing beacon (E32)
11 Warning buzzer for reverse travel (H14)
12 Working head lights, rear (E27 and E28)
13 Spraying pump (M02)
14 Float switch for fuel (B201)
15 Central electrics
16 Proximity switch, reversing monitoring (B32)
17 Warning horn (B11)
18 Working head lights, front (E24 and E26)

4.3.1 Control elements

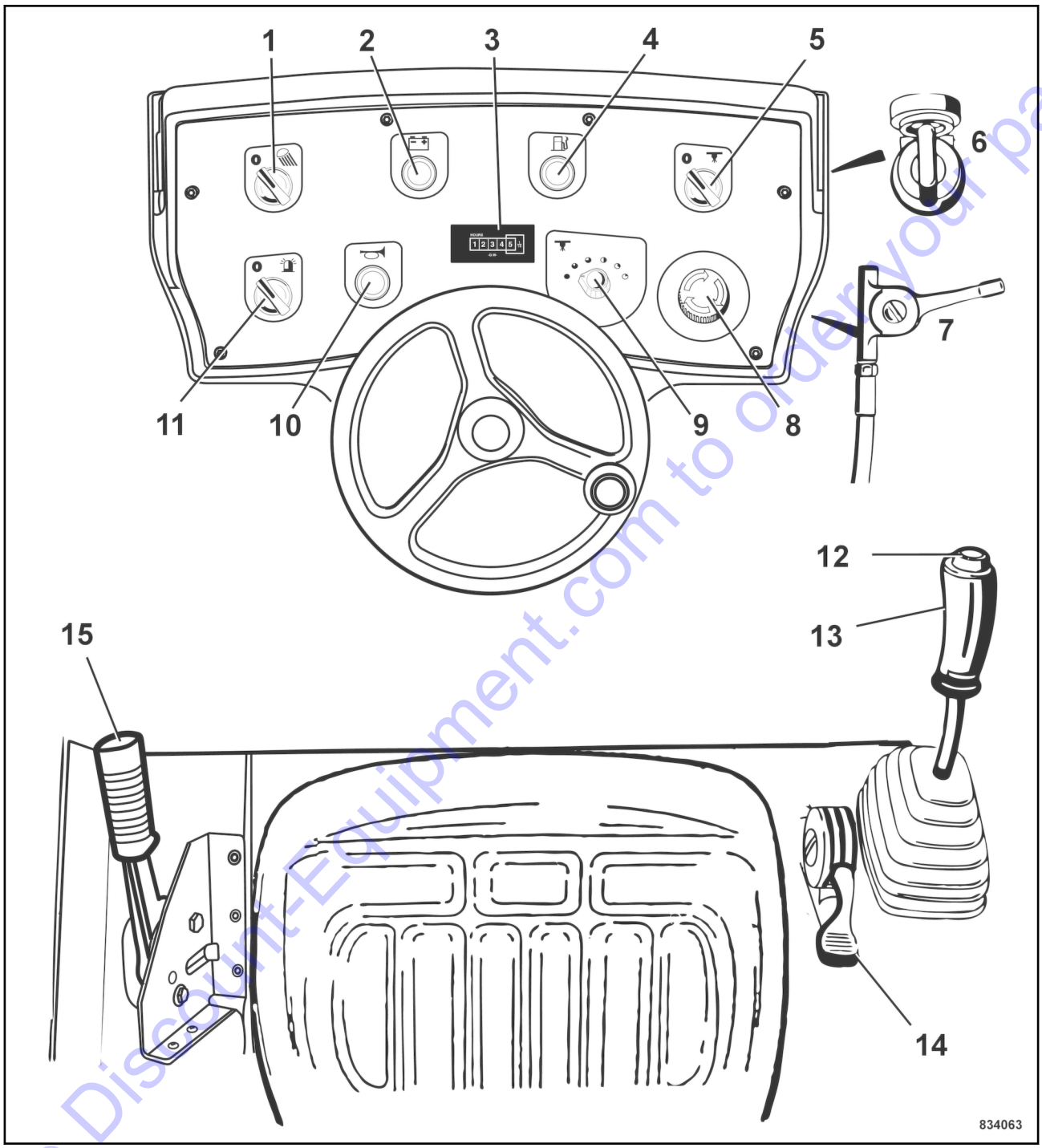


Fig. 71

1 *[S53]* Rotary switch for working lights[1]
2 *[H08]* Charge control light
3 *[P00]* Operating hour meter
4 *[H38]* Fuel level warning light
5 *[S05]* Rotary switch for spraying system

6 *[S00]* Ignition switch
7 Choke lever
8 *[S01]* Emergency stop switch
9 *[A01]* Rotary switch for interval spraying
10 *[S03]* Push button for warning horn
11 *[S38]* Rotary switch for flashing beacon[1]
12 *[S13]* Push button for vibration
13 Travel lever
14 Throttle lever
15 Parking brake lever

1 - Optional equipment

4.4 Central electrics

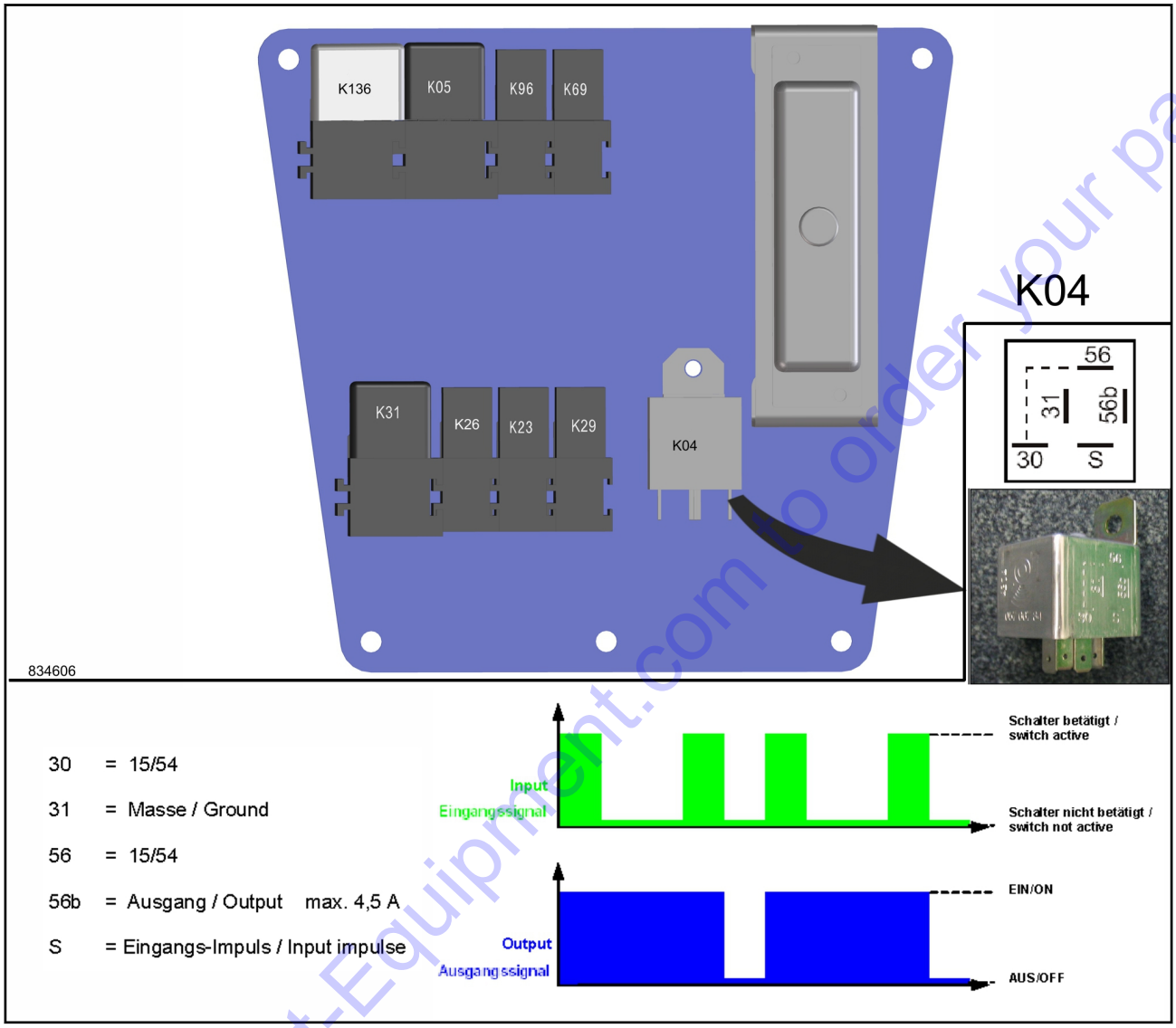


Fig. 72

K136 Timer relay seat contact (5 sec. delayed release)
K05 Relay for start current
K96 Relay for engine oil pressure
K69 Relay for engine shut-down
K31 Relay for start current
K26 Relay for reverse alarm system
K23 Relay for spraying pump
K29 Relay for vibration
K04 Stepping relay for vibration

K04

This module is an electronic stepping relay. A ground switching pulse on Pin (S) sets the output (56b) (operating voltage applied to the output (56b)). The next pulse resets the output (56a) (no operating voltage applied to the outlet (56b)).

If the operating voltage (15/54) is switched off, the output will remain dead when switching on again.

4.5 Fuse assignment

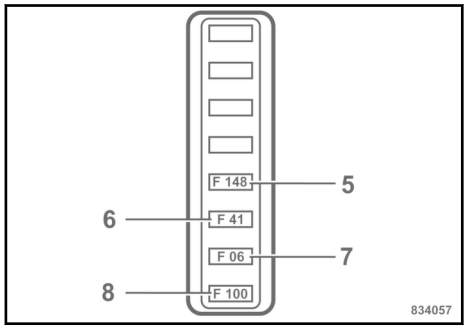


Fig. 73

- Fuse box

The fuse box is located behind the steering column covering.

WARNING!
Fire hazard!
Do not use fuses with higher ampere ratings and do not repair fuses with a piece of wire.

(5) 25 A	(F148) Fuse control MESX (potential 15)
(6) 15 A	(F41) Flashing beacon
(7) 15 A	(F06) Spraying system
(8) 20 A	(F100) Working head lights

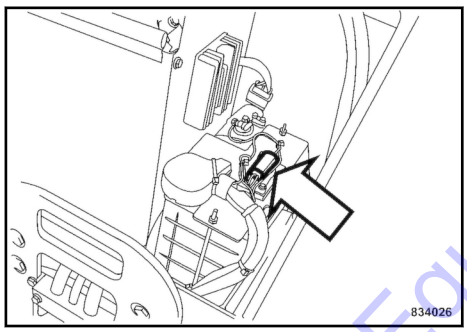


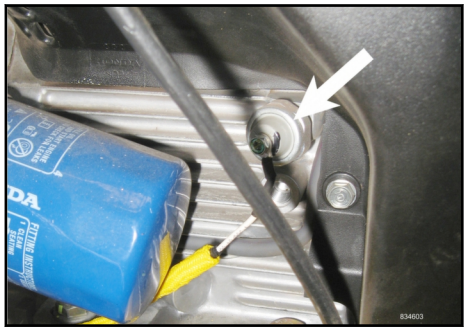
Fig. 74

- Main fuse

WARNING!
Fire hazard!
Do not use fuses with higher ampere ratings and do not repair fuses with a piece of wire.

25 A	F 00

4.6 Engine oil pressure monitoring



If the oil pressure drops below 0.5 bar, the engine is shut down.

Fig. 75: Oil pressure switch, B06

4.7 Proximity switches, B08 and B38

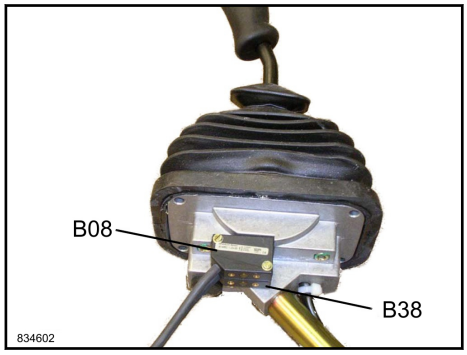


Fig. 76: Proximity switches on travel lever

B08 Proximity switch for travel lever “0” position
B38 Proximity switch for vibration lock

Working principle

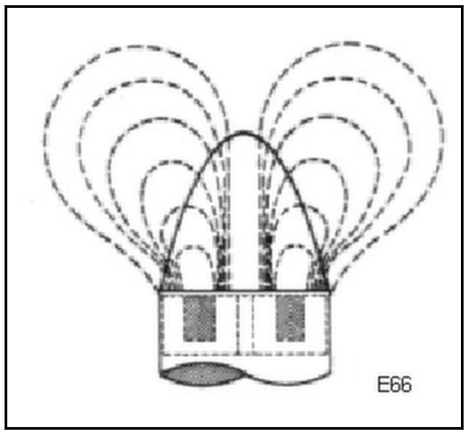


Fig. 77

The working principle is based on the principle of the dampened LC-oscillator. The coil of the oscillation circuit forms a high-frequency magnetic stray field.

This stray field leaks out from the active area of the proximity switch. If metal or non-ferrous metal enters into the response range, energy is absorbed. The oscillator is thus dampened and the resulting change in current consumption is evaluated.

Breaking and making contacts

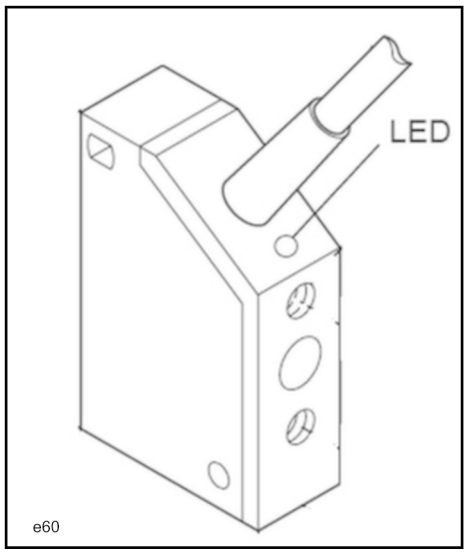


Fig. 78

Proximity switches are used as breaking or making contacts. Depending on the design the switching distances are 2 or 4 mm. The maximum amperage is 300 mA.

The LED ↳ Fig. 78 lights up, when the initiator has detected metal in its stray field.

4.8 Inspection and maintenance work

4.8.1 Maintenance Table

No.	Maintenance works	Page
	Every 250 operating hours	
4.8.2.1	*Battery service*	*93*

4.8.2 Every 250 operating hours

4.8.2.1 Battery service

WARNING!

Danger of cauterisation ! Danger of explosion!

When working on the battery do not use open fire, do not smoke!

The battery contains acid. Do not let acid come in contact with skin or clothes!

Wear protective clothing!

Do not lay any tools on the battery!

For recharging remove the plugs from the battery to avoid the accumulation of highly explosive gases.

ENVIRONMENT!

Dispose of the old batteries environmentally.

Maintenance free batteries also need care. Maintenance free only means that the fluid level does not need to be checked. Each battery suffers under self-discharge, which may, in not checked occasionally, even cause damage to the battery as a result of exhaustive discharge.

The following therefore applies for the service life:

1. Switch off all consumers (e.g. ignition, light, inside light, radio).
2. Check open-circuit voltage of the battery at regular intervals. At least once per month.

Reference values: 12.6 V = fully charged; 12.3 V = 50% discharged.

1. Recharge the battery immediately after an open-circuit voltage of 12.25 V or less is reached. Do not perform quick charging.

The open-circuit voltage of the battery occurs approx. 10 hours after the last charging process or one hour after the last discharge.

1. After each charging process allow the battery to rest for one hour before taking it into service.
2. For resting periods of more than one month you should always disconnect the battery. Do not forget to perform regular open-circuit voltage measurements.

NOTICE!

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

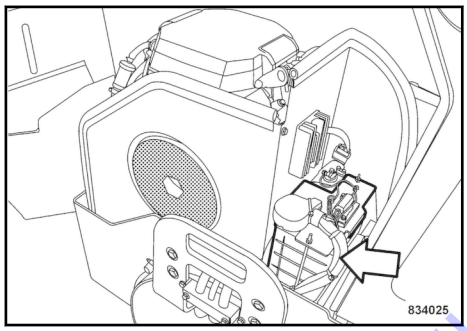


Fig. 79

1. Open the engine hood.
2. Clean battery ⇨ Fig. 79 and battery compartment.
3. Clean battery poles and pole clamps and grease them with pole grease (Vaseline).
4. Retighten the pole clamps.
5. Check the fastening of the battery.

5 Hydraulic system

5.1 Basic principles

5.1.1 Open and closed hydraulic circuit

Open circuit

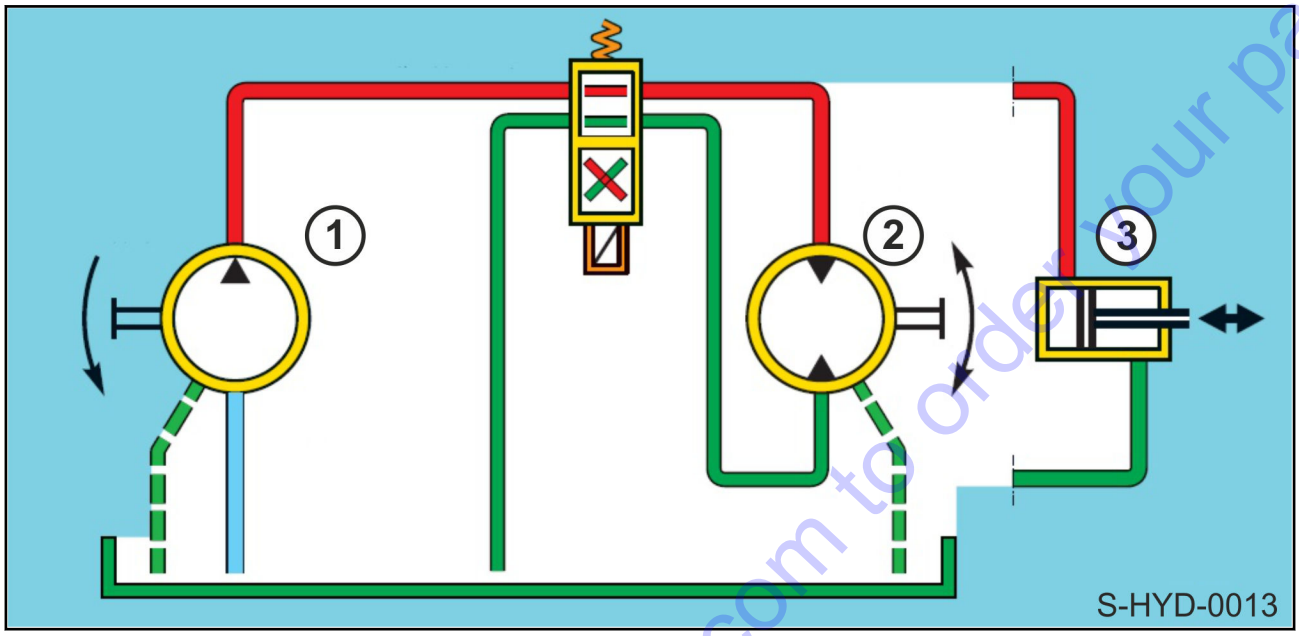


Fig. 80: Open circuit

Open in this case means that the suction line of a pump (1) normally is situated below the fluid level, the surface of which is in open contact with atmospheric pressure. Reliable equalization of pressure between the air in the hydraulic oil tank and the ambient air ensures problem free suction of the pump.

In an open circuit the hydraulic oil is fed to the consumer (2 or 3) and also returned to the tank through way valves.

Closed circuit

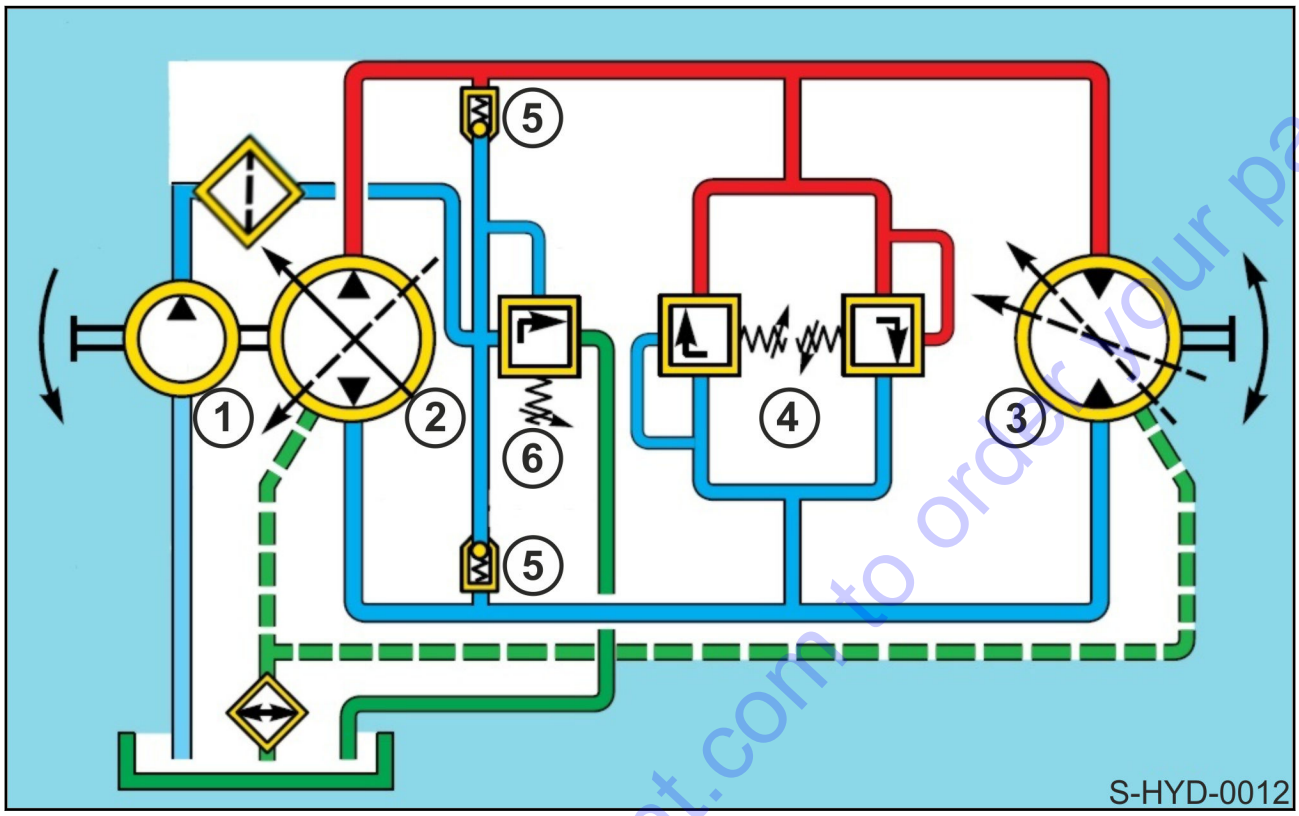


Fig. 81: Closed circuit

One talks about a closed hydraulic system, when the hydraulic oil flows from the consumer (3) directly back to the pump (2).

The closed circuit consists of a high and a low pressure side, depending on the load direction (take-off moment on the consumer).

The high pressure side is protected by high pressure relief valves (4), which release oil into the low pressure side. The medium remains in the circuit.

Only the leakage on pump and motor needs to be replenished. This is accomplished by a charge pump (1) which permanently draws a sufficient amount of hydraulic fluid (charge capacity) from the tank and feeds it through a check valves (5) into the low pressure side of the closed circuit. The excess quantity delivered by the charge pump flows through a charge pressure relief valve (6) back into the tank. Charging the low pressure side enables the pump (2) to work with higher operating data.

5.1.2 Swash plate principle, pump

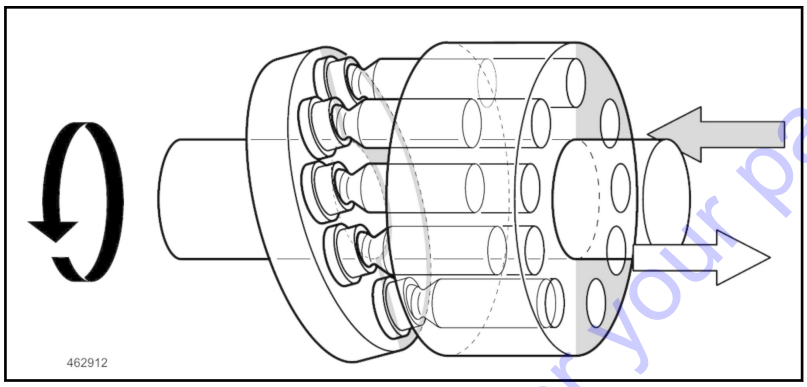


Fig. 82

The swash plate pump is a positive displacement machine with oil displacing pistons arranged axially to the drive shaft. The pistons are thereby supported by the swash plate.

Axial piston units based on the swash plate principle with fixed or variable displacement can be used as hydraulic pumps or hydraulic motors. In pump mode the mechanical energy is converted to hydrostatic energy, when used in motor mode the hydrostatic energy is converted to mechanical energy. When used as a pump, the flow volume is proportional to the drive speed and the swashing angle. The available (pump) torque increases with the pressure drop between high and low pressure side.

Variable displacement pumps and motors can be change their displacement, i.e. the pump delivery rate or motor throughput, by simply changing the angle of the swash plate.

Description of function

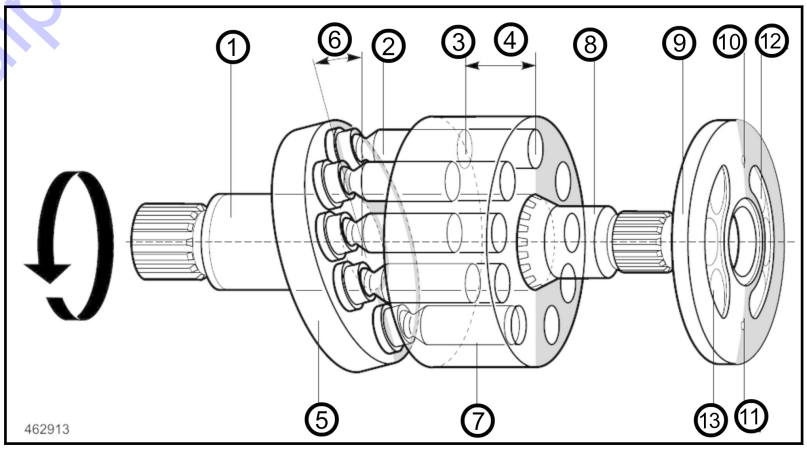


Fig. 83

1 Drive shaft
2 Piston
3 Piston area
4 Piston stroke
5 Slipping disc
6 Adjusting angle
7 Cylinder

8 Through drive
9 Valve plate
10 Top dead centre TDC
11 Bottom dead centre BTC
12 Control slots in suction side of swash plate (for sense of rotation shown)
13 Control slot on pressure side

Driven by the engine, the drive shaft rotates and drives the cylinder via a splined connection. The cylinder rotates with the drive shaft and drives the 9 pistons. The pistons rest with their slipper pads on the sliding face of the swashing cradle and perform an axial movement. The slipper pads are held on the sliding face and are positively guided by a retaining device. During a complete rotation of the cylinder block each piston moves through the bottom and top dead centre back to its initial position. From dead centre to dead centre is performs a full piston stroke. During this process the flow volume determined by the stroke is drawn in through the control slots in the valve plate or pumped out. During the suction stroke the hydraulic fluid is drawn into the increasing piston chamber, i.e. it is actually pressed in. On the opposite side the oil is pressed out of the piston bores into the hydraulic system during the compression stroke.

5.1.3 External gear pumps

External gear pumps mainly consist of the friction bearing mounted gear pair and the housing with front and rear covers. The drive shaft, which is sealed with a radial seal, protrudes from the front cover. The bearing forces are absorbed by friction bearings. These have been designed for high pressures and have excellent antifriction properties - particularly at low speeds. The gears have 12 teeth each. This keeps flow pulses and noise emissions at a low level.

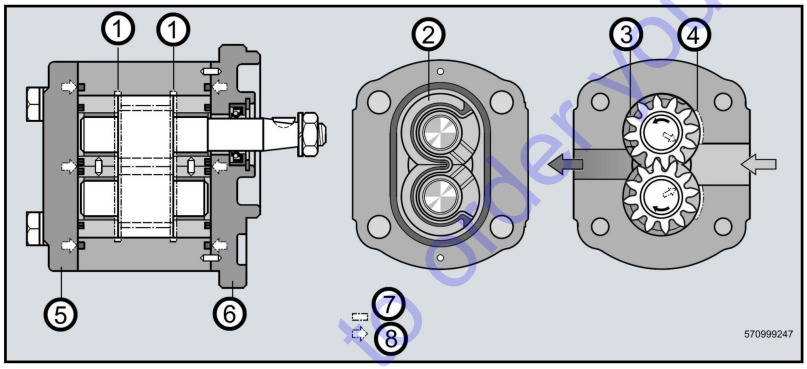


Fig. 84: Axial compensation of gear pump

1	Axial seal	5	Cover
2	Outer pressure field	6	Flange
3	Inner pressure field	7	Sealing zone
4	Radial seal	8	Compensation forces

Internal sealing of the pressure chambers is achieved by flow volume dependent forces. This results in an excellent rate of efficiency. On the rear side the moveable bearing bushings are pressurized and thus tightly pressed against the gears. The pressurized pressure fields are thereby limited by special seals. Sealing around the circumference of the gears to the housing is assured by small gaps, which appears between gears and housing in dependence on the pressure.

Function

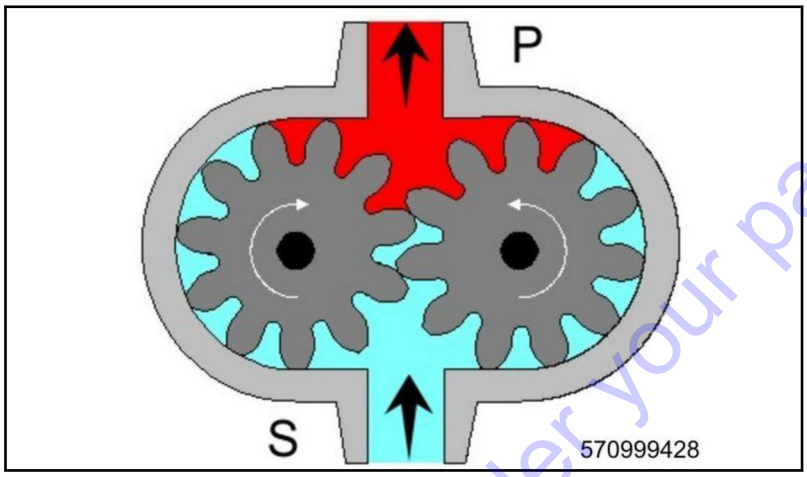


Fig. 85

The increasing volume caused by a tooth exiting a tooth gap results in a vacuum in the suction chamber. The pressure fluid is transported into the pressure chamber. There the meshing of teeth and tooth gaps displaces the pressure fluid into the upper supply line.

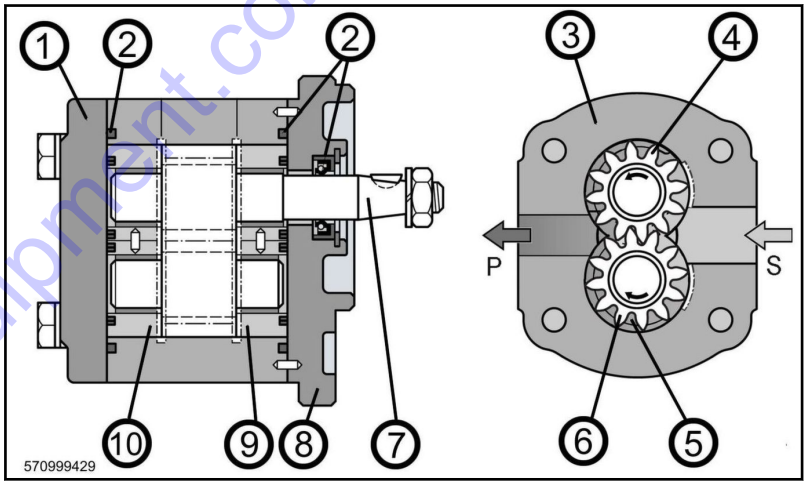


Fig. 86

1	Cover	6	Gear (driven)
2	Seals	7	Shaft
3	Housing	8	Flange
4	Gear (driving)	9	Bearing plate
5	Displacement chamber	10	Bearing plate

Multiple gear pumps

Gear pumps are suited for multiple pump arrangements, in which the drive shaft of pump 1 is extended to drive a second or third pump. The shafts are connected by drivers in between. The individual pump stages are sealed to each other, i.e. the suction ports are separated from each other.

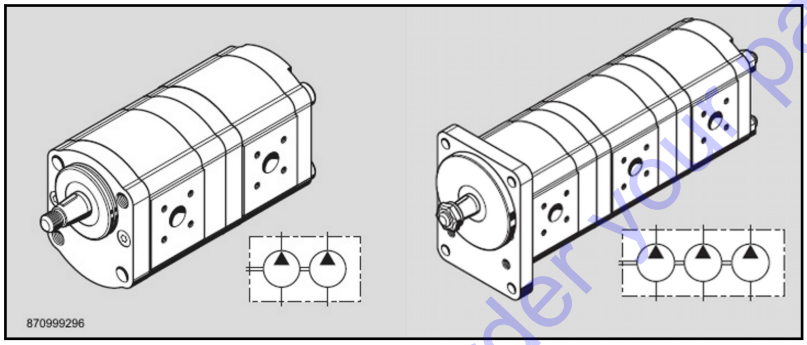


Fig. 87

5.1.4 Outer gear motors non-reversible

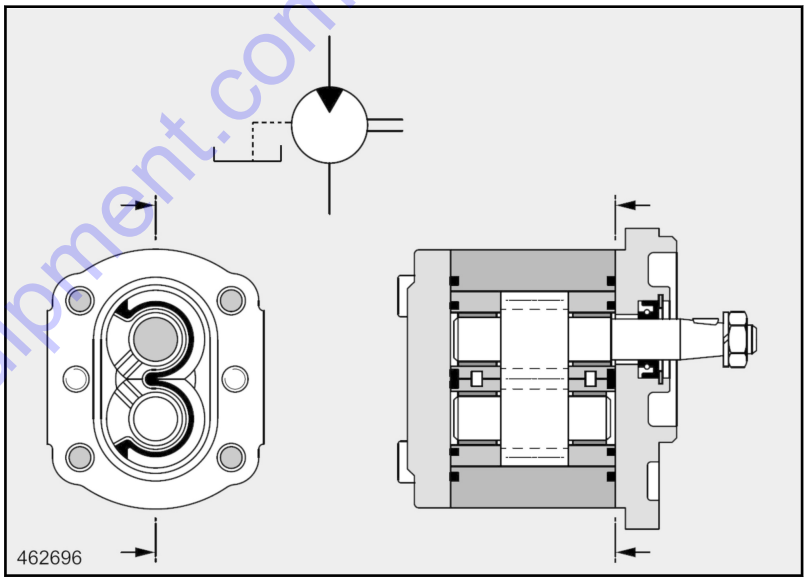


Fig. 88: Gear motor

In their design gear motors are quite similar to gear pumps. The only difference is the slightly different axial pressure field. The pressure fluid flowing into the gear motor works on the gears. It generates a torque, which is then transferred by the output shaft.

External gear motors for one sense of rotation are of asymmetrical design, i.e. high and low pressure sides are predetermined. Reversing operation is not possible. The arising leak oil is internally fed to the outlet. The pressure load in the outlet is limited because of the radial seal.

5.2 Overview of hydraulics

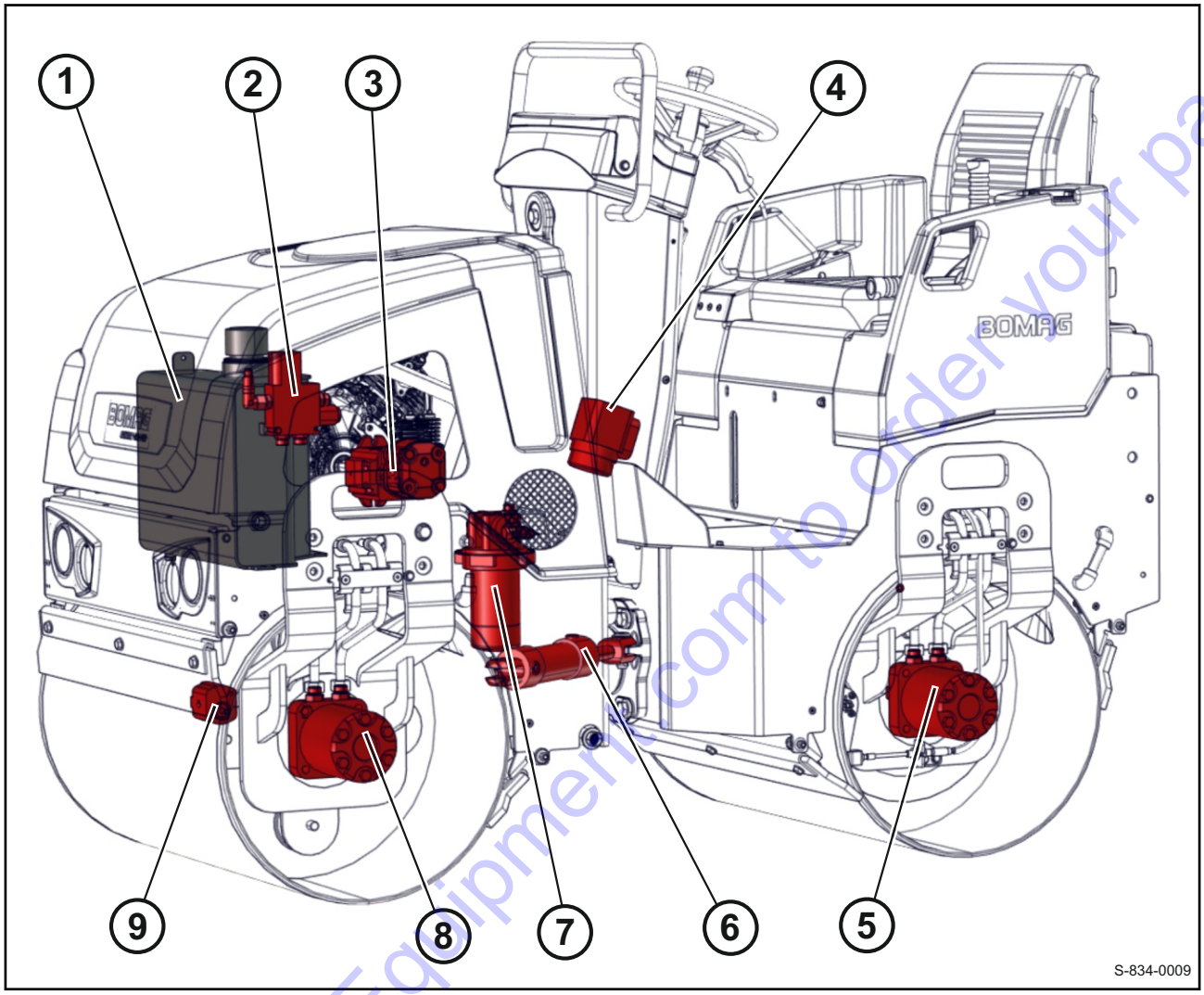


Fig. 89

1 Hydraulic oil tank
2 Vibration valve (Y22)
3 Pump unit, travel pump with steering / charge / vibration pump
4 Steering valve
5 Rear drum drive motor
6 Steering cylinder
7 Charge circuit filter
8 Front drum drive motor
9 Vibration motor

The travel pump is directly driven by the crankshaft of the engine via an elastic coupling, the pump speed is therefore identical with the engine speed.

The steering / charge / vibration pump is a directly driven gear pump, which is connected with the travel pump via a coupling. The pump speed is identical to the engine speed.

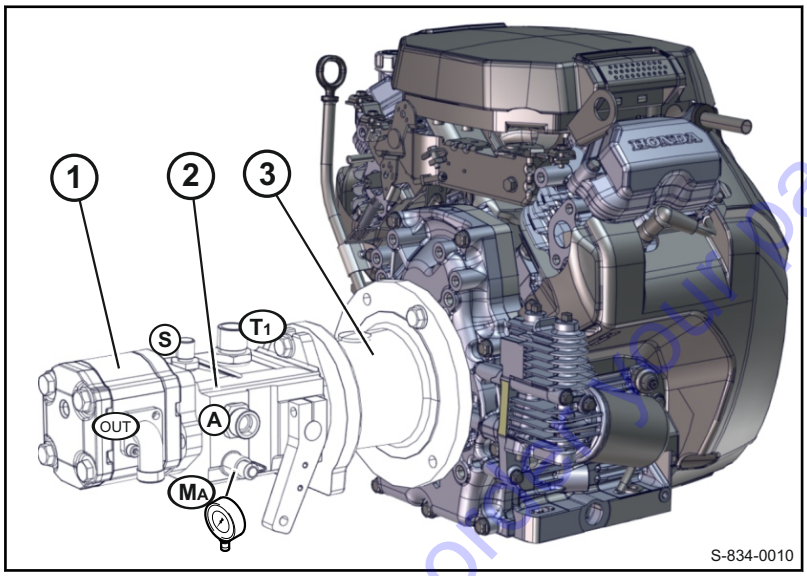


Fig. 90: Pump assembly

1 Steering / charge / vibration pump
2 Travel pump
3 Pump flange with flexible coupling
A Working port, travel pump forward
M_A Pressure test port, pressure A
OUT Pressure side steering / charge / vibration pump
S Pressure port for charge circuit
T_1 Leak oil connection

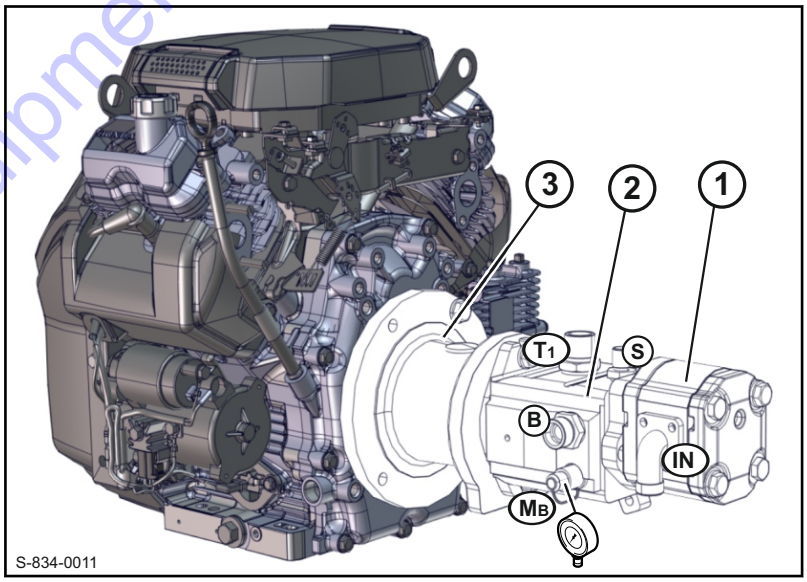


Fig. 91: Pump assembly

1 Steering / charge / vibration pump
2 Travel pump
3 Pump flange with flexible coupling
B Working port, travel pump reverse
IN Suction side steering / charge / vibration pump

M_B Pressure test port, pressure B
S Pressure port for charge circuit
T_1 Leak oil connection

5.3 Description of hydraulic components

5.3.1 Travel pump, PMVO 13S

Axial piston variable displacement pump PMVO 13S1M

Control, mechanical

The variable displacement axial piston pump generates, controls and regulates a volumetric pressure fluid flow. It has been designed for mobile applications, e.g. in construction equipment.

NOTICE!

The variable displacement axial piston pump must be filled with pressure fluid and purged during start-up and operation. This must also be considered for longer periods of rest, because the system may run empty through the hydraulic lines.

The PMVO is a variable displacement axial piston pump in swash plate design for hydrostatic drives in closed circuits. The volumetric flow is proportional to the drive speed and the displacement. The volumetric flow can be infinitely changed by adjusting the swash plate accordingly.

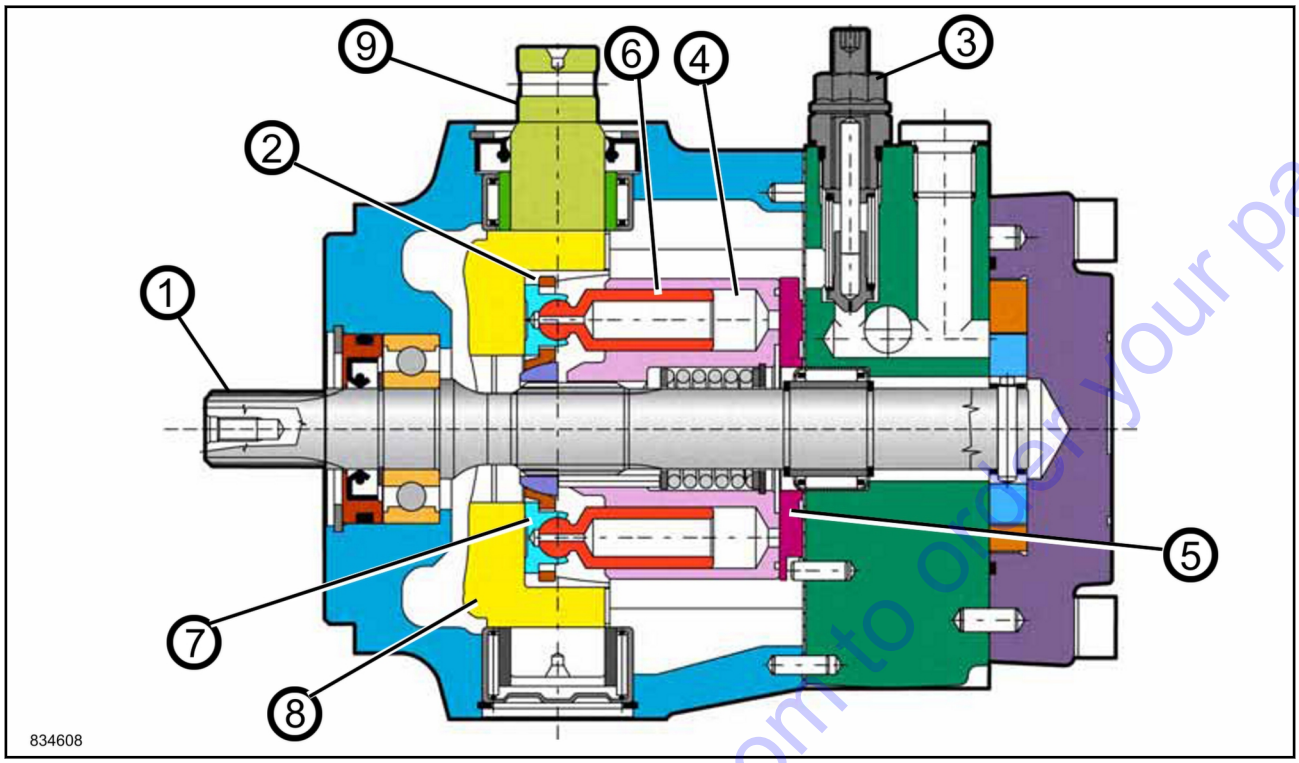


Fig. 92

Pos	Designation	Pos	Designation
1	Drive shaft	6	Piston
2	Retracting plate	7	Slipper pad
3	Charge pressure relief valve	8	Slipping disc
4	Cylinder	9	Swashing shaft
5	Valve plate		

Hydraulic diagram

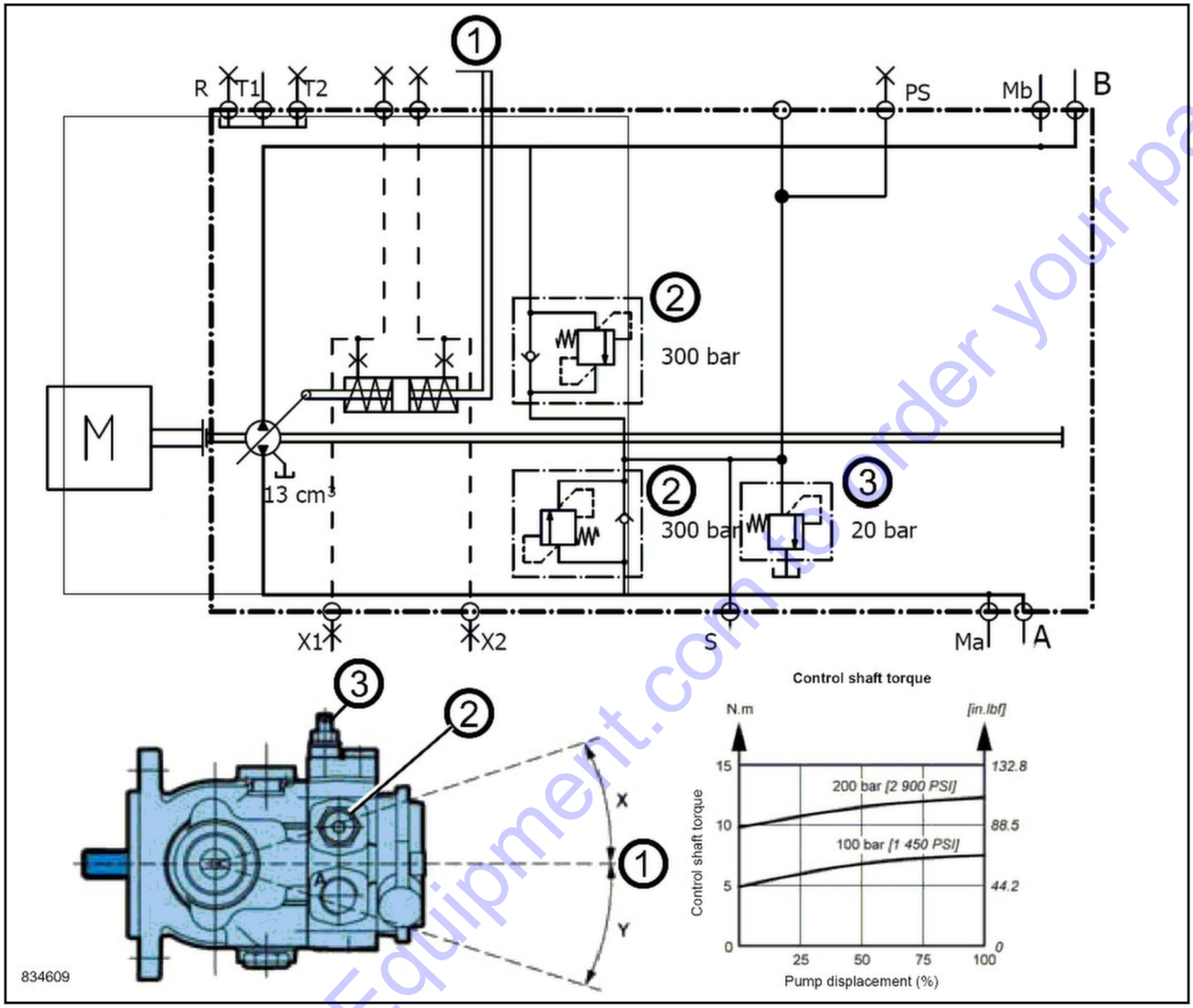


Fig. 93

Pos	Designation	Pos	Designation
1	mechanical control	A	Work connection
2	High pressure relief valves	B	Work connection
3	Charge pressure relief valve	M	Motor
		M_a	Pressure test port, pressure A
		M_b	Pressure test port, pressure B
		P_S	Control pressure inlet
		R	Ventilation
		S	Pressure port for charge circuit

Pos	Designation	Pos	Designation
		T_1	Leak oil
		T_2	Leak oil
		X_1 X_2	Port for control pressures, pressure in front of nozzle

High pressure relief and charge pressure valve

High pressure relief valves with integrated boost check valves

Pressure peaks occurring during very fast swashing processes, as well as the maximum pressures are safeguarded by superordinate high pressure relief valves, which open when the adjusted value is exceeded and relieve oil into the low pressure side. The fluid quantity always remains constant in the closed hydraulic circuit. Leakages in pump and motor are compensated by the charge pump.

The boost check valves are integrated in the high pressure relief valves. These valves open to the low pressure side and let cool and filtered oil flow from the charge oil circuit into the closed hydraulic circuit, in order to compensate leaks and flushing quantities.

Charge pressure relief valve

The charge pressure valve belongs to the group of safety elements in a closed hydraulic circuit. This valve limits the pressure in the charge circuit to the pre-adjusted value.

5.3.2 Travel motor TG405

Torque motor TG405, gerotor motor

Gerotor motors are slow running hydraulic motors with high torque.

With a given oil flow and a given pressure the displacement of the motor (nominal size of motor) determines both the speed and the torque.

This means:

a) that the speed is determined by the supplied oil flow and

b) the torque depends on the available pressure.

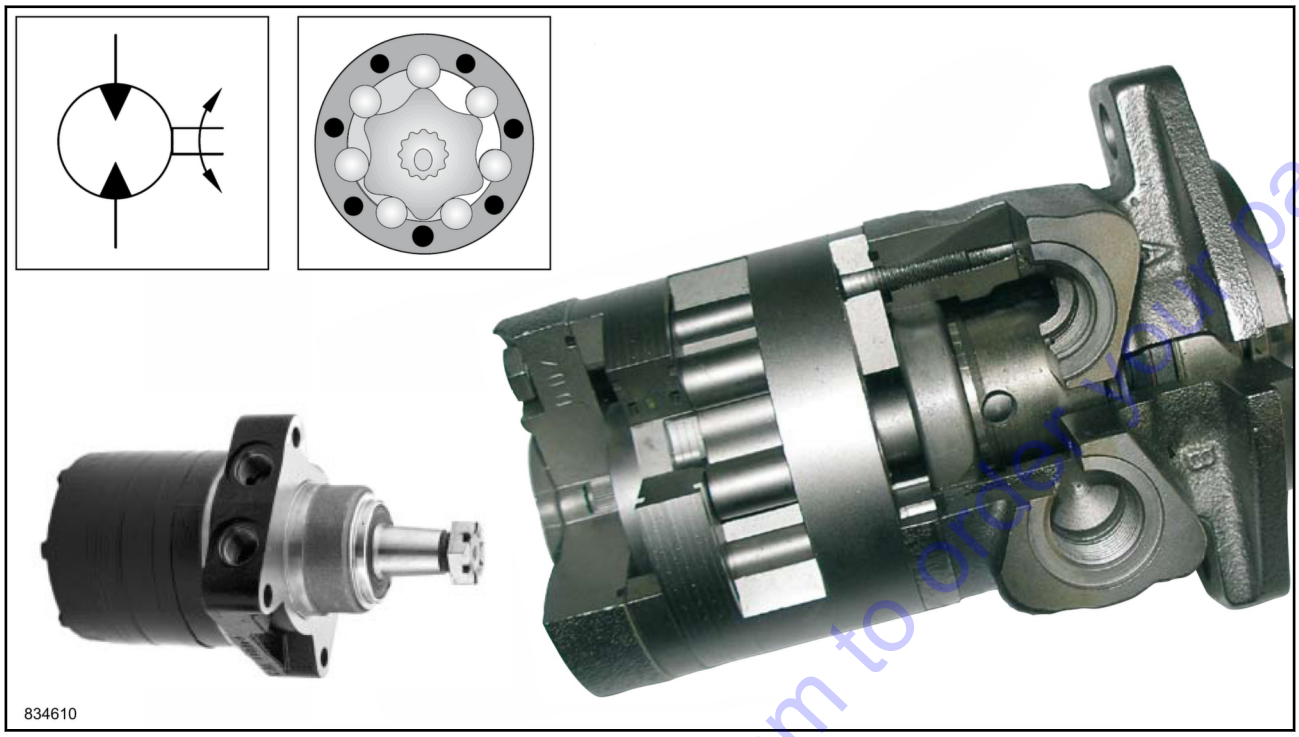


Fig. 94

The drive sets of the hydraulic motors consist of a housing section with internal gearing and a gear wheel, the centre of which during rotation orbits around the centre of the ring gear.

Notes on repair

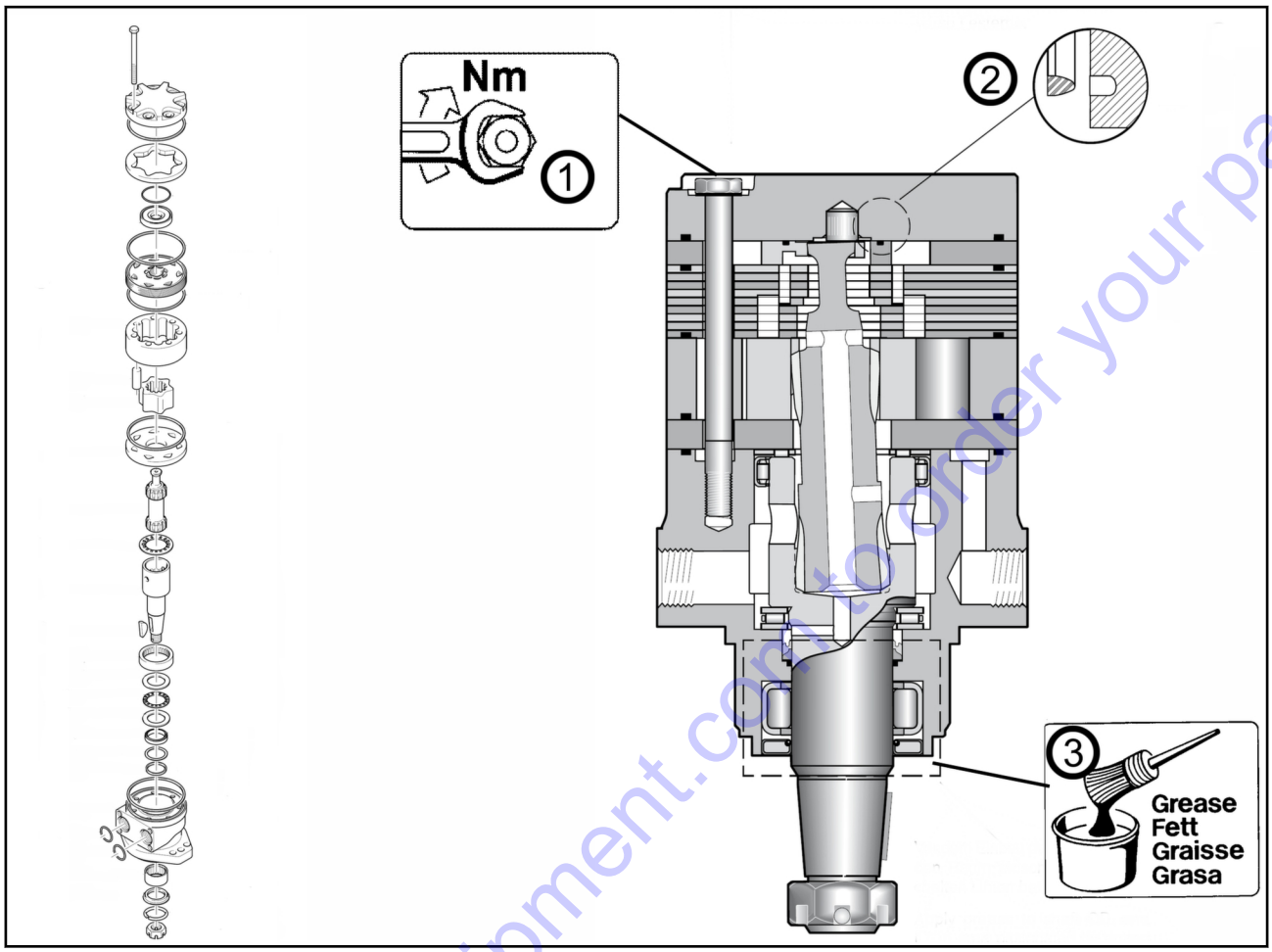


Fig. 95

1) 61 to 75 Nm tightening torque alternately on 7 screws.

2) Insert commutator completely with new seal. The flat side of the seal faces towards the outside.

3) Before assembling the drive shaft thoroughly grease the space between the dashed lines.

5.3.3 Steering valve

The steering unit works hydrostatically, i.e. there is no mechanical connection between the steering wheel and the wheels to be steered (articulated joint, drum, etc.). The mechanical connection is replaced by hydraulic piping and hoses between the steering unit and the steering cylinder(s).

When the steering wheel is operated, the steering unit measures the exact oil quantity proportional to the rotation of the steering wheel. This oil quantity is directed to the steering cylinders.

The steering unit mainly consists of a rotary spool valve and a metering pump (gear set). The steering column connects the steering unit to the steering wheel of the vehicle. When turning the steering wheel, the rotary spool valve makes sure that oil from the steering pump is guided through the gear set to the cylinder ports L or R, depending on the turning direction of the steering wheel. The gear set measures the oil flow to the steering cylinder proportionally to the turning angle of the steering wheel.

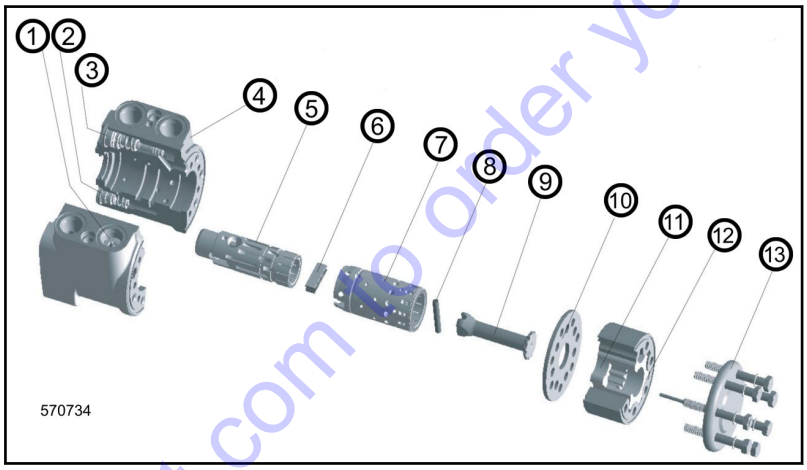


Fig. 96

1 Check valve
2 Shock valve
3 Pressure limiting valve
4 Housing with replenishing valves
5 Inner spool
6 Neutral position spring
7 Pin
8 Outer spool
9 Cardan shaft
10 Distributor plate
11 Gear
12 Ring gear
13 Cover

The steering valve is additionally equipped with a pressure limiting valve which limits the steering pressure.

Suddenly occurring pressure peaks, which may be caused by e.g. external influences such as driving against a curb stone, are compensated by two shock valves, which are integrated in the steering valve. Each of these shock valves is fitted with an additional replenishing valve. These replenishing valves protect the system against cavitation which could be caused by the reaction of the shock valves.

A check valve inside the steering unit makes sure that the hydraulic oil cannot flow to the steering pump if outside forces are introduced. In such a case, the steering cylinders would act as pumps and press the oil back to the pump.

5.4 Description of hydraulic circuits

5.4.1 Travel circuit

The travel circuit is a closed hydraulic circuit, it consists mainly of the travel pump **PMVO13S** with the integrated safety elements, the travel motors and the check valve.

The travel pump has the task of supplying the travel circuit with hydraulic oil.

The travel motors are connected in series and drive the drums.

The gear pump flanged to the travel pump is responsible for vibration, steering and the charge circuit, the return flow from the steering valve passes through the charge oil filter and the charge oil port on the travel pump.

The **filter** is equipped with a **bypass valve**. This valve opens at a differential pressure (pressure difference between filter inlet and filter outlet) of Δp = 3.5 bar. This differential pressure depends on the filter contamination and the viscosity of the hydraulic oil.

Contamination indicator

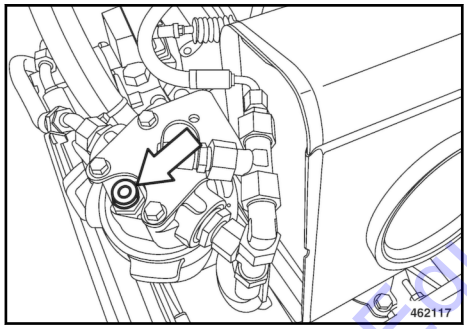


Fig. 97

The filter is equipped with a contamination indicator, the indicator pin of which pops out at a differential pressure of Δp = 2.5 bar.

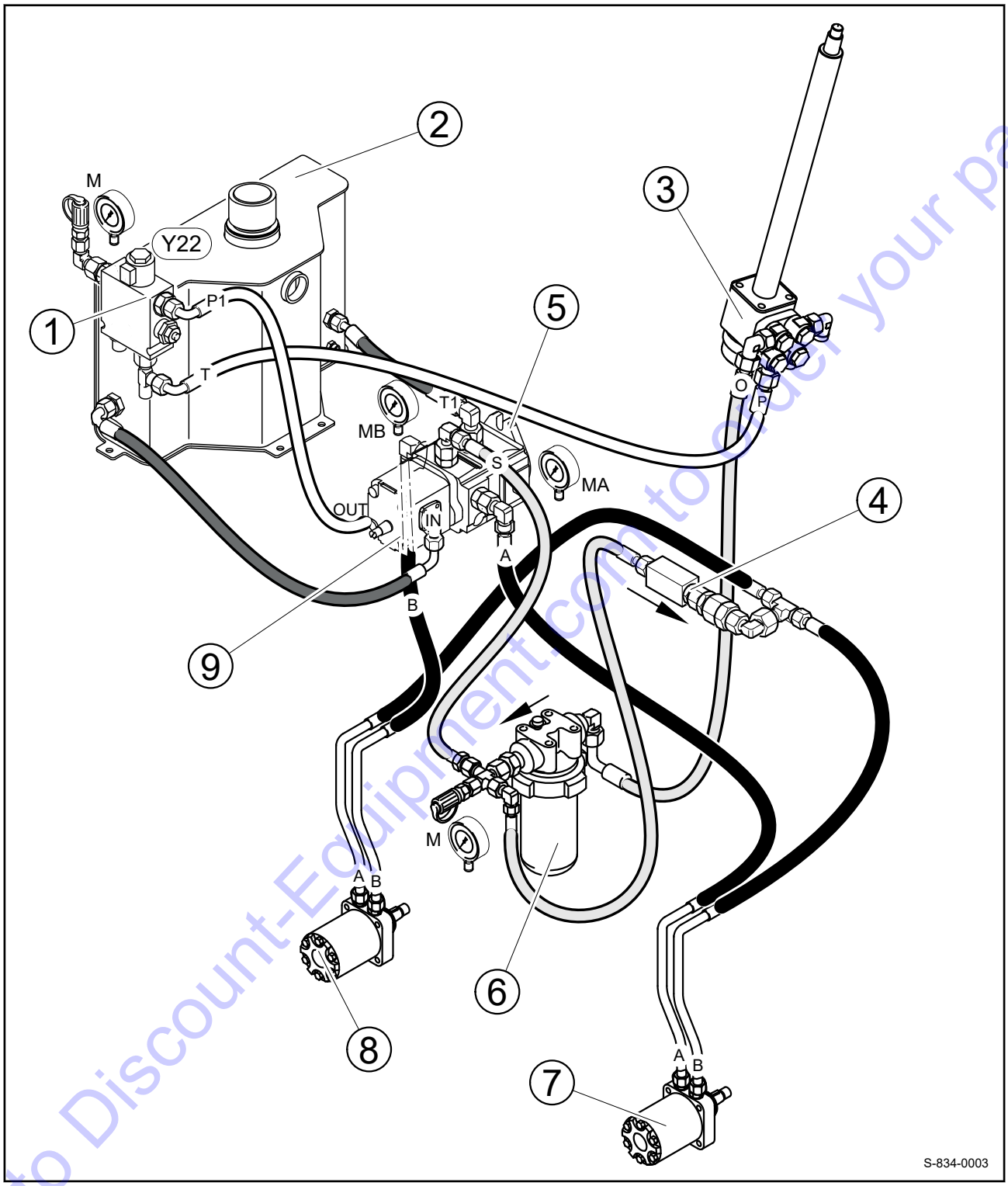


Fig. 98

1 Vibration valve (Y22) with pressure test port
2 Hydraulic oil tank
3 Steering valve
4 Check valve, 1 bar
5 Travel pump

6 Charge oil filter with pressure test port
7 Rear drum drive motor
8 Front drum drive motor
9 Steering / charge / vibration pump
M Pressure test ports

Brake

Hydrostatic braking

During travel operation the machine is braked by the closed hydraulic circuit. When moving the travel lever to neutral position the supply from the pump is interrupted, the machine is hydrostatically braked.

5.4.2 Vibration circuit

The vibration circuit is an open hydraulic circuit.

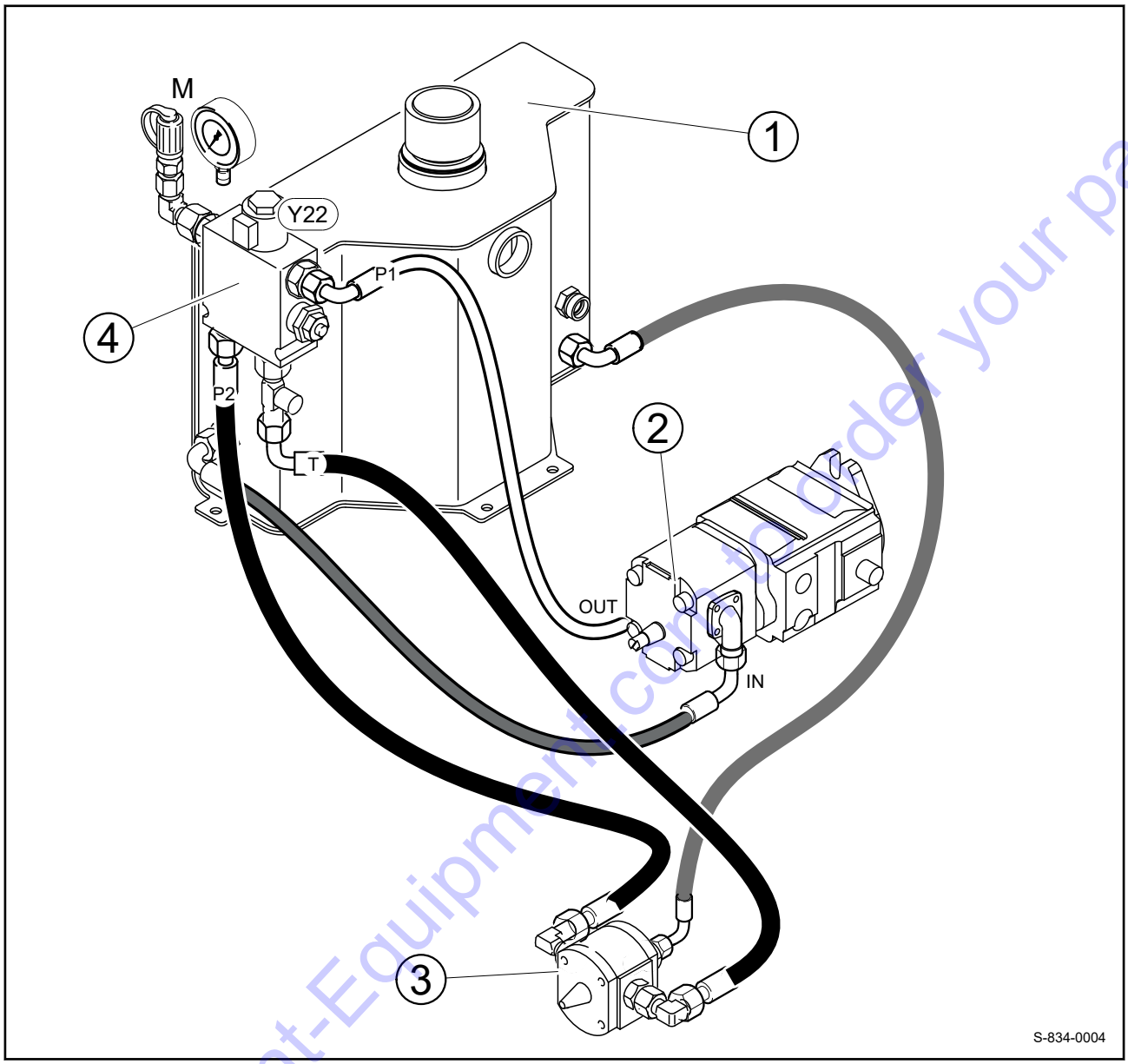


Fig. 99

1 Hydraulic oil tank
2 Steering / charge / vibration pump
3 Vibration motor
4 Vibration valve (Y22) with pressure test port
M Pressure test port

Vibration drive

The vibration pump delivers the hydraulic oil from the tank to the vibration valve (Y22). When the vibration is switched on, hydraulic oil flows to the vibration motor.

Rotation of the vibration motor causes rotation of the exciter shaft. The eccentric weights attached to the exciter shaft generate the vibration of the drum.

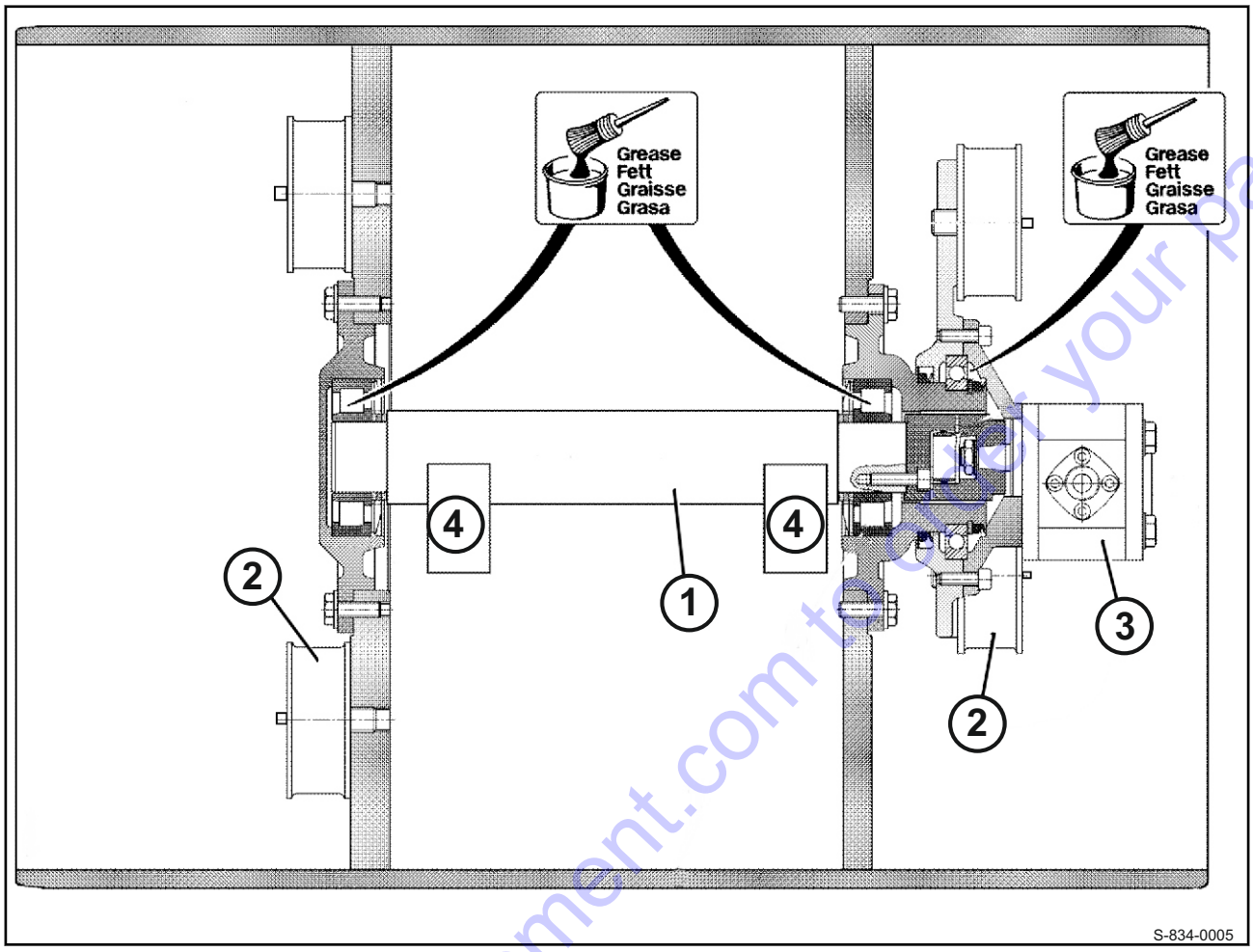


Fig. 100

1 Exciter shaft
2 Rubber buffer
3 Vibration motor
4 Weights

5.4.3 Steering circuit

The steering circuit is an open hydraulic circuit.

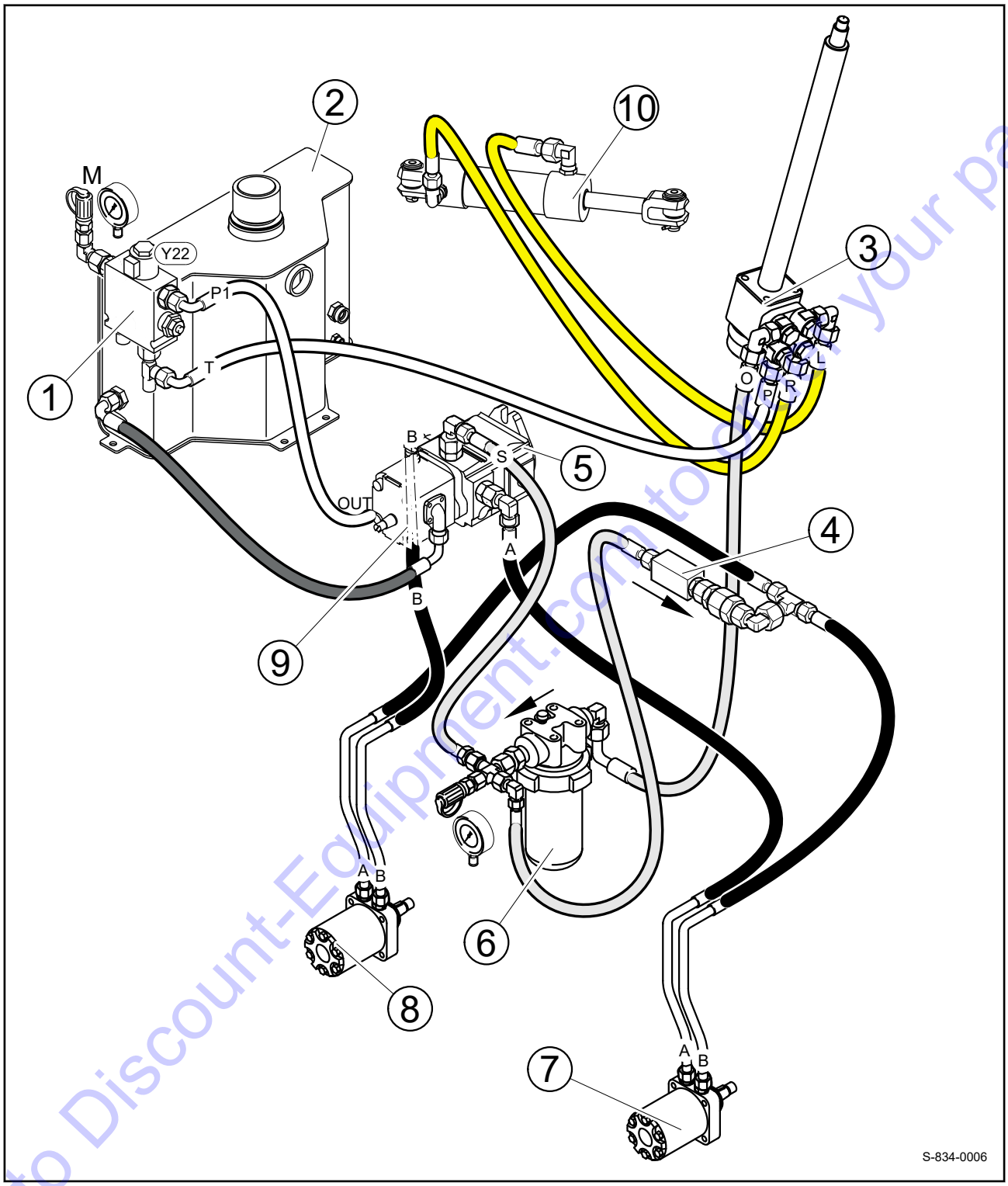


Fig. 101

1 Vibration valve (Y22) with pressure test port
2 Hydraulic oil tank
3 Steering valve
4 Check valve, 1 bar
5 Travel pump

6 Charge oil filter with pressure test port
7 Rear drum drive motor
8 Front drum drive motor
9 Steering / charge / vibration pump
10 Steering cylinder
11 Pressure test port

The steering pump delivers the hydraulic oil from the tank through the vibration valve to the steering orbitrol and to the steering cylinder. If the steering is not operated, the complete oil flow will flow through the charge oil filter to the charge ports of the travel circuit. When turning the steering wheel, the distributor valve directs the oil flow to the piston or piston rod side of the steering cylinder.

A metering pump inside the steering unit measures the exact oil quantity required for the steering wheel rotation and feeds it to the steering cylinder. The steering cylinder is extended or retracted and this articulates the machine.

5.5 Tests and adjustments

5.5.1 Checking the rotation speeds

Special tools
Vibration reed frequency meter

NOTICE!

Perform measurements at operating temperature of the hydraulic oil (40 °C).

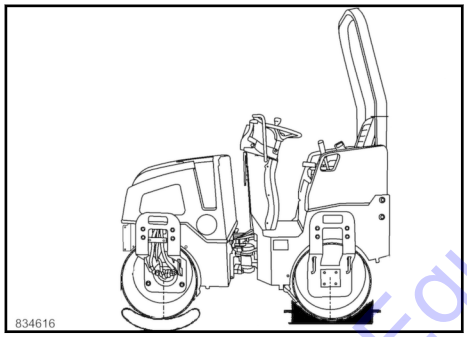


Fig. 102

1. Drive the drum of the machine onto an elastic base (rubber buffers) ↳ Fig. 102 and block the rear drum additionally with suitable chocks.

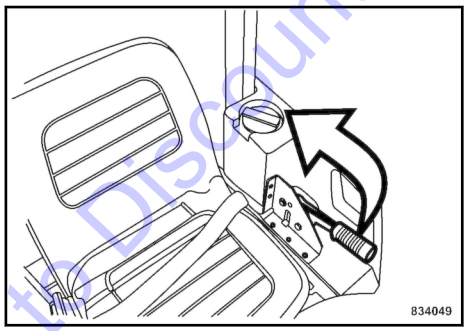


Fig. 103

2. Pull up the parking brake lever. ↳ Fig. 103.

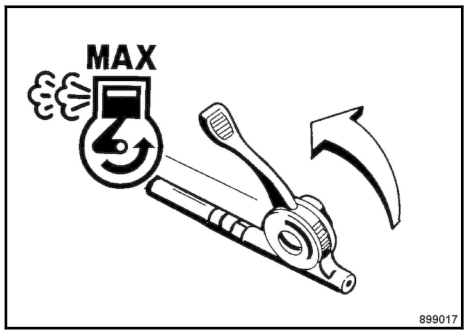


Fig. 104

3. Start the engine and shift the throttle lever to max. speed position ↳ Fig. 104.

Checking the engine speed

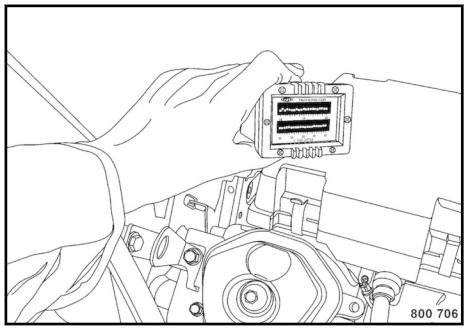


Fig. 105

1. Measure the speed, rest the measuring instrument on your thumb ↳ Fig. 105.

⇨

Nominal value high idle speed
See technical data.

2. Switch the vibration on.

⇨

Nominal value nominal speed
See technical data.

Evaluation of test
If the nominal value is not reached, perform trouble shooting for the petrol engine.

Checking the exciter shaft speed

1. Switch the vibration on at max. engine speed.
2. Measure the speed of the exciter shaft by letting the measuring instrument rest on your thumb ↳ Fig. 106.

⇨

Nominal value
See technical data.

Evaluation of measurement
If the nominal value is not reached, perform troubleshooting on the engine or in the vibration circuit.

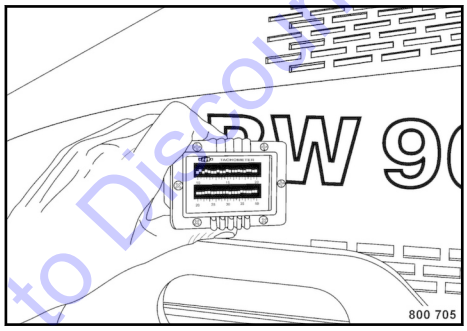


Fig. 106

5.5.2 Pressure tests in the travel circuit

Special tools
Hydraulic test case

NOTICE!

Perform measurements at operating temperature of the hydraulic oil (40 °C).

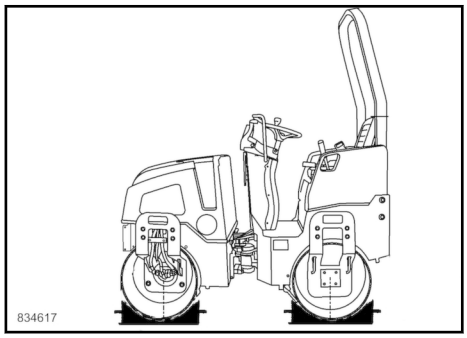


Fig. 107

1. Block the drums with suitable chocks ↳ Fig. 107.

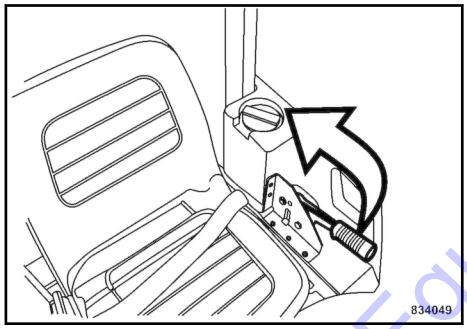


Fig. 108

2. Pull up the parking brake lever. ↳ Fig. 108.

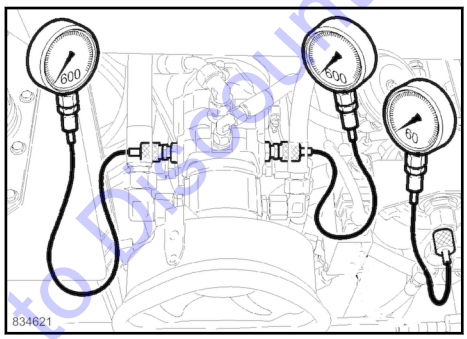


Fig. 109

3. Connect 600 bar pressure gauges to the high pressure test ports for M_A and M_B and a 60 bar pressure gauge ↳ Fig. 109 to the charge pressure test port.

NOTICE!

Do not activate the vibration and do not steer while checking the pressure.

This would destroy the 60 bar pressure gauge.

4. Start the engine and shift the throttle lever to max. speed position.

5. Read charge and high pressure gauges.

⇨

Nominal value

Charge pressure gauge: See technical data.

High pressure gauge: Both identical pressure (charge pressure).

Evaluation of test

If the nominal value is not reached, check the steering/charge pump.

6. Move the travel lever quickly forward and backward, read the pressure gauges.

⇨

Nominal value

See technical data.

Evaluation of test

If the charge pressure drops below the nominal value during the high pressure test, check the individual components.

If the specified high pressure is not reached, check the travel pump.

If the starting pressure is reached to one travel direction only, check the high pressure relief valves.

5.5.3 Adjusting the neutral positions of the travel pump

Special tools

Hydraulic test case

NOTICE!

Perform measurements at operating temperature of the hydraulic oil (40 °C).

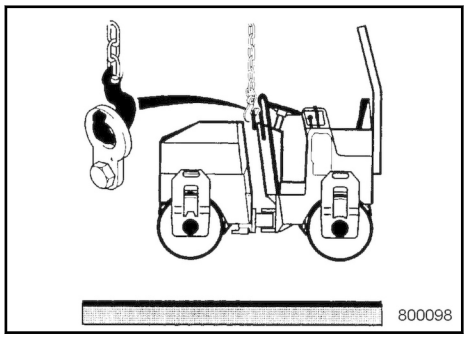


Fig. 110

1. Raise the machine ↳ Fig. 110, so that both drums can turn freely.

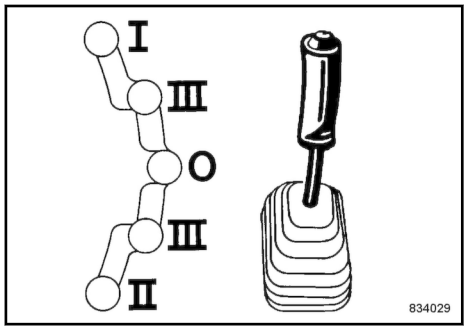


Fig. 111

2. Shift the travel lever to position “0” ↳ Fig. 111.

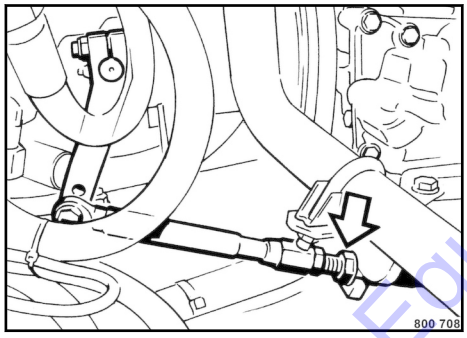


Fig. 112

3. Start the engine and run it with maximum speed.
4. Adjust the travel control cable ↳ Fig. 112 so that both drums stop.

5.5.4 Travel pump high pressure test

Special tools
Hydraulic test case

NOTICE!

Perform measurements at operating temperature of the hydraulic oil (40 °C).

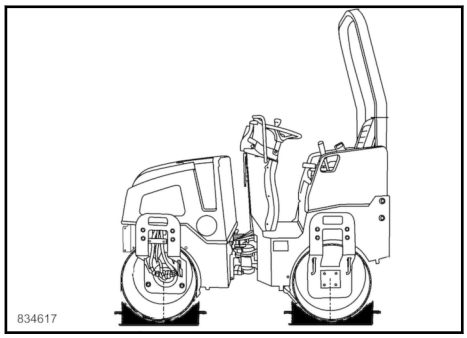


Fig. 113

1. Block the drums with suitable chocks ↳ Fig. 113.

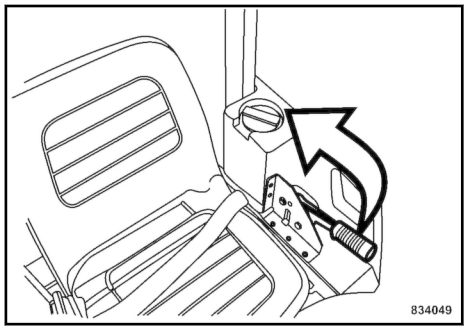


Fig. 114

2. Pull up the parking brake lever ↳ Fig. 114.

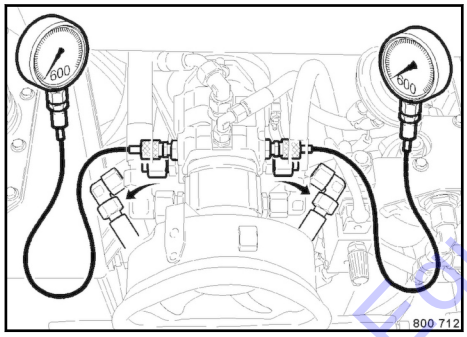


Fig. 115

3. Connect 600 bar pressure gauges ↳ Fig. 115 to high pressure test ports M_A and M_B.
4. Close high pressure ports M_A and M_B with plugs.

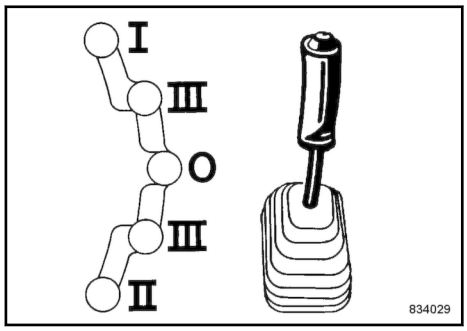


Fig. 116

5.

NOTICE!

Run the following pressure test for max. 3 seconds.

Move the travel lever quickly to both travel directions ↳ Fig. 116 and read the high pressure gauges.

⇨

Nominal value

approx. 320 bar

Evaluation of measurement

If the nominal value is reached in one travel direction only, check the high pressure limiting valves.

If the nominal value is not reached in both directions, check the travel pump; replace if necessary.

5.5.5 Pressure tests in the vibration circuit

Special tools

Hydraulic test case

NOTICE!

Perform measurements at operating temperature of the hydraulic oil (40 °C).

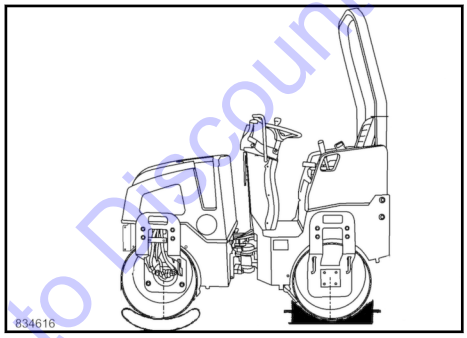


Fig. 117

1. Drive the drum of the machine onto an elastic base (rubber buffers) ↳ Fig. 117 and block the rear drum additionally with suitable chocks.

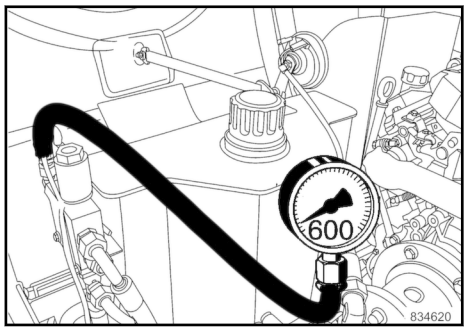


Fig. 118

2. Connect a 600 bar pressure gauge to the pressure test port on the vibration valve ↳ Fig. 118.
3. Start the engine and shift the throttle lever to max. speed position.

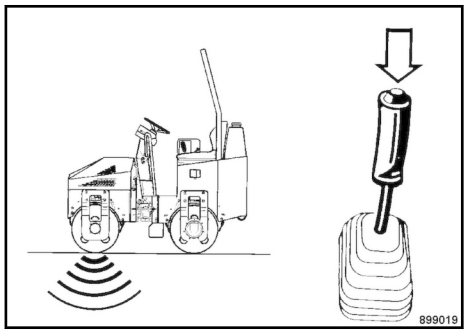


Fig. 119

4. Switch the vibration on ↳ Fig. 119.

⇨

Nominal value

Start-up pressure = see technical data.

Operating pressure = see technical data.

If starting pressure is not reached, check the vibration control valve block.

If the starting pressure is reached, but the operating pressure is too low, you should also check the leakage quantity of the vibration motors.

If the operating pressure is too high, the bearings for both vibrator shafts must be checked.

5.5.6 Vibration pump high pressure test

Special tools

Hydraulic test case

NOTICE!

Perform measurements at operating temperature of the hydraulic oil (40 °C).

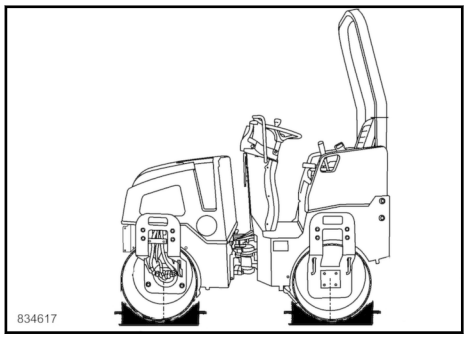


Fig. 120

1. Block the drums with suitable chocks ↳ Fig. 120.

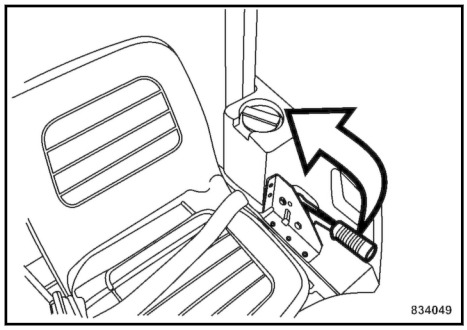


Fig. 121

2. Pull up the parking brake lever. ↳ Fig. 121.

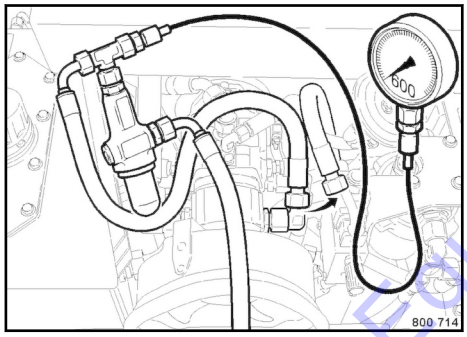


Fig. 122

3. **NOTICE!**

   Run the following pressure test for max. 3 seconds.

   Close the pump outlet ↳ Fig. 122 with a 200 bar pressure limiting valve.

4. Start the engine for a moment.

⇨

Nominal value
approx. 200 bar

Evaluation of test
If the nominal value is not reached, replace the vibration pump.

5.5.7 Checking the leakage rate of the vibration motor

NOTICE!

Perform measurements at operating temperature of the hydraulic oil (40 °C).

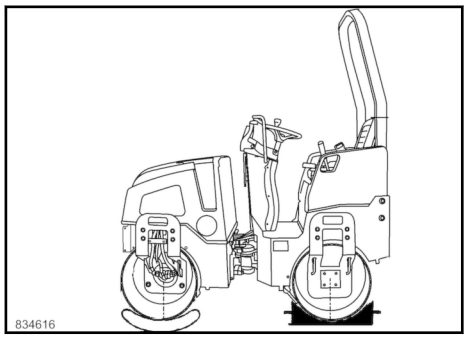


Fig. 123

1. Drive the drum of the machine onto an elastic base (rubber buffers) ↳ Fig. 123 and block the rear drum additionally with suitable chocks.

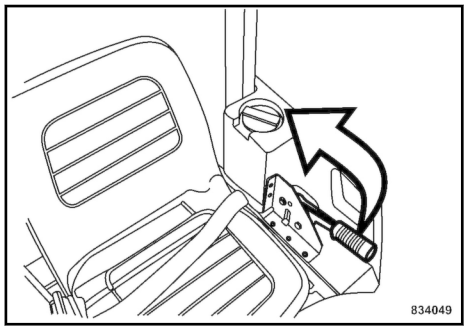


Fig. 124

2. Pull up the parking brake lever. ↳ Fig. 124.

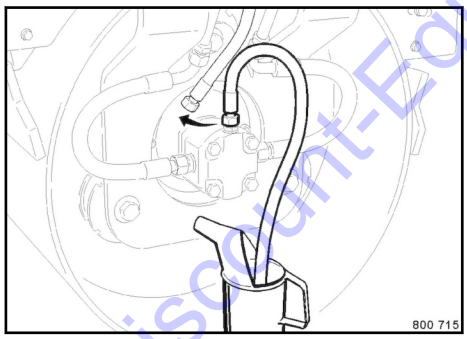


Fig. 125

3. Disconnect the leak oil hose ↳ Fig. 125, connect a measuring hose and hold it into a measuring beaker.
4. Start the engine and shift the throttle lever to max. speed position.
5. Switch the vibration on and measure the running out leak oil during one timed minute.

⇨

Nominal value

max. 0.25 litre/min

Evaluation of test

If the permissible leak oil rate is exceeded, replace the vibration motor.

5.5.8 Pressure tests in the steering circuit

NOTICE!

Perform measurements at operating temperature of the hydraulic oil (40 °C).

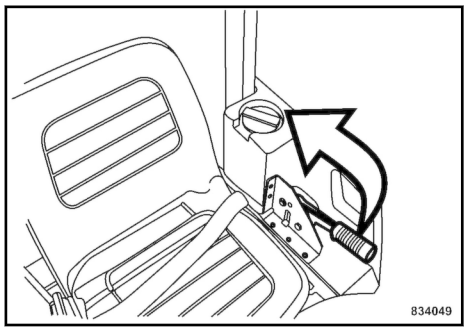


Fig. 126

1. Pull up the parking brake lever. ↳ Fig. 126.

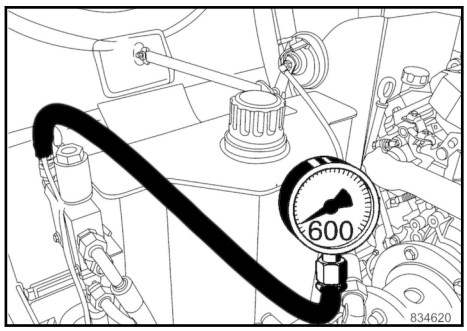


Fig. 127

2. Connect a 600 bar pressure gauge to the steering pressure test port ↳ Fig. 127.

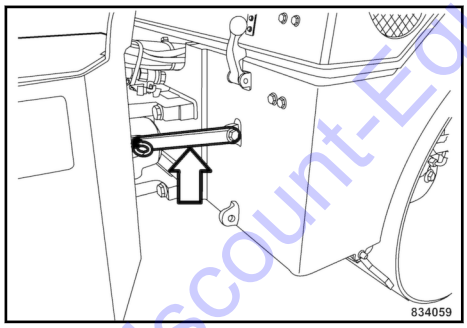


Fig. 128

3. Engage the articulation lock ↳ Fig. 128.
4. Start the engine and run it at idle speed.
5. Operate the steering system and read the pressure gauge.

Nominal value

approx. 100 bar

Evaluation of test

If the nominal value is reached, check the steering cylinder.

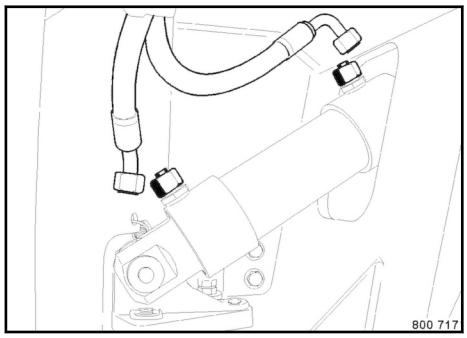


Fig. 129

6. Disconnect the hydraulic hoses ↳ Fig. 129 from ports L and R on the steering cylinder and close them with plugs.

7. Repeat the pressure test.

Nominal value
approx. 10 bar

Evaluation of test
If the nominal value is reached, replace the steering cylinder.

If the nominal value is not reached, check the steering/charge pump.

8. Reconnect the hydraulic hoses to the steering cylinders.

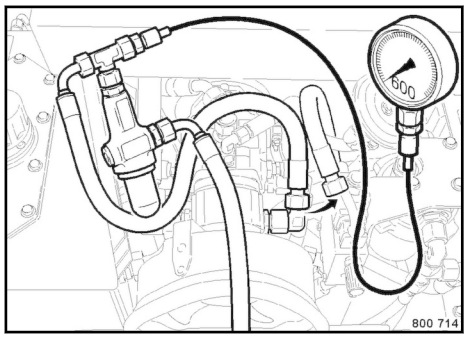


Fig. 130

9. Close the pump outlet ↳ Fig. 130 with a 200 bar pressure limiting valve.

10. Run the engine for a short while with idle speed and read the pressure gauge.

⇨

Nominal value
approx. 200 bar

Evaluation of test
If the nominal value is reached, replace the steering valve.

If the nominal value is not reached, replace the steering/charge/vibration pump.

5.6 Flushing and bleeding

5.6.1 Flushing in general

NOTICE!

Changing a component

– Always flush the complete oil circuit after you have replaced a component.
– Particulate contamination circulating in fluid systems causes surface damage due to generally known wear mechanisms (abrasion, erosion, surface fatigue).

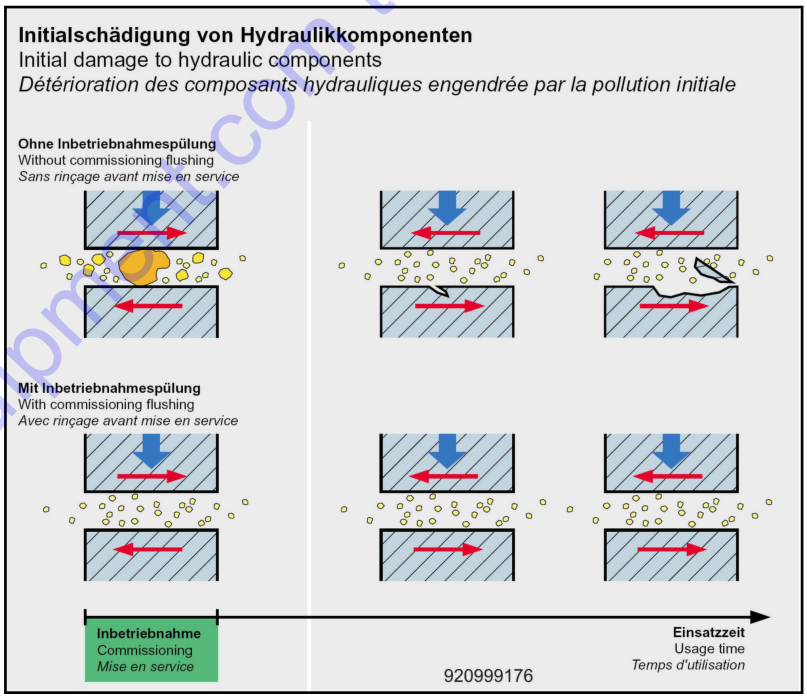


Fig. 131

Effect of contamination

- Coarse particles (>15 µm)
  – Sudden failure of components.
- Fine particle contamination (5–15 µm)
  – Wear of components, internal leaks, inaccurate controlling behaviour, blockage of valves.
- Extra fine particle contamination (<2–5 µm)
  – Silting of oil, accelerated ageing of oil, corrosion.

- Water in oil
  - Increased wear, accelerated ageing of oil.
- Chips (abrasion) in the oil
  - Open and clean all components in the oil circuit; replace if necessary.
  - Clean all high pressure hoses in the oil circuit; replace if necessary.
  - If abrasion is found in the travel circuit you should also flush the vibration circuit.
  - If abrasion is found in the vibration circuit you should also flush the travel circuit.

Before flushing

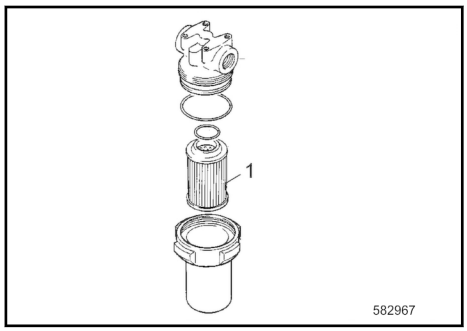


Fig. 132

1. Change the filter element (1).

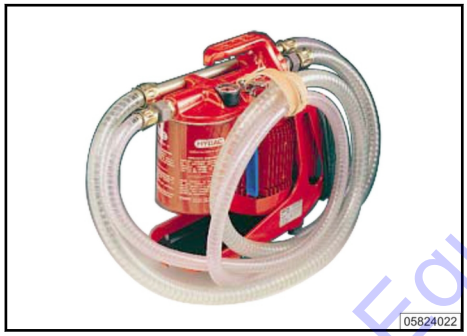


Fig. 133

2.

NOTICE!

Clean the hydraulic tank

Change the oil in case of excessive contamination, oil discolouration or if the oil change interval is almost due.

Filter the tank content with the filling and filtering unit and pump it into an oil container.

3. Mark all hoses and disconnect them from the hydraulic oil tank.

4. Clean the oil tank thoroughly from inside; remove the tank cover, if necessary.

5. Reconnect all hoses.

6. Fill the hydraulic oil tank again with the filling and filtering unit.

Bleeding

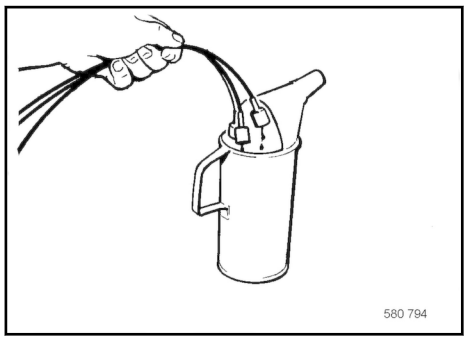


Fig. 134

1. Always bleed closed hydraulic circuits if lines had been removed or connected.

Servicing the flushing filter kit

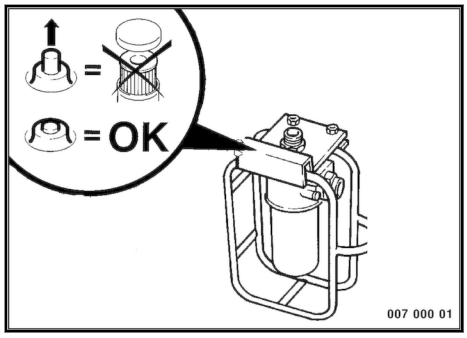
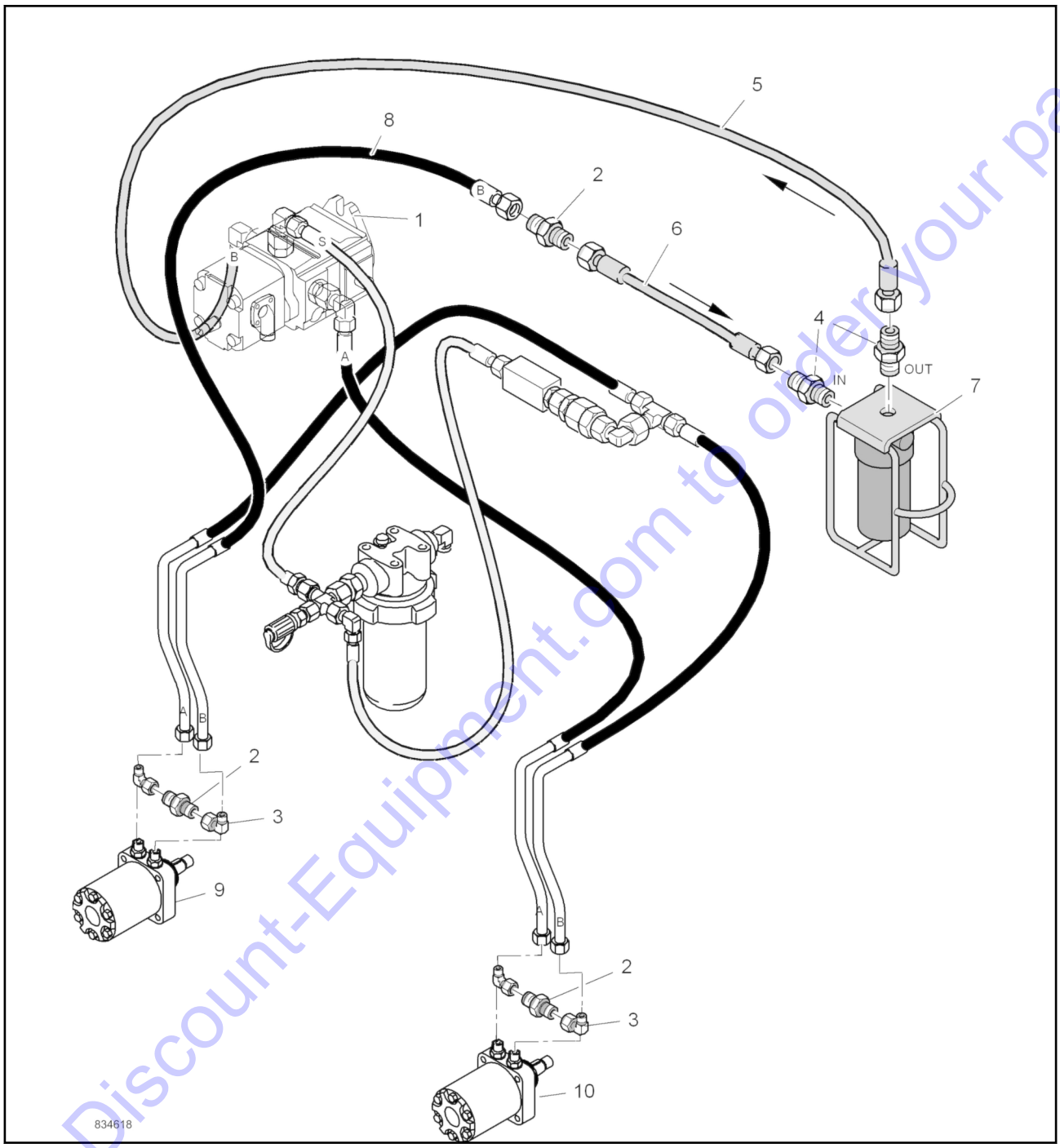


Fig. 135

1. Replace the filter element of the flushing filter when the red control pin of the contamination indicator is pressed out during the flushing process.
2. Clean hoses and connections and store the flushing kit in a clean and protected environment.

5.6.2 Flushing schematic for travel system



1 Travel pump
2 Bulkhead fitting (tool)
3 Elbow union (tool)
4 Screw socket 1" - 25S (tool)
5 Flushing hose 25S - 20S (tool)
6 Flushing hose 25S - 20S (tool)
7 Flushing filter with filter element 1µ (tool)

8 Hose connection, travel pump B - drum drive motor, front
9 Front drum drive motor
10 Rear drum drive motor

5.6.3 Flushing the travel system

Observe the chapter "Flushing - General"

Installing the flushing filter

NOTICE!

Before the installation of the filters check hoses and connections for cleanliness.

The flushing filter must be installed in the low pressure side in the return flow to the pump, so that only cleaned oil will enter the travel pump.

With the connection shown in the illustration the travel pump must therefore be actuated to forward direction.

1. Disconnect the high pressure hose (8) from the travel pump (port B) and connect it with the flushing hose (6) flushing filter inlet “IN” (see chapter “Flushing diagram travel system”).
2. Connect the flushing hose (5) flushing filter outlet “OUT” to the high pressure port (B) on the travel pump.

Disconnecting the drum drive motors

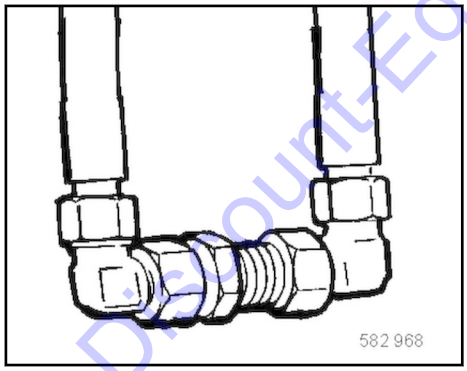


Fig. 136

1. Take the drum drive motors (9 & 10) out of the hydraulic circuit and join the hoses together.

Bleeding the travel circuit

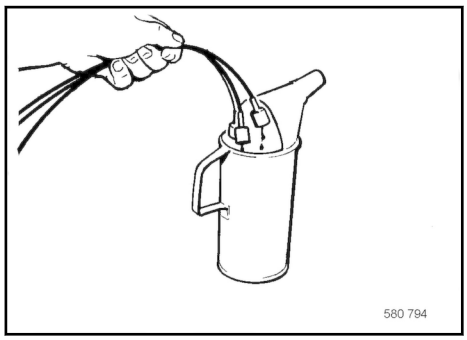


Fig. 137

1.

Bleeding the travel circuit, see chapter "Bleeding the travel circuit".

Flushing the hoses

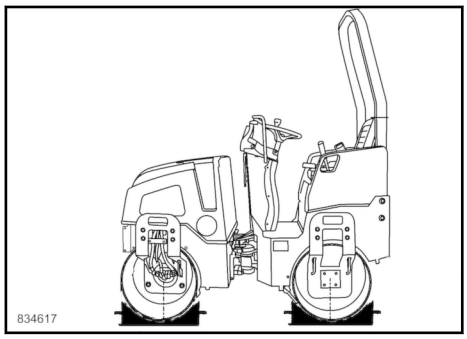


Fig. 138

1. Block the drums with suitable chocks.

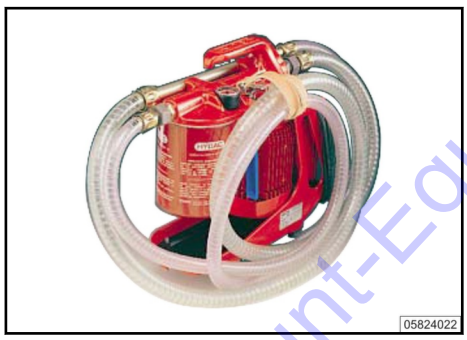


Fig. 139

2.

Keep circulating the complete tank content with the filling and filtering unit throughout the entire flushing process.

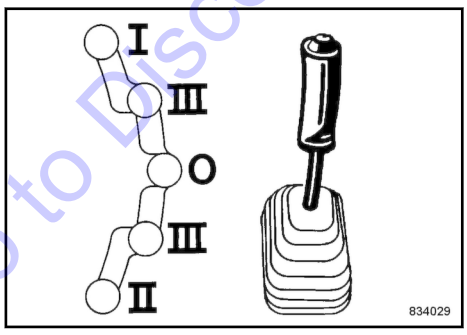


Fig. 140

3.

NOTICE!

Move the travel lever only to travel direction forward, as otherwise the flushing filter will be subjected to oil flow from the wrong direction.

Start the engine and shift the travel lever to travel direction forward.

4. Perform the flushing process at various engine speeds for approx. 10 minutes.

5. Shut down the engine.

6. Reconnect the high pressure hoses to the drum drive motors.

Flushing the drum drive motor

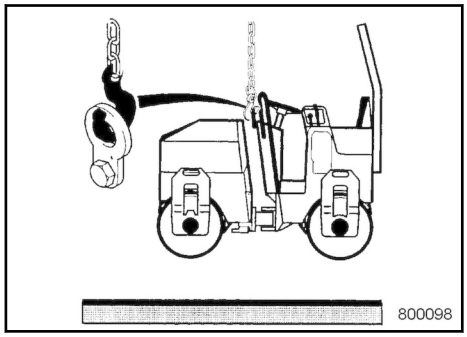


Fig. 141

1. **WARNING!**
Danger of accident!
The drums must be able to rotate freely.

Jack or lift up the machine.

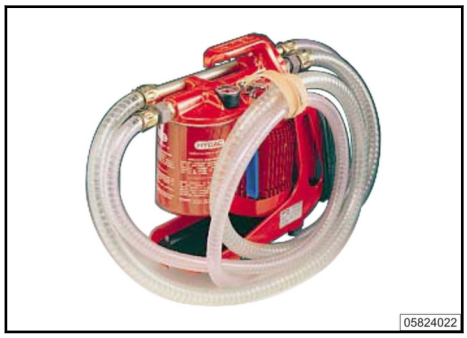


Fig. 142

2. *Keep circulating the complete tank content with the filling and filtering unit throughout the entire flushing process.*

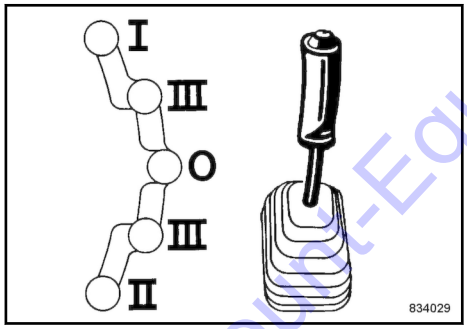


Fig. 143

3. **NOTICE!**
Move the travel lever only to travel direction forward, as otherwise the flushing filter will be subjected to oil flow from the wrong direction.

Start the engine, run it with maximum speed and shift the travel lever to travel direction forward.

4. Run the flushing procedure for approx. 10 minutes. During this process keep changing the pump flow by shifting the travel lever several times between full and half speed in reverse travel.
5. Shut down the engine.
6. Remove the flushing filter and reconnect the high pressure hoses.

Bleeding the travel circuit

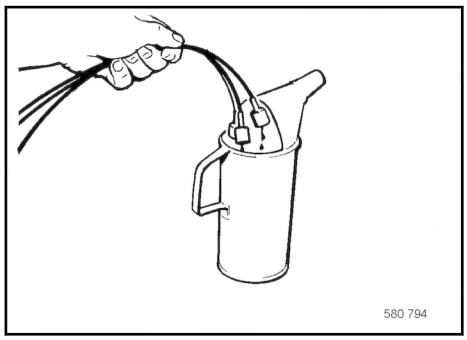


Fig. 144

1.

Bleeding the travel circuit, see chapter "Bleeding the travel circuit".

Circulating the tank content

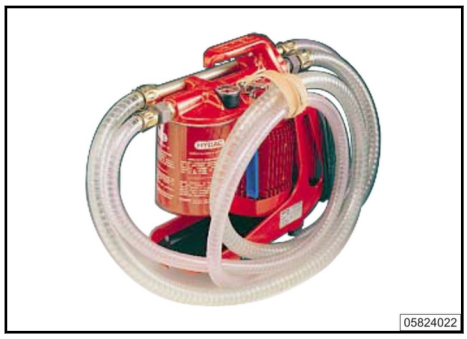


Fig. 145

1. After completing the bleeding process circulate the tank content with the filling and filtering unit for another 15 minutes.

Function test

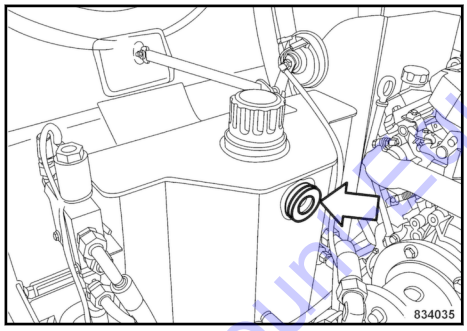


Fig. 146

1. Check the hydraulic oil level in the tank; fill up if necessary.
2. Check all connections for leaks with the engine running (visual inspection).
3. Perform a test drive, load the travel system in forward and reverse travel, e.g. by driving uphill or starting on a gradient.
4. Check all ports and connections once again for leak tightness (visual inspection).

5.6.4 Bleeding the travel circuit

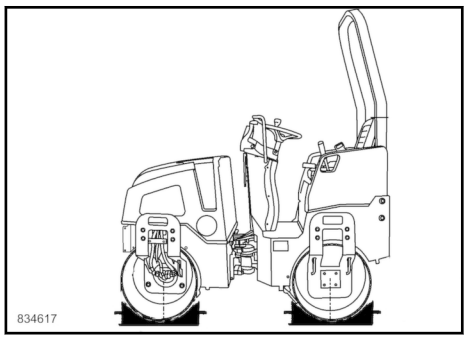


Fig. 147

1. Secure the drums with chocks.

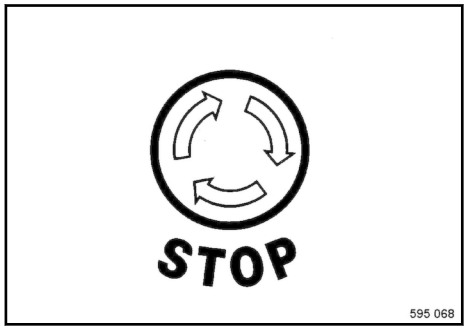


Fig. 148

2. Actuate the emergency stop switch.

⇨

WARNING!

The engine must not start.

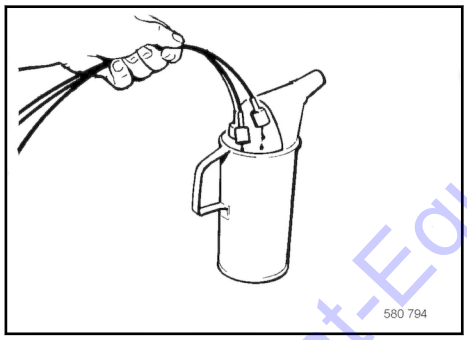


Fig. 149

3. Install a pressure test hose to the charge pressure test port.
4. Install a pressure test hose each to the high pressure test ports.
5. Hold the open ends of the pressure test hoses ↳ Fig. 149 into a container.
6. Operate the starter motor for approx. 30 seconds. Wait one minute and repeat this procedure until oil starts to run out of the pressure test hoses.
7. Remove the pressure test hoses.

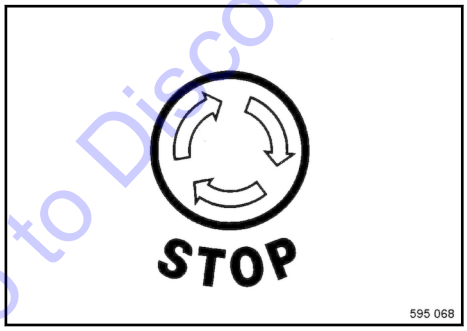


Fig. 150

8. Unlock the emergency stop switch.

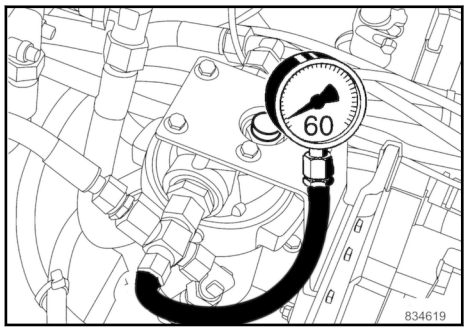


Fig. 151

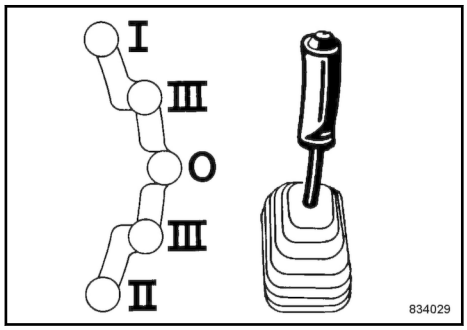


Fig. 152

9. Connect a 60 bar pressure gauge ↳ Fig. 151 to the charge pressure test port and run the engine max. 15 seconds at idle speed.

10. Wait for approx. 30 seconds and keep repeating this procedure until the gauge shows a constant charge pressure reading.

11.

NOTICE!

With the flushing filter installed shift the travel lever only to travel direction forward, as otherwise the flushing filter will be subjected to oil flow from the wrong direction.

WARNING!

Only run the engine with idle speed.

12. Start the engine.

13. Shift the travel lever ↳ Fig. 152 approx. 1/3 to forward direction.

14. After approx. 1 to 2 minutes shut down the engine for a minute.

⇨

This waiting time is necessary to allow air bubbles to escape through the leak oil return line.

15. After a waiting time of approx. 1 minute keep repeating this procedure, until the indicated charge pressure drops directly to zero when shutting down the engine.

5.7 Inspection and maintenance work

5.7.1 Maintenance Table

5.7.2 Checks prior to start up

5.7.2.1 Checking the hydraulic oil level

NOTICE!

If, during the daily inspection of the oil level the hydraulic oil level is found to have dropped, check all lines, hoses and components for leaks.

In hydraulic systems filled with Panolin Synth. 46 use only the same oil to top up. With other ester based oils consult the lubrication oil service of the respective oil manufacturer.

For quality of oil refer to the "table of fuels and lubricants".

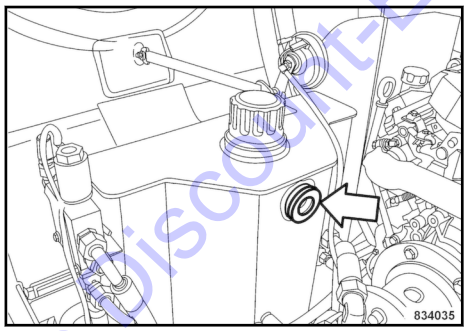


Fig. 153

1. Check the oil level in the oil level inspection glass ↳ Fig. 153.

At room temperature of approx. 68 °F (20 °C) the hydraulic oil level should reach approx. the middle of the inspection glass.

1. If the oil level is too low top up hydraulic oil immediately.

5.7.2.2 Checking the hydraulic oil filter element

NOTICE!

If the hydraulic oil is very cold the pin may pop up, you should therefore only check the filter and press the pin in at operating temperature.

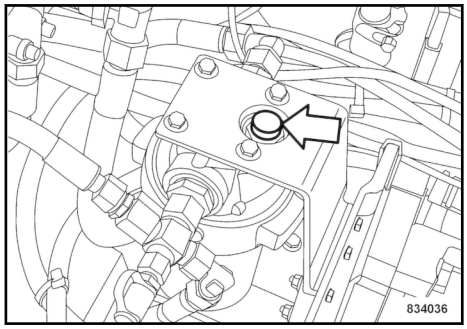


Fig. 154

1. Check the contamination indicator ↳ Fig. 154 at operating temperature and with the engine running at maximum speed.
2. If necessary press the pin in.

Pin remains pressed in	Hydraulic oil filter element o.k.
Pin pops out	Replacing the hydraulic oil filter element

5.7.3 Every 2000 operating hours

5.7.3.1 Changing the hydraulic oil

See also the notes on the hydraulic system in the chapter "General notes on maintenance".

WARNING!

Danger of scalding!

When draining off hot hydraulic oil!

NOTICE!

The hydraulic oil must also be changed after major repairs in the hydraulic system.

Perform the oil change when the hydraulic oil is warm.

Replace the hydraulic oil filter elements with every hydraulic oil change.

Change the filter only after the hydraulic oil change and after the test run.

Clean the area round hydraulic oil tank, filler opening and breather filter.

Do not start the engine after draining the hydraulic oil.

Do not use any detergents to clean the system.

For quality and quantity of oil refer to the "table of fuels and lubricants".

When changing from mineral oil based hydraulic oil to an ester based biologically degradable oil, you should consult the lubrication oil service of the oil manufacturer for details.

ENVIRONMENT!

Catch running out oil and dispose of environmentally.

1. Drive the machine, until the hydraulic oil has reached operating temperature.

1. Shut down the engine.

1. Remove the cap from the hydraulic oil tank ↳ Fig. 155.

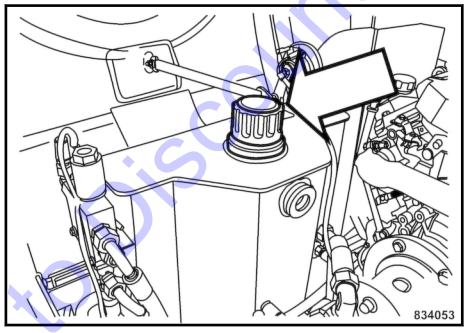


Fig. 155

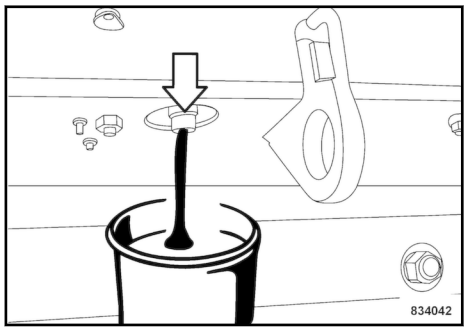


Fig. 156

1. Unscrew the plug from the hydraulic oil tank ↳ Fig. 156, drain off and collect all hydraulic oil.
2. Turn the plug tightly back in.

We recommend to use our filling and filtering unit with fine filter to fill the system. This ensures finest filtration of the hydraulic oil, prolongs the lifetime of the hydraulic oil filter and protects the hydraulic system.

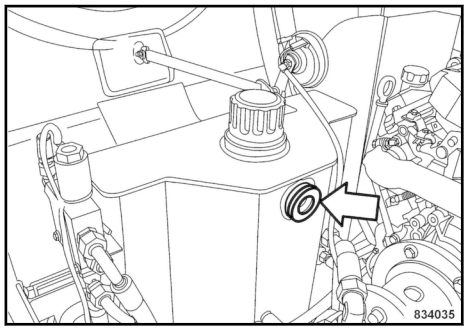


Fig. 157

1. Fill in new hydraulic oil.
2. Check the hydraulic oil level in the inspection glass ↳ Fig. 157.

NOTICE!

The breather filter for the hydraulic oil tank is integrated in the filler cap, you must therefore replace the complete filler cap.

1. Close the tank with a new cover.
2. Perform a test run and check the system for leaks.

5.7.3.2 Change the hydraulic oil filter

WARNING!

Danger of scalding!

Danger of scalding by hot oil when unscrewing the oil filter.

NOTICE!

If the filter has to be changed together with the hydraulic oil, the filter must only be changed after the oil change and after the test run.

Do not use the oil in the filter bowl again.

Visible dirt may be an early sign for the failure of system components and indicate the possible failure of components. In this case determine the cause and replace or repair the defective components, if necessary. Negligence may cause destruction to the entire hydraulic system.

Do not clean or reuse the filter element.

Apart from the normal oil change intervals, the filter element must also be changed after major repairs in the hydraulic system.

ENVIRONMENT!

Catch running out oil, dispose of oil and filter element environmentally.

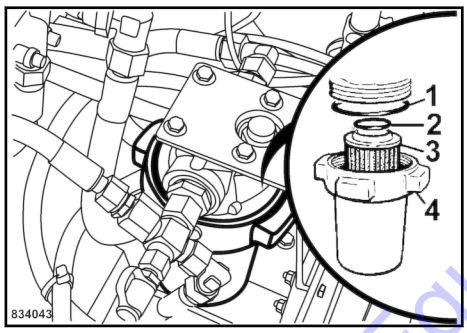


Fig. 158

1. Remove filter bowl (4) ↳ Fig. 158 with filter element (3).
2. Examine the surface of the filter element thoroughly for any visible dirt.
3. Take out the old filter element and clean filter bowl and thread.
4. Reassemble the filter bowl with a new filter element and new loop rings (1) and (2).
5. After a short test run check the filter for leaks.

6 Machine assemblies

6.1 Engine

6.1.1 Engine overview

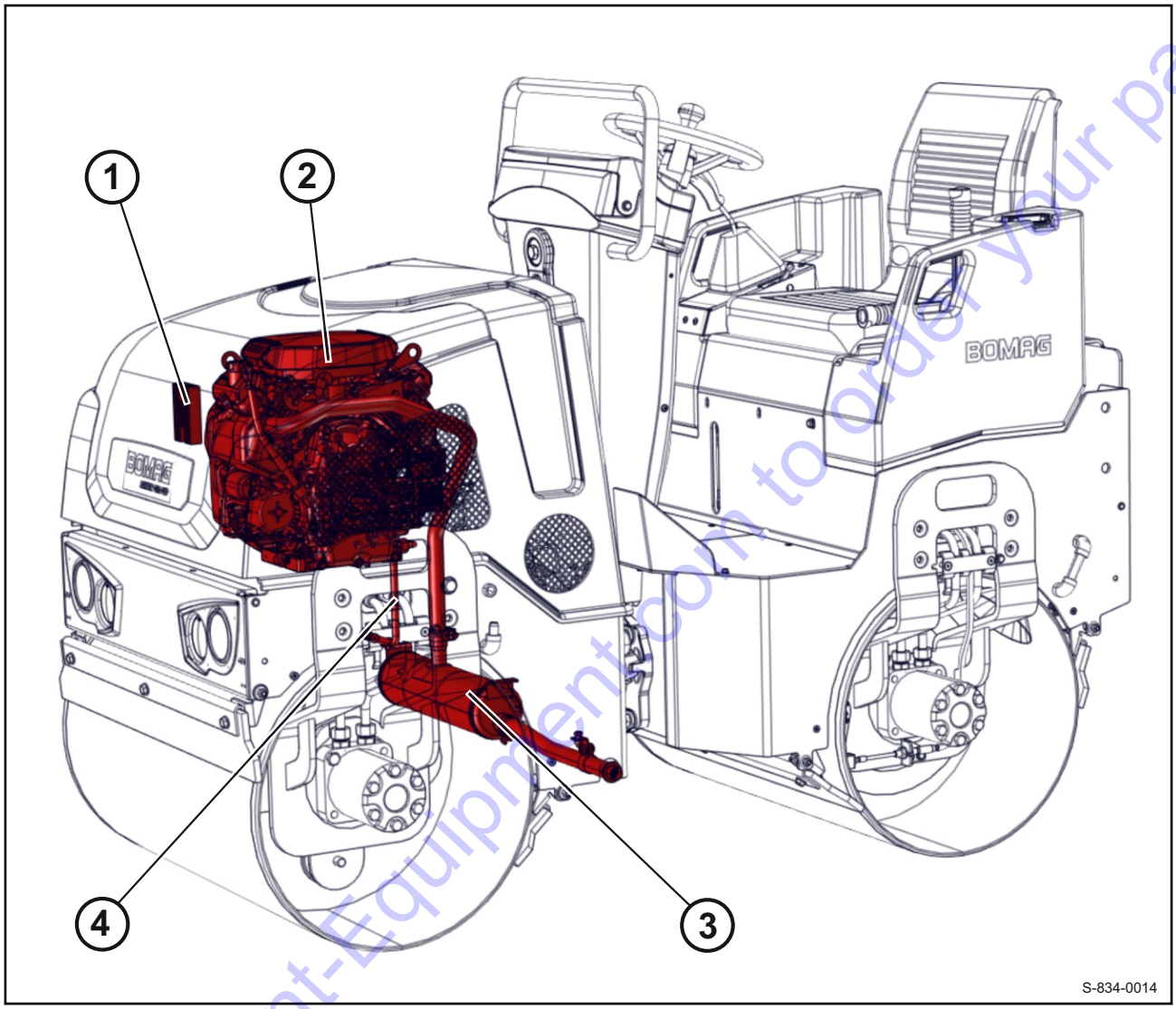


Fig. 159

1 Charge regulator (A61)
2 Engine
3 Exhaust system
4 Oil drain hose

Tandem vibratory rollers type BW 900-50 are powered by an air cooled Honda petrol engine series GX630. This engine is a four-stroke two-cylinder engine with suspended valves.

The engine is equipped with an electric fuel shut-down solenoid (Y58), which interrupts the fuel supply to the main carburettor nozzle when energized.

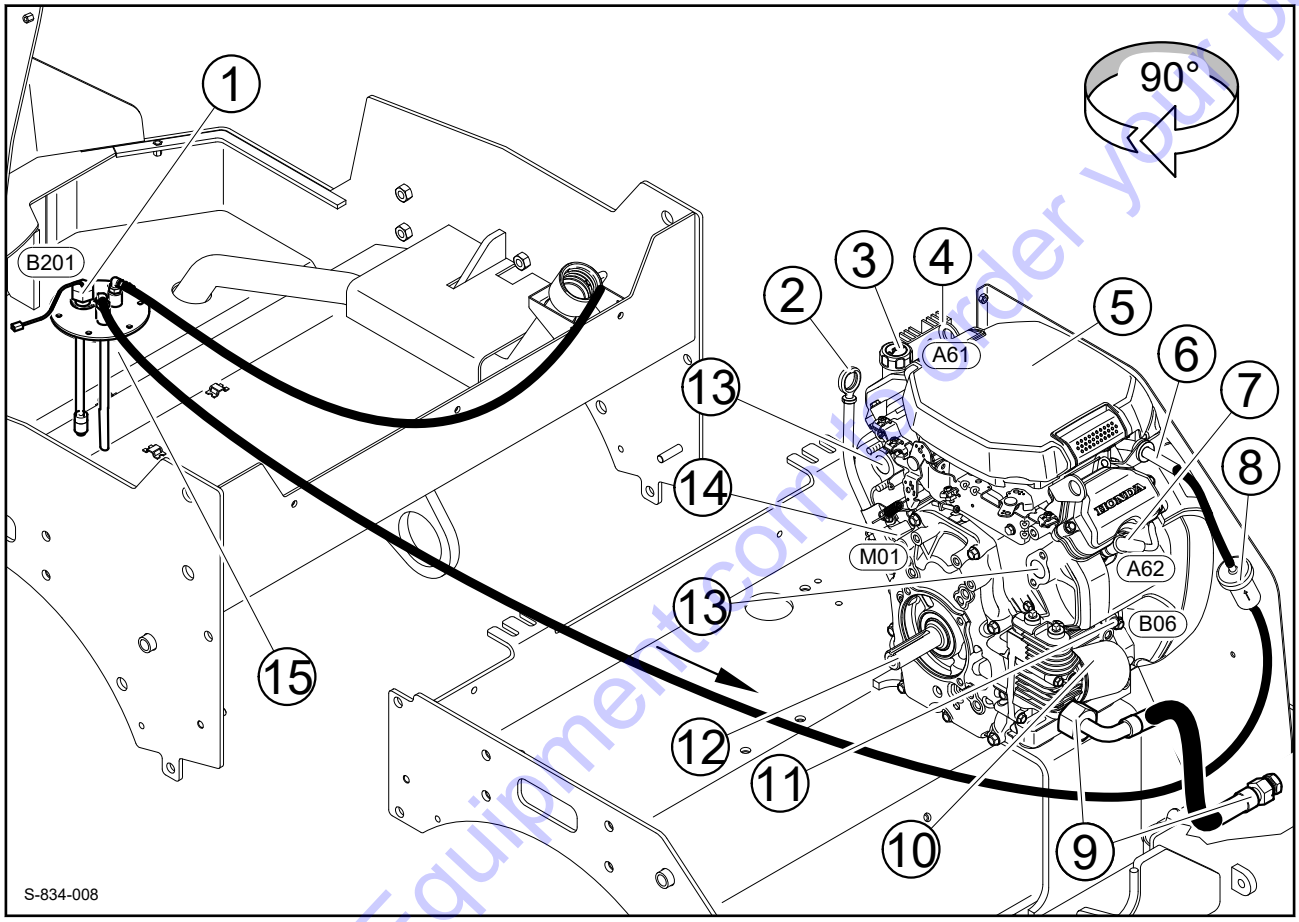


Fig. 160: Engine

1 Float switch for fuel (B201)
2 Oil dipstick
3 Oil filler neck
4 Charge regulator (A61)
5 Air filter
6 Connection for fuel pre-filter
7 Spark plug (A62)
8 Fuel pre-filter
9 Oil drain
10 Oil filter
11 Oil pressure switch (B06)
12 Crankshaft
13 Exhaust outlet
14 Starter motor (M01)
15 Fuel tank

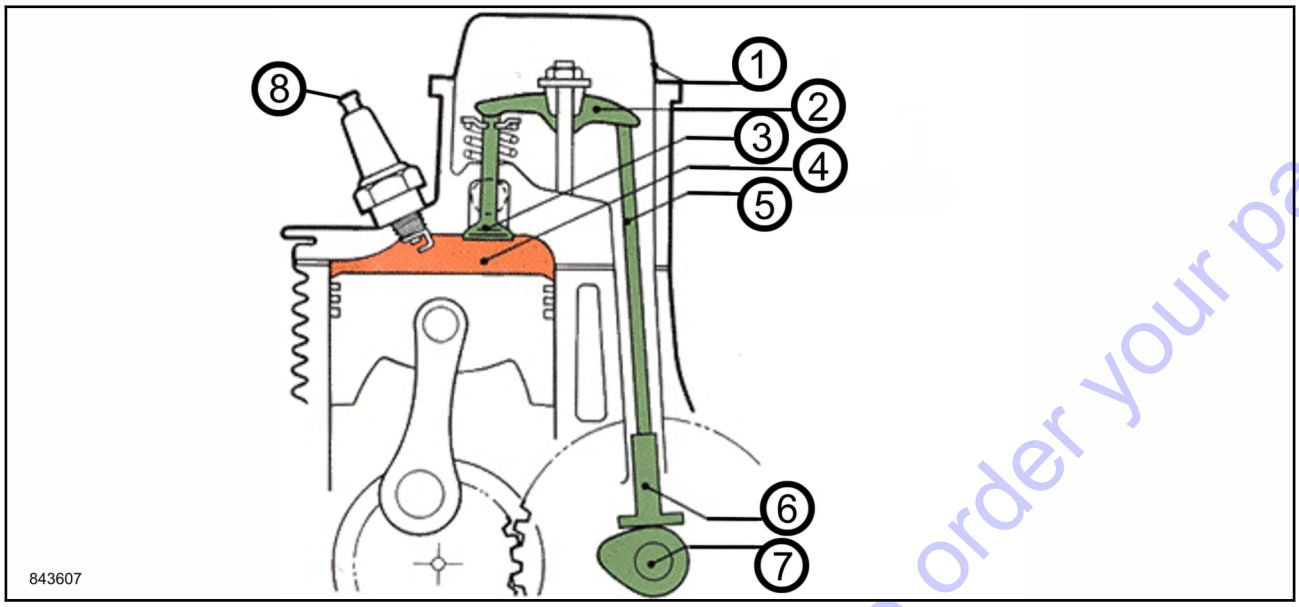


Fig. 161

1 Valve cover
2 Rocker arm
3 Exhaust valve
4 Combustion chamber
5 Push rod
6 Plunger
7 Camshaft
8 Spark plug

6.1.2 Carburettor inspection

Carburettor Check Sheet

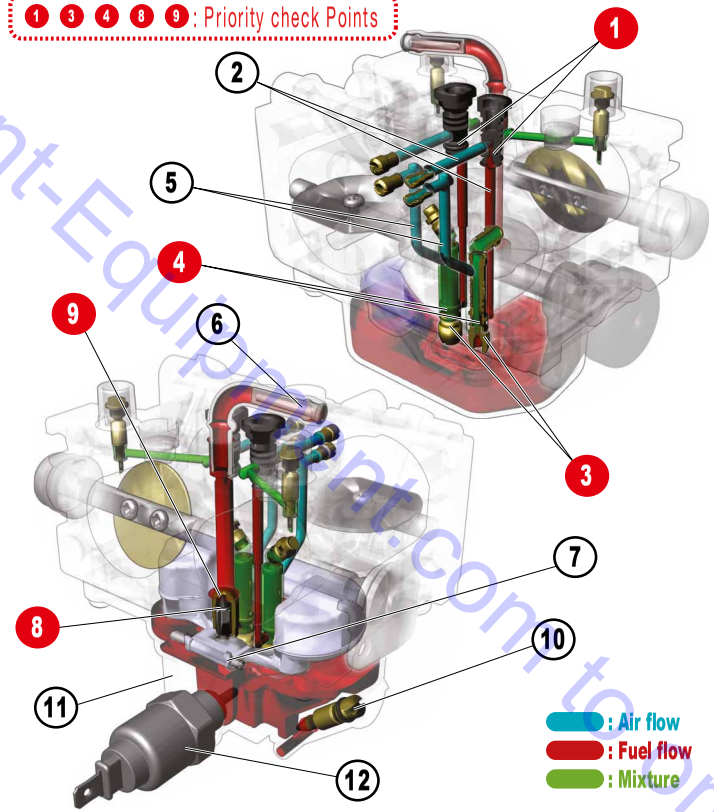
GX630/660/690

FUEL (Three Elements of Engine) COMPRESSION IGNITION

Before inspecting the fuel system, perform the minimum inspection for compression and ignition system.

HONDA ENGINES

1 3 4 8 9: Priority check Points



◆ Poor performance at low speed
◆ Unstable idle speed

Pilot jet clogged.	1	Remove foreign materials/dirt. (Use needle B (Ø 0.3) to clean)
Pilot jet air path clogged.	2	Remove foreign materials/dirt.

◆ Engine does not start or stop
◆ Hard starting
◆ Engine starts but quickly stops

Main jet clogged.	3	Remove foreign materials/dirt. (Use needle A (Ø 0.5) to clean)
Main nozzle clogged.	4	Remove foreign materials/dirt.
Main nozzle air path clogged.	5	Remove foreign materials/dirt.
Fuel strainer screen clogged.	6	Blow air and check the screen for clogging.
Float doesn't move properly.	7	Remove foreign materials around float pin.

Check of float chamber

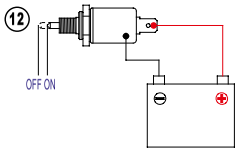
Water inside Float chamber cause engine failure.
Take off Float chamber and clean.

11

Fuel cut solenoid valve

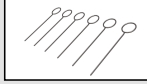
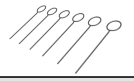
Connect the 12V battery to the fuel cut solenoid valve connector as shown.
Check the needle of the valve should retract in.

12



Using of Carburetor Cleaning Kit (Kit No.07JPZ-0010000)

Carburetor cleaning kit is useful to remove foreign materials/dirt.

Needle A (Ø 0.5) (Main jet)	Needle B (Ø 0.3) (Pilot jet)	Pump nozzle (Air blow to jets and Air paths)	Screw driver (Main jet assemble/disassemble)
			

◆ Engine speed does not increase
◆ Poor performance at high speed
◆ Unstable engine speed

Pilot jet clogged.	1	Remove foreign materials/dirt. (Use needle B (Ø 0.3) to clean)
Pilot jet air path clogged.	2	Remove foreign materials/dirt.
Main jet clogged.	3	Remove foreign materials/dirt. (Use needle A (Ø 0.5) to clean)
Main nozzle clogged.	4	Remove foreign materials/dirt.
Main nozzle air path clogged.	5	Remove foreign materials/dirt.
Fuel strainer screen clogged.	6	Blow air and check the screen for clogging.

◆ Overflow
◆ Gasoline leaks

Float valve worn or coated with foreign materials/dirt.	8	Remove foreign materials/dirt.
Valve seat worn or coated with foreign materials/dirt.	9	Remove foreign materials/dirt. (Don't damage the seat surface)

For long storage of the engine (More than 3 months).

10

Drain gasoline from float chamber by running the engine until it stops or by loosening the drain screw while engine is stopped.

www.honda-engines-eu.com

Printed in Belgium - Published by: Honda Europe NV European Engine Center - Specifications can be changed without notice - Edition: 7744 Nov. 2012

6.1.3 Inspection and maintenance work

6.1.3.1 Maintenance Table

6.1.3.2 Every 10 operating hours

6.1.3.2.1 Checking the engine oil level

NOTICE!

The machine must be in horizontal position.

For quality of oil refer to the "table of fuels and lubricants".

1. Start the engine and run it 1 to 2 minutes with idle speed.
2. Shut the engine down and wait 2 to 3 minutes.

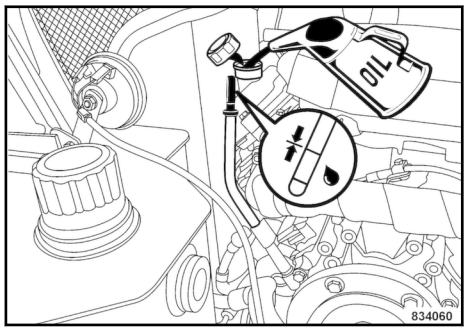


Fig. 162

1. Pull the dipstick ↳ Fig. 162 out, wipe it off with a lint-free, clean cloth and reinsert it until it bottoms.
2. Pull the dipstick back out.

The oil level must always be between the "MIN"- and "MAX"-marks.

1. If the oil level is too low top up oil immediately.
2. If the oil level is too high, determine the cause and drain the oil off.

6.1.3.2.2 Cleaning the cooling air intake openings

NOTICE!

Dirt in the cooling air intake openings reduces the cooling effect.

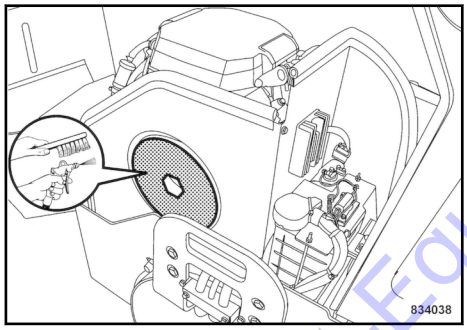


Fig. 163

1. Clean the cooling air intake openings ↳ Fig. 163.

6.1.3.3 Every 125 operating hours

6.1.3.3.1 Check, clean the air filter, replace if necessary

NOTICE!

A dirty oil filter obstructs the air flow to the carburettor, which then reduces the engine power.

In a dusty environment you should clean the air filter every day.

Damaged air filters must be replaced in any case. It is therefore recommended to keep at least one air filter in stock.

The air filter must be changed after 500 operating hours, but at the latest after 2 years.

Incorrectly handled filter cartridges may become ineffective because of damage (e.g. cracks) and cause damage to the engine.

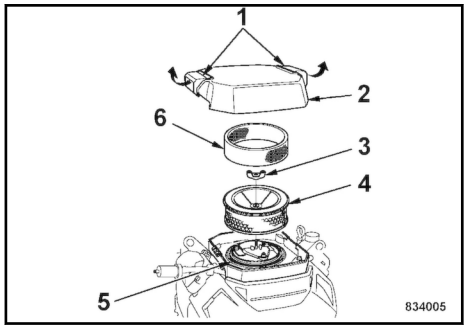


Fig. 164

1. Unscrew the air filter cover locking nut (1) ↳ Fig. 164 and remove the cover (2).
2. Unscrew the wing nut (3).
3. Take out the paper (4) and foam rubber inserts (6).
4. Separate the foasm rubber element from the paper filter insert.
5. Check both filter elements and replace if damaged.

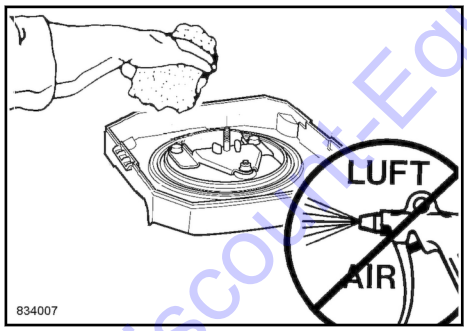


Fig. 165

1. Clean out the air filter housing with a cloth ↳ Fig. 165.

NOTICE!

Do not use compressed air to blow out the air filter housing.

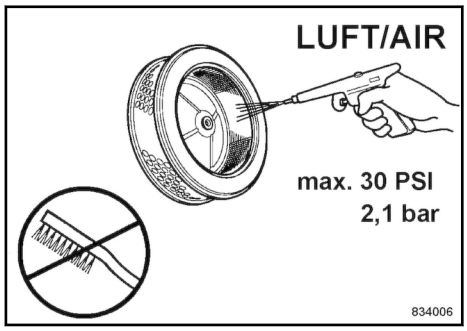


Fig. 166

WARNING!
Eye injury!
Wear safety goggles.

NOTICE!
Do not hold the compressed air nozzle closer to the filter than 1 in (3 cm)

1. Bang the paper filter element several times against a hard surface.
2. Blow out the paper filter element with clean compressed air and a maximum air pressure (max. 30 PSI/2.1 bar) ↳ Fig. 166.

1. Clean the foam rubber element in warm soapsuds, rinse and dry thoroughly.
2. Then submerge the foam rubber element in clean engine oil and finally press out all excess oil.

If the amount of oil remaining in the foam rubber element is too high, the engine will develop smoke during starting.

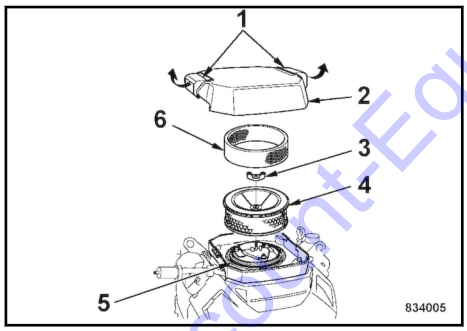


Fig. 167

1. Place the foam rubber element (6) ↳ Fig. 167 on the paper element (4).
2. Reinstall the assembled air filter. Make sure that the seal (5) under the air filter is present.
3. Tighten the wing nut (3).Tighten the screw (3).
4. Attach the filter cover (2) to the air filter housing and secure it with the air filter cover lockl (1).

6.1.3.3.2 Clean, check the spark plugs, replace if necessary

WARNING!
Danger of burning!
Let the engine cool down for approx. 15 minutes before unscrewing the spark plugs.

NOTICE!

Renew the spark plugs at the latest after 250 operating hours or once every year.

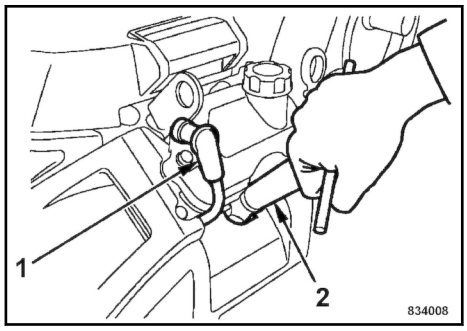


Fig. 168

1. Pull off the spark plug socket (1) ↳ Fig. 168 and clean off any dirt in the spark plug area.
2. Unscrew the spark plug with a spark plug spanner (2).

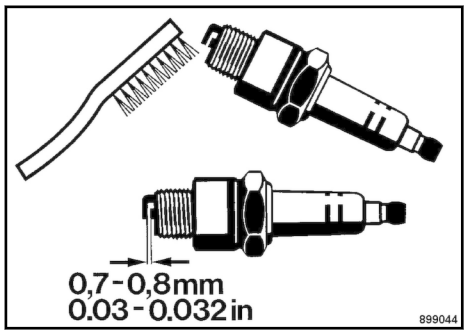


Fig. 169

1. Check the spark plug visually and clean it if necessary ↳ Fig. 169.

NOTICE!

In case of excessive combustion residuals or burned off electrodes replace the spark plug, ensure correct heat value of the spark plug.

Do not use spark plugs with incorrect heat value.

Recommended spark plug: ZFR5F (NGK)

1. Check the electrode gap with a feeler gauge, if necessary adjust the gap to0.03 - 0.032 in (0.7 - 0.8 mm).
2. Turn the spark plug carefully in by hand.
3. Tighten the spark plug with a spark plug spanner, until it is correctly seated.
4. Tighten a new spark plug for another 1/2 turn.
5. Tighten used spark plugs by another 1/8 to 1/4 turn.

NOTICE!

A loose spark plug can overheat and damage the engine.

Overtightening the spark plug can damage the thread in the cylinder head.

1. Press the spark plug socket back on.

6.1.3.3.3 Changing engine oil and oil filter

WARNING!
Danger of scalding!
When draining off hot oil.
By hot oil when unscrewing the engine oil filter.

NOTICE!
Drain the engine oil only when the engine is warm.
For quality and quantity of oil refer to the "table of fuels and lubricants".

ENVIRONMENT!
Catch running out oil and dispose of environmentally together with the oil filter cartridge.

1. Unscrew the oil filler plug.

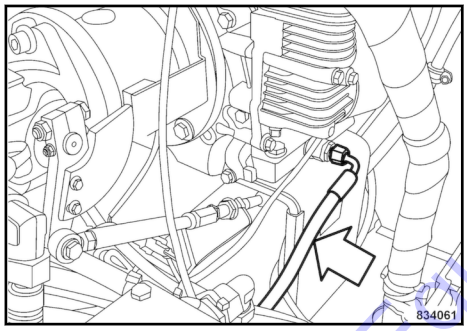


Fig. 170

1. Place the drain hose ↳ Fig. 170 into the collecting container and open the drain plug. Catch running out oil.
2. Turn the oil drain plug back in with a new seal ring.

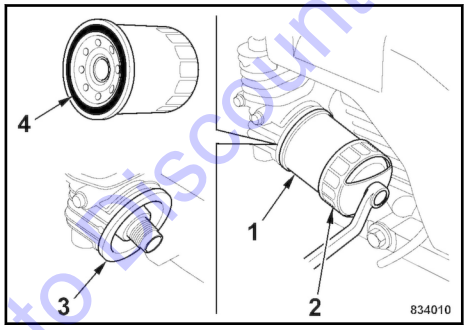


Fig. 171

1. Unscrew the filter cartridge (1) ↳ Fig. 171 using an appropriate tool (2).
2. Clean the sealing face on the filter carrier (3) from any dirt.
3. Slightly oil the rubber seal (4) on the new filter cartridge.
4. Turn the new filter cartridge on by hand, until the seal contacts.
5. Tighten the filter cartridge for another 3/4 turn.

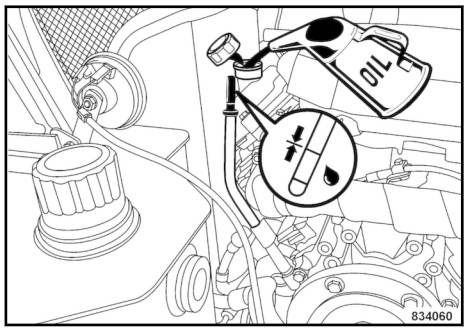


Fig. 172

1. Fill in new engine oil ↳ Fig. 172.
2. Screw the oil filler cover back on again.
3. After a short test run check the oil level once again , if necessary top up to the top mark (Max).

6.1.3.4 Every 250 operating hours

6.1.3.4.1 Change the fuel pre-filter

WARNING!
Fire hazard!
When working on the fuel system do not use open fire, do not smoke, do not spill any fuel.

WARNING!
Health hazard!
Do not inhale any fuel fumes.

ENVIRONMENT!
Catch running out fuel, do not let it seep into the ground.

Dispose of the used fuel precleaners environmentally.

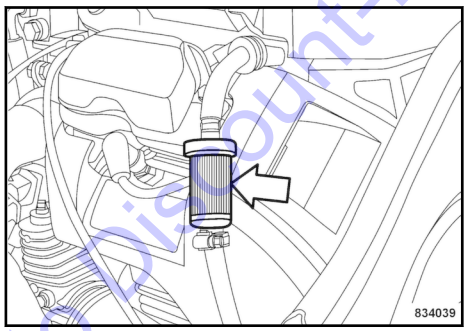


Fig. 173

1. Loosen the hose clamps ↳ Fig. 173.
2. Pull the fuel filter out of the top and bottom hoses.
3. Install the new fuel filter by observing the flow direction.
4. Retighten the hose clamps.

6.1.3.4.2 Checking, adjusting the valve clearance

NOTICE!

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

Check and adjust only when the engine is cold.

Adjusting values intake valves: 0.0031 in ± 0.0079 in (0.08 ± 0.02 mm)

Adjusting values exhaust valves 0.0039 in ± 0.0079 in (0.10 ± 0.02 mm)

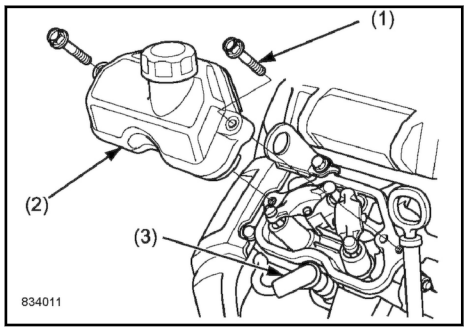


Fig. 174

1. Unscrew the cylinder head cover fastening screws (1) ↳ Fig. 174 and take off both cylinder head covers (2).
2. Pull off spark plug socket (3).

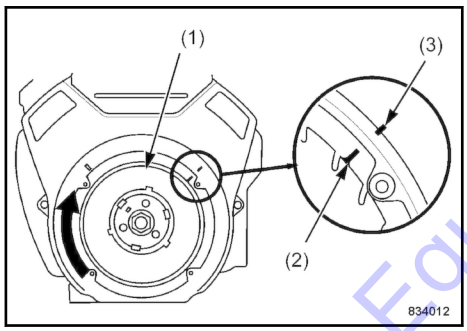


Fig. 175

1. Turn the flywheel (1) ↳ Fig. 175 clockwise until the marks (2, 3) are in line.

Cylinder 1 in top dead centre position in compression stroke. Both valves closed. If not, crank the engine for 360°)

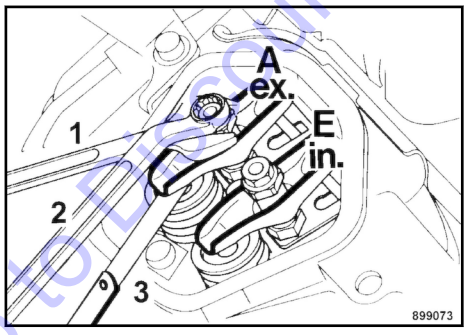


Fig. 176

1. A feeler gauge of appropriate thickness ↳ Fig. 176 must fit with little resistance between rocker arm and valve.
2. If the gap is too narrow or too wide for the feeler gauge, the valve must be adjusted.
3. After the adjustment tighten the nut with 5.5 lbf·ft (7.5 Nm).

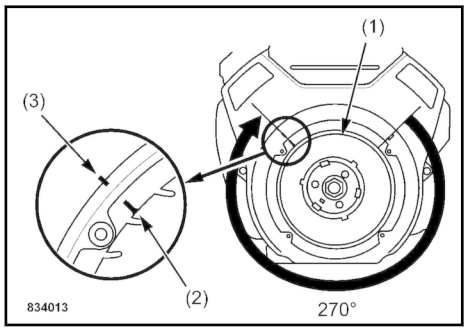


Fig. 177

1. Turn the flywheel clockwise further ↳ Fig. 177, until the marks (2, 3) are in line.
2. Check and , if necessary, adjust the valve clearance of the 2nd cylinder.
3. After checking and adjusting reassemble the cylinder head covers with new gaskets.
4. Tighten the cylinder head screws.

After a short test run check the engine for leaks.

6.1.3.4.3 Check, adjust the idle speed

NOTICE!

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

Check and adjust only at operating temperature of the engine.

Setting: 1400 ± 150 min^{-1}

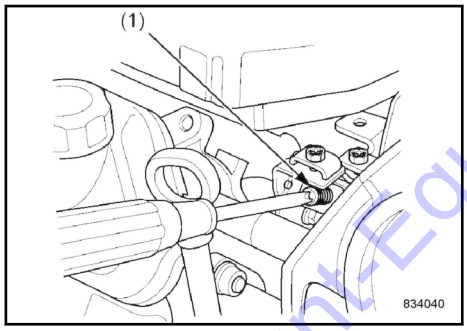


Fig. 178

1. Run the engine to warm it up to operating temperature.
2. Adjust the engine idling speed with the setscrew (1) ↳ Fig. 178.

6.1.3.5 Every 2000 operating hours

6.1.3.5.1 Checking fuel lines and clamps

WARNING!

Danger of burning!

Perform inspection work only after the engine has cooled down and with the engine stopped.

NOTICE!

If fuel lines or hose clamps are found to be damaged, the corresponding parts must be immediately repaired or replaced.

After replacing lines or hose clamps the fuel system needs to be bled.

Disassembled or new fuel lines must be closed with clean cloths on both ends, to make sure that no dirt will enter into the fuel system. Dirt particles can destroy the injection pump.

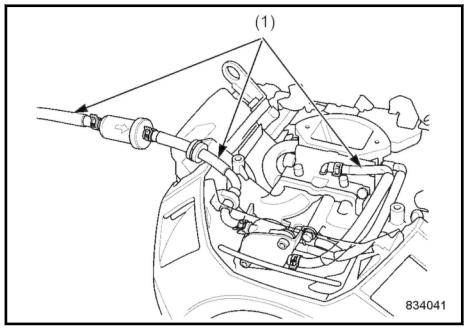


Fig. 179

1. Check the condition and tight fit of all fuel lines (1) ↳ Fig. 179 and hose clamps.
2. Replace damaged parts immediately with original spare parts.

6.1.3.6 As required

6.1.3.6.1 Engine conservation

NOTICE!

A machine with conserved engine must be clearly marked by attaching a clear warning tag.

Depending on the weather condition these conserving measures will provide protection for approx. 6 - 12 months.

The conserving oil must be replaced by engine oil (refer to the section "Fuels and lubricants") according to the API- (MIL) classification before taking the machine into operation.

Anti-corrosion oils are those that comply with the specification MIL-L-21260 B or TL 9150-037/2 resp. Nato Code C 640/642.

If the engine is to be shut down for a longer period of time (e.g. during winter) we recommend the following conservation measures for the engine to avoid corrosion:

1. Clean engine and cooling system: With cold cleansing agent and water jet or, even better, with steam cleaning equipment.
2. Run the engine warm and shut it down.
3. Drain the still warm engine oil and fill in anti-corrosion engine oil.
4. Drain the fuel from the fuel tank.
5. Remove the cylinder head covers, spray the rocker chambers with anti-corrosion oil. Then fasten the covers again.
6. Unscrew both spark plugs and spray anti-corrosion oil through the spark plug openings. Crank the engine several times and install the spark plugs again.
7. Close air intake on air filter and exhaust opening tightly.

6.2 Oscillating articulated joint

Oscillating articulated joints are used to establish a moveable connection between the rear and front frames of agricultural and construction equipment. The machine can be steered around the vertical axis by means of an articulated movement; the rear frame can oscillate on the horizontal axis. The advantage of the oscillating articulated joint is the fact that front and rear frame move in the same track.

The oscillation compensates for uneven surfaces and creates an even drum pressure. Both the pivot point of the oscillating joint, which was purposely designed to be low, as well as the low centre of gravity of the machine ensure good stability.

6.2.1 Repair overview for oscillating articulated joint

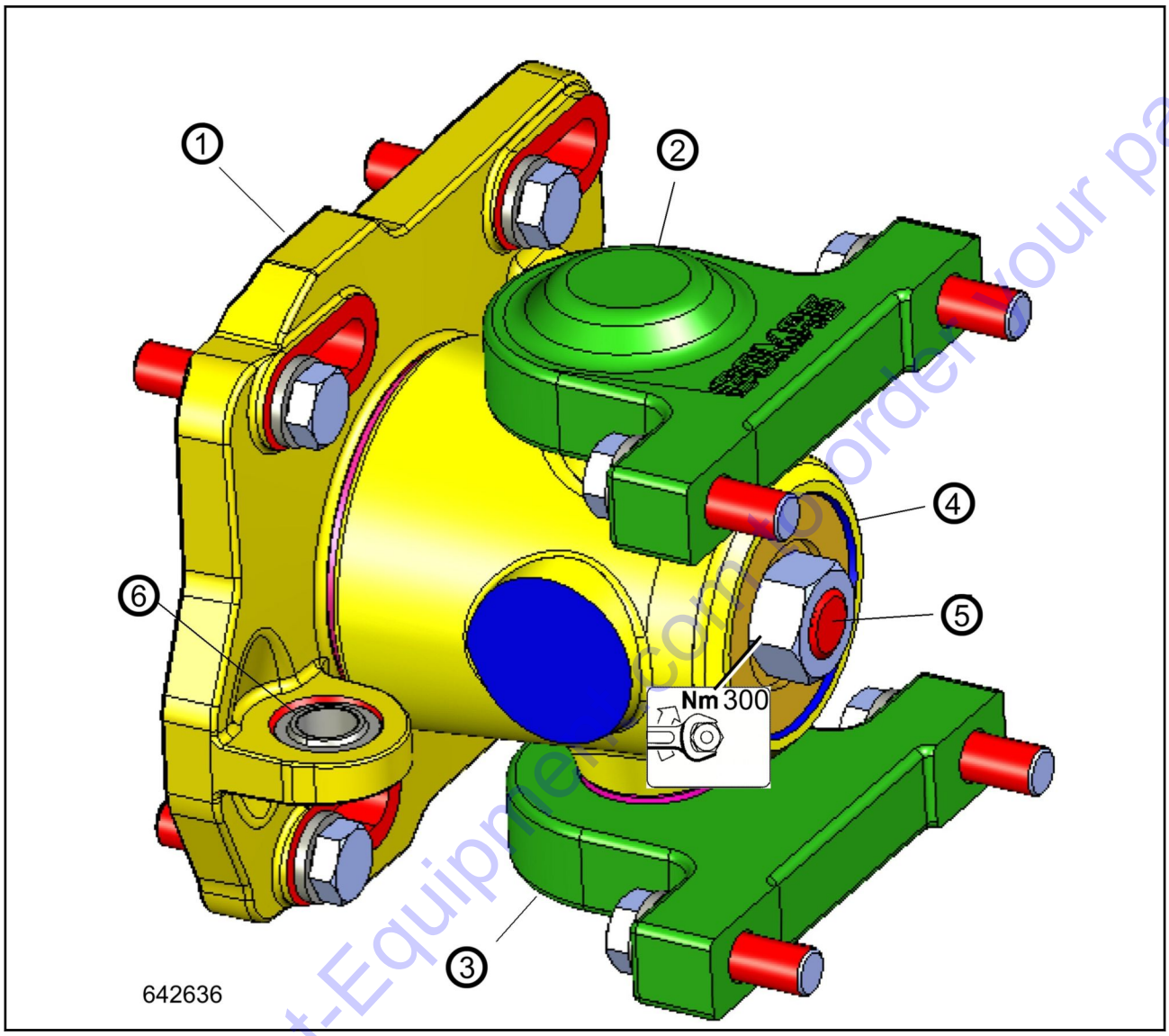


Fig. 180

1 Housing
2 Bearing block, top
3 Bearing block, bottom
4 Bearing housing
5 Bearing journal
6 Rocker bearings for steering cylinder

When tightening the bearing housing (4) move the bearing housing slightly to and fro to ensure a uniform wear pattern of the individual bearing rollers.

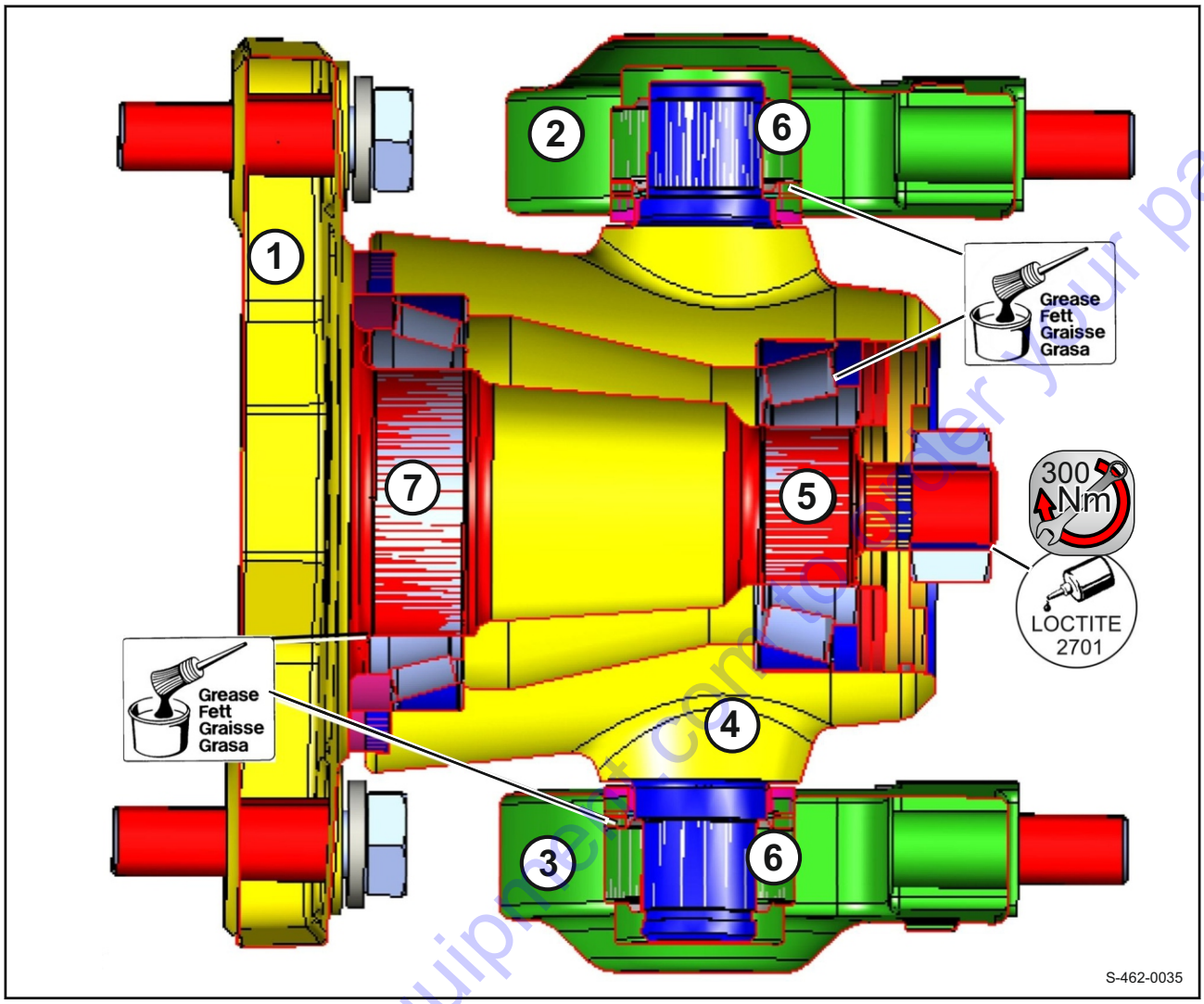


Fig. 181

1 Bearing journal
2 Bearing block, top
3 Bearing block, bottom
4 Bearing housing
5 Tapered roller bearing
6 Rocker bearing
7 Tapered roller bearing

When tightening the bearing housing, move the bearing housing slightly to and fro to ensure a uniform wear pattern of the individual bearing rollers.

6.2.2 Removing and installing the oscillating articulated joint

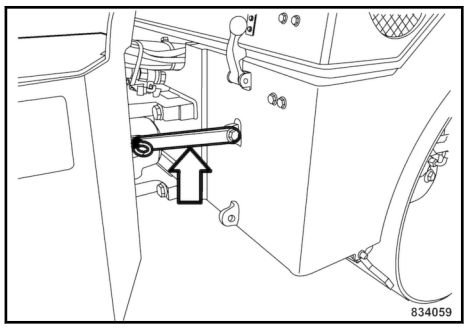


Fig. 182

1. Engage the articulation lock ↳ Fig. 182.

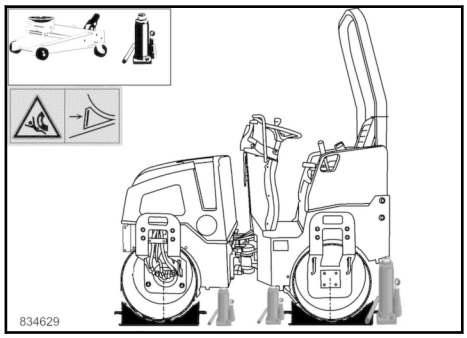


Fig. 183

2. **WARNING!**
   Danger of accident!
   Block front and rear drums with wedges against rolling!
   Do not work in the articulation area of the roller while the engine is running.

   Block the drums with suitable chocks ↳ Fig. 183.
3. Safely support front and rear frames.

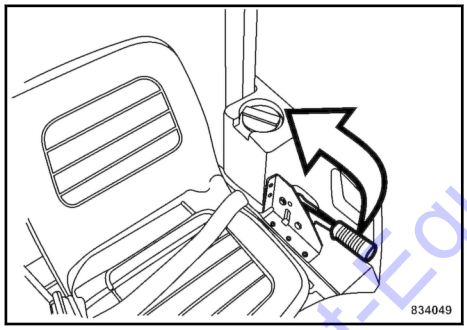


Fig. 184

4. Pull up the parking brake lever ↳ Fig. 184.

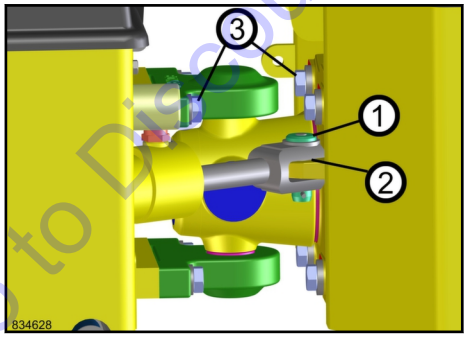


Fig. 185

5. Attach lifting tackle to the articulated joint.
6. Remove the split pin form the steering cylinder bearing bolt 1 ↳ Fig. 185 and knock out the bolt.
7. Remove the backing discs (2).
8. Unscrew fastening screws (3) with washers and lift out the oscillating articulated joint.

6.2.3 Repairing the oscillating articulated joint

Dismantling the oscillating articulated joint

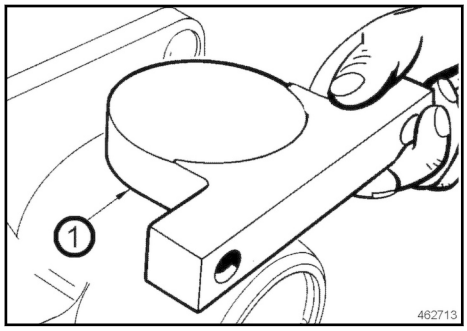


Fig. 186

1. Pull bearing blocks 1 ↳ Fig. 186 off both sides.

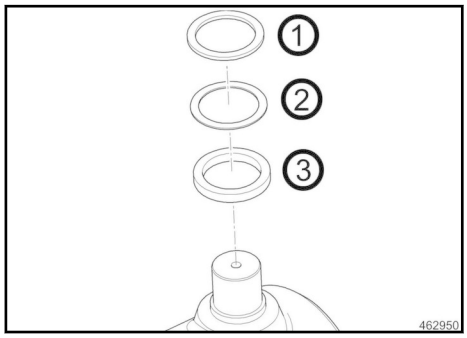


Fig. 187

2. Remove supporting discs 1 ↳ Fig. 187, shims (2) and seal rings (3) from both sides.

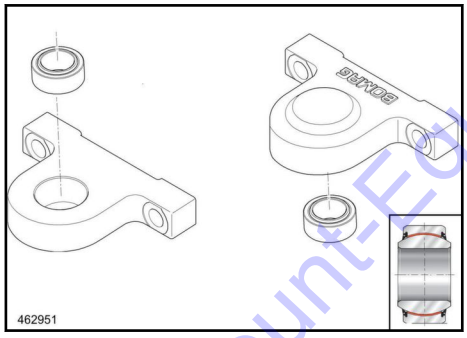


Fig. 188

3. Extract the rocker bearing ↳ Fig. 188 with a suitable puller.

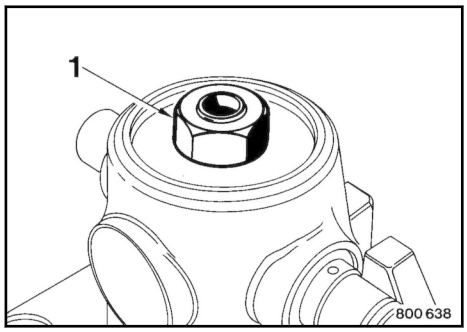


Fig. 189

4.

Hexagon nut secured with LOCTITE.

Unscrew hexagon nut 1 ↳ Fig. 189.

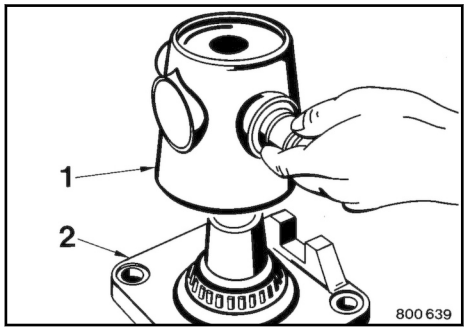


Fig. 190

5. Pull bearing housing 1 ↳ Fig. 190 off bearing journal (2).

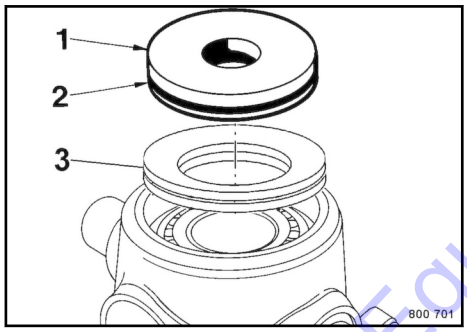


Fig. 191

6. Take disc 1 ↳ Fig. 191 out of the bearing housing and remove O-ring (2).

7. Remove the Belleville springs (3).

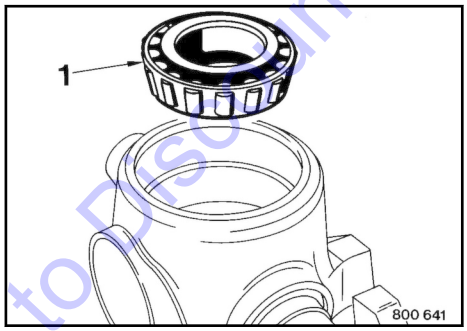


Fig. 192

8. Remove taper roller bearing 1 ↳ Fig. 192.

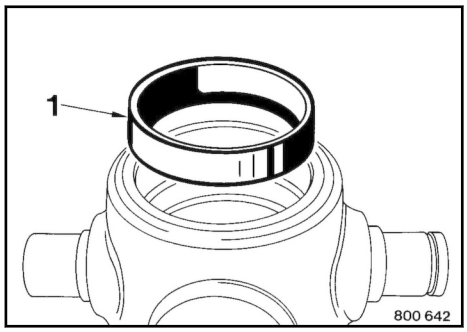


Fig. 193

9. Remove outer bearing race 1 ↳ Fig. 193.

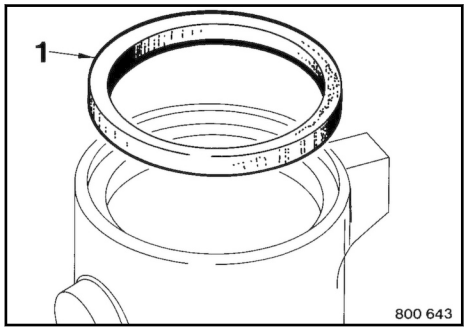


Fig. 194

10. Turn the bearing housing upside down and take out seal ring 1 ↳ Fig. 194.

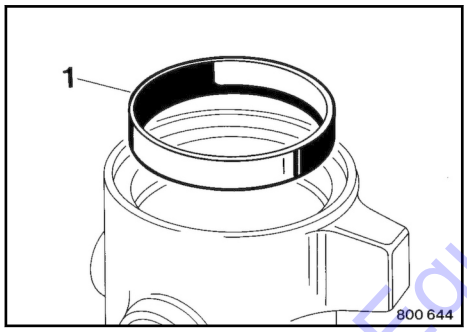


Fig. 195

11. Knock the outer bearing race 1 ↳ Fig. 195 out of the bearing housing.

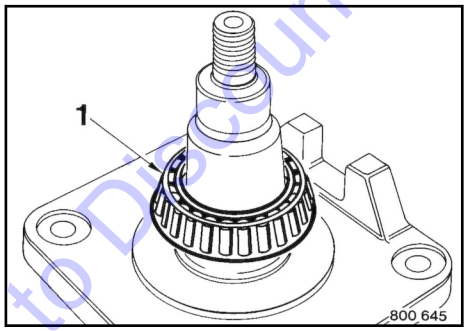


Fig. 196

12. Pull taper roller bearing 1 ↳ Fig. 196 off the bearing journal.

Assembling the oscillating articulated joint

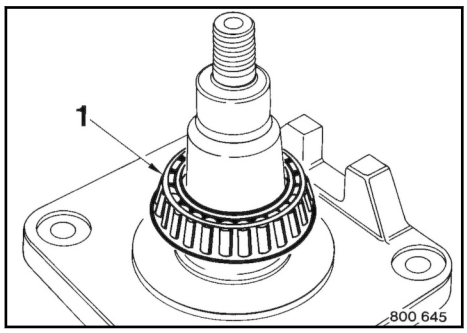


Fig. 197

1. Press taper roller bearing 1 ↳ Fig. 197 onto the bearing journal.

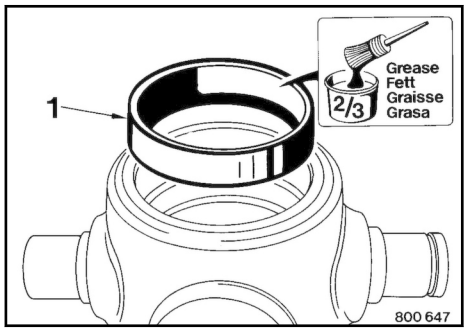


Fig. 198

2. Press outer bearing race 1 ↳ Fig. 198 into the bearing housing and fill to 2/3 with lithium saponified high pressure grease.

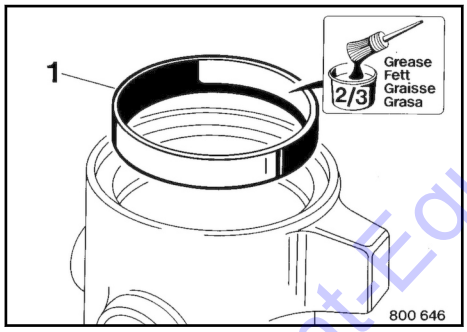


Fig. 199

3. Turn the bearing housing upside down.

4. Press outer bearing race 1 ↳ Fig. 199 into the bearing housing and fill to 2/3 with lithium saponified high pressure grease.

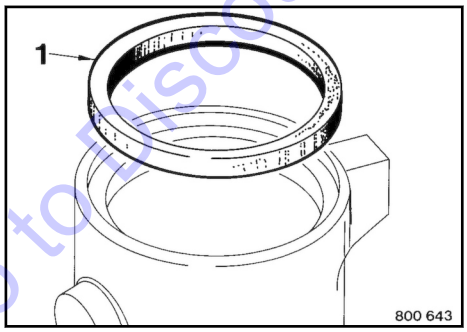


Fig. 200

5. Insert a new seal ring 1 ↳ Fig. 200 into the bearing housing.

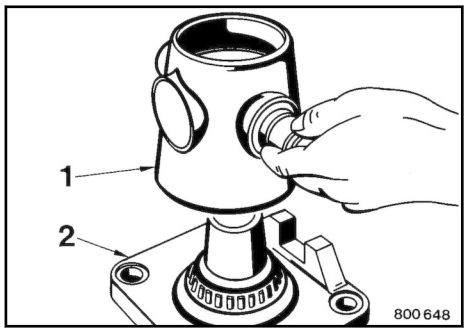


Fig. 201

6. Mount bearing housing 1 ↳ Fig. 201 to bearing journal (2).

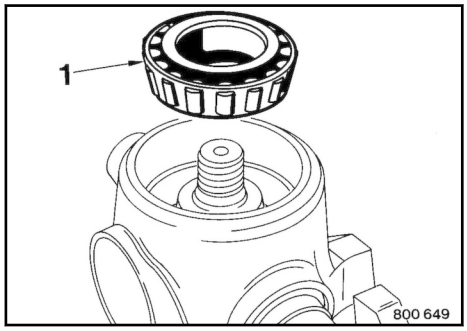


Fig. 202

7. Knock taper roller bearing 1 ↳ Fig. 202 into the bearing housing.

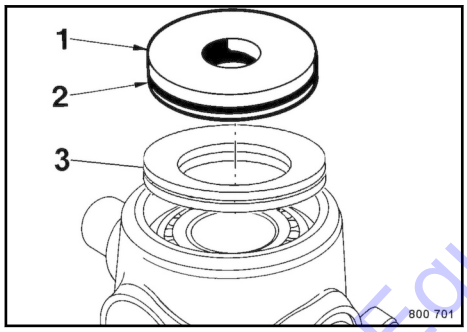


Fig. 203

8. Insert Belleville springs 3 ↳ Fig. 203 with the curvature pointing down.

9. Fit the new O-ring (2) with grease into the disc (1).

10. Install disc (1) into the bearing housing.

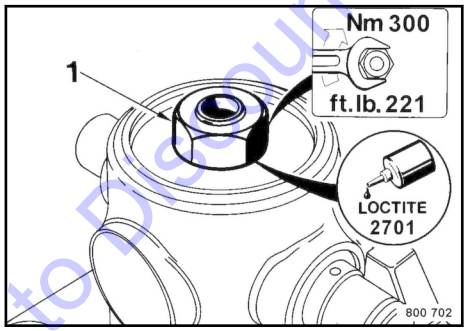


Fig. 204

11.

When tightening the hexagon nut (1) move the bearing housing to and fro to ensure a uniform wear pattern of the individual bearing rollers.

Cover the thread on the bearing journal with LOCTITE and tighten hexagon nut 1 ↳ Fig. 204 with 300 Nm.

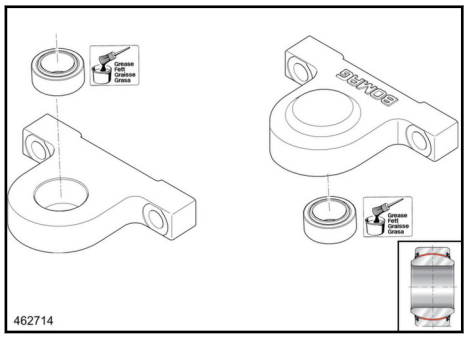


Fig. 205

12.

NOTICE!

The assembly mandrel should only contact the outer race of the rocker bearing, as otherwise the bearing will be destroyed!

Knock the new rocker bearings ↳ Fig. 205 in until they bottom.

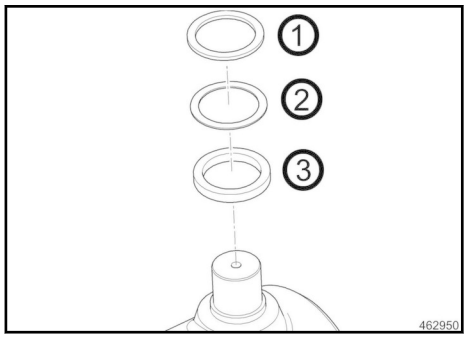


Fig. 206

13. Install new seal rings (3) ↳ Fig. 206, shims (2) and supporting discs (1) to the bearing journals of the bearing housing.

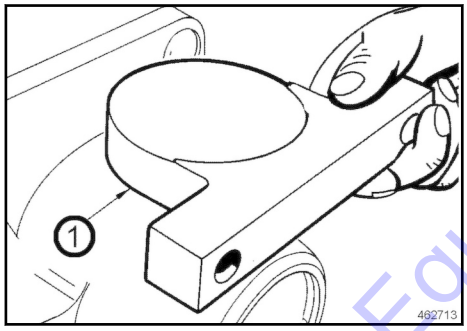


Fig. 207

14. Knock both bearing blocks 1 ↳ Fig. 207 onto the bearing journals.

6.3 Drum

6.3.1 Vibratory drum, front

6.3.1.1 Repair overview of vibratory drum

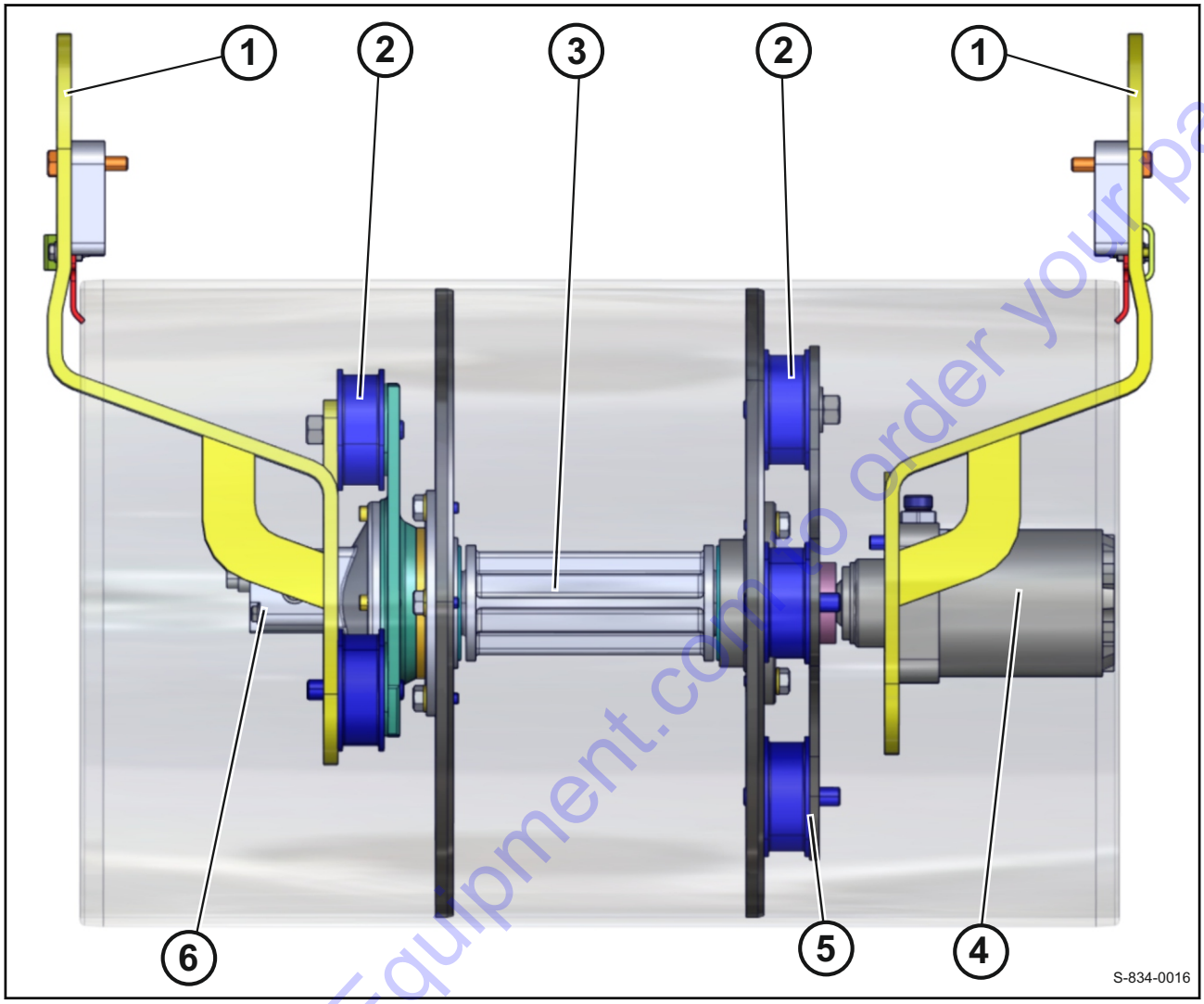


Fig. 208: Vibratory drum, front

1 Support legs
2 Rubber buffer
3 Exciter shaft
4 Travel motor
5 Drive disc
6 Vibration motor

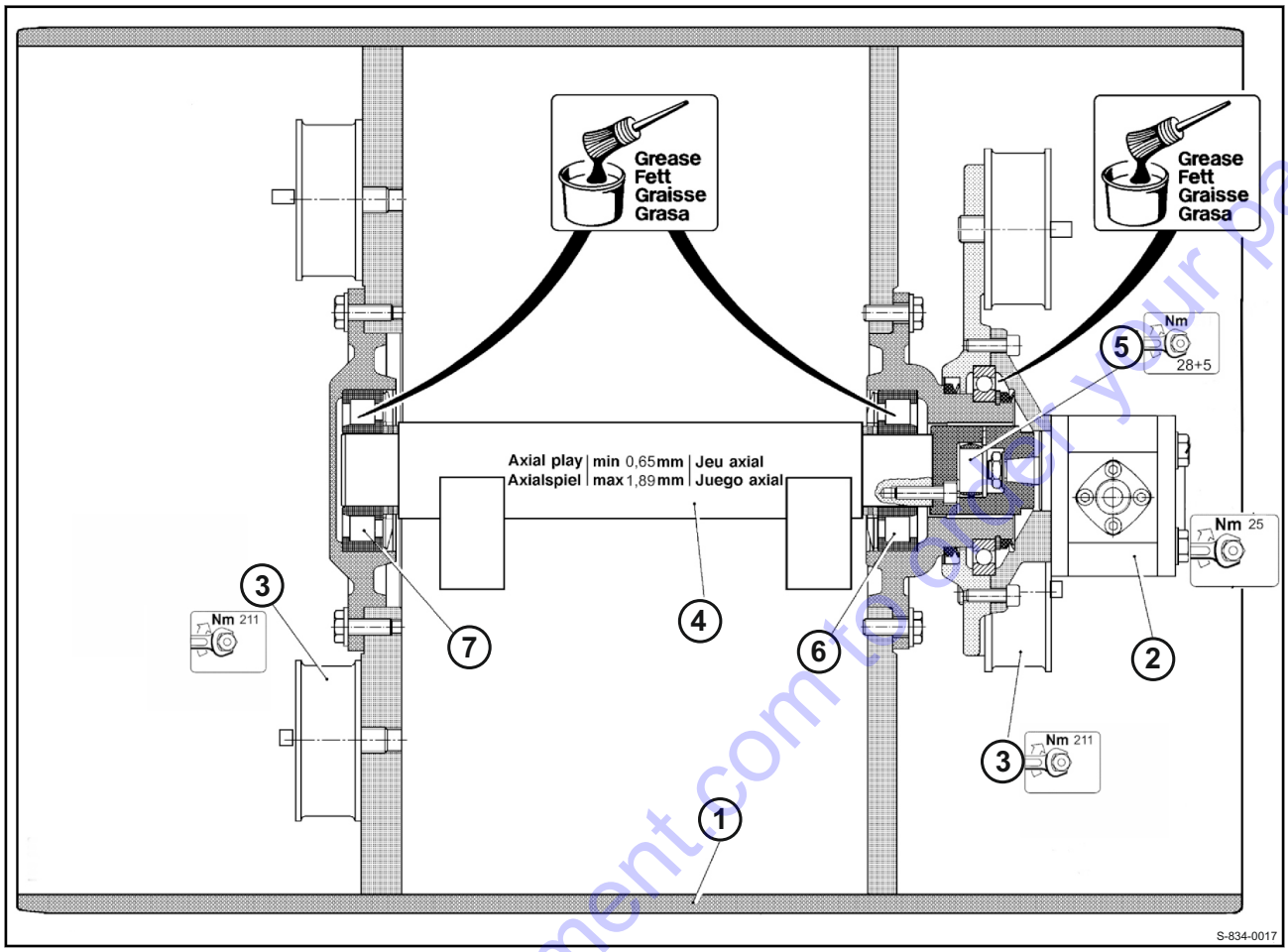


Fig. 209

1 Drum
2 Vibration motor
3 Rubber buffer
4 Exciter shaft
5 Clutch
6 Vibration bearings
7 Travel bearings

6.3.1.2 Removing and installing the vibratory drum

Removing the vibratory drum

1. Park the machine on level and firm ground.
2. Always secure the machine against unintended rolling.

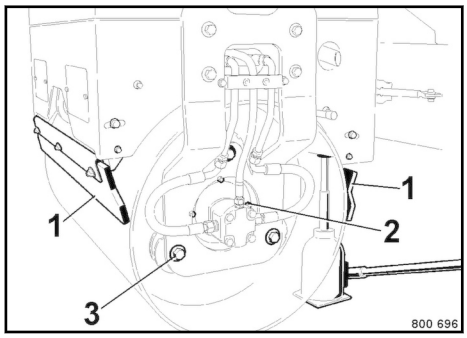


Fig. 210

3. Lift the front frame up ↳ Fig. 210 and support it safely.
4. Unhook the springs to relieve the scrapers (1).
5. Unscrew the fastening screws (2) and remove the vibration motor with its flange.

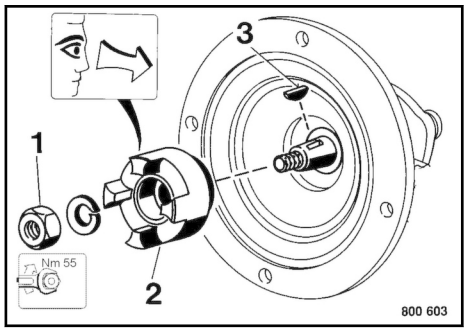


Fig. 211

6. Check coupling hub 2 ↳ Fig. 211 for wear.
7. If necessary, unscrew the hexagon nut (1) and pull off the coupling hub (2) with a puller.
8. Remove the feather key (3).
9. Unscrew the fastening nuts (3) ↳ Fig. 210 for support legs – rubber buffers.

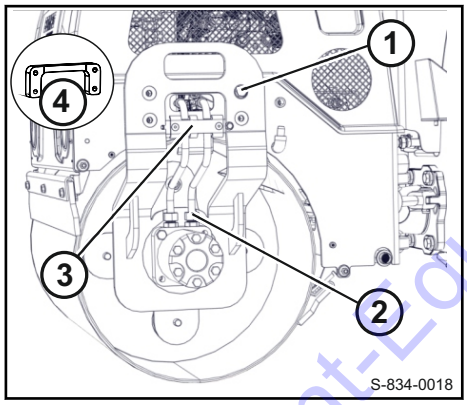


Fig. 212

10. Mark the hydraulic hoses 2 ↳ Fig. 212 and disconnect them from the ports.

ENVIRONMENT!

Collect leaking oil and dispose of in an environmentally friendly way.

11. Disassemble the hose brackets (3).
12. Close all hydraulic hoses and motor ports with suitable plugs.
13. Unscrew the fastening screws (1), remove the spacer (4) and pull the drum with the support leg sideways out of the frame.

Installing the drum

Install the drum in reverse order, for this purpose move the drum with attached travel motor and support leg parallel into the frame. Mount the support leg under pretension, mount the hydraulic hoses and vibration motor.

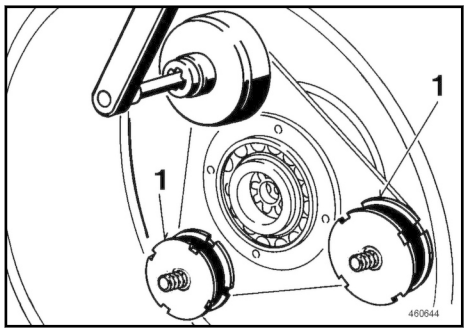


Fig. 213

1. Examine all rubber buffers 1 ↳ Fig. 213 for wear, replace if necessary.

Adjusting the pre-load of the rubber buffers

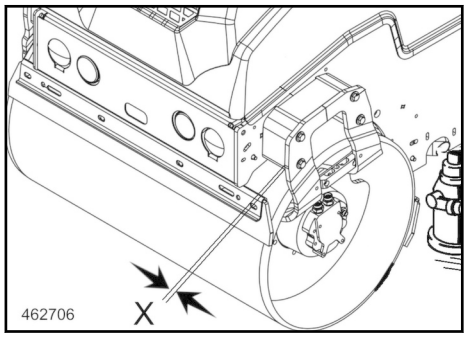


Fig. 214

1.

NOTICE!

Install the support legs under pre-load.

The preload of the rubber buffers is achieved by a gap "X" ↳ Fig. 214 between support leg and spacer block when tightening.

⇨

Nominal value: Distance X = 1mm

If necessary attach compensation shims on either side.

Starting up the machine

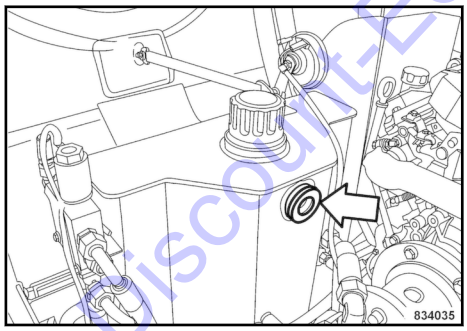


Fig. 215

1.

NOTICE!

Bleed the travel circuit before starting operation.

Check the hydraulic oil level ↳ Fig. 215, top up if necessary.

2. Perform a test drive, check function of travel system, vibration and spraying system.
3. Check all connections and fittings for leak tightness.

6.3.1.3 Dismantling the vibratory drum

WARNING!

Secure the drum against unintended rolling.

Removing the travel motor

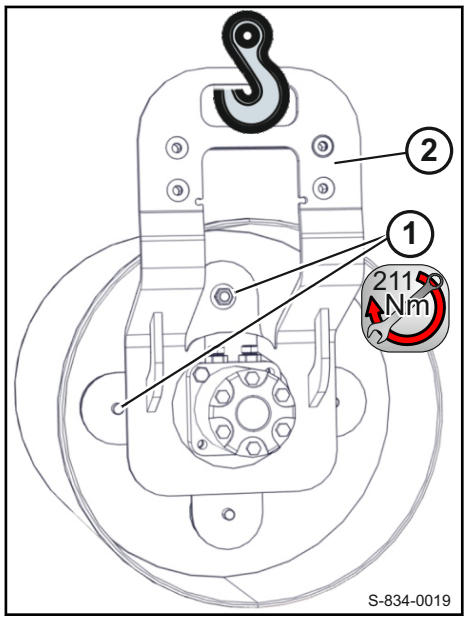


Fig. 216

1. Attach the lifting tackle to support leg 2 ↳ Fig. 216.
2. Unscrew the four hexagon nuts (1).
3. Remove support leg (2) with travel motor and drive disc from the drum.

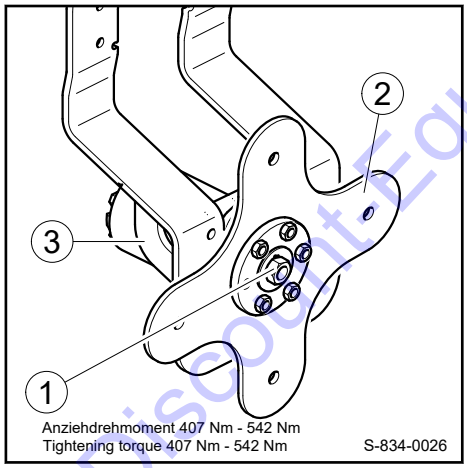


Fig. 217

4. Unscrew hexagon nut 1 ↳ Fig. 217 and pull the drive disc (2) off the travel motor (3).

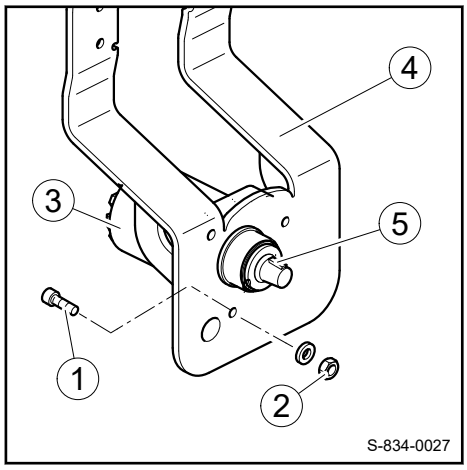


Fig. 218

5. Disassemble fastening screws 1 ↳ Fig. 218, washers and nuts (2).
6. Remove the travel motor (3) from the support leg (4).
7. Disassemble the feather key (5).

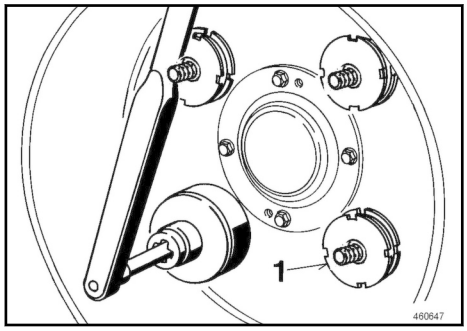


Fig. 219

8. Check the rubber buffers 1 ↳ Fig. 219, unscrew and replace if necessary.

Dismantling the travel bearing on the vibration drive side

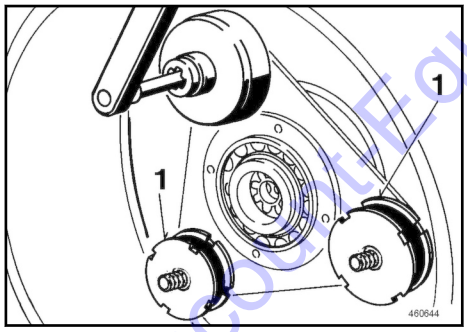


Fig. 220

1. Disassemble the rubber buffers 1 ↳ Fig. 220.

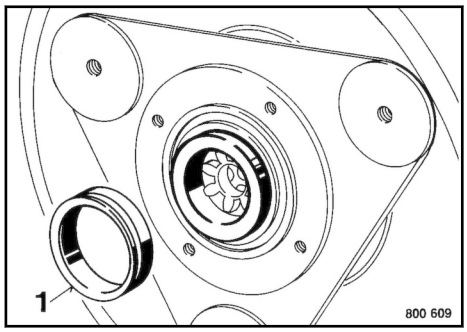


Fig. 221

2. Take off V-ring 1 ↳ Fig. 221.

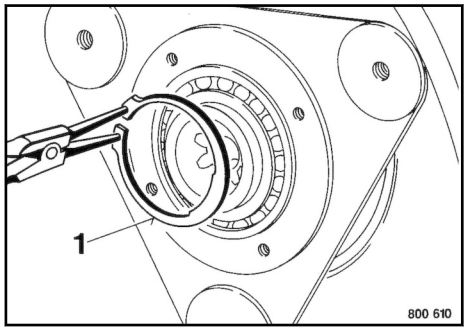


Fig. 222

3. Remove circlip 1 ↳ Fig. 222.

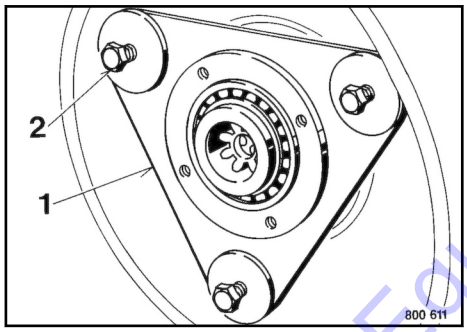


Fig. 223

4. Press flange 1 ↳ Fig. 223 off the bearing flange with forcing screws (2).

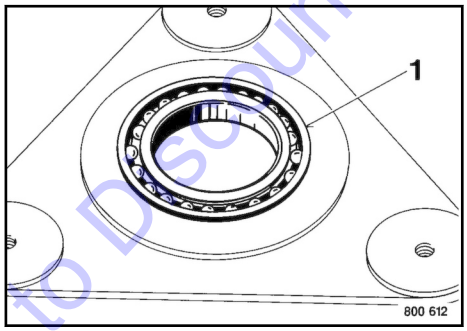


Fig. 224

5. Knock ball bearing 1 ↳ Fig. 224 out of the flange.

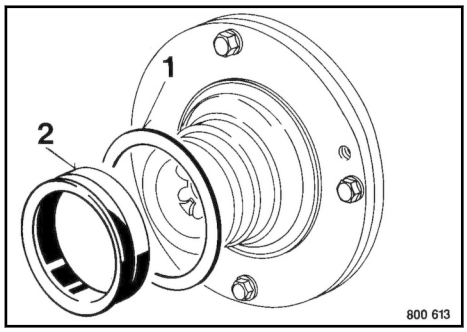


Fig. 225

6. Take shim 1 ↳ Fig. 225 and V-ring (2) off the bearing flange.

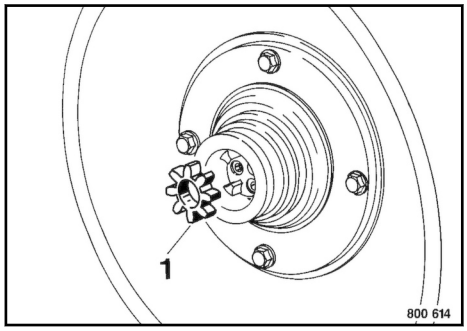


Fig. 226

7. Remove coupling element 1 ↳ Fig. 226.

Removing / dismantling the exciter shaft

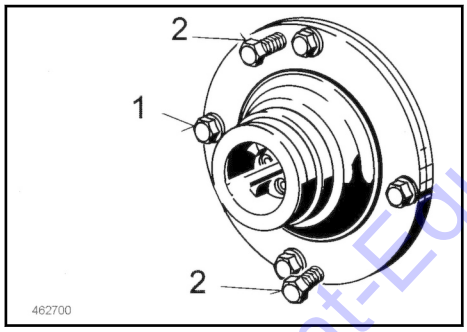


Fig. 227

1. Unscrew fastening screws 1 ↳ Fig. 227.
2. Force the bearing flange off the drum using forcing screws (2).

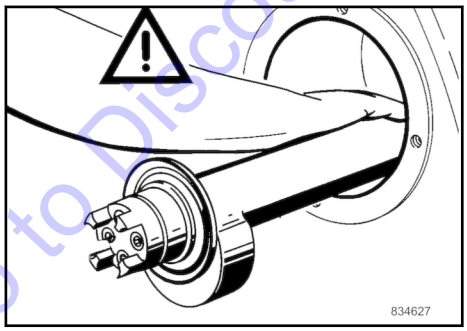


Fig. 228

3.

NOTICE!

Danger of squashing!

Pull the exciter shaft out of the drum ↳ Fig. 228.

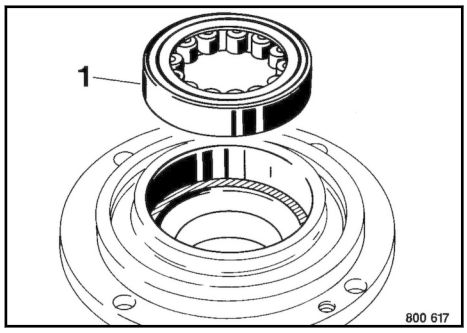


Fig. 229

4. Remove cylinder roller bearing 1 ↳ Fig. 229 from the bearing flange.

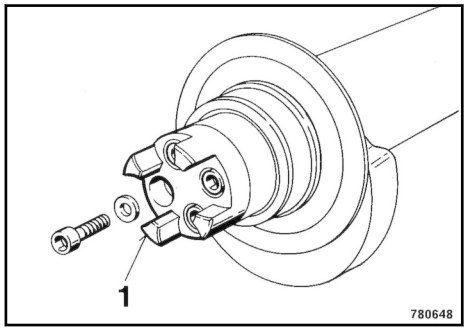


Fig. 230

5. Pull coupling hub 1 ↳ Fig. 230 off the exciter shaft.

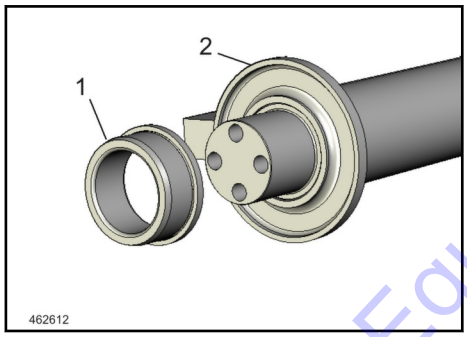


Fig. 231

6. Pull inner bearing race 1 ↳ Fig. 231 off both sides of the exciter shaft.

If the inner bearing race sits very tight, heat the ring up with a torch.

7. Remove the seal ring (2) from both ends of the exciter shaft.

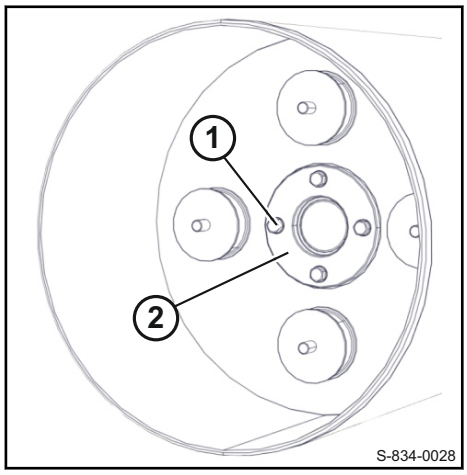


Fig. 232

8. Unscrew hexagon screws 1 ↳ Fig. 232.
9. Remove the flange (2).

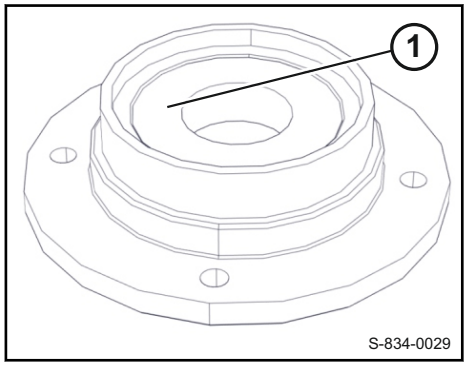


Fig. 233

10. Remove cylinder roller bearing 1 ↳ Fig. 233 from the flange.

6.3.1.4 Assembling the vibratory drum

Assembling / installing the exciter shaft

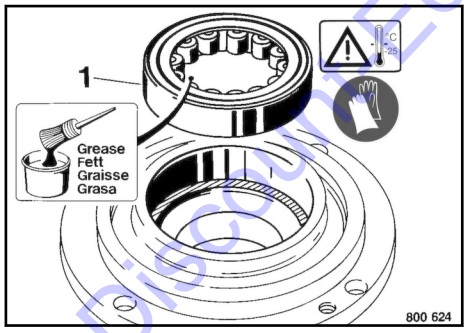


Fig. 234

1.

Fill approx. 15 g of lithium saponified high pressure grease into the gap between the rolling elements and approx. 15 g into the grease chamber of the bearing flange.

Cool the new cylinder roller bearing 1 ↳ Fig. 234 down to -25°C, press it into the bearing flange until it bottoms and fill it with high pressure grease.

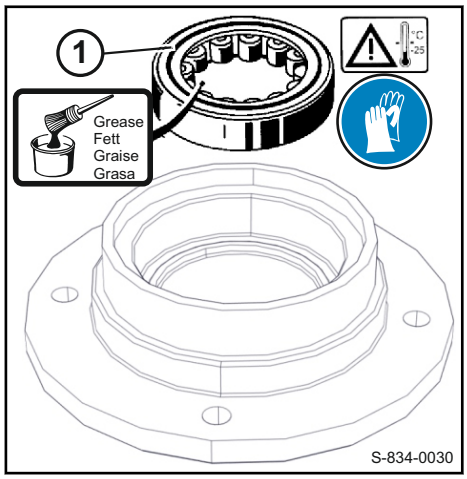


Fig. 235

2.

Fill approx. 15 g of lithium saponified high pressure grease into the gap between the rolling elements and approx. 15 g into the grease chamber of the flange.

Cool the new cylinder roller bearing 1 ↳ Fig. 235 down to -25°C and press it into the flange until it bottoms and fill it with high pressure grease.

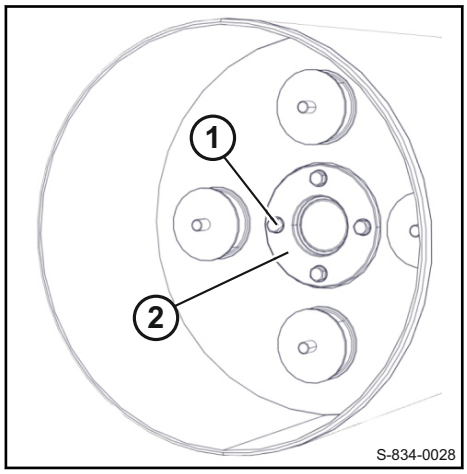


Fig. 236

3. Mount flange 2 ↳ Fig. 236 to the drum with the hexagon screws (1) and washers.

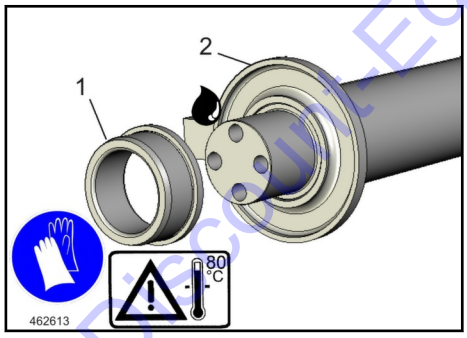


Fig. 237

4.

Lubricate the bearing seat areas.

Install seal ring 2 ↳ Fig. 237 on both ends of the exciter shaft.

5.

WARNING!
Danger of burning!
Wear protective gloves.

Heat the inner bearing races (1) up to approx. 80 °C and slide on both ends of the exciter shaft.

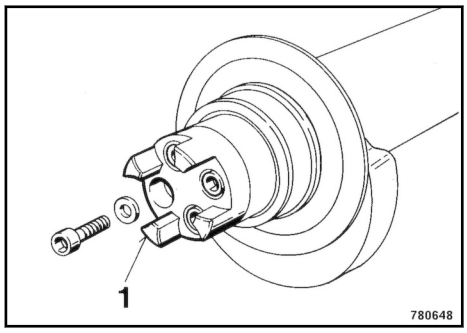


Fig. 238

6. Install coupling hub 1 ↳ Fig. 238.

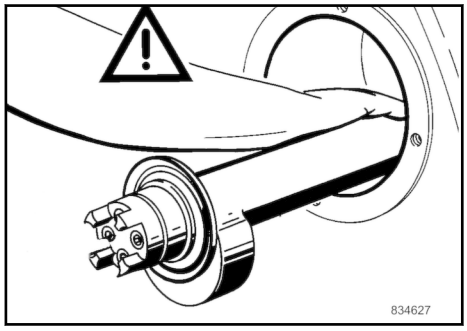


Fig. 239

7.

NOTICE!

Danger of squashing!

Insert the exciter shaft into the opposite cylinder roller bearing ↳ Fig. 239.

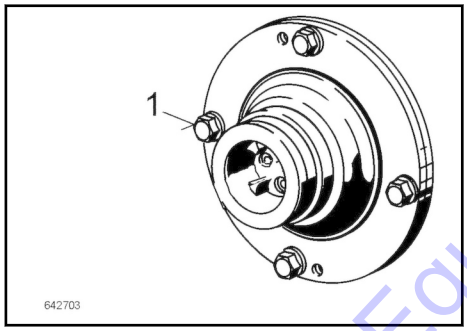


Fig. 240

8. Slide the bearing flange over the exciter shaft and fasten it with hexagon screws 1 ↳ Fig. 240 and washers.

Measure the axial clearance

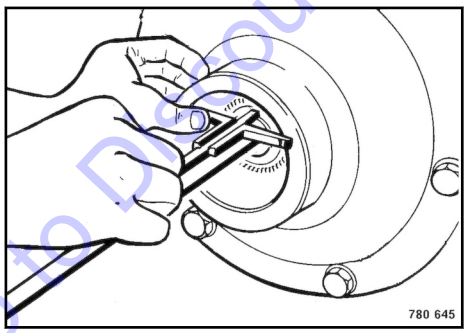


Fig. 241

1. Push the exciter shaft into the bearing flange against the end stop ↳ Fig. 241.
2. Measure the distance between coupling and front face of the bearing flange.
3. Pull the exciter shaft out against the end stop.

4. Measure the distance between coupling and front face once again.

Subtract the second measurement from the first measurement to calculate the end float.

Nominal value:
min. 0.65 mm
max. 1.89 mm

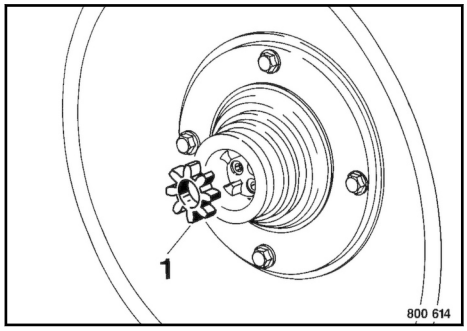


Fig. 242

5. Insert coupling element 1 ↳ Fig. 242 into the coupling hub.

Assembling the travel bearing on the vibration side

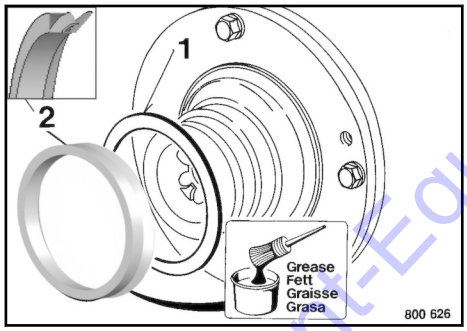


Fig. 243

1. Attach shim 1 ↳ Fig. 243.
2. Install the new V-ring (2) on the bearing flange and grease it as shown.

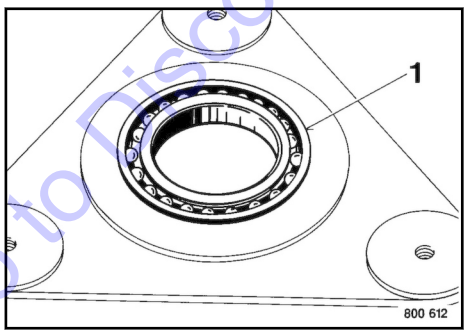


Fig. 244

1. Press ball bearing 1 ↳ Fig. 244 into the flange until it bottoms.

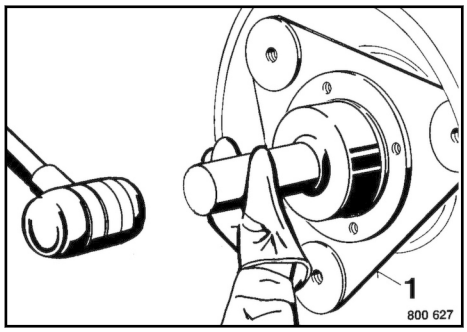


Fig. 245

2. Knock flange 1 ↳ Fig. 245 onto the bearing flange using a drift punch.

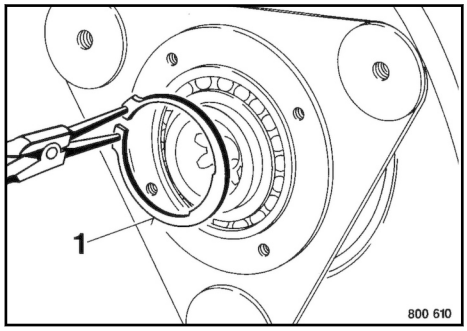


Fig. 246

3. Insert circlip 1 ↳ Fig. 246 into the groove in the bearing flange and check the correct fit.

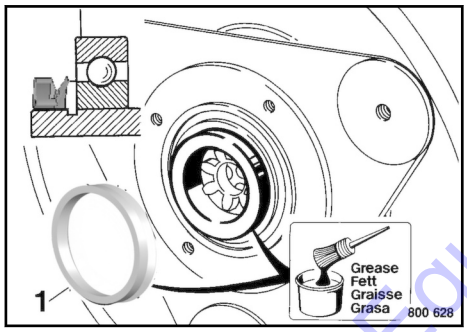


Fig. 247

4. Install the new V-ring 1 ↳ Fig. 247 and grease it.

5. Fill the ball bearing with high pressure grease.

Fill bearings and cavities to 2/3 with lithium saponified high pressure grease.

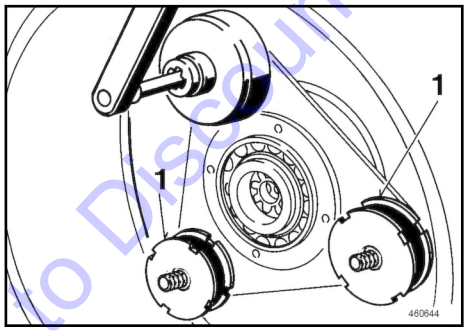


Fig. 248

6. Tighten rubber buffer 1 ↳ Fig. 248 with a matching rubber buffer mounting bell.

Tightening torque for rubber buffers:
211 Nm

Installing the travel motor

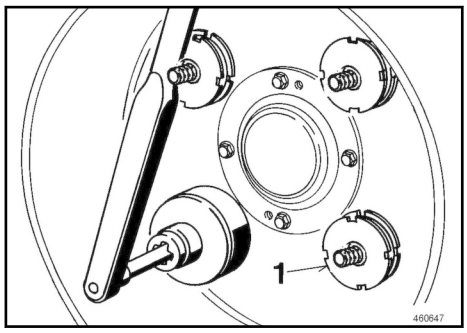


Fig. 249

1. Tighten rubber buffer 1 ↳ Fig. 249 with a matching rubber buffer mounting bell.

Tightening torque for rubber buffers:
211 Nm

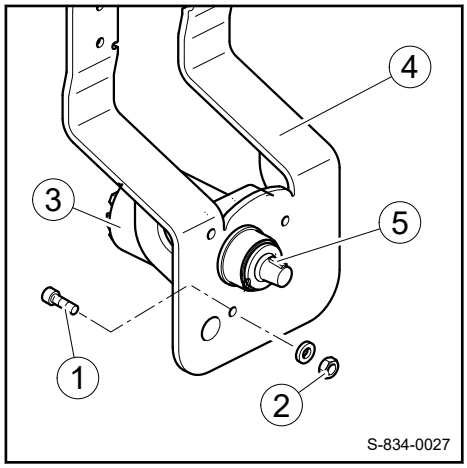


Fig. 250

2. Mount travel motor 3 ↳ Fig. 250 with hexagon screws (1), washers and nuts (2) to the support leg (4).

3. Install the feather key (5) in the travel motor (3).

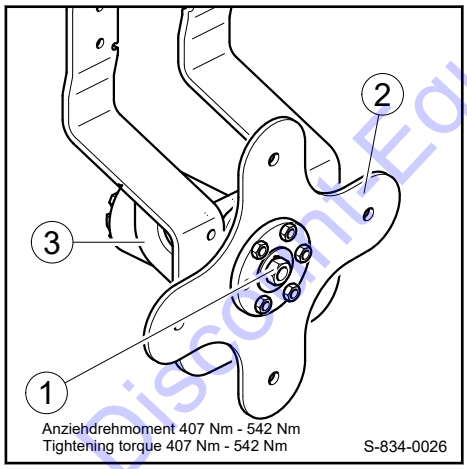


Fig. 251

4. Mount the drive disc 2 ↳ Fig. 251 with fastening nut (1) to the travel motor.

Tightening torque:
407 to 542 Nm

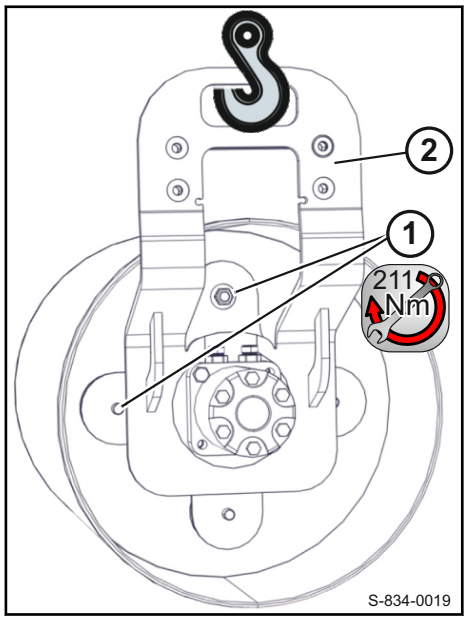


Fig. 252

5. Mount support leg 2 ↳ Fig. 252 with travel motor and drive disc to the drum.

Tightening torques for rubber buffers (1):
211 Nm

6.3.2 Rear drum

6.3.2.1 Repair overview of rear drum

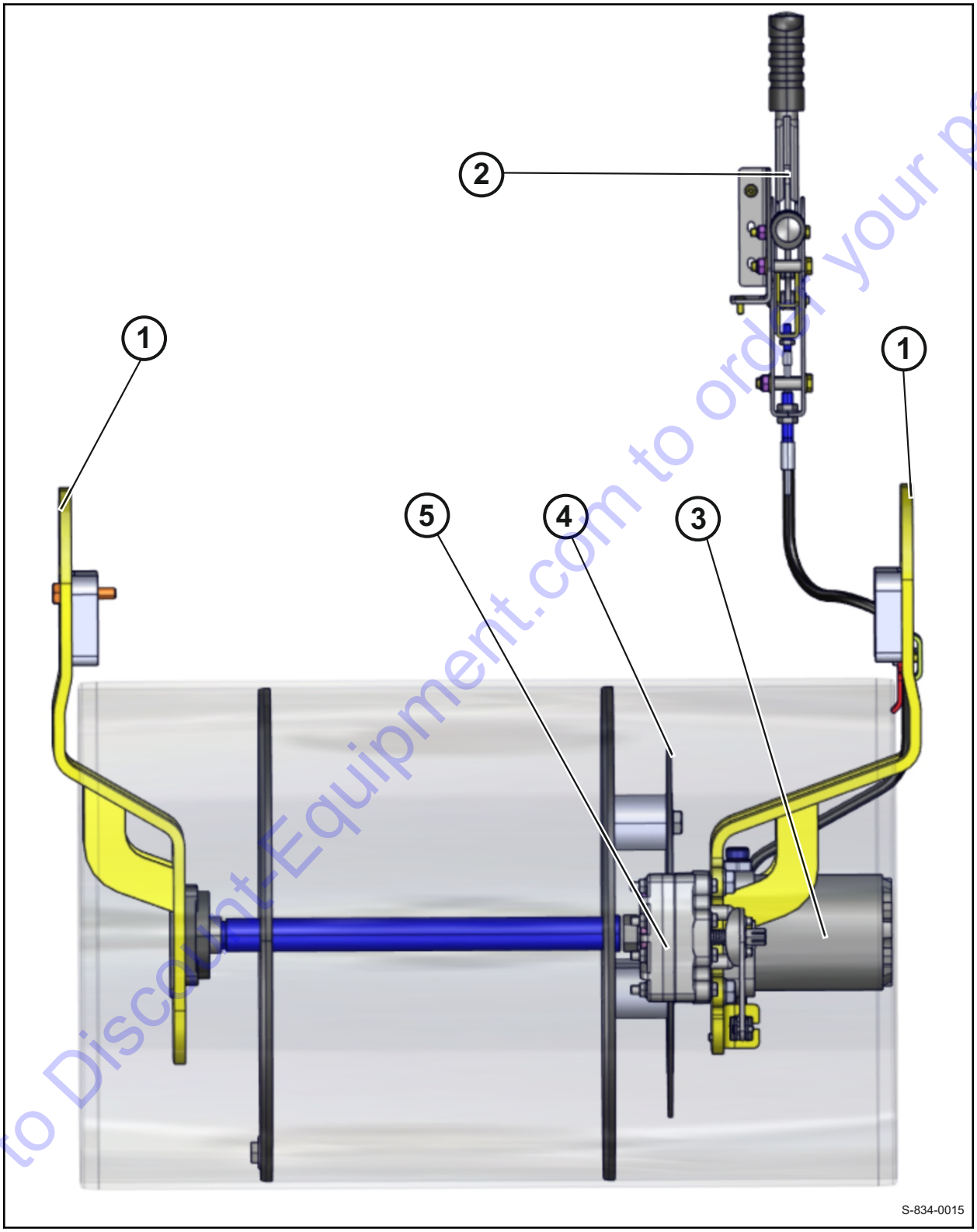


Fig. 253: Rear drum

1 Support legs

2 Brake operation
3 Travel motor
4 Drive disc
5 Parking brake

6.3.2.2 Removing and installing the rear drum

Removing the drum

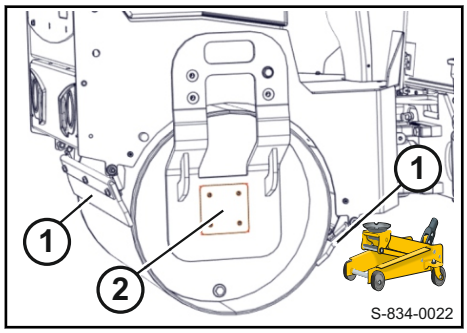


Fig. 254

1. Park the machine on level and firm ground.
2. Always secure the machine against unintended rolling.
3. Lift the rear frame up ↳ Fig. 254 and support it safely.
4. Unhook the springs to relieve the scrapers (1).
5. Disassemble the covering plate (2).

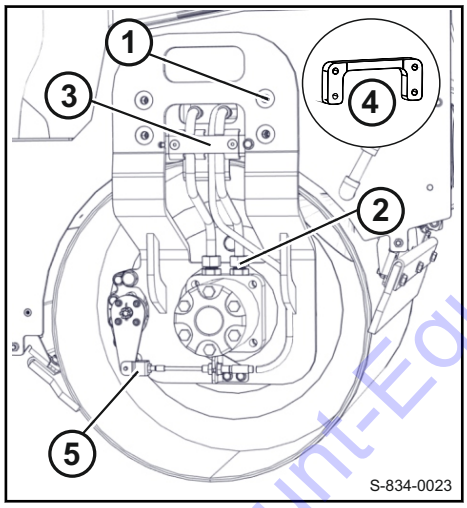


Fig. 255

6. Mark the hydraulic hoses 2 ↳ Fig. 255 and disconnect them from the ports.

ENVIRONMENT!

Collect leaking oil and dispose of in an environmentally friendly way.

7. Disassemble the hose brackets (3).
8. Close all hydraulic hoses and motor ports with suitable plugs.
9. Disconnect the Bowden cable (5) from the parking brake and drum.
10. Unscrew the fastening screws (1), remove the spacer (4) and pull the drum with the support leg sideways out of the frame.

Installing the drum

Install the drum in reverse order, for this purpose move the drum with attached travel motor and support leg parallel into the frame. Screw on the support leg, connect the hydraulic hoses, mount the Bowden cable (parking brake) and covering plate.

Starting up the machine

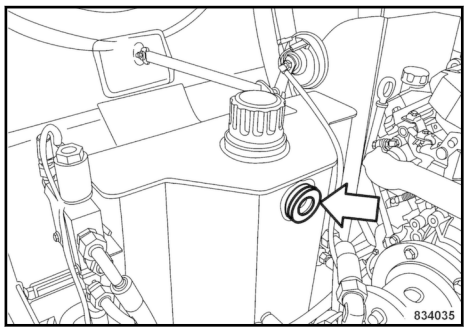


Fig. 256

1. **NOTICE!**

   Bleed the travel circuit before starting operation.

   Check the hydraulic oil level ↳ Fig. 256, top up if necessary.
2. Perform a test drive, check function of travel system, parking brake and spraying system.
3. Check all connections and fittings for leak tightness.

6.3.2.3 Dismantling the rear drum

WARNING!

Secure the drum against unintended rolling.

Removing the travel bearing

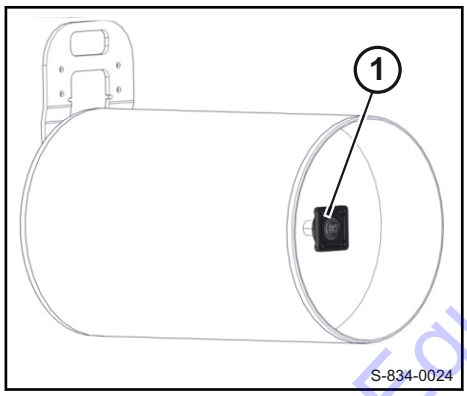


Fig. 257

1. Pull travel bearing 1 ↳ Fig. 257 out of the shaft.

Removing the travel motor

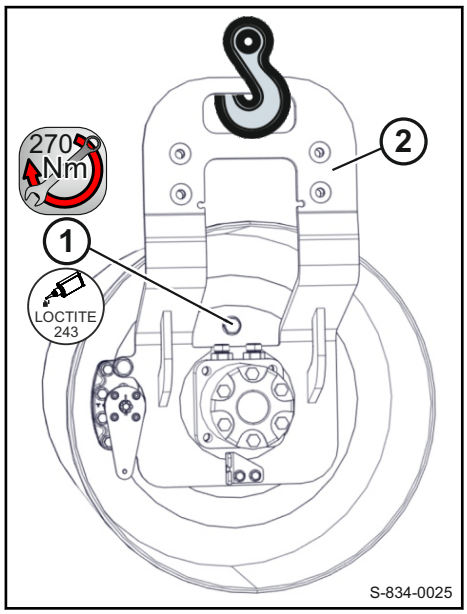


Fig. 258

1. Attach the lifting tackle to support leg 2 ↳ Fig. 258.
2. Unscrew the four hexagon nuts (1).
3. Remove support leg (2) with travel motor, lift the drive disc and parking brake from the drum.

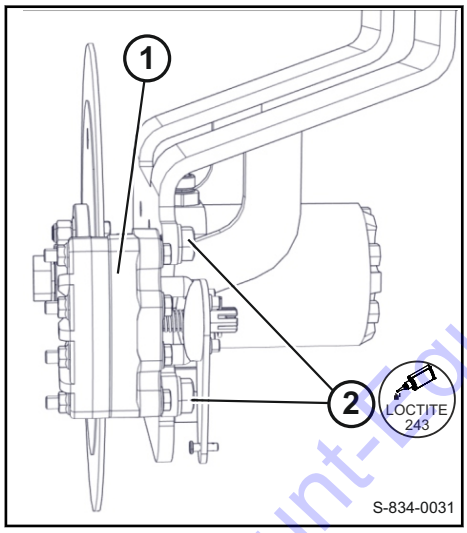


Fig. 259

4. Unscrew hexagon screws 2 ↳ Fig. 259 with washers and remove the parking brake (1).

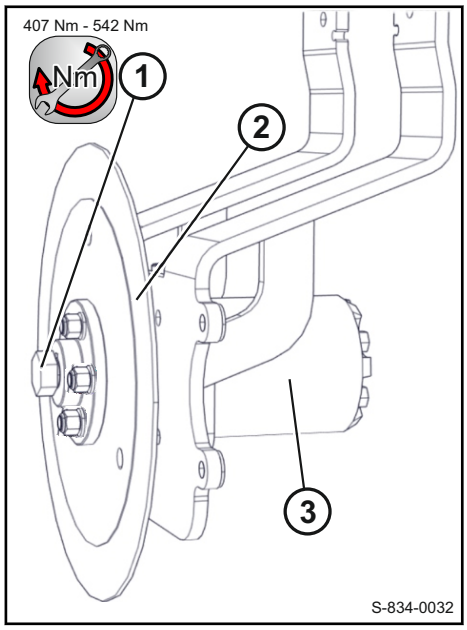


Fig. 260

5. Unscrew hexagon nut 1 ↳ Fig. 260 and pull the drive disc (2) off the travel motor.

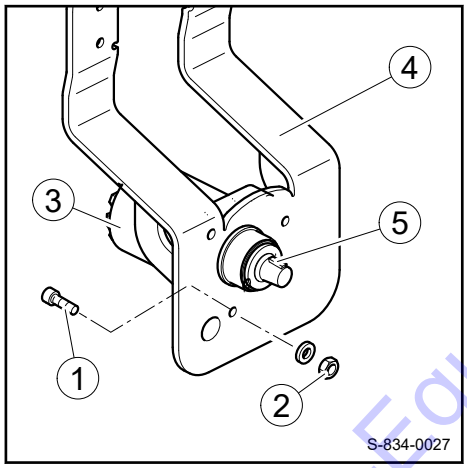


Fig. 261

6. Disassemble fastening screws 1 ↳ Fig. 261, washers and nuts (2).
7. Remove the travel motor (3) from the support leg (4).
8. Disassemble the feather key (5).

6.3.2.4 Assembling the rear drum

Assembling the travel bearing

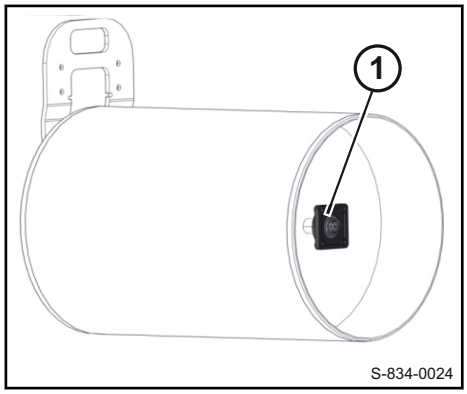


Fig. 262

1. Slide the travel bearing 1 ↳ Fig. 262 onto the shaft.

Installing the travel motor

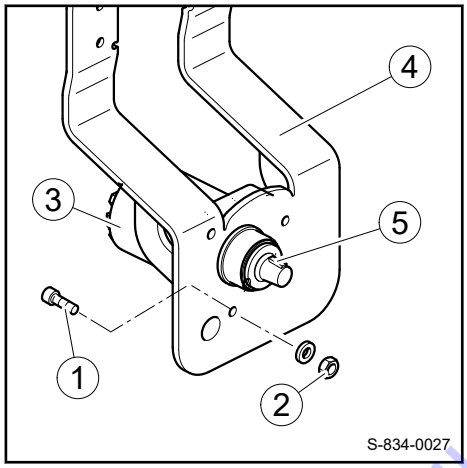


Fig. 263

1. Mount travel motor 3 ↳ Fig. 263 with hexagon screws (1), washers and nuts (2) to the support leg (4).
2. Install the feather key (5) in the travel motor (3).

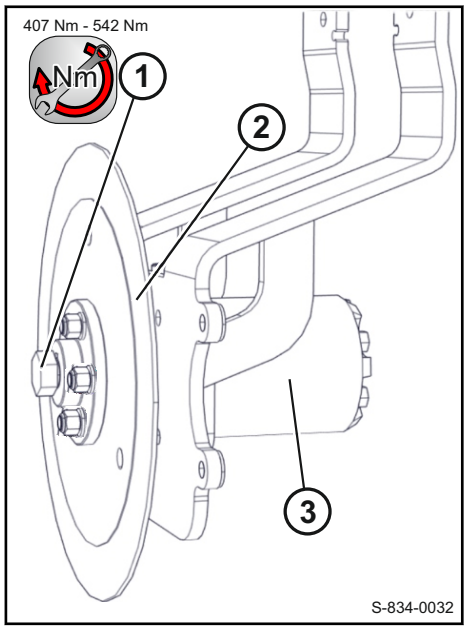


Fig. 264

3. Mount drive disc 2 ↳ Fig. 264 with fastening nuts (1) to the travel motor (3).

Tightening torque:
407 to 542 Nm

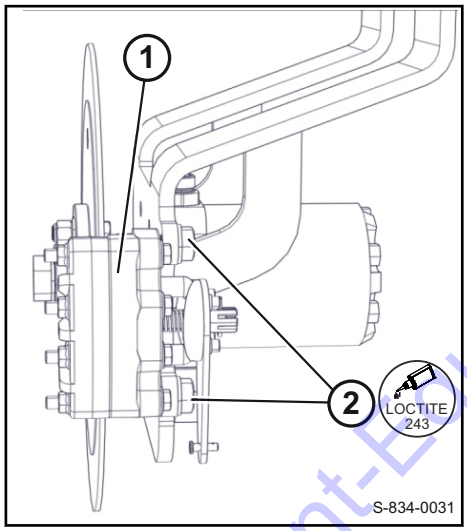


Fig. 265

4. Mount parking brake 1 ↳ Fig. 264 with screws (2) and washers to the support leg.

⇨ Insert screws (2) with LOCTITE 243.

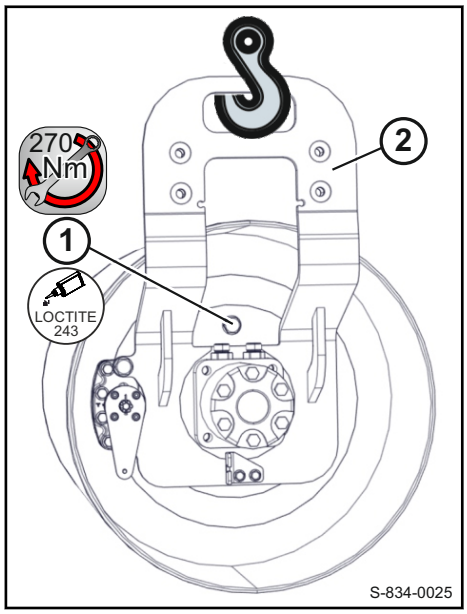


Fig. 266

5. Mount support leg 2 ↳ Fig. 266 with travel motor, drive disc and parking brake to the drum.

Tightening torques for hexagon screws (1):
270 Nm

⇨ Insert the hexagon screws (1) with LOCTITE 243.

6.3.3 Inspection and maintenance work

6.3.3.1 Maintenance Table

No.	Maintenance works	Page
	Every 10 operating hours	
6.3.3.2.1	*Cleaning the scrapers*	*200*
	Every 125 operating hours	
6.3.3.3.1	*Lubricating the rear drum bearings*	*201*

6.3.3.2 Every 10 operating hours

6.3.3.2.1 Cleaning the scrapers

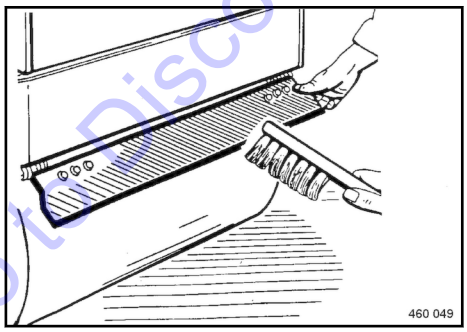


Fig. 267

1. Fold the scrapers up and clean them ↳ Fig. 267. This is of particular importance before compacting asphalt surfaces.

6.3.3.3 Every 125 operating hours

6.3.3.3.1 Lubricating the rear drum bearings

NOTICE!

For quality of grease refer to the "table of fuels and lubricants".

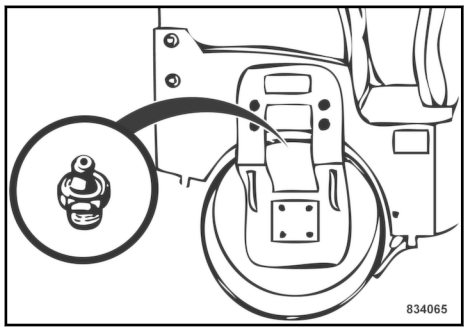


Fig. 268

1. Clean the grease nipple of the bearing on the rear drum ↳ Fig. 268.
2. Lubricate the grease nipple with a grease gun, until grease starts to run out of the bearing.

7 Troubleshooting

7.1 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.

7.2 Emergency procedures

7.2.1 Actuating the emergency stop switch

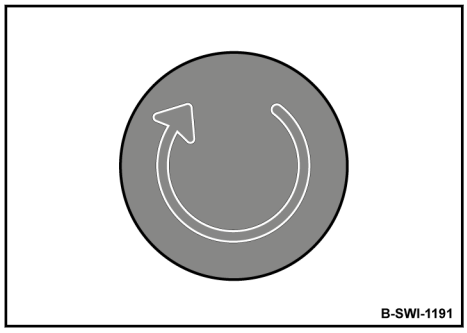


Fig. 269

1. In events of emergency and in case of danger actuate the emergency stop switch immediately.

   ⇨ The engine is shut down and the parking brake is closed.

7.2.2 Towing

WARNING!

Danger of accident!

Before releasing the parking brake secure the machine against unintended rolling by using appropriate means (e.g. metal wheel chocks).

Use a towing vehicle with sufficient traction and braking power for the unbraked towed load.

Use a tow bar.

Using the machine as towing vehicle is not permitted.

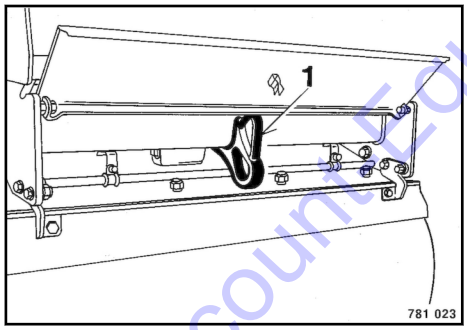


Fig. 270

1. Attach the drawbar to the front or rear towing hitch (1) ↳ Fig. 270.

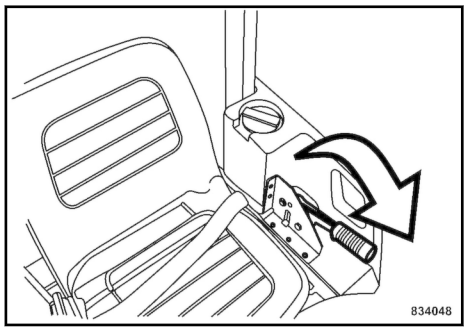


Fig. 271

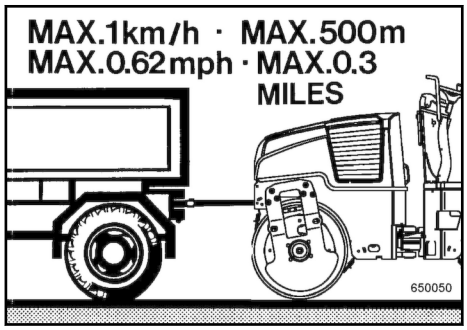


Fig. 272

After towing

1. Release the parking brake ↳ Fig. 271.

NOTICE!

Tow the machine only after having released the parking brake.

Towing speed 1 km/h, max. towing distance 500 m.

WARNING!

Danger of accident!

Before loosening the drawbar secure the machine against unintended rolling by using appropriate means (e.g. metal wheel chocks), or apply the parking brake.

7.3 Troubleshooting, electrical systems

7.3.1 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.

Due to the fast technical development electric and electronic vehicle systems become more intelligent and more comprehensive day by day, and can hardly be dispensed with in hydraulic and mechanical vehicle systems.

Diagnostics according to plan

Well structured trouble shooting procedures can save time and money.

Random tests have revealed that purely electronic components or control units only very rarely are the actual cause of failures:

- In approx. 10 % of the examined cases the problems were caused by control units.
- In approx. 15 % sensors and actuators were the cause of the problems.

By far the highest proportion of all faults could be traced back to wiring and connections (plugs, etc.).

General:

Before changing any expensive components, such as control units, you should run a systematic trouble shooting session to eliminate any other possible fault sources. Knowledge in basic electrics is required for this purpose. If a fault was diagnosed without having pulled the plug of the control unit or inspected the wiring, this should be done before changing any parts.

Check for good cable and ground contacts, therefore keep all mechanical transition points between electric conductors (terminals, plugs) free of oxide and dirt, as far as this is possible.

Always use the machine related wiring diagram for testing. If one or more faults were detected, these should be corrected immediately.

Do not disconnect or connect battery or generator while the engine is running.

Do not operate the main battery switch under load.

Do not use jump leads after the battery has been removed.

Sensors and electric actuators on control units must never be connected individually or between external power sources for the purpose of testing, but only in connection with the control unit in question.

It is not permitted to pull plugs off while the voltage supply is switched on (terminal 15 "ON")! Switch the voltage supply "OFF" first and pull out the plug.

Even with an existing polarity reversal protection incorrect polarity must be strictly avoided. Incorrect polarity can cause damage to control units!

Plug-in connectors on control units are only dust and water tight if the mating connector is plugged on! Control units must be protected against spray water, until the mating connector is finally plugged on!

Unauthorized opening of control electronics (Microcontroller MC), modifications or repairs in the wiring can cause severe malfunctions.

Do not use any radio equipment or mobile phones in the vehicle cab without a proper aerial or in the vicinity of the control electronics!

Switches, plugs, wiring looms

Over the years corrosion and contamination can create high contact resistances in plugs and switches, wiring looms affected by “copper worm” (corrosion) are poor conductors. In extreme incidents such a component will be absolutely dead, while minor damage more or less reduces the performance of the affected consumers to a noticeable extent.

In many cases it is enough to examine the components visually: Green male connectors of plugs, neglected switch contacts must be mechanically cleaned and reassembled with some contact spray. Cables core showing green discolouration must be replaced. A resistance measurement provides exact information about the conductivity.

Leakage currents

The machine has not been driven for a few days, and the battery is almost empty? This may be caused by a “surreptitious consumer” in the electrical network of the machine, of a leakage current simply “draws” your battery empty. Such a leakage current can be caused by e.g. the ignition lock, a defect switch, a relay or a clamped or chafed cable.

A leakage current can be located by a amperage measurement with a multimeter.

Measuring fault

Whenever the electrical system of the vehicle behaves in an unexpected way, one should first consider that there may be a ground problem! The older the electrical system and the lower the voltage, the more likely this will be the cause.

As we all know, being able to utilize electric current requires the existence of a closed electric circuit, the electrons leaving the battery must be able to return to the battery. In vehicles numerous existing metal parts can be used for this purpose. The negative pole of the battery is connected with the metal of the frame. The current then flows through an insulated cable to e.g. a lamp should light, and instead of a return line, the socket of the lamp is also, in some way, connected to the frame, through which the current can flow back to the battery. However, should the connection between lamp and frame corrode causing a high electrical resistance at that point, the current will try to find a different way. If no other way can be found, the component will simply not work, even if the meter shows that voltage arrives. Very often the current finds a different way back to the battery, sometimes through other consumers.

Measuring sensors and actuators

Sensor signals are best checked where they are needed, i.e. on the control unit. If the correct signal is received you can be sure that not only the sensor, but also the wiring to the control unit is in good working order.

It is a common procedure to pick up the signals with a break-out-box, the Y-cable of which is fastened between control unit and control unit plug. If no break-out-box is available, the measurement takes place directly on the sensor, or one must try to gain access to the back of the plug.

Trouble shooting procedure:

- First check the corresponding actuator, in case of a faulty signal the output signal must be checked directly on the control unit.
- If the output signal is correct, check the wiring to the actuator.
- In case of an incorrect output signal, check the corresponding input signals after.
- In case of incorrect input signals check the signal on the sensor itself.
- If the sensor signal is correct, check the wiring to the control unit for continuity and against ground (short circuit).
- If the sensor delivers a correct signal, the sensor itself may be the cause of the problem, or the sensor may be affected by other incorrectly working components.
- However, the voltage supply and the ground connection of the control unit as well as the power supply for sensors and actuators must also be checked. Because an incorrect voltage value can distort the input and output signals.
- If the action steps described above do not deliver a result, the periphery is OK and the fault must be in the control unit, but be cautious, most faults are caused by poor contacts in the plug connections.

If the battery is empty

If the battery is empty, the fault is normally quite quickly identified.

There are the following possibilities:

- because it is no longer charged by the generator
- because one of the consumers (light, radio, etc.) has not been switched off
- because a hidden consumer “surreptitiously” empties the battery
- because the battery is defective
- generator or regulator are defective
- wiring between generator, starter and battery in poor condition

Check and measure the charge system for faults

It makes sense to be familiar with the working principle of the charge system.

Necessary if:

- the battery is permanently discharged
- the battery has boiled over and acid has escaped
- the headlights light considerably brighter when accelerating
- light bulbs burn out frequently at irregular intervals

7.3.2 Fuse assignment

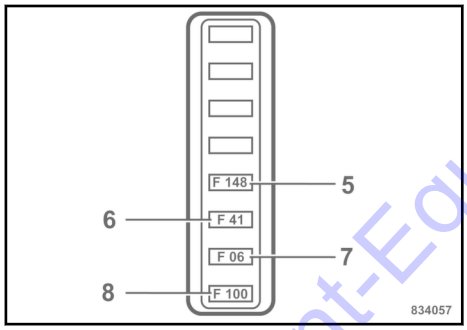


Fig. 273

- Fuse box

The fuse box is located behind the steering column covering.

WARNING!

Fire hazard!

Do not use fuses with higher ampere ratings and do not repair fuses with a piece of wire.

(5) 25 A	(F148) Fuse control MESX (potential 15)
(6) 15 A	(F41) Flashing beacon
(7) 15 A	(F06) Spraying system
(8) 20 A	(F100) Working head lights

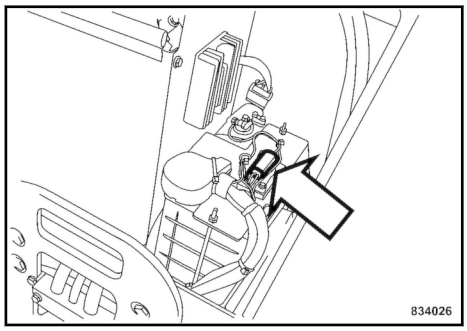


Fig. 274

- Main fuse

WARNING!
Fire hazard!
Do not use fuses with higher ampere ratings and do not repair fuses with a piece of wire.

25 A	F 00

7.3.3 Starting the engine with jump leads

NOTICE!
A wrong connection will cause severe damage in the electric system.
– Bridge the machine only with a 12 Volt auxiliary battery.

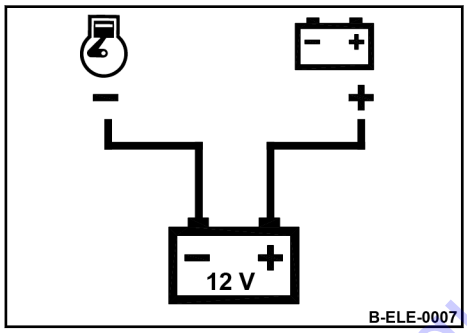


Fig. 275

1. Connect the plus pole of the external battery first with the plus pole of the vehicle battery using the first jump lead.
2. Then connect the second battery cable first to the minus pole of the current supplying auxiliary battery and then to engine or chassis ground, as far away from the battery as possible.
3. Start the engine.

NOTICE!
Danger of damage to the electronic system!
If no powerful consuming device is switched on, voltage peaks may occur when separating the connecting cables between the batteries, which could damage electrical components.

4. Once the engine is running switch on a powerful consumer (working light, etc.).
5. After starting disconnect the negative poles first and the positive poles after.
6. Switch off the consumer.

7.4 Trouble shooting, hydraulics

7.4.1 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.

There are many reasons for faults and malfunctions occurring in hydraulic systems. After years of trouble-free operation, even a perfectly designed and carefully operated system will eventually suffer line losses or undesirable side effects that can be described as natural: They are caused by wear, clogging and material fatigue. In such cases, it is particularly important to quickly detect sources of fault or defective parts and replace them as cost-effectively as possible. The cause of a component failure needs to be determined.

Preventive maintenance and servicing, especially regular checks of oil cleanliness, is of course the best method to pre-emptively minimise any faults and malfunctions. Nevertheless, malfunctions and faults may occur during operation of a hydraulic system or machine which impair the general functional sequence but also the safety of the hydraulic system or machine. In addition to impairing product quality, this may result in hazards that can no longer guarantee working safely with the machine.

If the control system is not a purely hydraulic system and, in fact, the hydraulic system is operated as part of an electro-hydraulic control system, it may be necessary to involve a qualified electrician in troubleshooting. In the case of complex systems operated with electronic controls, it may also be necessary to call in a specialist for electronic hardware or software.

At the beginning of troubleshooting, the necessary technical documents and information should be available, e.g. operating instructions, and circuit diagrams including measuring points.

Common symptoms and causes

Unusual or excessive noise during operation may indicate clogged filters or foreign matter in the line. However, even a suction line bent one time too many or too far, stiff valves, incorrectly adjusted engines/motors, tired pumps and incorrect operating temperatures can often cause “unhealthy” noises.

Too little or no pressure – this is how a hydraulic system may stop working. There is often incorrect air in the system because there are one or more leaks. The correct viscosity of the liquid used and sufficient cooling are also important for the pressure to be correct. And, of course, the coupling, pump and engine must not be allowed to grind, overheat or foam.

Fluctuations in pressure and flow make operation difficult and the system unpredictable. This is usually caused by contamination, blockages or tension. Many hydraulic systems can already be remedied by cleaning the corresponding components, bleeding the system and replacing the old liquids.

7.4.2 Insufficient hydraulic power

Trouble shooting charge pressure, example travel circuit

If the charge pressure is not inside the nominal range, no high pressure can be built up in the system.

Diesel engine running, travel lever position "0"

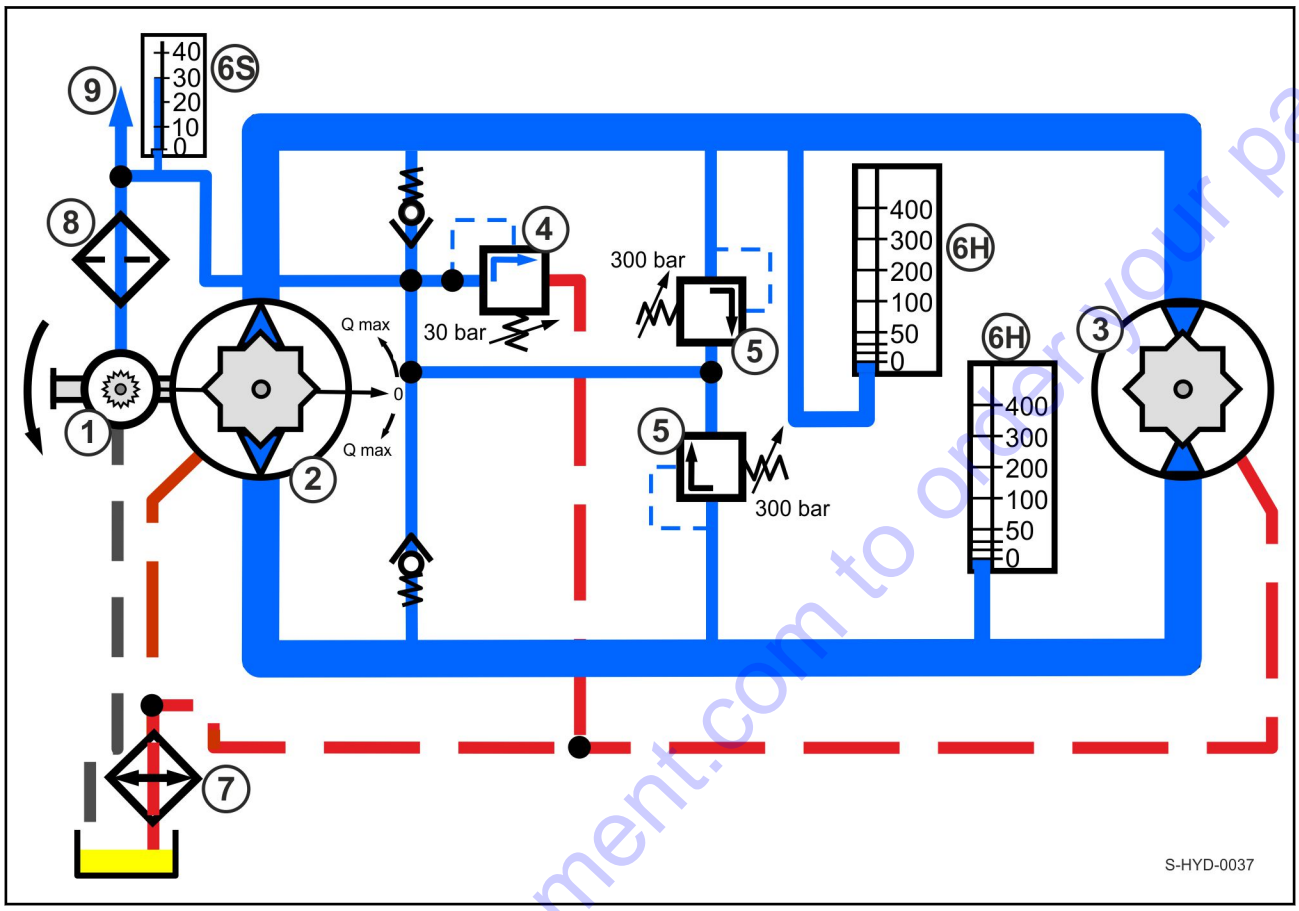


Fig. 276: Charge pressure (6S) present

1 Charge pump
2 Variable displacement pump
3 Hydraulic motor
4 Charge pressure relief valve (example 30 bar)
5 Pressure limiting valves (example 300 bar)
6 Pressure gauge, (6S) charge pressure, (6H) high pressure
7 Cooler (optional)
8 Filter
9 Connection for pump control

- If the charge pressure in the system drops, there is an internal leak in the hydraulic circuit.
- But there may also be an internal leak in an external component, which is also controlled by charge pressure. For example: Brake valve, brake piston, etc.
- However, the steering pump could also be defective, because the steering pump delivers the the oil that is fed into the closed hydraulic circuit.

Troubleshooting closed circuit
using the example of a travel circuit

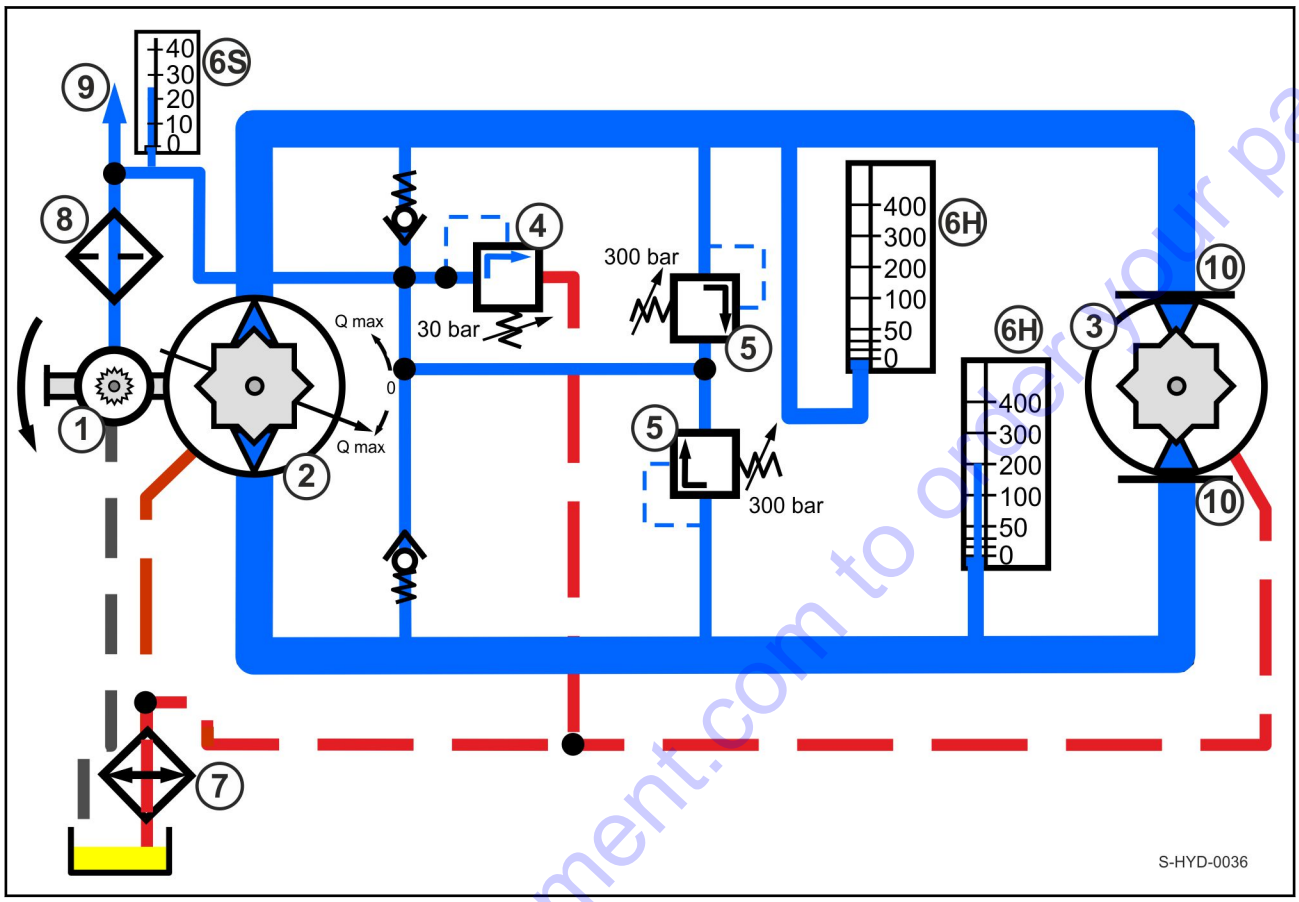


Fig. 277

10 Pressure resistance plugs

1. Connect pressure gauges (6) for high pressure and charge pressure.
2. Disconnect hydraulic motor/s (3) and close the ports with pressure resistant plugs (10).

   ⇨ The variable displacement pump can now be pressure tested.

NOTICE!

Do not run the test over a longer period of time (danger of overheating).

3. Start the engine and accelerate to full speed.
4. Shift the travel lever to forward and reverse.
5. Read the pressure gauges (6).Read the pressure gauge.

   ⇨ If the pressure gauges show the correct values, the variable displacement pump is OK. The fault is in the hydraulic motor/s (3).

7.4.3 Troubleshooting axial piston pumps

The following table should be of help when performing trouble-shooting. This table is by no means complete. In practice, other problems may occur that have not been listed here.

Procedure:

1. Always proceed systematically, even under time pressure. Indiscriminate, ill-considered disassembly and changing of settings can lead to a situation in which the original cause of a fault can no longer be detected.
2. Get an overview of the function of the product in connection with the overall system.
3. Try to clarify whether the product was able to deliver the required function within the overall system before the fault occurred.
4. Develop a clear understanding of the troubleshooting process. If necessary ask the direct operator or machine driver.
5. Have conditions or area of application of the product been changed?
6. Were changes (e.g. changeovers) or repairs made to the overall system (machine/plant, electrics, control) or to the product? If yes: What kind?
7. Has the product or the machine been operated as intended?
8. How does the fault manifest itself?

Fault description	Cause	Remedy
Unusual noises	Insufficient suction conditions, e.g. air in the suction line, inadequate diameter of the suction line, excessive viscosity of the pressure fluid, extreme suction height, too low suction pressure, foreign bodies in the suction line.	Machine or system manufacturer (e.g. optimize feed conditions, use suitable pressure fluid). Completely purge the axial piston unit, fill the suction line with pressure fluid. Remove foreign bodies from inside the suction line.
	Inappropriate fastening of the axial piston unit.	Check the fastening of the axial piston unit as specified by the machine or plant manufacturer. Observe the tightening torques.
	Inappropriate fastening of attachment parts, e.g. coupling and hydraulic lines.	Fasten attachment parts as specified by the coupling or fittings manufacturer.
	Pressure limiting valves of the axial piston unit (charge pressure, high pressure, pressure override valve).	Purge the axial piston unit, check the viscosity of the pressure fluid, consult the service department. Consult the service department.
	Mechanical damage to the axial piston unit.	Replace the axial piston unit, consult the service department.

Fault description	Cause	Remedy
No or insufficient volumetric flow	Faulty mechanical drive (e.g. defective coupling).	Check and repair the drive.
	Drive speed too low.	Consult the service department
	Insufficient suction conditions, e.g. air in the suction line, inadequate diameter of the suction line, excessive viscosity of the pressure fluid, extreme suction height, too low suction pressure, foreign bodies in the suction line.	Completely purge the axial piston unit, fill the suction line with pressure fluid. Remove foreign bodies from inside the suction line.
	Pressure fluid not within the optimal viscosity range.	Use appropriate pressure fluid.
	External control and setting facilities defective.	Check the external control.
	Pilot or control pressure too low.	Check pilot and control pressure, consult the service department.
	Functional disturbance in the control facility or the regulator on the axial piston unit.	Consult the service department.
	Mechanical damage to the axial piston unit.	Replace the axial piston unit.
No or insufficient pressure	Faulty mechanical drive (e.g. defective coupling).	Check and repair the drive.
	Poor drive power.	Consult the service department.
	Insufficient suction conditions, e.g. air in the suction line, inadequate diameter of the suction line, excessive viscosity of the pressure fluid, extreme suction height, too low suction pressure, foreign bodies in the suction line.	Completely purge the axial piston unit, fill the suction line with pressure fluid. Remove foreign bodies from inside the suction line.
	Pressure fluid not within the optimal viscosity range.	Use appropriate pressure fluid.
	External control and setting facilities defective.	Check the external control.
	Pilot or control pressure too low.	Check pilot and control pressure.
	Functional disturbance in the control facility or the regulator on the axial piston unit.	Consult the service department.
	Wear of the axial piston unit.	Replace the axial piston unit.
	Mechanical damage to the axial piston unit.	Replace the axial piston unit.
	Drive unit defective (e.g. hydraulic motor or cylinder).	Check the drive unit, replace if necessary.
Fluctuations in pressure/volumetric flow	Axial piston unit not or insufficiently purged.	Completely purge the axial piston unit.
	Insufficient suction conditions, e.g. air in the suction line, inadequate diameter of the suction line, excessive viscosity of the pressure fluid, extreme suction height, too low suction pressure, foreign bodies in the suction line.	Completely purge the axial piston unit, fill the suction line with pressure fluid.

Fault description	Cause	Remedy
Fluctuations in pressure/volumetric flow	Insufficient suction conditions, e.g. air in the suction line, inadequate diameter of the suction line, excessive viscosity of the pressure fluid, extreme suction height, too low suction pressure, foreign bodies in the suction line.	Remove foreign bodies from inside the suction line.
Pressure fluid too hot	Excessive input temperature on axial piston unit.	Check the system, e.g. malfunction of the cooler, pressure fluid level in tank too low.
	Malfunction of the pressure control valves (e.g. high pressure limiting valve, pressure override valve, pressure controller).	Consult the service department.
	Malfunction of the flushing valve (not for nominal size 18).	Consult the service department.
	Wear of the axial piston unit.	Replace the axial piston unit.

7.5 Trouble shooting, diesel engine

7.5.1 Starting the engine with jump leads

NOTICE!

A wrong connection will cause severe damage in the electric system.

– Bridge the machine only with a 12 Volt auxiliary battery.

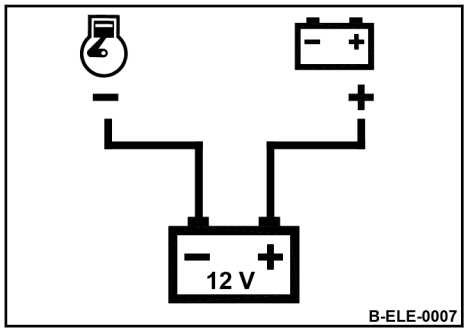


Fig. 278

1. Connect the plus pole of the external battery first with the plus pole of the vehicle battery using the first jump lead.
2. Then connect the second battery cable first to the minus pole of the current supplying auxiliary battery and then to engine or chassis ground, as far away from the battery as possible.
3. Start the engine.

NOTICE!

Danger of damage to the electronic system!

If no powerful consuming device is switched on, voltage peaks may occur when separating the connecting cables between the batteries, which could damage electrical components.

4. Once the engine is running switch on a powerful consumer (working light, etc.).
5. After starting disconnect the negative poles first and the positive poles after.
6. Switch off the consumer.

7.5.2 Engine problems

Fault description	Cause	Remedy
Engine does not start	Fuel tank empty	Fill fuel tank
	Fuel filter clogged	Change the filter
	Fuel lines leaking	Check all line connections for leaks and tighten the fittings
	Emergency stop switch locked	Unlock the emergency stop switch

Fault description	Cause	Remedy
Engine does not start	Driver not seated (seat contact switch)	Occupy the driver's seat when starting.
	Travel lever not in neutral position	Return the travel levers to neutral position.
	Battery not charged or not connected	Charge the battery, check the pole clamps
	Operating error	see section “Starting the engine”
	Incorrect valve clearance	Adjust the valve clearance
	Lack of oil	Fill up engine oil
	Spark plugs defective, soiled, incorrect electrode gap	Unscrew the spark plugs, check, replace if necessary
Poor starting of engine or engine works irregularly with poor power	Battery power too low	Have battery checked
	Battery pole clamps loose or oxidized, causing the starter to turn too slow	Clean the pole clamps, tighten and cover them with acid-free grease
	Especially in winter: use of too viscous engine oil	Use an engine oil complying with the ambient temperatures
	Fuel supply too low, fuel system clogged	Change the fuel filter. Check the line connections for leaks and tighten the fittings.
	The specified valve clearance is not correct	Adjust the valve clearance
	Carburettor defective	Have examined by a specialist
	Air filter dirty	Clean air filter, change if necessary
	Excessive play in throttle cable	Adjust the throttle cable, replace if necessary
Engine looses power and speed, excessive exhaust smoke	Engine oil level too high	Drain the oil down to the top dipstick mark
	Poor quality fuel	Use specified fuel
	Air filter dirty	Clean air filter, change if necessary
	Poor compression due to burned or broken piston rings or incorrect valve clearance	Have piston rings and pistons examined by a specialist, adjust the valve clearance
Engine overheating, engine must be shut down immediately!	Cooling air inlets heavily soiled	Clean the cooling air inlets
	Air filter dirty	Clean air filter, change if necessary

8 Special tools

8.1 Special tools for hydraulic system

8.1.1 Special tools, tests and adjustments

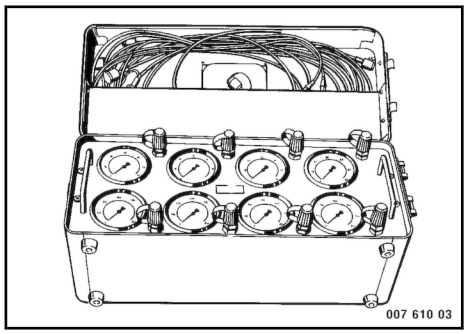


Fig. 279

- Hydraulic test case, large
- **BOMAG part no.: 007 610 03**

– *4 x 60 bar pressure gauges*
– *4 x 600 bar pressure gauges*
– *8 pressure test hoses*

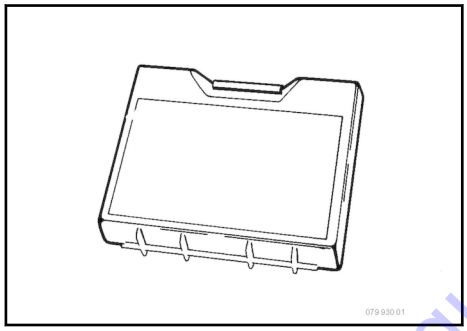


Fig. 280

- Hydraulic test case, small
- **BOMAG part no.: 079 930 01**

– *2 x 60 bar pressure gauges*
– *2 x 600 bar pressure gauges*
– *4 pressure test hoses*

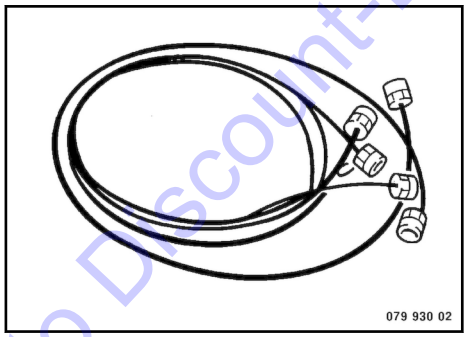
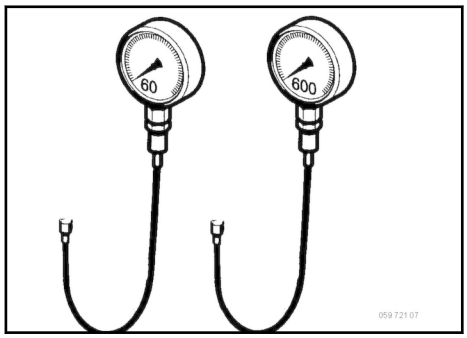


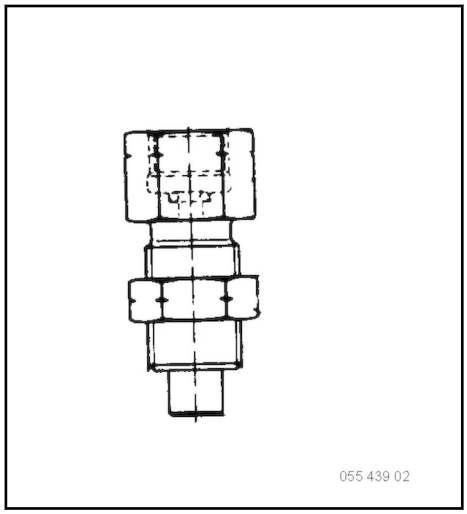
Fig. 281

- Measurement lines
- **1000 mm BOMAG part no.: 079 930 02**
- **2500 mm BOMAG part no.: 079 930 03**



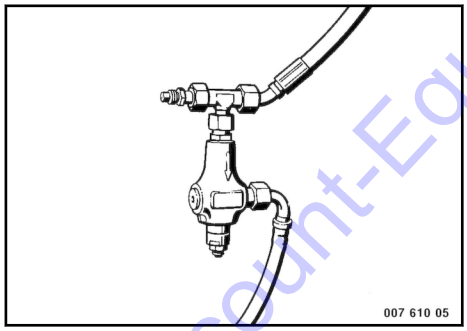
- Pressure gauge
- **60 bar BOMAG part no.: 059 721 07**
- **600 bar BOMAG part no.: 059 721 04**

Fig. 282



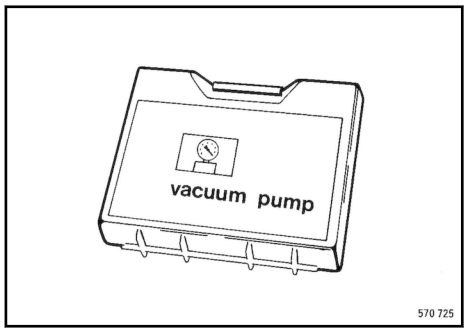
- Adapter for pressure test hose
- **BOMAG part no.: 055 439 02**

Fig. 283



- Gear pump testing device
- **BOMAG part no.: 007 610 05**

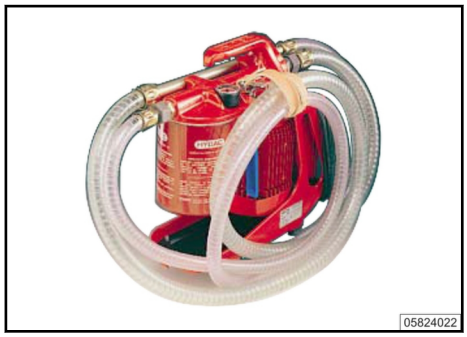
Fig. 284



- Vacuum pump for hydraulic oil tank
- **BOMAG part no.: 007 610 04 (12 Volt)**
- **BOMAG part no.: 007 610 24 (24 Volt)**

Fig. 285

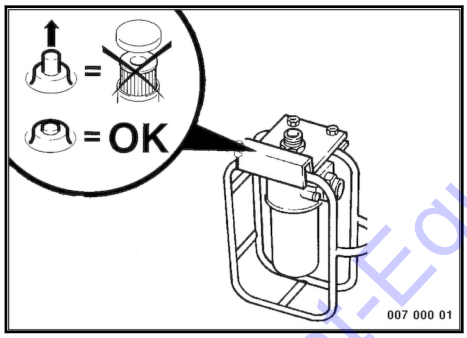
8.1.2 Special tools for flushing



The following list informs about special tools for flushing. You should choose the corresponding tool for the work to be carried out.

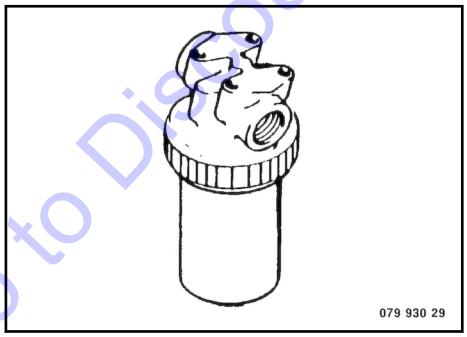
- Filling and filtering unit
- **BOMAG part no.: 058 240 22**

Fig. 286



- Flushing filter (S connection)
- **BOMAG part no.: 007 000 01**
- Filter element 1µ
- **BOMAG part no.: 079 930 52**
- Flushing hose 20S - 25S (2 pieces)
- **BOMAG part no.: 055 509 19**
- Screw socket R1“ - 25S (2 pieces)
- **BOMAG part no.: 055 400 52**

Fig. 287



- Flushing filter (L connection)
- **BOMAG part no.: 079 390 29**
- Filter element
- **BOMAG part no.: 079 390 14**
- Flushing hose 15L (2 pieces)
- **BOMAG part no.: 055 510 09**
- Screw socket R3/4“ -- 15L (2 pieces)
- **BOMAG part no.: 055 400 89**

Fig. 288

8.2 Special tools, electrics

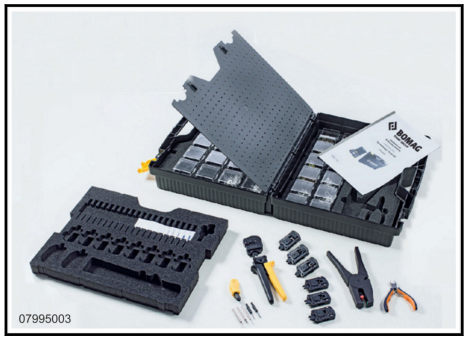


Fig. 289: Special pliers

Special pliers tool kit

The contacts are not included in the kit. Depending on the contact to be crimped, the matching tool head must be attached to the handle.

BOMAG part-no.: 079 950 03

- Comprising:
  - Different tool heads
  - Unlocking tools
  - Manual
  - Operating manual and plastic boxes for storing different contacts

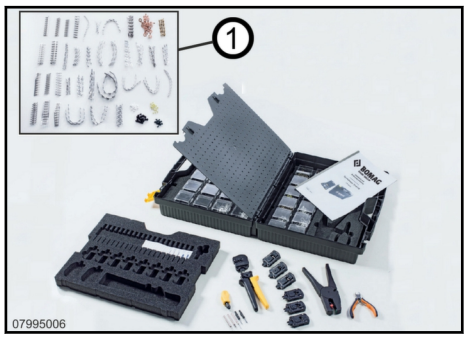


Fig. 290: Equipment kit (1)

Equipment kit for special pliers tool kit

BOMAG part-no.: 079 950 06

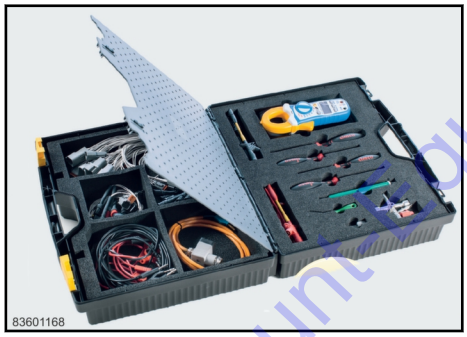


Fig. 291: Measuring set

Measuring set

BOMAG part-no.: 836 011 68

- Comprising:
  - Clamp multimeter
  - Measuring adapter
  - Measurement lines
  - Screwdriver
  - Other accessories

8.3 Special tools for drum

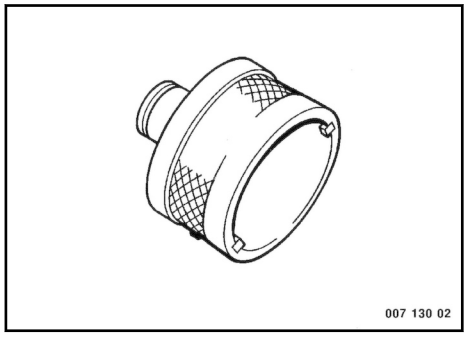


Fig. 292

- Bell to change the rubber buffers

9 Index

Index

D

M

O

T

Appendix

Appendix

A Circuit diagrams

A.1 Circuit diagram 78

BOMAG FAYAT GROUP

Bomag GmbH

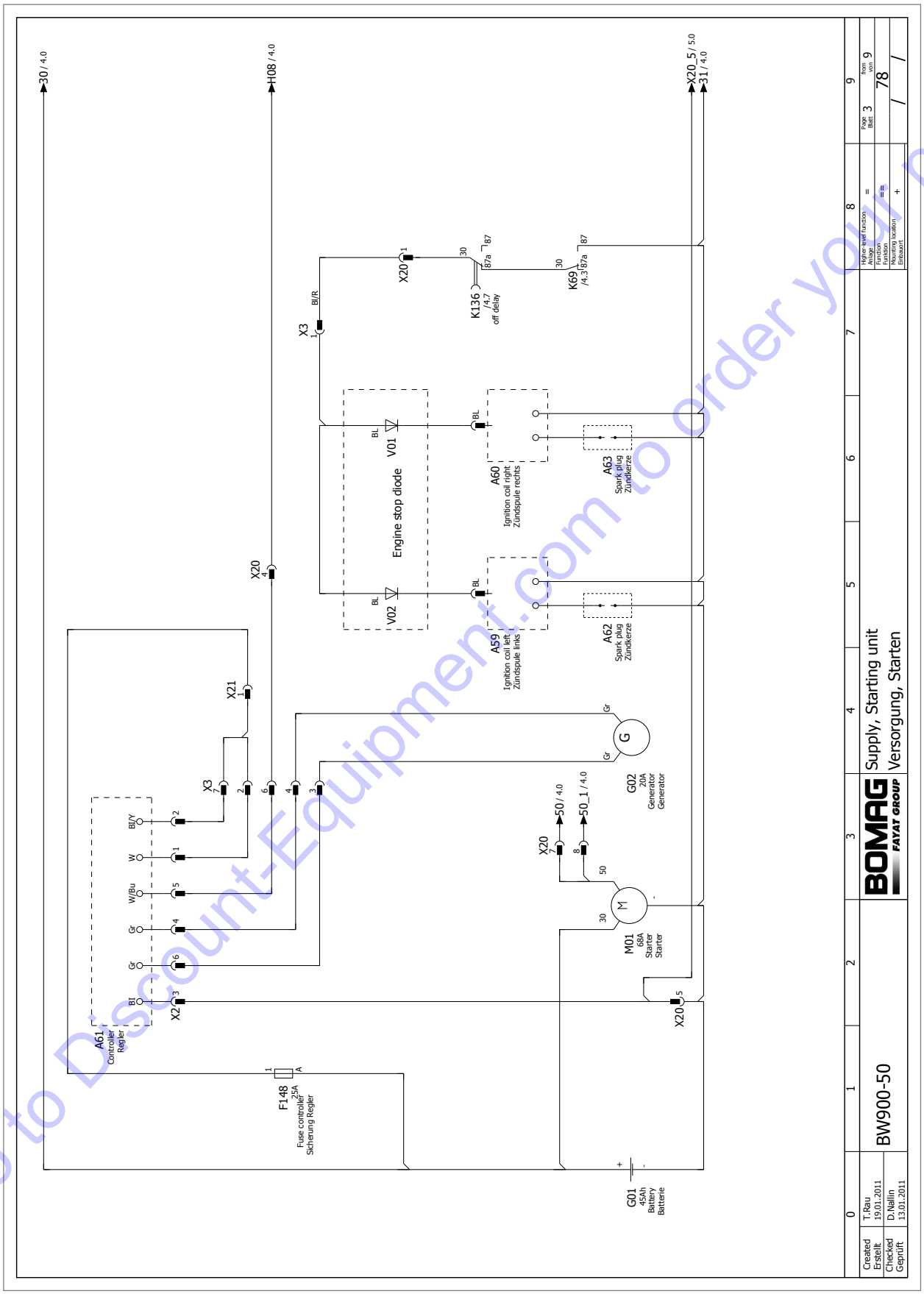
Industriegebiet Hellerwald
D-56154 Boppard

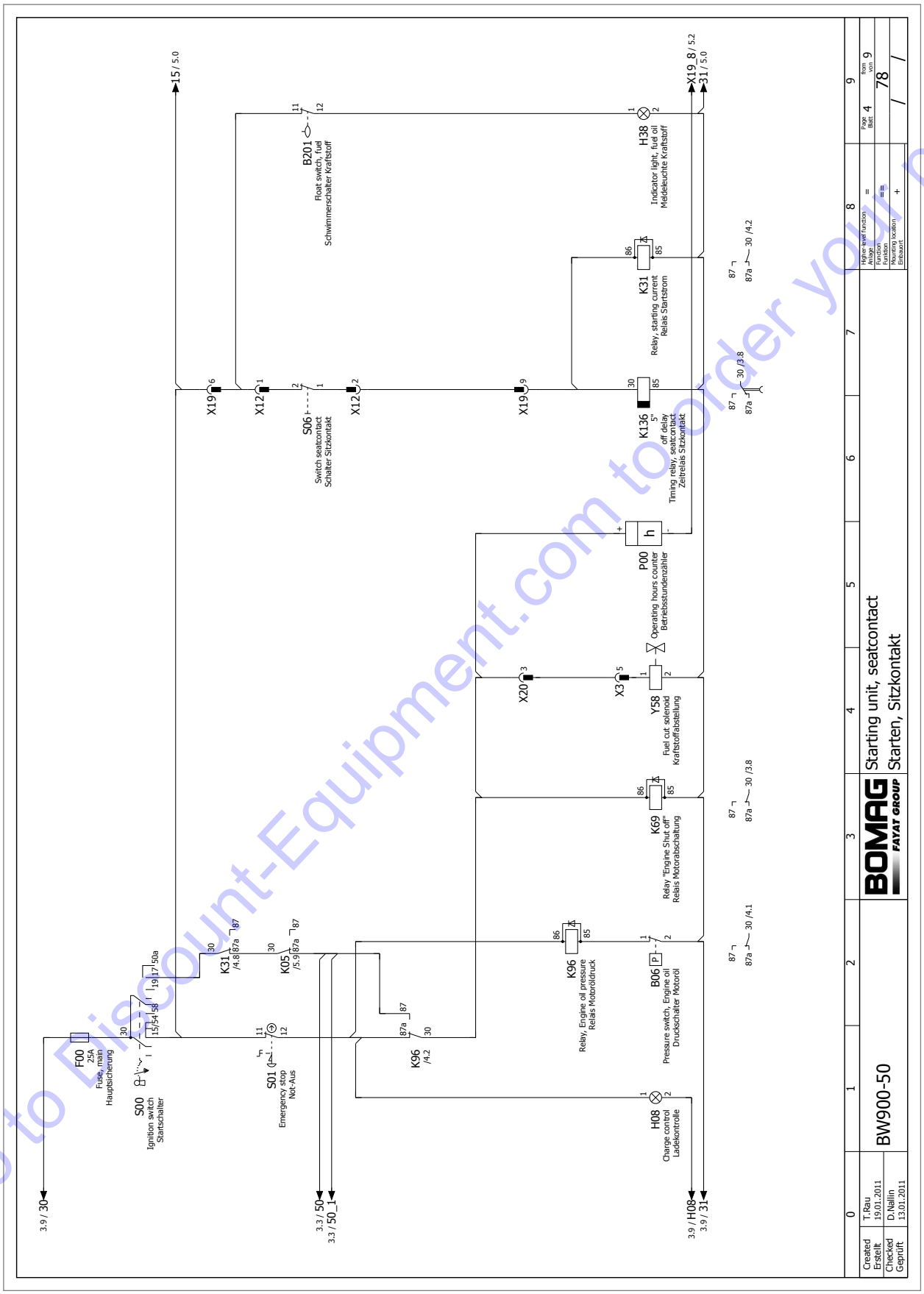
0		1	2	3	4	5	6	7	8	9
Created Erstellt	T.Rau 19.01.2011	BW900-50		BOMAG FAYAT GROUP	Cover sheet Deckblatt				Higher-level function Anlage =	Page Blatt 1 from von 9
Checked Geprüft	D.Nallin 13.01.2011								Function Funktion ==	78
									Mounting location Einbauort +	/ /

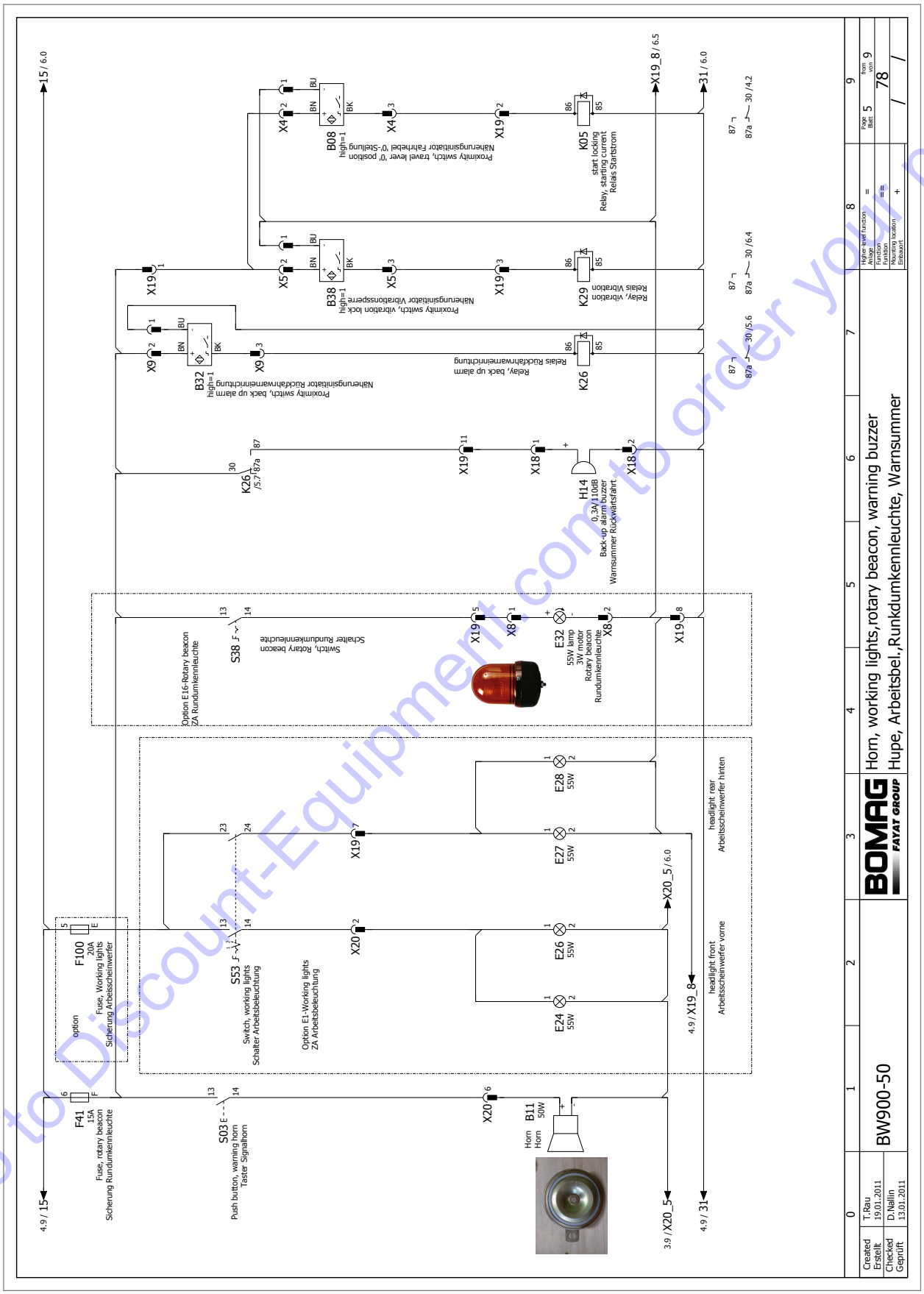
Table of contents
Inhaltsverzeichnis

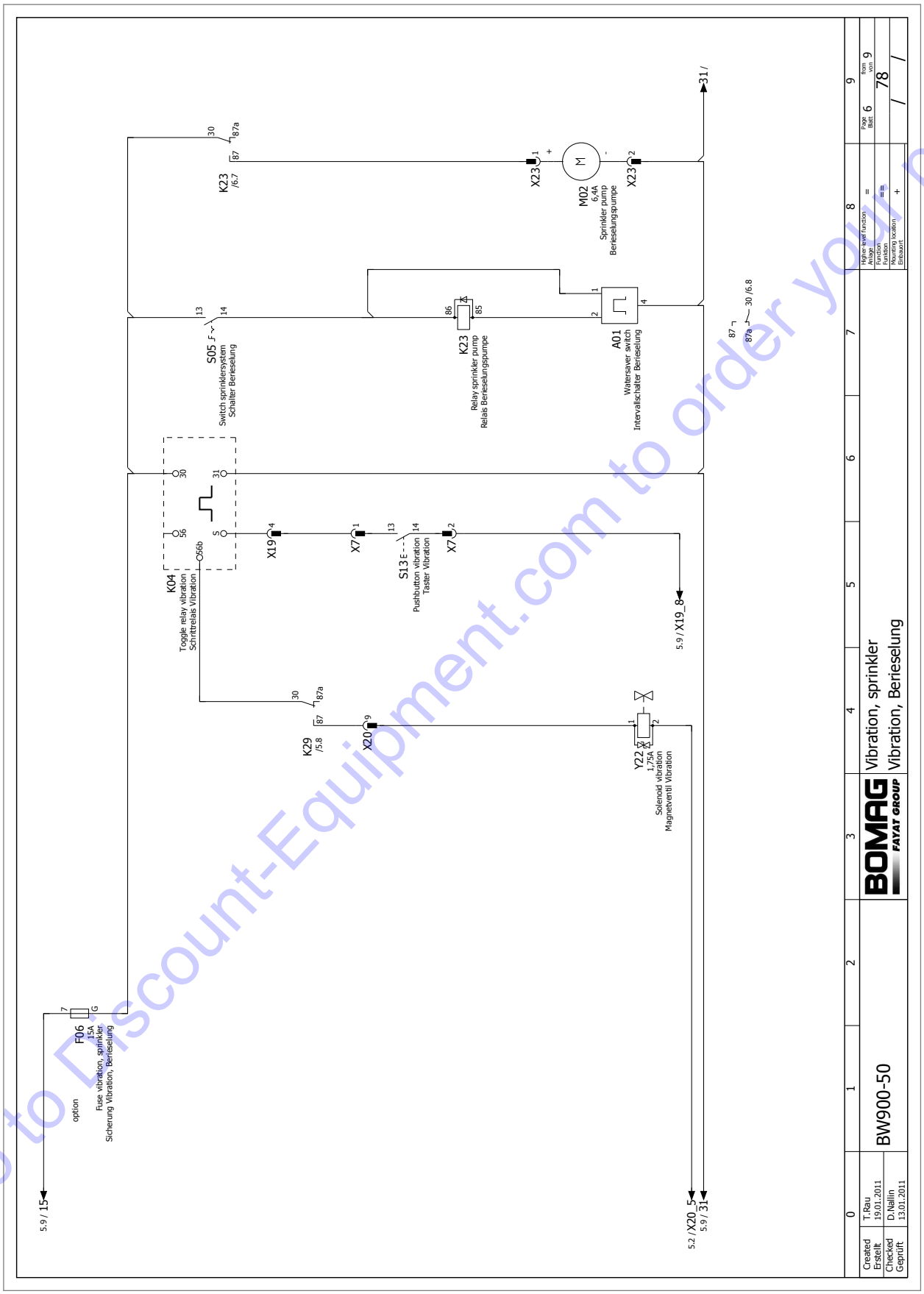
Page Blatt	Higher-level function Anlage	Function Funktion	Description	Beschreibung
1			Cover sheet	Deckblatt
2			Table of contents	Inhaltsverzeichnis
3			Supply, Starting unit	Versorgung, Starten
4			Starting unit, seatcontact	Starten, Sitzkontakt
5			Horn, working lights,rotary beacon, warning buzzer	Hupe, Arbeitsbel.,Runkdumkennleuchte, Warnsummer
6			Vibration, sprinkler	Vibration, Berieselung
7			Device tag list	Betriebsmittelliste
8			Device tag list	Betriebsmittelliste
9			Plug overview	Steckerübersicht

0	1	2	3	4	5	6	7	8	9
Created Erstellt T.Rau 19.01.2011 Checked Geprüft D.Nallin 13.01.2011	BW900-50		BOMAG FAYAT GROUP	Table of contents Inhaltsverzeichnis				Higher-level function Anlage = Function Funktion == Mounting location Einbauort +	Page Blatt 2 from von 9 78 / /









Device tag list
Betriebsmittelliste

Device tag BMK	Page Blatt	Path Pfad	Mounting location Einbauort	Higher-level function Anlage	Function text	Funktionstext	characteristics Techn.-Kenngrößen
	3	5					
A01	6	7			Watersaver switch	Intervallschalter Berieselung	
A59	3	5			Ignition coil left	Zündspule links	
A60	3	6			Ignition coil right	Zündspule rechts	
A61	3	2			Controller	Regler	
A62	3	5			Spark plug	Zündkerze	
A63	3	6			Spark plug	Zündkerze	
B06	4	2			Pressure switch, Engine oil	Druckschalter Motoröl	
B08	5	9			Proximity switch, travel lever '0' position	Näherungsinitiator Fahrhebel '0'-Stellung	high=1
B11	5	1			Horn	Horn	50W
B32	5	7			Proximity switch, back up alarm	Näherungsinitiator Rückfahrwarneinrichtung	high=1
B38	5	8			Proximity switch, vibration lock	Näherungsinitiator Vibrationssperre	high=1
B201	4	9			Float switch, fuel	Schwimmerschalter Kraftstoff	
E24	5	2			headlight front	Arbeitsscheinwerfer vorne	55W
E26	5	2			headlight front	Arbeitsscheinwerfer vorne	55W
E27	5	3			headlight rear	Arbeitsscheinwerfer hinten	55W
E28	5	4			headlight rear	Arbeitsscheinwerfer hinten	55W
E32	5	5			Rotary beacon	Rundumkennleuchte	55W lamp 3W motor
F00	4	1			Fuse, main	Hauptsicherung	25A
F06	6	2			Fuse vibration, sprinkler	Sicherung Vibration, Berieselung	15A
F41	5	1			Fuse, rotary beacon	Sicherung Rundumkennleuchte	15A
F100	5	2			Fuse, Working lights	Sicherung Arbeisscheinwerfer	20A
F148	3	1			Fuse controller	Sicherung Regler	25A
G01	3	0			Battery	Batterie	45Ah
G02	3	4			Generator	Generator	20A
H08	4	1			Charge control	Ladekontrolle	
H14	5	6			Back-up alarm buzzer	Warnsummer Rückwärtsfahrt	0,3A/110dB
H38	4	9			Indicator light, fuel oil	Meldeleuchte Kraftstoff	
K04	6	5			Toggle relay vibration	Schrittrelais Vibration	
K05	5	9			Relay, starting current	Relais Startstrom	start locking
K23	6	7			Relay sprinkler pump	Relais Berieselungspumpe	
K26	5	7			Relay, back up alarm	Relais Rückfahrwarneinrichtung	
K29	5	8			Relay, vibration	Relais Vibration	
K31	4	8			Relay, starting current	Relais Startstrom	
K69	4	3			Relay "Engine Shut off"	Relais Motorabschaltung	
K96	4	2			Relay, Engine oil pressure	Relais Motoröldruck	
K136	4	7			Timing relay, seatcontact	Zeitrelais Sitzkontakt	5" off delay

0		1	2	3	4	5	6	7	8	9
Created Erstellt	T.Rau 19.01.2011	BW900-50		BOMAG FAYAT GROUP	Device tag list Betriebsmittelliste				Higher-level function Anlage =	Page Blatt 7 from von 9
Checked Geprüft	D.Nallin 13.01.2011								Function Funktion ==	78
									Mounting location Einbauort +	/ /

Device tag list
Betriebsmittelliste

Device tag BMK	Page Blatt	Path Pfad	Mounting location Einbauort	Higher-level function Anlage	Function text	Funktionstext	characteristics Techn.-Kenngrößen
M01	3	2			Starter	Starter	68A
M02	6	8			Sprinkler pump	Berieselungspumpe	6,4A
P00	4	5			Operating hours counter	Betriebsstundenzähler	
S00	4	1			Ignition switch	Startschalter	
S01	4	1			Emergency stop	Not-Aus	
S03	5	1			Push button, warning horn	Taster Signalhorn	
S05	6	7			Switch sprinklersystem	Schalter Berieselung	
S06	4	7			Switch seatcontact	Schalter Sitzkontakt	
S13	6	5			Pushbutton vibration	Taster Vibration	
S38	5	5			Switch, Rotary beacon	Schalter Rundumkennleuchte	
S53	5	2			Switch, working lights	Schalter Arbeitsbeleuchtung	
V01	3	6			Diode	Diode	
V02	3	5			Diode	Diode	
Y22	6	4			Solenoid vibration	Magnetventil Vibration	1,75A
Y58	4	4			Fuel cut solenoid	Kraftstoffabstellung	

0		1	2	3	4	5	6	7	8	9
Created Erstellt	T.Rau 19.01.2011	BW900-50		BOMAG FAYAT GROUP	Device tag list Betriebsmittelliste				Higher-level function Anlage =	Page Blatt 8 from von 9
Checked Geprüft	D.Nallin 13.01.2011								Function Funktion ==	78
									Mounting location Einbauort +	/ /

Plug overview
Steckerübersicht

Designation Bezeichnung	Mounting location Einbauort	Function text Funktionstext

Contact Kontakt	Page Blatt	Path Pfad	Type Typ
BL	3	5	
BL	3	6	

X2

Contact Kontakt	Page Blatt	Path Pfad	Type Typ
1	3	3	Plug controller engine
2	3	3	
3	3	2	
4	3	2	
5	3	3	
6	3	2	

X3

Contact Kontakt	Page Blatt	Path Pfad	Type Typ
1	3	7	Plug engine functions
2	3	3	
3	3	3	
4	3	3	
5	4	4	
6	3	3	

X4

Contact Kontakt	Page Blatt	Path Pfad	Type Typ
2	5	9	Plug travel lever
3	5	9	

X7

Contact Kontakt	Page Blatt	Path Pfad	Type Typ
1	6	5	Plug Pushbutton vibration
2	6	5	

X8

Contact Kontakt	Page Blatt	Path Pfad	Type Typ
1	5	5	Plug rotary beacon
2	5	5	

X12

Contact Kontakt	Page Blatt	Path Pfad	Type Typ
1	4	7	plug seat contact
2	4	7	

Designation Bezeichnung	Mounting location Einbauort	Function text Funktionstext

X18

Contact Kontakt	Page Blatt	Path Pfad	Type Typ
1	5	6	Plug warning buzzer
2	5	6	

X19

Contact Kontakt	Page Blatt	Path Pfad	Type Typ
1	5	8	Plug wiring harness frame rear
2	5	9	
3	5	8	
4	6	5	
5	5	5	
6	4	7	
7	5	3	
8	5	5	
9	4	7	
11	5	6	

0	1	2	3	4	5	6	7	8	9
Created Erstellt T.Rau 19.01.2011 Checked Geprüft D.Nallin 13.01.2011	BW900-50		BOMAG FAYAT GROUP	Plug overview Steckerübersicht				Higher-level function Anlage = Function Funktion == Mounting location Einbauort +	Page Blatt 9 from von 9 78 / /

A.2 Hydraulic diagram 138

F26_FT001

BOMAG
FAYAT GROUP

Bomag GmbH

Hellerwald
56154 Boppard

Hydraulikschaltplan
Hydraulic schematic

Projektbeschreibung Project description	BW 900-50
Zeichnungsnummer Drawing number	138
Typ Type	
Maschinenhochnummer Machine index	**83400007**

Erstellt am Created on	**14.07.2009**		
Bearbeitet am Edit date	**20.04.2012**	von (Kürzel) by (short name)	**hagen**

0	1	2	3	4	5	6	7	8	9	
Bearb. Ed. by	I. Hagen 19.04.2012	BW 900-50		BOMAG FAYAT GROUP	Deckblatt cover sheet			Zeichnungsnummer drawing number 138	Blatt Page	1
Gepr Appr	Neil Liu 20.04.2012							Dokumentart document type	Blatt Page	7

Inhaltsverzeichnis / Table of contents

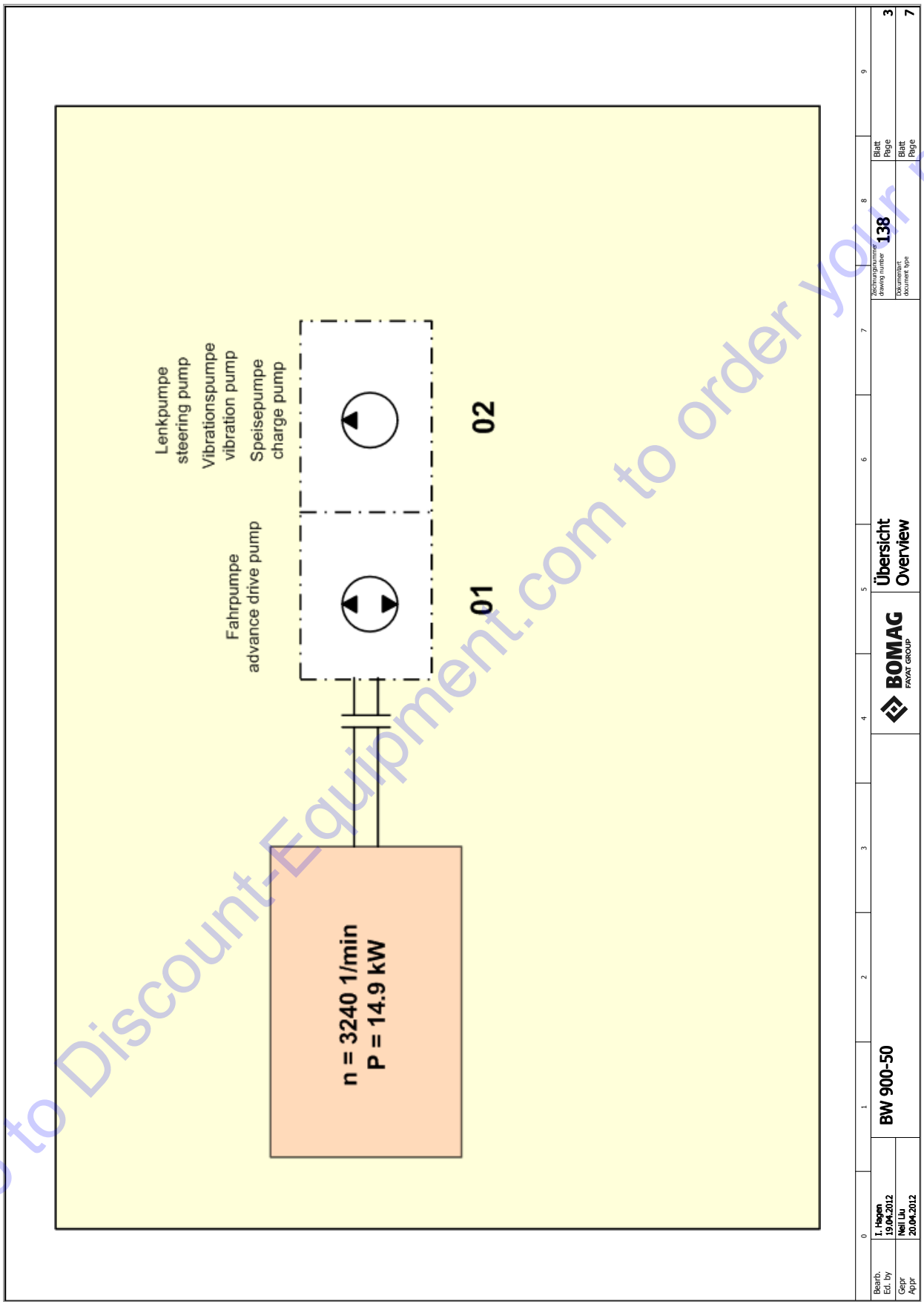
Spalte X: eine automatisch erzeugte Seite wurde manuell nachbearbeitet
Column X: An automatically generated page was edited

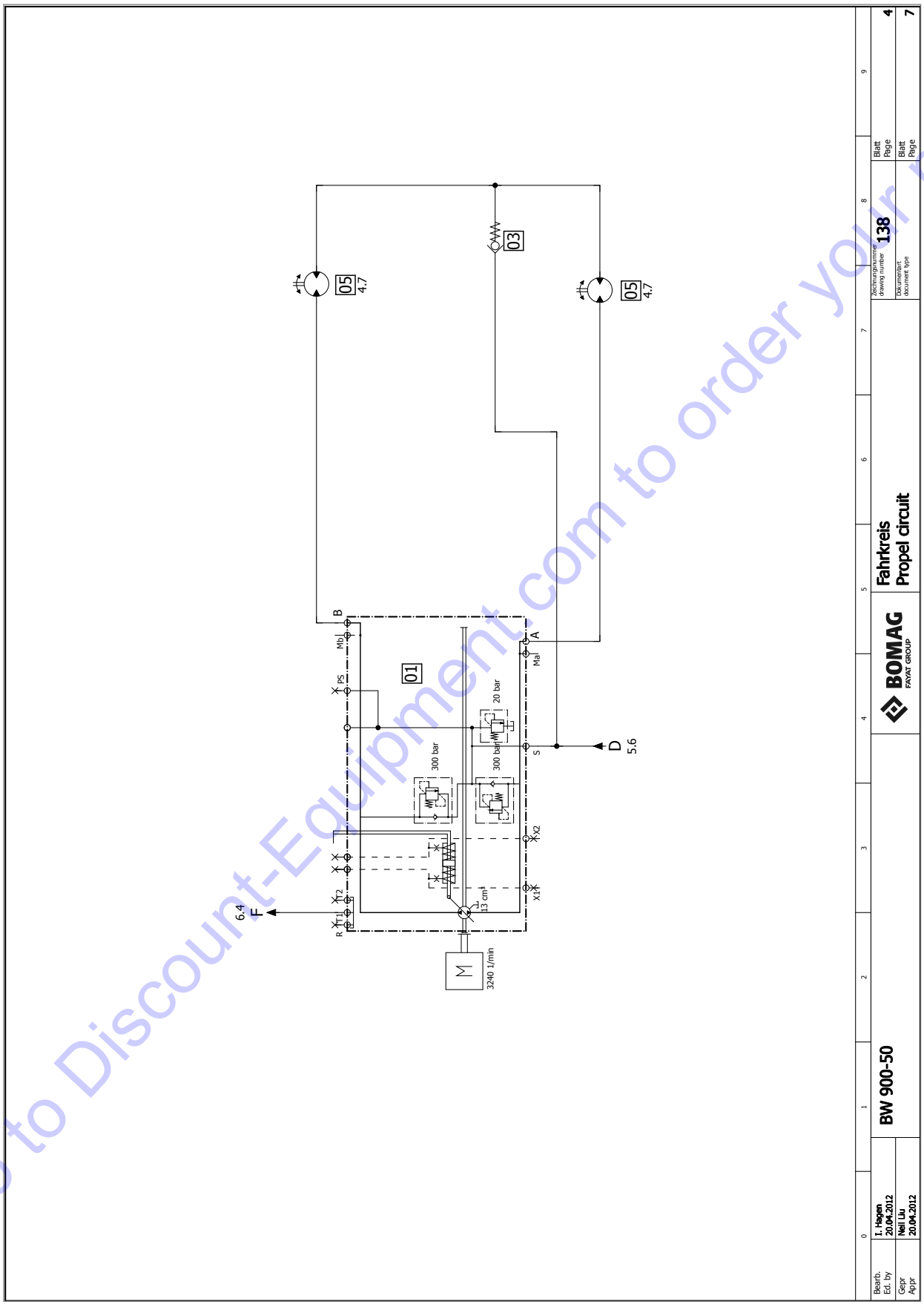
F06_001

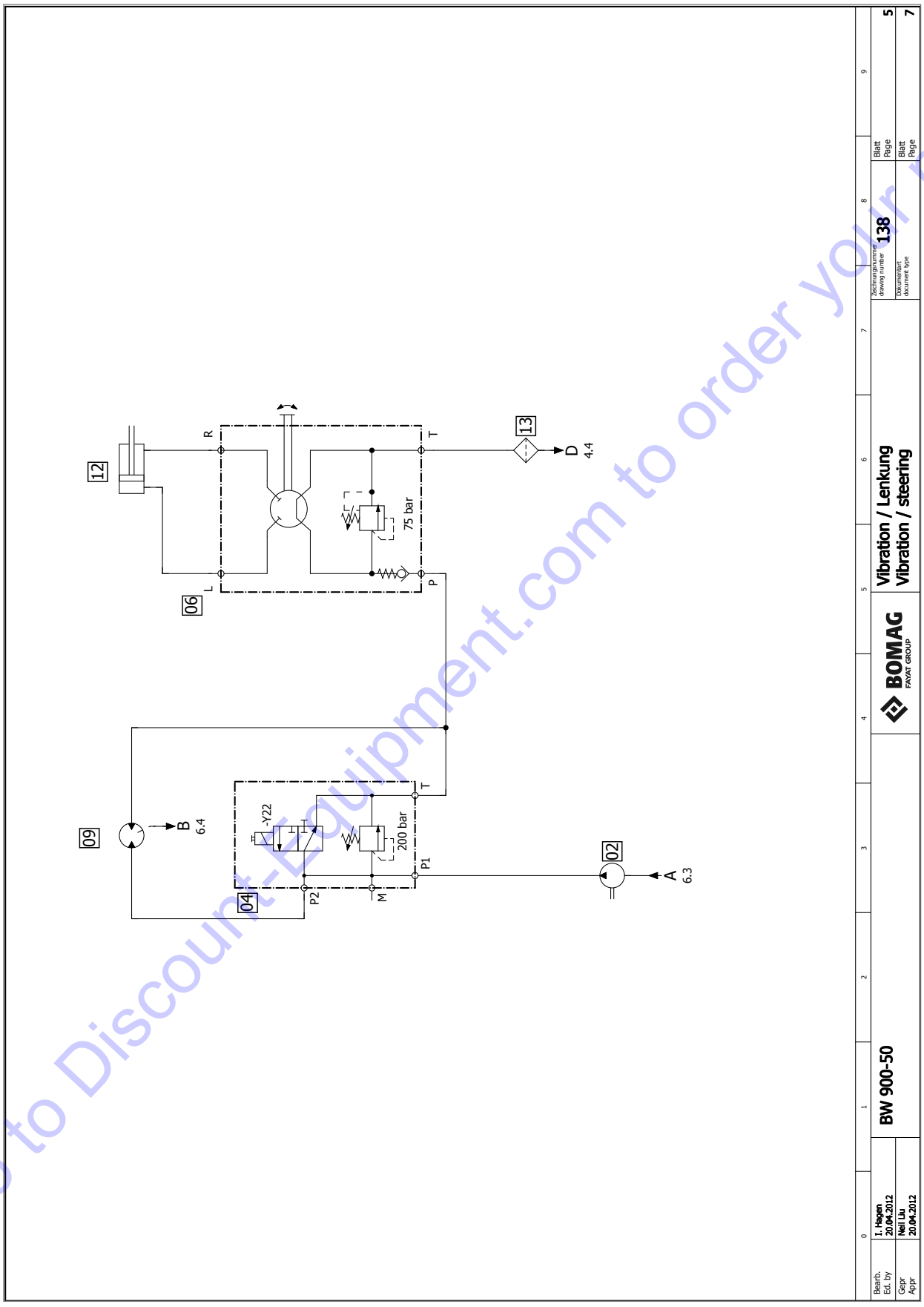
Seite / Page	Seitenbeschreibung	Page description	Datum / Date	Bearbeiter / Edited by	X
1	Deckblatt	cover sheet	19.04.2012	hagen	X
2	Inhaltsverzeichnis : 1 - 7	Table of contents : 1 - 7	20.04.2012	hagen	
3	Übersicht	Overview	19.04.2012	hagen	
4	Fahrkreis	Propel circuit	20.04.2012	hagen	
5	Vibration / Lenkung	Vibration / steering	20.04.2012	hagen	
6	Tank	Tank	19.04.2012	hagen	
7	Betriebsmittelliste : 01 - 13	Device tag list : 01 - 13	20.04.2012	hagen	

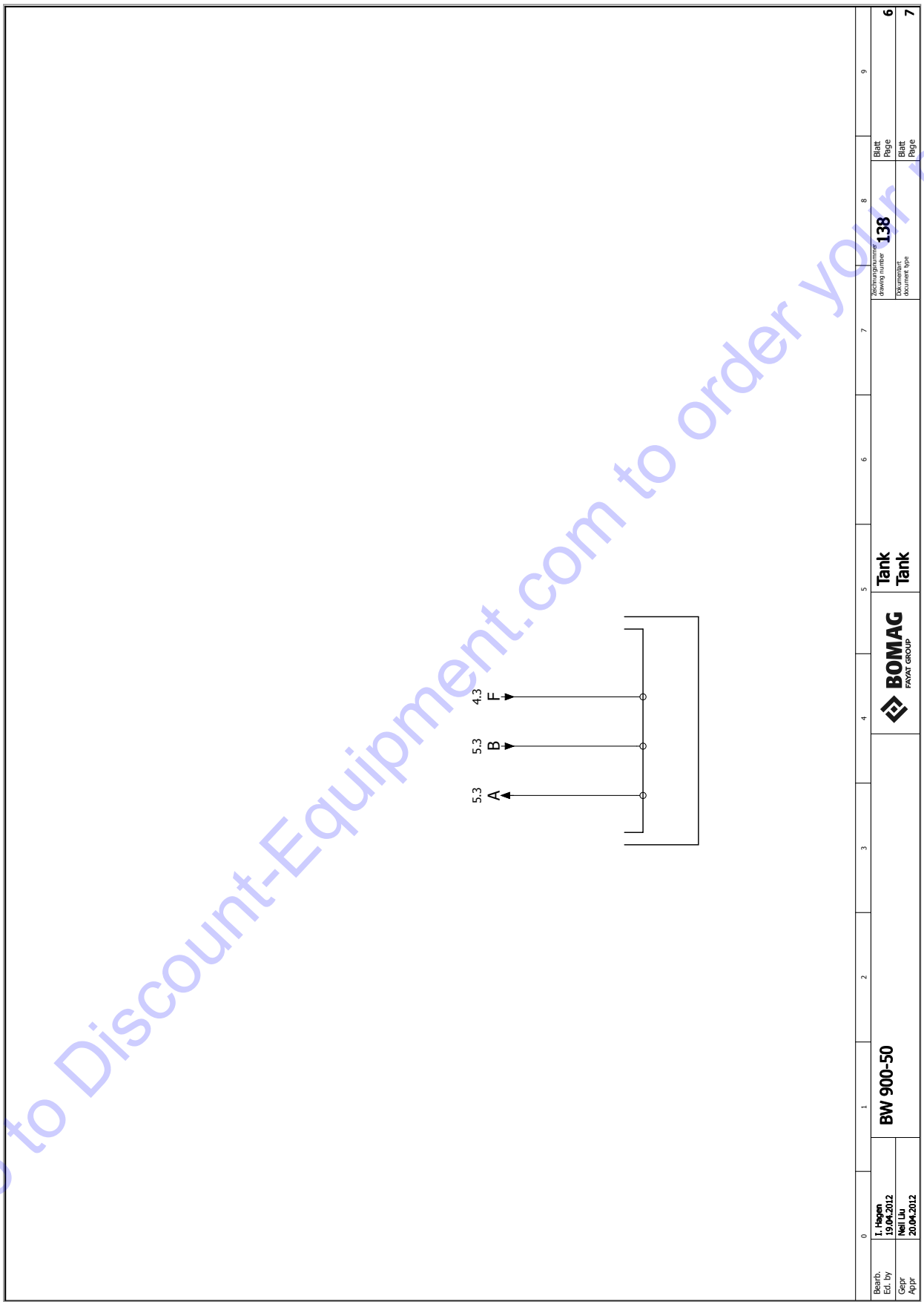
0	1	2	3	4	5	6	7	8	9

Bearb. Ed. by	I. Hagen 20.04.2012	BW 900-50	BOMAG FAYAT GROUP	Inhaltsverzeichnis : 1 - 7 Table of contents : 1 - 7	Zeichnungsnummer drawing number 138	Blatt Page 2
Gepr Appr	Neil Liu 20.04.2012				Dokumentart document type	Blatt Page 7



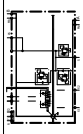
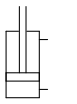






F03_001

Betriebsmittelliste Device tag list

Betriebsmittelkennzeichen Device tag	Funktionstext Function text	QVW X-Ref	Technische Daten technical data Messwert Metered value	Symbol Symbol
01	Fahrpumpe Drive pump	4.3	13 cm³	
02	Vibrationspumpe Vibration pump	5.3	5,5 cm³	
03	Rückschlagventil Non-return valve	4.8		
04	Vibrationsventil Vibration valve	5.3		
05	Fahrmotor Drive motor	4.7 4.7	405 cm³ 405 cm³	
06	Lenkventil Fehlt	5.5	80 cm³	
09	Vibrationsmotor Vibration motor	5.3	4 cm³	
12	Lenkzylinder Steering cylinder	5.6	55/25/125 Hub /Stroke	
13	Filter Filter	5.6	12 µm	

* alle Drücke gemessen bei einer Öltemperatur von ca. 50°C; Verbrennungsmotor im hohen Leerlauf
* all pressure measurement at oil temperature 50 °C; combustion engine at high idle

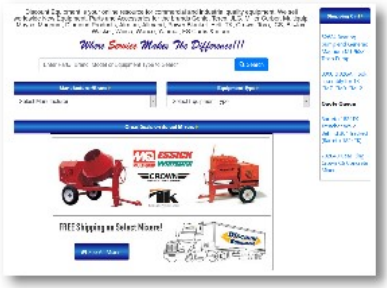
Betriebsmittelkennzeichen Device tag	Funktionstext Function text	QVW X-Ref	Technische Daten technical data Messwert Metered value	Symbol Symbol

Bearb. Ed. by	1. Hagen 20.04.2012	BW 900-50	BOMAG FAYAT GROUP	Betriebsmittelliste : 01 - 13 Device tag list : 01 - 13	Zeichnungsnummer drawing number	138	Blatt Page	7
Gepr Appr	Neil Liu 20.04.2012				Dokumentart document type		Blatt Page	7

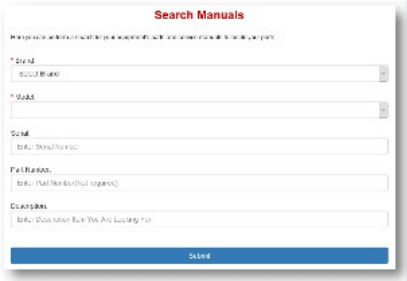
PARTS FINDER

Search Website by Part Number

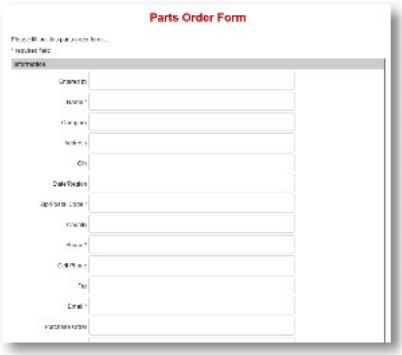
Discount Equipment



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



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



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