BOMAG
FAYAT GROUP

Operating Instruction
Maintenance Instruction

Original Operating Instructions

BW 212 D-5 SL



S/N 961 584 36 1001>

Single drum roller

008 207 64 EN

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⚠ **WARNING:** Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.

⚠ **WARNING:** Crude oil, gasoline, diesel fuel and other petroleum products can expose you to chemicals including toluene and benzene, which are known to the State of California to cause cancer and birth defects or other reproductive harm.
These exposures can occur in and around oil fields, refineries, chemical plants, transport and storage operations such as pipelines, marine terminals, tank trucks and other facilities and equipment.

For more information go to www.P65Warnings.ca.gov/petroleum.

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1 Introduction

1.1 Foreword

BOMAG manufactures machines for earth, asphalt and refuse compaction, stabilizers/recyclers as well as planers and pavers.

BOMAG's vast experience in connection with state-of-the-art production and test methods, such as lifetime tests of all important components and highest quality demands guarantee maximum reliability of your machine.

These operating and maintenance instructions are part of your machine.

They provide necessary information to operate your machine safely and properly.

They also contain information on required operating, maintenance and repair measures.

Carefully read the operating and maintenance instructions before taking your machine into operation.

Please observe the safety regulations strictly and follow all instructions to ensure safe operation.

If you are not yet acquainted with the indicators and control elements on this machine, you should thoroughly read the corresponding chapter ↳ *Chapter 4 'Indicators and control elements' on page 69*.

The description of the individual operating steps including the notes on safety to be followed can be found in chapter "Operation" ↳ *Chapter 6 'Operation' on page 105*.

Before every start up, carry out all required visual inspections and function tests ↳ *Chapter 5 'Checks prior to start up' on page 93*.

Ensure the compliance with the specified operating, maintenance and repair measures to maintain the functional safety of your machine.

A description of all necessary maintenance work, maintenance intervals as well as information on fuels and lubricants can be found in the chapter “Maintenance” ↬ *Chapter 8 ‘Maintenance’ on page 137*.

Do not service or repair your machine by yourself to avoid harming persons or damaging material or environment.

The machine must only be serviced and repaired by qualified and authorised personnel.

Contact our customer service to carry out the required maintenance work or necessary repairs.

In case of operating errors, inadequate maintenance or the use of unapproved fuels and lubricants all warranty claims will become null and void.

For your own personal safety you should only use original parts from BOMAG.

For your machine we offer service kits to make maintenance easier.

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

These operating and maintenance instructions are also available in other languages.

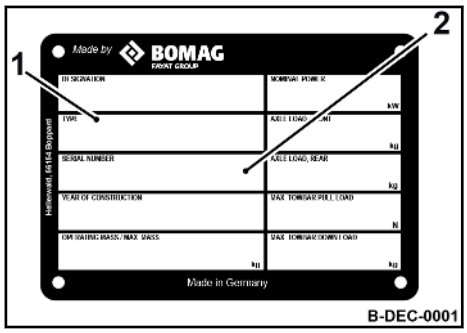
Apart from that, you can also order the spare parts catalogue against the serial number of your machine.

The above notes do not constitute an extension of the warranty and liability conditions specified in the general sales and delivery conditions of BOMAG GmbH.

We wish you successful work with your BOMAG machine.

1.2 Type plates

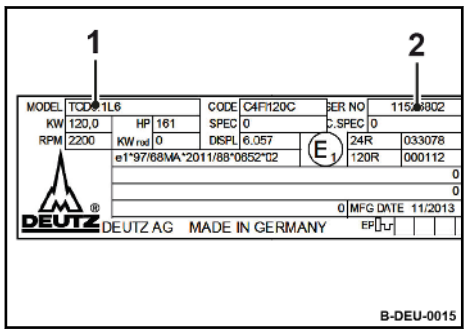
Machine type plate



Please enter here:	
1	Machine type:
2	Serial number:

Fig. 1: Example

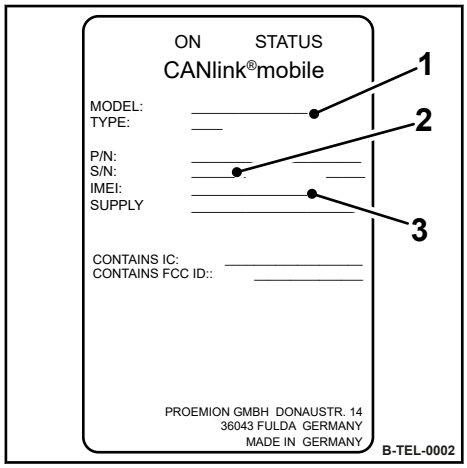
Engine type plate



Please enter here:	
1	Engine type:
2	Engine number:

Fig. 2: Example

Telematic type plate



Please enter here:	
1	Model/type:
2	Serial number (S/N):
3	IMEI:

Fig. 3: Example

2 Technical data

Dimensions

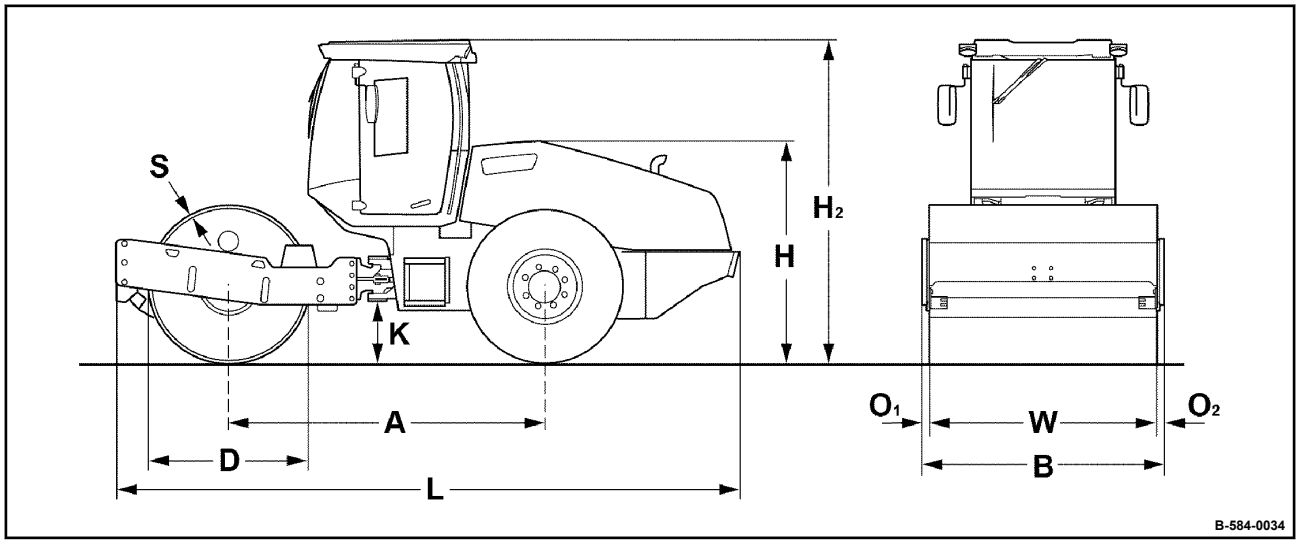


Fig. 4

A	B	D	H	H_2	K	L	$O_{1/2}$	S	W
2975 (117)	2260 (89)	1500 (59)	2240 (88)	3053 (120)	530 (20.9)	5870 (231)	65 (2.6)	25 (1.0)	2130 (84)
Dimensions in millimetres (Dimensions in inches)									

Weights		
Max. operating weight	13610 (30005)	kg (lbs)
Operating weight with cabin	11490 (25331)	kg (lbs)
Axle load, drum	6900 (15212)	kg (lbs)
Axle load, wheels	4590 (10119)	kg (lbs)
Static linear load	32.4 (181)	kg/cm (pli)

Travel characteristics		
Travel speed (1)	0–6 (0–3.7)	km/h (mph)
Travel speed (2)	0–10 (0–6.2)	km/h (mph)
Max. gradeability without/with vibration (soil and weather dependent)	45/43	%

Drive		
Engine manufacturer	Deutz	
Type	BF4M 2012 C	
Cooling system	Fluid	
Number of cylinders	4	
Rated power ISO 14396	98	kW
Rated power SAE J 1995	132	HP
Rated speed	2300	min^{-1}

Electric system		
Voltage	12	V

Tyres		
Tyre size	23.1-26 12PR	
Air pressure, nominal value	1.1 (16)	bar (psi)

Brakes		
Service brake	hydrostatic	
Parking brake	hydro-mechanical	

Steering		
Type of steering	Oscill.-articul.	
Steering angle	+/- 35	°
Oscillation angle	+/- 12	°
Inner track radius	3677 (145)	mm (in)

Exciter system		
Drive system	hydrostatic	
Frequency (1/2)	30/36 (1800/2160)	Hz (vpm)
Amplitude (1/2)	1.80/0.95 (0071/0037)	mm (in)
Centrifugal force (1/2)	236/170 (53055/38218)	kN (lbf)

Filling capacities		
Fuel (diesel)	250 (66)	l (gal us)

2.1 Noise and vibration data

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

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

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

2.1.1 Noise data

Sound pressure level at the operator's stand

L_{pA} = 82 dB(A), determined acc. to ISO 11201 and EN 500.



WARNING!
Loss of hearing caused by too high noise burdens!
– Wear your personal protective equipment (ear protection).

Guaranteed sound power level

L_{WA} = 108 dB(A), determined acc. to ISO 3744 and EN 500.

2.1.2 Vibration data

Vibration of the entire body (driver's seat)

The weighted effective acceleration value determined according to ISO 2631 is ≤ 0.5 m/s^2.

Hand-arm vibration

The weighted effective acceleration value determined according to ISO 5349 is ≤ 2.5 m/s^2.

Technical data – Noise and vibration data

3 Concerning your safety

3.1 Basic prerequisites

3.1.1 General

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

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

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

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

Furthermore, the following obviously also applies:

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

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

3.1.2 Explanation of signal words used



DANGER!
Danger to life if failing to comply!
Sections marked accordingly indicate an extremely dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.



WARNING!
Danger to life or danger of severe injuries if failing to comply!
Sections marked accordingly indicate a dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.



CAUTION!
Danger of injury if failing to comply!
Sections marked accordingly indicate a dangerous situation that could lead to fatal or severe injuries, if this warning is disregarded.



NOTICE!
Danger of material damage if failing to comply!
Sections marked accordingly indicate possible dangers for machines or components.

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

ENVIRONMENT!

Environmental damage if failing to comply!

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

3.1.3 Personal protective equipment

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

	Working clothes	Tight fitting working clothes with low tear resistance, tight sleeves and without any projecting parts protect against being caught by moving components.
	Safety shoes	They protect against heavy falling parts and slipping on slippery ground.
	Protective gloves	They protect the hands against scrapes, punctures or deeper injuries, irritating and caustic substances and burns.
	Safety goggles	They protect the eyes against airborne particles and squirting fluids.

	Face protection	This protects the face against airborne particles and squirting fluids.
	Hard hat	This protects the head against falling parts and injuries.
	Hearing protection	This protects against extreme noise.
	Fine dust mask	For protection against particulate pollutants.
	Respiratory protection	This protects the airways against substances or particles.

3.1.4 Intended use

This machine is intended for commercial use only.

The machine must only be used for:

- Compaction during earthwork and for road sub-base construction.
- Compaction of bituminous material, e.g. road surface layers.

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

3.1.5 Improper use

Dangers may arise with the machine if it is used other than for its intended purpose.

Any hazard caused by improper use is the sole responsibility of the operating company or driver/operator; the manufacturer cannot be held liable.

Examples of improper use are:

- Work with vibration on hard concrete, cured bitumen layers or extremely frozen ground.
- Driving on non-load-bearing subsoil or inadequate contact areas (danger of tilting).
- Using the machine for towing.
- Using to pull down walls or demolish buildings.

Transporting persons, except the machine driver, is prohibited.

Starting, operating and charging the machine in potentially explosive environments or underground mining is prohibited as the machine does not comply with ATEX requirements, among others.

3.1.6 Estimated service life of the machine

If the following general conditions are met, the service life of the machine is usually in the range of several thousand operating hours:

- Regular safety inspections by an expert / qualified person
- Performance of the prescribed maintenance work within the specified time
- Immediate performance of necessary repair work
- Exclusive use of original spare parts

3.2 Definition of responsible persons

3.2.1 Operating company

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

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

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

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

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

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

3.2.2 Expert / qualified person

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

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

3.2.3 Driver / operator

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

Observe your local laws and regulations.

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

The driver or operator must:

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

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

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

3.3 Basic safety regulations for safe operation

3.3.1 Remaining dangers, remaining risks

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

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

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

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

3.3.2 Medical auxiliary devices

Medical auxiliary devices, e.g. Pacemakers, insulin pumps or hearing aids, can be impaired in their function by electromagnetic interference when the machine is in operation.

Only use auxiliary equipment that is adequately shielded against electromagnetic interference.

3.3.3 Regular safety inspections

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

3.3.4 Modifications and alterations to the machine

Unauthorized changes to the machine are prohibited for safety reasons.

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

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

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

3.3.5 Damage, defects, misuse of safety devices

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

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

3.3.6 Roll Over Protection Structure (ROPS) and Fall On Protection Structure (FOPS)

Machines with cabin already have ROPS/FOPS as an integrated part of the cabin.

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

The ROPS/FOPS must not have any rust, damage, hairline cracks or open fractures.

The current machine weight must never exceed the testing weight for the ROPS/FOPS.

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/FOPS must therefore also not be straightened or repaired if it is damaged.

A defective ROPS/FOPS must always be replaced with an original spare part in close coordination with the manufacturer.

3.3.7 Telematic

If the machine is equipped with Telematic *(optional equipment)* , various points must be observed:

- The machine must not be operated in the vicinity of safety-critical infrastructure if it could be negatively affected by the emitted interference of radio equipment.
- If transport of the machine by air freight is planned, the power supply to the machine must be disconnected beforehand.
- The power supply to the machine must also be disconnected if local regulations in sensitive areas require this.
- Repairs to the machine are not permitted. The machine may only be repaired by the manufacturer. Inform our Customer Service Department.

The operation of radio equipment is regulated by national laws and regulations. To find out which requirements apply, please contact: *info@bomag.com*.

3.4 Handling fuels and lubricants

3.4.1 Preliminary remarks

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

Safety data sheets provide valuable information about the following characteristics:

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

3.4.2 Safety regulations and environmental protection regulations for handling diesel fuel

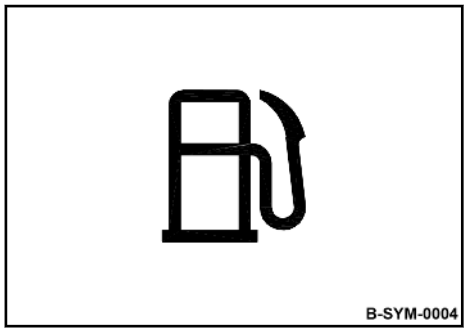


Fig. 5

WARNING!
Danger of burning by ignited diesel fuel!
- Do not allow diesel fuel to come into contact with hot components.
- Smoking and open fire are prohibited!
- Wear your personal protective equipment (protective gloves, protective clothing).

CAUTION!
Health hazard caused by contact with diesel fuel!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Do not inhale any fuel fumes.
- Avoid contact.

CAUTION!
Danger of slipping on spilled diesel fuel!
- Immediately bind spilled diesel fuel with an oil-binding agent.

ENVIRONMENT!
Diesel fuel is an environmentally hazardous substance!
- Always keep diesel fuel in proper containers.

» Continued on the next page

– Immediately bind spilled diesel fuel with an oil-binding agent and dispose of properly.
– Dispose of diesel fuel and fuel filters according to regulations.

3.4.3 Safety regulations and environmental protection regulations for handling oil

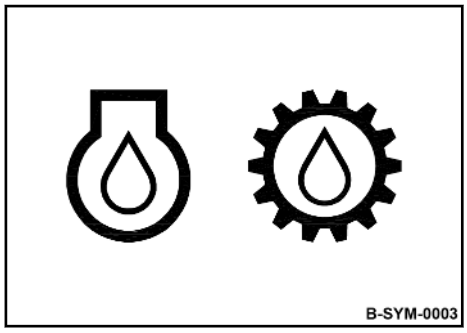


Fig. 6

WARNING!
Danger of burning by ignited oil!
– Do not allow oil to come into contact with hot components.
– Smoking and open fire are prohibited!
– Wear your personal protective equipment (protective gloves, protective clothing).

CAUTION!
Health hazard caused by contact with oil!
– Wear your personal protective equipment (protective gloves, protective clothing).
– Do not inhale any oil vapours.
– Avoid contact.

CAUTION!
Danger of slipping on spilled oil!
– Immediately bind spilled oil with an oil-binding agent.

ENVIRONMENT!
Oil is an environmentally hazardous substance!
– Always keep oil in proper containers.
– Immediately bind spilled oil with an oil-binding agent.
– Dispose of oil and oil filter according to regulations.

3.4.4 Safety regulations and environmental protection regulations for handling hydraulic oil

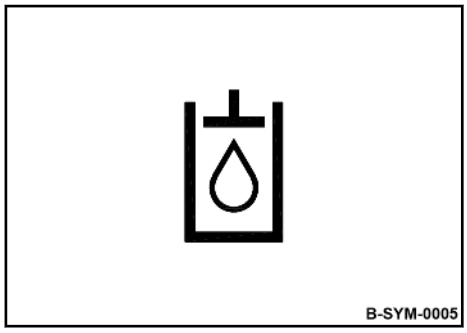


Fig. 7

WARNING!
Danger of injury caused by escaping pressure fluid!
- Always depressurize the hydraulic system before starting work in the hydraulic system.
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).

Should hydraulic fluid penetrate the skin, seek medical assistance immediately.

WARNING!
Danger of burning by ignited hydraulic oil!
- Do not allow hydraulic oil to come into contact with hot components.
- Smoking and open fire are prohibited!
- Wear your personal protective equipment (protective gloves, protective clothing).

CAUTION!
Health hazard caused by contact with hydraulic oil!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Do not inhale any oil vapours.
- Avoid contact.



CAUTION!

Danger of slipping on spilled oil!

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



ENVIRONMENT!

Oil is an environmentally hazardous substance!

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

3.4.5 Safety regulations and environmental protection regulations for handling coolants

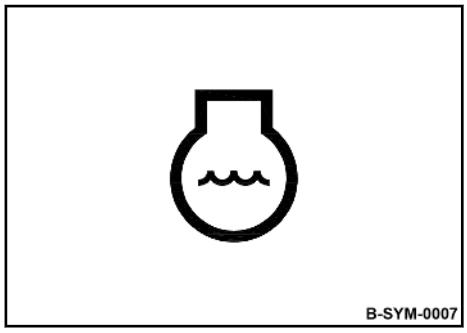


Fig. 8

WARNING!

Danger of scalding by hot fluid!

– Open the compensation tank only when the engine is cold.
– Wear your personal protective equipment (protective gloves, protective clothing, goggles).

CAUTION!

Health hazard caused by contact with coolant and coolant additives!

– Wear your personal protective equipment (protective gloves, protective clothing).
– Do not inhale any fumes.
– Avoid contact.

CAUTION!

Danger of slipping on spilled coolant!

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

ENVIRONMENT!

Coolant is an environmentally hazardous substance!

– Always keep coolant and coolant additives in proper containers.

» Continued on the next page

– Immediately bind spilled coolant with an oil-binding agent and dispose of it according to regulations.
– Dispose of coolant according to regulations.

3.4.6 Safety regulations and environmental protection regulations for handling battery acid

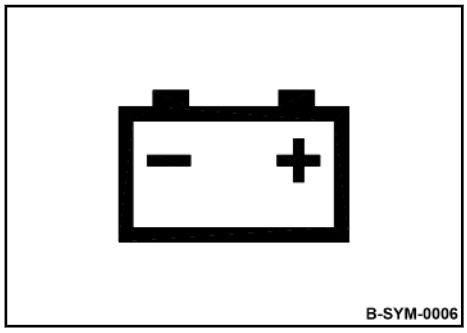


Fig. 9

WARNING!
Danger of cauterization with acid!

- Wear your personal protective equipment (protective gloves, protective clothing, goggles).
- Do not allow clothes, skin or eyes to come into contact with acid.
- Rinse off spilled battery acid immediately with lots of water.

Rinse acid off clothes, skin or eyes immediately with lots of clean water.

Immediately call for medical advice in case of cauterization.

WARNING!
Danger of injury caused by exploding gas mixture!

- Remove the plugs before starting to recharge the battery.
- Ensure adequate ventilation.
- Smoking and open fire are prohibited!
- Do not lay any tools or other metal objects on the battery.
- Do not wear jewellery (watch, bracelets, etc.) when working on the battery.
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).



ENVIRONMENT!

Battery acid is an environmentally hazardous substance!

– Dispose of battery and battery acid according to regulations.

3.5 Load/transport the machine

Use only stable loading ramps of sufficient load bearing capacity.

Loading ramps and transport vehicle must be free of grease, oil, snow and ice.

The ramp inclination must be less than the gradability of the machine.

Make sure that persons are not endangered by the machine tipping or sliding off. The instructing person must stand within the view of the operator, but outside the danger area.

Secure the machine with the articulation lock after driving it on the transport vehicle or before loading it with a crane.

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

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

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

Lifting tackle must not be damaged by machine components.

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

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

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

Fasten the lifting gear only at the specified lifting points.

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

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

After the transport loosen the articulation lock again, as otherwise the machine wouild not be steerable.

3.6 Starting up the machine

3.6.1 Prior to commissioning

Only use machines which have been serviced at regular intervals.

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

Wear personal protective equipment.

Make sure that the machine is equipped with the required lighting according to the requirements of the application.

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

Before mounting the machine check whether:

- persons or obstructions are beside or under the machine;
- the machine is free of oily and combustible materials;
- all access steps, grips and platforms are free of obstacles, grease, oils, fuel, dirt, snow and ice;
- all safety elements are in place;
- all maintenance flaps and doors are closed and locked.

Climb onto or off the machine only when the machine is standing. Use the existing access steps and grips.

When climbing on and off the machine use the three-point support method: Always keep two feet and one hand or one foot and two hands on the machine.

Never jump off the machine.

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

If the tests reveal damage or other defects, the machine must not be operated until these have been rectified.

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

3.6.2 Starting the engine

The machine must only be started and operated from the driver's seat.

Before starting and moving the machine, make sure that there is nobody in the danger zone.

To start, set all control levers to "neutral position".

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

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

After starting check all display instruments.

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

For operation in closed or partly closed rooms ensure adequate ventilation.

3.6.3 Starting the engine with jump leads

Connect positive with positive and negative with negative (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.

3.7 Driving the machine; working operation

3.7.1 Driving the machine

Remove objects (e.g. clothing, unauthorised attachments) that are in the driver's field of vision.

Securely fasten or remove loose objects in the cabin or the driver's stand.

Always wear the seat belt when driving.

Only drive on load-bearing surfaces.

Do not drive on ice and snow.

If the machine has touched high-voltage power lines:

- do not leave the driver’s stand,
- warn others from coming close to or touching the machine,
- if possible, drive the machine out of the danger zone,
- have the power switched off.

Operate the machine only from the driver’s stand.

Keep the cabin doors closed.

Do not adjust the driver’s seat while driving.

Do not climb onto or off the machine while the machine is driving.

Do not use the machine to transport persons.

In the case of unusual noises and appearance of smoke, perform troubleshooting to determine the cause and have the fault corrected.

Match the speed to the working conditions.

Do not make extreme steering movements when driving with high speed, danger of tipping over!

Always give way to loaded transport vehicles.

Switch the lights on if visibility is poor.

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

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

Always keep a sufficient distance when passing through subways, under bridges, tunnels, electric power lines etc.

3.7.2 Driving up and down slopes

Do not drive on gradients or slopes exceeding the maximum gradeability of the machine ↳ *Chapter 2 'Technical data' on page 15*.

Drive extremely carefully on gradients and always directly up or down the slope.

Soil conditions and weather influences impair the gradeability of the machine.

Wet and loose soil considerably reduces traction of the machine on inclinations and slopes. Increased danger of accident!

3.7.3 Cross-slope

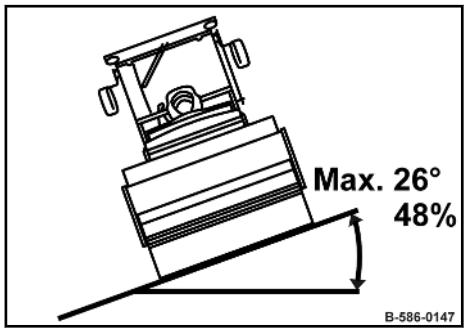


Fig. 10: Maximum cross-slope

The tipping angle was measured statically on level, hard ground with the machine stopped and without steering.

The max. permissible inclination of the machine may be limited by the max. permissible slanted position of the engine.

The specified angle must not be exceeded.

With loose soil, acceleration/deceleration, running vibration, steering or attached accessories the tipping angle may be considerably lower.

Driving across slopes should therefore be strictly avoided, because of the high risk of tipping over and the related risk of severe or even fatal accidents.

3.7.4 Working with vibration

When compacting with vibration you must always check the effect of the vibration on nearby buildings and underground supply lines (gas, water, sewage, electric power). If necessary stop compacting with vibration.

Do not activate the vibration on hard (frozen, concrete) ground. Components may get damaged.

3.7.5 Parking the machine

Park the machine on horizontal, level, firm ground.

Before leaving the machine:

- Shift all control levers to “neutral position”, “Off” or “0”;
- apply the parking brake,
- Switch off the engine and remove the ignition key;
- Switch off and pull out the main battery switch;
- Secure the machine against unauthorised use.

Do not jump off the machine, but use hand grips and access steps.

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

When parking on ascents or descents use appropriate means to secure the machine against rolling.

3.8 Refuelling

Do not inhale any fuel fumes.

Refuel only with the engine shut down.

Do not refuel in closed rooms.

No open fire, do not smoke.

Static charges may be generated in the fuel as it passes through the filling system. The discharge of these charges in the presence of combustible vapours can cause fire or an explosion.

Ultra-low sulphur diesel fuel poses a higher risk of combustion caused by the static charging than diesel fuel with a higher sulphur content.

You should therefore always make sure that the filling system is properly grounded and that there is equipotential bonding to the machine. If necessary use a connecting cable between filling system and vehicle ground.

Apply measures against electrostatic charging.

Monitor the entire refuelling process.

Do not spill any fuel. Collect leaking 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 tank cap; if necessary, replace immediately.

3.9 Emergency procedures

3.9.1 Actuating the emergency stop switch

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

The machine is braked immediately, the engine is shut down.

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

In case of frequent use the wear on the multi-discs brakes will be very high, you should therefore never use the emergency stop switch as a service brake.

3.9.2 Disconnecting the battery

In event of emergency, e.g. in case of a cable fire, disconnect the battery from the vehicle network.

Turn off and pull out the main battery switch or lift off the battery pole to do so.

3.9.3 Towing the machine

Tow the machine only in a case of emergency or to avoid an accident.

Before releasing the parking brake apply suitable measures to secure the machine against unintended rolling.

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

If no tow bar is used, towing is only permitted uphill.

Before starting towing operations make sure that the fastening means are able to withstand the load and are fastened at the points provided for this purpose.

Before removing the towing facility apply appropriate measures to secure the machine against unintended rolling.

3.10 Maintenance work

3.10.1 Preliminary remarks

Always carry out the prescribed maintenance work and maintenance measures on time in order to maintain the safety, operational readiness and long service life of the machine.

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

3.10.2 Working on hydraulic lines

Before the hydraulic system can be depressurized, machine parts with hydraulic movement must be safely set down or secured to prevent them from falling.

Relieve hydraulic pressures before working on hydraulic lines. Hydraulic oil escaping under pressure can penetrate the skin and cause severe injury. Immediately call for medical assistance if injured by hydraulic oil.

Do not step in front of or behind the machine 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!

Any hydraulic oil must be collected and disposed of in an environmentally friendly way.

Always collect and dispose of hydraulic oils separately.

Do not start the engine after draining off the hydraulic oil. Once all work is completed (with the system still depressurized!) check all connections and fittings for leaks.

Hydraulic hoses must be visually inspected at regular intervals.

Do not mix up hoses by mistake.

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

3.10.3 Working on the engine

Do not work on the fuel system while the engine is running. Danger to life due to high pressures!

Wait until the engine has stopped, then wait approx. another 15 minutes.

Keep out of the danger zone during the initial test run.

In case of leaks return to the workshop immediately.

Drain the engine oil at operating temperature. Danger of scalding!

Wipe off spilled oil, collect leaking oil and dispose of it in an environmentally friendly way.

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

The settings for idle speed and highest speed must not be changed, since this would affect the exhaust gas values and cause damage to engine and power train.

Engine and exhaust system work at high temperatures. Keep combustible materials away and do not touch any hot surfaces.

Check and change coolant only when the engine is cold. Collect coolant and dispose of it in an environmentally friendly way.

3.10.4 Maintenance work on electric components and battery

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 bridge fuses.

When working on the battery, smoking and open fire are prohibited!

Do not lay any tools or other metal objects on the battery.

Do not wear jewellery (watch, bracelets, etc.) when working on the battery.

Connection cables of the battery must not touch or rub against machine parts.

3.10.5 Working on the air conditioning

Faults on the air conditioning should only be remedied by authorized service personnel.

Do not perform welding work in the vicinity of the air conditioning. Danger of explosion!

Do not release refrigerant into the atmosphere, but dispose of it in line with environmental regulations.

3.10.6 Working on wheels and tyres

Explosion-like bursting of tyres or parts of tyres and rims can cause most severe or even fatal injuries.

Do not drive with damaged wheels or tyres.

Install the tyres only if you are sufficiently experienced and with the right tools at hand. If necessary have the tyres assembled in a qualified workshop.

Always ensure the correct tyre pressure and do not exceed the specified maximum pressure.

When checking the tyre pressure stand in the extended path of the tyre track. Use an at least 6-meter-long air hose, so that you can keep a safe distance to the tyre.

Always consider the heavy weight of a wheel during disassembly and assembly. Use a crane or forklift truck equipped with suitable claws or belts on the hoisting device.

3.10.7 Cleaning work

Do not perform cleaning work while the motor is running.

Allow the engine to cool down before starting cleaning work on engine and exhaust system.

Never use gasoline or other easily inflammable substances for cleaning.

When cleaning with a high pressure cleaner, do not subject electrical parts and insulation material to the direct jet of water, or cover them beforehand.

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

3.10.8 Measures for longer shut-down periods

If the machine is taken out of operation for a longer period of time, various conditions must be met and maintenance work must be carried out both before and after shut-down ↬ *Chapter 8.12.8 ‘Measures prior to extended shut-down period’ on page 215*.

It is not necessary to define a maximum storage period if these measures have been performed.

3.10.9 After maintenance work

Reassemble all guards and protective devices.

Close all maintenance flaps and maintenance doors again.

3.11 Repair

Identify a defective machine with a warning sign.

Only operate the machine after it has been repaired.

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

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

3.12 Signage

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

Replace damaged and illegible stickers or signage immediately.

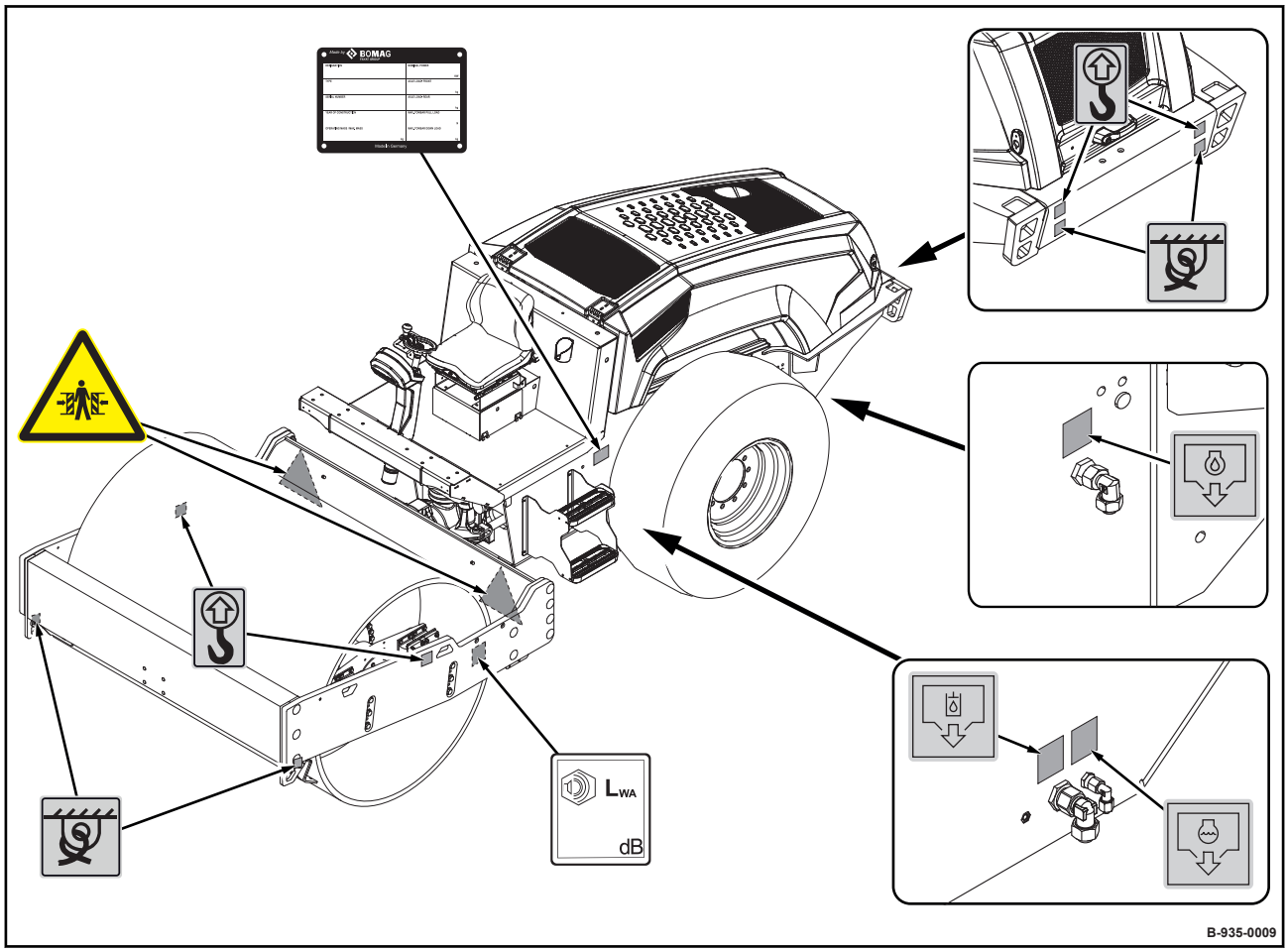


Fig. 11

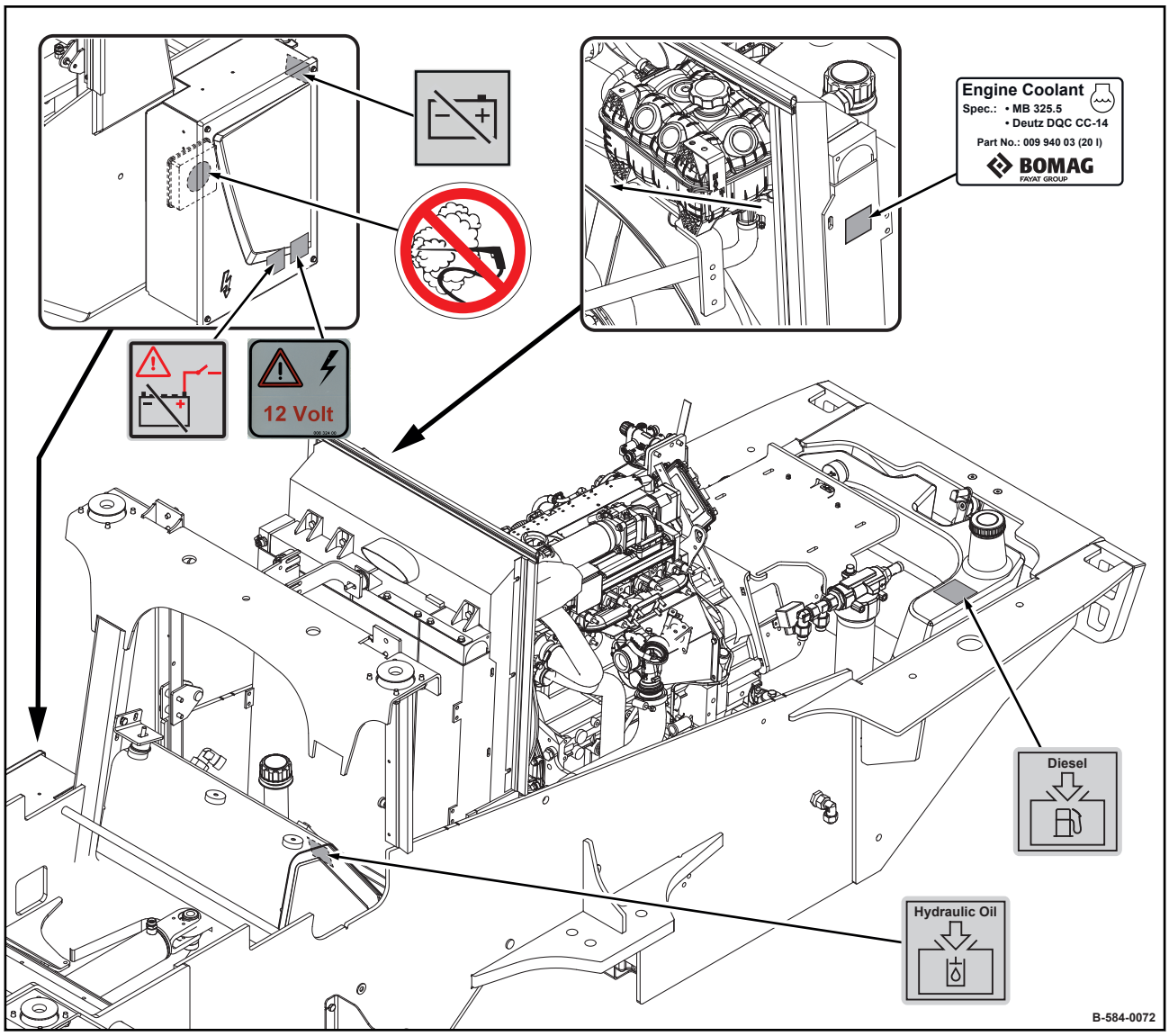

Engine Coolant
Spec.: • MB 325.5
• Deutz DQC CC-14
Part No.: 009 940 03 (20 l)
BOMAG
FAYAT GROUP
12 Volt
Diesel
Hydraulic Oil
B-584-0072

Fig. 12

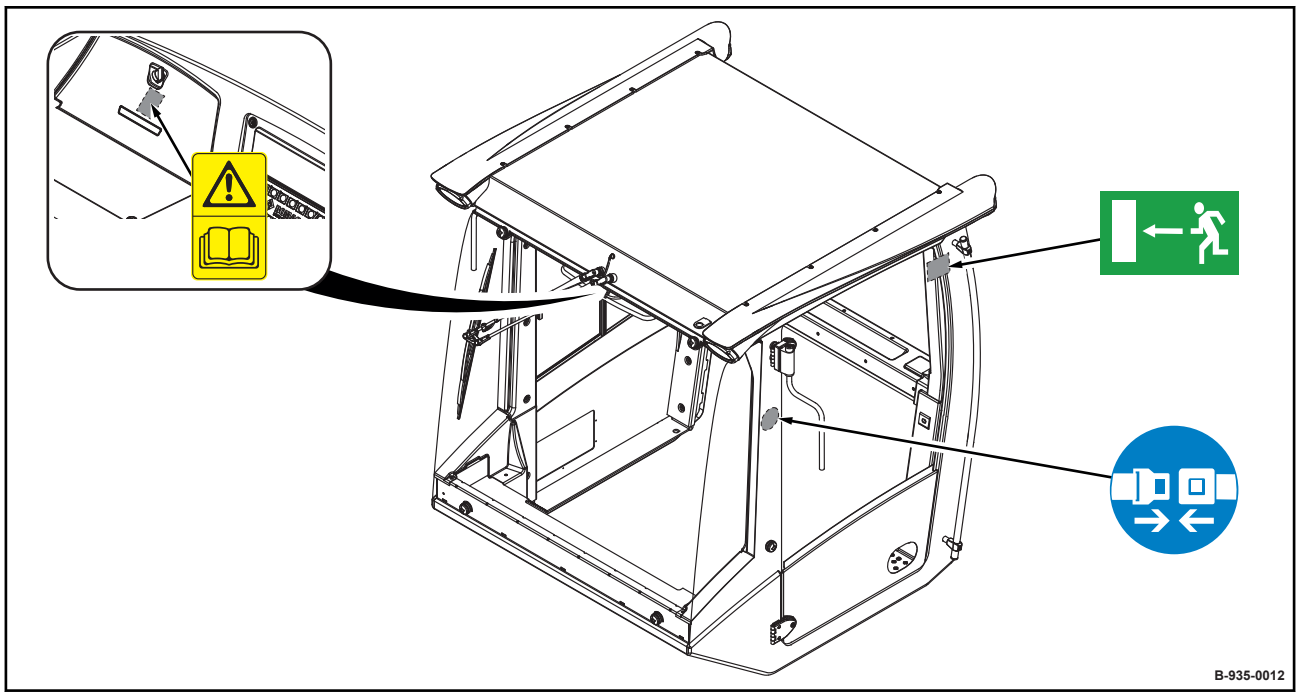


Fig. 13



Warning sticker - Danger of crushing

Fig. 14



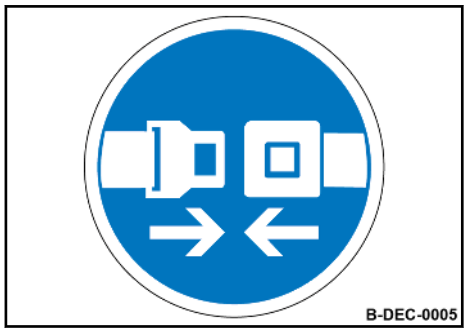
Warning sticker - Follow operating instructions

Fig. 15



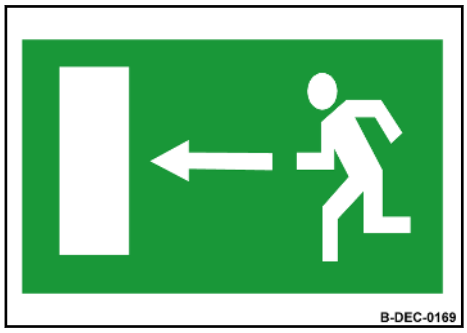
Prohibition sticker - High pressure cleaning

Fig. 16



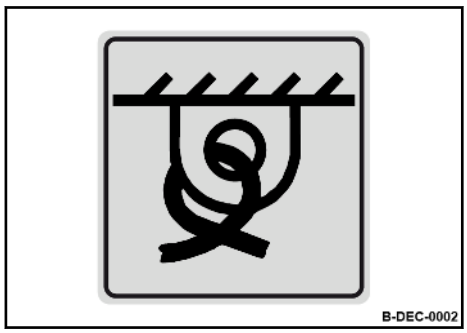
Instruction sticker - Always wear your seat belt

Fig. 17



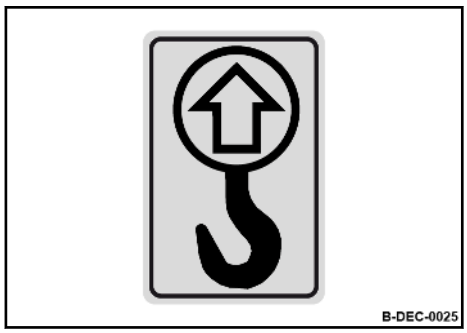
Information sticker - Emergency exit

Fig. 18



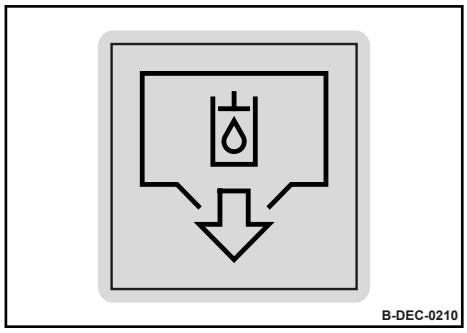
Information sticker - Lashing point

Fig. 19



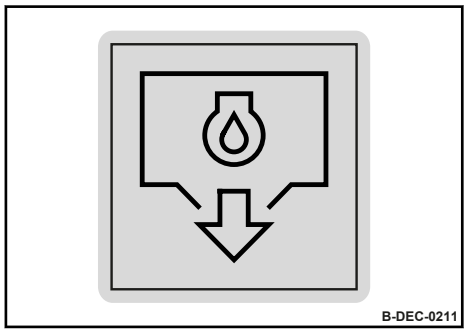
Information sticker - Lifting point

Fig. 20



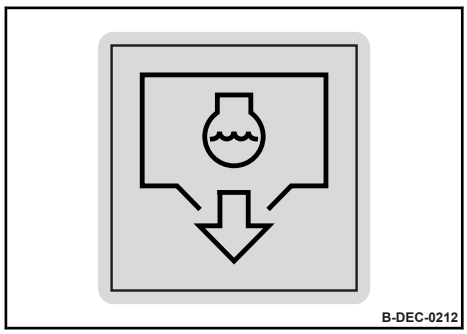
Information sticker - Hydraulic oil drain

Fig. 21



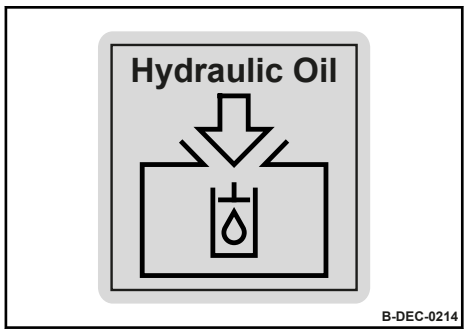
Information sticker - Engine oil drain

Fig. 22



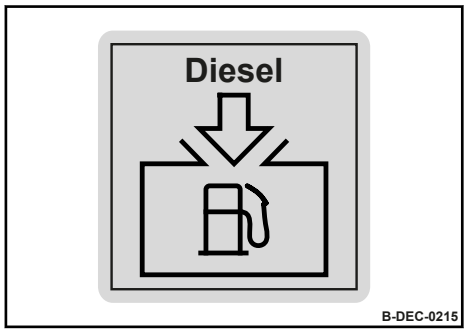
Information sticker - Coolant drain

Fig. 23



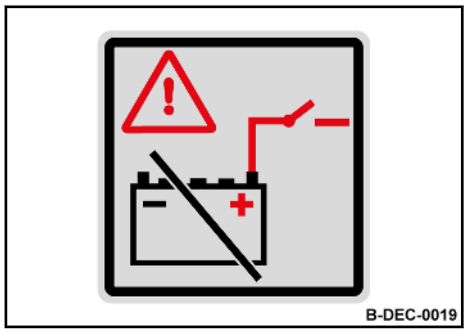
Information sticker - Filler opening for hydraulic oil

Fig. 24



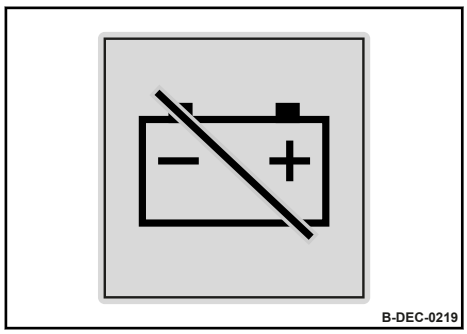
Information sticker - Filler opening for diesel

Fig. 25



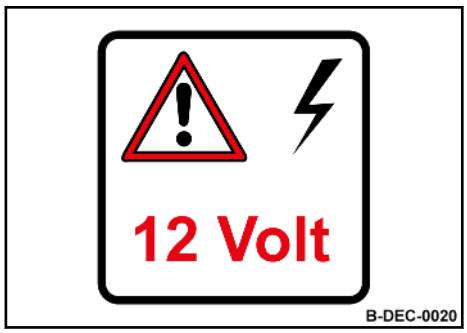
Information sticker - Main battery switch plus side

Fig. 26



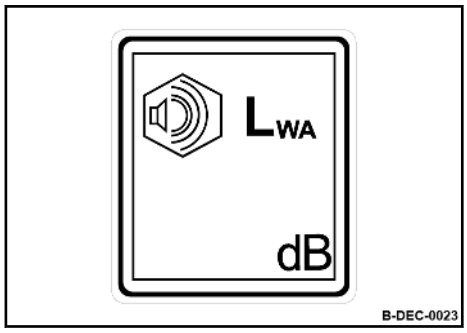
Information sticker - Disconnecting the battery

Fig. 27



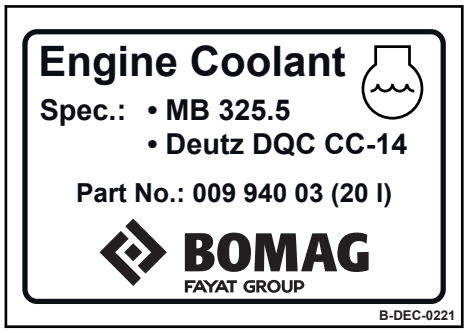
Information sticker - Vehicle voltage 12 V

Fig. 28



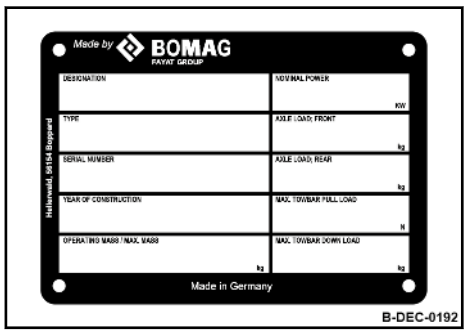
Information sticker - Guaranteed sound capacity level

Fig. 29



Information sticker - Coolant

Fig. 30



Machine type plate (example)

Fig. 31

3.13 Danger zones

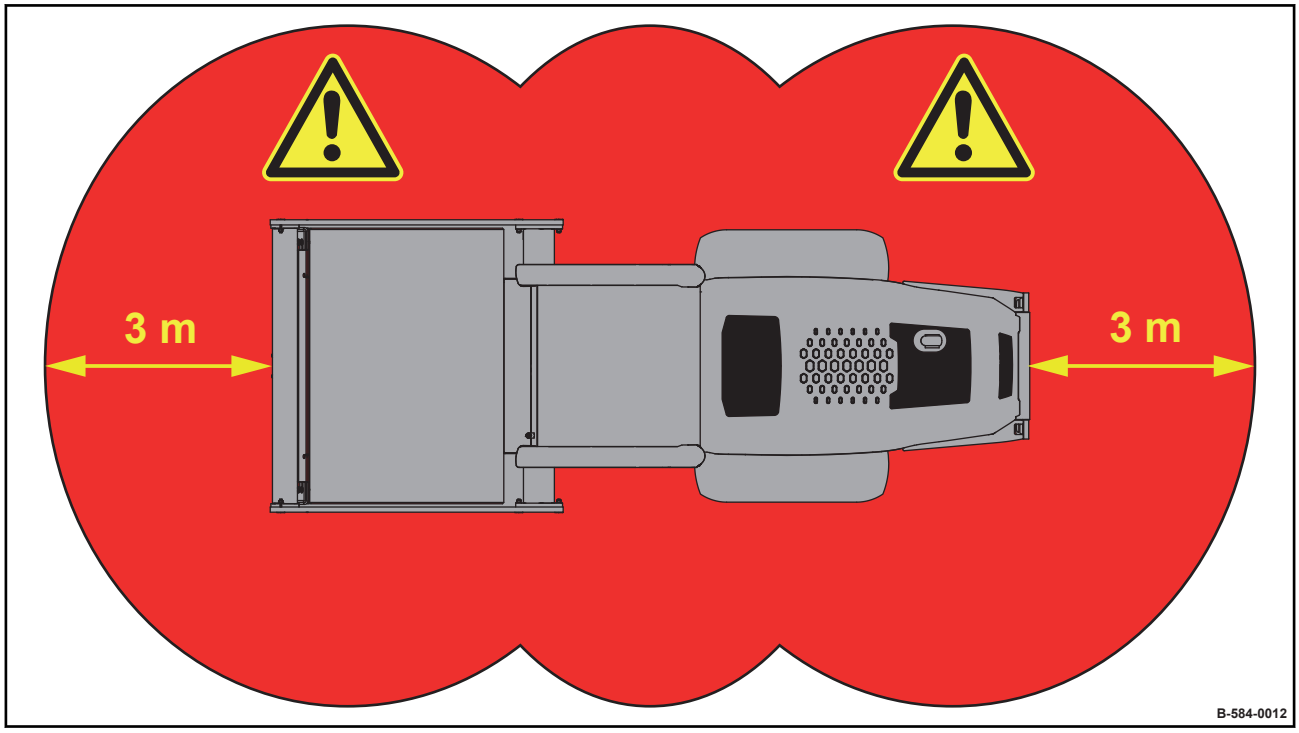


Fig. 32

The area around the machine is a danger zone.

Before starting the machine and during operation, the driver / operator must ensure that nobody is in the danger zone.

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

4 Indicators and control elements

4.1 Driver’s stand

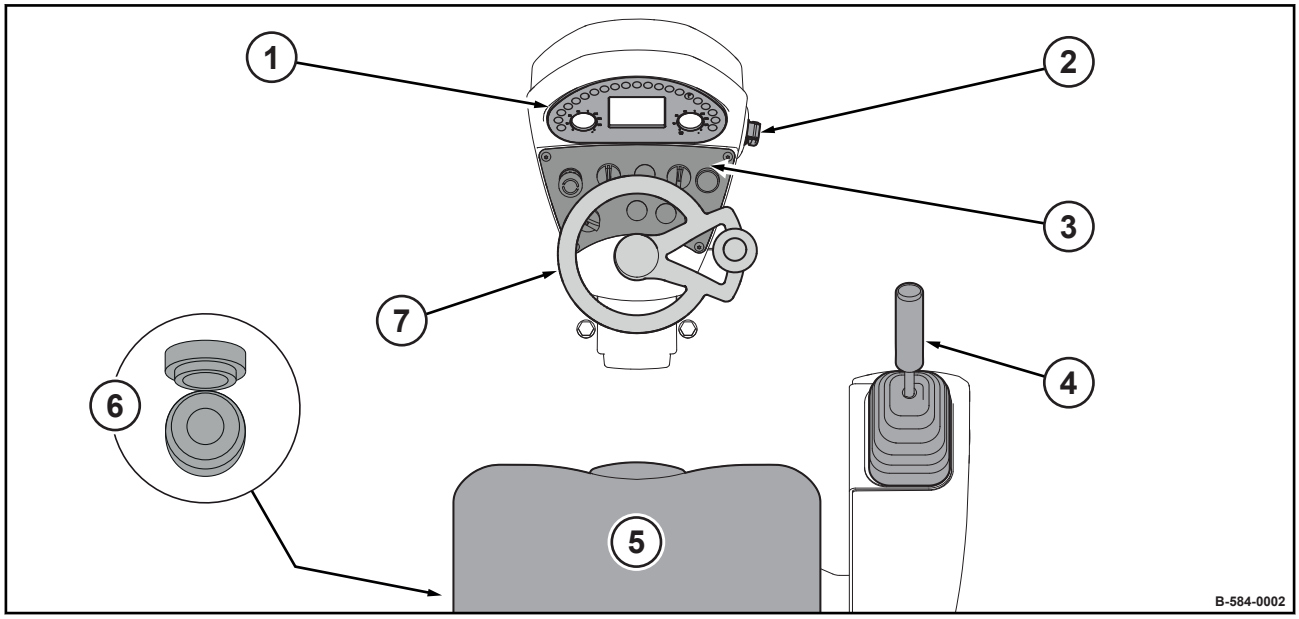


Fig. 33

1 Instrument cluster
2 Starter switch
3 Operating console
4 Travel lever
5 Driver’s seat
6 Socket
7 Steering wheel

4.1.1 Instrument cluster

Overview

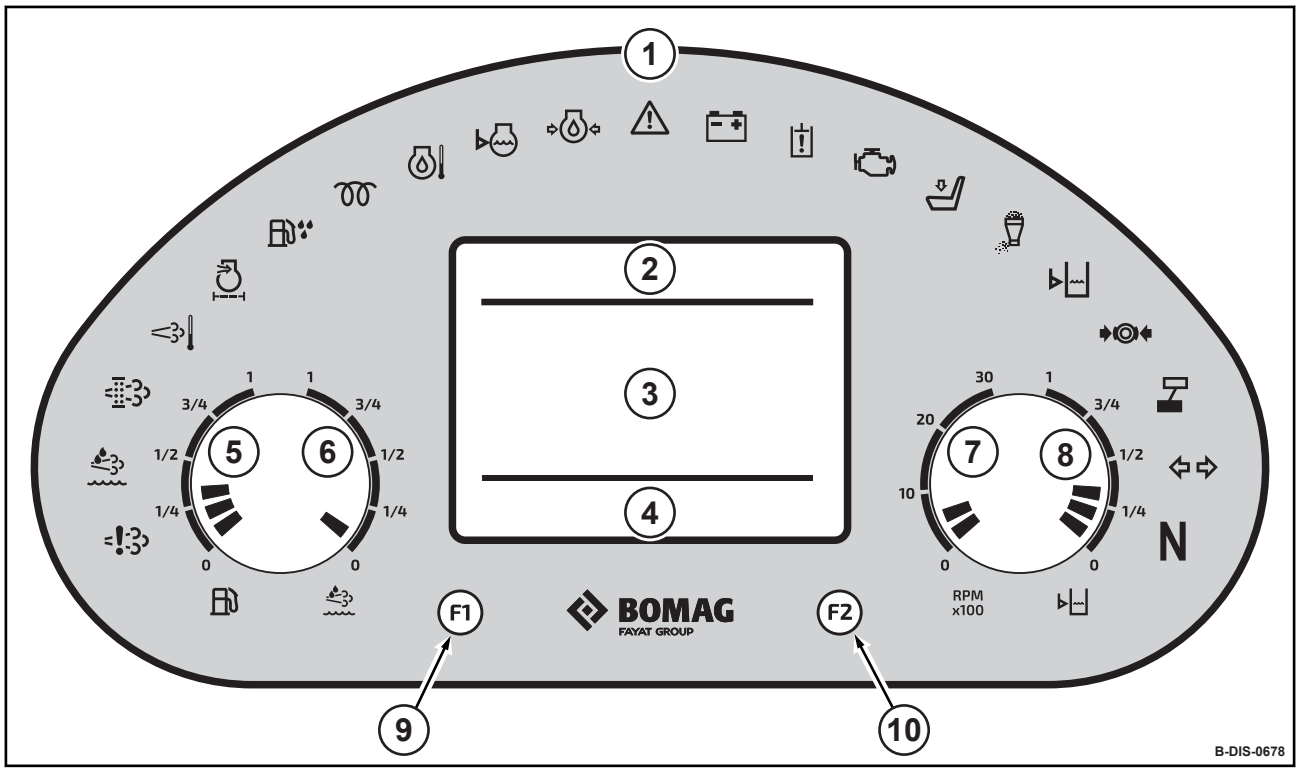
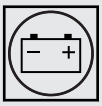
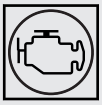


Fig. 34

1 Control and warning lights
2 INFO 3 display field
3 INFO 2 display field
4 INFO 1 display field
5 Fuel level gauge
6 Not assigned
7 Engine speedometer
8 Not assigned
9 *[F1]* button
10 *[F2]* button

Control and warning lights

	Designation	Note
	Exhaust gas after-treatment system warning light	Not assigned
	AdBlue®/DEF warning light	Not assigned
	Regeneration warning light	Not assigned
	Exhaust gas temperature warning light	Not assigned
	Air filter warning light	Not assigned
	Water in fuel warning light	Lights up when there is excessive water content in the fuel pre-filter. Warning buzzer sounds. Clean the water separator.
	Preheating control light	Lights up during pre-heating.
	Warning light for engine oil temperature	Lights up if the engine oil temperature is too high. Warning buzzer sounds. Run the engine at idle speed or, if necessary, shut it down and clean the radiator; if necessary, repair the engine.
		Flashes if the engine oil temperature continues to rise (engine overheating). Warning buzzer sounds. The engine will be shut down after a short while.
	Coolant level warning light	Not assigned

	Designation	Note
	Engine oil pressure warning light	Lights up if the engine oil pressure is too low. The engine will be shut down after a short while. Check the engine oil level; if necessary, repair the engine.
	Central warning light	Flashes in case of system faults, warnings and for information purposes.
	Charge control light	Lights up if the battery is not being charged. Check the belt drive, if necessary, repair the generator.
	Warning light for hydraulic system	Not assigned
	Engine control light	Lights up in case of a fault in the engine control unit. Take note of the fault codes and inform our Customer Service Department.
	Driver’s seat warning light	Lights up when the driver’s seat is not occupied. If the machine is travelling, the warning buzzer will sound and the machine is decelerated after 3 seconds. To continue driving, occupy the driver's seat and shift the travel lever again to the desired travel direction through the parking brake position.
	Precision spreader control light	Not assigned
	Water level warning light	Not assigned
	Parking brake warning light	Lights up when the parking brake is applied.

	Designation	Note
	Crabwalk control light	Not assigned
	Indicator control light	
N	Neutral position indicator	Not assigned

INFO 1 display field

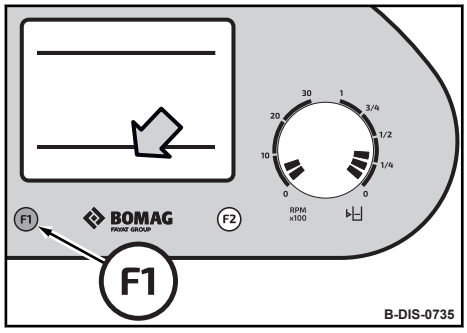


Fig. 35

Each actuation of the *[F1]* button switches between:

- Operating hours
- Coolant temperature
- Battery voltage
- Vibration frequency *(optional equipment)*

INFO 2 display field

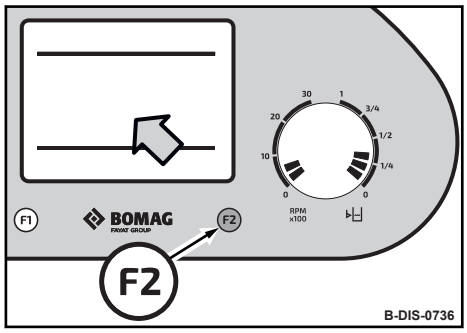
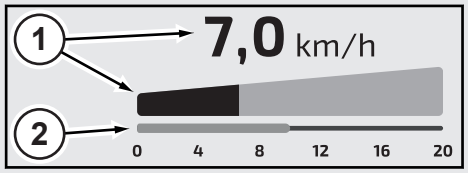
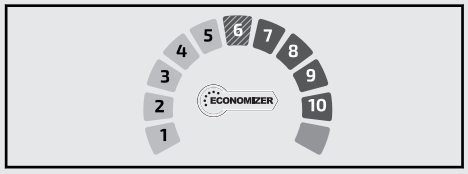
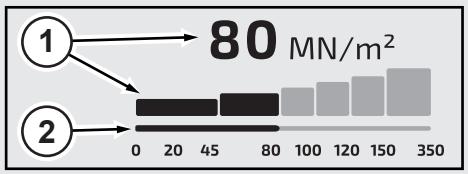
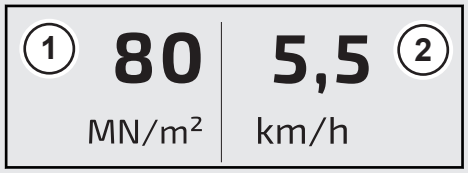
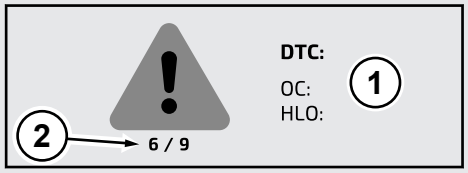
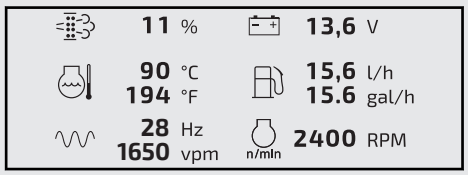


Fig. 36

Each actuation of the button *[F2]* switches between:

- Travel speed
- ECONOMIZER *(optional equipment)*
- E_{VIB} value *(optional equipment)*
- Travel speed and E_{VIB} value *(optional equipment)*
- Fault code display
- Overview of operating values

INFO 2 display field	Description
	(1) Travel speed (2) Pre-selected speed limitation (depending on the position of the rotary switch for travel ranges)
	Compaction status *Chapter 6.5 'ECONOMIZER' on page 117*
	(1) E_{VIB} value (2) Pre/selected E_{VIB} value (only for machines with Variocontrol)
	(1) E_{VIB} value (2) Travel speed
	(1) ■ DTC: Fault code ■ OC: Frequency of fault ■ HLO: Operating hour when fault last occurred (2) Fault code index/total of incoming fault codes
	■ Diesel particulate filter soot load (Only on machines with exhaust gas after-treatment system) ■ Coolant temperature ■ Vibration frequency (Only on machines with corresponding measuring technology *(optional equipment))* ■ Battery voltage ■ Fuel consumption ■ Engine speed

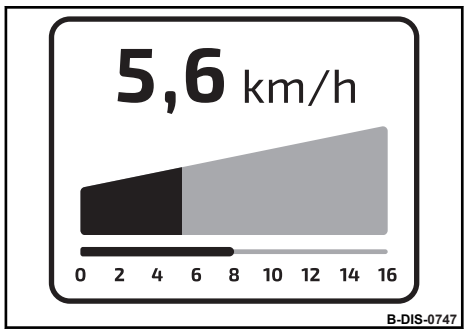


Fig. 37

After 5 seconds, the view of the INFO 2 display field is automatically switched over to full screen mode.

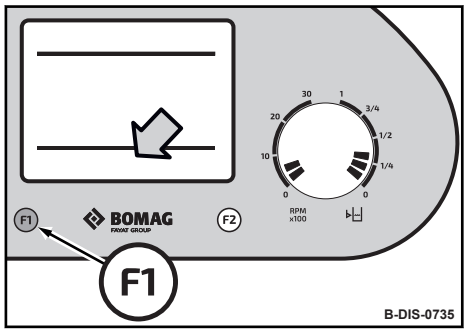


Fig. 38

The view can be changed with the *[F1]* button:

Press briefly	Return to the view with three display fields. After 5 seconds, the view switches back to full screen mode again.
Press long	Returns to the view with three display fields permanently.
Press long again.	Permanent view appears in full screen mode after 5 seconds.

INFO 3 display field

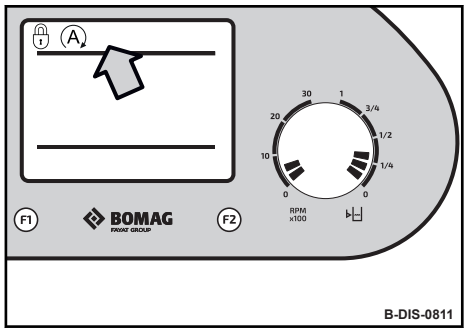


Fig. 39

	Designation	Note
	Immobilizer control light	Lights up when the electronic immobilizer is active.
	ECOSTOP control light	Lights up after the engine has been shut down by the ECOSTOP function.

4.1.2 Starter switch

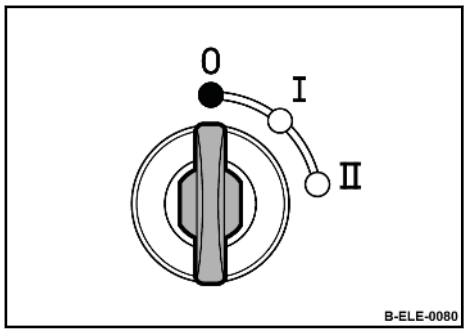


Fig. 40

Position "0"	Switch the ignition off Ignition key can be removed
Position "I"	Ignition on All control and warning lights light up for a moment (test function) At low temperatures the pre-heating control light lights up
Position "II"	Turn further against spring pressure, the engine starts Turn the ignition key back to position "I" when the engine starts

The starter switch is designed with a re-start lock. The ignition key must first be turned back to position "0" before a new starting attempt can be made.

4.1.3 Operating console

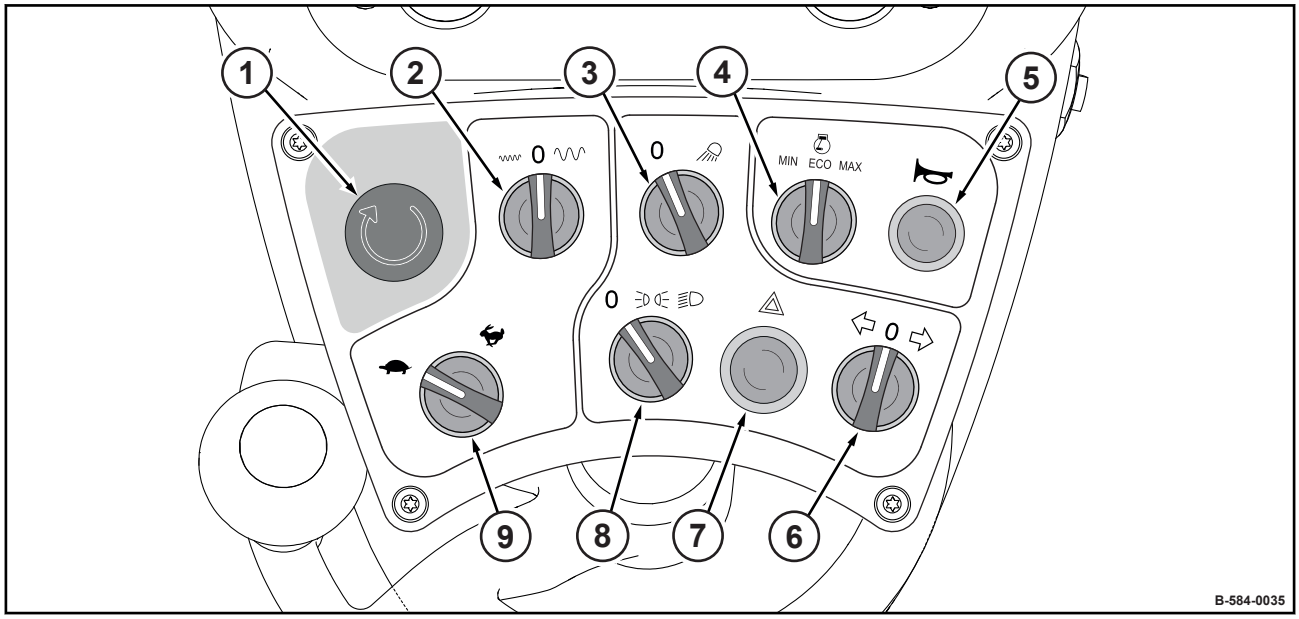


Fig. 41

1 Emergency stop switch
2 Rotary switch for amplitude pre-selection
3 Rotary switch for working lights *(optional equipment)*
4 Rotary switch for engine speed
5 Push button for warning horn
6 Rotary switch for direction indicators *(optional equipment)*
7 Push button for hazard light system *(optional equipment)*
8 Rotary switch for lighting *(optional equipment)*
9 Rotary switch for travel speed ranges

4.1.3.1 Emergency stop switch

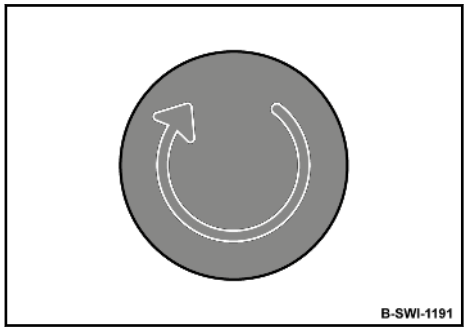


Fig. 42

press	In events of emergency and in case of danger actuate the emergency stop switch immediately by pressing it fully down. It automatically locks in end position. The machine will be braked immediately. The engine is shut down.
switch off/ unlock	Turn the Emergency Stop switch clockwise and let it go.

NOTICE!

In case of frequent use the wear on the multi-discs brakes will be very high.

– Do not use the emergency stop switch as service brake!

4.1.3.2 Rotary switch for amplitude pre-selection

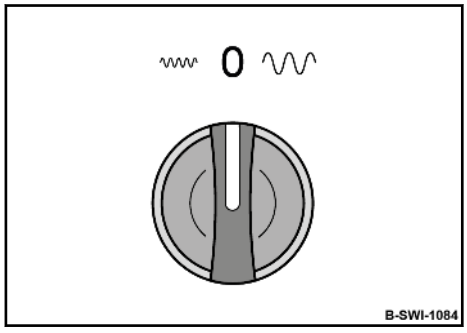


Fig. 43

Position “Left”	low amplitude, high frequency
Position “Middle”	Vibration off
Position “Right”	high amplitude, low frequency

4.1.3.3 Rotary switch for working lights

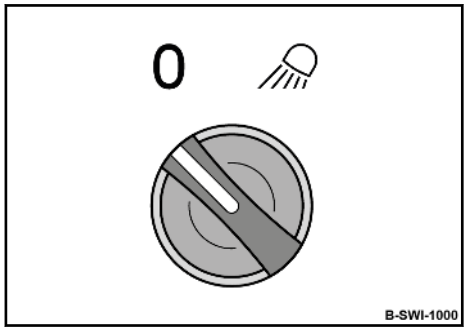


Fig. 44

Position “Left”	Working lights off
Position “Right”	Working lights on

Optional equipment

4.1.3.4 Rotary switch for engine speed

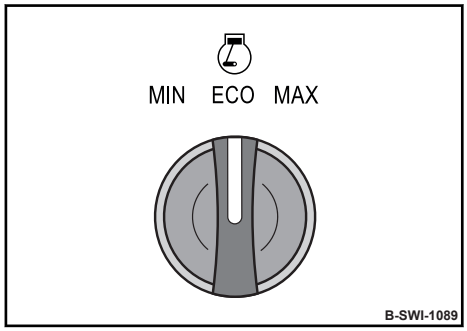


Fig. 45

Position “MIN”	Idle speed position
Position “ECO”	Travel lever in parking brake position: ■ The engine runs with reduced speed. ■ This enables economical operation.
	Travel lever out of neutral: ■ The engine runs with max. speed.
Position “MAX”	Full load position

4.1.3.5 Push button for warning horn

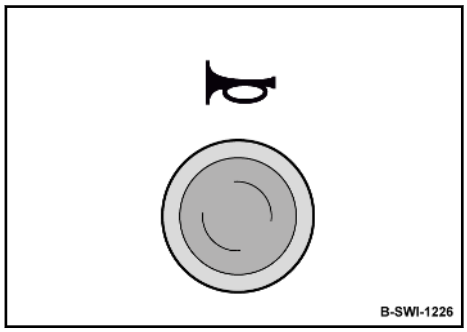


Fig. 46

Press.	Warning horn sounds

4.1.3.6 Rotary switch for direction indicators

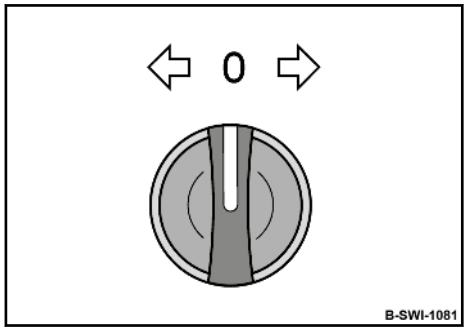


Fig. 47

Position “Middle”	Direction indicators off
Position “left or right”	Front and rear direction indicators on the corresponding side are flashing

Optional equipment

4.1.3.7 Push button for hazard light system

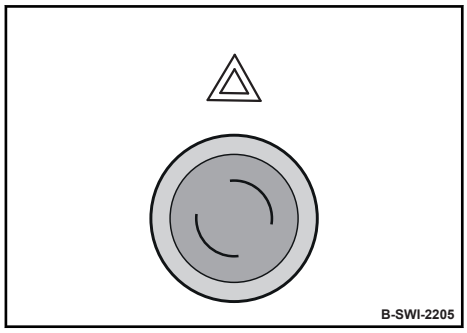


Fig. 48

Press	Hazard light system on
Press again.	Hazard light system off

Optional equipment

4.1.3.8 Rotary switch for lighting

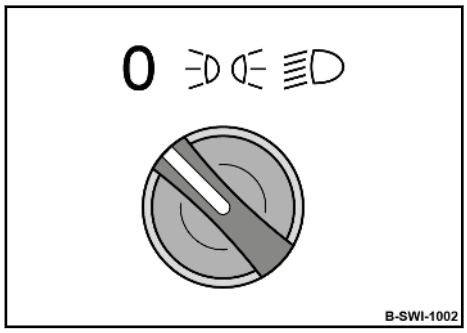
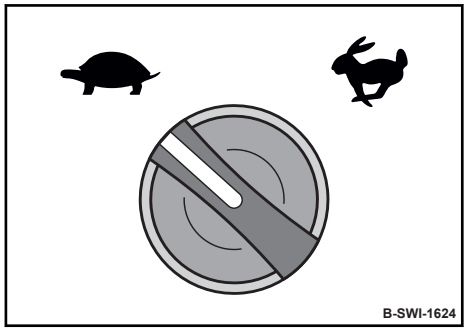


Fig. 49

Position "Left"	Light off
Position “Middle”	Side light on
Position "Right"	Travel light on

Optional equipment

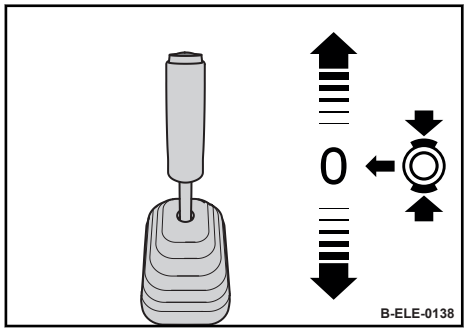
4.1.3.9 Rotary switch for travel ranges



Position “Left”	Travel speed range 1
Position “Right”	Travel speed range 2

Fig. 50

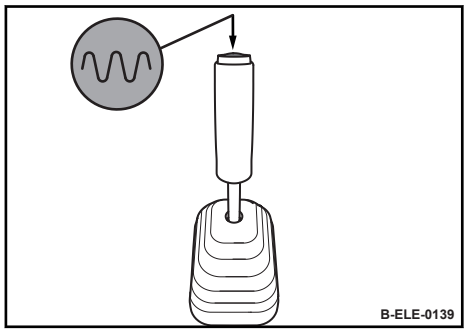
4.1.4 Travel lever



Shift forward	Forward travel
Pull back	Backward travel
Position “Middle”	Service brake position
Position “Middle right”	Parking brake position

Fig. 51

Push button for vibration



Press	Vibration on
Press again	Vibration off

Fig. 52

4.1.5 Driver’s seat

4.1.5.1 Standard driver’s seat

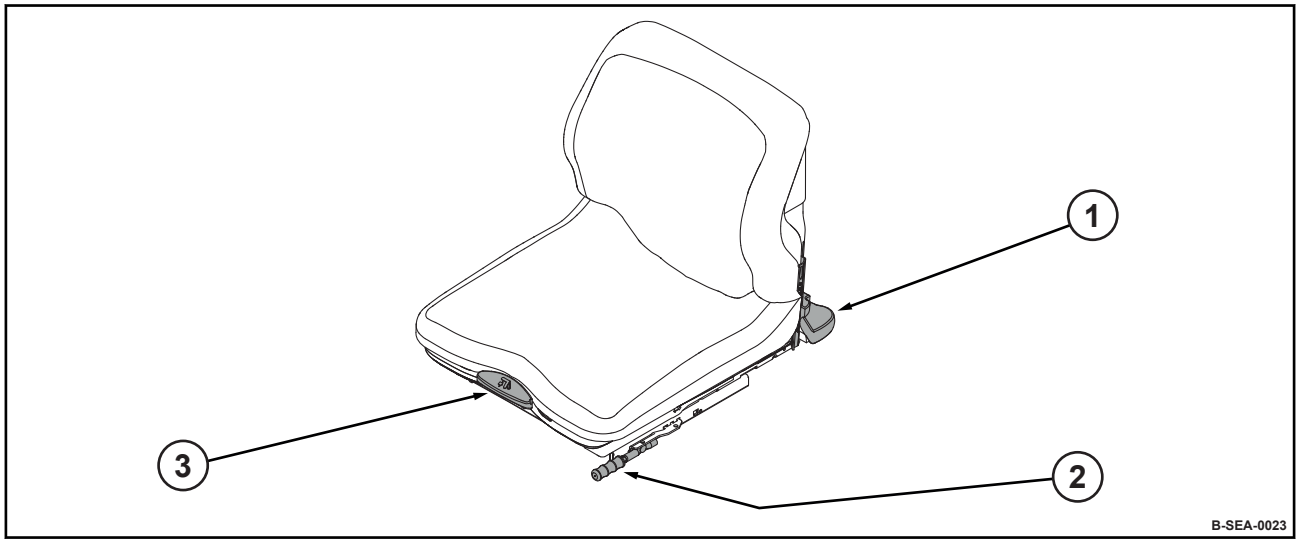
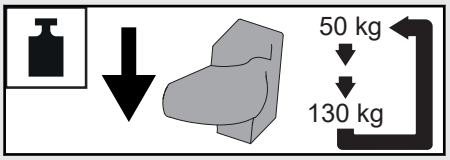
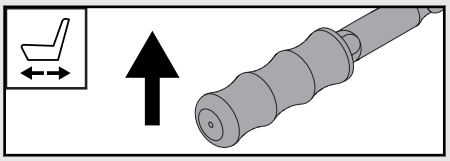
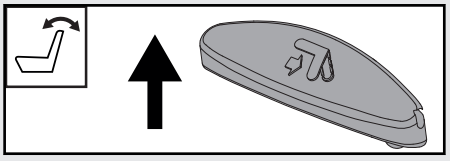


Fig. 53

Pos.	Control element	Setting	Description
1		Driver’s weight	Press down the handle until the correct driver’s weight has been set. Press down the handle against the end stop, the weight adjustment automatically switches back to the top position.
2		Length adjustment	Pull the lever up and push the seat forward or back.
3		Backrest inclination	Relieve the backrest and pull the lever up.

4.1.5.2 Comfort driver’s seat

Optional equipment

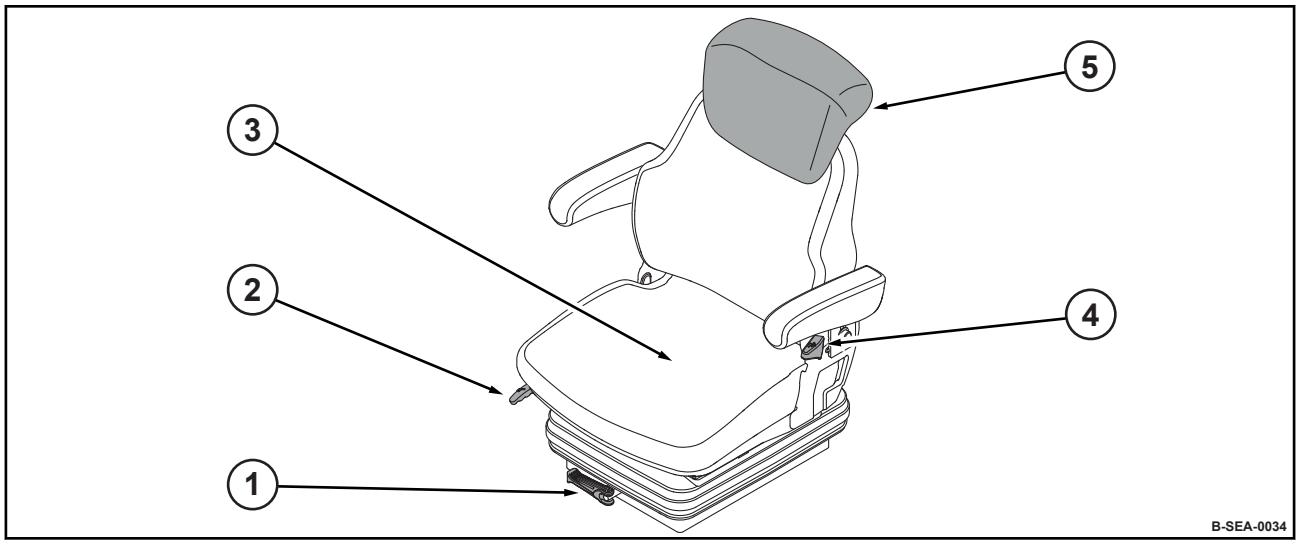
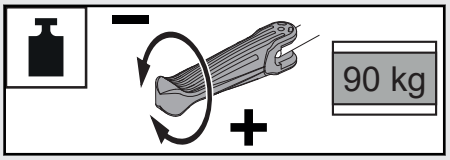
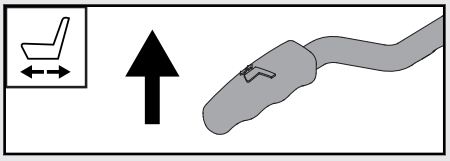
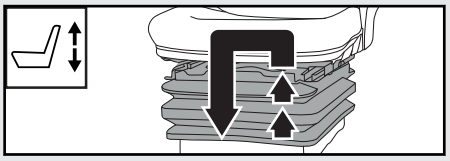
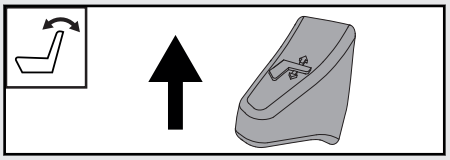
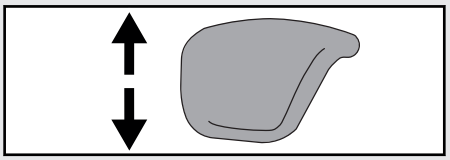
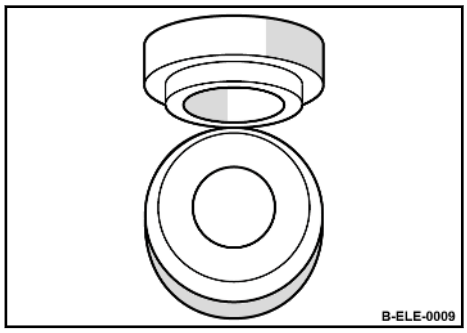


Fig. 54

Pos.	Control element	Setting	Description
1		Driver’s weight	Check weight setting in the window. Fold out and turn the handle until the correct driver’s weight has been set.
2		Length adjust-ment	Pull the lever up and push the seat forward or back.
3		Seat height	Lift up the seat until it locks at the appropriate height. When lifting the seat completely it will sink down to lowest position.

Pos.	Control element	Setting	Description
4		Backrest inclination	Relieve the backrest and pull the lever up.
5		Backrest extension	Adjust the backrest extension by pulling or pushing it in.

4.1.6 12 V DIN socket



Permanent current, loadable up to 20 A.

Fig. 55

4.2 Cabin

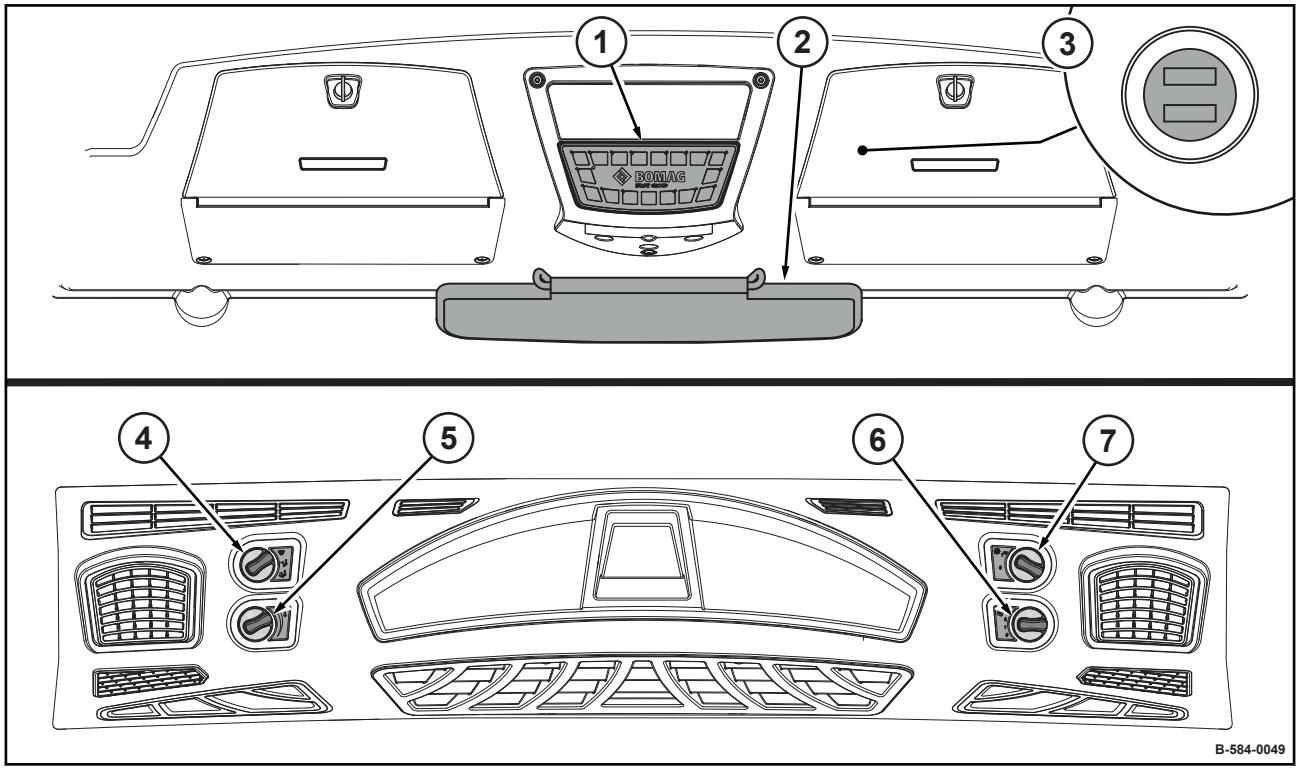


Fig. 56

1 Control console cabin
2 Sun visor
3 USB sockets
4 Rotary switch for air distribution
5 Rotary switch for cabin temperature
6 Rotary switch for fan
7 Rotary switch for air conditioning

4.2.1 Control console cabin

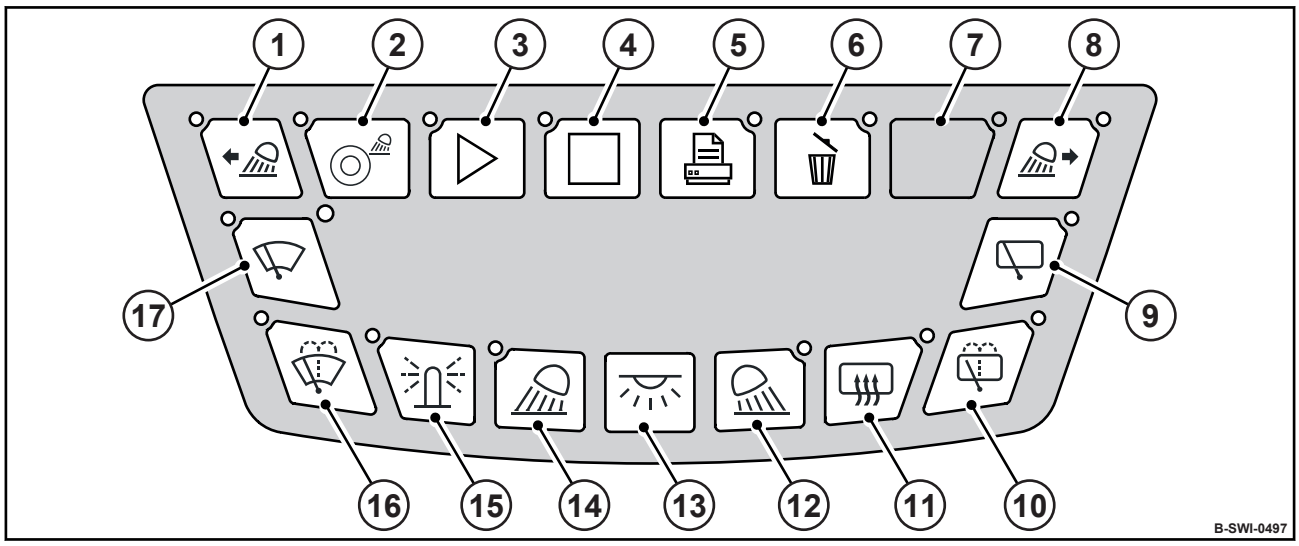
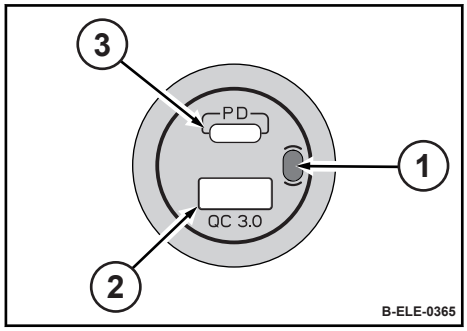


Fig. 57

Pos.	Designation	Note
1 – 8	Not assigned	
9	Rear windscreen wiper	Interval/on/off
10	washer nozzles for rear wind-screen	
11	Rear windscreen heating	The rear windscreen heating is switched off after three minutes.
12	Rear working lights	
13	Cabin light	
14	Front working lights	
15	Flashing beacon	
16	Washer nozzles for front wind-screen	
17	Front windscreen wiper	Interval/on/off

4.2.2 USB socket



Press	ON; charging ports light up
Press again	Off

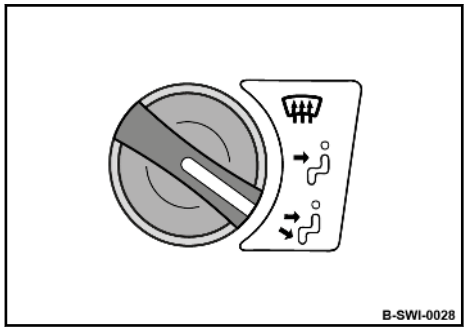
Optional equipment

Fig. 58

1 On/off push button
2 Charging port USB type A
3 Charging port USB type C

4.2.3 Heating / air conditioning

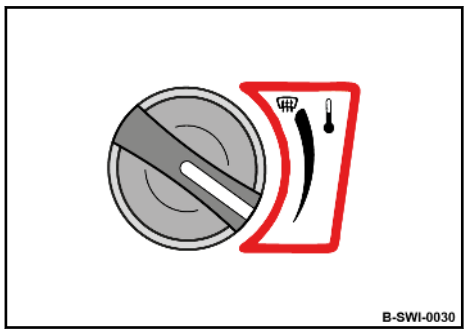
4.2.3.1 Rotary switch for air distribution



Position "Top"	Air flow to windscreen
Position "Middle"	Air flow to body
Position "Bottom"	Air flow to body and footwell

Fig. 59

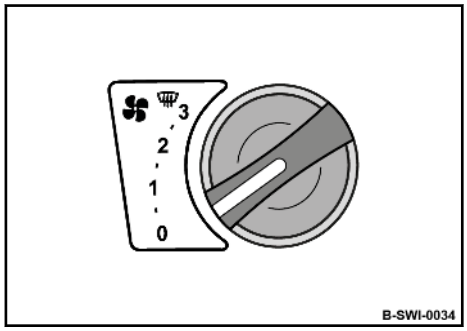
4.2.3.2 Rotary switch for cabin temperature



Position "Top"	max. temperature
Position "Bottom"	min. temperature

Fig. 60

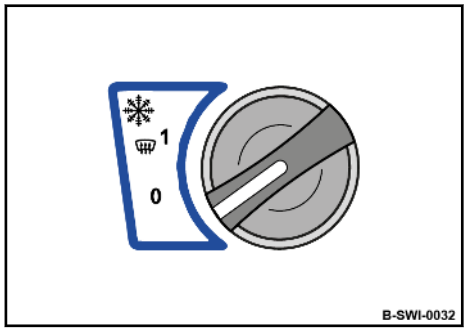
4.2.3.3 Rotary switch for fan



Position “0”	Fan off
Position “1” to “3”	Fan stages of different strengths

Fig. 61

4.2.3.4 Rotary switch for air conditioning system



Position "Top"	Air conditioning on
Position "Bottom"	Air conditioning off

Fig. 62

Optional equipment

The air conditioning system only works when the engine is running and the fan is switched on.

4.2.4 Fire extinguisher

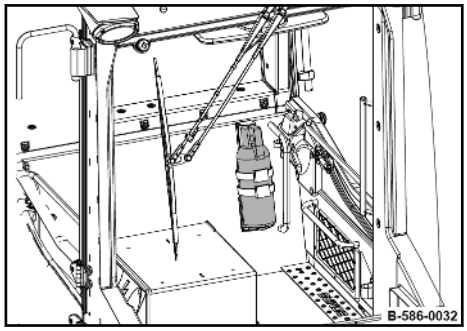


Fig. 63

Optional equipment

NOTICE!
Components may get damaged!
– When retrofitting a fire extinguisher, install it only in this position.

4.3 Outside of machine

4.3.1 Main battery switch

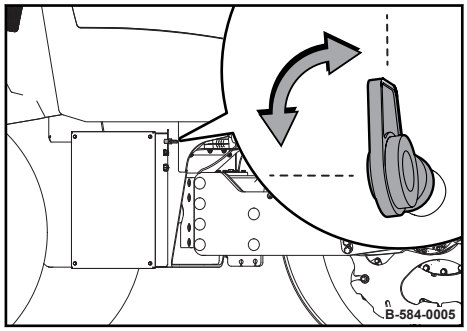


Fig. 64

Position “on”	Main battery switch locked. Normal position, operation.
Turn anticlock-wise	Main battery switch can be pulled out. Disconnects the batteries from the on-board electrics, e.g. to prevent unauthorised use. Individual control units may still be connected to the board electrics despite the main battery switch being pulled out.

Indicators and control elements – Outside of machine

5 Checks prior to start up

5.1 Notes on safety

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

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

Safety installations must not be removed or made ineffective.

Do not change any fixed settings.



WARNING!

Health hazard caused by fuels and lubricants!

– Safety regulations and environmental protection regulations must be followed when handling fuels and lubricants *Chapter 3.4 ‘Handling fuels and lubricants’ on page 33*.



WARNING!

Danger of injury caused by rotating parts!

– Before starting work on the machine make sure that the engine can not be started.



CAUTION!

Danger of being injured by the engine hood dropping down!

– Always secure an opened engine hood.

Park the machine safely *Chapter 6.7 ‘Parking the machine in secured condition’ on page 119*.

Open and secure the engine hood *Chapter 8.2.1 ‘Open and secure the engine hood’ on page 140*.

Close the engine hood again after work is completed.

5.2 Visual inspections and function tests

1. Check the hydraulic oil tank and lines for condition and leaks.
2. Check the fuel tank and lines for condition and leaks.
3. Check the cooling system for contamination, damage and leaks.
4. Check the bolted connections are tight and secure.
5. Check the engine and exhaust system for leaks.
6. Check the belt drive for damage.
7. Check the machine for contamination and damage.
8. Check function of steering.
9. Check function of brake.
10. Check emergency stop function.
11. Check function of backup alarm system.
12. Check the mirror settings and condition.
13. Check function of seat contact switch.

5.3 Daily maintenance

5.3.1 Checking the engine oil level

NOTICE!
Danger of engine damage!
- If the engine is warm, shut it down and check the oil level after five minutes. With a cold engine the oil level can be checked immediately.
- Use only oil of the permitted specification *Chapter 8.3.1 ‘Engine oil’ on page 143*.

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

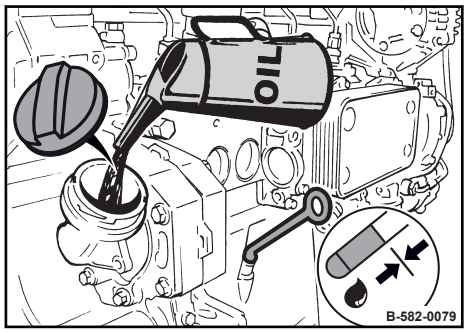


Fig. 65

1. Pull the dipstick out, wipe it off with a lint-free, clean cloth and reinsert it to the end stop.
2. Pull the dipstick out again.
   ⇨ The oil level must be between the “MIN” and “MAX” marks.
3. For topping up, clean the area around the filling port.
4. Unscrew the cap and fill with engine oil up to the “MAX” mark.
5. Close the cap.

5.3.2 Checking the fuel level; topping up fuel

5.3.2.1 Checking the fuel level

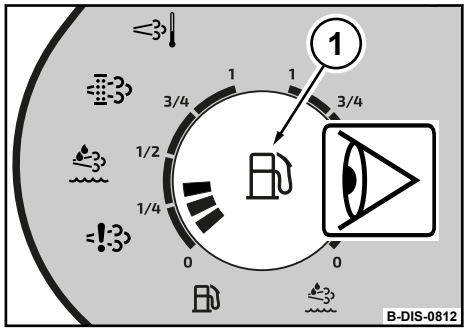


Fig. 66

1. Check the filling level on the fuel gauge.
   ⇨ Depending on the filling level, the fuel level warning light appears (1):
   - Warning light lights up = filling level 7% – 12%
   - Warning light flashes = filling level < 7%
2. Refuel as necessary, when doing so, always shut down engine and auxiliary heating.

5.3.2.2 Refuelling

NOTICE!

Danger of engine damage!

– Never run the fuel tank empty, as otherwise the fuel system needs to be bled.
– Monitor the entire refuelling process.
– Contaminated fuel can cause malfunction or even damage of the engine. If necessary, fill in fuel through a screen filter.
– Use only fuel of the permitted specification ↳ *Chapter 8.3.2 ‘Fuel’ on page 145*.

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

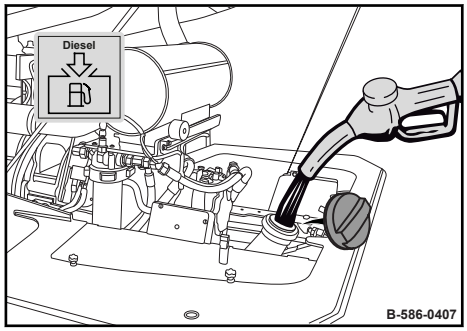


Fig. 67

1. Clean the area around the filling port.
2. Unscrew the cap and fill with fuel.
3. Close the cap.

5.3.3 Checking the hydraulic oil level

NOTICE!
Components may get damaged!
- Check the hydraulic oil level at room temperature (approx. 20 °C (68 °F)).
- 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.
- Use only oil of the permitted specification *Chapter 8.3.4 'Hydraulic oil' on page 150*.

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

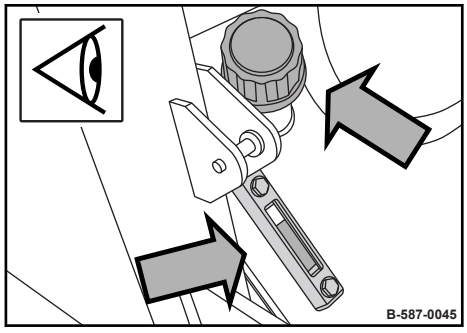


Fig. 68

1. Check the oil level in the inspection glass.

Normal level	approx. 3 cm (1.2 in) below the top edge of the sight glass
Minimum level	Middle of inspection glass

2. For topping up, clean the area around the filling port.
3. Unscrew the cover and fill in hydraulic oil.
4. Close the cap.

5.3.4 Checking the coolant level

NOTICE!
Danger of engine damage!
- If, during the daily inspection the coolant level is found to have dropped, check all lines, hoses and engine for leaks.
- Do not use radiator sealant to seal leaks.
- Use only coolant of the permitted specification *Chapter 8.3.3 'Coolant' on page 146*.

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

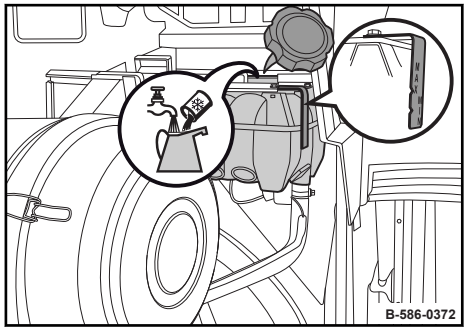


Fig. 69

1. Check the coolant level in the compensation tank.

WARNING!
Danger of scalding by hot fluid!
- Open the compensation tank only when the engine is cold.
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).

2. For topping up, clean the area around the filling port.
3. Unscrew the cover and fill in coolant up to the “MAX” mark.
4. Close the cap.

5.3.5 Checking the air filter

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

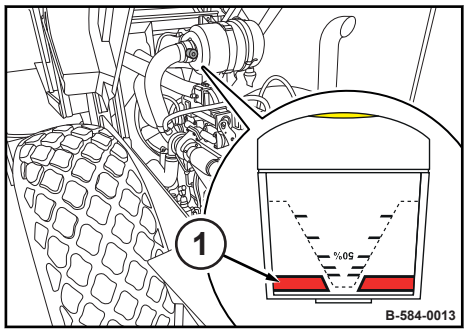


Fig. 70

1. Check the air filter maintenance indicator.
2. If the yellow pin has reached the red area (1), service the air filter ↳ *Chapter 8.12.1 'Air filter maintenance' on page 207*.

5.3.6 Checking wheels and tyres

WARNING!
Danger of being injured by bursting tyres!

- Wear your personal protective equipment (safety shoes, gloves, goggles, hard hat).
- When checking the tyre pressure stand in the extended path of the tyre track.
- Use an air hose with a length of min. 6 meters.
- Never exceed the permitted maximum pressure.

The tire pressure can be adapted to the operating conditions within the specified limits.

A reduced tire pressure improves the traction especially on sandy soils.

Higher tires pressures improve the driving stability of the machine.

The total height of the machine can also be influenced by changing the tire pressure.

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves
- Safety goggles
- Hard hat

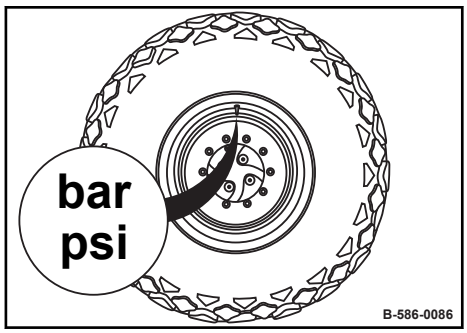


Fig. 71

1. Move the machine so that the tyre valve is in top position.
2. Park the machine safely ↳ *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
3. Check the wheels and tyres for cuts, bulges, damaged rims, missing wheel studs or nuts.
4. Have damaged wheels or tyres replaced immediately.
5. Unscrew the valve caps and check the front and rear tyre pressure, correct if necessary.

   Ensure equal pressure in all tyres.

   > *Tyre pressure nominal value* ↳ *Chapter 2 'Technical data' on page 15*

6. Screw the valve caps back on again.

6 Operation

6.1 Setting up the workplace

1. Park the machine safely ↳ *Chapter 6.7 ‘Parking the machine in secured condition’ on page 119*.
2. If necessary, adjust the driver's seat ↳ *Chapter 4.1.5 ‘Driver’s seat’ on page 83*.

6.2 Starting the engine

WARNING!
Loss of hearing caused by too high noise burdens!
– Wear your personal protective equipment (ear protection).

Protective equipment:
- Hearing protection

Prerequisites:
- Main battery switch is switched on.
- Emergency stop switch is unlocked
- The travel lever is in “Middle right” position (parking brake closed).

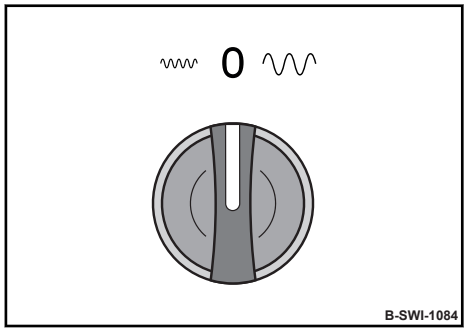


Fig. 72

1. Turn the rotary switch for amplitude pre-selection to “Middle” position.

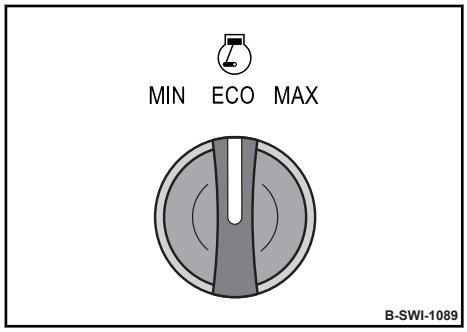


Fig. 73

2. Turn the rotary switch for engine speed to position “ECO”.

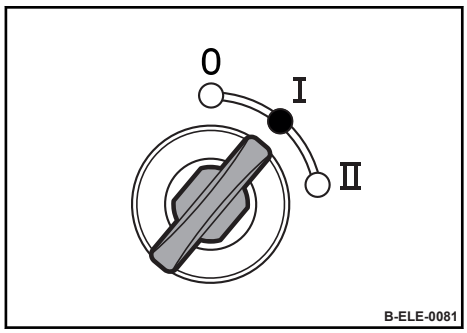


Fig. 74

3. Turn the ignition key to position “I”.

⇨ All control and warning lights in the instrument cluster light up for a moment.

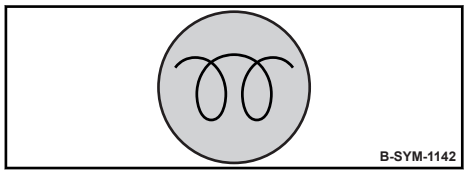


Fig. 75

4. If the pre-heating control light lights up, wait until it goes out before starting the engine.

The starter switch is designed with a re-start lock. The ignition key must first be turned back to position “0” before a new starting attempt can be made.

NOTICE!

Components may get damaged!

– Run the starting process for maximum 20 seconds without interruption and pause for a minute between starting attempts.
– If the engine has not started after two attempts, determine the cause.

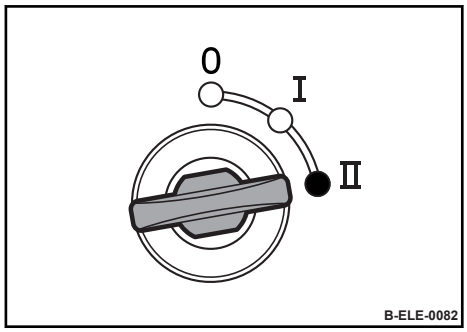


Fig. 76

5. Turn the ignition key to position “II”.

⇨ The starter cranks the engine.

NOTICE!

Danger of engine damage!

– Warm up engine for a short while before starting work. Do not operate the engine immediately under full load.

6.3 Travel mode

6.3.1 Preliminary remarks and safety notes

Driving up and down slopes

DANGER!
Danger to life caused by the machine turning over!
– Never drive across a slope.
– Always drive straight up or down a slope.

Do not drive on gradients exceeding the maximum gradeability of the machine *Chapter 2 'Technical data' on page 15*.

Soil conditions and weather influences impair the gradeability of the machine.

Wet and loose soil considerably reduces traction of the machine on inclinations and slopes. Increased danger of accident!

Leaving the seat while travelling

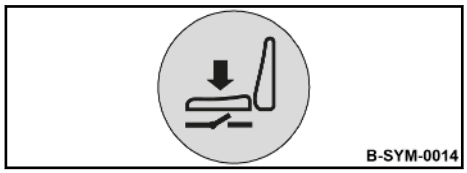


Fig. 77

If the operator leaves his seat while travelling, the driver's seat warning light lights up.

The warning buzzer sounds.

After approx. 3 seconds, the machine brakes to a standstill.

Before being able to drive again, the travel lever must first be shifted to the right into the parking brake position.

6.3.2 Driving the machine

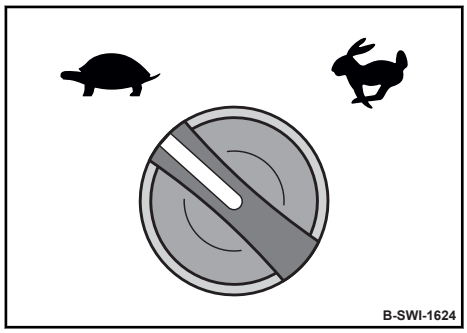


Fig. 78

1. Fasten your seat belt.
2. Pre-select the desired travel speed range.

The travel speed range can also be switched over while driving.

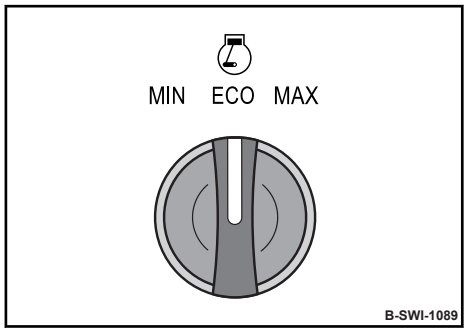


Fig. 79

3. Turn the rotary switch for engine speed to position “ECO”.

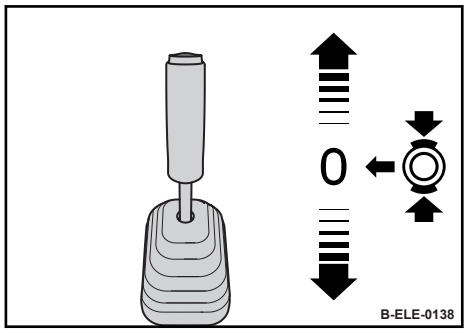


Fig. 80

4. Shift the travel lever to the left out of parking brake position to disengage.
5. Shift the travel lever slowly in the desired travel direction.
   ⇨ The further the travel lever is moved forwards or backwards, the faster the machine will travel.

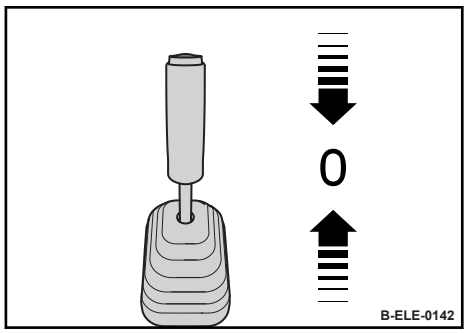


Fig. 81

6. Set the travel lever to “Middle” position to stop the machine.
   ⇨ The machine decelerates to a standstill.
7. Always apply the parking brake when stopping on inclinations or slopes.

6.3.3 Applying the parking brake

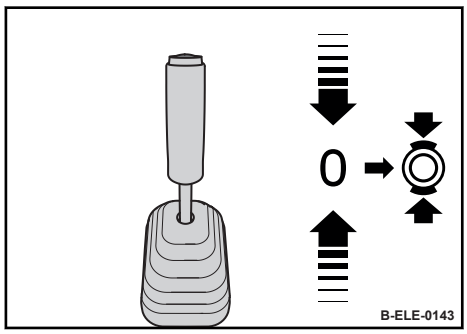


Fig. 82

1. Shift the travel lever to “Middle” position.
   ⇨ The machine decelerates to a standstill.
2. Engage the travel lever to the right (parking brake position).
   ⇨ The parking brake warning light lights up.

6.4 Working with vibration

6.4.1 Preliminary remarks and safety notes

NOTICE!

Possible damage to neighbouring buildings!

– When compacting with vibration you must always check the effect of the vibration on nearby buildings and underground supply lines (gas, water, sewage, electric power).
– If necessary stop compacting with vibration.

NOTICE!

Machine parts may get damaged!

– Do not activate the vibration on hard (frozen, concrete) ground.

Vibration at standstill causes transverse marks:

- Switch the vibration on only after shifting the travel lever in the desired travel direction.
- Switch the vibration off before stopping the machine.

6.4.2 Switching the vibration on and off

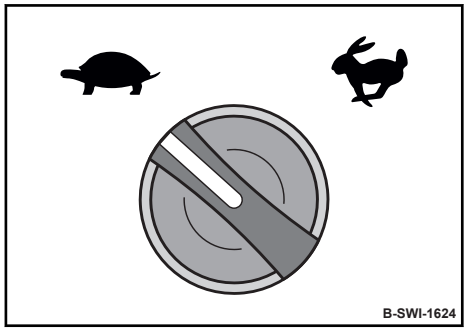


Fig. 83

1. Turn the rotary switch for travel speed ranges to “Left” position.

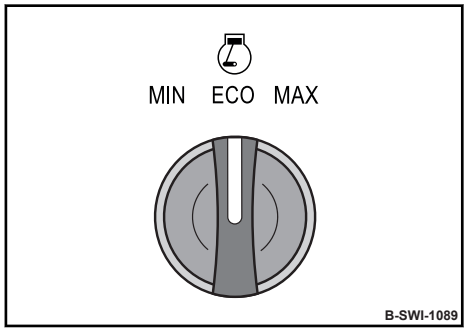


Fig. 84

2. Turn the rotary switch for engine speed to “ECO” or “MAX” position.

Pre-selecting the vibration

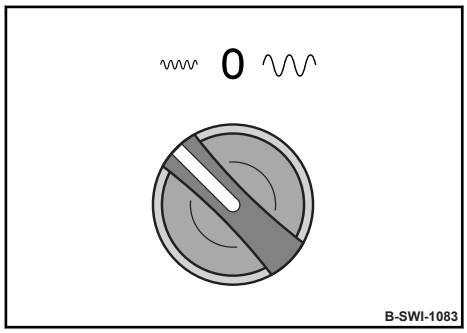


Fig. 85

3. Pre-select the desired amplitude with the rotary switch for amplitude pre-selection.

Switching the vibration on

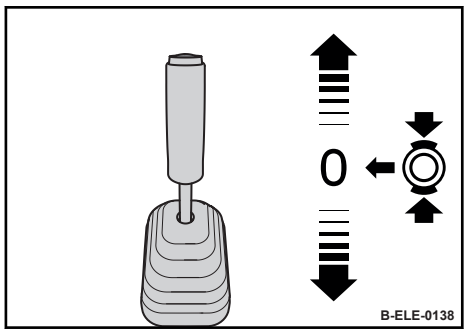


Fig. 86

4. Shift the travel lever slowly in the desired travel direction.

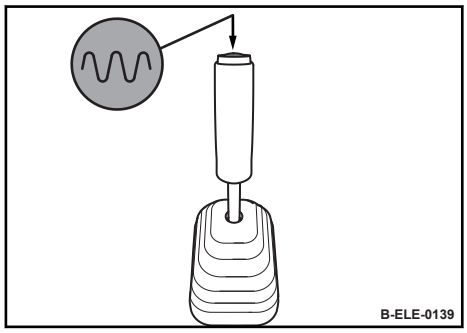


Fig. 87

5. Actuate the vibration push button.
   ⇨ Vibration is switched on.

Switching the vibration off

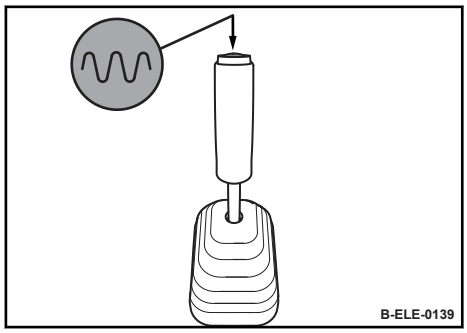


Fig. 88

6. Press the push button once again to switch off vibration.
   ⇨ Vibration is switched off.

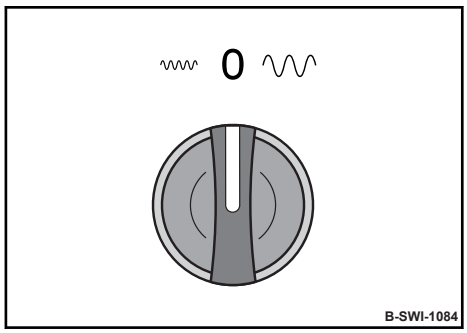


Fig. 89

7. After finishing work, turn the rotary switch for amplitude pre-selection back to position “0”.

6.5 ECONOMIZER

Optional equipment

The ECONOMIZER continuously informs the driver about the compaction status of the layer being compacted and enables the detection and targeted post-compaction of local weak spots.

The acceleration sensor on the drum measures the reaction of the road subbase.

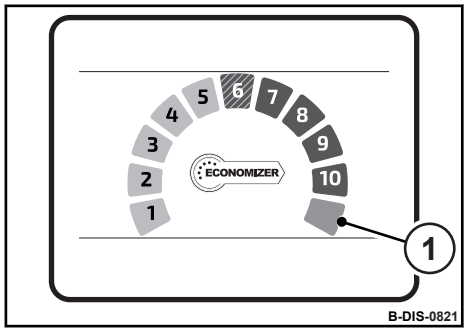


Fig. 90

- With the vibration switched on, the measuring value for the soil stiffness is shown on a scale (1–10).
- Intermediate steps are displayed as a hatched area on the scale.
- If the display value does not increase any further, no further compaction can be achieved with this machine. The maximum display value (10) is not always reached.
- If the drum is in jump operation, the display (1) flashes.

In order to achieve the desired soil stiffness, one must always perform a suitable reference measurement before compaction is started.

The reference measurement is used to determine which display value of the ECONOMIZER corresponds with the measuring value for soil stiffness.

6.6 Terrameter

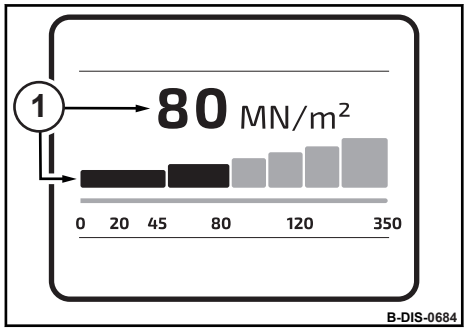


Fig. 91

The current compaction value (1) is shown on the display *'E_{VIB} value'*.

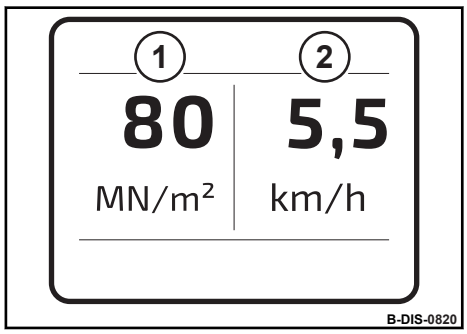


Fig. 92

In addition to the compaction value (1), the machine's current travel speed (2) is also shown on the *'travel speed and E_{VIB} value'* display.

The displays allow weak spots in compaction to be identified and excess passes can be prevented.

Optional equipment

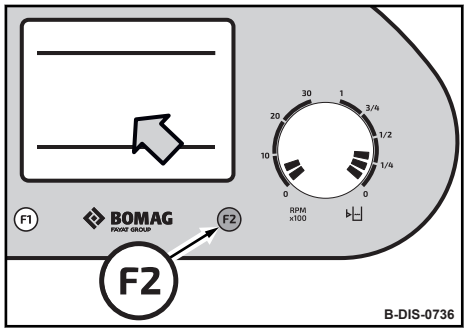


Fig. 93

1. Press the *[F2]* button on the travel lever until the *'travel speed'* or *'travel speed and E_{VIB} value'* display appears.

   ⇨ When working with vibration, the actual E_{VIB} value will now be displayed during the compaction pass as well as the travel speed where applicable.

6.7 Parking the machine in secured condition

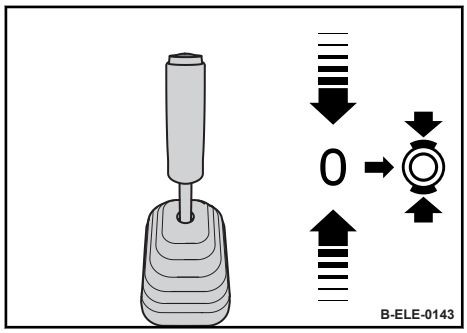


Fig. 94

1. Drive the machine onto level, firm ground.
2. To stop the machine return the travel lever to “Middle” position and shift it to the right to lock (parking brake position).
   ⇨ The parking brake warning light lights up.

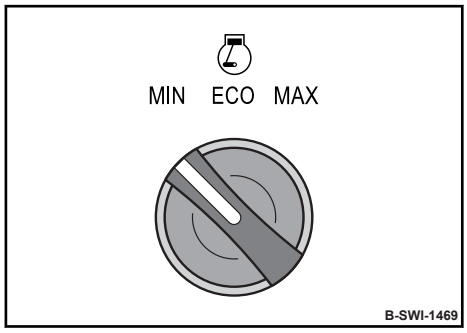


Fig. 95

3. Turn the rotary switch for engine speed to position “MIN”.

NOTICE!

Danger of engine damage!

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

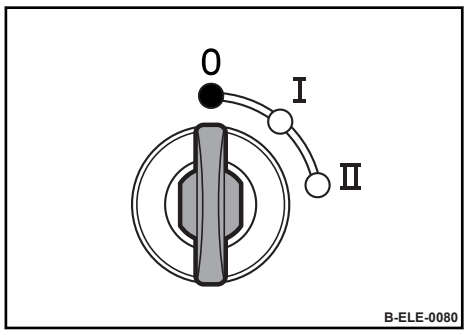


Fig. 96

4. Turn the ignition key to position “0” and pull it out.

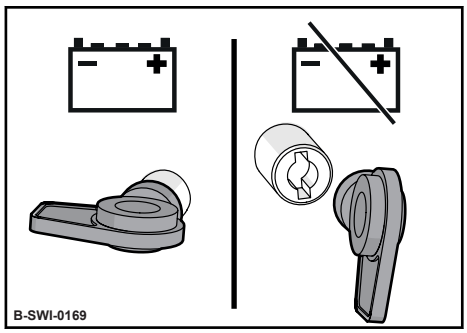


Fig. 97

5. Turn the main battery switch anticlockwise and pull it out.

6.8 Operating the heating / air conditioning system

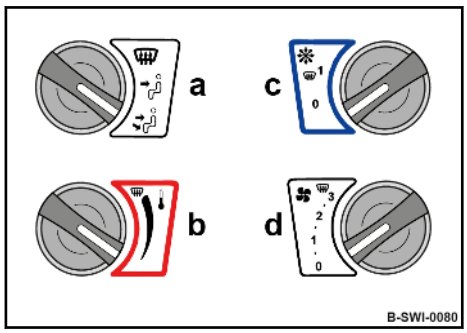


Fig. 98

a Adjust the air distribution
b Regulate the cabin temperature
c Air conditioning on/off
d Set the fan speed

NOTICE!

The function of the heating / air conditioning system may be affected!

– Always keep the air inlet slots on the cabin free of snow, foliage etc.
– Switch the air conditioning on every month for about ten minutes.

Heating the interior

1. Close all windows completely.
2. Adjust the desired air distribution.
3. Switch on the fan.
4. Regulate the cabin temperature.

Cooling the interior

1. Close all windows completely.
2. Adjust the desired air distribution.
3. Switch on the fan.
4. Switch the air conditioning on.
5. Regulate the cabin temperature.

Reducing the humidity

1. Direct the air distribution to the windscreen.
2. Switch the fan to stage “3”.
3. Set the cabin temperature to “Max”.
4. Switch the air conditioning on.

6.9 ECOSTOP

Optional equipment

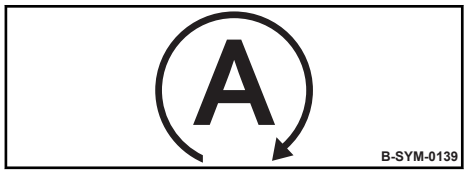


Fig. 99

In order to reduce the idle speed times of the machine, the engine is, under certain conditions, automatically shut down after an idle time of 10 minutes.

The ECOSTOP control light lights up.

Prerequisites for automatic shut-down of the engine:

- Travel lever in parking brake position
- Driver's seat not occupied
- Hydraulic oil temperature between 50 - 90 °C (122 - 194 °F)
- Coolant temperature between 60 - 90 °C (140 - 194 °F)
- Engine idle speed
- Regeneration at standstill is not active (on machines with exhaust gas aftertreatment system)

NOTICE!

The battery can become partly or fully discharged!

After the engine has been shut down, ignition and possibly other consuming devices (e.g. lighting) may still be switched on.

– If necessary, switch off consuming devices and ignition.

Starting the engine after ECOSTOP

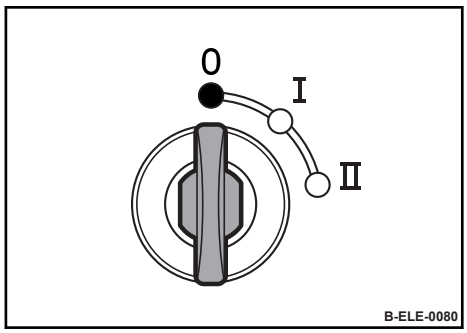


Fig. 100

1. Turn the ignition key to position “0”.
2. Start the engine *Chapter 6.2 ‘Starting the engine’ on page 107*.

6.10 Emergency procedures

6.10.1 Actuating the emergency stop switch

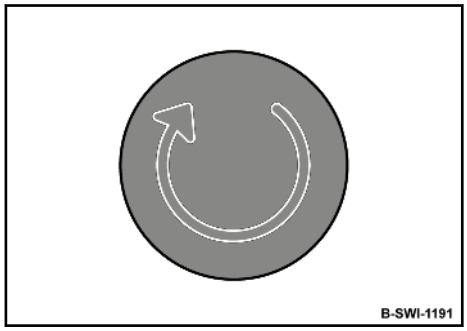


Fig. 101

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.

6.10.2 Disconnecting the battery

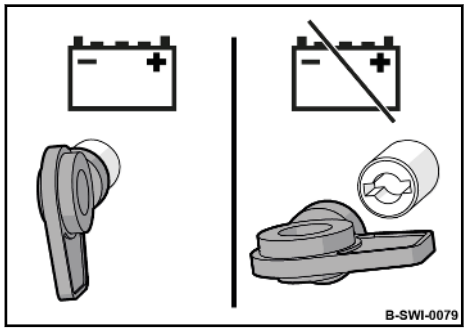


Fig. 102

1. In events of emergency, e.g. in case of a cable fire, disconnect the battery from the vehicle network. For this purpose turn the main battery switch anticlockwise and pull it out or pull the battery terminal off the battery.

6.10.3 Emergency exit

If a machine has turned over and the cabin door is jammed, the cabin windows can be used as emergency exits.

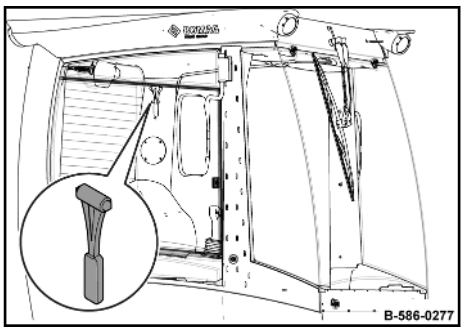


Fig. 103

1. Take the emergency hammer out of its bracket and smash the cabin window.

6.10.4 Towing the machine

Tow the machine only in case of emergency or to prevent an accident.

Towing distance max. 500 m (1600 ft), towing speed max. 1 km/h (55 ft/min).

Before towing make sure that:

- the tractor vehicle has sufficient traction and braking power for the non-braking towed load;
- lifting tackle is of sufficient strength to withstand the load and is fastened at the points provided for this purpose.

If no tow bar is used, towing is only permitted uphill.

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

WARNING!
Danger of injury caused by uncontrolled machine movement!
– Always secure the machine against unintended rolling.

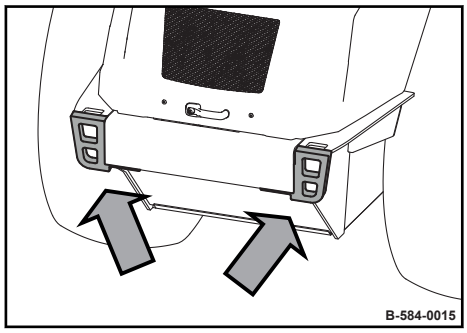


Fig. 104

1. Fasten the towing device reliably to the towing points.
2. Open and secure the engine hood
↳ *Chapter 8.2.1 'Open and secure the engine hood' on page 140*.

Travel pump

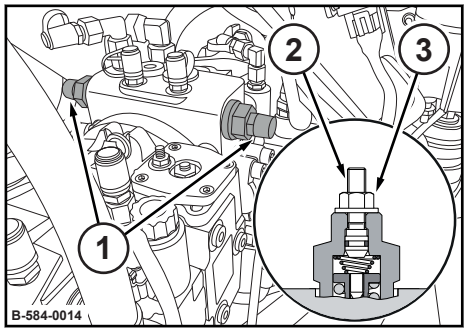


Fig. 105

3. Remove the caps from the two high pressure limiting valves (1).
4. For bypass switching, loosen the counter nuts (3).
5. Tighten the socket head cap screws (2) until the screw touches the spring cup (increased resistance).
6. Tighten the socket head cap screws another half turn.
7. Tighten the counter nuts, tightening torque: 22 Nm (16 ft·lbf).

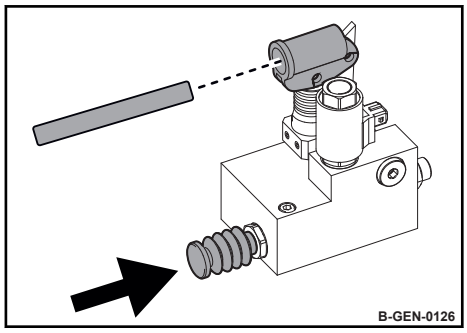


Fig. 106

8. Press the emergency operation button completely in.
9. Insert a suitable pump lever extension and operate the pump, until the brake is released.

   ⇨ The machine can now be towed.

6.10.5 After towing

WARNING!
Danger of injury caused by uncontrolled machine movement!
– Always secure the machine against unintended rolling.

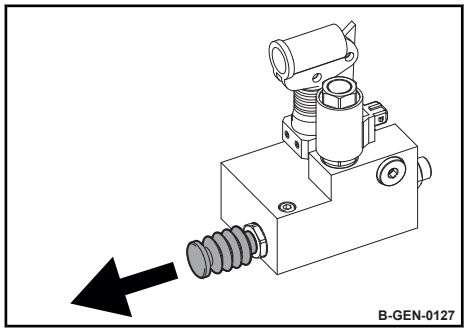


Fig. 107

1. After towing, park the machine in a safe place and secure it against accidentally rolling away.
2. If the engine cannot be started, pull the emergency operation button completely out after towing.

> *After starting the engine the emergency operation button is pushed out by hydraulic pressure.*

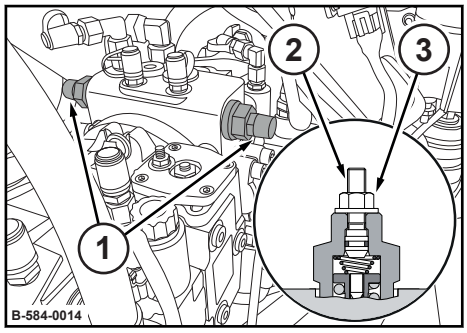


Fig. 108

3. Loosen the counter nuts (3) on the high pressure limiting valves of the travel pump.
4. Unscrew the socket head cap screws (2) against the end stop.
5. Tighten the counter nuts, tightening torque: 22 Nm (16 ft·lbf).

7 Loading / transporting the machine

7.1 Prepare for transport

1. Close all doors, windows and flaps.
2. Remove all loose objects from the machine or from the operator's stand or fasten them reliably.

7.2 Loading the machine

Use only stable loading ramps of sufficient load bearing capacity.

Loading ramps and transport vehicle must be free of grease, oil, snow and ice.

The ramp inclination must be less than the gradeability of the machine.

Before driving onto or off a transport vehicle, the driver must ensure that nobody is in the danger zone.

The driver must make sure that there is visual contact with the guide and that communication is possible.

Centre-of-gravity position

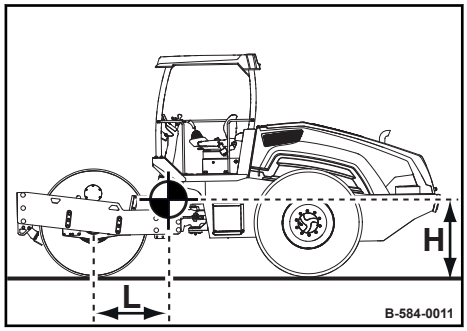


Fig. 109

Distance from middle of drum	Height
1204 mm	929 mm
47.4 in	36.6 in

DANGER!
Danger to life caused by the machine slipping or turning over!
– Make sure that no persons are in the danger zone.

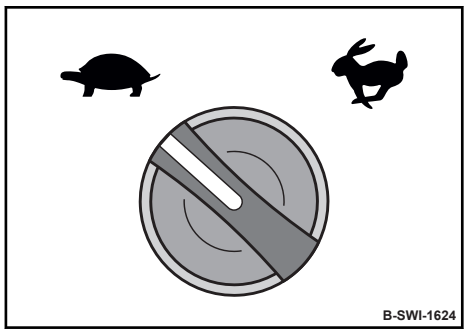


Fig. 110

1. Turn the rotary switch for travel speed ranges to position “Left”.
2. Drive the machine carefully onto the transport vehicle.
3. Observe the centre of gravity.
4. Switch off the engine and remove the ignition key.
5. Engage the articulation lock ↬ *Chapter 8.2.3.1 ‘Engaging the articulation lock’ on page 141*.

7.3 Lashing the machine to the transport vehicle

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

Always use appropriate lashing tackle at the lashing points.

Use lashing tackle only in the specified loading direction.

Lashing tackle must not be damaged by machine parts.

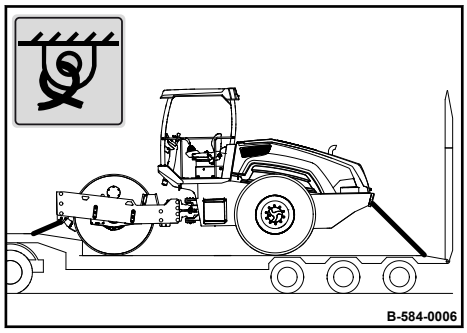


Fig. 111

1. Fasten the lashing tackle at the marked lashing points.
2. Lash the machine securely to the transport vehicle.

7.4 Loading by crane

Loads may only be attached and hoisted by an expert/qualified person.

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

Only use lifting and lashing tackle with sufficient load bearing capacity for the weight to be loaded. Minimum load bearing capacity of the lifting tackle: see max. operating weight ↬ *Chapter 2 'Technical data' on page 15*.

Always use appropriate lashing tackle at the lashing points.

Use lashing tackle only in the specified loading direction.

Lashing tackle must not be damaged by machine parts.

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

1. Shut down the engine.
2. Engage the articulation lock ↬ *Chapter 8.2.3.1 'Engaging the articulation lock' on page 141*.
3. Fasten the lashing tackle at the marked lifting points.
4. Adjust the length of the lifting tackle so that the crane hook is vertically above the centre of gravity of the machine.
5. Use a suitable crossbar to prevent the machine from being damaged.

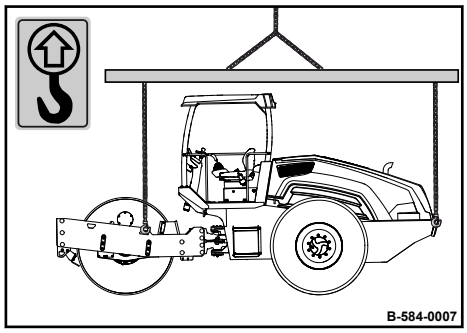


Fig. 112



DANGER!

Danger to life caused by suspended loads!

– Do not step or stand under suspended loads.

6. Lift the machine carefully and set down again at the intended location.

7.5 After transportation

Use only stable loading ramps of sufficient load bearing capacity.

Loading ramps and transport vehicle must be free of grease, oil, snow and ice.

The ramp inclination must be less than the gradeability of the machine.

Before driving onto or off a transport vehicle, the driver must ensure that nobody is in the danger zone.

The driver must make sure that there is visual contact with the guide and that communication is possible.

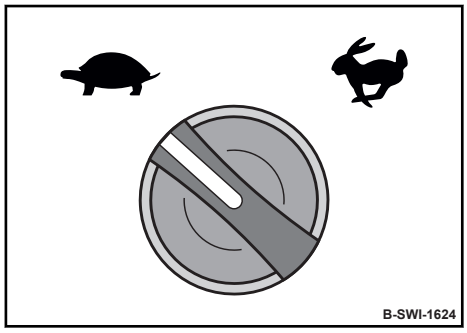


Fig. 113

1. Loosen the articulation lock *Chapter 8.2.3.2 'Disengaging the articulation lock' on page 142*.
2. Turn the rotary switch for travel speed ranges to “Left” position.
3. **DANGER!**
   Danger to life caused by the machine slipping or turning over!
   – Make sure that no persons are in the danger zone.

   Drive the machine carefully off the transport vehicle.

8 Maintenance

8.1 Preliminary remarks and safety notes

DANGER!
Danger to life caused by an operationally unsafe machine!
- The machine must only be serviced by qualified and authorized personnel.
- Follow the safety regulations for maintenance work *Chapter 3.10 'Maintenance work' on page 54*.

WARNING!
Health hazard caused by fuels and lubricants!
- Safety regulations and environmental protection regulations must be followed when handling fuels and lubricants *Chapter 3.4 'Handling fuels and lubricants' on page 33*.

CAUTION!
Danger of being injured by the engine hood dropping down!
- Always secure an opened engine hood.

Wear your personal protective equipment.

Park the machine on horizontal, level, firm ground.

Keep unauthorised persons away from the machine.

Perform maintenance work only with the engine shut down.

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

Do not touch hot components.

Thoroughly clean the machine and engine before starting maintenance work.

Before mounting the machine, check whether all access steps, grips and platforms are free of obstacles, grease, oils, fuel, dirt, snow and ice.

Use only the intended access steps and grips to mount the machine.

For overhead maintenance work use the access steps and working platforms provided or other secure means.

Do not step on machine parts which are not intended for this purpose.

Always attach the articulation lock when working in the area of the articulated joint.

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

After maintenance work has been completed, dispose of fuels and lubricants, filters, sealing elements and cleaning cloths in line with environmental regulations.

After maintenance work is completed reinstall all protective devices.

Close all maintenance flaps and doors after maintenance work has been completed.

The terms right/left are always in relation to the travel direction.

8.2 Preparations/concluding work

Certain maintenance tasks require preparations and concluding activities.

This includes e.g. opening and closing maintenance flaps and maintenance doors as well as securing certain components.

After this work close all maintenance flaps and doors again and return all components to their operating condition.

8.2.1 Open and secure the engine hood

Opening the engine hood

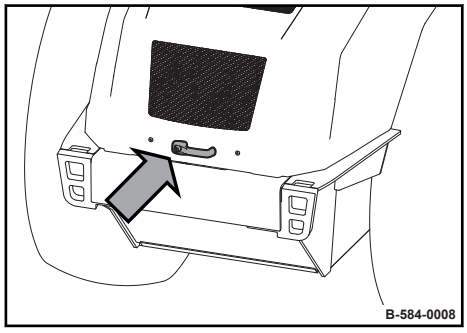


Fig. 114

1. Unlock the lock.
2. Press the button.
3. Swing the engine hood upwards by the handle.

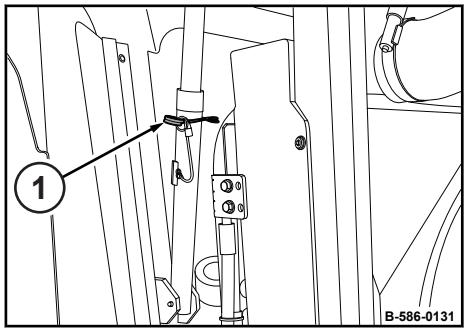


Fig. 115

4. Secure the engine hood into its uppermost position with a split pin (1).

8.2.2 Opening the battery compartment cover

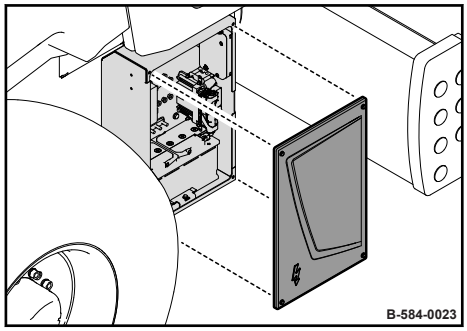


Fig. 116

1. Loosen the fastening screws and remove the cover.

8.2.3 Engaging/releasing the articulation lock

8.2.3.1 Engaging the articulation lock

WARNING!

Danger of crushing by the articulating machine!

– Do not step into the articulation area of the machine while the engine is running.

1. Move the steering to middle position and stop the machine.
2. Switch off the engine and remove the ignition key.
3. Pull the split pin out of the locking bolt for the articulation lock.
4. Lift up the articulation locking bolt and swivel it by 180°.

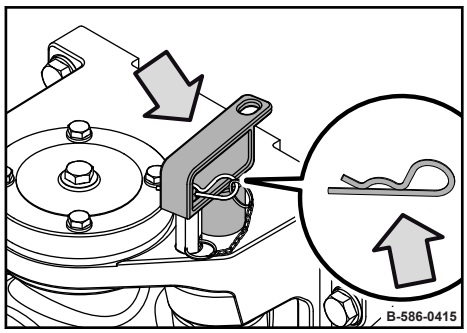


Fig. 117

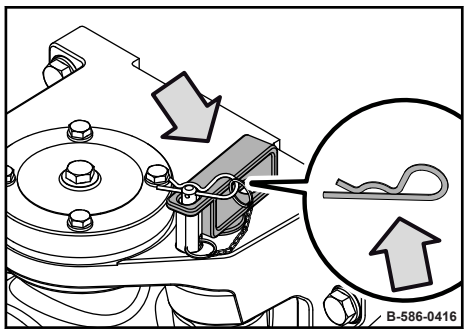


Fig. 118

5. Engage the articulation locking bolt and secure it with the split pin.

8.2.3.2 Disengaging the articulation lock

WARNING!
Danger of crushing by the articulating machine!
– Do not step into the articulation area of the machine while the engine is running.

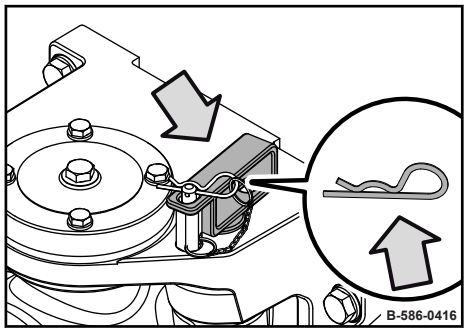


Fig. 119

1. Pull the split pin out of the locking bolt for the articulation lock.
2. Lift up the articulation locking bolt and swivel it by 180°.

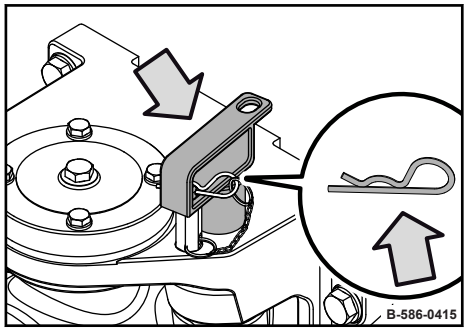


Fig. 120

3. Engage the articulation lock in the holding fixture and secure it with the split pin.

8.3 Fuels and lubricants

8.3.1 Engine oil

8.3.1.1 Oil quality

For use in DEUTZ engines, engine oils are divided into DEUTZ engine oil quality classes (DQC).

The following engine oil specifications are permitted:

DEUTZ	ACEA	API	DHD
DQC II-10	E3-96 E4-12 E5-02 E7-12	CH-4 CI-4 CI-4 Plus	DHD-1
DQC III-10	-	-	-
DQC IV-10	-	-	-

Avoid mixing engine oils.

The list of approved engine oils is also available on the Internet under the *www.deutz.com*.

8.3.1.2 Oil viscosity

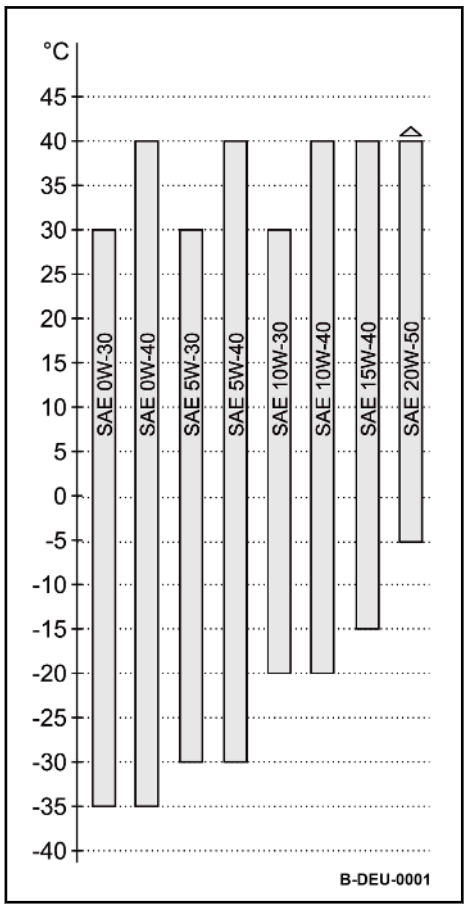


Fig. 121: Oil viscosity diagram

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

Only use multi-purpose oils.

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

Optimal operating conditions can be achieved by using the oil viscosity chart as a reference.

8.3.1.3 Oil change intervals

If the oil change intervals are not reached over a period of one year, the oil change should be performed at least 1 x per year, irrespective of the operating hours reached.

The oil change interval must be halved if at least one of the following conditions applies:

- Permanent ambient temperatures below -10 °C (14 °F)
- Engine oil temperatures below 60 °C (84 °F).
- Sulphur content in fuel exceeding 0.5 %

8.3.2 Fuel

8.3.2.1 Fuel quality

You should preferably use commercial diesel fuel with a sulphur content of less than 0.5 %.

When using a diesel fuel with a high sulphur content of 0.5 % to 1.0 % the oil change intervals must be halved.

Fuels with a sulphur content of more than 1.0 % are not permitted.

In order to fulfil national emission regulations one must strictly use the legally required fuels (e.g. sulphur content).

The following fuel specifications are recommended:

- EN 590
- ASTM D975 Grade-No. 1-D and 2-D
- JIS K 2204 Grade Fuel 1 and Grade Fuel 2 with lubrication properties acc. to EN 590

8.3.2.2 Winter fuel

For winter operation use only winter diesel fuel, to avoid clogging because of paraffin separation.

At very low temperatures disturbing paraffin separation can also be expected when using winter diesel fuel.

Diesel fuels suitable for temperatures down to -44 °C (-47 °F) are available for Arctic climates.

NOTICE!
Danger of engine damage!
– The admixture of petroleum and the addition of “flow enhancing additives” (fuel additives) is not permitted.

8.3.2.3 Storage

Even traces of zinc, lead and copper can cause deposits in the injection nozzles, especially in modern Common-Rail injection systems.

Zinc and lead coatings in refuelling systems and fuel lines are not permitted.

Copper containing materials (copper lines, brass items) should be avoided, because they can cause catalytic reactions in the fuel with subsequent depositing in the injection system.

8.3.3 Coolant

8.3.3.1 General

For fluid cooled engines the cooling fluid must be prepared by admixing a cooling system protection agent to the fresh water and should be checked within the specified maintenance intervals.

This prevents damage caused by corrosion, cavitation, freezing and overheating.

8.3.3.2 Water quality

The correct quality of water is highly important when preparing coolant. Clear and clean water within the boundaries of the following analysis values should generally be used.

Analysis values	
pH-value at 20 °C (68 °F)	6.5 - 8.5
Chlorine-ion content	max. 100 mg/l
Sulphate ion content	max. 100 mg/l
Water hardness (ion content of calcium and magnesium)	max. 3.56 mmol/l max: 356 mg/l (ppm)
Germ degree:	max. 20 °dH
English degree:	max: 25 °eH
French degree:	max: 35.6 °fH
Bacteria, fungi, yeasts	not permitted

Information concerning the water quality can be obtained from the waterworks.

If the fresh water analysis values are unknown, these must be determined with the help of a water analysis.

If the values of the analysis deviate, the water must be treated accordingly:

pH-value too low	- Adding of caustic lye of soda or caustic potash solution.
Water hardness too high	- Mix with soft, distilled or fully demineralized water
Chlorides and/or sulphates too high	- Mix with distilled or fully demineralized water

NOTICE!
Danger of engine damage!
– Another analysis must be made after the fresh water has been prepared.

8.3.3.3 Cooling system protection agent

As a protection against frost, corrosion and boiling, anti-freeze agents must be used in any climatic conditions.

Coolant is prepared by adding an ethylene-glycol based anti-freeze agent with corrosion inhibiting properties to the cooling water.

We therefore highly recommend using our BOMAG cooling system protection agent.

If our cooling system protection agent is not available for any important reasons, you may, in exceptional cases, use products that have been approved by the engine manufacturer.

The list of approved lubrication oils is available on the Internet under the *www.deutz.com*.

Products of the same product group (see Deutz Technical Circular Cooling System Protection Agents) can be mixed with each other.

The BOMAG cooling system protection agent corresponds with product group C.

NOTICE!

Danger of engine damage!

- Do not mix different coolants and additives of any other kind.
- Before changing the product you must clean the entire cooling system.
- Consult our customer service if in doubt.
- The cooling system protection agent must be used all year round, to provide adequate corrosion protection.

The mixing ratio must not be below or exceed the following value:

Cooling system protection agent	Fresh water	Protection against cold down to
min. 35%	65%	-22 °C (-8 °F)
40%	60%	-28 °C (-18 °F)
45%	55%	-35 °C (-31 °F)
max. 50%	50%	-41 °C (-42 °F)

NOTICE!

Danger of engine damage!

- A proportion of more than 50% of cooling system protection agent results in reduced cooling power.
- The use of corrosion protection oils as cooling system protection agents is not permitted.

8.3.4 Hydraulic oil

8.3.4.1 Mineral oil based hydraulic oil

The hydraulic system is operated with hydraulic oil HV 46 (ISO) with a kinematic viscosity of 46 mm^2/s at 40 °C (104 °F) and 8 mm^2/s at 100 °C (212 °F).

When refilling or changing oil, use only hydraulic oil type HVLP according to DIN 51524, part 3, or hydraulic oil type HV according to ISO 6743/4.

The viscosity index must be at least 150 (observe information of manufacturer).

8.3.4.2 Bio-degradable hydraulic oil

The hydraulic system can also be operated with a synthetic ester based biodegradable hydraulic oil.

The biodegradable hydraulic oil Panolin HLP Synth. 46 or Plantohyd 46 S meets all the requirements of a mineral oil based hydraulic oil according to DIN 51524.

In hydraulic systems filled with biodegradable hydraulic oil, always use the same oil to top up and do not mix oil types.

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

NOTICE!

Danger of damage to the hydraulic system!

- After the changeover check the hydraulic oil filters increasingly for contamination.
- Have regular oil analyses performed regarding the water content and mineral oil.
- Replace the hydraulic oil filter at the latest after 500 operating hours.

8.3.5 Gear oil SAE 75W-90

Use a fully synthetic gear oil in accordance with SAE 75W-90, API GL5 with a kinematic viscosity of at least 16 mm^2/s at 100 °C (212 °F).

8.3.6 Gear oil SAE 80W-140

Use a fully synthetic gear oil in accordance with SAE 80W-140, API GL5 with a kinematic viscosity of at least 20 mm^2/s at 100 °C (212 °F).

It is a hypoid lubricant of highest quality class for transmissions under extreme strain.

8.4 List of fuels and lubricants

Assembly group	Fuel or lubricant		Spare parts number	Filling quantity
	Summer	Winter		Observe the level mark!
Engine oil	SAE 10W-40 Specification: ↳ *Chapter 8.3.1 'Engine oil' on page 143*		009 920 06 20 l	8.5 l (2.2 gal us)
	SAE 15W-40			
	SAE 10W-30			
	SAE 30	SAE 10W		
Fuel	Diesel	Winter diesel fuel		250 l (66 gal us)
	Specification: ↳ *Chapter 8.3.2 'Fuel' on page 145*			
Coolant	Mixture of water and anti-freeze agent Specification: ↳ *Chapter 8.3.3 'Coolant' on page 146*		009 940 03 20 l	14 l (3.7 gal us)
Hydraulic system	Hydraulic oil (ISO), HVLP 46 Specification: ↳ *Chapter 8.3.4.1 'Mineral oil based hydraulic oil' on page 150*		009 930 09 20 l	75 l (20 gal us)
	or ester based biodegradable hydraulic oil Specification: ↳ *Chapter 8.3.4.2 'Bio-degradable hydraulic oil' on page 150*			
Exciter housing	Gear oil SAE 75W-90 Specification: ↳ *Chapter 8.3.5 'Gear oil SAE 75W-90' on page 151*		009 925 05 20 l	1.2 l each (0.32 gal us)

Assembly group	Fuel or lubricant		Spare parts number	Filling quantity
	Summer	Winter		Observe the level mark!
Drive axle	Gear oil SAE 80W-140 Specification: *Chapter 8.3.6 'Gear oil SAE 80W-140' on page 151*		009 925 07 20 l	11 l (2.9 gal us)
Wheel hubs	Gear oil SAE 80W-140 Specification: *Chapter 8.3.6 'Gear oil SAE 80W-140' on page 151*		009 925 07 20 l	1.4 l each (0.37 gal us)
Tyres	Water + calcium chloride			295 l + 100 kg (80 gal us + 220 lbs)
	or water + magnesium chloride			308 l + 87 kg (81 gal us + 192 lbs)
Air conditioning	Refrigerant R134a			1500 g (3.3 lbs)

8.5 Running-in instructions

8.5.1 General information

When commissioning new machines, the running-in instructions listed in this chapter must be carried out after the specified operating hours.

The maintenance work listed must be carried out in addition to the regular maintenance intervals.

NOTICE!

Danger of engine damage!

– Up to approx. 250 operating hours check the engine oil level twice every day.

Depending on the load the engine is subjected to, the oil consumption will drop to the normal level after approx. 100 to 250 operating hours.

8.5.2 After the first 250 operating hours

1. Tighten all bolted connections on air intake, exhaust, oil sump and engine mounts.
2. Retighten the bolted connections on the machine.
3. Retighten the wheel nuts ↳ *Chapter 8.9.11 ‘Retightening the wheel nuts’ on page 197*.
4. Oil and filter change on diesel engine ↳ *Chapter 8.8.1 ‘Change engine oil and oil filter cartridge’ on page 171*.
5. Oil change in drive axle ↳ *Chapter 8.9.6 ‘Change the oil in the drive axle’ on page 190*.

6. Oil change in wheel hubs ↳ *Chapter 8.9.7 ‘Changing the oil in the wheel hubs’ on page 191*.
7. Exciter unit oil change. ↳ *Chapter 8.9.9 ‘Change the oil in the exciter housing’ on page 195*

8.5.3 After the first 500 operating hours

1. Oil and filter change diesel engine. ↳ *Chapter 8.8.1 ‘Change engine oil and oil filter cartridge’ on page 171*
2. Exciter unit oil change. ↳ *Chapter 8.9.9 ‘Change the oil in the exciter housing’ on page 195*

8.5.4 After the first 1000 operating hours

1. Oil change in drive axle. ↳ *Chapter 8.9.6 ‘Change the oil in the drive axle’ on page 190*
2. Oil change in wheel hubs ↳ *Chapter 8.9.7 ‘Changing the oil in the wheel hubs’ on page 191*
3. Exciter unit oil change. ↳ *Chapter 8.9.9 ‘Change the oil in the exciter housing’ on page 195*
4. Retighten the wheel nuts. ↳ *Chapter 8.9.11 ‘Retightening the wheel nuts’ on page 197*

8.6 Maintenance Table

No.	Maintenance works	Page
	Daily maintenance	
5.3.1	*Checking the engine oil level*	*97*
5.3.2	*Checking the fuel level; topping up fuel*	*98*
5.3.3	*Checking the hydraulic oil level*	*100*
5.3.4	*Checking the coolant level*	*101*
5.3.5	*Checking the air filter*	*102*
5.3.6	*Checking wheels and tyres*	*103*
	Every 250 operating hours	
8.7.1	*Checking the rubber-bonded metal rails and rubber buffers*	*159*
8.7.2	*Cleaning the radiator module*	*160*
8.7.3	*Checking the ribbed V-belt*	*162*
8.7.4	*Checking, tensioning the V-belt of the air conditioning compressor*	*162*
8.7.5	*Checking the oil level in the drive axle*	*165*
8.7.6	*Checking the oil level in the wheel hubs*	*165*
8.7.7	*Checking the oil level in the exciter housing*	*166*
8.7.8	*Changing the fresh air filter in the cabin*	*168*
8.7.9	*Check the air intake lines*	*169*
8.7.10	*Checking radiator hoses and hose clamps*	*169*
8.7.11	*Check the parking brake*	*170*
	Every 500 operating hours	
8.8.1	*Change engine oil and oil filter cartridge*	*171*
8.8.2	*Replacing the fuel filter; bleeding the fuel system*	*173*
8.8.3	*Checking the anti-freeze concentration and the condition of the coolant*	*176*
8.8.4	*Checking the hydraulic lines*	*177*

No.	Maintenance works	Page
8.8.5	*Servicing the battery; checking the main battery shutoff*	*179*
8.8.6	*Servicing the air conditioning system*	*180*
	Every 1000 operating hours	
8.9.1	*Checking, adjusting the valve clearance*	*183*
8.9.2	*Replacing the ribbed V-belt*	*185*
8.9.3	*Replacing the V-belt of the air conditioning compressor*	*186*
8.9.4	*Checking the engine mounts*	*187*
8.9.5	*Replacing the hydraulic oil filter*	*188*
8.9.6	*Change the oil in the drive axle*	*190*
8.9.7	*Changing the oil in the wheel hubs*	*191*
8.9.8	*Checking the rocker bearing clearance*	*193*
8.9.9	*Change the oil in the exciter housing*	*195*
8.9.10	*Retightening the fastening of the axle on the frame*	*197*
8.9.11	*Retightening the wheel nuts*	*197*
8.9.12	*Checking the ROPS/FOPS*	*198*
8.9.13	*Checking the travel lever control*	*199*
8.9.14	*Cleaning the circulation air filter of the heating*	*199*
	Every 2000 operating hours	
8.10.1	*Changing the hydraulic oil*	*200*
8.10.2	*Changing the coolant*	*202*
	Every 3000 operating hours	
8.11.1	*Check the injection valves*	*206*
	As required	
8.12.1	*Air filter maintenance*	*207*
8.12.2	*Checking and cleaning the water separator*	*211*
8.12.3	*Adjusting the scrapers*	*212*
8.12.4	*Cleaning the machine*	*213*

No.	Maintenance works	Page
8.12.5	*Filling the windscreen washer tank*	*214*
8.12.6	*Drain the fuel tank sludge*	*214*
8.12.7	*Retightening the padfoot shell*	*215*
8.12.8	*Measures prior to extended shut-down period*	*215*

8.7 Every 250 operating hours

8.7.1 Checking the rubber-bonded metal rails and rubber buffers

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

1. Drive the machine onto horizontal, level, firm ground.

   Make sure there is sufficient space to drive the machine for at least one full turn of the drum.

2. Shut down the engine.

Checking the rubber-bonded metal rails

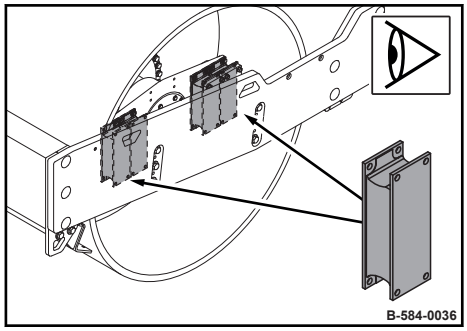


Fig. 122

3. Check the rubber-bonded metal rails on the left-hand side for a tight fit, cracks and tear-offs.
4. Have damaged any rubber-bonded metal rails replaced immediately by our Customer Service Department.

Checking the rubber buffers

To check the rubber buffers on the right-hand side, the drum has to be moved one revolution in three steps.

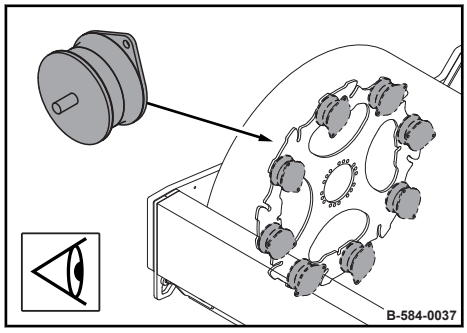


Fig. 123

5. Check the rubber buffers that are visible for a tight fit, cracks and tear-offs.

   Then start the engine and move the machine forward approx. 1.50 m (5 ft).

   Shut the engine down and perform the check once again.
6. Repeat these activities until the drum has been moved one revolution.
7. Have any damaged rubber buffers replaced immediately by our Customer Service Department.

8.7.2 Cleaning the radiator module

NOTICE!

Components may get damaged!

– Dirt on fan blades and oil coolers reduce the cooling effect. Dirt deposits in these areas are substantially supported by oil and fuel on these surfaces. For this reason you should always seal any oil or fuel leaks in the vicinity of the cooling fan or the radiator and clean the cooling fins after.
– Do not damage any cooling fins on the cooler core when cleaning.

Cleaning with compressed air

Protective equipment:

- Working clothes
- Protective gloves
- Safety goggles

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Allow the engine to cool down.
3. **CAUTION!**
   Danger of eye injuries caused by particles flying around!
   – Wear your personal protective equipment (protective gloves, protective clothing, goggles).

   Blow the radiator out with compressed air from the air discharge side.

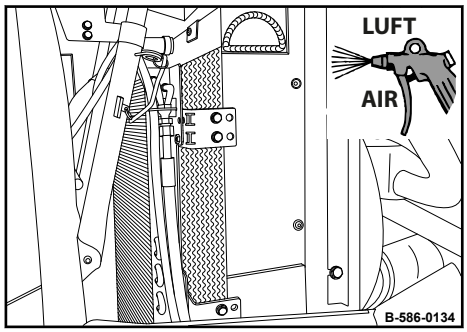


Fig. 124

4. Blow the radiator out with compressed air from the air supply side.

Cleaning with cold cleansing agent

NOTICE!
Electric components can be damaged by water entering into the system!
– Protect electrical equipment such as generator, regulator and starter against the direct water jet.

1. Spray engine and radiator with a suitable cleansing agent, e.g. cold cleansing agent, let it soak in for a while and spray it off with a strong water jet.
2. Warm up the engine for a while to avoid corrosion.

8.7.3 Checking the ribbed V-belt

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Allow the engine to cool down.
3. Check the entire circumference of the belt for damage and cracks.
4. Replace damaged ribbed V-belts.

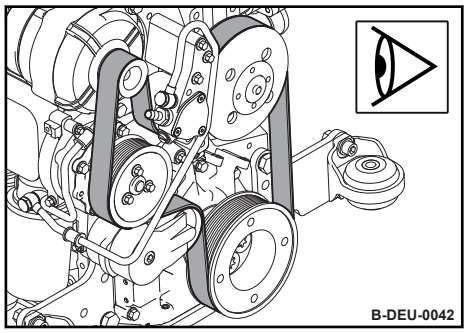


Fig. 125

Check dimension "a" between the tongue of the moveable and the end stop of the fixed part of the idler pulley.

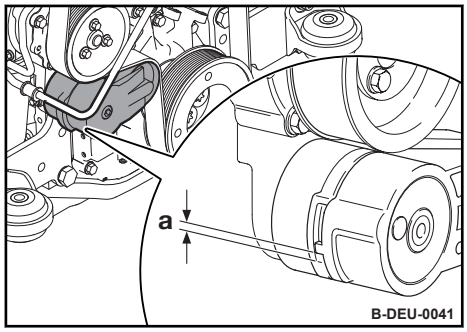


Fig. 126

5. Check dimension "a" on the idler pulley.
   ⇨ The dimension must be min. 3 mm (0.12 in).

   If the dimension is smaller, replace the ribbed V-belt.

8.7.4 Checking, tensioning the V-belt of the air conditioning compressor

1. Park the machine in secured condition *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Allow the engine to cool down.

8.7.4.1 Checking the condition of the V-belt

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

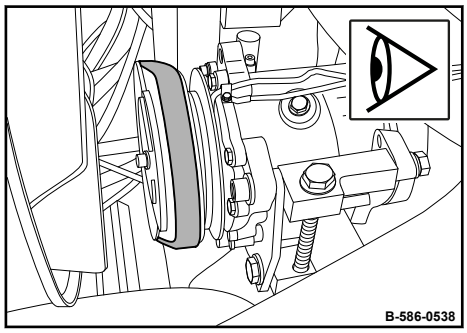


Fig. 127

1. Check the entire circumference of the belt for damage and cracks.
2. Replace a damaged or torn V-belt ↬ *Chapter 8.9.3 'Replacing the V-belt of the air conditioning compressor' on page 186*.

8.7.4.2 Checking the V-belt tension

Protective equipment:
- Working clothes
- Protective gloves

Tool:
- Belt tension tester

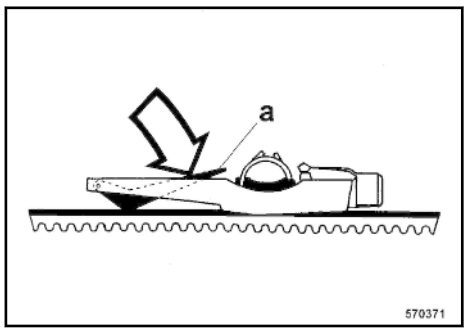


Fig. 128

1. Press the indicator arm (a) of the tester into the gap of the measuring scale.
2. Place the meter in the middle between the V-belt pulleys on the back of the belt.

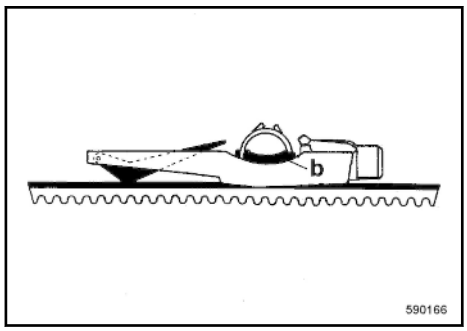


Fig. 129

3. Actuate the push button (b) evenly with a finger under a right angle to the belt, until the pressure spring disengages audibly and noticeably.

   ⇨ The indicator arm remains in the measured position.

4. Take the measuring unit carefully off, without moving the indicating arm.

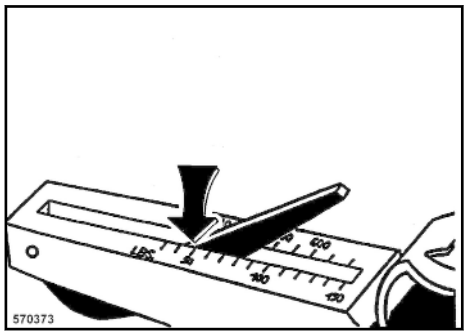


Fig. 130

5. Read the belt tension where the upper edge of the indicating arm intersects with the measuring scale.

   Belt tension nominal value

during initial assembly (new belt)	400 N (90 lbf) (cold)
after a running-in time, in case of reassembly	300 N (67 lbf)

6. Tighten the belt, if necessary.

8.7.4.3 Tensioning the V-belt

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

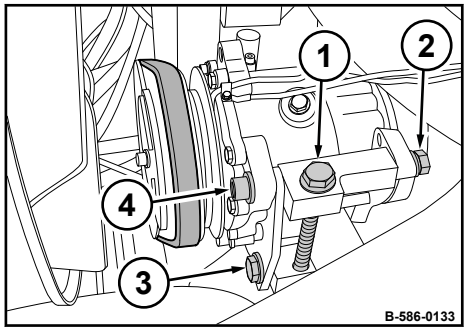


Fig. 131

1. Loosen the screws (2, 3, 4) on the compressor.
2. Turn the tensioning screw (1) to tighten the V-belt to the specified value.
3. Tighten screws (2, 3, 4) again.

8.7.5 Checking the oil level in the drive axle

NOTICE!
Components may get damaged!
– Use only gear oil of the permitted specification ↬ *Chapter 8.3.6 'Gear oil SAE 80W-140' on page 151*.

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

1. Park the machine safely ↬ *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Clean the area around the oil level inspection plug and unscrew the plug.

   A second oil level inspection plug is located on the opposite side.
3. Make sure the oil level is up to the bottom edge of the bore; top up oil if necessary.
4. Screw the oil level inspection plug back in tightly.

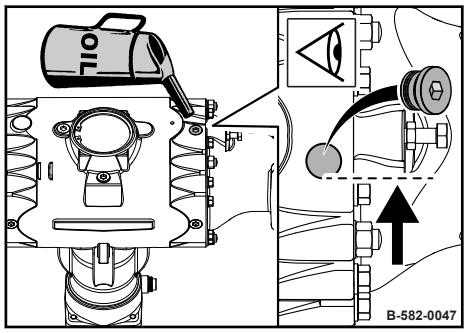


Fig. 132

8.7.6 Checking the oil level in the wheel hubs

NOTICE!
Components may get damaged!
– Use only gear oil of the permitted specification ↬ *Chapter 8.3.6 'Gear oil SAE 80W-140' on page 151*.

Protective equipment:

- Working clothes
- Protective gloves

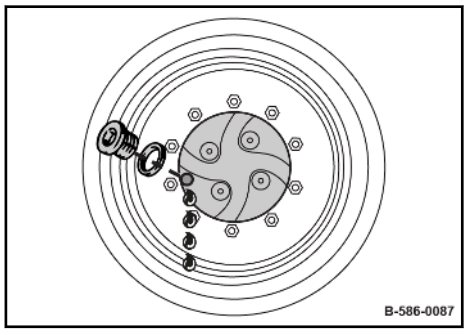


Fig. 133

1. Move the machine until the oil level inspection plug is in horizontal position.
2. Park the machine in secured condition ↬ *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
3. Clean the area around the level inspection plug and unscrew the plug.
4. The oil level must reach the bottom edge of the bore, top up oil if necessary.
5. Turn the level inspection plug tightly back in.
6. Change the oil in both wheel hubs.

8.7.7 Checking the oil level in the exciter housing

NOTICE!

Components may get damaged!

– Use only gear oil of the permitted specification ↬ *Chapter 8.3.5 'Gear oil SAE 75W-90' on page 151*.

Protective equipment:

- Working clothes
- Protective gloves

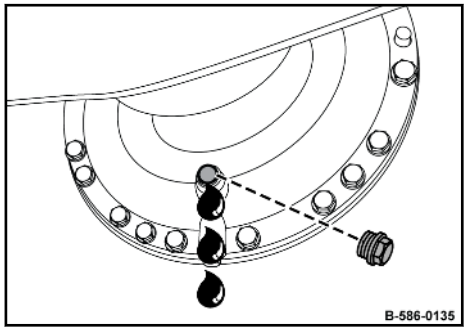


Fig. 134

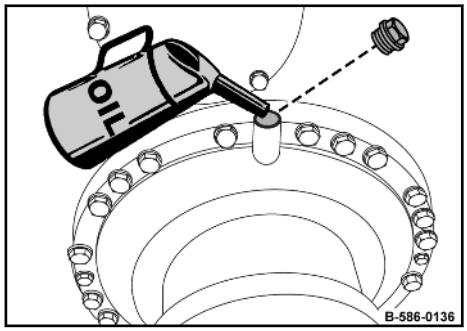


Fig. 135

1. Before checking the oil level, run the machine warm with vibration for about 1/2 hour.
2. Move the drum, until the oil level inspection plug is in bottom position.
3. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
4. Clean the area around the oil level inspection plug and unscrew the plug.
   ⇨ The oil level must reach the bottom edge of the level bore.
5. If necessary, clean the area around the filler plug and unscrew the filler plug.
6. Fill with oil through the filler bore until it starts to run out through the level inspection bore.
7. Retighten the filler and oil level inspection plugs.
8. Repeat this inspection on the opposite side.
9. If a loss of oil is found, perform trouble-shooting, repair the drum if necessary.

8.7.8 Changing the fresh air filter in the cabin

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.7 'Parking the machine in secured condition' on page 119*.

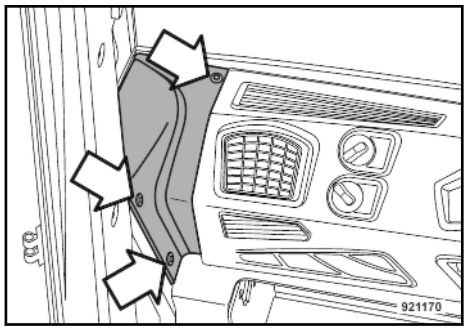


Fig. 136

2. Pull the fastening pins out of the left cover and remove the cover.

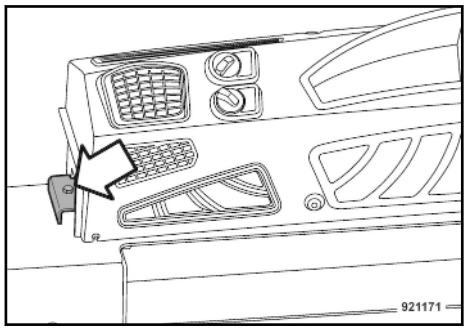


Fig. 137

3. Loosen the fastening screw.
4. Also remove the cover from the right hand side and loosen the fastening screw.

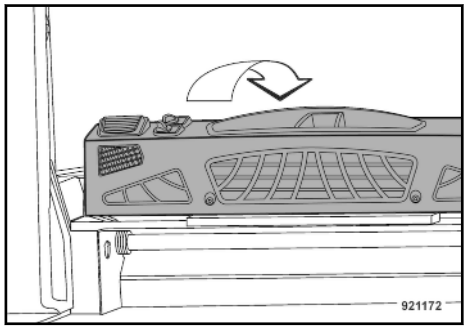


Fig. 138

5. Tilt the console towards the front screen and hold it.

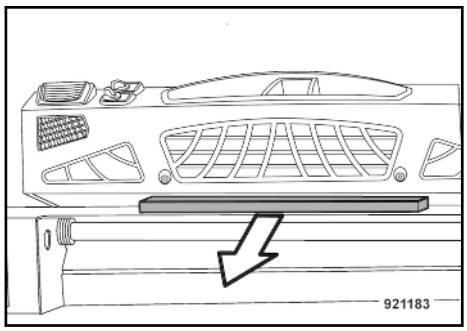


Fig. 139

6. Take out the filter.
7. Insert the new filter and fold the console down again.
8. Tighten the left and right fastening screws and reinstall the covers.

8.7.9 Check the air intake lines

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Allow the engine to cool down.
3. Check the condition and tight fit of all air intake lines and hose clamps.
4. If fuel lines or hose clamps are found to be damaged, the corresponding parts must be immediately replaced.

8.7.10 Checking radiator hoses and hose clamps

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

1. Park the machine safely ↳ *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Allow the engine to cool down.
3. Check the condition and tight fit of all radiator hoses and hose clamps.

4. If a radiator hose is swollen, hardened or cracked, the hose and hose clamps must be replaced immediately.

8.7.11 Check the parking brake

This work must only be performed by authorized service personnel.

8.8 Every 500 operating hours

8.8.1 Change engine oil and oil filter cartridge

Perform this maintenance work at the latest after one year.

NOTICE!

Danger of engine damage!

- Change the oil only with the engine at operating temperature.
- Use only oil of the permitted specification *Chapter 8.3.1 ‘Engine oil’ on page 143*.
- Filling quantity: *Chapter 8.4 ‘List of fuels and lubricants’ on page 152*

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.

WARNING!

Danger of burning on hot components!

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

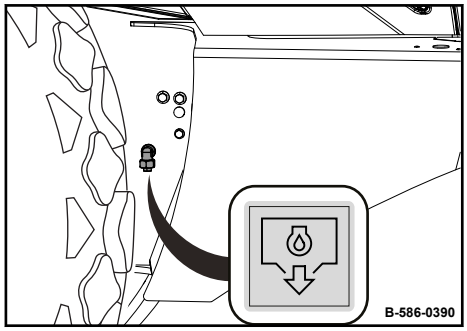


Fig. 140

2. Unscrew the drain plug and collect any oil running out.
3. Screw the drain plug back in tightly.

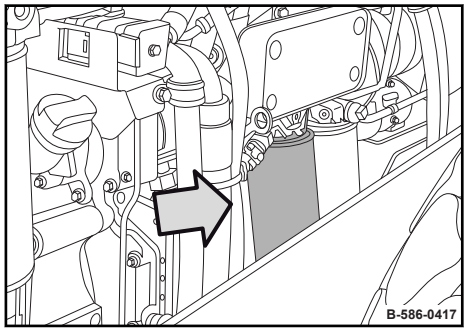


Fig. 141

4. Thoroughly clean the outside of the oil filter cartridge.
5. Unscrew the oil filter cartridge using an appropriate strap wrench.
6. Remove any dirt from the sealing face of the filter carrier.
7. Thinly apply oil to the rubber seal of the new oil filter cartridge.
8. Screw on the new oil filter cartridge tightly by hand.

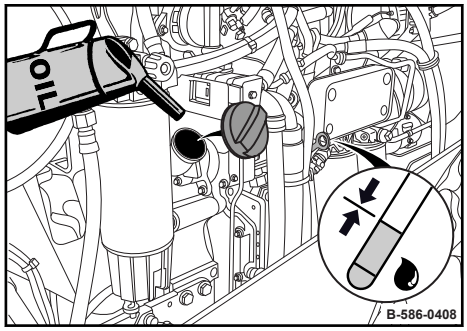


Fig. 142

9. Fill with new engine oil.
10. After a short test run check the oil level on the dipstick; if necessary, top up to the top dipstick mark.
11. Check oil filter cartridge and drain plug for leaks.
12. Dispose of the oil and oil filter cartridge in line with environmental regulations.

8.8.2 Replacing the fuel filter; bleeding the fuel system

8.8.2.1 Preliminary remarks

NOTICE!
Danger of engine damage!

- Ensure strict cleanliness! Thoroughly clean the area around the fuel filters.
- Air in the fuel system causes irregular running of the engine, a drop in engine power, stalls the engine and makes starting impossible.
- After work on the fuel system bleed the system, perform a test run and check for leaks.
- Additional bleeding of the fuel system by a 5 minute test run in idle speed or low load is mandatory.

1. Park the machine in secured condition ↳ *Chapter 6.7 ‘Parking the machine in secured condition’ on page 119*.

8.8.2.2 Replacing the fuel filter

Perform this maintenance work at the latest after one year.

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

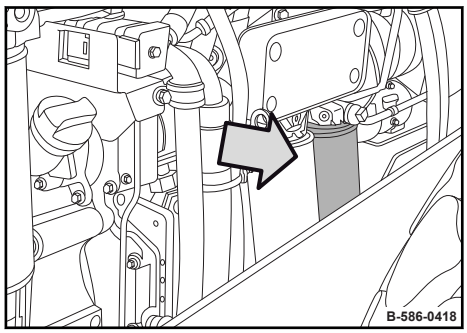


Fig. 143

1. Loosen and unscrew the fuel filter cartridge using an appropriate strap wrench.
2. Remove any dirt from the sealing face of the filter carrier.
3. Slightly oil the rubber seal on the new filter cartridge.
4. Screw the new filter cartridge on by hand until the seal fits closely.
5. Tighten the filter cartridge by another half turn.

8.8.2.3 Replacing the fuel pre-filter

Perform this maintenance work at the latest after one year.

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

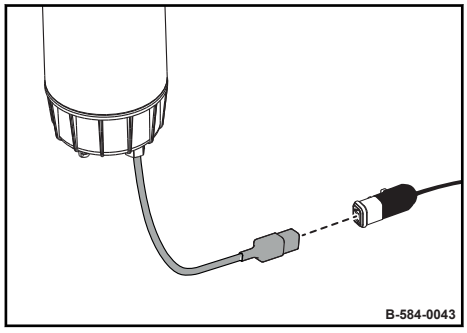


Fig. 144

1. Pull the plug-in connection off the sensor on the water separator.
2. Place a collecting vessel under the drain bore.

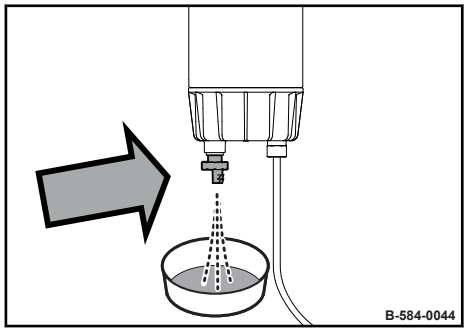


Fig. 145

3. Unscrew the drain plug and collect the escaping fuel.

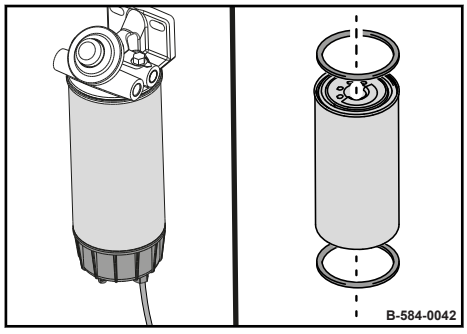


Fig. 146

4. Unscrew and remove the fuel pre-filter using a suitable strap wrench.
5. Unscrew the water separator from the filter cartridge.
6. Apply a thin coat of oil to the rubber seal of the water separator.
7. Screw the water separator to the new fuel pre-filter by hand, until the seal fits closely, then tighten hand-tight.
8. Slightly oil the rubber seal on the new fuel pre-filter.
9. Screw the fuel pre-filter on by hand until the seal contacts; then tighten hand-tight.
10. Push the plug-in connection onto the sensor on the water separator.

11. Dispose of fuel and filter in line with environmental regulations.

8.8.2.4 Bleeding the fuel system

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

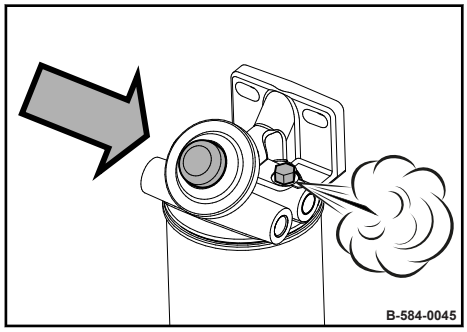


Fig. 147

1. Open the bleeding screw on the fuel pre-filter for one turn.
2. Operate the fuel hand pump manually, until fuel flows out of the bleeding screw without air bubbles.
3. Tighten the bleeding screw.
4. Start the engine and run it for 5 minutes at idle speed.
5. Check the fuel pre-filter for leaks.

8.8.3 Checking the anti-freeze concentration and the condition of the coolant

Protective equipment:

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

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Allow the engine to cool down.

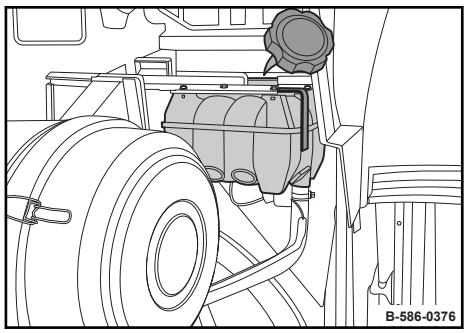


Fig. 148

3. Unscrew the cap and check the anti-freeze concentration with a conventional tester.
4. Check the condition of the coolant.
5. Thoroughly flush the cooling system if the coolant is contaminated by corrosion residues or other suspended matter ↬ *Chapter 8.10.2 'Changing the coolant' on page 202*.
6. Close the cap.

8.8.4 Checking the hydraulic lines

This work must only be performed by an expert / qualified person!

1. Park the machine in secured condition ↳ *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Check all hydraulic lines.

   Hydraulic hoses must be immediately replaced if:

   - the outer layer is damaged down to the inlay (e.g. chafing, cuts, cracks),
   - embrittlement of the outer layer or formation of cracks in the hose material,
   - the hose shows deformation in pressurized and depressurized condition, which do not comply with the genuine shape of the hydraulic hose (e.g. layer separation, formation of blisters, crushed spots, buckling),
   - leaks on hose, socket or fitting,
   - the hydraulic hose has separated from the fitting,
   - fittings are damaged or deformed, whereby the function and strength of the hose - fitting connection is impaired,
   - the fitting shows corrosion that impairs both function and strength,
   - incorrect installation (squeezing, shearing or chafing points),
   - paint covered hydraulic hoses (no detection of identifications or cracks),
   - shelf life and service life exceeded.
3. Replace damaged hydraulic hoses immediately, fasten these properly and avoid chafing.
4. Only operate the machine after it has been repaired.

8.8.5 Servicing the battery; checking the main battery shutoff

8.8.5.1 Battery service

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!

Protective equipment:

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

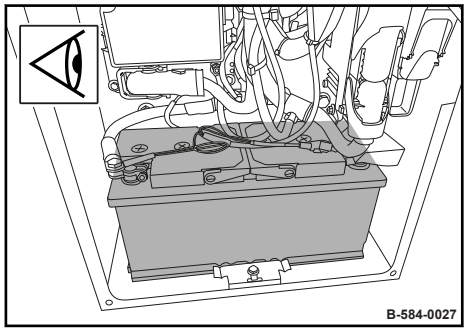


Fig. 149

1. Park the machine safely *Chapter 6.7 ‘Parking the machine in secured condition’ on page 119*.
2. Remove the battery and clean the battery compartment.
3. Clean the outside of the battery.
4. Clean the battery poles and terminals and grease them with pole grease (Vaseline).
5. Install the battery and check the battery fastening.
6. On serviceable batteries check the acid level, if necessary top up to the filling mark with distilled water.

8.8.5.2 Checking the main battery shutoff

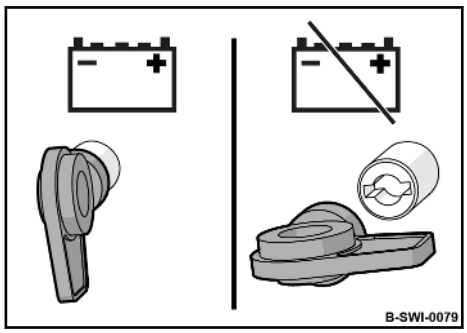


Fig. 150

1. Turn the main battery switch counter-clockwise and pull it out.
2. Check by turning the ignition key, whether the battery is disconnected from the electric system of the machine.

8.8.6 Servicing the air conditioning system

8.8.6.1 Cleaning the condenser

Protective equipment:

- Working clothes
- Protective gloves
- Safety goggles

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Allow the engine to cool down.

The air conditioning condenser is located in front of the radiator.

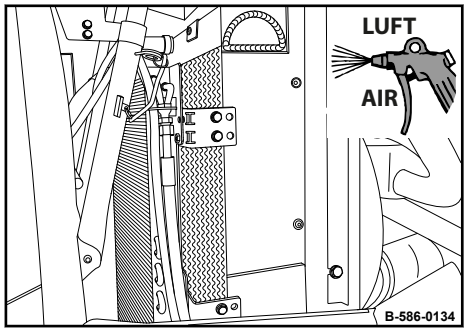


Fig. 151

3. **CAUTION!**
   Danger of eye injuries caused by particles flying around!
   – Wear your personal protective equipment (protective gloves, protective clothing, goggles).

   Clean the condenser fins with compressed air or water.

8.8.6.2 Air conditioning function test

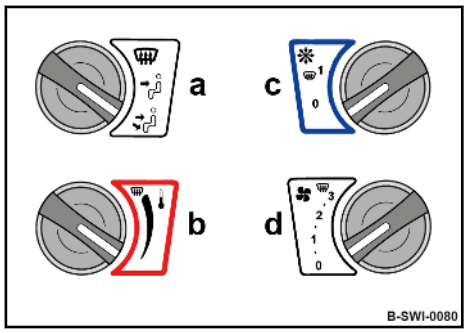


Fig. 152

a Adjust the air distribution
b Regulate the cabin temperature
c Air conditioning on/off
d Fan on/off

1. Start the engine.
2. Switch the fan to the highest stage.
3. Choose the lowest cabin temperature.
4. Switch the air conditioning on.
5. Direct the air flow into the cabin and check, that the flowing out air is considerably cooler.

   ⇨ If the outflowing air is considerably cooler, the air conditioning system is in good working order.

8.8.6.3 Checking the condition of the drier/collector unit

Have the drier/collector unit replaced by our customer service once every year before the operating season.

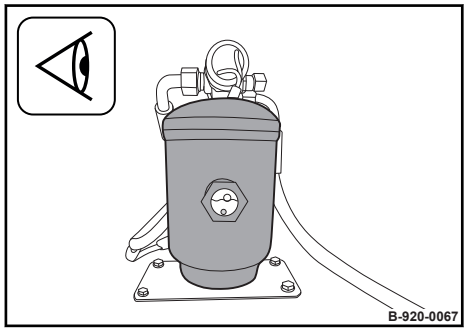


Fig. 153

1. Check the drier/collector unit for mechanical damage or rust.
2. In case of mechanical damage or rust, have the drier/collector unit immediately replaced by our customer service.
3. Start the engine.
4. Switch the air conditioning on.

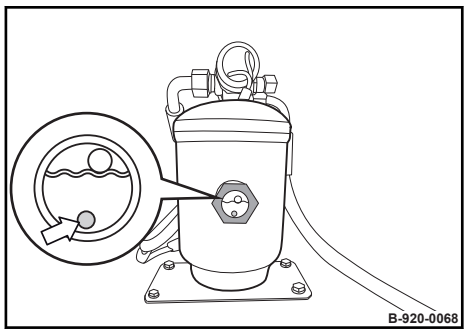


Fig. 154

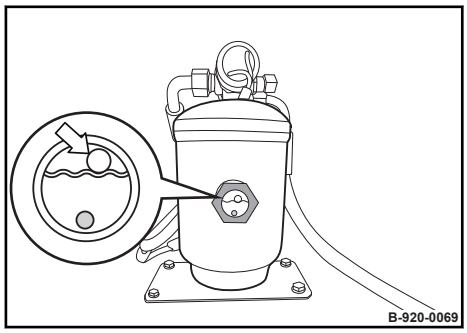


Fig. 155

5. Check the moisture indication pearl inside the inspection glass of the drier/collector unit.

orange	The degree of moisture in the drying agent is correct.
colourless	Moisture level of drying agent too high

6. If the moisture level of the drying agent is too high, have the drier/collector unit replaced by our customer service.

7. Check the white floating ball inside the inspection glass of the drier/collector unit.

Ball floats right on top	The refrigerant level is correct.
Ball floats at bottom	The refrigerant level is not correct.

8. If the refrigerant level is too low, have the air conditioning system inspected by our customer service.

8.9 Every 1000 operating hours

8.9.1 Checking, adjusting the valve clearance

NOTICE!
Danger of engine damage!
We recommend to have this work carried out by trained personnel or our after sales service.

– Before checking the valve clearance let the engine cool down for at least 30 minutes. The engine oil temperature must be below 80 °C (176 °F).

Valve clearance	
Intake valve (I)	0.3 mm (0.012 in)
Exhaust valve (E)	0.5 mm (0.02 in)

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.7 ‘Parking the machine in secured condition’ on page 119*.
2. Allow the engine to cool down.

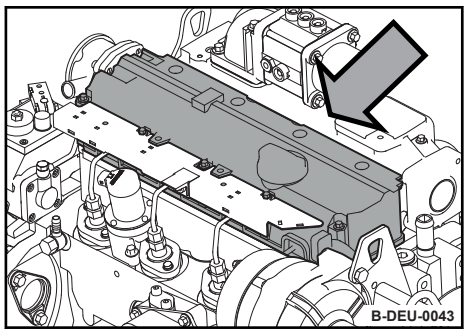


Fig. 156

3. Remove the valve cover.

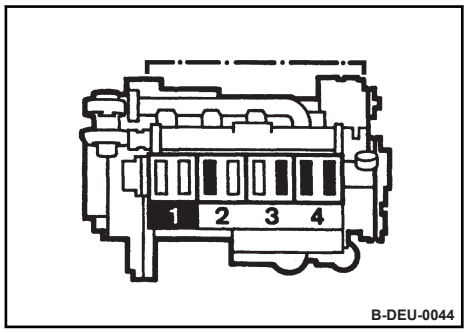


Fig. 157

4. Turn the crankshaft, until the valves on cylinder 1 are overlapping.

⇨ The valves marked black can be checked and adjusted.

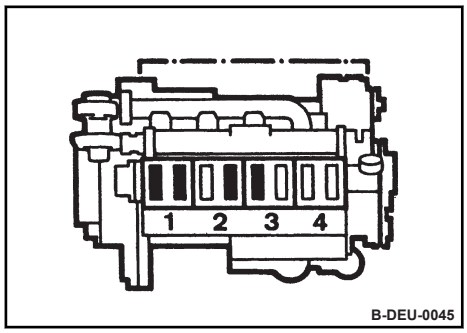


Fig. 158

5. Turn the crankshaft, until the valves on cylinder 4 are overlapping.

⇨ The valves marked black can be checked and adjusted.

Checking the valve clearance

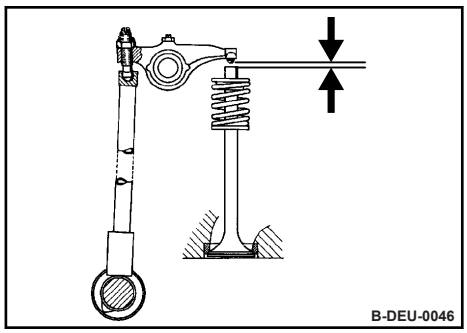


Fig. 159

6. Check valve clearance between rocker arm and valve with a feeler gauge. The feeler gauge must fit through the gap with little resistance.
7. If the gap is too narrow or too wide for the feeler gauge, adjust the valve clearance.

Adjusting the valve clearance

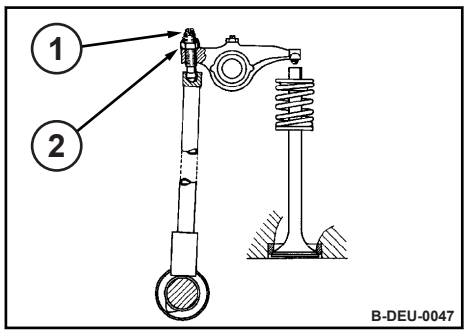


Fig. 160

8. Slightly slacken the counter nut (2).
9. Adjust the setscrew (1) with a screwdriver, until the feeler gauge can be inserted and pulled out with little resistance after retightening the counter nut.
10. Install the cylinder head cover with a new seal.
11. After a short test run, check the engine for leaks.

8.9.2 Replacing the ribbed V-belt

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Allow the engine to cool down.

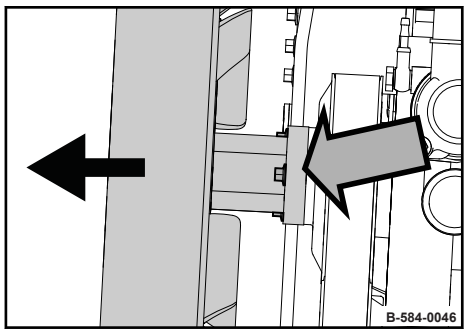


Fig. 161

3. Unscrew fastening screws and push the impeller forward.
4. Remove the V-belt of the air conditioning compressor ↬ *Chapter 8.9.3 'Replacing the V-belt of the air conditioning compressor' on page 186*.

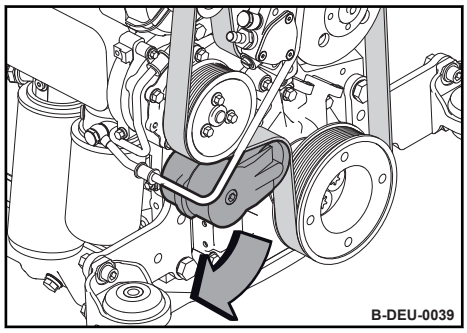


Fig. 162

5. Swing the idler pulley back and remove the ribbed V-belt.
6. Check the condition of tensioning device and belt pulleys (e.g. excessively worn bearings of tensioning device, idler pulley and deflection pulleys as well as the profile wear on the belt pulleys).
7. Replace any damaged parts.
8. Install the new ribbed V-belt.
9. Swing the idler pulley back and align the ribbed V-belt.

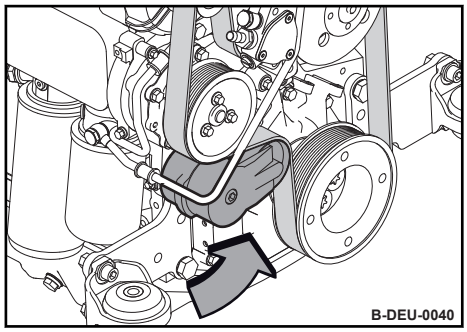


Fig. 163

10. Slowly release the tensioning element.
11. Check the correct seat of the ribbed V-belt on the V-belt pulleys.
12. Assemble the V-belt of the air conditioning compressor ↬ *Chapter 8.9.3 'Replacing the V-belt of the air conditioning compressor' on page 186*.
13. Tighten the impeller again.

8.9.3 Replacing the V-belt of the air conditioning compressor

Perform this maintenance work at the latest after two years.

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

1. Park the machine safely ↳ *Chapter 6.7 ‘Parking the machine in secured condition’ on page 119*.
2. Allow the engine to cool down.
3. Loosen the screws (2, 3, 4) on the compressor.
4. Relieve the V-belt with the tensioning screw (1) and take it off.
5. Install the new V-belt.
6. Turn the tensioning screw (1) to tighten the V-belt to the specified value ↳ *Chapter 8.7.4.2 ‘Checking the V-belt tension’ on page 163*.
7. Tighten screws (2, 3, 4) again.

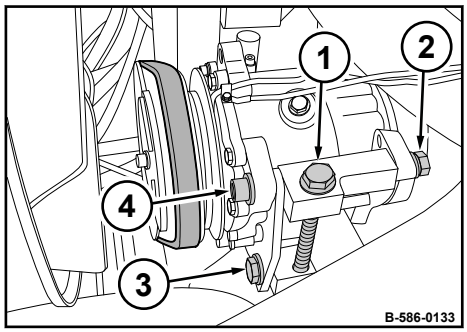


Fig. 164

8.9.4 Checking the engine mounts

Protective equipment:
- Working clothes
- Protective gloves

1. Park the machine in secured condition ↳ *Chapter 6.7 ‘Parking the machine in secured condition’ on page 119*.
2. Allow the engine to cool down.
3. Check air intake and exhaust manifold fastenings for tight fit.
4. Check sockets and clamps between air filter, exhaust turbocharger and charge air line as well as the engine oil lines for tight fit and leaks.
5. Check fastening screws on the engine oil sump and engine mounts for tight fit.

6. Check condition and tight fit of engine pillow blocks.

8.9.5 Replacing the hydraulic oil filter

Perform this maintenance work at the latest after one year.

NOTICE!
Components may get damaged!
- 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 housing again.
- Apart from the normal oil change intervals, the filter element must also be changed after major repairs in the hydraulic system.

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

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Allow the engine to cool down.

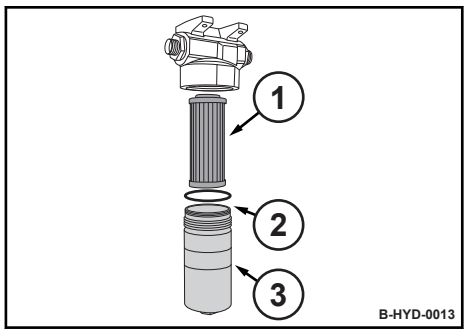


Fig. 165

3. Unscrew the filter housing (3).

NOTICE!

Negligence may cause destruction to the entire hydraulic system!

- 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.
- Do not clean or reuse the filter element.

4. Take out the filter element (1) and clean the filter housing.
5. Clean the thread on the filter housing.
6. Reassemble the filter housing with a new filter element and a new O-ring (2).

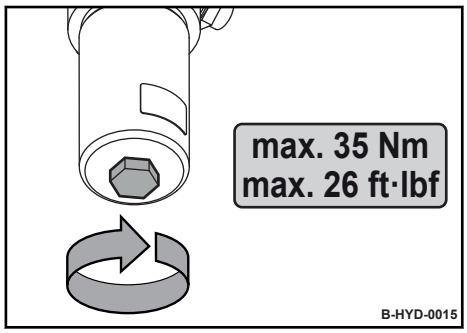


Fig. 166

7. Tighten the filter housing; tightening torque max. 35 Nm (max. 26 ft·lbf).
8. After a short test run check the filter for leaks.
9. Dispose of the oil and filters in line with environmental regulations.

8.9.6 Change the oil in the drive axle

NOTICE!
Components may get damaged!
- Drain gear oil only at operating temperature.
- Use only gear oil of the permitted specification *Chapter 8.3.6 'Gear oil SAE 80W-140' on page 151*.
- Filling quantity: *Chapter 8.4 'List of fuels and lubricants' on page 152*.

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

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.

WARNING!
Danger of burning on hot components!
- Wear your personal protective equipment (protective gloves, protective clothing).
- Avoid touching hot components.

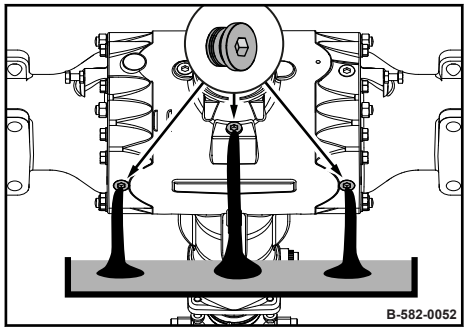


Fig. 167

2. Clean the area around all drain plugs and oil level inspection plugs.
3. Unscrew the drain plugs and oil level inspection plugs and collect any oil running out.
4. Turn the drain plugs tightly back in.

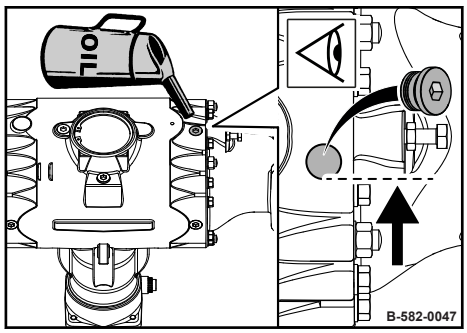


Fig. 168

5. Fill in fresh gear oil through the oil level inspection bore, until it reaches the bottom edge of the bore.

   A second oil level inspection bore is located on the opposite side.
6. After filling with oil, wait until the oil has evenly distributed itself inside the axle, if necessary fill with some more oil.
7. Turn the oil level inspection plugs tightly back in.
8. Dispose of oil in an environmentally friendly way.

8.9.7 Changing the oil in the wheel hubs

NOTICE!
Components may get damaged!
- Drain gear oil only at operating temperature.
- Use only gear oil of the permitted specification ↳ *Chapter 8.3.6 'Gear oil SAE 80W-140' on page 151*.
- Filling quantity: ↳ *Chapter 8.4 'List of fuels and lubricants' on page 152*.

Perform this maintenance work at the latest after one year.

Protective equipment:

- Working clothes
- Protective gloves

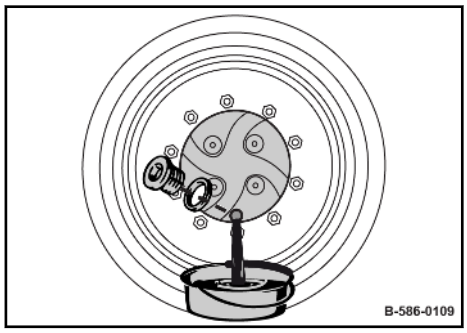


Fig. 169

1. Move the drum, until the oil level inspection plug is in bottom position.
2. Park the machine in secured condition ↬ *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
3. Clean the area around the oil level inspection plug.

WARNING!

Danger of burning on hot components!

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

4. Unscrew the level inspection plug and catch any oil running out.

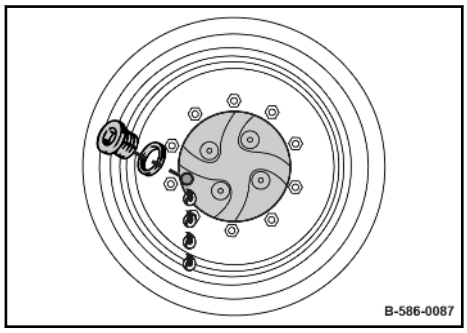


Fig. 170

5. Move the drive wheel, until the oil level inspection plug is in horizontal position.
6. Fill in oil through the inspection bore, until it starts to run out through the level inspection bore.
7. Turn the level inspection plug tightly back in.
8. Change the oil in both wheel hubs.
9. Dispose of oil in an environmentally friendly way.

8.9.8 Checking the rocker bearing clearance

WARNING!
Danger of crushing by the articulating machine!
– Do not step into the articulation area of the machine while the engine is running.

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

1. Drive the machine onto horizontal, level, firm ground.
2. Steer the machine to the left against the stop position.

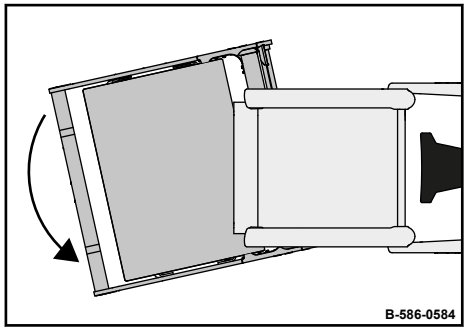


Fig. 171

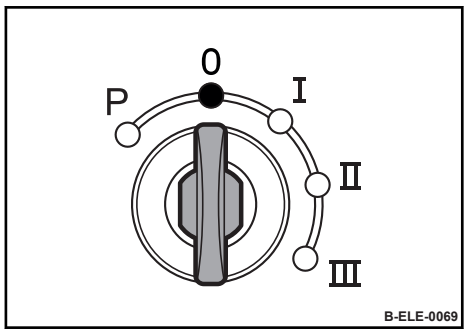


Fig. 172

3. Turn the ignition key to position “0” and pull it out.

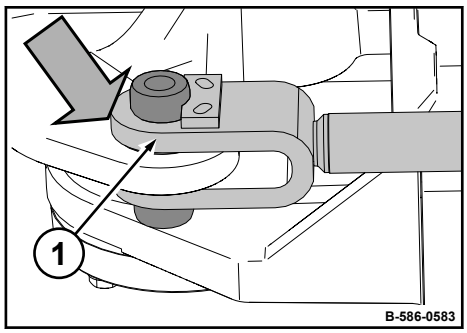


Fig. 173

4. Use a pen to mark the fork head (1) of the steering cylinder.
5. Start the engine *Chapter 6.2 'Starting the engine' on page 107*.

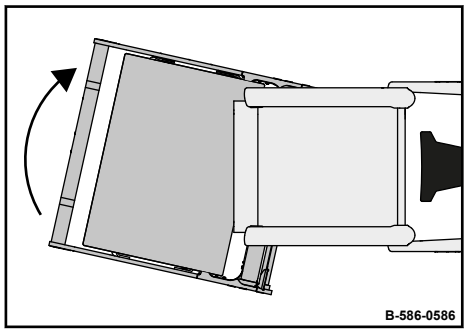


Fig. 174

6. Steer the machine to the right against the stop position.

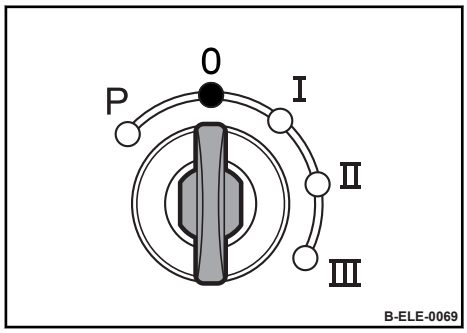


Fig. 175

7. Turn the ignition key to position “0” and pull it out.

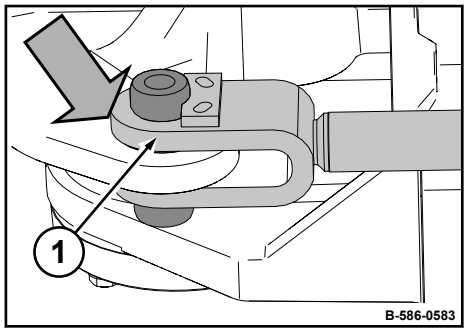


Fig. 176

8. Set a mark again on the fork head of the steering cylinder (1).

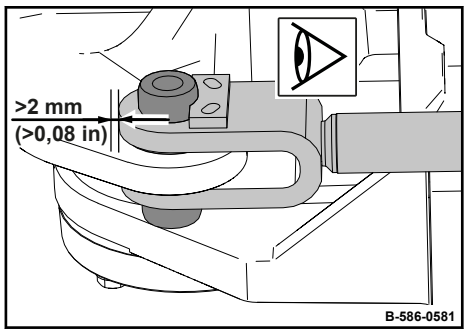


Fig. 177

9. Measure the distance between the marks.
10. As soon as the distance is >2 mm (>0.08 in), have the rocker bearing replaced by our customer service.

8.9.9 Change the oil in the exciter housing

NOTICE!
Components may get damaged!
- Drain gear oil only at operating temperature.
- Use only gear oil of the permitted specification ↳ *Chapter 8.3.5 'Gear oil SAE 75W-90' on page 151*.
- Filling quantity: ↳ *Chapter 8.4 'List of fuels and lubricants' on page 152*.

Perform this maintenance work at the latest after one year.

Protective equipment:

- Working clothes
- Protective gloves

1. Before changing the oil level run the machine warm for about 1/2 hour with vibration.
2. Move the drum, until the drain plug is in bottom position.
3. Park the machine in secured condition ↳ *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
4. Clean the area around the drain plug.

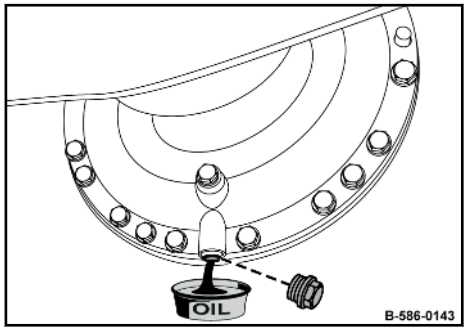


Fig. 178

WARNING!

Danger of burning on hot components!

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

5. Unscrew the drain plug and catch any oil running out.
6. Turn the drain plug tightly back in.
7. Clean the area around the oil level inspection plug.
8. Unscrew the oil level inspection plug.

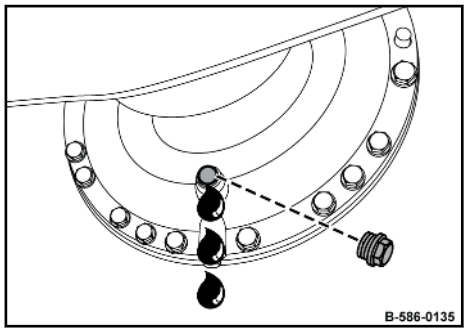


Fig. 179

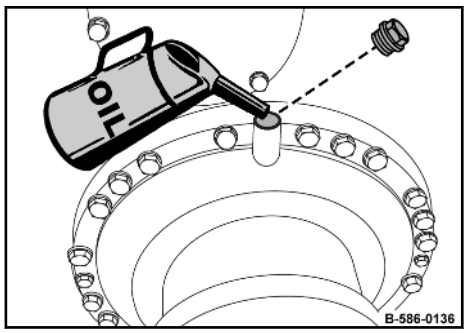


Fig. 180

9. Unscrew the oil filler plug and fill in new oil through the oil filler bore, until oil starts to drip out through the inspection bore.
10. Retighten the filler and level inspection plugs.
11. Change the oil on both sides.
12. Dispose of oil in an environmentally friendly way.

8.9.10 Retightening the fastening of the axle on the frame

Protective equipment:
- Working clothes
- Protective gloves

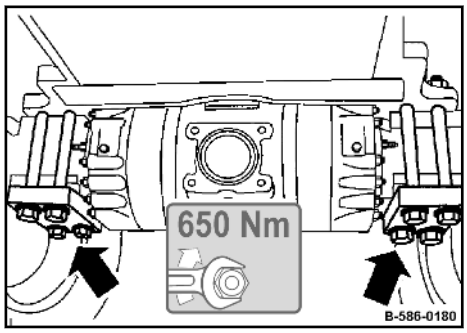


Fig. 181

1. Check all fastening nuts on axle mounting bolts for tight fit, retighten if necessary, tightening torque: 650 Nm (480 ft·lbf).

8.9.11 Retightening the wheel nuts

Protective equipment:
- Working clothes
- Protective gloves

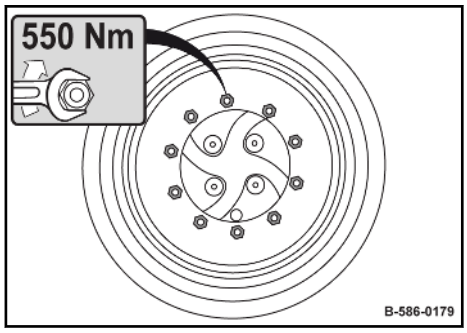


Fig. 182

1. Tighten the wheel nuts cross-wise, tightening torque: 550 Nm (405 ft·lbf).

8.9.12 Checking the ROPS/FOPS

If the cabin is assembled, ROPS/ FOPS is already integrated as part of the cabin.

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.

Unusual movements and noises (vibrations) during operation are signs for damage or loosened fastening elements.

1. Inspect the cabin, especially the ROPS/ FOPS structure, for cracks, corrosion, damage and missing fastening parts.
2. Check the fastening screws for the cabin (ROPS/FOPS) to the driver's stand for tight fit.
3. Check the rubber buffers of the operator's platform suspension for condition and tight fit.
4. Check the condition and fastening of the seat belts.

8.9.13 Checking the travel lever control

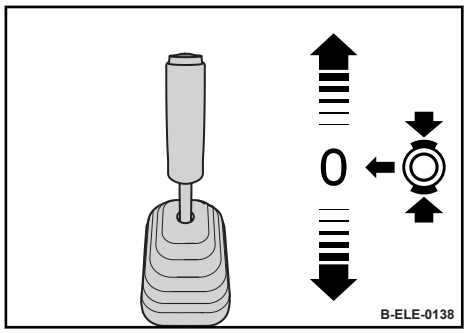


Fig. 183

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Move the travel lever forwards, backwards and to parking brake position. Check the function, for ease of movement, clearance and damage.
3. In case of malfunction, determine the cause and have the relevant components replaced by our customer service.

   Replace broken travel lever only completely.
4. Only operate the machine after it has been repaired.

8.9.14 Cleaning the circulation air filter of the heating

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

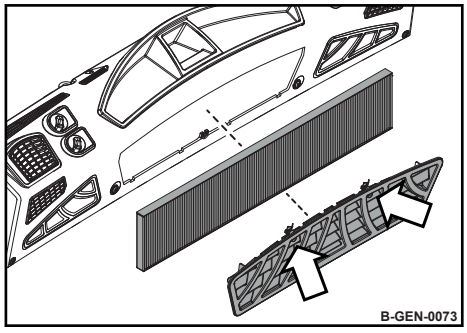


Fig. 184

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Loosen the locks and remove the cover.
3. Take out the filter.
4. Clean the filter, replace if necessary.
5. Insert the filter and reinstall the cover.

8.10 Every 2000 operating hours

8.10.1 Changing the hydraulic oil

Perform this maintenance work at the latest after two years.

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

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

Do not start the engine after draining off the hydraulic oil.

Do not use any detergents to clean the system.

Use only lint-free cleaning cloths for cleaning.

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

NOTICE!

Risk of damage!

- Perform the oil change when the hydraulic oil is warm.
- Use only hydraulic oil of the permitted specification ↳ *Chapter 8.3.4 ‘Hydraulic oil’ on page 150*.
- Filling quantity: ↳ *Chapter 8.4 ‘List of fuels and lubricants’ on page 152*.

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.

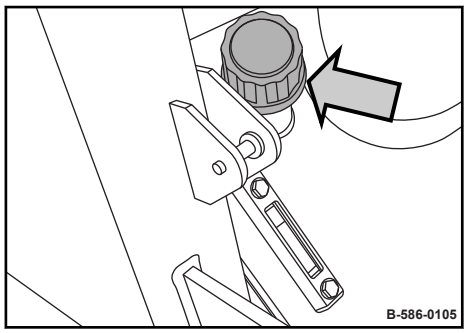


Fig. 185

2. Clean the area around the filling port and remove the cap.

WARNING!

Danger of burning on hot components!

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

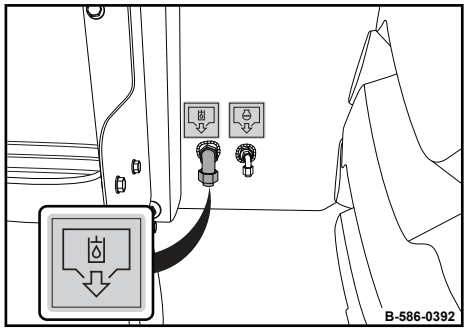


Fig. 186

3. Unscrew the plug.
4. Drain off and collect all hydraulic oil.
5. 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.

6. Fill in new hydraulic oil.

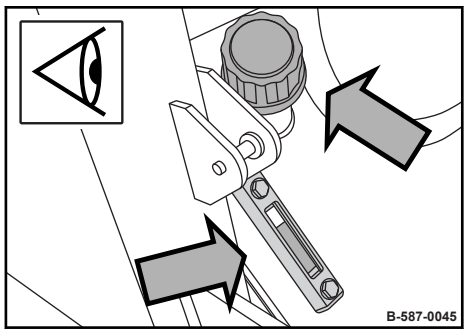


Fig. 187

7. Check the oil level in the inspection glass.

Normal level	Approx. 3 cm (1.2 in) below the top edge of the sight glass
Minimum level	Middle of inspection glass

8.

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

Close the tank with a new cap.

9. Dispose of oil in line with environmental regulations.

8.10.2 Changing the coolant

Perform this maintenance work at the latest after two years.

Do not start the engine after draining off the coolant.

In case of lubrication oil entering into the cooling system or if a suspicious turbidity caused by corrosion residues or other suspended matter occurs, the coolant must be drained off and the complete cooling system needs to be cleaned.

Oil can damage the sealing materials used in the cooling system.

If oil has entered, add a cleansing agent in order to remove any residues from the system. Follow the instructions of the manufacturer! If in doubt, consult your Customer Service or the engine manufacturer.

When changing the coolant without any signs of contamination, cleaning the cooling system is not necessary.

NOTICE!

Danger of engine damage!

- Use only coolant of the permitted specification *Chapter 8.3.3 ‘Coolant’ on page 146*.
- Do not mix different coolants and additives of any other kind.
- Filling quantity: *Chapter 8.4 ‘List of fuels and lubricants’ on page 152*

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.7 ‘Parking the machine in secured condition’ on page 119*.
2. Allow the engine to cool down.
3. Unscrew the cap from the compensation tank.

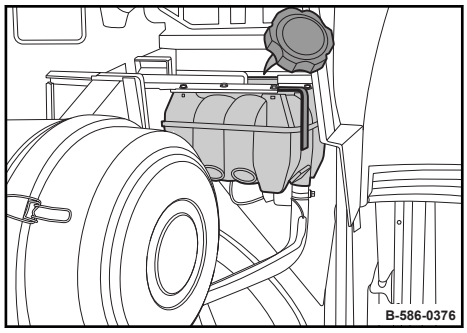


Fig. 188

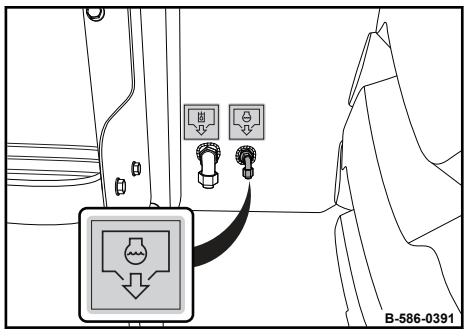


Fig. 189

4. Unscrew the plug.
5. Drain off and collect all coolant.
6. Turn the plug tightly back in.
7. Check the condition of the coolant.
8. Thoroughly flush the cooling system if the coolant is contaminated by corrosion residues or other suspended matter.
9. Remove the thermostat.
10. Fill with clean water.
11. Start the engine and run to operating temperature.
12. Allow the engine to cool down to approx. 50 °C (122 °F).
13. Drain off all water.
14. If using a cleaning agent repeat the flushing process twice with clear water.
15. Reinstall the thermostat.

NOTICE!

Danger of engine damage!

The anti-freeze concentration (additive) must be at least 35 Vol% and maximum 45 Vol%.

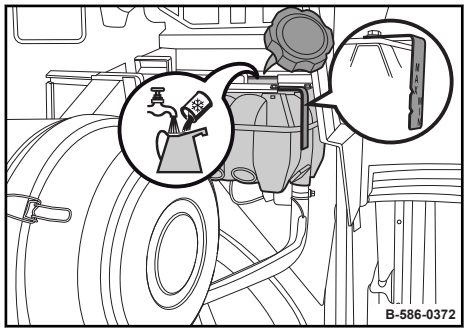


Fig. 190

16. Fill up coolant.
17. Close the cap.

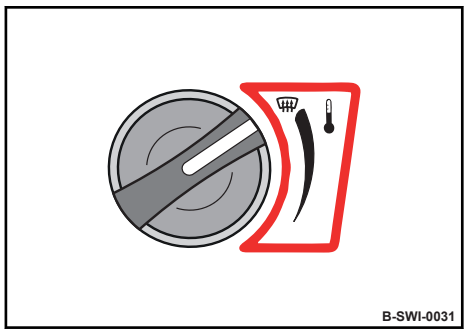


Fig. 191

18. Set maximum cabin temperature.

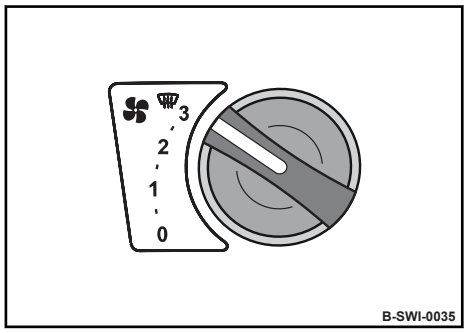


Fig. 192

19. Set maximum fan speed.
20. Start the engine ↬ *Chapter 6.2 ‘Starting the engine’ on page 107*.
21. Run the machine with idle speed until operating temperature has been reached and the thermostat opens.
22. As soon as the thermostat has opened, run the engine for approx. 1 minute at high speed.
23. Shut down the engine.
24. Allow the engine to cool down.
25. Check the coolant level again when the engine has cooled down; top up if necessary.
26. Dispose of coolant in line with environmental regulations.

8.11 Every 3000 operating hours

8.11.1 Check the injection valves

This work must only be performed by authorized service personnel.

8.12 As required

8.12.1 Air filter maintenance

NOTICE!
Danger of engine damage!

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

We generally recommend to renew the air filter. A new filter element is far less expensive than a possible engine damage.

Protective equipment:

- Working clothes
- Protective gloves
- Fine dust mask
- Safety goggles

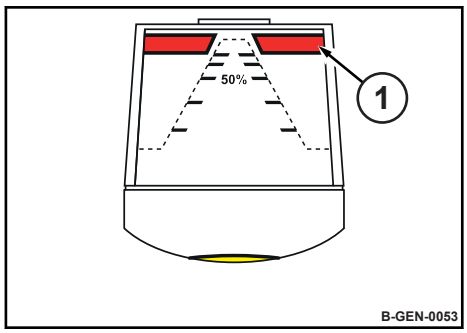


Fig. 193

Carry out the air filter maintenance when the yellow pin of the maintenance indicator has reached the red area (1), but after one year at the latest.

1. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Allow the engine to cool down.

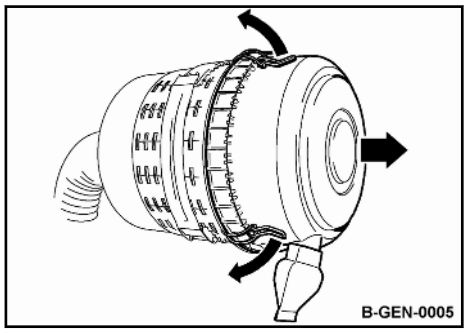


Fig. 194

3. Loosen both locking hooks on the housing cover and take the cover off.
4. Clean housing cover and dust discharge valve.

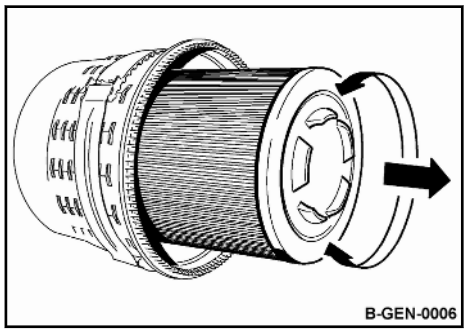


Fig. 195

5. Pull out the air filter with light turning movements.

CAUTION!
Danger of eye injuries caused by particles flying around!
– Wear your personal protective equipment (protective gloves, protective clothing, goggles).

CAUTION!
Danger due to fine dust pollution!
– Wear a fine dust mask.

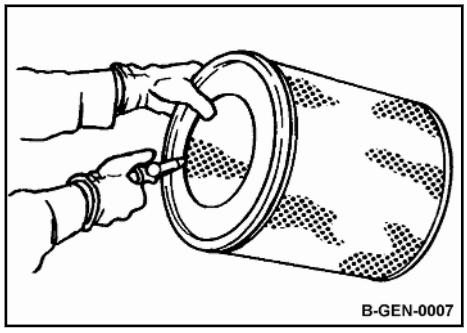


Fig. 196

6. Blow the air filter out with dry compressed air (max. 2.1 bar (30 psi)) from inside to outside by moving the gun up and down inside the element, until it is free of dust.

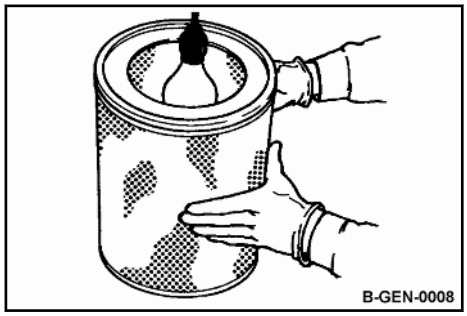


Fig. 197

7. Examine the air filter with a torch for cracks and holes in the paper bellows.
8. In case of damage replace the air filter and the safety element.

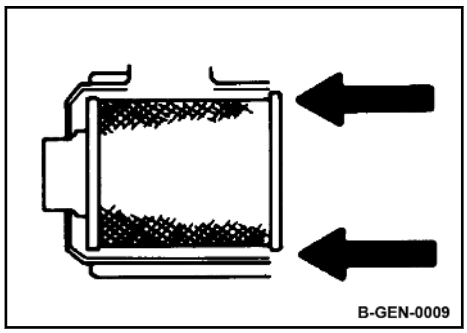


Fig. 198

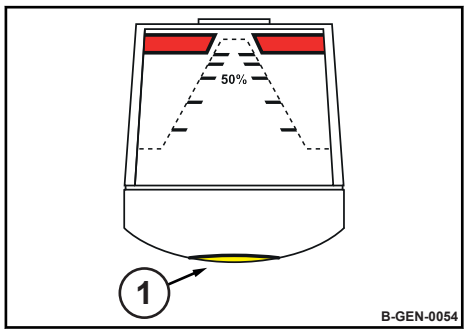


Fig. 199

9. Slide the air filter carefully into the housing.

NOTICE!
Danger of engine damage!
- The dust discharge valve must point vertically downwards.
- Make sure that the cover locks engage correctly.

10. Reassemble the housing cover.
11. Press the reset button (1) for the yellow piston on the maintenance indicator.

8.12.1.1 Replacing the safety element

NOTICE!
Danger of engine damage!
The safety element must not be cleaned and should not be used again after it has been removed.

The safety element must be replaced:
- if the air filter is damaged.
- at the latest after one year.
- if the air filter warning light comes on again after the air filter has been cleaned.

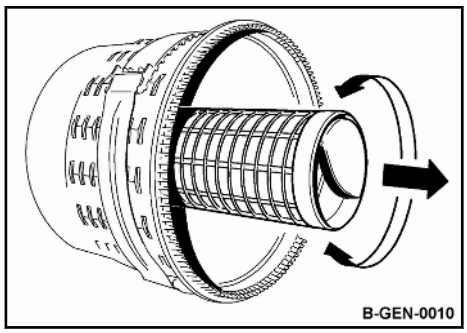


Fig. 200

1. Remove the housing cover and pull the air filter element off.
2. Pull the safety element out by turning it lightly.
3. Push in a new safety element.
4. Insert the air filter and reassemble the housing cover.

8.12.2 Checking and cleaning the water separator

The service intervals for the water separator depend on the water content in the fuel and can therefore not be determined precisely.

After taking the engine into operation you should check for signs of water and dirt initially every day.

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

1. Park the machine safely *Chapter 6.7 ‘Parking the machine in secured condition’ on page 119*.

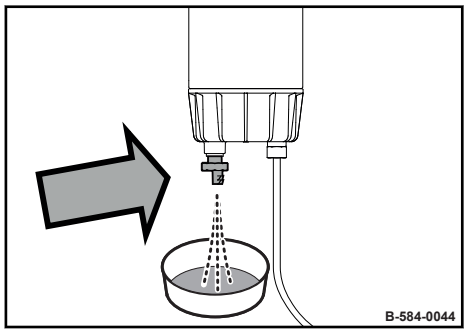


Fig. 201

2. Loosen the drain plug and drain the fluid until pure diesel fuel starts to run out.
3. Collect the escaping fluid.
4. Screw the drain plug back in tightly. Check for leaks; if necessary, use a new seal ring.

   ⇨ Once the water separator is empty, the warning light for water in fuel must go out.

8.12.3 Adjusting the scrapers

Smooth drum scraper

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

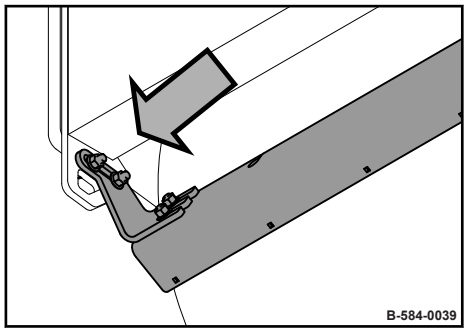


Fig. 202

1. Check the condition of the scraper plate.
2. Replace worn scraper plate.
3. Check the scraper setting.
   ⇨ The distance to the drum should be approx. 1 mm (0.04 in).
4. To readjust the scrapers, loosen the fastening screws on both sides and push the scraper to the drum until the correct distance is reached.
5. Fasten the fastening screws again.

Scraper on smooth drum with padfoot shell

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

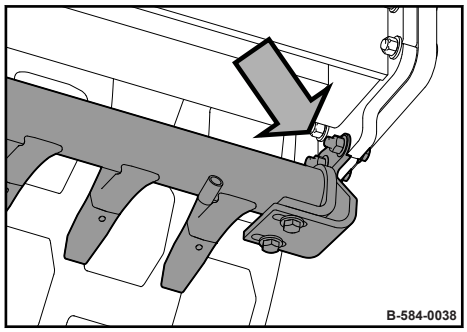


Fig. 203

1. Check the condition of the scraper teeth.
2. Replace worn teeth.
3. Check the scraper setting.
   ⇨ The distance to the drum should be approx. 25 mm (1.0 in).
4. To readjust the scrapers, loosen the fastening screws on both sides and swivel the scraper until the correct distance is reached.
5. Fasten the fastening screws again.

8.12.4 Cleaning the machine

Clean the machine thoroughly at least once a week.

If necessary, clean the machine daily for example when used on highly cohesive soils or cement.

Do not climb on the machine to clean it.



WARNING!
Danger of injury caused by falling off the platform!
– Always ensure safe standing.

Protective equipment:

- Working clothes
- Protective gloves
- Safety goggles

1. Park the machine in secured condition ↳ *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
2. Allow the engine to cool down.
3. When cleaning with a high pressure cleaner, do not subject electrical parts and insulation material to the direct jet of water, or cover them beforehand.
4. If necessary, clean the windows using a telescopic rod.

8.12.5 Filling the windscreen washer tank

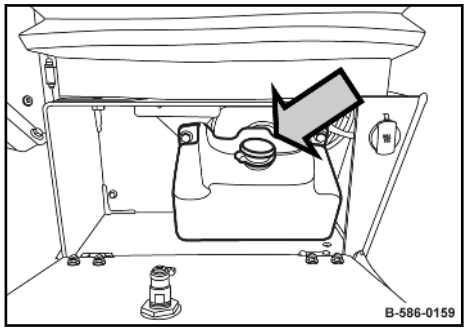


Fig. 204

1. Open the flap under the driver's seat on the left hand side.
2. Check the fluid level in the provision container, top up if necessary.
3. If there is a risk of frost, you may also fill the provision container with an anti-freeze mixture.

8.12.6 Drain the fuel tank sludge

Protective equipment:

- Working clothes
- Protective gloves

1. Park the machine in secured condition ↬ *Chapter 6.7 'Parking the machine in secured condition' on page 119*.

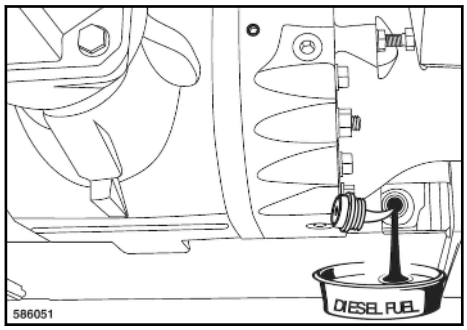


Fig. 205

2. Unscrew the drain plug and drain off and catch approx. 5 litres of fuel.
3. Turn the drain plug tightly back in.
4. Dispose of fuel environmentally.

8.12.7 Retightening the padfoot shell

Protective equipment:

- Working clothes
- Safety shoes
- Protective gloves

After the installation of the padfoot shell segments, all fastening screws must be retightened.

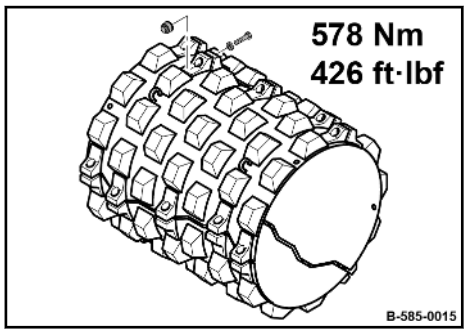


Fig. 206

1. Run an approx. two minute test drive with vibration.
2. Park the machine safely *Chapter 6.7 'Parking the machine in secured condition' on page 119*.
3. Retighten all fastening screws.
4. After approx. 60 minutes work, retighten all fastening screws again.

8.12.8 Measures prior to extended shut-down period

8.12.8.1 Measures before shutting down

If the machine is shut down for a longer period of time, e.g. winter season, the following work must be carried out:

1. Clean the machine thoroughly.
2. After shutting down store the machine under cover in a dry and well ventilated room.
3. Grease the bare piston rods of all hydraulic cylinders well and pull them in as far as possible.
4. Spray a thin oil film onto to all lever joints and bearing points without lubrication.
5. Repair damaged paint; preserve bare areas thoroughly with anti-corrosive agent.
6. Clean the water separator.

7. Fill the fuel tank with diesel fuel to prevent the formation of condensation water in the tank.
8. Change engine oil and oil filter if the oil has been changed more than 300 hours ago, or if the oil is older than 12 months.
9. Check the anti-freeze concentration and the coolant level.
10. Disconnect the ground strap from the battery (this avoids self-discharge caused by closed-circuit consuming devices).

8.12.8.2 Battery service during prolonged machine downtimes



WARNING!

Danger of injury caused by exploding gas mixture!

- Remove the plugs before starting to recharge the battery.
- Ensure adequate ventilation.
- Smoking and open fire are prohibited!
- Do not lay any tools or other metal objects on the battery.
- Do not wear jewellery (watch, bracelets, etc.) when working on the battery.
- Wear your personal protective equipment (protective gloves, protective clothing, goggles).

Protective equipment:

- Working clothes
- Protective gloves
- Safety goggles

1. Switch off all consuming devices (e.g. ignition, light).
2. Measure the open-circuit voltage of the battery at regular intervals (at least 1x per month).
   ⇨ Reference values: 12.6 V = fully charged; 12.3 V = discharged to 50%.
3. Recharge the battery immediately after an open-circuit voltage of 12.25 V or less is reached. Do not perform fast charging.
   ⇨ The open-circuit voltage of the battery occurs approx. 10 hours after the last charging process or one hour after the last discharge.
4. Switch off the charging current before removing the charging clamps.
5. After each charging process allow the battery to rest for one hour before taking it into service.
6. For standstill periods of more than one month you should always disconnect the battery. Do not forget to perform regular open-circuit voltage measurements.

8.12.8.3 Measures before restarting

1. Replace the fuel filter.
2. Replace the air filter.
3. Change engine oil and oil filter.
4. Check the coolant level.

5. Check the charge condition of the batteries, recharge if necessary. Check the battery fluid level before and after charging.
6. Connect the ground straps to the batteries.
7. Check the function of the electric system.
8. Check cables, hoses and lines for cracks and leaks.
9. Check the service life of hydraulic hoses and replace if necessary.
10. Start the engine and run it for 15 to 30 minutes with idle speed.
11. While the engine is running keep an eye on the gauges for engine oil pressure and coolant temperature.
12. Check the oil levels.
13. Check the function of electric system, steering and brakes.
14. Clean the machine thoroughly.
15. Vent and refill the air conditioning system.

9 Troubleshooting

9.1 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.

9.2 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.

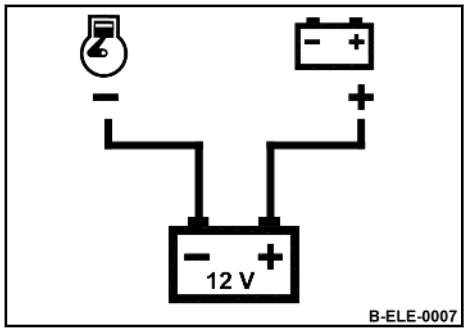


Fig. 207

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 *Chapter 6.2 'Starting the engine' on page 107*.

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.

9.3 Fuse assignment

9.3.1 Notes on safety

WARNING!
Danger of injury by fire in the machine!
– Do not use fuses with higher ampere ratings and do not bridge fuses.

9.3.2 Central electrics

The power board for central electrics is located in the battery compartment.

1. Release the clamps and take off the cover.

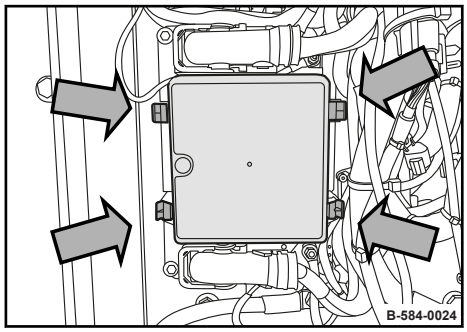


Fig. 208

Fuse	Amperage	Designation
F05	20 A	12-V socket
F13	10 A	Starter switch
F18	15 A	Working head lights, front
F22	15 A	Working head lights, rear
F23	15 A	Warning horn
F24	10 A	Instrument cluster
F31	10 A	Cabin fan
F39	50 A	Main fuse for cabin
F40	30 A	Heating, air conditioning

Fuse	Amperage	Designation
F41	10 A	Flashing beacon
F67	20 A	Control (potential 30)
F68	15 A	Reserve (potential 30)
F91	5 A	Sensors
F103	15 A	Reserve (potential 15)
F109	10 A	Windscreen wiper, washer
F122	10 A	Engine control unit
F124	25 A	Fuel pre-heating
F148	2 A	Control (potential 15)
F153	15 A	Reserve (potential 15)
F157	30 A	Starter
F169	5 A	Start current
F180	5 A	Sensors
F182	5 A	Sensors
F243	7.5 A	BOMAG TELEMATIC (potential 30)
F244	5 A	BOMAG TELEMATIC (potential 15)
F375	10 A	Interface diagnostics (potential 30)
F376	10 A	Interface diagnostics (potential 15)
F387	10 A	Interface for measuring technology (potential 30)
F388	10 A	Interface for measuring technology (potential 15)
F415	5 A	Acceleration transducer

Checking fuses

The power board for central electrics has a test device (Fuse Test) that enables continuity testing for flat fuses.

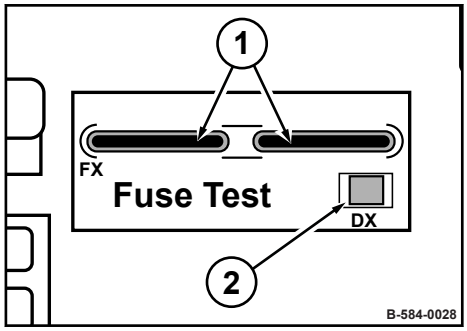


Fig. 209

1. Insert the two plugs of the fuse into the recesses (1).

⇨ If the fuse is OK, the LED (2) lights up.

9.3.3 Traffic lights

The power board for the traffic lights is located in the battery compartment.

Optional equipment

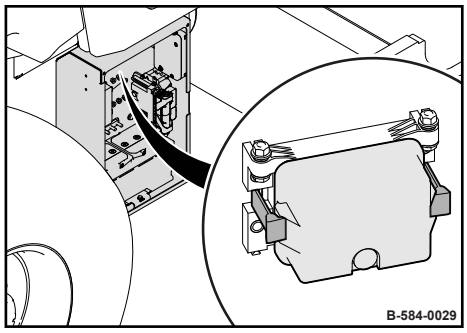


Fig. 210

1. Release the clamps and take off the cover.

Fuse	Amperage	Designation
F07	15 A	Hazard light
F09	5 A	Parking and tail light, left
F10	5 A	Parking and tail light, right
F66	15 A	Head lights, front
F70	5 A	Direction indicators
F82	10 A	Parking and tail light
F85	10 A	Head lights, front

9.3.4 Main fuses

The main fuse box is located in the battery compartment.

1. Open and remove the cover.

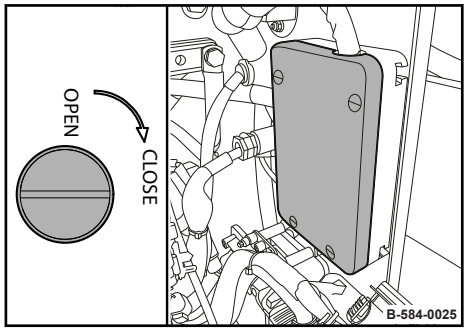


Fig. 211

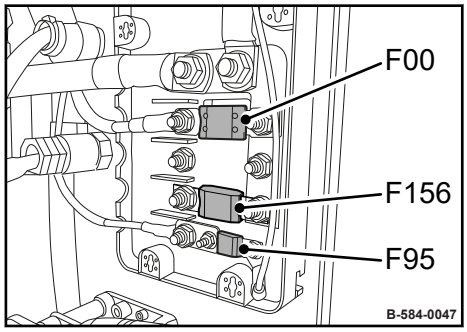


Fig. 212

Fuse	Amperage	Designation
F00	100 A	Main fuse
F95	23 A	Engine control unit
F156	60 A	Traffic lights

9.3.5 Control console cabin

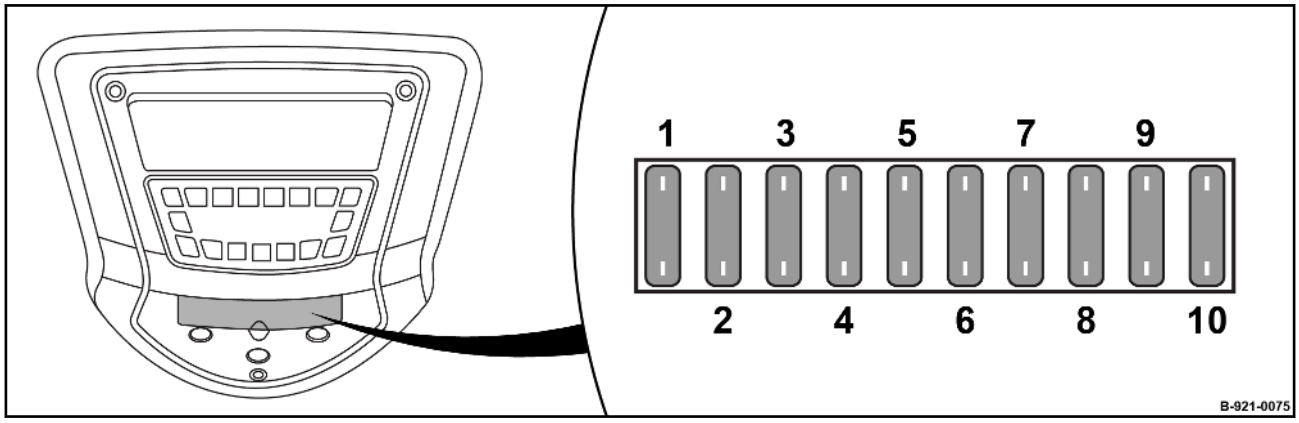


Fig. 213

Position	Fuse	Amperage	Designation
1	F17	5 A	Radio
2	F264	10 A	BCM
3	F271	10 A	BCM net
4	F150	5 A	GPS
5	F266	10 A	Radio/Tachograph
6	F143	20 A	Rear windscreen heating
7	F28	15 A	Rear windscreen wiper
8	F27	15 A	Front windscreen wiper
9	F279	15 A	Spare
10	F272	5 A	Control console cabin

9.4 Fault code display

If the warning buzzer sounds and the central warning light lights up or flashes, read out the fault code and inform our Customer Service Department.

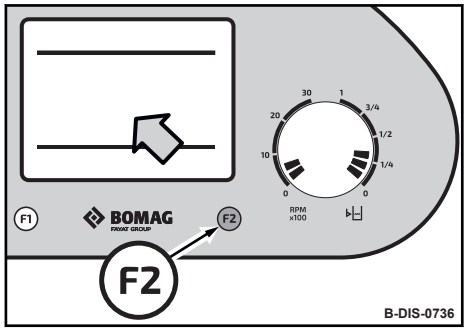


Fig. 214

1. Press the *[F2]* button on the instrument cluster until the *'Fehlercode-Anzeige'* appears.

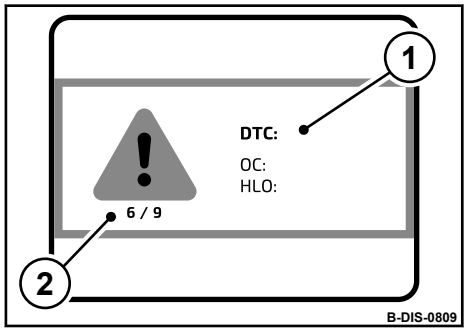


Fig. 215

2. Read out and note the fault code (1).
3. If necessary, read out and note further fault codes.
   ⇨ If there are other incoming fault codes, these will also be shown in the INFO 2 display field (2).

   In this case, the display will automatically switch to the next fault code after approx. 4 seconds.
4. Inform our Customer Service Department.

9.5 Engine faults

Fault	Possible cause	Remedy
Engine does not start or starts poorly	Fuel tank empty	Refuel, bleed the fuel system
	Temperature below starting limit	Check
	Cold starting facility	Check, replace if necessary
	Engine oil with wrong SAE viscosity class	Change the engine oil
	The fuel quality does not meet the requirements	Change the fuel
	Battery defective or not charged	Check
	Cable to starter loose or oxidized	Check cable connection
	Starter defective or pinion does not engage	Check starter
	Air filter clogged / exhaust turbocharger defective	Check, replace if necessary
	Air in the fuel system	Bleed the fuel system
	Compression pressure too low	Check
	Exhaust gas counter pressure too high	Check
	Injection line leaking	Check
Engine does not start and diagnostic lamp is flashing	Engine electronics prevent starting	Check fault by fault code, repair as necessary
Engine starts, but runs irregularly or misfires	Exhaust gas counter pressure too high	Check
	Compression pressure too low	Check
	Cold starting facility	Check, replace if necessary

Fault	Possible cause	Remedy
	Air in the fuel system	Bleed the fuel system
	Fuel pre-cleaner soiled	Check, clean the water separator, replace the fuel pre-cleaner
	The fuel quality does not meet the requirements	Change the fuel
	Injector defective	Replace
	Injection line leaking	Check
Speed changes are possible and central warning lamp lights	Engine electronics detected a system fault and activates a substitute speed	Check fault by fault code, repair as necessary
The engine overheats, the coolant temperature warning lamp lights	Ventilation line to the coolant compensation tank clogged	Clean
	Engine oil with wrong SAE viscosity class	Change the engine oil
	Engine oil cooler defective	Check, replace if necessary
	Engine oil filter dirty	Replace
	Engine oil level too low or too high	Check, top up or drain off as necessary
	Injector defective	Replace
	Radiator soiled	Clean
	Coolant pump defective (V-belt torn or loose)	Check, whether torn or loose
	Lack of coolant	Check the coolant level, top up if necessary.
	Resistance in cooling system too high / flow quantity too low	Check the cooling system
	Charge air pipe leaking	Check
	Intercooler soiled	Clean

Fault	Possible cause	Remedy
	Air filter clogged / exhaust turbocharger defective	Check, replace if necessary
	Fan defective / V-belt torn or loose	Check fan / V-belt, replace if necessary
	Exhaust gas counter pressure too high	Check
Insufficient engine power	Engine oil level too high	Check, top up or drain off as necessary
	Fuel intake temperature too high	Check the system
	The fuel quality does not meet the requirements	Change the fuel
	Air filter clogged / exhaust turbocharger defective	Check, replace if necessary
	Fan defective / V-belt torn or loose	Check fan / V-belt, replace if necessary
	Charge air pipe leaking	Check
	Intercooler soiled	Clean
	Resistance in cooling system too high / flow quantity too low	Check the cooling system
	Injection line leaking	Check
	Injector defective	Replace
Insufficient engine power and diagnostics lamp lights	Engine electronics reduces the power	Check fault by fault code, repair as necessary
Engine does not work with all cylinders	Injection line leaking	Check
	Injection valve defective	Check, replace if necessary
	Charge air pipe leaking	Check
	Engine oil level too high	Check, drain off if necessary

Troubleshooting – Engine faults

Fault	Possible cause	Remedy
Engine has too low or no oil pressure	Engine oil level too low	Check, top up or drain off as necessary
	Engine oil with wrong SAE viscosity class	Change the engine oil
Engine has excessive oil consumption	Engine oil level too high	Check, drain off if necessary
	Crankcase ventilation	Check, replace if necessary
Blue engine exhaust smoke	Engine oil level too high	Check, drain off if necessary
White engine exhaust smoke	Temperature below starting limit	Check
	Cold starting facility	Check, replace if necessary
	The fuel quality does not meet the requirements	Change the fuel
	Injector defective	Check, replace if necessary
Black engine exhaust smoke	Air filter clogged / exhaust turbocharger defective	Check, replace if necessary
	Charge air pipe leaking	Check
	Injector defective	Replace

9.6 Telematic

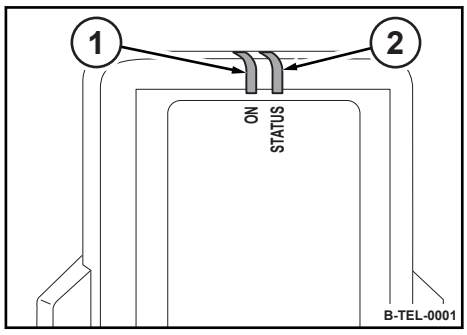


Fig. 216

The ON LED (1) indicates the status of the voltage supply.

The STATUS LED (2) indicates the connection status.

The different colours of the STATUS LED symbolise different levels of urgency, from 5 (low priority) to 1 (high priority). If there are several errors at the same time, the one with the highest priority is displayed.

During normal operation, the STATUS LED flashes from time to time. However, this is not an error condition, but symbolises data traffic.

ON LED		
Colour	**Status**	**Meaning**
-	Off	System switched off.
Green	On	System switched on.
red	On	System switched on, voltage beyond the tolerance. Battery voltage too low.
Green	Flashing	System in diagnostics mode or update mode.

STATUS LED		
Colour	**Status / priority**	**Meaning**
-	Off / -	System switched off.
Green	On / -	Connection to the server.
Blue	On / 1	No connection to the server.
Orange	On / 2	Faulty connection to the Telematic CAN bus 1.

STATUS LED		
Colour	**Status / priority**	**Meaning**
red	On / 3	Faulty connection to the Telematic CAN bus 2.
Magenta	On / 4	No location found or no antenna connected.

10 Disposal

10.1 Final shut-down of machine

After the machine has reached the end of its service life, the individual components of the machine must be disposed of properly.

Observe national regulations!

Carry out the following work and have the machine dismantled by a state-approved recycling company.



WARNING!

Health hazard caused by fuels and lubricants!

– Safety regulations and environmental protection regulations must be followed when handling fuels and lubricants ↬ *Chapter 3.4 'Handling fuels and lubricants' on page 33*.

Protective equipment:

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

1. Remove the batteries.
2. Empty the fuel tank.
3. Drain the hydraulic oil tank.
4. Drain the coolant from the cooling system and engine.
5. Drain off engine oil.
6. Drain off gear oil.

11 List of special tools

Belt tension tester
BOMAG No. 079 947 09

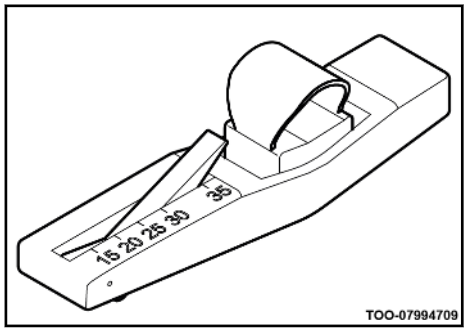


Fig.

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