

TAKEUCHI

TW9

Wheel Loader



Operating Instructions

⚠ WARNING

These operating instructions are read and understand, otherwise injury or death is caused.

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From vehicle ID No: **TL08020438>**

Translation of the original operating instructions

Wheel Loader

TW9

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Please complete before commissioning the wheel loader:

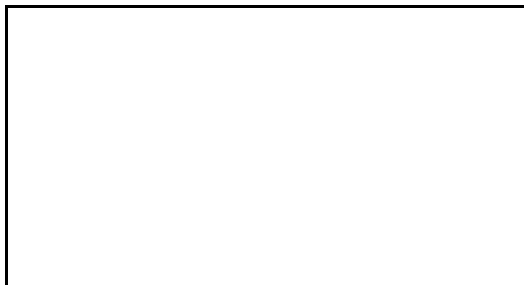
Vehicle model:

Vehicle ID No.:

Year of construction:

Commissioned on:

Dealer:



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1 Introduction

You decided to buy a **TW9 Wheel Loader**.

The confidence placed in this model will be rewarded by the efficient and economical performance of the machine.

This operating manual contains all the information and instructions that are required to handle the machine correctly. Please read them carefully before putting the machine into operation and make sure that they are kept at hand at all times.

Should you need further explanations or should anything be unclear, please contact your dealer immediately.

Special equipment and attachments are not included in these Operating Instructions.

We reserve the right to make improvements on the machine within the scope of impending technical developments, without incurring any obligation to change these Operating Instructions.



Any modifications of products and their equipment using extras and work attachments which are not included in our product range require our written approval. If our approval is not sought, our warranty expires, as does our product liability.

Please state the vehicle type and vehicle identification number when making inquiries or orders, and in all written correspondence.



The vehicle identification number of the machine is stamped onto the type label (1/1).

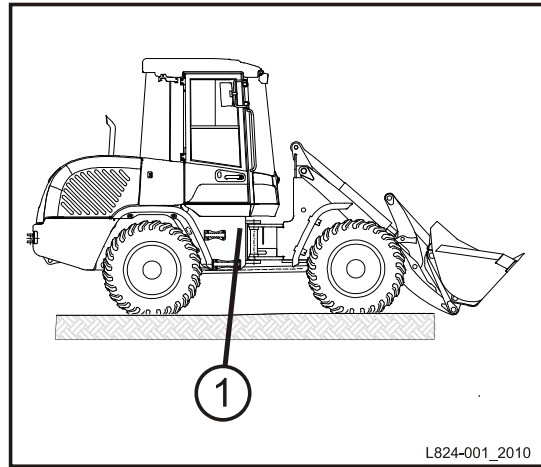


Fig. 1 Type label

1 Introduction

1.1 Warranty and Maintenance

The warranty period covers 12 months, beginning with the day the machine is handed over or put into operation.

Safe working conditions and good working order of the machine are prerequisites for efficient work. Your wheel loader fulfils these requirements when correctly handled and when serviced and maintained as specified.

Careful observation of the machine whilst in function and the use of the specified fuels, lubricants, and coolants will prevent malfunction.

Trained specialist personnel are responsible for any servicing of the machine which requires expert knowledge. Inspections and repairs must therefore be carried out by your dealer's customer service.

In respect of possible claims for damages during the warranty period, all work specified in the maintenance and inspection plan must be carried out at the specified intervals.

After the warranty period, too, regular maintenance must be performed in order to ensure that the machine is constantly in good working order and enjoys a reasonable service life.

Insist that only **original spare parts** are used in the event of any repair work. In this way, you will have a product of lasting high quality, thereby ensuring that your machine maintains its original condition.

1.2 Copyright

This instruction book is intended for use by personnel responsible for operation, maintenance, repair and supervision of the machine.

This operating manual is copyrighted. It contains technical specifications and documentation which shall not, either in whole or in part, be reproduced, transmitted or used for the purpose of competition without our express permission.

1.3 Notes on using the Operating Instructions

References to pictures and items

The references to pictures and items contained in the text, such as (*Fig. 12/4*) or (*12/4*) mean figure 12, item 4.

The figures shown in this manual partly contain additional equipment.

Symbol "Danger "



This symbol indicates a high risk of injuries. Strictly observe the safety instructions.

Symbol "Warning "



Not abiding by the information indicated by this symbol might cause substantial property or equipment damage. Strictly observe the safety instructions.

Symbol "Note "



This symbol is employed for information containing important notes about the correct use and/or how to proceed. Non-compliance may lead to malfunction.

1.4 Environmental standards

When operating or working on the machine the environmental standards currently valid must be observed at all times.

During installation, repair and maintenance tasks, particular care must be taken that substances that would damage the environment such as

- lubricating oil and grease
- hydraulic oil
- fuel
- coolant
- cleaning fluids containing solvents

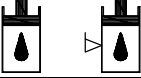
do not seep into the ground or the sewerage system.

These substances must be kept, transported, collected and disposed of in suitable containers.

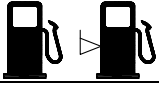
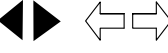
If above-mentioned liquids seep into the ground, their escape must be stopped immediately and the liquid be bound with suitable binding agents. If necessary, the soil involved must be removed. Absorbent materials and removed soil must be disposed of properly. The environmental standards currently valid must be observed.

1.5 Pictograms

The following Table explains the meaning of the pictograms which may be attached to your machine.

Symbol	Description
	Danger
	In Operating Instructions: Warning On machine: Caution
	Note
	Battery charge indicator
	Preheating
	Engine oil pressure
	Engine oil temperature
	Engine oil level
	Coolant temperature
	Coolant level
	Air filter
	Hydraulic oil Hydraulic oil level
	Hydraulic oil temperature
	Hydraulic oil filter clogging indicator

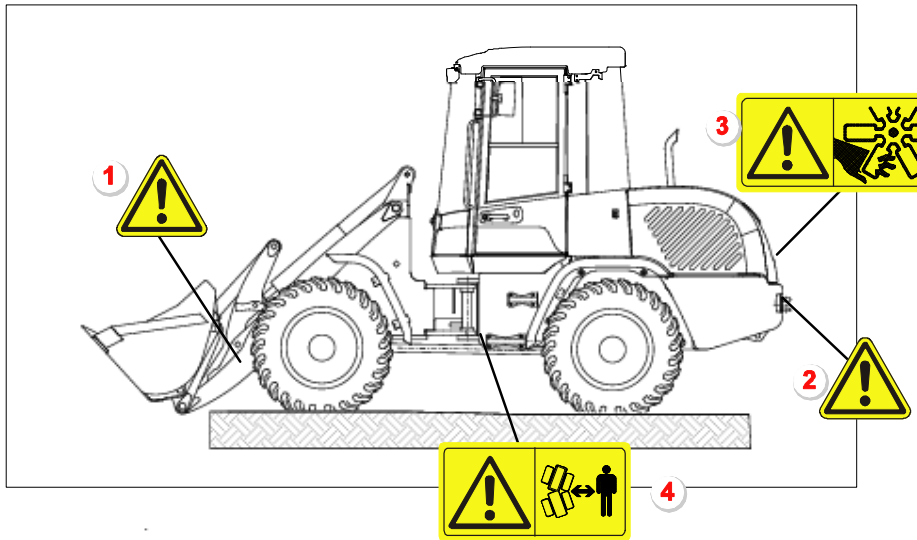
1 Introduction

Symbol	Description
	Horn
	Fuel Fuel level
	Blower Heating/ventilation
	Windshield washer and wiper system
	Parking brake
	Direction indicator LT/RT
	Working floodlights
	High-beam indicator
	Rotating beacon
	Travel direction FWD/REV
	Travel speed FAST
	Travel speed SLOW
	Working hydraulics shut-off
	Unlocked
	Locked
	Float position

Symbol	Description
	Hazard warning system
	Operating mode indicator Operating hours
	Lashing points
	Suspension points for loading by crane
	First-aid kit
	Fire extinguisher
	On machine: Safety distance
	Danger of crushing
	Danger of injury
	The relevant notes in the operating instructions should be observed
	Grease gun Lubricating point
	Air conditioning

1.6 Location of safety signs

The safety signs are located in the following positions on the machine:



Locations of safety signs

- 1 Safety distance (left and right sides of lifting frame)
- 2 Safety distance
- 3 Danger of injury
- 4 Danger of crushing

Servicing and replacing safety signs

- The safety of the operator always has to come first.
- Safety signs must always be kept in good condition and legible.
- Replace any safety sign which has been damaged or disappeared.
- Use mild detergents and water to clean the safety signs.
- Do not use any detergents containing solvents.
- Always specify machine serial number and language when ordering safety signs.

2 Safety and Accident Prevention

2.1 Introductory remarks

Declaration of Conformity

The machine complies with the fundamental requirements stipulated in the applicable European guidelines.

Conformity has been proven. The respective documents and the original of the Certificate of Conformity are kept by the manufacturer.

A copy of the Certificate of Conformity is attached to the sales documents.

EC declaration of conformity according to the machinery directive 2006/42/EC

1. We hereby declare that the earth-moving machine of type **TW9**:
Wheel Loader: TW9
Vehicle ID No.: TL0802
Actual productivity: 44 KW
2. complies with all the relevant requirements of Machinery Directive 2006/42/EC.
3. The machine also complies with the relevant requirements of the following Directives:
2004/108/EC (EMC), 2000/14/EC Appendix VIII (noise emission), 97/68/EC (exhaust emission)
4. Representative sound power level:
100.0 dB (A)
5. Guaranteed sound power level:
101 dB (A)
6. Applied harmonized standards:
EN ISO 12100
EN 474-1
EN 474-3
7. Document editor, who is authorized to compile technical documentation:
Maik Schulze, D 74564 Crailsheim, Kraftwerkstraße 4, Germany
8. Conformity assessment procedure according to Directive 2000/14/EC Appendix VIII as well as voluntary type examination by: DGUV Test Prüf- und Zertifizierungsstelle
Fachausschuss Bauwesen
Landsberger Straße 309
D-80687 Munich
Notified Body number: 0515

The EC declaration of conformity only applies if the earth-moving machine is used in accordance with the operating instructions. It includes the use of original work attachments and other work attachments, which are mentioned in the operating instructions or in other documentation for application at this earth-moving machine.

Replaceable equipment manufactured by Dealers or third party manufacturers may only be installed and used if the installation at the affected earth-moving machine is performed by Dealer. In all other cases, special written approval is required from Dealer.

Date of the declaration of conformity 29.12.2009

Langenburg

Terex GmbH Geschäftsbereich Terex Schaeff	Schaeffstraße 8 74595 Langenburg, Germany
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2 Safety and Accident Prevention

Read the operating instructions thoroughly and follow the notes on safe operation before putting the earth-moving machine into operation.

National safety regulations - e.g. the Accident Prevention Regulations, "Earth-Moving Machinery" (BGR 500 Chapter 2.12) and "Vehicles" (BGV D29) in the Federal Republic of Germany - must also be complied with when operating the earth-moving machine.

In addition to the Operating Instructions, legal regulations governing road traffic and road safety measures must also be observed. Such duties could also apply in respect of e.g. handling hazardous goods or the wearing of personal safety gear.

Furthermore, safety laws governing work in particular locations (tunnels, adits, quarries, pontoons, contaminated areas, etc.) must likewise be observed.

2.2 Intended use

The earth-moving machine with standard bucket equipment is intended solely for work which is suitable for the function of the machine and its work implements.

Such work involves loosening, taking up, transporting and dumping soil, rock or other materials as well as loading these materials on trucks, conveyor belts or other means of transport, when the transport of the material is normally done by positioning the earth-moving machine.

The assembly of special work attachments such as multi-purpose bucket, side-dump bucket, broom, fork lift attachment etc. allows the machine to perform the corresponding applications.

Any usage above and beyond that specified here, e.g. the transport of persons or the usage of the lift equipment as work platform is regarded as improper use. The supplier cannot be held responsible for any damage resulting from improper use. This risk is borne solely by the user.

Strict compliance with the operating and maintenance instructions and the performance of maintenance work, as well as adherence to the maintenance intervals is also part of intended use.

Safety and Accident Prevention 2

2.3 General safety notes

It is important to refrain from any working methods which impair safety.

The earth-moving machine is only to be used if it is in a safe, operational condition.

The manufacturer's instructions must be complied with for operation, maintenance, repair, assembly, and transportation.

The plant operator must provide additional special safety instructions, wherever necessary, for specific local conditions.

The operating instructions and any information pertaining to safety must be carefully kept in the driver's cab.

The operating instructions and safety notes must be complete and fully readable.

Safety equipment on earth-moving machines must not be deactivated or removed.

Protective clothing must be worn during operation. Rings, scarves and unbuttoned jackets are to be avoided. Protective goggles, protective boots, helmets, gloves, reflecting jackets, ear-muffs, etc. may be required.

Before commencing work, information must be obtained on first aid and possible means of rescue (emergency ambulance, fire brigade, helicopters).

A check must be carried out to ensure that the first aid box is at hand and that its contents comply with regulations.

Personnel must be aware of the location and method of operation of the fire extinguishers on the earth-moving machine as well as on-site fire-warning and fire-fighting equipment.

Loose parts such as tools or other accessories must be secured to the earth-moving machine.

Open doors, windows, covers, flaps, etc. must be closed or secured so that they cannot slam shut.

2.4 Operation

Earth-moving machines shall only be independently operated and serviced by persons who

- are physically and mentally suitable
- have been instructed in the operation or maintenance of earth-moving machines and have demonstrated this ability to the plant operator
- can be expected to perform their allocated duties reliably.

All such persons must be of the legal minimum age.

They must be designated by the plant operator to operate or service the earth-moving machine.

Operating equipment and controls are only to be operated from the driver's seat.

The earth-moving machine is only to be ascended and entered using the entrances and surfaces intended for this purpose.

It is the driver's responsibility to ensure that the operator's stand, entrances and other surfaces of the earth-moving machine which have to be stepped on are free of dirt, grease, oil, ice and snow.

The following driving license categories are required for driving a wheeled loader on public highways:

Driving license categories			
≤3500 kg	>25 km/h	=	B, C1, C, T
≤7500 kg	≤25 km/h	=	L, C1, C, T
≤7500 kg	>25 km/h	=	C1, C, T
>7500 kg	≤25 km/h	=	L, C, T
>7500 kg	>25 km/h	=	C, T

2 Safety and Accident Prevention

2.5 Danger zone

Nobody must be allowed to remain in the danger zone of an earth-moving machine.



The danger zone encompasses the area around the earth-moving machine in which persons may be injured by movements of the earth-moving machine during operation, its work implements and attachments, or by swinging out or falling loads.

The machine operator is only to work the earth-moving machine if nobody is in the danger zone.

The machine operator must give a warning signal to persons who may be in danger.

The machine operator must stop work with the earth-moving machine if someone remains in the danger zone despite the warning.

To ensure no danger of crushing, a sufficient safety distance (min. 0.5 m) must be kept from solid objects, e.g. buildings, excavation slopes, scaffolding, other machines, etc.

If the above safety distance cannot be maintained, the area between solid objects and the working zone of the earth-moving machine must be blocked off.

If conditions are such that the machine operator's view of the driving and working zone is restricted, he must be guided or the driving and working zone must be marked by a solid barricade.

2.6 Transport of persons

The transport of persons on the machine is forbidden.

2.7 Stability

The earth-moving machine must be used, driven and operated in such a manner that its stability against overturning is ensured at all times.

The machine operator must drive at speeds which are suitable for local conditions.

The permitted payload of the earth-moving machine must not be exceeded.

The earth-moving machine must remain at a sufficient distance from the edges of quarries, pits, mounds and slopes to ensure there is no risk of falling.

Earth-moving machines must be secured so that they cannot roll or slip when in the vicinity of excavations, shafts, ditches, pits and slopes.

Safety and Accident Prevention 2

2.8 Travel operation

Before putting the earth-moving machine into operation, the driver's seat, mirrors and operator controls must be adjusted so as to ensure safe working.

A safety belt (seat belt), if installed, must always be fastened.

The windows must be clean and free of ice.

Driving tracks must be designed so as to ensure smooth, safe operation, i.e. they must be sufficiently wide, on ground which has as few slopes as possible and sufficient carrying capacity.

Downhill tracks must be set out in such a way that earth-moving machines can be safely braked.

Before driving downhill, the appropriate gear for the terrain must be selected and the gear lever not be moved during downhill travel (road or off-road gear).

On steep drops and uphill gradients, the load must be carried on the uphill side, if possible, in order to increase stability.

Before driving downhill, the appropriate gear for the terrain must be selected and the gear lever shall not be moved during downhill travel (on-road or off-road gear).

The internal dimensions of constructions must be noted before entering underground passages, tunnels, etc.

It is the plant operator's responsibility to ensure that equipment such as first-aid box, warning triangle, hazard lights are kept with the earth-moving machine according to the traffic regulations valid in the user's country and that the driver has the appropriate license as required by the national traffic laws of the country in question.

Outside areas covered by general traffic regulations, e.g. on factory premises, traffic regulations should be applied in the proper manner. This should also apply with regard to drivers' licenses.

2.9 Working Operation

Daily before start of operation and after every attachment change, the machine operator must check the correct fastening of the work attachments as well as the correct locking of the quick-mount hitch. Work attachments are to be carefully moved at low height. During this check nobody must be allowed to remain in the danger zone of the earth-moving machine.

The machine operator shall only swing the work equipment over occupied driver's seats, operator consoles and workplaces of other machines when these are protected by overhead guards (FOPS).

If a cabin does not have the required protection, the driver of this vehicle must leave the operator's stand while the work equipment is being swung overhead.

The vehicles must be loaded in such a manner as to ensure that there is no overloading and no material can be lost as long as the machine is moving. The vehicle must be loaded from the lowest possible height.

The weight of each load must be evenly distributed before it is moved. Unequal weight distribution can have a negative effect on the stability of the machine. The operator must be familiar with on-site conditions and work at a speed which is both safe and highly efficient.

At dumping points, earth-moving machines may only be operated if suitable measures have been taken to prevent rolling or falling.

2 Safety and Accident Prevention

2.10 Guides

Guides must be easily recognizable, e.g. by means of reflective clothing. They must remain within the machine operator's field of vision.

While guiding the machine, guides shall not be given other jobs which may distract them from their task.

2.11 Danger of falling objects

Earth-moving machines are only to be used where there is a danger of falling objects if the operator's stand has a canopy (FOPS). A front guard must be employed if there is a risk of materials breaking through into the cabin.

In front of walls e.g. of stacked materials, earth-moving machines must be positioned and operated in such a way that the driver's seat and entry to the driver's seat are not situated on the side facing the wall.

Demolition work is only to be performed by earth-moving machines where there is no danger to persons and if the machine is equipped with canopy, cabin-mounted front guard and the appropriate work implement.

See regulations book "Demolition work" (ZH 1/614) published by the German Tiefbau-Berufsgenossenschaft (Civil Engineering Employer's Liability Insurance Association).

2.12 Working in the vicinity of underground power lines

Before commencing excavating work using earth-moving machines, it must be determined whether any underground power lines are present in the intended working zone which may present a danger to persons.

If underground power lines are present, their exact position and course must be determined in consultation with the proprietor or operator of the lines, and the necessary safety precautions decided and implemented.

The course of power lines in the work area must be clearly marked, under supervision, before commencing any excavation work. If the position of lines cannot be determined, search ditches must be dug - manually, if need be.

If underground power lines are encountered unexpectedly or they or their protective covers are damaged, the machine operator must discontinue work immediately and notify the supervisor.

Safety and Accident Prevention 2

2.13 Working in the vicinity of overhead power lines

If the earth-moving machine is being used in the vicinity of overhead power lines and trolley wires, a safety distance which varies depending on the nominal voltage of the overhead line must be maintained between the lines and the earth-moving machine and its work equipment, to prevent current overspill. This also applies to the distance between these lines and attached implements or loads.

The safety distances specified below must be complied with:

Nominal voltage in Volt	Safety distance in meters
- 1,000 V	1.0 m
more than 1 kV - 110 kV	3.0 m
more than 110 kV - 220 kV	4.0 m
more than 220 kV - 380 kV	5.0 m
nominal voltage unknown	5.0 m

In the observation of safety distances, all working movements of earth-moving machines, e.g. positions of the work equipment and the dimensions of attached loads must be taken into consideration. Uneven ground which would cause the earth-moving machine to be inclined and thus nearer to overhead lines must also be taken into account.

During work in windy conditions, both overhead lines and work equipment may swing out, thus reducing the safety distance.

If it is impossible to maintain sufficient distance from overhead power lines and trolley wires, the plant operator must consult with the proprietor or operator of the overhead lines to find other safety precautions to prevent current overspill. Such measures could be, e.g.

- Switching off the current
- Re-routing the overhead line
- Cabling, or
- Limiting the work zone of earth-moving machines.

2.14 Operation in closed rooms

If earth-moving machines are to be used in closed spaces, these areas must be sufficiently ventilated and special regulations observed.



Breathing in the resulting engine fumes in closed areas is a health hazard and can result in unconsciousness or even death.

- *You must ensure that adequate air supply and ventilation is available and that you always abide by the applicable regulations.*



The working height may be restricted when working in enclosed spaces, under facades, superstructures, high-voltage lines, or similar.

This can lead to damage.

2.15 Work stoppages

Before rest periods and at the end of the working day, the driver of the earth-moving machine must park the machine on ground which has sufficient carrying capacity and is as level as possible, and must secure it against unintended movement.

Before rest periods and at the end of the working day, the driver must lower the work equipment onto the ground or secure it so that it cannot move.

The driver is not to leave the earth-moving machine if the work equipment has not been lowered to the ground or secured.

Earth-moving machines shall only be parked in places where they do not present an obstacle, e.g. on the construction site or to plant traffic. Warning devices, e.g. triangles, warning cordons, flashing or hazard lights are to be used if necessary.

Before leaving the operator stand, the driver must bring all operating equipment and controls into home position, switch off the working hydraulics and apply the brakes.

If the driver is leaving the earth-moving machine unattended, he must first turn off the drive motors and ensure that they cannot be started up by unauthorized persons (e.g. removing ignition keys).

2 Safety and Accident Prevention

2.16 Change of work attachments, maintenance, repair

Earth-moving machines shall only be converted, maintained or serviced under the guidance of a suitable person designated by the plant operator and following the manufacturer's Operating Instructions.

After every change of work attachments, the driver must convince himself that the quick-attach system is correctly fastened and locked.

Work on e.g.

- brake systems,
- steering systems,
- hydraulic and
- electric systems

of the machine is only to be carried out by expert personnel specially trained in these areas.

Stability must be ensured during all type of work on the machine at all times.

The work equipment must be secured against movement by lowering it to the ground or equivalent measures, e.g. cylinder supports, trestles. With the engine running, the unprotected articulation range of articulated loaders shall not be entered.

When jacking up earth-moving machines, jacking devices must be positioned so that they cannot slip. Jacks must be positioned and applied absolutely straight, without tilting.

Raised earth-moving machines must be supported by suitable structures such as crosswise stacks of planks, square timbers or steel trusses.

Stabilize the earth-moving machine that has been lifted with the work attachment, immediately after lifting with a supporting structure. Work under raised machines which are only supported by their hydraulics is forbidden.

The engine/motor(s) must be turned off prior to all maintenance and repair work. These requirements may only be ignored in the case of maintenance or repair work which cannot be performed without the engine/motor(s) running.

When performing maintenance and repair work on the hydraulic system, the hydraulic system must be relieved of pressure. With the engine turned off, lower the work equipment to the ground and actuate all hydraulic control levers until there is no pressure in the hydraulic system.

Before working on the electrics or when performing arc-welding on the machine, the connection to the battery must be disconnected.

When disconnecting the battery, first the negative pole then the positive pole must be disconnected. The battery must be re-connected in reverse order.

During repair work around the battery, it must be covered with insulating material. Tools should never be placed on or near the battery.

Protective devices of moving machine parts are only to be opened or removed after the drive has been switched off and cannot be switched on again by unauthorized persons. Protective devices are e.g. engine/motor covers, doors, protective grating, trim.

Upon completion of assembly, maintenance or repair work, all protective devices must once more be attached in the proper manner.

Load-bearing parts of earth-moving machines are only to be welded following consultation with the manufacturer and in accordance with recognized welding principles.

Protective structures (ROPS; FOPS) are not to be welded or drilled in any way.

Safety and Accident Prevention 2

Before commencing work on the hydraulic system, the operating pressure, pilot pressure, back pressure and pressure inside the tank must be let off.

Alterations, such as welding of the hydraulic system, are only to be undertaken with the manufacturer's permission.

Swallowing lubricants as well as long and repeated skin contact can be hazardous to health and should therefore be avoided. When used properly, there is no particular danger to health. The safety specification sheets from the mineral companies must be observed.

Only the hoses specified by the manufacturer shall be used.

Hydraulic hoses must be routed and assembled by expert personnel.

In the vicinity of fuel or batteries, smoking and naked flames are prohibited.

2.17 Recovery, loading, transportation

Earth-moving machines are only to be loaded onto recovery vehicles if adequate towing vehicles are used.

The tow fixing points specified by the manufacturer must be employed.

For loading and transportation, earth-moving machines and all necessary auxiliary equipment must be secured against unwanted movement.

The traveling gear and crawler unit of earth-moving machines must be sufficiently cleaned of mud, snow and ice to ensure that ramps can be driven up without risk of slipping.

When transporting the earth-moving machine on trucks, flatbed trailers, or by rail, it must be sufficiently secured with chocks and by attachment to the lashing points.

Before setting off, the route to be taken must be examined to determine whether the roads are wide enough, entrances and passages under bridges are large enough and that roads and bridges have sufficient carrying capacity.

2.18 Monitoring and inspections

The machine must be submitted to a general inspection according to the existing UVV-regulations (Accident Prevention Regulations). This inspection must be carried out by an expert (e.g. machine engineer or machine foreman):

- before the machine is put into operation for the first time and before the machine is again put into operation after essential modifications have been made
- at least once a year
- in the meantime, according to operating conditions and local environments.

The results of this inspection have to be recorded in writing and this record kept until the next inspection takes place.

Prior to every work shift, the machine operator must check the earth-moving machine according to the inspection and maintenance plan.

Hydraulic hoses must be replaced as soon as the following damage is recognized:

- Damage to the outer layer which reaches the intermediate layer,
- Embrittled patches on the outer layer,
- Deformations when under pressure or without pressure which differ from the original shape of the installed hose,
- Leaks,
- Damage to hose fittings or to the connection between the fitting and the hose.

The coolant level may only be checked after the engine has cooled down; the cap must be turned carefully in order to let off excess pressure.

Prior to operations, the machine operator must check the function of the safety devices.

The machine operator must advise the supervisor immediately - and his replacement, if there is a change of operator - with regard to any shortcomings.

In the event of shortcomings which jeopardize the operating safety of the earth-moving machine, it is not to be used until these have been eliminated.

2 Safety and Accident Prevention

2.19 Fire prevention

- Switch off the engine when filling the fuel tank and take special care as long as the engine is hot.
- Never smoke or handle open flames whilst refueling the tank of the machine.



The fire extinguisher must be kept in the cabin (operator's stand). The fire extinguisher symbol must be attached.

2.20 Emergency exit

The right-hand cab door acts as an emergency exit.

2.21 Other dangers

Failure of hydraulic system

If the hydraulic system fails because the diesel engine is not running, the hydraulic pump is damaged or hydraulic oil has been lost, only the following **emergency functions** can still be performed:

- manual steering (without servo assistance) and
- lower work equipment (only if ignition is switched on).

3 Technical data

3.1 Views

- General-purpose bucket and parallel kinematics

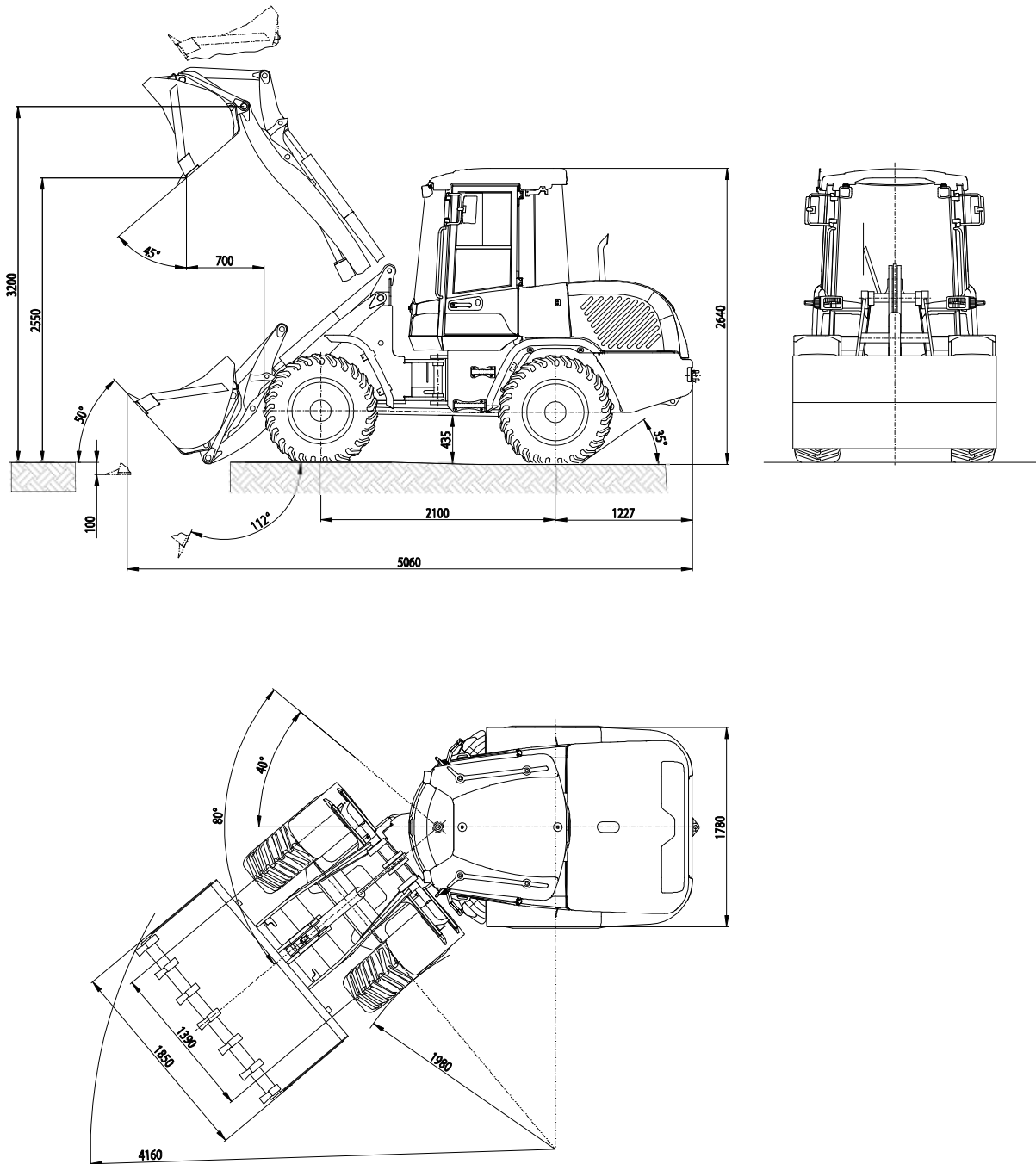


Fig. 3 Dimensioned drawing - standard bucket and parallel kinematics
Tires 405/70 R18

3 Technical data

- Multi-purpose bucket and parallel kinematics

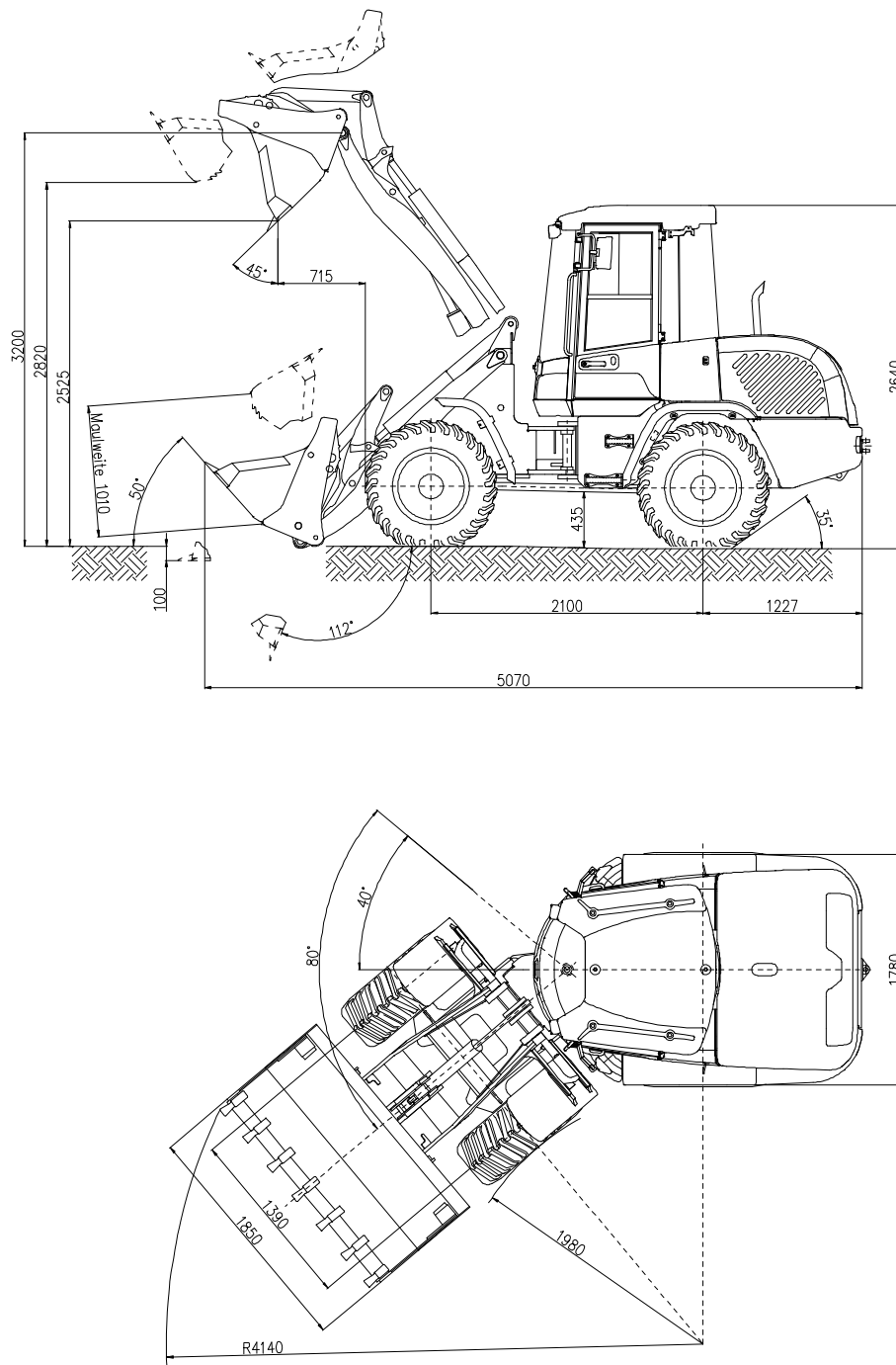


Fig. 4 Dimensioned drawing - multi-purpose bucket and parallel kinematics
Tires 405/70 R 18

- Fork lift attachment and parallel kinematics

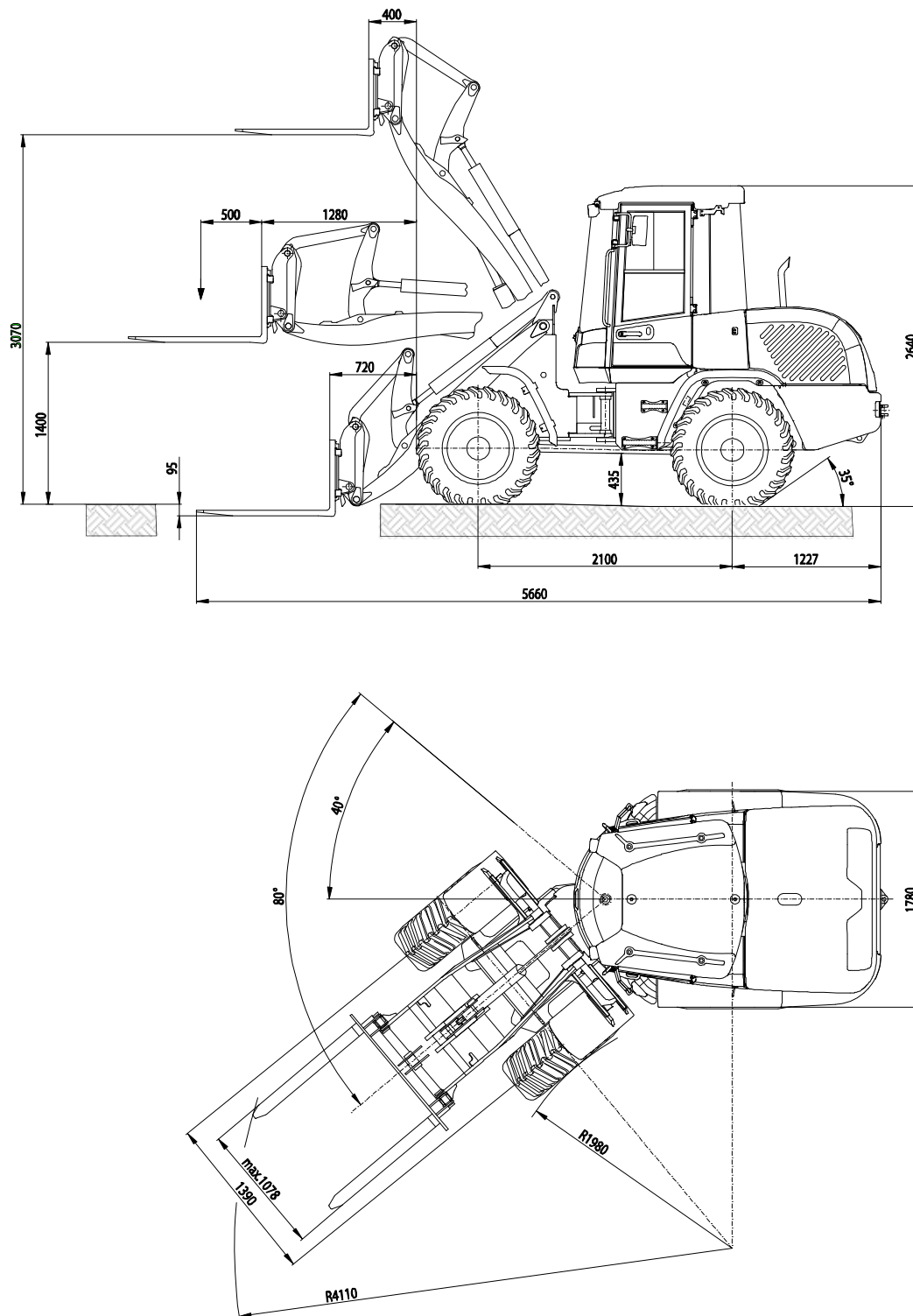


Fig. 5 Dimensioned drawing - fork lift attachment and parallel kinematics
Tires 405/70 R 18

3 Technical data

- General-purpose bucket and Z kinematics

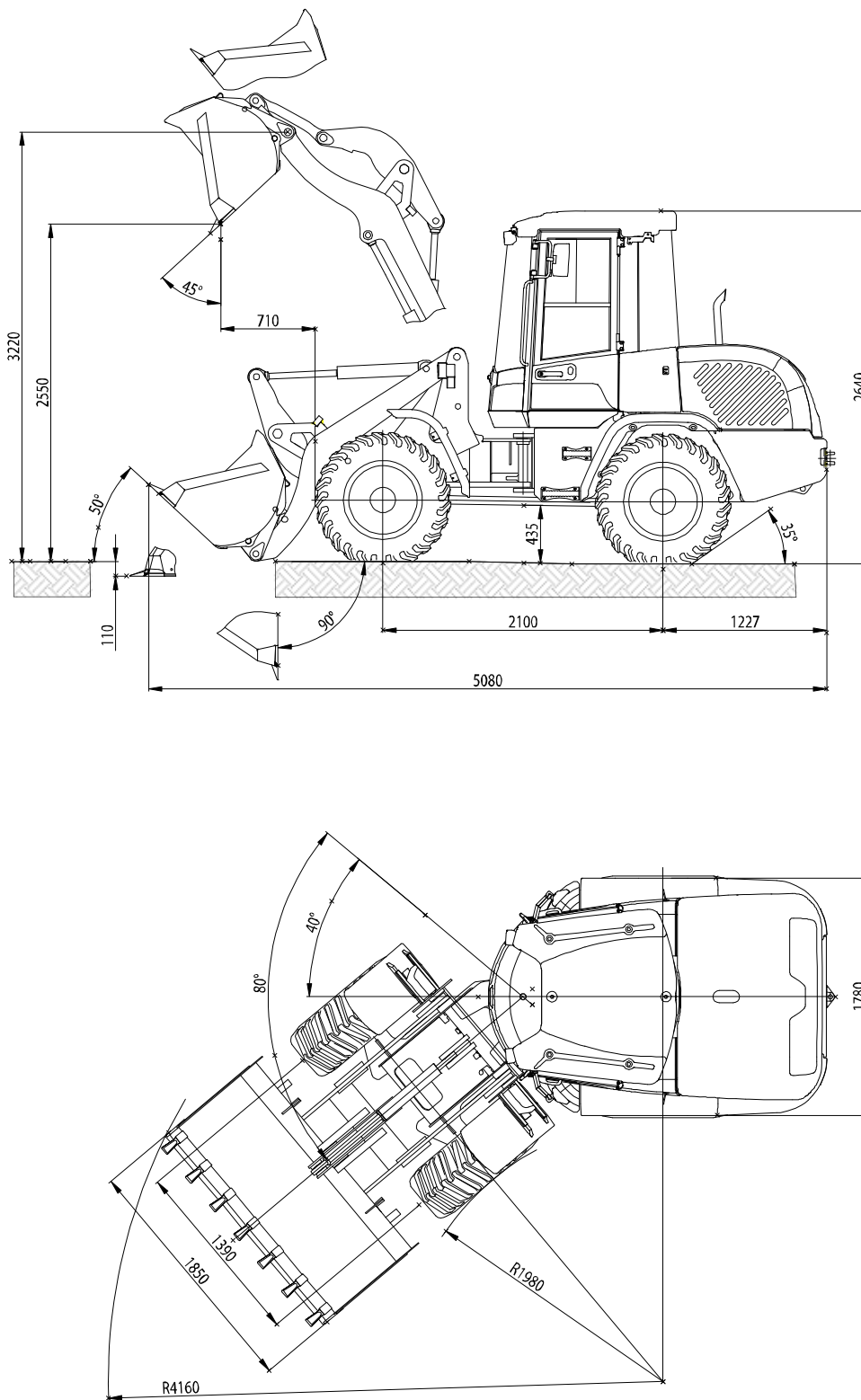


Fig. 6 Dimensioned drawing - standard bucket and Z kinematics
Tires 405/70 R18

- Multi-purpose bucket and Z kinematics

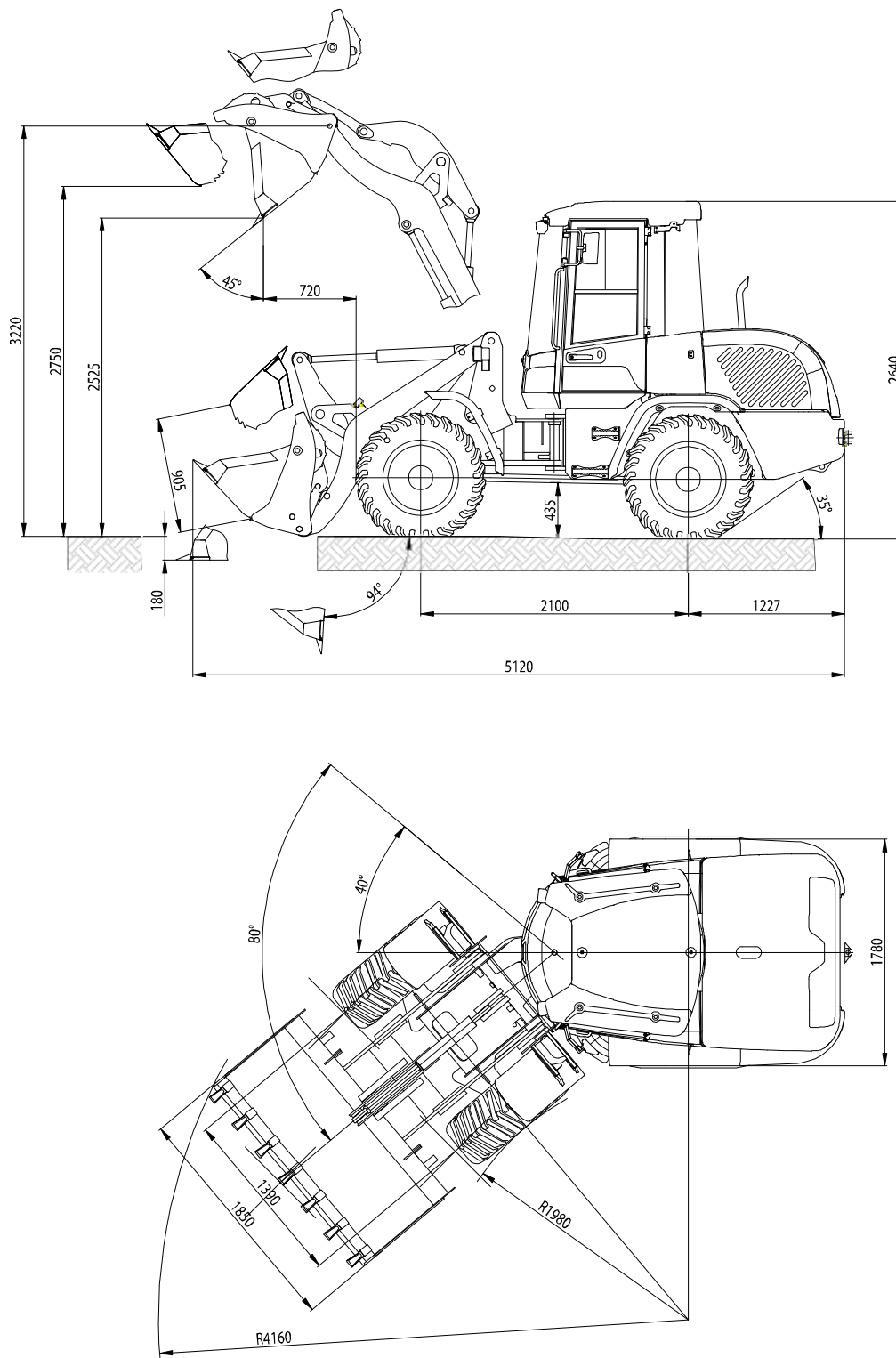


Fig. 7 Dimensioned drawing - multi-purpose bucket and Z kinematics
Tires 405/70 R18

3 Technical data

- Fork lift attachment and Z kinematics

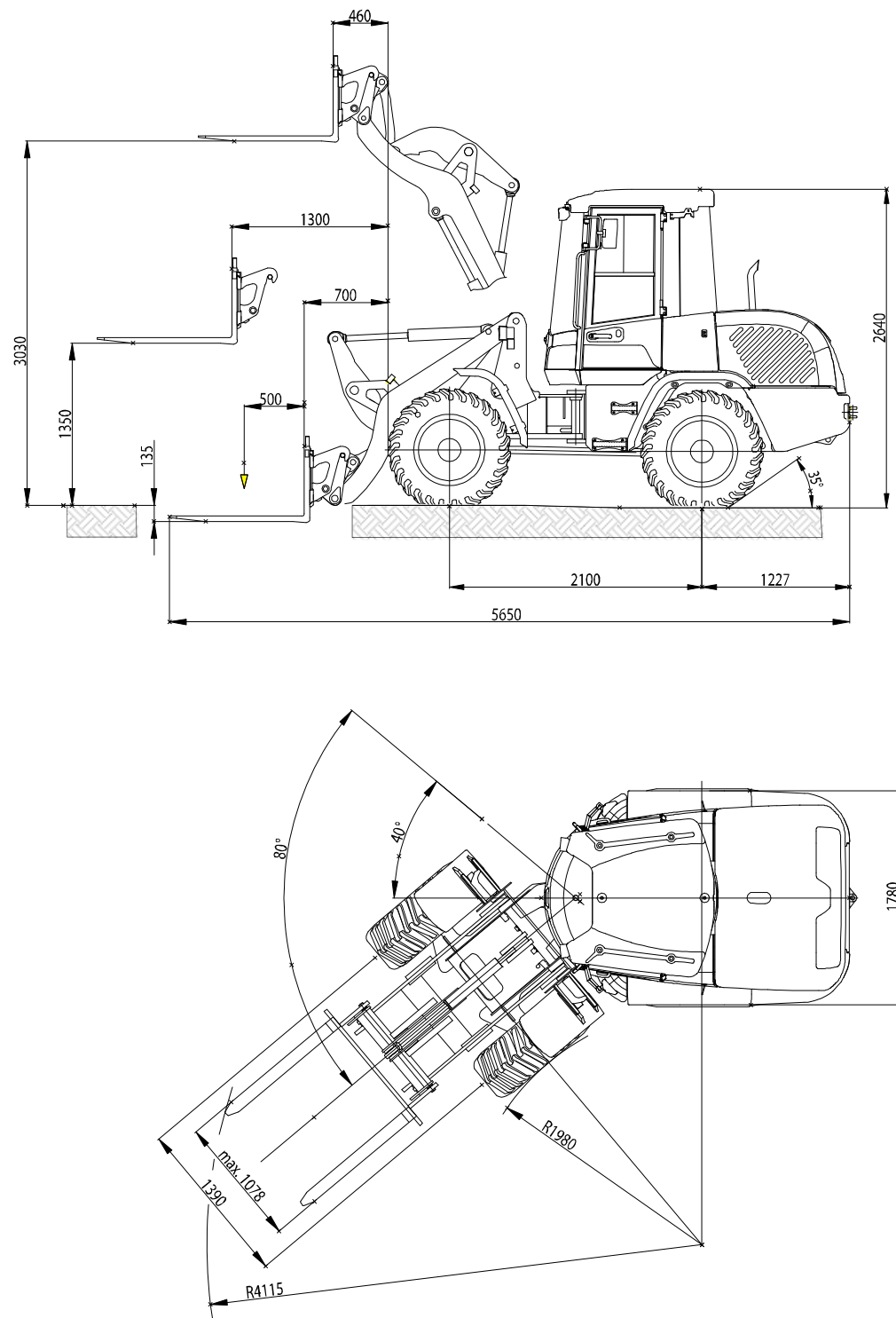


Fig. 8 Dimensioned drawing - fork lift attachment and Z kinematics
Tires 405/70 R18

- Low profile canopy with general-purpose bucket 0.8 m³

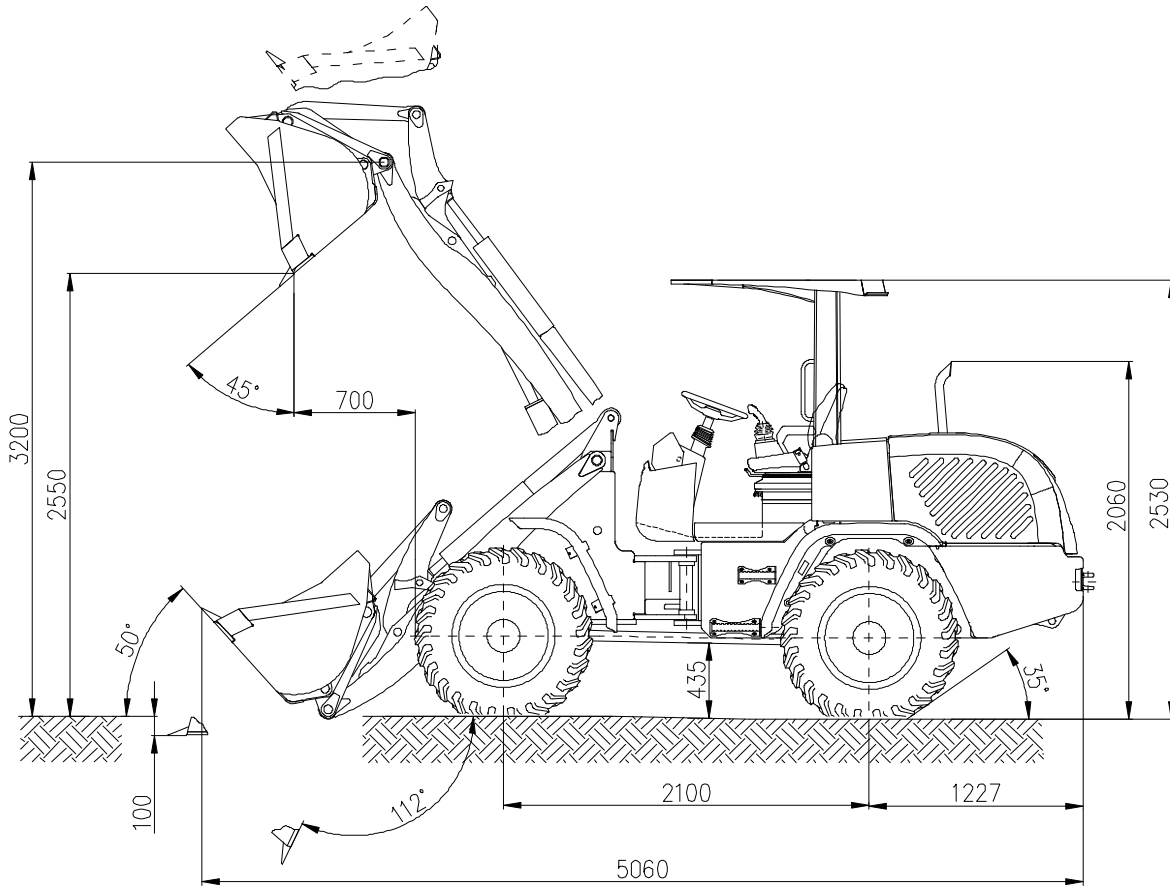


Fig. 9 Dimensioned drawing - low profile canopy with standard bucket 0.8 m³
Tires 15.5/55 R18

3 Technical data

- Fold-down bar with general-purpose bucket 0.8 m³

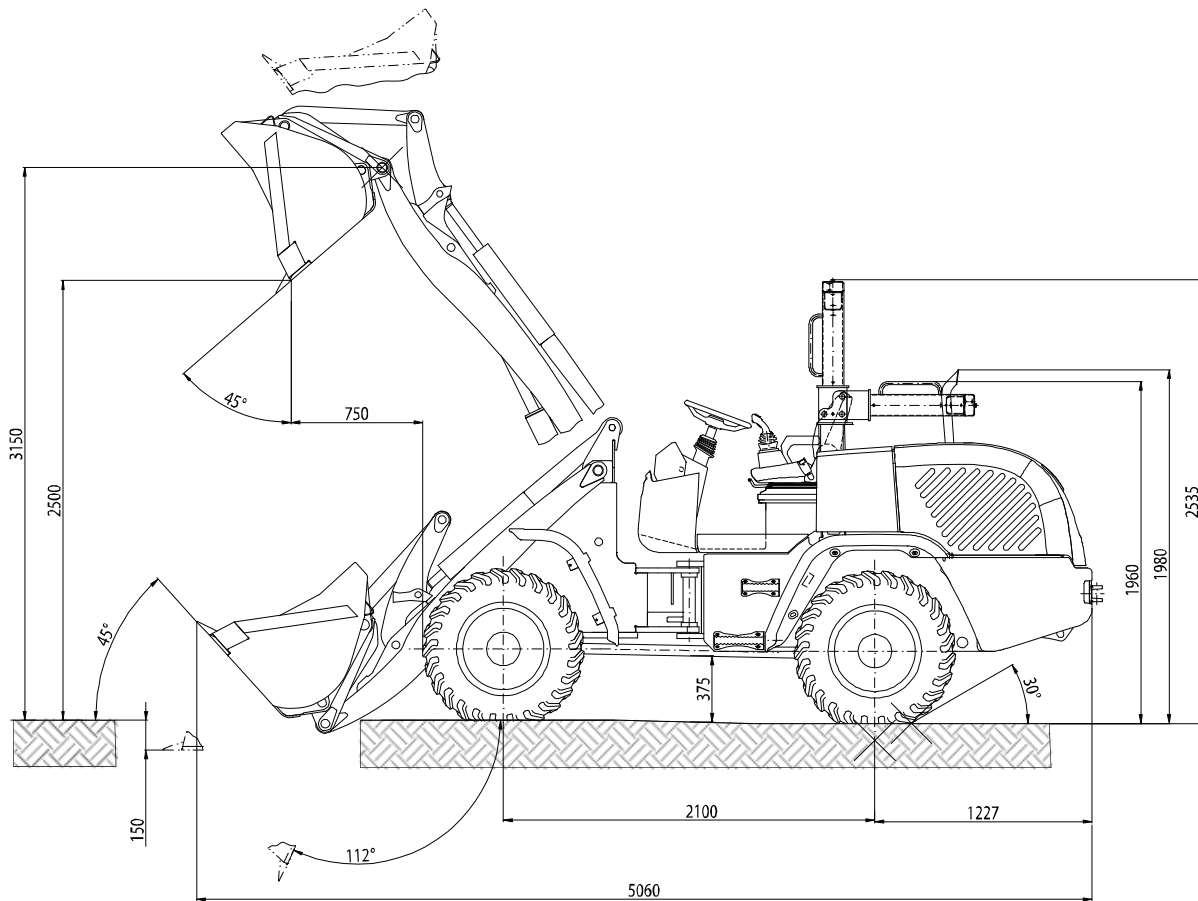


Fig. 10 Dimensioned drawing - fold-down bar with standard bucket 0.8 m³
Tires 15.5/55 R18

Technical data 3

3.2 Diesel engine

Manufacturer, model	Deutz, D 2011 L04 W
Type	4-cylinder diesel engine Exhaust-optimized engine EU level III EPA-Interim tier 4
Combustion	4-stroke cycle, direct fuel injection
Stroke displacement	3600 cm ³
Output	44.0 kW (67 HP) at n=2,200 rpm
Performance and exhaust standards	ISO 14396 / EC-R-120
Torque	Max 210 Nm / 1,700 rpm
Specific fuel consumption at nominal engine speed	235 g/kWh
Cooling	Water-antifreeze mixture for all-year operation
Heating	Fresh air with heat exchanger connected to coolant circuit

3.3 Electrical system

Nominal voltage	12 V
Battery	12 V / 100 Ah / 900 A (EN) (DIN EN50342)
Generator	14 V 95 A
Starter	12 V / 2.6 kW
Cold starting aid	Heater plug 12 V
Lighting system	in compliance with German and European standards

3.4 Transmission

Transmission	Variable displacement pump, flange-mounted directly onto diesel engine, two-stage variable displacement motor with power shift on rear axle reduction gear. High-speed version featuring rear axle manual transmission shiftable in standstill position. Suction return filter in the form of a tank insert filter.			
Travel speed	Forward - Reverse			
		TW9	TW9 S	
			Travel range I	Travel range II
	Travel range "Work"	0 - 7 km/h	0 - 7.0 km/h	0 - 14 km/h
	Travel range "Road"	0 - 20 km/h	0 - 18 km/h	0 - 36 km/h
Power transmission	Hydrostatic travel drive, closed circuit, independent from loader installation. Automatic optimization and adjustment of drawbar pull and speed. The travel drive in closed circuit additionally acts as non-wearing service brake. Continuous speed regulation both forward and in reverse. Four-wheel drive via propeller shaft connection.			
Operating pressure - driving	max. 420 bar			

3 Technical data

3.5 Brakes

Service brake	Hydraulically actuated center-mounted disk brake, combined with hydrostatic brake of travel drive. Brake acts on all 4 wheels via 4-wheel drive.
Parking brake	Mechanically actuated center-mounted disk brake at front axle.
Additional brake	The hydrostatic travel drive in closed circuit additionally acts as non-wearing service brake.

3.6 Hydraulic system

Hydraulic pump	Gear pump on throughdrive of variable displacement pump.
	Pump capacity: max. 64 l/min.
	Working pressure, steering: 175 bar
	Working pressure, loading: 250 bar
Priority valve	Priority supply of hydraulic oil to steering through load-sensing system, ensuring that all the available oil can be provided if necessary. Rapid steering movements even at low engine revs.
Steering	Fully hydraulic, proportionally acting articulated steering. One steering cylinder with end-position damping at both ends.
Total steering angle	80°
Loader installation	Parallel kinematics Double-acting work cylinders, one lift cylinder, and one tilt cylinder.
	Z kinematics Double-acting work cylinders, two lift cylinders, and one tilt cylinder.
	Hydraulic proportionally-actuated control valve with 3 control circuits. Work functions: "Lift / lower", "Dump / tilt-back", "Additional control circuit".
	Third control circuit as fingertip control, electro-proportional control, oil flow limited via potentiometer, continuous operation circuit, installation on loading frame incl. plug-in couplings.
	Hydraulically-operated float position for the "Lower" work function if "lowering" pressure point on joystick is exceeded, electrically-activated locking effect for continuous "Float" operation.
	Single, four-way control lever (joystick) with integrated travel direction switch and switch for additional control circuit.
Additional control circuit	Max. oil flow 64 l/min
	Max. operating pressure 230 bar
Hydraulic oil cooler	Thermostatically controlled.

Technical data 3

3.7 Axles

Front axle	Rigidly-mounted planetary drive with integrated center-mounted disc brake. Self-locking differential (45%) as standard.
Rear axle (standard)	Oscillating planetary drive axle with self-locking differential and integrated reduction gear.
Rear axle (high-speed version)	Oscillating planetary drive axle with self-locking differential and integrated 2-stage reduction gear.
	Angle of oscillation $\pm 10^\circ$

3.8 Tires

Tire size	Tire pressures front	Tire pressures rear
12.5-18 MPT	2.8	1.8
12.5-20 MPT	2.5	1.8
14.5-20 MPT	2.0	1.5
335/80 R20 XM	2.5	1.7
335/80 R20 EM	2.5	2.5
405/70 R18	3.0	2.5



Special tires available on request!

If solid-rubber or foamed tires are used, special measures must be taken and restrictions apply.



The tire pressure refers to standard equipment.

During fork lift operations, the tire pressure of the front wheels must be increased by at least 0.5 bar.

3 Technical data

3.9 Consumables

3.9.1 Filling quantities

All values stated are approximate.			
Fluid capacities		in liters	Fuels and lubricants
Fuel tank	approx.	75.0	Diesel fuel
Engine with oil filter	approx.	9.0	Engine oil (change quantity)
Hydraulic oil, tank and system	approx.	55.0*	Hydraulic oil
Hydraulic oil tank	approx.	46.0	Hydraulic oil (change quantity)
Service brake	approx.	0.25	ATF-oil
Front axle center housing	approx.	3.8	Transmission oil
Rear axle center housing and transmission (standard)	approx.	4.5	Transmission oil
Rear axle center housing and transmission (high-speed version)	approx.	6.0	Transmission oil
Wheel hubs, front / rear axle	each approx.	0.6	Transmission oil
Coolant	each approx.	15	Mixture of water, additives and glycol
* The hydraulic oil quantity depends on the equipment level of the machine			
The filling level indication is always the decisive factor			

3.9.2 Consumable specifications

Stipulated consumables for Central Europe			
Application	Designation	Specification, standards, quality	Remark
Engine	Diesel fuel	EN 590 ASTM D975 1-D / 2-D	 Before using RME fuels (rape oil methyl ester), it is essential that you consult your responsible dealer for further details.
Engine	Engine oil	SAE 15W-40 API CH-4 or CI-4 ACEA E3 / E4	See also engine manufacturer's instructions
Hydraulic system	Hydraulic oil or multi-grade engine oil	HVLP 46 or SAE 10W-40	The following viscosity limit values must be observed (according to ASTM 445) at 100°C min. 8 mm ² /s (cSt) at -10°C approx. 1,500 mm ² /s (cSt)
	Bio-degradable hydraulic oil based on synthetic ester	Filling according to customer specifications. Brand label on machine.  Do not mix bio-degradable oils from different manufacturers.	The same viscosity values apply as for mineral hydraulic oils.  When changing from mineral to bio-degradable hydraulic oils, the tank and hydraulic system must be completely drained, cleaned, and flushed. For further details, please consult your responsible dealer before changing oils.
Axles	Transmission oil	SAE 85W-90LS API-GL 5	Alternative recommendations SAE 90LS SAE 80W-90LS
Lubrication points	Multi-purpose, lithium-soap based grease	K2K-30 DIN 51825	
Brake	Brake oil	ATF Type A Suffix A Dexron-IID	
Cooler	Mixture of water, additives and glycol	 Machine damage due to incorrect coolant and mix proportions. Observe the cooling system information provided in the engine manufacturer's Operating and Maintenance Manual.	The antifreeze is factory-set to approx. -25°C.

3 Technical data

Alternative recommendation for other temperature ranges

Engine oil In compliance with API CH-4 or CI-4 and In compliance with ACEA E3 / E4	Hydraulic oil In compliance with DIN 51524.T3 HVLP
Viscode Umgebungstemperatur/Ambient temperature/Température ambiante	Viskohyd Umgebungstemperatur/Ambient temperature/Température ambiante

Cold weather kit

A cold weather kit is optionally available for wheeled loader operation below -15°C.



Note that 5W-30 engine oil is changed back to standard oil with viscosity class SAE 15W-40 at temperatures >+30°C.

3.10 Permissible loads in compliance with German Road Traffic Regulations (StVZO)

Permissible total weight	see type label,
Permissible axle load, front	and / or
Permissible axle load, rear	Allgemeine Betriebs Erlaubnis (General Certification)

3.11 Sound level values, vibration

Sound level values in compliance with directive 2000/14/EC and EN 474		
Guaranteed sound power level	L _{WA} = 101 dB (A)	
Sound pressure level (at driver's ear)	L _{PA} = 76 dB (A)	
Vibration values in compliance with directive 2002/44/EC and EN 474		
Effective values of acceleration below	0.5 m/s ²	for entire body
and	2.5 m/s ²	for the upper body limb dimensions

3.11.1 Equivalent vibration values

Equivalent vibration values for entire body vibration emission according to ISO/TR 25398							
Type of machine	Typical operating condition	Average value			Standard deviation		
		$1,4 \cdot \alpha_{w,eqx}$	$1,4 \cdot \alpha_{w,eqy}$	$a_{w,eqz}$	$1,4 \cdot S_x$	$1,4 \cdot S_y$	S_z
		m/s^2					
Compact wheeled loader <4500kg	Load & carry	0.94	0.86	0.65	0.27	0.29	0.13
Wheeled loader >4500kg	Load & carry	0.84	0.81	0.52	0.23	0.20	0.14
	Use in quarrying	1.27	0.97	0.81	0.47	0.31	0.47
	Transition travel	0.76	0.91	0.49	0.33	0.35	0.17
	V-shaped motion	0.99	0.84	0.54	0.29	0.32	0.14

3 Technical data

3.12 Dimensions and weights

Specifications refer to general-purpose bucket and 405/70 R18 tires

		Parallel kinematics	Z kinematics
Operating weight with standard equipment according to ISO 6016	kg	4,900	4,900
Total length, standard bucket on ground	mm	5,060	5,085
Total width	mm	1,850	1,850
Total height (cab roof)	mm	2,640	2,640
Unladen weight	mm	4,800	4,800
Wheel base	mm	2,100	2,100
Track width FR / RR	mm	1,390	1,390
Rear overhang angle	°	35	35
Ground clearance below propeller shaft	mm	435	435
Turning radius at outside edge of bucket in transport position	mm	4,160	4,160
Turning radius at outside edge of tires	mm	3,780	3,780
Turning radius at inside edge of tires	mm	1,980	1,980

3.13 Front loader installation

Specifications refer to general-purpose bucket and 405/70 R18 tires

		Parallel kinematics	Z kinematics
Width of bucket	mm	1,850	1,850
Capacity in accordance with ISO 7546 (max. density = 1.8 t/m ³)	approx. m ³	0.8	0.8
Payload in bucket 0.8 m ³ x 1.8 t/m ³ or 0.9 m ³ x 1.6 t/m ³	kg	1,440	1,440
Dump height at 45° dump angle	approx. mm	2,550	2,550
Dump reach at max. dump height	approx. mm	700	710
Max. bucket hinge pin height	approx. mm	3,200	3,220
Reset angle	°	50	50
Dump angle at max. dump height	°	45	45
Digging depth, horizontal bucket	approx. mm	100	110
Lift capacity at ground level according to ISO 14397-2	N	48,000	48,400
Ripping force at cutting edge of bucket according to ISO 14397-2	N	45,900	47,300
Tipping load, straight according to ISO 14397-1	kg	3,720	3,720
Tipping load, articulated according to ISO 14397-1	kg	3,280	3,280
Work cycle times, "Lift"	sec.	4.7	4.9
Work cycle times "Lower"	sec.	3.2	3.4
Dumping in uppermost position "In"	sec.	1.1	1.1
Dumping in uppermost position, "Out"	sec.	1.3	0.8

Stability conforms to ISO 14397-1

3.14 Bucket with parallel kinematics

	Width mm	Capacity, heaped m ³	Max. density (γ) t/m ³
General-purpose bucket	1850	0.8	1.8
Bucket with bolt-on cutting edge	1,850	0.8	1.8
Earth bucket	1850	0.9	1.6
Earth bucket with bolt-on cutting edge	1,850	0.9	1.6
Multi-purpose bucket	1,850	0.75	1.6
Multi-purpose bucket with bolt-on cutting edge	1,850	0.75	1.6
Light-material bucket with bolt-on cutting edge	1,850	1.0	1.2
Light-material bucket with bolt-on cutting edge	1,950	1.2	0.8
Side-dump bucket	1,850	0.7	1.8
High-tip bucket	1,850	0.7	1.2

3.14.1 Bucket with Z kinematics

	Width mm	Capacity, heaped m ³	Max. density (γ) t/m ³
Standard bucket	1,850	0.8	1.8
Bucket with bolt-on cutting edge	1,850	0.8	1.8
Earth bucket	1,850	0.9	1.6
Earth bucket with bolt-on cutting edge	1,850	0.9	1.6
Multi-purpose bucket	1,850	0.75	1.6
Multi-purpose bucket with bolt-on cutting edge	1,850	0.75	1.6
Light-material bucket with bolt-on cutting edge	1,850	1.0	1.2
Light-material bucket with bolt-on cutting edge	1,950	1.2	0.8
Side-dump bucket	1850	0.7	1.8
High-tip bucket	1850	0.7	1.2

3 Technical data

3.15 Fork lift attachment

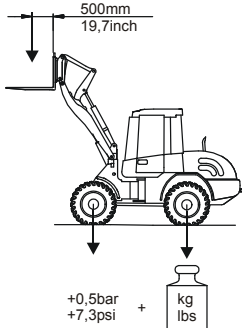
Fork-arm connection in compliance with ISO/FEM Class 2 Form B, DIN 15 173 / ISO 2328 respectively

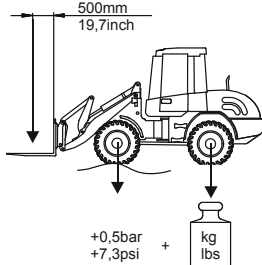
Width of fork carrier	mm	1,240
Length of forks	mm	1,100
Fork cross section	mm	100x45
Max. stacking height	mm	3,070

The payloads are determined in compliance with DIN 24094 / ISO 14397-1 and EN ISO 474-3 respectively with a safety factor of 1.25 or 80% of the tipping load and the machine moving over level ground.

The payloads in crane operation are determined with load hooks on the forks, at a 500 mm load radius from the rear of the fork, according to ISO 14397-1 with a stability factor of 2.0 / 50% of the tipping load.

The payloads are valid for a machine fitted with 12.5-20MPT 10PR tires and in a condition in compliance with ISO 6016.

Total lift range			S=2.0	S=1.25
		kg	1,250	2,050
		lbs	2,750	4,400
		kg	1,380	2,250
		lbs	3,030	4,840

Transport position			S=1.67	S=1.25
		kg	1,720	2,300
		lbs	3,790	5,060
		kg	1,870	2,500
		lbs	4,120	5,500



If screw-on rear axle weights or rear tires with hydroinflation are used.



During fork lift operations, the tire pressure of the front wheels must be increased by at least 0.5 bar.

3.16 Optional accessories (options)

- Orthopedic air-cushioned driver's seat
- Fire extinguisher
- Pressurized cab
- Air-conditioning
- Independent diesel heating with timer
- FOPS-roof guard
- Sliding window in right-hand door
- Working floodlight, rear
- Yellow rotating beacon
- Radio installation kit
- Sliding window, right-hand door
- Diesel exhaust cleaner
- Catalyst
- High-speed version
- Anti-theft device (immobilizer)
- Back-up alarm system
- Overload warning device
- Bucket return positioner
- Electrical tank refilling pump
- Quick-attach system, hydraulically operated
- Snow blade
- Sweeper
- Load hook for attaching to forks
- Rear axle weights
- Outlet for hydraulic hand hammer
- Filling with biodegradable hydraulic oil (ester-based "BIO-E-HYD-HEES")
- Hitch for agricultural or forestry tractor

Further optional equipment available on request!



Any modifications of products and their equipment using extras and work attachments which are not included in our product range require our written approval. If our approval is not sought, our warranty expires, as does our product liability for any resulting consequential damage.

3 Technical data

4 Operation

4.1 First Instruction



The machine must be entered from the left-hand side as seen in the direction of travel.

The right-hand cab door acts as an emergency exit.

If the cab is entered by the right-hand door, the joystick may be operated unintentionally.

If you are not familiar with the operator controls and display elements of this machine, read this Chapter carefully **before** operating the machine.

This Chapter deals with all functions.

Before driving and working with the machine it is necessary to thoroughly familiarize yourself with the display elements and operator controls.

Each time before putting the machine into operation it must be subjected to a thorough visual inspection. Ensure that there is no damage, loose or missing screws, oil accumulations, oil or fuel leakage. Shortcomings must be remedied immediately. In the event of shortcomings which jeopardize the operating safety, the machine must not be put into operation until these have been eliminated.

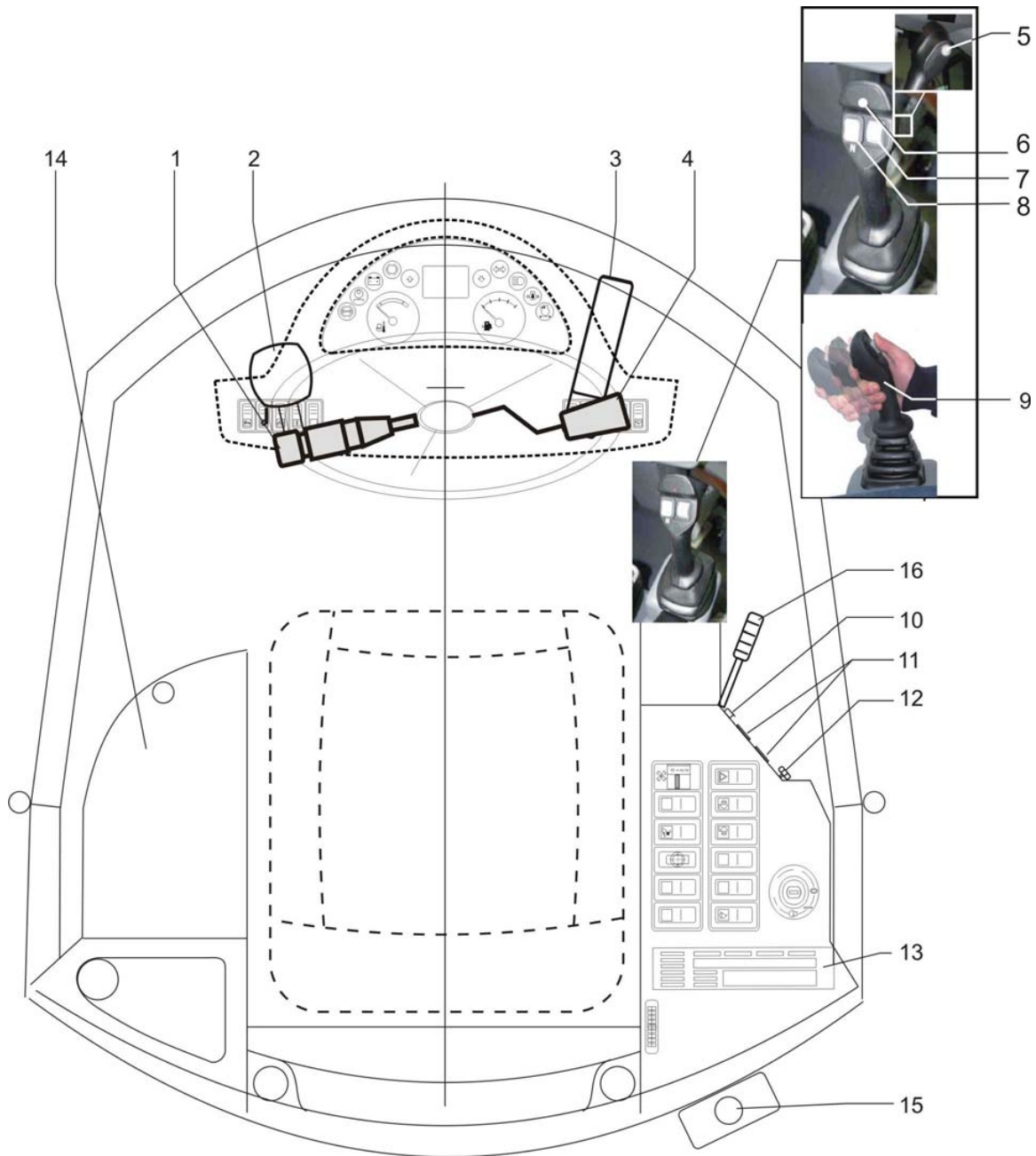
Before putting the machine into operation, the inspections according to chapter 7.8 must be carried out.

4 Operation

4.2 Display elements and operating controls

The following list includes non-standard equipment!

- Operating controls



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Fig. 10.1 Operator controls

	Description of fig. 10.1 - Operator controls
1	Direction indicator, horn, low/-high beam (steering-column switch)
2	Brake-inching pedal
3	Accelerator pedal
4	Steering wheel - tilt and height adjustment
5	Stop button - additional control circuit
6	Control light
7	Actuation – potentiometer, 3rd control circuit
8	Travel direction switch (without function if working hydraulics are deactivated)
9	Impulse mode - float position
10	Power socket
11	Fuse carrier
12	Fresh air - recirculating air
13	Radio
14	Control rod for mechanical quick-attach device
15	Washer fluid tank
16	Parking brake

4 Operation

- Instrument panel

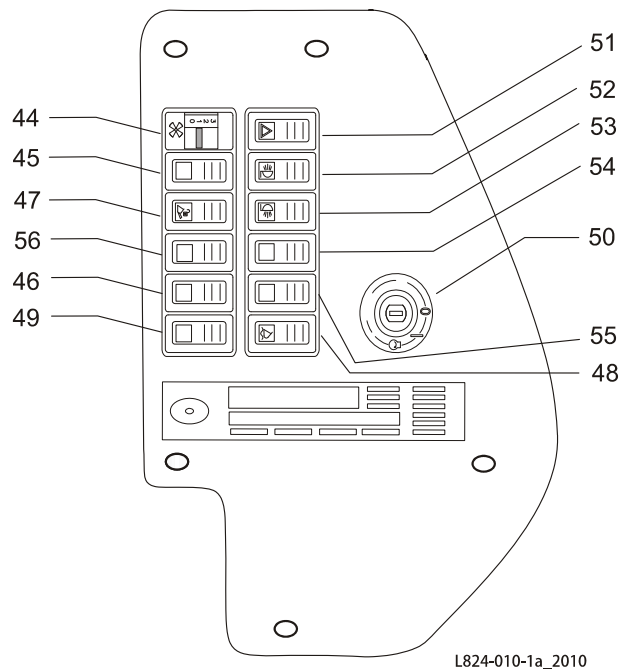
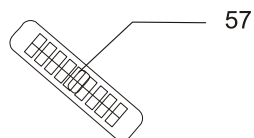
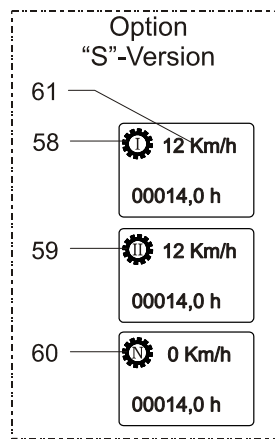
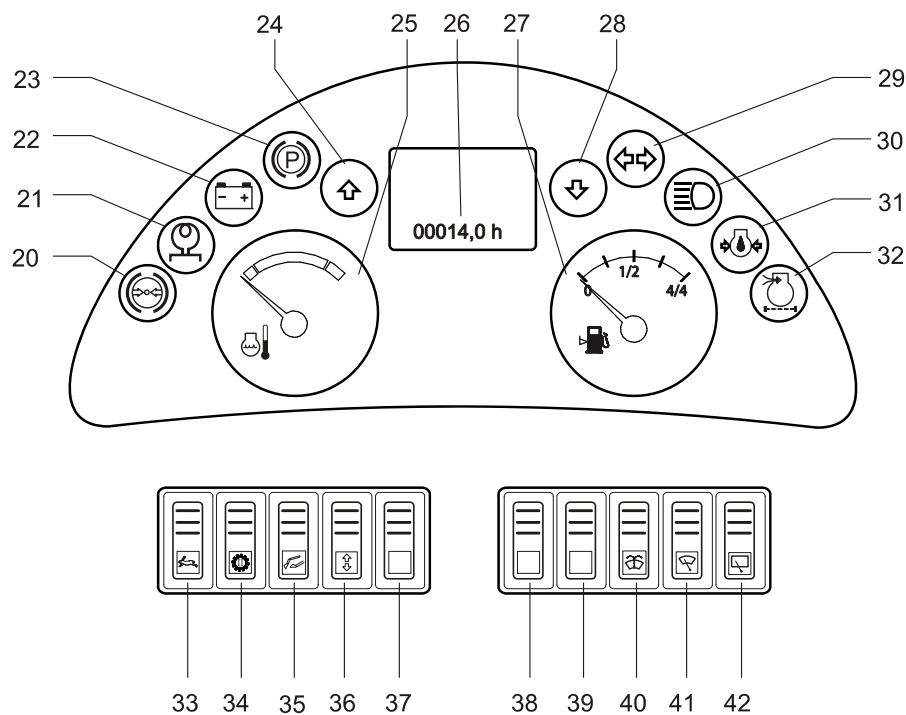


Fig. 10.2 Operator controls

Description of fig. 10.2 - Instrument panel	
20	Not assigned
21	ORANGE - pre-heating monitor
22	RED - battery charge indicator
23	RED - parking brake
24	GREEN - travel direction, forward
25	Coolant temperature
26	Operating hour meter
27	Fuel-level indicator
28	GREEN - travel direction, reverse
29	GREEN - direction indicator
30	BLUE - high beam
31	RED - engine oil pressure
32	RED - air filter indicator
33	Travel speed - FAST - SLOW
34	High-gear changeover switch  Only press if machine is at standstill!
35	Multi-function switch with lock for "working equipment" cut-off and change-over of the "travel direction preselection switches" from pos. 8 to pos. 36  Only press if machine is at standstill!
36	Preselection of travel direction - Function only active if working hydraulics are disabled
37	Not assigned*
38	Not assigned*
39	Not assigned*
40	Windshield washer function front/rear
41	Windshield wiper, front
42	Windshield wiper, rear
43	--
44	Fan switch - heating
45	Switch - air-conditioning
46	Not assigned*

47	Preselection button for actuation – 3rd control circuit
48	Preselection button – float position continuous operation
49	Not assigned*
50	Glow plug and starter switch
51	Hazard warning switch
52	Working floodlight front - switch on the parking light (fig. 10.1, pos. 1)
53	Working floodlight rear - switch on the parking light (fig. 10.1, pos. 1)
54	Not assigned*
55	Not assigned*
56	Potentiometer "flow rate" - 3rd control circuit
57	Control - heating/air-conditioning
58	Monitor - indicator "manual transmission range I"
59	Monitor - indicator "manual transmission range II"
60	Monitor - indicator "manual transmission not ready for operation"  If this symbol comes up, the manual transmission is in an intermediate position. The machine is not ready for driving! This can be remedied by performing brief steering movements until the manual transmission engages.
61	Speed indicator

* for non-standard equipment

4 Operation

4.3 Engine

4.3.1 Starting the engine



Each time before putting the machine into operation, the inspections according to section 7.8 must be carried out.



Before switching on the engine, take care to ensure that no one is in the immediate vicinity of the machine or in the danger zone.

- All gearshift levers to neutral.
- Parking brake (11/9) applied, travel direction preselectors (11/8; 11/36) in position "0".
- Insert ignition key in pre-heat/ starter switch (11/50).

Hot start

- Switch on ignition and wait for approx. 5 sec.



The display establishes the internal readiness for operation. As a result, all indicator lamps are briefly activated for a functional check.

- Turn clockwise to "1"; the indicator lamps (11/22, 11/31) light up.
- Pre-heating starts; the indicator lamp (11/21) lights up.
- Press the accelerator pedal (11/3) completely down for normal start and to the quarter-open position for hot start.
- After the indicator lamp (11/21) has gone out, turn the pre-heat/ starter switch to "Start". As soon as the engine is running, turn the ignition key to "1" and decrease the revs to low idle speed. The indicator lamps should go out.
- If the engine has not started after max. 20 seconds, turn the ignition key to "1" or "0", and pause for at least 1 minute before trying again. Repeat the start-up procedure.



Do not drive the engine at full throttle straight away. Drive with restraint until the operating temperature of the engine has been reached.

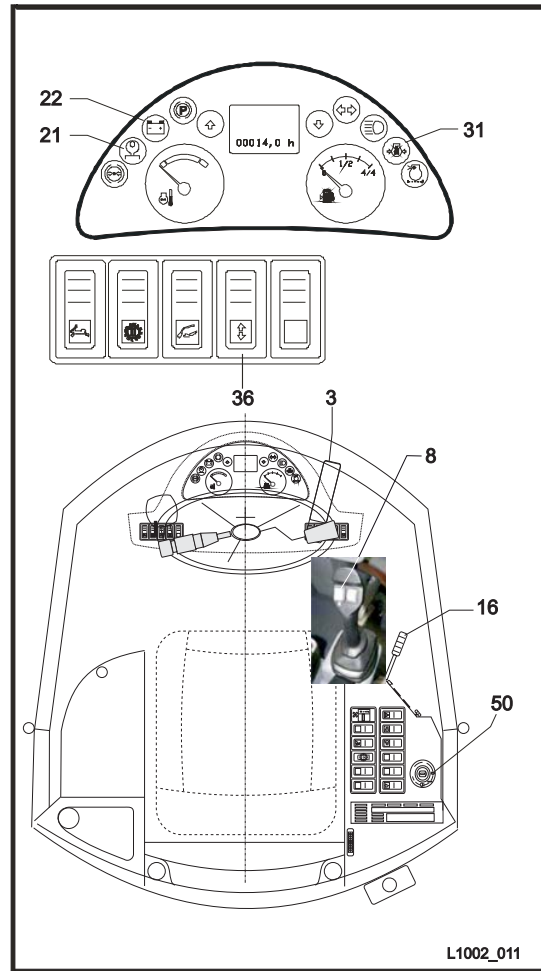


Fig. 11 Operation

4.3.2 Monitoring during operation



*If the engine and the machine are put into operation **without** prior remedy of the defect, severe damage to the engine may result!*

- If the battery charge control lamp (12/22) or the engine oil pressure indicator lamp (12/31) light up, switch off the engine immediately and determine the cause, or call for service personnel.
- If the permitted engine oil temperature (12/25) is exceeded, stop work, open the engine hood and keep the engine running at idle speed to allow it to cool down. Once the engine has cooled down, turn it off and determine the cause of overheating, or call for service personnel.
- If the air filter service indicator lamp (12/32) lights up, perform the necessary air filter maintenance.

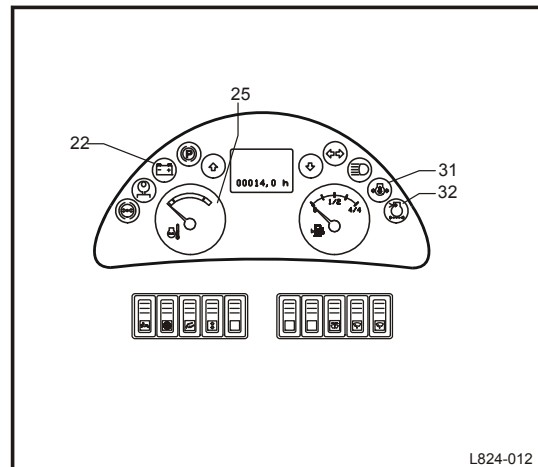


Fig. 12 Operation

4.3.3 Switching off the engine



Do not switch off the engine when running at full throttle, but allow it to run for a short time without load at low idle-running speed.

- Turn the ignition key to "0". The engine stops automatically.

4 Operation

4.4 Driver's seat / Steering wheel tilt adjustment

Driver's seat

The comfort seat is spring-mounted with oil-pressure operated shock absorbers and lap belt.

The seat meets international quality and safety standards in compliance with ISO 7096 and ISO 6683 (fig. 13).

1. Horizontal adjustment
2. Weight adjustment
3. Seat back adjustment
4. Vertical adjustment

Raising seat:

Raise seat until it clicks audibly into place.

Lowering seat:

Raise seat as far as the stop; the seat then sinks to its lowest position.

Tilt adjustment of steering wheel

- Push down lever (14/4)
- Adjust steering-wheel tilt.
- Release lever.

Steering wheel height adjustment

- Push up lever (14/4).
- Adjust steering-wheel height.
- Release lever.

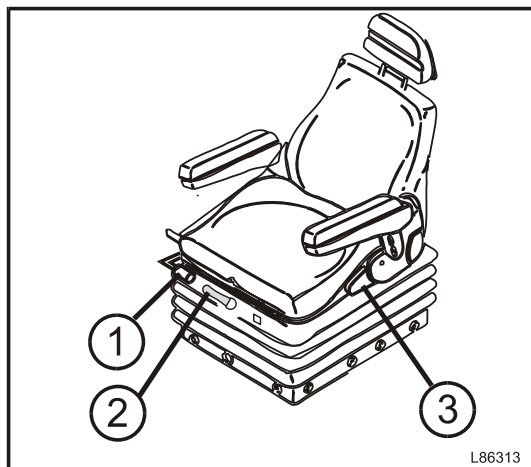


Fig. 13 Operator's seat

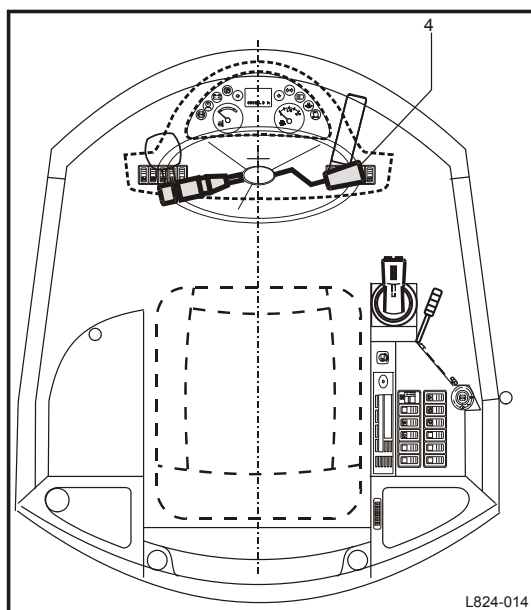


Fig. 14 Operation

4.5 Heating / ventilation

Heating

- The heater is connected to the engine oil circuit.
- The fan is operated using the switch (15/44); temperature is adjusted using the control (15/57) and can be operated with fresh air and re-circulating air.
- Open aspirating hole (15/12) for re-circulating air mode.
- The air is distributed by adjusting the air vents.

Ventilation

- In ventilation mode, the valve towards the engine oil circuit remains closed.
- The fan is operated using the switch (15/44).
- The air is distributed by adjusting the air vents.

Air-conditioning system (optional)



The air conditioning system should be switched on for approx. 5 minutes at least once a month to lubricate the compressor seals.

- Adjust ventilation to circulating air mode, open aspirating holes (15/12).
- Control (15/57) in position "Cold".
- Turn the air conditioning system on with the rotary switch (15/43).
- Switch on the blower (15/44).



How to achieve good cooling performance:

- After switching on the air conditioning system, open the windows for 2-3 minutes to allow the hot air (stored heat) to escape.
- Keep windows and doors closed.
- In order to achieve optimum cooling circulation, close the foot and front air vents and only open the rear air vents (15/60).
- It is recommended to cool down the vehicle interior temperature by no more than 6 to 8°C below outside temperature.

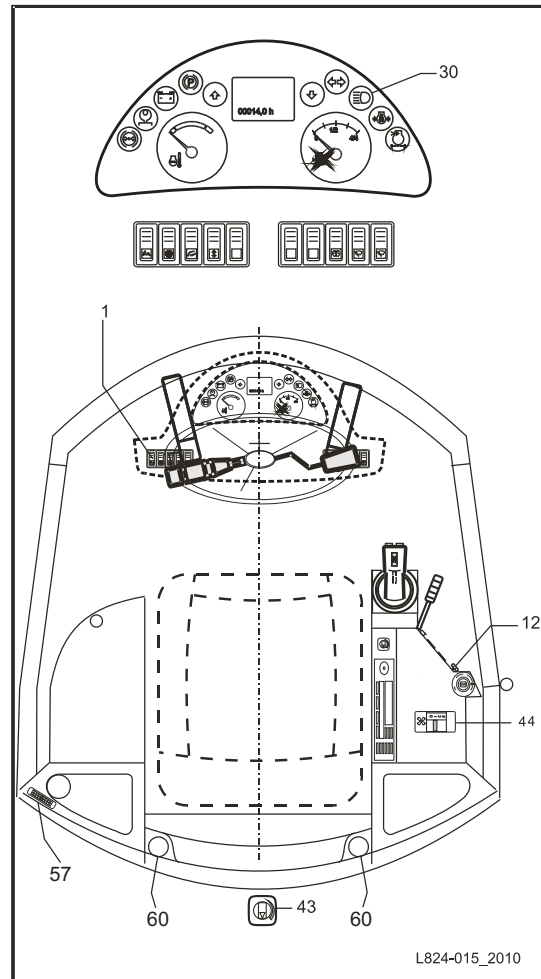


Fig. 15 Operation

4 Operation

4.6 Lighting in compliance with German Road Traffic Regulations (StVZO)

The lighting of the loader is switched on and off by turning the steering-column switch (15/1).

Setting 0	Light Off
Setting 1	Parking light
Setting 2	Driving light (low beam / high beam). Switch from one to another by lifting the steering-column switch (15/1). Blue indicator light for high-beam (15/30) lights up

4.7 Hydroinflation of tires

When the loader is used with a fork lift attachment, the rear wheels may be filled with a water-antifreeze mixture to increase the lifting capacity.

Prepare the mixture in an appropriately sized container. Allow it to cool and stir until there are no more lumps.



Always pour magnesium chloride into the water, not the other way round!
Do not allow the solution to come into contact with eyes, skin or clothing.
Caustic substance!

Recommendation when filled to 75% with antifreeze protection to -30 °C

Values per wheel:

Type of tire	MgCl ₂ approx. kg	H ₂ O l	Total kg
405/70 SPT	55	70	125
12.5-20 MPT	57	74	131
335/80 XM	59	73	132
335/80 SPT	51	66	117
12.5-18 MPT	45	58	103
14.5-20 MPT	57	74	131

MgCl₂ = Magnesium chloride

H₂O = Water

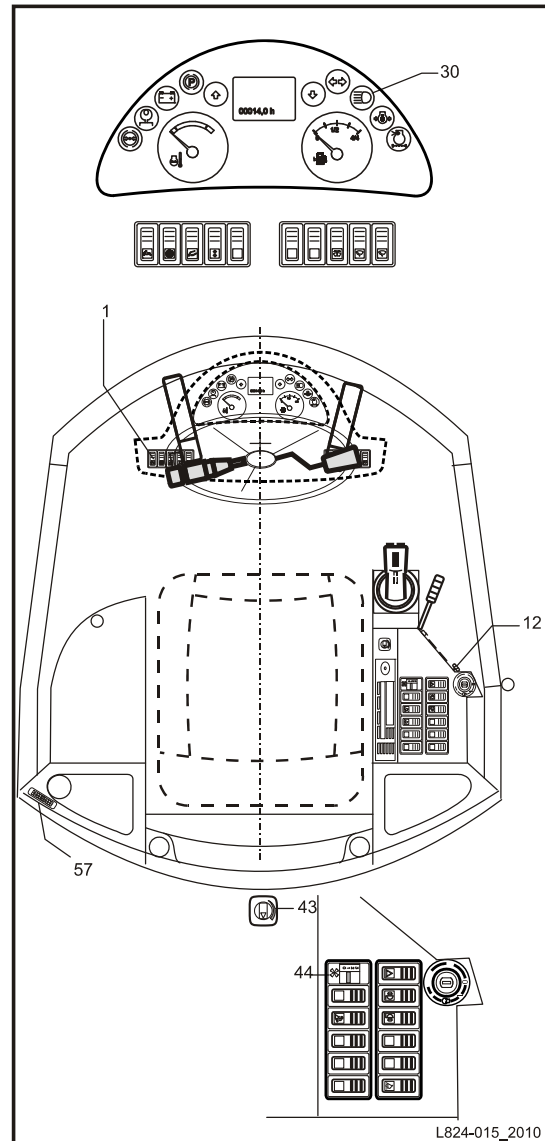


Fig. 16 Operation

4.8 Driving, steering and braking

4.8.1 Driving



When driving on public roads, the wheel loader, as a self-propelled work machine, is subject to the legal regulations valid in the user's country. (For example, in the Federal Republic of Germany, StVZO and StVO).



The machine has **two** preselection switches for travel direction, which are alternately active.

These are changed via the multi-function switch (16/35).

One preselection switch for travel direction (16/36) is located on the instrument panel and another such switch on the joystick (16/8) for controlling the working hydraulics.

The multi-function switch (16/35) is only to be pressed if the machine is at a standstill and both travel direction preselection switches are in neutral position. If the two direction-of-travel preselection switches are pressed in a contradictory manner, the machine stops.

When **driving on roads**, the joystick (16/8) for the working equipment must be deactivated via the multi-function switch (16/35).

This also deactivates the travel direction preselection switch on the joystick (16/8). The direction of travel is preselected using the switch (16/36) on the instrument panel.

In **working operation**, the joystick (16/8) for the working equipment must be activated via the multi-function switch (16/35).

This also deactivates the switch (16/36) on the instrument panel.

The direction of travel is preselected using the travel direction preselection switch on the joystick (16/8).



Drive carefully down gradients at a moderate speed. Do not press accelerator pedal fully down.

Reduce travel speed before switching from hydraulic high-speed gear to hydraulic low-speed gear.

The machine must be stopped before switching from mechanical gear speed 2 to mechanical gear speed 1.

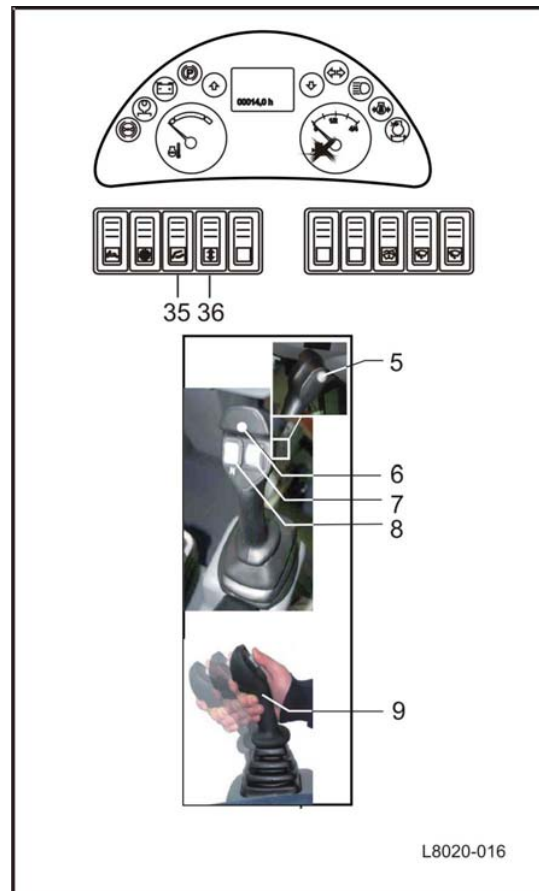


Fig. 16 Operation

4 Operation

Driving off

- Set the travel direction preselection switch on the joystick (17/8) and on the instrument panel (17/36) to "0" (neutral position).
- The indicator lamps (17/24 and 17/28) must not light up.
- Start engine.
- Raise lift frame as far as the "Travel" height mark (18/1).
- Select speed range "FAST" or "SLOW" (17/33) as required.
- High-speed version (option) - select speed range I or II.
Observe the indicator light (17/58-60).
- Release the parking brake (17/16).
- Adjust the desired travel direction using the preselection switches (17/8 or 17/36 respectively).
- The indicator lamp (17/24 or 17/28) lights up.
- Press accelerator pedal (17/3). The machine only drives off once a certain engine speed is reached.
- Travel speed is increased and decreased using the accelerator pedal. Travel speed directly depends on engine speed.
- The direction of travel may be changed quickly by operating the preselector switches (17/8 or 17/36 respectively).

Coming to a halt

- Travel speed is reduced by releasing the accelerator pedal. The hydrostatic travel drive acts as a non-wearing auxiliary brake.
- Operate the brake-inching pedal (17/2) as required.

See also chapter "4.8.3 Brakes".

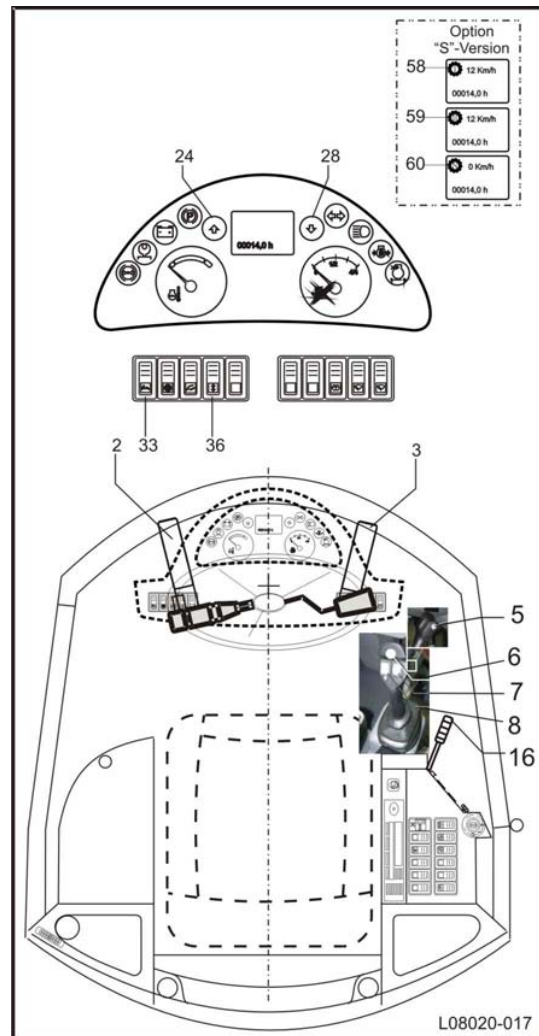


Fig. 17 Operation

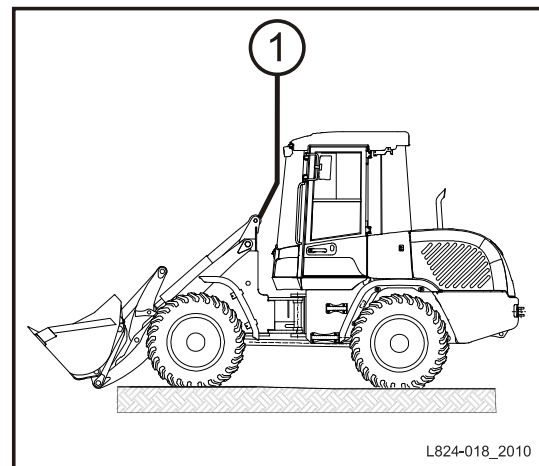


Fig. 18 Height mark

4.8.2 Steering

- The wheel loader features a fully hydraulic, proportionally acting articulated steering.
- Priority supply of hydraulic oil to steering through load-sensing system.



In the event of steering malfunctions, determine the cause immediately (see Trouble-Shooting Table) and call for service personnel if necessary.

4.8.3 Brakes

Service and auxiliary brake

- To bring the machine to a halt, release the accelerator pedal (19/3). The hydrostatic travel drive then acts as an auxiliary brake.
- Operate the brake-inching pedal (19/2) as required.

Parking brake

- Only apply the parking brake (19/9) if the machine is stationary.



Once the parking brake is applied (19/16), the travel drive is deactivated.

Brake-inching mechanism

- The machine features a brake-inching mechanism altering the relationship between travel speed and engine speed.
- When the brake-inching pedal (19/2) is operated, travel speed is reduced - irrespective of engine speed - until the machine comes to a stop.
This mechanism permits sensitive driving at maximum engine speed, e.g. when loading a truck, where fast working cycles are required.

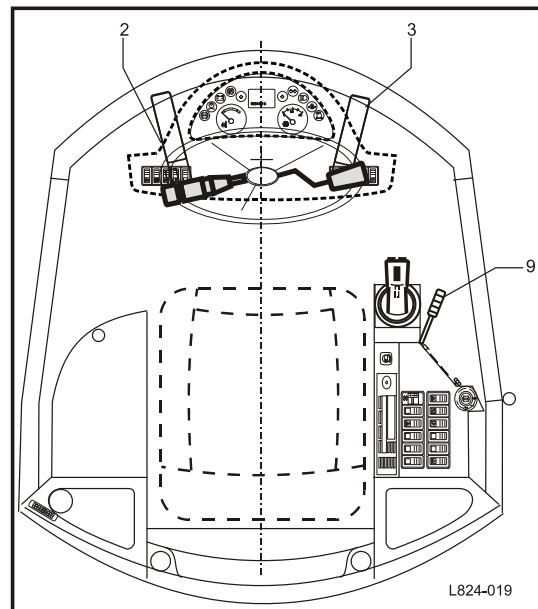


Fig. 19 Operation

4 Operation

4.8.4 Driving on roads

Before driving on open roads, the following points have to be observed:



The wheel loader must be equipped as stipulated by the regulations authorizing the use of vehicles for road traffic in the user's country.



When travelling longer distances, schedule breaks so that tires and components are able to cool down.

- Empty the bucket and tilt back completely.
- Attach the protective device on the front bucket edge.
- Secure the side-dump bucket with socket pins.
- Completely retract the high-tip bucket.
- Fold up the forks of the fork lift attachment, lock in place and secure against lateral shifting.



Rigid forks must be dismantled before driving on public roads!

- Raise the lift frame as far as the height color mark (18/1) until sufficient ground clearance is secured.
- Set the travel direction preselection switch on the joystick (20/8) and on the instrument panel (20/36) to "0" (neutral position).
- Switch off the working hydraulics (20/35).



Only shift when machine is at standstill!

- Check the function of the direction indicators, hazard warning lights, horn, low/high beam.
- Close the cab door.

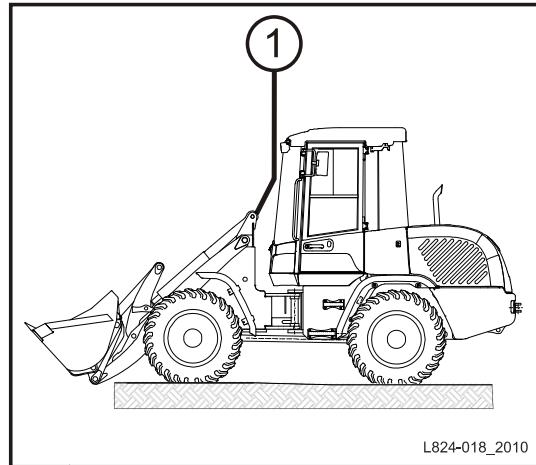


Fig. 18 Height color mark

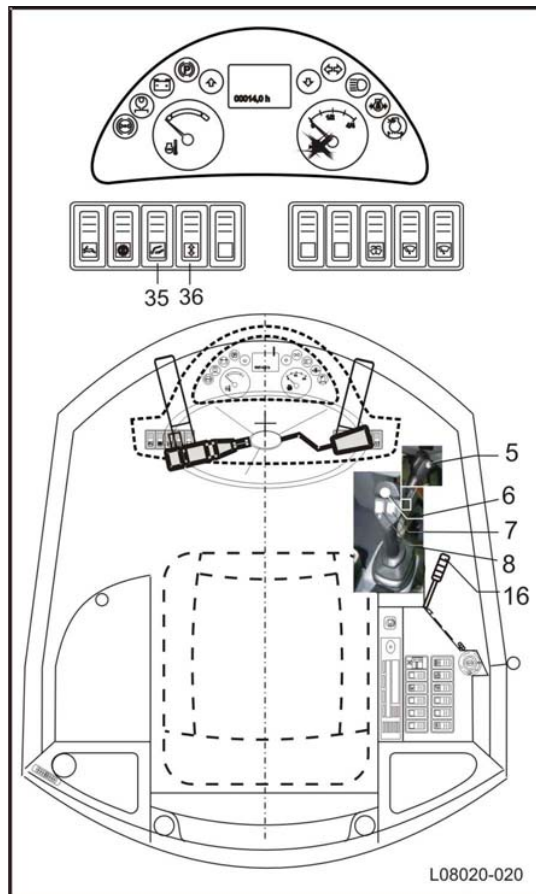


Fig. 20 Operation

4.8.5 Switching off the machine (parking)

- Set the travel direction preselection switches (21/8 and 21/36) to "0".
- Lower the work attachment onto the ground.
- Switch off the working hydraulics (21/35).
- Apply the parking brake (21/16).
- Switch the engine off and remove the ignition key.
- Lock the cab after finishing work to keep **unauthorized persons** from getting in.



If necessary, use chocks to stop the machine from rolling away.

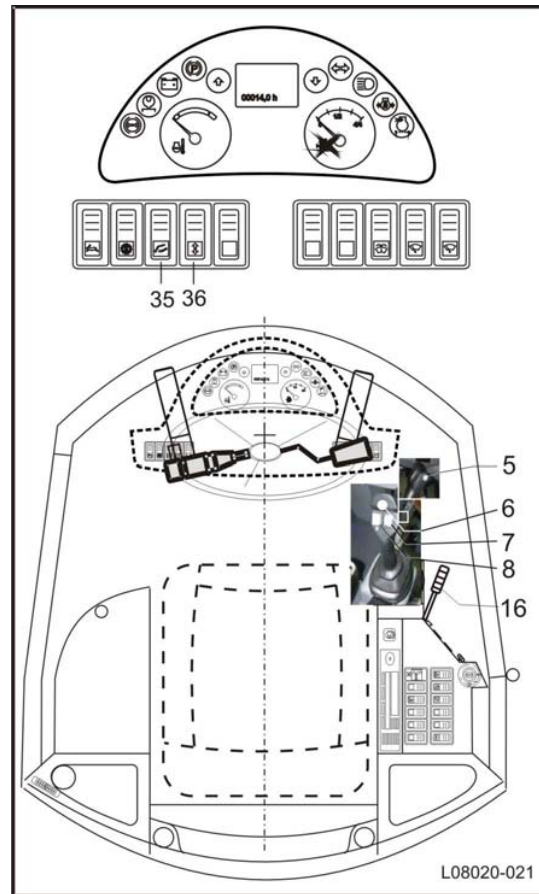


Fig. 21 Operation

4 Operation

Working Operation of the machine 5

5 Working Operation of the machine

5.1 General notes



Daily before start of operation and after every attachment change, check the correct fastening of the work attachments as well as the correct locking of the quick-mount hitch. The bucket is to be carefully moved at low height.

- Before commencing loading work, memorize the lever controls well.
- During loading operations, driving and work movements should flow in smooth succession.
- Drive slowly when familiarizing yourself with the controls.

5.1.1 Lever controls

1	Lowers the lifting frame, float position
2	Opens
3	Closes
4	Dumps
5	Travels forwards and backwards
6	Lifts lifting installation
7	Tilts back



* For grading work, only tilt the joystick half way, because if it is tilted all the way the "regeneration" function takes effect.

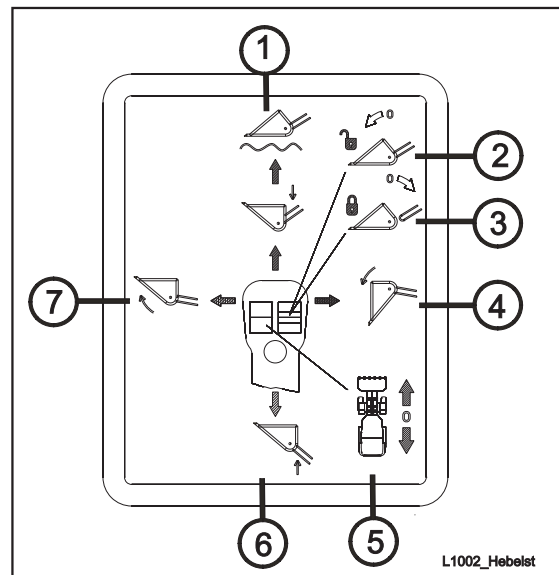


Fig. – Lever controls

5 Working Operation of the machine

5.2 Operation - Loader

- Switch on the work equipment (22/35).

Operation - Bucket

- Operate joystick (22/6).

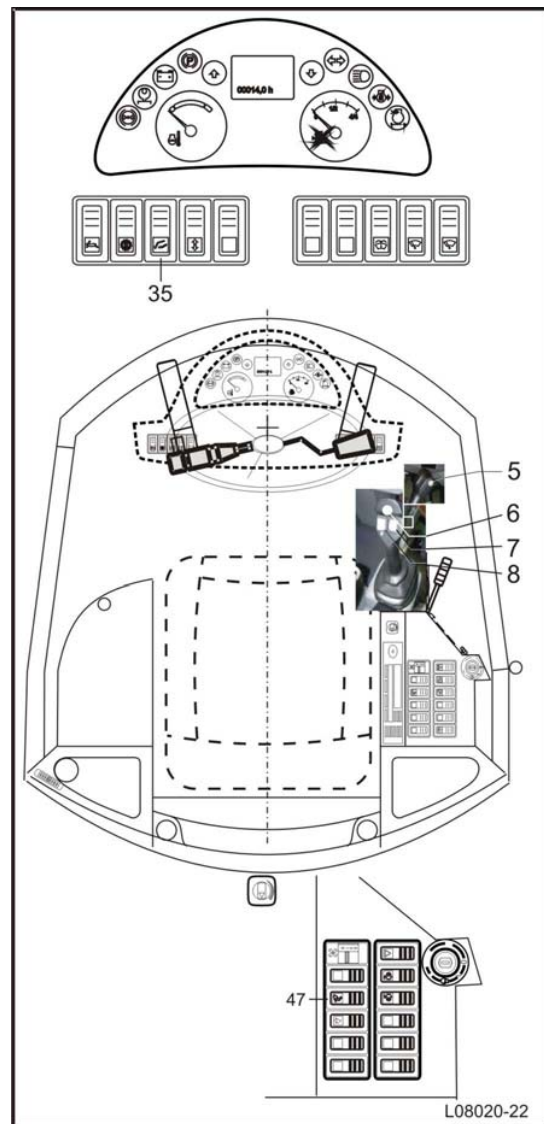


Fig. 22 Operation

Working Operation of the machine 5

Fingertip control (electro-proportional control)

Third control circuit

- Proportional actuation of the control circuit
- In continuous operation, the amount can be controlled.
- Sensitive control of hydraulically-driven work attachments, such as multi-purpose bucket, sweeper, etc.



Fingertip control and float position are deactivated as soon as the ignition is switched off.



No oil flow if the potentiometer (23a/56) is turned as far to the left as it will go.

Impulse mode

- Press the "Continuous operation - additional control circuit" (23a/47) button once.
- Push the roller (23a/7) on the joystick until the required amount of hydraulic oil is achieved.
- For sensitive movements, the flow rate can be reduced by using the potentiometer (23a/56).

Continuous operation

- Turn the potentiometer (23a/56) as far as it will go to the left.
- Press the "Continuous operation - additional control circuit" (23a/47) button once.
- Select the direction of rotation using the roller (23a/7) on the joystick.
- With the roller pushed, press the stop button (23a/5) on the rear until the control light (23a/6) flashes on the front of the handle.
- Release the roller (23a/7) and stop button (23a/5).
- Set the flow rate/rotational speed using the potentiometer (23a/56).
- To deactivate continuous operation, press the button (23a/47) or the roller on the joystick (23a/7).



The oil flow also depends on the engine speed.



If an attachment is used repeatedly, continuous operation can also be activated via preset potentiometer (23a/56).



The continuous and impulse mode functions are deactivated as soon as the ignition is switched off.

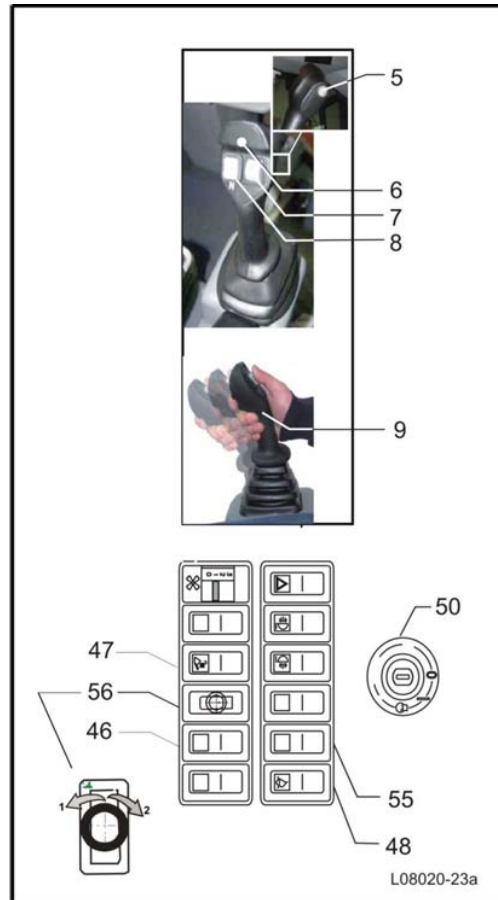


Fig. 23a Operation

Potentiometer (23a/56)

1 = lower oil flow = greater precision

2 = increased oil flow = higher speed

5 Working Operation of the machine

Operation - Float position



The float position for continuous mode must always be switched off when not in use. Switch (23a/48) in position "0".



Fingertip control and float position are deactivated as soon as the ignition (23a/50) is switched off.

Impulse mode

- Lower the bucket onto the ground.
- The "float position" function is activated if the "lowering" pressure point on joystick is exceeded (23a/9).
- For the "float operation" the joystick (23a/9) must be held in the "float position", otherwise it returns to the neutral position.

Continuous operation

- Lower the bucket onto the ground.
- Continuous "float" operation is activated by pressing the button (23a/48) and putting the joystick (23a/9) into "float position".
- To end continuous operation, return the joystick (23a/9) to the neutral position or deactivate the button (23a/48).

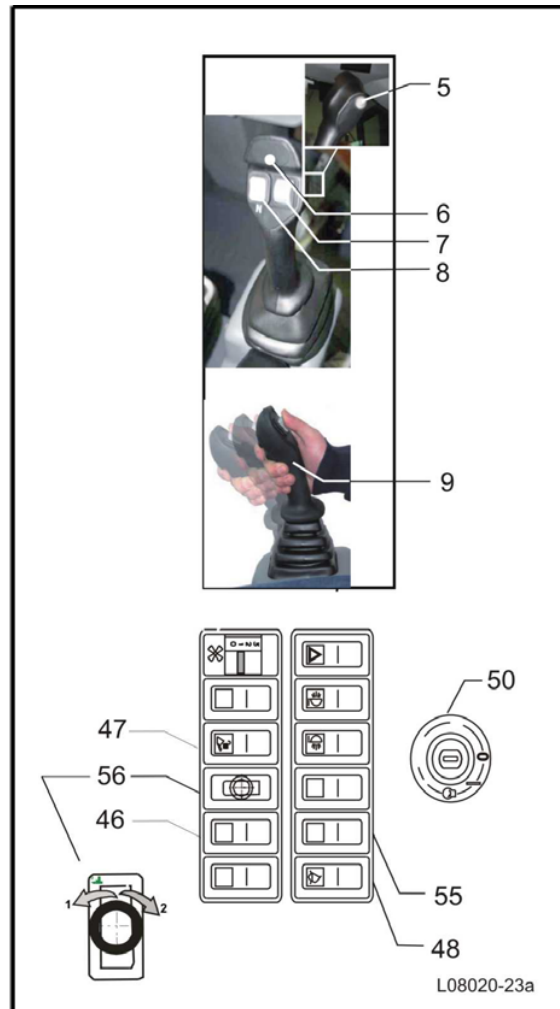


Fig. 23a Operation

Working Operation of the machine 5

5.3 Changing work attachments

5.3.1 General notes

To achieve maximum utilization of the machine for a variety of applications, a great number of work attachments and accessories are available.

The machine is equipped with a quick-attach system, to shorten the time it takes to change attachments.

When mounting a multi-purpose bucket, front sweeper, etc., an additional control circuit is required.



*Under certain circumstances, it is possible to use the work attachments of predecessor models on our machines. When mounting work attachments of predecessor models, however, these may have to be adjusted and/or are subject to utilization restrictions. The installation of work attachments which are not included in our product range requires our written approval. It is essential to consult your dealer **before mounting** such a work attachment.*



When the attachments have been removed, they must be secured against tilting and overturning to avoid possible injuries to persons.

5 Working Operation of the machine

5.3.2 Assembly of work attachments



The bearings on the lifting frame, quick-attach system and work attachment must be free of dirt. The system must be relieved of pressure before hydraulic connections are disconnected.

Procedure for changing directly mounted work attachments



If an attachment is hydraulically operated, disconnect the hydraulic connection first of all (system must be without pressure).

- Lower the work attachment onto the ground and position so that it cannot tilt.
- Remove the pin of the linkage and the pin of the lift frame.
- Move the lift frame out of the work attachment and install a new one.

Procedure for changing work attachments with mechanical quick-attach system



If an attachment is hydraulically operated, disconnect the hydraulic connection first of all (system must be without pressure).

- Lower the work attachment onto the ground and position so that it cannot tilt.
- Raise pin (24/2) and open the quick-mount hitch using the control rod (24/1) until the locking bolts are completely retracted.
- **Check the function of the quick-attach system lock and grease the pins if necessary.**
- Attach another work attachment and close the quick-mount hitch until the locking bolts are completely extended and the lock clicks in.
- Ensure that the work attachment and the lock are properly seated.
- The control rod is kept in the left-hand storage box in the cab.

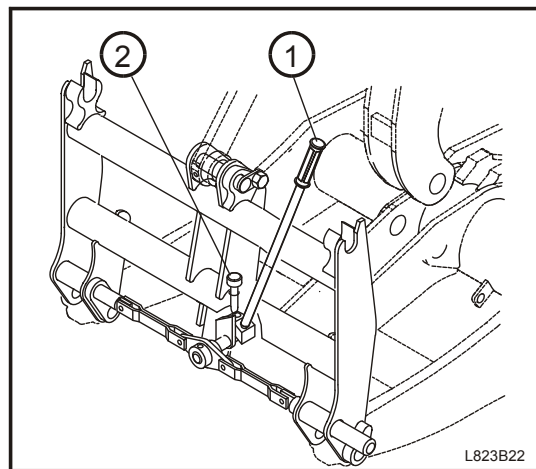


Fig. 24 Quick-attach system

Working Operation of the machine 5

Procedure for changing work attachments with hydraulic quick-attach system

- Lower the work attachment onto the ground and position so that it cannot tilt.
- Switch off the diesel engine.
- In the case of a hydraulically activated work attachment, start the ignition and press the rocker switch (25/47) once.
- Push the roller (25/7) forwards and backwards repeatedly to relieve the pressure of the quick couplings.
- Switch off the ignition.
- Release the hydraulic quick couplings on both distributor blocks.
- Switch the ball valve (26/1) to the "Unlock quick-attach system" position.
- Start the diesel engine.
- Activate the auxiliary circuit with the rocker switch (25/47).
- Unlock the quick-attach system with the roller (25/7) and move out of tool.
- Pick up new tool and lock with the roller (25/7).



Perform a visual check to ensure that the quick-attach system is correctly locked.

- Switch off the diesel engine.
- In the case of a hydraulically activated work attachment, start the ignition and press the rocker switch (25/47) once.
- Push the roller (25/7) forwards and backwards repeatedly to relieve the pressure of the quick couplings.
- Switch off the ignition.
- Ball valve (26/1) in position "Quick-attach system locked".
- Connect the hydraulically operated work attachment to the connection of the additional control circuit.



The additional control circuit (25/47) must be switched off unless a hydraulically operated additional attachment is connected.

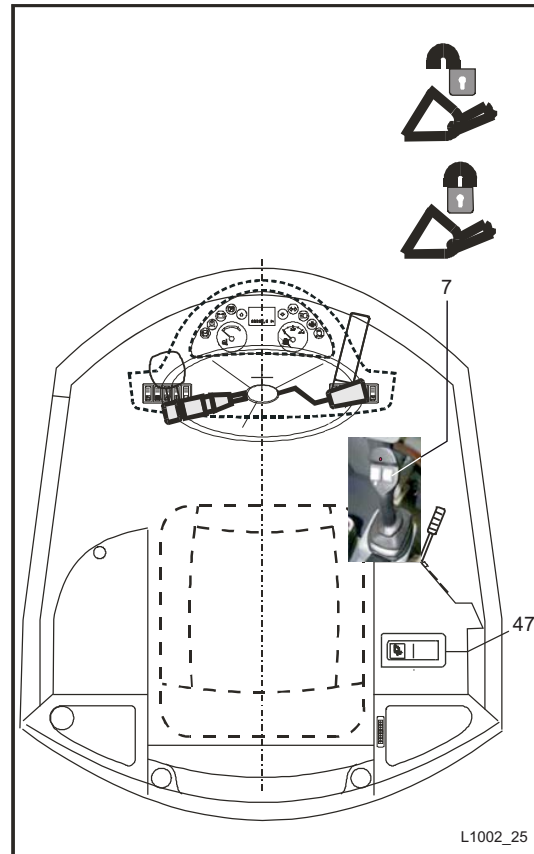


Fig. 25 Operation

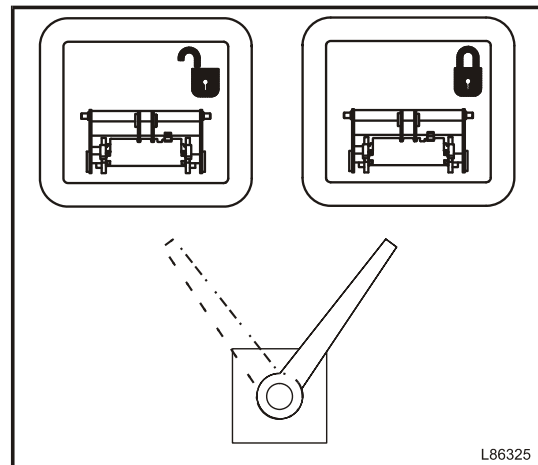


Fig. 26 Hydraulic quick-attach system

5 Working Operation of the machine

5.4 Notes on how to work with the machine

5.4.1 Loading

During transport, the bucket - either filled or empty
- must be kept as close to the ground as possible.

If possible, avoid long transport distances!



For loading, lower the bucket and position the cutting edge parallel to the ground. Reduce driving speed by inching as required.

Move the bucket into the material to be loaded.

As soon as the bucket is filling, slightly raise the lift frame and tilt back the bucket.

For dumping, raise the bucket until it is above the point of dumping and dump the material.

5.4.2 Scraping and grading

- Lower the lift frame and move the cutting edge into the ground keeping a flat angle of inclination. Do not penetrate too deeply to ensure smooth removal of earth.
- During this operation, the depth is only to be leveled by moving the bucket in and out.

5.4.3 Excavating

- To dig out an excavation, strip layers which are as regular as possible.
- Plan the excavating work in such a way as to enable the wheel loader to drive forward with full bucket out of the excavation.
- Keep the outward run of the excavation as flat as possible.

Recovery and transport of the machine 6

6 Recovery and transport of the machine

6.1 Recovery of the machine

Towing of the wheel loader must be restricted to clearing a junction or a road, to prevent damage to the hydrostatic travel drive.

If possible, let the diesel engine run at low idle during towing.

Towing lugs

- *front:* right and left on the axle plates.
- *rear:* bottom right and left on the side plates of the rear end.



Max. load suspension of towing lugs approx. 5,300 kg.

- Whenever the wheel loader has to be towed (maximum 50m when the engine is stopped), "Travel" oil circuit must be opened so that the hydrostatic transmission no longer acts as an auxiliary brake.
- On both high pressure limiting valves (27/1) with bypass, in connection plate of hydro pump, loosen nut (28/1) and screw in screw (28/2) until even with nut.
- Re-tighten the nut (28/1).
- After towing, screw back screw (28/2) until the stop.
- Re-tighten the nut (28/1).

Torque: 30 Nm



Absolute cleanliness is essential when working on the hydraulic system. Always secure the machine with chocks and relieve the hydraulic system of pressure before carrying out maintenance and repair work.

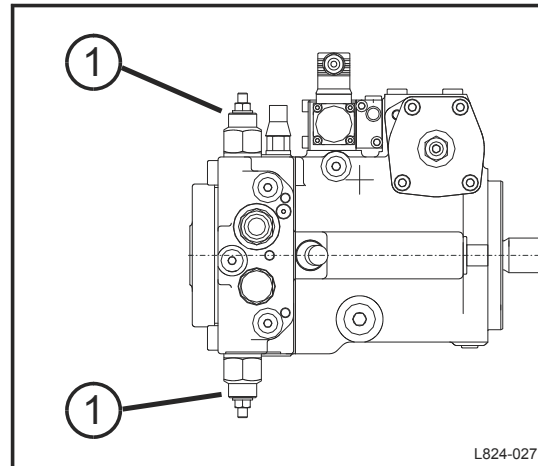


Fig. 27 Hydraulic pump

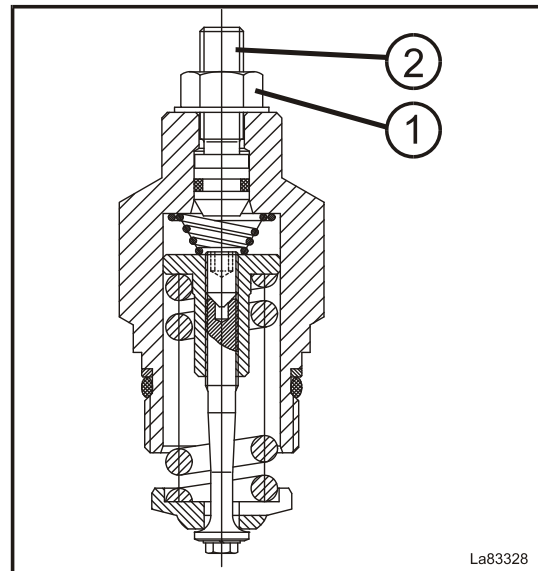


Fig. 28 High-pressure relief valve

6 Recovery and transport of the machine

6.2 Loading the machine using a crane



Use a crane lifting harness and a crane with adequate lifting capacity!



Take note of the total machine weight!



Only use approved and undamaged sling gear.

- Do not pull sling gear over sharp edges.

To load the machine by use of a crane, the following preparations are required:

- Empty the bucket and tip back.
- Move the lift frame to travel position.
- Apply the pin of the articulation lock (29/1).
- Stop the engine.
- Dismount from the machine and close the doors.
- Attach the loader to the hoisting appliance at the specified, marked points (fig. 29) in the correct manner.

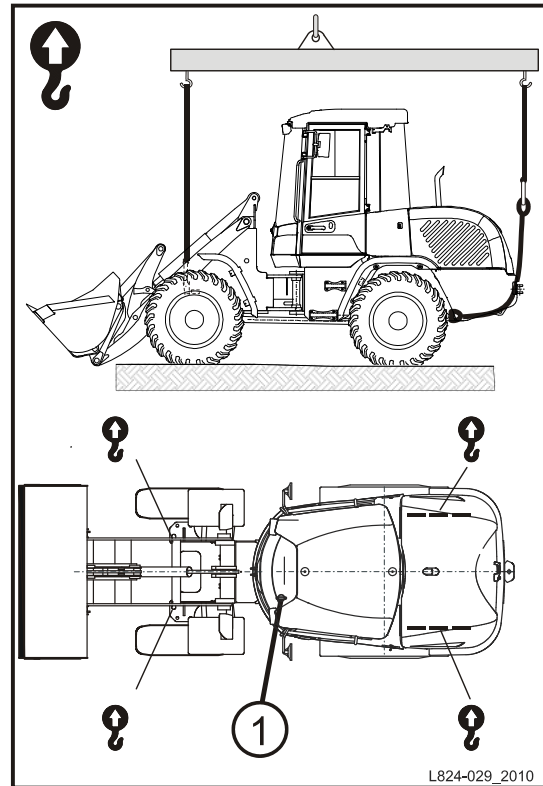


Fig. 29 Loading the machine using a crane

6.3 Transporting the machine

To transport the machine onto a flat bed trailer, railway goods wagon, etc. the following measures must be taken:

- Empty the bucket and tilt back.
- Drive the machine onto the flat bed trailer, goods wagon, etc., or lift by crane if required.
- Replace the articulation lock (30/1).
- Lower the work attachment onto the ground.
- Stop the engine.
- Dismount from the machine and close the doors.
- Attach the excavator to the points illustrated (fig. 30) in the correct manner.



Be aware of the total transport height.

Risk of accident when driving in tunnels, under bridges, etc.!



Transport dimensions see chap. 3 Technical data.

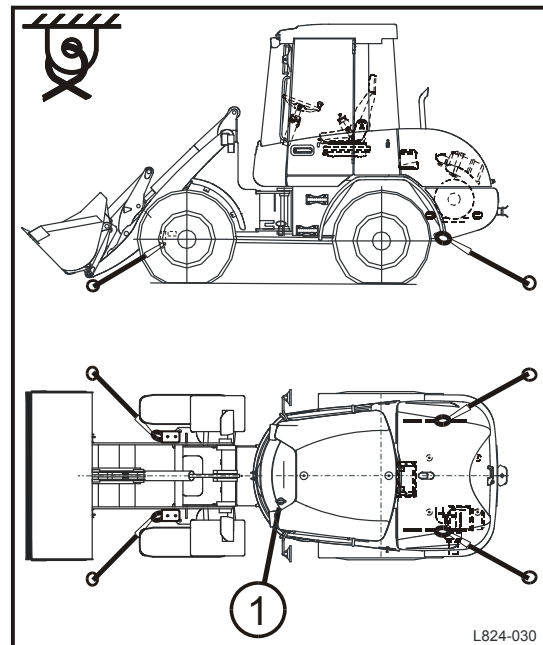


Fig. 30 Lashing for transport

7 Maintenance and Care

7.1 General notes

The good operating condition and life expectancy of machines are largely influenced by care and maintenance.

For this reason, it is in every machine owner's interest to perform the specified maintenance work and comply with the service intervals. This chapter deals in detail with periodic maintenance, inspection and lubricating tasks.

The type-specific maintenance and inspection plan lists all work to be performed on the machine at regular intervals. Maintenance and inspection plans for this purpose are contained in every Instruction Book.

It is essential that the recommendations in chapter 2 "Safety and Accident Prevention", are observed.

7.2 Intervals

Initial inspection	Once before first putting into operation	Chapter 7.8.1
Daily tasks	Every 10 operating hours or every shift ¹⁾	Chapter 7.8.2
Weekly tasks	Weekly or after 50 operating hours ¹⁾	Chapter 7.8.2
100 operating hours	Once after first putting into operation ²⁾	Chapter 7.8.4
Every 500 operating hours	After every 500 operating hours or 6 months	Chapter 7.8.4
Every 1,000 operating hours	After every 1,000 operating hours or 12 months	Chapter 7.8.4
Every 2,000 operating hours	After every 2,000 operating hours or after 2 years	Chapter 7.8.4
¹⁾ The first date to arrive always applies		
²⁾ also applicable if new or overhauled diesel engines are put into operation.		

7 Maintenance and Care

7.3 Regular oil analysis

Oil analysis are not intended as a substitute for the oil change intervals but - apart from a possible reduction of maintenance costs and as a form of preventive maintenance - they take into account the increasing environmental awareness.

Advantages of an oil analysis

- Extension of the oil change intervals under standard or light-duty operating conditions.
- Minimum wear of high-quality components with optimum use of the lubricants.
- Periodic laboratory analyses enable an early detection of imminent damage.
- Repairs performed before they actually become absolutely necessary help prevent serious and unexpected damage.
- Resulting damage will also be prevented.

How often should the oil be analyzed?

Regular oil analysis will indicate any developing trends regarding the state of the oil and the machine. The oils should be analyzed at the following intervals:

- Hydraulic oil: 1,000 running hours
- Transmission oil: 500 running hours
- Engine oil: 100 running hours

Based on the first results, the laboratory recommends the interval for the next sampling.

Ask your dealer for an information booklet detailing the scope and procedures of the oil analysis.

7.4 Warranty

During the warranty period thorough inspections are stipulated which are obligatory and must be carried out by trained specialist dealer personnel.



The inspections are obligatory and must be paid for.

The performance of inspections as specified must be confirmed on the inspection cards in the warranty/handing-over certificate.

Failure to do so may adversely affect our warranty coverage.

7.5 Inspection parts and aids



Service parts for inspections should be ordered well in advance!
Contact your dealer for further information!

Lubricants

- The machine's life expectancy and operating condition largely depend on the use of the specified lubricants and compliance with the service intervals.
- If lubricants which do not conform to our recommendations are used, consequential damage may occur for which we will not assume liability, even inside the warranty period.
- For lubricant specifications see section 3.9.

7 Maintenance and Care

7.6 Care and cleaning



The machine must be cleaned on a suitable surface with an oil separator.

- **Neither** a steam-jet appliance **nor** a high-pressure cleaning apparatus may be used for cleaning during the first two months after the machine has been used for the first time, or when newly painted, to ensure that the paint can harden sufficiently.
- Do not use aggressive detergents to clean the machine. We recommend using commercially available cleaning agents for passenger cars.
- When cleaning with a steam-jet appliance, the hot water jet should not exceed 80 °C and a spray pressure of 70 bar.
- Linings (insulating materials, etc.) should not be exposed directly to water, steam or high-pressure jets.
- When cleaning with water or steam jets, take care not to spray exhaust-gas and air filter openings.
- When cleaning the engine with water or steam jets, do not expose sensitive engine parts, such as generator, cabling, oil pressure switches, etc. directly to the jet.
- After each wet clean, the machine must be lubricated in accordance with the lubricating plan and a test of all work cycles, steering and driving functions carried out.

7.7 Notes for winter operation

The following points and the relevant notes in the engine instruction manual should be observed during winter operation.

Hydraulic oil

- If the machine is not used for longer periods at temperatures around and below freezing, warm up the engine by running at medium revs for approx. 3-5 min.

Engine oil

- The oil viscosity (SAE class) should be selected according to the ambient temperature at the machine's place of operation.



Note that 5W-30 engine oil is changed back to standard oil with viscosity class SAE 15W-40 at temperatures >+30°C.

Coolant

- Before the beginning of the cold season, check the level of antifreeze and adjust in line with the ambient temperature if necessary. The antifreeze is factory-set to -25 °C.

Condition of the battery

- A good cold start performance requires a well-charged battery. By warming the battery to approx. +20° (remove the battery after the engine has been turned off and store it in a warm room), the minimum starting temperatures can be lowered by 4-5 °C.
- When installing the battery, ensure good contact of terminal connections.
- Only tighten terminal screws so that they are "hand-tight", to prevent deformation of the terminal cones!

Fuel

- Only use commercially available brand-name diesel fuel with a sulfur content of less than 0.5%.
- Use only winter diesel fuel in winter to prevent line connections becoming blocked through paraffin deposits. At very low temperatures, troublesome deposits may also occur when winter diesel is used.
- If only summer diesel is available, or if winter diesel must be used at very low temperatures, we recommend the addition of petroleum (fig. 36) or additives. These mixtures should only be used temporarily, **never for longer periods**.



Only mix the components in the tank!

First fill the required quantity of petroleum and then add the diesel fuel.



Flow improvement agents are to be selected according to the specifications of your fuel supplier.



Petrol shall not be added.
Danger of explosion!

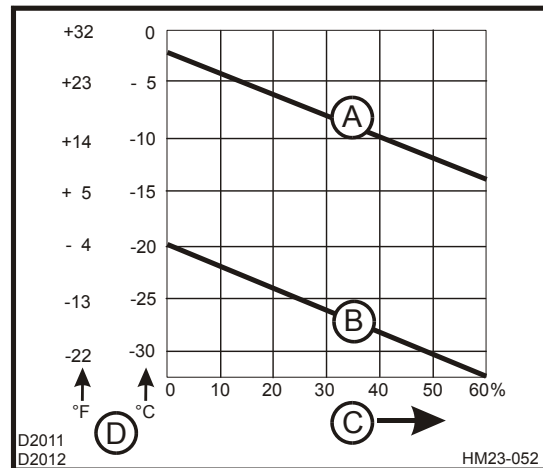


Fig. 36 Table for the addition of petroleum or additives

A = Summer diesel

B = Winter diesel

C = Added proportion of petroleum

D = Outside temperature

7 Maintenance and Care

7.8 Checking, maintenance and inspection plans

7.8.1 Initial inspection (hand-over inspection)

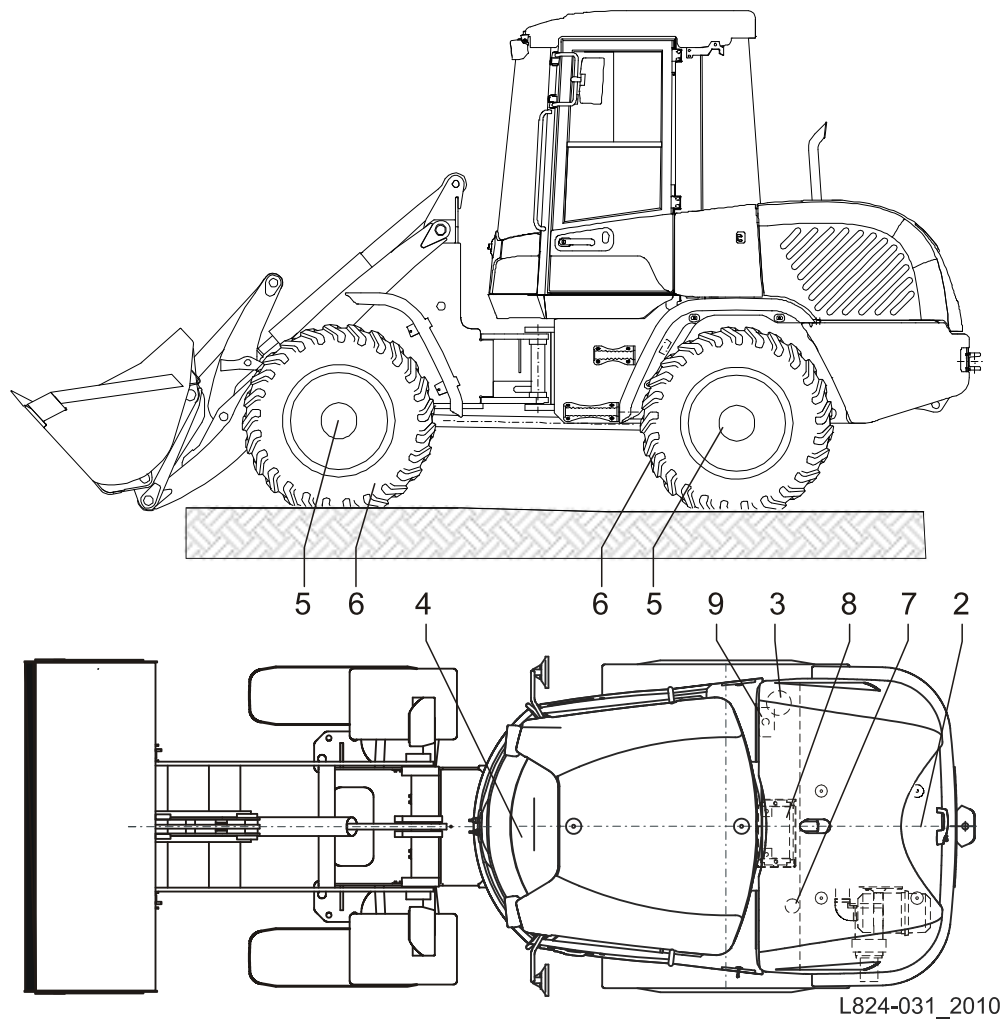


Fig. 31 Initial inspection

Maintenance and Care 7

Work to be carried out by trained specialist dealer personnel:

		Chapter
1	Check machine for presence of machine-specific operating instructions	--
2	Check the engine oil level	7.9.1
3	Hydraulic oil level	7.9.9
4	Check the fuel level	7.9.4
5	Check oil level of differential and axle hubs	7.9.13
6	Check tire pressure and tightness of wheel nuts	7.9.14
7	Check brake oil level	7.9.8
8	Check the battery fluid level and charge condition	7.9.17
9	Top up windshield washer system	7.9.19
10	Lubricate the machine (all lubrication points)	7.8.3
11	Test run, hydraulic function check and test work.	--
12	Visual inspection of all hoses, pipes, cylinders, etc. for leak tightness	--
13	Check function of electrical indicating and warning elements, as well as the light system	--
14	Sign hand-over card and return to manufacturer	--

7 Maintenance and Care

7.8.2 Daily and weekly tasks

Inspection and maintenance jobs to be performed by service personnel

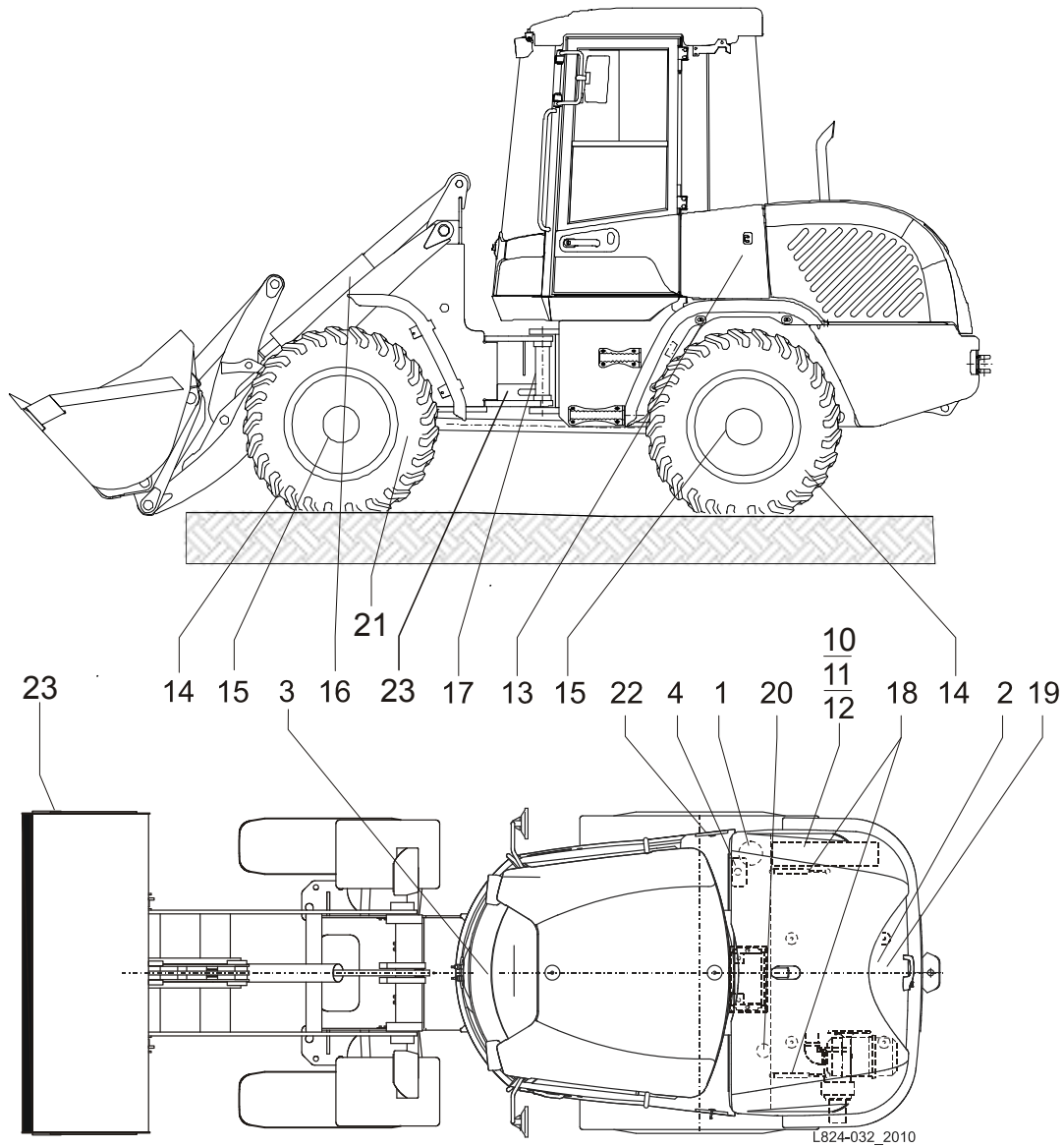


Fig. 32 Inspection and service schedule

Maintenance and Care 7

Daily		Chapter
1	Check hydraulic oil level	7.9.9
2	Check the engine oil level	7.9.1
3	Check fuel level (fuel gauge on instrument panel)	7.9.4
4	Check windshield washer fluid level	7.9.19
5	--	
6	Visual check (general) for material cracks, external damage, completeness, etc.	--
7	Check for leaks: Pipes, hoses, control valves, hydraulic pumps, cylinders, etc.  <i>The screw-in couplings must be locked when tightening hose or line connections to prevent rotation.</i>	--
8	Check electrical indicating and warning elements, and the lighting system	--
9	Check smooth running of operator controls	--

Weekly		Chapter
11	Clean cooling fins on hydraulic oil cooler  Machine damage due to strong accumulation of dust. • Shorten the cleaning intervals!	7.9.10
12	Clean cooling fins on water cooler  Machine damage due to strong accumulation of dust. • Shorten the cleaning intervals!	7.9.3
12	Check the coolant level	7.9.3
13	Check that door catches function perfectly	--
14	Check tire pressure and tightness of wheel nuts	7.9.14
15	Check fastening of axles and propeller shaft	--
16	Check bearing bushings and bolts of work equipment	--
17	Check pins/bolts, bushings, and the linkage assembly of the articulated steering	--
18	Check that pneumatic springs of engine hood function perfectly	--
19	Drain the fuel filter	7.9.4
20	Check brake oil level	7.9.8
21	Check function of brakes	--
22	Check if the dust filter for cab ventilation is dirty and clean if required  Machine damage due to strong accumulation of dust. • Shorten the inspection and cleaning intervals!	7.9.18
23	Check function, condition and completeness of safety equipment	--
24	Lubricate the machine according to overview of lubricating points	7.8.3

7 Maintenance and Care

7.8.3 Overview of lubricating points



Replace defective grease nipples immediately and check if grease passes through!

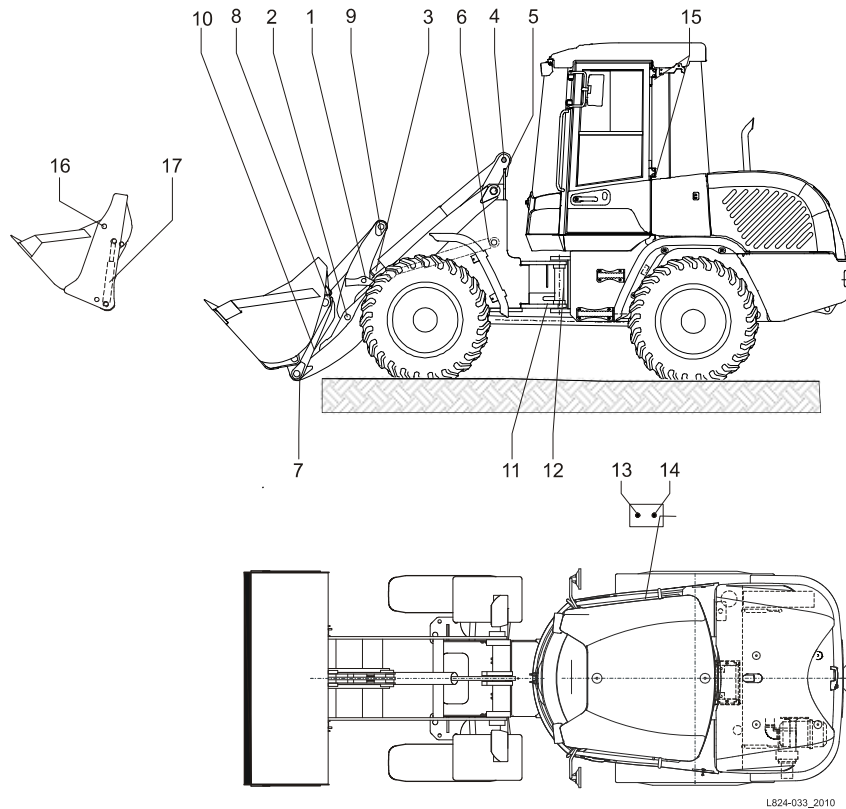


Fig. 33 Lubrication schedule - parallel kinematics

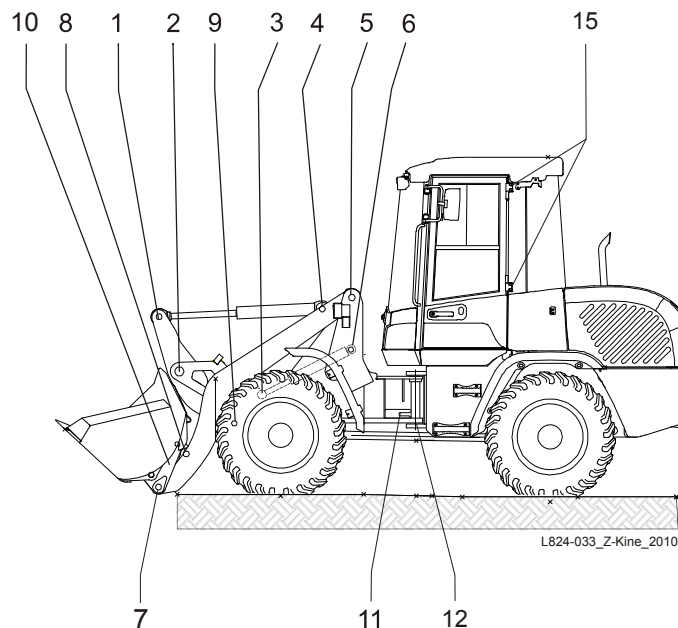


Fig. 33 Lubrication schedule - Z kinematics

Grease all lubricating points with multi-purpose grease

The intervals stated are valid for one-shift operation

Item	Lubricating point	Number	daily	weekly	Chapter
1	Tilt cylinder - Tilt control lever	1		X	--
2	Lift frame - Tilt control lever	1		X	--
3	Lift cylinder - Lift frame	1 (2)*		X	--
4	Tilt cylinder - Front-end	1		X	--
5	Lift frame - Front-end	2		X	--
6	Lift cylinder - Front-end	1 (2)*		X	--
7	Lift frame - Quick-attach system	2		X	--
8	Linkage - Quick-attach system	1		X	--
9	Tilt control lever - Linkage	1		X	--
10	Mechanical quick-attach system Hydraulic quick-attach system	3 2		X X	--
11	Steering cylinder - Front-end	1		X	--
12	Articulation	3		X	--
13	Steering cylinder - Rear-end	1		X	--
14	Rear axle bearing	1		X	--
15	Door hinges	4		X	--
16	Multi-purpose bucket	2		X	--
17	Multi-purpose bucket cylinder	4		X	--

* () Z kinematics



In the case of special operating conditions, e.g. working on sandy ground, the lubrication intervals should be shortened, in order to encourage self-cleaning of bearing points.

7 Maintenance and Care

7.8.4 Inspection plan

Work to be carried out by trained specialist dealer personnel:

O = <i>Checking, maintenance</i> X = <i>Replace</i>		Operating hours				min 2x year- ly	min 1x year- ly	Chapter
Perform work with machine at operating temperature		after 100	every 500	every 1000	every 2000			
1	Check machine for presence of machine-specific operating instructions	O	O					--
2	Change the engine oil			X			X	7.9.1
3	Change the engine oil filter			X			X	7.9.2
4	Drain water from the fuel tank	O	O			O		7.9.4
5	Replace the fuel filter			X			X	7.9.4
6	Clean fuel pump, sieve filter			O				7.9.4
7	Check air intake	O	O					7.9.5
8	Replace main air filter cartridge	according to the service indicator					X	7.9.5
9	Replace the air filter safety cartridge	as required ¹⁾						7.9.5
10	Clean cooling fins on hydraulic oil cooler  Machine damage due to strong accumulation of dust. • Shorten the cleaning intervals!	O	O			O		7.9.10
11	Clean cooling fins of water cooler (combined cooler)  Machine damage due to strong accumulation of dust. • Shorten the cleaning intervals!	O	O			O		7.9.3
12	Check antifreeze level in coolant						O	7.9.3
13	Change coolant	as required ¹⁾						7.9.3
14	Check V-belt tension	O		O				7.9.6
15	Check engine mount and pump attachment	O	O					--
16	Check engine speed setting, upper and lower idle speeds	O	O					--
17	Check valve lash of engine and adjust if necessary	1x every 500 OH and as required						--
18	Check injection valves				O			--
19	Check or replace the fuel leakage oil line			O	X ¹⁾			7.9.4
20	Replace toothed belt ³⁾							--
21	Check crankcase breather in valve cover				O			--
22	Check acid level and battery connections	O	O					7.9.17
23	Check condition of tires, tire pressure and fastening of wheel nuts	O	O					7.9.14
24	Check fastening of axles and propeller shaft	O	O					--
25	Check bearing bushings and bolts of work equipment and replace if necessary	O	O					--
26	Check bushings and bolts of the articulation and the articulated steering and replace if necessary	O	O					--

Maintenance and Care 7

O = Checking, maintenance X = Replace		Operating hours				min 2x year- ly	min 1x year- ly	Chapter
Perform work with machine at operating temperature		after 100	every 500	every 1000	every 2000			
27	Check that door catches function perfectly, and replace if necessary	O	O					--
28	Clean or replace the dust filter for cab ventilation	O		X			X	7.9.18
29	Check electrical indicating and warning elements as well as lighting equipment.	O	O					--
30	Check smooth running of operator controls and adjust if necessary	O	O					--
31	Check tightness of all pipes, hoses, control valves, hydraulic pumps, cylinders, etc.  <i>When tightening hose and pipe connections, screw-in couplings must be locked to prevent rotation.</i>	O	O					--
32	Check or change hydraulic oil	O	O	X ²⁾			X	7.9.9
33	Replace insert of hydraulic oil return suction filter	X	X			X		7.9.11
34	Replace the breathing filter			X			X	7.9.12
35	Check function of brakes, replace brake oil	O	O		X		X	7.9.8
36	Bleed brake	O	O					7.9.8
37	Differential of rear axle with transmission / option: manual transmission, oil check and/or oil change	X	O	X			X	7.9.13
38	Differential - front axle oil: check or oil change resp.	X	O	X			X	7.9.13
39	Wheel hubs of front and rear axles: oil check or oil change	X	O	X			X	7.9.13
40	Lubricate the machine according to overview of lubricating points	O	O					7.8.3
41	Check function, condition and completeness of safety equipment	O	O					--
42	Hydraulic function check with function pressure test	O	O					--
43	Test run and test work	O	O					--
44	Sign inspection card and return to manufacturer	O	O ⁴⁾					7.4

1) at least every 2 years

2) Extension of oil change intervals according to oil sample analysis and laboratory report.
For further information see section 7.3.

3) every 5 years or 3,000 running hours

4) Within warranty.

7 Maintenance and Care

7.9 Inspection and maintenance work

7.9.1 Engine oil

Checking the engine oil level

- The oil level must be checked daily before start-up with the machine standing on level ground.
- The notches on the oil dipstick (35/1) indicate the min. and max. oil levels.
- Top up engine oil if necessary. Unscrew the closure cap (35/2) and pour in oil using a clean container.

Changing the engine oil



Collect the waste oil, do not allow it to seep into the ground.

Dispose of according to regulations!

- Run the engine until it reaches operating temperature, engine oil temperature approx. 80°C.
- Park the machine on level ground.
- Stop the engine.
- Remove the cover from the bottom rear-end.
- Place suitable drip pans under the opening
- Screw the oil drain hose onto the oil-change valve (35/3).



Danger of scalding when hot oil is drained!

- Remove the oil drain hose and screw the protective cap onto the valve.
- Close the service opening with the cover.
- To change the engine oil filter (35/4), see section 7.9.2.
- Top up engine oil to the "MAX" mark on the oil dipstick (35/1) using the filling hole (35/2).
- Start the engine and run at low idle speed for approx. 2 min.
- Stop the engine.

- Check oil level and refill oil (emptied cooler has filled with oil).
- Start the engine and run at low idle speed for approx. 2 min.
- Stop the engine.
- Check the oil level and top up oil if required.

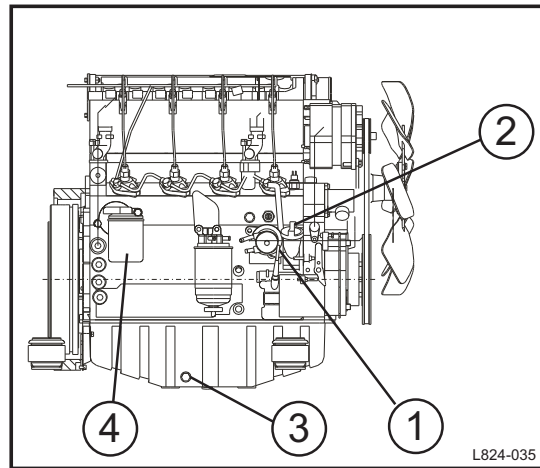


Fig. 35 Engine oil

7.9.2 Engine oil filter

The engine oil filter must be replaced every time the engine oil is changed.

- Place oil drip pan below the engine oil filter.
- Clean the outside of the engine oil filter.
- Unscrew the filter cartridge (36/4) using a commercially available tool and check that the fastening stud is firmly secured in the filter head.
- Dispose of the filter cartridge according to regulations.
- Check filter head condition and clean.
- Fill the new filter with oil, wet the sealing ring with oil and tighten firmly by hand.
- After a test run, check the tightness of the engine oil filter cartridge.

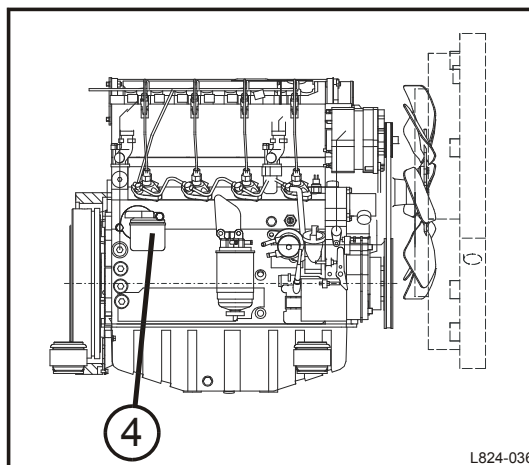


Fig. 36 Engine oil filter

7 Maintenance and Care

7.9.3 Cooling system - combined hydraulic oil-water cooler

7.9.3.1 Checking the coolant level

- Check the coolant level daily before starting, with the machine parked on level ground. To do so, use the sight glass (37-1/2) of the combined cooler. If the coolant level is insufficient, top up accordingly.



Danger of scalding

due to hot oil getting into contact with skin or eyes.

- Only open the cooler cap after the engine has cooled down.
- Remove the cap (37-1/1) and top up coolant if required. With the engine cooled down, the compensation tank should be half full.



Refill with a 50%-50% mixture of water and antifreeze.

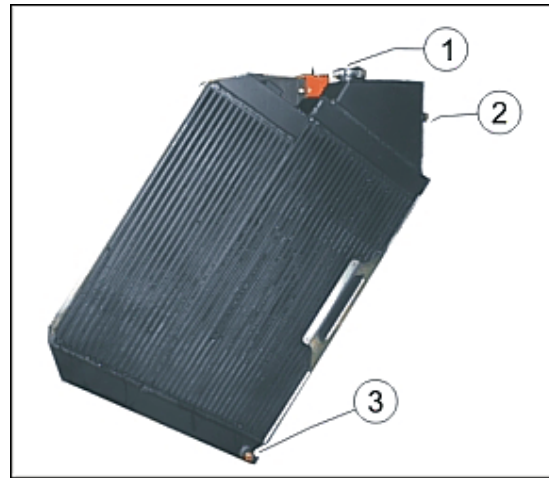


Fig. 37-1 Combined cooler

7.9.3.2 Checking antifreeze

Before the beginning of the cold season, check the level of antifreeze.

- The antifreeze is factory-set to -25 °C. If temperatures are lower, the level of antifreeze must be adjusted accordingly.

7.9.3.3 Cleaning cooling fins



Machine damage

due to overheated engine.

- *Thoroughly clean the cooler to prevent overheating of the engine and/or the hydraulic oil.*



Only perform cleaning after stopping the engine and letting it cool down!

- Clean the combined cooler from the outlet side with compressed air.
- If necessary, e.g. if there is oil in the cooler, clean with cold cleaner or steam jet device with oil separator over a suitable surface. Do not spray generator directly with water or jet stream.
- After cleaning, the engine must be brought to operating temperature in order to dry the cooler.

7.9.3.4 Changing coolant



Danger of scalding

due to hot oil getting into contact with skin or eyes.

- *Only open the cooler cap after the engine has cooled down.*

- Park the machine on a level surface.
- Switch off the engine and allow the cooling system to cool down.
- Remove the cooler cap (37/1).
- Unscrew the water drain plug (37/3) and drain coolant.
- If necessary, flush the cooling system with clean water.
- Re-fit the drain plug and the water hose.
- Fill the cooling system with coolant and close the cap.
- Start the engine and bring to operating temperature; turn off the engine and allow to cool.
- Check the coolant level and top up coolant (several times, if necessary).

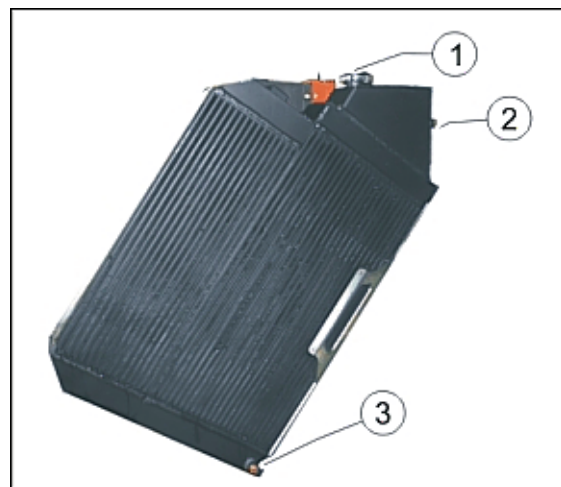


Fig. 37-2 Combined cooler

7 Maintenance and Care

7.9.4 Fuel system

Checking the fuel level

- Check the fuel level using the fuel gauge (38/27).
- Top up fuel every day after use to prevent condensation from forming before the machine is next put into operation.

Draining the fuel filter

- Open the fuel filter on the water drain (39/2) until pure fuel escapes.
- Close again the water drain.

Replacing the fuel filter

- Clean the outside of the fuel filter (39/1).
- Unscrew the filter cartridge using a commercially available tool and check that the fastening stud is firmly secured in the filter head.



Collect fuel and dispose of according to regulations!

- Dispose of the filter cartridge according to regulations.
- Check filter head condition and clean.
- Wet the seal with oil or fuel and tighten firmly by hand.
- Check tightness.



The fuel system does not have to be vented.

Fuel tank

- Drain water from the fuel tank via the drain plug (40/1).
- Clean the filler screen (40/2) and check for damage.

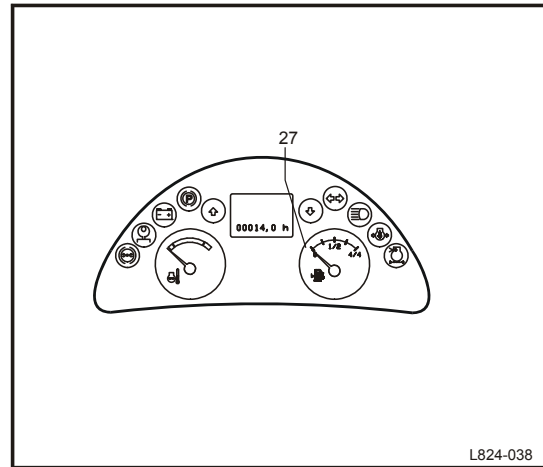


Fig. 38 Operation

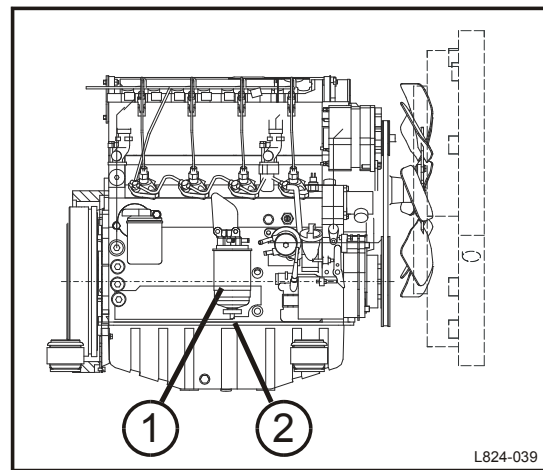


Fig. 39 Fuel filter

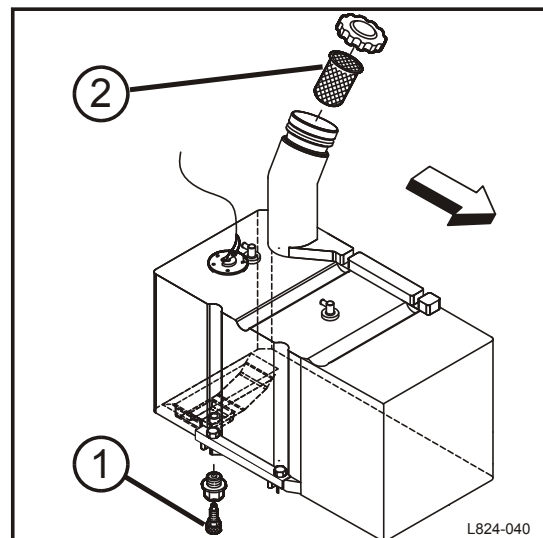


Fig. 40 Fuel tank

Cleaning fuel pump, sieving filter

- Loosen and unscrew the hexagonal screw (41/1).
- Take out the fuel sieve (41/2 - cover and sieve forming a unit).
- Clean the sieve in fuel and replace it, if necessary.
- Put the seals (41/3 and 41/4) into position.
- Install cover fuel strainer (41/2) and tighten with screw.
- Check tightness.

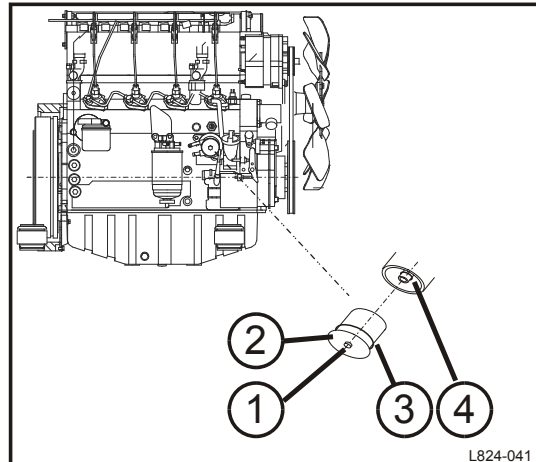


Fig. 41 Fuel pump

Replacing the fuel leakage oil line

- Separate the rubber hoses (42/3) from the injection valves.
- Separate the rubber hose (42/1) from the fuel tank.
- Separate the rubber hoses (42/4, 42/3, 42/1) from the connection pieces (42/2).
- Dispose of the rubber hoses (42/4, 42/3, 42/1) in an environmentally friendly manner.
- Connect the new rubber hoses with the connection pieces
- Connect the rubber hoses (42/3) to the injection valves.
- Connect the rubber hose (42/1) to the fuel tank.
- Check tightness.

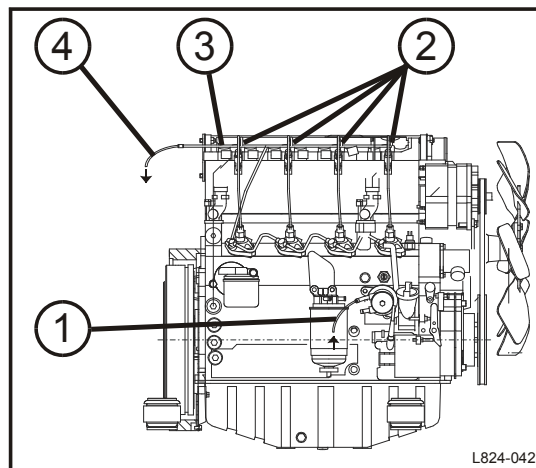


Fig. 42 Fuel leakage oil lines

7 Maintenance and Care

7.9.5 Air filter, air intake



*All maintenance work on the air intake system must be carried out with the engine off.
Do not start the engine after the filter cartridge has been removed.*

7.9.5.1 Dust ejection valve

- Dust ejection valves (43/1) are largely maintenance-free.
- Any baked-on dust can be removed by squeezing the valve together.

7.9.5.2 Air intake

- Check the air filter attachment and retaining straps for damage.
- Check the tightness of the air intake between the air filter and the engine.
- Examine rubber parts for damage.



Replace defective parts immediately!

7.9.5.3 Cartridge maintenance intervals

Air filter main cartridge

- The air filter main cartridge must be replaced as soon as the filter maintenance indicator lamp (44/32) on the instrument panel lights up during operation.
- A brief delay in maintenance does not result in lower filter efficiency.

Air filter safety cartridge

The air filter - safety cartridge must be replaced in the following cases:

- after the fifth maintenance of the main cartridge.
- after 2 years of operation at the latest.
- if the service indicator switches on after the main cartridge has just been serviced.
- if the main cartridge is damaged.
- if the safety cartridge is defective.

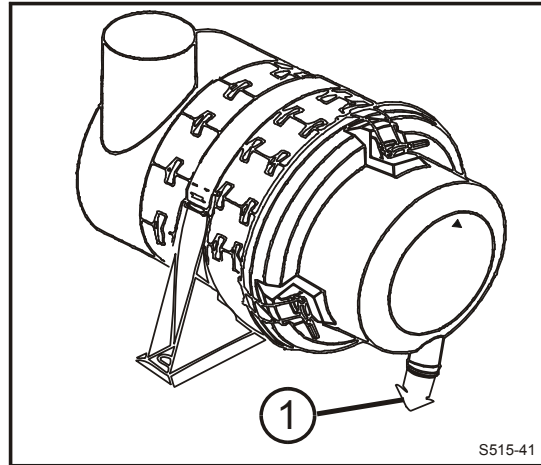


Fig. 43 Air filter

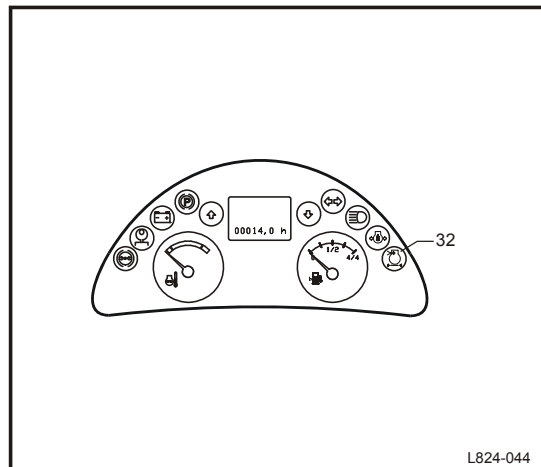


Fig. 44 Operation

7.9.5.4. Cartridge replacement

Main cartridge

- Release the wire tighteners (45/1) and remove the bottom of the housing (45/4).
- Withdraw the main cartridge (45/2) by twisting slightly to and fro.
- Check whether the safety cartridge (45/3) must be replaced.



*Remove the safety cartridge **only** in the case of necessary maintenance work. Only open the seal (45/5) of the safety cartridge for the purpose of replacement.*

- Note down the date of maintenance in the appropriate sections of the safety cartridge (45/3).
- Insert the new or cleaned main cartridge carefully into the filter housing starting with the open side and check that it is correctly positioned.
- Fit the lower part of the housing. (Pay attention to the position of the dust extraction valve).
- Place the wire fasteners in the groove of the flange on the filter housing and tighten.

Safety cartridge

- Remove the main cartridge.



*Do not clean the safety cartridge and, once it has been removed, **do not use it again.***

- Using a suitable tool (e.g. screwdriver), pierce the seal (45/5) of the safety cartridge (45/3) from the inside, then lift up the two clips (45/6).
- Grasp the safety cartridge (45/3) by the two clips (45/6), withdraw by moving slightly to and fro, and dispose of it.
- Insert a new safety cartridge and check that it is correctly positioned.
- Re-install the main cartridge.

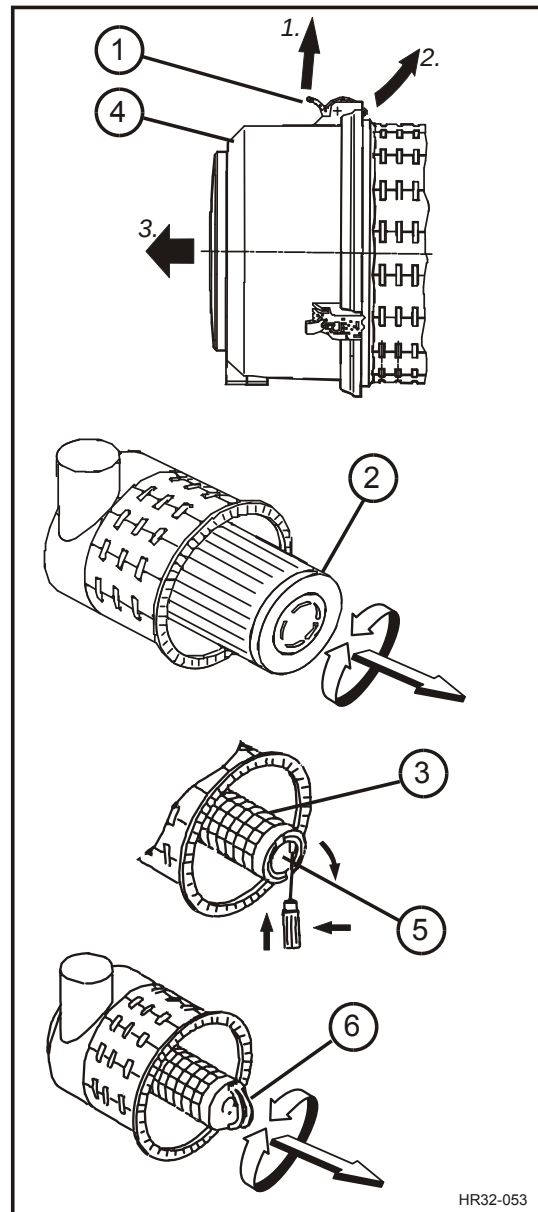


Fig. 45 Replacing air filter cartridge

7 Maintenance and Care

7.9.5.5 Cleaning the main cartridge



Never wash or brush out the main cartridge.

Make sure that no dust ends up on the inside of the main cartridge when blowing out.

- The main cartridge can be cleaned up to five times if necessary. It must be replaced once it reaches its maximum service life of two years, at the latest. The number of times it is cleaned must be marked.
- For cleaning (46/1), a pipe the end of which is bent at 90° should be attached to a compressed-air pistol. It must be sufficiently long to reach the floor of the cartridge. Blow out the main cartridge from the inside to the outside with dry compressed air (max. 72.5 psi) by moving the pipe up and down in the cartridge and continue until no more dust escapes.
- Check the clean main cartridge for damage to the paper bellows and rubber seals (46/2). Tears and perforations in the paper bellows can be determined using a torch.



Never continue to use damaged main cartridges. If in doubt, use a new one.

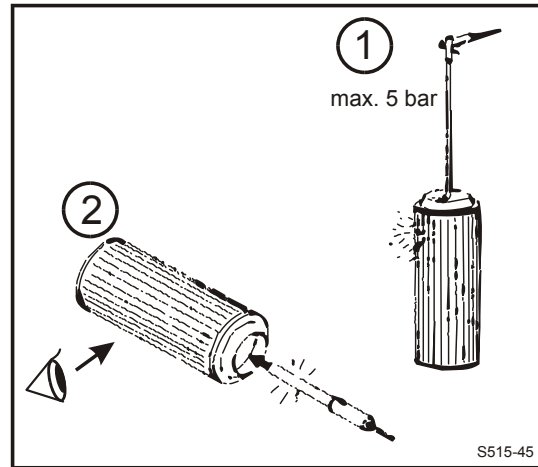


Fig. 46 Cleaning the main cartridge

7.9.6 V-belt

Checking the condition of the V-belt



Check or tension V-belts only when the engine is turned off.

Risk of injury!

- Check the entire V-belt for damage (visual inspection).



Replace damaged or worn V-belts immediately.

Checking V-belt tension



We recommend the use of a belt tensioner gauge in order to check the V-belt tension. The tension check must be carried out according to the manufacturer's manual.

Checking Tension Without Using a Belt Tensioner Gauge

- To check the tension, press the V-belt with your thumb in the middle of the greatest free length, and measure the sag.
- Using medium thumb pressure of approx. 45 N, the V-belt sag (A) should equal approx. 10-15 mm.

Tensioning the V-belt

- Slacken the fastening screws (47/1).
- Swing the generator (47/2) until the tension is correct.
- Re-tighten the fastening screws.
- Check the tension again.

7.9.7 Checking Valve Lash

The valve lash must be checked by your service specialist.

Changing the V-belt

- Slacken the fastening screws (47/1).
- Swivel the generator against the direction of tensioning.
- Remove the used V-belt and fit new one.
- Rotate the generator (47/2) in the direction of the arrow until the V-belt tension is correct.
- Re-tighten the fastening screws.
- Check the tension again.



When new V-belts are mounted, their tension has to be checked after the first 15 min. and adjusted if necessary.

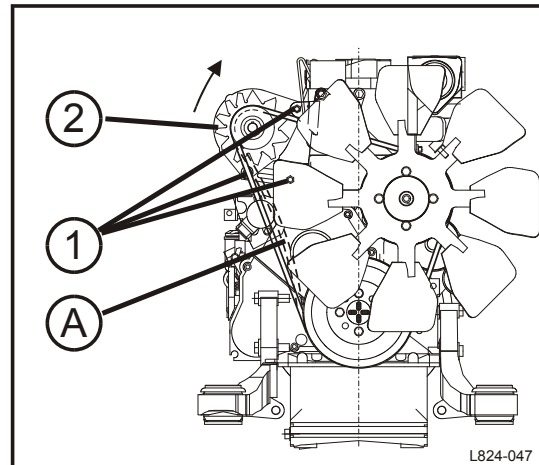


Fig. 47 V-belt

7 Maintenance and Care

7.9.8 Brakes

Checking the brake oil level

- Visual inspection (49/1) of brake oil level.



Only top up with ATF-oil!

Changing brake oil and bleeding the brake



*Collect the waste oil, do not allow it to seep into the ground.
Dispose of according to regulations!*



Use a bleeding device for changing brake oil and bleeding.

- Remove the cover on the front-end above the axle.
- Release the bleeder screw (50/1), connect the bleeder hose and insert it into collecting bottle.
- Connect the bleeding device to the brake oil container (49/1).
- Change brake oil and bleed the brake according to the Bleeding Device Operating Instructions.
- Remove the bleeder hose and re-tighten the bleeder screw.
- Release the bleeder screw (50/2) on the inch valve of the "travel" hydraulic pump; connect the bleeder hose and insert it in the collecting bottle.
- Perform the bleeding process.
- Remove the bleeder hose and re-tighten the bleeder screw.
- Dismount the bleeding device and close the brake oil container using the original cover.
- Re-mount the cover on the front-end.

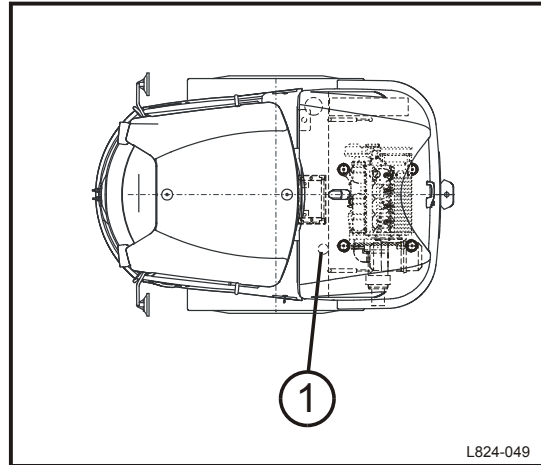


Fig. 49 Brake oil

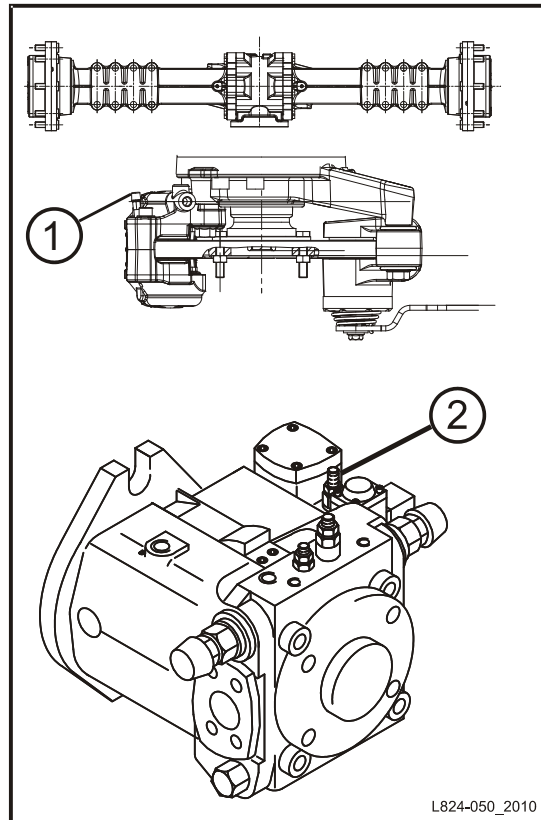


Fig. 50 Venting the brake

7.9.9 Hydraulic oil tank

Checking hydraulic oil level

- Check the oil level using the oil dipstick (51/1); top up hydraulic oil if required.

Changing the hydraulic oil



Danger of scalding when hot oil is drained!

- Retract all hydraulic cylinders.
- Stop the engine.
- Unscrew the oil dipstick (51/1).
- Remove the drain plug (51/4) on the hydraulic oil tank and drain oil into a clean receptacle.



Collect the waste oil, do not allow it to seep into the ground. Dispose of according to regulations!

- Flush and clean the hydraulic tank as required (to do so, completely remove the suction filter 51/2).
- Screw back on the drain plug carefully.
- Fill up with clean hydraulic oil using the breather. To do so, remove the filter head (51/3).
- Screw back on the breather head.
- Screw back in the oil dipstick.

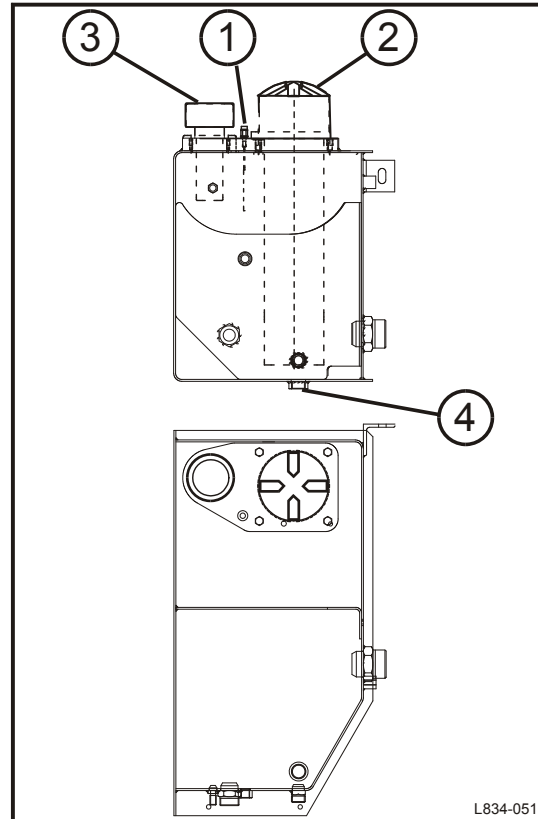


Fig. 51 Hydraulic oil tank

7 Maintenance and Care

7.9.10 Hydraulic oil cooler



Dirt accumulation in coolers causes the hydraulic oil to overheat. Only perform cleaning after stopping the engine and letting it cool down

The machine is equipped with a combined radiator and hydraulic oil cooler. Both cooler components must be cleaned during maintenance (see also Chap. 7.9.3)

- Clean the cooler components (52/1) by blowing it out with compressed air from the air discharge side.



If necessary, clean with cold cleaner or steam jet device with oil separator over a suitable surface. Do not spray generator directly with water or jet stream while doing so.

Run engine hot afterward to prevent formation of rust.

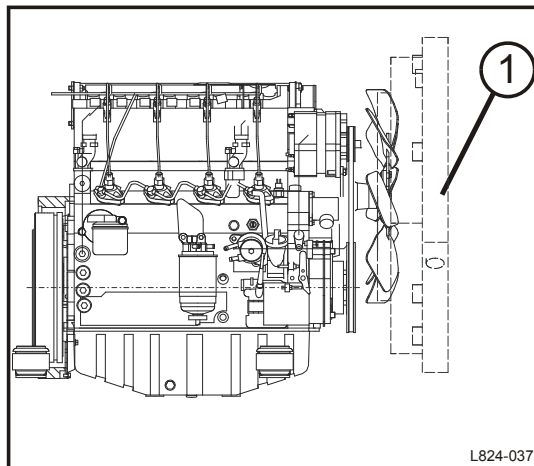


Fig. 52 Hydraulic oil cooler

7.9.11 Hydraulic oil filter



After major repairs the filter cartridge of the hydraulic oil filter must also be replaced after the test run.

Changing the filter insert

- Unscrew the oil dipstick (51/1).
- With the aid of a tool, remove the filter cover (53/1).
- Remove the filter element (53/5) along with the inlet connection (53/3) by pulling and turning at the same time.
- Remove the filter element from the inlet connection and dispose of according to regulations.
- Ensure that the seal (53/2) in the cover and the O-ring (53/4) on the inlet connection are in faultless condition and replace any damaged parts.
- Push a new filter element onto the inlet connection and insert together in filter.
- Screw back on the filter cover (53/1) and tighten using a torque of **20Nm**.
- Screw back in the oil dipstick.
- Check the tightness of the filter by means of a test run.

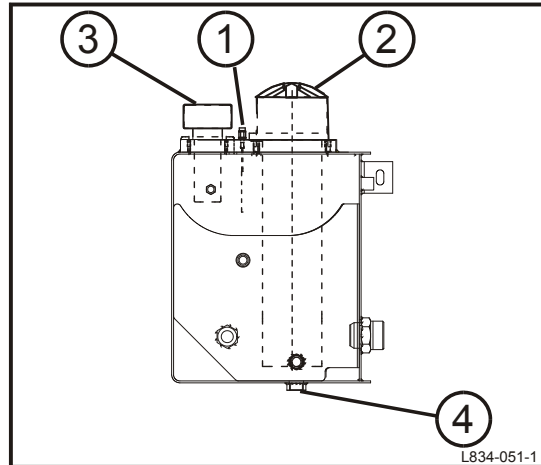


Fig. 51 Hydraulic oil tank

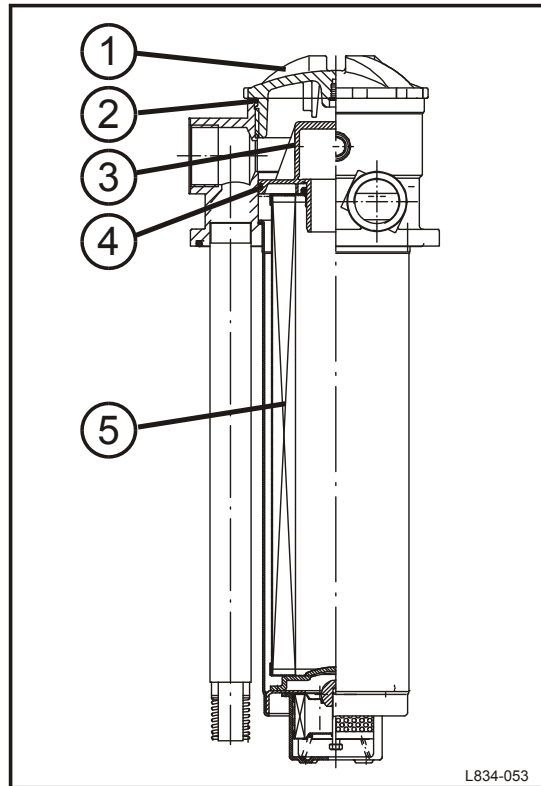


Fig. 53 Hydraulic oil filter

7 Maintenance and Care

7.9.12 Breather



Replace the breather if it is dirty, e.g. due to oil fumes.

- Unscrew the oil dipstick (54/1).
- Remove the breather (54/2) and dispose of according to regulations.
- Clean the screen (54/4) and check for damage; replace if required.
- Screw in new breather (54/2) with O-ring (54/3) and tighten by hand.
- Screw back in the oil dipstick.

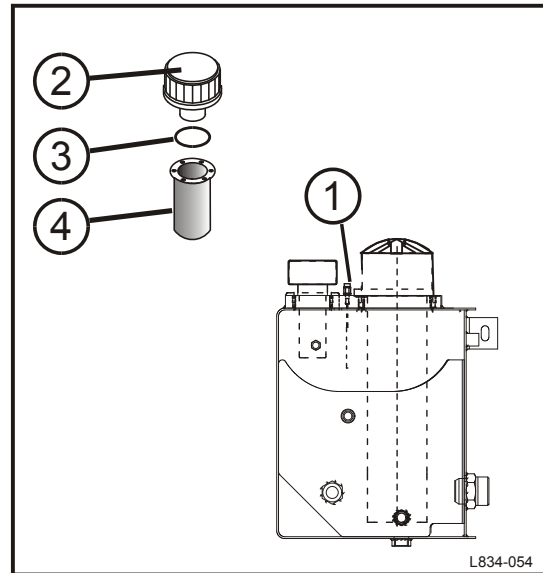


Fig. 54 Breather

7.9.13 Axles

General

The axle oil must be changed at operating temperature.



Collect the waste oil, do not allow it to seep into the ground. Dispose of according to regulations!



*After filling the axles with oil, move the machine for approx. **5 minutes** to ensure that the oil is evenly distributed. Check the oil level again and top up if necessary.*

7.9.13.1 Front axle differential

Checking the axle oil level

- Remove the inspection plug (55/1) check and top up oil if required.

Changing axle oil

- Park the machine on level ground.
- Open the inspection-filling plug (55/1).
- Open the drain plug (55/2) on the differential and drain oil.
- Flush out the axle if necessary.
- Screw back on the drain plug carefully.
- Pour in oil using the inspection-filling hole until oil escapes.
- Carefully close the inspection-filling plug.

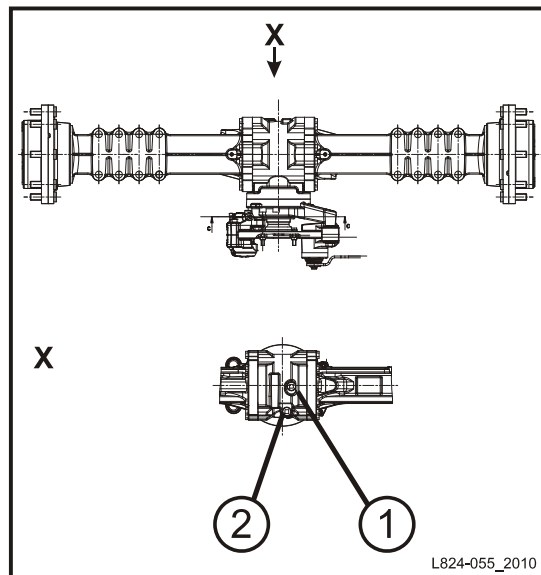


Fig. 55 Front axle

7 Maintenance and Care

7.9.13.2 Differential of rear axle with transmission

Checking the axle oil level

- Remove the inspection plug (56/1) check and top up oil if required.

Changing axle oil



The rear axle differential and the transmission have combined oil filling.

- Park the machine on level ground.
- Open the inspection-filling plug (56/1).
- Open the drain plugs on the differential (56/2) and the transmission (56/3) and drain oil.
- Flush out the axle if necessary.
- Carefully close the drain plugs.
- Pour in oil using the inspection-filling hole (56/1) until oil escapes.
- Carefully close the inspection-filling plug.

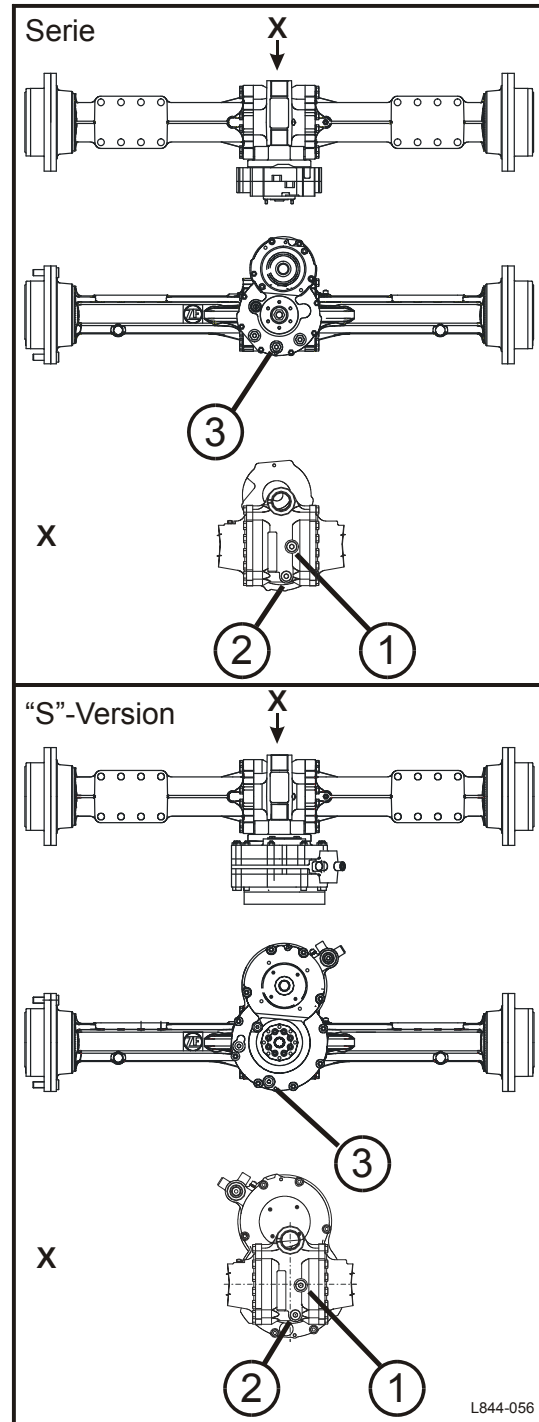


Fig. 56 Rear axle

7.9.13.3 Wheel hub

Checking the axle oil level

- Remove the inspection plug (57/1) check and top up oil if required.

Changing axle oil



The wheel hub has a combined inspection, filling and drain plug!

- Turn the wheel until the screw plug (57/1) on the hub is at the bottom.
- Open the screw plug and catch the escaping oil.
- Flush out if necessary.
- Turn the wheel to the filling and inspection position; the inspection mark must be horizontal.
- Fill in oil up to the lower edge of the hole.
- Carefully close the screw plug.

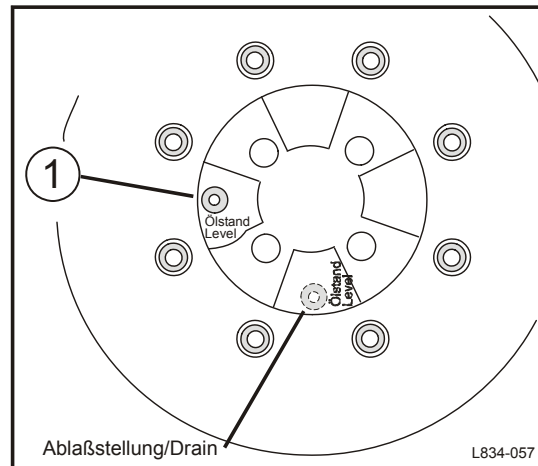


Fig. 57 Wheel hub

7.9.14 Wheels

Checking the tire pressure

- Check the air pressure in accordance with the pressure chart given in chapter 3.8.

Checking the tightness of wheel nuts

- During the first 50 operating hours, check the tightness of the wheel nuts (M 20x1,5) daily and subsequently every week, and tighten to the correct torque if necessary.



Fastening torque: 460 Nm

- When fitting a wheel, tighten the nuts to the correct torque crosswise in several stages.

7.9.15 Injection valves

Injection valves must be checked by your service specialist.

7.9.16 Control cog belt for drive motor

The toothed belt must be replaced by your service specialist.

7 Maintenance and Care

7.9.17 Electrical equipment

Battery



Follow the instructions of the battery manufacturer when taking a battery into service for the first time.

- The acid level should be approximately 10 mm above the plate edges. If necessary, top up with pure distilled water.
- Only check the battery with the engine switched off.
- Only check the battery isolator after the engine has been switched off.



For maintenance-free batteries, this check is not necessary.

Disconnecting the battery

- Deactivate the battery isolator switch
- First disconnect the battery ground cable (-) and then the positive cable (+).
- Remove the clamping bracket (59/1).
- Lift out the battery.

Installing the battery

- Place the battery into the machine and secure it with the clamping bracket (59/1).
- Connect the positive cable (+), then the battery ground cable (-).



Ensure that the negative terminal is attached to the negative pole (-) and the positive terminal to the positive pole (+).

- Switch the battery isolator switch on.

In winter, in particular, take care to ensure that the battery is well charged.

Lighting and warning equipment

- Check the function of the lighting equipment.
- Check the function of the indicator lamps.
- Check the function of the warning equipment.

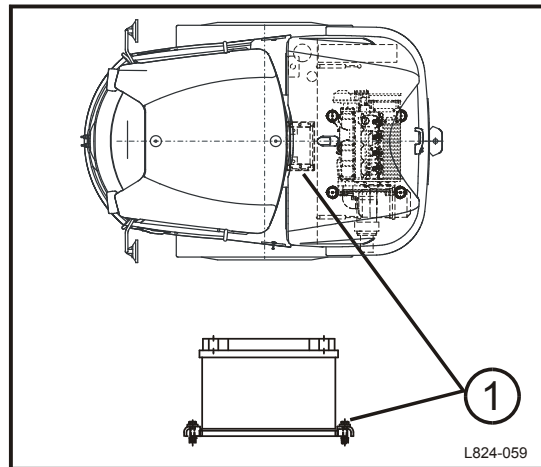


Fig. 59 Battery

7.9.18 Cab ventilation dust filter

- The air intake for the heater and fresh air supply of the cab features a dust filter, optionally a charcoal/ pollen filter.

Removing

- Remove the ventilation louver (60/1).
- Remove the angle bracket (60/2).
- Remove the dust filter (60/3).
- Clean the filter or replace it.

Cleaning the dust filter



Never wash or brush out the filter!

- Knock the filter with the intake side (side covered by expanded metal) several times on a flat and hard surface.
- Using dry compressed air (max. 5 bar), blow against the direction of flow.
- Check the filter for damage to the paper bellows and seal.



Never continue to use damaged dust filters!

Installation

- Insert new or cleaned dust filter until the stop.



Observe the mounting position!

Air flow arrows pointing towards cab.

- Fasten the dust filter with the angle bracket.
- Re-install the ventilation louver.

7.9.19 Windshield washer system

- Topping up the windshield washer tank (61/1) as required.
- Add antifreeze when temperatures are around or below freezing.

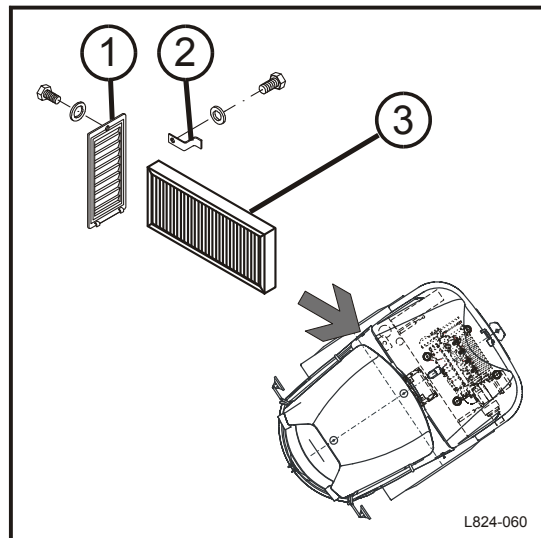


Fig. 60 Cleaning the dust filter for cab ventilation

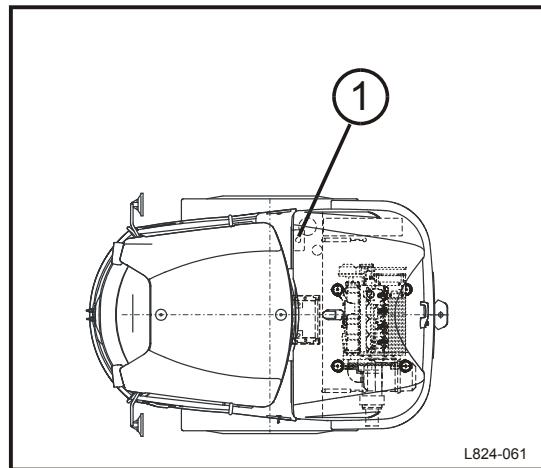


Fig. 61 Windshield washer tank

7 Maintenance and Care

7.10 Taking out of service

7.10.1 Preservation for temporary taking out of service

In order to prevent damage (corrosion, etc.) from storage during shutdown periods over three months, certain preservation measures must be taken:

- We recommend keeping the machine in a dry, dust-free room during the storage period.
- Thoroughly clean the inside and outside of the machine, including the engine.
- Lubricate the machine according to the lubrication plan.
- Check the oil levels of all assemblies such as axles, transmission(s), etc. and top up if necessary.
- Check the hydraulic oil level and top up if necessary.
- Repair any paint damage.
- Fill the diesel tank completely, to prevent corrosion of the tank walls.
- Check the antifreeze level in the coolant and adjust if necessary.
- Perform all preservation measures specified in the diesel engine Operating Manual.
- Check the tire pressure according to the prescribed value and protect the tires from direct sunlight.
- Treat bare piston rods with a commercially available anti-corrosion agent.
- Remove and clean the battery and keep it according to regulations in a dry - in winter, frost-proof - room. Coat connections with a little pole grease.
- Seal off the air intake opening of the air filter system and the exhaust pipe opening.

7.10.2 During immobilization

When the machine is out of use for 6 months, after this time all assemblies must be brought to operating temperature and maneuvered for approx. 15 min.

- Beforehand, the anti-corrosion coat must be removed from the piston rods, and the openings of the air filter system and the exhaust pipe freed.
- After the maneuvering cycle, preserve the machine once more as previously described.

7.10.3 After the machine had been taken out of service

Before putting the machine into operation once more, the following measures must be carried out:

- Anti-corrosion coat must be cleaned from the piston rods.
- Seal off the air intake opening of the air filter and the exhaust pipe opening.
- Remove the air filter insert, check its condition and replace if necessary.
- Clean the machine with a neutral detergent.
- Check and, where required, re-charge and re-install the battery
- Carry out all measures for putting the diesel engine back into operation listed in the Engine Operating Manual.
- If the machine has been out of use for more than 6 months, the oil in the assemblies such as axles, transmission(s), etc. must be changed.
- If hydraulic oil filters such as suction and return filters as well as breathers have been out of use for more than 6 months, they must be replaced.
- Lubricate the machine according to the lubrication plan.

7.10.4 Disposing of the wheeled loader



Warning

Damage to persons and property

If the wheeled loader is not disposed of by qualified personnel at the end of its service life, this may result in accidents and environmental damage.

The wheeled loader can only be disposed of by an appropriate waste disposal company.

Recommends returning the machine to a dealer.

Troubleshooting 8

8 Troubleshooting

8.1 General notes

Operating problems are often the result of incorrect handling of the machine, the use of unsuitable materials or irregular maintenance.

The following table presents a summary of a range of problems and their probable causes.

If a problem can only be eliminated through repair, then your responsible Service Agent must be called in.

8.2 Engine

All defects and faults in the diesel engine must be examined as described in the separate engine instruction book.

During the warranty period, malfunctions must be dealt with by the responsible SERVICE Agent or a specialist workshop.

Fault	Possible cause	Remedy
8.3 No steering movement		
1	Oil supply to pump interrupted	Check and repair suction line
2	Hydraulic pump damaged	Repair or replace
3	Priority valve damaged	Remedy fault (call Service Agent)
4	Hand metering unit damaged	Remedy fault (call Service Agent)
5	Steering cylinder damaged	Repair
6	Mechanical fault	Repair
8.4 Insufficient performance of service brake		
1	Wear on the disk brake	Adjust or repair (call Service Agent)
2	Master brake cylinder damaged	Repair or replace (call Service Agent)
3.	Mechanical fault	Repair (call Service Agent)
8.5 Insufficient performance of parking brake		
1	Wear on the disk brake	Adjust or repair
2	Solenoids of valve damaged	Repair and/ or re-adjust
8.6 Hydrostatic travel drive without neutral position		
1	Switch for travel direction damaged	Replace / repair
2	Solenoids of valve damaged	Replace / repair
3	Neutral position incorrectly adjusted	Check, re-calibrate (call Service Agent)
4	Internal damage to travel pump	Replace travel pump
5	Excessive engine idling	Adjust

8 Troubleshooting

Fault	Possible cause	Remedy
8.7 Hydraulic oil exceeds max. admissible temperature		
1	Thermo switch damaged	Replace
2	Oil level too low	Top up oil to mark on dipstick
3	Oil cooler dirty or damaged	Clean, check and replace if required
4	Suction filter clogged	Replace
5	High-pressure valves do not respond all the time or too early	Check high-pressure valves, re-adjust or replace if necessary
6	Flushing circulation not functioning	Check pressure of flushing and charge pump, possible back pressure in cooling circuit, check housing pressure
7	Travel pump or travel motor damaged (wear)	Replace
8	Loader pump worn	Replace
9	Main pressure relief valve damaged	Replace
8.8 Sluggish acceleration and deceleration, too little propulsive power		
1	Insufficient engine power	Check diesel engine
2	Brake has got stuck	Check, remedy damage
3	No tank pressurization	Check ventilation filters and breathers, replace
4	Suction filter clogged	Replace filter
5	FAST-SLOW-gear not functioning due to electric or mechanical fault	Check power supply and solenoid valve, repair and replace if necessary Check travel motor
6	Fault in operation of brake-inching pedal	Check, adjust, replace
7	Charge pump sucking up air	Check, eliminate leaks
8	Travel pump incorrectly adjusted	Re-adjust travel pump
9	Insufficient charge or supply pressure	Check pressure, adjust
10	Pressure relief valve of charge circuit dirty or damaged	Check, re-adjust or replace
11	Insufficient high-pressure	Check high-pressure; re-adjust or replace pressure cut-off and high-pressure valves if required.
12	Travel pump does not open fully, pilot pressure too low	Nozzles clogged, check, repair
13	Internal damage to travel pump or travel motor	Replace units
14	Travel motor mis-adjusted	Re-adjust travel motor

Troubleshooting 8

Fault	Possible cause	Remedy
8.9 Transmission works in one direction only		
1	Switch for travel direction damaged	Repair or replace if necessary
2	Solenoid valve gets stuck or is damaged	Repair or replace if necessary
3	Power supply towards switch for travel direction or solenoid valve interrupted	Check and repair (incl. ground connection)
4	Pilot pressure too low on one side	Nozzles clogged, check, repair
5	High-pressure relief valve is faulty or incorrectly adjusted	Swap valves around. If machine now travels in the other direction, examine valve, clean and replace if necessary
8.10 Transmission works in neither direction		
1	Too little hydraulic oil in tank	Top up oil to mark on dipstick
2	Mechanical connection to diesel engine faulty	Check, repair
3	Charge pump damaged, no charge pressure	Remove pump and examine, install new pump if necessary
4	Switch for travel direction damaged	Repair or replace if necessary
5	Solenoid valve for travel direction damaged	Repair or replace if necessary
6	Suction filter clogged	Replace filter
7	Suction line between tank and pump kinked	Check and eliminate kink
8	Power supply towards switch for travel direction and solenoid valve interrupted	Remedy cause of interruption
9	Internal damage to travel pump or travel motor	Replace units completely
10	Mechanical connection between travel motor and axle interrupted	Check, repair
8.11 Loader installation is not working		
1	Oil supply to pump interrupted	Check suction line and repair if required
2	Main pressure relief valve damaged	Check and replace if necessary
3	Hydraulic pump damaged	Check, repair or replace
4	Hydraulic pump drive mechanically interrupted	Check and repair

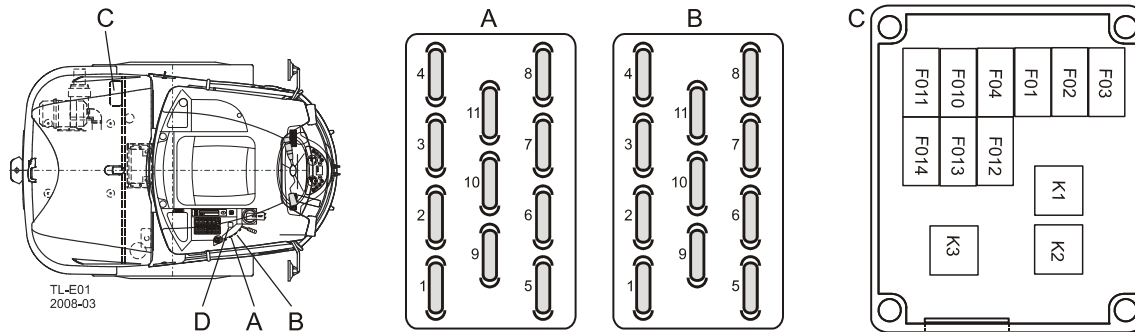
8 Troubleshooting

Fault	Possible cause	Remedy
8.12 Decrease in machine's performance (loader installation)		
1	Insufficient engine power	Check diesel engine and adjust if necessary
2	Hydraulic oil level too low	Top up hydraulic oil to mark on dipstick
3	Pump is sucking up air	Re-tighten hose connections. Replace O-ring or seals
4	Insufficient operating pressure	Re-adjust main pressure relief valve, replace if necessary
5	Pump worn	Replace pump
6	Incorrect hydraulic oil	Quality of hydraulic oil must conform to our recommendation
8.13 Working cylinders not operating satisfactorily		
1	Seals in cylinders worn	Re-seal cylinders
2	Secondary valves defective	Check secondary valves and replace completely if necessary
8.14 Faults in the electrical system		
1	Outside and/or internal lighting damaged	Check cables, connections, bulbs and fuses
2	Windshield wiper not working	Check cables, connections, and fuses Examine windshield wiper for mechanical damage Check or replace if necessary
3	Horn not responding	Check cables, connections, and fuses Replace complete horn if required
4	Control organs are imprecise	Determine the fault or source of the problem, call Service Agent if necessary
5	Starting system does not work satisfactorily	Check charge capacity of battery Test starter function Check connection and condition of power and battery ground cables Check function of ignition lock, replace if necessary

9 Appendix

9.1 Electrical system

- Fuse box – assignment diagram



Fuses A			Fuses B		
Position	Amps	Assigned to	Position	Amps	Assigned to
FL 1	15	Heater fan, air conditioning	FR 1	15	Working floodlights, front
FL 2	15	Windshield wiper and washer system, front	FR 2	15	Working floodlight, rear
FL 3	15	Windshield wiper and washer system, rear	FR 3	10	Direction indicators
FL 4	10	Rotating beacon / interior light	FR 4	10	Hazard warning switch
FL 5	10	RCS / travel motion alarm	FR 5	15	Socket, radio permanent positive
FL 6	10	SRF/air-cushioned seat	FR 6	15	Reserve
FL 7	10	Optional: socket attachment	FR 7	10	Signal horn
FL 8	10	E-module inputs	FR 8	10	Main-beam headlight
FL 9	10	Instrument clusters	FR 9	10	Dipped beam
FL 10	10	Radio (ignition lock)	FR 10	10	Side light, left
FL 11	10	Refueling pump/SRF	FR 11	10	Side light, right
Main fuses and relays in starter box C					
F01	50	Pre-fuse/supply	F013	5	Reserve
F02	80	Preheating system	F014	5	Reserve
F03	30	Power supply control module			
F04	50	Starting/shut-off relay	K1		Starting relay
F010	15	Cut-out switch	K2		Preheater relay
F011	10	Reserve	K3		Shut-off relay
F012	5	Reserve			
Main fuses and relays in starter box D (underneath right-hand armrest)					
FZ1	30	Fans / heating	K3		Indicator
FZ2		Optional	K5		Fans heating
FZ3		Optional	K6		Lighting
FZ4	30	Lighting			
FZ5		Optional			
FZ6		Optional			

9 Appendix

9.2 Equipment options

Ride control system (RCS)

Depending on the machine's operating weight, road conditions, and speed, there may be pitching oscillations when driving wheel loaders.

The ride control system reduces pitching oscillation, which results in the following advantages:

- higher transport speed
- improved material-handling performance
- more stable steering performance
- shorter braking distance
- increased ride comfort



When activating the ride control system (RCS) with raised loader installation, the lifting frame may temporarily sink.

Only switch on RCS when the machine is stationary and the lift frame is lowered.



Load-retaining valves (option) are without function as long as the ride control system is activated!

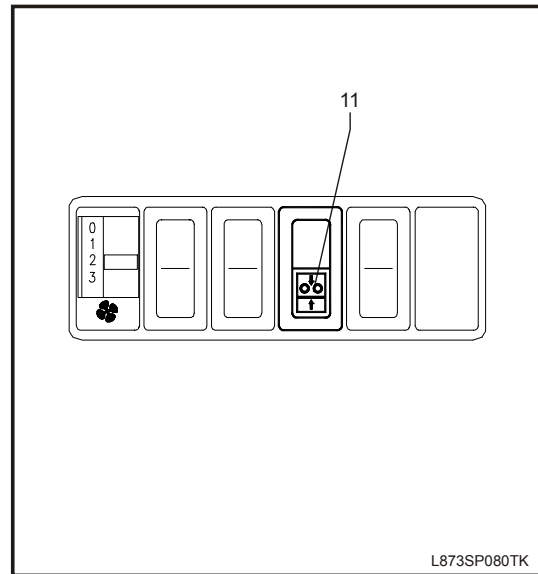


Fig. 80 Operation

Operation

20 km/h version

- Operate the ride control system toggle switch (80/11).
The green indicator lamp lights up.

High-speed version

- The ride control system is automatically activated as soon as the travel speed is more than 6 km/h.



The bucket tilt cylinder must not be at a cylinder stop (bucket not completely tilted back) as otherwise free oscillation is not possible.

Repair



Before working on the loader hydraulic system, the accumulator pressure of the ride control system must be let off. To do so:

- Stop the machine in the proper manner.
- Switch off the RCS (80/11).
- Control block for RCS is installed in rear-end.
- Slacken counternut and adjusting screw (81/1), the accumulator pressure is reduced.

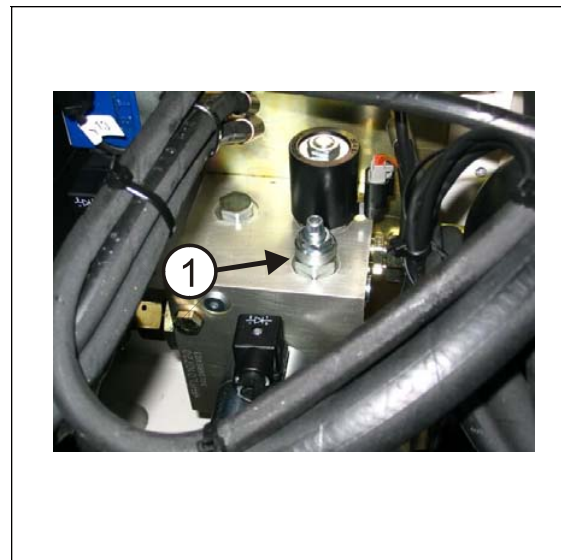


Fig. 81 Slacken counternut

9.3 Immobilizer

9.3.1 Activating the immobilizer



The immobilizer is self-activating; that is, without additional activation or divergent actions.

If the mechanical start switch is in position "0" (terminal 15 off), the immobilizer is generally activated.

- Set the start switch key to position "0."
- The immobilizer is automatically activated after 5 sec.
- The immobilizer becomes and remains activated if the key remains inserted in position "0".

9.3.2 Deactivating the immobilizer



The immobilizer is deactivated if a valid mechanical key and a valid electronic key (transponder) are present.

- Set the start switch key to position "1".
- The transponder is not read until the mechanical key in the start switch has activated terminal 15. This makes it necessary to first open the mechanical locking system before the electronic key is inspected. A manipulation of the immobilizer with the ignition deactivated is thereby impossible.

9.3.3 Learning a new key

Learning a new key takes place with a master key that is identified with a red key pommel.

The master key must be stored carefully; only one master key is available for each immobilizer.

This master key can only be used to learn new keys; it cannot be used to deactivate the immobilizer. This prevents the master key from being used to operate the vehicle.

- Insert the master key into the ignition lock.
- Set the master key in position "1" (terminal 15 on) for max. 5 sec.
- Set the master key in position "0" (terminal 15 off).
- Pull out the master key.
- The immobilizer electronics expects the key that is to be learned in the next 15 sec.
- Insert the key to be learned into the ignition lock.
- Turn the key to be learned to position "1".
- The learned key is registered as a valid key.

If no key is recognized for learning in 15 sec, the learning procedure ends automatically.

9 Appendix

9.3.4 Learning multiple new keys

- Insert the keys to be learned into the ignition lock one after the other.
- Turn the key to be learned to position "1".
- Leave the individual keys in the position "1" for at least 1 sec.

Up to 10 keys can be learned.

With this technique, it is possible to learn one key on several immobilizers, such as for a general fleet key.



This function is only available if the control unit relay is additionally connected to terminal 30.

9.3.5 Clearing learned keys

Clearing learned keys is necessary if a learned key has been lost.

All learned keys are cleared during the deletion process. After clearing, all available keys can be relearned.

- Insert the master key into the ignition lock.
- Set the master key in position "1" (terminal 15 on) for minimum 20 sec.
- All learned keys are cleared and all available keys can be relearned.
- The master key code is not deleted during the clearing process.



This function is only available if the control unit relay is additionally connected to terminal 30.

9.3.6 Security functions

If more than 5 keys are activated in the ignition lock within 1 minute with different invalid codes, the immobilizer remains active for 15 minutes and accepts no valid keys during this time.

This procedure prevents the "testing" of different keys and the coincidental locating of the correct key.

If different invalid keys are recognized without the ignition lock being brought to position "0," the immobilizer remains activated for 15 minutes and accepts no valid keys.

Valid keys are only accepted after the 15 minutes and recognition of the start switch in the "0" position. This prevents the key from being tested without the mechanical ignition lock being activated, such as if the ignition lock is forcibly brought to the "1" position.

9.3.7 Fault causes

Immobilizer has no function	
1	Inspect voltage supply on plug contacts
2	Check antenna plug-in connection
3	Check antenna cable (see 'Checking antenna')
4	Use key with learned transponder
Key learning not possible	
1	Terminal 30 not connected to control unit
2	No or incorrect master key used previously (red grip)
3	Time for master key in ignition too short or too long
4	Key to be learned does not have transponder
5	Defective antenna
6	Learning time for key in ignition too short
Clearing of learned keys not possible	
1	No or incorrect master key used (red grip)
2	Time for master key in ignition lock too short
3	Defective antenna

9 Appendix

DELIVERY AND HANDING-OVER INSTRUCTIONS

The following checklist is to be followed when handing over the machine to the dealer/ customer:

1. Operating Instructions

The Operating Instructions should be read side by side, and be explained in detail through practical training on the machine.

Items which are particularly important include:

- Accident Prevention Regulations published by the employer's liability insurance associations in the users country
- Technical data
- Operator controls, indicating and warning elements
- Checks before putting the machine into operation
- Diesel engine running-in instructions
- Starting and stopping the diesel engine
- Explanation of hydrostatic travel drive
- Driving, speed ranges, notes for driving on roads
- Recovery and transport of the machine
- Operation of all functions
- Operation of quick-attach system
- Explanation of maintenance intervals and points according to Maintenance and Inspection Plan by demonstrating and explaining maintenance points on machine
- Lubrication intervals and points of lubrication according to lubrication chart and demonstration of these points on the machine
- Handing-over of Diesel Engine Operating Instructions

2. Spare parts list

- Structure of Spare Parts List, Figures and the associated texts
- Instructions for ordering spare parts - always state the type of machine, the vehicle identification number ("Fz-Id.Nr."), parts designation, complete spare part number, number of pieces, delivery address, etc.

3. Warranty

- Explanation of warranty stipulations
- Explanation of inspection cards and note on maintenance and inspection plan.
- Explanation of how to fill out the warranty/handing-over card correctly and how to return to Dealer



Wheel Loader TW9

Maintenance and Inspection Plan

The careful performance of all prescribed inspections is the best prerequisite for the machines continuous readiness for operation.

All maintenance work mentioned should therefore be performed in the prescribed sequence with the machine being in warm condition.

The inspections are obligatory.

Failure to do so may adversely affect our warranty coverage.

The machine must be thoroughly cleaned before inspection takes place.

Inspection plan

Work to be carried out by trained specialist dealer personnel

O = Checking, maintenance X = Replace		Operating hours				min 2x year- ly	min 1x year- ly
Perform work with machine at operating temperature		after 100	every 500	every 1000	every 2000		
1	Check machine for presence of machine-specific operating instructions	O	O				
2	Change the engine oil			X			X
3	Change the engine oil filter			X			X
4	Drain water from the fuel tank	O	O			O	
5	Replace the fuel filter			X			X
6	Clean fuel pump, sieve filter			O			
7	Check air intake	O	O				
8	Replace main air filter cartridge	according to the service indicator					X
9	Replace the air filter safety cartridge	as required ¹⁾					
10	Clean cooling fins on hydraulic oil cooler  The cleaning intervals should be shortened if there is high exposure to dust.	O	O			O	
11	Clean cooling fins on engine oil cooler  The cleaning intervals should be shortened if there is high exposure to dust.	O	O			O	
12	Check antifreeze level in coolant						O
13	Change coolant	as required ¹⁾					
14	Check V-belt tension	O		O			
15	Check engine mount and pump attachment	O	O				
16	Check engine speed setting, upper and lower idle speeds	O	O				
17	Check valve lash of engine and adjust if necessary	1x every 500 OH and as required					
18	Check injection valves				O		
19	Check or replace the fuel leakage oil lines			O	X ¹⁾		
20	Replace toothed belt ³⁾						
21	Check crankcase breather in valve cover				O		
22	Check acid level and battery connections	O	O				
23	Check condition of tires, tire pressure and fastening of wheel nuts	O	O				
24	Check fastening of axles and propeller shaft	O	O				
25	Check bearing bushings and bolts of work equipment and replace if necessary	O	O				
26	Check bushings and bolts of the articulation and the articulated steering and replace if necessary	O	O				
27	Check that door catches function perfectly, and replace if necessary	O	O				

O = Checking, maintenance X = Replace		Operating hours				min 2x year- ly	min 1x year- ly
Perform work with machine at operating temperature		after 100	every 500	every 1000	every 2000		
28	Clean or replace the dust filter for cab ventilation	O		X			X
29	Check electrical indicating and warning elements as well as lighting equipment.	O	O				
30	Check smooth running of operator controls and adjust if necessary	O	O				
31	Check tightness of all pipes, hoses, control valves, hydraulic pumps, cylinders, etc.  When tightening hose and pipe connections, screw-in couplings must be locked to prevent rotation.	O	O				
32	Check or change hydraulic oil	O	O	X ²⁾			X
33	Replace insert of hydraulic oil return suction filter	X	X			X	
34	Replace the breathing filter			X			X
35	Check function of brakes, replace brake oil	O	O		X		X
36	Bleed brake	O	O				
37	Differential of rear axle with transmission / option: manual transmission, oil check and/or oil change	X	O	X			X
38	Differential - front axle oil: check or oil change resp.	X	O	X			X
39	Wheel hubs of front and rear axles: oil check or oil change	X	O	X			X
40	Lubricate the machine according to overview of lubricating points	O	O				
41	Check function, condition and completeness of safety equipment	O	O				
42	Hydraulic function check with function pressure test	O	O				
43	Test run and test work	O	O				
44	Sign inspection card and return to manufacturer	O	O ⁴⁾				

1) at least every 2 years

2) Extension of oil change intervals according to oil sample analysis and laboratory report
For further information see Operating Instructions

3) every 5 years or 3,000 running hours

4) under warranty