

Operating Manual

AMAZONE

ZG-B 5500 Special / Super / Drive
ZG-B 8200 Special / Super / Drive

Bulk Fertiliser Spreader



MG5160
BAG0003.9 09.14
Printed in Germany

**Please read this operating
manual before first commis-
sioning.
Keep it in a safe place for
future use.**

en



Reading the instruction

Manual and following it should seem to be inconvenient and superfluous as it is not enough to hear from others and to realize that a machine is good, to buy it and to believe that now everything should work by itself. The person in question would not only harm himself but also make the mistake of blaming the machine for possible failures instead of himself. In order to ensure success one should enter the mind of a thing, make himself familiar with every part of the machine and get acquainted with how it's handled. Only in this way could you be satisfied both with the machine and with yourself. This goal is the purpose of this instruction manual.

Leipzig-Plagwitz 1872. Rud. Sark.

Identification data

Manufacturer:	AMAZONEN-WERKE H. DREYER GmbH & Co. KG
Machine Ident. No.:	
Type:	ZG-B Special, ZG-B Super, ZG-B Drive
Permissible system pressure (bar)	Maximum 210 bar
Year of manufacture:	
Factory:	
Basic weight (kg):	
Approved total weight (kg):	
Maximum load (kg):	

Manufacturer's address

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Spare part orders

Spare parts lists are freely accessible in the spare parts portal at www.amazone.de.
Please send orders to your AMAZONE dealer.

Formalities of the operating manual

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Foreword

Foreword

Dear Customer,

You have chosen one of the quality products from the wide product range of AMAZONEN-WERKE, H. DREYER GmbH & Co. KG. We thank you for your confidence in our products.

On receiving the machine, check to see if it was damaged during transport or if parts are missing. Using the delivery note, check that the machine was delivered in full including the ordered special equipment. Damage can only be rectified if problems are signalled immediately!

Before first commissioning, read and understand this operating manual, and particularly the safety information. Only after careful reading will you be able to benefit from the full scope of your newly purchased machine.

Please ensure that all the machine operators have read this operating manual before commissioning the machine.

Should you have any questions or problems, please consult this operating manual or contact your local service partner.

Regular maintenance and timely replacement of worn or damaged parts increases the lifespan of your machine.

User evaluation

Dear Reader,

We update our operating manuals regularly. Your suggestions for improvement help us to create ever more user-friendly manuals. Send us your suggestions by fax.

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1 User Information

The User Information section provides information on use of the operating manual.

1.1 Purpose of the document

This operating manual

- Describes the operation and maintenance of the machine.
- Provides important information on safe and efficient handling of the machine.
- Is a component part of the machine and should always be kept with the machine or the traction vehicle.
- Keep it in a safe place for future use.

1.2 Locations in the operating manual

All the directions specified in the operating manual are always seen from the direction of travel.

1.3 Diagrams used

Operator control action and responses

Actions to be carried out by the operator are given as a numbered list. It is important that the sequence of steps is observed. The responses for each operator control action are given by an arrow. Example:

1. Operator control action step 1
→ Machine response to operator control action 1
2. Operator control action step 2

Lists

Lists without an essential order are shown as a list with bullets. Example:

- Point 1
- Point 2

Number items in diagrams

Numbers in round bracket refer to items in diagrams. The first number refers to the diagram and the second number to the item in the figure.

Example: (Fig. 3/6)

- Figure 3
- Item 6

2 General safety instructions

This section contains important information on safe operation of the machine.

2.1 Obligations and liability

Comply with the instructions in the operating manual

Knowledge of the basic safety information and safety regulations is a basic requirement for safe handling and fault-free machine operation.

Obligations of the operator

The operator is obliged only to let those people work with/on the machine who

- Are aware of the basic workplace safety information and accident prevention regulations.
- Have been trained in working with/on the machine.
- Have read and understood this operating manual.

The operator is obliged

- To keep all the warning symbols on the machine in a legible state.
- To replace damaged warning symbols.

Obligations of the user

Before starting work, anyone charged with working with/on the machine is obliged

- To comply with the basic workplace safety instructions and accident prevention regulations.
- To read and follow the "General safety information" section of this operating manual.
- To read the section "Warning symbols and other labels on the machine" (page 17) of this operating manual and to follow the safety instructions represented by the warning symbols when operating the machine.
- If you still have queries, please contact the manufacturer.

Risks in handling the machine

The machine has been constructed to the state-of-the art and the recognised rules of safety. However, there may be risks and restrictions which occur when operating the machine

- For the health and safety of the operator or third persons,
- For the machine,
- For other goods.

Only use the machine

- For the purpose for which it was intended.
- In a perfect state of repair.

Eliminate any faults immediately which could impair safety.

Guarantee and liability

Our "General conditions of sales and delivery" are always applicable. These shall be available to the operator, at the latest on the completion of the contract. Guarantee and liability claims for damage to people or goods will be excluded if they can be traced back to one or more of the following causes:

- Improper use of the machine.
- Improper installation, commissioning, operation and maintenance of the machine.
- Operation of the machine with defective safety equipment or improperly attached or non-functioning safety equipment.
- Non-compliance with the instructions in the operating manual regarding commissioning, operation and maintenance.
- Independently-executed design changes to the machine.
- Insufficient monitoring of machine parts which are subject to wear.
- Improperly executed repairs.
- Disasters through the impact of foreign bodies and acts of God.

2.2 Representation of safety symbols

Safety instructions are indicated by the triangular safety symbol and the highlighted signal word. The signal word (danger, warning, caution) describes the severity of the risk, and carries the following meaning:

**DANGER**

Indicates an immediate high risk which will result in death or serious physical injury (loss of body parts or long term damage) if not avoided.

If the instructions are not followed, then this will result in immediate death or serious physical injury.

**WARNING**

Indicates a medium risk, which could result in death or (serious) physical injury if not avoided.

If the instructions are not followed, then this may result in death or serious physical injury.

**CAUTION**

Indicates a low risk which could cause minor or medium level physical injury or damage to property if not avoided.

**IMPORTANT**

Indicates an obligation to special behaviour or an activity required for proper machine handling.

Non-compliance with these instructions can cause faults on the machine or in the environment.

**NOTE**

Indicates handling tips and particularly useful information.

These instructions will help you to use all the functions of your machine to the optimum.

2.3 Organisational measures

The operator must provide the necessary personal protective equipment as per the information provided by the manufacturer of the crop protection agent to be used, such as:

- Chemical-resistant gloves,
- Chemical-resistant overalls,
- Water-resistant footwear,
- A face mask,
- Breathing protection,
- Safety glasses,
- Skin protection agents, etc.



The operating manual

- Must always be kept at the place at which the machine is operated.
- Must always be easily accessible for the operator and maintenance personnel.

Check all the available safety equipment regularly.

2.4 Safety and protection equipment

Before each commissioning of the machine, all the safety and protection equipment must be properly attached and fully functional. Check all the safety and protection equipment regularly.

Faulty safety equipment

Faulty or disassembled safety and protection equipment can lead to dangerous situations.

2.5 Informal safety measures

As well as all the safety information in this operating manual, comply with the general, national regulations pertaining to accident prevention and environmental protection.

When driving on public roads and routes, then you should comply with the statutory road traffic regulations.

2.6 Operator training

Only those people who have been trained and instructed may work with/on the machine. The operator must clearly specify the responsibilities of the people charged with operation and maintenance work.

People being trained may only work with/on the machine under the supervision of an experienced person.

Activity \ People	Person specially trained for the activity ¹⁾	Trained operator ²⁾	Person with specialist training (specialist workshop*) ³⁾
Loading/Transport	X	X	X
Commissioning	--	X	--
Set-up, tool installation	--	--	X
Operation	--	X	--
Maintenance	--	--	X
Troubleshooting and fault elimination	X	--	X
Disposal	X	--	--

Legend:

X..permitted --..not permitted

- 1) A person who can assume a specific task and who can carry out this task for an appropriately qualified company.
- 2) Instructed persons are those who have been instructed in their assigned tasks and in the possible risks in the case of improper behaviour, have been trained if necessary, and have been informed about the necessary protective equipment and measures.
- 3) People with specialist technical training shall be considered as a specialist. Due to their specialist training and their knowledge of the appropriate regulations, they can evaluate the work with which they have been charged and detect possible dangers.

Comment:

A qualification equivalent to specialist training can be obtained through long term activity in the appropriate field of work.



Only a specialist workshop may carry out maintenance and repair work on the machine if such work is additionally marked "Workshop work". The personnel of a specialist workshop shall possess the appropriate knowledge and suitable aids (tools, lifting and support equipment) for carrying out the maintenance and repair work on the machine in a way which is both appropriate and safe.

2.7 Safety measures in normal operation

Only operate the machine if all the safety and protection equipment is fully functional.

Check the machine at least once a day for visible damage and check the function of the safety and protection equipment.

2.8 Danger from residual energy

Note that there may be residual mechanical, hydraulic, pneumatic and electrical/electronic energy on the machine.

Use appropriate measures to inform the operating personnel. You can find detailed information in the relevant sections of this operating manual.

2.9 Maintenance and repair work, fault elimination

Carry out prescribed setting, maintenance and inspection work in good time.

Secure all media such as compressed air and the hydraulic system against unintentional start-up.

Carefully fix and secure larger subassemblies to lifting gear when carrying out replacement work.

Check all the screw connections for a firm seat. After completion of the maintenance work, check the function of the safety equipment.

2.10 Design changes

You may make no changes, expansions or modifications to the machine without the approval of AMAZONEN-WERKE. This is also valid when welding support parts.

Any expansion or modification work shall require the written approval of AMAZONEN-WERKE. Only use the modification and accessory parts released by AMAZONEN-WERKE, so that the type approval remains valid according to the national and international regulations.

Vehicles with an official type approval or with equipment connected to a vehicle with a valid type approval or approval for road transport according to the German road traffic regulations must be in the state specified by the approval.



WARNING

Risk of contusions, cuts, dragging, catching or knocks from support parts.

It is forbidden to:

- Drill holes in the frame or on the running gear.
- Increase the size of existing holes on the frame or the running gear.
- Weld support parts.



2.10.1 Spare and wear parts and auxiliary materials

Immediately replace any machine parts which are not in a perfect state.

Only use AMAZONE spare and wear parts released by AMAZONEN-WERKE, so that the type approval remains valid according to the national and international regulations. The use of wear and spare parts from third parties does not guarantee that they have been constructed in a way as to meet the requirements placed on them.

AMAZONEN-WERKE shall accept no liability for damage caused by the use of unreleased spare and wear parts or auxiliary materials.

2.11 Cleaning and disposal

Handle and dispose of any materials used carefully, in particular

- When carrying out work on lubrication systems and equipment and
- When cleaning using solvents.

2.12 Operator workstation

The machine may only be operated by one person sitting in the driver's seat of the tractor.

2.13 Warning symbols and other labels on the machine



Always keep all the warning symbols on the machine clean and in a legible state. Replace illegible warning symbols. You can obtain the warning symbols from your dealer using the order number (e.g. MD 075).

Warning symbols - structure

Warning symbols indicate dangers on the machine and warn against residual dangers. At these points, there are permanent or unexpected dangers.

A warning symbol consists of two fields:



Field 1

is a symbol describing the danger, surrounded by triangular safety symbol.

Field 2

is a symbol showing how to avoid the danger.

Warning symbols - explanation

The column **Order number and explanation** provides an explanation of the neighbouring warning symbol. The description of the warning symbols is always the same and specifies, in the following order:

1. A description of the danger.
For example: danger of cutting!
2. The consequence of non-compliance with risk avoidance instructions.
For example: causes serious injuries to fingers or hands.
3. Instructions for avoiding the danger.
For example: only touch machine parts when they have come to a complete standstill.

2.13.1 Positions of warning symbols and other labels

The following diagrams show the arrangement of the warning symbols on the machine.

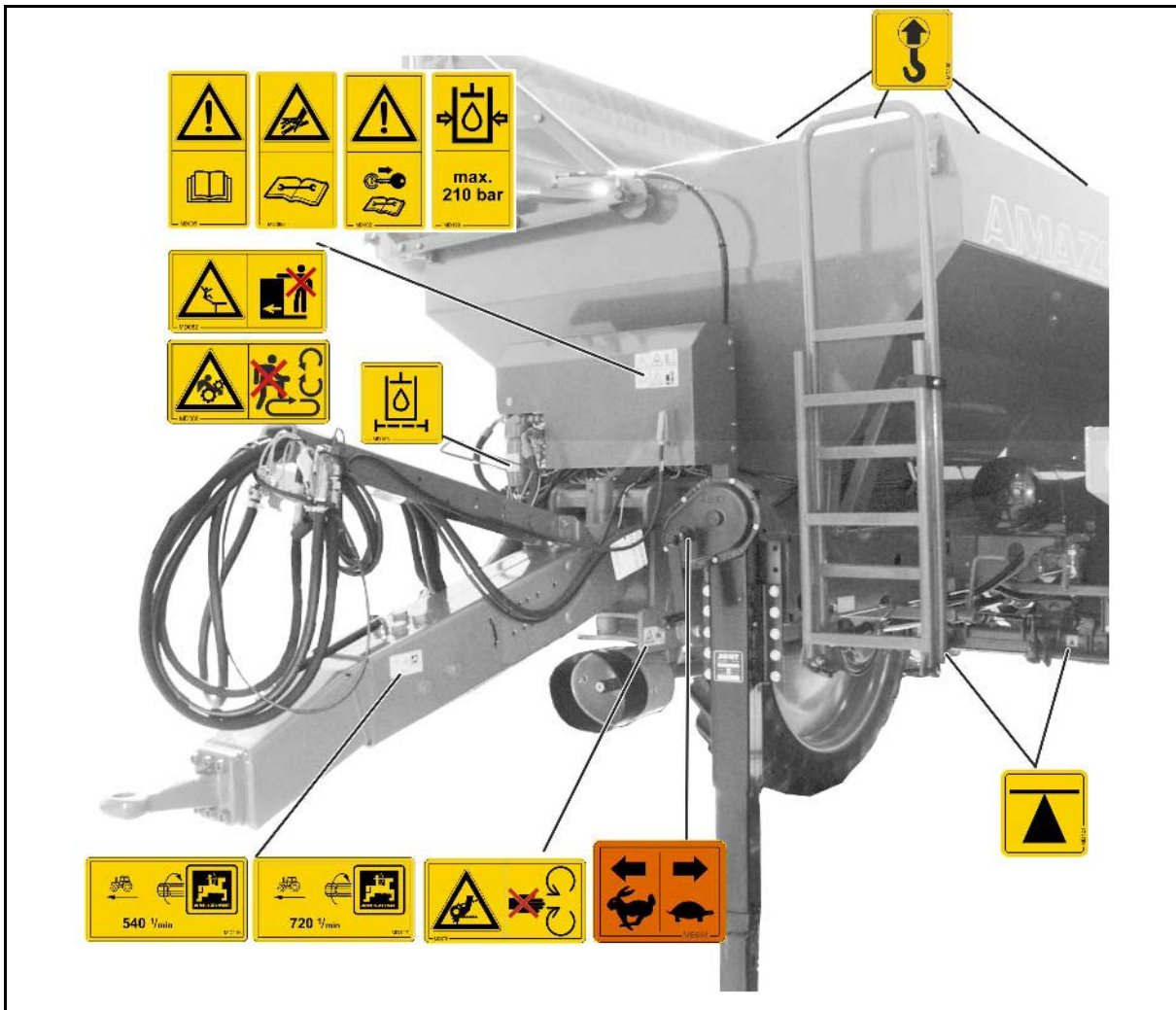


Fig. 1



Fig. 2



Fig. 3



Fig. 4

MD 075

Risk of fingers and hands being cut or cut off by accessible, moving parts involved in the work process.

This danger can cause extremely serious injuries and the loss of body parts.

- Never reach into the danger area when the tractor engine is running with PTO shaft / hydraulic / electronics system connected.
- Wait for all moving machine parts to come to a complete standstill before reaching into the danger area.



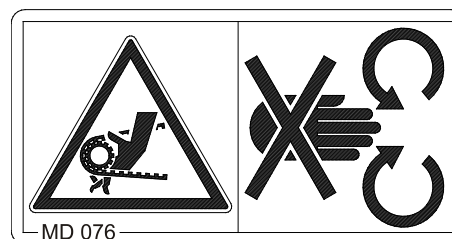
MD 076

Danger of your hand or arm being drawn in or caught by power-driven, unprotected chain or belt drives.

This danger causes serious injuries, including loss of body parts such as the hand or arm.

Never open or remove protective equipment from chains or belt drives,

- while the tractor engine is running and the PTO shaft is connected / hydraulic drive is engaged
- or the ground wheel drive is moving



MD 078

Risk of crushing fingers or hands by accessible moving machine parts.

This danger causes serious injuries, including loss of body parts such as fingers or hand.

Never reach into the danger area while the tractor engine is running and the PTO shaft / hydraulic system is connected.



MD 082

Risk of falling for personnel riding on treads or platforms.

This danger can cause extremely serious and potentially fatal injuries.

It is forbidden to ride on the machine or climb the machine when it is running. This also applies to machines with treads or platforms.

Make sure that nobody is riding on the machine.

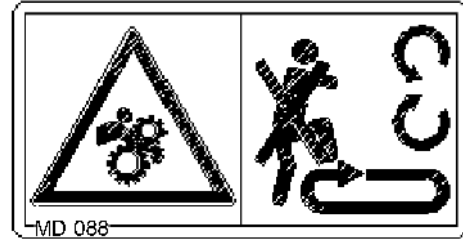


MD 088

Risk of being drawn in or caught by moving parts involved in the work process, caused by climbing on the loading platform when the machine is running.

This danger can cause extremely serious and potentially fatal injuries.

Never climb onto the loading platform when the tractor engine is running with PTO shaft / hydraulic / electronics system connected.



MD 093

Danger due to catching or entrapment due to accessible powered elements of the machine.

These dangers can cause extremely serious and potentially fatal injuries.

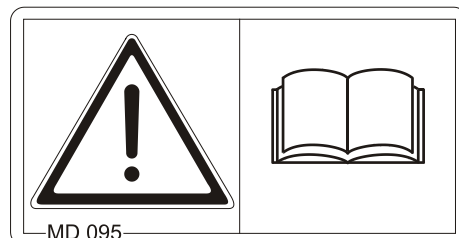
Never open or remove protective devices from driven machinery

- as long as the tractor engine is running with the PTO shaft connected / hydraulic drive engaged or
- as long as the tractor engine can be unintentionally started with the PTO shaft connected / hydraulic drive engaged.



MD 095

Read and follow the operating manual and safety information before starting up the machine!

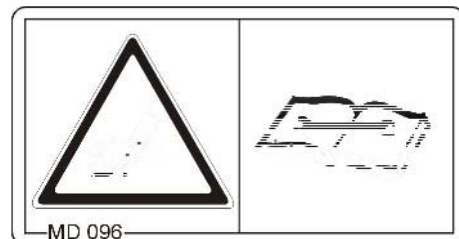


MD 096

Danger from escaping high-pressure hydraulic fluid due to leaking hydraulic hose lines.

This danger may cause serious injuries, perhaps even resulting in death, if escaping high-pressure hydraulic fluid passes through the skin and into the body.

- Never attempt to plug leaks in hydraulic hose lines using your hand or fingers.
- Read and observe the information in the operating manual before carrying out maintenance and repair work on the hydraulic hose lines.
- If you are injured by hydraulic fluid, contact a doctor immediately.

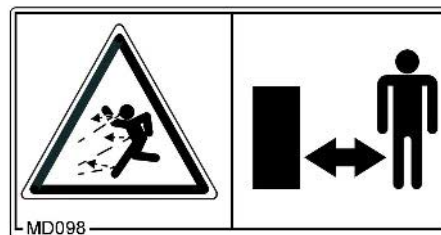


General safety instructions

MD 098

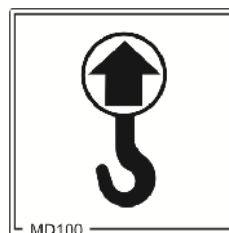
Danger from flying fertiliser particles.

Please ensure that all personnel maintain a sufficient safety distance and stay outside the danger area.



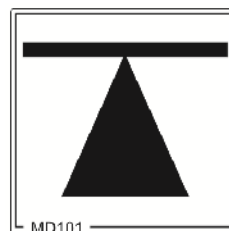
MD 100

This symbol indicates anchorage points for fastening slinging gear when loading the machine.



MD 101

This symbol indicates jacking points for lifting gear (jack).



MD 102

Danger from intervention in the machine, e.g. installation, adjusting, troubleshooting, cleaning, maintaining and repairing, due to the tractor and the machine being started unintentionally and rolling.

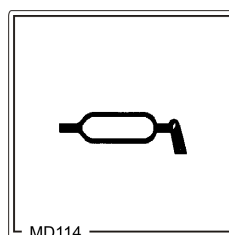
These dangers can cause extremely serious and potentially fatal injuries.

- Secure the tractor and the machine against unintentional start-up and rolling before any intervention in the machine.
- Depending on the type of intervention, read and understand the information in the relevant sections of the operating manual.



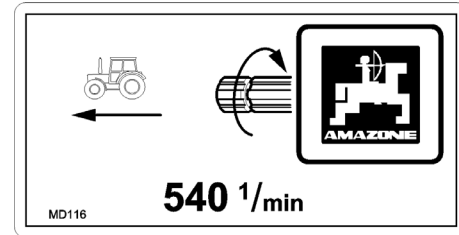
MD 114

This symbol indicates a lubrication point.



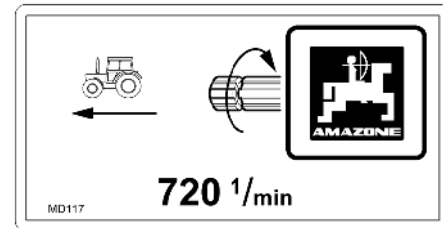
MD 116

Nominal speed (540 rpm) and direction of rotation of the machine-side drive shaft.



MD 117

Nominal speed (720 rpm) and direction of rotation of the machine-side drive shaft.

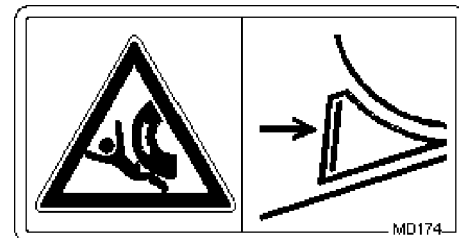


MD 174

Danger from unintended continued movement of the machine.

Causes serious, potentially fatal injuries anywhere on the body.

Secure the machine against unintended continued movement before uncoupling the machine from the tractor. To do this, use the parking brake and/or the wheel chock(s).



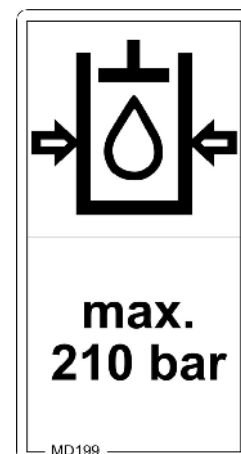
MD 175

The torque of the screw connection is 510 Nm.



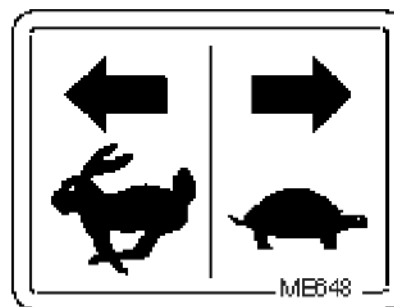
MD 199

The maximum operating pressure of the hydraulic system is 210 bars.



ME648

Fast/slow



2.14 Dangers if the safety information is not observed

Non-compliance with the safety information

- Can pose both a danger to people and also to the environment and machine.
- Can lead to the loss of all warranty claims.

Seen individually, non-compliance with the safety information could pose the following risks:

- Danger to people through non-secured working areas.
- Failure of important machine functions.
- Failure of prescribed methods of maintenance and repair.
- Danger to people through mechanical and chemical impacts.
- Risk to environment through leakage of hydraulic fluid.

2.15 Safety-conscious working

Besides the safety information in this operating manual, the national general workplace safety and accident prevention regulations are binding.

Comply with the accident prevention instructions on the warning symbols.

When driving on public roads and routes, comply with the appropriate statutory road traffic regulations.

2.16 Safety information for the operator



WARNING

Risk of contusions, cuts, dragging, catching or knocks from insufficient traffic and operational safety.

Before starting up the machine and the tractor, always check their traffic and operational safety.

2.16.1 General safety and accident prevention information

- Beside these instructions, comply with the general valid national safety and accident prevention regulations.
- The warning symbols and labels attached to the machine provide important information on safe machine operation. Compliance with this information guarantees your safety.
- Before moving off and starting up the machine, check the immediate area of the machine (children)! Ensure that you can see clearly!
- It is forbidden to ride on the machine or use it as a means of transport!
- Drive in such a way that you always have full control over the tractor with the attached machine.
In so doing, take your personal abilities into account, as well as the road, traffic, visibility and weather conditions, the driving characteristics of the tractor and the connected machine.

Connecting and disconnecting the machine

- Only connect and transport the machine with tractors suitable for the task.
- When connecting machines to the tractor three-point hydraulic system, the attachment categories of the tractor and the machine must always be the same!
- Connect the machine to the prescribed equipment in accordance with the specifications.
- When coupling machines to the front or the rear of the tractor, the following may not be exceeded:
 - The approved total tractor weight
 - The approved tractor axle loads
 - The approved load capacities of the tractor tyres
- Secure the tractor and the machine against unintentional rolling, before coupling or uncoupling the machine.
- Do not stand between the machine and tractor to be coupled while the tractor is approaching the machine.
Any helpers may only act as guides standing next to the vehicles, and may only move between the vehicles when both are at a standstill.
- Secure the operating lever of the tractor hydraulic system so that unintentional raising or lowering is impossible, before connecting the machine to or disconnecting the machine from the tractor three-point hydraulic system.
- When coupling and uncoupling machines, move the support equipment (if available) to the appropriate position (stability).



General safety instructions

- When actuating the support equipment, there is a danger of injury from contusion and cutting points!
- Be particularly careful when coupling the machine to the tractor or uncoupling it from the tractor! There are contusion and cutting points in the area of the coupling point between the tractor and the machine.
- It is forbidden to stand between the tractor and the machine when actuating the three-point linkage.
- Coupled supply lines:
 - must easily give way to all movements in bends without tensioning, kinking or rubbing.
 - must not rub against other parts.
- The release ropes for quick action couplings must hang loosely and may not release themselves when lowered.
- Also ensure that uncoupled machines are stable!

Use of the machine

- Before starting work, ensure that you understand all the equipment and actuation elements of the machine and their function. There is no time for this when the machine is already in operation!
- Do not wear loose-fitting clothing! Loose clothing increases the risk over being caught by drive shafts!
- Only start-up the machine, when all the safety equipment has been attached and is in the safety position!
- Comply with the maximum load of the connected machine and the approved axle and drawbar loads of the tractor. If necessary, drive only with a partially filled hopper.
- It is forbidden to stand in the working area of the machine.
- It is forbidden to stand in the turning and rotation area of the machine.
- There are contusion and cutting points at externally-actuated (e.g. hydraulic) machine points.
- Only actuate externally-actuated machine parts when you are sure that there is no-one within a sufficient distance from the machine!
- Before leaving the tractor, secure it from unintentionally starting up or rolling away.
For this:
 - Lower the machine onto the ground
 - Apply the parking brake
 - Switch off the tractor engine
 - Remove the ignition key

Machine transportation

- Comply with the national road traffic regulations when using public highways.
- Before moving off, check:
 - The correct connection of the supply lines
 - The lighting system for damage, function and cleanliness
 - The brake and hydraulic system for visible damage
 - That the parking brake is completely disengaged
 - The function of the brake system
- Ensure that the tractor has sufficient steering and braking power. Any machines and front/rear weights connected to the tractor influence the driving behaviour and the steering and braking power of the tractor.
- If necessary, use front weights.

The front tractor axle must always be loaded with at least 20 % of the tractor empty weight, in order to ensure sufficient steering power.
- Always fix the front or rear weights to the intended fixing points according to regulations.
- Comply with the maximum load of the connected machine and the approved axle and drawbar loads of the tractor.
- The tractor must guarantee the prescribed brake delay for the loaded vehicle combination (tractor plus connected machine).
- Check the brake power before moving off.
- When turning corners with the machine connected, take the broad load and balance weight of the machine into account.
- Before moving off, ensure sufficient side locking of the tractor lower links, when the machine is fixed to the three-point linkage or lower links of the tractor.
- Before moving off, move all the swivel machine parts to the transport position.
- Before moving off, secure all the swivel machine parts in the transport position against risky position changes. Use the transport locks intended for this.
- Before moving off, secure the operating lever of the three-point linkage against unintentional raising or lowering of the connected machine.
- Check that the transport equipment, e.g. lighting, warning equipment and protective equipment, is correctly mounted on the machine.
- Before transportation, carry out a visual check that the upper and lower link bolts are firmly fixed with the linchpin against unintentional release.
- Adjust your driving speed to the prevailing conditions.
- Before driving downhill, switch to a low gear.
- Before moving off, always switch off the independent wheel braking (lock the pedals).

2.16.2 Hydraulic system

- The hydraulic system is under a high pressure.
- Ensure that the hydraulic hose lines are connected correctly.
- When connecting the hydraulic hose lines, ensure that the hydraulic system is depressurised on both the machine and tractor sides.
- It is forbidden to block the operator controls on the tractor which are used for hydraulic and electrical movements of components, e.g. folding, swivelling and pushing movements. The movement must stop automatically when you release the appropriate control. This does not apply to equipment movements that:
 - are continuous
 - are automatically controlled
 - require a floating position or pressed position to function
- Before working on the hydraulic system
 - Lower the machine
 - Depressurise the hydraulic system
 - Shut off the tractor engine
 - Apply the parking brake
 - Remove the ignition key
- Have the hydraulic hose line checked at least once a year by a specialist for proper functioning.
- Replace the hydraulic hose line if it is damaged or worn. Only use original AMAZONE hydraulic hose lines.
- The hydraulic hose lines should not be used for longer than six years, including any storage time of maximum two years. Even with proper storage and approved use, hoses and hose connections are subject to natural ageing, thus limiting the length of use. However, it may be possible to specify the length of use from experience values, in particular when taking the risk potential into account. In the case of hoses and hose connections made from thermoplastics, other guide values may be decisive.
- Never attempt to plug leaks in hydraulic hose lines using your hand or fingers.

Escaping high pressure fluid (hydraulic fluid) may pass through the skin and ingress into the body, causing serious injuries!
If you are injured by hydraulic fluid, contact a doctor immediately.
Danger of infection.
- When searching for leakage points, use suitable aids, to avoid the serious risk of infection.

2.16.3 Electrical system

- When working on the electrical system, always disconnect the battery (negative terminal).
- Only use the prescribed fuses. If fuses are used that are too highly rated, the electrical system will be destroyed – risk of fire.
- Ensure that the battery is connected correctly - firstly connect the positive terminal and then connect the negative terminal. When disconnecting the battery, disconnect the negative terminal first, followed by the positive terminal.
- Always place the appropriate cover over the positive battery terminal. If there is accidental earth contact, there is a risk of explosion.
- Risk of explosion. Avoid sparking and naked flames in the area of the battery.
- The machine can be equipped with electronic components, the function of which may be influenced by electromagnetic interference from other units. Such interference can pose risks to people, if the following safety information is not followed.
 - If retrofitting electrical units and/or components on the machine with a connection to the on-board power supply, the user is responsible for checking whether the installation might cause faults on the vehicle electronics or other components.
 - Ensure that the retrofitted electrical and electronic components comply with the EMC directive 2004/108/EEC in the appropriate version and carry the CE mark.

2.16.4 Coupled machines

- Observe the permitted combination options of the attachment equipment on the tractor and the machine drawbar.
Only couple permitted combinations of vehicles (tractor and attached machine).
- On single axle machines, observe the maximum permitted drawbar load of the tractor on the attachment equipment.
- Ensure that the tractor has sufficient steering and braking power.
Machines attached or coupled to a tractor influence the driving behaviour and steering and braking power of the tractor, in particular single axle machines with a drawbar load on the tractor.
- Only a specialist workshop may adjust the height of the drawbar on yoke bars with a drawbar load.



2.16.5 Brake system

- Only specialist workshops or recognised brake services can carry out adjustment and repair work on the brake system.
- Have the brake system thoroughly checked regularly.
- If there are any malfunctions, stop the tractor immediately using the brake system. Have the malfunction rectified immediately.
- Before performing any work on the brake system, park the machine safely and secure the machine against unintentional lowering or rolling (wheel chocks).
- Be particularly careful when carrying out any welding, torch cutting or drilling work in the area of the brake lines.
- Always carry out a braking test after any adjusting or repair work on the brake system.

Pneumatic braking system

- Before coupling the machine, clean any dirt from the sealing rings on the hose couplings of the supply and brake line.
- Only move off with the machine connected when the pressure gauge on the tractor shows 5.0 bar.
- Drain the air reservoir every day.
- Before driving without the machine, lock the hose couplings on the tractor.
- Hang the hose couplings of the machine supply and brake lines in the appropriate empty couplings.
- When filling up or replacing the brake fluid, use the prescribed fluid. When replacing the brake fluid, comply with the appropriate regulations.
- Do not make any changes to the specified settings on the brake valves.
- Replace the air reservoir if:
 - The air reservoir can be moved in the tensioning belts
 - The air reservoir is damaged
 - The rating plate on the air reservoir is rusty, loose or missing.

Hydraulic brake system for export machines

- Hydraulic brake systems are prohibited in Germany.
- When filling up or replacing the brake fluid, use the prescribed hydraulic fluids. When replacing the hydraulic fluids, comply with the appropriate regulations.

2.16.6 Tyres

- Repair work on tyres and wheels may only be carried out by specialists with suitable installation tools.
- Check the air pressure at regular intervals.
- Inflate tyres to the specified pressure. If the air pressure in the tyres is too high, then there is a risk of explosion.
- Park the machine in a safe place and lock the machine against unintentional lowering and rolling (parking brake, wheel chocks), before carrying out work on the tyres.
- Tighten or retighten all the fixing screws and nuts in accordance with the specifications of AMAZONEN-WERKE.

2.16.7 Fertiliser spreader operation

- Stay clear of the working area! Danger from flying fertiliser particles. Direct persons away from the throwing range of the fertiliser spreader. Do not walk or stand close to rotating spreading discs.
- Fill the fertiliser spreader only when the tractor engine is shut off, the ignition key is pulled and the sliders are closed.
- Do not place any foreign objects in the hopper.
- While carrying out the spread rate check, beware of danger points from rotating machine parts.
- For side spreading at field edges, bodies of water or roads, use side spreading devices.
- Before each use, ensure that the attachment parts are properly fitted, particularly those for attaching the spreading discs and spreading vanes.

2.16.8 Universal joint shaft operation

- Use only the PTO shafts prescribed by the AMAZONEN-WERKE factories, equipped with the proper safety devices.
- Also read and follow the operating manual from the PTO shaft manufacturer.
- The protective tube and PTO shaft guard must be undamaged, and the shield of the tractor and machine universal joint shaft must be attached and be in proper working condition.
- Work is prohibited while the safety devices are damaged.
- You may install or remove the PTO shaft only after you have done all of the following:
 - Switched off the universal joint shaft
 - Switched off the tractor engine
 - Applied the parking brake
 - The ignition key has been removed
- Always ensure that the universal joint shaft is installed and secured correctly.
- When using wide-angle PTO shafts, always install the wide angle joint at the pivot point between the tractor and machine.
- Secure the PTO shaft guard by attaching the chain(s) to prevent movement.
- Observe the prescribed pipe overlaps in transport and operational positions. (Read and follow the operating manual from the PTO shaft manufacturer.)
- When turning corners, observe the permitted bending and displacement of the PTO shaft.
- Before switching on the universal joint shaft, check that the selected universal joint shaft speed of the tractor matches the permitted drive rev. speed of the machine.
- Instruct people to leave the danger area of the machine before you switch on the universal joint shaft.
- While work is being carried out with the universal joint shaft, there must be no one in the area of the universal drive or PTO shaft while it is turning.
- Never switch on the universal joint shaft while the tractor engine is shut off.
- Always switch off the universal joint shaft whenever excessive bending occurs or it is not needed.
- **WARNING!** After the universal joint shaft is switched off, there is a danger of injury from the continued rotation of freewheeling machine parts.

Do not approach the machine too closely during this time. You may work on the machine only after all machine parts have come to a complete stop.
- Secure the tractor and machine against unintentional starting and unintentional rolling away before you perform any cleaning, servicing or maintenance work on universal joint shaft-driven machines or PTO shafts.
- After decoupling the PTO shaft, place it on the holder provided.

- After removing the PTO shaft, attach the protective sleeve to the universal joint shaft stub.
- When using the travel-dependent universal joint shaft, note that the universal joint shaft speed depends on the drive speed, and that the direction of rotation reverses when you drive in reverse.

2.16.9 Cleaning, maintenance and repairs

- Only carry out maintenance, repair and cleaning work on the machine when
 - The drive is switched off
 - The tractor engine has come to a complete stop
 - The ignition key has been removed
 - The machine connector has been removed from the on-board computer
- Regularly check the nuts and bolts for a firm seat and retighten them as necessary.
- Secure the raised machine and/or raised machine parts against unintentional falling before maintaining, repairing or cleaning the machine.
- When replacing work tools with blades, use suitable tools and gloves.
- Dispose of oils, greases and filters in the appropriate way.
- Disconnect the cable from the tractor generator and battery before carrying out electrical welding work on the tractor and on attached machines.
- Spare parts must at least meet the specified technical requirements of AMAZONEN-WERKE. This is ensured through the use of original AMAZONE spare parts.

3 Loading

Loading and unloading with a tractor



WARNING

There is a risk of accident if the tractor is unsuitable and the machine brake system is not connected to the tractor or filled.



- Couple the machine to the tractor correctly before loading the machine onto a transport vehicle or unloading it from a transport vehicle.
- You may only couple and transport the machine with a tractor for loading and unloading, if the tractor meets the necessary power requirements.

Pneumatic braking system:

- Only move off with the machine connected when the pressure gauge on the tractor shows 5.0 bar.

Loading using a lifting crane

There are 2 attachment points (Fig. 5, Fig. 6) at the front and rear of the hopper.



DANGER

If loading the machine with a lifting crane, use the marked attachment points for lifting belts.



DANGER

The minimum tensile strength of each lifting belt must be 1,000 kg!

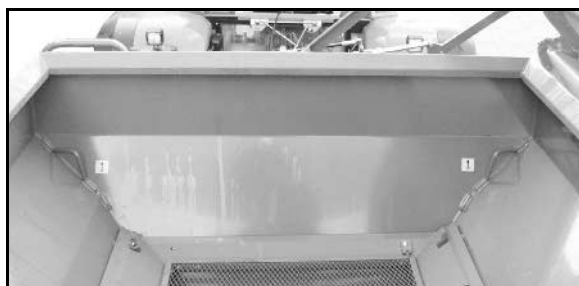


Fig. 5



Fig. 6

4 Product description

This section:

- Provides a comprehensive overview of the machine structure.
- Provides the names of the individual modules and controls.

Read this section when actually at the machine. This helps you to understand the machine better.

4.1 Overview of subassemblies

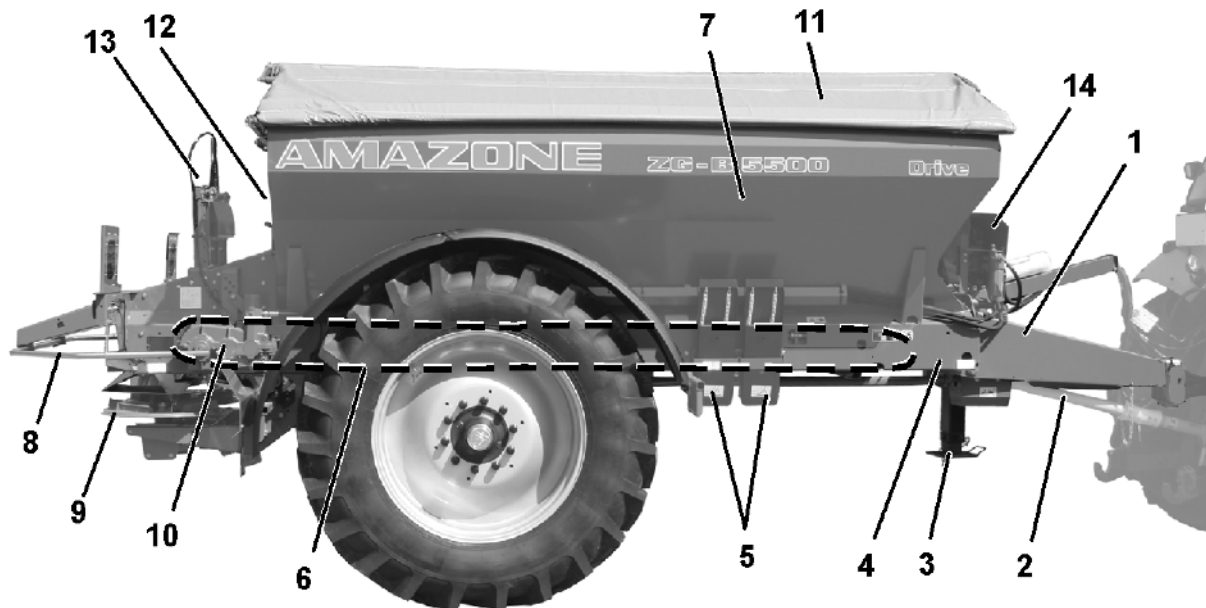


Fig. 7

- | | |
|-------------------|-------------------------------------------------------------------------------|
| (1) Drawbar | (8) Guard tube |
| (2) PTO shaft | (9) Spreader unit with spreading discs |
| (3) Stand | (10) Gearbox |
| (4) Frame | (11) Swivelable hopper cover (Option) |
| (5) Wheel chocks | (12) Main shutter |
| (6) Belt conveyor | (13) Double shutter (Option) |
| (7) Hopper | (14) ZG-B Drive : hydraulic block with oil filter and machine computer |

4.2 Safety and protection equipment

PTO shaft guard

- On the PTO shaft
- PTO shaft guard on the implement side

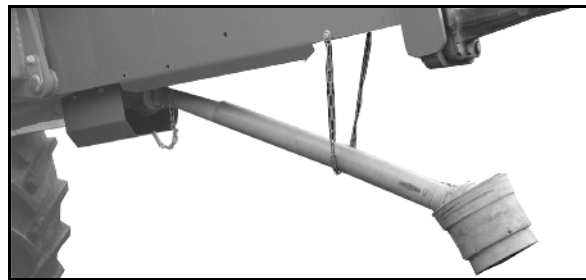


Fig. 8

PTO shaft guard

- On the PTO shaft (ZG-B Super / Special)
- On the gearbox (ZG-B Super / Special)
- On the ground wheel (ZG-B Super)



Fig. 9

Guard tube



Fig. 10

Guard plate for intermediate floor belt drive

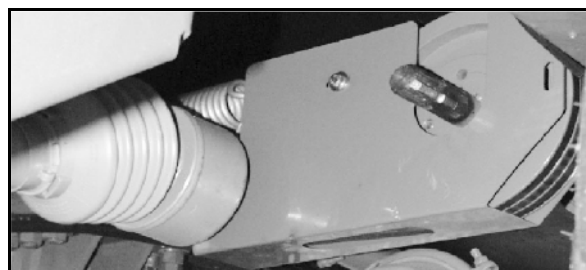


Fig. 11

Stop tap on TrailTron drawbar against unintentional activation of the track follow steering

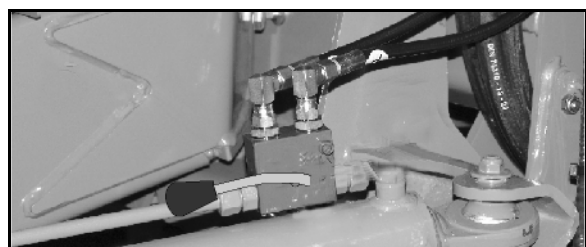


Fig. 12

4.3 Supply lines between the tractor and the machine

Supply lines in parking position:

Fig. 13/...

- (1) Hydraulic hose lines (depending on equipment)
- (2) Electric cable for lighting
- (3) Machine cable with machine connector for operating terminal
- (4) Brake line with coupling head for air-pressure brake

Alternative:

Brake line with connection to hydraulic brake

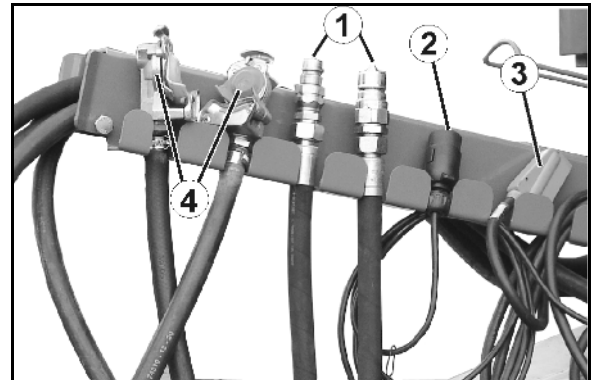


Fig. 13

4.4 Transportation equipment

Fig. 14:

- (1) 2 rear lights, 2 brake lights, 2 turn indicators
- (2) 2 red reflectors (triangular)
- (3) 1 registration plate holder with lighting
- (4) Warning signs (square)

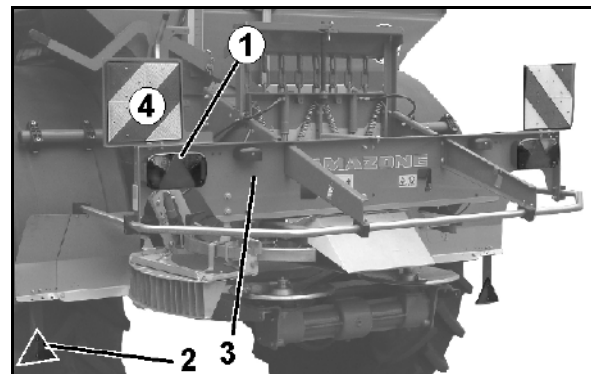


Fig. 14

Fig. 15/...

- (1) 2 x 3 reflectors, yellow (lateral view: distance of max. 3m)



Fig. 15



Connect the lighting system via the connector to the 7-pin tractor socket.

4.5 Intended use

The machine

- has been designed for the use in agricultural and municipal operation and for spreading
 - dry, granular, prilled and crystalline fertiliser (OM spreading discs, sieve screen)
 - earth moist lime (lime spreading discs)
 - sand (additional package "sand")
 - grit, salt and mixtures (additional package "winter service").
- Is coupled to a tractor depending on the drawbar via
 - Pin coupling
 - Hitch hook
 - Ball couplingand is operated by an additional person.

Sloping terrain can be navigated as follows:

- Along the contours
 - Direction of travel to the left 5 %
 - Direction of travel to the right 5 %
- Along the gradient
 - Up the slope 15 %
 - Down the slope 15 %

Using the steering drawbar with TrailTron control for precise tracking is prohibited if on sloping terrain. See page 72.

The intended use also includes:

- Compliance with all the instructions in this operating manual.
- Execution of inspection and maintenance work.
- Exclusive use of original AMAZONE spare parts.

Other uses to those specified above are forbidden and shall be considered as improper.

For any damage resulting from improper use:

- the operator bears the sole responsibility,
- AMAZONEN-WERKE assumes no liability whatsoever.

4.6 Danger areas

The danger area is the area around the machine in which people can be caught:

- By work movements made by the machine and its tools
- By materials or foreign bodies thrown out of the machine
- By tools rising or falling unintentionally
- By unintentional rolling of the tractor and the machine

Within the machine danger area, there are danger points with permanent or unexpected risks. Warning symbols indicate these danger points and warn against residual dangers, which cannot be eliminated for construction reasons. Here, the special safety regulations of the appropriate section shall be valid.

No-one may stand in the machine danger area:

- as long as the tractor engine is running with a connected cardan shaft / hydraulic system.
- as long as the tractor and machine are not protected against unintentional start-up and running.

The operating person may only move the machine or switch or drive the tools from the transport position to the working position or vice-versa when there is no-one in the machine danger area.

Danger points exist:

- Between the tractor and the machine, in particular during coupling and uncoupling and when loading the seed hopper
- In the area of moving parts
- When climbing onto the machine
- Under raised, unsecured machines and machine parts
- While spreading, from fertiliser pellets in the area of the spread fan

4.7 Rating plate and CE mark

The rating plate shows:

- Vehicle- / machine ID no.:
- Type
- Basic weight kg
- Permissible support load kg
- Permissible rear axle load kg
- Permissible system pressure bar
- Permissible total weight kg
- Factory
- Model year
- Year of manufacture

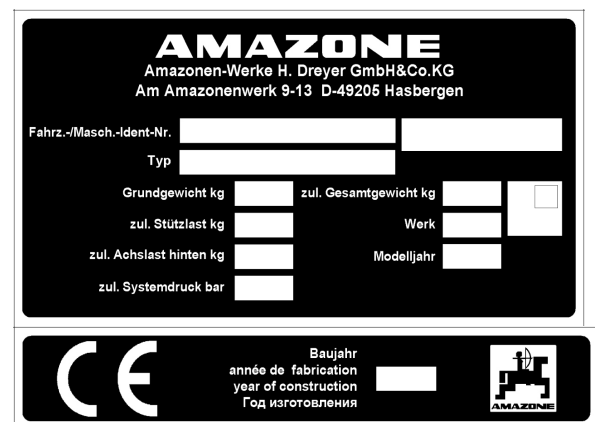


Fig. 16

4.8 Technical data

			ZG-B 5500		ZG-B 8200	
Hopper size		[l]	5500		8200	
Length over-all:		[m]	6,60			
Width / height with tyres:						
Tyres	Impression depth	[mm]	Width	Height	Width	Height
540/65 R38	0		2390	2447	2390	2777
550/60-22,5	0		2400	2260	2400	2590
600/55-26,5	0		2450	2300	2450	2630
700/50-26,5	0		2550	2300	2550	2630
23.1-26	0		2437	2410	2437	2740
28L-26	-50		2664	2422	2664	2752
750/60-30,5	30		2540	2392	2540	2722
460/85 R38	100		2700 2250	2523		
480/80 R46	100		2130	2572	2730	2854
520/85 R38	100		2740 2320	2540	2740 2320	2870
520/85 R42	100		2170	2574	2170	2904
520/85 R46	-125		2620	2617	2620	2947
Brake			Overrun brake with automatic reversing or Pneumatic brake		Pneumatic brake	
			Hydraulische Bremsanlage (nur für Export)			
			Spreader disc speed Standard speed 720 rpm. Maximum permissible speed 870 rpm			
			Universal joint shaft speed depending on equipment Standard speed 540 rpm / 720 rpm / 1000 rpm			



- Due to the impression depth caused by changing the wheels, two vehicle widths are specified for some tyres.
- The vehicle widths are specified for an axle width of 1850 mm.
For axles with axle width 2000 mm:
Add 150 mm to the axle specification

4.8.1 Weights basic machine and modules



The basic weight (empty weight) is calculated from the total individual weights of the modules.

	ZG-B 5500	ZG-B 8200
	[kg]	
Basic machine	1300	1400
Pair of tyres:		
• 460/85 R38, 10-hole (1,6 bar)	582	
• 480/80 R46, 10-hole (1,6 bar)	544	
• 520/85 R38, 10-hole (1,6 bar)	600	
• 520/85 R42, 10-hole LI155A8 (1,6 bar)	774	
• 520/85 R42, 10-hole LI162A8 (1,6 bar)	690	
• 520/85 R46, 10-hole (1,6 bar)	730	
• 540/65 R38, 10-hole (1,6 bar)	600	
• 550/60-22,5, 8/10-hole (2,1 bar)	300	
• 600/55-26,5, 8/10-hole (2,0 bar)	412	
• 700/50-26,5, 10-hole (1,8 bar)	428	
• 750/60-30,5, 10-hole (1,4 bar)	428	
• 23,1-26, 10-hole (1,7 bar)	500	
• 28 L-26, 10-hole (1,6 bar)	566	
Axle		
• braked	300	
• unbraked	150	
Pneumatic brake	50	
Drawbar		
• Drawbar (standard)	145	
• Steering drawbar	175	
• Run-on device with drawbar	106	
Equipment Drive	150	
Equipment Special, Super	110	
Limiter	25	
Double shutter	49	
Fertiliser chain rake	21	
Ground wheel	96	
Cover	80	

4.8.2 Permissible total weight and payload



The permissible total weight of the machine depends on the

- permitted drawbar load
- permitted axle load
- permitted load capacity per pair of tyres



The permissible total weight is the total of

- the permitted drawbar load and
- one of the following (whichever is smaller):
 - permitted axle load
 - permitted load capacity for each pair of wheels.

Please refer to the following tables for the values used for determining the permissible total weight.

Payload = permissible total weight - basic weight



DANGER

Exceeding the permitted payload is prohibited.

Risk of accident because of unstable driving conditions.

Carefully determine the payload, and therefore the permitted filling amount for your machine. Not all filling media can be used to fill the tank completely.

Permitted drawbar load

	ZG-B 5500	ZG-B 8200
	[kg]	
Straight drawbar	2000	
cranked drawbar	2000	
Run-on device with drawbar	1600	-

Permitted axle load

Axle load [kg]		Axles								
operational speed in [km/h]	unbraked	With run.-on de- vice with drawbar	Width [mm]							
			1850				2000			
			Impression depth [mm]							
			+125 bis 0	-25 bis -125	-150	-200	+125 bis 0	-25 bis -125	-150	-200
50	-	-	10000	8000	7500	7000	9500	9000	8500	8000
40	9000	-	10500	8500	8000	7500	10000	9500	9000	8500
25	10800	8000	12000	9500	9000	7500	11000	9500	9500	9000

Tyre load capacity (LI) per wheel

LI	146	148	150	152	154	155	158	160	162	165
kg	3000	3150	3350	3550	3750	3875	4250	4500	4750	5150

LI	167	169	171	173	175	177	179	181	183	185
kg	5450	5800	6150	6500	6900	7300	7750	8250	8750	9250



The maximum tyre load capacity is only achieved with correct tyre filling pressure, see table page **42**.

4.9 Necessary tractor equipment

To use the machine, the tractor must fulfil the power requirements and must be equipped with the necessary electric, hydraulic and brake connections.

Tractor engine power

ZG-B 5500	from 60 kW
ZG-B 8200	from 75 kW

Electrical system

Battery voltage:	• 12V (Volt)
Lighting socket:	• 7-pin

Hydraulic system

Maximum operating pressure:	• 210 bar
Tractor pump capacity:	• At least 40 l/min at 150 bar
Machine hydraulic fluid:	• Transmission/hydraulic fluid, petrol SAE 80W API GL4 The machine hydraulic/transmission fluid is suitable for the combined hydraulic/transmission fluid circuits of all standard makes of tractor.
Hydraulic control units:	Depending on equipment, see page 56

Brake system

Dual circuit service brake system:	• 1 hose coupling (red) for the supply line • 1 hose coupling (yellow) for the brake line
Single circuit service brake system:	• 1 service line hose coupling for the brake line
Hydraulic brake system:	• 1 hydraulic coupling, conforms to ISO 5676



The hydraulic brake system is prohibited in Germany and several other EU countries.

Universal joint shaft

Required speed:	• 540 rpm, , 720 rpm or 1000 rpm;
Direction of rotation	• Clockwise, viewed from rear toward the tractor, depending on equipment,

4.10 Noise production data

The workplace-related emission value (acoustic pressure level) is 74 dB(A), measured in operating condition at the ear of the tractor driver with the cabin closed.

Measuring unit: OPTAC SLM 5.

The noise level is primarily dependent on the vehicle used.

5 Structure and function

The following section provides information on the machine structure and the functions of the individual components.



Fig. 17

The **AMAZONE ZG-B** bulk fertiliser spreader is a fertiliser spreader with hoppers from 5,200 l to 8,200 l in volume.

It is used for spreading

- damp fertiliser (spreading discs of lime) and
- granular fertiliser (spreading discs OM).

In the municipal sector, bulk precision broadcasters are used for

- lime treatment in forests
- applying sand on golf courses
- in winter service

The conveyor belt (Fig. 17/1) delivers the spreading material (Fig. 17/2) from the hopper (Fig. 17/3) to the spreader units.

The spreading discs (Fig. 17/4) are driven by the PTO shaft with 540 rpm., 720 rpm. or 1000 rpm.

The freely adjustable hopper outlet determines the amount of material entering the spreading unit and thus the amount of material to be spread. The spreader units distribute the spreading material.

The steep wall of the hopper and the wide floor conveyor belt mean that no material is left in the hopper even if damp fertiliser is used.

Equipment of the ZG-B:

- **ZG-B Special:**
 - Conveyor belt with drive via PTO shaft
- **ZG-B Super:**
 - Conveyor belt with drive via ground wheel
- **ZG-B Drive:**
 - Distance related metering via electro hydraulically controlled floor belt.
 - **AMATRON 3** in-cab terminal
 - Double shutter system fitted as standard, can be disengaged on one side
 - Can be supplied with weigh cell (optional)

5.1 Air-pressure brake system

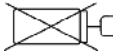


Keeping to the service interval is essential for proper functioning of the dual circuit service brake system.

Fig. 18/...

- (1) Braking force regulator
- (2) Hand lever for setting braking force manually
- (3) Setting position marking

The braking force is set in 3 stages, depending on the load status of the machine.

- Machine full → 1/1
- Machine partially full → 1/2
- Machine empty → 0
- Brake released → 

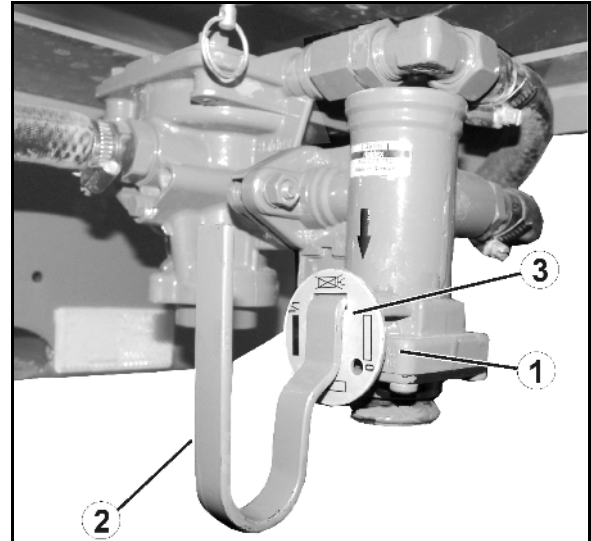


Fig. 18

Fig. 19/...

- (1) Air reservoir
- (2) Drainage valve for condensate
- (3) Test connection

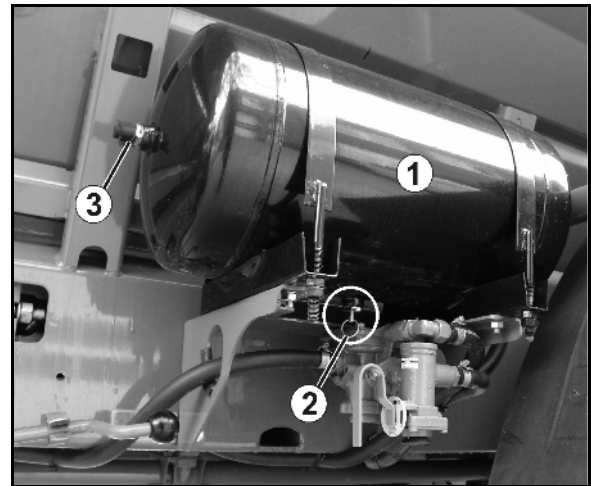


Fig. 19

- **Dual-circuit pneumatic braking system**

Fig. 20/...

- (1) Hose coupling on brake line (yellow)
- (2) Hose coupling on supply line (red)

Without illustration:

- **Single circuit pneumatic braking system**
Hose coupling (black)

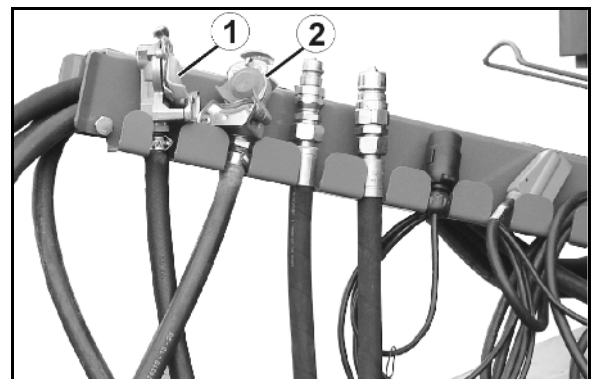


Fig. 20

5.1.1 Coupling the brake system



WARNING

Risk of crushing, cutting, being caught or drawn in, or impact through incorrectly functioning brake system.

- When coupling the brake and supply line, ensure that
 - The sealing rings on the hose couplings are clean
 - The sealing rings on the hose couplings seal properly
- Replace damaged sealing rings immediately
- Drain the air reservoir each day before the first use
- Only start up with the machine coupled if the pressure gauge on the tractor shows 5.0 bar



WARNING

Risk of crushing, cutting, being caught or drawn in, or impact through the accidentally rolling machine, if the service brake is released.

Dual-circuit pneumatic braking system:

- Always couple the hose coupling on the brake line (yellow) first and then the hose coupling on the supply line (red).
- The service brake on the machine is immediately released from the brake setting if the red hose coupling is coupled.

1. Open the cover on the hose coupling on the tractor.
2. Pneumatic braking system:
 - **Dual-circuit** pneumatic braking system:
 - 2.1 Fasten the brake line hose coupling (yellow) in the yellow coupling on the tractor, as specified.
 - 2.2 Fasten the supply line hose coupling (red) in the red coupling on the tractor, as specified.

→ When coupling the supply line (red), the supply pressure coming from the tractor automatically presses out the actuator button for the release valve on the trailer brake valve
 - **Single circuit** pneumatic braking system:
 - 2.1 Fasten the hose coupling (black) to the tractor, as specified.
3. Release the parking brake and/or remove the wheel chocks.

5.1.2 Uncoupling the brake system



WARNING

Risk of crushing, cutting, being caught or drawn in, or impact through the accidentally rolling machine, if the service brake is released.

Dual-circuit pneumatic braking system:

- Always uncouple the supply line hose coupling (red) first, and then the brake line hose coupling (yellow).
- The service brake of the machine only moves into the brake position when the red hose coupling has been uncoupled.
- Always keep to this order, otherwise the service brake system will be released and may set the unbraked machine in motion.



When the machine is uncoupled or pulled away from the trailer, air is vented from the trailer brake valve supply line. The trailer brake valve is automatically switched and operates the service braking system independently of the automatic, load-dependent braking force regulator.

1. Secure the machine against unintentionally rolling. To do this, use the parking brake and/or wheel chocks.
2. Pneumatic braking system
 - **Dual-circuit** pneumatic braking system:
 - 2.1 Release the supply line hose coupling (red).
 - 2.2 Release the brake line hose coupling (yellow).
 - **Single circuit** pneumatic braking system:
 - 2.1 Release the hose coupling (black).
3. Close the hose coupling covers on the tractor.

5.2 Hydraulic service brake system

To control the hydraulic service brake system, the tractor requires hydraulic braking equipment.

5.2.1 Coupling the hydraulic service brake system



Only couple clean hydraulic couplings.

1. Remove the protective caps.
2. Clean the hydraulic plug and hydraulic socket if necessary.
3. Insert the tractor's hydraulic plug into the machine's hydraulic socket.
4. Tighten the hydraulic screw union (if present) hand-tight.

5.2.2 Uncoupling the hydraulic service brake system

1. Loosen the hydraulic screw union (if present).
2. Protect the hydraulic plug and hydraulic socket against soiling using the dust protection caps.
3. Store the hydraulic hose line in the hose cabinet.

5.2.3 Emergency brake

In event of the machine being released from the tractor during travel, the emergency brake will brake the machine

Fig. 21/...

- (1) Pulling cable
- (2) Brake valve with pressure accumulator
- (3) Hand pump to relieve the brake
- (A) Brake released
- (B) Brake applied

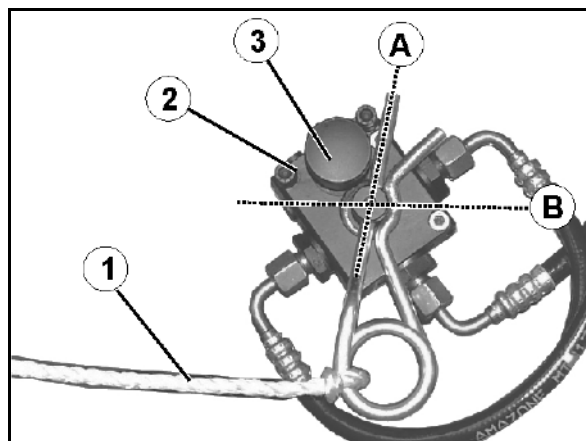


Fig. 21



DANGER

Before travel, set the brake to the application position.

For this purpose:

1. Secure the pulling cable to a fixed point on the tractor.
 2. Apply the tractor brake with the tractor engine running and hydraulic brake connected.
- Pressure accumulator of the emergency brake is being charged.

**DANGER****Risk of accident through brake malfunction!**

After withdrawing the safety splint (e.g. when activating the emergency brake), it is essential to insert the safety splint into the brake valve from the same side (Fig. 21). Otherwise the brake will not function.

After reinserting the safety splint, carry out a brake test for the service brake and the emergency brake.

5.3 Parking brake

When the parking brake is on, it secures the uncoupled machine against unintentional rolling. The parking brake is operated by turning the crank, which in turn operates the spindle and bowden cable.

Fig. 22:

Crank; locked in idle position

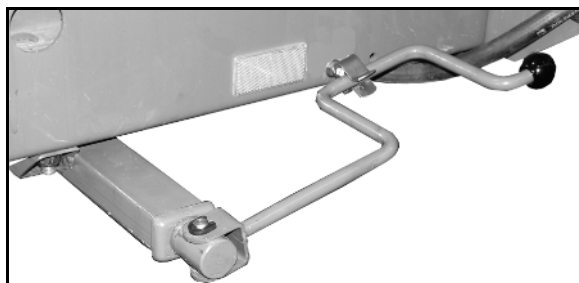


Fig. 22

Fig. 23:

Crank position for releasing / applying in the end area.

(the parking brake requires approx. 20 kg manual force to be applied).

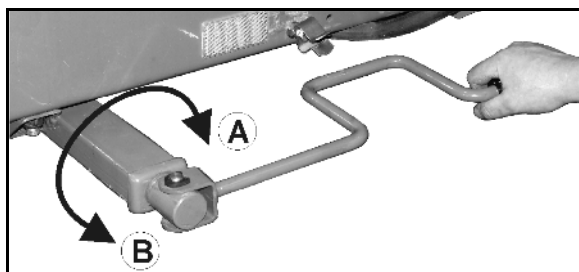


Fig. 23

Fig. 24:

Crank position for quick releasing / applying.

(A) Apply the tractor parking brake.

(B) Release parking brake.

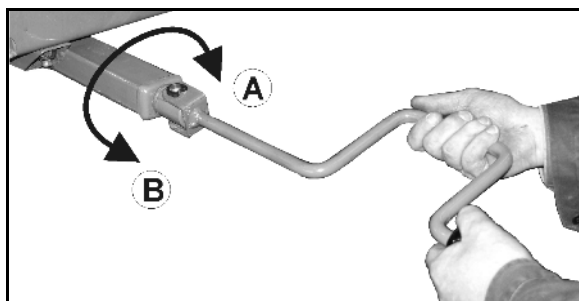


Fig. 24



- Correct the setting of the parking brake if the spindle's tension is no longer sufficient.
- Ensure that the bowden cable is not lying or rubbing against other vehicle parts.
- When the parking brake is off, the bowden cable must be slightly slack.

5.4 Overrun brake with automatic reversing

Fig. 25/...

- (1) Parking brake
 - o Off (A)
 - o On (B)
- (2) Pulling cable

When coupling the machine:

- Fasten the parking brake pulling cable to a fixed point on the tractor.

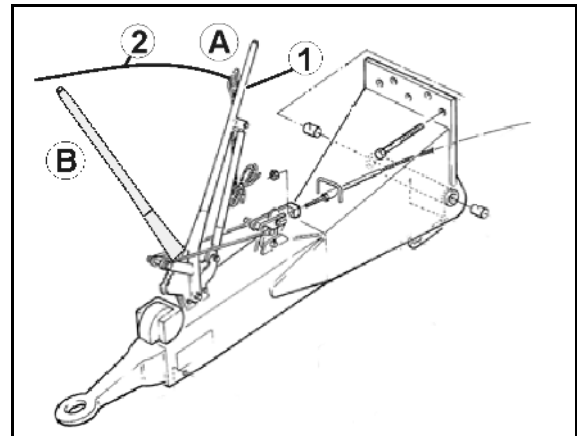


Fig. 25

5.5 Wheel chocks

Use wheel chocks to prevent the machine from rolling.

Fig. 26/...

- (1) Foldable wheel chocks
- (2) Wheel chock storage

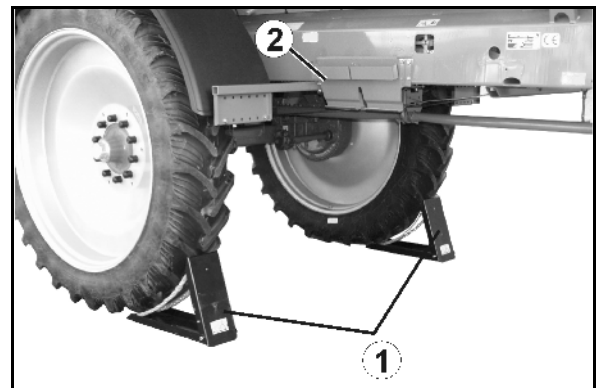


Fig. 26

5.6 Safety chain for implements without brake system

Implements without a brake system or with a single-line brake system must be equipped with a safety chain in compliance with local country regulations.

The safety chain must be correctly fixed to a suitable position on the tractor before transporting.

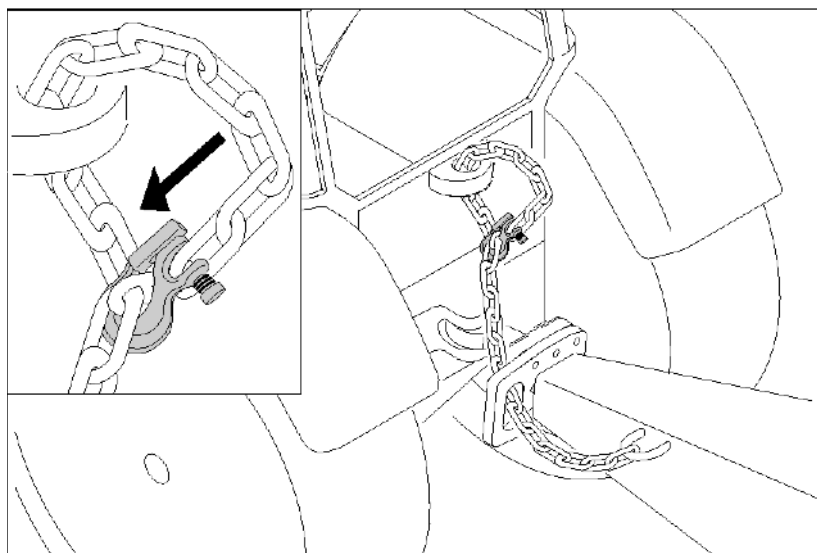


Fig. 27

5.7 Drawbars



If using automatic trailer couplings, check that the connection is secure after coupling. If using non-automatic trailer couplings, secure the coupling pin positively after inserting it.

The **ZG-B** is equipped with a spring-suspended drawbar and is height-adjustable.

Draw bars:

- Draw bar with towing eye (Fig. 28/1) for coupling to the tractor pin coupling.
- Draw bar with ball coupling (Fig. 28/2) for coupling to the tractor ball coupling.
- Hitch draw bar with rotating towing eye (Fig. 28/3) for coupling to the tractor hitch hook.



If the **ZG-B** is not standing with the frame angled level to the ground behind the tractor, after it has been coupled, the tractor coupling or towing eye on the spreader needs to be adjusted.

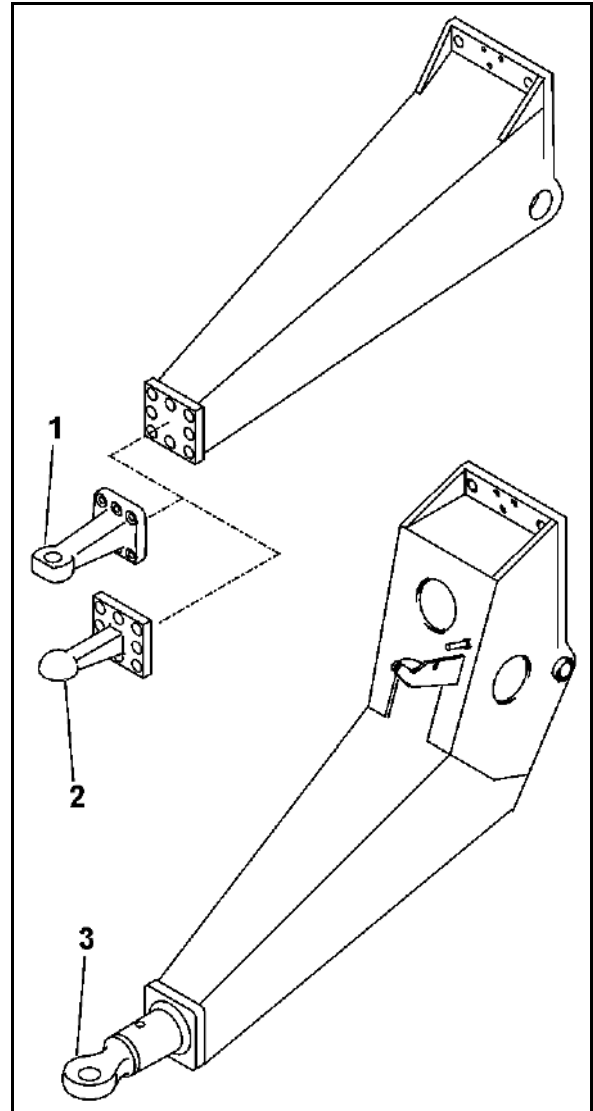
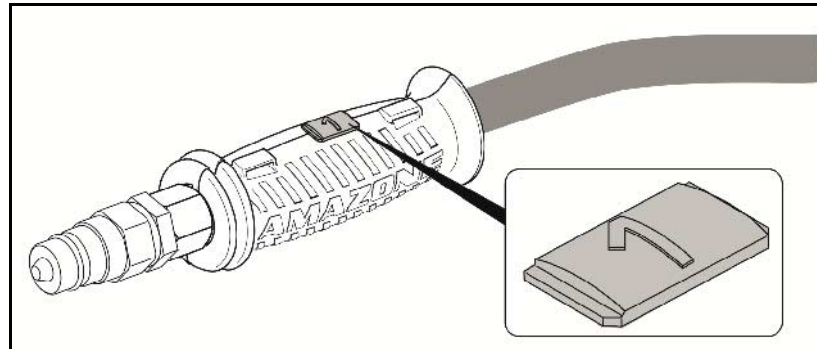


Fig. 28

5.8 Hydraulic connections




- All hydraulic hose lines are equipped with grips.






















Coloured markings with a code number or code letter have been applied to the gripping sections in order to assign the respective hydraulic function to the pressure line of a tractor control unit!



Films are stuck on the implement for the markings that illustrate the respective hydraulic function.

- The tractor control unit must be used in different types of activation, depending on the hydraulic function.

Latched, for a permanent oil circulation	
Tentative, activate until the action is executed	
Float position, free oil flow in the control unit	

Marking		Function		Tractor control unit	
yellow			double shutter left (Option)	Single-acting	
green			double shutter right (Option)	Single-acting	
red			ground wheel	Single-acting	
blue			Limiter (Option)	Double acting	
			lower		
natural			Hopper cover (Option)	Double acting	
			open		
			close		
ZG-B Drive:					
Red			Permanent oil circulation	Single-acting	
Red			Pressure-free return flow		
Red			Load sensing control line (Where required / settings on the hydraulic block)		

Maximum permissible pressure in oil return: 8 bar

Therefore do not connect the oil return to the tractor control unit, but to a pressure-free oil return flow with a large plug coupling.

**WARNING**

For the oil return, use only DN16 lines and select short return paths.

Pressurise the hydraulic system only when the free return has been correctly coupled.

Install the coupling union (supplied) on the pressure-free oil return flow.

**WARNING**

Danger of infection from escaping hydraulic fluid at high pressure!

When coupling and uncoupling the hydraulic hose lines, ensure that the hydraulic system is depressurised on both the machine and tractor sides.

If you are injured by hydraulic fluid, contact a doctor immediately.

5.8.1 Coupling the hydraulic hose lines**WARNING**

Risk of contusions, cutting, catching, drawing in and knocks from faulty hydraulic functions when the hydraulic hose lines are connected incorrectly!

When coupling the hydraulic hose lines, observe the coloured markings on the hydraulic plugs.



- Check the compatibility of the hydraulic fluids before connecting the machine to the hydraulic system of the tractor.
Do not mix any mineral oils with biological oils.
- Observe the maximum approved hydraulic fluid pressure of 200 bars.
- Only couple clean hydraulic connectors.
- Plug the hydraulic connector(s) into the hydraulic sleeves, until the hydraulic connector(s) audibly lock.
- Check the coupling points of the hydraulic hose lines for a correct, tight seat.

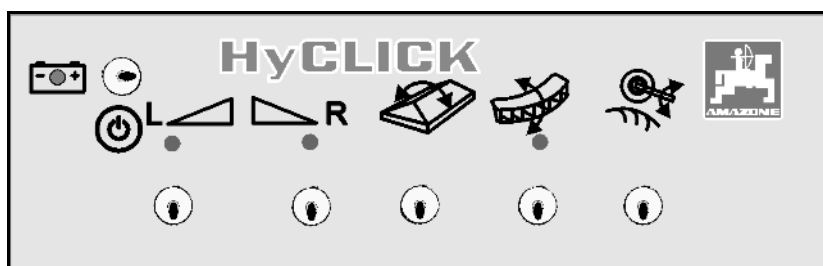
1. Swivel the actuation lever on the spool valve on the tractor to float position (neutral position).
2. Clean the hydraulic connectors of the hydraulic hose lines before you couple the hydraulic hose lines to the tractor.
3. Connect the hydraulic hose line(s) to the tractor control unit(s).

5.8.2 Decoupling the hydraulic hose lines

1. Swivel the actuation lever on the tractor control unit on the tractor to float position (neutral position).
2. Unlock the hydraulic connectors from the hydraulic sockets.
3. Protect the hydraulic plug and hydraulic socket against soiling using the dust protection caps.
4. Place the hydraulic hose lines in the hose cabinet.

5.9 Hyclick electro-hydraulic preselection

For ZG-B Super / Special



The Hyclick is an electro-hydraulic preselection device for convenient operation of all hydraulic functions with only one double-acting tractor control unit.



See Hyclick operating manual.

5.10 PTO shaft

The PTO shaft transmits power between the tractor and machine.

One-sided PTO shaft with wide angle (Fig. 29/1)

- Wide angle attached on the tractor side, standard
- Wide angle attached on implement side if Trail-Tron is used.

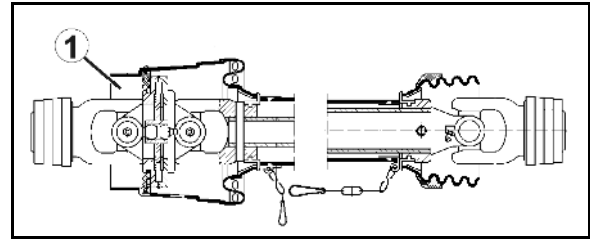


Fig. 29



WARNING

Danger of crushing from tractor and machine unintentionally starting up or rolling away!

Couple or decouple the PTO shaft and tractor only when tractor and machine have been secured against both unintentional starting and unintentional rolling away.



WARNING

Danger of catching or entrapment due to the unprotected gear-box input shaft owing to the use of a PTO shaft with a short PTO shaft guard!

Use only one of the listed permissible PTO shafts.



WARNING

Danger of trapping and entrapment by unguarded PTO shaft or damaged safety devices!

- Never use the PTO shaft if the safety device is missing or damaged, or without correctly using the supporting chain.
- Before all use, check that
 - all PTO shaft protective devices are installed and fully functional.
 - the clearance around the PTO shaft is sufficient in all operating modes. Insufficient clearance will result in damage to the PTO shaft.
- Attach the supporting chains in a way that ensures sufficient swivelling range of the PTO shaft in all operating positions. Supporting chains must not become caught on machine or tractor parts.
- Have any damaged or missing parts of the PTO shaft replaced immediately with OEM parts from the PTO shaft manufacturer. Note that only a specialist workshop may repair a PTO shaft.
- After decoupling the PTO shaft, place it on the holder provided. This protects the PTO shaft from damage and dirt.
 - Never use the supporting chain of the PTO shaft to suspend the uncoupled PTO shaft.



WARNING

Danger from being entangled and drawn in by unguarded PTO shaft parts in the power transmission area between the tractor and driven machine!

Work only when the drive between the tractor and driven machine is fully guarded.

- The unguarded parts of the PTO shaft must always be guarded by a shield on the tractor and a PTO shaft guard on the machine.
- Check that the shield on the tractor or the PTO shaft guard on the machine and the safety devices and guards of the extended PTO shaft overlap by at least 50 mm. If they do not, you must not power the machine via the PTO shaft.



- Use only the provided PTO shaft or one of the same type.
- Read and follow the operating manual provided for the PTO shaft. Correct use and maintenance of the PTO shaft prevents serious accidents.
- When coupling the PTO shaft
 - refer to the operating manual provided for the PTO shaft.
 - observe the permissible drive speed of the machine.
 - observe the correct installation length of the PTO shaft. Here, see the chapter "Adjusting the length of the PTO shaft to the tractor"
 - observe the correct installation position of the PTO shaft. The tractor symbol on the protective tube of the PTO shaft identifies the tractor-side connection of the PTO shaft.
- Always mount the overload or freewheel clutch on the machine if the PTO shaft has an overload or freewheel clutch.
- Before switching on the universal joint shaft, read and follow the safety precautions for universal joint shaft operation in the chapter entitled "Safety information for the user", page 32.



The unfavourable geometry on the tractor in association with large wheels on the ZG-B can cause a collision between the universal joint shaft and the flange on the drawbar eye.

To remedy this, an offset drive unit is available, order no.: 935060.

5.10.1 Coupling the PTO shaft



WARNING

Danger from crushing or impact if there is insufficient clearance when coupling the PTO shaft!

Couple the PTO shaft with the tractor before coupling the machine with the tractor. This will ensure the necessary clearance for safe coupling of the PTO shaft.

1. Drive the tractor up to the machine, leaving a clearance of approximately 25 cm between the tractor and the machine.
2. Secure the tractor against unintentional starting and rolling away, see the chapter "Securing the tractor against unintentional starting and rolling away", from page 101.
3. Check whether the universal joint shaft of the tractor is switched off.
4. Clean and grease the tractor's universal joint shaft.
5. Fit the latch of the PTO shaft over the universal joint shaft of the tractor until the latch is heard to engage. When coupling the PTO shaft, refer to the operating manual provided for the PTO shaft and observe the permissible universal joint shaft speed of the tractor.
6. Secure the PTO shaft guard using the supporting chain(s) to prevent movement.
 - 6.1 Fasten the supporting chain(s) so that it is as perpendicular to the PTO shaft as possible.
 - 6.2 Attach the supporting chain(s) in a way that ensures sufficient swivelling range of the PTO shaft in all operating positions.



Supporting chains must not become caught on machine or tractor parts.

7. Check that there is sufficient clearance around the PTO shaft in all operational positions. Insufficient clearance will result in damage to the PTO shaft.
8. Provide the necessary clearance (if required).

5.10.2 Uncoupling the PTO shaft



WARNING

Danger from crushing or impact if there is insufficient clearance when uncoupling the PTO shaft!

First uncouple the machine from the tractor before uncoupling the PTO shaft from the tractor. This will ensure the necessary clearance for safe uncoupling of the PTO shaft.



WARNING

Danger from burns on hot components of the PTO shaft!

Do not touch components of the PTO shaft that have become hot (particularly clutches).



- After decoupling the PTO shaft, place it on the holder provided. This protects the PTO shaft from damage and dirt.
Never use the supporting chain of the PTO shaft to suspend the uncoupled PTO shaft.
- Clean and lubricate the universal joint shaft if it will not be used for an extended period.

1. Uncouple the machine from the tractor. Also refer to the chapter "Uncoupling the machine", page 108.
2. Drive the tractor up to the machine, leaving a clearance of approximately 25 cm between the tractor and the machine.
3. Secure the tractor against unintentional starting and rolling away, see the chapter "Securing the tractor against unintentional starting and rolling away", from page 101.
4. Pull the latch of the PTO shaft off the universal joint shaft of the tractor. Observe the operating manual supplied with the PTO shaft when uncoupling the PTO shaft.
5. Place the PTO shaft in the holder provided.
6. Clean and lubricate the universal joint shaft if it is not going to be used for a longer period of time.

5.11 Main shutter slide

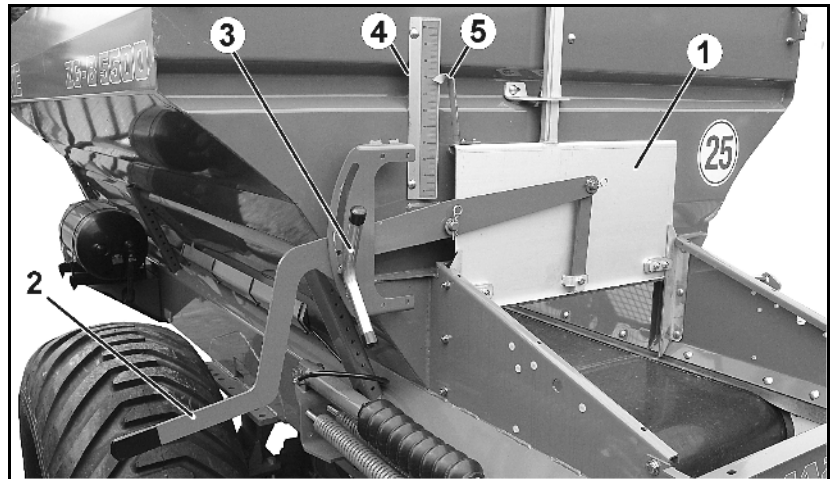


Fig. 30

- (1) Main shutter slide
- (2) Hand lever for adjustment
- (3) Clamping bolt to secure adjustment
- (4) Scale
- (5) Pointer

Adjust the quantity to be spread on the main shutter slide.

Close the main shutter slide or double shutter during the transport.

5.12 Double shutter

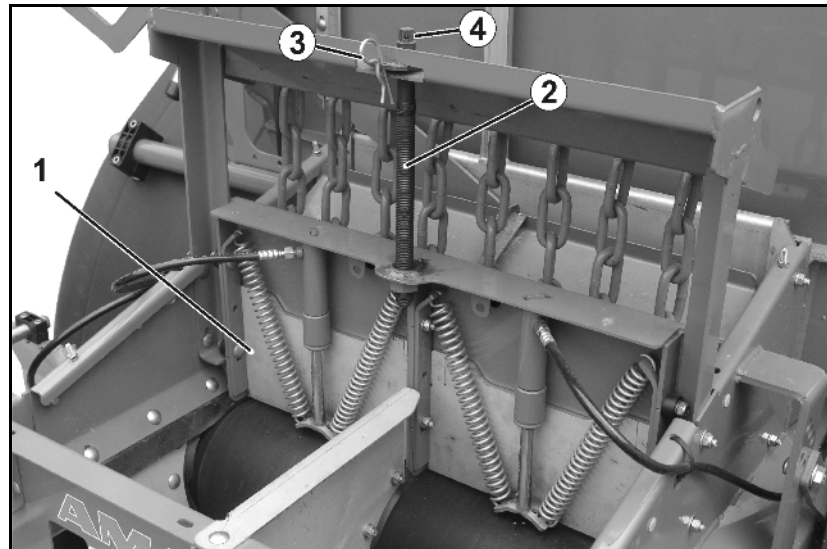


Fig. 31

- (1) Double shutter in operating position, both shutters closed
- (2) Spindle for commissioning the double shutter
- (3) R' clip
- (4) Attachment for 17 mm wrench

Open and close hydraulically the fertilizer sluice via double shutter.
By half side opening half side spreading is possible .

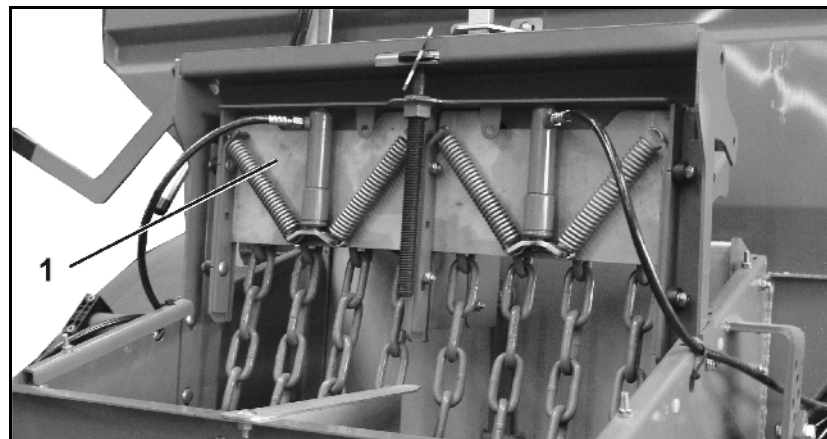


Fig. 32

- (1) Double shutter taken out of operation

Commissioning / decommissioning (workshop task)

1. Removing the R' clip.
2. Move the **double shutter** into the completely lowered / raised position **via the spindle** using a power screwdriver.
3. Secure the position using R' clips.

5.13 Fertiliser chain rake (option)



Use the chain rake to spread lime and bone meal.

The chain rake ensures even feed of the fertiliser to the spreading disc.

5.13.1 Chain rake, removable

Assembly:

insert the chain rake into the mount on the left and right side, and secure with a linch pin.

Removal:

pull out the linch pins and remove the chain rake from the mount.

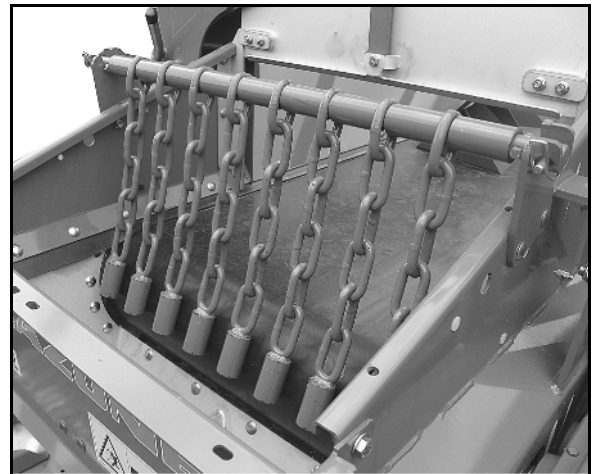


Fig. 33

5.13.2 Chain rake on the double shutter

Implements with a double shutter can be equipped with a chain rake mounted on the double shutter.

Put the chain rake into operating position (workshop task):

1. Take the double shutter out of operation.
2. Remove each of the chain ends from the parking device on the double shutter and place behind the conveyor belt.



Fig. 34

Structure and function

Take the chain rake out of operation (workshop task):

1. Put the chain hook in the parking device on the double shutter.
2. Put the double slider into operation.

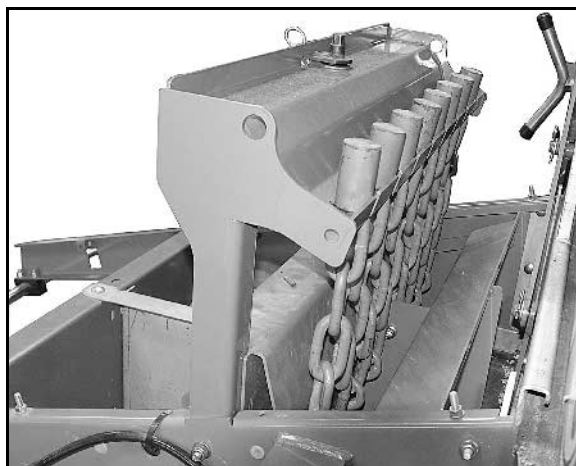


Fig. 35

5.14 Spreading granular fertiliser with spreading discs OM

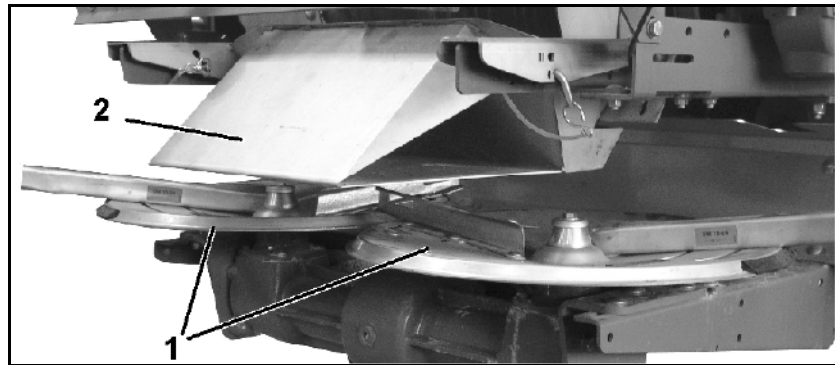


Fig. 36

- (1) spreading discs OM
- (2) funnel chute



For spreading granular fertilisers with the spreading discs OM always make use of the funnel chute. In this way the feed on point of the fertiliser on the spreading discs is optimised.

The working width can be infinitely adjusted by swivelling the spreading vanes on the **OM** spreading discs.

The **OM** spreading discs **10-16** can be used for working widths of 10-16 m.

The **OM** spreading discs **18-24** can be used for working widths of 18-24 m.

The **OM** spreading discs **24-36** can be used for working widths of 24-36 m.

As seen in the direction of travel:

- Left spreading disc (Fig. 37/1) with **L** mark.
- Right spreading disc (Fig. 37/2) with **R** mark.

Spreading vane:

- **Long** (Fig. 37/3) – Adjustment scale with values from 35 to 55.
- **Short** (Fig. 37/4) – Adjustment scale with values from 5 to 28.

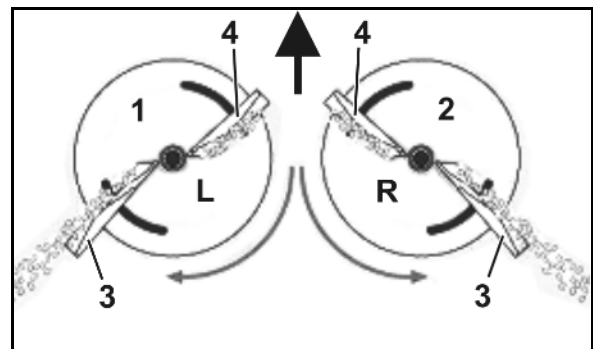


Fig. 37



The U-shaped spreading vanes are installed in such a way that the open sides point in the direction of rotation and take in the fertiliser.



Configure the settings using the information in the setting chart. You can easily check the configured working width using the mobile fertiliser test rig (optional).

Setting the funnel chute

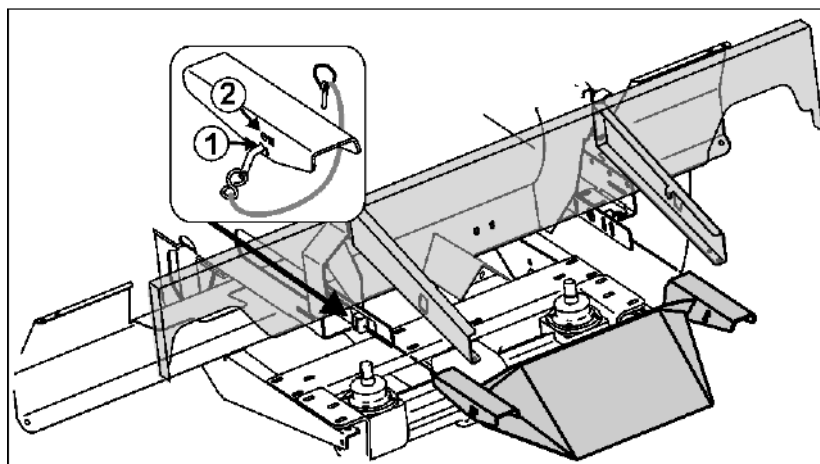


Fig. 38

The holes are labelled with the numbers 1 and 2.

Funnel chute position	Spread rate
Hole 1	up to 150 kg/ha
Hole 2	More than 150 kg/ha

5.15 Spreading lime with lime spreading discs

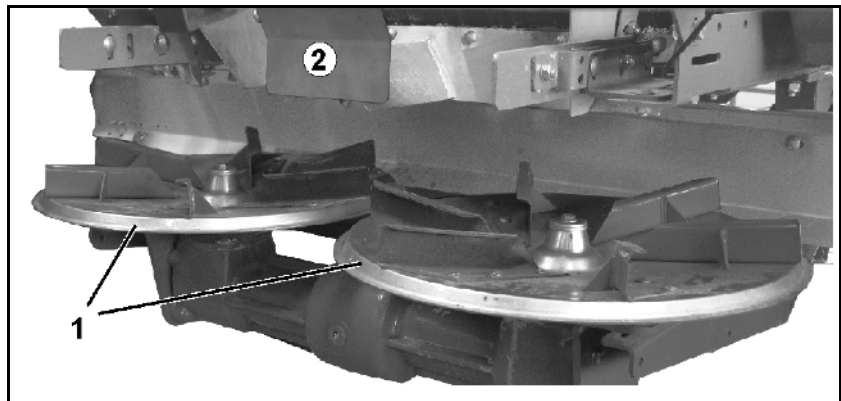


Fig. 39

- (1) spreading discs of lime
- (2) guide plate



For spreading earth-moist lime fertilizers, use the deflector guide and the chain rake.

Setting the guide plate

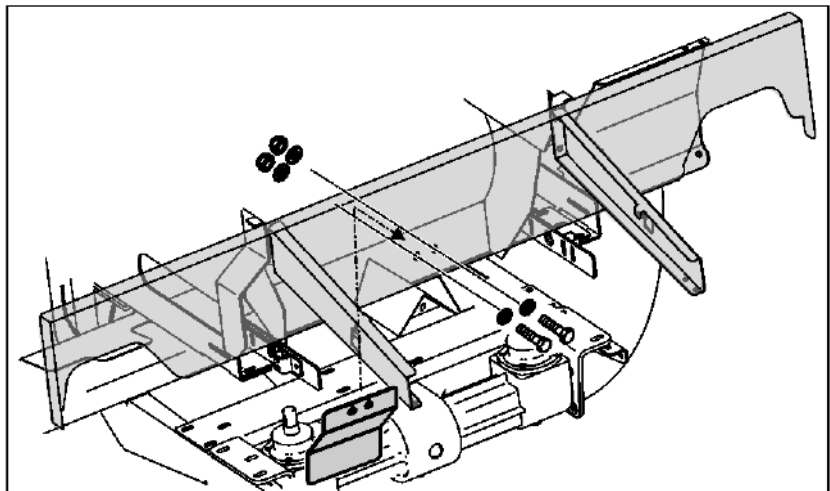


Fig. 40

5.16 Spreading granulated fertiliser with lime spreading discs

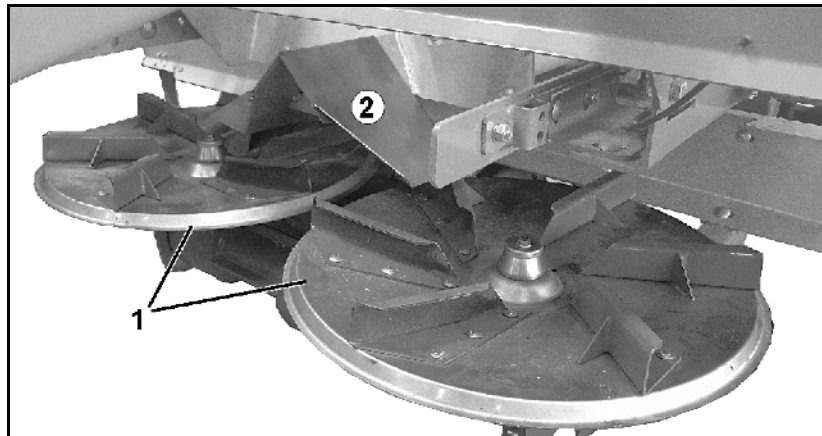


Fig. 41

- (1) spreading discs of lime
- (2) guide plate



Special case:

For spreading granulated non-nitrogen fertiliser up to a working width of 18 m, use the roof chute.

Roof chute assembly

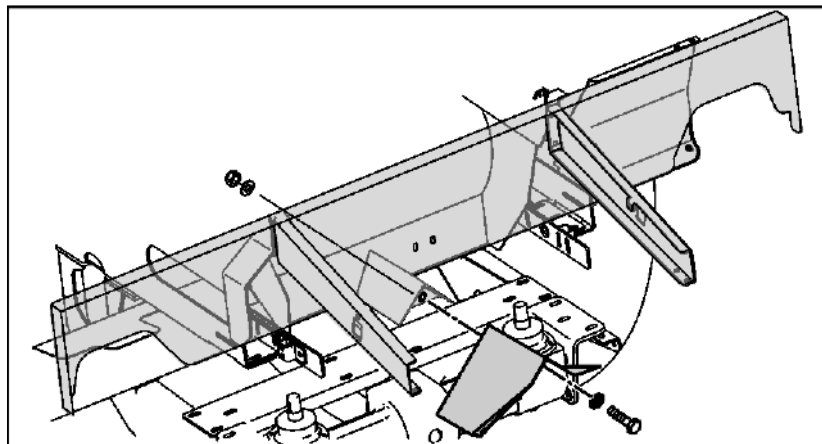


Fig. 42

5.17 Spreading of bone meal with bone meal spreading discs



DANGER

Risk of injury from colliding bone meal spreading vanes!

Before using the bone meal spreading vanes, turn them by hand to make sure that the spreading vanes do not collide.

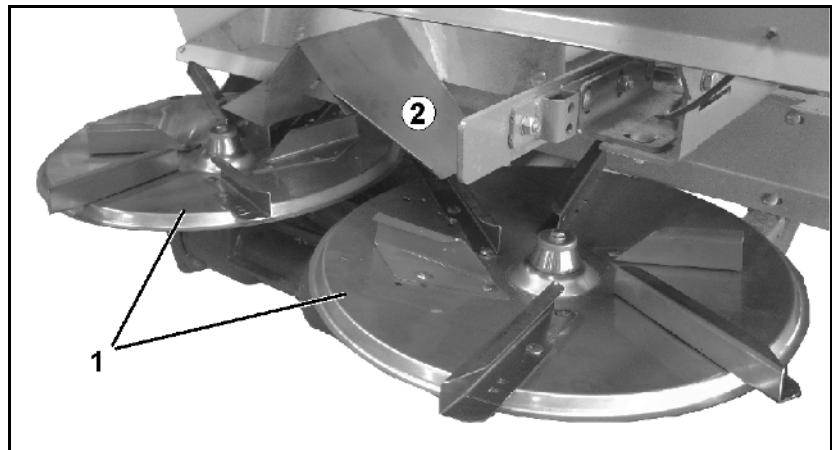


Fig. 43

(1) Spreading discs for bone meal

(2) Roof chute



For spreading bone meal up to a working width of 18 m, use the roof chute and the chain rake.

5.18 Spreading disc holder

Spreading disc holder (Fig. 44/1) For carrying two extra spreading discs on the left and right sides of the hopper.

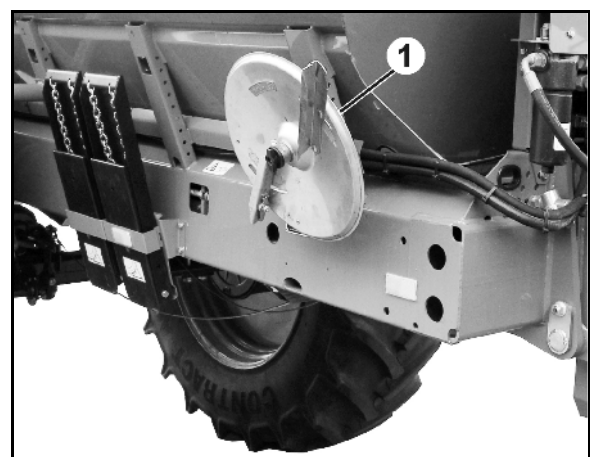


Fig. 44

5.19 Boundary and side spreading with the boundary spreading Limiter

If the first tramline is half the working width of the field edge, you can carry out boundary spreading using the Limiter (Fig. 45). Shut down and turn on hydraulically the Limiter.

To set the values of the setting table, position the boundary spread deflector on the guide bracket

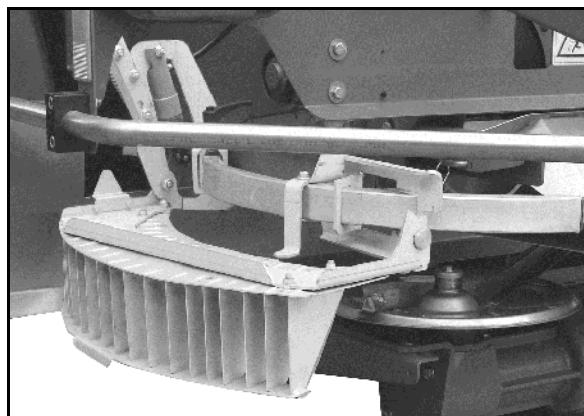


Fig. 45

Hydraulic throttle (Fig. 46):

The speed for raising the Limiter M is adjustable via the throttle rotator.

The throttle is located at the end of the hose line or on the hydraulic block.

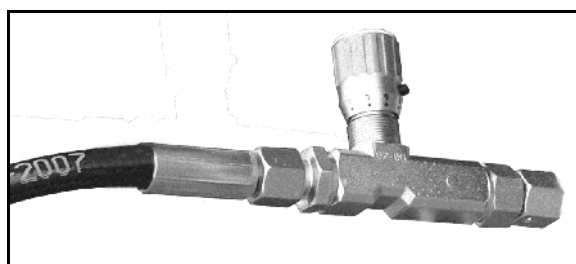


Fig. 46

5.20 Conveyor belt

The conveyor belt (Fig. 47) delivers the spreading material via the flap control from the hopper to the spreader units.

Depending on equipment version, the conveyor belt is driven on the

- ZG-B Special: with universal joint shaft.
- ZG-B Super: with ground wheel.
- ZG-B Drive: with hydraulic drive.

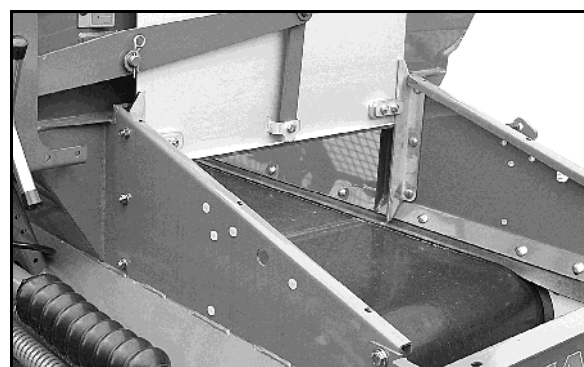


Fig. 47

5.20.1 Belt conveyor driven hydraulically

ZG-B Special / ZG-B Super:

Manual gearbox with two speeds and idle.

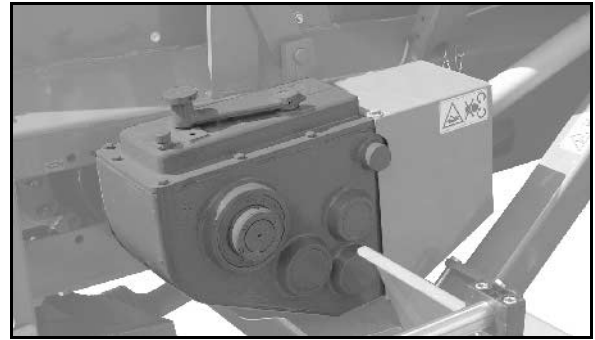


Fig. 48

ZG-B Drive:

The belt conveyor is driven hydraulically by a gearbox.

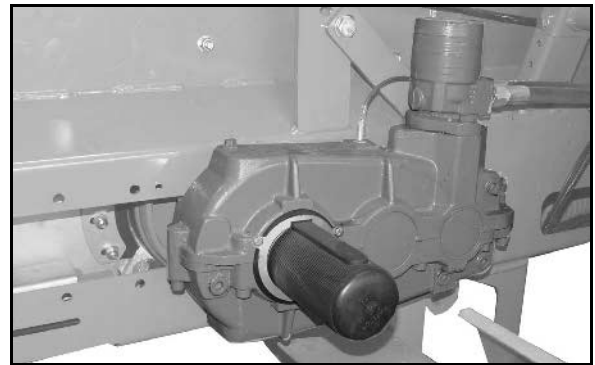


Fig. 49

5.20.2 Ground wheel drives of conveyor belt

ZG-B Super

The ground wheel drives (Fig. 50) allows the forward speed related spread rate control.

The ground wheel

- o Is pressed by spring pressure on to the **ZG-B** - wheel
- o Hydraulically taken from the wheel (Fig. 51).

The stroke of the drive wheel can be adapted to the size of the spreader's tyre by changing the position of the ram (Fig. 51/1).

Stop tap on the hydraulic hose (Fig. 52):

- Stop tap closed - Position A
- Stop tap opened - Position B



Fig. 50

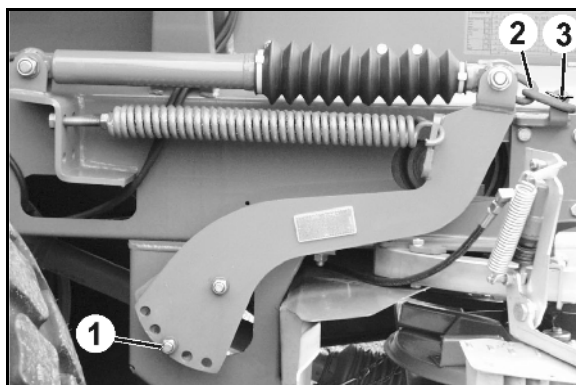


Fig. 51



Ensure that the conveyor belt is switched off when travelling on public roads.

1. Close lock tap.
2. Secure the ground wheel by using the chain (Fig. 52/2) and clip pin (Fig. 52/3).

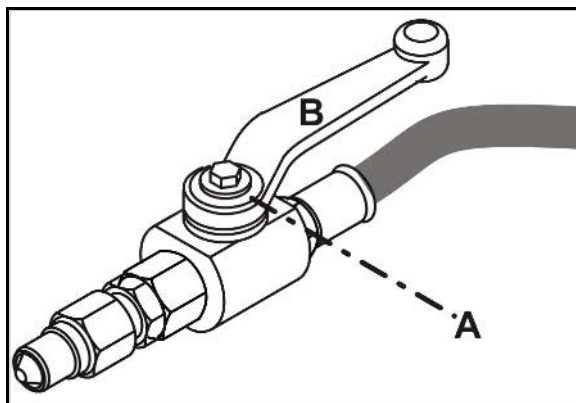


Fig. 52

5.21 Foldable ladder

The foldable ladder (Fig. 53/1) enables a user to comfortably ascend the hopper for cleaning purposes.



Warning

Keep the ladder folded in and locked when the vehicle is in motion (Fig. 53/2).

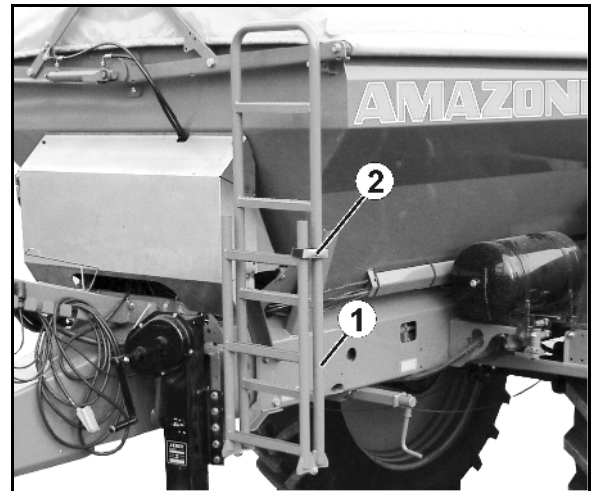


Fig. 53

5.22 Stand

Raising the stand after coupling

1. Wind up the stand (Fig. 54/1) to the limit stop using the hand crank (Fig. 54/2).
2. Pull the pins (Fig. 54/3) out of the stand.
3. Raise the stand.
4. Insert the pins in the lower hole (Fig. 54/4) and secure them.

Lowering the stand before coupling

1. Hold the inside of the stand steady and pull the pins (Fig. 54/3) out of the stand.
2. Lower the stand.
3. Insert the pins in the upper hole and secure them.
4. Wind down the stand (Fig. 54/1) to the limit stop using the hand crank (Fig. 54/2) until the load is relieved from the yoke bar.

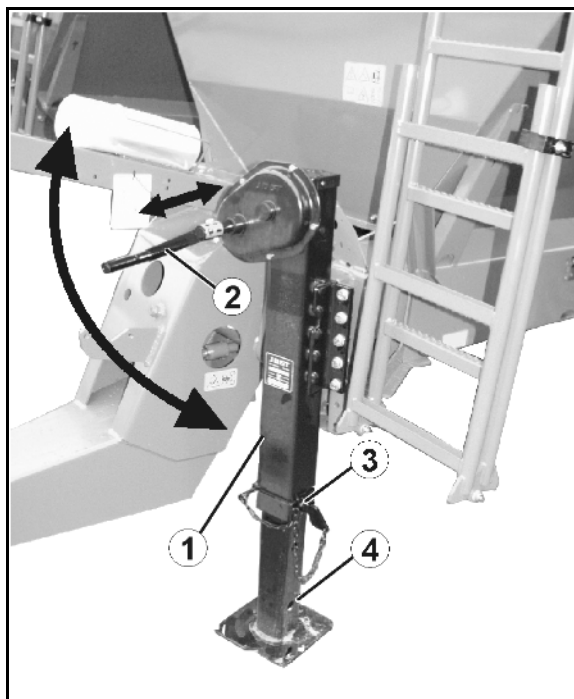


Fig. 54



The stand with crank has a fast and slow gear (Fig. 55).

- Pull out manual crank – fast gear for stand.
- Push in manual crank – slow gear for stand (high loads).

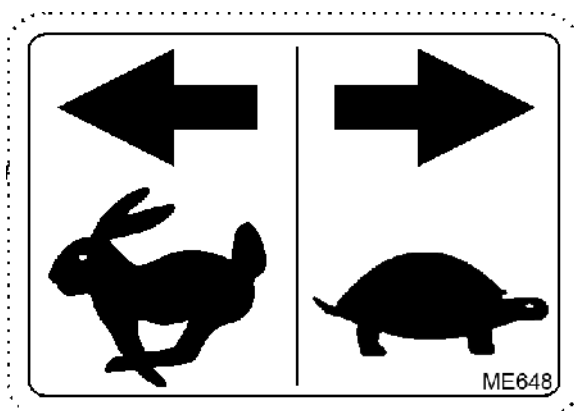


Fig. 55



After operating the crank, swivel the hand lever upwards as in Fig. 56.

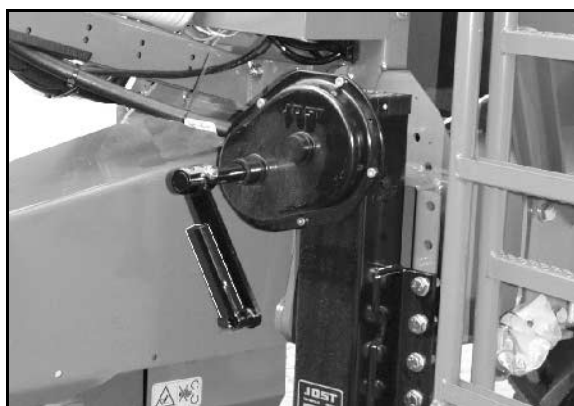


Fig. 56

5.23 Charging sieves

For spreading

- Granular fertiliser : Insert the sieve screen (Fig. 57/1) and secure using a lynch pin!
- Earth moist lime: remove the sieve screen.

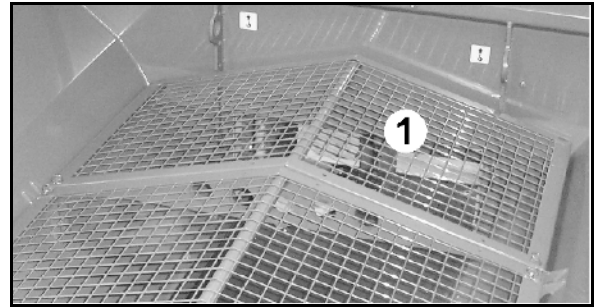


Fig. 57



The charging sieves can be trodden on in order to clean the inside of the hopper.

5.24 Swivelable hopper cover (optional)

The swivelable hopper cover ensures for dry goods to be spread, even in event of wet weather.

The hopper cover is optional.

- Hydraulically operated
 - via tractor control unit *natural* (ZG-B Super / Special)
 - via in-cab terminal AMATRON 3 or HyClick (ZG-B Drive)
- manually operated (nur ZG-B 5200 Special)



Fig. 58

5.25 ZG-B Drive

5.25.1 AMATRON 3 in-cab terminal

The AMATRON 3 in-cab terminal (Fig. 59) controls, operates and monitors the ZG-B Drive in a convenient manner.

The spread rate is set electronically via adjustment the speed of the conveyor belt. The slider position required for a specific spreading quantity is determined by means of fertiliser calibration.

The hydraulic functions are operated using the AMATRON 3:

- o Open and close the slide gates.
- o Take the Limiter M into and out of service
- o Setting the quantity
- o Open and close the hopper covers.



Fig. 59

To start up the ZG-B, the basic data for the relevant machine type must be selected in the Setup menu on the AMATRON 3 (Fig. 60).

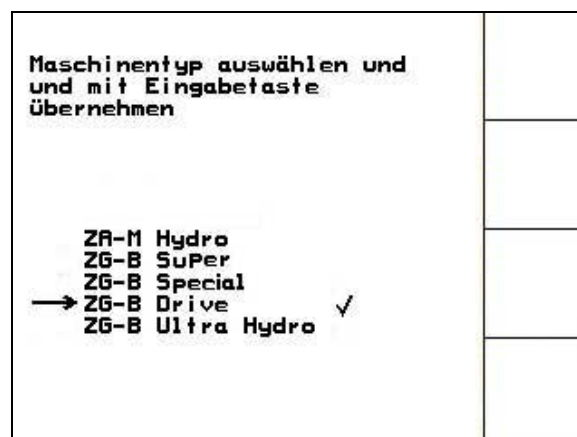


Fig. 60

5.25.2 Control block and machine computer

The valves of the hydraulic block are actuated via the **AMATRON 3**, thus ensuring all the hydraulic functions.

Depending on the equipment, the adjustable hydraulic throttles for the hydraulic swivelable hopper cover can be found on the hydraulic block.

The oil filter is equipped with a maintenance indicator and should be cleaned according to this.

Fig. 61/...

- (1) Cover plate of the hydraulic block and machine computer
- (2) Oil filter

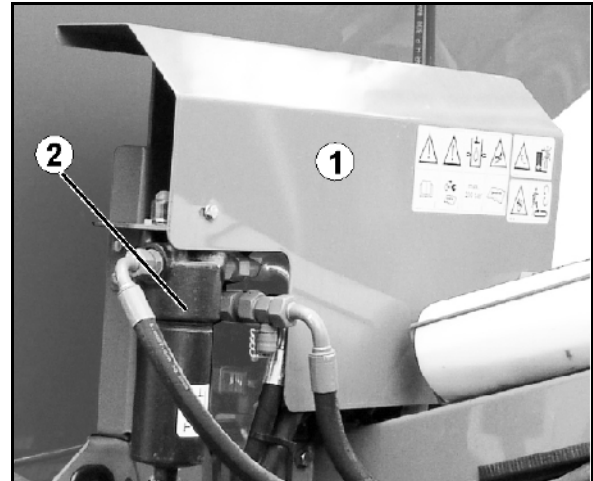


Fig. 61

5.25.3 TrailTron tracking control

TrailTron tracking control for automatic, virtually 100% precise tracking captures the position of the angle of the drawbar (Fig. 62/1) to determine the direction of travel of the tractor.

If the position of the drawbar deviates from the tractor's central position (drawbar lined up with tractor's direction of travel), TrailTron realigns

- the following steering axle
 - the tracking steering drawbar
- until the central position is reached again.

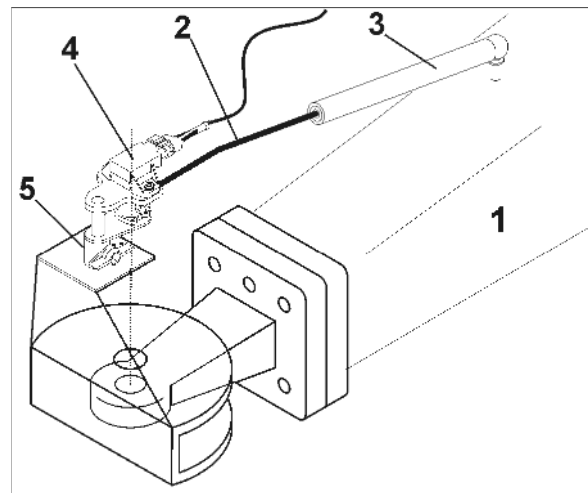


Fig. 62

Connecting the TrailTron position encoder

1. Insert the rod (Fig. 62/2) into the plastic bush (Fig. 62/3) stecken.
2. Insert the position encoder (Fig. 62/4) into the holder (Fig. 62/5).
3. Align the potentiometer in direction of travel (cable to rear) and secure with a locking screw against rotation.



See also: AMATRON 3 operating manual.

Structure and function



A precondition for the perfect functioning of the hydraulically operated following steering axle/drawbar is a correctly performed TrailTron calibration

Perform a TrailTron calibration

- before initial operation.
- if there are any deviations between the following steering axle control shown on the display and the actual following steering axle control.



DANGER

The use of the TrailTron steering drawbar

- for precise tracking on sloping terrain is prohibited.
Only use the TrailTron steering drawbar on level ground. Unevenness of a maximum 5° (due to furrows) is permitted.
- for manoeuvring while reversing is prohibited.

Risk of the machine tipping over.

- When using the tracking steering drawbar, there is a risk of tipping over when performing a turning manoeuvre on a headland, and on tight bends at high speeds, due to the shifting of the centre of gravity when the steering drawbar is pushed in.
- The risk of tipping over is especially great when travelling downhill on uneven ground.
- Adapt your driving accordingly and reduce speed when performing a turning manoeuvre on a headland, so that you are in complete control of the tractor and trailed sprayer.



For ZG-B with TrailTron, damage to the PTO shaft from too much bending due to incorrect installation of the PTO shaft.

- Use with TrailTron: install the wide angle of the PTO shaft on the implement side.
- Use without TrailTron: install the wide angle of the PTO shaft on the tractor side.

Transportation




DANGER



Risk of accident from the machine tipping over.

- It is prohibited while TrailTron is switched on :
 - Manoeuvring
 - Transportation
- For transportation, move the steering drawbar to the transport position.

1. Move steering drawbar (steering drawbar in line with machine).

For this:

- 1.1  Put TrailTron into manual mode.

- 1.2  ,  Align steering drawbar manually.

TrailTron stops automatically once the central position has been reached.

2. Switch off AMATRON 3 ausschalten.

3. Actuate tractor control unit **red**.

→ Switch off oil circulation.

4. Secure the steering draw bar into position 0 by closing the stop tap. (Fig. 63/1).

Before using the implement, open the stop tap (Position I).

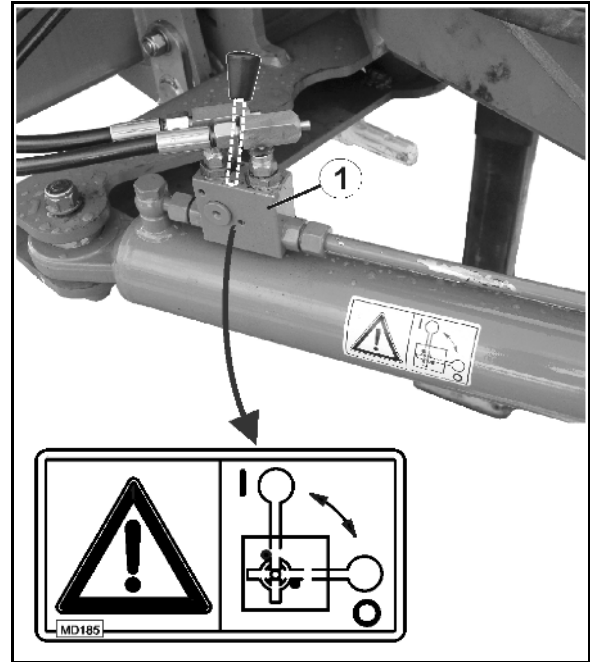


Fig. 63



CAUTION

Risk of collision between tractor wheel and hydraulic cylinder of steering drawbar.

The right-hand steering angle of the tractor is restricted when the steering draw bar is in transport position!



5.26 Weighing technology with weighing terminal

The implement can be equipped with a weighing device with 3 weighing cells for:

- determining the tank volume (filling level monitoring) and
- monitoring the application rate.



Weighing terminal for displaying the tank volume in kg with button on the right side.

-  Pressing the button briefly - scroll in the menu.
 -  Pressing the button for a long time (2 - 3 seconds) – for executing and confirming.
- Wait for rising of the unit lighting,
- let go of the button when the unit lighting flashes.




- When switching on the power supply, the weighing terminal displays the current weight of the tank content.
- For displaying the correct tank volume, the empty implement must be balanced first.




- When tared, the balance of the display is 0 kg with empty tank.
- Calibration is the balance of the correct change in weight of the display when changing the tank volume (for customer services only).

5.26.1 Tare the weighing equipment

The implement must be completely emptied!

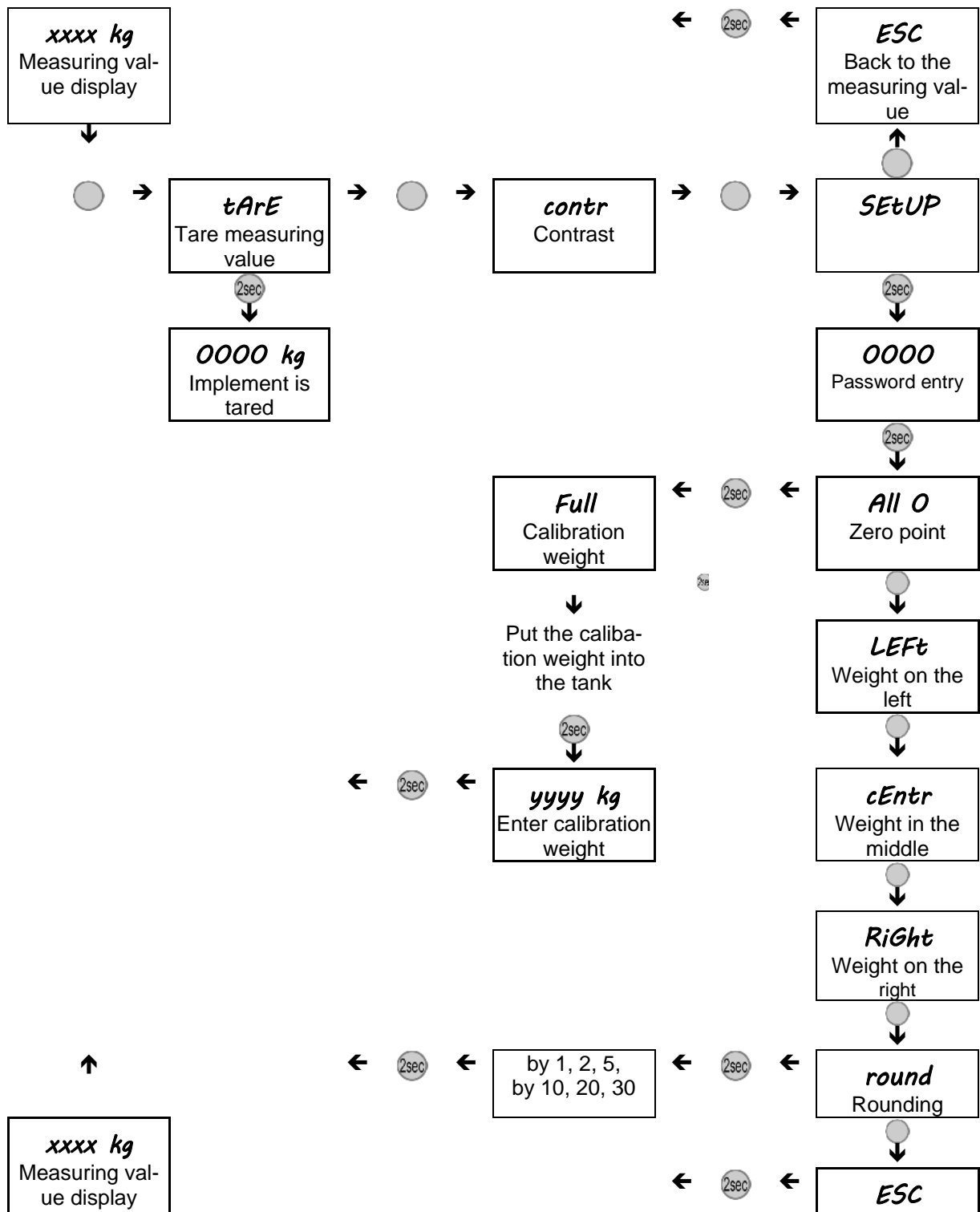
1. 





→ Display **tArE**
2. 

→ Display **0 kg**

→ Tare complete.

5.26.2 Menu layout



	<i>contr</i>	 - Adjustable in 15 steps or automatic adjustment for the lighting conditions.
	Entries	 - Adjust the flashing digit  - Switch to the next digit
	<i>Full</i>	The calibration weight must be known
	<i>cABLE</i>	The display with designation left, middle or right indicates a cable break on the corresponding sensor.

Calibration of the weighing equipment (customer services)



When calibrating, the measurement device is assigned with two values:

- The value 0 kg is assigned to the empty tank.
- Any value greater than 2000 kg is assigned according to the filling weight.

5.27 AMALOG⁺ as hectare counter for ZG-B Super

5.27.1 Product description

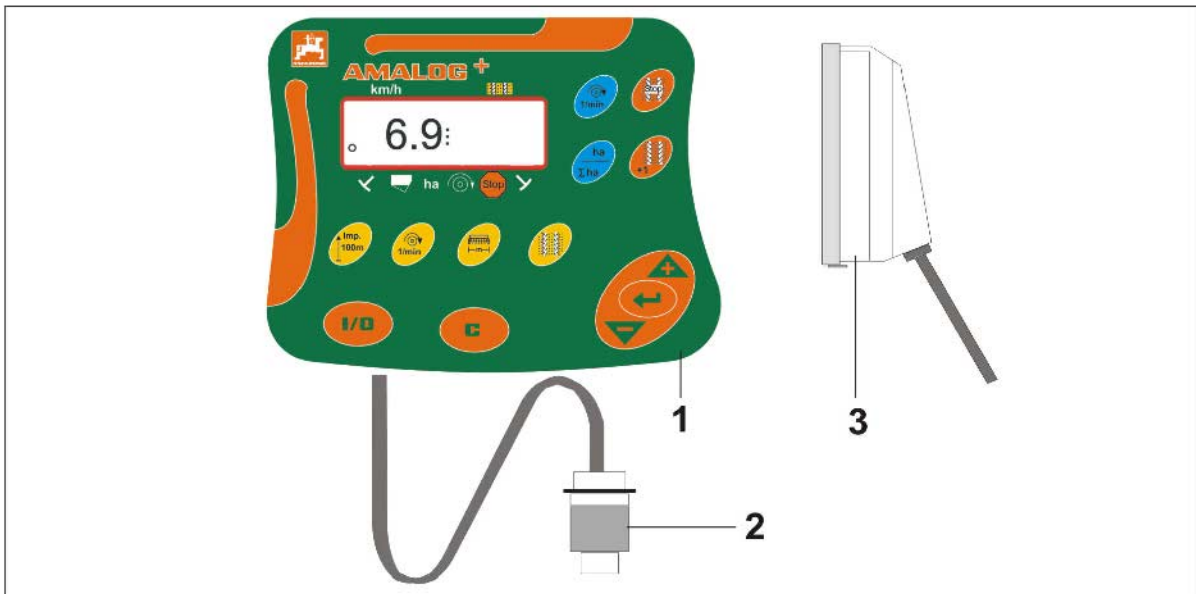



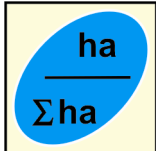



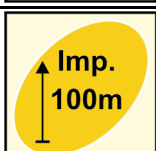


Fig. 64

- (1) Computer with fixing console
- (2) Socket connection, 12V
- (3) 20-pin connector with cable harness

The AMALOG⁺ is equipped with a lithium battery and data storage.


The data are again available for the next use, even after a long period of deactivation of the on-board power supply.

Key assignment (keys not listed are have no function)

Key	Key assignment	Key	Key assignment
	Switch AMALOG+ On / Off		Display of <ul style="list-style-type: none"> worked part area [ha] total worked area [ha] and back to the the work display
	Correction key		Input / display of working width [m]
	Increasing of the value displayed		Input/display of a soil-dependent number of impulses of a 100 m-long calibration distance
	Reduction of the value displayed		Data input confirmation

5.27.2 Work display Starting work

Set the worked part area to 0 [ha].

1. Press and hold the  key.


2. Press .

During work, the AMALOG+ displays

- the forward speed, e.g., 6.9 km/h.
- (1) The flashing circle symbol during work indicates that
- the AMALOG+ is receiving impulses from the gearbox sensor
 - the AMALOG+ is working correctly.



Fig. 65


Press .

- Display (Fig. 66) of worked part area (e.g. 10.5 ha) since activating the start function.

- (1) Control indicator, worked area



Fig. 66

Press the  key twice.

- Display (Fig. 67) total worked area (e.g. 105.1 ha).

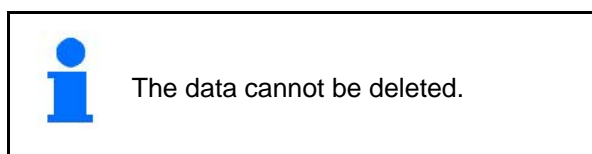



Fig. 67

Press the  key

- Back to the work display.
- The displays remain for 10 seconds.

5.27.3 Installing the terminal



The terminal must have an electrical connection via the console to the tractor chassis!

For this purpose, remove the paint at the installation points before installing the console!

Connecting the terminal

1. Insert the counterpiece (Fig. 68/1) into the console and secure with the thumb screw (Fig. 68/2).
2. Insert the power cable (Fig. 69/1) into the console and the 12V tractor socket.
3. Connect the console and the terminal with the power cable (Fig. 69/2).
4. Route the cable with the implement plug (Fig. 69/3) into the tractor cab and insert it into the implement plug in the terminal.

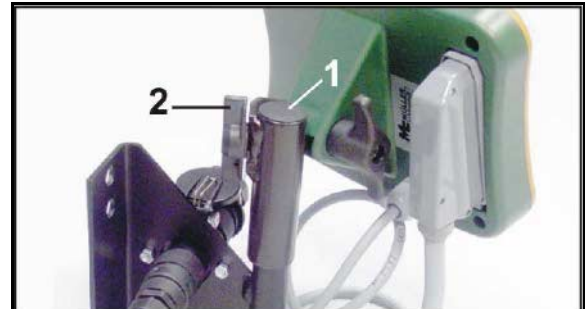


Fig. 68

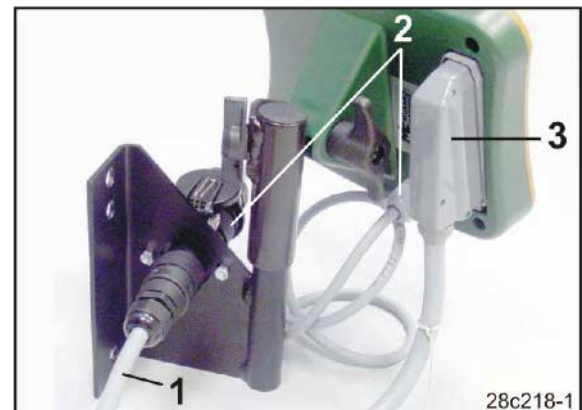


Fig. 69

5.27.4 Settings

Select Hectare counter mode

Digit 1 shows the mode

Digit 2 shows the coding.

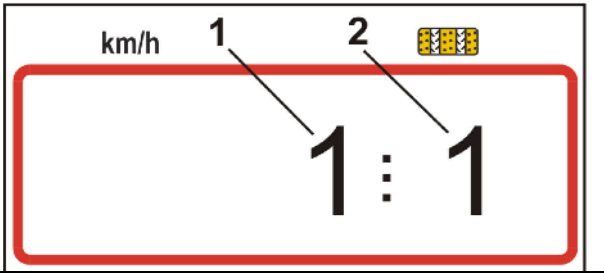


Fig. 70

1. Press and hold the key.
2. Press .
→ Open mode 1 (see Fig. 70).
3. Set Code 2 with the and keys.
4. Press .
→ Save the code.

Mode 1	Activate the functions of the on-board computer	
	Code 1	Activate all functions of the on-board computer
	Code 2	Activate only the hectare counter of the on-board computer

Enter working width

1. Press .
→ Display: stored working width [m].
2. Set working width [m] with the and keys (e.g. 3.00 for 3 m working width).
3. Press .
→ Store the selected value.



Display (Fig. 71/1):
Working width, e.g. 3.0 m

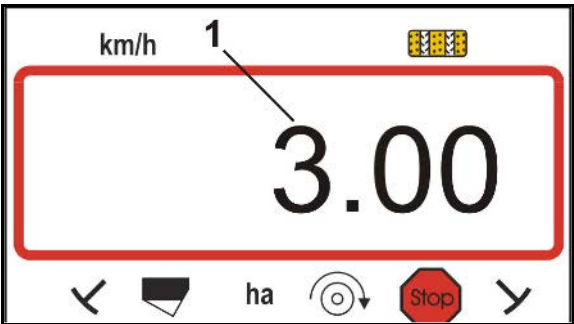


Fig. 71

5.27.5 Calibration value

The AMALOG+ needs the "Impulses per 100 m" calibration value to determine

- the actual forward speed [km/h]
- the worked area.

If the calibration value is unknown, determine the "Impulses per 100 m" calibration value by means of a calibration run (see section "Determine impulses per 100 m", Seite 90).



If the exact calibration value is known, you can enter the "Impulses per 100 m" calibration value manually in the AMALOG+ (see section "Enter calibration value (imp./100 m)", unterhalb).

Enter calibration value (imp./100 m)

1. Bring implement to a standstill.

2. Press .

→ Display: stored calibration value (imp./100 m).

3. Set the calibration value (imp./100 m) with the  and  keys.

4. Press .

→ Store the selected value.



Display (Fig. 72):
calibration value (imp./100 m), e.g.
1053



Fig. 72

Determine impulses per 100 m

Always determine the exact calibration value for "Impulses per 100 m" by performing a calibration run:

- before initial commissioning
- if there are differences between the measured and actual forward speed / distance travelled
- if there are differences between the measured and actual worked area.
- if there are different soil conditions.

The "Impulses per 100 m" calibration value must be determined under the prevailing operating conditions in the field.

1. On the field, measure out a calibration distance of exactly 100 m. Mark the start and end point of the calibration distance.
2. Move tractor vehicle to starting position (Fig. 73) and seed drill to operational position (if necessary, interrupt seed dosing).

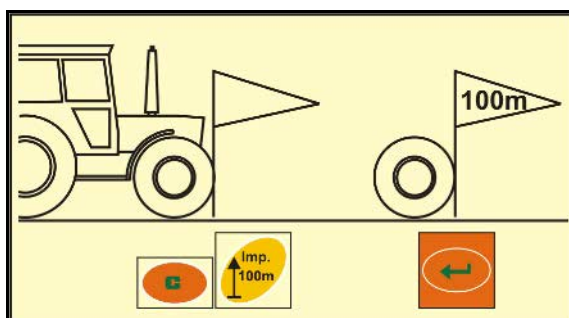



Fig. 73

3. Press and hold the  key.

4. Press .

→ The display shows "0".

5. Start.

→ The display shows the impulses.



Do not press a key during the calibration run.

6. Stop after exactly 100 m.

→ The display (Fig. 74) shows the calibration value (e.g. 1005 imp./100 m).

7. Press .

→ Store the calibration value (imp./100 m).

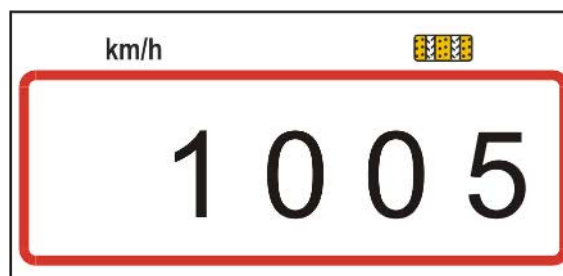


Fig. 74



Display the stored value: press the  key.



The calibration value (imp./100 m) must not be less than 250. The AMALOG⁺ otherwise does not work properly.

6 Commissioning

This section contains information

- on commissioning your machine.
- on checking how you may connect the machine to your tractor.



- Before operating the machine for the first time the operator must have read and understood the operating manual.
- Comply with the chapter "Safety information for the operator", from Page 25 when
 - connecting and disconnecting the machine
 - transporting the machine
 - using the machine
- Only couple and transport the machine to/with a tractor which is suitable for the task.
- The tractor and machine must meet the national road traffic regulations.
- The operator and the operator shall be responsible for compliance with the statutory road traffic regulations.



WARNING

Risk of contusions, cutting, catching, drawing in and knocks in the area of hydraulically or electrically actuated components.

Do not block the operator controls on the tractor which are used for hydraulic and electrical movements of components, e.g. folding, swivelling and pushing movements. The movement must stop automatically when you release the appropriate control. This does not apply to equipment movements that:

- are continuous or
- are automatically locked or
- require a floating position or pressed position to function

6.1 Checking the suitability of the tractor



WARNING

Danger of breaking during operation, insufficient stability and insufficient tractor steering and braking power on improper use of the tractor!

- Check the suitability of your tractor, before connecting the machine to the tractor.
You may only connect the machine to tractors suitable for the purpose.
- Carry out a brake test to check whether the tractor achieves the required braking delay with the machine connected.

Requirements for the suitability of a tractor are, in particular:

- The approved total weight
- The approved axle loads
- The approved drawbar load at the tractor coupling point
- The load capacity of the installed tyres
- The approved trailer load must be sufficient

You can find this data on the rating plate or in the vehicle documentation and in the tractor operating manual.

The front axle of the tractor must always be subjected to at least 20 % of the empty weight of the tractor.

The tractor must achieve the brake delay specified by the tractor manufacturer, even with the machine connected.

6.1.1 Calculating the actual values for the total tractor weight, tractor axle loads and load capacities, as well as the minimum ballast



The approved total tractor weight, specified in the vehicle documentation, must be greater than the sum of the

- Tractor empty weight,
- ballast weight and
- total weight of the connected machine or drawbar load of the connected machine



This information is only valid for the Federal Republic of Germany:

If, having tried all possible alternatives, it is not possible to comply with the axle loads and / or the approved total weight, then a survey by an officially-recognised motor traffic expert can, with the approval of the tractor manufacturer, be used as a basis for the responsible authority to issue an exceptional approval according to § 70 of the German Regulations Authorising the Use of Vehicles for Road Traffic and the required approval according to § 29, paragraph 3 of the German Road Traffic Regulations.

6.1.1.1 Data required for the calculation

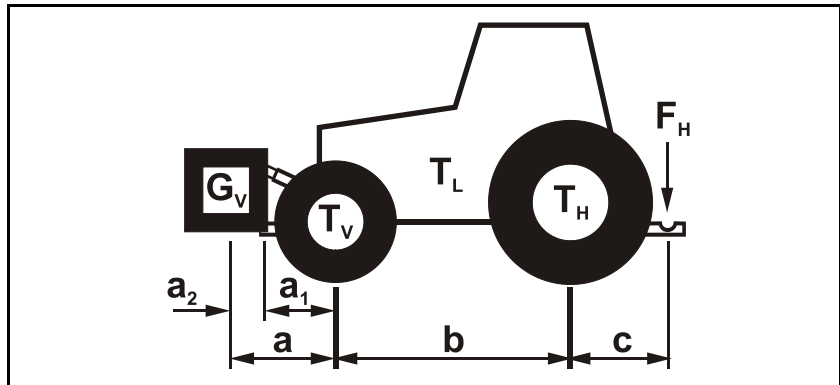


Fig. 75

T_L	[kg]	Tractor empty weight	See tractor operating manual or vehicle documentation
T_V	[kg]	Front axle load of the empty tractor	
T_H	[kg]	Rear axle load of the empty tractor	
G_V	[kg]	Front weight (if available)	See front weight in technical data, or weigh
F_H	[kg]	Maximum drawbar load	See technical data of machine
a	[m]	Distance between the centre of gravity of the front machine mounting or the front weight and the centre of the front axle (total $a_1 + a_2$)	See technical data of tractor and front machine mounting or front weight or measurement
a_1	[m]	Distance from the centre of the front axle to the centre of the lower link connection	See tractor operating manual or measurement
a_2	[m]	Distance between the centre of the lower link connection point and the centre of gravity of the front machine mount or front weight (centre of gravity distance)	See technical data of front machine mounting or front weight or measurement
b	[m]	Tractor wheel base	See tractor operating manual or vehicle documents or measurement
c	[m]	Distance between the centre of the rear axle and the centre of the lower link connection	See tractor operating manual or vehicle documents or measurement

6.1.1.2 Calculation of the required minimum ballasting at the front $G_{V \min}$ of the tractor to assure the steering functions properly

$$G_{V \min} = \frac{F_H \cdot c - T_V \cdot b + 0,2 \cdot T_L \cdot b}{a + b}$$

Enter the numeric value for the calculated minimum ballast $G_{V \min}$, required on the front side of the tractor, in the table (section 6.1.1.7).

6.1.1.3 Calculation of the actual front axle load of the tractor $T_{V \text{tat}}$

$$T_{V \text{tat}} = \frac{G_V \cdot (a + b) + T_V \cdot b - F_H \cdot c}{b}$$

Enter the numeric value for the calculated actual front axle load and the approved tractor front axle load specified in the tractor operating manual in the table (section 6.1.1.7).

6.1.1.4 Calculation of the actual total weight of the combined tractor and machine

$$G_{\text{tat}} = G_V + T_L + F_H$$

Enter the numeric value for the calculated actual total weight and the approved total tractor weight specified in the tractor operating manual in the table (section 6.1.1.7).

6.1.1.5 Calculation of the actual rear axle load of the tractor $T_{H \text{tat}}$

$$T_{H \text{tat}} = G_{\text{tat}} - T_{V \text{tat}}$$

Enter the numeric value for the calculated actual rear axle load and the approved tractor rear axle load specified in the tractor operating manual in the table (section 6.1.1.7).

6.1.1.6 Tyre load capacity

Enter the double value (two tyres) of the approved load capacity (see, for example, tyre manufacturer's documentation) in the table (section 6.1.1.7).

6.1.1.7 Table

	Actual value according to calculation	Approved value according to tractor instruction manual	Double approved load capacity (two tyres)
Minimum ballast front / rear	<div style="border: 1px solid black; padding: 5px; display: inline-block;">/ kg</div>	--	--
Total weight	<div style="border: 1px solid black; padding: 5px; display: inline-block;">kg</div>	≤ <div style="border: 1px solid black; padding: 5px; display: inline-block;">kg</div>	--
Front axle load	<div style="border: 1px solid black; padding: 5px; display: inline-block;">kg</div>	≤ <div style="border: 1px solid black; padding: 5px; display: inline-block;">kg</div>	≤ <div style="border: 1px solid black; padding: 5px; display: inline-block;">kg</div>
Rear axle load	<div style="border: 1px solid black; padding: 5px; display: inline-block;">kg</div>	≤ <div style="border: 1px solid black; padding: 5px; display: inline-block;">kg</div>	≤ <div style="border: 1px solid black; padding: 5px; display: inline-block;">kg</div>



- You can find the approved values for the total tractor weight, axle loads and load capacities in the tractor registration papers.
- The actually calculated values must be less than or equal to (≤) the permissible values!


WARNING

Risk of crushing, cutting, being caught or drawn in, or impact through insufficient stability and insufficient tractor steering capability and brake power.

It is forbidden to couple the machine to the tractor used as the basis for calculation, if

- one of the actual, calculated values is greater than the approved value.
- there is no front weight (if required) attached to the tractor for the minimum front ballast ($G_{V \min}$).



- You must use a front weight which is equal to at least the required minimum front ballast ($G_{V \min}$).

6.1.2 Requirements for tractor operation with attached machines



WARNING

Risk of breakage of components during operation through unapproved combinations of connecting equipment.

- Ensure:
 - that the connection fitting on the tractor possesses a permissible drawbar load sufficient for the actual drawbar load.
 - that the axle loads and weights of the tractor altered by the drawbar load are within the approved limits. If necessary, weigh them.
 - that the tractor's actual static rear axle load does not exceed the permissible rear axle load.
 - that the permissible total weight of the tractor is observed
 - that the approved load capacities of the tractor tyres are not exceeded

6.1.2.1 Combination options for connection fittings and towing eyes

Fig. 76 shows permitted combination options for joining the connection fitting on the tractor and the towing eye on the machine in relation to the maximum permitted drawbar load.

You will find the maximum permitted drawbar load in the vehicle documentation or on the rating plate on the connection fitting of your tractor.

Maximum permissible drawbar load	Connection fitting on the tractor	Towing eye on the fixed drawbar trailer
2,000 kg	Pin coupling DIN 11028 / ISO 6489-2	Towing eye 40 for hydraulic high-lift drawbar DIN 11043
	Non-automatic pin coupling DIN 11025	
3,000 kg - ≤ 40 km/h 2,000 kg - > 40 km/h	Trailer hook (hitch hook) ISO 6489-1	Towing eye (hitch ring) ISO 5692-1
	Trailer peg (Piton-fix) ISO 6489-4	
2500 kg - ≤ 40 km/h 2000 kg - > 40 km/h	Ball coupling 80	Ball bracket 80

Fig. 76

6.1.2.2 Calculating the actual D_C value for the combination to be coupled



WARNING

Risk of breakage of the connection fitting between tractor and machine due to improper use of the tractor.

Calculate the actual D_C value for your combination, made up of tractor and machine, to check whether the connection fitting on your tractor displays the required D_C value. The actual calculated D_C value for the combination must be less than or equal to (\leq) the given D_C value of the connection fitting of your tractor.

The actual D_C value of a combination to be coupled is calculated as follows:

$$D_C = g \times \frac{T \times C}{T + C}$$

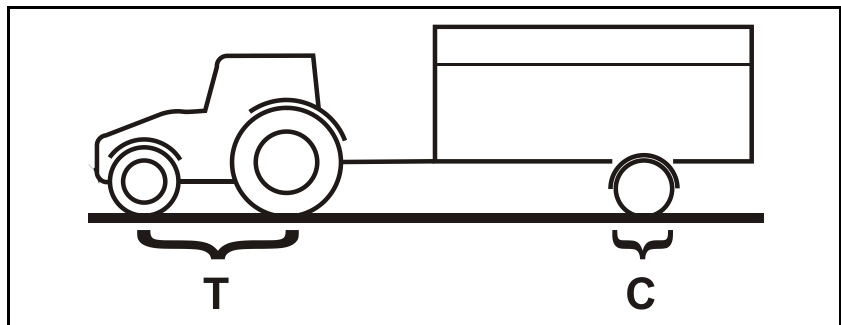


Fig. 77

- T:** Permissible total weight of your tractor in [t] (see tractor operating manual or registration papers)
- C:** Axle load of the machine loaded with the permitted mass (payload) in [t], without drawbar load
- g:** Acceleration due to gravity (9.81 m/s²)

Actual calculated
 D_C value for the combination

D_C value given on the tractor for the connection fitting

KN	\leq	KN
----	--------	----



You can find the D_C value for the connection fitting on the connection fitting itself / in the operating manual for your tractor.

6.1.3 Machines without their own brake system

**WARNING**

Risk of crushing, cutting, being caught or drawn in, or impact through the brake power of the tractor being inadequate.

The tractor must achieve the brake rate specified by the tractor manufacturer, even with the machine connected.

If the machine does not possess its own brake system:

- the actual tractor weight must be greater than or equal to (\geq) the actual weight of the connected machine

In many countries, other regulations apply. In Russia, for example, the weight of the tractor must be double that of the attached machine.

- the maximum operational speed is 25 km/h

6.2 Adjusting the length of the PTO shaft to the tractor



WARNING

Danger from damaged and/or destroyed, flying parts if the PTO shaft is upended or pulls apart while the machine coupled to the tractor is being raised/lowered because the length of the PTO shaft has not been adjusted properly.

Have the length of the PTO shaft in all operational positions checked by a specialised workshop and, if necessary, adjusted before coupling the PTO shaft to your tractor for the first time.

In this way, you prevent upending of the PTO shaft or insufficient profile overlap.



This adjustment of the PTO shaft applies only for the current tractor type. You may need to readjust the PTO shaft if you couple the machine to another tractor. Always observe the operating manual supplied with the PTO shaft when adjusting the PTO shaft.



WARNING

Danger of being caught and drawn in if the PTO shaft is installed incorrectly or if unauthorised design changes are made.

Only a specialist workshop may make design changes to the PTO shaft. When doing so, read and follow the operating manual provided.

Adjusting the length of the PTO shaft is permitted with consideration of the required minimum profile overlap.

Design changes to the PTO shaft that are not described in the PTO shaft operating manual provided are not permitted.



WARNING

Danger of being crushed between the rear of the tractor and the machine when raising and lowering the machine to determine the shortest and longest operating position of the PTO shaft.

Only actuate the operator controls for the tractor's three-point linkage

- from the intended workstation.
- if you are outside of the danger area between the tractor and the machine.



WARNING

Danger of crushing from unintentional:

- **Rolling of the tractor and the connected machine!**
- **Lowering of the lifted machine!**

Secure the tractor and machine from unintentional starting and unintentional rolling and secure the machine unintentional lowering before entering the danger zone between the tractor and lifted machine in order to adjust the PTO shaft.



The PTO shaft is at its shortest when it is horizontally. The PTO shaft is at its longest when the machine is fully lifted.

1. Couple the tractor to the machine (do not connect the PTO shaft).
2. Apply the tractor's parking brake.
3. Determine the clearance height of the machine with the shortest and longest operating position for the PTO shaft.
 - 3.1 To do so, raise and lower the machine via the tractor's three-point hydraulic system.
While doing so, actuate the manual controls for the tractor's three-point hydraulic system on the rear of the tractor, from the provided workstation.
4. Secure the machine, lifted in the measured clearance height, against unintentional lowering (for example, by supporting it or hooking it to a crane).
5. Secure the tractor from unintentional starting before entering the danger area between the tractor and machine.
6. When measuring the length and shortening the PTO shaft, read and follow the operating manual from the PTO shaft manufacturer.
7. Put the shortened halves of the PTO shaft back together.
8. Grease the universal joint shaft of the tractor and the gearbox input shaft before connecting the PTO shaft.
The tractor symbol on the protective tube of the PTO shaft identifies the tractor-side connection of the PTO shaft.

6.3 Securing the tractor / machine against unintentional start-up and rolling



WARNING

Risk of contusions, cutting, catching, drawing in and knocks when making interventions in the machine through

- **Unintentional falling of the unsecured machine raised using the tractor's three-point linkage.**
- **Unintentional falling of raised, unsecured machine parts.**
- **Unintentional start-up and rolling of the tractor-machine combination.**
- Secure the tractor and the machine against unintentional start-up and rolling before any intervention in the machine.
- It is forbidden to make any intervention in the machine, such as installation, adjustment, troubleshooting, cleaning, maintenance and repairs
 - When the machine is running
 - For as long as the tractor engine is running with a connected turbine shaft / hydraulic system.
 - When the ignition key is inserted in the tractor and the tractor engine with the connected turbine shaft / hydraulic system could be started unintentionally.
 - When the tractor and machine are not secured against unintentional rolling using their parking brakes and/or wheel chocks.
 - When moving parts are not blocked against unintentional movement.

When carrying out such work, there is a high risk of contact with unsecured components.

1. Lower the raised, unsecured machine / raised, unsecured parts of the machine.
- This is how to prevent unintentional falling:
2. Shut down the tractor engine.
 3. Remove the ignition key.
 4. Apply the tractor's parking brake.
 5. Secure the machine against unintentional rolling (only attached machine)
 - On flat ground using the parking brake (if available) or wheel chocks.
 - On uneven ground or slopes using the parking brake and wheel chock.

6.4 Fitting wheels



If the machine is fitted with inflatable spare tyres, running wheels must be fitted before putting into operation.



WARNING

- Only one permitted set of tyres may be used, as specified in the technical data (see page 40).
- Wheel rims that are suitable for the tyres used must have a rim that has been fully welded all the way round.

1. Lift machine slightly using lifting crane.



DANGER

Use the attachment points marked for lifting belts.

See also "Loading" section, page 34.

2. Loosen wheel nuts on the inflatable spare tyres.
3. Remove inflatable spare tyres.



CAUTION

Take care when removing the inflatable spare tyres and putting the running wheels in place.

4. Place the running wheels on threaded bolts.
5. Tighten wheel nuts.



Required tightening torque for wheel nuts: 510 Nm.

6. Lower machine and remove lifting belts.
7. After 10 hours of operation, tighten the wheel nuts.

6.5 Initial operation of service brake system



Perform a brake test while the machine is empty, and again when it is loaded to test the braking behaviour of the tractor with coupled machine.

We recommend that you have a specialist workshop balance the brakes on the tractor and the machine in order to attain optimum braking and minimum wear to brake pads (see "Maintenance" section, page 158).

6.6 Adjusting the height of the machine drawbar

1. Uncouple the spreader from the tractor (Seite 108) and park it using the support.
2. Support the drawbar on a stable trestle (Fig. 78/1) and unscrew both securing screws (Fig. 78/2).
3. The spacer discs (Fig. 78/3) can be turned evenly to adjust the drawbar. The buffers (Fig. 78/4) must not be removed. They absorb any impact transferred from the tractor to the spreader.
4. Screw the drawbar tight (tightening torque 162 Nm).

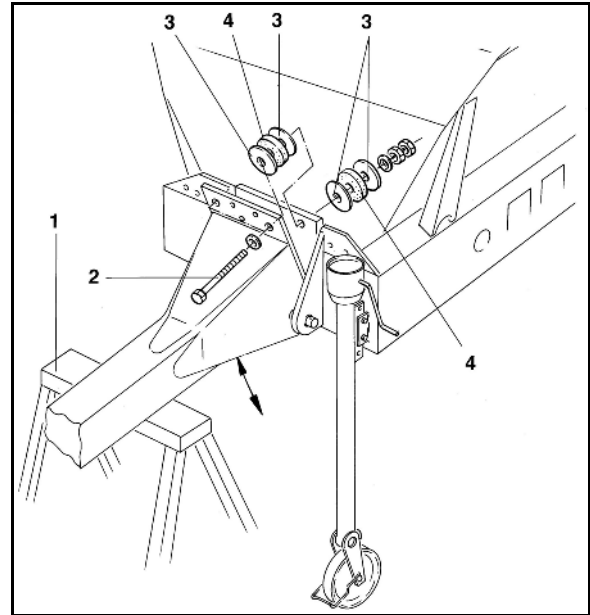


Fig. 78

6.7 Adjusting the system setting screw on the hydraulic block

ZG-B Drive:



Always adjust the system setting screw to the hydraulic system on your tractor. Increased hydraulic fluid temperatures are the result of an incorrectly adjusted system setting screw, caused by constant strain on the tractor hydraulics pressure relief valve.

Fig. 79/...

- (1) System converting bolt
- (2) LS connection for the load sensing control line

Fig. 80/...

- (1) Tractor connection for the load sensing control line
- (2) Tractor connection for the load sensing pressure hose
- (3) Tractor connection for the pressure-free return flow

The tractor hydraulic system determines the setting of the system setting screw on the hydraulic block (Fig. 79/1).

Depending on the tractor hydraulic system, the system setting screw must be

- **screwed out** up to the stop (factory setting) on tractors with
 - open-centre hydraulic system (constant flow system, geared pump hydraulics).
 - setting pump with adjustable oil extraction via the control unit
- **screwed in** up to the stop (in contrast to the factory setting) on tractors with
 - closed-centre hydraulic system (constant pressure system, pressure-regulated setting pump).
 - load-sensing hydraulic system (pressure and power-controlled setting pump) with direct load-sensing pump connection. Using the flow control valve on the tractor, adjust the actual flow rate to the required flow rate.

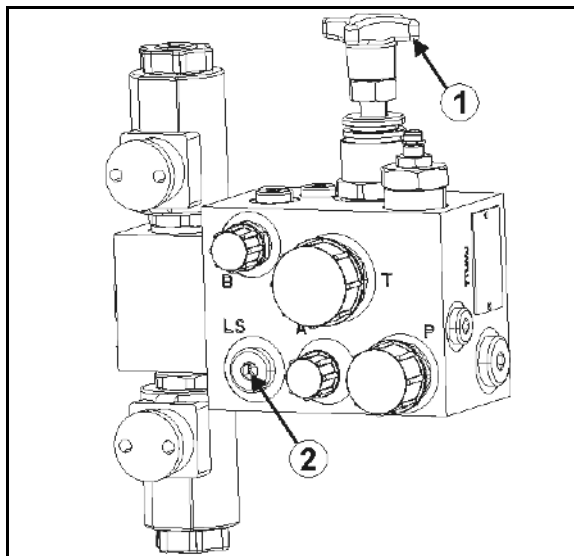


Fig. 79

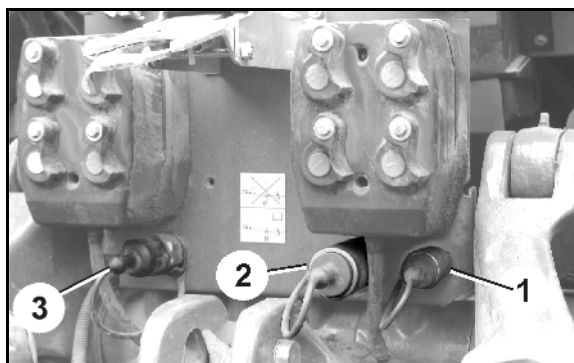


Fig. 80



- The machine must be depressurised before making adjustments.
- The hydraulic block can be found at the front of the machine, behind the cover plate.

6.8 TrailTron position encoder

If using TrailTron, a holder for the position encoder (Fig. 81/1) must be fitted to the tractor.

The holder must be made according to the actual circumstances of the tractor with the sleeve with locking screw (Fig. 81/2) and metal plate (Fig. 81/3) provided.

When installed, the position encoder must be directly above the pivot point of the tractor pin coupling (Fig. 81/4).

- Keep the distance between the coupling point and position encoder (Fig. 82/ X) as small as possible (particularly with the hitch drawbar).
- In neutral position with the machine coupled, the rod of the position encoder must be pulled approximately 100 mm out of the holder.

If necessary, fasten the holder in an alternative position.

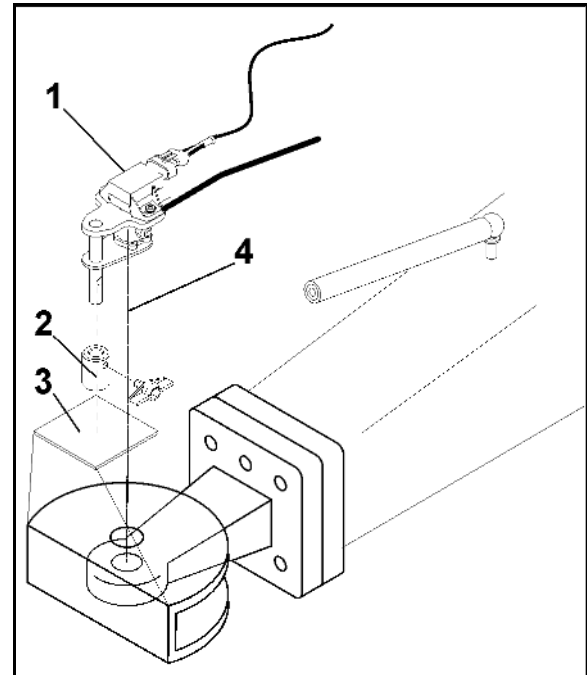


Fig. 81

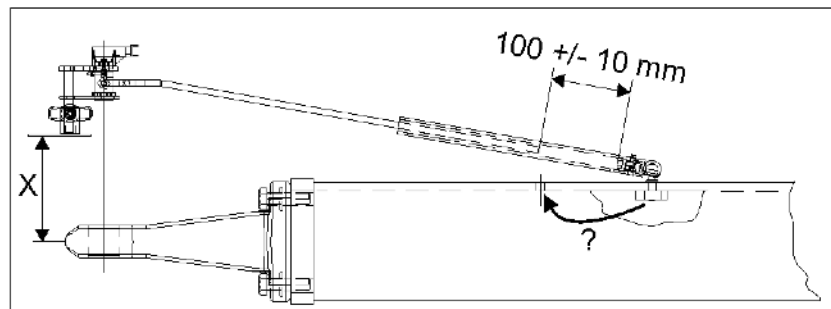


Fig. 82

7 Coupling and uncoupling the machine



When coupling and decoupling the machine, comply with the chapter "Safety information for the operator", page 25.



WARNING

Risk of contusions from unintentional starting and rolling of the tractor and machine when coupling or uncoupling the machine!

Secure the tractor and machine against unintentional start-up and rolling, before entering the danger area between the tractor and machine when coupling or decoupling the machine. See also Page 101.

7.1 Coupling the machine



WARNING

Danger of breaking during operation, insufficient stability and insufficient tractor steering and braking power on improper use of the tractor!

You may only connect the machine to tractors suitable for the purpose. For this, see the chapter "Checking the suitability of the tractor", page 92.



WARNING

Risk of contusions when coupling the machine and standing between the tractor and the machine!

Instruct people to leave the danger area between the tractor and the machine before you approach the machine.

Any helpers may only act as guides standing next to the tractor and the machine, and may only move between the vehicles when both are at a standstill.



WARNING

Risk of crushing, being caught or pulled in, or impact when the machine is unexpectedly released from the tractor.

Use the intended equipment to connect the tractor and the machine in the proper way.

**WARNING****Risk of energy supply failure between the tractor and the machine through damaged power lines!**

During coupling, check the course of the power lines. The power lines

- must give slightly without tension, bending or rubbing on all movements of the connected machine.
- may not scour other parts.

1. Direct people away from the danger area between the tractor and machine before you approach the machine with the tractor.
2. Couple the supply lines first before coupling the machine with the tractor.
 - 2.1 Drive the tractor up to the machine, leaving a clearance of approximately 25 cm between tractor and machine.
 - 2.2 Secure the tractor against unintentional starting and unintentional rolling.
 - 2.3 Check whether the universal joint shaft of the tractor is switched off.
 - 2.4 Connect the supply lines to the tractor.
3. Now reverse the tractor towards the machine so that the connection fitting can be coupled.
4. Couple the connection fitting.
5. Lift the stand into transport position.
6. Hydraulic brake/overrun brake: fasten the parking brake pulling cable to the tractor.
7. Remove wheel chocks, release the parking brake.



When taking a corner with the implement hooked up for the first time, please make sure that no attachment on the tractor collide with the implement.

7.2 Uncoupling the machine



DANGER

- Before uncoupling, always secure the machine with 2 wheel chocks.
- Before uncoupling the **ZG-B**, make sure that uneven residue in the hopper is distributed evenly to prevent the combination from tipping.
- Risk of accident from the drawbar moving upwards.
- If the load is concentrated on one side at the rear, the bulk fertiliser spreader must not be uncoupled. As a single-axle vehicle, a load concentrated on one side at the rear leads to a risk of the bulk fertiliser spreader tipping over backwards.



WARNING

Risk of contusions, cutting, catching, drawing in and knocks through insufficient stability and possible tilting of the uncoupled machine!

Park the empty machine on a horizontal space with a hard surface.



When uncoupling the machine, there must always be enough space in front of the machine, so that you can align the tractor with the machine if necessary.

1. Park the machine in a level parking area on solid ground.
2. Uncouple the machine from the tractor.
 - 2.1 Secure the machine against unintentionally rolling. See page 101.
 - 2.1 Lower the stand to the parking position.
 - 2.2 **Uncouple** the connection fitting.
 - 2.3 Draw the tractor approximately 25 cm forwards.
The space created between the tractor and the machine allows better access for decoupling the PTO shaft and the supply lines.
 - 2.4 Secure the tractor and machine against unintentional starting and unintentional rolling.
 - 2.6 Uncouple the supply lines.
 - 2.7 Fasten the supply lines in the corresponding parking sockets.
 - 2.8 Hydraulic brake: detach parking brake pulling cable from tractor.

7.2.1 Manoeuvring the uncoupled machine



DANGER

You must be particularly careful when manoeuvring the machine with the service brake system released, since only the manoeuvring vehicle is now braking the machine.

The machine must be connected to the manoeuvring vehicle before you actuate the release valve on the trailer brake valve.

The manoeuvring vehicle must be braked.



The service brake system cannot be released using the release valve if the air pressure in the air reservoir drops below 3 bar (e.g. if the release valve has been actuated multiple times or if there are leaks in the brake system).

To release the service brake

- Fill the air reservoir.
- Remove all air from the braking system at the drain valve on the air reservoir.

1. Connect the machine to the manoeuvring vehicle.
2. Brake the manoeuvring vehicle.
3. Remove the wheel chocks and release the parking brake.
4. **Pneumatic braking system** only:
 - 4.1 Press in the actuator button on the release valve as far as it will go (see page 47).
 7. The service brake system is released and the machine can be manoeuvred.
 - 4.2 Once the manoeuvring procedure is finished, pull out the actuator button on the release valve as far as it will go.
 7. The pressure from the air reservoir brakes the machine again.
5. Actuate the brakes on the manoeuvring vehicle again once you have finished manoeuvring the machine.
6. Firmly apply the parking brake again and secure the machine against rolling with wheel chocks.
7. Uncouple the machine and manoeuvring vehicle.

8 Adjustments



When performing any adjustment work on the machine, observe the information in the following chapters

- "Warning symbols and other labels on the machine" from page 17 and
- "Safety information for the operator" from page 25.

Observing this information is important for your safety.



WARNING

Danger of, shearing, cutting, entrapment, entanglement, being drawn in, caught or struck during all adjustment work on the machine

- **due to unintentional contact with moving operating elements (spreading vanes of rotating spreading discs).**
- **due to tractor and connected machine unintentionally starting up or rolling away.**
- Secure the tractor and the machine against unintentional start-up and rolling, before adjusting the machine. See page 101.
- Only touch moving operating elements (rotating spreading discs) when they have come to a complete standstill.



WARNING

Risk of catching, trapping and knocks during all adjustment work on the machine due to unintentional lowering of the coupled and raised machine.

Secure the tractor cabin against entry of other persons to prevent unintentional actuation of the tractor's hydraulic system.

Configure all settings of the AMAZONE ZG-B bulk fertiliser spreader according to the information in the setting chart.

All common kinds of fertiliser on the market are spread in the AMAZONE spreading hall, and the setting data measured during this process is incorporated into the setting chart. The types of fertiliser listed in the setting chart were in perfect condition when the measurements were taken.

It may be necessary to adapt the information in the spreading table due to variations in fertiliser condition from:

- Effects of the weather and/or unfavourable storage conditions
- Fluctuations in the physical fertiliser properties, even within the same type and brand
- Changes in the spreading properties of the fertiliser

may mean that deviations from the information in the setting chart are necessary when setting the desired spread rate or working width. We cannot guarantee that your fertiliser will have identical spreading properties to that tested by us, even if it is the same kind and brand.



We expressly disclaim liability for consequential damages resulting from spreading errors.



Configure all settings with the utmost caution. Deviations from the optimum setting can have a negative effect on the spreading pattern.

The settings listed in the setting chart are intended solely as guide numbers, as the spreading properties of the fertiliser can change, making different settings necessary.

Only carry out adjustments and other work on the centrifugal broadcaster when the motor is switched off and the hydraulic system is depressurised. Remove the ignition key, secure the vehicle to prevent it from starting up inadvertently or rolling.

Wait until all moving machine parts have come to a complete standstill before making adjustments or carrying out other work on the machine.






For unknown kinds of fertiliser or a general check of the set working width, you can easily check the working width using the mobile fertiliser test rig (optional).



If you cannot definitively assign the fertiliser to a kind listed in the setting chart

- At www.amazone.de → **FertiliserService** and in the app for Android and iOS mobile devices, you will find the latest supplements to the setting chart ,
- the **AMAZONE** Fertiliser Service will assist you over the telephone in assigning the fertilisers and setting recommendations
☎ +49 (0) 54 05 / 501 111
- please consult the contact partner in your country

Contact partners in the respective countries::

					
(GB)	0044 1302 755720	(I)	0039 (0) 39652 100	(H)	0036 52 475555
(IRL)	00353 (0) 1 8129726	(DK)	0045 74753112	(HR)	00385 32 352 352
(F)	0033 892680063	(FIN)	00358 10 768 3097	(BG)	00359 (0) 82 508000
(B)	0032 (0) 3 821 08 52	(N)	0047 63 94 06 57	(GR)	0030 22620 25915
(NL)	0031 316369111	(S)	0046 46 259200	(AUS)	0061 3 9369 1188
(L)	00352 23637200	(EST)	00372 50 62 246	(NZ)	0064 (0) 272467506
				(J)	0081 (0) 3 5604 7644

8.1 Setting the spread rate



ZG-B Drive: Electro hydraulic spread rate setting via the floor belt speed. See the software AMABUS operating manual.



ZG-B Special, Super:

The scale value can be found in the spreading table or determined by using the enclosed slide rule.

Settings depends on

- the main shutter slide,
- the provided belt speed .

The slider position depends on:

- the kind of fertiliser to be spread (**quantity factor**),
- the working width,
- the speed of operation .
- the desired spread rate.

8.1.1 The quantity factor can be taken from the setting chart

Example

Kind of fertiliser: KAS 27%N gran. Hydro Rostock

Spreading disc: OM 24-36

Working width: 27m

Working speed: 12 km / h

spread rate: 200 kg / ha

1. For fertiliser or trade name, please refer to the setting chart.
2. Read off group of fertiliser (**group 1**).

ZG-B Drive:

→ Bulk density: 1,03 kg/l im terminal **AMATRON⁺** eingeben.

ZG-B Spezial, Super:

3. Setting position refer to the setting chart.

ZG-B Super: always select 12 km/h.

→ shutter position 18

→ belt speed I

Fertiliser	trade name	group of fertiliser	bulk density [kg/l]	spread rate see page
KAS	KAS 27%N gran. fertiva GmbH	1	1,02	62-64
KAS	KAS 27%N gran. Linzer NAC	2	0,98	59-61
KAS	→KAS 27%N gran. Hydro Rostock	→1	→1,03	→62-64
KAS	KAS 27%N gran. Hydro Sluiskil (NL)	1	1,05	65-67

shutter position		Working width														
		20			21			24			27			28		
Belt speed		km/h			km/h			km/h			km/h			km/h		
I	II	8	10	12	8	10	12	8	10	12	8	10	12	8	10	12
14		323	258	215	308	246	205	269	215	179	239	191	159	231	185	154
16		369	295	246	351	281	234	308	246	205	273	219	182	211	211	176
18	←	415	332	277	395	316	264	346	277	231	308	246	205	237	237	198



The value for the shutter position must be halved for the belt speed II.



It is recommended to carry out a spread rate check with this slider position.

8.1.2 Determining the setting value using a sliding ruler



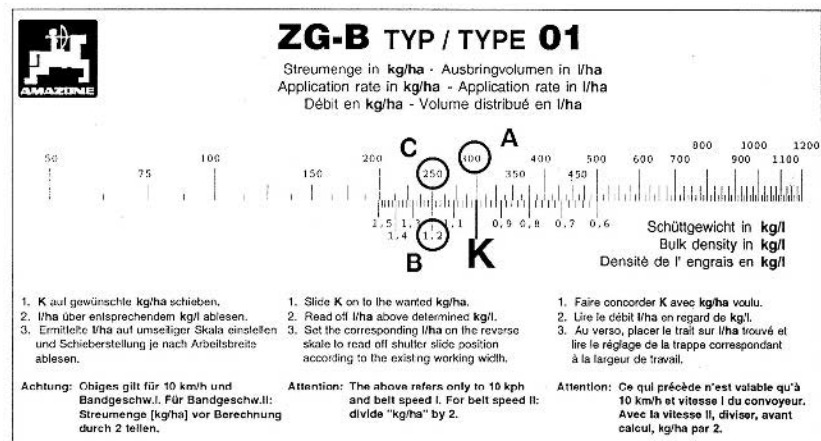
The shutter position shown on the sliding ruler is valid for a forward speed of 10 km/h at a belt speed on gearbox position I.

- For other forward speeds, calculate the shutter position as follows:

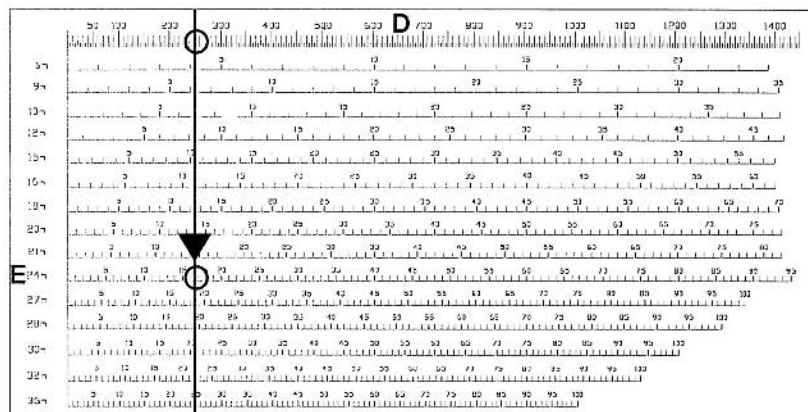
$$\text{Shutter (X km/h)} = \frac{\text{Shutter (10 km/h)} \times \text{X km/h}}{10 \text{ km/h}}$$

- For belt speed II, divide the determined shutter position by two.

- Determine the bulk density [kg/l] of the fertiliser by weighing a precisely filled litre gauge.
- On the sliding ruler, push the marking K to the desired spreading quantity [kg/ha] A.
- Read the spreading volume C from the bulk density B determined.



- On the back of the sliding ruler, cover the spreading volume D with the red line 2 and read the shutter position for the desired working width E.
- If required, convert the shutter position for another forward speed or belt speed II.



8.1.3 Setting the spread rate via the main shutter slide



Fig. 83

1. Unscrew the locking bolt.
2. Move the main shutter to the desired value of the scale using the hand lever.
3. Tighten the locking bolt again.



The setting figures of the setting chart may only be considered as standard data. The flowing properties of the fertiliser may change and thus require other settings. Therefore always carry out a spread rate check before commencing the spreading work.

The determination of the shutter slide position with the aid of the calculating disc rule is carried out after a spread rate check. This way the varying flowing properties of the fertiliser are already considered when determining the shutter slide position.

The optimum spread pattern requires the maintenance of constant PTO shaft rev. speed and operating speed (except for ground wheel drive and AMATRON 3) during the spreading operation.

For the ground wheel drive the ratio between operating and belt speed is always the same. To determine the shutter slide position following the setting chart refer to column 12 km/h-.

We recommend that you carry out a spread rate check with this shutter slide position.

8.1.4 Setting the belt speed

Only for ZG-B Special / Super!

On the shift gearbox (Fig. 84/1) two belt speeds can be set with the aid of the control lever (Fig. 84/2) and the conveyor belt can be disengaged.

- Belt speed 2 = two-time belt speed 1.

Prior to any setting disengage the tractor PTO shaft and wait until the PTO shaft and the conveyor belt have come to a standstill. Briefly lift the gear change shift (Fig. 84/2) and let it catch in the desired position.

	Control lever in position
Belt speed I:	1
Switching off conveyor belt	0
Belt speed II	2

Adjust the belt speed according to the chosen spread rate and shutter position according to the setting chart..

For large application rates we recommend belt speed II.

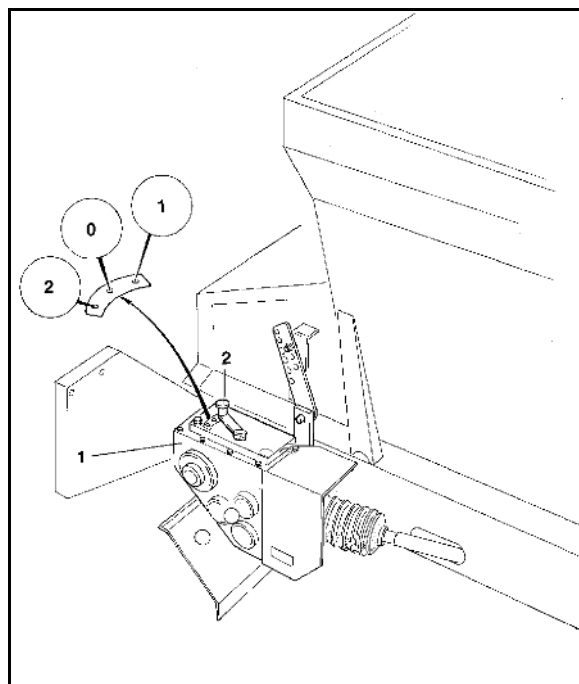


Fig. 84

8.2 Spread rate control mineral fertiliser calibration

Check the adjusted shutter slide positions by carrying out a calibration test using the calibration device (option).

Spread rate control must be carried out:

- each time fertiliser is changed
- when spread rate is changed
- when working width is changed

8.2.1 Arrangement for the spread rate check

1. Adjust the shutter slide according to the setting chart.
2. Unscrew the hex. bolt.
3. Remove the spreading disc.
4. Screw in the hex. bolt again.
5. Remove the funnel chute.
6. Hang the calibration device (Fig. 85/1) in the pockets (Fig. 85/2) and secure using clip pins (Fig. 85/3) sichern.
7. Hang each one calibration bucket (Fig. 85/4) on the hook underneath the outlets.

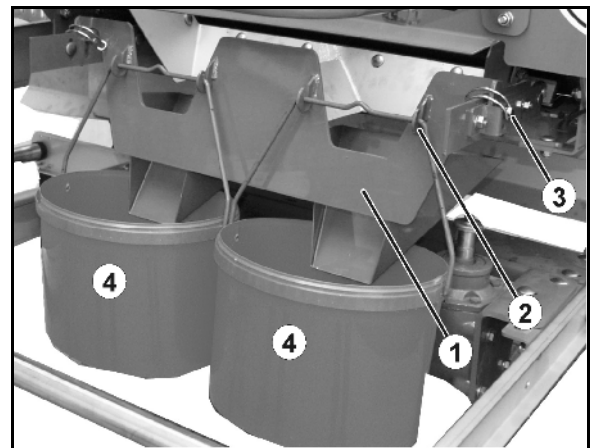


Fig. 85

After a test run which delivers the fertiliser in relation to the shutter slide position to the end of the belt, the fertiliser can be collected during a predetermined test distance (forward distance)



ZG-B Drive: **See operation manual**
Software AMABUS, **chapter fertiliser**
calibration.

8.2.2 Spread rate check by driving a test distance

It is possible to check the spread rate by driving a test distance..

Working width [m]	Required forward distance [m]	Area covered [ha]	Multiplier for the total spread rate
9	55,50	1/20	20
10	50,00	1/20	20
12	41,60	1/20	20
15	33,30	1/20	20
16	31,25	1/20	20
18	27,75	1/20	20
20	25,00	1/20	20
21	23,80	1/20	20
24	41,60	1/10	10
27	37,00	1/10	10
28	35,70	1/10	10
30	33,30	1/10	10
32	31,25	1/10	10
36	27,75	1/10	10

Table 1

Conversion of the required test distance for working widths not shown in the setting table:

1. Working width up to 23 m - multiplier "20"

$$\text{Required forward distance at desired working width [m]} = \frac{500}{\text{Working width [m]}}$$

2. Working width from 24 m - multiplier "10"

$$\text{Required forward distance at desired working width [m]} = \frac{1000}{\text{Working width [m]}}$$



Due to the limited capacity of the calibration tray, halve the test distance and double the multiplication factor at high fertiliser application rates per ha.

- Accurately drive along the test distance at field conditions (with intended operational speed and PTO shaft speed (540 1/min or 720 1/min.).
- Multiply the weight of the fertiliser collected in the calibration trays with the multiplier stated, in order to receive the actually adjusted spread rate kg/ha



If the actual spread rate is smaller than the desired spread rate adjust the necessary bigger shutter slide position on the main shutter.

If the actual spread rate is bigger than the desired spread rate adjust the necessary smaller shutter slide position on the main shutter.

If necessary repeat the spread rate check.

8.2.3 Stationary spread rate check



Important!

Only ZG-B Special!

It is possible to check the spread rate stationary.

Working width [m]	Required forward distance [m]	Area covered [ha]	Multiplier for the total spread rate		
			8	10	12
9	55,50	20	24,97	19,98	16,65
10	50,00	20	22,50	18,00	15,00
12	41,60	20	18,72	14,98	12,48
15	33,30	20	14,98	11,99	9,99
16	31,25	20	14,06	11,25	9,37
18	27,75	20	12,49	9,99	8,32
20	25,00	20	11,25	9,00	7,50
21	23,80	20	10,71	8,57	7,14
24	41,60	10	18,72	14,98	12,48
27	37,00	10	16,65	13,32	11,10
28	35,70	10	16,06	12,85	10,71
30	33,30	10	14,98	11,99	9,99
32	31,25	10	14,06	11,25	9,37
36	27,75	10	12,49	9,99	8,32

Table 2

Conversion of the required measuring time for working widths (measuring distances) or speeds of operation not shown in the table:

$$\text{Required test distance at desired working width [sec]} = \frac{\text{test distance [m]}}{\text{Speed of operation [km/h]}} \times 3,6$$

Determination of the test distance, see Seite 118.

- Set the PTO shaft speed of **540** 1/min and accurately maintain the required period for the calibration test stated in table 2.
- Multiply the weight of the fertiliser collected in the calibration trays with the multiplier stated in order to receive the actually adjusted spread rate kg/ha.



If the actual spread rate is smaller than the desired spread rate adjust the necessary bigger shutter slide position on the main shutter.

If the actual spread rate is bigger than the desired spread rate adjust the necessary smaller shutter slide position on the main shutter.

If necessary repeat the spread rate check.

8.3 Setting the spreading discs OM

8.3.1 Setting the working width



- There are different spreading disc pairs for the various working widths.
- The existing tramline system (distance between the tramlines) determines the selection of the required spreading disc pair.
- The working widths are adjustable within the working ranges of the respective Omnia Set (OM) spreading disc pairs (however, there may be deviations for the spreading of urea).
- The type of fertiliser and desired working width determine the setting of the pivotable spreading vanes.

The specific spreading properties of a fertiliser influence its throwing range. The pivotable spreading vanes allow the adjustment of these specific spreading properties of a fertiliser, so that the respective fertiliser can be spread over the desired working width.

Working width	Spreading disc pair
10 – 16 m	OM 10 – 16
18 – 24 m	OM 18 – 24
24 – 36 m	OM 24 – 36



The primary factors that affect the spreading properties are:

- Granule size
- Bulk density
- Surface condition
- Humidity

We therefore recommend the use of a well granulated fertiliser by a renowned manufacturer and also checking of the working width setting using the mobile fertiliser test rig.



WARNING

Danger of ejection of parts of the quick-release screw connection in event of incorrect tightening of the wing nut after the working depth is set!

After setting the working depth, always check whether you have manually retightened the wing nut of the quick-release screw connection.

8.3.2 Adjusting the spreading vane positions

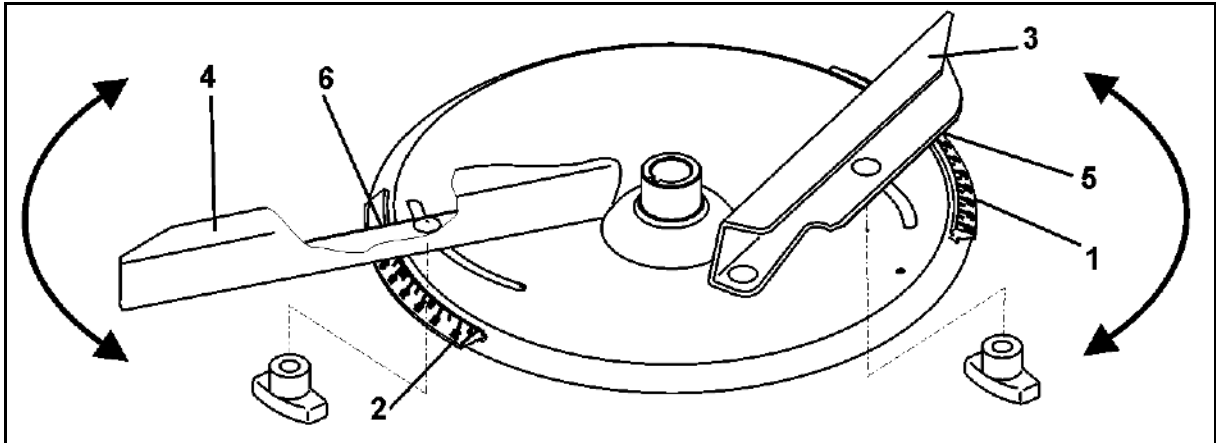


Fig. 86

The spreading vane position depends on:

- the working width and
- the type of fertiliser.

Two different scales, designed so as to make it impossible to confuse them, are arranged on each spreading disc for precision setting of the individual spreading vane positions (Fig. 86/1 and Fig. 86/2).



- The shorter spreading vanes (Fig. 86/3) are assigned the scale (Fig. 86/1) with values from 5 to 28; the longer spreading vanes (Fig. 86/4) are assigned the scale (Fig. 86/2) with the values from 35 to 55.
 - For the short spreading vane (Fig. 86/3), read off the set value on the read-off edge (Fig. 86/5).
 - For the long spreading vane (Fig. 86/4), read off the set value on the read-off edge (Fig. 86/6).
- Swivelling the spreading vanes to a higher scale value (Fig. 86/1 or Fig. 86/2) increases the working width.
- The shorter spreading vanes primarily distribute the fertiliser in the centre of the spread pattern, while the longer vanes primarily distribute it to the outer area.



Use the setting chart for adjusting the spreading vane.

Adjust the spreading vanes as follows:

1. Turn off the spreading-disc drive.
2. Secure the tractor against unintentional starting and rolling away, see the chapter "Securing the tractor against unintentional starting and rolling away", from page 101.
3. Wait until rotating spreading discs come to a complete standstill before adjusting the working width.
4. Set the desired working width by swivelling the short and long spreading vanes in one after the other.
 - 4.1 Turn the spreading disc so that the respective wing nut under the spreading disc can be released without problem.
 - 4.2 Release the respective wing nut.
 - 4.3 Refer to the setting chart for the short and long spreading vanes.
 - 4.4 Swivel the respective spreading vane so that you can read off the required setting on the scale on the read-off edge.
 - 4.5 Firmly retighten the respective wing nut by hand (without a tool).

Extract from setting chart

Example:


Kind of fertiliser: **KAS 27% N gran. Hydro Rostock**

Spreading disc: **OM 24 – 36**

Desired workind withd: **27m**

1. For fertiliser or trade name, please refer to the setting chart.
 2. Read off group of fertiliser.
 3. Position of vane refer tot eh setting chart :
- short spreading vanes 12,
- long spreading vanes 44

Fertiliser	Trade name	Group
KAS	KAS 27% N gran. Fertiva Gmbh	1
	KAS 27% N gran. Linzer NAC	2
	→KAS 27% N gran. Hydro Rostock	→1
	KAS 27% N gran. Hydro Sliskll (NL)	1

Group	<div style="text-align: center;">  </div>					
	24	27	28	30	32	36
1→	10/44	12/44	13/44	15/44	15/44	10/44
2	15/43	17/44	17/44	17/45	17/46	15/43

8.3.3 Checking the working width with the mobile test rig (optional)

The working width is determined in part by the specific spreading properties of the fertiliser.

As is well known, the primary factors that affect the spreading properties are:

- Granule size
- Bulk density
- Surface condition and
- Humidity

The setting values of the setting chart are, therefore, to be considered **guideline values** only, as the spreading properties of the different types of fertiliser may change. We recommend checking the working width of the machine using the **mobile fertiliser test rig** (Fig. 87).



Fig. 87



See the operating manual for the mobile test rig.

Adjustments

8.3.4 Late top dressing

The spreading discs are supplied as standard with spreading vanes by which besides the normal spreading (Fig. 88) procedure also late top dressing in crops may be conducted.

For late top dressing Swivel the swivel blades of the spreading discs without slackening the nuts (without any tools) into the upper position (Fig. 89). This way the fertiliser spread fan is raised.



Fig. 88

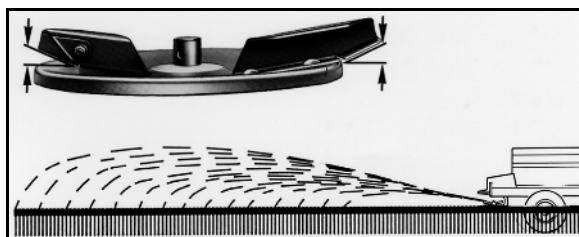


Fig. 89

8.3.5 Setting the funnel chute

Adjust the funnel chute as follows:

Funnel chute position	Spread rate
Hole 1	up to 150 kg/ha
Hole 2	over 150 kg/ha

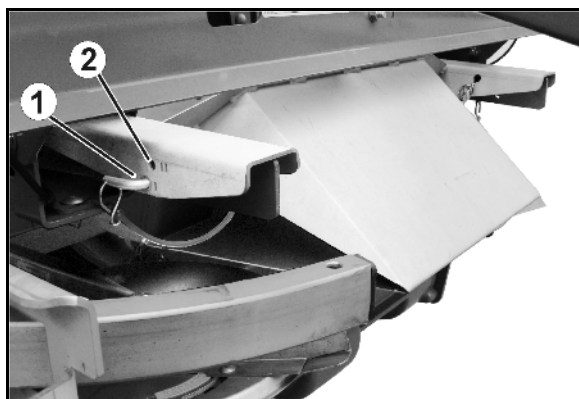


Fig. 90

8.4 Boundary, ditch and side spreading

1. Boundary spreading in accordance with fertiliser ordinance (Fig. 91)

Along the field boundary there is a road, a field path or another person's lot.

Fertiliser is not permitted to fall beyond the boundaries in accordance with the fertiliser ordinance.

2. Ditch spreading in accordance with fertiliser ordinance (Fig. 92):

There is body of water or a ditch along the field boundary.

The fertiliser ordinance specifies the following:

- No fertiliser must be spread within one metre of the boundary (with use of boundary spreading devices).
- No fertiliser must be spread within three metres of the boundary (without use of boundary spreading devices).
- Erosion and wash-away (e.g. in surface waters) must be prevented.

3. Side spreading (Fig. 93)

The boundary is delineated by an area in agricultural use. It is acceptable for a small amount of fertiliser to be thrown across the field boundary.

The fertiliser distribution in towards the centre of the field is still close to the nominal quantity. A small amount of fertiliser is thrown across the field boundary.

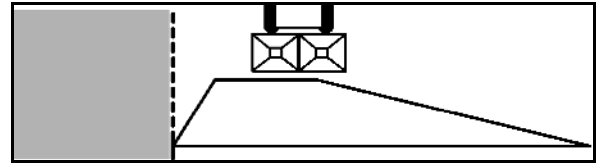


Fig. 91

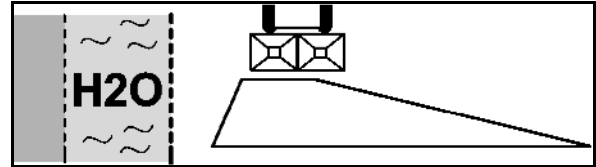


Fig. 92

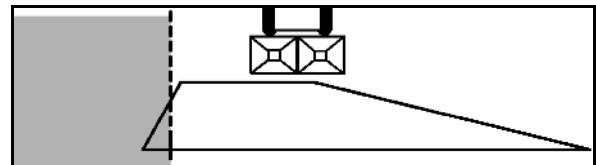


Fig. 93

Adjustments

8.4.1 Boundary and side spreading using the Limiter ZG-B boundary spread deflector

The setting of the Limiter M depends on

- Boundary distance
- Type of fertiliser,
- Nature of the field boundary

Read the value to be set from the setting chart.



- The values of the setting chart are to be understood as guide numbers, as the fertiliser conditions may vary. Readjust the Limiter if necessary.
- The boundary/edge distance in the setting chart always indicates half the working width.















 LIMITER 		OM 10-12/OM 10-16				OM 18- 24				OM 24- 36					
		5	6	7,5	8	9	10	10,5	12	12	13,5	14	15	16	18
KAS CAN AN NPK DAP MAP		12	10	8	7	8	6	4	2	2	1	0	0	0	0
		15	13	12	10	13	12	11	10	11	10	9	8	7	5
		15	13		15	15	14	14	12	12	12	12	11	10	8
		15	13		15	15	14	14	12	12	12	12	11	10	8
Harnstoff Urea Urée Мочевина		6	5	4	4	4	3	3	2	2	1	0	-	-	-
		13	11	9	8	8	7	6	6	6	6	5	-	-	-
		15	13	11	10	11	10	9	8	8	8	7	7	6	-
		15	13	11	10	11	10	9	8	8	8	7	7	6	-
P K PK MgO		9	7	4	3	3	3	3	0	0	0	0	0	0	0
		12	11	9	8	7	5	4	3	3	2	1	0	0	0
		15	14	12	11	10	8	7	6	6	5	5	4	4	3
		15	14	12	11	10	8	7	6	6	5	5	4	4	3
AMAZONE		A								B					

Fig. 94

	Boundary/edge distance (half working width) corresponding to the mounted OM spreading discs
	Boundary spreading
	Edge spreading
	Ditch spreading
	Necessary reduction of universal joint shaft speed

Fig. 95/...

- (1) Boundary spreading deflector and scale with setting values from 0 to 15.
- (2) Display for the scale
- (3) Clamping lever
- (4) Guide bar
- (5) Position sensor

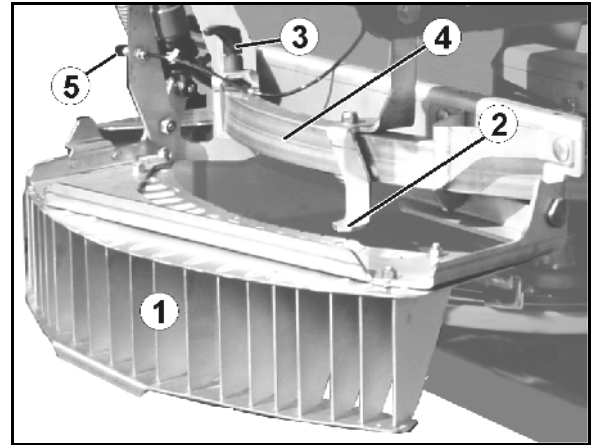


Fig. 95



- Lower the boundary spreading deflector hydraulically for border / boundary spreading.
- After spreading at the boundary, swivel the boundary spreading deflector upwards hydraulically and continue with normal spreading.

Settings

For setting the numerical values, move the boundary spreading deflector on the guide bar.

1. Release the clamping lever for this purpose.

If the swivel range of the clamping lever handle is not sufficient, lift the handle, turn back and lower again.

2. Push the boundary spreading deflector on the guide bar until the indicator is positioned at the value to be set from the setting chart.
3. Tighten the clamping lever again.

he boundary spread deflector can be fitted for setting different scale graduations in position A or position B.

Fig. 96/...

Pos. A: - for scale graduation 3 – 14

Pos. B: - for scale graduation 0 – 11

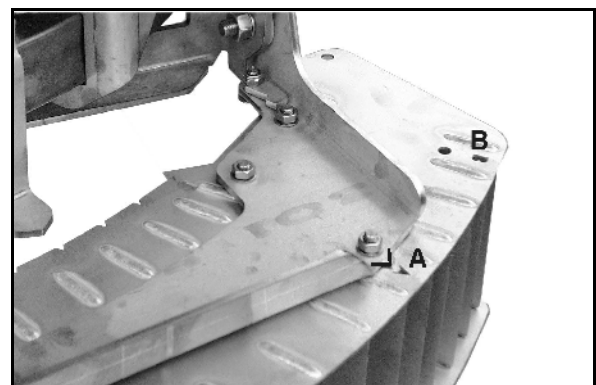


Fig. 96

Late top dressing with the Limiter

For late top dressing bring the border spread deflector into a medium high position (Fig. 97).

- To do this lower the border spread deflector hydraulically.

On the upper side of the border spread deflector you will find on the right hand and left hand side each one setting lock (Fig. 98).

1. Slacken the nuts (Fig. 98/1) of the setting locks.
2. Manually raise the deflector.
3. Position the setting locks up (Fig. 98/2) to the stop and firmly tighten the locks.
4. Lower the deflector.

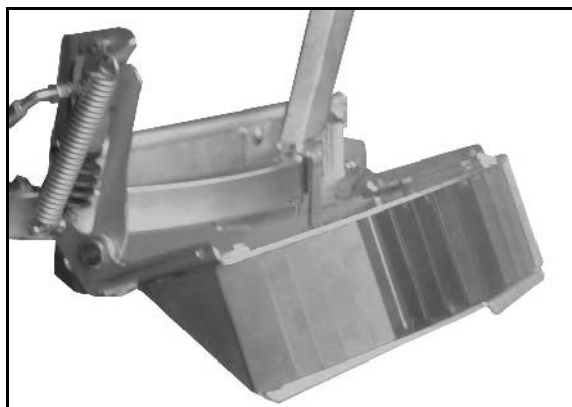


Fig. 97

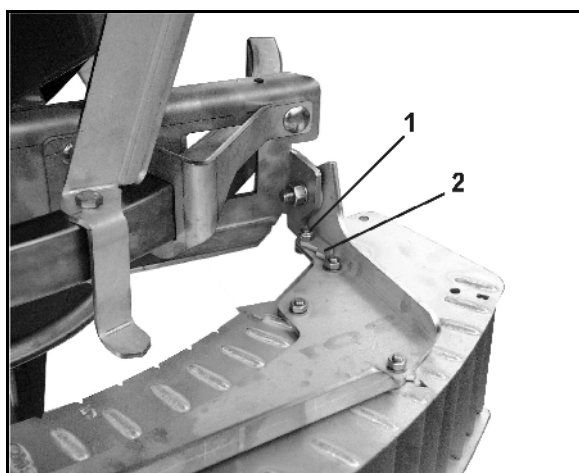


Fig. 98

9 Transportation



- Comply with the chapter "Safety information for the operator", from page 27 when moving.
- Before moving off, check:
 - The correct connection of the supply lines
 - The lighting system for damage, function and cleanliness
 - The brake and hydraulic system for visible damage
 - That the parking brake is released completely.
 - The function of the brake system.



WARNING

Risk of contusions, cuts, dragging, catching or knocks from tipping and insufficient stability.

- Drive in such a way that you always have full control over the tractor with the attached machine.
In so doing, take your personal abilities into account, as well as the road, traffic, visibility and weather conditions, the driving characteristics of the tractor and the connected machine.



WARNING

Danger of breaking during operation, insufficient stability and insufficient tractor steering and braking power on improper use of the tractor!

These risks pose serious injuries or death.

Comply with the maximum load of the connected machine and the approved axle and drawbar loads of the tractor. If necessary, drive only with a partially filled hopper.



WARNING

Risk of falling from the machine if riding against regulations!

It is forbidden to ride on the machine and/or climb the running machine.

Instruct people to leave the loading site before approaching the machine.



Do not exceed the width of 2,55 m during the transport!



Put the implement in transport position

- Put the ladder in transport position.
- Close the main shutter.
- Close the swivelable hopper cover.

ZG-B Drive:

- Put the TrailTron draw bar in transport position, see page 80.
- Close the double shutter on both sides.
- Keep the **AMATRON⁺** switched off during road transport.

ZG-B Super:

- Put the ground wheel drive in transport position.

10 Use of the machine



When using the machine, observe the information in the following sections:

- "Warning symbols and other labels on the machine" from page 17 and
- "Safety information for the operator", on page 25 ff.

Observing this information is important for your safety.



WARNING

Danger from catching, entanglement, pulling in or entrapment during machine operation due to accessible powered elements of the machine.

- Only start up the machine, when all the safety equipment has been attached and is in the closed position.
- It is forbidden to open the safety equipment
 - when the machine is running
 - for as long as the tractor engine is running with a connected PTO shaft/hydraulic system.
 - when the ignition key is inserted in the tractor and the tractor engine with the connected turbine shaft / hydraulic system could be started unintentionally.



WARNING

Danger from ejected, damaged components caused by impermissibly high drive speeds of the tractor universal joint shaft!

Observe the approved machine drive speed before switching on the tractor universal joint shaft.



WARNING

Danger from being entangled and drawn in and danger from foreign objects being caught and thrown in the danger area of the driven PTO shaft!

- Whenever the machine is used, first check to ensure that the safety devices and guards of the PTO shaft are fully intact and functional.
Have damaged safety devices and guards of the PTO shaft replaced immediately by a specialised workshop.
- Check that the PTO shaft guard is secured against rotation by the supporting chain.
- Maintain a sufficient safety clearance between you and the driven PTO shaft.
- Direct people out of the danger area of the driven PTO shaft.
- Shut down the tractor engine immediately in case of danger.



WARNING

Danger of catching or entanglement and drawing in or entrapment of loose clothing by moving elements (rotating spreading discs)!

Do not wear loose-fitting clothing. Tight clothing reduces the risk of unintentional catching or entanglement and drawing in or entrapment by moving elements.



WARNING

Risk of contusions, cutting, catching, drawing in and knocks through insufficient stability and tipping of the tractor and/or the connected machine.

Drive in such a way that you always have full control over the tractor with the attached machine.

In so doing, take your personal abilities into account, as well as the road, traffic, visibility and weather conditions, the driving characteristics of the driver and the connected machine.



DANGER

Risk of the implement tipping over when the steering drawbar is pushed in; particularly on very uneven or sloping terrain!

With a loaded or partially loaded implement with tracking steering drawbar, there is a risk of tipping over when performing a turning manoeuvre on a headland at high speeds, due to the shifting of the centre of gravity when the steering drawbar is pushed in. The risk of tipping over is especially high travelling downhill on sloping terrain.

Adapt your driving technique accordingly and reduce speed when performing a turning manoeuvre on a headland, so that you are in complete control of the tractor and implement.



WARNING

Risk of contusions, cutting, catching, drawing in and knocks through

- **Unintentional start-up and rolling of the tractor-machine combination.**

Secure the tractor and the machine against unintentional start-up and rolling, before eliminating faults on the machine. See page 101.

Wait for the machine to stop before entering the machine danger area.



- For new machines, after 3-4 full hopper loads, check that the screws are tight and retighten if necessary.
- Use only fertiliser with the proper grain size, of the kinds listed in the setting chart. If the type of fertiliser is not known exactly, check the working width using the mobile fertiliser test rig.
- When spreading mixed fertilisers, note the following:
 - Each variety may have different flight characteristics.
 - The individual varieties may separate.
- After every use, remove any fertiliser clinging to the spreading vanes.

**ZG-B Drive,****before starting with the spreading operation:**

- Job-data
- Machine-data

Enter on AMATRON 3 and recheck.
See operation manual of AMATRON 3!



Put the implement in working position:

- Adjust the main shutter.

ZG-B Drive:

- Put the TrailTron draw bar in operating position (stop tap in position I), see page 80.

ZG-B Super:

- Put the ground wheel drive in operating position.



- The fertiliser spreader is coupled to the tractor.
- The supply hoses are connected.
- The PTO-shaft is connected.
- The settings have been configured.

Checking the outlet-openings of the guide chute before every operation

Spreading material can build up inside the outlet openings (Fig. 99/1) of the guide chute to become too narrow to achieve a correct spread pattern. To achieve a correct spread pattern ensure that both outlets are clean. Therefore before every operation of the bulk spreader check or clean the outlets as follows



Danger!

Disengage tractor PTO shaft, stop tractor engine and remove ignition key.

1. Remove guide chute. (Fig. 99/3).
2. Check or clean the outlet openings (Fig. 99/1).
3. Push guide chute back into position and affix by two clip pins (Fig. 99/2).

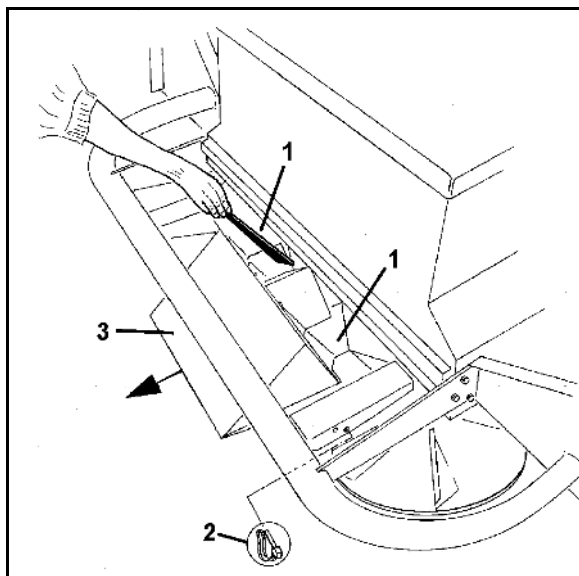


Fig. 99

10.1 Filling the machine



WARNING

Danger of breaking during operation, insufficient stability and insufficient tractor steering and braking power on improper use of the tractor!

Comply with the maximum load of the connected machine and the approved axle and drawbar loads of the tractor. If necessary, drive only with a partially filled hopper.



WARNING

Couple the bulk fertiliser spreader to the tractor before loading.



- Remove residues or foreign bodies from the hopper before filling with fertiliser.
- Make sure that the charging sieve is always closed before you fill the hopper. Only a closed charging sieve prevents clumps of fertiliser and/or foreign bodies getting into the hopper and blocking the agitator.
- Let the floor belt run for a short period to reduce friction.
- It is essential to observe the safety instructions from the fertiliser manufacturer. Use appropriate protective clothing as necessary.



ZG-B Drive: Enter the refilled amount of fertiliser into the AMATRON 3.

See operator's manual of AMATRON 3.

10.2 Emptying the machine while stationary

The **ZG-B** is emptied while stationary using the floor belt drive.

For this:

1. Open the slide gate.
2. Remove the spreading discs.
3. Refit the spreading disc screws to protect the screw thread.
4. Hopper emptying via the PTO shaft drive.



CAUTION

Remove the spreading discs. Danger of injury from PTO shaft driven spreading discs.



CAUTION

Do not step on the running floor belt emptying any residues. Risk of tripping!



ZG-B Drive:

See the software AMABUS operating manual, machine data.

ZB-B Super:

Before emptying, switch the the drive of conveyor belt from ground wheel drive to PTO shaft drive.

For this purpose:

Pull the PTO shaft from the ground wheel, guide through the frame (Fig. 100/1) and put it on the intermediate drive (Fig. 101/1).

If necessary, turn the gearbox into an aligned position by relocating the screw connections (Fig. 100/2) in the perforated sheet metal.

After emptying, put the drive back onto the ground wheel and turn the gearbox back to the initial position and secure it.

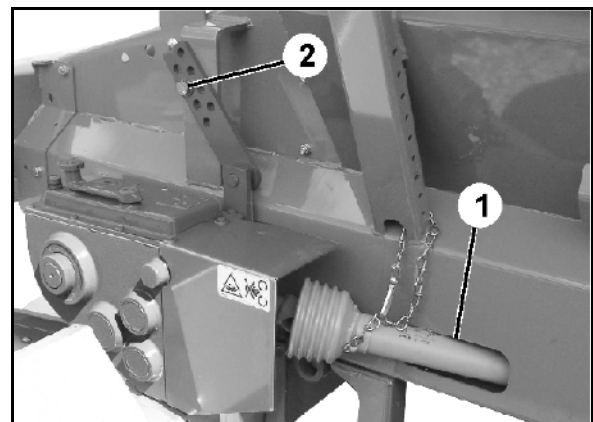


Fig. 100

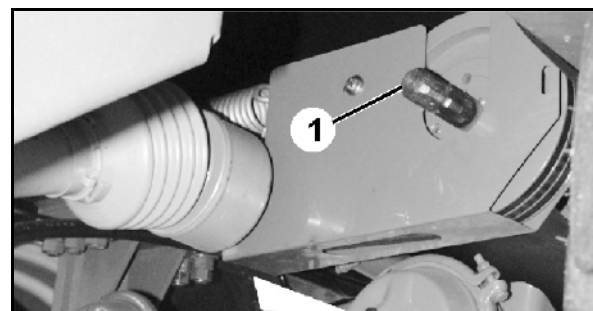


Fig. 101

10.3 Spreading operation



Spreading disc OM

- The spreading vanes and swivel blades are made of especially hard-wearing stainless steel. However, the spreading vanes and swivel blades are wearing parts.
- The type of fertiliser, times of use and spread rates influence the service life of spreading vanes and swivel blades.
- Several spreading materials such as kieserite, Excello granules and magnesium sulphate may cause higher levels of wear on the spreading vanes. We supply spreading vanes with higher resistance to wear for these spreading materials (optional).
- The technical condition of the spreading vanes and swivel blades is essential for uniform lateral distribution of the fertiliser on the field (i.e. forming strips).



Spreading disc OM

WARNING

Danger of ejection of parts of the spreading vanes / swivel blades, caused by worn spreading vanes / swivel blades!

Every day, at the start and end of spreading work, check all spreading vanes for visible damage/defects. Refer to the criteria for the replacement of wearing parts in the chapter "Replacing spreading vanes", page 151.



WARNING

Danger from materials or foreign objects that are thrown from or ejected by the machine at high speeds.

- Make sure that uninvolved persons are kept well clear of the danger area of the machine in the following situations:
 - Before you switch on the power for the spreading discs.
 - While the tractor engine is running.
- When spreading fertiliser at field edges in residential areas / along roads, take care not to endanger persons or damage objects. Maintain a sufficient safety distance and use the appropriate devices for boundary spreading and/or reduce the drive speed of the spreading discs.



ZG-B Drive: See the software AMABUS operating manual.

1. Open the shutter.
 - o Main shutter:
adjustment according to the setting chart.
 - o Double shutter:
Open shutter hydraulically (tractor control unit *yellow* und *green*).
2. Engage the universal joint shaft at low tractor engine speed.
3. **ZG-B Super:** Ground wheel driven unit for the conveyor belt:
Create the drive with the aid of a single acting control spool valve (tractor control unit *red*).
4. For border spreading lower Limiter hydraulically into work (the tractor control unit *blue*).
5. After having finished the spreading operation
 - o Disengage the PTO shaft at slow tractor's rev. speed,
 - o **ZG-B Super:** Stop ground wheel drive,
Close the shutter.



GEFAHR

Do not stand in the slewing range of the drive wheel and its operating mechanism!

Ensure that there are no persons in the danger zone!

Never reach inside the machine while parts may still be moving! Risk of injury!



- Ensure that the PTO shaft rev. speed is matched with the spreader unit.
 - Set the universal joint shaft speed to 540 rpm /720 rpm, 1000 rpm unless indicated otherwise in the setting chart.
- Maintain a constant spreading disc speed.



ZG-B Special:

- select the universal joint shaft speed to 540 rpm!
- Maintain constant working speed.

10.4 Recommendation for working in headlands

Prerequisite for accurate work at field boundaries and edges. The first tramline (Fig. 102/T1) is generally placed half a tramline's width from the edge of the field (see page 138). A tramline of this type is laid in the same fashion in the headlands.

Bearing in mind the notes given (page 138), drive in the first tramline around the field in a clockwise direction.

On account of spreading towards the rear, for accurate distribution on headlands the following must be noted:

Open and close the sliders for forward (tramlines T1, T2, etc.) and return trips (tramlines T3, etc.) at different distances to the field edge.

- Open the slide gate after entering the tramline at point **P1** (Fig. 103), when the spreader discs are at distance X from the tramline of the headland.
 - $X = 1$ working width with working widths $> 18\text{m}$.
 - $X = 1.5$ working widths with working widths $< 18\text{m}$.
- Close the slide gate before leaving the tramline at point **P2** (Fig. 103), when the spreader discs are located at the level of the first tramline of the headland.



Using the method just described prevents fertiliser loss and over or under-fertilising and thus is an environmentally friendly way of working.

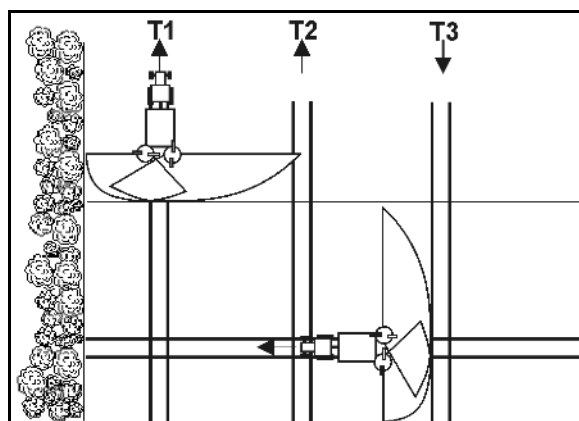


Fig. 102

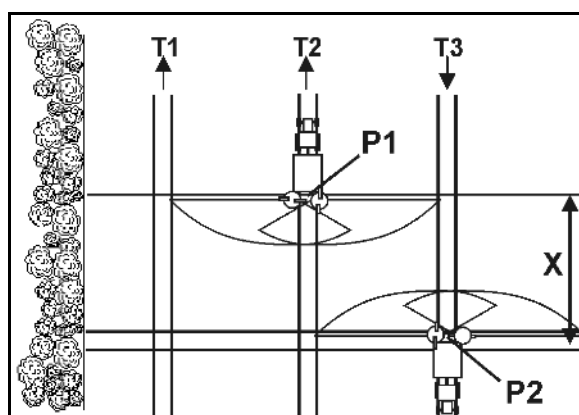


Fig. 103

11 Faults

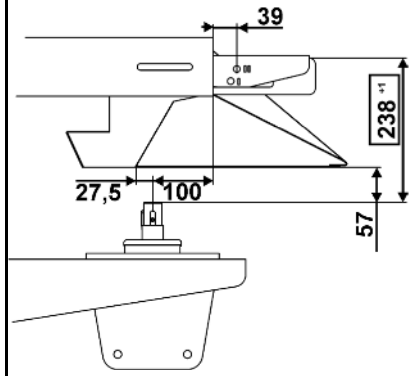


WARNING

Danger of crushing, shearing, cutting, being drawn in and/or caught if the tractor/machine combination is started and/or rolls unintentionally.

Secure the tractor and the machine against unintentional start-up and rolling, before eliminating faults on the machine. See page 101.

Wait for the machine to stop before entering the machine danger area.

Fault	Cause	Remedy
Fertiliser lateral distribution not uniform.	Fertiliser deposits on the spreading discs and the spreading vanes.	Clean the spreading discs and the spreading vanes.
	The spreading properties of your fertiliser differ from those of the one we tested when creating the setting chart.	Contact the AMAZONE Fertiliser Service. ☎ 05405-501 111
	Spreader unit measurements are incorrect..	Check the measurements of the spreader unit and correct, if necessary. 
Too much fertiliser in the tractor track	Prescribed spreading disc speed is not reached.	Increase tractor engine speed.
	Spreading vanes and outlets defective or worn.	Check the spreading vanes and outlets. Replaced defective or worn parts immediately.
Too much fertiliser in the overlap area	Prescribed spreading disc speed is exceeded.	Reduce tractor engine speed.

Faults

Fault	Cause	Remedy
Floor belt does not convey fertiliser	ZG-B Special, Super: Idle gearbox.	Select gearbox position 1 or 2.
	Slip on the ground wheel in gearbox position 2.	Briefly select gearbox position 1.
	ZG-B Special: The belt on the intermediate drive is torn or slips.	Replace the belt
	ZG-B Drive: Oil pressure too low.	Increase the oil pressure from the tractor.
Floor belt is parallel	Fertiliser caking on the shafts of the floor belt.	Remove the fertiliser caking. Adjusting the scraper.
	Bearing defective	Replace the bearing.
Collision of the PTO shaft and flange of the towing eye.	Unfavourable geometry on the tractor.	Mount the drive unit offset: order number 935060.
Swivelable hopper cover does not open/opens too fast	Throttle not adjusted correctly.	Adjust throttle.
No hydraulic functions	Fluid supply at the tractor is not switched on.	Switch on fluid supply at the tractor.
	Power supply to valve block interrupted.	Check cable, plug and contacts.
	Oil filter contaminated.	Replace/clean oil filter. (Seite 169).
	Solenoid valve dirty	Rinse solenoid valve (sivulla 169).
The temperature of the hydraulic fluid is too high in a tractor equipped with a constant flow system (gear pump)	The system converting bolt on the spreader valve block has not been unscrewed to the limit stop (factory setting).	Unscrew the system converting bolt on the spreader valve block until it reaches the limit stop (Seite 104).
	Defective plug couplings	Check plug couplings, repair/replace as required.
	Defective tractor control unit	Check tractor control unit, repair/replace as required.
The temperature of the hydraulic fluid is too high in a tractor equipped with a constant pressure system (some older John Deere tractors)	The system converting bolt on the spreader valve block has not been screwed in to the limit stop (opposite of factory setting).	Screw the system converting bolt on the spreader valve block until it reaches the limit stop (Seite 104).
	Defective plug couplings	Check plug couplings, repair/replace as required.
	Defective tractor control unit	Check tractor control unit, repair/replace as required.

Fault	Cause	Remedy
The temperature of the hydraulic fluid is too high for a tractor with load-sensing system and oil removal via the tractor control unit	The system converting bolt on the spreader valve block has not been unscrewed to the limit stop (factory setting).	Unscrew the system converting bolt on the spreader valve block until it reaches the limit stop (Seite 104).
	The quantity of oil at the tractor control unit has not sufficiently reduced.	Reduce the quantity of oil at the tractor control unit.
	Defective plug couplings	Check plug couplings, repair/replace as required.
	Defective tractor control unit	Check tractor control unit, repair/replace as required.
The temperature of the hydraulic fluid is too high for a tractor with load-sensing system, direct oil removal and control line	The system converting bolt on the spreader valve block has not been screwed in to the limit stop (opposite of factory setting).	Screw the system converting bolt on the spreader valve block until it reaches the limit stop (Seite 104).
	Defective plug couplings	Check plug couplings, repair/replace as required.
AMATRON 3 shows no function	Power supply defective.	Check power supply to AMATRON 3

12 Cleaning, maintenance and repairs



WARNING

Risk of crushing, shearing, cutting, being caught and/or drawn in, or impact through

- **Unintentional falling of raised, unsecured machine parts.**
- **Unintentional start-up and rolling of the tractor-machine combination.**

Secure the tractor and machine against unintentional start-up and rolling, before carrying out cleaning, maintenance or repair work on the machine when coupling or decoupling the machine. See also page 101.



WARNING

Risk of crushing, shearing, cutting, being caught and/or drawn in, or impact through unprotected danger points

- Mount protective equipment, which you removed when cleaning, maintaining and repairing the machine.
- Replace defective protective equipment with new equipment.



DANGER

- **When carrying out maintenance and repair, observe the safety instructions (see page 33).**
- **You may only carry out maintenance or repair work under moving machine parts that are in a raised position if such parts are secured with suitable, positive-fit locking devices against accidental lowering.**



- Regular and proper maintenance will keep the machine in good condition for a long time, and will prevent early signs of wear. Regular and proper maintenance is a requirement of our warranty conditions.
- Use only genuine **AMAZONE** spare parts (see "Spare and wear parts and auxiliary materials" section, page 16).
- Only use genuine **AMAZONE** replacement hoses, and hose clamps made of V2A for assembly.
- Testing and maintenance operations require specialist knowledge. This is not provided in this operating manual.
- Observe environmental protection measures when carrying out cleaning and maintenance work.



- Observe legal requirements when disposing of lubricants, e.g. oils and grease. These legal requirements also affect parts that come into contact with these lubricants.
- Do not exceed a greasing pressure of 400 bar when greasing with high pressure grease guns.
- The following are prohibited:
 - drilling the running gear.
 - drilling through existing holes on the transport frame.
 - welding load-bearing components.
- Protective measures are necessary, such as covering lines or extending lines in particularly critical locations
 - during welding, drilling and grinding work.
 - when working with cut-off wheels near plastic wires and electric wires.
- Clean the machine thoroughly with water before carrying out repair work.
- Carry out repair work on the machine with the pump switched off.
- Thorough cleaning must be carried out before repair work can be carried out inside the spray liquid tank. Keep out of the spray liquid tank.
- Disconnect the machine cable and power supply from the on-board computer when carrying out any cleaning or maintenance work. This applies especially to welding on the machine.

12.1 Cleaning



- Monitor brake, air and hydraulic hose lines particularly carefully.
- Never treat brake, air and hydraulic hose lines with benzene, benzole, petroleum or mineral oils.
- After cleaning, grease the machine, in particular after cleaning with a pressure washer / steam jet or liposoluble agents.
- Observe the statutory requirement for the handling and removal of cleaning agents.
- After use clean the machine with a normal jet of water (greased implements only on washing bays with oil traps).
- Clean outlet openings and shutters especially carefully.
- Treat dry machine with an anticorrosive agent. (Only use biologically degradable protective agents).

Cleaning with a pressure washer / steam jet



- Always observe the following points when using a pressure washer / steam jet for cleaning:
 - Do not clean any electrical components.
 - Do not clean any chromed components.
 - Never aim the cleaning jet from the nozzle of the pressure washer / steam jet directly on lubrication and bearing points.
 - Always maintain a minimum jet distance of 300 mm between the high pressure cleaning or steam jet cleaning nozzle and the machine.
 - Comply with safety regulations when working with pressure washers.

12.2 Lubrication point overview



Lubricate all the lubricating nipples (keep the seals clean).

Lubricate / grease the machine at the specified intervals (operating hours h).

The lubrication points on the machine are indicated with the film (Fig. 104).

Carefully clean the lubrication points and grease gun before greasing, so that no dirt enters the bearing. Completely press out the soiled grease in the bearings and replace it with new grease.

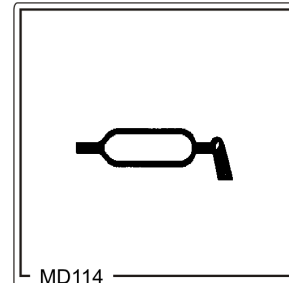


Fig. 104

Lubricants



For lubrication, use a lithium saponified, multipurpose grease with EP additives:

Company	Lubricant designation	
	Normal use conditions	Extreme use conditions
ARAL	Aralub HL 2	Aralub HLP 2
FINA	Marson L2	Marson EPL-2
ESSO	Beacon 2	Beacon EP 2
SHELL	Retinax A	Tetinax AM

For lubricating axle and brake (Fig. 105/1), please refer to page 146.

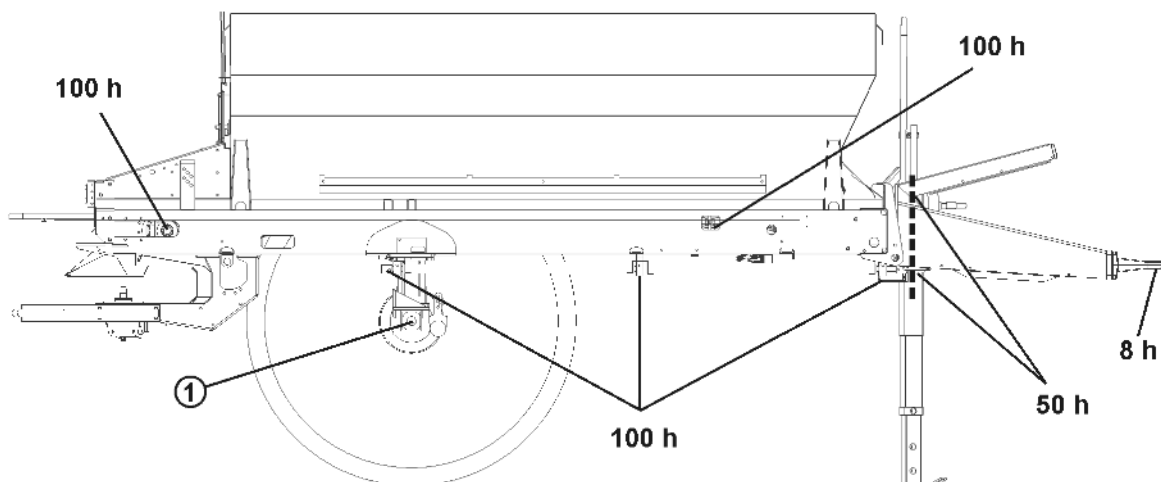


Fig. 105

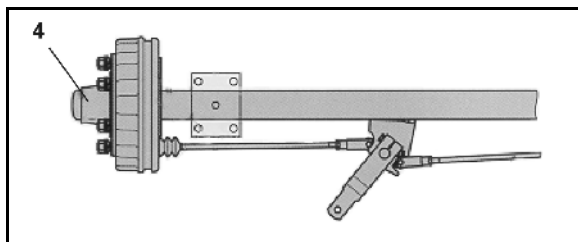


Fig. 106

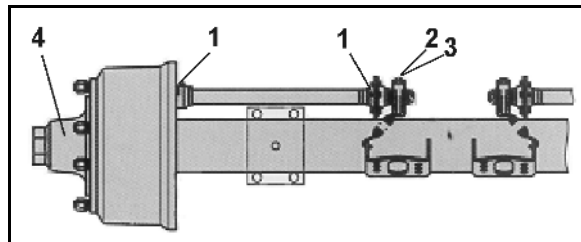


Fig. 107

	Lubrication point	Interval [h]	Number of lubrication points	Type of lubrication
Fig. 106	Axle with expanding lever brake			
Fig. 107	Axle with S-cam brake / wing cam brake			
1	Brake shaft bearing, outer and inner	200		Grease nipple
2	Linkage adjuster	1000		Grease nipple
3	ECO-Master automatic linkage adjuster	1000		Grease nipple
4	Renew wheel hub bearing grease, check taper roller bearings for wear	1000		Grease nipple

Brake shaft bearing, outer and inner

Caution: no grease or oil should be allowed to get into the brakes. Depending on the model series, the cam bearing for the brakes may not be sealed.

Only use lithium saponified grease with a dropping point greater than 190 °C.

ECO-Master automatic linkage adjuster

Each time the brake pads are replaced:

1. Remove the rubber stopper cap.
2. Apply grease (80 g) until sufficient clean grease escapes at the adjusting screw.
3. Slacken the adjusting screw by approximately one turn with a ring spanner. Actuate the brake lever several times by hand. The automatic readjustment should function smoothly. Repeat several times, as necessary.
4. Refit the stopper cap. Grease again.

Renewing the wheel hub bearing grease

1. Jack up the vehicle securely and release the brakes.
2. Remove the wheels and dust caps.
3. Remove the lynch pin and unscrew the axle nut.
4. Use a suitable extraction device to remove the wheel hub and brake drum, taper roller bearing and sealing elements from the axle stub.
5. Label the removed wheel hubs and bearing cages so that you do not confuse them when refitting.
6. Clean the brakes, check for wear, sound condition and function and replace worn parts.

The interior of the brake must be kept free from lubricants and dirt.

7. Thoroughly clean the interior and exterior of the wheel hubs. Remove all traces of old grease. Thoroughly clean the bearings and seals (diesel oil) and check for reusability.

Before refitting the bearings, lightly grease the bearing carrier and then refit all parts in the reverse order. Carefully fit parts with press fits and pipe bushings so that they are not twisted or damaged.

The bearings, the wheel hub cavity between the bearings and the dust cap must be smeared with grease before fitting. The grease should fill approximately a quarter to a third of the space in the fitted hub.

8. Fit the axle nut and adjust the bearing and brake. Finally, carry out a function check and an appropriate test run and rectify any detected faults.



The wheel hub bearing must only be greased with BPW special longlife grease with a dropping point greater than 190 °C.

The wrong grease or too great a quantity can result in damage.

Mixing lithium-saponified grease with sodium-saponified grease can result in damage caused by incompatibility.

Greasing the PTO-shaft

When the spreader is used in winter, the guard tubes must be greased to prevent seizure caused by freezing.

Also follow the shaft manufacturer's assembly and maintenance instructions attached to the PTO shaft.

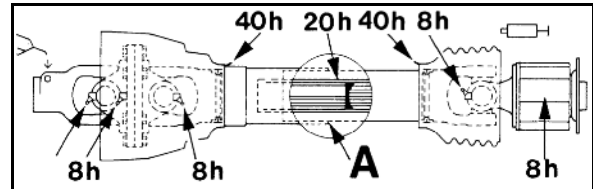


Fig. 108

12.3 Maintenance schedule – overview



- Carry out maintenance work when the first interval is reached.
- The times, continuous services or maintenance intervals of any third party documentation shall have priority.

After the first working run

Component	Maintenance work	see page	Workshop work
Wheels	• Wheel nut check	163	X
	• Check for play in the wheel hub bearing	157	X
Hydraulic system	• Check for leak tightness	165	X

Daily

Component	Maintenance work	see page	Workshop work
Air reservoir for the air-pressure brake	• Drain the air reservoir	160	
Spreading discs and vanes	• Condition check, replace if necessary	151	
Oil filter	• Check contamination indicator, replace oil filter if necessary		
Hydraulic system	• Check for defective hose lines	169	X
Electric traffic light kit	• Replace defective bulbs	170	

Monthly / every 50 operating hours

Component	Maintenance work	see page	Workshop work
Hydraulic system	<ul style="list-style-type: none"> • Check for leak tightness • Check for defective hose lines 	165	X
Parking brake	• Check the braking effect with the brake on	162	

Every three months / 200 operating hours

Component	Maintenance work	see page	Workshop work
Dual-circuit service brake system	<ul style="list-style-type: none"> Check for leak tightness Check pressure in the air reservoir Check brake cylinder pressure Visual inspection of brake cylinder Joints on brake valves, brake cylinders and brake linkages 	160	X
	Linkage adjuster brake settings	158	X
	Check the function of the automatic linkage adjuster	159	X
	Brake pad check	158	X
Expanding lever brake	Brake settings	159	X
Line filter	<ul style="list-style-type: none"> Clean Replace damaged filter inserts 	160	
Wheels	Wheel nut check	149	X
	Check play on wheel hub bearings	157	

Annually / 1,000 operating hours

Component	Maintenance work	see page	Workshop work
Brake drum	<ul style="list-style-type: none"> Check for dirt 	157	X

As necessary

Component	Maintenance work	see page	Workshop work
Solenoid valves	<ul style="list-style-type: none"> Clean 	169	
Belt conveyor	<ul style="list-style-type: none"> Tension belt conveyor if it is running unevenly 	154	
Drawbar	<ul style="list-style-type: none"> Replace if damaged 	155	X

12.4 Exchanging the spreading discs

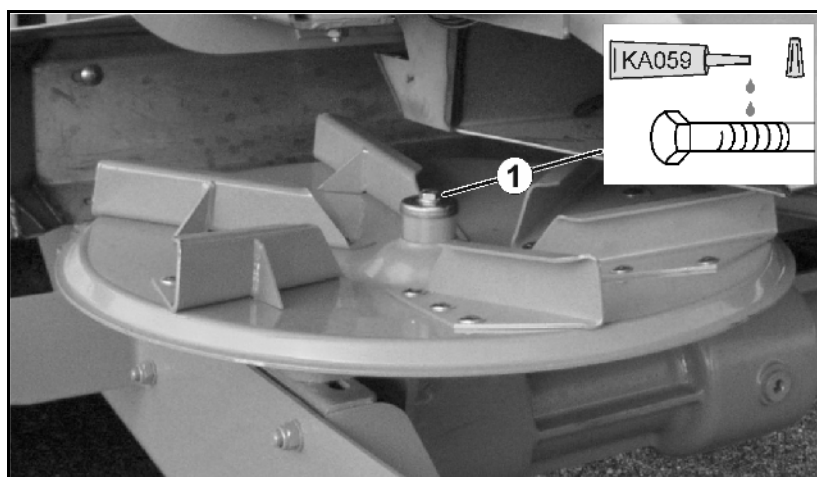


Fig. 109

1. Remove the M10 hexagonal bolt (Fig. 109/1).
2. Pull off the spreading disc from the gearbox shaft.
3. Set up other spreading disc.
4. Fix spreading disc.



When setting up spreading discs do not mix up "left hand" and "right hand". The spreading discs are labelled accordingly:

→ **L = left, R = right.**

Beforehand remove the funnel chute (if fitted).

The right hand side gearbox shaft is provided with a shear pin: Here always set up the right hand spreading disc with the two keys.



GEFAHR

- Do not stand in the immediate vicinity of the rotating spreading discs!
- Do not touch any of the machine's moving parts! Wait until they have come to a complete standstill!
- Before changing the spreading discs or adjusting the spreading vanes, switch off the tractor's PTO shaft, turn off the tractors engine and remove the ignition key!!
- Keep clear of flying fertiliser!

12.5 Replacing the spreading vanes and swivel vanes



- The technical condition of the spreading vanes, including their swivel blades, is essential for uniform lateral distribution of the fertiliser on the field (i.e. forming strips).
- The spreading vanes are made of especially wear-resistant stainless steel. Nevertheless, we remind you that the spreading vanes and their swivel vanes are wear parts.



Replace the spreading vanes and / or swivel blades as soon as holes from abrasion are visible.

12.5.1 Replacing the spreading vanes



WARNING

Danger of ejection of spreading vanes caused by the unintentional release of fixing bolts and quick-release screw connections!

- When replacing the spreading vanes, it is essential to replace used self-locking nuts of the fixing bolts with new ones. A used self-locking nut no longer has the required clamping force to produce a secure screw connection.
- Ensure that the open side of the disc spring is toward the spreading disc before tightening the wing nut. Only in this position can the disc spring pretension and secure the quick-release screw connection.



It is essential to ensure that the spreading vanes are installed correctly! The open side of the U-shaped spreading vane must be facing the direction of rotation.



When exchanging the spreading vanes and swivel blades, use the assembly paste provided. This is the only way to ensure that the specified tightening torque is sufficient.

Spreading vanes OM

- (1) Self-locking nut
- (2) Washer
- (3) Fixing bolt
- (4) Quick-release screw connection
 1. Release and remove the fixing bolt.
 2. Release and remove the quick-release screw connection.
 3. Replace the spreading vane.
 4. Replace the used self-locking nuts of the fixing bolts with new ones.
 5. Apply the assembly paste (KA059) to the screw threads.
 6. Secure each spreading vane with a fixing bolt, washer and an unused self-locking nut so that they can move on the spreading disc.
 7. Tighten the self-locking nut with a tool to the extent that you can still just swivel the spreading vane by hand.
 8. Fit the quick-release screw connections consisting in each case of a round-head screw, disc spring and wing nut. Make absolutely sure that the open side of the disc spring faces the spreading disc.
 9. Swivel the read-off edge of each spreading vane until it reaches the setting required for the desired working width.
 10. Firmly tighten the respective wing nut of the quick-release screw connection by hand (without using a tool).

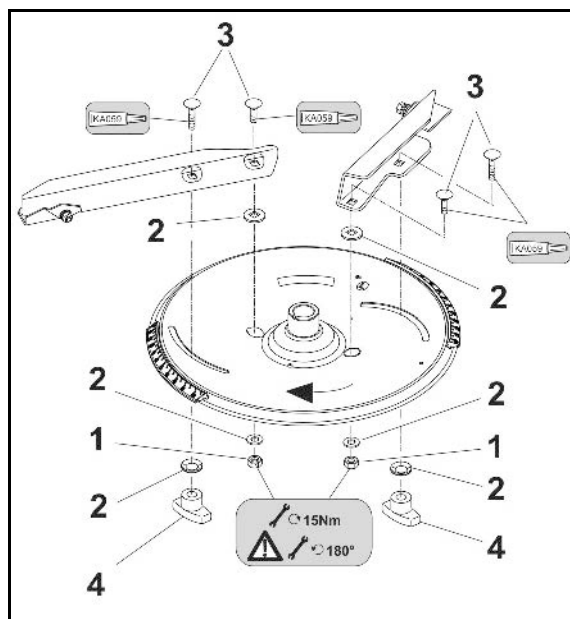


Fig. 110

12.5.2 Replacing the swivel vanes OM



WARNING

Danger of ejection of swivel blades of spreading vanes caused by the unintentional release of screw connections!

When replacing the spreading blades, it is essential to replace used self-locking nuts of the screw connections with new ones. A used self-locking nut no longer has the required clamping force to produce a secure screw connection.



When exchanging the spreading vanes and swivel blades, use the assembly paste provided. This is the only way to ensure that the specified tightening torque is sufficient.

- (1) Self-locking nut
- (2) Washer
- (3) Fixing bolt
- (4) Quick-release screw connection

1. Release the self-locking nut.
2. Remove the self-locking nuts, disc springs and swivel blades from the fixing bolts.
3. Make sure that the plastic washer remains on the fixing bolt.
4. Apply the assembly paste (KA059) to the screw threads.
5. Mount the new swivel blade.
 - 5.1 Push the new swivel blade on to the fixing bolt.
 - 5.2 Push the disc springs alternately (not stacked on top of one another) on to the fixing bolt.
 - 5.3 Secure the plastic washer, swivel blade and disc springs with an unused self-locking nut so that they move on the spreading vane.
 - 5.4 Tighten the self-locking nut with a tool so that the swivel blade can still just be swivelled by hand but cannot swing upwards automatically.

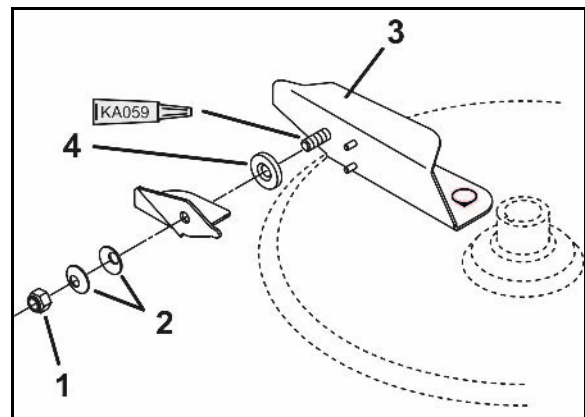


Fig. 111

12.6 Belt conveyor with automatic belt control

One property of belt conveyors (Fig. 112/1) is that they give way under load on inclines such as on sloping terrain or if they are loaded on one side only. The belt conveyor then runs outwards. One-sided belt conveyor running is prevented by the automatic belt control in **AMAZONE** bulk fertiliser spreaders **ZG-B**.

The conveyor belt is tensioned in the floor belt with automatic belt control between the drive drum (Fig. 112/2) and the pulley (Fig. 112/3).

While the drive drum is secured rigidly in the floor belt, the pulley can turn around the swivel axle (Fig. 112/4). The belt conveyor is also guided between two control rollers (Fig. 112/5), which are connected to the pulley by a control frame (Fig. 112/6).

If the belt conveyor runs outwards due to a one-sided load, the control rollers follow this movement. Consequently, this causes the pulley to turn around the swivel axle. As a result, the distance between the pulley and the drive drum increases on the side toward which the belt conveyor is moving.

The larger distance causes the belt conveyor to return to the middle and continue to settle down in the middle.

Tensioning the belt conveyor:

The belt conveyor is tensioned with pretension in the floor belt for stable, even belt movement. If the belt conveyor runs unevenly in any circumstance, the belt conveyor should be retensioned on both sides as described below:

1. Loosen the rear lock nuts on both sides when viewed in the direction of travel (see arrow) (Fig. 113/1) by turning them anti-clockwise.
2. Turn the nuts on both sides evenly to the left when viewed in the direction of travel (see arrow) (Fig. 113/2).
3. Tighten the lock nuts.



The adjustment travel of the nuts (Fig. 113/2) must be equal on both sides of the floor belt. Do not turn either nut (Fig. 113/2) more than a ½ spanner turn. Tighten the lock nuts and check whether the belt conveyor is driven evenly again.

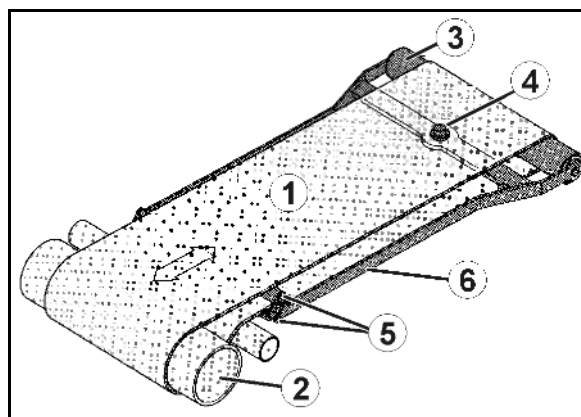


Fig. 112

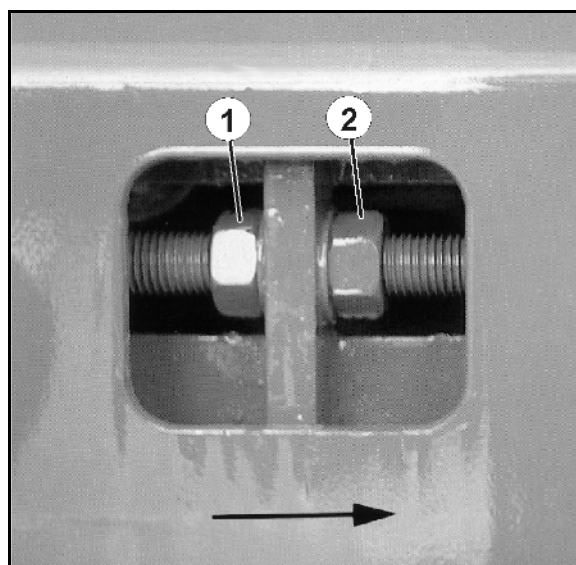


Fig. 113

12.7 Drawbars



DANGER

- Replace damaged drawbars immediately on road safety grounds.
- Repairs may only be carried out by the manufacturing factory.
- For reasons of safety, performing welding and drilling work on the drawbar is prohibited

Yoke bar

The towing eye diameter of the yoke bar, when new, is 40 or 50 mm.

Wear to the towing eye is permissible; this will increase the diameter by up to 1.5 mm.

If wear is greater than this, the wearing bushing on the towing eye must be promptly replaced.

Hitch drawbar

Wear to the towing eye is permissible; this will increase the diameter by up to 1.5 mm.

If wear is greater than this, the ball point coupling on the eye must be promptly replaced.

12.8 Axle and brake



For optimum brake performance with a minimum of wear, we recommend that the brakes on the tractor are balanced with those on the machine. After the service braking system has been run in for a suitable period, arrange for the brakes to be balanced by a specialist workshop.

Have the balancing process carried out before these empirical values are reached if you discover excessive wear on the brake pads.

To avoid problems with the brakes, adjust all vehicles in accordance with EC Directive 71/320 EEC.



WARNING

- Repair and adjustment work on the service braking system should only be carried out by trained specialist personnel.
- Special care is required for welding, torch cutting and drilling work in the vicinity of brake lines.
- Always carry out a braking test after any adjusting or repair work on the braking system

General visual inspection



WARNING

Carry out a general visual inspection of the brake system. Observe and check the following criteria:

- Pipe lines, hose lines and hose couplings must not be externally damaged or corroded.
- Hinges, e.g. on fork heads, must be properly secured, easy to move, and not worn out.
- Ropes and cables
 - must be properly run.
 - may not have any visible cracks.
 - may not be knotted.
- Check the piston stroke on the brake cylinders, and adjust as necessary.
- The air reservoir must not
 - move around in the tensioning belts.
 - be damaged.
 - show any outward signs of corrosion damage.

Checking the brake drum for dirt

1. Unscrew the two cover plates (Fig. 114/1) on the inside of the brake drum.
2. Remove any dirt and plant debris which may have entered the drum.
3. Refit the cover plates.



CAUTION

Dirt entering the drums may be deposited on the brake pads (Fig. 114/2) and thus appreciably reduce brake performance.

Risk of accident.

If dirt is discovered in the brake drum, the brake pads must be inspected by a specialist workshop.

For this to happen, the wheel and brake drum must be removed.

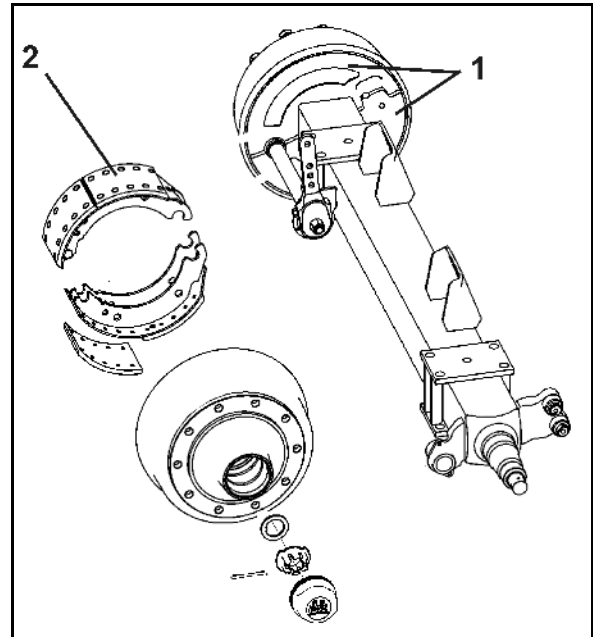


Fig. 114

Checking play on wheel hub bearings

1. To check the play on wheel hub bearings, raise the axle until the wheels turn freely (Fig. 115).
2. Release the brake.
3. Place a lever between the tyre and the ground and check the play.

If bearing play can be detected:

Adjust the bearing play

1. Remove the dust cup or hub cap.
2. Remove the split pin from the axle nut.
3. Tighten the wheel nut while turning the wheel at the same time until the wheel hub is lightly braked as it turns.
4. Turn the axle nut back to the next available split pin hole. If it is already over a hole, turn it to the next hole (max. 30°).
5. Fit the split pin and bend it slightly open.
6. Top up the dust cap with high melting point grease and drive it into, or screw it onto the wheel hub.

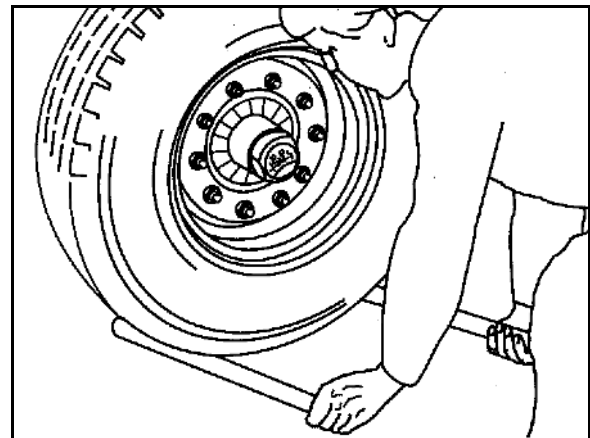


Fig. 115

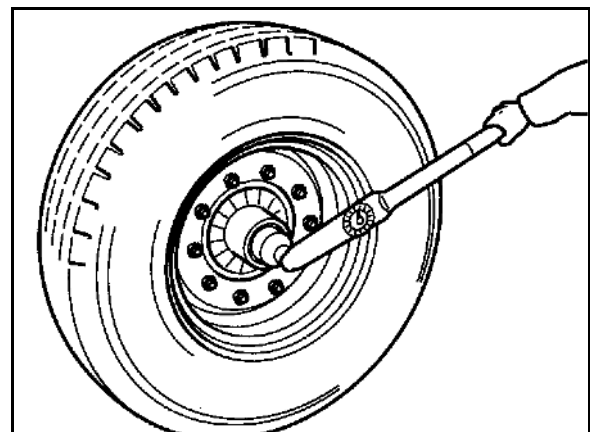


Fig. 116

Brake pad check

Open the inspection hole (Fig. 117/1) by pulling out the rubber stopper (if present).

At a residual thickness

- | | |
|----------------------|------|
| a: for riveted pads | 5 mm |
| (N 2504) | 3 mm |
| b: for adhesive pads | 2 mm |

the brake pad must be replaced.

Reinsert the rubber tab.

Brake adjustment

Depending on use, the wear and function of the brakes must be constantly checked and, if necessary, readjustment must be carried out. Readjustment is required after using approx. 2/3 of the max. cylinder stroke for emergency braking. To do this, jack up the axle and secure it against unintended movement.

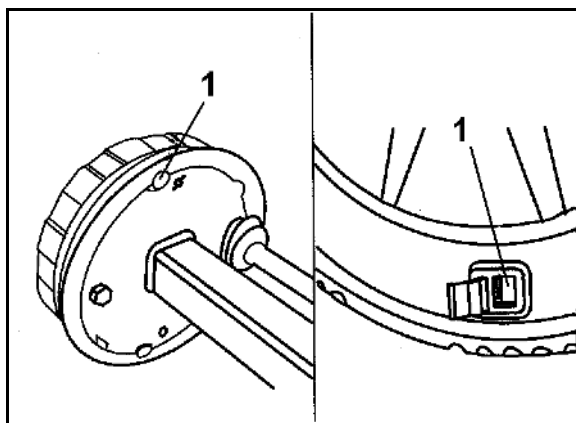


Fig. 117

Adjusting the linkage adjuster

Move the linkage adjuster by hand in the pressure direction (Fig. 119). If the free travel of the long-stroke diaphragm cylinder pressure rod is max. 35 mm, the wheel brake must be readjusted.

Adjustments are made using the readjustment hexagon bolt on the linkage adjuster. Set free travel "a" to 10-12 % of the connected brake lever length "B", e.g. lever length 150 mm = free travel 15 – 18 mm.

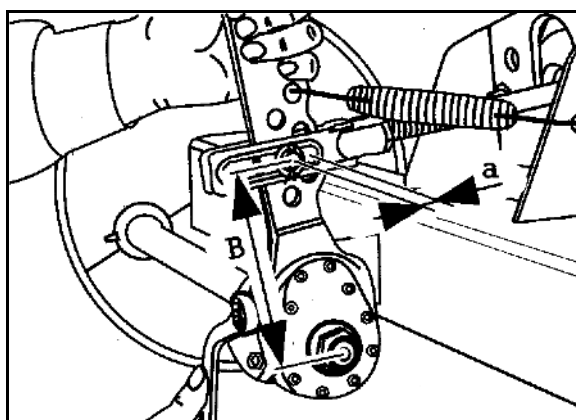


Fig. 118

Adjusting the automatic linkage adjuster

Basic settings are made in the same way as for the standard linkage adjuster. Readjustment occurs automatically at a cam rotation of approx. 15°.

The ideal lever position (which cannot be altered owing to the attachment of the cylinder) is approx. 15° before perpendicularity, and the same in the actuation direction.

Checking the function of the automatic linkage adjuster

1. Remove the rubber stopper cap.
2. Slacken the adjusting screw (arrow) with a ring spanner (Fig. 119) approx. $\frac{3}{4}$ of a turn anti-clockwise. There must be free travel of at least 50 mm for a lever length of 150 mm.
3. Actuate the brake lever several times by hand. This should cause a smooth automatic readjustment; it should be possible to hear the coupling engaging and, on the back stroke, the adjusting screw should turn clockwise slightly.
4. Refit the stopper cap.
5. Lubricate with BPW ECO_Li91 special high melting point grease.

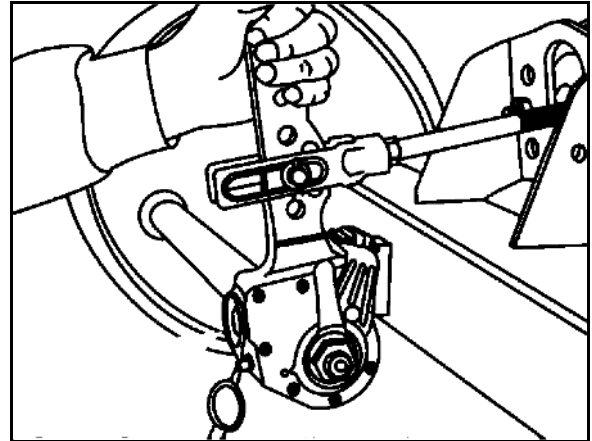


Fig. 119

Adjusting the S3008 RAZG expanding lever brake

1. Tension lever system for ramp equipment and for releasing the hand brake lever.
 2. Tighten the regulating screws on the wheel brakes in the direction of the arrow, using a screwdriver, until the wheel is hard to turn in the direction of travel.
 3. Turn the regulating screw back until a braking effect can no longer be felt when the wheel turns forwards.
 4. Reinstall the tension lever system for ramp equipment and adjust it so that it is free from play.
 5. As a test, apply the parking brake slightly and use the same braking torque (in the direction of travel) to check the wheels on the left and right.
- Inspection hole (Fig. 120/1)

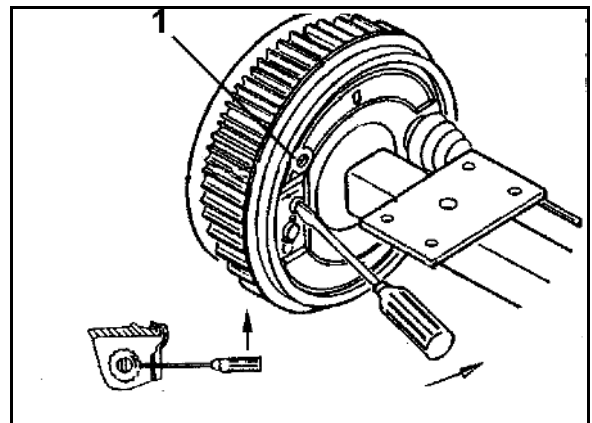


Fig. 120

Air reservoir



Drain the air reservoir every day.

Draining the air reservoir

Fig. 121/...

- (1) Air reservoir
 - (2) Tensioning belts
 - (3) Drainage valve
 - (4) Test connection for pressure gauge
1. Pull the drain valve (Fig. 121/3) in a side-ways direction using the ring until no more water escapes from the air reservoir (Fig. 121/1).
- Water flows out of the drain valve (Fig. 121/3).
2. Unscrew the drain valve (Fig. 121/3) from the air reservoir and clean the reservoir if there are signs of dirt.

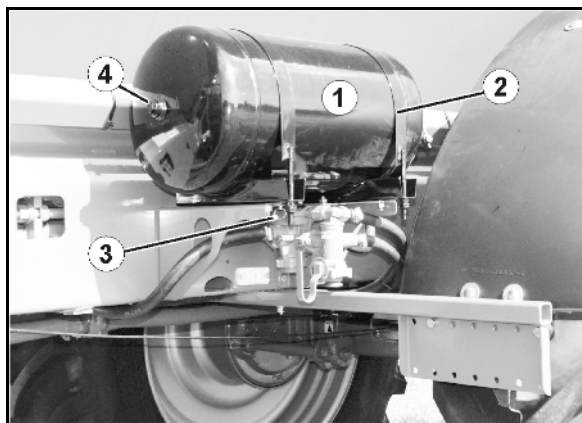


Fig. 121

Line filter



- Change damaged filter inserts.

1. Press together the locking piece (Fig. 122/1) on the two lugs.
2. Remove the locking piece with O-ring, pressure spring and filter insert.
3. Clean (rinse out) the filter insert with petrol or thinner and blow dry with compressed air.
4. Press together the locking piece (Fig. 122/1) on the two lugs.
5. Insert the locking piece with O-ring, pressure spring and filter insert.

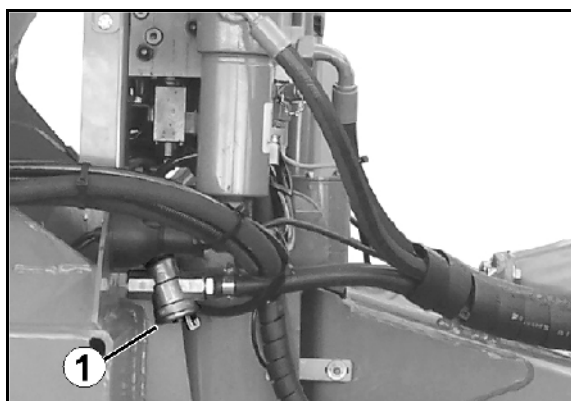


Fig. 122



When inserting the locking piece, make sure that the O-ring is not twisted in the guide slot.

12.8.1 Inspection instructions for the dual circuit service brake system

1. Leak tightness check

1. Check all connections, pipe lines, hose lines and screw connections for leak tightness.
2. Remedy any leaks.
3. Repair any areas of chafing on pipes and hoses.
4. Replace porous and defective hoses.
5. The dual-circuit service brake system may be considered leakproof if the drop in pressure is no more than 0.15 bar after 10 minutes.
6. Seal any leaking areas or replace leaking valves.

2. Checking the pressure in the air reservoir

Connect a pressure gauge to the test connection on the air reservoir.

→Set value 6.0 to 8.1 + 0.2 bar

3. Checking the brake cylinder pressure

Connect a pressure gauge to the test connection on the brake cylinder.

→ Set value: with brake not applied 0.0 bar

If an ALB regulator is installed, the values are checked in line with the information on the Haldex ALB plate.

4. Visual inspection of the brake cylinder

1. Check the dust sleeves or gaiters for damage.
2. Replace damaged parts.

5. Joints on brake valves, brake cylinders and brake linkages

Joints on brake valves, brake cylinders and brake linkages must move freely. Grease or lightly oil, if necessary.

12.9 Parking brake



On new machines, the brake cables of the parking brake may stretch. Readjust the parking brake,

- if three quarters of the spindle tensioning distance is required to firmly apply the parking brake.
- if you have just fitted new brake pads.

When carrying out maintenance on the brake system, comply with the chapter "Safety information for the operator", page 25.

Adjusting the parking brake



When the parking brake is off, the brake cable must be slightly slack (even if the air-sprung suspension is raised to the maximum or fully lowered). However, the brake cable must not rest or chafe against other parts of the vehicle.

1. Release the cable clamps.
2. Shorten the brake cable as appropriate and retighten the cable clamps.
3. Check for the correct braking effect from the parking brake when applied.

12.10 Tyres / wheels



- **Required tightening torque for wheel nuts or bolts:**
510 Nm
- **tyre pressures:** **see on page 43**



- Regularly check the
 - wheel nuts for firm seating.
 - tyre pressures.
- Only use the tyres and wheels which we have specified (see page 43).
- Repair work on tyres must only be carried out by specialists using suitable fitting tools.
- Installing tyres requires sufficient knowledge and proper fitting tools.
- Use the jack only at the jacking points indicated.

12.10.1 Tyre pressures



CAUTION

There is a risk of tyres bursting when tyres are pumped up and if tyre pressure is too high.



- The required tyre pressure is dependent on
 - tyre size.
 - tyre loading capacity.
 - speed.
- The operational performance of the tyres is reduced
 - by overloading.
 - if tyre pressure is too low.
 - if tyre pressure is too high.



- Check tyre pressures regularly when the tyres are cold, i.e. before starting a run (see page 43).
- The difference in pressure between the tyres on one axle must be no greater than 0.1 bar.
- Tyre pressure can be raised by up to 1 bar after a fast run or in warm weather. Tyre pressure should on no account be reduced as it is then too low when the tyres cool down.

12.10.2 Fitting tyres



- Remove any instances of corrosion from the wheel rim seating surfaces before fitting a new / another tyre. Corrosion can cause damage to the wheel rims when the vehicle is in operation.
- When fitting new tyres, always use new valves for tubeless tyres or new inner tubes.
- Always fit the valves with valve caps which have a gasket insert.

Fitting tyres:

To jack up the **ZG-B** for tyre changes, use the jack at the jacking points indicated (Fig. 123/1).

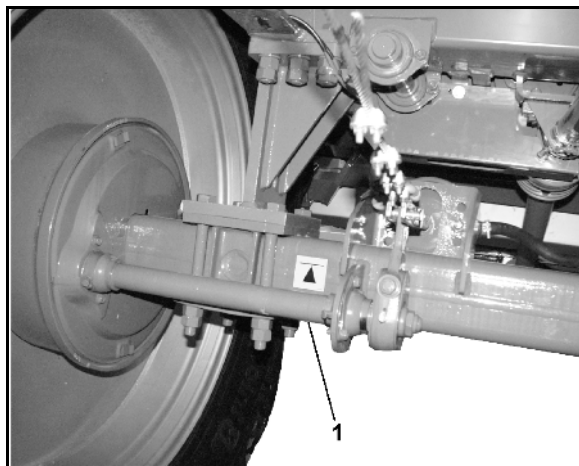


Fig. 123

12.11 Hydraulic system



WARNING

Risk of infection through the high pressure hydraulic fluid of the hydraulic system entering the body!

- Only a specialist workshop may carry out work on the hydraulic system.
- Depressurise the hydraulic system before carrying out work on the hydraulic system.
- When searching for leak points, always use suitable aids.
- Never attempt to plug leaks in hydraulic hose lines using your hand or fingers.

Escaping high pressure fluid (hydraulic fluid) may pass through the skin and ingress into the body, causing serious injuries!

If you are injured by hydraulic fluid, contact a doctor immediately. Risk of infection!



WARNING

Danger of unintentional contact with hydraulic fluid!

Please take the following first-aid measures:

- Following inhalation:
 - No special action required.
- Following contact with the skin:
 - Wash off with plenty of soap and water.
- Following contact with the eyes:
 - Rinse eyes for several minutes under running water, holding the eyelid open.
- Following ingestion:
 - Seek medical assistance.



- When connecting the hydraulic hose lines to the hydraulic system of connected machines, ensure that the hydraulic system is depressurised on both the drawing vehicle and the trailer.
- Ensure that the hydraulic hose lines are connected correctly.
- Regularly check all the hydraulic hose lines and couplings for damage and impurities.
- Have the hydraulic hose line checked at least once a year by a specialist for proper functioning.
- Replace the hydraulic hose line if it is damaged or worn. Only use original **AMAZONE** hydraulic hose lines.
- The hydraulic hose lines should not be used for longer than six years, including any storage time of maximum two years. Even with proper storage and approved use, hoses and hose connections are subject to natural ageing, thus limiting the length of use. However, it may be possible to specify the length of use from experience values, in particular when taking the risk potential into account. In the case of hoses and hose connections made from thermoplastics, other guide values may be decisive.
- Dispose of old oil in the correct way. If you have problems with disposal, contact your oil supplier.
- Keep hydraulic fluid out of the reach of children!
- Ensure that no hydraulic fluid enters the soil or waterways.

12.11.1 Labelling hydraulic hose lines

The assembly labelling provides the following information:

Fig. 124/...

- (1) Manufacturer's labels (A1HF)
- (2) Date of manufacture of the hydraulic hose lines (02 04 = February 2004)
- (3) Maximum approved operating pressure (210 bar).

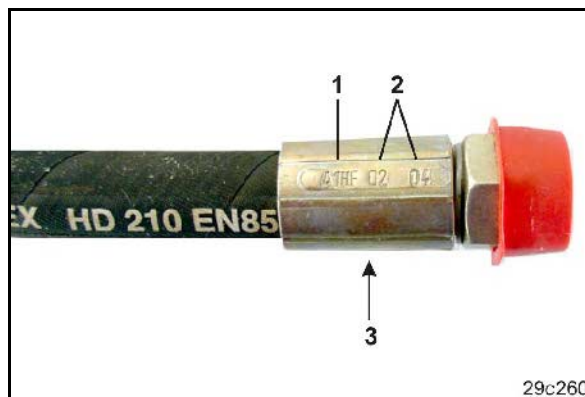


Fig. 124

12.11.2 Maintenance intervals

- **After the first 10 operating hours, and then every 50 operating hours**

1. Check all the components of the hydraulic system for tightness.
2. If necessary, tighten screw unions.

Before each start-up:

1. Check hydraulic hose lines for visible damage.
2. Eliminate any scouring points on hydraulic hose lines and pipes.
3. Replace any worn or damaged hydraulic hose lines immediately.

12.11.3 Inspection criteria for hydraulic hose lines



For your own safety and in order to reduce pollution, ensure the following inspection criteria.

Replace hoses if the respective hose fulfils at least one of the following criteria:

- Damage to the outer layer up to the ply (e.g. scouring points, cuts, cracks).
 - Brittleness of the outer layer (crack formation of the hose material).
 - Deformations which do not match the natural shape of the hose. Both in a depressurised and pressurised state or when bent (e.g. layer separation, bubble formation, pinching, bends).
 - Leak points.
 - Installation requirements not complied with.
 - Life span of 6 years has been exceeded.
- The date of manufacture of the hydraulic hose line on the assembly is decisive for determining these six years. If the date of manufacture on the assembly is "2004", then the hose should not be used beyond February 2010. See also "Labelling of hydraulic hose lines".



Common causes for leaking hoses / pipes and connection pieces include:

- missing O-rings or seals
- damaged or badly fitting O-rings
- brittle or deformed O-rings or seals
- foreign bodies
- badly fitting hose clips

12.11.4 Installation and removal of hydraulic hose lines



Use

- only genuine AMAZONE replacement hoses. These hoses stand up to chemical, mechanical and thermal loads.
- hose clips made from V2A for fitting hoses, as a rule.



When installing and removing hydraulic hose lines, always observe the following information:

- Ensure cleanliness.
- Always install the hydraulic hose lines to ensure the following in all operational positions
 - There is no tension, apart from the hose's own weight.
 - There is no possibility of jolting on short lengths.
 - Outer mechanical influences on the hydraulic hose lines are avoided.

Use appropriate arrangements and fixing to prevent any scouring of the hoses on components or on each other. If necessary, secure hydraulic hose lines using protective covers. Cover sharp-edged components.

- The approved bending radii may not be exceeded.



- When connecting a hydraulic hose line to moving parts, the hose length must be appropriate so that the smallest approved bending radius is not undershot over the whole area of movement and/or the hydraulic hose line is not overtensioned.
- Fix the hydraulic hose lines at the specified fixing points. There, avoid hose clips, which impair the natural movement and length changes of the hose.
- The coating of hydraulic hose lines is not permitted.

12.11.5 Mounting hose fittings with O-rings and sleeve nuts

1. First, tighten the sleeve nut manually.
2. Then, use the spanner to tighten the sleeve nut at least $\frac{1}{4}$ to a maximum of $\frac{1}{2}$ turn.



You must not tighten screw unions with O-rings as tight as those with compression rings.

If you tighten the sleeve nut tighter than specified, the cone-shaped screw union may break (in particular at the welded pin on the hydraulic cylinder).

12.12 Hydraulic fluid filter

Hydraulic fluid filter (Fig. 125/1) with contamination indicator (Fig. 125/2):

Green → Filter fully functional

Red → Replace filter

To remove the filter, twist off the filter cover and replace the filter.



CAUTION

Dump the pressure in the hydraulic system beforehand.

After replacing the filter, press the contamination indicator back into place.

→ Green ring again visible.

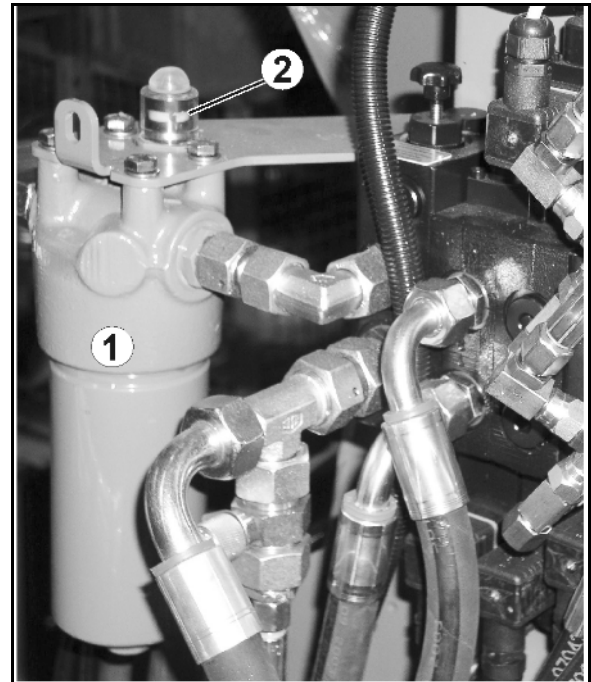


Fig. 125

12.13 Cleaning the solenoid valves

To eliminate impurities from the solenoid valves, they must be flushed through. This may be necessary if deposit prevent the slider fully opening or closing.

1. Unscrew the magnetic cap (Fig. 126/1)
2. Remove the solenoid (Fig. 126/2)
3. Unscrew the valve rod (Fig. 126/3) with valve seats and clean with compressed air or hydraulic fluid.



CAUTION

Dump the pressure in the hydraulic system beforehand.

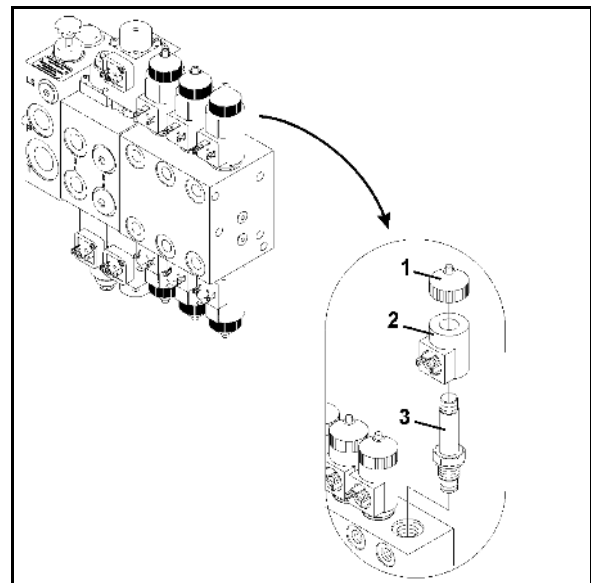


Fig. 126

12.14 Gearbox

Gear oil: 090 I SAE

- There is no need to change the oil.
- Fill levels:
 - o Conveyer belt shift gearbox 4,5l
 - o Conveyor belt gearbox with hydr. drive 1,0l
 - o Universal spreader unit gearbox 2,5l
 - o Angular gearbox ground wheel drive 1,0l

12.15 Electric lighting system



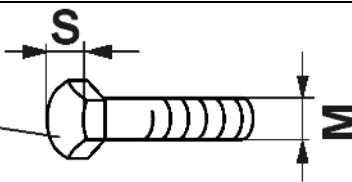
WARNING

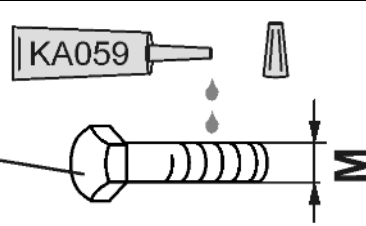
Replace defective bulbs immediately so that you do not pose a hazard to other motorists and cyclists!

Replacement of light bulbs:

1. Unscrew the sight glass.
2. Remove the defective bulb.
3. Insert the replacement bulb (ensure that the voltage and wattage are correct).
4. Insert and screw on the sight glass.

12.16 Screw tightening torques

<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> 8.8 10.9 12.9 </div>  </div>				
M	S	Nm		
		8.8	10.9	12.9
M 8	13	25	35	41
M 8x1		27	38	41
M 10	16 (17)	49	69	83
M 10x1		52	73	88
M 12	18 (19)	86	120	145
M 12x1,5		90	125	150
M 14	22	135	190	230
M 14x1,5		150	210	250
M 16	24	210	300	355
M 16x1,5		225	315	380
M 18	27	290	405	485
M 18x1,5		325	460	550
M 20	30	410	580	690
M 20x1,5		460	640	770
M 22	32	550	780	930
M 22x1,5		610	860	1050
M 24	36	710	1000	1200
M 24x2		780	1100	1300
M 27	41	1050	1500	1800
M 27x2		1150	1600	1950
M 30	46	1450	2000	2400
M 30x2		1600	2250	2700

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M	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24
Nm	2,3	4,6	7,9	19,3	39	66	106	162	232	326	247	314

13 Hydraulic diagram

ZG-B Special / Super

1. Double shutter left hand side (*yellow*)
2. Double shutter right hand side (*green*)
3. Ground wheel drive (*red*)
4. Limiter (*blue*)
5. Adjustable throttle valve
6. Hydraulic locking block
7. Hopper cover (*natural*)
8. Adjustable throttle valve

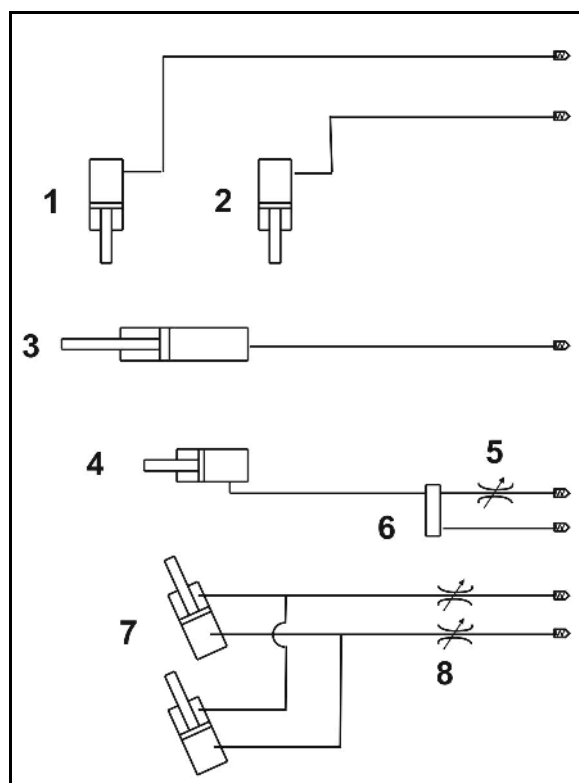


Fig. 127



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