Please read and follow this operating manual before putting the machine into operation. Keep it in a safe place for future use.
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. Däck
Identification data

Manufacturer: AMAZONEN-WERKE
H. DREYER GmbH & Co. KG

Type: KE 2500/3000 Special

Permissible system pressure in bar:

Year of manufacture:

Works:

Basic weight (kg):

Approved total weight (kg):

Maximum load (kg):

Manufacturer's address

AMAZONEN-WERKE
H. DREYER GmbH & Co. KG
Postfach 51
D-49202 Hasbergen
Phone: + 49 (0) 5405 50 1-0
Fax: +49 5405 501-234
E-mail: amazone@amazone.de

Spare part orders

AMAZONEN-WERKE
H. DREYER GmbH & Co. KG
Postfach 51
D-49202 Hasbergen
Phone: +49 5405 501-290
Fax: +49 5405 501-106
E-mail: et@amazone.de

Online spare parts catalogue: www.amazone.de

When ordering spare parts please always specify the number of your machine.

Formalities of the operating manual

Document number: MG3483
Compilation date: 10.09

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Reprinting, even of sections, permitted only with the approval of AMAZONEN-WERKE H. DREYER GmbH & Co. KG.
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. Replacement will be made only if a claim is filed immediately!

Please read and follow this operating manual—in particular, the safety instructions—before putting the machine into operation. 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 they put the machine into operation.

Should you have problems or queries, please consult this operating manual or give us a call.

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

Operator 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 Operator information

The "Operator information" section supplies information on using 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 viewed in the direction of travel.

1.3 Diagrams used

Instructions for action and reactions

Tasks to be carried out by the operator are presented as numbered instructions. Always keep to the order of the instructions. The reaction to instructions is given by an arrow. Example:

1. Instruction for action 1
   \[\rightarrow\] Reaction of the machine to instruction for action 1
2. Instruction for action 2

Lists

Lists without a mandatory sequence are presented as a list with bullet points. Example:

- Point 1
- Point 2

Item numbers in diagrams

Numbers in round brackets refer to the item numbers in the diagrams. The first digit refers to the diagram; the second digit, to the item number in the illustration.

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 received instruction in working with/on the machine.
- Have read and understood this operating manual.

The operator is obliged

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

If you still have queries, please contact the manufacturer.

Obligations of the operator

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 understand the section "General safety instructions" in 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 the operator discovers that a function is not working properly, then they must eliminate this fault immediately. If this is not the task of the operator or they do not possess the appropriate technical knowledge, then they should report this fault to their superior (owner).
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 that could impair safety immediately.

Guarantee and liability

Our "General conditions of sales and business" 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 structural changes to the machine.
- Insufficient monitoring of machine parts that are subject to wear.
- Improperly executed repairs.
- Catastrophic events as a result of the impact of foreign objects or force majeure.
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 acuteness of the risk and has the following significance:

<table>
<thead>
<tr>
<th>Safety Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Danger]</td>
<td>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.</td>
</tr>
<tr>
<td>![Warning]</td>
<td>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.</td>
</tr>
<tr>
<td>![Caution]</td>
<td>Indicates a low risk, which could incur minor or medium level physical injury or damage to property if not avoided.</td>
</tr>
<tr>
<td>![Important]</td>
<td>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.</td>
</tr>
<tr>
<td>![Note]</td>
<td>Indicates handling tips and particularly useful information. These instructions will help you to use all the functions of your machine to the optimum.</td>
</tr>
</tbody>
</table>
2.3 Organisational measures

The operator must provide the necessary personal protective equipment specified by the manufacturer of the crop protection agent, e.g.:

- chemical-resistant gloves,
- chemical-resistant overall,
- waterproof footwear,
- face protection,
- breathing apparatus,
- protective goggles,
- Skin protection, etc.

The operation 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 Training of personnel

Only people who have received appropriate training and instruction may work with/on the machine. The responsibilities of the operating and maintenance personnel must be clearly defined. People being trained may only work with/on the machine under the supervision of an experienced person.

<table>
<thead>
<tr>
<th>Activity</th>
<th>People</th>
<th>Person specially trained for the task</th>
<th>Operator who has received instruction</th>
<th>Persons with specialist training (specialist workshop*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading/Transport</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Commissioning</td>
<td></td>
<td>--</td>
<td>X</td>
<td>--</td>
</tr>
<tr>
<td>Set-up, tool installation</td>
<td></td>
<td>--</td>
<td>--</td>
<td>X</td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td>--</td>
<td>X</td>
<td>--</td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td>--</td>
<td>--</td>
<td>X</td>
</tr>
<tr>
<td>Troubleshooting and fault elimination</td>
<td>X</td>
<td>--</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Disposal</td>
<td></td>
<td>X</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

Legend: X..permitted --..not permitted

1) A person who can perform a specific task and is authorised to 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 specifically designated "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 Risk of residual energy

Note that there may be residual mechanical, hydraulic, pneumatic and electrical/electronic energy at 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 a timely manner.

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. Check that safety equipment is functioning correctly once the maintenance work is complete.
2.10 Structural changes

You may make no changes, expansions or modifications to the machine without the authorisation 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 operating permit, for example, remains valid in accordance with 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 crushing, cut, caught, drawn in or struck if supporting parts break.

It is forbidden to:

- Drill holes in the frame or on the chassis.
- Increasing the size of existing holes on the frame or the chassis.
- Welding support parts.
2.10.1 Spare and wear parts and auxiliary material

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

Use only genuine AMAZONE spare and wear parts or parts approved by AMAZONEN-WERKEN to ensure that the operating permit retains its validity in accordance with national and international regulations. If you use wear and spare parts from third parties, there is no guarantee that they have been designed and manufactured in such a way as to meet the requirements placed on them.

AMAZONEN-WERKE accepts no liability for damage arising from the use of unapproved spare parts, 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 must be operated by only one person from the driver's seat of the tractor.
Positioning of warning pictograms and other labels

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

Fig. 1

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

Warning symbols indicate dangers on the machine and warn against residual dangers. In these areas danger is always present or may occur unexpectedly. A warning pictogram consists of two fields:

Field 1
is a pictogram describing the danger, surrounded by triangular safety symbol.

Field 2
is a pictogram showing how to avoid the danger.

Warning pictograms - explanation

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

1. A description of the danger.
   For example: risk of cutting!

2. The consequence of nonobservance of the risk-avoidance instructions.
   For example: causes serious injuries to fingers or hands.

3. Risk-avoidance instructions.
   For example: only touch machine parts when they have come to a complete standstill.
### General safety instructions

<table>
<thead>
<tr>
<th>Order number and explanation</th>
<th>Warning pictograms</th>
</tr>
</thead>
</table>
| **MD 075**  
Risk of cutting or severing of fingers/hand through direct contact with moving parts involved in the working process!  
This danger can cause extremely serious injuries resulting in the loss of limbs.  
- Never reach into the danger area when the tractor engine is running with the PTO shaft or hydraulic/electrical system connected.  
- Wait until all moving parts of the machine are at a standstill before reaching into the danger area. | ![MD075](image) ![STOP](image) |
| **MD 076**  
Risk of drawing-in/entrapment for hand or arm due to moving force-transmission parts!  
This danger may cause extremely serious injuries resulting in the loss of limbs.  
Never open or remove protective equipment,  
- while the tractor engine is running with the PTO shaft or hydraulic/electronic system connected  
- if the ground wheel drive is moving | ![MD076](image) ![X](image) |
| **MD 078**  
Risk of crushing of fingers/hand by accessible, moving parts of the machine!  
This danger can cause extremely serious injuries resulting in the loss of limbs.  
Never reach into the danger area when the tractor engine is running with the PTO shaft or hydraulic/electrical system connected. | ![MD078](image) ![X](image) |
**MD 079**

*Risk of materials or foreign objects being flung away from or out of the machine when entering or remaining in the danger area of the machine!*

These dangers can inflict severe injuries on all parts of the body.

- Stay well clear of the danger area of the machine.
- Ensure that all persons maintain a sufficient safety distance from the danger area of the machine as long as the tractor engine is running.

**MD 082**

*Risk of falling when riding the machine on treads or platforms!*

This can cause extremely serious and potentially fatal injuries.

Persons must not ride/climb on machines when they are running. This ban also applies to machines with treads or platforms.

Ensure that no one rides with the machine.

**MD 087**

*Risk of cutting or severing of fingers/hand through direct contact with moving parts involved in the working process!*

This danger can cause extremely serious injuries resulting in the loss of limbs.

Stay well clear of the danger area when the tractor engine is running with the PTO shaft or hydraulic/electrical system connected.
MD 089
Risk of crushing the entire body caused by suspended loads or raised parts of the machine!
This can cause extremely serious and potentially fatal injuries.
- Personnel are prohibited from entering/remaining in the area below suspended loads or raised parts of the machine.
- Stay well clear of suspended loads or raised parts of the machine.
- Make sure that persons stay well clear of suspended loads or raised parts of the machine.

MD 095
Read and understand the operating manual safety information before starting up the machine!

MD 096
Risk of hydraulic fluid escaping under pressure from leaking hydraulic lines!
This can inflict serious injuries with potentially fatal consequences if hydraulic fluid escaping at high pressure passes through the skin and into the body.
- Never attempt to plug leaks in hydraulic lines using your hand or fingers.
- Read and observe the information in the operating manual before carrying out maintenance and repair work on hydraulic lines.
- If you are injured by hydraulic fluid, contact a doctor immediately.
MD 097

Risk of crushing the entire body by entering/remaining in the stroke area of the three-point suspension when the three-point suspension is operated!

This can cause extremely serious and potentially fatal injuries.

- Personnel are prohibited from standing in the stroke area of the three-point suspension when the three-point hydraulics are operated.
- Actuate the operating controls for the tractor's three-point hydraulic system
  - only from the designated workstation.
  - Under no circumstances if you are in the stroke area between the tractor and machine.

MD 100

This symbol indicates the lifting gear attachment points used for loading of the machine.

MD 102

Danger during 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.
**General safety instructions**

**MD 113**  
Study and observe the instructions for cleaning, servicing and maintaining in the appropriate chapter of the operating manual.

**MD 115**  
The maximum operating pressure of the hydraulic system is 200 bar.

**MD 119**  
This symbol indicates the maximum drive speed (1000 rpm) and direction of rotation of the drive shaft on the machine side.
2.14 Risks if the safety information is not observed

Nonobservance of 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 pictograms.

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 crushing, cutting, being trapped or drawn in, or impact through inadequate roadworthiness 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 pictograms 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 influence of the mounted or attached machine.

Coupling and uncoupling the machine

• You may only couple and transport the machine with a tractor if the tractor meets the necessary power requirements.

• When coupling machines to the tractor three-point hydraulic system, the attachment categories of the tractor and the machine must always be the same!

• When coupling machines to the front or the rear of the tractor, the following may not be exceeded:
  o The approved total tractor weight
  o The approved tractor axle loads
  o The approved load capacities of the tractor tyres

• Secure the tractor and the machine against unintentional locomotion before coupling or uncoupling the machine.

• It is forbidden for people to stand between the machine to be coupled and the tractor, whilst the tractor is moving towards 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 in the position, so that unintentional raising or lowering is impossible, before coupling the machine to or uncoupling the machine from the tractor's 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 risk of injury from nip and shear points!
- Be particularly careful when coupling the machine to the tractor or uncoupling it from the tractor! There are nip and shear 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 hydraulic system.
- Coupled supply lines:
  - Must give without tension, bending or rubbing on all movements when travelling round corners.
  - May not scour 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 of 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 coupled machine and the approved axle and support 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 swivel area of the machine.
- There are nip and shear 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!
- Secure the tractor against unintentional start-up and rolling before you leave the tractor.
  For this:
  - Lower the machine onto the ground
  - Apply the parking brake
  - Switch off the tractor engine
  - Remove the ignition key

Machine transportation

- When using public highways, national road traffic regulations must be observed.
- 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 proper functioning of the braking system
- Ensure that the tractor has sufficient steering and braking power. Any machines and front/rear weights coupled 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 empty tractor 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 coupled machine and the approved axle and support loads of the tractor.
- The tractor must guarantee the prescribed brake delay for the loaded vehicle combination (tractor plus coupled machine).
• Check the brake power before moving off.
• When turning corners with the machine coupled, 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 hydraulic system 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 hydraulic system against unintentional raising or lowering of the coupled 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 pins are firmly fixed with the lynch pin 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:
  o are continuous or
  o are automatically locked or
  o necessarily require an open centre or pressure position to operate correctly
- Before working on the hydraulic system
  o Lower the machine
  o Depressurise the hydraulic system
  o Switch off the tractor engine
  o Apply the parking brake
  o Take out the ignition key
- Have the hydraulic hose line checked at least once a year by a specialist for proper functioning. Replace damaged or ageing hydraulic lines. 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 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!
- Use suitable aids when searching for leaks to avoid the risk of serious injury.
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 with too high a rating, 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. Accidental grounds may cause an explosion.
- Risk of explosion! Avoid sparking and naked flames in the vicinity 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.
  - In the case of retrofitting of electrical units and/or components on the machine, with a connection to the on-board power supply, the operator must check 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 89/336/EEC in the appropriate version and carry the CE mark.

2.16.4 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 risk 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 uncoupling 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.
2.16.5 Cleaning, maintenance and repairs

- As a fundamental rule, only carry out maintenance, repair and cleaning work when
  - the drive is switched off
  - the tractor engine is at a standstill
  - the ignition key has been removed
  - the connector to the machine has been disconnected from the on-board computer

- Regularly check the nuts and bolts for a firm seat and retighten them as necessary.

- If the machine or parts of the machine are raised, secure them against unintentional lowering before carrying out cleaning, maintenance or repair work.

- When replacing work tools with blades, use suitable tools and gloves.

- Dispose of oils, greases and filters in the appropriate way.

- Disconnect the cable to the tractor generator and battery, before carrying out electrical welding work on the tractor and on attached machines.

- Spare parts must meet at least the specified technical requirements of AMAZONEN-WERKE! This is ensured through the use of original AMAZONE spare parts.
Loading and unloading

3 Loading and unloading

Loading using a lifting crane:

WARNING
Risk of crushing due to accidental falling of a machine attached to a load carrier during loading and unloading!

- Only use lifting gear (ropes, slings, chains, etc.) with a tensile strength of at least
  - 1500 kg (without roller),
  - 2000 kg (with roller),
- Only attach your lifting gear to/at the designated points.
- Never remain in or enter the area below a raised, unsecured load.

Fig. 2/1: Mounting point for lifting sling

![Mounting point for lifting sling](image)

Fig. 2
4 Product description

This section:
- Provides a comprehensive overview of the machine structure.
- Provides the designations 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 – Assemblies

Fig. 3

(1) Frame
(2) Oil sump
(3) Exchange speed gearbox with bevel gears with auxiliary PTO stub
(4) Tines
(5) Tool guard, front (protective equipment)
(6) Lower link coupling points
(7) Top link coupling point
(8) PTO shaft cover
(9) PTO shaft bearing when taking out of service
(10) Auxiliary PTO stub
Fig. 4
(1) Levelling bar
(2) Height adjustment of levelling bar
(3) Roller
(4) Eccentric pin with handle for depth adjustment of tines
(5) Side guide plates
(6) Carrying arms of the roller
(7) Tool guard, rear

4.2 Safety and protection equipment

- PTO shaft guard on gearbox
- Tool guard, front
- Tool guard, rear
- PTO shaft all-round guard
- Rollers
- Side guide plate
4.3 Intended use

The **KE 2500 / 3000 Special** rotary harrow

- Has been designed for conventional soil tillage of agricultural crop lands.
- Is coupled to the tractor using the tractor three-point hitch attachment and is controlled by an operator.
- May only be used with a trailing roller.

  This also applies if the **KE 2500 / 3000 Special** is used as part of a combination (see on page 76).

Slopes can be travelled

- Along the contours
  - Direction of travel to left  20 %
  - Direction of travel to right  20 %
- Along the gradient
  - Up the slope  20 %
  - Down the slope  20 %

The intended use also includes:

- Compliance with all the instructions in this operating manual.
- Execution of inspection and maintenance work.
- Exclusive use of genuine **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.
4.4 Danger areas and danger points

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 objects ejected by 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 pictograms 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 PTO 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, particularly during coupling and uncoupling operations.
- In the area of moving parts:
- By climbing onto the machine.
- Underneath raised, unsecured machines or parts of machines.

4.5 Conformity

Directives / standards

The machine fulfills the:
- Machines directive 98/37/EC
- EMC directive 89/336/EEC
- EN 907
- EN 12761-1
- EN 12761-2
4.6 Rating plate and CE marking

The following diagrams show the location of the rating plate and CE marking.

The rating plate (Fig. 5) and CE marking (Fig. 6) can be found on the frame of the machine.

The rating plate shows:

- machine ID no.
- type
- basic weight (kg)
- year of manufacture
- factory

The CE mark signifies that the machine complies with basic health and safety requirements.
## 4.7 Technical data

<table>
<thead>
<tr>
<th>Type</th>
<th>KE 2500 Special</th>
<th>KE 3000 Special</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working width [m]</td>
<td>2.50</td>
<td>3.00</td>
</tr>
<tr>
<td>Overall width [m]</td>
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<td>3.00</td>
</tr>
<tr>
<td>Centroidal distance $d$ [mm]</td>
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<td>550</td>
</tr>
<tr>
<td>Weight without roller [kg]</td>
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<td>850</td>
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<tr>
<td>Weight with cage roller</td>
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<td></td>
</tr>
<tr>
<td>SW 420 [kg]</td>
<td>988</td>
<td>1065</td>
</tr>
<tr>
<td>SW 520 [kg]</td>
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<td>1145</td>
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<tr>
<td>Weight with tooth packer roller</td>
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<td></td>
</tr>
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<td>1210</td>
</tr>
<tr>
<td>PW 500 [kg]</td>
<td>1190</td>
<td>1312</td>
</tr>
<tr>
<td>PW 600 [kg]</td>
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<tr>
<td>Weight with wedge ring roller</td>
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<td></td>
</tr>
<tr>
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<td>-</td>
<td>1324</td>
</tr>
<tr>
<td>KW 580 [kg]</td>
<td>1297</td>
<td>1432</td>
</tr>
<tr>
<td>Number of rotors</td>
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<td>10</td>
</tr>
<tr>
<td>Length of tines [mm]</td>
<td>260</td>
<td>260</td>
</tr>
<tr>
<td>Max. working depth [mm]</td>
<td>200</td>
<td>200</td>
</tr>
</tbody>
</table>

The overall weight is obtained from the sum of basic weights for KE with installed roller!
4.8 Necessary tractor equipment

The tractor must have the necessary power and be equipped with the electrical, hydraulic and brake connections for the brake system that are required for working with the machine.

Tractor engine power

- up to 103 kW (140 bhp)

Electrical system

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

Universal joint shaft

- Required speed: 540 rpm, 720 rpm, 1000 rpm (ideally)
- Direction of rotation: Clockwise, when viewing tractor from rear.

Three point attachment

- The lower links of the tractor must be equipped with lower link hooks.
- The top links of the tractor must be equipped with top link hooks.

4.9 Data on noise emission

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.

The **AMAZONE KE 2500 / 3000 Special** rotary harrow may only be used with a trailing roller as a

- Stand-alone machine
- As part of a cultivation combination with
  - **AMAZONE** top-mounted seed drills
  - **AMAZONE** side-mounted seed drills.

The **KE 2500 / 3000 Special** models are used for

- Seed bed preparation following a plough, chisel cultivator or subsoiler
- Seed bed preparation without pre-tilling

### 5.1 PTO shaft

The PTO shaft transmits power between the tractor and machine.

The **KE 2500 / 3000 Special** models are equipped with a PTO shaft that incorporates an overload safety feature.

The overload safety must be mounted on the machine side.

Fig. 8:

- PTO shaft with ratchet clutch
  - Transferable torque: 1700 Nm.

Fig. 9:

- PTO shaft with shear pin coupling
  - Transferable torque: 2400 Nm.
Fig. 10/…

(1) PTO shaft
(2) Holding bracket for PTO shaft
(3) Fastening position for holding bracket during use with lynch pin as lock
(4) Retaining chain for PTO shaft guard.
(5) Fixing position of retaining chain when machine is in use.

---

**WARNING**

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

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

---

- Use only the provided PTO shaft or one of the same type.
- Read and follow the operating manual for the PTO shaft supplied. Correct use and maintenance of the PTO shaft prevents serious accidents.
- To couple the PTO shaft observe
  - the operating manual for the PTO shaft supplied.
  - the permissible drive rev. speed of the machine.
  - the correct installation length of the PTO shaft. Also see page 56 in chapter "Adjusting length of PTO shaft at the tractor".
  - the correct installation location of the PTO shaft. The tractor symbol on the protective tube of the PTO shaft identifies the tractor-side connection of the PTO shaft.
- If the PTO shaft has an overload or freewheel clutch, you must always install the clutch on the machine side.
- 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 operator", page 28.
WARNING

Risk of entanglement due to 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.
- Always check before using the machine
  - that all protective equipment for the PTO shaft is installed and in working order.
  - that the clearances around the PTO shaft are sufficient in all implement situations. Insufficient clearances will result in damage to the PTO shaft.
- Attach the supporting chains (does not apply to PTO shaft with full guard) in such a way as to ensure sufficient swivelling area 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.
- Attach the supporting chains (does not apply to PTO shaft with full guard) in such a way as to ensure sufficient swivelling area in all operating positions. Supporting chains must not become caught on machine or tractor parts.
- Place the PTO shaft in the holder provided when the machine is uncoupled. This protects the PTO shaft from damage and dirt.
  - Never use the retaining chain of the PTO shaft to hang up the uncoupled PTO shaft.

WARNING

Risk of entanglement in unguarded parts of the PTO shaft in the power transmission area between the tractor and driven machine!

These risks pose serious injuries or death.

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

- The exposed parts of the PTO shaft must always be protected by a shield on the tractor and a PTO shaft guard on the machine.
- Check that the shield on the tractor, 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.
<table>
<thead>
<tr>
<th>Use only the provided PTO shaft or one of the same type.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read and follow the operating manual for the PTO shaft. Correct use and maintenance of the PTO shaft prevents serious accidents.</td>
</tr>
<tr>
<td>When coupling the PTO shaft, observe the operating manual from the PTO shaft manufacturer.</td>
</tr>
<tr>
<td>Ensure sufficient clearance in the swivelling area of the PTO shaft. Insufficient clearance causes damage to the PTO shaft.</td>
</tr>
<tr>
<td>Observe the permitted drive rev. speed of the machine.</td>
</tr>
<tr>
<td>If the PTO shaft has an overload or freewheel clutch, you must always install the clutch on the machine side.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>Before switching on the universal joint shaft, read and follow the safety precautions for universal joint shaft operation in the chapter entitled &quot;Safety information for the operator&quot;, page 28.</td>
</tr>
</tbody>
</table>
5.1.1 Coupling the PTO shaft

**WARNING**

Risk of crushing and impact due to insufficient clearances when coupling the PTO shaft!

Couple the PTO shaft to the tractor before coupling the machine to the tractor to ensure that the necessary clearance for safe coupling of the PTO shaft is available.

1. Clean and grease the universal joint shaft on the tractor and the gearbox input shaft of the machine.
2. Couple the tractor to the machine.
   → The machine is lowered and is resting on the ground.
3. Secure the tractor against unintentional starting and unintentional rolling away.
4. Check whether the universal joint shaft is switched off.
5. Slide the lock of the PTO shaft on to the universal joint shaft of the tractor until it audibly engages. When coupling the PTO shaft, observe the operating manual for the PTO shaft and the permissible universal joint shaft speed of the tractor.
6. Check whether the clearances around the PTO shaft are sufficient in all implement situations. Insufficient clearances will result in damage to the PTO shaft.

**CAUTION**

Supporting chains must not become caught on machine or tractor parts.
WARNING
Risk of crushing and impact due to insufficient clearances when uncoupling the PTO shaft!
Uncouple the machine from the tractor first before uncoupling the PTO shaft from the tractor, to ensure that the necessary clearance for safe uncoupling of the PTO shaft is available.

CAUTION
Risk of burning on hot components of the PTO shaft!
This danger can cause minor to serious injuries to the hands.
Do not touch components of the PTO shaft that have become hot (particularly clutches).

- After uncoupling the PTO shaft, place it in 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. Switch off the universal joint shaft.
2. Lower the machine onto the ground.
3. Secure the tractor and machine against unintentional starting and unintentional rolling away.
4. Pull the PTO shaft lock off the universal joint shaft of the tractor.
5. Place the PTO shaft in the holder provided.
5.2 Tines

The tines made of hardened boron steel (Fig. 11/1) ensure smooth running of the soil tillage implement.

The long tines permit a high passage clearance when incorporating straw.

The round tine carriers prevent rocks from becoming jammed. The tines are fastened in sockets (Fig. 11/2) shaped in such a way that the tines have a spring action and can avoid rocks and other obstacles.

The tines move into an upright position during towing and press the clods downwards leaving behind an optically fine seed bed.

The depth can be adjusted by locating the carrying arms using the AMAZONE eccentric pins (Fig. 12/1) see page 63.

5.3 Exchange speed gearbox with bevel gears

The soil tillage implement has an exchange speed gearbox with two bevel gears.

Two gear ratios can be set by exchanging the bevel gears.

The gearbox is equipped with an auxiliary PTO stub as standard.
5.4 Three-point attachment frame

The frame of the machine has been built to satisfy the requirements and dimensions of a category II three-point attachment.

Fig. 14/…

(1) Top coupling point with upper link pin
(2) Bottom coupling points with lower link pins
(3) Lynch pin for securing upper and lower link pins

**WARNING**

Risk of crushing, catching, and knocks when the machine unexpectedly releases from the tractor!

Raise machine above the top link until it is horizontal in the operational position, i.e. with frame running parallel to the ground.

5.5 Three-point hitch extension (option)

The three-point hitch extension increases the distance between the tractor and the machine.

Locate the three-point hitch extension at each hinging point with 2 pins and secure with clip pins!
5.6 Roller

Cage roller

The cage rollers produce an open surface and can be used in combination with side-mounted seed drills.

The cage roller is not suitable for use in combination with top-mounted seed drills.

Wedge ring roller

The wedge ring roller works without blockage for re-consolidation in strips. Maximum re-consolidation takes place in the seed embedding area for exact seed placement. The surface remains open.

The roller is suitable for medium to heavy soils and for all seed drills.

The roller is cleaned by carbide-coated scrapers.

Tooth packer roller

The tooth packer roller works without blockage for surface rolling. The re-consolidation takes place over the entire surface. The roller is cleaned by carbide-coated scrapers.

The roller is suitable for all seed drills and all soils.

5.7 Levelling bar

Fig. 19/…

(1) Levelling bar

(2) Height adjustment of the levelling bar

The levelling bar

- removes ground undulations in front of the roller and pulverises remaining clods on heavy soil.
- performs pre-compaction of loose soil thus reducing slippage at the roller.
- prevents (if adjusted correctly) blocking of the roller on loose, dry and light soil.

The height of the levelling bar is adjusted via the swivellable crank (see page 65).
5.8 Side panels

The side panels (Fig. 20/1) guide the soil stream of the tilled soil directly in front of the roller and prevent the soil from escaping to the side or between the soil tillage implement and roller.

In addition to these functional tasks, each side panel prevents access to the outer driven soil tillage tines and therefore also serves as protective equipment.

In order to restrict the soil stream effectively, the working depth of the side guide plates and the spring tension must be adjusted to the soil conditions, see page 66.

**KE 2500 / 3000** rotary harrows are equipped as standard with spring-mounted side guide plates (Fig. 20/1).

5.9 Tractor wheel mark eradicator (optional)

Tractors with narrow tyres often leave deep wheel marks on unpacked soils.

The soil tillage implement can be used with a shallower working depth if these deep tracks are first eliminated by the tractor wheel mark eradicators (Fig. 21).

![Fig. 20](image1)

When parking the soil tillage implement with wheel mark eradicator tines, ensure that the soil tillage implement is standing on solid ground, but that the tines of the wheel mark eradicators are pushed into loose soil in order to prevent damage.

**Installation:**

1. Replace the existing cover fastening screws with the longer screws supplied.

2. Bolt carrier pipe (Fig. 21/1) on to the soil tillage implement with two cover fastening screws (Fig. 21/2).

3. Fasten the wheel mark eradicator (Fig. 21/3) to the carrier pipe using the clamping plates (Fig. 21/4) and screws.
This section contains information

- on operating your machine for the first time.
- on checking how you may couple the machine to your tractor.

- Before operating the machine for the first time the operator must have read and understood the operating manual.
- Follow the instructions given in the section "Safety information for the operator" on page 24 onwards when
  - coupling and uncoupling the machine,
  - transporting the machine and
  - 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 vehicle owner and the vehicle driver (operator) shall be responsible for compliance with the statutory road traffic regulations.

WARNING

Risk of crushing, 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
- necessarily require an open centre or pressure position to operate correctly
6.1 Checking the suitability of the tractor

**WARNING**
Risk 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 you attach or hitch the machine.
  You may only couple 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 coupled.

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 coupled.

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
- empty tractor weight
- ballast weight and
- machine’s total weight when attached or supported weight when hitched.

This note only applies to 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

![Diagram of tractor and machine connections](image)

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>$T_L$</td>
<td>[kg]</td>
<td>Empty tractor weight</td>
</tr>
<tr>
<td>$T_V$</td>
<td>[kg]</td>
<td>Front axle load of the empty tractor</td>
</tr>
<tr>
<td>$T_H$</td>
<td>[kg]</td>
<td>Rear axle load of the empty tractor</td>
</tr>
<tr>
<td>$G_H$</td>
<td>[kg]</td>
<td>Total weight of rear-mounted machine or rear ballast</td>
</tr>
<tr>
<td>$G_V$</td>
<td>[kg]</td>
<td>Total weight of front-mounted machine or front ballast</td>
</tr>
<tr>
<td>$a$</td>
<td>[m]</td>
<td>Distance between the centre of gravity of the front machine mounting or the front weight and the centre of the front axle (total $a_1 + a_2$)</td>
</tr>
<tr>
<td>$a_1$</td>
<td>[m]</td>
<td>Distance from the centre of the front axle to the centre of the lower link connection</td>
</tr>
<tr>
<td>$a_2$</td>
<td>[m]</td>
<td>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)</td>
</tr>
<tr>
<td>$b$</td>
<td>[m]</td>
<td>Tractor wheel base</td>
</tr>
<tr>
<td>$c$</td>
<td>[m]</td>
<td>Distance between the centre of the rear axle and the centre of the lower link connection</td>
</tr>
<tr>
<td>$d$</td>
<td>[m]</td>
<td>Distance between the centre of the lower link connection point and the centre of gravity of the rear-mounted machine or rear ballast (centre of gravity distance)</td>
</tr>
</tbody>
</table>

- $T_L$, $T_V$, $T_H$, $G_H$, $G_V$, $a$, $a_1$, $a_2$, $b$, $c$, $d$: See tractor operating manual or vehicle documentation.
- $G_H$, $G_V$: See technical data for machine or rear ballast.
- $a$, $a_1$, $a_2$, $b$, $c$, $d$: See technical data of tractor and front machine mounting or front weight or measurement.
- $T_L$, $T_V$, $T_H$, $G_H$, $G_V$, $a$, $a_1$, $a_2$, $b$, $c$, $d$: See technical data of front machine mounting or front weight or measurement.
6.1.1.2  Calculation of the required minimum front ballasting $G_{V_{\text{min}}}$ of the tractor to ensure steering capability

$$G_{V_{\text{min}}} = \frac{G_{H} \cdot (c + d) - T_{V} \cdot b + 0,2 \cdot T_{F} \cdot b}{a + b}$$

Enter the numeric value for the calculated minimum ballast $G_{V_{\text{min}}}$ required on the front side of the tractor in the table (on page 54).

6.1.1.3  Calculation of the actual front axle load of the tractor $T_{V_{\text{act}}}$

$$T_{V_{\text{act}}} = \frac{G_{V} \cdot (a + b) + T_{V} \cdot b - G_{H} \cdot (c + d)}{b}$$

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 (on page 54).

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

$$G_{\text{total}} = G_{V} + T_{L} + G_{H}$$

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 (on page 54).

6.1.1.5  Calculation of the actual rear axle load of the tractor $T_{H_{\text{act}}}$

$$T_{H_{\text{act}}} = G_{\text{total}} - T_{V_{\text{act}}}$$

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 (on page 54).

6.1.1.6  Tractor tyre load capacity

Enter twice the value (two tyres) of the approved load capacity (see tyre manufacturer's documentation, for example) in the table (on page 54).
### 6.1.1.7 Table

<table>
<thead>
<tr>
<th>Actual value according to calculation</th>
<th>Approved value according to tractor instruction manual</th>
<th>Double approved load capacity (two tyres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum ballast front / rear</td>
<td>/ kg</td>
<td>--</td>
</tr>
<tr>
<td>Total weight</td>
<td>kg ≤</td>
<td>kg</td>
</tr>
<tr>
<td>Front axle load</td>
<td>kg ≤</td>
<td>kg ≤</td>
</tr>
<tr>
<td>Rear axle load</td>
<td>kg ≤</td>
<td>kg ≤</td>
</tr>
</tbody>
</table>

- 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, entrapment, drawing in and impact through insufficient stability of the tractor and insufficient tractor steering capability and braking 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 ($G_{V_{min}}$).

- Ballast your tractor with weights at the front or rear if the tractor axle load is exceeded on only one axle.
- Special cases:
  - If you do not achieve the minimum ballast at the front ($G_{V_{min}}$) from the weight of the front-mounted machine ($G_{V}$), you must use ballast weights in addition to the front-mounted machine.
  - If you do not achieve the minimum ballast at the rear ($G_{H_{min}}$) from the weight of the rear-mounted machine ($G_{H}$), you must use ballast weights in addition to the rear-mounted machine.
6.2 Mounting the PTO shaft

Only mount the PTO shaft when the machine is not attached. Before mounting the PTO shaft, clean and lubricate the gearbox input shaft!

1. Push the PTO shaft onto the gearbox input shaft and fasten it using the screw (Fig. 24/1).
2. Reinstall the PTO shaft guard on the machine side.

Mount the overload clutch on the machine side!

Fig. 23

Fig. 24
6.3 Adjusting the length of the PTO shaft to the tractor

**WARNING**
Risk of
- injury to operator/third parties from damaged and/or destroyed parts being flung out if the PTO shaft is upended or pulls apart while the machine coupled to the tractor is being raised/lowered due to incorrect adjustment of the PTO shaft.
- entanglement due to incorrect fitting or unauthorised structural changes to PTO shaft!

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

When adjusting the PTO shaft, observe the operating manual supplied with the PTO shaft without fail.

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.

**WARNING**
Risk of being caught and drawn in if the PTO shaft is installed incorrectly or if unauthorised structural changes are made.

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

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

Structural changes to the PTO shaft that are not described in the operating manual from the PTO shaft manufacturer are not permitted.

**WARNING**
Risk of crushing 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.

Actuate the operating controls for the tractor's three-point hydraulic system
- only from the designated workstation.
- If you are outside of the danger area between the tractor and the machine.
**WARNING**

Risk of crushing from unintentional:
- Rolling of the tractor and the coupled machine!
- Lowering of the lifted machine!

Secure the tractor and machine from unintentional starting and unintentional rolling and secure the machine from 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 horizontal. 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. Actuate the manual controls for the tractor's three-point hydraulic system on the rear of the tractor from the workstation provided.
4. Secure the machine, lifted at 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 input shaft at the machine 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.
6.4 Securing the tractor/machine against unintentional start-up and rolling

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

- unintentional lowering of the machine when it is raised with the tractor’s three-point hydraulic system and unsecured.
- unintentional lowering of parts of the machine when in a raised position and unsecured.
- 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
  o when the machine is being operated.
  o as long as the tractor engine is running with the PTO shaft / hydraulic system connected.
  o if the ignition key is in the tractor and the tractor engine can be started unintentionally with the PTO shaft / hydraulic system connected.
  o if the tractor and machine have not each been prevented from unintentionally rolling away by applying their parking brakes and/or securing them with wheel chocks
  o if 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. Switch the tractor engine off.
3. Remove the ignition key.
4. Apply the tractor parking brake.
5. Secure the machine against unintentional rolling (only attached machine)
   o by applying the parking brake (if fitted) or by using wheel chocks, if the terrain is level.
   o by applying the parking brake and using wheel chocks if the machine is on unlevel terrain or on an incline.
7 Coupling and uncoupling the machine

When coupling and uncoupling machines, follow the instructions given in the section "Safety information for the operator" page 24.

**WARNING**
Risk of crushing 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 away before entering the danger area between the tractor and machine to couple or uncouple the machine. See page 58.

**WARNING**
Risk of crushing between the rear of the tractor and the machine when coupling and uncoupling the machine!
Actuate the operating controls for the tractor's three-point hydraulic system
- only from the designated workstation.
- If you are outside of the danger area between the tractor and the machine.

7.1 Coupling the machine

**WARNING**
Risk of breaking during operation, insufficient stability and insufficient tractor steering and braking power on improper use of the tractor!
You may only couple the machine to tractors suitable for the purpose. See section "Checking tractor suitability", page 51.

**WARNING**
Risk of crushing 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
Persons may be exposed to the risk of crushing, entanglement, drawing in and impacts if the machine unexpectedly detaches from the tractor!

- Use the intended equipment to couple the tractor and the machine in the proper way.
- When coupling the machine to the tractor's three-point hydraulic system, ensure that the attachment categories of the tractor and the machine are the same.

If your tractor is equipped with a Cat. III three-point hydraulic system, it is imperative to replace the Cat. II lower link pins in the machine with Cat III lower link pins using the reducing sleeves.
- Only use the upper and lower link pins provided to couple the machine (original pins).
- Visually check the upper and lower link pins for obvious defects whenever the machine is coupled. Replace upper and lower link pins if there are clear signs of wear.
- Use a lynch pin on each of the upper and lower link pins in the pivot points on the three-point frame attachment to secure them against unintentional release.
- Before starting off, perform a visual inspection to ensure that the upper and lower link hooks are correctly locked.

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

Check the path of the supply lines when coupling them up. The supply lines
- must give slightly without tension, buckling or rubbing throughout the entire movement range of the mounted or hitched machine.
- may not scour other parts.

WARNING
Risk of breakage and premature wear of the exchange gear main gearbox during operation due to unsuitable power output of the tractor drive.

Observe the maximum permissible drive output of your tractor for your machine's exchange gear main gearbox. This is the only way to prevent damage due to overloading. For more information see chapter "Necessary tractor equipment", page 39.

AMAZONE KE 2500 / 3000 Special models are equipped with Cat. II upper and lower link pins for the purposes of mounting the upper and lower links to the tractor.
1. Secure the machine to prevent it from unintentionally rolling away.

2. When coupling the machine check it thoroughly for visible defects. Also refer to chapter "Obligations of operator", page 8.

3. Fasten the ball sleeves over the upper and lower link pins in the pivot points of the three-point attachment frame.

4. Secure the upper link pins and lower link pins with the lynch pin to prevent accidental detachment.

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

6. Now couple the PTO shaft and the supply lines to the tractor as follows before coupling the machine to the tractor:

   6.1 Drive the tractor up to the machine leaving a gap (approx. 25 cm) between the tractor and machine.

   6.2 Secure the tractor against unintentional starting and rolling away. Also refer to page 58 in chapter "Securing tractor against unintentional starting and rolling".

   6.3 Check that the tractor's PTO shaft is switched off.

   6.4 Couple the PTO shaft and the supply lines.

   6.5 Align the lower link hooks so they are flush with the lower pivot points of the machine.

7. Now continue reversing the tractor towards the machine until the tractor's lower link hooks are automatically received by the machine's lower pivot points.

8. Raise the tractor's three-point hydraulic system until the lower link hooks receive the ball sleeves and lock automatically.

9. Couple the top link with the upper pivot point of the three-point attachment frame from the tractor seat via the upper link hook.

   → The top link hook locks automatically.

10. Raise the machine into the working position.

11. Instruct persons to leave the danger area behind the machine.

12. Change the length of the top link so that the boom carrier of the machine is vertically upright.

13. Before starting off, perform a visual inspection to ensure that the upper and lower link hooks are correctly locked.
If possible, pin the top link pins to the upper pivot point of the three-point attachment frame so that the coupled top link is roughly horizontal. The amount of lifting power required to lift out the machine is at a minimum when the top link is horizontal.

7.2 Uncoupling the machine

**WARNING**
Risk of crushing, cutting, entanglement, drawing in and impacts due to insufficient stability and tipping of the uncoupled machine!

Park the machine on a level area with a solid subsurface.

- Observe that when uncoupling the machine, there must always be enough space in front of the machine to allow the tractor to be aligned with the machine when approaching it during subsequent coupling.
- Before uncoupling the machine, make sure that the coupling points (upper and lower link) are stress free.

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 away. See page 58.
   2.2 Release top link.
   2.3 From the tractor seat, unlock top link hooks and uncouple.
   2.4 Release lower link.
   2.5 From the tractor seat, unlock lower link hooks and uncouple.
   2.6 Pull tractor forward approx. 25 cm. → This will allow more room between tractor and machine and give better access for uncoupling the PTO shaft.
   2.7 Secure tractor and machine against unintentional starting and rolling away.
   2.8 Uncouple the PTO shaft.
   2.9 Place the PTO shaft in the holder.
   2.10 Disconnect the supply lines.
8 Settings

WARNING
Risk of crushing, cutting, catching, drawing in and knocks through
• unintentional falling of the machine raised using the tractor’s three-point hydraulic system.
• 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 making adjustments to the machine. See Page 58.

8.1 Adjusting the working depth of the tines

WARNING
Risk of catching and entanglement in driven tool rotor when adjusting the working depth of the tines!

Secure the tractor to prevent accidental starting and rolling and wait until the tool rotor has come to a standstill before adjusting the working depth of the tines.

WARNING
Risk of crushing if the raised soil tillage implement drops accidentally when the working depth of the tines is being adjusted!

This can result in severe injuries to the lower limbs.

Slightly raise the soil tillage implement until the carrying arms are resting on the support for the trailing roller and the holes in the quadrant plates for the depth setting pins unblock.

WARNING
Risk of crushing between the depth setting pins / support for the trailing roller and the carrying arm for the soil tillage implement when adjusting the working depth of the tines!

This can inflict severe injuries to hands and fingers.

Make sure when grasping the depth setting pins that your hand/fingers can never enter the area between the carrying arm and the depth setting pins.
The soil tillage implement is supported by the roller while in operation. This ensures that the working depth is precisely maintained.

To adjust the working depth:

1. Only raise the soil tillage implement slightly above the tractor’s three-point hydraulic system until the carrying arms (Fig. 25/3) unblock the holes of the quadrant plate (Fig. 25/2) for the depth setting pins (Fig. 25/1).

2. Secure the tractor and machine against unintentional starting and unintentional rolling away.

3. Remove the lynch pin (Fig. 25/4).

4. Locate the depth setting pins in the quadrant plate accordingly.

5. Secure the depth setting pins with the lynch pin.

The illustration shows the correct handling of the depth setting pins when adjusting the seed placement depth.

The depth setting pins form a square with different spacings.

This makes precision adjustment possible by turning the depth setting pins.

Make sure that the depth setting pins on all carrying arms

- are located in the same hole,
- reach the bearing point with the same edges (see number marks 1-4).

![Fig. 25](image)

- The higher the depth setting pins are located in the quadrant plate the greater the working depth will be.
- If the working depth changes, the side guide plates and levelling board must be adjusted accordingly.
8.2 Adjusting the levelling bar

**WARNING**
Risk of drawing in and trapping due to driven tool rotor when adjusting the working depth of the levelling bar!

These risks can result in serious injuries, particularly to the lower limbs.

Secure the tractor to prevent accidental starting and rolling and wait until the tool rotor has come to a standstill before adjusting the working height of the levelling bar.

---

**WARNING**
Risk of crushing through accidental lowering of the machine when adjusting the working height of the levelling bar!

This can result in severe injuries to the lower limbs.

The levelling bar can be easily adjusted by raising the machine only slightly via the tractor's three-point hydraulic system.
For conventional sowing, the levelling bar (Fig. 26/1) should always push an earth wall in front to level any undulations.

The levelling bar is not required for mulch sowing. Secure the levelling bar in its upper position when not required.

Make the same settings on all setting segments. The pointer (Fig. 26/2) and notches (Fig. 26/3) serve for orientation.

**Adjusting the levelling bar:**

1. Adjust the height of the levelling board by evenly relocating the positioning bolts (rough adjustment).
2. Secure each positioning bolt with a clip pin.
3. Fold the crank up (Fig. 26/4).
4. Crank the levelling bar to the desired height (fine adjustment).
5. Fold the crank down.

8.3 **Adjusting the side guide plates**

For seed bed preparation after the plough, screw on the side guide plates (Fig. 27/1) so that they slip through the soil at a maximum depth of 1 to 2 cm.

If, under unfavourable conditions, straw is pushed together by the side guide plates fasten these at an angle, i.e. higher at the front than at the rear, or right at the top.
8.4 Adjusting the wedge ring roller scrapers

The scrapers (Fig. 28) are adjusted at the factory. Adjust the setting to the working conditions as follows:

1. Unscrew the bolted connections.
2. Adjust the scraper in the slotted hole.
3. Tighten the bolted connection.

Do not set the distance between the scraper and intermediate ring to less than 10 mm, as otherwise excessive wear may result.

8.5 Adjusting the tractor wheel mark eradicator

DANGER

Before making adjustments or carrying out installations, switch the engine off, remove the ignition key and make sure that the universal joint shaft has come to a standstill.

1. Raise soil tillage implement slightly to adjust the tractor wheel mark eradicator using the tractor’s hydraulic system and suitable supports.
2. Bring wheel mark eradicator tines into the correct position (tractor track) and bolt on.
3. Adjust the working depth by relocating the pin (Fig. 29/1) in the teeth of the wheel mark eradicator (Fig. 29/3) then secure with lynch pin (Fig. 29/2).
9 Transportation

- On transportation journeys, follow the instructions given in the section "Safety information for the operator", page 26.
- Before moving off, check:
  - that the supply lines are connected correctly.
  - the lighting system for damage, proper operation and cleanliness,
  - the braking and hydraulic system for visible defects.
  - that the parking brake is released completely.
  - that the brake system is functioning correctly.

**WARNING**

Risk of crushing, cutting, trapping, drawing in or impact if the mounted machine accidentally detaches.

Before transportation, carry out a visual check that the upper and lower link pins are secured with a lynch pin against unintentional release.

**WARNING**

Risk of crushing, cutting, catching, drawing in and knocks when making interventions in the machine through unintentional machine movements.

- On folding machines, check that the transport locks are locked correctly.
- Secure the machine against unintentional movements before starting transportation.

**WARNING**

Risk of crushing, 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 or coupled machine.
- Before transportation, fasten the side locking of the tractor lower link, so that the connected or coupled machine cannot swing back and forth.
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.

WARNING
Bring the Huckepack system into the transport position during transport journeys!

WARNING
If the levelling board accidentally detaches from the machine during a transport journey this may put other road users in danger!
Both of the spindles used to adjust the working height of the levelling board must be secured using a mandrel and lynch pin to prevent accidental twisting.
10 Use of the machine

When using the machine, observe the information in the sections

- "Warning signs and other labels on the machine", from page 17 and
- "Safety information for the operator", from page 24

Observing this information is important for your safety.

**WARNING**

**Risk of crushing, drawing in and entrapment by unprotected drive elements when the machine is in operation!**

Only ever start up the machine when the protective equipment is fully installed.

**WARNING**

**Risk of crushing, cutting, severing of limbs, drawing in, trapping and impacts due to insufficient stability and tipping of the tractor and/or mounted machine.**

Drive in such a way that you are completely in control of the tractor and mounted machine at all times.

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 influence of the mounted machine.

**WARNING**

**Risk of crushing, cutting, trapping, drawing in or impact if the mounted machine accidentally detaches.**

Each time before the machine is used, carry out a visual check that the upper and lower link pins are secured with a lynch pin against unintentional release.

**WARNING**

**Risk of objects being flung out when the machine is being driven!**

Instruct people to leave the danger area of the machine before you switch on the universal joint shaft.
CAUTION
Risk of breakage during operation when the ratchet clutch for the exchange gear main gearbox is engaged!
Switch off the universal joint shaft of the tractor immediately if the ratchet clutch engages.
This prevents damage to the gearbox.
Observe the information in the chapter "Removing blockages at the tool rotors" without fail, see on page 75.

WARNING
Risk of trapping and entanglement and risk of foreign objects being caught and flung out in the danger area of the driven PTO shaft!
- Whenever the machine is used, check that the safety devices and guards of the PTO shaft are fully intact and functional beforehand.
- Have a specialised workshop replace damaged safety devices and PTO shaft guards immediately.
- Check that the protective equipment on the tractor or soil tillage implement and the safety devices and protective equipment of the extended PTO shaft overlap by at least 50 mm. If not, the soil tillage implement must not be driven via the PTO shaft.
- Check that the PTO shaft guard is secured against rotation by the supporting chain.
- Observe the approved drive rev. speed of the soil tillage implement before switching on the universal joint shaft of the tractor.
- Stay at a safe distance from 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.

CAUTION
Risk of the PTO shaft breaking in the event of excessive bending of the driven PTO shaft!
Observe the permitted bending of the driven PTO shaft when lifting the machine. Excessive bending of the driven PTO shaft causes increased, premature wear to or immediate destruction of the PTO shaft.
- Observe the information in the operating manual for the PTO shaft.
- Switch off the universal joint shaft of the tractor immediately if the machine does not run smoothly when raised.
Use of the machine

WARNING
Risk of shearing, trapping, entanglement and impact due to accidental contact with driven soil tillage tines on the tool rotor if the protective equipment on the rear of the soil tillage implement is missing!

Use of the soil tillage implement without the roller is prohibited. In addition to its functional role, the roller also has a safety function and acts at the same time as a fixed separating protective device (accident prevention).

WARNING
Risk of cutting, trapping, entanglement and impact due to driven soil tillage tines!

- Make sure that third persons always keep a safe distance from the machine when the tractor engine is running with the PTO shaft connected.
- Instruct people to leave the danger area of the machine before you switch on the tractor's universal joint shaft.

WARNING
Risk of crushing between the carrying arms of the soil tillage implement and support for the trailing roller, and also between the carrying arms and depth setting pins, when raising or lowering the machine!

This can result in severe injuries to the fingers and hands.

Instruct people to leave the danger area of the machine before you raise or lower the machine.

WARNING
Risk of drawing in and entrapment by driven soil tillage tines when the machine is operated without the side panels!

Only ever start up the machine when the side panels are installed as instructed.
10.1 Work commencement

1. Instruct people to leave the danger area of the machine before you raise or lower the soil tillage implement.

2. Just before starting work in the field, lower the soil tillage implement using the tractor hydraulics until the tines are slightly above but not touching the ground.

3. Bring the tractor's universal joint shaft up to the prescribed speed.

4. While the tractor is starting up, lower the soil tillage implement completely.

- In tractors with hydraulically or pneumatically shiftable universal joint shafts, the universal joint shaft may only be switched on when the tractor is idling to prevent damage to the PTO shaft.

- If the movement of the tooth packer roller is sluggish during initial use, e.g. due to adhesive effects of paint, do not immediately adjust the scrapers but simply pull the roller over solid (unploughed) ground until the roller turns more easily.

Speed of tractor universal joint shaft

The tractor universal joint shaft speed should be set to 1000 rpm. A lower PTO shaft speed causes higher torques that may lead to a faster response from the overload clutch. The tractor's universal joint shaft speed of 540 rpm can only be selected when working on light or loose soil at a low working depth.

- Never select a higher tine speed than is absolutely necessary.

- Set the tractor universal joint shaft speed to 1000 rpm.
10.2 During the work

When lifting, e.g. turning at the end of the field, raise the machine just enough to lift the soil tillage implement and roller slightly out of the ground. As long as the PTO shaft is angled only slightly, the PTO shaft can continue to run. If the machine makes noise while lifted, switch off the tractor universal joint shaft.

Observe the minimum length of the tines. For large working depths, exchange the tines for new ones even before they have reached the minimum length.

As the wear of the tines increases, adjust the working depth of the soil tillage implement and also the side guide plates and levelling bar to this new working depth.

Minimum length of tines: 150 mm
10.3 Removing blockages at the tool rotors

If the machine encounters stony ground or a fixed obstacle, the tines and/or rotors may come to a complete stop. The PTO shaft is equipped with an overload clutch to prevent damage to the gearbox in this situation.

WARNING
Risk of drawing-in/entrapment for the operator if the machine starts up accidentally when removing blockages by hand!

The removal of blockages must not be attempted under the following circumstances,
- when the machine is being driven.
- while the tractor engine is running with the PTO shaft connected.
- if the ignition key is in the tractor and the tractor engine could be started unintentionally with the PTO shaft connected.
- if the tractor is not secured against accidental rolling via the parking brake.

1. Stop the tractor immediately.
2. Lift the machine out of the ground.
3. Simultaneously lower the tractor's universal joint shaft speed to roughly 300 rpm so that the ratchet clutch audibly engages again.
4. Continue working if the turning motion of the tool rotor is unimpeded.
5. Remove the blockages at the tool rotors by hand if they cannot be removed via the controls at the tractor.

If the rotors do not start rotating, switch off the universal joint shaft and remove the obstacle (only with the engine shut off and the ignition key removed). Once you have done this, the ratchet clutch is immediately ready for operation.

Shear bolt coupling:
Replace the shear bolt, see page 99.
11 Arrangement of various machine combinations

The soil tillage implement can be used as designated as

- Stand-alone machine with trailing AMAZONE roller (PW, KW, SW)
- Combination with AMAZONE roller and
  - Mounted seed drill D9
    (see the section "11.2", on page 79)
  - Mounted seed drill D9 with lifting frame
    (see the section "11.3", on page 82)
  - Top-mounted seed drill AD
    (see the section "11.5", on page 87)
  - Pneumatic top-mounted seed drill AD-P Special
    (see the section "11.6", on page 87)
11.1 Mounting and removing the rollers

Installation:

The rollers must be attached to the soil tillage implement via 2 carrying arms (Fig. 30/1).

1. Place the roller on level ground and secure it, both at the front and rear, against rolling away.
2. Couple the soil tillage implement to the tractor and drive backwards towards the roller.
3. Locate the carrying arms (Fig. 30/1) of the roller in the supports (Fig. 30/3) of the soil tillage implement with pins (Fig. 30/2) and secure with nut and bolt (Fig. 30/4).

**WARNING**

Fixing the carrying arms as shown in figure (Fig. 31) is not allowed.

Fixing the carrying arms as shown is only for transport on a freight vehicle, when delivering the machine ex works.

**CAUTION**

- Ensure that the roller is particularly well supported before being coupled (secure to prevent it from overturning or rolling away).
- Exercise particular caution when fastening the roller to the soil tillage implement, as the roller may overturn if it is not supported properly. Risk of injury!
Adjusting the working depth of the tines; see on page 63.

- **KE** in combination with seed drill:
  → Remove the upper pins (Fig. 32/1) as soon as the combination is equipped with a top-mounted seed drill that is fastened to the soil tillage implement and roller.

- **KE** as stand-alone machine with trailing **AMAZONE** roller:
  → The roller and carrying arm are each connected by 2 pins.

**Removal:**

1. Place the tractor-mounted rotary harrow on level ground and secure the roller at both the front and rear to prevent rolling away.
2. Undo screws and nuts (Fig. 30/4), take out pins (Fig. 30/2) of the carrying arms.

**CAUTION**

Ensure that no load is acting on the pin connection before removing the pin!
11.2 Connecting the mounted seed drill

The coupling parts (optional) serve to secure the mounted seed drill to the soil tillage implement. Seed drill equipment with lower and top link hinging points Cat. II is required.

In combination with a seed drill, the soil tillage implement may have to be raised higher for turning at the end of a field.

Switch off the PTO shaft before raising the soil tillage implement if the PTO shaft is too sharply angled during raising, in order to prevent damage to the PTO shaft.
1. Secure each lower link hook (Fig. 34/1) with two screws (Fig. 34/2).

   Screw on the lower link hooks (Fig. 34/1) so that the seed drill
   o can be connected without problem
   o runs closely behind the roller.

2. Withdraw the two pins (Fig. 35/1) from the lower link hooks and swivel the locking straps (Fig. 35/2).

3. Direct people out of the danger area.

4. Drive the soil tillage implement up to the seed drill.

5. Engage the lower link pins (Fig. 35/3) of the seed drill with the lower link hooks.

6. Secure the securing straps (Fig. 35/2) with the pins (Fig. 35/1).

7. Secure the pins with clip pins.

8. Secure the top link (Fig. 36/1) with the seed drill pin on the top link of the seed drill.

9. Secure the pin with a clip pin.

10. Align the seed drill so that it is straight by lengthening or shortening the top link.

11. Secure the position of the top link with the lock nut (Fig. 36/2).
11.2.1 Fitting the coupling parts (workshop work)

1. Attach the coupling carrier arms (Fig. 37/1) to a crane.
2. Secure the coupling carrier arms with two spacer sleeves (Fig. 37/2) to the soil tillage implement with two pins (Fig. 37/3).
3. Secure the pins with screws (Fig. 37/4) and nuts.
4. Secure the links (Fig. 37/5) of the chains together with the upper link (Fig. 37/6) on the soil tillage implement with a pin (Fig. 37/7).
5. Secure the pin with two securing nuts (Fig. 37/8).

6. Attach the tension spring (Fig. 38/1) to the two chains. When untensioned, the chains should not touch the tower of the soil tillage implement.
11.3 Connecting the mounted seed drill D9 with lifting frame

**AMAZONE** side-mounted seed drills can be attached to the **AMAZONE Huckepack** system on the soil tillage implement.

If the tractor has not enough lifting power to raise the combination of soil tillage implement, roller and side-mounted seed drill with the adjustable coupling parts, the lifting power requirement can be reduced using the **AMAZONE Huckepack** system.

Fig. 39 – lifting frame lowered into operating position.

Fig. 40 – lifting frame raised for transportation and for turning at the end of the field.

The lifting frame is operated via a single acting tractor control unit.

- **Huckepack 2.1**
  
  For seed drills with a total weight of 1600 kg.

---

**CAUTION**

Risk of injury from moving parts when raising the lifting frame!

- Only operate the hydraulic lifting frame if persons are outside the swivelling area!

- It is prohibited to enter or remain in the area below the raised combination!
Coupling the seed drill

1. Drive the soil tillage implement up to the seed drill.
   Seed drills with Cat. II lower link pivot points can be attached.

2. Couple seed drill to the lower link coupling points of the rear frame.
   Prior to coupling check for locking straps (Fig. 41/1) that have swung forward.

3. Secure tractor and machine against unintentional starting and rolling away.

4. Swivel the locking straps (Fig. 41/1) over the stubs of the lower link and secure each locking strap with a bolt (Fig. 41/2) and lynch pin (Fig. 41/3).

5. Locate the top link (Fig. 41/4) on the upper coupling points of the seed drill and secure lifting frame (Fig. 41/5) with the pin and lynch pin.

6. Bring the seed drill into a horizontal position by twisting the top link.

---

**Fig. 41**

Check with the tractor rear window open whether parts of the **AMAZONE** Huckepack system collide with the rear window.

If necessary the rear window may not be fully opened.

Make use of the various bolt-on options at the catch hooks (Fig. 41/6) to ensure that the trailing seed drill can be fastened as close as possible behind the roller.

Lower screw union in

- Position a for small rollers,
- Position b for large rollers.

The bolt-on positions for the catch hooks must be the same on both sides.
Fitting of lifting frame (workshop task)

1. Coupling the soil tillage implement to the tractor.
2. Secure tractor and machine against unintentional starting and rolling away.
3. Hook lifting frame into a hoist.
4. Guide the lifting frame to the left and right between the mounting plates (Fig. 42/1), locate with pins (Fig. 42/2) and secure with nut and bolt.
5. Locate the top link on the upper coupling point (Fig. 42/3) of the soil tillage implement with pin (Fig. 42/4) then secure with lynch pin.
6. Connect the hydraulic lines to the hydraulic cylinders and attach to the soil tillage implement with cable ties.
7. Connect hydraulic line to the tractor.
8. Pressurise the lifting frame via the controls at the tractor cab and check the hydraulic system for leaks, repair if necessary.

The hydraulic connection of the lifting frame can be established with the hydraulic system of the tractor’s lower link.

To do this, it is necessary to install an additional hydraulic coupling in the tractor (workshop task).

When operating the hydraulic system of the tractor’s lower link:
- the seed drill complete with lifting frame is raised first,
- then the machine combination above the tractor’s lower link is raised.

Before reaching the headland, raise the machine combination until the tines and roller have just left the soil.

→ In this position the angling of the PTO shaft in most tractors is only very slight which means it is possible to turn with the PTO shaft running.

Once the turn is complete, the combination is then lowered and works with the soil tillage implement starts and as the tractor moves off the seed drill is applied roughly at the point where the soil tillage implement has started work.

→ This makes working in narrower headlands possible.

Fig. 42
Road transportation using the AMAZONE Huckpack 2.1 system

Securing / releasing the lifting frame for road transportation / use.

1. Actuate tractor control unit.
→ Raise the seed drill complete with lifting frame.
2. Secure tractor and machine against unintentional starting and rolling away.
3. Swivel safety brace (Fig. 43/1)
   o into the transport position (Fig. 43/2) or
   o into the parking position (Fig. 43/4).
4. Locate safety brace with pin (Fig. 43/3) then secure with lynch pin.

### 11.4 Restricting the lift height of the precision airplanter

The lift height of the lifting frame can be restricted (see on page 86) by installing the lift height limitation valve (Fig. 44).

If the soil tillage implement is used in combination with a universal joint shaft driven seed drill, it is advisable to limit the lift height of the lifting frame so that the universal joint shaft can continue running when the tractor is turning.

A precision airplanter remains functional during turning with the tractor's universal joint shaft running. The shutdown of the universal joint shaft and corresponding pressure drop in the precision airplanter with dropping of grains from the metering discs no longer occurs.

If the seed drill is raised by the lifting frame, the top link (Fig. 44/1) pushes against the pin (Fig. 44/2) and closes the valve that regulates the flow of oil to the cylinders.

The lift height of the seed drill is adjustable. To adjust the lift height, the pin (Fig. 44/2) must be located in the corresponding hole of the U-bracket and secured using a lynch pin.

---

When transporting the machine by road, the pin (Fig. 44/2) must be removed so the seed drill can be fully raised by the lifting frame and the lift height limitation can't be effective.
11.4.1 Fitting of the lift height limitation

**CAUTION**

The hydraulic system is under a high pressure! Depressurise the hydraulic system before starting work on the lifting frame.

1. Lower the lifting frame.
2. Secure tractor and machine against unintentional starting and rolling away.
3. Depressurise the hydraulic system.
4. Unscrew the hydraulic line from the T-connector (Fig. 45/1).
5. Screw the valve holder (Fig. 45/2) on at the upper pivot point of the soil tillage implement.
6. Screw hydraulic lines on at the valve (Fig. 45/3), run the hydraulic line to the tractor and connect to a single-acting spool valve.
7. Pressurise the lifting frame by operating the spool valve from the tractor cab and check the hydraulic system for leaks, repair if necessary.

**WARNING**

Risk of injury from moving parts!

Direct persons away from the danger area before operating the tractor control unit!
11.5  Connecting the top-mounted seed drill AD

- Fitting the coupling parts
- Connecting the AD
  → See AD operating manual.

Fig. 46

11.6  Connecting the top-mounted seed drill AD-P Special

- Fitting the coupling parts
- Connecting the AD-P Special
  → See AD-P Special operating manual.

Fig. 47
12 Cleaning, maintenance and repairs

**WARNING**
Risk of crushing, cutting, catching, drawing in and knocks through
- unintentional falling of the machine raised using the tractor's three-point hydraulic system.
- unintentional falling of raised, unsecured machine parts.
- unintentional start-up and rolling of the tractor-machine combination.

Secure the tractor and machine against unintentional starting and unintentional rolling away before you perform any cleaning, servicing or maintenance work on the machine. See page 58.

**WARNING**
Risk of crushing, cutting, catching, drawing in and knocks through unprotected danger points!
- Mount protective equipment, which you removed when cleaning, maintaining and repairing the machine.
- Replace defective protective equipment with new equipment.

12.1 Cleaning

- Pay particular attention to the brake, air and hydraulic hose lines.
- Never treat brake, air and hydraulic hose lines with petrol, benzene, petroleum or mineral oils.
- After cleaning, grease the machine, in particular after cleaning with a high pressure cleaner / steam jet or liposoluble agents.
- Observe the statutory requirement for the handling and removal of cleaning agents.
Cleaning, maintenance and repairs

Cleaning with a high pressure cleaner / steam jet

- Always observe the following points when using a high pressure cleaner / 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 high pressure cleaner / 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 high pressure cleaners.

12.2 Lubricating instructions

**WARNING**

Risk of crushing, catching, entanglement and impacts due to accidental movements of the tractor and machine in the danger areas of the machine!

Never climb inside the machine,
- as long as the tractor engine is running with a connected PTO shaft / hydraulic system.
- if the ignition key is in the tractor and the tractor engine can be started unintentionally with the PTO shaft / hydraulic system connected.
- if the tractor is not secured against accidental rolling via the parking brake.
- if the machine is not resting on the ground or if raised machine parts are not secured to prevent them from dropping accidentally.

1. Lower the machine so that it rests on the ground.
   → This prevents the raised machine from dropping accidentally.

2. Secure the tractor against unintentional starting and unintentional rolling away.

3. Lubricate the machine.

Lubricate/grease the machine at the specified intervals.

Lubrication points on the machine are indicated with the foil (Fig. 48).

Carefully clean the lubrication points and grease gun before lubrication so that no dirt is pressed into the bearings. Press the dirty grease out of the bearings completely and replace it with new grease.

Fig. 48
Cleaning, maintenance and repairs

<table>
<thead>
<tr>
<th>Designation</th>
<th>Quantity</th>
<th>Lubrication interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Flange bearings of the roller</td>
<td>2</td>
<td>50 h every 3 months</td>
</tr>
<tr>
<td>2 Crank, levelling bar</td>
<td>2</td>
<td>100 h every 6 months</td>
</tr>
<tr>
<td>3 PTO shaft</td>
<td>See below</td>
<td></td>
</tr>
<tr>
<td>4 Huckepack 2.1</td>
<td>6</td>
<td>100 h every 6 months</td>
</tr>
</tbody>
</table>

Lubricants

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

<table>
<thead>
<tr>
<th>Company</th>
<th>Lubricant name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal operating conditions</td>
</tr>
<tr>
<td>ARAL</td>
<td>Aralub HL 2</td>
</tr>
<tr>
<td>FINA</td>
<td>Marson L2</td>
</tr>
<tr>
<td>ESSO</td>
<td>Beacon 2</td>
</tr>
<tr>
<td>SHELL</td>
<td>Ratinax A</td>
</tr>
</tbody>
</table>

Lubrication point overview

1. Flange bearing of
   - Tooth packer roller
   - Cage roller
   - Wedge ring roller

2. Crank of levelling bar

3. PTO shaft

   The protective tubes must be greased to prevent freezing in winter.

   Also observe the installation and service instructions from the PTO shaft manufacturer, which are fastened to the PTO shaft.

Fig. 49

Fig. 50
If the lubrication nipple of the universal joint needs to be accessed, e.g. to carry out maintenance on the PTO shaft, the PTO shaft guard must be turned.

Pull the halves of the PTO shaft apart. Lubricate the sliding tubes manually if a lubricating nipple is not provided.

Also observe the maintenance instructions of the PTO shaft manufacturer.

4. Huckepack
12.3  Service plan – 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.

For the first time after 1 week / 50 operational hours

<table>
<thead>
<tr>
<th>Component</th>
<th>Servicing work</th>
<th>See page</th>
<th>Workshop task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gearbox</td>
<td>Oil change</td>
<td>95</td>
<td>X</td>
</tr>
</tbody>
</table>

Every six months / 100 operational hours

<table>
<thead>
<tr>
<th>Component</th>
<th>Servicing work</th>
<th>See page</th>
<th>Workshop task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gearbox</td>
<td>Check the oil level</td>
<td>95</td>
<td></td>
</tr>
</tbody>
</table>

Once a year / every 200 operational hours

<table>
<thead>
<tr>
<th>Component</th>
<th>Servicing work</th>
<th>See page</th>
<th>Workshop task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vent pipe</td>
<td>Check for blockage</td>
<td>95</td>
<td></td>
</tr>
</tbody>
</table>

Every two years / 350 operational hours

<table>
<thead>
<tr>
<th>Component</th>
<th>Servicing work</th>
<th>See page</th>
<th>Workshop task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gearbox</td>
<td>Oil change</td>
<td>95</td>
<td>X</td>
</tr>
</tbody>
</table>

As required

<table>
<thead>
<tr>
<th>Component</th>
<th>Servicing work</th>
<th>See page</th>
<th>Workshop task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil tillage tines</td>
<td>Exchange</td>
<td>97</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Restore to original length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload clutch of PTO shaft</td>
<td></td>
<td>99</td>
<td>X</td>
</tr>
</tbody>
</table>
12.4 Replacement of exchange gear wheels (workshop task)

**WARNING**

Risk of crushing due to unintentional lowering of the raised machine when exchanging or replacing the exchange gear wheels!

This can inflict severe injuries resulting in loss of limbs, particularly the lower limbs (feet).

The exchange gear wheels of the exchange gear main gearbox should only be exchanged/replaced by a specialist workshop under the following circumstances:

- the soil tillage implement and trailing roller have separated or have been pulled apart.
- the raised soil tillage implement is secured using supports or a crane to prevent it from lowering accidentally.

**WARNING**

Risk of drawing in and trapping due to unintentional starting and rolling of the tractor when exchanging or replacing the exchange gear wheels!

Secure the tractor and machine to prevent unintentional starting and rolling away before performing any cleaning, servicing or maintenance work on the machine.

**WARNING**

Risk of burns from hot components of the exchange gear main gearbox or hot gear oil directly after the machine has been in use!

This can result in severe injuries to the fingers and hands.

Wear protective gloves and use suitable tools to exchange or replace the exchange gear wheels.

The speed of the tines can be adjusted at the gearbox by replacing the bevel wheels.

Two speeds can be set.

The speed of the tines depends which gear wheel is mounted in the gearbox and the speed of the tractor's universal joint shaft.

For the speed of the tines refer to the table of speeds (Fig. 53).
We recommend setting the speed of the tractor's universal joint shaft at 1000 rpm!

Setting high tine speeds can cause substantially higher wear of the tines!

**CAUTION**

Risk of burning from hot gearbox and gear oil!

Do not touch the gearbox housing or parts of the gearbox and gear wheels if they are hot! Wear suitable gloves!

Avoid coming into contact with hot gear oil!

1. Separate the soil tillage implement and top-mounted seed drill if necessary. For more information refer to the operating instructions for the top-mounted seed drill.

   → The exchange gear main gearbox is easily accessible.

2. Secure the tractor against unintentional starting and unintentional rolling away.

3. Put on protective gloves

4. Release and remove the screws (Fig. 54/1) on the gearbox cover (Fig. 54/2).

5. Remove gearbox cover and cover gasket from gearbox casing

6. Withdraw the axial retaining device (Fig. 55/4) from the drive shaft.

7. Thoroughly clean the drive shaft so that no dirt gets into the gearbox when the drive shaft is withdrawn from the casing.

8. Withdraw the drive shaft from the casing in the direction of the arrow (Fig. 55/3).

9. The gear wheel I is pushed off the shaft.

10. Remove the gear wheel from the output drive shaft and fit the other gear wheel.

11. Push the drive shaft back into the casing and fit the remaining gear wheel on the shaft.

12. Secure the axial retaining device on the shaft.

13. Fit the gearbox cover and cover gasket with screws.
12.5 Oil level in gearbox (workshop task)

The oil level in the gearbox should only be checked when the machine is horizontal.

The oil film on the oil dipstick (Fig. 56/1) must appear below the "max." mark.

Fill gear oil as required (see table on page 92) via the aperture channel of the oil dipstick.

Place a suitable container below the gearbox to collect the oil before you open the oil drain screw.

The gearbox has an oil dipstick (Fig. 56/1) with venting function. Proper ventilation must be provided at all times, as otherwise the gearbox can develop leaks.

Make sure that the oil dipstick is always tightly seated!

Types of gear oil and filling quantities

<table>
<thead>
<tr>
<th>Filling quantity</th>
<th>Gear oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4 l</td>
<td>SAE 80 W-90</td>
</tr>
</tbody>
</table>

12.6 Oil level in spur gear trough

There is no need to change the oil.

Gear oil filling quantity, spur gear troughs [ l ]:

| KE 2500 | 21 |
| KE 3000 | 25 |

The teeth of the spur gears in the spur gear trough must be halfway covered with gear oil when the soil tillage implement is in a horizontal position.

A vent pipe for the spur gear trough is fitted to the gearbox (Fig. 58/1).

Proper ventilation must be ensured at all times.

Regularly clean the vent pipe using compressed air.
After a general overhaul of the soil tillage implement, add new gear oil only.

When replenishing gear oil, ensure that the oil you are using is clean and that dirt cannot enter the spur gear trough while the oil is being added.

Only use gear oil with CLP quality and IG 460 viscosity.

The spur gear troughs are filled at the factor with this gear oil: **ERSOLAN 460**

**Manufacturer:** Wintershall.

If it is necessary to add or replace gear oil and no ERSOLAN 460 brand oil is available, the gear oil varieties listed in the table may be admixed or substituted.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Gear oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wintershall</td>
<td>ERSOLAN 460</td>
</tr>
<tr>
<td>Agip</td>
<td>Blasia 460</td>
</tr>
<tr>
<td>ARAL</td>
<td>Degol BG 460</td>
</tr>
<tr>
<td>Autol</td>
<td>Precis GEP 460</td>
</tr>
<tr>
<td>Avia</td>
<td>Avilub RSX 460</td>
</tr>
<tr>
<td>BP</td>
<td>Energoil GR-XP 460</td>
</tr>
<tr>
<td>Castrol</td>
<td>Alpha SP 460</td>
</tr>
<tr>
<td>DEA</td>
<td>Falcon CLP 460</td>
</tr>
<tr>
<td>ESSO</td>
<td>Spartan EP 460</td>
</tr>
<tr>
<td>FINA</td>
<td>Giran 460</td>
</tr>
<tr>
<td>Fuchs</td>
<td>Renep Compound 110</td>
</tr>
<tr>
<td>Mobil</td>
<td>Mobilgear 634</td>
</tr>
<tr>
<td>Shell</td>
<td>Omala 460</td>
</tr>
</tbody>
</table>
12.7 Soil tillage tines

The tines (Fig. 58/1) of the soil tillage implement are made of hardened, high-strength boron steel. The tines are subject to wear and must be replaced no later than when they have reached a length of $L_{\text{min.}} = 125$ mm (Fig. 58). For great working depths, the tines must be replaced earlier in order to avoid damage and wear to the tool carriers (Fig. 58/2).

If the tines fall below the minimum length of 125 mm, claims due to rock damage shall not be accepted.

Replacing the soil tillage tines (workshop task)

**WARNING**

- **Risk of crushing due to unintentional lowering of the raised machine when exchanging or replacing the soil tillage tines!**

  The soil tillage tines should be exchanged/replaced at the workshop. You may only exchange/replace soil tillage tines if the soil tillage implement is secured by supporting elements or a crane to prevent it from lowering accidentally.

**WARNING**

- **Risk of catching and entrapment due to unintentional starting and rolling of the tractor when exchanging or replacing the soil tillage tines!**

  Secure the tractor to prevent accidental starting and rolling before you exchange/replace the soil tillage tines.
The soil tillage tines (Fig. 59/1) are fastened to the sockets of the tool carriers (Fig. 59/2).

1. Pull the lynch pin (Fig. 59/3) out of the pin (Fig. 59/4).
2. Remove the pin (Fig. 59/4) from the tool carrier by striking it in an upwards direction.
3. Pull the soil tillage tines out of the tool carrier.
4. Replace them.
5. Peg them using pins and secure using a lynch pin.

The running direction of the tines changes for every tool carrier. Therefore, the soil tillage implement is equipped with two varieties of tines (one for each running direction). The soil tillage tines must not be confused.

The leftmost tool carrier, viewed in the direction of travel, rotates clockwise. The running direction of the tool carriers is illustrated in Fig. 60.

The arrows shown above the tool carriers identify the running direction of the tool carriers.

Figure (Fig. 60/1) shows the rotary harrow tines for clockwise rotating tool carriers.

Figure (Fig. 60/2) shows the rotary harrow tines for anticlockwise rotating tool carriers.
12.8 PTO shaft with shear pin coupling (workshop task)

The PTO shaft is equipped with a shear pin coupling (Fig. 61).

If the rotor is blocked by stones that become trapped between the tines, the shear pin breaks off to prevent damage to the gearbox components.

The pin shears off at a torque of 2400 Nm.

Use a M10 x 50 8.8 bolt with shaft as the shear pin.

If bolts without shafts are used the transferable torque reduces by 20%.

12.9 PTO shaft with ratchet clutch (workshop task)

Under normal conditions, the ratchet clutch is maintenance-free.

Only in case of intensive work and very frequent activation of the clutch do we recommend checking the lubrication condition once per season.

If lubrication is necessary, use Agraset 116 or Agraset 117 special grease.

Also observe the installation and service instructions from the PTO shaft manufacturer, which are fastened to the PTO shaft.

12.10 Top and lower link pins

WARNING
Risk of crushing, catching, and knocks when the machine unexpectedly releases from the tractor!

Check the upper and lower link pins for visible damage each time you couple the machine. Replace the upper and lower link pins if there are clear signs of wear.
### 12.11 Screw tightening torques

<table>
<thead>
<tr>
<th>Thread</th>
<th>Width across flats [mm]</th>
<th>Tightening torques [Nm] depending on the quality of the nuts/bolts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>8.8</td>
</tr>
<tr>
<td>M 8</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>M 8x1</td>
<td></td>
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