Original operating instructions

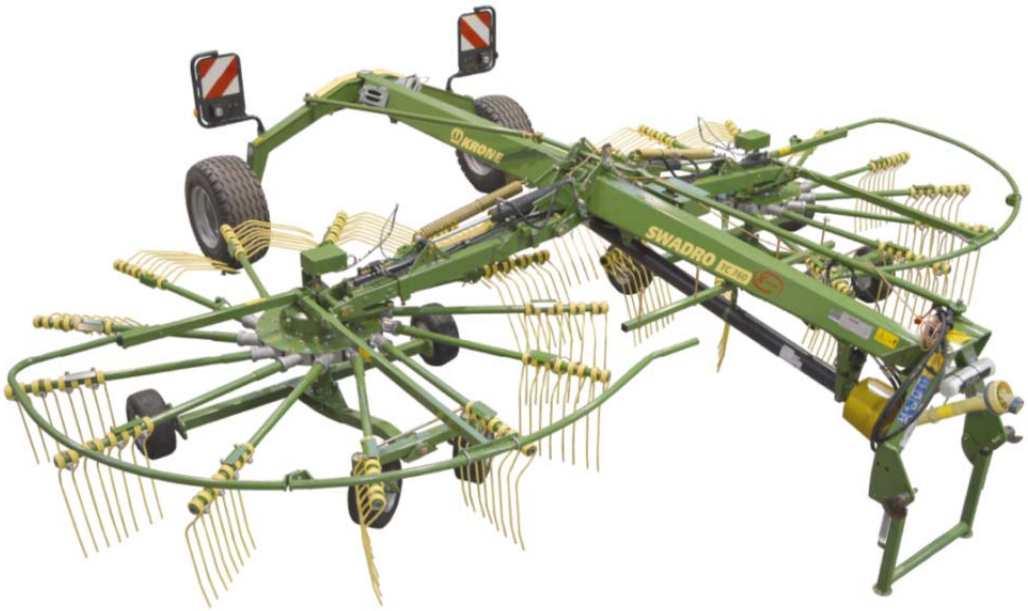
KRONE

Rotary Rake

Swadro TC 680
Swadro TC 760

(from serial no.: 913 038)

Order no.: 150 000 287 02 en



20.05.2015

EC Declaration of Conformity

We, **Maschinenfabrik Bernard KRONE GmbH**

Heinrich-Krone-Str. 10, D-48480 Spelle

hereby declare as manufacturer of the product named below, on our sole responsibility, that the

machine: **Rotary rake KRONE**
type / types: **Swadro TC 680; Swadro TC 760**

to which this declaration refers is in compliance with the relevant provisions of

EC Directive 2006/42/EC (machines)

The signing managing director is authorised to compile the technical documents.

Spelle, 22.10.2014

Dr.-Ing. Josef Horstmann
(Managing Director Design & Development)

Year of manufacture:	**Mach. no.:**

1 Table of Contents

2 Foreword

Dear Customer,

By purchasing your rotary rake, you have acquired a quality product from KRONE.

We are grateful for the confidence you have invested in us in buying this machine.

It is important to read the operating instructions very carefully before you start operating the machine to allow you to use the rotary rake to its full capacity.

The contents of this manual are laid out in such a way that you should be able to perform any task by following the instructions step by step. It contains extensive notes and information about maintenance, how to use the machine safely, secure working methods, special precautionary measures and available accessories. This information and these instructions are essential, important and useful for the operational safety, reliability and durability of the rotary rake.

Note

In the operating instructions which follow, the rotary rake will also be referred to as the "machine".

Please note:

The operating instructions are part of your machine.

Only operate this machine after you have been trained to do so and according to these instructions.

It is essential to observe the safety instructions!

It is also necessary to observe the relevant accident prevention regulations and other generally recognised regulations concerning safety, occupational health and road traffic.

All information, illustrations and technical data in these operating instructions correspond to the latest state at the time of publication.

We reserve the right to make design changes at any time and without notification of reasons. Should you for any reason not be able to use these operating instructions either wholly or partially, you can receive a replacement set of operating instructions for your machine by quoting the number supplied overleaf.

We hope that you will be satisfied with your KRONE machine.

Maschinenfabrik Bernard Krone GmbH

Spelle

3 To this Document

3.1 Validity

These operating instructions apply to rotary rakes of the series:
Swadro TC 680, Swadro TC 760

3.2 Identifying Symbols in the Operating Instructions

The safety instructions contained in this manual which could result in personal injury if not followed are identified by the general danger sign:

Danger!

DANGER!
Type and source of the hazard!
Effect: Danger to life or serious injuries.
- Measures for hazard prevention

Warning !

WARNING!
Type and source of the hazard!
Effect: Injuries, serious material damage.
- Measures for hazard prevention

Caution!

CAUTION!
Type and source of the hazard!
Effect: Property damage
- Measures for risk prevention.

General function instructions are indicated as follows:
Note!

Note - Type and source of the note
Effect: Economic advantage of the machine
- Actions to be taken

Instructions which are attached to the machine need to be followed and kept fully legible.

3.3 Direction Information

Direction information in these operating instructions such as front, rear, right and left always applies in direction of travel.

3.4 Means of representation

In these operating instructions, the following means of representation are used:

Action steps

One point (•) indicates an action step you have to perform, as for example:

- Set the left outside mirror.

Sequence of actions

Several points (•) in front of a sequence of actions characterize a sequence of actions you have to perform step by step, as for example:

- Loosen counter nut.
- Mount screw.
- Tighten counter nut.

Enumeration

Bullet points (-) characterize enumerations such as, for example:

– Brakes
– Steering
– Lighting

4 Safety

4.1 Purpose of Use

The rotary rake is used for swathing of cut crops. It is attached on the rear in the three-point block KAT I and KAT II.

4.2 Intended use

The rotary rake is built exclusively for conventionaluse in agricultural work (intended use).

Unauthorised modifications to the machine may have a negative effect on the machine characteristics or safe and reliable use of the machine or may interfere with proper operation. Unauthorised modifications shall therefore release the manufacturer of any liability for consequential damage.

4.3 Service life of the machine

- The service life of this machine strongly depends on proper use and maintenance as well as the operating conditions.
- Permanent operational readiness as well as long service life of the machine can be achieved by observing the instructions and notes of these operating instructions.
- After each season of use, the machine must be checked thoroughly for wear and other damage.
- Damaged and worn parts must be replaced before placing the machine into service again.
- After the machine has been used for five years, carry out full technical inspection of the machine. According to the results of this inspection, a decision concerning the possibility of reuse of the machine should be taken.
- Theoretically, the service life of this machine is unlimited as all worn or damaged parts can be replaced.

4.4 Basic safety instructions

Non-compliance with the safety instructions and warnings

Non-compliance with the safety instructions and warnings may result in injuries and damage to the environment and property.

4.4.1 Importance of the operating instructions

The operating instructions are an important document and a part of the machine. They are intended for the user and contain information relevant to safety.
Only the procedures indicated in the operating instructions are reliable. If the operating instructions are not followed, people may be seriously injured or killed.

- Before using the machine for the first time, read and follow all the "Basic safety instructions" in the chapter Safety.
- Before working, also read and observe the respective sections in the operating instructions.
- Retain the operating instructions and ensure that they are always available.
- Hand over the operating instructions to subsequent users.

4.4.2 Personnel qualification

If the machine is not used properly, people may be seriously injured or killed. To avoid accidents, each person who works with the machine must satisfy the following minimum requirements:

– He is physically capable of controlling the machine.
– He can work safely with the machine in accordance with these operating instructions.
– He understands the method of operation of the machine within the scope of his work and can identify and avoid the dangers associated with the work.
– He has read the operating instructions and can implement the information in the operating instructions accordingly.
– He is familiar with driving vehicles safely.
– For road travel he has adequate knowledge of the highway code and has the stipulated driving licence.

4.4.3 Children in danger

Children cannot assess danger and behave unpredictably.
As a result, children are especially at risk.

- Keep children away from the machine.
- Keep children away from consumables.
- Especially before starting up and moving the machine, ensure that there are no children in the danger zone.

4.4.4 Coupling

If the tractor and the machine are not correctly connected, there is a risk of causing serious accidents.

- When connecting front attachments or trailers, follow all operating instructions:
  – The operating instructions for the tractor
  – The operating instructions for the machine
  – The operating instructions for the universal shaft
- Follow the coupling instructions, see chapter on starting up "Connect the machine to the tractor".
- Note the modified driving behaviour of the combination.

4.4.5 Structural changes to the machine

Structural changes and enhancements may impair the functionality and operational safety of the machine. As a result, people may be seriously injured or killed.

- Have structural changes and enhancements performed by an authorised service centre only.

4.4.6 Additional equipment and spare parts

Additional equipment and spare parts, which do not comply with the requirements of the manufacturer, may impair the operational safety of the machine and cause accidents.

- To ensure operational safety, use original or standard parts which comply with the requirements of the manufacturer. If in doubt, have parts verified by the dealer or manufacturer.

4.4.7 Workstations and passengers

Control of the moving machine

The moving machine requires the driver to react quickly at any time. Otherwise, the machine may move in an uncontrolled manner and seriously injure or kill people.

- Start the engine from the driver's seat only.
- Never leave the driver's seat while the machine is moving.
- Never climb in or out of the machine while it is moving.

Passengers

Passengers may be seriously injured by the machine or fall off the machine and get run over. Ejected objects may strike and injure passengers.

- Never let people ride on the machine.

4.4.8 Operational safety: Technically perfect condition

Operation only when the machine has been started up correctly

If the machine is not started up correctly according to these operating instructions, the operational safety of the machine is not ensured. As a result, accidents may occur and people may be seriously injured or killed.

- Do not use the machine unless it has been started up correctly, see chapter Start-up.

Technically perfect condition of the machine

Improper maintenance and adjustment may affect the operational safety of the machine and cause accidents. As a result, people may be seriously injured or killed.

- Perform all maintenance and adjustment work according to the chapters Maintenance and Adjustment.
- Before performing any maintenance or adjustment work, shut down and safeguard the machine, see chapter Safety "Shutting down and safeguarding the machine".

Danger resulting from damage to the machine

Damage to the machine may impair the operational safety of the machine and cause accidents. As a result, people may be seriously injured or killed. The following parts of the machine are particularly important for safety:

– Steering
– Safety devices
– Connecting devices
– Lighting
– Hydraulic system
– Tyres
– Universal shaft

If there are doubts about the operational safety of the machine, for example due to leaking consumables, visible damage or an unexpected change to the driving behaviour:

- Shut down and safeguard the machine, see chapter Safety, "Shutting down and safeguarding the machine".
- Immediately eliminate potential causes of damage, for example heavy soiling, or tighten slack screws.
- If possible, repair the damage according to these operating instructions.
- In the case of damage which may affect operational safety and cannot be repaired according to these operating instructions: Have damage repaired by a qualified service centre.

Technical limit values

When the technical limit values of the machine are not met, the machine may be damaged. Thus there is a risk of accidents, serious injuries or death. With regard to safety, it is of special importance to comply with the following technical limit values:

– Gross vehicle weight
– Permissible axle load
– Permissible supported load
– Maximum permissible speed

- Meet limit values, refer to chapter entitled “Technical Data”.

4.4.9 Danger zones

Danger zones on the tractor and the machine

The area around the tractor and the machine is a danger zone.
There are the following hazards in this danger zone:

– The tractor and the machine may start moving or rolling away and run over people.
– If the power lifter is unintentionally actuated, the machine may make hazardous movements.
– Defective or insecurely attached electrical cables may cause fatal electric shocks.
– Defective or insecurely attached hydraulic or pneumatic lines may become detached and flail around. Hydraulic oil may escape under high pressure and cause serious injuries to the skin or face.
– Clothing may become caught and wrapped around an exposed PTO shaft or a damaged or incorrectly installed universal shaft.
– When the drive is switched on, machine parts may rotate or swivel.
– Hydraulically raised machine parts may descend unnoticed and slowly.

If the danger zone is not observed, people may be seriously injured or killed.

• Keep people away from the danger zone of the tractor and the machine.
• Do not switch on the drives and engine until there is nobody in the danger zone.

The safety clearance is:

– 30 metres in front of the machine while in operation.
– 5 metres in front of the machine when at a standstill.
– 3 metres on either side of the machine.
– 5 metres behind the machine.

• Before working in front of and behind the tractor and in the danger zone of the machine: Shut down and safeguard the machine, see chapter Safety, "Shutting down and safeguarding the machine". This also applies to brief inspection work. Many serious accidents in front of and behind the tractor and the machine occur due to negligence and running machines.
• Consider the information in all relevant operating instructions.
  – The operating instructions for the tractor
  – The operating instructions for the machine
  – The operating instructions for the universal shaft

Danger zone between tractor and machine

People standing between the tractor and machine may be seriously injured or killed if the tractor rolls away or by machine movements:

- Before starting all work between the tractor and machine: • Shut down and safeguard the machine, see chapter Safety, "Shutting down and safeguarding the machine". This also applies to brief inspection work. Many serious accidents occur due to negligence and running machines.
- If the power lifter has to be actuated, keep all people away from the area of movement of the power lifter.

Danger zone when drive switched on

When the drive is switched on, there is a danger to life from rotating and swivelling machine parts. There must be nobody in the danger zone of the machine.

- Before starting the machine, direct all people out of the danger zone of the machine.
- If a hazardous situation arises, switch off drives and diesel engine immediately.

Danger zone of the P.T.O. shaft

People may be caught, pulled in and seriously injured by the PTO shaft and the driven components.

Before engaging the PTO shaft:

- Make sure that all safety devices are fitted and in the protection position.
- Ensure that the selected speed and direction of rotation of the PTO shaft match the permitted speed and direction of rotation of the machine.
- Ensure that nobody is in the danger zone of the PTO shaft or the universal shaft.
- If the angles are too large, switch off the PTO shaft. The machine may be damaged. Parts may be flung out and cause injury to persons.
- If the PTO shaft is not required, switch off the PTO shaft.

Danger zone universal shaft

People may become caught by the universal shaft, pulled in and seriously injured.

- Ensure that the universal shaft guards are attached and functional.
- Ensure that nobody is in the danger zone of the PTO shaft or the universal shaft.
- Provide the section tube and universal shaft guards with adequate cover.
- Allow the universal shaft locks to engage.
- Attach the chains to prevent the universal shaft guards from rotating with the shaft.
- Follow the operating instructions for the universal shaft.

Danger zone due to coasting machine parts

When the drives have been switched off, the following machine parts will coast:

– Universal shaft
– Rotor

When machine parts are coasting, people may be seriously injured or killed.

Shut down and safeguard the machine, see chapter Safety, "Shutting down and safeguarding the machine".

- Do not touch machine parts until they have come to a standstill.

4.4.10 Keeping safety devices functional

If safety devices are missing or damaged, people may be seriously injured or killed by moving machine parts.

- Replace damaged safety devices.
- Re-install all removed safety devices and all other parts and move them into protective position before starting up the machine.
- If it is doubtful whether all safety devices have been correctly installed and are functional, have a service centre check them.

4.4.11 Personal protective equipment

The wearing of personal protective equipment is an important safety measure. Missing or unsuitable personal protective equipment increases health risks and injuries.
Personal protective equipment is for example:

– Work gloves
– Safety boots
– Protective clothing
– Breathing protection
– Hearing protection
– Face and eye protection

- Specify and provide personal protective equipment for the particular job.
- Use only personal protective equipment which is in proper condition and offers effective protection.
- Adjust personal protective equipment to the person, for example the size.

Wear suitable clothing

Loose clothing increases the risk of it becoming caught or wrapped around rotating parts and of it becoming caught on protruding parts. As a result, people may be seriously injured or killed.

- Wear tight-fitting clothing.
- Never wear rings, chains or other items of jewellery.
- Cover long hair with a hairnet.
- Wear sturdy shoes or protective work boots.

4.4.12 Safety signs on the machine

Safety stickers on the machine warn of hazards in danger areas and are an important component of the safety equipment of the machine. Missing safety stickers increase the risk of serious and fatal injuries.

- Clean dirty safety stickers.
- After cleaning, always check that safety stickers are complete and legible.
- Immediately replace missing, damaged and unrecognisable safety stickers.
- Provide spare parts with the designated safety stickers.

Description, explanation and order numbers of the safety stickers, see chapter Safety, "Safety stickers on the machine".

4.4.13 Traffic safety

Dangers when driving on roads and in fields

The mounted or attached work machine changes the handling characteristics of the tractor. The handling characteristics also depend on the operational state and on the ground. If the driver does not consider changed handling characteristics, he may cause accidents.

- Observe procedures for driving on roads and in fields, see chapter "Driving and transportation".

Prepare the machine for road travel

If the machine is not prepared properly for road travel, serious accidents may occur with traffic.

- Before travelling on the road, always prepare the machine for road travel, see chapter Driving and transportation, "Preparations for road travel".

Danger of overturning

The machine may overturn when driving on slopes. As a result, accidents may occur and people may be seriously injured or killed. The risk of overturning depends on many factors.

- Observe procedures for driving, see chapter Driving and transportation.

4.4.14 Parking the machine safely

The parked machine may overturn. People may be crushed and killed.

- Park the machine on a stable and even surface.
- Before adjusting, repairing, servicing or cleaning the machine, ensure that it is securely positioned. If in doubt, support the machine.
- In the chapter Driving and transportation note the section "Parking the machine".

Unattended parking

Adults and playing children are at risk from an inadequately secured and unattended parked machine.

- Before switching off the machine: Shut down and safeguard the machine, see chapter Safety, "Shutting down and safeguarding the machine".

4.4.15 Consumables

Unsuitable consumables

Consumables which do not comply with the requirements of the manufacturer, may impair the operational safety of the machine and cause accidents.

- Use only consumables which comply with the requirements.

For the requirements of fuels, see chapter Description of machine, "Consumables".

Protection of the environment and disposal

Consumables such as diesel fuel, brake fluid, antifreeze and lubricants may damage the environment and the health of people.

- Do not release consumables into the environment.
- Absorb leaked consumables with an absorbent material or with sand, place in a liquid-tight labelled container and dispose of according to the official regulations.

4.4.16 Sources of danger on the machine

Noise may lead to health problems

When working with the machine for a longer time, serious health damage may result such as hearing loss, deafness or tinnitus. When using the machine at high speed, the noise level increases as well.

- Before starting up the combination of tractor and machine, evaluate the danger by noise. Determine and use hearing protection that is suitable depending on environmental conditions, working hours as well as working conditions and operating conditions of the machine. In this process, observe sound pressure level, refer to chapter Technical Data.
- Define rules for the utilization of hearing protection and for working time.
- When the machine is in operation, keep windows and doors of the cab closed.
- Remove hearing protection for road travel.

Liquids under pressure

The following liquids are under high pressure:

– Hydraulic oil

Liquids under high pressure may penetrate the body through the skin and cause serious injuries.

- If a damaged pressure system is suspected, immediately contact a qualified service centre.
- Never search for leaks with bare hands. Even a pin-sized hole may cause serious injuries.
- Keep body and face away from leaks.
- If liquids penetrate the body, immediately consult a doctor. The liquid must be removed from the body as quickly as possible. Danger of infection!

Hot liquids

Risk of burns and scalding from hot liquids!

- When draining hot consumables, wear protective gloves.
- If required, leave liquids and machine parts to cool down before performing repair, maintenance and cleaning work.

Toxic exhaust gases

Exhaust gases may seriously damage your health or be fatal.

- While the engine is running, provide adequate ventilation to prevent prolonged exposure to exhaust gases.
- Do not leave the engine running in a closed room unless there is a suitable exhaust gas extraction system.

4.4.17 Dangers associated with certain activities: Work on the machine

Work on the machine only when it has been shut down

If the machine has not been shut down and safeguarded, parts may move unintentionally or the machine may start moving. As a result, people may be seriously injured or killed.

- Before performing any work on the machine, such as making adjustments, cleaning, preparing for road travel, preparing for work, servicing or rectifying malfunctions, shut down and safeguard the machine, see chapter Safety "Shutting down and safeguarding the machine".

Maintenance and repair work

Incorrect maintenance and repair work will endanger operational safety. As a result, accidents may occur and people may be seriously injured or killed.

- Only perform work which is described in these operating instructions. Before performing any work, shut down and safeguard the machine, see chapter Safety, "Shutting down and safeguarding the machine".
- All other maintenance and repair work may be performed by a qualified service centre only.

Raised machine and machine parts

The raised machine may accidentally drop, roll away or overturn and crush or kill people.

- Do not stand under the raised machine. First put the machine down.
- Before performing any work under the machine, securely support the machine, see chapter Safety "Securely supporting the raised machine and machine parts".
- Before performing any work on or under raised machine parts, lower the machine parts or secure them mechanically with rigid safety supports or with a hydraulic shut-off device to prevent them from dropping.

Danger associated with welding work

Improper welding work will endanger the operational safety of the machine. As a result, accidents may occur and people may be seriously injured or killed.

- Before performing welding work on the machine, obtain the consent of KRONE customer service and, if required, identify alternatives.
- Have welding work performed by experienced technicians only.

4.4.18 Dangers associated with certain activities: Working on wheels and tyres

Fitting/removing wheels and tyres

Improper fitting or removal will endanger operational safety. As a result, accidents may occur and people may be seriously injured or killed.
The fitting of wheels and tyres requires adequate knowledge and approved tools.

- If there is a lack of knowledge, have the wheels and tyres fitted by the KRONE dealer or by a qualified tyre service.
- When fitting tyres on the wheel rims, never exceed the maximum permitted pressure specified by the tyre manufacturers, otherwise the tyre or even the wheel rim may explode.
- When fitting the wheels, tighten the wheel nuts to the stipulated torque, see chapter Maintenance "Tyres".

4.4.19 Behaviour in hazardous situations and when accidents occur

Neglected or incorrect procedures in hazardous situations may obstruct or prevent the rescue of people in danger. Difficult rescue conditions will impair the chances of helping and healing the injured.

- In principle: Switch off the machine.
- Gain an overview of the hazardous situation and identify the cause of the hazard.
- Safeguard the accident location.
- Rescue people from the danger zone.
- Withdraw from the danger zone and do not enter again.
- Alert rescue teams and, if possible, fetch help.
- Take immediate life-saving measures.

4.5 Safety routines

4.5.1 Stopping and securing the machine

WARNING!

Risk of injury due to movement of the machine or machine parts

If the machine has not been shut down, the machine or machine parts may move unintentionally. As a result, people may be seriously injured or killed.

- Before leaving the machine: Shut down and secure the machine.

To park the machine securely:

- Park the machine on a stable and even surface.
- Switch off the drives and wait until coasting parts have come to a standstill.
- Switch off the tractor engine, remove the ignition key and take it with you.
- Secure the tractor against rolling away.

4.5.2 Supporting lifted machine and machine parts securely

WARNING!

Risk of injury due to movement of the machine or machine parts

If the machine is not supported securely, the machine or machine parts may roll, fall or drop. As a result, people may be seriously injured or killed.

- Before working on or under raised components: Securely support machine or machine parts.

To securely support the machine or machine parts:

- Shut down and safeguard the machine, see chapter Safety, "Shutting down and safeguarding the machine".
- Before performing any work on or under raised machine parts, lower the machine parts or secure them mechanically with rigid safety supports (e.g. support stand, crane) or with a hydraulic shut-off device (e.g. stop cock) to prevent them from dropping.
- Never support the machine or machine parts with materials which can buckle.
- Never support the machine or machine parts with hollow blocks or bricks. Hollow blocks or bricks may break under continuous load.
- Never work under the machine or machine parts which are held up by a car jack.

4.5.3 Coupling the machine safely

WARNING!

Risk of injury while hitching the machine

While hitching the machine to the tractor, the machine or machine parts may move unintentionally. As a result, people may be seriously injured or killed.

- Follow the correct steps while hitching the machine.

- While hitching the machine to the tractor, never stand between the tractor and the machine.
- Depressurise the tractor hydraulics.
- Shut down and safeguard the machine, see chapter Safety, "Shutting down and safeguarding the machine".
- Connect the hydraulic hose lines only if the hydraulic systems of the tractor and machine are depressurised.
- Connect and secure the universal shaft.
- Connect the lighting cable.
- Connect the power cable.

4.5.4 Uncoupling the machine safely

WARNING!

Risk of injury while unhitching the machine

While unhitching the machine, the machine or machine parts may move unintentionally. As a result, people may be seriously injured or killed.

- Follow the correct steps below while unhitching the machine:

- Shut down and safeguard the machine, see chapter Safety, "Shutting down and safeguarding the machine".
- Lower the parking support.
- Depressurise the tractor hydraulics.
- Disconnect the hydraulic hose lines only if the hydraulic systems of the tractor and machine are depressurised.
- Disconnect the lighting cable from the tractor.
- Disconnect the universal shaft and place it on the holder provided.
- While unhitching the machine from the tractor, never stand between the tractor and the machine.

4.5.5 Preparing the machine for repair, maintenance and adjustment work

WARNING!

Risk of injury during repair, maintenance and adjustment work on the machine.

If the machine has not been shut down, the machine or machine parts may move unintentionally. As a result, people may be seriously injured or killed.

If the machine is not supported securely, the machine or machine parts may roll, fall or drop. As a result, people may be seriously injured or killed.

- Before starting repair, maintenance and adjustment work, perform the following steps:

- Shut down and safeguard the machine, see chapter Safety, "Shutting down and safeguarding the machine".
- The raised machine or machine parts must be securely supported, see chapter Safety "Securely supporting the raised machine and machine parts".

4.5.6 Starting the machine safely

WARNING!

Risk of injury while starting up the machine

If the machine has not been safely placed in operation, the machine or machine parts may move unintentionally. As a result, people may be seriously injured or killed.

- Make certain before starting up the machine that the following requirements are met:

– The hydraulic lines are connected.
– The universal shaft is connected and secured.
– The lighting system is connected.
– The safety chain is in place (not provided in all countries).
– All safety equipment is in place, is proper condition, and in the protective position.
– The PTO speed of 540 rpm is not exceeded.
– The universal shaft recommended by the manufacturer is being used.
– The hoses, cables and ropes are laid so that they do not scrape, come under tension or become jammed or come in contact with other parts (such as the tractor tyres).
– The machine parts of the tractor do not come in contact with the machine parts of the machine (especially when cornering).
– There are no persons in the machine danger zone.

4.6 Safety stickers on the machine

4.6.1 Position and meaning of the safety stickers on the machine

The rotary rake is equipped with all safety devices (protective devices). However, it is not possible to eliminate all potential hazards on this machine as this would impair its full functional capability. Hazard warnings are attached to the machine in the relevant areas to warn against any dangers. The safety instructions are provided in the form of so-called warning pictograms. Important information on the position of these safety signs and what they mean is given below!

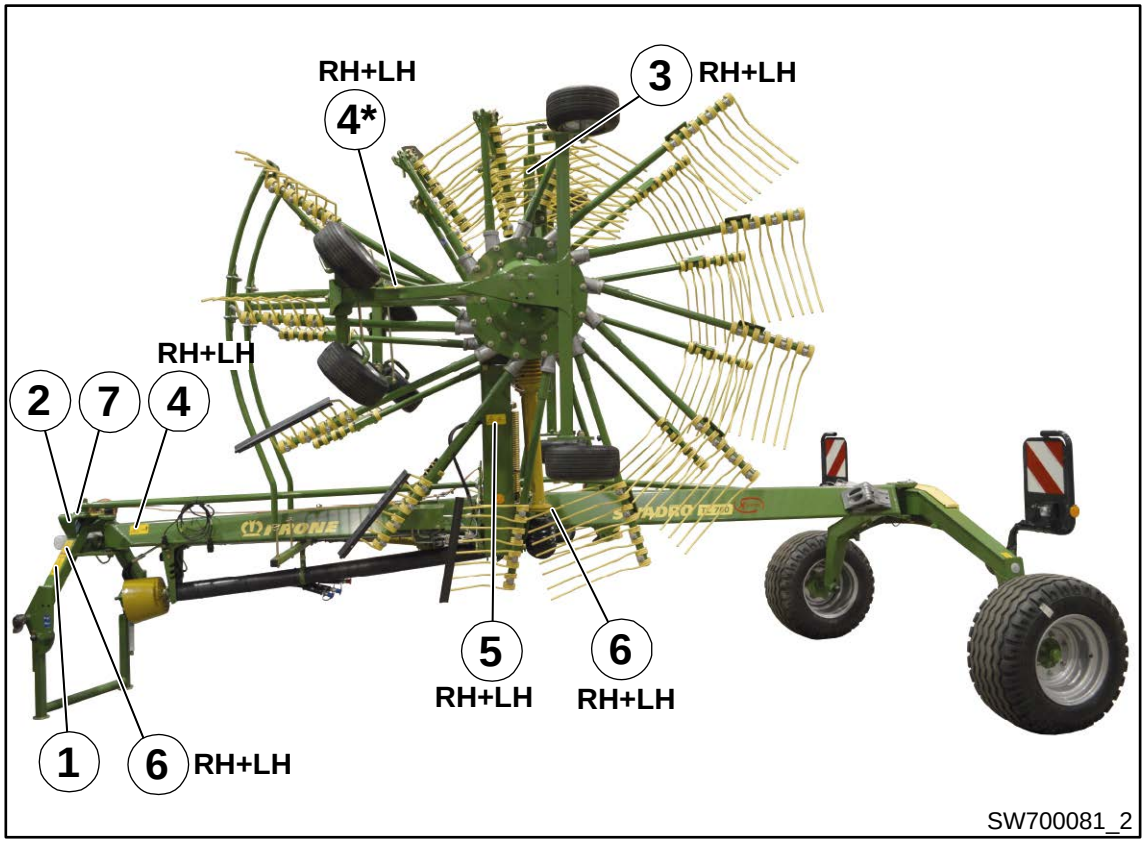
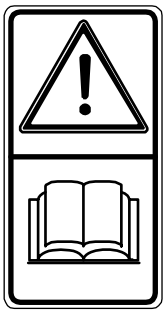


Fig. 1
RH = right-hand side of the machine / LH = left-hand side of the machine

1) Order no. 939 471 1 (1x)

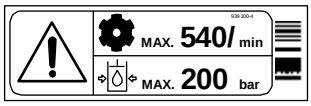


Danger due to incorrect operation and lack of knowledge

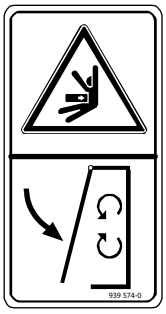
Incorrect operation and lack of knowledge of the machine as well as incorrect behaviour in hazardous situations is risking the life of the operator and third parties.

- Before starting up the machine, read and follow the operating instructions and safety instructions.

2) Order no. 939 100 4 (1x)

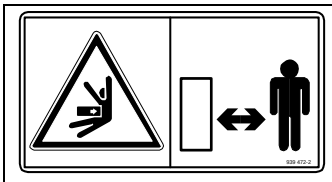
	**Danger if the maximum permitted PTO speed or the maximum permitted operating pressure is exceeded.** If the maximum permitted PTO speed is exceed, parts of the machine may be destroyed or forcibly ejected. If the maximum permitted operating pressure is exceeded, hydraulic parts may be damaged. As a result, people may be receive serious or life threatening injuries. • Observe the permitted PTO speed. • Observe the permitted operating pressure.

3) Order No. 939 574 0 (2x)

	**Danger from shock** There is a danger of injury due to moving machine parts when the machine is running. • Move guards into protective position before start-up.

4) Order No. 939 472 2 (2x)

*) in case of hydraulic width adjustment design (+2)

	**Danger due to impact** Risk of death due to swivelling movements of the machine. • Ensure that there is nobody in the swivel range of the machine. • Maintain distance from moving machine parts.

5) Order no. 939 469 1 (2x)

	**Danger due to impacts or crushing** Danger to life from machine parts folding down or lowering. • Ensure that there is nobody in the swivel range of the machine parts. • Maintain distance from moving machine parts.

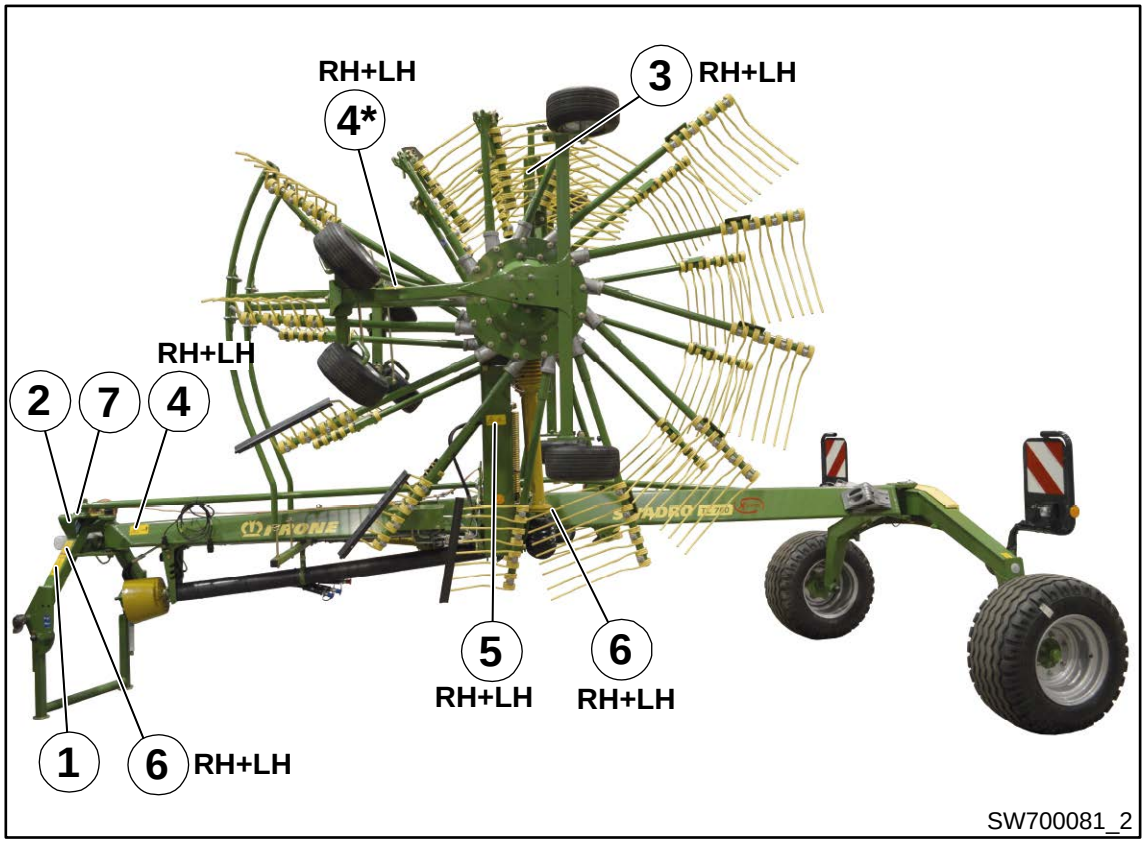
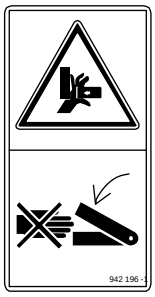
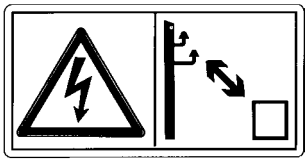


Fig. 2
RH = right-hand side of the machine / LH = left-hand side of the machine

6) Order no. 942 196 1 (4x)

	**Danger due to crushing or shearing** Risk of injury due to crushing or shearing points on moving machine parts. • While parts are moving, never reach into areas where there is a risk of being crushed.

7) Order no. 942 293 0 (1x)

	**Danger due to electric shock.** Life-threatening injuries caused by a flashover if machine parts come too close to power transmission lines. • Maintain the prescribed safe distance from power transmission lines.

4.6.2 Re-Ordering the Adhesive Safety and Information Labels

Note

Every adhesive safety and information label is assigned an order number and can be ordered directly from the manufacturer or from an authorized dealer (see Section "Contact").

4.6.3 Affixing the Adhesive Safety and Information Labels

Note - Affixing an adhesive label

Effect: Adhesion of the label

- The surface for affixing the adhesive label must be clean and free of dirt, oil and grease.

4.6.4 Contact

Maschinenfabrik Bernard Krone GmbH
Heinrich-Krone-Strasse 10
D-48480 Spelle (Germany)

Telephone: + 49 (0) 59 77/935-0 (Head Office)
Fax.: + 49 (0) 59 77/935-339 (Head Office)
Fax.: + 49 (0) 59 77/935-239 (Spare parts - domestic)
Fax.: + 49 (0) 59 77/935-359 (Spare parts - export)
Email: info.ldm@krone.de

5 Machine Description

5.1 Machine overview

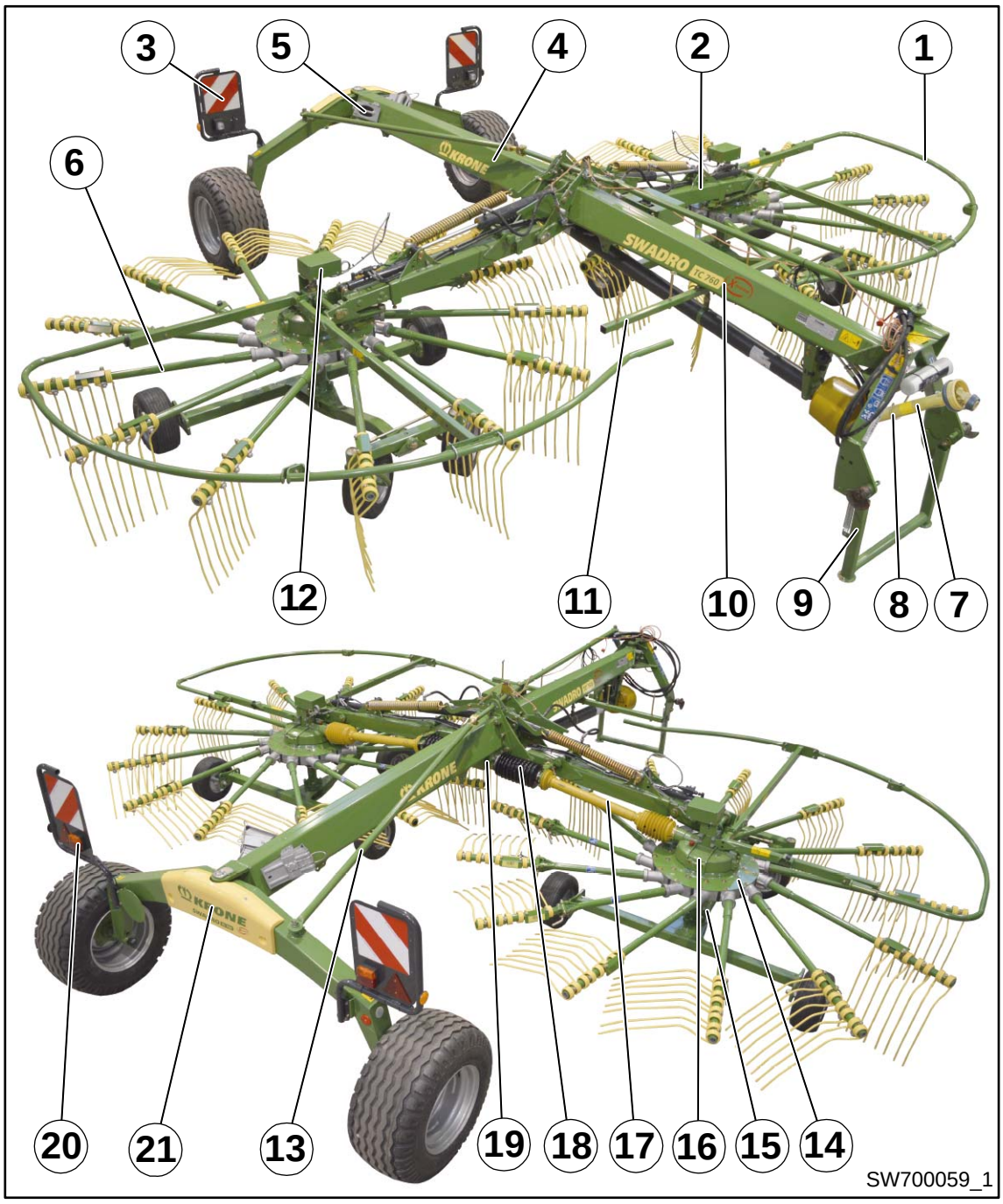


Fig. 3

1) Hoop guard	8) Universal shaft bracket	15) Rotor chassis
2) Outrigger arm	9) Parking support	16) Rotor gearbox
3) Warning panel	10) Frame front	17) Universal shaft rotary drive
4) Frame rear	11) Support tine guards	18) Overload protection
5) Wheel chock	12) Electronic rotor height adjustment*	19) Main gearbox
6) Tine arm	13) Transverse link	20) Lighting
7) Drive universal shaft	14) Rotor	21) Chassis

* only for Plus version

5.2 Identification Plate

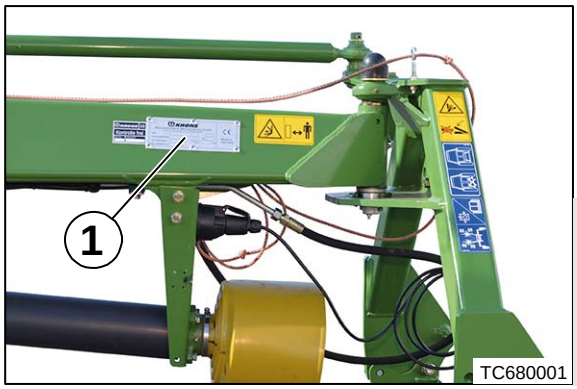


Figure 4

The machine data is located on the type plate (1).

5.3 Information Required for Questions and Orders

Type	
Year of manufacture	
Vehicle ID number	

Note

The entire identification plate represents a legal document and should not be altered or rendered illegible!

When asking questions concerning the machine or ordering spare parts, be sure to provide type designation, vehicle ID number and the year of manufacture : To ensure that these data are always available, we recommend that you enter them in the fields above.

Note

Authentic KRONE spare parts and accessories authorised by the manufacturer help to ensure safety. The use of spare parts, accessories and other devices which are not manufactured, tested or approved by KRONE will result in the revoking of the liability for damages resulting thereof.

5.3.1 Contact

Maschinenfabrik Bernard Krone GmbH
Heinrich-Krone-Strasse 10
D-48480 Spelle (Germany)

Telephone: + 49 (0) 59 77/935-0 (Head Office)
Fax.: + 49 (0) 59 77/935-339 (Head Office)
Fax.: + 49 (0) 59 77/935-239 (Spare parts - domestic)
Fax.: + 49 (0) 59 77/935-359 (Spare parts - export)
Email: info.ldm@krone.de

5.4 Overload protection

Note

The overload protection must not be changed. The guarantee becomes invalid if an overload protection is used other the protection provided!

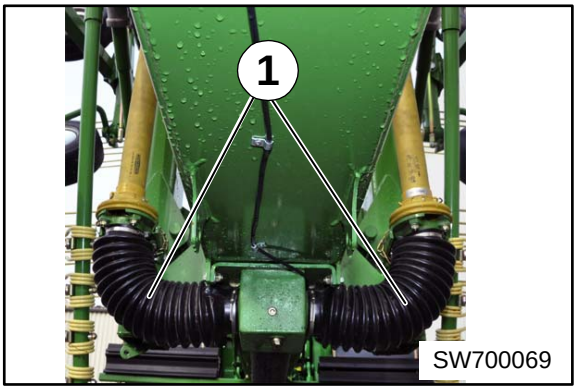


Fig. 5

1) Overload protection

The star ratchet couplings of the overload protection systems can also engage if the speed is low or when approaching the rotors. A vibrating noise results. The torque is then transferred by pulsation. The brief engaging of the star ratchet couplings does not affect the function of the machine. To prevent an early wear of the overload protection system, switch of the P.T.O. shaft if the vibrating noise can be heard for a longer duration.

6 Technical Data of the Machine

6.1 Technical data

All information, illustrations and technical data in these operating instructions correspond to the latest state at the time of publication. We reserve the right to make design changes at any time and without notification of reasons.

Swadro TC 680

Road travel is only permitted with the swivelled outrigger arms in transport position.
The maximum height of 4 m must not be exceeded.

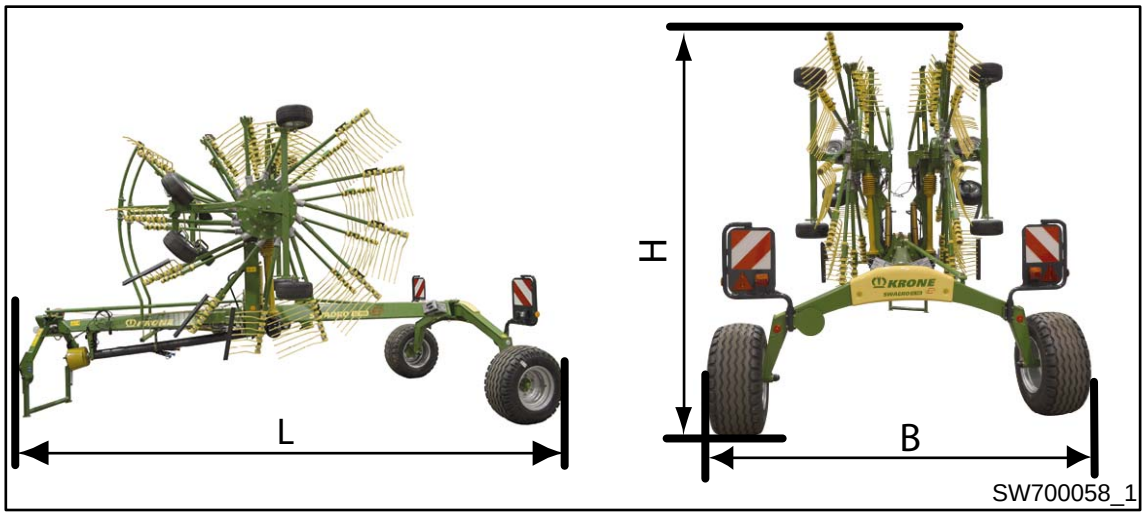


Fig. 6

Dimensions in Transport Position	mm
Height with tine arms rigid	3995
Height with tine arms folding	3580
Length	5900
Width	2900

Dimensions in Working Position	mm
Height	1600
Length	5900
Width	6800
Acreage output	6.5-7 ha/h

Weights	kg
Permitted gross weight	1950
Permissible axle load	1100
Permissible bearing load	850

Minimum Requirements for the Tractor	
Power requirement	37/50 kW/HP
P.T.O. speed	max. 540 rpm
Lighting voltage	12 volt, 7-pin plug
Voltage control unit (optional)	12 volt, 3-pin plug
Max. operating pressure of hydraulic system	200 bar
Hydraulic connections	1x single-action control unit
Max. permissible transport speed	40 km/h
Lower link	Height definable and side definable

Equipment of the Maschine (Standard)	
Understeering coupling	Cat. I and Cat. II
Tine arms rigid	Standard
Number of rotors	2
Number of arms per rotor	10
Number of the double tines per arm	4
Rotor diameter	3300 mm
Lighting	Standard
Warning panels	Standard
Universal shaft	Wide angle

Equipment of the machine (optional)
Swath cloth
Tine security system
Hydraulic single-rotor lifting mechanism with spring relief
Trailing guide wheels
Tandem axles
Wheel hub weight
Additional rotor

Machine equipment (country-specific requirement)	
Safety chain	min. 89 kN (20.000 lbf)

Airborne Sound Emission	
Equivalent continuous pneumatic level recorder	less than 70 d B(A)

Swadro TC 760

Road travel is only permitted with the swivelled outrigger arms in transport position.
The maximum height of 4 m must not be exceeded.

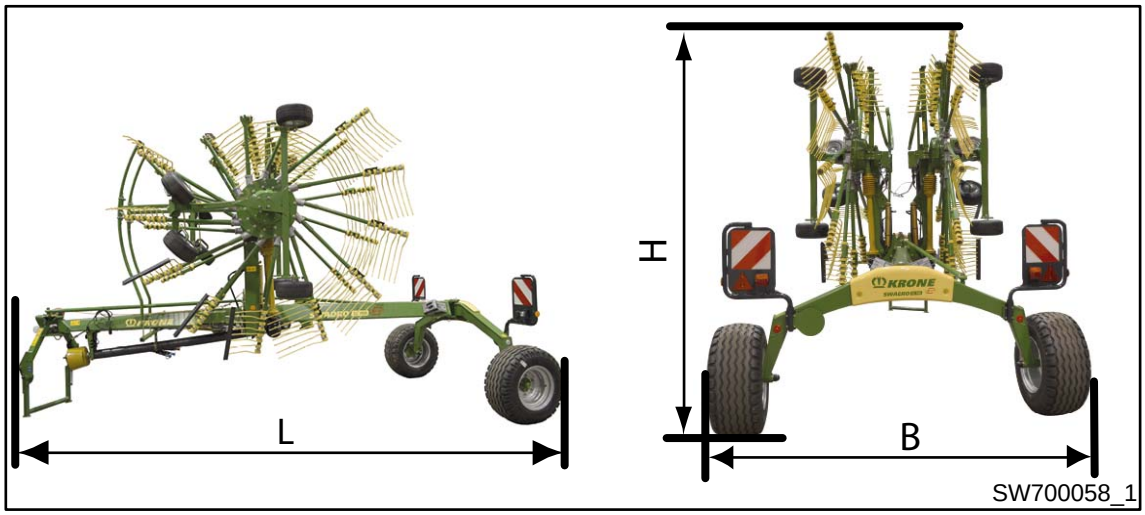


Fig. 7

Dimensions in Transport Position	mm
Height with tine arms rigid	3995
Height with tine arms folding	3580
Length	5900
Width	2900

Dimensions in Working Position	mm
Height	1600
Length	5900
Width	6800 - 7600
Acreage output	7.5 ha/h

Weights	kg
Permitted gross weight	2200
Permissible axle load	1250
Permissible bearing load	950

Minimum Requirements for the Tractor	
Power requirement	37/50 kW/HP
P.T.O. speed	max. 540 rpm
Lighting voltage	12 volt, 7-pin plug
Voltage control unit (optional)	12 volt, 3-pin plug
Max. operating pressure of hydraulic system	200 bar
Hydraulic connections	1x single-action control unit 1x double-action control unit
Max. permissible transport speed	40 km/h
Lower link	Height definable and side definable

Equipment of the Maschine (Standard)	
Understeering coupling	Cat I and Cat II
Number of rotors	2
Number of arms per rotor	13
Number of double tines per arm	4
Rotor diameter	3300 mm
Universal shaft	Wide angle
Lighting	
Warning panels	
Adjustment of the working width	
Tine arms rigid	
Mechanical rotor height adjustment	

Equipment of the machine (version)	
Tine arms rigid	
Tine arms folding	
Plus	Hydraulic working width adjustment
	Electro-hydraulic single-rotor lifting mechanism
	Electrical rotor height adjustment
	Reinforced drive train for rotor gearbox
	Spring relief

Equipment of the machine (accessories kit)
Swath cloth
Tine security system
Hydraulic single-rotor lifting mechanism with spring relief
Hydraulic working width adjustment
Guide wheels staying in operating for a certain period of time before being switched off completely
Tandem axles
Wheel hub weight
Additional rotor

Machine equipment (country-specific requirement)	
Safety chain	min. 89 kN (20.000 lbf)

6.2 Tyres

Tyres	Tyre designation	Tyre pressure [bar]
Main running gear	10.0/75- 15.3 10 TL (standard) 15.0/55-17 10 PR TL (optional)	1.0
Rotor running gear	16 x 6.50-8 10 PR	1.8

Airborne Sound Emission	
Equivalent continuous pneumatic level recorder	less than 70 d B(A)

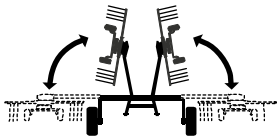
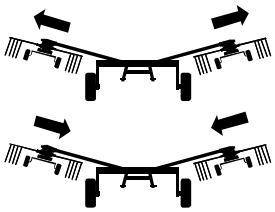
6.3 Consumables

6.3.1 Filling Quantities and Lubrication Designations for Gearboxes

Lubricants	Filling quantity [litres]	Filtered lubricants	Bio-degradable lubricants
Rotor gear	0.5 l	Fluid gear grease GFO 35	**On request**
Main gearbox	0.5 l	SAE 90	

7 Control and Display Elements

The following table shows the functions on the machine (depending on machine design)

Function	Description
Crank on left rotor	• Increase or reduce the rotor height of the left rotor.
Crank on right rotor	• Increase or reduce the rotor height of the right rotor.
Single-action control unit (red 1+) 	**From transport position to working position:** • Pull the operating cable and keep it under tension. • Float position (red 1+): Lowers the machine from transport position to working position. **Headland position:** • Pressure (red 1+): Raises the machine from working position to headland position. • Float position (red 1+): Lowers the machine from headland position to working position. **From working position to transport position:** • Switch off PTO drive. • Pull the operating cable and keep it under tension. • Pressure (red 1+): Raises the machine from working position to transport position.
Double-action control unit (blue 2+/ blue 2-) 	**Increasing the working width** • Pressure (blue 2+): Increase the working width. **Reducing the working width** • Pressure (blue 2+): Reduce the working width.

With Hydraulic Single-Rotor Lifting Mechanism Design

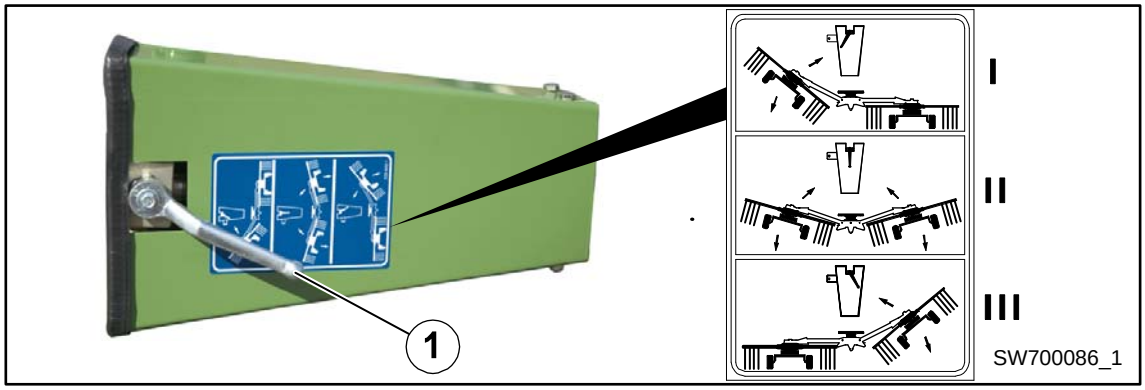


Fig. 8

The position of the switching valve (1) determines which rotor is lifted or lowered. The actual movement is made via the single-acting control unit.

Position	Function
I	**Single-rotor lifting mechanism of the left rotor:** The right rotor remains in working position. The left rotor is lifted or lowered.
II	**Twin-rotor lifting mechanism**: Both rotors are lifted or lowered.
III	**Single-rotor-lifting mechanism of the right rotor:** The left rotor remains in working position. The right rotor is lifted or lowered.

In case of electro-hydraulic single-rotor lifting mechanism design

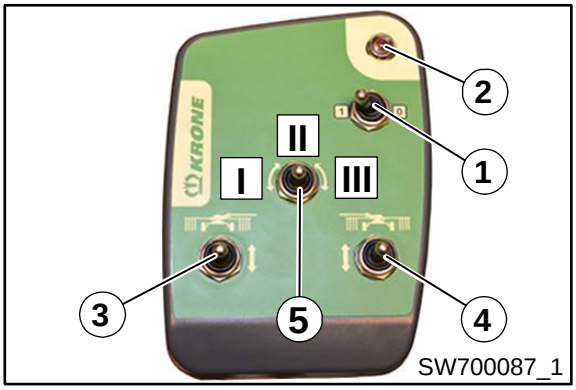


Fig. 9

The following table explains the function of the individual switches.

Switch	Function	
1) Main switch	Switch on (I) and switch off (0) control unit.	
2) Indicator lamp (red)	Lit when the control unit is switched on.	
3) Momentary toggle switch (momentary-action)	Set the rotor height on the left rotor.	
4) Momentary toggle switch (momentary-action)	Set the rotor height on the right rotor.	
5) Momentary toggle switch	Selects the rotor that is to be lifted or lowered. The actual movement is made via the single-action control unit.	
	Pos. I	**Single-rotor lifting mechanism of left rotor:** The right rotor remains in its position. The left rotor is lifted or lowered.
	Pos. II	**Twin-rotor lifting mechanism:** Both rotors are raised or lowered.
	Pos.III	**Single-rotor lifting mechanism of right rotor:** The left rotor remains in its position. The right rotor is lifted or lowered.

8 Commissioning

WARNING!
Risk of accident or damage to the machine due to an incorrect initial operation!
Only an authorized service technician is permitted to carry out the initial operation.

WARNING!
If the basic safety instructions are not followed, people may be seriously injured or killed.
- To avoid accidents, the basic safety instructions in the chapter Safety must have been read and followed, see chapter Safety "Basic safety instructions".

WARNING!
If the safety routines are not adhered to, people may be seriously injured or killed.
- To avoid accidents, the safety routines in the chapter Safety must be read and followed, see chapter Safety "Safety routines".

WARNING!
Risk of injury due to the unsecured machine rolling away!
If the machine is not secured against rolling away when it has been switched off, there is a risk of people being injured by the machine rolling away in an uncontrolled manner.
- Secure the machine against rolling away with wheel chocks.

8.1 General

Prior to attaching or detaching devices to or from the 3-point suspension, move the loading equipment to a position that excludes inadvertent lifting or lowering!
Use extreme caution when attaching or detaching implements onto or from the tractor!
In the vicinity of the 3-point linkage, there is risk of injury due to crushing and shearing points!

8.2 First installation

The document "Assembly Instructions" describes how to install the device for the first time.

8.3 Preparations on tractor

8.3.1 Adjusting the lower suspension arms

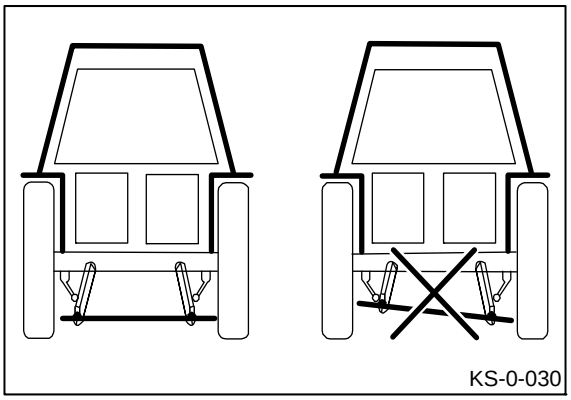


Fig. 10

Note

The tractor lower suspension arms must always be installed so that the lifting points of the lower suspension arms are all at the same distance from the ground. In order to prevent swivelling of the machine during transport or operation, the lower suspension arms must be secured by limiting chains or bars.

CAUTION! – Collision with the trailer coupling

Effect: Damage to the tractor or machine

Depending on the type of tractor, the top link of the tractor and/or the universal shaft of the machine could collide with the trailer coupling.

- To prevent damage, it may be necessary to detach the trailer coupling. For further information refer to the tractor manufacturer's operating instructions.

8.4 Connecting the Lower Link

Fig. 11

- Connect the machine according to the operating instructions of the tractor manufacturer to the lower links, raise it slightly and secure it.
- Place the machine onto the parking support.
- Turn off the tractor and secure it.

8.5 PTO shaft

8.5.1 Length adjustment

Caution! - Changing the tractor

Effect: Damage to the machine

When using the machine for the first time and whenever changing the tractor Check PTO shaft for the correct length. If the length of the PTO shaft does not match the tractor, always observe the chapter entitled "Adjusting the length of the PTO shaft".

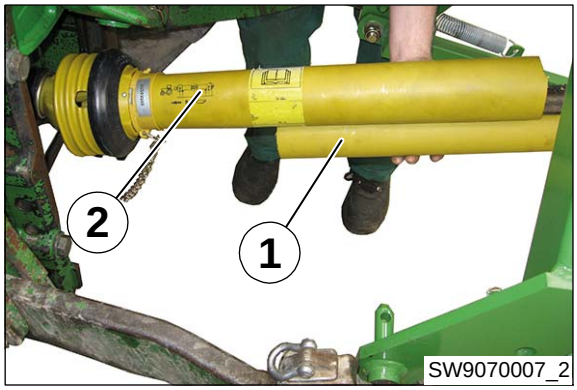


Fig. 12

The length of the universal shaft must be adjusted.

- Connect the machine to the tractor without universal shaft.
- Raise the lower links of the tractor.
- Drive three-point hitch in all the way.
- Position machine in the shortest universal shaft position setting.

The shortest position is reached if the PTO shaft end of the tractor is on the same hight (horizontal) as the drive journal of the machine.

- Place the machine onto the parking support.
- Turn off the tractor, remove the ignition key and carry it with you. Secure the machine from rolling away.
- Disassemble the universal shaft.
- Attach universal shaft half with wide-angle coupling (1) on machine side.
- Attach the other universal shaft half (2) on tractor side.

Observe the marking on the universal shaft.

For further procedure, please refer to the operating instructions of the universal shaft manufacturer.

Note

Check the swivel range and clearance of the PTO shaft! Damage can be caused if the tractor or the machine touch the PTO shaft (e.g. hitching device, hitching frame, lower suspension arms).

8.6 Regulating direction of travel

The track control arm has been preset in the works of the manufacturer.
Check the straight-ahead driving with hitched machine. The machine must run on a level road centred behind the tractor.
If the machine runs diagonally to the tractor, the track control arm must be readjusted.
Only service technicians are authorized to carry out work on the steering.

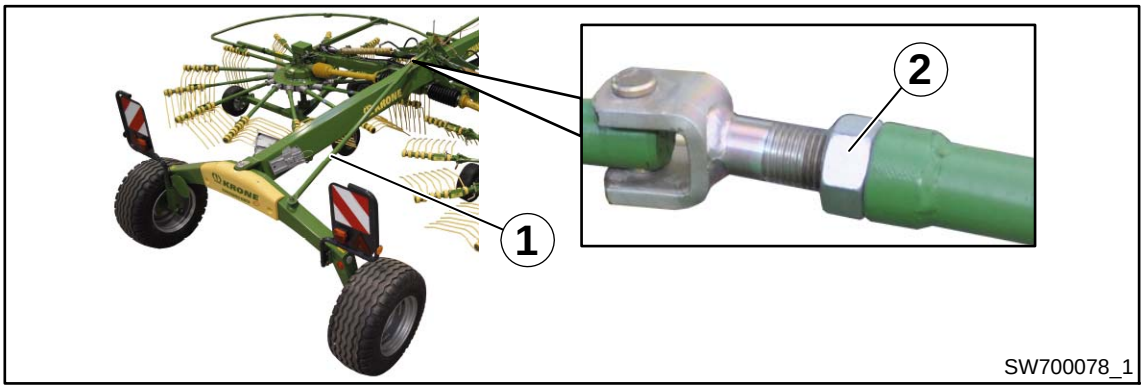


Fig. 13

If the swather is not running in the centre behind the tractor on a level street, this can be controlled by adjusting the transverse suspension arms (1).

- Loosen the counter nut (2).
- Adjusting transverse suspension arm:

Steering rod shorter => directs machine further to the left
Steering rod longer => directs machine further to the right

- Tighten counter nut (2).

9 Start-up

WARNING!

If the basic safety instructions are not followed, people may be seriously injured or killed.

- To avoid accidents, the basic safety instructions in the chapter Safety must have been read and followed, see chapter Safety "Basic safety instructions".

WARNING!

If the safety routines are not adhered to, people may be seriously injured or killed.

- To avoid accidents, the safety routines in the chapter Safety must be read and followed, see chapter Safety "Safety routines".

Check prior to start-up to ensure that:

– The length of the universal shaft is adjusted, see section "Universal shaft" in Start-up.

– Driving straight ahead with the machine attached is correct adjusted, see section "Adjusting the direction of travel" in Start-up.

9.1 Preparations on tractor

9.1.1 Adjusting the lower suspension arms

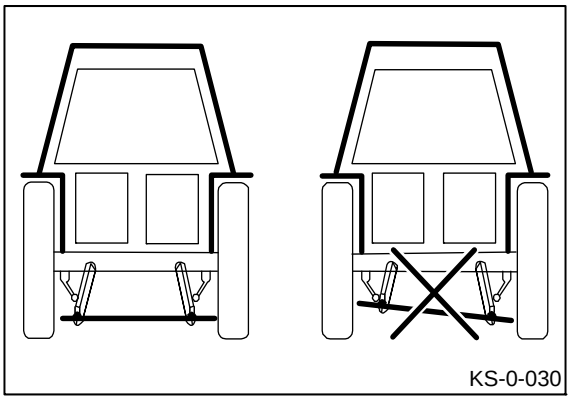


Fig. 14

The machine is fitted with a Cat. II centering pivot for the three-point hydraulic system.

Note

The tractor lower suspension arms must always be installed so that the lifting points of the lower suspension arms are all at the same distance from the ground. In order to prevent swivelling of the machine during transport or operation, the lower suspension arms must be secured by limiting chains or bars.

CAUTION! – Collision with the trailer coupling

Effect: Damage to the tractor or machine

Depending on the type of tractor, the top link of the tractor and/or the universal shaft of the machine could collide with the trailer coupling.

- To prevent damage, it may be necessary to detach the trailer coupling. For further information refer to the tractor manufacturer's operating instructions.

9.2 Connect the machine to the tractor

CAUTION! – Collision with the trailer coupling

Effect: Damage to the tractor or machine

Depending on the type of tractor, the top link of the tractor and/or the universal shaft of the machine could collide with the trailer coupling.

- To prevent damage, it may be necessary to detach the trailer coupling. For further information refer to the tractor manufacturer's operating instructions.

Note

In the following description, one assumes that the machine (after final assembly) is in the transport position.

Fig. 15

- Connect the machine according to the operating instructions of the tractor manufacturer to the lower links, raise it slightly and secure it.
- Place the machine onto the parking support.
- Turn off the tractor and secure it.

9.3 Connecting the hydraulic lines

WARNING! - If the hydraulic hoses are interchanged when connecting them to the hydraulic system of the tractor, the functions will be interchanged as well.

Effect: Injuries, serious damage to the machine

- Identify the hydraulic connections.
- Always ensure correct connection between the machine and the tractor.
- When connecting and removing the hydraulic hoses to and from the tractor hydraulics take care that the hydraulics are pressureless both on the tractor side and the machine side.

Caution! - Soiling of the hydraulic system

Effect: Damages to the machine

- When connecting the quick couplings, ensure that these are clean and dry.
- Note chafing areas or points of contact.

Note

Connect hydraulic hoses correctly.

- The hydraulic hoses are marked with numbers and coloured dust caps.

- Switch the control units on the tractor to float position.
- Depressurise the hydraulic system on the tractor and the machine.
- Shut down and safeguard the machine, see chapter Safety -> Safety routines, "Shutting down and safeguarding the machine".

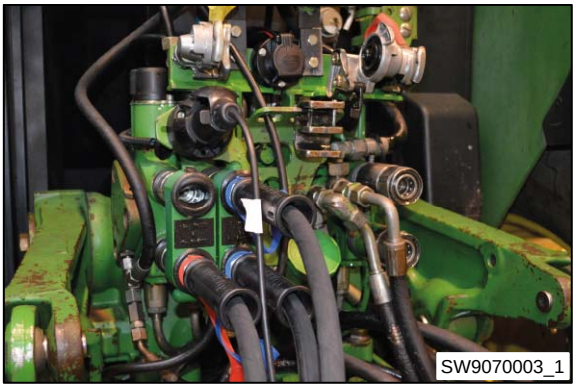


Fig. 16

Swadro TC 680 / Swadro TC 760

- Connect the hydraulic coupling (red 1+) of the machine to a single-action control unit of the tractor.

With optional version: hydraulic width adjustment

- Connect the hydraulic couplings (blue 2+ / blue 2-) of the machine to a double-action control unit of the tractor.

In case of Plus version

- Connect the hydraulic coupling (red 1+) of the machine to a single-action control unit of the tractor.
- Connect the hydraulic couplings (blue 2+ / blue 2-) of the machine to a double-action control unit of the tractor.

9.4 Lighting connection

Note

Before inserting the plugs, make certain the plugs and sockets are clean and dry. Dirt and moisture may result in short circuits!

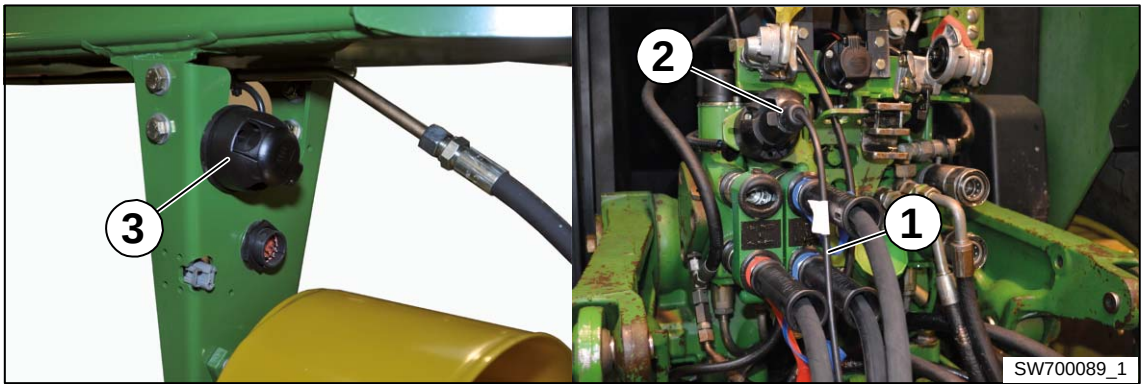


Fig. 17

The lighting system is connected via the 7-pin connection cable (1).

To do this:

- Insert the 7-pin plug of the connection cable (1) into the relevant socket (2) of the tractor.
- Insert the 7-pin connection cable plug (1) into the appropriate socket (3) of the machine.
- Position the cable so that it will not come in contact with the wheels.

9.5 Connecting the Operation

In case of Plus version

Note

Before inserting the plugs, make certain the plugs and sockets are clean and dry. Dirt and moisture may result in short circuits!

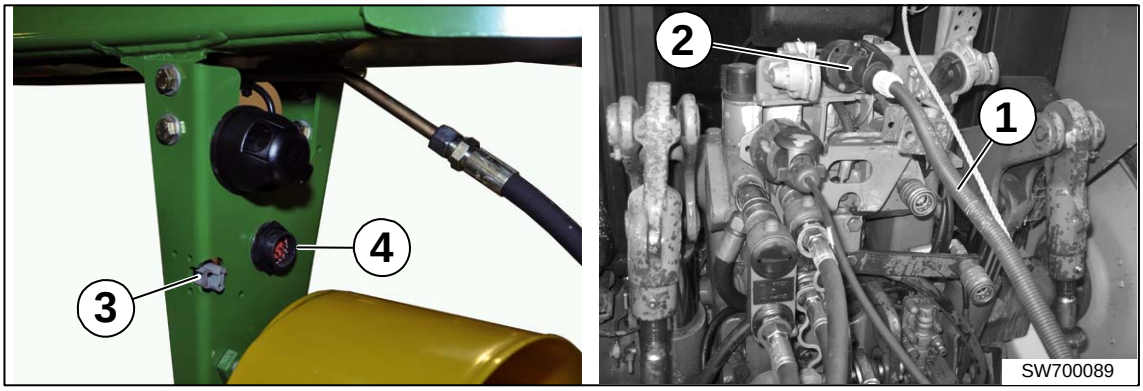


Fig. 18

The connection for operation is made via power supply cable (1).

Note

If need be, mount socket for power supply and support for operation panel on the tractor beforehand.

To do this:

- Connect power supply cable (1) with socket for power supply (2) to tractor and with socket (3) to the machine.
- Insert the plug of the operation panel into the appropriate socket (4) of the machine.
- Lay the cables so that they do not touch the wheels.

9.6 Install the PTO shaft

Caution! - Changing the tractor

Effect: Damage to the machine

When using the machine for the first time and whenever changing the tractor Check PTO shaft for the correct length. If the length of the PTO shaft does not match the tractor, always observe the chapter entitled "Adjusting the length of the PTO shaft".

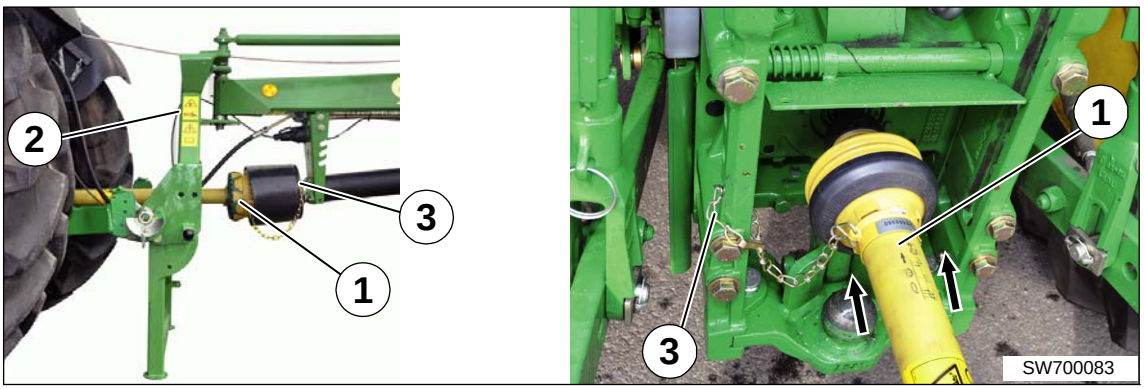


Fig. 19

- Switch off the engine and remove the ignition key.
- **Install the PTO shaft (1) on the machine side (wide angle on machine side).**
- Rotate the PTO shaft support (2) upwards.
- Then slide PTO shaft onto the PTO of the tractor. In doing this, ensure that the sliding pin is securely engaged.
- Secure the PTO shaft guard against turning with the retaining chain (3).

9.7 Using the safety chain

WARNING!

When using a wrongly dimensioned safety chain, the safety chain may tear if the machine loosens unintentionally. This can result in serious accidents.

- Always use a safety chain with a minimum tensile strength of 89 kN (20.000 lbf).

WARNING!

If the safety chain is layed so that it is too tight or too loose, then it may tear. As a result, serious injuries or damage to tractor and machine may be caused.

- Position the safety chain so that it does not tension when cornering. Also make sure when laying it that it does not touch the tractor wheels or other parts of tractor or machine.

Note

Using the safety chain

Attachment of the safety chain is not stipulated in all countries.

- Shut down and safeguard the machine, see chapter Safety -> Safety routines, "Shutting down and safeguarding the machine".

The safety chain is used as an additional safety precaution for trailed devices, should they become detached from the drawbar during transport. Attach the safety chain with the respective mounting parts to the hitching device on the tractor or to another specified connection point. The safety chain should have just enough play to be able to go around curves.

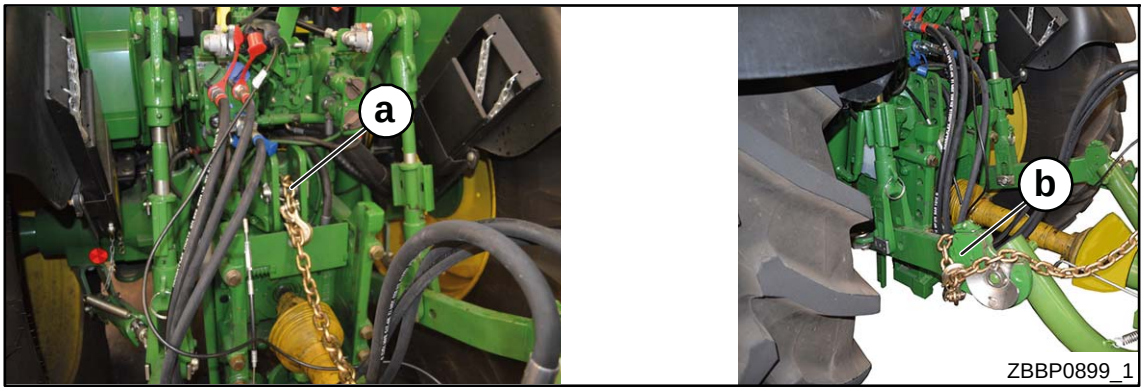


Fig. 20

- Install safety chain (1) on an eligible position (for example: a or b) on the tractor.

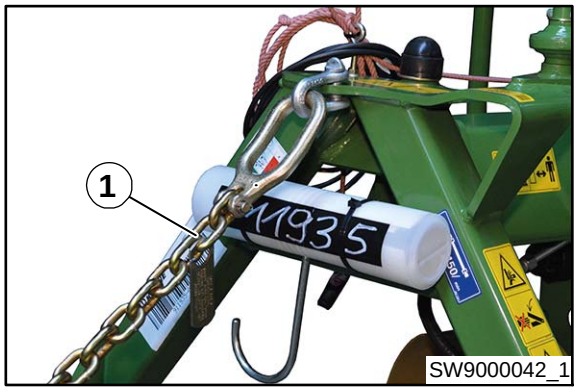


Fig. 21

- Install the safety chain (1) on the machine.

9.8 Swivelling parking support into transport position

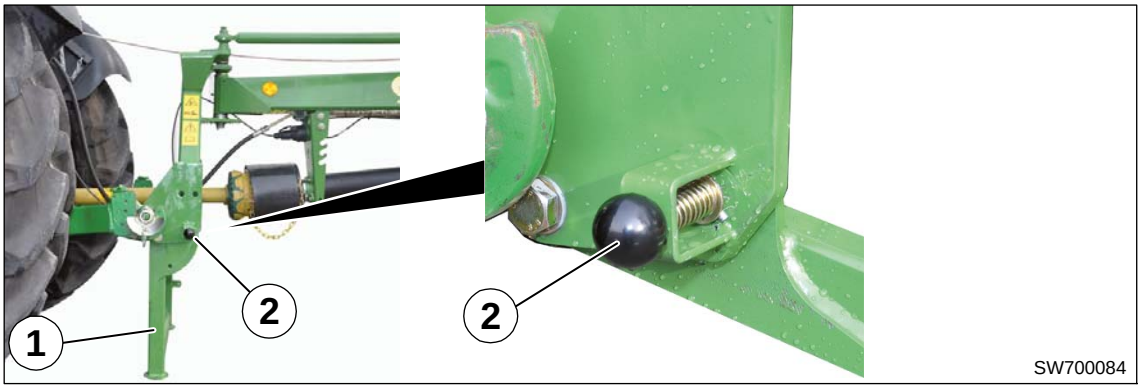


Fig. 22

- Raise the machine until the parking support (1) can be swivelled to the rear.
- Turn off the tractor and secure it against the possibility of rolling back.
- Pull the tension bar (2), swivel the parking support (1) to the rear by 90° and fix it in place in this position by using the tension bar.

10 Driving and Transport

WARNING!

If the basic safety instructions are not followed, people may be seriously injured or killed.

- To avoid accidents, the basic safety instructions in the chapter Safety must have been read and followed, see chapter Safety "Basic safety instructions".

WARNING!

If the safety routines are not adhered to, people may be seriously injured or killed.

- To avoid accidents, the safety routines in the chapter Safety must be read and followed, see chapter Safety "Safety routines".

WARNING!

There is a risk of accidents if the control valves on the tractor are not locked.

If the control valves are not locked, machine components may be activated unintentionally. This can result in serious accidents.

- To prevent functions being triggered accidentally, the control valves on the tractor must be switched to neutral and locked during road transport journeys.

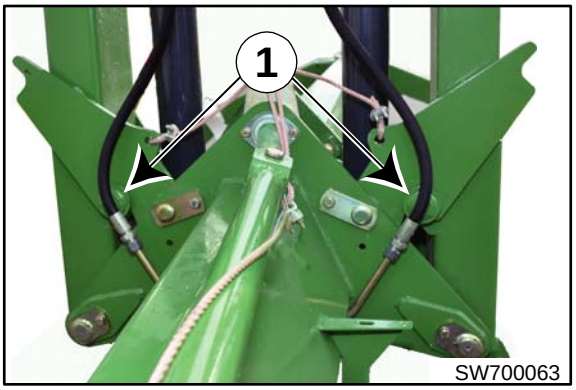
WARNING!

Danger when cornering with a machine hitched

When cornering, the hitched machine swings out further than the tractor. This can lead to accidents.

- Take the greater swivel range into account.
- When turning, take account of people, oncoming traffic and obstacles.

10.1 Preparations for road travel



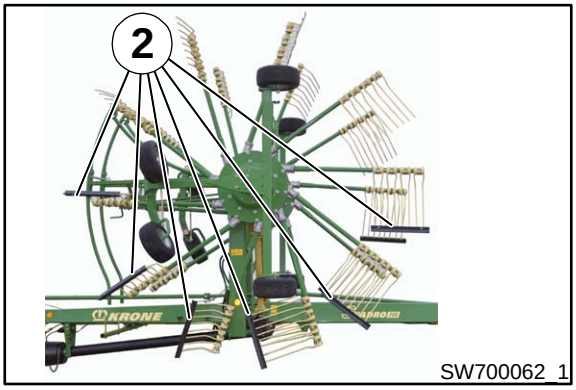


Fig. 23

Before road travel, make certain that

- the machine is fully and correctly hitched.
- the PTO shaft is switched off and the rotors have come to a standstill.
- the rotors are locked.
- the rotor arms are completely retracted, in case of working width adjustment design.
- the operation panel is switched off, in case of the electro-hydraulic single-rotor lifting mechanism design.
- the machine is in the transport position.
- all hydraulic control units are in neutral position.
- the retaining bolts are correctly engaged in the lockings (1).
- the tine guards (2) are attached on the tines which are located in transport position below 2 m.
- the lighting system is working.
- the lower links are lowered to a height of 355 mm to the ground in order to meet the transport height.

10.2 Travelling on an incline

Danger! - Travelling on an incline (danger of turning over!).

Effect: Danger to life, injuries or damage to the machine.

- Never move the tine arms from working to transport position or from transport to working position when the machine is positioned across an incline.

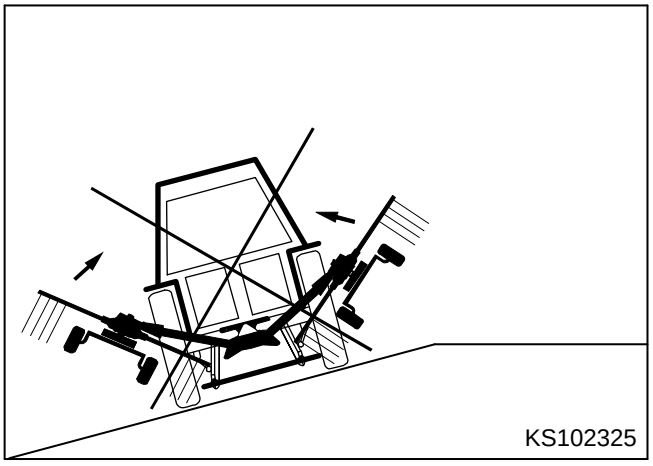


Figure 24

For the version with trailing guide wheels

In order to prevent the machine from drifting off when driving on the slope, the trailing guide wheels must be fixed, refer to chapter Settings “Fixing the Trailing Guide Wheels”.

10.3 Switching off the machine

WARNING!

Risk of injury due to the unsecured machine rolling away!

If the machine is not secured against rolling away when it has been switched off, there is a risk of people being injured by the machine rolling away in an uncontrolled manner.

- Secure the machine against rolling away with wheel chocks.

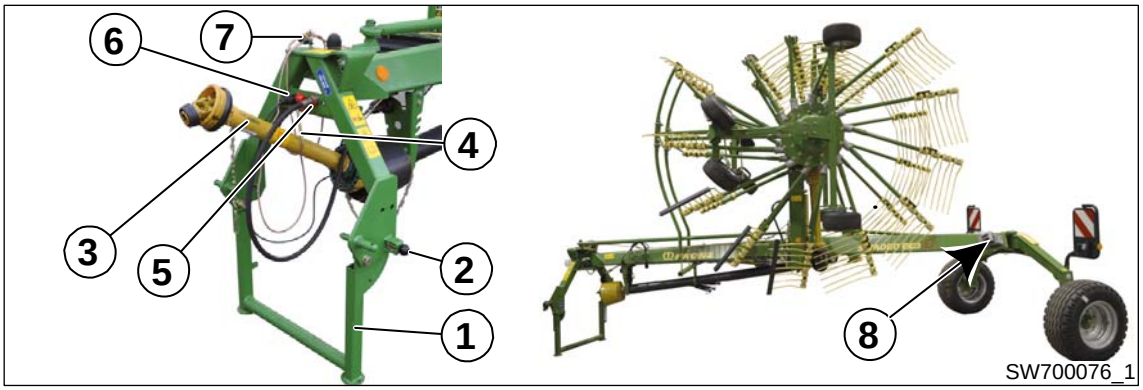


Fig. 25

Choose a level, dry and adequately stable surface.

- Set control unit(s) to float position.
- Switch off tractor and secure it against the possibility of rolling away.
- Secure the machine against the possibility of rolling away by means of wheel chocks (8).
- To swivel the parking support (1) downward, pull the bolt (2), swivel parking support downward until the bolt locks.
- Lower the lower links until the parking support is on the ground.
- Disconnect universal shaft (3) and lay it down on the support (4).
- Uncouple hydraulic hoses (5) and insert them into the supports.
- Loosen lighting cable (6) between tractor and machine and insert it into the supports intended for this purpose.
- Disconnect the power supply plug (7) (optional) between tractor and machine and place it in the supports.
- Put down the operating cable.
- Lower the lower link pinions of the tractor until the tractor can be driven away safely.

11 Operation

WARNING!

If the basic safety instructions are not followed, people may be seriously injured or killed.

- To avoid accidents, the basic safety instructions in the chapter Safety must have been read and followed, see chapter Safety "Basic safety instructions".

WARNING!

If the safety routines are not adhered to, people may be seriously injured or killed.

- To avoid accidents, the safety routines in the chapter Safety must be read and followed, see chapter Safety "Safety routines".

CAUTION! - Do not drive in reverse when using the machine for work.

Effect: Damage to the machine.

The machine is designed to travel forwards. Never reverse while the machine is in switched on and in working position. Lift rotors first.

11.1 Removing the tine protections from the tine tips

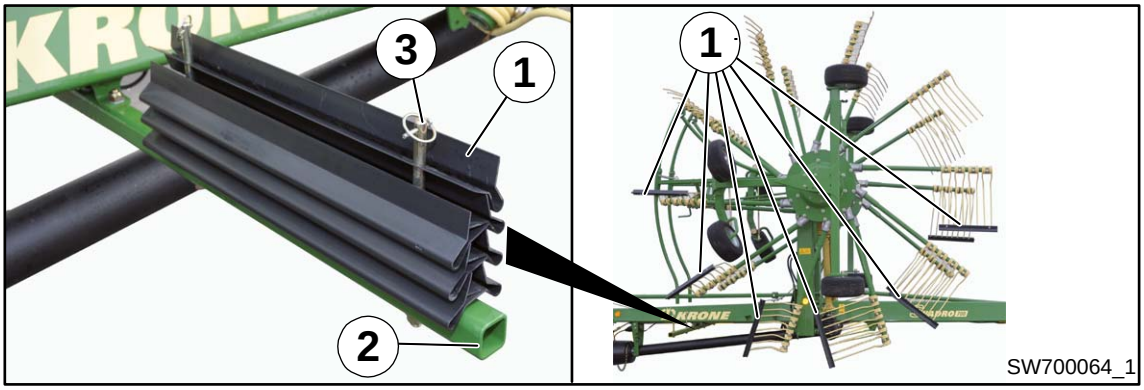


Fig. 26

- Turn off the tractor and secure it against the possibility of rolling back.
- Remove the tine guards (1) from the machine.
- Insert the tine guards into the support (2) and secure them with linch pins (3).
- Repeat this process for the other machine side.

11.2 Lowering Outrigger Arms into Working Position

- Shut down and safeguard the machine, see chapter Safety -> Safety routines, "Shutting down and safeguarding the machine".

11.2.1 For design without single-rotor lifting mechanism

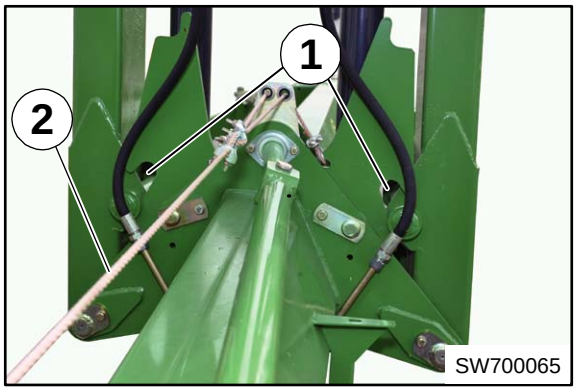


Fig. 27

- Switch on the tractor.
- To relieve the locks (1), actuate the single-action control unit at the tractor and pressurise the hydraulic cylinders.
- To release the locks (1), pull the actuating rope (2) and keep it tensioned.
- Set the single-action control unit (red 1+) of the tractor to the float position.
- When the rotors are in the working position, release the actuating rope (2).
- Switch off the tractor and secure it against the possibility of rolling back.

11.2.2 For design with hydraulic single-rotor lifting mechanism

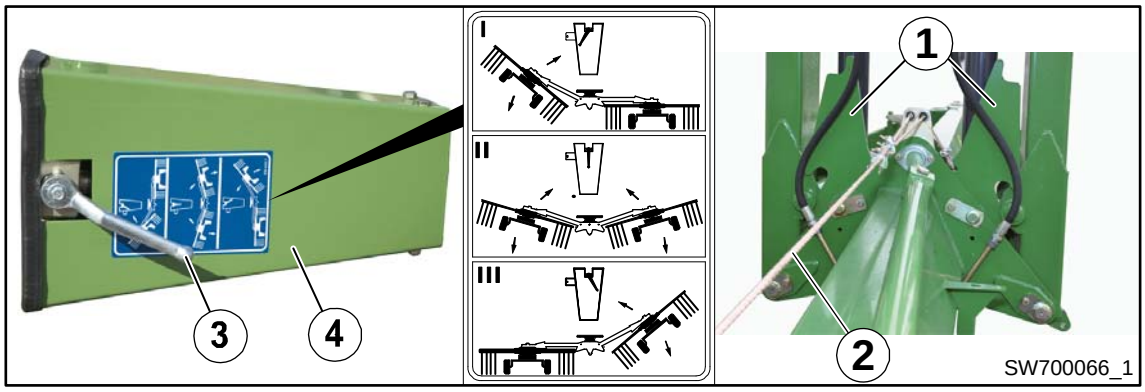


Fig. 28

- Insert the hydraulic control unit (4) into the bracket in the tractor cabin.
- Switch the switching valve (3) to the central position (II).
- Switch on the tractor.
- To relieve the locks (1), actuate the single-action control unit at the tractor and pressurise the hydraulic cylinders.
- To release the locks (1), pull the actuating rope (2) and keep it tensioned.
- Set the single-action control unit (red 1+) of the tractor to the float position.
- When the rotors are in the working position, release the actuating rope (2).
- Switch off the tractor and secure it against the possibility of rolling back.

11.2.3 In Case of Electro-Hydraulic Single-Rotor Lifting Mechanism Design

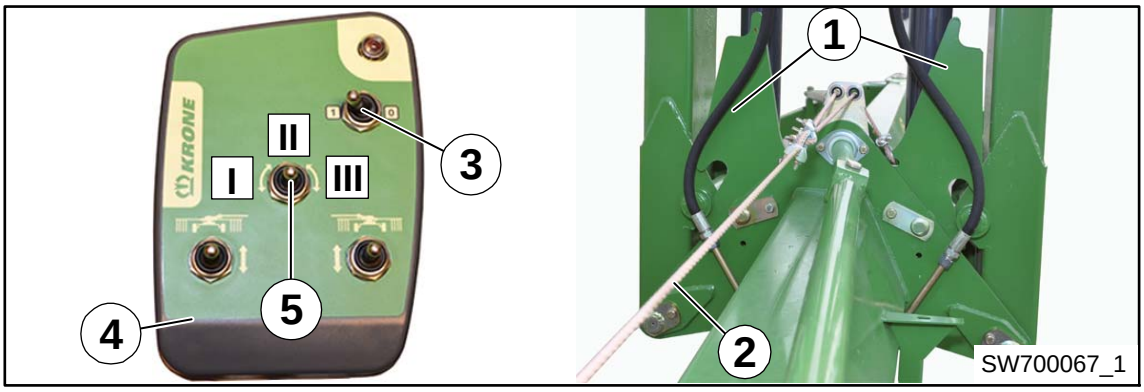


Fig. 29

- Fasten operation panel (4) in the tractor cab.
- Start tractor.
- Switch on operation panel (0>1).
- Move switch (5) into central position (II).
- In order to release the lockings (1), actuate the single-action control unit on the tractor and pressurize the hydraulic cylinders.
- To release the lockings (1), pull the actuating rope (2) and keep it tensioned.
- Set the single-action control unit (red 1+) of the tractor to float position.
- Release the actuating rope (2) when the rotors are located in the working position.
- Switch off tractor and secure it against the possibility of rolling away.

Note

The changeover of the outrigger arms from the transport position into working position can also be performed without the operation panel being switched on. In this case, both outrigger arms are always activated at the same time.

11.3 Swivel tine arms to working position.

- Shut down and safeguard the machine, see chapter Safety -> Safety routines, "Shutting down and safeguarding the machine".

Releasing rotor lock

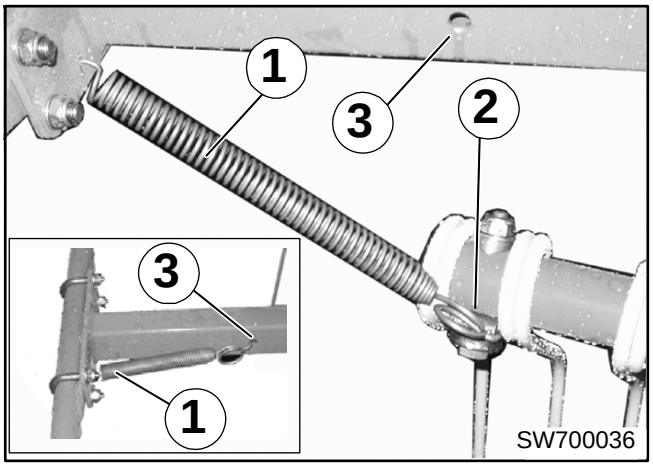


Fig. 30

- Lower outrigger arms into working position.
- Switch off tractor and secure it against the possibility of rolling away.
- To release rotor lock, loosen the tension spring (1) out of the fastening clamp (2) of the tine.
- Hang the tension spring into the retaining bore hole (3).

11.3.1 For design with collapsible tine arm

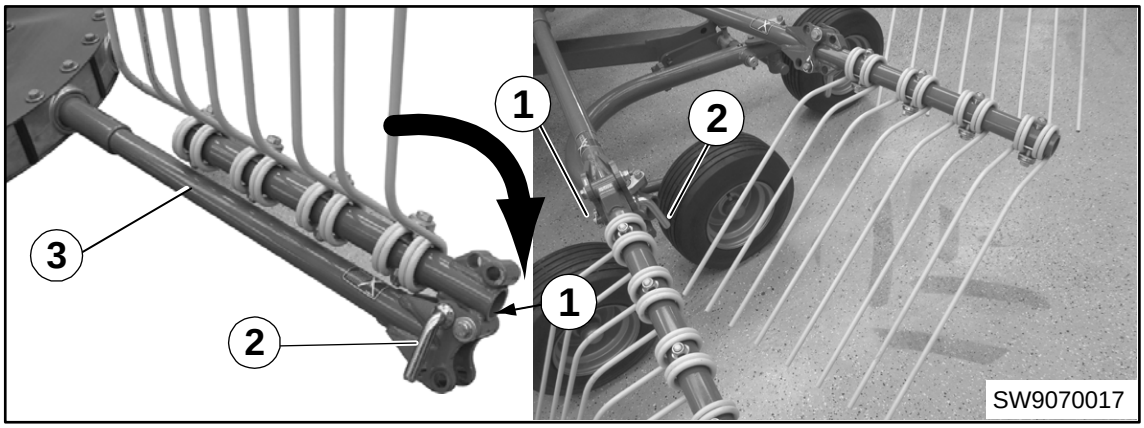


Fig. 31

NOTE! Swivel folding tine arms into working position in a certain order:

- In direction of travel right, swivel the folding tine arms into working position starting from the rear.
- In direction of travel left, swivel the folding tine arms into working position starting from the front.

• Pull linch pin (1).
• Pull out bolt (2).

CAUTION! When swivelling the tine arms into working position, turn the rotors so that the tine arms do not collide with the guard.

• Swivel tine arm (3) into working position.

NOTE! The bolts may get lost when they are not inserted from above and secured.

• Insert bolt (2) from above.
• Secure bolt with linch pin (1).

Make sure that the linch pin (1) engages properly (the ring of the linch pin must be located in the groove of the shaft).

11.4 Move the hoop guards to the working position.

Warning - Crush hazard!
Effect: Injury to hands
Do not hold onto hoop guards to swivel within range of the rotating points.

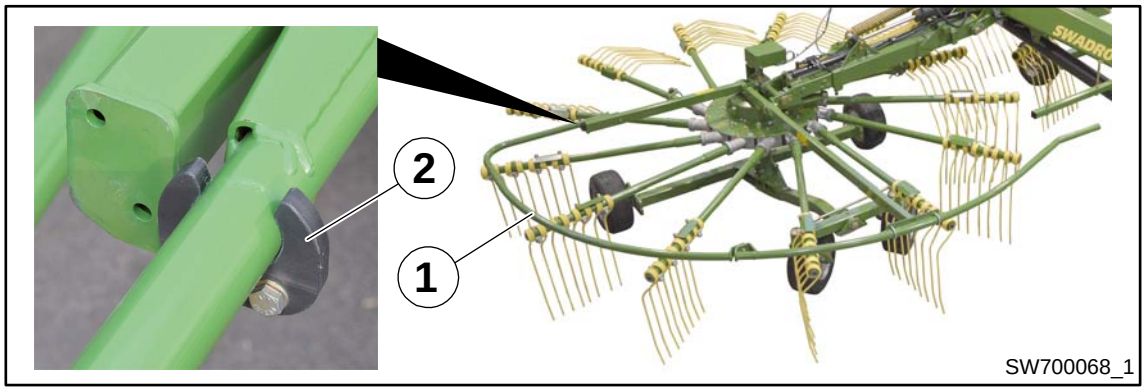


Fig. 32

• Swivel the hoop guard (1) to the outside into working position and allow the locking (2) to lock in place.

11.5 Setting the Working Height

Setting the working height in case of the mechanical version

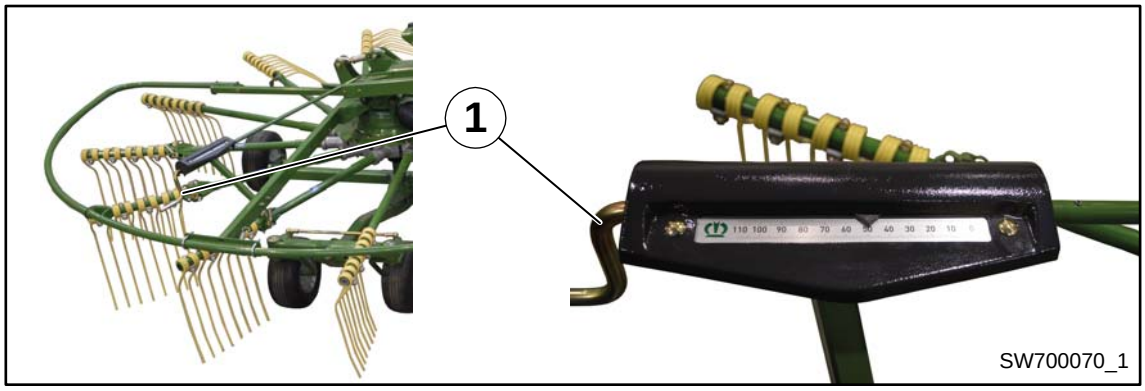


Fig. 33

- Lower outrigger arms into working position.
- Raise the lower links until the lower link pinions are approx. 630 mm above the ground.
- Switch off the tractor and secure it against the possibility of rolling away.
- Turn the crank (1) to the right to increase the spacing of tines to the ground.
- Turn the crank (1) to the left to reduce the spacing of the tines to the ground.

Setting the working height in case of electrical design (optional))

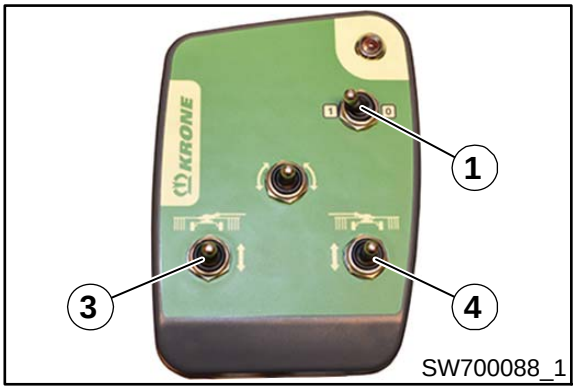


Fig. 34

The working height can be adapted to crop and terrain while the machine is in operation or in headland position.

To do this:

- Raise the lower links until the lower link pinions are located approx. 630 mm above the ground.
- Move outrigger arms to headland position or working position.
- Switch on operation panel.

Working height of left rotor:

- To increase the working height of the left rotor, press switch (3) upward.
- To reduce the working height of the left rotor, press switch (3) downward.

Working height of right rotor:

- To increase the working height of the right rotor, press switch (4) upward.
- To reduce the working height of the right rotor, press switch (4) downward.

11.6 Adjusting the Working Width

- Shut down and safeguard the machine, see chapter Safety -> Safety routines, "Shutting down and safeguarding the machine".

For design with mechanical working width setting:

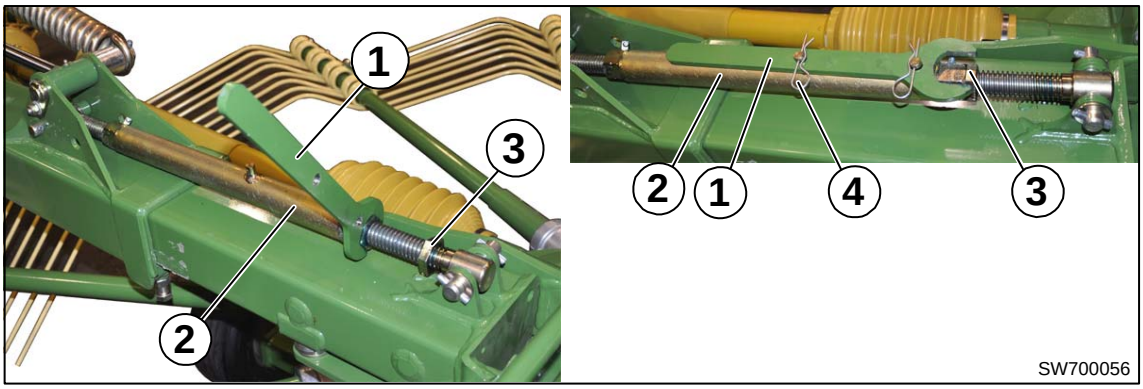


Fig. 35

- In order to set the working width, lower the rotors until the guide wheels are located a little above the ground.
- Stop and secure the machine, refer to chapter Safety → Safety Routines “Stopping and Securing the Machine”.
- Remove special key (1) from threaded spindle (2).
- Loosen counter nut (3).
- Set the desired working width via threaded spindle (2) by using the special key (1).
- **CAUTION!** In order to meet the transport height, retract rotors completely.
- Secure threaded spindle (2) by using counter nut (3).
- Put special key down on the threaded spindle and secure with spring cotter pin (4).

The distance between the rotors and the swath former:
high amount of forage = long distance
small amount of forage = short distance

For design with hydraulic working width setting:

Caution! - Adjusting the working width
Effect: Damage to the machine

- Before extending the rotors, make certain there is no one in the danger zone of the rotors!
- Never try to adjust the working width if the tractor is switched off and the tines are in contact with the ground.
- Only set the working width of the rotor arms in headland position.

- In order to lift the rotors to the headland position, actuate the single-action control unit (red 1+).
- In order to increase the working width, actuate the double-action control unit (blue 2+).
- In order to reduce the working width, actuate the double-action control unit (blue 2-).

- **CAUTION!** In order to meet the transport height, retract rotors completely.

The distance between the rotors and the swath former:
high amount of forage = long distance
small amount of forage = short distance

11.7 Move the hoop guards to transport position.

Warning - Crush hazard!
Effect: Injury to hands
Do not hold onto hoop guards to swivel within range of the rotating points.

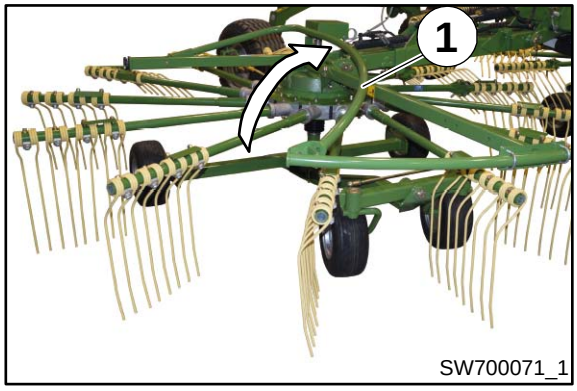


Fig. 36

- Lower rotor arms into working position.
- Turn off the tractor and secure it against the possibility of rolling back.
- Fold over the hoop guard (1) from working position to transport position.

11.8 Swivelling tine arms into transport position

- Shut down and safeguard the machine, see chapter Safety -> Safety routines, "Shutting down and safeguarding the machine".

11.8.1 With rigid tine arms design

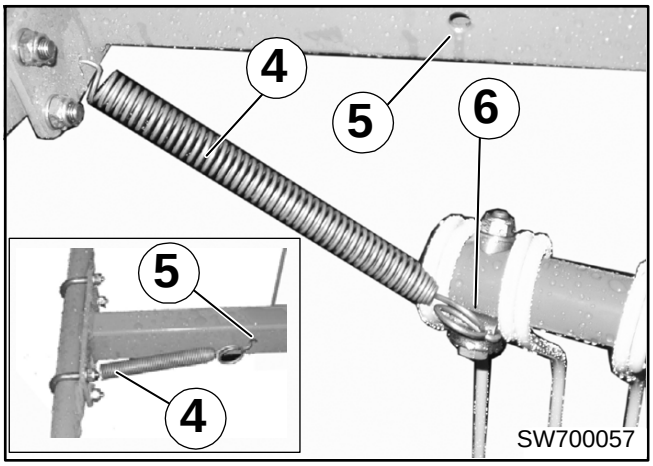


Fig. 37

11.8.2 Fixing the Rotors

- Lower the rotor arms into working position.
- Turn off the tractor and secure it against the possibility of rolling back.
- To prevent the rotors from turning, unhook the tension spring (4) from the retaining bore (5) and hook into the fastening clamp (6).

11.8.3 For design with collapsible tine arm

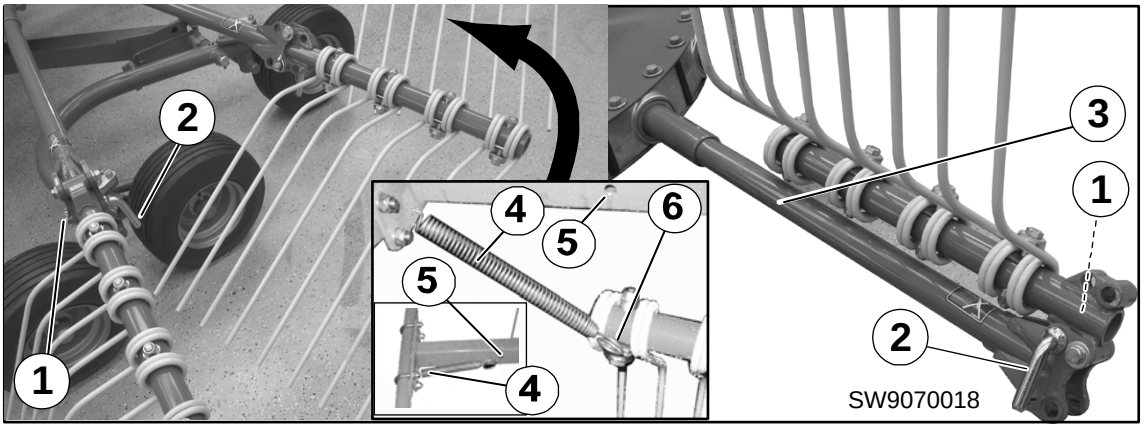


Figure 38

Firstly:

- Turn the left rotor far enough so that the swivelling tine arms are extended outwardly.
- Pull out the linch pin (1).
- Remove the bolts (2).
- Swivel tine arms (3) to transport position; the rotor must be turned so that the tine arms do not collide with the protection when swivelling.
- Insert the bolts (2) and secure with the linch pin (1).
- Secure rotors so that they do not turn, unhook the tension spring (4) from the fastening hole (5) and hook into the fastening clamp (6).

Then:

- Turn the right rotor far enough so that the swivelling tine arms are extended outwardly.
- Pull out the linch pin (1).
- Remove the bolts (2).
- Swivel tine arms (3) to transport position; the rotor must be turned so that the tine arms do not collide with the protection when swivelling.
- Insert the bolts (2) and secure with the linch pin (1).
- Secure rotors so that they do not turn, unhook the tension spring (4) from the fastening hole (5) and hook into the fastening clamp (6).

Note

Check that the swivelling tine arms of both rotors are extended outwards. If necessary, move rotors to correct position.

Note

Swivel the right collapsible tine arm on the machine side in sequence from the front backwards and the left collapsible tine arm on the machine side in sequence from the back forwards to the transport position.

11.9 Raising Outrigger Arms into Transport Position

Caution!

Before swivelling the mowing unit up into transport position, turn off the PTO.

- Before lifting the rotors from the headland position, turn off PTO shaft and wait for rotors to come to a standstill.
- Nobody should be in the swivel range of the rotors.

Note

Before switching from the working to the transport position, make sure the width adjustment (working width) is fully retracted.

11.9.1 For design without single-rotor lifting mechanism

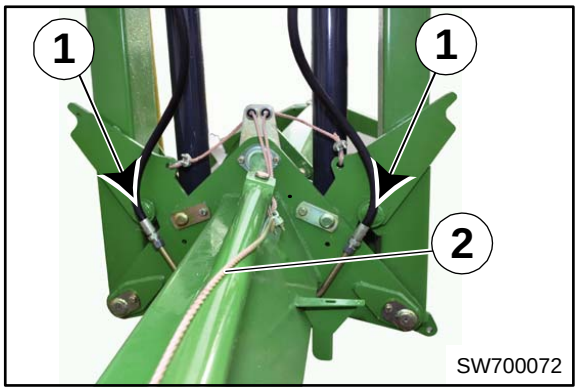


Fig. 39

- Switch on the tractor.
- In order to lift the locks (1), pull the operating rope (2) and keep it tensioned.
- Actuate the single-action control unit until the rotors have been lifted to the transport position.
- Release the operating rope.
- Actuate the single-action control unit until the locks (1) on the right and left-hand side engage in the retaining bolts.
- Set all hydraulic control units to the neutral position.
- Visually inspect whether the retaining bolts have engaged correctly in the locks (1).

Note

Make certain the transport locks engage correctly and the actuating rope is not tight. Perform a visual inspection to ensure the locks (1) have engaged correctly.

11.9.2 For design with hydraulic single-rotor lifting mechanism

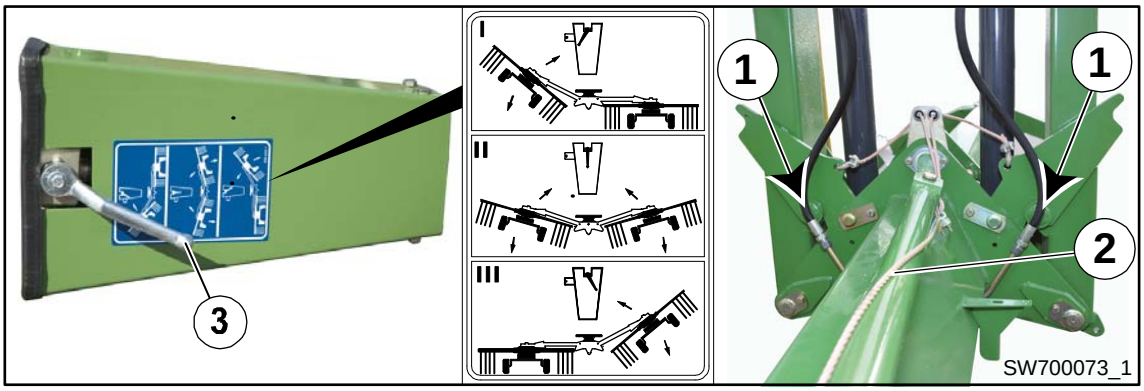


Fig. 40

- Set switching valve (3) to the central position (II).
- Switch on the tractor.
- In order to lift the locks (1), pull the operating rope (2) and keep it tensioned.
- Actuate the single-action control unit until the rotors have been lifted to the transport position.
- Release the operating rope.
- Actuate the single-action control unit until the locks (1) on the right and left-hand side engage in the retaining bolts.
- Set all hydraulic control units to the neutral position.
- Visually inspect whether the retaining bolts have engaged correctly in the locks (1).

Note

Make certain the transport locks engage correctly and the actuating rope is not tight. Perform a visual inspection to ensure the locks (1) have engaged correctly.

11.9.3 In Case of Electro-Hydraulic Single-Rotor Lifting Mechanism Design

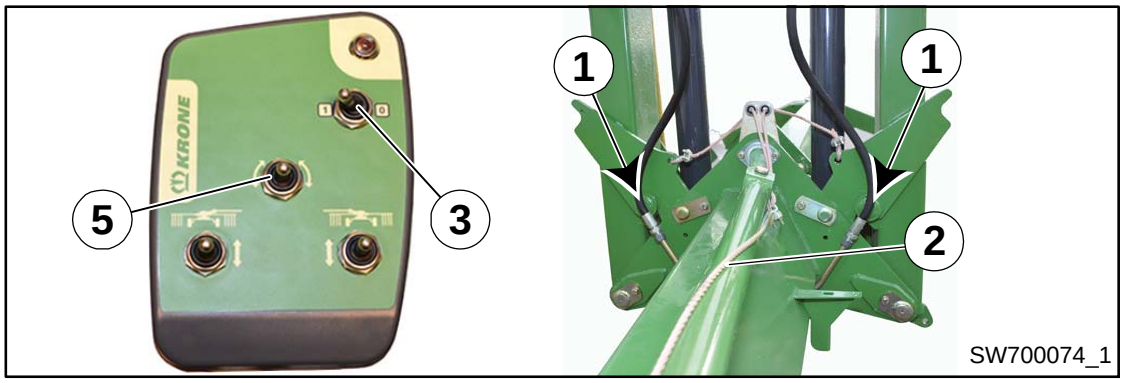


Fig. 41

- Switch on the controls via switch (3) (0 > 1).
- Set switch (5) to the central position.
- Switch on the tractor.
- In order to lift the locks (1), pull the operating rope (2) and keep it tensioned.
- Actuate the single-action control unit until the rotors have been lifted to the transport position.
- Release the operating rope.
- Actuate the single-action control unit until the locks (1) on the right and left-hand side engage in the retaining bolts.
- Set all hydraulic control units to the neutral position.
- Visually inspect whether the retaining bolts have engaged correctly in the locks (1).
- Switch off the controls via switch (3).

Note

Make certain the transport locks engage correctly and the actuating rope is not tight. Perform a visual inspection to ensure the locks (1) have engaged correctly.

11.10 Protecting the tine tips (transport position and rotary rake switched off)

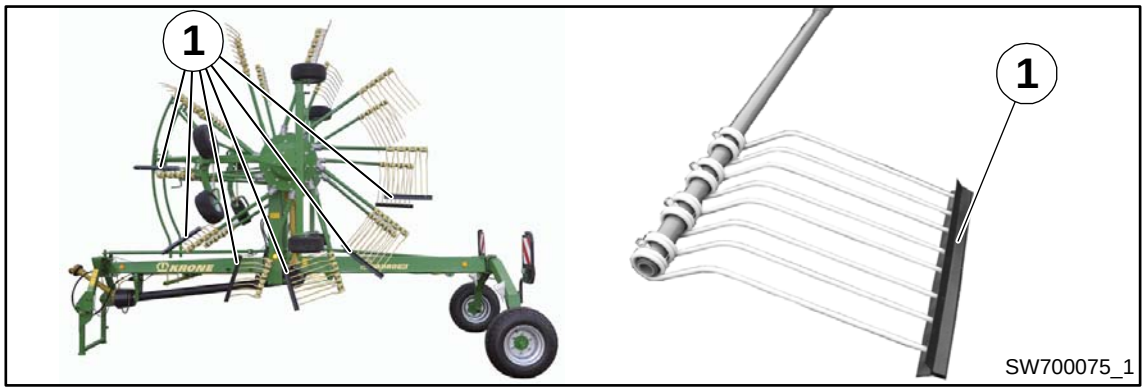


Fig. 42

The tines must be fitted with guards which are positioned at less than 2 m in transport position or when the machine is switched off. The tine guards are located on the front supports (right and left side of the machine).

- Connect the tine guards (1) onto the tines.

11.11 Selecing Rotor Operation

Depending on how the machine is equipped, different rotor operations can be selected with the rotary rake.

Twin-rotor operation: Swath placement to the middle with right and left rotor

Single rotor operation: Swath placement to the middle with left rotor

Single rotor operation: Swath placement to the middle with the right rotor

11.11.1 For design with hydraulic single-rotor lifting mechanism

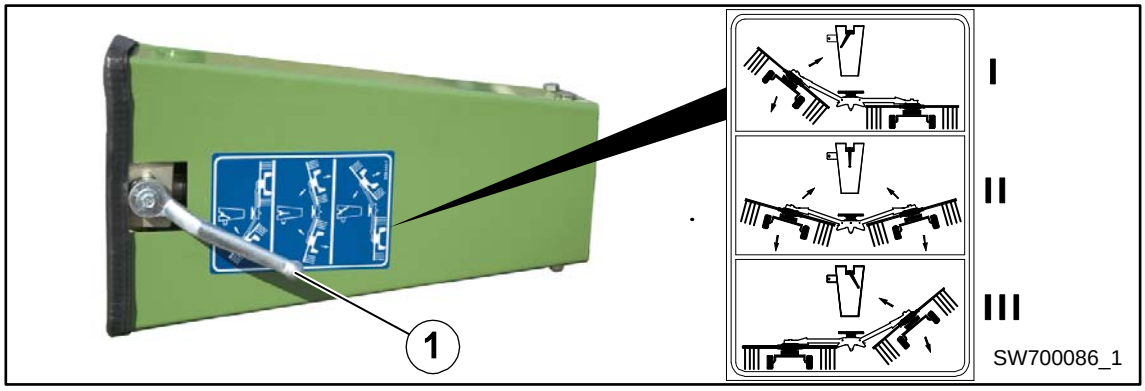


Fig. 43

Single-Rotor Operation with Right Rotor

To swath just with the right rotor, proceed as follows:

- Move the rotor arms to the working position.
- Move the switching valve (1) to position (1).
- Activate the single-acting control unit to lift the left rotor into headland position.

Twin-Rotor-Operation

To swath with both rotors, proceed as follows:

- Move the rotor arms to the working position.
- Bring switching valve (1) to position (II).
- Move the single-acting control unit to position (“Lowering / Float Position”).

Single-Rotor Operation with Left Rotor

To swath just with the left rotor, proceed as follows:

- Move the rotor arms to the working position.
- Move the switching valve (1) to position (III).
- Activate the single-acting control unit to lift the right rotor into headland position.

11.11.2 In Case of Electro-Hydraulic Single-Rotor Lifting Mechanism Design

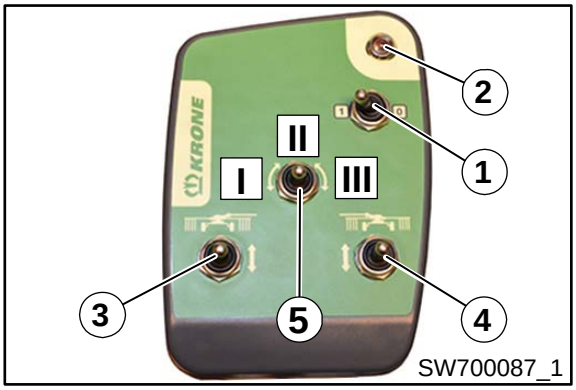


Fig. 44

Single-rotor operation with right rotor

In order to use just the right rotor for swathing, proceed as follows:

- Move outrigger arms into working position.
- Move switch (5) to position (I).
- Actuate the single-action control unit in order to raise the left rotor into headland position.

Twin-rotor operation

Proceed as follows in order to swath with both rotors:

- Move outrigger arms into working position.
- Move switch (5) to position (II).
- Move single-action control unit to position (“Lower / float position”).

Single-rotor operation with left rotor

In order to use just the left rotor for swathing, proceed as follows:

- Move outrigger arms into working position.
- Move switch (5) to position (III).
- Actuate the single-action control unit in order to raise the right rotor into headland position.

11.12 Travelling speed und drive speed

The travelling speed and drive speed while swathing depend on:

- forage quantity
- ground
- degree of dryness

Use these as rough guidelines:

- PTO speed approx. 450 rpm
- Travelling speed approx. 8 - 10 km/h

Drive speed and travel speed must be adapted to each individual operation.

Note

The travelling speed is based on the work image (orderly rake work with good formation of swaths).

11.13 Swathing

- Ensure there is no one in the working range of the machine.
- Raise lower links by approx. 100 mm (the height from lower link pinions to ground is approx. 630 mm).
- Raise outrigger arms into headland position.
- Switch on universal shaft at low engine speed.
- Increase speed slowly to approx. 450 rpm.
- Lower outrigger arms into working position.
- Move single-action control unit to position (“Lower / float position”) to ensure the soil adaption of the chassis when using the machine for work.
- Select travelling speed so that the crop is picked up cleanly and completely.
- Readjust working height, if necessary.

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12 Settings

WARNING!

If the basic safety instructions are not followed, people may be seriously injured or killed.

- To avoid accidents, the basic safety instructions in the chapter Safety must have been read and followed, see chapter Safety "Basic safety instructions".

WARNING!

If the safety routines are not adhered to, people may be seriously injured or killed.

- To avoid accidents, the safety routines in the chapter Safety must be read and followed, see chapter Safety "Safety routines".

WARNING! - Working in the area of the rotor tines!

Injuries to eyes due to rotors tines.

- Wear protective goggles when working in the vicinity of the rotor tines.

12.1 Setting the Rotor Inclination

The rotor pitch angle has been set at a transverse angle to the chassis in the factory. If the crops are not picked up properly, the working quality can be improved by adjusting the rotor pitch.
The rotor pitch angle is adjusted for each rotor via the guide wheels at the chassis. The best results are achieved if the rotor pitch adjustment ensures the tines are closer to the ground level when outputting the crops than at the start when picking up the crops.

- Shut down and safeguard the machine, see chapter Safety -> Safety routines, "Shutting down and safeguarding the machine".

12.1.1 Rotor chassis (serial)

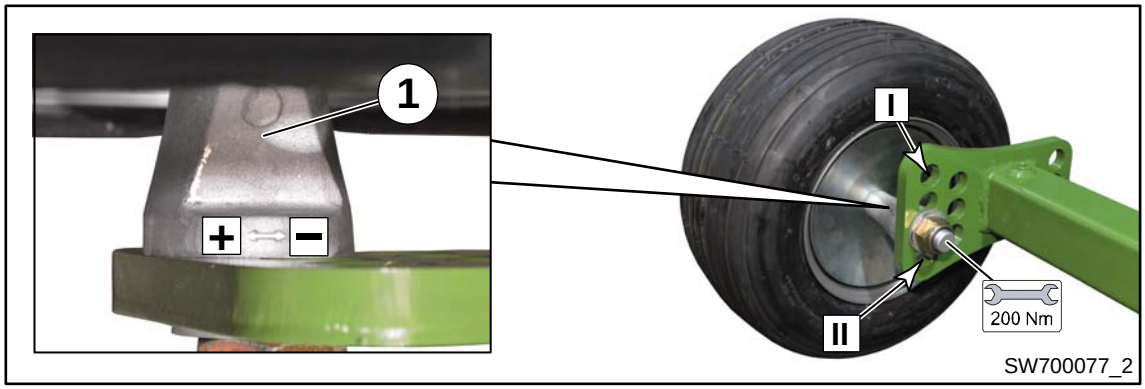


Fig. 45

Setting the rotor inclination:
Pos. I = Reducing rotor inclination
Pos. II = Increasing rotor inclination

Do not step under the raised rotors.
- To do this, raise the outrigger arms until the changeover work can be performed.
- To set rotor inclination, dismount the rear guide wheels and move them in the hole pattern.

Vernier adjustment via eccentric cam (1):
− = Reducing rotor inclination
+ = Increasing rotor inclination

Do not step under the raised rotors.
- Raise the outrigger arms until the changeover work can be performed.
- Loosen the nut of the wheel bolt.
- Turn the eccentric (1) to set the rotor inclination.
- Tighten the nut of wheel bolt.

Note
If the forage is heavy, adjust the inner running gear as low as possible!

12.1.2 For the Version with Trailing Guide Wheels (optional)

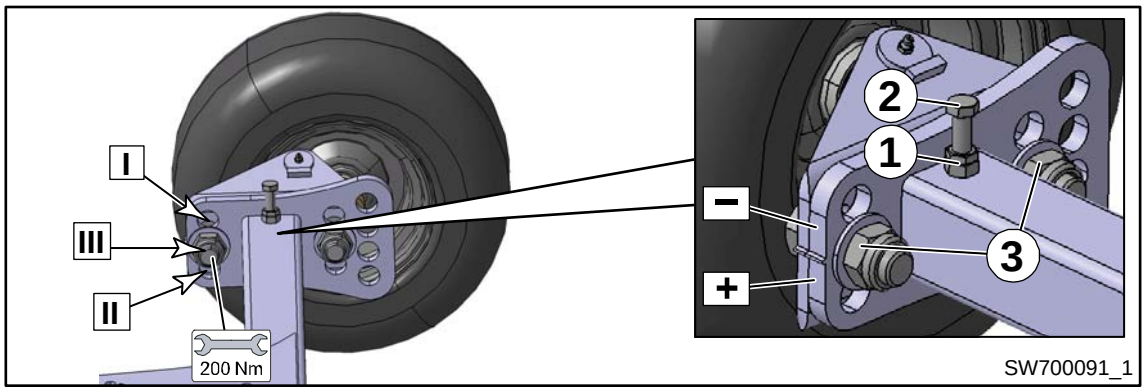


Fig. 46

Setting the rotor inclination:
Pos. I = Reducing rotor inclination
Pos. II = Increasing rotor inclination

Do not step under the raised rotors.
- To do this, raise the outrigger arms until the changeover work can be performed.
- To set rotor inclination, dismount the rear guide wheels and move them in the hole pattern.

Vernier adjustment by the screw on the oblong hole (3):
− = Reducing rotor inclination
+ = Increasing rotor inclination

Do not walk beneath the raised rotor.
- Only lift the rotor arms as far as necessary to carry out changes.
- Release the counter nut (1).
- To adjust the guide wheel, turn the stop screw (2) several turns anti-clockwise (upward).
- Release the nuts (3), but make sure the screws still prevent the guide wheel from moving.
- Shift the guide wheel to adjust the rotor pitch.
- Use the stop screw (2) to clamp the rotor at the desired pitch.
- Tighten the counter nut (1).
- Tighten the nuts (3).

Note
If the forage is heavy, adjust the inner running gear as low as possible!

12.1.3 With tandem chassis version (optional)

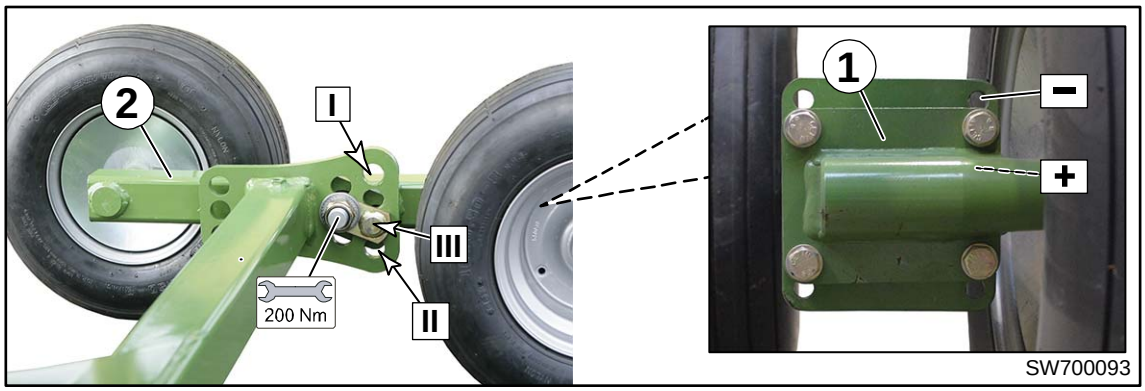


Fig. 47

Setting the rotor inclination:
Pos. I = Reducing rotor inclination
Pos. II = Increasing rotor inclination

Do not step under the raised rotors.

- To do this, raise the outrigger arms until the changeover work can be performed.
- To set rotor inclination, dismount the rear guide wheels and move them in the hole pattern.

Vernier adjustment via plate (1):
− = Reducing rotor inclination
+ = Increasing rotor inclination

Note
When adjusting the rotor pitch, ensure the tandem axle (2) is horizontal.

Note
If the forage is heavy, adjust the inner running gear as low as possible!

12.2 Fixing the Trailing Guide Wheels

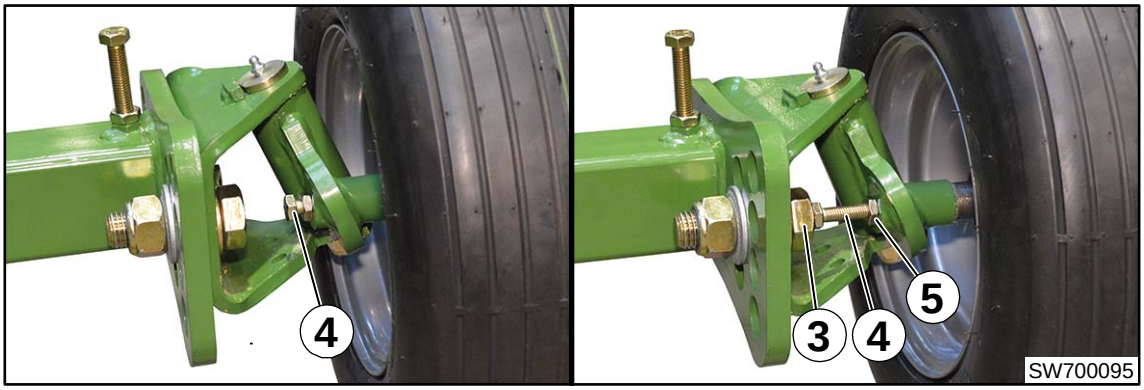


Fig. 48

In order to prevent the machine from drifting off when driving on the slope, fix the trailing guide wheels.

To do this:

- Loosen counter nut (5).
- Press guide wheel to the outside until the stop is reached and hold it.
- Unscrew the screw (4) until it rests against the screw (3).
- Tighten counter nut (5).

13 Maintenance

WARNING!

If the basic safety instructions are not followed, people may be seriously injured or killed.

- To avoid accidents, the basic safety instructions in the chapter Safety must have been read and followed, see chapter Safety "Basic safety instructions".

WARNING!

If the safety routines are not adhered to, people may be seriously injured or killed.

- To avoid accidents, the safety routines in the chapter Safety must be read and followed, see chapter Safety "Safety routines".

13.1 Spare Parts

Danger! - Using non-approved spare parts.

Effect: Danger to life, serious injuries or loss of warranty claims as well as exclusion of liability

- Use only authentic KRONE spare parts and accessories authorised by the manufacturer. The use of spare parts, accessories or additional equipment not manufactured, tested or approved by KRONE will exclude any liability for consequential damage.

Note

To ensure problem-free operation of the machine and to reduce wear and tear, specific maintenance and upkeep intervals must be observed. These include cleaning, greasing, lubricating and oiling parts and components.

13.2 Maintenance table

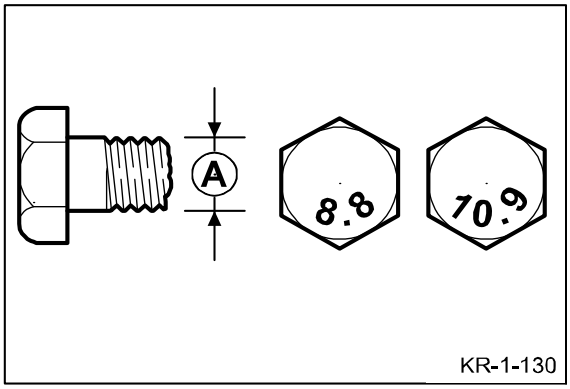
Maintenance work	Maintenance interval					
	Once after 10 hours	Before the beginning of the season	Every 10 hours but at least 1x daily	Once after 50 hours	Every 50 hours	After 1000 ha
Rotor gearbox						
Maintenance-free (permanently lubricated with grease)						
Main gearbox						
Oil level check		X				
Oil change						X
Tyres						
Check tyres for cuts and breaks visually		X				
Check tyre pressure	X	X			X	
Wheel nuts	X				X	
Crown nut chassis	X	X				
Tighten screws / nuts						
All screws		X			X	
Screws on the tines	X	X			X	
Check the locking of the transport position	X	X				

13.3 Tightening Torques

The tightening torque M_A is stated in Nm (unless otherwise indicated).

A Ø	5.6	6.8	8.8	10.9	12.9
	M_A (Nm)				
M 4		2.2	3	4.4	5.1
M 5		4.5	5.9	8.7	10
M 6		7.6	10	15	18
M 8		18	25	36	43
M 10	29	37	49	72	84
M12	42	64	85	125	145
M14		100	135	200	235
M14x1.5			145	215	255
M 16		160	210	310	365
M16x1.5			225	330	390
M 20			425	610	710
M 24			730	1050	1220
M 24x1.5	350				
M 24x2			800	1150	1350
M 27			1100	1550	1800
M 27x2			1150	1650	1950
M30			1450	2100	2450

A = Thread size
(The stability class can be seen on the head of the screw.)



NOTE

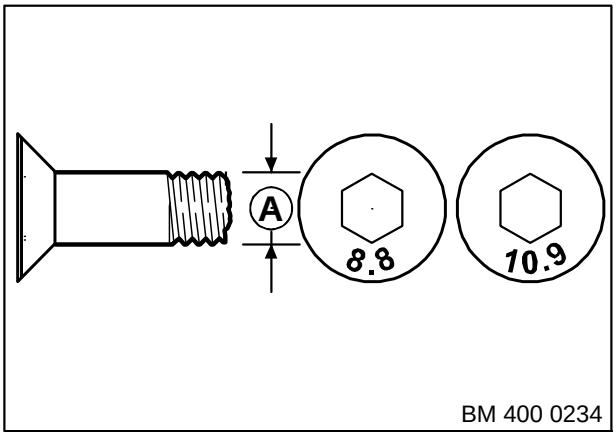
The table above does not apply to countersunk screws with a hexagonal socket head if the countersunk screw is tightened with the hexagonal socket head.

13.4 Tightening Torques (Countersunk Screws)

The tightening torque M_A is stated in Nm (unless otherwise indicated).

A Ø	5.6	8.8	10.9	12.9
	M_A (Nm)			
M 4		2.5	3.5	4.1
M 5		4.7	7	8
M 6		8	12	15
M 8		20	29	35
M 10	23	39	58	67
M 12	34	68	100	116
M 14		108	160	188
M 16		168	248	292
M 20		340	488	568

A = Thread size
(The stability class can be seen on the head of the screw.)



NOTE

The table above applies only to countersunk screws with hexagonal socket heads and metric threading that are tightened by the hexagonal socket head.

13.5 Deviating Torque

13.5.1 Testing the Screws on the Tines

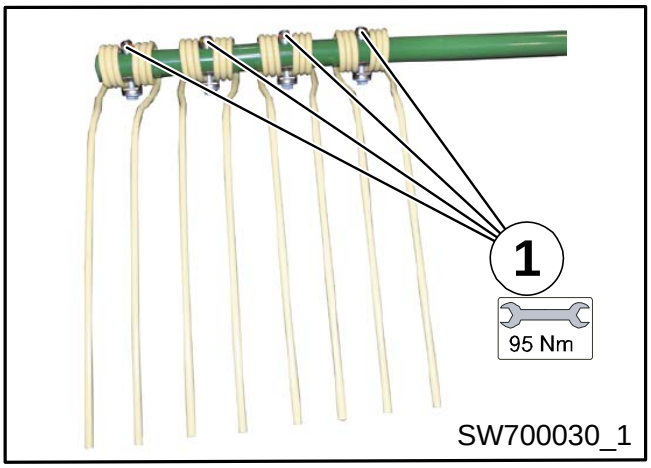


Fig. 49

Testing the Screws on the Tines: According to the Maintenance Table

When having released the screws,

- remove the nut.
- apply adhesive (high-strength) on the threading overhang of the screw.
- lift the tines on the tine end and tighten the nut to the torque specified below.

13.5.2 Torque of Wheels on the Running Gear

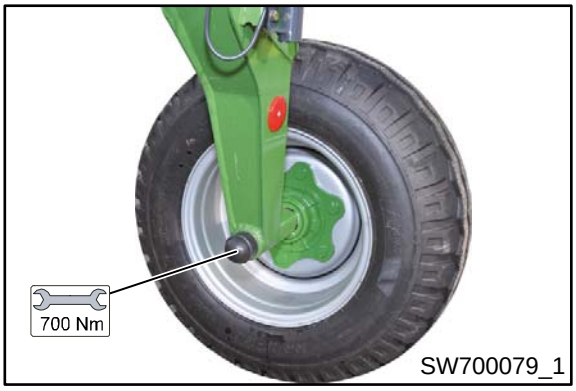


Fig. 50

Check locknut: According to the maintenance table

13.6 Tyres

Warning! - Tyre fitting incorrect
Effect: Injuries or damage to the machine

- Fitting tyres requires sufficient knowledge and the availability of proper tools!
- If tyres are not correctly fitted, it could explode when pumped up. This can cause serious injury. If you do not have sufficient experience of fitting tyres, have tyres fitted by the KRONE dealer or a qualified tyre specialist.
- When fitting tyres on the wheel rims, the maximum pressure given by the tyre manufacturer must not be exceeded. The tyre or even the wheel rim could explode and/or burst.
- If the tyre heels do not fit properly when the maximum permitted pressure is reached, let out the air, align tyres, lubricate the tyre heels and pump up the tyre again.
- Detailed information about how to fit tyres onto agricultural machinery can be obtained from the tyre manufacturers.

13.6.1 Checking and maintaining tyres

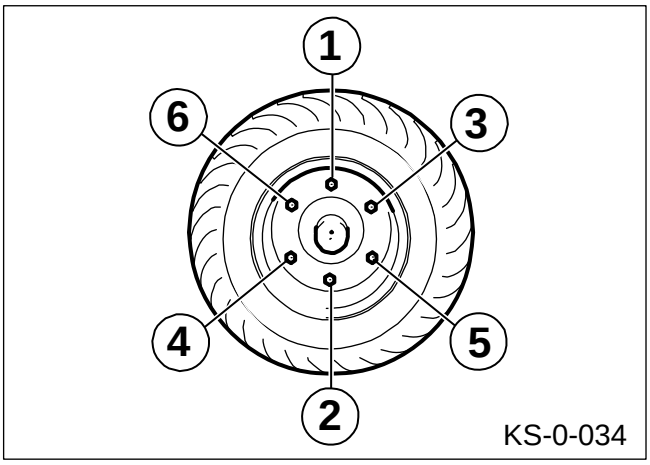


Fig. 51

When loosening and tightening the wheel nuts, observe the order indicated in the illustration.
Check the wheel nuts: According to the maintenance table
Check the tyre air pressure: According to the maintenance table

Tightening Torque

Threading	Key size in mm	Number of bolts per hub - pieces	Max. tightening torque	
			black	galvan.
M12 x 1.5	19	4/5	95 Nm	95 Nm
M14 x 1.5	22	5	125 Nm	125 Nm
M18 x 1.5	24	6	290 Nm	320 Nm
M20 x 1.5	27	8	380 Nm	420 Nm
M20 x 1,5	30	8	380 Nm	420 Nm
M22 x 1.5	32	8/10	510 Nm	560 Nm
M22 x 2	32	10	460 Nm	505 Nm

13.7 Replacing the tine arms (in case of repair)

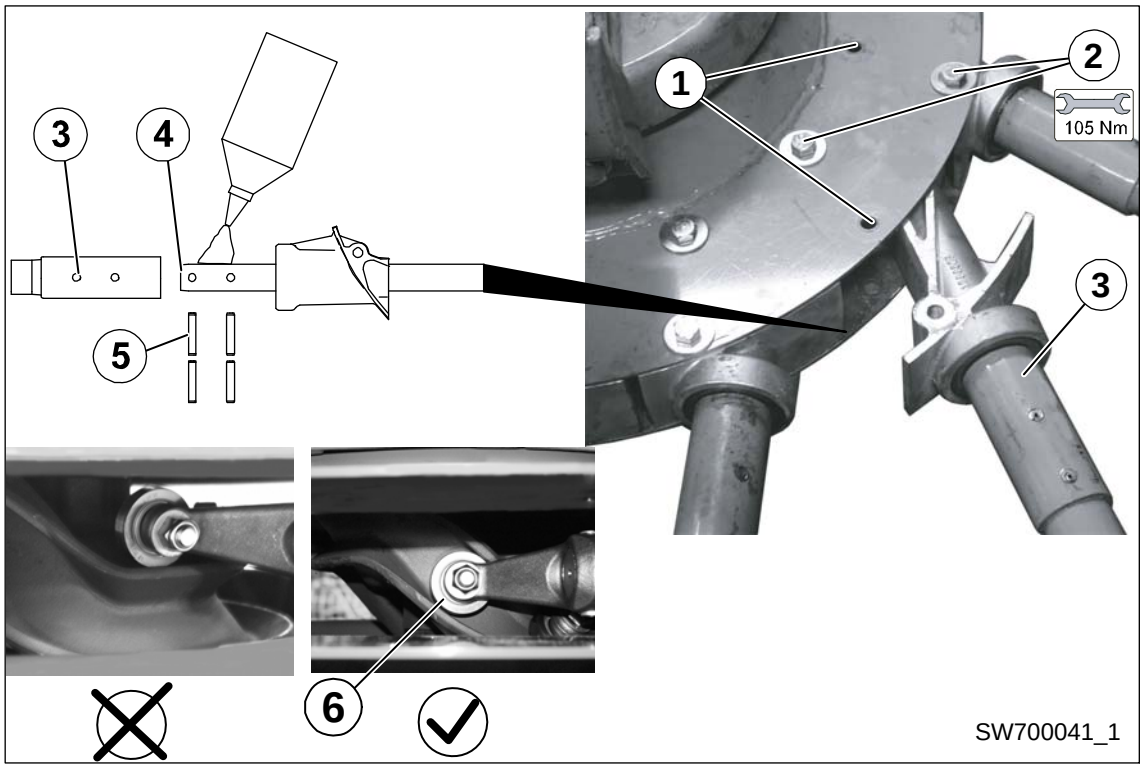


Fig. 52

In case of repairs, the tine arms can be removed and replaced individually.

- Unscrew the screws (1) of the tine arm
- Loosen the bolts (2) on the nearby tine arms
- Remove the tine arm (3) and replace the faulty components

Note
The tine arms (3) are glued together with the control arm shafts (4). To be able to loosen the components from each other, the connecting point must be heated up (to about 300 degrees).

- When a new tine arm (3) /control arm shaft (4) is installed, these two parts must be glued to each other before installation with high-strength adhesive.
- Apply glue (high-strength) (Part No. 939 042 0) on the front of the control arm shaft (4).
- Mount the tine arm (3) and secure with clamping sleeves (5).
- While installing the tine arm, make certain that the cam follower roller is inserted into the running track of the cam track.

Note
The cam follower roller is securely inserted into the running track when barely any play can be observed in the motion of the tine arm.

- Tighten all bolts to the required torque **(105 Nm)**.

Caution!
Turn the rotor once around 360 degrees manually. The rotor must move easily. If it does not, the tine arms are not installed correctly. The error must be eliminated so that the rotor can turn easily.

13.8 Replacing the tines (in case of repairs)

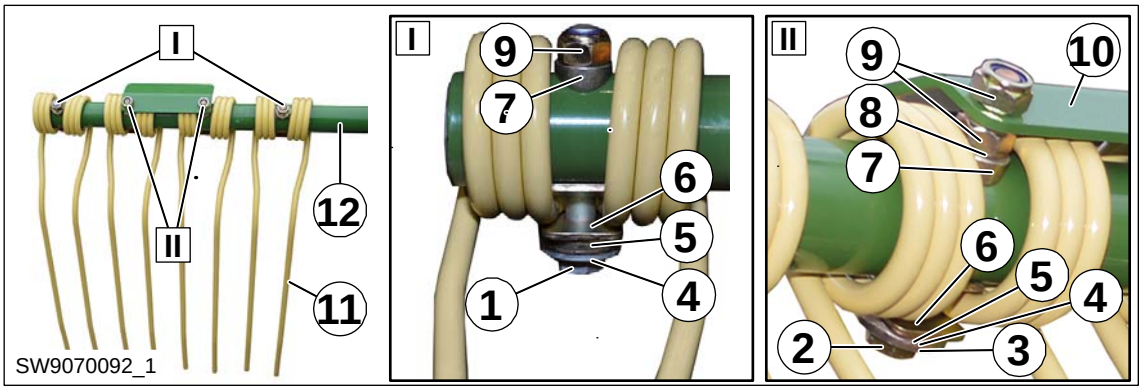


Fig. 53

1)	Hexagonal head screw M12 x 90 - 10.9	2)	Hexagonal head screw M12 x 110 - 10.9
3)	Detent edged washer SKM 12	4)	Detent edged washer SKB 12
5)	12.5x35x8 washer	6)	Fastening terminal
7)	Support	8)	13x24x2.5 washer
9)	Locknut M12	10)	Deflector plate
11)	Tines	12)	Tine arm
Adhesive (high strength) (order no. 938 627 0)			

- Remove all tines in front of the broken tine to remove the broken tine.
- Remove the broken tine.

Installing New Tine

- Slide fastening clamp onto the tine.
- Slide tine onto the tine arm.
- Guide hex bolt with detent edged washer and washer from below through the fastening clamp and the tine arm.
- Apply adhesive (high-strength) on the threading overhang of the screw.
- Install support, washer and locknut, raise tine on the tine end and tighten nut with torque (95 Nm).

Proceed as described above with all tines.

14 Maintenance – lubrication chart

WARNING!

If the basic safety instructions are not followed, people may be seriously injured or killed.

- To avoid accidents, the basic safety instructions in the chapter Safety must have been read and followed, see chapter Safety "Basic safety instructions".

WARNING!

If the safety routines are not adhered to, people may be seriously injured or killed.

- To avoid accidents, the safety routines in the chapter Safety must be read and followed, see chapter Safety "Safety routines".

- Shut down and safeguard the machine, see chapter Safety -> Safety routines, "Shutting down and safeguarding the machine".

14.1 Lubrication Points on the Universal Shafts

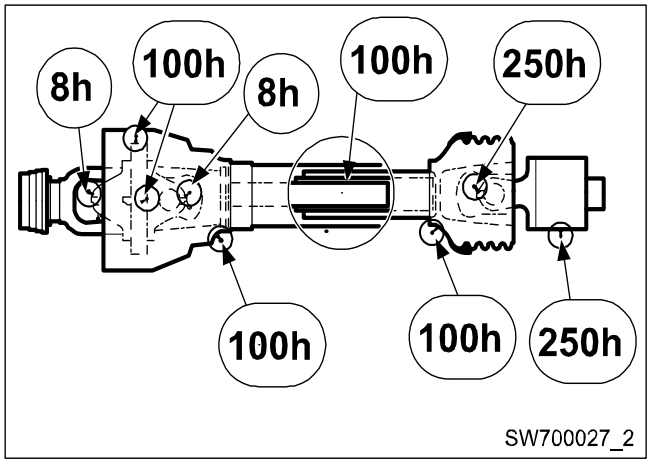


Fig. 54

Lubricate the PTO shafts at the intervals indicated in the drawing with a multi-purpose grease. Follow the operating instructions of the PTO shaft manufacturer.

14.2 Lubrication Points on the Machine

Note

To make the illustration easier to read, the greasing points have only been shown on one side of the machine. The greasing same points are present on the other side of the machine (mirror-image).

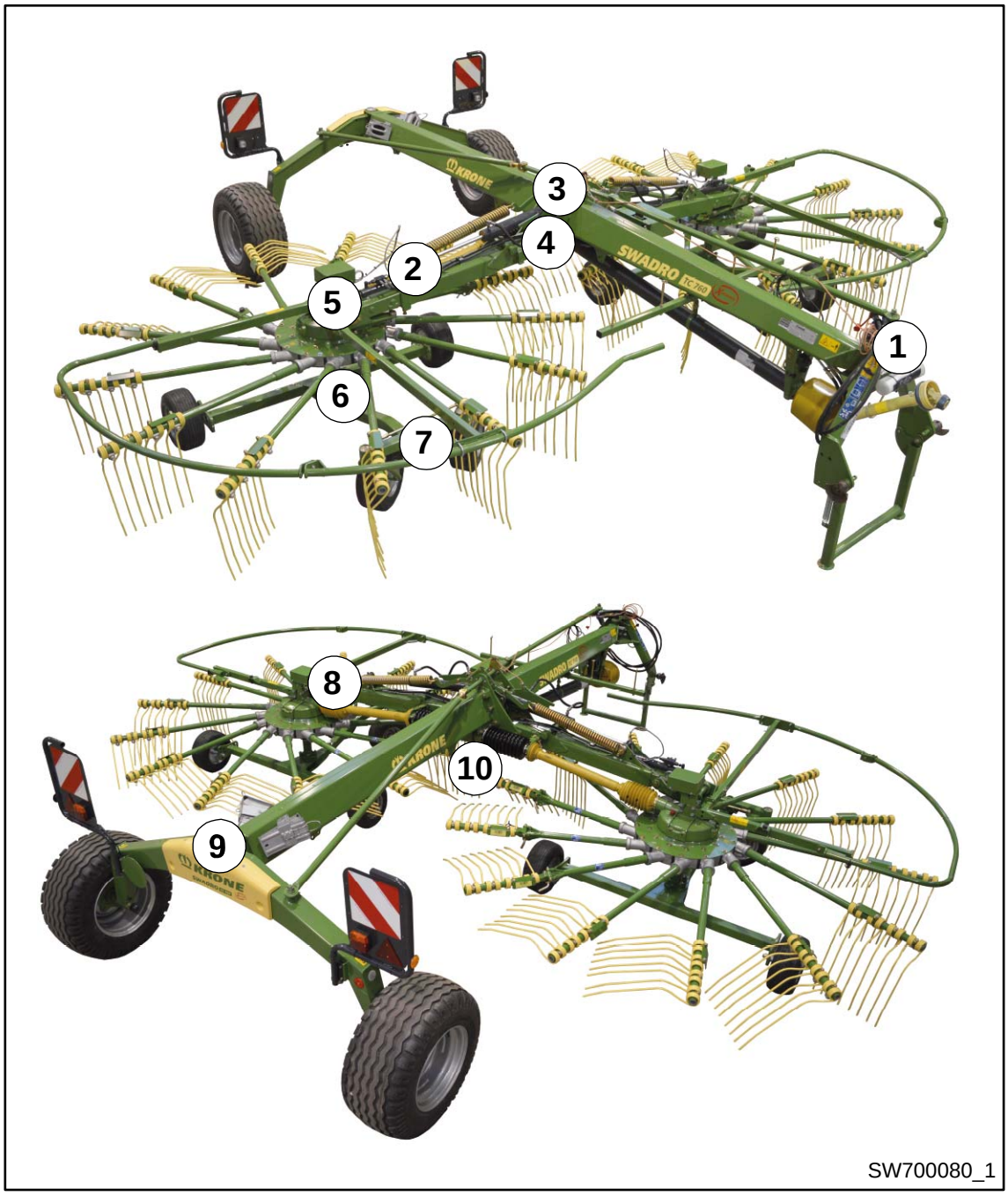
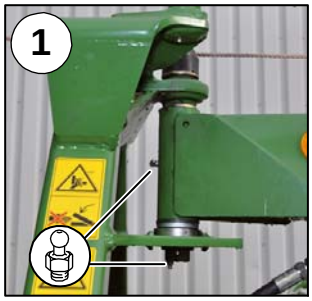
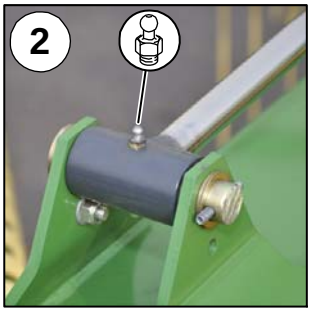
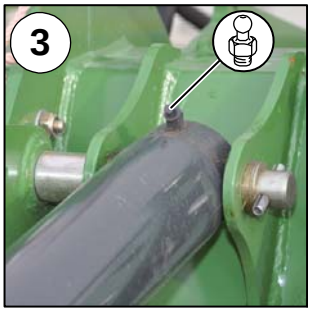
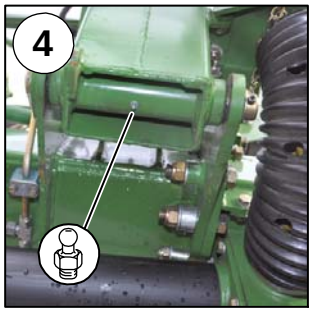
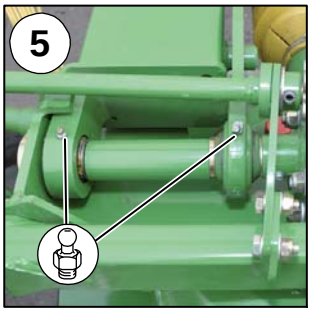
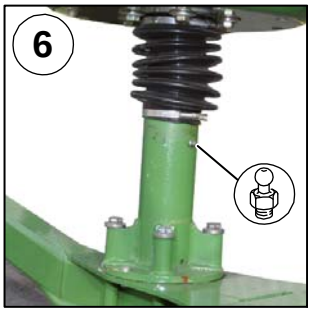
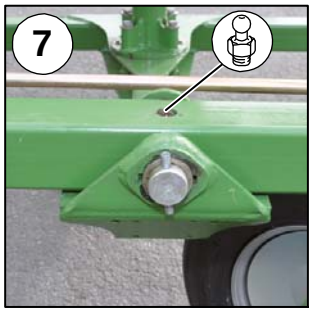
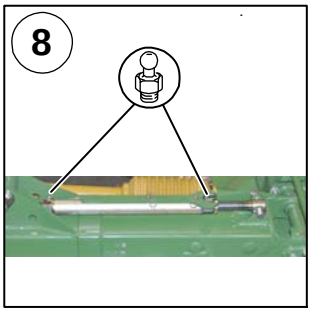
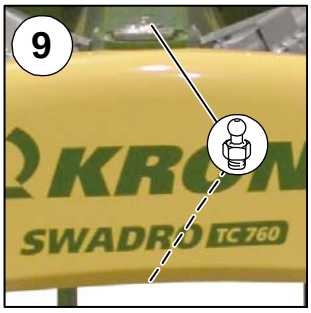
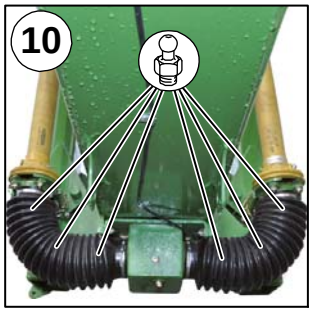


Fig. 55

Lubricate the lubrication points every 20 operating hours.		
		
		
		

Lubricate the lubrication points every 250 operating hours.		
		

15 Maintenance - hydraulic system

WARNING!

Risk of injury as a result of incorrect handling of liquids under high pressure.

Effect: Escaping high-pressure liquids can penetrate the skin and cause serious injury.

Repair work on the hydraulic system may only be performed by authorised KRONE professional workshops.

- Depressurise the system before disconnecting lines.
- When searching for leaks, use suitable aids and wear protective goggles.
- High-pressure liquid that is escaping from a small opening is virtually invisible. Therefore, you should use a piece of cardboard or something similar when searching for leaks. Protect your hands and body.
- If liquid penetrates the skin, consult a doctor immediately. The liquid must be removed from the body as quickly as possible. Danger of infection! Physicians who are not familiar with this area must consult appropriate information from a competent medical source.
- Check hydraulic hoses regularly and replace if there are any signs of damage or ageing! The replacement lines must comply with the requirements of the device manufacturer.
- Ensure that all line connections are tight before the pressure in the system builds up again.

WARNING! – Hydraulic hose lines are subject to ageing

Effect: Danger to life or serious injuries

The characteristics of the lines change depending on pressure, heat load and the effect of UV rays.

The date of manufacture appears on the hydraulic hoses. This way the age can be ascertained quickly.

By law the hydraulic lines must be replaced after six years.

Use original spare parts when replacing hydraulic hoses!

16 Maintenance - Gearbox

WARNING!

If the basic safety instructions are not followed, people may be seriously injured or killed.

- To avoid accidents, the basic safety instructions in the chapter Safety must have been read and followed, see chapter Safety "Basic safety instructions".

WARNING!

If the safety routines are not adhered to, people may be seriously injured or killed.

- To avoid accidents, the safety routines in the chapter Safety must be read and followed, see chapter Safety "Safety routines".

Interval for oil level check and oil change: refer to chapter Maintenance “Maintenance Table”

Oil quality / quantity: see "Consumables" in the Description of the machine section.

Used oil disposal: see chapter Safety "Consumables"

Prerequisite:

– The machine is in the working position, see "Moving the machine into the working position" in the Operation chapter.

- Prepare the machine for servicing, repair, maintenance and adjustment work, see section Safety -> Safety routines "Preparing the machine for servicing, repair, maintenance and adjustment work".

16.1 Main gearbox

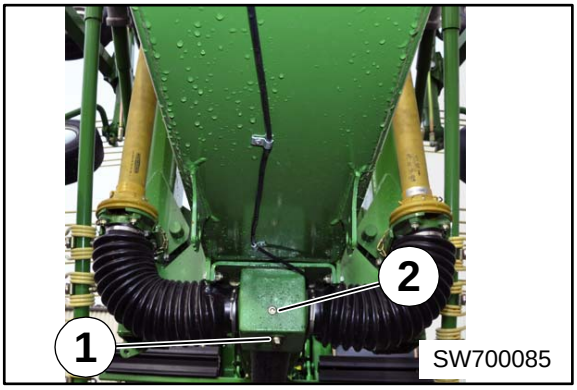


Fig. 56

Interval for oil level check and oil change: refer to chapter Maintenance “Maintenance Table”

Oil Quality / Amount of Oil: Refer to Chapter Technical Data “Lubricants”

Oil Change:

Collect escaping oil in a suitable container.

- Screw out oil drain plug (2) and drain the oil.
- Screw in the oil drain plug (2).
- Unscrew the inspection screw (1).
- Top up new oil until the control hole (1) is reached.
- Screw in the inspection screw (1).

Note

The used oil must be disposed of correctly

17 Special equipment

WARNING!

If the basic safety instructions are not followed, people may be seriously injured or killed.

- To avoid accidents, the basic safety instructions in the chapter Safety must have been read and followed, see chapter Safety "Basic safety instructions".

WARNING!

If the safety routines are not adhered to, people may be seriously injured or killed.

- To avoid accidents, the safety routines in the chapter Safety must be read and followed, see chapter Safety "Safety routines".

17.1 Tine loss safeguard

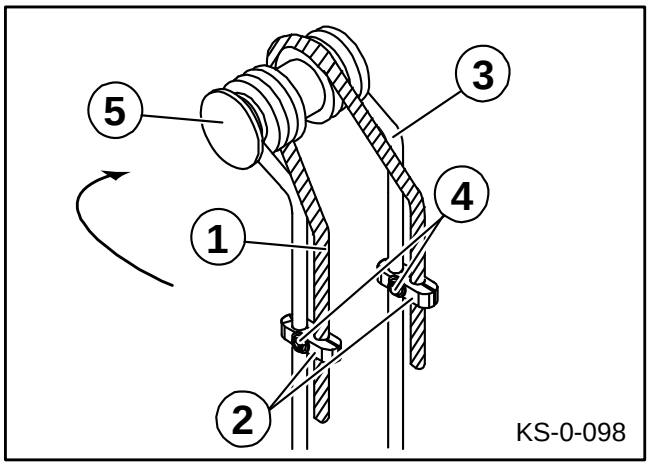


Figure 57

Mounting the tine loss safeguard

The tine loss safeguard for the double coil spring tines consists of:

- a cable
- two cable clamps
- two coach bolts, washers and lock nuts each

Secure the cable (1) with the cable clamps (2) onto the rotor tines (3).

Note

Thecable must be located behind the rotor tine in relation to the direction of rotation. The nuts (4) of the cable clamps must face outwards.

Spare tine loss safeguards Order No. : 153 479 0

17.2 Chain for height restriction of suspension arms

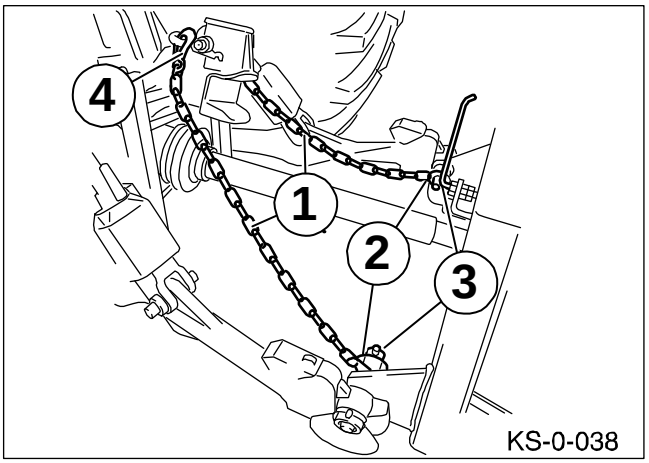


Figure 58

- Secure chains (1) with a spring-type slotted straight pin (3) and a washer (2) at the suspension arm seats.
- Attach chain hooks (4) to the tractor.
- Select chain length according to desired max. lowering level.

Note

Spare tine loss safeguards Order No. : 153 479 0
Chain for height restriction of suspension arms Order No.: 250 759 0

18 Placing in Storage

WARNING!

If the basic safety instructions are not followed, people may be seriously injured or killed.

- To avoid accidents, the basic safety instructions in the chapter Safety must have been read and followed, see chapter Safety "Basic safety instructions".

WARNING!

If the safety routines are not adhered to, people may be seriously injured or killed.

- To avoid accidents, the safety routines in the chapter Safety must be read and followed, see chapter Safety "Safety routines".

18.1 Special Safety Instructions

WARNING! - When performing repair, maintenance or cleaning work on the machine, or in the case of technical intervention, drive elements may start moving.

Effect: Danger to life, injuries or damage to the machine.

- Switch off engine, remove the ignition key and carry it with you.
- Secure machine and tractor against rolling.
- Turn off PTO shaft.
- After the repair, maintenance, cleaning work or technical modifications are completed, mount all protective covers and safety devices properly again.
- Avoid skin contact with oils, greases, cleaning agents and solvents.
- In the event of injuries or burns due to oils, cleaning agents or solvents, contact a physician immediately.
- All other safety instructions must also be followed to avoid injuries and accidents.

18.2 At the End of the Harvest Season

Before placing the machine in winter storage, clean the outside thoroughly. If you use a high-pressure cleaner to do this Do not keep a stream of water directed at bearing points. After cleaning is completed, lubricate all lubrication points. Do not wipe off any grease that comes out of bearing points. The hardened grease will provide additional protection against moisture.

Check all movable components such as deflector rollers, joints, tension rollers, etc. to make certain they move easily. If necessary remove, clean, grease and remount. If necessary, replace with new parts.

Use only original KRONE replacement parts.

Disassemble the PTO shaft. Lubricate the inner tubes and the guard tube with grease. Grease the lubrication points on the cross joint and grease the bearing rings of the guard tube.

Repair places with damaged paint and preserve all bare metal places thoroughly with rust protection agent.

Park the machine in a dry location, but not in the vicinity of artificial fertilisers or livestock buildings. Repair places with damaged paint and preserve all bare metal places thoroughly with rust protection agent.

Caution!
The machine should only be placed on blocks with a suitable vehicle lifting device. Make certain that the machine is stable and safe when it is on blocks.

To provide relief for the tyres, set the machine on blocks. Protect the tyres against external influences such as oil, grease, direct sunlight , etc.

Perform the necessary repair tasks during the time immediately after the harvest season. Draw up a list of all replacement parts you will need. This will make it easier for your KRONE dealer to process your orders and you will be certain that your machine will be ready for use at the beginning of the next season.

18.3 Before the Start of the New Season

18.4 Special Safety Instructions

WARNING! - When performing repair, maintenance or cleaning work on the machine, or in the case of technical intervention, drive elements may start moving.

Effect: Danger to life, injuries or damage to the machine.

- Switch off engine, remove the ignition key and carry it with you.
- Secure machine and tractor against rolling.
- Turn off PTO shaft.
- After the repair, maintenance, cleaning work or technical modifications are completed, mount all protective covers and safety devices properly again.
- Avoid skin contact with oils, greases, cleaning agents and solvents.
- In the event of injuries or burns due to oils, cleaning agents or solvents, contact a physician immediately.
- All other safety instructions must also be followed to avoid injuries and accidents.

- Lubricate the machine thoroughly. Remove any condensation water which may have collected in the bearings.
- Check oil level in the gearbox(es) and top up if necessary.
- Check hydraulic hoses and lines for leaks and replace them where necessary.
- Check the air pressure in the tyres and refill if necessary.
- Check all screws to make certain they are tight or retighten them if necessary.
- Check all electrical connection cables and the lighting. Repair or replace it if necessary.
- Check all settings on the machine and correct if necessary.
- Re-read the operating instructions thoroughly.

Note

Use vegetable oils and greases.

19 Malfunctions - Causes and Remedies

WARNING!

If the basic safety instructions are not followed, people may be seriously injured or killed.

- To avoid accidents, the basic safety instructions in the chapter Safety must have been read and followed, see chapter Safety "Basic safety instructions".

WARNING!

If the safety routines are not adhered to, people may be seriously injured or killed.

- To avoid accidents, the safety routines in the chapter Safety must be read and followed, see chapter Safety "Safety routines".

Malfunction	Possible cause	Remedy
Rotor does not work smoothly.	Working height is set too high.	Lower working height.
	Working speed is too high.	Reduce driving speed. Guide value 8 - 10 km/h. Slow down in case of uneven terrain or high amount of forage.
	Speed is too low.	Increase the speed. Guide value 450 rpm
	Side rotor inclination adjusted incorrectly.	Change the side inclination (refer to chapter Operation “Setting the Side Inclination”).
	Tine arm(s) crooked.	Replace tine arms.
High forage contamination.	Working height is set too low.	Raise working height.
	Tine arm(s) bent.	Replace tine arms.
Swath width too large	Working width too long.	Change working width. (Swadro TC 760)
	Speed is too low.	Increase speed.
In headland position, one rotor goes down and the other one goes up.	Rotors are not swivelled up into headland position.	Actuate hydraulics until the rotor arms rest against the stops.
It is not possible for the rotor to adapt to unevenness of the ground.	The lower links of the tractor are set too high or too low.	Align frame horizontally (the height from lower link pinions to ground is approx. 63 cm).
	The tractor hydraulics is not in the float position.	Set tractor hydraulics to float position.
The electrical adjustment of the working height does not work properly.	Fuse defective.	Replace the fuse in the switch box which is mounted on the frame.

20 Disposal of the machine

20.1 Disposal of the machine

After the service life of the machine has expired, the individual components of the machine must be disposed of properly. The applicable country-specific, current waste disposal guidelines and the legal laws must be observed.

Metal parts

All metal parts must be brought to a metal recycling centre.

The components must be freed from operating fluids and lubricants (gear oil, oil from hydraulic system, ...) before being scrapped.

The operating fluids and lubricants must be brought separately to an environmentally friendly disposal point or recycling centre.

Operating fluids and lubricants

Operating fluids and lubricants (diesel fuel, coolant, gear oil, oil from hydraulic system, ...) must be brought to a disposal point for waste oil.

Synthetic materials

All synthetic materials must be brought to a recycling centre for synthetic materials.

Rubber

Rubber parts (hoses, tyres, …) must be brought to a rubber recycling centre.

Electronic scrap

Electronic parts must be brought to a disposal point for electronic scrap.

21 Appendix

The circuit diagram can be found in the Appendix.

Circuit diagram	document no.: D24 150101050 EN	version: 01

twin rotor rake centre swathing

Swadro from series TC

Document type	Sheet	description
Cover sheet	1	twin rotor rake centre swathing
Equipment list	1	Equipment list
Layout plan	1	Layout plan
Circuit diagram	1	Stromlaufplan

C				creator	Albers	document no.: D24 150101050 EN - 01	Swadro from series TC Table of contents
B				date	23.01.2014		
A				reviewed			
modification	date	name		date		Copyright reserved	copyright notice

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operating equipment identification	function	Sheet/path
-A1	central electric board	/1.D1
-K1	lock valve rotor right	/1.E5
-K2	lock valve rotor left	/1.E6
-M1	working height left	/1.E3
-M2	working height right	/1.E4
-P1	control system ON	/1.A3
-S1	control system ON - OFF	/1.A2
-S2	single-rotor lifting mechanism	/1.A7
-S3	working height left	/1.A4
-S4	working height right	/1.A6

C				creator	Albers	document no.: D24 150101050 EN - 01	Swadro from series TC Equipment list
B				date	16.01.2014		
A				reviewed			
modification		date	name	date		Copyright reserved	copyright notice

Equipment list	
plant	
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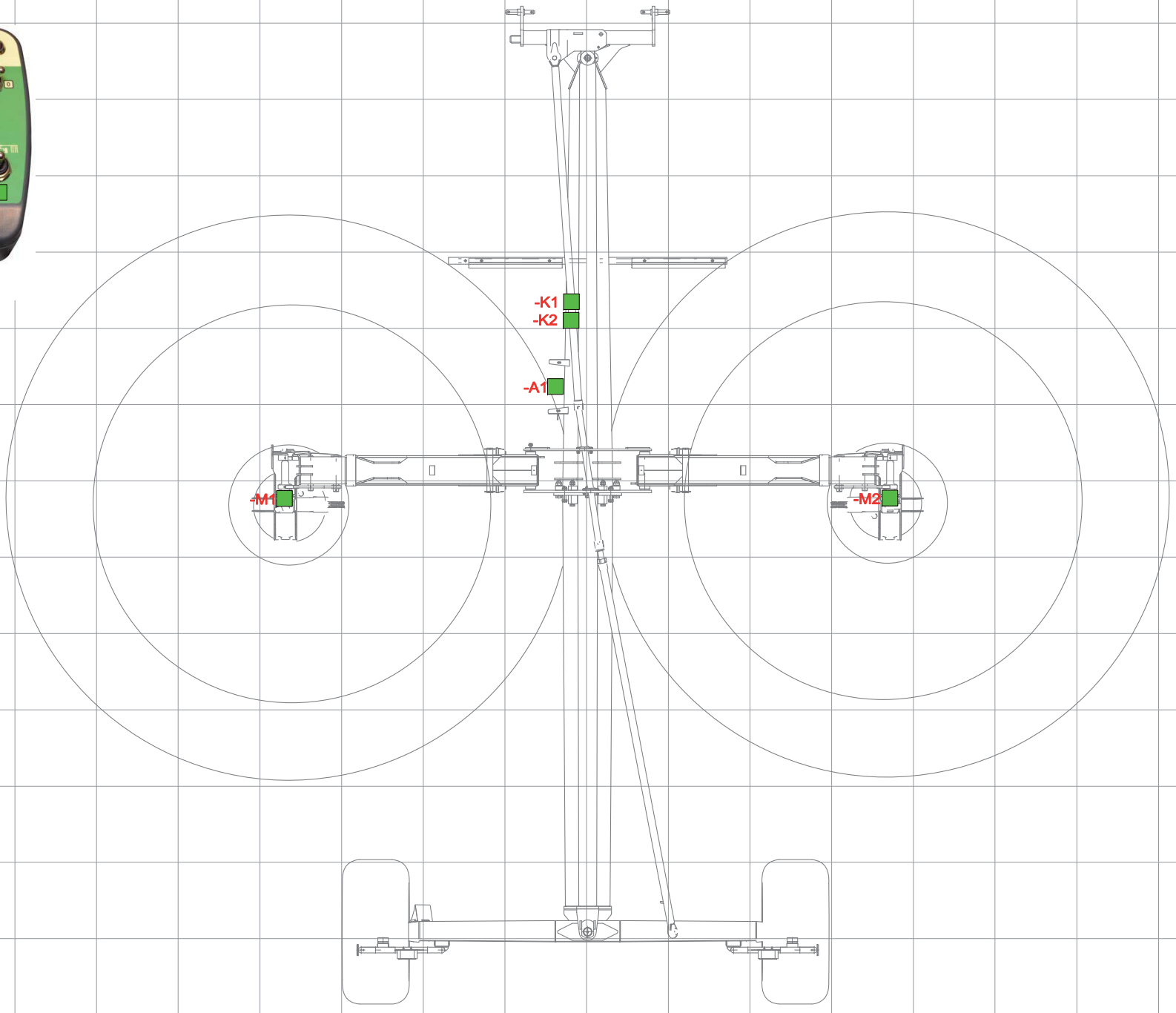

C				creator	Albers L.	KRONE	document no.: D24 150101050 EN - 01	Swadro from series TC Layout plan	Layout plan AP
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A		20.01.2014	R. Löcken	reviewed					location
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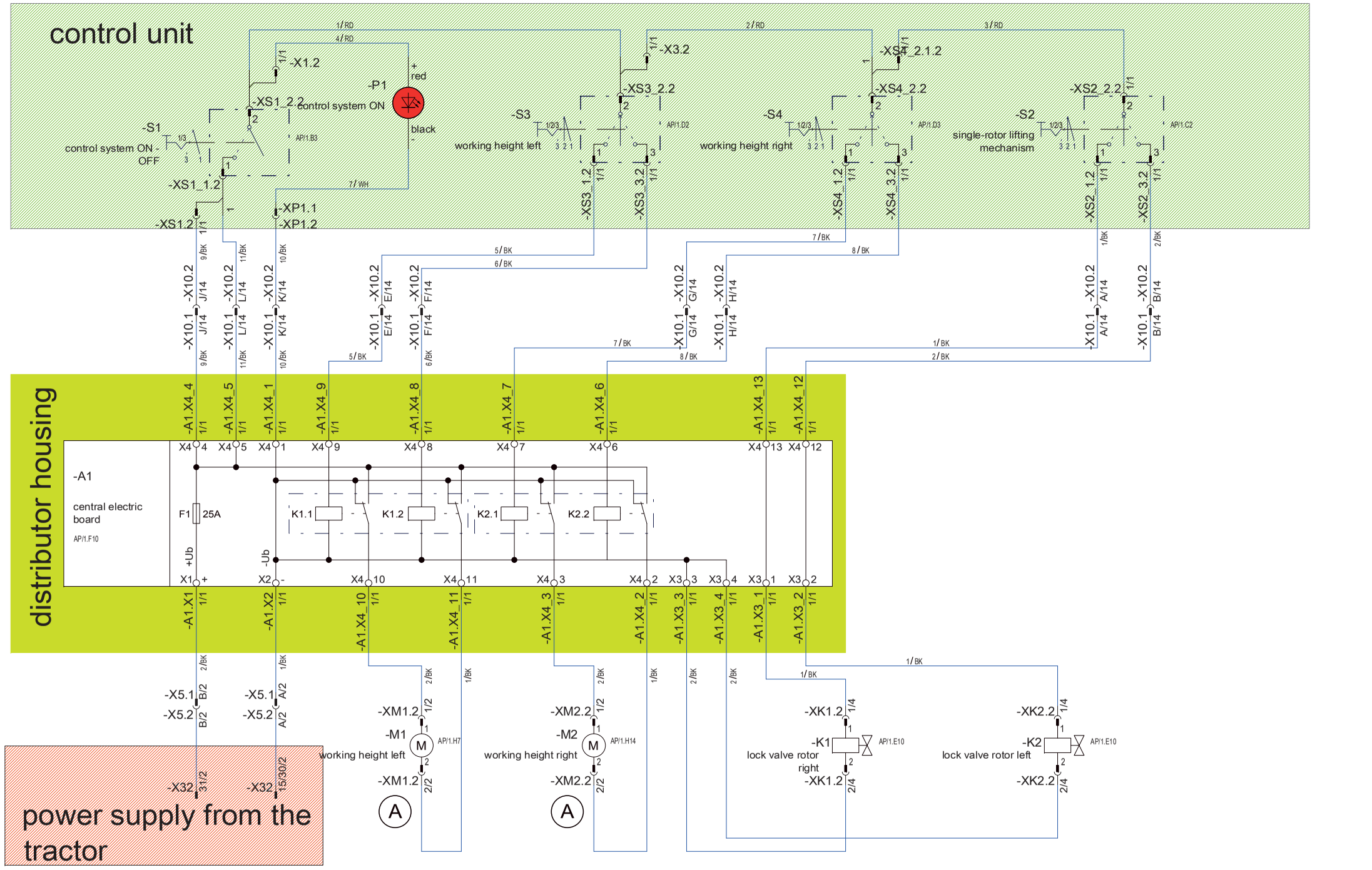

C				creator	Albers L.	document no.: D24 150101050 EN - 01	Swadro from series TC Circuit diagram
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A	Polung an Stecker M1.2 und M2.2 getauscht	20.11.2014	AlbersL	reviewed			
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