Operating Instructions

Cultivator

Kristall 9 (U)

- EN -

Item no. 175_4747
2/05.11

LEMKEN GmbH & Co. KG

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Dear customer,

Thank you for the trust you have placed in us by purchasing this device. The device can only be used to its full advantage when operated and used properly. When the device was delivered, you will already have been instructed in operation, adjustment and maintenance by your dealer. However, this brief instruction is not a substitute for thorough study of the operating instructions.

These operating instructions will help to familiarise you with the LEMKEN GmbH & Co. KG device and the options available for using it.

The operating instructions contain important information about how to operate the device safely, properly and efficiently. Following the instructions will help to prevent hazards, faults and down times and will increase reliability and service life. Read the operating instructions carefully and attentively before commissioning.

Make sure that the operating instructions are always available at the location where the device is used.

The operating instructions must be read and followed by anyone who is involved in carrying out the following work:

- Coupling and uncoupling
- Adjustments
- Operation
- Maintenance and repairs
- Troubleshooting, and
- Final shutdown and disposal.

These operating instructions are deemed to be the original operating instructions.

Spare parts ordering

This device is supplied with a specification listing all assemblies that are relevant for the product. The spare parts list valid for your device includes both those assemblies relevant to you and those that are not intended for your device. Make sure that you only order spare parts that belong to the assemblies that can be found on your specification or the enclosed print out. When ordering spare parts, state the type designation and serial number of the device. This information can be found on the rating plate. Enter this data in the fields below so that it is always to hand.

Type designation:	
Serial number:	

Remember that you should only use genuine LEMKEN spare parts. Reproduction parts have a negative influence on the function of the device, have a shorter service life and present risks and hazards that cannot be estimated by LEMKEN GmbH & Co. KG. They also increase the maintenance costs.

Service and spare parts

Information on service and spare parts is available from your local dealer or our website at www.lemken.com.

CONTENTS

1 GENERAL INFORMATION

1.1 Liability

The "Standard Terms and Conditions of Sales and Delivery" of LEMKEN GmbH & Co. KG, in particular Section IX, shall apply. Liability. In line with the dimensions cited in these conditions the LEMKEN GmbH & Co. KG shall not be held liable for any personal or material damage, when such damage is caused by one or more of the following reasons:

- improper use of the device, see also section entitled "Intended use",
- non-compliance with the operating instructions and the enclosed safety instructions,
- unauthorised changes to the device,
- inadequate monitoring of parts which are subject to wear,
- maintenance work that has not been conducted properly or in good time,
- the use of spare parts that are not original LEMKEN GmbH & Co. KG spare parts,
- accidents or damage through outside influences or force majeure

1.2 Guarantee

The "Standard Terms and Conditions of Sales and Delivery" of LEMKEN GmbH & Co. KG shall apply at all times.

The guarantee period shall be one year from the date of receipt of the implement. We shall rectify any implement faults in accordance with the LEMKEN guarantee guidelines.

1.3 Copyright

These operating instructions represent a document in terms of the law on unfair competition.

Copyright is retained by

LEMKEN GmbH & Co. KG

Weseler Strasse 5

D-46519 Alpen, Germany

These operating instructions are intended to be used by the operator of the implement. They contain texts and drawings which must not be

- reproduced,
- divulged or
- communicated in any other way in whole or in part without the express permission of the manufacturer.

Infringements will result in a claim for damages.

1.4 Optional accessories

LEMKEN implements may be equipped with various accessories. The operating instructions below describe both series components and optional accessories.

Please note: These accessories will vary depending on the type of equipment.

2 SYMBOLS USED IN THE OPERATING INSTRUCTIONS

2.1 Hazard classes

The following symbols are used in the Operating Instructions for particularly important information:

DANGER

Denotes an imminent hazard with high risk, which will result in death or severe physical injury, if not avoided.

WARNING

Denotes a possible hazard with medium risk, which could result in death or severe physical injury, if not avoided.

CAUTION

Denotes a low-risk hazard, which could cause light or medium physical injury or property damage, if not avoided.

2.2 Information

Denotes special user tips and other particularly useful or important information for operation and efficient utilisation.

2.3 Environmental protection

Indication of special recycling and environmental protection measures.

2.4 Indication of passages

The following symbols are used for particular passages in the operating instructions:

- Indicates work steps
- Indicates enumerations

3 SAFETY MEASURES AND PRECAUTIONS

General safety instructions for the operator are specified in the chapter entitled "Safety measures and precautions". At the start of some main chapters the safety instructions, which refer to all work to be carried out in this chapter, are listed together. Each safety-relevant work step includes other safety instructions specific to the work step.

3.1 Target group

These operating instructions are restricted exclusively to the use of the device by trained technicians and instructed persons.

3.2 Intended use

The device is manufactured in accordance with state-of-the-art standards and the recognised safety rules. However, the use of the device may result in a risk to life and limb of the user or third parties, or cause damage to the device and other material property. The device may be operated in a technically perfect condition only, in accordance with its designated use and by safety-conscious persons in compliance with the operating instructions.

Intended use also includes:

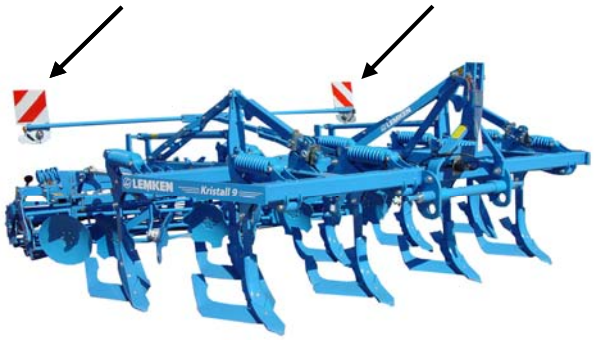
- compliance with the operating instructions and implementation of the work steps indicated in the operating instructions,
- compliance with the safety and warning signs on the device,
- observance of the power limits of the tractor and device,
- observance of all maintenance specifications and additional checks,
- the use of original spare parts,
- the use of the listed auxiliary and operating materials as well as their environmentally friendly disposal.

Safe operation is not guaranteed unless all instructions, settings and power limits applicable to the device are observed.

3.3 Safety equipment on the device

To protect the user and the device, the device features special safety equipment.

– Always keep all safety equipment in working order.



Lighting system

3.4 Safety and warning signs

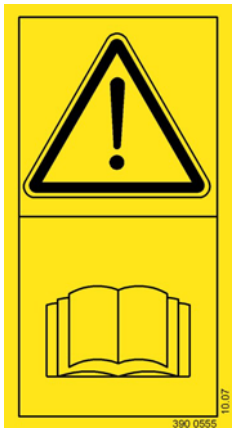
3.4.1 General information

The implement features all equipment which ensures safe operation. If hazardous areas could not be completely secured with respect to operational safety, warning signs are affixed which indicate these residual risks. Damaged, lost or illegible warning signs must be replaced immediately.

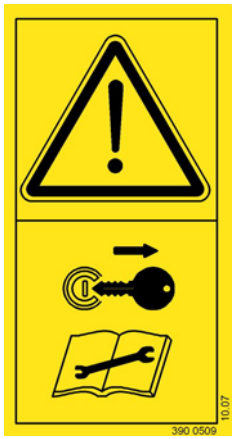
3.4.2 Meaning of warning signs

– Please familiarise yourself with the meaning of the warning signs.

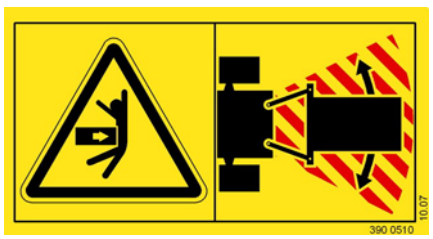
The following explanations provide detailed information.



ATTENTION: Please read and observe the operating instructions and safety instructions before starting up the implement for the first time!



ATTENTION: Before carrying out maintenance or repair work, switch off the engine and remove key!



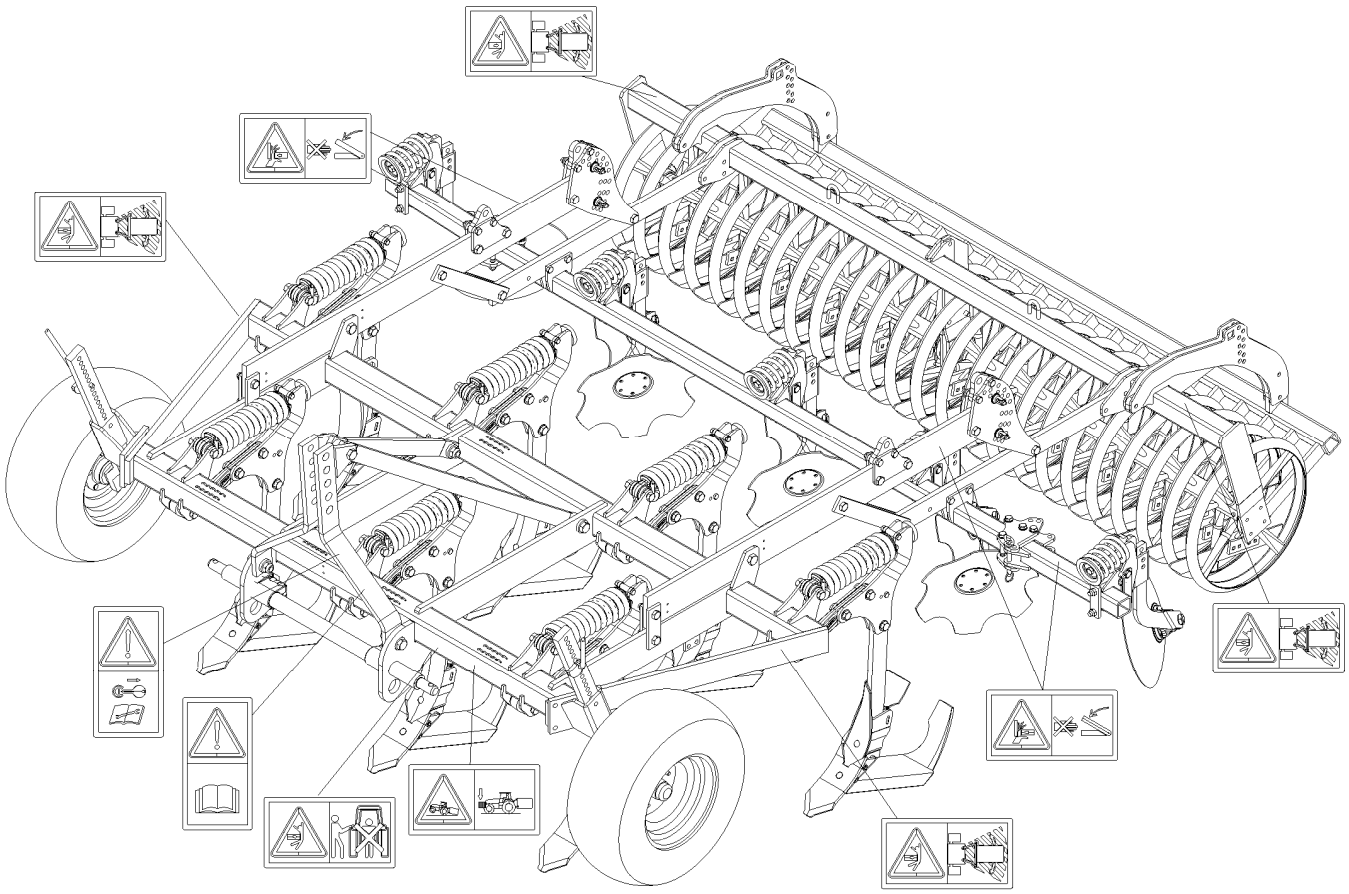
ATTENTION: Do not remain in the operating and swivel area of the implement!

ATTENTION: Danger of crushing!

CAUTION! The front axle of the tractor must always be loaded with at least 20% of the tractor's curb weight!

ACHTUNG: When the three-point power lift is activated, stay outside of the lifting range of the three-point suspension.

3.4.3 Position of the safety and warning signs



3.5 Special safety instructions

Risk of injury due to non-observance of the currently valid occupational safety guidelines

WARNING

If the currently valid occupational safety guidelines are bypassed or safety equipment is rendered unusable when handling the device, there is a risk of injury.

- The operator must personally monitor all work on and with the device.
- The operator instructs his personnel in occupational safety according to the currently valid occupational safety guidelines.

Risk of injury due to foreign objects ejected at high speed

WARNING

During work there is a risk of injury to the face and body by lumps of earth, soil constituents or stones ejected at high speed.

- During work there must be nobody directly in front of, behind or next to the device.
- During work nobody must accompany the device.

WARNING

Risk of injury when freeing casualties

When rescuing people trapped or injured by the device, there is a risk of additional serious injury to the casualty if the hydraulic connections were not connected according to their colour coding as described in the section entitled "Required hydraulic equipment". As a result, functions may run in the opposite direction or may be inverted.

– Before actuating the hydraulics, check that the hydraulic connections of the device are connected to the tractor according to the colour coding.

If there is no identification on the tractor and on the device or if the connections are not connected to the tractor according to their identification, it may not be possible to free the person safely.

If in doubt, leave casualties to be freed by specially trained rescue personnel.

3.6 Hazardous areas

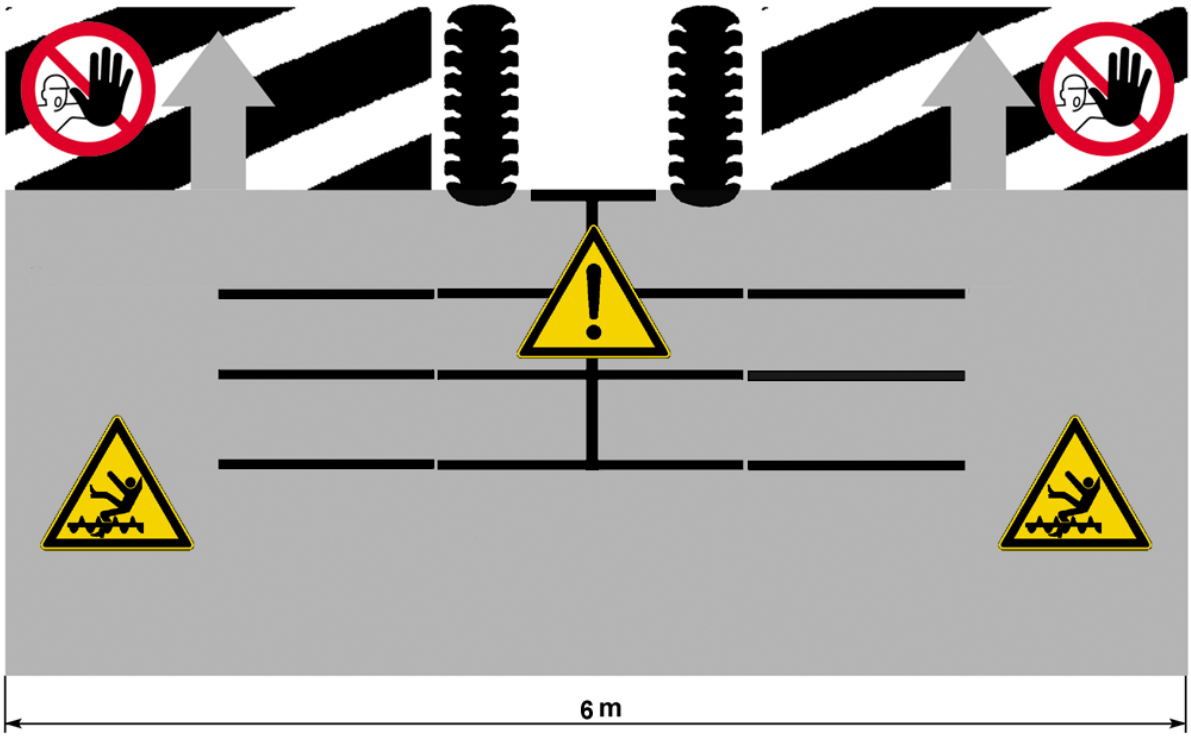
WARNING

Moving hazardous area

The hazardous area of the device moves during operation of the device!

During operation of the device there must be nobody in front of the actual hazardous area, as the hazardous area moves with the device!

3.6.1 Hazardous areas during operation of the device



3.7 Residual risks

Residual risks are particular hazards which occur when handling the device and which cannot be eliminated despite a design in accordance with safety requirements.

Residual risks are not usually obvious and may be the source of a potential injury or health hazard.

3.7.1 Hazard caused by mechanical systems

There is a risk of accidents due to crushing, cutting and striking body parts

- on abruptly moving machine parts,
- on moving machine parts caused by stored mechanical energy in elastic parts, such as springs,
- on an inadequately stable device,
- on the general shape or mounting location of components.

3.7.2 Hazard caused by hydraulic systems

There is a risk of injury to body parts, in particular the face, eyes and unprotected areas of skin, caused by burns and contamination with hydraulic fluid

- due to hot/pressurised hydraulic fluid spraying out of leaking joints or lines,
- due to bursting, pressurised lines or components.

3.7.3 Hazard during operation

During operation there is a risk of injury, particularly to the face, from ejected stones and lumps of earth.

3.8 Applicable rules and regulations

The applicable rules which must be observed during operation of the device are listed below:

- Observe the currently valid national highway code!
- Observe the currently valid national laws and regulations for occupational safety.
- Observe the currently valid national laws and regulations for operational safety.

3.9 Operation on public highways

3.9.1 Lighting system and identification

A proper lighting system, identification and equipment must be on the device if it is to be transported on public roads. Further information can be requested from the appropriate authorities.

3.9.2 Requirements of the tractor

– Ensure that the tractor with mounted device always reaches the stipulated braking deceleration.

Observe the permitted axle loads, gross weights and transportation dimensions, see also section entitled "Axle loads"!

Observe the permitted power limit of the tractor!

WARNING

Risk of accidents due to inadequate steerability

A tractor which is too small or which has inadequate front ballast cannot be manoeuvred safely or steered with adequate tracking stability. As a result, the driver or other road users may be injured or killed.

– Only use a tractor which can be adequately ballasted and safely manoeuvred.

– Ensure that the front axle of the tractor is always loaded with at least 20% of the net weight of the tractor. See section on "Axle loads".

3.9.3 Axle loads

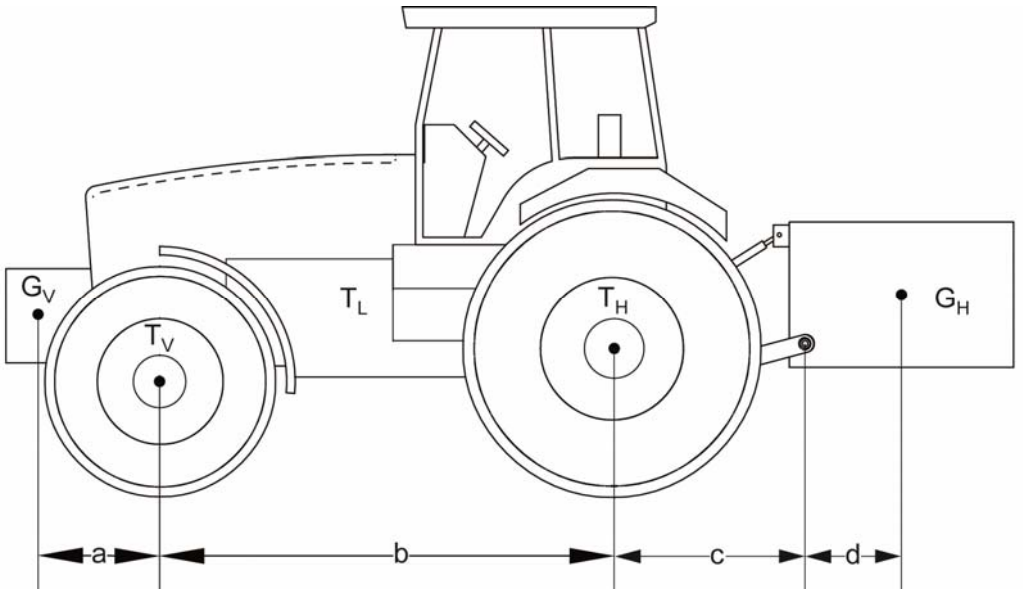
Implements mounted to the front and rear three-point linkage must not result in the following being exceeded:

- permissible gross weight of tractor,
- permissible axle loads of tractor,
- the tractor's tyre load-carrying capacities.

The tractor's front axle must always be loaded with at least 20 % of the tractor's curb weight.

The following data are required for the calculation:

- from the tractor operating instructions,
- from the implement operating instructions,
- which are to be documented through remeasuring.



Data from tractor operating instructions

– Take the following data from your tractor's operating instructions:

Abbreviation		Data
T_L	Tractor kerb weight (kg)	_____ kg
T_V	Front axle load (kg) of empty tractor	_____ kg
T_H	Rear axle load (kg) of empty tractor	_____ kg

Data from implement operating instructions

– Take the following data from these operating instructions or from the documents for the front weight or rear weight:

Abbreviation		Data
G_H	Gross weight (kg) for rear mounting implement or rear weight	_____ kg
G_V	Gross weight (kg) for front mounting implement or front weight	_____ kg
d	Distance (m) between centre of lower control link ball and centre of gravity for rear mounting implement or rear weight	_____ m

Data to be determined through remeasuring are

– Determine the following data through remeasuring:

Abbreviation		Data
a	Distance (m) between centre of gravity for front mounting implement or front weight and centre of front axle	_____ m
b	Tractor wheelbase (m)	_____ m
c	Distance (m) between centre of rear axle and centre of lower control link	_____ m

Calculation of minimum ballasting value at front $G_{V\ min}$ for rear mounting implement

$$G_{V\ min} = \frac{G_H \times (c + d) - T_V \times b + (0.2 \times T_L \times b)}{a + b}$$

– Enter the calculated minimum ballasting value, as required at the front of the tractor, into the table.

Calculation of minimum ballasting value at rear $G_{H\ min}$ for front mounting implement

$$G_{H\ min} = \frac{G_V \times a - T_H \times b + (0.45 \times T_L \times b)}{b + c + d}$$

– Enter the calculated minimum ballasting value, as required at the rear of the tractor, into the table.

Calculation of actual gross weight G_{tat}

$$G_{tat} = G_V + T_L + G_H$$

– Enter the value for the calculated actual gross weight and the permissible gross weight as given in the tractor's operating instructions into the table.

Calculation of actual front axle load $T_{V\ tat}$

$$T_{V\ tat} = \frac{G_V \times (a + b) + T_V \times b - G_H \times (c + d)}{b}$$

– Enter the value for the calculated actual front axle load and the permissible front axle load as given in the tractor's operating instructions into the table.

Calculation of actual rear axle load $T_{H\ tat}$

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

– Enter the value for the calculated actual rear axle load and the permissible rear axle load as given in the tractor's operating instructions into the table.

Tyre load-carrying capacity

– Enter double the value (for two tyres) for the permissible tyre load-carrying capacity (see, e.g. tyre manufacturer's documentation) into the table.

Table	Actual value according to calculation			Permissible value according to tractor operating instructions			Double permissible tyre load-carrying capacity [two tyres]	
Minimum ballasting, front	$\mathbf{G_{V\ min}}$	kg		-			-	
Minimum ballasting, rear	$\mathbf{G_{H\ min}}$	kg		-			-	
Gross weight	$\mathbf{G_{tat}}$	kg	≤	$\mathbf{T_L}$	kg		-	
Front axle load	$\mathbf{T_{V\ tat}}$	kg	≤	$\mathbf{T_V}$	kg	≤	kg	
Rear axle load	$\mathbf{T_{H\ tat}}$	kg	≤	$\mathbf{T_H}$	kg	≤	kg	

3.9.4 Check before departure

– Before driving with the implement raised, lock the control lever of the control unit; otherwise it may drop and the implement may be unintentionally lowered.

– Mount and check the transport equipment such as the lighting system, warning signs and protective devices.

The actuating cables for the quick-release couplings of the tractor must hang loose and must not actuate themselves in any position.

– Before starting up and operating the implement, check the immediate vicinity around it. No-one must be standing in this area!

– Ensure that visibility is adequate.

Observe permitted axle loads, total weights and transportation dimensions.

3.9.5 Correct behaviour in road traffic

– When driving on public highways, observe the relevant statutory national regulations.

Driving behaviour, steering and braking performance are influenced by ballast weights.

– Ensure that the tractor has adequate steering and braking performance.

– When driving around corners, take into account the wide radius and the inertia of the device.

It is prohibited to transport people on the device.

3.10 Obligation of the operator

- Before switching on the device, read the operating instructions.
- Follow the safety instructions!
- Wear appropriate protective clothing when carrying out any work on the device. Protective clothing must be tight-fitting!
- Observe generally accepted and other obligatory regulations for the prevention of accidents and protection of the environment and add them to the operating instructions!

The operating instructions are an important component of the device.

- Ensure that the operating instructions are always ready available at the installation location of the device and are kept for the entire service life of the device.
- If the device is sold or the operating company changes, pass on the operating instructions with the device!
- Keep all safety instructions and danger warnings on the device in a completely legible state. The affixed safety and warning signs provide important information on safe operation. Comply with them to ensure your safety!
- Do not alter, retrofit or modify the device, potentially impairing safety, without the approval of the manufacturer. The manufacturer is not liable for any damage resulting from arbitrary modifications to the device!
- Operate the device only in compliance with all connection and default values provided by the manufacturer!
- Use original spare parts only!

3.11 Operating the device safely

3.11.1 General information

- Before starting work, familiarise yourself with all equipment and actuating elements as well as their functions!
- Do not operate the device until all protective devices have been attached and are in the safety position!
- Always attach the device in accordance with the regulations and only on the stipulated devices.
- Always exercise extreme caution when mounting the device on or removing it from the tractor!
- In the area of the three-point linkage there is a risk of injury from crushing and/or shearing!
- Before mounting the device on or removing it from the three-point linkage, move the operating equipment into the position which prevents the device from being uninitentionally raised or lowered!
- When actuating the external control for the three-point attachment, do not walk between the tractor and device!
- It is prohibited to be within the hazardous area of the machine and to climb up on the implement while it is operating!
- In the wider operating range of the device there is a risk of injury, e.g. from ejected stones!
- Before actuating hydraulic equipment (such as flap devices), ensure that there is nobody in the flap area! Risk crushing and/or shearing by remote power operated parts!
- Never stand between tractor and device. This is only permitted when the tractor is secured against rolling away by the parking brake and the chocks!
- Always keep the device in a clean state to prevent the risk of fire!
- Before leaving the tractor, deposit the device on the ground! Switch off the engine and remove the ignition key!

3.11.2 Personnel selection and qualifications

- The driver of the tractor must have the appropriate driving licence!
- Any work on the device may be carried out by trained and instructed personnel only. Personnel must not be on drugs, intoxicated or taking medication!
- Servicing and maintenance work may be carried out by trained technicians or appropriately instructed persons only!
- Only electricians may work on the electrical components in accordance with the electro-technical regulations!

4 HANDING OVER THE DEVICE

– As soon as the device is delivered, ensure that it corresponds with the order package.

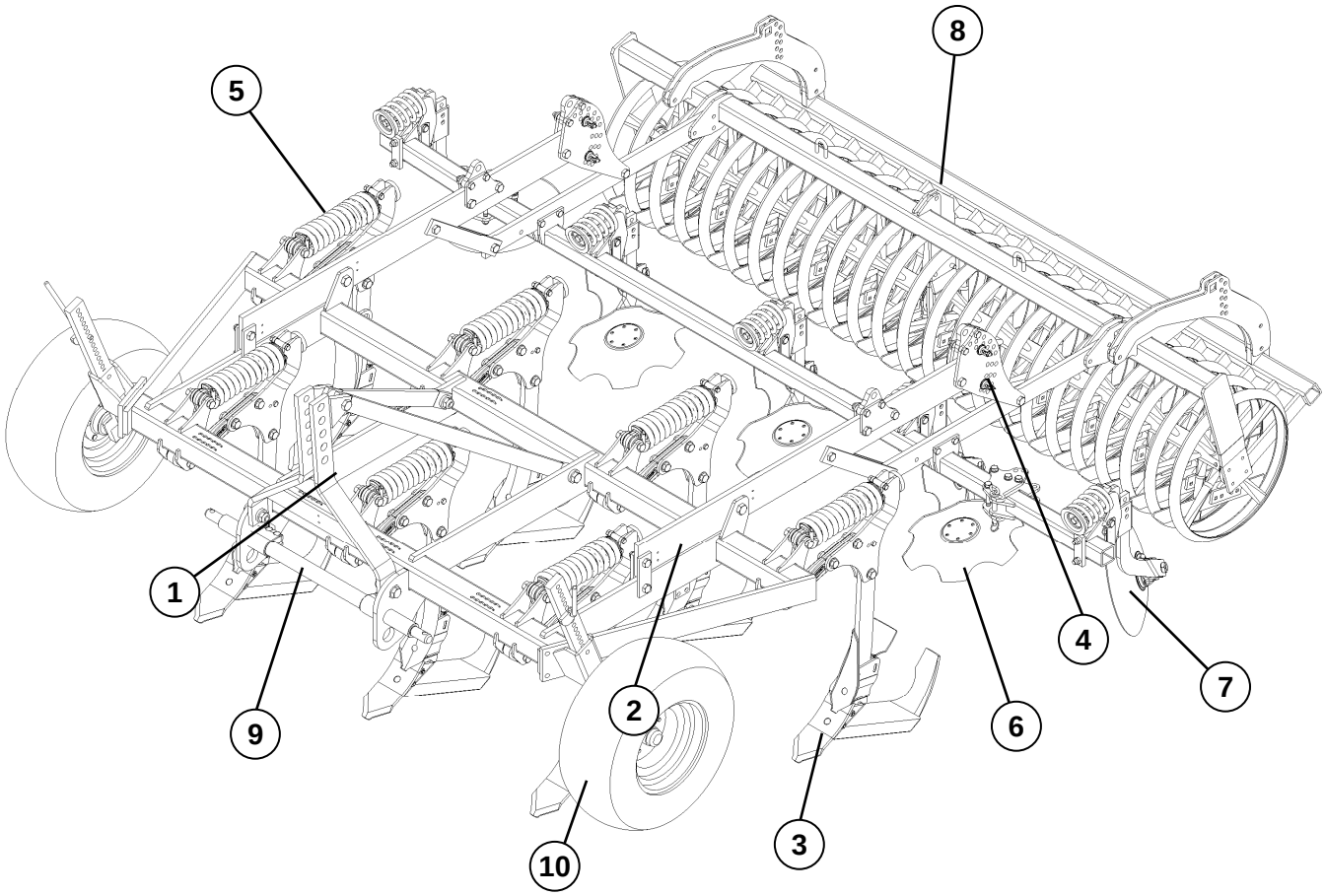
– Also check the type and completeness of any supplied accessories.

When the device is handed over, your dealer will explain how it works.

– As soon as trhe device is handed over, familiarise yourself with the device and its functions.

5 DESIGN AND FUNCTION

5.1 Overview



1 Three-point headstock

2 Frame

3 Tines

4 Working-depth adjustment for tines

5 Automatic overload safety device for the tines

6 Hollow discs (serrated)

7 Edge discs

8 Roller (knife roller MSW 600)

9 Drawbar

10 Feeler wheel

5.2 Function

5.2.1 Three-point headstock

The three-point headstock with top link pin and drawbar complies with the ISO 730 standard.

The drawbar L3/Z3 complies with category 3.

The drawbar L2/Z3 complies with category 3N.

The drawbar L2/Z2 complies with category 2.

The implement with a 3 m working width is fitted with a choice of category 2 or 3 top link pin and the implement with a 3.5 m and 4 m working width is fitted exclusively with a category 3 top link pin.

5.2.2 Frame

In the version with shearbolt device the frame has tine pockets for holding the rigid tines. In the version with automatic overload safety device the frame has supports for the overload safety device elements. Overload safety device elements cannot be used on a frame with tine pockets.

5.2.3 Tines

Either tines with a permanently integrated share foot or tines with quick-change system can be used.

a) Tines with permanently integrated share foot

On this tine the different share tips, guide plates and wing shares can be screwed on and off independently of each other.

b) Tines with quick-change system

Share feet with different share systems can be attached to these tines and secured by linch pins.

5.2.4 Working depth adjustment of the tines

The working depth must be adjusted separately for the left and right sides of the device. This is done using an adjustment mechanism with pins.

5.2.5 Automatic overload safety device for the tines

The automatic overload safety device for the tines protects the frame and the tines from overload. The spring of the overload safety device has been preset. This setting must not be changed.

5.2.6 Hollow discs

The hollow discs protected by shear bolts are serrated and level the soil behind the tines. They level the ridges which are thrown up by the tines on the back row. The hollow discs are also available with an automatic overload safety device.

5.2.7 Edge discs

The depth and pitch angle of the edge discs, protected by shear bolts, can be adjusted. They should retrieve the soil which has been thrown out. The edge discs are also available with an automatic overload safety device.

5.2.8 Rollers

The rollers ensure reconsolidation and additional crumbling of the soil. During operation on the land they bear the weight of the implement if the implement has been lowered for work and they ensure exact depth guiding. The weight of the rollers can also support the feed behaviour of the implement. The implement can be fitted with different roller types.

5.2.9 Drawbar

The drawbar has the category Cat. 3 N, Cat. 3 or Cat. 2

The drawbar mounting position influences the implement's intake behaviour, lifting height and the roller pressure load as well as the tractor slip when working.

5.2.10 Feeler wheels

Feeler wheels are used to improve the depth guide.

6 PREPARATION OF THE TRACTOR

6.1 Tyres

The pressure - especially in the rear tractor tyres - must be equal. In heavy conditions it may be necessary to add wheel weights and/or water ballast. (See manufacturer's instructions).

6.2 Lift Rods

Adjust lift rods to equal length. (See manufacturer's instructions).

6.3 Check Chains or Sway Blocks of the Three Point Linkage

Check chains or sway blocks MUST be adjusted so that the lower links are always free to move sideways during working.

6.4 Required power sources

CAUTION

Damage to electrical components

The tolerance range for the power supply is between 10 V and 15 V. Overvoltage and undervoltage may result in malfunctions and under certain circumstances may destroy electrical or electronic components.

– Ensure that the power supply of the device is always within the specified tolerance range.

The following power sources are required on the tractor for the electrical consumers:

Consumer	Volt	Direct connection to the tractor battery	Power socket
Lighting system	12	-	In accordance with DIN-ISO 1724

6.5 Required hydraulic equipment

The implement is supplied as standard with separate hydraulic connections for each consumer. The protective caps for the hydraulic connections are colour-coded and the hydraulic connections themselves are alphanumerically coded.

For operation of the individual hydraulic devices listed below, the tractor must be equipped with the following double-acting control units:

Consumer	**Double acting control unit**	**Tractor/Implement**	
		Colour	Code
Hydraulic working depth adjustment	x	Green	P2 T2

6.6 Three-point linkage

WARNING

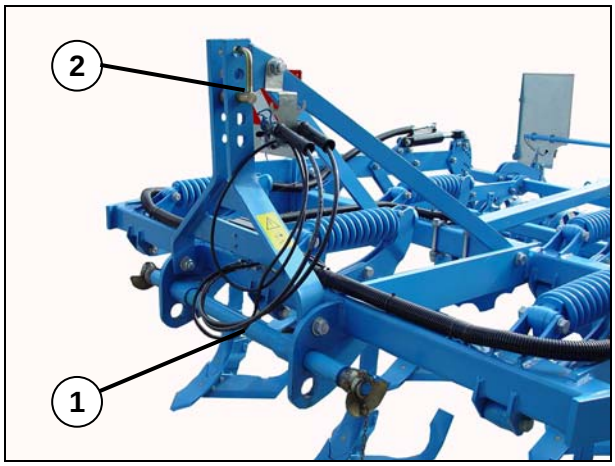
Loss of the implement

The tractor's three-point linkage category and the category of the drawbar and top link pin must match. Otherwise, the drawbar and the top link pin may slip out of the linkage when driving over uneven ground or due to vibrations.

– Always ensure:

- that the three-point linkage category exactly matches
- the diameter of the drawbar and the top link pins.

6.6.1 Drawbar



For this implement, the only drawbars (1) and top link pins (2) approved are those listed in the table below and those that correspond to the category of the three-point linkage on the tractor. If they do not match, then either the tractor's three-point linkage or the implement's drawbar (1) and the top link pin (2) must be replaced with a suitable, authorised version.

More information is available in the following table.

	Working width		
	300 cm	**350 cm**	**400 cm**
Drawbar	Category 3N	Category 3N	Category 3N
Drawbar	Category 3	Category 3	Category 3
Drawbar	Category 2	---	---
Upper linkage	Category 2 (approx. Ø 26 mm) or category 3 (approx. Ø 32 mm)	Category 3 (approx. Ø 32 mm)	Category 3 (approx. Ø 32 mm)

The table below shows the maximum permissible tractor power outputs and dimensions for each category as per ISO 730-1.

Tractor power output		**Cat.**	**Pintle diameter of drawbar (mm)**	**Length of drawbar (shoulder distance) (mm)**
kW	**HP**			
185	251	3N	36.6	825
185	251	3	36.6	965
92	125	2	28	825

6.6.2 Upper link pin

DANGER

Danger to life if three-point linkage category is too small

If a drawbar or a top link pin is used with a category that is too small, these components may be overloaded and break. This means that the implement:

- could fall down and injure or cause fatal injury to anyone standing in the immediate vicinity.
- could be damaged.

As a result, other road users may be injured or killed while the implement is being transported.

– Only use drawbars and top link pins that comply with a category corresponding to the tractor's output in accordance with ISO 730-1.

In the three-point tower of the device there are 26 mm and 32 mm diameter bores only. Only top link pins of category 2 or 3 can be used.

6.7 Hydraulic system

6.7.1 Transport

CAUTION

Lowering the three-point linkage

The device may be damaged if the three-point linkage of the tractor is lowered due to an incorrect setting or operation.

– For transport always switch the hydraulic system of the tractor to "position control".

See operating instructions of the tractor manufacturer.

6.7.2 Work assignment

– For use on the land switch the hydraulic system of the tractor to float position or mixed control.

See operating instructions of the tractor manufacturer.

6.7.3 Coupling and uncoupling

CAUTION

Lowering or raising the three-point linkage

If the three-point linkage moves uncontrollably due to an incorrect setting or operation, the operator may be injured.

– To couple or uncouple the device, always switch the tractor hydraulics to position control.

7 PREPARATIONS ON IMPLEMENT

7.1 Final assembly

For transportation-specific reasons, the implement is not always delivered in a fully-assembled condition. Use the implement only when the implement has been fully assembled and a functional check has been performed.

8 ATTACHING THE IMPLEMENT

WARNING

Risk of injury when coupling the device

There is a risk of body parts being crushed between the tractor and device

The tractor must be secured against unintentionally rolling away.

– Never actuate the hydraulic system of the tractor if there are people between the tractor and device.

WARNING

Risk of accident from spurting hydraulic fluid

Hydraulic fluid which escapes under high pressure may penetrate your skin and cause severe injuries. If injuries occur, call a doctor immediately

– Before connecting the hydraulic hoses to the tractor hydraulics, check that the hydraulics are depressurised on the tractor and device.

– Always ensure that the hydraulic hoses are connected as stipulated.

To prevent operating errors, coupling sleeves and plugs must be identified for hydraulic function connections between tractor and device. If the connections are interchanged, functions will be reversed (e.g. raise/lower or fold in/fold out).

CAUTION

Risk of injury from unsecured top link pin

If the top link pin is not secured, it may slip out or get lost.

- As a result, the device may fall down or be damaged.
- As a result, people in the immediate vicinity may be injured.
- The top link pin must always be secured.
- When the device is lifted out, there must be nobody in the immediate vicinity of the device.

DANGER

Danger to life due to unsecured connection between lower link and drawbar

If the connection between lower link and drawbar is not secured, the pintle of the drawbar may slip out.

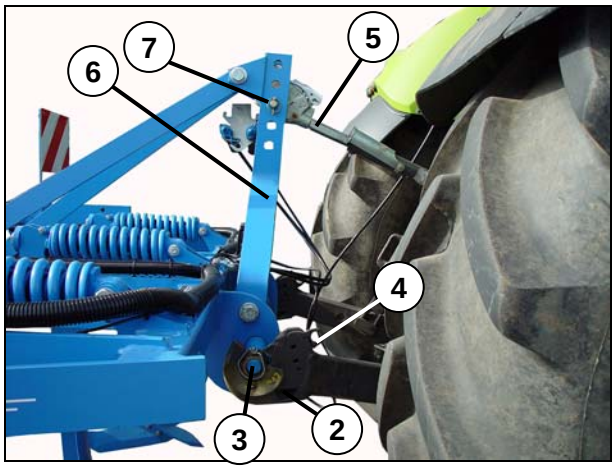
As a result, the implement may fall down and injure or kill people in the immediate vicinity.

As a result, other road users may be injured or killed while the implement is being transported.

The connection between lower link and drawbar must always be secured.

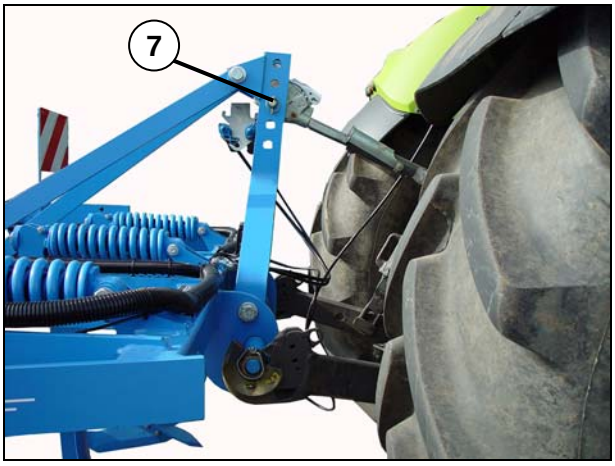
Nobody may be in the immediate vicinity of the implement when it is lifted out.

8.1 General information



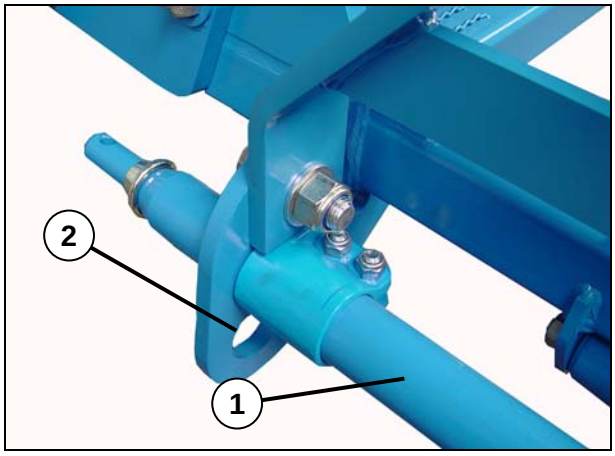
- For coupling the device switch the hydraulic system three-point linkage of the tractor to position control.
- Drive the tractor backwards towards the implement until the tractor is in front of the implement and the catch hooks of the lower links (2) can be coupled with the drawbar (3). However, keep a distance of approx. 40 cm between the tractor and implement.
- Secure the tractor to prevent it from rolling away.
- Connect the hydraulic hoses to the tractor as described in the table in the section entitled “Required hydraulic equipment”.
- Connect the electrical cables to the tractor as specified in the table in the “Required power sources” section.
- Now drive up to the implement and connect the lower links (2) on the tractor to the drawbar (3).
- Secure the drawbar (3) with the safety equipment (4).
  See also operating instructions of the tractor manufacturer.
- Connect the top link (5) to the three-point tower (6) using the top link pin (7).

The position of the top link also presets the pressure load of the rollers and therefore the degree of crumbling and recompacting of the soil. See also the section entitled “Pressure load of the rollers”.



– Secure the top link pin (7) using the linch pin.

8.2 Drawbar



The drawbar (1) can be mounted on the device at two heights = draw point positions.

The picture shows the drawbar (1) in the upper mounting position = low draw point.

The bores (2) are used to hold the drawbar (1) in the lower mounting position = high draw point.

Drawbar mounting position	**Draw point**	**Function**
High	Low	• Improve infeed of the implement • Increase roller pressure • Reduce the lifting force requirement
Low	High	• Increase the lifting height • Reduce slippage • Reduce roller pressure

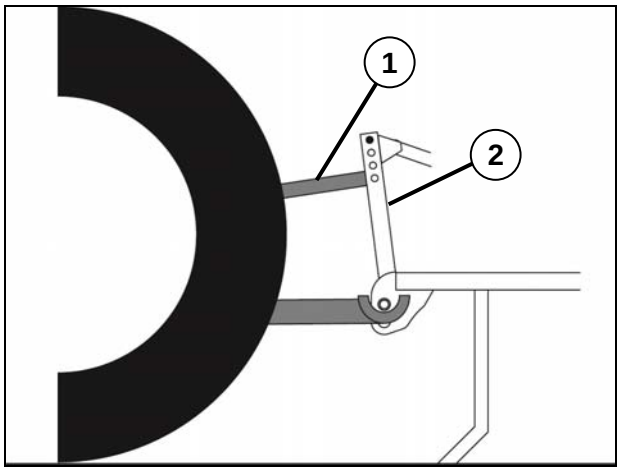
8.3 Upper control link

CAUTION

Risk of injury from unsecured upper control link pin

If the upper control link pin is not secured, it may slip out or get lost.

- As a result, the implement may fall down or be damaged.
- As a result, people in the immediate vicinity may be injured.
- The upper control link pin must always be secured.
- Nobody may be in the immediate vicinity of the implement when it is lifted out.



The top link (1) can be mounted in several positions on the three-point tower (2).

A total of four mounting positions are provided.

Upper control link mounting position	Function
Lower	• Improve infeed of the implement • Relieve less load on the front axle of the tractor • Increase roller pressure • Reduce the lifting force requirement
Higher	• Increase the lifting height • Reduce slippage • Reduce roller pressure

9 DRIVING ON PUBLIC HIGHWAYS

9.1 General information

A proper lighting system, identification and equipment must be on the implement, if it is to be transported on public roads. The country-specific valid laws and regulations pertaining to driving on public roads must be observed.

9.2 Transport dimensions

Before transportation on public highways, ensure that the maximum permitted transport width of 3m is not exceeded.

– If fitted, swivel the edge discs backwards into the transport position. See “Edge discs” section.

The Kristall 9/350, 9/400, 9/350 U and 9/400 U are more than 3m wide. They may only be transported on public highways where this is permitted by law or a certificate of exemption.

10 OPERATION

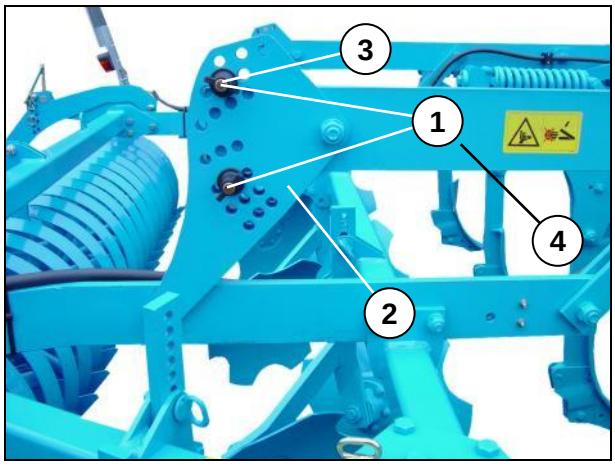
DANGER 	**Risk of accident when making adjustments** When making any adjustments to the device, there are risks of crushing, cutting, clamping and striking your hands, feet and body on heavy and occasionally compressed and/or sharp-edged parts. • Always park implement on the ground. • Adjustment work may be carried out by appropriately instructed personnel only. • Always wear appropriate protective clothing. • Always observe the currently valid operational safety and accident prevention regulations. • Switch off tractor engine. • Pull on handbrake.

DANGER 	**Risk of accident from freely rotating rollers** If you climb on freely rotating rollers, there is a risk of crushing and clamping feet or legs between the freely rotating rollers and fixed device parts. – Never climb on freely rotating rollers.

10.1 Working depth of tines

Kristall 9/300 (U), Kristall 9/350 (U)

10.1.1 General information



The working depth of the implement can be adjusted by approx. 5 to 25 cm. This is done using the guide pins (1).

– Raise the implement using the three-point hydraulics on the tractor.

– Release the lower guide pins (1) by removing the securing pins.

– Insert the lower guide pin (1) in a hole in the adjusting plates (2) corresponding to the desired working depth.

  Lower hole => Greater working depth

  Higher hole => Less working depth

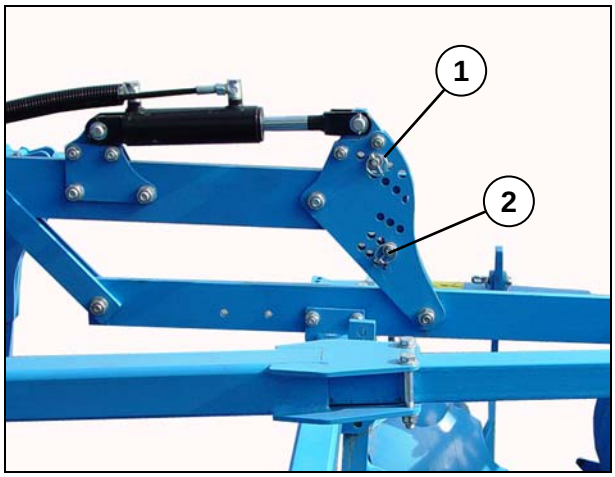
– Insert the implement. When the working depth is reached, the load on the upper guide pins (3) is relieved.

– Insert the upper guide pins (3) directly above the carrier (4) so that the weight of the rollers provides additional support for the implement's penetration. Raising the implement increases the clearance between the rollers and the ground.

– Secure the guide pins by inserting the securing pins.

If the implement features feeler wheels, they must also be adjusted if the working depth is changed. See "Feeler wheels" section.

10.1.2 Hydraulic working depth adjustment

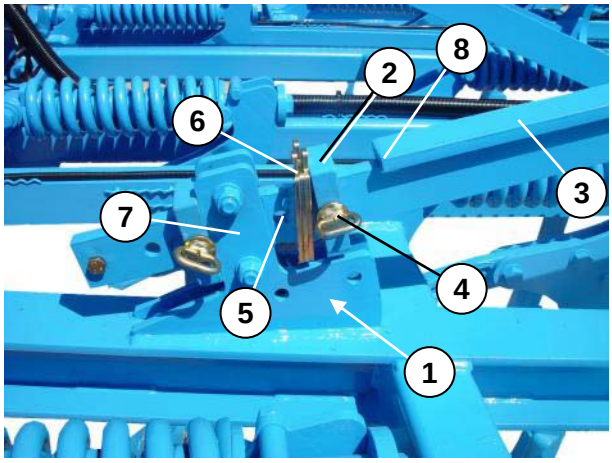


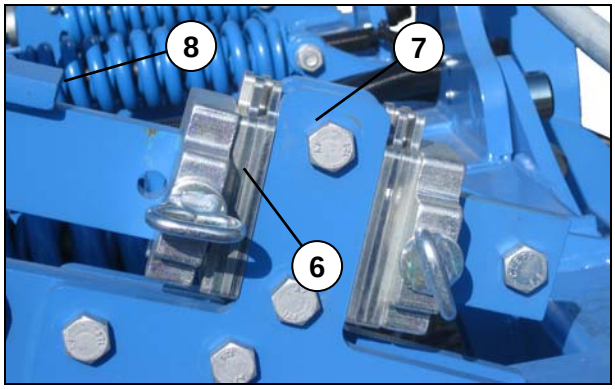
In the hydraulic working depth adjustment the guide pins (1) are used to set the maximum required working depth and the guide pins (9) are used to set the minimum required working depth.

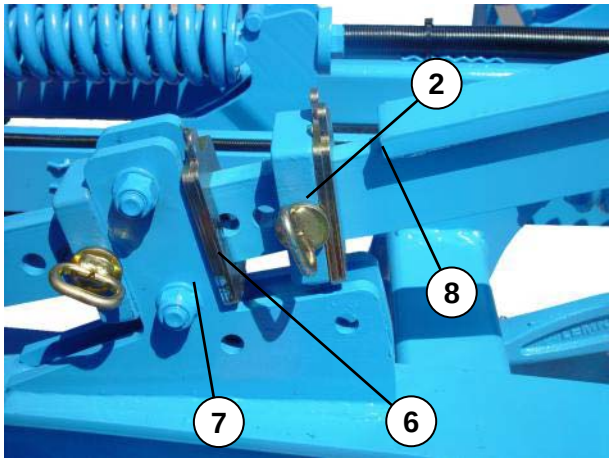
The hydraulic cylinders are used to set either the maximum or minimum working depth adjustment as required.

Kristall 9/400 (U)

10.1.3 General information







The working depth of the implement can be adjusted by approx. 5 to 25 cm.

A precision adjustment can be made using the adjustment devices (1) with adjustment stops (2) and spacer plates (6).

A rough setting can be conducted through shifting the adjustment stops (2) on the strut (3) with the aid of linch pins (4).

- The shorter the distance between the stop (7) and end (8) of the strut in the working position, the larger the working depth.
- The longer the distance between the stop (7) and end (8) of the strut in the working position, the smaller the working depth.

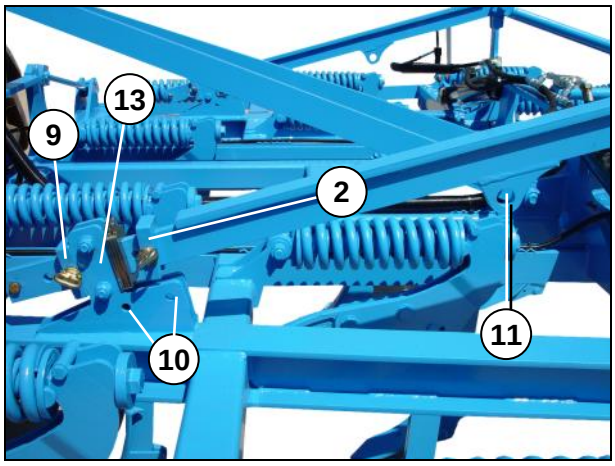
The working depth of the front and rear shares must be the same.

– If this is not the case:

– adjust the length of the top link until the front and rear shares are working at the same depth.

If the implement features feeler wheels, they must also be adjusted if the working depth is changed. See "Feeler wheels" section.

10.1.4 Hydraulic working depth adjustment



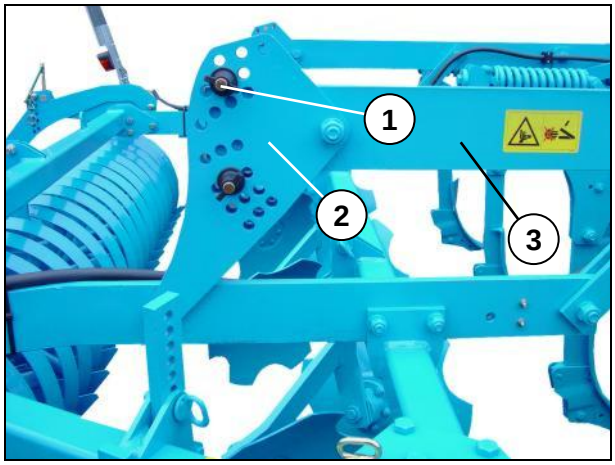
In the hydraulic working depth adjustment the adjustment stops (2) are used to set the maximum required working depth and the counter stop (9) is used to set the minimum required working depth.

The hydraulic cylinders -see arrow- are used to set either the maximum or minimum working depth adjustment as required.

Intermediate positions are not possible. The required hydraulic cylinders with holder are connected to the bores (10) and the bore (11). How to set the adjustment stop (2) and the counter stop, please see the section entitled “Working depth of the tines”. The adjustment stop (2) and the counter stop (9) must always be moved up against the holder (13).

10.2 Lowering depth of the rollers

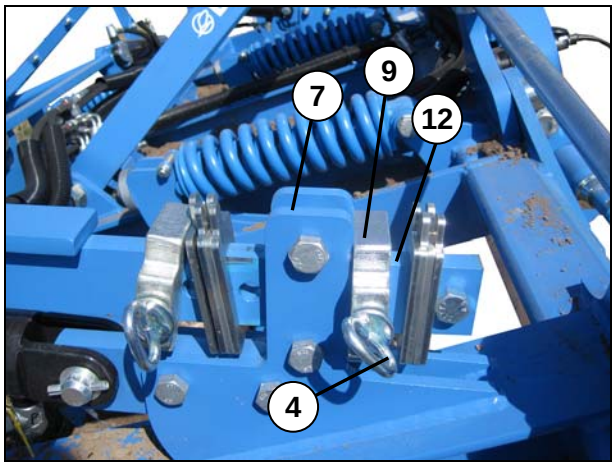
Kristall 9/300 (U), Kristall 9/350 (U)



To ensure that the roller is not lowered too far when raising, the guide pins (1) must be inserted as deep as possible into a hole in the adjustment plates (2) above the carrier (3) in the working position.

- Lower the implement to the working position.
- Make sure that the guide pin (1) is relieved.
- Release the guide pin (1) and pull it out.
- Insert the guide pin (1) into a deeper hole in the adjustment plates (2).
- Lock the guide pin (1).

Kristall 9/400 (U)



To prevent the roller from being lowered too far when lifted out, the counter stop (9) must be in the working position as near as possible to the stop (7).

- Lower the implement to the working position.
- Make sure that the counter stop (9) is relieved.
- Release the linch pin (4) and pull it out.
- Push the counter stop (9) as far as possible towards the stop (7).
- Use spacer plates to compensate for any gap (12) between the counter stop (9) and stop (7).
- Fix the counter stop (9) with the linch pin (4) and secure the linch pin (4).

10.3 Feeler wheel

Risk of injury due to unsecured feeler wheel

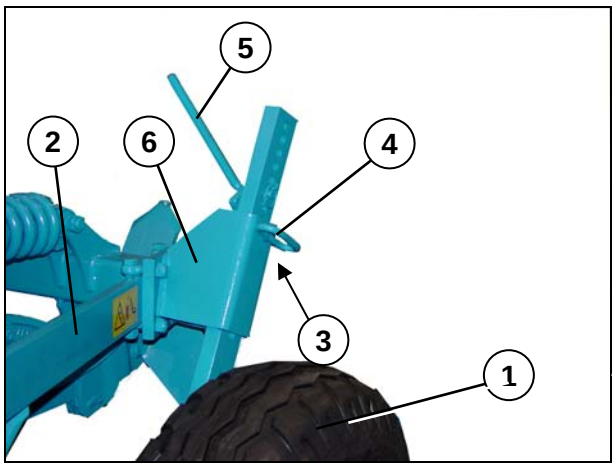
WARNING

If the guide pin and cam lever are simultaneously removed, the feeler wheel is no longer held in place and can slide downwards when unsecured. This can result in crushing and foot injuries.

– Never dismantle the guide pin and the cam lever at the same time.

– Secure the cam lever (2) with the split ring.

The implement's depth guide is always controlled by the roller. The feeler wheels are readjusted by the roller following depth adjustment to ensure that the implement is guided accurately when on a slope or on partly compacted soil.



– Lift the implement out slightly.

– The depth is adjusted via the pin adjustment (3) with the pin (4) and cam lever (5).

-- Insert the cam lever (5) directly above the console (6) and secure the lever (5) with the split ring.

– Relieve the load on the guide pin (4) by turning the cam lever (5).

– Release the guide pin (4) and remove it.

– Move the feeler wheel (1) into the required position by swivelling the cam lever (5).

– Re-insert the guide pin (4).

– Secure the guide pin (4) with the split ring.

10.4 Working depth of hollow discs

DANGER

Loss of components

If the guide pins are not secured, they can fall out due to vibrations in operation. This can result in components being lost during operation and transportation and can cause accidents or damage to the implement and the tractor.

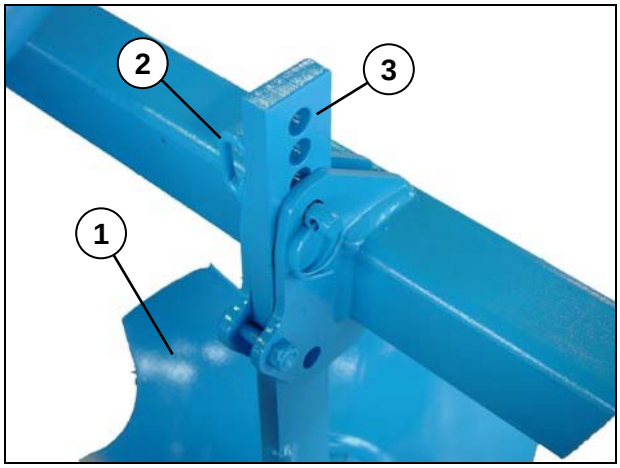
The guide pins must always be secured.

WARNING

Risk of injury due to removed shear bolt

If the shear bolt is removed, the tines can pivot freely. This can lead to crushing of the fingers around the tine carrier.

– Mount the removed shear bolts without delay.



The hollow discs (1) are adjusted with the pins (2) as follows:

– Release the guide pin (2).
– Slide the disc carrier (3) slightly upwards to relieve the load on the guide pin (2).
– Pull the guide pin (2) out.
– Push the disc carrier (3) into the required position.
– Re-insert the guide pin (2).
– Secure the guide pin (2).

10.5 Working depth of the edge discs

DANGER

Loss of components

If the guide pins are not secured, they can fall out due to vibrations in operation. This can result in components being lost during operation and transportation and can cause accidents or damage to the device and the tractor.

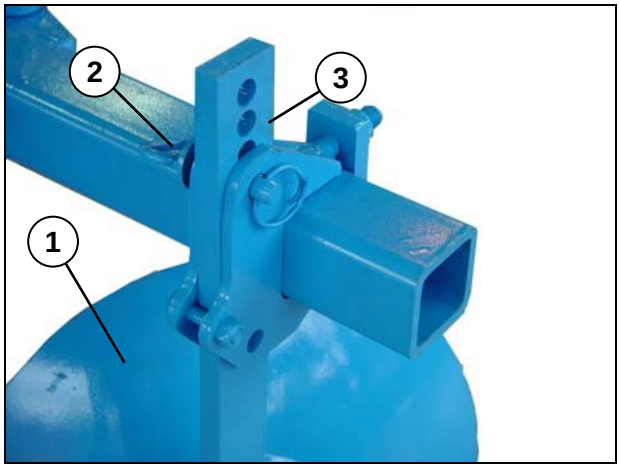
The guide pins must always be secured.

WARNING

Risk of injury due to removed shear bolt

If the shear bolt is removed, the tine can pivot freely. This can lead to crushing of the fingers around the tine carrier.

– Mount the removed shear bolts without delay.



The edge discs (1) are adjusted with the guide pins (2) as follows:

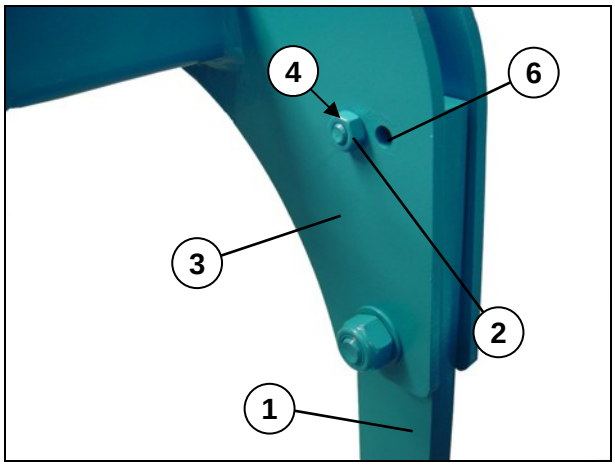
– Release the guide pin (2).
– Slide the disc carrier (3) slightly upwards to relieve the load on the guide pin (2).
– Pull the guide pin (2) out.
– Push the disc carrier (3) into the required position.
– Re-insert the guide pin (2).
– Secure the guide pin (2).

10.6 Share position

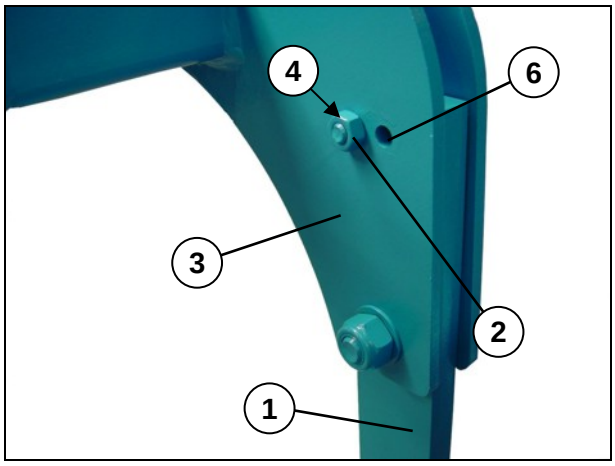
WARNING **Risk of injury due to removed shear bolt**

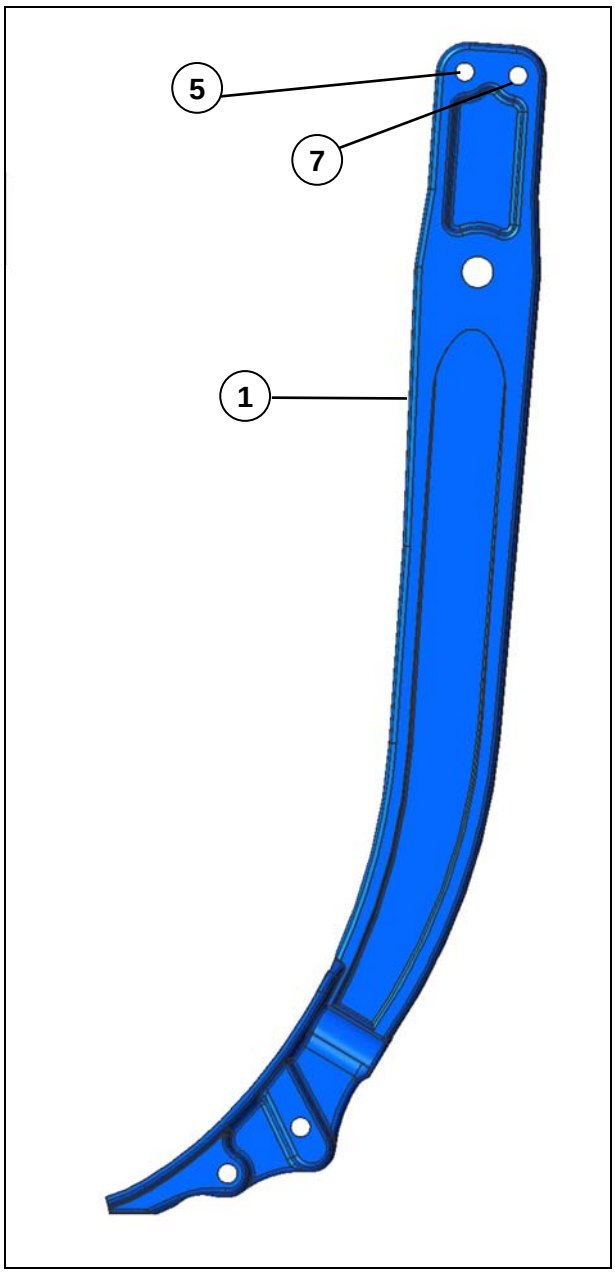
If the shear bolt is removed, the tine can pivot freely. This can lead to crushing of the fingers around the tine carrier.

– Replace a removed shear bolt immediately.



The share position or the contact angle of the tines (1) can be altered. A “flat” share position in conjunction with wing shares ensures a flat tillage horizon (share tip and wing shares work at almost the same depth) and reduces traction requirement, even in heavy soils.





A "steep" share position ensures that the tines (1) achieve good penetration even in hard and dry soils.

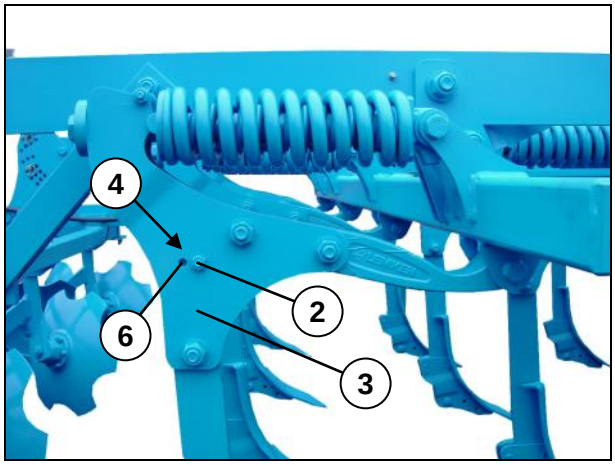
The share position is altered by inserting the shear bolt (2) in a different position.

Flat share position

– Insert the shear bolt through the hole (4) of the tine carrier (3) and the hole (5) of the tine (1).

Steep share position

– Insert the shear bolt through the hole (6) of the tine carrier (3) and the hole (7) of the tine (1).



The adjustment has to be made for all the tines.

- Raise the attachment by a few centimetres.
- Loosen and remove nut from the shear bolt (2).
- Press out the shear bolt using a suitable tool.
- Tilt the tine into the desired position.
- Insert the shear bolt as required into the hole (4) or (6) tine carrier (3).
- Screw on the nut.
- Tighten the nut to a tightening torque of 113 Nm.

10.7 Automatic overload protection

10.7.1 Tines

DANGER

Risk of fatal injury due to high spring force

If the tine, the hollow disc or the edging disc is actuated and has still not been moved back into the working position, it can suddenly rebound into the working position with great force and at high speed. This can cause serious injury or death to any persons in the tilting area of the tine.

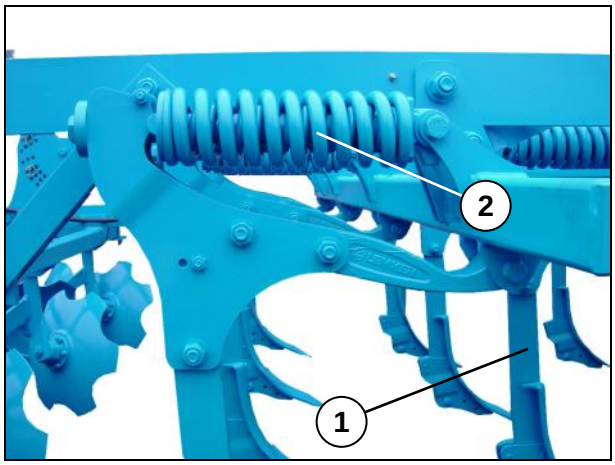
– Do not approach the tine, the hollow disc or the edging disc until it has swivelled all the way back into the working position.

DANGER

Risk of accidents due to moving tines

When an obstruction is encountered, the tine tilts very quickly upwards by spring force. This can cause injury to persons in the area of the tines.

Never climb onto the implement when working.



The tines (1) are equipped with an automatic overload protection with pressure-adjusting springs (2) that have a high preload.

The release force at the share tip on the overload protection is preset. This setting may not be altered.

When an obstruction is encountered in the soil, the tine tilts backwards and upwards and is then automatically returned to the working position once the obstruction has been passed.

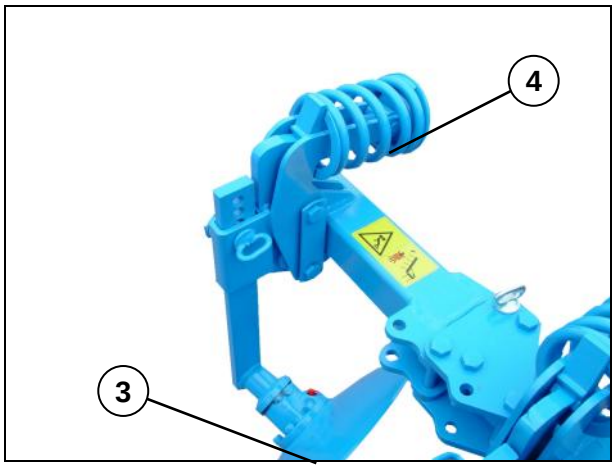
10.7.2 Hollow discs

Risk of fatal injury due to high spring force

DANGER

If the tine, the hollow disc or the edging disc is actuated and has still not been moved back into the working position, it can suddenly rebound into the working position with great force and at high speed. This can cause serious injury or death to any persons in the tilting area of the tine.

– Do not approach the tine, the hollow disc or the edging disc until it has swivelled all the way back into the working position.



The hollow discs (3) with overload protection are fitted with a compression spring (4) that is under high preload. When an obstruction is encountered in the soil, the hollow disc tilts backwards and upwards and is then returned to the working position automatically after rolling over the obstruction.

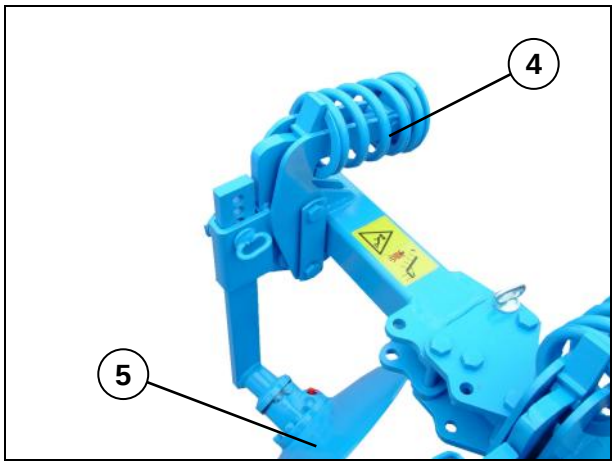
10.7.3 Edge discs

Danger to life due to high spring energy

DANGER

If the tine, the hollow disc or the edge disc is actuated and has still not been moved back into the working position, it can suddenly rebound into the working position with great force and at high speed. As a result, people who are in the swivel area of the tine may be seriously injured or even killed.

– Do not approach the tine, the hollow disc or the edge disc until it has swivelled all the way back into the working position.



The edge discs (5) with overload safety device feature a compression spring (4) which is highly pretensioned. If an obstruction in the soil is struck, the edge disc moves backwards and upwards and is automatically reset to the working position after running over the obstruction.

10.8 Rollers

10.8.1 General information

The mounted devices can be fitted with different roller types. The rollers control the implement at the working depth. Irrespective of the roller type used, the soil is more or less recompacted or more or less crumbled.

Roller type		**Kristall 9**	**Kristall 9 U**
Tube bar roller	RSW 540	x	x
	RSW 600	x	x
Double roller	DRF 400/400	x	x
	DRR 400/400	x	x
	DRR 540/400	x	x
Trapezoidal packer roller	TPW 500	x	x
Knife roller	MSW 600	x	X
Rubber ring roller	GRW 590	x	x
Dual profile roller	DPW 540/540	x	x

The tube bar rollers, dual rollers and dual-profile rollers do not require any special adjustment measures.

The knife roller features a knife bar with blades used as scrapers which are highly adjustable, see section entitled “Knife roller”.

The trapezoidal packing roller and rubber ring roller are equipped with scrapers that can be adjusted.

10.8.2 Blade rollers

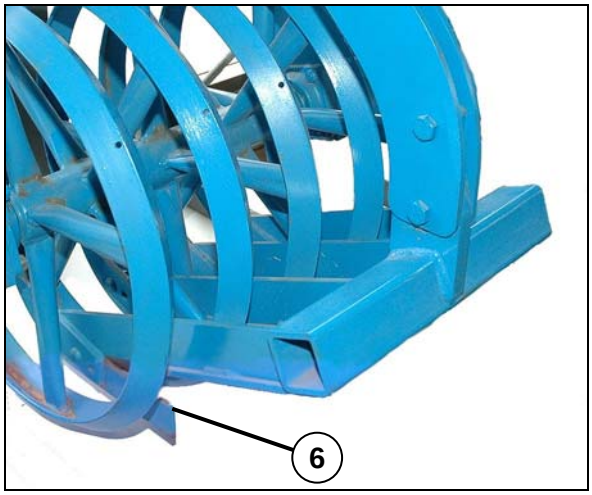
CAUTION

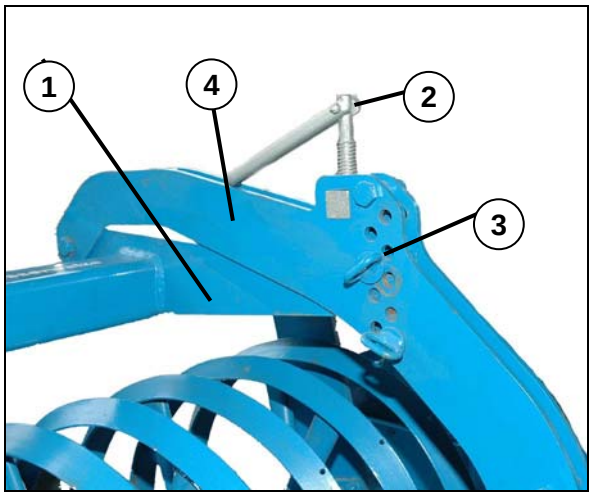
Loss of components

If the guide pins are not secured, they can fall out due to vibrations during operation.

The guide pins must always be secured by split rings.

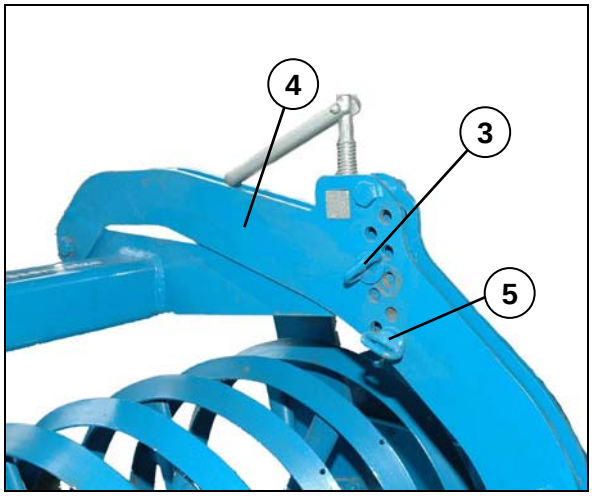
Working depth of blades

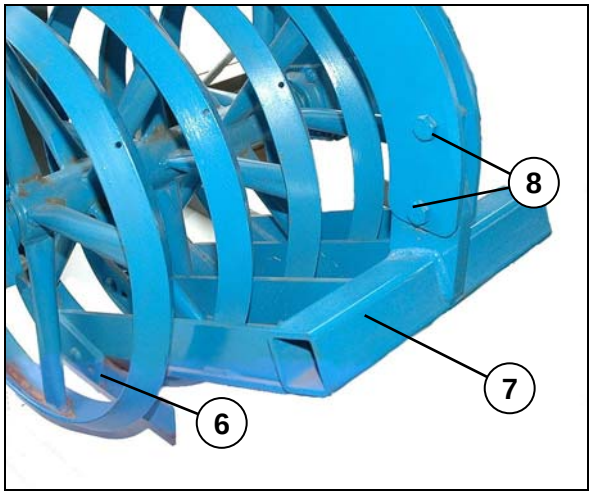




The working depth of the blades (6) is adjusted using the guide pins (3) as follows:

- Rotate the spindles in a clockwise direction until the guide pins (3) are relieved.
- Release and remove the guide pins (3) above the support plate (1).
- Move the supporting arms (4) to the desired position using the spindles (2).
- Insert the guide pins (3) into one of the free holes on the supporting arms (4).
- Secure the guide pins (3) with split rings.
- Rotate the spindles (2) in a counterclockwise direction somewhat to relieve them.





Movement of blades

The upward movement of the blades (6) is limited using the guide pins (5). If necessary, slight movement upwards can be permitted.

Position of blades

The blades are generally screwed onto the blade frame (7) in the front position. In case of wear, the blades (6) can be moved backwards.

Adjusting the blade frame

If the adjusting range using the guide pins (3) is insufficient, the blade frame (7) can be moved higher in relation to the supporting arms (4). To do this, remove the screws from the holes (8) and move the blade frame (7).

Adjusting position	
High	For extremely sticky or light soil conditions
Low	For greater working intensity

10.8.3 Pressure load on rollers - Intake behaviour

The pressure load on the rollers is determined by the position of the upper control link and the mounting position of the drawbar.

The hydraulic system of the tractor must be switched to the float position.

Drawbar

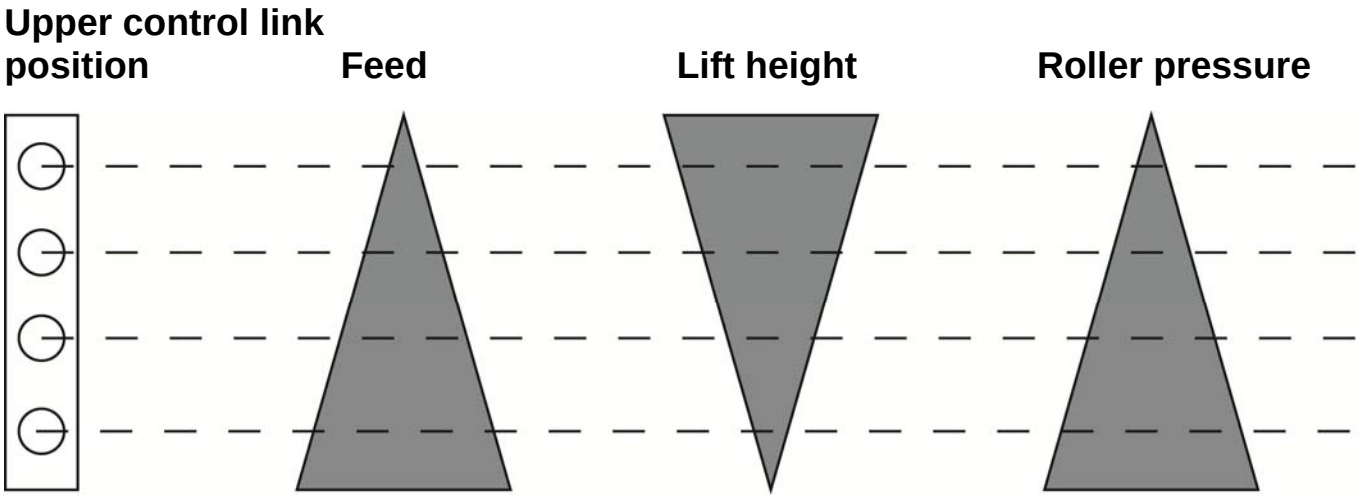
The drawbar should always be mounted in the upper mounting position.

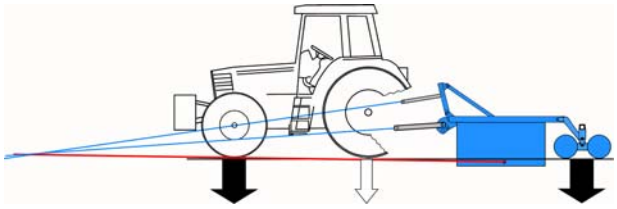
The drawbar should only be mounted into the lower mounting position, when the implement is unable to be raised far enough or when the upper control link is in an optimum position the pressure load on the rollers is too high.

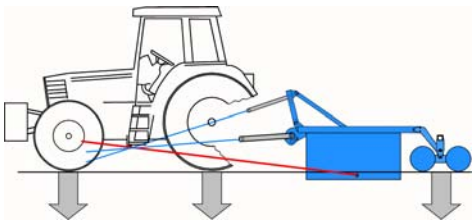
The hydraulic system of the tractor must be switched to the float position.

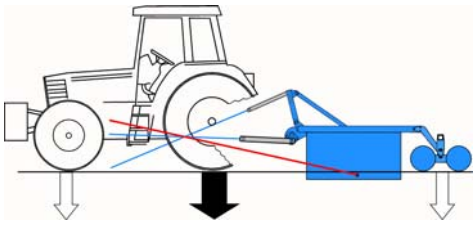
Upper control link

The mounting position of the upper control link exerts an influence on the lift height, the intake behaviour and the roller pressure. The hydraulic system of the tractor must be switched to the float position.









- The lower the upper control link is mounted on the implement's three-point tower, the greater the pressure load on the rollers – resulting in better intake behaviour.
- The higher the upper control link is mounted on the implement's three-point tower, the lower the pressure load on the rollers – resulting in poorer intake behaviour.
- If the pressure load is too low and the recompacting or tilling effect of the rollers is insufficient, the upper control link must be mounted lower on the three-point tower – resulting in better intake behaviour.
- If the pressure load is too high and the rollers clogged as a result or if they plunge too far into the soil, the upper control link must be mounted higher up on the three-point tower – resulting in poorer intake behaviour.

Upper control link mounting position

Risk of injury from unsecured upper control link pin

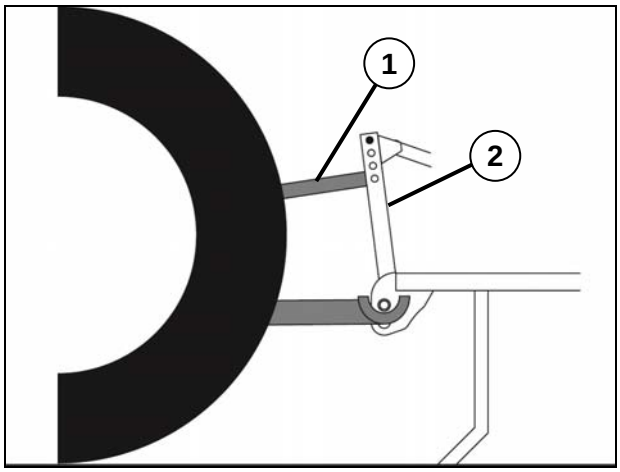
CAUTION

If the upper control link pin is not secured, it may slip out or get lost.

As a result, the implement may fall down or be damaged.

As a result, people in the immediate vicinity may be injured.

- The upper control link pin must always be secured.
- Nobody may be in the immediate vicinity of the implement when it is lifted out.



The position of the upper control link (1) with lowered implement can be changed as follows:

– Fully lower the implement.

– Switch the tractor's hydraulic system to position control.

– Actuate the hydraulic system on the tractor until the upper control link pin (2) is relieved.

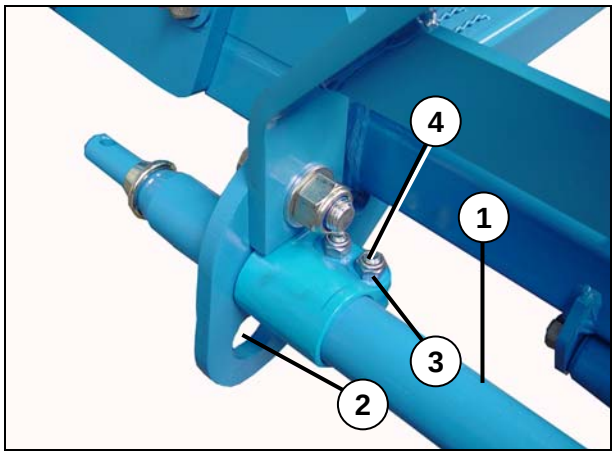
– Release the upper control link pin (2) and pull it out!

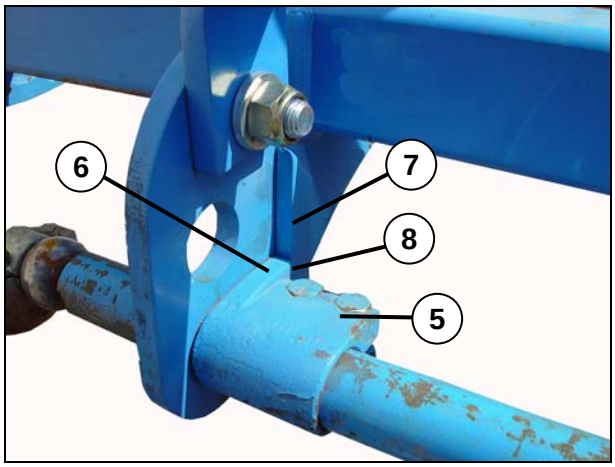
– Adjust the length of the upper control link so that the upper control link pin (2) can be mounted in the required position.

– Attach the upper control link pin (2).

– Secure the upper control link pin (2).

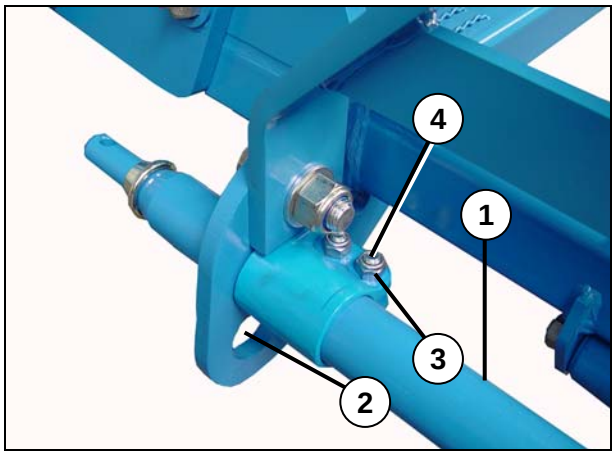
Drawbar mounting position

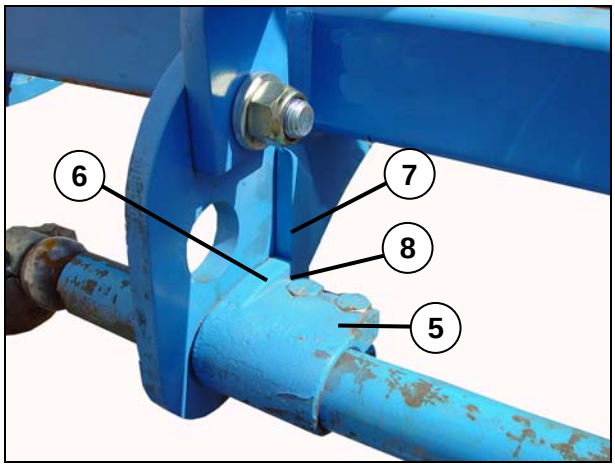




The mounting position of the drawbar (1) with unhitched implement can be changed as follows:

- Remove the nuts (3) on the bolts (4) of the two locking pieces (5).
- Pull the drawbar (1) as far as the middle out of the bores of the rail plates (6).
- Push the locking pieces (5) down off the drawbar (1) and deposit them on the ground.
- Pull the drawbar (1) all the way out of the bores.
- Insert the drawbar (1) into the required bore (2) of the rail plate (6) and push them in by approx. 50 cm.





- Push the locking pieces (5) onto the drawbar (1).
- Ensure that the side with the support surface (7) is facing the rail plate (6).
- Push the drawbar (1) through the bores until the two ends of the drawbar (1) on the left and right are the same distance from the rail plates (6).
- Push the locking pieces (5) up to the rail plates (6).
- Ensure that the support surfaces (7) are positioned on the stop (8) of the rail plates (6).
- Tighten the nuts (3) on the bolts (4) (197 Nm).

10.9 Turning at the headland

DANGER

Risk of damage to components

If the implement is not fully raised, there is a danger that components may be damaged during an improper turn at the headland.

Before turning at the headland the implement must be completely raised before turning-in to avoid any damage to the implement.

Turning at the headland may only be conducted at a speed suitable for the off-road and ground conditions.

Before turning at the headland

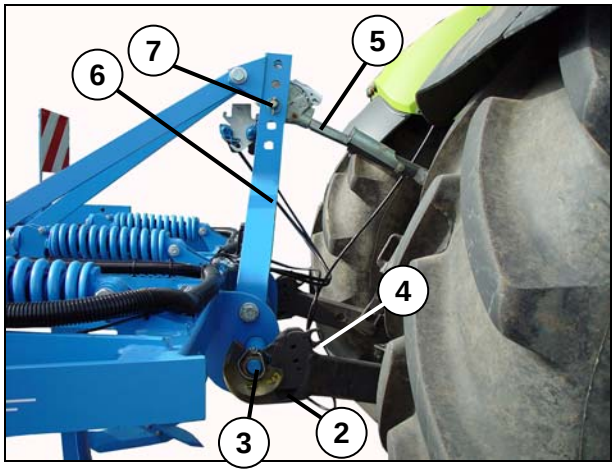
- Raise the implement all the way.

After turning at the headland

- Lower the implement when driving straight ahead, at a suitable speed, to the preset working depth.

11 UNCOUPLING THE IMPLEMENT

11.1 General information



- Lower the implement before uncoupling.
- To depressurise the hydraulic hoses, move the actuation levers for the control units to the float position.
- Actuate the hydraulic system of the three-point linkage on the tractor until the upper control link pin (7) is relieved.
- Release the upper control link pin (7) and remove it.
- Remove the upper control link (5) from the three-point tower (6) and position it in the designated holder on the tractor.
- Release the safety device (4) and remove the lower links (2) from the pintles of the drawbar (3).
  Refer to the tractor manufacturer's operating instructions for further details.
- Drive about 20-30 cm away from the implement.
- Secure the tractor to prevent it from rolling away.
- Detach the electric cables.
- Detach the hydraulic hoses and push on the protective caps.
- Carefully drive the tractor away from the implement.

12 SWITCHING OVER TO DIFFERENT SHARE SYSTEMS

DANGER

Danger presented by implement not secured against lowering

If the raised implement is not secured to prevent it from lowering, people underneath may be injured or killed.

A raised implement must be supported when people are carrying out maintenance or service work in its danger zone.

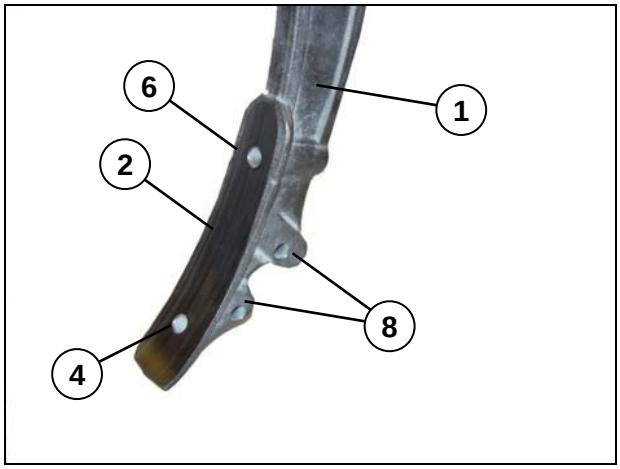
12.1 Share tips, guide plates and wing shares

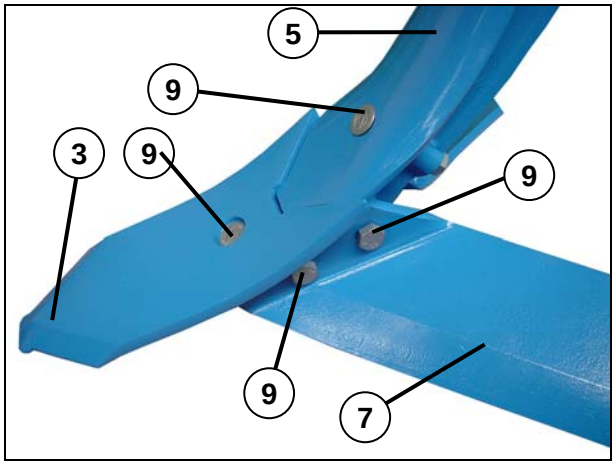
The device can be used with different share systems which enable both deep soil processing and flat full-surface soil processing.

Both the share tips and the wing shares are also available in an armoured version. Armoured share tips and wing shares have considerably higher service lives than non-armoured share tips and wing shares.

12.2 Tine with integrated share foot

To switch over to a different share system, the corresponding components of the tine (1) must be removed and replaced with the components required for the desired share system.





- To do this, lift out the device by approx. 20 cm.
- Secure the device with a support to prevent it from unintentionally dropping.
- Lock the control units of the tractor and switch the tractor engine off.
- Connect the respective share tip (3) via the bore (4),
- the respective guide plate (5) via the bore (6) and
- the wing share (7) via the bores (8) by means of screws (9) to the tine (1) with integrated share foot (2).

12.3 Tines with quick-change system

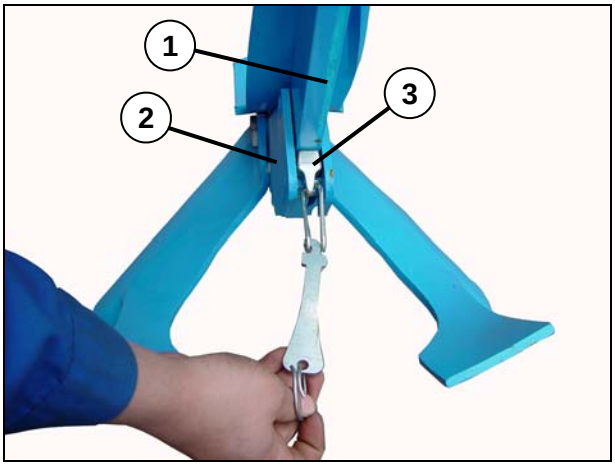
Risk of accident due to falling and extending of components and implements

WARNING

Performing work under raised components/implements or next to swivelled-in components/implements is dangerous.

- Always secure the tractor against rolling away.
- Remove the ignition key.
- Secure the tractor to safeguard it against unauthorised start-up.
- Support and secure the raised or retracted components and implements using appropriate supports.

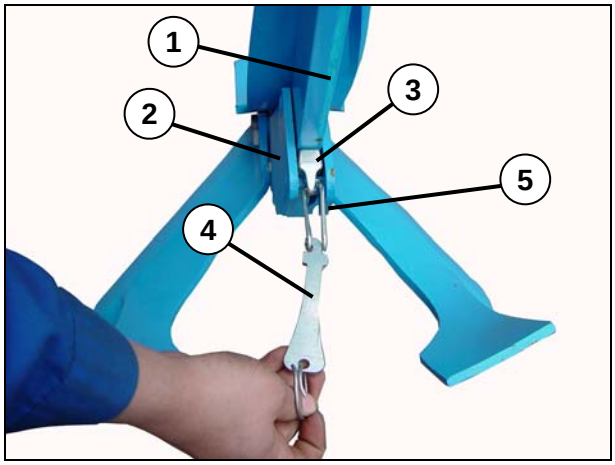
The share base with share tip, guide plate and wing share weighs approx. 12 kg.

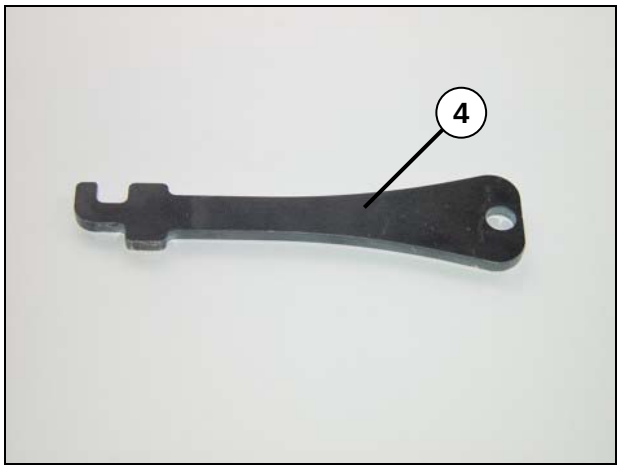


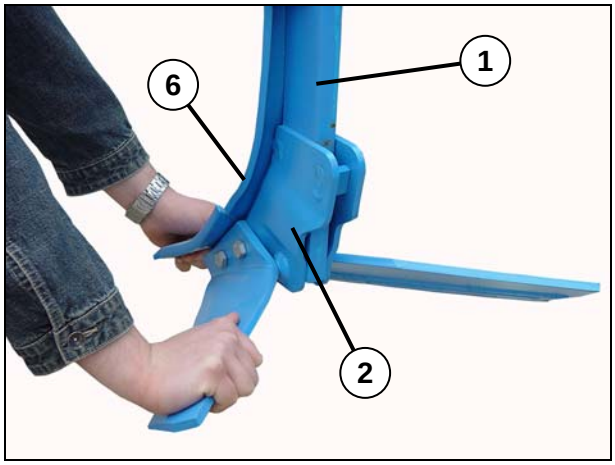
If the tine (1) features a quick-change system with exchangeable share base (2), the share base (2) can be removed together with the share system after the linch pin (3) has been removed and replaced by a share base (2) with a different share system. In this way the device can be switched over to a different soil processing method within a few minutes.

12.3.1 Removing the share base

When the implement has been lifted out, it must be secured with the aid of a suitable support to prevent it from unintentionally dropping.





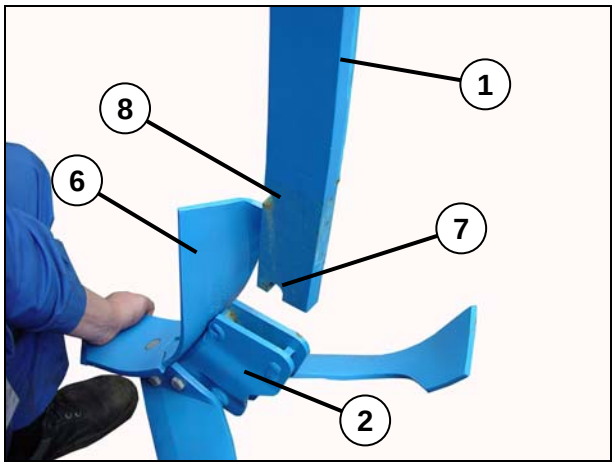


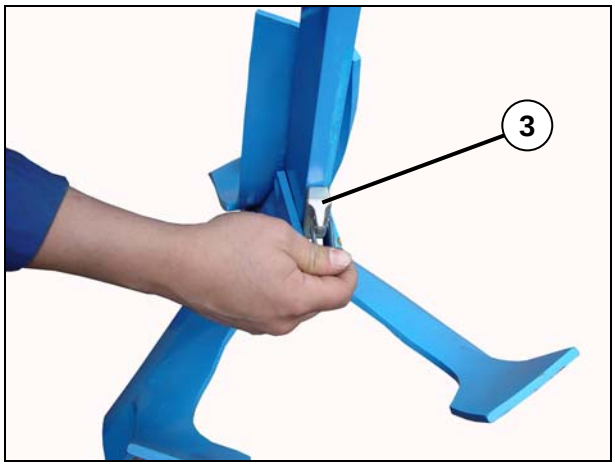
- Switch the tractor's three-point linkage hydraulic system to position control.
- Raise the implement all the way.
- Secure the implement with a support to prevent it from unintentionally dropping.
- Lock the tractor's control units.
- Switch the tractor engine off.
- Using the hook wrench (4), swivel the retaining wire (5) of the linch pin (3) backwards.
- Hold the share base (2) in the detent position by pressing the guide plate (6) up against the tine (1).
- Remove the linch pin (3) by pulling it upwards.
- Hold the share base (2) with both hands and swivel the share base (2) forwards to detach it from the tine (1).
- Pull the share base (2) downwards and deposit it outside the implement.

12.3.2 Attaching the share base

The share base (2) is attached to the tine (1) in reverse order to its removal.

When the implement has been lifted out, it must be secured with the aid of a suitable support to prevent it from unintentionally dropping.





– Push the share base (2) from below onto the tine (1).
– Ensure that the reinforcing struts of the share base (2) engage first in the notch (7) and then in the notch (8) of the tine (1).
– In doing so, press the guide plate (6) up against the tine (1) to keep the share base (2) locked in position and prevent it from falling down.
– Push the linch pin (3) between the guide of the share base (2) and the tine (1).

The linch pin (3) holds the share base (2) in the detent position.

The securing clip prevents the linch pin (3) from slipping out.

– Fold the securing clip (5) downwards.
– When all share feet have been attached, lift out the implement slightly to relieve the support.
– Remove the support and store it until the next time the implement is switched over.

13 SWITCHING OFF THE DEVICE

13.1 Shutting down the device in an emergency

– In an emergency shut down the device via the tractor.

– Switch the tractor engine off.

– Remove the ignition key.

CAUTION

Damage caused by improper storage of the device

If incorrectly or improperly stored, the device may be damaged, e.g. by humidity and dirt.

The device should be deposited on a flat and adequately stable base only.

– Clean the device prior to storage.

– Lubricate the device according to "Lubrication diagram".

13.2 Disposal

Metal and plastic components must be recycled.

– When disposing of the device, ensure that the individual components as well as the auxiliary and operating materials are disposed of in an environmentally friendly manner.

14 MAINTENANCE AND REPAIRS

14.1 Special safety instructions

14.1.1 General

WARNING

Risk of injury when carrying out maintenance and repair work

There is always the risk of injury when carrying out maintenance and repair work.

- Use suitable tools, suitable climbing aids, platforms and support elements.
- Always wear protective clothing.
- Carry out maintenance and repair work only on an extended and deposited device or on a device secured by suitable support elements to prevent it from extending or dropping.

14.1.2 Personnel qualifications

CAUTION

Risk of accident due to inadequate qualifications of the maintenance and repair personnel

Maintenance and repair work require appropriate training.

All maintenance and repair work may only be carried out by trained and instructed personnel.

14.1.3 Protective equipment

CAUTION

Risk of accident due to working without protective equipment

There is always an increased risk of accidents when carrying out maintenance work and repairs.

– Always wear appropriate protective equipment.

14.1.4 Immobilise the implement for maintenance and repairs

Risk of accidents when tractor starts up

Injuries may occur if the tractor starts moving during maintenance and repair work.

WARNING

- Switch off the tractor engine before carrying out any work on the implement.
- Secure the tractor against unintentional starting.
- Remove the ignition key.
- Affix a warning sign in front of the implement and in front of the tractor to advise outsiders of maintenance work.
- Secure the tractor against rolling away using wheel chocks.

14.1.5 Working on the hydraulics

Risk of accident from spurting hydraulic fluid

WARNING

Fluid (hydraulic fluid) which escapes under high pressure may penetrate your skin and cause severe injuries. If injuries occur, call a doctor immediately.
Always depressurise the hydraulic system before working on it.

- Always wear appropriate protective clothing before working on the hydraulic system.

14.1.6 Working on the electrics

CAUTION

The device will be damaged if it is connected to the power supply while work is being carried out on it

If the device is still connected to the power supply of the tractor, the device will be damaged if work is carried out on the electrics.

- Before carrying out any work on the electrics of the device, always disconnect the power supply from the tractor.

14.1.7 Working under the raised device

Risk of accident due to lowering and extending of components and devices

WARNING

It is extremely dangerous to work under raised or next to retracted components and devices.

- Always secure the tractor to prevent it from rolling away. Remove the ignition key and secure the tractor to prevent it from being started up by unauthorised persons.
- Support and secure raised or retracted components and devices with suitable support elements.

14.1.8 Utilised tool

WARNING

Risk of accident due to use of unsuitable tool

If working with an unsuitable or defective tool, there is a risk of accidents and injuries.

– Perform all work on the device with a suitable and functional tool only. This applies in particular to the use of lifting gear.

WARNING

Risk of back injuries

If your posture is not correct when installing or fixing heavy or cumbersome components, you may suffer back injuries which require long convalescence.

Installation and maintenance work may be carried out by trained and instructed personnel only.

– Perform all work on the device with a suitable and functional tool only. This applies in particular to the use of lifting gear.

Risk of accident due to tool slipping off

WARNING

If applying a large force, e.g. when loosening bolts, the tool may slip off. This may result in hand injuries on sharp-edged parts.

– Avoid applying a large force by using suitable auxiliary equipment (e.g. extensions).

Check nuts and bolt heads, etc. for wear and, if required, consult an expert.

14.2 Environmental protection

– Ensure that all materials and operating supplies used to maintain and care for the device are disposed of in line with environmental regulations.

– All recyclable components should be recycled.

– Observe the national regulations applicable in your country.

14.3 Maintenance intervals

14.3.1 After the initial start-up (at the latest after 2 hours)

Check	What to do?
Wheel nuts	– Retighten all wheel nuts to the appropriate torque. See section entitled "Tightening torques".
Screw connections	– Retighten all other bolts and nuts on the device to the appropriate torque. See section entitled "Tightening torques".

14.3.2 Daily inspection

Check	What to do?
Tyres	– Check the tyres for damage and wear. – Check the air pressure and, if required, correct. See section entitled "Tyres and air pressure".
Hydraulic hoses	– Check hydraulic hoses for damage and leaks. Immediately replace damaged or defective hydraulic hoses. The hydraulic hoses must be replaced at the latest 6 years after the date of manufacture. Use hydraulic hoses authorised by LEMKEN only.
Safety equipment	– Check that the safety equipment functions properly. See section entitled "Safety equipment".
Soil processing tools	– Check all soil processing tools for damage and wear. Replace damaged or worn components.

14.3.3 Weekly inspection

Check	What to do?
Wheel nuts	– Check that all wheel nuts are tight and, if required, retighten the wheel nuts to the appropriate torque.
Screw connections	– Retighten all other bolts and nuts on the device to the appropriate torque. – If required, secure the screw connections with locking compound. See section entitled "Tightening torques".

14.4 Tightening torques

14.4.1 Wheel nuts

Diameter / thread	Tightening torque [Nm]
M12x1.5	80
M14x1.5	125
M18x1.5	290
M20x1.5	380
M22x1.5	510

14.4.2 Other bolt connections

Diameter / thread	Property class		
	8.8 [Nm]	10.9 [Nm]	12.9 [Nm]
M6	9,7	13.6	16.3
M8 / M8x1	23.4	32.9	39.6
M10 / M10x1.25	46.2	64.8	77.8
M12 / M12x1.25	80,0	113	135
M14	127	178	213
M16 / M16x1.5	197	276	333
M20	382	538	648
M24 / M24x2	659	926	1112
M30 / M30x2	1314	1850	2217

14.5 Checking connections to the tractor

Visually inspect the hydraulic couplings.

Check that the hydraulic couplings are not leaking hydraulic fluid.

Connect the hydraulic lines to the tractor and check for leaks under pressure.

Defective or leaking couplings must be repaired or replaced immediately by a specialist workshop.

Visually inspect the connectors and cables. Check that there are no bent or broken contact pins in the plugs and exposed cable locations.

Defective connectors must be repaired or replaced immediately by a specialist workshop.

WARNING

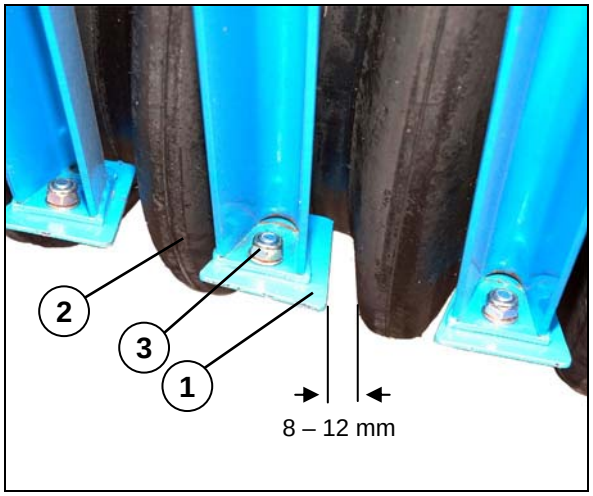
Risk of accident from spurting hydraulic fluid

Fluid (hydraulic fluid) which escapes under high pressure may penetrate your skin and cause severe injuries. If injuries occur, call a doctor immediately.

- When searching for leaks, use suitable aids to prevent eye injuries.
- Always wear appropriate protective clothing.

14.6 Scrapers

14.6.1 Scrapers on rubber ring roller



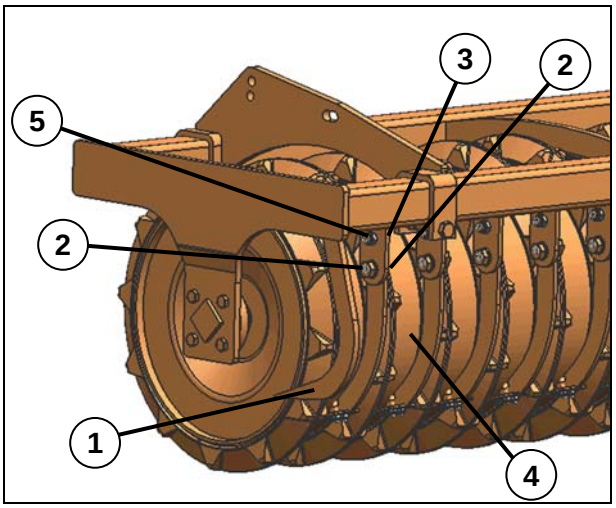
The scrapers (1) on the rubber ring rollers (2) have slots to allow adjustment.

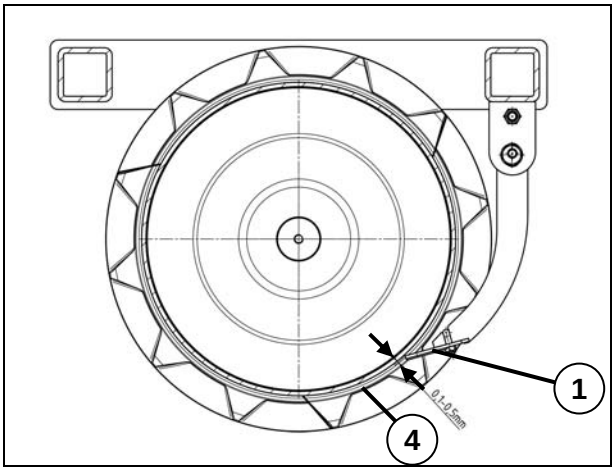
– Release the self-locking nut (3).

– Adjust the relevant scraper on the roller so that it has a clearance of between 8 and 12 mm to the rings.

– Re-tighten the self-locking nut (3) (46 Nm).

14.6.2 Trapezoidal packer roller scrapers





The trapezoidal packer roller is fitted with scrapers (1) whose distance from the roller casing (4) can be adjusted with eccentric nuts (2).

- Undo the bolt (3) of the eccentric nut (2) using a 19 mm spanner.
- Adjust the eccentric nut (2) using a 24 mm spanner. The distance of the scraper (1) from the roller casing (4) must be between 0.1 mm and 0.5 mm.
- Rotate the roller 360°.

The scrapers must not touch the roller casing in any rotational position.

If a single scraper (1) touches the roller casing, it must be adjusted so that it is again at a distance of between 0.1 and 0.5 mm from the roller casing (4) in the narrowest position.

- Securely tighten the screws (3) again (80 Nm).
- Retighten the screw (5) that may have come somewhat loose due to the adjustment (80 Nm).

14.7 Air pressure of tyres

WARNING

Hazard due to incorrect air pressure

Excessive air pressure in the tyres can cause the tyres to burst.

Insufficient air pressure can cause overloading of the tyres.

The following minimum and maximum permitted air pressures are approved, depending on the tyre size, the profile and the PR figure or the load index. The PR figure or load index and the profile designation are stamped into the tyres.

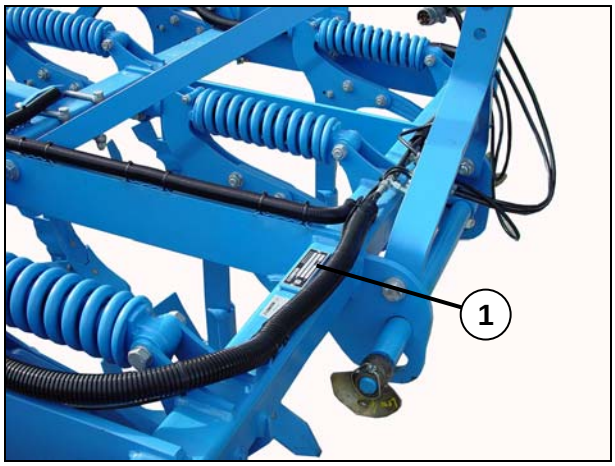
Tyre size	Profile	Ply rating [PR]	Min. permitted air pressure [bar]	Max. permitted air pressure [bar]
10.0/80-12	AW	8	2.6	2.8

15 TECHNICAL DATA

	Kristall 9					
	300	**300 U**	**350**	**350 U**	**400**	**400 U**
Weight without roller approx. [kg]	772	1015	871	1181	990	1478
Weight with knife roller MSW 600 approx. [kg]	1312	1555	1521	1831	1750	2238
Length with knife roller MSW 600 approx. [cm]	320	350	320	350	320	3650
Transport width [cm] *	300	300	350	350	400	400
Working width [cm]	300	300	350	350	400	400
Centre of gravity distance with knife roller approx.	150	165	150	165	150	165
Tractor output up to [KW / PS]	99 / 135	99 / 135	116 / 158	116 / 158	132 / 180	132 / 180
Min. working depth [cm]	5	5	5	5	5	5
Max. working depth [cm]	25	25	25	25	25	25
Recommended working speed [km/h]	8 – 12	8 – 12	8 – 12	8 – 12	8 – 12	8 – 12

* With retracted edging discs.

16 IDENTIFICATION PLATE



The identification plate (1) is situated on the front of the frame.

17 NOISE, AIRBORNE SOUND

The noise level of the implement does not exceed 70 dB (A) during work.

18 NOTES

As the version of equipment is depending from the order, the equipment of your implement and its description concerned may deviate in some cases. To ensure a continuously updating of the technical features, we reserve the right to modify the design, equipment and technique.

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