

OPERATING INSTRUCTIONS

MOUNTED REVERSIBLE PLOUGH JUWEL 7 M



Ensure that these instructions are always available when using the machine and can be accessed by all users..

Keep these instructions for the entire service life of the machine.

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Pass these instructions to all users / owners.

Original instructions

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1 About these instructions

1.1 Introduction

Observe the operating instructions

These operating instructions are important and belong to the machine's scope of delivery.

These operating instructions must be available to the user at the place of use.

- Always read chapter "Safety" before using the machine for the first time.
- Read chapter "Operation Basic operation" before using the machine for the first time.
- Before starting work, also read the relevant steps in the operating instructions.

For an unambiguous assignment of this document to the machine, transfer the following data from the type plate of the machine Schapter 3.3 'Type plate' on page 20:

Designation on the type plate	Enter the machine data here:
Series	
Type designation	
Model year	
Serial number	
Year of manufacture	

Equipment variants

The machines can be equipped differently at the factory.

Standard components, special equipment or optional accessories are not marked separately.

The contents of these operating instructions, e.g. illustrations, may therefore differ from the equipment of the machine.

Depending on the equipment, additional documents may be required for operation.

Validity range

Initial commissioning

These operating instructions do not describe initial commissioning.

INFORMATION

Prior to operation, initial commissioning and instruction in operation, setting and maintenance must have been carried out by the dealer.

1.2 Target groups

The target groups of these operating instructions are operators, users and service personnel of the machine.

The target groups must meet the requirements for the qualification of the personnel \clubsuit , see page 8.

1.3 Applied symbols

1.3.1 Design of warning signs

The warning signs in these instructions have the following design:



WARNING

Type and source of hazard

Possible consequences of non-adherence

- Measures for hazard avoidance

The signal word indicates the risk level.

1.3.2 Signal words and hazard statements

The following signal words and hazard statements are used to label warning signs and to warn of residual risks:



DANGER

Indicates an immediate hazardous situation

If the hazardous situation is not avoided, it will result in death or serious injury.



WARNING

Indicates a hazardous situation

If the hazardous situation is not avoided, it may result in death or serious injury.



CAUTION

Indicates a hazardous situation

If the hazardous situation is not avoided, it may result in moderate or minor injury.

1.3.3 Warning of property damage

ATTENTION

Indicates a situation that may result in property damage

If the situation is not avoided, it may result in damage to the machine or to objects in the vicinity of the machine.

1.3.4 Other notices and information

INFORMATION

Indicates tips and useful information for the user

The tips and information facilitate work. This ensures proper use of the machine.

ENVIRONMENTAL PROTECTION

Indicates notices and special measures regarding environmental protection

The tips and information on environmental protection facilitate environmentally friendly use of the machine.

1.3.5 Symbols and text markings

Symbol, text marking	Meaning	
In front of and in texts		
•	Marking for routine maintenance tasks	
9	Activities that demand the help of service staff.	
-	Listing	
[1], 1, 1	Position numbers	
Example: 'Settings'	Software element	
Example: [OK]	Softkey, key, switch and button	
[kg]	Unit	
\$	Cross reference	
In work instructions		
\checkmark	Preconditions	
•	 Working steps in single-step work instructions Measures for hazard avoid- ance in safety information 	
1. 2.	Working steps in multi-step work instructions	
⇔	Result	
In illustrations		
Light grey coloured components	Non-relevant components, visible to facilitate orientation	
Yellow coloured components	Action-relevant components	

1.3.6 Direction specifications

The direction specifications used in the text (left, right, front and rear) refer to the direction of travel of the tractor when moving forwards, i.e. in normal operation.

1.4 Further applicable documents

Further documents to be observed:

- Operating instructions of the tractor
- For partially assembled or disassembled delivery: Mounting instructions
- Spare parts list
- Operating instructions for the furrow press

INFORMATION

In other documents and in sections of these operating instructions, the **machine** is also referred to as an **implement**.

2 Safety 2.1 Intended use

The machine is used for soil cultivation on agricultural land. It may only be used in accordance with the recognised rules of good agricultural practice. Limitations The permitted working depth is limited to the cultivatable soil horizons. Not intended for use in the following cases: On very or deep-frozen soils In soil horizons with unweathered bedrock In soil horizons with loose rock or solid hard rock Personnel • Only sufficiently qualified personnel may use the machine. Schapter 2.2 'Personnel qualification requirements' on page 8 • Only use the machine with a suitable tractor. Tractor When using the machine, observe the permitted loads and weights

for the tractor, machine and tractor-machine combination.

Operating instructions

The operating instructions are part of the machine. The machine is intended exclusively for use in accordance with these operating instructions. Applications of the machine not described in these operating instructions may result in personal injury or death or property damage. If applications other than those described in the operating instructions are planned, obtain the prior written consent of the manufacturer. This also applies to unauthorised modifications and alterations to the machine.

- Observe the operating instructions and follow the working steps given therein.
- Clarify questions of comprehension concerning the contents of these operating instructions before starting work. If necessary, contact the manufacturer's sales partner.

INFORMATION

In other documents and in sections of these operating instructions, the **machine** is also referred to as an **implement**.

Technically perfect condition

- Operate the machine only in a technically perfect condition.
- Observe the maintenance instructions. Perform all the necessary tests.
- ▶ Use original spare parts or parts approved by the manufacturer.
- Only use the auxiliary and operating materials listed.
- Dispose of auxiliary materials and operating materials in an environmentally responsible manner.

Service life The actual service life of a machine is not limited to a specific time period as long as the machine is in efficient working order. The efficient working order of the machine depends to a great extent on the actual operating conditions and proper maintenance in accordance with the relevant operating instructions.

Liability and warrantyLiability and warranty are excluded if personal injury and damage to
property can be traced back to improper use or non-observance of the
operating instructions.

2.2 Personnel qualification requirements

Operator	The operator is obliged to inform all the users about correct application of the machine and the respective hazards. This can be done on the basis of these operating instructions. The operator is responsible for ensuring that the operating instructions are always available at the machine and that the users observe the operating instructions. The operator must also provide any necessary personal protective equip- ment.
Users	Users are persons who drive, adjust, operate or maintain the machine. Users must be able to use the machine safely. This means:
	 Users understand how the machine works.
	Users know and are able to avoid dangers.
	Users are physically capable of controlling the machine.
	In order to use the machine as intended and in a professional manner, users must have the required technical (agricultural) knowledge.
	Unless otherwise indicated, users may carry out all activities described in these operating instructions themselves.
	Certain activities should only be performed by service personnel, e.g. work on braking systems. These activities are indicated in the operating instructions by the symbol 9 .
Service personnel	Service personnel within the meaning of these instructions are all persons who maintain and repair safety-relevant components. Service personnel are qualified for these activities based on their training and expertise (for example agricultural machine mechanics).

2.3 Hazardous areas

If the hazardous areas are not heeded, this may result in death or serious injury to personnel.

Only once all persons have left the hazardous areas: Switch on drives and motors.

Any work required while the motor or drive is running in a hazardous area requires special attention and precautions. Follow the instructions for action in these operating instructions exactly.

Labels on the machine indicate the hazardous areas , see page 16.

Moving hazardous area

2 m 2 m b

Moving hazardous area

The hazardous area includes the area in the direction of travel across the entire width **b** of the machine.

▶ NEVER climb out of the tractor while it is moving.

The hazardous area of the machine during operation.

- ▶ NEVER allow other persons to board the tractor while it is moving.
- ▶ In addition, maintain a safety distance of 2 m from the machine.
- While driving on the field, observe the entire hazardous area. Stop if required.

Hazardous area between the tractor and machine

When standing between the tractor and machine, there is a risk due to tractor movements or sudden machine movements.

- Secure the tractor against rolling away.
- Before operating the linkage: Keep all persons away from the movement area of the linkage.

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Parked machine	The parked machine may overturn. This may result in fatal or serious injuries.	
	Park the machine in operating position.	
	Park the machine on firm and level ground only.	
	Place a plate (metal, wood, stone) with sufficient carrying capacity under the stands.	
Risk of injury due to stored mechan- ical energy	The machine is equipped with components in which mechanical energy is stored (e.g. springs, overload safety units). Uncontrolled release of mechanical energy accelerates components like a projectile.	
	This may result in fatal or serious injuries.	
	 NEVER dismantle or open components that store mechanical energy. 	
Risk of injury at the hydraulic system	The hydraulic system is under high pressure. Leaking hydraulic oil can penetrate through the skin into the body. Risk of injury to body parts, face, eyes and unprotected skin areas	
	The hydraulic oil may be hot.	
	The hydraulic oil is harmful to health.	
	When working on the hydraulic system: Wear safety goggles and gloves.	
	Check the condition of the hydraulic system according to the main- tenance schedule. Replace damaged or worn components of the hydraulic system immediately.	
	NEVER touch leaks without hand protection.	
	 If hydraulic oil has penetrated the body: Seek medical attention immediately. Remove the hydraulic oil from 	

2.4 Workplaces and passengers

Workplaces

The main workplace for working with the machine is the driver's seat in the tractor. Further workplaces are described in the respective instructions for action.

the body as quickly as possible. Risk of infection

Dangerous situations may occur if several persons operate the machine functions at the same time.

- Observe the hazardous areas.
- > Pay attention to other persons in the vicinity of the machine.

Passengers

Passengers may fall from the machine and seriously injure themselves. Scattered objects may hit and injure passengers.

▶ NEVER allow persons to ride along on the machine.

2.5 Technically perfect condition

Operation only after proper preparations Operational safety of the machine cannot be guaranteed without proper preparations in accordance with these operating instructions.

This may result in fatal or serious injuries.

▶ Use the machine only after proper preparations.

Schapter 4.2 'Preparations at the tractor' on page 29

Observe the technical limit values
 If the technical limit values of the machine are not observed, the machine will be damaged.
 This may result in fatal or serious injuries.
 ▶ Observe the machine-specific limit values.
 © Chapter 12 'Technical data' on page 92

Danger due to damage to the machine	Damage to the machine can impair the operational safety of the machine and cause accidents.
	This may result in fatal or serious injuries.
	To ensure that the machine is in a safe condition, carry out the fol- lowing measures:
	Check the machine according to the maintenance schedule.
	🌣 Chapter 9.2.1 'Maintenance schedule' on page 77
	Repair damage and eliminate causes of damage immediately.
	Remove coarse dirt.
	If safety-relevant damage cannot be repaired in accordance with these operating instructions:
	Have damage repaired by a qualified specialist workshop.
Modifications at the machine	Structural modifications and extensions can impair the functionality and operational safety of the machine.
	This may result in fatal or serious injuries.
	Auxiliary equipment and spare parts that do NOT comply with the man- ufacturer's requirements may negatively affect the operational safety of the machine and cause accidents.
	Modifications and conversions may only be carried out with the written consent of the manufacturer.
	 Structural modifications and extensions must only be carried out by an authorised specialist workshop.
	Use original spare parts or parts approved by the manufacturer.
	Only use the auxiliary and operating materials listed.
	Schapter 12.8 'Operating materials' on page 95 🖗
Welding work	Improper welding work endangers the operational safety of the machine.
	This may result in fatal or serious injuries.
	Have welding work carried out by a qualified specialist workshop.

2.6 Safe handling

2.6.1 Personal protective equipment

Carrying and wearing protective equipment is an important safety component.

Lack of or inappropriate protective equipment increases the risk of damage to health and injury to persons.

For certain work on the machine, the following protective equipment is required in addition to suitable workwear:

Safety gloves

Use protective equipment as follows:

- Only use protective equipment that is in proper condition.
- Only use protective equipment that provides effective protection.
- Adapt protective equipment to the respective person, e.g. size.

2.6.2 Driving the tractor-machine combination

Different driving behaviour	Mounted or trailed machines change the driving characteristics of the tractor.
	The driving characteristics also depend on the operating status, the filling or loading and on the subsoil.
	If the driver does not consider changed characteristics, accidents may occur.
	Observe changed driving behaviour when driving.
	🌣 Chapter 5 'Road travel' on page 34
Unattended parking	An insufficiently secured and unattended tractor-machine combination is a danger to persons, e.g. children playing.
	Before leaving: Stop the tractor-machine combination.
	Engage the parking brake.Turn off the engine.Remove ignition key.
	Before continuing to drive: Check the safe condition of the tractor- machine combination again.
	🌣 Chapter 5 'Road travel' on page 34

2.7 Safety devices and labels

For the protection of the user, other persons and the machine, the machine is equipped with special safety devices, e.g.:

- Lighting equipment and markings
- Stabilisation

The actual equipment of the machine with safety devices depends on the country-specific rules and regulations.

Schapter 3.2.3 'Safety devices' on page 18

Keeping the safety devices fully functional

Existing and fully functional safety devices protect against death or serious personal injury.

- Replace damaged safety devices.
- Install dismantled safety devices before commissioning.
- Move the safety devices to the protective position.
- In case of doubt whether all safety devices are properly installed and fully functional: Commission a specialist workshop.

Keeping the labels legible

Labels on the machine warn of dangers at danger points and belong to the safety equipment of the machine.

Missing labels increase the risk of fatal and serious injury.

- Clean dirty labels.
- Replace damaged, illegible or lost labels immediately.
- Provide spare parts with the provided labels.

Schapter 3.2.1 'Position of the label' on page 16

Schapter 3.2.2 'Meaning of the labels' on page 16

Design and description 3

3.1 **Machine overview**

INFORMATION

Depending on the equipment of the machine and country-specific requirements, the assembly groups described below may be present on the machine.



- 2 Turnover device
- 3 Headstock

1

- 4 Basic frame
- 5 Plough bodies
- 6 Additional tool (skimmer, trashboard)

- 8 Lighting equipment
- Mechanical overload safety device 9
- 10 Disc coulter
- 11 Optiquick adjustment centre

3.2 Machine safety

3.2.1 Position of the label



3.2.2 Meaning of the labels

This section explains the information and warning signs that have been affixed to the machine.

Reading the operating instructions



Incorrect use or operation of the machine can result in death or serious injury.

Before commissioning:

- Read and observe the operating instructions.
- ► Follow the instructions for action.

Turn off the engine



A tractor with the engine running can cause unintentional movements. This may even be fatal or result in serious injuries.

Before maintenance and repair work:

- Turn off the engine.
- Engage the parking brake of the tractor.
- Remove the ignition key.

Working range and swivel area



The swivelling machine may hit persons. This will result in death or serious injury.

When the tractor is running:

 Do NOT remain in the working range and swivel area of the machine.

Area between the tractor and machine



A tractor with the engine running can make or cause unintentional movements. This will result in death or serious injury.

When the tractor is running:

▶ Do NOT remain in the area between the tractor and machine.

Hydraulic equipment



Connection overview of hydraulic hoses

- P0/T0 hydraulic overload safety device comfort version
- P1/T1 plough rotation (including hydraulic frame swing-in, if available)
- P2/T2 hydraulic depth adjustment (equipment V)
- P3/T3 hydraulic depth adjustment depth and transport wheel
- P5/T5 not used
- P6/T6 hydraulic front furrow width adjustment
- P8/T8 not used
- P15/T15 swivel furrow press in and out

3.2.3 Safety devices

3.2.3.1 Lighting equipment and identification

The marking and the lighting equipment increase safety while driving on the road.

For public road traffic, the machine must be equipped with the following components in accordance with national regulations:

- Marking
- Lighting equipment

Lighting equipment



Lighting equipment example

- 1 Warning boards
- Lateral reflectors
- 3 LED lighting equipment
- 4 Rear reflectors

Warning board



Depending on national regulations, a warning board may be required for slow-moving vehicles.

3.2.3.2 Stabilisation



Stand

The stand ensures that the dismantled machine is stable. When mounted, the stand is folded up again.

Design and description

3.2.3.3 Depth and transport wheel pins

3.3 Type plate

The machine is marked with a type plate. The machine type is uniquely defined on the type plate.



Sample design of a type plate (standard)

Pins for securing the depth and transport wheel

- 1 Series
- 2 Type designation
- 3 Model year
- 4 Serial number
- 5 Year of manufacture
- 6 Vehicle class, subclass, speed index
- 7 EU type approval number
- 8 Vehicle identification number. The vehicle identification number is also engraved in the frame near the type plate.
- 9 Permissible total mass [kg]*
- 10 Permissible drawbar load [kg] (axle 0)
- 11 Permissible axle load [kg] (axle 1)
- 12 Permissible axle load [kg] (axle 2)
- 13 CE label
- 14 EAC label
- 15 Company name and address of the manufacturer
- 16 Company logo
- 17 Manufacturer

*For machines with an EU type-approval number, the permissible total mass is equal to the sum of the permissible axle loads.

♥ Further type plate versions: *Type plate variants* on page *102*.

3.4 Headstock



The headstock 1 with cross shaft 3 and top link pin 2 2 has been designed according to standard ISO 730.

The headstock is used to connect the implement to the three-point linkage of the tractor.

The implement is available with different cross shafts.

The approved options for connecting the implement to the tractor are shown in the technical data.

Chapter 12.11 'Connecting equipment at the machine' on page 96

3.5 Basic frame



The basic frame **1** carries the plough bodies symmetrically arranged on both sides.

The basic frame is swivelled via the turnover device to the left or right-turning operating position.

The rear shoulder on the basic frame enables the basic frame to be extended by a frame extension and an additional pair of plough bodies to be attached.

3.6 Working width adjustment

Depending on the equipment, the user can adjust the working width mechanically or hydraulically.



3.7 Turnover device



The machine is equipped with a hydraulic turnover device 1 for which users can adjust the inclination angle 2 manually.

3.8 Support wheels



The support wheel mounted to the frame enables precise and consistent depth control. During the turning process, the support wheel swings into the position which corresponds to the respective operating position.

While working in the field, the support wheel only performs a touch function.

Support wheel variants:

- Pendulum wheel Pendulum wheels are used exclusively as touch wheels.
- Depth and transport wheel Depth and transport wheels are used as touch wheels and additionally support safe road transport.

♦ Chapter 12.9 'Tyres and wheels' on page 95

3.9 Overload safety devices

Overload safety devices protect the basic frame and the plough bodies against overloads.



Double-cutting shearing protection

Double-cutting shearing protection in the leg brackets is standard on all machines. Shear bolts **1** are replaced when broken.



Mechanical non-stop overload safety device (Tandem)

With the mechanical non-stop overload safety device 2, the release force is infinitely adjusted via the preload of the spring packages.

When an obstacle is encountered, the body avoids it by both moving upwards and sideways.



Hydraulic overload safety device OptiStone

With the hydraulic overload safety device **3** the release force is adjusted between a minimum and a maximum release pressure.

When an obstacle is encountered, the body avoids it by both moving upwards and sideways.

Using an additional comfort valve, the user can adjust the operating pressure from the driver's seat while working.

3.10 Optiquick adjustment centre

Using the Optiquick adjustment centre, the draw point and front furrow width can be adjusted independently of each other. This allows ploughing without side pull at any working width.



Equipment with mechanical adjustment of the front furrow width without hydraulic frame swing-in

The draw point **1** and the front furrow width **2** are adjusted mechanically.



Equipment with mechanical adjustment of the front furrow width on hydraulic frame swing-in

The draw point **1** is adjusted mechanically. The front furrow width is adjusted mechanically using the sleeve **2** on the hydraulic frame swing-in.



Equipment with hydraulic adjustment of the front furrow width and hydraulic frame swing-in

The draw point **1** is adjusted mechanically. The front furrow width **2** and the hydraulic frame swing-in are adjusted hydraulically.

3.11 Plough body

DuraMaxx



The slats **1** or mouldboards **2** are attached to the frog **4** with hooks **3**. As such the wearing parts can be exchanged rapidly without tools.

Dural



The following belongs to the plough body:

- Mouldboard, divided into shin 2 and mouldboard blade 1 or slat
- Share, divided into share wing and point
- Frog 6
- Landside 7

3.12 Additional tools



Trashboard 1



Skimmers 2

Design and description



Sword coulter 3

3.13 Disc coulter

The large disc coulters pre-cut the furrow edge. Various disc coulters are available.



Equipment with disc coulter 1 smooth, stalk 2 rigid



Equipment with disc coulter 1 toothed, stalk 2 spring-loaded

INFORMATION

The spring-loaded disc coulter is only available for ploughs with a hydraulic overload safety device.



Equipment with disc coulter 1 smooth, stalk 2 rigid, adjustable lengthwise

3.14 Subsoiler



Example: Subsoiler

4 Attaching

4.1 Checking suitability of the tractor



WARNING

Risk of accident due to unsuitable tractor

If the tractor is not suitable for the machine, components of the machine may be overloaded and the tractormachine combination may not be steered safely.

This may result in accidents with injuries or death of persons or damage to the machine.

- Prior to attachment, it must be ensured that the tractor is suitable for use with machine.

Checklist	
Tractor power	🗞 Performance data, page 93
The tractor power must be within the permitted power range.	
The tractor power must be sufficient for the consumers of the connected machine, e.g., hydraulic connections.	
Three-point linkages	rightarrow Connecting equipment at the machine,
The categories of the tractor's three-point linkage as well as the cross shaft and top link pin of the machine must match.page 96 \clubsuit Cross shaft overview, page 30	
If the categories differ, the user must adjust the tractor's three- point linkage or replace the cross shaft and top link pin of the machine with a suitable, approved version.	
Electrical connections	🗞 Electrical connections, page 94
An electrical connection must be available on the tractor for each consumer.	
Hydraulic connections	🗞 Hydraulic connections, page 94
A hydraulic connection and a suitable control unit must be avail- able for each consumer.	
Hydraulic oil	😓 Operating materials, page 95
The hydraulic oils of the machine and tractor must be compatible.	
Axle loads Determine the axle loads and the required ballasting.	\Leftrightarrow Calculating the axle load and ballasting for mounted implements, page 113

4.2 Preparations at the tractor

Keep the tractor documentation ready

The tractor is prepared before attaching the machine. For this purpose, the user must carry out various checks and adjustments.

The following information about the tractor is required:

- Air pressure of tyres
- Instructions for adjusting the lifting rods
- Instructions for adjusting the check chains or stabilisers

Tasks on the tractor

Checklist		
Tyres Check the air pressure of the tractor tyres. Under difficult conditions: Use additional wheel weights or fill tyres evenly with water.	 Observe the instructions of the tractor manufacturer. The air pressure must be the same in all the tyres of one axle. 	
Lifting rods Check the length of the lifting rods.	 Observe the instructions of the tractor manufacturer. Adjust the lifting rods of the tractor to the same length. Lock the slot of the lifting rods. 	
 Check chains and stabilisers Targets: Lateral movement of the lower links when working in the field Central position of the machine behind the tractor when driving on public roads 	 Observe the instructions of the tractor manufacturer. Working in the field: The lower links must be freely movable (sufficient lateral movement). Road travel: The lower links must be fixed (no lateral movement). 	

Checklist

Top link

Check attachment position of the top link.

At tractors with several attachment positions for the top link:

Attach the top link, ensuring the top link in the extension points towards the front axle of the tractor.



4.3 Preparing the machine

Adjusting the height of the cross shaft



The cross shaft can be mounted at two positions.

- Position for better plough penetration
- Position B if the plough cannot be lifted far enough for the turning process.

INFORMATION

Does NOT apply for models with six furrows.



Change the cross shaft position as follows:

- 1. Remove the screws 2.
- 2. Turn the bar plates 3 with cross shaft 2 180°.
- 3. Apply threadlocker to screws 2.
- 4. Screw in screws 2.
5. Tighten nuts 4 to a tightening torque of 580 Nm.

First depth adjustment

Recommendation: Before using the implement for the first time, make a basic adjustment for the intended working depth. The precision adjustment is made when using the implement in the field. *Schapter 6.3.2 'Adjusting the depth' on page 46*

The working depth is roughly adjusted using the support wheel. On the version with hydraulically adjustable depth and transport wheel, the adjustment is made when the machine has been mounted using the hydraulic system.

- 1. Swivel support wheel all the way up.
- 2. Measure the vertical distance between the lower edge of the wheel and the share level.
- 3. Adjust support wheel or depth and transport wheel until the vertical distance between the wheel and share level corresponds with the intended working depth. Schapter 6.3.2 'Adjusting the depth' on page 46

4.4 Mounting the machine

WARNING

Risk of accident due to unsuitable tractor

If the tractor is not suitable for the machine, components of the machine may be overloaded and the tractormachine combination may not be steered safely.

This may result in accidents with injuries or death of persons or damage to the machine.

 Prior to attachment, it must be ensured that the tractor is suitable for use with machine.

Preconditions:

- $\sqrt{4}$ The tractor is suitable for operating the implement, page 28.
- $\sqrt{1}$ $\stackrel{\text{\tiny V}}{\Rightarrow}$ The tractor is prepared, page *29*.





- 1. Switch the hydraulics of the three-point linkage to position control for attachment.
- 2. Move the tractor straight back in front of the machine.
 - Stop at a distance of about 40 cm.
 - The lower links are positioned in front of the cross shaft 1.
- 3. Secure the tractor against rolling away.
- 4. Depressurise the additional tractor control units.
- 5. Connect hydraulic hoses to the tractor.
 - Make certain they are assigned correctly.
 - Note the hydraulic system labels.
- 6. Connect the electric lines to the tractor.
- 7. Check correct installation and function of the lighting equipment.
- 8. If necessary, fix the control box or operation terminal into position in the tractor cab. Reconnect the lines.
- 9. Back the tractor up to the machine.
 - ⇒ The lower links are positioned underneath the cross shaft.
- 10. Connect the lower links of the tractor to the cross shaft 2.
- 11. Secure the tractor against rolling away.
- 12. Secure cross shaft in the lower links.
 - Follow the operating instructions of the tractor.
- 13. Relieve the stand 3.
 - To do so, lift the machine with the three-point linkage approx.
 1...5 cm.
- 14. Pull out the locking bar 4 with a rotational movement.
- 15. Swing up the stand.
- 16. Secure the stand with the locking bar.







17. Select attachment position for the top link.

SI	ot 5	Fix	red hole 6
•	Quick penetration on the headland	-	Even field areas For tractors with top link
-	Better ground adaptation on hilly terrain Pin in the centre of the slot	•	control For ploughs with mechan- ical and hydraulic over- load safety device
1	Ploughs with five or more furrows in normal soil con- ditions	•	Where the support wheel is positioned in the middle of the plough
1	Improved traction Pin located at the front of the slot		

- 18. Lower the plough on level ground.
- 19. Connect the headstock and top link 7 to the top link pin 8.
- 20. Secure the top link pin with the linch pin .
 - Only use the top link pin supplied with the machine.
- 21. Adjust the top link 7 to the correct length.
 - When the top link pin is installed in the fixed hole: Turn the top link until the plough is 1...3 cm higher at the front than at the rear.
 - When the top link pin is installed in the slot: Turn the top link until the following criteria are met:
 - Top link pin is located at the front of the slot.
 - Plough is 1...3 cm higher at the front than at the rear.
- 22. When driving on public roads: Mount the lighting equipment and the warning boards. Schapter 5.2 'Preparing for road travel' on page 34



5 Road travel

5.1 Information on road travel

Laws on driving on public roads differ in many countries.

- Pay particular attention to local laws and regulations regarding the following points:
 - Driving on public highways
 - Maximum permissible transport height
 - Maximum permissible transport width
 - Maximum permissible transport weight
 - Lighting equipment
 - Markings
- NEVER exceed the maximum transport speed of the machine. Chapter 12.5 'Performance data' on page 93

5.2 Preparing for road travel

Check and prepare the following assembly groups, safety devices and functions in accordance with these operating instructions before each road travel:

Checklist				
Working width adjustment	•	Adjust to the smallest working width. \clubsuit See page 55		
Connections of the machine to the tractor	•	The top link pin must be secured. The connections of the lower links with the cross shaft must be secured.		
Check chains and stabilisers Target:	-	Observe the instructions of the tractor manufacturer. The lower links must be fixed (no lateral movement).		
 Central position of the machine behind the tractor when driving on public roads 				
Transport position of depth and trans- port wheel	•	The depth and transport wheel must be switched to transport position. 4 See page 39		
When driving on public roads, the depth and transport wheel is used as a transport wheel.				
Transport position for machines with depth and transport wheel	•	The machine must be switched to transport position. 4 See page <i>39</i>		

Checklist	
Lighting equipment	 The lighting equipment must be mounted and fully functional. See page 35
Subsoilers	 Subsoilers must be remounted to transport position. See page 37
Control units of the tractor	 Observe the instructions of the tractor manufacturer. To avoid unintentional movements of the machine: Lock the tractor control units.

5.2.1 Preparing the lighting equipment for road travel

Before driving on the road:

- 1. Mount the lighting equipment.
- 2. Test the lighting equipment.

Version with pendulum wheel



The lighting equipment is mounted in operating position.

- 1. Lift the machine.
- 2. Turn the machine to the right-turning position.
- 3. Attach the lighting equipment 1 to the landside of the last plough body 2.
- 4. Secure the lighting support **3** with pin and linch pin **4**.

Road travel

Version with depth and transport wheel



The lighting equipment is mounted in operating position.

- 1. Lift the machine.
- Turn the machine to the transport position.
 Chapter 6.1.2 'Moving the plough with depth and transport wheel to transport position' on page 39
- 3. Attach the lighting equipment 1 to the rear end of the basic frame 2.
- 4. Secure the lighting support **3** with pin and linch pin **4**.

Connecting the electrical line



- 1. Connect the electrical line of the lighting equipment.
 - Connect the connector of the lighting equipment 1 to the socket 2.
- 2. Test the lighting equipment.

5.2.2 Subsoilers

Before driving on the road: Move the subsoilers to the transport position.



DuraMaxx (left) and Dural (right)

- 1. Release the locking bar (DuraMaxx) 3 or pin (Dural) 4.
- 2. Pull the subsoiler 1 out of the holder 2.
- 3. Insert the subsoiler in the holder from above.
- 4. Secure the subsoiler with locking bar or pin.

6 Operation

6.1 Basic operation

6.1.1 Turning the plough frame



The turnover device is equipped with a double acting turnover ram with switching.

Machines with hydraulic frame swing-in are additionally equipped with a double acting hydraulic ram 2.

The hydraulic functions are operated using a double acting tractor control unit.

Preconditions:

- $\sqrt{}$ NO persons are present in the turning range and swivel area.
- \checkmark The user operates the turnover device exclusively from the driver's seat.
- V Plough with hydraulic overload safety device: Shut-off valve 3 is closed.
 Ball valve is vertical to the flow direction.
 Shut-off valve 3 is open in the image.
- 1. Lift out plough.



- 2. Apply pressure to the connection for the turnover device using the control unit.
 - ⇒ With hydraulic frame swing-in: The frame swings in automatically.

Plough turns 180°.

With hydraulic frame swing-in: The frame swings out automatically.

3. After turning and swinging out: Switch the control unit to "N" (neutral).

A new turning process can then be carried out.

6.1.2 Moving the plough with depth and transport wheel to transport position

Standard procedure

Precondition:

- $\sqrt{}$ The plough with depth and transport wheel is in operating position.
- 1. Switching depth and transport wheel.
- 2. \checkmark The plough has been moved to transport position.

Switching depth and transport wheel



CAUTION

Risk of crushing

Crushing and shearing points in the area of the wheel stops

Do NOT reach into the crushing points and shearing points.

Hydraulically adjustable depth and transport wheel

- 1. Turn the plough to the right operating position.
- 2. Park plough on the ground.
- 3. Remove the pin 2.
- 4. Lift up plough.
 - ⇒ The hydraulic ram 1 is detached from the wheel stalk 3.





- 5. Swivel the hydraulic ram 4 against the stop 6.
 - ⇒ The hydraulic fork s of the hydraulic ram engages behind the spring clamp 7.

The hydraulic ram is secured against swivelling back automatically.



- 6. Release and pull out the pin **s**.
- 7. Swivel the depth and transport wheel by 90°.
- 8. Lock the depth and transport wheel with the pin **B**.
- 9. Secure the pin with a linch pin.



Hydraulically dampened depth and transport wheel

- 1. Rotate the plough to the right-turning position.
- 2. Park plough on the ground.
- 3. Remove the pin 2.
- Disconnect the hydraulic damper 1 from the wheel stalk 3.
 CAUTION: Crush risk
- 5. Lift up plough.



- 6. Release and pull out the pin 4.
- 7. Swivel the depth and transport wheel by 90°.
- 8. Lock the depth and transport wheel with the pin 4.

9. Secure the pin with a linch pin.

The plough has been moved to transport position



- 1. Pull up the detent pin 1.
 - ⇒ The lever 2 swivels back into position.
 - The locking pin <u>3</u> moves out.
- 2. Lift out plough.
- 3. V-version: Adjust the plough to the smallest working width.
- 4. Slowly turn the plough until the locking pin **3** engages audibly.
- 5. Check whether the locking pin is correctly engaged.
- 6. Lower the plough.
- 7. Remove top link from the headstock.
- 8. Lift the plough at front.
 - ⇒ The plough with depth and transport wheel is in transport position.

6.1.3 Moving the plough with depth and transport wheel to operating position

Standard procedure

Precondition:

- $\sqrt{}$ The plough with depth and transport wheel is in transport position.
- 1. 🗞 Switching depth and transport wheel.
- 2. Solution 2. Noving the plough to operating position.

Switching depth and transport wheel



CAUTION

Risk of crushing

Crushing and shearing points in the area of the wheel stops

Do NOT reach into the crushing points and shearing points.



Hydraulically adjustable depth and transport wheel

- 1. Turn the plough to the right operating position.
- 2. Release and pull out the pin 1.
- 3. Swivel depth and transport wheel by 90° towards the plough frame.
- 4. Fix the depth and transport wheel in this position with the pin 1.
- 5. Secure the pin with a linch pin.
- 6. Lower the plough.



7. Swivel the hydraulic ram 2 downwards.



- 8. Mount the hydraulic ram 3 on the wheel stalk 5.
- 9. Secure the hydraulic ram with the pin 4.
- 10. Lift up plough.



Hydraulically dampened depth and transport wheel

- 1. Turn the plough to the right operating position.
- 2. Release and pull out the pin 1.
- 3. Swivel depth and transport wheel by 90° towards the plough frame.
- 4. Fix the depth and transport wheel in this position with the pin 1.
- 5. Secure the pin with a linch pin.
- 6. Lower the plough.



- 7. Mount the hydraulic damper 2 on the wheel stalk 4.
- 8. Secure the hydraulic damper with the pin **3**.
- 9. Lift up plough.

Moving the plough to operating position



- 1. Lower the lower link of the tractor.
- 2. Connect the top link and the headstock to the top link pin 4.
- 3. Lift up plough.
- 4. Pull the lever 2 until the detent pin 1 engages in the designated hole.
 - \Rightarrow Locking device is in operating position .
- 5. Move the control unit for turning back and forth until the locking pin 3 unlocks audibly.
- 6. Turn the plough to the right operating position.

6.2 Changing the setup state

6.2.1 All setup options at a glance

Setup options	Conversion / Retrofit
Sword coulter	Nounting the sword coulter, page 44
Wide furrow cutter	Nounting the wide furrow cutter, page 44
attachment arm	rightarrow Mounting the attachment arm, page 45

6.2.2 Mounting the sword coulter

Retrofitting sword coulters



DuraMaxx (left) and Dural (right)

- 1. Unscrew the countersunk screw **5** and the hexagon bolt **4**.
- 2. Remove the landside wedge 1.
- 3. Mount the sword coulter 2 with two countersunk screws in front of the landside.
- 4. Tighten the countersunk screws 5.

6.2.3 Mounting the wide furrow cutter



The wide furrow cutter widens the furrow of the last plough body.

- $\sqrt{}$ Application: light to medium soils
- Mount the wide furrow cutter at the last plough body.

6.2.4 Mounting the attachment arm



- $\sqrt{}$ Observe the operating instructions for the attachment arm.
- 1. Insert the attachment arm 1 into the retaining pocket 2 at the front of the plough frame.
- 2. Secure the attachment arm with pin 3.
- Connect hydraulic supply pipes: Connect the plug 4 to the sleeve
 .

6.3 Adjusting the machine

6.3.1 All adjustments at a glance

The following table shows the adjustments that the user can make at the machine.

Preconditions:

- $\sqrt{}$ The machine has been attached properly to the tractor.
- √ The top link is adjusted correctly.
 ♦ Chapter 4.4 'Mounting the machine' on page 31

Adjustment options at the machine	Adjustment
Working depth	🏷 Adjusting the depth, page 46
Inclination	& Adjusting the inclination, page 49
Adaptation of the front furrow width to the working width of the other plough bodies	♦ Adjusting front furrow width, page 50
Tractor/plough traction line (side pull correction)	✤ Adjusting the tractor/plough traction line, page 52
Pitch angle	Adjusting the pitch angle of the plough bodies, page 52
Working width per plough body	✤ Adjusting the working width of the plough bodies, page 55
Landside	Adjusting the landside of DuraMaxx plough bodies, page 58
Subsoiler	Adjusting the working depth of the sub- soilers, page 59

Adjustment options at the machine	Adjustment
Trashboard	rightarrow Adjusting the trashboard , page 59
Skimmers	🏷 Adjusting the skimmer , page 61
Disc coulter	Adjusting the disc coulter, page 63

6.3.2 Adjusting the depth

The working depth is adjusted using the tractor's three-point linkage and the plough's touch wheel. The touch wheel prevents the plough from working too deeply. In order to reduce slippage, the plough weight is transferred to the tractor as far as possible.

Standard procedure

- 1. Switch the hydraulics for the rear lifting gear of the tractor to draft control or mixed control.
- 2. Preset the position of the touch wheel, to do so:
 - Lower the machine to the ground.
 - Adjust the position of the touch wheel.
 - ⇒ The distance between the ground and the touch wheel corresponds exactly to the working depth.
- 3. Move the machine into the ground. Plough a few metres.
- 4. Check the working depth near the touch wheel. Readjust the touch wheel setting if necessary.
- 5. Check the pressure of the touch wheel on the ground.
 - Normal conditions: Low touch wheel load
 - To ensure the plough remains safely in the ground under stony conditions: Higher touch wheel load
- 6. When driving: Use the lower links to align the plough parallel to the ground.
 - \Rightarrow All the plough bodies work to the same depth.
- 7. Prestress the top link to pull.
 - \Rightarrow In the slot: The top link is positioned at the front.
 - \Rightarrow The top link is loaded to pull.

Adjusting the working depth - pendulum wheel, hydraulically damped



- 1. Remove the pin 1.
- 2. Fix the stop 2 in the required position with the pin 1.
- 3. Secure the pin **1** with the linch pin **3**.
- 4. After each change to the working depth: Align the plough again parallel to the ground via the lower link position.

If a finer adjustment is required, the stop can be moved to a different position.

- 1. Turn over the stop 2.
- 2. Secure the pin 1 with the linch pin 3.

Operation

Adjusting the working depth - depth and transport wheel, hydraulically dampened



- 1. Remove the linch pin 3.
- 2. Remove the pin 2.
- 3. Fix the stop 1 in the required position with the pin 2.
- 4. After each change to the working depth: Align the plough again parallel to the ground via the lower link position.

If a finer adjustment is required, the stop can be moved to a different position.

- 1. Turn over the stop 1.
- 2. Secure the pin 2 with the linch pin 3.

Adjusting the working depth - depth and transport wheel, hydraulic



- Adjust the working depth via a double acting control unit in the tractor cab.
 - The depth indicator <u>i</u> is used for orientation:
 - 1 = shallow
 - 5 = deep

6.3.3 Adjusting the inclination

Check the inclination



- 1. Move the machine into the ground.
- 2. Plough a few metres.
- 3. Leave the machine in the ground and stop.
- 4. Check the inclination of the plough.
 - For a uniform ploughing pattern, the plough legs must be perpendicular to the ground.

Adjust the inclination with a simple hydraulic turnover device



The inclination is adjusted mechanically via two adjusting nuts . The right and left-hand sides are adjusted separately.

- 1. Briefly pressurise the hydraulic connection for the turnover ram 1.
 - ⇒ With hydraulic frame swing-in: The frame swings in automatically.

The plough lifts approx. 5...10 cm.

The arm 2 rotates a few centimetres away from the stop.

- 2. Adjust the inclination in the required direction with the adjusting nut 3.
- 3. Rotate the plough back up to the stop.
 - ⇒ With hydraulic frame swing-in: The frame swings out automatically.
- 4. Check the inclination again.
- 5. If required: Repeat the adjustment.
- 6. Rotate the plough.
- 7. Check the inclination on the other side and adjust it.

Operation

6.3.4 Adjusting front furrow width



Preconditions:

 $\sqrt{}$ The inclination of the plough is adjusted correctly on both sides.

The front furrow width 2 is adjusted using the Optiquick adjustment centre 1. Here, the front furrow width is adapted to the working width of the other plough bodies.



Machine with mechanical front furrow adjustment

The front furrow width is adjusted with the outer turnbuckle 1.

Check the front furrow width:

Front furrow width		
Too narrow	•	Turn the outer turnbuckle longer.
Too wide	-	Turn the outer turnbuckle shorter.



Machine with mechanical front furrow adjustment and hydraulic frame swing-in

The front furrow width is adjusted with the adjuster sleeve **1** on the hydraulic ram **2**.

- 1. Lower the machine.
- 2. Undo the clamping screw 3.
- 3. Extend the hydraulic ram 2 until the adjuster sleeve 1 has been relieved.
- 4. Check the front furrow width:

Front furrow width		
Too narrow	•	Turn the adjuster sleeve 1 . Increase the dimension A .
Too wide	•	Turn the adjuster sleeve 1. Decrease the dimension A.

5. Make sure that the clamping screw **3** of the adjuster sleeve **1** is pointing outwards.

ATTENTION: Danger of sealing damage

Incorrect positioning of the adjuster sleeve 1 will damage the seal 4.

- 6. Tighten the clamping screw 3.
- 7. Retract hydraulic ram 2.



Machine with hydraulic front furrow adjustment

The front furrow width is adjusted with the hydraulic ram 1.

- 1. Check the front furrow width.
- 2. If the front furrow width is not correct: Change the front furrow width.

Front furrow width		
Too narrow	•	Extend hydraulic ram 1.
Too wide		Retract hydraulic ram 1.

6.3.5 Adjusting the tractor/plough traction line



The plough is optimally adjusted when...

- ... the tractor/plough traction line (connecting line between the draw point z and the centre of the plough pz) runs through the middle of the rear tractor axle M.
- ... the tractor runs straight ahead without side pull.

The tractor/plough traction line is adjusted with the inner turnbuckle.



Checking the side pull:

Side pull	
Tractor pulls towards the ploughed land.	 Turn the inner turnbuckle 1 longer.
Tractor pulls towards the unploughed land.	Turn the inner turnbuckle shorter.

6.3.6 Adjusting the pitch angle of the plough bodies

DuraMaxx



The pitch angle is adjusted via the position of the eccentric plate **1**. When delivered, the plough bodies are mounted at an average pitch angle to the ground. The eccentric plate is in the middle position. The notch of the eccentric plate points to the front.

INFORMATION

Adjust all the plough bodies to the same pitch angle. Eccentric plates on the plough bodies are in the same position.



Changing pitch angle:

- 1. Undo the nut 2.
 - The eccentric plate <u>1</u> can be rotated.



- 2. Undo the nut 3.
 - The plough body can be swivelled around this pivot point.

Target	Pitch angle	Adjustment
Improved penetration	Larger pitch angle	 Notch on the eccentric plate downwards in the direction of the point
Improved depth con- trol	Smaller pitch angle	 Notch on the eccentric plate upwards s in the direction of the plough frame

3. After adjusting the pitch angle: Tighten the nuts 2, 3 5 *Tightening torques*, page 103.

Dural



Standard procedure:

INFORMATION

Adjust all the plough bodies to the same pitch angle.

- Bear from behind over the rearmost and foremost point.
- Adapt individual plough bodies to this height.
- 1. Adjust pitch angle of the first and last plough body.
- 2. Measure the distance between point and plough frame (= reference dimension).
- 3. Adjust the remaining plough bodies, according to the reference dimension.



The pitch angle is adjusted via the two adjusting screws , 1a, 1b. When delivered, the plough bodies are mounted at an average pitch angle to the ground.

Changing pitch angle:

- 1. Undo the screw 2.
- 2. Undo the self-locking nut of the bolted connection 3.
 - The plough body can be swivelled around this pivot point.
- 3. Undo the clamping screw 4.



4. Adjust the pitch angle.

Target	Pitch angle	Adjustment
Improved penetration	Larger pitch angle 5	 Screw in the adjusting screw clockwise. Unscrew the adjusting screw b anti-clock- wise.
Improved depth con- trol	Smaller pitch angle 6	 Screw in the adjusting screw clockwise. Unscrew the adjusting screw anti-clock- wise.

5. After adjusting the pitch angle: Retighten all the bolted connections 4, 3, 2 4 *Tightening torques*, page 103.

6.3.7 Adjusting the working width of the plough bodies

Hydraulic working width adjustment The working width of the machine is infinitely adjustable.

Interbody clearance [cm]	Adjustment range per body [cm]
90	3050
100	3055
120	3658



The working width of the plough bodies is adjusted via the tractor. The hydraulic ram **1** for adjusting the working width is controlled via an additional tractor control unit.

Preconditions:

- $\sqrt{}$ The front furrow width is adjusted.
- $\sqrt{}$ The tractor/plough traction line is adjusted.
- Adjust the working width with the additional control unit.

Working width	Adjustment
Smaller working width	 Pressurise connection "P" of the additional control unit. The piston rod 2 moves out.
Larger working width	 Pressurise connection "T" of the additional control unit. The piston rod 2 moves in.

 \Rightarrow The adjusted working width is displayed on the scale 3.

Mechanical working width adjustment

The working width of the implement can be set in four adjustments.

B2

35

38

45

B1

30

33

40

Working width per body

B3

40

44

53

B4

45

50

60

X	
1 2	

The working width is adjusted by adjusting the individual plough bodies and the position of the touch wheel. The leg brackets of the individual plough bodies have holes for 4 different positions. Each plough body position is assigned a position of the pendulum wheel or hydraulic depth and transport wheel:

Plough body position	B1	B2	B3	B4
Pendulum wheel position	а	b	c	d
Hydraulic depth and transport wheel position	al	b1	a2	b2



Adjusting the working width on the plough body:

- 1. Turn the plough to the right operating position.
- 2. Undo the screw 1.

Interbody clearance [cm]

90

100

120

- 3. Undo the screw 2.
- 4. Reposition the screw 2 in the selected hole B1, B2, B3 or B4.
 - Set the same working width at all the plough bodies.
- 5. Tighten the screws 1, 2 & Tightening torques, page 103.



Adapt the position of a pendulum wheel:

Plough body position	B1	B2	B3	B4
Pendulum wheel position	а	b	с	d

- 1. Undo the screw 3.
- 2. Undo the screw 4 and reposition it in the respective hole a, b, c or d.
- 3. Tighten the screws 🗞 *Tightening torques*, page 103.

Adapt the position of a hydraulic depth and transport wheel:



Plough body
positionB1B2B3B4Hydraulic depth
and transporta1b1a2b2

- 1. Undo the screw 5.
- 2. Swing the arm 6 with the control rod 7 into the correct position (see table and figure).
- 3. Reposition the screw 5.
- 4. Tighten the screw **S** by *Tightening torques*, page 103.



6.3.8 Adjusting the landside of DuraMaxx plough bodies

Landside V2



The landside V2 4 is the standard installation position that is also suitable for working on slopes.

Landside V1



The landside V1 1 is suitable for dry conditions

Move the landside



INFORMATION

Set the landsides on all the plough bodies to the same position.

- 1. Undo the screw 3.
- 2. Remove the screw 2.
- 3. Set the landside **1** to another position.
- 4. Reinsert the screws 2, 3.
- 5. Tighten the screws 2, 3 🗞 Tightening torques, page 103.

6.3.9 Adjusting the working depth of the subsoilers



DuraMaxx (left) and Dural (right)

- 1. Slide the subsoiler 1 into the holder 2 from below.
- Secure the subsoiler with a locking bar (DuraMaxx)
 or pin (Dural)
 4.
- 3. To change between the two positions:
 - Release the locking bar or the pin 4.
 - Move the subsoiler 1.
 - Secure the subsoiler 1 with locking bar 3 or pin 4.

6.3.10 Adjusting the trashboard

INFORMATION

Adjust the trashboards on all the plough bodies to the same position.

DuraMaxx equipment





- 1. Align the trashboard 1 using the slots 4 on the holder 2.
- 2. Screw the trashboard to the holder.
- 3. Align the holder 2 using the slots 5 on the leg 3.
- 4. Screw the holder to the leg.

Dural equipment



- 1. Align the trashboard 1 4 on the holder 2.
- 2. Screw the trashboard to the holder.
- 3. Align the holder 2 with the trashboard via the slots 5 on the mouldboard or the slat 3.
 - The edge of the trashboard is positioned on the mouldboard or mouldboard slat.
 - This prevents harvest residue from being deposited between the slats or mouldboard and the trashboard.
- 4. Screw the holder to the slat or the mouldboard.
- 5. Use the support screw 6 to support the trashboard against the leg.

INFORMATION: The installation position of the support screw and the lock nut varies depending on the shape of the plough body.

6. Secure the support screw 6 with the lock nut 7.





6.3.11 Adjusting the skimmer

The skimmer has the following setup options:

- Working depth
- Stalk position
- Projection angle

Working depth



Target:

- The required working depth of the skimmer 1 is approx. 5 to 10 cm.
 - For a plough working depth of 25 cm, this results in a distance
 (skimmer point to plough body point) of approx. 15 to 20 cm.
- Side distance to the landside of the plough body: approx. 2 to 3 cm



1. Unlock the pin 2.

CAUTION: Risk of crushing If the pin is pulled out, the skimmer can fall down.

- Ensure the skimmer CANNOT fall down: Hold the skimmer with one hand until the skimmer has been secured to the stalk again with the pin.
- 3. Pull out the pin.
- 4. Adjust the required working depth:
 - Select the required hole 4 on the stalk 5.
- 5. Insert the pin 2 in the selected hole.

6. Secure the pin with linch pin 3.

Stalk position



To optimise the position of the skimmer for the respective operating conditions: Change the stalk position.

- 1. Undo the bolted connections 6.
- 2. Move the stalk to the required position.

Changing the stalk position	Effects
To the rear c	 More free space between the skimmer and the plough body in front of it
To the front 🔹	 More free space between the skimmer and the respective plough body (prevents, e.g. stones becoming jammed)

3. Tighten the bolted connections 6.

Projection angle



In the standard version, the projection angle of the skimmer cannot be changed.

Side distance:

In conjunction with the projection angle setting, three different positions a, b, c for installing the swivelling bracket 7 on the bracket a can be selected. This enables optimised adjustment of the skimmer, e.g. for combined use with disc coulters.



Projection angle:

- 1. Release and pull out the pin 10.
- 2. Swivel the skimmer 1 to the required position.
- 3. Swivel the lug 9.
 - Align the holes in the lug and the swivelling bracket .



- 4. Connect the lug and the swivelling bracket with the pin 10.
- 5. Secure the pin with linch pin 11.

6.3.12 Adjusting the disc coulter



The disc coulters have been adjusted for operation at the factory. Subsequent adjustments for the disc coulters are only necessary when the setup state is changed.

The disc coulters offer the following adjustment options:

- Working depth
- Side distance
- Swivel limit



DANGER

Stored mechanical energy

Spring-loaded disc coulters are preloaded. Uncontrolled release of mechanical energy accelerates components like a projectile.

After each adjustment:

- Retighten the loosened bolted connections.
- Check whether the disc coulters can oscillate freely when viewed in the direction of travel.
- NEVER remove the retaining ring 4 from springloaded disc coulters.



Target:

The working depth **o** of the disc coulter: between 7 cm and 12 cm



- 1. Undo the screw 2.
- 2. Swivel the coulter arm **1** to the required working depth.
- 3. Retighten the screw 2.







Spring-loaded disc coulter:

- 1. Undo the screw.
- 2. Swivel the coulter arm to the required working depth.
 - Ensure that the gearing of the coulter arm and the adjacent Hirth-type bracket mesh exactly.
- 3. Retighten the screw.

Side distance



Targets:

- Disc coulters cut 2...3 cm wider than the trailing tools.
- Disc coulters run parallel to the landside of the plough body.
- Side distance s to the landside of the plough body: approx. 2...3 cm
- Side distance s to the landside of the plough body in combination with skimmers: approx. 2...5 cm



Rigid disc coulter

The side distance to the landside of the plough body is adjusted by swivelling the coulter stalk **3**.

- 1. Undo the screw 2.
- 2. Swivel the coulter stalk in the slot a until the required position of the coulter disc 1 has been reached.
- 3. Retighten the screw 2. 4 Tightening torques, page 103



Spring-loaded disc coulter

Swivel limit

Targets:

- Disc coulters run parallel to the landside of the plough body.
- Side distance to the landside of the plough body: approx. 2 to 3 cm (when swivelled)
- Disc coulters must not collide with the skimmers when swivelling them in.

The lateral swivel area of the disc coulter **1** is limited by the adjusting piece **2**.

- 1. Undo the screw 3.
- 2. Turn the adjusting piece **2** until the required position has been reached.
- 3. Retighten the screw 3. Strightening torques, page 103


Disc coulter next to skimmer equipment

- 1. Swivel the disc coulter 1 towards the skimmer 4.
- 2. Limit the swivel area with the adjusting piece 2 up to this point.



Disc coulter in front of skimmer equipment

Adjust the adjusting piece 2 to ensure the swivelled in disc coulter
 is facing the point of the skimmer 4.



Adjust the adjusting piece 2 to ensure the swivelled in disc coulter
 1 is facing the point 5 of the plough body.

6.3.13 Adjust the release force of the mechanical overload safety device

The release force of the mechanical overload safety device depends on the prestressing of the spring packages. When an obstacle is encountered, the plough body avoids it by moving upwards.

The release force of the mechanical overload safety device is set in the factory.



If the mechanical overload safety devices are released without obstacles: Increase the prestressing of the spring packages.

- Screw in the adjusting screws 1 clockwise.
 - Adjust all the spring packages 2 by the same amount.
 - **WARNING:** Replace faulty tension rods **immediately**.

6.3.14 Adjusting the release force of the hydraulic overload safety device

Operating pressure

With the operating pressure, the user can set when a plough body will move upwards or to the side to avoid an obstacle.

The operating pressure to be set depends on the soil conditions.

Minimum operating pressure	125 bar
Maximum operating pressure	200 bar
Shallow, light soils	Low operating pressure
Difficult soil conditions	High operating pressure

INFORMATION

In order to protect the hydraulic system, the plough and the tractor:

- Work with the lowest operating pressure possible.

Adjusting the standard version



- 1. Open the shut-off valve 1 on the headstock for the overload safety device.
 - \Rightarrow The ball valve is in the direction of flow.
- 2. Read the operating pressure at the pressure gauge.
- 3. Set the desired operating pressure using the tractor control unit.

Additional control unit on the tractor.	
"P" position	Reduce pressure.
"T" position	Increase pressure.

- 4. Close the shut-off valve on the headstock for the overload safety device.
 - \Rightarrow The ball valve is perpendicular to the direction of flow.

Adjusting the comfort version



The comfort version saves the minimum operating pressure (\geq 125 bar) and the maximum operating pressure (\leq 200 bar). When working the user can set any desired pressure between these two values.

- 1. Connect the adjusting valve unit 1 to an additional tractor control unit.
- 2. Switch the additional control unit to the "T" position for a few seconds.
 - The maximum operating pressure is built up.
- 3. Read the maximum operating pressure on the pressure gauge 4.
- 4. Set the desired maximum operating pressure.
 - Increase the maximum operating pressure: Turn the rotary knob ² clockwise.
 - Reduce the maximum operating pressure: Turn the rotary knob ² anticlockwise.
- 5. Switch the additional control unit to the "P" position for a few seconds.
 - The minimum operating pressure is built up.
- 6. Read the minimum operating pressure on the pressure gauge 4.

- 7. Set the desired minimum operating pressure.
 - Increase the minimum operating pressure: Turn the rotary knob 3 clockwise.
 - Reduce the minimum operating pressure: Turn the rotary knob³ anticlockwise.

INFORMATION

During working switch the control unit of the three-point linkage to the float position. If several plough bodies are released simultaneously, overload protection is otherwise not guaranteed.

Set the intermediate values during working:

- 1. Switch the additional unit to the desired direction.
- 2. Read the operating pressure at the pressure gauge.
- 3. Switch the tractor control unit to the float position.

6.4 Working with the machine

6.4.1 Standard procedure

- 1. Position the tractor-machine combination.
- 2. Dismantle the lighting equipment.
- 3. Set the machine.
- At a machine with a hydraulic overload safety device that is equipped with a comfort valve: Switch the tractor control unit to the float position.
 - ⇒ Overload protection is also guaranteed if several plough bodies are released simultaneously.
- 5. During forward travel, insert the machine into the soil.
- 6. Soil cultivation:
 - Drive the tractor over the land worked on.
 - Keep to the recommended operating speed.
 - Adapt the speed to the actual terrain.
 - Observe the working result.
 - Observe faults:
 - Blockages
 - Triggered overload safety devices
 - Sheared off shear bolts
 - Monitor hazardous areas. If necessary, stop and discontinue soil cultivation.
- 7. When reaching the headland: Lift the machine.
- 8. Once the machine has been lifted out, initiate turning at the headland.
- 9. Do not reinsert the machine until driving straight forward.
- 10. On completion of soil cultivation: Clean the machine and remove coarse dirt.
- 11. Prepare the machine for road travel.

6.4.2 Driving on the headland

1. Before the headland: Lift the machine fully.

ATTENTION: If parts of the machine come into contact with the ground, the machine components may be damaged when turning.

- On the headland: Adapt the driving speed to the actual ground and soil conditions.
- After the headland: Do not lower the machine until driving straight forward.

7 Cleaning and care

7.1 After working in the field

- Remove soil from the implement.
 - \Rightarrow No soiling of roads: Soil remains in the field.

7.2 Cleaning with high-pressure cleaner

The user can clean the implement with the high-pressure cleaner.

When cleaning, the user must observe the following:

ATTENTION

Damage due to cleaning with a high-pressure cleaner

Components may be damaged when cleaning with a high-pressure cleaner.

When cleaning with a high-pressure cleaner:

- Observe the position and meaning of the labels.
- Make sure that no water enters the electrical, electronic and hydraulic components.
- Do NOT point the jet of the high-pressure cleaner directly at the bearings or seals.

8 Detaching

8.1 Removing the machine

Preconditions:

- $\sqrt{\ }$ Parking space: Solid, level floor that offers sufficient carrying capacity
- $\sqrt{}$ Subsoilers are in the transport position.
- $\sqrt{}$ The implement is parked in the right-turning operating position.
- \checkmark $\,$ Prior to extended breaks or winter storage: Clean and lubricate the machine.
- 1. Secure the tractor and the machine to prevent them from rolling away.

WARNING: When standing between the tractor and machine, there is a risk of the tractor rolling away or of sudden machine movements.

- 2. Switch the hydraulics of the three-point linkage to position control for detaching.
- 3. Lower the machine.
- 4. Relieve the top link.
- 5. Uncouple the headstock from the top link.
- 6. Lift the implement approx. 5...10 cm using the three-point linkage.
- 7. Fold down the stand.
- 8. Lower the lower link until the stand is on the ground.
- 9. Unlock the cross shaft in the lower links.
- 10. Disconnect the lower link of the tractor and the cross shaft.

Follow the operating instructions for the tractor.

- 11. Drive the tractor about 40 cm away from the implement.
- 12. Secure the tractor against rolling away.
- 13. Depressurise the additional control units of the hydraulic system.

WARNING: Hydraulic oil under pressure may squirt out of the hydraulic hoses when they are connected and disconnected.

- 14. Uncouple the hydraulic hoses from the tractor.
- 15. Slide protecting caps onto the hydraulic connections.
- 16. Hook the hydraulic hoses into the hose cabinet.
- 17. Uncouple the electrical lines from the tractor.
- 18. Position the protecting caps on the connectors of the electric lines.

- 19. Drive the tractor away from the machine.
 - \Rightarrow The machine is detached.

9 Maintenance and repair work

9.1 Maintaining the machine properly

Personnel

Certain activities, e.g. working on hydraulic hoses, should only be carried out by service personnel.

These activities are marked with the symbol *(***)** and in the maintenance schedule in the SERVICE PERSONNEL column.

9.1.1 Preparations

- 1. Park the machine.
- 2. Secure the machine to prevent it from rolling away.
- When working on folding machines: Fold out the folding parts of the machines or secure them against folding out.
- 4. When working on raised machines: Secure the machines against lowering (e.g. with support elements).
- 5. Remove the ignition key.
- 6. Notify other people of the maintenance work.

Necessary deviations from this procedure are described in the respective maintenance chapters.

9.1.2 During the maintenance and repair

To prevent accidents or injuries:

- ▶ Wear protective equipment.
- Use auxiliary equipment, e.g.:
 - Suitable tools
 - Climbing aids
 - Supporting elements
- For dismantling and mounting heavy components: Use hoisting gear.
- Check nuts and screw heads etc. for wear and tear. Consult a specialist if necessary.
- Follow maintenance instructions.

9.2 Maintenance

9.2.1 Maintenance schedule

Chap.	Task to execute	Before the season	After cleaning	After the first 2 operating hours	Every 10 operating hours	Every 20 operating hours	Every 50 operating hours	Every 100 operating hours	Every 200 operating hours	Every 4000 operating hours	Annually	At the latest 6 years after date of manufacture	SERVICE PERSONNEL	Page
9.2.3	Checking the top link pin	•					•							79
9.2.4.1	Check tyres				•									79
9.2.4.1	Check air pressure				•									79
9.2.4.1	Check the wheel nuts	•		•			•							80
9.2.4.2	Checking the bolted connections			•										80
9.2.5	Checking hydraulic hoses				•									80
9.2.5	Replacing hydraulic hoses											•	•	80
9.2.5	Check hydraulic connections				•									81
9.2.6	Checking connector plugs and lines	•					•							81
9.2.7	Check soil cultivation implements				•									81

9.2.2 Notes on bolted connections

Generally, with the exception of wheel nuts, no maintenance work is required on bolted connections.

The category of the bolted connections determines whether users are allowed to carry out work on bolted connections themselves or must assign service personnel.

Three categories of bolted connections are differentiated:

- Bolted connections on which users are not allowed to carry out any work.
- Bolted connections with special tightening torques
- Bolted connections with standard tightening torques

♥ The bolted connections are listed in *Tightening torques* starting on page *103*.

Bolted connections for service per- sonnel	 These include: Glued in bolted connections Bolted connections with very high tightening torques Bolted connections that require special tools.
	Only service personnel may work on these bolted connections. In case of problems with these bolted connections (loosened connections, damage), assign service personnel immediately.
	The threadlocker, tightening torques and special tools to be used are shown in the service documentation.
	The appendix "Bolted connections for service personnel" is used to identify these bolted connections.
Bolted connections with special tight- ening torques	Bolted connections on which the user may carry out work while observing the special tightening torques. The tightening torques differ from the standard tightening torques.
	The appendix "Bolted connections with special tightening torques" is used to identify these bolted connections.
Bolted connections with standard tightening torques	This includes all other bolted connections. The user may loosen these bolted connections and tighten them to standard tightening torques. <i>S Appendix B 'Tightening torques' on page 103</i>

9.2.3 Tractor connection

Checking the top link pin



- 1. Visual inspection of the top link pin for:
 - Damage
 - Wear
- 2. Replace damaged or worn top link pins.

9.2.4 Frame

9.2.4.1 Tyres and wheels

Check tyres

- Visual inspection
 - Damage
 - Wear

Replace damaged tyres immediately.

Check air pressure



WARNING

Risk of accident due to incorrect air pressure

Excessive air pressure in the tyres may cause the them to burst. Insufficient air pressure can lead to overloading of the tyres. This will have a negative influence on accurate follow-on of the implement. This may result in accidents with injuries or death of persons or damage to the implement.

- Do NOT use the assembly air pressure stated on the tyres.
- Set air pressure according to the details in the technical data.
- Check air pressure Correct according to the details in the technical data. Chapter 12.9 'Tyres and wheels' on page 95

Check the wheel nuts

Tighten the wheel nuts on the implement to the respective tightening torque.

9.2.4.2 Bolted connections

Checking the bolted connections

Bolted connections on which adjustments have been made:

- 1. Check and retighten the bolted connections.
- 2. If necessary, secure the bolted connections with locking compound.

9.2.5 Hydraulics

Checking hydraulic hoses

- 1. Check hydraulic hoses for damage and leakages.
 - ➡ ♀ ♀ Replace damaged or defective hydraulic hoses immediately.
- 2. Check date of manufacture of the hydraulic hoses.
 - ⇒ 🥱 Have hydraulic hoses replaced at the latest after 6 years.

Replacing hydraulic hoses

Personnel:

Service personnel

- Replace hydraulic hoses every 6 years (according to date of manufacture).
 - ⇒ Only use hydraulic hoses approved by the manufacturer, see spare-parts list.

Check hydraulic connections

- 1. Check the hydraulic connections for the following when pressureless:
 - Damage
 - Leakages
 - Repair damaged or leaking hydraulic connections immediately or have them replaced.
- 2. Connect the hydraulic connections pressureless.
- 3. Check leak tightness of the hydraulic connections under pressure.

9.2.6 Electrics

Checking connector plugs and lines

- Perform visual inspection of the connector plugs and cables.
 - Watch for bent or broken contact pins in the plugs.
 - Watch for exposed places in cables.

9.2.7 Checking the soil cultivation tools

Check soil cultivation implements

- Visual inspection
 - Damage
 - Wear

Replace damaged or worn soil cultivation implements.

9.3 Lubricating

9.3.1 Lubrication schedule

INFORMATION

The lubrication points are colour coded on the machine.

Chap.	Task to execute	Before the season	After cleaning	Every 10 operating hours	Every 20 operating hours	Every 50 operating hours	Every 100 operating hours	Page
9.3.2	Lubricate components at the headstock					•		83
9.3.2	Lubricating the components at the Optiquick adjustment centre	•		•				83
9.3.2	Lubricate slotted nuts on the leg brackets			•				84
9.3.2	Lubricating the swivel bearing of the wheel	•				•		85
9.3.2	Lubricate wheel bearing	•					•	85
9.3.3	Grease top link pin	•	•		•			86
9.3.3	Grease piston rods	•	•					86
9.3.3	Grease surfaces	•	•					86

9.3.2 Lubricating components via grease nipples

Lubricate components at the headstock



1. 1 Lubricate grease nipple on the turnover device 1.



- 2. 2 Lubricate grease nipple on the pin 1.
- 3. 2 Lubricate grease nipple on the hydraulic ram of the turnover device 2.

Lubricating the components at the Optiquick adjustment centre



Lubricate two grease nipples and 2 each on the pins of the link.



- Up to two turnbuckles can be installed on the implement for mechanical front furrow adjustment and mechanical frame swing-in.
- Lubricate two grease nipples on the turnbuckle 1.



- A hydraulic ram is installed for hydraulic frame swing-in.
- Lubricate two grease nipples on the pins 1 and 2.



- A hydraulic ram is installed for hydraulic front furrow adjustment.
- ▶ Lubricate two grease nipples on the pins 1 and 2.

Lubricate slotted nuts on the leg brackets



Lubricate 2 slotted nuts 1 (top and bottom) at each leg bracket using 1 grease nipple.

Lubricating the swivel bearing of the wheel



Lubricate the lubricating points 1 and 2 at the swivel bearings.



Lubricate wheel bearing



Lubricate 1 lubricating point at the wheel bearing 1.

9.3.3 Grease components

Grease top link pin



Dismantle, grease and reassemble the top link pin.

Grease piston rods

▶ Grease piston rods with an acid-free grease.

Grease surfaces

► Grease uncoated surfaces that can rust.

10 Troubleshooting and error correction

10.1 Find and eliminate errors correctly

10.1.1 Prior to troubleshooting at the implement

- 1. Park the tractor-device combination.
- 2. Secure the tractor-device combination to prevent it from rolling away.
- 3. When working on the folding implement: Fold out the folding parts of the implements or secure them against folding out.
- 4. When working on an excavated device: Secure the implement against sinking.
- 5. Remove the ignition key.

Necessary deviations from this procedure are described in the respective troubleshooting chapters.

10.1.2 When troubleshooting and eliminating errors

To prevent accidents and injuries:

- ► Wear protective equipment.
- Use the following instruments:
 - Suitable tools
 - Climbing aids
 - Supporting elements
- For dismantling and mounting heavy components: Use hoisting gear.
- ► To avoid slipping of tools:
 - Use aids to reduce the amount of force required, e.g. extensions.
 - Check nuts and screw heads etc. for wear and tear. Consult a specialist if necessary.
- Observe troubleshooting instructions.

10.2 Error - Cause - Remedies at a glance

Penetration and depth control of the plough, slippage

Fault description	Cause	Ren	nedy
Plough fails to remain in the soil.	Penetration force is too low.	•	Penetrate soil with body: Reduce the distance of the point to the plough frame (max. 2 cm).
Plough fails to penetrate the soil.	Pitch angles of shares are too small.	•	Switch off body: Increase the distance of the point to the plough frame (max. 2 cm).
	Top link is mounted too high on the headstock.	-	Mount the top link at a lower position on the headstock.
Excessive slippage on the tractor.	Tractor hydraulics are not adjusted correctly. Plough weight rests on the touch wheel.	-	Adjust the tractor hydraulics: Transfer sufficient plough weight to the tractor.

Miscellaneous

Fault description	Cause	Remedy
Plough body shear bolt shears off fre- quently.	An incorrect shear bolt has been installed.	Use original shear bolts.

INFORMATION

To prevent the thread from being in the shear area: Always install the shear bolt head on the side of the plough facing the ploughed soil.

10.3 Replacing the shear bolt

WARNING

Risk of impact

Plough bodies release upwards when the shear bolt is overloaded. Sudden swinging back of the body can lead to serious personal injury.

All the implements are equipped with shearing protection.

- NEVER stay in the release area of plough bodies.
- Always keep a safe distance.



WARNING

Risk of crushing

Moving parts in the area of the shearing protection may cause crushing and shearing injuries.

- Keep hands and fingers away from moving parts.



Shearing protection, standard

Broken shear bolt: Replace the shear bolt **1** immediately.

- 1. Do not lift out the implement for the time being and leave it in the soil.
- 2. Remove remaining pieces of the shear bolt 1.
- 3. Stand behind the plough body as seen from the direction of travel.

A WARNING: Risk of impact due to moving components

- 4. Undo the screw 2 on the leg.
- 5. Lift the implement until the plough body swings back into the operating position.
- 6. Have the new shear bolt at the ready.
 ♦ Chapter 12.10 'Permitted shear bolts' on page 95

ATTENTION: Only use shear bolts that meet the specified dimensions and quality. Only these bolts provide effective protection against damage.

7. Stand behind the plough body as seen from the direction of travel.



8. Swivel the plough body all the way back into the operating position by hand.

▲ WARNING: Risk of crushing due to moving components Keep hands and fingers away from the area of the stalk and the leg bracket.

- 9. Visual inspection: Corresponding holes for the shear bolt
- 10. Retighten the shear bolt **1** and the screw **2**.



Shear bolt 1 and screw 2 for the hydraulic overload safety device



 Shear bolt for automatic mechanical overload safety device "Tandem"

11 Shutdown and disposal

11.1 Shutdown

When the implement can no longer be used, it is dismantled and broken down into its components. Special knowledge is required to dismantle the implement.

CAUTION

Risk of accidents due to discharge of stored energy

Springs are under tension. Hydraulic components are pressurised.

- Assign qualified specialists to dismantle them.

11.2 Disposal

Special knowledge is required for disposal.

ENVIRONMENTAL PROTECTION

- Return metal components and plastic components to the flow of potentially recyclable resources.
- Dispose of auxiliary materials and operating materials in an environmentally responsible manner.
- If appropriate assign qualified specialists for disposal.

12 Technical data

12.1 Dimensions

Specification	Number of plough bodies					
	3	3+1 4	4+1 5	6		
Transport length, max. [mm]	4000	5000	6000	7000		
Transport length, min. [mm]	3000	4000	4900	5800		
Transport width, max. [mm]	2200	2200	2300	2400		
Transport width, min. [mm]	1700	1700	1700	1700		
Transport height, max. [mm]	2500	2500	2500	2500		
Transport height, min. [mm]	1700	1700	1700	1700		
Working width of each plough body - Juwel 7 M	300/350/400/450 (with 90 cm interbody clearance)					
approx. [mm]	330/380/440/500 (with 100 cm interbody clearance)					
Working width of each plough body - Juwel 7 M V	300–500 (with 90 cm interbody clearance)					
approx. [mm]	300-5	50 (with 100 cm	interbody clea	rance)		
Distance from centre of gravity [mm]		16002400	19002900	2400-3200		

For determining the actual dimensions: Measure Take into account applicable national transport width regulations.

12.2 Machine weights

Specification	Number of plough bodies					
	3	3+1 4	4+1 5	6		
Drawbar load, max. [kg]	1800	2200	1100	1200		
Drawbar load, min. [kg]	300	500	800	900		
Axle load, max. [kg]	1400	1700	2100	2000		
Axle load, min. [kg]	-	-	800	900		
Gross weight, max. [kg]	1800	2200	2600	2800		
Gross weight, min. [kg]	800	1100	1400	1700		

For determining the actual weights: Weigh

12.3 Permissible mass and loads

The maximum permissible total mass, drawbar load and axle load of the machine are listed on its type plate.

If the load capacities of the wheels are lower than the permissible axle loads, the permissible axle load is limited to the permissible load capacity of the wheels.

INFORMATION

Observe the national regulations / laws and, if necessary, approval documentation.

12.4 Required drawbar load

Specification	Value
Required drawbar load	At least 4% of the weighed machine weight or 500 kg

12.5 Performance data

Permitted tractor power

		Number of p	lough bodies	
	3	3+1 4	4+1 5	6
Permitted tractor power [HP]	70100	80130	90160	120200
Permitted tractor power [kW]	5174	5996	66118	88147

Juwel 7 M	maximum permitted transport speed
With depth and transport wheel on even road sur- face	40 km/h
In uneven terrain and on roads with potholes	Significantly reduced speed to avoid damage to the implement.

12.6 Connection data

12.6.1 Electrical connections

Voltage sources

Consumer	Voltage [Volt]	Direct connection to the tractor battery	Power socket
Lighting equipment	12	-	According to DIN ISO 1724
Lighting equipment (Canada, USA)	12	-	According to ISO 1185

Voltage tolerance range: 10 V to 15 V

12.6.2 Hydraulic connections

Implement without auxiliary operating element

Hydraulic connections and control units

Consumer	SA	DA	Colour	Code
Hydraulic overload safety device - comfort ver- sion	-	•	White	P0 / T0
Plough rotation device (including hydraulic frame swing-in, if available)	-	•	Red	P1 / T1
Hydraulic working width adjustment (version V)	-	•	Green	P2 / T2
Hydraulic depth adjustment - depth and trans- port wheel	-	•	Blue	P3 / T3
Attachment arm for furrow press, connected directly to the control unit	•	-	Black	P4
Hydraulic front furrow width adjustment	-	•	Yellow	P6 / T6
Swing furrow press in and out	-	•	Yellow	P15 / T15

EW = single acting control unit DW = double acting control unit

12.7 Noise, airborne sound

Noise level of the implement while working

≤70 dB(A)

12.8 Operating materials

Operating material	
Hydraulic oil [type]	HLP 46 according to ISO 4406 21/19/16
Grease [type]	High performance lubrication grease with MoS ₂ solid lubricants (e.g. Castrol Molub-Alloy 370-2) Turnover device: Olystamoly 2

12.9 Tyres and wheels

Depth wheel variants	Size
Pendulum wheel, hydraulically dampened	10.0/75–15.3, 770 mm x 277 mm
Pendulum wheel, hydraulically dampened	340/55–16, 770 mm x 340 mm
Depth and transport wheel, hydraulically dampened	10.0/75–15.3, 770 mm x 277 mm
Depth and transport wheel, hydraulically dampened	340/55–16, 770 mm x 340 mm
Depth and transport wheel, hydraulically dampened, working depth hydraulically adjustable	340/55–16, 770 mm x 340 mm

Juwel 7 M

Tyre size	Manufac- turer	Profile	Ply rating [PR]	Load + speed index	Air pressure [bar]
340/55–16	Trelleborg	AW 305	-	140 A8	4.0
10.0/75–15.3 (touch wheel)	BKT	AW 702	18 PR	135 A8	7.1

The PR number, the load and speed index and the profile designation have been vulcanised in the tyres.

12.10 Permitted shear bolts

Machine	Permitted shear bolts
Juwel 7 M	M14x75 LS 56x15 - 8.8
Juwel 7 M V	
Juwel 7 M X	M14x70 LS 51x15 - 10.9 Zn

✤ Tightening torques, page 103

12.11 Connecting equipment at the machine

Permitted categories for cross shafts and top link pins

Cross shaft category 2

Cross shaft category 3N

Cross shaft category 3

Top link pin – category 2 (Ø 26 mm]

Top link pin – category 3 (Ø 32 mm]

th For determining the category of cross shaft or lower link connection: See annex, *Cross shaft overview* on page *117*.

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Appendix

A Type plate variants

- 1 Series
- 2 Type designation
- 3 Serial number
- 4 Year of manufacture
- 5 Vehicle class, subclass, speed index
- 6 EU type approval number
- 7 Vehicle identification number. The vehicle identification number is also engraved in the frame near the type plate.
- 8 Permitted gross weight [kg]*
- 9 Permissible drawbar load [kg] (axle 0)

- 10 Permissible axle load [kg] (axle 1)
- 11 Permissible axle load [kg] (axle 2)
- 12 CE label
- 13 EAC label
- 14 Company name and address of the manufacturer
- 14a Address of the manufacturer
- 15 Company logo
- 16 Manufacturer
- 17 Date of homologation
- 18 Type / Equipment / Version

*For implements with an EU type-approval number, the permissible gross weight is equal to the sum of the permissible axle loads.

Type plates in German

LEMKEN GmbH & Co. KG Weseler Straße 5 46519 Alpen - Germany	15 GLEMKEN 16
13 Baureihe	6
Тур 2	8 KG
Serien-Nr. 3	9 A-0 KG
8 Baujahr 4	11 A-2 KG

Type plates in French

Z LEWKEN 465	19 Alpen - Germany 14a		l	
Marque 16 1	6	PTAC	8	kg
Type/variante/version 1	8	Masse max. essieu	10	kg
Série	1	Masse max. attelage	9	kg
No. d'identification	3	Année de fabrication	4	
Désignation	2	Réception par la DREAL du Centre le	17	
B Tightening torques

B.1 General information about bolted connections

- 1. Identify screw connections.
 - Check identification marking on the screw and nut if necessary.
 - Check the description in the spare-parts list.
- 2. Secure screw connections with once loosened self-locking nuts against self-loosening. Use one of the following measures:
 - Use new self-locking nuts.
 - Use lock washers.
 - Use locking compound (e.g. Loctite).

INFORMATION

The following tightening torques refer to screw connections not specifically mentioned in these operating instructions. Special tightening torques are indicated in the text.

B.2 Screws and nuts made of steel

	Tighte according	ening torqu to strengtl	e [Nm] n category
Diameter	8.8	10.9	12.9
M6	9.7	13.6	16.3
M8	23.4	32.9	39.6
M10	46.2	64.8	77.8
M12	80.0	113	135
M14	127	178	213
M16	197	276	333
M20	382	538	648
M24	659	926	1112
M30	1314	1850	2217

B.3 Screws and nuts made of V2A

Diameter	Tightening torque [Nm]
M4	1.37
M5	2.7
M6	4.6
M8	11
M10	22
M12	39
M14	62
M16	95
M18	130
M20	184
M22	250
M24	315
M27	470

B.4 Wheel bolts and wheel nuts

Diameter	Tightening torque [Nm]
M14	125
M18x1.5	290
M20x1.5	380
M22x1.5	510

C Bolted connections

C.1 Bolted connections for service personnel

No work by the user required

The service personnel will find further notes and information on tightening torques, locking compounds and tightening procedures in the service documentation.



9 Support tube of link bearing	
Support tube	D45/M75 Zn
	D50/M80 Zn
	D60/M95
	D112.9 Zn
Slotted nut	M75x3 - KM 15 Zn
	M80x2 - KM 16 Zn
	M95x2 - KM 19 Zn
	M100x2 - KM 20 Zn



9 Turnover device bearing of mounted plough	
Turnover shaft	E90
	E100
	G/E 120
	M130
Slotted nut	M80
	M90
	M100
	M110

C.2 Bolted connections with special tightening torques



Frame extension	
External thread	Hexagon bolt M16 10.9
Internal thread	Locknut NM16-8
Tightening torque	270 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-



Bearing plates on basic frame	
External thread	Hexagon bolts M20x1.5 10.9
Internal thread	Hexagon nut M20 DIN 934-10 Zn
Tightening torque	400 Nm
Locking compound	Micro-encapsulated bolts or WEICONLOCK AN 302-59
Tightening procedure	Impact driver
Notes	-



Leg brackets	
External thread	Hexagon bolts M20x1.5 10.9
Internal thread	Hexagon nut M20 DIN 934-10 Zn
Tightening torque	400 Nm
Locking compound	Micro-encapsulated bolts or WEICONLOCK AN 302-59
Tightening procedure	Impact driver
Notes	-



Control rod	
External thread	Hexagon bolts M16x50ls 10.9 Zn
Internal thread	Hexagon nut M16 DIN 934-8 Zn
Tightening torque	270 Nm
Locking compound	WEICONLOCK AN 302-59
Tightening procedure	Impact driver
Notes	-



[ERROR: Missing definition for variable "Hydr. Überlastsicherung"!]: Pressure cylinder connection		
External thread	Hexagon bolts M16x75 12.9 Zn	
Internal thread	Hexagon nut M16 DIN 934-12 Zn5	
Tightening torque	320 Nm	
Threadlocker	-	
Tightening procedure	Ratchet wrench	
Notes	-	



Share wing attachment	
External thread	M10x33 12.9
Internal thread	Nut M10 Zn
Tightening torque	60 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-



Mouldboard attachment	
External thread	M10x35 8.8
Internal thread	Nut M8 Zn
Tightening torque	40 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	



Plough beam of stalk plate	
External thread	Hexagon bolts M20x80 10.9 Zn
Internal thread	Locknut NM20 DIN 985-10 Zn
Tightening torque	500 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-



Plough beam of stalk plate	
External thread	Hexagon bolts M16x70 12.9 Zn
Internal thread	Hexagon nut M16 DIN 934-12 Zn
Tightening torque	330 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	



Share wing / point attachment	
External thread	Countersunk screws M12 12.9
Internal thread	MU 10 Zn
Tightening torque	90 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-



Support	
External thread	Countersunk screws M16 8.8
Internal thread	Locknut M16 8 Zn
Tightening torque	200 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-



Mouldboard sla	it support attachment
----------------	-----------------------

External thread	Countersunk screws M12 12.9
Internal thread	Locknut M12 8 Zn
Tightening torque	80 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-



Mouldboard attachment	
External thread	Countersunk screws M10 12.9
Internal thread	Nut M10 10 Zn
Tightening torque	60 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-

Bolted connections



Landside wedge, sword coulter attachment

External thread	Countersunk screws M10 12.9
Internal thread	Nut M10 10 Zn
Tightening torque	60 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-



Mouldboard slat attachment

External thread	Countersunk screws M10 12.9
Internal thread	Locknut M10 8 Zn
Tightening torque	40 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-



Bearing plates on basic frame	
External thread	M20x1.5xls - 10.9 Zn
Internal thread	M20x1.5 DIN 934-10 Zn
Tightening torque	400 Nm
Locking compound	Micro-encapsulated bolts or WEICONLOCK AN 302-59
Tightening procedure	Impact driver
Notes	-



Support for rocker arm basic frame	
External thread	M24x*** - 10.9 Zn D931
Internal thread	M24 934-8 Zn
Tightening torque	400 Nm
Locking compound	WEICONLOCK AN 302-59
Tightening procedure	Impact driver
Notes	-

Bolted connections



Swivel bracket leg bracket bearing External thread Flange bushing M60x2 Znph Internal thread Slotted nut M60x2 D80x2 4Zn Tightening torque 270 Nm Locking compound WEICONLOCK AN 302-59 Tightening procedure Impact driver Notes



Leg bracket bearing	
External thread	Pin D50 M20x1.5
Internal thread	Slotted nut M30x1.5
Tightening torque	270 Nm
Locking compound	WEICONLOCK AN 302-59
Tightening procedure	Impact driver
Notes	-



Frame extension	
External thread	Hexagon bolts M16x55ls 30x20-10.9 Zn
Internal thread	Locknut NM16-8 Zn DIN 985
Tightening torque	270 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-



Control rod	
External thread	Hexagon bolts M16x50ls 10.9 Zn
Internal thread	Hexagon nut M16 DIN 934-8 Zn
Tightening torque	270 Nm
Locking compound	WEICONLOCK AN 302-59
Tightening procedure	Impact driver
Notes	-



OptiStone: Stalk plate bearing					
External thread	Pin D40/ M30x1.5 Cr				
Internal thread	Slotted nut M30x1.5				
Tightening torque	200 Nm				
Locking compound	WEICONLOCK AN 302-59				
Tightening procedure	Torque wrench				
Notes	-				



Adjusting piece attachment	
External thread	Hexagon bolts M16x65 - 8.8 Zn DIN 931
Internal thread	Locknuts NM16-8 Zn DIN 985
Tightening torque	200 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-



Cross shaft plate	
External thread	Hexagon bolts M20x65ls - 12.9 Zn
Internal thread	Hexagon nuts M20 DIN 934-8 Zn
Tightening torque	400 Nm
Locking compound	WEICONLOCK AN 302-59
Tightening procedure	Impact driver
Notes	-



Adjusting piece attachment	
External thread	Hexagon bolts M16x65 - 8.8 Zn DIN 931
Internal thread	Locknuts NM16-8 Zn DIN 985
Tightening torque	200 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-

Bolted connections



Wheel arm of pendulum wheel					
External thread	Hexagon bolts M20x1.5 - 10.9				
Internal thread	Hexagon nuts M20x1.5 - 10 Zn				
Tightening torque	400 Nm				
Locking compound	WEICONLOCK AN 302-59				
Tightening procedure	Impact driver				
Notes	-				



Pendulum wheel bearing plate	
External thread	Hexagon bolts M20x1.5 - 10.9
Internal thread	Hexagon nuts M20x1.5 - 10 Zn
Tightening torque	400 Nm
Locking compound	Micro-encapsulated bolts or WEICONLOCK AN 302-59
Tightening procedure	Impact driver
Notes	-



Skim stalk (2)	
External thread	T-head bolts M16
Internal thread	Hexagon nuts M16 DIN 934-8 Zn
Tightening torque	167 Nm
Locking compound	-
Tightening procedure	Impact driver
Notes	-

D Calculating the axle load and ballasting for mounted implements

The calculation of the axle loads and required ballasting is based on data from the operating instructions for the tractor and implement. The result of the calculation is a guide value for an initial assessment of the axle loads and the required ballasting. For exact results weigh the tractor "empty" and "with mounted implement" (tractor, front axle, back axle).

D.1 Data



To calculate axle loads, the following data items are required for each tractor that is used:

- Data from operating instructions for the tractor
- Data from operating instructions for the implement
- Data from measurements on the tractor
- Data from measurements on the tractor/implement combination

Data acquisition for calculating axle loads					
Abbreviation	Value	Unit			
Tractor data from	n the operating instructions or determined by weighing				
$T_{G_{zul}}$	Permissible gross weight of the tractor		[kg]		
T_{V_zul}	Permissible front axle load		[kg]		
T _{H_zul}	Permissible back axle load		[kg]		
TL	Tare weight of the tractor		[kg]		
T _v	Front axle load of tractor when empty		[kg]		
Т _н	Back axle load of tractor when empty		[kg]		
Data from the op	erating instructions for the tractor or from the tyre manufacture	er's documen	tation		
	Permissible tyre load-carrying capacity ² , front axle (per tyre)		[kg]		
	Permissible tyre load-carrying capacity ² , back axle (per tyre)		[kg]		
Data from the operating instructions for the implement and data from documentation for the front weight or rear weight					
G _H	Gross weight ¹ of rear-mounted implement or rear weight		[kg]		
Gv	Gross weight ¹ of front mounted implement or front weight		[kg]		
d	Distance between the centre of the lower link ball and the centre of gravity of the rear-mounted implement or rear weight		[m]		
Data from measu	rements on the tractor/implement combination				
а	Distance between the centre of gravity of the front-mounted implement and the centre of the front axle		[m]		
b	Tractor wheelbase		[m]		
c	Distance between the centre of the back axle and the centre of the lower link ball		[m]		
¹ Determine value	s by weighing.				
² Observe permiss	ible speed and air pressure.				

D.2 Calculations

Perform calculations for each tractor that is used.

Minimum ballasting, FrontG_{Vmin} for $G_{V_{min}} = \frac{G_{H}^{*}(c+d) - T_{V}^{*}b + (0,2*T_{L}^{*}b)}{a+b}$ rear-mounted implement Enter the calculated value in the result table. Minimum ballasting, RearG_{Hmin} for $G_{H \min} = \frac{G_{V} * a - T_{H} * b + (0.45 * T_{L} * b)}{b + c + d}$ front mounted implement Enter the calculated value in the result table. Actual gross weight G_{tat} $G_{tat} = G_v + T_1 + G_H$ Enter the calculated value in the result table. Enter the permissible gross weight (see tractor operating instructions) in the result table. Actual front axle load T_{Vtat} $T_{v tat} = \frac{G_v * (a+b) + T_v * b - G_H * (c+d)}{b}$ Enter the calculated value in the result table. Enter the permissible front axle load (see tractor operating instructions) in the result table. Actual back axle load T_{Htat} $T_{H tat} = G_{tat} - T_{V tat}$ Enter the calculated value in the result table. Enter the permissible back axle load (see tractor operating instructions) in the result table. Front axle load as a percentage $T_{V\%}$ $T_{V\%} = \frac{T_{V tat} * 100}{T_{V}}$ Enter the calculated value in the result table. Tyre load-carrying capacity Permissible tyre load-carrying capacity from the documentation of the tractor manufacturer or tyre manufacturer. Enter twice the value (for 2 tyres) in the result table.

D.3 Results for tractor/implement combination

Create a result table for each tractor that is used:

	Act accordin or m	tual value g to calcu easureme	lation nt	Permitted value according to tractor operating instruc- tions		Double permis- sible tyre load- carrying capacity (2 tyres)		
Minimum ballasting, front ¹	G _{Vmin}		kg			-		-
Minimum ballasting, rear ¹	G _{Hmin}		kg			-		-
Gross weight ²	G _{tat}		kg	\leq		kg		-
Front axle load ^{2, 3}	T _{Vtat}		kg	\leq		kg		kg
Back axle load ^{2, 3}	T _{Htat}		kg	\leq		kg		kg
Percentage of front axle relief $^{4}_{\mathrm{TV\%}}$	20 ≤		%					-

¹ Positive values: required ballasting, negative values: Appropriate ballasting.

² The actual values must be less than or equal to the permitted values.

³ The actual values must be less than or equal to two times the load-carrying capacity of a tyre (2 tyres).

⁴ The front axle load must be at least 20% of the tractor's empty weight.

E Cross shaft overview

To determine the cross shaft or lower link connection:

- Determine the dimensions shown in the sketch on the implement.
- Compare the dimensions with the data in the table.
- The category of the three-point linkage must match with the category of cross shaft or lower link connection.



Tractor power		Catagory	Decignation		Ø7 [mm]	T[mm]	
kW	HP	Category	Designation	C [11111]	۵ ۲ [iiiii]	. []	
30 - 92	40 - 125	2	L2Z2	825	28	390 - 505	
30 - 92	40 - 125	**	L3Z2	965	28		
60 - 185	81 - 251	3N*	L2Z3	825	36.6	390 - 505	
60 - 185	81 - 251	3	L3Z3	965	36.6	480 - 635	
110 - 350	149 - 476	4N*	L3Z4	965	50.8	480 - 635	
110 - 350	149 - 476	4	L4Z4	1166	50.8	480 - 635	
		***	K700	1100	58		

*) Intermediate category according to ISO, e.g. suitable for the use of wide tyres

**) Category with special length: If distance (T) is too large, a mounted implement is not guided well laterally during work. Using a longer cross shaft will optimise guidance of the implement.

*** Special category for lower link balls with diameter 58 mm

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