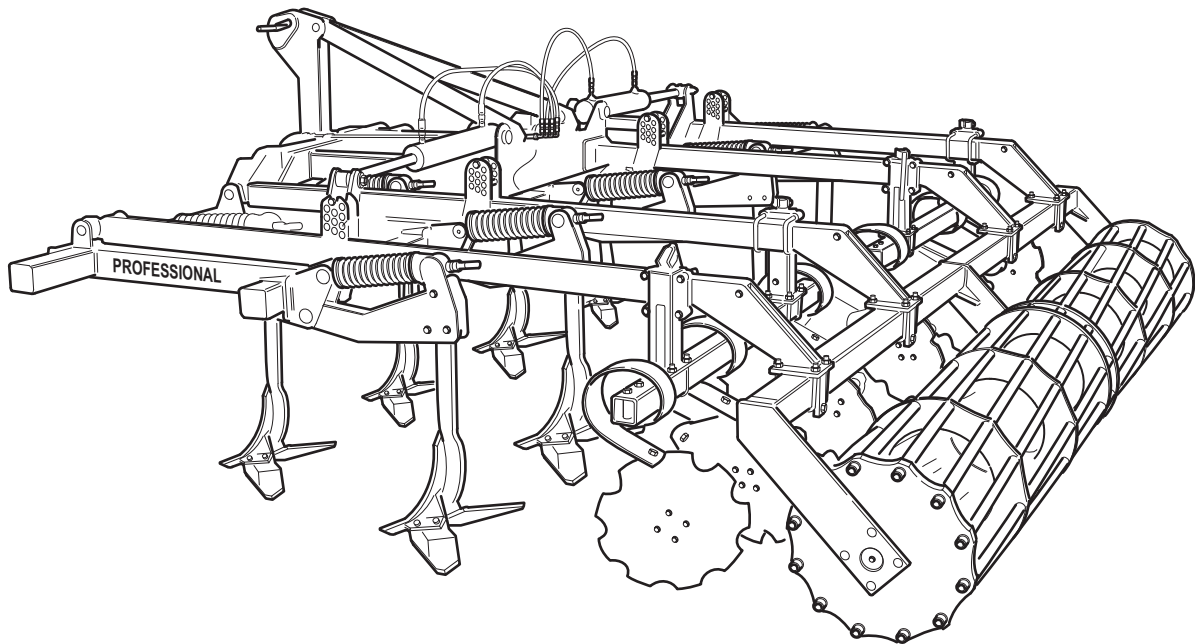


# DELTA



Operating instructions

# Contents

<b>Introduction/Foreword</b> .....	<b>2</b>	<b>Transportation by Road/Traffic Safety</b> .....	<b>19</b>
Product Details .....	2	Traffic safety .....	19
Explanation of the pictograms .....	3	Markings .....	19
<b>Safety</b> .....	<b>4</b>	Transportation width .....	19
General Safety Advice .....	4	General .....	20
Coupling and Uncoupling .....	4	<b>Operation</b> .....	<b>21</b>
Operation .....	4	Setting the working depth of the tines .....	21
Transportation by Road/Transport .....	5	Share Position .....	22
Maintenance .....	5	Setting the working depth of the concave discs .....	23
Hydraulics .....	5	Setting the roller .....	24
Safety decals .....	8	Setting the Overload Protection .....	24
<b>Technical data</b> .....	<b>10</b>	<b>Troubleshooting</b> .....	<b>25</b>
<b>Construction and Function</b> .....	<b>11</b>	<b>Maintenance/Repair</b> .....	<b>26</b>
Designated use .....	11	Safety .....	26
<b>Pre-Commissioning</b> .....	<b>14</b>	General .....	26
General .....	14	Lubrication Chart .....	26
Basic settings of the furrow press .....	14	Shear Protection .....	28
Alignment of the concave discs .....	14	<b>Decommissioning and storage</b> .....	<b>29</b>
<b>Commissioning</b> .....	<b>15</b>		
Preparation of the Tractor .....	15		
Coupling of the disc cultivator .....	16		
Three Point Hitch .....	16		
Uncoupling of the disc cultivator .....	18		

## Introduction/Foreword

The operating instructions contain basic advice which should be observed when operating and maintaining the disc cultivator. Before use and commissioning of the disc cultivator, these operating instructions must be read and understood by any person who is authorised to work with or on the disc cultivator. The operating instructions must be accessible to authorised persons at all times.

Operators should observe specific safety instructions contained in other chapters of this manual as well as general safety advice contained in the chapter on safety.

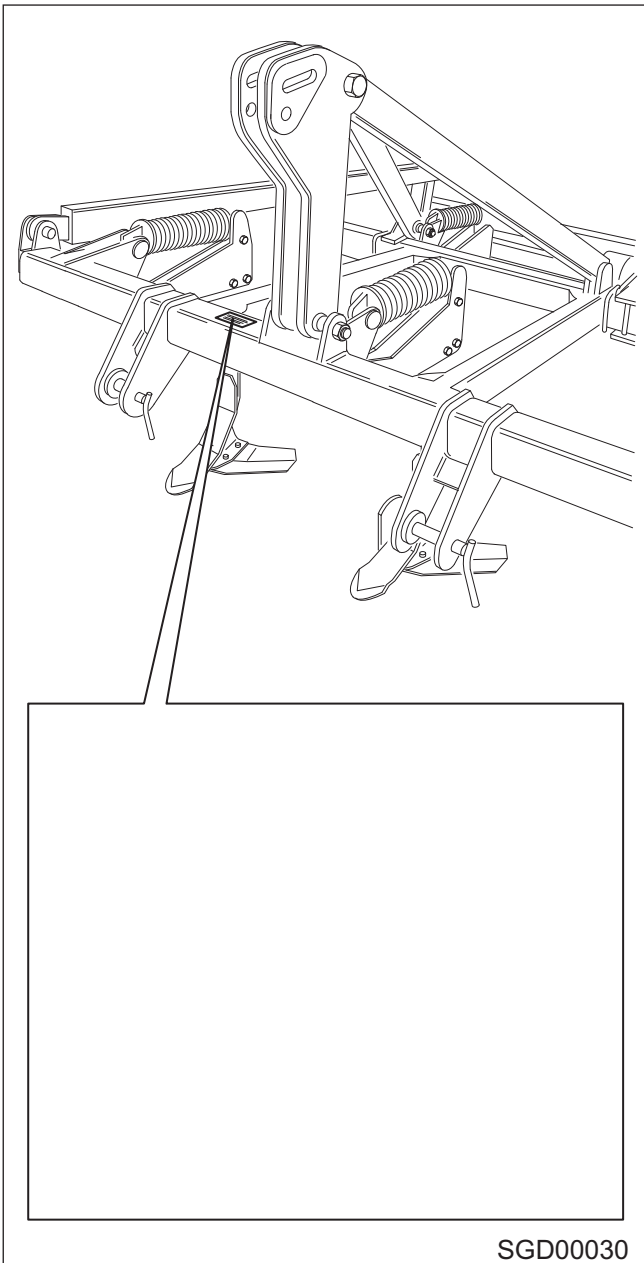
## Product Details

### Identification

The specifications of the disc cultivator are located on the type plate. This is mounted on the front cross beam.



**All markings on the type plate are required for documentary proof and should not be changed or made unrecognisable!**












## Information required for inquiries and ordering of spare parts

For any queries regarding the disc cultivator and for ordering spare parts, please quote the model identification and the serial number

## Explanation of the pictograms

The pictograms within the operating instructions reduce the text and thus make it easier to work with the existing document. Before starting to work with the operating instructions, familiarise yourself with the meaning of the pictograms!

	<b>Attention</b>	Important advice
	<b>Visual Check</b>	Visual examination, examination of condition
	<b>Adjust</b>	Check and adjust measurements and settings
	<b>Grease</b>	Lubricate parts with oil or grease
	<b>Secure</b>	Install safety devices, for example cotter, locking plate, safety ring
	<b>Service friendly</b>	Labour-saving
	<b>Observe mounting direction</b>	It is possible to install these parts in the wrong direction
	<b>Recycling</b>	Certain operating agents should be supplied to a recycling process
	<b>Environmental protection</b>	Valid regulations for environmental protection must be observed

## Safety



### General Safety Advice

- Before commissioning the disc cultivator read the operating instructions and safety advice! It is mandatory to stick to the safety advice and the warnings stated in the manual. The manufacturer declines any responsibility for accidents and damages to the disc cultivator resulting from failure to apply safety advice.
- The disc cultivator should only be used, maintained and repaired by persons who are familiar with the safety advice and who are informed about the dangers!
- General safety advice and the regulations for the prevention of accidents must be observed.
- The safety instructions must be passed on to other users.

### Coupling and Uncoupling

- Be careful when coupling or uncoupling implements to and from the tractor! Do not stand between tractor and disc cultivator when the tractor is moving.
- Fasten the implement only at the provided points!
- **Do not use fully mounted cultivators together with tracked tractors. Damages on fully mounted cultivators caused by the use of tracked tractors are not covered by the normal warranty conditions of Kongskilde.**
- Always fix weights correctly at the intended attachment points!
- Check and attach transport equipment, for example lighting equipment, warnings and possibly safety equipment!
- Release mechanism for quick couplings should hang loosely and should not trigger themselves at a low level!
- Observe the tractor's operating instructions.

### Three point hitch

- The attachment category for the three point hitch on the tractor and the implement have to match properly, or the appropriate adjustments must be made!
- Before coupling or uncoupling implements to the three point hitch, put the operating mechanism into a position which will prevent any accidental lifting or lowering!
- While the implement is in transport position, ensure sufficient locking at the side of the three point linkage!

### Operation

- Before each use, check the implement and the tractor as to their road and operational safety!
- Before starting work, familiarise yourself with all facilities and operating elements. It is too late to do so during work activities!
- Examine work surface for hidden obstacles which could pose a risk (for example under-ground cables, pipes).
- Adjustments should only be made on the implement when it is completely parked in working position and when the engine of the tractor is switched off. Remove ignition key and apply hand brake!
- Wear tightly fitting work clothes. Avoid loose clothes which could be caught in movable parts.
- Wear strong shoes or preferably safety shoes.

- Unauthorised persons are not allowed to stay in the work area during work. No work is to be carried out if there are unauthorised persons, especially children, in the vicinity of the disc cultivator or in the danger zone of collapsible parts without keeping a safe distance.
- It is prohibited to give allow any person to ride on the disc cultivator.
- Never work diagonally to inclines or slopes, where there is a risk that the tractor will overturn.

## Transportation by Road/Transport

- When using public traffic routes, observe the regulations specific to the particular country!
- Never use public roads, if the edge discs are in working position or if they exceed the admissible transportation width of 3 m.



**The attachment of implements should not exceed the admissible total weight, the admissible axle load and the weight-bearing capacity of the tractor tyres.**

**To ensure the ability to steer, the front axle load should always amount to at least 20% of the unladen weight of the tractor.**

### Before driving:

- Observe admissible axle loads, total weights and transport measurements!
- Performance, ability to steer and brake are influenced by attached or coupled implements and ballast weights. Ensure that there is sufficient ability to steer and brake!
- Before starting off and using the disc cultivator, check the immediate area. Pay special attention to children and that there is sufficient visibility!
- For road transportation with the implement raised, lock the control valves of the tractor and for disc cultivators which are hydraulically collapsible, shut the stop cock of the hydraulic system on the disc cultivator side.

### During Transportation:

- Riding on the implement during work and transport is not permitted.
- Never leave the driver's cab during transportation!
- When driving around corners and bends take the extra width and/or the inertia of the disc cultivator as well as the high centre of gravity of the folded frame into consideration!

### After transportation:

- Before leaving the tractor, set the implement down onto the ground, switch engine off, remove ignition key and apply hand brake!
- No-one should stand between tractor and implement without securing the vehicle by the hand brake and/or a chock!
- Collapsible frame parts should be completely lowered down. The implement should only be parked with frame parts lowered and with the stop cock shut.

### Note:

- The measures for road safety when using public routes are described in full detail on page 19.

## Maintenance

- Repairs, maintenance and cleaning work as well as the solving of functional faults should principally only be carried out while the engine is switched off. Remove ignition key and apply hand brake!
- For maintenance on a raised up implement, always secure the disc cultivator on suitable stands!
- When changing work tools which have cutting edges use suitable tools and gloves!
- Spare parts should correspond at least to the technical requirements defined by the manufacturer. Use only original parts!


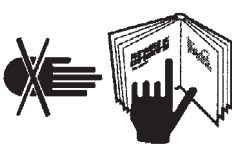
## Hydraulics

- For the hydraulically collapsible frame option, special safety advice in regard to hydraulic components must be followed!

- When connecting hydraulic hoses on the disc cultivator side to the tractor, use coupling sockets with double-acting operation. Ensure the hoses are routed in a way that enables safe operation (hoses should not have kinks, be crushed or pulled).
- Regularly check hydraulic hoses and replace when damaged or ageing! (The hydraulic hoses must be replaced every 6 years). The new hoses must correspond to the technical requirements of the disc cultivator manufacturer!
- When searching for leaks, do not use your hand, use suitable service aids or injury may result!
- Liquids (hydraulic oil) which escape under high pressure, can penetrate the skin and cause serious injuries! Consult a doctor immediately, if injured!
- Before working on hydraulic components, set down the implement, release the pressure of the system and switch off the engine!
- Protect coupling plug from dirt. When the hydraulic hoses are uncoupled, put the coupling plug into the parking socket provided on the implement.

## Safety decals

The attached warning and advice signs provide important advice to assure safe operation - the observance of these ensures your safety. The following pages contain all pictograms, which are also placed on the implement.






1

**Read and observe the operating instructions!**

**Before commissioning the disc cultivator, read and observe both operating instructions and safety advice!**

Order No.: 187 250

2

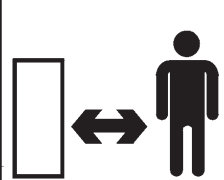
**Danger of crushing**  
Never reach into the danger zone, as long as there could be moving parts.



Order No.: 689 549

**Danger rotating concave discs**  
When concave discs are rotating, keep sufficient distance.

Order No.: 629547

3

4

**Read and observe the operating instructions!**



**Before maintenance and repair work, read and observe the operating instructions.**

Order No.: 918835800

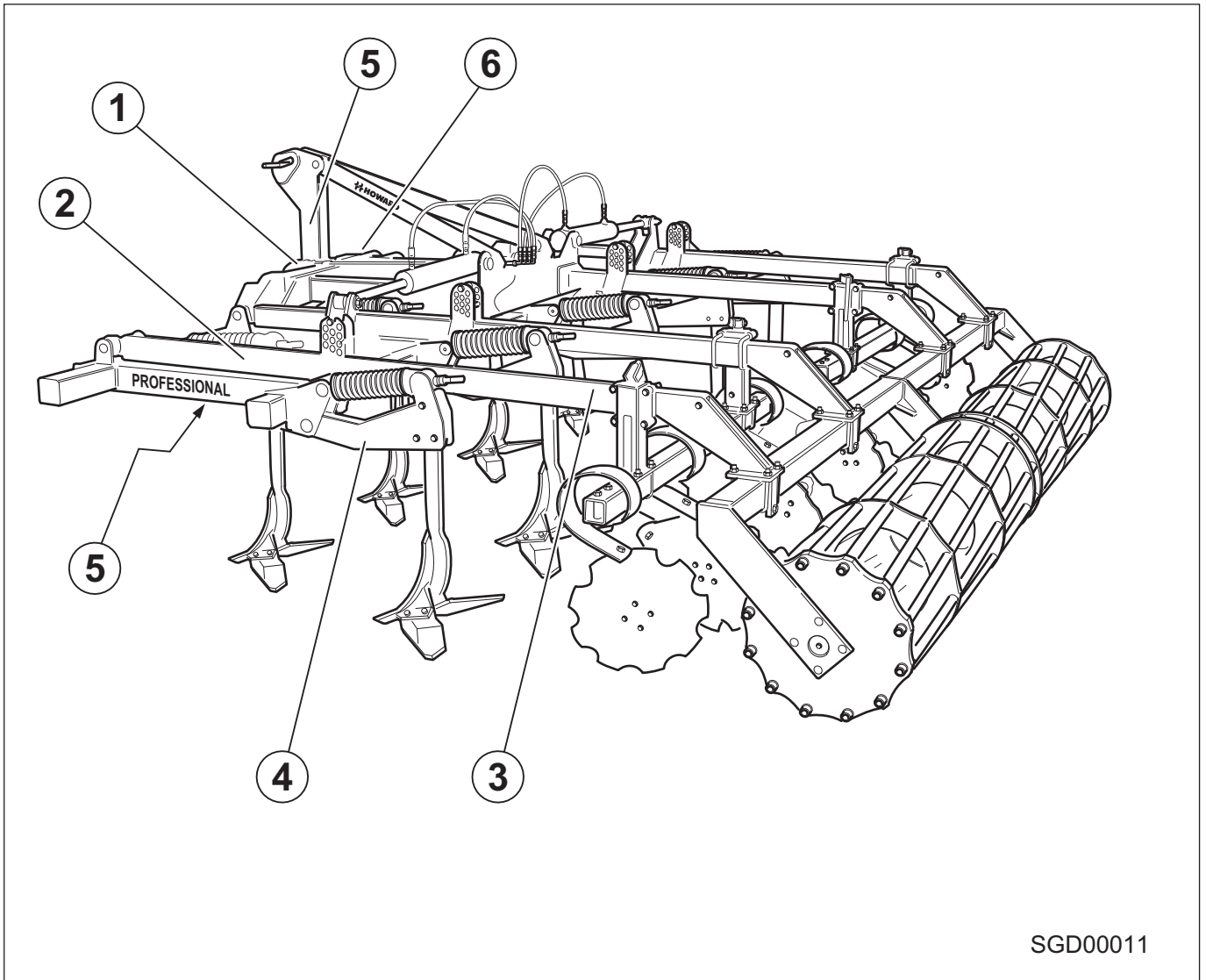
**Moving Parts**  
Do not stand near the collapsible frame of the cultivator.

Order No.: 629546

5





SGD00011

6

MACHINE MUST BE  
PARKED IN WORKING  
POSITION

LA MACHINE DOIT  
ETRE DEPOSEE EN  
POSITION TRAVAIL

MASCHINE NUR IM  
ABGESENKTEN

**Park in lowered  
position**

**The disc cultivator  
must only be parked  
in working position.**

**Order No.: 646708**



**Keep safety advice labels always in a clean and readable condition! Request substitutes for damaged or missing safety advice labels from the dealer and place in the intended position. Position and importance are described in this section.**

## Technical data

<b>Working width/ Equipment variant</b>	<b>HSF 250</b>	<b>HSF 300</b>	<b>HSF 400</b>	<b>HSF 400 H</b>	<b>HSF 500 H</b>	<b>HSF 600 H</b>
Spring overload protection	/ x	/ x	/ x	/ x	/ x	/ x
2,5 m - Numer of tines - Numer of discs	5 - 4					
3,0 m - Numer of tines - Numer of discs		7 - 6				
4,0 m - Numer of tines - Numer of discs			9 - 8	9 - 8		
5,0 m - Numer of tines - Numer of discs					11 - 10	
6,0 m - Numer of tines - Numer of discs						13 - 12
HP demand	75 - 120	90 - 150	110 - 180	110 - 180	130 - 220	180 - 260
Weight kg	650 / 900	765 / 1080	1040 / 1460	1480 / 1880	1610 / 2080	1960 / 2480
Cage roller 450 mm	125 kg	145 kg	190 kg	230 kg	290 kg	315 kg
Cage roller 550 mm	190 kg	225 kg	270 kg	300 kg	370 kg	450 kg
Cage roller 630 mm	215 kg	260 kg	310 kg	340 kg	440 kg	520 kg
Cutter roller 450 mm	265 kg	315 kg	303 kg	450 kg	550 kg	650 kg
Transport width cm	250	300	400	300*	300*	300*

\* - folded up

## Construction and Function

### Designated use

The Delta Professional is a disc cultivator. It is used to work organic substances (for example manure in solid or liquid form, compost etc.) into the soil, to loosen the soil surface (for example after the winter period) and to mix layers of soil.

The DELTA Professional disc cultivator has been designed exclusively for use in agricultural work. Any use other than this is not in accordance with the designated use. The manufacturer does not accept liability for damage resulting from such misuse; it is solely at the owner's risk.

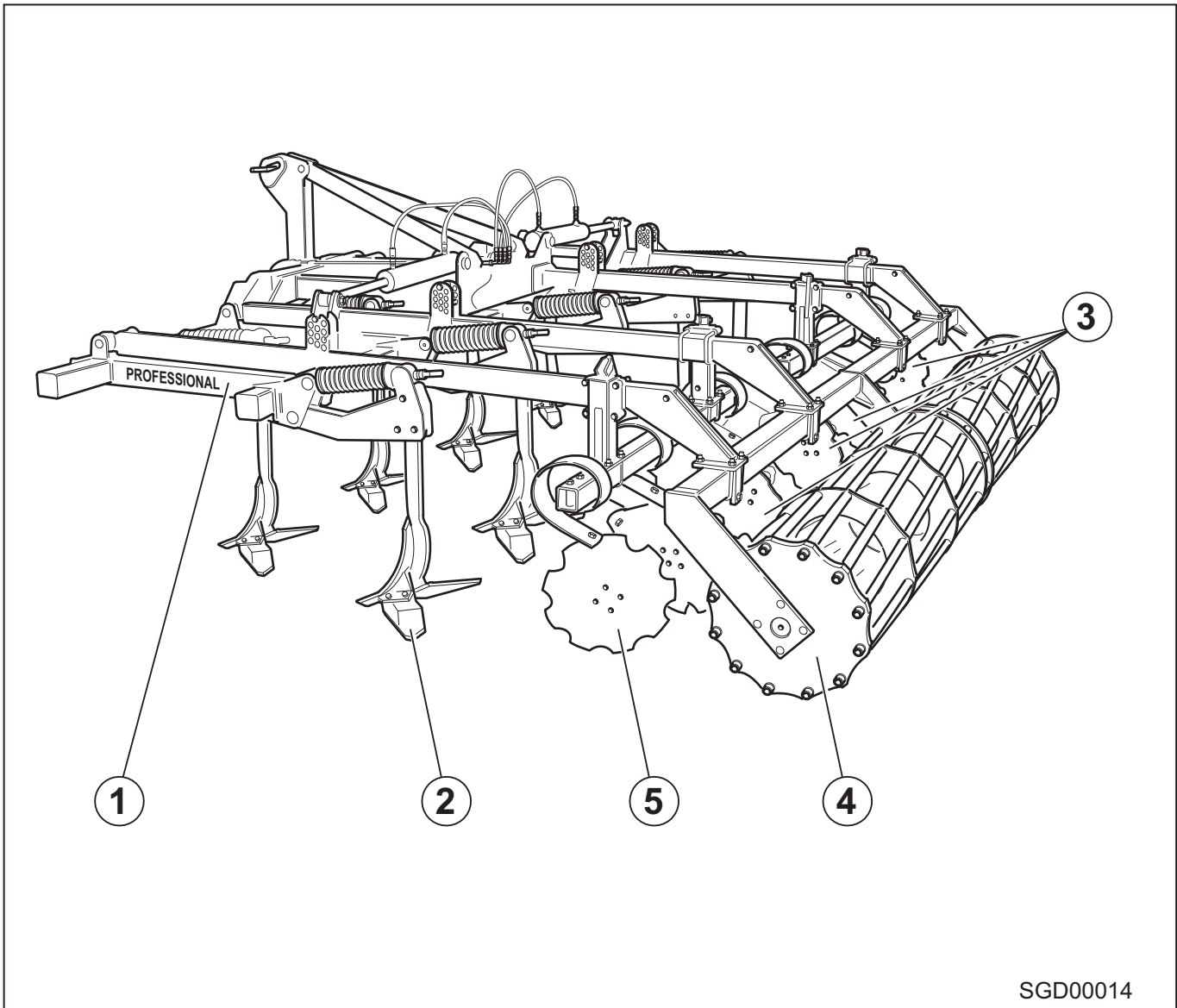
The designated use also includes the operating, maintenance and repair conditions stipulated by the manufacturer!

#### Assemblies

- Frame (rigid or hydraulically collapsible)
- Share stems
- Shares
- Concave discs
- Cage rollers

#### Optional

- Automatic spring overload protection
- Edge discs
- Tandem rollers
- Coiled spring tines



SGD00014

**Frame (1)**

The frame is made from strong 100 mm box section, the height of the frame is 800 mm and the distance between the rows of tines is 1000 mm.

**Shares (2)**

Share tip, guide plate, share foot as well as wing shares are individually screwed in and each part can be changed independently.

**Concave Discs (3)**

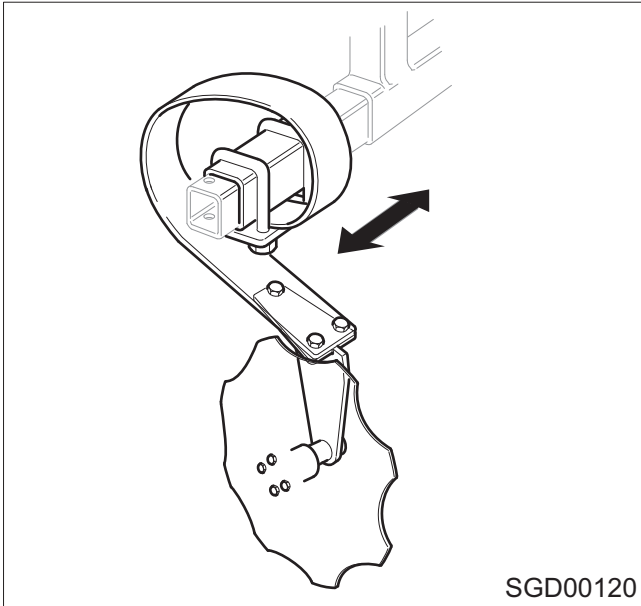
The concave discs have serrated edges and have a diameter of 460 mm. They are arranged in pairs and are fully spring-loaded. Since the rollers and the concave discs form one unit, they can both be set simultaneously to the same working depths resulting in a constant work performance.

**Cage rollers (4)**

The disc cultivator can be manufactured with 4 different cage rollers and cutter roller:

- Standard rollers with diameters of 450, 550 or 630 mm,
- Tandem roller with a diameter of 450 mm.
- Cutter roller 550mm

The cage rollers facilitate the exact depth guidance of the cultivator.



SGD00120

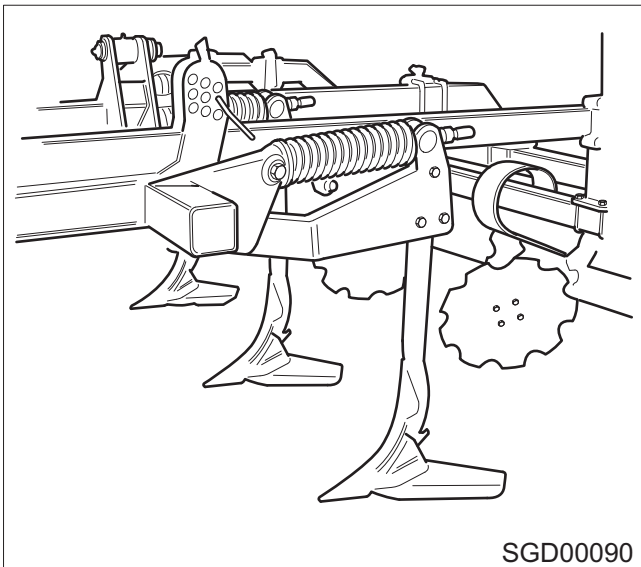
### Edge Discs (5)

The edge discs can be obtained as special equipment. They enable an exact passage without building up mounds.

The edge discs are fastened at the outer ends of the concave disc carriers. They do not operate as low as the inner discs, but they merely move soil, which has been thrown beyond the working width, back into the furrows made by the outer tines.



**For transportation by road, the edge discs have to be moved toward the centre of the frame.**



SGD00090

### Automatic spring overload protection

The overload protection protects the tines against increased strain, wear or destruction. If a tine meets an obstacle, it will move upwards and backwards. It will travel to a height of 400 mm. After this the tine will return to the starting position.

### Hydraulically collapsible frame

Disc cultivators, which have a working width starting from 4 m, can be produced with hydraulically collapsible frames.



**The hydraulically collapsible frame can be folded to a transportation width, which is in accordance with the regulations for road transport.**

## Pre-Commissioning

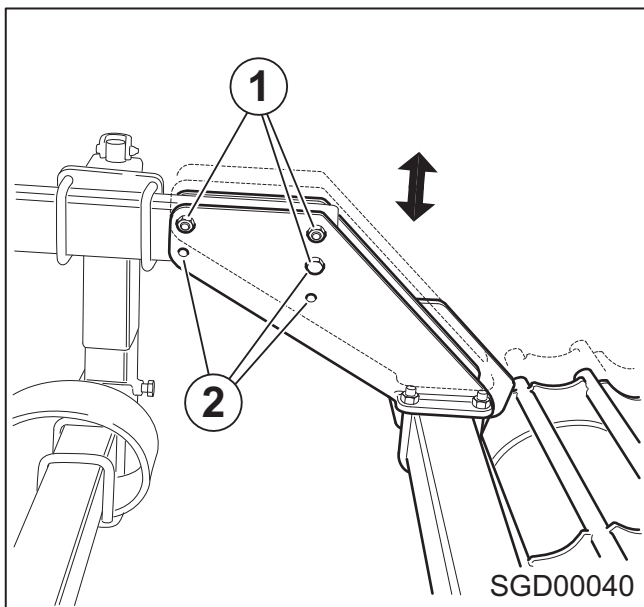
## General



All nuts and bolts have to be checked for tightness the first time the implement is used and have to be tightened, if necessary.



During pre-commissioning all grease points have to be lubricated - see lubrication chart.



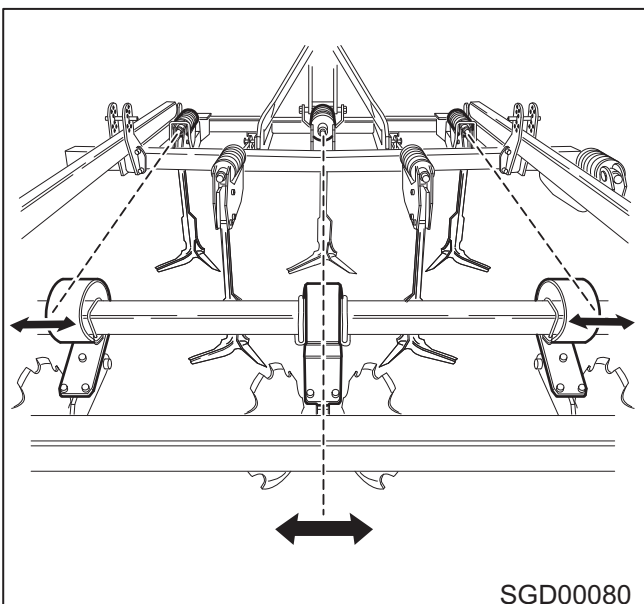
## Basic settings of the furrow press

If space is limited, the cross beam of the furrow press can be transported separately with the cage rollers.

In this case the cross beam has to be connected to the parallel linkage.



The positioning 1 represents the basic setting. The difference in height between positions 1 and 2 is 50 mm.



## Alignment of the concave discs



Pairs of concave discs should be located in line behind the shares of the first row.

Align the pairs of concave discs as follows:

- loosen their fastenings,
- move along the cross beam and
- Finally refasten.



For models with screwed fastenings, it is also possible to move the shares on the first row.

## Commissioning

### Preparation of the Tractor

Before coupling the disc cultivator to the tractor, the tractor must be prepared for use.

#### Tyres



The air pressure of the tractor tyres has to be the same for the left and right rear wheel. This applies also to the front wheels. Refer to the operating instructions supplied by the tractor manufacturer!

#### Lower Linkage Arms



Set implement hitch points on lower arms level (left to right) by adjusting lifting arms (if required).

#### Limiting Chains/Stabilisers



The limiting chains/stabilisers have to be adjusted in such a way that they will always enable side free play of the lower links during work!

### Control Settings

The hydraulic controls of the tractor have to be switched to work in „float“ position or „load and depth control“!

#### Front Ballast



Ensure that the tractor has sufficient front ballast!



The front axle load should amount to at least 20 % of the unladen weight of the tractor. This advice must be followed to ensure safe operation of the tractor. See operating instructions of the tractor manufacturer!

#### Special Permit



All DELTA Professional disc cultivators with a width larger than 3 m, must not be transported on public roads, when coupled to the tractor. To transport implements wider than 3 m on public roads, a special permit must be obtained from the appropriate authorities.

#### Note:

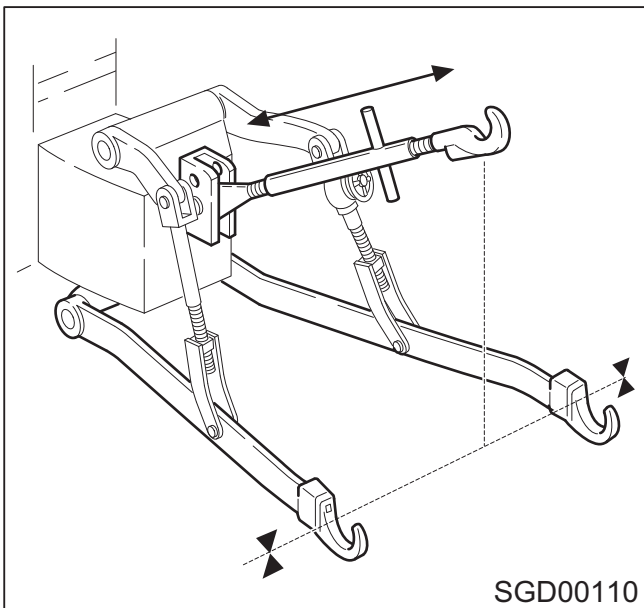
The measures for road safety when using public routes are described in full detail on page 19.

## Coupling of the disc cultivator

### Safety



Ensure that during coupling of the disc cultivator, no-one is standing between tractor and implement. No-one should stand in the operational range of the implement.



### Three Point Hitch



The three point attachment category on the disc cultivator and tractor must match with each other.



If they do not correspond, the three point linkage of the tractor must be adjusted.

### Preparation



The lower links of the tractor must always be aligned horizontally. The limiting chains or stabilisers of the tractor's lower links have to be adjusted in such a way that they will always allow moderate side free play of the implement during work. For road transportation the setting has to be adjusted in such a way that the implement cannot swing out sideways.

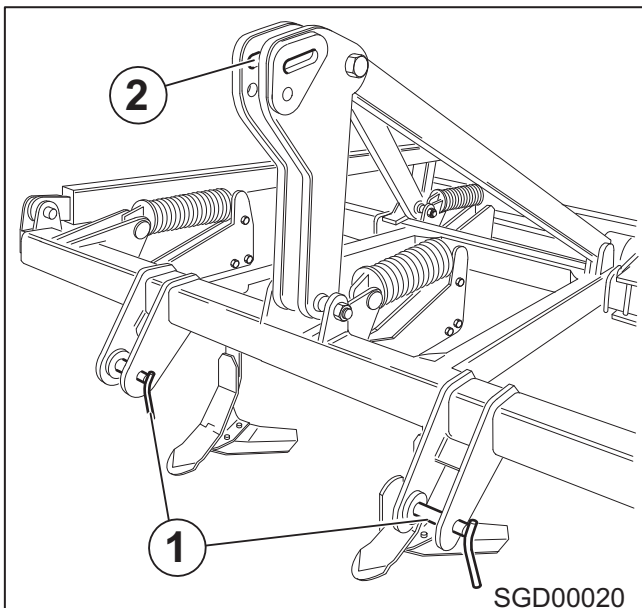


When coupling the disc cultivator the following preparations should be made:

- Park the disc cultivator on firm and level ground.
- Switch the hydraulic system of the tractor to position control.

### Connection procedure (or Coupling procedure)

- 1.) Lower the lower link arms such that the hitch points are below the cultivator pin height.
- 2.) Reverse tractor with lowered lower links up to the disc cultivator until the linkage hooks are positioned under the hitch points (1).
- 3.) Lift linkage until the quick coupling balls of the disc cultivator, which are to be mounted on the hitch pins bolts, are caught by the hooks of the tractor.
- 4.) Lock and secure hooks.
- 5.) Fit top link into the upper catch point (2) of the disc cultivator.
- 6.) Lock and secure top link.



**The top link and lower links coupling bolts should always be secured by their security fittings (lynch pin). Make sure that the security fittings are not lost.**



**When connecting the hydraulic hoses, ensure that the pressure has been released in the hydraulic systems of the tractor and on the implement side. Ensure cleanliness!**

- 7.) When using a hydraulically collapsible frame, the hydraulic hoses must be connected with the corresponding connections on the tractor. Before opening the stop cock of the hydraulic system on the implement.

## Uncoupling of the disc cultivator

### Safety



When parking the disc cultivator, ensure that the ground is level and firm! When folding the frame and lowering the whole implement, ensure that no-one is between the tractor and disc cultivator.

### Preparation

Proceed as follows to uncouple the disc cultivator:

- drive the disc cultivator onto firm and level ground and
- switch the hydraulic system of tractor to position control.

### Uncoupling procedure

- 1.) Lower cultivator completely.
- 2.) When using a hydraulically collapsible frame, fold it completely, remove any pressure from the hydraulic system then separate the hydraulic connections.
- 3.) Remove the top link of the tractor from the disc cultivator (2).
- 4.) Lower links must be removed from the lower supports (1).

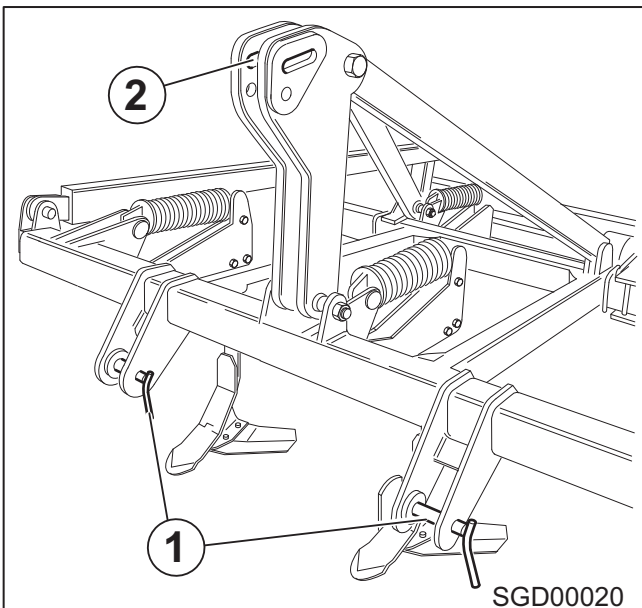


Special care should be taken whenever uncoupling the lower links. There is danger of injury if the implement falls down or tips.

### Aftercare

After uncoupling, check that the disc cultivator is standing in a secure position.

When using a hydraulically collapsible frame, shut the stop cock of the hydraulic system. To protect it from dirt, the coupling plugs of the hydraulic hoses are to be plugged into the parking sockets provided.



## Transportation by Road/Traffic Safety

### Traffic safety

- When using public traffic routes, observe the regulations applicable in the particular country!
- Never use public roads, if the edge discs are in working position!

### Caution!



**The attachment of implements must not exceed the overall admissible weight, the admissible axle load and the weight-bearing capacity of the tractor tyres.**

**To ensure the steering ability, the front axle load should always amount to at least 20 % of the unladen weight of the tractor.**

### Before driving:

- Observe admissible axle loads, overall weights and transport measurements!
- Road behaviour, ability to steer and brake are influenced by the attached or coupled implements and ballast weights. Ensure sufficient ability to steer and brake!
- Before starting to drive and use the disc cultivator, check the immediate area. Pay special attention to children and that there is sufficient visibility!
- For road transportation with the implement raised, lock the control valves of the tractor and for disc cultivators, which are hydraulically collapsible, shut the stop cock of the hydraulic system on the disc cultivator side.

### During Transportation:

- Riding on the implement during work and transport is not permitted.
- Never leave the driver's cab during transportation!
- When driving around corners and bends take the extra width and/or the inertia of the disc cultivator as well as the high centre of gravity of the folded frame into consideration.

### After transportation:

- Before leaving the tractor, set the implement down onto the ground, switch engine off, remove ignition key and apply hand brake!
- No-one should stand between tractor and implement without securing the vehicle by the hand brake and/or a chock!
- Collapsible frame parts should be completely lowered down. The implement should only be parked with lowered frame parts and the stop cock shut.

### Markings

Identify the disc cultivator by warning signs or markers during the day.

During periods of darkness and poor visibility, the warning signs or markers must be complemented by tail lights and reflectors.



**If the disc cultivator conceals**

- **the lighting equipment,**
- **the direction indicators as well as**
- **the licence plate of the tractor, they need to be duplicated on the disc cultivator.**



**If the disc cultivator projects more than 40 cm beyond the front side lights of the tractor, the implement has to be identified to the front. During the day by warning signs and foils and during darkness or periods of poor visibility by side lights at the front.**

### Transportation width

For transportation on any public road, track or place, the legal transport width up to a maximum of 3 m, should not be exceeded. If the transport width is exceeded, a special authorisation can be obtained under certain conditions from the appropriate authorities (In Germany: according to §70 Road Traffic Law). A requirement could be for example a certain minimum width of the roads which are to be used.

## General



**Remove the lighting equipment and the warning signs before working in the field to avoid damage to them!**



**The lighting equipment with warning sign may be purchased optionally.**

## Transport security

Hydraulically collapsible frame parts must be secured for transportation on public roads against any accidental folding out by turning the stop cock of the implement to the close position.

### Note:

The locking device on the hydraulic cylinders prevents from accidental folding in case of a defect in the hydraulic hoses. However, it does not prevent unintentional folding if the control device is operated by mistake.



**Never drive with the frame folded up while the stop cock is open.**

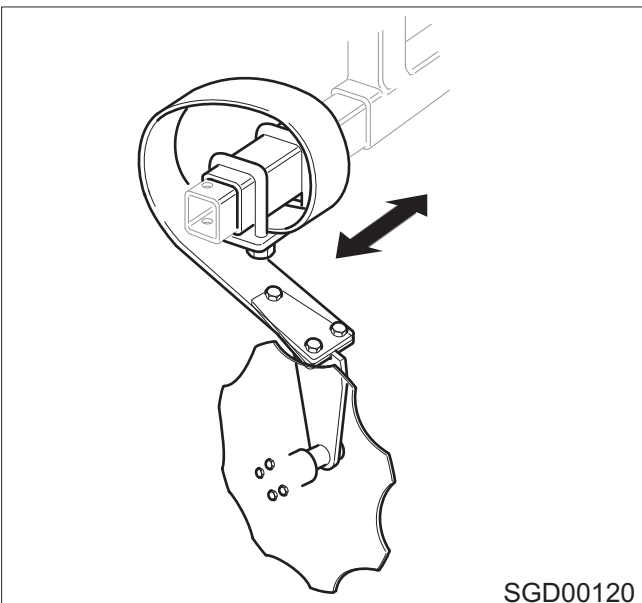
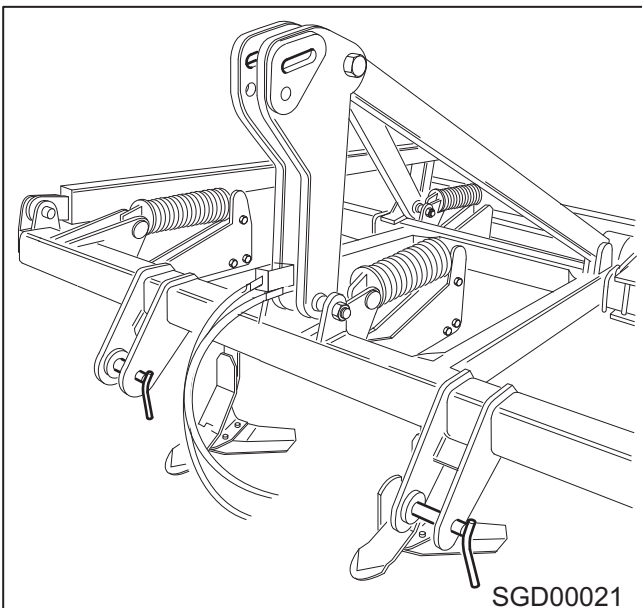
## Edge Discs



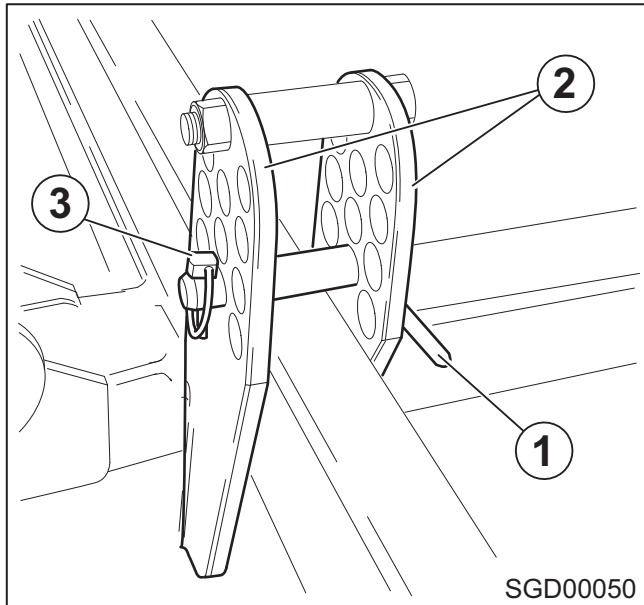
**For transportation on public roads, the edge discs have to be moved in. Never use public roads, if the edge discs are in working position!**

Proceed as follows to push in the edge discs:

- 1.) remove the safety bolts,
- 2.) slide the edge discs toward the inside and
- 3.) resecure using the bolts.



## Operation



### Setting the working depth of the tines

**Make adjustments only when the engine of the tractor is switched off. Remove ignition key and apply hand brake!**

The shares should work 8 -10 cm deep. If the area is very uneven or has deep ruts, it may be necessary to work a little deeper. The working depth is set by means of the drilled plate on each side of the furrow press hoist arm.



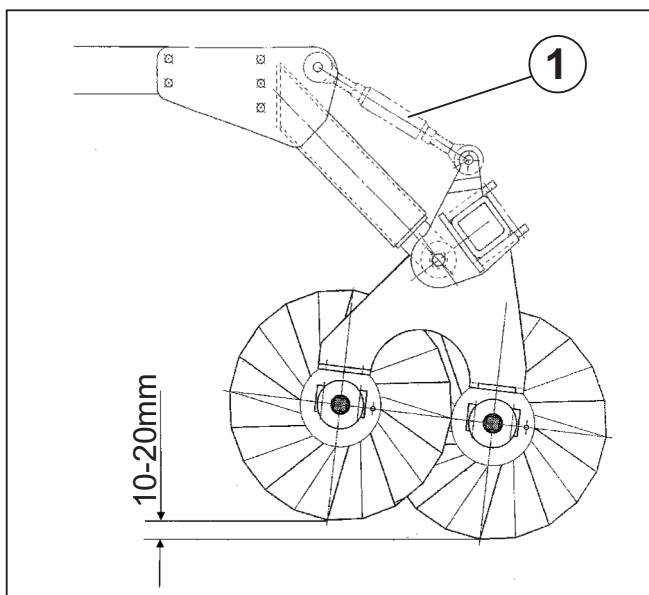
**There is danger of crushing an cutting in the area of the furrow press arm, the concave discs and the rollers!**

The working depth can be changed as follows:

- 1.) Loosen the lynch pin (3),
- 2.) Move bolt (1) to a different position in the drilled plate (2)
  - lower hole = less working depth
  - higher hole = greater working depth
- 3.) Secure the bolt (1) with the lynch pin (3).



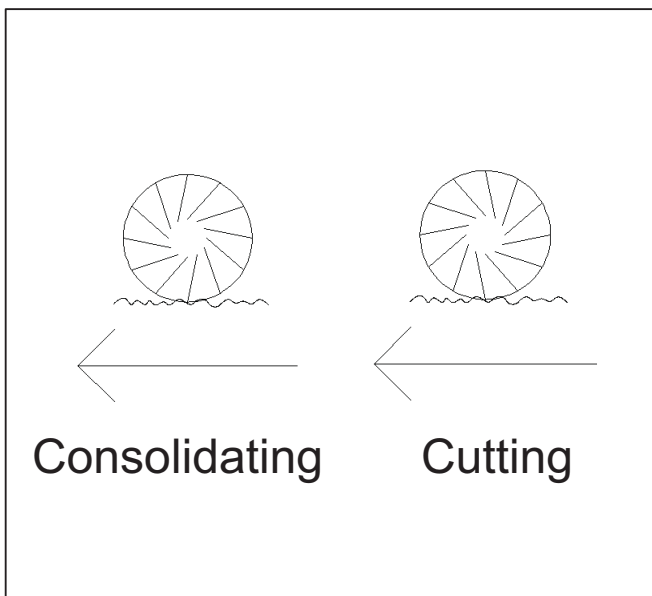
**When finishing the adjustment, check the fitting off the safety ring (3).**



### Setting of the cutter roller

Adjust the DELTA with the cutter roller in such way that the front disc shaft runs a little higher than the rear one (approx. 10-20 mm).

Use the spindles (1) for adjusting and make sure that all spindles have the same length.



## Setting the direction of the cutter roller

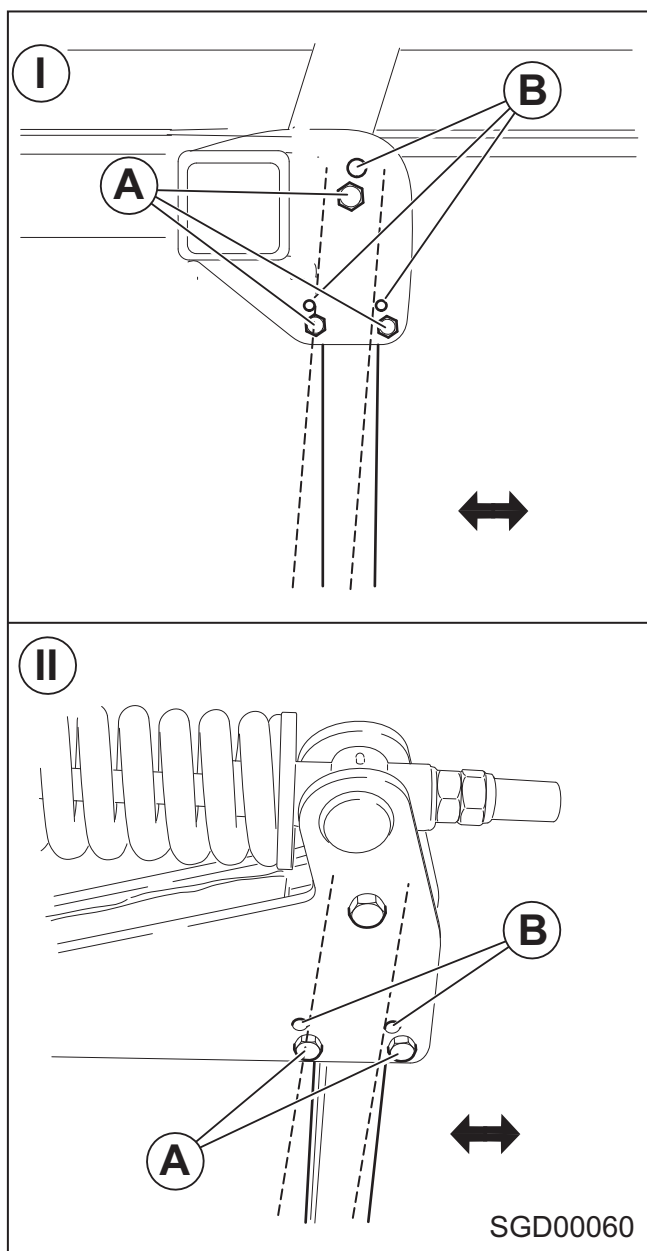
The Kongskilde cutter roller 550mm is useable in two directions of movement.

- Passive direction, less soil cutting, more consolidation.
- Active direction, more soil cutting, less consolidation.

As standard all cutter rollers are mounted passive.

The sketch shows the setting. The arrow is indicating the direction of driving.

If desired, the cutter rollers can be converted from passive to active and visa versa.



## Share Position

The position of the tines or shares on the disc cultivator can be set to one of two positions, either steep or flat.

### Steep Share Position (A)



**HOWARD disc cultivators are factory-set to the steep share position.**

The steep share position ensures that the disc cultivator will penetrate both hard and dry soils well.

### Flat Share Position (B)

A flat share position ensures an even working level - share tip and wing shares work nearly at the same depth and thus reduce the requirements for pulling power.

This position is recommended for heavy and muddy soils.

### Changing the share position



**The share position should only be adjusted if the engine of the tractor is switched off! Remove ignition key and apply the hand brake!**

**Secure the disc cultivator on suitable stands!**

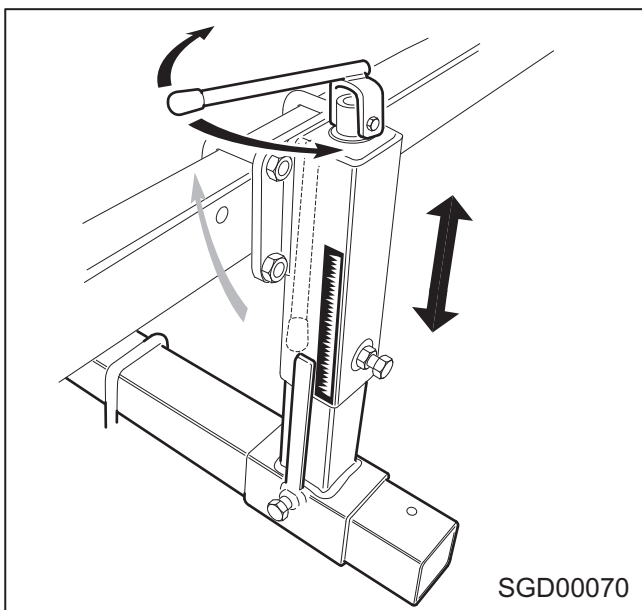
I = shear bolt protection

II = non-stop protection

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## Setting the working depth of the concave discs

The discs should work at about half the depth of the tines. The furrows and mounds left by behind the tines, should be evened out and levelled off by the concave discs.



The working depth can be changed as follows:



**Adjust settings only when the disc cultivator is completely lowered and the engine of the tractor is switched off! Remove ignition keys and apply hand brake!**

- 1.) Fold the handle so that it is horizontal,
- 2.) by turning the bar right or left, the concave discs can be lifted or lowered,
- 3.) Read the height on the indicator rod markings,
- 4.) repeat the setting at the other bars and
- 5.) fold the handle down again.



**The depth control has been adjusted to its best possible setting, if the following roller is evenly "filled" with soil over its whole width or is covered in an even "veil of soil".**

The discs are not adjusted depp enough, if there is more soil in the roller, directly behind the pairs of discs, than between the pairs of discs. The discs are adjusted too deply, if the is clearly less soil behind the pairs of discs than between them.



**It is not necessary to readjust the working depth of the tines after adjusting the depth of the concave**



## Setting the roller

The compressing effect of the roller or rollers can be changed by adjusting the angle of the top link. The hydraulic controls of the tractor must be switched to „Float“ position or „Load and Depth control“. The latter setting is applicable, if there is too much slip.



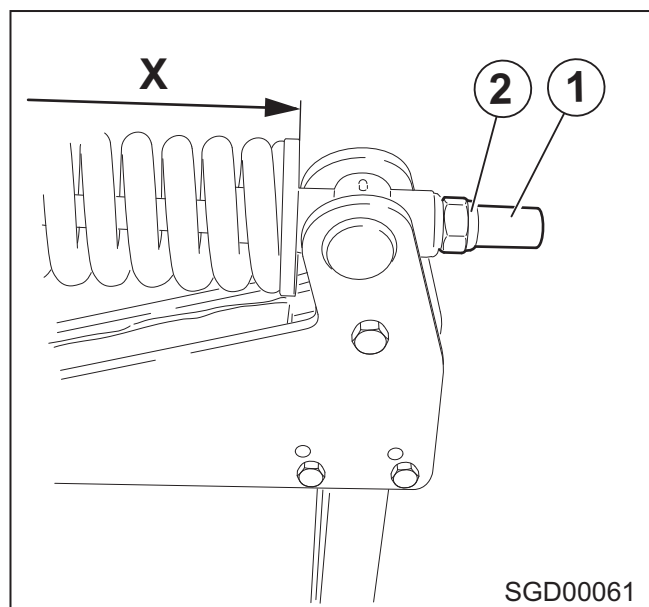
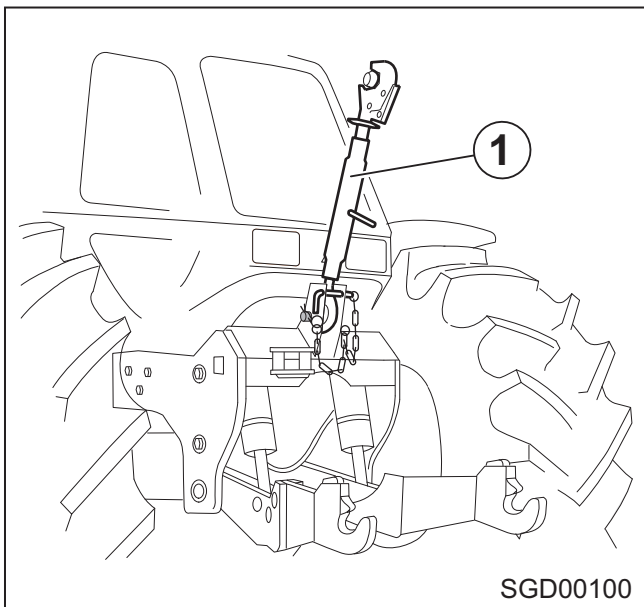
**There is danger of crushing and cutting in this area of the three point linkage ! Do not step between tractor and disc cultivator when handling the three point hitch. Alter position of top link only if disc cultivator is completely lowered!**

The following rule applies to the adjustment of the top link (1):

- Steep angle of the top link, that means rising from tractor to implement => low compression
- Less steep angle of the top link => medium compression
- Flat position of the top link => strong compression



**The top link should never be adjusted so that it slopes downward from tractor to implement.**



## Setting the Overload Protection



**The overload elements are under spring tension!**

- 1.) Remove cap (1),
- 2.) Loosen lock nut (2),
- 3.) Turn the nut (2) to alter the length of the spring
  - Spring relaxed:  $X > 405$  mm (spring length)
  - Spring loaded optimally:  $X = 330$  mm (spring length)
- 4.) Tighten lock nut (2) and replace cap (1)



## Troubleshooting

Fault	Cause	Remedy
Cage roller sinks in too deeply and/or bull dozes.	Roller pressure is too high	Adjust top link to a steeper position
		Adjust hydraulic controls of tractor to pulling power or load and depth control
		Use either a bigger or a tandem roller
Grooves and mounds behind the cage roller	The grooves and mounds left behind by the tines at the back are not sufficiently levelled off by the concave discs	Working depth of the concave discs must be changed. The discs should work at about half the depth of the tines
There is clearly less soil in the cage roller behind the pair of discs than there is between the concave discs	The concave discs work too deep	Adjust discs to a higher position
There is clearly more soil in the cage roller behind the pair of discs than there is between the concave discs	The concave discs are not set deep enough	Adjust discs to a lower position
Overload protections are constantly triggered	Spring tension too low	Increase spring tension
	Working depth of the tines is too deep	Reduce working depth of the tines
	Position of shares is set too aggressively	Reduce the angle of entry of the share – Change the share position

# Maintenance/Repair

## Safety

- Repairs, maintenance and cleaning work as well as troubleshooting should in principal only be carried out while the engine of the tractor is switched off. Remove ignition key and apply hand brake!
- For maintenance on a raised up implement, always secure the disc cultivator on suitable stands.
- When changing working parts which have cutting edges use suitable tools and gloves!
- Regularly check nuts and bolts for tightness and tighten them, if necessary.
- When performing electrical welding work on the tractor or on an implement coupled to the tractor, disconnect wiring to the tractor generator and battery!
- Spare parts should correspond at least to the technical requirements defined by the manufacturer. Use only original parts!
- Maintenance and repair work on the collapsible frame parts should only be carried out, if they are lowered down and the hydraulic system is released of pressure.

## General



The DELTA Professional disc cultivator requires very little maintenance.



All nuts and bolts must be checked for tightness after 10 working hours initially, then after every 100 working hours, and tightened, if necessary.



Worn share tips, wing shares, guide plate, ect. must be changed at the earliest possible moment, so that load-bearing parts are not affected.



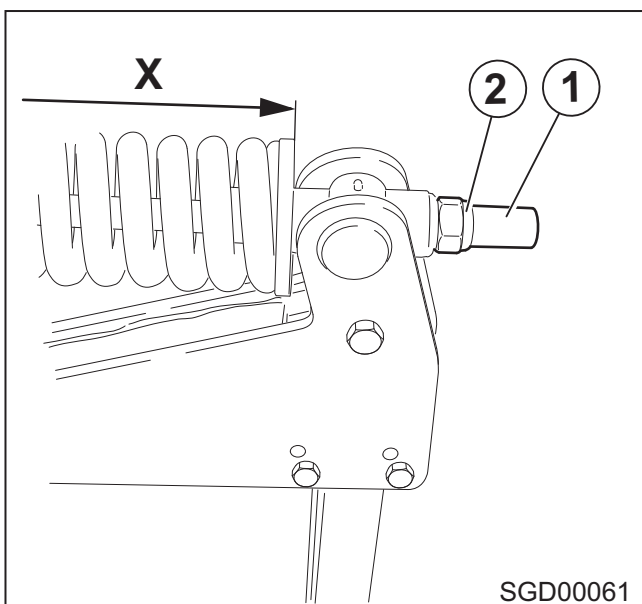
Use only original HOWARD replacement parts!

## Lubrication Chart

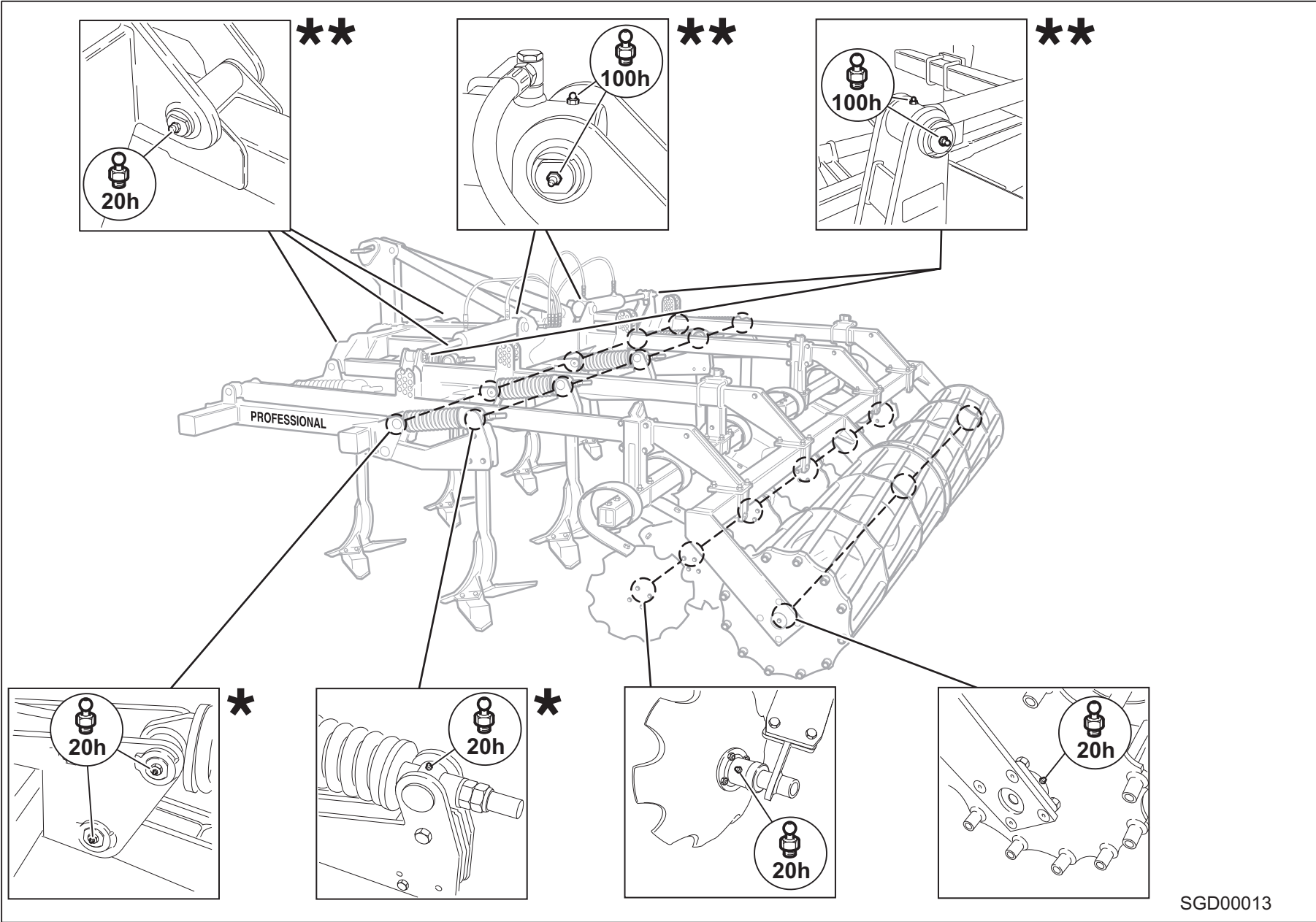
- \* = only applicable to tines with overload protection
- \*\* = only applicable to the hydraulically collapsible frame



Overload elements are under spring tension. Do not dismantle until the spring tension is completely released (see page 24).



SGD00061



## Shear Protection

Each tine - with the exception of the coiled spring tines - is equipped with a shear pin. This protects the frame and the tines against overload.

After a shear pin has been broken, proceed as follows:



**Use suitable tools for changing the shear pin!**

- 1.) Raise the disc cultivator a few centimeters.

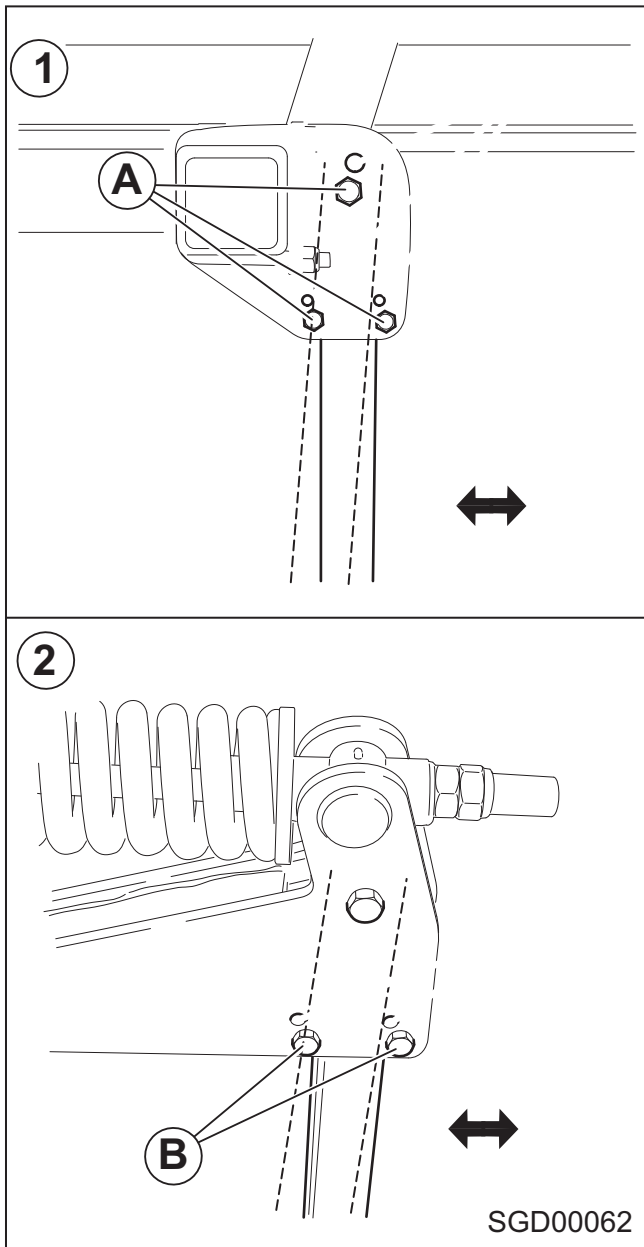


**There is danger of crushing and cutting in the area of the shear protection!**

- 2.) Remove the remnants of the shear pin,
- 3.) Tilt back the tines,
- 4.) Insert a new shear pin into the same drill-hole that had been used before, and fasten with care.



**Use only the listed shear pins. These shear pins are suitable for the disc cultivator. They can protect against overload thus prevent premature shearing.**



1 = rigid tines **with** overload protection =  
**(A)** HOWARD part 301212655 (bolt)  
 + 307212125 (nut)

2 = rigid tines **without** overload protection =  
**(B)** HOWARD part 301212855 (bolt)  
 + 307212125 (nut)

## Decommissioning and storage



When the disc cultivator is not being used for long periods, it should be stored in a secure place - inaccessible to children.



Before long breaks (winter break) as well as before initial use, all grease points have to be lubricated and the dowel pins and control facilities be provided with grease.



Exposed areas (unpainted parts) of the shares and concave discs must be greased with an environmentally friendly lubricant, in order to prevent their rusting.



Order any necessary replacement parts at the time of storing the disc cultivator, in order to avoid delays at the beginning of the season.





