DALBO

POWERCHAIN 1200

User instructions	
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Type:	POWERCHAIN 1200
Product number:	68030
Serial no.:	110615-XXXXXX

MADE IN DENMARK

CE

POWERCHAIN

Type 1200 cm

Congratulations on your new disc harrow. For **safety reasons** and to achieve optimal use of the machine, you should **read the user instructions** before using the machine.

Your disc harrow has:

For inquiries regarding spare parts or service, please always provide the model number and serial number. At the back, there is a spare parts list that makes it easier to get an overview of the individual components.

EU-DECLARATION OF CONFORMITY

DALBO A/S
DK-7183 Randbøl

hereby declares that the above-mentioned machine is manufactured in accordance with the provisions of Directive 2006/42/EC, which replaces Directive 98/37/EC and the amending Directives 91/368/EEC, 93/44/EEC, and 93/68/EEC on the approximation of the laws of the Member States relating to machinery regarding safety and health requirements in the design and manufacture of machinery.

CE

This machine complies with the safety requirements of the European safety guidelines.

DALBO A/S Date: _____

Alessio Riulini, CEO

Contents

Introduction and identification of serial number

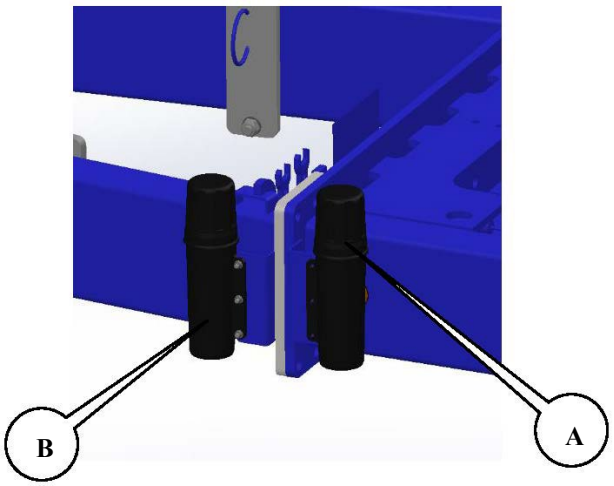
Information

- This user manual is intended for those who use and maintain the disc harrow. It contains sections relating to safety, usage, and maintenance. It is very important that all users read and understand the user manual before using the disc harrow.
- Each time a new user starts using the disc harrow, it is very important that they receive instruction on the correct use of the tool. This includes reviewing and reading the user manual as well as how to start operating it in the field.
- If there are any questions regarding reading the user manual or doubt about the general use and safety of the disc harrow, it is very important that you stop using it and contact DALBO A/S.

Location of the user manual and quick manual with tools

The user manual is in a plastic folder (A) placed on the machine's central frame. Quick manual with tools is in the plastic folder (B)

Fig. 1



Location of the serial number

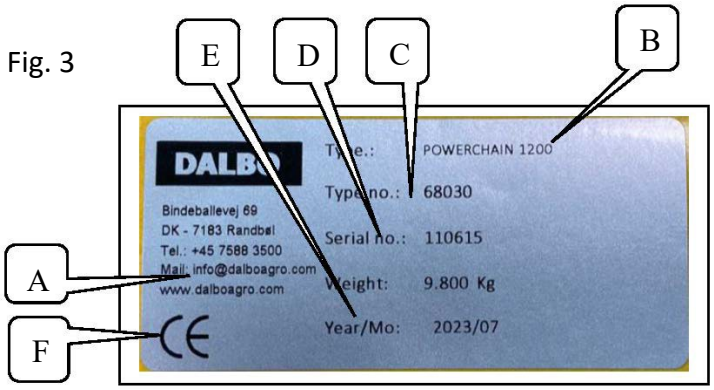
Fig. 2

The data plate on the disc harrow is located centrally on the machine's drawbar near the support leg. The data plate may either be a self-adhesive foil located (A) or a metal plate placed in the same area. The serial number of your machine can also be found on page 2 of the user manual.

The disc harrow is equipped with a data plate. A typical data plate is shown below, which contains the following data:

A: Name, manufacturer and address of the manufacturer.
B: Machine model.
C: Machine type number.
D: Serial number.
E: Year of production.
F: CE label.

Fig. 3



Warranty provision

Dalbo's general warranty obligations also apply to this machine.
They can be found here:
https://www.dalboagro.com/da/garanti-og-reklamation/garantibetingelser/

Safety

This symbol can be found in the instruction manual whenever advice is given regarding your safety, the safety of other users, or the operational safety of the machine. All safety instructions must be followed and made accessible to all users of the machine.

General points

- Before starting work, the user must be familiar with all controls on the machine.
- The disc harrow may be used for soil cultivation of ordinary agricultural land.
- The user manual must always be available if the need arises. If it gets damaged or goes missing, a new one must be obtained from DALBO A/S.
- Do not use the disc harrow if you are tired, ill, or under the influence of alcohol, medication, or psychoactive drugs.
- The disc harrow is normally used in daylight, but if there is a need to operate the machine in darkness, the tractor's lights should be used.
- Carefully check the functions of the disc harrow before starting the machine.
- Appropriate personal protective equipment and safety gear must be worn when carrying out maintenance work on the machine.
- The user of the disc harrow must not wear loose-fitting clothing that could get caught in the disc harrow.
- Using the disc harrow can create dust. It is therefore advisable to regularly check the tractor's cabin filter or to use some form of dust mask while working.
- To avoid dangerous situations arising during use of the machine, it is important to ensure that the user has good visibility at all times. The tractor's mirrors and windows must therefore be kept clean and intact.
- Keep the machine free of foreign objects, including tools, waste, etc. to prevent injury to the user or damage to the disc harrow.

- Any modification to the disc harrow may lead to safety issues. If modifications are made, the user will be held responsible for any consequent accidents.

- Safety labels are placed on the machine containing important instructions regarding your own safety, the safety of others, and the correct use of the machine. Always ensure that these labels are intact.
  Fig. 4

Use a strap when using a crane or forklift to lift the disc harrow. 4 points.

Safety sign:
Remember to read the instruction manual.

Safety sign:
Disc harrow swings out.

- The safety labels should be cleaned daily.
- The safety labels should be replaced if they are damaged.
- If the part where the safety label is attached is replaced, a new label must be attached. The white backing film on the label is removed, and the label is stuck to the new part.
- New safety labels can be ordered from DALBO A/S

- Passengers must not be carried during operation or transport unless the tractor is equipped with designated seating for this purpose. Refer to the tractor's manual.

- When operating the disc harrow, ensure that nobody is within the machine's operational radius. The machine may only be operated from inside the tractor.

- Ensure that no one is on the harrow while it is in use.

- Ensure that the side sections are entirely in when the disc harrow is in the folded position. Similarly, the control handles should be secured against accidental operation.

- Before exiting the tractor or if adjustments, maintenance, or repairs need to be performed on the disc harrow, the machine should be unfolded and lowered onto the ground, or secured in the transport position. The tractor should be braked, the engine turned off, and the ignition key removed to ensure that the machine is protected against accidental starting.

- Remember to secure the support legs and, if applicable, the lift pins with a retaining ring.

- The operator's seat must never be left while the machine is in operation.

- The driving speed must always be adjusted to the conditions.

- Only use the machine if all safety devices are installed. Defective safety devices must be replaced immediately.

Noise level

- Except for the impact of the machine with external objects, no other noise will exceed 80 dB(A).

Chains

- All chain connections must be secured with at least a bolt and a locking nut. Quality 8.8.

- Protective equipment, such as heavy-duty gloves, must be used when handling the discs, as they can be sharp.

Hydraulics

- Before any repair work on the hydraulic system, the machine is lowered onto the ground, the pressure is released from the system, the engine is stopped, and the ignition key is removed.

- Hydraulic connections should be thoroughly cleaned before being connected. Ensure that the pressure has been released from the hydraulic system when connecting the hydraulic hoses to the tractor's hydraulics.

- For hydraulic systems with a built-in pilot-operated check valve, it can be difficult to fully release the pressure. Therefore, hold a cloth around the fitting/part being disconnected to contain any potential oil leakage.

- After any repairs on the hydraulic system, the system must be thoroughly bled of air.

- The hydraulic hoses should be regularly inspected for defects such as cracks, kinks, wear or breaks. Defective hoses must be replaced immediately.

- Avoid spilling oil onto the ground. In the event of any spillage, the contaminated soil should be collected and disposed of.

- Ensure that you wash your skin thoroughly after coming into contact with oil and grease. Oil-soaked clothing should be changed immediately, as it can be harmful to the skin.

- Hydraulic oil that leaks under high pressure can penetrate the skin and cause serious injuries. In the event of any injuries, seek medical assistance.

- Do not use discs or flexible hoses as handles, as they are moving parts that do not provide a secure support.

Assembly

- There is a risk of pinching when assembling the machine. Ensure that no one is between the tool and the tractor or between the parts being connected.

- Do not use rings or flexible hoses as handles, as they are moving parts that do not provide a secure support.

Maintenance and repairs

- For all repair and maintenance work, the machine must be properly supported or stabilized, the tractor and machine must be safely braked, the engine must be turned off, and the keys must be removed.

- Oil, grease, and filters must be disposed of in accordance with applicable environmental regulations.

- Retighten all bolt connections after a few hours of use. All bolt connections must be checked at regular intervals and tightened when necessary. Check cotter pins and bolts to prevent breakdowns. Gross negligence of this and any resulting damage is not covered by the warranty.

Road transport

- When driving on public roads, all safety and warning devices required by law must be installed and tested. The driver is responsible for proper lighting and marking in accordance with traffic laws. Damaged parts must be replaced before driving on public roads.

- In terms of the dimensions of the machine, the driver must ensure with the traffic authorities that it can be transported on public roads.

- When transporting the machine, care must be taken to ensure that the tractor's total weight and axle load are not exceeded, and that the load on the tractor's front axle is not less than 20 percent of the total weight of the combination.

- Before starting road transport from the field in muddy conditions, you must clean the disc harrow and tractor tires of mud.

- The disc harrow must be in transport position when driving on public roads.

- Max. 40 km/h for road transport.

Correct use

- For the correct use of the machine, it is essential that you follow the manufacturer's operating, maintenance, and repair instructions and that you use original spare parts only.

- The disc harrow may only be used, maintained, and repaired by persons who are familiar with the machine and have knowledge of the hazards that may arise. Please contact the manufacturer if there is any doubt about the use of the disc harrow or the user manual.

- The manufacturer is not liable for damages resulting from modifications to the machine that have been made without the manufacturer's prior approval. Furthermore, the manufacturer is not liable for damages resulting from improper use. Responsibility for this lies solely with the user.

- No additional weight may be added to the disc harrow beyond the original weights that can be mounted on the disc chains as optional equipment.

Technical data

POWERCHAIN

Table 1. Technical data

Size [cm]	1200
HP min.	300
Gross weight [kg]:	
Basic machine	9800
Sections (pcs.)	4
Hydraulic requirements:	
3 DB + 1 SA[1]	X
1 SA + free return to sowing equipment	X
Gross weight of additional equipment [kg]	
Sowing equipment	200 kg
Extra weight (max.)	1500 kg
Swivel support wheels	-
Axle load [kg]	0.84 x gross weight
Support load [kg]	0.16 x gross weight

[1] DB = double-acting, SA = single-acting

How to read the instruction manual

The order of the described items may not appear to be in a logical sequence. Reference is therefore made to the table of contents where the headings for the relevant topics can be found.

The instruction manual is divided into 5 main sections:

- Safety
- Starting and operation
- Additional equipment
- Maintenance
- Repairs

The following symbols are used in the instruction manual for:

Points that are particularly important for functionality and the durability of the machine.

Points that are important for safety.

Delivery

The disc harrow is delivered complete on a flatbed trailer.

If the disc harrow needs to be lifted, we recommend attaching straps in the center section so that the machine hangs in balance. (See page 8, section “Safety, general”)

Incorrect rigging and lifting can cause serious damage to the machine and injuries to people around it.

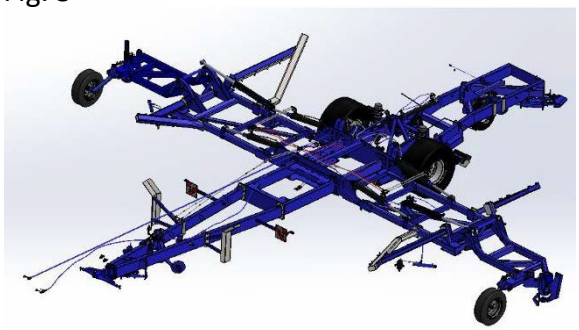
DALBO A/S does not accept liability for any damage in connection with inappropriate or incorrect rigging and lifting

Use

This is a standard disc harrow built to break up, cultivate, and level the very top layer of soil. The disc harrow is recommended for establishing a false seedbed after harvest, for preparing the seedbed for the subsequent crop, and for mechanical weed control.
The disc harrow is equipped with 4 rows of diamond-shaped chains with mounted discs.

The disc harrow is divided into 4 sections, but due to its design with discs on chains, it is highly effective at conforming to the contours of the field.

Fig. 5



POWERCHAIN 1200 without chains

Sowing equipment for establishing, for example, catch crops can be mounted on the disc harrow as additional equipment. The seeds are spread between the first and second disc rows for optimal soil contact and germination. If sufficient processing is not achieved under hard and dry conditions, up to 7.2 kg of additional weight per disc can also be added.

Connecting and disconnecting

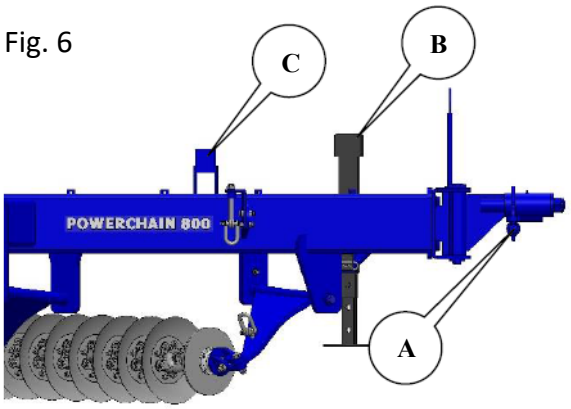
Connecting

The disc harrow is attached to the tractor's lift arms, where the pulling point (A) should be in the hook of the lift arm.

The lift arm pins are secured with a bolt and claw, after which the support leg (B) is raised and placed in the working position (C).

When adjusting the harrow to the tractor, it is important that the lift pins are pointing upwards.

Fig. 6



- Remember to secure the lift arm pins with a bolt or similar fastener.
- Remember to secure the support leg with a retaining ring or similar fastener.

- Hydraulic hoses and light wires must be installed in such a way that they are not damaged during operation.

Hydraulics

The disc harrow requires, as standard, three double-acting and one single-acting hydraulic outlets, where the double-acting outlets are for the wheel frame and outlet, and the single-acting outlet is for tensioning the disc chains. If sowing equipment is installed, an additional single-acting outlet with free return is required.

Table 2. Labeling of hoses

Cylinder name	Color	Outlet	Function
Wheel frame	Yellow	Double-acting	Lifts the disc harrow onto the wheels and lowers it into the working position.
Folds together the inner section + movable rear section	Red	Double-acting	Folds the inner sections and the tail section in/out.
Folds together the outer section	Blue	Double-acting	Folds the outer sections in/out.
Disc chains	White	Single-acting	Tighten disc chains

Disconnecting

The disc harrow must be either folded (in transport position) or fully unfolded in working position without chain tensioning.
Disconnecting is done in the reverse sequence of connecting.

Remember to relieve the pressure from the connection hoses to the hydraulic system before disconnecting the hoses.

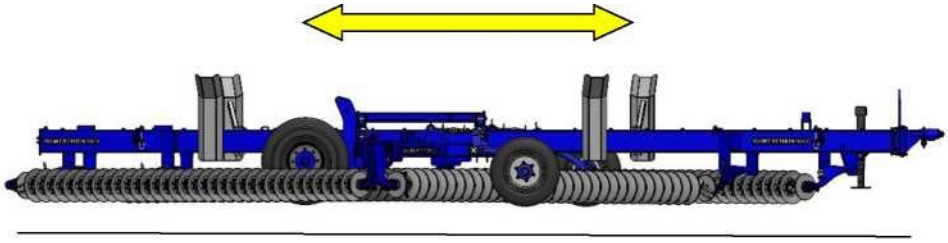
Adjustment

The disc harrow is factory preset, but fine-tuning will always be necessary before use. Several different adjustment options make your disc harrow more versatile and allow for optimal utilization of the machine.

Adjusting the tow height of the lift arms

To achieve uniform soil cultivation across the entire working width of the tool, the tractor's lift pins must be adjusted so that the frame of the disc harrow is parallel to the ground in the direction of travel when the discs are working in the soil.

Fig. 7

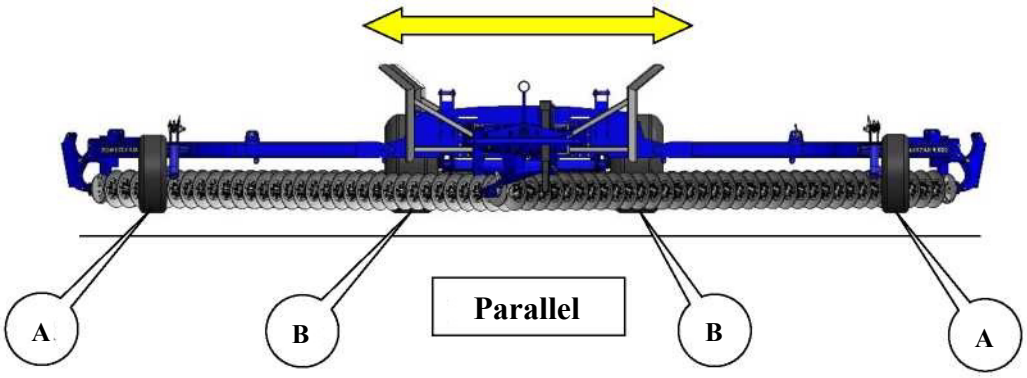


Parallel

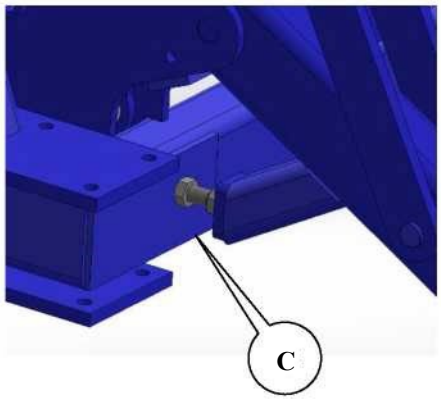
The tractor's lift pins should point upwards, as indicated in the drawing. If this is not the case, the lift linkage can be rotated 180 degrees so that the attachment points are positioned higher.

The same applies to the frames across the direction of travel, which should also be parallel to the ground when the discs are working.

Fig. 8



- Stop bolts (C) on the outer section are adjusted so that the frames of the inner and outer sections are parallel
- The wheel frame (B) is lowered to the bottom position
- The support wheels (A) are adjusted on the spindles so that the side frames are horizontal



The support wheels at the rear are adjusted so that the movable rear end and the fixed rear end are parallel.

Parallel

It is important for proper adjustment that the machine is placed on a flat, preferably horizontal surface when being set up.

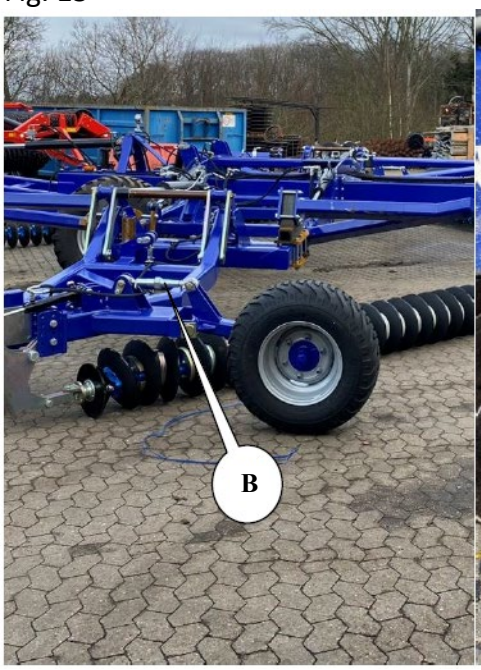
Fine tuning

The disc harrow must be finely tuned, and this fine-tuning should be done in the field where the results after harrowing can be assessed.

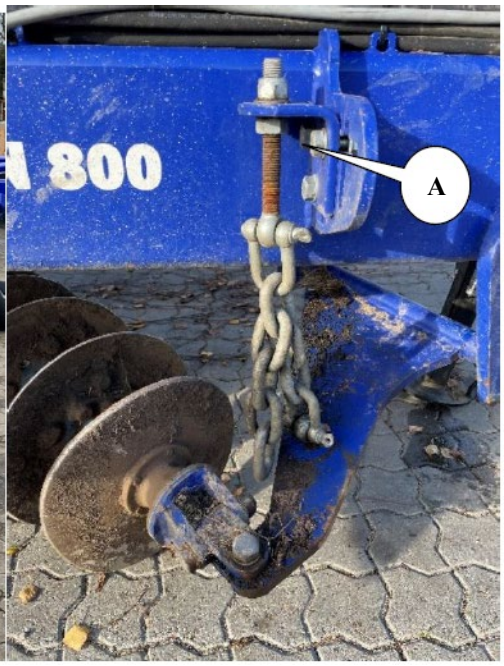
Each end of each chain can be individually adjusted.

First, the two front chains are adjusted to achieve a uniform working depth across the entire working width of the machine. This is done using the threaded spindles (A) at the front of the machine. These are marked as measurement points 1 and 2, along with the fine adjustment of the support wheels on the outer sections (B).

Fig. 15

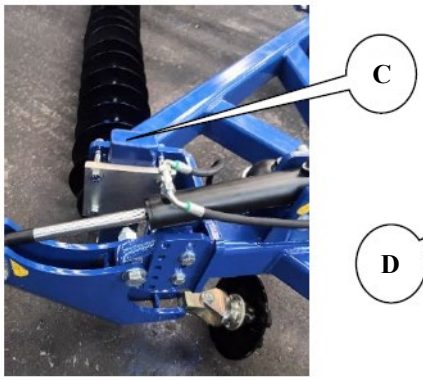


Side

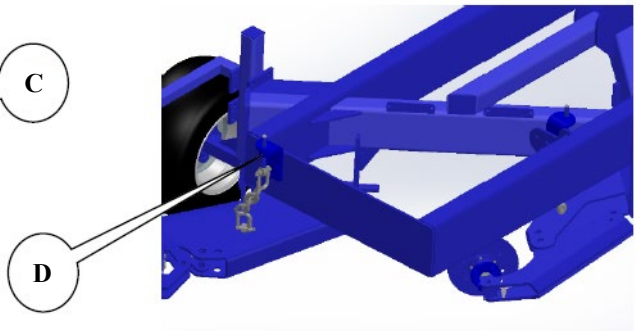


Front

Next, the rear chains are adjusted so that the harrow creates as smooth a working profile as possible behind the disc harrow, both at the transition between the two side sections in the center of the harrow and at the overlap between two pulls. This is done by adjusting the square tube up or down (C) or using threaded spindles (D) marked measurement points 3 and 4. The setting depends on soil type, vegetation cover, soil moisture, and travel speed.



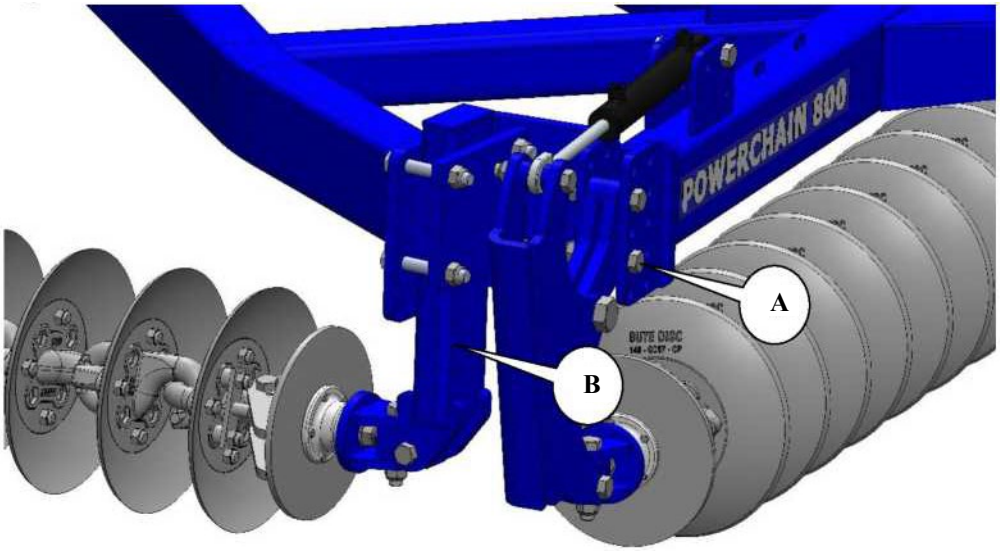
Side



Rear

The front disc chain can also be adjusted in height on the outer section. (A) belongs to the adjustment of the front chain, (B) belongs to the adjustment of the rear chain.

Fig. 16

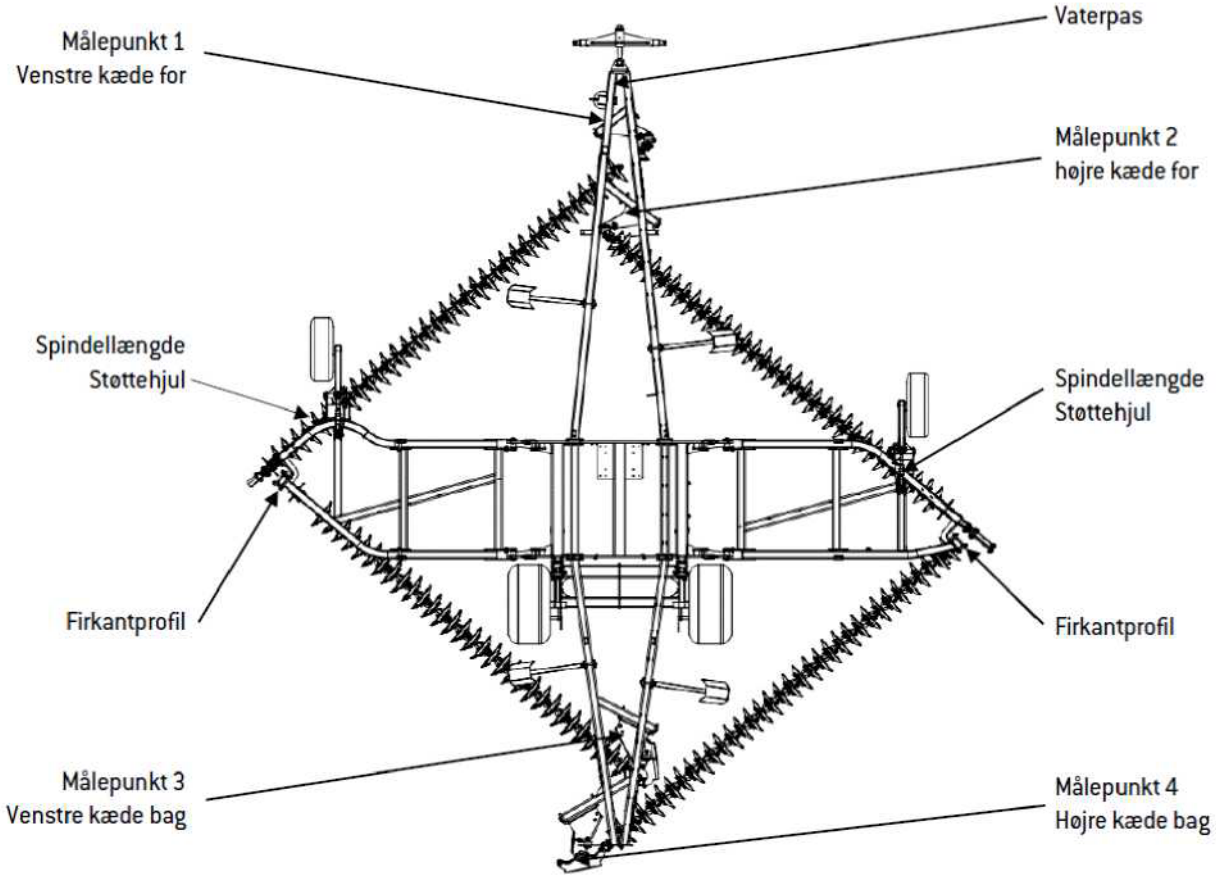


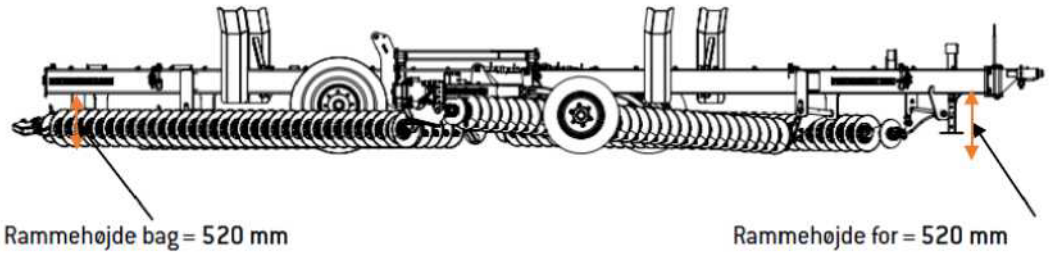
This adjustment option can be used as the discs become worn. As the discs wear, the entire frame must be lowered further toward the ground to achieve the same tillage. This reduces the ground clearance between the bottom edge of the frame and the soil surface, which increases the risk of plant residues blocking underneath the machine. When adjusting at the 2 points at the outermost part on each side, it is important that a corresponding up/down adjustment is made on the threaded pieces at the front and rear. This is to maintain the same fine adjustment of the working image behind the machine's center.

If (A) is moved, the support wheel must be adjusted so that the depth of the fork chain fits again. The depth of the rear chain (B) is adjusted to match the front chain.

Basic setting (factory setting)

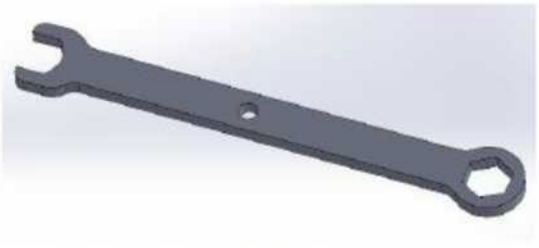
Oversigt over målepunkter og deres placering.





Tools:

Measuring stick or tape measure.



Ring open-ended wrenches: 2 x NV30 +1 x NV60

Measurement point 1 - left chain for 540 mm

Measurement point 3 - right chain for 540 mm

Measurement point 3 - left chain for 440 mm

Measurement point 4 - right chain for 460 mm

Spindle length support wheel C-C = 505 mm

The spindle length is set equally on both sides.

Spirit level

When the tractor with the harrow is on a level surface, it can be adjusted using the level.

Square profile 65 mm

The square tubes are set equally on both sides.

Driving and operating

Proper operation is important to achieve the best performance from your disc harrow. This applies to both field work and safety. It is therefore important to have a good understanding of the safety measures for the machine.

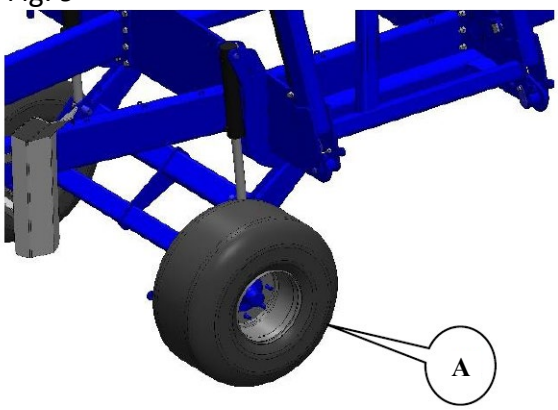
Unfolding and folding

Unfolding and folding are done with the tractor parked

Unfolding

1 The machine is lifted completely onto the wheel frame (A) via the hydraulics (marked: Yellow).

Fig. 9



2 Chain tensioner (white) is set to float position

Fig. 10

3 The cylinders for unfolding and folding of the inner section and rear section (marked: Red) are activated, and the inner side sections and the movable rear end are fully unfolded. Cylinders are NOT set in float position.

Fig. 11

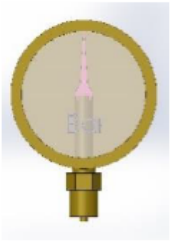
4 The cylinders for the outer sections are activated and fully unfolded; the cylinders are NOT set to float position.

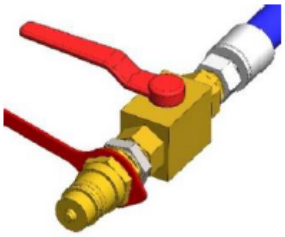
Fig. 12

180 bar

5 The disc chains now hang loosely in downward arcs and need to be tightened before work begins.

6 With the open valve on the single-acting hose (marked: White) the pressure is now raised to 180 bar on the manometer, and the valve is closed. This tightens the chains and the disc harrow is ready for use.





Folding

1 The machine is lifted slightly onto the wheel frame, with approximately 10 cm extension on cylinder (A) via the hydraulics (marked: Yellow).

Fig. 13

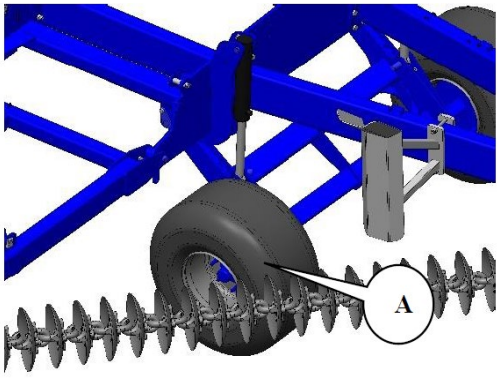
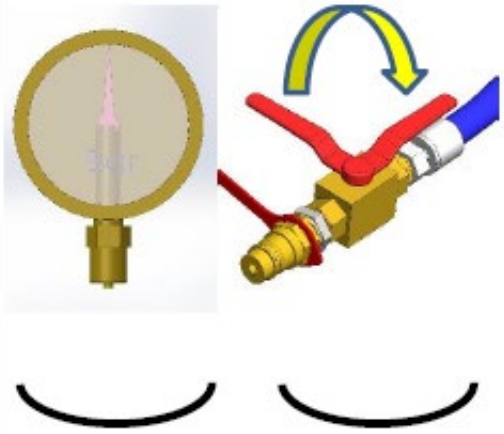


Fig. 14

2 The disc chains are tight and must now be loosened so that they hang in downward arcs.

3 With the open valve on the single-acting hose (marked: White) the pressure is now lowered to 0 bar on the manometer. This loosens the chains. The outlet is set to float position during the folding process. During the remaining part of the folding process, the manometer should be monitored to ensure it remains at 0 bar.

0 bar

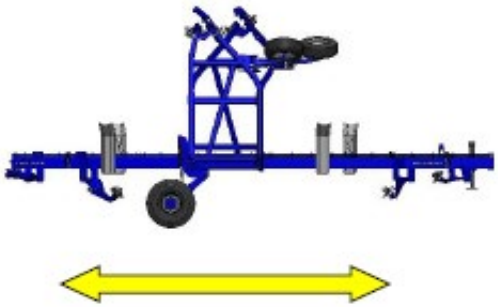


4 The disc chains now hang loosely in downward arcs and the disc harrow is ready for folding.

5 The cylinders for unfolding and folding of the outer sections (marked: blue) are activated, and the outer sections are folded fully together.

6 The cylinders for the inner sections and movable rear section (marked red) are activated. The sections are folded fully together

7 Adjust the height of the tractor's lift pins and the disc harrow's wheel frame so that the machine is horizontal in the direction of travel before beginning road transport. It is an advantage to lower the machine as much as possible during road transport. Check the chain's ground clearance.



Horizontal

Before road transport, it is very important that the machine is cleaned to such an extent that no soil, stones, or plant residues are spilled on public roads.

Driving speed

It is recommended that you drive at approximately 12 km/h, but you should always adjust your speed according to the conditions.

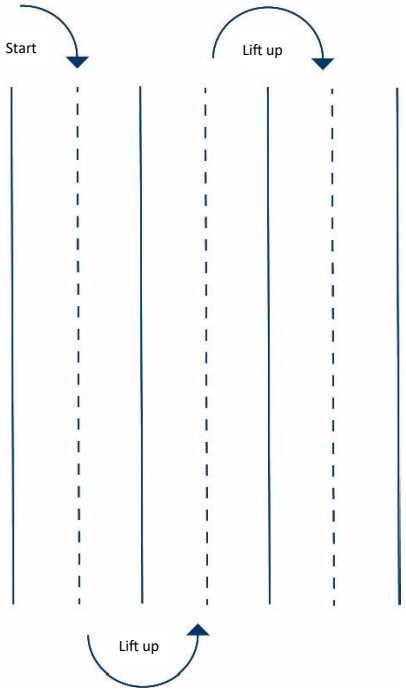
If the speed increases, wear also increases, especially under dry conditions. There will also be a risk of damage to wear parts when driving at excessive speed under unfavorable conditions.

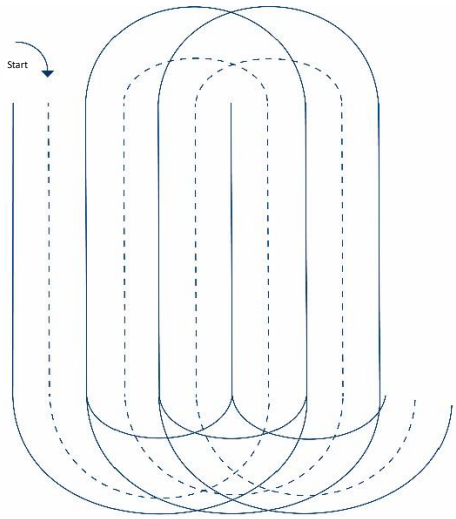
The power requirement is highly dependent on soil type, working width, terrain, and speed. See the table “Technical data”.

Tilling on low-lying land

Two methods can be used when tilling on low-lying land.

1. Lift the disc harrow clear of the ground using the tractor’s lift and the transport wheels on the disc harrow, then turn 180 degrees and drive into the track next to the one just created.
2. If GPS is used, it is possible to make a wide arc on the low-lying ground without lifting the machine and drive into a track 3-4 widths further out. It is important that the turn is wide enough so that the inner parts of the harrow do not drive backward at any point.





Troubleshooting

Table 4:

Error	Cause	Remedy
The sides work too deeply	• Support wheels on the sides are set too high	• Lower the support wheels
The center works too deeply	• Support wheels on the sides are set too low	• Raise the support wheels
Depression behind the center of the disc harrow	• Disc harrow not horizontal in the direction of travel. Tipping backwards	• Lower the tractor's lift pins
	• Incorrect adjustment of the front threaded rods. See the section "fine adjustment"	• Lower the front threaded rods
	• Incorrect adjustment of the rear threaded rods. See the section "fine adjustment"	• Raise the rear threaded rods
Elevation behind the center of the disc harrow	• Disc harrow not horizontal in the direction of travel. Tipping forwards	• Raise the tractor's lift pins
	• Incorrect adjustment of the front threaded rods. See the section "fine adjustment"	• Raise the front threaded rods
	• Incorrect adjustment of the rear threaded rods. See the section "fine adjustment"	• Lower the rear threaded rods

Additional equipment

It is possible to equip POWERCHAIN with various types of additional equipment.

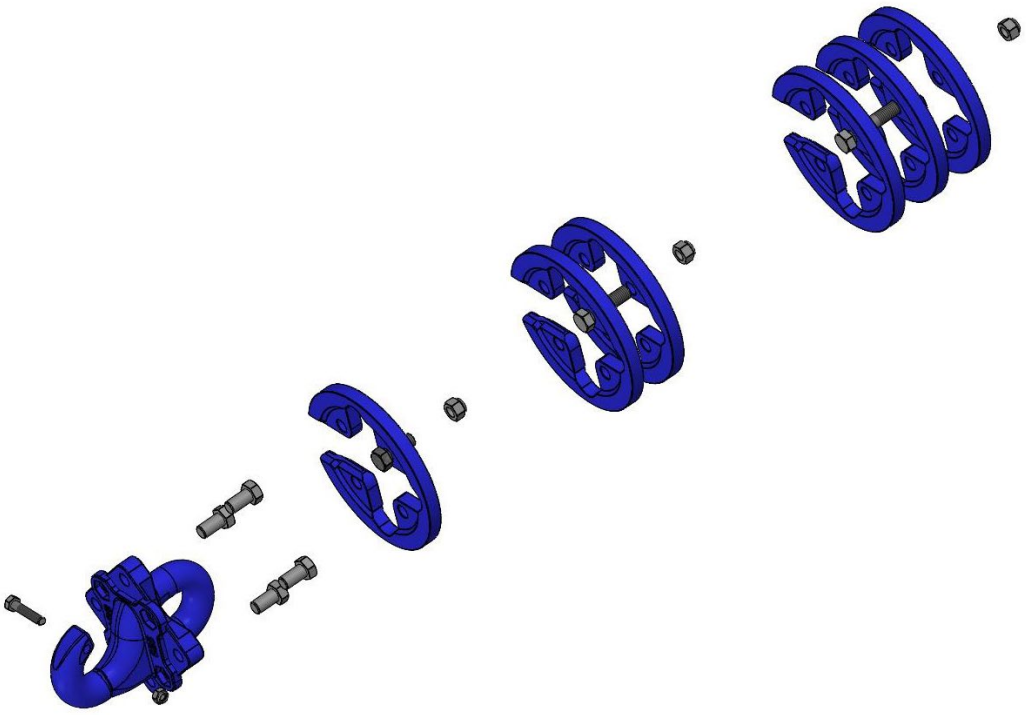
- Extra weights
- Hydraulic brakes
- Swiveling support wheels

Extra weights on the discs

Retrofitting

In dry and extremely hard conditions, it can be beneficial to attach up to 3 weights of 2.4 kg per disc. They will increase the total weight of the disc harrow by 15, 30, and 45 kg per meter of chain, respectively. By attaching the weights, it will be easier for the discs to work through the hard and dry soil to the desired working depth on the first pass.

Fig. 19



See the spare parts manual for item numbers on weights with accompanying bolts.

It is important to mount all the weights correctly and with the right bolt length. This is to ensure that weights are not lost during field work or transport on the road.

Mounting of weight discs on the disc units

Tools:

Most nuts can be tightened with a ratchet wrench NV24.

Some must be tightened with an open-end wrench NV24.

1 weight disc/disc unit

Here, M16 x 40 bolts + M16 lock nuts are used.



2 weight discs/disc units

Here, M16 x 60 bolts + M16 lock nuts are used.




3 weight discs/disc units

Here, M16 x 80 bolts + M16 lock nuts are used.

In some cases, the nut on the locking nut can only be tightened with an open-end wrench.

General points:

Bolts must be installed in all 4 holes. Note that the nuts are on the same side as the weight disc, and the bolt head is seated in the hexagonal hole of the blue chain link.

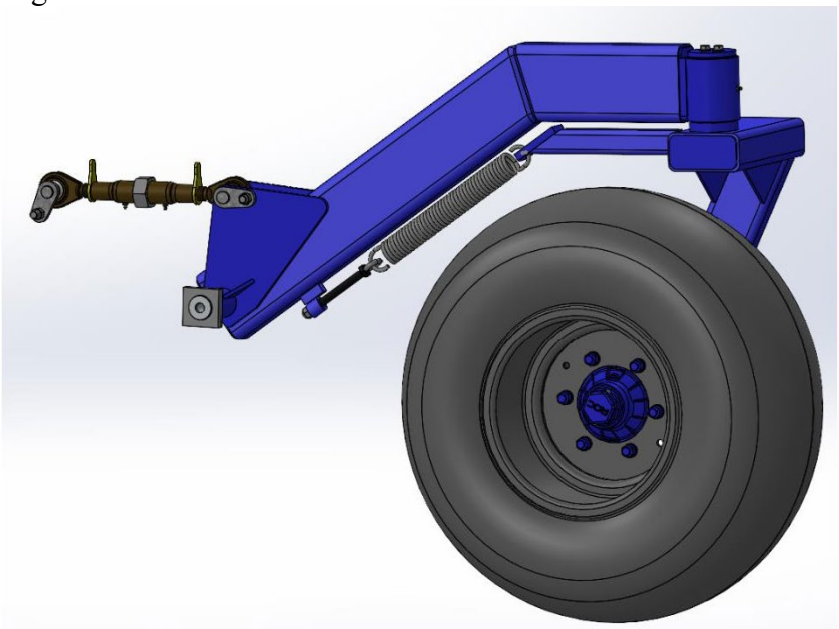
Selection of brake system

As the machine's axle load exceeds 3.5 tons, the disc harrow must be equipped with either pneumatic or hydraulic brakes. This legislation is applicable in all EU countries. The type of brake is chosen based on the tractor that will be used with the disc harrow and is selected when ordering the disc harrow.

Swiveling support wheels

As an option, the machine can be equipped with pivoting support wheels, which should be added to the machine in cases where the user wishes to turn on low-lying ground with the disc harrow in the soil. If the disc harrow is turned on low-lying ground while in the soil with standard mounted "non-pivoting" support wheels, it can cause excessive wear on the tires of the support wheels or break the frames.

Fig. 20



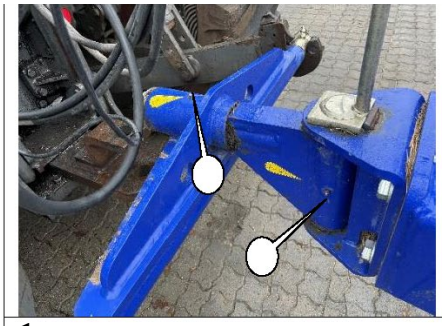
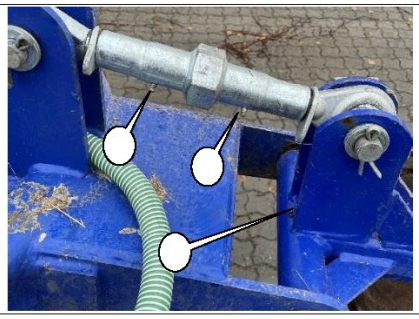
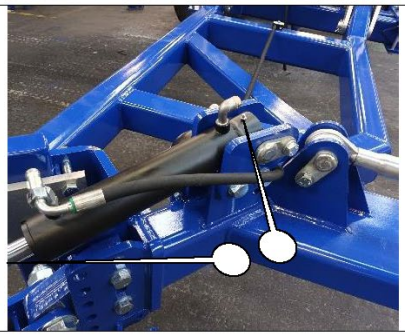
Maintenance

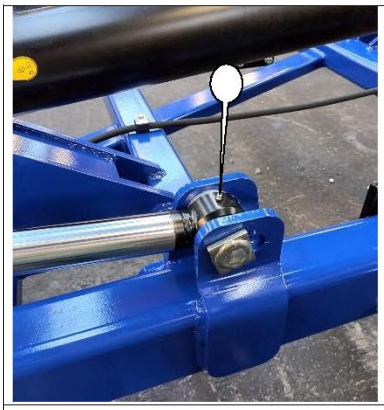
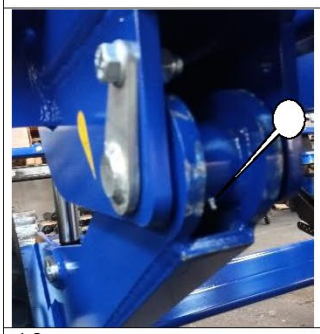
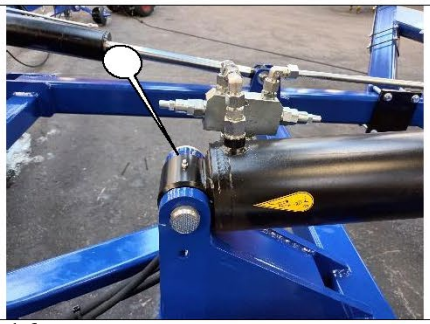
Good maintenance ensures a long lifespan for the disc harrow and therefore optimal performance from the machine. Grease nipples are therefore installed in areas where wear is greatest.

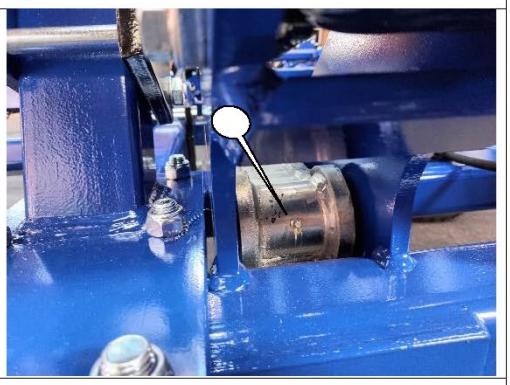
Retighten all screw connections after the first working day. Check cotter pins and bolts to prevent breakdowns. Also check that the hydraulic system is sealed.

Lubrication

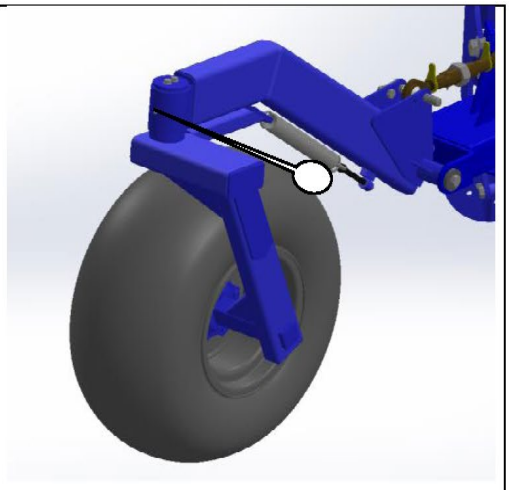
Table 7:

	
1	**2**
	
3	**4**
	
5	6

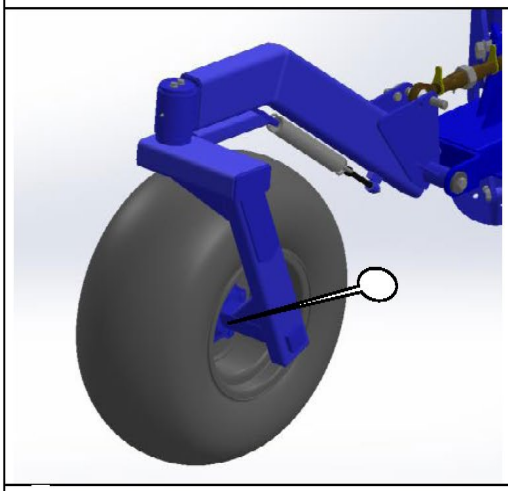
	
7	8
	
9	10
	
11	12
	
13	14
	
15	16

	
17	18
	
19	20
	
21	22
	
23	24

25



26



27

Lubrication points	Number of nipples	Lubrication interval hours	Image
Lift drawbar at the front	2	8	1
Disc chain suspension at the front	2	8	2
Swivel joint at inner sections	4	8	3
Support wheels sides – suspension	6	8	4
Support wheels sides – hub	2	8	5
Tension cylinder for disc chain – front	4	8	6
Cylinder for inner section – piston rod	4	8	7
Cylinder for inner section – housing	4	8	8
Tension cylinder + suspension for disc chain – rear	4	8	9
Tension cylinder for disc chain – rear	2	8	10
Cylinder for wheel frame – top	2	8	11
Cylinder for wheel frame – bottom	2	8	12
Wheel frame	2	8	13
Wheel – wheel frame	2	50	14
Cylinder for outer section – piston rod	2	8	15
Cylinder for outer section – cylinder tube	2	8	16
Pivot joint at outer section 1	2	8	17
Pivot joint at outer section 2	2	8	18
Pivot joint at outer section 3	2	8	19
Pivot joint at outer section 4	2	8	20
Support legs	1	50	21
Movable rear section	3	8	22
Cylinder for movable rear section – cylinder tube	1	8	23
Cylinder for movable rear section – piston rod	1	8	24
Support wheel on movable rear section	2	50	25
Swivel support wheel – caster bracket	2	8	26
Swivel support wheel – wheel hub	2	50	27

All lubrication points should be lubricated at least once a year. It is also recommended that you spray the extending piston rods with oil after the disc harrow has been cleaned, washed, and stored when parked for long periods at the end of the season.

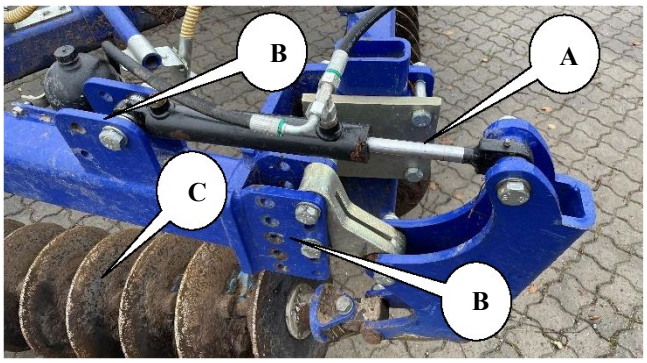
Some lubrication points are easiest to access with the machine unfolded. It is recommended that you position the machine (folded/unfolded) so that the grease nipple can be reached without having to step onto the disc harrow.

Adjustment

Adjusting disc chains

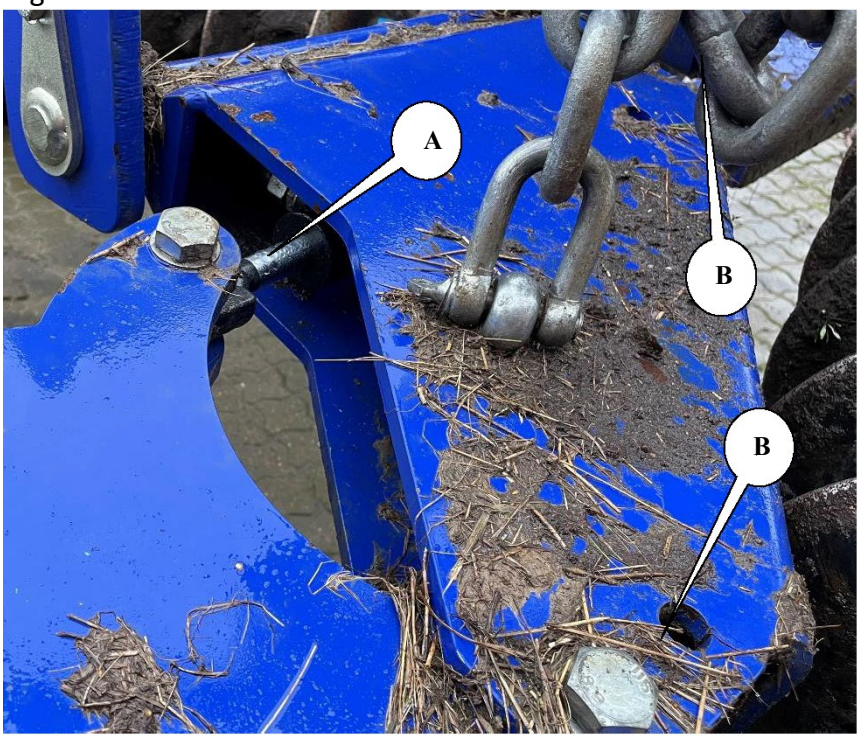
After the first season, there will be wear on both the discs and the disc chains. When the disc harrow is unfolded and the disc chains are tightened via the tension cylinder, with the manometer showing 180 bar and the valve closed, a contraction of the cylinder will have occurred, as shown in the images in figures 21-22 (A) below.

Fig. 21



Chains at the front

Fig. 22

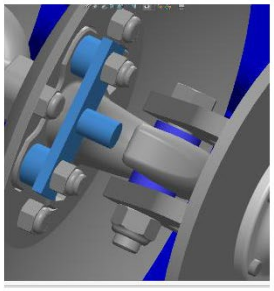


Chains at the rear

As a general rule, there is no need for adjustment or to possibly remove a chain link as long as some of the piston rod (A) in figures 21-22 is visible while the manometer shows 180 bar. If, on the other hand, none of the piston rod (A) in figures 21-22 is visible at 180 bar of pressure, lateral adjustment will be needed at points (B) in figures 21-22, or there may be a need to remove an entire chain link along with the associated disc (C) in figure 21.

Securing the chain

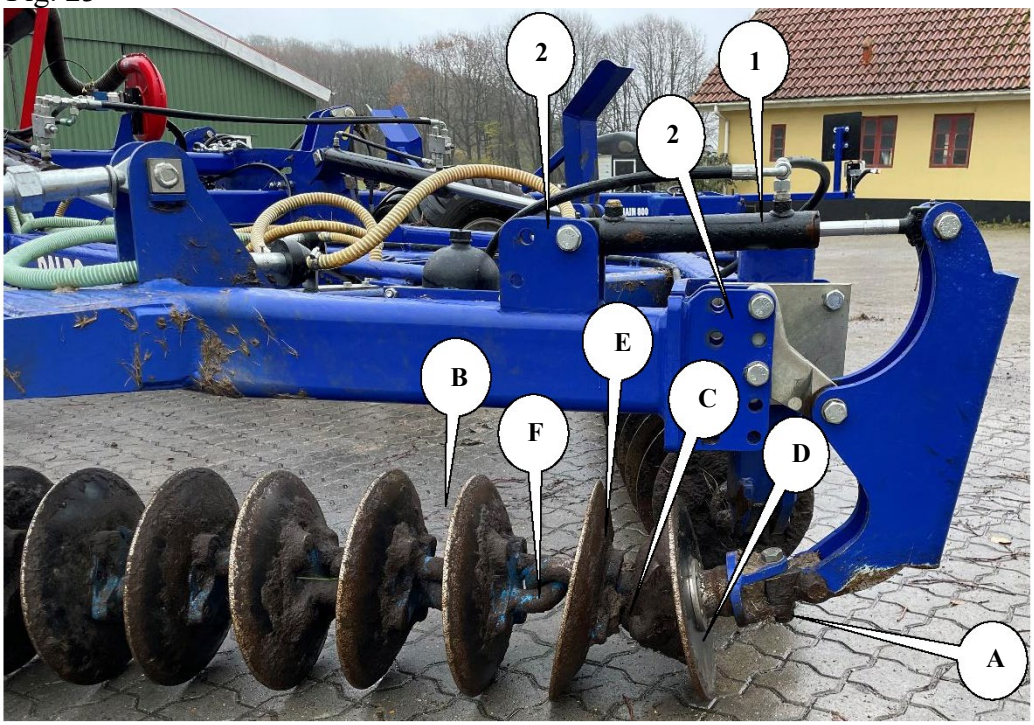
Check that there are lock nuts on all chain links and that the locking brackets are in place



Removing chain links

Removal of the disc chains, and thus individual chain links, is carried out with the machine unfolded, all discs resting on the ground, and 0 bar on the manometer. This is always done at the end where the tension cylinder (1) fig. 23 is mounted.

Fig. 23



Loosen the bolt (A), and roll the disc chain (B) to the side for better access. Then, remove the bolt (C) between the end disc (D) and the first disc chain link (E). The end disc (D) can now be removed. The disc chain link (E) is then removed by first loosening the disc on the chain link itself and then removing the small locking bolt (F). The chain link is then rotated out of the chain.

Installation of a smaller chain link in the row is now carried out in reverse order. When installation involves using 1 less chain link in the row, there may be a need for lateral adjustment of the suspension at points (2) fig. 23.

Wheel

The wheel bearings are checked once a year. Lift the wheel clear of the ground (see under the section “Tire pressure”).

Adjustment and lubrication of wheel bearings

1. Remove the hub cap.
2. The splitter is removed.
3. Tighten the castellated nut by 1/6 of a turn so that the hole aligns with the axle. The wheel is rotated and should not turn stiffly. There should be a slight amount of play felt in the hub casing when the wheel is moved from side to side. If there is still a lot of play, the process is repeated.
4. Install the cotter pin
5. Fill ¾ of the hub cap with grease and install it.

Tire pressure

The tables below show the load, speed, and tire pressure in relation to each other for the different tire combinations.

When working in the field, it is recommended that you lower the tire pressure on the transport wheels 600/50-22.5 to 1.8 bar to prevent the disc harrow from bouncing.

300/80-15.3 STARCO

300/80-15.3 STARCO AW [SG-316] FREE WHEEL 131AS (128B)													
1.0 bar	**1.2 bar**	**1.4 bar**	**1.6 bar**	**1.8 bar**	**2.0 bar**	**2.2 bar**	**2.4 bar**	**2.6 bar**	**2.8 bar**	**3.0 bar**	**3.2 bar**	**3.4 bar**	**SPEED**
1335	1485	1625	1755	1880	2000	2115	2225	2335	2435	2540	2635	2730	**10 km/h**
1270	1410	1545	1570	1790	1905	2010	2115	2220	2315	2410	2505	2595	**15 km/h**
1205	1340	1465	1585	1695	1805	1905	2005	2105	2195	2285	2375	2460	**20 km/h**
1135	1260	1380	1495	1600	1700	1800	1895	1985	2070	2155	2240	2320	**25 km/h**
1070	1190	1300	1405	1505	1600	1695	1785	1865	1950	2030	2110	2185	**30 km/h**
1000	1115	1220	1320	1415	1505	1590	1675	1755	1830	1905	1980	2050	**35 km/h**
955	1060	1160	1255	1345	1430	1510	1590	1665	1740	1815	1885	1950	**40 km/h**
880	980	1070	1160	1240	1320	1395	1470	1540	1605	1675	1740	1800	**50 km/h**

600/50-22.5

Load Index PR Symbols	Inflation Pressure bar	Recommended Load							
		Speed							
		Drive wheel				Free rolling			
		10 kmph	25 kmph	40 kmph	50 kmph	10 kmph	25 kmph	40 kmph	50 kmph
16PR 165A8 161B 153A8 149B	0.8	2560	2180	1830	1647	3630	3080	2590	2330
	1.5	3710	3150	2650	2385	5240	4450	3740	3370
	2	4380	3720	3130	2817	6190	5260	4420	3980
	2.2	4630	3940	3310	2980	6540	5560	4670	4200
	2.4	4870	4140	3480	3130	6870	5840	4910	4420
	2.6	5110	4340	3650	3285	7210	6130	5150	4640

Hydraulics

All hydraulic hoses must be checked for wear or damage. Check that the hoses are not subjected to pinching.

When parked for an extended period, the extending piston rods should be coated with oil or pressure grease to prevent rust from forming on the piston rods. Remember to remove it again before use.

Replacement and repairs

	Safety is important for **all** repair work on the disc harrow. The following points must therefore always be observed, along with the safety points at the start of the instruction manual.
	When replacing cylinders, the cylinder must always be filled with oil before it is subjected to load. It is therefore recommended that you install the cylinder in the fixed part of the frame first, after which the cylinder is filled with oil by moving it back and forth several times before installing it in the opposing part.
	All maintenance and repair work on the disc harrow may only be carried out when the machine is lowered onto the ground or held in the transport position, the tractor is braked, the engine is stopped, and the ignition key is removed to prevent accidental starting of the machine.
	For all repair work on the hydraulics, special attention must be paid to safety. Before starting the work, release the pressure in the hydraulic system and, if necessary, support the component.
	After repair work on the hydraulic system, the system must always be bled before use to ensure protection against breakdown and personal injury.

Hydraulics

Replacement of cylinder for unfolding and folding the inner sections.

The repair is carried out with the disc harrow unfolded and the inner sections resting on supports at the outer ends of the inner sections. The ground must be firm and level.

1. Release the pressure from the cylinders. Note that due to the over-center valves, there may be residual pressure in the cylinder.
2. Remove the hoses.
3. Remove the cotter pins and pins, after which the cylinder is free.
4. The over-center valve is removed either for installation on the new cylinder or to prevent damage during the repair of the cylinder.
5. Install the new or repaired cylinder on the center frame. Remember to ensure the pin is engaged in the pin stop and secure it with a cotter pin.
6. Install the hoses and the over-center valve.
7. Support the cylinder so that the piston rod can extend freely. Carefully feed oil into the cylinder and move the cylinder back and forth several times. It is important that the side sections are not moved by the remaining cylinders.
8. The piston rod is now mounted on the inner section. Remember to secure the pin with a cotter pin.
9. After installation, ensure that there is no risk of the hoses tearing or pinching.
10. Fold the inner sections in and out several times to check the repair and to provide additional bleeding of the system.
11. Unfold the inner sections and check the repair for leaks.

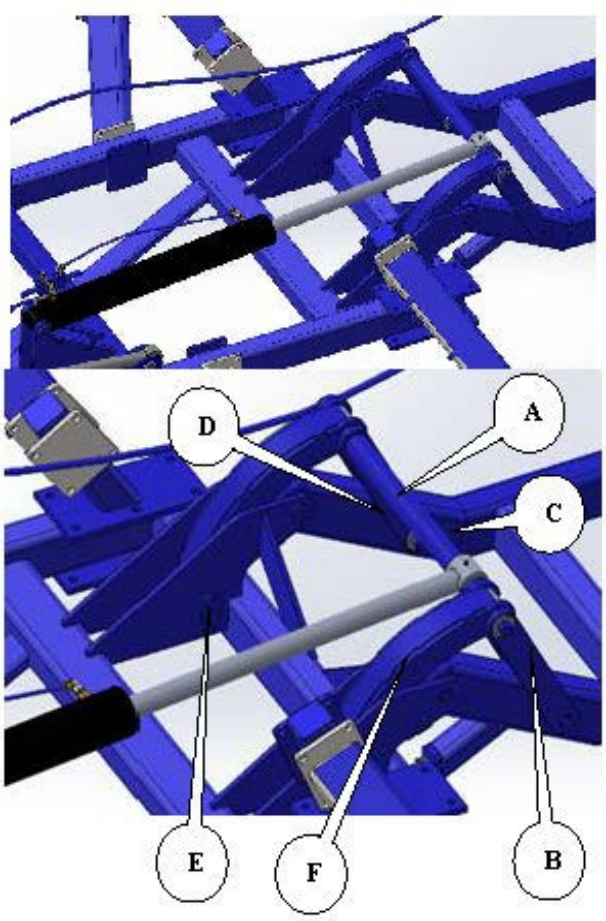
Replacing the cylinder for lifting the rear section

The same procedure is followed as for the cylinders for the inner section.

Replacing the cylinder for lifting the outer section

Access to a crane or similarly approved lifting equipment is necessary

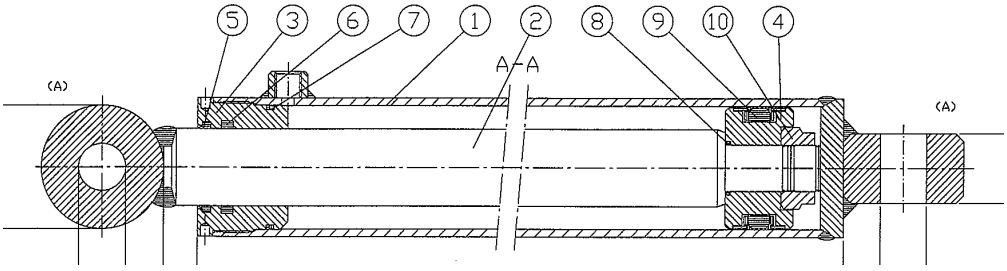
1. Support the inner section and outer section so that they rest without hydraulic support.
2. Axle position (A) is supported in the crane.
3. Points 4, 5, and 6 are performed simultaneously on both sides of the outer section.
4. Remove the intermediate arms at position (B), remembering to remove the cotter pin at position (C) first. Once the intermediate arms at position (B) are removed, the intermediate arms at position (D) will swing down.
5. Remove the pins at position (E), allowing the inner arms at position (F) to be swung up and pulled off the axle. **Once the pin for the second inner arm is removed, the axle will hang loose.**
6. The intermediate arms at position (D) can be tilted up and pulled off the axle.
7. Support the cylinder tube (against the inner section) and lower the crane. The axle pos. (A) can now be removed.
8. remove hoses from the over-center valve; if necessary, the cylinder can be carefully moved to the negative position first, minimizing the amount of oil in the cylinder.
9. The pin on the tube side can now be removed, and the cylinder is free.
10. Install the new or repaired cylinder on the center frame.
11. Hoses and, if applicable, the over-center valve are installed.
12. Support the cylinder so that the piston rod can extend freely. Carefully feed oil into the cylinder and move the cylinder back and forth several times. It is important that the outer section is not moved by the cylinder on the opposite side.



Ensure that no one is within the working radius of the equipment.

Replacement of gaskets

Fig. 25



1. The cylinder is emptied of oil by gently moving the piston back and forth.
2. Move the piston to the center position, after which the upper section (pos. 3) is unscrewed from the cylinder tube (pos. 1). A special tool is required to remove the upper section. If the upper section is stuck, this can be remedied by gently heating the front part of the upper section. Once the upper section is unscrewed from the cylinder tube, pull out the piston towards the top part, after which the piston rod can be pulled out of the cylinder tube (pos. 1).
3. Remove the locking nut (pos. 10) that secures the seal ring (pos. 4).
4. Pull the seal ring (pos. 4) off the piston rod (pos. 2).
5. Pull the upper section (pos. 3) off the piston rod (pos. 2).
6. Remove the seals in the upper section (pos. 5+6+7+8+9) and the seal ring.
7. All parts are cleaned and checked for chips, burrs, etc. Check for rust formation around the scraper (pos. 5) in the upper section. If this is the case, it must be removed.

Assembly

1. Install new seals (pos. 5+6+7+8+9) on the upper section as well as the seal ring.
2. Lubricate the threads on the upper section (pos. 3) and the cylinder tube (pos. 1) with oil.
3. Install the upper section (pos. 3) on the piston rod.
4. Install the seal ring (pos. 4) and screw on the locking nut and **secured it with Loctite**. Ensure that the threads are completely clean and free of oil and other impurities before using Loctite. **Oil must not be added within 12 hours after using Loctite.**
5. Lubricate the outer seal on the seal ring that comes into contact with the cylinder tube, as well as the inside of the cylinder tube, with oil, and push the piston into the middle position.
6. Install the upper section on the cylinder tube and tighten it.
7. For installing the cylinder, see “Replacing“.

Replacing the cylinder for the wheel frame

Unfold and lower the disc harrow onto a secure support (A) on each side of the machine, as shown in Figure 24. The wheels are then lifted off the ground and lowered again until they just rest on the ground. Release the pressure from the tilt cylinder (B).

Fig. 24

1. Remove the hoses from the cylinder.
2. Support the cylinder.
3. Remove the cotter pins in the pins and then remove the pins.
4. The cylinder can be removed.
5. The new or repaired cylinder can be installed.

After assembly, activate the tipping cylinder until there is a slight movement in the cylinder. The cylinder is then activated in the opposite direction until it is back in the starting position. Move the cylinder back and forth in this manner a few times, and then move the cylinder into its end positions several times to bleed the system.

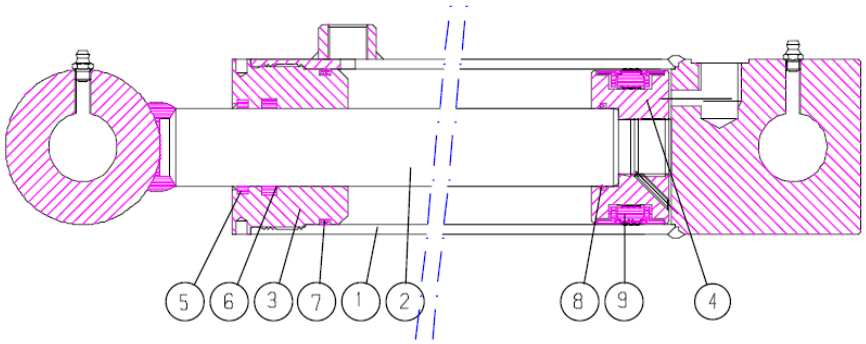
Ensure that no one is within the working radius of the equipment.

Replacing the set of gaskets in the wheel frame cylinder

DISASSEMBLY:

1. Drain the cylinder of oil (use compressed air if necessary to move the piston back and forth to push the oil out).
2. Move the piston to the mid-position. The upper section (pos. 3) is unscrewed by 30 mm. If the upper section is stuck, this can be remedied by gently heating the front part of the upper section. Once the upper section is unscrewed, the piston is pulled toward the upper section, after which the upper section is completely unscrewed and the piston rod is pulled out.
3. Remove the seal ring (pos. 4).
4. Pull the upper section off the piston rod (pos. 2).
5. Remove the seals in the upper section and the seal ring (pos. 5+6+7+8+9) (use a pick or screwdriver if needed).
6. All parts are cleaned and checked for chips, burrs, etc. Check for rust formation around the scraper ring (pos. 5) in the upper part. If this is the case, it must be removed.

Fig. 27

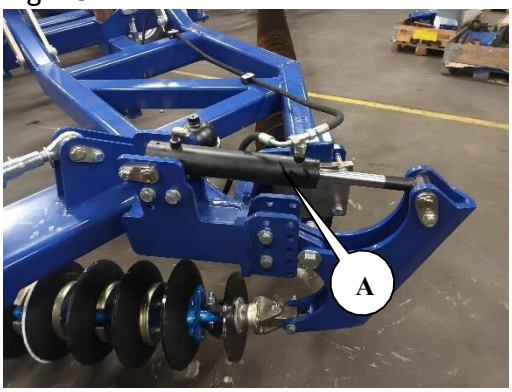


ASSEMBLY:

1. Install new seals in the upper section and the seal ring. The scraper ring at pos. 5 is installed using a piece of pipe that fits snugly around the lip (or a special mandrel). The cuff at pos. 9 on the machine foot is installed using a round bar/screwdriver.
2. The threads on the upper section and the cylinder tube are lubricated with grease (rust-protective anti-seize compound).
3. Install the upper section (pos. 3) on the piston rod.
4. The machine foot at pos. 4 is installed and sealed with Loctite.
   Ensure that the threads are completely clean and free of oil and other impurities before using Loctite.
   Oil must not be added within 12 hours after using Loctite.
5. Lubricate the cuff at pos. 9 on the machine foot and the inner end of the cylinder tube with lubricating oil, and push the piston into the central position.
6. Screw on the upper section and tighten it.

Replacement of cylinder for tightening the disc chain

Fig. 28



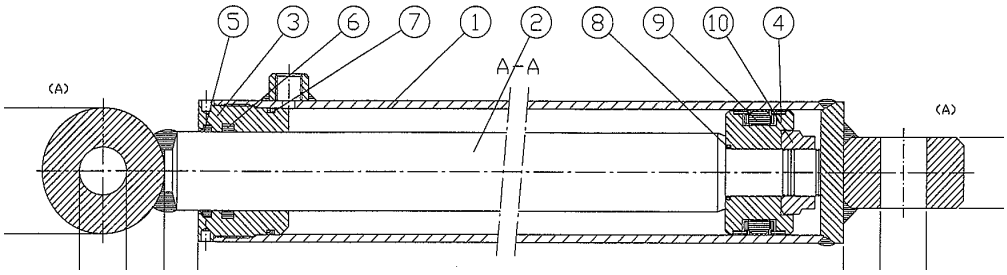
1. The disc harrow is unfolded with the disc chains resting on the ground.
2. Check that the pressure is released from the manometer so that the cylinder (A) is pressure-free.
3. Remove the hoses from the cylinders.
4. Remove bolts, cotter pins, and pins (B).
5. The new or repaired cylinder (A) is installed.
6. Remember to mount cotter pins in the pins.

After assembly, activate the tipping cylinder until there is a slight movement in the cylinder. The cylinder is then activated in the opposite direction until it is back in the starting position. Move the cylinder back and forth in this manner a few times, and then move the cylinder into its end positions several times to bleed the system.

Ensure that no one is within the working radius of the equipment.

Replacing the set of gaskets when tightening the disc chain

Fig. 29



1. The cylinder is emptied of oil by gently moving the piston back and forth.

2. Move the piston to the center position, after which the upper section (pos. 3) is unscrewed from the cylinder tube (pos. 1). A special tool is required to remove the upper section. If the upper section is stuck, this can be remedied by gently heating the front part of the upper section. Once the upper section is unscrewed from the cylinder tube, pull out the piston towards the top part, after which the piston rod can be pulled out of the cylinder tube (pos. 1).
3. Remove the locking nut (pos. 10) that secures the seal ring (pos. 4).
4. Pull the seal ring (pos. 4) off the piston rod (pos. 2).
5. Pull the upper section (pos. 3) off the piston rod (pos. 2).
6. Remove the seals in the upper section (pos. 5+6+7+8+9) and the seal ring.
7. All parts are cleaned and checked for chips, burrs, etc. Check for rust formation around the scraper (pos. 5) in the upper section. If this is the case, it must be removed.

Assembly

8. Install new seals (pos. 5+6+7+8+9) on the upper section as well as the seal ring.
9. Lubricate the threads on the upper section (pos. 3) and the cylinder tube (pos. 1) with oil.
10. Install the upper section (pos. 3) on the piston rod.
11. Install the seal ring (pos. 4) and screw on the locking nut and **secured it with Loctite**. Ensure that the threads are completely clean and free of oil and other impurities before using Loctite. **Oil must not be added within 12 hours after using Loctite.**
12. Lubricate the outer seal on the seal ring that comes into contact with the cylinder tube, as well as the inside of the cylinder tube, with oil, and push the piston into the middle position.
13. Install the upper section on the cylinder tube and tighten it.
14. For installing the cylinder, see “Replacing “.

Removing/mounting wheels on roads

For removing wheels on roads, support the main frame of the disc harrow at point (A) in Fig. 28 with a stand or jack, as shown in the images below. The wheel will therefore be lifted off the ground.
Fig. 30

Remove the wheel nuts and the wheel can be replaced. After installing the new wheel, the nuts are screwed on and tightened with a “firm hand”. Next, lower the wheels so that they are touching the ground and tighten the nuts to 300 Nm.

It is important that the wheel nuts and the rim’s contact surfaces are clean as the wheel nuts may loosen otherwise.

It is important that the lifting device can support at least 75% of the machine’s total weight. The machine must also be properly braked and secured.

Removing/mounting wheels in the field

To remove the wheel, unfold the disc harrow with the disc chains resting on the ground. The machine is then supported at points (A) in Fig. 30, and the wheels will thus be lifted off the ground. If the support does not have sufficient bearing surface relative to the ground’s load-bearing capacity, driving plates or similar should be used to ensure this.
Fig. 31

Remove the wheel nuts and the wheel can be replaced. After installing the new wheel, the nuts are screwed on and tightened with a “firm hand”. Next, lower the wheels so that they are touching the ground and tighten the nuts to 300 Nm.

It is important that the wheel nuts and the rim’s contact surfaces are clean as the wheel nuts may loosen otherwise.

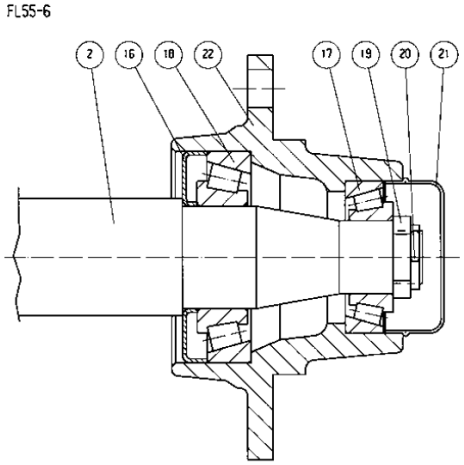
Retighten the wheels after 1-2 hours of use.

Replacing wheel bearings

Remove the wheel and disassemble as described above

Fig. 32

1. Remove the hub cap at pos. 21
2. Remove the cotter pin at pos. 20
3. Remove the castellated nut at pos. 19
4. You can now knock out the axle at pos. 2
5. Remove the bearings at pos. 17+18
6. Remove the sealing ring at pos. 16



Assembly

1. Mount the outer rings from the bearings at pos. 17+18 in the hub casing at pos. 22
2. Mount the sealing ring at pos. 16
3. Mount the inner ring from the bearing at pos. 18 on the axle at pos. 2 and mount the axle in the hub casing
4. Mount the inner ring from the bearing at pos. 17 on the axle at pos. 2
5. Screw the castellated nut onto the shaft at pos. 2 at the same time as you rotate the hub casing at pos. 22. Tighten the castellated nut until the hub casing turns smoothly. Then loosen the castellated nut a quarter turn or until the hub casing turns around easily.
6. Mount the cotter pin at pos. 20
7. Fill the hub cap at pos. 21 halfway with ball bearing grease and then mount it

Scrapping

The disc harrow must be unfolded. It is important to release pressure from **all** cylinders.

During disassembly, it is important to be aware of the weight of each part. It is therefore **important** to support or lift the part to prevent the risk of falling or tipping over.

Hydraulic hoses and cylinders are removed and emptied of oil. The oil is collected to avoid contamination. Oil and hoses are sent for disposal.

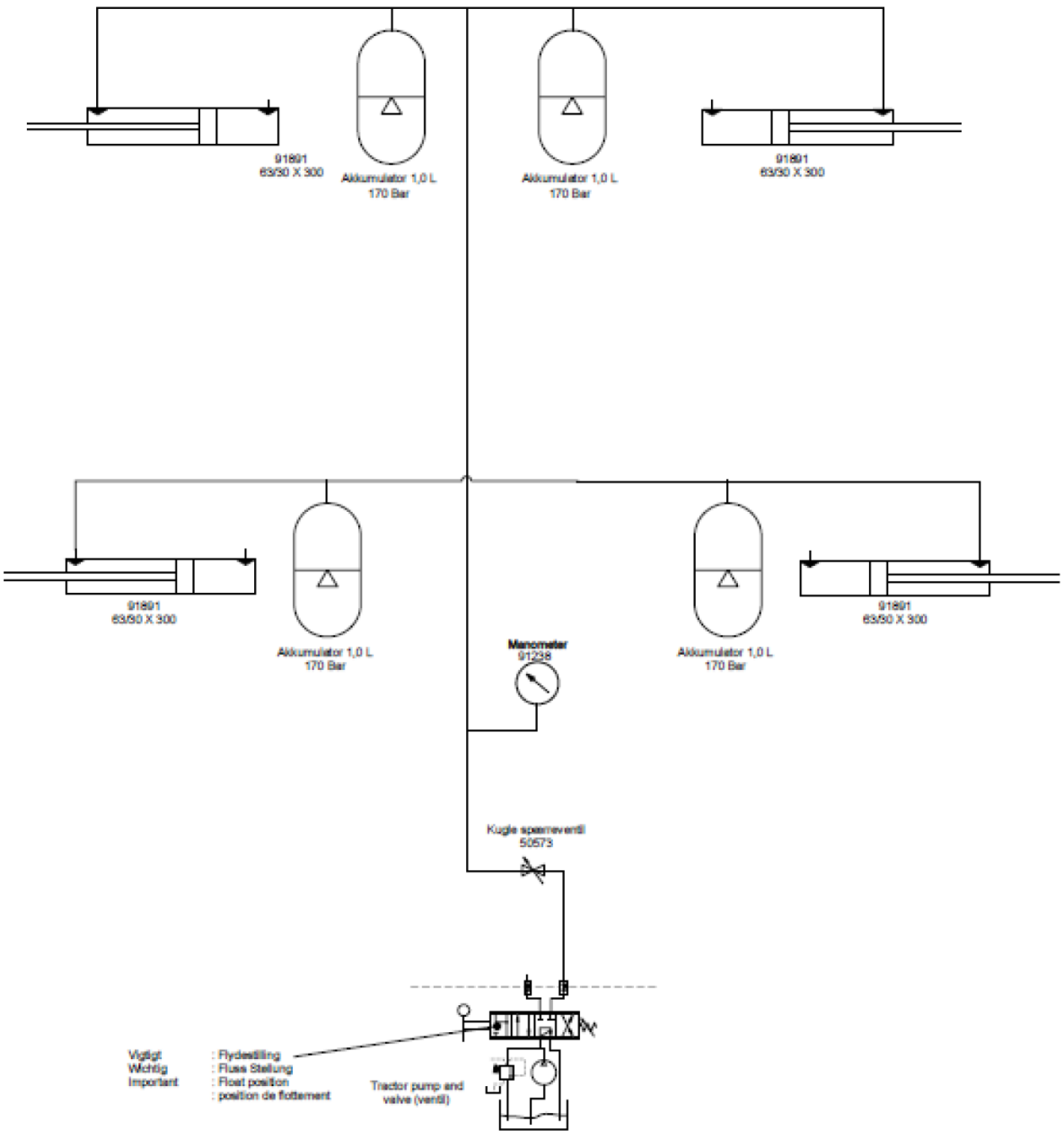
All metal parts that are part of the machine can be sent for recycling.

Scrapping of waste must take place in accordance with local legislation.

Hydraulics diagram

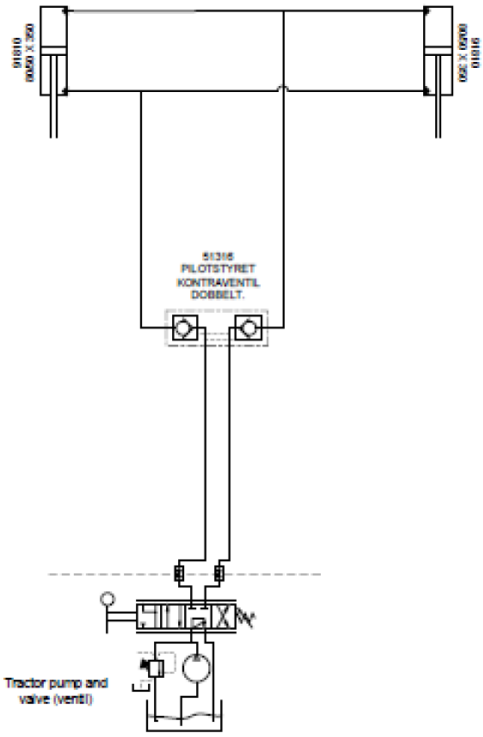
Hydraulics diagram for

POWERCHAIN 1200



Cylinder kædetallerkener
Chain disc cylinder
White

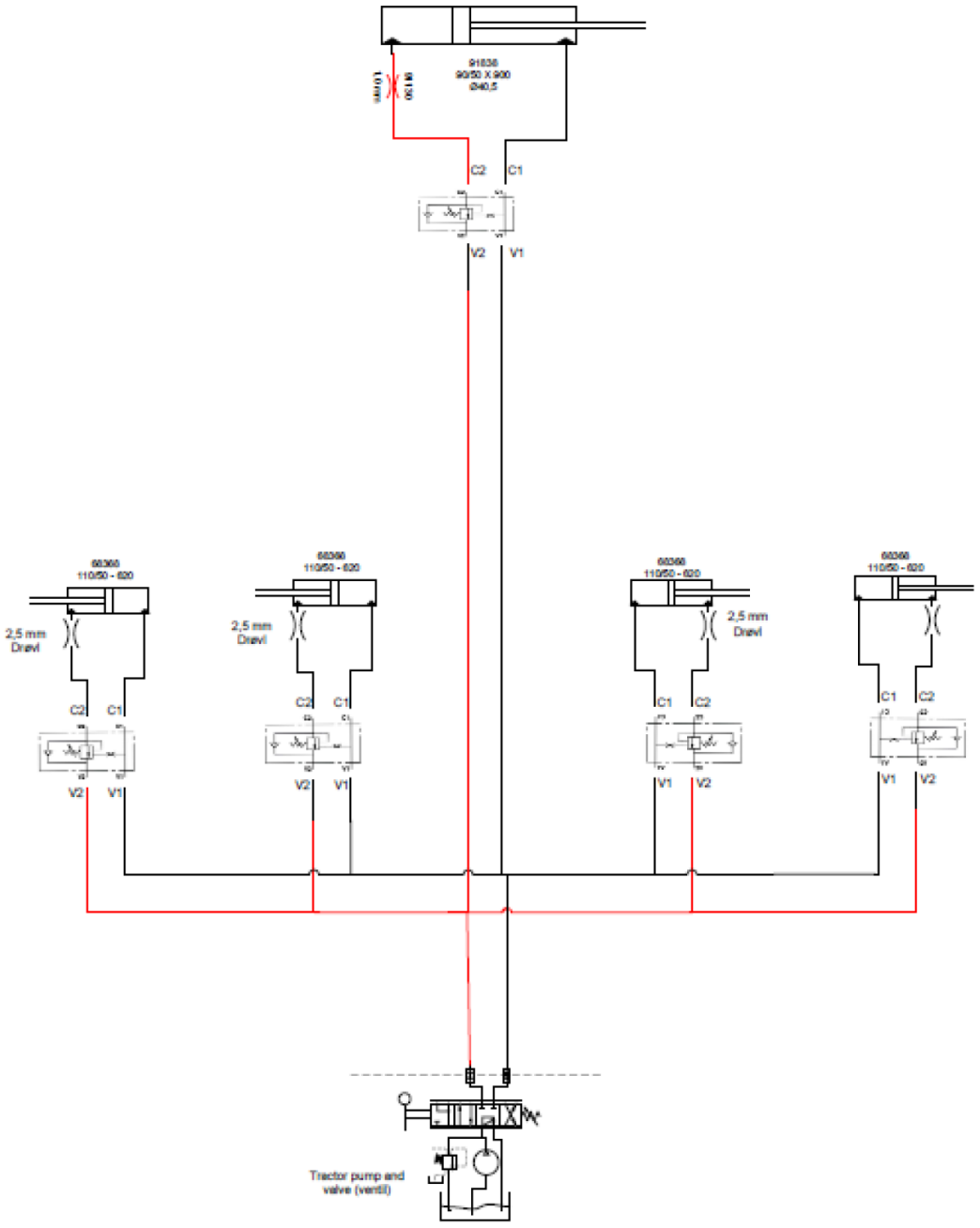
POWERCHAIN 1200



Hjulstel
Wheel frame
Yellow

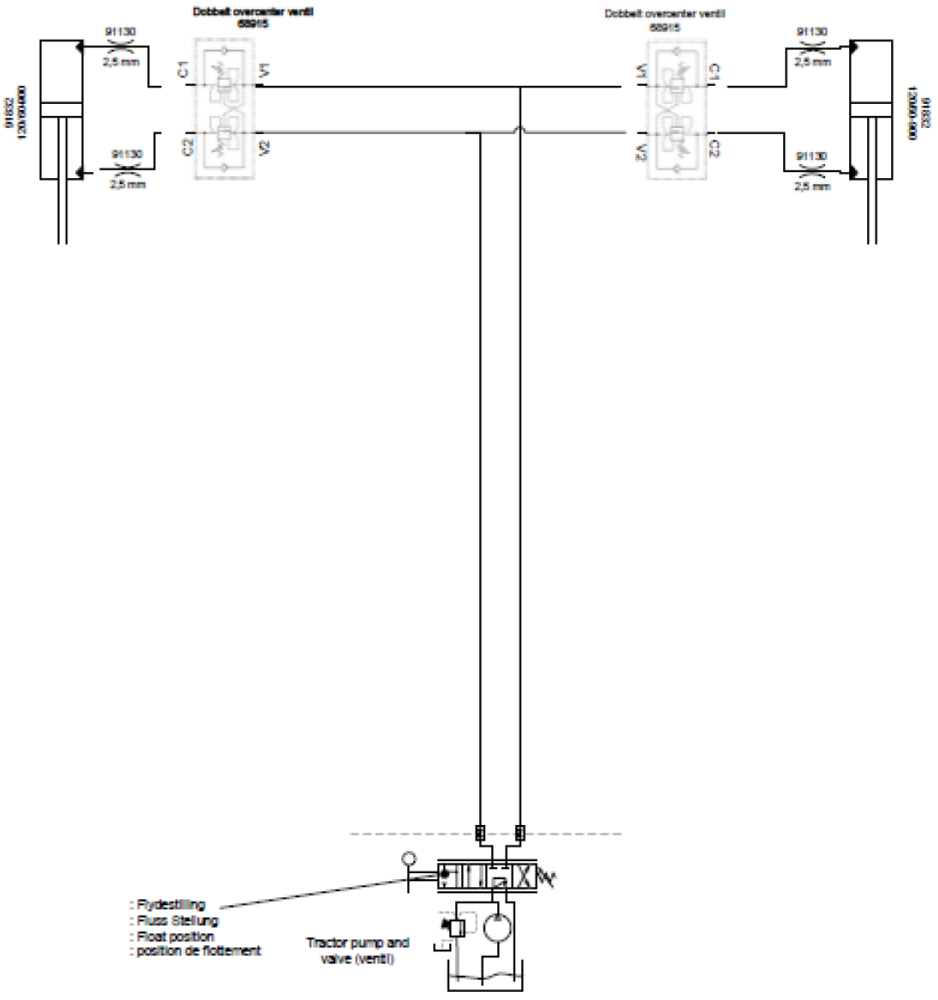
Hydraulics diagram for

POWERCHAIN 1200



Udklap inder og ende sektion
Unfolding/folding inner and rear sections
Red

POWERCHAIN 1200



Udfoldning ydervinge
Folding outerwing
XXXX

Spare parts

See the separate spare parts manual