

MINIMAX

(EU-type approval **MMPRAR**)



User instructions

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MMPRAR
MINIMAX
950 cm

Congratulations on your new drum. For **safety reasons** and for optimal use from your machine, you should read through the user manual thoroughly **before you take it into use**.

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Your drum has:

No.: _____ VIN no.: _____
Month of manufacture: _____ Tare weight in kg: _____

When enquiring about spare parts or servicing, we kindly ask that you always provide the type number and serial number. At the back you will find a list of spare parts, which helps give an overview of the individual parts.

EU DECLARATION OF CONFORMITY

DALBO A/S
DK-7183 Randbøl

hereby declares that the aforementioned machine is manufactured in accordance with the stipulations in Directive 2006/42/EC, which replaces the Directive 98/37/EC and the amending Directives 91/368/EEC, 93/44/EEC and 93/68/EEC on a mutual approach for member state legislation on machinery for health and safety requirements in connection with the construction and manufacture of machinery.



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

DALBO A/S

Date: _____

Alessio Riulini, CEO

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Introduction and identification of serial number

Information

- This user manual is intended for the person who uses and maintains the drum. It contains all items concerning safety, use and maintenance. It is very important that all users read and understand the user guide before starting to use the drum.
- Every time there is a new user of the drum, it is very important that the person in question is instructed on the correct use of the drum. This includes a review and a read-through of the user guide and commissioning in the field.
- If there are doubts regarding reading the user guide or concerning the general use and safety of the drum, it is very important to stop its use and contact the DALBO A/S.

Location of user manual

The user manual can be found in a plastic case on the machine's side frame. Remove the plastic case before starting the drum and stow the user manual in a safe and accessible place for all users of the drum.

Fig. 1

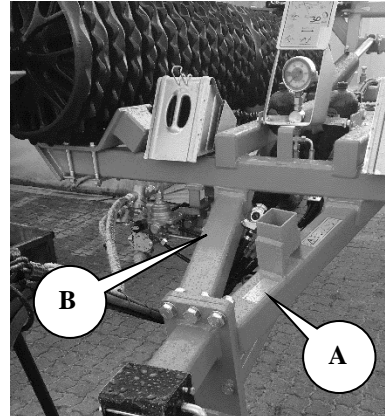


MINIMAX 630

Location of serial number

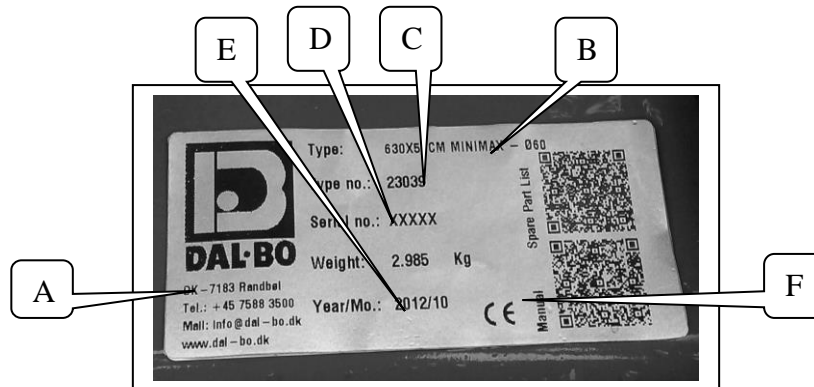
The data plate on the 450-830 is located centrally on the machine's draw-bar. The data plate can either be placed as self-adhesive foil (A), or as metal (B). The serial number of your machine can also be found on page 2 in the user guide.

Fig. 2



Every single machine is equipped with an identification plate. Below is shown a typical identification plate, which containing the following data:

- A: Name, company name and address of the manufacturer.
- B: Machine model.
- C: Machine type.
- D: Machine serial number.
- E: Year of manufacture.
- F: CE imprinting.



Warranty provision

By default, your MINIMAX is delivered with a 2-year warranty from the date of delivery. DALBO A/S shall bear no liability for damage caused by the improper use of the drum.

Safety

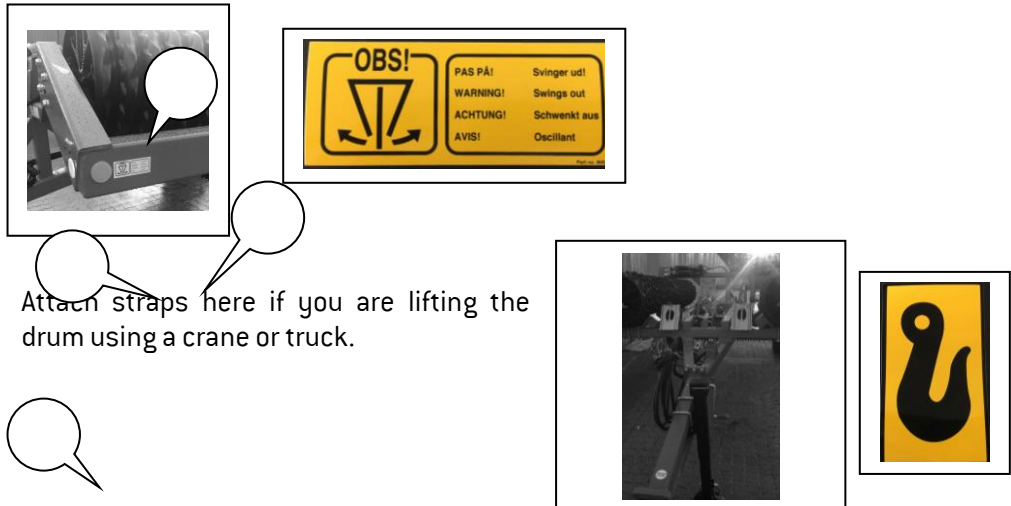


You will see this symbol in the instruction manual each time advice is given about your safety, the safety of other users, or the functional safety of the machine. All safety instructions must be observed and made available to all users of the machine.

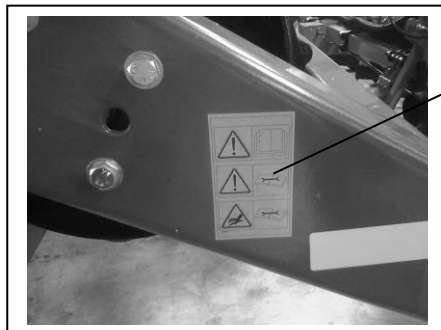
General

- Before starting its operation, the user must be familiar with all parts of the machine.
- Safety labels have been placed on the machine. These contain important instructions about your own safety and that of others, as well as the correct use of the machine. Always make sure, that these stickers are intact.

Fig. 3



- Some safety stickers are on the machine. Pictures below show where these are mounted and a description of each.



Safety sticker:
Remember to read instruction manual.



Safety sticker:
Machine opening.



- Clean security labels daily.
- Replace security labels if they are damaged.
- If the part with a safety label needs to be replaced, install a new label. Remove the white foil sticker from the label and stick the label onto the new part.
- You can order a new safety label from the DALBO A/S

- There should be no passerby around the machine during work or transportation.
- When operating the drum, ensure that there are no people within the machine's operating radius. The machine may only be operated from inside the tractor.
- When the drum is folded up, be sure the side sections are engaged. Likewise, this will secure the control levers against accidental operation.
- Before leaving the tractor, performing any adjustments, maintenance or repairs to the drum, unfold the machine and lower it to the ground or, secure it in transport mode, apply the brakes on the tractor, turn off the engine and remove the ignition key so that the machine is secured against accidental starting.
- Remember to secure the supporting legs as well as the lifting arm with lynch pins.
- Never leave the driver's seat while the machine is being driven.
- The driving speed must always be adjusted to the conditions.
- Only use the machine if all safety devices have been mounted. Defective safety devices must be replaced immediately.
- The machine is not indicated for being used in other sectors apart from the agricultural one.
- The handbook must be always at reach in order to be able to consult it if needed. Should it be lost or damaged, it is necessary to request the substitutive copy to DALBO.
- Do not use the machine if tired, ill, or under the effect of alcohol, medicine or drugs.
- This machine is usually used during the day, but should it be, exceptionally, necessary to use the machine at night or in conditions of reduced visibility the lighting system supplied with the tractor must be used.
- Verify the machine carefully before starting it up.
- The staff must use the emergency equipment and the personal protective devices while operating and carrying out maintenance on the machine.

MINIMAX

- We recommend the operator assigned to the machine not to wear clothing that could be caught by the machine.
- During the use, the machine could emit dust. It is advised to verify the filters on the cabin ventilation system periodically or use suitable protection systems for the respiratory tracts such as anti-dust mask.
- During use the operator must have sufficient visibility on working areas considered as dangerous, therefore it is opportune to keep the mirrors supplied on the tractor clean and in a perfect state.
- Keep the machine clean from foreign material (detritus, tools, various objects), that could damage functioning or cause damages to the operator.
- Avoid operating on muddy or loose soil.
- Any alteration on the machine could cause safety problems. Should this occur the user will be held the only person liable for any accident.
- Please make sure at any time to have enough clearance to overhead power lines

Noise level

- Except of the interaction of the machine with external factors, no other noises from this machine exceed 80 db(A).

Hydraulics

- Prior to any repair work on the hydraulics unit, the machine's undercarriage must be lowered, the pressure must be removed from the unit, the engine must be switched off and the ignition key must be removed.
- Hydraulic connections must be cleaned thoroughly before connecting. When connecting the hydraulic hoses to the tractor's hydraulics, ensure that pressure is removed from the hydraulics and that all hoses are fixed so that there is no danger of them being damaged during transport, driving and operation.
- For hydraulic systems with built-in pilot-controlled non-return valves, it can be difficult to completely remove the pressure. You should hold a cloth around the fitting/part that is being removed to catch any oil that may leak.
- After repairs on the hydraulic system have been completed, all air must be completely removed from the system.
- Check the hydraulic hoses regularly for defects such as tears, cracks, wear or damage. Defective hoses must be replaced immediately.
- Avoid spilling oil on the ground. If this should happen, it should be collected and safely disposed of immediately.
- Clean hands thoroughly after skin contact with oil and grease. Change out of oil-soaked clothing immediately, as this can be harmful to the skin.

- Hydraulic oil that flies out under high pressure can penetrate through the skin and cause serious injuries. Seek professional medical assistance immediately in the event of any injury.
- Do not use the controls or flexible tubes as handles. These components are mobile and do not offer a stable support.

Mounting

- There is a risk of crushing when carrying out mounting. People must not stand between the machinery and the tractor or between parts being connected.
- Pay the maximum attention during the equipment coupling and uncoupling phases.

Maintenance and repair

- The machine must be properly supported while undertaking all repair and maintenance work; the tractor and machine must have their brakes properly activated, the engine must have been turned off and the ignition key removed.
- Tighten all screw fittings after a few hours of use. All screw fittings must be checked at regular intervals and tightened when necessary. Check cotter pins and bolts to avoid breakdowns.
- Oil, grease and filters must be disposed of and in accordance with the applicable environmental legislation.

Driving on roads

- When driving on public roads, all safety arrangements and warnings required by law must be installed and tested. The driver is responsible for the correct use of lights, brake systems and traffic signs in accordance with traffic laws.
- With regard to the dimensions of the machinery, the driver must make enquiries with the traffic authorities to ensure that it may be transported on public roads.
- When transporting the machine, care must be taken not to exceed the total weight and axle load of the tractor and that the load on the front axle is no less than 20 per cent of the tractor's overall weight. In that case, use the front weight of the tractor.
- Before starting to drive on public road from a non-paved or dirty surface, it is required to clean the wheels of the tractor and machine from any presence of mud.
- When driving on a public road, the roller must be in transport position.
- Road transport must be done with a maximum speed of 25 km/h.

Correct use

- Correct use of the machine also includes compliance with the manufacturer's operating, maintenance and repair instructions, as well as the exclusive use of original spare parts.
- The drum may only be used, maintained and repaired by people who are familiar with the machine and who are aware of the dangers that can arise. We remind to refer to the manufacturer in case of doubts on the use of the machine and on the interpretation of this handbook.
- The manufacturer is not liable for damage resulting from changes to the machine carried out without the manufacturer's prior permission. Furthermore, the manufacturer is not liable for any damage that results from incorrect use. Responsibility for this rests solely with the user.
- No extra weight may be mounted on the drum.

Technical data

MINIMAX 950

Size [cm]	950
HP (recommended)	160-220
Gross Weight [kg]:	
• Cambridge 50	5215
• Cambridge 55	6090
• Crosskill 53	4580
• Cross Combi 50	5340
• Cross Combi 55	6410
Sections (pieces)	3
Hydraulic requirements:	
1 DV + 1 EV ¹	X
Additional Equipment [kg]	
Crackerboard	745
Air brakes	180

¹ DV = dual action, EV = single action

How to read the instruction manual

It is possible that the order in which the topics are listed does not appear as logical. Please refer to the table of contents, where the titles for the relevant topics can be found.

The main points in the instruction manual are divided into 5 key sections:

- Safety
- Getting Started and Driving
- Additional Equipment
- Maintenance
- Repairs

The following symbols are used in the instruction manual for:



Points that are especially important for the functionality as well as the life-time of the machine.



Points that are relevant to safety.

Delivery

The drum is delivered fully assembled via platform truck.

If the drum needs to be lifted, it is recommended that it is rigged with straps in the middle-section and pulled, so that the machine is balanced.



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



DALBO does not accept liability for damage in connection with inappropriate or incorrect rigging and lifting.

Use

This is a standard roller, designed for rolling and levelling ploughed and sown areas. Rolling is intended on farming areas where better soil compaction is needed and to avoid the soil to dry out by extreme dry conditions. Rollers equipped with crackerboard is able to level ploughed areas with a perfect result.

The drum is a three-piece drum with integrated hydraulic weight transfer, where the sections move independently of each other.

Fig. 2



MINIMAX 950

As a drum, MINIMAX 950 is used before sowing to crush tubers as well as after sowing to improve sprouting and push down stones.

The MINIMAX 950 can be optionally fitted with hydraulic crackerboards. The main application of the crackerboard is in preparing the soil for sowing. The vibrating effect of the teeth decomposes tubers and performs a processing and alignment of the raw ploughed soil, as well as the previously prepared ground. If you do not wish to use the crackerboard, tilt it up and the machine can then be used exclusively as a drum.

First use or restart after a long break

- Verify that the machine has no damaging.
- Verify the mechanical units that must be in good state and not rusted.
- Verify the correct functioning of the light bars (if present).
- Grease carefully all mobile parts.
- Verify that no oil are leakages from connections and pipes.

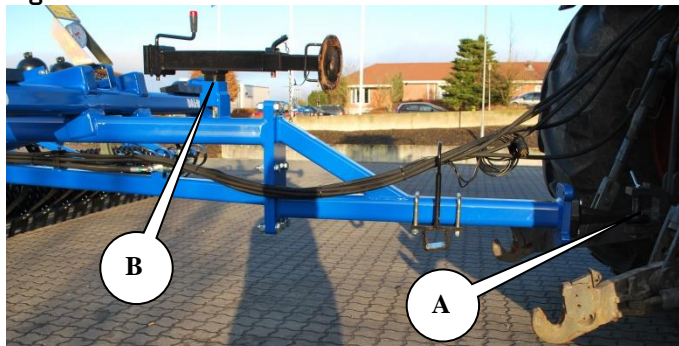
Connecting and disconnecting

Connecting

The drum is connected to the tractor's fixed drawbar, where the towing eye (A) must be between the drawbar's forks.

The lever is inserted, the support leg raised and placed in the working position (B)

Fig. 3



- Remember to secure the lever with linchpins or similar.
- Remember to secure the supporting legs with linchpins or similar



- The lift arms are adjusted so that they do not collide with the bar when turning.

Hydraulics

As standard, the drum requires a double-acting and single-acting hydraulic outlet, in which the double-acting output extends and the single-acting raises/lowers (tilts) the drum. If a crackerboard is fitted, a double-acting outlet is required.

Table 1. Hose markings

Cylinder name	Colour	Outlet	Function
Tilt cylinders	White	Single-acting	Lift the drum up on the wheels and down into working mode.
Folding/ weight transfer	Red	Double-acting	Fold the side sections together/out to transfer the weight from the mid-section to the side sections



- Make sure the hydraulic hoses have not been crushed.
- Float position is required for the folding/weight transfer

Disconnecting

The drum must be folded (in transport position) or unfolded before disconnection.

The support leg is unscrewed so that the drum's bar can be lifted from the tractor's drawbar, the hydraulic hoses are removed and the nail is removed.



Remember to release the pressure from the connecting hoses to the hydraulic system before disconnecting the hoses.

Settings

The drum is factory set at delivery, but fine tuning will always be necessary before use. Many different adjustment options make your drums more versatile and allow the potential to gain optimal use of the machine.

In order to achieve uniform pressure on the ground, the bar must be adjusted correctly for the tractor concerned. The tractor's tensile height must be approx. 50cm and max 60cm by 950cm

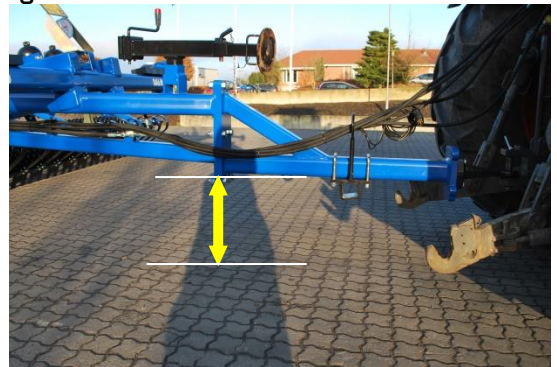
Tensile adjustment

In order to achieve uniform pressure on the ground, the bar must be adjusted correctly for the tractor concerned.

(measured where the arrow is indicated on the image (flange plate) as the front part of the pull is reversible)

Height under drawbar:
Approx. 50cm by 950cm

Fig. 4



It is important that the machine's central section [A] is horizontal during work. In order to achieve uniform pressure on the ground

Fig. 5



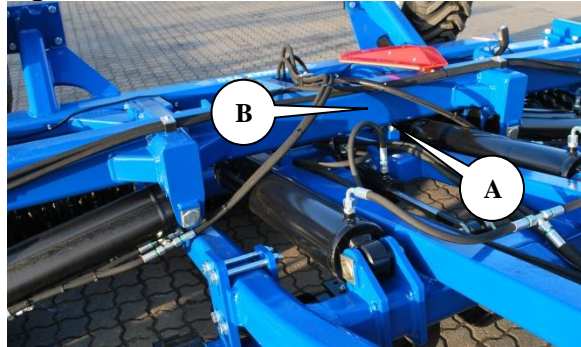
It is important for a correct setting for the machine to be on a **horizontal** surface when set

Adjustment of Central Section

With the MINIMAX unfolded (see “Driving and operating”) check if the bolts (A) have approx. 10 mm air to the pipe (B).

The central section must be horizontal to achieve the best result in the field. In addition, the 3 square tubes must be in line (same height from the ground)

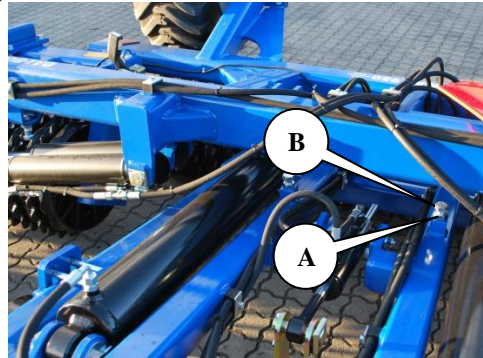
Fig. 6



If the bolts (A, Fig. 5) go against the pipe and the centre frame is not horizontal, the bolts must be adjusted. Likewise, the bolts should be adjusted if there is too large a space between the frame and the bolt head.

1. Loosen the lock nut (A).
2. Adjust the bolt (B) up/down.
3. Tighten the lock nut (A).
4. Check if the frame is horizontal and if the height of the bar fits.
5. If the bolts (B) do not move against the bar, drive the tractor slightly forward and check the setting.

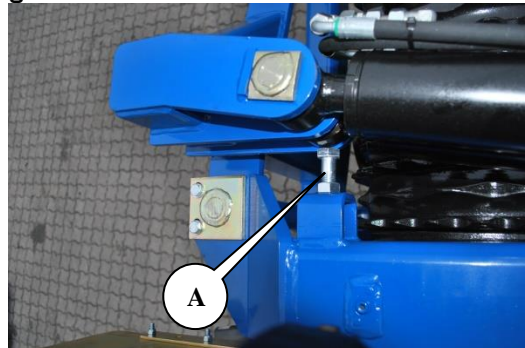
Fig. 7



Adjustments of stop for folding

To ensure the correct position of the side sections during transport, it is possible to adjust the rear stop (A) for the side sections

Fig. 8



Driving and operating

Proper operation is important in order to get optimal performance from your drum. This applies not only to working in the field but also in terms of safety. It is therefore crucial that you have thoroughly read the safety precautions that cover the machine.

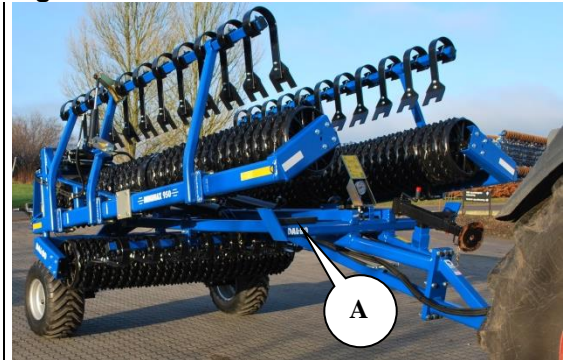
Unfolding and folding

Unfolding and folding are conducted with the tractor in park.

Unfolding

- 1 The side section is lifted up by the carriers (A) with the tilt cylinder (marked: White).

Fig. 9



- 2 The cylinders for unfolding and folding (marked: Red) are activated and the side sections are completely folded.
- 3 The tilt cylinders are activated and the drum is lowered to the ground.
- 4 The cylinders for unfolding and folding (marked: Red) are set in the float position.

Fig. 10

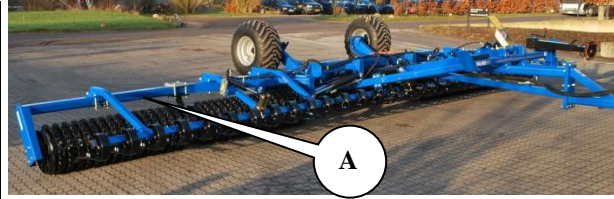


Before the drum is started, the weight transfer must be adjusted correctly (see “Hydraulic Weight Transmission Adjustment”).

Folding

1. The unfolded and folded cylinders (marked: Red) are activated, so that the outside of the side sections (A) are lifted as much as possible.

Fig. 11



2. The tilt cylinders (marked: White) are activated to full length and the drum is tilted free of the ground

Fig. 12



3. The unfolded and folded cylinders are activated again and the side sections are folded in.
4. The tilt cylinders are activated and the drum is lowered onto the transport hooks.

Fig. 13



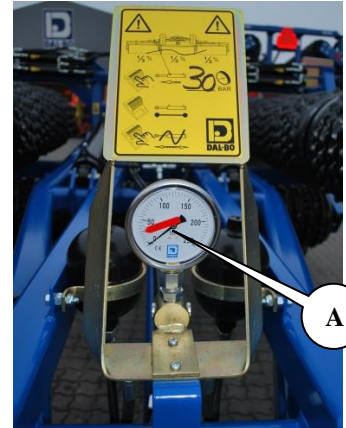
Adjustments of hydraulic weight transfer

The hydraulic weight transfer distributes the weight evenly on the drum sections.

1. After the drum is unfolded, pressure is taken out of the unfolded and folded cylinders (marked: Red), after which the cylinders' control lever is activated in the opposite direction.

2. After a moment, the pressure will appear on the pressure gauge. The pressure will increase approx. 30 bars (A). This means that some of the mid-section weight is transferred to the side sections.

Fig. 14



3. The operating levers are then set in float position. The float position is required to achieve a hydraulic weight transfer in which the sections are individually movable.
4. It may be necessary to adjust the pressure for the hydraulic weight transfer. Likewise, it may be necessary to drive with less or more pressure, depending on soil conditions.

Too much pressure

1. The pressure on the outer edges of the side sections will be too great. The rings are pressed too much into the soil and leave clear tracks outside the side sections.
2. The mid-section packs too little, which can be seen as the soil under the mid-section is higher and not as compressed as under the side sections.

Too little pressure

1. The pressure on the outer edges of the side sections will not be large enough to provide a uniform seal.
2. The mid-section packs too much, which can be seen as the soil under the mid-section is more compressed than under the side sections.



For the durability of the machine and the result in the ground, it is very important that the cylinders are placed in float position during work in the field.



Failure to put the machine in float position is considered improper use and could, in a worst case scenario, cause a break in the frame.

Driving speed

MINIMAX

It is recommended that the machine be driven at 6-10 km/h, but driving should always be done according to conditions.

If the speed is increased, wear will also increase, especially under dry conditions. There is also a risk of damaging the rings by driving at excessively high speeds under adverse conditions.

The power requirement is very dependent on the type of soil and terrain as well as the speed.

Table 2, Guide for power requirements in HP

Working width (cm)	950
Power [HP]	160-220

Troubleshooting

Problem	Cause	Remedy
The central section is pressing too much	<ul style="list-style-type: none"> • Too little pressure is being transferred to the side sections 	<ul style="list-style-type: none"> • The hydraulic lever for unfolding/folding is activated in such a way that it is creating more pressure on the side sections (see “Driving and Operating”).
	<ul style="list-style-type: none"> • The bar is too high 	<ul style="list-style-type: none"> • Align bar and central section (see “Bar Height Adjustment” and • “Adjustment of Central Section”
	<ul style="list-style-type: none"> • The central section is not horizontal 	<ul style="list-style-type: none"> • Align bar and central section (see “Bar Height Adjustment” and • “Adjustment of Central Section”
The outer part of the side sections are pressing too much	<ul style="list-style-type: none"> • Too little pressure on the central section 	<ul style="list-style-type: none"> • The hydraulic lever for unfolding/folding is activated in such a way that it is creating more pressure on the central section (see “Driving and Operating”).
	<ul style="list-style-type: none"> • The bar is too low 	<ul style="list-style-type: none"> • Align bar and central section (see “Bar Height Adjustment” and • “Adjustment of Central Section”
	<ul style="list-style-type: none"> • The central section is not horizontal 	<ul style="list-style-type: none"> • Align bar and central section (see “Bar Height Adjustment” and • “Adjustment of Central Section”
The pressure varies on the pressure gauge when working in the field	<ul style="list-style-type: none"> • Accumulator is defective; 	<ul style="list-style-type: none"> • Contact workshop
	<ul style="list-style-type: none"> • Pilot controlled non-return valve is defective • Cylinder (gaskets) leak 	<ul style="list-style-type: none"> • Set the weight transfer to 30 bars and put the operation lever in float position. Then keep the MINIMAX parked for 1/2 hour. If the pressure has fallen, it is possible that the pilot-controlled non-return valve is defective or there may be dirt in the valve (Rinse the valve and clean the parts), (RELEASE THE PRESSURE from the system before repair)
The side sections are not following the terrain	<ul style="list-style-type: none"> • The weight transfer hydraulic system is not in float position 	<ul style="list-style-type: none"> • Put the hydraulic weight transfer system in float position (see “Adjustments of hydraulic weight transfer”).

Additional Equipment

It is possible to equip the MaxiMax 950 with different types of extra equipment

- Crackerboards with bowed parts
- Gabions
- Light Sets
- Air brakes
- Hydraulic brakes

Crackerboard

The clear advantages of the crackerboards are that the teeth can be moved individually so that they give after meeting with local resistance. This ensures a strong level of flexibility in the crackerboard as opposed to a regular board, as the entire planing does not need to be redone simply because of an obstacle.

Fig. 15



Power

Compared with a regular board, the crackerboard does not require as much power, although this depends a lot on what kind of work the crackerboard is doing.

Table 3, The crackerboard's power requirements in HP

	950
Power requirements in [HP]	60-85



By moving the least amount of soil possible, this reduces fuel consumption while reducing the wear on the material.

Hose markings

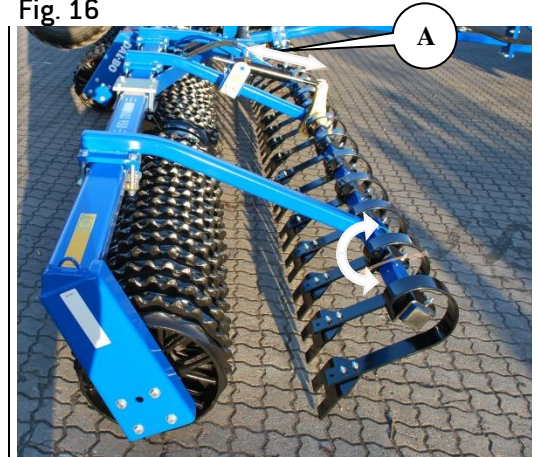
Table 4. Hose markings

Cylinder name	Col-our	Outlet	Function
Depth adjustment / Angle adjustment	Green	Double-acting	Adjusts the crackerboard's working depth

Adjustment of the teeth's angle and depth

The crackerboard's working depth and angle are hydraulically (A) adjustable. The depth and angle settings are done in the same function.

Fig. 16



Driving and operating

The crackerboard is a flexible unit with several possible applications. At a set depth of approx. 5 cm, the teeth, with their vibrating effect, will be able to crush the tubers.

A deeper adjustment of the crackerboard gives a greater plane result, similar to the plane board, in which a small bank is built up in front of the teeth.

Fig. 17



It is **not** the purpose of the crackerboard that it should act as a dozer blade, but rather perform light tilling of the soil. Since each tooth can move individually and thus provide local resistance, the crackerboard is easy to drive.



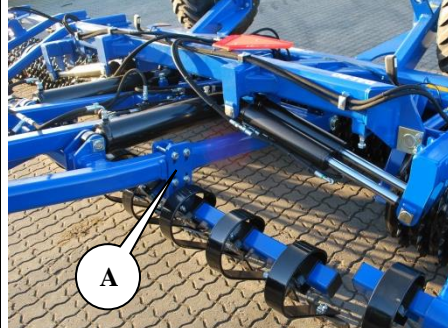
It is possible that the crackerboard sections may drive unevenly in depth. It may, therefore, be necessary to “reset” the crackerboard by raising it to the top position. Afterwards, hold on to the tractor's hydraulic pump for approximately 30 seconds to remove any air in the system.

Retrofitting

The crackerboard can be mounted at the factory, but it can also be delivered later if the need arises. For mounting, a crane or similar auxiliary equipment will be required.

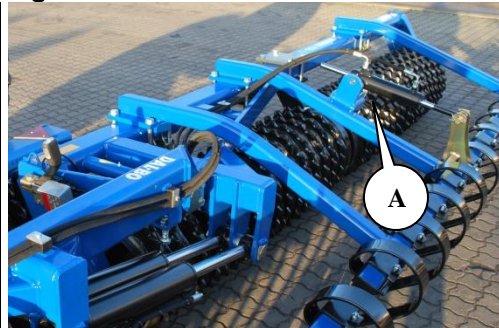
- 1 Unfolding the MINIMAX.
- 2 The mid-section is mounted in the flanges (A).
The mid-section is finely tuned to the side sections to achieve the same working depth

Fig. 18



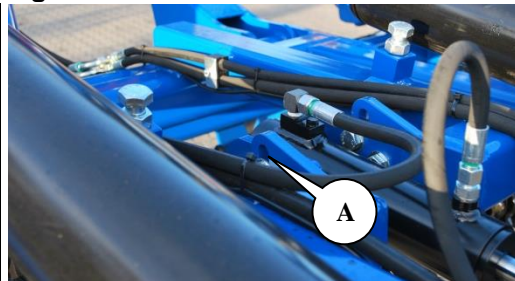
- 3 The side sections are mounted in the flanges (A).
- 4 The hydraulic cylinders are mounted.

Fig. 19



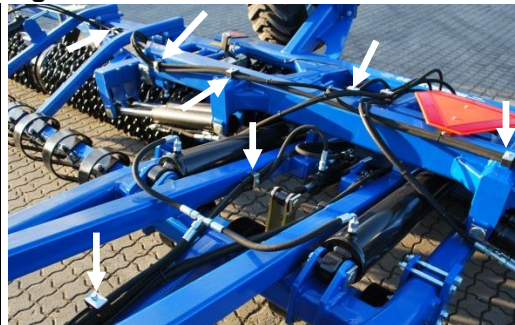
- 5 The hydraulic cylinders in the centre are mounted and adjusted in the sliding rails (A) to achieve the same movement as the side sections.
- 6 The hoses are mounted on the cylinders.

Fig. 20



- 7 The hoses are fastened to the hose holders (A) (not all hose holders can be seen in the figure).
- 8 After all fittings have been tightened, the crackerboard can be connected to the tractor's hydraulics.

Fig. 21



It is important to ventilate the system thoroughly in order to prevent personal injury. Which is why you should move the cylinders right out into the outer positions a couple of times.

Maintenance

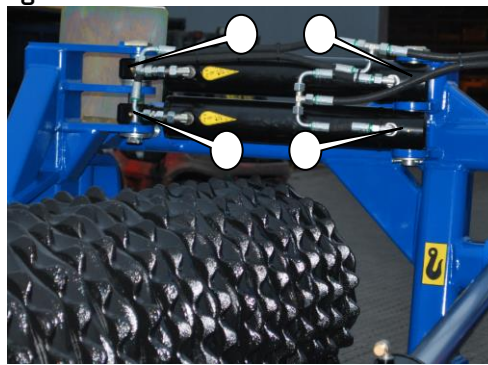
Good maintenance ensures a long life for the drum and therefore optimal use of the machine. Which is why grease fittings have been installed in places where wear is greatest.



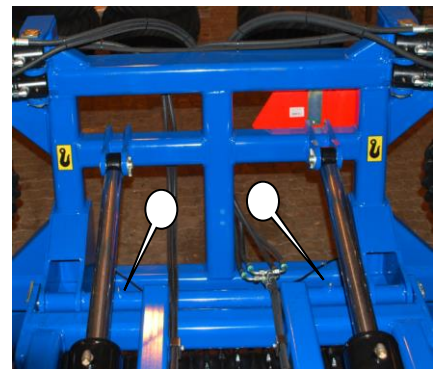
All screw connections must be tightened after the first day of work. Cotter pins and bolts should be checked to avoid breakdowns. The hydraulic system should also be checked to ensure it is air-tight.

Lubrication

Fig. 22



A



B



C



D

Lubrication points	Number of nuts	Lubrication interval hours	Image
Folding cylinder	8	8	A
Rotation pin for tilt	2	8	B
Rotation pin for unfolding the side sections	2	8	C
Wheels	2	50	D



All lubrication points should be greased at least once a year.

Adjustments

Adjustment of fittings

After the first season, the fittings will have worked themselves loose on the shaft. By moving the stop rings on the shaft, the fittings can be clamped together to remove any dirt and wear can be minimised.

Adjustment of fittings is best done with the MINIMAX 950 folded.

- 1 The bolts (A) are loosened and the fittings pushed together
- 2 The bolts in the stop rings are tightened and loosened in the same place on the axle a few times, so that the bolts are better attached to the axle.

Fig. 23



Wheels

The wheel bearing must be lubricated and adjusted once a year. Also make sure you have the correct tyre pressure [see tyres].

Adjustments and lubrication of wheel bearings

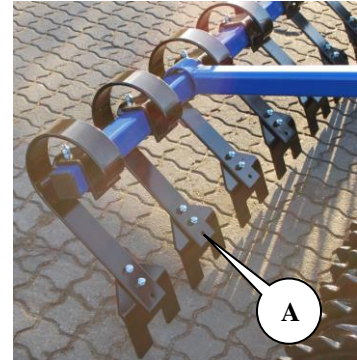
1. Hub cap is removed.
2. The cotter is removed.
3. The castellated nut is tightened with a 1/6 turn, so that the hole is aligned with the shaft. The wheel is spun around and there should be no resistance. Only a little bit of slack should be felt in the hub housing when the wheel is moved from side to side. If there is too much slack, repeat the process.
4. The cotter is installed
5. The hub cap is $\frac{3}{4}$ filled with grease and fitted.

Worn out parts

The slides are factory-fitted in the upper holes on the tooth. The slides must be moved to the lower holes (A) before wear starts to appear on the teeth.

After the slides are worn out. Positioned in the lower holes, replace the slides so that no wear occurs on the crack-board.

Fig. 24



Hydraulics



All hydraulic hoses must be checked for wear or damage. Ensure the hoses are not subjected to any crushing.



If left parked for longer periods of time, protruding plunger rods should be greased with oil or pressure grease, in order to avoid the build-up of rust on the plunger rod. Remember to remove it again before use.

Replacement and repairs



Safety is crucial in regard to **all** repair work on the drum. The following points must therefore be observed at all times, as well as the points under safety at the beginning of the instruction manual.



When replacing cylinders, always fill the cylinder with oil before subjecting it to strain. It is therefore recommended that you mount the cylinder in the fixed part of the frame first, after which the cylinder is filled with oil and then mounted in the counterpart.



All maintenance and repair work on the drum must be conducted only when the machine is lowered to the ground or is set in transport mode, the tractor's brake is on, the engine is switched off and the ignition key is removed, so that the machine cannot move or start accidentally.



For all repair work on the hydraulics, always pay close attention to safety. Before starting the work, release the pressure in the hydraulics system and, if necessary, support the part.



Once the repair work on the hydraulics system is complete, the system must always be vented before use to prevent mechanical breakdown and personal injury.

Hydraulics

Changing out the cylinders for unfolding and folding the side sections

Any repairs must be carried out with the drum unfolded and resting on its undercarriage.

1. The pressure is removed from the cylinders.
2. The hoses are removed.
3. Cotter pins and nails are removed, and then the cylinder is free.
4. The new or repaired cylinder is mounted. Remember to secure the nail in the nail stop and secure the nails with cotter pins.
5. The hoses are mounted. After mounting, ensure that there is no risk of tearing or clamping the hoses.

Fig. 25



After mounting, the cylinders are activated for unfolding and folding until a small amount of movement can be felt in the cylinders. The cylinders are then activated in the opposite way until the cylinders are back in the starting position. The cylinders are moved a few times in this way. The drum is then tilted up onto the wheels and the side sections moved completely out into the outer positions to air out the system.



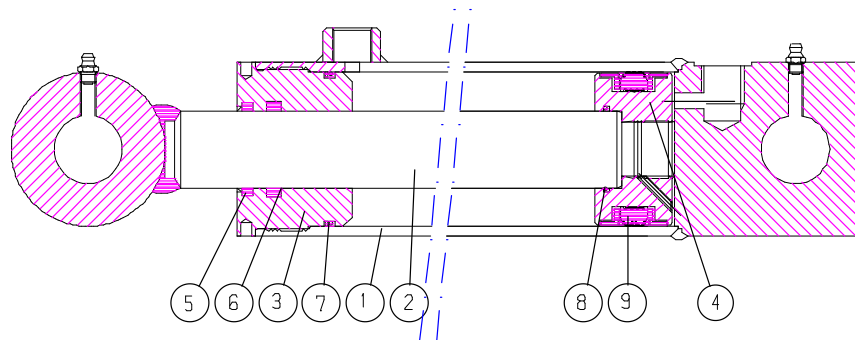
There must never be people within the machine's operating radius.

Replacement of the gaskets

DISMANTLING:

1. Empty the cylinder of oil, (if necessary, use compressed air to move the piston back and forth to push the oil out).
2. Drive the piston in the centre position. The cap (pos. 3) is unscrewed 30 mm. If the cap is stuck, it may help to warm up the front of the cap. When the cap is unscrewed, pull the piston towards the cap, after which the cap is completely unscrewed and the piston rod is pulled out.
3. The sleeves are removed, (pos. 4).
4. The cap is removed from the piston rod (pos. 2).
5. Remove the seals in the cap and sleeves (pos. 5+6+7+8+9), (use a needle or screwdriver, if necessary).
6. All parts are cleaned and checked for chips, burrs etc. Check for rust around the scraper ring (Item 5) in the cap. If this is the case, remove it.

Fig. 26:



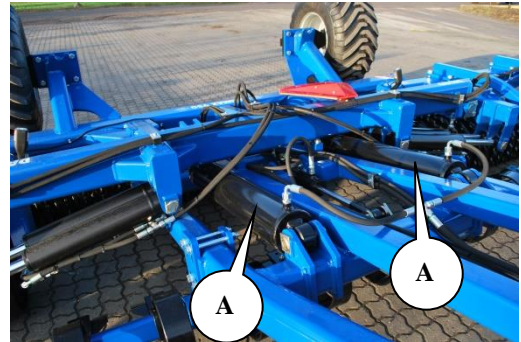
MOUNTING:

1. New seals are fitted in the cap and the sleeves. The scraper ring, pos. 5, is mounted with the help of a tube that fits outside around the lip (or special mandrel). The cuff pos. 9 on the sleeve is mounted with help of a round bar/screwdriver.
2. The thread on the cap and the cylinder tube is lubricated with grease, (anti-corrosive wear agent).
3. The cap pos. 3 is mounted on the piston rod.
4. The sleeve pos. 4 is mounted and secured with Loctite.
5. Make sure the thread is completely clean and free of oil and other impurities before using Loctite.
6. **Do not fill the oil within 12 hours of using Loctite.**
7. Grease the cuff pos. 9 on the sleeve as well as the outer end of the cylinder tube's inside with lubricating oil and push the piston into centre position.
8. Screw the cap on and tighten.

Changing the tilt cylinder

The drum is unfolded and lowered onto the base (working position). The pressure is removed from the tilt cylinders (A).

Fig. 27



1. The hoses are disconnected from the cylinder.
2. The cylinder is supported.
3. The cotter pins in the rivets are disconnected while the rivets are uninstalled.
4. The cylinder can be uninstalled.
5. New or repaired cylinders can be installed.



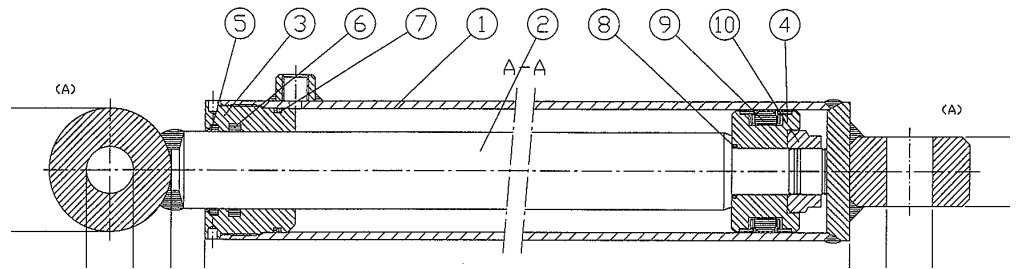
After mounting, the cylinders are activated until a small amount of movement can be felt in the cylinders. The cylinders are then activated in the opposite way until the cylinders are back in the starting position. The cylinders are moved a few times in this way, after which the cylinders are moved out in the outer positions a few times to air the system out.



There must never be people within the machine's operating radius.

Change the gaskets on the tilt cylinder

Fig. 28



1. The cylinder is emptied of oil by moving the piston carefully back and forth.
2. Move the piston into the centre position, after which the end cap (pos. 3) is unscrewed from the cylinder tube (pos. 1). A special tool must be used to remove the cap. If the cap is stuck, it may help to warm up the front of the cap. Once the cap has been unscrewed from the cylinder tube, pull the piston towards the cap, after which the piston rod can be removed from the cylinder tube (pos. 1).
3. The lock nut (pos. 10) that is holding the sleeve (pos. 4) is dismounted.
4. The sleeve (pos. 4) is removed from the piston rod (pos. 2).
5. The cap (pos. 3) is removed from the piston rod (pos. 2).
6. The seals in the cap (pos. 5+6+7+8+9) as well as the sleeve are removed.
7. All parts are checked for chips, burrs etc. Check for rust around the scraper ring (pos. 5) in the cap. If this is the case, remove it.

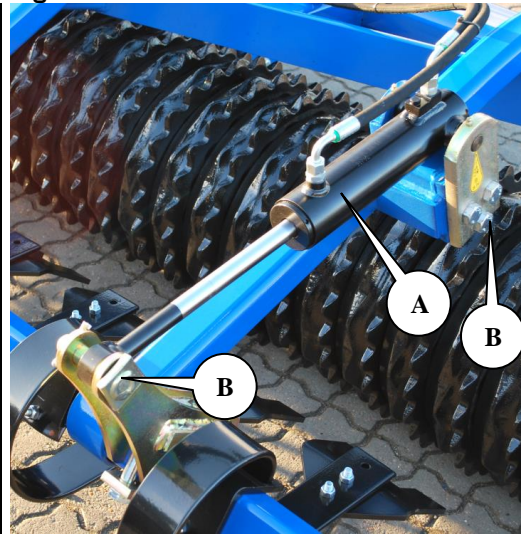
Mounting

1. New seals (pos. 5+6+7+8+9) are fitted in the cap and the sleeve.
2. The thread on the cap (pos. 3) and the cylinder tube (pos. 1) are lubricated with oil.
3. The cap (pos. 3) is mounted on the piston rod.
4. The sleeve (pos. 4) is mounted and the lock nut is screwed and **secured with Loctite**. Make sure the thread is completely clean and free of oil and other impurities before using Loctite. **Do not fill the oil within 12 hours of using Loctite.**
5. Lubricate the outermost seal on the part of the sleeve in contact with the cylinder tube as well as lubricating the innermost cylinder tube with oil and then push the piston into the centre position.
6. The cap is mounted on the cylinder tube and tightened.
7. To mount the cylinder, refer to "Changing the tilt cylinder".

Additional Equipment - Changing the cylinder to crackerboard

Fig. 29

1. MINIMAX is unfolded while resting on the ground.
2. The crackerboard is lowered and the pressure is removed from the hydraulic system.
3. The hoses are disconnected from the cylinder.
4. Bolts, cotter pins and rivets (B) are removed.
5. New or repaired cylinder (A) is mounted.
6. Remember to install the cotter pins in the rivets.



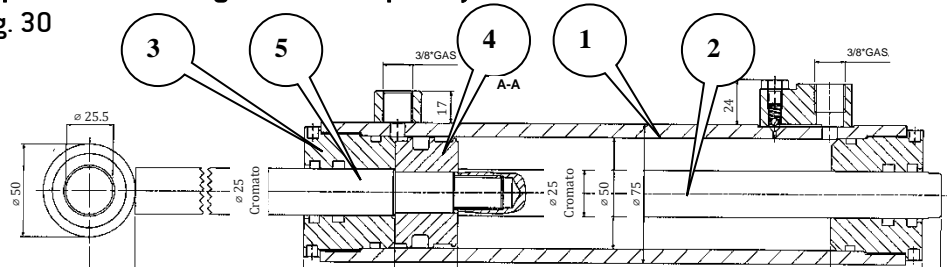
After mounting, the cylinders are activated until a small amount of movement can be felt in the cylinders. The cylinders are then activated in the opposite way until the cylinders are back in the starting position. The cylinders are moved a few times in this way, after which the cylinders are moved out in the outer positions a few times to air the system out.



There must never be people within the machine's operating radius.

Replacement of the gaskets for depth adjustment

Fig. 30



Cylinder 25/60/25-205

- 1 The cylinder is emptied of oil by moving the piston carefully back and forth.
- 2 Move the piston into the centre position, after which the end cap (pos. 3) is unscrewed from the cylinder tube (pos. 1). A special tool must be used to remove the cap. If the cap is stuck, it may help to warm up the front of the cap. Once the cap has been unscrewed from the cylinder tube, pull the piston towards the cap, after which the piston rod can be removed from the cylinder tube (pos. 1).
- 3 The piston rod (pos. 2) that holds the sleeve (pos. 4) in place is uninstalled.
- 4 The sleeve (pos. 4) is removed from the piston rod (pos. 5).
- 5 The cap (pos. 3) is removed from the piston rod (pos. 5).
- 6 The gaskets are removed.
- 7 All parts are cleaned and checked for chips, burrs etc. Check for rust around the scraper ring in the cap. If this is the case, remove it.

Mounting

- 1 New seals and a sleeve are mounted.
- 2 The thread on the cap (pos. 3) and the cylinder tube (pos. 1) are lubricated with oil or grease.
- 3 The cap (pos. 3) is mounted on the piston rod.
- 4 The sleeve (pos. 4) is mounted and the piston rod (pos. 2) is **secured with Loctite**. Make sure the thread is completely clean and free of oil and other impurities before using Loctite. **Do not fill the oil within 12 hours of using Loctite.**
- 5 Lubricate the outermost seal on the part of the sleeve in contact with the cylinder tube as well as lubricating the innermost cylinder tube with oil, and then push the piston into the centre position.
- 6 The cap is mounted on the cylinder tube and tightened.
- 7 To mount the cylinder, refer to "Additional Equipment - Changing the cylinder to crackerboard".

Removing/mounting wheels on the road

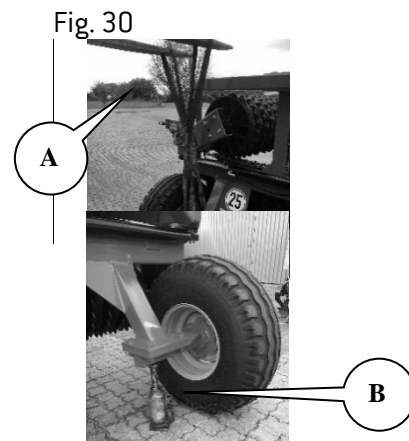
To remove a wheel on the road, hoist the drum with a strap and crane (A), or car jack (B) as shown in the pictures below. Make sure, that the car jack has a secure stand and the implement is connected with the tractor. The wheel will thus be free of the ground.

The wheel nuts are removed and the wheel can be replaced. After installing the new wheel, screw the nuts on and tighten 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 wheel surfaces are clean, otherwise the wheel nuts may loosen.

It is important that the lifting device is able to manage 75% of the machine's total weight. In addition, the machine must be properly braked and secured.



Removing/mounting wheels on the ground

To remove wheels, unfold the drum with the rings resting on the base. The wheels will not therefore touch the ground.

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



It is important that the wheel nuts and wheel surfaces are clean, otherwise the wheel nuts may loosen.

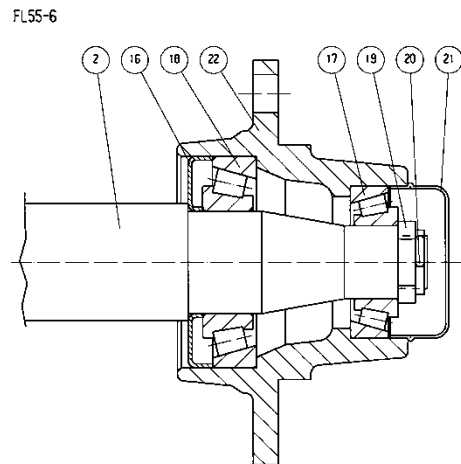


Re-tighten the wheels after 1-2 hours of use.

Replacing the bearings

1. The hub cap pos. 21 is removed
2. The cotter pin pos. 20 is removed
3. The castellated nut pos. 19 is removed
4. The axle pos. 2 can now be taken out
5. The bearings pos. 17+18 are removed
6. The sealant ring pos. 16 is removed

Fig. 31



Mounting

1. The outer rings of the bearings pos. 17+18 are mounted in the hub casing pos. 22
2. The sealant ring pos. 16 is installed
3. The inner bearing ring pos. 18 is mounted on the shaft pos. 2 and the shaft is mounted in the hub casing
4. The inner bearing ring pos. 17 is mounted on the shaft pos. 2
5. The castellated nut is screwed onto the shaft pos. 2, while the hub casing pos. 22 is rotated. The castellated nut is tightened to the slowly rotating hub casing. Then loosen the castellated nut a quarter turn or until the hub casing turns around easily.
6. The splitter pos. 20 is mounted
7. The hub cap pos. 21 is filled halfway with ball bearing grease and the hub cap is mounted

Dismantling the drum body

The repair is performed on a flat surface with the drum connected to a tractor and unfolded with the rings resting on the ground. It would be a great help to have a crane or something similar available for both the dismantling and assembly.

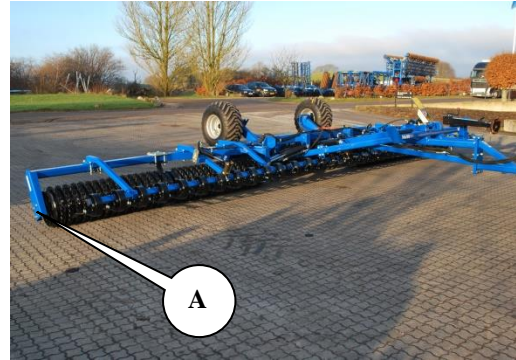
Replacement of the drum body on the side sections



If no crane is available, both axles on the side sections must be removed to prevent the drum overturning.

1. Loosen the bolts (A)
2. Attach the square pipe to the side section and tighten the strap lightly until the bolts (A) are loose and can be removed.
3. The tilt cylinder is activated and the drum is tilted up onto the wheels
4. The rings can be pulled away from the drum.

Fig. 32



If no crane is available, the drum's folded cylinder can be easily activated and put in a position so that the bolts are loose and can be removed.

Mounting

1. The rings are placed in a position corresponding to the placement when the drum is unfolded.
2. The drum is unfolded and tilted carefully down over the rings.
3. Mount the bolts (A)

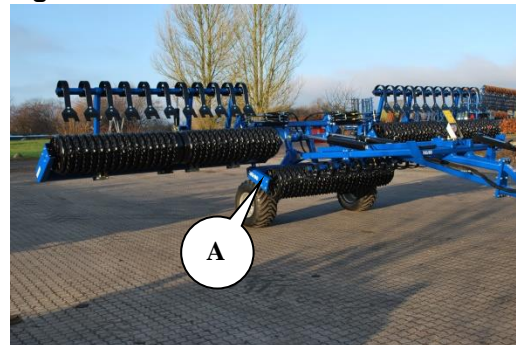


There must be no people within the operating radius when/if the hydraulic system is activated.

Replacement of the centre drum body

1. Loosen the bolts (A)
2. The tilt cylinder is activated, the drum is tilted towards the wheels, the drum rings support the base and the bolts are loose.
3. Remove the bolts
4. The drum is tilted up onto the wheels.
5. The rings can be pulled away from the drum.
6. Mounting is carried out in reverse order

Fig. 33





The hydraulic system must not be activated when there are persons within the machine's operating radius.

Disposal



The drum must be unfolded. It is crucial that the pressure is released from **all** the cylinders.



When dismantling/assembling, attention should be directed towards the weight on the part in question. It is therefore **important** that this part be supported or lifted up, so there is no risk of collapse or overturning.

Hydraulic hoses and cylinders must be disconnected and any residual oil emptied out. The oil is collected to avoid pollution. Oil and hoses are sent for destruction.

All iron in the machinery can be sent for recycling.

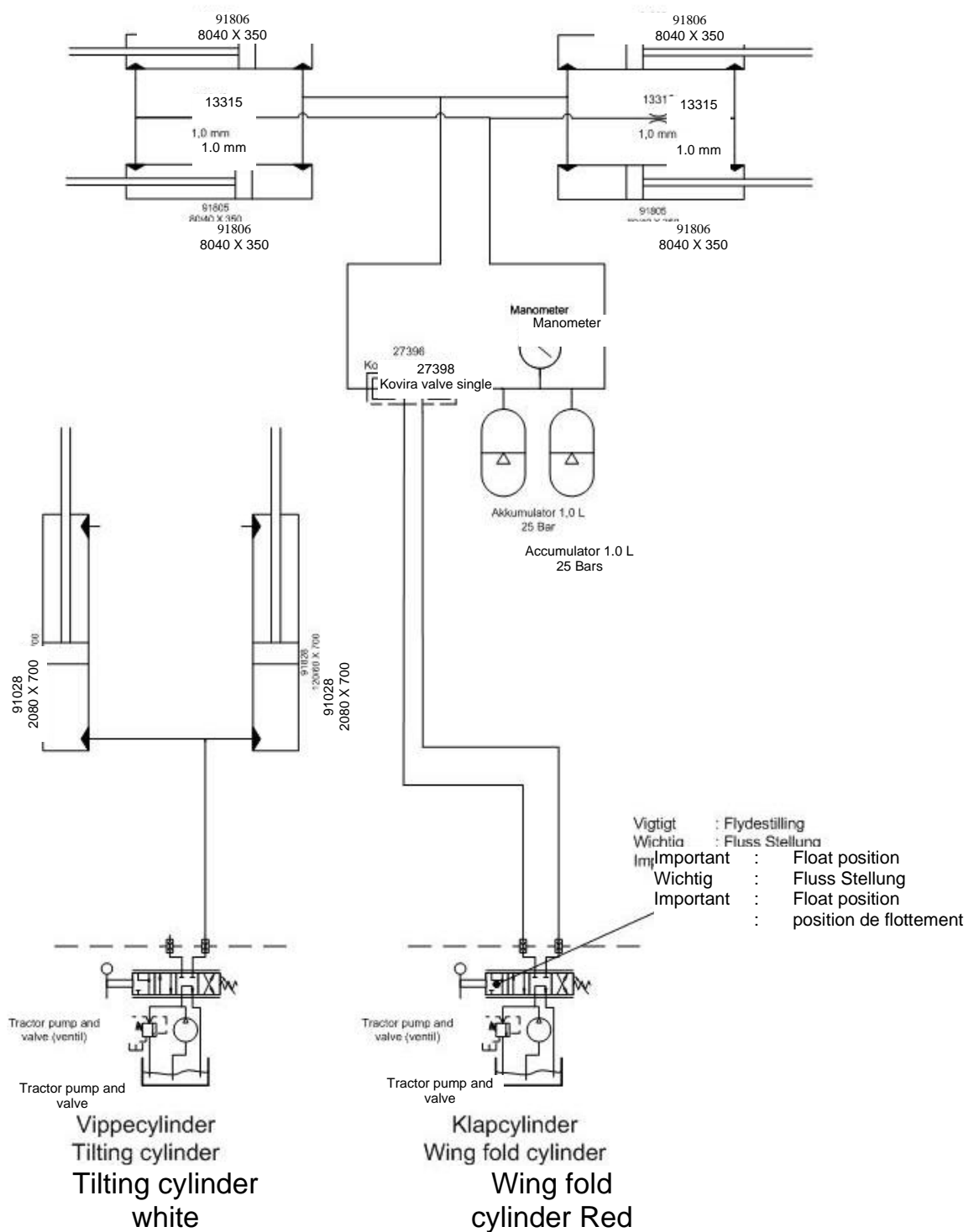
Hydraulics diagram

Ground machine

Fig. 34

MINIMAX 950

DAL-BO

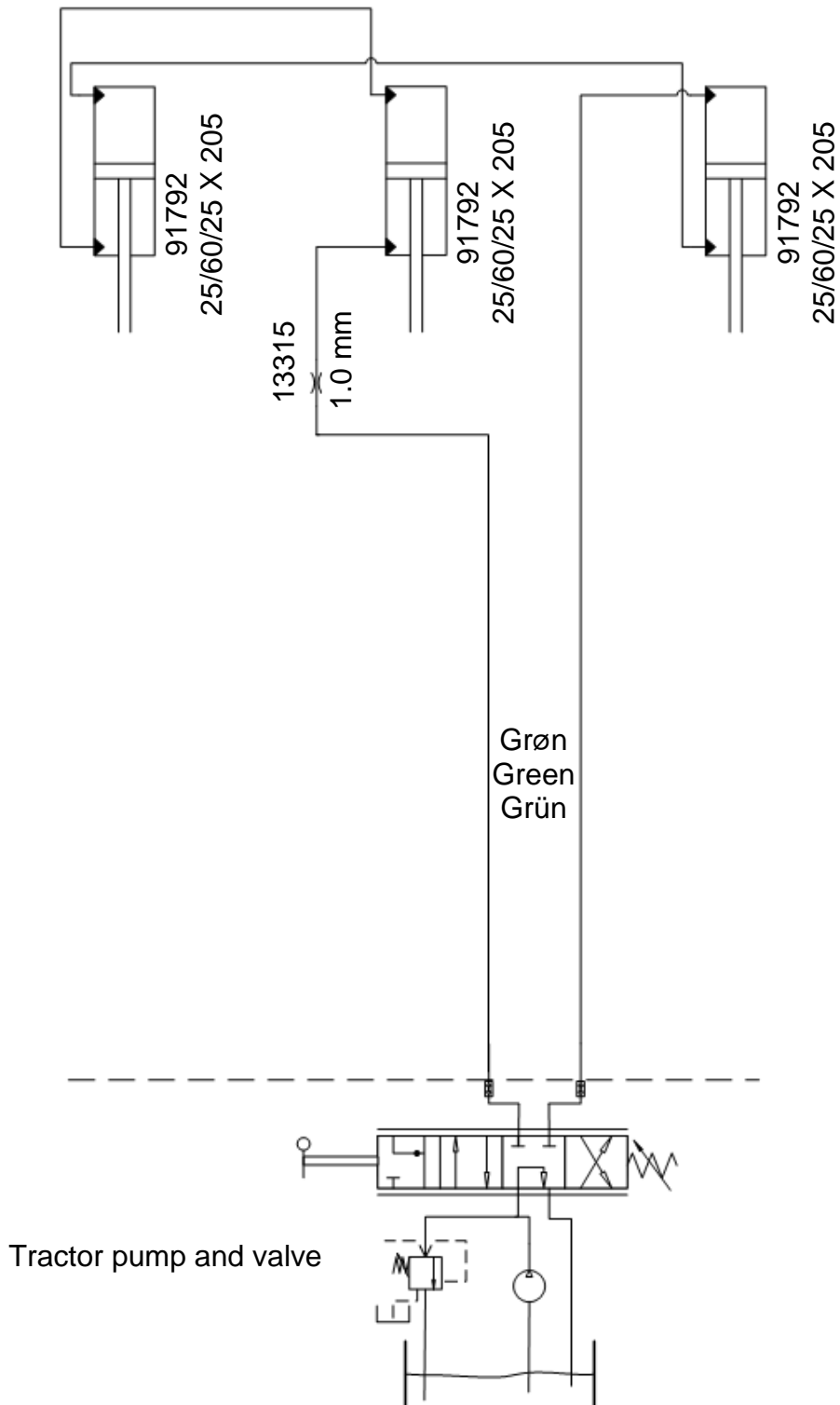


Additional Equipment - Crackerboard

Fig. 35

MINIMAX 950

Lamelplanke
Crackerboard



Spare parts