

DALBO®

SUBSOILER



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SUBSOILER

Type 300 cm

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

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Your subsoiler 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.



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

DALBO A/S
Alessio Riulini, CEO

Date: _____

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Introduction and identification of serial number

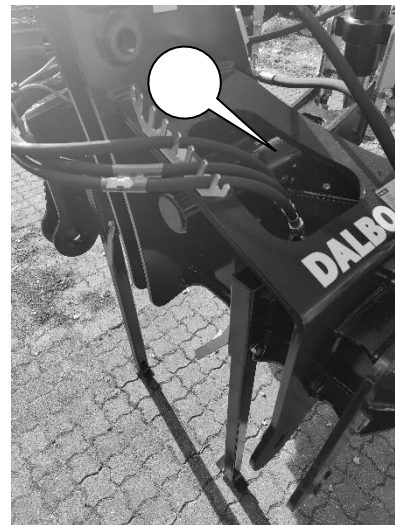
Information

- This user manual is intended for the person who uses and maintains the subsoiler. It contains all sections relating to safety, usage, and maintenance. It is very important that all users read and understand the user manual before starting to use the subsoiler.
- Each time a new user starts using the subsoiler, 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 subsoiler, it is very important that you stop using it and contact DALBO A/S.

Location of the user manual

The user manual can be found in a plastic case placed next to the machine's 3-point hitch. It is important to ensure that the user manual is accessible to all users of the machine.

Fig. 1



Location of the serial number

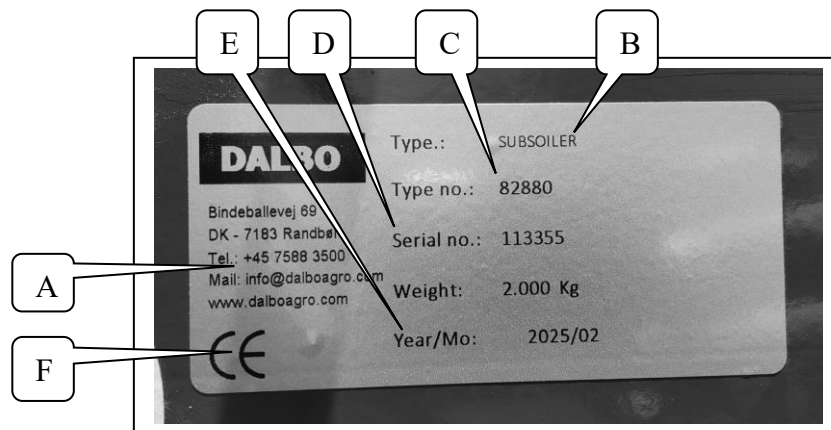
The type plate on the subsoiler is located centrally on the frame next to the 3-point hitch. The type plate is a self-adhesive foil placed (A). The serial number of your machine can also be found on page 2 in the user manual.

Fig. 2



The subsoiler 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.
- D: Serial number.
- E: Year of production.
- F: CE label.



Warranty provision

See the general sales and guarantee conditions

Safety



You will find this symbol in the instruction manual whenever 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.

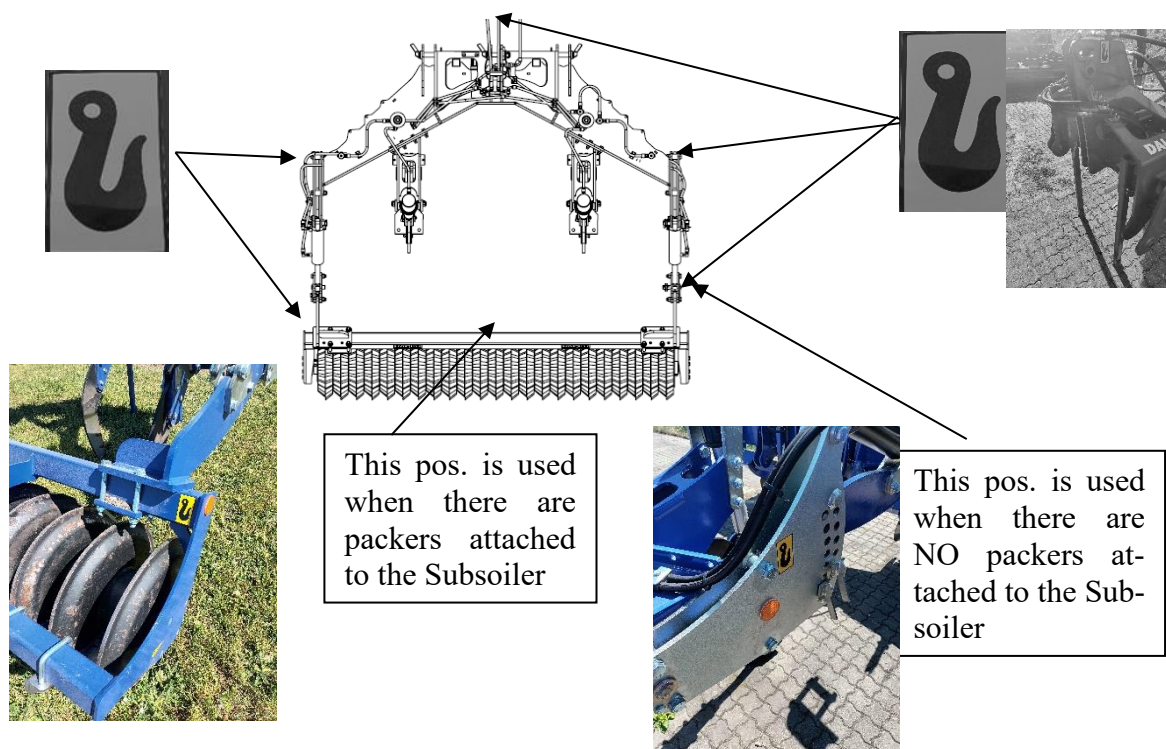
General

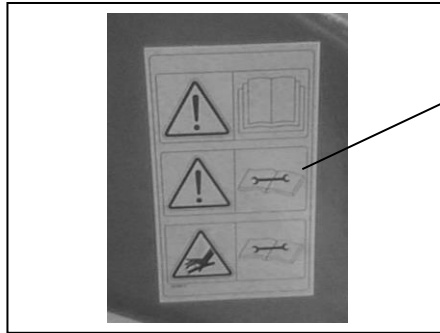
- Before starting work, the user must be familiar with all controls on the machine.
- The machine must not be used for anything other than the cultivation of ordinary agricultural land.
- The user manual must always be available if the need arises. If it gets damaged or goes missing, a new one must be obtained from DALBO A/S.
- Do not use the machine if you are tired, ill, or under the influence of alcohol, medication, or drugs.
- The machine is normally used in daylight, but if there is a need to operate the machine in darkness, the tractor's lights must be used.
- Carefully check the machine's functions before starting it.
- Appropriate personal protective equipment and safety gear must be worn when carrying out maintenance work on the machine.
- The user of the machine must not wear loose-fitting clothing that could get caught in machinery.
- Using the machine 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 machine.

- Any modification to the machine 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. 3

Use a strap when using a crane or forklift to lift the machine.





Safety sign:
Always read the instruction manual.



- Clean the safety labels daily.
- Replace the safety labels 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

- No passengers are allowed on the machine during work or for transport.
- When operating the machine, ensure that nobody is within its operational radius. The machine may only be operated from inside the tractor. When coupling and uncoupling, the tractor's lift can be operated with external buttons, if it has them; these are typically found on the tractor's rear fenders.
- Before leaving the tractor, or if adjustments, maintenance or repairs need to be made to the machine, first lower the machine's undercarriage, apply the tractor's brake, turn off the engine, and remove the ignition key in order to safeguard the machine against unintentional start-up.
- Remember to secure the support legs and the lifting arms with cotter pins.
- 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.

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.
- Clean hands thoroughly after skin 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 hoses as handles, as these are movable parts that do not provide secure support.

Installation

- 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 hoses as handles, as these are movable parts that do not provide secure support.

Maintenance and repair

- The machine must be properly supported while undertaking all repair and maintenance work, the tractor and machine must have brakes properly activated, the engine must have been turned off, and the ignition keys removed.
- 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.

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

Driving on roads

- When driving on public roads, all safety and warning devices required by law must be installed and tested. The driver is responsible for correct use of lights and traffic signs in accordance with traffic laws.
- 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 not to exceed the total weight and axle load of the tractor and that the load on the tractor's front axle is no less than 20 per cent of the actual overall weight. If that is the case, use front weights on the tractor.
- Before starting road transport from the field in muddy conditions, you must clean the machine and tractor tires of mud.
- The machine must be in transport position when driving on public roads.

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 machine 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 machine 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 extra weight may be fitted to the machine.

Technical data

In the table below, you can see the weight of the machine in relation to how it is equipped.

A standard machine consists of teeth only without additional equipment. A wheelset refers to a standard machine including wheelset.

	The weights indicated below are with standard teeth [kg]				
	Standard machine	Wheel-set	CrossCombi Light packs	T-ring packs	HD packs
Subsoiler PROFI - 2 teeth	815	995	1825	1470	1875
Subsoiler PROFI - 3 teeth	970	1150	1980	1630	2030
Subsoiler PROFI - 4 teeth	1130	1315	2140	1790	2200
Subsoiler PROFI - 5 teeth	1285	1470	2300	1950	2350
Subsoiler PROFI - 6 teeth	1620	1800	2880	2395	-----
Subsoiler PROFI - 7 teeth	1770	1955	3030	2550	-----

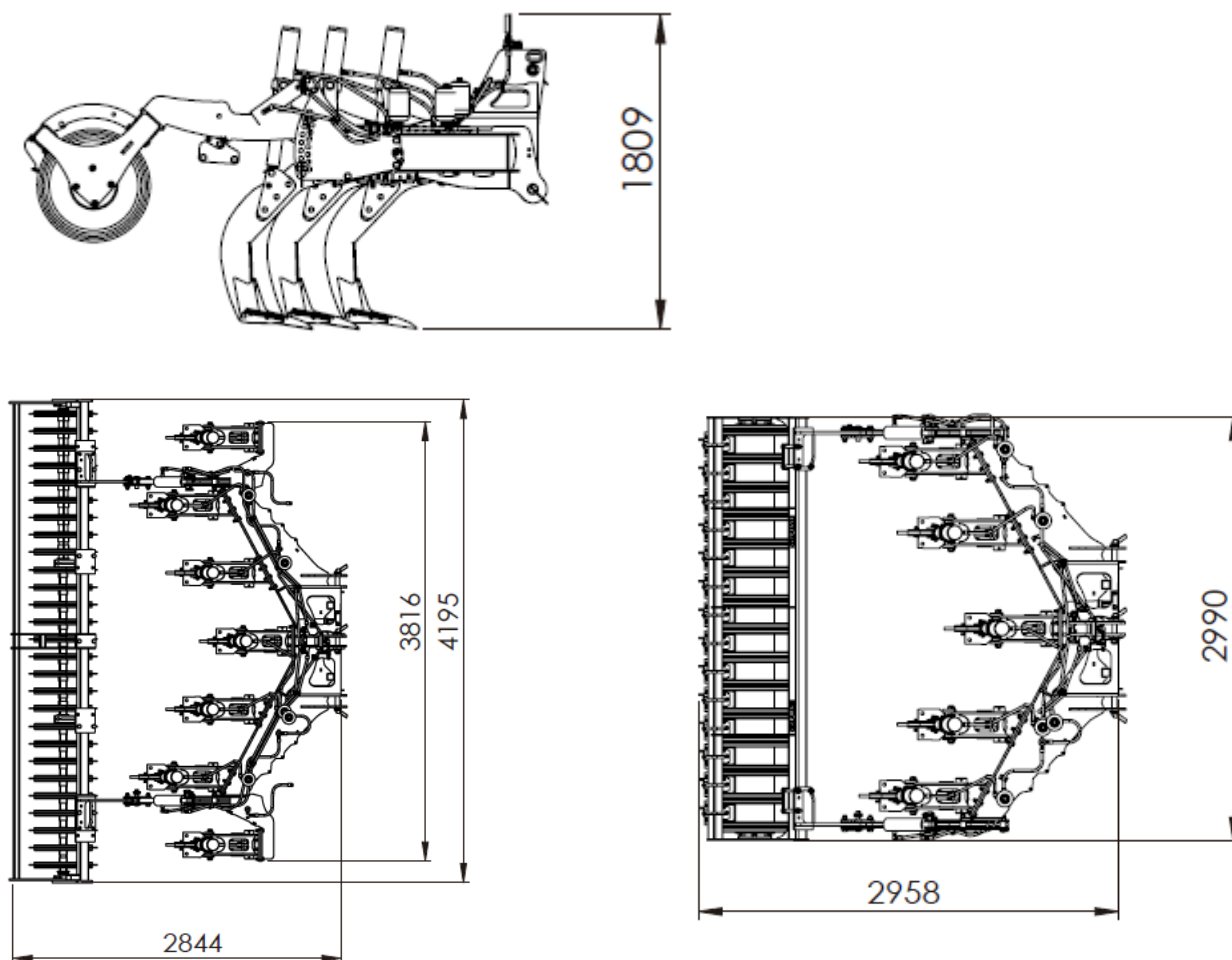
The table below includes additional weight to the table above.

These weights are added if the machine is supplied with the equipment listed below.

	Additional weight [kg]	
	Slicing section in front of teeth	Light Sets
Subsoiler PROFI - 2 teeth	255	
Subsoiler PROFI - 3 teeth	280	
Subsoiler PROFI - 4 teeth	305	
Subsoiler PROFI - 5 teeth	325	
Subsoiler PROFI - 6 teeth	375	
Subsoiler PROFI - 7 teeth	400	

Measurements

The measurements indicate the general size of the machines.



Hydraulic requirements

Hydraulic requirements:	
1. 1 EV	X
2. 1 DV for packer	X

The table below shows how much oil flows back to the tractor from the package when the machine is at maximum depth.

Model	Oil in liters
300/400	1.2

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 machine is delivered fully assembled on a flatbed trailer.

If the machine needs to be lifted, we recommend attaching straps to the 3-point hitch. (See page 10, section "Safety, general")



Incorrect rigging and lifting can cause serious damage to the machine and people nearby.



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

Description of the machine

The subsoiler is a powerful cultivator that is especially well-suited to loosening and breaking up soil. It does not plow and cannot be used to reach lower depths, e.g. for headland and rows.

The standard machine consists of a toothed section, whereby you must either mount a packer section or support wheels for depth adjustment.

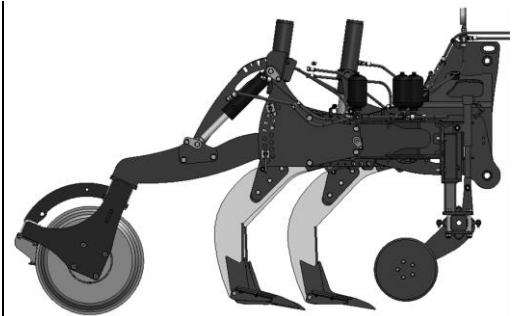
The teeth loosen the soil to a maximum depth of 450 mm without mixing up the soil. The soil is left either packed or tilled depending on whether the machine is equipped with a packer or with wheels.

The machine can be supplied with a disk cutting section where a cutting edge is placed next to each tooth. These can slice through any plant debris so that it does not drag on the teeth.

The machine is delivered from the factory ready for use.

Fig. 3

The picture shows a machine supplied with a packer and cutting section



The machine is designed for all-year operation, with however frost-free conditions. Due to the machine's large tare weight and construction, it is able to loosen soil even under very hard soil conditions.



Only use the machine to till soil that has already been cultivated. This means that previously forested areas, gravel roads and similar must not be tilled with this machine.

The working speed must be adjusted to a range of 4-10 km/h. If you drive any faster, this will significantly increase wear on the wear parts and place strain on the machine's construction.



The machine is constructed so sturdily that it can tolerate high loads. Nevertheless, it is always necessary to adjust the driving speed to the conditions, i.e. reduce driving speed, for example, when the ground is very hard.

Limitations in the use of the machine

The following describes what the machine may/must not be used for:

- The machine may only be used for loosening compressed soil and tilling organic plant material in agricultural areas that have been cultivated. Those areas to be tilled must have been subject to normal agricultural maintenance, i.e. without significant bumps or holes. Any rocks in the field must be collected from the area to the extent that is normally carried out. The area must be reasonably drained.
- The plant material must not be any stiffer than corn stalks.
- The machine may only be used after first being attached to an agricultural tractor, by way of connection to the rear 3-point hitch.
- The machine can work at a maximum speed of 10 km/h. The speed shall, however, always be adjusted to the nature of the terrain.

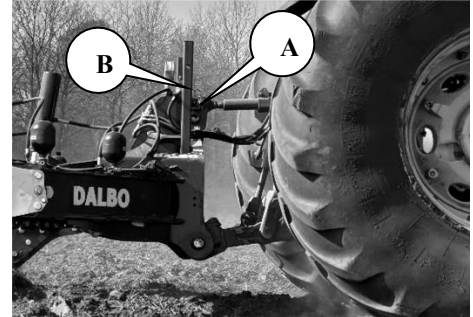
Any other use of the machine, which does not fulfil the aforementioned conditions, will be considered unauthorized use and will result in the loss of the manufacturer's warranty and liability.

Connecting and disconnecting

Connecting

The machine is connected to the tractor's 3-point hitch and is secured with ball joints and cotter pins (A) The support foot (B) is lifted up and secured.

Fig. 4



Remember to secure the connection with ball joints and cotter pins.

Hydraulics

The machine requires a single-acting hydraulic outlet for stone protection as standard.

Labeling of hoses

Cylinder name	Color	Outlet	Function
Stone protection	Un-marked	Single-acting	Set the pressure in the hydraulic stone protection

Marking of hoses additional equipment

Cylinder name	Color	Outlet	Function
Depth adjustment	Yellow	Double-acting	Sets the working depth of the machine.

Disconnecting

Place the machine on a flat, stable surface and lower any packer to the ground. Lower the support leg onto the flat surface and secure it with cotter pins, remove the hydraulic hoses, and disconnect the 3-point hitch.



Make sure the hydraulic hoses have not been crushed



Always disconnect the machine on a flat surface to ensure maximum stability.



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

Settings

The machine is very easy to work with and to set up.

There are different setting options depending on how the machine is configured

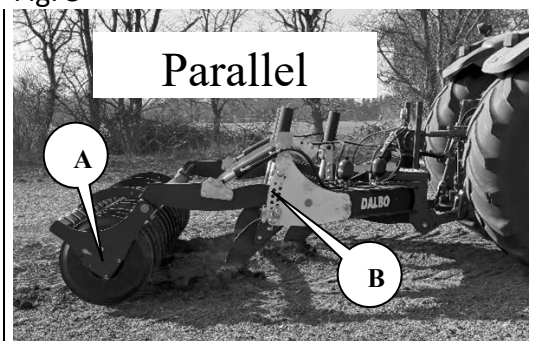
Before taking into use each time, it is necessary to check the incline of the frame to ensure work is carried out optimally and uniformly.

Adjusting the main frame

To achieve a uniform tilling of the soil, the main frame on the machine must be parallel to the undercarriage, both lengthways and transversely.

Here you can see the machine at work. Here, the main frame is shown parallel.

Fig. 5

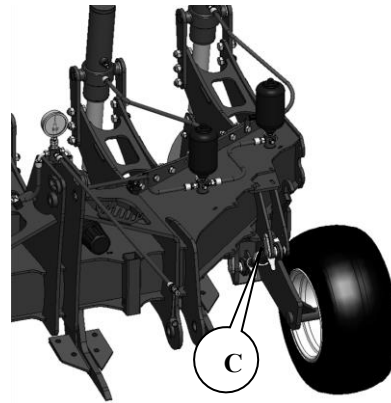


Adjustment of depth

The working depth of the machine is set hydraulically with the packer (A fig. 5) and can be locked or restricted with rivets through the hole pattern (B fig. 5)

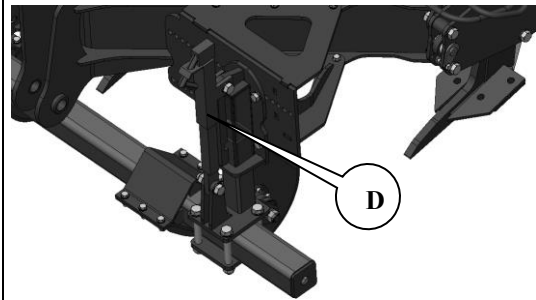
If the machine is supplied with support wheels, the working depth can be adjusted via the top rod (C fig. 6)

Fig. 6



If the machine is supplied with a cutting section. This is set in relation to the desired working depth via the spindle (D fig. 7). The disk needs to run at a working depth of around 5 cm

Fig. 7



Setting the stone protection

In order to avoid breakdowns and ensure the machine is working correctly, it is important to drive with the correct pressure in the hydraulic stone releaser. Incorrect pressure may result in the stone protection not releasing and thus a risk of damaging the machine's frame.

The pressure in the hydraulic system must be 100 bar. This ensures that the machine maintains its depth as well as that the teeth can release when they drive over stones, for example. 100 bar is marked in green on the machine.

Fig. 8



It is important to ensure that the pressure does not exceed 100 bar. Dalbo takes no responsibility for breakdowns or damage to the machine as a result of incorrect operating pressure.

Driving and operating

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



During driving, transport or adjusting the machine, people must never be seated on it or in the immediate vicinity



Follow the tractor manufacturer's recommendations in regard to passengers in the relevant tractor while driving or using the machine.

Driving speed

Drive the machine at 4-10 km/h, and always in compliance with weather conditions.

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

The power requirement is highly dependent on soil type, number of teeth, terrain, and speed. See the table.

Table 4, **Guide for power requirements in HP per tooth**

Teeth	all
Power per tooth [HP]	50-80



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

Troubleshooting

Error	Cause	Remedy
Uneven working depth	<ul style="list-style-type: none"> Frame not parallel with under-carriage 	<ul style="list-style-type: none"> Adjust the frame by setting the lifting arms and top rod
	<ul style="list-style-type: none"> Incorrect/unevenly distributed packer or support wheels 	<ul style="list-style-type: none"> Adjust the wheels or the packer so they/it is level on the left and right sides
The teeth do not release upon impact with an object	<ul style="list-style-type: none"> Pressure is too high in the hydraulic stone protection system 	<ul style="list-style-type: none"> Reduce the pressure to 100 bar
	<ul style="list-style-type: none"> Membrane in the accumulator is defective 	<ul style="list-style-type: none"> Replace the defective accumulator(s)
The teeth are releasing too much or too often	<ul style="list-style-type: none"> Pressure is too low in the hydraulic stone protection system 	<ul style="list-style-type: none"> Increase the pressure to 100 bar

Maintenance

Good maintenance ensures both a long operational life for the machine and optimal performance. 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.

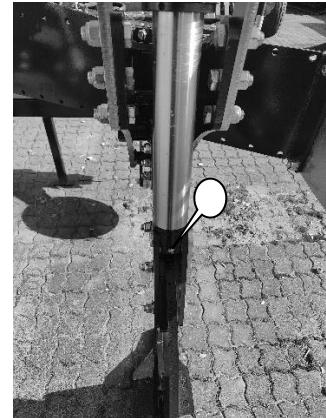
Lubrication

Some of the lubrication points indicated below depend on how the machine is configured. The only standard lubrication points that are always present are in connection with the hydraulic stone protection.

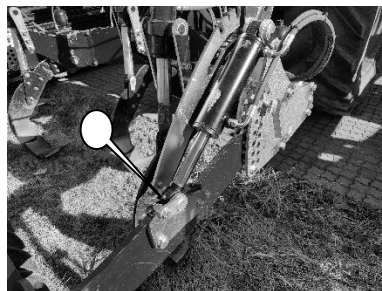
Fig. 9



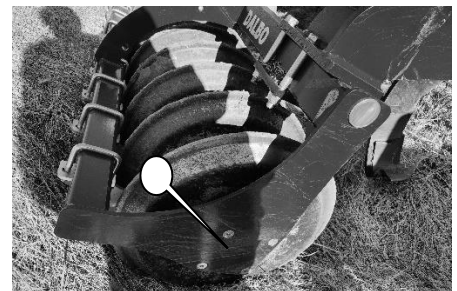
A



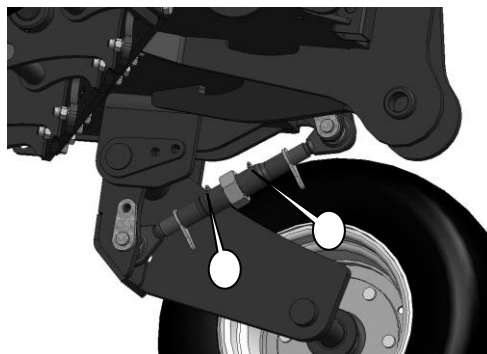
B



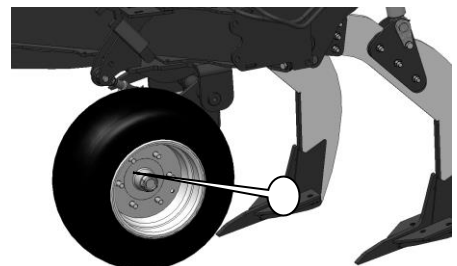
C



D



E



F

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Lubrication points	Number of nipples	Lubrication interval hours	Image
Stone protection (lubrication point per tooth)	1	8	A
Cylinders for stone protection (lubrication point per tooth)	1	8	B
Cylinder packer	2	8	C
Bearings in the packer	2	50	D
Top stand next to support wheels	4	50	E
Bearings in the wheel hub	2	50	F



During maintenance, suitable protective equipment must be used in the form of gloves and safety goggles. These should be approved for oil and lubricants



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 machine has been cleaned, washed, and parked for an extended period.

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.

Replacements and repairs



Safety is important for **all** repair work on the machine. 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 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 machine must be conducted only when the machine is lowered to the ground, or is set in transport mode, the tractor has the break on, the engine is switched off and the ignition key is removed, so that the machine is secured against unintentional starting.



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 carrying out work on the hydraulic system, the system must always be bled before being taken into use in order to safeguard against breakdown or injury.



This is during all work with maintenance, replacement, and repairs. Suitable protective equipment must be used in the form of gloves and safety goggles. These should be approved for sharp objects, oil and lubricants

Hydraulics

Replacing the cylinder for depth adjustment/packer

The machine is lowered down onto the ground and the pressure is released from the hydraulics so that the hydraulic system is fully pressure-free. Rest the packer on the ground.

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



The system has a double-acting, pilot-operated check valve built-in. This means that there may be residual pressure in the cylinder

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After installation, activate the cylinders again. The cylinders are activated both ways and are fully sealed in both outer positions. This must be done in order to ventilate the system with the cylinder.

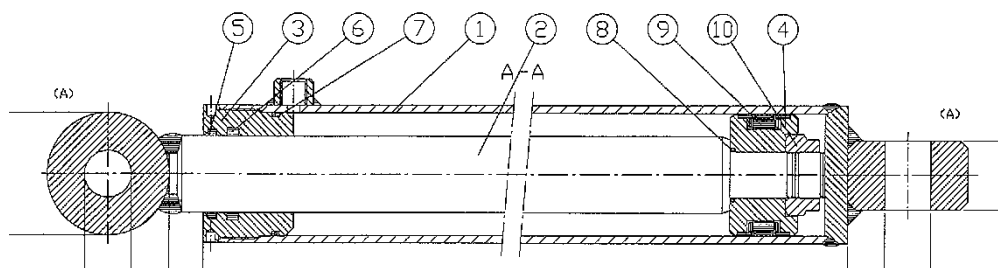


Ensure that no one is within the working radius of the equipment.

Replacing the seals

(cylinder illustration may deviate from the physical cylinder)

Fig. 10



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 lock 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.

Installation

1. Install new seals (pos. 5+6+7+8+9) in the upper section and 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. The sleeve (pos. 4) is mounted and the lock nut is screwed and **secured with Loctite**. Ensure that the threads are completely clean and free of oil and other impurities before using Loctite. **Do not fill the oil 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. To mount the cylinder, refer to “Replacing the cylinder ”.

Wheels – changing or repair

Before disassembling the wheels, lower the machine onto the ground and turn off the tractor and secure it against unintentional movement.

Remove the wheel nuts and the wheel can be replaced. After mounting a new wheel, the nuts are screwed on and tightened 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.

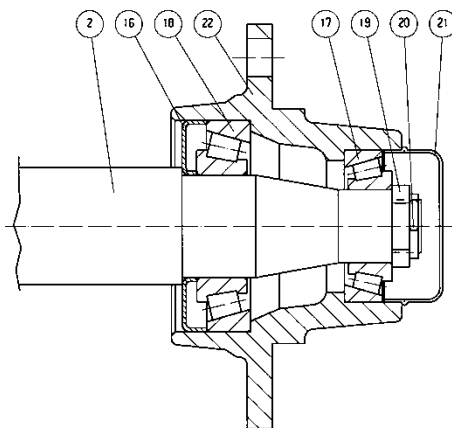


Wheels must be retightened after 1-2 hours of use.

Replacing the wheel bearings

Fig. 11

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



Installation

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 onto the axle
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 axle 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 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

Replacement of worn parts

Always carry out replacements on a flat surface with the machine connected to a tractor and hanging in the lift. Support the machine securely. Do not walk under the machine.

Replacement of worn parts

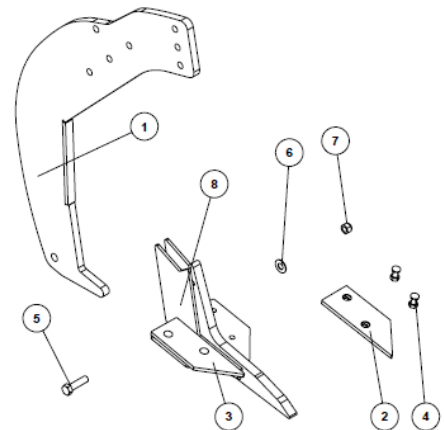


Do not walk under the machine without it being properly supported and secured against unintentional movement

Replacement of foot.

1. The bolt (5) is loosened and removed
2. The foot (8) with corresponding winged tines (2 and 3) can then be removed and changed as needed
- The winged tines (3 and 4) can be replaced without removing the foot first. Here, it's only the bolt (4) that needs loosening and removing.
- Assembly is carried out in reverse order.

Fig. 12



Bolt and nut (5 and 7) must only be tightened loosely to the contact area on the wear part. (8).

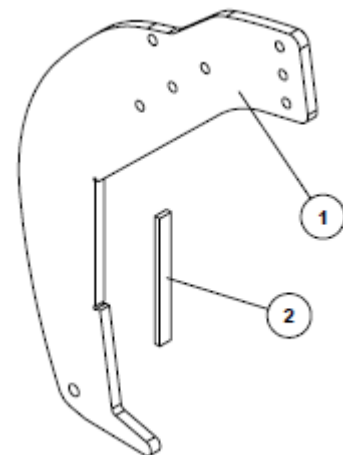
Do NOT use an impact wrench to tighten bolts and nuts (5 and 7)

Replacement of worn plate.

The hard-metal plate (2) can be replaced

1. First, cut off the old plate by cutting the welds, after which these are sanded down.
2. The new plate is centered and welded onto the rod. Make 4 welds of 2-3 cm lengths along each side of the plate.

Fig. 13



It is important to replace the worn parts as needed and before any damage occurs on the rod itself or on bolt fasteners on the other parts.

Disposal



The machine must be placed on a fixed surface. It is important to release pressure from **all** cylinders.



During disassembly/dismantling, attention should be directed towards the weight on the part in question. It is therefore **important** to support or lift the part to prevent the risk of it falling or tipping over.

Remove all hydraulic hoses and cylinders and empty them of oil. The oil is collected to avoid contamination. Oil and hoses must be sent for destruction.

Anything iron that is part of the machine can be sent for recycling.

Disposal of waste must be carried out in accordance with local legislation.

Spare parts