Fransgård

Manual

EN

PELLET CHIPPER

PC-2700-PEH & PC-2700-PIH

SAFETY AND

USER MANUAL

FOR

PELLET CHIPPER

TYPE PC-2700-PEH & PC-2700-PIH

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Congratulations on your new PC-2700-PEH or PC-2700-PIH Pellet Chipper.

In this user manual you will find the wood chipper's specifications, operating conditions, safety precautions and how to maintain it.

This safety and operating manual only applies to the PC-2700-PEH and PC-2700-PIH Pellet Chipper with integrated TOTALSYSTEM and feeder and PTO axle and must be read before use.

Please note that the illustrations in this manual do not necessarily correspond exactly to the wood chipper: Some drawings and sketches are therefore labelled to make them easier to understand.

Yours sincerely,

Fransgård Maskinfabrik A/S

Table of Contents

1 Specifications

This section provides an overview of the wood chipper and PTO axle's operating data and specifications.

1.1 Chipper

Type: PC-2700-PEH / PC-2700-PIH
Weight (PC-2700-PEH): Approx. 1,500 kg.
Weight (PC-2700-PIH): Approx. 1,550 kg.
Power: v. 1000 rpm 112 kW max. (150 hp).
v. 540 rpm 60 kW max. (80 hp).
Revolutions (PTO.): 540/1,000 rpm.
Noise level: 126 dB max.
Oil pressure: 150 bar max.
Oil flow: 30 l/min. max.
Minimum operating temperature: -10°C.
Height: Approx. 3.25 metres.
Width: Approx. 2.6 metres.
Length: Approx. 2.4 metres.
Rotor diameter: 920 mm.
Overall rotor diameter
(incl. ejector blades): 1,224 mm.
Rotor weight (total): Approx. 380 kg.
Rotor thickness (chipping disc): Approx. 47 mm.
Number of chipping blades: 4 pcs.
Number of screen blades (TOTALSYSTEM): 4 pcs.
Feed opening (height x width): 27 x 27 cm
Trunk diameter: 27 cm max.
Capacity: 5-30 m^3 per hour (depending on the screen type, etc.).
Groove spline on the axle: 1 3/4" x Z6.

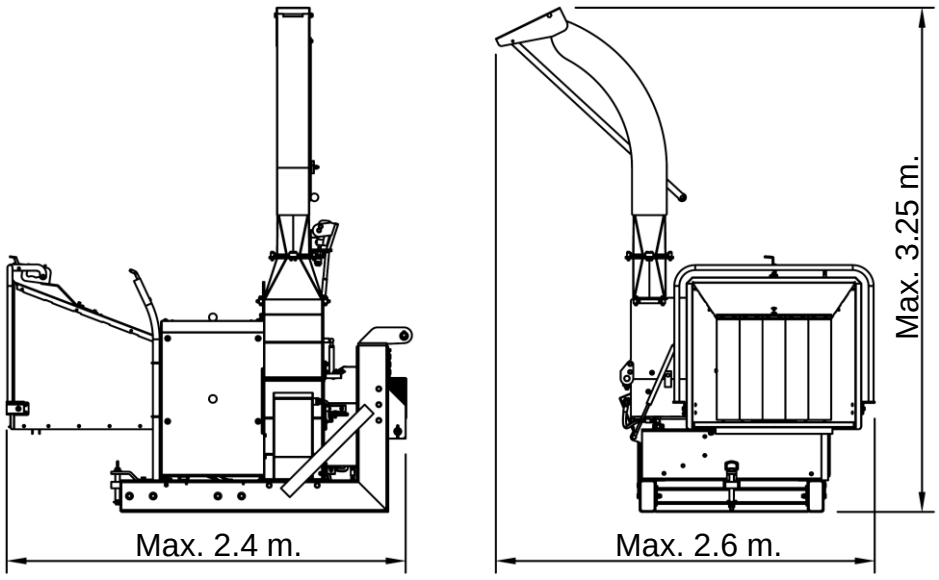


Figure 1: The chipper's main dimensions

1.2 Power transmission axle

If the chipper comes with a PTO axle, it is assumed that this is used with the chipper.

If you choose to find a PTO axle yourself or if you need to replace a worn-out one, choose an axle that complies with the following:

Type:	PTO axle with idling and a slip clutch on the chipper side.
Mounting:	1 3/8" x Z6 internal groove spline (tractor side) 1 3/4" x Z6 internal groove spline (chipper side)
Length:	The axle length must be adapted to the tractor on which the chipper is to be mounted, taking into account that it can telescope. In addition, the requirements for length, overlap between the 2 axle parts, etc., specified by the axle manufacturer must be observed.
Nominal performance:	The nominal performance of the axle is adapted to the chipper's specifications (see Section 1.1 for this information). Note that fewer kW may be transferred at 540 rpm than at 1000 rpm.

Furthermore, read the manual that comes with the selected PTO axle and follow all instructions in it to ensure proper use and maintenance, as well as safety regulations.

2 Mounting the chipper

This section explains how to mount and connect the chipper to a tractor.

2.1 On delivery of a new chipper

When the chipper is received new from the factory, it may be mounted on some pieces of wood, or possibly on a Euro pallet. These pieces of wood are intended solely for transport between the dealer and customer, and **must** therefore be **removed** before using the chipper.

2.2 Mounting a chipper on a tractor

The chipper must be mounted on the tractor's 3-point hitch with hitch pins. For safety reasons, it is important that the chipper is correctly secured in all 3 places.

Warning: DO NOT start the chipper unless the chipper is correctly mounted on the tractor's 3-point hitch.

2.3 Mounting the PTO axle

The PTO axle is first mounted on the groove spline on the chipper's main axle and then on the tractor's PTO. Note that the clutch, which is mounted on the PTO axle, must face the chipper.

After the coupling end of the PTO axle has been fitted and tightened, fit the SFT guard. See Section 5.11 on how to do this.

It is important to check that the PTO axle is not too long. If it is too long, there is no room for it between the tractor and the chipper when the chipper is lifted with the tractor's lift. This can cause serious damage to the chipper and tractor.

Afterwards, remember to attach the chains on the PTO axle to the chipper and tractor respectively, so that the plastic guard on the PTO axle does not move around with the axle during operation.

2.4 Installation of hydraulic hoses

The chipper's two loose hydraulic hoses are inserted into the tractor's valve block. Pressure hose (P) is plugged into the tractor's pressure port and the return hose (with one-way valve) is plugged into the tractor's return port.

3 Checking the chipper before operation

Before starting the chipper, it is important that the chipper is inspected, as bolts may have loosened during transport. If there is no inspection, accidents can occur and, in the worst case scenario, the chipper could break down and you could be injured.

Warning: When opening the chipper or removing its guards, the tractor **must be** stopped and the PTO axle removed.

3.1 Checking blades

To ensure good chipping of the wood, the blades must be sharp. If the blades are too dull or the cutting edge has been chipped, they can be sharpened (see Section 6.5 on sharpening blades). If the blade has become too worn to sharpen, it may be necessary to fit a new set of blades (see Section 6.6 on changing blades).

Warning: The blades are very sharp and it is not recommended to put your fingers inside the rotor housing, even when the chipper is stopped and the PTO axle is removed!

3.2 Checking the screen blades

To ensure that the screen works and that there is a good cutting effect between the holes in the feeder and the screen blades, the cutting edge must be intact. If the cutting edge is too round, has been chipped too much or has been chipped, the blade must be turned or replaced completely (see Section 6.7 on changing screen blades). The cutting edge can be ground slightly. However, you should be aware that if the distance between the screen blade and the screen is too great, the functionality of the screen will be reduced.

3.3 Checking feeder segments

To ensure that the screen works and that there is a good cutting effect between the holes in the screen and the screen blades, the screen must be in good condition. Check that the feeder has not been deformed, that there are no cracks in the feeder segments, that all bolts between the feeder segments are present and that the bolts holding the feeder segments in place against the side plate of the rotor housing are installed and in good condition. To ensure good chip quality, it is also necessary to ensure that the holes in the feeder have not been worn too elongated. The larger the holes have been worn, the larger the pieces of wood will be able to fit through the holes. If the holes have worn too large, it is necessary to replace the feeder segments. See Section 6.10.3 about changing screen segments.

3.4 Checking the rotor

Check that the rotor is not damaged and that all parts of the rotor, be it chipping blades, screen blades, intermediate/cutting blades, rear rotor, ejector blades (see Section 10 for

the location of parts), are also intact. If the rotor or its parts are not intact, it can be dangerous to drive with the chipper.
If tools, metal or large stones have been accidentally left in the chipper, it must not be used again until the bearing housings, axle, rotor, blades, knives, screens, etc., have been checked for cracks.

While checking the rotor, gently rotate it one turn to ensure that the blades clear the anvils. If necessary, see Section 6.13 ff. for information about the anvils.

The ejector blades should be replaced either every 1,000 hours of operation or every 5,000 m^3 of chipped pellets (whichever occurs first) to avoid blade fatigue.

3.5 Checking bolts

Before starting the chipper, it is important to tighten all bolts. In particular, it is important that all bolts on the rotor are tightened, as it can be extremely dangerous if they fall off during operation. Furthermore, it is important to check that the NordLock lock washers on the bolts for the blades are correctly fitted (see Section 6.25 for more information).

The following bolts must be checked inside the chipper:
- Bolts + NordLock lock washers (see above) for mounting blades on the rotor (12 pcs.). Tightening torque = 180 Nm.
- Bolts + nuts and NordLock lock washers for mounting cutting blades (8 sets). Tightening torque = 70 Nm.
- Bolts for fitting centre/cutting blades on the rotor (12 pcs.). Tightening torque = 160 Nm.
- Bolts + nuts for mounting the rear rotor (8 pcs.). Tightening torque = 70 Nm.
- Bolts + nuts and NordLock lock washers for mounting ejector blades (8 sets). Tightening torque = 180 Nm.

The remaining bolts on the chipper should also be inspected and, if necessary, retightened.

Warning: Due to the risk of pinching your fingers and the sharpness of the blades, it is not recommended to put your fingers into the housing to tighten the bolts! See Section 6.3 on locking the rotor when working on it.

3.6 Checking the main bearings

Bearings should be checked for play. If there is too much play, the chipper cannot function properly and the bearings may need to be replaced.

Remember to lubricate the bearings regularly to ensure a long operational life (also see Section 6.11).

Note that the pinion screws in the flange bearing on the feeder side should **not** be installed/tightened, as the axle must be able to move freely. This **only** applies to the 65 mm flange bearing closest to the feeder!

3.7 Checking guards

Check that all guards are intact and properly secured before starting the machine. All guards that must be installed during operation can be found in Section 5.4.

After checking the above points, close the chipper and tighten the four bolts (M16x50 with locknuts) that hold the top and bottom sections together (see Figure 2). If these bolts are not in and securely fastened, do **not** start the chipper. Failure to do so can be **extremely dangerous**.

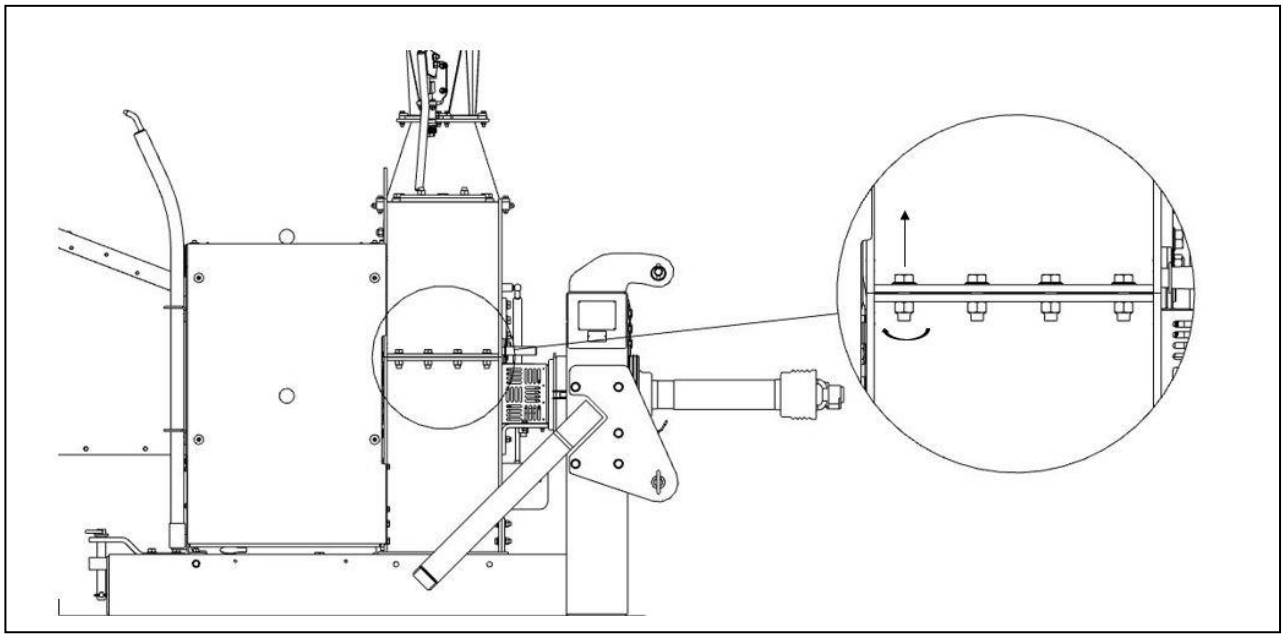


Figure 2: Top and bottom sections bolt together

3.8 The first hours of operation

During the first hours of operation, it is important to pay extra attention to the chipper. Should something unexpected happen, stop the tractor immediately to avoid further problems.

If the problem cannot be solved immediately, contact your dealer/manufacturer, who will be able to help you find a solution.

4 Chipper operation

Before starting the chipper**,** place it on a flat, stable surface. It is also extremely important to make 100% sure that there are no bolts, nuts or other metal objects inside the machine, as these could be ejected from the machine and cause damage to the machine. It is not recommended to use the chute to store tools, etc., while transporting the chipper, as this can cause them to be drawn into the machine when it is started up.

It is recommended that the points in Chapter 3 are reviewed before start-up to ensure a long operational life.

Warning: The chipper **must** be correctly mounted on the tractor's 3-point hitch when in use.

4.1 Starting and stopping chippers

The chipper is started by switching on the tractor and then engaging the PTO, after which the rotor will start.

To stop the chipper, switch off the PTO and the rotor will slowly slow down and stop on its own.

4.2 Starting and stopping the feeder

The feeder is controlled by pushing or pulling the control handle, but before you can start the feeder, the button on the activation box must be pressed so that the blue light in the button switches off. If you press the button and the light stays on, one of the emergency stops has been pressed. See section 5.2 and section 5.3 for the location and activation of the activation box and emergency stops.

The control handle has 3 settings:
1. The control handle is in position 1 and the feeder reverses, i.e. pulls the wood from the chipper.
2. The control handle is in position 2 and the feeder are stationary
3. The control handle is in position 3 and the feeder pulls the wood into the chipper

The 3 positions are described in Figure 3.

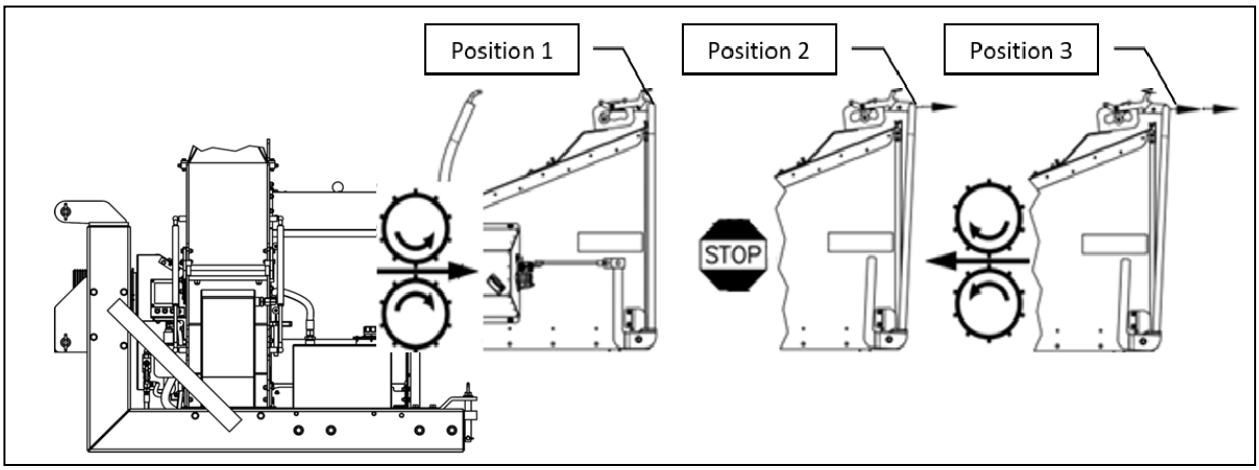


Figure 3: Control handle positions

Figures explaining this can also be found on the chipper (the same figures are also depicted in section 5.14.12).

The control handle **must be** in position 1 when the wood chipper is started and must also be in this position when the chipper is not in use.

To avoid accidentally starting the feeder, the control handle is designed so that it locks when it is moved to position 1.

To release the control handle from position 1, lift the small hook (see Figure 4) and then pull the control handle to position 2.

Warning: For safety reasons, we strongly warn you not to bypass, modify or remove this feature!

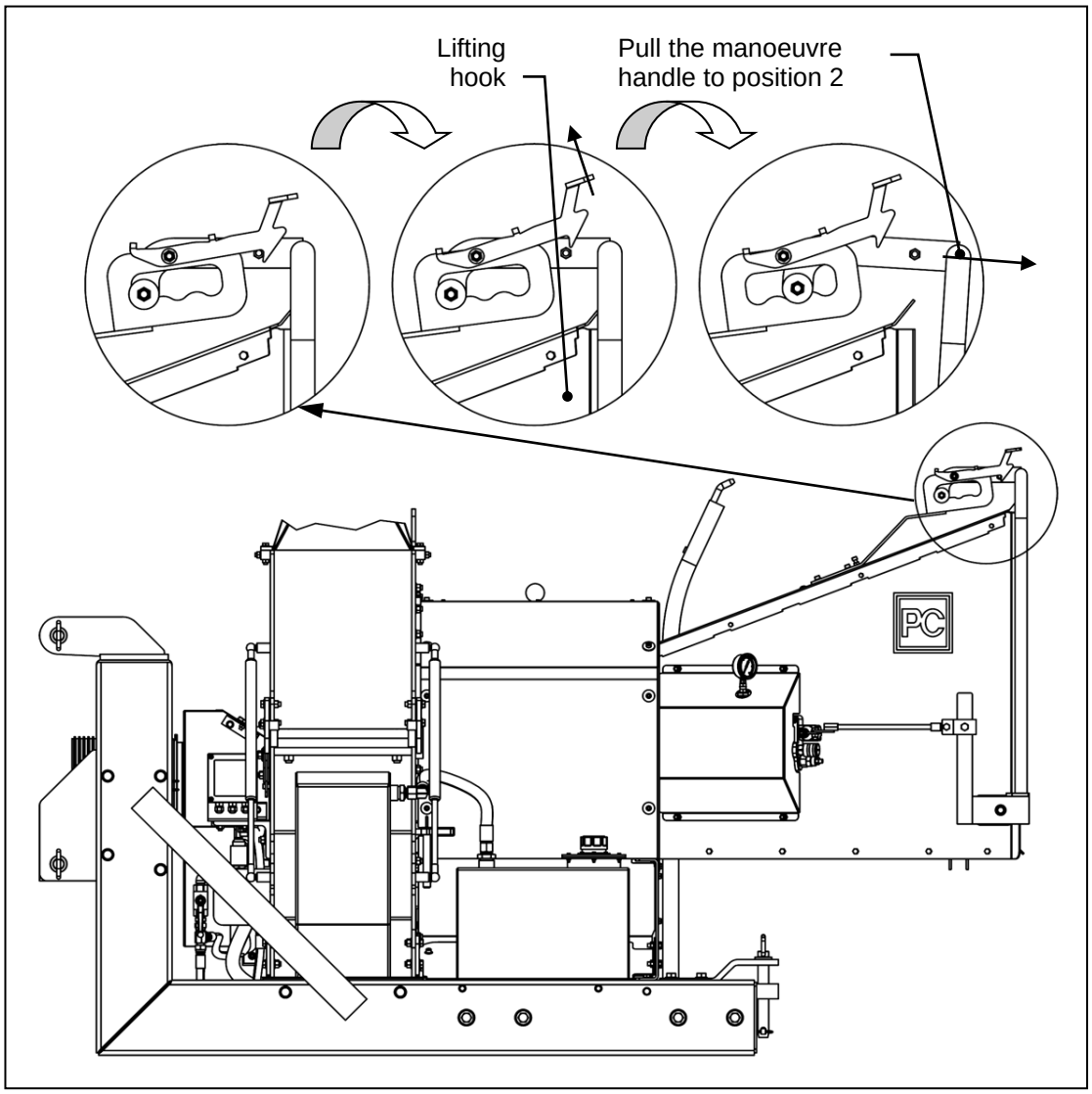


Figure 4: Releasing the manoeuvre handle from lock in position 1

4.3 Hydraulics in general

When the chipper is running, it is important that the hydraulics are correctly adjusted and working properly.

The chipper's safety valve is set as standard to a permissible operating pressure of 150 bar. To ensure a long operational life of the hydraulic motors, it is important to regularly check that this pressure is not exceeded.

The hydraulic pressure is checked during operation when wood is fed into the chipper. When chipping wood in the chipper, check that the pressure gauge pointer does not exceed 150 bar. If this is the case, reduce the pressure in the safety valve. A description of this can be found in Section 6.17.

When starting the chipper, make sure that the feed roller(s) rotate correctly in relation to the position of the control handle (see Figure 3). If this is not the case, check that the hydraulic hoses are correctly installed. A description of this can be found in Section 6.14.

It is important to ensure that all hydraulic hoses are correctly fitted. Some of the hydraulic parts cannot withstand pressure on the wrong ports and can therefore be damaged if the hoses are not installed correctly.

If it is necessary to retighten a hydraulic hose, the tightening torque must be 70 Nm for the hydraulic hoses that were fitted to the machine at the factory. If the hose has been replaced, contact the supplier of the hose for information on the correct installation.

The chipper must be switched off and disconnected from the tractor when working on the hydraulic system. In addition, make sure the hydraulic system is not pressurised.

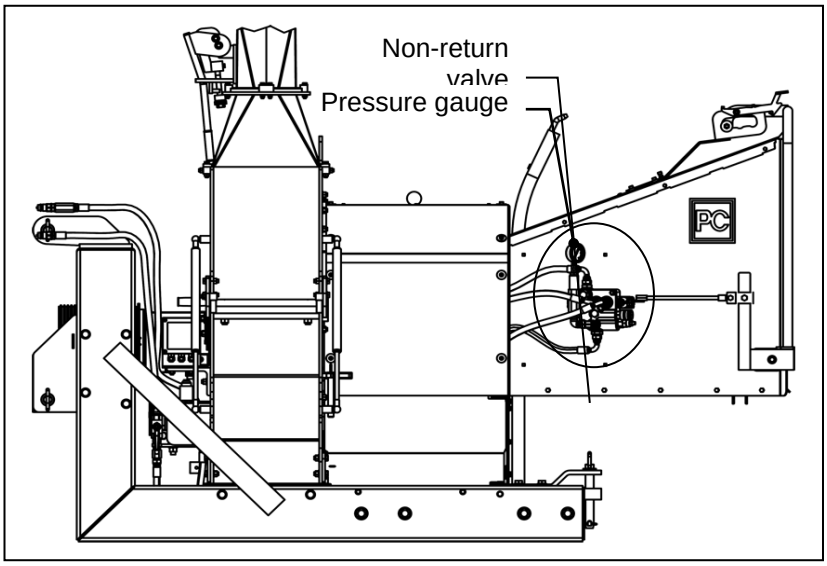


Figure 5: Location of the non-return valve (guard above the non-return valve not shown)

Note that the direction of rotation of the feed roller(s) must **not** be changed by swapping the hydraulic hoses. For type PC-2700-PIH, it is recommended that you read the manual that came with the tractor regarding the use of the hydraulic system and follow the recommendations regarding the installation of a temperature gauge and oil cooler.

To ensure a long operational life for hydraulic components, mixing oil types is not recommended. You should also pay attention to the permissible operating temperature of the oil.

4.4 Setting the feed speed

The speed at which the wood is drawn into the machine can be adjusted. Turning the flow valve on the valve block (see Figure 6) changes the speed at which the feed rollers rotate and thus the feed speed of the wood.

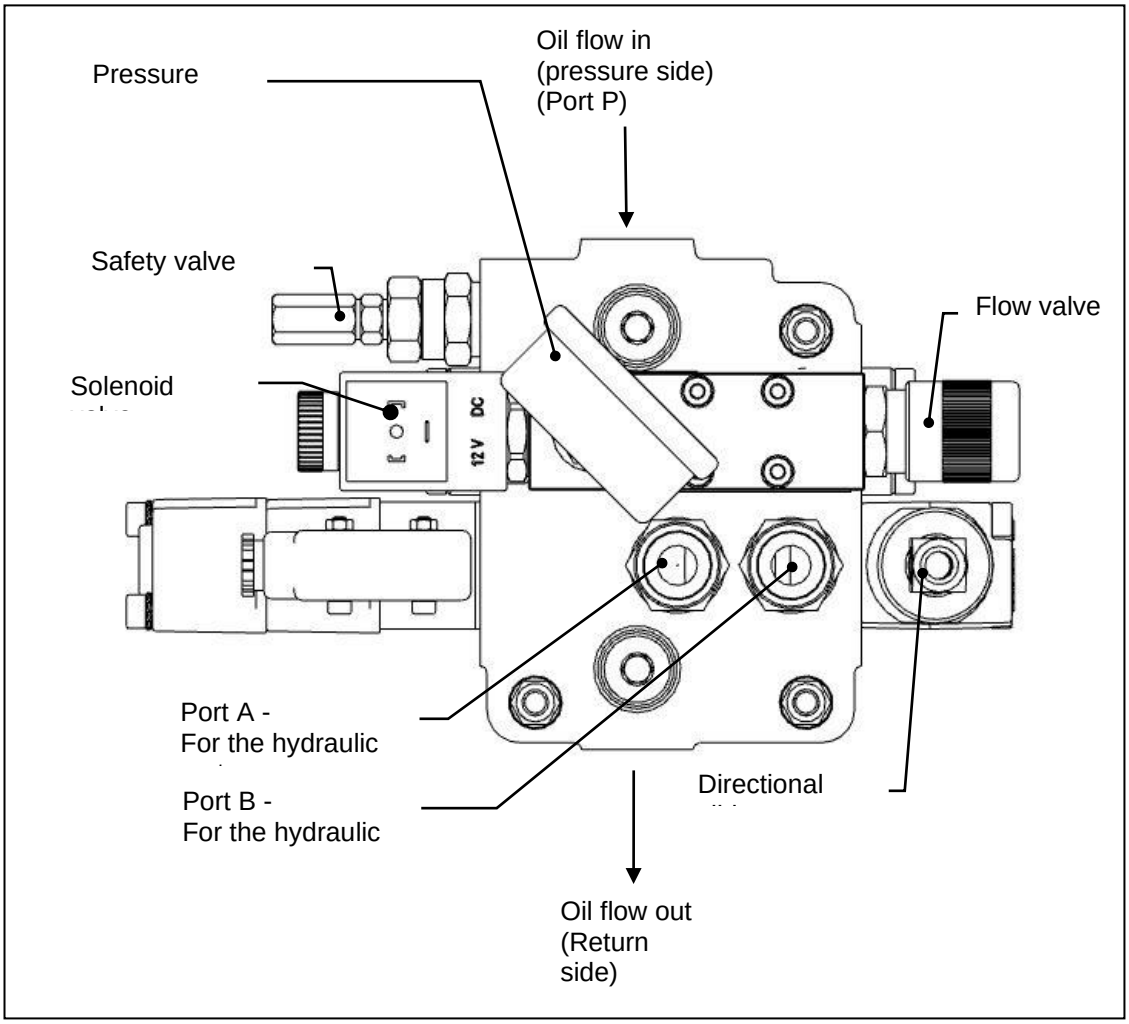


Figure 6: Overview of the non-return valve

4.5 Setting the spout

The chipper comes with a swivel spout that can be steplessly rotated and locked around the chipper. The spout is limited so that it cannot point towards the feed chute. That way, you don't risk pointing the spout at the work area where people are feeding the chipper with wood. Spout can be rotated 320°

Pay close attention to where the spout is pointing when you start feeding wood into the machine. Pay particular attention to whether the spout is pointing towards people, animals or other inappropriate objects and, if necessary, turn the spout away from them.

The spout is rotated by pulling the locking arm towards the horizontal position, after which the spout can be rotated with the locking arm in the desired position. The locking arm is then pushed back into the vertical position and the spout is now locked. Should the spout not be properly locked, the locking mechanism can be tightened (see Section 4.6 for Setting the swivel spout locking mechanism). If the spout has difficulty turning, the two surfaces around which the spout turns can be lubricated with a little oil.

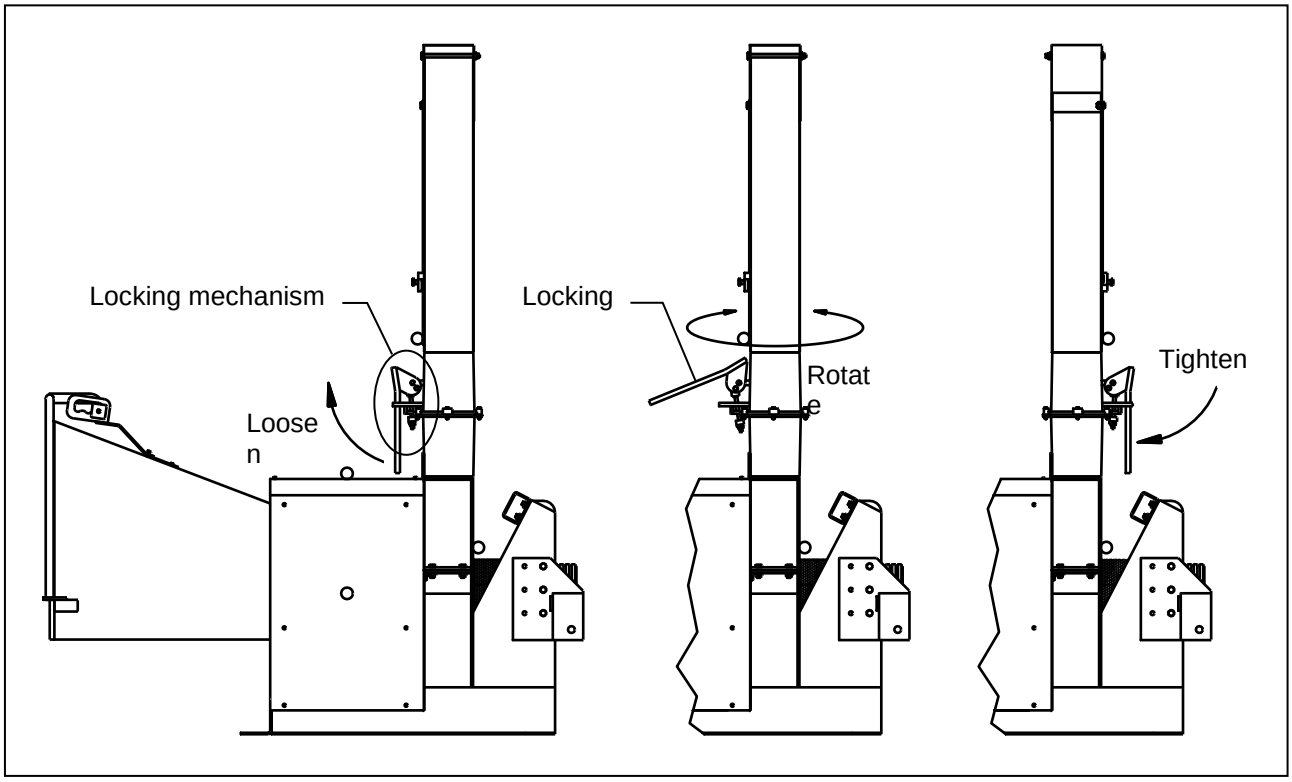


Figure 7: Setting the swivel spout

The height of the chipper at which it is ejected from the spout can be adjusted by loosening the thumbscrew on the spout (see Figure 8) and pushing or pulling the rocker blade arm until it reaches the desired setting. Then tighten the thumbscrew again.

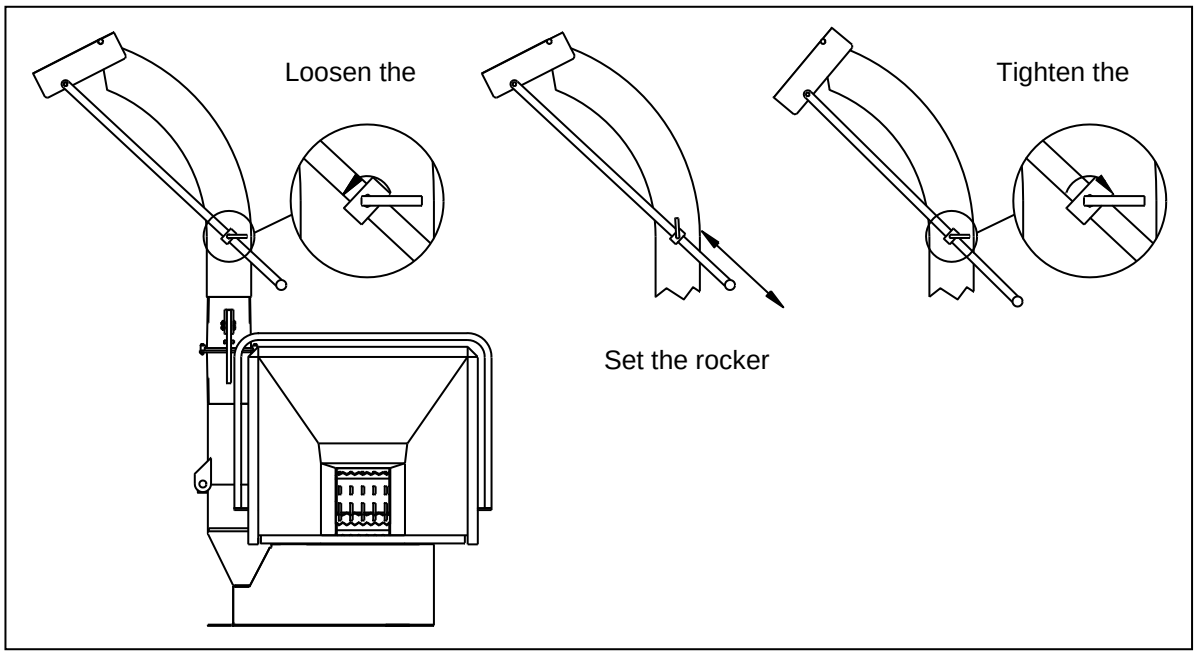


Figure 8: Rocker blade adjustment

For safety reasons, when transporting the chipper, the spout must be turned so that it points backwards and locked in this position. Also, make sure that the lock is tight enough to prevent the spout from swinging out in the opposite direction.

4.6 Setting the locking mechanism for the swivel spout

If the spout is not properly locked when the locking arm is tightened, the locking mechanism can be tightened. This is done in the following way (see Figure 9):

1. Release the locking lever by pulling it towards the horizontal position.
2. Loosen the locking screw.
3. Tighten the adjusting screw slightly (e.g. ¼ turn).
4. Tighten the locking arm and check if the lock on the spout is properly locked - if not, start at step 1 again.
5. Loosen the locking arm.
6. Tighten the locking screw so that the adjusting screw is locked.
7. Tighten the locking arm.

The locking mechanism should now be ready for use.

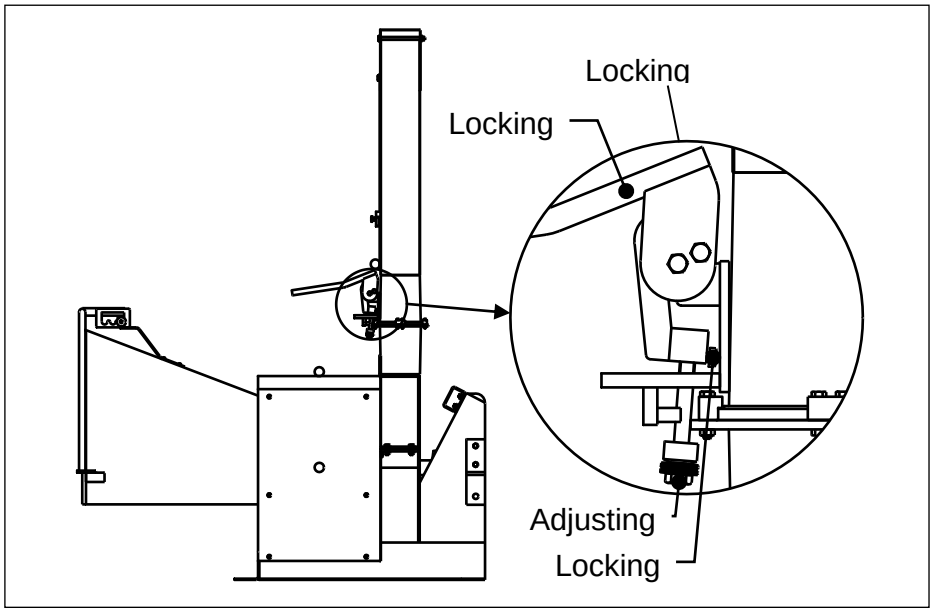


Figure 9: Setting the locking mechanism

4.7 Feeding the chipper

When you are about to chip wood into chips, here's what you need to do:

1. Review the points mentioned in Section 3 and then mount the chipper correctly on the tractor's 3-point hitch.
2. Switch on the tractor.
3. Connect the power plug
4. Engage the tractor's PTO.

5. Press the button on the activation box so that the blue light disappears.
6. Check that the feed speed and spout on the chipper are set correctly.
7. Move the control handle to position 3 (see Figure 3).
8. Feed the wood into the chute opening and push it further into the feed roller(s), which grabs the wood and pulls it into the chipper, which starts chipping the wood.
9. After chipping, push the control handle back to position 1 and switch off the tractor.

If you do not have a speed monitor fitted or if it is switched off and you can hear that the chipper is struggling to keep up (it loses too many revolutions during feeding), you can stop feeding for a moment by pushing the control handle to position 2 or 1 until you can hear that the rotor is up to speed again. Please note that when the control handle is pushed to position 1, the direction of rotation of the feed rollers is reversed (i.e. the rollers turn the opposite way round) and the wood is pulled out of the machine again. Watch your legs when the machine reverses!

Warning: When the wood is drawn into the chipper, be aware that pieces of wood can be ejected out of the chute.

Warning: Be aware of loose clothing, cords, ropes, etc., that can get caught in the chipper or the wood to be chipped, so that you do not get pulled into the machine in a worst-case scenario.

5 Safety precautions

When using the chipper, there are a number of precautions that must be observed. To avoid accidents, it is vital to take care and observe the safety precautions outlined in this manual when using the chipper.

To further ensure safety, it's also important to maintain the machine and inspect it regularly. You can read more about machine maintenance in section 6

5.1 General precautions

When the chipper is in operation, always pay attention. Wood can be ejected out of the machine, foreign objects can be drawn into the machine, or something else unexpected and dangerous can happen.

Therefore, observe the following points:

- Pay attention.
- **Never** put your fingers into the machine's openings.
- **Never** open the machine during operation - stop the tractor and make sure the rotor is **completely** stopped before opening the chipper.
- **Never** open the machine while the PTO axle is fitted.
- **Never** remove wood or anything else that has become stuck while the machine is running.
- Ensure that **all** bolts are always tightened securely.
- Keep the machine in a **good** maintained condition.
- **Never** use the machine for anything other than what it is intended for.
- **Never** allow children under the age of 18 to operate or work on the machine.
- **Never** operate the machine without reading and understanding the safety instructions.
- Place the machine on a firm, level surface when chipping wood.
- Never use the machine without the guards **fully** mounted.
- If something unexpected happens, switch off the machine **immediately**.
- Do not use the machine indoors.
- **Never** bypass the safety mechanisms built into the machine.

5.2 Activation box

The chipper is fitted with an activation box. The purpose of the activation box is to ensure that the feed rollers do not start unintentionally the first time you start up the chipper. At the same time, it also prevents the rollers from starting immediately when you activate the emergency stops after they have been pressed.

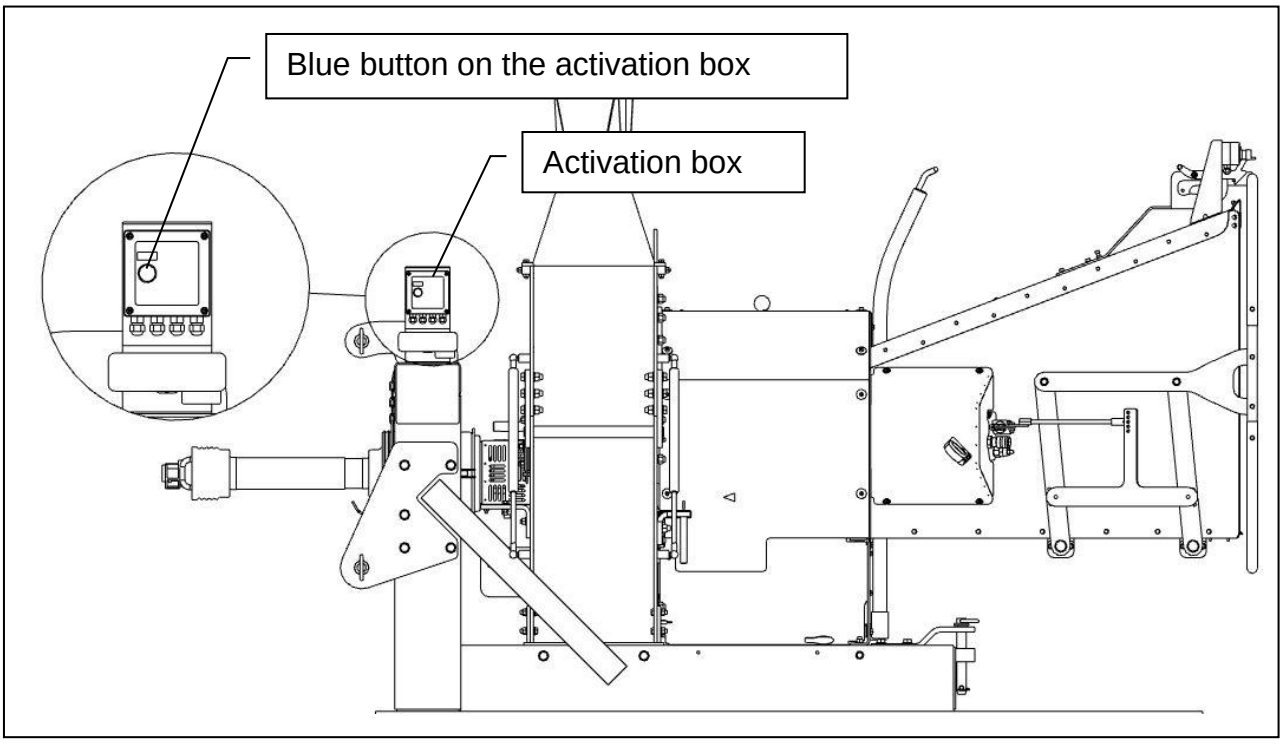


Figure 10 shows the location of the activation box

When the blue light is on (see Figure 10), it indicates that the connection to the stress system is broken and the feed rollers cannot be activated. By pressing the blue button, the connection is re-established to the valve block and the start and stop of the feeder can now be activated as described in section 4.2.

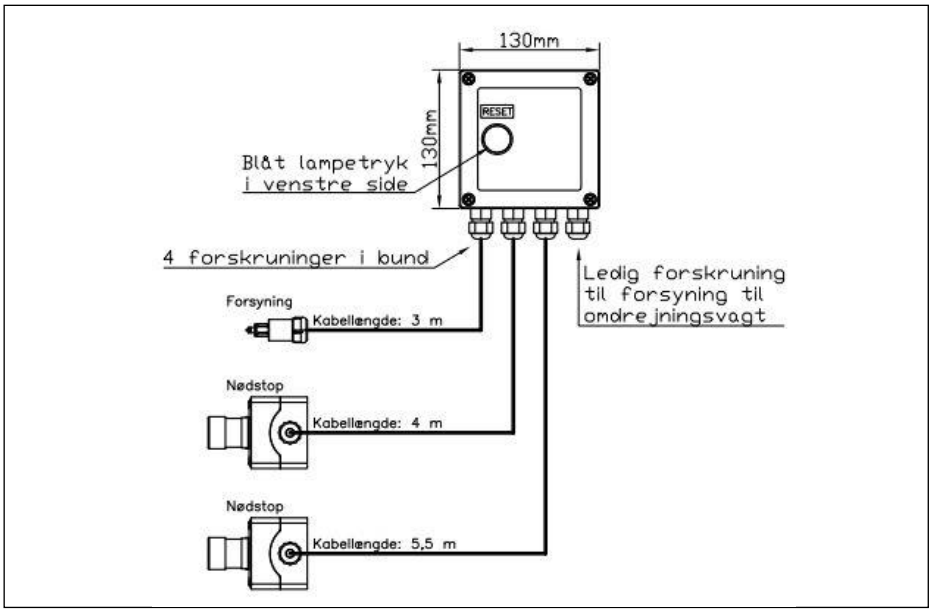


Figure 11 shows the reset box and its structure

If the blue button remains lit after it has been pressed, it indicates that one or both emergency stops are pressed. Check the emergency stops and trigger them as described in Section 5.3.

If, contrary to expectations, this does not work even though you have triggered the emergency stops correctly, it could indicate that there is a break in the circuit from the activation box to the emergency stops. Contact your dealer/mechanic to find and rectify the fault.

In Figure 11 you can see the different cable lengths and what they are connected to. To get a more detailed overview of how the box is structured, you can find the single-line diagram in Section 6.28.

5.3 Emergency stop

Two emergency stops are mounted on the top of the feed chute (see Figure 12). The emergency stops have the function of stopping the feed rollers when they are pressed in so that any danger can be stopped.

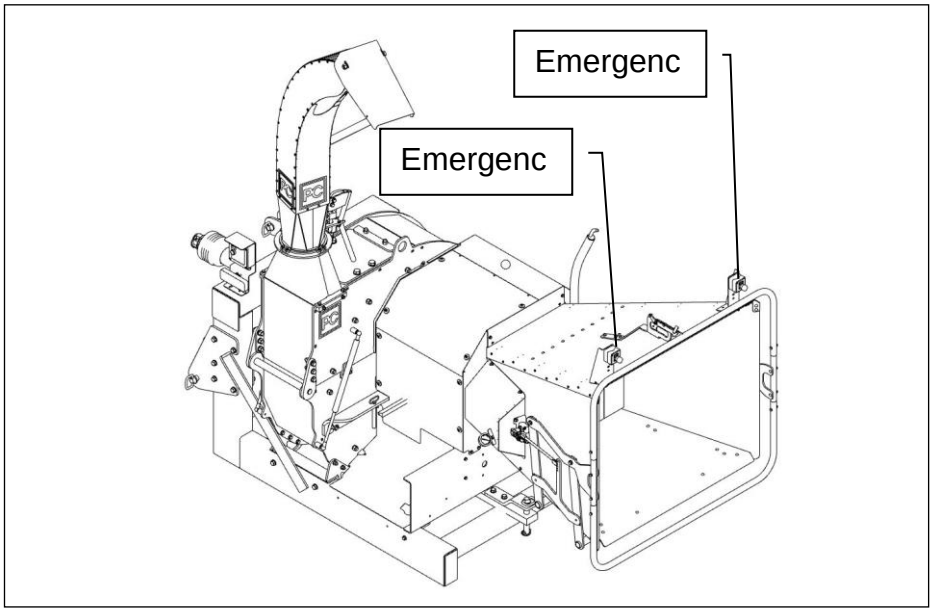


Figure 12 shows the location of the emergency stops

To reactivate the feed rollers, the emergency stops must be triggered again by turning the knob as shown in Figure 13, and the activation button must be pressed

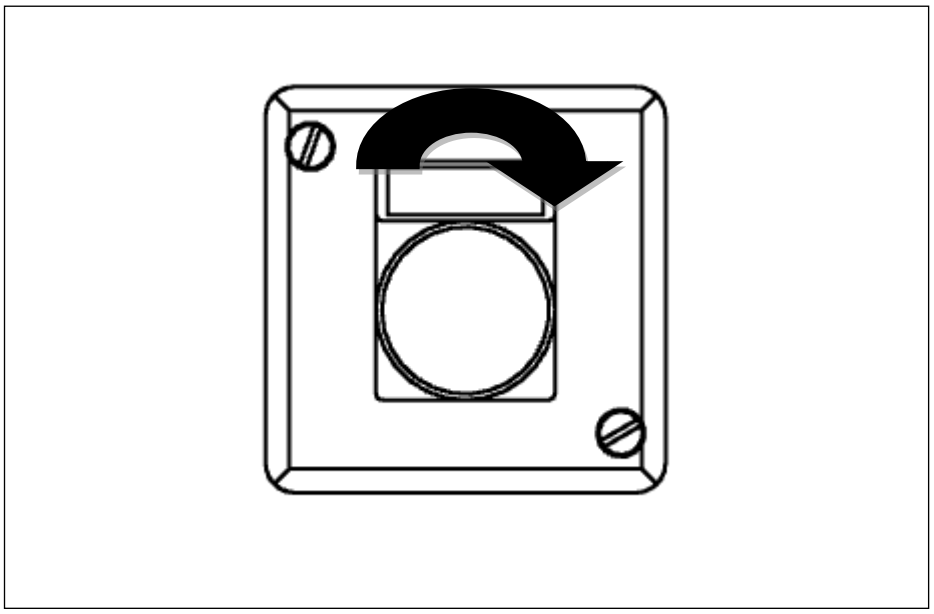


Figure 13 shows how to trigger the emergency stop

5.4 Guards

When the chipper is in operation, all guards **must** be fitted. If the guards have been damaged or cannot be fitted correctly, do not use the chipper until this has been corrected. Figure 14 and Figure 15 give an overview of the guards, all of which **must** be fitted during operation. In addition to the guards, the spout must also be fitted.

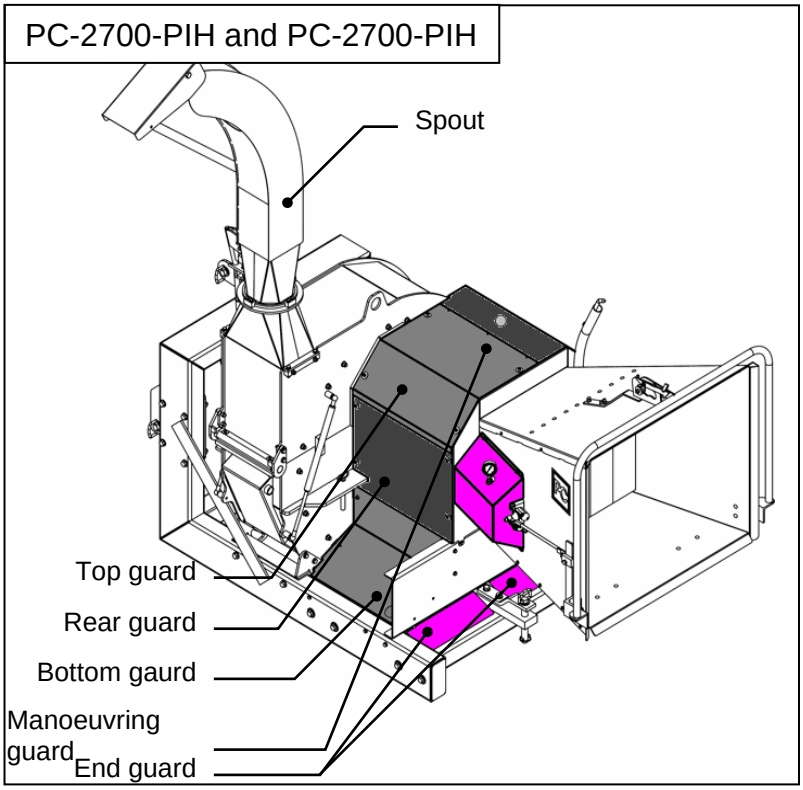


Figure 14: Guards that must be fitted during operation (PC-2700-PIH and PC-2700-PIH)

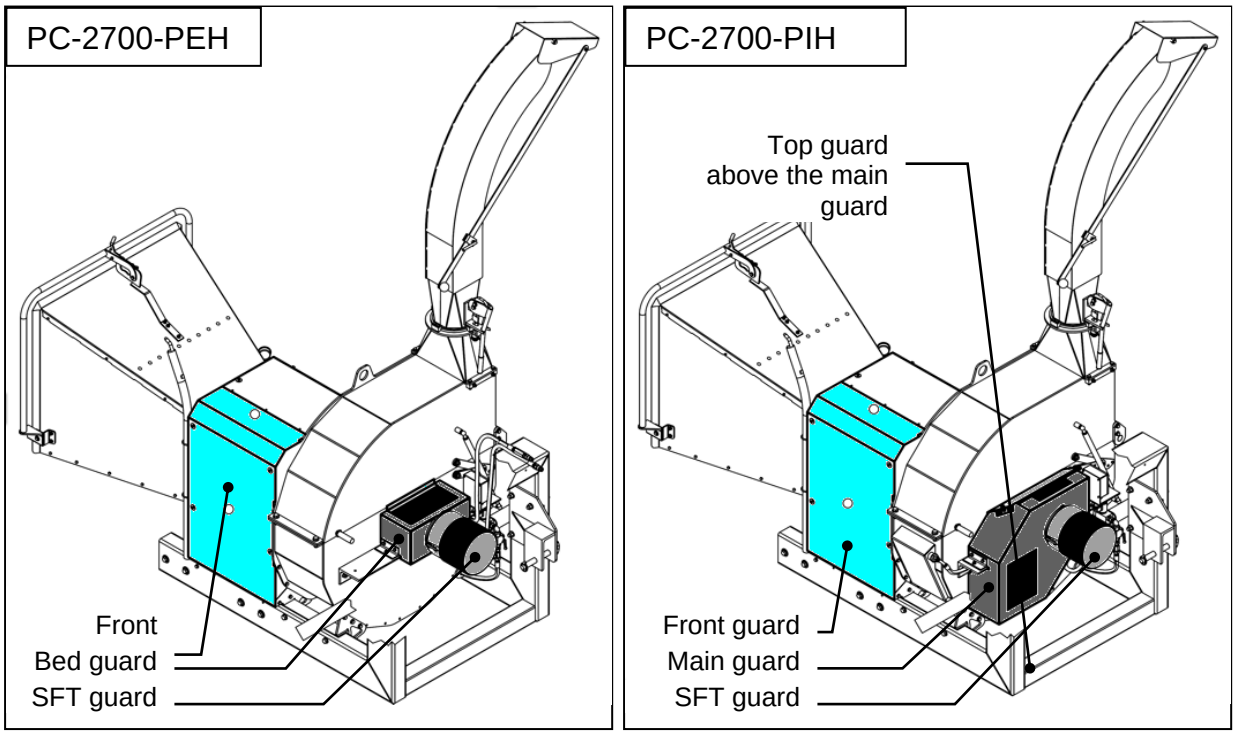


Figure 15: Guards that must be fitted during operation

5.5 Removing and fitting the front guard

During regular maintenance (cleaning, removing stuck wood debris, etc.), the front screen can be removed.

The front guard is removed by unscrewing the 4 bolts in the guard and then lifting the guard away with the two knobs.

Note that the guard itself can fall off if the 4 screws are not tightened.

When refitting the front guard, hold the front guard in place while the 4 bolts are screwed in and tightened.

5.6 Top and rear guard removal and fitting

For additional maintenance (thorough cleaning, fitting hydraulic hoses or lubricating the rotor flange bearing, etc.) it may be necessary to remove the top and rear guard. Note that the rear guard cannot be removed unless the top guard is removed first.

First remove the front guard as described in Section 5.5.

Remove the top guard by unscrewing the 4 bolts. The guard can then be removed.

Remove the rear guard by unscrewing the 4 bolts. The guard can then be removed.

When reinstalling the guards, this is done by first holding the rear guard in place while the 4 bolts are fitted and tightened. The top guard is then held in place and the 4 bolts are fitted and tightened. Then refit the front guard.

5.7 Removing and fitting the bottom guard

It is usually not necessary to remove the bottom guard. Only if the guard has been damaged may it be necessary to remove and replace it.

5.7.1 Bottom guard removal and installation for Type PC-2700-PEH

Remove the bottom guard by first removing the front, top and rear guards according to the instructions.

Unscrew the bolt that holds the guard to the chipper housing. Then remove the two bolts that secure the guard to the rear rail. Then remove the two long bolts that hold the guard to the side rail. The guard can now be removed.

To refit the guard, hold the guard in place and then loosely insert all 5 bolts mentioned above. Only when all bolts are in place, tighten the bolts and nuts together.

5.7.2 Bottom guard removal and installation for Type PC-2700-PIH

Remove the bottom guard by first removing the front, top and rear guards according to the instructions.

Then remove the hydraulic tank after draining it of hydraulic oil as described in Section 6.19.1.

Unscrew the bolt that holds the guard to the chipper housing. Then remove the two bolts that secure the guard to the rear rail. Then remove the two long bolts that hold the guard to the side rail. The guard can now be removed.

To refit the guard, hold the guard in place and then loosely insert all 5 bolts mentioned above. Only when all bolts are in place, tighten the bolts and nuts together.

The hydraulic tank can then be refitted. Remember to top up the hydraulic oil in the system before starting the machine (see Section 6.21).

5.8 Removing and fitting the top guard over the front panel (PC-2700-PIH only)

In order to lubricate the main bearing or to remove the main guard over the front panel, it is necessary to remove the top guard.

The guard is removed by unscrewing the two bolts and then the guard can be removed.

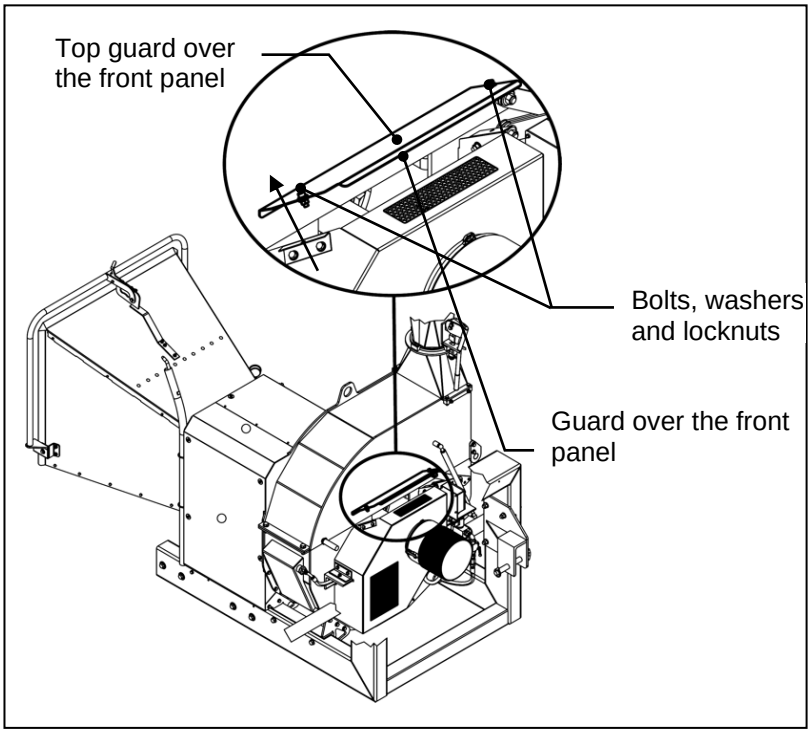


Figure 16: Top guard over the front panel

To fit the top guard, put it back in place and insert the two bolts, washers and locknuts and tighten them together.

5.9 Removing and fitting the main guard over the front panel (PC-2700-PIH only)

To access the hydraulic pump, pulleys and belts, it is necessary to remove the main guard.

To remove the guard, first remove the top guard over the front panel. A description of this can be found in Section 5.8.

Next, unscrew the bolt at the bottom of the main guard (see Figure 17) and then unscrew the two bolts on either side of the guard.

The main guard over the front panel can now be removed.

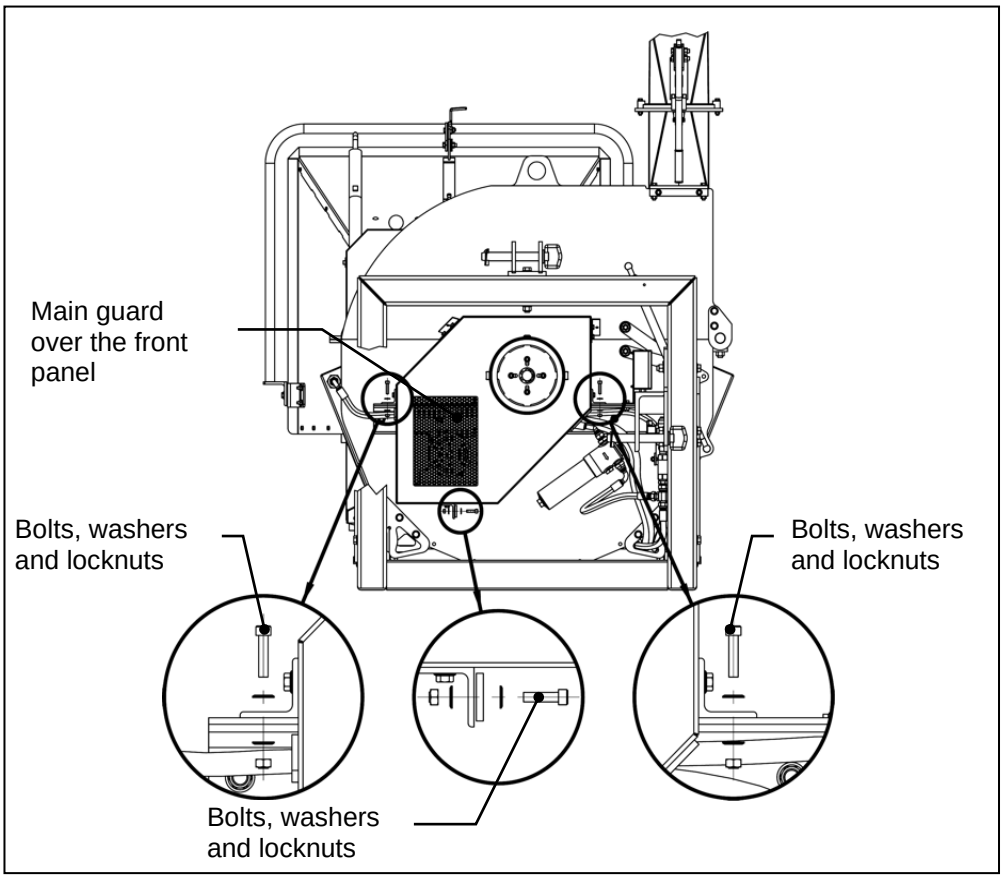


Figure 17: Main guard over the front panel (PC-2700-PIH only)

To refit the main guard, put it back in place and loosely insert the two bolts on either side and one bolt at the bottom, and loosely install the nuts and washers. Only when all three bolts are loosely fitted with washers and locknuts, tighten the bolts one by one.

After the main guard has been fitted, the top guard must be fitted according to the instructions in Section 5.8.

5.10 Removing and fitting the bed guard (PC-2700-PEH only)

In order to lubricate the main bearing, it is necessary to remove the screen covering the bed.

To remove the bed guard, unscrew the two bolts holding the bed guard in place (see Figure 18). You can then remove the bed guard.

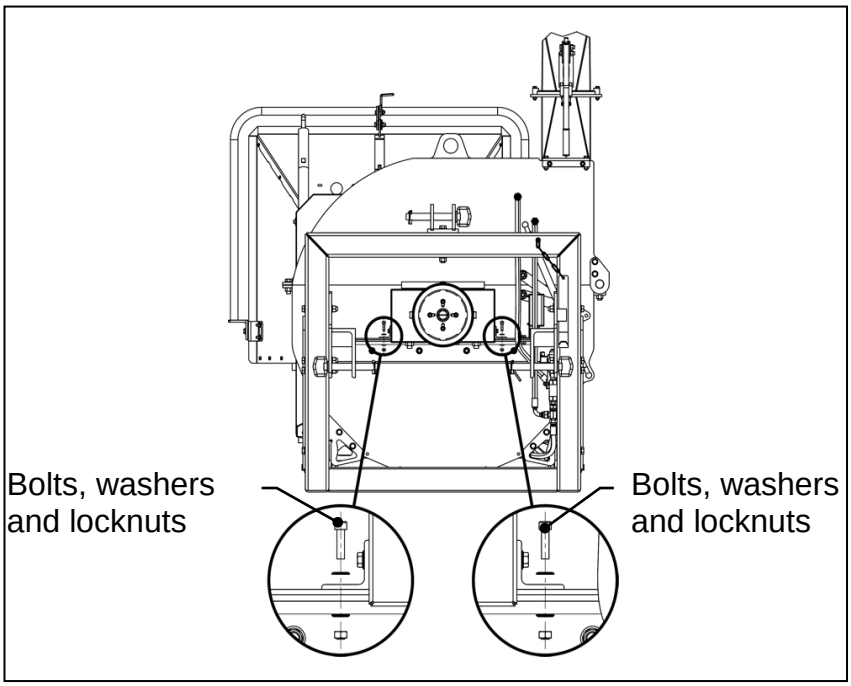


Figure 18: Bed guard (PC-2700-PEH only)

To fit the bed guard, place the bed guard in place over the bed and tighten the two bolts with washers and nuts on either side of the guard.

5.11 Removing and fitting the SFT guard

The SFT guard covers the clutch and part of the PTO axle and can only be installed when the part of the PTO axle that will be mounted on the chipper (the part with the clutch) is mounted on the chipper's groove spline.

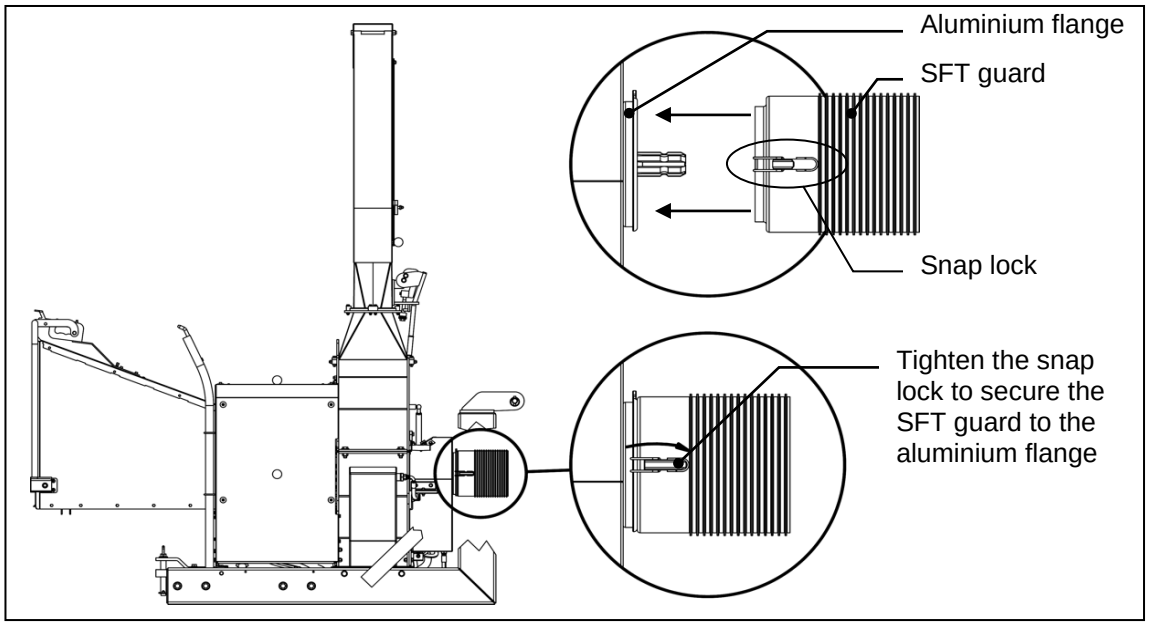


Figure 19: Fitting the SFT guard

To fit the SFT guard, insert it into the aluminium flange bolted to the bed guard and lock it to the bed guard with the snap locks (see Figure 19).

To remove the SFT guard, loosen the snap locks and pull the guard out of the aluminium flange.

5.12 Removing and installing the non-return valve guard

Before the guard can be removed, the chipper must be disconnected from the tractor and make sure that there is no pressure on the hydraulic system to avoid the risk of hydraulic oil escaping if you accidentally damage the pressure gauge when removing the guard.

Remove the guard covering the non-return valve by unscrewing the 4 board bolts and the guard can now be removed. Be careful not to damage the pressure gauge when pulling the guard over the pressure gauge. See Figure 20.

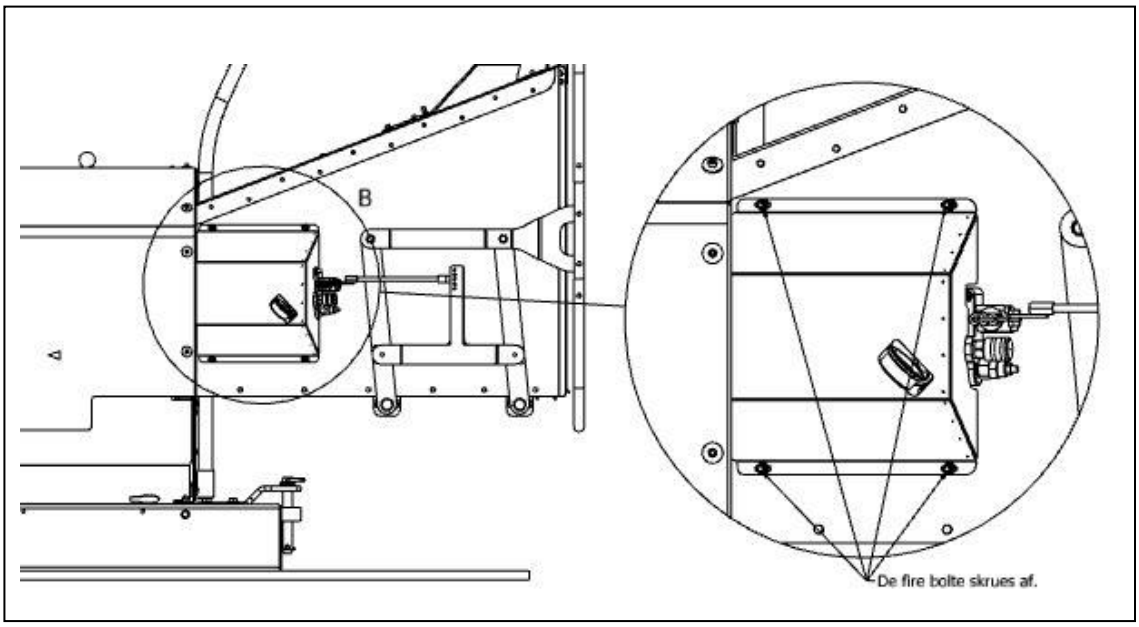


Figure 20: Removing the non-return valve guard

To reinstall the guard, hold it in place over the valve and insert and tighten the 4 fillister head bolts.

5.13 Protective equipment

When using the chipper, it is important to wear personal protective equipment. As a minimum, you are required to wear eye protection and hearing protection. It is also recommended to wear safety footwear, work gloves and appropriate workwear.

Warning: Be aware of loose clothing, cords, ropes, etc., that can get caught in the chipper or the wood to be chipped, so that you do not get pulled into the machine in a worst-case scenario.

5.14 Signage

There are a number of signs on the chipper. These signs are described and shown in this section. To avoid accidents and to operate the chipper in the best possible way, it is important that the signs are observed.

5.14.1 Read the user manual

Meaning:
Before using the machine, the user manual **must** be read and **must** be followed.

5.14.2 Beware

Meaning:
Pay attention when working with or near the chipper.

5.14.3 Eye and ear protection is mandatory

Meaning:
When the chipper is in operation, safety goggles and hearing protection or similar **must** be worn.

5.14.4 Rotating parts

Meaning:
There are rotating parts in the chipper that can cause injury. So, pay attention!

5.14.5 Sharp blade

Meaning:
The chipper has sharp blades that you can cause cuts. So, pay attention!

5.14.6 Revolutions PTO

Meaning:
The rotor must only run at either 540 or 1000 rpm max (rpm = revolutions per minute).

5.14.7 Risk of pinching

Meaning:
There is a risk of getting pinched. Therefore, keep your fingers away.

5.14.8 Do not open the rotor housing until the rotor has completely stopped

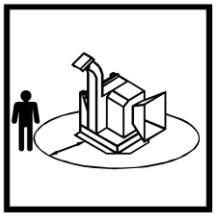
Meaning:
Do not open the chipper when the rotor is spinning.

5.14.9 Only open the rotor housing when the rotor has completely stopped

Meaning:
The chipper may **only** be opened when the rotor has **completely** stopped and the PTO axle is removed.

5.14.10 Safety distance

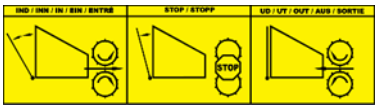
Meaning:
Pay attention and keep a safe distance from the machine as much as possible. This applies in particular to persons who do not work with the machine.



5.14.11 Things can be ejected

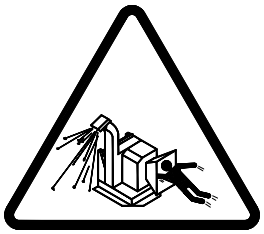
Meaning:
When the machine is in operation, things can be ejected from the machine. So, pay attention!

5.14.12 Operating the control handle



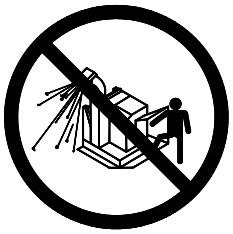
Meaning:
The control handle has the 3 settings shown. The function of the feeder follows the settings shown.

5.14.13 Risk of being pulled in



Meaning:
When the chipper is in operation, there is a risk of being pulled into it. So, pay attention!

5.14.14 Do not enter the chute

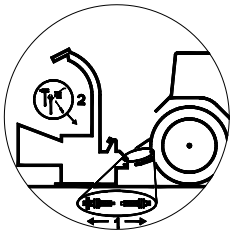


Meaning:
Do not insert body parts into the chipper chute as this can be extremely dangerous.

5.14.15 Noise level

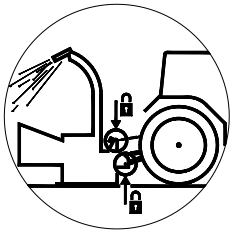
Meaning:
The chipper makes noise up to the displayed sound pressure level.

5.14.16 Remove the PTO axle before maintenance



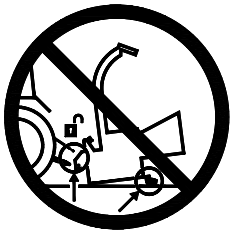
Meaning:
For safety reasons, the PTO axle for the chipper **must be removed** before performing maintenance on the chipper.

5.14.17 Mount the chipper on the 3-point hitch before use



Meaning:
The chipper **must** be **correctly** mounted on the tractor's 3-point hitch before use.

5.14.18 Place the chipper on a flat surface before disconnecting it from the tractor



Meaning:
The chipper **must** be placed on a flat, level surface before it can be disconnected from the tractor.

5.14.19 Do not use a hook

Meaning:
Where this mark is located, do not use a hook to lift the chipper.

5.14.20 Direction of rotation

Meaning:
The direction of rotation of the rotor follows the arrow shown.

5.14.21 Wear work gloves

Meaning:
Always wear gloves when hand-feeding the chipper

5.15 Placement of signs

All safety signs are placed in different locations on the chipper to inform about the risks that may be associated with using the chipper. On Figure 21 you can see where the safety signs are located.

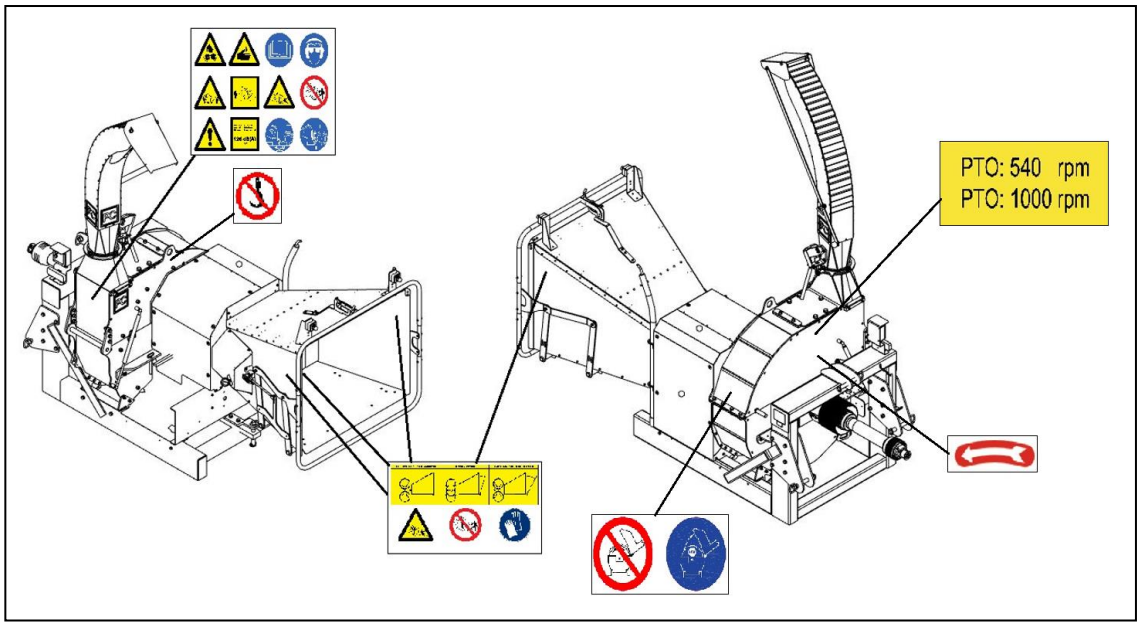


Figure 21 shows where the safety signs are located on the chipper

6 Maintenance

To minimise the risk of accidents and to ensure a long operational life, the machine must be regularly maintained. In general, pay attention to the machine's sound and other signals and check for and, if necessary, repair damage.

At the end of the season, it is recommended to thoroughly clean the chipper to ensure an easy start-up the next time it is used. It is also recommended to inspect the chipper, see Section 3, before using it again for a new season.

Note: For safety reasons, the PTO axle between the chipper and the tractor **must be removed** during all maintenance. In addition, make sure that the hydraulic system is not pressurised. If the chipper is fitted with a stress system, the cable for this must also be **unplugged** from the tractor's socket.

6.1 Opening the rotor housing

When servicing the chipper, it may be necessary to open the top of the chipper to access the rotor and screen.

Since the top of the rotor housing can ONLY be opened when the ejector blades on the rear rotor are in a horizontal position, it is necessary to ensure that this is the case. The easiest way to set the ejector blades in a horizontal position is to follow the following procedure.

The easiest way to open the chipper is as follows:

1. Disconnect the chipper from the tractor and remove the PTO axle.
2. Remove the front guard, see Section 5.5
3. If the machine is type PC-2700-PIH, it is a good idea to remove the top guard over the front panel, see Section 5.8.
4. To rotate the rotor, turn the end of the axle so that the bolt in the ring on the axle (next to the magnetic sensor) is in a horizontal position. This means that the ejector blades are also in a horizontal position. See Figure 22.
   Alternatively, on some models you can see a line on the end of the axle where the PTO axle is mounted. This line must be horizontal as the ejector blades are also horizontal.
5. Loosen and remove the bolts in the joint between the top and bottom of the rotor housing.
6. The top of the rotor housing can now be opened by grasping the handle on the top and lifting. See Figure 23.

Warning: Only when the spout is attached to the top can the top itself open.
Warning: If the spout is **not** attached to the top when you open the machine, the top will **not** be able to hold itself open. You can then insert a bolt through the hole on the scissor stop to hold the top up. Be careful when using this. Don't rely on the stop to hold the top up, especially when the machine is worn. Be two to open and close the top. Watch your

fingers as the machine closes. Regularly check the scissor stop and replace worn parts if necessary.

Make sure that the rocker blade on the spout does not hit the ground and bend as the top is opened. Therefore, if necessary, push the rocker blade into a position that prevents this from happening. Alternatively, you can turn the spout to a position so that this does not happen before opening the chipper.

Note: It is only necessary to remove the front guard to open the chipper, but it can be beneficial to remove multiple guards for more space and better visibility during maintenance.

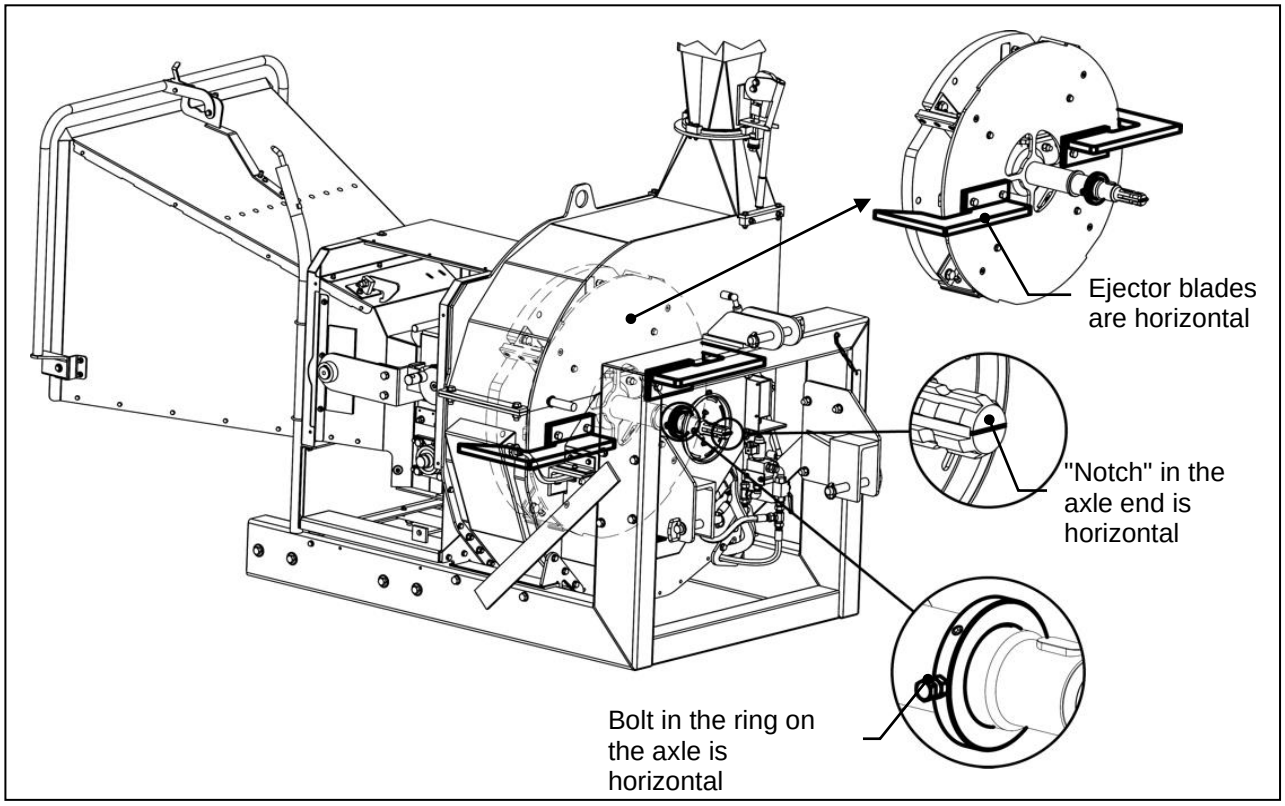


Figure 22: Opening machine 1 - Rotate the rotor to the correct position

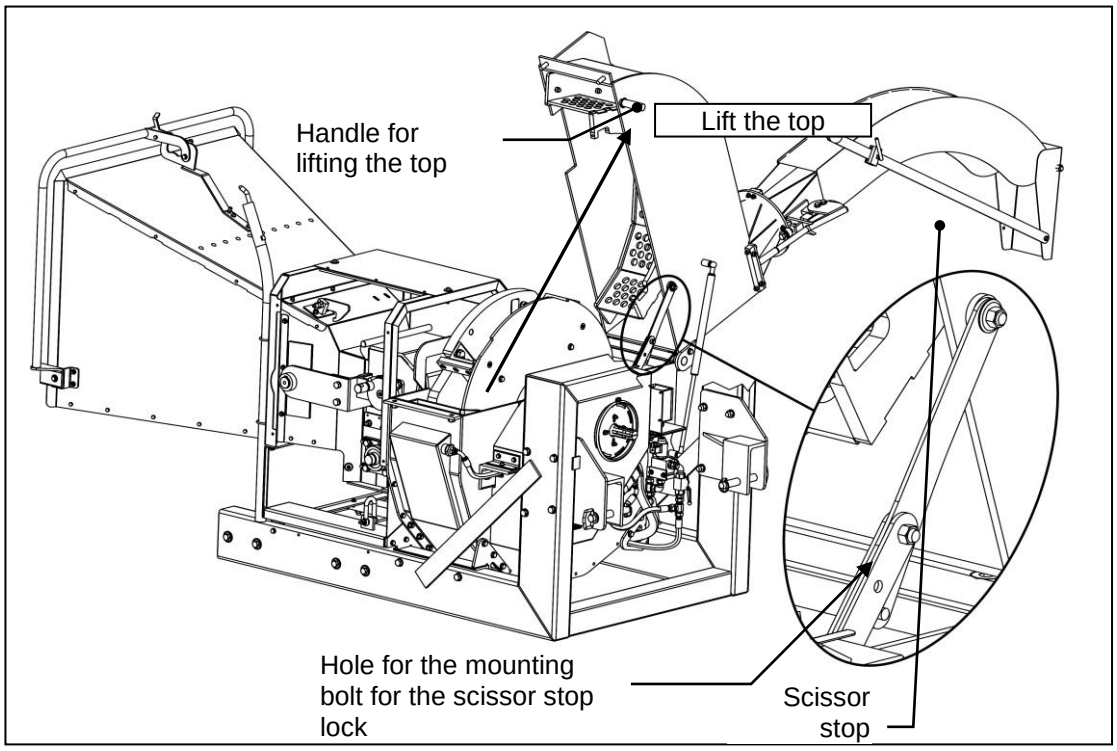


Figure 23: Opening the machine 2 - Lift the top and insert a bolt in the scissor stop if necessary.

6.2 Disconnecting and fitting feeders

When replacing the bottom roller, bottom anvil and side anvil, it is necessary to remove the feeder and pull it back slightly in relation to the rotor housing.

6.2.1 Disconnecting the feeder

The easiest way to disconnect the feeder is to follow the following procedure

1. Check that the hydraulic system is not pressurised.
2. Remove the front, top and rear guards, as well as the guard above the non-return valve, see sections 5.5, 5.6 and 5.12.
3. Remove the two hydraulic hoses from the non-return valve block on the side of the chute as shown in Figure 24A**.** It's a good idea to have a bucket or similar ready, as oil will inevitably leak out of the hydraulic hoses and the non-return valve block. The two M8 bolts as well as the two M16 bolts that hold the feeder to the chipper base frame can now be unscrewed (see Figure 24B).
4. The feeder can now be pulled back (see Figure 19C), ensuring that hydraulic hoses, etc., do not get stuck.
5. To prevent the feeder from tipping, it is supported with a low bend, for example, as shown in Figure 24C.
6. Check that the feeder is stable so that it doesn't tilt or the like when you work on it.

There is now free access to perform maintenance on the chipper.

6.2.2 Fitting feeders

The easiest way to fit the feeder is to follow the following procedure:

1. The feeder is pushed into place in front of the chipper, making sure that hydraulic hoses, etc., are not pinched. The feeder must be positioned so that the opening in the feeder is evenly distributed over the hole in the chipper.
2. The two M8x30 bolts + locknuts (see Figure 24B for the location) are loosely inserted.
3. The two M16x50 bolts + locknuts (see Figure 24B for the location) are loosely inserted. Once both bolts are installed, tighten them, checking that the feeder is evenly distributed around the hole in the chipper.
4. Tighten the two M8x30 bolts + locknuts mentioned in point 2.
5. Reinstall the two hydraulic hoses and tighten them securely - see section 6.15 for the correct installation of the hoses.
6. The rear, top and front guards and the guard above the non-return valve are installed according to sections 5.5, 5.6 and 5.12.

To ensure that everything is fitted correctly, it is recommended to gently turn the rotor once by hand by turning the end of the axle and checking that nothing hits anything.

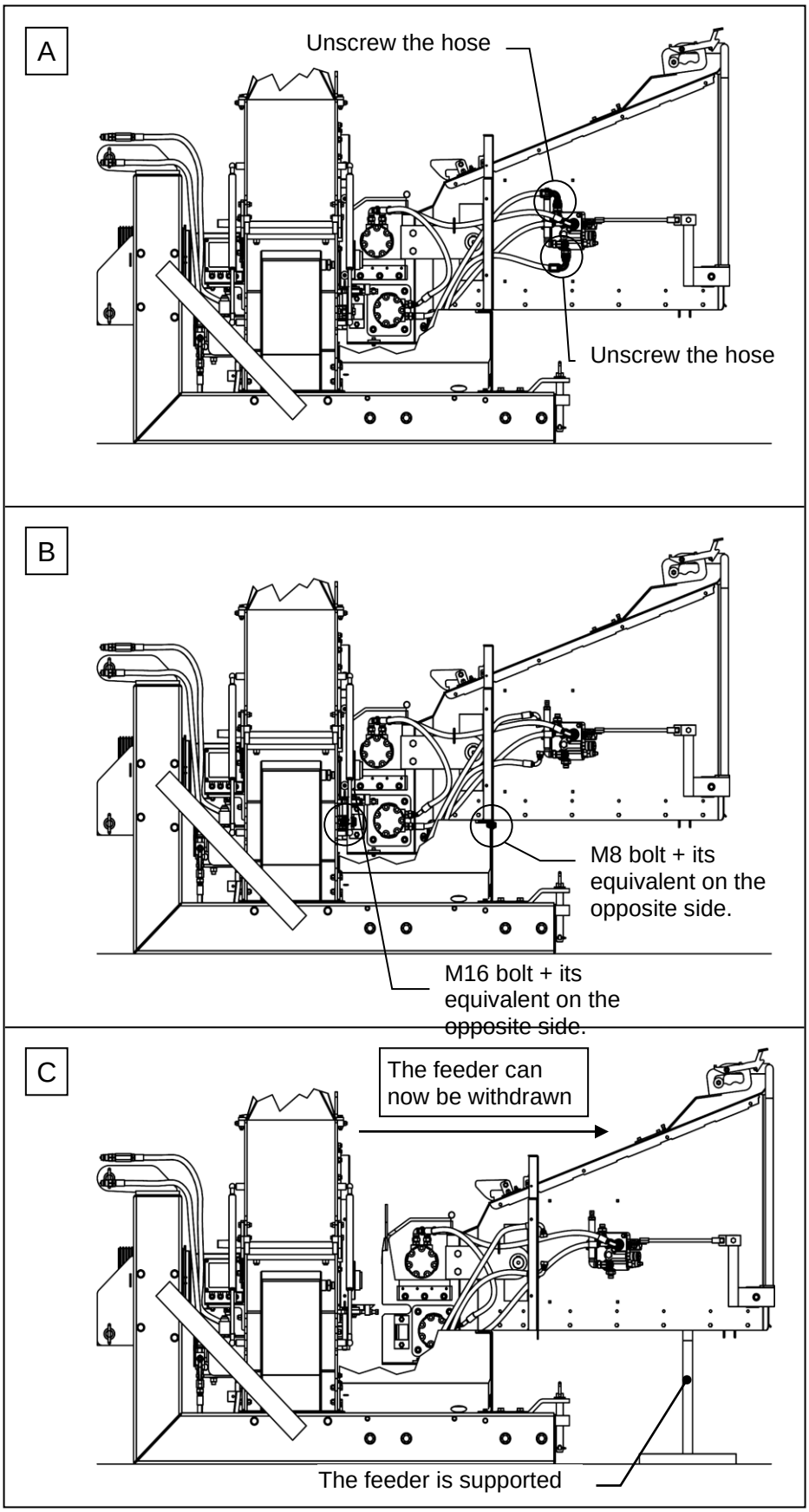


Figure 24: Disconnecting the feeder

6.3 Removing chipping blades

When the chipping blades need to be sharpened, changed or thoroughly inspected, it is necessary to dismantle them.

The easiest way to remove the blades is to follow the following procedure:

1. Remove the front and top guard and any rear guard, see Sections 5.5 and 5.6.
2. Open the chipper, see Section 6.1, so that the rotor is accessible.
3. Turn the rotor until one of the 4 holes in the rotor fits next to the block with a hole on the side of the rotor housing and insert the hitch pin so that the rotor is locked in place (see Figure 25B).
4. The first blade can now be removed by unscrewing the nut from the bolts holding the blade in place. You may need to be careful, as the NordLock washers offer a lot of resistance. The bolt may need to be held back to prevent it from moving around.
5. Once the blade is removed, take out the hitch pin. As the rotor is no longer in balance, it will start spinning on its own - so be careful!
6. Turn the rotor until the next hole matches the hole in the side of the rotor housing and insert the split pin, and the next blade can now be removed.
7. Repeat the procedure in steps 5 and 6 until all 4 blades have been removed.

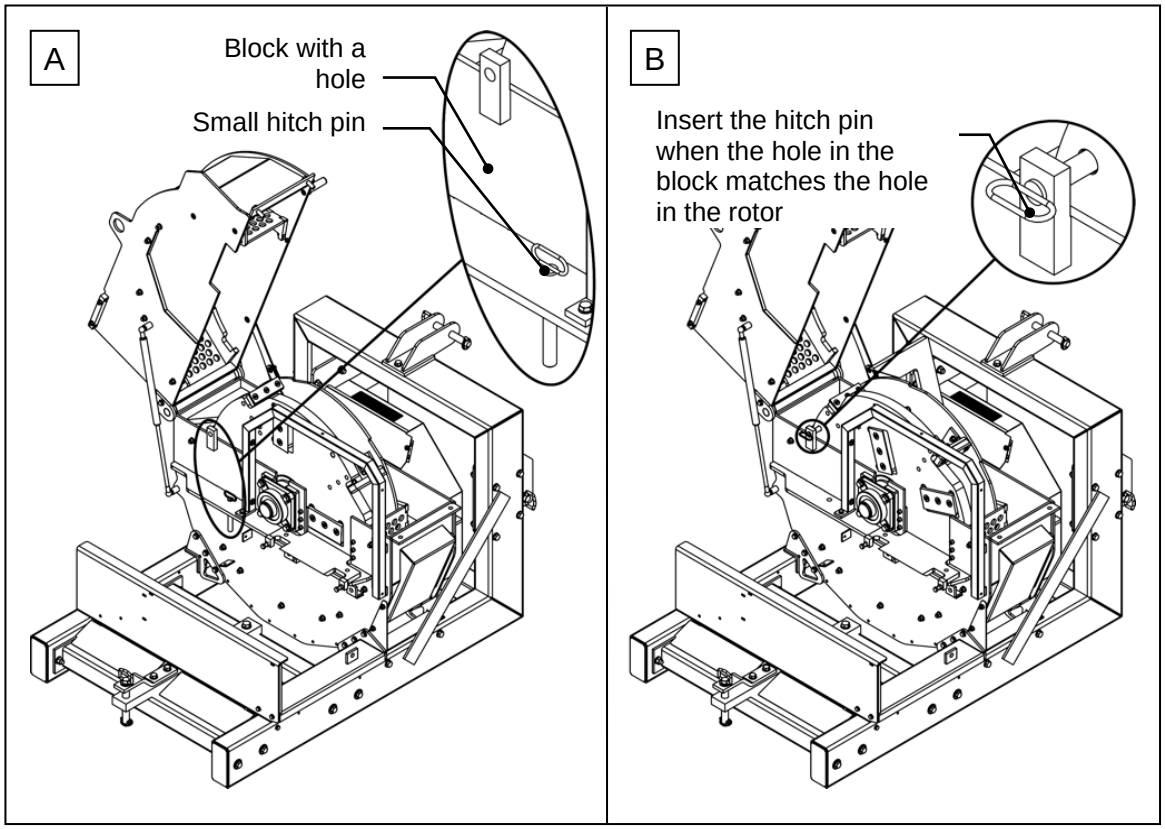


Figure 25: Locking the rotor during blade removal (spout and feeder not shown)

Warning: The rotor is balanced with the 4 blades attached, and when one or more of the blades are removed, the rotor is no longer balanced and will start turning on its own if not

locked. Therefore, be careful with your fingers and **never** put your fingers into the machine.

Warning: Even if the blades are removed because they are dull, there may still be places on the cutting edge where they are sharp. Therefore, be careful and wear thick gloves when handling the blades.

6.4 Mounting chipping blades

When the chipping blades have been removed, e.g. for sharpening or changing blades, they must be refitted correctly. For safety reasons, it is important that the guidelines for blade installation given here are followed.

When installing the blades, make sure that the bolts, nuts and NordLock washers are in good condition. If this is not the case, they need to be replaced. Please also read Section 6.25 regarding the use of NordLock washers.

Each blade is fitted with:

- 3 pcs. M16x90 *grade 10.9* with countersunk head and internal hexagonal head (this applies with standard blades fitted).
- 3 pcs. locknuts for M16 grade 8.8 - DIN 985.
- 3 sets of NordLock washers (each consisting of 2 identical counterparts) for M16.

If **all** these parts are **not** present, the blades must **not** be fitted and the chipper must not be used. Failure to do so can be **extremely dangerous**!

When fitting blades, the procedure is similar to that used when removing blades (see Section 6.3): Lock the rotor with the split pin in the position corresponding to the blade you want to fit, and then fit the blade. Remember that the rotor is not in balance when all the blades are not fitted, and it will therefore turn on its own when the split pin is not inserted.

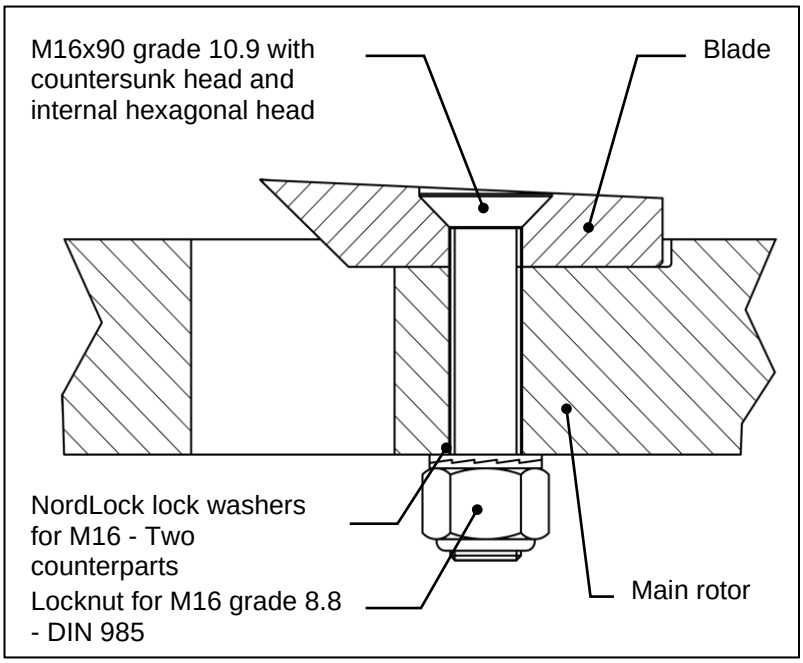


Figure 26: Section through the main rotor

Fit the washers in pairs so that the two roughly "notched" surfaces face each other (see Section 6.25). It is important that these washers are facing the correct way.

Tighten the bolts to a torque of 180 Nm.

Warning: When the blades are fitted, the balance of the rotor changes and it will start to turn on its own. Therefore, be careful with your fingers and **never** put your fingers into the machine.

Warning: Never fit damaged blades. For example, if the blade is broken or cracked, **do not** install the blade. Failure to do so can be **very dangerous**.

Warning: Always have all 4 blades fitted with all bolts correctly fitted and tightened during operation. If one or more blades and bolts are left out, the rotor may become unbalanced, which will cause oscillations during operation, and in the worst case scenario, the rotor could cause a breakdown.

Warning: When the blades are new or newly sharpened, they are **very sharp** and can cause cuts. Therefore, be careful and wear thick gloves when handling the blades.

6.5 Sharpening blades

When the chipper is in use, the blades become worn and the cutting edge becomes dull. It is therefore necessary to sharpen the blades regularly. The sharpening interval depends on the type of wood being fed into the machine and whether soil and pebbles have been dragged along with the wood to the blades.

Signs that the blades need sharpening:
- The chip quality is poor.
- The chipper struggles to grip the wood and the rotor loses speed quickly.

When the blades need to be sharpened, they must first be removed from the machine, but before doing so, check whether the blades need to be replaced instead (see Section 6.6). To remove the blades, follow the instructions in Section 6.3.

The blades are sharpened at an angle of 41° (See Figure 27), and it is important to adhere to this strictly to ensure good chip quality. If you are unable to sharpen the blades yourself, there are companies that specialise in this.

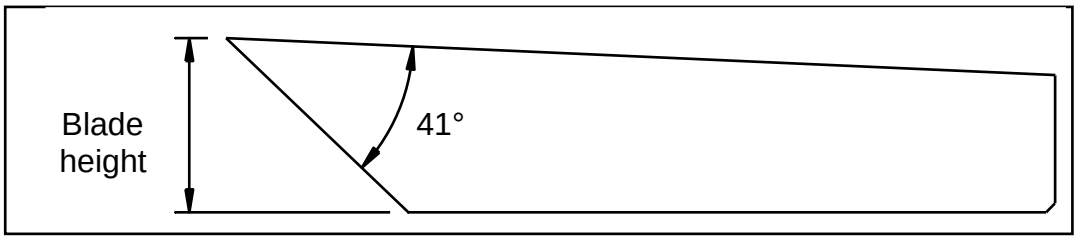


Figure 27: Side view of a blade with the sharpening angle and blade height marked

When sharpening blades, it is important to sharpen them evenly. In particular, the blade height must be the same on all 4 blades. If this is not adhered to, it can be difficult to set the bottom anvil and thus difficult to ensure a uniform chip.

For the overall balance of the rotor, it is important that the weight of the blades is the same.

To ensure the blade has a long operational life, observe the following:
- Only use the machine for chipping wood.
- Make sure that the wood being fed into the machine is as free of as much soil and pebbles as possible.
- **Never** put large stones, iron and other metals in the chipper.

Warning: **Never** attempt to sharpen the blades while they are still attached to the rotor. It can be very dangerous.

Warning: When the blades are newly sharpened, they are **very sharp** and can cause cuts. Therefore, be careful and wear thick gloves when handling the blades.

6.6 Changing chipping blades

When the chipping blades have been sharpened after a long period of use to the point where the edge surface is behind the hole through the rotor (see Figure 28), the chipping blades **must** be replaced.

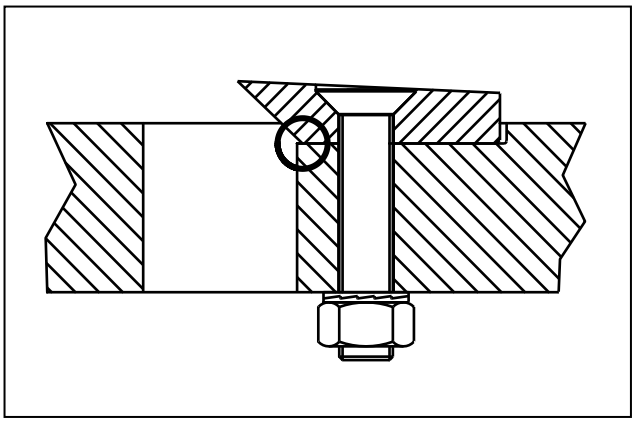


Figure 28: The blade's cutting edge behind the hole through the rotor

If the blades have been damaged (large nicks, breaks, etc.), e.g. if something very hard (e.g. stone or metal) has been in the machine, the blades **must** also be replaced. Remove the worn chipping blades according to the instructions in Section 6.3**,** and refit the new chipping blades according to Section 6.4.

Warning: Never run the chipper with damaged blades. It can be very dangerous!

6.7 Changing the screen blades on centre blades

Screen blades wear out over time. The blades have 4 cutting edges and can therefore be turned 4 ways before they need to be replaced. The cutting edges can be sharpened slightly, but if you want to ensure proper chipping quality, it is recommended to change the screen blades before they wear down too far. **The minimum width of the screen blades is 47 mm!**

Note: If the screen blade is cracked or large pieces have been knocked off the blade, it **must** be replaced for safety reasons. If one of the screen blades needs to be changed, it is necessary to change all 4 screen blades to ensure the weight is equal and the rotor remains in balance. If this is not followed and the rotor becomes unbalanced, it will wear and damage the main bearings quickly and the risk of causing serious damage to the wood chipper is high.

6.7.1 Removing screen blades

The easiest way to remove the screen blades is to follow the following procedure:

1. Remove the front and top guard and any rear guard, see Sections 5.5 and 5.6.
2. Open the chipper, see Section 6.1, so that the rotor is accessible.
3. Turn the rotor until one of the 4 holes in the rotor fits next to the block with a hole on the side of the rotor housing and insert the hitch pin so that the rotor is locked in place (see Figure 25B).
4. The first screen blade can now be removed by unscrewing the nut from the bolts that hold the screen blade in place. You may need to be careful, as the NordLock washers offer a lot of resistance.

5. Once the screen blade is removed, take out the hitch pin. As the rotor is no longer in balance, it will start spinning on its own - so be careful!
6. Turn the rotor until the next hole matches the hole in the side of the rotor housing and insert the hitch pin, and the next blade can now be removed.
7. Repeat the procedure in steps 5 and 6 until all 4 blades have been removed.

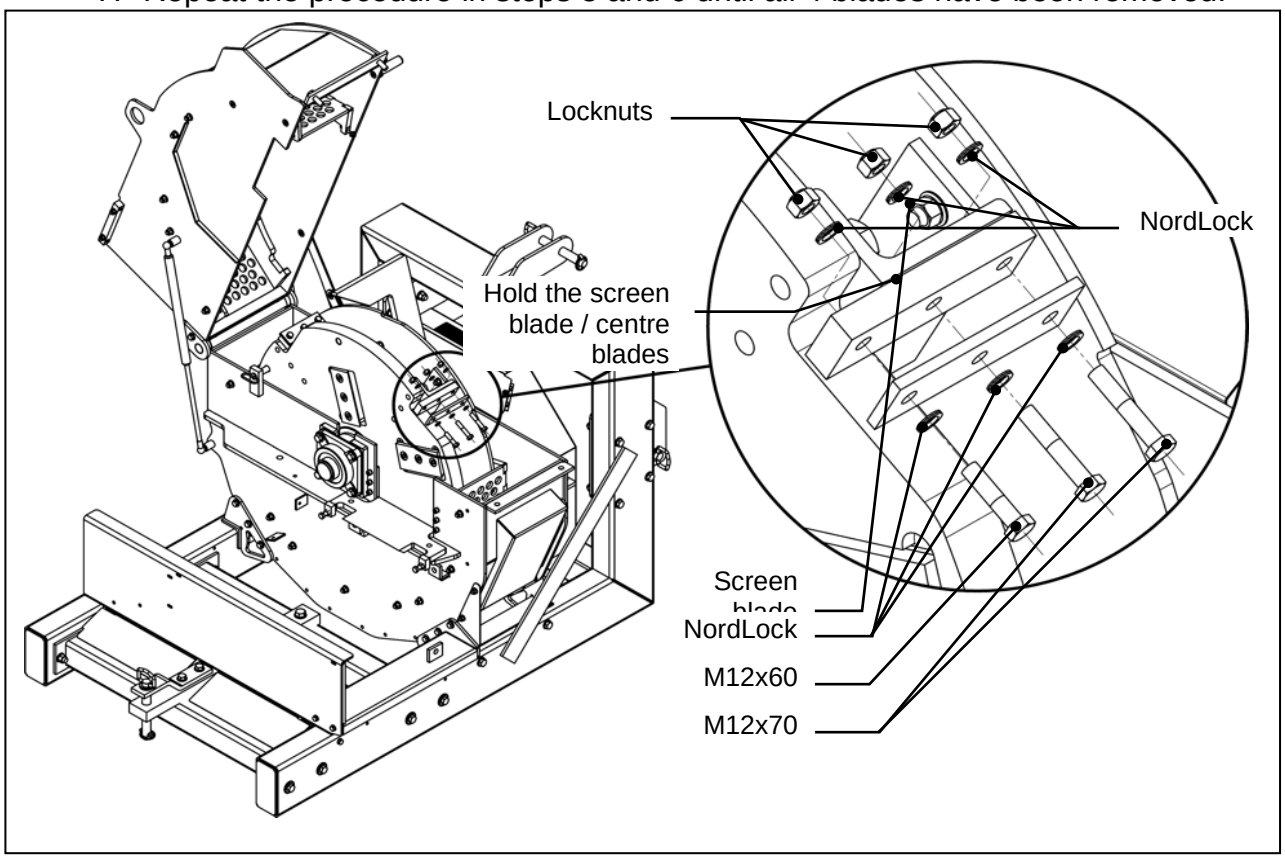


Figure 29: Changing screen blades (spout, feeder, etc., not shown)

6.7.2 Fitting screen blades

Once the blades have been removed, e.g. for sharpening, changing cutting edges or blades, they must be correctly refitted. For safety reasons, it is important that the guidelines for blade installation given here are followed.

When installing the blades, make sure that the bolts, nuts and NordLock washers are in good condition. If this is not the case, they need to be replaced. Please also read Section 6.25 regarding the use of NordLock washers.

Each screen blade is fitted with:
- 2 pcs. M12x70 grade 8.8.
- 1 pc. M12x60 grade 8.8.
- 3 pcs. locknuts for M12 grade 8.8.
- 6 sets of NordLock washers (each consisting of 2 identical counterparts) for M12.

See Figure 29 for part locations.

If **all** these parts are **not** present, the blades must **not** be fitted and the chipper must not be used. Failure to do so can be **extremely dangerous**!

When fitting the screen blades, the procedure is similar to that used when removing the chipping blades (see Section 6.3): Lock the rotor with the split pin in the position corresponding to the blade you want to fit, and then fit the blade. Remember that the rotor is not balanced when all the screen blades are not fitted, and it will therefore turn on its own when the hitch pin is not inserted and locks the rotor.

For the overall balance of the rotor, it is important that the weight of the screen blades is the same. This means that the screen blades must be ground to an equal size within 1/10 mm. It's also very important to turn the bolts the same way when mounting the screen blades, as this can also affect the balance of the rotor.
The bolts are tightened with 84 Nm and it is important that you tighten the nut when tightening with Newton metres.

6.8 Replacement of centre blades

It is usually rarely necessary to remove the centre blades. However, should they become damaged, they may need to be maintained or replaced.

The easiest way to remove a centre blade is to follow the following procedure:

1) Lock the rotor in a position so that the centre blade you want to remove is easy to access.
2) Remove the screen blade on the blade, see Section 6.7.
3) Remove the bolts between the centre blade and the rear rotor.
4) Remove the bolts that hold the centre blade to the main rotor.
5) Remove the centre blade. It may be necessary to loosen the bolts in several of the blades so that the centre blade you want to replace is not in tension.
6) Place the new centre blade in place of the old one and loosely insert the bolts that hold the centre blade to the main rotor. Bolts must have screw locks
7) Loosely insert the bolts between the centre blade and the rear rotor. Bolts must have screw locks
8) The bolts are now tightened and the new centre blade is now fixed.
9) After replacement, the rotor must be balanced! This **must** be observed!

6.9 Replacing ejector blades

It is usually rarely necessary to remove the ejector blades. However, should the blades become damaged, they may need to be maintained or replaced.

Remove the blades (see Section 10 for positioning) by unscrewing the bolts and removing the blade. The blade can then be replaced.

To install the blades, simply place them over the holes in the rear rotor and screw the bolts and NordLock washers back on and tighten them securely. Damaged bolts should also be

replaced if necessary (use M16x70x1.5 - 12.9 DIN 912). Remember to turn the blade the right way round.

After replacing the blades, the rotor must be properly balanced again. It is important to adhere to this to ensure that the rotor does not experience unwanted oscillations! This **must** be observed!

The ejector blades should be replaced either every 1,000 hours of operation or every 5,000 m^3 of chipped pellets (whichever occurs first) to avoid blade fatigue.

Warning: Always have both ejector blades fitted with all bolts, washers and nuts correctly fitted and tightened during operation. If one blade is left out, the rotor can oscillate and, in the worst case scenario, break down.

Warning: When the blades are removed/installed, the balance of the rotor changes and it will start to turn on its own. Therefore, be careful with your fingers and **never** put your fingers into the machine.

6.10 Changing the chip size

The chip size can be changed to get a chip size that suits your needs.

The chip size you get at a given chipper setting depends on a number of factors:

1. Wood type
2. Wood moisture
3. Blade height
4. Feed speed
5. Screen hole size

Re 1. Different types of wood have different hardnesses, which in turn affects the chip size.

Re 2. The drier the wood, the more prone it is to splintering and forming splinters and lumps. This tends to produce long but thin pieces of wood that will be further chipped in the screen.

Re 3. The blade height above the front of the main rotor affects how much each blade can take of the wood to be cut each time the blade passes over it. If the blade height is low, too little may be cut off, generally resulting in small chips. Conversely, if the blade height is high, a lot can be cut off, resulting in correspondingly large chips.

Re 4. By turning the flow valve on the non-return valve, you not only adjust the speed of the feed rollers, but also to some extent the chip length. The faster the feed rollers run, the coarser the chips you get. Conversely, the wood chips will be finer if the feed rollers run slowly, as the wood will be hit by a blade and chipped before it hits the rotor. This means that the full blade height is not utilised. To optimally utilise the blade height, the wood needs to hit the rotor just right and then be hit by a blade.

Re 5. The hole size in the screen is only of secondary importance to the chip size, as the size of the holes only determines the absolute largest piece of wood that can pass through the machine. If the blades are already making small chips, these will simply pass through the holes in the screen without necessarily being further shredded. The bigger the holes, the bigger the pieces of wood that can fit through. Conversely, smaller holes will result in less wood chips as the screen will have more to do. However, there is a lower limit to the size of the holes, as smaller holes will be more prone to clogging, which is also dependent on the type of wood and the moisture content of the wood. It should also be noted that the smaller the hole size, the smaller the capacity of the machine, as it will often be necessary to shred the wood before it can pass through the screen.

As you can see, only points 3, 4 and 5 can be changed immediately. But of the 3, only the blade height really matters for the overall chip size. The screen only ensures that there is a maximum size of wood pieces that can pass through the machine.

6.10.1 Adjust the chip size with shims under the blade.

By using a shim between the blade and rotor, you can adjust the blade height and thus initially the chip length. There are several different thicknesses of shims available for the wood chipper. Thus, the following chip lengths can be achieved:

Shim	Chip length
Nothing	3 mm
2 mm	5 mm
3 mm	6 mm
5 mm	8 mm
8 mm	11 mm
10 mm	13 mm
10+5 mm	18 mm

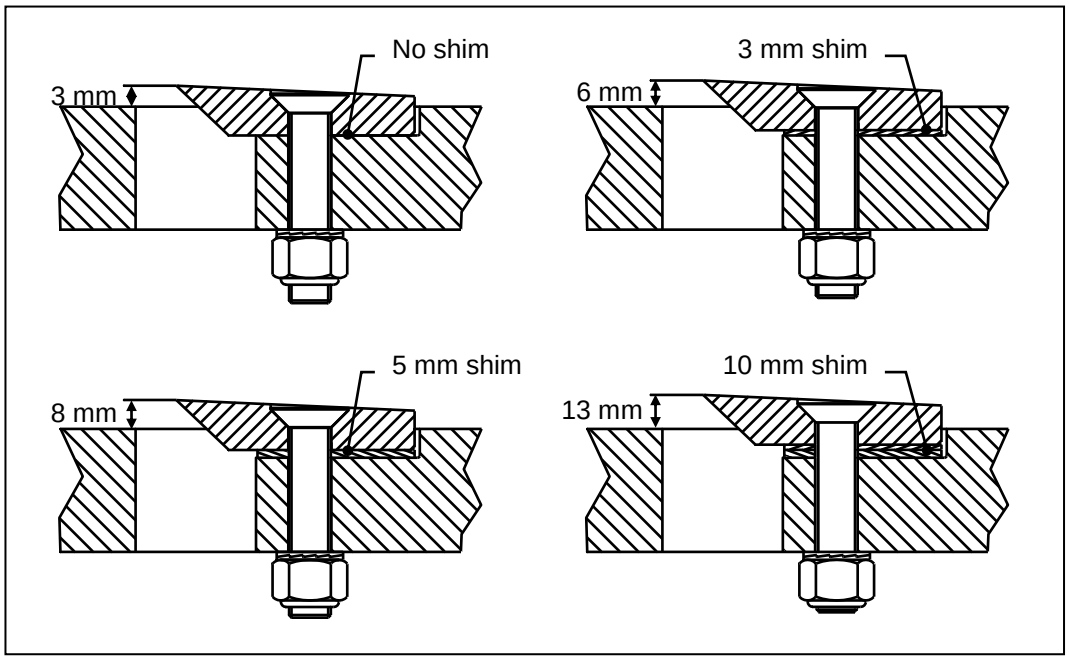


Figure 30: Different combinations of shims

Insert the shims as needed as shown in Figure 30, and the blades should be installed as mentioned in Section 6.3.

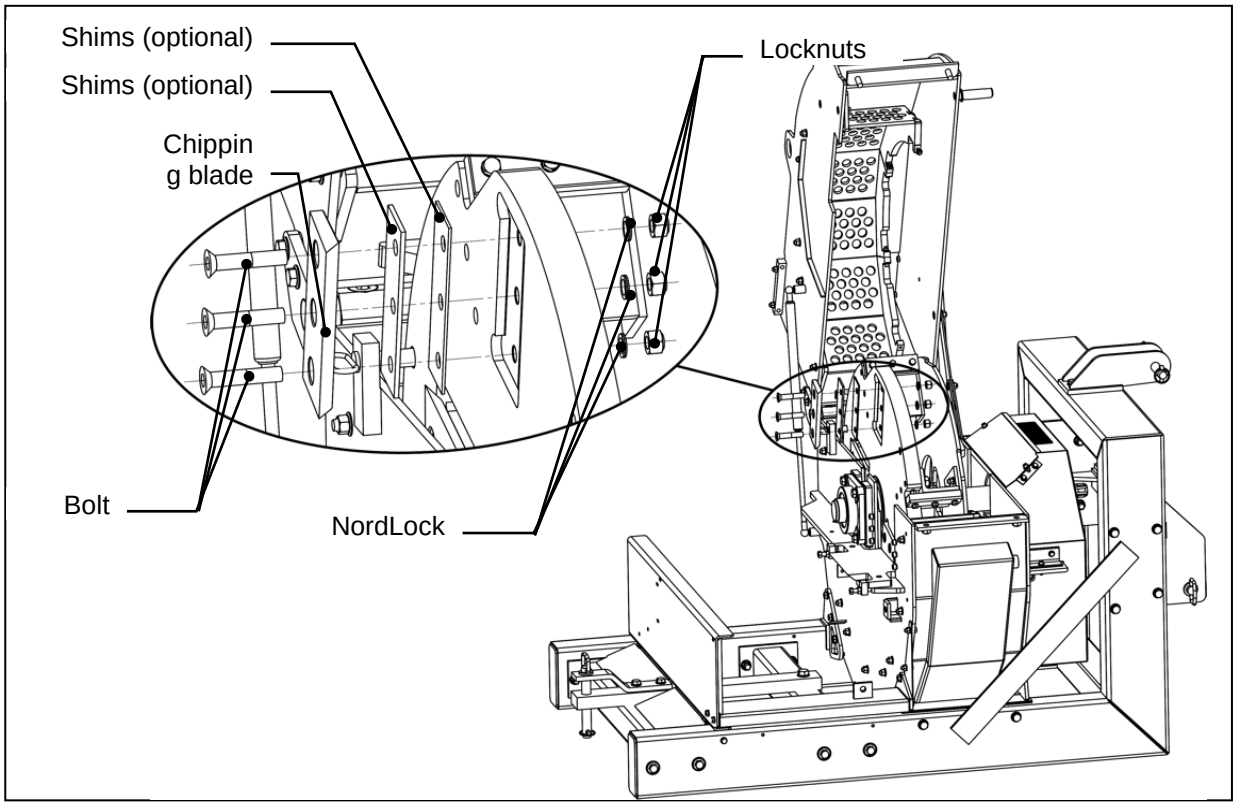


Figure 31: Mounting blades with shims
(chipper shown without a feeder, etc., for clarity)

Once you have installed or removed shims, remember to adjust the anvils to suit the new blade height. In particular, it is also important to pay attention to the side anvils when you have added shims that increase the blade height. See Section 6.13

The maximum permitted blade height above the rotor is 18 mm.

6.10.2 Setting the chip length by adjusting the oil flow.

As mentioned earlier, by turning the flow valve on the non-return valve, you can adjust the speed of the feed rollers and, to a certain extent, the chip length. The faster the feed rollers run, the coarser the chips you get. Conversely, the wood chips will be finer if the feed rollers run slowly, as the wood will be chipped into chips before it hits the rotor.

It is not recommended to use this method to generally control the chip length as it is difficult to control. The ideal is to run the feed so fast that the wood just hits the rotor disc before it is chipped. However, as this is difficult to achieve in practice, and as the rotor does not run at a constant rotation speed because it loses revolutions as the wood is chipped, you will run best by feeding a little slower than necessary. This ensures that the wood does not hit and slow down the blade before it is chipped, minimising the impact of the feed speed, which is why the blade height determines the chip size in the first place. Then the hole size in the screen affects the final chip size.

6.10.3 Setting the chip size when replacing the screen.

The size of the holes in the screen ultimately has little impact on the overall chip size. The screen only needs to ensure that there is a predetermined maximum size of the wood that comes through the machine, which means that you avoid sticks and lumps that fall outside the desired size. This maximum size is set solely by the hole size in the screen.

The blades can make coarse enough chips, but if the holes in the screen are too small for this size, the chips will not pass through the screen until they are sufficiently shredded. This is not desirable as it will reduce the capacity of the chipper. In order to maximise capacity, the blades should initially make as uniform a chip as possible. To ensure optimal performance, the screen should only work when there are sticks or lumps in the machine! This will also minimise wear and tear on the screen.

It is recommended that you only replace the screen with one with a different hole size if you have a good reason to do so. If you can use the chip when the hole size in the screen is, for example, 30 mm, then there is no need to reduce the hole size. If you can accept a larger maximum chip size than 30 mm, you can increase the hole size to increase capacity.

You can read more about chip sizes and combinations of blade height and hole sizes in the screen by scanning the QR code or entering this link in your web browser. http://www.pc-staal.dk/da/pc-flis.html

6.10.3.1 Removing screen segments

The easiest way to remove the screen segments is to follow the following procedure:

1) Open the chipper's top as described in Section 6.1.
2) For safety reasons, it is recommended to remove the blades as described in Section 6.3.
3) Lock the rotor in a suitable position depending on the screen segment you want to work on, as described in Section 6.3.
4) The bolts securing the segments to the side plates in the bottom section of the rotor housing can now be removed one segment at a time from one end. As you remove the segments, it can be beneficial to turn the rotor and lock it in a different position to remove the last segments. See Figure 32
5) The bolts that secure the segments to the side plates in the top of the rotor housing can now also be removed one segment at a time.

It takes two people to remove the segments.

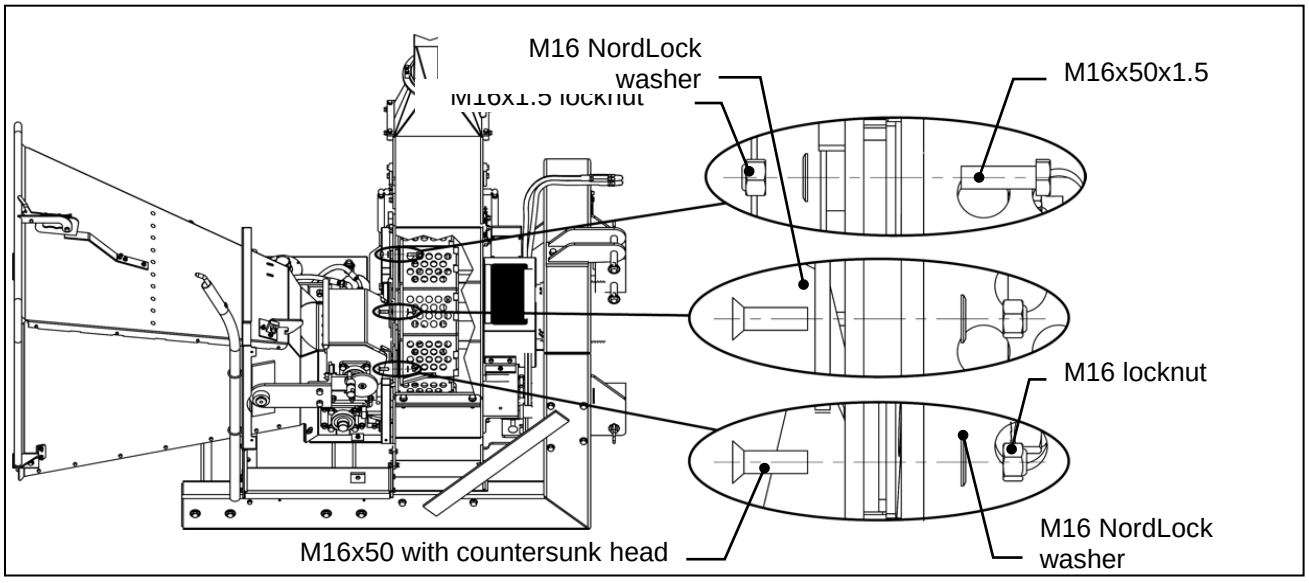


Figure 32: Bolt types for mounting screen segments against the side plate

6.10.3.2 Fitting screen segments

Before fitting the new screen segments, make sure you have all the parts you need. It is important to check that all parts are in order, as the screen can be subjected to a lot of stress during operation.

A complete set of screen segments consists of:

4 pcs. long screen segments.
2 pcs. short screen segments.

13 pcs. M16x50x1.5 - 8.8 DIN 960.
3 pcs. M16x50 - 10.9 with countersunk head and internal. hexagonal.
13 pcs. locknuts for M16x1.5 DIN 985.
3 pcs. locknuts for M16 DIN 985.
28 pcs. NordLock washers for M12 (*).

(*) If the bolt has a hexagonal head, NordLock washers are required on both the bolt and nut sides. If it is a countersunk head bolt, only use the NordLock washer on the nut side.

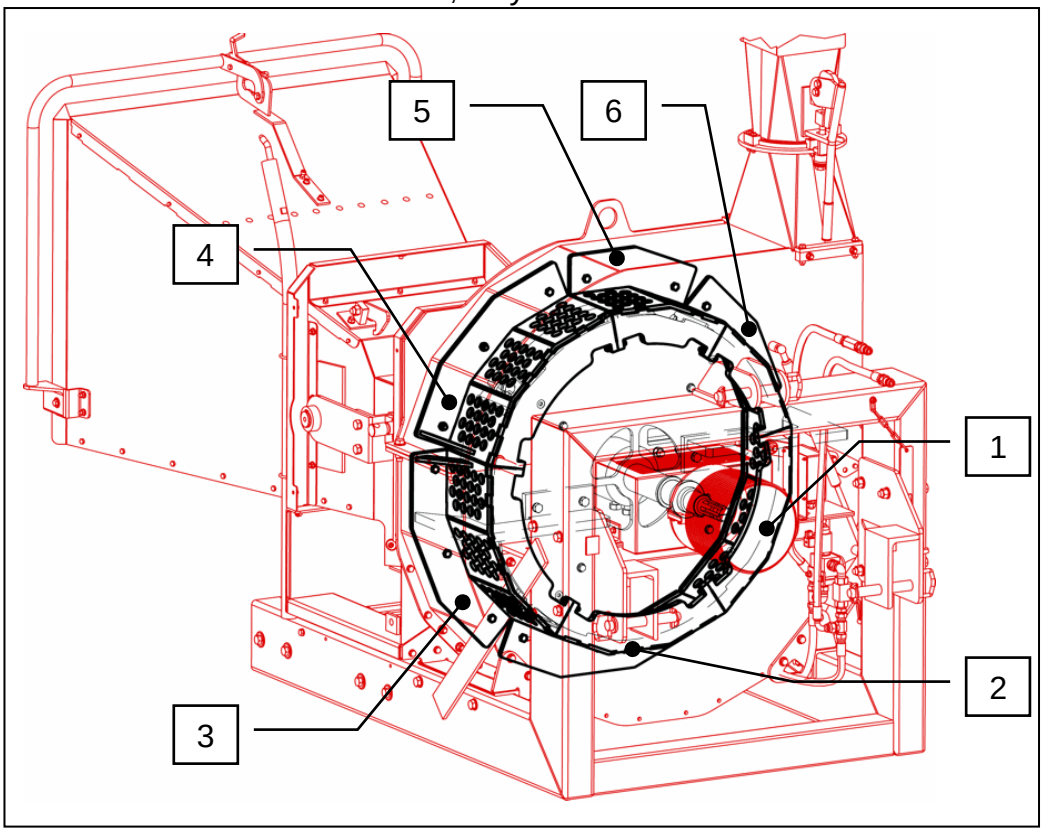


Figure 33: Overview of the location and numbering of the screen segments

Segments 1 + 2 + 3 must be in the bottom of the rotor housing.
Segments 4 + 5 + 6 must be in the top of the rotor housing.
Note: Segments 1 and 4 are the same.

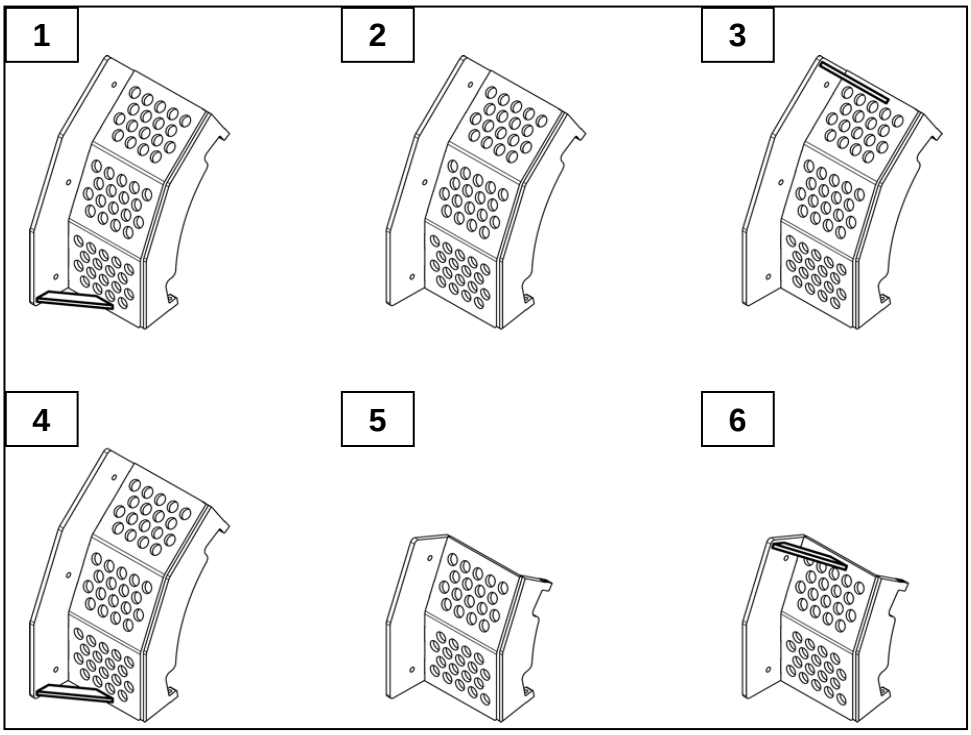


Figure 34: Overview of screen segments

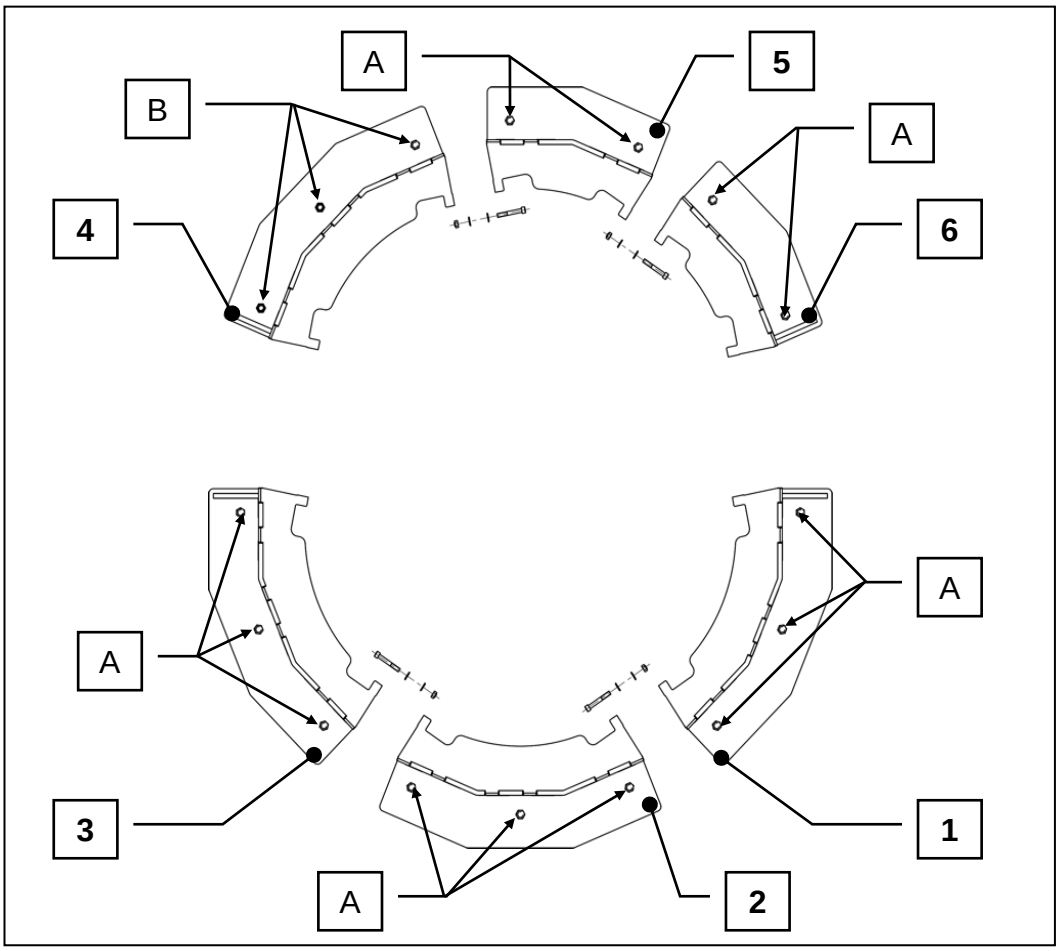


Figure 35: Overview of a complete screen and bolts for mounting

Note for Figure 31:
The numbers 1 to 6 refer to the number of the screen segment.
"A" is M16x50x1.5 + NordLock washer + Nordlock washer + locknut.
"B" is M16x50 with countersunk head and internal hexagonal head + NordLock washer + locknut.

"A" and "B" are for mounting screen segments against the side plates of the rotor housing.

The easiest way to install the screen segments is to follow the following procedure:

1) Take screen segment 2 and mount it at the bottom with 3 pcs. M16x50x1.5 - 8.8 DIN 960 + Washer + Locknut grade 8 (see Figure 35). Only loosely insert the bolts through the side plate so that the segment can still move slightly.
2) Take screen segment 1 and mount it on the correct side of the bottom segment you just mounted (see Figure 31). Here, too, the bolts are loosely inserted. Then mount screen segment 3 on the other side of screen segment 2, still only loosely inserting the bolts.
3) The bolts in the segments in the bottom section can now be tightened, making sure that they fall "neatly" into place next to each other. All segment mounting flanges must lie flat against the side plate in the bottom section.
4) Once the segments in the bottom section are fully assembled, the segments in the top can be assembled in the same way. It can be advantageous to start from the end of segment 6, then add segment 5 followed by segment 4.
5) Once the screen segments in the top are also fully assembled, you can reassemble the blades as described in Section 6.4.
6) Once all the blades are fitted, turn the rotor in such a position that the ejector blades are in a horizontal position so that the top can be closed.
7) Before the top can be closed, it is important to ensure that you have not forgotten any tools or bolts, etc., inside the machine. If this is not done, the worst-case scenario is that the machine could break down during start-up.
8) The top is now carefully closed, ensuring that all parts are free of each other. Next, insert the bolts between the top and bottom of the rotor housing so that the top is securely locked to the lower part (see Figure Figure 2).
9) Once the top is securely closed, carefully rotate the rotor a few turns by turning the end of the axle, listening for noises. If there are any noises, the fault must be found and rectified before starting the machine. This **must** be complied with.
10) Before starting up the machine, all guards must be correctly fitted as described in Section 5.4 ff.
11) The first time the machine is started up after changing screen segments, the rotor is slowly revved up, listening again for noises. If there are noises, the fault must be found and rectified before using the machine. This **must** be complied with.

Warning: Remember to check the machine for forgotten parts before start-up!

6.11 Lubricating bearings

To ensure a long operational life, bearings should be lubricated regularly.

If the machine is used 8 hours a day, the bearing manufacturer recommends lubricating the bearings 3-4 times a year with a lithium soap-based grease with a minimum viscosity of
68 $mm^2 s^{-1}$.

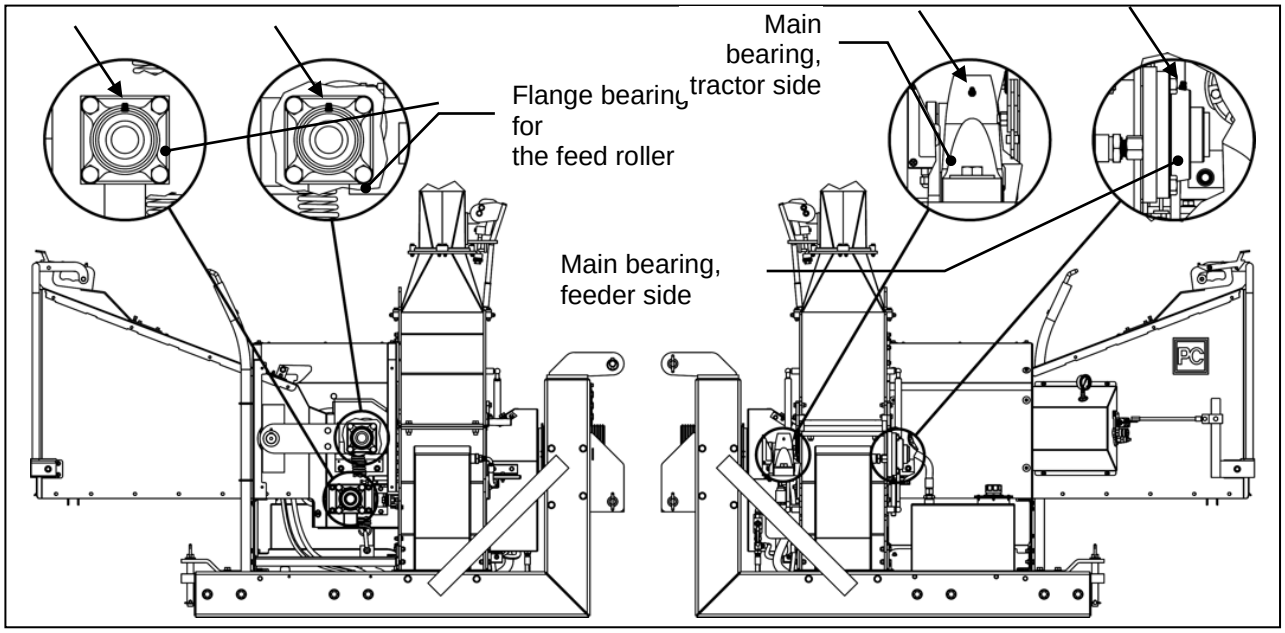


Figure 36: Location of grease nipples on bearings

To lubricate the bearings (4 in total), it is a good idea to use a grease gun that fits the grease nipples found on all bearings. Bearings and grease nipple locations can be found at Figure 36.

Lubricate the bearings by first removing the front, top and rear guards and the bed guard. The two main bearings are given 3 pump strokes and the small ones are given 1½ pump strokes. If this amount is exceeded, there is a risk of the bearings overheating during start-up. Therefore, please note that the bearings should **not** be filled with grease. Be careful not to press too much grease into the bearings as this can push the packing box out of the bed.

6.12 Lubrication of the hinge arm for the top of the feeder

The bushings that the hinge arms for the feeder to tilt over need regular lubrication and, as with the bearings, there are grease nipples here too (see Figure 37 for the location).

To lubricate the hinge arms, a type of lubricating grease containing molybdenum is used to ensure effective lubrication of the bushings. The lubrication interval is 10 hours.

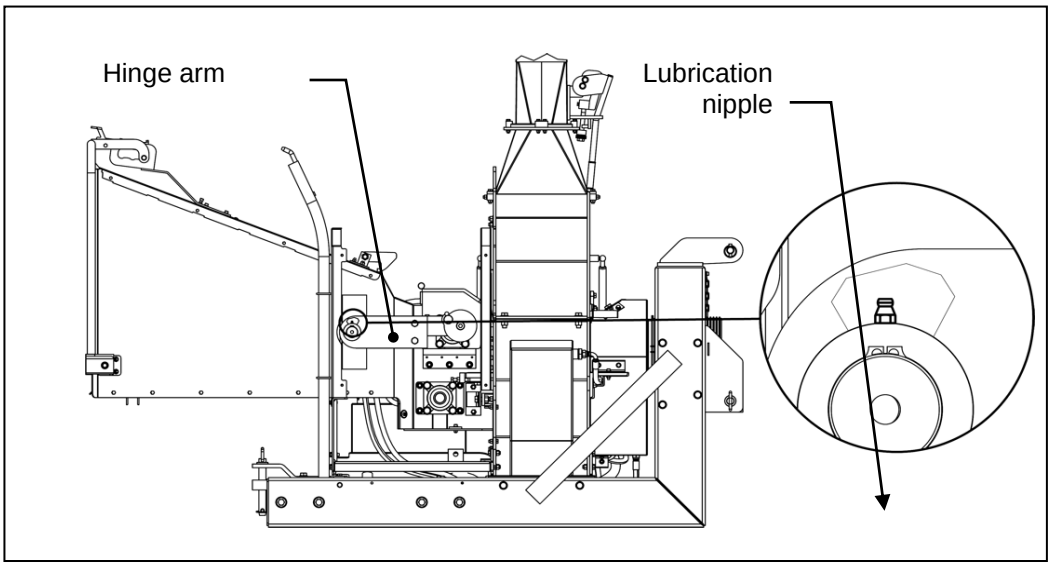


Figure 37: Location of the grease nipple on the hinge arm

6.13 Adjusting the anvil

In order for the chipper to work optimally and to ensure good chip quality, the bottom anvil can be adjusted.

It's **important** to always check and, if necessary, adjust the anvils when:
- The blades are remounted after they have been removed, e.g. for sharpening.
- The blades are changed.
- The rotor has been removed.
- The feeder has been removed.

In addition to the above-mentioned cases, it is a good idea to check the anvils before starting the chipper.

6.13.1 Opening the feeder for setting the anvil

To be able to adjust the anvil, it is necessary to first open the top part of the feeder to get a better view. To do this, follow the steps below:

1. Remove the front, top and rear guards, see Sections 5.5 and 5.6.
2. Loosen the spring by turning the rondelle clockwise using the spiked tube provided (see Figure Figure 38 B).
3. Remove the spring (now not under tension) from the axle pin welded to the disc.
4. Turn the hooks down (see Figure 38B).
5. Lift the top of the feeder with the tube provided and hold it in place with the hook (see Figure Figure 38D).
6. Open the chipper according to the instructions in Section 6.1.

The chipper is now ready to set the anvil.

Warning: When the top of the feeder is open, **never** put your fingers under the top. The top only opens to see the anvil better!

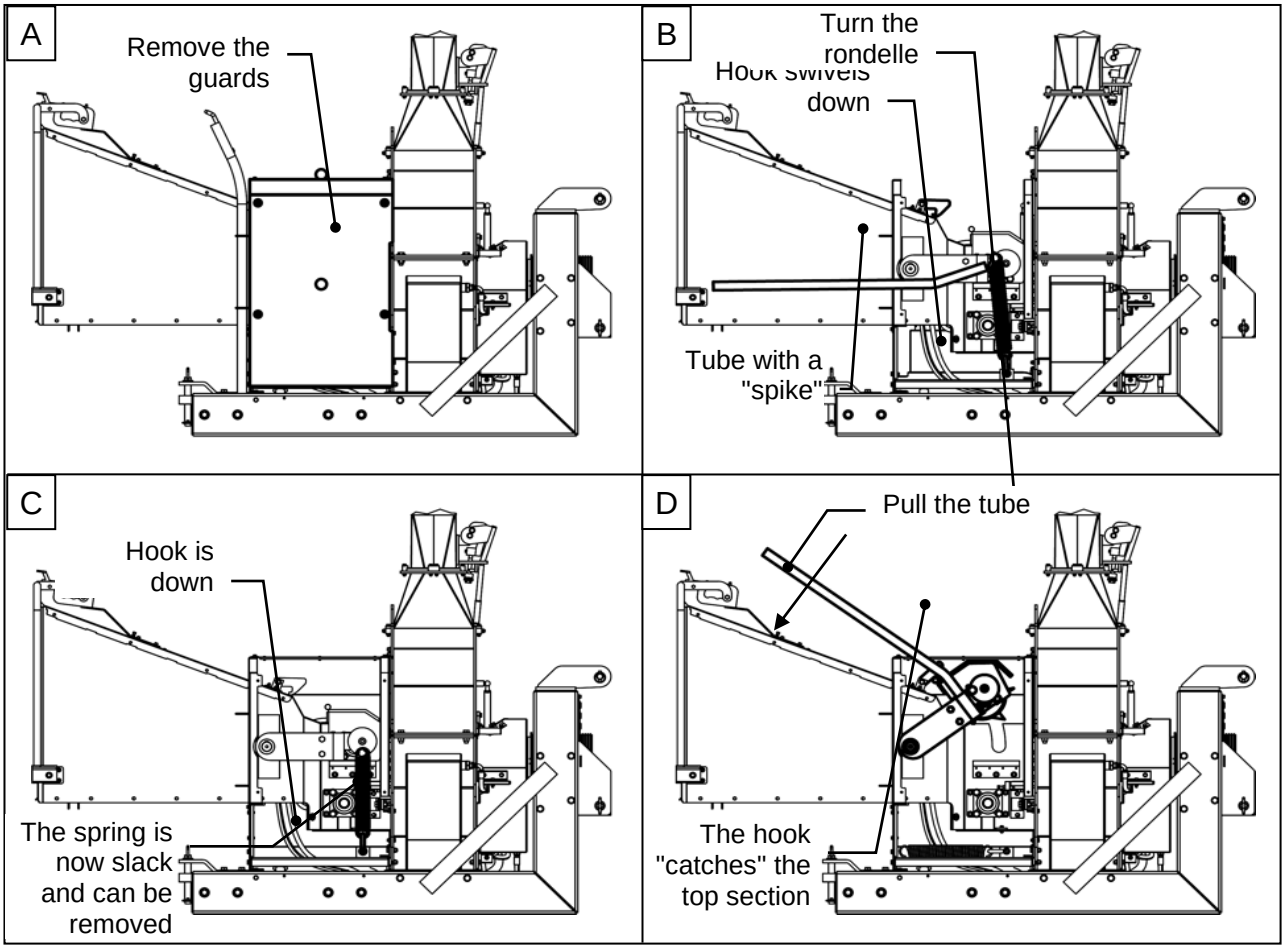


Figure 38: Opening the feeder

6.13.2 Closing the feeder

Before closing the feeder, check that all anvils are sufficiently clamped.
Closing the feeder is done in the reverse order of opening of feeder:

1. The supplied tube is inserted into its counterpart on the top of the feeder and, while pulling lightly on the tube, the hooks holding the top can be rotated away. The top can now be lowered into place.
2. The hooks swivel backwards so that they do not catch the top when the chipper is in use.
3. Lift the spring into place on the axle pin of the disc and turn it with the tool on the end of the tube to preload the spring.
4. The guards can now be mounted again (see section 5.4).

Warning: Watch your fingers when lowering the top.

6.13.3 Adjusting and installing the bottom anvil

To adjust the bottom anvil, first loosen the three bolts that hold the anvil in place. The anvil can then be adjusted by turning the four adjusting screws located on each side of the anvil.

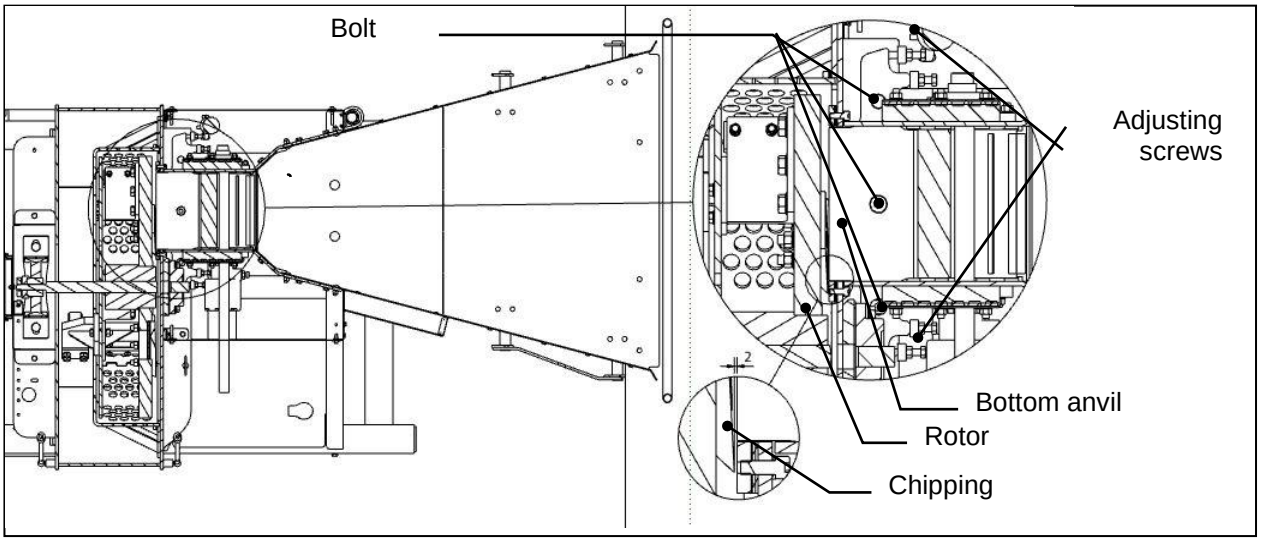


Figure 39: Adjusting the bottom anvil

Adjust the anvil so that there is a distance of approx. 2 mm between the anvil and the blades on the rotor by **gently** turning the rotor by hand in the direction indicated by the arrow above the bed guard on the tractor side. As you turn the rotor, check that the distance between the anvil and the blade is correct. If there is too much or too little space, adjust the adjusting screw until the distance is right. Remember to check the entire width of the anvil in case it is set slightly crooked.

Once **all** the blades have passed the anvil, it is recommended that you run the rotor one more time to ensure that the anvils are completely clear of the blades. If the setting is satisfactory, tighten the three bolts that hold the anvil in place during operation. The tightening torque for these three M16 bolts is 180 Nm.

The three M16 bolts holding the anvil must be locked with NordLock washers between the nut and the crossbar on the chipper (see Figure 40). For the rightmost bolt, NordLock washers must be fitted on both sides. It is **very important** that these discs are fitted, as otherwise the anvil can shake loose.

To further secure the bolts, lock the four adjusting screws with thread through the holes in the bolt heads - **this must be observed.**

Warning: Beware of the sharp, newly sharpened blades on the rotor as the rotor rotates.

6.13.4 Replacing bottom anvil

The bottom anvil can be replaced by removing the feeder according to the procedure in Section 6.2.1 and then unscrewing the anvil. The new anvil is put in place, the M16 bolts that hold the anvil in place are loosely inserted together with the NordLock washers. Set the anvil at the correct distance from the blades, see Section 6.13.3, and tighten the bolts. It's very important not to forget the NordLock washers.

The feeder can then be remounted according to the procedure in Section 6.2.2.

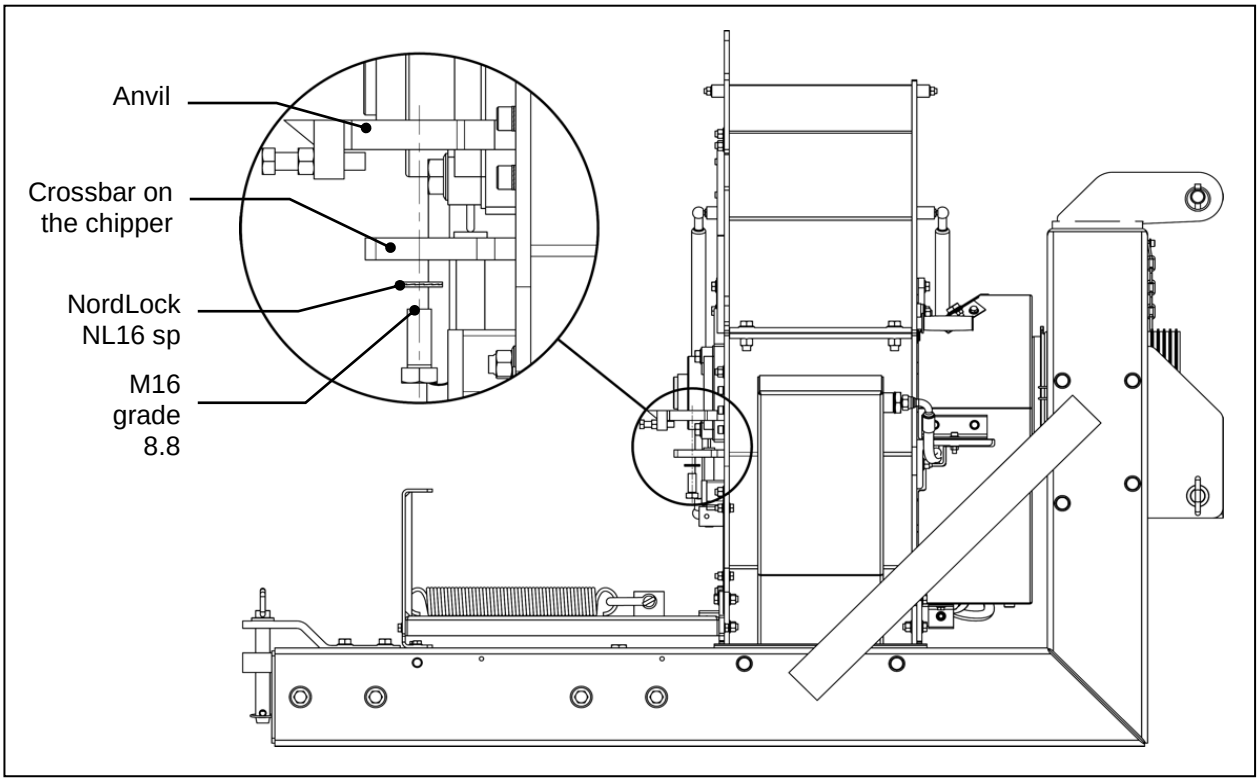


Figure 40: Installation of the bottom anvil

6.13.5 Checking the side anvil

The side anvils, one on each side of the feeder, are not adjustable, but are fixed to the inside of the chipper body (see Figure 37), each with 3 pcs. M10 bolts grade 8.8 with a cylindrical head and internal hexagonal head + NordLock washers.

On delivery, the side anvils are 1-2 mm from the blades. It is recommended to replace the anvils when this distance exceeds 3 mm. If the gap is approaching 4 mm, the anvils **must** be replaced for safety reasons!

Please note that the specified distances between side anvils and blades only apply to new blades.

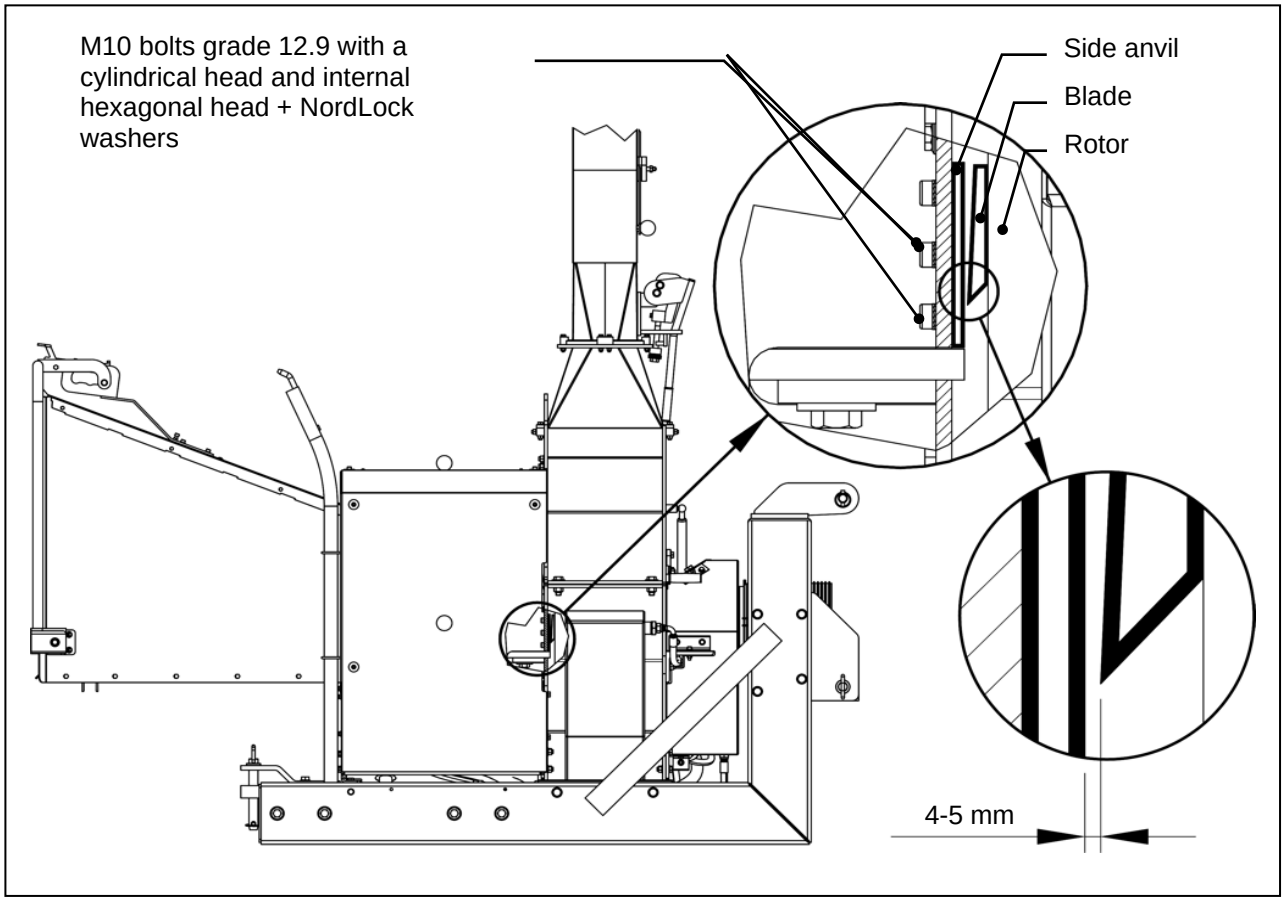


Figure 41: Side anvil

6.13.6 Replacing side anvils

The easiest way to replace the side anvil is to follow the following procedure:

1. Dismantle the front, top and rear guard according to section 5.5 and 5.6
2. Remove the feeder as described in Section 6.2.1.
3. Open the chipper and lock the rotor with the split pin as in Section 6.3 to prevent it from turning.
4. There is now free access to the two side anvils (see Figure 42).
5. The bolts holding the anvils can now be unscrewed, ensuring that the anvils do not fall into the chipper when the last bolt is removed.
6. A suitable side anvil is selected according to Section 6.13.6.1.
7. The new side anvil can now be mounted as shown in Figure 43 magnification B, each with 5 pcs. M10 bolts with cylinder head and internal hexagonal grade 12.9 DIN 912 and 5 sets of NordLock washers.
8. After the first bolt has been inserted and tightened, check that it does not protrude beyond the anvil on the opposite side. If the bolt protrudes through the side anvil, shorten it. This can be done, for example, by filing or grinding it down a little so that the bolt end is flush with the side anvil. **Do not** use washers as shims to limit how much the bolt protrudes through, as this will prevent the NordLock washers from

working properly. Also, do **not** use bolts that are too short. Also see Figure 44 for the correct installation.

9. Once both side anvils are installed and the bolts are tightened, check that the distance L2 (see Figure 43 magnification C) is between 4-5 mm. If this is not the case, choose a different thickness of side anvil.
10. If the distance L2 is satisfactory, the feeder can be remounted, see Section 6.2.2**.**

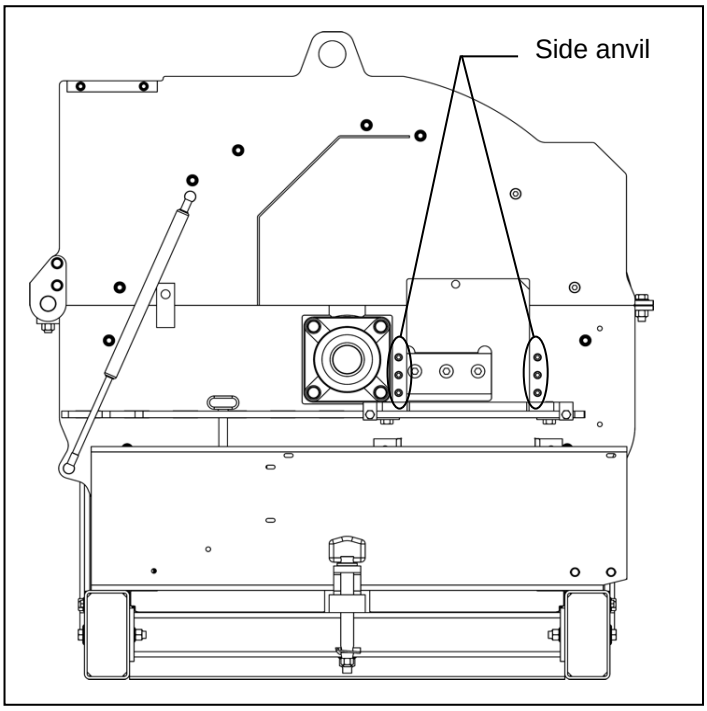


Figure 42: Positioning the side anvil

Warning: Beware of the sharp blades as there is a direct hole to the rotor when replacing the side anvil.

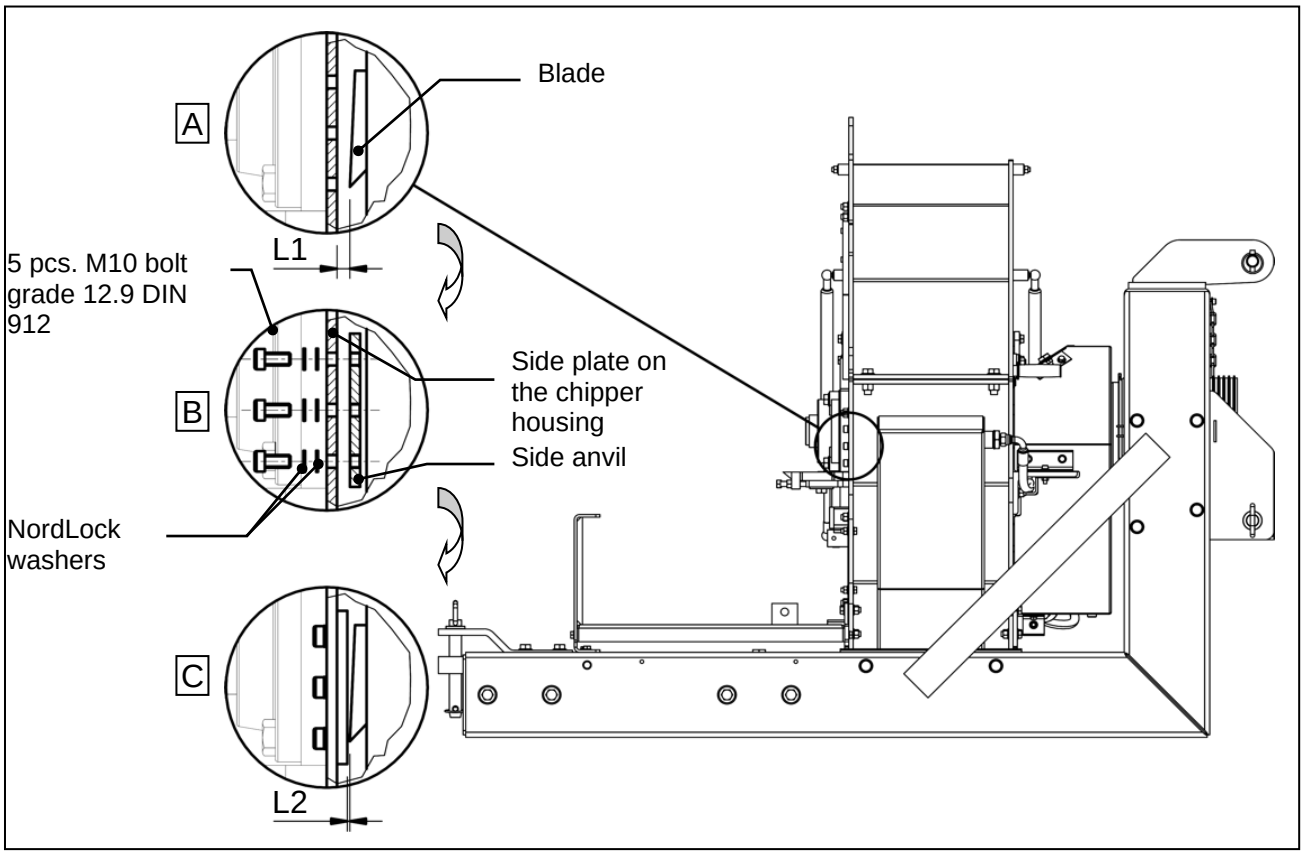


Figure 43: Installation of the side anvil (feeder removed)

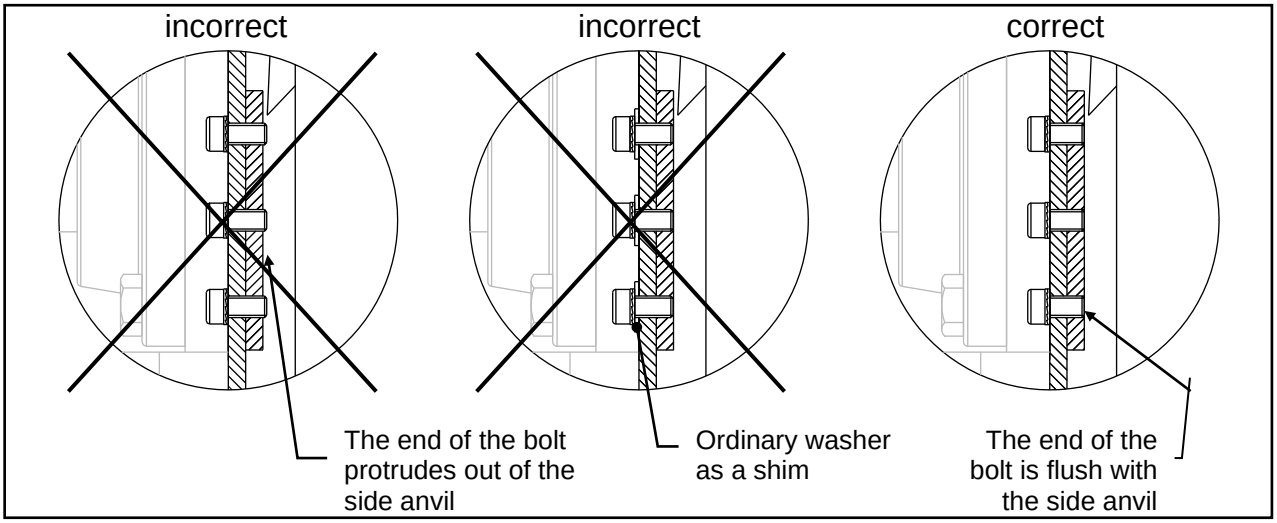


Figure 44: Correct installation of the side anvil (magnification as in Figure 39)

6.13.6.1 Choosing side anvils

To account for wear and tear, as well as inaccuracies in the side plates, the side anvils are available in several thicknesses.

To select a side anvil of the appropriate thickness, follow the following procedure:

1. By measuring from the inside of the chipper's side plate to the blade edge, measurement L1 is found (see Figure 43 magnification A).
2. A suitable anvil is found by subtracting 4-5 mm from the measured L1 value. For example, if you measure 15 mm from side plate to blade edge and subtract 4-5 mm, you get a thickness of 10-11 mm. Therefore, a 10 mm anvil is chosen. The L2 measurement will then be 15 mm - 10 mm = 5 mm.

It is possible to use spacers between the side anvil and the side plate to adjust the distance L2 correctly.

The minimum thickness of the anvils is 8 mm.

Note that the thickness of the anvils does not necessarily have to be the same on both sides.

6.14 Hydraulic diagrams

If the hydraulic hoses have been removed or if they are being replaced, it is important to install the hoses correctly.

When working with hydraulic hoses, it is important to ensure that the hydraulics are not pressurised. If pressurised, there is a risk of hydraulic oil spraying out of the hoses when they are removed. Therefore, never have the hoses mounted on the tractor's hydraulic outlet (type PC-2700-PEH) when working with the hoses.

If the machine has an internal hydraulic system (type PC-2700-PIH), you must also ensure that there is no pressure on the system. You can briefly move the control handle to the loading position and then return it to the stop position. In the loading position, the oil will flow freely to the return tank and the system should then be depressurised. However, be careful when working on the system in case there is a fault with it. Don't rely blindly on the pressure gauge.

Warning: When working on the hydraulic system, the PTO axle **must be** removed!

6.14.1 Hydraulic diagram for PC-2700-PEH (tractor hydraulics)

To ensure that the feeder works as intended, the hydraulic hoses must be installed correctly.

For safety reasons, it is important that the feed rollers rotate correctly in relation to the position of the control handle (see Figure 3). Install the hydraulic hoses correctly by following the instructions in Figure 45.

When working on the hydraulic system, remember to remove the hydraulic hoses from the tractor's sockets to ensure that the hydraulic system is not pressurised.

Note that the direction of rotation of the feed roller(s) must **not** be changed by swapping the hydraulic hoses fitted to the tractor.

Warning: When working on the hydraulic system, the PTO axle **must be** removed!

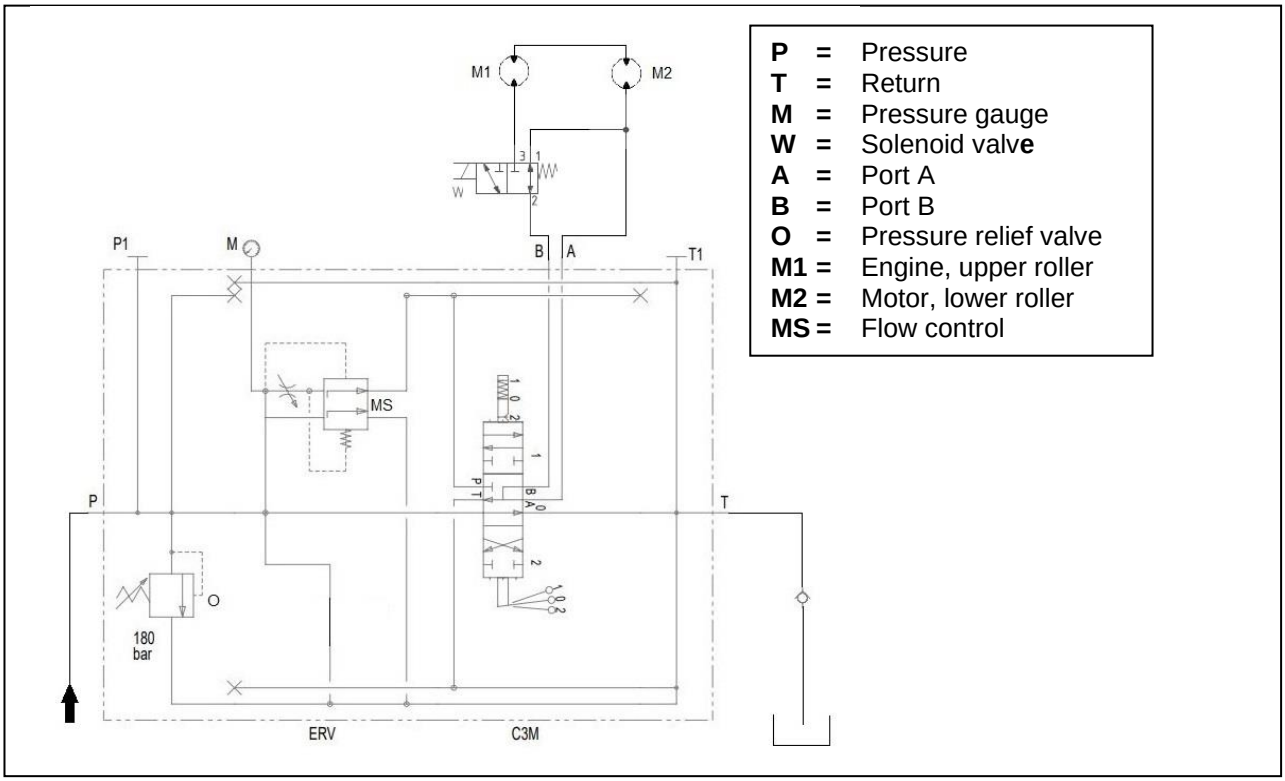


Figure 45:Hydraulic diagram for PC-2700-PEH (Tractor hydraulics)

6.14.2 Hydraulic diagram for PC-2700-PIH (Internal hydraulics)

To ensure that the feeder works as intended, the hydraulic hoses must be installed correctly.

For safety reasons, it is important that the feed rollers rotate correctly in relation to the position of the control handle (Figure 3). Install the hydraulic hoses correctly by following the instructions in Figure 45.

When working on the hydraulic system, remember to ensure that the hydraulic system is not pressurised.

Note that the direction of rotation of the feed roller(s) must **not** be changed by swapping the hydraulic hoses.

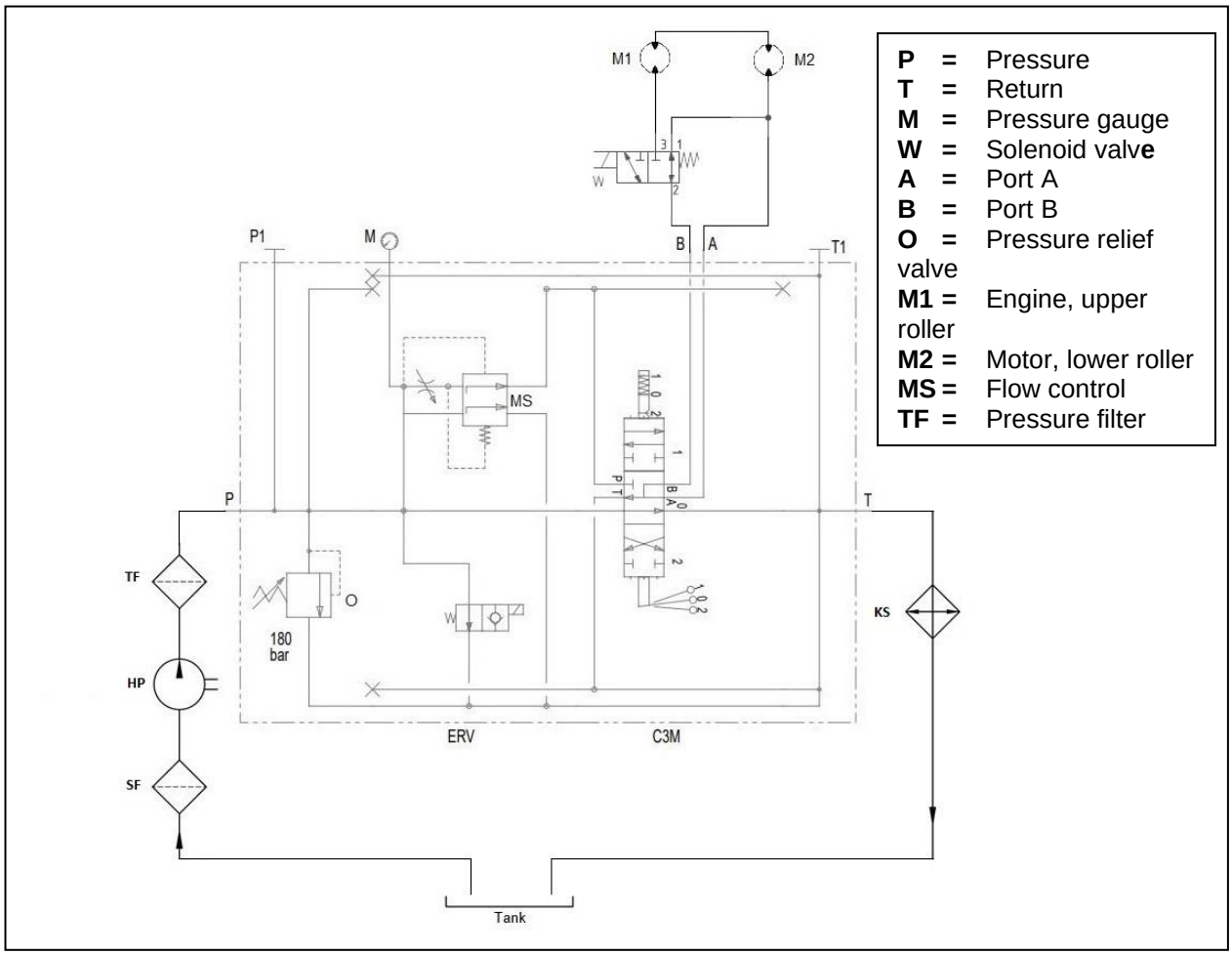


Figure 46: Hydraulic diagram for PC-2700-PIH (Internal hydraulics)

Warning: When working on the hydraulic system, the PTO axle **must be** removed!

6.15 Replacing hydraulic hoses

If a hydraulic hose has been damaged, e.g. if a hose has burst, it must be replaced.

When purchasing and installing a new hose, it is important that it meets the following specifications:

Standard : EN857 2SC
Dimension : ½" – 1"
Pressure : 275 bar
Temperature range : -40 - 100°C

In addition, hoses that are not covered by guards should be placed in a "sock" to prevent oil from splashing onto the person operating the chipper if the hose springs a leak.

Hydraulic hoses purchased from the chipper manufacturer must be tightened to 70 Nm. If hydraulic hoses from another supplier are used, contact them for information on the correct installation.

6.16 Non-return valve on hydraulic hoses (Type PC-2700-PEC only)

As the non-return valve must not be pressurised at the return port, a non-return valve is screwed onto the return hose to the tractor to ensure that this port is not accidentally pressurised.

The non-return valve works in such a way that it only allows oil flow in one direction, so it must be installed in such a way that it allows oil flow **from** the chipper **to** the tractor.

When the non-return valve is correctly installed and you accidentally switch the supply and return, nothing will happen as the non-return valve will block the hydraulic oil to the chipper.

For the non-return valve to function properly, it must be installed as shown in Figure 47.

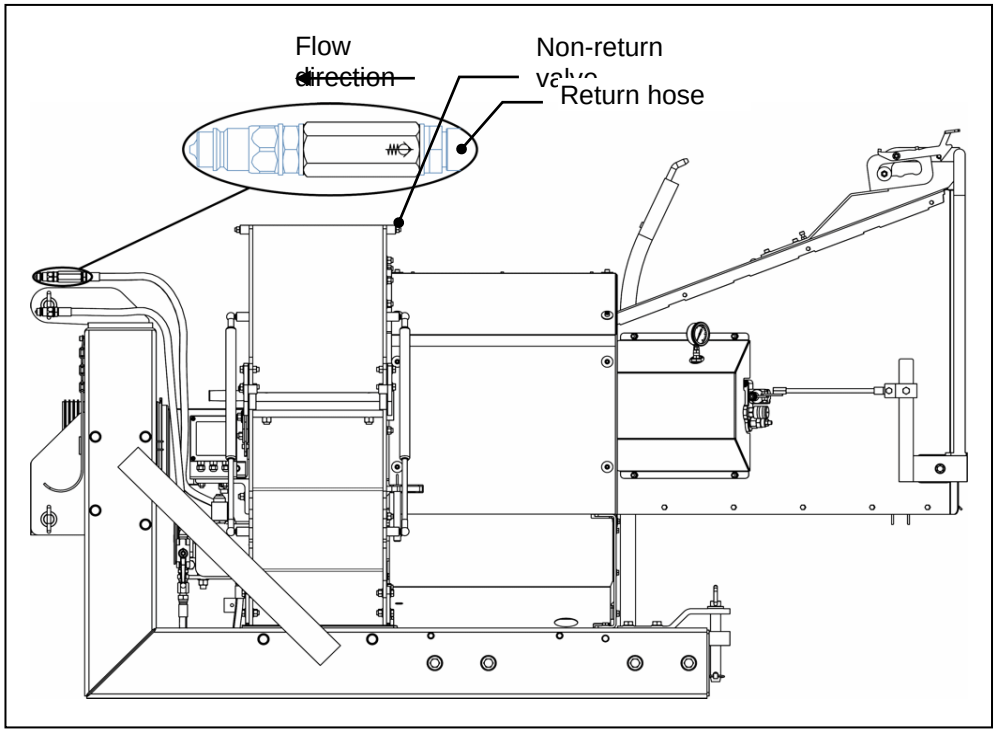


Figure 47: Installing the non-return valve

6.17 Setting the safety valve on the non-return valve (hydraulic valve)

It may sometimes be necessary to set the permissible hydraulic pressure using the safety valve on the non-return valve block located on the side of the funnel (see Figure 6).

If the pressure is too low, the machine will not perform optimally (the rollers cannot draw the wood into the machine) and it is a good idea to increase the permissible pressure for better performance.
If the pressure is too high, you risk reducing the operational life of the hydraulic parts. Hydraulic motors in particular can only handle higher pressures than specified for a short period of time.

If the chipper draws wood into the machine and suddenly stops feeding, it could be because the pressure is set too low. When the wood stops, the pressure in the hydraulic system will increase, which you can read on the pressure gauge. If the operating pressure reading is not close to 150 bar, it may be worthwhile to adjust the safety valve to allow a higher pressure. If the pressure exceeds 150 bar, the safety valve must be adjusted downwards to ensure a long operational life of the hydraulic components.

The above only applies if the rollers stop due to lack of pressure, NOT if it's the stress system that turns off the feed.

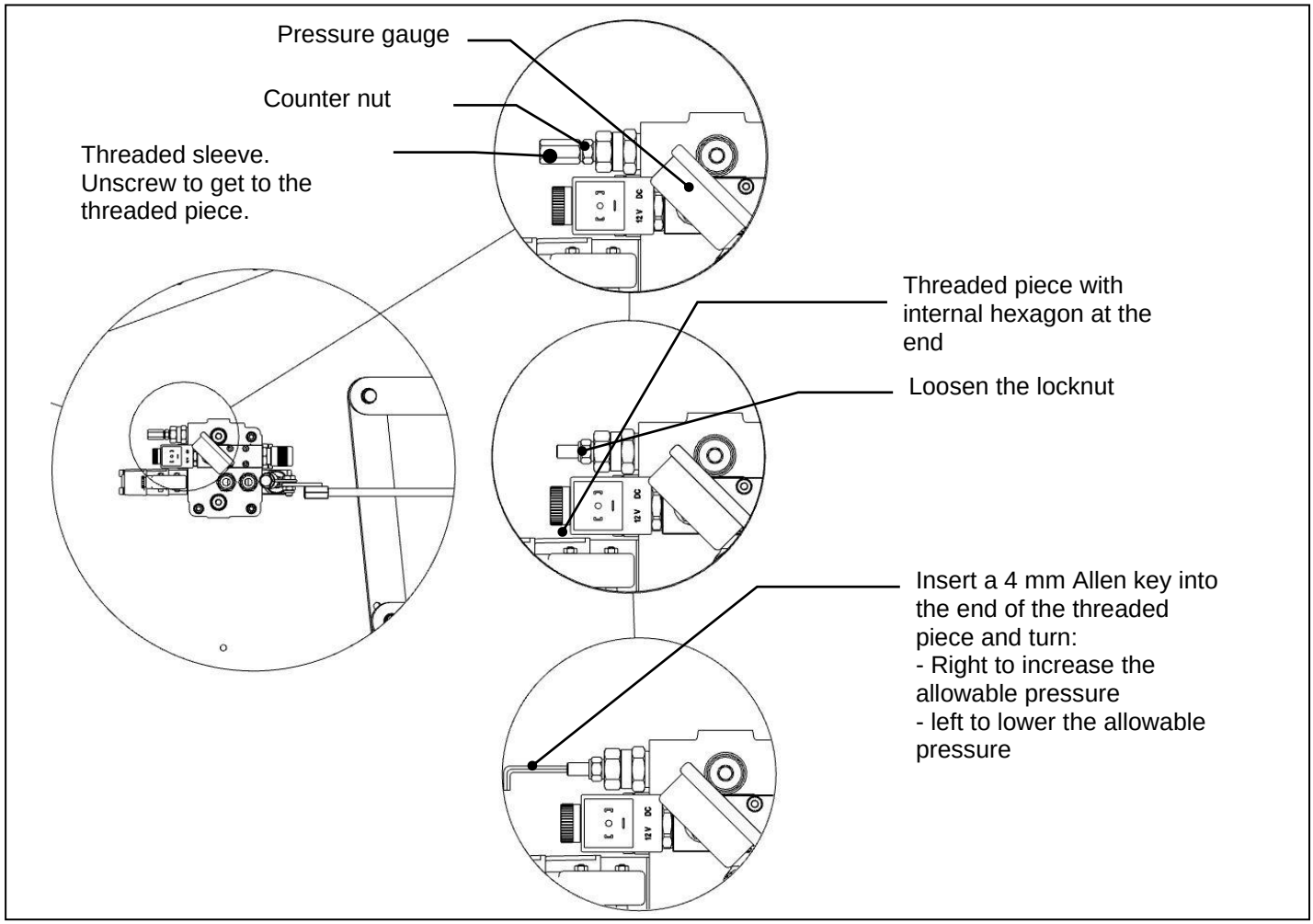


Figure 48: Safety valve setting on the monoblock valve (hydraulic hoses, etc., are not shown)

The safety valve must be set to a maximum permissible operating pressure of 150 bar. The easiest way to do this is as follows:

1. Start the chipper according to the instructions in section 4.
2. Feed wood measuring under 27 cm at one end and over 27 cm at the other end, thin end first into the chipper to block the rollers.
3. When chipping wood, you can read the pressure on the pressure gauge (see Figure 48). The pressure will fluctuate depending on operating conditions and if it exceeds 150 bar, the pressure must be reduced.
4. If the pressure needs to be adjusted, stop and switch off the machine. Then loosen the locknut on the threaded piece. Note that it is not necessary to unscrew the nut completely.
5. Insert a 4 mm Allen key into the end of the threaded piece and turn:
   - Right turn (clockwise) to lower the permissible pressure.
   - Left turn (anti-clockwise) to increase the permissible pressure.

6. By adding more wood to the chipper, the pressure gauge checks whether the pressure is satisfactory.
7. When the pressure is set correctly, tighten the locknut.

It can be beneficial to have two people when setting the pressure. One puts wood into the chipper, while the other checks and adjusts the pressure.

It is recommended to check the pressure regularly and readjust it if necessary to ensure the hydraulic parts have a long operational life.

6.18 Hydraulic oil change (PC-2700-PIH only)

It is recommended to check the hydraulic oil regularly. Firstly, it checks that the oil level is correct and secondly, that the oil is clean.

Check the oil level when the machine is stationary on a flat, horizontal surface. If you check the oil level during operation, you will not get a correct picture.

The oil level should be approx. 24 cm from the bottom of the tank. This means that the oil is just up to the bottom of the filling sieve (see Figure Figure 49).

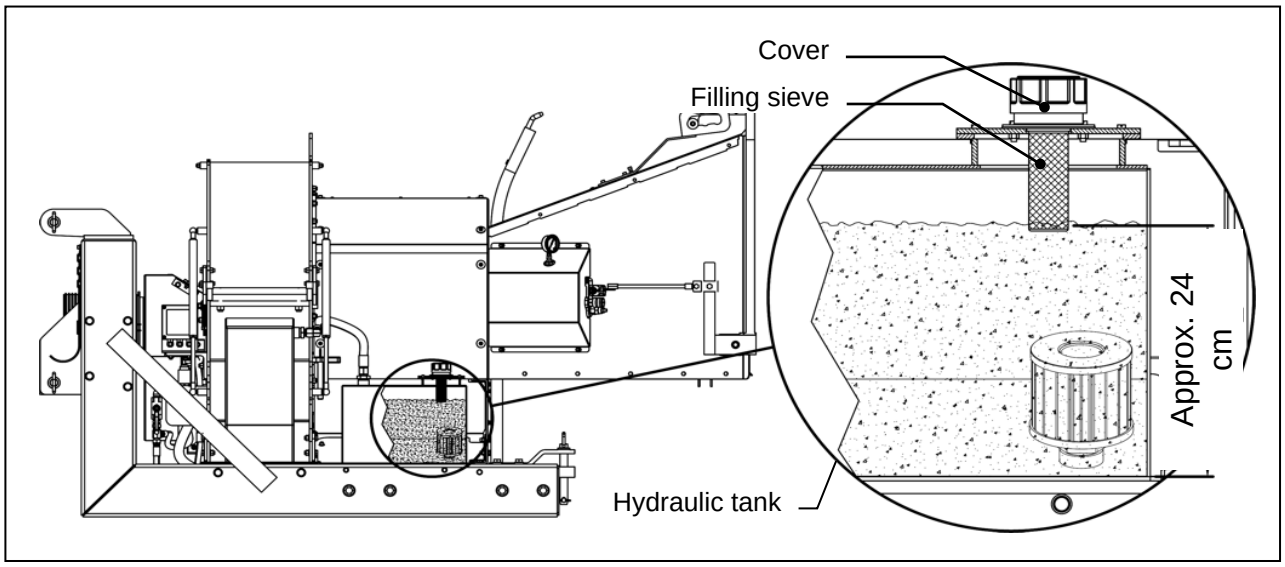


Figure 49: Checking the oil level.

If the oil level is too low, add oil until the height is correct.

If the oil level is too high, there is a risk of the oil overflowing during machine operation when the oil gets hot!

If the oil is contaminated, it is recommended to change it to ensure a long operational life for the hydraulic components.

6.19 Draining hydraulic oil (PC-2700-PIH only)

If the hydraulic oil has become contaminated or dirty, it is necessary to change it. To avoid contaminating the new hydraulic oil, the old oil must be drained off.

To ensure the quality and a long operational life of the new oil, it's a good idea to drain off as much of the old oil as possible.

The hydraulic oil is mainly in the tank and in the cooling jacket. There is also a lot in the hoses, and it's a good idea to disassemble some of these after emptying the tank and cooling jacket to get as much of the old oil out of the system as possible.

It can be an advantage if you can place the chipper on, e.g. a car lift, over a lubrication pit or similar **securely** when draining the oil, as it can be difficult to find something that can get under the bottom plug in the hydraulic sump and the nozzle in the tank to collect the old oil if the machine is standing directly on the ground. In addition, for environmental reasons, care must be taken not to spill hydraulic oil on the ground.

6.19.1 Emptying the hydraulic tank (PC-2700-PIH only)

The easiest way to empty the tank is to unscrew the suction hose (see Figure 50) from the bottom of the tank. This will cause the oil to run out.

To access the suction hose, it is necessary to remove the guards above the feeder. This is best done by following the instructions in Sections 5.5 and 5.6.

Remember to have a bucket or other container ready to collect the old oil!

Once the oil has been drained from the tank, reattach the hose and tighten it.

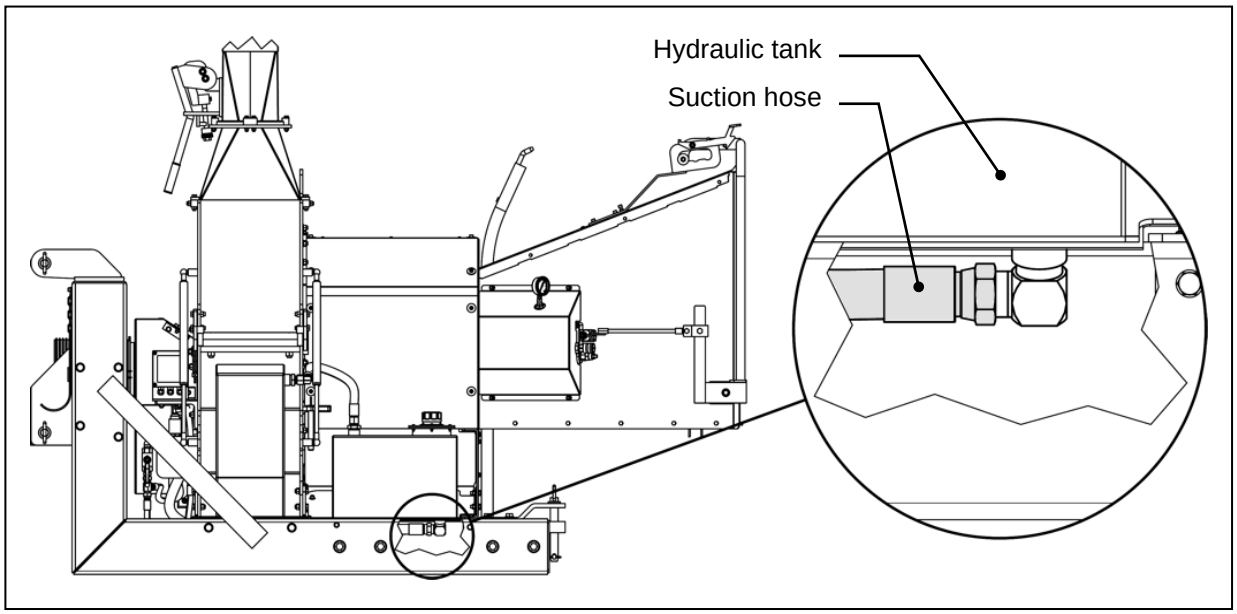


Figure 50: Attaching the suction hose to the bottom of the hydraulic tank

6.19.2 Emptying the cooling jacket (PC-2700-PIH only)

The easiest way to empty the cooling jacket is to unscrew the bottom plug from the bottom of the jacket (see Figure 51Figure 51: Location of the bottom plug). This will cause the oil to run out. Remember to have a bucket or other container ready to collect the old oil!

Once the oil has been drained from the cooling jacket, re-wrap the bottom plug with Teflon tape (PTFE tape) or similar that can handle hydraulic oil and screw it back into the bottom of the cooling jacket.

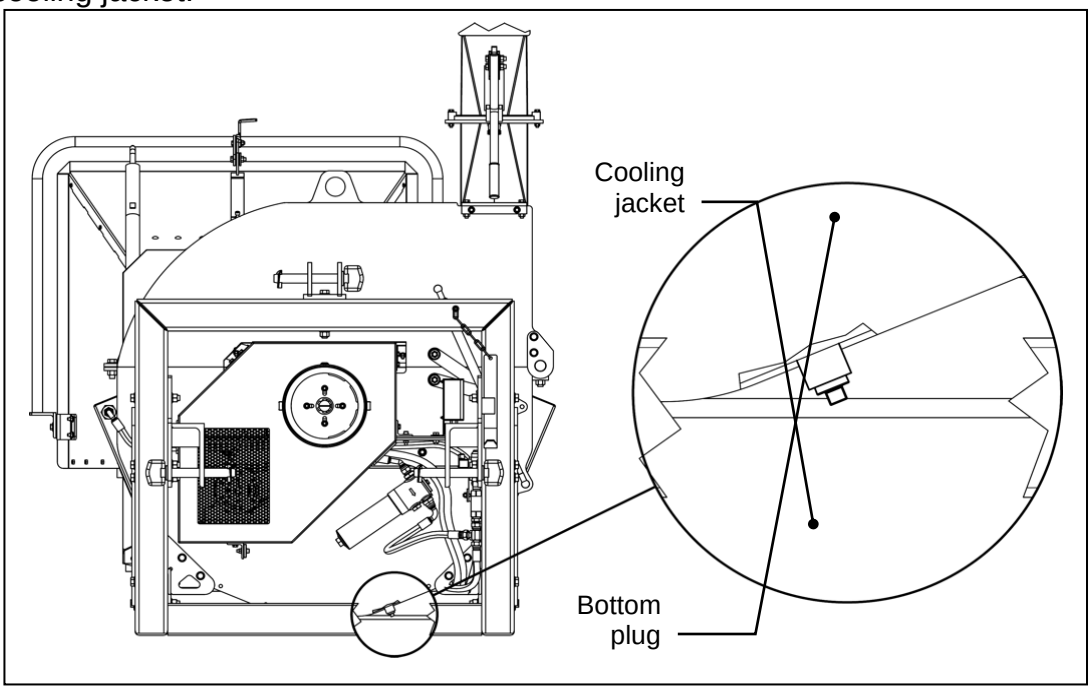


Figure 51: Location of the bottom plug

6.20 Changing oil filters (PC-2700-PIH only)

To ensure oil quality, two oil filters are fitted in the machine.

A suction filter is placed at the bottom of the hydraulic tank, which ensures that no large impurities are sucked from the tank into the hydraulic system. There is a pressure filter that filters the smaller impurities from the oil before it is pumped to the motors.

If too many impurities from the oil are collected in the filters over time, the resistance in the hydraulic system becomes too great and the filters can be replaced.

6.20.1 Changing the suction filter (PC-2700-PIH only)

The suction filter is easiest to change during an oil change when the hydraulic tank has been emptied of oil.

Unscrew the large cover at the top of the hydraulic tank by unscrewing the 6 small screws. You can then reach into the hole and unscrew the filter from the suction nozzle. A new filter is placed in place of the old filter and screwed on. See Figure 52. The cover at the top of the hydraulic tank can then be screwed back on, remembering to pack the flange with, for example, a suitable liquid gasket.

Contact your dealer to find a suitable new suction filter.

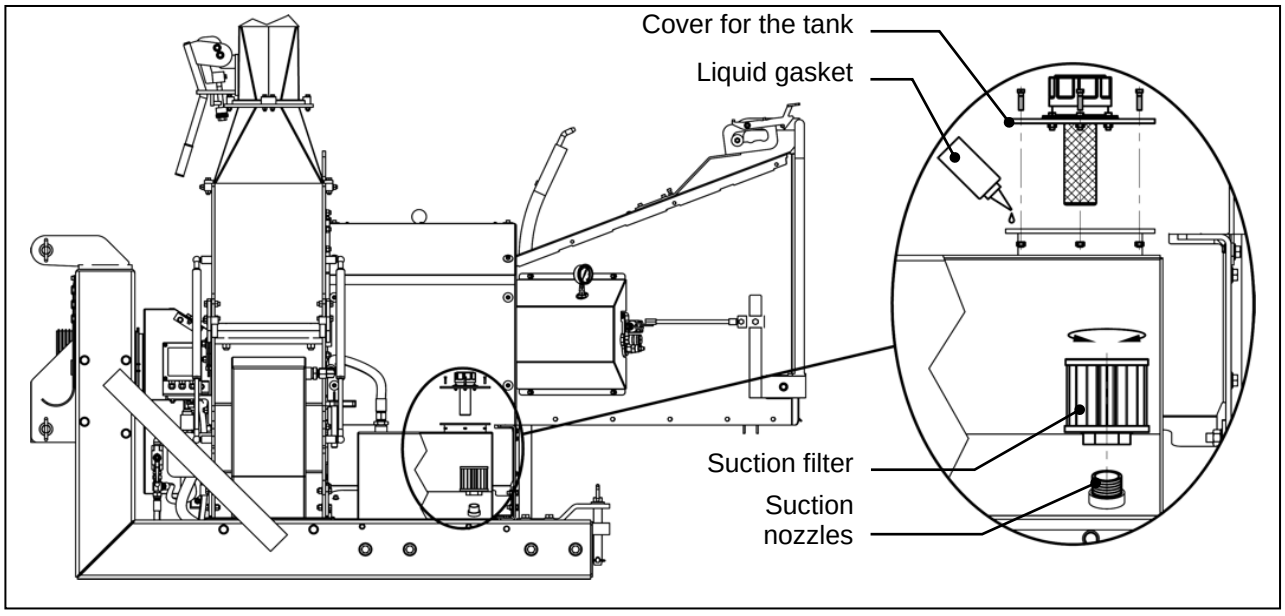


Figure 52: Changing the suction filter

6.20.2 Changing the pressure filter (PC-2700-PIH only)

The pressure filter has a replaceable filter cartridge, so there is no need to replace the entire filter unit.

With a bucket or similar ready to collect any hydraulic oil, unscrew the bottom of the filter (see Figure 53) and pull out the filter element. Insert a new filter element and screw the bottom of the filter back on.

Contact your dealer to find a suitable new filter element.

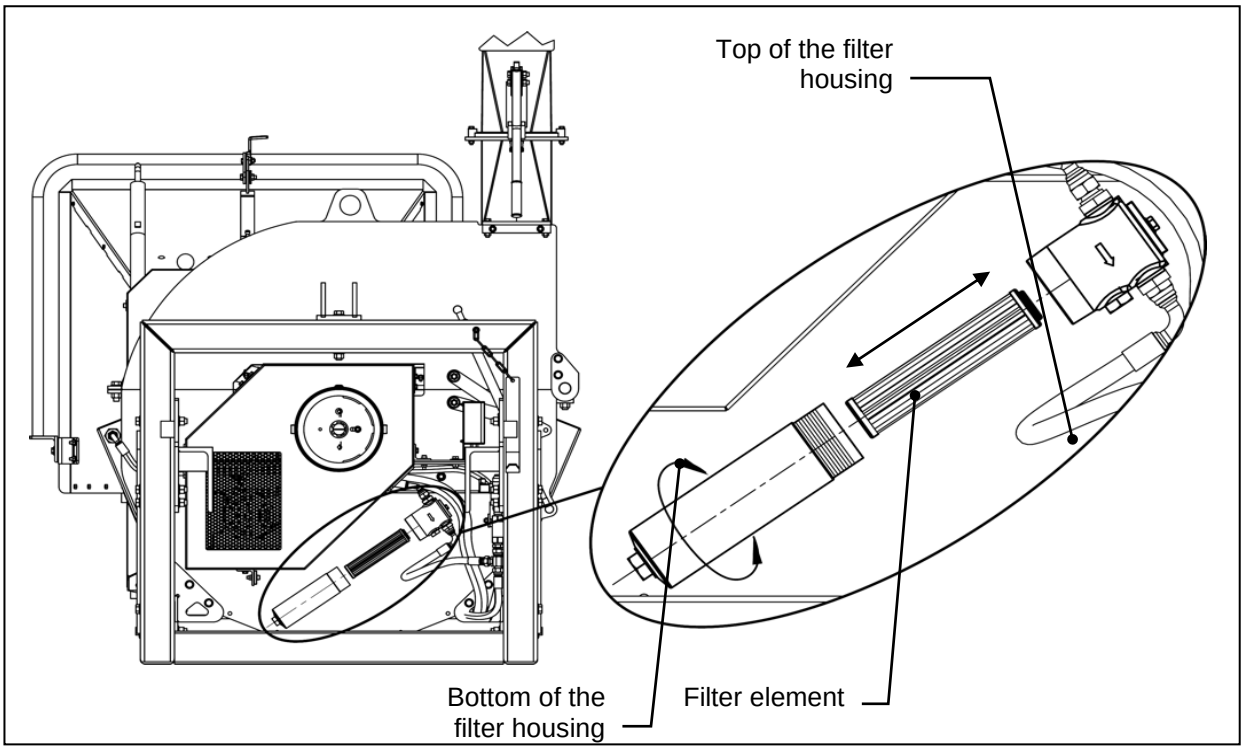


Figure 53: Changing the filter element in a pressure filter

6.21 Filling hydraulic oil (PC-2700-PIH only)

The oil is filled through the cover in the hydraulic tank. The filling sieve under the cover must remain in place during refuelling to collect any impurities and to avoid accidentally dropping anything into the tank.

The hydraulic system can hold approximately 35 - 40 litres.

It is recommended to use an HV32 oil under normal operating conditions.

When adding oil to an empty hydraulic system, fill the hydraulic tank first. Then ensure that all guards are fitted to the chipper and that the top of the rotor housing is bolted correctly to the bottom of the rotor housing. Once this is done, the rotor is set in motion with just a few revolutions. This will cause the hydraulic pump to start pumping oil into the hydraulic system, filling the cooling jacket, hoses, etc. To prevent the pump from running empty, i.e. without oil, it is necessary to top up the oil in the tank as the oil disappears into the rest of the system.

When the oil is constantly up to the bottom of the filler sieve, do not add any more oil! Oil has a high coefficient of expansion and will therefore fill up more as it heats up. Therefore, there must be room in the hydraulic tank for this to happen.

6.22 Adjusting the control handle mechanism

To ensure that the feed roller(s) have the correct functions in relation to the position of the control handle and if all three positions (1. stop, 2. feed, 3. reverse) are not working, it may be necessary to adjust the control handle mechanism.

The control handle works correctly when the direction of rotation of the feed roller(s) corresponds to those shown on Figure 3**and** if **all** 3 positions work!

If all three positions can be set in the control handle, but positions 2 and 3 (feed and reverse) are reversed compared to what is shown on Figure 3, the hydraulic hoses are probably not mounted correctly. See 6.14.1 (PC-2700-PIH with tractor hydraulics) or 6.14.2 (PC-2700-PIH with internal hydraulics) for a description of how the hydraulic hoses **should** be fitted.

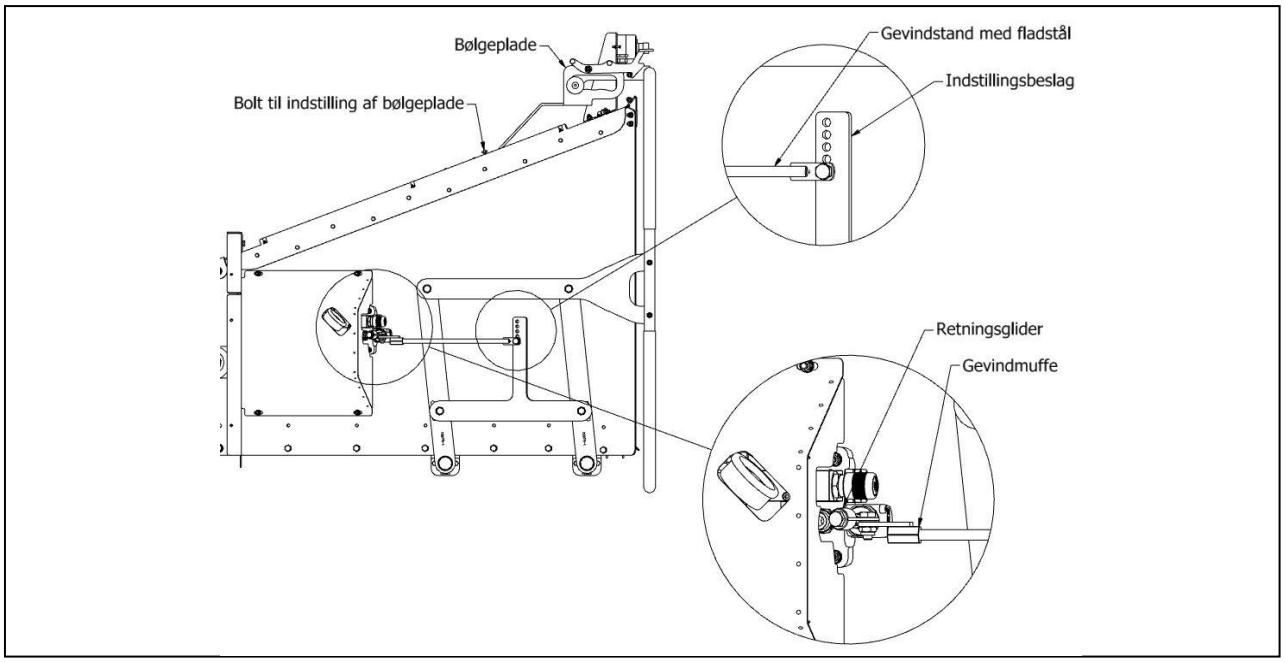


Figure 54: Overview of the control mechanism

If the function of the feed roller(s) does not correspond to the position of the control handle, it may be necessary to adapt the control handle mechanism to the travel of the directional slider.

When adjusting the control handle mechanism, it is important to be careful not to damage the directional slider on the non-return valve.

When adjusting the control handle mechanism, the control handle mechanism must first be checked:

6.22.1 Checking the control handle mechanism

1. Move the control handle to position 1 (see Figure 3). Then unscrew the "loose" M10 bolt with the locknut completely from the piece of flat steel with a hole welded to the threaded rod, releasing the threaded rod from the vertically adjustable part.
2. You should now check whether it is necessary to adjust the control handle mechanism. This is done in the following way:
    a) Set the control handle position 1 and also set the directional slider to position 1 (see Figure 55 at the top).
    b) Check if the hole in the piece of flat steel welded to the threaded rod matches the hole in the vertically adjustable part.
    c) Set the control handle to position 2 and also set the directional slider to position 2.
    d) Also check that the two holes fit opposite each other.
    e) Set the control handle to position 3 and also set the directional slider to position 3.
    f) Check again if the two holes fit opposite each other.
3. If it is found during the check in point 2 that the holes are differently offset from each other, the travel of the control handle mechanism must be changed. See section 6.22.2.
4. If, during the check in point 2, it is found that the holes are offset from each other, the directional slider must be adjusted to the "notches" in the corrugated sheet. See section 6.22.3.
5. If the check in step 2 shows that the holes at each position fit exactly opposite each other, the control handle mechanism is correctly adjusted and the "loose" M10 bolt can be screwed back on by tightening the locknut so much that the bolt can still move in the hole.

Also see Figure 55 for the different issues.

Note: If you try the control handle with the loose M10 bolt attached, it is important **not** to force if the control handle meets resistance. If too much force is used and the control handle mechanism is not yet correctly adjusted, there is a risk of damaging the directional slider on the non-return valve block (see Figure 6).

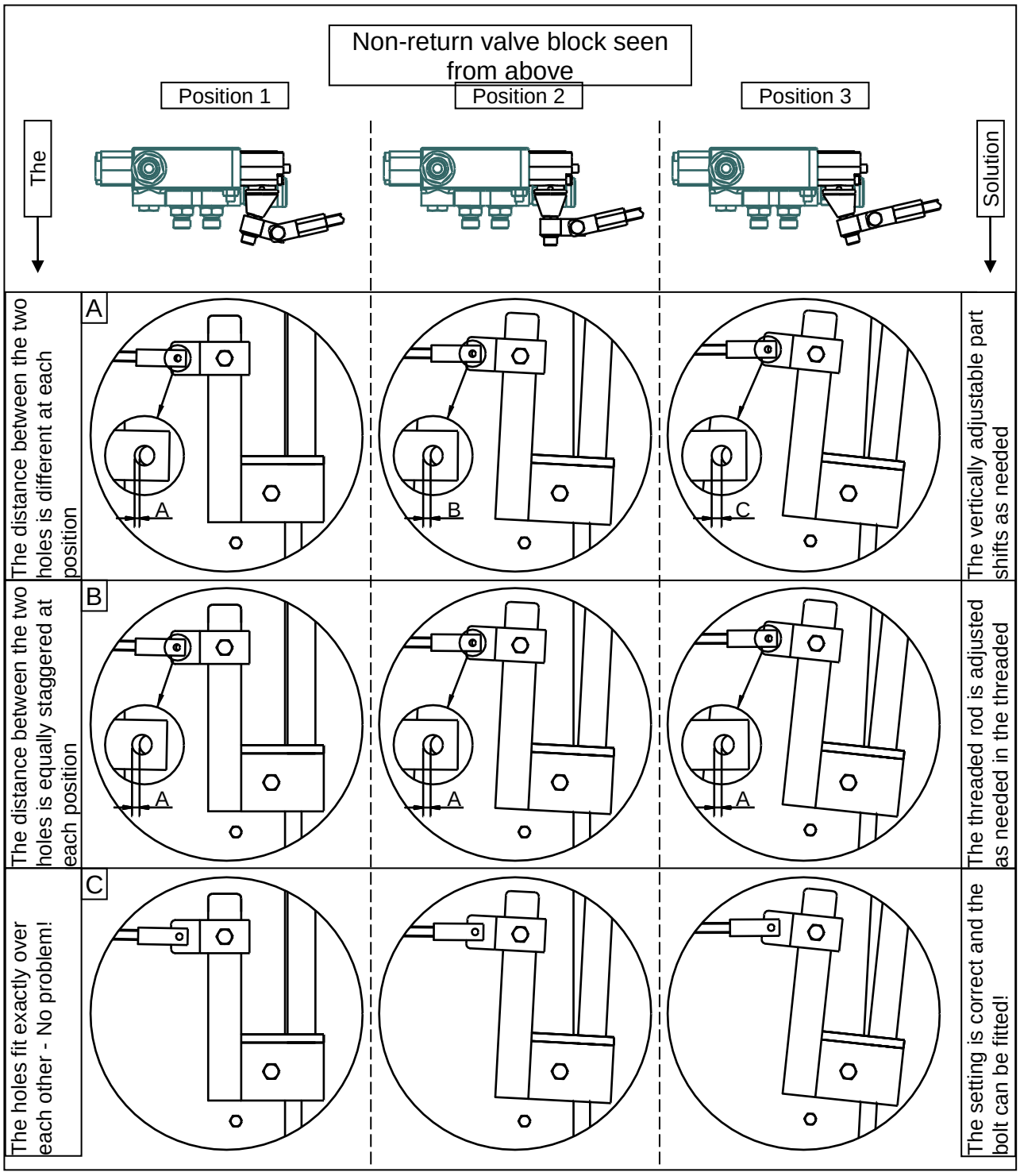


Figure 55: Adjusting the control handle mechanism

6.22.2 Changing the travel of the control handle mechanism

If the travel of the control handle mechanism is not suitable, do the following (see Figure 54 for the location of the parts):

1. Move the threaded rod to one of the other holes on the adjustment bracket.
2. Tighten the "loose" M10 bolt so that it can only turn slightly.
3. Test the travel as in section 6.22.1 point 2. a) - f). If the travel is not correct, start at point a) again.
4. When the travel is correct, everything is reassembled. The bolt and nut must **not** be tightened so tightly that the threaded rod is clamped together with the vertically adjustable part. In other words, the two parts must be able to work as a hinge.

6.22.3 Adjusting directional slider travel to "notch" on corrugated sheet

If the travel on the control handle is OK but the three positions of the valve do not match the three "notches" on the corrugated sheet, the threaded rod must be adjusted in length. This is done by the following procedure:

1. Turn the threaded rod in the threaded sleeve until it has a length that makes the "notches" on the corrugated sheet match the three positions on the valve. The easiest way to do this is to turn the threaded rod, e.g. 1 turn in the desired direction of rotation and fit the "loose" M10 bolt and check whether the valve travel and the "notches" match, see the procedure in section 6.22.1 point 2. a)-f).
2. Once the length is correct, reassemble it and put the locknut back on and tighten it just enough so that the bolt can still move in the hole. The bolt and nut must **not** be tightened so tightly that the threaded rod is clamped together with the vertically adjustable part. In other words, the two parts must be able to work as a hinge.

6.23 Fitting the spout

When fitting the spout, it's an advantage to have two people.

Lift the spout onto the chipper and place it over the hole in the top of the chipper (see Figure 56). Insert the 4 bolts into the holes and tighten with locknuts.

It is recommended to retighten the 4 bolts after a period of operation to ensure they are properly tightened.

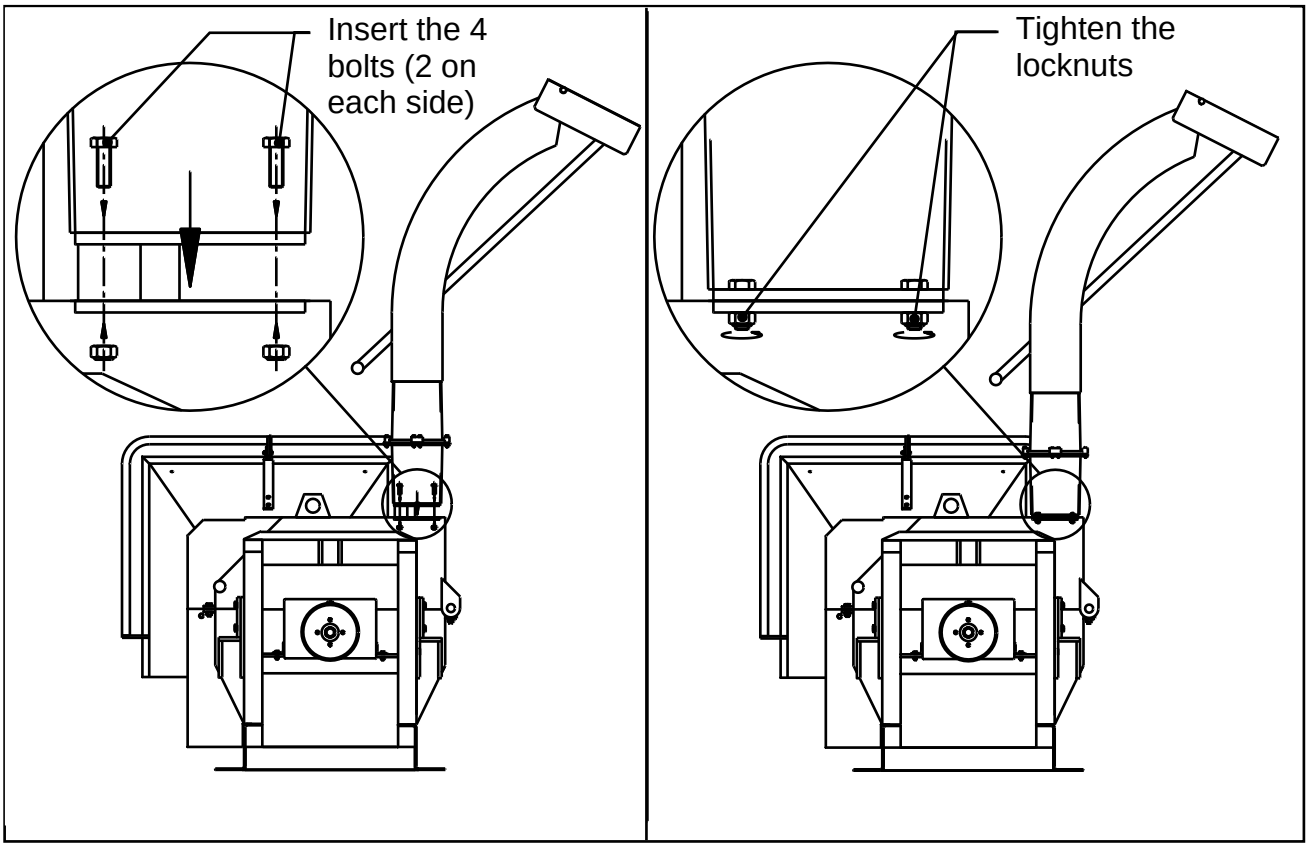


Figure 56: Fitting the spout

6.24 Changing feed rollers

It is usually not necessary to remove the feed rollers in the chipper. If a feed roller has been damaged or needs to be replaced for other reasons, contact your dealer/manufacturer, who will be able to help you find a solution.

6.25 NordLock washers

NordLock washers are special washers designed for use in places where extra safety is needed to prevent bolts and nuts from rattling loose, for example, when fitting the blades on the rotor.

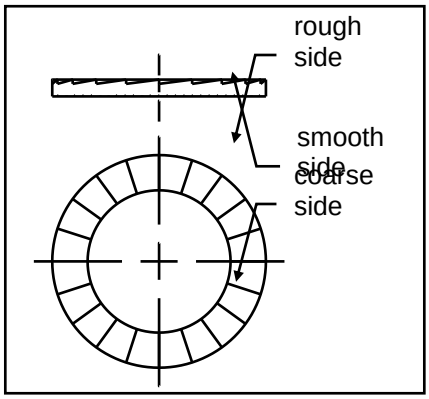


Figure 57: NordLock washer

NordLock washers must **always** be fitted in **pairs** with the rough surfaces (see Figure 57) facing each other to function properly (see Figure 58 for an example). If the bolt has a hexagonal or cylindrical head, NordLock washers **must also be** fitted **between the head and the item** being tightened.

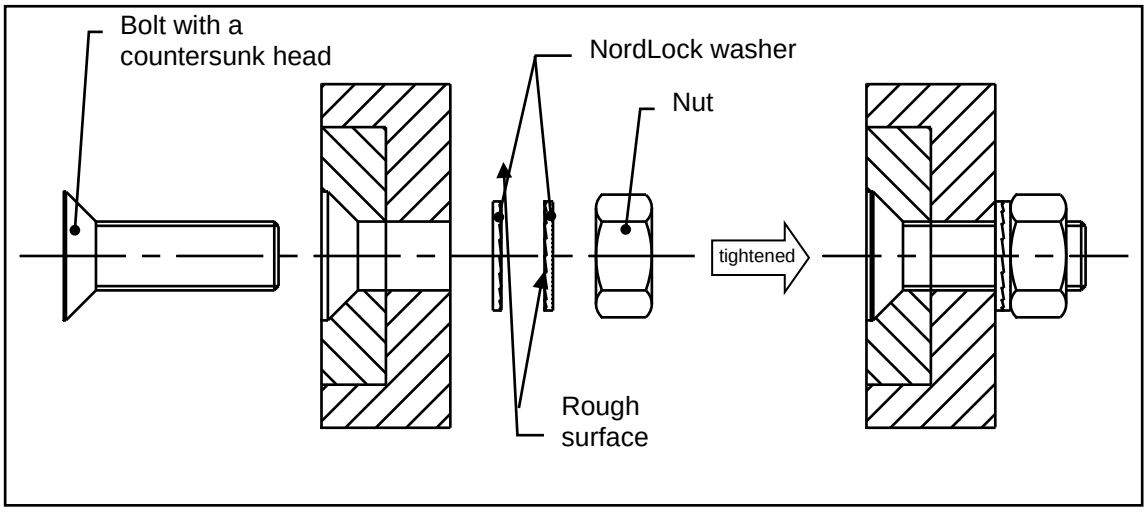


Figure 58: Example of the correct way to fit NordLock washers

When tightening the bolt or nut, make sure the NordLock washers are centred over each other to ensure they work properly.

Note: If the NordLock washers are tightened against a bolt or nut up to grade 8.8, the washers can be reused up to 5 times. If the grade of the bolt or nut is 10.9 or higher, the washers must be changed **every time** the bolt or nut is removed!

The bolt grade is on the bolt head or on the nut.

6.26 Shoulder for the PTO axle

To avoid damaging the PTO axle, it should be placed in the hook located at one side suspension when the chipper is not in use (see Figure 59).

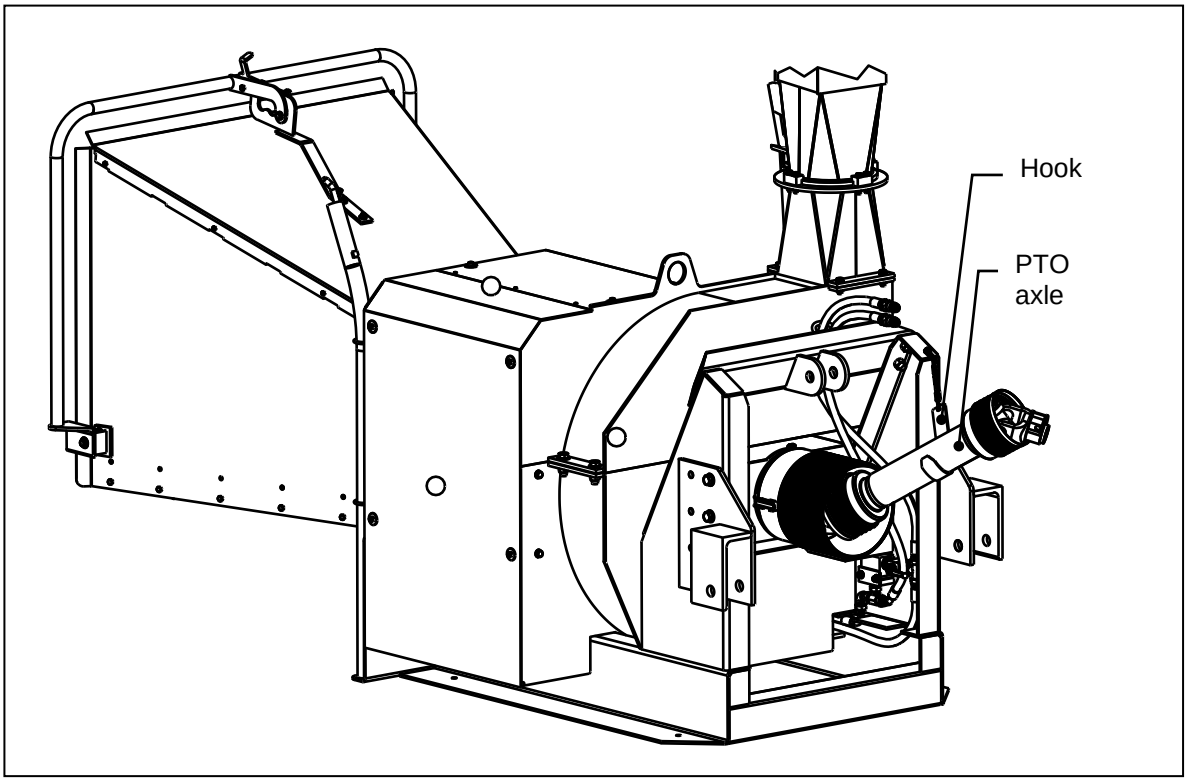


Figure 59: The PTO axle is placed in the hook when the machine is not in use

6.27 PTO axle maintenance

To ensure a the PTO axle has a long operational life, it must be properly maintained. Read the manual that came with the PTO axle to see how to do this.

6.28 Single-line diagram

Should there be any problems with the chipper's electrical system, the single-line diagram can be used to get an overview of how it is built.

If you experience problems with the electrical system, it is recommended that you contact your dealer, manufacturer or other professionals specialised in electrical diagrams to diagnose the fault and have it rectified.

Warning: **Do not** modify the circuit in relation to the single-line diagrams as this can have fatal consequences for the safety of the machine.

Warning: Do not work on the electrical system until the power plug and the machine's PTO axle have been disconnected from the tractor.

6.28.1 Activation box single-line diagram

On Figure 60 you can see the single-line diagram of the activation box.

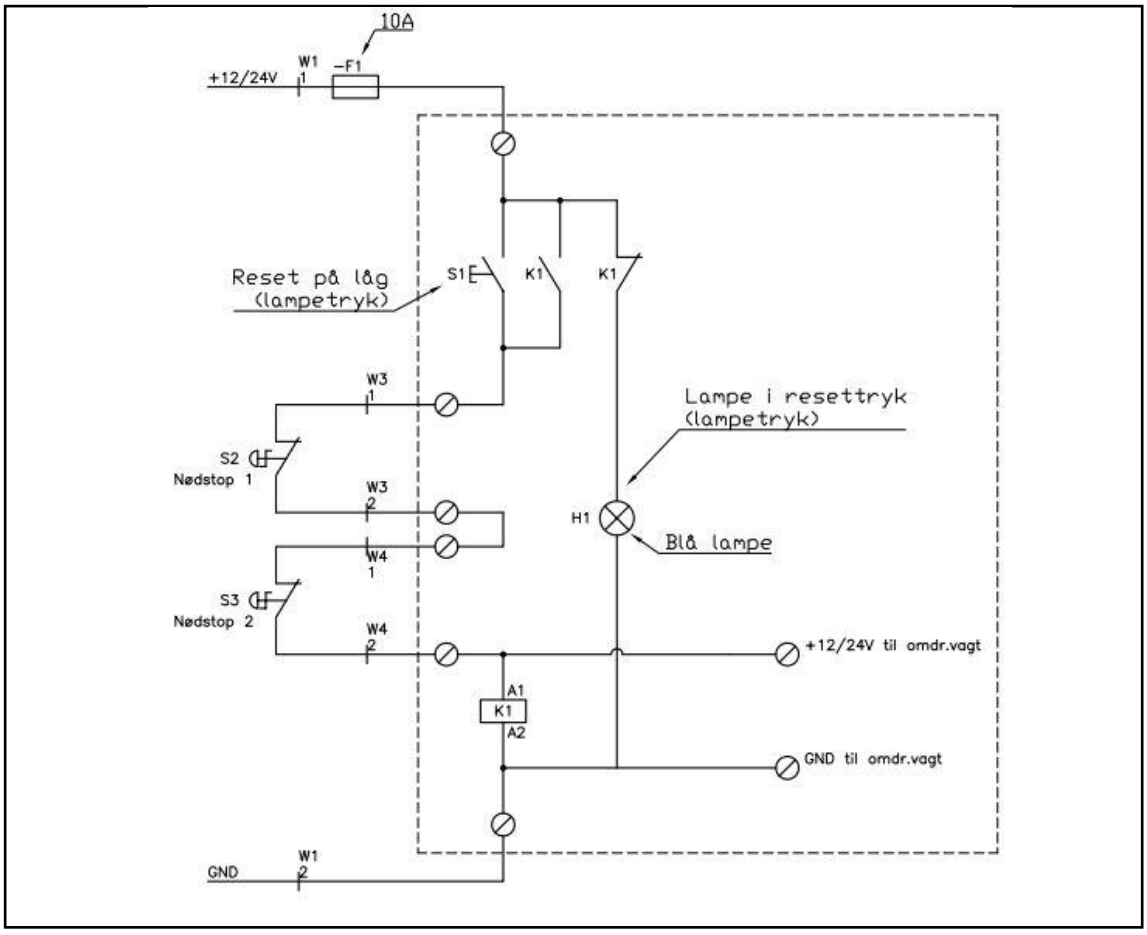


Figure 60 shows the single-line diagram of the activation box

7 Stress system

The stress system constantly measures the rotor rotation speed, and if it falls below a predetermined number, it's a sign that the tractor is running out of power and can no longer keep up. The stress system therefore stops the feed rollers to give the tractor time to get the rotor back up to speed, after which the feed rollers start again. It all happens automatically.

7.1 The stress system's default setting

On delivery, the stress system is set to **start** the feed rollers when the rotor speed exceeds 950 rpm, and stop the feed rollers when the rotor speed falls below 750 rpm.

Of course, this does not apply if it has been agreed that the stress system will be delivered with a different setting.

7.2 Overall operation

The Fransgård PC-Chipper allows for rotation monitoring of the rotor and infeed rollers, as well as alarm signalling when both low and high limit values are exceeded.

If used according to the guidelines in this manual, the monitor will be a useful and reliable tool for many years to come.

7.2.1 Different features and displays

The following features are included in the computer:

	Programmable tachometer (revolutions per minute). Used with a rotor speed sensor.
	Programmable tachometer with a visual alarm (revolutions per minute). Use with a roller speed sensor.
	Working hours (hours/minutes)
	Total working hours (hours/minutes)
Type	Selecting the machine type

The features are further elaborated on in the following Chapter 2.

7.2.2 Overview of the monitor

Marker
Display marker (vertical or horizontal) on the left side of the display indicates which function is currently shown in the display.

Display

Control buttons
Switch between display views. Initiate changes to the marked value. Programming in new numerical values and resetting.

Display views
Shows the possible features (values) that can be shown in the display.

Plug
Input for included sensors and possible outputs.

7.2.3 Explanation of the control buttons

↓↓-Button

Press the ↓↓ button to switch between the different displays (indicated in the pane to the left of the end of the display) and thus between the different features of the monitor. Each time the button is pressed, the position of the cursor/display changes by one step. The cursor starts in the top left corner and then moves "downwards".

The button is also used to exit the change menu (see the next section).

SET-Button

The SET button is used for programming (changing/deleting) values in the computer, e.g. entering alarm values for high and low revs.

Use the ↓↓ button to navigate to the feature/display that you want to change or program. Then press and hold the SET button for approx. 1 second until the number flashes. Press C 0 9 to change or delete the first digit of the value to be programmed. Pressing the SET button moves the cursor to the next digit in the value and so on until all digits have been

changed/programmed. Finally, press the button to exit the programming menu and save the programmed value in the memory.

-Button

Use the button to change or delete the values that are to be programmed (and which were first made to flash using the button).

Also see the examples below.

7.3 Review of features

7.3.1 Specification of features and limit values

Symbol:	Description:	Limit value:
	Stress system rotor	1 - 9999 rpm. (in practice, not below 12 rpm)
	Stress system rollers with visual alarm (not available)	1 - 9999 rpm. (in practice, not below 12 rpm)
	Working hours	0:0 - 99:59 hours:minutes 9999 full hours
+	Total working hours	0:0 - 99:59 hours:minutes 9999 full hours
Type	Selecting the machine type	1 – 18

The computer has an internal memory that saves all values when power is interrupted.

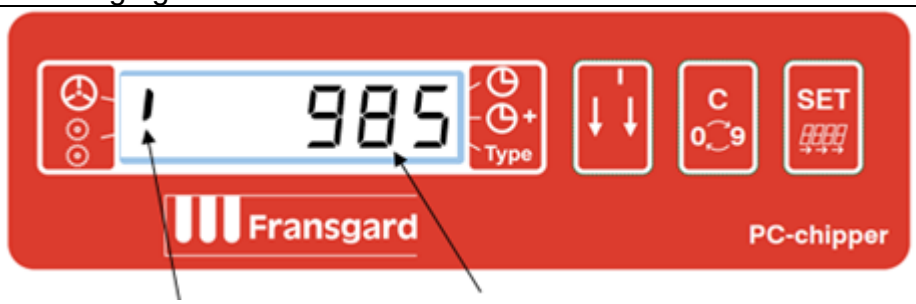
7.3.2 Stress system for the rotor and infeed rollers[1] (rpm)

The alarm features of the tachometers are programmable, i.e. it is possible to enter/change the alarm limit values. Both upper and lower limit values are included. Alarms are only given on the infeed rollers. If the rotation speed of the infeed rollers exceeds the entered upper limit value, the display flashes alternately between '0' and '9999'.

7.3.3 Display of the current rotation speed

[1] Rpm of the infeed rollers is not available

In this display view, the top vertical cursor (the rotor) is highlighted, as shown in the following figure.



Display marker at the rotor

Display of current rotor RPM

7.3.4 Programming access

To gain access to change values, you need to know a password.

Display feature that requires a password.
Blade RPM
RPM roller
Machine type

7.3.5 Password

1221

7.3.6 Programming alarm limit values

The tachometer is programmable. This makes it possible to instruct the computer to switch off the valve of the infeed rollers if the rotation speed falls below the entered lower limit value 'L' or exceeds the entered upper limit value 'h'.

7.3.7 Programming of limit values and low/high rotation speed.

Example of programming limit values on the rotor. Change low value to 850 rpm and high value to 1000 rpm.

Example of changing the low limit value to 850 Rpm and the high limit value to 1000 Rpm		
Press the button:	**The display shows:**	**Explanation:**
↓↓	0	Find the stress system for the rotor by repeatedly pressing the button

	c 0 0 0 0	Enter the password as follows:
SET	c x _ _ _	Hold the button for 1 second until "c" lights up on the left and the first digit (out of 4) flashes.
C	c x _ _	Press the button until the digit has the correct value.
SET		Press to set/change the next digit (the second digit will now flash)
↓↓	c xxxx	Press the "arrow" button to continue.
		When the password is entered correctly, the following will appear:
C	L x _ _ _	Press the button until the digit has the correct value. Note that zero (0) cannot be written in this location.
SET	L x _ _	Press to set/change the next digit (the second digit will now flash)
C	L 800	Press the button until the desired digit is correct.
SET	L 800	Press to set/change the next digit (the third digit will now flash)
C	L 850	Press the button until the desired digit is correct.
SET	L 850	Press to set/change the last digit.
C	L 850	Press the button until the desired digit is correct.
↓↓	h x000	Press the "arrow" key and "h" (high) will light up on the left and the first digit (out of four) will flash.
C	h 1000	Press the button until the desired digit is correct.
SET	h 1000	Tap to set/change the next digit (the second digit will now flash).
C	h 1000	Press the button until the desired digit is correct.
SET	h 1000	Press to set/change the next digit (the third digit will now flash).
C	h 1000	Press the button until the desired digit is correct.
SET	h 1000	Press to set/change the last digit.
C	h 1000	Press the button until the desired digit is correct.
↓↓		Exit the programming menu. Or if the Pulse factor and max/High needs to be changed see Section 2.2.4

Below is an illustration of the change menus for the low and high limit value.

Display marker
at the rotor

Change low alarm limit 'L' to 850

Change engagement value 'h' to
1000 rpm. on the rotor

If the alarm limit values on the rotor are exceeded, the current rotation speed continues to be displayed while the infeed rollers stop. If the rotor has been below the lower limit value, the infeed rollers will start up again when the rotor speed is above the entered upper limit value 'h' (e.g. 1000 rpm).

7.3.8 Programming values for the Pulse factor and max/High 'H' rotation speed.

Example of programming the number of pulses per revolution - factor 'F' - on the rotor (the same principle applies to the infeed rollers) to a value of 3, and the max/high value 'H' on the rotor to a value of 1100 rpm.

Press the button:	The display shows:	Explanation:
	h 1000	Continue after entering h XXXX
SET	c 0 0 0 0	Hold the button for 1 second until the digit "c" flashes. Enter the password as follows:
C	c x _ _ _	Press the button until the digit has the correct value.
SET	c x _ _	Press to set/change the next digit (the second digit will now flash)
SET	c x _ _	Press to set/change the next digit (the second digit will now flash)
		Enter your password

↓↓	c xxxx	Press the "arrow" button to continue.
SET	F x.00	The display shows "F" flashing.
C 0 9	F x0.00	Press the button until the digit has the correct value. Note that zero (0) cannot be written in this location.
SET	F x.00	Press to set the next digit
C 0 9	F 3.00	Press the button until the desired digit is correct.
SET	F 3.00	Press to set the next digit.
C 0 9	F 3.00	Press the button until the desired digit is correct.
SET	F 3.00	Press to set the last digit.
C 0 9	F 3.00	Press the button until the desired digit is correct.
↓↓	H x000	Press the "arrow" key and the digit 'H' will flash.
C 0 9	H 1000	Press the button until the desired digit is correct.
SET	H 1000	Press to set the next digit.
C 0 9	H 1100	Press the button until the desired digit is correct.
SET	H 1100	Press to set the next digit.
C 0 9	H 1100	Press the button until the desired digit is correct.
SET	H 1100	Press to set the last digit.
C 0 9	H 1100	Press the button until the desired digit is correct.
↓↓	0	Exit the programming.

Note: max/High value 'H' can only be set for the rotor.

7.4 Work path on the machine

7.4.1 Displaying the rotation time on the machine

In this display, the top horizontal cursor on the right-hand side is activated. The total rotation time will be shown as illustrated in the following figure.

Operating time in hours and minutes

Display marker at the rotation time

- Above 99:59 hours/minutes, only full hours are displayed

7.4.2 Reset the rotation time on the machine

Resetting the rotation time (operating time) of the machine can be done at any time. First press the ↓↓ button until the working time display appears. The following entries are then made:

Press the button:	The display shows:	Explanation:
↓↓	72:57 (example)	Find job hours by repeatedly pressing the button.
SET	72:57	Press and hold the button for 5 seconds until the number flashes.
↓↓	00:00	Press the button to reset the rotation time.

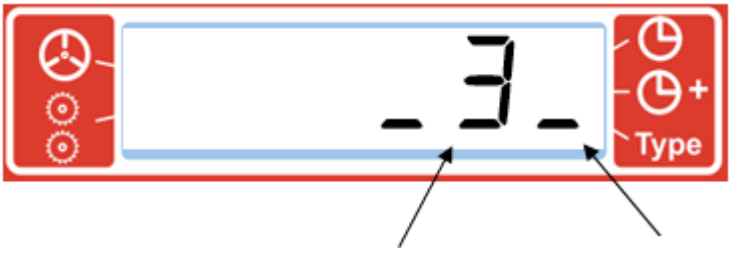
Note: The total hour counter (centre horizontal marker on the right side) cannot be reset. It is used to record the total working time of the machine.

7.5 Programming machine type presets.

Example of changing machine type 3 to machine type 12.

Press the button:	The display shows:	Explanation:
↓↓	_3	Find the machine type by repeatedly pressing the button.
SET	c 0 0 0 0	Hold the button for 1 second until the digit "c" flashes. Enter the password as follows:
C	c x _ _ _	Press the button until the digit has the correct value.
SET	c x _ _	Press to set/change the next digit (the second digit will now flash)
↓↓	c xxxx	Press the "arrow" button to continue.
SET	x3	Hold the button for 1 second until the line flashes.
C 0 9	13	Press the button until the digit has the correct value. Note that zero (0) cannot be written in this location.
SET	13	Press to set the next digit
C 0 9	12	Press the button until the desired digit is correct
↓↓	12	Exit the programming.

Note: When selecting an obsolete machine type, machine type 0 is automatically selected!



Machine type selection display 1 - 18

Display marker for machine type.

7.5.1 Setup table for included machine types.

Model	L Stop value Rotor	h Switch-on value Rotor	H Upper stop value Rotor	Pulses/rpm rotor	Pulses/rmp... roller	Roller flashes. Alarm for roller rpm too high	Machine setup
1	750	910	1100	1	6	31	1
2	800	910	1100	1	6	31	2
3	670	910	1100	1	6	31	3
4	400	500	600	1	6	28	4

7.6 Mounting

7.6.1 Mounting the computer

A plastic rail is supplied with the computer that fits the cut-out at the back of the computer housing. The rail also attaches to rubber mounts on the machine so that the computer avoids the worst shocks and at the same time sits comfortably for the user.

Connect the sensors to the junction box as indicated in the installation diagram (see the later section). The cables are installed in such a way that they are protected against mechanical damage and that they are not exposed to tension (breakage) when the machine is rotating or the hydraulics are operated.

7.6.2 Fitting sensors for rotation measurement

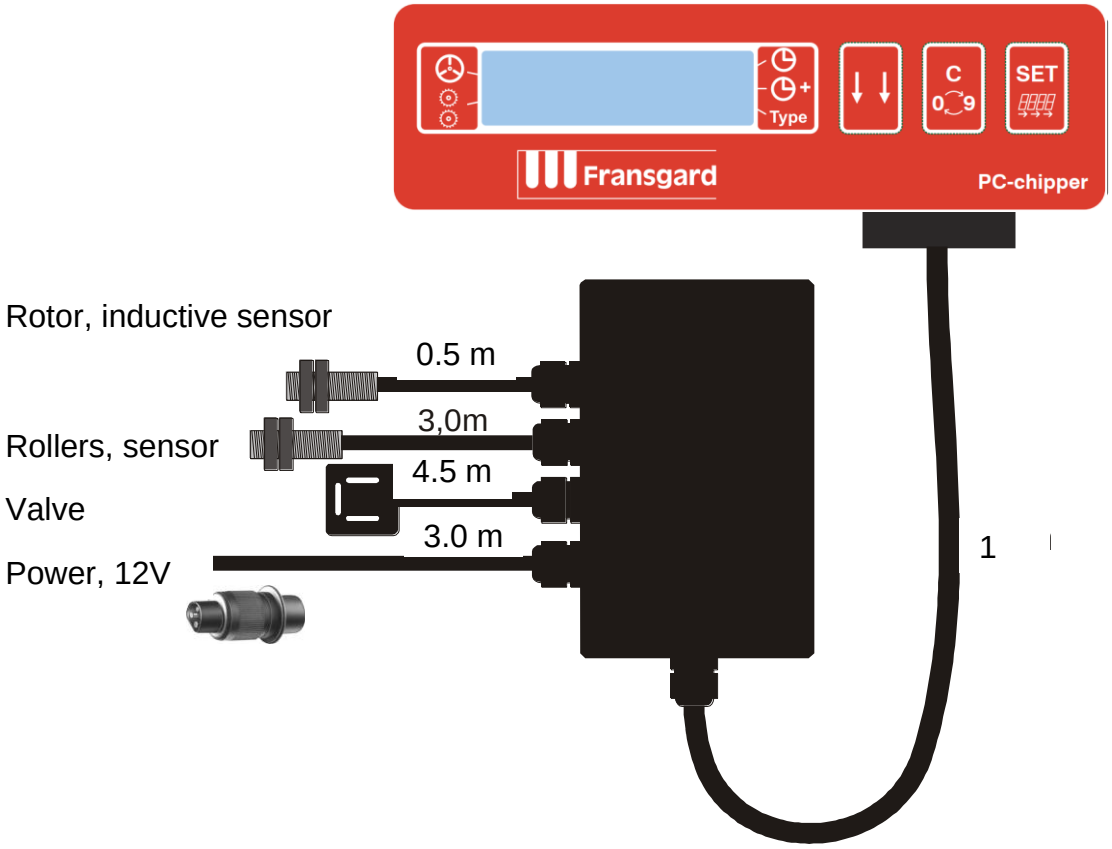
The inductive sensor is positioned so that the rotor's sidepieces/spokes pass the switch's terminal surface at a distance of 2 - 6 mm when rotating.

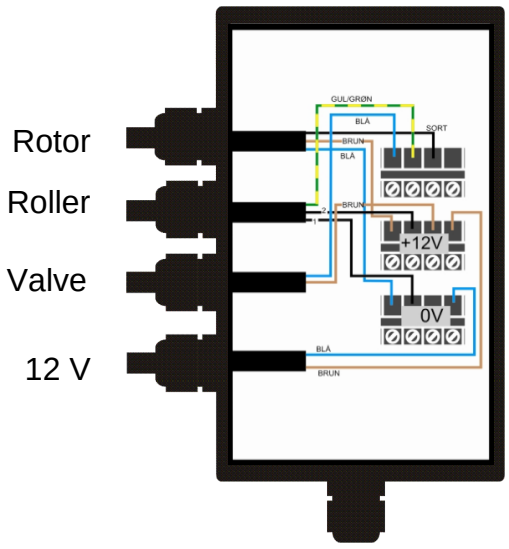
The magnetic ring with 6 magnets is mounted on the axle at the infeed rollers. The Hall sensor is positioned so that the magnets in the magnetic ring rotate past the switch's terminal surface at a distance of 2-3 mm:

- As the electronic sensors (Hall/inductive) use power, the "+V" for these sensors should preferably be connected across the ignition key so that it does not drain the battery of power when the machine is stopped.

7.7 Mechanical setup and mounting diagram

Installation diagram when using electronic sensors (Hall or inductive sensors):





7.8 Technical data

Display: 6 digits

Power supply: 12 V

Temperature influences: The chipper Monitor is fully operational within -10 - 70^{0}C

Pulse signals from the sensor: Max. 225 pulses/sec.

7.9 Note

The controller/monitor is designed for use in connection with the described feature. Any other use of the controller/monitor may involve significant risk and relieves the controller supplier of any liability.

Please note that Lykketronic A/S is only responsible for the electronic controller/monitor and not for the overall function of the machine, including the safety aspects.

7.10 Important regarding the use of the stress system

Note that the feed rollers only start turning when the rotor is running at the **minimum** *operating speed* when the chipper is started.

This means that when the machine is started, you can only start feeding wood into the machine once you have the rotor running at the minimum *operating speed* (default = 950 rpm).

8 Solenoid valve

The stress system solenoid valve is a device built on the non-return valve and is located on the left side of the feed chute (see Figure 61)

The stress system shuts off the supply of hydraulic oil to the hydraulic motors by opening a solenoid valve (see Figure 61) so that the hydraulic oil flows past the feed rollers, which are bypassed.

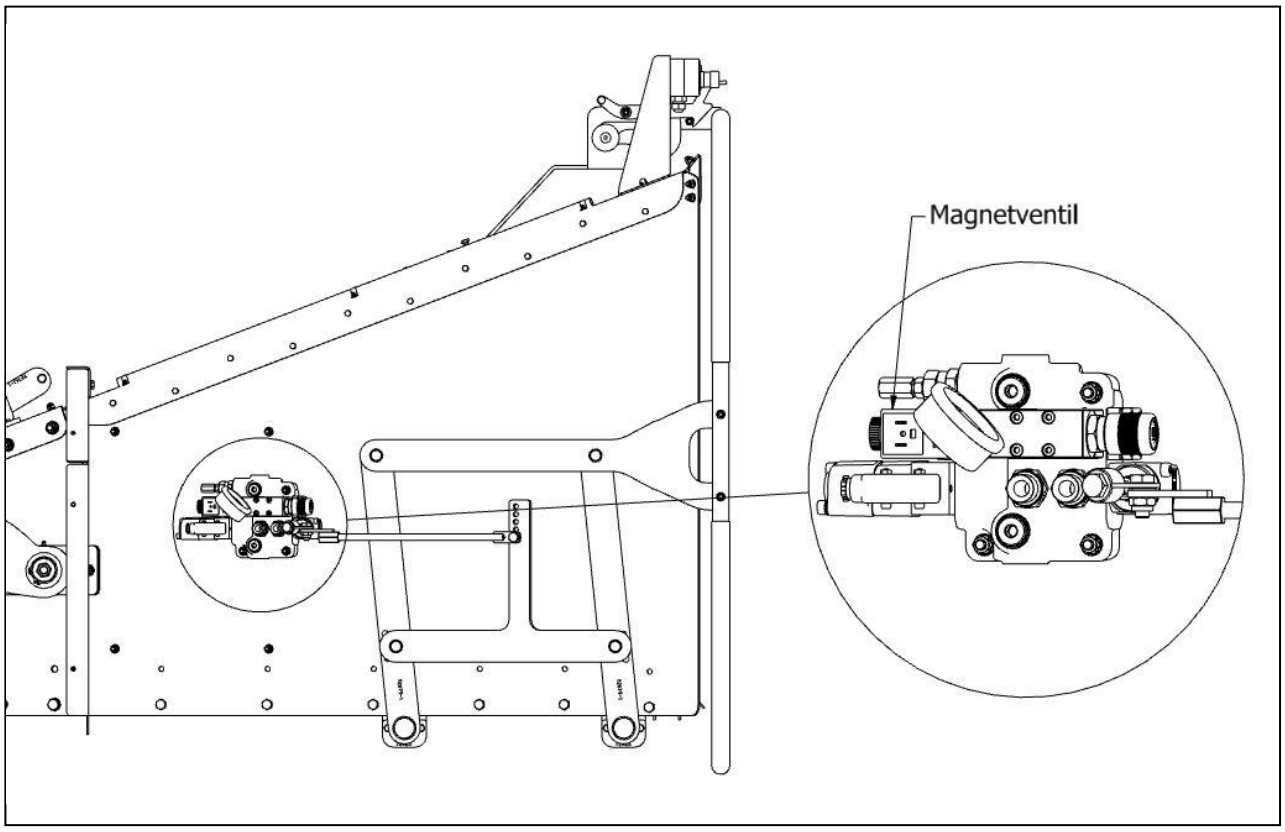


Figure 61: Location of valves for the stress system

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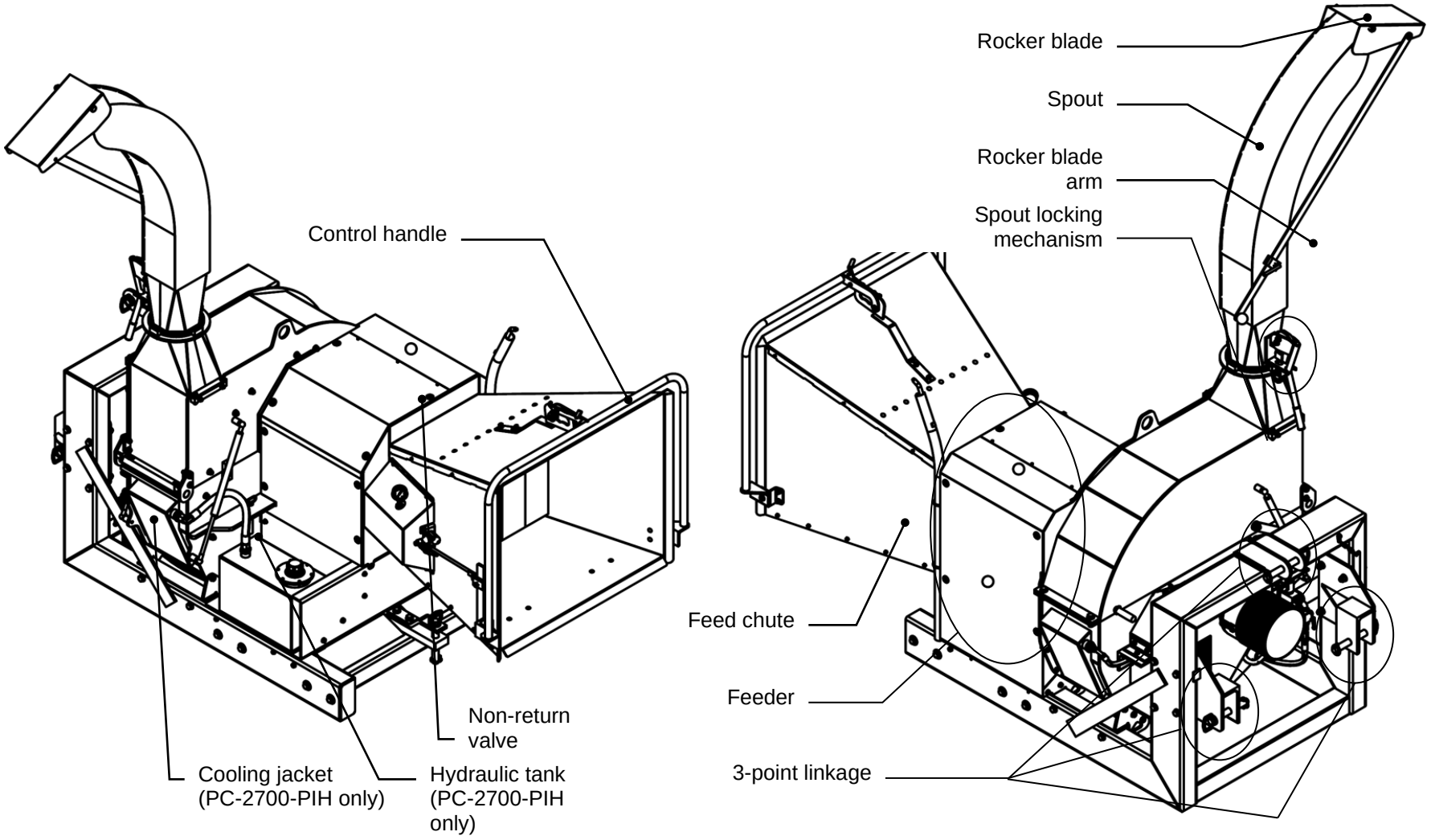
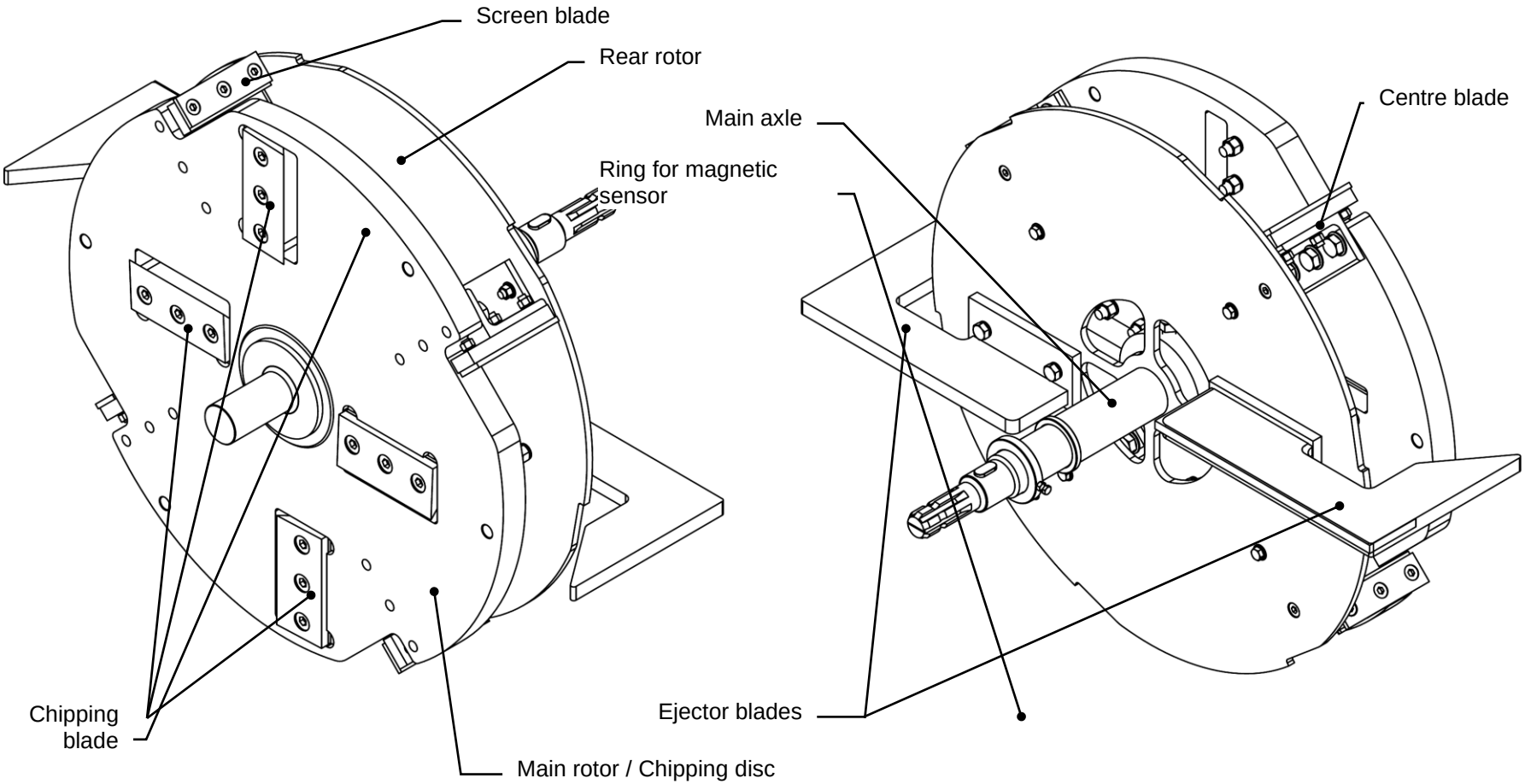
9 Chipper overview

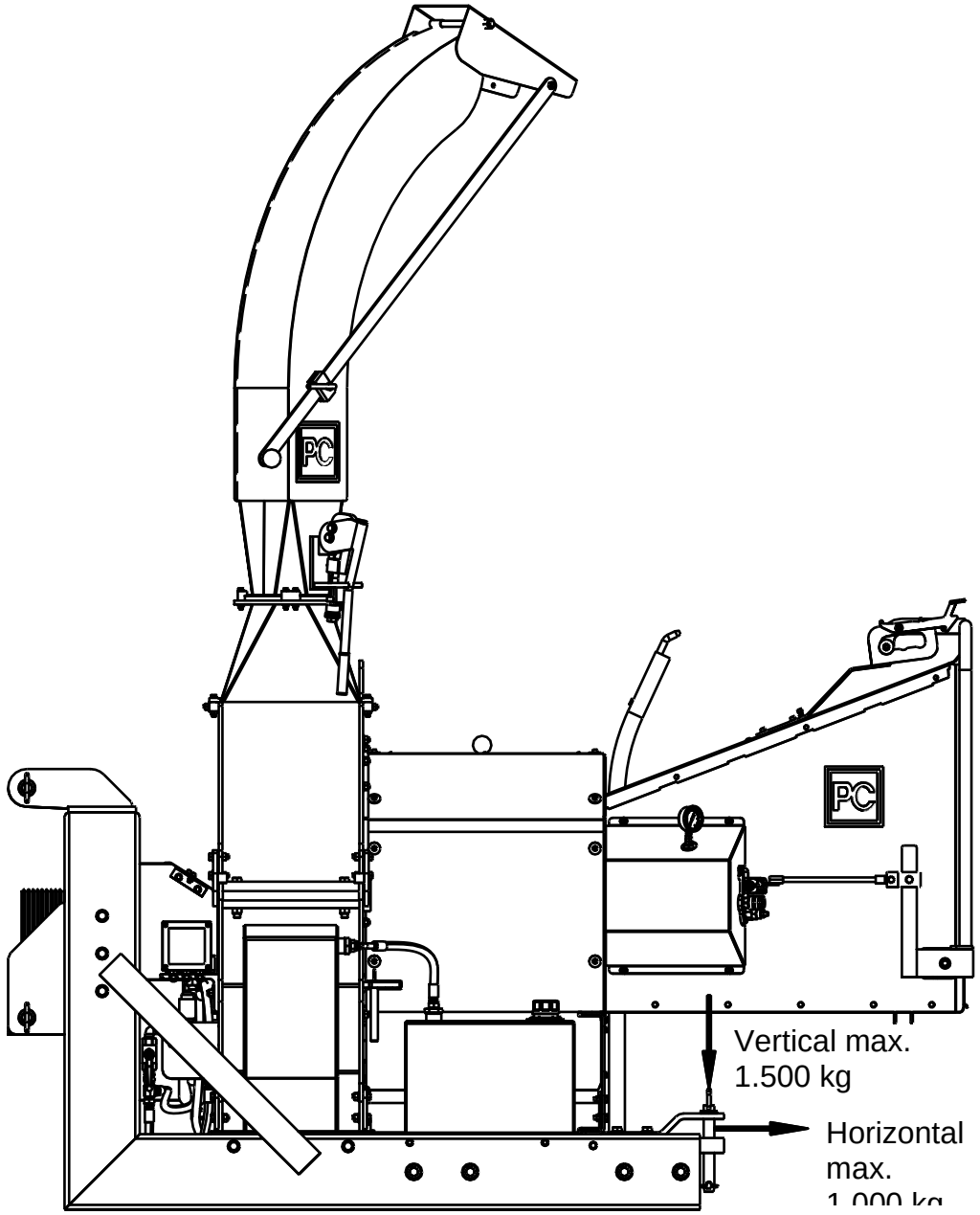


10 Rotor overview



11 Vehicle load

The maximum load for the trailer is 1,500 kg vertically and 1,000 kg horizontally.



12 Troubleshooting

12.1 The rollers won't turn round

If you experience problems with the feed rollers, try troubleshooting using the points in this section. If this does not solve the problem, please contact your dealer/manufacturer for further assistance.

12.1.1 The activation button lights up

Check the emergency stops and then press the activation button as described in sections 5.2 and 5.3

12.1.2 Rollers blocked

Try reversing the roller and see if the blockage loosens.
Stop the chipper, switch off the tractor and check where something is stuck and fix it.

12.1.3 Emergency stop activated

Check if one or more emergency stops are activated.

12.1.4 Rotor speed too slow

The stress system only activates the rollers when the rotor revolutions exceed the selected operating speed (e.g. 900 rpm).
→ Adjust the rotor speed with the tractor's hand throttle.
→ If necessary, adjust the speed monitor**Fejl! Bogmærke er ikke defineret.** to match the number of revolutions you want to drive with.

12.1.5 Rotor speed too fast

The stress system stops the rollers if the revolutions exceed 1,100 rpm. This is a safeguard against overloading.
Reduce the rotor speed to below 1,100 rpm.

12.1.6 Problem with hydraulic supply

Check that the hydraulic hoses are correctly installed as described in section 2.4 and that the hydraulic outlet on the tractor is activated.
Hydraulic flow not turned up. Adjust the flow rate on the flow valve as described in section 4.4.
Check the hydraulic pressure as described in Section 6.17

12.2 No light in the stress system display

If you experience problems, you can try the following options to find and fix the error.

12.2.1 supply failure

Check that the supply cable is plugged into the tractor and that there is voltage on the tractor.
Check the fuses in the tractor.
Check if the connector on the cable that connects the display unit to the junction box is correctly assembled.
Check the supply cable. If necessary, open the lid of the grey junction box of the stress system and check for loose connections.
Check the fuse located inside the connector on the supply cable for the control unit that plugs into the tractor.

12.2.2 Device error

Stress system defective. Contact the supplier/manufacturer for a solution.

12.3 Stress system does not work as intended

Read section 7 for setting the stress system.

12.3.1 The display on the stress system does not show the current number of revolutions

When the machine is running, the LED at the end of the magnetic sensor should flash. During operation, a magnetic bolt will pass the sensor and it will flash. Each flash corresponds to one revolution.
Check if the wires in the junction box are loose.
Check if the distance between sensor and bolt is correct (there should be 2-3 mm distance when the
two parts are next to each other).
Defective sensor. Contact the supplier/manufacturer for a solution.


Fransgård