

# USER MANUAL

## KS45S **PALAX®**

Powered by tractor  
Powered by electric motor



Serial number \_\_\_\_\_

Year of manufacture \_\_\_\_\_

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# 1. Overview

## 1.1. Foreword

This Instruction Manual is intended for a professional operator of the machine. The operator must have usual general knowledge and skills. For example, the buyer of a tractor-powered machine is expected to master the use of PTO shaft transmission.

Before the installation and operation, the operator of the machine must become thoroughly familiar with the contents of the manual. The operator is also obliged to gain familiarity with the operating controls of the machine and the emergency stop mechanism. For more information about our products, please visit our website at [www.palax.fi](http://www.palax.fi).

Register at <https://info.palax.fi> to ensure that you at all times have the most recent information about your machine at your disposal.

**NOTE !      Keep this manual with the machine at all times.**

## 1.2. EU Declaration of Conformity

Directive 2006/42/EC

Manufacturer: TP Silva Oy  
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Product: Palax KS 45 Firewood Processor with discharge conveyor of 4.3 m.

Powered by: Tractor PTO or electric motor

Models: TR Powered by tractor equipped with own hydraulic system  
TR/SM Powered either by tractor or electric motor

Serial number: \_\_\_\_\_

We hereby certify that the machine meets the requirements of the Government Decree 12.6.2008/400 on safety of machinery through which the Machine Directive 2006/42/EC has been put into effect, and that during the manufacturing process the following harmonized standards have been applied.

SFS-HANDBOOK93-series, SFS-EN 349-1+A1, SFS-EN 609-1+A1, SFS-EN 618, SFS-EN 620, SFS-EN 953+A1, SFS-EN 954-1, SFS-EN 982+A1, SFS-EN 4254-1, SFS-EN 11684, SFS-EN 12100-1+A1, SFS-EN 12100-2, SFS-EN 13850, SFS-EN 13857, SFS-EN 14121-1, SFS-EN 14121-2 SFS-EN 60204-1+A1, SFS-EN 13849.

Notified body No. 2157: Spitzenverband der landwirtschaftlichen  
Sozialversicherung Prüf- und Zertifizierungsstelle  
Weissensteinstraße 70/72  
D-34131 Kassel

TP Silva Oy  
1.1.2023



Seppo Koironen  
Managing Director







### 1.3. Intended use of the machine



This Firewood Processor with Conveyor is intended to be used for production of firewood from round timber. Use of the machine for any other purposes is prohibited.

#### Maximum size of the wood







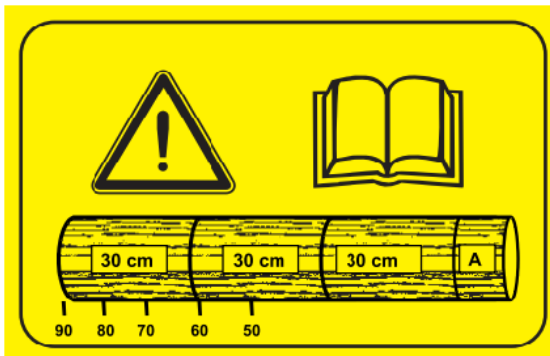



- ❑ For cutting, the maximum diameter of the tree is about 43 cm.
- ❑ The maximum length of the log is 4 m.
- ❑ When handling long trees, we recommend using a specific log-lifting deck with rollers or hydraulic feed.

### 1.4. Warning signs

    	<p>Read the instruction manual</p> <p>Beware of the moving saw-bar</p> <p>Wear protective clothing</p> <p>Use eye guards and hearing protectors</p> <p>Wear safety shoes</p>	 <p>Reversing the in-feed conveyor</p>	 <p>Feeding with the in-feed conveyor</p>
		 <p>Interrupting the splitting</p>	 <p>Launch of splitting.</p>
		 <p>Adjusting the splitting wedge height.</p>	

 <p>Permissible revolutions range of the PTO shaft</p>	 <p>Opening the protective net for the splitting chute interrupts the splitting</p>	 <p>Direction of rotation of the motor/PTO shaft</p>
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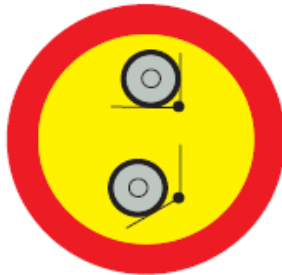
 <p>Lifting point for forklift truck</p>	 <p>Saw-chain oil tank</p>	 <p>The machine may only be operated by one person</p>	 <p>Keep clear of the machine's moving parts</p>
 <p>Beware of the PTO shaft</p>	 <p>The danger zone around the machine is 5 metres</p>  <p>See instructions for cutting the last billet in the manual</p>	 <p>Disconnect the machine from the power source before servicing</p>	
 <p>Adjustment of discharge conveyor speed</p>	 <p>Emergency stop (only in machines powered by electricity)</p>		



**Lifting the hydraulic log-clamp**



**Using the hydraulic log-deck**



**Dropping plate in use**



**Dropping plate not in use**



**Manual operation of the dropping plate**



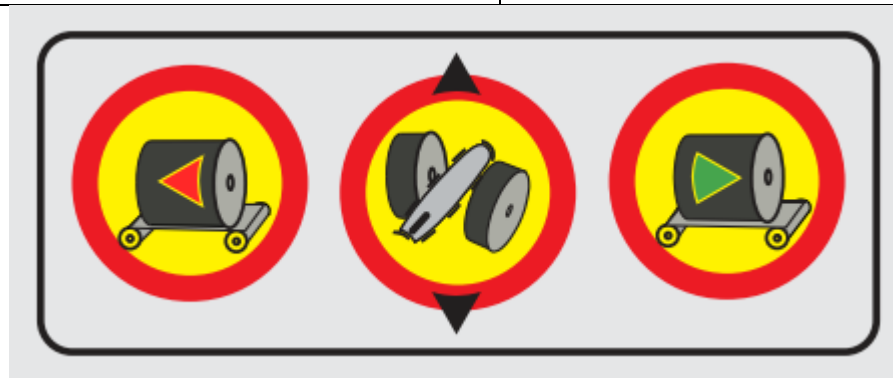
**Adjusting the saw-bar speed**



**Lifting point**



**Adjusting the chain oil flow**



**Reversing the in-feed conveyor – Sawing – Advancing the in-feed conveyor**



## 1.5.Nameplates

### Nameplate on the machine

- ❑ The name and address of the manufacturer
- ❑ Designation of the machine type
- ❑ Serial number and year of manufacture
- ❑ Total weight of the machine
- ❑ The sign is located at the same end of the machine as the in-feed conveyor.
- ❑ Always mention the serial number and year of manufacture when ordering spare parts.



### Nameplates on the electric drive

- ❑ 3-phase motor
- ❑ Voltage 230/380 V or 380/600 V, may vary depending on the country.
- ❑ Output 22 kW, current 50A.
- ❑ The sign is located in the connecting box of the electric motor.

## 1.6.The main dimensions and models of the machine

Item	Tractor-powered	Tractor/Electrically powered
Output	-	22 kW
Fuse size	-	50A
Weight	1,390 kg	1,490 kg
Height/width/length	2510 x 1240 x 3250 mm	
Crosscut deck	Length 2,500 mm	
Height of crosscut deck	1020 mm	
Saw-bar length	20"	
Saw-chain	Gauge 1,6 mm; pitch 0,404"; 71 links	
Max. diameter of the log	43 cm	
Max. length of the log to be split	55 cm	
The 4.3 m firewood conveyor is included in the dimensions and weight.		

## 1.7. Safety instructions

### General regulations and restrictions

- ❑ The maximum length of log that can be cut is 4 metres. If no log-stand or log-deck is used.
- ❑ The machine is exclusively intended for the production of firewood.
- ❑ The machine may only be operated by one person.
- ❑ The danger zone around the machine is 5 metres to the sides and away from the conveyor.
- ❑ Lift and lock the in-feed deck and the discharge conveyor in the transport position for transportation.
- ❑ Never remove any safety-related devices from the machine.
- ❑ Transport width of the machine is 3.2 m. The machine must not be transported on public roads hitched to the three-point linkage of the tractor.
- ❑ A transport platform for towing the machine with a tractor is available as an option.

### The operator

- ❑ Only persons over 18 years of age are allowed to operate this machine.
- ❑ Every person operating the machine, must thoroughly study the entire user manual.
- ❑ Always use eye guards and hearing protectors.
- ❑ Always wear protective shoes.
- ❑ Always wear work gloves.
- ❑ Do not wear loosely-fitting clothing.

### Before use

- ❑ Always carry out the required preparations on both the machine and the conveyor before starting the operation.
- ❑ Make sure that all other people stay outside the operating range.
- ❑ Only use a fault-free PTO shaft and attach the chain for the shaft-guard. The permissible revolutions range of the PTO shaft is 450–500 r.p.m.
- ❑ Only operate the machine on a sufficiently firm and level surface.
- ❑ Only operate the machine in an adequately lit space.
- ❑ Keep the tractor-powered machine hitched to the tractor. Also ensure that sufficient space is provided for the PTO shaft and its guard.
- ❑ Always check that all the covers are intact and properly fastened.
- ❑ Always ensure that the saw-chain is in perfect condition.
- ❑ Always ensure that the electric conductors are intact.
- ❑ Always check that all the controls are operational.
- ❑ Always check the oil level and make sure that the hydraulic hoses and components are free of damage.
- ❑ Before starting the work, make sure that the machine is firmly in position.

### During operation

- ❑ Carelessness during the cut-off operation constitutes a major hazard!
- ❑ During the cut-off operation, make sure that the tree is always supported by the log-clamp and the in-feed deck: danger of rolling over!
- ❑ Exercise particular caution when cutting knotty or crooked logs, because, as faulty cutting might roll the log over or twist the saw-bar with enough force to break it.
- ❑ Keep the working space clean and clear of foreign objects.

- ❑ Always stop the machine and disconnect the power supply cable or the PTO shaft before servicing.
- ❑ Only cut one log at a time.
- ❑ Danger! Stay away from moving parts.

### **1.8.Noise emission and vibration**

- ❑ Equivalent continuous A-weighted sound-pressure level at the workstation is 89.5 dB (A) and the sound power level is 100.5 dB (A).
- ❑ The vibration emission values do not exceed the limit 2.5m/s<sup>2</sup>.

### **1.9.Responsibilities of the operator**

- ❑ The machine may only be used to produce firewood.
- ❑ All the safety-related devices are necessary to ensure a sufficient level of safety.
- ❑ The Palax KS 45 is a very safe machine provided that the instructions supplied are properly followed, the regular maintenance routines are duly executed and the work is carried out without haste.
- ❑ It is the responsibility of the operator to ensure before the work is started that all the safety-related devices are in perfect order and the machine has been serviced in a due manner.
- ❑ The operator is responsible for ensuring that no one else is subjected to any danger.
- ❑ Modifying the construction of the machine is prohibited.
- ❑ The machine must never be operated under the influence of alcohol or drugs.
- ❑ Remember that as the operator you are responsible for any injuries caused if safety-related devices have been removed from the machine.

### **1.10.Operating conditions**

- ❑ Always place the machine on as level a surface as possible.
- ❑ Prevent risks, such as slipping in winter, by organising the work site in a due manner.
- ❑ When starting the machine in severe frost, allow it to idle at about 1/4 of the maximum speed for about 5 to 10 minutes in order to warm up the oil and make it less viscous.
- ❑ Only operate the machine in an adequately lit space.
- ❑ It is recommended that a suitable stand be purchased or made that enables the trees to be processed where the logs are ready at the level of the in-feed deck. Hence, unnecessary lifting may be avoided and the work can proceed much faster. We recommend using the Palax Mega log-deck, the Palax Midi log-deck or the Palax Log log-stand.
- ❑ The most suitable temperature range for operation is approximately - 20 to +30 degrees Centigrade. Otherwise, the weather conditions do not set any restrictions on the operation.
- ❑ Make sure that no other people, especially children, are present inside the operating range.
- ❑ Never use the machine indoors, owing to the risk of dust generation or the danger of exhaust gases.

### 1.11. Terms of warranty

The warranty period runs for 12 months from the date of purchase.

**The parts that affect the safety or the adjustment of the machine are sealed. The seal must not be broken without the consent of the manufacturer or the dealer. Breaking the seal voids the warranty, and transfers the liability from the machine's manufacturer to the person, who broke the seal.**

#### **The warranty covers**

- ❑ Parts which have been damaged during normal operation of the machine due to any defects in material or workmanship.
- ❑ The reasonable repair cost as set forth in the agreement between the buyer and the manufacturer.
- ❑ A new part delivered as a replacement for the defective one.

#### **The warranty does not cover**

- ❑ Defects due to normal wear, faulty operation or negligent maintenance.
- ❑ The saw-bar, the drive wheel, the saw-chain and the in-feed conveyor belt are wear parts that are not covered by the warranty.
- ❑ Defects in the machine due to any modifications which the buyer has made or ordered from a third party and which have affected the machine in such a way that it can no longer be considered to correspond to its original configuration.
- ❑ Other possible expenses or financial claims due to the above-mentioned measures.
- ❑ Indirect expenses and/or travel costs incurred while making repairs under warranty.
- ❑ For parts changed during the warranty period, the warranty expires at the same time as the warranty period of the machine.

### 1.12. Operating instructions for the winch

Please refer to the user manual of the winch or visit our website at [www.palax.fi](http://www.palax.fi) for more detailed operating instructions for the winch.

## 2. Acceptance and setting up the machine for operation

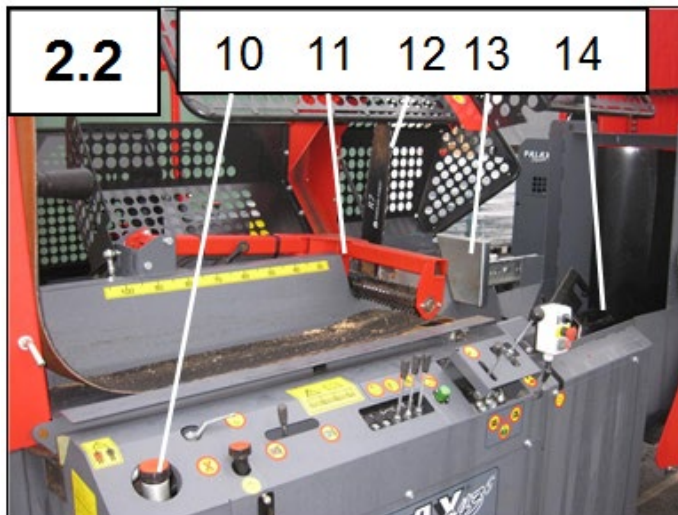
### 2.1.State of delivery and acceptance control

- ❑ The machine is delivered almost ready-assembled, adjusted and test driven.
- ❑ Check the delivered goods without delay.
- ❑ If the product shows transport damage, contact the transport company and your dealer immediately.

#### Main parts of the machine, Figs. 2.1, 2.2 and 2.3



- 1 In-feed conveyor extension
- 2 In-feed conveyor
- 3 Cover for splitting area
- 4 Control panel
- 5 Saw-bar cover
- 6 Controls for the starting, stopping and emergency stopping of a machine powered by electricity
- 7 Cover for splitting area
- 8 Winch
- 9 Discharge conveyor



- 10 Hydraulic oil tank
- 11 Log-clamp
- 12 Crosscut saw-blade
- 13 Wood length limiter
- 14 splitting wedge

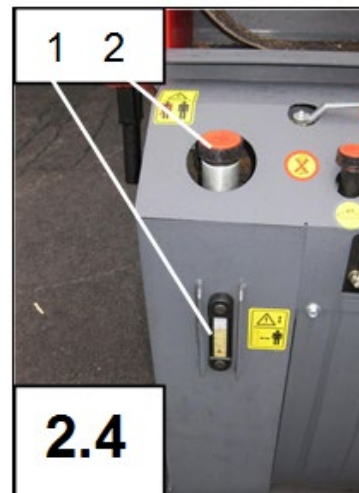


- 15 Table extension leg
- 16 Three-point linkage
- 17 Exit opening for sawdust
- 17 Electric socket
- 18 PTO shaft
- 19 Additional hydraulic circuit, for example, for a log-deck
- 20 Lifting point



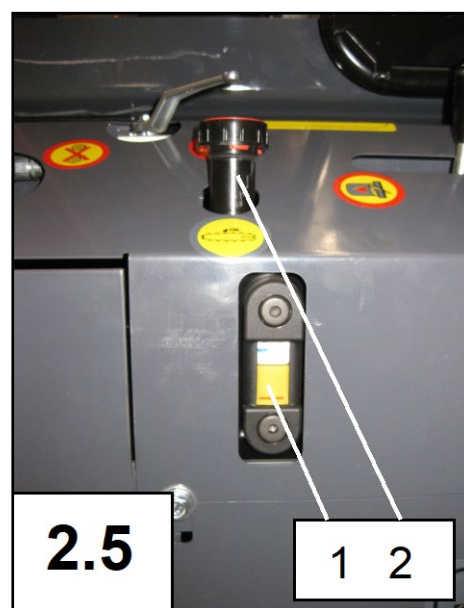
## 2.2. Topping up hydraulic oil, Fig. 2.4

- ❑ The hydraulic oil volume is 135 litres.
- ❑ Filling cap 2 for the hydraulic oil.
- ❑ The oil should be Unavis 32, Shell Tellus 32, NESTE HYDRAULI 32 or of equivalent quality.
- ❑ Only use fresh, clean oil, because smooth operation of the machine is highly dependent on the purity of the oil.
- ❑ Regularly check the oil level in the level glass. 1



## 2.3. Checking and topping up the saw-chain oil, Fig. 2.5

- ❑ Regularly check the level of the saw-chain oil in the level hose 1.
- ❑ Top up oil as necessary. The oil level must reach to at least the lower edge of the gauge at all times. The volume of the tank is about 1.5 litres.



## 2.4. Bringing the conveyor into the work position, Figs. 2.6, 2.7, 2.8 and 2.9



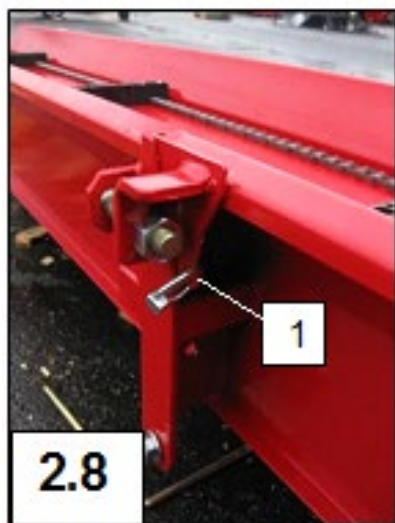
- ❑ Pull down the conveyor and leave it supported by the winch ropes and the tip wheel. Remove the conveyor chain holder from under the conveyor.
- ❑ Lock the conveyor in the work position by means of the cotters. Fig. 2.7

### Bringing the conveyor into the transport position

- ❑ Bringing the conveyor into the transport position is done in the same manner as bringing it into the work position, but in reverse order.
- ❑ NOTE! Only lift the conveyor when it has been swung to the centre position! When it is lifted up, the conveyor must always be in the centre position. If the conveyor is in a swung position while lifted up, it may hit the surrounding structures and get damaged.

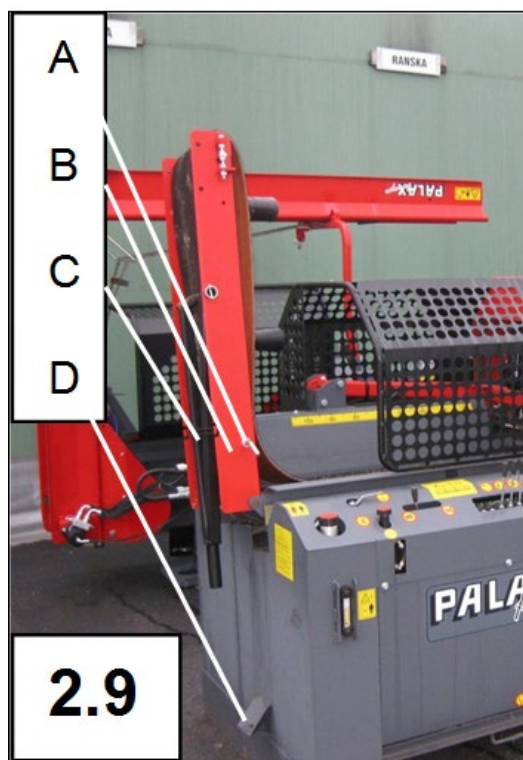


- ❑ While the conveyor is in the transport position, the locking cotters can be kept behind the locking pin. Fig. 2.8, 1.
- ❑ In the transport position, the conveyor must be locked into place using the chain. Hook the chain in the slot in the winch stand. Fig. 2.9



## 2.5. Bringing the in-feed conveyor into the work position, Fig. 2.9

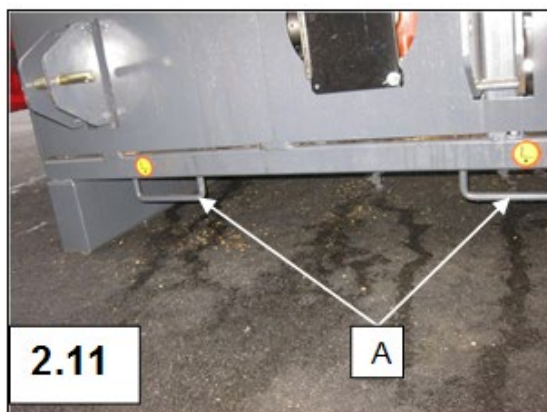
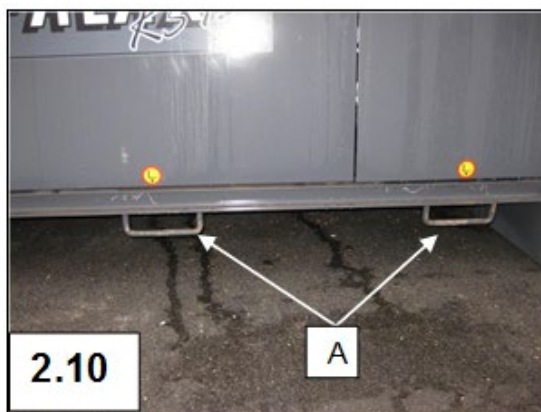
Pull in the handle A for the locking device, and swing the extension table B into the work position. Place the support leg C in the slot D, when you swing the table into the work position.



## 2.6. Lifting and moving the machine, Figs. 2.10, 2.11

### Lifting the machine is allowed:

- ❑ With a forklift truck, by the lifting points A in the front and rear under the machine's frame.
- ❑ When moving the machine by tractor, ensure that the transfer/lifting capacity of the tractor is sufficient with respect to the machine's weight.



### 3. Using the firewood processor, description of operation

#### 3.1. Operating controls, Figs. 3.1

1. Filling cap for hydraulic oil
2. On/off operation of dropping plate
3. Filling cap for chain oil tank
4. Manual operation of pusher
5. Manual operation of the dropping plate
6. Height adjustment of splitting wedge
7. Control of hydraulic log-clamp



8. Adjustment of discharge conveyor speed
9. Control of additional equipment
10. Joystick
11. Adjustment of sawing pressure
12. Starting, stopping and emergency stopping of an electrically powered machine.

#### 3.2. Setting up the machine for operation

- ❑ Place the firewood processor by the log-deck or the pile of logs to be split so, that access to- from and working with the machine is completely unobstructed. A suitable distance from the log-deck to the in-feed conveyor is about 1/4–1/3 of the length of the trunks.
- ❑ Set up the discharge and in-feed conveyors in accordance with the guidelines presented above.
- ❑ Before starting up, check the condition of the operating controls and the safety devices.
- ❑ Before starting up, always check the levels of the hydraulic oil and the chain oil.

#### 3.3. Testing the machine

- ❑ When starting the machine in severe frost, allow it first to idle at low speed for about 5 minutes; this warms up the oil.
- ❑ While the motor is running, check that the hydraulic system and the controls for shutting off are operational.
- ❑ Test that the safety limit switches are operating when the cover is opened. Once the cover is open, the hydraulic valves cannot be operated with the exception of the firewood conveyor.
- ❑ Check the oil supply to the saw-chain. You may have to adjust the oil flow to the saw-chain, for example, if the oil is too cold or too warm.
- ❑ If you observe even a minor malfunction in the operation of the machine, find out the cause and repair it!
- ❑ The machine must always be tested before starting its use.

**NOTE! Stop the machine and disengage the power take-off of the tractor or disconnect the power cord from the socket to locate and repair a possible fault in the machine!**



### 3.4. Electric drive, start and emergency stop.

- ❑ The power output of the motor is 22 kW and the speed is 1500 rpm.
- ❑ The machine is equipped with an automatic Y-D starter with an emergency stop feature.
- ❑ All the electric installations have been made ready.
- ❑ The cross-section of the extension cord required for a tension of 400 V must be 10 mm<sup>2</sup>.
- ❑ When starting up the machine, check that the direction of rotation corresponds to the arrow on the blade cover.
- ❑ To check the direction of rotation, run the motor for a short while and then stop it suddenly.
- ❑ The machine may only be connected to a power supply equipped with a fault current switch of 30 mA.
- ❑ The machine must be equipped with a 5-pole extension cord (L1, L2, L3, N ja PE) to operate.

**NOTE ! Electric work may only be carried out by a professional person.**

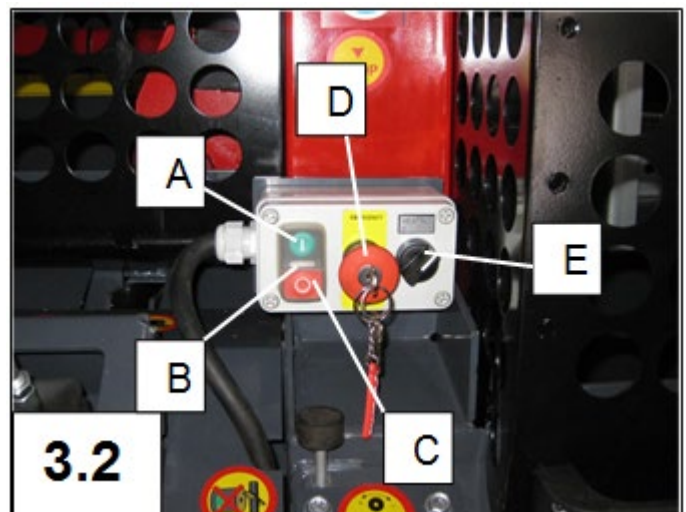
### 3.5. Starting the electric motor using the Y/D starter, Fig. 3.2

- ❑ Press the start button A. In the Y-position the motor starts rotating at slow speed with low output. The start phase takes several tens of seconds.
- ❑ As the engine speed increases, the D-position is automatically switched on and the motor quickly reaches full speed.
- ❑ At the same time, the signal light B between the pushbuttons illuminates.
- ❑ Stop the engine using the pushbutton C.
- ❑ The switch E is for the heater carpet of the hydraulic oil tank (optional).

**NOTE ! The machine must not be operated until the motor is running at full speed.**

### 3.6. Emergency stopping of an electrically powered machine, Fig. 3.2

- ❑ Push down the emergency stop button D.
- ❑ Turn the pushbutton clockwise to release it.
- ❑ The emergency stop button can be locked by a key. The locking prevents the use of the machine



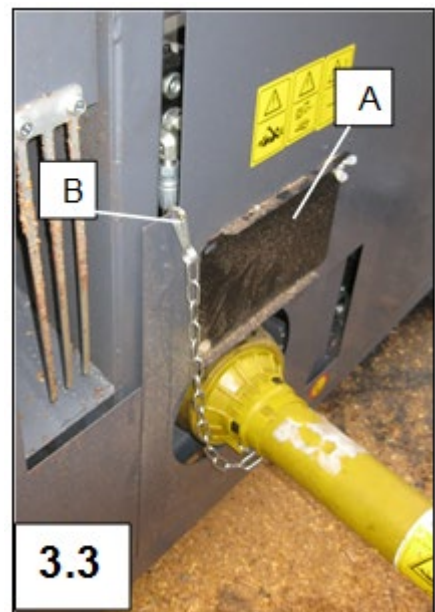
### 3.7. Powered by tractor

- ❑ The tractor-powered machine must always be hitched to the tractor's lifting arms. This ensures that the distance between the firewood processor and the tractor stays correct. If it changes during operation, severe damage might result.
- ❑ Usually, the machine is delivered with the attachment lug removed. The log shall be attached by the customer.
- ❑ A suitable power take-off shaft is, for example, BONDIOLI A 143 or WALTERSCHEID W 2300.
- ❑ No safety clutch is required for the PTO shaft.
- ❑ Only use fault-free PTO shafts and always attach the chains for the shaft-guard to the machine (Fig. 3.3, B).
- ❑ Start the tractor and switch on its PTO at low revolutions, after that increase the revolutions to 450-500 r.p.m.
- ❑ The machine comes with towing pins of 28 mm.

### 3.8. The machine is equipped with a system to prevent simultaneous operation in two modes, Fig. 3.3

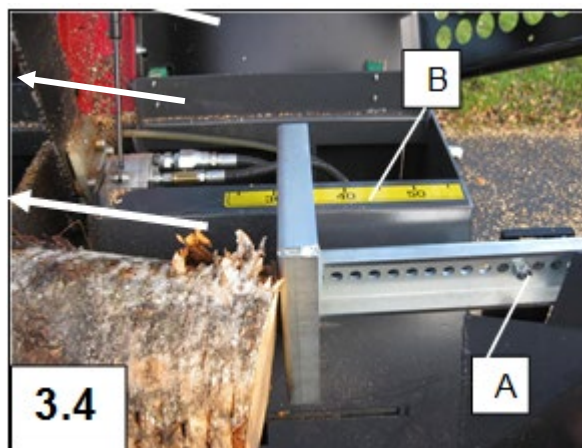
- ❑ When the cover plate A is turned down, it is possible to connect the extension cord. When the cover is raised up, it is possible to connect the PTO shaft.
- ❑ Attachment point B for the guard of the PTO shaft

**WARNING! Never remove from the machine the plate that prevents the simultaneous operation in two modes. Always remove the PTO shaft before operating the machine by electricity.**



### 3.9. Adjusting the log length, Fig. 3.4

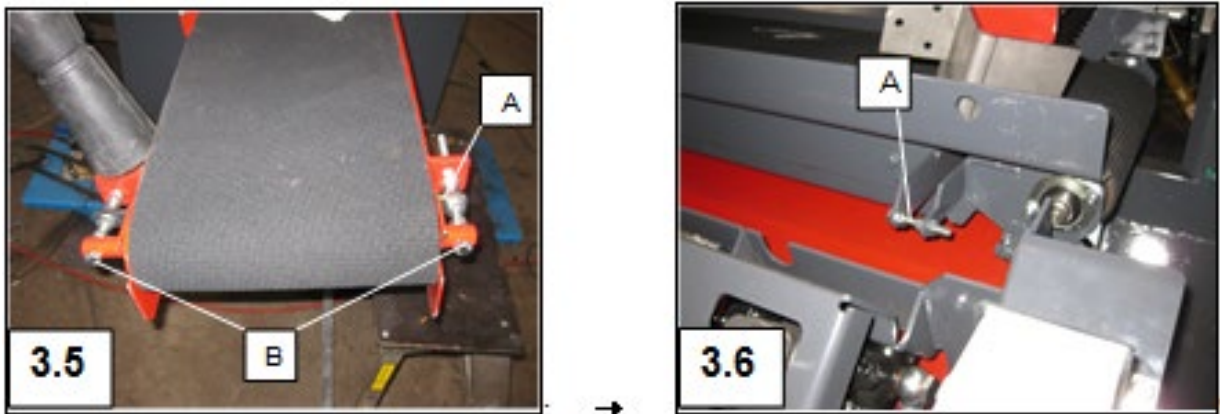
- ❑ The length of the log is adjusted by shifting the log length limiter.
- ❑ Remove the bolt A, and shift the log length limiter to the desired position on the scale B.





### 3.10. In-feed conveyor, Fig. 3.5 and 3.6

- ❑ The hydraulically driven in-feed conveyor is 350 mm wide and 2600 mm long.
- ❑ The drive and return rollers of the in-feed conveyor are equipped with scrapers A, Fig. 3.5, which keep the rollers clean at all times. For example, in winter snow does not pack on the rollers.
- ❑ Both ends of the in-feed conveyor can be adjusted. Figs. 3.5 B and 3.6 A.



**NOTE !** The infeed conveyor belt is a wear-part, but using the belt in an appropriate manner, considerably increases its service life.

#### How to use the belt

- ❑ Do not pull trees from the ground using the belt, because the belt wears quickly if it slips under the tree.
- ❑ Stop the infeed operation immediately when the tree comes in contact with the log-stop.
- ❑ Use a log-stand equipped with freely rotating rollers or hydraulic operation to make handling of the trees easier.
- ❑ Always keep the belt at a suitable tightness.
- ❑ Make sure that the belt does not chafe against the edges of the deck, and adjust as necessary.
- ❑ While replacing the belt, make sure that the new belt rotates in the right direction.

### 3.11. How the safety features affect the operation of the machine

- ❑ The machine is equipped with devices that ensure operational safety. The safety-related devices affect the operation of the cover for the splitting area, the saw-bar and the pusher.
- ❑ The protective net for the splitting chute must be closed so as to enable the cutting and splitting operations.
- ❑ Once the protective net is opened, the pusher returns to its rear position, and the operation of the hydraulic valves is prevented.

#### Warning!

- ❑ All the safety-related devices are necessary to ensure a sufficient level of safety.
- ❑ Do not remove any of the safety features from the machine. The machine operator is responsible for the flawless operation of the safety-related devices.

## 4. Use of the firewood processor, crosscut operation

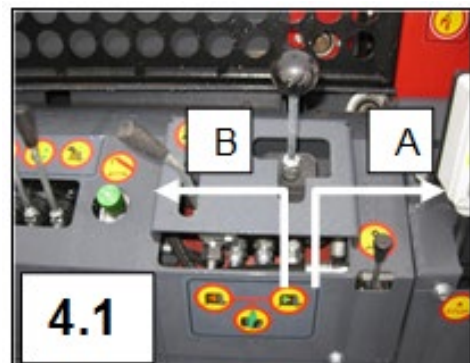
### 4.1. During the operation

- ❑ Exercise caution, always keep your hands away from the saw-blade.
- ❑ During the crosscut operation, make sure that the log always is supported on the in-feed deck at the cutting point.

#### Placing the wood on the deck

**WARNING! Wrongly positioned trees may get turned over on the deck by the cutting force. This might badly twist the saw-bar, causing it to break.**

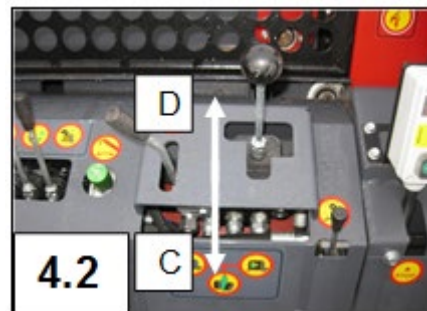
- ❑ The machine is equipped with an in-feed conveyor driven by a hydraulic motor, and a log-clamp equipped with a hydraulic cylinder and motor. The toothed roller transfers the log to the exact length set by means of the hydraulic log length limiter.
- ❑ Select the log that you wish to process. Note that the maximum diameter of the log allowed for the machine is 34 cm. The presence of branches and the shape of the tree may increase the classified diameter of the trunk. When transferring the log to the machine, be careful not to endanger or harm the operator or the machine.
- ❑ The operator must take into account the weight of the large logs, and ensure that he does not get injured while lifting them.
- ❑ We recommend using a log-deck, such as Palax Mega or Palax Midi, to make the work easier.
- ❑ To transfer the log for cutting, shift the control lever of the in-feed conveyor to the front and to the right, in direction A, (Fig. 4.1). Lift up the log-clamp by simultaneously pulling back the lever of the log-clamp. Lower the log-clamp onto the trunk as soon as the head of the trunk has passed by the clamp. When the log reaches the length limiter, stop the in-feed belt by returning the joystick to its initial position.
- ❑ Ensure that the log stays on the in-feed conveyor throughout the feed operation.
- ❑ During the transfer, the operator must be at the operating controls and absolutely not by the moving log! While the log is lying on the in-feed conveyor during transfer, always make sure that neither your hands nor other parts of your body get squeezed between the log and parts of the machine.
- ❑ If the log bumps into the edge of the cutting opening or any other part of the machine and stops, stop the in-feed conveyor and turn the control lever to the left, in direction B, to make the conveyor reverse. Correct the position of the log, and check that it is not too large.
- ❑ The log must stay in position on the in-feed conveyor throughout the execution of the last cut. If the remaining part of the trunk is not long enough for two full-length pieces of firewood, leave the full-length part on the in-feed conveyor, place the shorter end on the splitting chute, and do the cutting in this position. This is to ensure that the longer and heavier part of the log is not left hanging without support, which would make it rise up from under the saw-bar. The length scale is located above the in-feed conveyor and the zero-point is at the saw-bar.



- ❑ Using the operating lever (Fig. 3.1, 5.), bring the dropping plate deep into the splitting chute. Transfer the last billet with the in-feed conveyor into the splitting chute. Using the operating lever, drop the billet from the top of the dropping plate to the bottom of the chute, and manually start the splitting operation (Fig. 3.1,4). Note. The in-feed belt does not run, if the saw-bar is not in its upper position.

## 4.2. Crosscut operation

- ❑ During the crosscut operation, make sure that the log always is supported on the in-feed deck at the cutting point.
- ❑ Be especially careful when cutting knotty or crooked trees.
- ❑ When the log stops for cutting, return the feed lever to its initial position. Before cutting the log, make sure it is not too twiggy or its form is not such that cutting it might be hazardous or cause some damage.
- ❑ Cut the log by pulling back the control lever for feeding and cutting, in direction C (Fig. 4.2).
- ❑ As the lever is actuated, the crosscut saw-bar goes down and the saw-motor starts up.
- ❑ Always execute the sawing movement by pulling the handle completely to the rear. The lowering speed of the saw-bar is automatically adjusted in accordance with the cutting speed of the saw-chain. You can increase the cutting speed by adjusting the turning force of the saw-bar.
- ❑ Keep the lever in its extreme position until the log is cut. Always make sure that the cut-off log aligns with the chute.
- ❑ Return the saw-bar to its upper position in direction D. The splitting stroke will launch automatically.



## 4.3. Instruction for problematic situations

- ❑ If the saw-bar gets stuck or does not bite into the log properly, lift the saw-bar up, and try to saw anew at the same place. If the sawing is still not successful, move the log a little.

### Crooked trees

- ❑ Cut crooked trees where they bend.
- ❑ When cutting crooked trees, make sure that the log is properly supported by the in-feed deck.

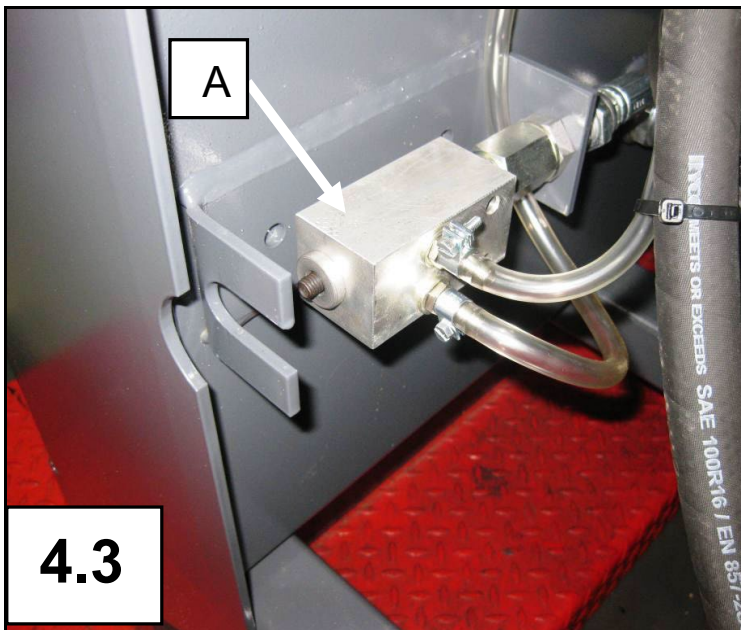
### Big trees

- ❑ Make sure that the rotational speed of the saw-blade is correct. Min. 450 r.p.m., max 500 r.p.m.
- ❑ Make sure that the saw-chain is sharp and properly lubricated.

### Cutting small trees

- ❑ Ensure that the log is travelling at the rear edge of the in-feed deck.
- ❑ Only cut one log at a time.
- ❑ Make sure that the log is kept firmly in position under the clamp during sawing.

#### 4.4. Lubricating the chain-saw, Fig. 4.3

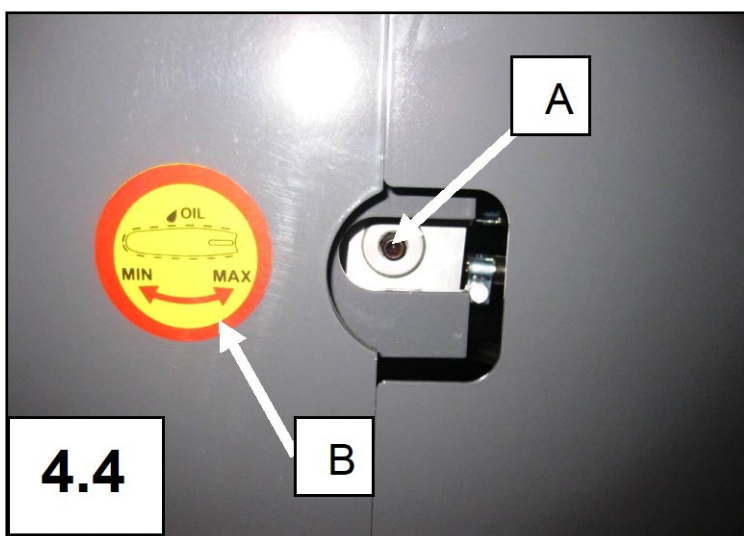


- ❑ The machine is equipped with an automatic lubricator for applying saw-chain oil.
- ❑ The machine is equipped with a hydraulically controlled piston pump with adjustable, precise metering.

**NOTE !** The volume of oil applied at each pass is sufficient by a fair margin to lubricate the chain under normal conditions. If you cut a lot of thick trees, it is advisable to increase the oil volume. Temporarily, the oil volume can be increased by lifting up the crosscut saw-bar and, immediately after that, resuming the operation.

#### 4.5. Adjusting the oil feeding rate

**NOTE !** Always switch off the machine before adjusting the oil flow.



- ❑ The adjustment screw (a 4-mm hexagon socket screw) (Fig. 4.4, A) is located in the pump body.
- ❑ The correct adjustment directions are shown on the decal affixed to the machine (Fig. 4.4, B). The oil flow is increased by turning the screw counter-clockwise, and it is decreased by turning it clockwise.

## 5. Use of the firewood processor, splitting operation

### 5.1. Splitting speed and force

- ❑ Normally the splitting movement is executed at the highest possible speed when the splitting force is the lowest.
- ❑ As the force requirement increases, the machine automatically adopts a greater splitting force. The splitting force is increased in steps so that it can be about 5, 10 or 16 tons. The change of the splitting force affects inversely to the splitting speed. When the force is low, the speed is high and vice versa.
- ❑ As the log starts splitting, and the force requirement is reduced, the machine adopts a lower splitting force, which means the splitting speed is increased.

### 5.2. Splitting wedges

- ❑ Keep the splitting wedge sharp and observe during handling that the logs do not contain anything, which could damage it.
- ❑ The height of the splitting wedge can be adjusted hydraulically using the lever in the control panel.

Standard wedge:

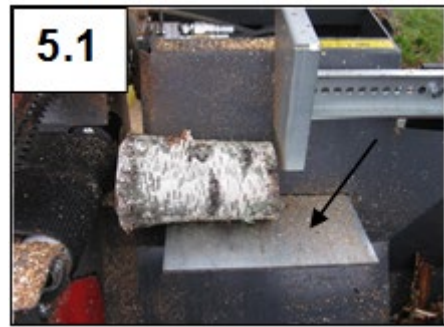
- ❑ The 2/6 wedge for splitting the wood in 2 or 6 ways.

Optional wedges:

- ❑ The short straight wedge for splitting the wood in 2 ways or, if the wedge is lowered, no splitting will take place.
- ❑ The 2/4 -wedge for splitting the wood in 2 or 4 ways.
- ❑ The 2/8 wedge for splitting the wood in 2 or 8 ways.
- ❑ The 2/10 -wedge for splitting the wood in 2 or 12 ways.
- ❑ The 2/12 -wedge for splitting the wood in 2 or 12 ways.

### 5.3. Dropping plate, Fig. 5.1

- ❑ In particular, when short pieces of firewood are processed from large logs, the logs are frozen or very knotty, it is possible that the billet drops or jumps onto the bottom of the chute in a wrong position, and the splitting cannot be started until the position of the billet has been corrected.
- ❑ The Palax KS 45 is equipped with a specific dropping plate that helps to transfer the billet being controlled into the splitting chute after the cut-off operation.
- ❑ The dropping plate can be switched either to automatic operation or completely out of operation. The operating mode of the plate is selected via the ON-OFF lever 2 on the control panel, Fig 3.1.
- ❑ When the dropping plate is in use, it automatically operates synchronously with the crosscut saw-bar. If the plate is not in use, the cut-off billet falls straight onto the bottom of the splitting chute.
- ❑ In the automatic mode, the plate comes up during the cutting operation and receives the cut-off billet. When the crosscut saw-bar is raised via the control lever, the dropping plate goes down first and drops the billet into the splitting chute before the saw-bar starts going up again. This allows the billet to settle in the splitting chute before the automatic stroke is launched.
- ❑ The dropping plate can be operated manually via the control lever 5, irrespective of the position of the ON-OFF lever 2.



**NOTE! When you saw large trunks or knotty trunks with diameter near the maximum allowed, we recommend that you disable the dropping plate to prevent the pusher from pushing the log being split against the dropping plate and breaking it.**

### 5.4. Disturbances during the splitting operation and their remedy

#### A stuck log:

- ❑ If the logs are big and have big branches, the force of the pusher may not be sufficient.
- ❑ If the log sticks to the wedge, reverse the pusher using the control lever.
- ❑ Raise the splitting-wedge and retry splitting the billet by launching the stroke manually. Changing the position of the billet often helps.
- ❑ If the log does not split, turn the splitting lever to the right to reverse the cylinder and enable safe removal of the billet.
- ❑ Open the protective net and hit the stuck wood loose using another piece of wood.
- ❑ If the log has a big branch, make the branch split by turning the log and pushing it towards the wedge with the root end first. Doing it this way requires the least power..



### 5.5.Re-splitting the logs safely

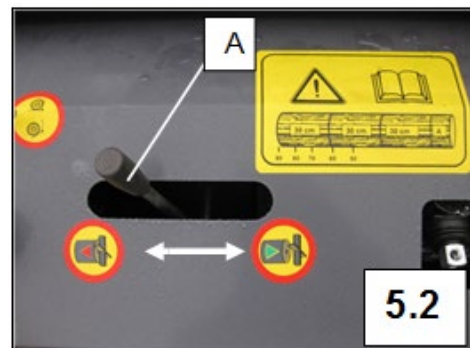
- ❑ If you want to process small-sized firewood from large logs, even pieces split in 8 or 12 ways may still be too large.
- ❑ Proceeding in the following way will help you to split the wood safely into even smaller pieces.
  1. Stop the conveyor by turning up the speed control screw. Fig. 3.1, 8.
  2. Open the protective net for splitting chute
  3. Place the logs to be split into the splitting chute.
  4. Close the protective net.
  5. Start the splitting operation using the manually operated start lever.

### 5.6.Operation of the splitting mechanism

- ❑ The splitting mechanism has automatic operation, but it can be operated manually as well.

#### Automatic launch of the splitting stroke.

- ❑ The splitting stroke is launched as soon as the saw-bar is lifted up after the cutting operation. The splitting stroke starts when the saw-bar comes close to its upper position.



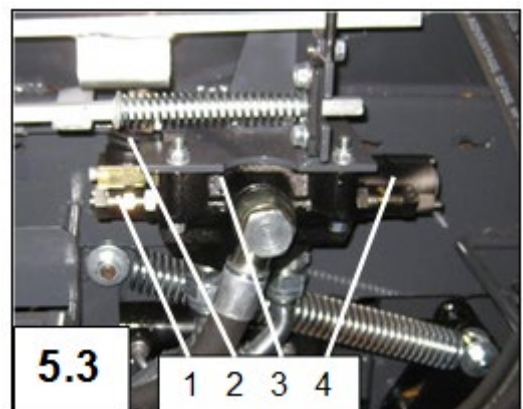
#### Manual start, Fig. 5.2

- ❑ The splitting stroke is launched by turning its control lever (A) momentarily to its extreme position in the right.
- ❑ The pusher returns automatically to its initial position.
- ❑ The pusher can be returned to its initial position in the middle of its stroke by turning the control lever for splitting momentarily to its extreme position in the left.

#### Parts of the splitting valve, Figure 5.3

- 1 Valve rod
- 2 Spool shifter
- 3 Valve

Ball joint – detent end of the valve, which locks the spool in the splitting position



## 6. Maintenance of the machine

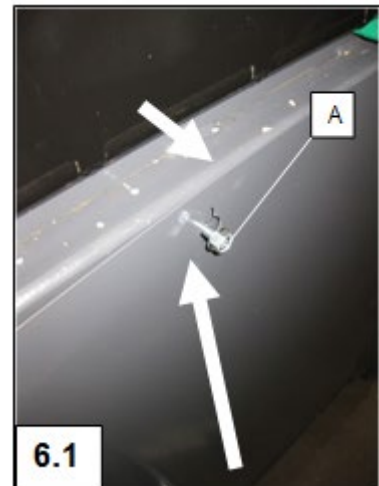
**Note!** Always stop the machine and disconnect it from the power source before performing any service measures.

If a service measure requires the power source to be running, particular caution must be exercised!

After completing the service measures, and before starting the operation, fasten all the protective covers in place, ensure that the protective devices are in order and test run the machine in accordance with the instructions in point 3.2.

### Removing the protective covers, Fig. 6.1

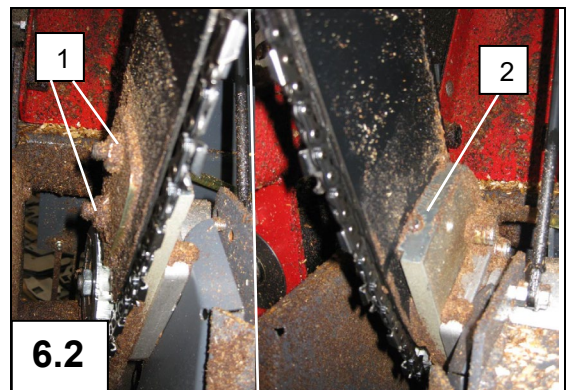
Loosen the attachment screws of the protective covers (A) a few centimetres, and lift off the covers. The attachment screws need not be taken away for removal of the protective covers.



### Crosscut saw-blade

#### Changing and tightening the saw-chain, Fig. 6.2

- ❑ Open the protective net.
- ❑ To tighten the saw-chain, loosen the attachment nuts (1) of the saw-bar (Fig. 6.2) and turn the tightening bolt (2) clockwise.
- ❑ To remove the saw-chain, turn the tightening bolt (2) counter-clockwise until the chain slackens.
- ❑ The chain needs to be tightened enough to prevent it from sagging under the saw-bar.
- ❑ Finally, tighten the attachment nuts of the saw-bar.
- ❑ Check the chain for tightness at regular intervals.
- ❑ Working with a blunt or damaged saw-chain is utterly uneconomical. Clean up and check the saw-chain. Make sure that there are no cracks in the chain links and that all the rivets are intact. If the chain is damaged or worn out, it must be replaced.



#### Servicing the saw-chain

- ❑ If the saw-chain will not be used for a while, clean it up using a brush and immerse it in an oil bath.
- ❑ Always after re-sharpening, clean up the saw-chain thoroughly, remove from it any stuck chips or grinding dust and immerse it in oil.

#### Cutting teeth

- ❑ Use only special saw-chain files!
- ❑ Saw-chain pitch 0.404"; gauge 1.6 mm; length 71 links.
- ❑ Checking the saw-chain pitch:  $t = \frac{\text{the distance over three rivets}}{2}$ .

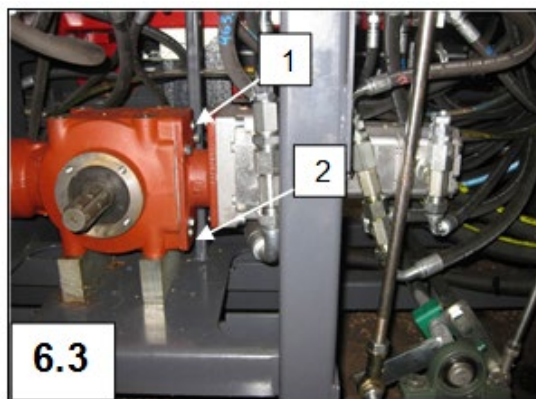
- ❑ The standard filing angle is 30°.
- ❑ The angles must be the same on all the cutters of the saw-chain. If the angles are uneven, the saw-chain will rotate unevenly, will wear more quickly and may even break.
- ❑ All cutters must be the same length. If the cutters are not the same length, they will have different heights. This makes the chain run roughly and possibly crack.
- ❑ The required sharpening results can be met only after sufficient and constant practice. Use a file holder! As required, turn to a professional.

### **Servicing the saw-bar**

- ❑ Always turn the saw-bar over, file its side and clean its groove when necessary.

### **6.1. Changing the angular gear oil, Fig. 6.3**

- ❑ Loosen the attachment screws of the lower cover at the rear of the machine, and remove the cover.
- ❑ The oil plugs are located in the side of the angular gear. Filling 1 and drainage 2, Fig. 6.3.
- ❑ The angular gear must be demounted for the oil change, or the used oil must be drained, for example, by means of suction drainage.
- ❑ Fill up with about 1 litre of new oil.
- ❑ The upper limit is at the lower edge of the filling opening.
- ❑ Oil type SAE 80.



### **Lubricating the machine**

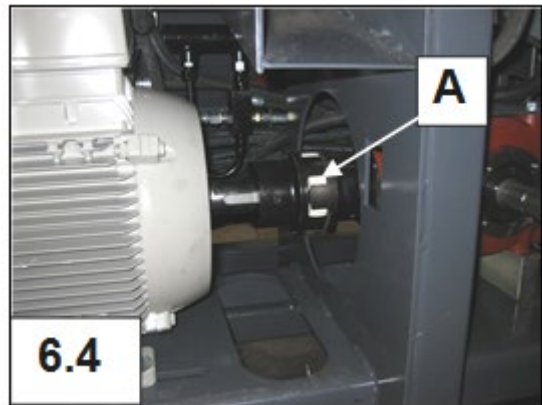
- ❑ See the service schedule. Many of the bearings are lubed-for-life and do not need to be lubricated. If a lubed-for-life bearing receives too much lubricant, its gasket may get damaged.

**NOTE !      If the machine is left standing for a longer period of time, it is important that the bearings always be provided with clean lubricant.**

- ❑ If the machine is used regularly, lubricate the bearings once a week.
- ❑ Oil the moving joints daily.

## 6.2. Coupling for electric motor, Fig. 6.4

- ❑ Check the rubber A of the coupling at regular intervals.
- ❑ For example, every time the saw-shaft is lubricated.
- ❑ If the clutch clearly shows play, change the rubber.
- ❑ If the coupling makes an unusual rattling noise, the coupling rubber and possibly also the coupling claws are worn out and need to be replaced without delay.

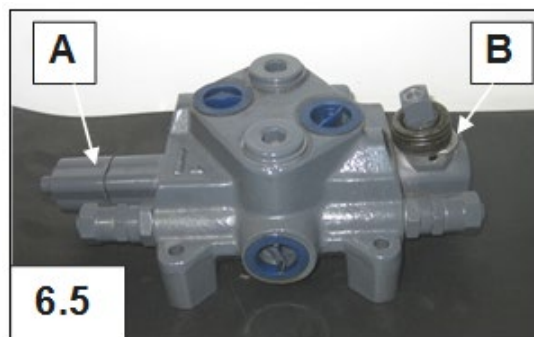


## 6.3. Oil change

- ❑ To ensure flawless operation of the machine, the oil must be changed every 500 operating hours or at least one year after the start of operations.
- ❑ The oil tank is drained by opening the bottom plug under the tank.
- ❑ The filters (2 pcs.) must also be changed, because of the contaminants extracted from the hydraulic system, which end up in the filters. We recommend changing the filters for the first time soon after the start-up, because the largest impurities come loose from the hydraulic system shortly after the start-up.

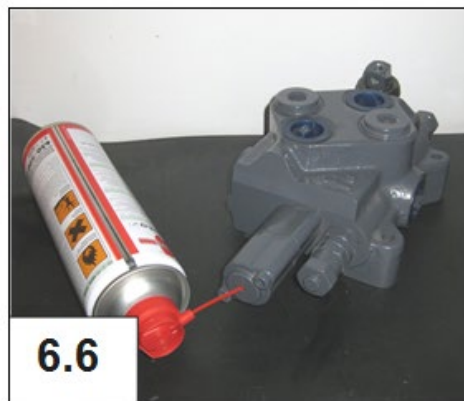
## 6.4. Maintenance of the valve

- ❑ The detent end A, the spool shifter joint B and the ball joint of the control valve must be lubricated regularly to ensure their long service life and flawless operation.
- ❑ Lubrication of the valve is particularly important if the machine is left standing for several months.
- ❑ If the parts of the detent have become rusty, the machine will not operate flawlessly.



### 6.5. Detent end of valve

- ❑ There is a small hole in the middle of the end plate of the detent end of the valve for spraying lubricant onto the moving parts of the valve.
- ❑ Only use oil that does not congeal in frost.
- ❑ The easiest way is to use a spray bottle with a nozzle and pipe.
- ❑ Insert the spray pipe in the hole and press 2-3 times for about 1-2 seconds at a time.
- ❑ The oil spreads smoothly on the moving parts of the detent end.



**NOTE !      Do not use Vaseline spray because this congeals in severe frost and the valve will not then operate properly.**

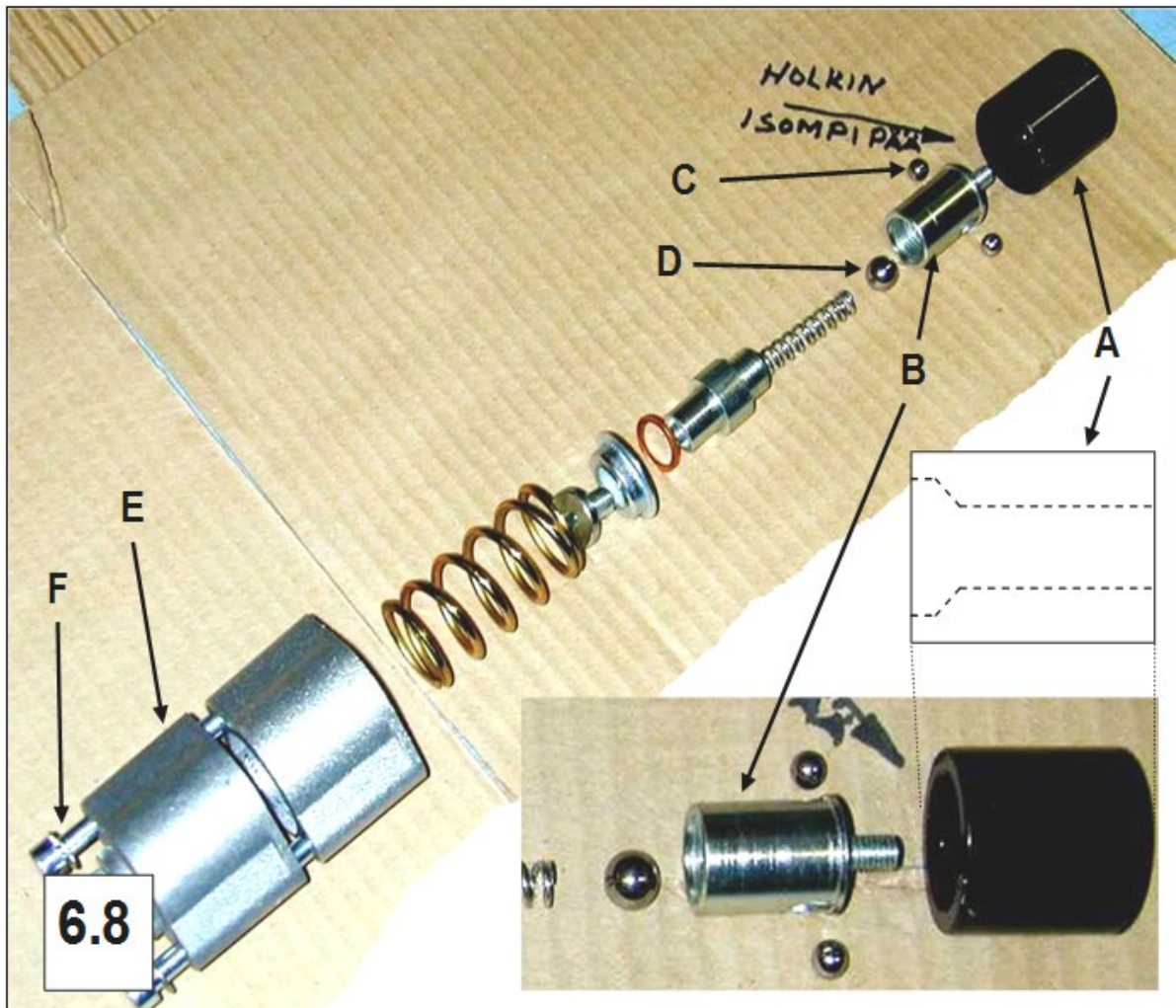
### 6.6. Lubricating the spool shifter

- ❑ The spool shifter is equipped with a pin and a ball joint that require regular maintenance and lubrication.
  1. Lift up the edge of the protective rubber of the spool shifter.
  2. Spray lubricant on both sides of the pin and down on the ball joint.
  3. At the same time, check that the rubber is intact.





### 6.7. Structure of the detent end and the correct order of parts. Fig. 6.8



- ❑ Keep the cover E of the detent end depressed while undoing the valve screws F, as the stiff springs can throw the cover off. This can also make the springs and balls of the detent fly off.
- ❑ To ensure that the small balls C stay properly in position during assembly of the detent end B, apply a small amount of Vaseline to the holes in the side of the detent end B. Ensure that part A comes into the correct position, as illustrated in the picture.

### 6.8. Discharge conveyor

- ❑ The conveyor is equipped with hydraulic transmission
- ❑ The conveyor chains are equipped with automatic spring tensioning.
- ❑ The bearings at the top of the conveyor are lubed-for-life so they do not require any maintenance.
- ❑ The bearing at the lower end of the conveyor shall be lubricated every 100 hours.





### **6.9. Cleaning the machine**

- ❑ Keep the conveyor free of debris to ensure its trouble-free operation.
- ❑ The machine, and in particular the conveyors, must always be cleaned when the work is ended. This is especially important in winter.

### **6.10. Washing the machine**

- ❑ Wash the machine occasionally with a high-pressure cleaner. This is especially important if the machine is left standing for a longer period of time. Lubricate the machine after washing.

**Note. Do not direct the water jet onto electric devices or bearings.**

### **6.11. Storing the machine.**

- ❑ The machine is intended for outdoor use but it is recommended to keep it under cover for longer standstills to avoid corrosion or malfunctions.
- ❑ For storing outdoors, cover the machine with a tarpaulin of suitable size.

**Note. Always ensure after the service that the machine's operating controls and protective devices are operating properly. All the protective covers that were removed from the machine for the service must be returned to their places after the service measures.**

## 7. Maintenance schedule

Object	Task	Daily	Service interval 100 h	Service interval 500 h	Service interval 1000 h	Material /Method
Angular gear TR–powered	Check 1 Change 2 Change		X	X	X	SAE 80 1 l
Hydraulic oil Normal conditions	Check 1 Change 2 Change		X	X	X	Volume 135l E.g. Esso Unavis 32 Neste Hydraul 32
Oil filters	1 Change 2 Change		X	X	X	FIO 100/3, 2 pcs. The filters must always be changed in connection with the oil change.
Bearings requiring lubrication	Lubrication		X			Ball-bearing lubricant
Splitting valve	Lubrication		X			Lubrication oil, spray At least once a month.
All levers	Lubrication	X				Lubrication oil
Crosscut saw- blade	Sharpening					As required
Machine	Cleaning	X				
Electric motor	Cleaning	X				
Electric equipment	Cleaning	X				

## 8. Malfunctions and their remedy

<b>Disturbance</b>	<b>Cause</b>	<b>Remedy</b>
Splitting is not operational	<ol style="list-style-type: none"> <li>1. Protective net for splitting chute is open.</li> <li>2. No oil or too little oil.</li> <li>3. Debris inside the launch system.</li> <li>4. The oil is too cold.</li> <li>5. A hydraulic hose has burst or is leaking.</li> <li>6. The splitting system does not move due to freezing.</li> </ol>	<ol style="list-style-type: none"> <li>1. Close the protective net.</li> <li>2. Stop the machine immediately and top up the oil.</li> <li>3. Clean up the launch system.</li> <li>4. Allow the oil to circulate at free-flow for a few minutes.</li> <li>5. Replace the hose.</li> <li>6. Always clean the machine when you stop working.</li> </ol>
The splitting movement does not stop, when the protective net is opened.	<ol style="list-style-type: none"> <li>1. The setting of the locking device has moved out of position or the locking device is broken.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust the locking device or replace the faulty part.</li> </ol>
Slow or powerless splitting movement.	<ol style="list-style-type: none"> <li>1. The oil is too cold.</li> <li>2. No oil or too little oil.</li> </ol>	<ol style="list-style-type: none"> <li>1. Allow the oil to circulate at free-flow for a few minutes.</li> <li>2. Top up oil.</li> </ol>
The log does not split.	<ol style="list-style-type: none"> <li>1. Incorrect position of the wedge.</li> <li>2. A large branch at the splitting point.</li> <li>3. Exceeds the upper limit for the machine.</li> <li>4. The oil pressure has dropped.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust the height of the wedge.</li> <li>2. Stop the machine, open the splitting cover, rotate the log, and close the splitting cover.</li> <li>3. Maximum thickness 43 cm.</li> <li>4. Check the hydraulic system.</li> </ol>
The crosscut saw cuts poorly.	<ol style="list-style-type: none"> <li>1. The blade is dull.</li> </ol>	<ol style="list-style-type: none"> <li>1. Sharpen or replace the chain.</li> </ol>
The saw-chain clashes with the saw-cover.	<ol style="list-style-type: none"> <li>1. The bolts of the bearings supporting the saw-shaft have loosened. The saw-shaft in an oblique position.</li> </ol>	<ol style="list-style-type: none"> <li>1. Straighten the saw-shaft and tighten the bolts.</li> </ol>
The conveyor belt is running at the side.	<ol style="list-style-type: none"> <li>1. The setting has moved out of position.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust the return rollers at the end of the conveyor. Test run after the adjustment.</li> </ol>
The log gets stuck in the splitting wedge.	<ol style="list-style-type: none"> <li>1. Incorrect length of splitting stroke.</li> <li>2. Blunt splitting wedge.</li> </ol>	<ol style="list-style-type: none"> <li>1. Extend the stroke.</li> <li>2. Sharpen the saw-blade.</li> </ol>
The log rises up during splitting.	<ol style="list-style-type: none"> <li>1. Crooked or knotty tree.</li> <li>2. Stroke of the pusher is too short.</li> </ol>	<ol style="list-style-type: none"> <li>1. Correct the position of the log.</li> <li>2. Check the stroke length of the pusher.</li> </ol>
The log clashes with the bottom of the conveyor.	<ol style="list-style-type: none"> <li>1. The conveyor stands too upright.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the rise angle of the conveyor.</li> </ol>

The electric motor does not start.	<ol style="list-style-type: none"> <li>1. Emergency stop button has been depressed.</li> <li>2. The temperature switch has tripped.</li> <li>3. Makes loud noise, but does not start.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reset the emergency stop button.</li> <li>2. Wait for 1-2 minutes; the temperature switch then resets automatically.</li> <li>3. The fuse has blown, replace it.</li> </ol>
The electric motor stops easily and the thermo-relay trips.	<ol style="list-style-type: none"> <li>1. Incorrect setting of the thermo-relay.</li> </ol>	<ol style="list-style-type: none"> <li>2. Re-adjust the thermo-relay.</li> </ol>
The electric motor rotates in the wrong direction.	<ol style="list-style-type: none"> <li>1. Two phase conductors in the wrong order.</li> </ol>	<ol style="list-style-type: none"> <li>1. Switch the positions of two of the conductors in the plug. Leave the work to an expert!</li> </ol>
The oil gets very warm.	<ol style="list-style-type: none"> <li>1. Too little oil.</li> <li>2. The cylinder hits the bottom but the pressure is not relieved, so the oil circulates via the relief valve.</li> </ol>	<ol style="list-style-type: none"> <li>1. Top up oil.</li> <li>2. Adjust the cylinder stroke and swing.</li> <li>3. Check the oil pump.</li> </ol>

## 9. Electric diagrams

