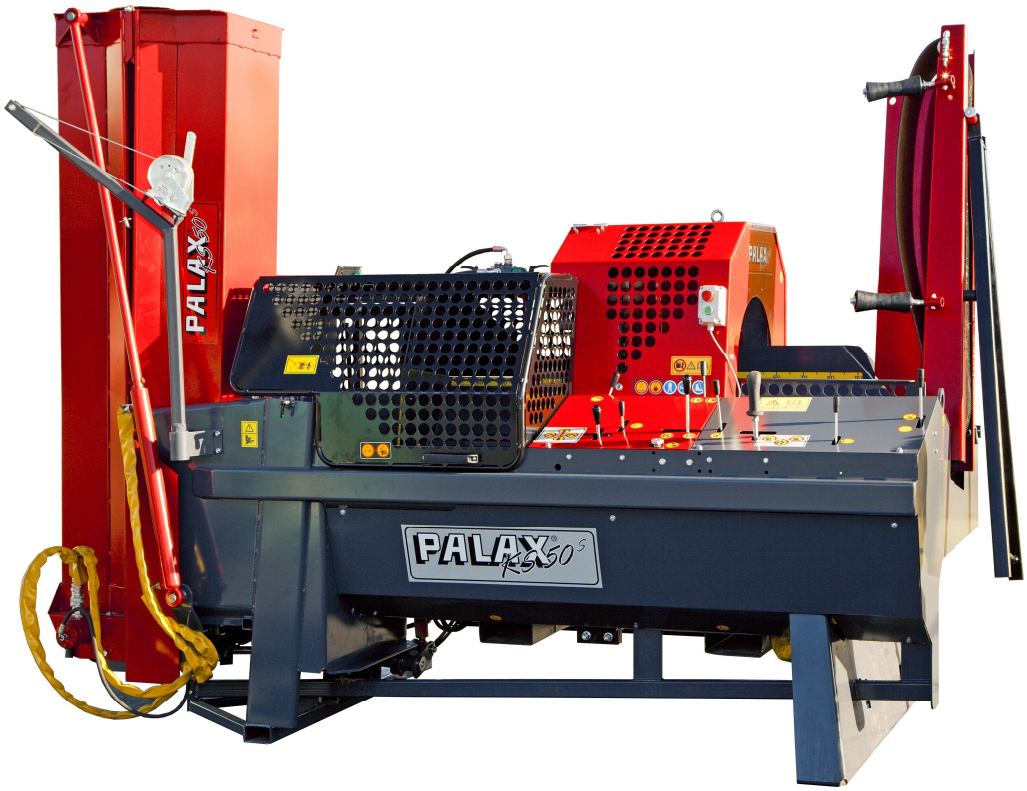
OPERATING INSTRUCTIONS

PALAX KS 50s

powered by tractor
powered by electricity
swing conveyor of 4.0-metres with hydraulic motor



SERIAL NUMBER _____

YEAR OF MANUFACTURE _____

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CONTENTS

1 BASIC SPECIFICATIONS AND RESPONSIBILITIES

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 power take-off 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.

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

1.2 EU Declaration of Conformity

Directive 2006/42/EC

Manufacturer:	Ylistaron Terästakomo Oy www.palax.fi Lahdentie 9 FI-61400 Ylistaro Finland +358 6 474 5100
Product:	Palax KS 50s Firewood Processor with discharge conveyor of 4 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-HANDBOOK 93-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.

Ylistaron Terästakomo Oy
29.12.2009

Martti Vaurio
Managing Director

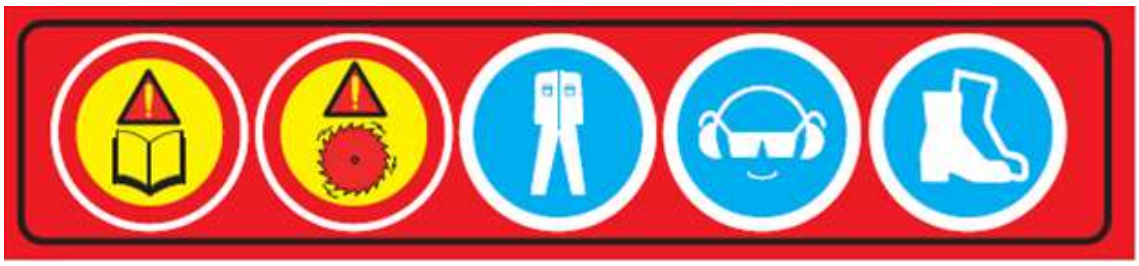
1.3 Intended use of the machine

This Firewood Processor with Conveyor is intended for the purpose of producing firewood primarily of round timber, but of logs as well.
Use of the machine for any other purposes is prohibited.

Note! Max. capacity of the machine

- For cutting, the maximum diameter of the tree is about 48 cm.
- The maximum length of the log to be processed is 4–5 metres. If the logs are longer than this, a log-deck shall be used

1.4 Warning signs



Read the instruction manual | **Beware of the crosscut saw-bar** | **Wear clothes, which do not hang loosely** | **Always use eye guards and hearing protectors** | **Wear safety shoes**

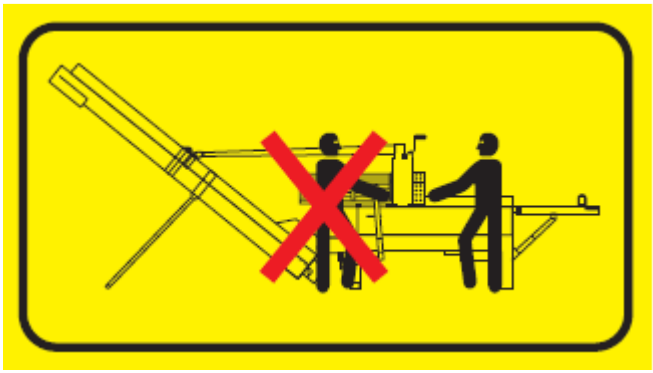
Risk of getting squeezed

Beware of power take-off shaft

Disconnect the machine from the electric supply before taking to any service measures

Safe distance from the conveyor 5 m

Stay away from moving parts



The machine may only be operated by one person

1.5 Instruction signs

Lifting point, for a forklift truck

Lifting point, hook

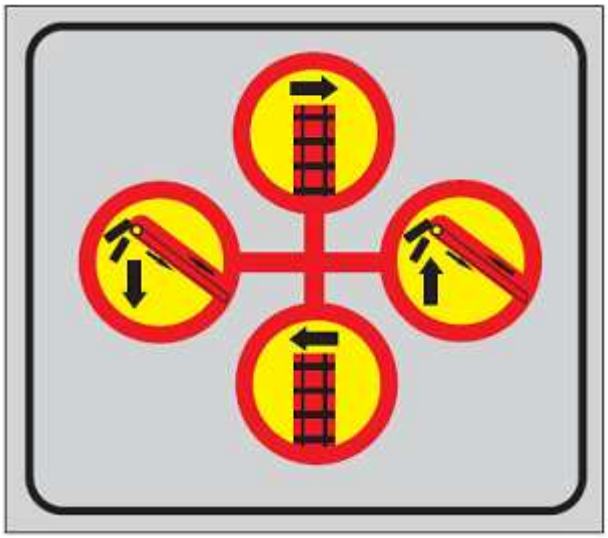
Direction of rotation of the motor

Rotational speed of the PTO-shaft

Saw-chain oil tank

Adjustment of oil flow to the saw-chain

1.6 Signs for operating controls



Sideways adjustment of the discharge conveyor

Height adjustment of the discharge conveyor

Starting and stopping the discharge conveyor belt

Height adjustment of the splitting wedge

Emergency stop, only in machines powered by electricity

Manual start of the splitting cylinder

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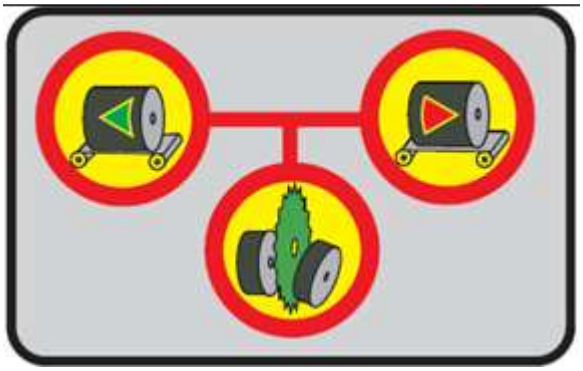
Reversing the pusher

Stopping the splitting

/

Automatic splitting

Automatic splitting ON **OFF**



Lifting the hydraulic log-clamp

Controlling the in-feed conveyor and cutting operation as well as automatic launch of the splitting

Bringing the log onto the in-feed rollers using the hydraulic log-deck

Flap not in use/Manual use of the flap

Flap not in use

1.7 Type markings

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 15 kW, current 32A.

- The sign is located in the connecting box of the electric motor.

1.8 The main dimensions and models of the machine

Item	Powered by tractor	TR /operated by electricity
Output	-	15 kW
Fuse size	-	32 A
Weight	2,000 kg	2,100 kg
Height/width/length	2600 mm x 3300 mm x 1800 mm	
Crosscut deck	Length 2550 mm	
Height of crosscut deck	1,040 mm	
Saw-bar length	22”	
Saw-chain	Gauge 1,6 mm; pitch 0,404”; 75 links	
Max. diameter of the tree	48 cm	
Max. length of tree, splitting	660 mm	

1.9 Safety instructions

General regulations and restrictions

- The maximum length of the log to be cut is 4–5 metres. A log-deck shall be used for longer logs.
- The machine is exclusively intended for the production of firewood.
- The machine is about 3.3 metres wide, which means its transport width is slightly greater than that of the tractor.
- The machine may only be operated by one person.
- The danger zone around the conveyor is 5 metres to the sides and to the rear.
- Before transporting, always swing the extension table of the in-feed conveyor into the upright position, and lock it there.
- The three-point linkage of the tractor is of size-category two. If using a tractor larger in size, check that there is sufficiently space for the PTO-shaft and its protective guard.
- Never use the machine indoors, risk of dust generation!
- Never remove any safety-related devices from the machine.

The operator

- 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

- Make sure that all other people stay outside the operating range.
- Always hitch the tractor-driven machine to the three-point linkage. Also ensure that sufficient space is provided for the PTO-shaft and its guard.

- Only use a fault-free power take-off drive shaft and attach the chain for the shaft-guard. The rotational speed 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.
- Always check that all the covers are intact and properly fastened.
- Always check that the crosscut saw-bar is intact.
- Always ensure that the electric conductors are intact.
- Always check that all the controls are operational.
- Always check the oil level and that the hydraulic hoses and components are undamaged.
- 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 log is always supported by the cut-off deck at the cutting point. Danger of rolling over!
- Exercise particular caution when cutting knotty or crooked logs, because, as a result of faulty cutting, the log might roll 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 before servicing.
- Only cut one log at a time.
- Danger! Stay away from moving parts.

1.10 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/s2.

1.11 Responsibilities of the operator

- All the safety-related devices are necessary to ensure a sufficient level of safety.
- The machine operator is responsible for the flawless operation of the safety-related devices and for ensuring that the machine is serviced in a due manner.
- Modifying the construction of the machine is prohibited.
- The machine may only be used to produce firewood.
- The operator is responsible for ensuring that no one else is subjected to any danger.
- As the operator, remember that you are responsible for any injuries caused if any safety-related devices have been removed from the machine or if its operation has been modified in any way.
- The KS 50s is a very safe machine provided that it is operated carefully following the instructions and that it is serviced regularly.

1.12 Operating conditions

- Always place the machine on as level a surface as possible.

- Prevent risks, such as slipping in winter, by organising the work sit–e in a due manner.
- 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.
- The suitable temperature range for operation is approximately -20 to +30 degrees Centigrade. When starting the machine in severe frost, first allow it to idle at low speed for about 5 to 10 minutes. This way, the oil warms up and flows better, so risk of damage to the seals is reduced.
- No restrictions concerning the weather apply.
- Make sure that no other people, especially children, are present inside the operating range.
- Never use the machine indoors, risk of dust generation!

1.13 Terms of warranty

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

The warranty covers

- Parts, damaged during normal operation of the machine due to defects in material or workmanship.
- The reasonable repair cost in accordance with the agreement between the seller and the manufacturer or 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 saw-chain, the sprocket, the conveyor belts or oils.
- 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 demands due to the above-mentioned measures.
- Any indirect costs and/or travel expenses incurred from making repairs under the guarantee.
- The warranty for parts changed during the warranty period, expires at the same time as the warranty period of the machine.
- Consult your dealer about matters related to the warranty.

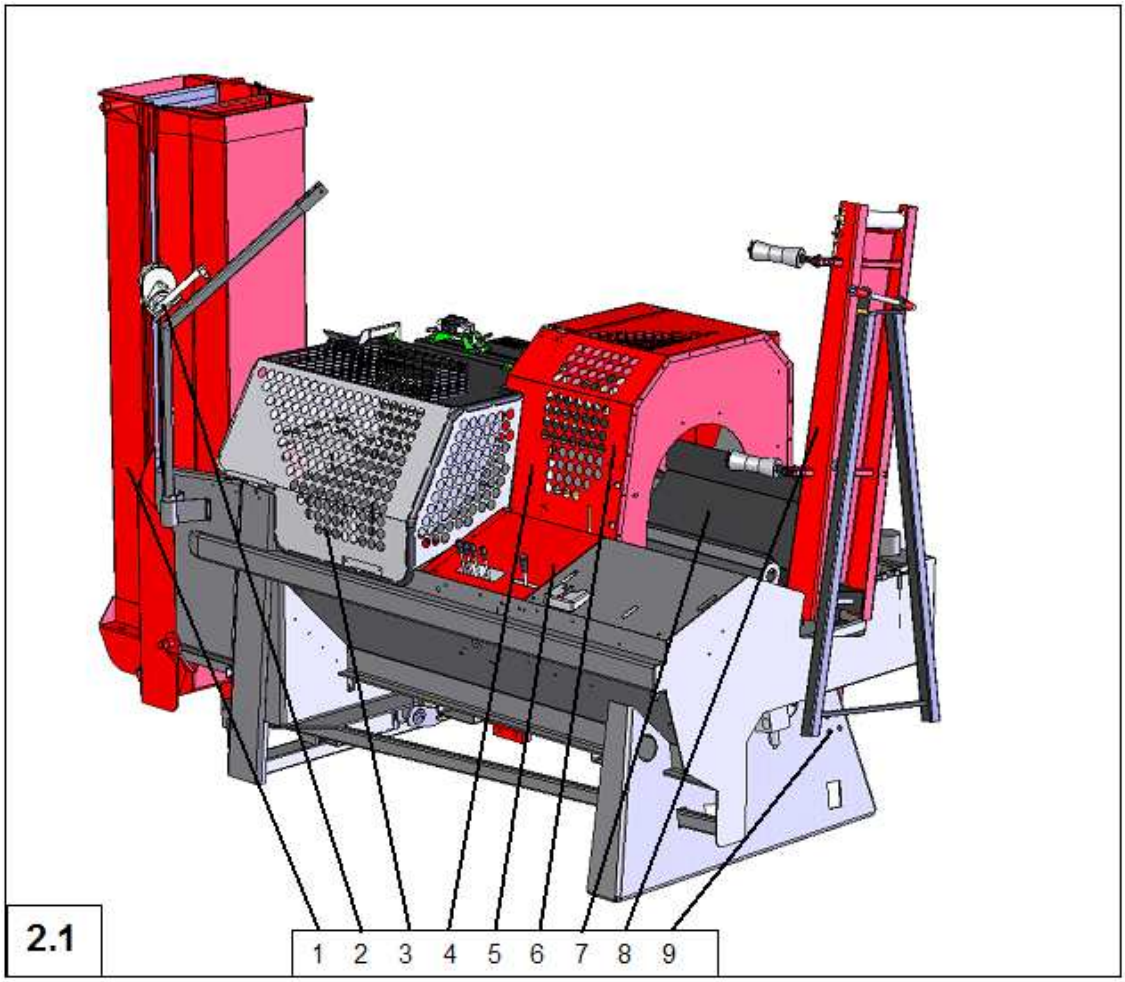
2 TAKING DELIVERY AND ASSEMBLY OF THE MACHINE

2.1 State of delivery and acceptance control

- The machine is delivered almost ready-assembled, adjusted and test driven.

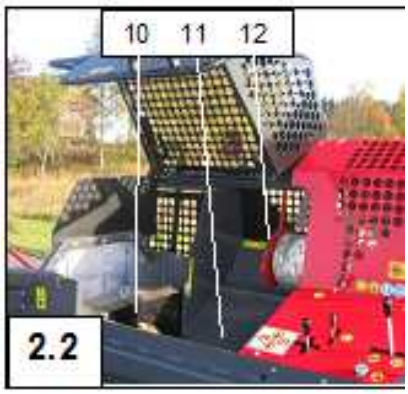
- ❒ Check the delivered goods without delay.
- ❒ If the product shows transport damage, contact the transport company and your dealer immediately.

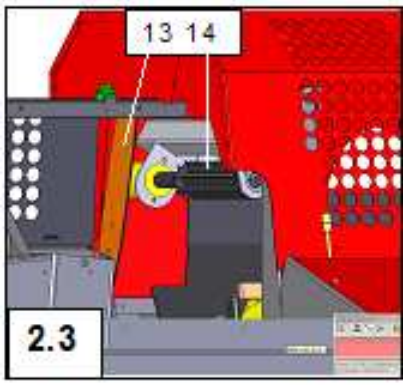
2.2 Main parts of the machine, Figs. 2.1, 2.2, 2.3 and 2.4



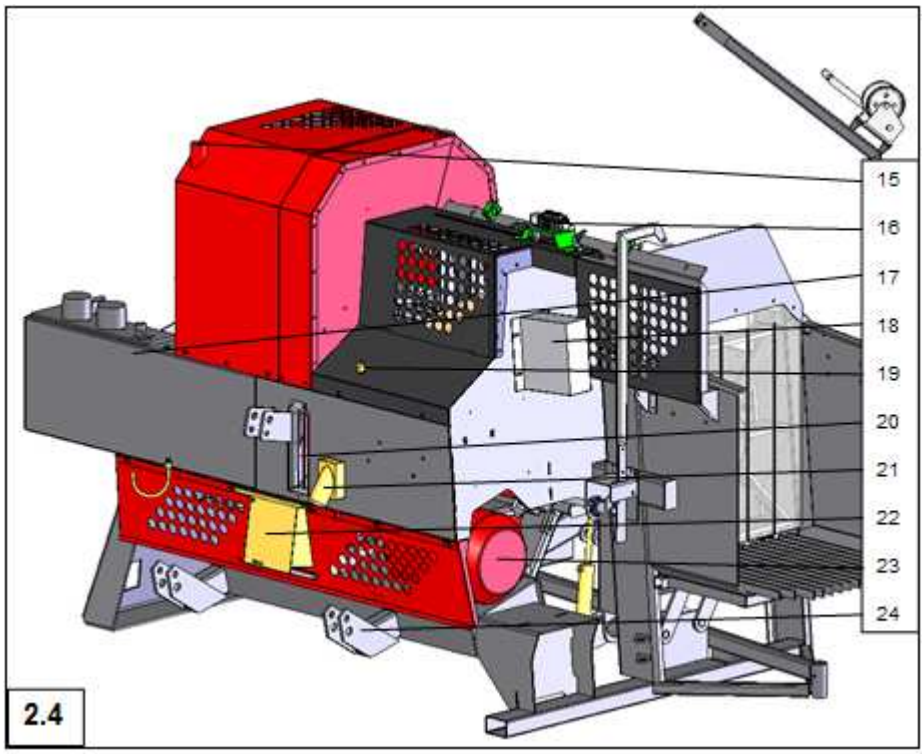
2.1

1 Discharge conveyor
2 Winch
3 Cover for splitting area
4 Blade cover
5 Control panel
6 Controls for the starting, stopping and emergency stopping of a machine powered by electricity
7 In-feed conveyor
8 In-feed conveyor extension
9 Connectors for external hydraulic circuit (log-deck)





10 splitting wedge
11 Flap
12 Log-length limiter
13 Crosscut saw-blade
14 Log-clamp



15 Saw-chain oil tank
16 Log-stop
17 Hydraulic oil tank
18 Oil cooler (optional)
19 Adjustment of oil flow to the saw-chain
20 Exit opening for sawdust
21 Electric socket
22 PTO- shaft
23 Electric motor
24 Three-point linkage

2.3 Installing the winch, Figure 2.5

- The machine is equipped with a winch for changing the splitting wedge and manoeuvring the in-feed conveyor extension.
- The winch is delivered separately with the machine.
- Lower the peg at the lower end of the winch support (1) into the socket (2) in the winch lug.
- Fasten the winch support to the socket using the screw and the washer (3) that were delivered with the winch.

2.4 Topping up hydraulic oil, Fig. 2.6

- The volume of hydraulic oil is 120 litres.
  Oil type Univis 32, SHELL Tellus 32, NESTE HYDRAULI 32 or equivalent.
- Only use fresh, clean oil, because smooth operation of the machine is highly dependent on the purity of the oil.
- Check the oil level regularly by means of the dipstick 2.

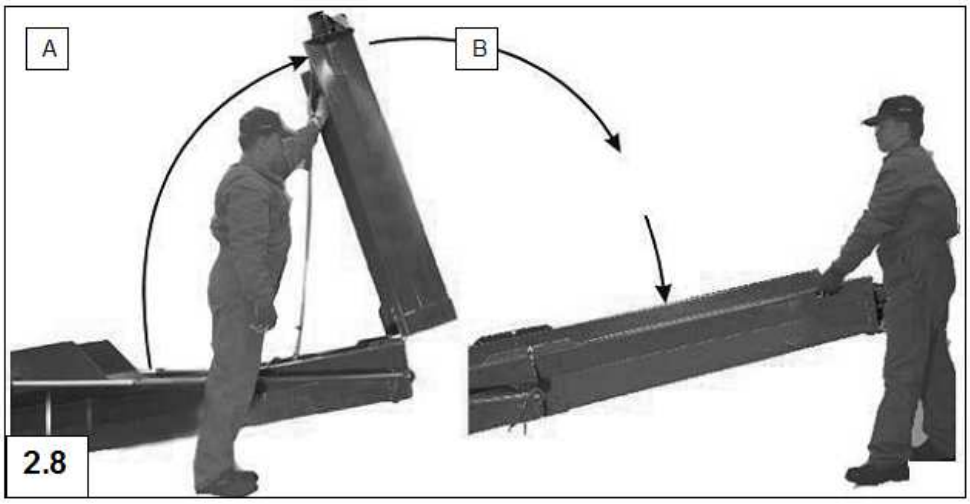
2.5 Checking and topping up the saw-chain oil, Fig. 2.7

- The oil tank for the saw-chain is located in the saw housing at the rear of the machine.
- Regularly check the level of the saw-chain oil in the level hose 1.
- Top up the oil, as necessary. The volume of the tank is about 9 litres.

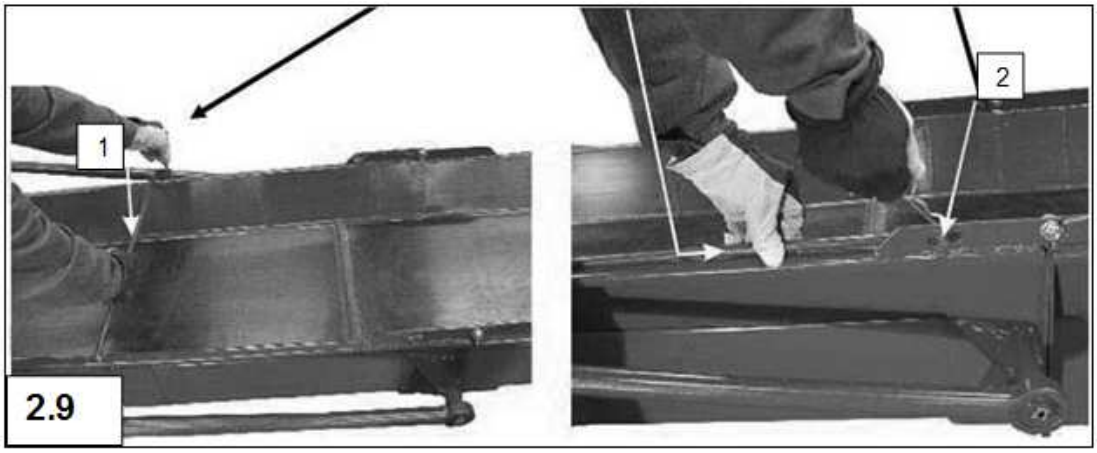
2.6 Bringing the discharge conveyor into the work position, Figures 2.8-2.10

- Bringing the conveyor into the work position, adjusting it while in the work position or lifting it into the transport position shall be carried out in such a manner that that neither the machine, nor the persons or the environment will be exposed to danger or damage.
- Never stand or walk under the conveyor while it is in the upper position!

1. Make sure that the control lever for the conveyor's drive motor is in the STOP-position, which means the conveyor belt is immovable.
2. Lower the conveyor using the control lever on the control panel.
3. Lift up the extension, point A, Fig. 2.8.
4. Lower the extension, point B, Fig. 2.8.
5. The holder (1) at the centre of the conveyor prevents the conveyor belt from lowering of itself into the transport or storing position. Remove the split cotter (2) that locks the holder while the conveyor is in the horizontal position. Turn the holder parallel with the conveyor and lock it in position using the split cotter.
6. Lift up the conveyor to an angle of about 45 degrees.
7. Lock the extension of the conveyor using the lock at the bottom of the conveyor.
8. Start the discharge conveyor using the control lever on the control panel.



2.8



2.9

2.7 Bringing the conveyor into the transport position

1. Bringing the conveyor into the transport position is done in the same manner as bringing it into the work position, but in reverse order.
2. 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.

2.8 Bringing the in-feed conveyor to the work position, Fig. 2.1

1. Transfer the loop of the winch to the hole in the plate of the conveyor's extension part.
2. Keep the wire rope tight.
3. Release the lock bolt.
4. Lower the extension part by means of the winch so that the holes in the support leg pipe align with the holes in the support legs.
5. Release the winch hook from the in-feed conveyor.
6. Bringing the extension part of the in-feed conveyor to the transport position proceeds in the reverse order.

2.9 Changing the splitting wedge, Fig. 2.11

- As standard, the machine comes with a splitting wedge that splits in 8 ways. In addition, splitting wedges that split in four, six, eight or twelve ways are available as an option.
- To change the splitting wedge, proceed as follows:

1. Undo the locking screw of the splitting wedge rail.
2. Bring the splitting wedge to its most extreme vertical position using the height adjustment lever on the control panel.
3. Open the splitting cover completely: When opening the cover, the gas spring thrusts the cover to its normal open-position. After this, open the cover completely with your hand so that the cover turns away from over the splitting wedge.
4. Twist an eye-bolt into the hole in the upper surface of the splitting wedge.
5. Attach the wire rope of the winch to the loop of the eye-bolt and lift away the splitting wedge.
6. Lower the replacement splitting wedge onto its rails by means of the winch. Make sure that the splitting wedge is set in its upper position.

7. As soon as the splitting wedge has been lowered and is supported only by the lifting mechanism, release the wire rope of the winch.
8. Lower the splitting wedge, and ensure that it is connected to the lifting mechanism of the wedge.
9. Remove the eye-bolt from the upper part of the splitting wedge. The eye-bolt and the splitting wedge may become damaged, if the log to be split partly goes above the upper surface of the splitting wedge.
10. Redo the locking screw of the splitting wedge rail.

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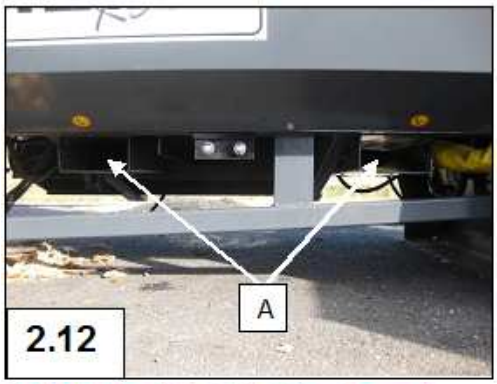
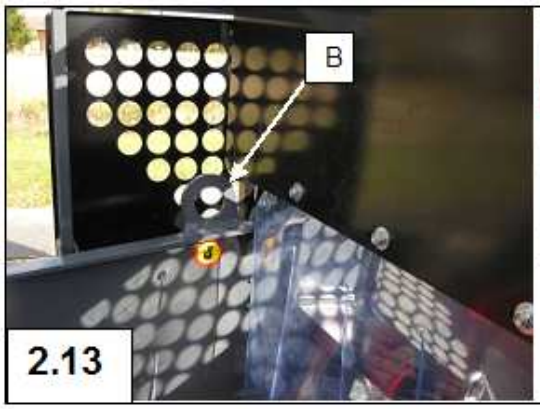
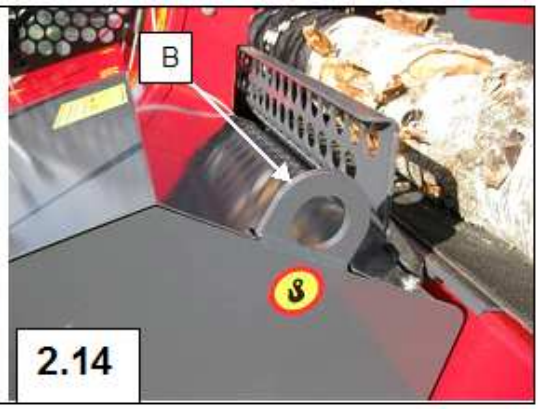
2.10 Lifting and moving the machine, Figures 2.12, 2.13, 2.14

Lifting the machine is allowed:

- With a forklift truck, by the lifting points A under the machine's frame.
- By the lifting points B and C on the upper part of the machine.
- 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 DRIVING POWER

The Palax KS 50s Firewood Processor can be driven both by tractor and by electric motor.

3.1 Powered by a tractor

- Always connect the machine to the tractor's three-point linkage and ensure that the space reserved for the PTO-shaft and its guard is sufficient.

- Suitable PTO-shaft are, for example: Binacchi B6110CEA60A60, Bondioli & Pavesi 7C26044CE007007.
- No safety clutch is required for the power take-off shaft.
- Only use fault-free power take-off drive shafts and always attach the chains for the shaft-guard to the machine.

NOTE! When you disconnect the power take-off shaft from the tractor, hang it in the hook on the machine.

- The machine comes with towing pins of 28 mm.
- If the power take-off of the tractor has a high-speed range, it is recommended to use it, because the horsepower requirement of the Firewood Processor is small.
- Make sure that the speed of the power take-off shaft does not exceed 500 r.p.m.
- The permissible revolutions range is 450–500 r.p.m.

3.2 Selecting the operating mode: powered by tractor or electricity (Figures 3.1 and 3.2)

- The machine is equipped with a system to prevent simultaneous operation in two modes.
- When the cover plate is shifted to the left (Figure 3.1), it is possible to connect the extension cable, and when it is shifted to the right (Figure 3.2), it is possible to connect the power take-off shaft.

3.3 Electric drive, start and emergency stop

- The power output of the motor is 15 kW at a speed of 1450 r.p.m.
- The machine is equipped with an automatic Y-D starter with an emergency stop feature.
- All electric installations must be completed.
- In the 380 V-system the fuse size is 32 A slow.
- The cross-section of the required extension cord is 6 mm2.
- Check the motor's direction of rotation when starting up the machine. If the motor and the pump are rotating in the wrong direction (the motor is running, but none of the functions can be activated), the direction of rotation is wrong.

In this case, assign a professional electrician to switch two of the phase conductors.

3.4 Starting

- Press the start button. 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 switched on and the motor quickly reaches full speed.
- The signal light between the start and stop buttons lights up when the D-position is activated.

NOTE! The machine must not be operated until the motor has reached full speed, because in the Y-position the output of the electric motor is very low.

3.5 Emergency stop of an electric-motor-powered machine

- The emergency stop is carried out by depressing the Emergency Stop button, button B on the starter.
- Release the button by turning and pulling up.

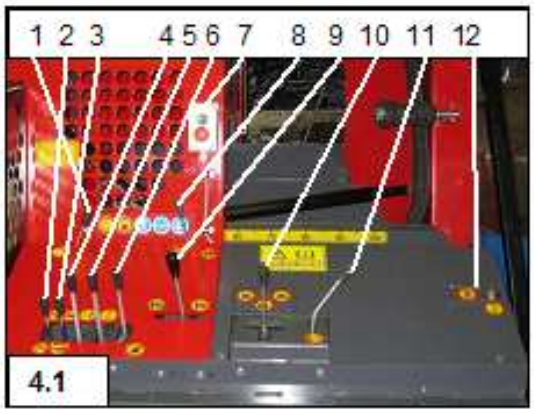
3.6 Starting the electric motor in frost

- In severe frost, the hydraulic oil or the oil in the angular gear can become so cold and viscous that the motor cannot be started.
- If operating the machine under cold conditions, we recommend that less viscous hydraulic oils be used.

NOTE! An electric heating carpet of 300 W with a thermostat is available as an option for the oil tank. We recommend installing 2–3 carpets in the KS 50 machine. Using the heater is beneficial, if the machine is operated under cold conditions. The starter is equipped as standard with a lever switch for the heater. Keeping the heating switched on for about 1-2 hours is enough to make the oil sufficiently fluent.

4 USING THE FIREWOOD PROCESSOR, DESCRIPTION OF OPERATION

4.1 Operating controls, Fig. 4.1 and 4.2



1. Starting and stopping the discharge conveyor belt
2. Swinging the discharge conveyor to the side
3. Lifting or lowering the discharge conveyor
4. Adjusting the splitting wedge height.
5. Operating the flap manually
6. Lifting the hydraulic log-clamp
7. Starting, stopping and emergency stopping of a machine powered by electricity.
8. ON-OFF lever for automatic splitting
9. Manual launch and stop/reverse of the splitting cylinders
10. Controlling the in-feed conveyor and cutting operation as well as automatic launch of splitting.
11. Bringing the log onto the in-feed rollers using the hydraulic log-deck
12. Bringing the flap to the ON/OFF-position.

4.2 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, also check that the operating controls and safety devices are in order. If any shortcomings are observed, repair them before starting up the machine.
- Before starting up, always check the levels of the hydraulic oil and the lubrication oil for the saw-chain.
- Start-up and testing
  1. Bring the control lever for splitting to the Stop-position.
  2. Start-up:
     a. When powered by tractor: Start the tractor and switch on the power take-off at low revolutions before increasing them to 500 r.p.m.
     b. When powered by electricity: Connect up the cable to the connector on the machine, and start the machine from the Start-button making sure that the motor is rotating in the correct direction.

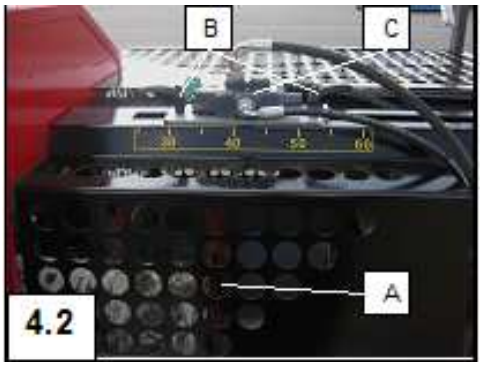
3. While the motor is running, check that the hydraulic system and the controls for shutting off are operational.
4. Test that the safety limit switches are operating when the cover is opened. The saw-bar must not lower nor the splitting mechanism work, while the cover is open.

- Check the supply of lubrication oil 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!

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!

4.3 Adjusting the log length, Fig. 4.2

- The length of the log is adjusted by shifting the hydraulic log length limiter.
- Unscrew the locking bolts B, that keep the hydraulic valve C in position, and shift the log-stop to the desired length position.



4.4 How the safety devices affect the operation of the machine, Figure 4.4

- 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.
- The protective net cannot be opened, if the saw-bar is not in its upper position!
- When the protective net is opened, the cutting movement of the saw-shaft is prevented and the pusher returns to its rear position.

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.

5 USE OF THE FIREWOOD PROCESSOR, CROSSCUT OPERATION

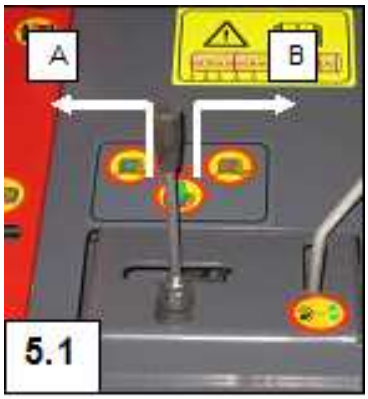
5.1 During the operation

- 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.

5.2 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 diameter of the machine's cutting opening is 48 cm, but the presence of branches and the form 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.
- To transfer the log for cutting, shift the control lever of the in-feed conveyor to the front and to the left, in direction A, (Fig. 5.1). 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. The in-feed conveyor stops as soon as the trunk reaches the log length limiter.
- Ensure that the log stays on the in-feed conveyor throughout the feed operation.

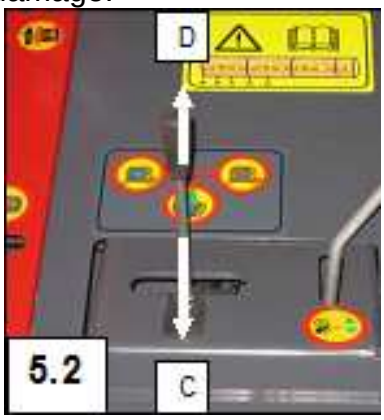


- During the transfer, the operator must be at the operating controls and absolutely not by the moving log! While the log is lying on the in-feed conveyor during transfer, always make sure that neither your hands nor other parts of your body get squeezed between the log and parts of the machine.
- If 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.
- 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.

5.3 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. 5.2).
- 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.
- Keep the lever in its extreme position until the log is cut off. Always make sure that the cut-off log aligns with the chute.
- Return the saw-bar to its upper position in the direction D
- If the automatic splitting feature is active, the splitting movement will be launched at the same time.



5.4 Disturbances during crosscut operation and their remedy

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

- Check that the rotational speed of the PTO-shaft is correct, 450–500 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.

6 USE OF THE FIREWOOD PROCESSOR, SPLITTING OPERATION

6.1 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 4, 8 or 24 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.

6.2 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.

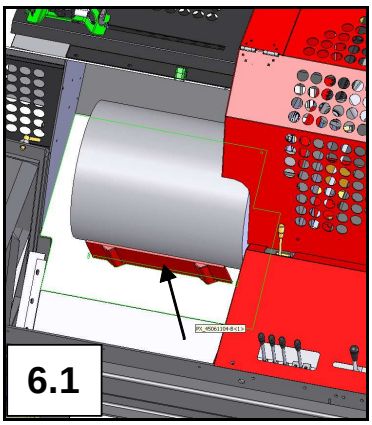
A wedge splitting in 8 ways, standard feature
- A standard wedge for splitting the log in eight ways.

A wedge splitting in 2/4 ways, optional
- Using this wedge, the log can be split in two ways (a log at maximum 20 cm in diameter) or in four ways.

A wedge splitting in 6 ways, optional equipment
- Using this wedge, the log can be split in six ways.

A wedge splitting in 12 ways, optional equipment
- Using this wedge, the log can be split in twelve ways.

6.3 Flap, Fig. 6.1


6.1

- 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 50s is equipped with a special flap that helps to transfer the billet being controlled into the splitting chute after the cut-off operation.
- The flap can be switched either to automatic operation or completely out of operation. The operating mode of the flap is selected with the ON-OFF lever 12 on the control panel, Fig 4.1.
- If the flap is in use, it automatically operates synchronic with the crosscut saw-bar. If the flap is not in use, the cut-off log falls straight onto the bottom of the splitting chute.

- In the automatic mode, the flap comes up during the cutting operation and receives the cut-off billet. When the crosscut saw-bar is raised using the control lever, first the flap goes down and guides the billet to the splitting chute, then the saw-bar starts going up again. This helps the billet settle correctly in the splitting chute before the automatic splitting is launched (applies provided that the automatic launch feature is also active).
- The flap can be operated manually using the control lever 5 irrespective of the position of the ON-OFF lever 12.

6.4 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 the splitting using the manual control. Changing the position of the log 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 log.
- 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..

6.5 Re-splitting the logs safely

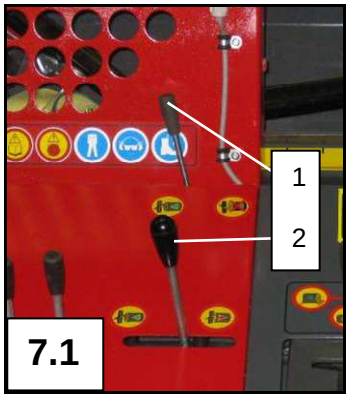
- If you want to process small-sized firewood from large logs, even pieces split in 8 or 12 ways may still be too large.
- Proceeding in the following way will help you to split the wood safely into even smaller pieces.
  1. Open the protective net for splitting chute
  2. Place the logs to be split into the splitting chute.
  3. Close the protective net.
  4. Start the splitting operation with the manually-operated start lever.

7 OPERATION OF THE SPLITTING MECHANISM

- The splitting mechanism can either be operated manually or set to operate automatically.

7.1 Automatic start, Fig. 7.1

- When the control lever (1) for the automatic splitting is turned left to the ON position, the automatic splitting feature becomes active.
- The splitting starts as soon as the saw-bar is lifted up after the cutting operation. The splitting starts when the saw-bar is close to its upper position.

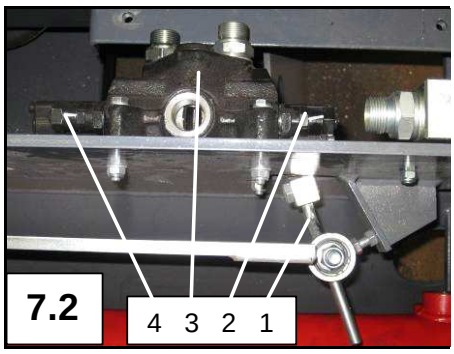


7.2 Manual start

- When the control lever for the automatic splitting is turned to the right to position OFF, no automatic splitting will occur, and the splitting must be launched manually.
- The splitting is launched by turning the control lever (2) for the splitting mechanism momentarily to its extreme position to the left.

7.3 Parts of the splitting valve, Figure 7.2

1 Valve rod
2 Spool shifter
3 Valve
4 Ball joint – detent end of the valve, which locks the spool in the splitting position



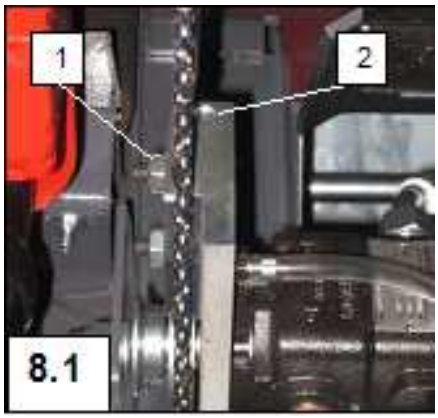
8 MAINTENANCE OF THE MACHINE

Note! Always stop the machine before servicing.

8.1 Crosscut saw-blade

8.1.1 Changing and tightening the saw-chain, Figures 22 and 23

- Unscrew the hexagon bolts of the saw-bar cover behind the machine and lift the saw-bar cover open.



- To tighten the saw-chain, loosen the attachment nuts (1) of the saw-bar (Fig. 8.1) 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.

8.1.2 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 oil or photogen.
- 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 75 links.
- Checking the saw-chain pitch: t = the distance over three rivets divided by two.
- 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.

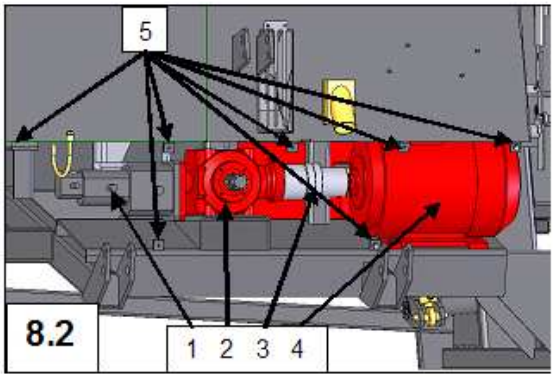
Depth gauges

- The depth gauge determines the height at which the cutter enters the wood and thus the thickness of the chip removed. The depth gauge setting is reduced when the chain is sharpened. Use the filing gauge to check the setting. If necessary, file using a flat or triangular file.
- The distance between the depth gauge and the cutting edge = 0.65 mm. While sawing coniferous trees, the setting can be increased by 0.2 mm, except in frost.

8.1.3 Servicing the saw-bar

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

8.2 Changing the angular gear oil, Fig. 8.2



- Loosen the attachment bolts of the lower cover at the back of the machine and remove the cover by sliding it to the side.
- The oil plugs are located in the side of the angular gear.
- 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 0,5 litres of new oil.
- The upper limit is at the lower edge of the filling opening.
- Oil type SAE 80

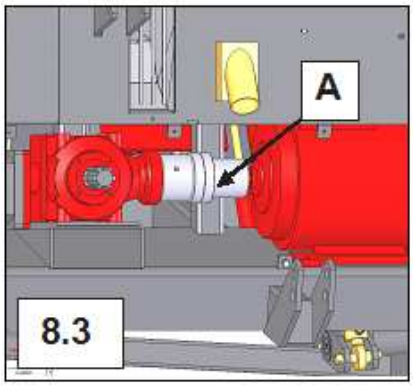
8.3 Lubricating the machine

- 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. The log-stop, the legs and the support rollers of the deck.

8.4 Coupling for electric motor, Fig. 28



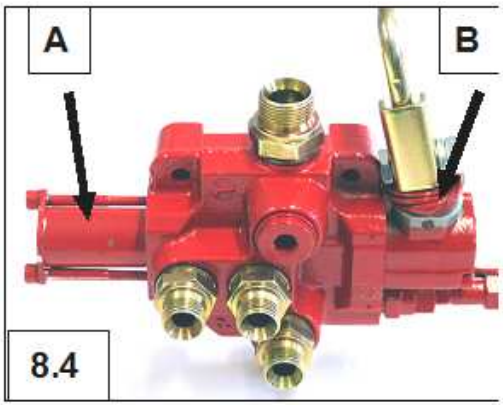
- Check the rubber A of the coupling at regular intervals.
- For example, every time the saw-shaft is lubricated.
- If the clutch clearly shows play, change the rubber.
- If the coupling makes an unusual rattling noise, the coupling rubber and possibly also the coupling claws are worn out and need to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

8.5 Oil change

- To ensure flawless operation of the machine, the oil must be changed every 500 operating hours or at most 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.

8.6 Maintenance of the valve

- To withstand and operate flawlessly, the detent end A, the spool shifter joint B and the ball joint of the control valve require regular lubrication.
- 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.



8.7 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.

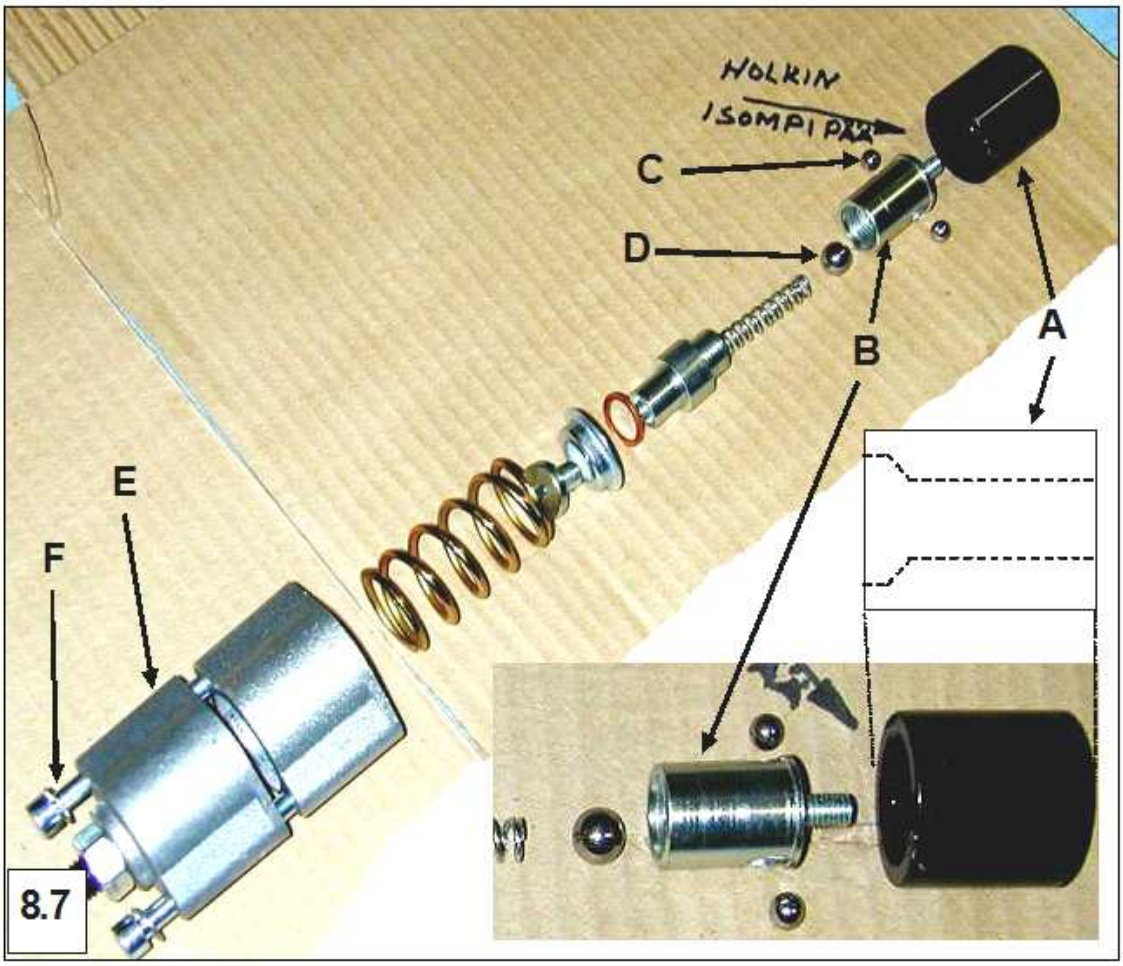
NOTE! Do not use spray Vaseline because it congeals in severe frost and the valve will not operate properly.

8.8 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.


8.6

8.9 Structure of the detent end and the correct order of the parts, Fig. 8.7



- 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 the part A comes into the correct position, as illustrated in the picture.

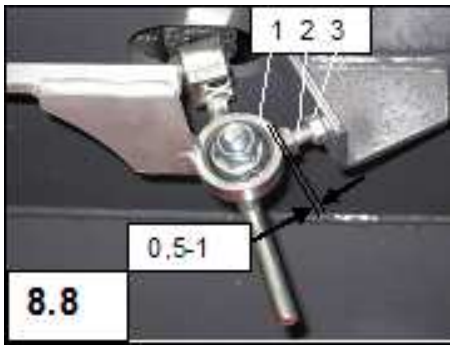
8.10 Basic settings of the splitting valve

- The valve and linkage have been adjusted and test run at the factory.
- The initial settings do not usually change so there is rarely any need for readjustment.
- If parts of the launch linkage have been dismantled and then reassembled, they must be adjusted in connection with the reassembly.

NOTE! During adjustment of the hydraulic valve, the following must apply:

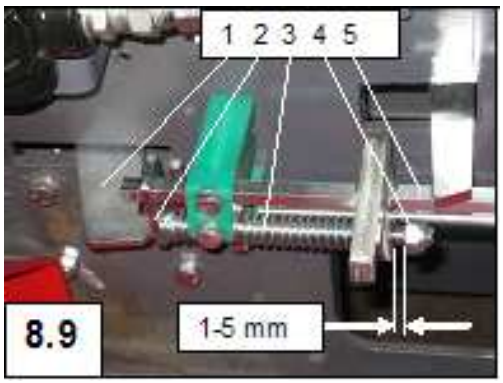
1. The splitting cylinder must be in the rear position.
2. The launch rod must be tightened.
3. The engine must be switched off

8.11 Adjusting the end stopper for the launch rod



- The purpose of the end stopper for the launch rod is to stop movement of the launch rod so that no excess strain, caused by the splitting mechanism, will be exerted on the splitting valve.
- The machine must be switched off. Turn on the splitting movement using the manual control lever.
- Loosen the lock nut for the end stopper.
- Adjust the screw so that the gap between the screw and the launch rod is 0.5-1 mm.
- Tighten the lock nut.
- Return the splitting valve to the centre-position.

8.12 Adjusting the launch lever pusher gap



- Ensure that the splitting valve is in its initial position and that the automatic splitting feature is operational (the lever is turned to the left).
- Pull back the control valve for cutting (sawing movement) and, at the same time, pull the saw-bar down. Note. The machine must be switched off!
- Lift up the crosscut saw-bar slowly and note when the pendulum (1, Fig. 8.9), by means of the pusher (2), pushes the launch rod (5) so far along that the splitting valve will turn and lock up in the splitting position.
- If the linkage does not turn the splitting valve sufficiently to make the splitting valve lock in the splitting position, the arm of the pusher (2) must be extended by turning the nut (4) counter-clockwise.
- Adjust the gap so that, as the splitting valve lever reaches its end position, the pusher spring (3) is depressed by 1-5 mm until the pendulum is released.

8.13 Adjusting the start moment of splitting

1. Open the saw-bar cover, and remove the control panel cover and the lower cover from the rear end.
2. Ensure that the splitting valve is in its initial position and that the automatic splitting feature is operational (the lever is turned to the left).
3. Pull back the control valve for cutting (sawing movement) and, at the same time, pull the saw-bar down. Note. The machine must absolutely be switched off!

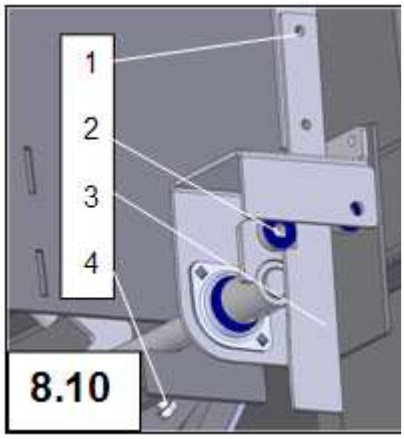
4. Lift the crosscut saw-bar slowly up and note the moment when the launch linkage turns the splitting valve to the splitting position.
5. To adjust the starting moment, disconnect the intermediate rod from the lever arm attached to the end of the saw-shaft.
6. To extend or shorten the intermediate rod, turn the joint at the end of it. Extending the rod makes the splitting start earlier and shortening it makes the splitting start later.

8.14 Adjusting the safety devices

- If any safety devices, or parts related to them have been dismantled, these must be adjusted in connection with the re-assembly so that they will operate properly.
  1. Remove the saw-shaft cover and the control panel cover for the adjustment.
  2. Make sure that the saw-shaft is in its upper position, the pusher is in its rear position, and the splitting valve is in the centre position.

8.14.1 Adjusting the safety wedge and the safety shaft

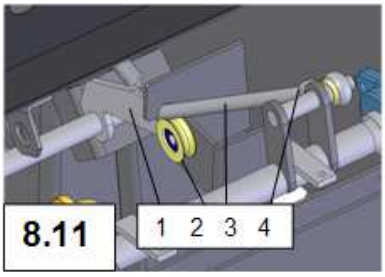
1. Close the cover for the splitting area.
2. Loosen the adjustment bolts for the safety wedge (1), and check that the bearing (2) for the turning device of the safety shaft makes contact with the narrower part of the safety wedge (3). As required, lower the safety wedge.
3. Lift up the safety wedge (3) so, that the corner of the wedge's broader part comes in contact with the bearing (2) of the safety shaft.
4. Tighten the bolts (1) of the wedge.
5. Adjust the support bolt (4) of the safety shaft so that its distance to the safety shaft is 0–2 mm.

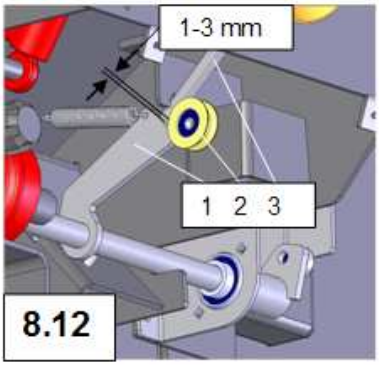


8.14.2 Adjusting the safety rod for the saw-shaft

1. Check that the safety wedge and the safety shaft are correctly adjusted, point 8.14.1.
2. Open the cover for the splitting area.
3. Adjust the distance between the support roller (2) for the safety rod and the sector-plate of the safety shaft to 1–4 mm. Observe that the sector-plate runs in the support roller's groove.
4. Loosen the lock nut (4) for the saw-shaft's safety rod (3).

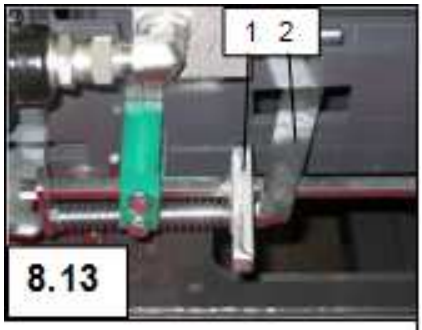
5. Adjust the safety rod so, that the distance between the end of the rod and the sector-plate of the safety shaft is 1–3 mm.
6. Fix the setting by tightening the lock nut (4).

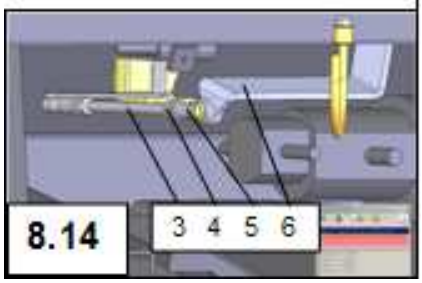




8.14.3 Centring lever for the splitting valve

1. Check that the safety wedge and the safety shaft are correctly adjusted, point 8.14.1.
2. Close the cover for the splitting area.
3. Turn the splitting valve to the splitting position, using the lever for manual control of the splitting mechanism.
4. Check that the lever (2) for centring the valve does not make contact with the turning device (1) of the launch bar's front end.
5. Open the cover for the splitting area.
6. Check that the centring lever turns the splitting valve to the centre-position. Also check that the centring lever does not turn so much that it ends up resting against the launch rod.
7. As required, adjust the trajectory of the centring lever by removing the intermediate rod from the lever on the safety shaft and turning the pilot bearing in the open or closed direction in order to adjust the length of the intermediate rod. Increasing the length makes the centring lever turn more.
8. Attach the intermediate rod and check its adjustment.
9. Finally, fix the position by means of a lock nut.



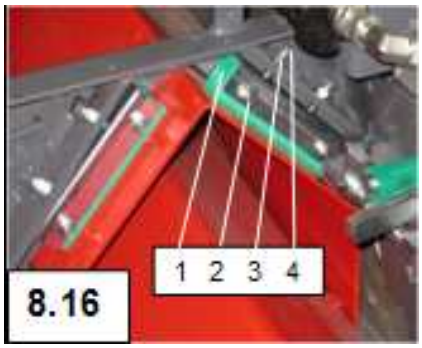


8.15 Discharge conveyor

- The conveyor is equipped with hydraulic transmission
- The conveyor belt is tightened by adjusting the roller at its upper end.
- The bearings at the top of the conveyor are lubed-for-life so they do not require any maintenance.
- The two bearings at the lower end of the conveyor shall be lubricated every 100 hours.

8.16 Adjusting the pusher clearance

- The pusher, moving inside the splitting chute, is supported at its front end and at the partition wall of the frame so that it cannot rise up from the space reserved for it during splitting.
- The plate at the front end of the pusher extends through the bottom of the splitting chute below the frame. The supports of the pusher, which slide under the splitting chute, are attached to this plate.
- These supports on the underside do not normally require any adjustment.
- The glide pads, installed in the partition wall of the frame, prevent the pusher from rising up, especially during the reverse movement.
- Remove the control panel for adjustment of the glide pads.
- Loosen the attachment bolts of the glide pads.
- Loosen the lock nuts for the tightening screws.
- Adjust the gap of the glide pads using the tightening screws. The gap is suitable, when the glide pads lightly follow the surface of the pusher. Excess tightening may hamper high-speed operation and subject the machine to unnecessary wear.



- Tighten the lock nuts of the adjustment screws and the attachment bolts of the adjustment pads.
- The glide pads can be replaced.

8.17 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.

8.18 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.

8.19 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.

❑

9 MAINTENANCE SCHEDULE

Object	Task	Daily	Service interval 100 t	Service interval 500 h	Service interval 1000 h	Material /Method
Angular gear TR–powered	Check 1 Change 2 Change		X	 X	 X	SAE 80 0.5 l Suction drainage
Hydraulic oil Normal conditions	Check 1 Change 2 Change		X	 X	 X	Volume 130 l e.g. Esso Univis 32 Neste Hydrauli 32
Oil filters	1 Change 2 Change			X	 X	FIO 100/ 3
Bearings requiring lubrication	Lubrication		X			Ball-bearing lubricant
Splitting valve	Lubrication		X			Lubrication oil, spray
All levers	Lubrication	X				Lubrication oil
Crosscut saw-blade	Sharpening					As required
Machine	Cleaning	X				
Electric motor	Cleaning	X				
Electric equipment	Cleaning	X				

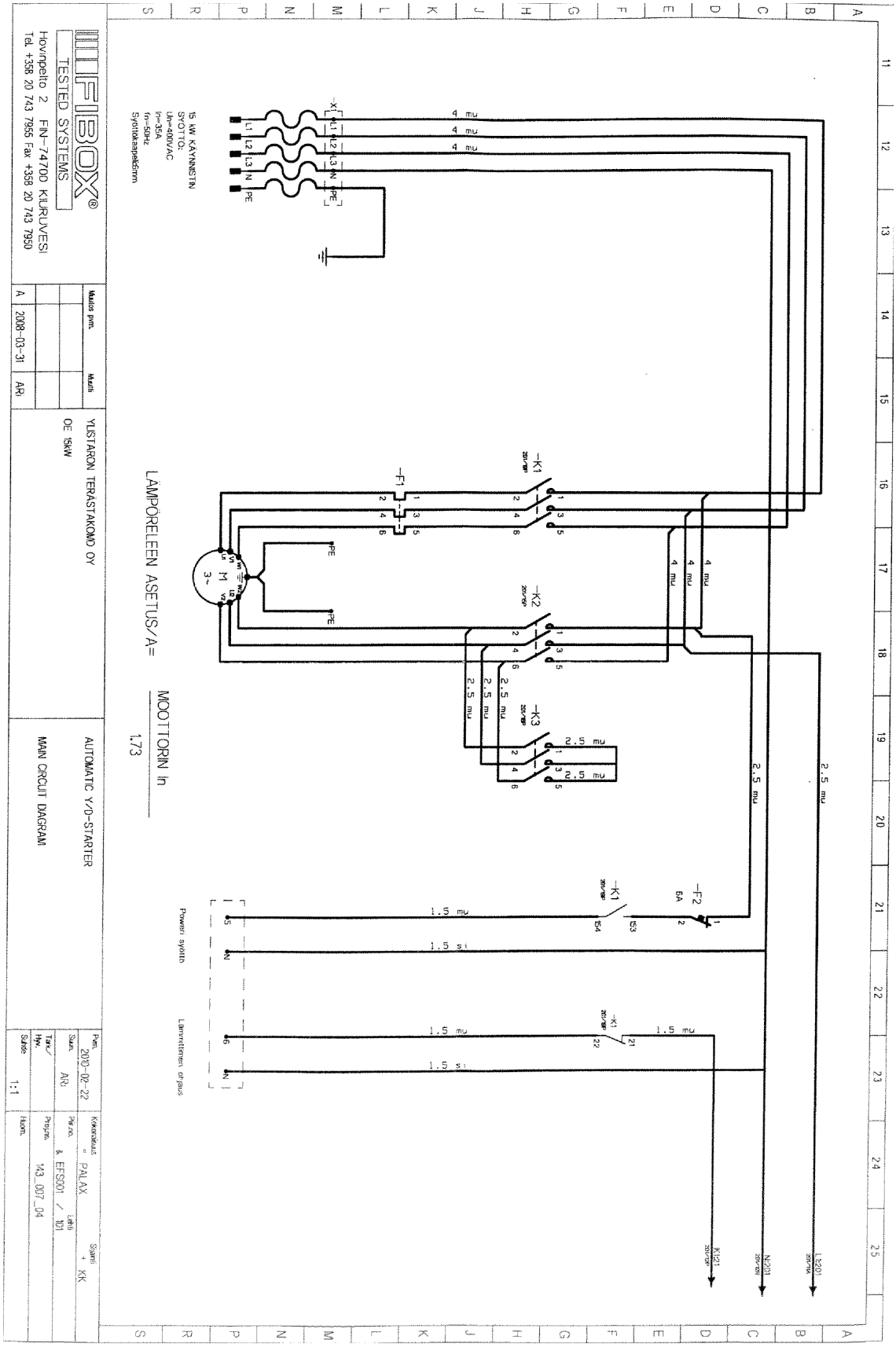
10 MALFUNCTIONS AND THEIR REMEDY

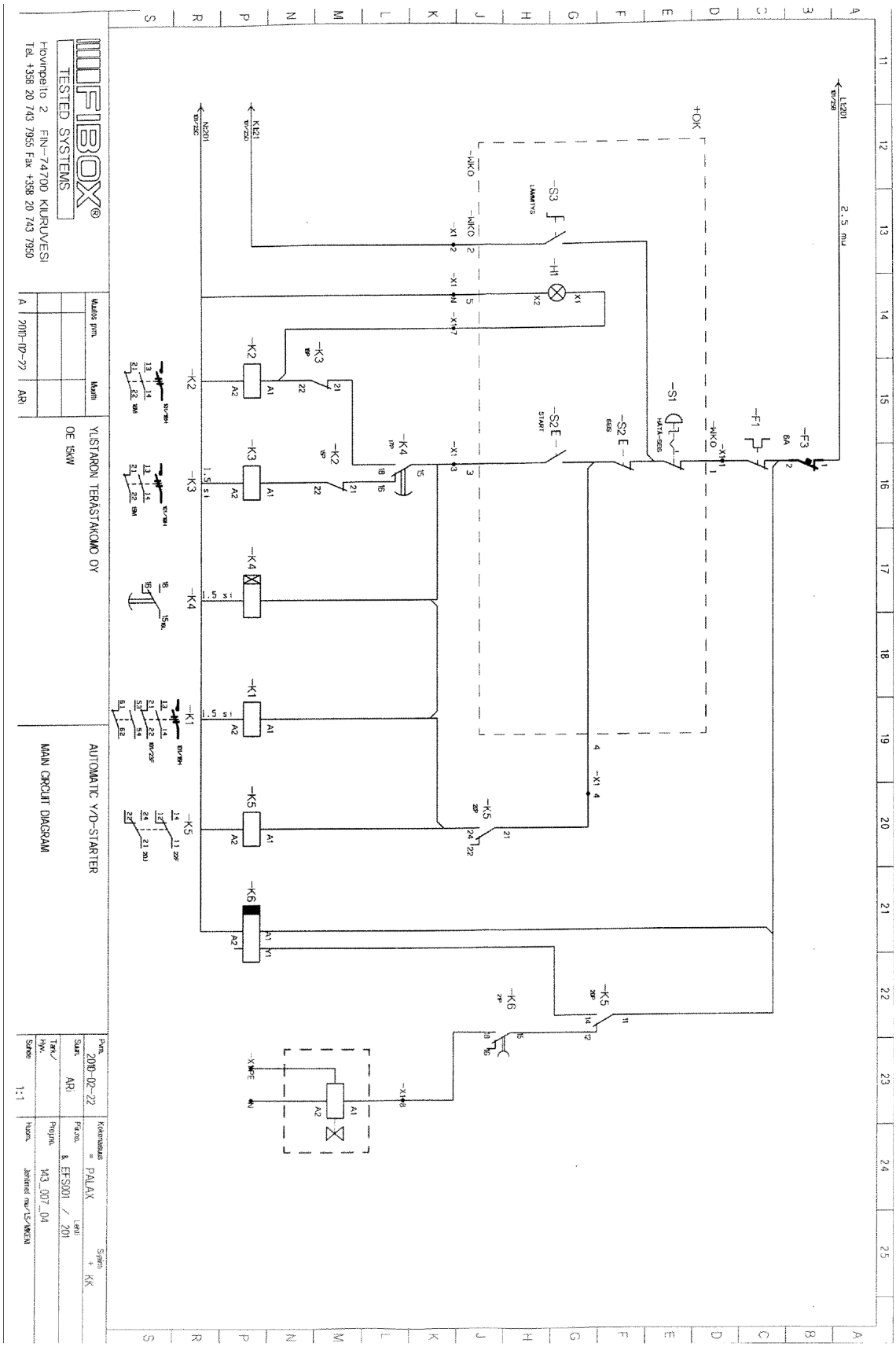
Disturbance	Cause	Remedy
Splitting is not operational.	1. Protective net for splitting chute is open. 2. No oil or too little oil. 3. Debris inside the launch system. 4. The oil is too cold. 5. A hydraulic hose has burst or is leaking. 6. The splitting system does not move due to freezing.	1. Close the protective net. 2. Stop the machine immediately and top up the oil. 3. Clean up the launch system. 4. Allow the oil to circulate at free-flow for a few minutes. 5. Replace the hose. 6. Always clean the machine when you stop working.
Protective cover for the splitting chute cannot be opened.	1. The saw-shaft is not in the upper position.	1. Lift up the saw-shaft completely.
The splitting movement does	2. The setting of the locking	2. Adjust the locking device

not stop, when the protective net is opened.	device has moved out of position or the locking device is broken.	or replace the faulty part.
Slow or powerless splitting movement.	1. The oil is too cold. 2. No oil or too little oil.	1. Allow the oil to circulate at free-flow for a few minutes. 2. Top up oil.
The log does not split.	1. Incorrect position of the wedge. 2. A large branch at the splitting point. 3. Exceeds the upper limit for the machine. 4. The oil pressure has dropped.	1. Adjust the height of the wedge. 2. Stop the machine, open the splitting cover, rotate the log, and close the splitting cover. 3. Maximum thickness 48 cm. 4. Check the hydraulic system.
The crosscut saw cuts poorly.	1. The blade is dull.	1. Sharpen or replace the chain.
The saw-chain clashes with the saw-cover.	1. The bolts of the bearings supporting the saw-shaft have loosened. The saw-shaft in an oblique position.	1. Straighten the saw-shaft and tighten the bolts.
The conveyor belt is running at the side.	1. The setting has moved out of position.	1. Adjust the return roller at the end of the conveyor. Test run after the adjustment.
The log gets stuck in the splitting wedge.	1. Incorrect length of splitting stroke. 2. Blunt splitting wedge.	1. Extend the stroke. 2. Sharpen the saw-blade.
The log rises up during splitting.	1. Crooked or knotty tree. 2. Stroke of the pusher is too short.	1. Correct the position of the log. 2. Check the stroke length of the pusher.
The log clashes with the conveyor belt.	1. The conveyor stands too upright.	1. Decrease the rise angle of the conveyor.
The electric motor does not start.	1. Emergency stop button has been depressed. 2. The temperature switch has tripped. 3. Makes loud noise, but does not start.	1. Reset the emergency stop. 2. Wait for 1–2 minutes; then the temperature switch resets automatically. 3. The fuse has blown, replace it.
The electric motor stops easily and the thermo-relay trips.	1. Incorrect setting of the thermo-relay.	2. Re-adjust the thermo-relay.

The electric motor rotates in the wrong direction.	1. Two phase conductors in the wrong order.	1. Switch the positions of two of the conductors in the plug. Leave the work to an expert!
The oil gets very warm.	1. Too little oil. 2. The cylinder hits the bottom but the pressure is not relieved, so the oil circulates via the relief valve.	1. Top up oil. 2. Adjust the cylinder stroke and swing. 3. Check the oil pump.

11 ELECTRIC DIAGRAMS

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YLISTARON TERÄSTAKOMO OY
OE 15kW
AUTOMATIC Y/D-STARTER
MAIN CIRCUIT DIAGRAM
PALAX
2010-02-22
ARI
EFS001 / 201
143_007_04
1:1
+DK
-S1
-S2
-S3
-F1
-F3
-H1
-K1
-K2
-K3
-K4
-K5
-K6
2,5 mm²