INSTRUCTION MANUAL
PALAX COMBI M

Powered by tractor
Powered by electric motor
Featuring conveyor

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1 Foreword

Congratulations for purchasing your new PALAX Firewood Processor.
The uncompromised aim in the development of this machine has always been high quality, reliability of operation and safety.
We believe you will be satisfied with this machine which meets all the safety requirement codes set out by the European Union. In confirmation of this, the machine comes provided with the CE-mark, the EU Declaration of Conformity and the Instruction Manual.

Ylistaron Terästakomo Oy

1.1 EU Declaration of Conformity

Manufacturer:	Ylistaron Terästakomo Oy Lahdentie 9 FI-61400 Ylistaro Finland
Product:	PALAX Combi M firewood processor with conveyor
Powered by:	tractor PTO, electric motor or combustion engine
Models:	TR, Powered by tractor equipped with own hydraulic system TR/SM, Powered by tractor / electric motor PMG Mobil, Honda petrol engine / equipped with a platform for transportation PMD Mobil, Lombardini Diesel engine/ equipped with platform for transportation

The following standards have been applied in manufacturing the machine

SFS-EN 60204-1	Electrical equipment of machines
SFS-EN ISO 14982	Electro-magnetic compatibility
SFS-EN 292-2+A1	Basic concepts, general design principles
SFS-ISO 11684	Safety signs and hazard pictorials
SFS-handbook 93	Safety of machines
EN 982	Hydraulics
EN 294, EN 847-1	Sawblades
EN 609- 1: 1999	Logsplitters
EN 1553: 2000	P.t.o etc
EN 1870- 6: 2002	Firewood saws
EN 620	Conveyor

Notified body:	**Deutsche Prüfstelle für Land- und Forsttechnik DPLF**
CE- certificate	**B- EG 2004 / 011**
GS- certificate	**B- GS 2004 / 018**

Ylistaron Terästakomo Oy

Jaakko Viitamäki
Managing Director

1.2 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.

Maximum size of the wood:

- For cutting, the maximum diameter of the tree is about 25 cm.
- The maximum length of the log is 4 m.
- If the trees are longer than this, they must be pre-cut to a suitable length.

1.3 Markings affixed to the machine

Beware the saw-blade

Read the instruction manual

Always use eye guards and protectors hearing

Stopping the splitting cylinder with the foot pedal

Hydraulic height adjustment of the splitting blade, optional

Manual start of the splitting cylinder

High-speed splitting

Normal splitting speed

Speed of the PTO shaft

1.4 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
- Diameter of the circular saw-blade 700 mm, the hole 35 mm.
- The highest permitted rotational speed 2,000 r.p.m.
- Nameplate at the rear of the blade housing

Nameplates on the electric drive

- 3-phase motor
- Voltage 230 / 380 V or 380 / 600 V, may vary depending on the country.
- Output 7.5 kW.

1.5 Safety instructions

- Always use eye guards and hearing protectors.
- Do not wear loosely-fitting clothing.
- Keep the working space clear of foreign objects.
- Never use the machine indoors, owing to the risk of dust generation or the danger of exhaust gases for a unit powered by a combustion engine.
- Keep the exhaust pipe of the combustion-engine-driven unit at a safe distance (i.e. at least 1 metre) from anything which might catch fire: danger of fire!
- Beware of the hot exhaust pipe on the combustion-engine-driven unit!
- Always stop the engine for refuelling.
- Only operate the machine in a properly lit space.
- Make sure that all other people stay outside the operating range. The machine is intended for operation by one person only.
- The machine is exclusively intended for the production of firewood.
- During the cut-off operation, make sure that the tree is always supported by the support rollers of the cross-cut deck: danger of rolling over!
- Exercise particular caution when cutting knotty or crooked trees, because, as a result of faulty cutting, the tree may roll over or twist the saw-blade with a force which breaks or splits the blade.
- Carelessness during the cut-off operation constitutes a serious danger.
- Always stop the machine before servicing.
- Always ensure that the electric conductors, if any, are intact.
- Always shift and lock the table extension into its rear position for transportation.
- Always lock the cross-cut deck in the rear position for transportation.
- Never remove any safety-related devices from the machine. Remember that you are responsible for any injuries caused if safety-related devices have been removed from the machine.
- Always carry out the required preparations before starting the operation.
- Only use fault-free power take-off drive shafts and attach the chains for the shaft-guard to the machine.

WARNING! Beware of low bridges and other obstacles!

- A machine equipped with a 3.5 m conveyor is about 3.6 m high, hence fitted to the three-point linkage of a tractor its height may exceed 4 metres. The 4.5-metre conveyor is intended for stationary use only.

1.6 Noise emission and vibration

The A-weighted sound-pressure level at the workstation is 87.5 dB (A) and the sound power level is 102.0 dB (A). The vibration emission values do not exceed 2.5 m/s2.

1.7 Responsibilities of the operator

- The machine may only be used to produce firewood.
- All the safety-related devices included in the machine are necessary to ensure a sufficient level of safety.
- The PALAX 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.
- 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.
- The operator is responsible for ensuring that no one else is subjected to any danger.
- Modifying the construction of the machine is prohibited.
- Remember that as the operator you are responsible for any injuries caused if safety-related devices have been removed from the machine.

1.8 Operating conditions

- Never use the machine indoors because of the risk of dust creation and the danger of exhaust gases.
- Only operate the machine in an adequately lit space.
- Make sure that no other people, especially children, are present inside the operating range.
- 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.
- Always place the machine on as level a surface as possible.
- 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.
- When starting the machine in severe frost, allow it first to idle at about 1/4 of the maximum 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.

1.9 Machine configurations

PALAX COMBI M –TR	P.T.O drive, for three-point hitch
PALAX COMBI M -TR/SM	P.T.O drive/electric motor, 7,5 kW, for three-point hitch
PALAX COMBI M -TR/SM+ MOBIL B	P.T.O drive/electric motor, 7,5 kW, single axle with brakes for trailing at 80 km/h
PALAX COMBI M -Honda GASOLINE 13 Hp	Petrol engine, Honda type GX 390, 10 kW
PALAX COMBI M – GASOLINE 13 Hp + MOBIL A	Single axle platform without brakes for trailing at 80 km/h
+ MOBIL B	Single axle platform with brakes for trailing at 80 km/h
PALAX COMBI M - DIESEL 15 Hp	Diesel engine, Lombardini type 7 LD 665, 11 kW
+ MOBIL B	Single axle platform with brakes for trailing at 80 km/h

PALAX belt conveyor of 3,5 m with manual winch
PALAX belt conveyor of 4,5 m with manual winch

1.10 Terms of warranty

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

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 to replace a defective one.

The warranty does not cover

- Defects due to normal wear, faulty operation or negligent maintenance.
- The cross-cut saw-blade, V-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.
- The travel expenses incurred while making repairs under warranty.
- The combustion engine, whose obligations under warranty lie with the manufacturer of the engine.

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.

1.11 Operating instructions for the combustion engine

- Refer to the engine's instruction manual for detailed operating and servicing instructions.

2 Taking delivery and pre-assembly of the machine

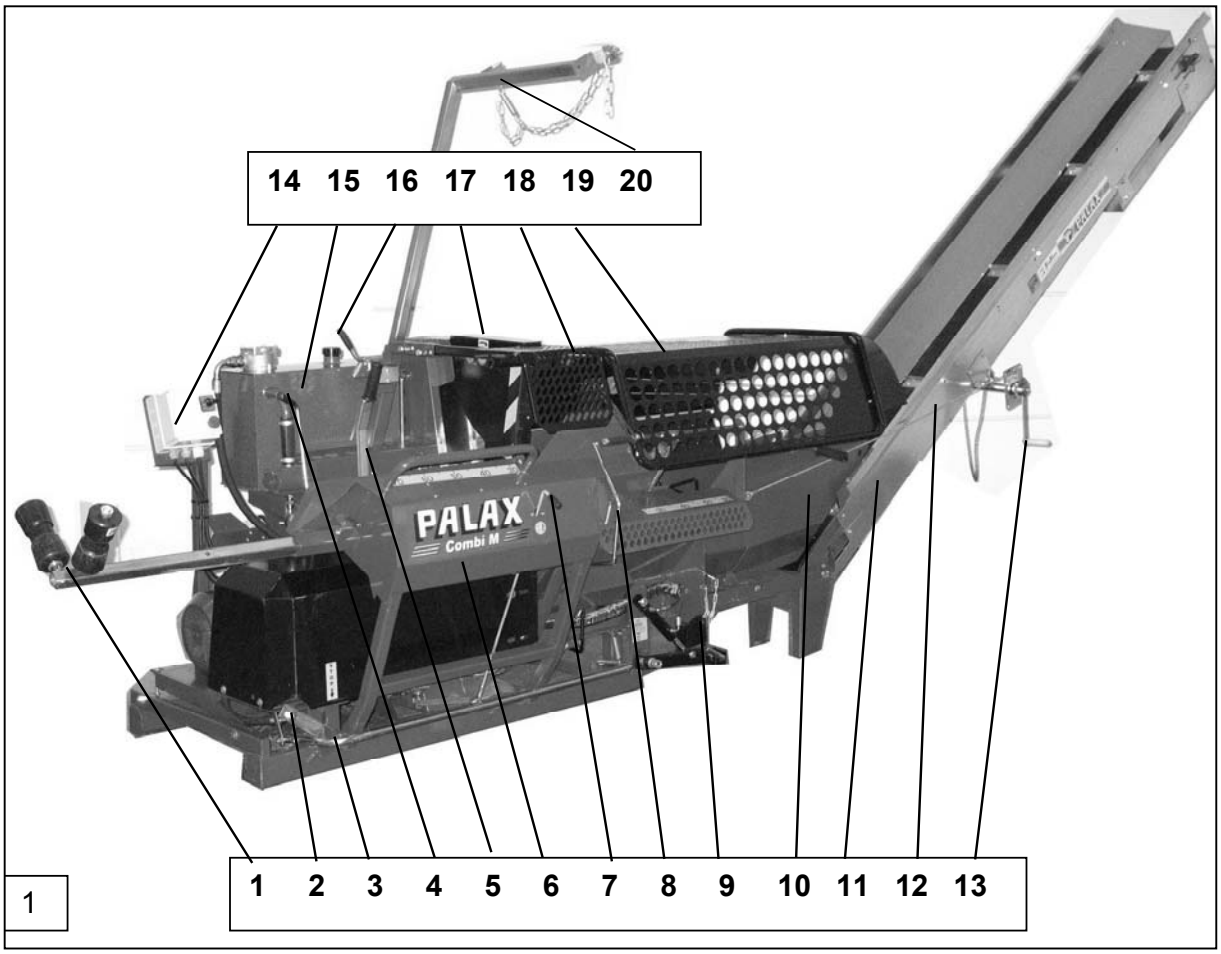
2.1 The transport set-up and unpacking

- The machine is fixed to the pallet at three points.
- Remove the plastic shroud covering the machine.
- Take away all loose parts from the package.
- Use a forklift truck to turn the machine into the horizontal position.
- Remove the transportation pallet only after the machine has been turned.

2.2 Acceptance inspection

- In order to save on freight expenses and to avoid damage during transportation, the machine is delivered partly dismantled, with all the protruding levers and protective structures removed and packed separately.
- Check the delivered goods without delay.
- If the product shows transport damage, contact the transport company and your dealer immediately.

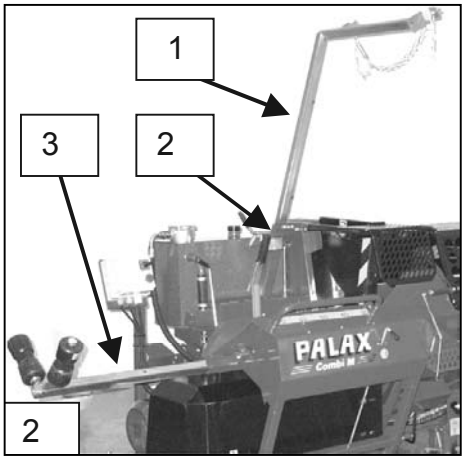
2.3 Main parts of the machine



1. Table extension	8. Log-stop control lever	15. Oil tank
2. Emergency stop lock	9. Splitting blade	16. Disengaging clutch of the angular gear
3. Emergency stop	10. Debris tray	17. Saw-blade cover
4. High-speed valve lever	11. Conveyor	18. Saw-blade cover net
5. Manual start of splitting motion	12. Supporting wire of conveyor	19. Splitting trough cover net
6. Cross-cut deck	13. Lifting winch of conveyor	20. Conveyor support
7. Splitting blade adjustment lever (1)	14. Electric motor starter	

(1). (only in connection with hydraulic adjustment)

2.4 Assembly of the table extension, Figure 2



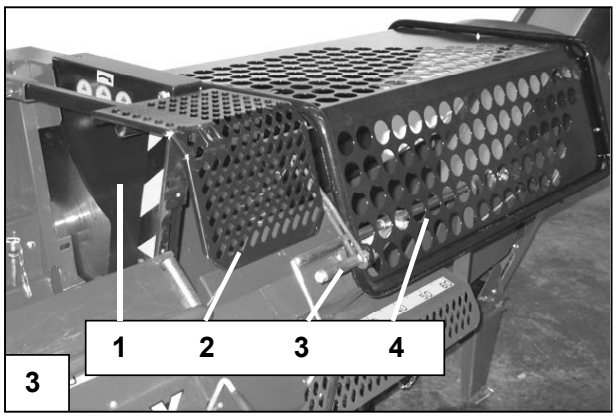
- Remove the limiting bolt from the end of pipe 3 in the table extension.
- Draw the quick-release lock open and push the pipe into the pipe in the table.
- Fix the limiting bolt (13 mm spanner).

2.5 Assembly of the conveyor support, Figure 2

- Place the conveyor support 1 in the sleeve at the machine frame.
- Wrench the screws 2 tight (19 mm spanner).

2.6 Protective cover of cross-cut saw-blade, Figure 3

- Put the protective cover of saw-blade 1 in place.
- Put the shaft pin in place.
- Do not wrench too tight. The casing must be easy to move (17 mm spanner).



2.7 Protective net of cross-cut saw-blade, Figure 3

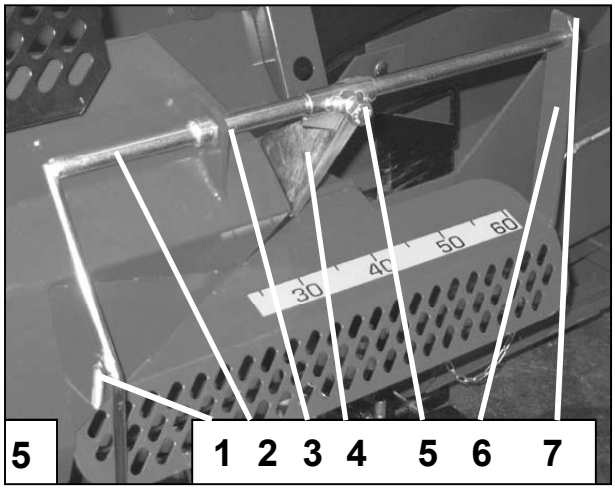
- Put the cover net of saw-blade 2 in place (19 mm spanner).

2.8 Protective cover of splitting trough, Figure 4

- Put the protective cover 4 (Figure 3) in place.
- Fix the limiting bolt 3 in accordance with Figure 3.
- Fix the plastic cover extension 1 (Figure 4).
- Put the safety wedge 2 (Figure 4) in place.
- Fix the plastic rear cover 3 (Figure 4).
- Do not fix the conveyor belt cover 4 until the assembly of the conveyor is completed.

2.9 Assembly of the log-stop, Figure 5

- Remove the cotter 6 from the end of shaft 2.
- Remove the log-stop (24 mm spanner).
- First push the shaft end through the lug 3, place the log-stop on the shaft and push the shaft through the lug 6 in the table end and put the cotter in place.
- Attach the end of the spring 1 to the lower edge of the support plate at the table.



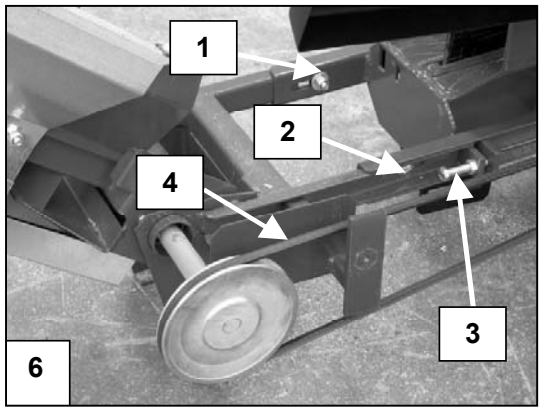
2.10 Setting the log-stop

- Set the desired cutting length using the scale, and wrench tight the screw of the log-stop.
- As you draw back the table, the limiter turns automatically to the limiting position.
- As you push the table in, the log-stop automatically turns away from the log, allowing it to fall down freely.

2.11 Topping up hydraulic oil

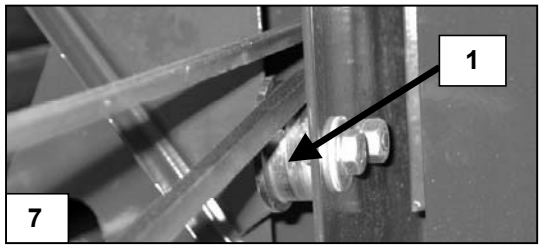
- Hydraulic oil volume 40 litres.
- Oil type Univis 32, SHELL Tellus 32, NESTE HYDRAULI 32 or equivalent.
- Only use fresh, clean oil.
- Observe particular cleanliness during the oil change, because the smooth operation of the machine is highly dependent on the purity of the oil.

2.12 Assembly of the conveyor, Figure 6



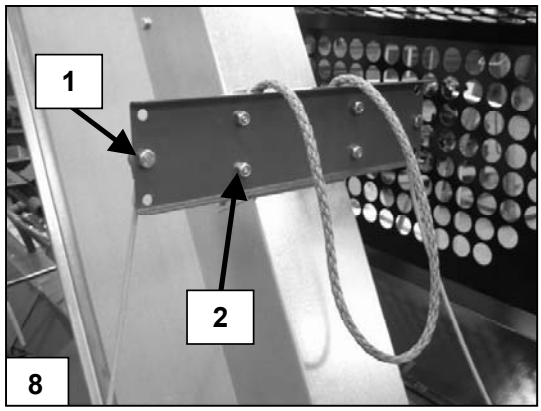
- At this stage the conveyor is on the ground.
- Remove bolts 1 and 2 from the attachment fork (19 mm spanner).
- Push the attachment fork on the conveyor into the corresponding fork on the machine.
- Put the attachment bolts in place and tighten them slightly, allowing the conveyor to still move in the fork on the machine.

2.13 Installing the V-belt, Figure 6



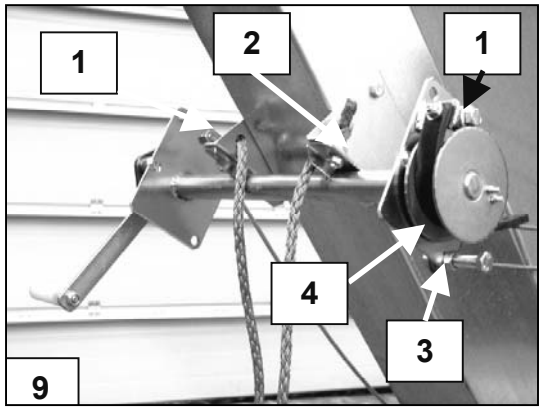
- Put the V-belt 4, type A 136 on the angular gear and conveyor pulleys.
- Put the belt onto pulley 1 as illustrated in Figure 7, in order to prevent the sawdust from falling on the belt.
- Adjust the tightness of the belt close to the suitable tightness with adjustment screw 3.
- Tighten the attachment screw 1 of the conveyor early enough to prevent the tightening of the belt from drawing the conveyor to an oblique position.
- After that, tighten the belt to its final tension. The tension is ideal when the belt gives way about maximum 5 cm under a 2 kg force in the middle.
- Tighten the attachment screw – and the other one as well.
- Put the V-belt cover in place.
- Lift the conveyor into the upright position against the transport support.

2.14 Installing the attachment plate and the support wires, Figure 8



- Lift the conveyor into the upright position against the transport support.
- Fix the plate to the lugs 2 at the conveyor.
- The attachment plate has three holes for attachment of the conveyor support wire.
- Put the wires into the holes, as required.
- If you are processing firewood onto a trailer with high sides, then fix the wires in the top holes.
- If you are processing firewood in, for example, a low transport cage, then fix the wires in the lowest holes.

2.15 Installing the conveyor winch, Figure 9 optional



- Fix the winch in the lugs 2 at the conveyor.
- Fix the winch wire in the attachment bolt 3.
- Fix the support wires in holes 1. The attachment plate has three holes for attachment of the wire.
- If you are processing firewood onto a trailer with high sides, then fix the wires in the top holes.
- If you are processing firewood in, for example, a low transport cage, then fix the wires in the lowest holes.

2.16 Installing the winch wire

- The wire is spooled on drum 2.
- There is an 8 mm-thick plate of polyethylene on top of the wire drum. This plate serves as a wire guide and also prevents the wire from unwinding from the drum.

2.17 Bringing the conveyor into the transport position

- When you lift the conveyor with the winch, leave it near the top-dead-centre and push it the rest of the way by hand to the transport support.
- Doing this helps to keep the rope tight on the drum and prevents it from getting mangled.
- Lock the conveyor with the chain and pin in the transport support.

2.18 Bringing the conveyor into the work position

- Disconnect the locking chain of the conveyor.
- Pull the conveyor out with the rope.
- Lower the conveyor and leave it supported by the wires.

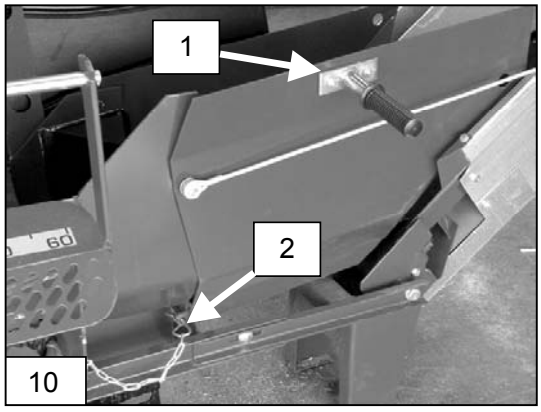
WARNING! If the conveyor is equipped with a winch, always hold it by the handle during lowering. Always leave the conveyor supported by the wires.

2.19 Fixing the lifting handle, Figure 10

- Fix the lifting handle 1 to the edge of the debris tray.
- The handle also serves as a support for the net cage.

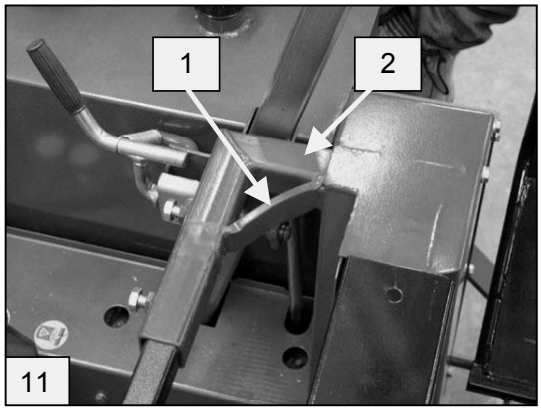
2.20 Locking the debris tray, Figure 10

- Swing the debris tray to the operating position
- Push the cotter pin into the hole 2.



2.21 Lifting and transferring the machine, Figure 11

- You can lift the machine either with a forklift truck or by slinging it by the frame pipe 2 in the upper part of the machine.
- If the conveyor is attached to the machine, sling the machine by the support pipe of the conveyor to ensure its balance.
- You can lift the machine under the frame pipes with a forklift truck.



WARNING! Beware of electric cables and other overhead obstacles!

- A machine equipped with a 3.5 m conveyor may be over 4 m high when fitted to the three-point linkage of a tractor.
- The machine with a 4.5-metre conveyor is intended for stationary use only.

3 Operation of the firewood processor powered by different power sources

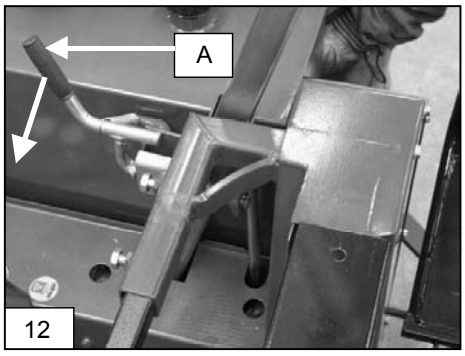
The Palax Combi M firewood processor may be driven by a tractor, an electric motor or a combustion engine.

3.1 Powered by a tractor

- Always hitch the machine to the three-point linkage of the tractor.
- A suitable power take-off drive shaft is, for example, a BONDIOLI A 3 or WALTERSCHEID W 2100.
- No safety clutch is required for the power take-off shaft.
- Only use fault-free power take-off drive shafts and attach the chains of the shaft-guard to the machine.
- As you disconnect the power take-off shaft from the tractor, support it using the hook on the machine.
- The machine is equipped with 22 mm pins and 28 mm bushings. If you only use 28 mm pins, we recommend attaching the bushings at their outer ends to the 22 mm pins by small welded seams to prevent them from getting lost.
- If the power take-off of the tractor has a high-speed range, then it should be used, because the horsepower requirement of the circular saw is small.
- Make sure that the speed of the power take-off shaft does not exceed 540 r.p.m.
- The suitable revolutions range is 450…500 r.p.m.

3.2 Emergency stop switch of the tractor powered machine, Figure 12

The machine powered by a tractor is equipped with a special emergency stop device to immediately disengage the transmission between the angular gear and the saw-blade shaft.
In case of an emergency, draw the lever A to the rear and push it down.

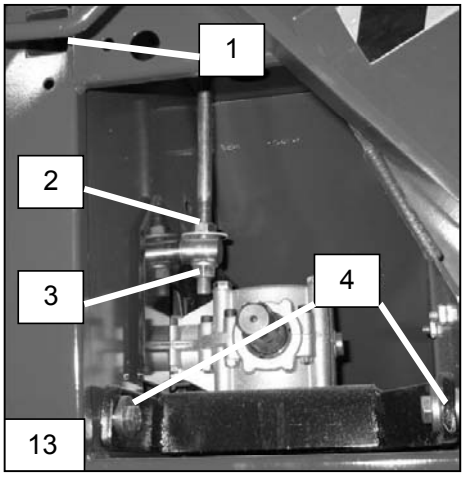


Operation of the clutch, Figure 12

- The V-belts between the angular gear and the saw-blade shaft are tightened by means of a lever with eccentric plate.
- To tighten the belts, turn the clutch lever A upwards. Thus the push rod pushes the angular gear bed downwards and the belts tighten.
- To slacken the belts, push the lever forward in the direction of the arrow.
- The tightness of the V-belts may be suitably adjusted by means of the M16 thread at the end of the push rod.

Adjusting the clutch, Figure 13

- Unscrew the lower nut 3 (24 mm spanner).
- Correspondingly, tighten the upper nut 2.
- The angular gear bed tilts at the joints 4 and the belts tighten.
- When tightening the V-belts, the clutch lever must be in the tightening position, i.e. turned to the upright position.
- If the tension of the V-belts is correct, then the adjustment of the clutch is also right.
- The tightness of the V-belts is controlled as follows: push the V-belts through the opening (1) using about 3 cm wide and about 50 cm long wooden strip.



- The tightness is correct if the belts are pushed down about 10…15 mm under a force of 2 kg.

Required measures in an emergency situation

- If the clutch has been used in an emergency situation, e.g. when a log has stuck in the circular saw-blade as a result of a mistake during the sawing, then immediately disconnect the power take-off transmission of the tractor as well, because the pulley of the angular gear can wear down the V-belts unnecessarily.

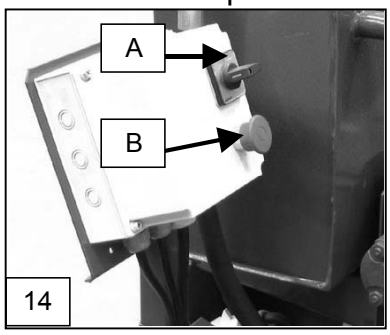
NOTE! The clutch must be reset in the operating position as the power take-off drive shaft is disconnected. Only use the clutch in an emergency situation!

3.3 Electric drive, start and emergency stop

- The power output of the motor is 7.5 kW and the speed is 1450 r.p.m.
- The machine is equipped with a starter with an emergency stop switch.
- All electric installations must be completed.
- In the 380 V system, the fuse size is 16 A, slow.
- The cross-section of the required extension cord is 2.5 mm2.
- Check the direction of rotation when starting up the machine. If the circular saw is rotating in the wrong direction, then switch the positions of two phases in the plug. If you are not sure how to do this, leave it to a professional.
- The machine can be powered by either a tractor or an electric motor.
- The machine is equipped with a system to prevent simultaneous operation in two modes.
- When the cover plate is shifted to the left (Figure 15), it is possible to connect the extension cable, and when it is shifted to the right, it is possible to connect the power take-off shaft.

Starting

- Turn the switch A to the right to position Y.
- Once the motor revolutions have increased to the maximum, turn the switch to position D.



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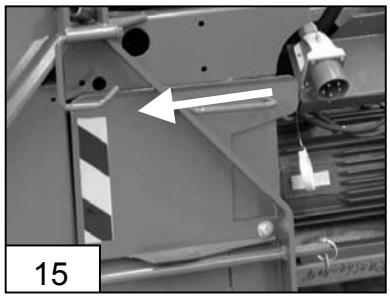
Emergency stop of a machine powered by electric motor, Figure 14

- To activate the emergency stop push down the emergency stop button B on the starter.
- The button is reset by pulling it up.

Starting the electric motor at sub-zero temperature, Figure 12

Slacken the V-belts of the angular gear using the clutch A (Figure 12).
During severe frost, the hydraulic oil, the oil in the angular gear, the V-belts and the conveyor belt can become so cold and stiff that the motor cannot be started.
Therefore it is possible to disengage the angular gear and the firewood conveyor in order to make the starting easier.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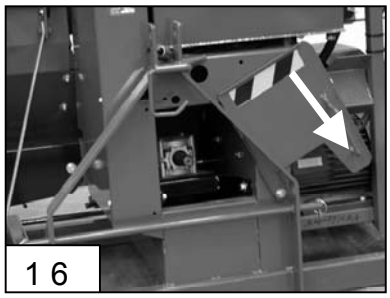
Selecting the power source, electricity or tractor, Figure 15 and 16

- The machine with electric drive is equipped with a special selector plate for choosing the power source.
- The power take-off shaft and the electric cord may not both be connected to the machine at the same time.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3.4 Honda petrol engine, start, stop and emergency stop

- Refer to the engine's instruction manual for its detailed operating and servicing instructions.
- Check the engine's oil level and top it up if necessary.

WARNING: petrol is highly flammable!

- Use 95E petrol in the combustion engine.
- Always stop the machine for refuelling.
- Take care not to spill petrol on the hot engine.

Starting the engine

- Check that the engine V-belts have been slackened using the clutch.
- Shift the gas lever to about half-way, activate the choke and pull the starter grip.
- As soon as the motor starts, reduce the setting of the choke gradually to make the engine run smoothly.
- Switch on the V-belt drive by shifting the clutch lever B and increasing the engine revolutions to maximum.
- The pre-set engine revolutions are equal to about 2,000 revolutions on the saw-blade shaft.

Stopping

- Shift the gas lever to idling.
- Switch off the engine with the key-switch.
- Close the fuel valve.
- We recommend keeping the V-belts tightened during transportation, in order to prevent the engine from "jumping".

Emergency stop

- Switch off the engine with the key-switch.

3.5 Lombardini Diesel engine, start, stop and emergency stop

- Refer to the engine's instruction manual for detailed operating and servicing instructions.
- Check the engine oil level and top it up if necessary.

WARNING: diesel fuel is highly flammable!
Always stop the machine for refuelling.

- Take care not to spill diesel fuel on the hot engine.

Stopping

- Shift the gas lever to idling.
- Switch off the engine with the key-switch.
- We recommend keeping the V-belts tightened during transportation, to prevent the engine from "jumping".

Emergency stop

- Switch off the engine with the key-switch.

Note! In connection with repair and maintenance work on the combustion engine, take care not to increase the engine revolutions and thus make the speed of the saw-blade exceed 2,000 r.p.m.

4 Use of the firewood processor, cross-cut operation

- The machine is intended for operation by one person only.
- Never leave the machine, which is easy to start, unattended.

4.1 Preparations before the use of the machine, all models

- Release the conveyor by removing the lock pin. Put the lock-chain back in the slot leading it under the conveyor and put the lock pin in place.
- Swing the debris tray to the operating position. Thus the cross-cut deck may also be turned to the open-position.
- Open the locking of the extension table and pull out the table. Lock the extension table in position.

Note! If the length of the log you intend to cut is, for example, 3 metres, then the extension table may be almost in its inner position provided that the log to be processed is placed on the table with its root-end first.
Doing so makes the feeding process easier, as the log stays on the rollers the maximum amount of time.

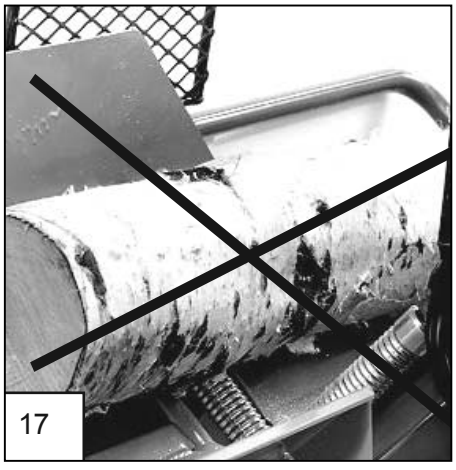
4.2 Operating the cross-cut saw, before the operation

- Cleanse the new circular saw-blade of any protective grease, because a greasy blade accumulates resin easily, making it heat up, lose its tension and start to wobble.
-

4.3 During the operation

- Exercise caution, always keep your hands away from the saw-blade.
- Do not cut slender trees more than two at a time, because if many trees are being cut at the same time, some of them may twist the blade strongly, thus making it heat up and lose its tension.
- Never stop the saw-blade by pressing a log against its side or its teeth.
- During the cross-cut operation, make sure that the log is always supported on the roller at the cutting point.
- Make sure that the setting of the saw-blade is correct.
- A suitable setting for sawing fresh wood is 1.0…1.2 mm and for sawing dry wood 1.4…1.6 mm.
- If a hard-metal blade is used, a particular setting is not necessary as the hard-metal blade is always slightly thicker than the blade-disc itself.

Note! A blade without setting heats up easily and requires a lot of driving power.


17

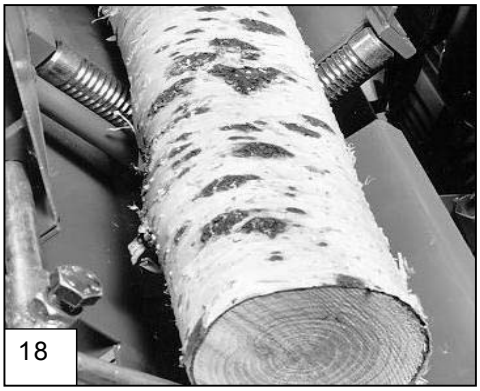
4.4 Placing the wood on the deck

Wrong, the log is not supported by the rollers, Figure 17.

WARNING! Wrongly positioned trees may get turned on the deck by the cutting force. Thus they may twist the blade badly, causing it to break.

Right, the log is supported by the rollers, Figure 18.

- The log is supported by both rollers.
- No risk of rolling over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4.5 Cross-cut operation

- Press the log smoothly against the saw-blade
- Support the log with your hand.
- Be especially careful when cutting knotty or crooked trees.

4.6 Disturbances during cross-cut operation and their remedy

Crooked trees

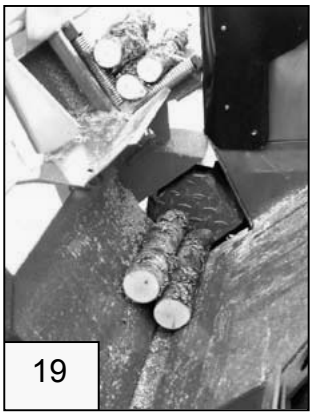
- Cut crooked trees where they bend.
- When cutting crooked trees, make sure that the log is properly supported by the rollers.

Big trees

- Make sure that the rotational speed of the saw-blade is correct.
- If the cutting sound is soft, the cutting speed and the saw-blade revolutions are correct.
- If the cutting sound is loud and cracking, the blade is proceeding too fast and the sawdust grooves get clogged. Check the rotational speed or reduce the advancing speed.

If the log is stuck in the saw-blade due to incorrect performance of sawing operation:

- Stop the machine immediately. Stop machines powered by electricity or combustion engine with their emergency stop button, and the machine powered by tractor by pulling the clutch A, Figure 12. Also disengage the power take-off shaft.
- Inspect the stuck saw-blade before continuing the cutting and verify no cracks have appeared in the roots of the teeth.
-
- A faulty saw-blade must not be used for cutting.


19

4.7 Cutting the small trees

It is also possible to cut small trees, 3 - 8 cm in diameter, two at a time. First remove the wedge. Push the processed firewood directly onto the conveyor (Figure 19).

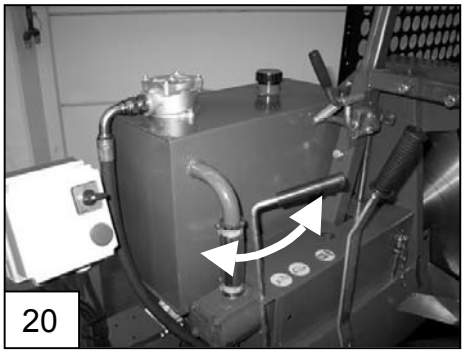
5 Use of the firewood processor, splitting operation

5.1 Splitting cylinder

- The machine can be equipped with a splitting cylinder of either 3.5 tons or 5.6 tons.

5.2 Manually-operated high-speed valve, Figure 20

- As standard, the machine comes equipped with a manually-operated high-speed valve (Figure 20) which increases the splitting speed by about 30%.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- The high-speed valve is intended for smaller trees, 10 - 15 cm in diameter.
- If the cylinder force is not sufficient to enable splitting of the wood with the high-speed movement, turn the control lever of the valve to the normal position. The machine does not need to be stopped for switching.

5.3 Automatic high-speed valve

An automatic high-speed valve, with splitting motion always at high-speed, is available as an option.
The speed decreases only for a short while as the required splitting force increases when thick logs are being processed. As the log starts to split, the force requirement immediately drops and the splitting motion resumes the high-speed operation.
The automatic high-speed valve speeds up processing of the firewood considerably and at the same time reduces the load on the transmission. The automatic valve is also available for retro-fitting.

5.4 Splitting wedges

Short, straight wedge, optional

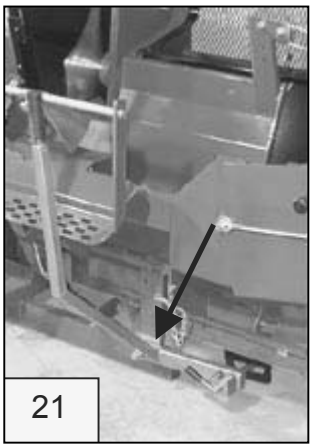
- The short straight wedge for splitting the wood in 2 ways or, if the wedge is lowered down, no splitting at all.

In 2/4 ways, standard

- The standard wedge for splitting in two or four ways.

In 2/6 ways, option

- A wedge for splitting the log in two or six ways
- Normally requires a cylinder of 5.6 tons.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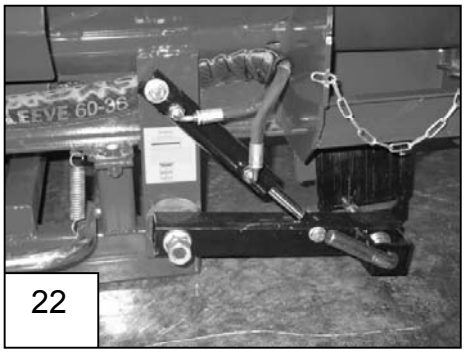
5.5 Manual adjustment of the splitting blade, Figure 21

- The machine is equipped with a manual system for height-adjustment of the wedge.
- The lever with friction plate for stepless adjustment keeps the wedge at the correct height at all times.
- The stiffness of the lever movement can be adjusted by tightening the Belleville-springs A of the friction plate.

Note! Never use grease on the friction plates.

5.6 Hydraulic height adjustment of the splitting blade, optional

- The splitting blade may also be adjusted hydraulically by means of the lever on the cross-cut deck.
- For hydraulic adjustment a small side flow is diverted from the main oil flow by means of a flow regulation valve.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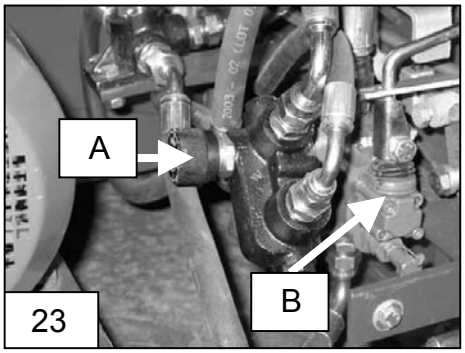
5.7 Adjusting the speed of the splitting blade adjustment cylinder, Figure 23

- A = Flow regulation valve
- B = Control valve of splitting cylinder



Adjustment

- The speed of the adjustment cylinder is increased by turning the valve A open.

NOTE! Use as small a flow as possible as the diverted oil flow is lacking from the flow to the splitting cylinder.

5.8 Disturbances during the splitting operation and their remedy

Stuck wood

- As the logs are big and have big branches, the force of the cylinder may fall short.
- If the tree sticks to the wedge, reverse the cylinder using the pedal.
- Raise the splitting-wedge and retry the splitting using the manual control. Changing the position of the log will help in many cases.
- If the log does not split, depress the splitting cylinder stopper pedal. Thus the cylinder reverses and the control valve locks-up. Now it is safe to remove the log.
- Open the net cage and hit the stuck wood loose using another piece of wood.
- If there is a big branch in the tree, turn the tree to such a position that you can push it towards the wedge with the root end first to make the branch split. Doing so requires the least power.

5.9 Re-splitting the logs safely

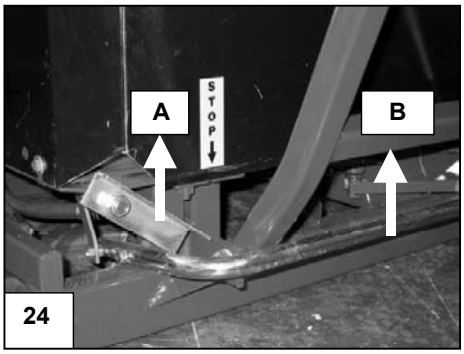
If you want to produce small-size firewood from large logs, even wood split by the 4 or 6-way wedge may still be too large in size.
Proceeding in the following way will help you to split the wood safely into even smaller pieces.

- Open the net cage.
- Put the wood you intend to split into the splitting-trough, e.g. one on top of the other. The pieces of wood will stay in this position, if you hit them carefully against the wedge.
- Close the net cage.
- Start the splitting operation with the manually-operated start lever.

5.10 How the safety features affect the operation of the machine

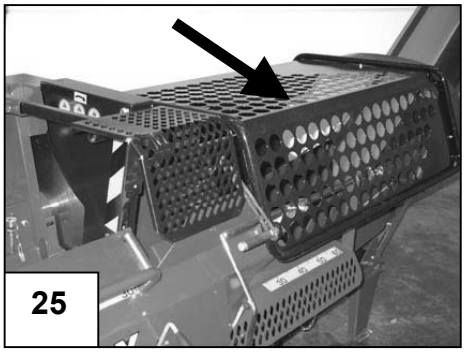
Foot pedal, Figure 24

The machine does not operate unless the lock-up device A of the foot pedal is in the open-position and the pedal B is not in the upper position.



Protective cover of splitting trough, Figure 25

The splitting motion does not operate unless the net cage of the splitting trough is in the closed-position.
If the protective net is lifted by about 30 mm, the splitting motion will stop and the cylinder will reverse to its initial position.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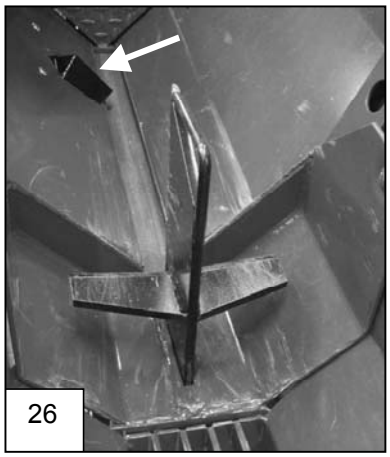
Warning ! To ensure the required safety level, do not remove any of the safety features from the machine.

6 Operation of the splitting device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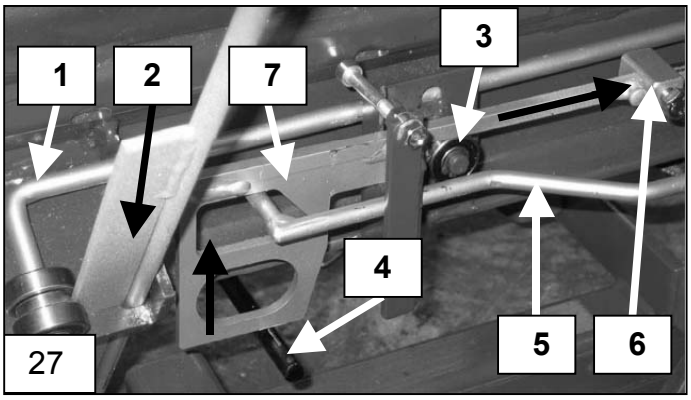
6.1 Sensor, Figure 26

- The sensor is placed in the splitting-trough so that the falling log always hits it straight on.
- Small logs are also capable of starting the splitting motion.

6.2 Parts of the splitting device, Figure 27

1. A device which prevents the start of the hydraulic valve
2. Safety wedge
3. Limiter bearing
4. Sensor
5. Control rod for manual start
6. Limiter of splitting hub
7. Launch rod



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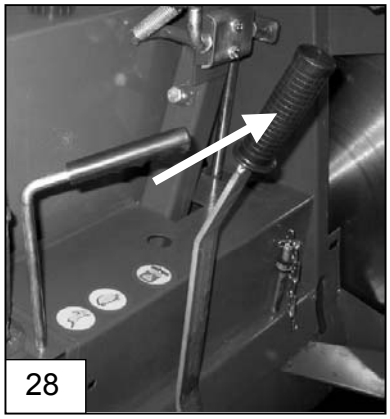
6.3 Operational principle of launching

1. As the wood falls into the splitting-trough, it hits the tip of the sensor, Figure 26.
2. The sensor rod 4 (Figure 27) lifts up the launch rod, 7, which is released from behind the fixed limiter bearing 3.
3. The launch rod 7 starts the splitting motion by means of the spring force.

6.4 Hand-start of the splitting motion, Figure 28

The splitting motion can also be started with the hand-start lever by pushing the lever in the direction of the arrow.
The hand-start lever affects the control lever 5 (Figure 27) which pushes the slanting surface of the launch rod 7. Thus the launch rod comes up from behind the limiter bearing 3 and the splitting motion starts.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Controls of the hydraulic valve

Tightener, part 1

- Stops and reverses the splitting cylinder, stops the valve in free-circulation and tightens the launching spring 6 for a new movement.

Locking lever, part 2

- As the net cage of the splitting-trough is lifted up, the safety wedge 2 will shift the locking rod 1 (Figure 27) into a position where it will impede the movement of the launching rod 7 (Figure 29).

Launching rod, part 3

Control lever, part 4

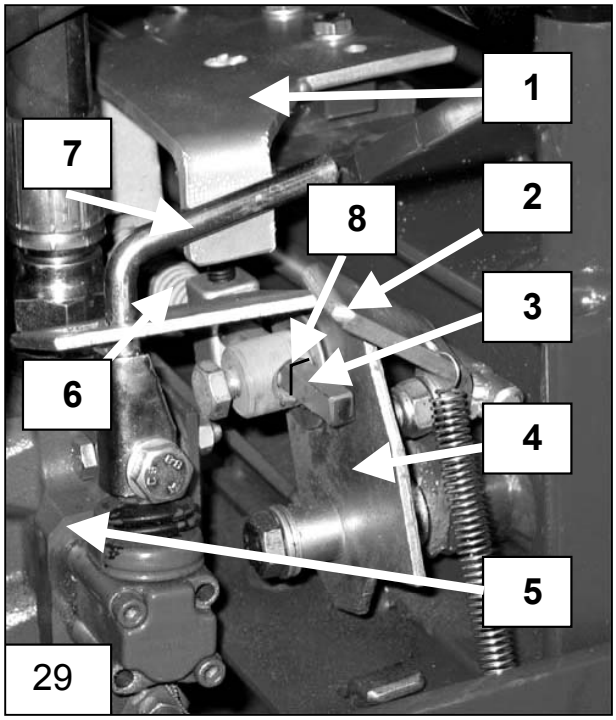
Hydraulic valve, part 5

Launching spring, part 6

Launching lever, part 7

Adjustment mark, 8

- The mark at the end of the launch rod 8 makes it easy to place the launching rod in the correct position.



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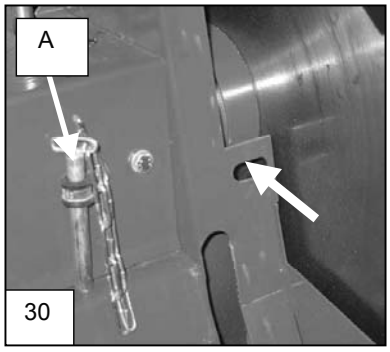
7 Maintenance of the machine

Note! Always stop the machine before servicing.

7.1 Cross-cut saw-blade

Removing the cross-cut saw-blade, Figure 30



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- Remove the sawdust trough side plate (17 mm spanner).
- Remove the side plate of the saw-blade cover (13 mm spanner).
- Put pin A into the hole indicated by the arrow to prevent the saw-blade from rotating and open the saw-blade nut (right-hand thread, 36 mm spanner).
- The thread on the nut is M 24 x 2.
- Carefully clean the surfaces of the flanges before re-installation of the blade.
- Before installing the blade, make sure that the pin, which prevents the saw-blade from rotating, is in place.

Sharpening the blade, hard-metal blade

The hard-metal blade can be sharpened "lightly" using a diamond file.
Depending on the cleanliness of the wood, as many as 500...1,000 bulk cubic metres of wood can be processed with a hard-metal saw-blade without resharpening.

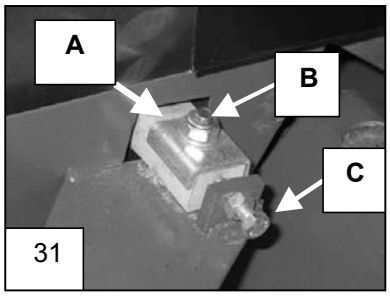
The best sharpening result and durability of the blade is achieved when the saw-blade is sharpened using an appropriate grinding machine and a diamond file.

Pre-stressing the saw-blade, hard-metal blade

Stressing-faults do not usually occur in hard-metal blades, but if the blade is very dull such faults are possible.

The same instructions which apply to pre-stressing of an ordinary blade also apply to pre-stressing of a hard-metal blade.

7.2 Guide of cross-cut saw-blade, Figure 31

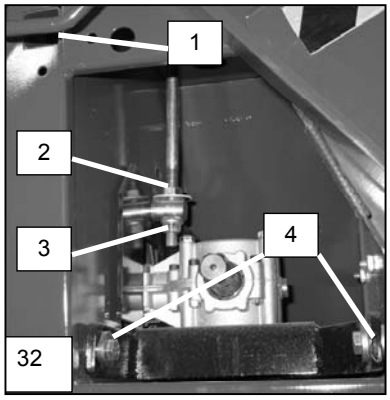


- There is a guide for the cross-cut saw-blade A (Figure 25) at the side of the sawdust trough, which prevents the blade from touching the edge of the sawdust trough in case of malfunction.
- Check the clearance between the piece of wood and the blade from time to time. Adjust as required. A suitable clearance is about 2…3 mm.

Adjustment of the saw-blade guide

- Loosen the bolt B.
- Loosen the lock nut of the adjustment bolt C and adjust the clearance with the bolt to about 2…3 mm.
- Tighten the nuts.

7.3 V-belts of the angular gear, Figure 32



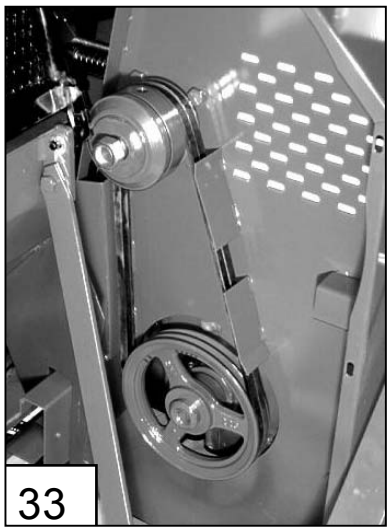
Tightening the belts

Belt type SPA 1357, 2 pcs

- Make sure that the emergency stop lever of the angular gear is in the closed-position.
- Loosen slightly the lower nut A of the adjustment rod of the angular gear bed (24 mm spanner).
- Tighten the belt slightly by turning the upper nut B downward by about 1…2 rounds.
- Check the tightness of the belts by pushing them with a broad wooden strip (about 30 mm wide) through the square opening at the rear edge of the saw-blade cover.
- The tightness of the belts is suitable when the strip bends down about 10…15 mm under a moderate force of about 2 kg.

Note! Because new belts always stretch slightly, re-tighten the belts of the tractor-powered model after a few hours of operation. After the first tightening, re-tighten as necessary

Replacement of the V-belts, angle gear, Figure 33

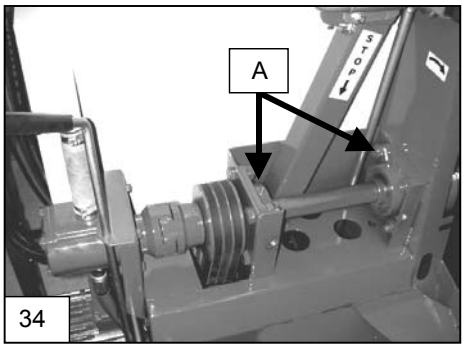


- Slacken the V-belts using the emergency stop lever.
- Remove the sawdust trough cover (17 mm spanner).
- Remove the side plate of the saw-blade cover (13 mm spanner).
- Place a pin, about 12 mm in diameter, into the hole in the belt pulley to prevent the blade from rotating.
- Unscrew the saw-blade nut (right-hand thread, 36 mm spanner).
- The thread on the nut is M 24 x 2.
- Remove the blade.
- Loosen the nuts on the angular gear bed.
- Replace the old belts with the new ones, type SPA 1357, two pcs.
- Tighten the V-belts using the emergency stop lever.
- When tightening the V-belts, follow the instructions in Chapter 8.2.
- Carefully clean the surfaces of the flanges before re-installation of the blade.
- Because new belts tend to stretch slightly, remember to check the tightness of the V-belts after a few hours of operation.

7.4 Changing the oil in the angular gear

- Open the oil plug C (Figure 32) and drain the used oil, e.g. by means of suction drainage.
- Fill up with new oil, about 0.5 litres.
- SAE 80 is used for tractor-powered machines.

7.5 Lubricating the machine, Fig 34



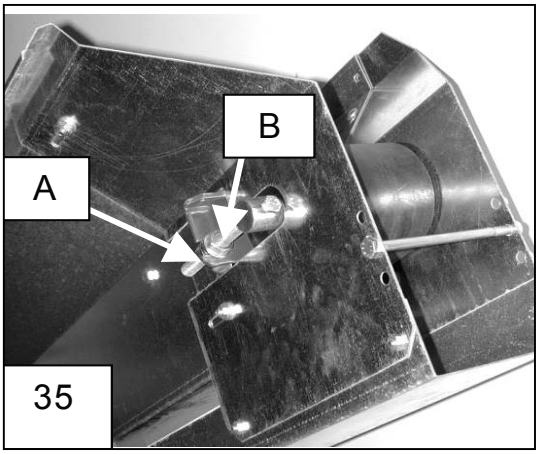
- If the machine is left unused for a longer period of time, lubricate the shaft bearings A (Figure 24) with roller-bearing lubricant at the end of the operating season.
- If the machine is used regularly, lubricate the bearings once a week.
- Lubricate daily with oil the moving joints, log-stop, table feet and the support rollers.

7.6 Adjustment of the conveyor belt

3.5 and 4.5 m models

The conveyor belt is installed and pre-adjusted at the factory.

Tightening the conveyor belt, Figure 35



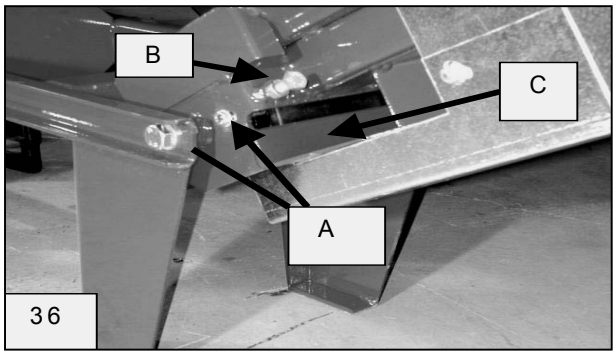
- Loosen the lower nuts A (Figure 35).
- Tighten the upper nuts B.
- Adjust both adjustment screws as much as is necessary to prevent the belt from pulling to the either side.
- The tightness is suitable if you are able to lift the belt about 5 cm with your hand.

Sideways adjustment of the belt, upper end

You can let the machine run, though exercising caution, when carrying out the sideways adjustment of the belt. This way the adjustment is much easier to perform.

- If the belt is running at the right edge, shift the right end of the upper roller outward.
- If the belt is running at the left edge, shift the left end of the upper roller outward.

Sideways adjustment of the belt, lower end, Figure 36



- The roller at the lower end of the conveyor can be adjusted by means of adjustment screw B on the right-hand side bearing of the lower roller.
- If the belt is running at the right edge, loosen slightly the attachment bolts A (13 mm spanner) of the bearing on the right-hand side and screw in the adjustment B (17 mm spanner). If the belt is running at the left edge, then turn the screw outward.
- Check the course of the belt and tighten the screws.
- It is best to carry out the adjustment, though exercising caution, when the belt is rotating at low speed.

7.7 Cleaning the conveyor

- Keep the conveyor free of debris to ensure its trouble-free operation.
- A particular debris scraper C (Figure 36) in front of the drive roller at the lower end, prevents the debris from falling between the roller and the belt.
- The debris scraper should be cleaned as necessary.
- Especially in wintertime, it is important that the conveyor is always cleaned at the end of every working session.
- The conveyor can also be washed with a high-pressure cleaner.

6.8 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.

7.9 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 and malfunctions.
- If a machine powered by a diesel engine is left standing for several months, the battery should be removed and regularly recharged. Also check the battery fluid level and top up as necessary.

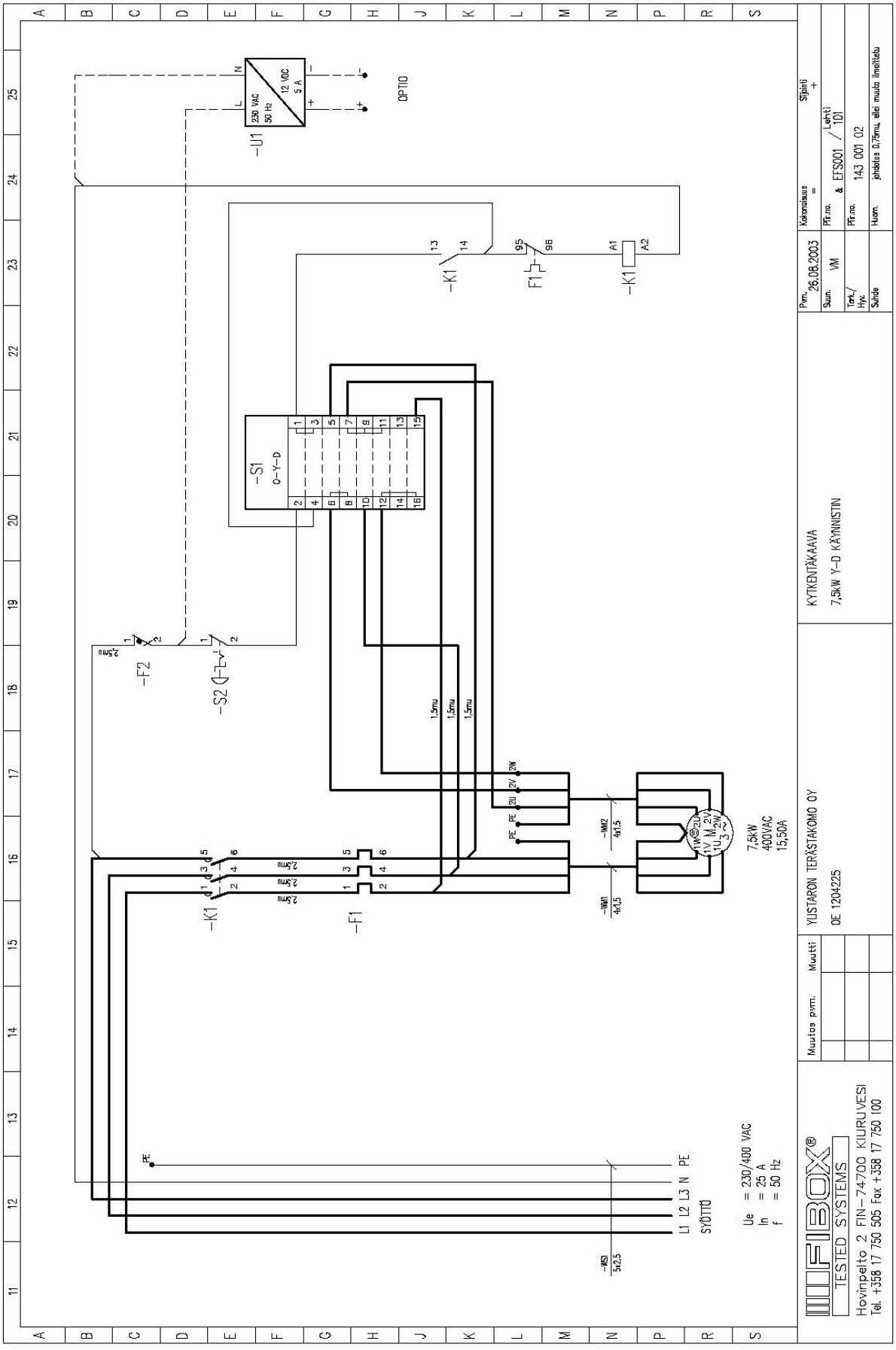
8 Maintenance schedule

Object	Task	Daily	Service interval 100 h	Service interval 500 h	Service interval 1000 h	Material /Method
Angular gear TR-driven	Check 1 Change 2 Change		X	X	x	SAE 80 0.5 l Suction drainage
Angular gear Combustion engine drive	Check 1 Change 2 Change		X	X	x	SAE 30 0.5 l Suction drainage
Hydraulic oil Normal conditions	Check 1 Change 2 Change		X	X	x	Volume 40 l e.g. Esso Univis 32 Neste Hydrauli 32
Oil filter	1 Change 2 Change			x	x	F 10 60/3
Blade-shaft bearings	Lubrication		X			Ball-bearing lubricant
All levers	Lubrication	X				Lubrication oil
V-belts Angular gear Electric motor Combustion engine Conveyor	Check and change as necessary					 SPA 1357, 2 pcs SPA 1320, 3 pcs XPA 1320, 3 pcs. A 136, 1 pc.
Cross-cut saw-blade	Sharpening					
Machine	Cleaning	X				
Electric motor	Cleaning	X				
Combustion engine	Service	x				Instruction manual of engine
Electric equipment	Cleaning	x				

9 Malfunctions and their remedy

Disturbance	Cause	Remedy
The cross-cut saw-blade is heavy on power and gets hot .	1. The blade is dull. 2. Setting too small. 3. Too much resin in the blade.	1. Sharpen the saw-blade. 2. Set the blade. 3. Clean the blade.
The saw-blade wobbles. The cross-cut blade starts to wobble after a short period of working.	1. Impurities between the flanges. 2. Setting too small, pre-stressing faults.	Clean the flanges and the blade. Set the blade. Pre-stress the blade.
The blade whines.	1. Too high speed, max. 1,500 r.p.m. 2. Root-crack at the tooth	Decrease the speed Do not use, replace the blade.
The saw-blade rotates in the wrong direction.	Wrong phase-order.	1. Switch positions of two phases.
The electric motor does not start.	1. Emergency stop button depressed. 2. Makes loud noise, but does not start.	1. Reset the emergency stop. 2. The fuse has blown, replace it.
The motor stops several times and the thermo-relay trips.	1. The blade is dull. 2. Incorrect setting of the thermo-relay.	1. Sharpen the saw-blade. 2. Re-adjust the thermo-relay.
Whining sound during the sawing operation and the revolutions drop.	1. V-belts are slack.	1. Tighten the belts.
The Honda engine dies.	1. Out of fuel. 2. Oil level low.	1. Refuel 2. Top up engine oil.

10 Electrical diagram



YLISTARON TERÄSTAKOMO
0E1204225

	Suomi	English	Deutsch			
	KOTELO	ENCLOSURE	GEHÄUSE	PCM 200/150 G	FIBOX SUOMI OY	1
	AS.LEVY	MOUNTING PLATE	MONTAGEPLATTE	MIV 200	FIBOX	1
	HOLKKITIIVISTE	GABLE GLAND	KABELVERSCHRAUBUNG	BM-12 M20	FIBOX SUOMI OY	2
	HOLKKITIIVISTE	GABLE GLAND	KABELVERSCHRAUBUNG	BM-17 M32	FIBOX SUOMI OY	1
	VASTAMUTTERI	LOCK NUT	GEGENMUTTER	BML-12 M20	FIBOX SUOMI OY	2
	VASTAMUTTERI	LOCK NUT	GEGENMUTTER	BML-14 M32	FIBOX SUOMI OY	1
-K1	KONTAKTORI	CONTACTOR	SCHÜTZ	LC1D18P7	SCHNEIDER	1
-F1	LÄMPÖRELE	OVERLOAD RELAY	THERMORELAIS	LRD21	SCHNEIDER	1
-F2	JOHDONSUOJAKATKAISIJA	MCB	AUTOMAT	24309	SCHNEIDER	1
-S1	VALINTAKYTKIN	OPERATION SWTCH	SCHALTER	M225-648764-241M1	SÄLZER	1
-S2	SIENIPAINIKE	EMERGENCY STOP	NOT AUS	ZB5AS54	SCHNEIDER	1
	LIITIN	SCREW TERMINAL CONTACT	KONTAKT	ZB5AZ102	SCHNEIDER	1
-X1	RIVILIITIN	TERMINAL BLOCK	KLEMME	KR 8031	ENSTO	2
	ADAPTERI	ADAPTER	ADAPTER	KRL 7	ENSTO	4
	OIKOSULKUSILTA	JUMPER	BRÜCKE	KRL 12, KRL 6067.03	ENSTO	1

	Svenska	Francais	Norsk			
	KAPSLING	BOITIER	KAPSLINGER	PCM 200/150 G	FIBOX SUOMI OY	1
	MONTAGEPLÅT	PLATINE DE MONTAGE	MONTAGEPLATER	MIV 200	FIBOX	1
	KABELFÖRSKRUVNING	PRESSE-ETOUPE	NIPPLER	BM-12 M20	FIBOX SUOMI OY	2
	KABELFÖRSKRUVNING	PRESSE-ETOUPE	NIPPLER	BM-17 M32	FIBOX SUOMI OY	1
	KONTRAMUTTER	ECROU	KONTRAMUTTER	BML-12 M20	FIBOX SUOMI OY	2
	KONTRAMUTTER	ECROU	KONTRAMUTTER	BML-14 M32	FIBOX SUOMI OY	1
-K1	KONTAKTOR	DISJONCTEUR	KONTAKTOR	LC1D18P7	SCHNEIDER	1
-F1	TERMORELÄ	RELAIS DE SURTENSION	RELÄ	LRD21	SCHNEIDER	1
-F2	AUTOMAT	AUTOMATE	AUTOMATSIKKRING	24309	SCHNEIDER	1
-S1	BRYTARE	INTERRUPTEUR	BTRYTER	M225-648764-241M1	SÄLZER	1
-S2	NÖDSTOP	ARRÊT D'URGENCE	NÖDSTOP	ZB5AS54	SCHNEIDER	1
	KONTAKT	VIS DE BORNIER	KONTAKT	ZB5AZ102	SCHNEIDER	1
-X1	UTTAGSPLINT	BORNIER	REKKEKLEMME	KR 8031	ENSTO	2
	ADAPTER	ADAPTATEUR	ADAPTER	KRL 7	ENSTO	4
	BRO	CAVALIER	LASK	KRL 12, KRL 6067.03	ENSTO	1