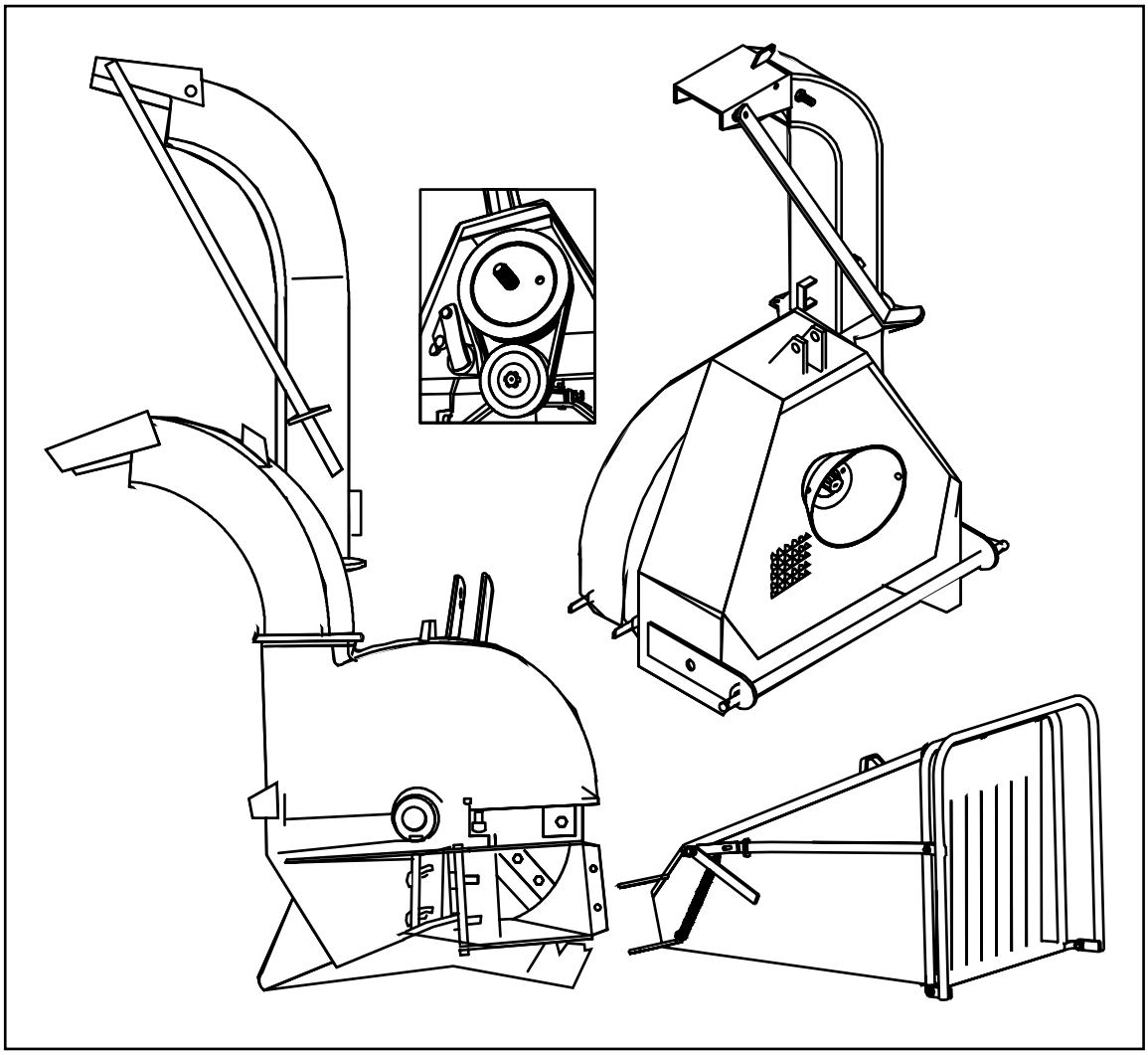
OPERATION, MAINTENANCE AND SPARE PARTS MANUAL

CHIPPER
CH 160
CH 160T i=2,1



READ THIS OPERATION AND MAINTENANCE MANUAL CAREFULLY BEFORE USING THE MACHINE

FARMI® Forest

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WARNINGSYMBOLS IN THIS MANUAL

- **imminent danger which could cause serious personal injury or death**

- **danger which could cause personal injury**

- **conditions or misuse that could damage equipment or machinery**

NOTE!

- **reminders, such as for performing checks or carrying out maintenance or repair procedures**

INTRODUCTION

This manual includes the information and maintenance instructions required for operating the machine in the optimal manner.

Although you have experience in using this kind of machinery, read the operation and maintenance instructions carefully since they include information enabling efficient and safe operation. Regular maintenance is the best way to guarantee the efficient and economical performance of the machine.

Each and every operator must read, understand, and follow all safety instructions and procedures.

CUSTOMER FEEDBACK

We are happy to receive your opinions and suggestions for improvements by mail, fax or e-mail. All implemented suggestions for improvements will be rewarded.

CH160

MANUFACTURER'S DECLARATION OF CONFORMITY

Farmi Forest Corporation
Ahmolantie 6, FIN-74510 IISALMI, Finland

Informs that the machine, launched on to the market

Farmi Chipper
(make)

CH160 / CH160T
(type)

(serial number)

conforms to the directives 98/37/EC and 89/336/EC, as amended, and the national regulations bringing these directives into force.

In designing the machine, the following unified standards have been applied:

EN 12100-1/2, EN 982, EN 60201-1

Iisalmi , Finland 15.11.2007
(place) (date)

Juha Hallivuori

CH160

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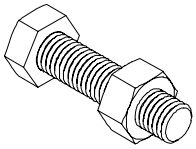
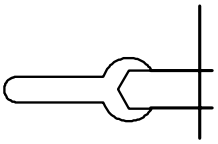
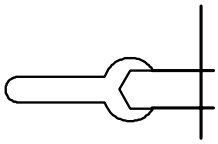
 Thread	 Millimeter	 Inch
M6	10	7/16
M8	13	1/2
M10	17	11/16
M12	19	3/4
M16	24	15/16
M20	30	1 3/16
M24	34	1 7/16

When ordering spare parts, please indicate machines type from the machine plate, spare parts order number, description and quantity required.

Example. CH160, knife, 43510220, 2 pc

SAFETY INSTRUCTIONS

These safety instructions are meant for the owners of FARMI equipment, as well as those who operate, service or repair it.

The instructions help with:

- using the machine safely, appropriately and effectively.
- identifying, avoiding and preventing potentially dangerous situations.

The manufacturer supplies an instruction manual, which must always be available at the place of operation of the machine. Each user must read the safety, maintenance and operating instructions before operating the machine, and comply with these instructions at all times.

Ensure that every operator of the machine is familiar with the content of the instruction manual and situation-specific safety instructions, and has been suitably trained before operating the machine.

The machine complies with technical requirements and applicable safety regulations. However, incorrect use, maintenance or repair of the machine may cause risks.

In addition to the instruction manual, remember to comply with regulations of the local occupational health and safety authorities, and with your country's laws and decrees.

The manufacturer is not liable for damages caused by:

- incorrect, negligent or inappropriate use of the product.
- non-original spare parts.
- normal wear and tear.
- misuse caused by an untrained person's improper actions.
- alterations made without the manufacturer's permission.

Written authorization must be requested from the manufacturer for any alterations to the machine.

STARTING

- Familiarize yourself thoroughly with the use, operation and controls of the machine and its equipment before starting.
- Familiarize yourself with the capacities and limitations of the machine and its equipment.
- Do not use the machine unless you are completely familiar with its operation.
- Be aware of the machine's danger zones.
- During operation, prevent bystanders from entering the danger zone.
- Ensure that each operator has the necessary safety equipment, such as a helmet, safety goggles, work safety boots and suitable protective clothing.
- Never wear loose clothing around moving parts. Protect long hair!
- Ensure that work is carried out according to the stipulations of applicable occupational health and safety legislation.
- Before starting up or using the machine, ensure that it cannot cause a risk to other people or property.
- Perform a safety check on the machine before every use. If you observe any faults or deficiencies, repair the machine immediately.
- Before operating the machine, ensure that there are no foreign articles in it.
- Place the machine on a hard, level surface for operation. In the winter avoid working in slippery areas.
- Before operation, ensure the machine is properly connected.
- Never use a faulty or deficient machine.

OPERATION

Many occupational accidents take place in abnormal circumstances. Therefore it is important to take into account all the possible circumstances that may arise during operation of the machine.

- Depending on the machine's type, it will have diverse safety devices and protectors. These are meant to protect the machine and its operator, and they must never be removed or altered. Never start up or use the machine without all the safety devices and protectors in place. Also check the universal joint's safety equipment and joins.
- Never insert any body part into the machine with the engine running.
- If any faults arise that may jeopardize occupational safety, turn off the machine.
- During operation, the machine's operator is responsible for safety in the whole work area. Work may not be carried out in the presence of any factors that jeopardize occupational safety.
- Exercise extreme caution when hitching / unhitching the machine from a tractor/trailer.

The machine's operator must have constant, unobstructed visibility of the work area. If this is not possible, the operator must work with an assistant.

- Look out for moving parts when the machine is in operation.
- Secure the machine against unauthorized and accidental operation (e.g. moving when parked) whenever it is left unattended.
- Never leave the machine running unattended.
- Avoid causing fast, stroke-like loading.
- Never exceed the given operating values.
- All safety and warning signs on and in the machine must be legible and intact.
- The machine may not be operated by persons who are unwell or under the influence of drugs or alcohol.

MAINTENANCE

- The machine may only be serviced and repaired by professionals.
- Electrical and hydraulic faults may only be repaired by authorized professionals.
- In cases requiring welding, contact the manufacturer.
- Turn off the tractor engine and disconnect the universal joint before beginning service or maintenance actions.
- Ensure that there is no pressure in the hydraulic system.
- Take out the key from the tractor's ignition for the duration of the servicing or maintenance. Check that the power is off from the machine you are working on.
- When servicing the machine, place it on a level surface and ensure that it cannot be moved.
- Observe the service intervals and annual safety inspections.
- All spare parts and equipment must fulfill the manufacturer's requirements. This can be guaranteed by using original parts.
- Put all safety devices back into place immediately once servicing or maintenance is complete.

When lifting the machine, check that the lifting/hoisting equipment is in perfect working order. Check the weight of the machine before lifting it. Choose lifting trajectories so that they do not cause any danger.

Many countries have specific legislation on lifting, hoisting cables and hoists. Always comply with local safety regulations.

OILS AND LUBRICATION

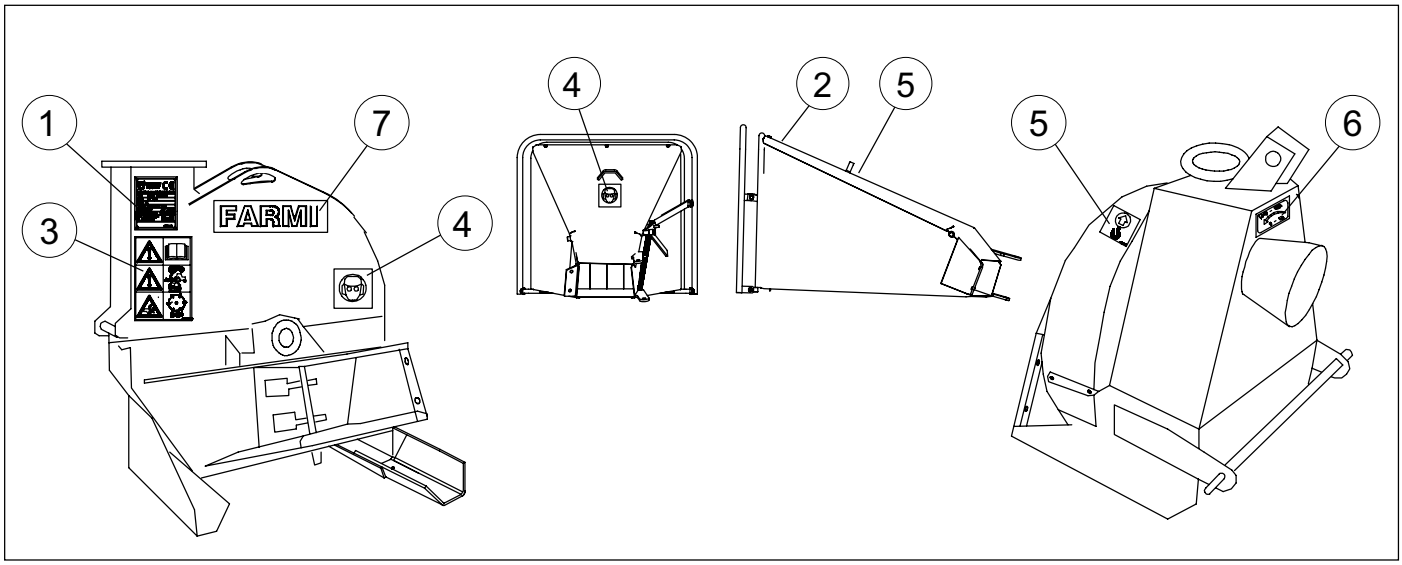
- Always use the oil types recommended by the manufacturer. Other types of oil may cause faults or improper operation of the equipment, which could lead to serious damage to people or property.
- Never mix different liquids or oils.
- Always follow the manufacturer's lubrication instructions.
- Use control equipment carefully until the hydraulic oil has had time to reach its operating temperature.

SAFETY INSTRUCTIONS FOR HYDRAULIC CIRCUITS

1. Work on hydraulic equipment may only be carried out by professional hydraulic engineers.
2. Be cautious when using the equipment in cold conditions.
3. Check the machine for leaks. Do not use the machine if there is a leak from any system. Check all hydraulic hoses – particularly those which are bent during use – and replace any that are in poor condition or have leaks. Ensure that all joins are tight and that the lines are not damaged. Check that all protective caps and filler caps are closed properly.
4. Check that all hose connectors, lengths and qualities comply with applicable requirements. When replacing or repairing hoses, use original parts or hoses and connectors recommended by the manufacturer. Check particularly that the pressure classes of the hoses and connectors are suitable to the operating pressure levels.
5. Check that all safety devices such as pressure relief valves, etc., are in place and work properly. Familiarize yourself with their use. Safety systems may never be bypassed.
6. Check the main hydraulic parts daily, and always after a fault. Replace any damaged parts immediately.
7. If a component is damaged, clean it before repairing it. Do not use solvents when cleaning parts.
8. Do not attempt to carry out repairs that you are not fully familiar with.
9. Never carry out repairs of the hydraulic circuit when the system is pressurized. When pressurized, the oil spray can penetrate the skin and cause mortal danger.
10. Never work below a device or component that is only being held up by hydraulics. Use separate supports when carrying our maintenance or repairs. Do not disconnect cylinders or their valves until the machine is well supported.
11. Most hydraulic oils do not evaporate easily. Risk factors include hot oil, spills and oil mist (pressurized).
12. If oil gets into your eyes, rinse with plenty of water and contact a doctor.
13. Avoid prolonged or repeated contact with your skin.
14. If sprays or contact with the skin cannot be avoided, use protective gloves, goggles and clothing as necessary. Do not use oily clothing.
15. Avoid discharging hydraulic oil into the environment, as it can pollute waterways and the groundwater. When working in ecologically vulnerable areas, use biofuel.
16. Store the oil in sealed containers provided by the manufacturer. Try to transfer the oil directly from its container into the tank.
17. If the oil must be passed through other containers, ensure that they are completely clean. Caps, funnels, sieves and filling holes must also be clean.
18. Never store oil outdoors, as water could condense in it.
19. Always dispose of oil in a suitable container, never into the environment!

STICKERS AND PLATES

These plates and stickers must be found on the chipper. Replace missing plates or stickers immediately.



Farmi Forest Corporation			
Ahmolantie 6 FIN-74510 IISALMI FINLAND	CE		
TYPE	FARMI CHIPPER		41012520
MODEL	CH 160		
SERIAL NO.			
YEAR OF MANUFACTURE	20		
POWER NEEDED	10-40	kW	
WEIGHT HYDR/MANUAL	330/270	kg	
MAX. HYDR. PRESSURE	175	bar	
OIL FLOW NEEDED	20	l/min	

1. Machine plate CH160 (41012520)

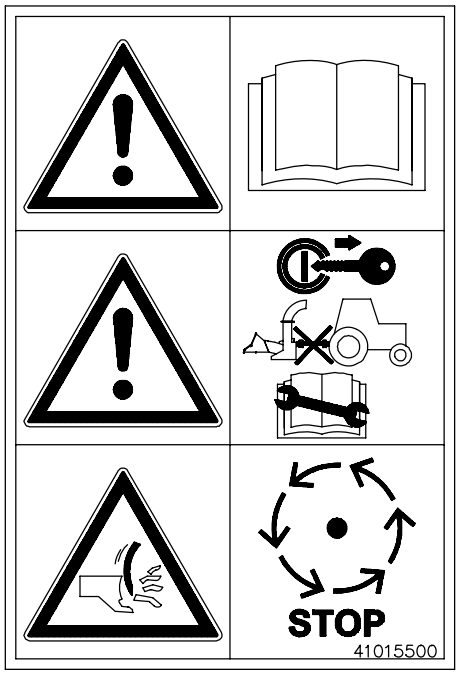
Farmi Forest Corporation			
Ahmolantie 6 FIN-74510 IISALMI FINLAND	CE		
TYPE	FARMI CHIPPER		41011740
MODEL	CH 160 T		
SERIAL NO.			
YEAR OF MANUFACTURE	20		
POWER NEEDED	18-40	kW	
WEIGHT HYDR/MANUAL	450/330	kg	
MAX. HYDR. PRESSURE	175	bar	
OIL FLOW NEEDED	20	l/min	

1. Machine plate CH160T (41011740)

FARMI forest

valmistaja manufacturer
Farmi Forest Oy
FIN-74510 IISALMI
FINLAND

2. Manufacturer sticker (40605214)



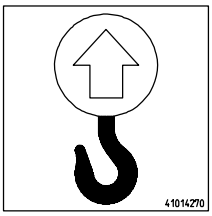
3. Note! (41015500)

Note!
See operation and maintenance manual.

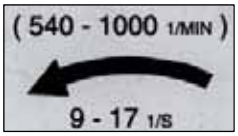
Note!
Stop the engine and remove the PTO shaft for maintenance.

Risk of cutting injury!
Stop the engine and wait until the disk has stopped.

4. Wear hearing protection. (40142080)



5. Lifting point sticker (41014270)



6. Rotation speed sticker (40141160)

7. FARMI sticker (30616171)

PRESENTATION

The FarmiCH160 is a double-knife disk cutter for chipping wood up to ø160 mm, for processing wood waste from, e.g., the side of jogging tracks or roads, and for other environmental chipping duties. The chipper can be driven by a tractor with a rating of 10–40 kW. The chipper can also be driven by a separate hydraulic motor.

CH160 accessories:

- Single-motor hydraulic feeder or mechanical hopper
- Independent hydraulic unit HD11
- Separate hydraulic motor drive
- “Wille” adapter
- “Bobcat“ adapter
- Belt transmission 160T

MAIN COMPONENTS

1. UPPER CHAMBER
2. LOWER CHAMBER
3. DISK
4. KNIFE
5. VERTICAL ANVIL
6. HORIZONTAL ANVIL
7. TWIG BLADE
8. DISCHARGE PIPE
9. LID
10. HYDRAULIC MOTOR (OPTIONAL)
11. BELT TRANSMISSION 160 T (OPTIONAL)

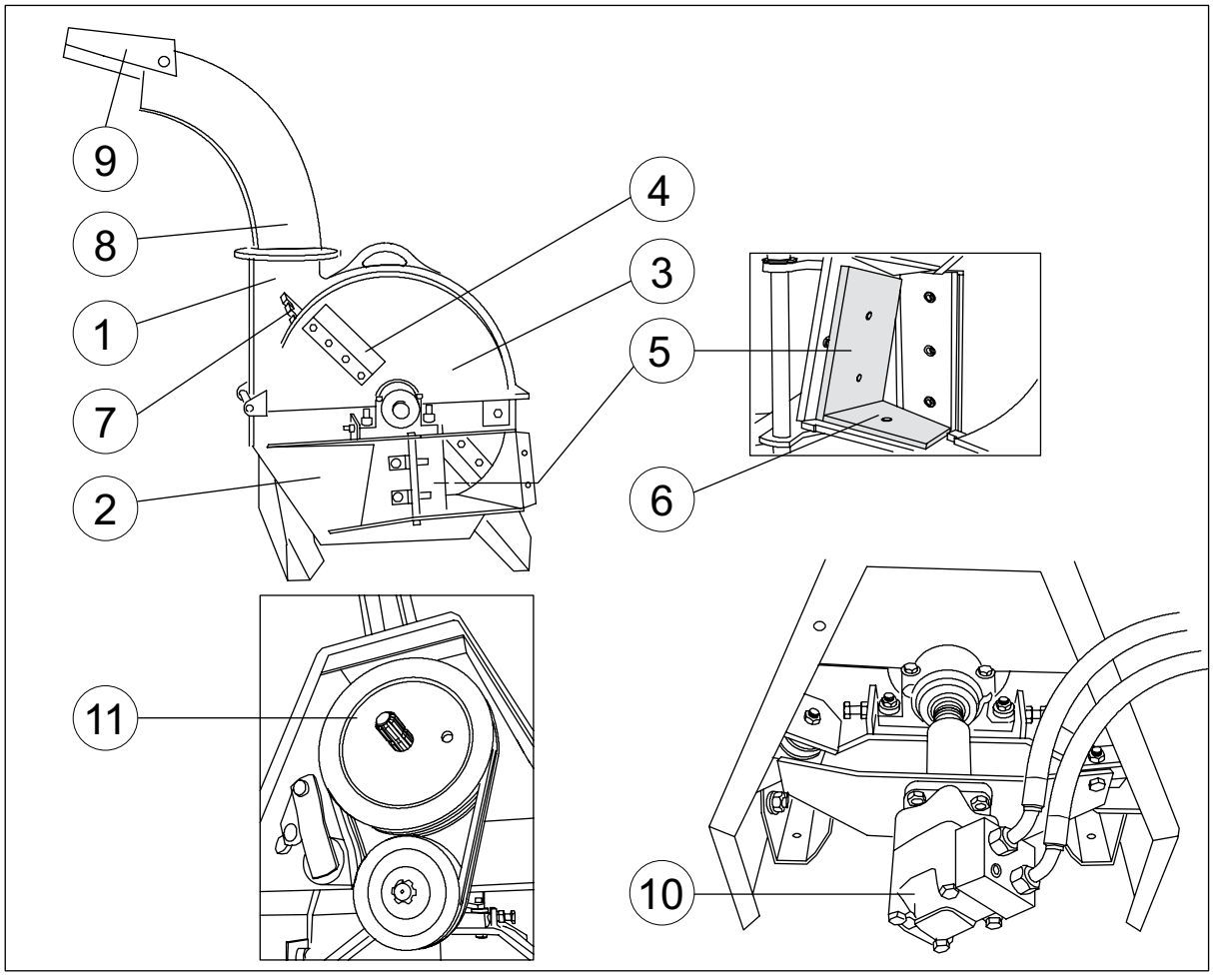


Fig. 1. Main components

CH160

DIMENSIONS

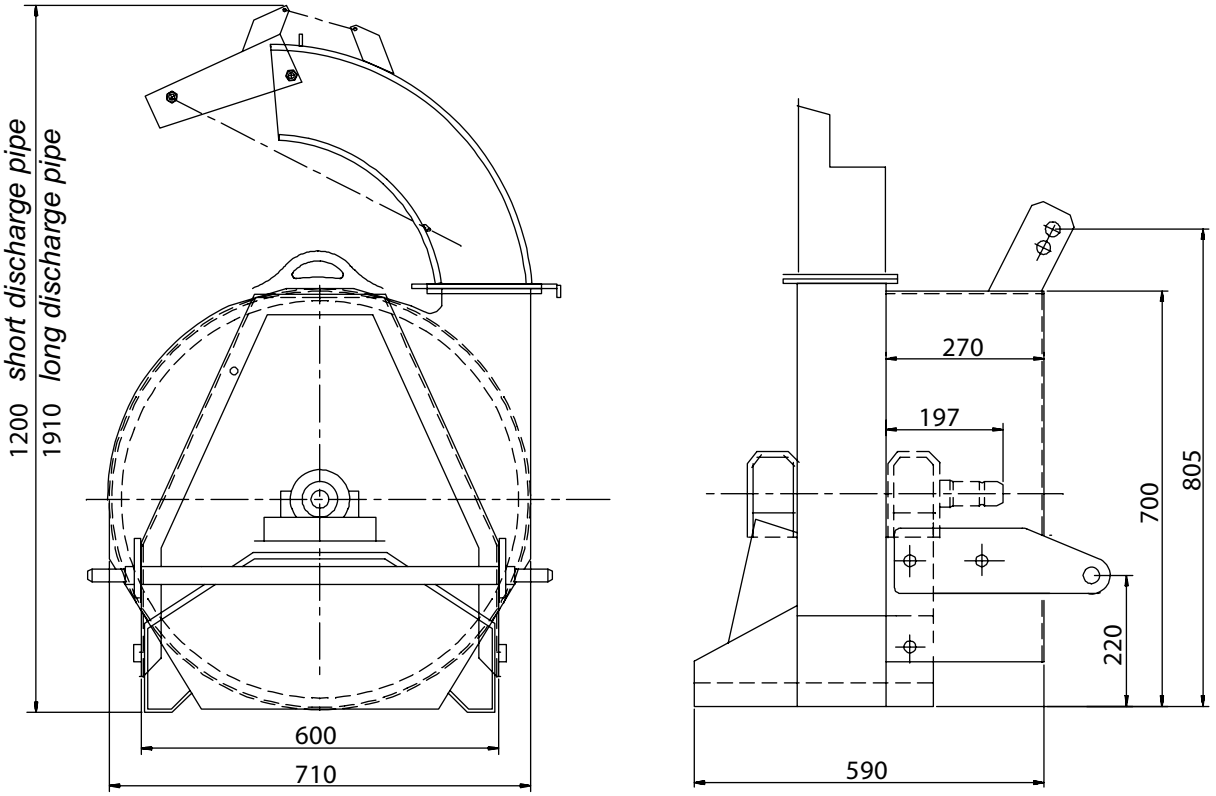


Fig. 2. CH160 dimensional drawing

TECHNICAL DATA	**CH160**
Type	disc chipper
Output	5-20 m^3/h
Chip length	13 mm
Max. wood diameter	160 mm
Power demand	10-40 kW
PTO rpm	540 tai 1000 rpm
Number of knives	2 pc
Power source	tractor or a separate hydraulic motor
Mounting	3-point linkage
Chipper weight	CH160 240 kg CH160T 284 kg
Disc diameter	670 mm
Disk weight	100 kg
Discharge pipe turning	360°
Opening of upper chamber	to one side
Feeder	manual chute or hydraulic feeder
Sound pressure level Sound power level CEN/TC144 WG8N16	102 dB (A) 120 dB (A)

LIFTING

CAUTION!

Lifting points for each machine are marked with hook symbols.

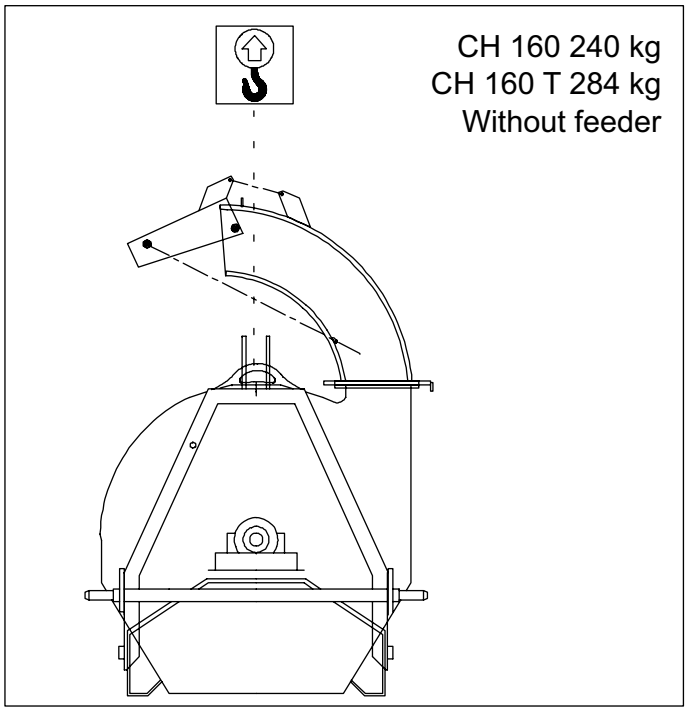


Fig. 3. CH160 lifting point.

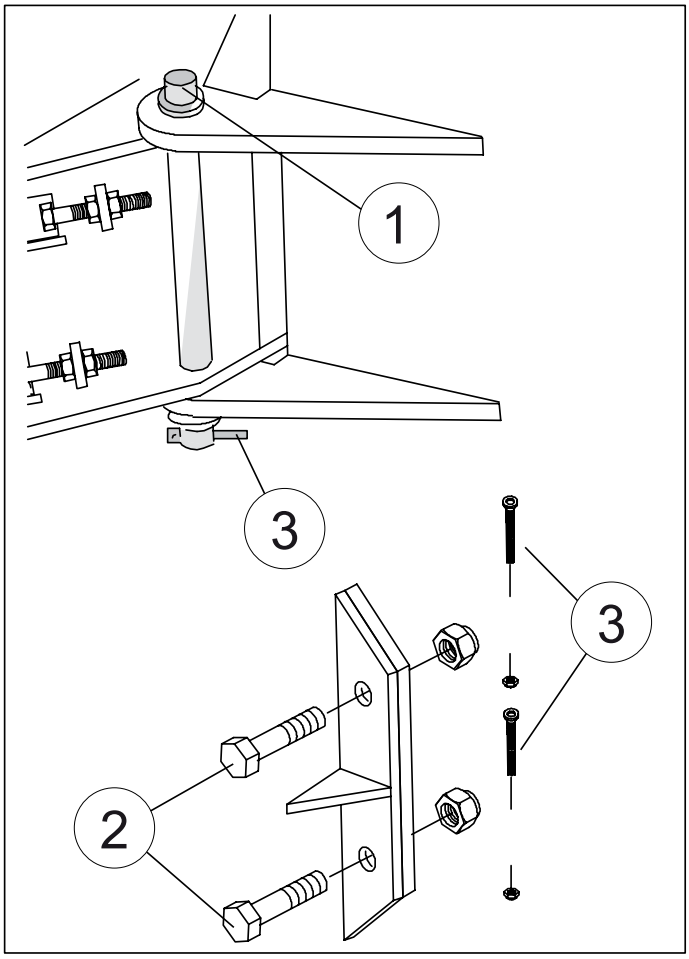


Fig. 4. Mounting the feeder

ASSEMBLY INSTRUCTIONS

1. Attach the feeder to the chipper from the left side with the hinge pin (1) and from the right side with two bolts (M12) (2). Remember to install the securing bolts (M6) (3). See Fig. 4.
2. Attach the discharge pipe to the chipper with two M10 bolts and one M16 bolt.
3. Mount the chipper on the tractor's 3-point hitch.
4. Install the PTO shaft.
5. Check that the length of the PTO shaft is correct for different hitch positions.

SHORTENING THE PTO SHAFT

1. Connect the device to the tractor.
2. Measure the distance between the splined shafts (Distance A)
3. First cut the thicker shaft shield to the correct length (1). Remember to leave at least a 40 mm clearance. Then cut a similar length off the profile tube (2). Shorten the other half of the PTO shaft in the same way. File off the burr.
4. Interconnect the tubes and check that the shaft has been shortened enough by moving the machine gently. Ensure that there is a 40 mm clearance. Also move the machine sideways to check that the shaft moves freely.

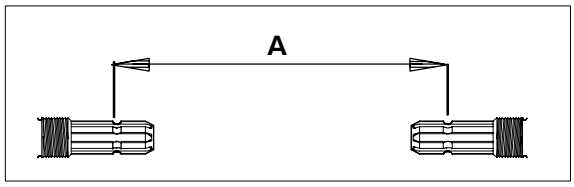


Fig. 5. Measure A, when the distance between the splined shafts is at its shortest.

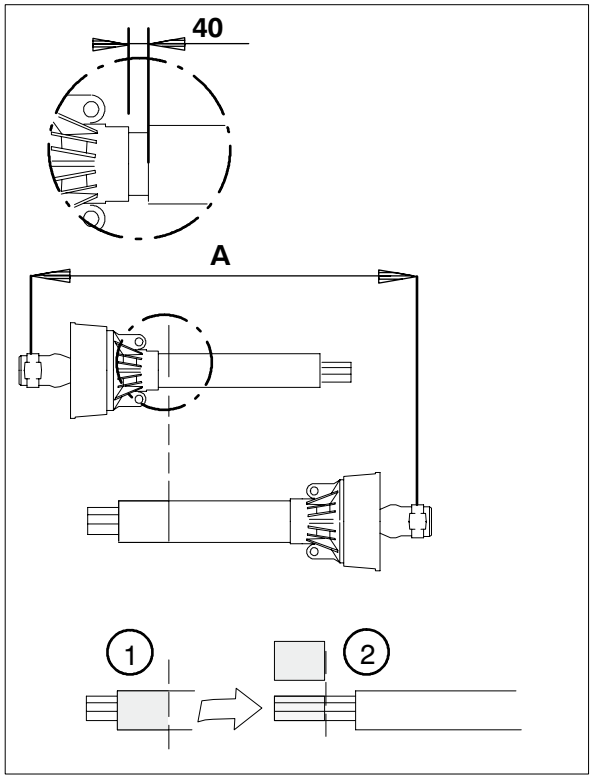


Fig. 6. Shortening the PTO shaft

MOUNTING ON THE WILLE 445 ADAPTER (Mounting kit 43510500)

- Attach the top link brackets of the adapter and chipper together with M20 pin and nut. (1)
- Attach the grabbers to the chipper's drawbar assy with four bolts (M16) (2).
- The grabbers have three grooves for the drawbar of the drawbar assy. Attach the grooves of the grabbers (3) so that the chipper is as vertical as possible at the operating position.

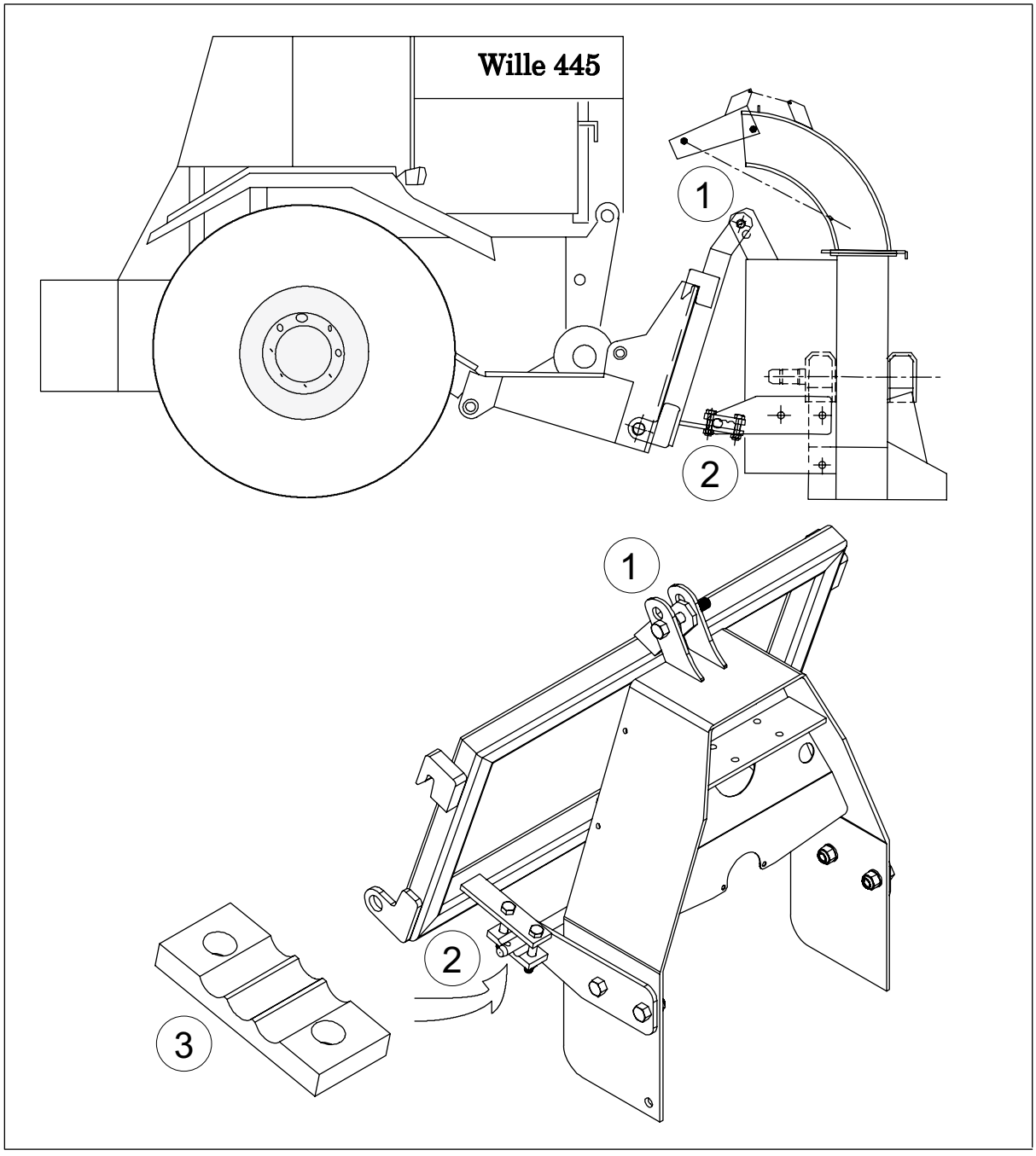


Fig. 7. Mounting on the Wille 445 adapter

MOUNTING ON THE BOBCAT ADAPTER (Mounting kit 03510800)

- The mounting assembly replaces the drawbar assy on the chipper frame.
- Attach the mounting plate to the top link brackets of the chipper with M20 pin and nut (1).
- Attach the left and right bracket to the chipper with four bolts (M20) (2).
- Attach the upper beam with four bolts (M12) (3).
- Attach the upper beam to the mounting plate with four bolts (M12) (4).
- Connect the hoses with quick-couplers to the Bobcat. Note the flow directions (see next page).

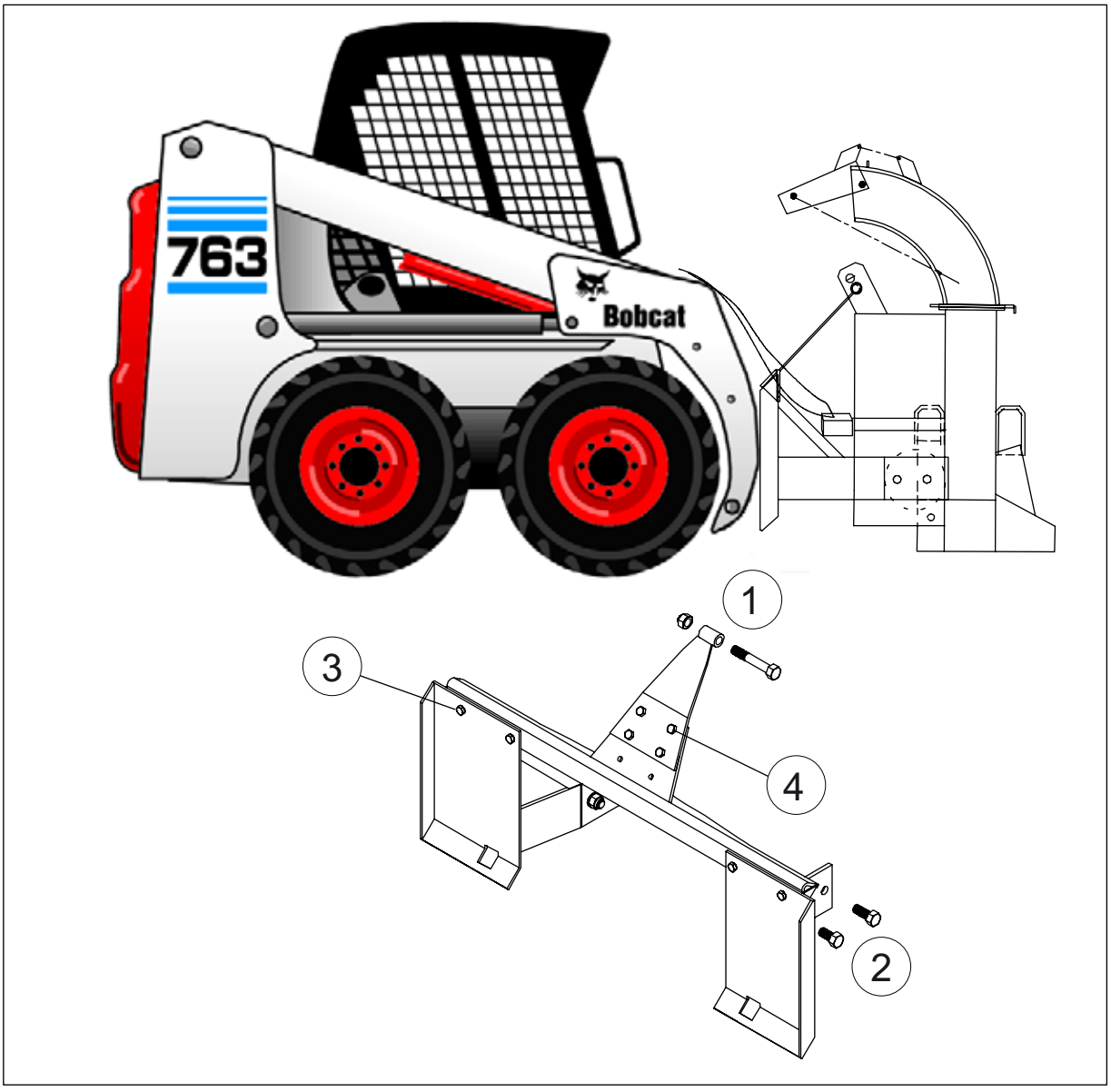


Fig. 8. Mounting on the Bobcat adapter

INSTALLING THE HD 100

The chipper can be driven with a separate hydraulic motor coupled to the chipper shaft.

1. Install the motor bracket on the chipper frame as shown in the figure.
2. Attach the coupling sleeve with the keyway facing the hydraulic motor.
3. Attach the hydraulic motor to the motor bracket. Check that the coupling sleeve is on the chipper's splined shaft.
4. Connect the hydraulic hoses to the hydraulics of the drive machine.

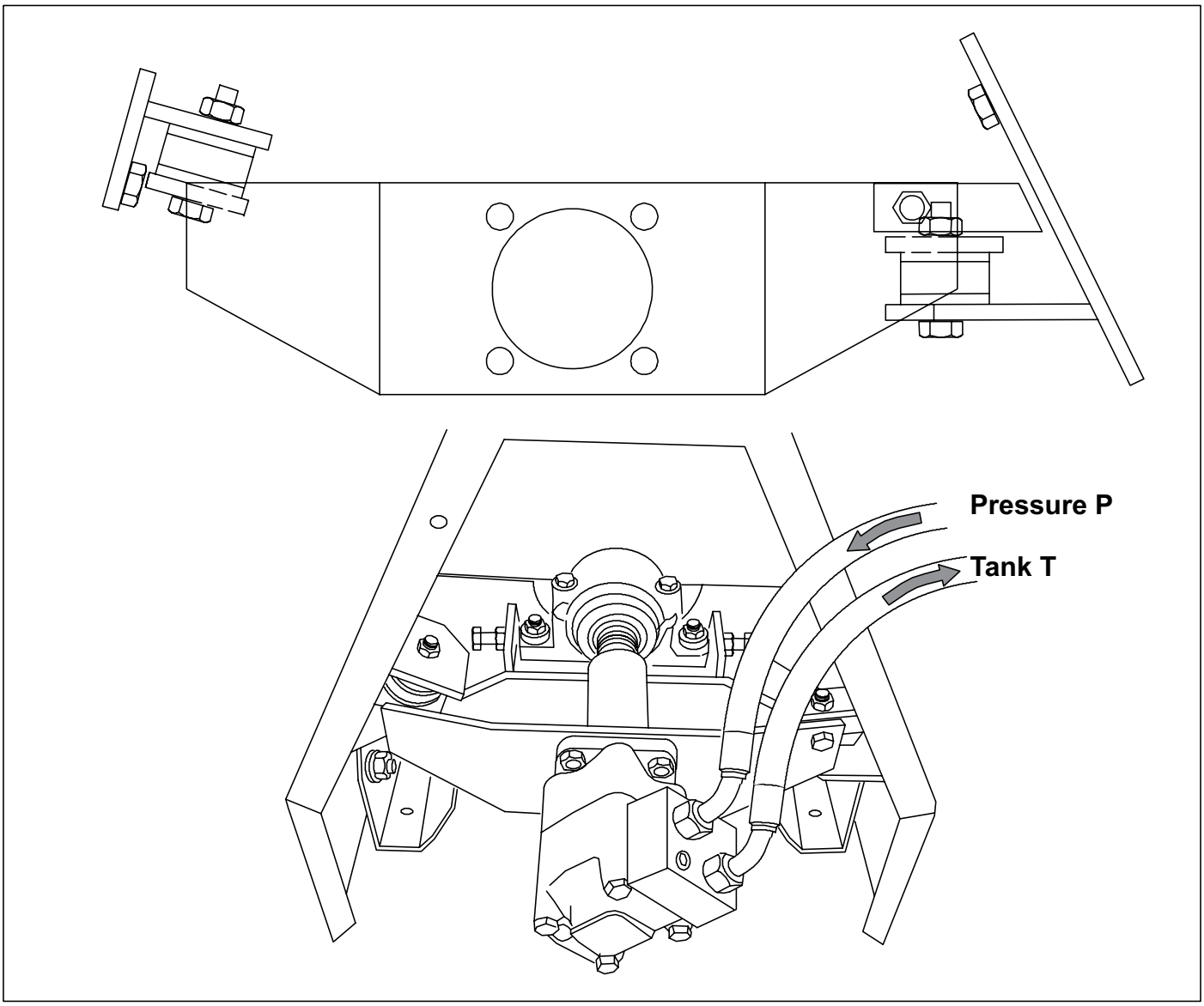


Fig. 9. Installing a separate hydraulic motor

INSTALLING THE 160T i=2.1 BELT TRANSMISSION

1. Remove the PTO guard and install to the cover plate (1). Remove the mounting bolts of the small cover plate and remove the cover plate (2) from the mounting frame. These components will not be needed later. See Figure 10.
2. Attach the upper belt pulley assembly (3) and the regulator plate (4) to the chipper with the M12 bolts (5). Tighten the bolts lightly so that the bearing housing can be moved. See Figure 11.
3. Install the belt tightener (6) with the pin (7) and the adjusting assembly with the pin with hole (8). Secure the pins with cotter pins.
4. Install the belts on the upper belt pulley.
5. Push the lower belt pulley (9) onto the splined shaft without the tightening cone (10) while placing the belts into the grooves of the lower belt pulley.
6. Install the lower belt pulley tightening cone, NordLock lock washer pairs, and tightening cone bolts (M12) (11). Tighten lightly so that the lower belt pulley can be moved on the splined shaft.
7. Check the alignment of the belts - see Figure 12. Adjust the alignment of the belt pulleys by moving the upper belt pulley bearing housing and the lower belt pulley.
8. Tighten the bolts of the upper belt pulley bearing housing and the bolts of the lower belt pulley tightening cone (5 and 11) M12 to 80 Nm.
9. Re-check the alignment of the belts and adjust if necessary.
10. Adjust the belt tightener so that the roller touches the belts lightly, then tighten the adjusting bolt (12) by two to three turns. See Figure 13. Be careful not to over-tighten, as this could damage the belts!
11. Attach the plate (1) to the mounting frame with bolts M8 (13).
12. Mount the chipper on the tractor. To check that everything is in order, run the chipper for a while at slow speed.
13. The belts must be run in, first without load for about ½ hour and then with the chipper loaded lightly for the first 8 hours of actual use.
14. Observe the tightness of the belts and, if necessary, adjust with the adjusting bolt (12).

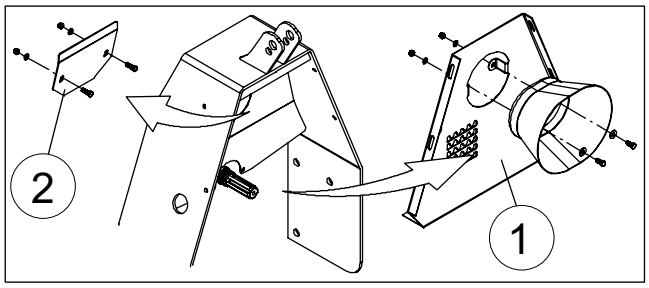


Fig. 10. Removing the covers

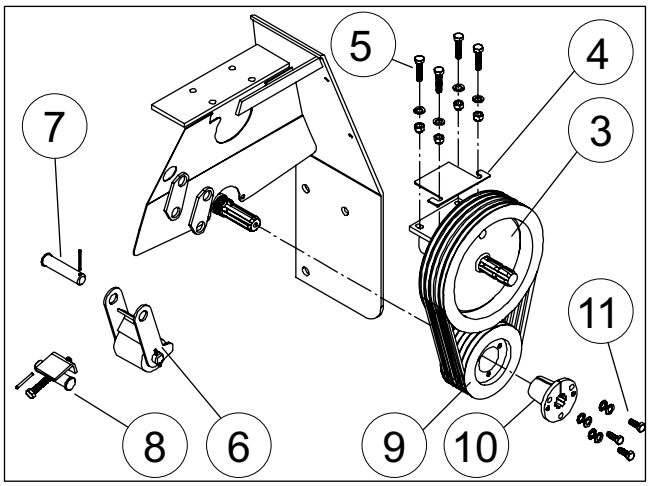


Fig. 11. Installing the 160T belt transmission

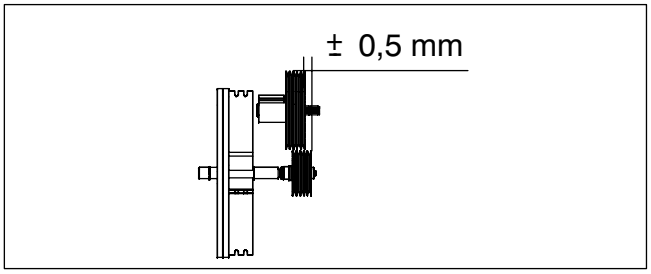


Fig. 12. Belt alignment

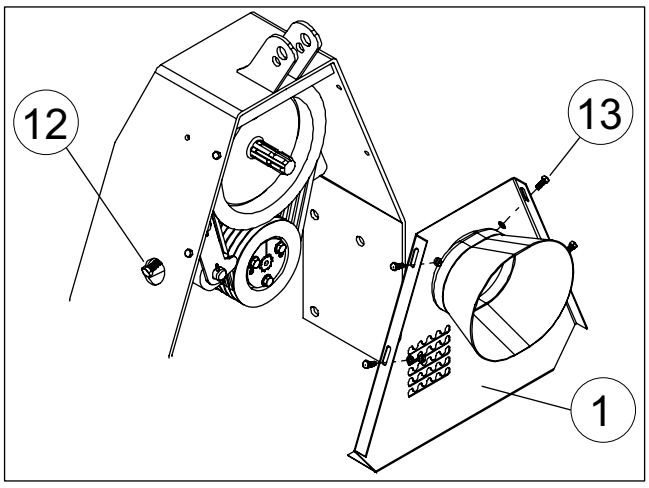


Fig. 13. Installing the 160T belt transmission cover plate

OPERATING THE CHIPPER

INSPECTIONS PRIOR TO OPERATION

- Park the chipper on level, hard ground.
- Stop the tractor's engine and ensure that the chipper is fully stopped before carrying out the inspections.
- Check that the disk rotates freely by turning the shaft, and ensure that there are no foreign objects inside the chipper.
- Ensure that all protective devices are intact and in place.
  Removal of the covers is prohibited.
- Direct the discharge pipe so that flying chips do not pose a risk to the operator or anyone else.

STARTING THE CHIPPER

- Start the chipper at low tractor engine speed and increase the speed slowly to the required chipping speed (540/1,000 rpm).
- The chipper is now ready for chipping.

STOPPING A TRACTOR-DRIVEN CHIPPER

- Slow the tractor engine speed to idle before disengaging the PTO. This is especially important with tractors featuring a PTO brake (e.g., Ford). Turn the PTO control lever slowly to the OFF position.

STOPPING A HYDRAULIC MOTOR DRIVEN CHIPPER

IMPORTANT! When the chipper is driven by the HD100, it is extremely important to slow the driving engine speed to idle before disconnecting the hydraulics, to prevent cavitation.

Never disconnect the hydraulics from high rpm. This will cause a risk of cavitation and may damage the hydraulic motor. Check that no sounds indicating cavitation can be heard from the hydraulic motor.

After stopping the chipper, wait for all movement to stop. The disk continues rotating like a flywheel after the PTO is disengaged.

CHIPPING

- Before feeding in the material to be chipped, ensure that the wood is free from nails, stones, etc.
- Feed the wood from a standing position on the left side of the feeder.
- Push the wood inside the feed chute until chipping starts. Let go of the wood as soon as the self-feeding starts.
- If you are using a hydraulic feeder, refer to the separate chipping instructions in the feeder manual.

Do not use the chipper in temperatures below -20°C. This is to avoid damage due to brittleness – especially in the knives – caused by the cold. Avoid chipping wood that is frozen solid, as self-feeding is reduced in this case.

DANGER!

ROTATING KNIVES! Knives can cause cutting injury. Do not reach inside the feed chute with hands or feet.

WARNING!

FIRE HAZARD! Always keep adequate fire-fighting equipment on hand when using the chipper.
Check the outside temperature of the chipper regularly. If the chipper heats up abnormally, stop the chipper and determine the cause of the overheating.
Check the temperature of bearings regularly. Pay special attention to careful maintenance, and keep the chipper free from dust.
If the chipper starts smoking, pour water down the feed chute.

REDUCING THE POWER DEMAND

When using a small tractor to power the CH160 chipper, select a PTO speed of 540 rpm. Run the tractor at full engine speed.

If the tractor's engine speed still decreases during chipping, reduce power demand by altering the chipper to cut with one knife.

The chipper is altered for single-knife operation simply by removing one knife and attaching it to the other side of the disk as a counterbalance, to retain the balance of the disk.

Since the chipper is self-feeding, the feed speed of wood is also halved.

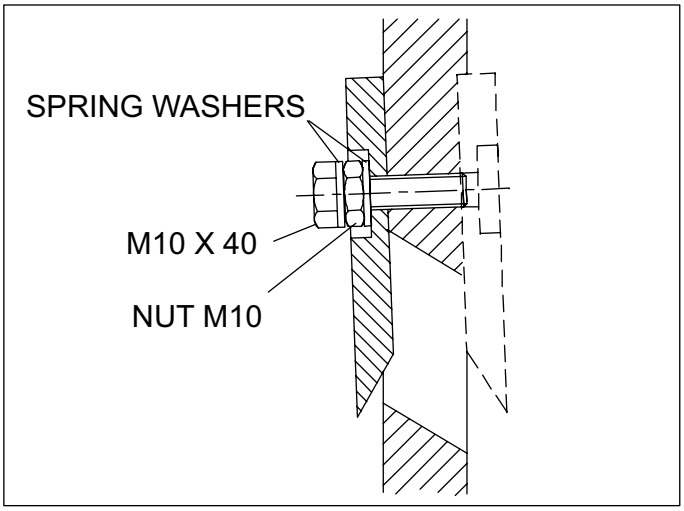


Fig. 14. Remove one knife and attach it to the other side of the disk. The dotted line shows the knife in its normal cutting position.

1. See Sections "Removing the upper chamber" and "Sharpening the knives".
2. Place a spring washer on the bolt. Turn the lock nut on the bolt and tighten to 45 Nm.
3. Place another spring washer on the bolt and turn the bolt through the knife into the disk. See Fig. 14. Tighten the bolts to 45 Nm. Attach the knife using all four bolts.
4. Interchange the cutting and counterbalance knives regularly to ensure the balance of the disk.

PERIODIC MAINTENANCE

WARNING!

Always disengage the PTO and stop the tractor and chipper fully before maintenance or repair work.

Ensure that the disk is fully stopped before inserting anything inside the feed chute.

Lock the disk before maintenance or repairs.

Park the chipper on hard, level ground to avoid it falling over.

Wear protective gloves when handling knives or anvils.

PERIODIC INSPECTIONS

- With new machines, check the mounting bolts for tightness after the first operating hour, tightening them if necessary. Tightening torques are shown in table.
- Check the mounting bolts for tightness once a week.
- The knife-to-anvil clearance is adjusted to the specified values. For instructions on adjusting the clearance, see Adjusting the knife-to-anvil clearance.

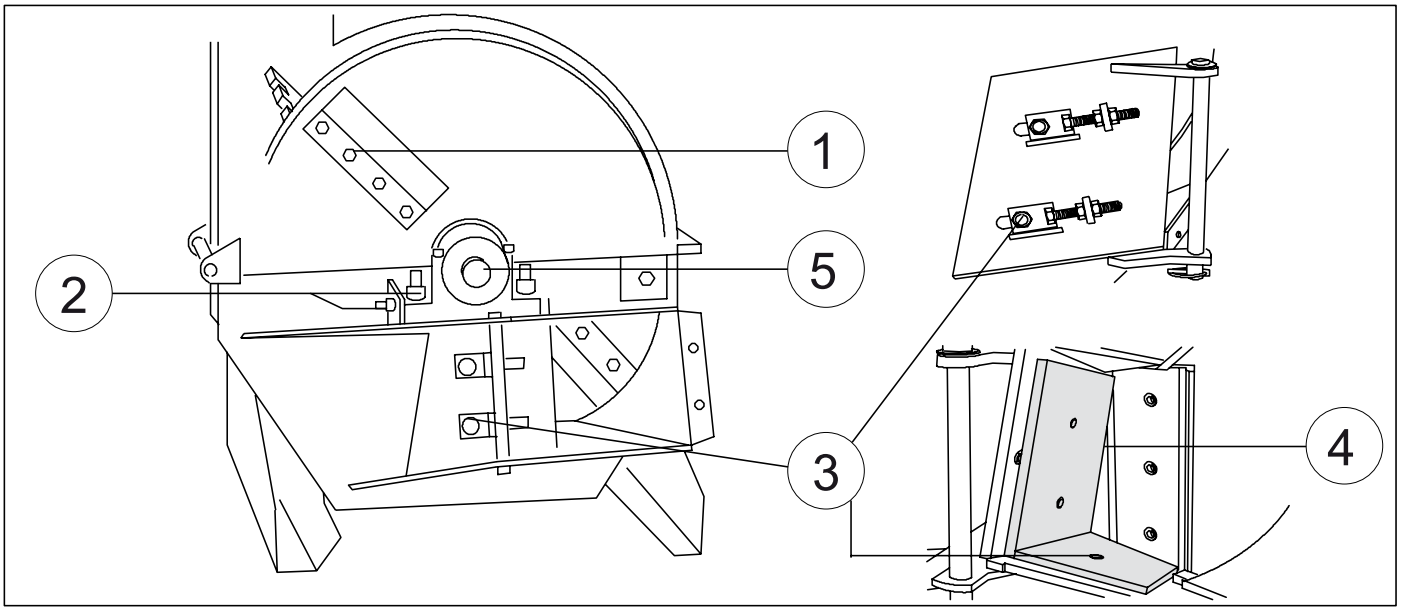


Fig. 15. Checklist for tightening and checking clearances

Item	Width across flats, mm (inches)	Tightening torque, Nm (lbf)
1. Check the knife bolts for tightness.	17 mm (11/16”)	60 (44 3/16)
2. Check the bearing housing bolts for tightness on both sides..	19 mm (3/4”)	80 (58 15/16)
3. Check the anvil bolts for tightness.	24 mm (15/16”)	200 (147 3/8)
4. Check the clearance between knives and vertical anvils.	19 mm (3/4”)	1,2 - 1,5 mm (0,02 - 0,06”)
5. Check the bearings for radial clearance.		0,02 - 0,03 mm (0,008 - 0,0012”)

8.1.LUBRICATING THE BEARINGS

- The bearings are lubricated at the factory, and a similar lubricant should be used for subsequent lubrication (Shell Alvania Grease R 3. or Kendall L427). An excessive amount of grease causes overheating and impairs lubrication.
- Lubricate the bearings every 200 working hours or at least once a year.

1. Open the upper bearing housing - see bearing housing assembly drawing, Fig. 28. Remove old grease as carefully as possible and replace it with new grease. Do not fill the bearing housing with grease.
2. Install the upper bearing housing and tighten to 50 Nm.

LUBRICATING THE PTO SHAFT

- Lubricate the PTO shaft prior to operation and regularly, as shown in Fig. 16.
- Lubricate the inner surface of the PTO shaft, accessed via the outer profile tube.
- Lubricate the shield tubes in wintertime to prevent them from freezing and sticking.

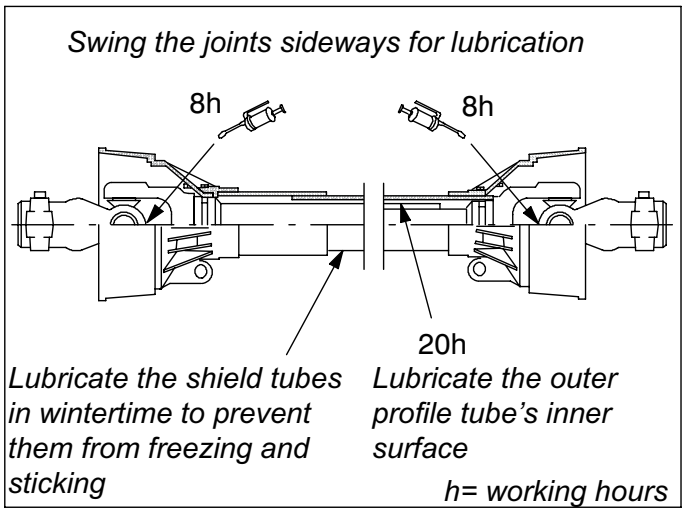


Fig. 16. Lubrication points and intervals for the PTO shaft

KNIFE AND ANVIL MAINTENANCE

Read the safety instructions. The disk continues rotating like a flywheel after the PTO is disengaged.

Wear protective gloves when handling knives or anvils.

OPENING AND REMOVING THE UPPER CHAMBER

- Remove the upper chamber (A) securing bolts (M6) (B) and fastening bolts (M12) (C). Turn the upper chamber to the side.
- To remove the upper chamber, remove the securing bolt (M6) (D) and hinge bolt (M12) (E).
- Lock the disk with the lock bolt Fig. 18.
- Remove the feeder or turn it to the side.

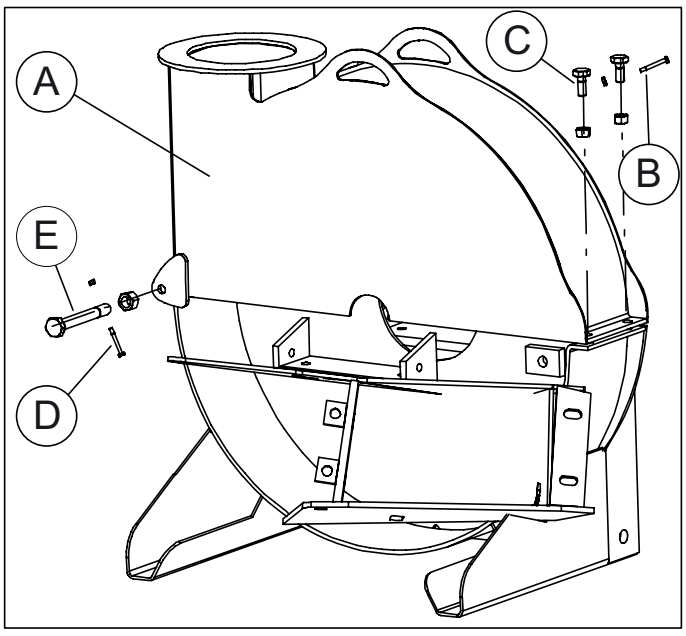


Fig. 17. Removing the upper chamber

REMOVING THE KNIVES

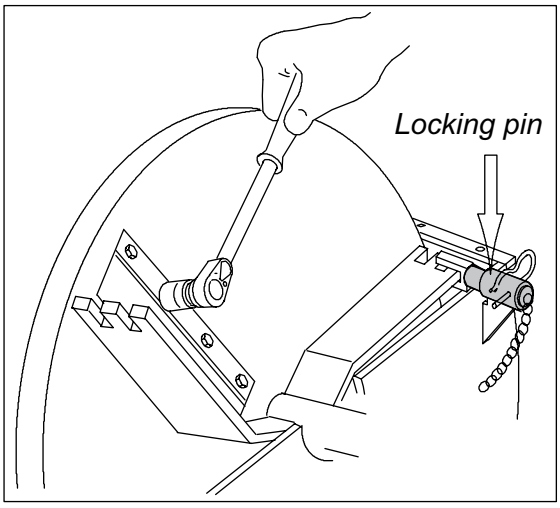


Fig. 18. Locking the disk and removing the lock nuts

1. Remove the knife lock nuts (M10). Fig. 18.
2. Remove the knife fastening bolts (M10). Turn the wrench in such a way that your hands would not hit the knife if the wrench should slip. Fig. 19.

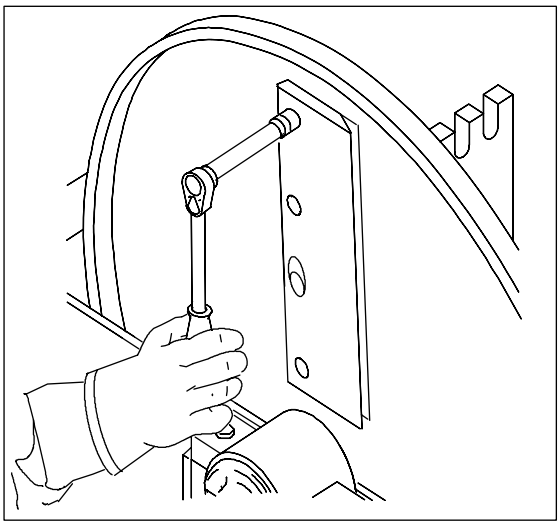


Fig. 19. Removing the knife fastening bolts

SHARPENING THE KNIVES

CAUTION!

Sharpen all knives equally. This ensures disk balance. Avoid heating the knife during sharpening. Wear protective gloves when handling or anvils.

The knives need sharpening when

- the self-feeding of wood has decreased;
- the power demand has increased;
- the chip surface is rough.

Normally, the knives can be sharpened several times without actually being removed (with, e.g., a sharpening stone or belt grinder).
More thorough conditioning is carried out with a surface grinder, with the knives removed.
The new knives are sharpened to a concave shape, R=200. The sharpening angle is 30° and hone angle is 45° . The hone angle prevents the edge from breaking. Fig. 20.

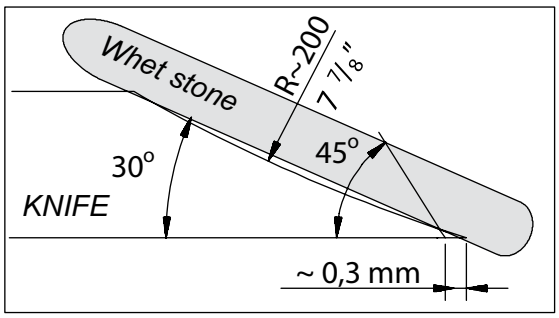


Fig. 20. The profile of a concave knife

It is recommended that the knives be sharpened to a concave shape. If this is not possible, the knife is sharpened to a flat profile. Fig. 21.

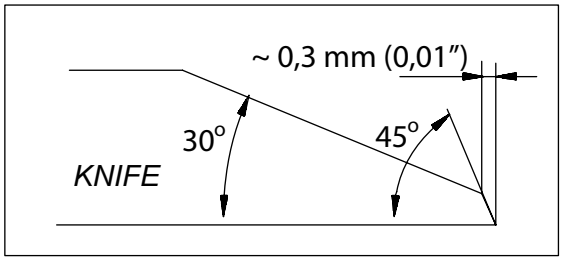


Fig. 21. A knife with a flat profile

The hone angle is ground to a 45° angle with two to three longitudinal strokes, using a level sharpening stone.
Burrs are removed from the knife fastening bolt side, grinding with the surface. Fig. 22.

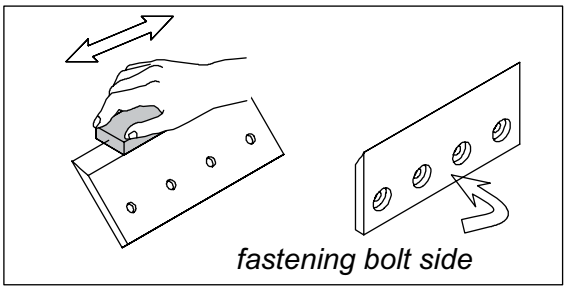


Fig. 22. Final grinding of the knife

REMOVING THE ANVILS

The chipper features both a vertical and horizontal anvil. To remove the anvils, open the fastening bolts (A) and (B) (M16). The horizontal anvil fastening bolt (B) is located below the feed opening. Fig. 23.

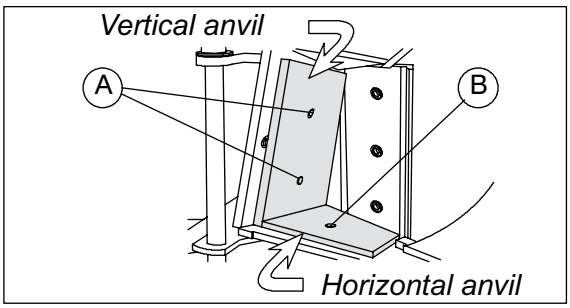


Fig. 23. Anvil fastening bolts

SHARPENING THE ANVILS

If you notice wear or rounding of the inner edge of the anvil, sharpen the anvils so that the original angles are retained. Fig. 24.

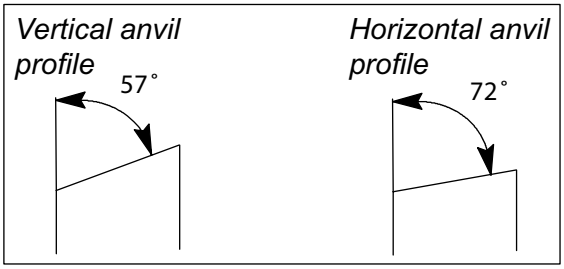


Fig. 24. Anvil profiles

INSTALLING THE KNIVES AND ANVILS

- Check the condition of the fastening bolts and nuts.
- Install the knives and anvils and tighten the fastening bolts to the torques specified in table.
- Adjust the knife-to-anvil clearance.

ADJUSTING THE KNIFE-TO-ANVIL CLEARANCE

The need for adjusting the anvils is determined by the amount the knives are sharpened. Always check and, if necessary, adjust the clearance between knives and anvils

- after a heavy sharpening;
- if the knives were removed - for example, due to sharpening;
- if new knives are replaced.

Check the clearance with a feeler gauge.

1. Loosen the anvil fastening bolts (A) and (B) (M16). Fig. 23.
2. Turn the disk so that a knife and the anvil are aligned. Place a feeler gauge between the knife and anvil. Adjust the vertical anvil clearance with the adjusting nuts (M12) (C, Fig. 25.) to 1.2–1.5 mm (0.05–0.06”).
3. Tighten the adjusting nuts (C) and anvil fastening bolts (A).
4. Adjust the horizontal anvil clearance at the front edge to 4–5 mm (0.16 – 0.20”).
5. Tighten the fastening bolt (B).
6. Re-check the knife-to-anvil clearances.

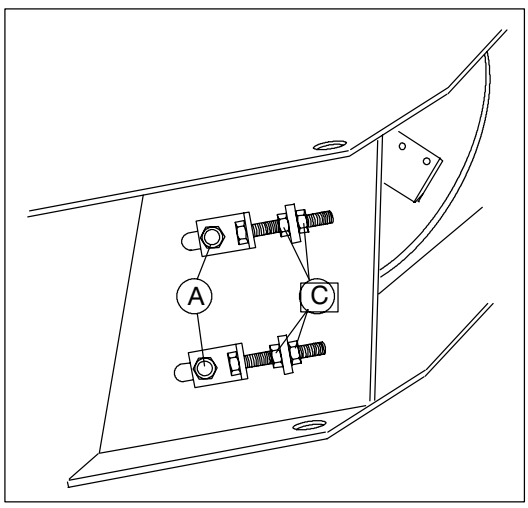


Fig. 25. Vertical anvil fastening and adjustment

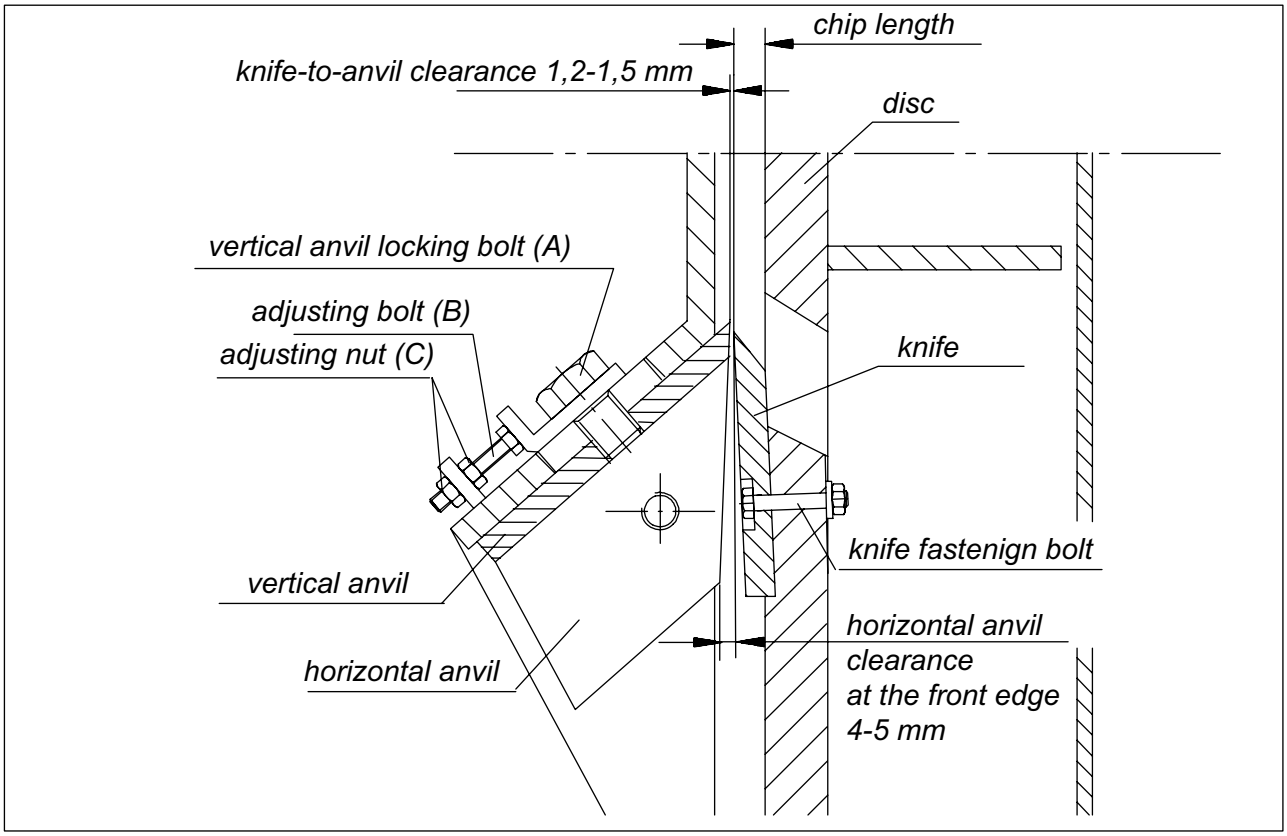


Fig. 26. Cross-section of the disk and knives / anvils

REPLACING THE SPLINED SHAFT

1. Remove the upper chamber.
2. Remove the bearings (see Chapter 13). Welding damages the bearings.
3. Lift the disk up using a hoist.
4. Grind an 11-mm-deep groove about 17 mm from the edge of the shaft. See Fig. 27.
5. Heat the joint area, if necessary.
6. Move the splined shaft so that it comes loose and can be removed.
7. Clean the shaft hole and install the new shaft as shown in Fig. 27..
8. Make a fillet weld up to the surface level with three runs. Use ESAB 68.81, OK 48, OK Femax 38.65, or equivalent filler.

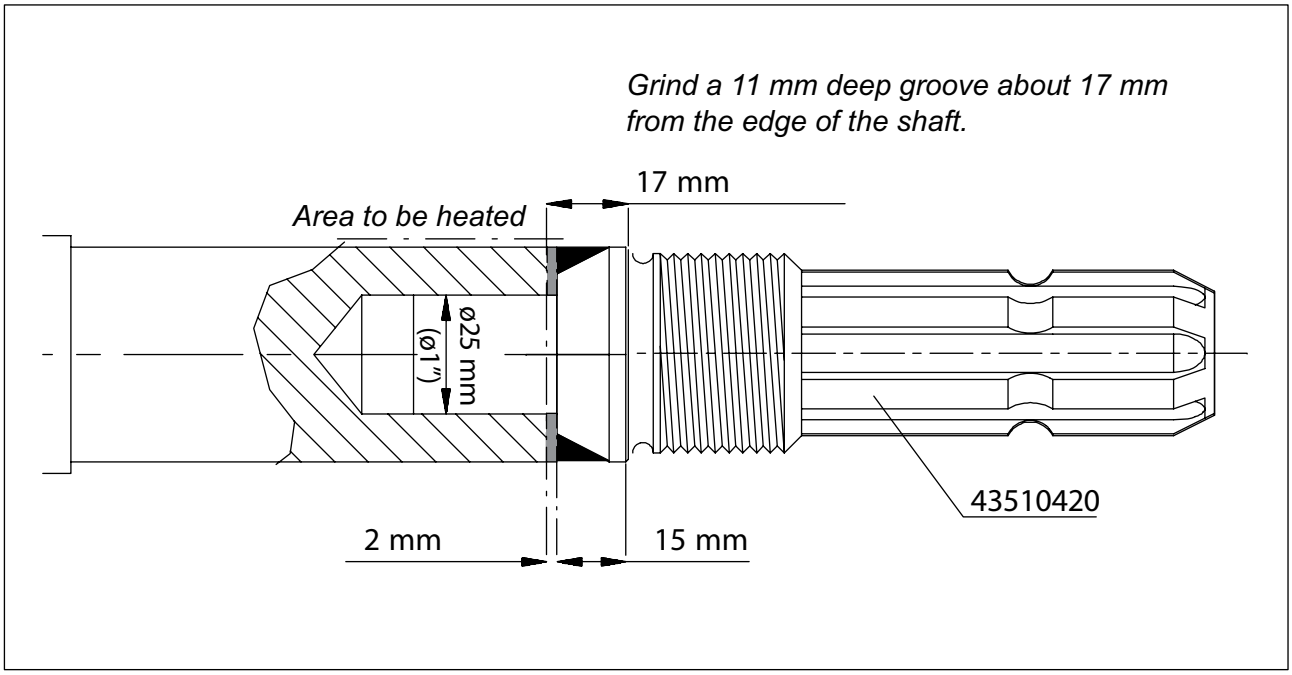


Fig. 27. Replacing the splined shaft

REPLACING THE BEARING

1. Open the upper chamber. See Section Opening and removing the upper chamber.
2. Remove the fastening bolts M10 (7) and the upper bearing housings (6).
3. Mark the location of the tightening cone on the shaft.
4. Lift the disk.
5. Bend the claw of the securing ring (3) out from the notch on the axle nut and open the axle nut.
6. Remove the axle nut, securing ring, spacer ring (4), bearing (5), spacer ring (9), and tightening cone (10).
7. Install the tightening cone, spacer ring (9), and bearing on the disk shaft. Note the thickness of the spacer ring (9) - see Fig. 28.
8. Install the securing ring with the claws facing outwards and the inside claw in the groove of the tightening cone, and install the axle nut.
9. The inner ring of the bearing should press tightly against the tightening cone.
10. Tighten the axle nut with a hook spanner until the bearing is tightly on the cone, or to 80 Nm. However, the outer ring of the bearing should turn freely. Note the location of the tightening cone on the shaft.
11. Bend one claw of the securing ring (3) into a notch on the axle nut.
12. Install the other half of the dust cover and end plate on the bearing housing. Install the spacer ring (4) on the shaft.
13. Lower the disk to the bearing housing.
14. Attach the other half of the dust cover to the upper bearing housing; install the upper bearing housing fastening bolts and tighten to 50 Nm.
15. Lubricate the bearing housing. An excessive amount of grease causes overheating and impairs lubrication.

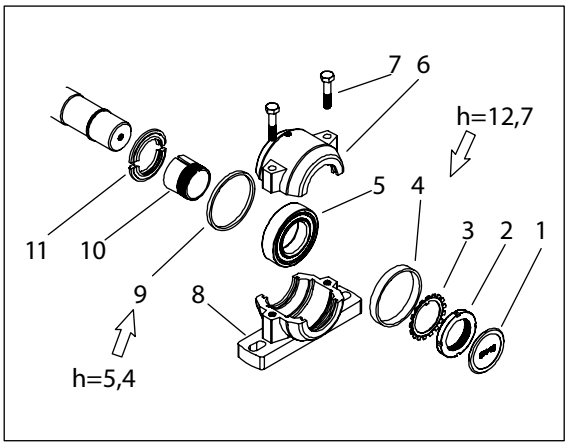


Fig. 28. Bearing, feeder side

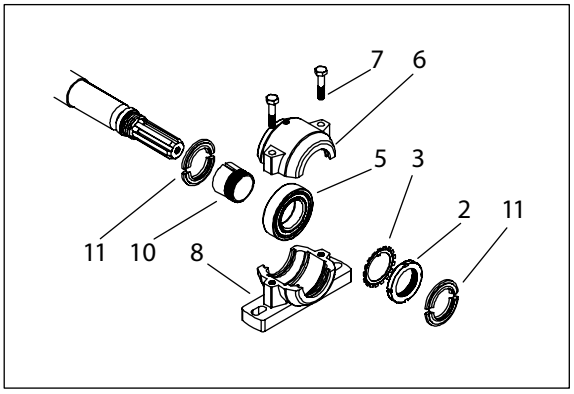


Fig. 29. Bearing, splined shaft side

The bearings at the feeder side and splined shaft side are different from each other. The bearing at the splined shaft side, Fig. 29., does not have spacer rings (4 and 9) and an end plate (1). The bearing at the splined shaft side has dust covers on both sides (11).

ADJUSTING THE BEARING CLEARANCE

1. Open the upper chamber. See Section Opening and removing the upper chamber.
2. Remove the fastening bolts (M10) (7) and the upper bearing housings (6).
3. Remove the grease from the bearing housing.
4. Lift the disk.
5. Bend the claw of the securing ring (3) out from the notch on the axle nut and open the axle nut.
6. Remove the spacer ring (3) if the bearing is at the feeder side.
7. Measure the radial clearance on top of the bearing between the rollers and outer ring with a feeler gauge. The clearance should be 0.02–0.03 mm (0,008-0,012”). Measure the clearance by pushing the feeler gauge between the rollers (point A, Fig. 31.) through the bearing and then moving the gauge back and forth between the rollers and outer ring - see Fig. 32. Do not force the feeler gauge through the clearance.
8. If the clearance exceeds 0.03mm, bend the clawof the securing ring (2) out from the notch on the axle nut (1).
9. The bearing is tightened by turning the axle nut clockwise with a 70 mm (2 3/4”) hook spanner until the right clearance is achieved. Do not tighten by hammering the axle nut.
10. Turn the axle nut clockwise until the notch is aligned with the nearest claw of the securing ring. Bend the claw into the notch. Do not bend the claw that was bent earlier.
11. Lower the disk to the bearing housing.
12. Install the upper bearing housing and tighten the bolts (6) to 50 Nm (36 7/8 lbf).
13. Lubricate the bearing housing. An excessive amount of grease causes overheating and impairs lubrication.

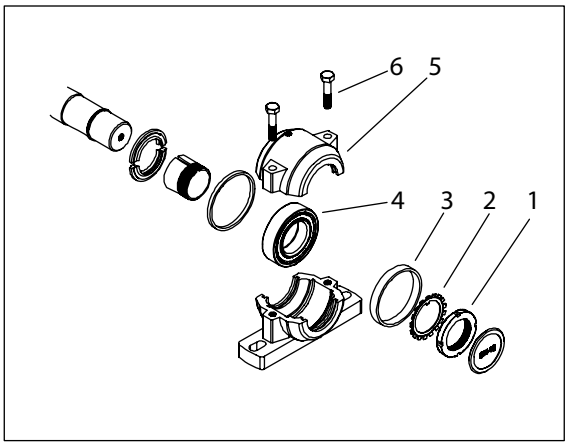


Fig. 30. Bearing, feeder side

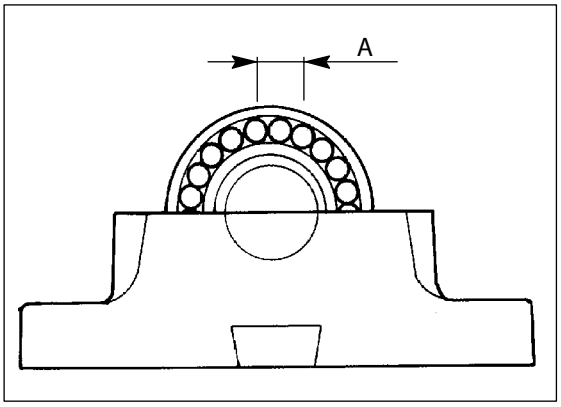


Fig. 31. Push the feeler gauge between the rollers and outer ring.

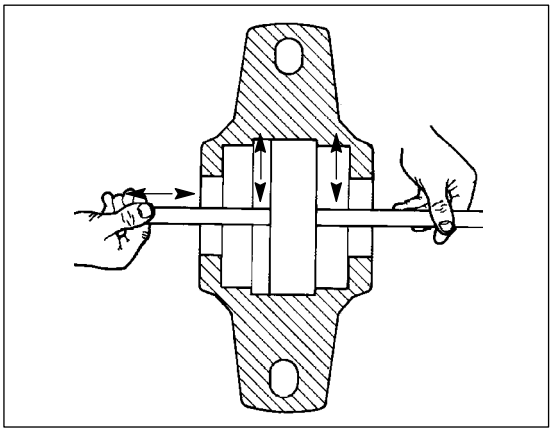


Fig. 32. Measuring the clearance

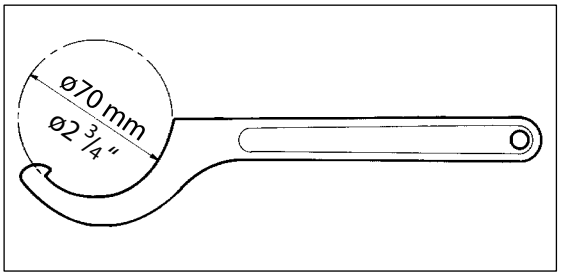
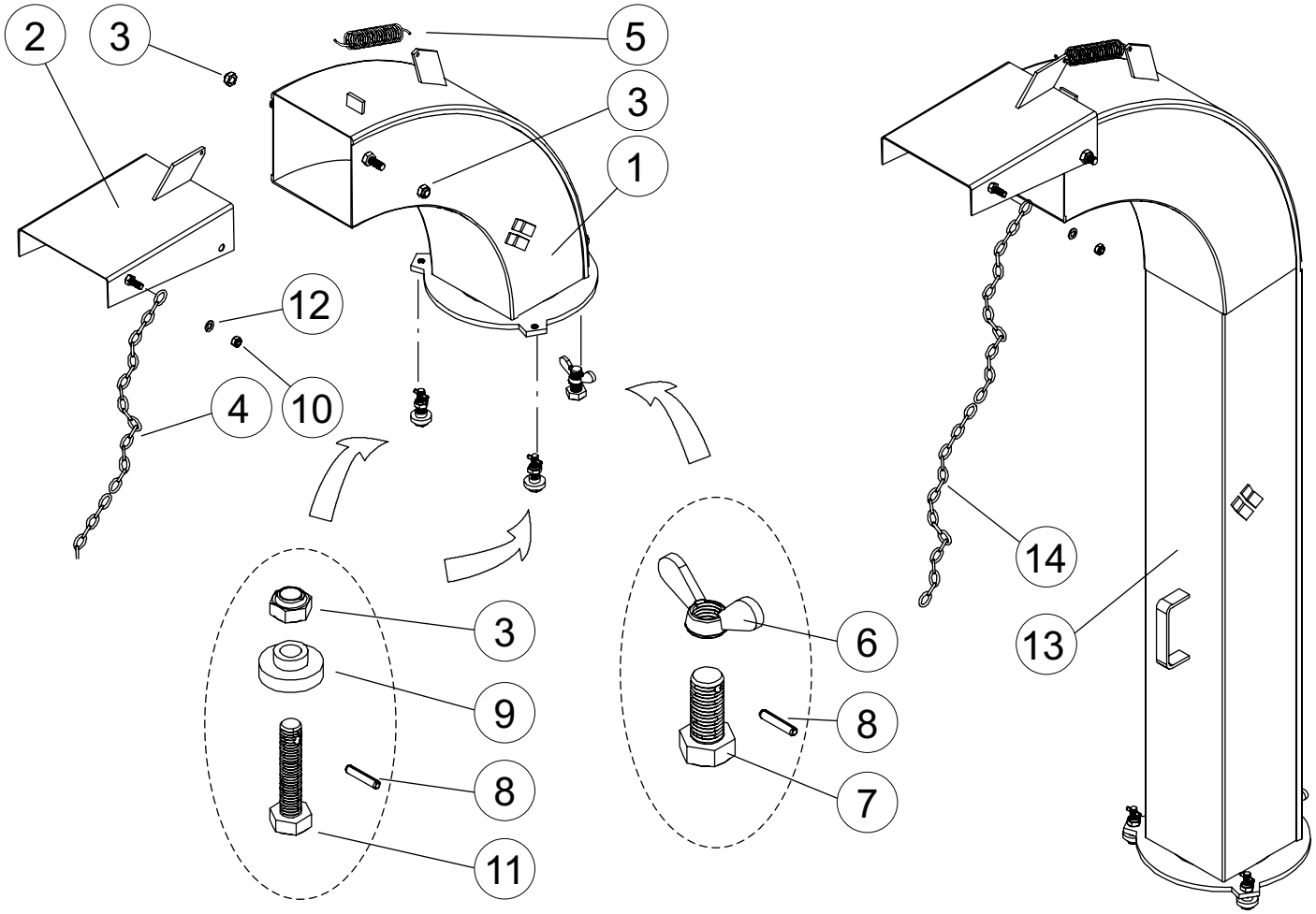


Fig. 33. Tightening the bearing

DISCHARGE PIPE



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	03515320	Long discharge pipe	complete	
1	43514600	Short discharge pipe		1
2	43510240	Lid		1
3	52117108	Lock nut	M10 DIN985 88ZN	4
4	03510300	Chain	600	1
5	94612082	Tension spring	DU26 DL2,6 L106	1
6	43340769	Butterfly nut		1
7	43511670	Safety screw	M16X40	1
8	52840295	Cotter pin	5X24 DIN1481	3
9	43340751	Reel		2
10	52117082	Lock nut	M8 DIN985 88ZN	1
11	43511650	Safety screw	M10X50	2
12	52200334	Washer	M8 DIN440 ZN	1
13	43514610	Long discharge pipe		1
14	03514590	Chain	1100	1

CH160

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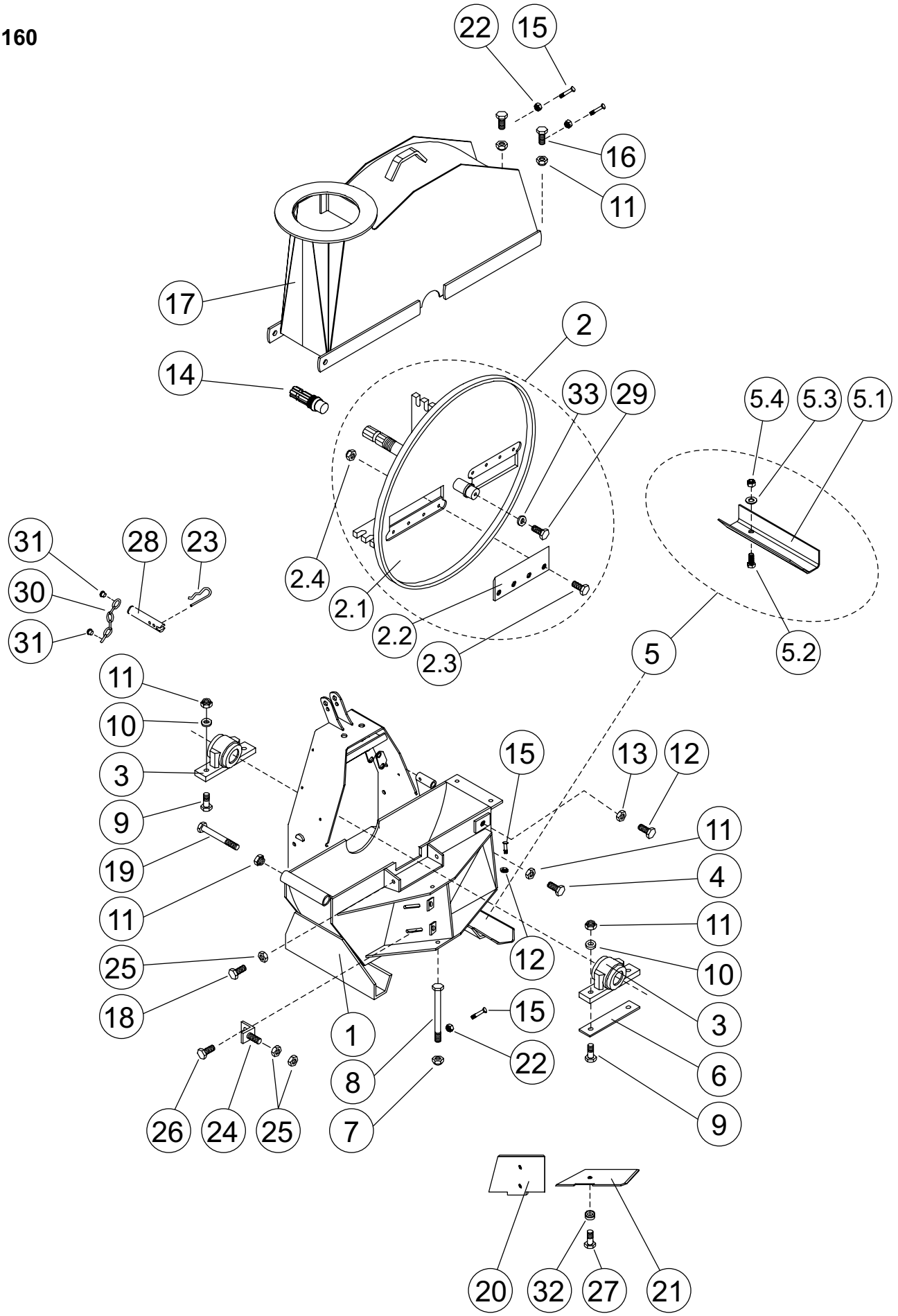
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CH160

CH160

Part	Order no	Description	Remarks	Qty
1	33514290	Lower housing		1
2	03510200	Disc	complete	1
2.1	33510190	Disc		1
2.2	43510220	Knife		2
2.3	52060258	Screw	M10X40 DIN933 88ZN	8
2.4	52117108	Lock nut	M10 DIN985 8ZN	8
3		Bearing system		
4	43511630	Safety screw		2
5	43513140	Extension plate	mounting	1
5.1	43512490	Extension plate		1
5.2	52062023	Screw	M12X30 DIN933 88ZN	1
5.3	52200508	Washer	M12 DIN440 ZN	2
5.4	52117124	Lock nut	M12 DIN985 8ZN	1
6	43341270	Mounting plate		2
7	52117165	Lock nut	M16 DIN985 8ZN	1
8	43511660	Safety screw	M16X240	1
9	52062056	Screw	M12X60 DIN931 88ZN	4
10	41215682	Washer		4
11	52117124	Lock nut	M12 DIN985 88ZN	7
12	52062916	Screw	M16X60 DIN933 88ZN	1
13	52110079	Nut	M16 DIN934 8ZN	1
14	43510420	Splined shaft		1
15	52060043	Screw	M6X25 DIN933 88ZN	5
16	43511630	Safety screw	M12X50	2
17	33345150	Upper housing		1
18	52062031	Screw	M12X40 DIN933 88ZN	2
19	43340546	Screw	L202	1
20	33341009	Vertical anvil		1
21	33340993	Horizontal anvil		1
22	52117066	Lock nut	M6 DIN985 88ZN	5
23	52842143	Cotter	5X105	1
24	43291103	Anvil adjuster		2
25	52110053	Nut	M12 DIN934 8ZN	8
26	52062106	Screw	M16X30 DIN933 88ZN	2
27	52062098	Screw	M16X25 DIN933 88ZN	1
28	43341429	Locking pin		1
29	52211042	Spring washer	M10 DIN127 ZN	1
30	03291143	Chain		1
31	52832045	Rivet	4,8X19	2
32	43310499	Washer		1
33	52060209	Screw	M10X16 DIN933 88ZN	1

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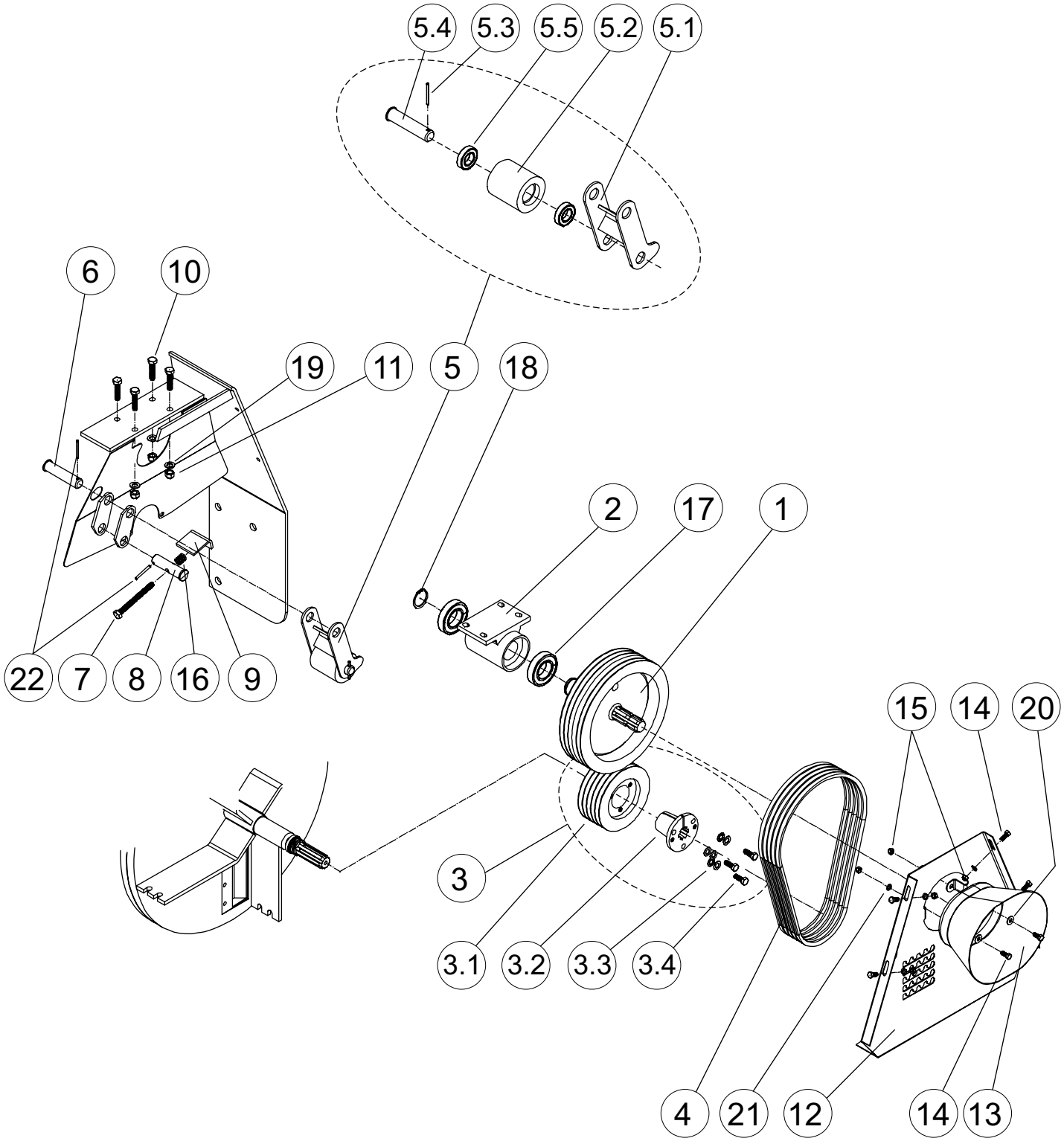
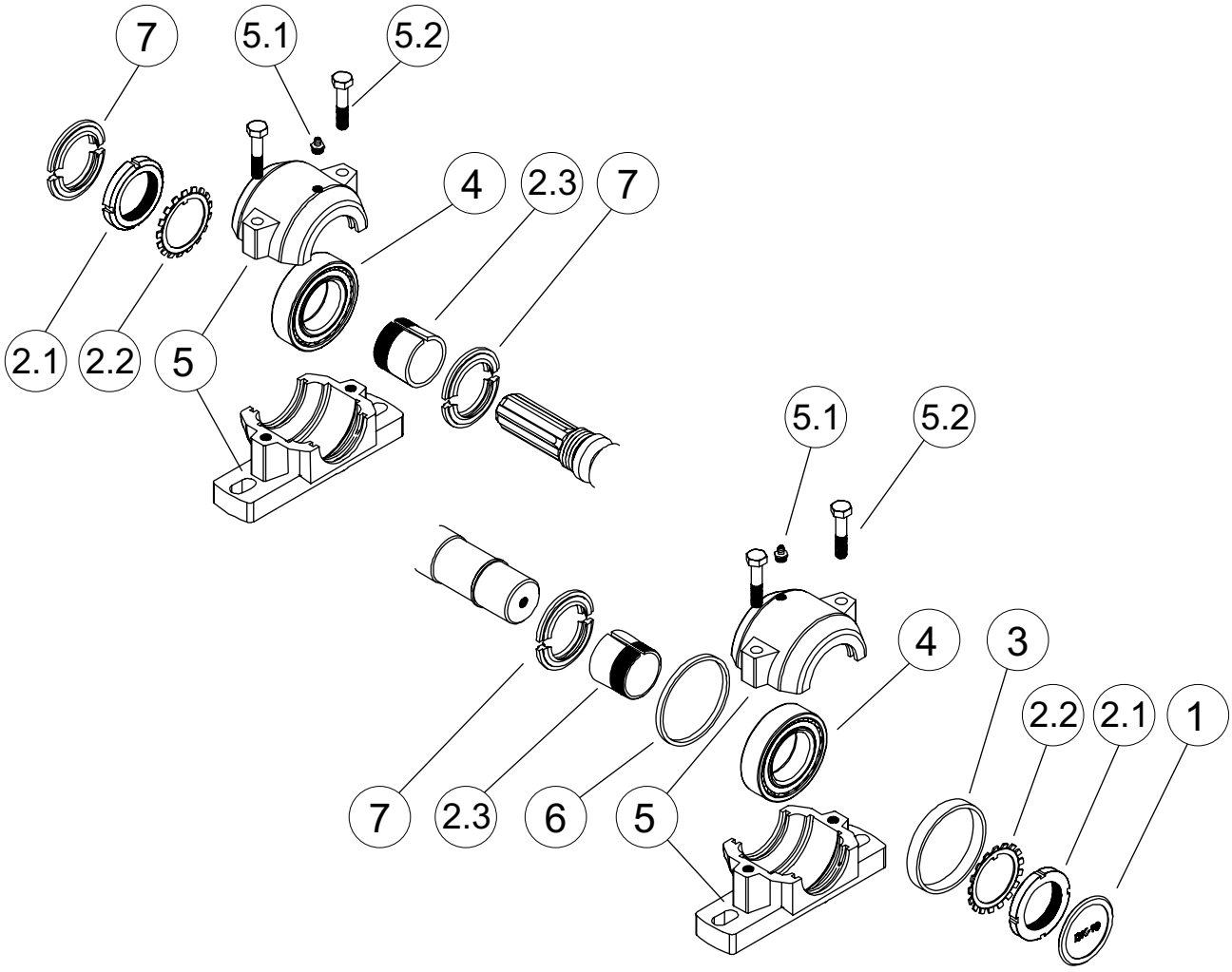


03514390 BELT TRANSMISSION CH160T i=2,1

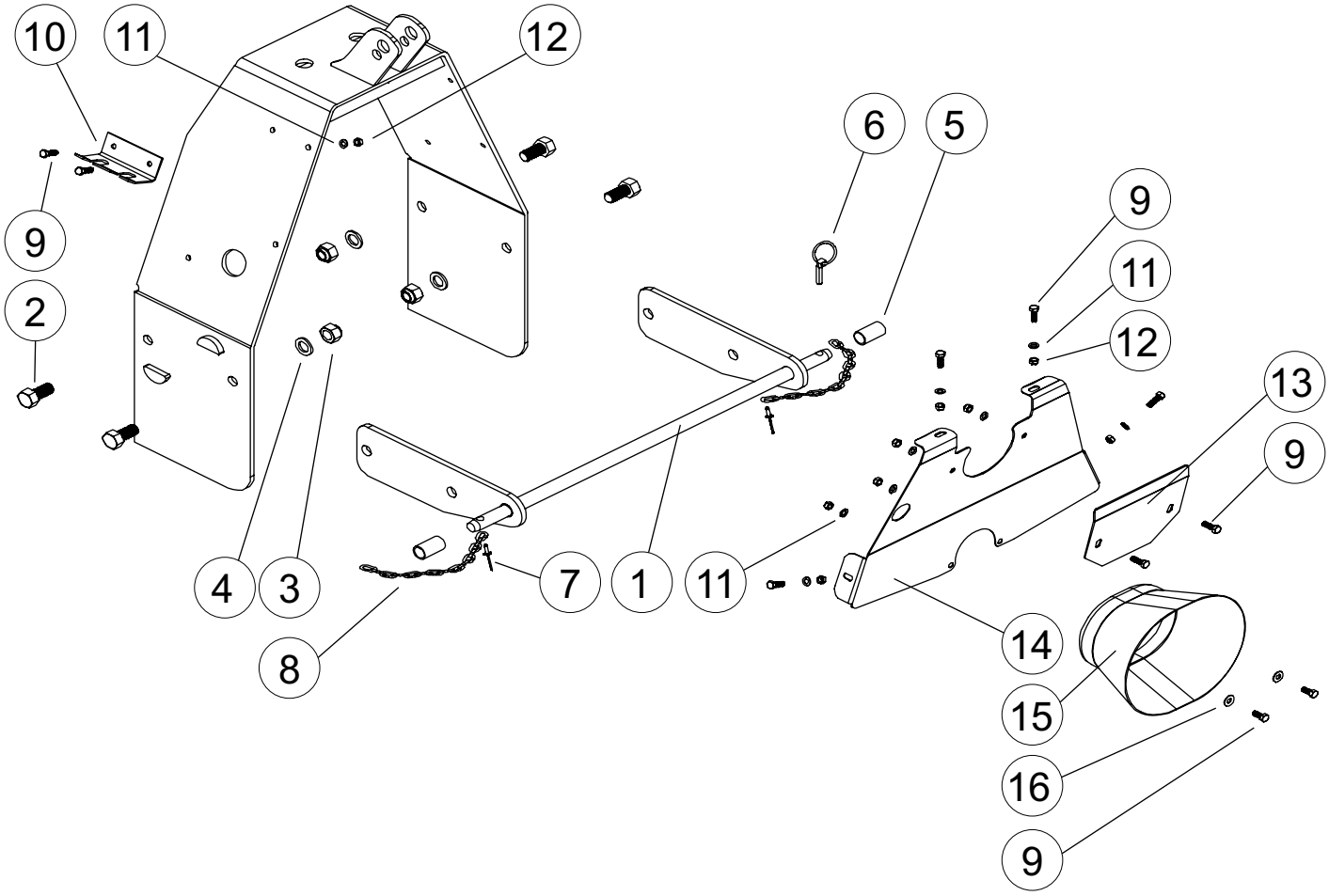
Part	Order no	Description	Remarks	Qty
1	43514300	Belt pulley	D315	1
2	43514450	Bearing housing		1
3	43514330	Belt pulley	complete	1
3.1	43514350	Belt pulley	D150	1
3.2	43514340	Tapered adapter sleeve		1
3.3	52214269	Lock washer	M12 NORD-LOCK	3
3.4	52062023	Screw	M12X30 DIN933 88ZN	3
4	54822382	Belt		5
5	43512020	Belt tightener	complete	1
5.1	43512030	Belt tightener		1
5.2	43341106	Reel		1
5.3	52840055	Cotter pin	5X50 DIN1481	1
5.4	43341114	Pin		1
5.5	54511134	Slotted sealed ball bearing		2
6	43341114	Pin		1
7	52063658	Screw	M12x120 DIN933 88ZN	1
8	43511950	Pin		1
9	43512050	Adjusting plate		1
10	52090560	Screw	M12x50 DIN933 10.9	4
11	52117124	Lock nut	M12 DIN985 8ZN	4
12	43511970	Cover plate		1
13	43511780	Cover of the universal shaft		1
14	52060126	Screw	M8X20 DIN933 88ZN	6
15	52117082	Lock nut	M8 DIN985 8ZN	6
16	43402150	Spring		1
17	54512140	Ball bearing		2
18	52230257	Circlip	45x2,5 DIN471	1
19	52200466	Washer	M12 DIN440 ZN	4
20	52200334	Washer	M8 DIN440 ZN	2
21	52200037	Washer	M8 DIN126 58ZN	6
22	52840055	Cotter pin	5X50 DIN1481	2

BEARING SYSTEM



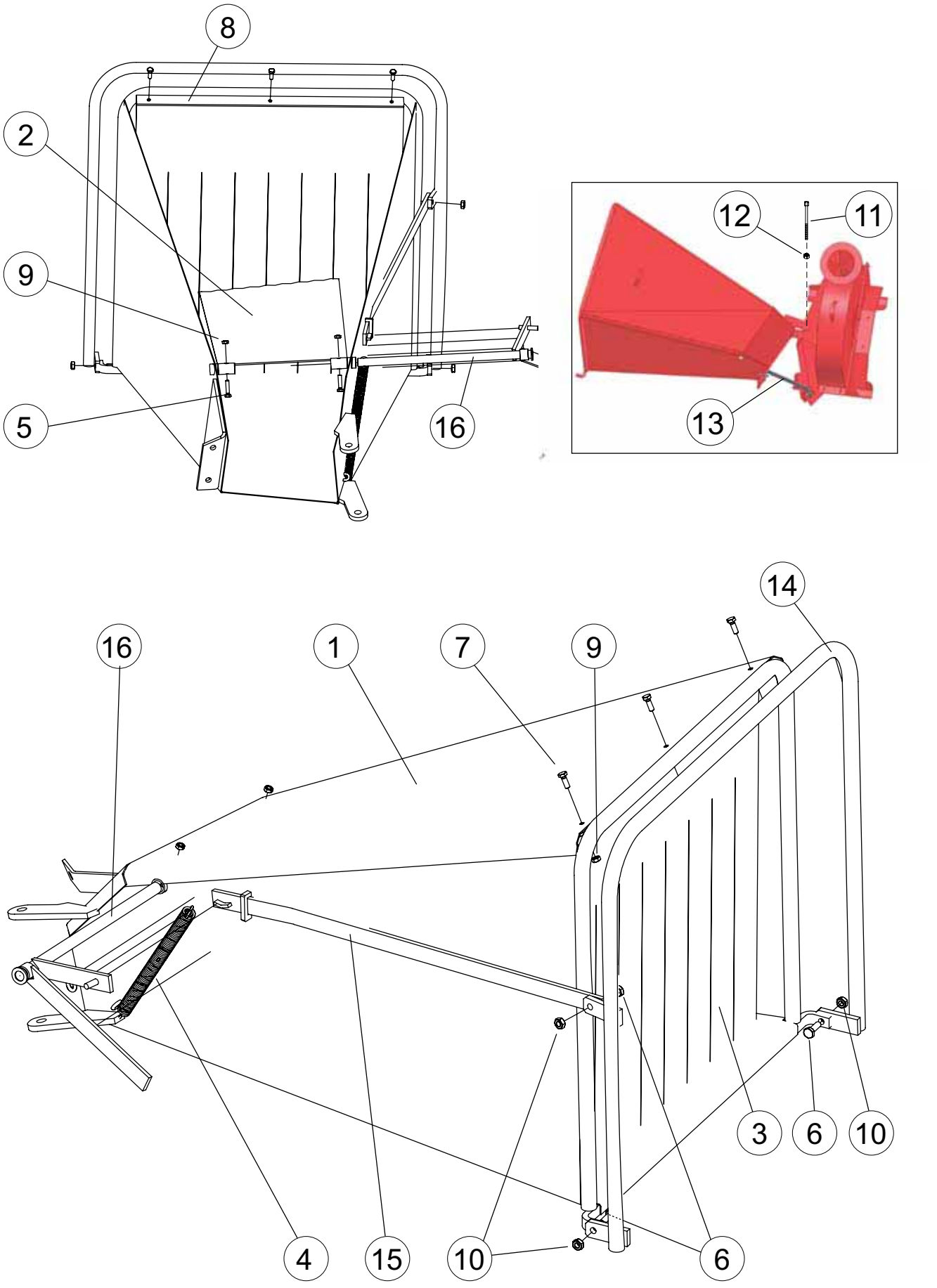
Part	Order no	Description	Remarks	Qty
1	54513569	End plate		1
2	54512371	Tightener sleeve, complete		2
2.1	-	Axle nut		1
2.2	-	Locking plate		1
2.3	-	Tightener sleeve		1
3	43513360	Spacer ring	D90/83X12.7	1
4	54512363	Tapered roller bearing		2
5	54513590	Bearing housing		2
5.1	52401015	Grease nipple	AR1/8	1
5.2	-	Screw	M10x50 DIN931 10.9	2
6	43513350	Spacer ring	D90/83X5.4	1
7	52334232	Seal		1

MOUNTING FRAME



Part	Order no	Description	Remarks	Qty
1	43343790	Draw bar		1
2	52062221	Screw	M20X50 DIN933 88ZN	4
3	52117207	Lock nut	M20 DIN985 8ZN	4
4	52211083	Spring washer	M20 DIN127 ZN	4
5	40293797	Bushing		2
6	52842150	Ring cotter	10X45	2
7	52832094	Rivet	4,8X15 FE	2
8	54826110	Chain		2
9	52060175	Screw	M8X25 DIN933 88ZN	10
10	43482290	Hose fastener		1
11	52200037	Washer	M8 DIN126 58ZN	10
12	52117082	Lock nut	M8 DIN985 88ZN	10
13	43514240	Cover plate		1
14	43514210	Cover plate		1
15	43511780	Cover of the universal shaft		1
16	52200334	Washer	M8 DIN440 ZN	2

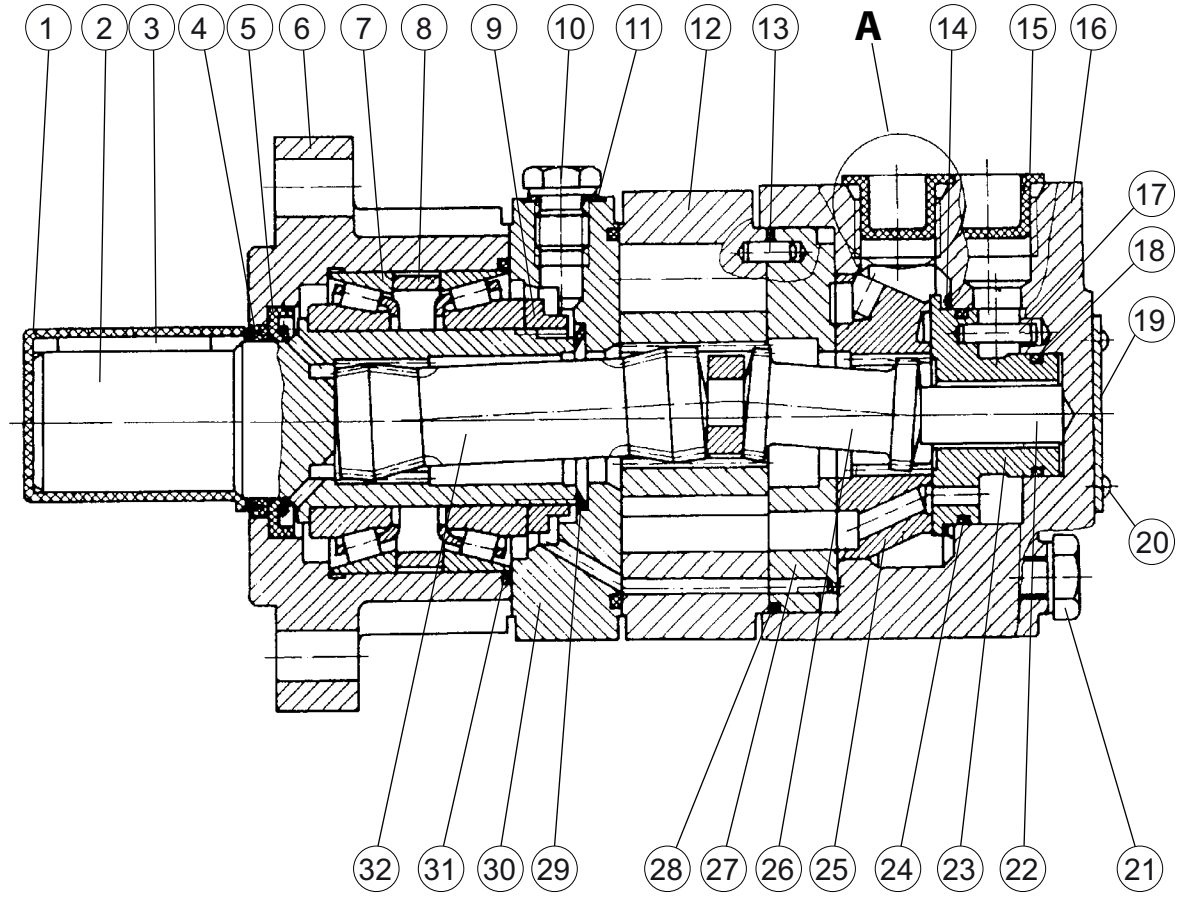
03511030 FEED CHUTE F160

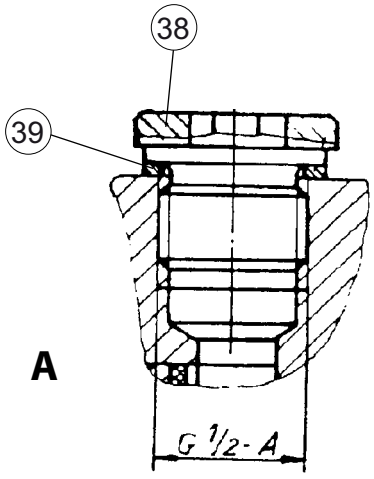


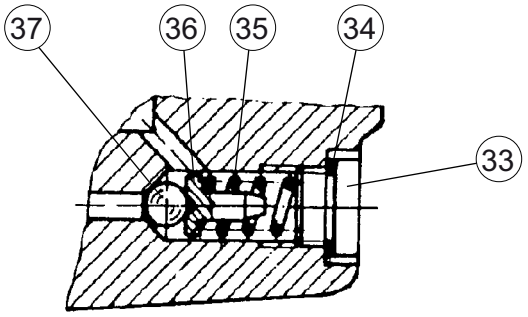
03511030 FEED CHUTE F160

Part	Order no	Description	Remarks	Qty
1	43517400	Feed chute	F160	1
2	43517640	Safety clapper		1
3	43517690	Safety clapper	PVC	1
4	94613098	Tension spring	DU23 DL3,5 L200	1
5	52070406	Screw	M8x35 DIN931 88ZN	2
6	52060233	Screw	M10X30 DIN933 88ZN	3
7	52060191	Screw	M8X22 DIN933 88ZN	3
8	43517710	Bracket		1
9	52117082	Lock nut	M8 DIN985 8ZN	5
10	52117108	Lock nut	M10 DIN985 8ZN	3
11	52063013	Screw	M16X240 DIN931 88ZN	1
12	52117165	Lock nut	M16 DIN985 8ZN	1
13	43517730	Support for transportation		1
14	43517630	Safety handle		1
15	43517650	Spring release lever		1
16	43517590	Safety clapper axle		1

LÖSI EPMS 100 C





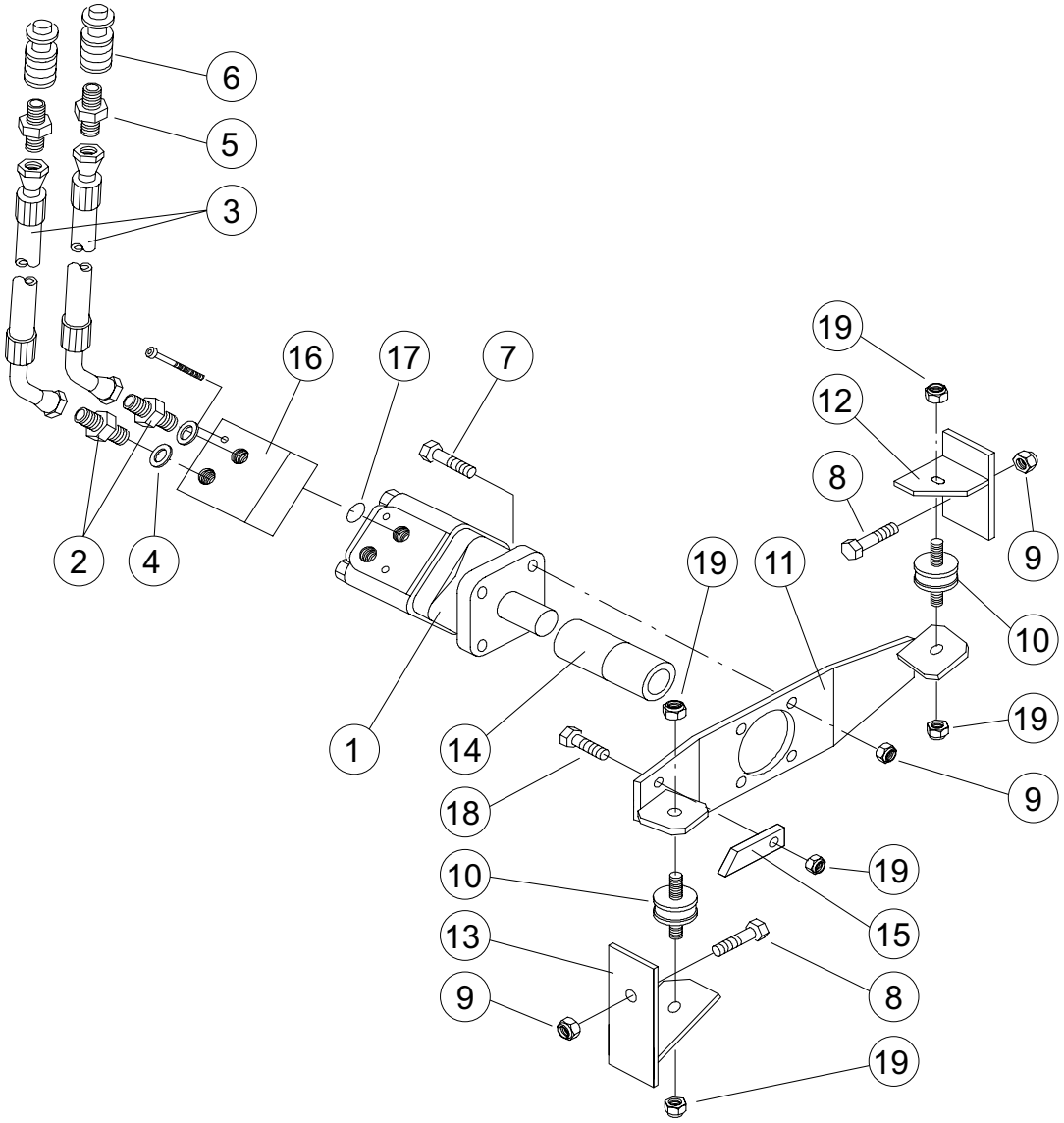


56001589 LÖSI EPMS 100 C

Part	Order no	Description	Remarks	Qty
1	58005299	Axle cover		1
2	58005307	Axle		1
3	58005315	Key		1
4	58005323	Seal ring		1
5	58005331	Seal		1
6	58005349	Housing		1
7	58005356	Tapered roller bearing		2
8	58005364	Bearing		1
9	58005372	Lock nut	M40X1,5	1
10	58005380	Plug	G1/4”-A	1
11	58005398	Washer	13X17	1
12	58005406	Sprocket kit		1
13	58005414	Pin		1
14	58005422	Spring washer		1
15	58005430	Seal plug		2
16	58005448	Flange		1
17	58005455	Pin		1
18	58005463	O-ring		1
19	58005471	Label		1
20	58005489	Rivet	2X5	4
21	58005497	Screw	M10X130	4
22	58005505	Washer		1
23	58005513	Plate		1
24	58005521	O-ring		1
25	58005539	Valve plate		1
26	58005547	Valve guide		1
27	58005554	Plate		1
28	58005562	O-ring		2
29	58005570	Seal ring		1
30	58005588	Plate		1
31	58005596	O-ring		1
32	58005604	Propeller shaft		1
33	58005612	Plug	M10X1	2
34	58005620	Washer	A10X14	2
35	58005638	Spring		2
36	58005646	Guide pin		2
37	58005653	Ball		2
38	58005661	Plug	G-1/2”-A	2
39	58005679	Washer	22X27-Cu	2

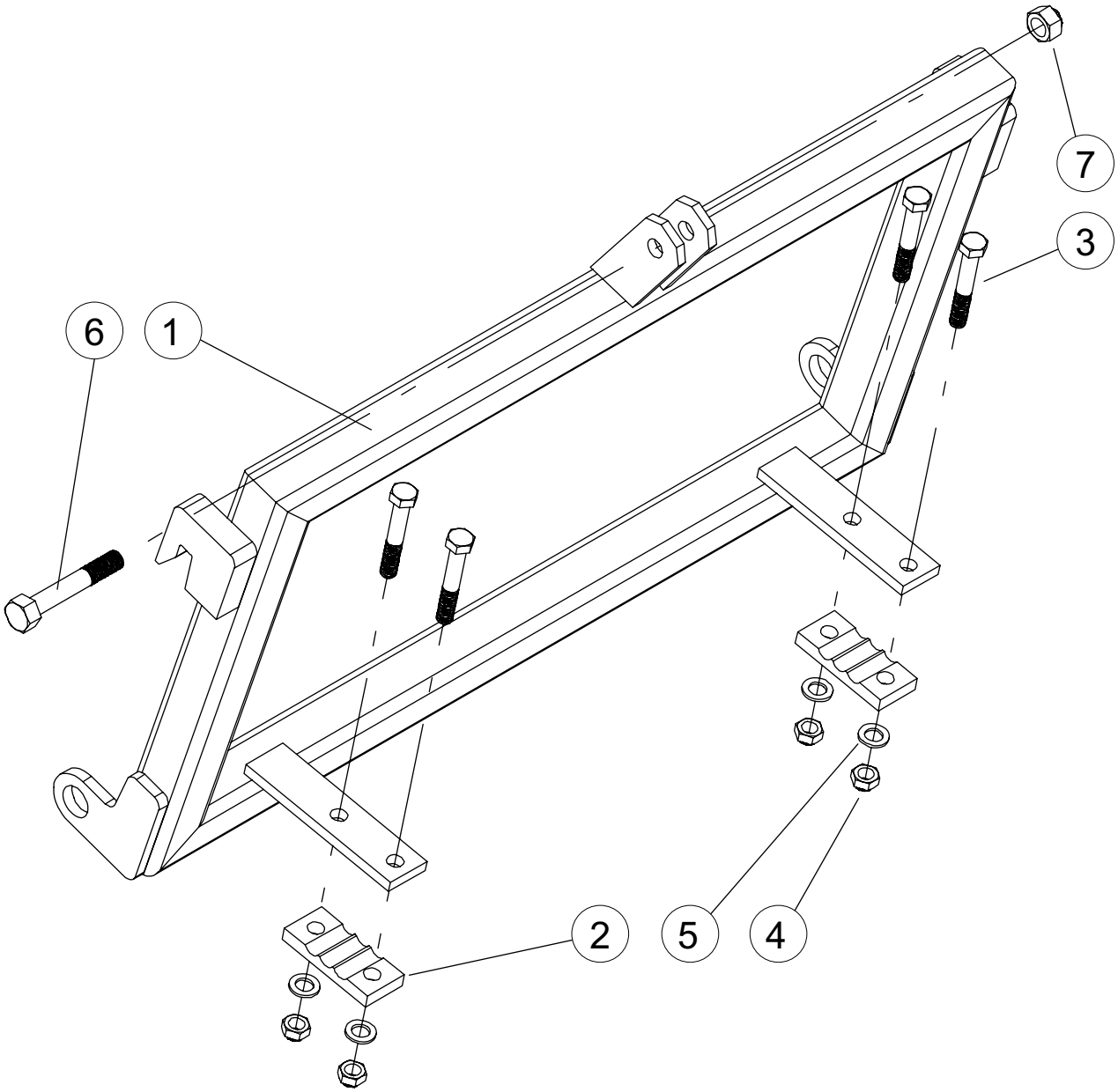
CH160

HD100



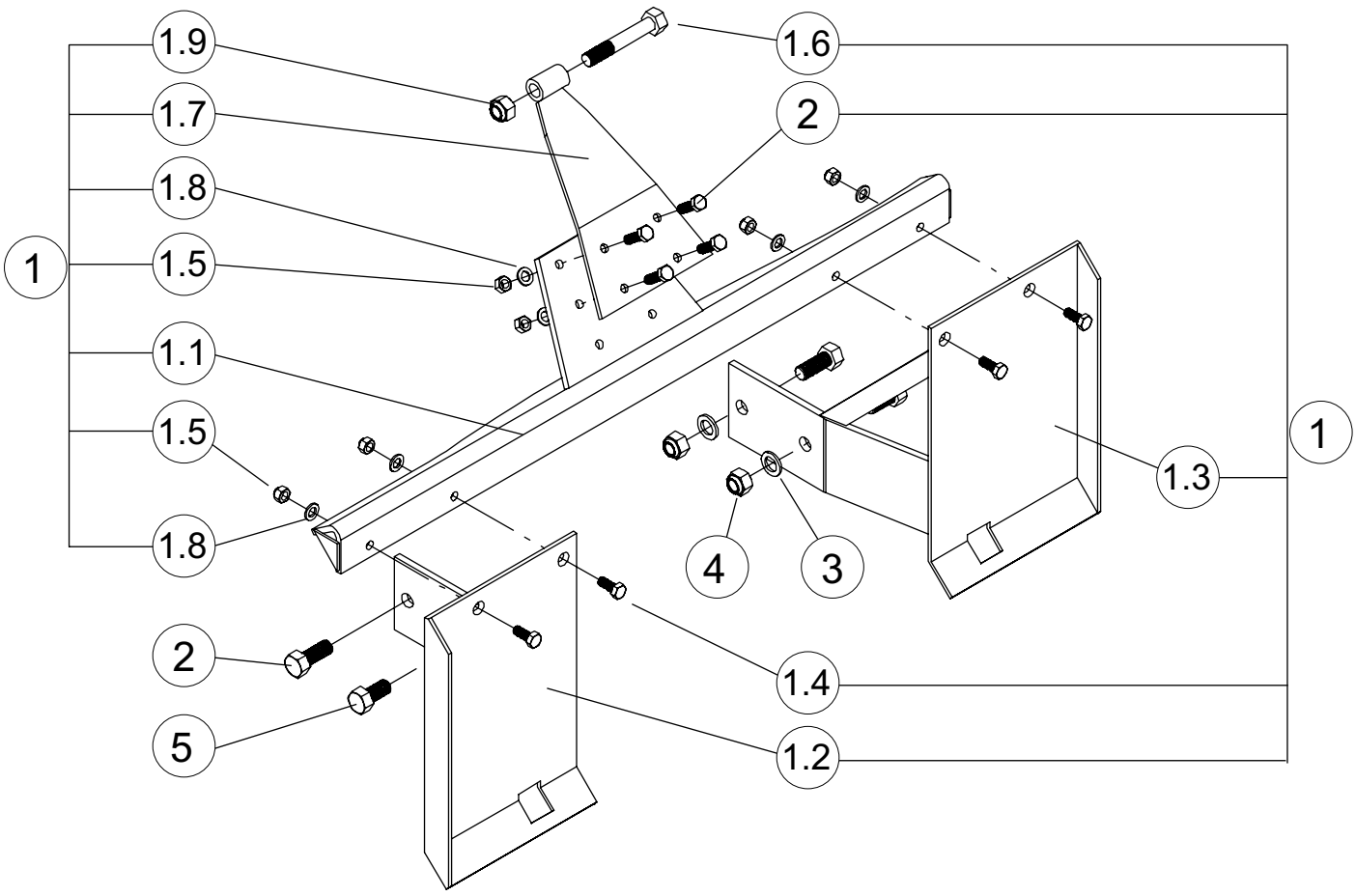
Part	Order no	Description	Remarks	Qty
1	56001589	Hydraulic motor	LÖSI EPMS 100 C	1
2	52432044	Double fitting	R1/2-3/4”	2
3	56533151	Hose assy	V3/4”S L=1,0 m	2
4	52390580	Usit-ring	U27,05X34,93X2,49	2
5	52449220	Quick fitting	3/4” SK	2
6	52449238	Quick fitting coupling	3/4” SK	2
7	52062031	Screw	M12X40 DIN933 88ZN	4
8	52062023	Screw	M12X30 DIN933 88ZN	2
9	52117124	Lock nut	M12 DIN985 8ZN	14
10	54923073	Damper		2
11	43510640	Motor support		1
12	43510620	Fastener	left	1
13	43510630	Fastener	right	1
14	43510590	Coupling sleeve		1
15	43510540	Limiter plate		1
16	56053986	Inlet valve	R1/2”	1
17	52301397	O-ring	21,95x1,78 90SH	2
18	52060225	Screw	M10X25 DIN933 88ZN	1
19	52117108	Lock nut	M10 DIN985 88ZN	5

ADAPTER WILLE



Part	Order no	Description	Remarks	Qty
	43510500	Adapter Wille	complete	
1	43510490	Frame		1
2	43510510	Plate		2
3	52062163	Screw	M16X100 DIN931 88ZN	4
4	52117165	Lock nut	M16 DIN985 88ZN	4
5	52200078	Washer	M16 DIN126 58ZN	4
6	43512510	Screw	M20X120	1
7	52117207	Lock nut	M20 DIN985 88ZN	1

ADAPTER BOBCAT



Part	Order no	Description	Remarks	Qty
1	03510800	Adapter frame		1
1.1	43510820	Upper beam		1
1.2	43510830	Fastener	left	1
1.3	43510840	Fastener	right	1
1.4	52062023	Screw	M12X30 DIN933 88ZN	4
1.5	52117124	Lock nut	M12 DIN985 88ZN	8
1.6	43512510	Screw	20X120	1
1.7	43513120	Fastening plate		1
1.8	52200466	Washer	M12 DIN440 ZN	8
1.9	52117207	Lock nut	M20 DIN985 88ZN	1
2	52062221	Screw	M20X50 DIN933 88ZN	2
3	52211083	Spring washer	M20 DIN127 ZN	4
4	52117207	Lock nut	M20 DIN985 88ZN	4
5	52062213	Screw	M20X40 DIN933 88ZN	2

WARRANTY

Farmi Forest Oy grants a 12-month warranty on all of its products, covering material and manufacturing faults. The warranty comes into effect on the product's delivery date.

The manufacturer is not liable for damages caused by:

- misuse of the product
- alterations or repairs made without the manufacturer's permission
- insufficient maintenance
- non-original parts

The warranty does not cover wearing parts.

Send faulty parts, carriage paid, to the manufacturer for inspection. Repairs will be conducted by Farmi Forest Oy or an authorized expert. The warranty is valid only if the bottom part of this page is filled in and returned to the manufacturer within 14 days of receipt of the product.
By returning the warranty certificate, you confirm that you have read and understood the instruction manual that came with the product.

Farmi Forest Corporation
Ahmolantie 6
FIN-74510 IISALMI
FINLAND

Date of delivery:_____/_____ 20_____

Dealer:

Dealer’s address:

Dealer’s tel:

Product and type:

Serial number:

Return to the manufacturer

Date of delivery:_____/_____ 20_____

Dealer:

Dealer’s address:

Dealer’s tel:

Customer:

Customer’s address:

Customer’s tel:

Product and type:

Serial number:

FARMI Forest

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