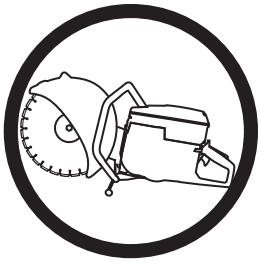
Husqvarna®

Workshop manual

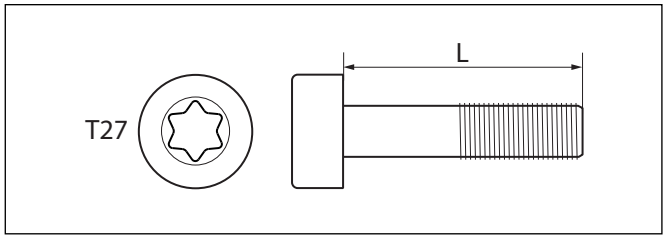
K7000 Ring



HUSQVARNA CONSTRUCTION PRODUCTS

HUSQVARNA K7000 Ring

CONTENTS



Screws – dimensions and torques
Information on screw type and recommended tightening torque is given in brackets - e.g. (M5x26, 7-8 Nm) - in a number of places in this workshop manual.

M= standard millimetre thread for fitting in metal.
MT= coarse thread for fitting in plastic.
5x26 indicates the coarseness x the length in millimetres. Note that the length is calculated minus the screw head.
7-8 Nm indicates the tightening torque in Newton metres.
Practically all screws of smaller dimensions have Torx T27 screw heads.

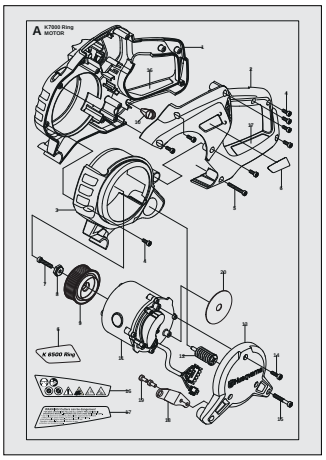
Workshop manual

This workshop manual covers virtually all work in the workshop that involves the K7000 Ring. Some very simple and rather obvious repair work has been omitted.

Arrangement – illustrations and text

This manual is divided into numbered chapters as well as chapter headings that are specified in bold at the top of each page.

The list of contents at the beginning of the manual also has a page reference to the beginning of each chapter.



Spare parts

The folder includes all spare parts for Husqvarna K7000 Ring.

The folder contains complete exploded drawings for the whole machine where the location, spare parts number and appearance of each component is easy to identify.

Information on spare parts, called IPL (Illustrated Parts List), can be downloaded from Husqvarna Construction Products' website or from Husqvarna EPC.

Service bulletins

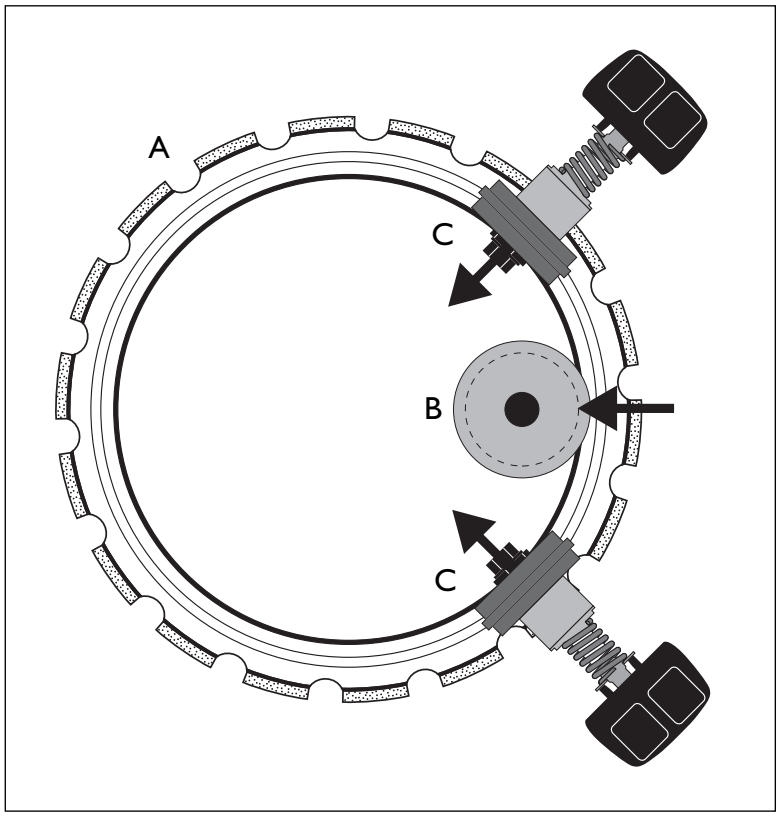
Service bulletins are issued when important design modifications have taken place, for example, or when amended service actions have been introduced. The service bulletins are available to download from the Husqvarna website under “Service bulletins, SB”.

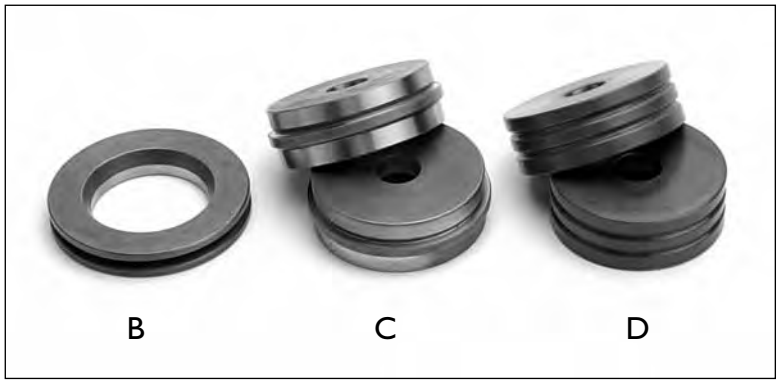
Operators manual

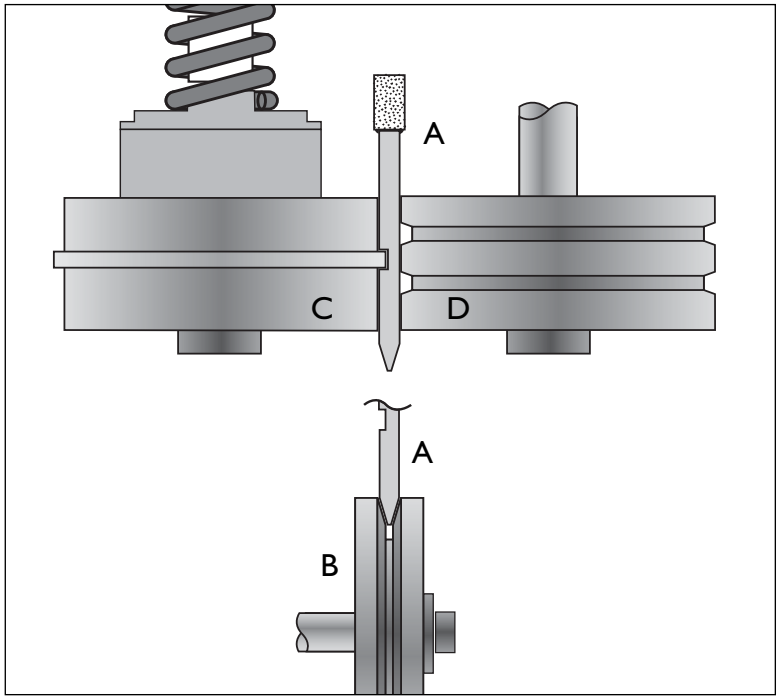
The operators manual describes how the machine is to be used, the functions of the machine, and the maintenance the operator normally carries out.

This manual also contains important instructions for the safe handling of the machine.

It is extremely important that service personnel are well acquainted with how the machine is used and follow the instructions given in the manual.







The blade's drive and guiding system

Eccentric drive

The unique concept behind the K7000 Ring is its eccentric drive (outside the centre) and guiding of the cutter blade (A).

Function

The drive wheel (B) which is powered by a belt driven off the engine, has a groove into which the blade slots.

The two engagement rollers (C) exert pressure against the blade (from the engagement roller springs, when the knob is tightened), causing the blade to press against the drive wheel. The lower picture shows how the engagement roller flanges grip in the cutter blade's groove. The only function of the support roller (D) is to exert counter-pressure so that the blade is located properly against the rollers without any play or clearance.

With this design, the cutter blade can be guided in both the radial and axial directions (rotating and lateral movements). Three points (at the two engagement and support rollers and at the drive wheel) guide the blade at the same time as the pressure against the drive wheel generates sufficient friction to drive the blade.

Important for good function

The description of the function indicates that it is particularly important that the engagement rollers can move axially without interference from the spring force (the direction of the arrows), so as to provide the correct pressure against the drive wheel. Corrosion or dirt that blocks movement will cause the blade to slip against the drive wheel. A properly greased bearing housing will reduce the risk of operational disruption.

There must be zero clearance in the adjustment of the engagement and support rollers against the sides of the blade. The adjustment is to be changed when the blade is replaced and must be checked at least once during the life of the blade. Because the adjustment is mechanically locked, there is no movement once the locknuts have been set and tightened.

Wear

In comparison with a traditional centre-driven machine, the blade's drive and engagement systems are subjected to harder wear since the mechanical parts work constantly in an environment of water and slurry.

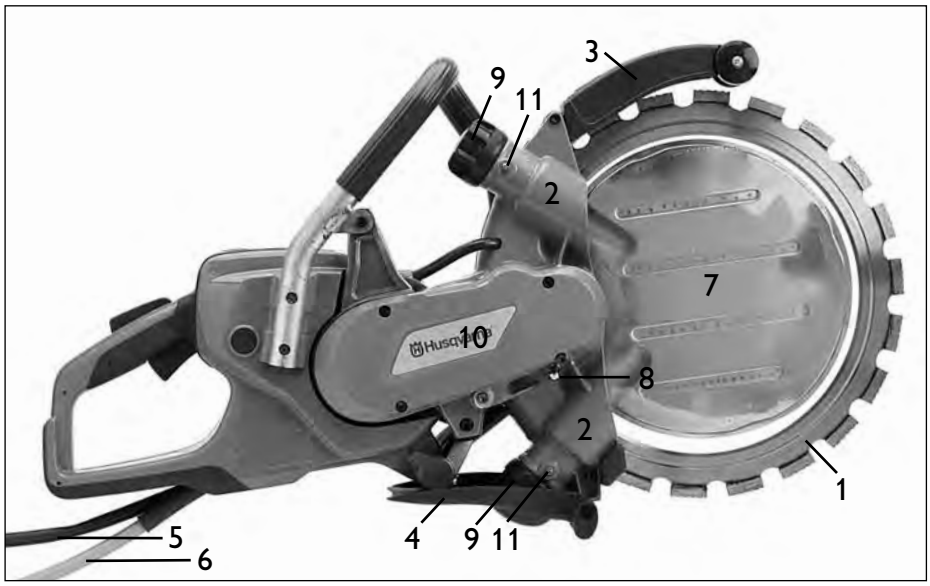
Parts subject to wear

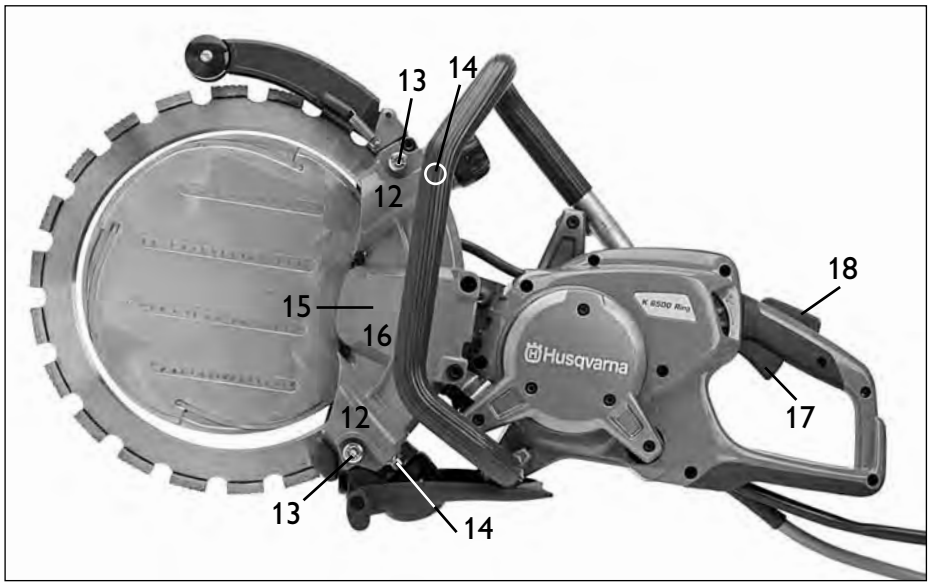
The wear-prone parts are the drive wheel, engagement rollers and support rollers (B, C and D in the figure). These parts can be quickly and easily replaced and this job is normally carried out by the user.

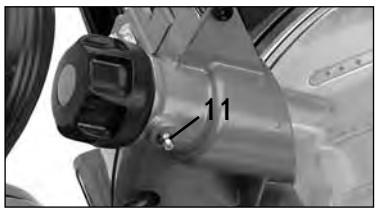
IMPORTANT

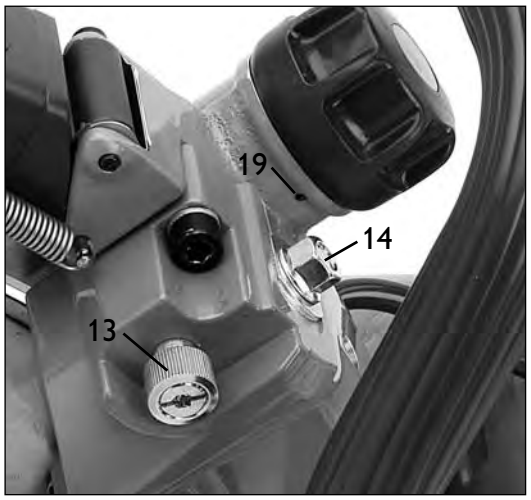
In all control and adjustment work on the engagement and support rollers, the knobs that tensions the blade against the drive wheel must be screwed out to its end position.

NB: The knobs must not be fully screwed to the end position as this restricts engagement roller rotation.









Components

1. Cutting blade – ring-shaped cutting blade with laser welded diamond segments
2. Engagement rollers (behind the cover)
3. Blade guard
4. Spray guard
5. Hose for water connection
6. Cable for the HF unit
7. Water disc
8. Button for locking the rotation of the drive wheel
9. Knob for tensioning the blade to the drive wheel
10. Transmission housing
11. Grease nipples for lubricating the bearing housings
12. Support rollers (behind cover)
13. Adjustment screws for adjusting the contact of the rollers with the blade
14. Lock nuts for roller adjustment
15. Drive wheel (behind the cover)
16. Support roller cover
17. Throttle
18. Starter inhibitor
19. Lubricating duct outlets

NOTE
In comparison to the hydraulically driven cutter ring, Husqvarna K3600, the engagement and support rollers have a reverse position on K7000 Ring.

The blade's rotational direction relative to the machine is the same for both machines (pulling blade), but the actual rotation of the cutting blade is the opposite.

The same cutting blade should therefore not be switched between the machines. Changing the direction of rotation causes increased wear of the blade.

Dismantling

Remove the support roller cover

Screw out the knobs at the outer position – the blade then has no tension on the drive wheel.

The support roller cover is secured with four screws. Loosen these.

Lift off the cover.

Lift out the blade

Remove the blade from the engagement roller and the blade from the drive wheel groove. Remove the blade.

Quick check

Check of blade replacement

In connection with the blade replacement it is appropriate and easy to make a quick check of the condition of the engagement and support rollers.

Roller bearings

Check that the rollers rotate smoothly and easily. In the event of bearing damage, this must be addressed, see Chapter 8.

Flange and groove

Also check that the engagement roller flange and support roller grooves (circled) are within acceptable tolerances, see Chapter 6.

If necessary, replace the engagement and support rollers as per Chapter 7.

Bearing holders – engagement rollers

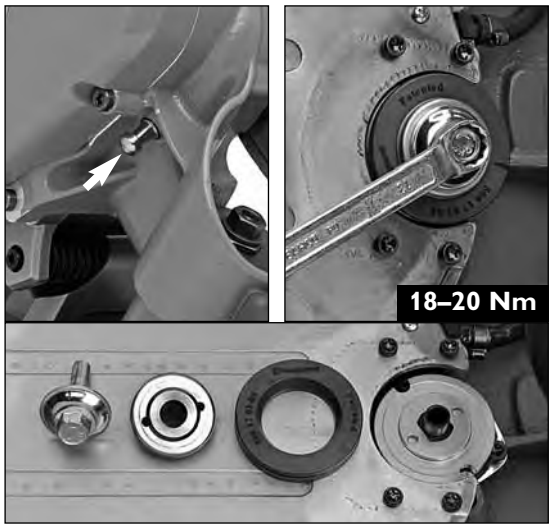
Check that the engagement roller bearing holders do not jam: unscrew the knobs a few turns and make sure the bearing holders move smoothly and without resistance.

Replacing the drive wheel

The blade and drive wheel are replaced together

A new blade is fitted with a new drive wheel. When replacing with a used blade, the associated drive wheel must be fitted.

Used blades can be used with new wheels, but never fit a new blade with a used drive wheel.



Remove the drive wheel
Push in the drive wheel rotary latch on the opposite side.

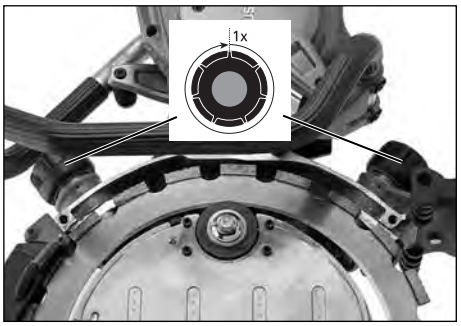
Remove the centre screw, lift off the carrier and the drive wheel.

Fit the new drive wheel, 18–20 Nm/13–15 lbf·ft.
Fit the new drive wheel and carrier. Fit the centre screw, push in the rotary latch and tighten the centre screw: 18–20 Nm.

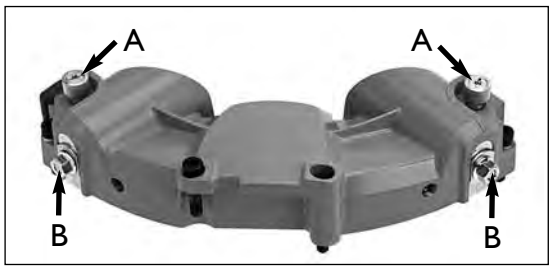
Fit the blade
The knobs must be screwed out. Fit according to **1. – 2. – 3.** below.

1. Align the cutting blade in the drive wheel.

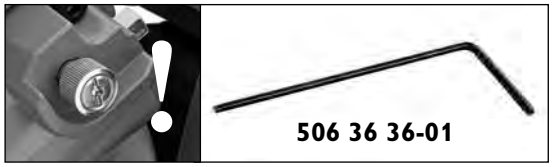
2. Align the groove of the cutting blade in relation to the two engagement rollers.



3. Keep the blade in place by turning the knobs at least one turn.

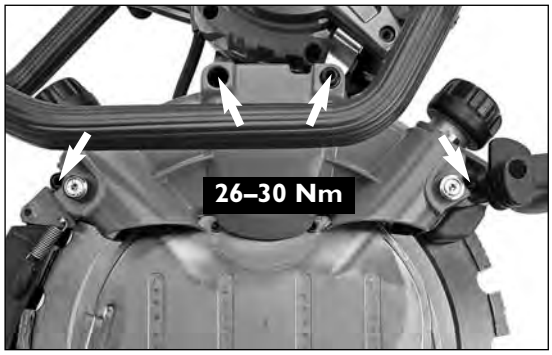


Initial set-up of support rollers
Prepare the adjustment of the support rollers, as per Chapter 5, as follows:
- Unscrew the two adjuster screws (A) about 2 turns.
- Loosen the two lock nuts (B).
- Push the support roller arms against the adjuster screw.
- Tighten the lock nuts (B) slightly to ensure inertia in the movement.



Fit the cover
Fit the screws and tighten them **lightly**. Screw out the knobs.

Check the position of the adjuster screws
Check that the adjuster screws are screwed out long enough to create play between the blade and rollers, as follows: Rotate the support rollers by hand – the blade should not now rotate with the rollers. Otherwise unscrew the adjuster screws a little more.



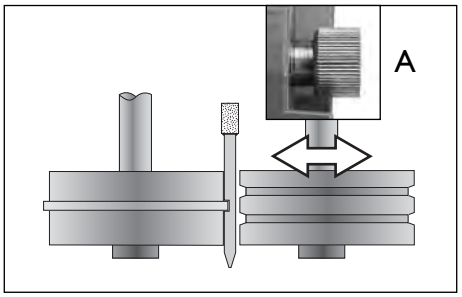
Tighten the cover, 26–30 Nm/19–22 lbf·ft.
Now tighten the cover: 26–30 Nm. Use a torque wrench or the tool that comes with the machine (506 36 36-01). A high torque is possible with this tool.

Adjust the contact of the rollers
Before the machine can be used, the rollers must be adjusted as shown in Chapter 5.

5 ROLLERS – ADJUSTMENT/INSPECTION

The rollers must always be adjusted following:
– changeover to a new blade
– changeover to another used blade
– replacement of guide or support roller
Always check the adjustment whenever the support roller cover has been removed and refitted.

IMPORTANT: When adjusting the rollers, the knobs must be screwed out – but not out fully to its end position as this will stop the engagement roller rotation.



Correct adjustment

Correctly adjusted rollers are essential for the operation of the machine and to minimise wear.

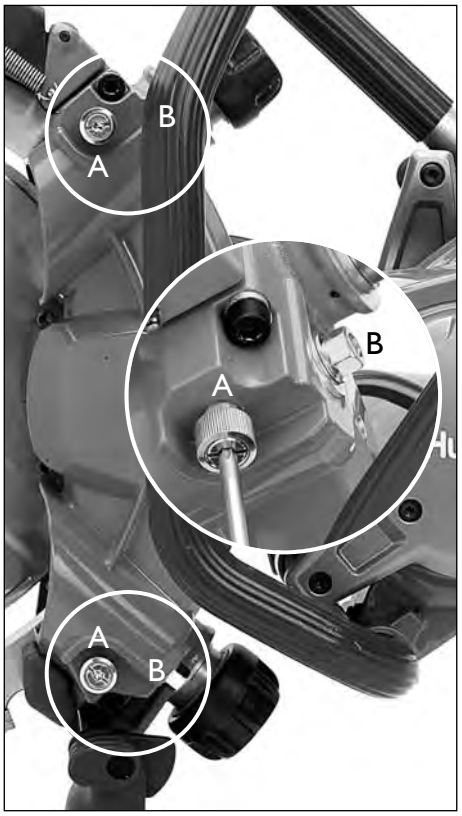
Correctly adjusted means that the rollers are in contact with the blade without any play.

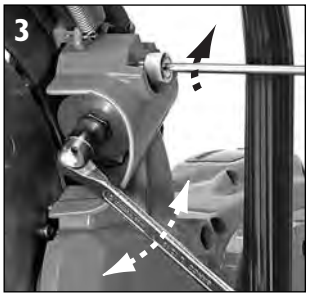
If the contact is too firm, this will increase roller wear and cause deformation of the blade which, at worst, could lead to a blade fracture.

If the contact is not firm enough, this will mean that control of the blade will be worse, which in extreme cases could lead to the blade leaving the groove.

Function

The support rollers are mounted on the arms of the support roller cover. The position of the arms is determined by the adjuster screws (A). The nuts (B) lock the arms' position.





Adjustment and checking

Adjustment of the roller contact with the blade must be made when the blade is mounted. Checking and readjustment must also be done at least once during the blade's life.

1. Screw out the knobs

Unscrew both knobs to the maximum position, then a half turn in.

2. Slacken off the lock nuts

This should only be done when carrying out readjustment when the blade is worn and has not been removed from the machine. When blade replacement is being carried out, according to the previous chapter, this has already been done.

Slacken off the lock nuts (B). Then tighten the lock nuts slightly before starting adjustment.

3. Adjustment

Place a wrench on one support roller, and rotate it back and forth while screwing in the adjuster screw (A) slowly. When the roller comes into contact with the blade and this rotates, the adjustment is correct. Do the same for the other support roller.

4. Tighten the lock nuts, 16–20 Nm/12–15 lbf·ft.

Tighten the lock nuts (B) at a torque of 16–20 Nm.

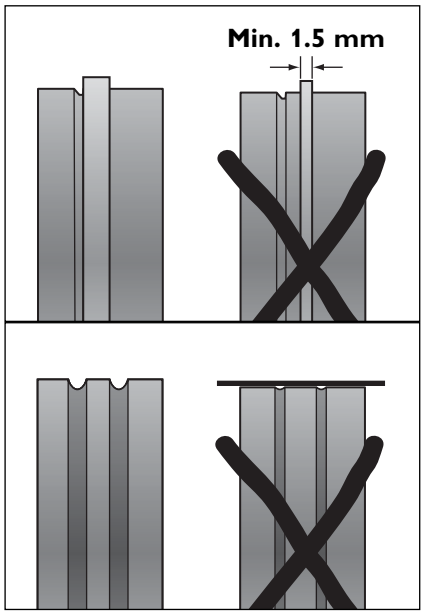
5. Checking

If the adjustment has been made correctly, it should be possible to slow the roller rotation using your thumb while the blade is rotated by hand.

If one of the rollers is adjusted incorrectly, steps 2–5 must be performed for the appropriate roller.

6. Screw in the knobs

Finish by tightening the knobs in operating position.



Replaceable wear parts

The engagement and support rollers, as well as the drive wheel, are exposed to extreme wear due to the dirty conditions in which they operate. As a result, wear parts have been made easy to replace. The lifespan of a set of engagement and support rollers can vary considerably depending on the material cut and the cutting technique employed. Using insufficient water during cutting increases wear. A set usually rolls approximately 2–6 blades.

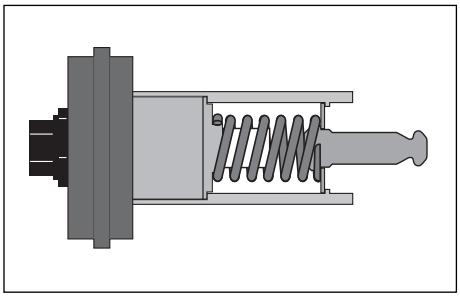
Same roller type replaced in pairs
In order for the blade to sit straight in the drive disc, the same roller type must be replaced in pairs.

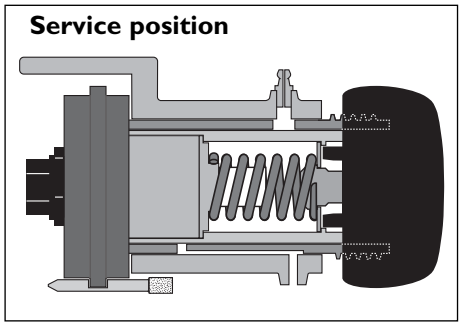
Upper and lower rollers may be swapped
It is common for the flange of the upper engagement roller to experience more wear due to the additional load exerted on it by the feed pressure. You can swap the upper and lower engagement rollers in order to get the full operational life out of both rollers.

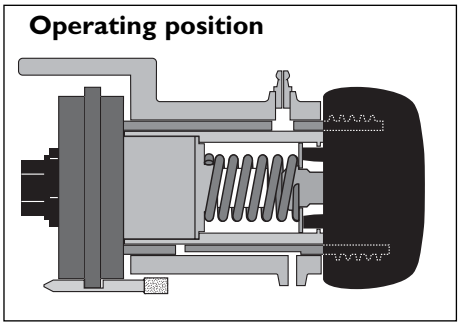
Wear limit

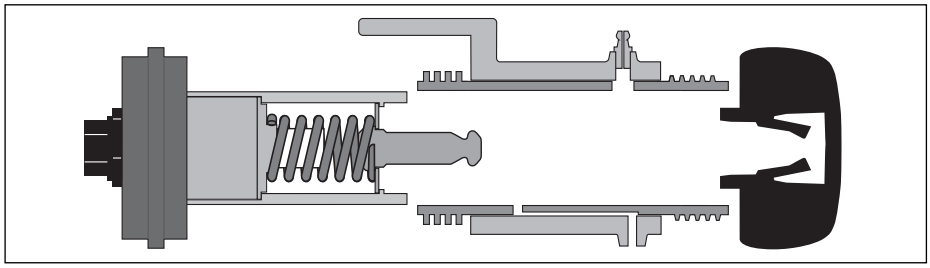
Engagement rollers
The engagement rollers must have a flange width of at least 1.5 mm/.06 in.

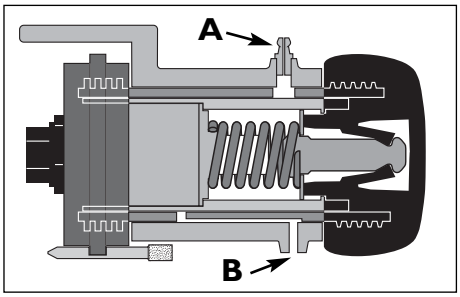
Support rollers
The support rollers must be replaced if they have no grooves.











Engagement rollers – construction

The spring, which creates compressive force on the blade's drive wheel, is pretensioned and contained within the bearing holder. The movement limiter, in the middle of the spring, limits the engagement roller movement in the event of abnormal stresses, such as jamming.

Service position
The knobs are screwed out which eliminates the spring force to the engagement rollers and drive wheel. Service position is used when replacing the blade and adjusting the rollers.

Operating position
The knobs are screwed into bottom position whereby the engagement rollers' springs tighten the cutting blade to the drive wheel.

Knob with snap fastener lock
The knob has a snap fastener lock on the bearing holder pin. Removing the knob releases the snap fastener lock from the pin and the bearing holder can be removed.

Lubrication – operating position
The bearing housing has lubricating ducts that directs the grease from the nipple (A) to the outlet duct (B) which indicates when the correct amount of grease has been filled. Lubrication is done with the knobs in operating position (knobs screwed in).

7 REPLACING ENGAGEMENT AND SUPPORT ROLLERS

IMPORTANT!
Worn engagement and support rollers have a smaller diameter than new rollers. Unscrew the adjuster screws two turns if only one type of roller is to be replaced, and four turns if all rollers are to be replaced before the cover is fitted.

Grease – characteristics

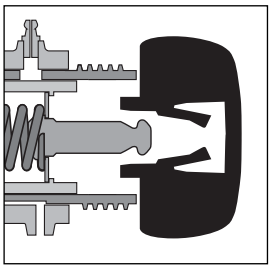
The grease used in the service procedures set out below must be stiff and afford good resistance to water penetration.

The original grease used during assembly in the factory is Shell Alvania RL3 (lithium grease), where the figure '3' indicates the NLGI grade of the grease. If you opt to use a different brand, the grease used must be of the same NLGI grade.

(The NLGI grade indicates the stiffness of the grease. The higher the NLGI grade, the stiffer the grease.)

Replacement of engagement rollers

Remove the blade as specified in Chapter 4.



Remove the knobs

Force off the knobs from the snap fasteners by unscrewing the knobs past the end stop. Unscrew the knobs.

Checking, cleaning

Push or pull off the bearing holders.

Defective bearing holders (wear/corrosion damage) are best replaced with new bearing holders complete with bearings.

Replace defective bearings as specified in Chapter 8.

Clean old grease from the bearing housing.

Wipe the bearing holders and make sure they are free from damage.

Check that the roller bearing feels intact.

Secure the tool in a vice

The easiest way to remove the roller is to put a box wrench in a vice. Lock the carrier with box wrench and remove the nut.

Never put the roller in the vice!

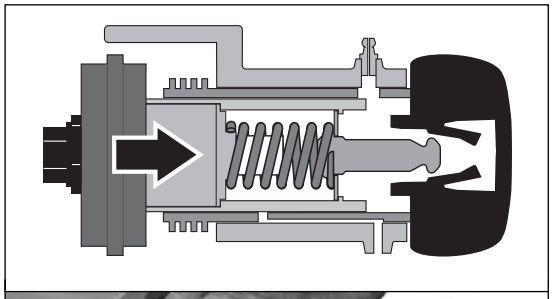
Remove the roller
When the nut is removed, lift off the carrier and roller. Lift off the washer to the ball bearing.

Clean and apply grease under the washer and the engagement roller seat. (The grease prevents the penetration of concrete slurry.) Note that the washer must be turned with the recess closest to the shaft facing down.

Fit the roller – 18 Nm/13 lbf·ft.
Fit the roller, and align the carrier to the profile on the shaft.

Lock the carrier and screw down the nut on this by hand.

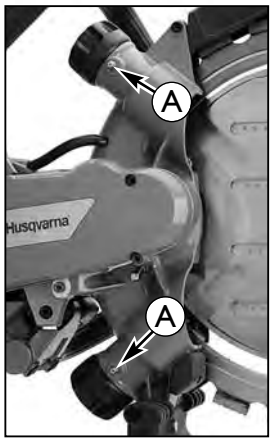
Tighten the nut, 18 Nm, with the same method used when removing (wrench in the vice).

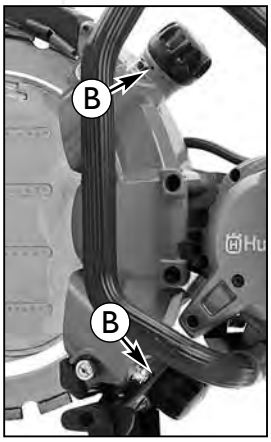


Bearing housing

Fit the bearing holders
Screw in the knobs. Press the bearing holders into the snap locks on the knobs.
Unscrew the knobs to their service position.

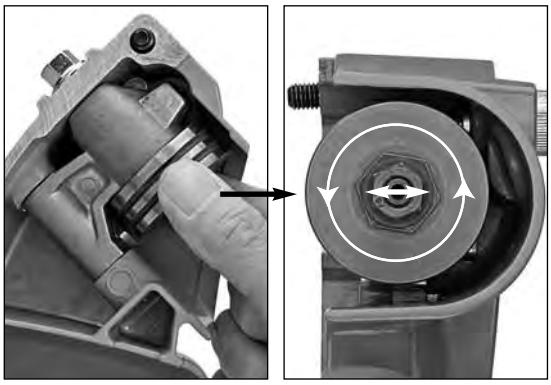
Mount the blade and adjust the rollers as per Chapters 4 and 5.





Lubricate the bearing housings
The knobs should be screwed in operating position!
Apply the grease gun to the nipples (A) and pump grease until clean grease comes out through the outlets (B).

7 REPLACING ENGAGEMENT AND SUPPORT ROLLERS



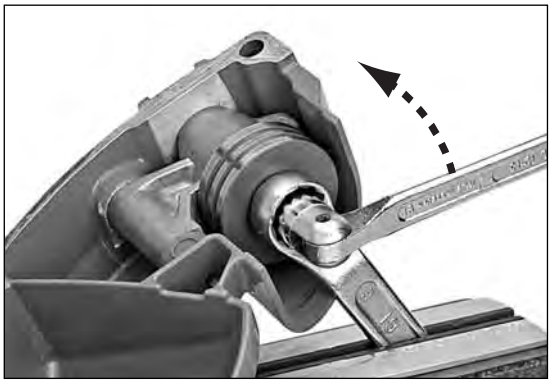
Support rollers

Checking

Make sure that the roller bearings are intact – the rollers must rotate easily, with a smooth motion and no play.

The support rollers are mounted on arms which change position when adjusting the roller. Make sure that the arms can move, and that there is no play in the attachments.

A defective bearing arm is best replaced with a complete new bearing arm with pre-installed bearings. Replace defective bearings as specified in Chapter 8.



Replacement of support rollers

Secure the tool in a vice

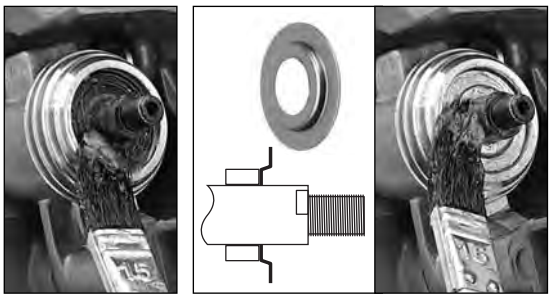
The easiest way to remove the roller is to put a box wrench in a vice.

Lock the carrier with box wrench and remove the nut.

Never put the roller in the vice!

When the nut is removed, lift off the carrier and roller. Also lift off the cover washer.

Clean the grooves in the sealing collar. Steel wire or string can be used as cleaning tools. The grooves and the conical inner of the roller helps prevent slurry from entering the centre.

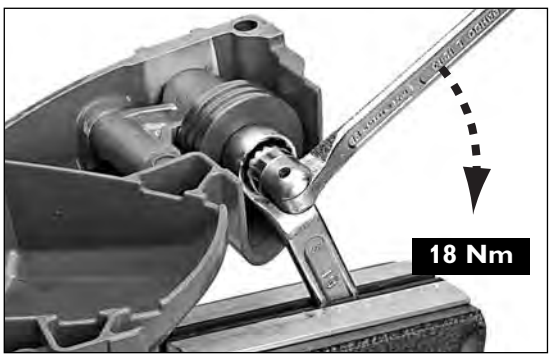


Lubricate

Clean and apply grease to the radial seal.

Fit the cover washer. Note that it is to be turned with the deeper part inwardly towards the wear ring shaft.

Lubricate the support roller seat.

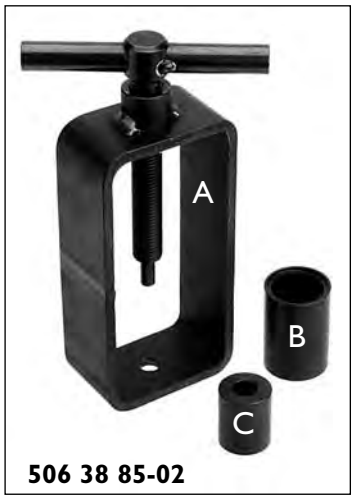


Fit the roller – 18 Nm/13 lbf·ft.

Fit the roller, and align the carrier to the profile on the shaft.

Lock the carrier and screw down the nut on this by hand.

Tighten the nut, 18 Nm, with the same method used when removing (wrench in the vice).



Tool

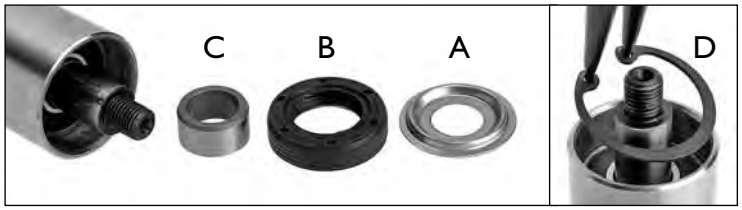
Bearing press 506 38 85-02
Bearing press (A), with removal sleeve (B) and mounting device (C), are used for the removal and installation of engagement and support roller bearings. Note that one end of the removal sleeve has a shoulder which is to face the engagement and support rollers' bearing holders.

The internal diameter of the rotary handle is adapted to suit the bearing holder pin. The handle is used for the removal and installation of the pin.

Engagement rollers

Remove the pin
Use the handle as shown above.
Press down the handle so that the spring below the pin is slightly compressed. Twist the handle so that one end of the pin washer can be moved past the interior flange of the bearing bracket.

Remove the pin and the spring below, together with the deflection limiter inside the spring.

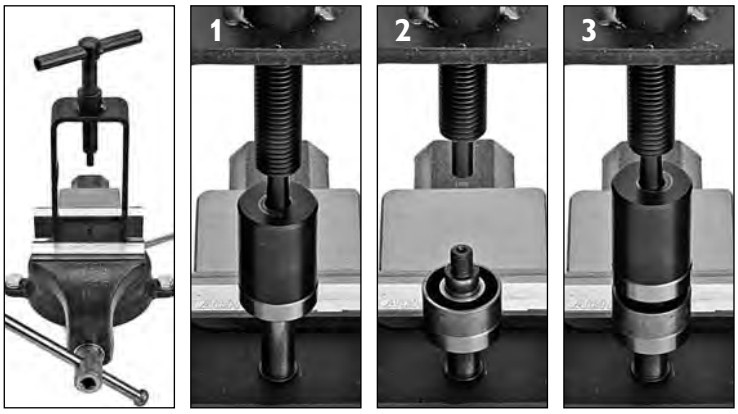


Remove seals
Lift off the cap (A)
Push up the sealing ring (B) using an awl.
(The sealing ring must be replaced.)
Remove the wear ring (C) from the shaft.
Remove the circlip (D).

Remove the bearing unit
Secure the bearing tool in a vice.

Position the disassembly socket on the bearing tool with the shoulder facing upwards and turn the bearing bracket with the protruding shaft downwards.
Press the bearing unit out through the bearing bracket.

Knock out the shaft
Knock out the shaft with a plastic hammer.



Fit new bearings

1. Place the shaft with the flange facing the hole on the bearing press. Add a ball bearing and place the mounting device on the bearing. Press down the bearing until the device is in contact with the shaft.

2. Add the inner and outer spacer rings.

3. Add the next ball bearing and place the mounting device on the bearing.

4. Press down the entire bearing unit until it touches the shaft flange.

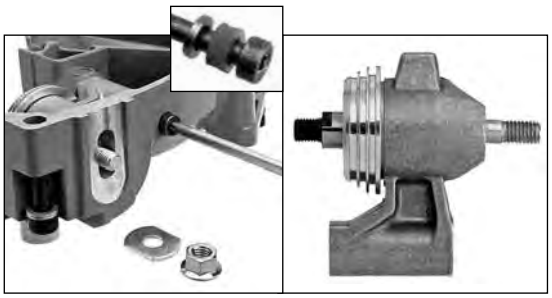
5. Lubricate the sealing washer's O-ring. Place the sealing washer on the mounting device and thread the bearing holder over this. Push the sealing washer by hand in the bearing holder and remove the device.

6. Turn the bearing holder and place it in the bearing press. Put the bearing unit in place.

7. Press in the bearing unit until it touches the sealing washer.

8. Fit the circlip. Fit the wear ring with the bevel outwards, as per the illustration. Fill the new radial seal internally with grease and fit using the mounting device. Add the cover washer.

Fit the spring with the movement limiter and the pin for the snap lock.



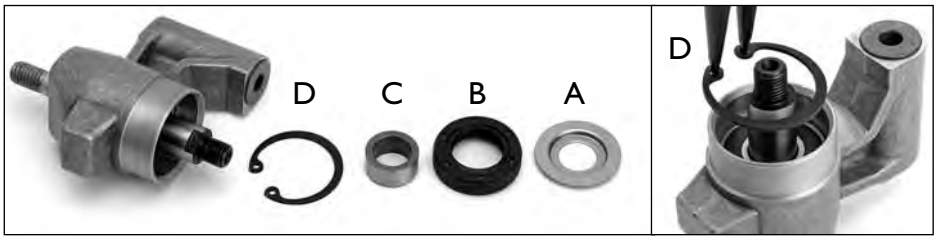
Support rollers

Remove the roller adjustment's lock nut and washer. Remove the bearing arm screw/shaft and remove the bearing arm.

Note that the nearest screw head has a plastic seal and a metal ring.

Sealing collar

Remove the sealing collar by gently knocking around with a small hammer and large pin punch.



Remove seals

Lift off the cover washer (A)
Push up the seal (B) with, for example, an awl. (The seal must be replaced.)
Remove the wear ring (C) from the shaft.
Remove the circlip (D).

Remove the bearing unit
Secure the bearing press in a vice.

Place the removal sleeve with the shoulder up and turn the bearing arm so that the tool screw meets the bearing arm screw.
Press out the bearing unit from the bearing arm.

Knock the shaft out from the bearings in the same way as shown on page 13.

Fit new bearings
1. Place the shaft with the flange facing the hole in the bearing press. Add a ball bearing and place the mounting device on the bearing. Press down the bearing until the device is in contact with the shaft.

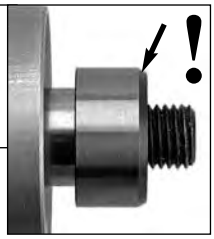
2. Add the inner and outer spacer rings.

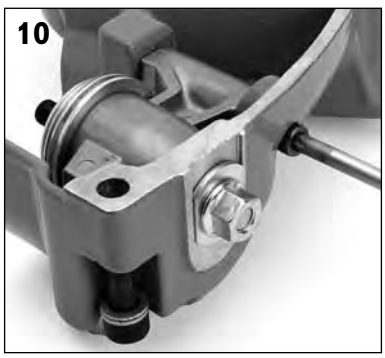
3. Add the next ball bearing and place the mounting device on the bearing.

4. Press down the entire bearing unit until it touches the shaft flange.

5. Grease the O-ring on the screw and fit this in the bearing arm.

6. Turn the bearing arm with the screw through the hole in the tool. Press in the bearing unit until it touches bearing arm.





7. Fit the circlip. Fit the wear ring with the bevel outwards, as per the illustration. Fill the new radial seal internally with grease and fit using the mounting device. Add the cover washer.

8. Fit the sealing collar using the tool's removal sleeve. First fit the mounting device on the shaft to centre the sleeve, now turn the sleeve.
Create a bridge with a suitable object on the sleeve and press on the sealing collar.

9. Apply grease to the seal and mount the cover washer. Grease the support roller seat.

10. Fit the bearing arm in the cover.

9 REPLACING ENGAGEMENT ROLLER BEARING SLEEVES


506 37 53-01

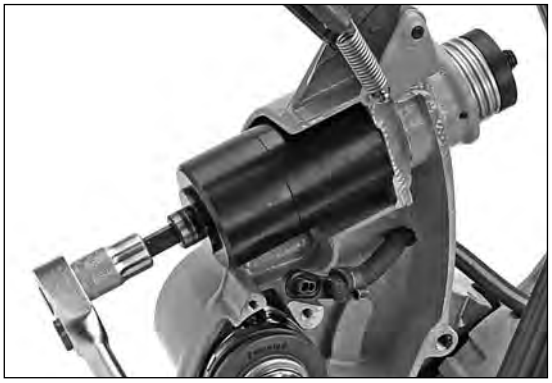
Dismantling

Tool
The special tool 506 37 53-01 is needed to replace the bearing sleeve.

Remove the water disc
The work is facilitated if the water disc is removed. Page 18 has a description of how this is done.

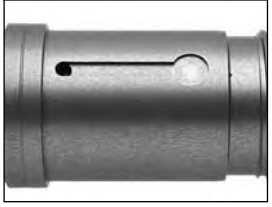
Lubricate the tool
This is particularly important when the bearing sleeve is fitted for the following reasons: When the bearing sleeve is screwed in with the tool, there is a tendency for the bearing sleeve to rotate in the screw direction. Greaseing the tool's sliding surfaces minimises this effect.

Removal is carried out in two steps
1. First fit the puller without the intermediate ring and press out the bearing sleeve a few centimetres.



2. Supplement the puller with the intermediate ring and press out the bearing sleeve completely.

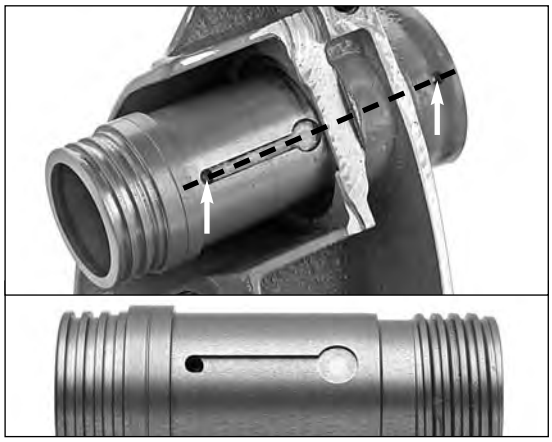


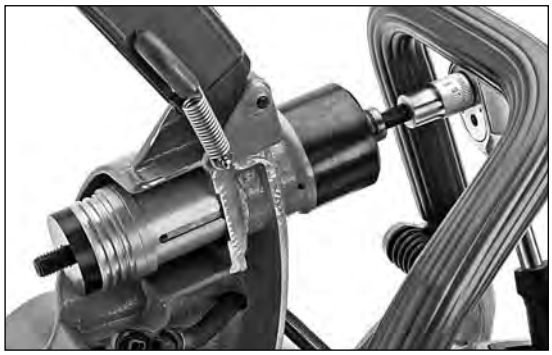
Installation

Turn the lubricating ducts correctly!
Note that the lubrication ducts in the bearing sleeve have a different look on the inlet and outlet side.

The large hole in the bearing sleeve is to face the grease nipple, while the milled duct with the small hole is to face the outlet side.

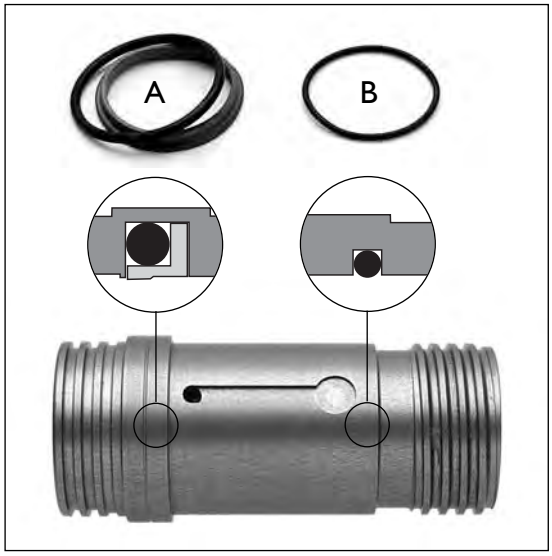


Line the lubrication duct
Put the sleeve in place by hand. Turn the sleeve so that the lubrication duct is aligned with the outlet duct in the chassis, or a millimetre lower (opposite to the tool's screw direction, as shown below) to compensate for any rotation during assembly.



Press in the bearing sleeve
During installation, the tool is used without the intermediate ring.
Fit the tool as shown in the illustration and screw in the bearing sleeve until it bottoms in the chassis.

Check the fitting
A simple way of checking that the bearing socket is in the correct position in the chassis (i.e. that it has not rotated during fitting) is to pump a little grease at the lubrication nipple.



Replaceable seals
Remove the seals using a sharp-pointed awl.

The stripper plate (A) comprises two components; an O-ring and a plastic ring. The O-ring is fitted first and positioned outermost (against the roller).

The plastic ring is first shaped around a round object (1) and then fitted in the bearing socket (2). Use pliers that do not damage the seal surface; circlip pliers are ideal. Shape the plastic ring in the bearing socket using a finger. Grease in the stripper plate and press in the bearing bracket. After a few minutes, pull out the bearing bracket and check that the stripper plate has shaped itself correctly.

The seal (B) is a simple O-ring that is fitted by hand without tools. Grease the O-ring.

506 37 61-02

Tool

A special tool is needed to replace the wheel bearing: 506 37 61-02.
Parts of the tool kit are used both for removal and installation of the drive wheel bearing.

It is important that the tool's sliding surfaces – threads, washers – are lubricated in order for the tool to function optimally.

Dismantling

Starting position

Remove the cutting blade as per Chapter 4, “Replacing the blade”. Leave the drive wheel in place.

Water disc

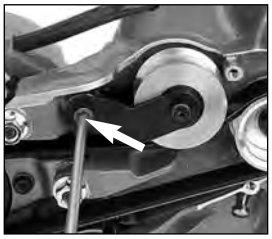
Remove the four screws that hold the water disc. Remove the screw to the water connection nipple (black arrow).

Remove the nipple from the disc. Check the O-ring on the connection that forms a seal with the water disc, it can come loose during removal.

Transmission housing

Unscrew the four screws securing the cover and remove it.

During reinstallation: Check that the cover's seal, above the tensioner wheel, is correctly positioned in the groove.



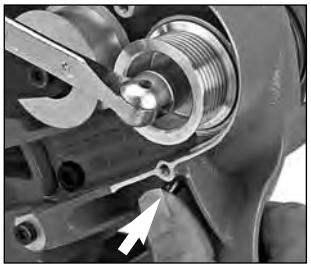
Drive belt

Loosen the tension roller locking screw.

Remove the belt.

Reassembly, 10–12 Nm

Tighten the tension roller's lock nuts at a torque of 10-12 Nm.



26–30 Nm

Belt pulley

Lock the rotation of the pulley by pressing in the rotation stop lug under the pulley. Remove the centre screw and remove the pulley.

If the pulley cannot be removed by hand – knock the shaft down a little using a brass drift until the pulley comes loose. Never pry the pulley using a tool as this will damaged it.

Reassembly, 26–30 Nm/19-22 lbf·ft.

Tighten the pulley's screw at a torque of 26–30 Nm.

Note: A new belt is best installed by first putting the belt in place and then fitting the pulley.


Drive wheel
Press in the rotary latch and remove the centre screw. Remove the carrier and drive wheel.


Carrier
Lift off the drive wheel carrier.

Sealing collar
Remove the sealing collar's three screws and remove the sealing collar.


Radial seal/holder
Lift out the sealing ring with holder.

Wear ring
Lift out the shaft's wear ring.

O-Ring
Remove the O-Ring.


Remove the bearing unit
Turn the machine with the transmission side facing up. Support the underside of the bearing housing with a block of wood.

Place the special tool's triangle in the chassis slot for this.

Knock out the whole bearing unit with a plastic hammer.
Tip: Use a small plastic hammer as a spacer, partly to stop the triangle from bouncing out of position and partly as an extender.


Divide the bearing assembly
Use the vice as a counterhold.

Mount the special tool's screw in the shaft and knock out the shaft and remove the two bearings.
Alternatively, use a brass mandrel to drive out the shaft.

Assemble bearings

Perform the following operations with the machine horizontal.
The transmission side should be facing up and the underside should be accessible.

Support washer

Parts of tool kit 506 37 61-02 are used for bearing assembly.

Note that the tool kit washer cannot be used as a support when the inner bearing is assembled. The washer will come into contact the bearing before it reaches the top of the chassis.

Use a pair of oversized standard washers as a support.

(The washer in the tool kit is intended for the assembly of main bearings on cutting machines with combustion engines.)

Assemble inner bearing

Place the bearing on the support plate and hold it on the underside of the bearing housing. Insert the screw through the washers on the top and fit the screw in the support plate on the underside.

Lock the screw and rotate the nut until the bearing comes into contact with the stop at the top.

Check assembly

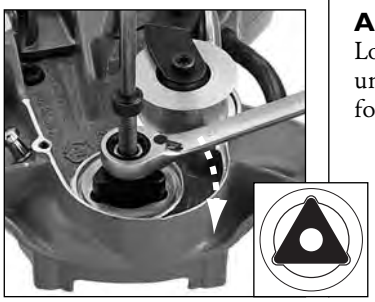
Now check that the bearing is completely in contact with the chassis.

The bearing seat dictates the alignment of the drive wheel and pulley when all components are installed.

Spacer ring

The spacer ring is to be situated between the first bearing and the one to be installed now.

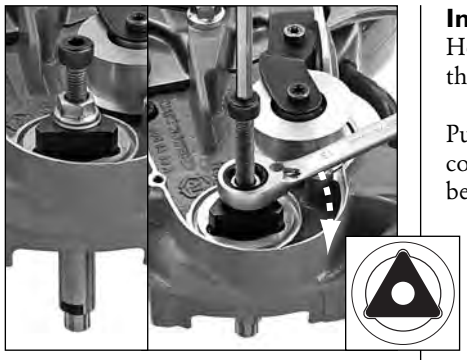
The spacer ring and wear ring are almost identical in size, but their materials and machining are significantly different and the rings must not be confused. Note that the spacer ring, the ring on the left, is now to be used in the following operations.



Assemble outer bearing

Locate the bearing and the **spacer ring** on the support plate and hold it under the bearing housing. Use the triangle in the tool kit for this and the following operations.

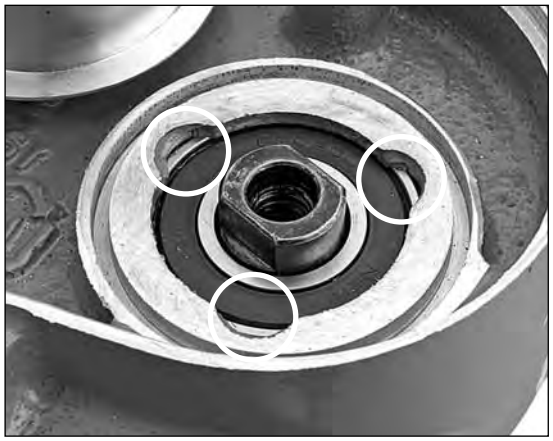
Note the position of the triangle – the triangle directly supports the assembled inner bearing.
Pull in the bearing using the tool until the spacer ring comes into contact with the inner bearing.



Install the drive shaft

Hold the drive shaft on the underside and screw in the tool's screw, through the triangle, into the base of the shaft.

Pull in the drive shaft using the nut on the tool until the shaft comes into contact with the domed underside of the triangle. Note that the triangle is to be turned to support the bearing.



Bearing assembly final inspection

Following bearing assembly check that the upper bearing is completely in contact with the chassis. The correct position of the bearings in the chassis means that the pulley and blade drive wheel are correctly aligned with the belt and cutting blade.

Assembly problems

If the inner bearing has dropped when the outer bearing was installed then a complete reassembly must be carried out. In that case the solution is to use a washer as a support when the outer bearing is assembled as well.
Unfortunately this is an inferior method as a non-uniform load is placed on the inner bearing between the bearing rings when the spacer ring comes into contact with both bearings. The assembly of the outer bearing must be interrupted just when the spacer ring met both bearings – in other words just when the resistance increases. Before assembling the shaft check that the spacer ring is located between the bearings with no play.

Under no circumstances can the position of the bearing package be adjusted by hitting it with a hammer. This will always lead to bearing damage.

Replace the radial seal

Replace the radial seal with a new one. Press out the old seal in any direction.

Place the new seal on a flat surface with its spring side up. Push down the holder until it comes into contact with the surface.

Note that the spring side of the radial seal must be face down in relation to the bearings during assembly.

Reinstall

Grease the O-ring and fill the radial seal internally with grease.

Note that the wear ring has a bevel which is to face upwards. The wear ring is first lubricated and mounted on the shaft, then the radial seal is fitted with the holder.

Install the other parts.

Cutting unit

Dismantling

The cutting unit is a separate unit that can be replaced.

Remove the first water hose at the water valve. Remove the four screws that hold the cutting unit to the crankcase.

Lift off the cutting unit.

Lock washers

The cutting machine is subjected to large vibration forces during operation. Three of the cutting unit's attachment points to the crankcase are therefore fitted with a special type of lock washer (Nord-Lock) that ensures secure locking, provided they are fitted with the correct torque. The washers must not be forgotten or replaced by other types of washer when reassembling.

Fit – use the torque wrench

In order for the Nord-Lock washers to provide secure locking, the two nuts and the screw must be tightened at a specific torque. This must be done with a torque wrench: **Torque 26–30 Nm/19–22 lbf·ft.**

The small screw, without a washer, must be treated with Loctite thread locking compound and tightened to 10-13 Nm/7-10 lbf·ft.

Spray guard

The spray guard is replaced as per the description below.

Replacing the spray guard is made with the machine in an inverted position.

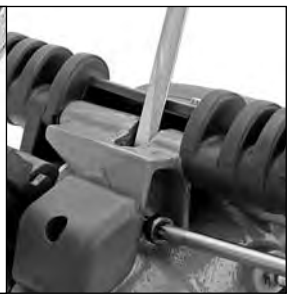
Dismantling

Remove the plugs
The plugs, one on each side, are of foamed plastic and can easily be removed with pointed pliers.

Remove the knob
Remove the knob and fold the spray guard back.

Unscrew the screw to the spring
Unscrew as far as possible so that the spring releases its grip.

Remove the two screws to the spray guard
Remove the screws on both sides of the spray guard. The screws are Torx T27.



Installation

Install the spray guard
First fit the two screws of the spray guard to the cutting head. Press the plastic plugs in place with a pin punch.

Fit the spring
Press in the spring latch with a screwdriver, turn the screw on the spring, as per the adjacent illustrations.

Blade guard

Replacement
The blade guard is attached with a screw to the cutting unit and can easily be replaced. A spring must also be removed.

Replaceable rollers
Note that the rollers can be removed from the blade guard and replaced.

Blade guard bracket
The bracket has a tube spacer surrounded by O-rings on each side. A metal clamp holds the parts in place. Grease the O-rings and the tube spacer.

Fit the metal clamp correctly!
If the metal clamp is turned incorrectly, the end positions of the blade guard will be misaligned. The metal clamp must be turned to ensure the folded plate edge is directed downward, as per the illustration.

Hose clips

Oetiker system

The machine is originally fitted mainly with a single-use Oetiker ear clip. This type of clip has the advantage of being able to give small-dimension hoses even clamping force all round with a minimal risk of leakage. Never replace with any other type of hose clip.

Tools

Standard cutting pliers are used to remove the ear clip.

Oetiker's special pliers are the best tool for fitting. These are manufactured by Knipex but are normally sold by Oetiker distributors only. These pliers are labelled: SYSTEM OETIKER, KNIPEX 1099.

Alternatively, cutting pliers can be used which are modified by grinding down the edge.

Note that the special pliers are designed to be able to fit the ear clip in two directions.

Removal

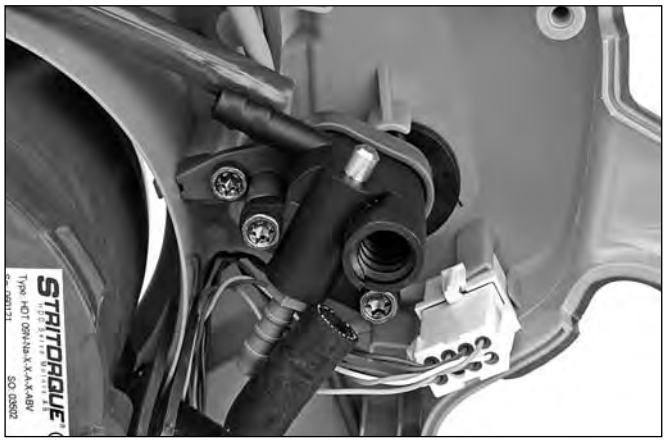
Use cutting pliers and cut the hose clip right across the ear.

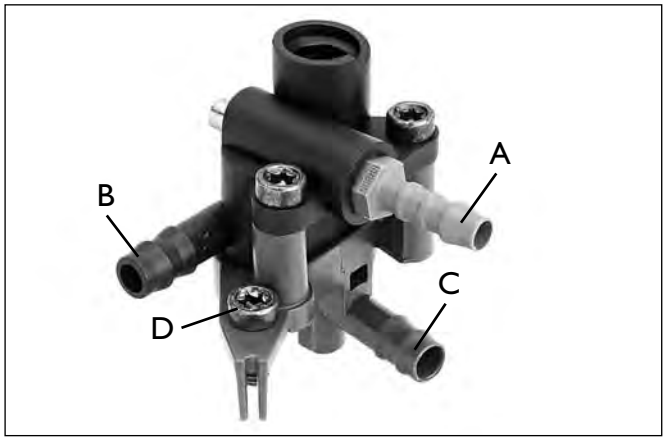
Separate the clip and remove it.

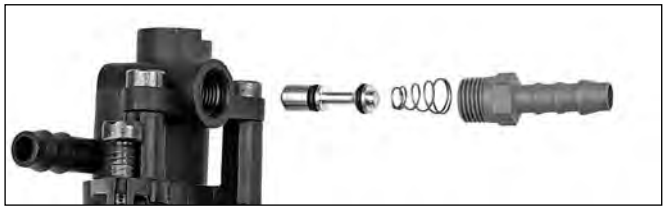
Assembly

Place the hose clip in the right position on the hose, then compress the clip with the pliers.

The photo on the right shows a hose clip fitted correctly.







Water valve

The water valve is accessible when the rear motor guard and controller unit has been removed, see page 26.

Function

The motor requires water cooling so as not to overheat. Water is carried from the hose connection, which has a Gardena hose connector, to the inlet side of the motor and on from the motor to the water valve and then to the water disc where the water flows out onto the blade.

The starter inhibitor controls the valve so that the water only flows when the starter inhibitor is depressed. The water flow is adjusted using the blue knob.

Test operation in the workshop

Motor cooling water need not be connected for short-term test operation at no-load.

Connections

A. To the motor cooling water outlet side.

B. To the cutting blade water disc.

C. This connection is plugged and has no function on this machine.

D. Screw securing the valve unit to the guard. (M5x14, 3–4 Nm)

Removal

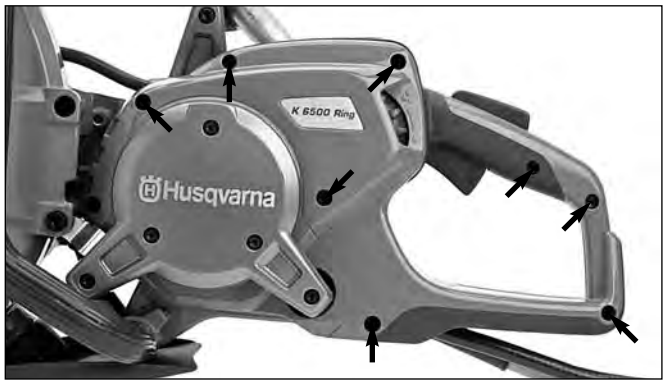
Disconnect the hoses at A and B. Undo the screw D, and the valve unit can be lifted off.

Maintenance

The water valve is available as a spare part as an assembly. It does not normally require servicing.

Valves can sometimes stick, especially if they have not been used for any length of time. Sticking valves can often be made to work by cleaning and lightly greasing the sliding surfaces.

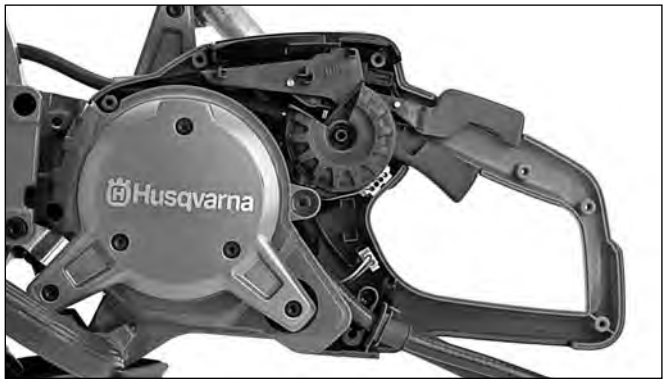
The adjacent illustration shows a valve removed.



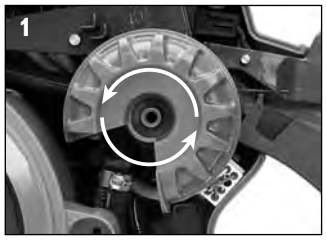
Removal

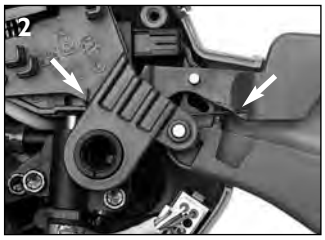
Rear motor guard

Remove the screws indicated with arrows, then remove the guard. (7 x MT5x14, 3-4 Nm. 1 x MT5x40, 3-4 Nm)



When the guard has been removed, most components are accessible, such as the control unit with electrical connections, the water valve and hoses.





Control unit

1. Remove the knob for the water valve by unscrewing it.

2. Note how the return spring for the starter inhibitor is fitted and tensioned.

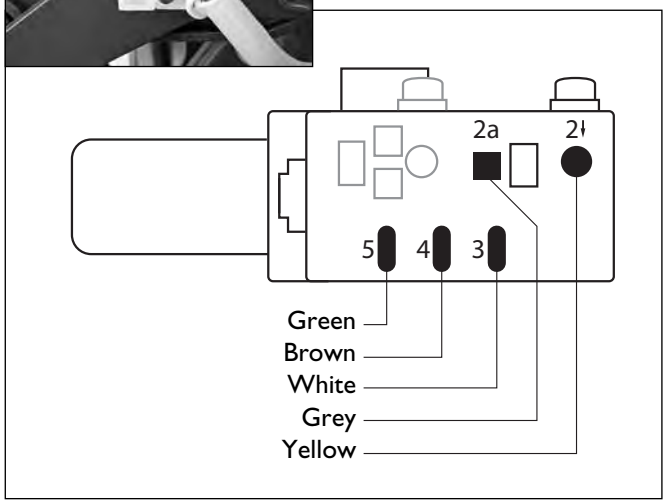
3. Lift off the control unit.

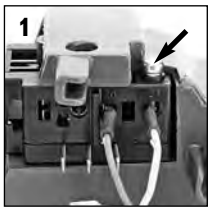
4. Turn the control unit so that the electrical connections on the back can be accessed.

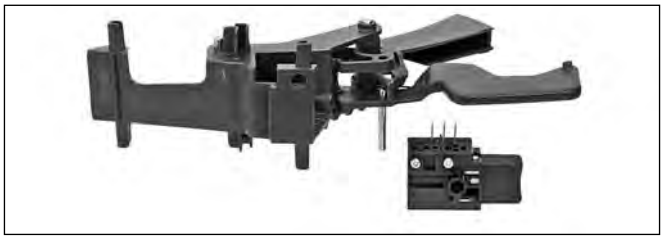
Electrical connections

Pay attention to the cable colours on the connections so that these can be connected to the correct contact positions when refitted.

The three pin connectors 3, 4 and 5 are removed by pulling them out.





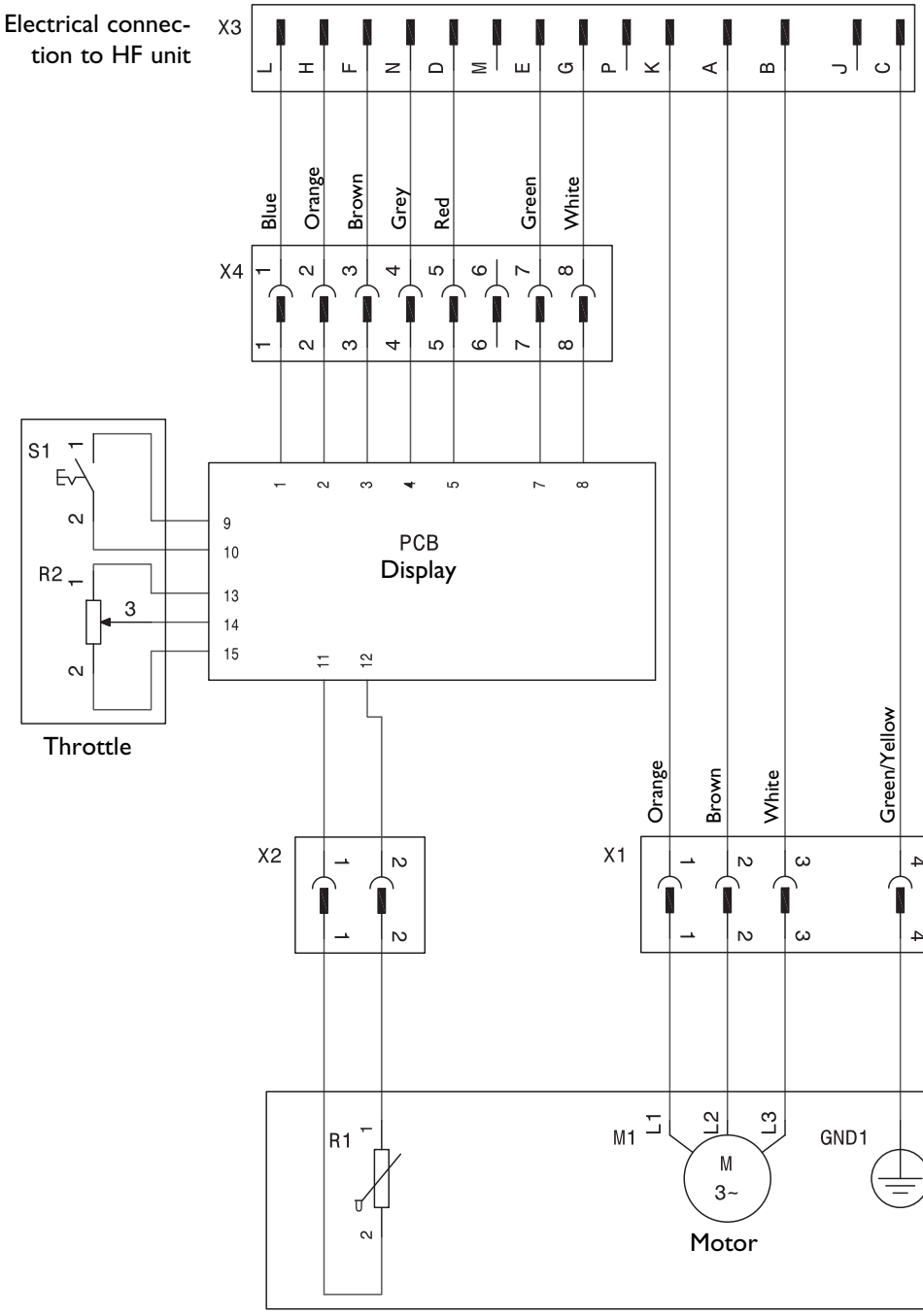


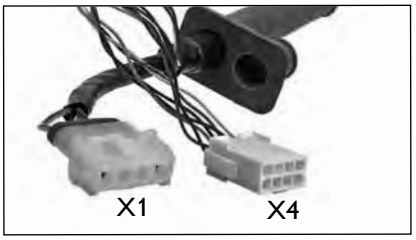
1. The yellow cable on the right is removed by undoing the locking screw on the top.

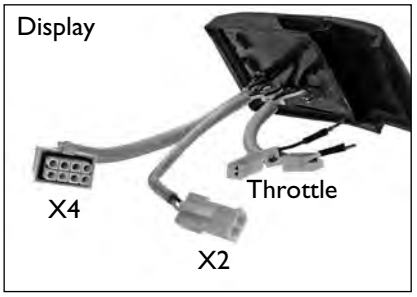
2. The grey cable on the left is locked with a spring. Insert a small screwdriver in the recess just to the right of the cable and pull this out. Also fitted in a similar way.

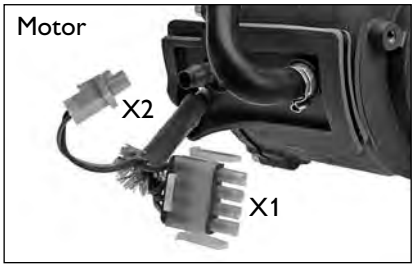
Switch
The switch can be replaced. Push out the shaft of the starter inhibitor and fold this back. The switch cam then be pulled out of the control unit.

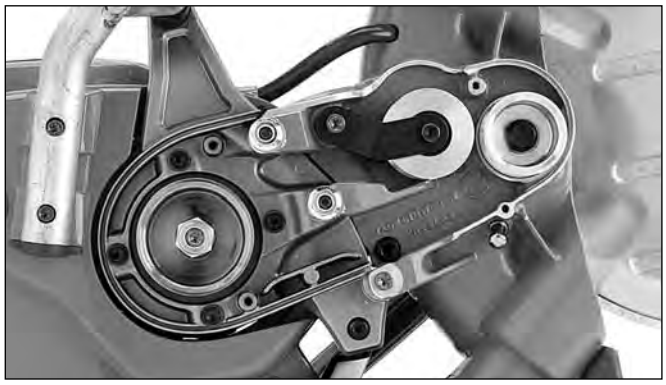
Wiring diagram











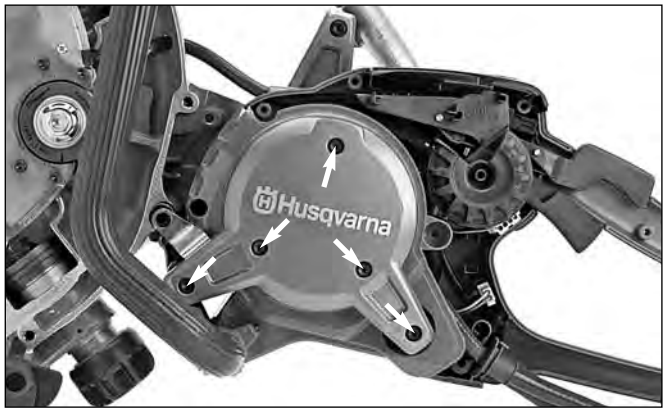
Removal

Starting position

Remove the blade as described on Page 6.

Remove the rear motor guard as described on Page 26.

Remove the transmission housing and belt as illustrated and described on Page 18.

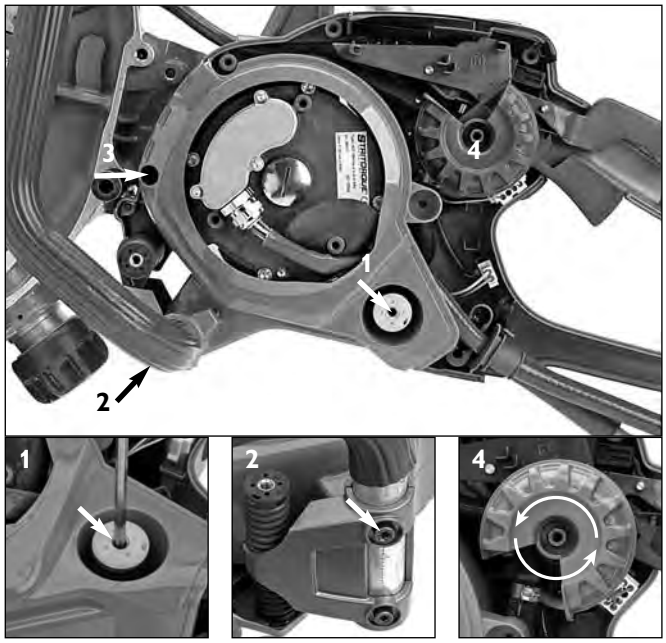


The front motor guard must be removed to access the motor itself and its electrical connections. The motor bracket must first be removed.

Motor bracket

The motor bracket connects the motor to the anti-vibration handle unit.

1. Remove the three inner screws. (3 x M5x26, 7–8 Nm)
2. Remove the two outer screws. (2 x M6x40, 5–6 Nm)
3. Lift off the motor bracket.



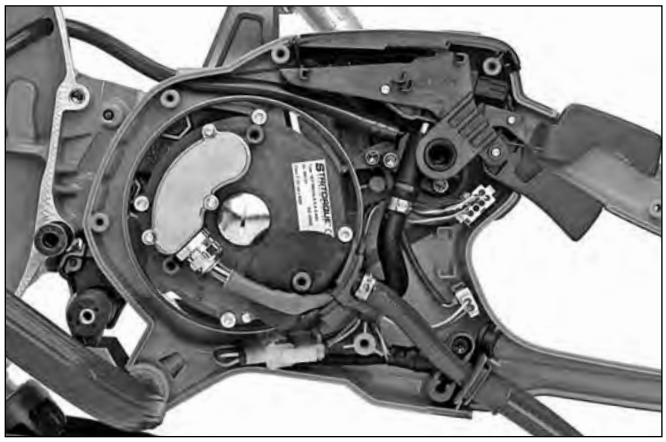
Front motor guard

1. Remove the inner anti-vibration element screw, 4 mm Allen (3–4 Nm).

2. Remove the screw by the handle bracket. (MT6x45, 4–5 Nm)

3. Remove the guard screw. (MT5x14, 3–4 Nm). Lift off the guard.

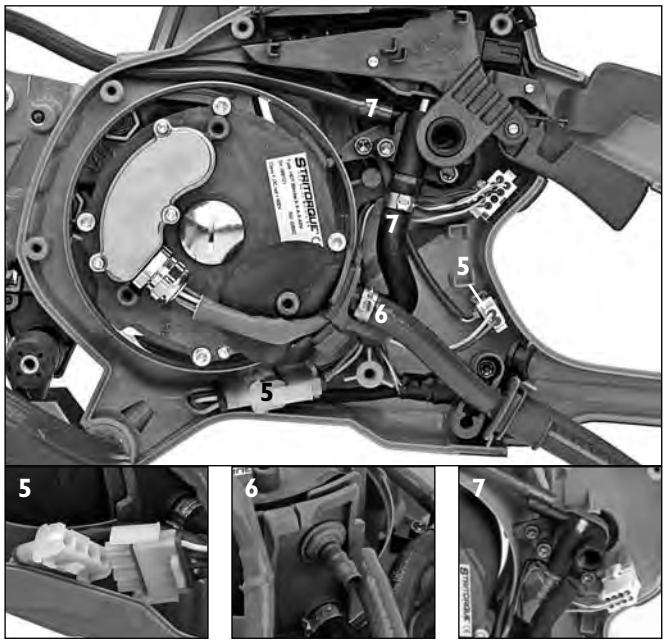
4. Remove the water control valve by unscrewing the knob.



Troubleshooting – testing motor functions

There is a chapter headed TROUBLESHOOTING at the end of the workshop manual. This shows how to carry out trouble-shooting with the motor and electrical components disassembled – this is in order to clearly illustrate how tests are to be carried out.

Note that the motor need not be dismantled for this trouble-shooting operation. All electrical connectors and other electrical components are accessible for inspection when the machine has been disassembled to the extent detailed on this page and as illustrated on the left.



5. Separate the 2 connectors for the motor.

6. Remove the hose clip and pull off the hose that runs from the water connection to the motor.

7. Remove the hose clip and pull off the hose that runs from the motor to the water valve.

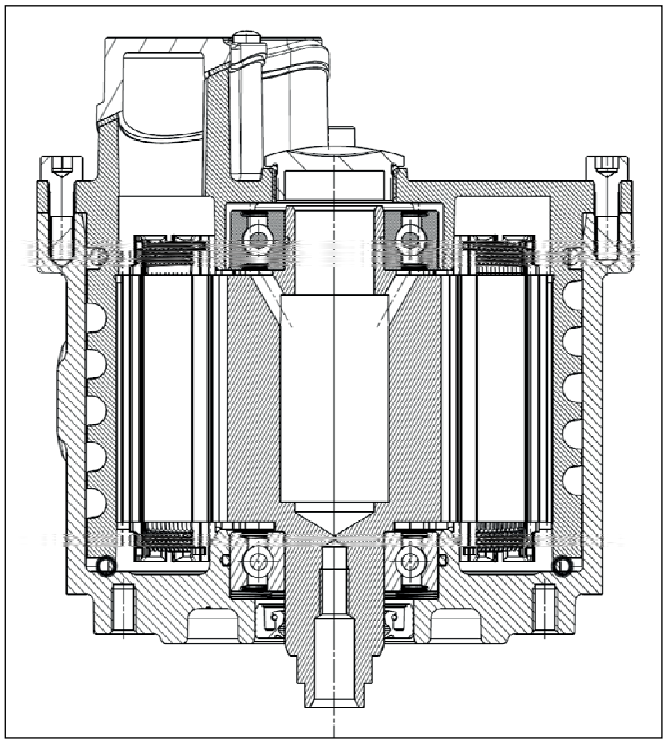
Pull off the hose that runs from the water valve to the water disc.

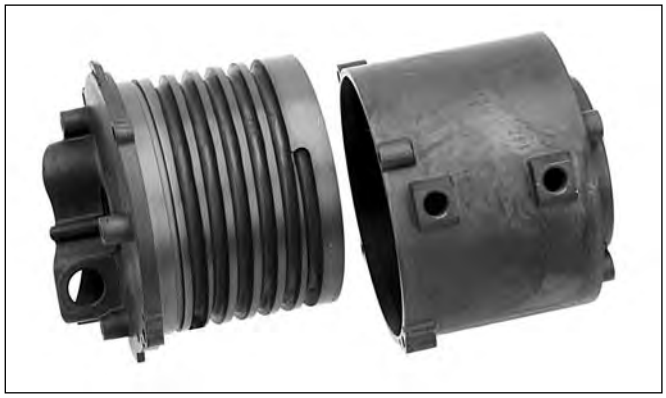
8. Turn the machine. The motor is secured to the cutting arm with four screws. Remove the screws (M5x12, 7–8 Nm).

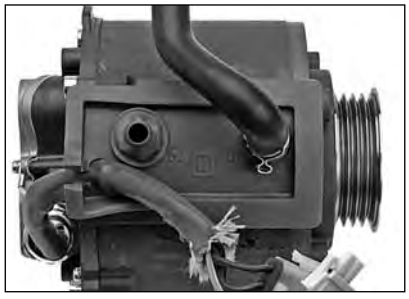
The motor can then be lifted out.

Do not dismantle the motor!

A defective motor cannot be reconditioned without specialist expertise and special tools. The entire motor must be replaced if it is defective.







Function

Working method

The way in which the high frequency motor works differs significantly from a traditional motor with rotor windings and collector/carbon brushes.

The rotor in the high frequency motor consists of permanent magnets with high magnetic force, known as neodymium magnets. In other words, the rotor has no windings or electrical components.

The stator has several field windings. The high frequency unit, which is connected to the motor, generates a rotating magnetic field in the stator and the rotor follows this movement.

In comparison with the traditional motor, the rotor and stator have essentially swapped functions.

The high frequency motor is considerably more efficient than a carbon brush motor and its output, in relation to its weight, is significantly higher, which is why it is ideal for handheld machines.

Cooling

The cavity between the stator and the rotor is filled with oil. This oil carries and distributes the heat out towards the motor housing. An outer jacket surrounds the motor housing and the space has channels for cooling water. The photo below shows the structure of the motor housing and cooling jacket.

The cutter is always used with water cooling to the blade. The water is first routed through the motor cooling channels and then to the water disc. The hose connection has a Gardena hose connector.

Testing in the workshop

Water does not need to be connected for motor cooling for short-term testing with the motor without load.

Service actions

The motor will probably not require any service actions during the service life of the machine. Repairs to this type of motor are complicated and require both special knowledge and special tools, and this work is not really of a type which can be carried out at a regular service workshop. Therefore, a failed motor will be replaced by a complete new motor.

Turn the gasket the right way

If the gasket is removed, note how this is to be turned when refitting. Make sure also that the plastic guard rests correctly in the grooves against the gasket during fitting.

Nipples for cooling water

Two nipples are connected to the motor for the cooling water supply. New ones are fitted without sealant. (3–4 Nm)

Belt pulley

The belt pulley is removed by locking the rotation using a 19 mm wrench and removing the centre screw, Torx 27. (M6x30, 10–12 Nm)

Tools

Multimeter

A multimeter is needed for most of the tests in order to measure resistance (ohm) and inductance (H = Henry). The multimeter's connection test with a buzzer is used to check switches, cables, contacts, etc. (The Husqvarna range of tools includes an efficient multimeter; see page 35.)

Insulation and continuity tester

The motor works with a voltage of just over 500 V AC. Even if simple measurement with a multimeter shows that the motor is demonstrating no insulation faults at stator windings or in connected cabling, it is not possible to rule out faults in these. Defective insulation can cause arcing at high voltages. This can be tested using an insulation tester. Megger and Fluke are just two examples of common makes.

Insulation is conveniently measured at 1,000 V over 3 seconds with a maximum of 5 mA.

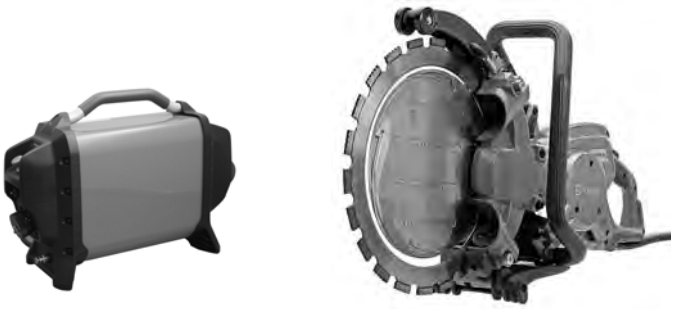
Note that connected test cables and test probes must be designed for 1,000 V or more.

Carefully read the instrument's operators manual for use!

Tachometer and screwdriver

The strength of the rotor's magnetic field is tested by rotating the motor to 1,000 rpm and measuring the voltage it emits at this speed. A simple tachometer is needed for this: an optical laser seeker is suggested. The easiest way to achieve rotation is to use a screwdriver.

IMPORTANT: No measurements should or must be carried out with the machine connected to a power source!



Rules of procedure for troubleshooting

Defective HF unit or cutting machine?

When troubleshooting, it is important to remember that the fault may be in either the cutting machine K7000 Ring or the unit PP70. If you have access to another working PP70 and machine, these can be used in order to identify the faulty unit.

If you have no other PP70 or machine to hand, the easiest way to go about troubleshooting is to start with the cutting machine, as this is made up of relatively few components.

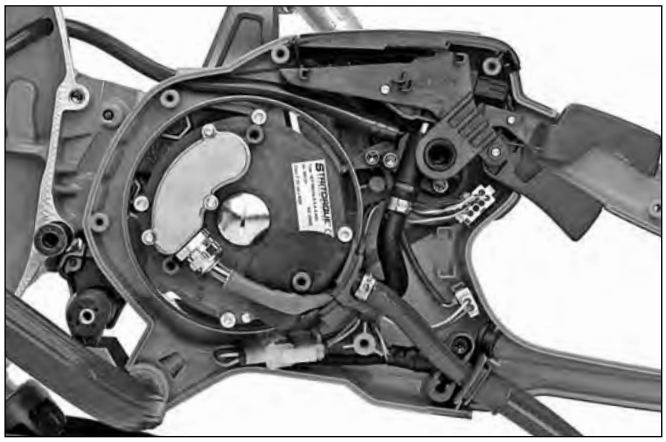
Troubleshooting K7000 Ring

The troubleshooting order can often be decided in each individual case depending on the symptoms, signs of external damage, operating conditions, number of hours of operation, etc.

The motor will not start

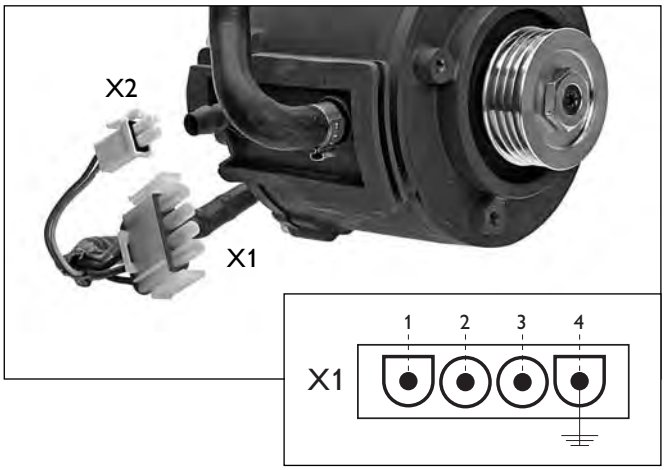
If the history of the cutting machine is not known and there are no further external signs of damage visible, the components of the machine must be tested. There are few components to test:

- Cabling, between the HF unit and the cutting machine
- The motor unit with built-in thermistor
- The throttle unit
- The display unit



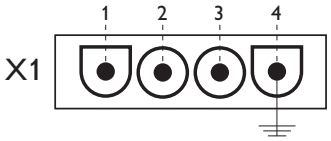
Dismantle the cutter

In the following section troubleshooting is demonstrated with the components disassembled for the sake of clarity. However, for all troubleshooting operations the machine need only be dismantled to the extent shown in the illustration, and disassembly is carried out according to the description on Page 28.

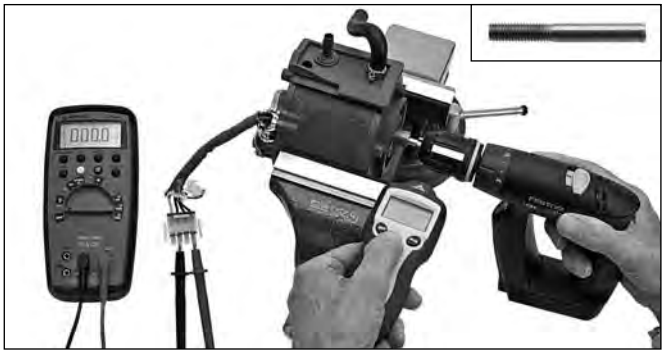


Short-circuit testing
Measure between 1–4, 2–4 and 3–4

Testing stator windings
Measure between 1–2, 2–3 and 3–1
Resistance measurement approx. 2 Ohm
Inductance measurement approx. 10–12 mH



Insulation testing
Measure between 1–4, 2–4 and 3–4



Rotor testing
Measure between 1–2, 2–3 and 3–1
Normal value: 73 volts rms at 1,000 rpm
Minimum value: 65 volts rms at 1,000 rpm

Motor

Dismantle the cutting machine so that the motor's connectors are accessible. The motor does not need to be removed from the machine.

Short-circuit testing

Check first to make sure that the motor does not have **shorted windings to earth** (motor material). This is easy to do using a multimeter on the contact X1. Set the multimeter in position for connection testing with a buzzer. A shorted motor gives a closed circuit between the earth cable (4) and one of the phases (1, 2, 3).

If no fault is indicated, the test must be extended to include insulation testing as indicated below.

Resistance and induction measurement

The following test shows whether the motor has **shorted winding turns**. A small number of shorted winding turns means that the motor loses power but can work for a short time. Fully shorted windings mean that the motor will not start.

The check is carried out with resistance measurement in Ω (Ohm), and inductance measurement in mH (milliHenry). An intact motor gives values of approx. 2 Ohm or 10–12 mH. Measure between 1-2, 2-3 and 3-1. If the deviation is more than 20 % lower, the motor must be regarded as defective.

Note: Measurement instruments may give incorrect readings. Therefore, place greater emphasis on the relative values between the windings than on the absolute readings.

Insulation testing

The insulation test is a test which indicates where there is inadequate insulation between the motor's **windings and earthing**.

Insulation measurement takes place in the same way as the initial check between the earth cable (4) and phases 1, 2 and 3. The insulation tester is set for a 1,000-volt voltage. The test must show maximum resistance for the result to be approved.

Rotor magnets

The rotor in the motor has permanent magnets with high magnetic energy, known as neodymium magnets. As with all permanent magnets, high temperature, blows, vibration and powerful external fields "wear out" the magnetic force. The service life of the machine is probably not limited by the rotor. A defective rotor will reduce motor output.

Neodymium is an earth metal, and the magnetic strength varies slightly from magnet to magnet at the time of manufacture. It is therefore impossible to set a precise limit as to when the rotor is considered to be consumed. If the phase voltage in the test below **exceeds 65 volts, the rotor must be considered usable**.

The rotor magnets are tested as follows:
Remove the belt pulley from the motor and replace the screw with a long screw from which the head has been cut off. Connect a screwdriver to the screw.

Connect test cables between **two phases** and set the multimeter to read **alternating current**. Rotate the motor to 1,000 revolutions per minute, and check this with a tachometer. **The typical normal value is 73 volts at 1,000 revolutions per minute**.

Repeat the test for all three phases: these must all give the same value, otherwise there is a fault in the stator windings.

		Min.	Typical	Max.
20 °C	68 °F	555 Ω	581 Ω	607 Ω
25 °C	77 °F	577 Ω	603 Ω	629 Ω
30 °C	86 °F	599 Ω	626 Ω	652 Ω

Thermistor

The thermistor is the motor's temperature monitor. It breaks the current to the motor if the temperature is too high. A defective thermistor may prevent the motor from starting. The thermistor is connected to the display unit on the cutting machine, which issues a warning if the motor temperature is too high.

The thermistor is integrated in the motor unit and cannot be replaced separately.

The thermistor changes resistance according to temperature, which can be measured with a multimeter. The machine must not have been run recently: it must be at room temperature as shown in the table. Measure at the contact X2, as shown in the photo at the top. The adjacent table shows typical values, as well as minimums and maximums.

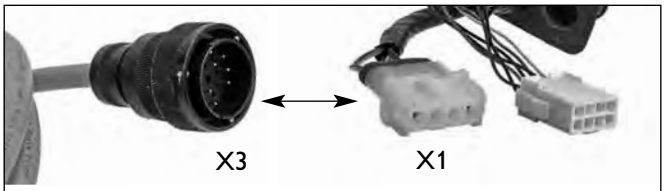
If measured values are outside the tolerance ranges, the thermistor is defective.

Cable between PP70 and K7000 Ring

Supply cables which have been "driven over" or abused are a relatively common cause of interference. Carry out a visual check of the outside of the cable for damage due to trapping. Also check that the contact pin is undamaged.

The cables to the motor are examined first with connection testing at both cable connections. This test shows whether there is any cable failure. Insulation testing is then carried out, which shows whether there is any damage to the cable insulation.

The signal cables, which work with low voltage, are examined only with a multimeter for cable failure and insulation faults.

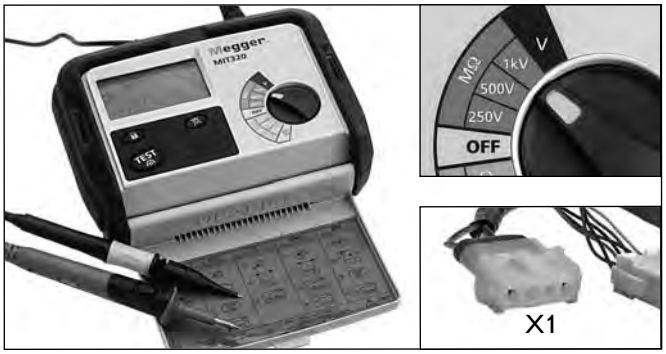


Pin	Cable
K	Red
A	Brown
B	White
C earth	Green/yellow

Motor cables – connection testing

Set the multimeter for connection testing with a buzzer.

Check that the three phase lines and the earth cable are connected to the contacts on the cable ends. The labelling and cable colours for the contact pins are shown in the adjacent photo (see also the diagram on page 27).



Motor cables – insulation testing

Set the insulation tester to give a voltage of 1,000 volts.

It is suggested that the test pins should be connected to the cable's connector at the motor side, X1. The arrangement for the test may look like this:

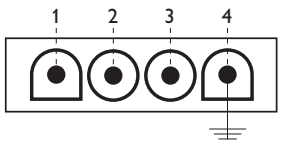
- connect the first test pin to phase 1, the second test pin to phase 2, then to phase 3 and then to earth.
- connect the first test pin to phase 2, the second test pin to phase 1, then to phase 3 and then to earth.
- continue according to the same pattern until all cables have been tested. See the adjacent table.

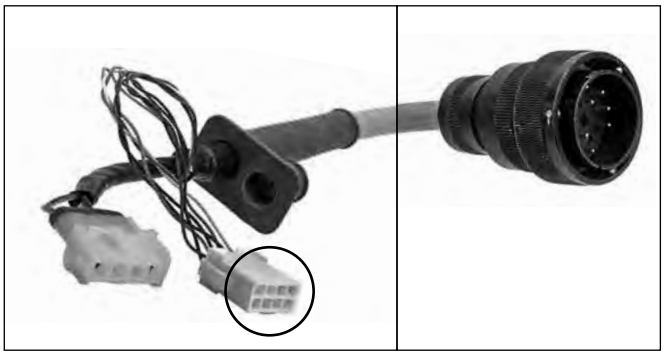
The insulation tester measures resistance during testing. The measurement must indicate the maximum ohm value if the cabling is fault-free. Poor insulation between the cables results in reduced resistance.

The cable must be replaced if the connection test and insulation test indicate broken cables or defective insulation.

Insulation testing of motor cables

Test pin A	Test pin B
1	2, 3 and 4
2	1, 3 and 4
3	1, 2 and 4
4	1, 2 and 3





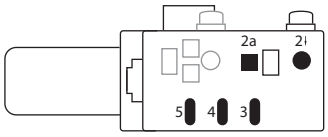
Signal cables, connection testing and insulation testing
This test is used to check whether any cable is broken and whether there is any damaged insulation which is causing the wires to come into contact with one another.

This test is carried out with a multimeter set for connection testing with a buzzer signal. The cabling does not need to be removed from the machine for this test.

Test methodically. The easiest way to proceed is to start from the rectangular connector. Place the first test pin in any terminal. Use the second test pin to test against all pins in the round contact. If the cabling is intact, there must be a connection with one of the pins, but not with any of the others. Proceed using the same method to test the other cables. Note that there are pins with no cable connections: see the wiring diagram on page 27.

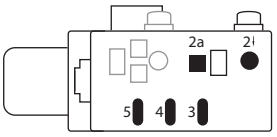
There is very little likelihood of any of the signal cables coming into contact with the motor cables due to damaged insulation, but this can be tested by also including the motor's connector in the test.

Throttle, passive



5–4: <20 kΩ
4–3: approx. 220 kΩ ± 20
2a–2↓: ∞ Ω

Throttle, active

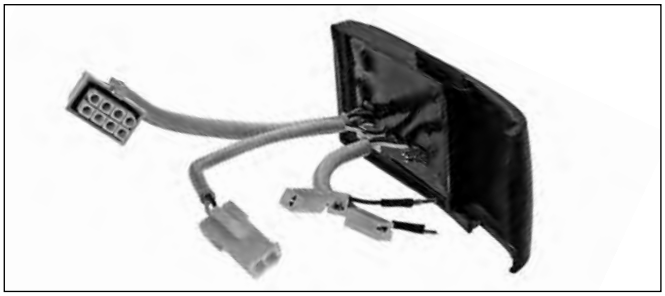


5–4: approx. 220 kΩ ± 20
4–3: approx. 0 Ω
2a–2↓: approx. 0 Ω

Switch

The cable connectors and removal of the switch from the control unit are described on Pages 26 and 27.

Switch functions can be checked using a multimeter set for resistance measurement. Check the resistance values across the terminals, numbered as illustrated, in passive and active modes. The values are typical for a functional switch.



Display card

If the HF unit and cabling are complete, the cutting machine's display must be shown. If the information “UNKNOWN UNIT” is displayed, the display unit is defective. If this is the case, replace it.

Note: even if the display shows communication between the cutting machine and the HF unit, this is not proof that the cabling between the two is fault-free.

Insulation and earth continuity testing

IMPORTANT
Legislation on insulation and earth continuity testing differs from country to country. Hence it is important to find out about applicable regulations in the country in which the service is carried out.

These **safety tests** are the last things done when the service actions have been completed and the machine has been reassembled.

Insulation testing 1,000 volts
Measure against phase pins K, A and B and earth point

Insulation testing
Measure with 1,000 volts between an earthed metallic part which can be touched and the phases (K, A and B) of the contact. There must be no current flowing between earth and the phases (max. ohm value).

Earth continuity testing
Measure against earth pin C and earth point

Earth continuity testing
Earth continuity testing shows that the machine's earthing is fault-free. Set the instrument for continuity measurement. Current must flow between an earthed metallic part which can be touched and the earth pin C of the contact (min. ohm value).

● = Service stage

The tools below can be obtained from Husqvarna:

506 38 85-02
Press tool for roller bearings

● Removal and fitting of the engagement and support rollers' bearings.

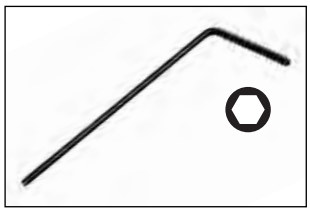
● Fitting of support rollers' sealing collar.

506 37 53-01
Press tool for the engagement roller bearing sleeves

● Removal and fitting of the engagement roller bearing sleeves.

506 37 61-02
Press tool for drive wheel bearings

● Removal and fitting of drive wheel bearings and drive shaft.

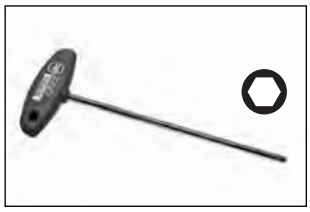


506 36 36-01
Hex key, 6 mm
(Delivered with the machine.)

● Removal/fitting of the support roller cover.

502 71 27-03
Workshop wrench, Torx T27

● Universal use.



Workshop wrench, Allen

● Universal use.

502 50 19-01 3 mm
502 50 18-01 4 mm
502 50 64-01 5 mm
504 90 00-01 6 mm

504 90 00-06
Workshop kit, mm dimensions

● Universal use.

Allen: 3, 4, 5 and 6 mm.
Socket: 8 mm

581 54 15-01
Multimeter
Make: Amprobe 37XR-A.
One of few universal instruments that can also measure inductance (H, Henry).

● Checking of the electric motor's functions.

The special tools below are needed for servicing the K7000 Ring, but are not sold by Husqvarna:

Insulation and continuity tester
Common makes: Megger, Fluke, etc.

● Checking of the motor's windings and cabling.

Tachometer
A number of optical tachometer makes are available.

● Checking of the motor's magnets.

Oetiker special pliers
Recommended tool. Sold by distributors of Oetiker hose clips.

● Fitting of Oetiker hose clips.

ARNE PALMQUIST

Husqvarna®

www.husqvarnacp.com

114 21 70-26
English
2013-09