Husqvarna®

Workshop manual

DM 230

HUSQVARNA CONSTRUCTION PRODUCTS

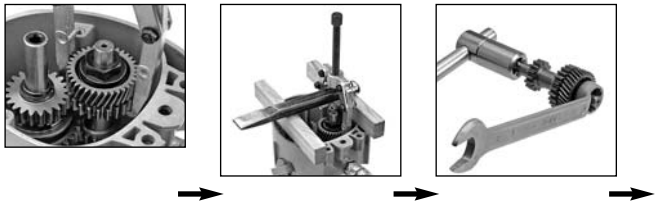
HUSQVARNA
DM 230

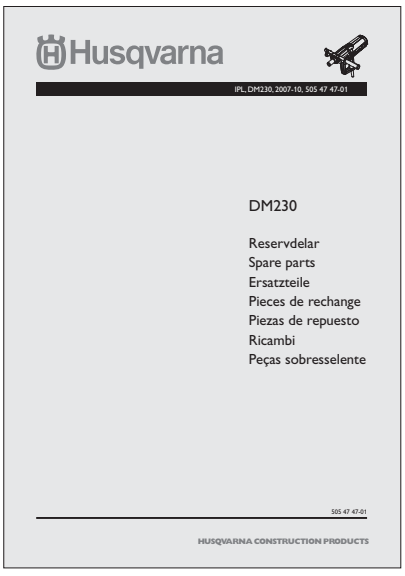
CONTENTS

115 13 18-26

"Dismantling in basic modules"

"Gear housing" (Example))





Workshop manual

The workshop manual covers virtually all work in the workshop that involves the DM 230. Some very simple and rather obvious repair work has been omitted.

Disposition

The initial section with the titles "Special function components" and "Dismantling in basic modules" shows the basic construction of the machine. This arrangement means that mechanics who have no experience of the machine must start with these chapters.

Later on, the manual describes in detail in the various chapters how the work is to be executed for the basic modules.

Arrangement – illustrations and text

In addition to graphics and illustrations, there are generally two text columns. The left-hand text column gives a brief explanation and is intended for experienced mechanics, whereas the right-hand column is a more detailed description and is intended for mechanics with less experience of repair work for this type of machine.

Contents

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

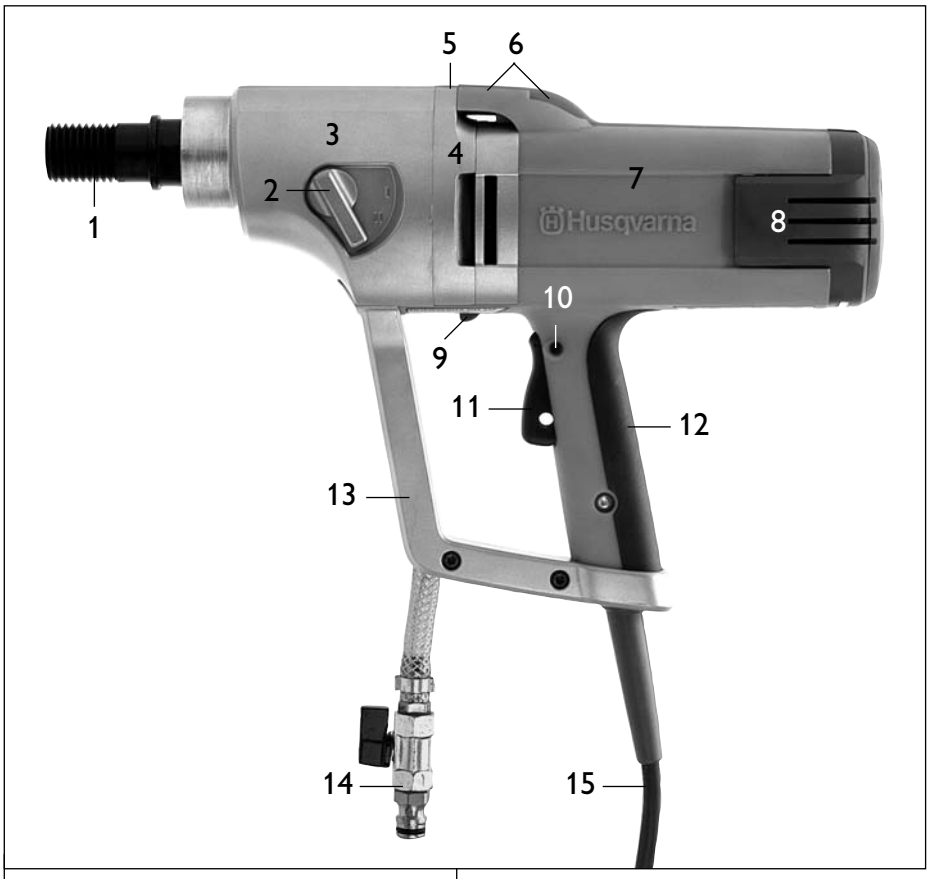
The list of contents also has page references to the start of each chapter.

Spares

Spares DM230

The folder includes all spares for Husqvarna DM230.

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



Components

1. Drill spindle
2. Gear knob
3. Gear housing
4. Gear box cover
5. Leakage duct (fault indicator)
6. Spirit level
7. Electric motor
8. Inspection cover to carbon brushes
9. SmartStart™
10. Power switch lock
11. Switch
12. Handle
13. Protecting brace and carrying handle
14. Water connector with valve
15 Mains cable
16 Earth-fault breaker

Work tip

The easiest and most convenient way of executing virtually all service work on the DM230 is with the machine in a vertical position with the drill spindle facing downwards.

Do it yourself

A fixture for securing the machine in a vice is easily made using a wood block and a pair of steel plates.

The wood block should be at an equal height to the drill spindle, about 55 mm (2-1/4 in.). Drill a hole with the diameter 1-1/4 inches, corresponding to around 32 mm, in the block.

The two steel plates secure the wood block horizontally in the vice.

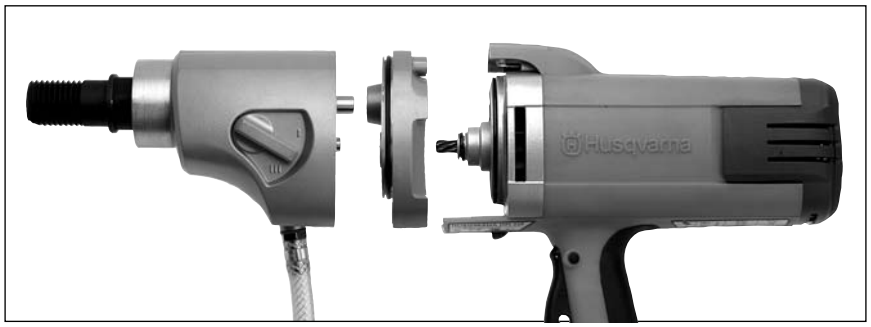
It is even easier to drill a hole in the work bench.

Warning

A workshop often has a range of electrical tools at the workplace. It is not uncommon for the wrong contact to be connected to the mains – perhaps to the very machine you are working with!

A simple way of highlighting this and preventing unintentional connections is to tape over the contact pin.

Note: A machine that has been dismantled must not be connected to the mains supply. Functional tests must not, and do not need to be made on a dismantled machine that is connected to the mains.



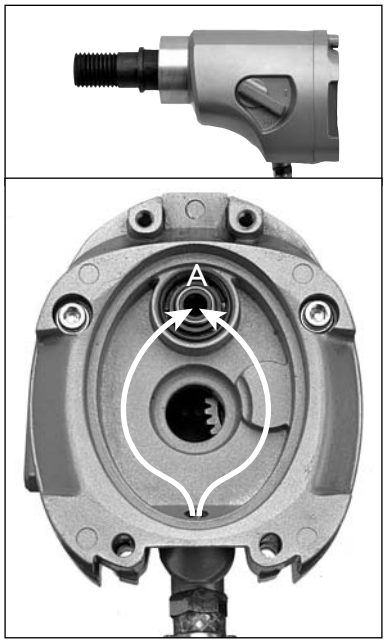
Basic modules

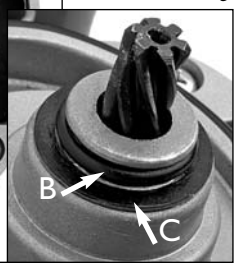
The machine can be separated into three basic modules:

1. The gear housing with three gear selection positions.

2. The gear box cover that separates the oil-filled gear housing from the opposite side where the water to the drill spindle is supplied.

3. Electric motor.





Water passage

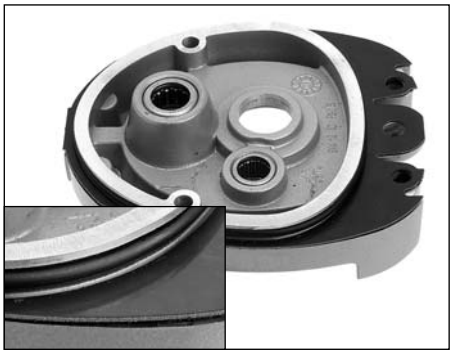
The water to the drill is directed into the gear box cover between the gear housing and the motor. The water is then directed on through the hollow spindle shaft (A) and runs out at the drill attachment.

Important – seals

The design means that the following seals must be in perfect condition:

– Double oil seals at the spindle shaft (A) and the O-ring around the gear drive (B). The gasket (C) is added to the O-ring (B) to the gear housing. If leaks were to occur from these seals, water would fill the gear housing.

– Seal D. A defective O-ring will mean external leaks.

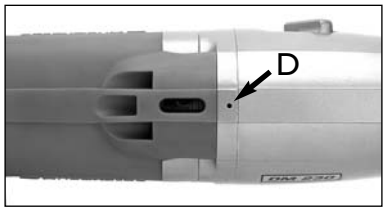


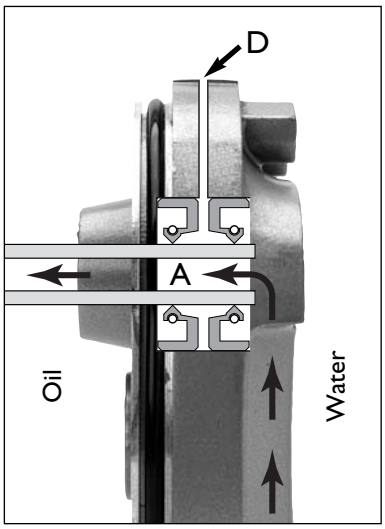
Gear box cover

The gear box cover separates the oil in the gear housing from one side and the water to the drill spindle on the other gear box cover side. Dismantle the gear box cover to access the gear housing units.

The gear box cover is also the bearing holder for the upper needle bearings of the intermediate and spindle shafts.

The seal between the gear box and the gear housing is made up of a gasket and an O-ring.





Spindle shaft seals

The spindle shaft has two seals to the gear box cover; one to the oil in the gear housing and the other to the water side. The arrows show the path of the water to the drill spindle.

The gear box cover has a channel (D) that runs between the two seals and on to the outside. Any water or oil that leaks here indicates that the seals are defective.

Replacing the seals

The easiest way of removing the spindle shaft seals is by using a counter stay device, see page 13.

When assembling, press the first seal ring fully down to the bottom. Fit the second seal so that it is level with the top edge of the seal housing. Check that the channel (D) runs out between the seals by inserting a steel wire or equivalent.

Gear housing/electric motor

Virtually all service work requires the separation of the gear housing from the electric motor.

Oil change

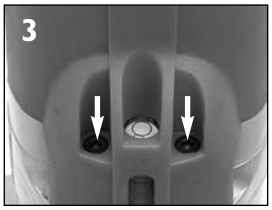
Oil changes are made through the hole in the electric motor's drive shaft in the gear box cover.

Separation

Motor/gear housing

1. Remove the 4 screws in the handle

2. Part the handle and remove one half.



3. Remove the screws next to the spirit levels.

4. Lift out the motor.

Separation

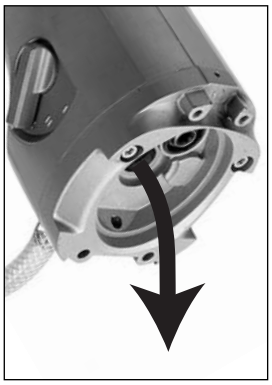
Electric motor/gear housing

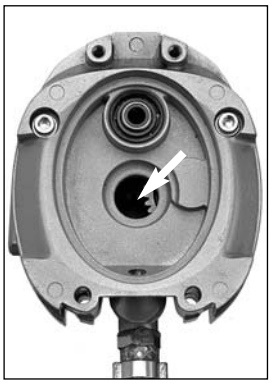
1. Remove both screws that connect the handle as well as the two screws that hold the handle to the gear housing.

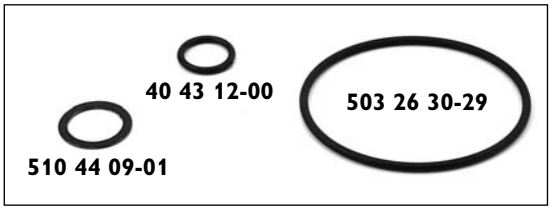
2. Part the handle and pull out the handle halves from the gear housing. Let one of the handle halves hang by the earth wires.

3. Remove the screws that keep the electric motor attached to the gear housing.

4. Lift the electric motor out of the gear housing.







Oil change in gear housing

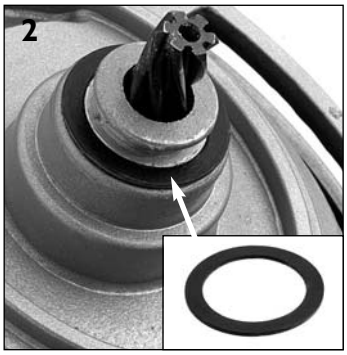
You can change the oil when the motor has been removed from the gear housing. Turn the machine vertically with the motor facing up when dismantling.

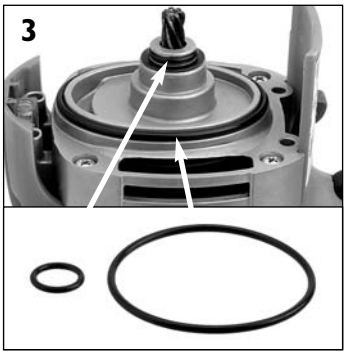
You must change the oil at 400 hour operational intervals. The oil is poured out and topped up through the hole in the motor shaft. Volume around 0.25 litre. Oil quality: Mobil Lube 1 SHC 75W90 or equivalent quality.

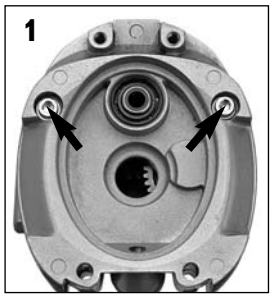
Replace seals – gasket set 515 98 07-01

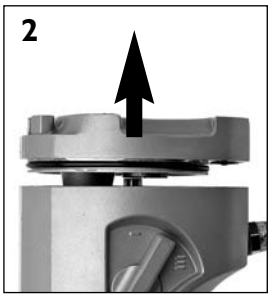
New seals must always be fitted in connection with an oil change.
The gasket set 515 98 07-01 contains the gasket and O-rings which must be replaced between the motor and the gear box cover.

1. Clean the seal surfaces carefully before fitting. **2**. Fitting the gasket. Apply grease under the gasket to keep it in place when assembling (illustration 4). **3**. Lubricate the O-rings and fit these. **4**. To avoid damaging the seals it is important the motor is precisely aligned with the gear housing when assembling. Press the motor together parallel to the gear housing and tighten the screws alternately.









Separation

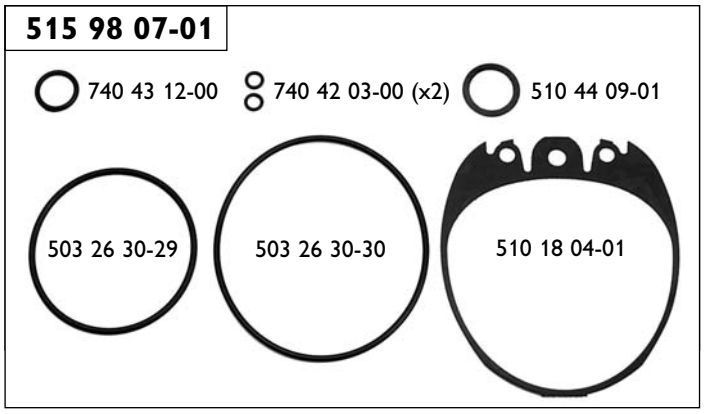
Gear box cover/gear housing
1. Remove the two screws.

2. Pull off the gear box cover.

Separation

Gear box cover/gear housing
1. Remove the two screws.

2. Pull off the gear box cover from the gear housing.



Gasket set 515 98 07-01

The gasket set contains all O-rings and gaskets between the motor/gear box cover and gear box cover/gear housing.

You must always replace the seals if the machine is separated in the places mentioned above. Never refit old seals!

Previous DM230 models may not have the gaskets 510 44 09-01 and 510 18 04-01. These have been added to provide a more secure seal and must be fitted in machines that have no gaskets.

Seals for gear box cover/gear housing
Remove the O ring and the gasket. Clean the seal contact surface.

Seals for gear box cover/gear housing
1. Remove the O ring.

2. Clean the slot for the O ring and the contact surface for the gasket. Also clean the contact surface for the gasket on the gear housing.

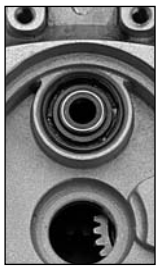
Start by fitting the gasket and then the O ring which is lubricated.

Replace and lubricate the O-rings on the screws.

3. Start by putting the gasket in place on the gear box cover.

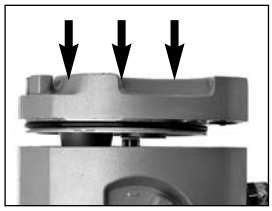
4. Fit the O ring and apply grease.

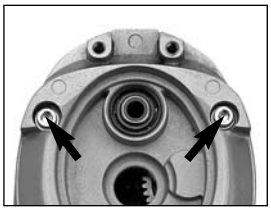
5. Replace and lubricate the O-rings on the screws.



Spindle shaft seals
The best way of removing the seals is by using a counter stay device.
Lubricate the oil seals. Fit the other seal ensuring it does not cover the leakage hole.

Spindle shaft seals
The best way of removing the spindle shaft seals is by using a counter stay device, see page 13.
Lubricate the oil seals. Note how these are to be turned. Fit the first seal at the very bottom and the second seal so that it does not cover the leakage channel. Check the position with a steel wire.





Fitting the gear box cover
Press the gear box cover down onto the gear housing. Tighten the screws alternately.

Fitting the gear box cover
Press the gear box cover in parallel and fully down onto the gear housing. Fit and tighten the screws alternately.

Function

The gear housing contains a transmission that reduces the high speed of the electric motor to a lower speed on the spindle shaft. The transmission has been constructed on two shafts: intermediate shaft (A) and spindle shaft (B).

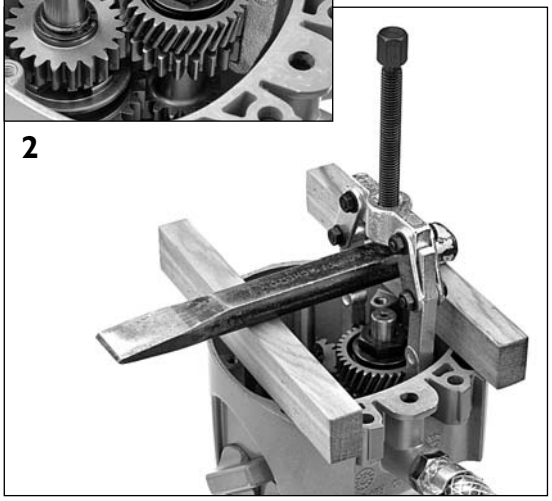
The electric motor powers the top gear wheel on the intermediate shaft. This gear wheel has a slip clutch to the intermediate shaft to protect the operator in the event of jamming.

The transmission has three gear selection positions that are controlled by the knob (C). Change gear when the motor is idle.

Service work

The work procedure dictates that the complete intermediate shaft must always be dismantled first.

However, the spindle shaft with attendant components, is dismantled into individual parts from the gear housing. Following dismantling of the components, the actual spindle shaft can be removed from the gear housing.



Dismantling – intermediate shaft

1. Position the puller under the two upper gear wheels.

2. Prepare for dismantling as per the illustration. Press the shaft up using the counter stay device.

Dismantling – intermediate shaft

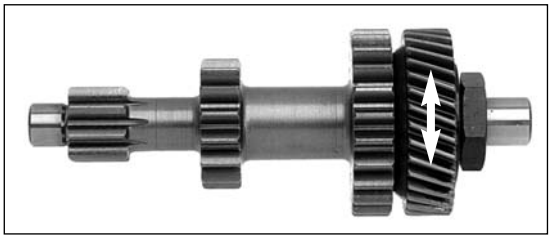
The intermediate shaft is force fitted on the ball bearing at the bottom of the gear housing.

Method

To dismantle you need a small standard puller with long handles, two spacers (wood blocks at least 15 mm high) and a bridge between them, e.g. a heavy metal object.

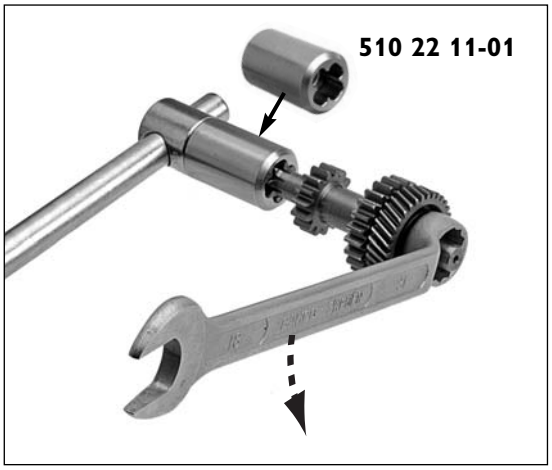
1. Position the puller under the two upper gear wheels.

2. Prepare for dismantling as per the illustration. Press the shaft up using the puller.



The helical gear has a slip clutch to the intermediate shaft.

The motor shaft powers the helical gear. There is a slip clutch between the drive and intermediate shaft.



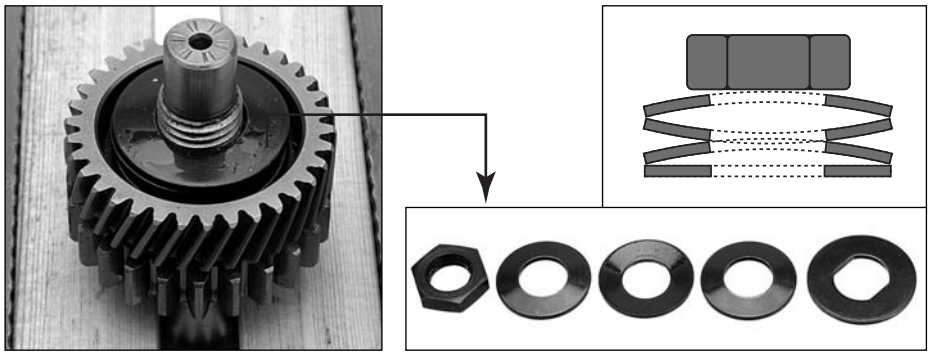
Slip clutch

Remove the nut.

Slip clutch

Use special tool 510 22 11-01 to lock the shaft.

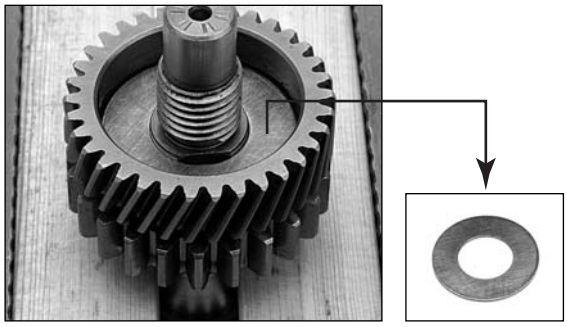
Remove the nut.



Spring washers
The spring washers provide the brake force to the slip clutch when the nut has been fitted and tightened with the correct torque.

It is particularly important for this function that the washers are correctly turned and that they are intact.

Removing spring washers
Lift up the three spring washers and the flat washer under these.

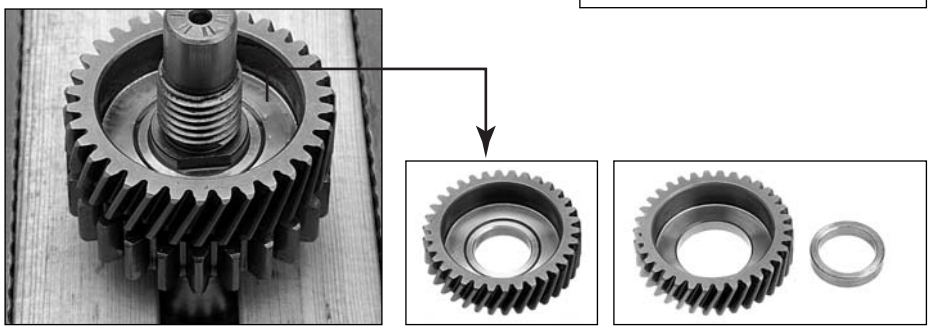


Removing friction washer
Remove the friction washer from the gear wheel.

Replace the washer if damaged or where its functionality is obviously impaired.

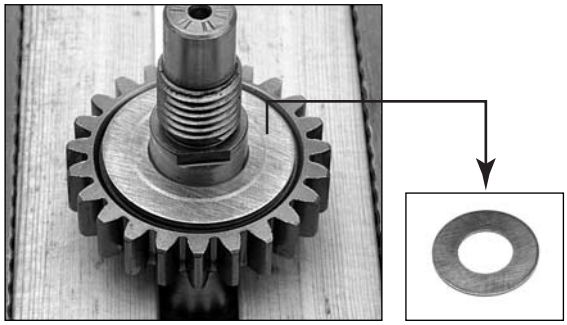
IMPORTANT
When refitting, oil the spring washers and friction washer with gearbox oil.

This is important in obtaining the correct slip torque when adjusting the slip clutch.



Lift off gear wheel
Check the condition of the gear wheel and that the centre bushing does not have too much play with the shaft.

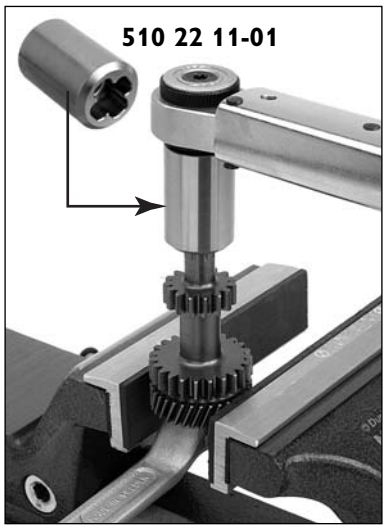
The bushing has a light force fitting to the gear wheel.

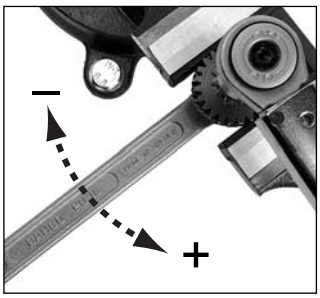


Removing friction washer
Remove the friction washer from the gear wheel.

Replace the washer if damaged or where its functionality is obviously impaired.

Rem. For practical work, lift the gear wheel up from the shaft and turn over to empty the washers.





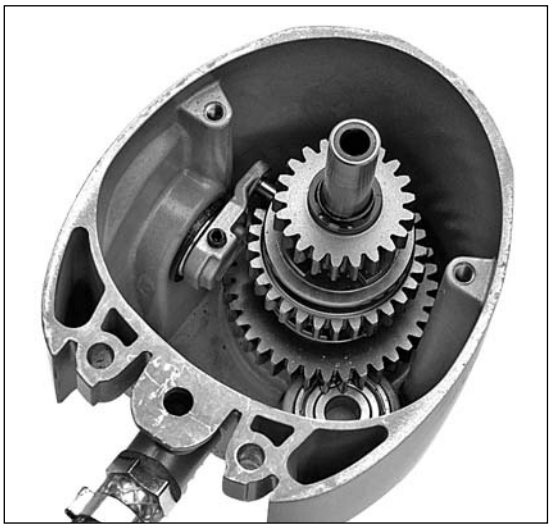
Adjusting the slip clutch

Place the intermediate shaft's helical drive in the vice with soft fibre jaws.

First tighten the nut to the mechanical stop. Then go back 45°. Now the clutch should slip at a minimum torque of 17 Nm (15 Nm or 11 lbf/ft in USA). If not, replace the spring and friction washers. These can be ordered in a complete kit. Part No. 525 40 20-01.

If the torque is higher, adjust to the correct figure.

Europe: 17 Nm
USA: 15 Nm, 11 lbf·ft



Spindle shaft

The spindle shaft is powered by the intermediate shaft which in turn is powered by the electric motor. The complete spindle shaft contains a number of moving parts, including axially moving gear wheel for gear function.

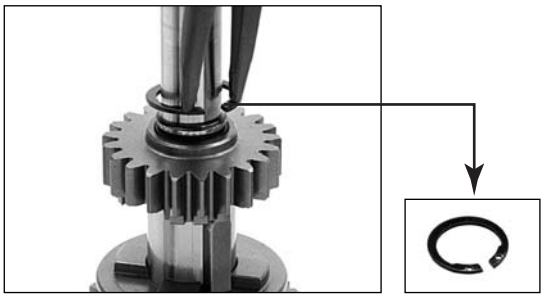
The transmission in this machine is rarely the cause of any problems. Incorrect handling of the machine could, however, cause the actual shaft to bend, or damage the tool bracket. If this is the case, all the units on the spindle shaft must be removed in order to replace the shaft itself.

Service work

The complete intermediate shaft must always be dismantled first.

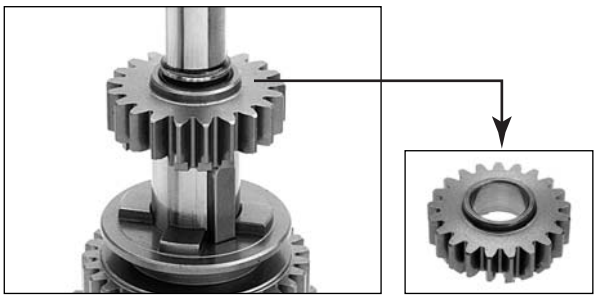
All work on the spindle shaft must be executed from the inside. Not before the shaft has been released from the surrounding components can the spindle shaft be removed from the gear housing.

Remark – illustrations: most illustrations in this chapter are, for the sake of clarity, photographed with a dismantled shaft.

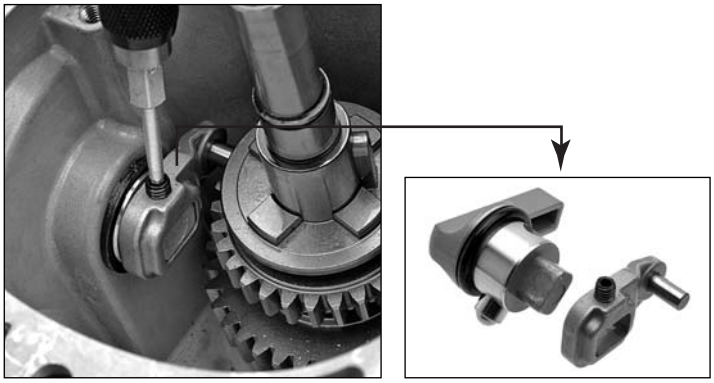


Dismantling the spindle shaft

Remove the circlip.



Lift off the gear wheel.

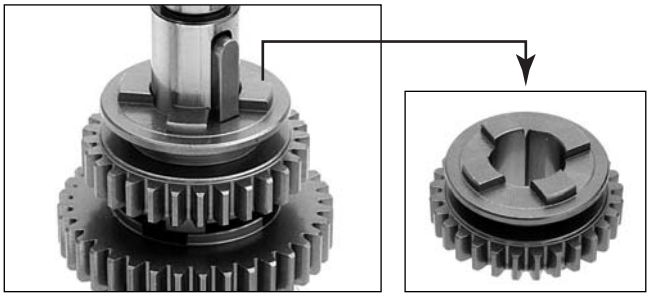


Dismantle the gear knob in the following way: Loosen the lock screw. Press the gear knob out of the housing. Remove the gear selector

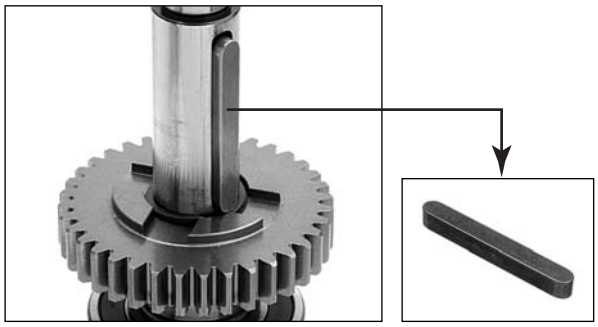
IMPORTANT – thread locking

When refitting, apply thread locking agent Loctite 243 to the threads on the lock screw.

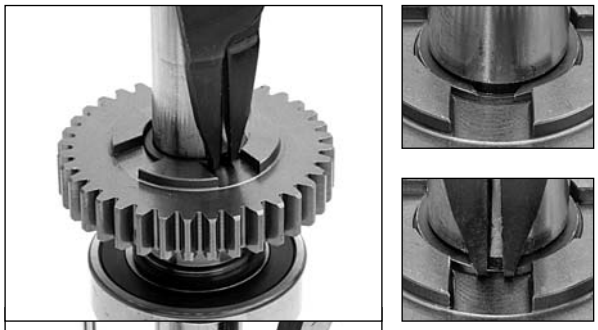
Lubricate the O ring.



Lift off the gear wheel.



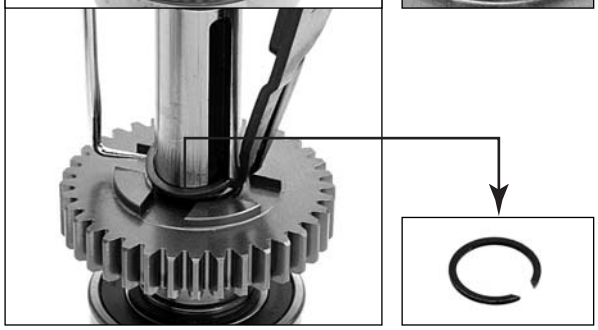
Remove the wedge.



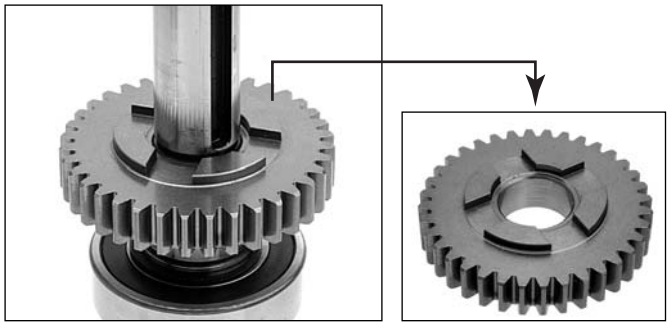
Milbar/Imperial
IR-15R

In order to remove the lock ring, you need small lock ring pliers of make: Milbar/Imperial IR-15R or equivalent.

Start by turning the lock ring to ensure the opening is accessible by pliers in the gear wheel.

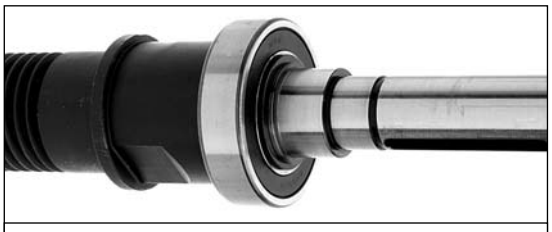


Expand the lock ring using the pliers and lift the ring up slightly. Lift the opposite side of the ring with a hook. Lift the lock ring off the shaft.



Lift off the gear wheel.

The gear housing after the removal of the intermediate shaft and spindle shaft components.



Bearings

The lower bearing of the spindle shaft is forced fitted to the gear housing and on the shaft. Circlips on the shaft secure the position.

It is easiest and best to replace the bearing using a hydraulic press. If this is unavailable, you can remove and fit with a low force fit by utilising differences in temperature.

Important
Be careful not to scratch the shaft where the seals make contact, immediately above the bearing and the shaft end by the gear box cover.

Bearing replacement – spindle bearings

Removing outer circlip

Bearing replacement – spindle bearings

Removing outer circlip
Remove the circlip using circlip pliers.

Pull out the spindle shaft
The adjoining arrangement is an excellent way of pulling the spindle shaft out together with the bearing.

Pull out the spindle shaft
The adjoining arrangement is an excellent way of pulling the spindle shaft out together with the bearing.

Attach the gear housing in the vice using soft jaws and a little pressure. Tape on a flat steel bar, e.g. a cold chisel on the opposite side. Put the puller claws at the spindle shaft's wrench flat and pull out the shaft with the puller.

Removing inner circlip

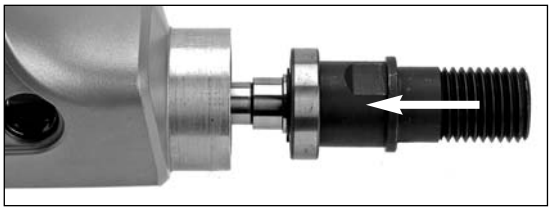
Removing inner circlip
Remove the ball bearing's inner circlip.

Pull the shaft out of the bearing
Using the adjoining solution, the bearing can be removed without the risk of damaging the shaft. Use smooth jaws in the vice and attach the shaft using light pressure ensuring it can slide along the jaws. Pull the shaft out of the bearing.

Reassembly
If the bearing is forced in place there is a major risk of damage to the shaft next to the bearing – see above "Important". We recommend the following method: Heat the ball bearing to around 100 °C.

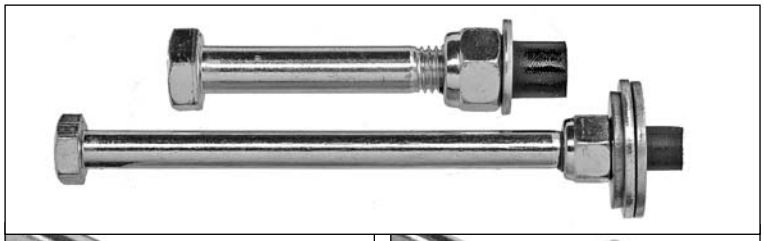
If possible cool the shaft in a cold store or with cooling spray prior to assembly. The bearing can then be pushed in place without using force.
Fit inner circlip.

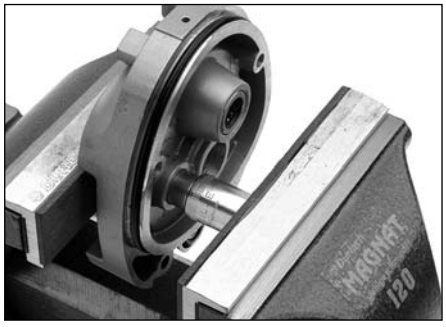
Oil seal
The oil seal is removed and fitted from the outside of the gear housing. A 34 mm socket is usually suitable as a tool. Lubricate the oil seal when assembling and knock it in level with the inside of the gear housing.

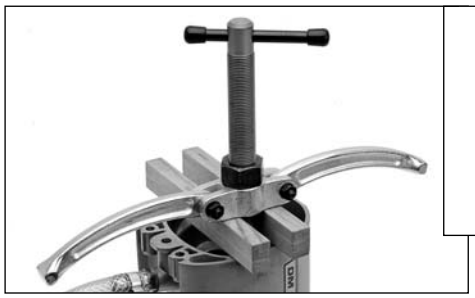


Fitting the spindle shaft
The spindle shaft can normally be fitted to the gear housing without force if the shaft has been cooled and the bearing seat in the gear housing has been heated.

Fitting the spindle shaft
Cool the ball bearing using cooling spray or place the shaft in a cold store. Heat the bearing seat on the gear housing to around 100 °C. The spindle shaft can then normally be fitted in the gear







Tools

Dismantling

The following tools are required for dismantling the gear housing's bearing:

1. Internal bearing extractor to grip behind the bearings.

2. Use a counter stay device where there is a dolly.

3. A slide hammer is an alternative to the counter stay device if there is no dolly available.

Fitting

As these bearings are seldom replaced, no assembly device has been produced. A suitable assembly tool can be very easily produced using a screw of an appropriate length, nut, washer and tape. Tape the threads ensuring the bearings are held in place.

1. Turn the needle bearings with the text side facing the washer. Press or knock down the bearings in place in the gear box cover.

2. It is important that the washers have a sufficiently large diameter to support the outer ring of the ball bearing during assembly. Press or knock down the bearing in place in the gear housing.

Bearing replacement

Dismantling needle bearings

The gear box cover's two needle bearings are removed as per the method shown in the illustration. Apply the counter stay either under the bearing or against the bottom edge of the bearing's needles.

Fitting needle bearings

Fit the needle bearings with the text side upwards. The opposite side is rounded in order to facilitate assembly. Press the bearing down so that it is level with the top edge of the bearing housing.

The easiest way of fitting the needle bearings in the gear box cover is by using a vice and a suitable socket. Alternatively you can knock the bearing in place using the tool mentioned above.

Dismantling ball bearings

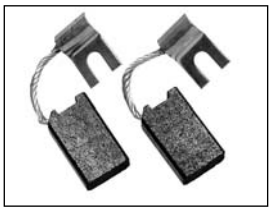
The gear housing's bearing for the intermediate shaft is removed using the same counter stay tool device used for the needle bearings.

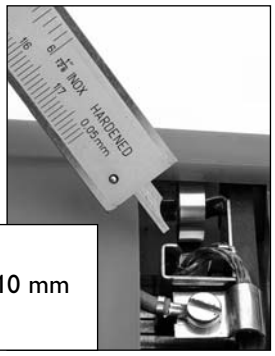
There is no level support surface for the counter stay device in the gear housing. The adjoining arrangement gives the device a level support surface. Alternatively you can use a slide hammer.

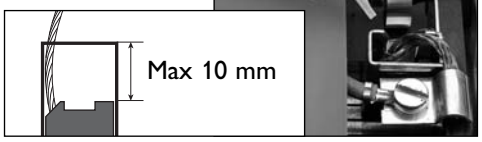
Fitting ball bearings

Start by fitting the bearing in the gear housing.

You should fit the intermediate shaft if possible by pressing. If you knock instead, you must be careful not to damage the bearing. Heat the bearing to around 100 °C and cool the end of the shaft using cooling spray. Knock in the shaft using a plastic hammer.





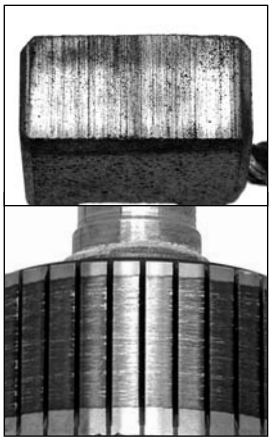


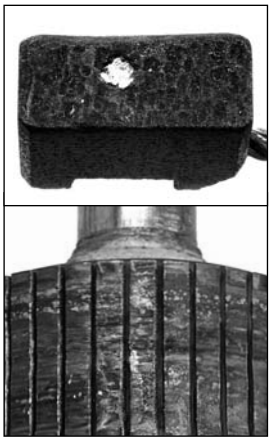
Replacing the carbon brushes

The two carbon brushes transfer electric current to the motor's rotor. A cable from the stator is connected to the screw in the holder. The carbon brush cable is connected to the same screw.

The carbon brushes are wear parts that must be checked regularly. Every week if the machine is used on a daily basis.

You should replace the carbon brushes when around half is left. You can easily measure this using a slide gauge without removing the brushes. Replace the carbon brushes when the distance from the brush holder to the top level of the brush exceeds 10 mm (.4 inch).





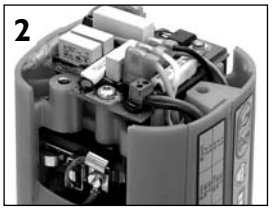
Worn carbon brushes – checking

The importance of replacing the brushes in good time is demonstrated by the adjoining illustrations.

The illustrations to the left show a brush that is worn but still operable. Both brushes and the collector have minor scratches in the direction of rotation which is entirely normal.

The illustrations to the right show the results when the brush is so worn that the spring, which presses the collector down, has reached its end position and no longer gives the brush the correct pressure to the collector. Sparking occurs which damages both brushes and, even worse, the collector in a very short time.

Pay careful attention to sparking near the collector
If the brushes are not worn, sparking could be due to the brushes being unable to move in their holders as a result of, for example, dirt.



Replacing the carbon brushes

1. Remove the screws

2. Lift off the cover.

3. Loosen the screw one turn.

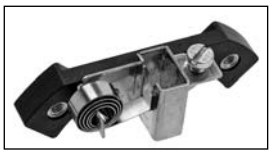
4. Pull out the cable lug

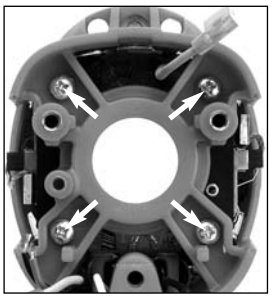
5. Lift the spring and pull out the carbon brush.

6. Let the spring rest in the holder and clean it.

Carbon brush holder

Remove the carbon brushes. Remove the circuit board screw and fold this to the side. The screws are now accessible.





Replacing the carbon brushes

1. Remove the inspection cover's three screws.

2. Lift off the cover.

3. Loosen the screw and screw it in one turn. Let the screw remain in place.

4. Pull out the cable lug from the screw.

5. Lift the spring with a hook that is turned as shown in the illustration to avoid any risk of the spring sliding outside the carbon brush holder. Lift off the carbon brush.

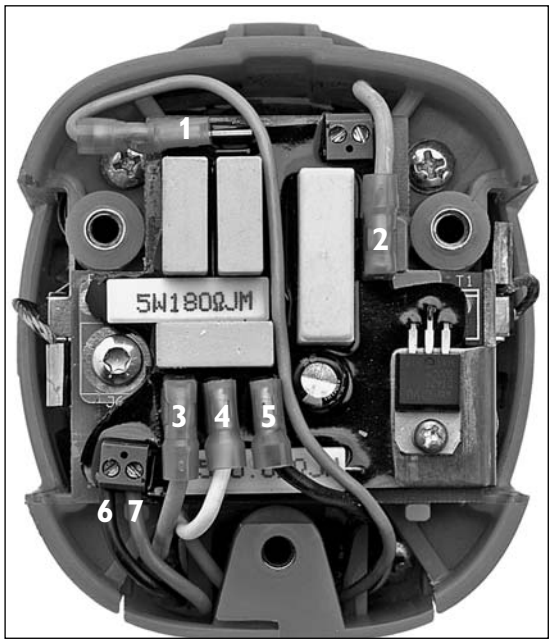
6. Let the spring rest in the holder and clean off any carbon particles and dirt.

Carbon brush holder

You do not need to remove the rotor to replace the carbon brush holder.

Remove the carbon brushes. Remove the screw to the circuit board and fold this to the side enabling access to the screws (arrows) to the holders.

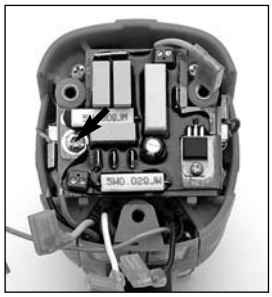
Note that the cable lug to the carbon brush must be closest to the holder and the cable to the stator on top.



Circuit board

The circuit board at the rear of the motor controls the motor's functions. Ensure the cable runs and connections are correct when reassembling:

1. Green cable – connects to earth point in the handle.
2. Grey cable – connects to stator winding.
3. Grey cable – connects to stator winding.
4. White cable – connects to switch in handle, point D below.
5. Black cable – connects to switch in handle, point C below.
6. Black cable – connects to Smartstart switch, position 9, page 4.
7. Red cable – connects to Smartstart switch, position 9, page 4.



Dismantling

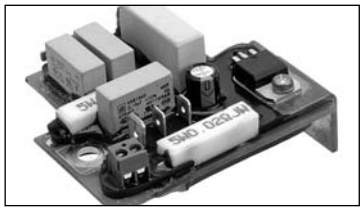
Loosen the cable connections 1–7.

Remove the screw, marked with an arrow.

Dismantling

Lift off the cable connections 1–5 and unscrew the cables 6 and 7 with a small screwdriver.

Remove the screw marked with an arrow. You can now remove the circuit board.

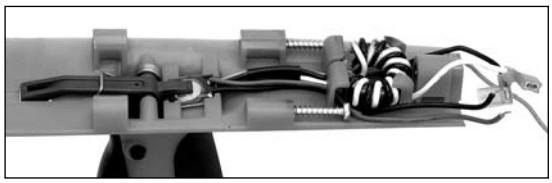


Functional test

Measurement to identify whether the circuit board is intact requires specialist knowledge and test equipment. The process of elimination is used rather than troubleshooting. If the rotor and stator have been found to be in working order, you can assume that the circuit board is defective.

Smartstart™

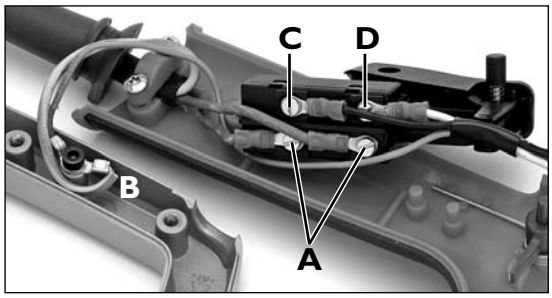
The switch completes the circuit each time the Smartstart button is pressed. The impulse is transferred on to the circuit board which switches the motor between full and half power.



Functional test

Ohm measurement is an easy way of checking that the switch short circuits when the Smartstart button is pressed. The machine does not need to be dismantled to run this check. Only remove the inspection cover and measure between 6 and 7, as per the illustration at the top, without disconnecting the cables.

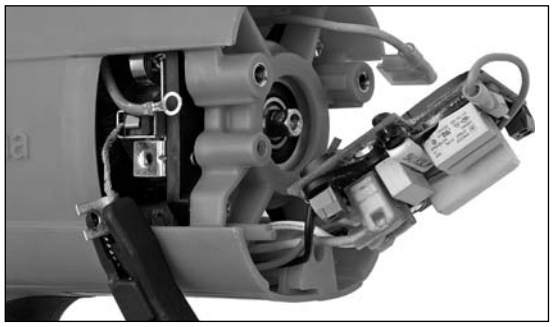
For replacement of components in the handle, start by dismantling the handle from the motor body. Insert a long screwdriver and loosen both screws. Now dismantle the handle.

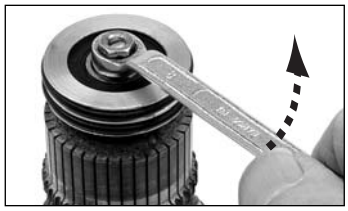


Switch/mains cable

Remove the screw that joins the two handle halves.

Note the connections if the switch or mains cable must be replaced:
A: Mains supply
B: Protective earth yellow/green cable. An additional cable (green) is connected here
C: Black cable
D: White cable





Functional test

Preparations
Remove the inspection cover to the carbon brushes. Remove the screw to the circuit board and fold this to the side to enable you to rotate the motor with a screwdriver.

Remove the screws for the cable attachment to the carbon brushes. Put the cable connections to the stator to one side ensuring these have no contact.

Connect a measuring cable to each carbon brush and connect to the measuring instrument. The carbon brushes must be in good condition to make a good contact to the collector.

Test cables
Use short test cables and lay these close to each other: the easiest way is to twist them. Cables run in a coiled way give incorrect readings.

Inductance measurement – Henry (H)
Inductance measurement is applied to check the condition of the rotor. The dimension is “Henry”, abbreviated H (1H = 1000 mH). Resistance measurement (ohm) produces no usable results.

Testing
Set the measuring instrument to measure mH. Turn the rotor shaft slowly once ensuring you obtain the measured values for each winding of the rotor.

Measured values
A typical measured value for a whole rotor is around 12 mH. If any position during the turn shows the values to be below 9 mH this indicates short-circuit in the winding.

Bearing replacement

Lock the carbon brushes as shown in the illustration.

Dismantle the gear box cover.

Warning!
You must not dismantle the rotor by knocking the magnet in the middle of the shaft!

Select a socket that fits the outer ring and knock out the rotor.

Bearing replacement

You do not need to remove the carbon brushes. Lift up the carbon brushes as shown in the illustration and lock the carbon brushes with the spring lying to the side.

Remove the four screws to the gear box cover.

Warning!
The hexagonal magnet in the middle of the shafts is the sensor for the motor's speed control. You must not dismantle the rotor by knocking the magnet.

Select a socket that fits the outer ring and carefully knock out the rotor together with the bearing from the motor housing.

Bearings and bearing holder
The ball bearing has a light force fitting to the bearing holder. This has two O-rings that attach the bearing seat in the motor housing.

Refitting is facilitated by lubricating the O-rings.

Collector side – bearing replacement
First remove the sensor. It has a screw thread.

Collector side – bearing replacement
First remove the magnetic sensor in the middle of the shaft. It has a screw thread. Grip the rotor and remove the sensor.

Dismantle the bearing holder and bearing.

Check that the O-rings are intact.

Dismantle the bearing holder and bearing individually or together.

Check that the O-rings are intact. Replace these where necessary.

Reassembly
Start by fitting the bearing in the bearing holder.

Fit the bearing unit on the rotor shaft. Use a tool that presses against the inner ring, such as a 12 mm socket.

Lubricate the O-rings and fit the rotor in the motor housing. Reassemble the other parts.

Reassembly
Start by fitting the bearing in the bearing holder. Select a tool that covers the outer ball race e.g. Husqvarna 502 50 82-01 (intended for the oil seals in power cutters).

Fit the bearing unit on the rotor shaft. In order to avoid damage to the bearing, use a tool that presses against the inner ring, such as a 12 mm socket.

Remember to refit the speed sensor. Lubricate the O-rings and fit the rotor in the motor housing. Reassemble the other parts.

!

Gear box cover side – bearing replacement
Press the rotor shaft out of the bearing.

Remove the circlip and spring washer under this.

Gear box cover side – bearing replacement
Press the rotor shaft out of the bearing using a counter stay device. Attach the claws of the counter stay device where the casting is thickest.

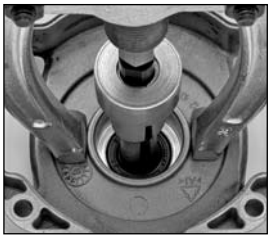
Remove the circlip and the wave shaped spring washer under this.

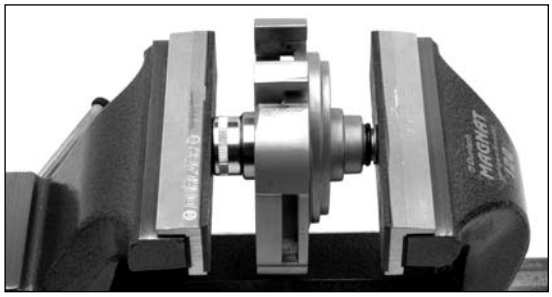
Remove the bearing with a counter stay device.

Remove the oil seal.

Use a counter stay device to pull out the ball bearings. (Page. 13 explains how to use the counter stay device.)

Also replace the oil seal under the ball bearing. Use a counter stay device to remove the seal.

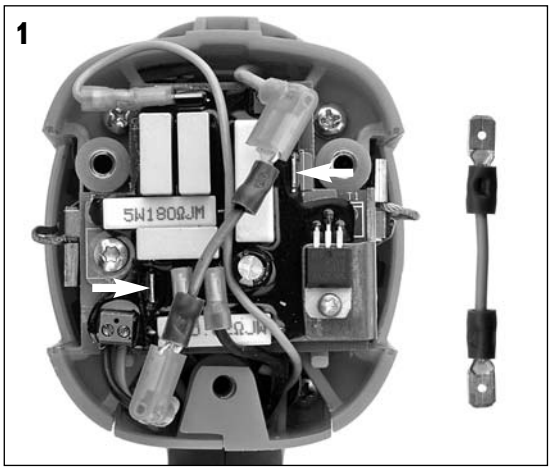


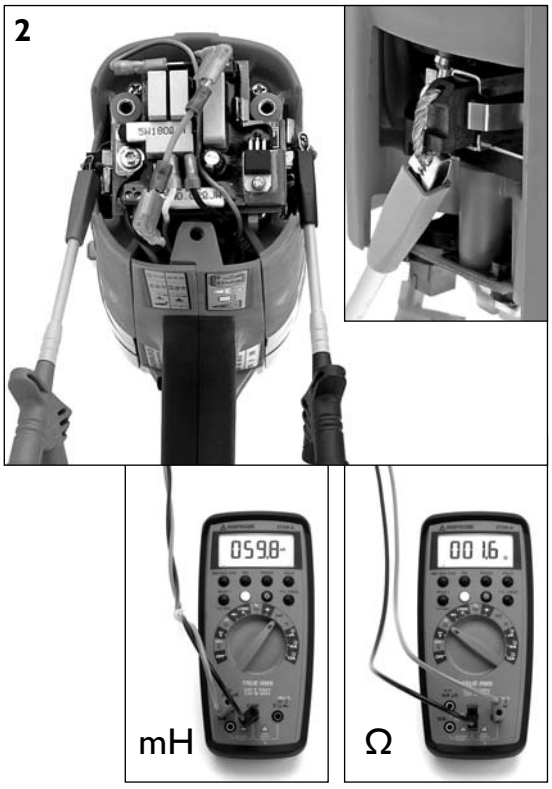


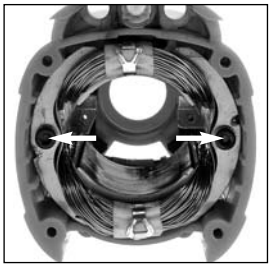
Reassembly
Press in the new bearing with support on the outer ring. Fit the spring washer on the circlip.

Fitting the rotor shaft in the bearing is difficult without a pressing tool. When fitting, press forces will arise between the outer and inner rings, which means that assembly by knocking in must be avoided.

If a pressing tool is unavailable, a makeshift solution would be to heat the bearing to around 100 °C and cool the rotor shaft with cooling spray. With a few careful knocks with a heavy rubber or plastic hammer, you can install the shaft in place in the bearing.







Functional test

Breaks in the stator winding are easily identified by carrying out the functional test described below. In general, short-circuited windings can also be identified, particularly if the short circuit excludes current in several winding turns. If the short circuit only excludes a few turns, the measurement is unlikely to record this. A fault like this has hardly any noticeable effect on the performance of the motor either.

Resistance measurement – Ohm (Ω)

Resistance measurement provides an unequivocal answer as to whether the stator winding is broken. However, the method gives unclear indications for short-circuited winding turns.

Inductance measurement – Henry (H)

The dimension is "Henry", abbreviated H (1H = 1000 mH). Inductance measurement is best applied to both identify breaks in the stator winding or short-circuited winding turns.

Preparations, illustration 1

Remove the inspection cover to the carbon brushes.

The stator winding is divided at the circuit board and connected in the following way: Disconnect the contacts to the stator, i.e. contacts 2 and 3 as shown on page 15. Connect the contacts using a cable fitted with flat pin contacts.

Test cables – inductance measurement

Use short test cables and lay these close to each other: the easiest way is to twist them. Cables run in a coiled way give incorrect readings.

Testing – inductance measurement, illustration 2

You do not need to remove the carbon brushes. Lift these up and lock with the spring. Connect the test pins to the cables on the carbon brushes.

Measured values

Typical measured values for a complete stator is around 60 mH. Typical value for resistance measurement is around 1.6 ohm.

If the stator winding is broken you get the value 0 mH. Resistance measurement gives a maximum, or immeasurable ohm figure.

Short-circuited winding turns reduce the inductance value. If the value falls below 45 mH, the stator is unusable.

A dismantled stator measured without enclosed rotor produces around 9 mH. If the value falls below 6 mH, the stator is defective.

IMPORTANT! When measuring inductance it is particularly important that no large iron or steel objects are present in the immediate vicinity. If, for example, the stator is placed on a steel covered work bench, you will get unusable measured values.

Dismantling

Remove the carbon brushes and the screws to the cable lugs.

Remove both stator screws.

Pull the stator out of the motor housing.

Dismantling

Remove the carbon brushes and the screws to the cable lugs.

Remove the two screws that hold the stator in the motor housing.

Pull the stator out of the motor housing by hand.

Reassembly

The round cable lugs are the connections at the carbon brushes. The flat pin contacts are connected to the circuit board, position 2 and 3 on page 15.

● = Service operation

The tools listed below are available from Husqvarna.

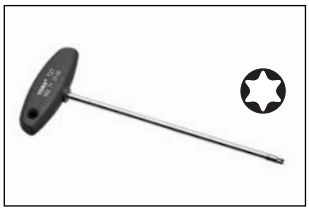
510 22 11-01
Special socket

● Tool Necessary for adjusting the intermediate shaft's slip clutch. 1/2 inch socket wrench attachment.

Workshop wrench, Hex

● 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



502 71 27-02
Workshop wrench, Torx T27

● Universal use.

504 90 00-06
Workshop set, mm-dimensions

● Universal use.

Hex: 3, 4, 5 and 6 mm
Socket: 8 mm

504 90 90-02
Universal puller

● Bearing dismantling.

The special tools below are needed for service work to DM 230 but are not sold by Husqvarna.

Lock ring pliers
Make: Milbar/Imperial IR-15R.
Pliers for small lock rings without eyes.

● Dismantling and fitting of the spindle shaft's lock ring.

Counter stay device
There are a number of manufacturers, e.g.: Kukko (Germany), Snap-On (USA).

● Dismantling of ball bearings and needle bearings in gear housing and gear box cover.

● Removal of oil seals (radial seals).

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

● Check of electric motor's functions.

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