Husqvarna®

Workshop manual

DM 220

HUSQVARNA CONSTRUCTION PRODUCTS

HUSQVARNA
DM 220

CONTENTS

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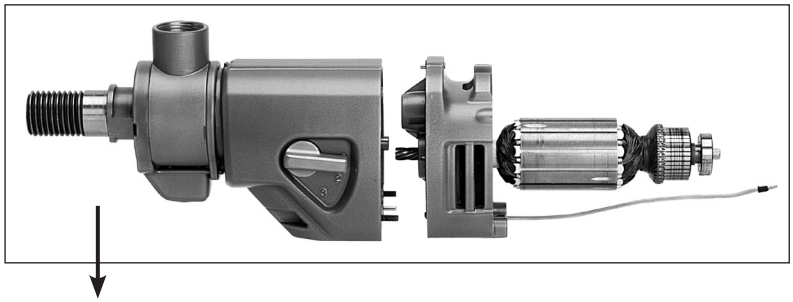
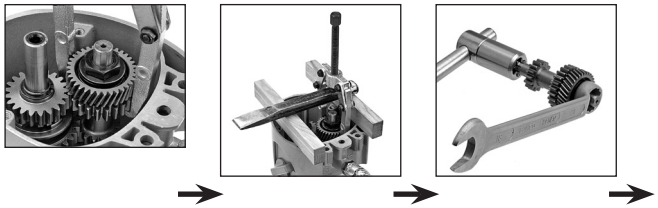
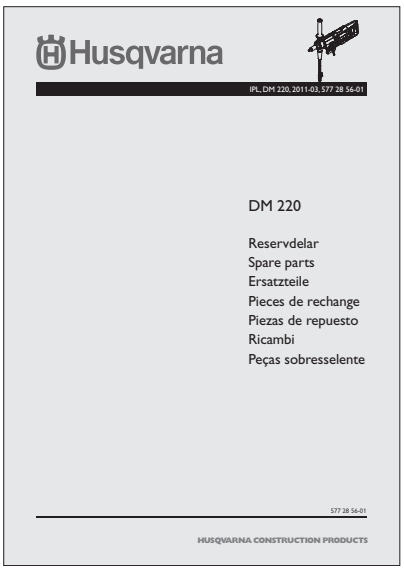
"Dismantling in basic modules"



"Gear housing" (Example)





Workshop manual

This workshop manual covers virtually all work in the workshop that involves the DM220. Some very simple and rather obvious repair work has been omitted.

Disposition

Introductory sections entitled "Water/dust unit" and "Dismantling in basic modules" show the basic structure 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 sometimes 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.

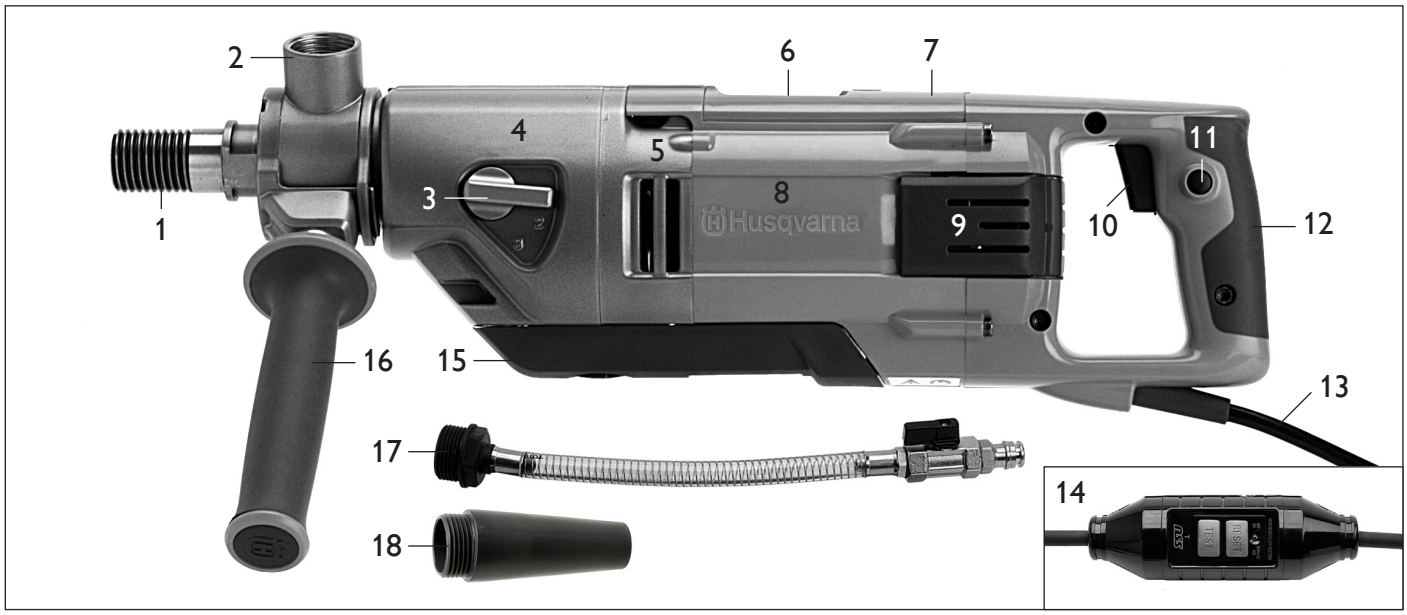
The list of contents also has page references to the start of each chapter.

Spares

Spares DM 220

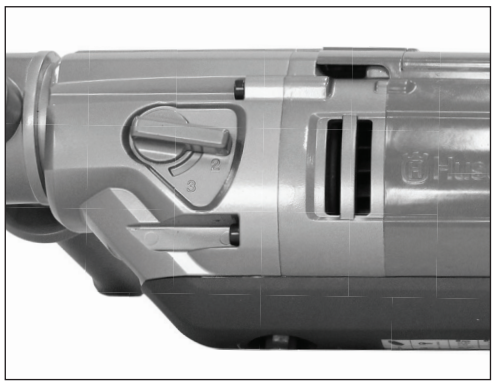
The folder includes all spares for Husqvarna DM220.

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. Water connection/dust extraction
3. Gear knob
4. Gear housing
5. Gear box cover
6. Electronic spirit level
7. Power indicator
8. Electric motor
9. Inspection cover for carbon brushes
10. Circuit breaker
11. Circuit breaker lock
12. Rear handle
13. Mains cable
14. Earth fault breaker
15. Stand mount and oil plug under the cover
16. Front handle
17. Water hose (connects at 2)
18. Sleeve for dust extractor (connects at 2)



Two different types

DM 220 has been updated and the later building has the gearbox bolted from the front for easier access.
The two different types will be called:

Type A
Type B

Two procedures differ between the types

- Dismantling of gear housing/gear box cover
- Adjusting the slip clutch

The difference between the types can be seen on the gear housing. On type B, the screws attaching the Gear housing to the Gear box cover are visible.

Work tip

The easiest and most convenient way of executing virtually all service work on the DM220 is with the machine in a vertical position with the drill spindle facing downwards.

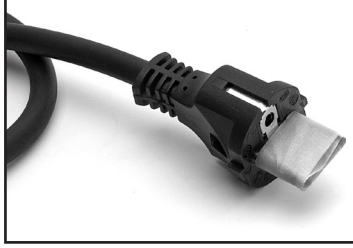
Do it yourself

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. Drill a hole with a diameter of 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.

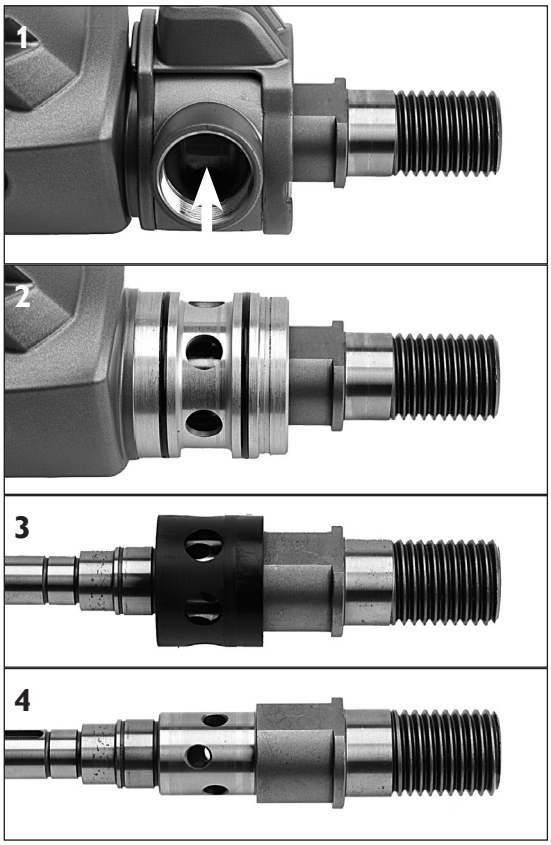


Warning

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.



Function

Water supply or dust extraction

Drilling with the DM220 can be performed either with water cooling or dry with dust extraction.

Construction

1. For connecting, you either use the water hose or the sleeve for dust extractor. The casing is rotatable with the front handle. The casing is held in place by a plastic ring in the casing's outer ring that locks the unit.

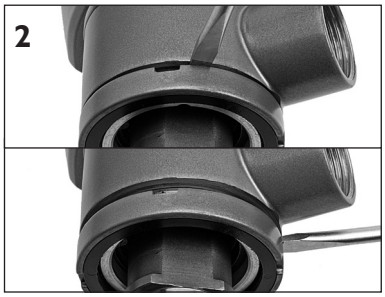
2. Two O-ring seals between the casing and the gear housing.

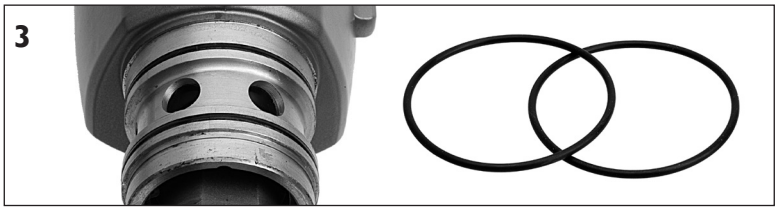
3. The seal between the rotating spindle shaft and gear housing consists of a cylinder which has radial seals at both ends. The cylinder is locked against rotation to the gear housing.

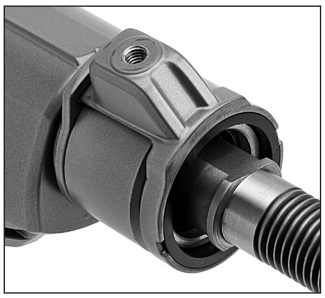
4. The holes in the drilling spindle lead out to the drill attachment.

Service

The casing seals, consisting of two O-rings, can be replaced from the outside of the machine. To replace the cylinder (3), that seals between the spindle shaft and gear housing, you must first remove the spindle shaft from the gear housing.







Replacing the seals

Remove the casing

1. The outer ring has a break slot for dismantling. Break up the ring a little with a screwdriver.

2. Continue to break up the ring all around until it releases its grip. Pull off the outer ring, the casing and the inner ring.

Replace O-rings

3. Remove the O-rings and clean. Lubricate the new O-rings and fit these.

Replace the plastic retaining ring

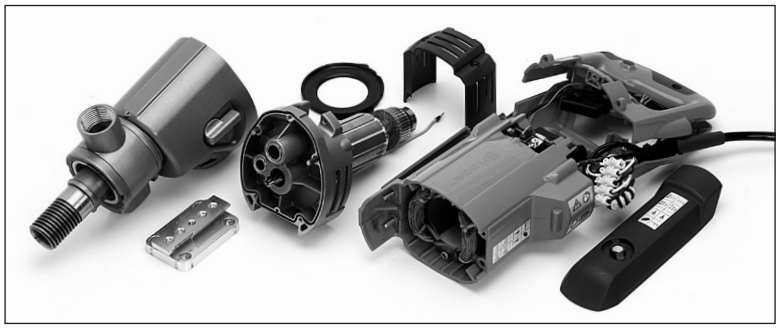
Always replace with new plastic rings once it has been dismantled. The outer ring has a break slot for removing the plastic ring.

Press the new plastic ring in the outer ring. Lubricate the inside of the plastic ring.

Fit the casing

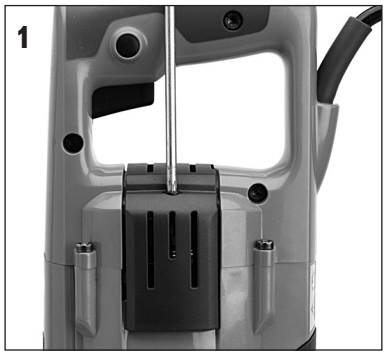
Assemble the inner ring, casing, and fit the outer ring dog to the inner ring.

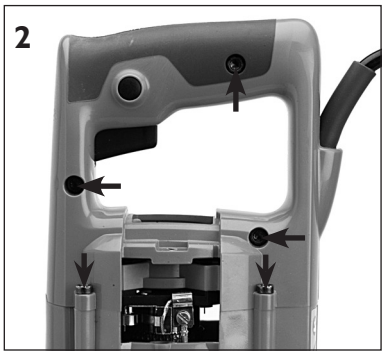
Fit the outer ring by tapping around the outside, then insert this in to its locking groove in the gear housing.



Gear housing/electric motor

Virtually all service work requires the separation of the gear housing from the electric motor. The process of dismantling the machine in to its basic components is described in this chapter.





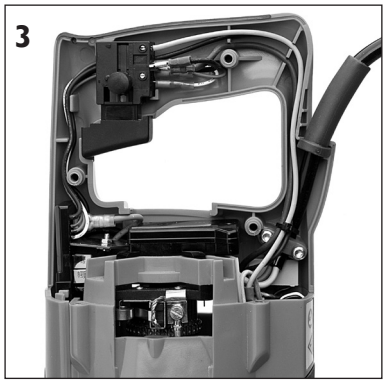
Separation

Gear housing/motor housing

The handle halves must be removed so that the screws that hold the electric motor to the gear housing can be accessed.

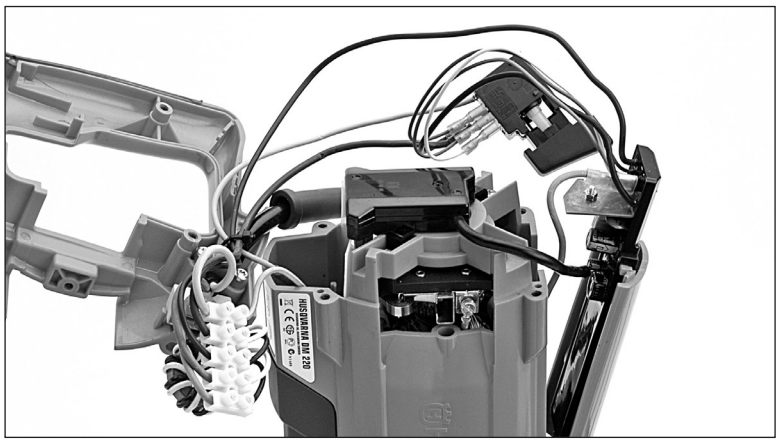
1. Remove the two screws holding the inspection cover for the carbon brushes. Remove the cover.

2. Remove the three screws connecting the handle halves and the two screws that hold the handle half to the motor.

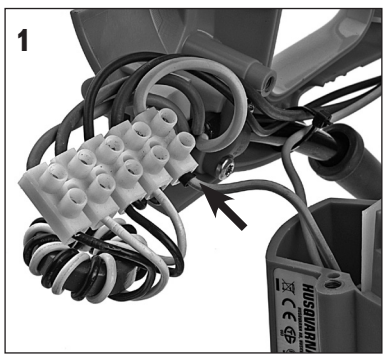


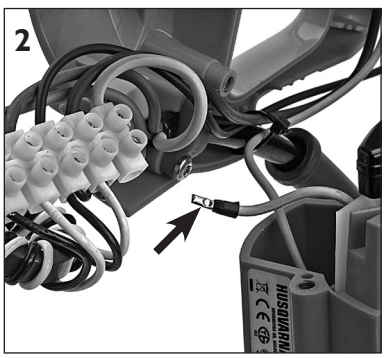
3. Lift off the handle half.

4. Turn the machine and remove the two screws that hold the other handle half.



Pull the connector for the power cables out of its compartment. An earth wire runs from the gear housing, under the stator, to the connector.

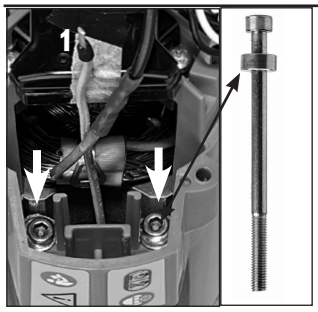


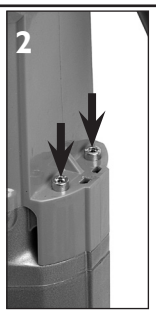


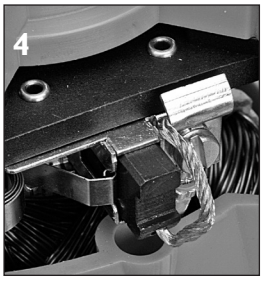
1. Locate the yellow/green earth wire that runs under the stator.

2. Remove the earth wire from the connector.

4 DISMANTLING BASIC MODULES







Four screws connect the electric motor to the gear housing.

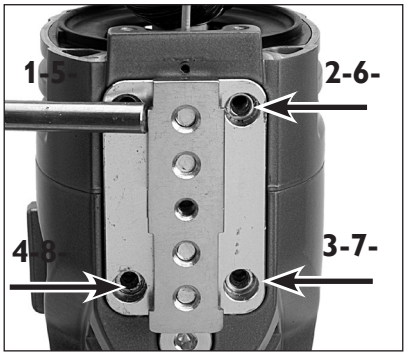
1. Remove the two screws at the location of the connector for the cables.

2. Remove the two screws on the opposite side, under the position of the circuit board.

3. Remove the cover for the stand mount.

4. Pull out the carbon brushes and lock them with the spring to the side of the carbon brush.

5. Lift off the electric motor housing. Note the earth wire in the gear housing.
If you need to use a puller to press the bearing from its seat, you must first remove the magnetic sensor at the centre of the shaft.



Gear housing/gear box cover

Remove the stand mount. It sits with a press fit in the gear housing and gear box cover.
Use a brass mandrel and angle this as shown in the figure to the left. Knock with a small metal hammer alternately on both sides so that the stand mount gradually lifts equally on both sides.

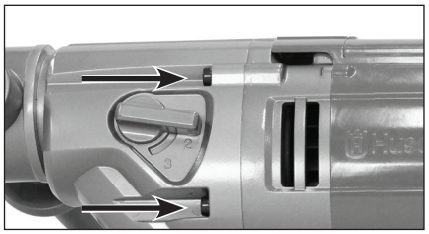
Lift off the air line for the fan. Store this in conjunction with the rotor as it can easily be overlooked when re-assembling.

Drain the oil

Remove the drain plug and drain the gearbox oil. (**Refilling**: Volume 0.25 litre. Oil quality: Mobil Lube 1 SHC 75W-90, Shell Spirax ASX 75W-90 or equivalent quality.)

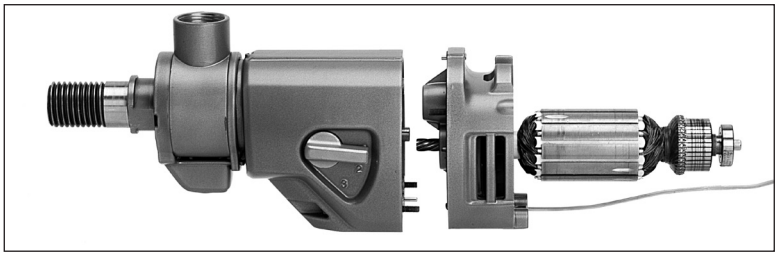
Type A

Four screws connect the gear housing to the gear box cover, two on the inside of the fan and two on the outside next to the oil plug.
Note that the screws on the fan have O-rings that seal the gear box oil.



Type B

Four screws on the gear housing connect it to the gear box cover



Pull the gear box cover, together with the rotor, from the gear housing. Remove the rotor from one side as described in the “ROTOR” chapter.

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 is built on two shafts, the 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.

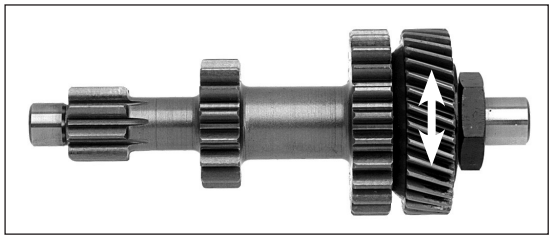
2. Prepare for dismantling as per the illustration. Press the shaft up using the puller.

Dismantling – intermediate shaft

To dismantle you need a small standard puller with long shanks, two spacers (wooden blocks, at least 15 mm/.6 in. high) and a bridge between them, e.g. a rough metal object.

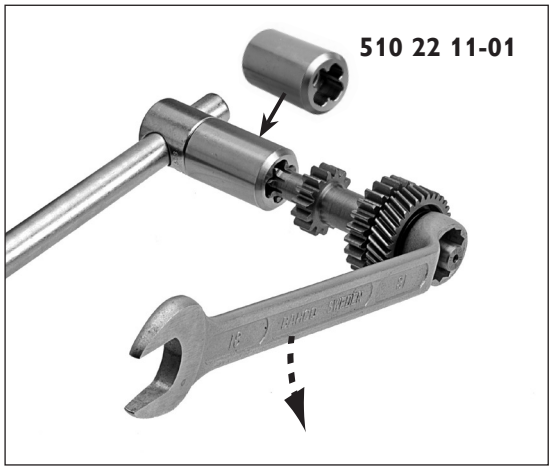
1. Position the puller under the two upper gear wheels.

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



The helical drive has a slip clutch on the intermediate shaft.

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



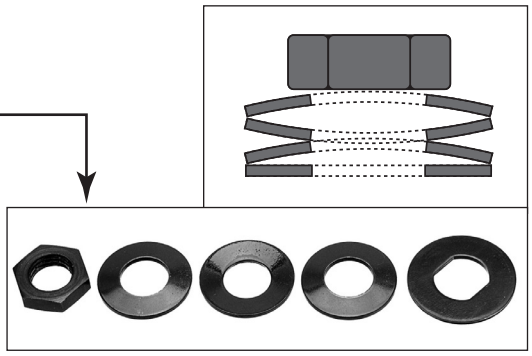
Slip clutch

Remove the nut.

Slip clutch

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

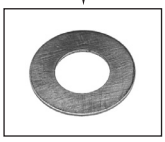
Remove the nut.



Spring washers
The spring washers provide the braking force to the clutch when the nut is fitted and tightened with the correct torque.

To function properly it is vital that the washers are installed correctly and that they are intact.

Remove the spring washers
Lift up the three spring washers and flat washer under them.



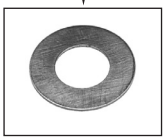
IMPORTANT
When reassembling the spring washers and friction washer, lubricate with gearbox oil.

This is important to ensure the correct slipping torque when adjusting the slip clutch.

Remove the friction washer
Remove the friction washer from the gear wheel. Replace the washer if it is damaged or has significantly reduced functionality.

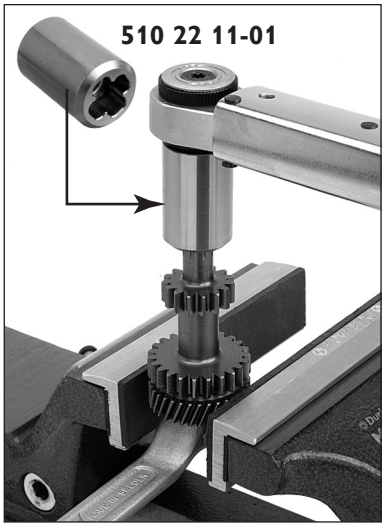
Lift off the gear wheel
Check the condition of the gear wheel and that the centre bushing is not loose on the shaft.

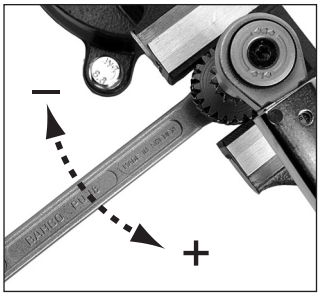
The bushing is located with a light press fit in the gear wheel.



Remove the friction washer
Remove the friction washer from the gear wheel. Replace the washer if it is damaged or has significantly reduced functionality.

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



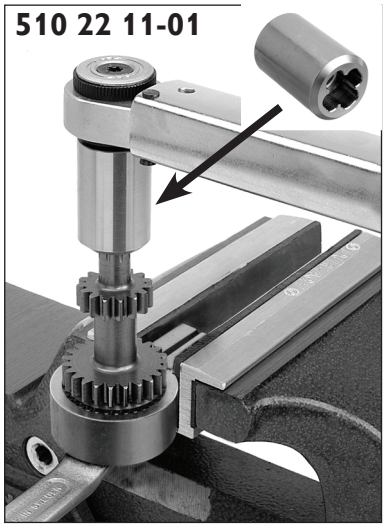


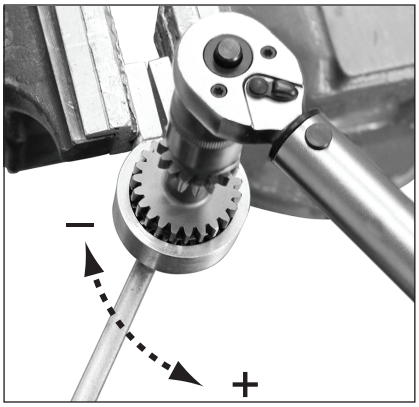
Torque: 16 Nm, 12 lbf·ft

Type A
Adjusting the slip clutch

Mount the intermediate shaft's helical drive wheel in a vice with soft fibre jaws.

Start by screwing in the nut to the mechanical stop position. Now unscrew the nut 45°. The clutch must have a slipping torque of at least 16 Nm. If the value is not reached, the spring and friction washers must be replaced.
If the slip clutch is higher than 16 Nm, adjust the value to the correct level.

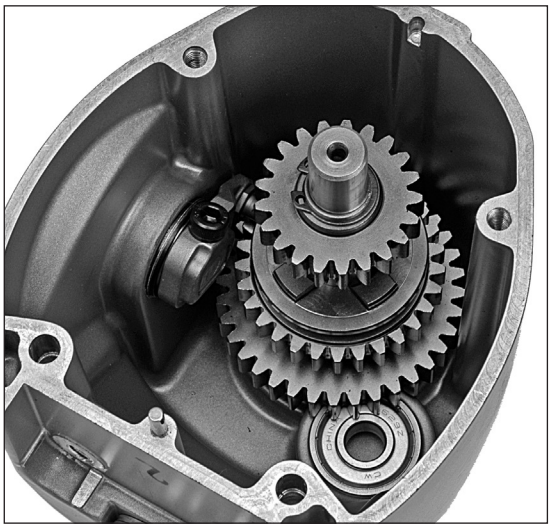




Type B
Adjusting the slip clutch

Mount the intermediate shaft's helical drive wheel in the service tool. Tighten the service tool in a vice.
Start by tightening the nut to the mechanical stop position. Check the torque with a torque wrench and socket -article number 5102211-01
The clutch must have a slipping torque of at least 16 Nm. If the value is not reached, the spring and friction washers must be replaced.
If the torque exceeds 16Nm, gradually unscrew the nut and check with the torque wrench.

Torque: 16 Nm, 12 lbf ft



Spindle shaft

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

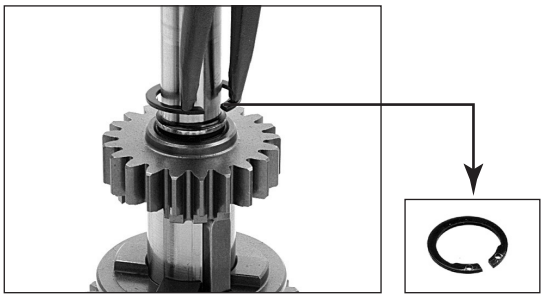
The transmission in this machine is rarely the cause of any problems. Incorrect handling of the machine could, however, cause the actual shaft to bend, or damage the tool bracket. In these cases, all units on the spindle shaft must be removed to replace the actual shaft.

Service work

The complete intermediate shaft must always be removed first.

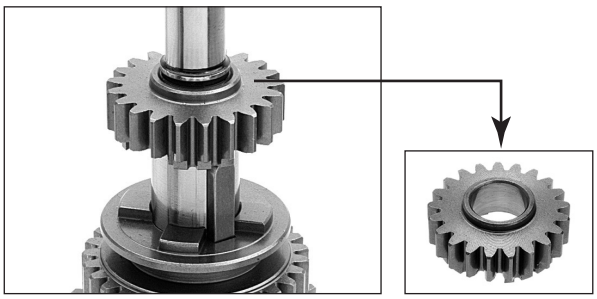
All work on the spindle shaft must be performed inside the gear housing. Only when the shaft is released from the components on this can the actual spindle shaft be removed from the gear housing.

Note – images: Most images in this chapter are photographed with the shaft removed for the sake of illustration.

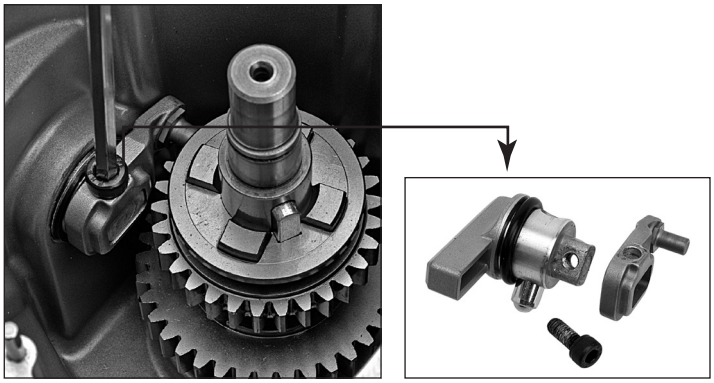


Removing the spindle shaft

Remove the circlip.



Lift off the gear wheel.

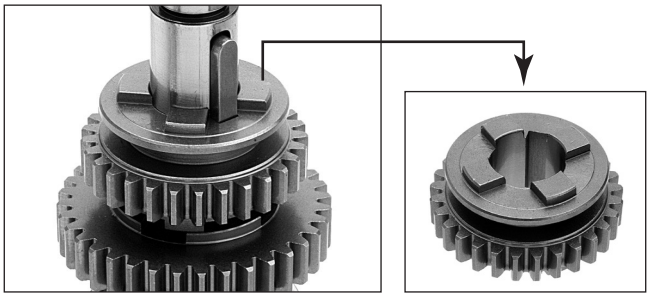


Remove the gear knob as follows: Loosen the lock screw. Press the gear knob out of the housing. Remove the gear selector.

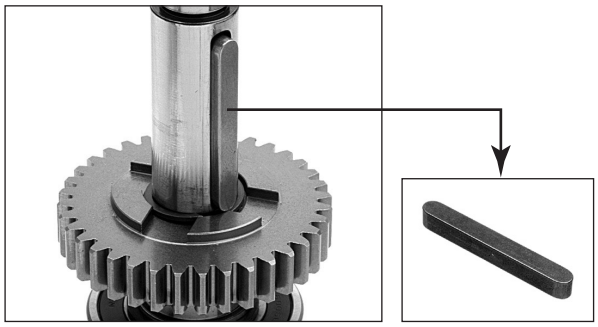
IMPORTANT – thread locking

When refitting the locking screw, thread locker must be applied to the threads, Loctite 243.

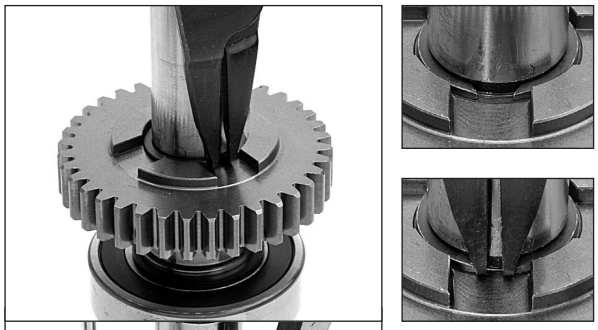
Lubricate the O-ring.



Lift off the gear wheel.



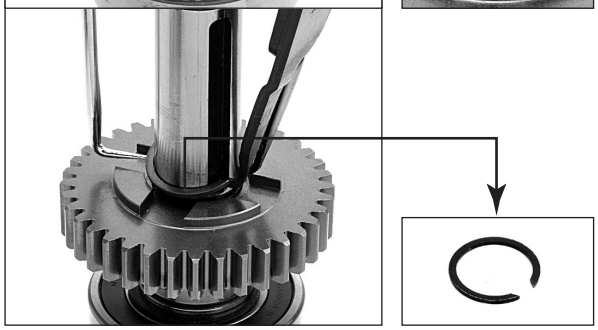
Remove the wedge.



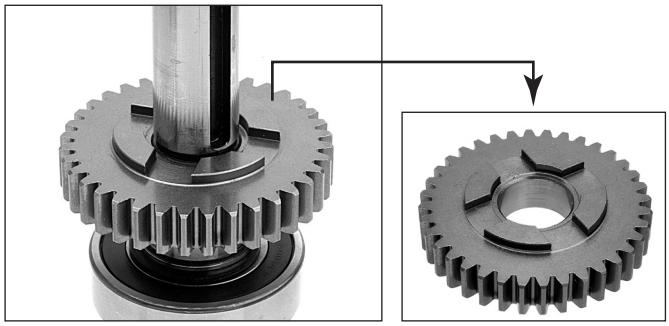
Milbar/Imperial
IR-15R

A small pair of lock ring pliers is needed to remove the lock ring, manufacture: Milbar/Imperial IR-15R or equivalent

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

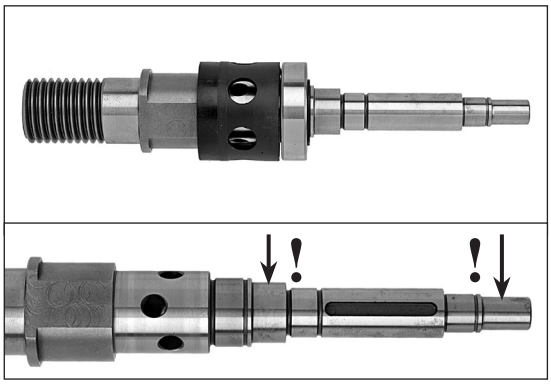


Expand the lock ring using the pliers and lift the ring up slightly. Lift the opposite side of the ring with a hook. Lift the lock ring off the shaft.



Lift off the gear wheel.

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



Bearings

The bottom bearings in the spindle shaft are press-fitted in the gear housing and on the shaft. The retaining rings on the shaft and in the gear housing secure the bearing. The black seal cylinder has radial seals at both ends, on the bearing and the tool holder. The cylinder is locked against rotation to the machine body. Always replace the whole sealing cylinder, or the radial seals if the spindle shaft is removed.

Important
Be careful not to scratch the shaft where the radial seal and needle bearing come into contact.

Bearing replacement – spindle shaft

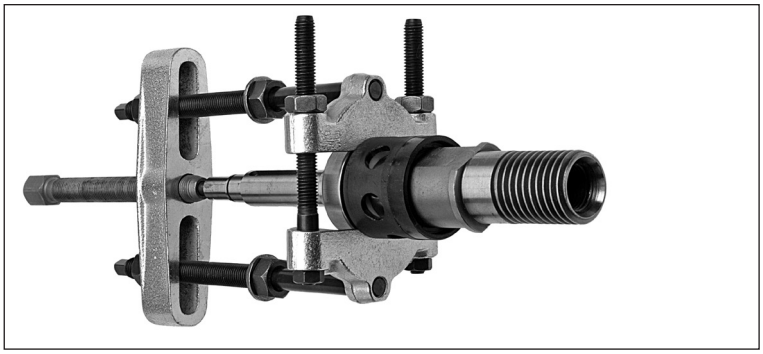
Remove the outer circlip
Remove the circlip using circlip pliers.

Press or pull out the spindle shaft
With the hydraulic press, the shaft is pressed out of the gear housing together with the bearing. Never knock out the spindle shaft!

The adjacent arrangement works well for pulling out the spindle shaft with the bearing.

Support the gear housing with the vice. Tape a flat iron, such as a cold chisel, on the opposite side. Insert the puller claw at the spindle shaft's wrench attachment and pull the shaft out with the puller.

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



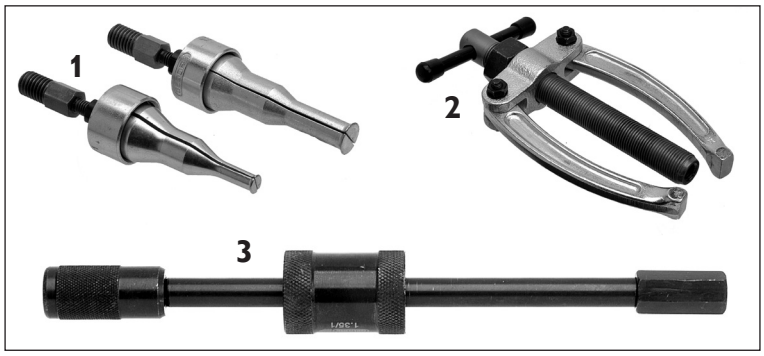
Remove the bearing
The bearing cannot be removed by pressing. Use bearing puller 531 00 48-67 or equivalent. Push the seal cylinder so that a gap occurs where the puller jaws are applied. Pull the bearing out of the spindle shaft.

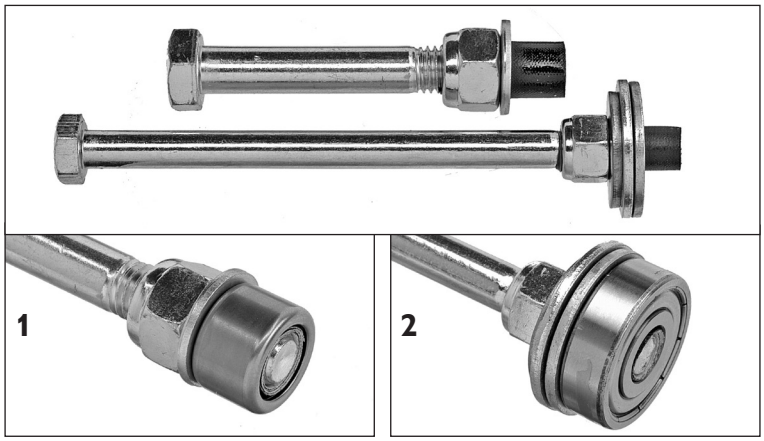
Replace the seal cylinder
Replace the seal cylinder when replacing bearings. Lubricate the seals. Fit the cylinder to the shaft.

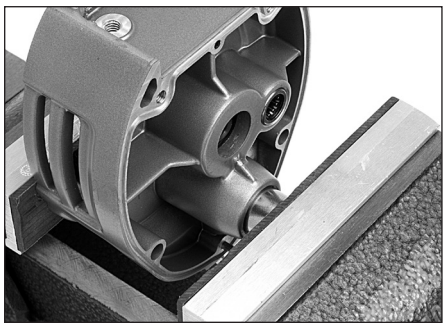
Reassembly
If possible cool the shaft in a cold store or with cooling spray and heat the bearing to about 100°C before mounting. The bearing can then be fitted with a light pressing force. A block of wood with a hole diameter equivalent to the bearing's inner ring works well as support and without risk of damaging the surface under the radial seal. Fit the inner circlip.

Fit the spindle shaft
Cool the ball bearing with cooling spray or put the shaft in a cold store. Heat the bearing seat on the gear housing (arrows) to about 100 °C. The spindle shaft can then usually be fitted in the gear housing with a minimal press force.

Note the seal cylinder's guide pin that is to be fitted into the groove in the gear housing.







Tools

Dismantling

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

1. Internal bearing extractor to grip behind the bearings.

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

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

Assembly

Since replacement of these bearings rarely occurs, there is no mounting device. Suitable mounting tools can be very easily produced with screws at the appropriate lengths, nuts, washers 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 large enough diameter to support the ball bearing's outer ring when assembling. 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 assembly of the needle bearings in the gear box cover is made easy with a press or with a vice.

Dismantling ball bearings

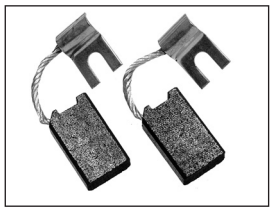
The gear housing's bearings for the intermediate shaft are removed with the same expander tool used for the needle bearings.

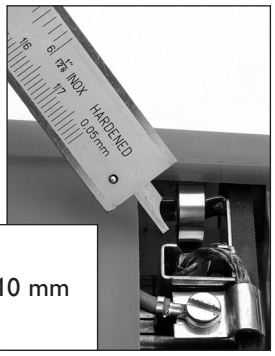
There is no level support surface for the counter stay device in the gear housing. The adjacent arrangement gives the puller's flat support surface. Alternatively you can use a slide hammer.

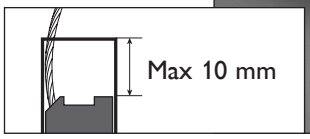
Fitting ball bearings

The bearing is fitted in the easiest way using the proprietary tool above in Figure 2.

Heating around the bearing seat reduces the press force. Knock in the bearing with a plastic hammer on the screw head.





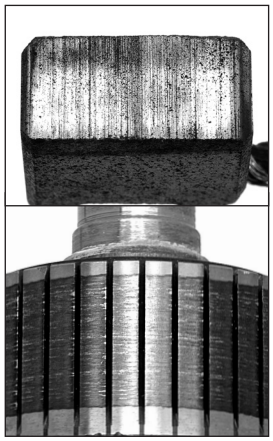


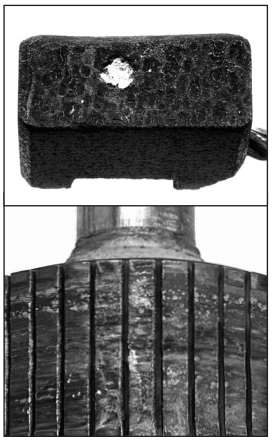
Replacing the carbon brushes

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's line 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 in.





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 the brush 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 guard.

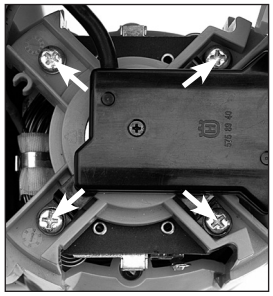
3. Loosen the screw.

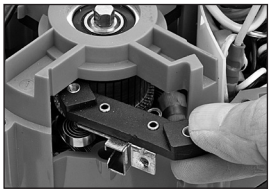
4. Pull out the cable lug

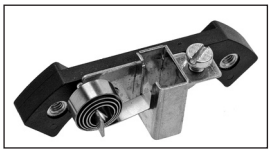
5. Lift the spring and pull out the carbon brush.

6. Fit a new carbon brush.

Carbon brush holder







Remove the carbon brushes. Remove the screws at the electronic box allowing the brush holders to be moved out.

Replacing the carbon brushes

1. Remove the inspection cover's two screws.

2. Lift off the guard.

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

4. Pull out the cable lug from the screw.

5. Lift the spring with an angular hook and pull out the carbon brush.

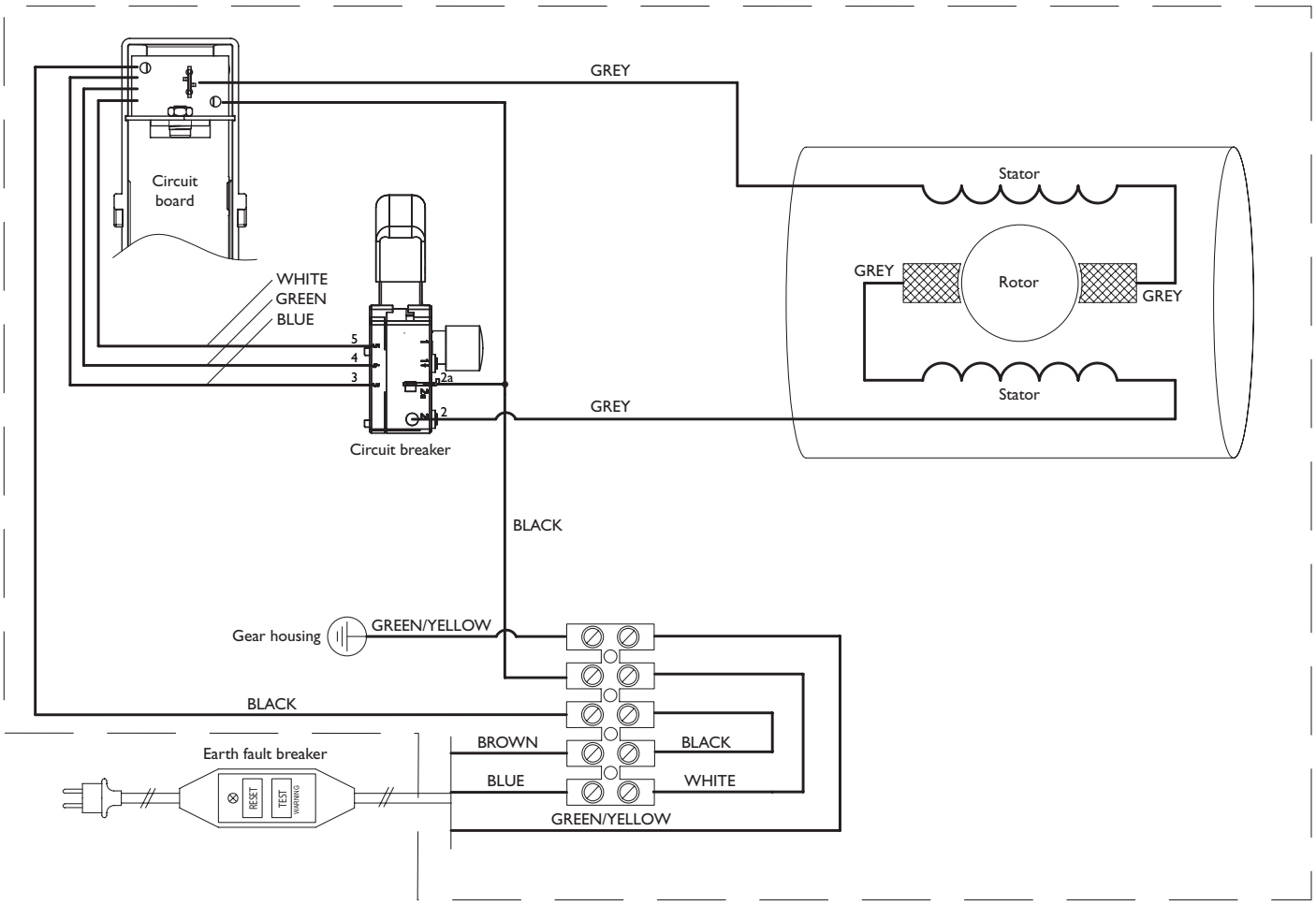
6. Fit a new carbon brush. The carbon brush's cable lug must be furthest in. Turn the carbon brush so that the cable runs over the carbon brush.

Carbon brush holder

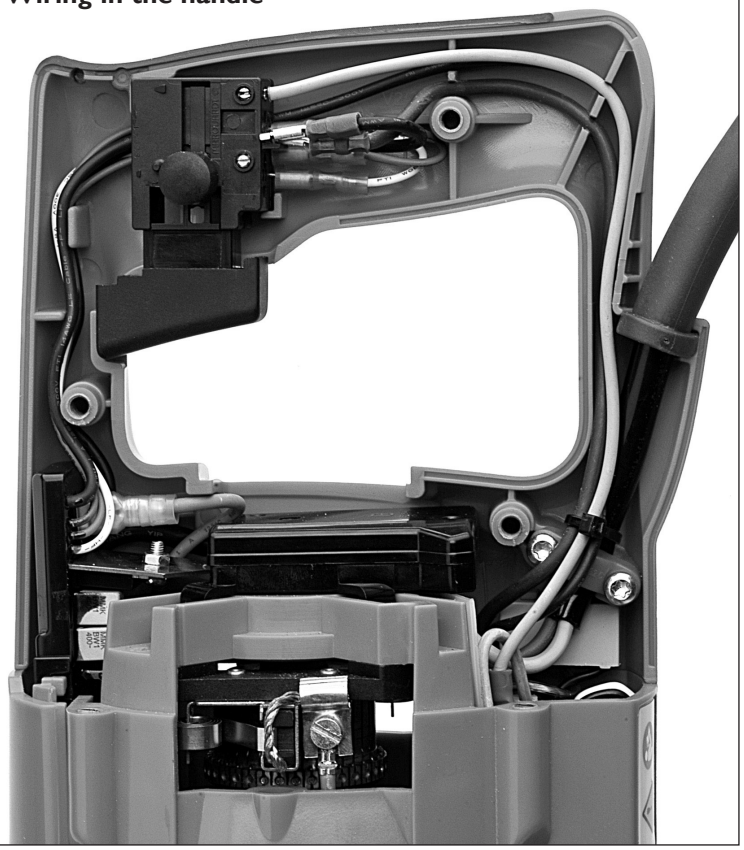
The rotor does not need to be disassembled to replace the carbon brush holder.

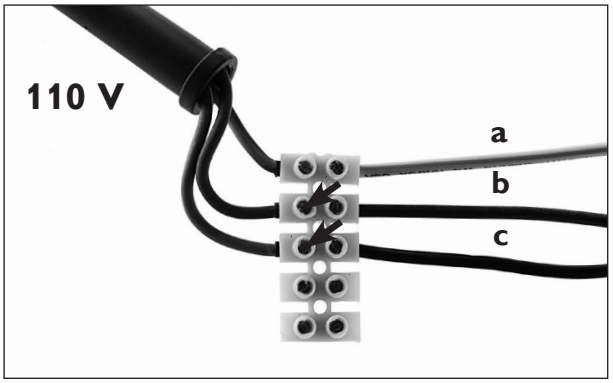
Remove the carbon brushes. Remove the screws that hold both the electronics box and the brush holders in place.

Note when re-assembling that the carbon ring lug should be closest to the holder and the cable to the top of the stator.



Wiring in the handle





Mains cable/terminal block

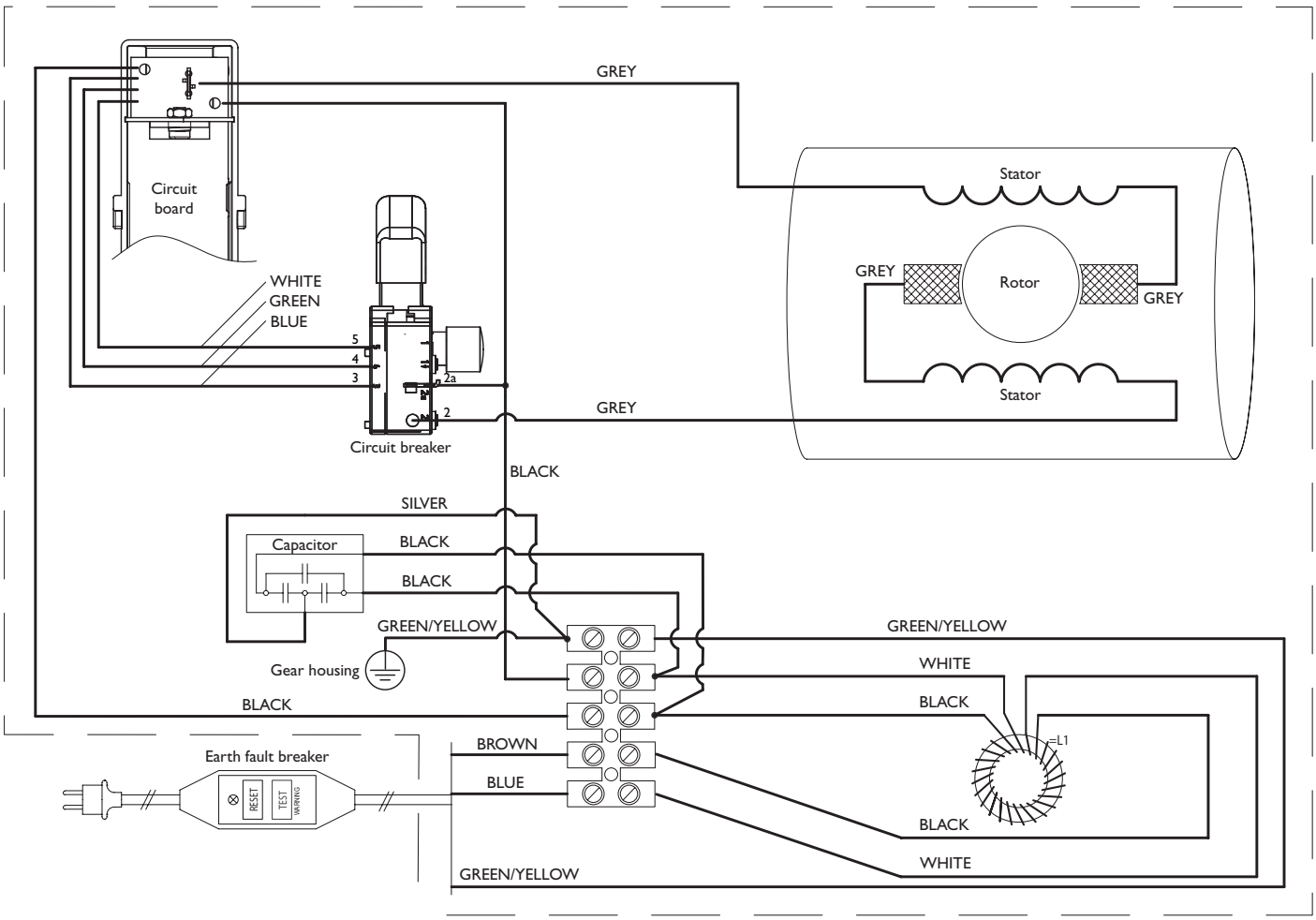
Terminal block

a Earth wire. Yellow/green wire.
b Connect to the circuit breaker, pos. **2a** according to page 18. Black cable.
c From a fixed connection in the circuit board. Black cable.

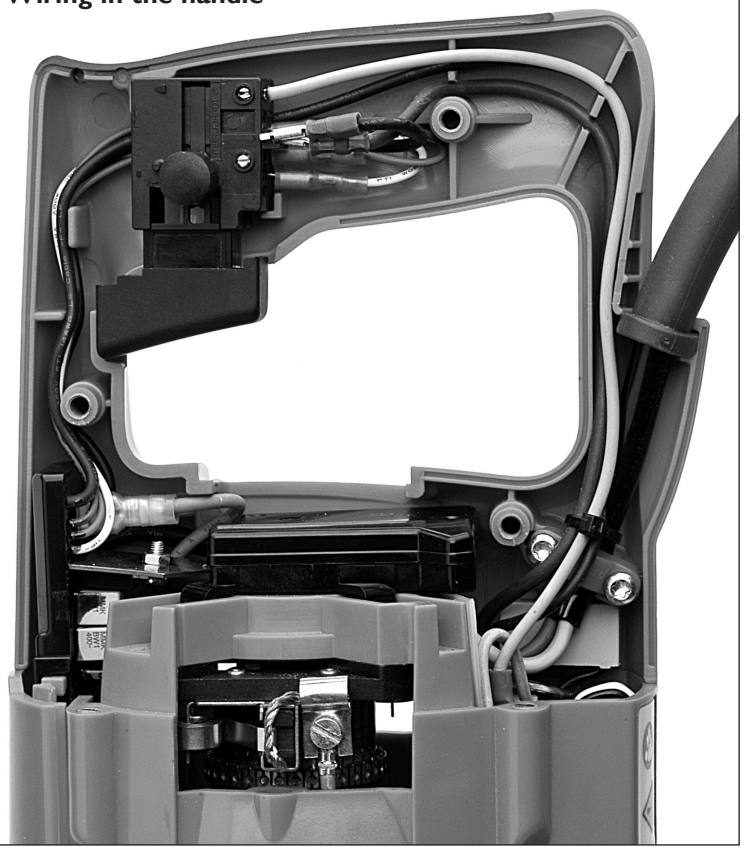
Avoid cable damage

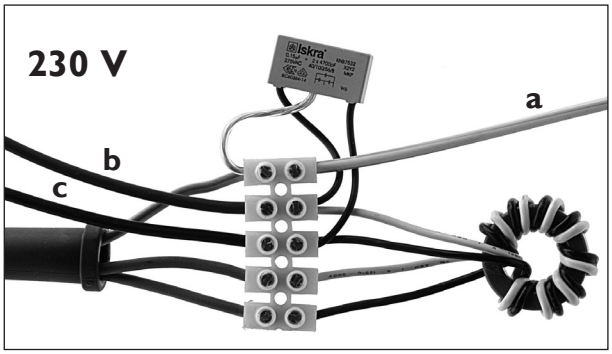
When reassembling, it is important that the cables are fitted in the handle with care to ensure the cables are not exposed.

9 WIRING DIAGRAM – CABLING, 230 V



Wiring in the handle





Mains cable/terminal block

Terminal block

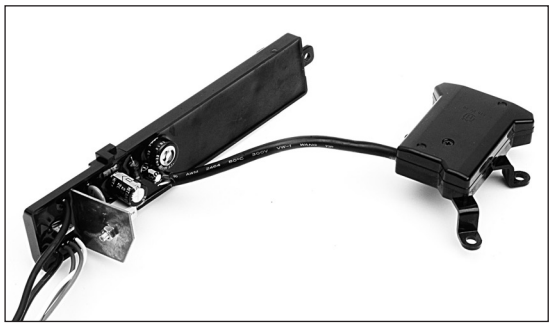
a Earth wire. Yellow/green wire. Connects to earth point in the gear housing.
b Connects to the circuit breaker, pos **2a** according to wiring diagram and image on page. 18. Black cable.
c From a fixed connection in the circuit board. Black cable.

Capacitor – 230 V

If the mains fuse blows, this may be due to a short-circuited capacitor. Remove the capacitor's black cables from the terminal block and measure the resistance.

Avoid cable damage

When reassembling, it is important that the cables are fitted in the handle with care to ensure the cables are not exposed to crushing damage.



Circuit board

The circuit board is divided into two interconnected units that cannot be shared.

The unit on the right has two functions. It senses the motor's speed and also has a function that acts as an electronic spirit level "Level guiding system".

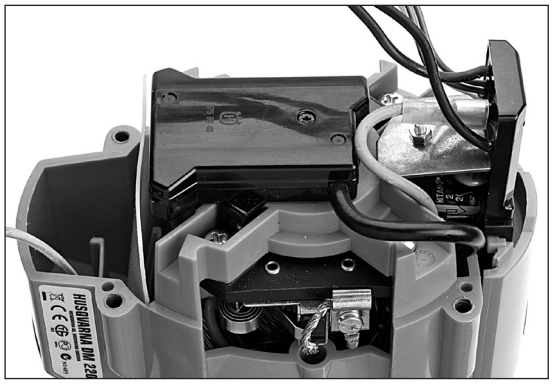
All information from the unit is passed on to the circuit board, to the left in the illustration.

The circuit board gives the machine the following functions:

Softstart™ is an electronic current limiter for smoother starting.
SmartStart® gives reduced speed when the circuit breaker is pressed in halfway.
Elgard™ is an electronic overload protection device.

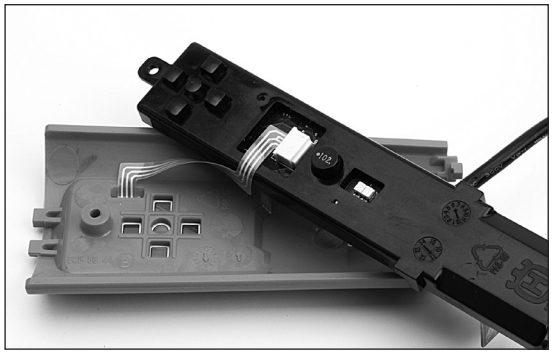
Function test

The functions of the circuit board require special expertise and special equipment in order to be tested. The exclusion method must apply instead. First test that the stator, rotor, cables, contacts, connectors, etc. are not defective. Only replace the circuit board after this check.



Turn the sensor unit correctly

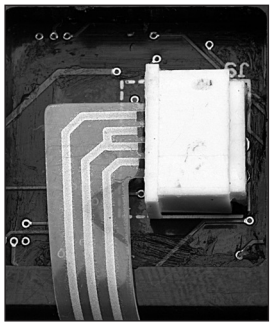
The unit above the rotor shaft may be turned incorrectly, whereupon the cable length to the circuit board will be too long and the spirit level function will be incorrect. Place the unit as shown in the illustration. The cable must run out to the side of the machine and on down to the circuit board.

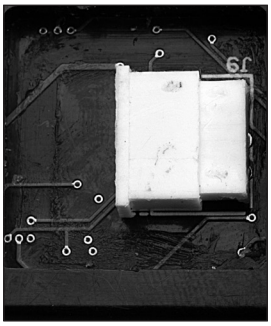


Level guiding system

The circuit board also contains the reading unit for the electronic spirit level that indicates the machine's angle with the help of five LEDs.

The spirit level functions are controlled from two circuit breakers. A flat cable connects the circuit breakers with the circuit board.

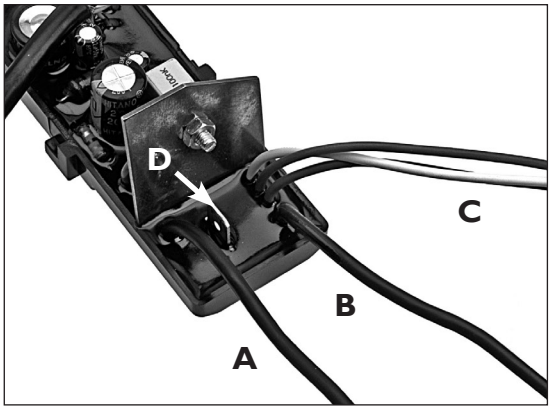




Flat cable

The connector to the flat cable has a locking function. To remove the flat cable, first press the connector to the left, according to the illustration on the right, after which the flat cable is removed.

Assemble in reverse order.



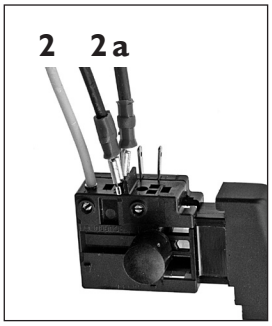
Circuit board wiring

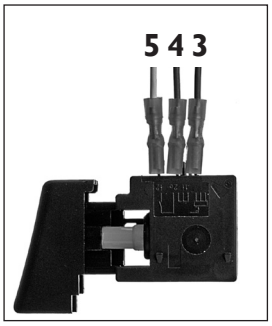
A Black cable with a small flat pin connector. Connects to the circuit breaker at position **2a** according to the wiring diagram and illustration below.

B Black, long cable that runs through the handle. Connects to the terminal at position **c** according to pages 15 and 16.

C Three cables, white green and blue. Connects to the circuit breaker at position **5**, **4** and **3**, according to the wiring diagram and illustration below.

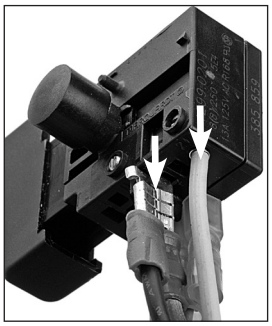
D Flat pin connector for stator cable.





Cable connections

Connections to the circuit breaker markings:
2. Stator winding, grey.
2a. From the fixed connection in the circuit board, black. Position **A** as shown in the illustration above.
2a. From the terminal block, black. Position **b** according to pages 15 and 16. Note that 2a has a common connection point for two flat-pin connectors.
5. White
4. Green
3. Blue

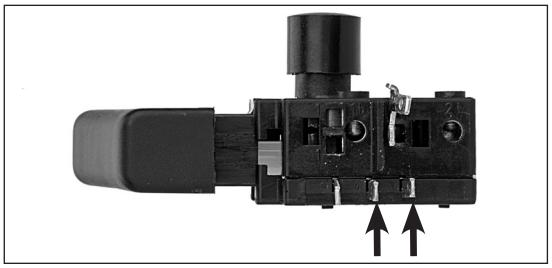


Circuit breaker – functional test

The circuit breaker has two functions: It cuts/closes the current to the stator and also contains the function for Smartstart.

Circuit breaker

With Ohm measurement, the circuit breaker's short circuiting is easily checked when it is pressed in. Remove the stator cable and fix a test pin in place. Connect the other test pin to the double connection.



Smartstart™

If the half and full-time function is not working this may be due to this part of the circuit breaker being defective.

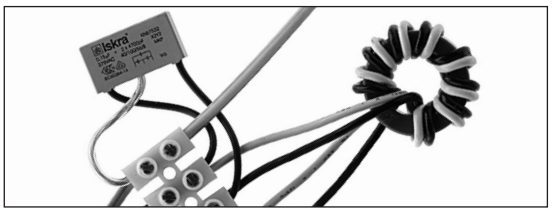
To check the Smartstart function, the resistance between the contact pins 3 and 4 on the circuit breaker is measured. A non-activated circuit breaker provides an approximate value of 220 kOhm. A fully pressed circuit breaker must provide a value of 0 Ohm.

Mains cable

If the mains supply does not reach the machine, a broken cable or faulty earth fault breaker is the possible cause.

Replace with a complete cord set

Do not remove the mains cords from the earth fault breaker, but replace with a new complete cord set.



Radio interference suppression

Interference suppression protection is only available for the 230 V model. The components are a coil with iron core and a capacitor.

Functional test

Preparations

Remove the screws on the right handle half to access the screws that hold the electronics box above the speed sensor. Remove the box and refit the screws, as these also hold the carbon brush holders.

Connect a measurement cable to each carbon brush and connect to the measurement instrument. The carbon brushes need to be in good condition to provide good contact with the collector.

Measuring cables

Use short measuring 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 with a wrench on the speed sensor a few times so that measurements are obtained for each winding on the rotor.

Measured values

Typical measured value for a complete rotor is around 12 mH. If any position during the turn shows values below 9 mH, this is evidence of a defective winding.

Bearing replacement

Press the rotor out of the gear box cover.

Collector side – bearing replacement

First remove the sensor.

Remove the bearing using a puller.

Fit with a press force to the bearing’s inner ring.

Bearing replacement

Press the rotor out of the gear box cover with a hydraulic press or standard puller as shown in the illustration. Never knock the rotor out of the gear box cover – this will damage the worm gear.

Warning!

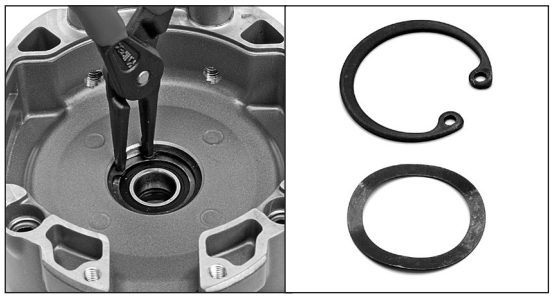
The hexagonal magnet in the middle of the shaft is the sensor for motor’s speed control. Press force must not be applied to the magnet.

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.

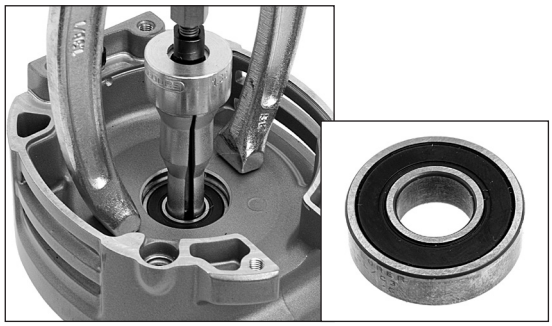
Remove the bearing using a standard puller.

You can assemble by pressing or knocking the bearing in place. The press force must be applied to the bearing’s inner ring.



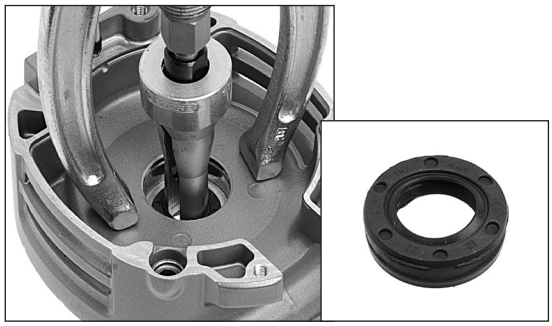
Gear box cover side – bearing replacement
Remove the circlip and wavy washer.

Gear box cover side – bearing replacement
Remove the circlip with circlip pliers and the wavy washer under this.



Remove the bearing with a counter stay device.

Use a counter stay device to pull out the ball bearing.



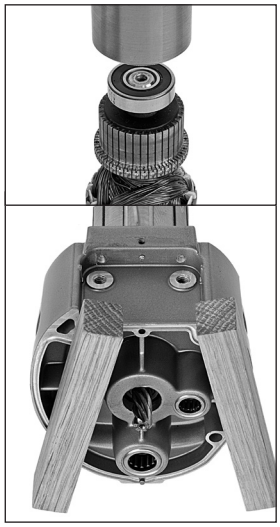
Replace the seal ring.

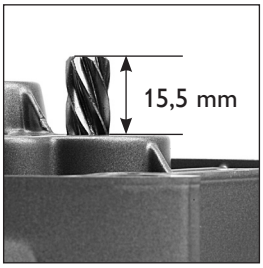
The seal ring under the ball bearing must also be replaced. Use a counter stay device to remove the seal.

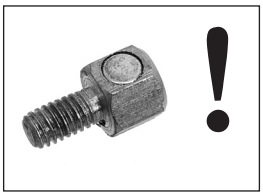
Press in the seal ring using a suitable socket. The seal ring's spring side should face the gear housing, with the flat side facing the rotor.

Press in the new bearing.
Fit the wavy washer and circlip.

Press in the new bearing with a socket that provides support to the outer ring. Press the bearing in fully into the stop in the bearing seat.
Fit the wavy washer and circlip.



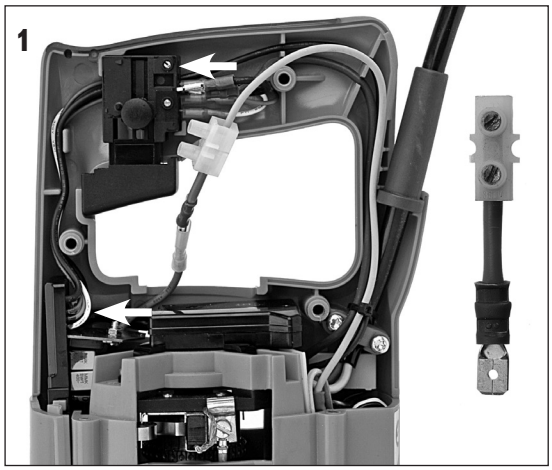


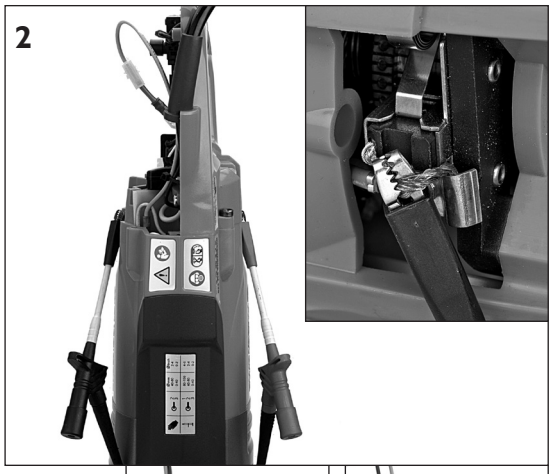


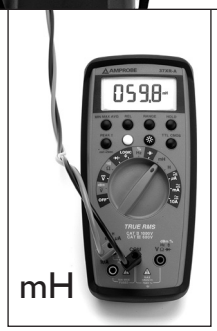
Fitting with press
Installing the rotor shaft in the bearing is difficult to do without a pressing tool. When installing, pressure forces will arise between the outer and inner ring, which means you must avoid assembling by knocking.

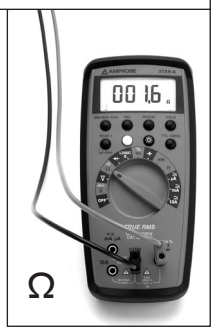
Support the gear box cover with a few pieces of wood in the press. The press force is applied to the rotor shaft end at the collector with dismantled sensor!
Push the shaft completely against the stop. Make sure the shaft's stop has reached the ball bearing by measuring the height of the worm gear above the gear box cover, which must be 15.5 mm.

Mount the speed sensor – thread locking
Do not forget to re-install the speed sensor on the shaft end! The sensor must be locked with Loctite thread locker.









Functional test

Breaks in the stator winding are detected easily with the following functionality check. In general, short-circuited windings can also be identified, particularly if the short circuit eliminates current in several winding turns. If the short circuit only eliminates 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 fractured. 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 fractures in the stator winding or short-circuited winding turns.

Preparations, illustration 1

Remove the inspection cover to the carbon brushes.

The stator winding is screwed at the circuit breaker and is connected with the flat pin connector at the circuit board. The arrows show the positions. Make an adapter as shown in the illustration and connect the stator cables.

Measuring cables - inductance measurement

Use short measuring 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

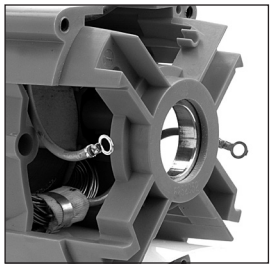
Typical measured values for a complete stator is around 60 mH. Typical value for resistance measurement is around 1.6 – 1.8 ohm.

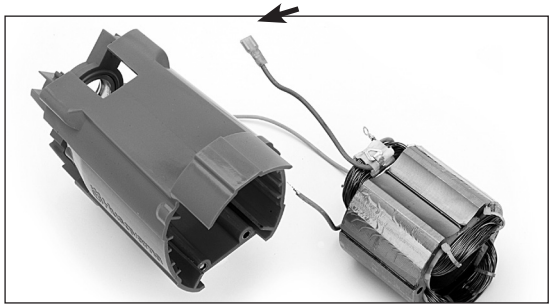
If the stator winding is broken you get the value 0 mH. Resistance measurement gives a maximum, or immeasurable ohm figure.

Short-circuited winding turns reduce the inductance value. If the value is less than 45 mH the stator is unusable.

A disassembled stator that is measured without installed rotor gives about 9 mH. If the value is less than 6 mH the stator is defective.

IMPORTANT! When measuring the inductance, it is extremely important that no large iron or steel objects are in the immediate vicinity. If the stator is placed on a plate covered workbench the readings will be useless.





Dismantling

Remove the carbon brush holders.

Remove both stator screws.

Pull the stator out of the motor housing.

Dismantling

Separate the motor unit from the gear housing as described in Chapter 4. Remove the carbon brush holders.

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

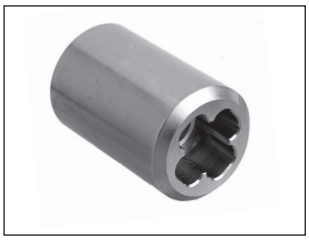
Pull the stator out of the motor housing by hand.

Reassembly

Note that the stator must be turned so that the cable with the flat pin connector comes on the motor housing's top side.

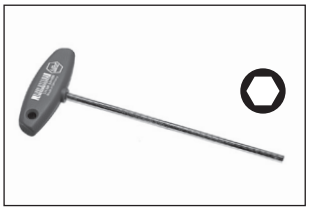
● = Service operation

The tools listed below are available from Husqvarna.



510 22 11-01
Special socket

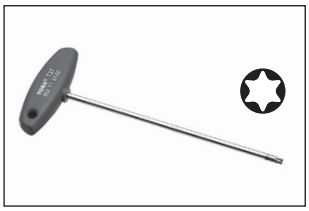
● Tool Necessary for adjusting the intermediate shaft's slip clutch. 1/2 inch socket wrench attachment.



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



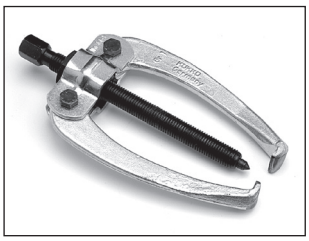
502 71 27-02
Workshop wrench, Torx T27

● Universal use.

504 90 00-06
Workshop set, mm-dimensions

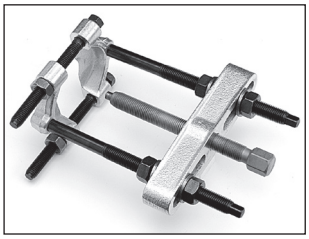
● Universal use.

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



504 90 90-02
Universal puller

● Bearing dismantling.



531 00 48-67
Bearing puller

● Removal of spindle shaft's front bearing.

582 11 04-01
Service tool

● Necessary for adjusting the intermediate shaft's slip clutch.

The special tools below are needed for service work to DM 220 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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