Husqvarna®

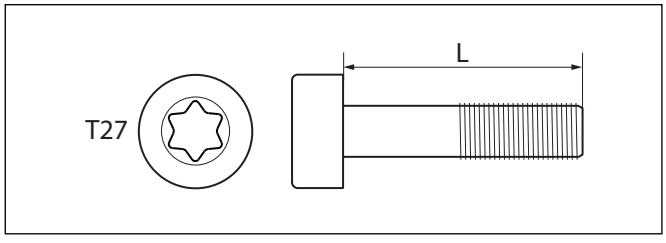
Workshop manual

DM 700

HUSQVARNA CONSTRUCTION PRODUCTS

HUSQVARNA
DM 700

CONTENTS



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

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

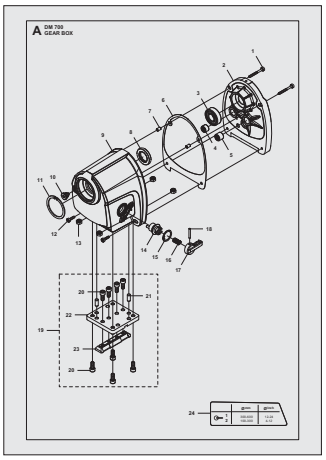
Workshop manual

This workshop manual covers virtually all work in the workshop that involves the DM 700. Some very simple and rather obvious repair work has been omitted.

Arrangement – illustrations and text

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

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



Spare parts

The folder includes all spare parts for Husqvarna DM 700.

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

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

Service bulletins

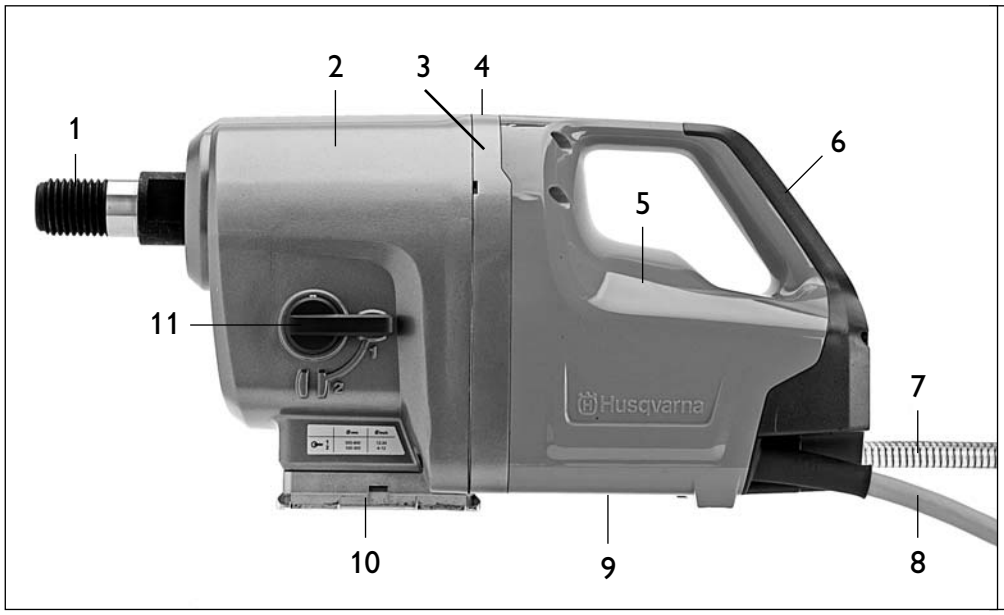
Service bulletins are issued when important design modifications have taken place, for example, or when amended service actions have been introduced. The service bulletins are available to download from the Husqvarna website under “Service bulletins, SB”.

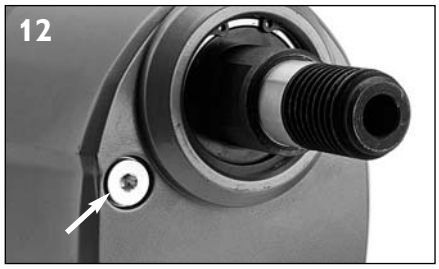
Operators manual

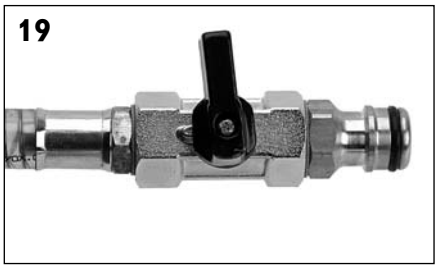
The operators manual describes how the machine is to be used, the functions of the machine, and the maintenance the operator normally carries out.

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

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







Components

1. Drill spindle
2. Gear housing
3. Gear box cover
4. Leakage channel
5. Motor housing
6. Handle for portability
7. Water hose
8. Electric cable
9. ID plate
10. Stand mount
11. Gear knob
12. Oil plug
13. Load display (LEDs)
14. Speed display (digital indication 1-6)
15. Speed control
16. Full/half speed breaker
17. Circuit breaker
18. Electrical connection for high frequency unit
19. Water coupling (Gardena®) with valve

Work tip

The easiest and most convenient way of executing virtually all service work on the DM 700 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 wood 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.

Dividing basic modules

For repair work only involving the gear housing, such as changing the spindle shaft, the machine is divided as shown in the top image and as described below. The division is made between the gear housing and the gear box cover on the gear housing. Before the machine is divided, it must be cleaned externally to avoid the risk of dirt entering the gear housing. Drain the oil from the gear housing.

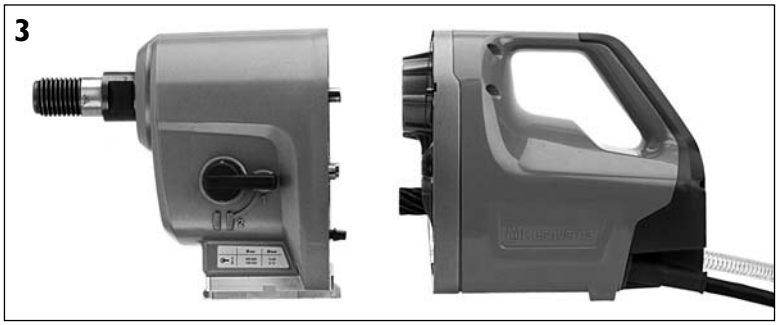
For work on the motor unit, the machine is divided in the manner shown in the image to the left and as described on the following page.

Division – gear housing/gear box cover

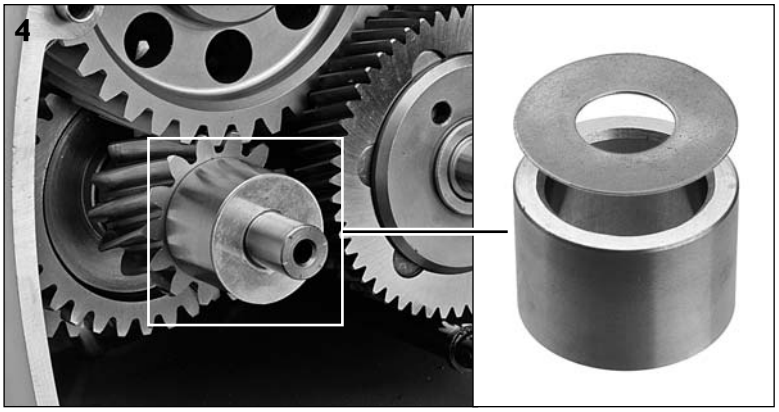
Dividing the gear housing is a particularly simple operation.

1. Remove the two arrowed screws on the motor housing. The screws above must remain in place. 2 x M5x49, 8 Nm

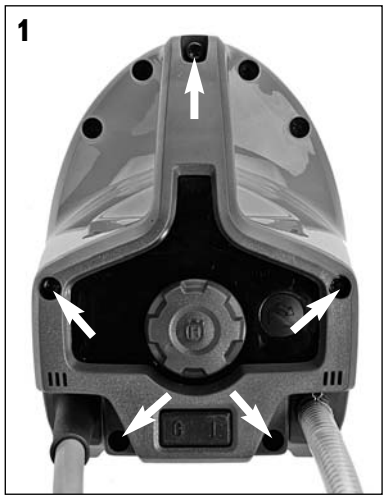
2. Remove the two arrowed screws on the front of the motor housing. 2 x M5x20, 8 Nm



3. The gear housing can now be divided. There is a break slot to help with the division. Use a screwdriver and break alternately on both sides.
Always fit a new gasket when refitting the gear housing.



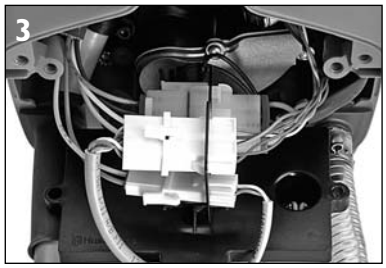
4. Note:
The secondary shaft has a loosely fitting spacer ring and brass washer which should be lifted off immediately after the division to avoid the risk of them falling into the gear housing when working with this.
If the washer is missing at the division, it is most likely stuck to the gear box cover, or it has fallen into the gear housing and must be removed.
NOTE: The brass washer must be replaced simultaneously with the change of oil after 300 hours.
(The spacer ring and washer stabilise the secondary shaft axially.)

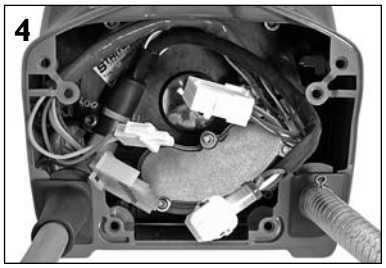


Division – gear housing/motor housing

1. The panel is secured with five screws. Remove these. Lift off the panel. 5 x MT 5x14, 3–4 Nm

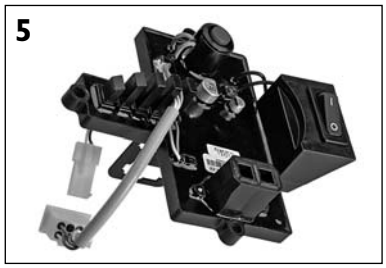
2. Remove the three screws to the circuit board. 3 x MT 5x20, 2–4 Nm

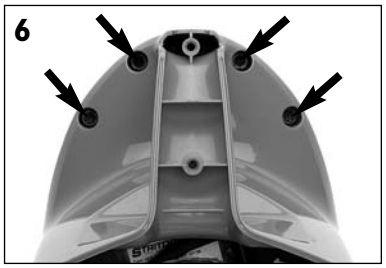




3. Fold down the circuit board to ensure the connectors are accessible. Note how these are attached to the holder when refitting.

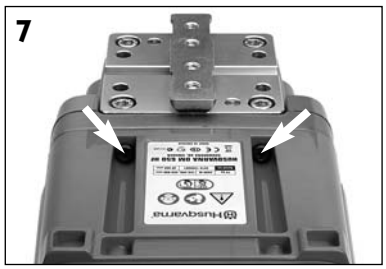
4. Divide the connectors and release them from the holder.





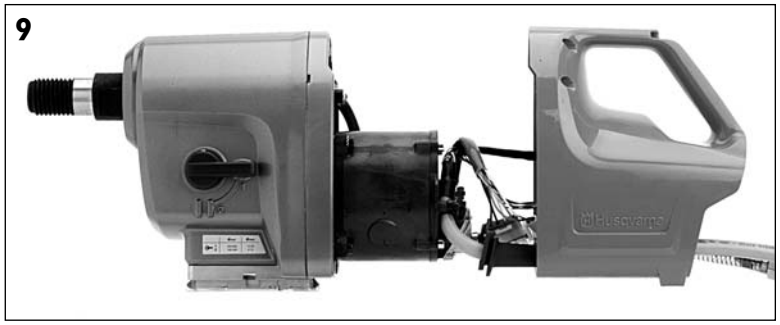
5. Remove the circuit board.

6. Remove the four screws on the machine cover.

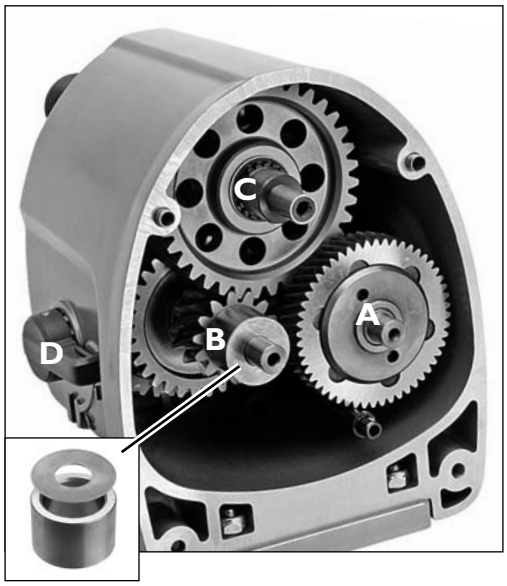


7. Remove the two screws on the bottom of the machine. 2 x M5x16, 8 Nm

8. Release the bushings for the water hose and electric cable from the motor housing by pushing them upwards and out of their attachments.



9. The motor cover can now be removed by sliding it backwards. The motor is now accessible.



Gear housing

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 based on three shafts:
A. The primary shaft where the upper gear wheel is driven by the gear wheel on the motor's output shaft. A slip clutch, which protects against overloading, is integrated with the gear wheel.
B. The secondary shaft is connected to the gear selector and the components in the shaft provide two gear positions that are controlled by handle D. You change gear with an idle motor.
C. The spindle shaft's only gear wheel is driven by the upper gear wheel of the secondary shaft.

Service work

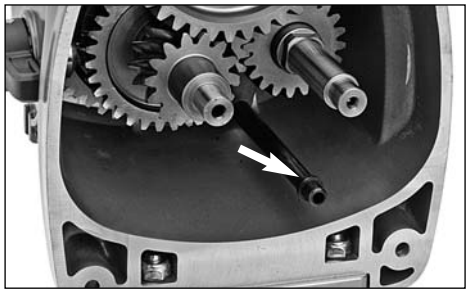
The service work that is most likely to be considered is the adjustment of the primary shaft's slip torque and the replacement of the spindle shaft due to mishandling. The slip clutch has a slip fit on the primary shaft. The spindle shaft can be replaced, when the gear wheel on this has been dismantled, without affecting the other shafts.

Gear housing oil: Transmission oil SAE 75W-90, 1 litre
Synthetic transmission oil according to API GL-5, for example,
Mobil Lube 1 SHC 75W-90, Shell Spirax ASX 75W-90.
The oil in the gear housing needs replacing after 300 hours. Replace the brass washer at the top of the secondary shaft at the same time.

Primary shaft

The primary shaft consists of two main components, the slip clutch and the actual primary shaft. The slip clutch is driven by the motor's output gear wheel. A squared drive on the slip clutch connects to the shaft.
One of the two lower gear wheels drives the secondary shaft depending on the gear position.

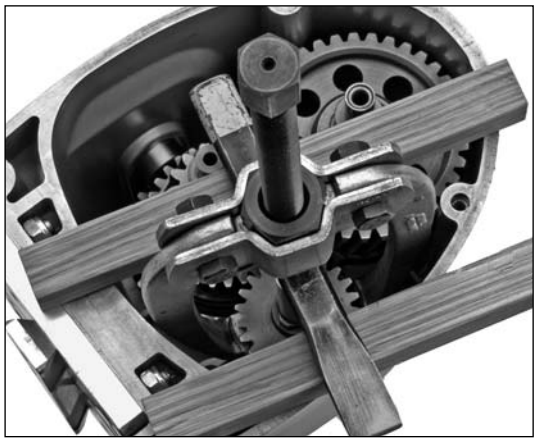
(The slip clutch is described on Page 8.)



Dismantling

Start by removing the slip clutch from the primary shaft, see Page 8.

Lift up the oil pipe.



Remove the primary shaft using a standard puller.
Place two wooden strips on the gear housing and place a heavy metal object such as a chisel as a bridge between the wooden strips. Fasten the puller claw under the gear wheel. Apply the puller screw against the chisel and push up the shaft with the puller.

Function

The electric motor powers the top gear wheel on the primary shaft. This gear wheel has a slip clutch to protect the operator and the gear box in the event of jamming. The cup springs provide the clamping force for the slip torque. Place flat friction washers on both sides of the gear wheel. The structure is shown in the image lower left.

You can adjust the slip torque if this is necessary by means of the nut on the shaft.

Service work

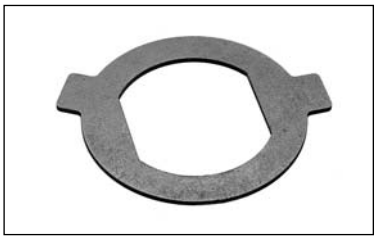
The slip clutch is made up of a large number of components whose structure is shown in the image on this page. The nut tightening determines the slip torque, which is adjusted according to the following page.

If the slip clutch is disassembled it is very important that the parts are re-assembled in the correct order to ensure its function!

Dismantling/assembly

The slip clutch has a sliding fit on the primary shaft, and the unit is lifted off without the use of tools.

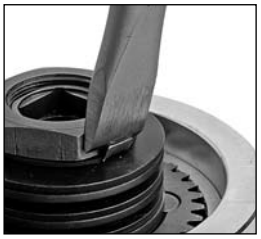
When the slip clutch is fitted, it must be rotated to ensure that it drops down on the square bracket on the shaft.

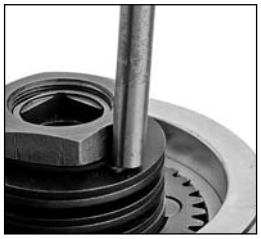


Lock washer

The lock washer prevents the nut from rotating and thereby ensures that the adjusted slip torque does not change because of this.

If the slip clutch is taken apart or if the slip torque is adjusted, the lock washer must be replaced with a new one.



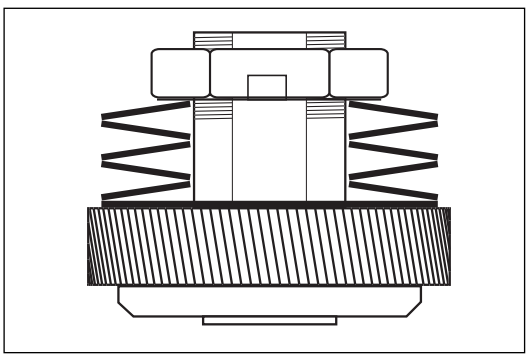


Locking nut – release

The easiest way to remove is in two steps: Knock out the tongue a little way with a hard chisel. Now knock the tongue completely flat with a pin punch.

Locking nut – lock

The easiest way to fit is in two steps: Knock up the tongue a little way with a hard chisel. Now knock the tongue against the nut with a pin punch.



Spring washers

If the slip clutch is dismantled into its component parts, it is important that the cup springs are turned correctly when refitting.

Also note in the image to the left that the large flat washer must be placed directly under the spring washers.

Lubricate the parts when assembling to allow you to adjust to the correct slip torque.

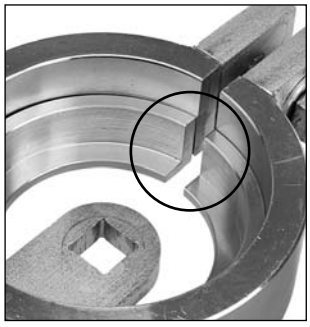
Tools – adjusting the slip torque

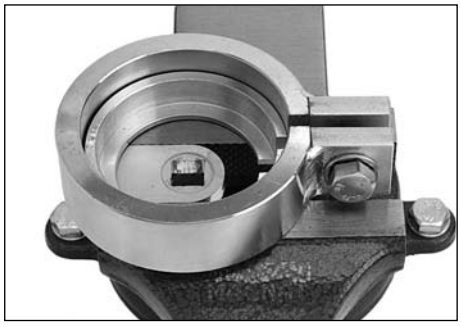
Special tools produced by Husqvarna are needed to adjust the slip torque. A torque gauge with continuous reading is also needed.

581 92 82-01
Turning pliers with 17 mm jaw width.

531 12 31-22
Clamping ring.

522 91 40-03
Adapter for the above clamping ring.



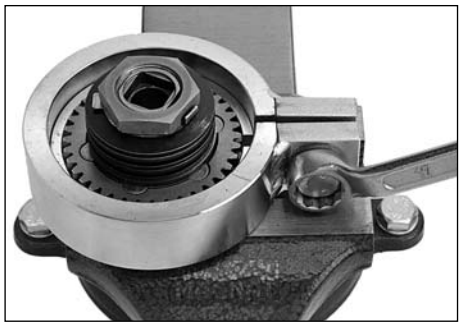


Adjust the slip torque

Preparations

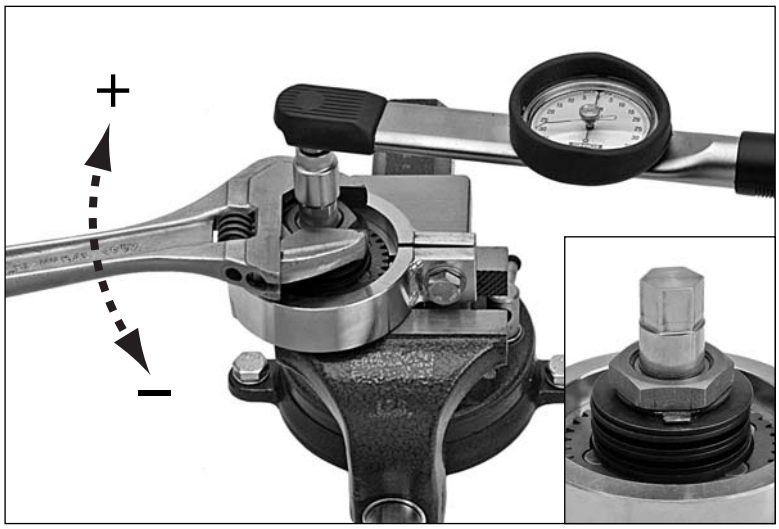
Place the adapter in the clamping ring and rotate it so that the slots face each other.

Fit the clamping ring in a vice.



Insert the slip clutch and tighten this with the screw.

Release the nut by unfolding the tongue.



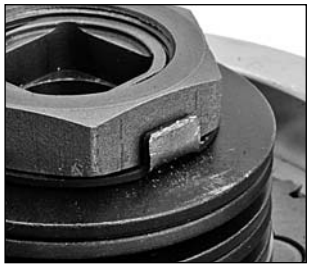
Adjustment

A torque wrench with a continuous reading is needed to adjust the slip torque to the correct level. Put a 17 mm socket on the torque wrench and put the turning pliers in position in the slip clutch.

The torque should be read with the torque wrench moving slowly. The torque is adjusted with the nut on the slip clutch.

Slip torque: 85 ± 3 Nm

Note: When the slip torque is tested, the torque will initially rise to a higher level to drop when the clutch slips. Accordingly, it is the lower torque when slipping that needs to be adjusted to the specified slip torque.



Lock the nut by folding one of the locking washer tongues.

Dismantling

Starting position

Lift off the spacer ring and brass washer at the top of the secondary shaft if this has not already been done.

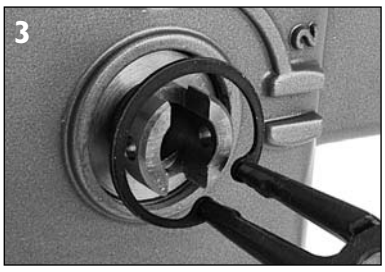
Remove the spindle shaft gear wheel, see Page 12.

Remove the complete primary shaft, see Page 7.

Remove the gear knob

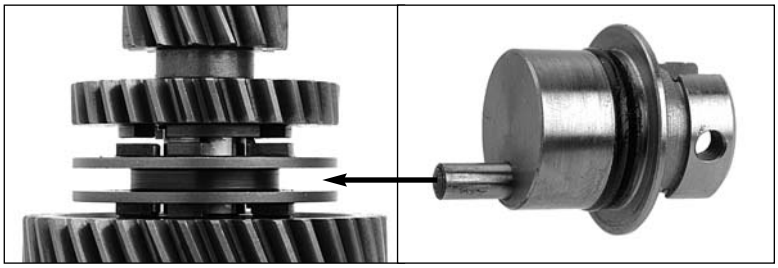
1. Remove the cotter pin with a punch and remove the knob.

2. Remove the spring.



3. Remove the circlip.

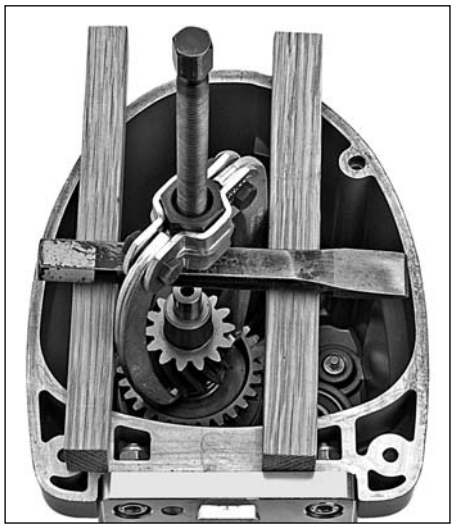
4. Press out the gear selector.



Reassembly

Check that the O-ring is intact. Grease the O-ring and the gear selector's contact surfaces facing the gear housing.

Turn the gear selector with the shift pin facing down. If the machine is placed with a tool attachment facing down (see Page 4) the pin will automatically be in the correct position to the shift wheel on the secondary shaft.



Remove the secondary shaft
Remove the secondary shaft using a standard puller.

Place two wooden strips on the gear housing and place a heavy metal object such as a chisel as a bridge between the wooden strips. Fasten the puller claw under the gear wheel. Apply the puller screw against the chisel and push up the shaft with the puller.

Remove the secondary shaft components
Remove the circlip.

Lift off the gear wheel.

Lift off the shift wheel and remove the locking wedge on the shaft.

Remove the lock ring using small lock ring pliers.

The range of small lock ring pliers is very limited. The Milbar/Imperial IR-15R make works well for this type and size of lock ring.

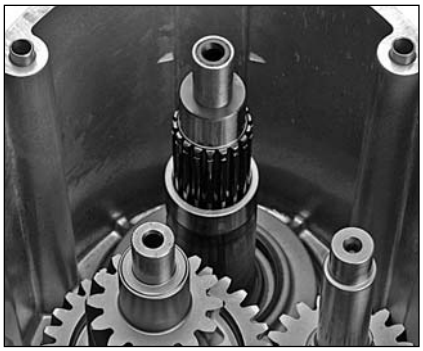
Lift off the gear wheel.

Remove the spindle shaft

Start by lifting off the slip clutch on the primary shaft.

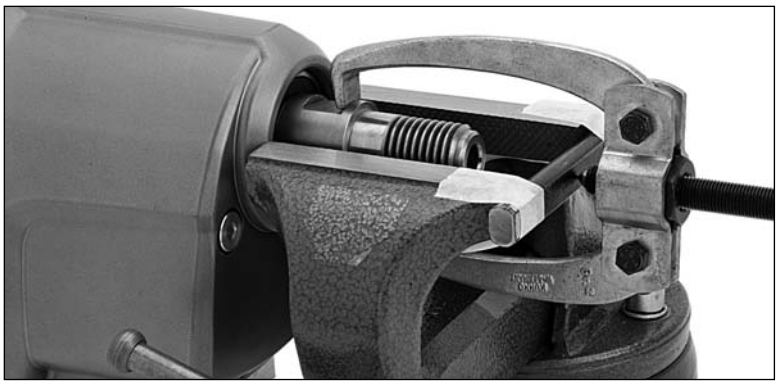
Remove the retaining ring on the spindle shaft: Expand the retaining ring using special pliers and lift up the ring gradually all around with a screwdriver.

(Special pliers are also used for assembly: Expand the retaining ring using pliers and lower the ring in place in the groove.)



The gear wheel has a sliding fit on the shaft and can normally be lifted off by hand.

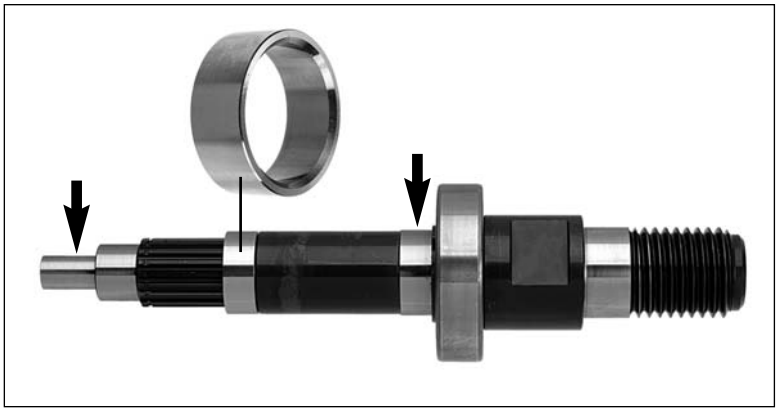
Remove the outer circlip on the gear housing exterior.



The easiest way of removing the spindle shaft is by using a hydraulic press.

Alternatively, the shaft can be pulled out of the gear housing as shown in the following arrangement.

The shaft must not be removed by knocking it out as this will deform the shaft end.



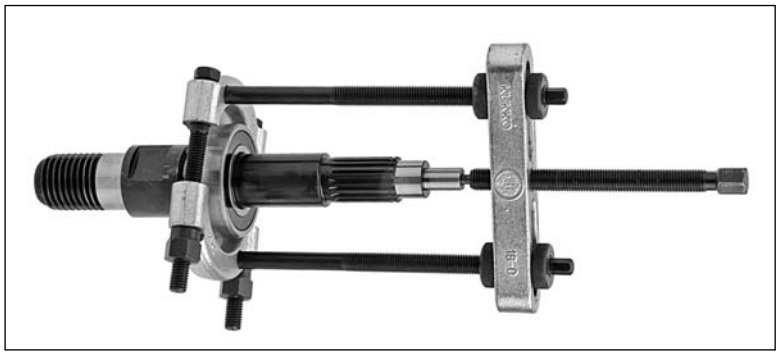
Caution
Be careful not to scratch the shaft where the radial seals touch (black arrows).

Spacer ring
The spindle shaft has a loose spacer ring that must not be mislaid.

Note that one side of the ring has a bevel towards the inner diameter. The ring's bevel must be turned in the direction of the drill attachment.
(Later versions may have bevels at both ends.)

Bearing replacement

Remove the bearing
Remove the bearing's inner circlip.



Remove the bearing from the shaft using the bearing puller 531 00 48-67 or with a hydraulic press.

Replace the radial seal
Always replace the radial shaft seal if the spindle shaft is removed or replaced.

Remove the radial seal with a suitable socket. Fit the new seal by gradually pressing it in with an object like a hammer handle. Grease the radial seal's sliding surfaces.

Fit the bearing
It is important that the inner ring has support when fitting. A piece of wood with a hole that provides the inner ring with support works well when fitting. A cooled shaft reduces the pressing force.

It is a good idea to use a hydraulic press when fitting, or alternatively the bearing can be knocked in place.

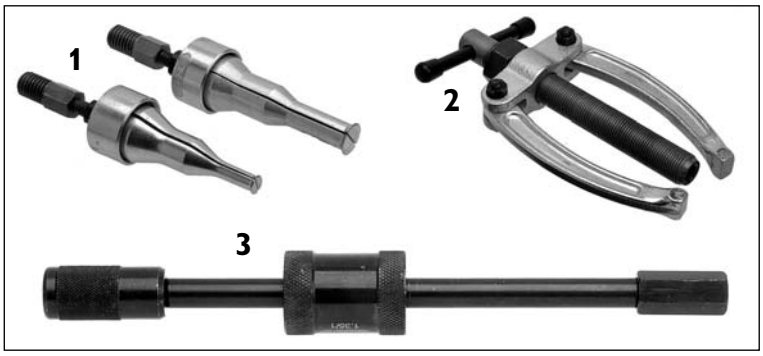
Observe caution ensuring that the shaft surface under the bearing is not scratched where the radial seal is in contact.

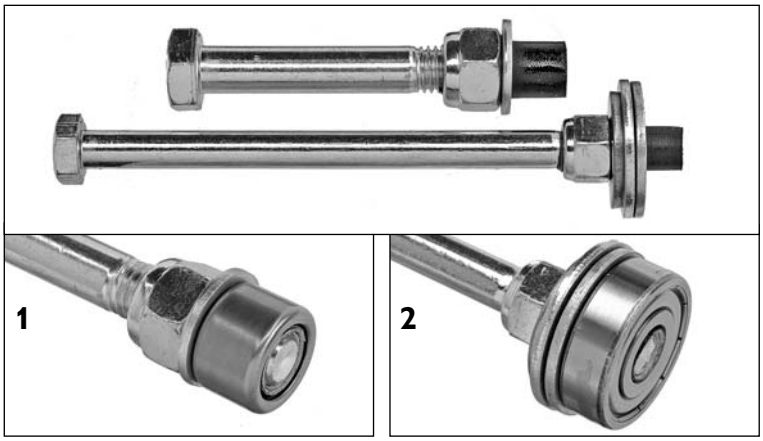
Fit the inner retaining ring
Do not forget to fit the inner circlip when the bearing has been fitted.

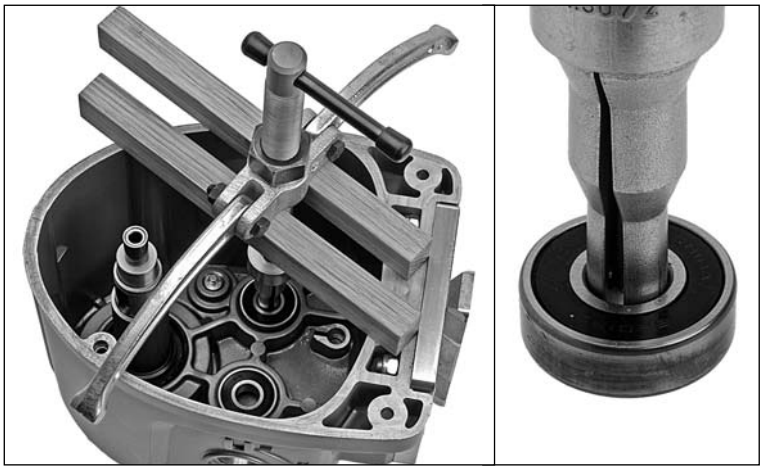
Fit the spindle shaft
The spindle shaft can be fitted without any pressing force in the gear housing by heating the bearing seat to about 100 °C and cooling the bearing with cooling spray. Push the shaft with the bearing in place and supplement, if necessary, with a few knocks with a punch around the bearing's outer ring.

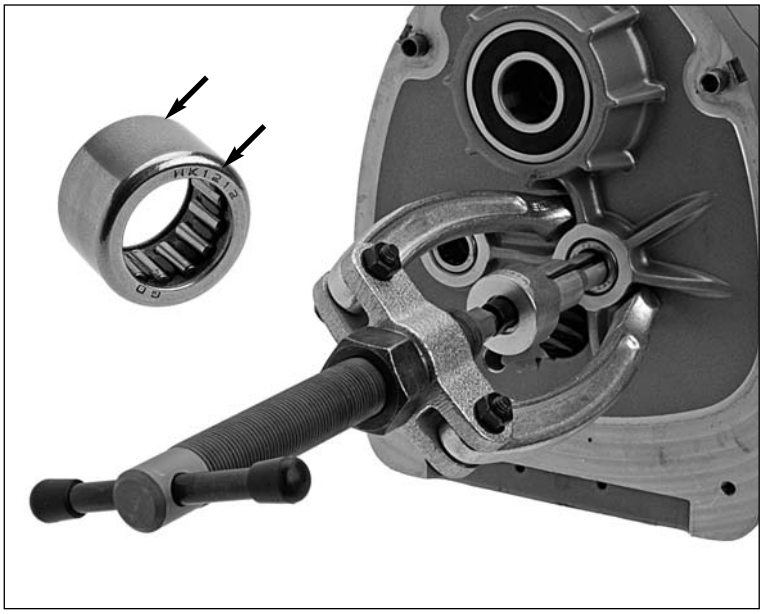
Alternatively fit the shaft using a hydraulic press.

Fit the retaining ring
Fit the outer circlip.









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.

Fitting

Since replacement of these bearings rarely occurs, there is no fitting device. 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. Fitting device for needle bearings.

2. Fitting device for ball bearings. It is important that the washers have a large enough diameter to support the ball bearing's outer ring when fitting. Press or knock down the bearing in place in the gear housing.

Gear housing ball bearings

Dismantling

Remove using a counter stay device. As it is difficult to find good support points for the counter stay device, the easiest solution is to create a bridge with a couple of strips of wood on the gear housing. Support the counter stay device against these and pull up the bearing.

Fitting

Use the tools solution as shown in image 2 above. Push or knock in the bearing.

Needle bearing

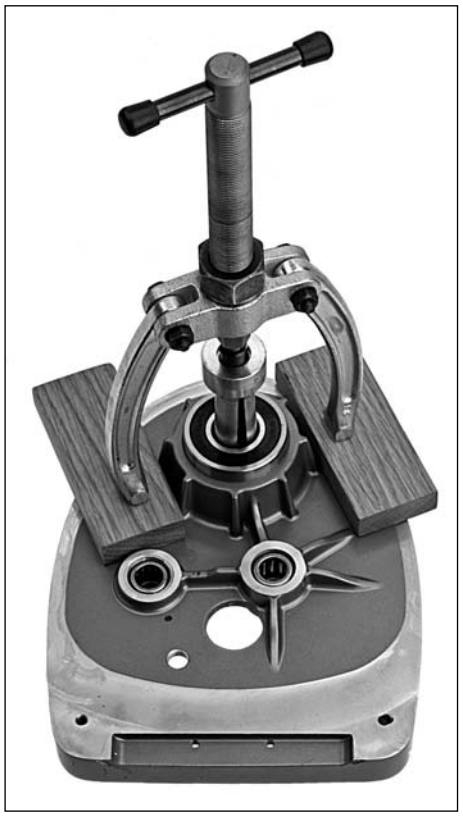
Dismantling

Remove using a counter stay device.

Fitting

Use the tool solution as shown in image 1 above. Push or knock in the bearing.

Note that the needle bearing cover usually has different radii, marked with arrows in the image. Fitting is easier if the most rounded side faces inwards to the bearing housing.



The spindle shaft bearing in the gear box cover

Dismantling

The bearing is easily removed with a counter stay device as shown in the adjacent image. Place a few pieces of wood under the legs of the counter stay device to distribute the pressure.

If the bearing is too tight, it helps to heat around the bearing seat.

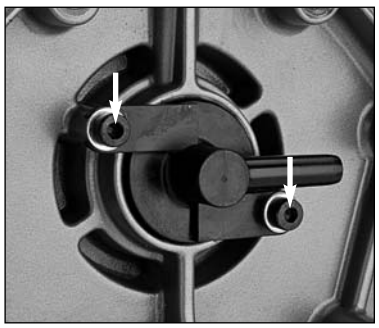
The bearing can also be removed by pressing. The sealing unit must be removed first in order to access the bearing.

Sealing unit

The sealing unit is a complete unit with double radial seal on the spindle shaft, and two O-rings that seal against the gear box cover. The unit must always be replaced if the spindle shaft bearing or spindle shaft is replaced.

Note the guide washer that sits at the bottom of the sealing device seat.

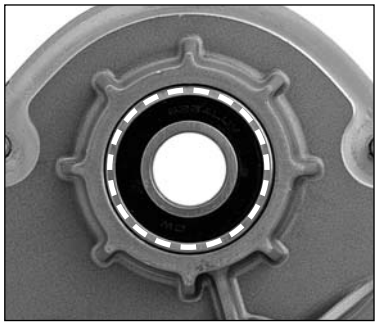
The removal and fitting of hose clamps is described on Page 19.



Remove the sealing unit

Remove the two screws.

The easiest way is to press out the sealing unit from the bearing side and then remove the bearing. Place a socket on the guide washer and press out the sealing unit. If the guide washer is deformed, replace it.



Fitting ball bearings

Fit the ball bearing using the hydraulic press.
Support the gear box cover against the surface closest to the bearing housing as shown in the image to the left.

It is important to apply pressing force to the ball bearing's outer ring, as shown in the image to the right.

The ball bearing can be fitted without any pressing forces by heating the bearing seat to about 100 °C and cooling the ball bearing.

Fitting the sealing unit

To avoid the risk of leakage, it is important to grease the two outer O-rings and the two inner radial seals that seal to the spindle shaft. Also grease the spindle shaft where it runs against the sealing unit. Use waterproof grease.

Do not forget the guide washer

Note that the guide washer must be fitted first. The collar should be turned upwards. (The guide washer controls the spindle shaft during assembly to ensure that the radial seals are not damaged.)

Now press in the sealing unit and screw it in place.

Electric motor

The motor belongs to the new generation of electric motors that work in conjunction with a high frequency unit. The rotor has permanent magnets and therefore has no carbon brushes. A typical feature is the high power to weight ratio.

The motor has been designed by Husqvarna. A unique feature is the advanced cooling system. This and the motor function are described on the next page.

Note that servicing measures for the motor are not described in this manual, as these cannot be carried out in a normal workshop without complicated special equipment and expert knowledge.

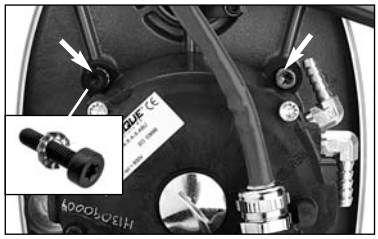
Dismantling

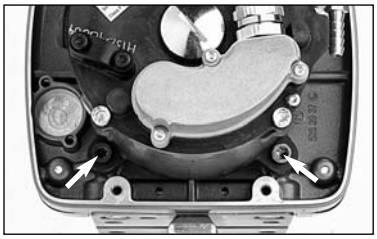
Remove hoses

Cut the hose clamps at the motor inlet and outlet connections for the cooling water. See description on Page 19.

Remove the cabling

Remove the two screws, (Allen key 3 mm) to the cable support and remove the cable.

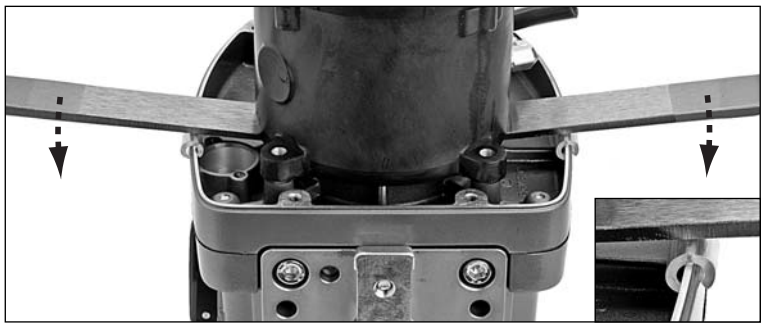




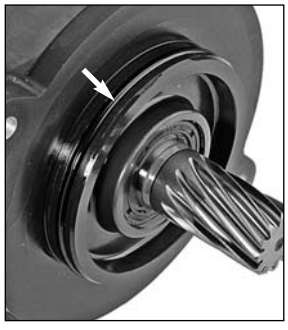
Remove the motor

The motor is secured to the gear box cover with four screws. Remove these. 4 x M5x20, 4-6 Nm

Note that the upper left screw has a washer.



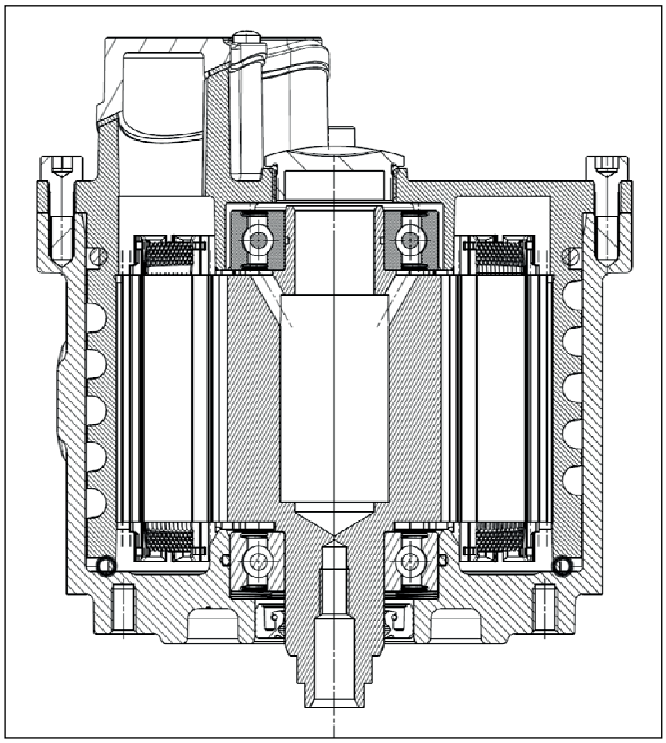
Pry up the motor to get the O-ring to release from the gear box cover. Place a soft object against the gear box cover to prevent damage to this, such as with a few cut tube stubs as shown.

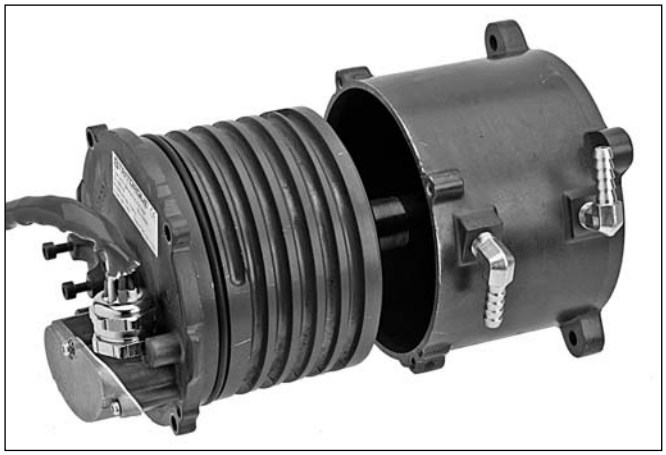


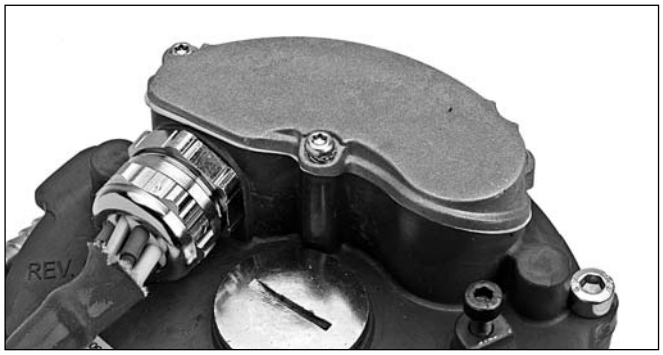
Fitting

Replace the O-ring

Always replace the O-ring if the motor is removed. Grease the O-ring when fitting the motor to the gear box cover.







Function

Working method

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

The rotor in the high frequency motor consists of permanent magnets with a high magnetic force, known as neodymium magnets. The rotor therefore has no windings and electrical components.

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

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

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

Cooling

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

The water is first directed through the motor and then on to the spindle shaft and the drill. The machine must not be operated without water cooling.

Testing in the workshop

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

Service actions

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

Rotor

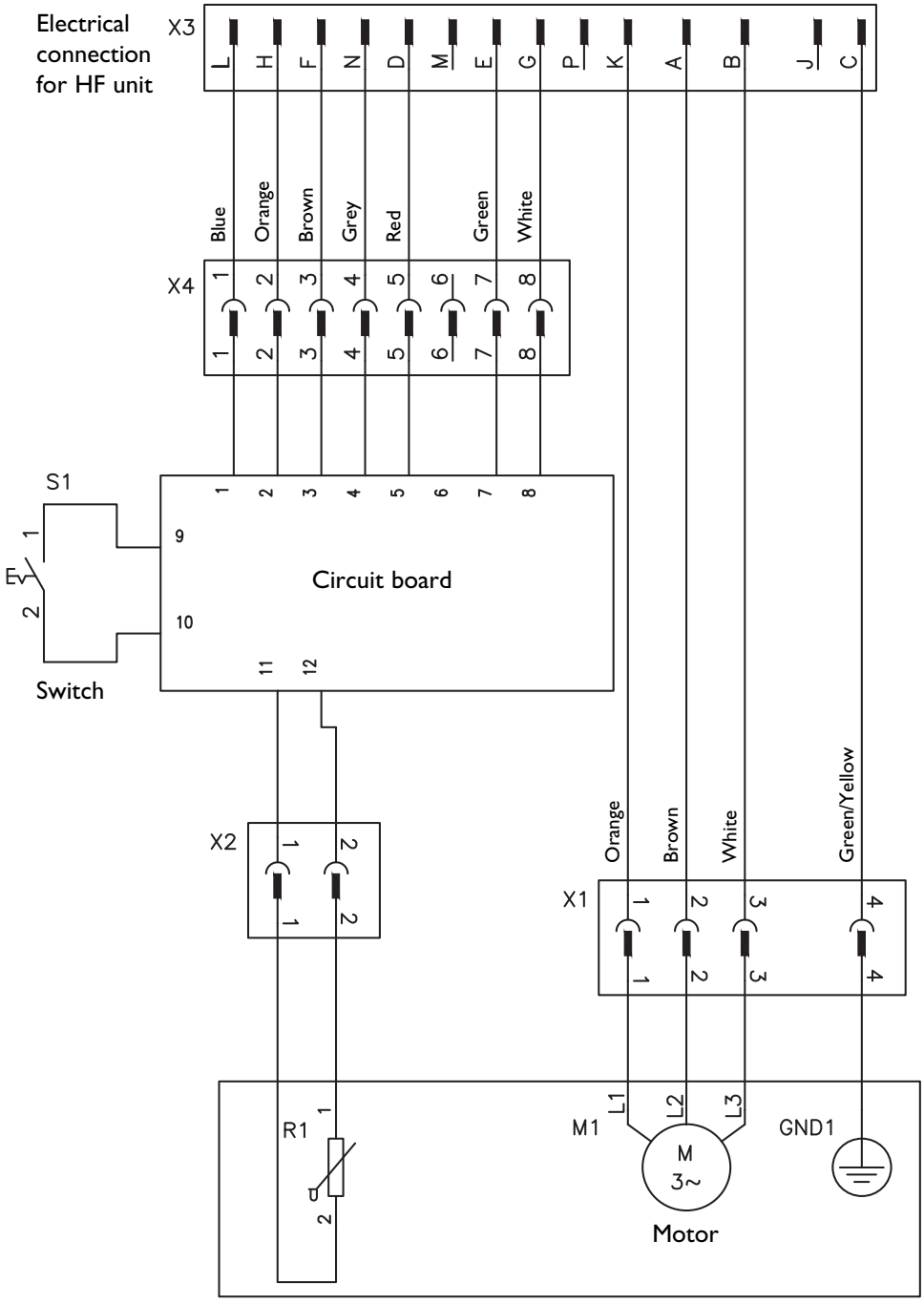
The rotor has permanent magnets of neodymium and therefore has no electrical components such as windings and carbon brushes.

The gear wheel that drives the primary shaft in the gear housing is attached to the shaft through shrinking. The gear wheel cannot be replaced separately.

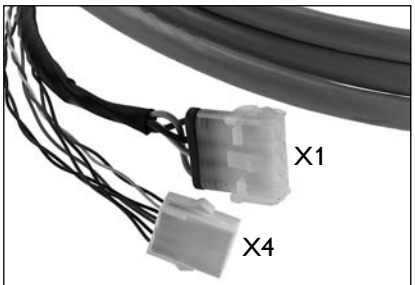
Thyristor

The thyristor is the motor's temperature sensor and is an integral part of the motor. The thyristor cannot be replaced separately.

Wiring diagram



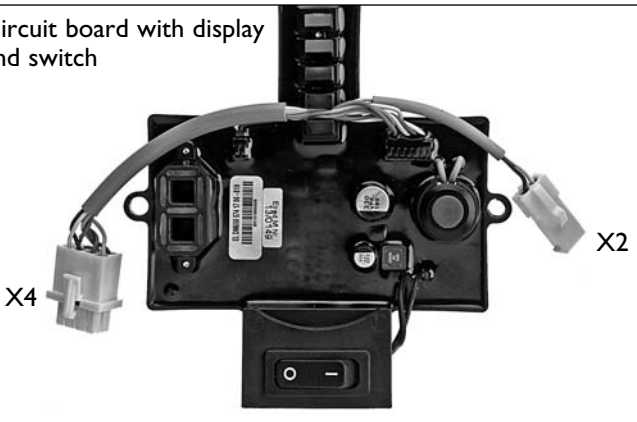
Connection for HF unit



Connections to motor and circuit board

Motor

Circuit board with display and switch



Hose clips

Oetiker system

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

Tool

Standard cutting pliers are used to remove the ear clip.

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

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

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

Dismantling

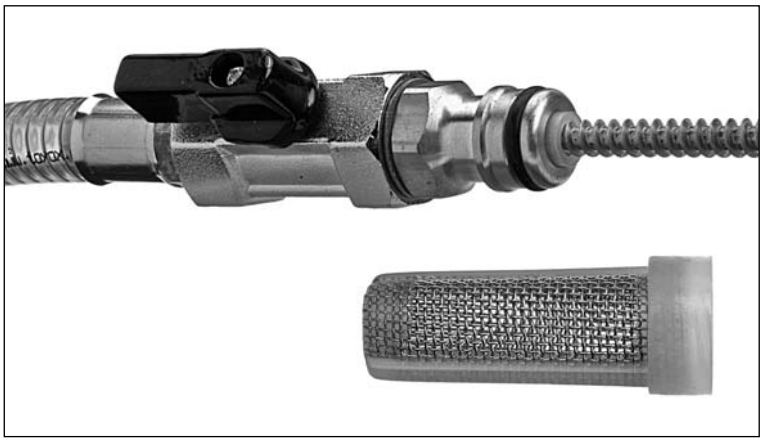
Use cutting pliers and cut the hose clip right across the ear.

Separate the clip and remove it.

Fitting

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

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



Water valve

The water valve has a connection for the Gardena coupling. To cool the motor, the machine must always be run with water. The only exception is short test running in the workshop without any load.

Filter

The hose coupling on the inlet side is fitted with a filter that should be checked when servicing and cleaned, or replaced if it is damaged.

A normal wood screw works excellently as a removal tool. Screw the screw into the filter and pull this out.

Fit the filter by pressing it in on a flat surface.

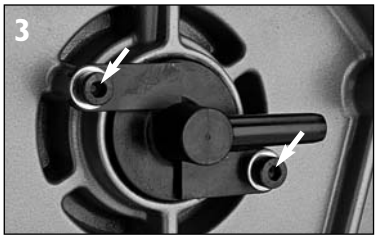
Elbow couplers

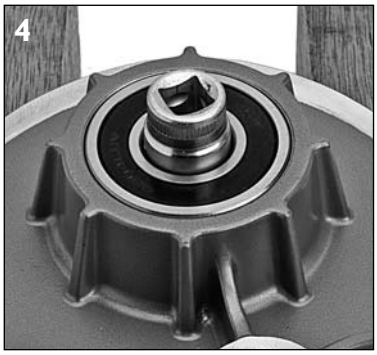
Two elbow couplers are connected to the motor for the cooling water supply. If these are removed they must be replaced with new ones.

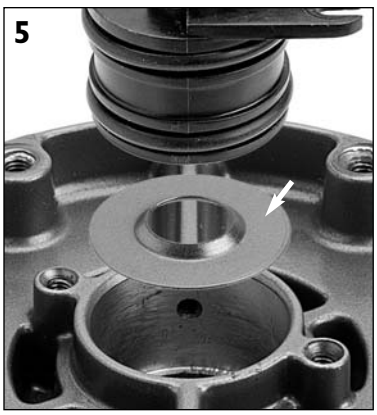
Fitting

The elbow couplers are taper-threaded and must not be applied with any kind of sealant during assembly.

Screw in the couplers all the way by hand. Now tighten with a tool one turn or more to align the connections as shown in the image on the left. Note that the couplers cannot be adjusted anti-clockwise during assembly as this will lead to leaks.







Sealing unit

Two outer O-rings seal against the gear housing's gear box cover and dual internal radial seals seal to the spindle shaft (1).
There are holes in the plastic body between the seals that connect with the channel that indicates leakage (2).
If water is leaking from the leakage channel, the radial seal closest to the motor is defective. Oil leaks indicate that the seal closest to the gear housing is defective.

Replacement

The sealing unit is replaced as a complete unit.

Remove the hose and the two screws (3). Pry off the sealing unit with, for example, a pair of slip-joint pliers. If this is not possible, the gear box cover must be removed and the sealing unit pressed out from the bearing side (4).

Check that the leakage channel is open by inserting a steel wire.

Grease the two outer O-rings and the two inner radial seals that seal to the spindle shaft. Also grease the spindle shaft where it runs against radial seals. Use waterproof grease.

Now press in the sealing unit and screw it in place.

Do not forget the guide washer!

Ensure that the guide washer (5) is in place before fitting the sealing unit. The collar should be facing upwards. (The guide washer centres the spindle shaft to prevent damage to the radial seals, when the gear box cover is fitted on the gear housing.)

Tools

Multimeter

A multimeter is needed for most of the tests in order to measure resistance (ohm) and inductance (H = Henry). The multimeter's connection test with a buzzer is used to check switches, cables, contacts, etc. (The Husqvarna range of tools includes an efficient multimeter; see page 25.)

Insulation and continuity tester

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

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

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

Carefully read the instrument's operators manual for use!

Tachometer and screwdriver

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

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

Rules of procedure for troubleshooting

Defective HF unit or drilling machine?

When troubleshooting, it is important to remember that the fault may be in either the drilling machine DM 700 or the PP70 unit. If you have access to another working PP70 and machine, these can be used in order to identify the faulty unit.

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

Troubleshooting DM 700

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

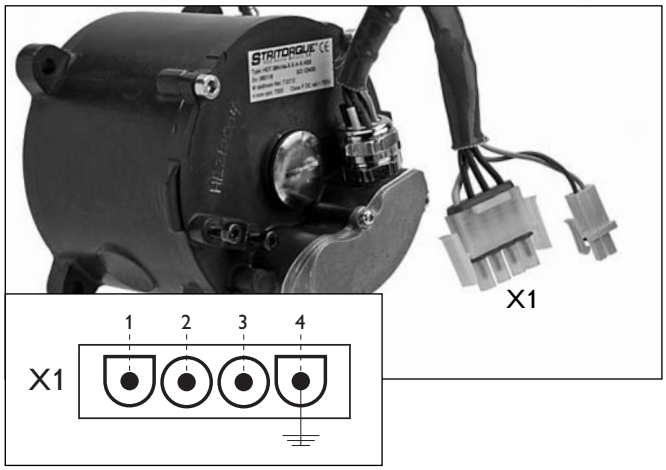
The motor will not start

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

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

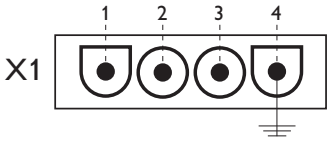
Remove the display unit

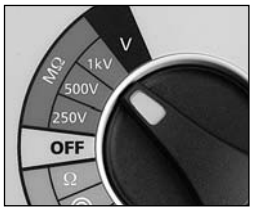
For all checks, it is necessary to remove the drilling machine's display unit as illustrated in order to make the electrical couplers accessible.



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

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





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

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

Motor

Disassemble the machine to ensure that the motor connectors are accessible, as shown in the previous image. In order to test the motor magnets, the motor must be removed from the machine.

Short-circuit testing

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

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

Resistance and induction measurement

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

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

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

Insulation testing

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

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

Rotor magnets

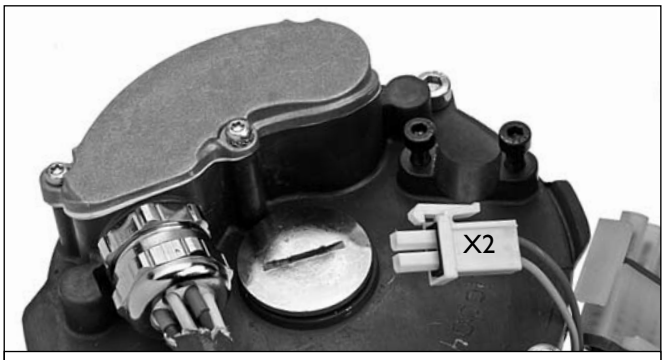
The rotor in the motor has permanent magnets with high magnetic energy, known as neodymium magnets. As with all permanent magnets, high temperature, blows, vibration and powerful external fields "wear out" the magnetic force. The service life of the machine is probably not limited by the rotor. A defective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

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

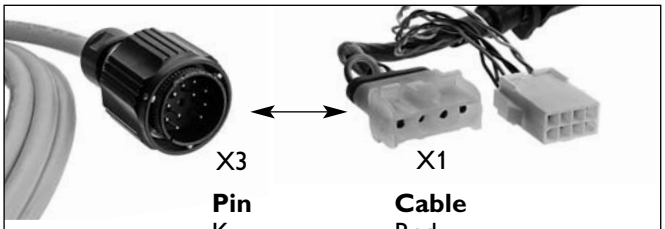
The rotor magnets are tested as follows:
No special tools have been designed for this test. A reliable solution is to use a piece of 3/4-inch hose with hose clamps. Thread the hose over the rotor's gear wheel and secure with a hose clamp. Push a tool socket in the other end and secure with a hose clamp. Select a suitable screw that is attached to a cordless drill.

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

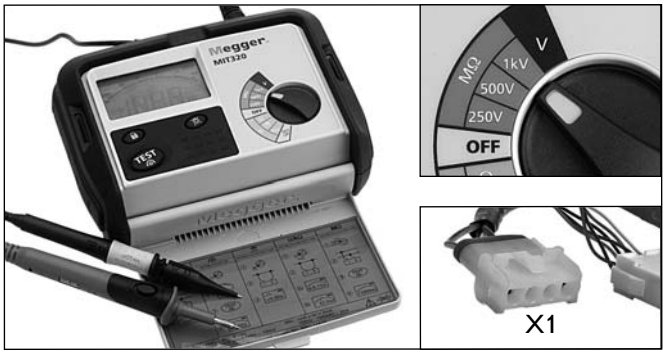
Repeat the test for all three phases: these must all give the same value, otherwise there is a fault in the stator windings.



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

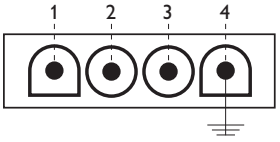


Pin	Cable
K	Red
A	Brown
B	White
C earth	Green/yellow



Insulation testing of motor cables

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



Thermistor

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

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

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

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

Cable between PP70 and DM 700

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

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

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

Motor cables – connection testing

Set the multimeter for connection testing with a buzzer.

Check that the three phase lines and the earth cable are connected to the contacts on the cable ends. The labelling and cable colours for the contact pins are shown in the adjacent photo (see also the diagram on page 18).

Motor cables – insulation testing

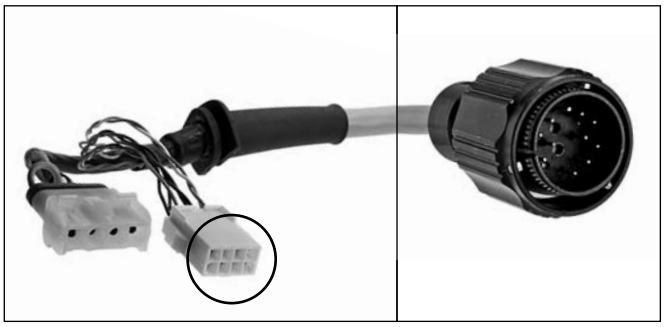
Set the insulation tester to give a voltage of 1,000 volts.

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

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

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

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

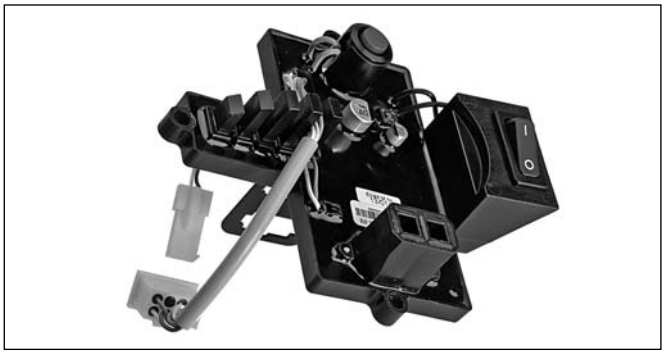


Signal cables, connection testing and insulation testing
This test is used to check whether any cable is broken and whether there is any damaged insulation which is causing the wires to come into contact with one another.

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

Test methodically. The easiest way to proceed is to start from the rectangular connector. Place the first test pin in any terminal. Use the second test pin to test against all pins in the round contact. If the cabling is intact, there must be a connection with one of the pins, but not with any of the others. Proceed using the same method to test the other cables. Note that there are pins with no cable connections: see the wiring diagram on page 18.

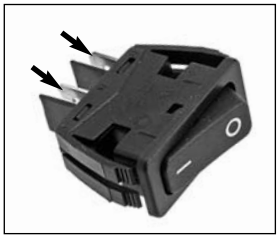
There is very little likelihood of any of the signal cables coming into contact with the motor cables due to damaged insulation, but this can be tested by also including the motor's connector in the test.

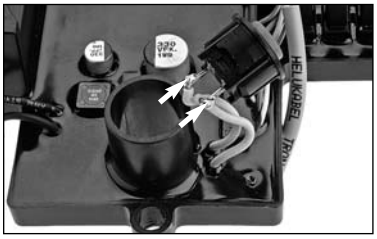


Display card

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

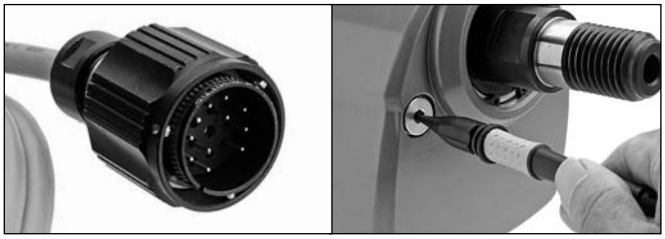
Note: Even if the display shows communication between the drilling machine and the HF unit, this is not proof that the cabling between the two is fault-free.





Switch

The main switch and push button for low speed (used when reinforcement bars are used in concrete) can be easily tested using a multimeter. Check that the switches open and close the circuit board in the intended way.



Insulation and earth continuity testing

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

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

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

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

Earth continuity testing
Measure against earth pin C and earth point

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

● = Service stage

The tools below can be acquired from Husqvarna.

531 12 31-22
Clamping ring

● Adjustment of the gear box's slip clutch.

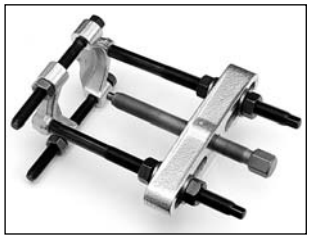
Used together with adapter 522 91 40-03.

522 91 40-03
Adapter

Used together with clamping ring 531 12 31-22.

581 92 82-01
Turning bar

● Adjustment of the gear box's slip clutch.



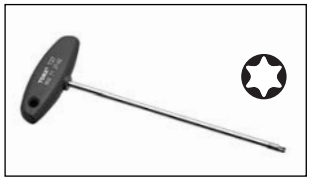
531 00 48-67
Bearing puller

● Removal of the spindle shaft's bearing.

Workshop wrench, Allen

● Universal use

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



502 71 27-03
502 71 27-03
Workshop wrench, Torx T27

● Universal use

504 90 00-06
Workshop kit, mm dimensions

● Universal use

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

504 90 90-02
Universal puller

● Removal of primary and secondary shaft.

● Removal of spindle shaft.

581 54 15-01
Multimeter

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

● Checking of the electric motor's functions

The special tools below are needed for servicing work on the DM 700 but are not sold by Husqvarna.

Lock ring pliers

Make: Milbar/Imperial IR-15R.
Pliers with small lock rings without eyes.

● Removal and installation of secondary and spindle shaft 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.

Insulation and continuity tester

Common makes: Megger, Fluke, etc.

● Checking of the motor's windings and cabling

Tachometer

A number of optical tachometer makes are available.

● Checking of the motor's magnets

Oetiker special pliers

Recommended tool. Sold by distributors of Oetiker hose clips.

● Fitting of Oetiker hose clips

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