Husqvarna®

Workshop manual

DM 200

English

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1 Introduction

1.1 Document description

This manual gives a full description of how to do maintenance and repair on the product. It also gives safety instructions that the personnel must obey.

1.2 Target group

This manual is for personnel with a general knowledge of how to do repair and do servicing. All personnel that do repair or do servicing on the product must read and understand the manual.

1.3 Revisions

Changes to the product can cause changes to the maintenance work and spare parts. Separate information is sent out for each change.

Read the manual together with all received information about changes to maintenance and spare parts for the product.

1.4 Safety

WARNING: All personnel that repair or do servicing on the product must read and understand the safety instructions in this workshop manual.

1.5 Servicing tools

The manual gives information about necessary servicing tools. Always use original tools from Husqvarna.

2 Safety

2.1 Safety definitions

Warnings, cautions and notes are used to point out specially important parts of the manual.

WARNING: Used if there is a risk of injury or death for the operator or bystanders if the instructions in the manual are not obeyed.

CAUTION: Used if there is a risk of damage to the product, other materials or the adjacent area if the instructions in the manual are not obeyed.

Note: Used to give more information that is necessary in a given situation.

2.2 General safety instructions

- You must not repair the product unless you have read and understood this workshop manual.
- The service center where the product is repaired must have safety equipment approved by local bylaws.
- The product is examined and approved only with the equipment given or recommended by the manufacturer.
- Service personnel must make sure that the service and repairs in this manual are done following legal requirements. This in order to avoid health and safety risks of the personnel doing the work.
- When possible, disconnect the power cable and make sure it cannot be connected until the service is completed.
- If you keep the product running during service, do not touch the wires. Electrical shock can cause injury.
- Follow the local waste regulations.
- Always make sure all nuts and bolts are correctly tightened.
- Do not lift the machine by holding the cable and do not pull the plug by pulling the cable.
- Check that the cables are not damaged and in good condition.
- Do not use the product if a cable is damaged.
- Use protective gloves and eye protection. Goggles must follow the ANSI Z87.1 for US or EN166 for EU countries.
- When using compressed air, do not point it to your body. Air can go in to the blood stream.
- Wear ear protection when test running.
- The product can make sparks and cause ignition of flammable materials.
- If a warning symbol decal on the product is damaged or missing, replace the warning symbol decal.

2.3 Symbols on the product

WARNING! This product can be dangerous and cause serious injury or death to the operator or others. Be careful and use the product correctly.

Read the operator's manual carefully and make sure that you understand the instructions before you use this product.

Always use approved personal protective equipment.

This product complies with applicable EC directives. (EU only).

Environmental mark. The product or package of the product is not domestic waste. Recycle it at an approved disposal location for electrical and electronic equipment.

Make sure that water cannot leak into the product when you drill in the ceiling. Use an applicable water collector.

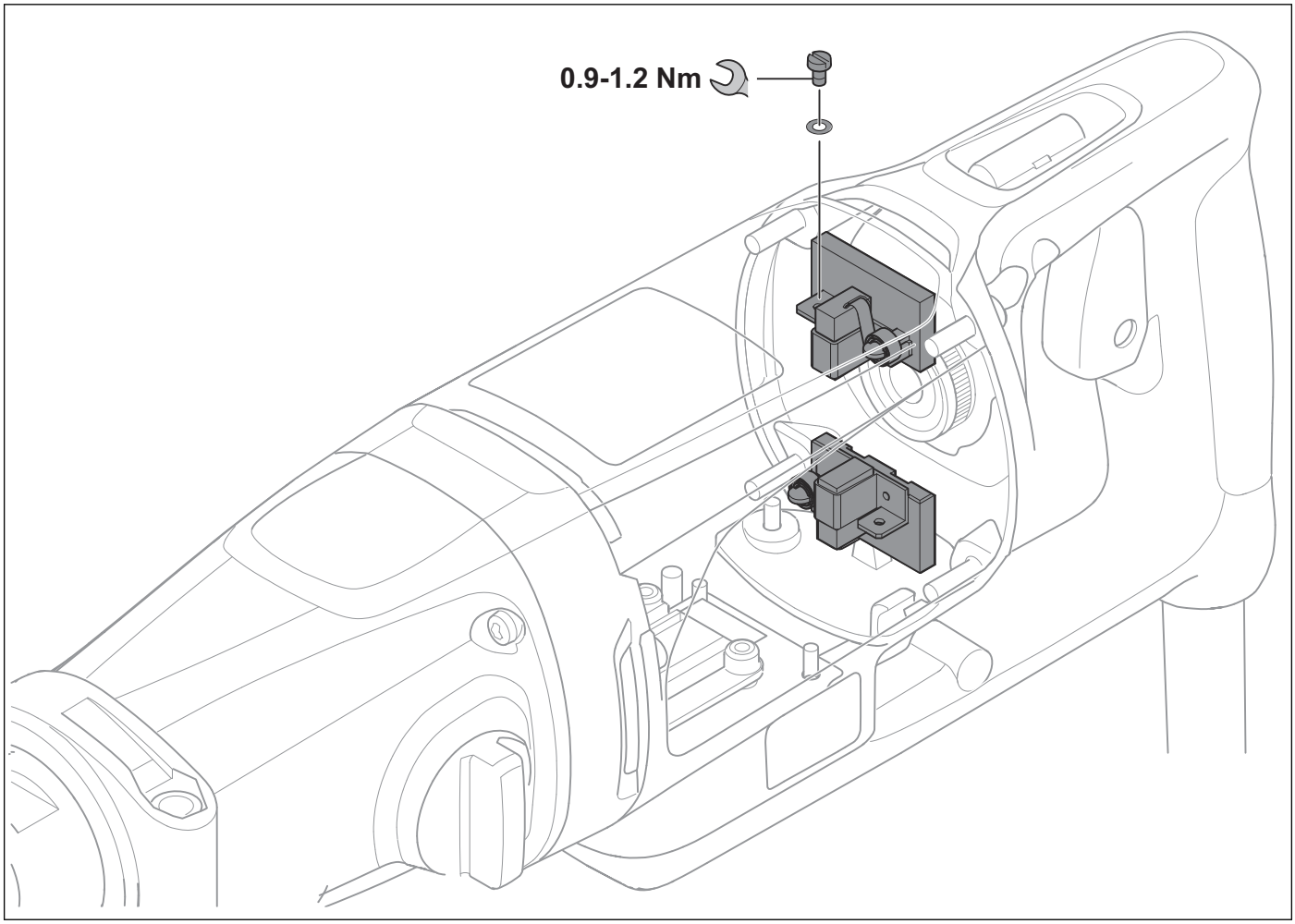
Note: Other symbols/decals on the product refer to special certification requirements for some markets.

3 Servicing data

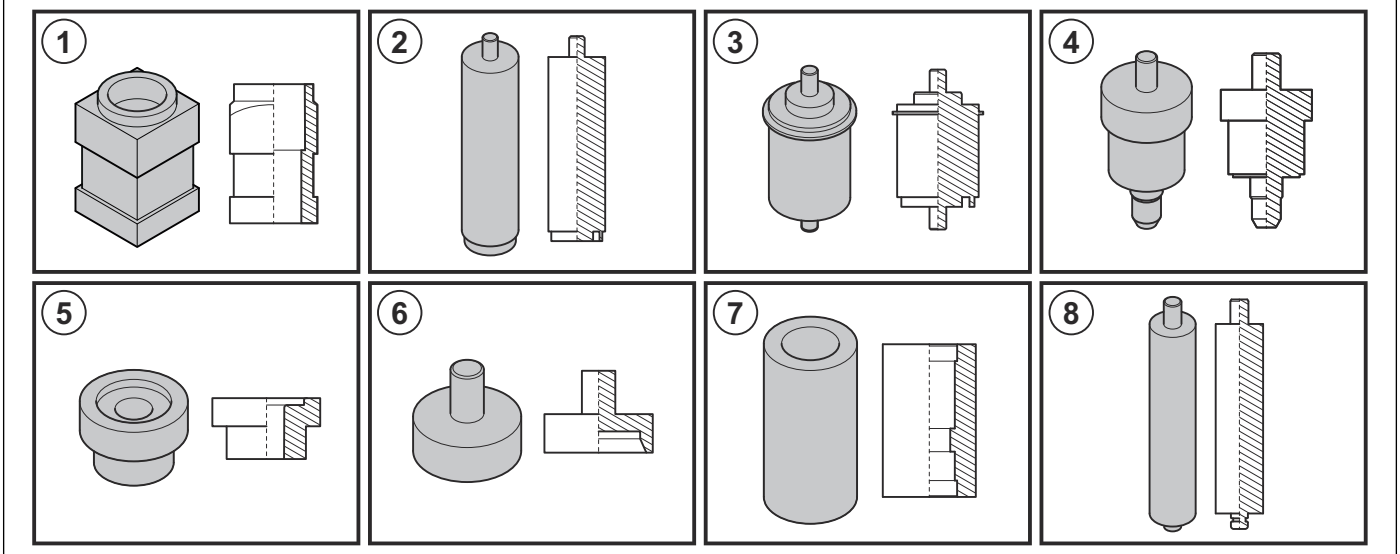
3.1 Symbols in the diagrams

Tightening torque, Nm

3.2 Tightening torques

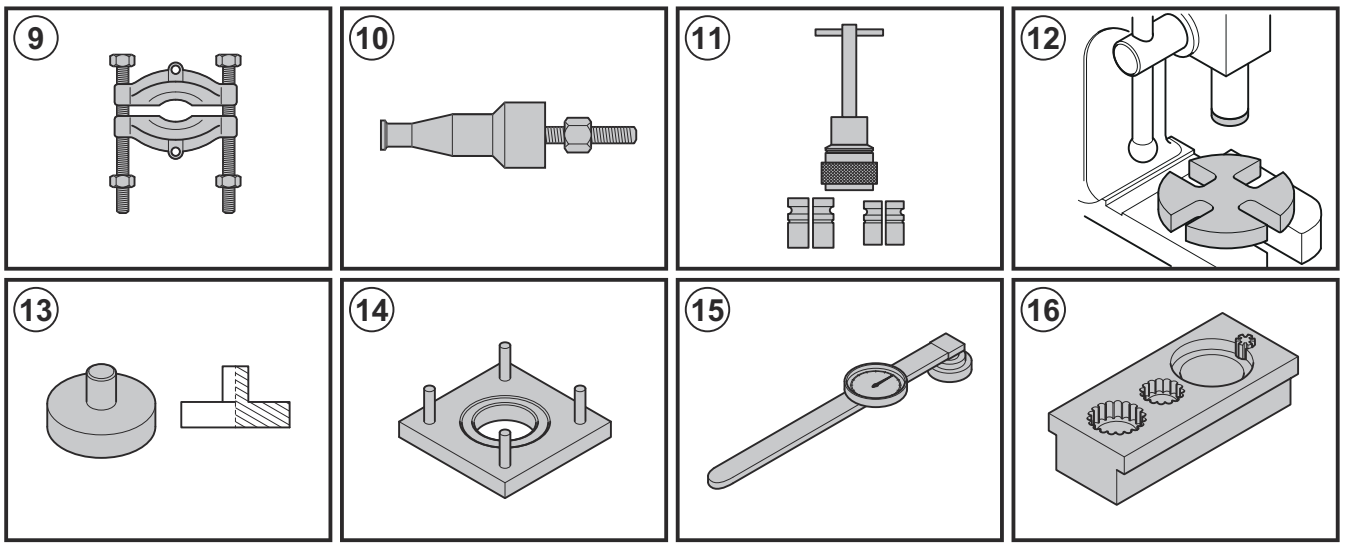


4.1 Servicing tools overview 1



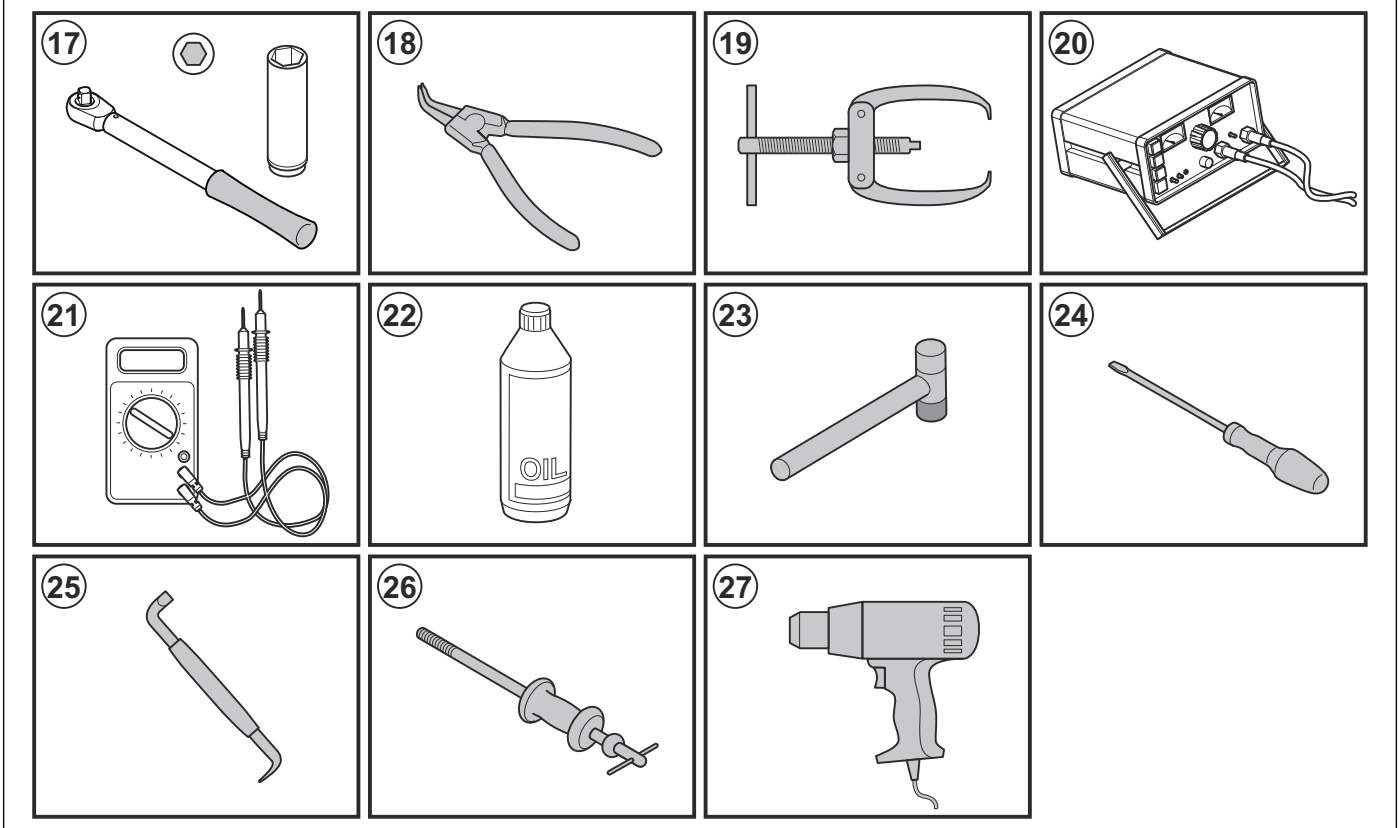
Pos.	Designation	Used for	Order No./Source
1	Machine holder tool	To attach the product to a vise. Refer to *To disassemble the product on page 10* and *To replace the gear oil on page 14*.	598 94 68-01
2	Shaft seal press tool	To replace the shaft seals for the drill spindle. Refer to *To replace the shaft seals for the drill spindle on page 20*.	531 14 23-01
3	Shaft seal press tool	To replace the shaft seals for the drill spindle. Refer to *To replace the shaft seals for the drill spindle on page 20*.	531 14 24-01
4	Shaft seal press tool	To replace the gear oil seal. Refer to *To replace the gear oil seal on page 14*.	598 94 73-01
5	Bearing press tool	To assemble the rotor. Refer to *To assemble the rotor on page 26*.	531 14 25-01
6	Bearing press tool	To assemble the rotor. Refer to *To assemble the rotor on page 26*.	531 14 27-01
7	Sleeve press tool	To replace the shaft sleeves for the drill spindle. Refer to *To replace the shaft sleeves for the drill spindle on page 18*.	531 14 28-01
8	Bearing press tool	To install the gear housing bearing. Refer to *To install the ball bearing in the gear housing on page 23*.	531 14 31-01

4.2 Servicing tools overview 2



Pos.	Designation	Used for	Order No./Source
9	Separator puller tool	To replace the shaft sleeves for the drill spindle. Refer to *To replace the shaft sleeves for the drill spindle on page 18*. To remove the drill spindle bearing. Refer to *To remove the drill spindle on page 16*.	598 94 78-01
10	Inner bearing puller tool	To remove the middle cover bearings. Refer to *To remove the needle bearings from the middle cover on page 23*.	531 14 32-01
11	Bearing puller tool	-	598 95 44-01
	Insert for roller bearing	To disassemble the rotor. Refer to *To disassemble the rotor on page 26*.	531 14 33-01
			598 95 45-01
12	Mandrel press	To install and remove product parts.	598 95 53-01
13	Protective tool for mandrel press	To install and remove product parts.	598 95 55-01
14	Press tool for motor housing	To assemble the stator. Refer to *To assemble the stator on page 28*.	531 14 34-01
15	Torque wrench	To control the tightening torque of the safety coupling. Refer to *To assemble the pinion shaft on page 25*.	531 14 36-01
16	Pinion shaft holder tool	To assemble the pinion shaft. Refer to *To assemble the pinion shaft on page 25*.	531 14 37-01

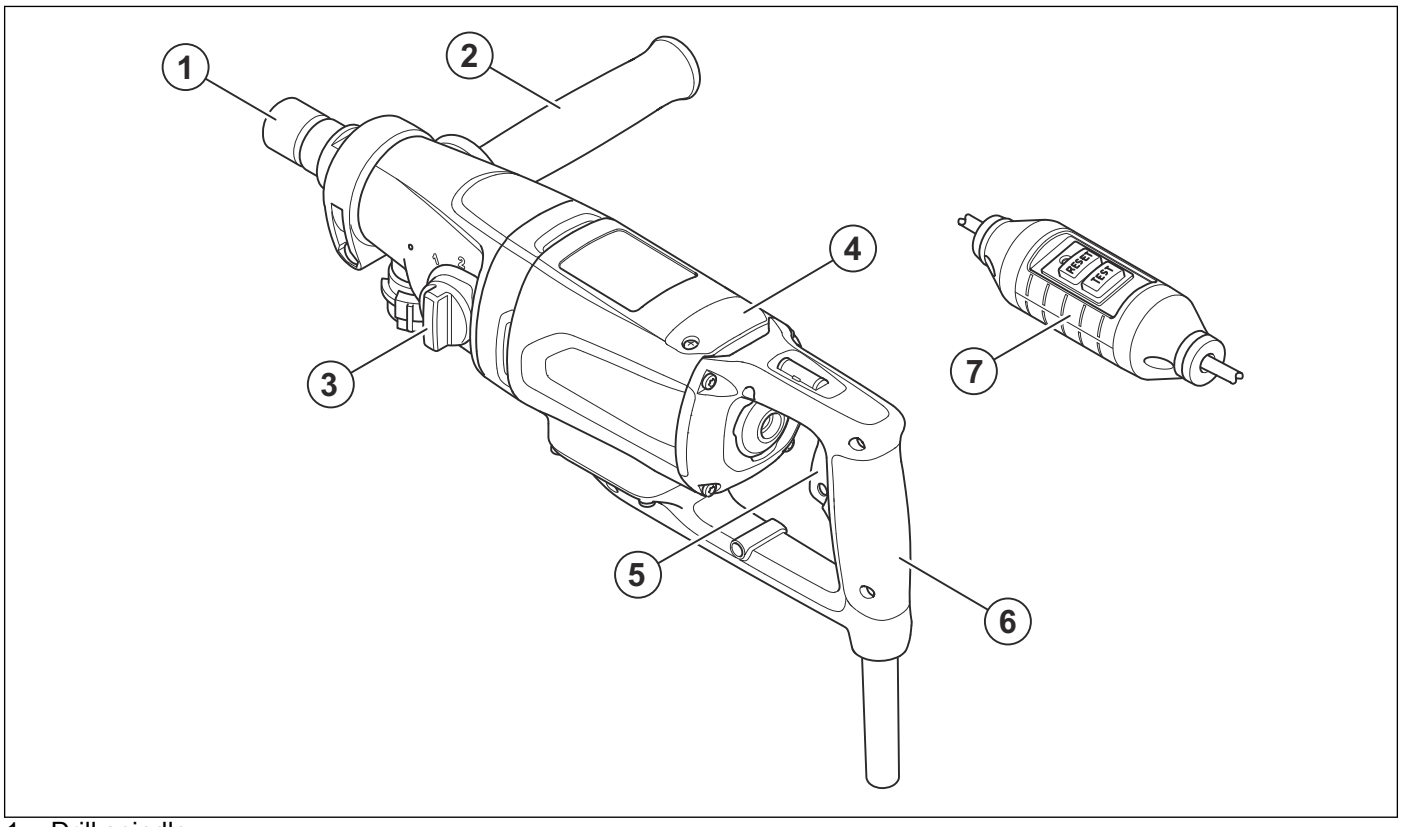
4.3 Servicing tools overview 3



Pos.	Designation	Used for	Order No./Source
17	Wrench	To install and remove product parts.	There are many manufacturers.
18	Circlip pliers	To install and remove product parts.	There are many manufacturers.
19	Small puller tool	To remove the pinion shaft. Refer to *To remove the pinion shaft on page 15*.	There are many manufacturers.
20	High voltage tester	To control the functions of the electrical system.	There are many manufacturers.
21	Multimeter	To control the functions of the electrical system.	There are many manufacturers.
22	Gear oil	Use 130 ml	Castrol ALPHA SP150 or equivalent.
23	Soft head mallet	To install and remove product parts.	There are many manufacturers.
24	Screwdriver	To install and remove product parts.	There are many manufacturers.
25	Offset screwdriver	To install and remove product parts.	There are many manufacturers.
26	Slide hammer	To remove the gear housing bearing. Refer to *To remove the ball bearing from the gear housing on page 22*.	There are many manufacturers.
27	Hot air gun	To install and remove product parts.	There are many manufacturers.

5 Product overview for repair and servicing

5.1 Product overview



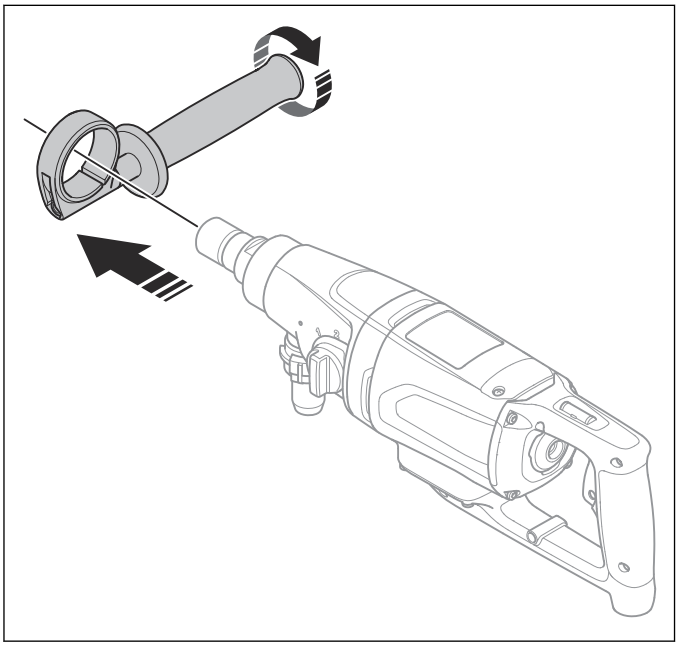
1. Drill spindle
2. Front handle
3. Gear selector
4. Carbon brush cover
5. Power switch
6. Rear handle
7. PRCD (Portable Residual Current Device)

6.1 To clean and examine the product parts

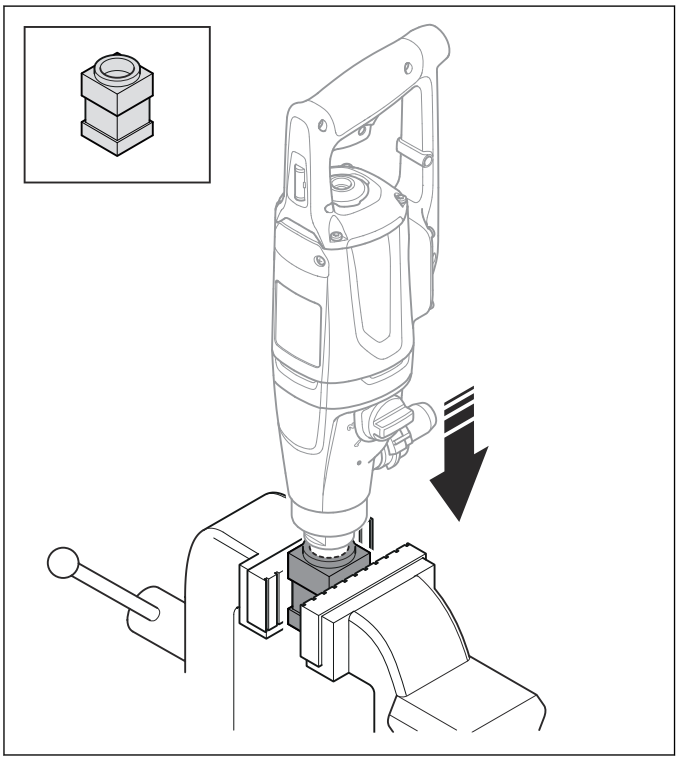
- Clean and examine all parts fully. You find more instructions in the chapter for each part if special tools or procedures are necessary.
- Replace damaged or defective parts.
- Always use original spare parts.

6.2 To disassemble the product

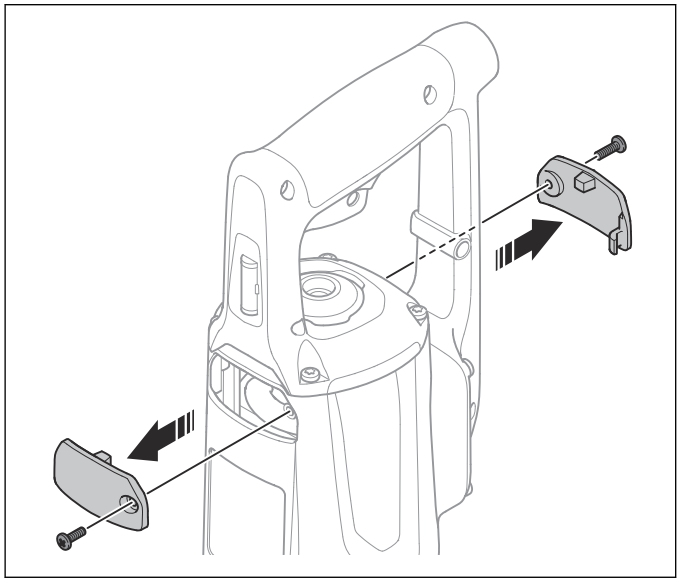
1. Remove the front handle.



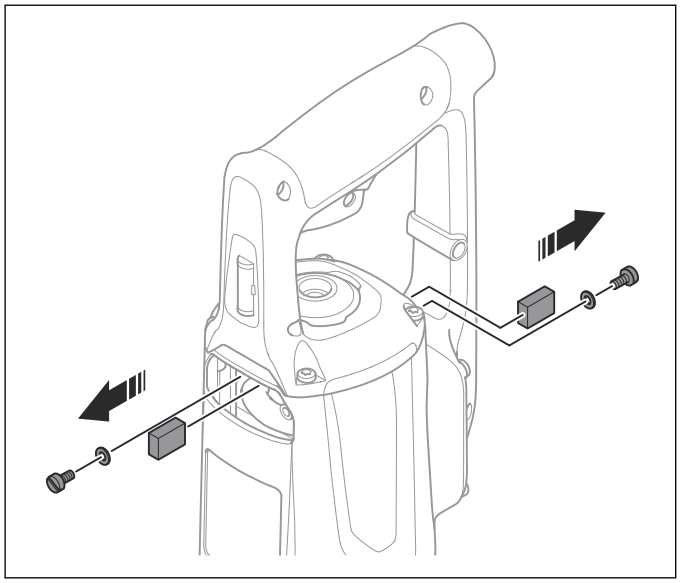
2. Attach the machine holder tool to a vise. Refer to *Servicing tools on page 6*. Put the product in a vertical position with the drill spindle in the machine holder tool.



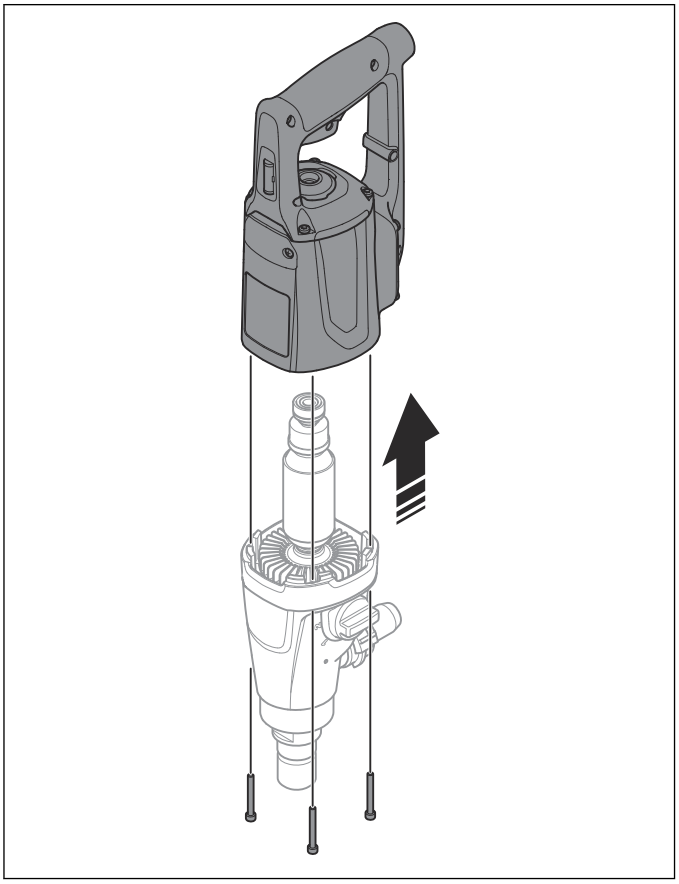
3. Remove the 2 screws that hold the carbon brush covers. Remove the carbon brush covers.



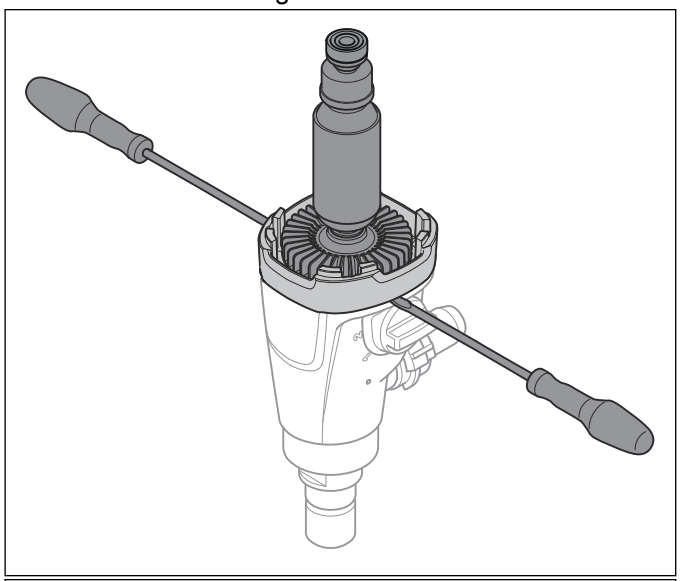
4. Remove the 2 screws and the 2 washers for the connection wires of the carbon brushes. Pull the carbon brushes out from the holders.

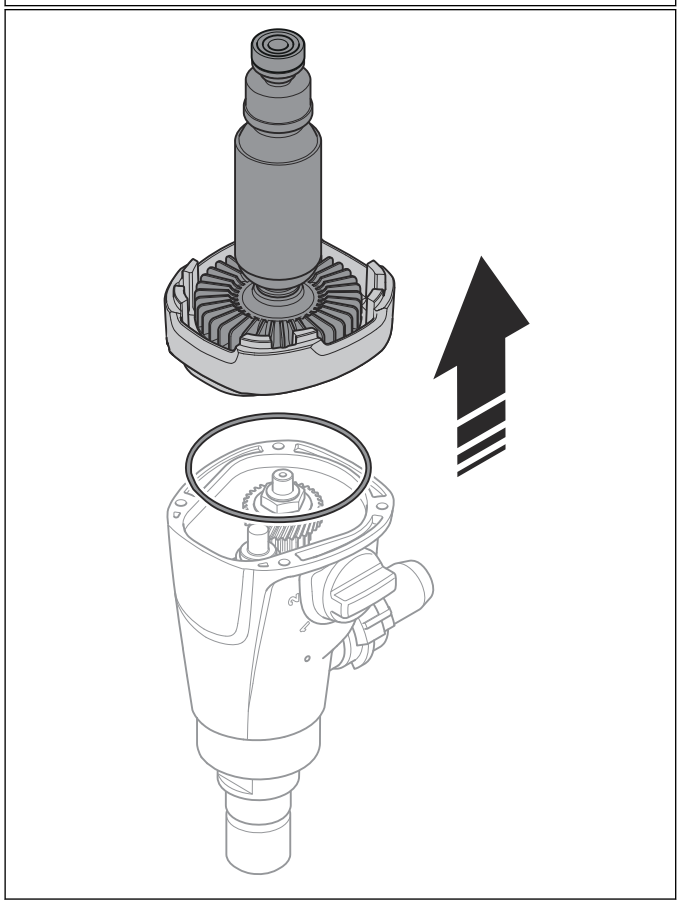


5. Remove the 4 screws that hold the motor housing. Remove the motor housing.



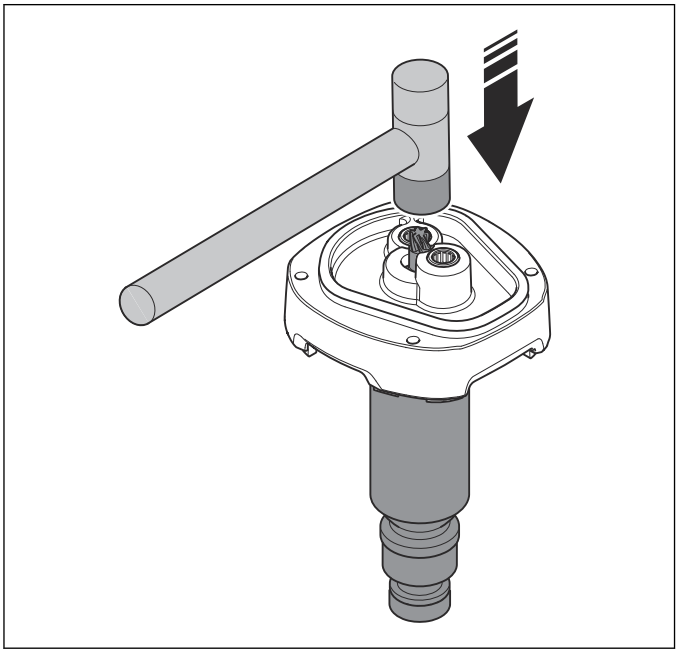
6. Put 2 flat screwdrivers in the recesses on the gear housing. Carefully loosen the middle cover. Remove the middle cover together with the rotor.





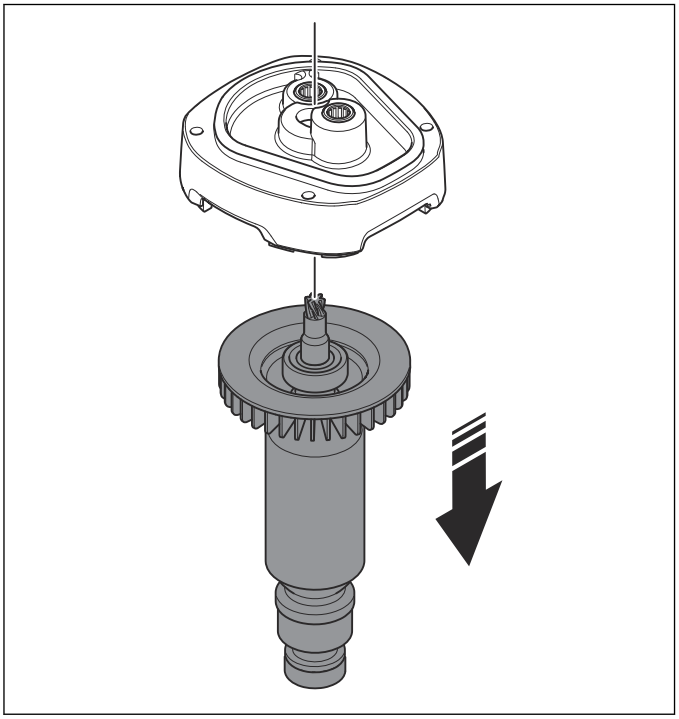
CAUTION: Make sure that the O-ring is not damaged.

7. Tap the rotor shaft carefully with a soft head mallet to loosen it.



CAUTION: Make sure that the metal surface does not become damaged.

8. Remove the rotor from the middle cover.



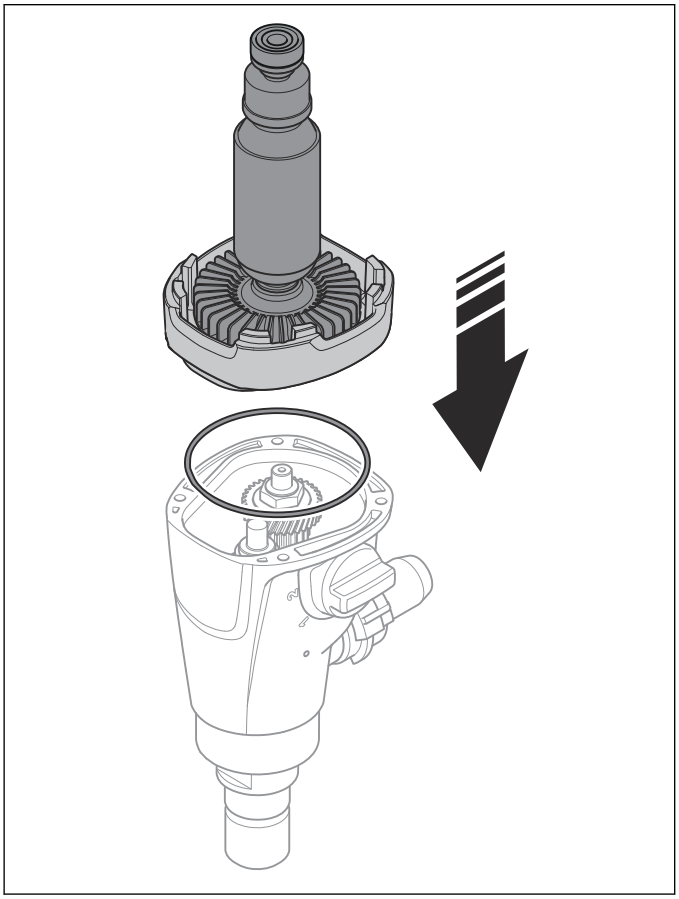
6.3 To assemble the product

Refer to *To assemble the rotor on page 26* to assemble the rotor.

Refer to *To assemble the stator on page 28* to assemble the stator.

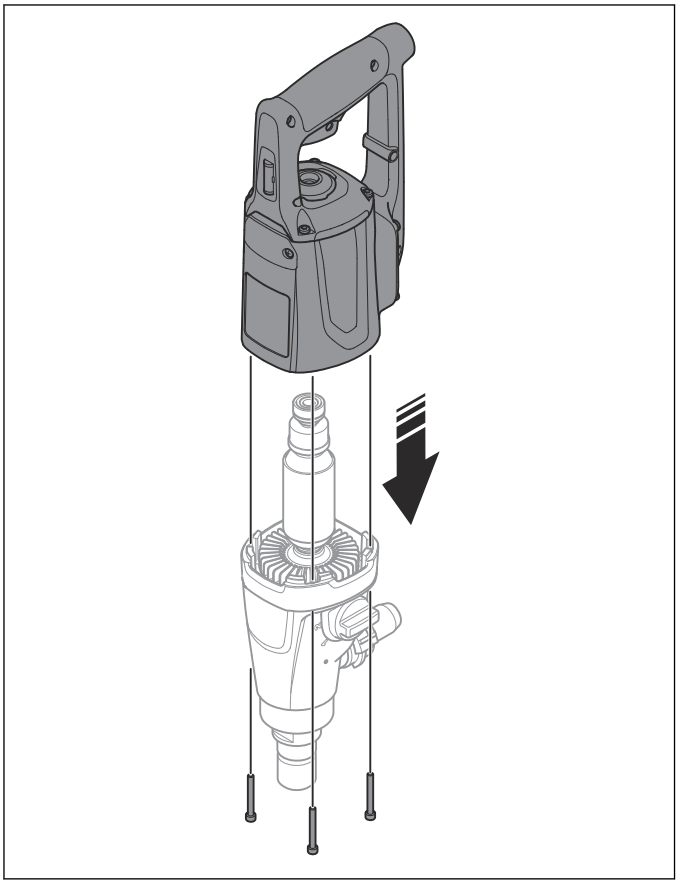
Refer to *To replace the gear oil on page 14* to replace the gear oil.

1. Put the middle cover with the rotor on the gear housing.

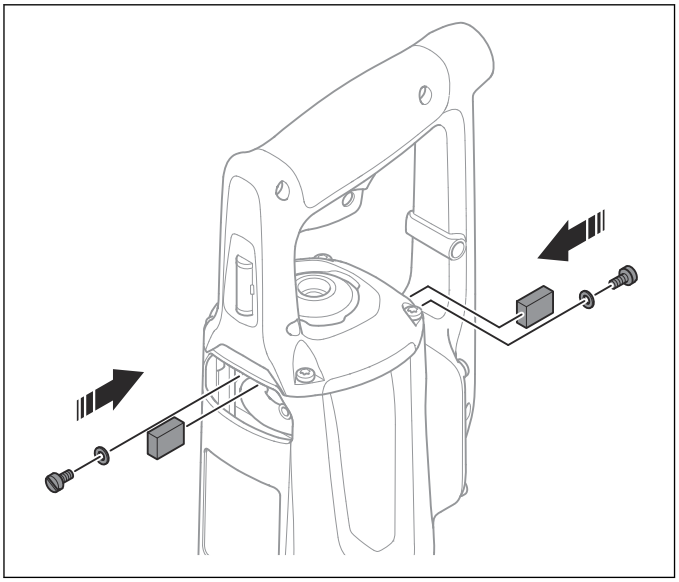


CAUTION: Make sure that the O-ring is not damaged.

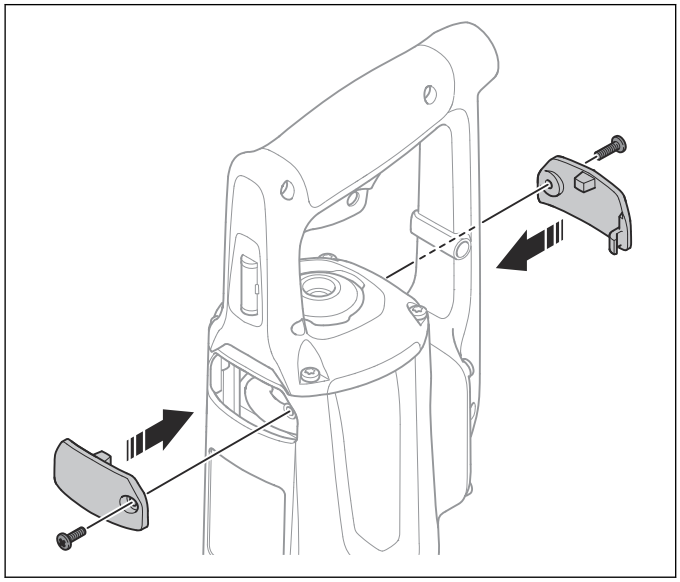
2. Put the motor housing on the middle cover. Align the screw holes in the gear housing with the holes in the motor housing. Put the 4 screws in the screw holes. Make sure that the rotor bearing is attached to the bearing seat. Tighten the 4 screws.



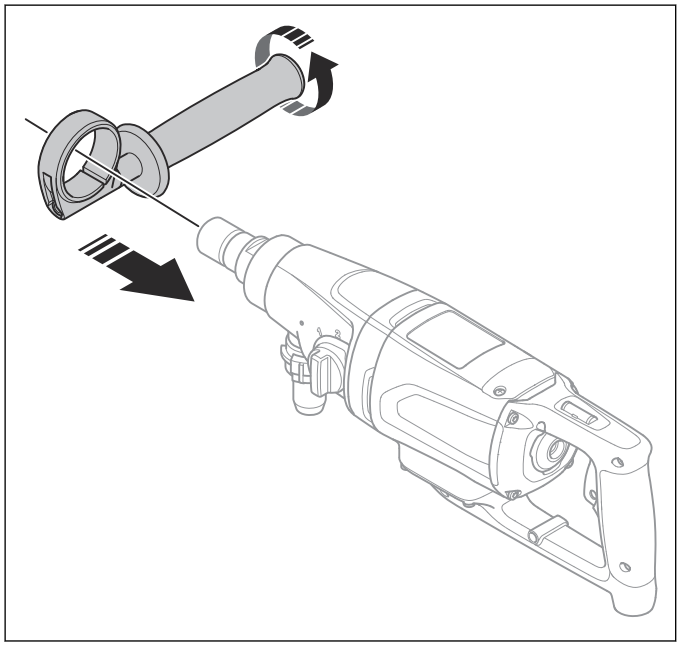
3. Install the carbon brushes in the holders. Install the brush connection wires with the 2 screws and the 2 washers.



4. Install the carbon brush covers with the 2 screws.



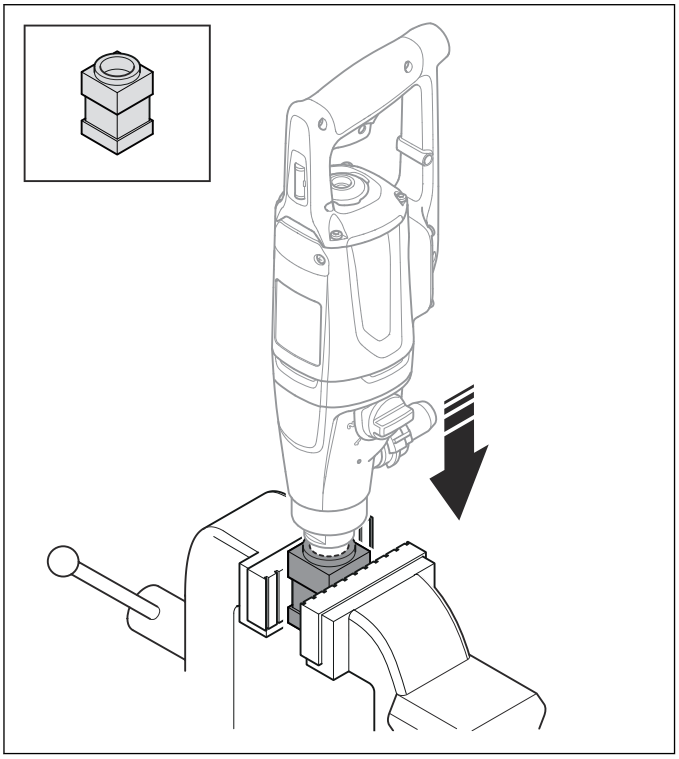
5. Install the front handle.



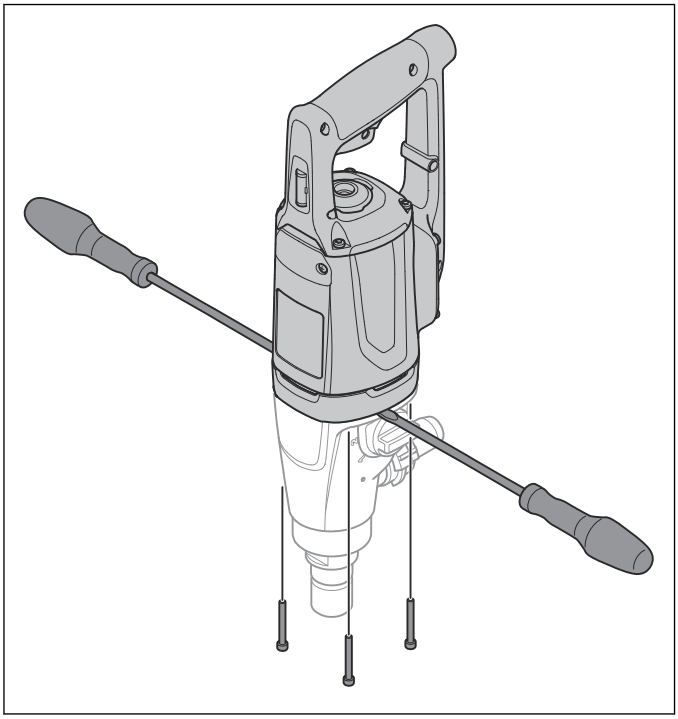
6.4 To replace the gear oil

Replace the gear oil for the first time after 100 hours of operation. After that, the interval is approximately each 300 hours of operation.

1. Attach the machine holder tool to a vise. Refer to *Servicing tools on page 6*. Put the product in a vertical position with the drill spindle in the machine holder tool.

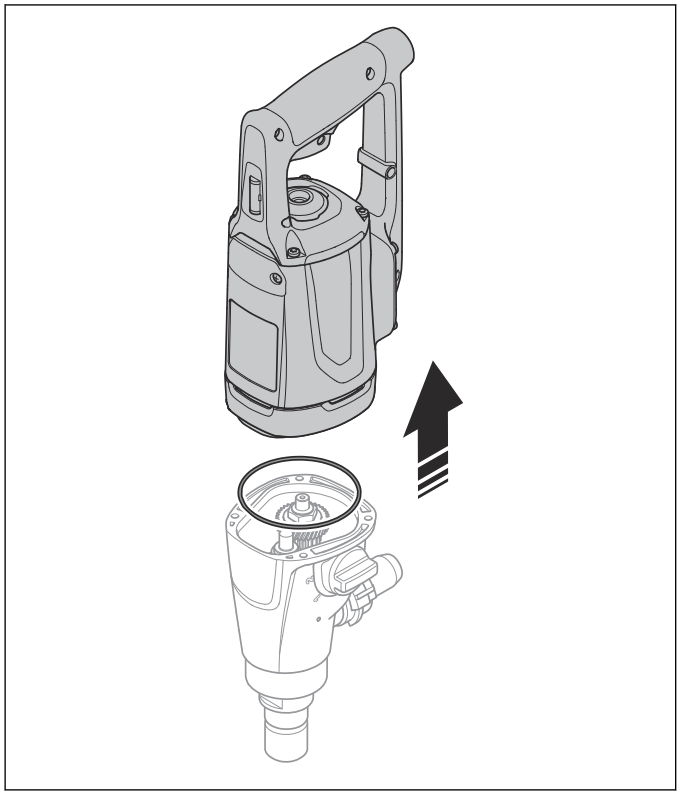


2. Remove the 4 screws that hold the motor housing. Put 2 flat screwdrivers in the recesses on the gear housing. Carefully loosen the middle cover and the motor housing.



CAUTION: Make sure that the O-ring is not damaged.

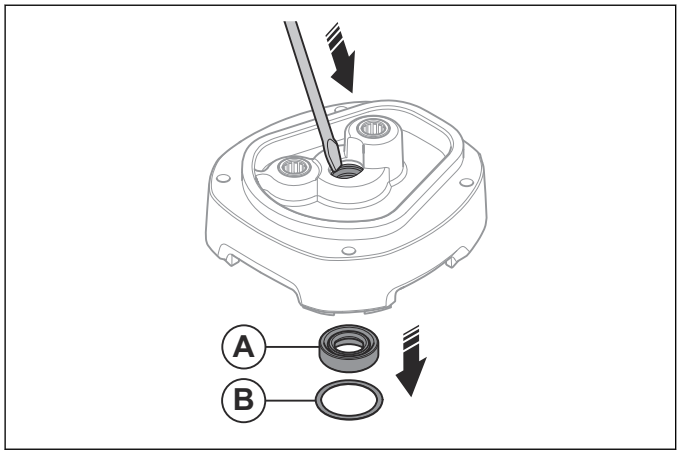
3. Remove the middle cover and the motor housing.



4. Put a container below the product. Remove the product from the machine holder tool. Tilt the product to drain the gear oil. Fill the gear housing with new gear oil. Refer to *Servicing tools on page 6*.
5. Assemble the product in opposite sequence.

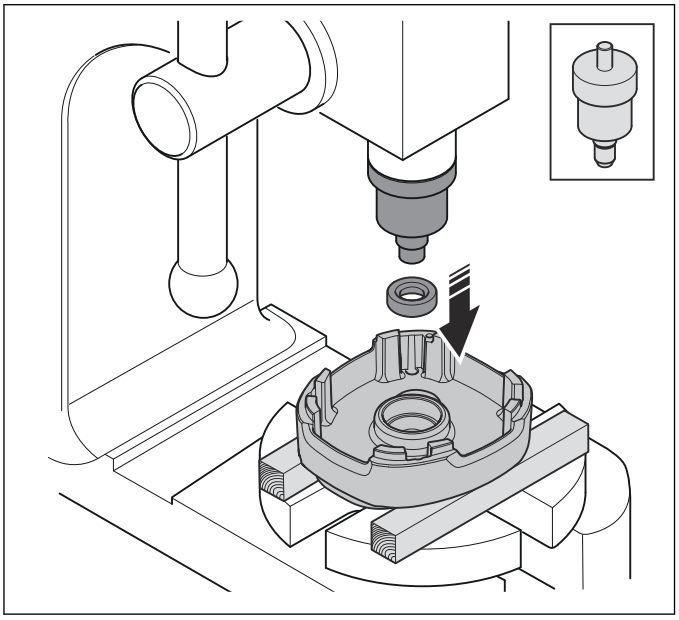
6.4.1 To replace the gear oil seal

1. Remove the middle cover. Refer to *To disassemble the product on page 10*.
2. Put the point of a screwdriver on the shaft seal (A). Carefully put pressure on the shaft seal and push it with the washer (B) in front of it. Remove the shaft seal and the washer.

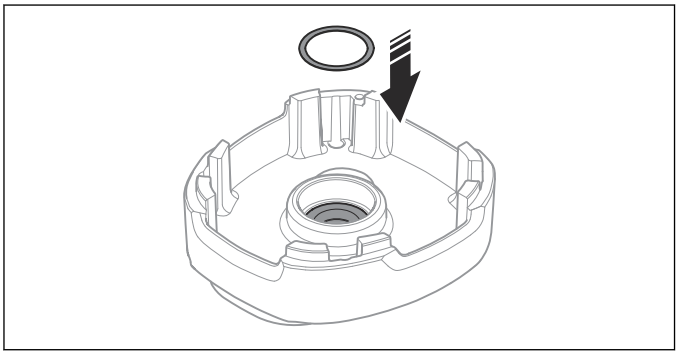


CAUTION: Make sure that the metal surface does not become damaged.

3. Put the middle cover on 2 spacers. Put gear oil on the surface of the bearing seat in the middle cover. Put a new shaft seal in the bearing seat. Push the shaft seal into the bearing seat with the shaft seal press tool attached to a mandrel press. Refer to *Servicing tools on page 6*.



4. Put gear oil on the shaft seal. Install the washer.



6.5 Carbon brushes

The carbon brushes transmit electric current to the rotor. The carbon brushes are wear parts and must be examined regularly.

6.5.1 To replace the carbon brushes

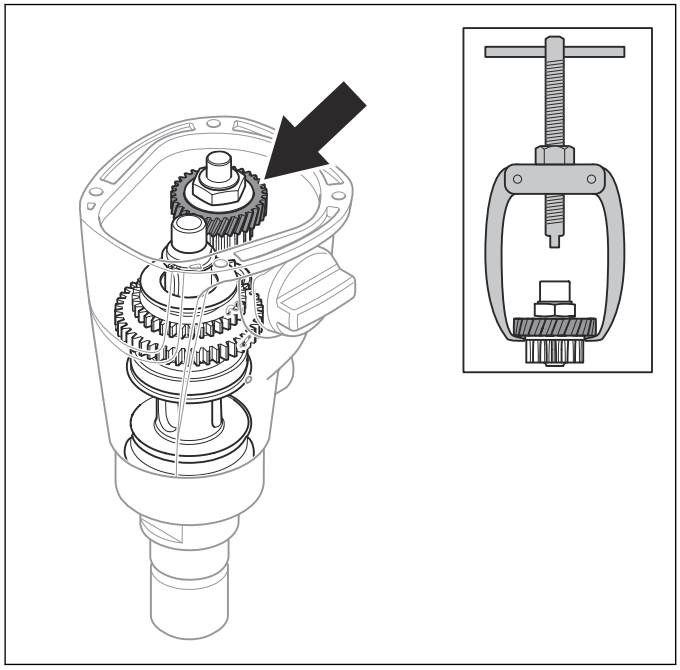
Replace the carbon brushes if less than 6 mm remain on the carbon brushes.

1. Remove the carbon brush covers. Refer to *To disassemble the product on page 10*.
2. Carefully remove the carbon brushes.
3. Install new carbon brushes.
4. Install the carbon brush covers. Refer to *To assemble the product on page 12*.

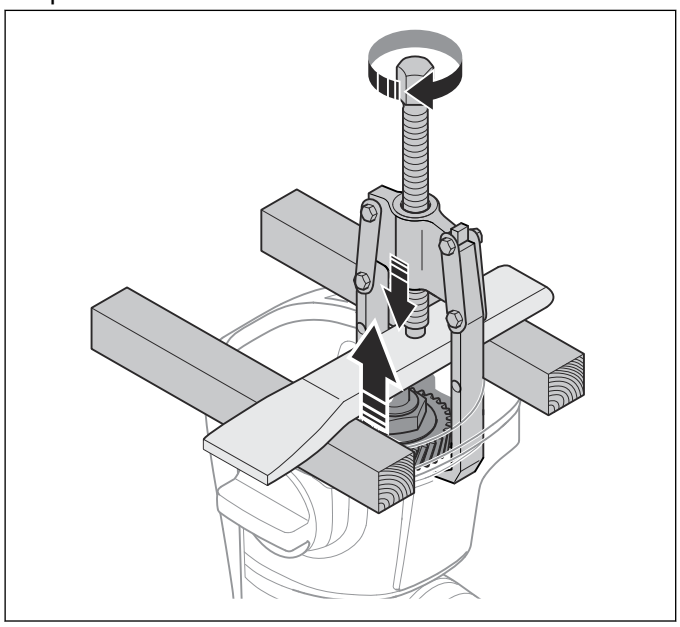
6.6 Gear housing

6.6.1 To remove the pinion shaft

1. Put a small puller tool on the top gear wheel on the pinion shaft. Refer to *Servicing tools on page 6*.



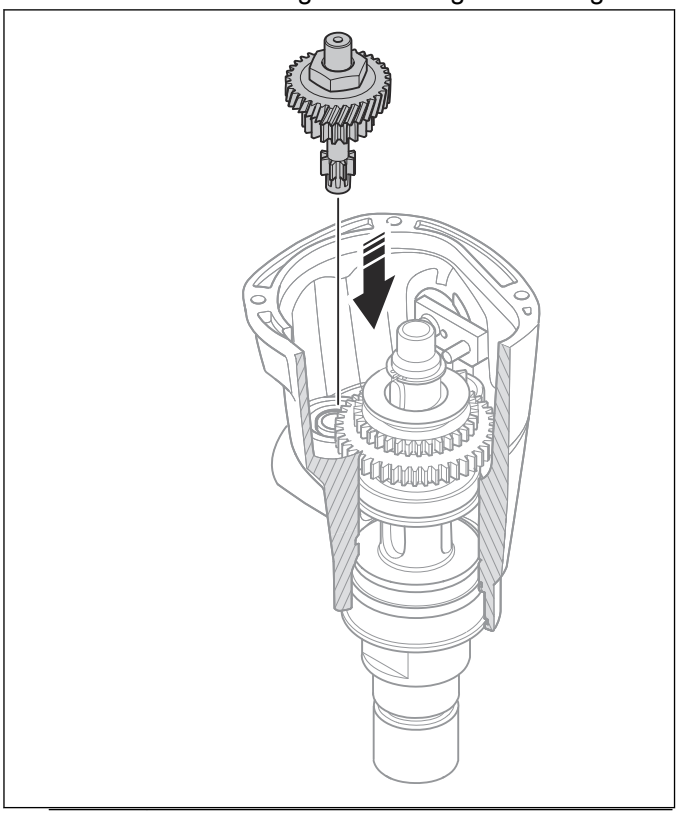
2. Use 2 spacers and put a piece of metal between them as support for the puller tool. Pull out the pinion shaft.



Note: Hold the gear selector with pliers to prevent the bottom bearing to come loose.

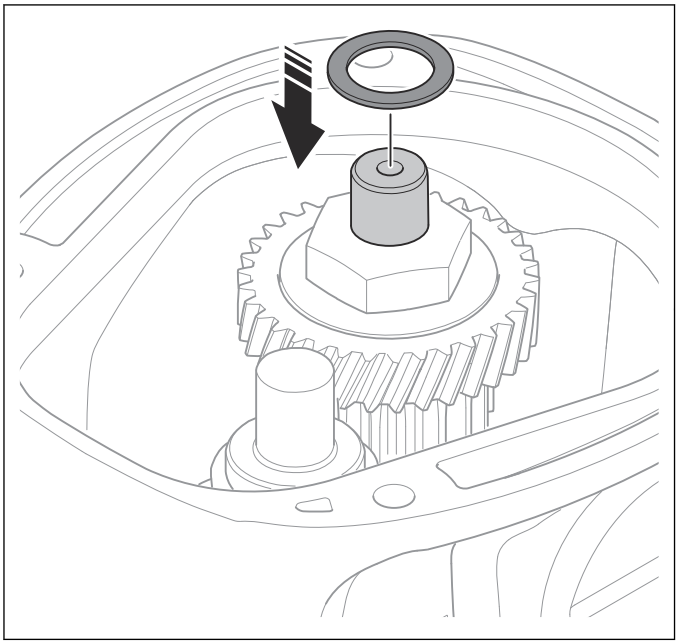
6.6.2 To install the pinion shaft

1. Put the pinion shaft into the gear housing. Tap the pinion shaft carefully with a soft head mallet to attach it to the bearing seat in the gear housing.



CAUTION: Make sure that the metal surface does not become damaged.

2. Put the shim ring on the pinion shaft.

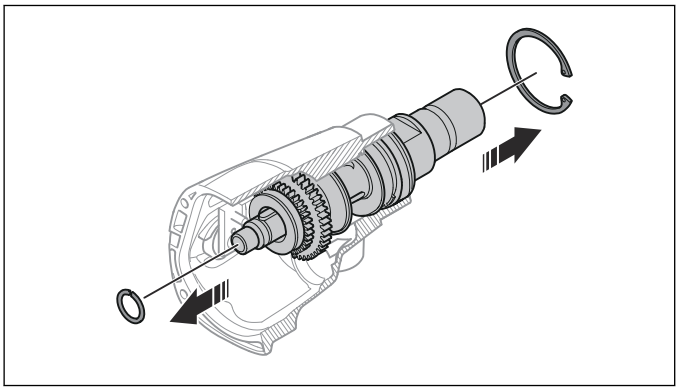


3. Fill the gear housing with gear oil and assemble the product. Refer to *To assemble the product on page 12*.

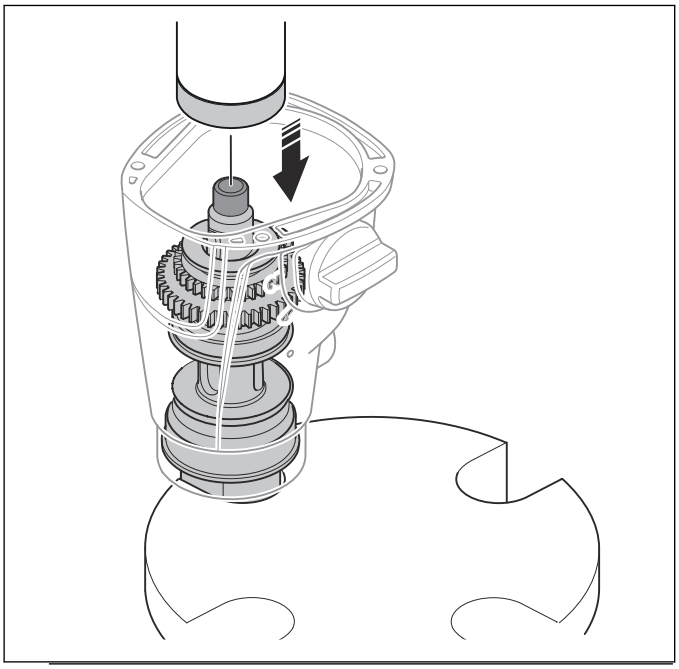
6.6.3 To remove the drill spindle

Note: Replace the shaft seals if the drill spindle is removed. Refer to *To replace the shaft seals for the drill spindle on page 20*.

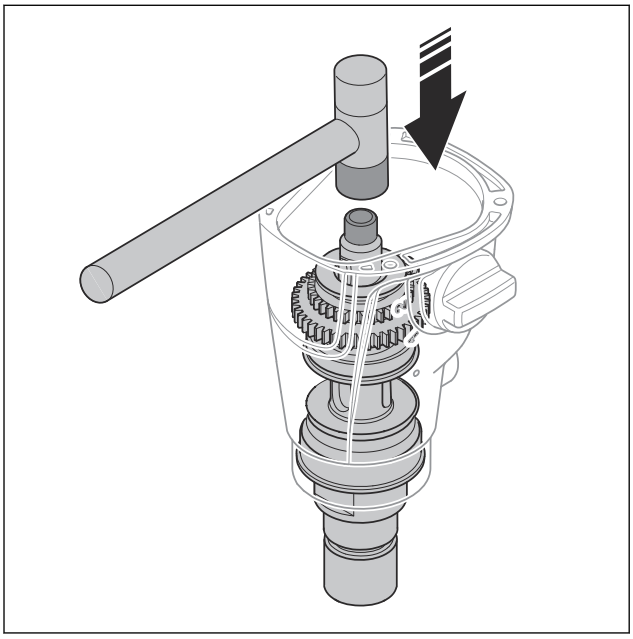
1. Remove the 2 snap rings with circlip pliers.



2. Push the drill spindle out of the gear housing with a mandrel press. Refer to *Servicing tools on page 6*.

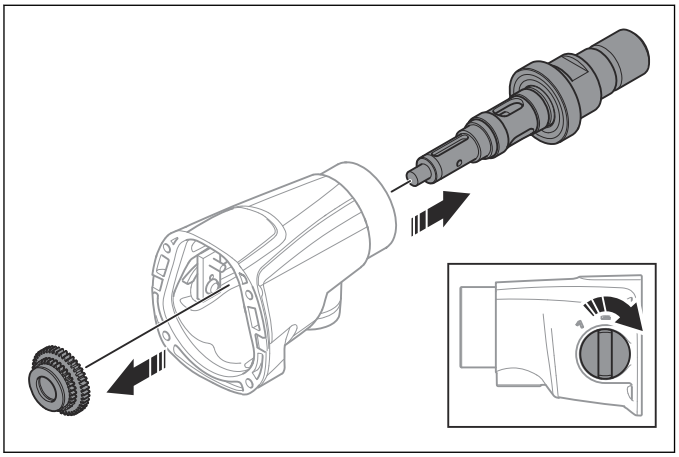


Note: If the drill spindle does not come out of the gear housing, tap the drill spindle carefully with a soft head mallet to loosen it.

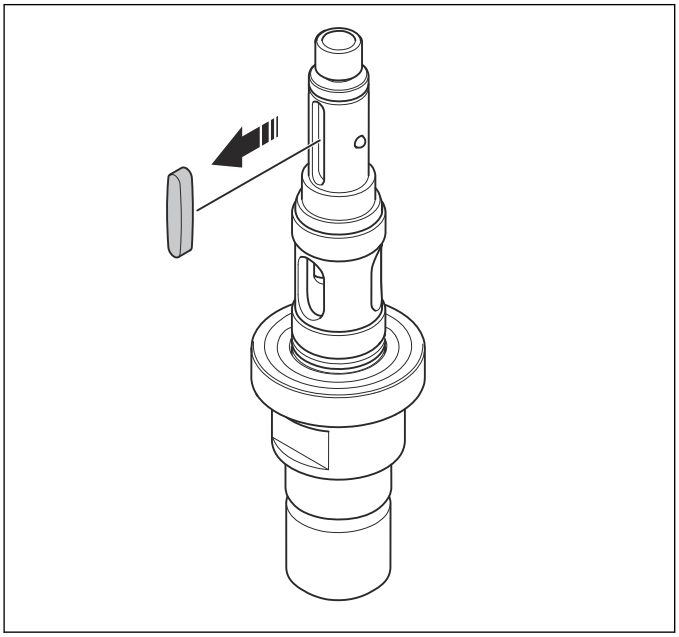


CAUTION: Make sure that the metal surface does not become damaged.

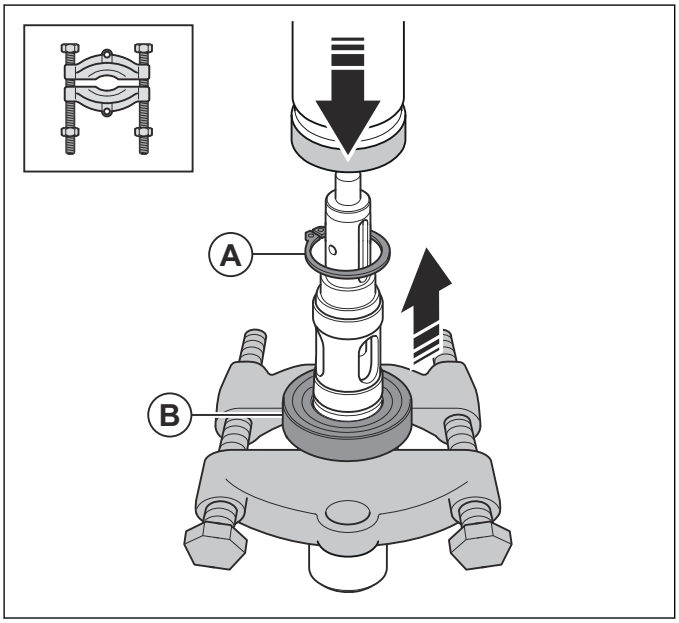
3. Pull the gear wheel off the shaft and remove the drill spindle. Turn the gear selector clockwise when you pull out the drill spindle from the gear housing.



4. Remove the parallel key.

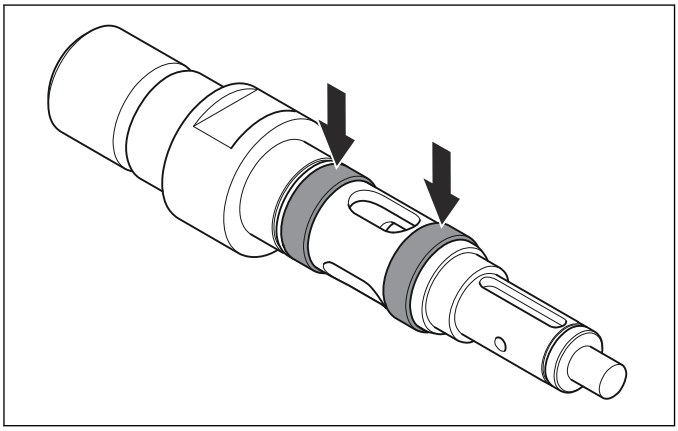


5. Remove the snap ring (A) with circlip pliers. Push the ball bearing (B) off the drill spindle shaft with the separator puller tool and a mandrel press. Refer to *Servicing tools on page 6*.

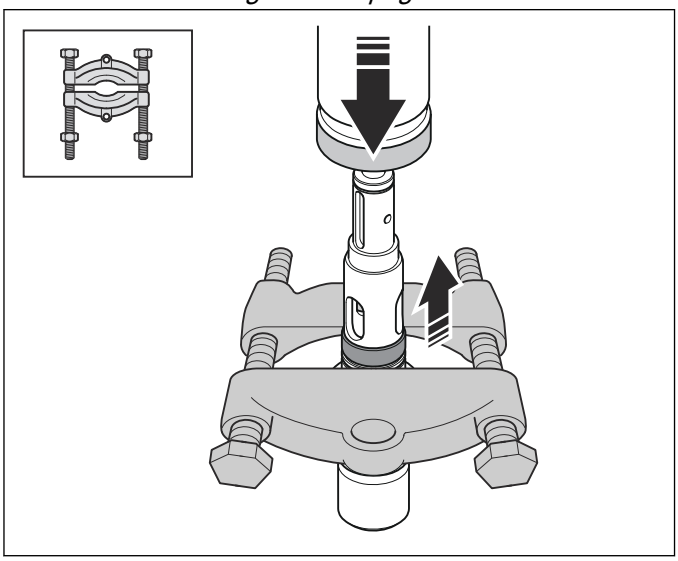


6.6.4 To replace the shaft sleeves for the drill spindle

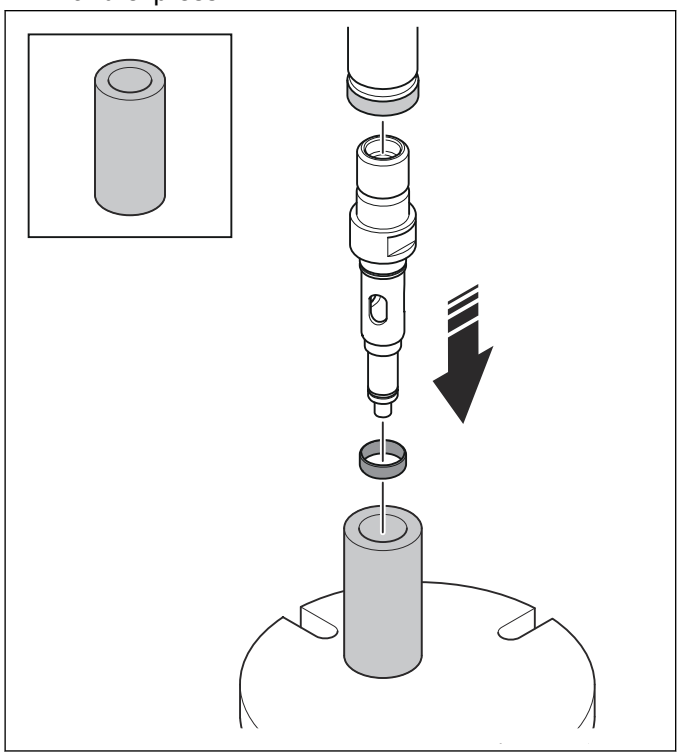
1. Clean the drill spindle shaft with a cloth. Examine the drill spindle for damage or wear. Refer to *To do a check of the gear housing and gears on page 31*.



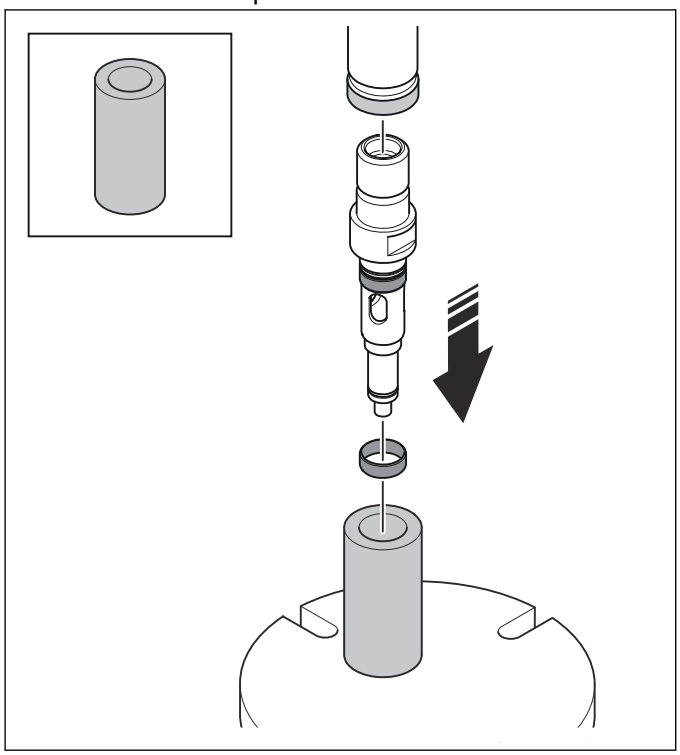
2. Push the 2 shaft sleeves off the drill spindle shaft with the separator puller tool and a mandrel press. Refer to *Servicing tools on page 6*.



3. Put the first shaft sleeve into the sleeve press tool. Refer to *Servicing tools on page 6*. Push the first shaft sleeve onto the drill spindle shaft with the mandrel press.

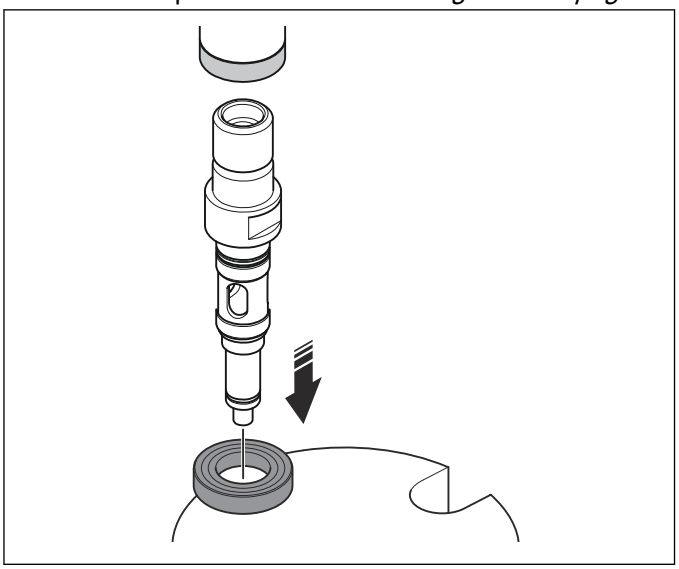


4. Turn the sleeve press tool to the other side. Put the second shaft sleeve into the sleeve press tool. Push the second shaft sleeve onto the drill spindle shaft with the mandrel press.

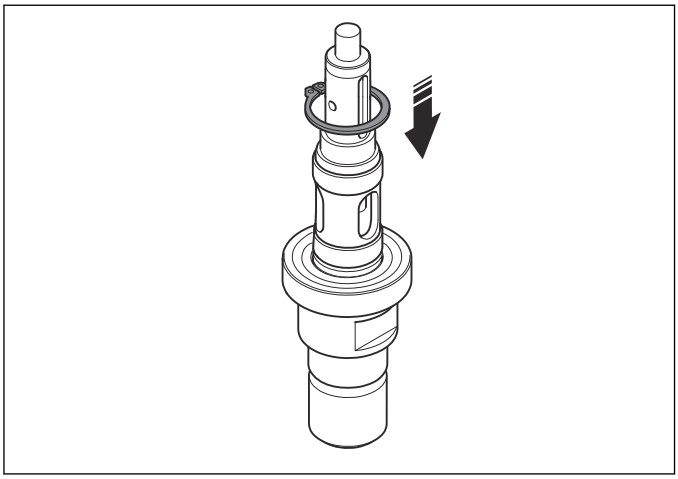


6.6.5 To install the drill spindle

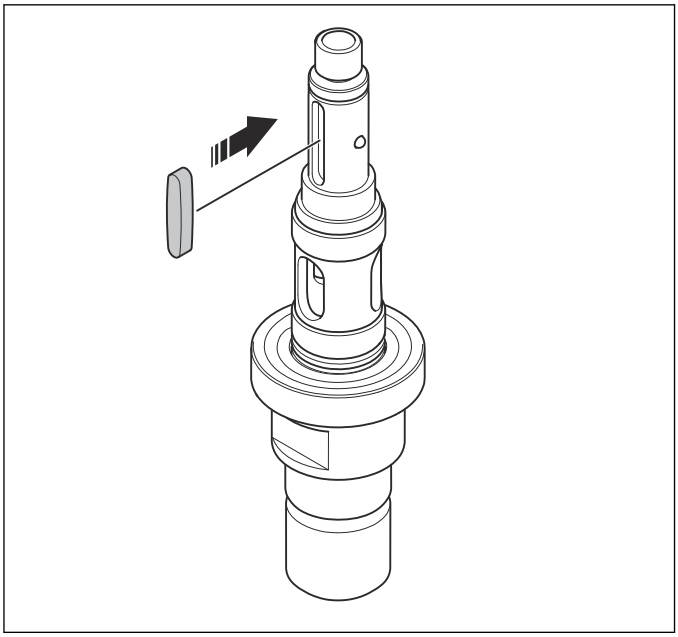
1. Push the ball bearing onto the drill spindle shaft with a mandrel press. Refer to *Servicing tools on page 6*.



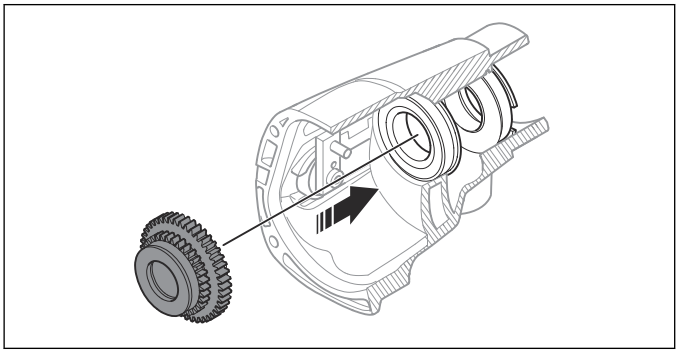
2. Install the snap ring with circlip pliers.



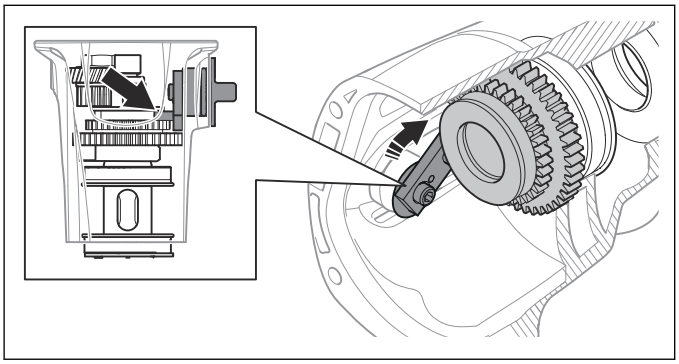
3. Install the parallel key.



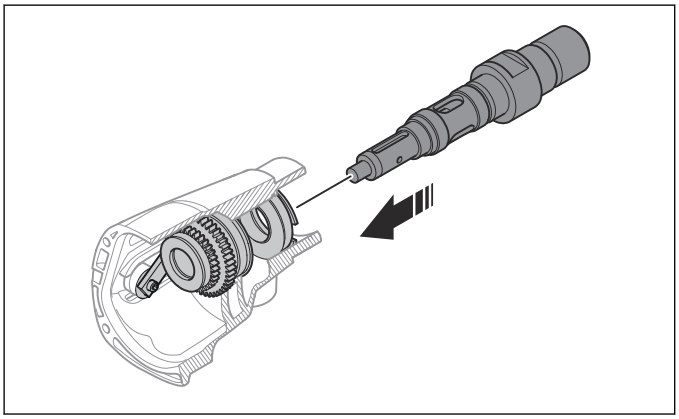
4. Put the gear wheel into the gear housing.



5. Put the pin of the gear selector into the groove of the gear wheel.

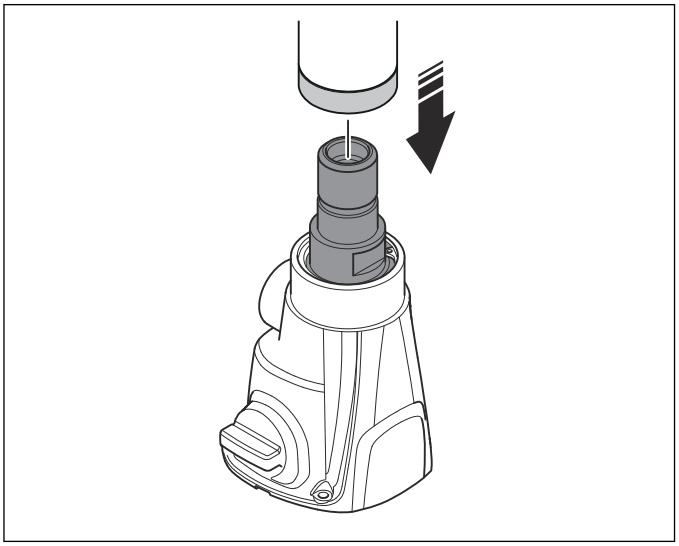


6. Put the drill spindle into the gear housing.



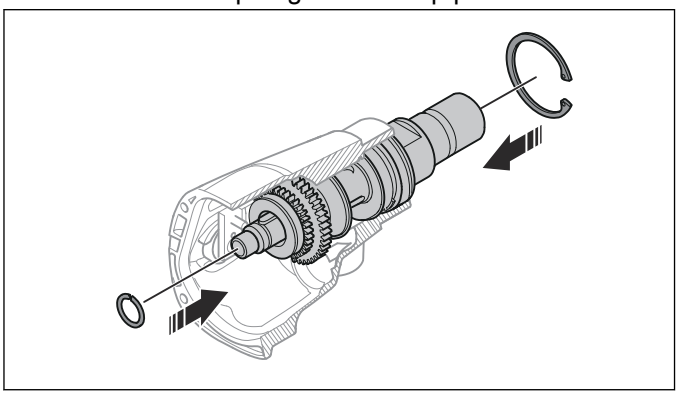
Note: Make sure that the parallel key is aligned with the groove in the gear wheel.

7. Push the drill spindle into the gear housing with the mandrel press.



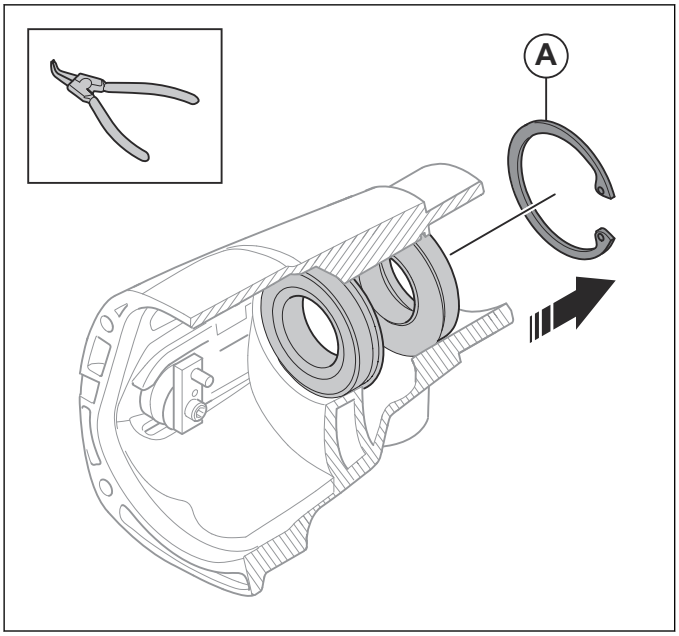
Note: Push the parts together by hand before you put the assembly in the mandrel press.

8. Install the 2 snap rings with circlip pliers.

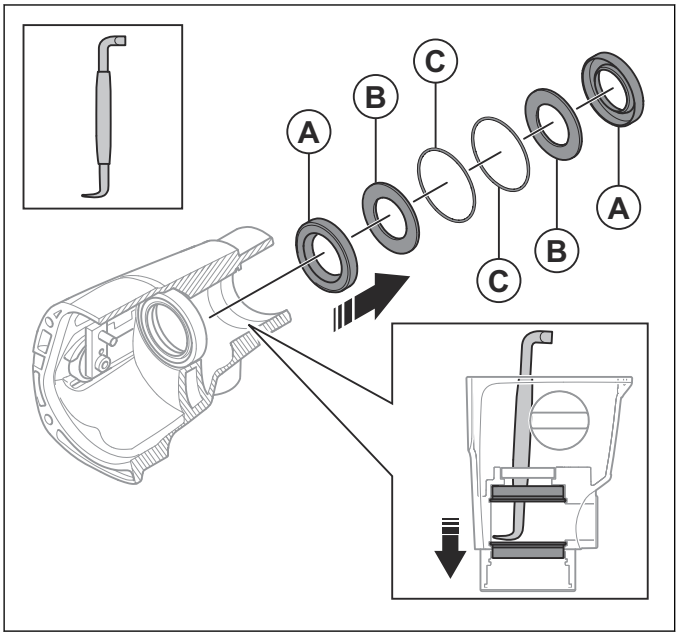


6.6.6 To replace the shaft seals for the drill spindle

1. Remove the snap ring (A) with circlip pliers.

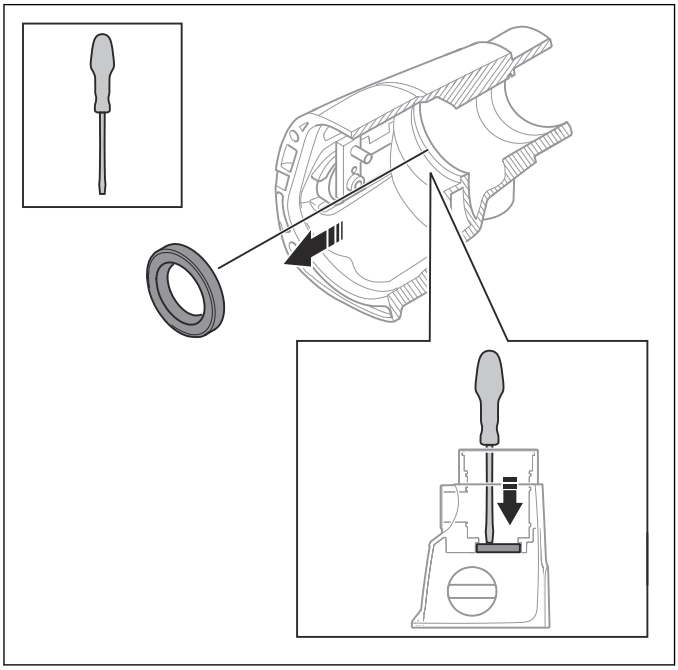


2. Push the shaft seals (A), the washers (B) and the O-rings (C) out of the gear housing with an offset screwdriver. Tap the offset screwdriver carefully with a soft head mallet if it is necessary.



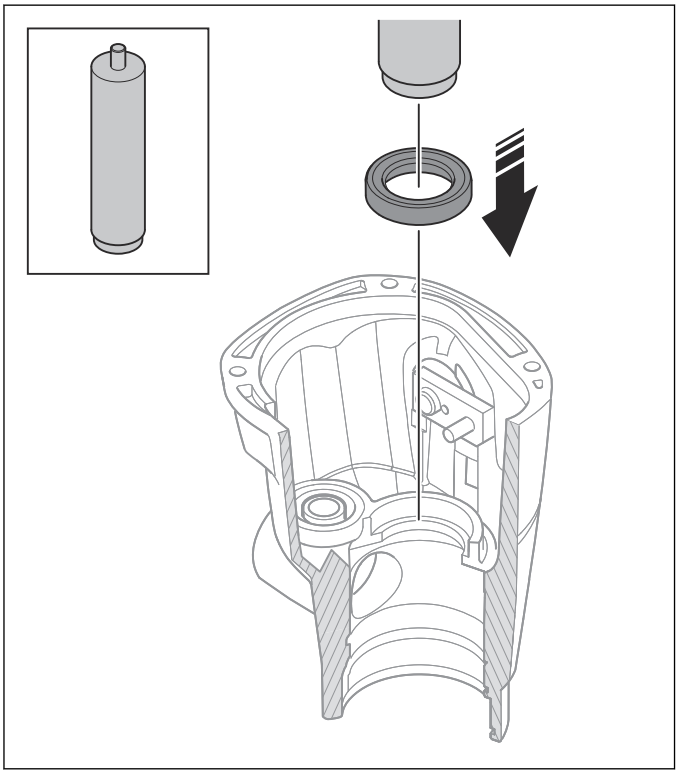
CAUTION: Make sure that the metal surface does not become damaged. Make sure that the O-rings are not damaged.

3. Use a screwdriver to remove the shaft seal (A).

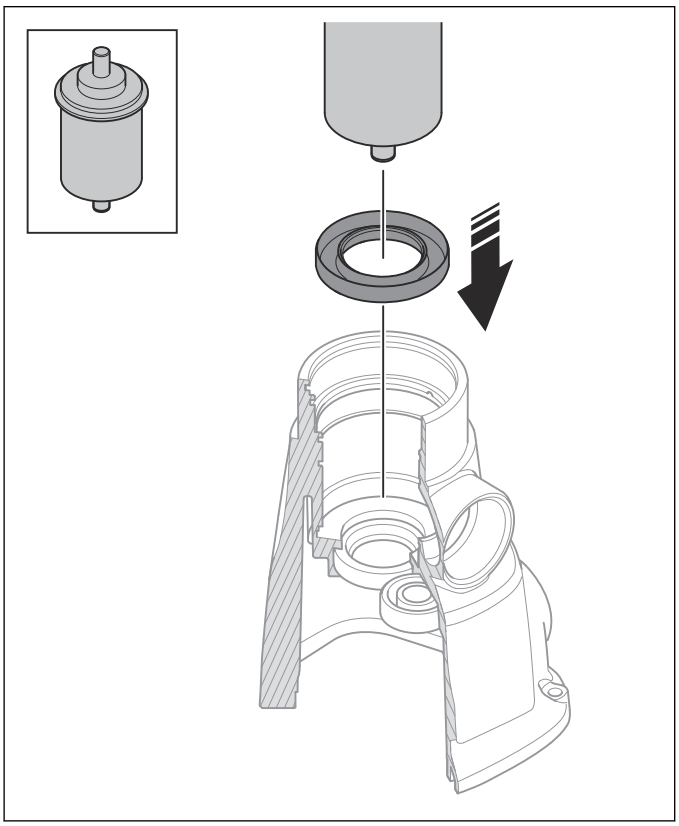


CAUTION: Make sure that the metal surface does not become damaged.

4. Clean and dry the seal seat. Put oil on the inner surface of the seal seat.
5. Attach the first shaft seal press tool to a mandrel press. Refer to *Servicing tools on page 6*. Put a new shaft seal on the shaft seal press tool. Push the first shaft seal into the seal seat.

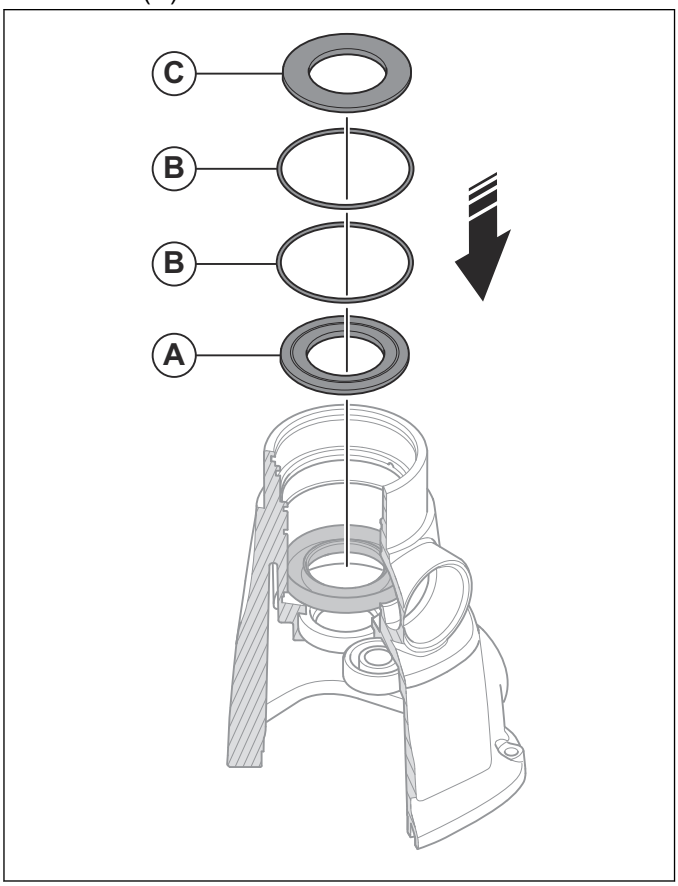


6. Attach the second shaft seal press tool to the mandrel press. Refer to . Put a new shaft seal on the shaft seal press tool. Push the second shaft seal into the seal seat.

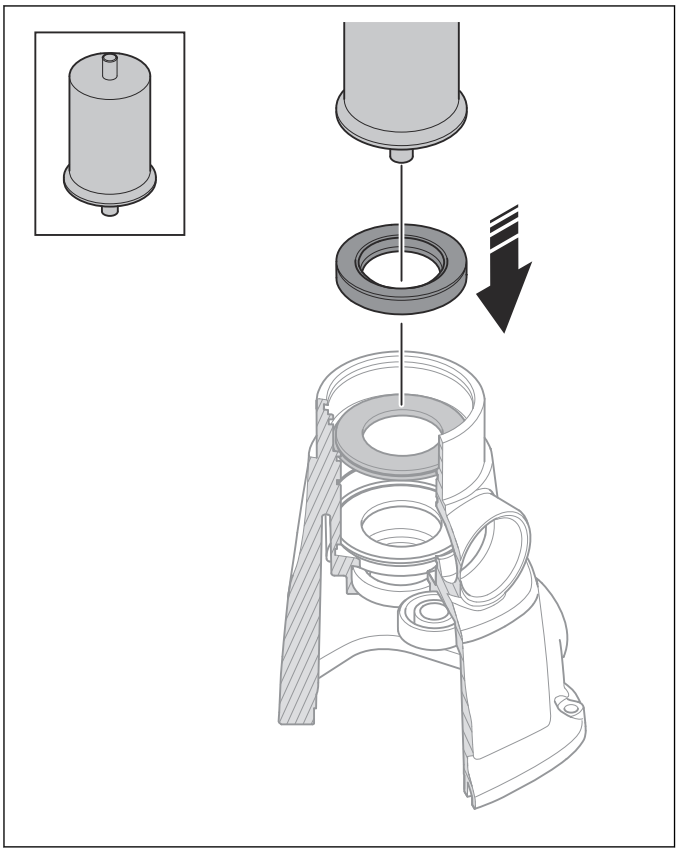


7. Put grease on the seals.

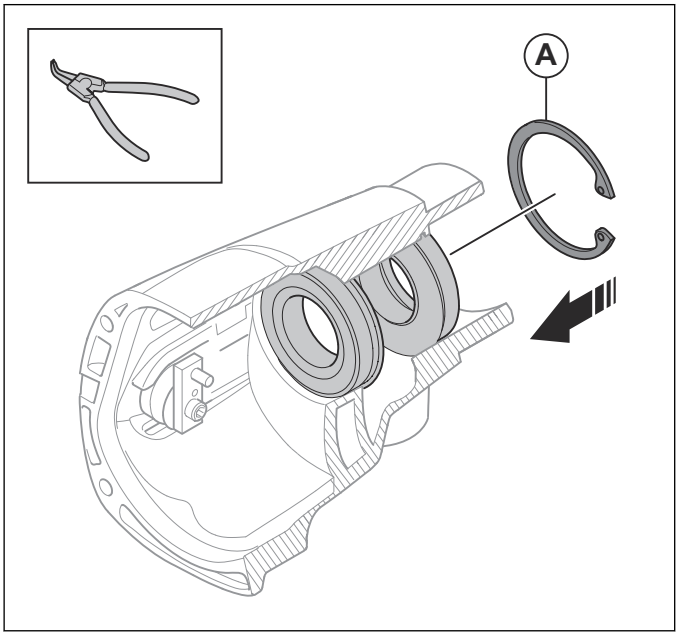
8. Install the washer with a groove (A) as the illustration shows. Install the O-rings (B). Install the washer (C).



9. Turn the second shaft seal press tool to the other side. Put a new shaft seal on the shaft seal press tool. Push the third shaft seal into the seal seat.



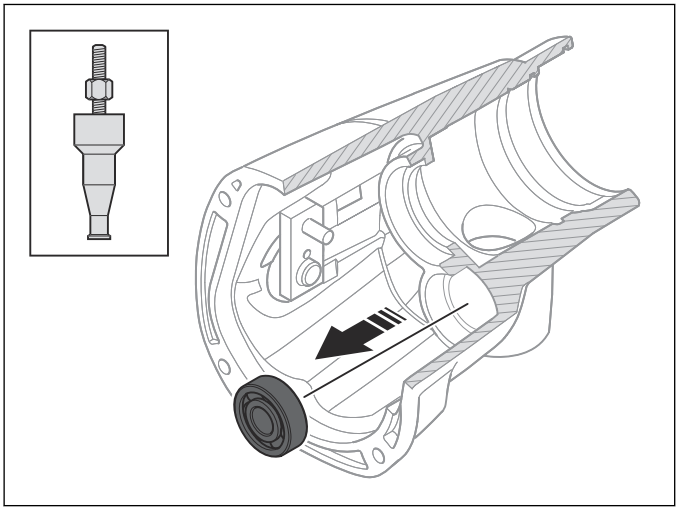
10. Install the snap ring (A) with circlip pliers.



CAUTION: Make sure that the leak hole does not become blocked.

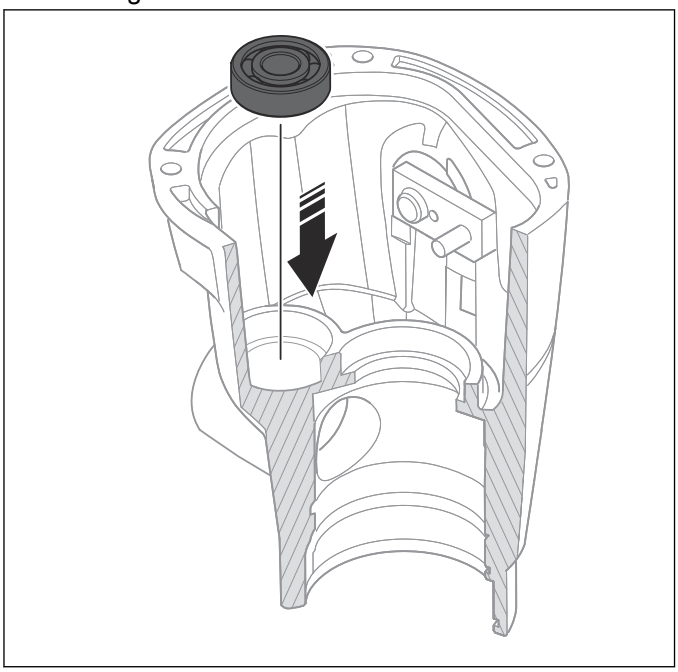
6.6.7 To remove the ball bearing from the gear housing

- Put an inner bearing puller into the ball bearing in the gear housing. Attach the puller to a slide hammer. Refer to *Servicing tools on page 6*. Remove the needle bearing.

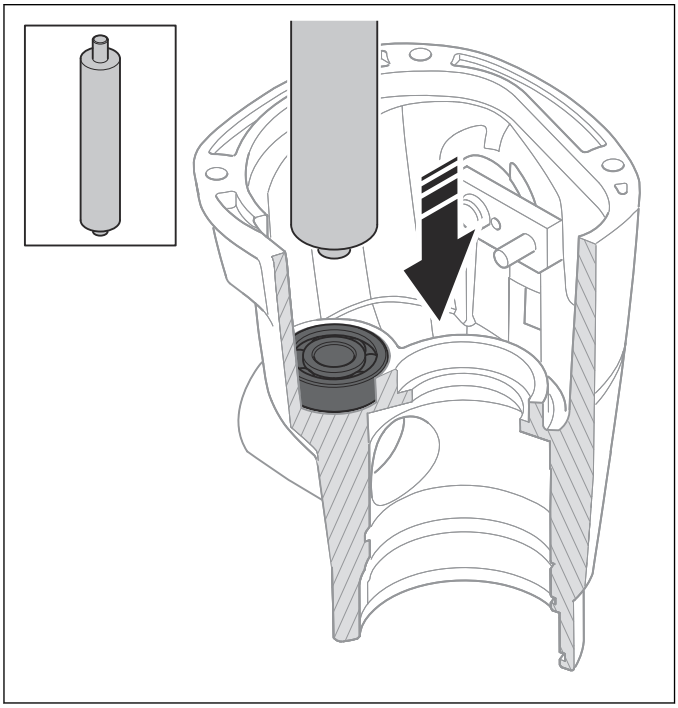


6.6.8 To install the ball bearing in the gear housing

1. Put the ball bearing into the bearing seat in the gear housing.

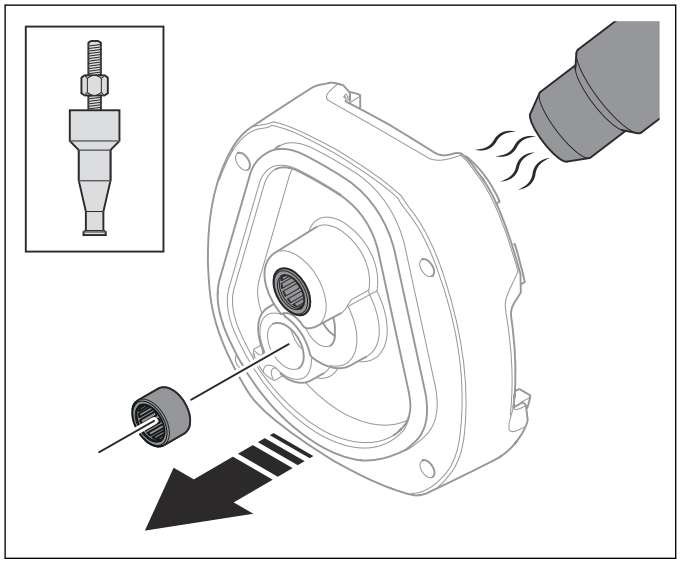


2. Attach the bearing press tool to a mandrel press. Refer to *Servicing tools on page 6*. Push the ball bearing into the bearing seat with the mandrel press.



6.6.9 To remove the needle bearings from the middle cover

1. Put an inner bearing puller into one of the 2 needle bearings in the middle cover. Refer to *Servicing tools on page 6*. Attach the puller to a vise. Apply heat to the bearing seat with a hot air gun. Tap the middle cover carefully with a soft head mallet to loosen the needle bearing from the bearing seat. Remove the needle bearing.

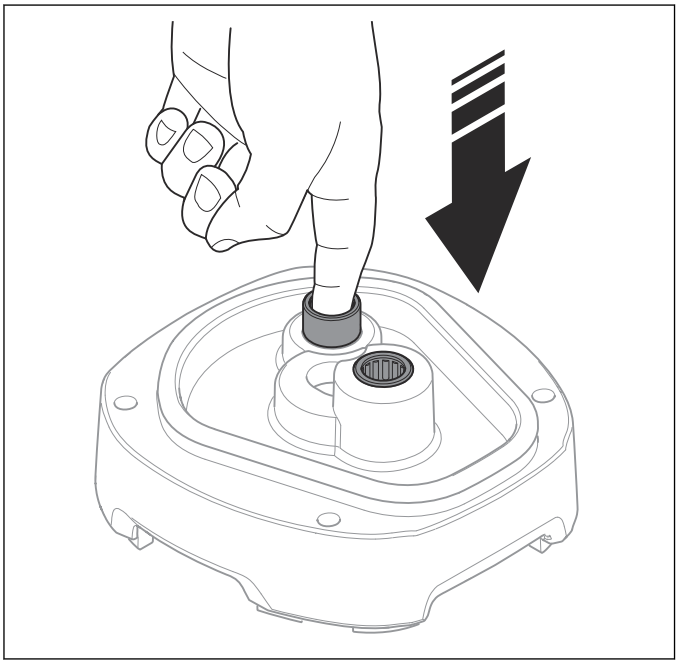


CAUTION: Make sure that the metal surface does not become damaged.

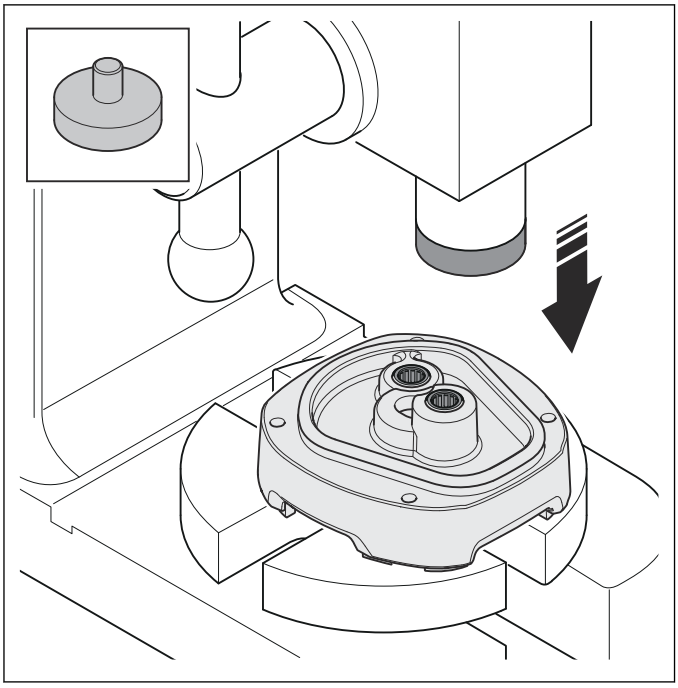
2. Do the same procedure as in the step before to remove the other needle bearing from the middle cover.

6.6.10 To install the needle bearings in the middle cover

1. Put the 2 needle bearings into the bearing seats in the middle cover.

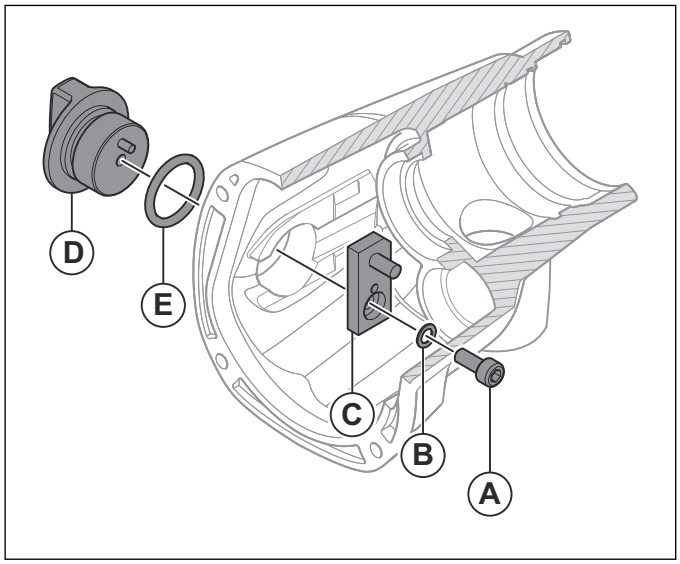


2. Attach the protective tool to a mandrel press. Refer to *Servicing tools on page 6*. Push the 2 needle bearings into the bearing seats.



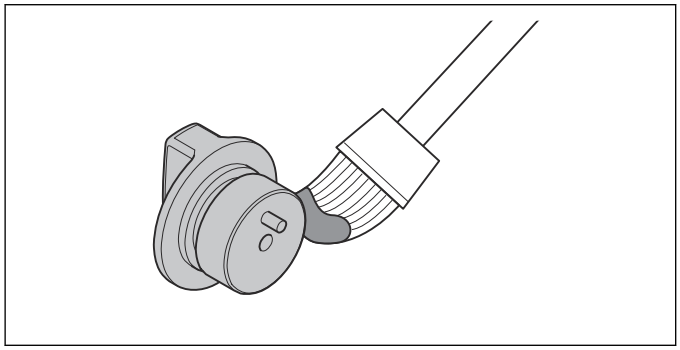
6.6.11 To remove the gear selector

- Remove the screw (A), the washer (B) and the bracket (C). Remove the gear selector (D) and the O-ring (E).

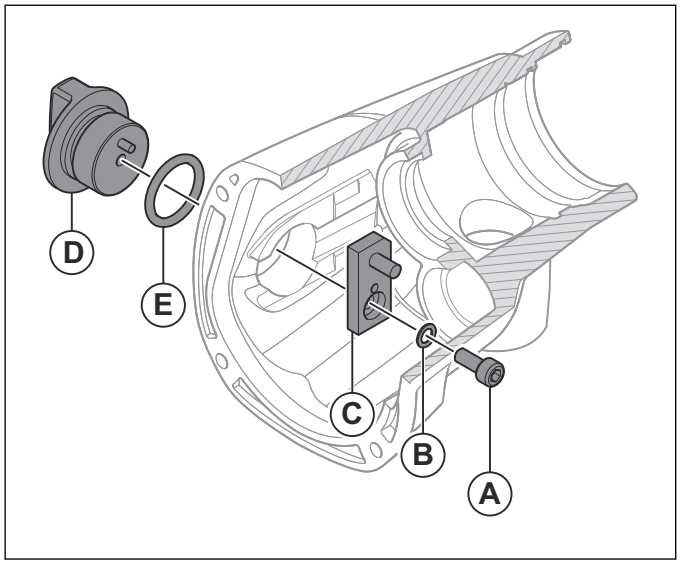


6.6.12 To install the gear selector

1. Put grease on the gear selector.

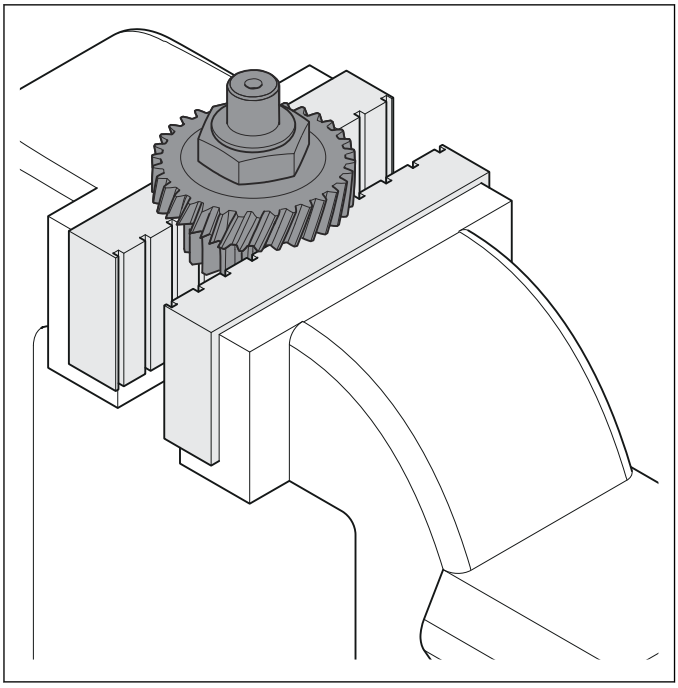


2. Install the O-ring (E) and the gear selector (D). Install the bracket (C), the washer (B) and the screw (A).

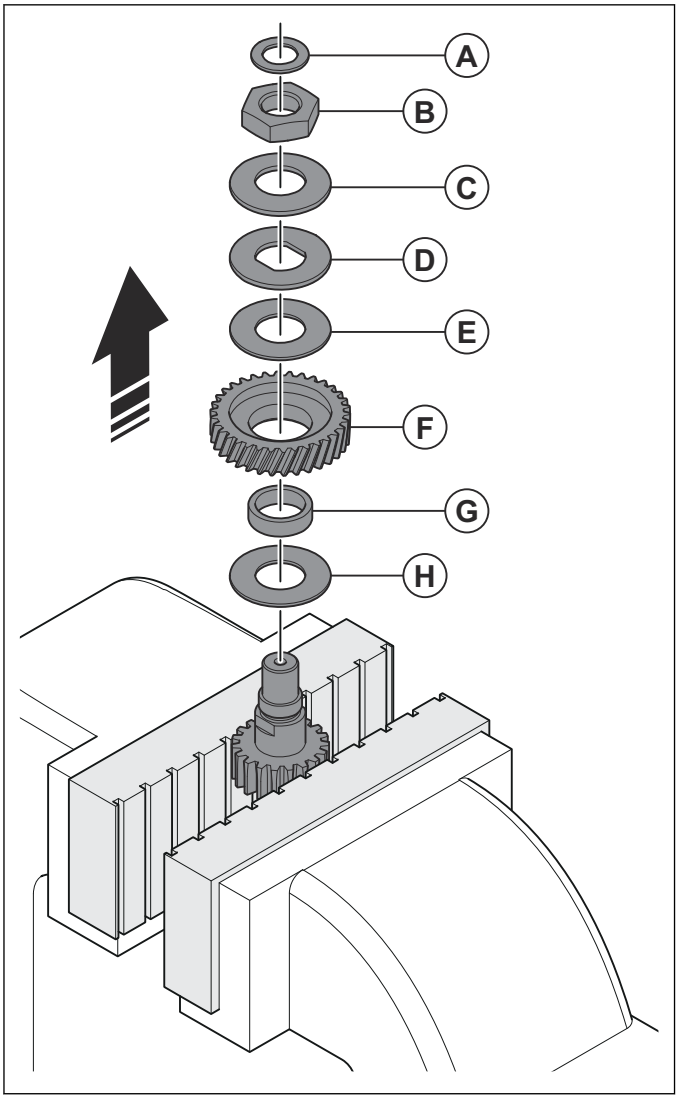


6.6.13 To disassemble the pinion shaft

1. Attach the pinion shaft to a vise with soft jaws.



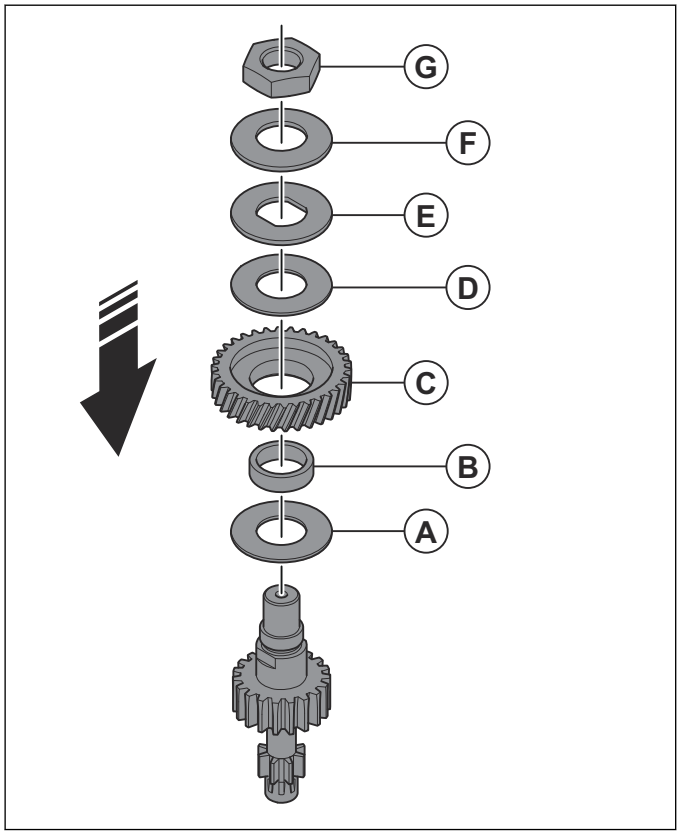
2. Remove the shim ring (A), the hex nut (B), the plate spring (C), and the pressure disc (D). Remove the brake disc (E), the gear wheel (F), the bearing sleeve (G), and the brake disc (H).



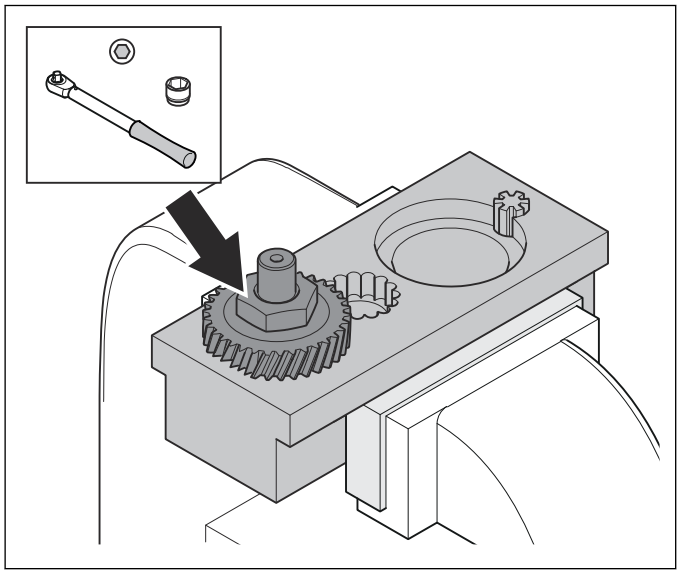
3. Clean and dry all parts. Examine all parts for wear. Replace damaged parts.

6.6.14 To assemble the pinion shaft

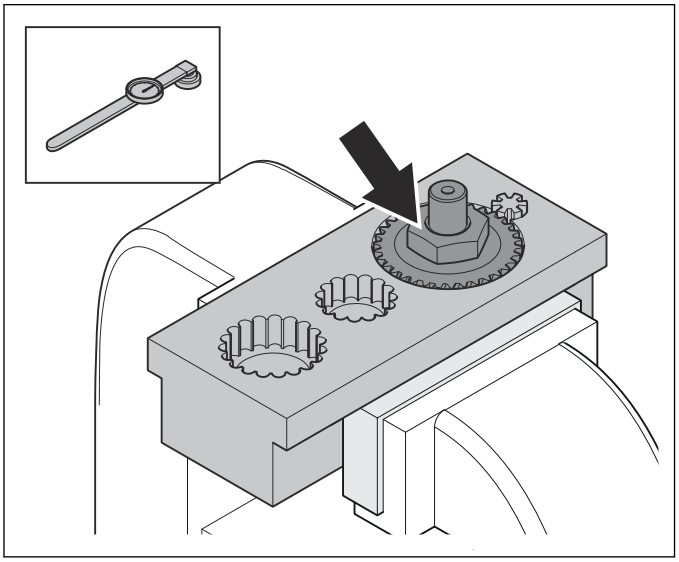
1. Put gear oil on all parts before assembly. Make sure to put gear oil on the two sides of the brake discs. Install the brake disc (A), the bearing sleeve (B), and the gear wheel (C). Install the brake disc (D), the pressure disc (E), the plate spring (F), and the hex nut (G).



2. Put the pinion shaft into the pinion shaft holder as the illustration shows. Tighten the hex nut slightly with a wrench. Refer to *Servicing tools on page 6*.



3. Put the pinion shaft into the pinion shaft holder as the illustration shows.



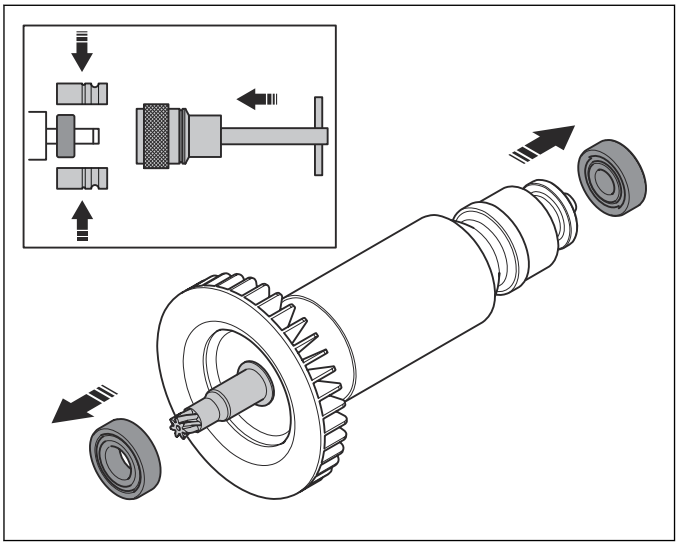
a) Do a check of the friction clutch with a torque wrench. Turn the torque wrench clockwise 1-2 times and read the value at the same time. The specified tightening torque is 10-11 Nm.
b) If the torque is too low, tighten the hex nut slightly with a wrench. Do a check of the friction clutch with the torque wrench again. Do the procedure until you read the correct value.
c) If the torque is too high, loosen the hex nut. Tighten the hex nut slightly and do a check with the torque wrench again. Do the procedure until you read the correct value.

Note: When the friction clutch rotates, it becomes warm. It increases the torque. Let the friction clutch become cool before you read the torque again.

6.7 Rotor

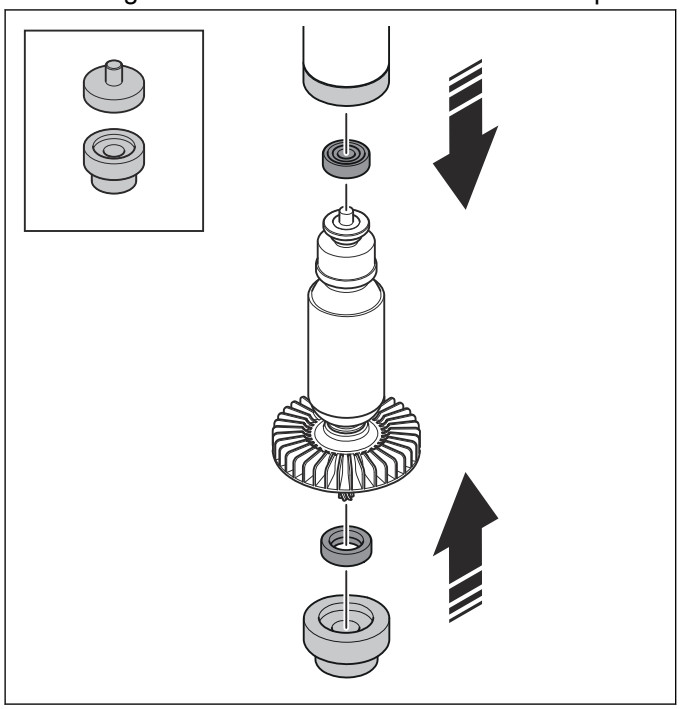
6.7.1 To disassemble the rotor

- Pull off the rotor bearings with the bearing puller tool. Refer to *Servicing tools on page 6*.

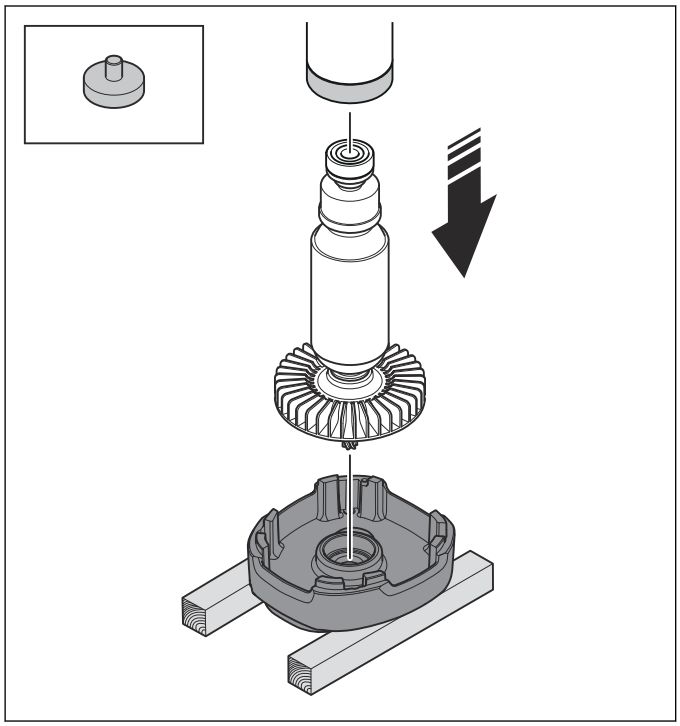


6.7.2 To assemble the rotor

1. Put the first ball bearing in the first bearing press tool. Refer to *Servicing tools on page 6*. Put the rotor shaft into the first ball bearing. Put the second ball bearing onto the rotor shaft. Attach the the second bearing press tool to a mandrel press. Push the ball bearings onto the rotor shaft with the mandrel press.



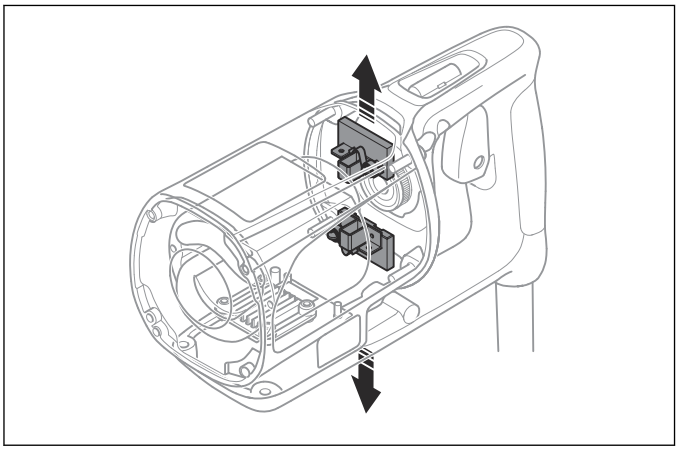
2. Install the gear oil seal. Refer to *To replace the gear oil seal on page 14*.
3. Put the middle cover on 2 spacers. Put the rotor into the bearing seat in the middle cover. Use the second bearing press tool to push the rotor into the bearing seat in the middle cover.



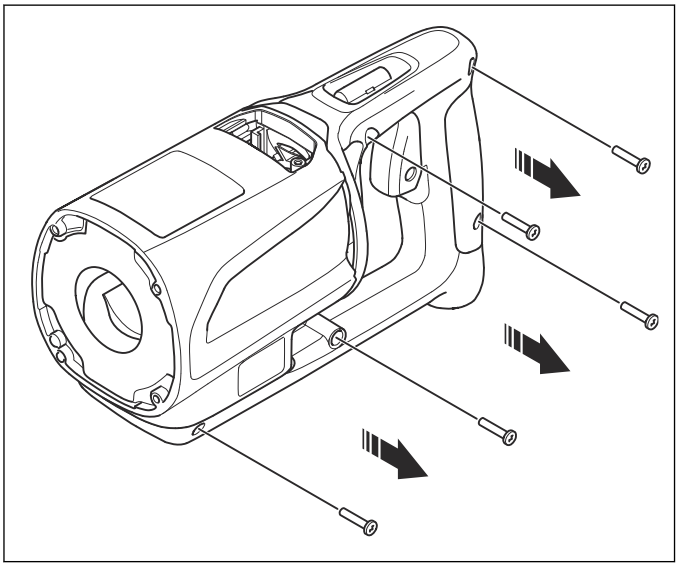
6.8 Stator

6.8.1 To disassemble the stator

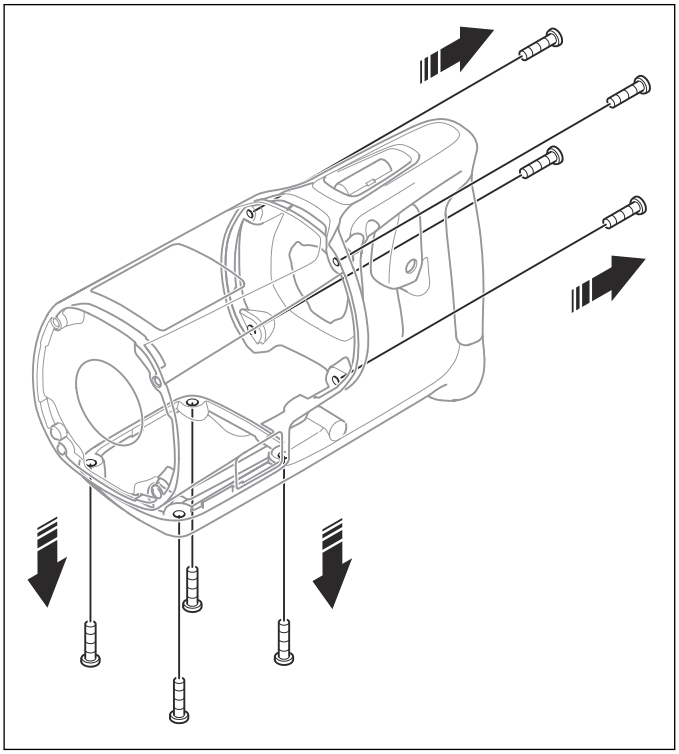
1. Remove the carbon brushes. Refer to *To replace the carbon brushes on page 15*.
2. Remove the carbon brush holders.



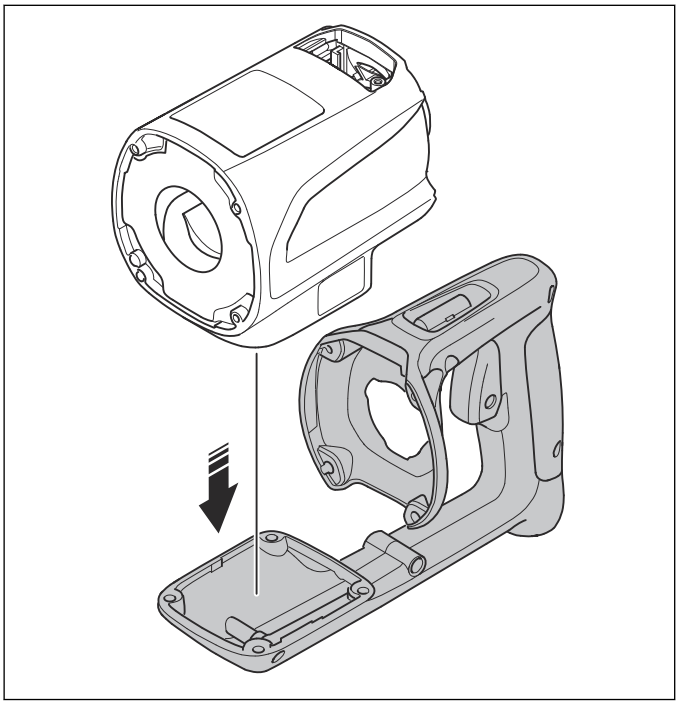
3. Remove the 5 screws that hold the rear handle.



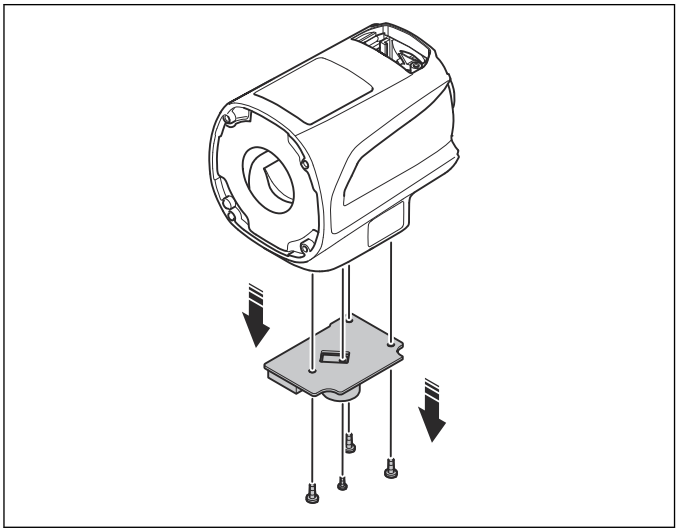
4. Remove the 8 screws that hold the rear handle.



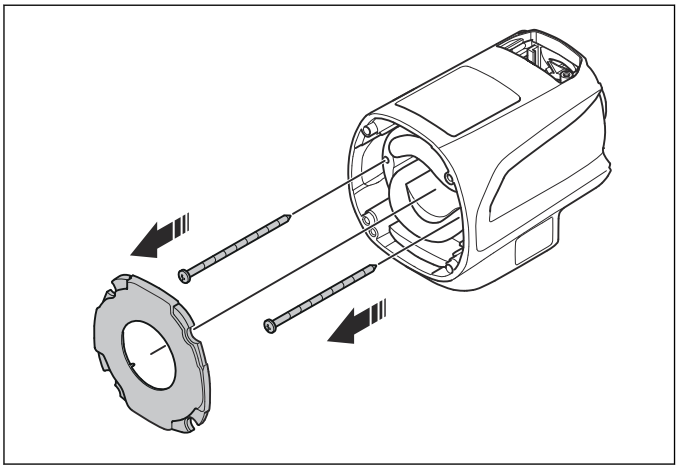
5. Make a note of how the motor connection wires from the terminal of the electronic module are connected.
6. Disconnect the motor connection wires from the terminal of the electronic module. Remove the rear handle.



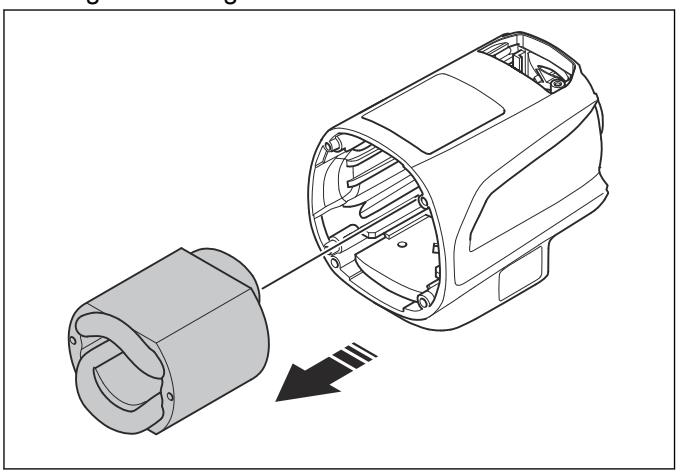
7. Remove the 4 screws that hold the electronic module. Remove the electronic module.



8. Remove the air disc and the 2 screws.



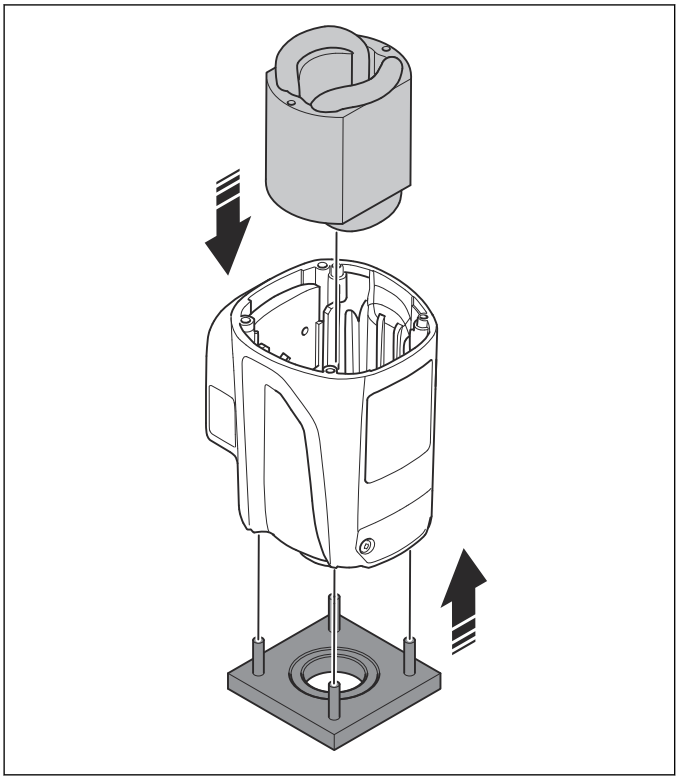
9. Tap the motor housing carefully with a soft head mallet to loosen the magnet housing. Remove the magnet housing.



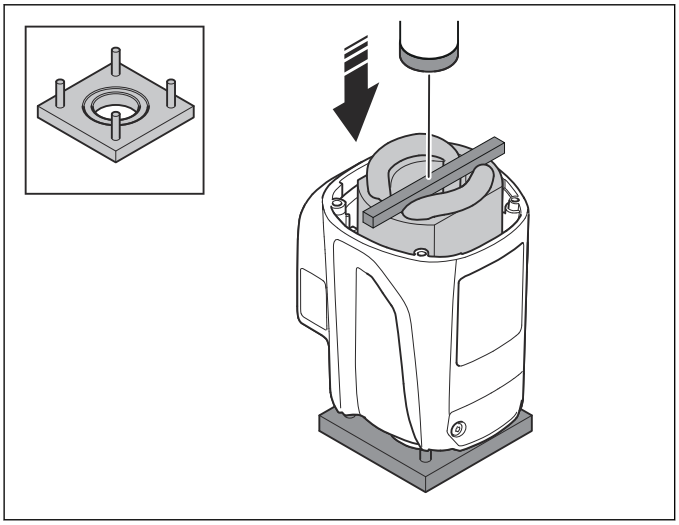
CAUTION: Make sure that the metal surface does not become damaged.

6.8.2 To assemble the stator

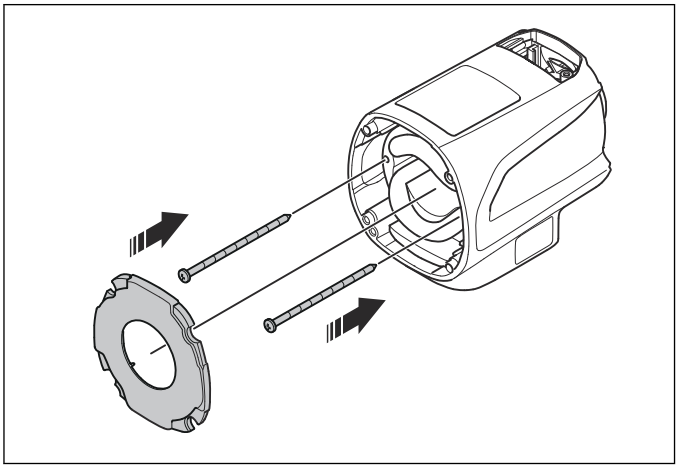
1. Put the motor housing onto the 4 pins of the press tool for motor housing. Refer to *Servicing tools on page 6*. Put the magnet housing into the motor housing. Push the magnet housing into the motor housing by hand.



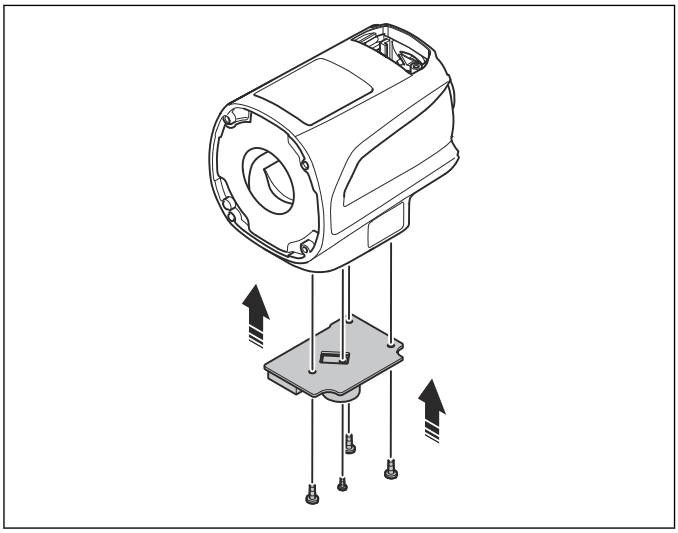
2. Put a piece of metal on the magnet housing as support for a mandrel press. Push the magnet housing into the motor housing with the mandrel press.



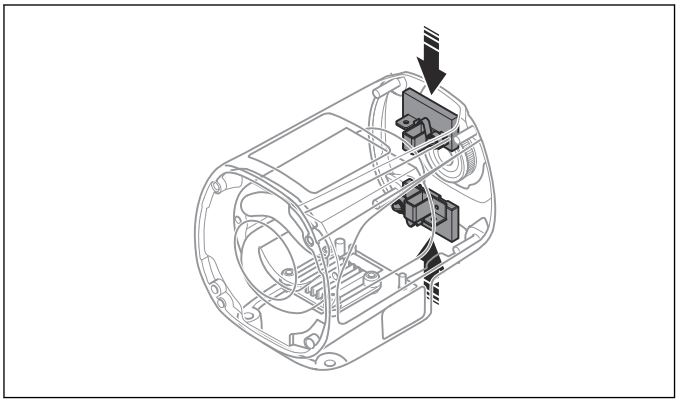
3. Install the 2 screws and the air disc.



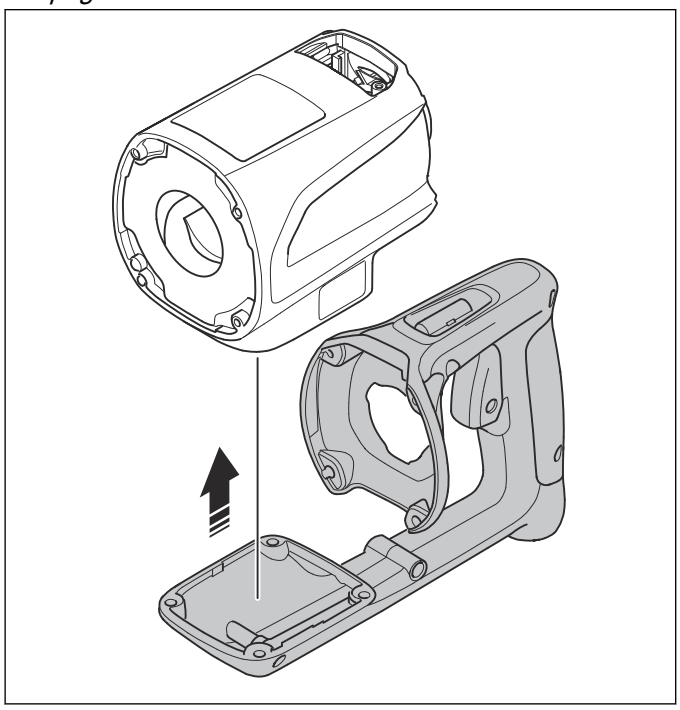
4. Install the electronic module with the 4 screws.



5. Install the carbon brush holders.

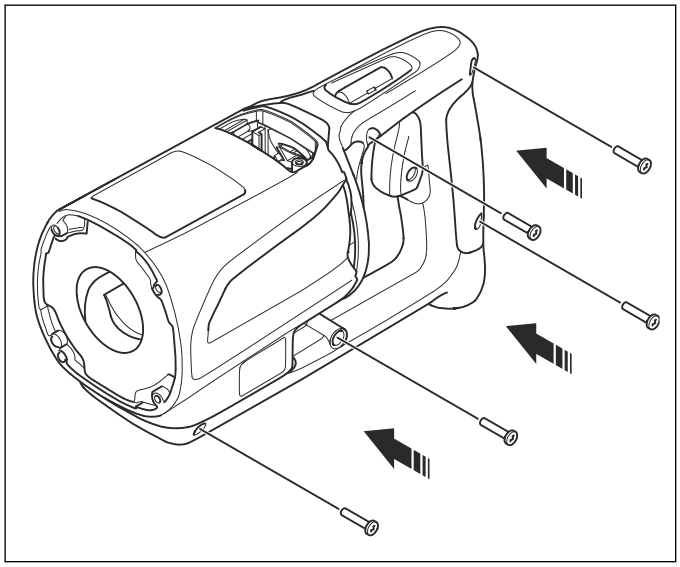


6. Connect the motor connection wires to the terminal of the electronic module. Refer to *Wiring diagram on page 35*. Install the rear handle.

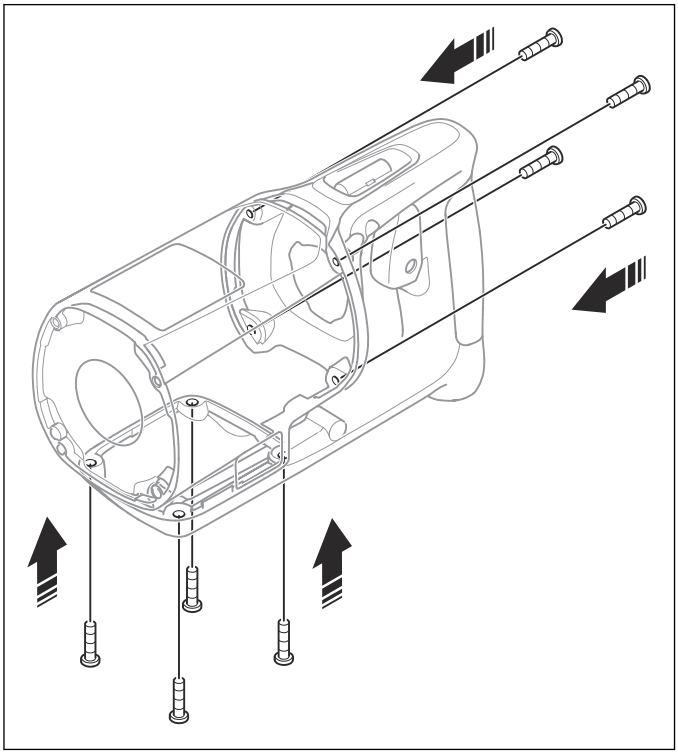


CAUTION: Make sure that the wires cannot touch the rotor.

7. Install the 5 screws.



8. Install the 8 screws.

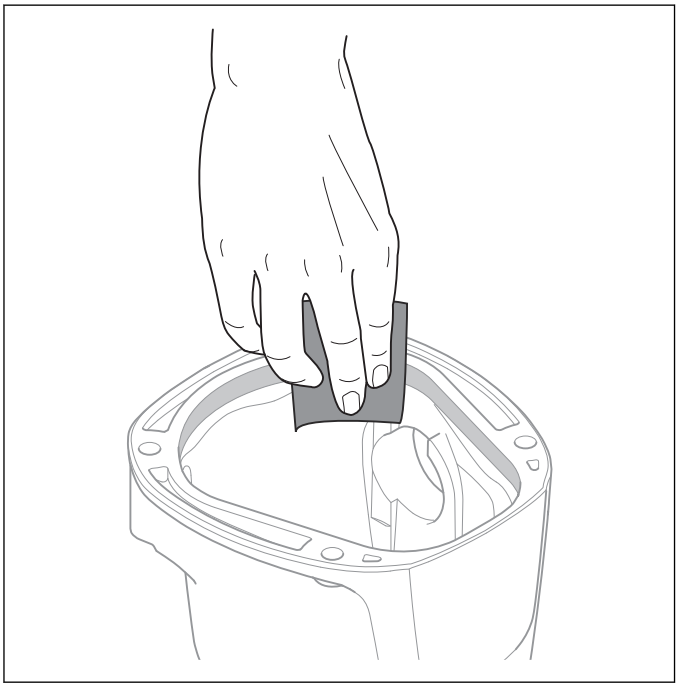


9. Install the carbon brushes. Refer to *To replace the carbon brushes on page 15*.

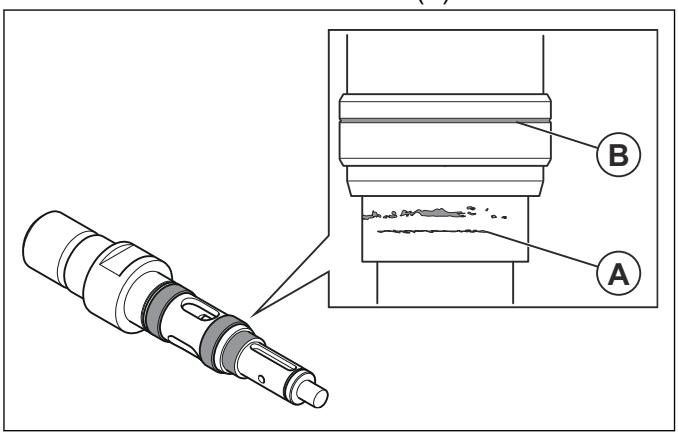
7.1 Gear housing

7.1.1 To do a check of the gear housing and gears

- Do a check of the gear housing for cracks and other damage. Use abrasive paper to remove sharp edges and scratches from the O-ring seat.



- Do a check of the ball bearings in the gear housing for damage. Do a check for water in the gear oil caused by damaged ball bearings.
- Do a check of the bearing seats for the pinion shaft, the gear shaft and the drill spindle shaft for damage and deformation.
- Do a check of the drill spindle shaft and the shaft sleeves for damage and deformation. Do a check for blue color from too high temperatures. Use abrasive paper to remove scratches and corrosion.
  a) The illustration shows the wear areas of the drill spindle. The drill spindle shaft must be replaced if the diameter is smaller than 21.80 mm at the wear area of the shaft seal (A).



  b) The shaft sleeves must be replaced if the diameter of the groove is smaller than 27.85 mm at the wear area (B).
- Do a check of the pinion shaft for damage and deformation. Do a check for blue color from too high temperatures. Use abrasive paper to remove scratches and corrosion.
- Do a check of the gear wheels for broken teeth, surface damage and deformation.
- Do a check of the brake discs for surface damage and deformation.
- Replace damaged parts.

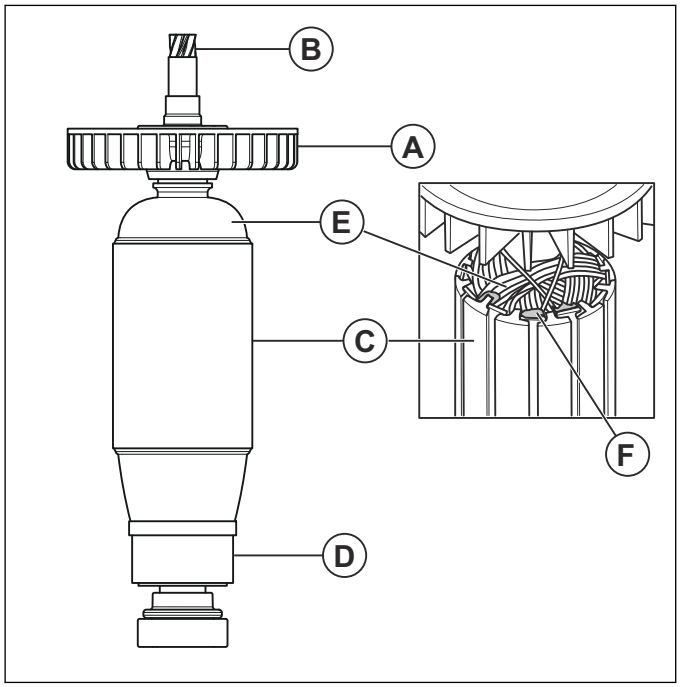
7.1.2 To do a check of the covers and the motor housing

1. Examine the top cover for damage.
2. Examine the middle cover and the motor housing for damage. Measure and make sure that the bearing seats are circular. If deviations are more than ± 0.1 mm, replace the parts.

7.2 Rotor

7.2.1 To do a check of the rotor

1. Examine the rotor fan (A) for damage. Replace the rotor if the rotor fan is damaged.



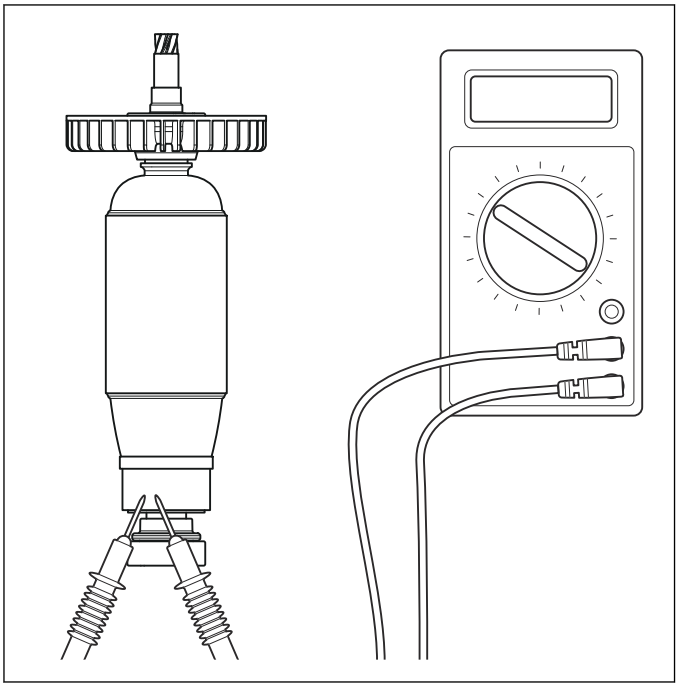
2. Examine the rotor shaft (B) for damage. Too low level of gear oil can cause a loss of surface hardness. Heat overload can cause a blue color on the rotor shaft. Replace the rotor if the rotor shaft is damaged.

CAUTION: Replace the first gear wheel if the rotor is replaced as a result of a damaged rotor shaft.

3. Examine the rotor surface (C) for damage. If the rotor is not in the center of the motor housing, the rotor surface can be damaged. Replace the rotor if the rotor surface is damaged
4. Examine the commutator (D) for damage. The commutator surface must be repaired if the wear is more than 0.07 mm. The nominal dimension is 31.8 mm.
5. Examine the coils (E) for damage. A short circuit between the segments on the commutator can cause burned coils. Unbalance or strong vibrations can cause a wire break in the coil. The rotor must be replaced if the coils or the wires are damaged.
6. Examine the insulation (F) for damage. Heat overload can cause a damaged insulation. Overload of the product, defective electronics or blocked air slots can cause heat overload. The rotor must be replaced if the insulation is damaged.

7.2.2 To do an electrical check of the rotor

- Do a check of the rotor windings with a multimeter. Examine 2 adjacent commutator plates. Refer to *Servicing tools on page 6*.



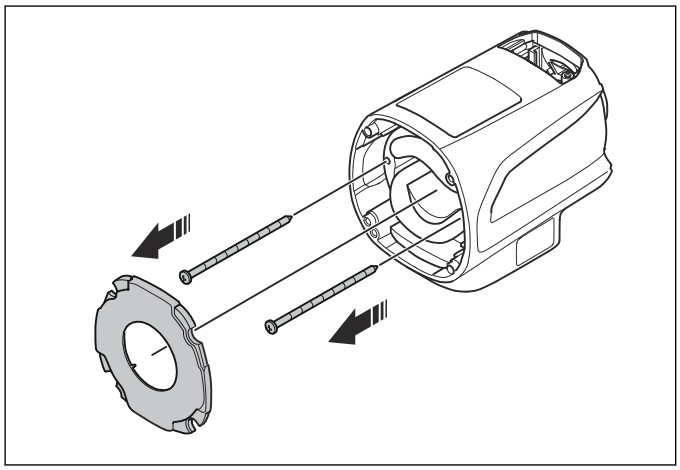
230V: Typical measured value for a correct rotor is R = 0.14 Ω ± 5%.

120V: Typical measured value for a correct rotor is R = 0.03 Ω ± 5%.

7.3 Stator

7.3.1 To do a check of the stator

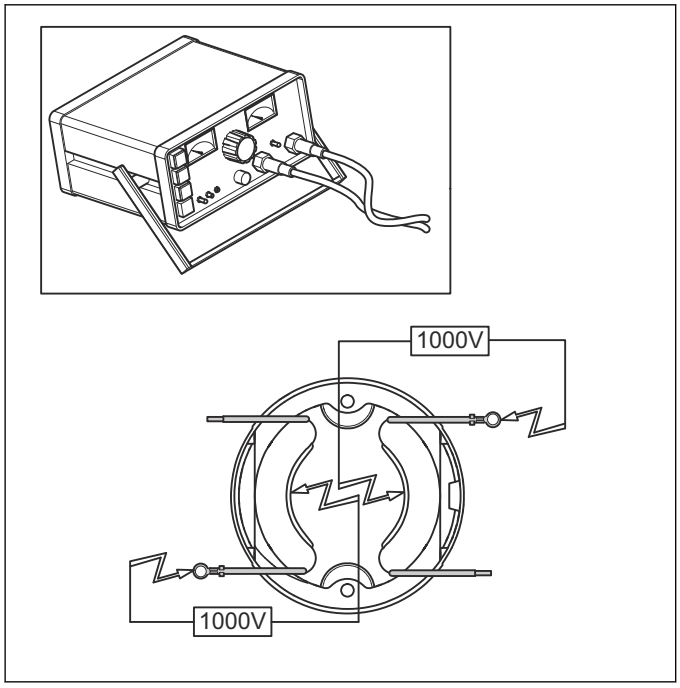
- Remove the air disc.



- Clean the motor housing.
- Examine the windings for damage.
- Examine the screws for damage. Tighten if it is necessary.

7.3.2 To do an electrical check of the stator

- Do a high voltage check with the high voltage tester.
  a) Set the high voltage tester to 1000V. Refer to *Servicing tools on page 6*.
  b) The 2 coils must be examined. Put the test probes as the illustration shows.



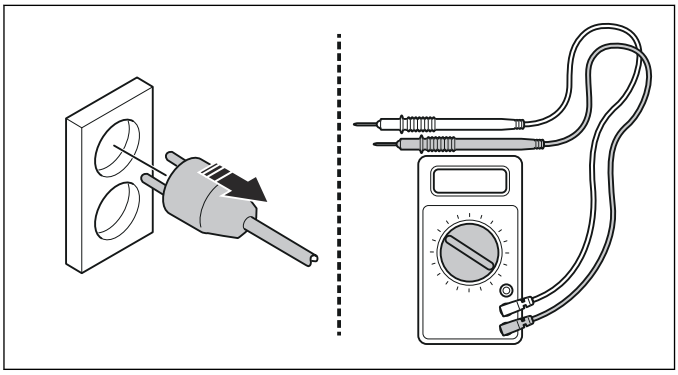
No fault signal must show on the high voltage tester.

7.4 Cables

7.4.1 To do a check of the power switch and power cord

WARNING: Disconnect the power cord from the power outlet.

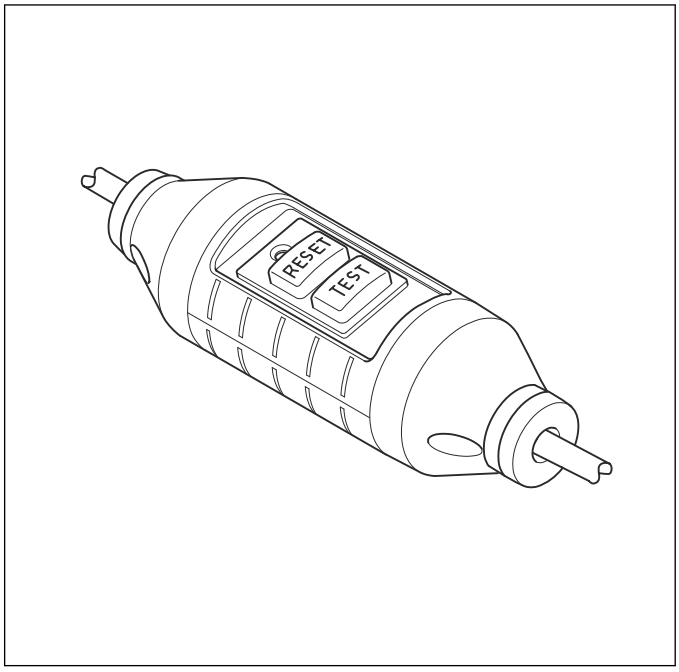
- Do a check of the power cord, the cable gland and the strain relief for damage.



- Do a check of the power plug and the power switch. If the power plug is burned, replace it.
- Do a check of the electrical function with a multimeter.

7.4.2 To do a check of the PRCD

The product has a PRCD installed on the power cord. The PRCD is for protection and engages if an electrical fault occurs.

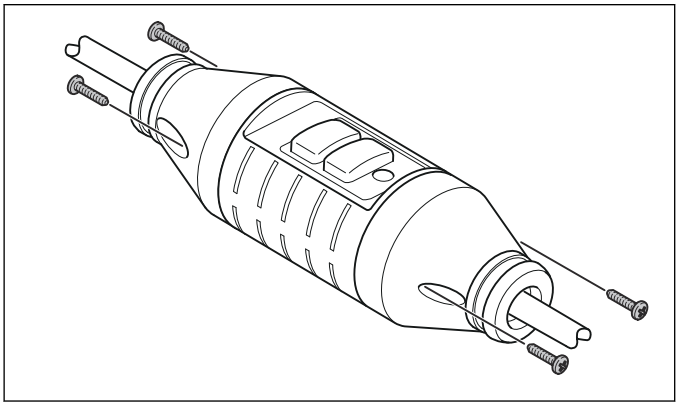


1. Connect the power plug to the power outlet.
2. Push the "RESET" button. The red indicator shows that the current is connected.
3. Pull the power plug out of the power outlet. The red indicator goes off.
4. Do step 1 and 2 again.
5. Push the "TEST" button. The red indicator goes off.
6. Push the "RESET" button again. The red indicator shows that the current is connected.

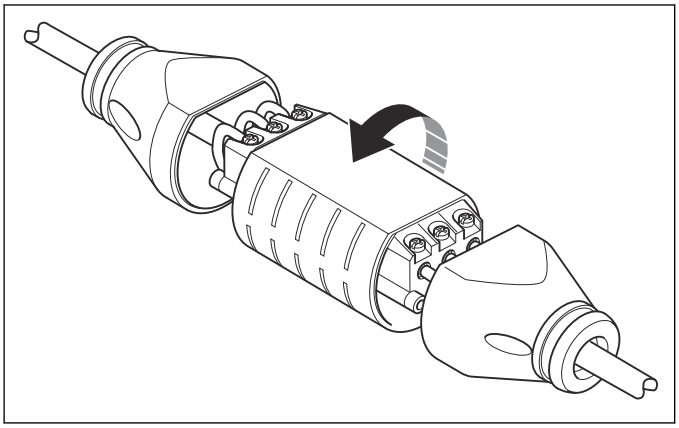
7.4.3 To examine the electrical cables of the PRCD

The PRCD only lets through current when it is connected to the power outlet. Examine the connection points with a multimeter.

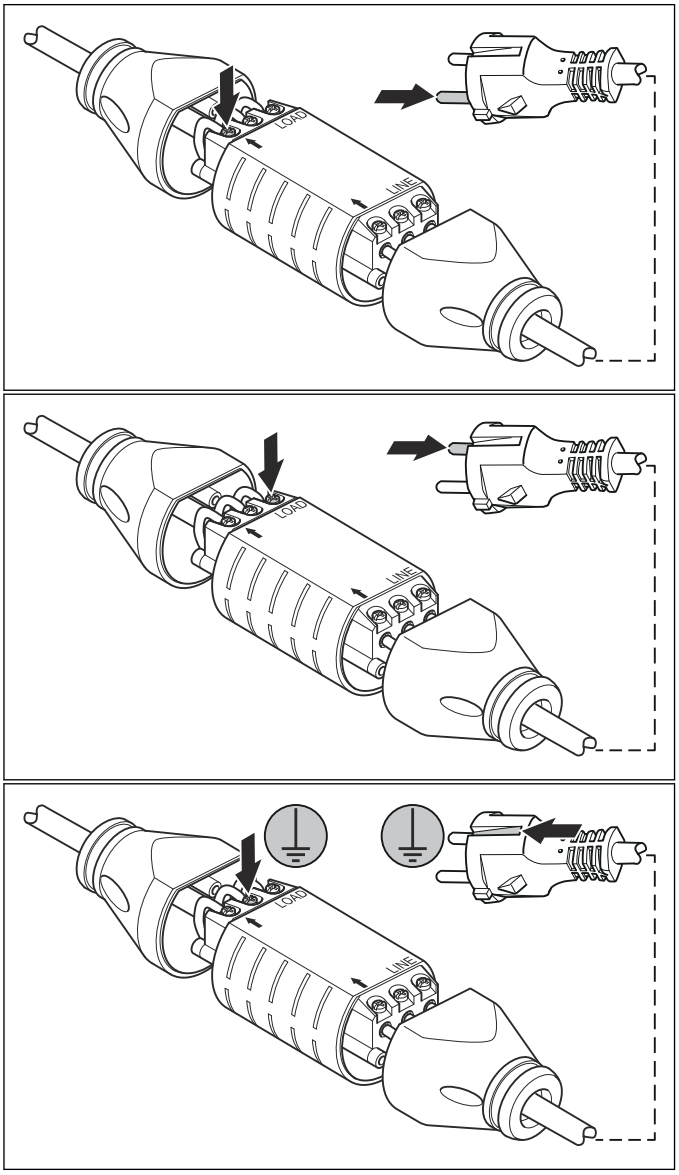
1. Remove the 4 screws and pull apart the ends of the PRCD.



2. Turn the PRCD to the other side.



3. Put the test probes at the connection points as the illustrations show.



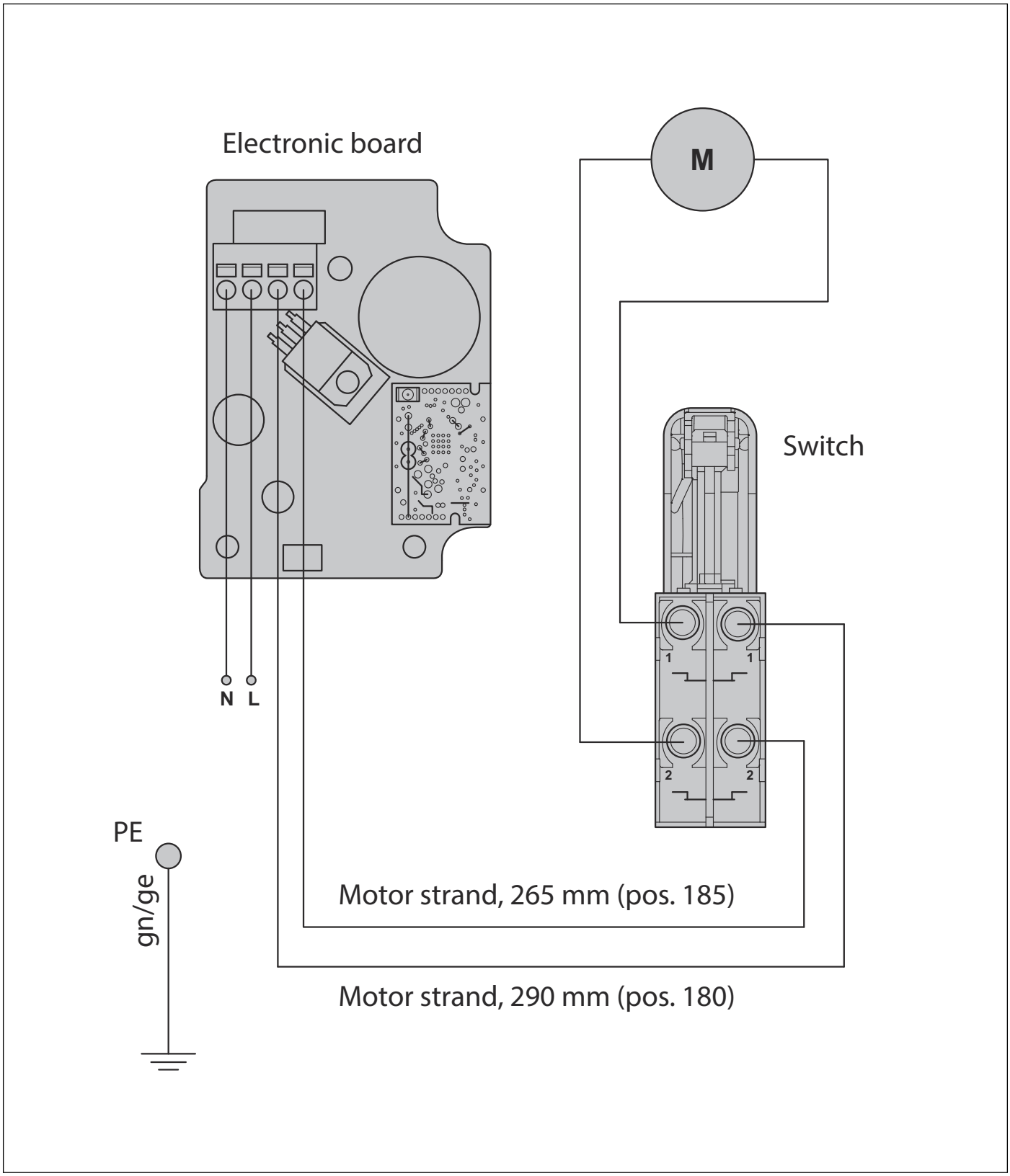
7.5 To do a check of the electronics

1. Do a visual check for damaged components.
2. Do a soft start of the motor. Refer to the operator's manual. The product must operate correctly.

7.6 To do a function test

- Let the motor operate for 10-15 minutes and measure the no load current.
  230V: Typical measured value is I = 3.0 - 3.5 A.

8.1 Wiring diagram



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