Husqvarna®

Workshop manual

DM 200, DM 210SP



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 particularly 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.

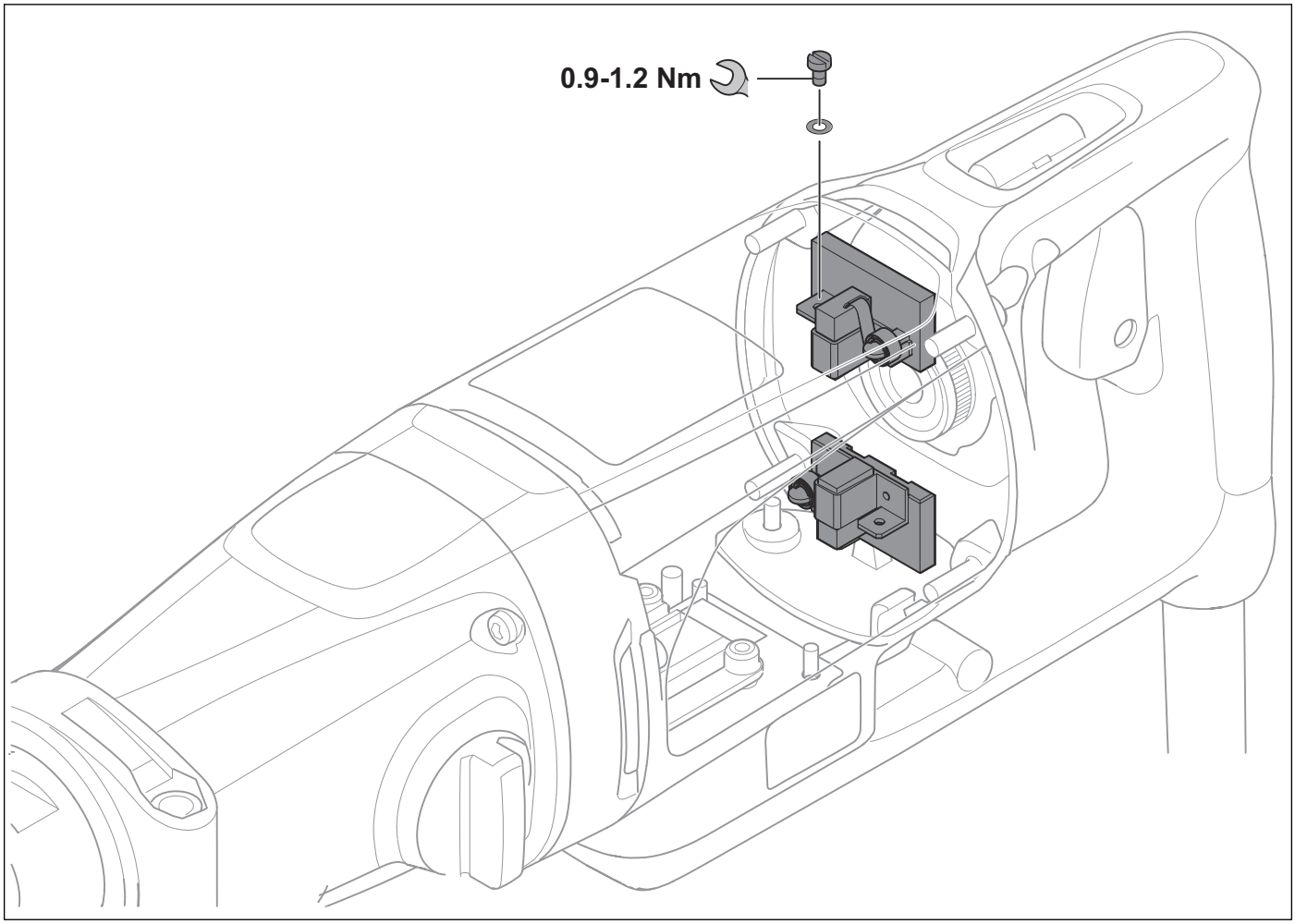
3 Servicing data

3.1 Symbols in the diagrams

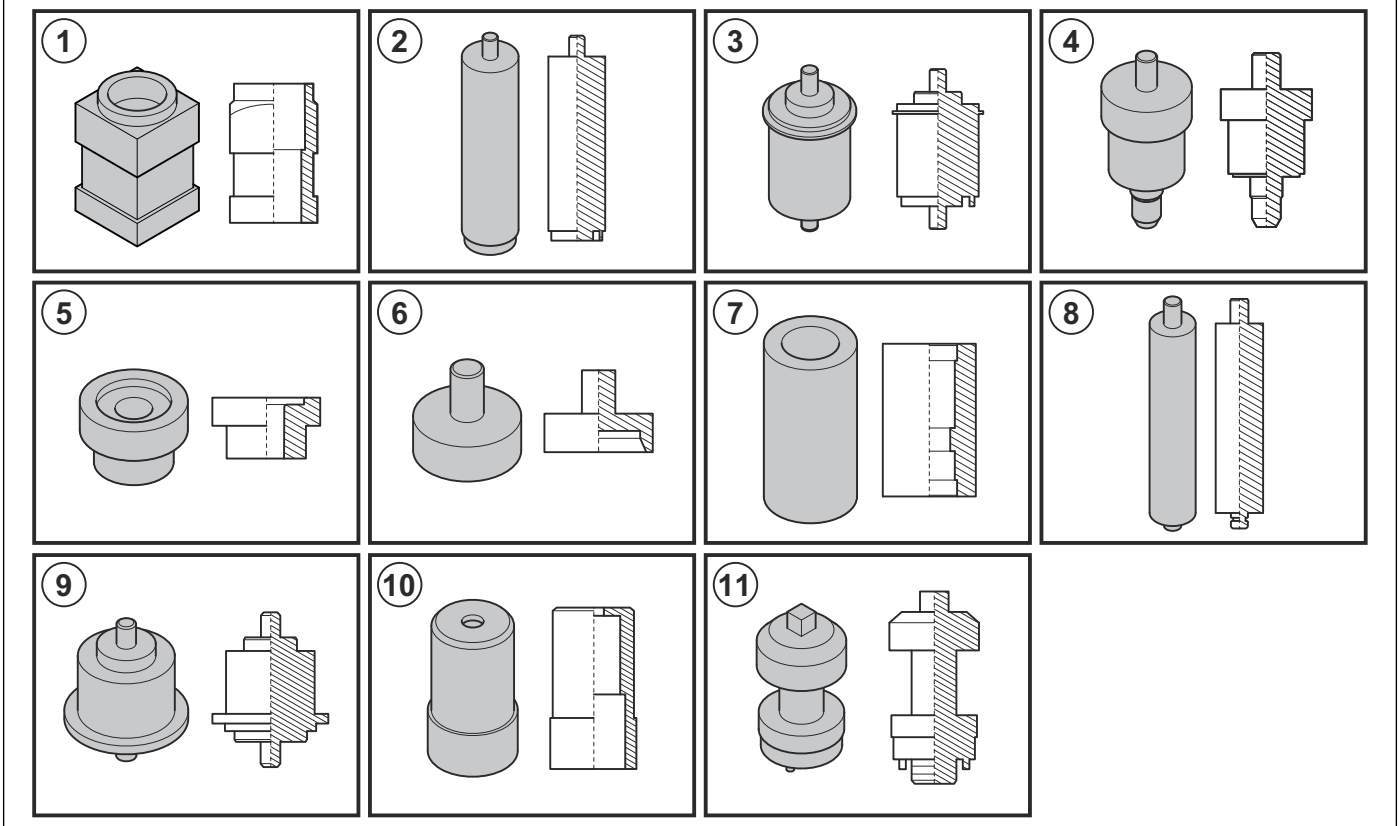


Tightening torque, Nm

3.2 Tightening torques

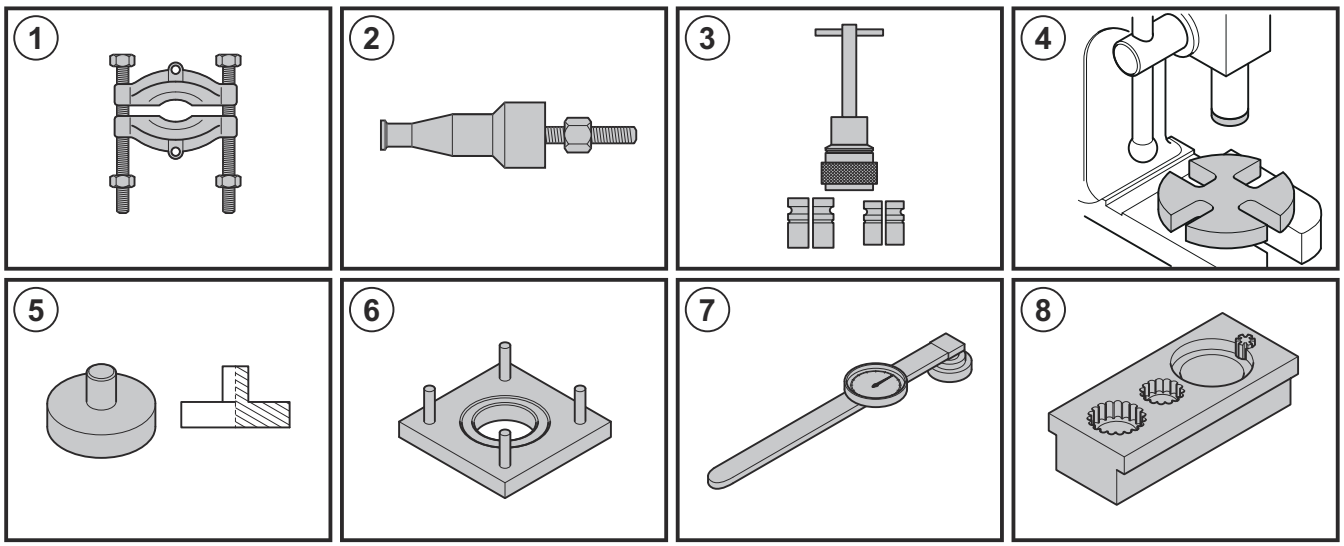


4.1 Servicing tools overview 1



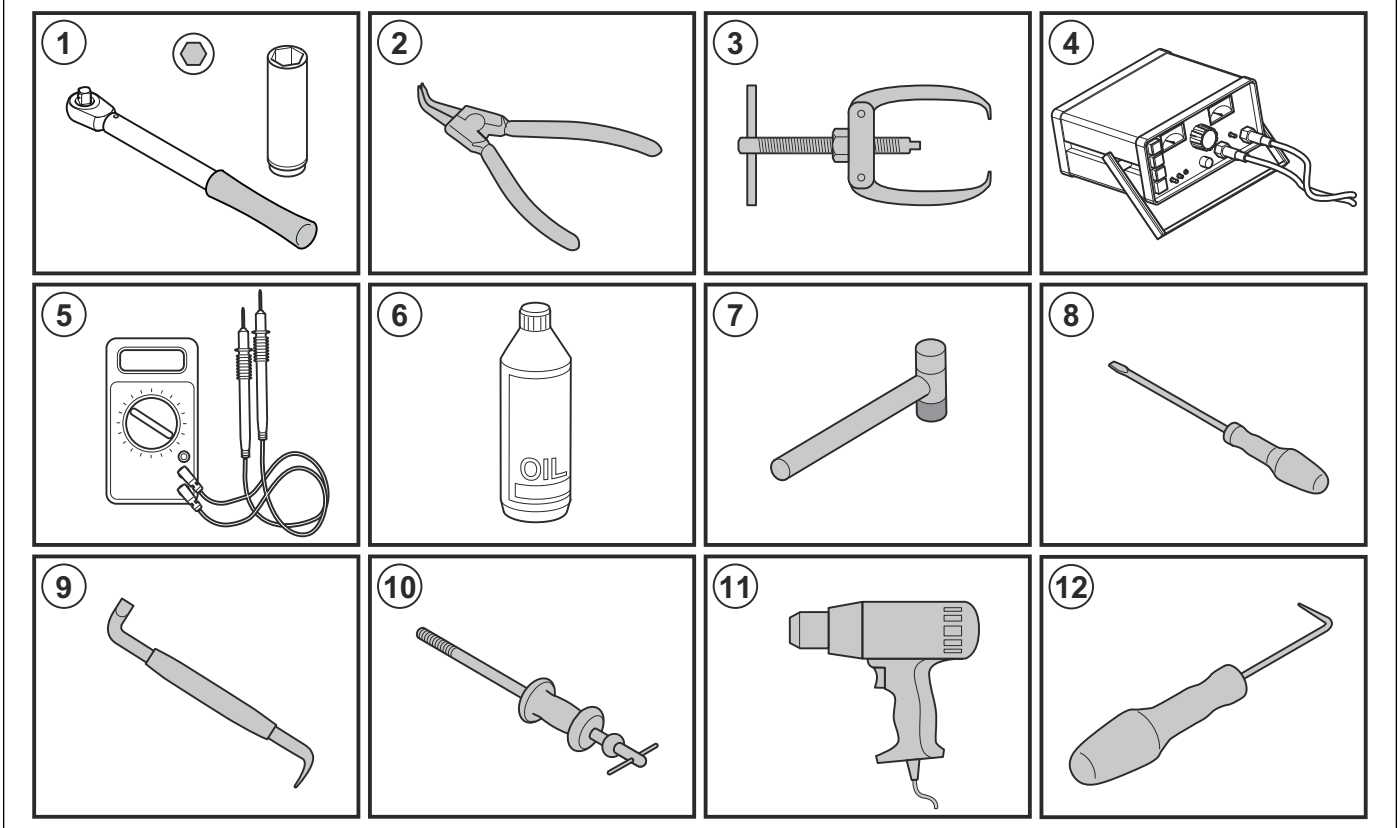
Pos.	Name	Use	Article number
1	Product holder tool	To attach the product to a vise.	598 94 68-01
2	Shaft seal press tool	To replace the shaft seals for the drill spindle.	531 14 23-01
3	Shaft seal press tool	To replace the shaft seals for the drill spindle.	531 14 24-01
4	Shaft seal press tool	To replace the gear oil seal.	598 94 73-01
5	Bearing press tool	To assemble the rotor.	531 14 25-01
6	Bearing press tool	To assemble the rotor.	531 14 27-01
7	Sleeve press tool	To replace the shaft sleeves for the drill spindle.	531 14 28-01
8	Bearing press tool	To install the bearing in the gear housing.	531 14 31-01
9	Seal press tool	To install the seal in the gear housing.	540 14 83-01
10	Shaft seal press tool	To install the spindle shaft in the gear housing. To install the snap ring on the spindle shaft.	540 14 84-01
11	Special tool	To remove and install the toothed bearing.	540 14 85-01

4.2 Servicing tools overview 2



Pos.	Name	Use	Article number
1	Separator puller tool	To replace the shaft sleeves for the drill spindle. Refer to *To replace the shaft sleeves for the drill spindle DM 200 on page 21*. To remove the drill spindle bearing. Refer to *To remove the drill spindle DM 200 on page 19*.	598 94 78-01
2	Inner bearing puller tool	To remove the middle cover bearings. Refer to *To remove the needle bearings from the middle cover on page 42*.	531 14 32-01
3	Bearing puller tool	-	598 95 44-01
	Insert for roller bearing	To disassemble the rotor. Refer to *To disassemble the rotor on page 43*.	531 14 33-01
			598 95 45-01
4	Mandrel press	To install and remove product parts.	598 95 53-01
5	Protective tool for mandrel press	To install and remove product parts.	598 95 55-01
6	Press tool for motor housing	To assemble the stator. Refer to *To disassemble and assemble the stator on page 44*.	531 14 34-01
7	Torque wrench	To control the tightening torque of the safety coupling. Refer to *To assemble the pinion shaft DM 200 on page 27*.	531 14 36-01
8	Pinion shaft holder tool	To assemble the pinion shaft. Refer to *To assemble the pinion shaft DM 200 on page 27*.	531 14 37-01

4.3 Servicing tools overview 3

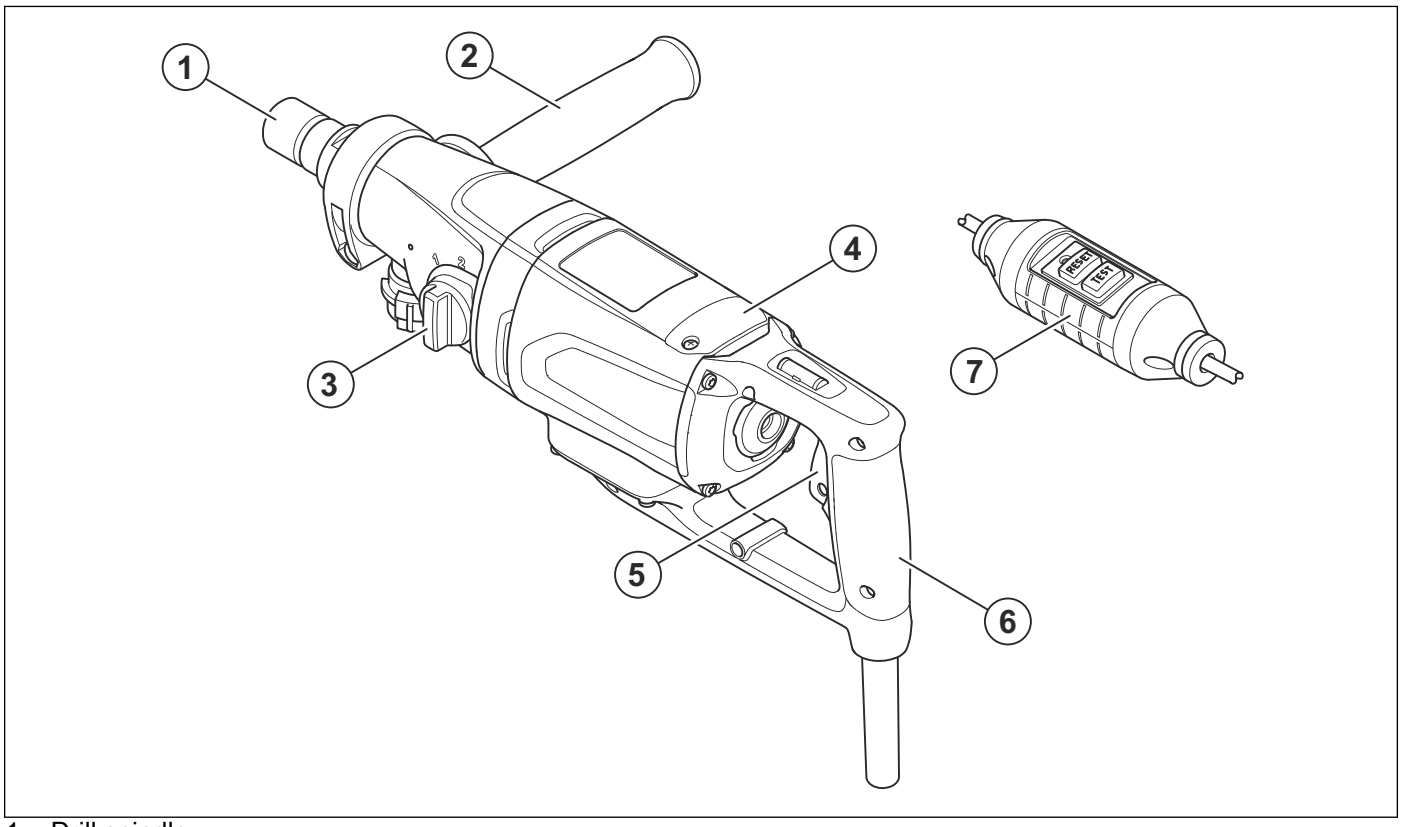


Pos.	Name	Use	Article number
1	Wrench	To install and remove product parts.	There are many manufacturers.
2	Circlip pliers	To install and remove product parts.	There are many manufacturers.
3	Small puller tool	To remove the pinion shaft. Refer to *To remove the pinion shaft DM 200 on page 18*.	There are many manufacturers.
4	High voltage tester	To control the functions of the electrical system.	There are many manufacturers.
5	Multimeter	To control the functions of the electrical system.	There are many manufacturers.
6	Gear oil	To lubricate the product.	Castrol ALPHA SP150 or equivalent.
7	Soft head mallet	To install and remove product parts.	There are many manufacturers.
8	Screwdriver	To install and remove product parts.	There are many manufacturers.
9	Offset screwdriver	To install and remove product parts.	There are many manufacturers.
10	Slide hammer	To remove the gear housing bearing. Refer to *To remove the ball bearing from the gear housing DM 200 on page 22*.	There are many manufacturers.
11	Hot air gun	To install and remove product parts.	There are many manufacturers.

Pos.	Name	Use	Article number
12	Picker	To install and remove product parts.	There are many manufacturers.

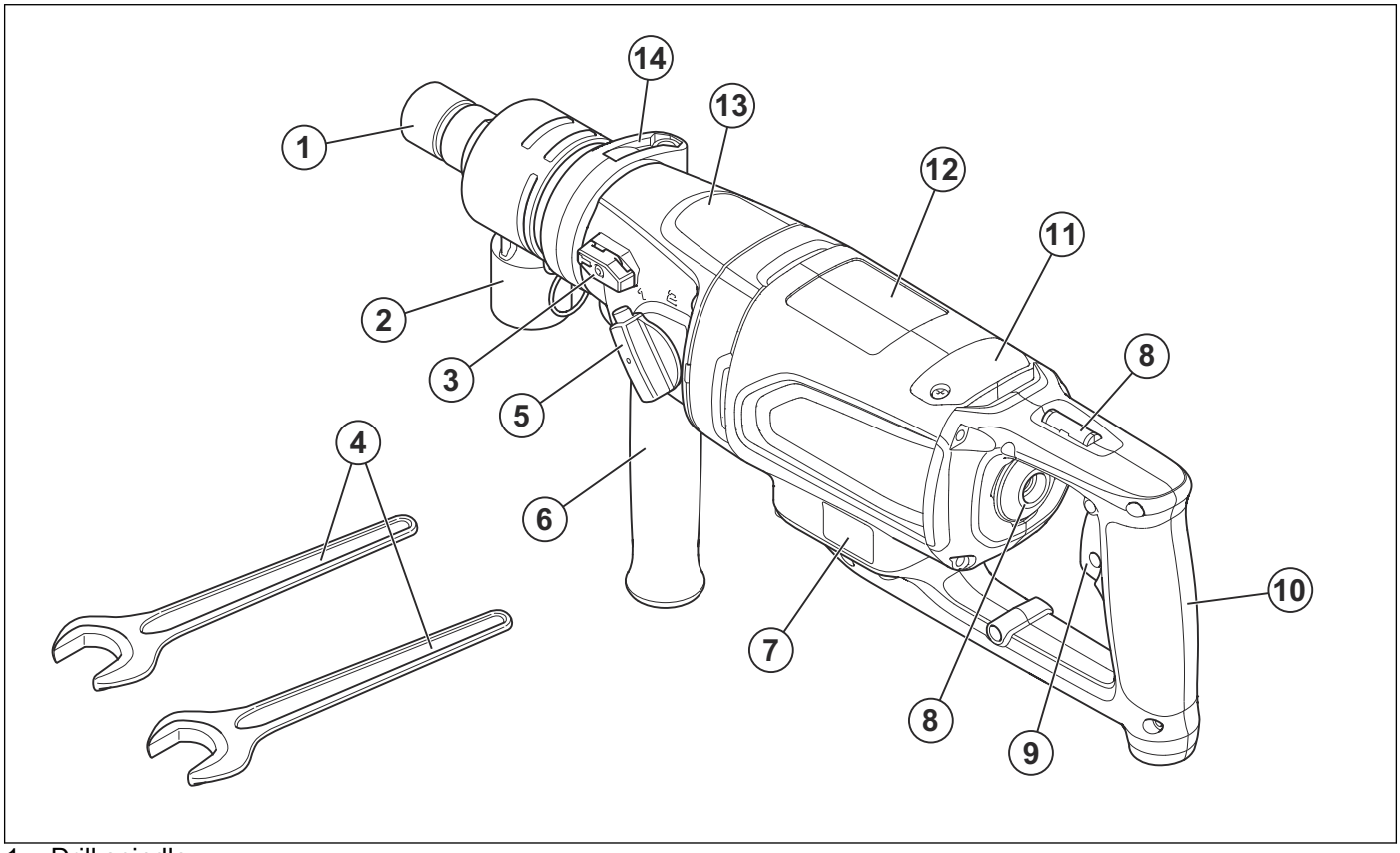
5 Product overview for repair and servicing

5.1 Product overview DM 200



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

5.2 Product overview DM 210SP



1. Drill spindle
2. Dust extractor connector
3. Switch to engage or disengage the percussion function
4. Wrenches
5. Gear selector
6. Auxiliary handle
7. Electronics box
8. Spirit level
9. Power switch
10. Main handle
11. Inspection cover
12. Motor
13. Gearbox
14. Clamp ring

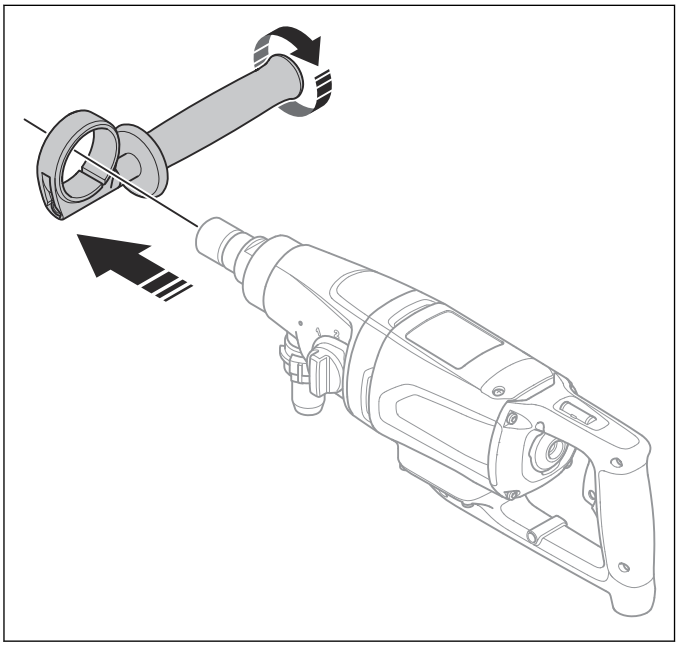
6 Repair and servicing

6.1 To clean and examine the product parts

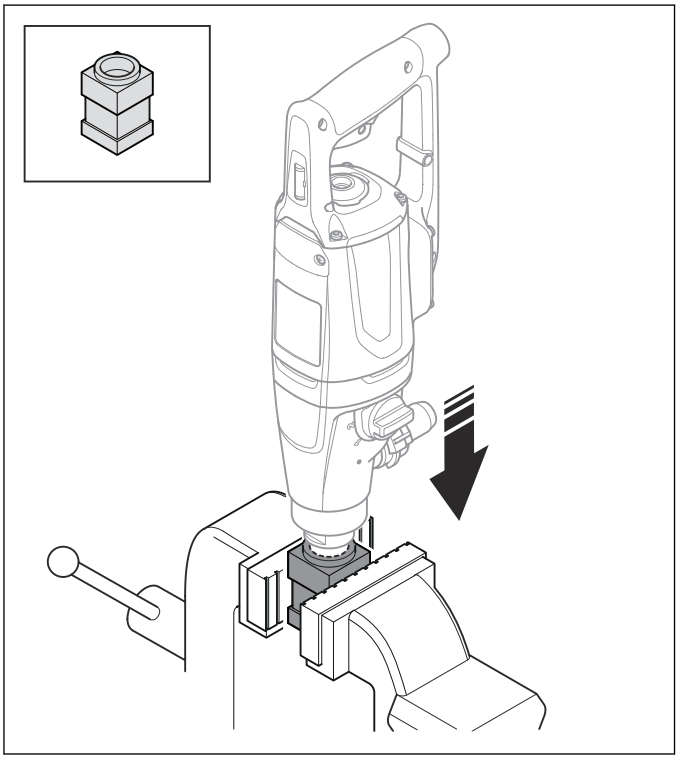
- Clean and examine all parts fully. You find more instructions in the chapter for each part if special tools or procedures are necessary.
- Replace damaged parts.
- Always use original spare parts.

6.2 To disassemble the product

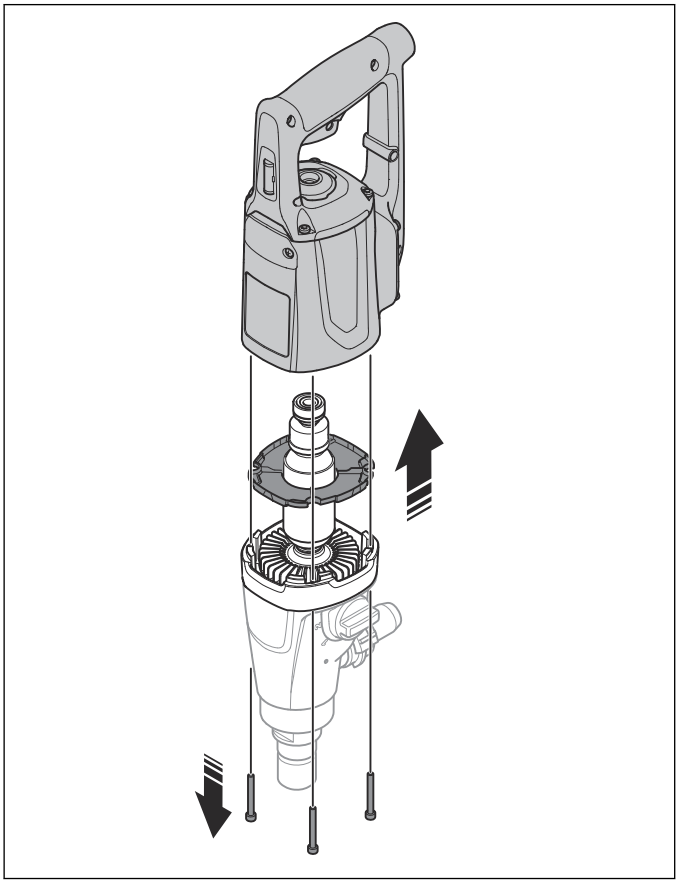
1. Remove the front handle.



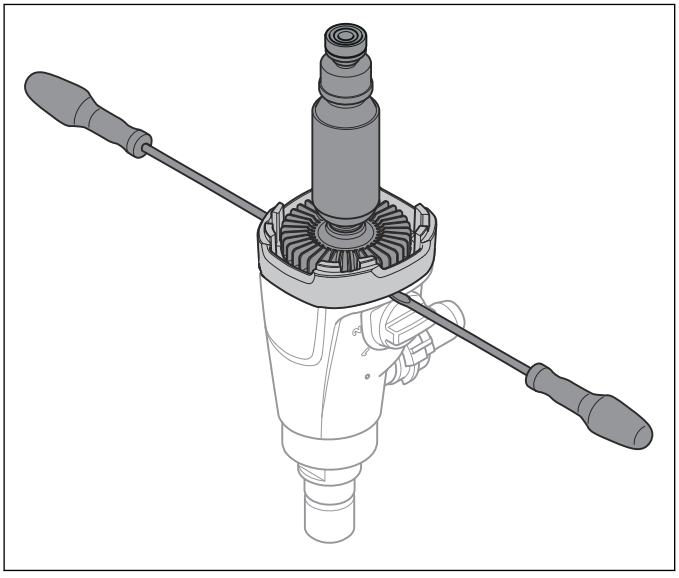
2. Attach the product holder tool to a vise. Refer to *Servicing tools on page 6*. Put the product in a vertical position with the drill spindle in the machine holder tool.



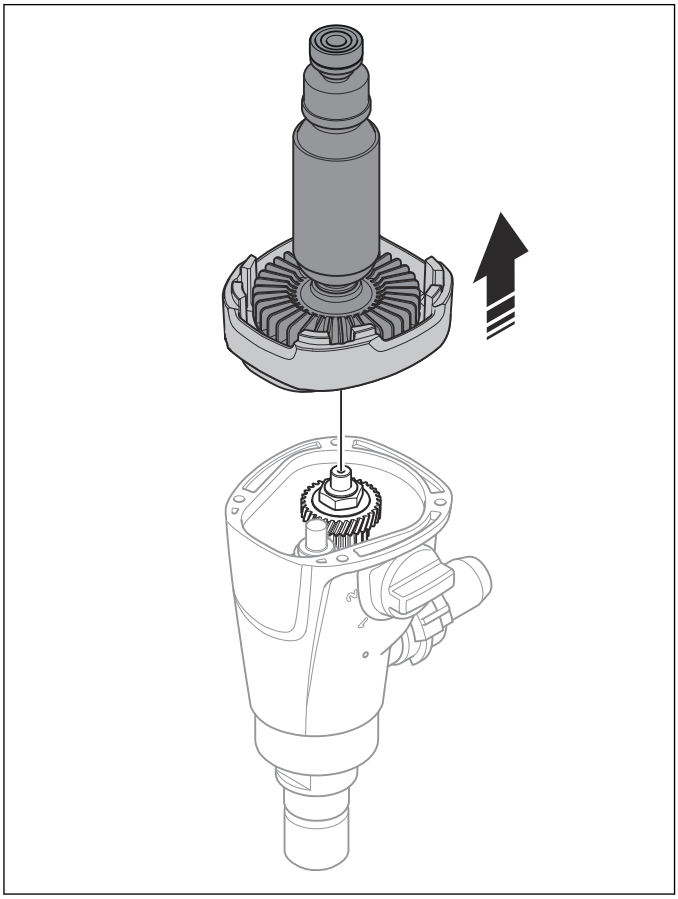
3. Remove the carbon brushes. Refer to *To replace the carbon brushes on page 17*.
4. Remove the 4 screws that hold the motor housing. Remove the motor housing and the air conductor.



5. Put 2 flat screwdrivers in the recesses on the gear housing. Carefully loosen the middle cover.

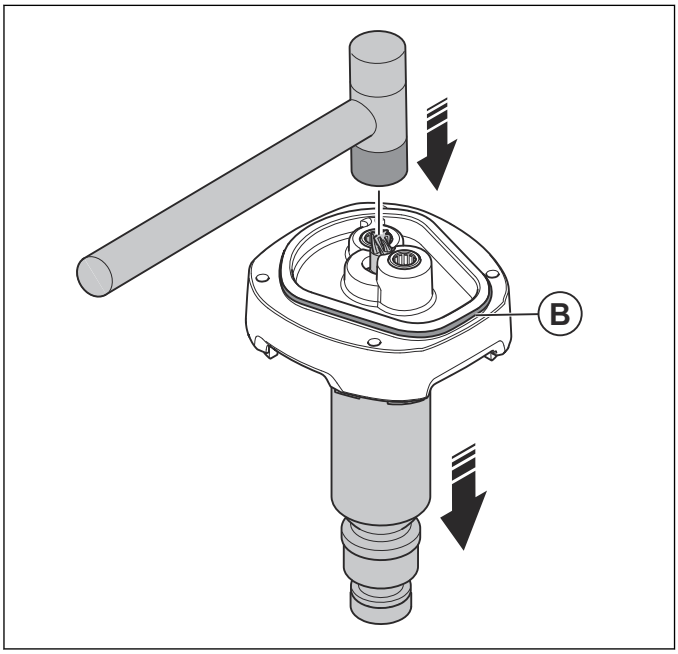


6. Remove the middle cover together with the rotor.



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

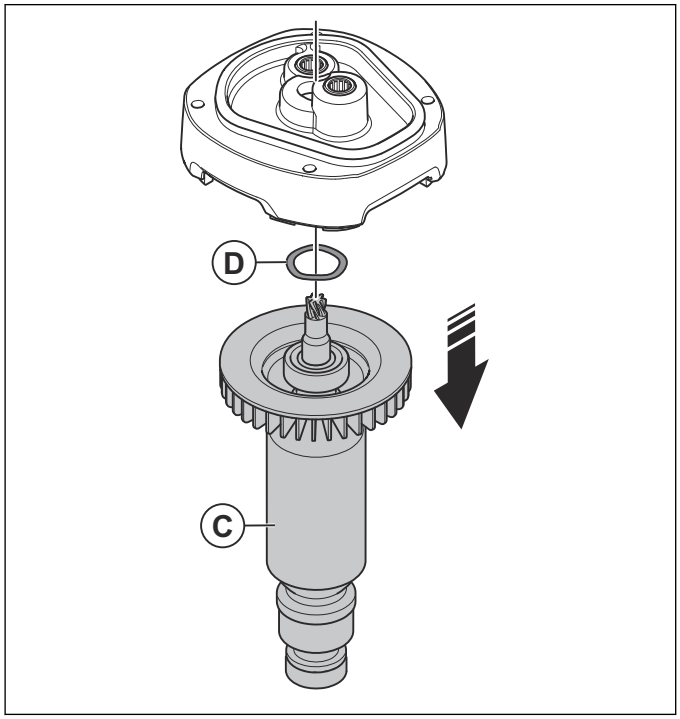
7. Tap the rotor shaft carefully with a soft head mallet to loosen it.



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

8. Do a check of the O-ring (B). Remove and discard it if it is damaged or worn.

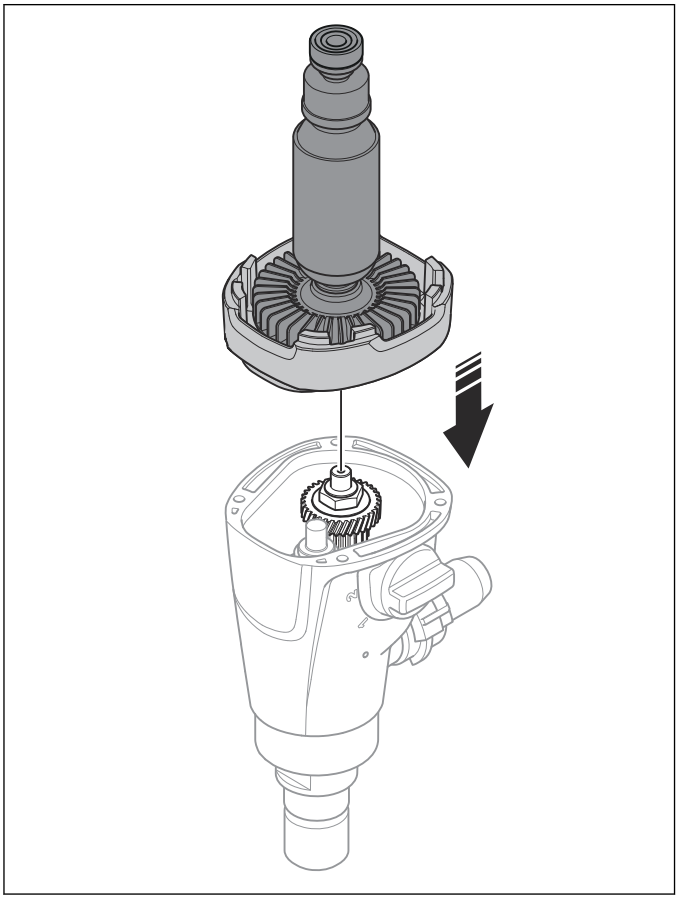
9. Remove the rotor (C) and the washer (D) from the middle cover.



6.3 To assemble the product

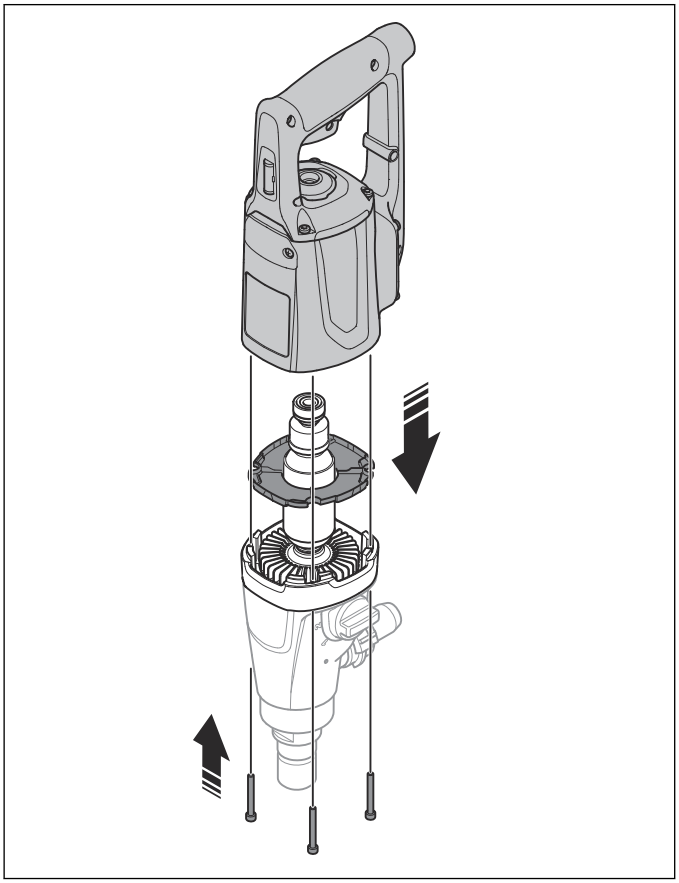
1. Assemble the rotor, refer to *To assemble the rotor on page 43*.
2. Assemble the stator, refer to *To disassemble and assemble the stator on page 44*.
3. Replace the gear oil, refer to *To replace the gear oil on page 15*.

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

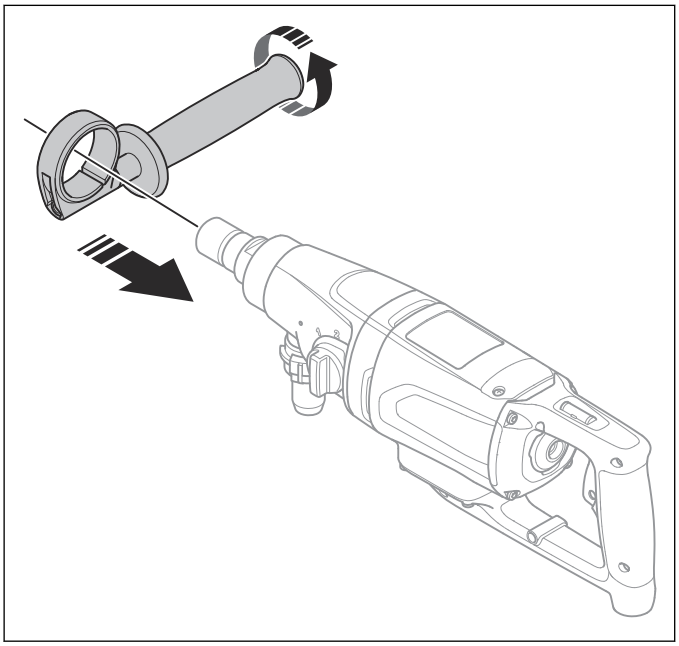


CAUTION: Make sure that the O-ring is not damaged.

5. Put the air conductor over the rotor.



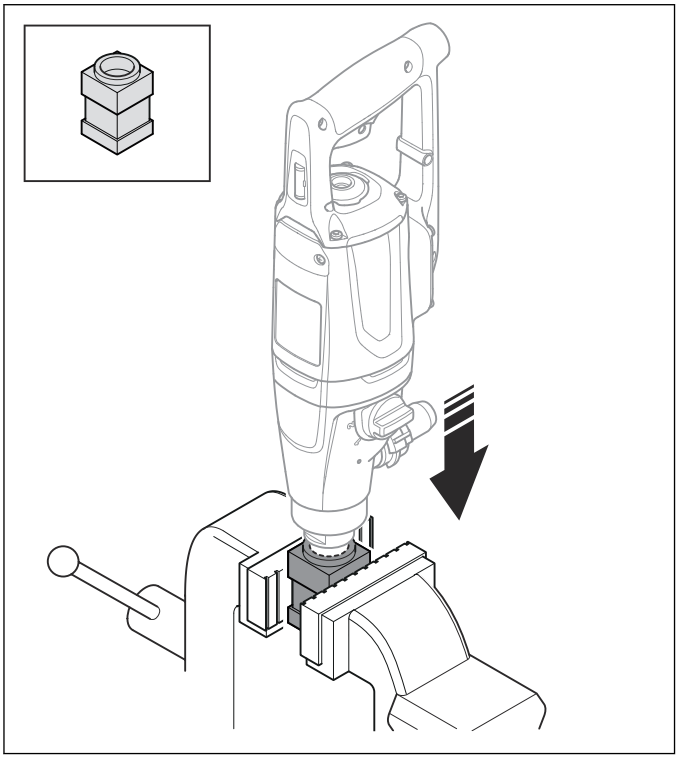
6. Put the motor housing on the middle cover. Align the screw holes in the gear housing with the holes in the motor housing. Put the 4 screws in the screw holes. Make sure that the rotor bearing is attached to the bearing seat. Tighten the 4 screws.
7. Install the carbon brushes in the holders. Refer to *To replace the carbon brushes on page 17*.
8. Install the front handle.



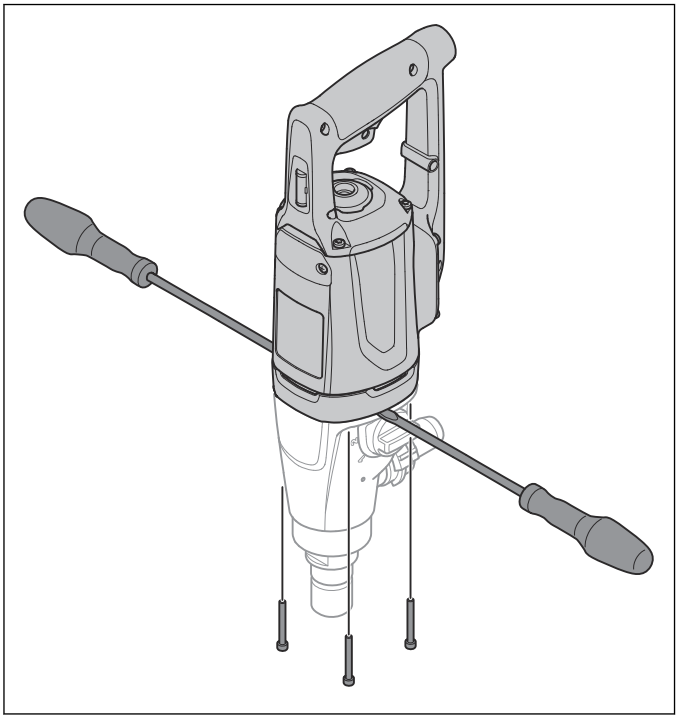
6.4 To replace the gear oil

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 product 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.

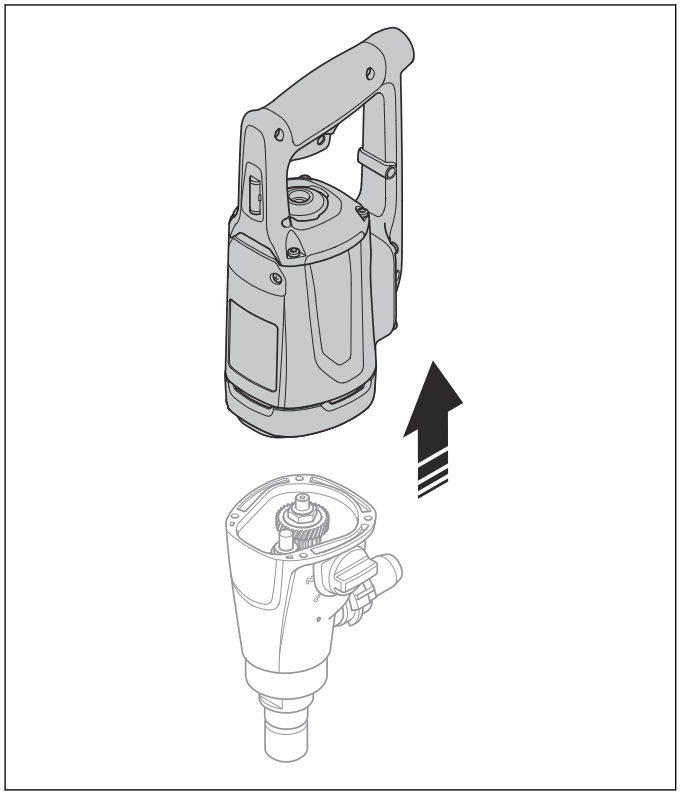


2. Remove the 4 screws that hold the motor housing. Put 2 flat screwdrivers in the recesses on the gear housing. Carefully loosen the middle cover and the motor housing.

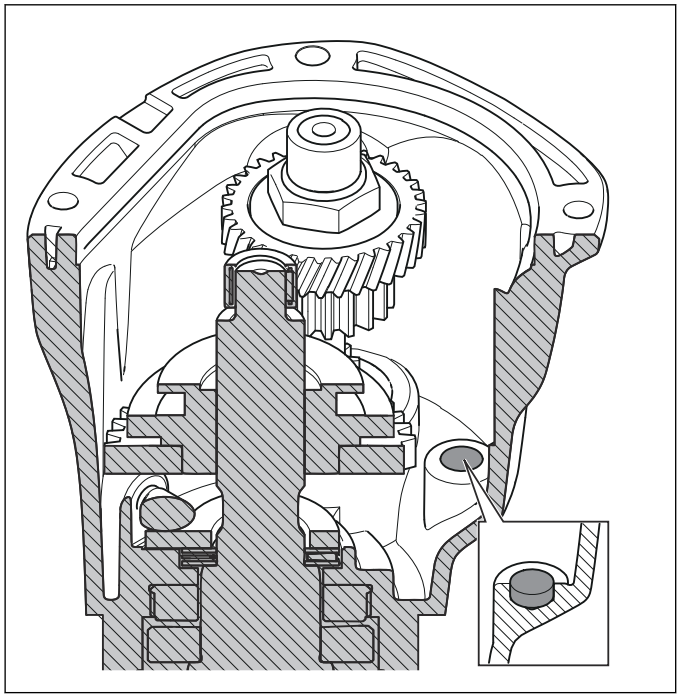


CAUTION: Make sure that the O-ring is not damaged.

3. Remove the middle cover and the motor housing.



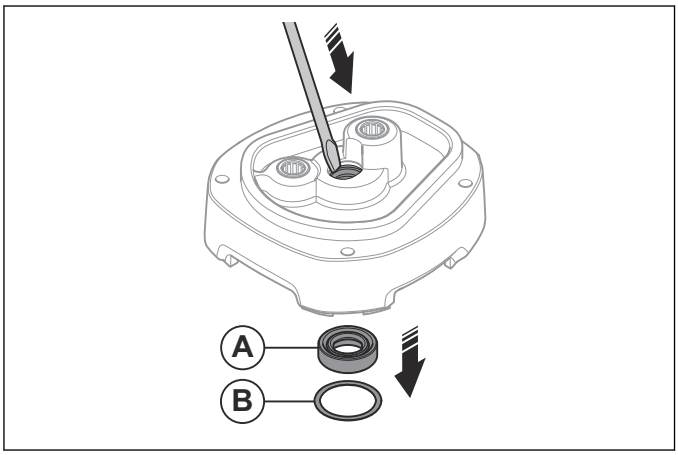
4. Put a container below the product. Remove the product from the machine holder tool. Tilt the product to drain the gear oil.
5. Do a check of the magnet in the gear housing. If there are metal shavings on the magnet, it is necessary to do a complete servicing of the gear housing. Refer to *Gear housing DM 200 on page 18* or *Gear housing DM 210SP on page 29*.



6. Fill the gear housing with 140 ml new gear oil. Refer to *Servicing tools overview 3 on page 8*.
7. Assemble the product in the opposite sequence.

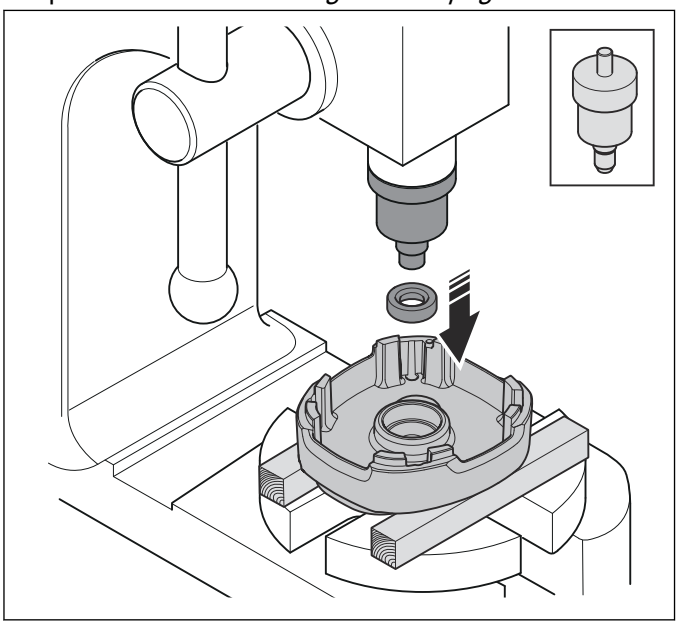
6.4.1 To replace the gear oil seal

1. Remove the middle cover. Refer to *To disassemble the product on page 12*.
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.

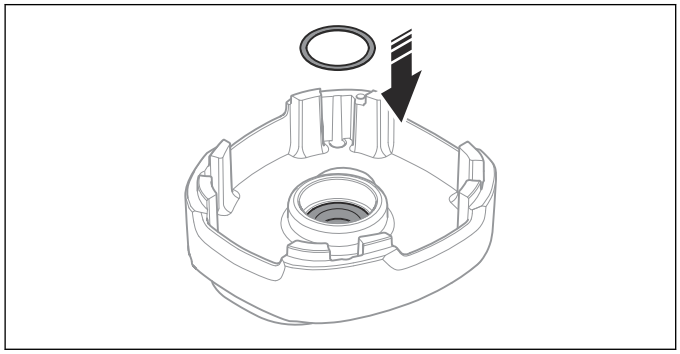


CAUTION: Make sure that the metal surface does not become damaged.

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 598 94 73-01 attached to a mandrel press. Refer to *Servicing tools on page 6*.



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



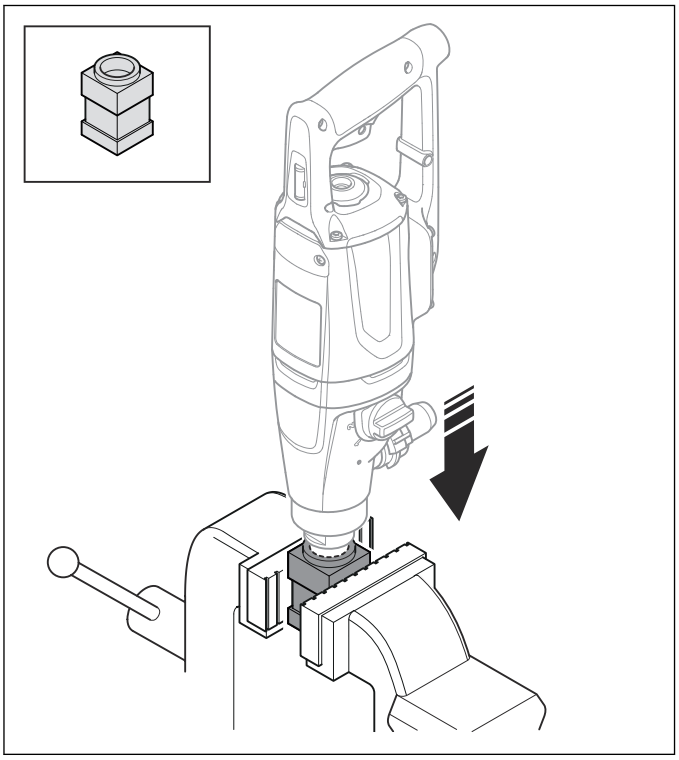
6.5 Carbon brushes

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

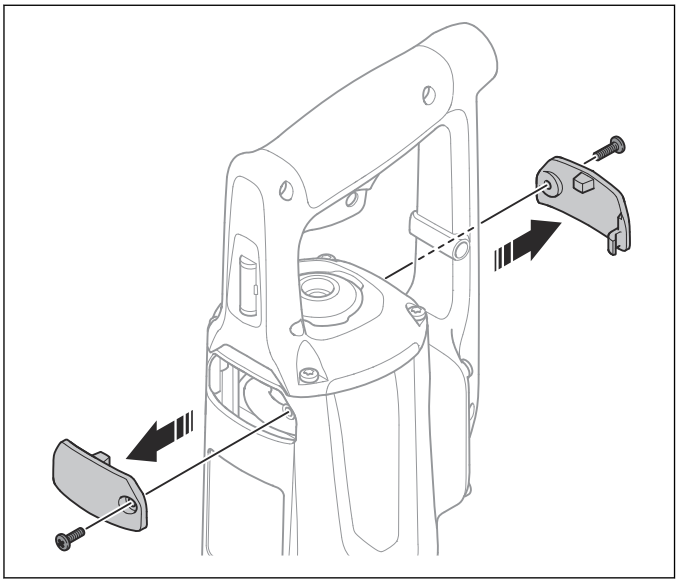
6.5.1 To replace the carbon brushes

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

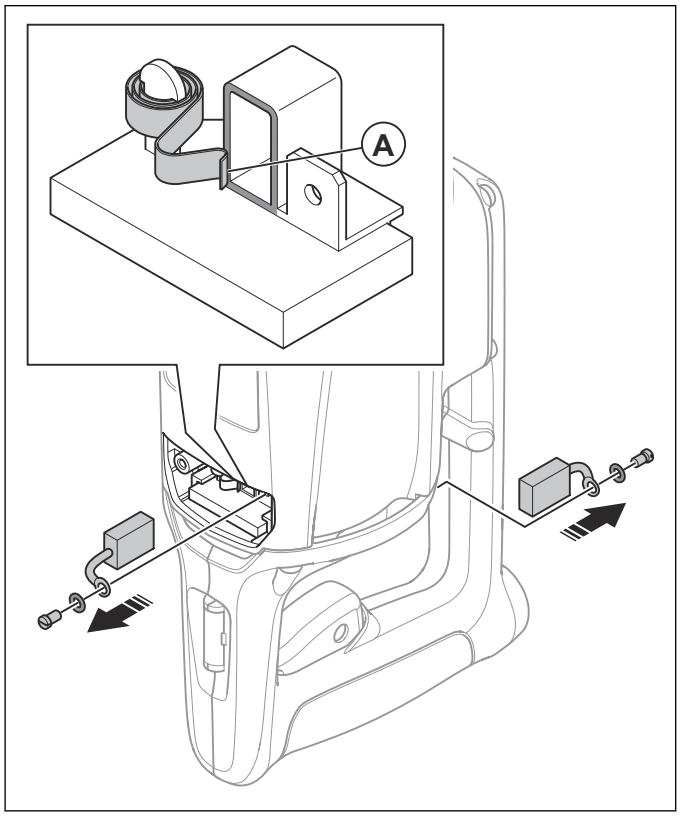
1. Attach the product holder tool to a vise. Refer to *To disassemble the product on page 12*. Put the product in a vertical position with the drill spindle in the machine holder tool.



2. Remove the 2 screws and the 2 inspection covers.

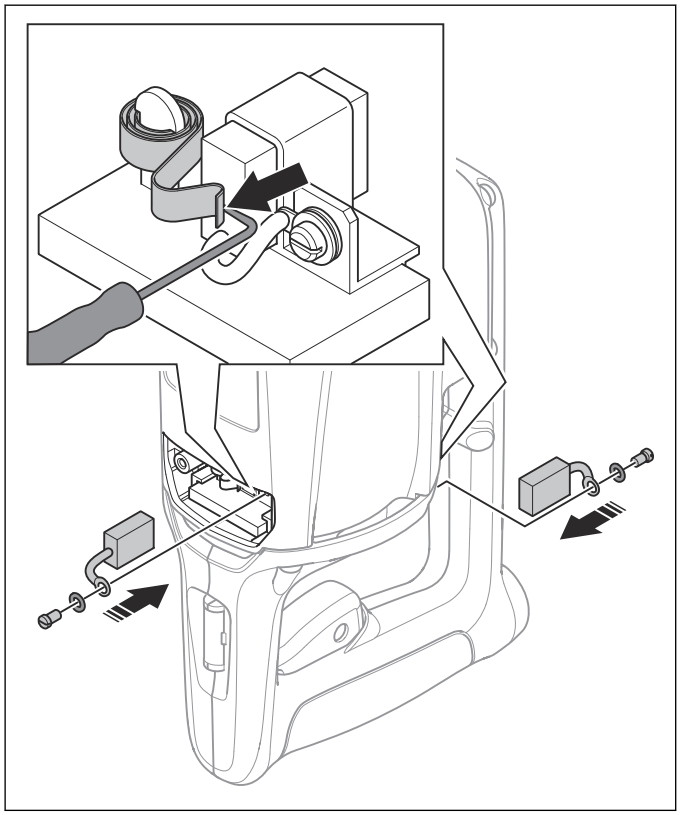


3. Remove the 2 screws and the 2 washers for the connection wires of the carbon brushes. Pull the carbon brushes out from the holders.

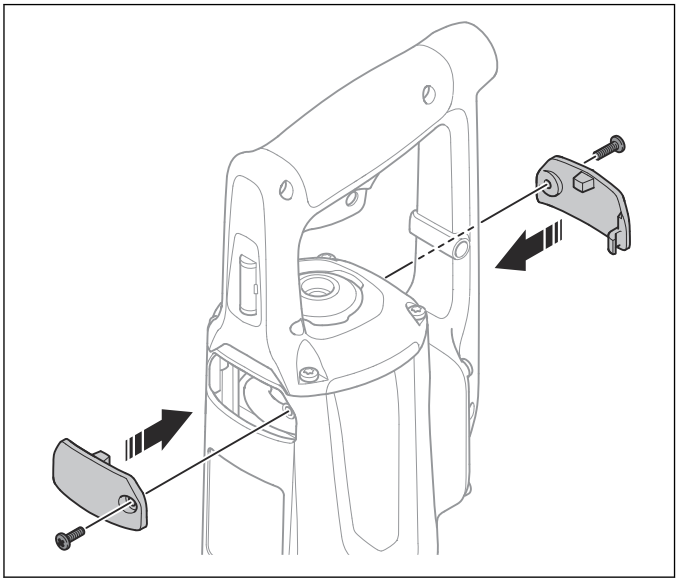


Note: Make sure that the spring (A) is held in place by the edge of the carbon brush holder when you remove the carbon brush.

4. Install the carbon brushes in the holders. Use a picker to lift the spring to the correct position. Refer to *Servicing tools overview 3 on page 8*.



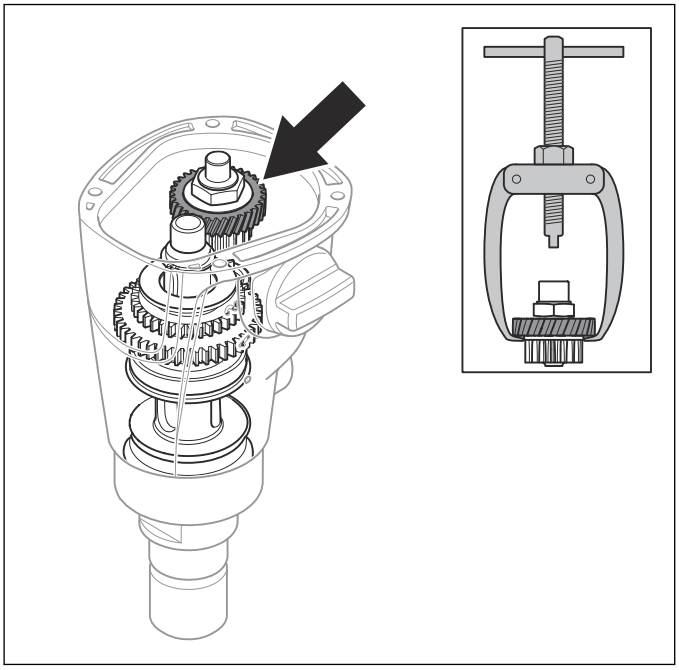
5. Install the brush connection wires with the 2 screws and the 2 washers.
6. Install the 2 inspection covers and the 2 screws.



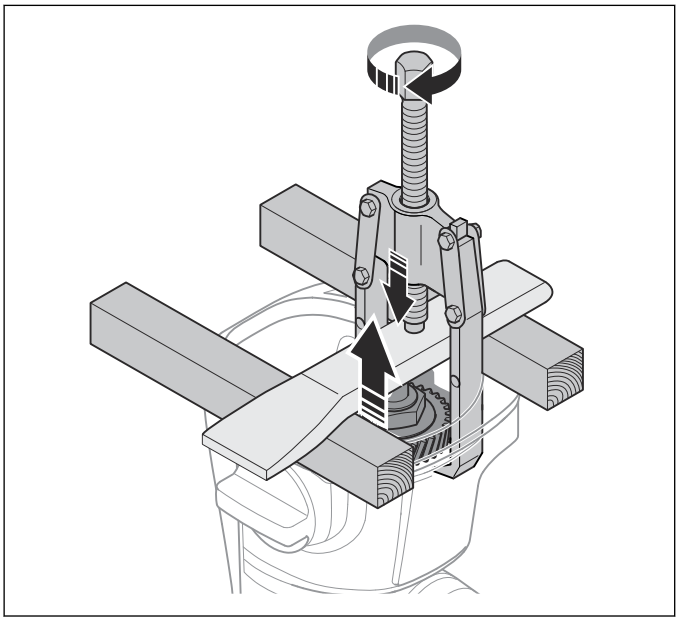
6.6 Gear housing DM 200

6.6.1 To remove the pinion shaft DM 200

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



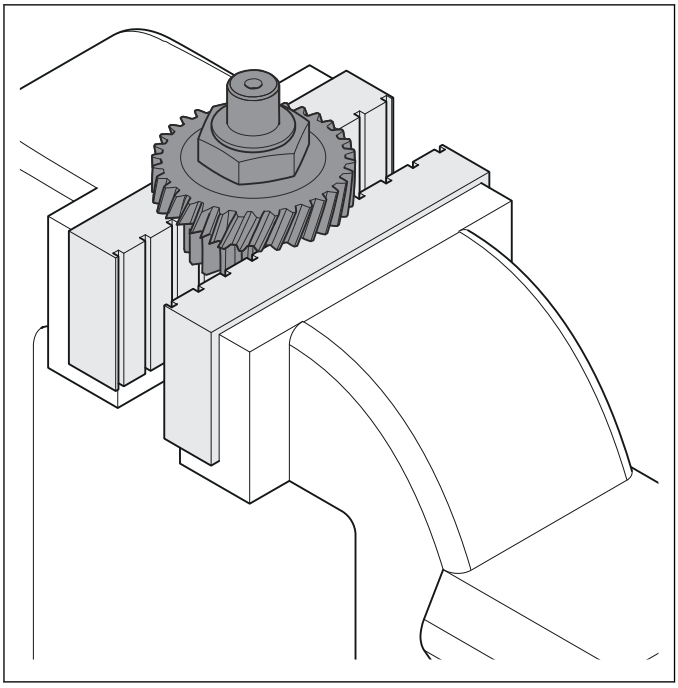
2. Use 2 spacers and put a piece of metal between them as support for the puller tool. Pull out the pinion shaft.



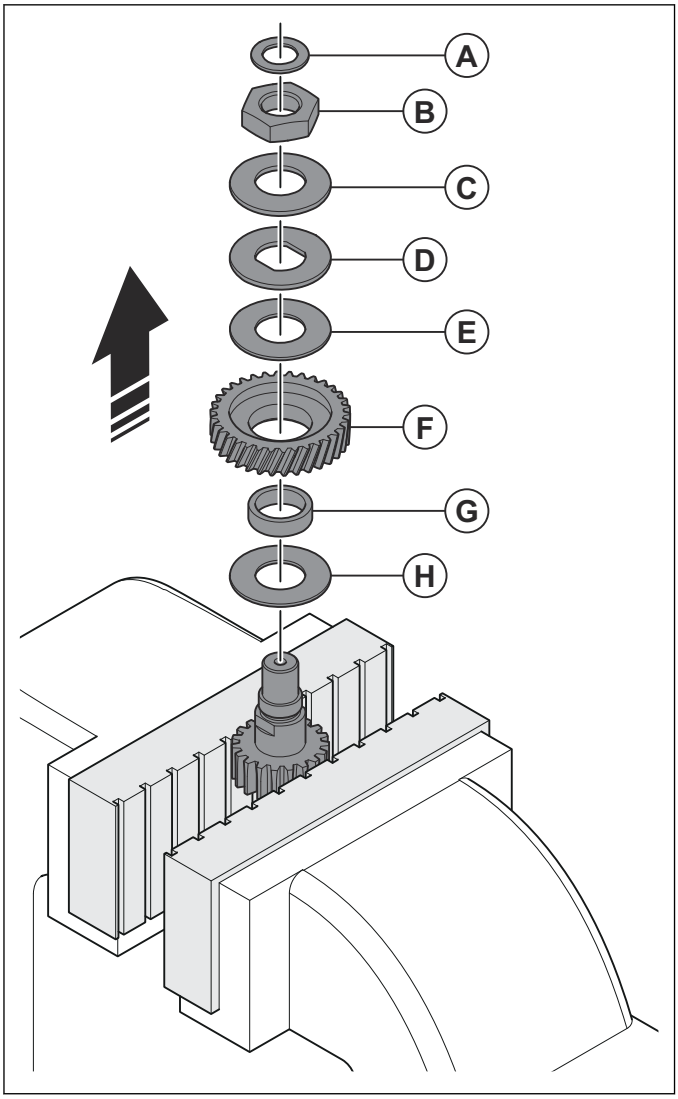
Note: Hold the gear selector with pliers to prevent the bottom bearing to come loose.

6.6.2 To disassemble the pinion shaft DM 200

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



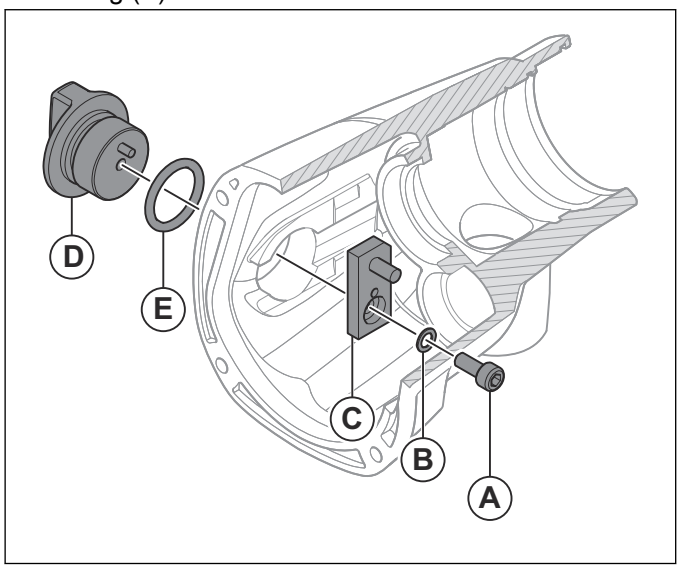
2. Remove the shim ring (A), the hex nut (B), the plate spring (C), and the pressure disc (D). Remove the brake disc (E), the gear wheel (F), the bearing sleeve (G), and the brake disc (H).



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

6.6.3 To remove the gear selector DM 200

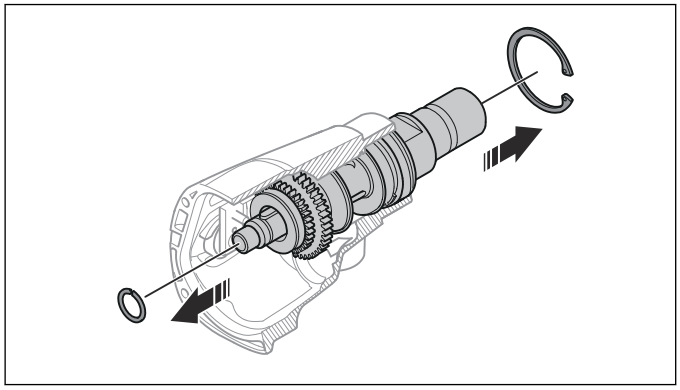
- Remove the screw (A), the washer (B) and the bracket (C). Remove the gear selector (D) and the O-ring (E).



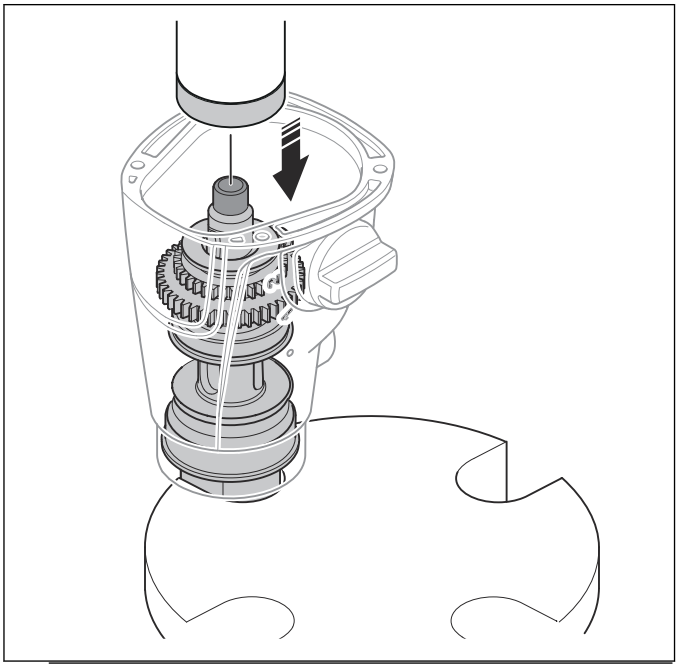
6.6.4 To remove the drill spindle DM 200

Note: Replace the shaft seals if the drill spindle is removed. Refer to *To replace the shaft seals for the drill spindle DM 200 on page 23*.

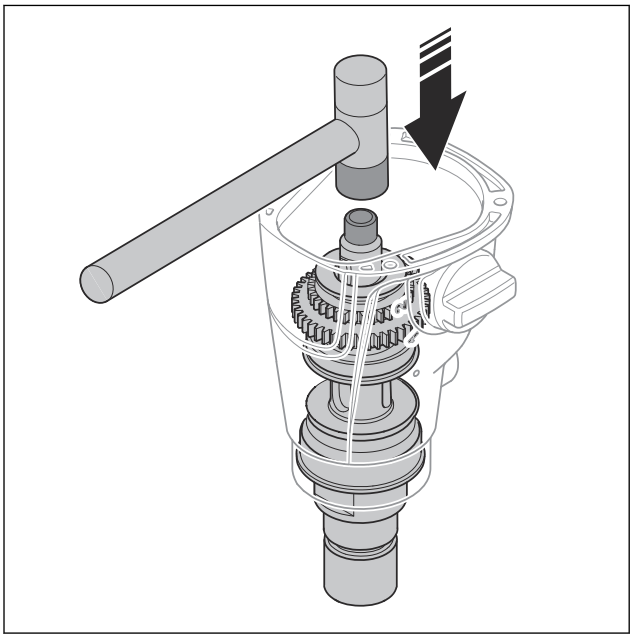
1. Remove the pinion shaft. Refer to *To remove the pinion shaft DM 200 on page 18*.
2. Remove the 2 snap rings with circlip pliers.



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

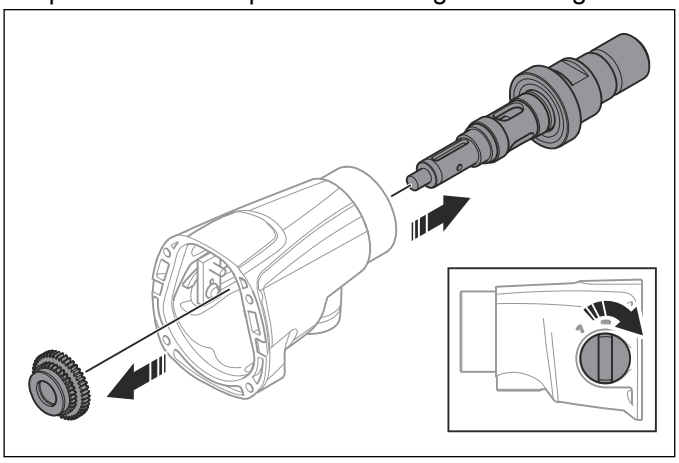


Note: If the drill spindle does not come out of the gear housing, tap the drill spindle carefully with a soft head mallet to loosen it.



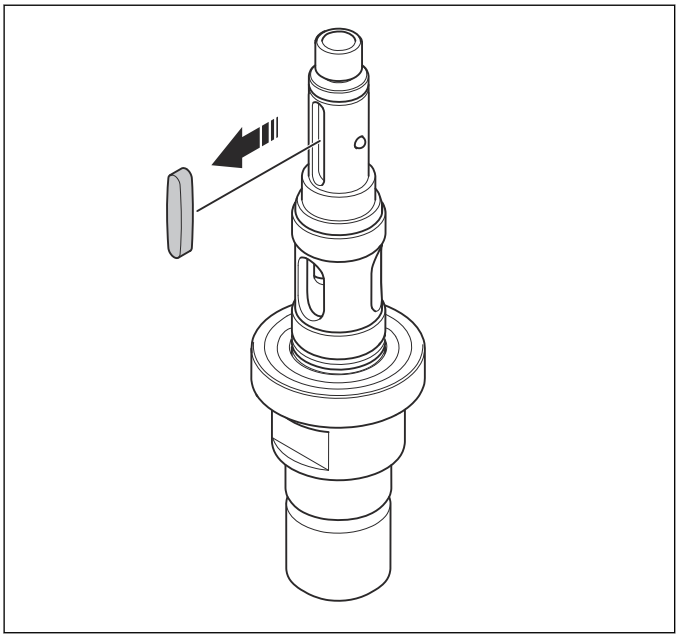
CAUTION: Make sure that the metal surface does not become damaged.

4. 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.

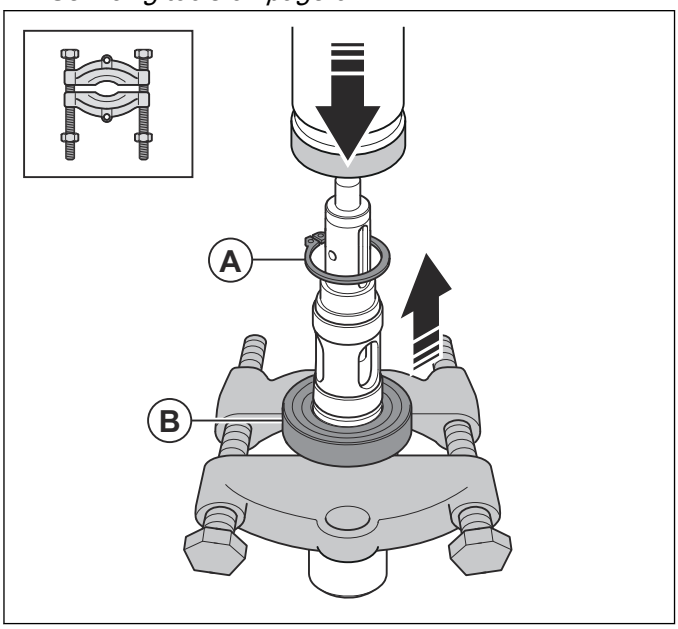


6.6.5 To disassemble and assemble the drill spindle DM 200

1. Remove the pinion shaft. Refer to *To remove the pinion shaft DM 200 on page 18*.
2. Remove the drill spindle. Refer to *To remove the drill spindle DM 200 on page 19*.
3. Remove the parallel key.



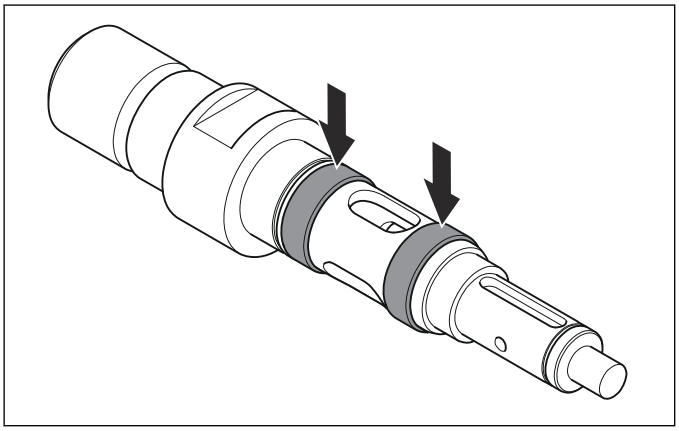
4. Remove the snap ring (A) with circlip pliers. Push the ball bearing (B) off the drill spindle shaft with the separator puller tool and a mandrel press. Refer to *Servicing tools on page 6*.



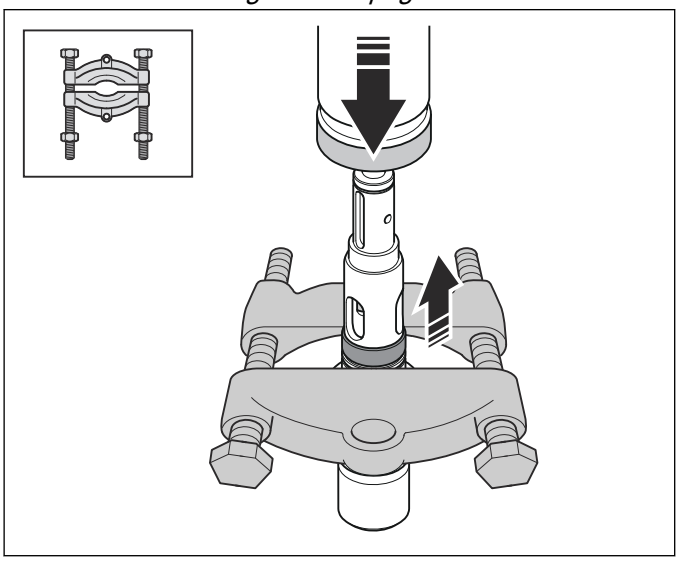
5. Assemble the drill spindle in the opposite sequence. Use a press tool to install the ball bearing on the shaft.

6.6.6 To replace the shaft sleeves for the drill spindle DM 200

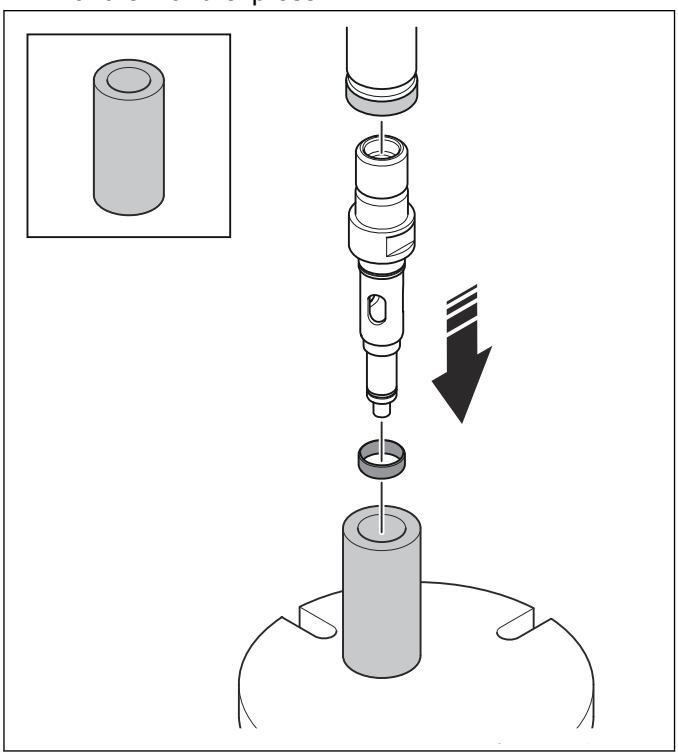
1. Clean the drill spindle shaft with a cloth. Examine the drill spindle for damage or wear. Refer to *To do a check of the gear housing and gears on page 48*.



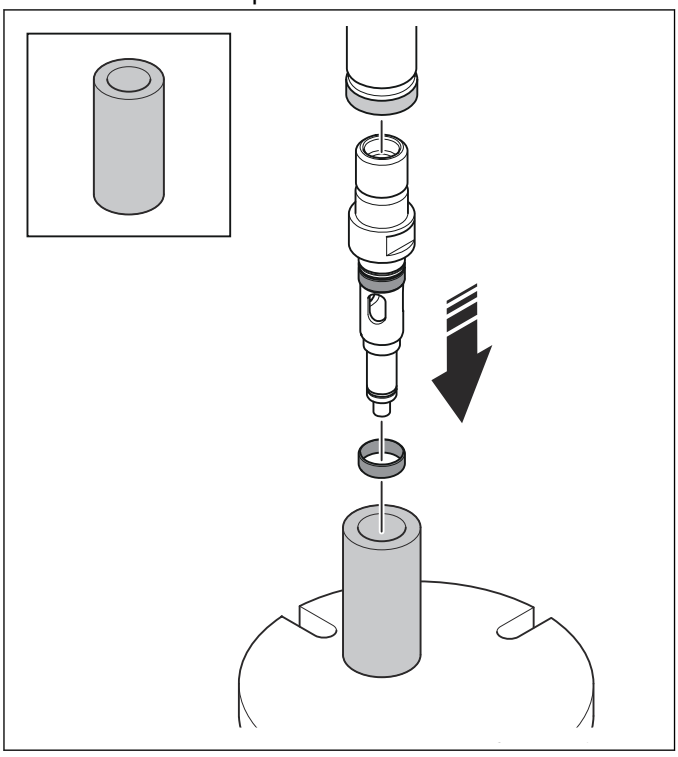
2. Push the 2 shaft sleeves off the drill spindle shaft with the separator puller tool and a mandrel press. Refer to *Servicing tools on page 6*.



3. Put the first shaft sleeve into the sleeve press tool 531 14 28-01. Refer to *Servicing tools on page 6*. Push the first shaft sleeve onto the drill spindle shaft with the mandrel press.

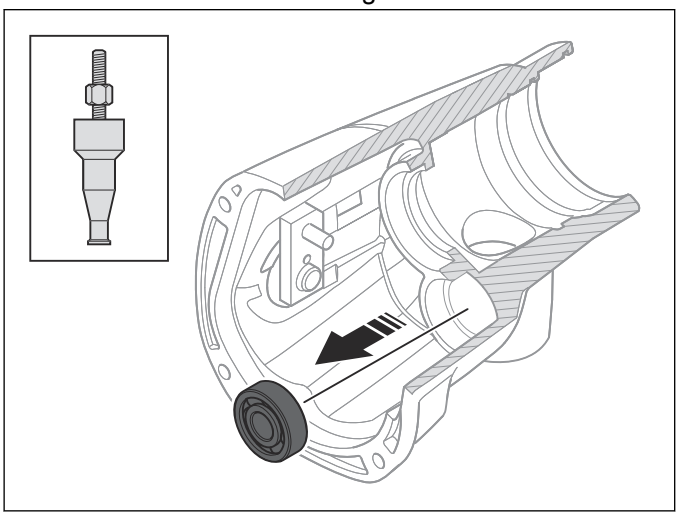


4. Turn the sleeve press tool to the other side. Put the second shaft sleeve into the sleeve press tool. Push the second shaft sleeve onto the drill spindle shaft with the mandrel press.



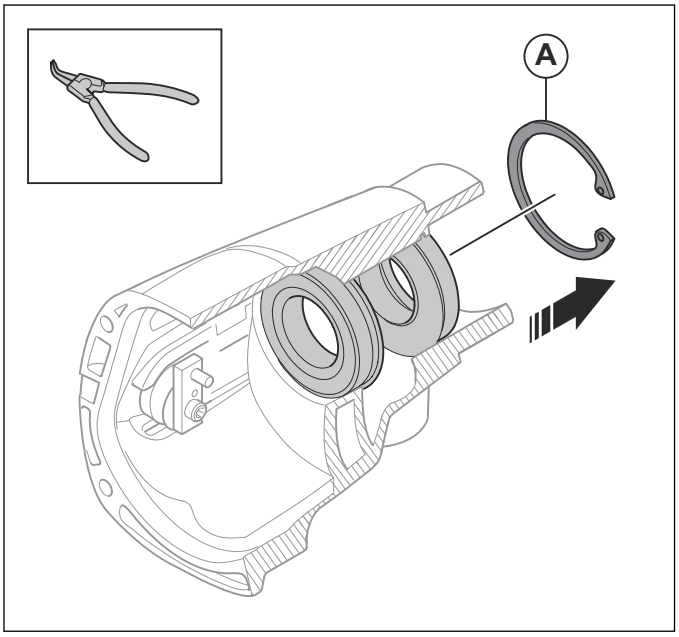
6.6.7 To remove the ball bearing from the gear housing DM 200

- 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.

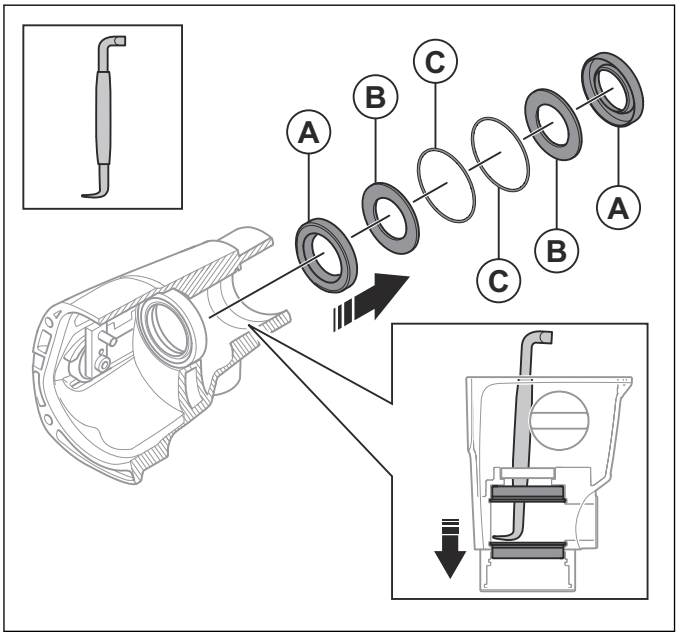


6.6.8 To replace the shaft seals for the drill spindle DM 200

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

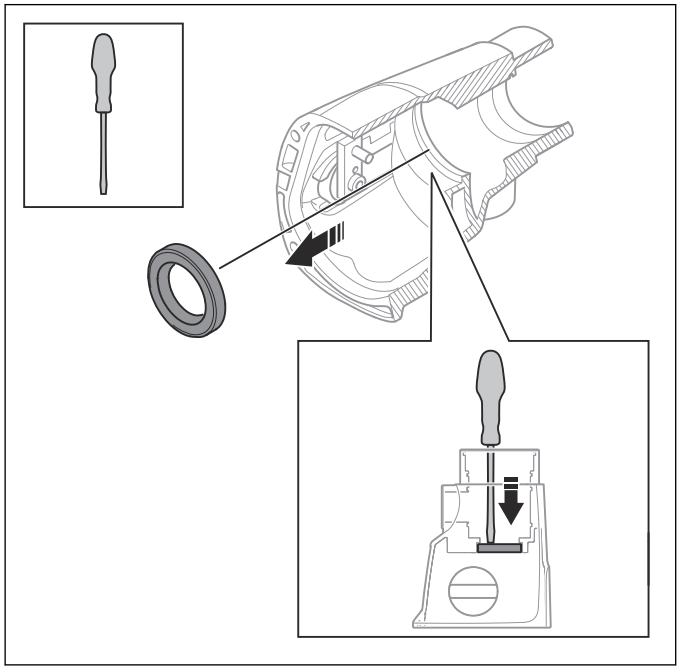


2. Push the shaft seals (A), the washers (B) and the O-rings (C) out of the gear housing with an offset screwdriver. Tap the offset screwdriver carefully with a soft head mallet if it is necessary.



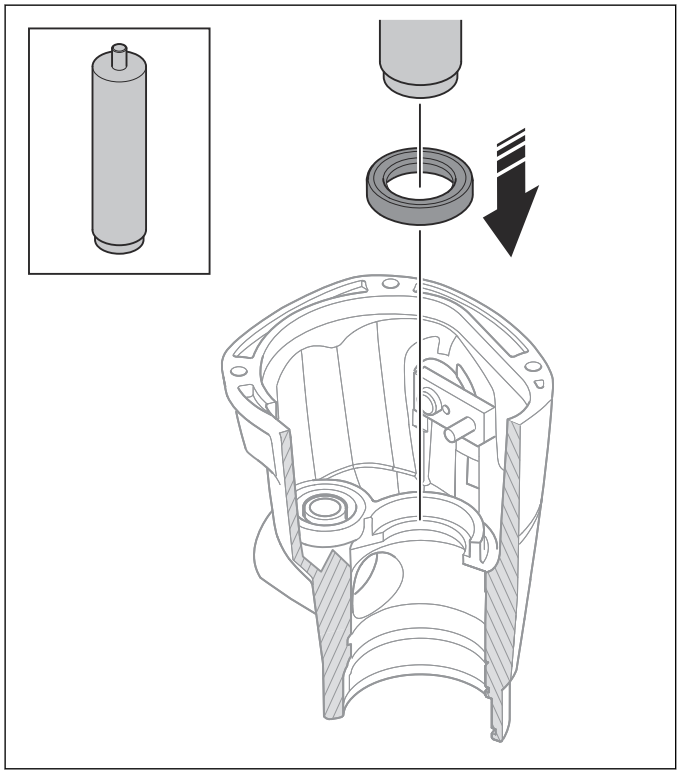
CAUTION: Make sure that the metal surface does not become damaged. Make sure that the O-rings are not damaged.

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

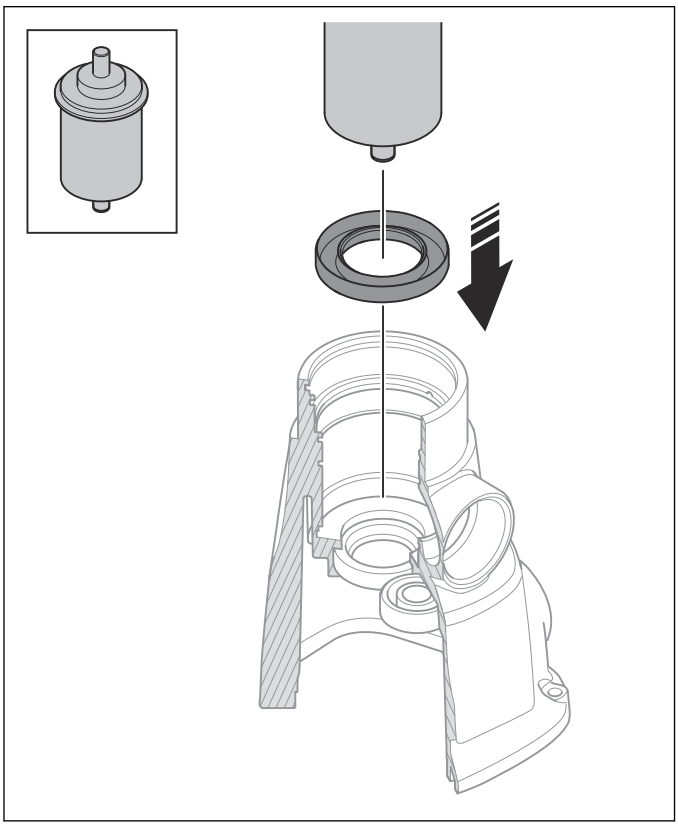


CAUTION: Make sure that the metal surface does not become damaged.

4. Clean and dry the seal seat. Put oil on the inner surface of the seal seat.
5. Attach the shaft seal press tool 531 14 23-01 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.

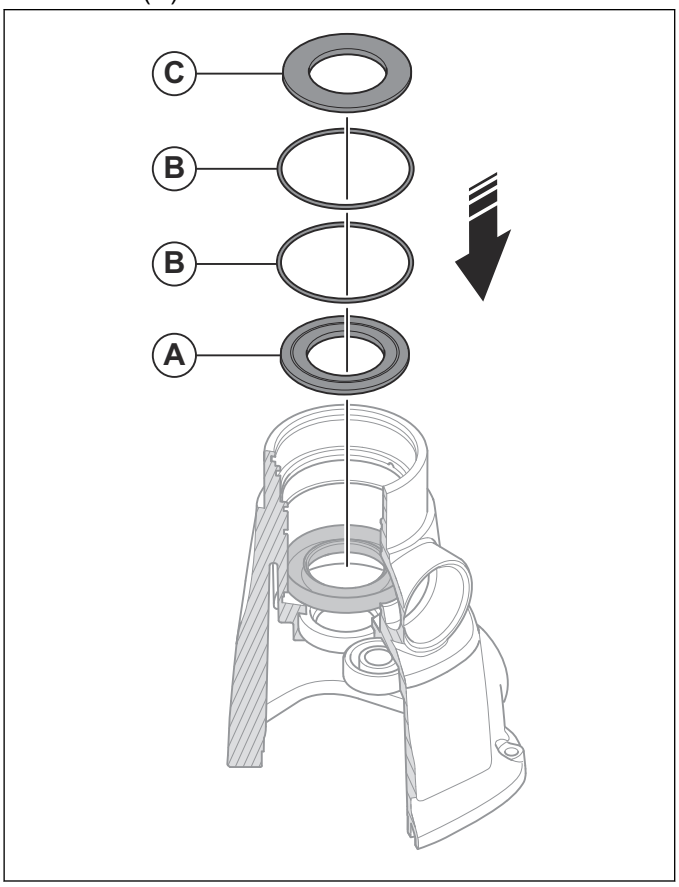


6. Attach the shaft seal press tool 531 14 24-01 to the mandrel press. Refer to *Servicing tools on page 6* Put a new shaft seal on the shaft seal press tool. Push the second shaft seal into the seal seat.

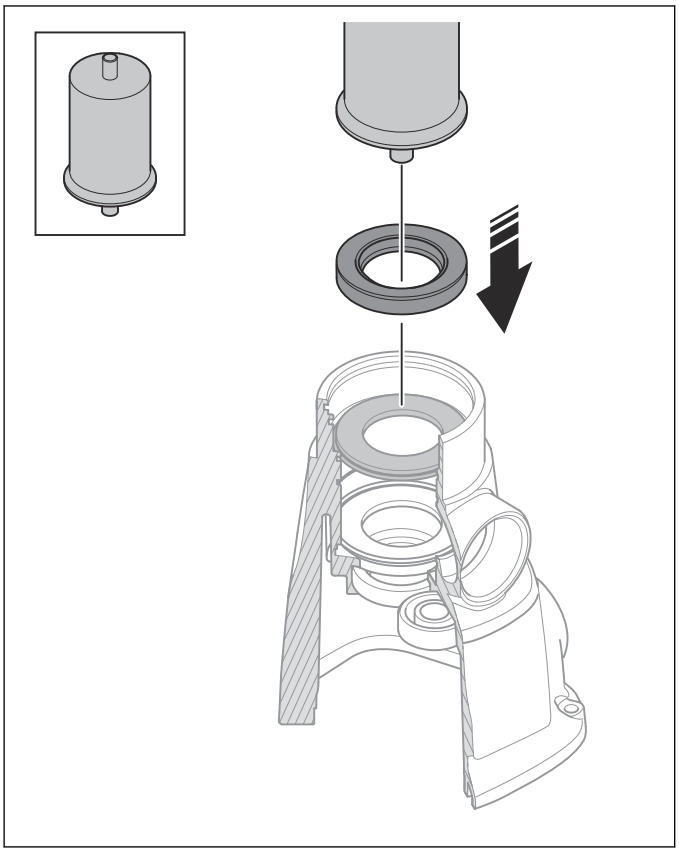


7. Put grease on the seals.

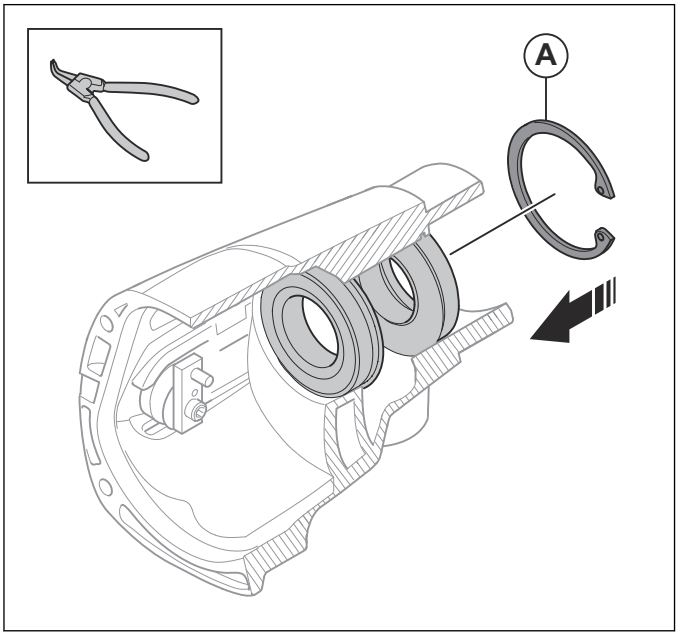
8. Install the washer with a groove (A) as the illustration shows. Install the O-rings (B). Install the washer (C).



9. Turn the shaft seal press tool 531 14 24-01 to the other side. Put a new shaft seal on the shaft seal press tool. Push the third shaft seal into the seal seat.



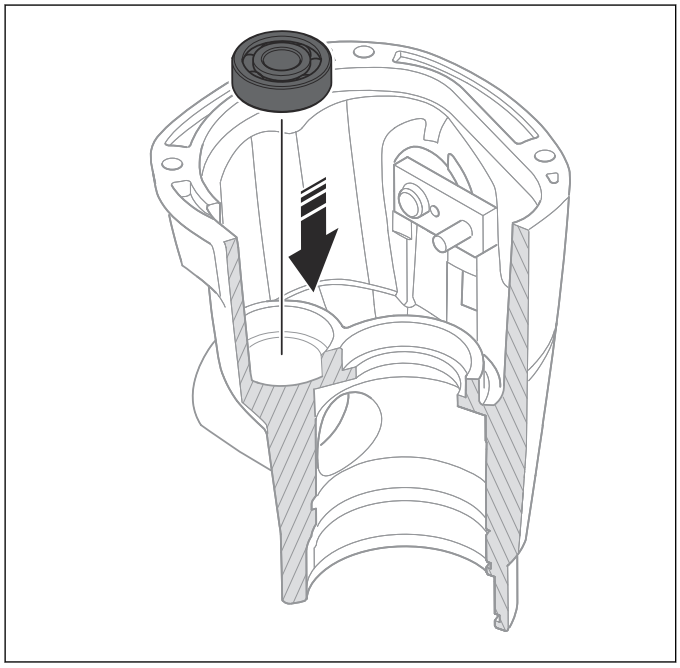
10. Install the snap ring (A) with circlip pliers.



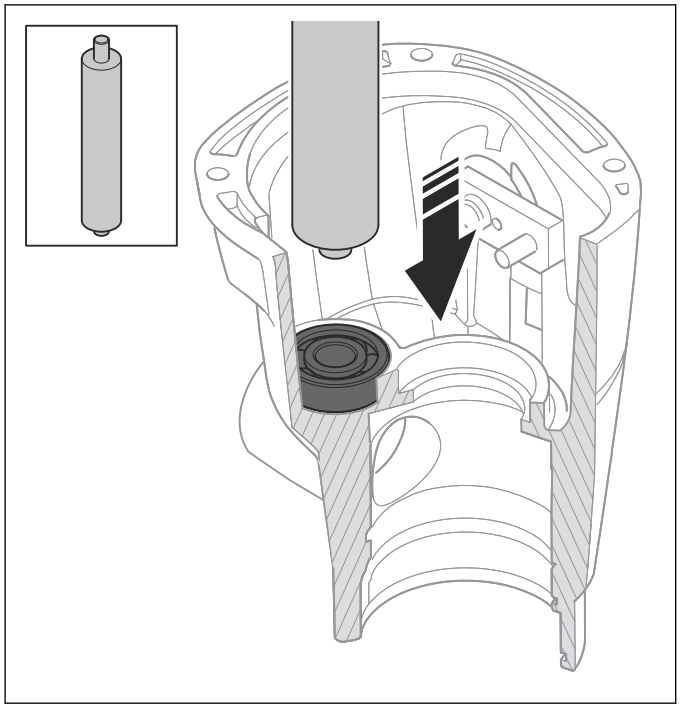
CAUTION: Make sure that the leak hole does not become blocked.

6.6.9 To install the ball bearing in the gear housing DM 200

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

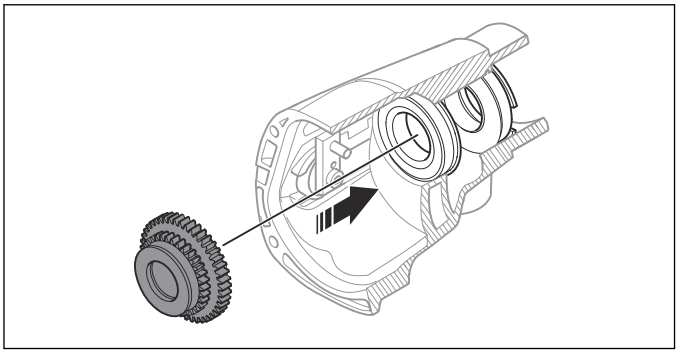


2. Use a press tool and mandrel 531 14 31-01 to install the ball bearing.. Refer to *Servicing tools on page 6*.

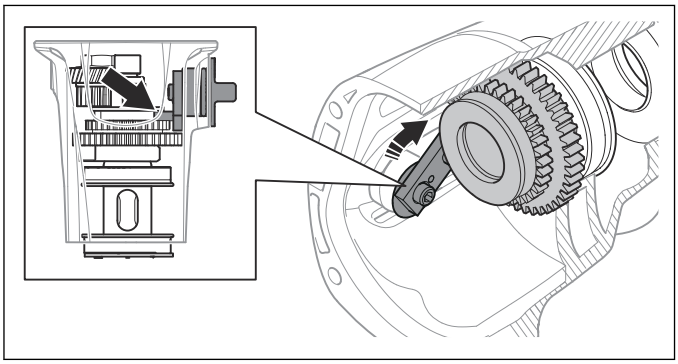


6.6.10 To install the drill spindle DM 200

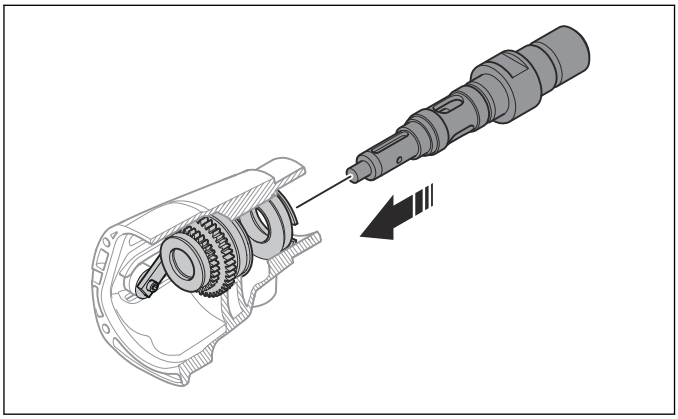
1. Assemble the drill spindle. Refer to *To disassemble and assemble the drill spindle DM 200 on page 20*.
2. Put the gear wheel into the gear housing.



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

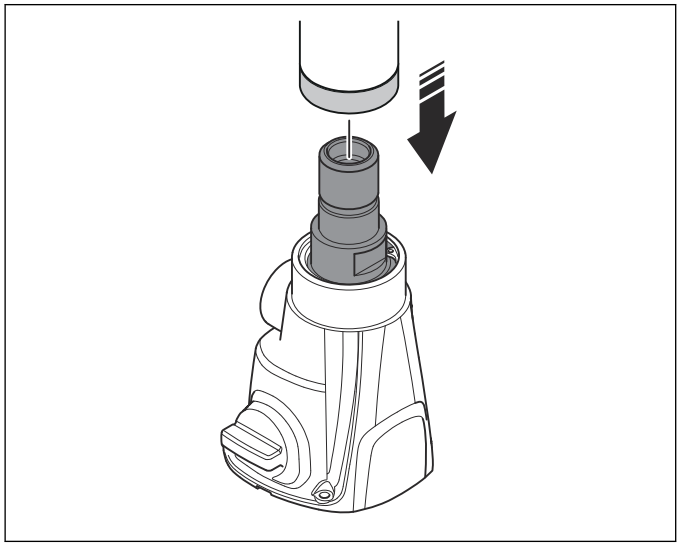


4. Put the drill spindle into the gear housing.



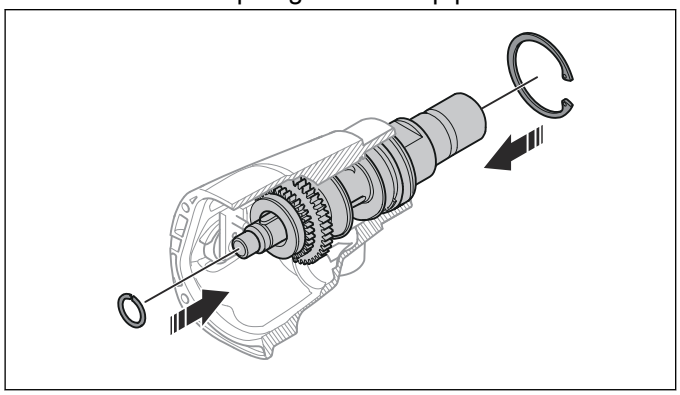
Note: Make sure that the parallel key is aligned with the groove in the gear wheel.

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



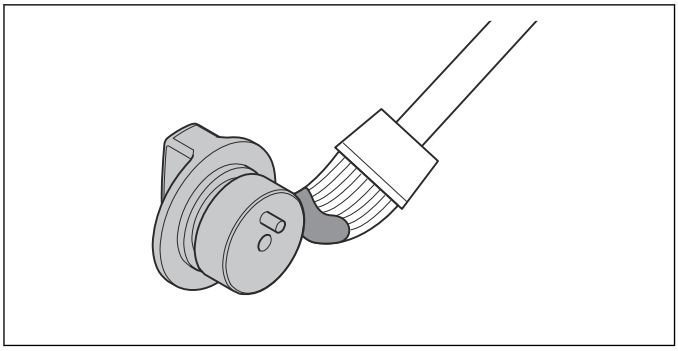
Note: Push the parts together by hand before you put the assembly in the mandrel press.

6. Install the 2 snap rings with circlip pliers.

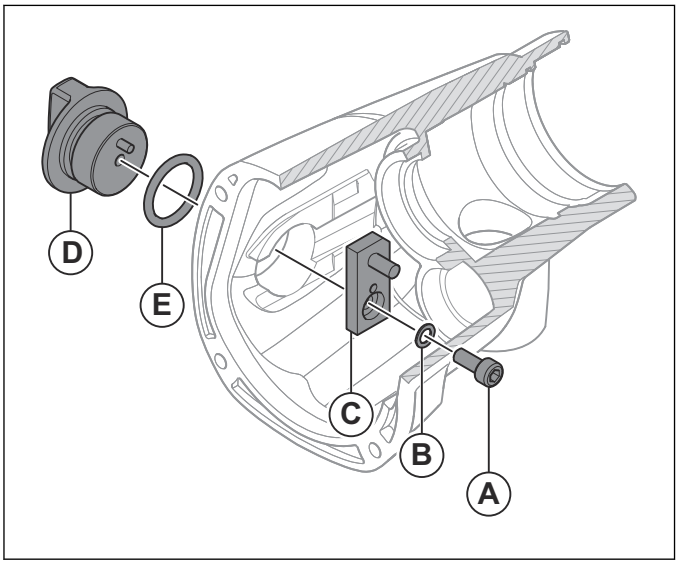


6.6.11 To install the gear selector DM 200

1. Put grease on the gear selector.

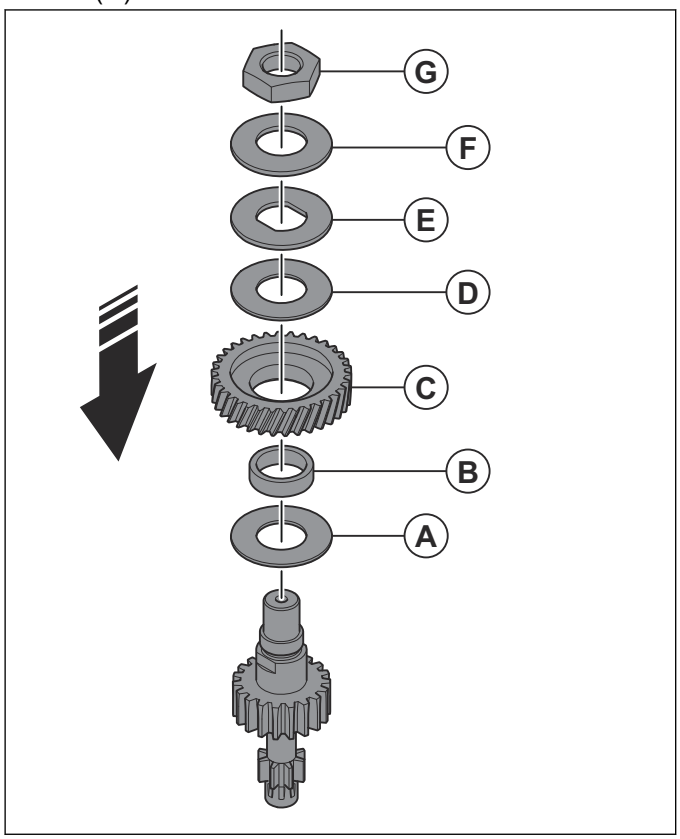


2. Install the O-ring (E) and the gear selector (D). Install the bracket (C), the washer (B) and the screw (A).

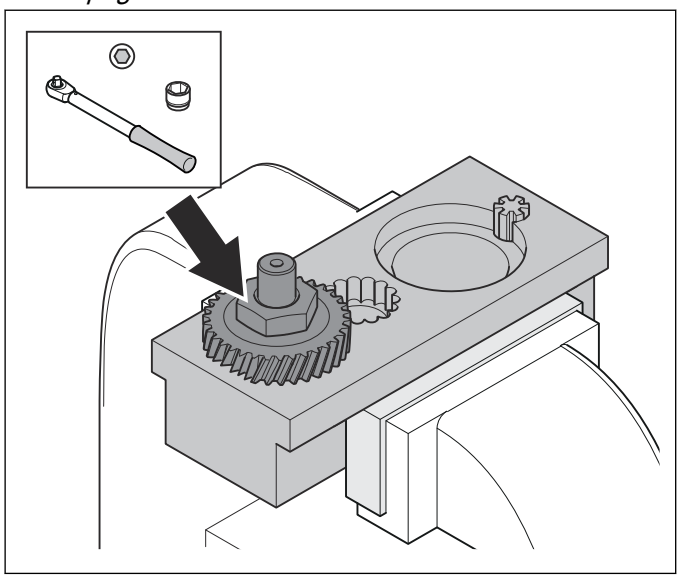


6.6.12 To assemble the pinion shaft DM 200

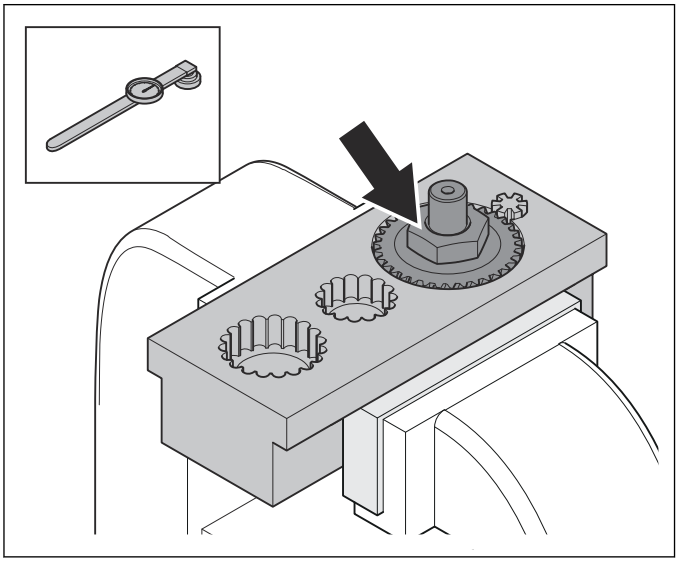
1. Put gear oil on all parts before assembly. Make sure to put gear oil on the two sides of the brake discs. Install the brake disc (A), the bearing sleeve (B), and the gear wheel (C). Install the brake disc (D), the pressure disc (E), the plate spring (F), and the hex nut (G).



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 overview 2 on page 7*.



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

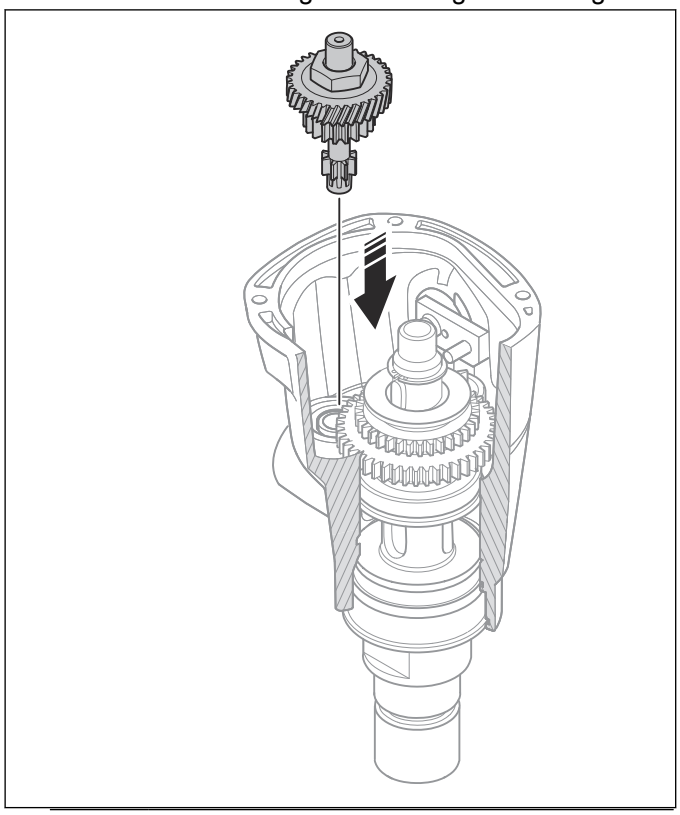


a) Put the torque wrench on the hexagon nut and turn it evenly clockwise 1–2 times so that the oil is displaced.
b) Do a check of the friction clutch with a torque wrench. Turn the torque wrench clockwise 1–2 times and read the value at the same time. The specified continues slip torque is 10–11 Nm.
c) 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.
d) 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.

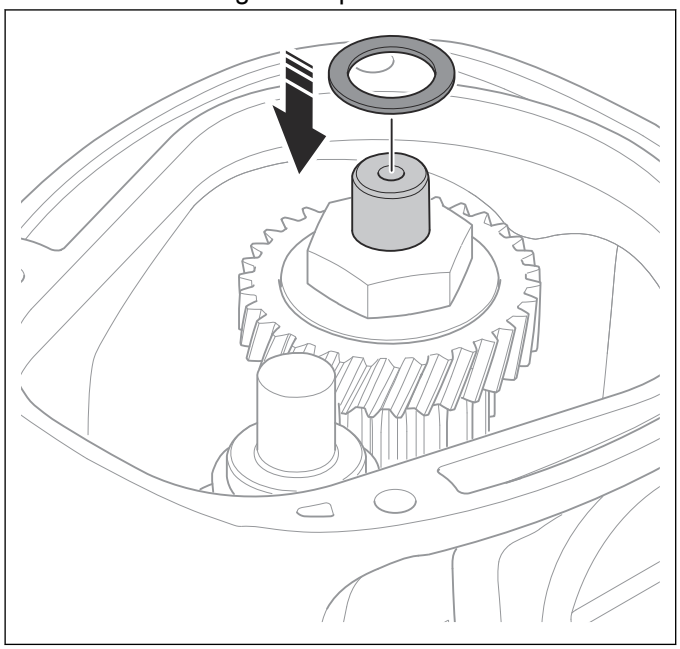
6.6.13 To install the pinion shaft DM 200

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.

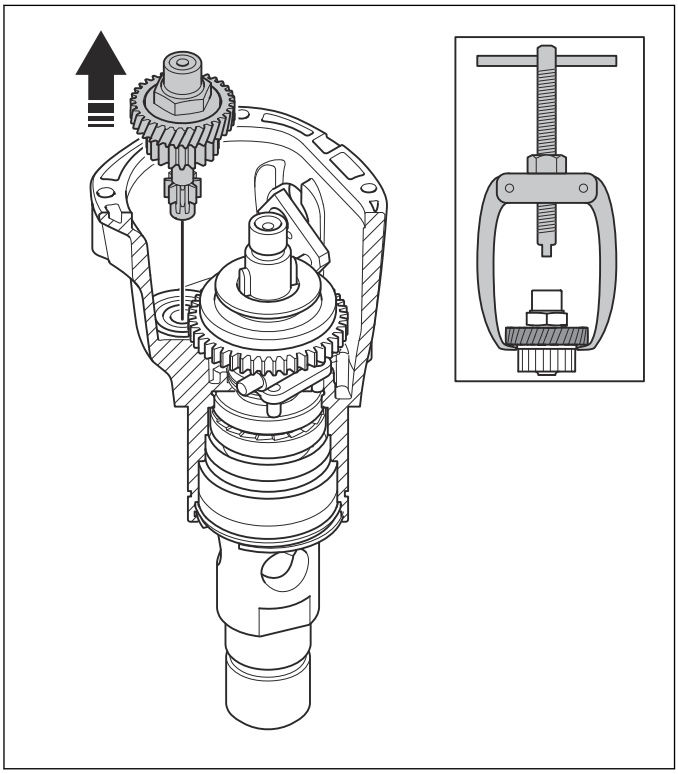


3. Fill the gear housing with gear oil and assemble the product. Refer to *To assemble the product on page 13*.

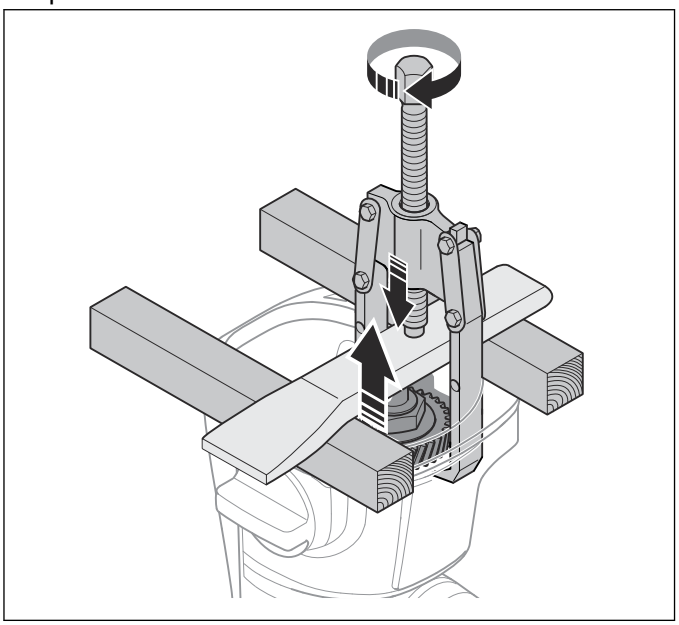
6.7 Gear housing DM 210SP

6.7.1 To remove the pinion shaft DM 210SP

1. Remove the motor housing and the middle cover. Refer to *To disassemble the product on page 12*.
2. Set the gear selector to position "1".
3. Put a small puller tool on the top gear wheel on the pinion shaft. Refer to *Servicing tools on page 6*.

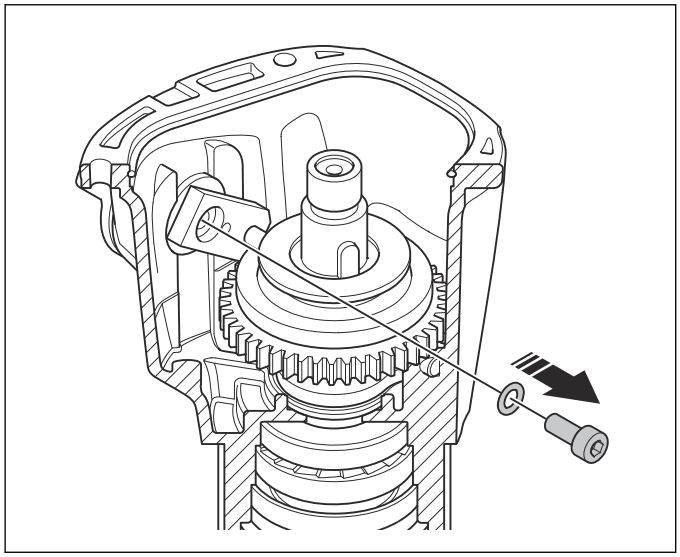


4. Use 2 spacers and put a piece of metal between them as support for the puller tool. Pull out the pinion shaft.

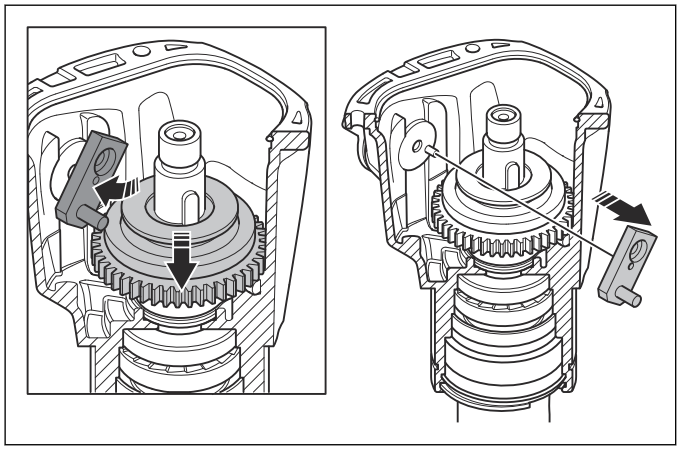


6.7.2 To remove the gear selector DM 210SP

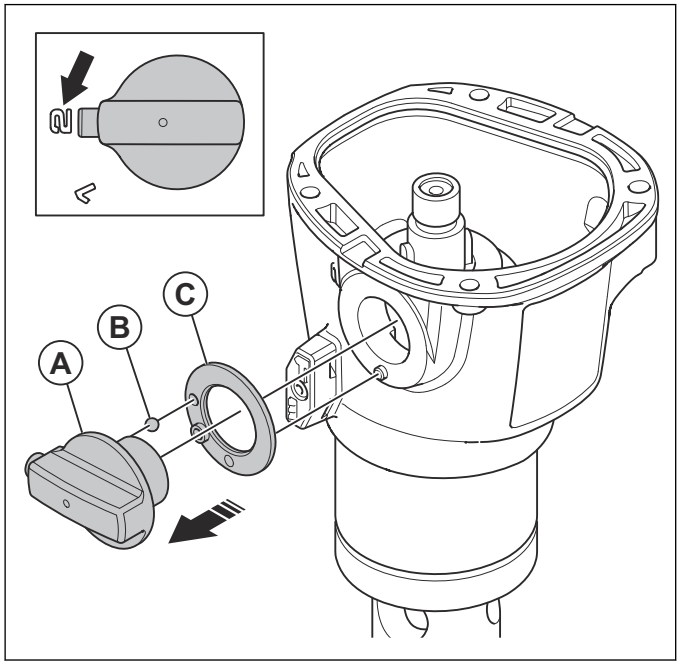
1. Remove the pinion shaft. Refer to *To remove the pinion shaft DM 210SP on page 29*.
2. Remove the screw and the washer.



3. Remove the bracket.



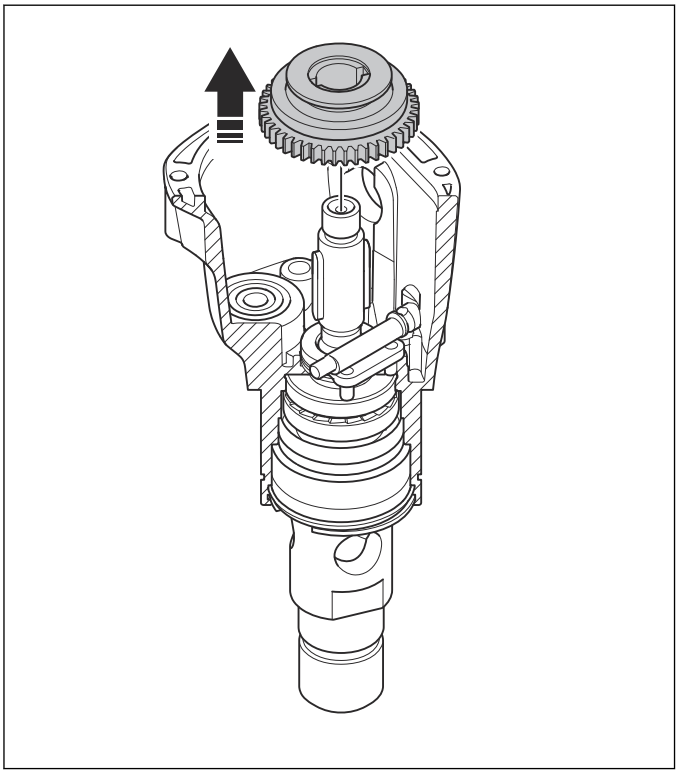
4. Put the gear selector in position "2".
5. Push out the gear selector (A).



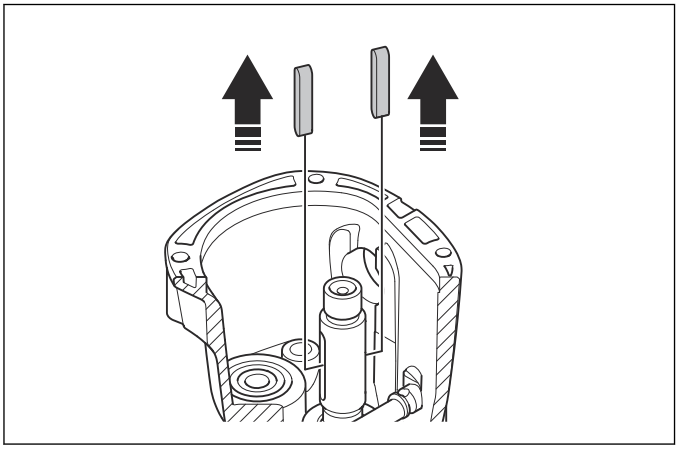
6. Remove the ball (B) and the washer (C).

6.7.3 To remove the percussion function shaft DM 210SP

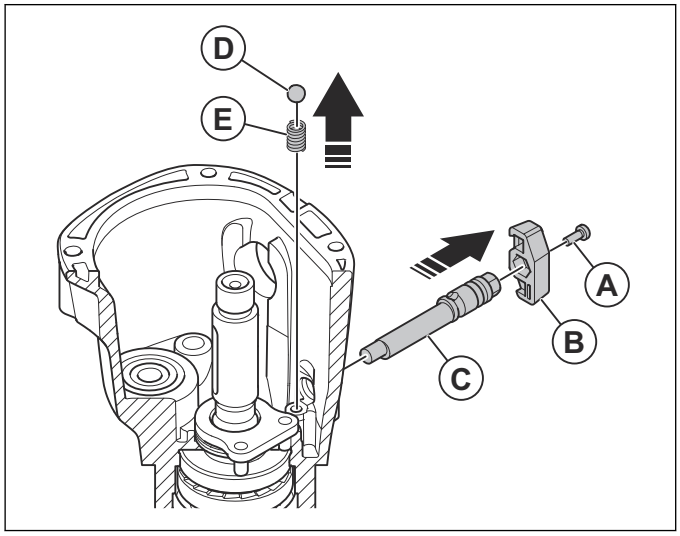
1. Remove the pinion shaft. Refer to *To remove the pinion shaft DM 210SP on page 29*.
2. Remove the gear selector. Refer to *To remove the gear selector DM 210SP on page 29*.
3. Remove the top gear wheel on the drill spindle.



4. Remove the 2 keys.



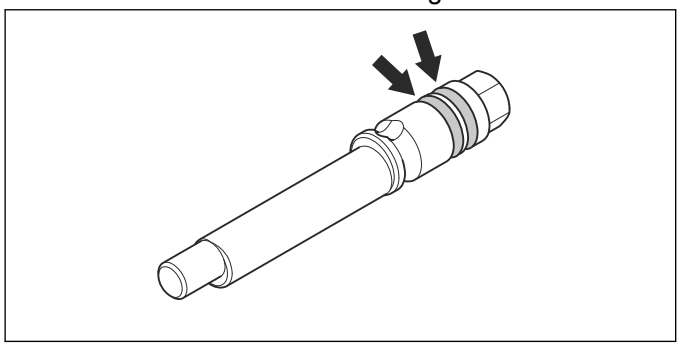
5. Remove the screw (A), the switch (B) and the axle (C).



6. Remove the ball (D) and the spring (E).

CAUTION: Be careful when you remove the axle. The spring (E) is loaded and the ball (D) can eject at a high speed.

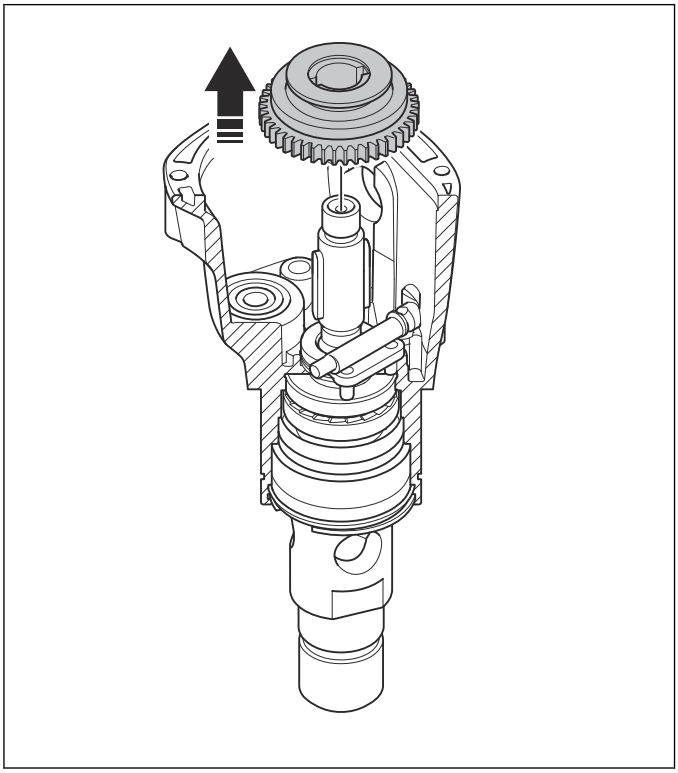
7. Remove and discard the 2 O-rings.



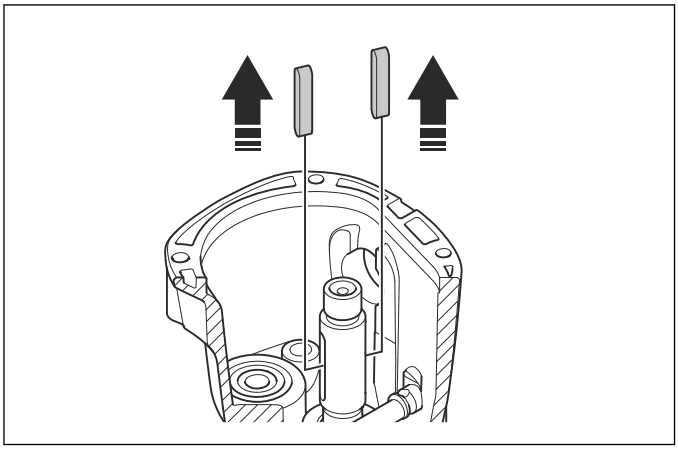
6.7.4 To remove the drill spindle DM 210SP

1. Remove the pinion shaft. Refer to *To remove the pinion shaft DM 210SP on page 29*.
2. Remove the gear selector. Refer to *To remove the gear selector DM 210SP on page 29*.

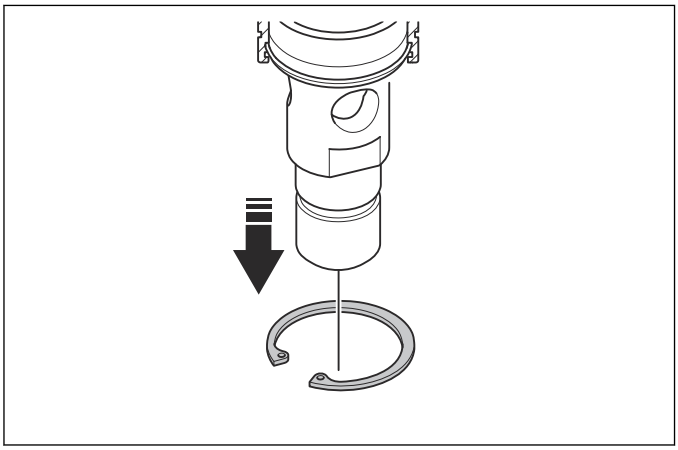
3. Remove the top gear wheel on the drill spindle.



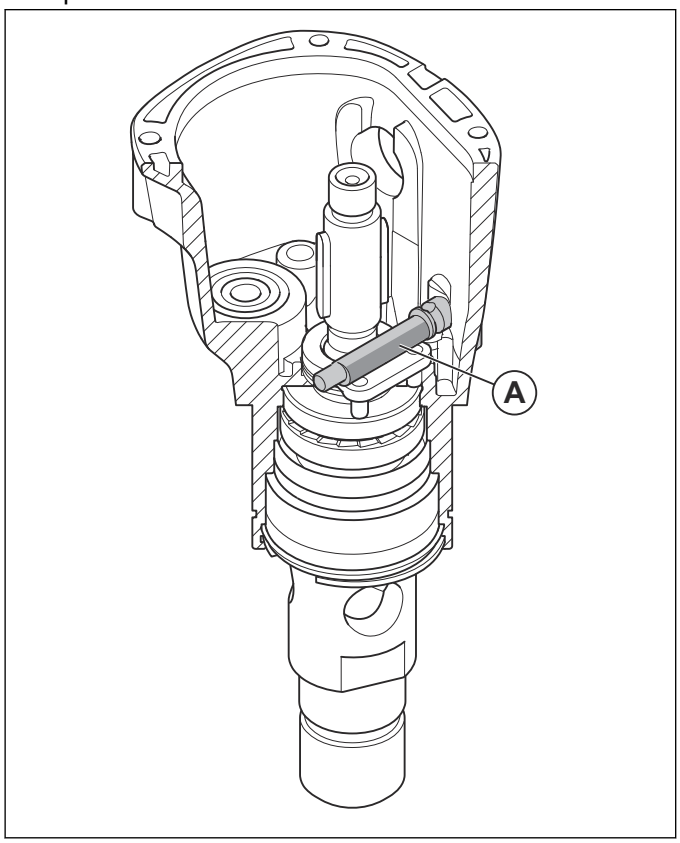
4. Remove the 2 keys.



5. Remove the snap ring.

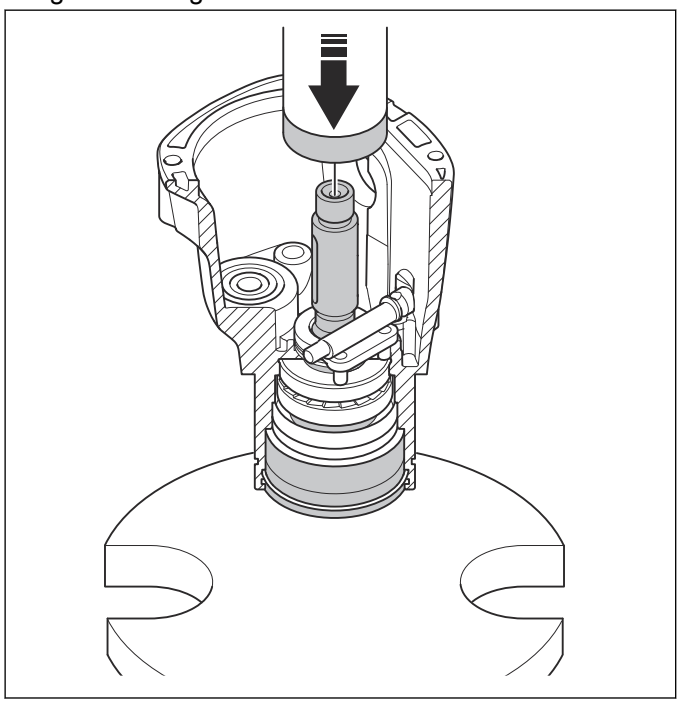


6. Rotate the percussion function shaft until the eccentric side (A) of the shaft points away from the spindle shaft.



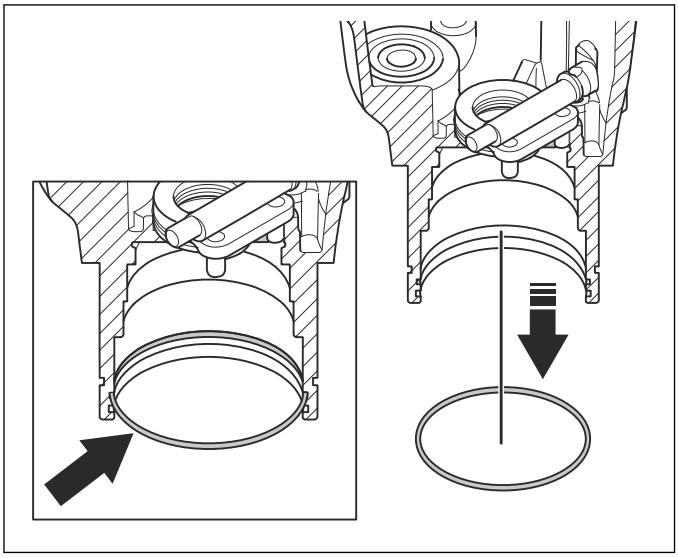
CAUTION: The percussion function shaft or the drill spindle can become damaged if the percussion function shaft is not in the correct position when you remove the drill spindle.

7. Use a press tool to remove the drill spindle from the gear housing.



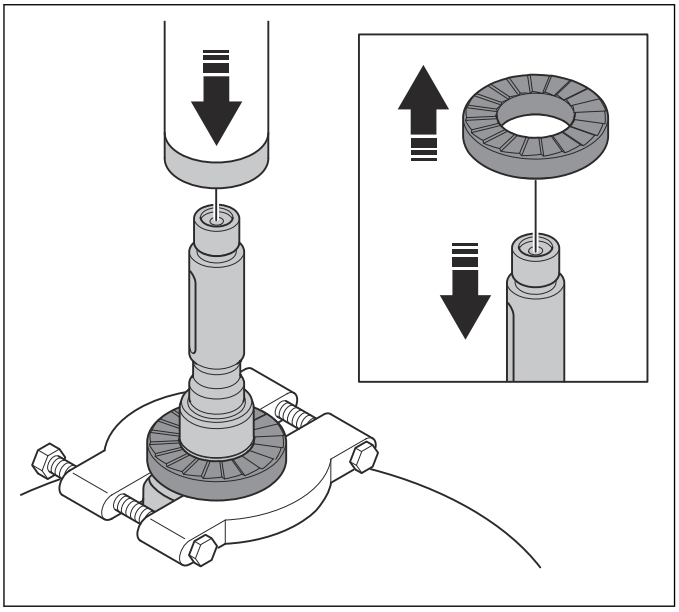
Note: If the drill spindle does not come out of the gear housing, tap the drill spindle carefully with a soft head mallet to loosen it.

8. Remove the O-ring and discard it.

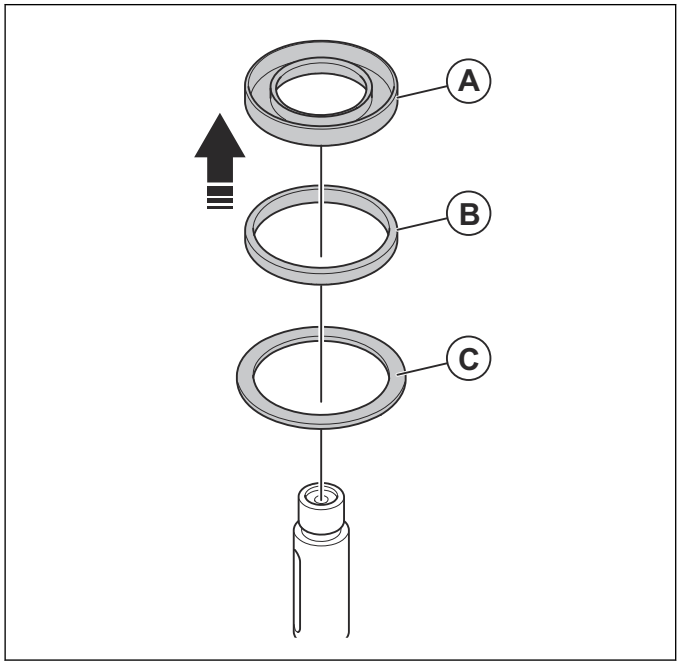


6.7.5 To disassemble the drill spindle DM 210SP

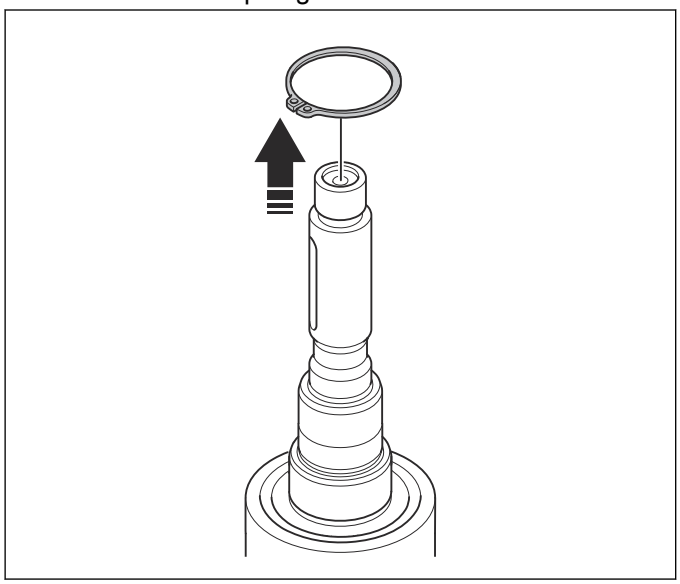
1. Remove the pinion shaft. Refer to *To remove the pinion shaft DM 210SP on page 29*.
2. Remove the gear selector. Refer to *To remove the gear selector DM 210SP on page 29*.
3. Remove the drill spindle. Refer to *To remove the drill spindle DM 210SP on page 30*.
4. Use a separator puller tool and a press tool to remove the toothed washer from the drill spindle shaft. Refer to *Servicing tools on page 6*.



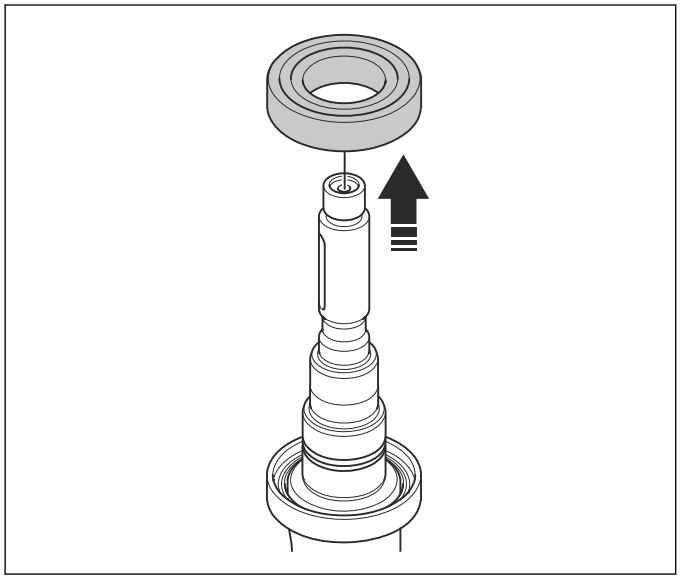
5. Remove the seal (A), the spacer (B) and the washer (C). Discard the seal.



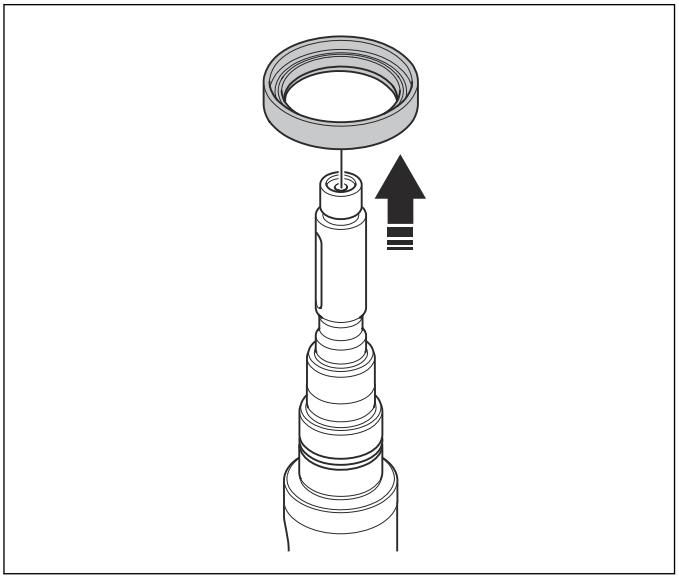
6. Remove the snap ring.



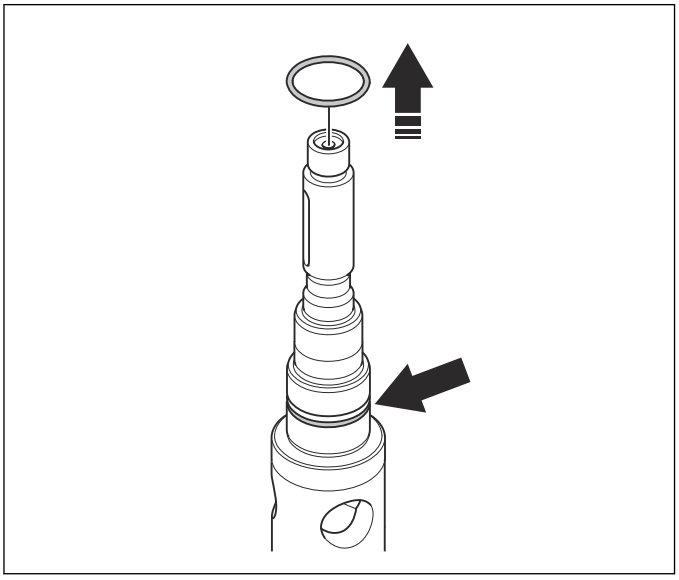
7. Remove the bearing.



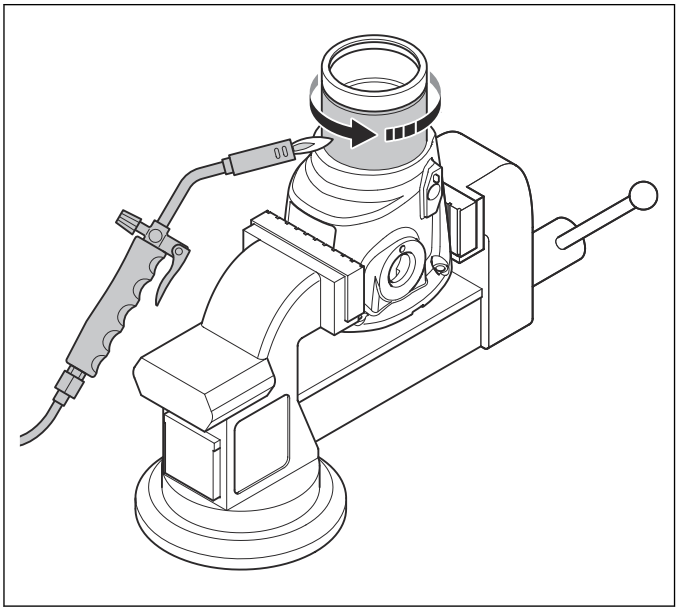
8. Remove the seal housing with the seal. Discard the seal.



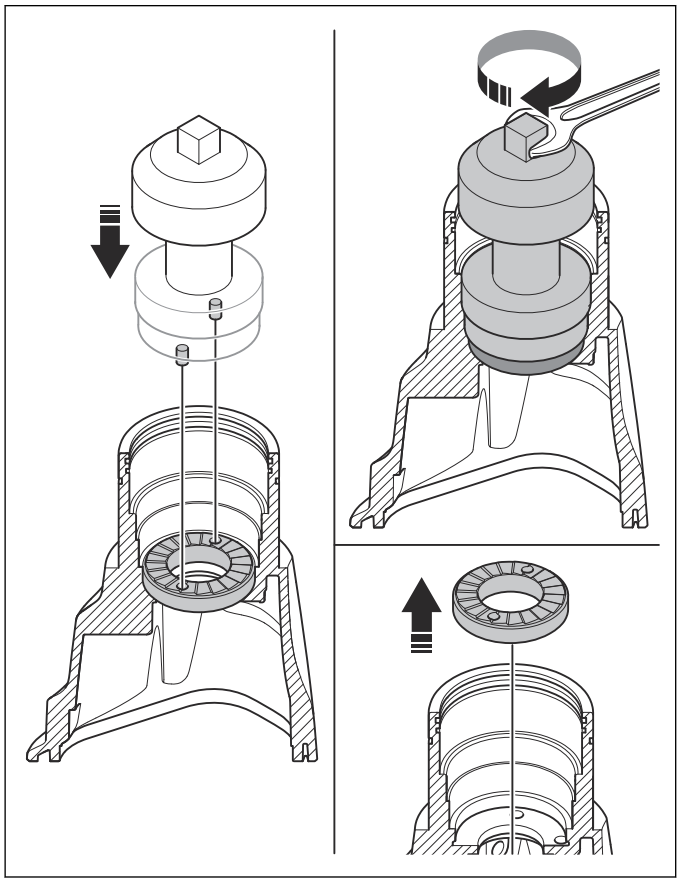
9. Remove the O-ring and discard it.



10. Apply heat to the gear housing.



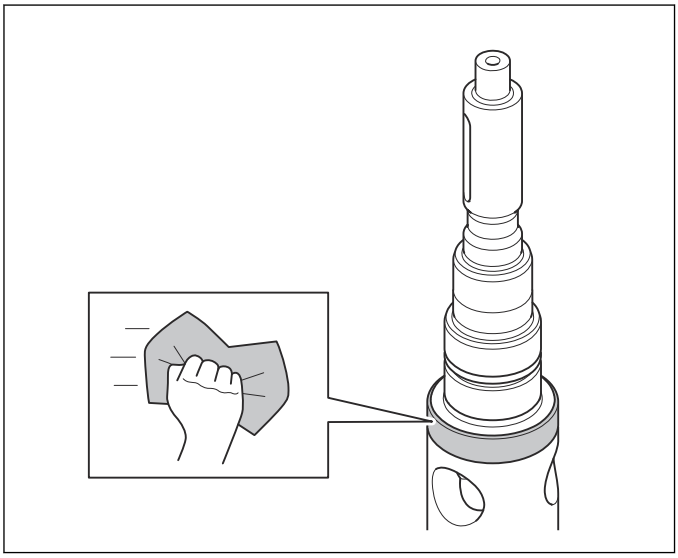
11. Remove the toothed bearing with special tool 540 14 85-01. Refer to *Servicing tools overview 1 on page 6*.



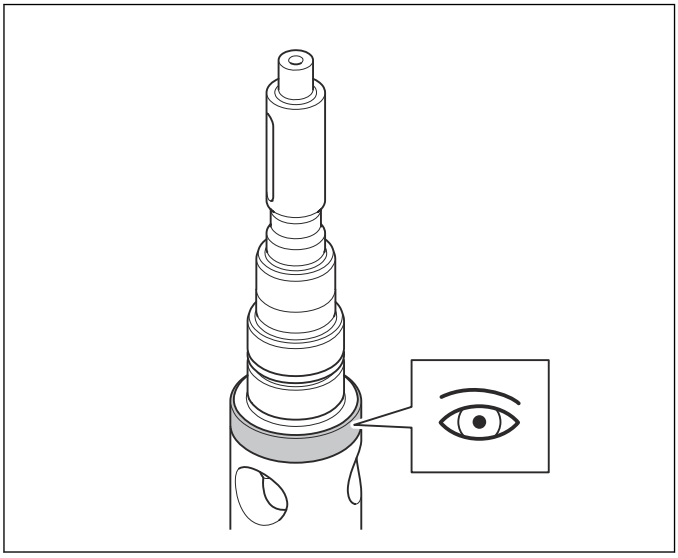
CAUTION: The toothed bearing is left hand threaded.

6.7.6 To do a check of the shaft sleeves for the drill spindle DM 210SP

1. Clean the drill spindle shaft with a cloth. Examine the drill spindle shaft for damage or wear.

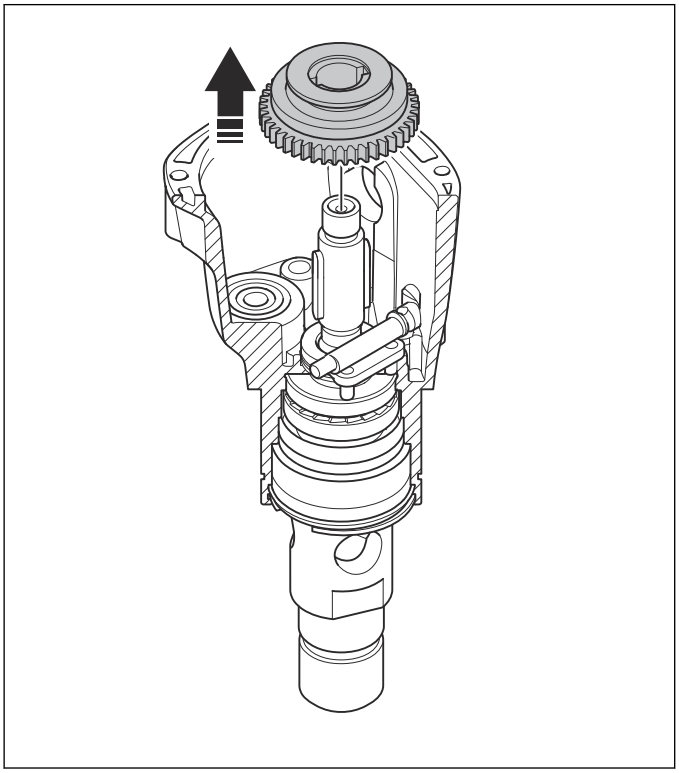


2. Do a visual inspection of the shaft sleeve. Replace the drill spindle shaft if the shaft sleeve is worn or damaged.

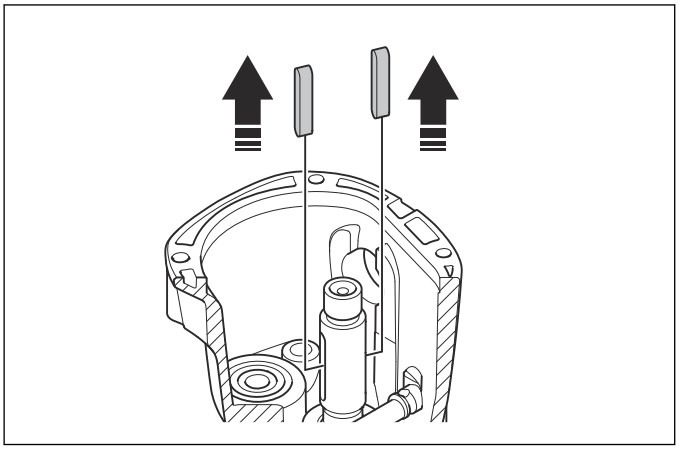


6.7.7 To remove the ball bearing from the gear housing DM 210SP

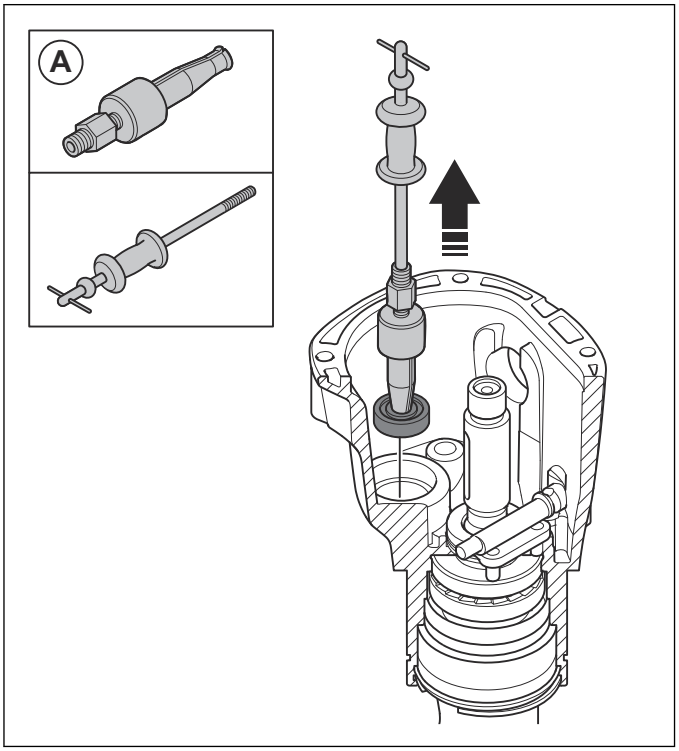
1. Remove the pinion shaft. Refer to *To remove the pinion shaft DM 210SP on page 29*.
2. Remove the gear selector. Refer to *To remove the gear selector DM 210SP on page 29*.
3. Remove the top gear wheel on the drill spindle.



4. Remove the 2 keys.



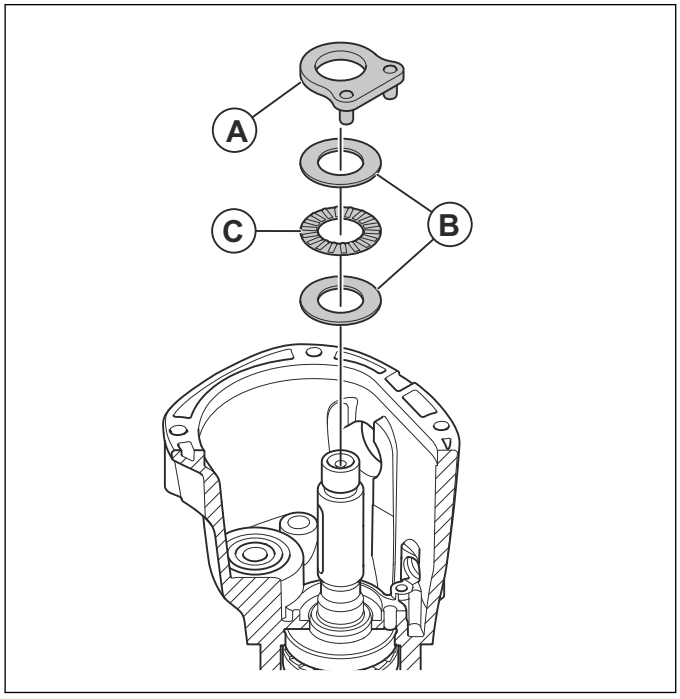
5. Insert the inner bearing puller tool (A) in the ball bearing.



6. Expand the special tool.
7. Remove the ball bearing with the special tool and a slide hammer.

6.7.8 To remove and install the needle bearing DM 210SP

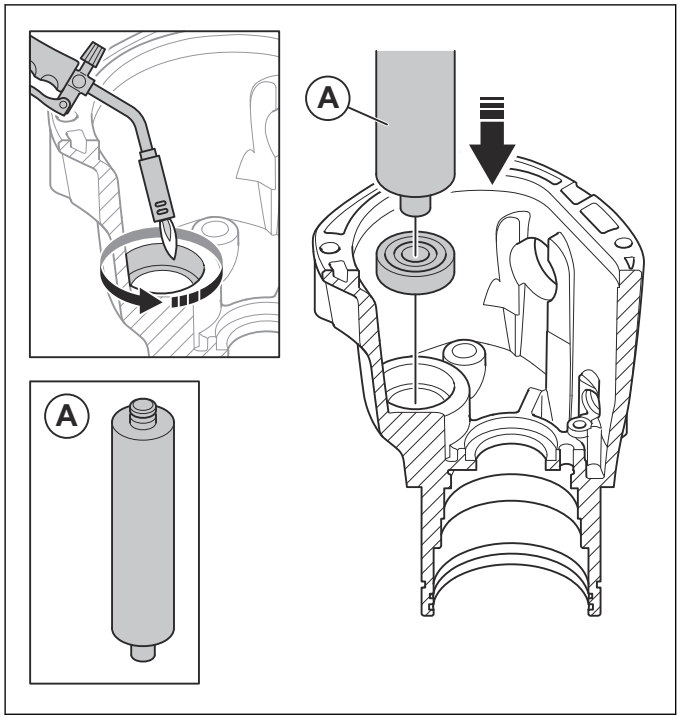
1. Remove the pinion shaft. Refer to *To remove the pinion shaft DM 210SP on page 29*.
2. Remove the gear selector. Refer to *To remove the gear selector DM 210SP on page 29*.
3. Remove the percussion function shaft. Refer to *To remove the percussion function shaft DM 210SP on page 30*.
4. Remove the support disc (A), the 2 bearing washers (B) and the needle bearing (C).



5. Install the needle bearing in the opposite sequence.

6.7.9 To install the ball bearing DM 210SP

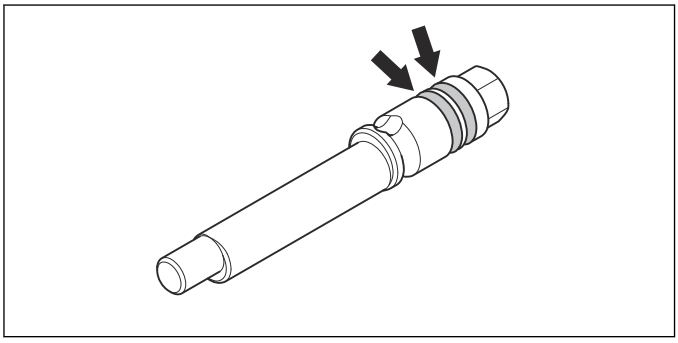
1. Apply heat to the gear housing.



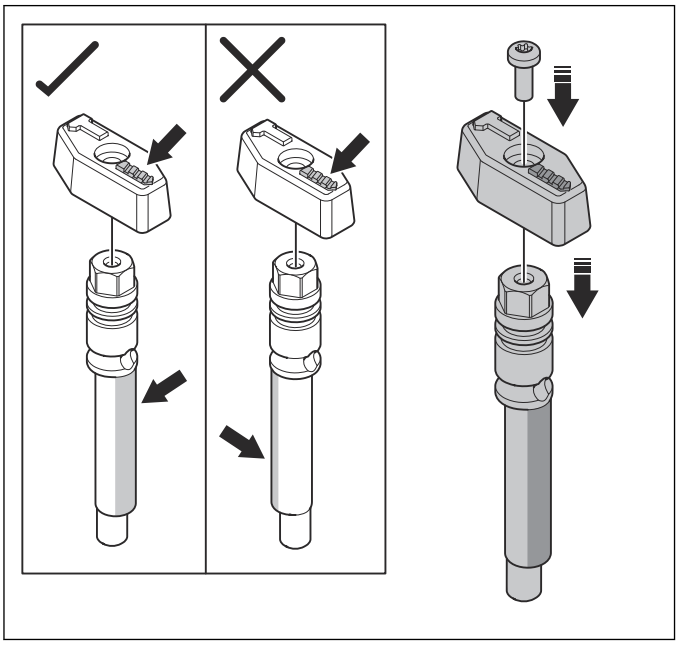
2. Use a press tool and mandrel 531 14 31-01 (A) to install the ball bearing. Refer to *Servicing tools overview 1 on page 6*.

6.7.10 To install the percussion function shaft DM 210SP

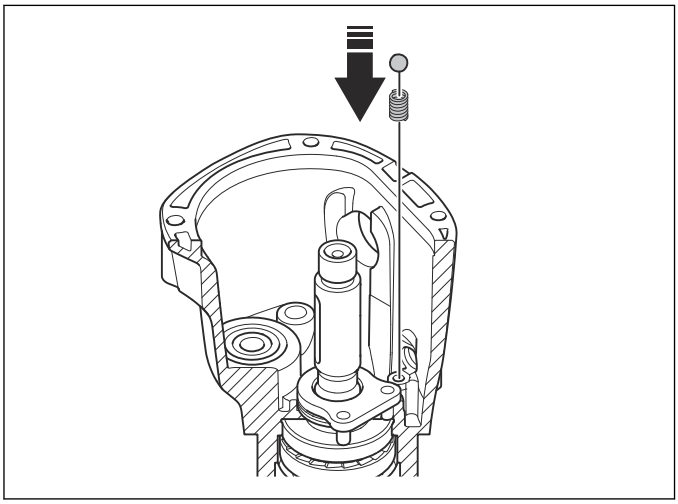
1. Install 2 new O-rings on the shaft.



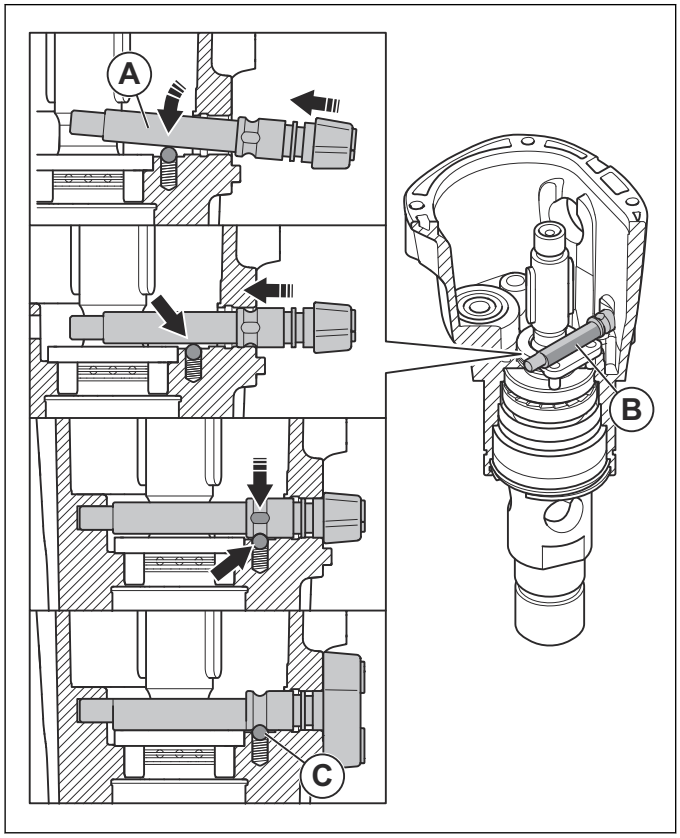
2. Install the switch and the screw. Make sure that the side of the switch with the drill is on the eccentric side of the shaft.



3. Install the spring and the ball in the housing.



4. Carefully install the shaft in the housing above the ball and the spring (A).

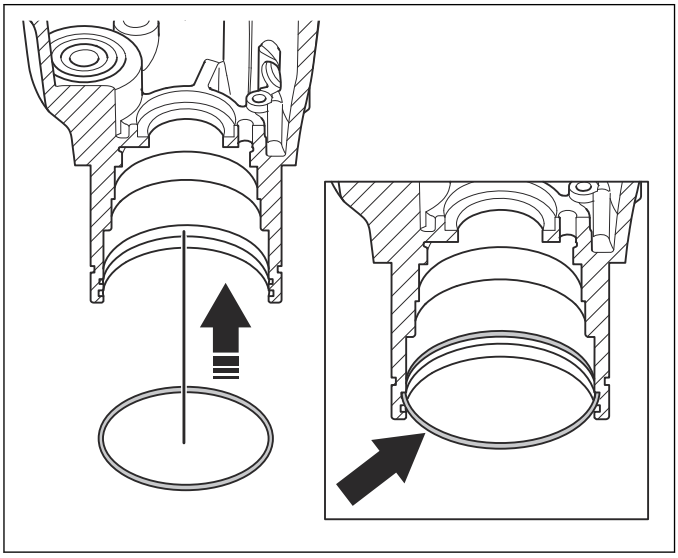


5. Turn the shaft until the eccentric side points away from the spindle shaft, and holds the ball in position (B).
6. Push the shaft in to the housing. The shaft is correctly installed when the ball clicks in to the slot in the shaft (C).

6.7.11 To assemble and install the drill spindle DM 210SP

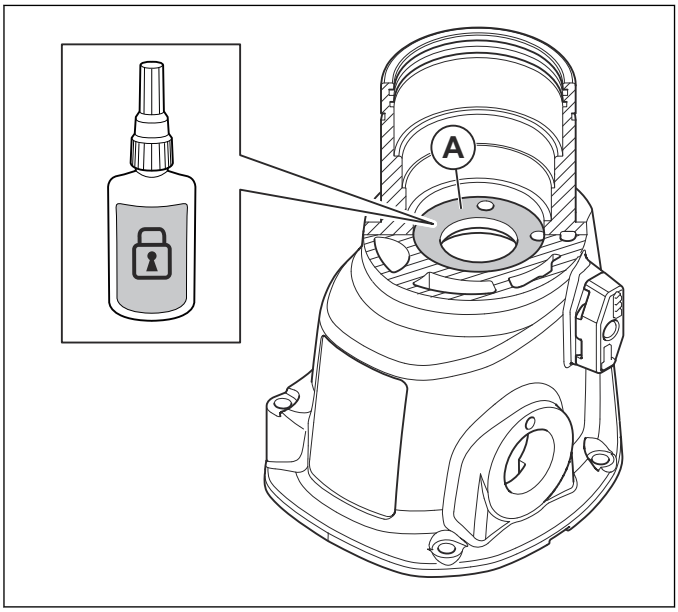
1. Install the ball bearing if you have removed it. Refer to *To install the ball bearing DM 210SP on page 35*.
2. Install the needle bearing if you have removed it. Refer to *To remove and install the needle bearing DM 210SP on page 35*.
3. Install the percussion function shaft if you have removed it. Refer to *To install the percussion function shaft DM 210SP on page 36*.

4. Install a new O-ring.

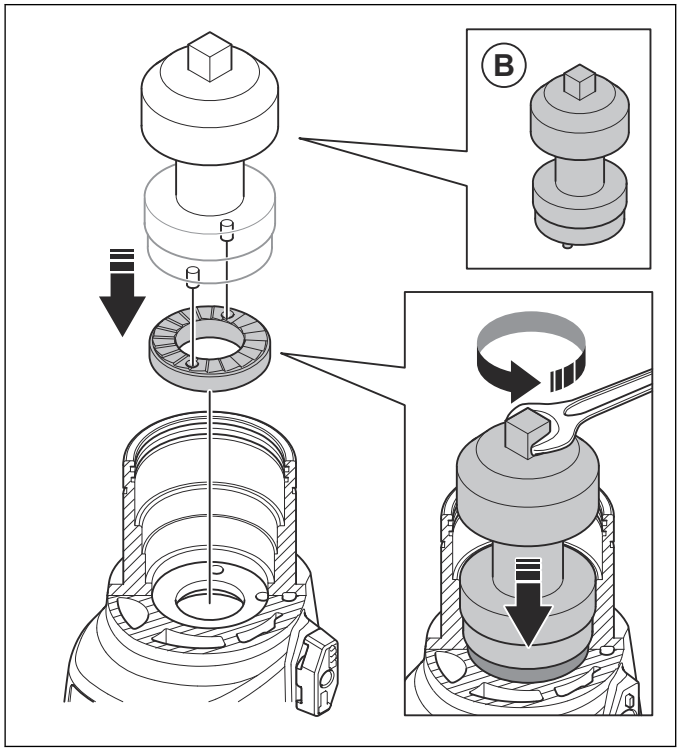


CAUTION: The toothed bearing is left hand threaded.

5. Apply Loctite to the area (A) in the gear housing.

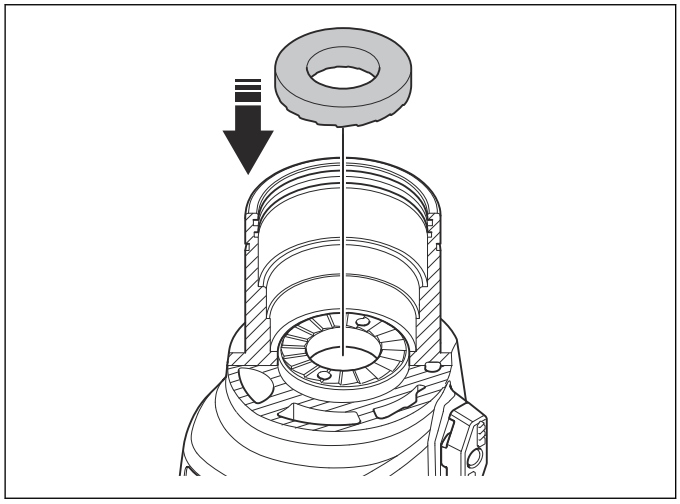


6. Install the toothed disc with the special tool 540 14 85-01 (B).

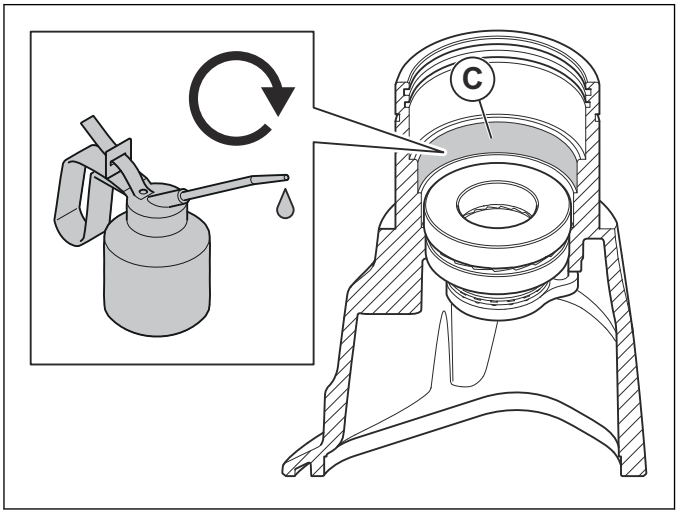


CAUTION: The toothed bearing is left hand threaded.

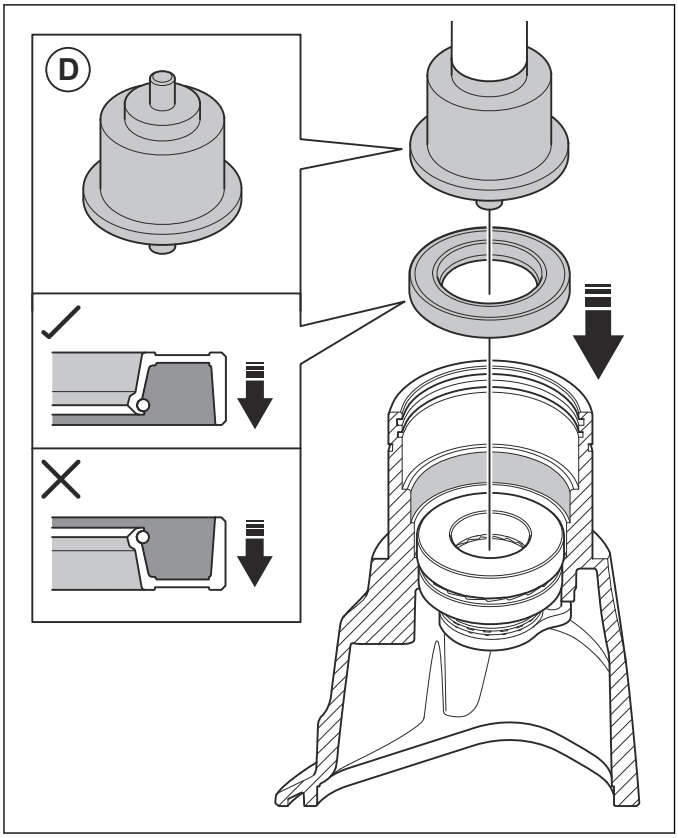
7. Put the toothed bearing in the gear housing.



8. Apply oil to the area (C) in the gear housing.

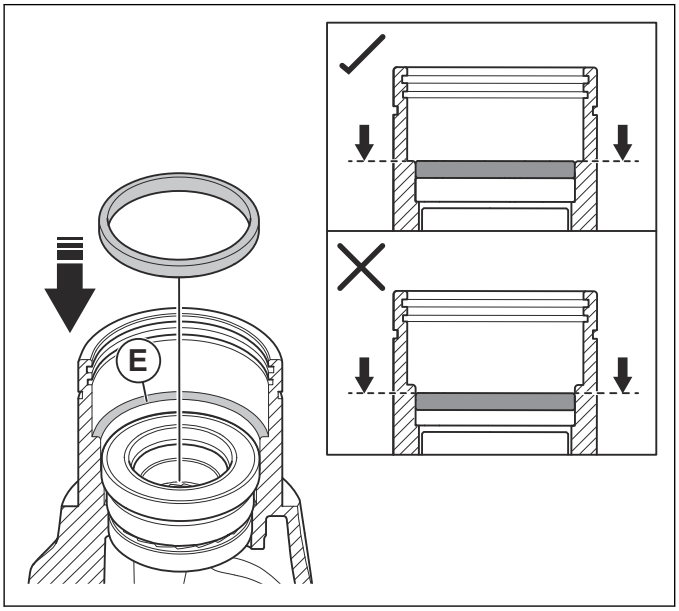


9. Install the seal in the gear housing with the seal press tool 540 14 83-01 (D).



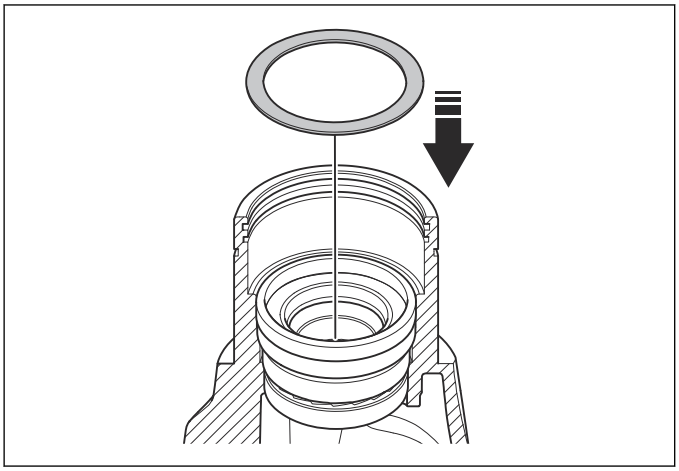
CAUTION: Make sure that you install the seal in the correct direction.

10. Install the spacer.

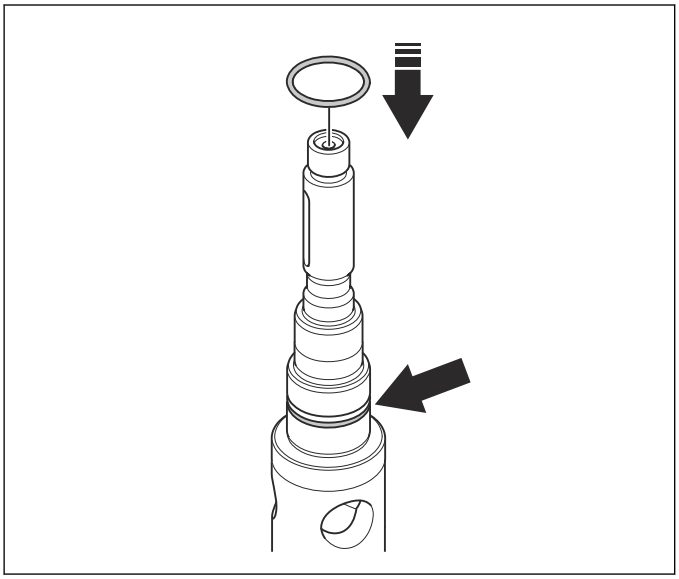


11. Make sure that the spacer is in line with the edge (E) in the gear housing.

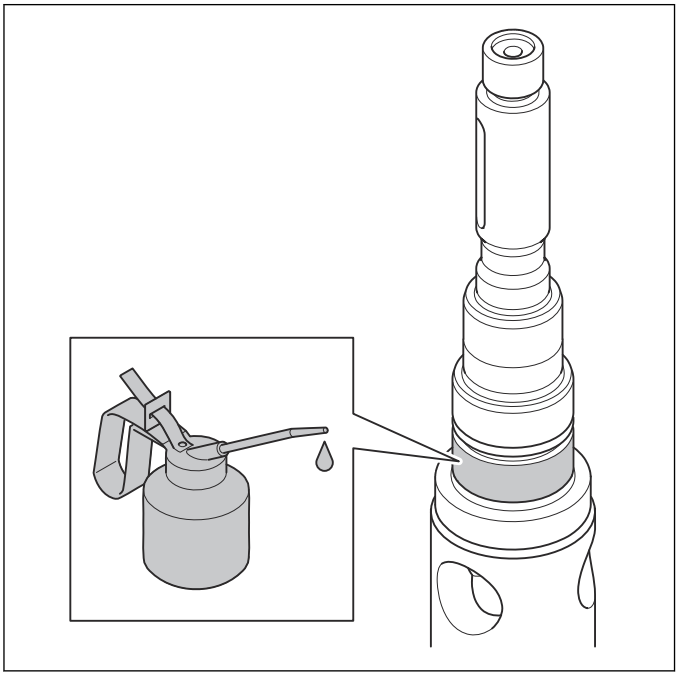
12. Install the shim.



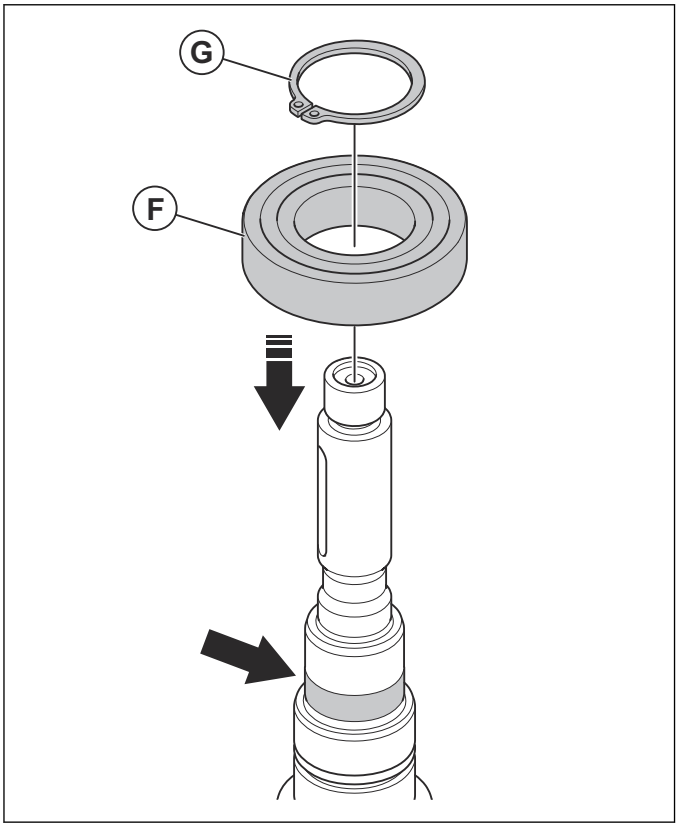
13. Install a new O-ring on the spindle shaft.



14. Apply Molykote G-Rapid Plus to the spindle shaft.

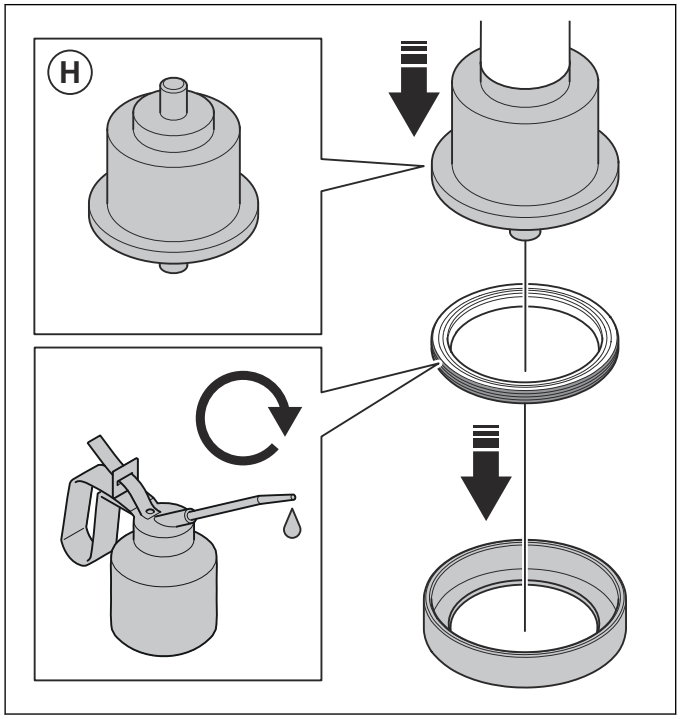


15. Put the bearing (F) on the spindle shaft.



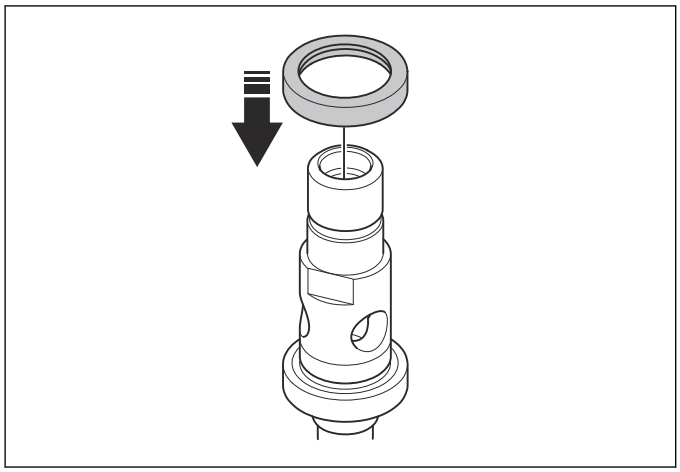
16. Install the snap ring (G).

17. Apply grease to the seal.

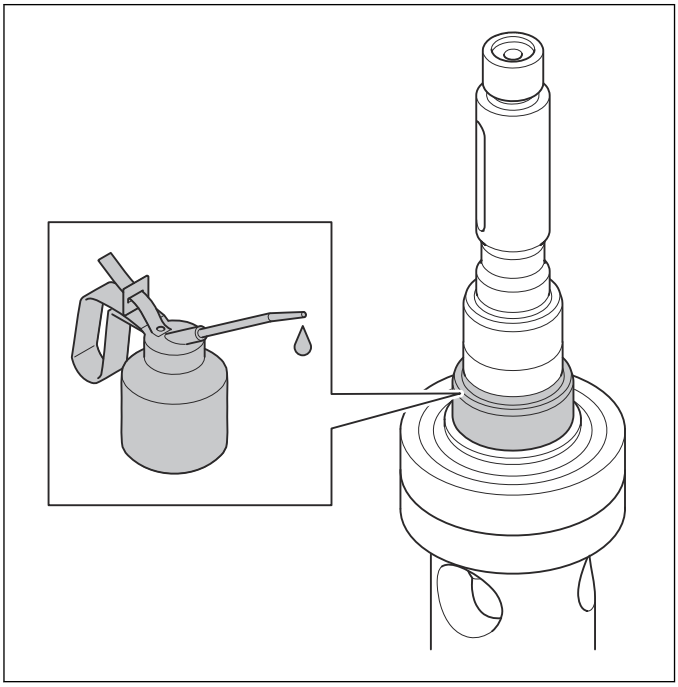


18. Install the seal in the seal housing with special tool 540 14 83-01 (H).

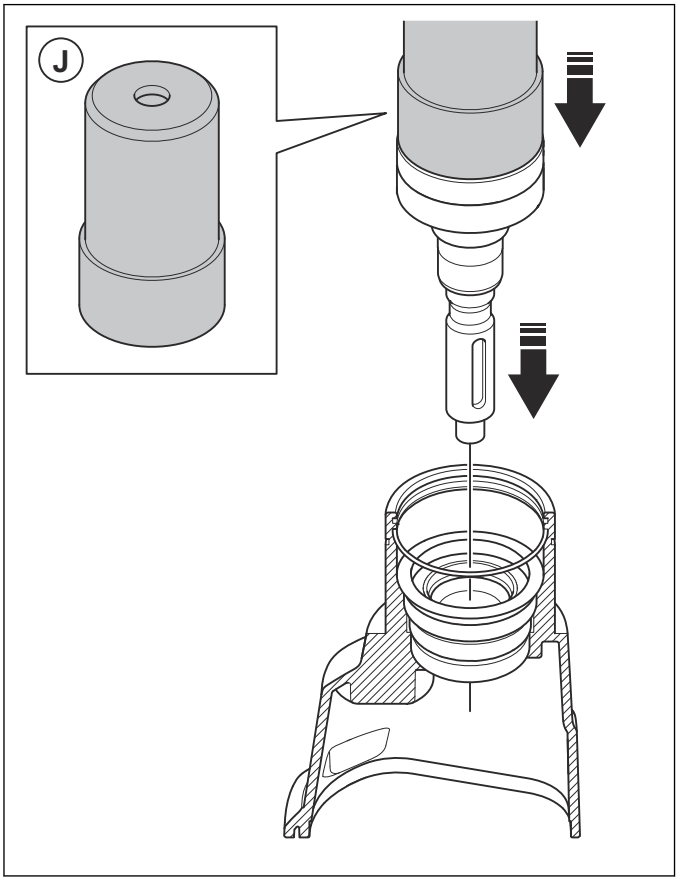
19. Install the seal housing with the seal on the spindle shaft.



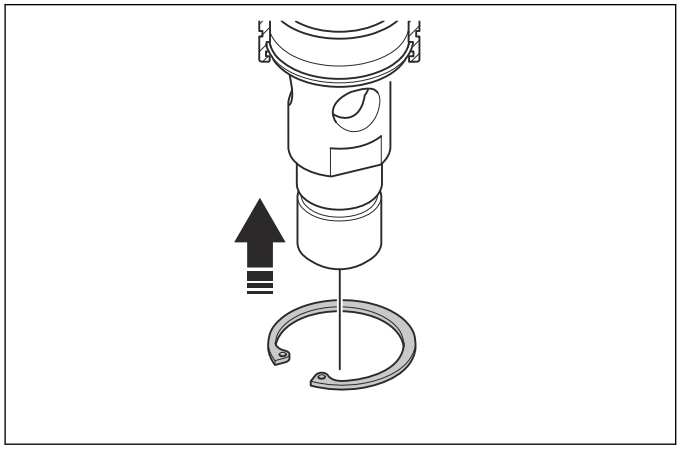
20. Apply oil to the area.



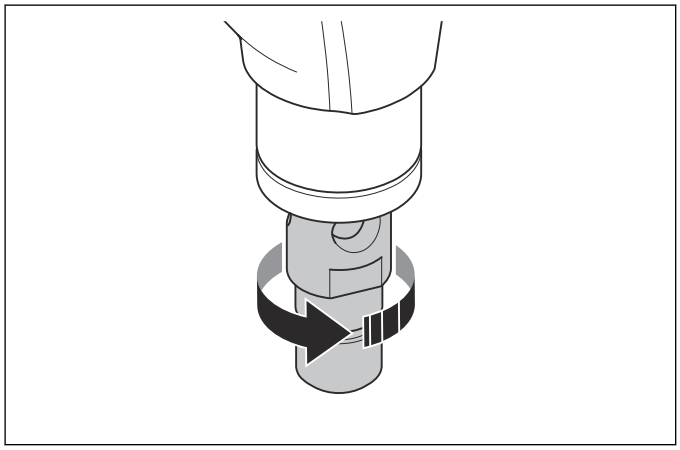
21. Use a press tool and special tool 540 14 84-01 (J) to install the spindle shaft in the gear housing.



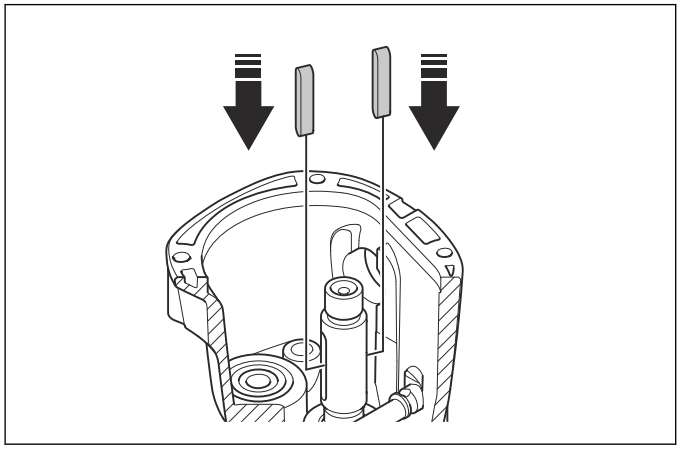
22. Install the snap ring. Use special tool 540 14 84-01 if it is necessary.



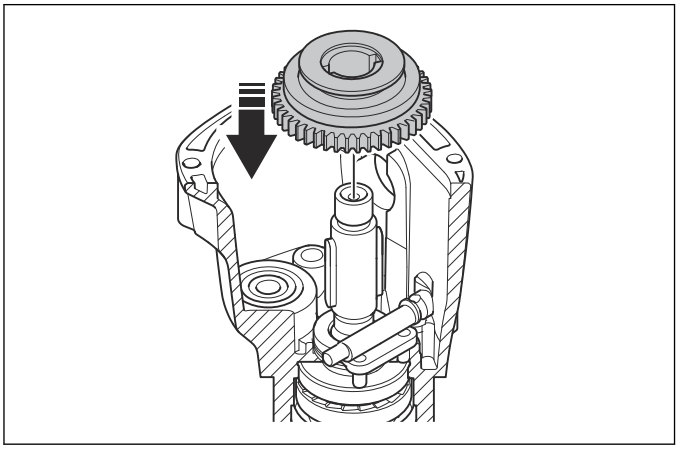
23. Rotate the spindle shaft by hand to make sure that the toothed discs move freely inside of the gear housing.



24. Install the keys.

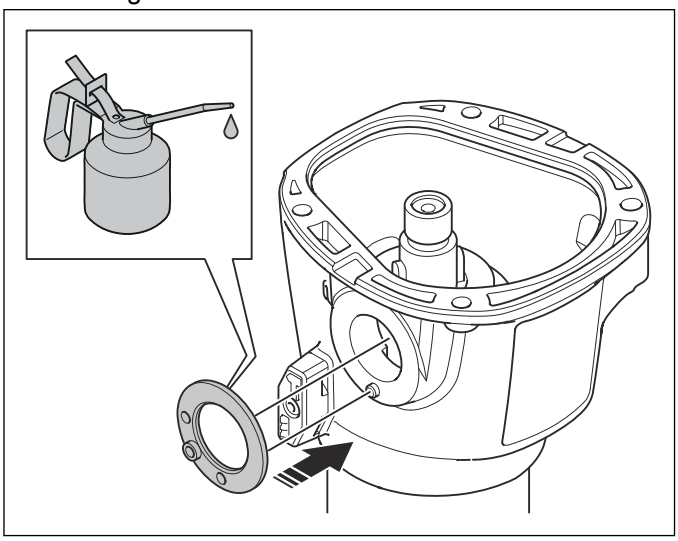


25. Install the gear.

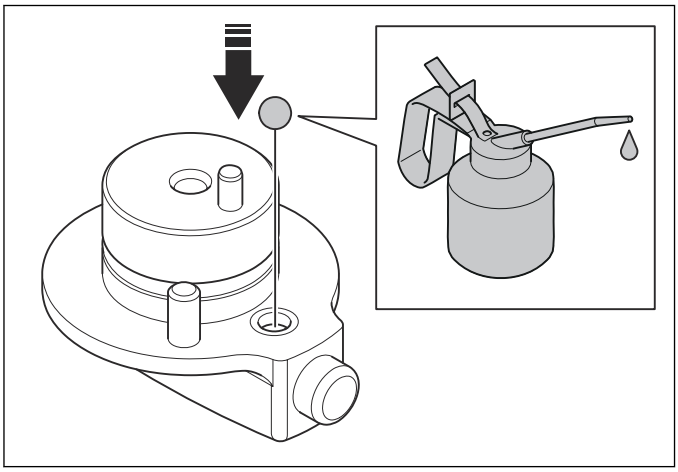


6.7.12 To install the gear selector DM 210SP

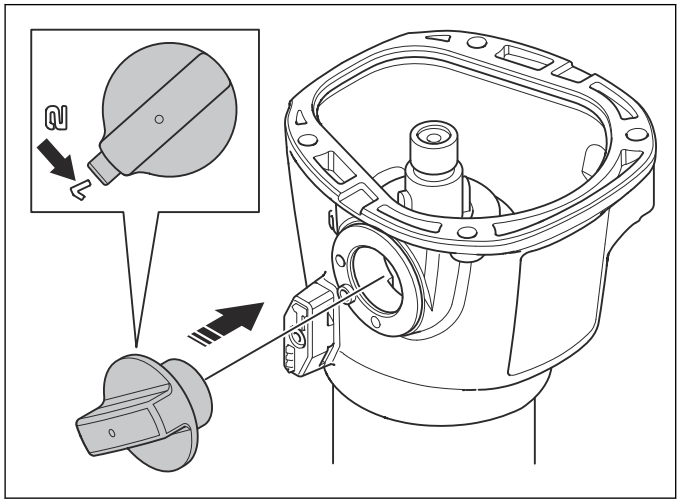
1. Apply grease to the washer and install it on the gear housing.



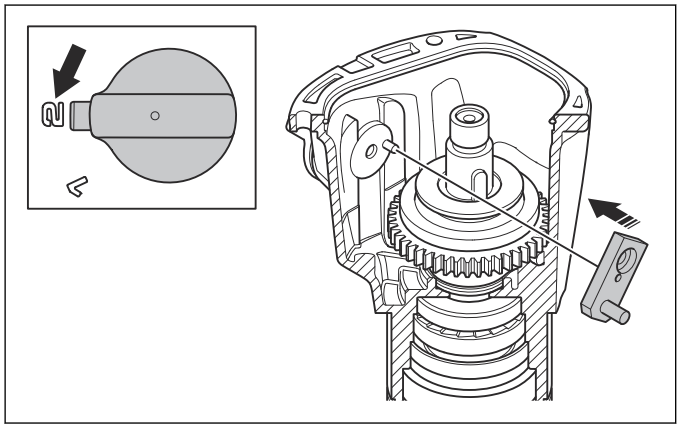
2. Install the ball in the gear selector switch.



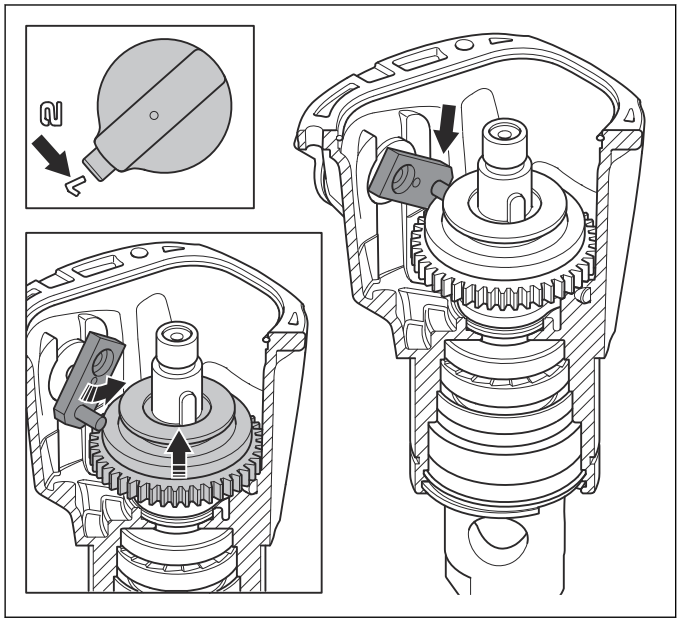
3. Install the gear selector switch in position "1".



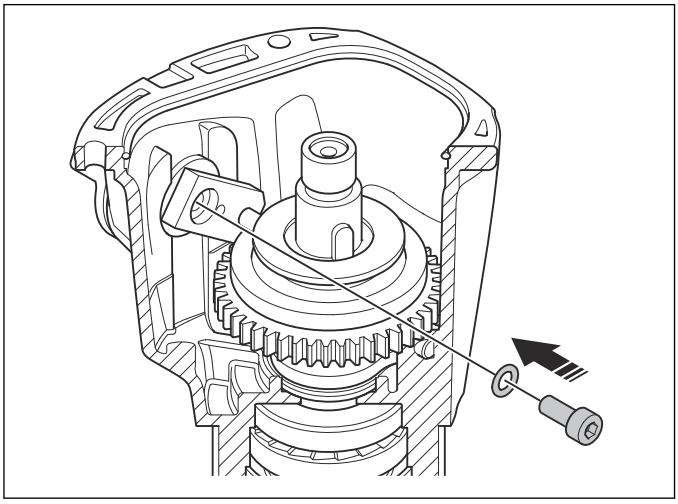
4. Set the gear selector switch to position "2" and install the bracket.



5. Set the gear selector switch to position "1" and install the pin on the bracket under the plate.

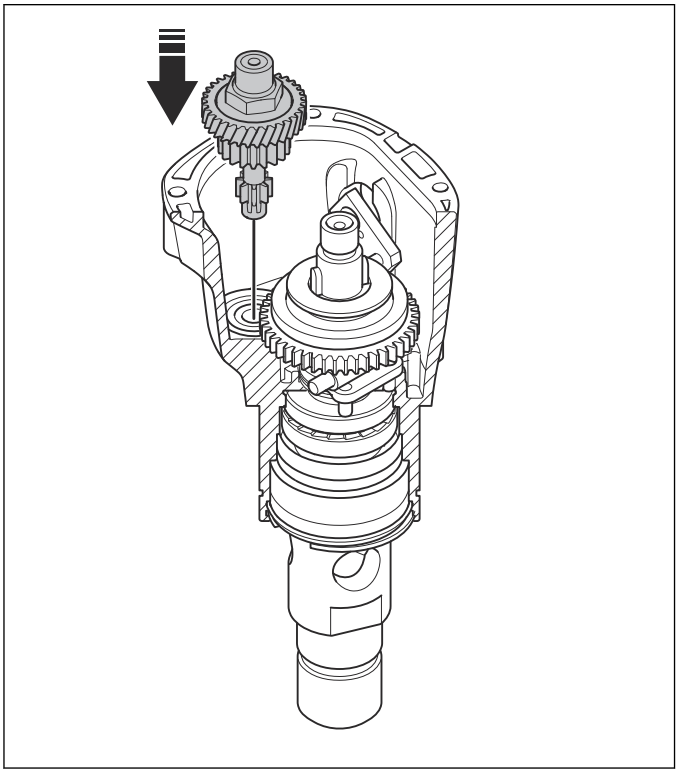


6. Install the washer and the screw.



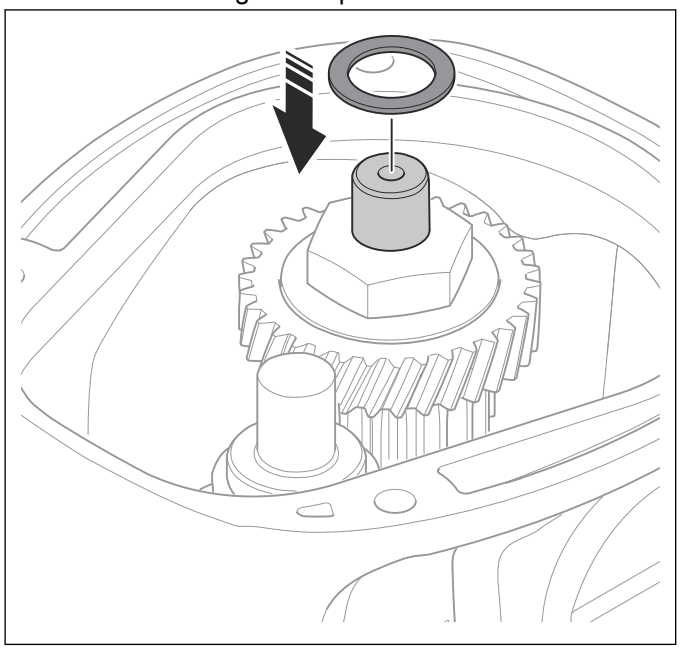
6.7.13 To install the pinion shaft DM 210SP

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.

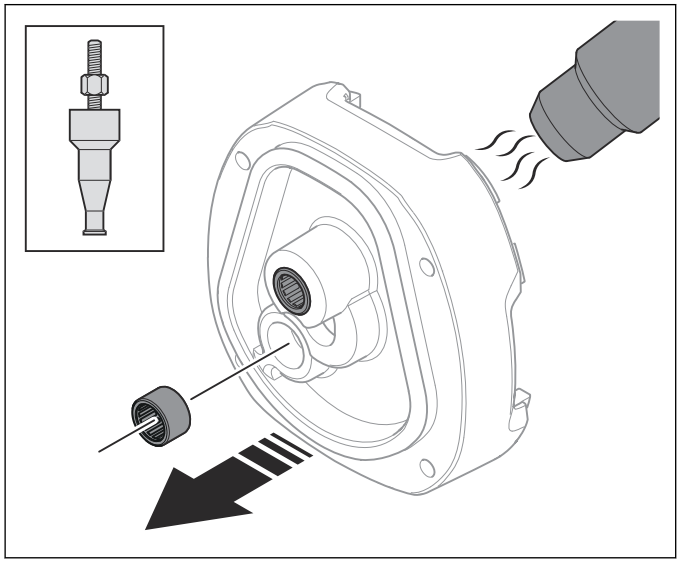
2. Put the shim ring on the pinion shaft.



3. Fill the gear housing with gear oil and assemble the product. Refer to *To replace the gear oil on page 15*.

6.8 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.

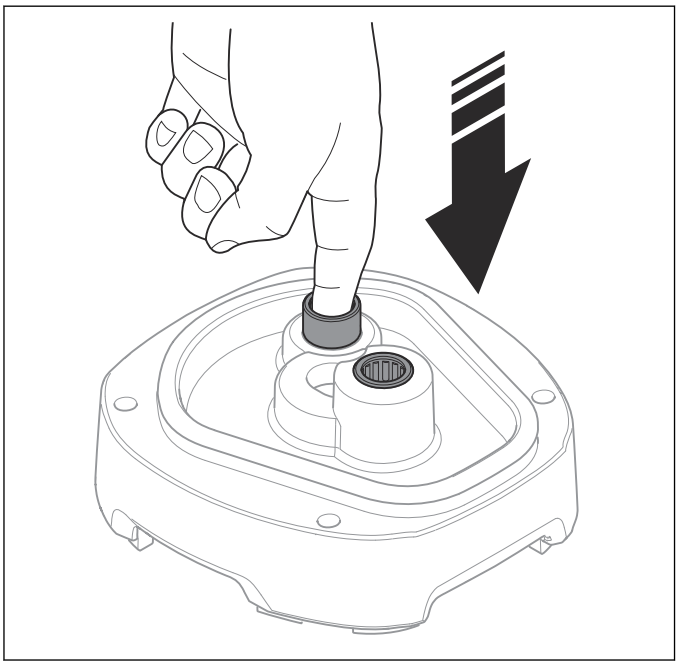


CAUTION: Make sure that the metal surface does not become damaged.

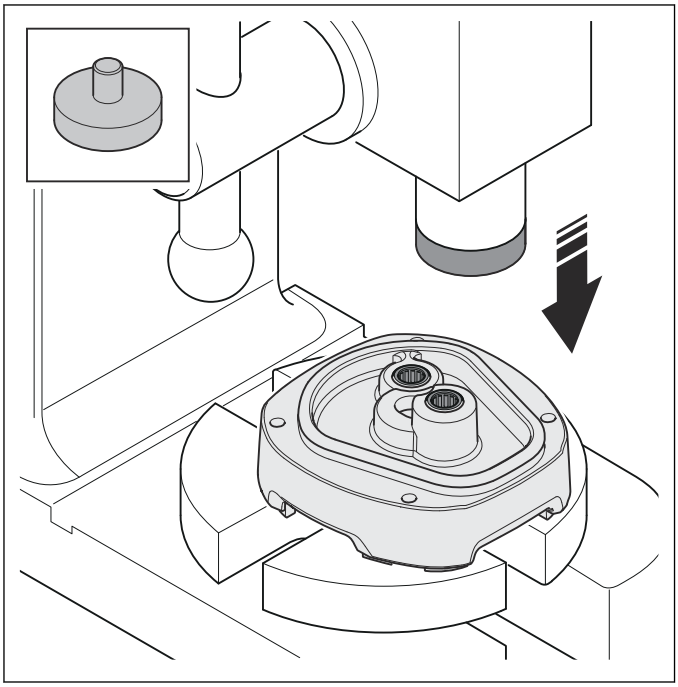
2. Do the same procedure as in the step before to remove the other needle bearing from the middle cover.

6.9 To install the needle bearings in the middle cover

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



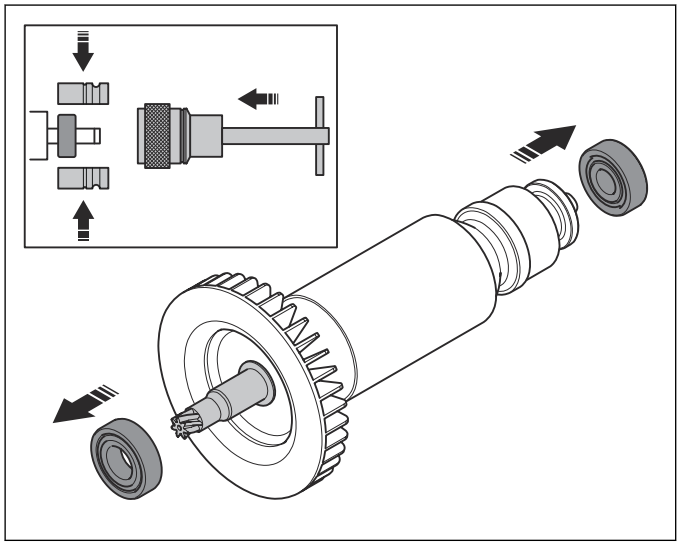
2. Attach the protective tool 598 95 55-01 to a mandrel press. Refer to *Servicing tools on page 6*. Push the 2 needle bearings into the bearing seats.



6.10 Rotor

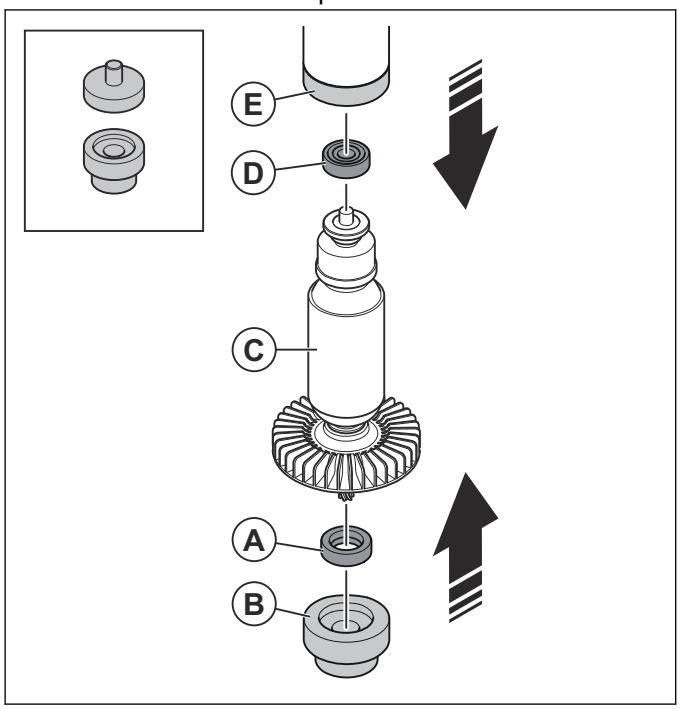
6.10.1 To disassemble the rotor

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



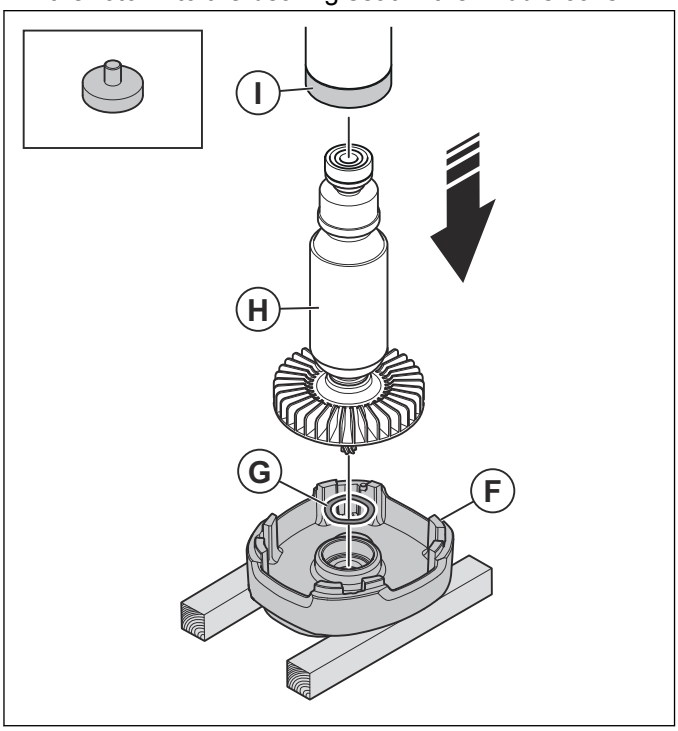
6.10.2 To assemble the rotor

1. Put the first ball bearing (A) in the bearing press tool 531 14 25-01 (B). Refer to *Servicing tools on page 6*. Put the rotor shaft (C) into the first ball bearing. Put the second ball bearing (D) onto the rotor shaft. Attach the bearing press tool 531 14 27-01 (E) 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 16*.

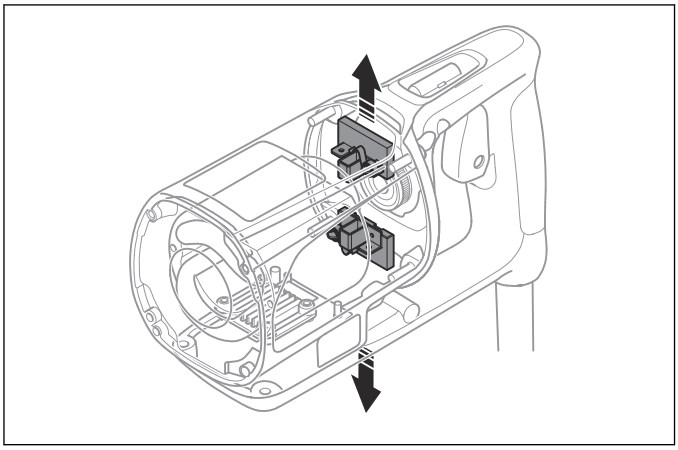
3. Put the middle cover (F) on 2 spacers. Install the washer (G) and the rotor (H) in the middle cover. Use the bearing press tool 531 14 27-01 (I) to push the rotor into the bearing seat in the middle cover.



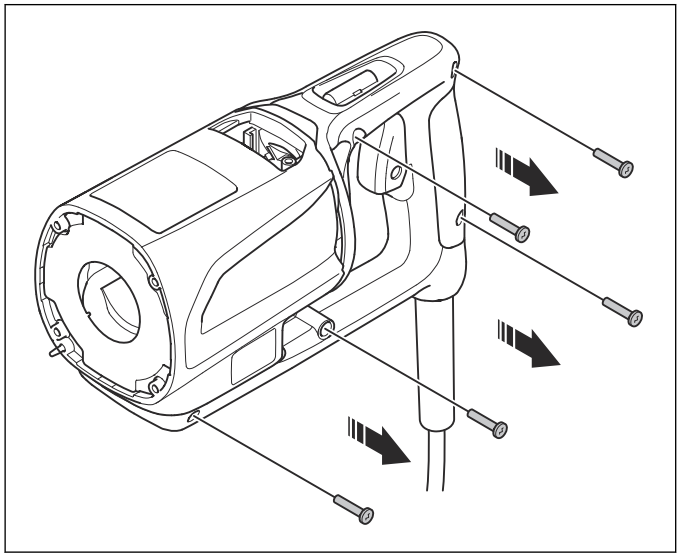
6.11 Stator

6.11.1 To disassemble and assemble the stator

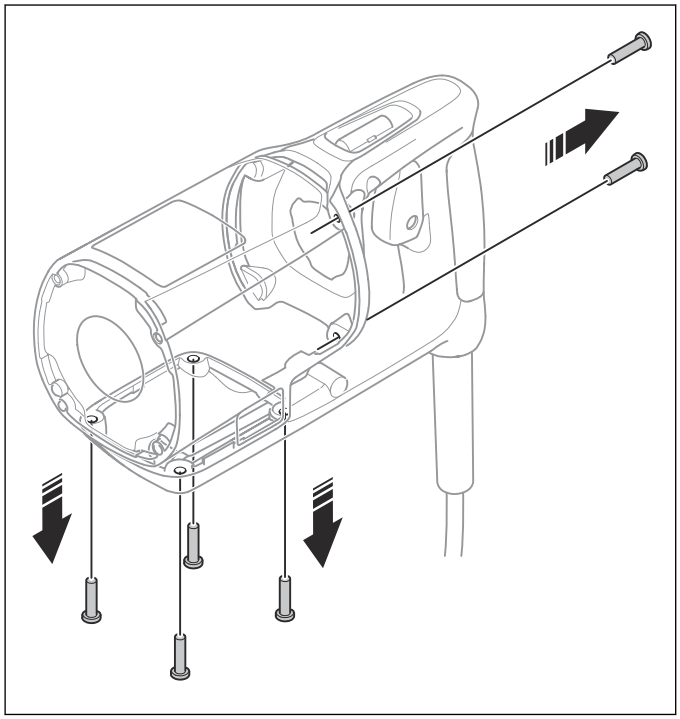
1. Remove the carbon brushes. Refer to *To replace the carbon brushes on page 17*.
2. Remove the carbon brush holders.



3. Remove the 5 screws.

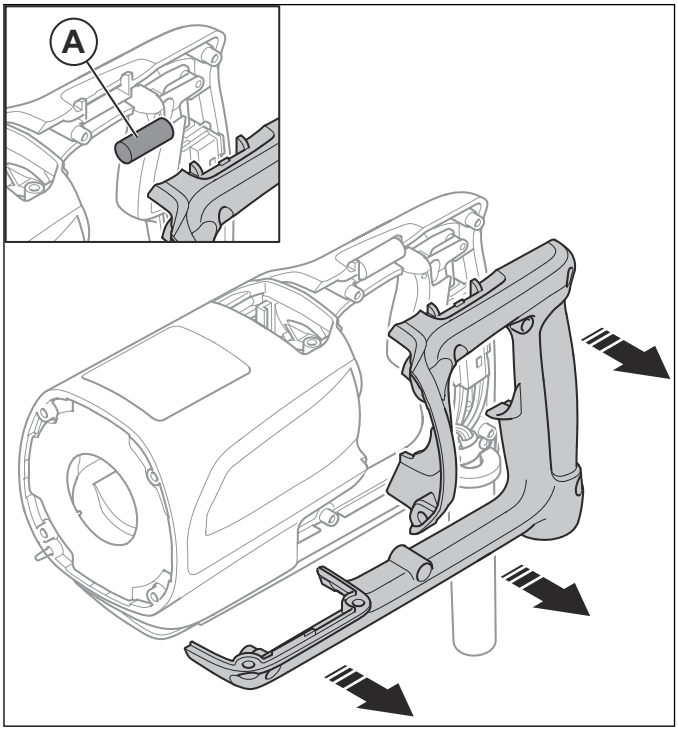


4. Remove the 6 screws.



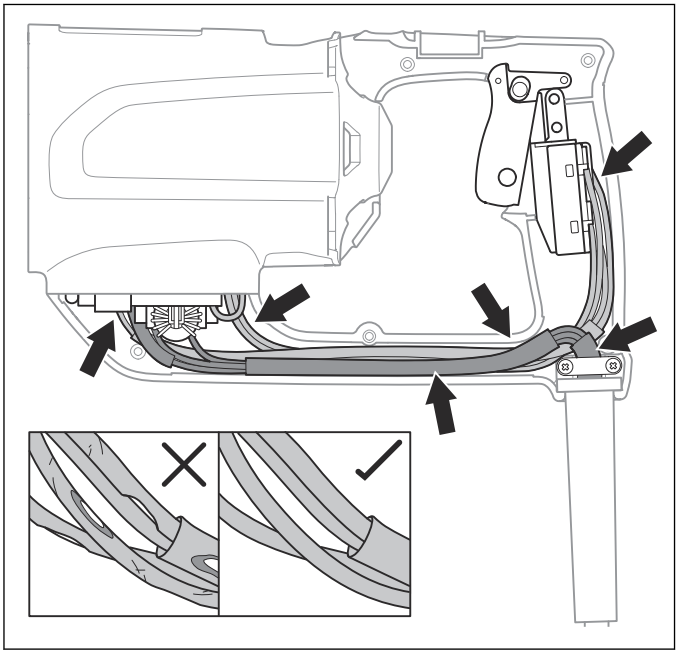
Note: Do not remove the 2 rear screws on the right handle half.

5. Remove the left handle half.

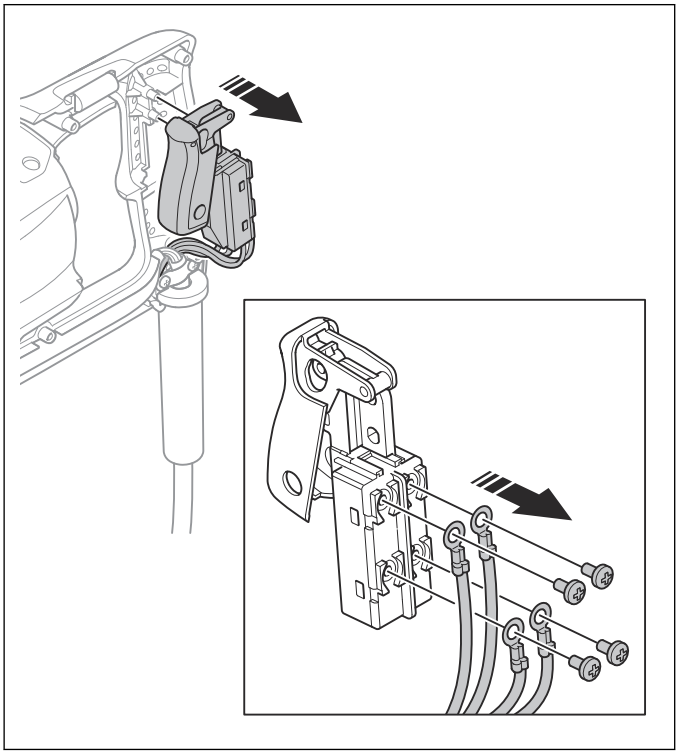


Note: The spirit level (A) comes loose when you remove the left handle half.

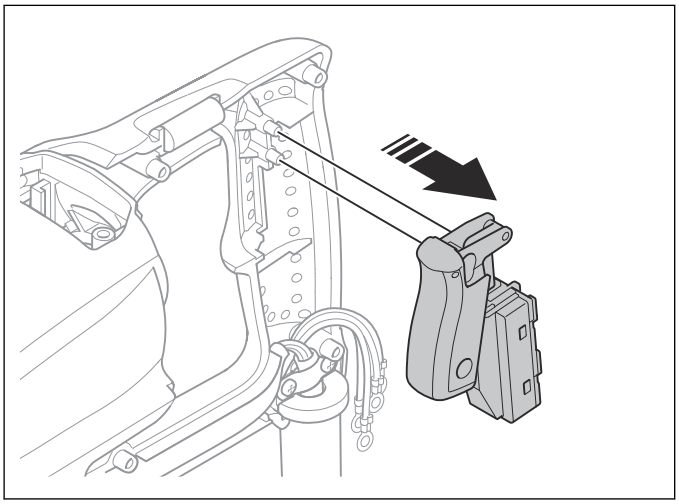
6. Do a check of the wires. Replace them if they are damaged.



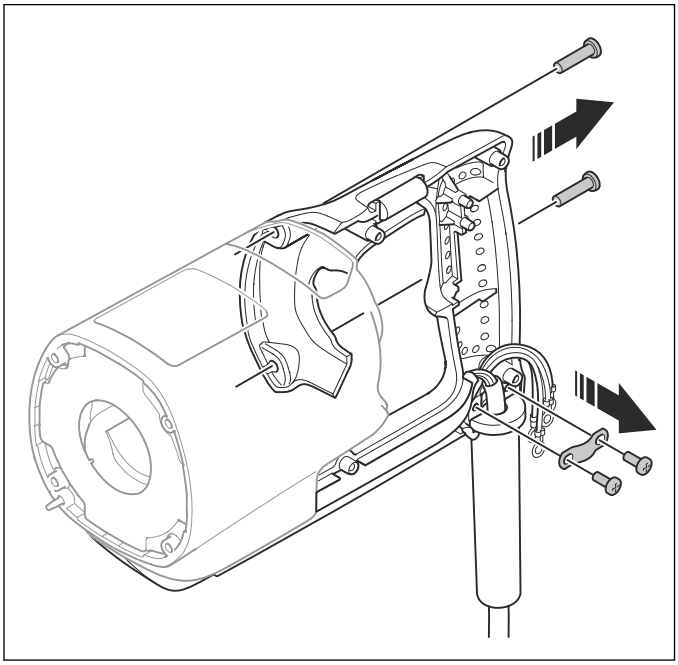
7. Remove the 4 screws that hold the wires to the power switch.



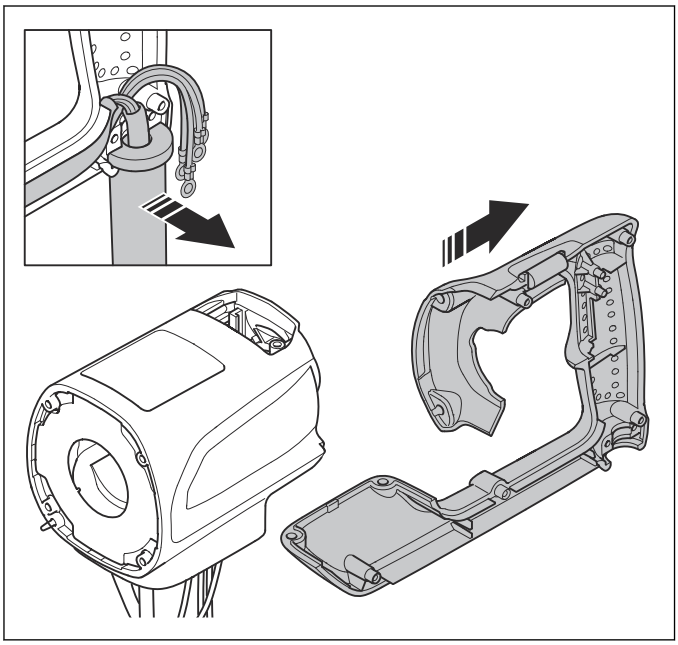
8. Remove the power switch.



9. Remove the 4 screws and the clamp.

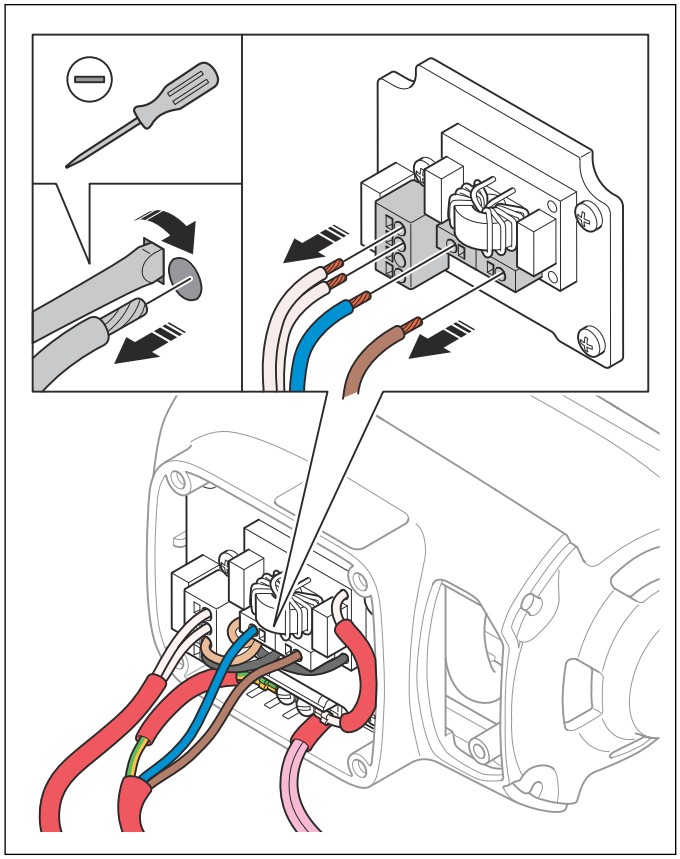


10. Carefully loosen the cable and remove the right handle half.

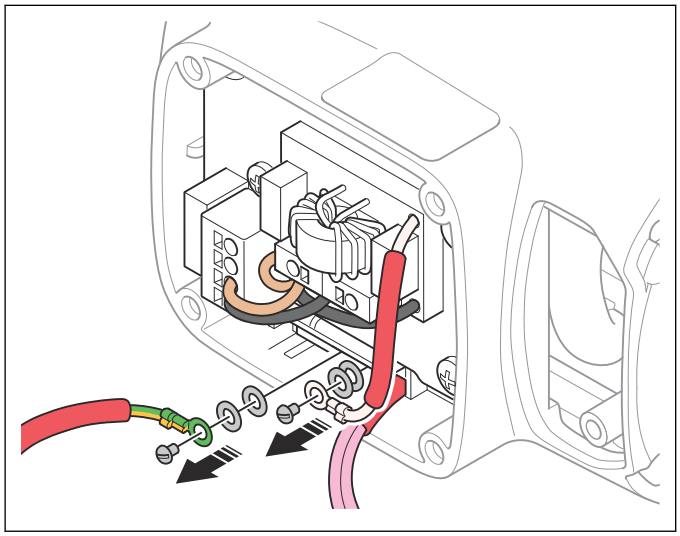


11. Make a note of how the motor connection wires from the terminal of the electronic module are connected.

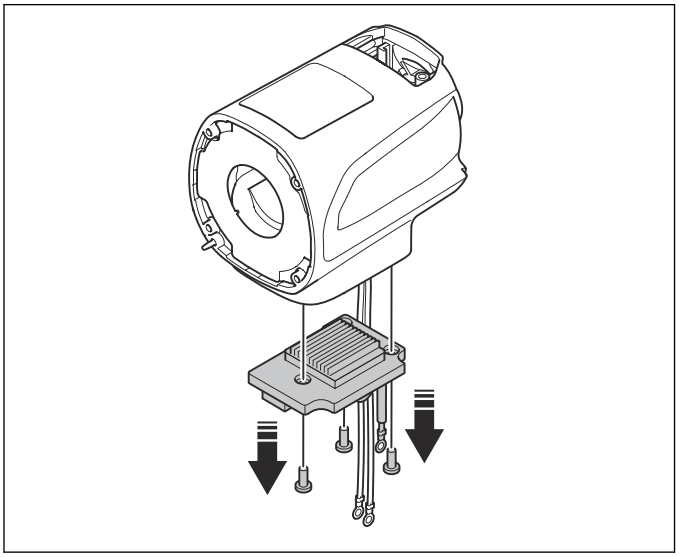
12. Disconnect the 4 wires with a flat screwdriver.



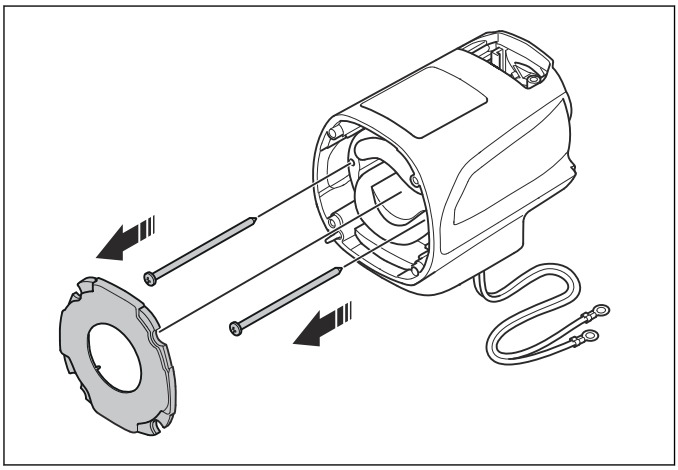
13. Remove the 2 screws and the 4 washers. Disconnect the 2 wires and remove the wiring harness.



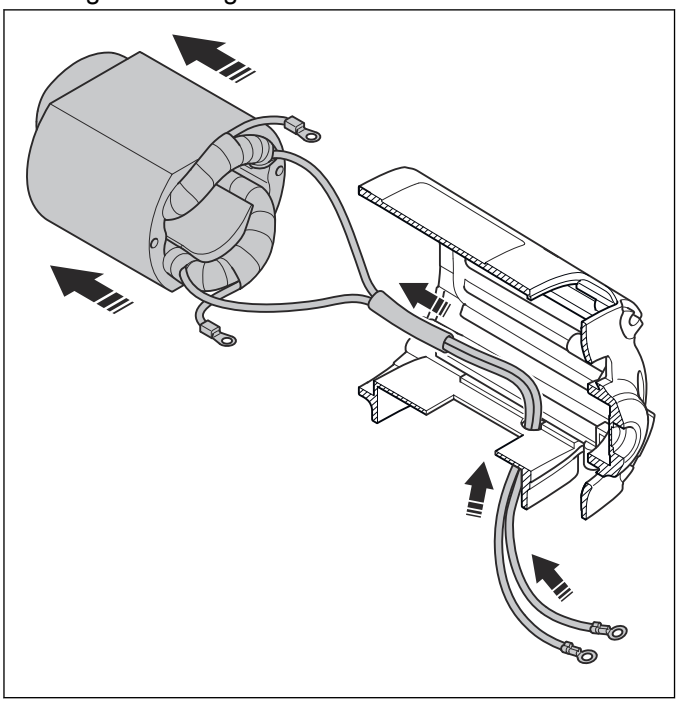
14. Remove the 4 screws that hold the electronic module. Remove the electronic module.



15. Remove the air disc and the 2 screws.

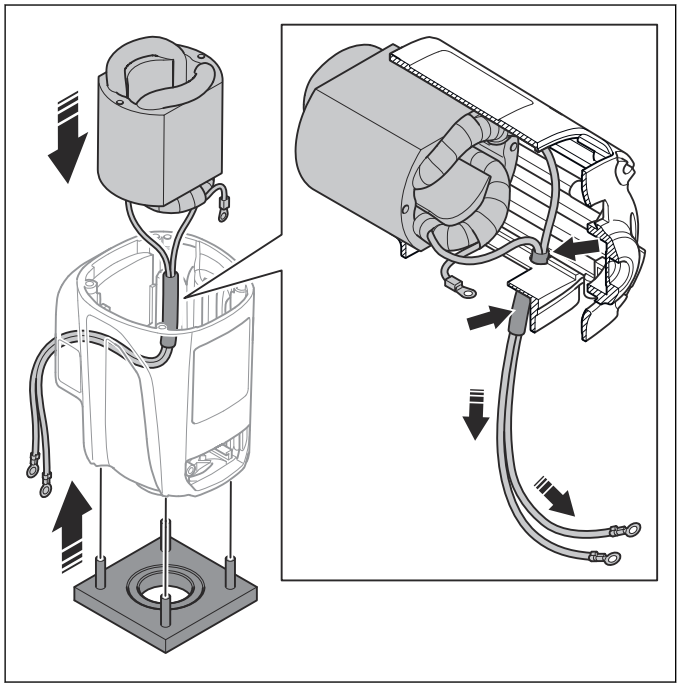


16. Tap the motor housing carefully with a soft head mallet to loosen the magnet housing. Remove the magnet housing.

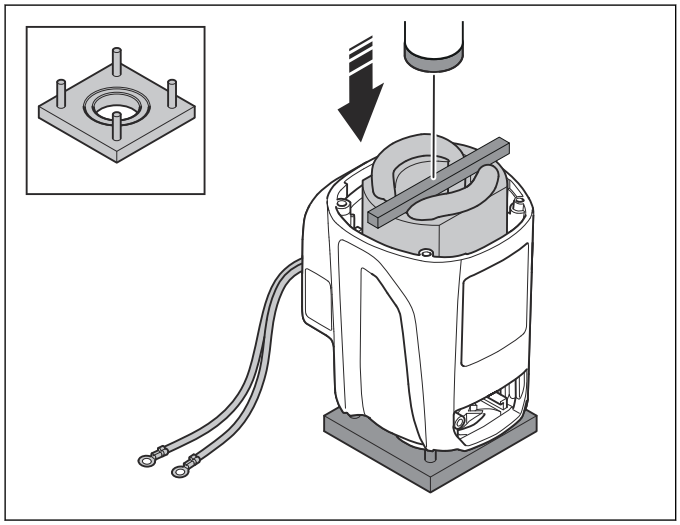


CAUTION: Make sure that the metal surface does not become damaged.

17. Assemble the stator in the opposite sequence. Do the steps that follow when you install the magnet housing:
    a) Put the motor housing onto the 4 pins of the press tool for motor housing. Refer to *Servicing tools overview 2 on page 7*. Put the magnet housing into the motor housing. Push the magnet housing into the motor housing by hand.



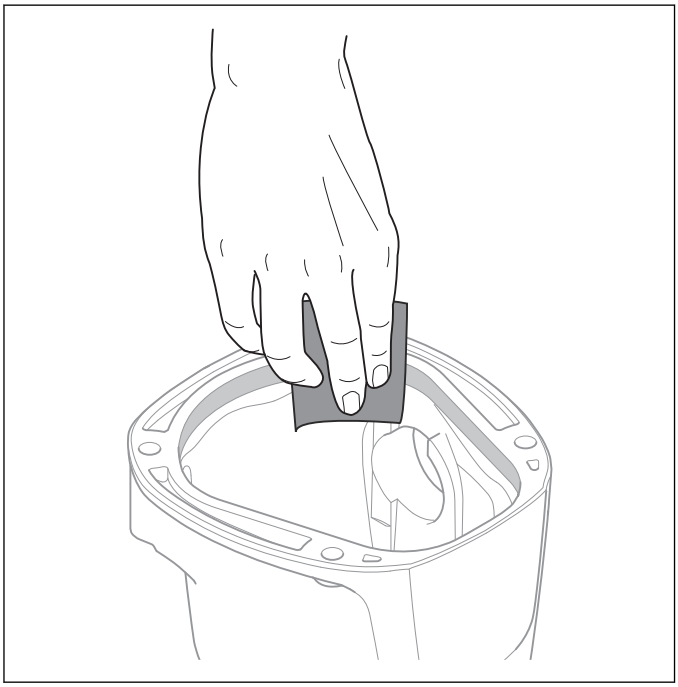
    b) Put a piece of metal on the magnet housing as support for a mandrel press. Push the magnet housing into the motor housing with the mandrel press.



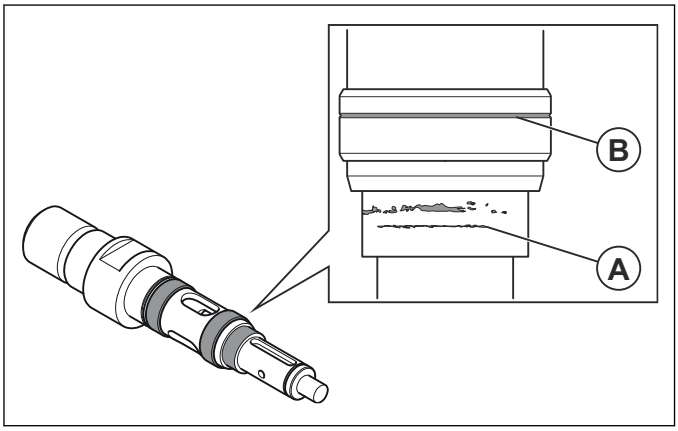
7.1 Gear housing

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.

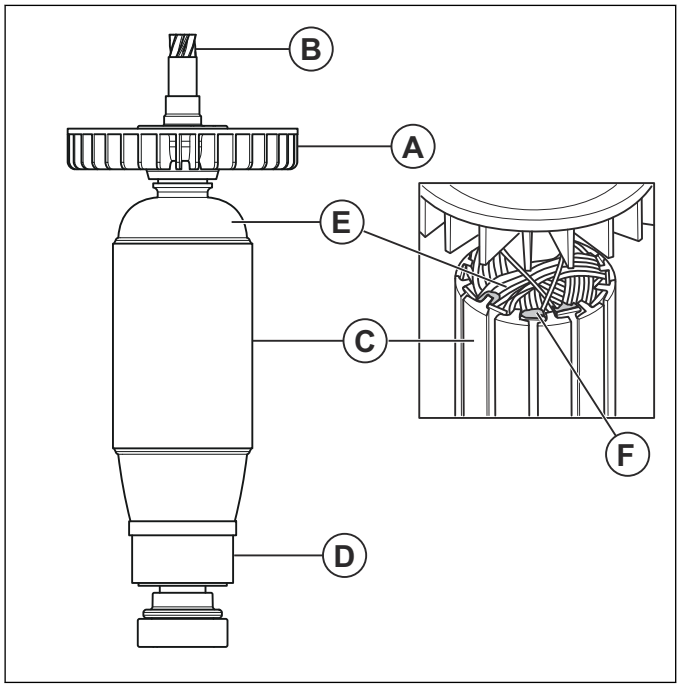
7.1.2 To do a check of the covers and the motor housing

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.



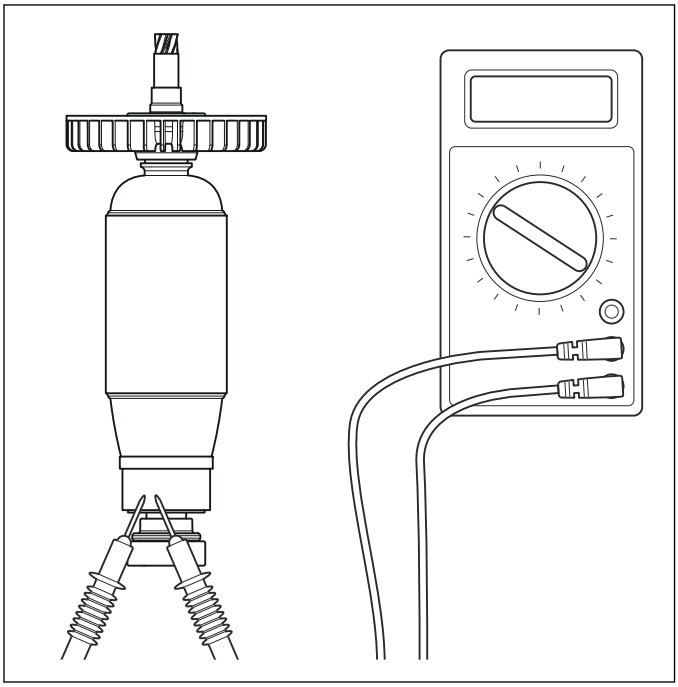
2. Examine the rotor shaft (B) for damage. Too low level of gear oil can cause a loss of surface hardness. Heat overload can cause a blue color on the rotor shaft. Replace the rotor if the rotor shaft is damaged.

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*.



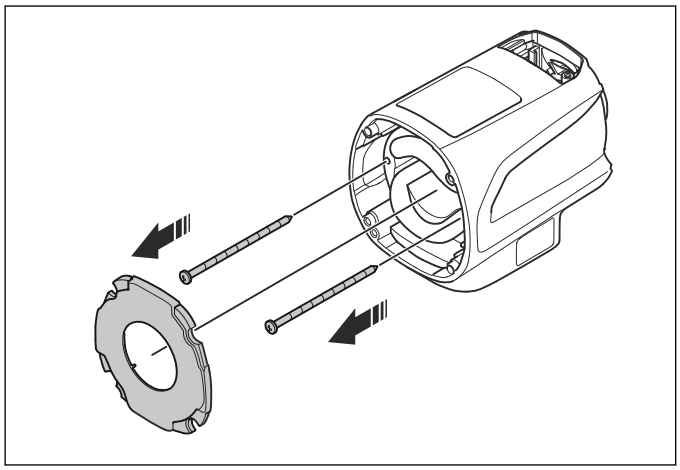
230V: Typical measured value for a correct rotor is R = 0.14 Ω ± 5%.

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

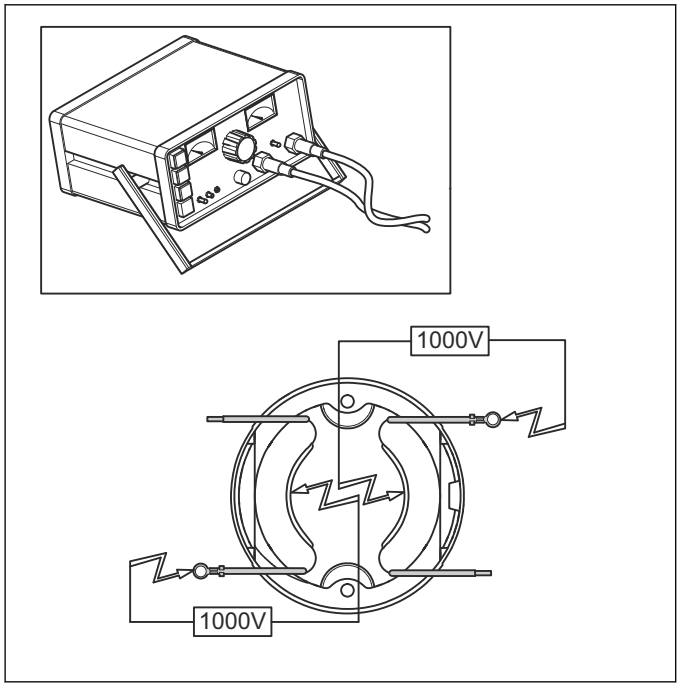
- Remove the air disc.



- 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.



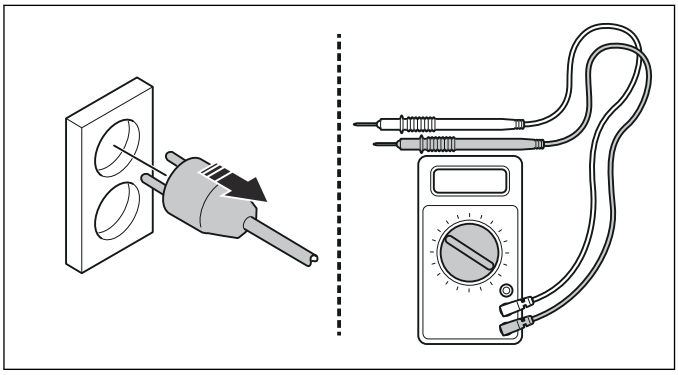
No fault signal must show on the high voltage tester.

7.4 Cables

7.4.1 To do a check of the power switch and power cord DM 200

WARNING: Disconnect the power cord from the power outlet.

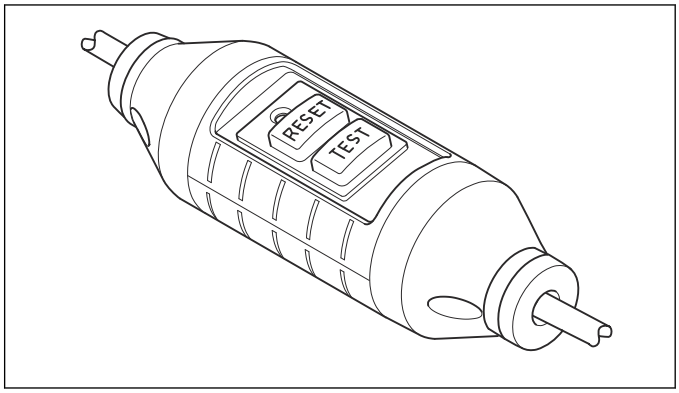
- Do a check of the power cord, the cable gland and the strain relief for damage.



- 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 DM 200

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

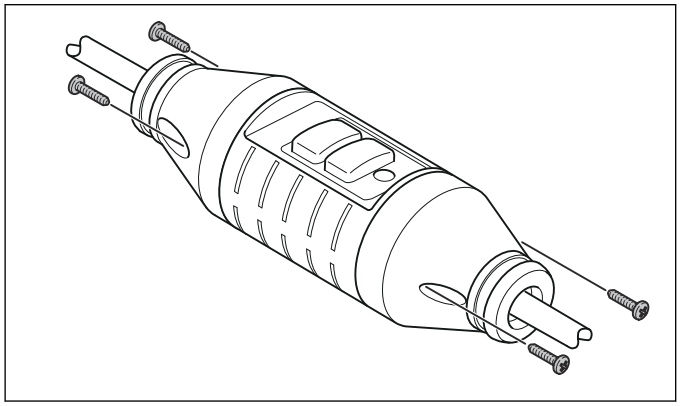


1. Connect the power plug to the power outlet.
2. Push the "RESET" button. The red indicator shows that the current is connected.
3. Pull the power plug out of the power outlet. The red indicator goes off.
4. Do step 1 and 2 again.
5. Push the "TEST" button. The red indicator goes off.
6. Push the "RESET"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

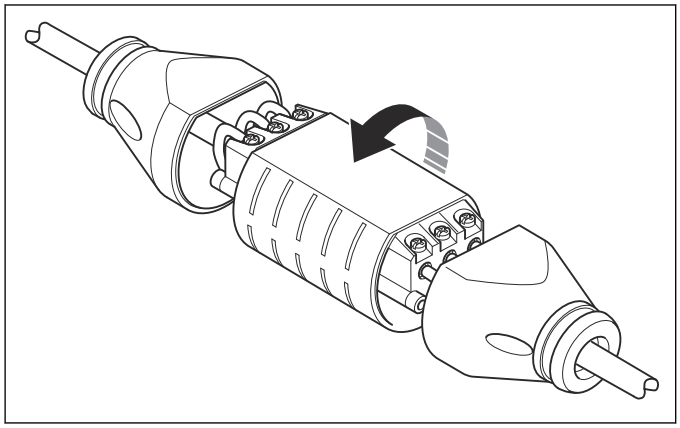
7.4.3 To examine the electrical cables of the PRCD DM 200

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

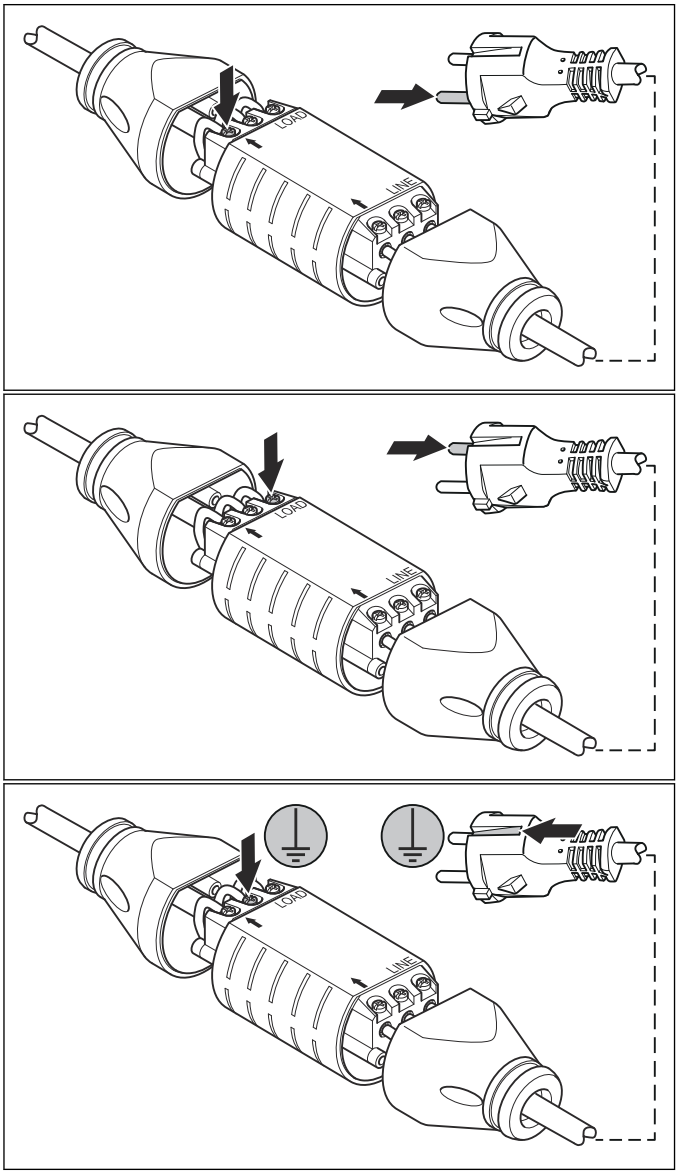
1. Remove the 4 screws and pull apart the ends of the PRCD.



2. Turn the PRCD to the other side.



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



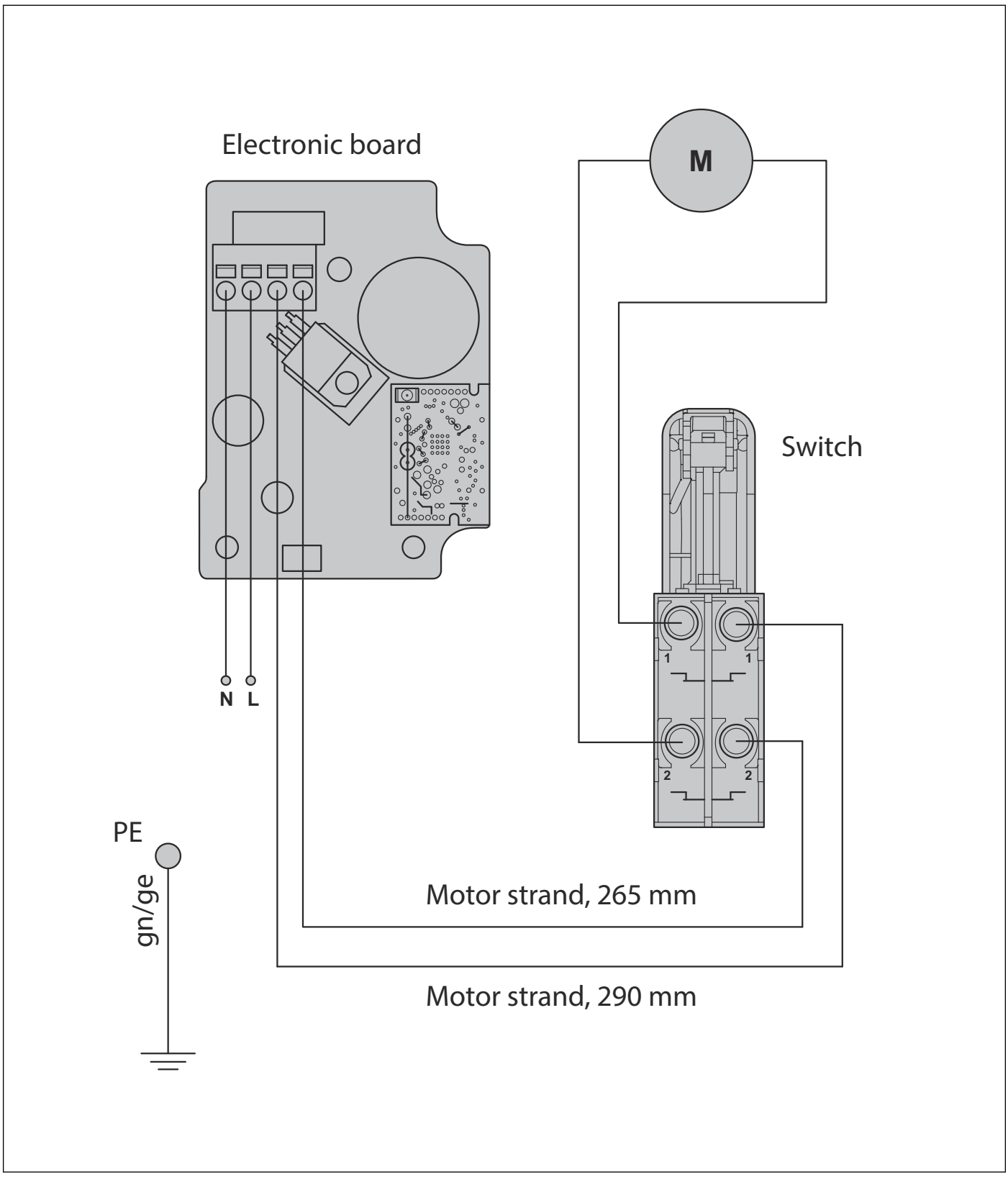
7.5 To do a check of the electronics

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.

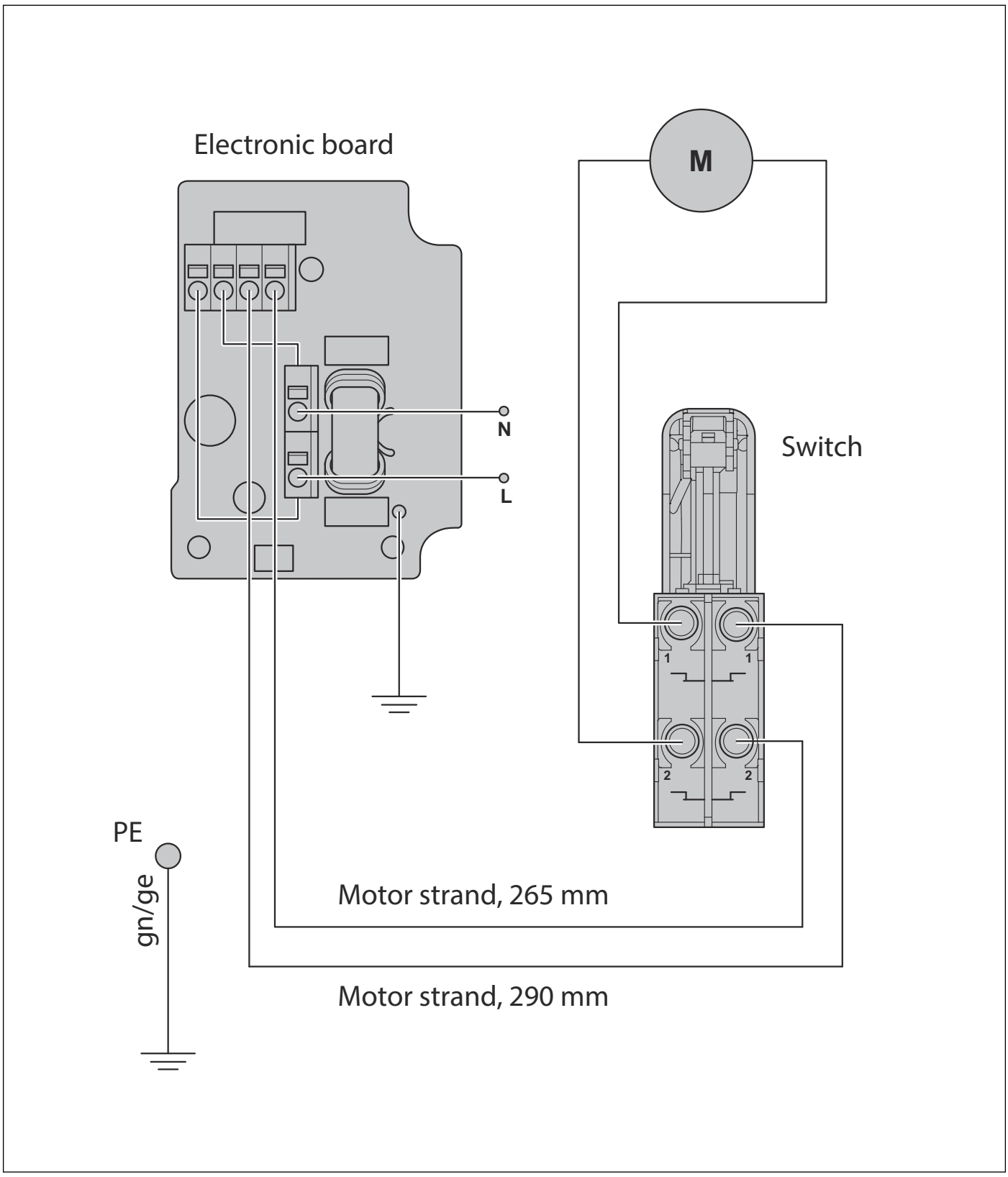
7.6 To do a function test

- 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 Wiring diagram DM 200



9 Wiring diagram DM 210SP



10 Technical data

Motor		
Electrical motor	Single-phase	
Rated voltage, V	110–120, 110, 220–240	
Rated power, W	2000	
Rated output, W	1340	
Rated frequency, Hz	50–60	
Rated current, A		
100-120V (US, JP)	15	
220-240V	9.3	
Drill bit		
Max. drill bit diameter, handheld, mm/in.	75/3	
Max. drill bit diameter in concrete, with drill stand, mm/in.	150/6	
Max. drill bit diameter in masonry, with drill stand, mm/in.	202/8	
Weight, kg/lb	6.5/14.3	
Tool connection		
Spindle thread, JP/RoW	A-Rod/1 1/4"	
Operating data		
Gear	1[1]	2
Speed spindle, idle, full load, rpm	700	1700
Speed spindle, idle, no load, rpm	1200	2800
Drill diameter in concrete, mm/in.	80–150/3.2–5.9	30–75/1.2–3.2

[1] Not recommended to use gear 1 at handheld drilling.

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