

PHE 6 H / PHE 6 S

Special Tools Required

- Torx screwdriver TX 30 4932 319 998
- Forcing disks 4931 599 018
- Adjustment tool for carbon brushes 9170 302 270
- Pulling-off device 9170 314 440
- Tool for dis-/assembly of the spindle (PHE 6 H) 9170 302 260

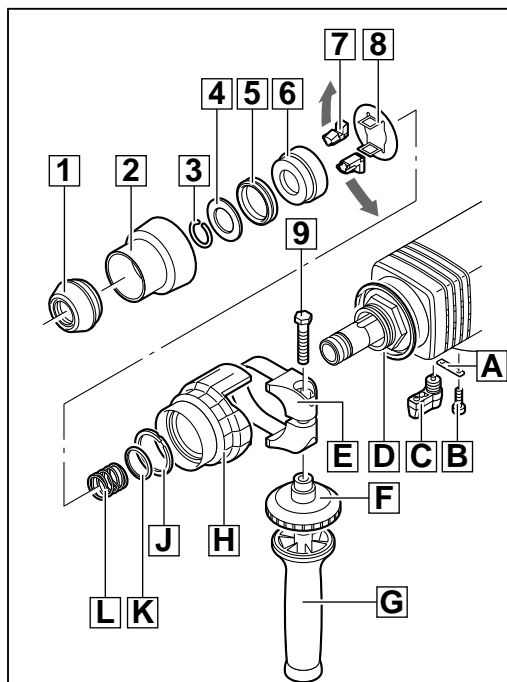
Important!

- Before beginning the maintenance work, perform an initial check with a high voltage test according to VDE (see chapter Electrical and Mechanical Test Instructions).
- Before all repair work, pull the power plug from the socket!
- Before disassembly, the machine must be connected to the RTR-READER (maintenance measuring instrument) in order to check for a possible maintenance interval.

Disassembly

**PHE 6 S:
Dismantling the
tool reception**

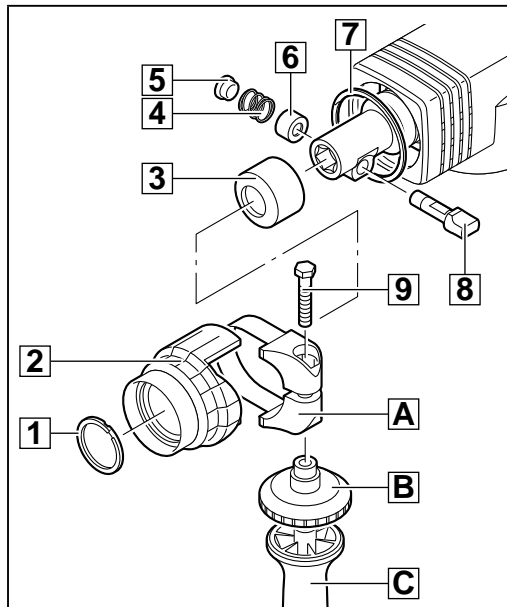
- 1 Remove the auxiliary handle (G) completely with the clamping ring (F).
- 2 Push back the rubber cover (2) and remove the end cover cap (1).
- 3 Remove the spring ring (3).
- 4 Remove the stop (4), the rubber stop (5) and the retainer (6).
- 5 Depress the retention plate (8) against resilience - the latches (7) are relieved. Unscrew the latches (7) and remove them (see illustration 1).
- 6 Remove the retention plate (8), the spring (L) and the washer (K).
- 7 Take out the restrictor (J).
- 8 Remove the cone (H).
- 9 Loosen the bearing bolt (9). Keep the tension and carefully remove the clamping ring (E).
- 10 Peel off the connecting ring (D).
- 11 Unscrew both screws (B). Slightly lift the switch lever (C) and pull out the retaining strap (A). Remove the switch lever (C).



1

**PHE 6 H:
Dismantling the
tool reception**

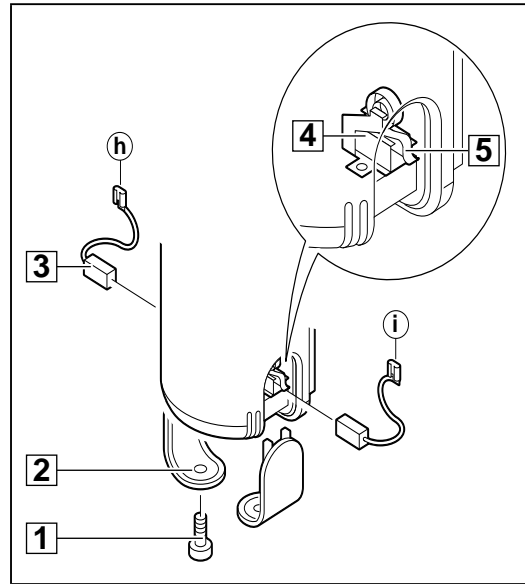
- 1 Remove the auxiliary handle (C) completely with the clamping ring ring (B).
- 2 Remove the dust guard cap (3).
- 3 Expel the latch (8) from the nosepiece with aid of a mandrel.
- 4 Remove the latch (5), the spring (4) and the distance sleeve (6).
- 5 Take out the restrictor (1).
- 6 Pull off the cone (2).
- 7 Loosen the bearing bolt (9). Keep the tension and carefully remove the strap (A).
- 8 Peel off the connecting ring (7).



2

Detaching the carbon brushes

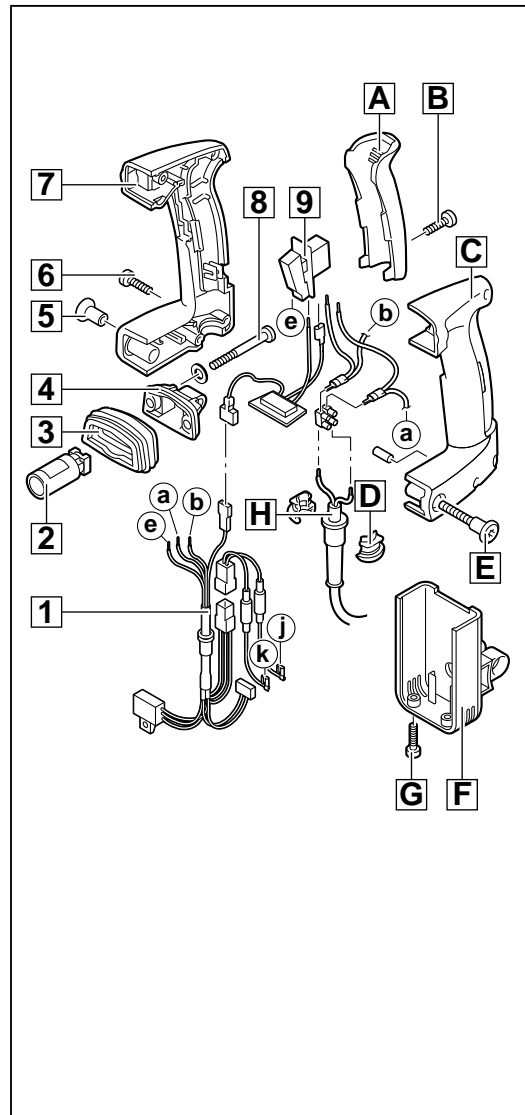
- 1 Loosen the screws (1) and remove the brush covers (2).
- 2 Lift the brush springs (5) off the respective carbon brushes (3) and place them on the upper edge of the brush holders (4).
- 3 Pull both cable lugs (h and i) off the carbon brushes (3) and remove them.



3

Dismantling the handgrip

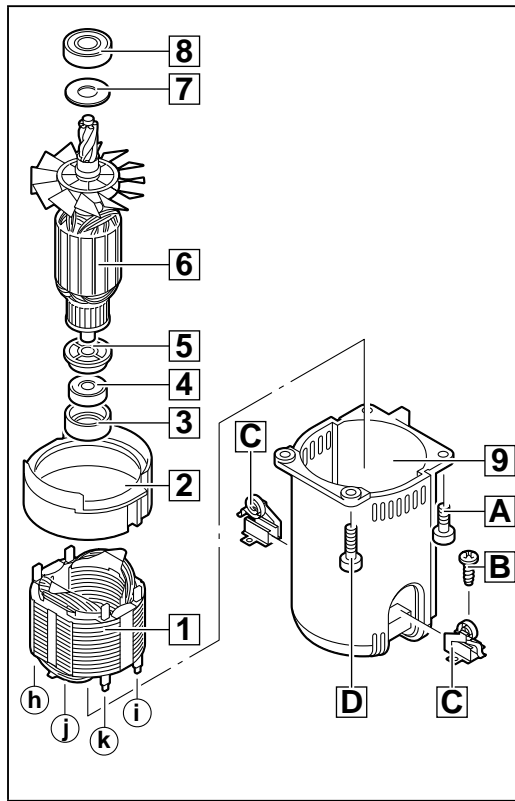
- 1 Loosen the two screws (G) of the housing (F).
- 2 Remove the handle screw (E) by steadying the knurled nut (5) at the same time. Remove the knurled nut (5).
- 3 Loosen the screw (B) and lever off the handle cover (A) from below (it is not possible to lever off the handle cover from above without destroying it!).
- 4 Unscrew the four screws (6) from the right half of the handle (7).
- 5 Unscrew both Torx screws (8) TX 30 of the handgrip holder (4) and remove them.
- 6 Pull off the handle shells completely with the housing (F).
- 7 Remove the damping element (2).
 ⚠ Attention: Do under no circumstances further dismantle the damping element!
- 8 Disconnect the plug-in connection (1) between the motor and the pair of handle shells.
- 9 Remove the handgrip holder (4) and the rubber collar (3) from the handle shells.
- 10 Remove the left handle shell (C) with the holding-down device.
- 11 Loosen the cable clamps (D) and lay bare the connecting cable (H) with the cable entry sleeve.
- 12 Remove the switch (9) with the capacitor from the handle shell.



4

Detaching the armature

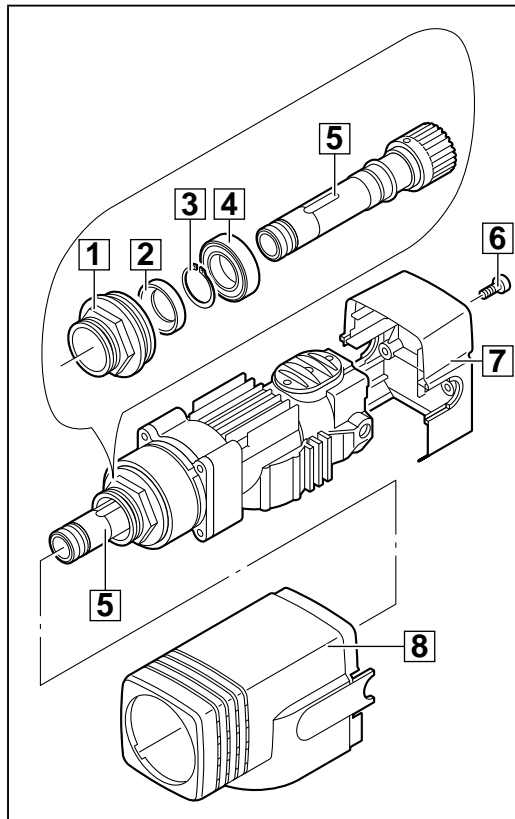
- 1 Loosen the two short (A) and the two long (D) screws.
- 2 Remove the motor housing (9) with the field (1) and the air deflector ring (2).
- 3 Remove the air deflector ring (2) from the motor housing (9) and expel the field (1) from the motor housing (9).
- 4 Loosen the screws (B). Remove the brush holders (C) from the motor housing (9).
- 5 Pull out the complete armature by turning it. If necessary, hit the motor housing lightly with a plastic hammer for support.
- 6 Remove the bearing sleeve (3) from the armature bearing (4).
- 7 Press off the armature bearings (4) and (8) with aid of the forcing disks (service tool).
- 8 Remove the insulating disk (5) and the ring (7).



5

**PHE 6 S:
Detaching the spindle sleeve**

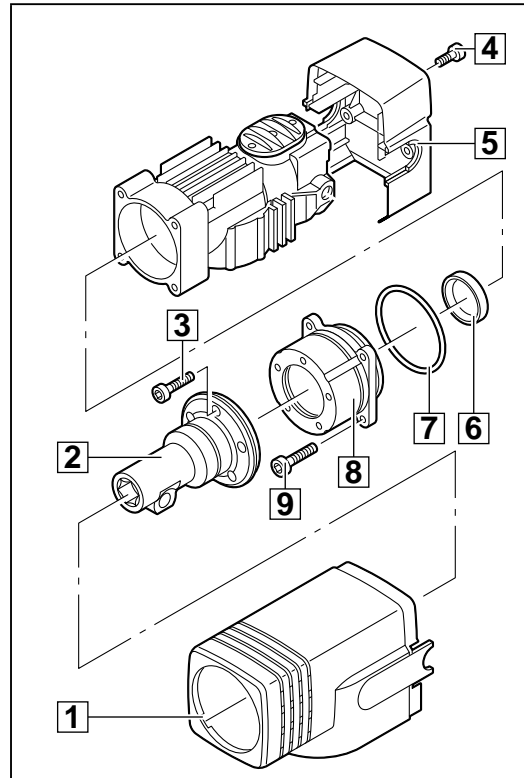
- 1 Loosen both screws (6) and remove the back part of the plastic housing (7).
- 2 Remove the plastic housing (8).
- 3 Fix the machine in a vice provided with protective chops and remove the nose-piece (1) (SW 50).
 ⚠ Attention! The nosepiece (1) has a left-handed thread!
- 4 Press the rotary shaft seal (2) from the nosepiece (1).
- 5 Remove the complete spindle sleeve (5) from the housing. If necessary, hit the housing lightly with a plastic hammer to loosen the drill spindle.
- 6 Remove the spring ring (3) and press off the bearing (4).



6

**PHE 6 H:
Detaching the
bearing housing**

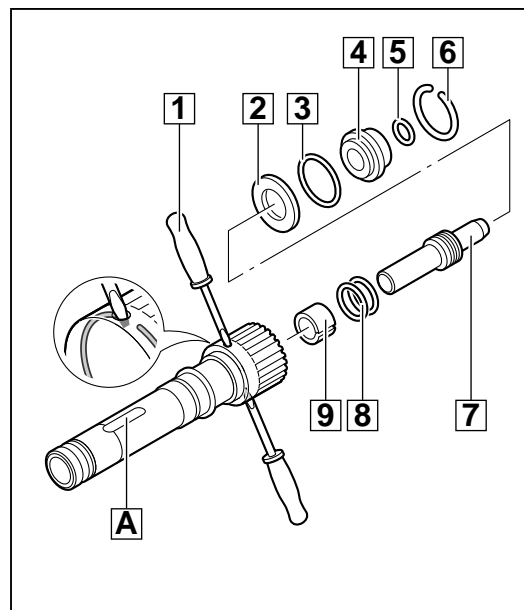
- 1 Loosen both screws (4) and remove the back part of the plastic housing (5).
- 2 Remove the plastic housing (1).
- 3 Loosen the screws (3) and remove the nosepiece (2).
- 4 Loosen the screws (9) and remove the bearing housing (8) with the O-ring (7).
- 5 Press the rotary shaft seal (6) from the bearing housing (8).



7

**PHE 6 S:
Dismantling the
spindle sleeve**

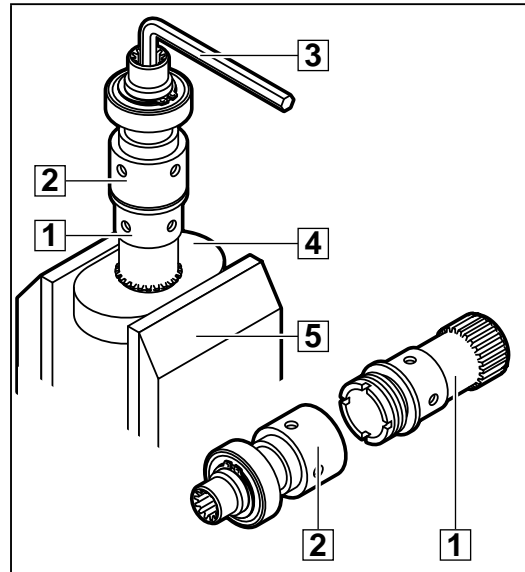
- 1 Insert a screwdriver (1) into one of the four service borings to lever off the round wire ring (6). The screwdriver must remain in the boring. Use a second screwdriver to lever off the round wire ring through the other service borings.
- 2 Take out the retainer (4) and remove the O-ring (5).
- 3 Remove the recoil ring (2) and the rubber ring (3).
- 4 Push out the anvil (7) with aid of a screwdriver from the other side of the spindle sleeve and remove the O-rings (8) from the anvil.
- 5 Knock out the buffer (9) through the grooves (A) in the spindle sleeve with aid of a mandrel.



8

**PHE 6 H:
Separating the
driver from the
barrel**

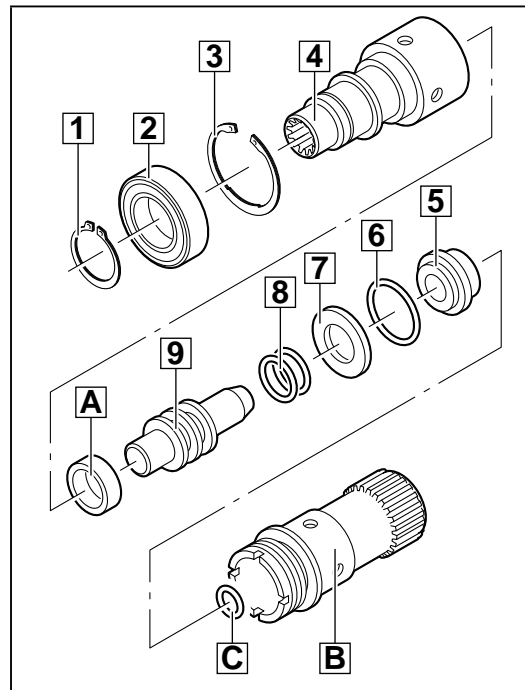
- 1 Fix the service tool (4) in a vice (5).
- 2 Insert the driver (2) with the barrel (1) into the service tool (4) and unscrew the driver (2) from the barrel (1) with aid of an Allen key (3).



9

**PHE 6 H:
Dismantling the
spindle sleeve**

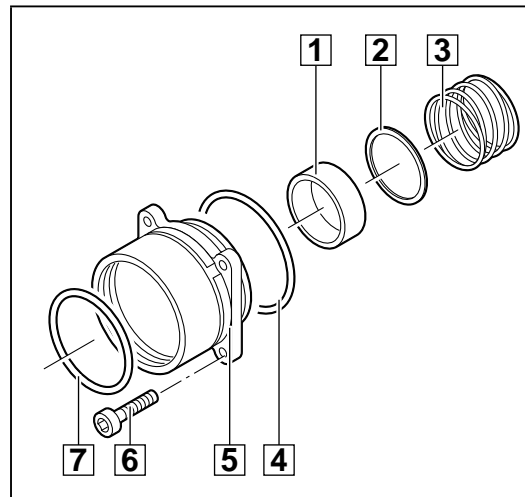
- 1 Remove the spring ring (1) and press off the ball bearing (2).
- 2 Remove the spring ring (3).
- 3 Fix the driver (4) in a vice with the anvil up and knock out the tension ring (A) with aid of a mandrel.
- 4 Remove the seal rings (8), the ring (7) and the rubber ring (6) from the anvil (9).
- 5 Remove the retainer (5) and the O-ring (C) from the barrel (B).



10

**PHE 6 S:
Dismantling the
guide sleeve**

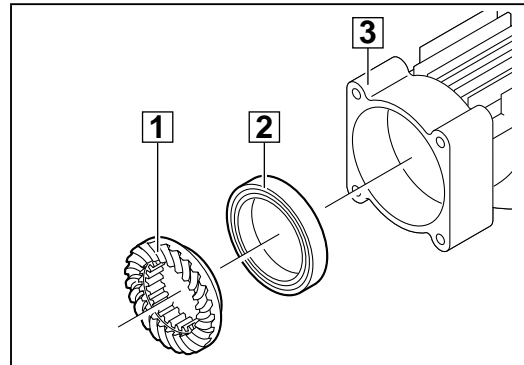
- 1 Remove the disk (7). Loosen the four secured screws (6).
- 2 Lever off the guide sleeve (5) from the machine. If necessary, hit the housing lightly with a plastic hammer for support.
- 3 Remove the washer (4).
- 4 Remove the spring (3) and the disk (2) and press out the ring (1).



11

**PHE 6 H:
Detaching the
bevel gear**

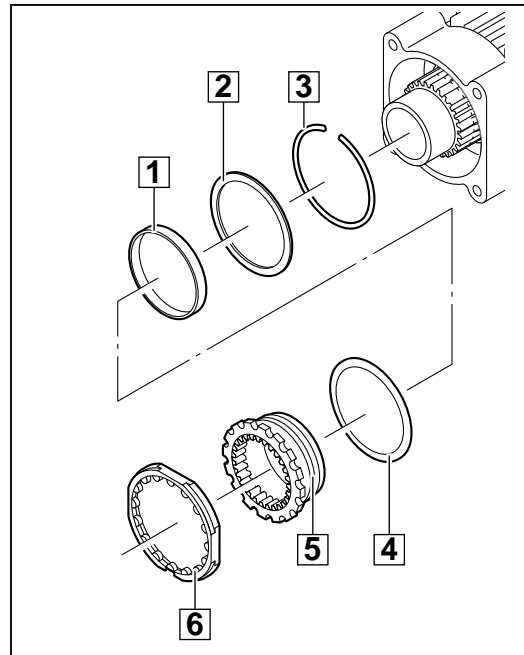
- 1 Knock the bevel gear (1) from the gear housing (3) with aid of a mandrel (lead the mandrel through the opening in the housing).
- 2 Remove the bearing (2) with aid of a pulling-off device or knock the housing with the opening against a wooden supporting plate.



12

**PHE 6 S:
Detaching the
rotary stop**

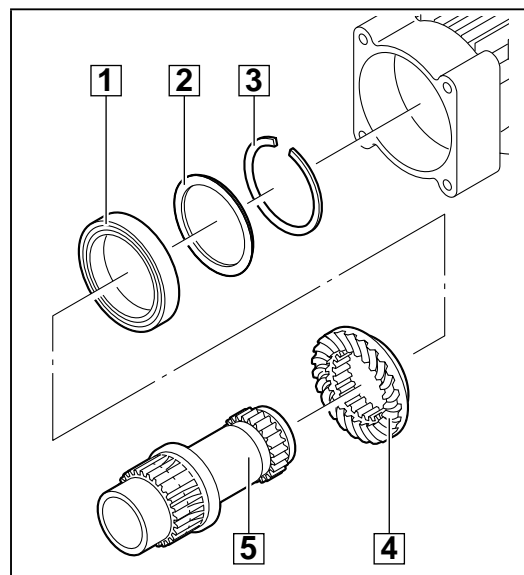
- 1 Remove the following parts, hitting the side of the machine lightly with a hammer for support:
 - locking ring (6) and
 - sleeve (5)
- 2 Detach the spring ring (3) from the sleeve (5) and remove the rings (2 and 4) and the spacer (1).



13


**PHE 6 S:
Detaching the
cylinder**

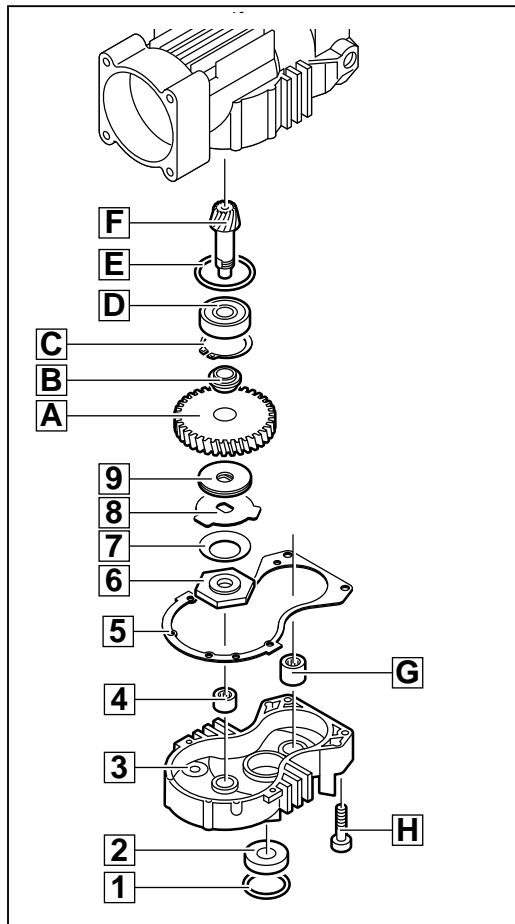
- 1 Remove the cylinder (5) from the housing by hitting the front part of the housing lightly with a plastic hammer.
- 2 Remove the spring ring (3).
- 3 Remove the spring washer (2).
- 4 Remove the bevel gear (4) with the bearing (1).
- 5 Pull the bearing (1) from the bevel gear (4).



14

Detaching the pinion shaft

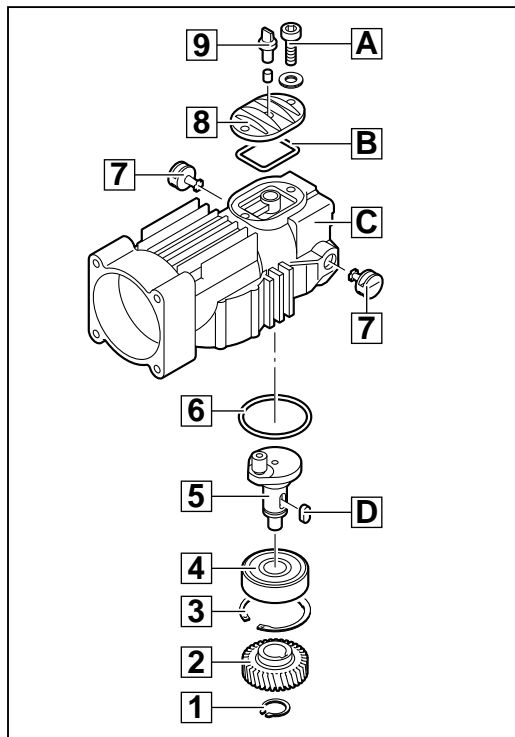
- 1 Lever off the O-ring (1) and the seal (2).
- 2 Loosen the six screws (H) of the gear box cover (3) and remove the gear box cover (3) with the gasket (5).
- 3 Pull out the needle bearings (4) and (G) with aid of an interior extractor.
- 4 Bend down the lugs of the securing plate (8).
- 5 Block the drive (A) using a screwdriver and unscrew the clutch (6) (right-handed thread).
- 6 Remove the cup spring (7), the securing plate (8), the drive (A), the friction disk (9) and the clutch (B).
- 7 Remove the spring ring (C).
- 8 Pull out the pinion (F) with the bearing (D).
 Fix the end of the pinion shaft in a vice between protective chops and hit the housing lightly with a plastic hammer.
- 9 Press the bearing (D) from the pinion (F).
- 10 Remove the O-ring (E) from the motor housing (pillow block).



15

Detaching the crankshaft

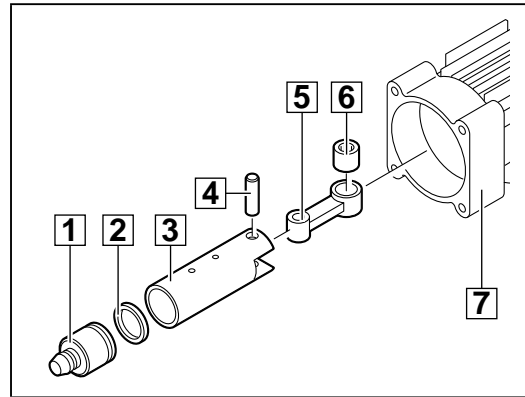
- 1 Loosen the two screws (A) and remove the service cover (8) with the gasket (B) and the valve (9).
- 2 Remove damaged welch plug (7).
- 3 Remove the spring ring (1).
- 4 Pull off the crank wheel (2) with aid of a pulling-off device (service tool). Steady the crank wheel for support.
- 5 Remove the key (D) from the crankshaft (5).
- 6 Remove the spring ring (3) and pull out the crankshaft; if necessary, press out the crankshaft through the opening in the cover with aid of a suitable mandrel.
- 7 Press the ball bearing (4) off the crankshaft.
- 8 Remove the O-ring (6) from the gear housing (C).



16

Detaching the piston and the connecting rod

- 1 Pull the piston (3) from the gear housing (7).
- 2 Pull the striker (1) from the piston (3) and remove the O-ring (2) from the striker (1).
- 3 Press the cylindrical bolt (4) from the piston (3) and pull out the connecting rod (5).
- 4 Press out the needle bearing (6) from the connecting rod (5).



17

Maintenance

General	It is recommended to submit the machine to maintenance after the carbon brushes have switched off.
Cleaning	Clean all parts – with the exception of the electrical parts – with cold cleaning agent. Caution! No cleaning agent should penetrate into the bearing. Clean the electrical parts with a dry brush.
Check for wear	Check the disassembled parts for wear (visual inspection) and replace worn parts.
Electrical tests	Before reassembling, perform an electrical test on all relevant parts (see chapter Electrical and Mechanical Test Instructions).

Lubrication

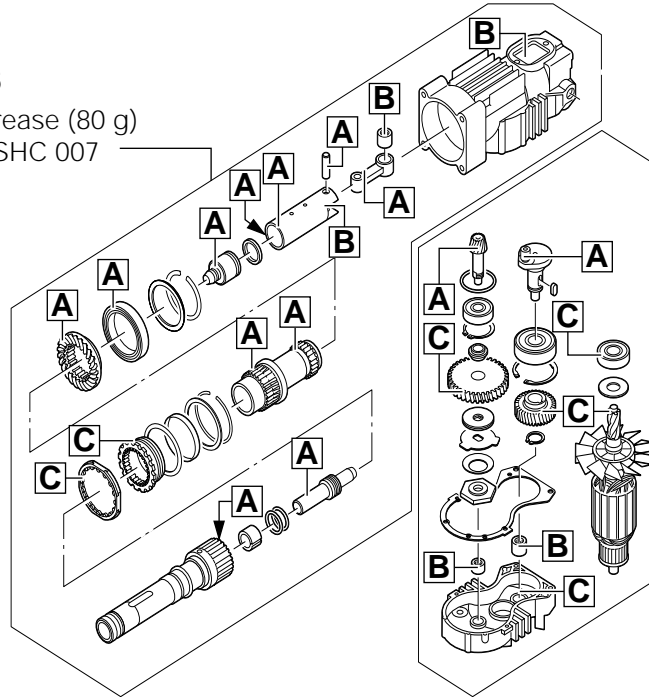
Each time maintenance is performed, the machine is to be lubricated as stated in the lubrication plan. After the machine is fully disassembled, completely remove the old grease and replace with new grease. The grease must be applied to the machine as indicated in the lubrication plan.

Legend

- A** Generously
- B** Fill
- C** Apply a small amount

PHE 6 S

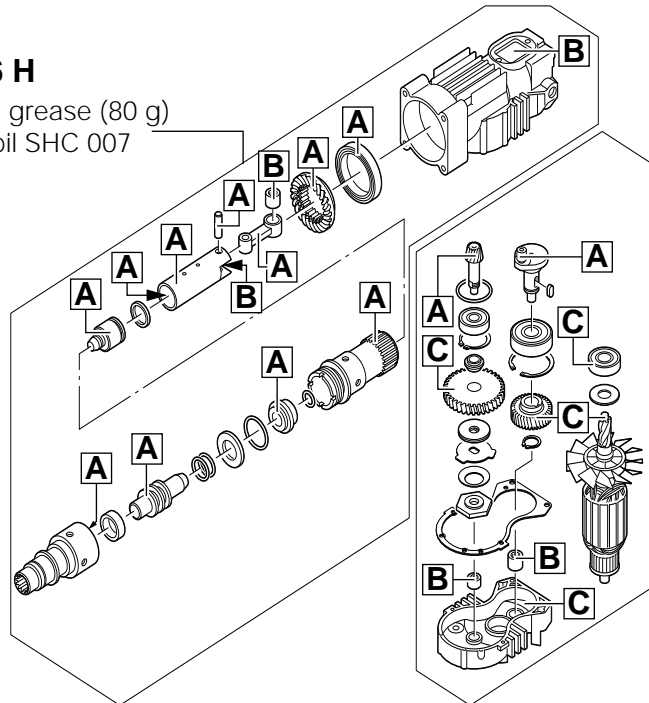
Red grease (80 g)
Mobil SHC 007



Blue grease (80 g)
Mobil HP 22

PHE 6 H

Red grease (80 g)
Mobil SHC 007



Blue grease (80 g)
Mobil HP 22

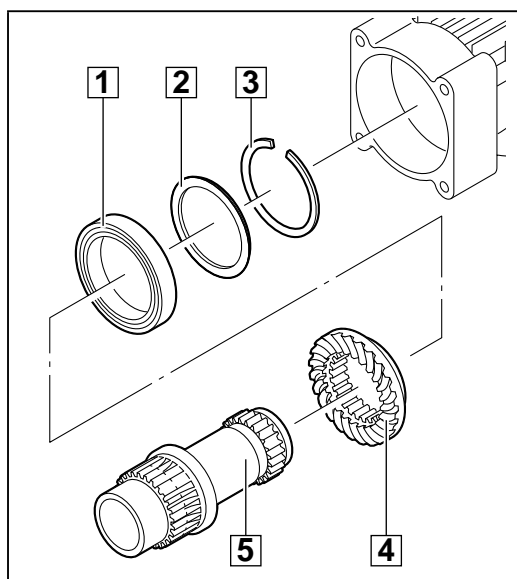
Torques

Screws in plastic	2,5 Nm
Screws in metal	4,0 Nm
Nut PHE 6 S (see assembly step 8)	120,0 Nm
Driver PHE 6 H (see assembly step 10)	30,0 Nm

Assembly

PHE 6 S: Mounting the cylinder

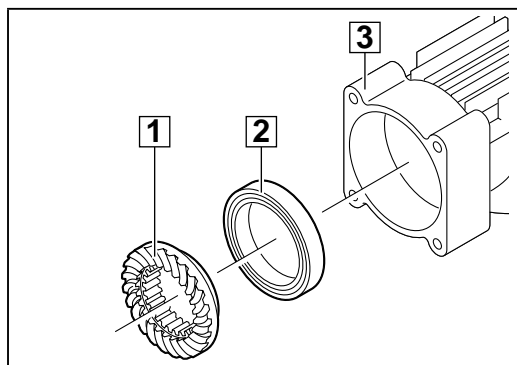
- 1 Press the bearing (1) onto the bevel gear (4). Fit the spring washer (2) and secure it with the spring ring (3).
- 2 Insert the bevel gear (4) completely with the bearing (1) flush into the housing.
- 3 Insert the cylinder (5) into the housing as far as it will go.



1

PHE 6 H: Mounting the bevel gear

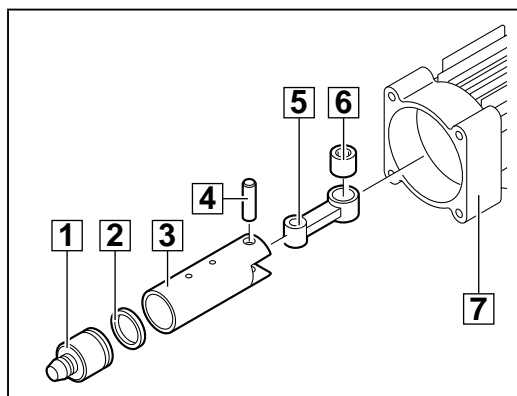
- 1 Press the bevel gear bearing (2) into the bevel gear (1).
- 2 Press the bevel gear (1) flush with the bearing (2) into the gear housing (3) using a suitable mandrel for support.



2

Mounting the piston and the connecting rod

- 1 Press the needle bearing (6) into the connecting rod (5).
- 2 Push the striker (1) with the O-ring (2) into the piston (3).
- 3 Put together the piston (3) and the connecting rod (5) and push the cylindrical bolt (4) through both borings.
- 4 Insert the piston (3) with the connecting rod (5) into the gear housing (7).



3

Mounting the crankshaft

- 1** Insert the O-ring (6) into the gear housing (C).

- 2** Press the ball bearing (4) onto the crankshaft (5).

- 3** Insert the crankshaft (5) into the gear housing from below (C) and fit it to the connecting rod bearing.

- 4** Mount the spring ring (3).

- 5** Insert the key (D) into the crankshaft (5).

- 6** Fit the crank wheel (2) with the collar facing the eccentric and press it on.

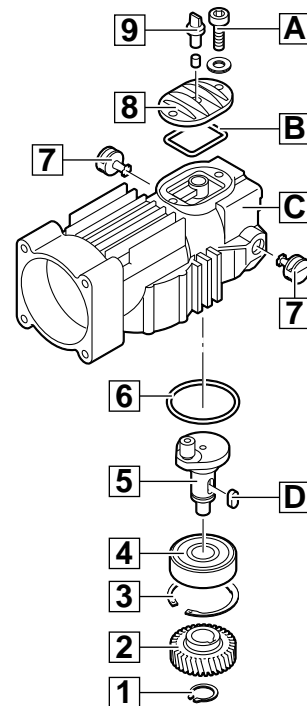
☞ Steady the crankshaft with a suitable mandrel which is pushed through the opening in the cover (otherwise the crankshaft is pushed in too far).

- 7** Secure the crank wheel (2) with the spring ring (1).

- 8** If necessary, mount the welch plug (7).


- 9** Fill the gear housing (C) through the service opening with grease according to the lubrication chart.

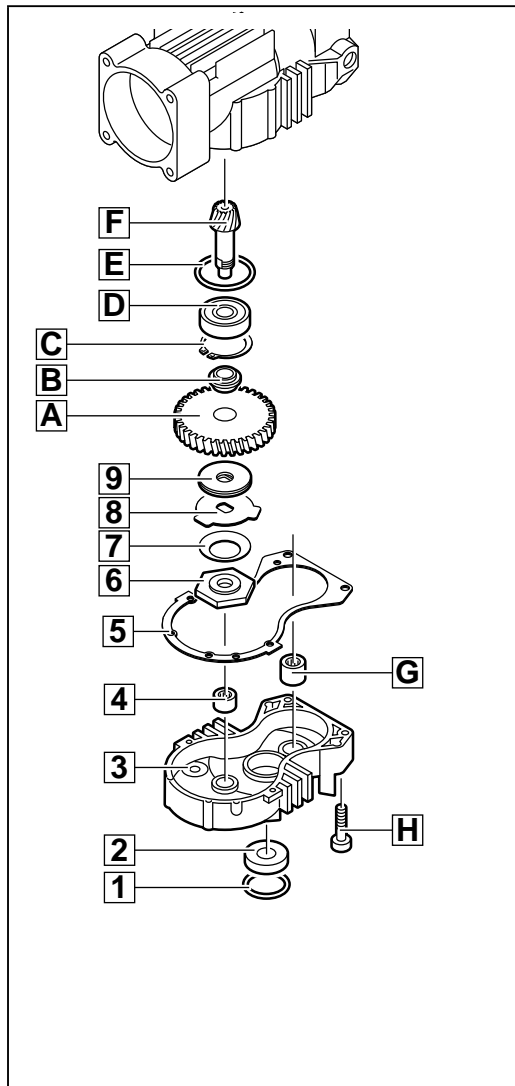
- 10** Fit the service cover (8) with gasket (B) and valve (9) and fasten it with the screws (A).



Mounting the reduction gear shaft


- 1 Insert the O-ring (E) into the housing.
- 2 Press the bearing (D) onto the pinion (F).
- 3 Press the pinion (F) with the bearing (D) into the housing.
- 4 Insert the spring ring (C).
- 5 Push the following parts over the pinion (F):
 - clutch (B),
 - drive (A),
 - friction disk (9) (the covering must face the drive),
 - securing plate (8) ,and
 - cup spring (7) (the bulging must face the clutch).
- 6 Block the drive (A) against twisting and screw down the clutch (6) as follows: Apply a torque wrench with a 32 mm nut to the clutch (6) with pressure such that the resilience is overcome. Screw down the clutch (6).

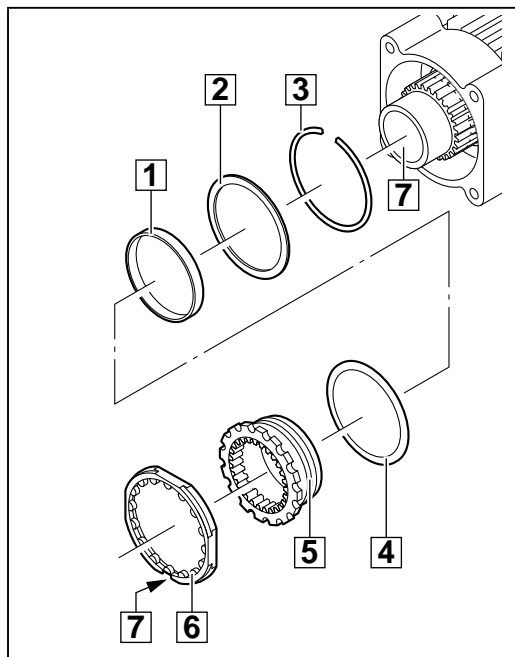
 **Torque 3 Nm**, use screw locking device.
- 7 Bend the three lugs of the securing plate (8) in order to secure the clutch (6).
- 8 Press the needle bearings (4) and (G) into the gear box cover (3).
- 9 Fit the gear box cover (3) with the gasket (5) to the housing and fasten it with the six screws (H).
- 10 Insert the O-ring (1) and the seal (2) into the housing.



PHE 6 S: Mounting the rotary stop

- 1 Fit the rings (4 and 2) and the spacer (1) to the sleeve (5) and secure it with the spring ring (3).
- 2 Push the sleeve (5) over the cylinder (7) inside the housing.
- 3 Fit the locking ring (6) to the sleeve (5) inside the housing (mind the right position!) and insert them as far as they will go with aid of a suitable mandrel.

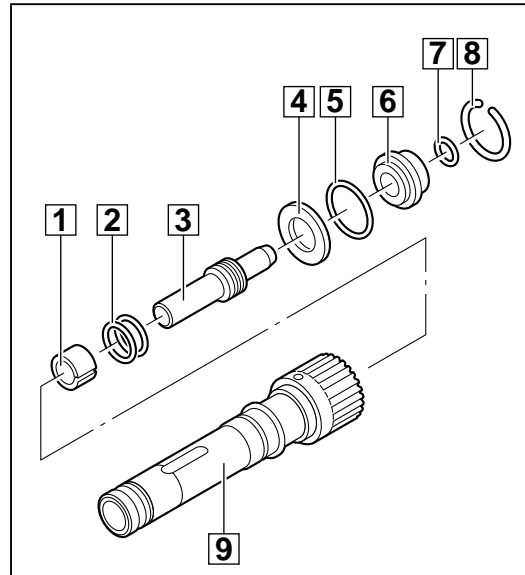
 The relief (7) of the locking ring (6) for the switch must face down (see illustration).



**PHE 6 S:
Assembling the
spindle sleeve**

- 1 Press the buffer (1) into the spindle sleeve (9) using a mandrel. Mind the right position!
- 2 Fit the O-rings (2) to the anvil (3) and insert the anvil into the spindle sleeve (9).
- 3 Insert the following parts into the spindle sleeve (9):
 - recoil ring (4),
 - rubber ring (5),
 - retainer (6),
 - O-ring (7) and
 - spring ring (8).

☞ When mounting the spring ring (8) take care that it engages in the groove of the spindle sleeve.



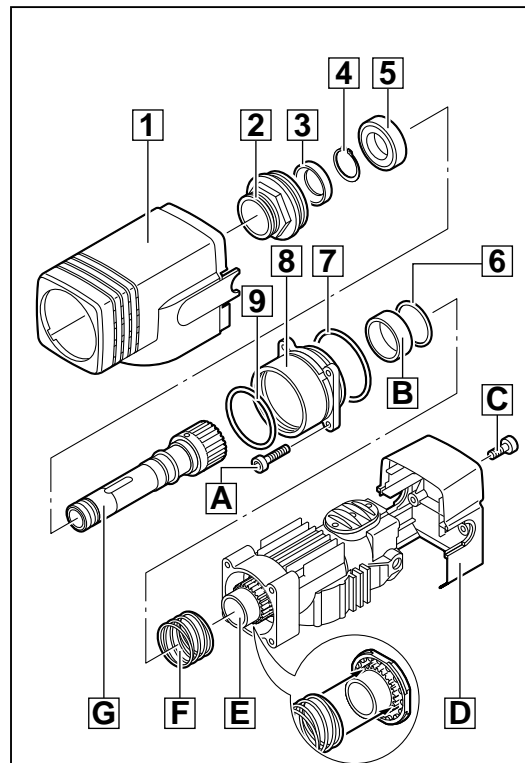
7

**PHE 6 S:
Mounting the
guide sleeve and
the spindle**

- 1 Push the spring (F), the washer (6) and the bearing (B) as well as the O-ring (7) over the cylinder (E).
- 2 Fit the guide sleeve (8) with the O-ring (9) and fasten it with the secured screws (A).
- 3
 - ☞ Take care that the spring (F) is located centrally on the cylinder (E) (see illustration).
- 4 Push the ball bearing (5) over the spindle sleeve (G) and secure it with the spring ring (4).
- 5 Insert the complete spindle into the housing.
- 6 Press the rotary shaft seal (3) into the nosepiece (2).
- 7 Fix the machine into a vice provided with protective chops and fit the nosepiece (2). Fasten the nosepiece with a torque of 120 Nm.

☞ Attention: The nosepiece (2) has a left-handed thread!

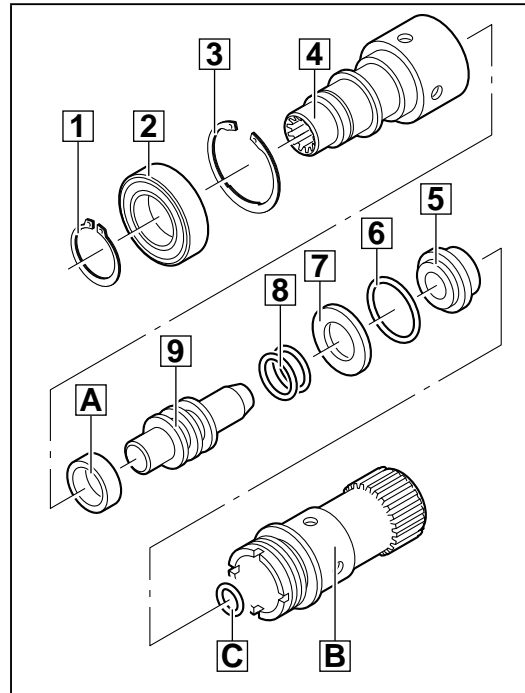
- 8 Mount the plastic housing (1).
- 9 Fit the back part of the housing (D) and fasten it with the screws (C).



8

**PHE 6 H:
Assembling the
spindle sleeve**

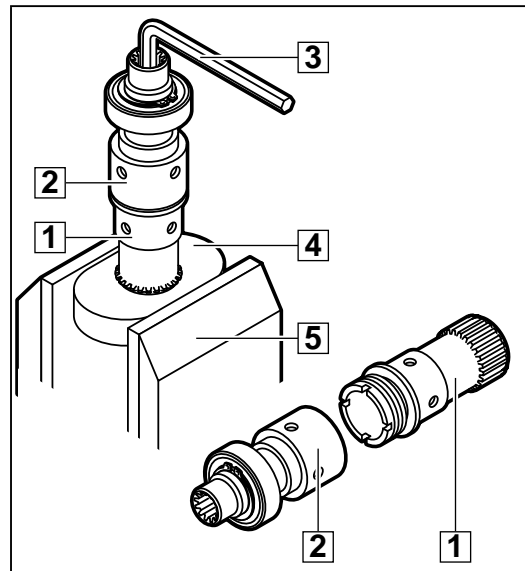
- 1 Insert a new O-ring (C) into the retainer (5) and fit the retainer to the barrel (B).
- 2 Grease the anvil (9) and fit two new seal rings (8).
 ⤵ Take care that the seal rings are not twisted.
- 3 Fit the ring (7) and the rubber ring (6) to the anvil (9).
- 4 Insert the anvil (9) into the driver (4).
- 5 Mount the spring ring (3).
- 6 Press the ball bearing (2) onto the driver (4) and secure it with the spring ring (1).



9

**PHE 6 H:
Assembling the
driver and the
barrel**

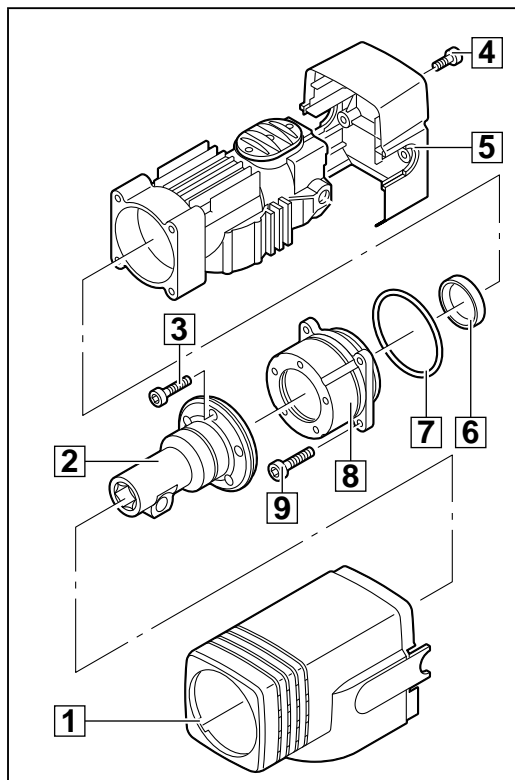
- 1 Grease the barrel (1) and screw down the driver (2).
- 2 Fix the service tool (4) in a vice (5).
- 3 Insert the barrel (1) and the driver into the service tool and fasten the two with an Allen key (3) (30 Nm).



10

**PHE 6 H:
Mounting the
bearing housing**

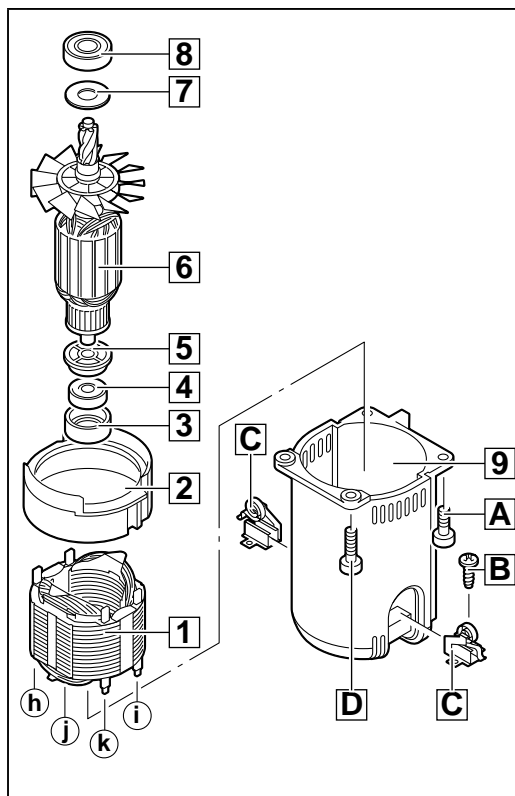
- 1 Press the rotary shaft seal (6) into the bearing housing (8).
- 2 Fit the bearing housing (8) with the O-ring (7) to the gear housing and fasten it with secured screws (9).
- 3 Fit the nosepiece (2) to the bearing housing (8) and fasten it with secured screws (3).
- 4 Push the plastic housing (1) over the gear housing from the front and secure it with the connecting ring.
- 5 Push the back part of the housing (5) over the gear housing from behind and fasten it with the screws (4).



11

**Mounting the
armature**

- 1 Push the insulating disk (5) and the ring (7) over the armature shaft and press on the armature bearings (4) and (8).
- 2 Push the bearing sleeve (3) over the armature bearing (4).
- 3 Lightly grease the armature bearing (8) and insert the complete armature into the machine by turning it.
- 4 Insert the brush holders (C) into the motor housing (9). Align them with the adjustment tool (service tool) and fix them with the screws (B).
- 5 Push the field (1) into the motor housing (9) and insert the air deflector ring (2). Mind the right position!
- 6 Push the motor housing (9) with the field (1) and the air deflector ring (2) over the armature.
- 7 Fasten the motor housing with two short screws (A) and two long screws (D).



12

Assembling the handgrip

- 1 Insert the switch (9) with the capacitor into the handle shell (7).

- 2 Insert the connecting cable (H) with the cable entry sleeve as well as the cable clamps (D) into the handle shell (7).

- 3 Fit the handle shell (C) with the holding-down device to the other handle shell and fasten them with the four screws (6).
 ⤵ Take care that no cables are jammed or squeezed.

- 4 Insert the handgrip holder (4) and the rubber collar (3) into the handle shell (7).

- 5 Connect according to wiring diagram.

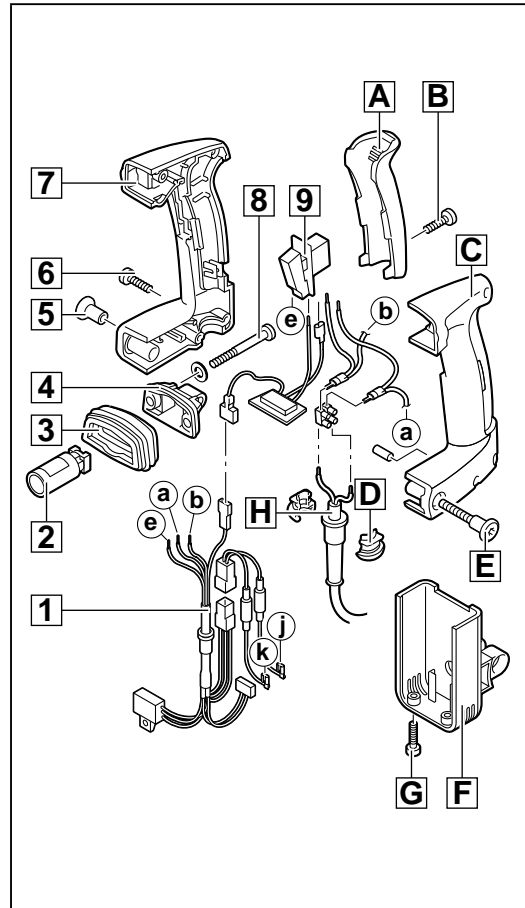
- 6 Insert the damping element (2) into the housing.

- 7 Push the completed pair of handle shells over the housing (F) and fasten it with the screws (G).

- 8 Fasten both Torx screws (8) TX 30 of the handgrip holder (4) together with the disks.

- 9 Insert the handle cover (A) from above and fasten it with the screw (B).

- 10 Screw down the handle screw (E), steady- ing the knurled nut (5) at the same time.



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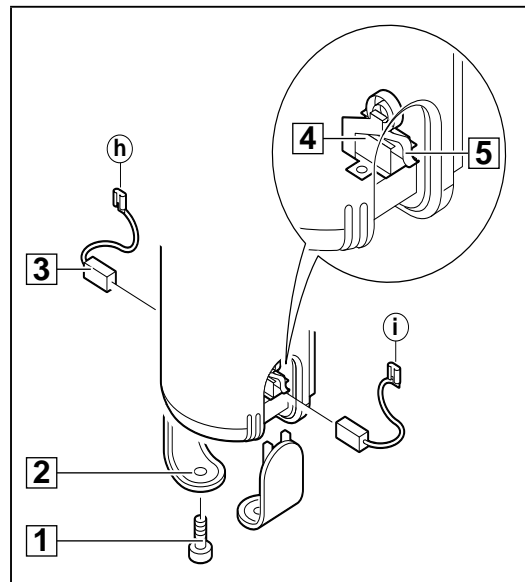
Mounting the carbon brushes

- 1 Mount the carbon brushes (3) and mount the cable lugs (h) and (i) on the field.

- 2 Insert the carbon brushes (3) into the brush holders (4).

- 3 Pull up the brush springs (5) of the brush holders (4) and push them over the carbon brushes (3).

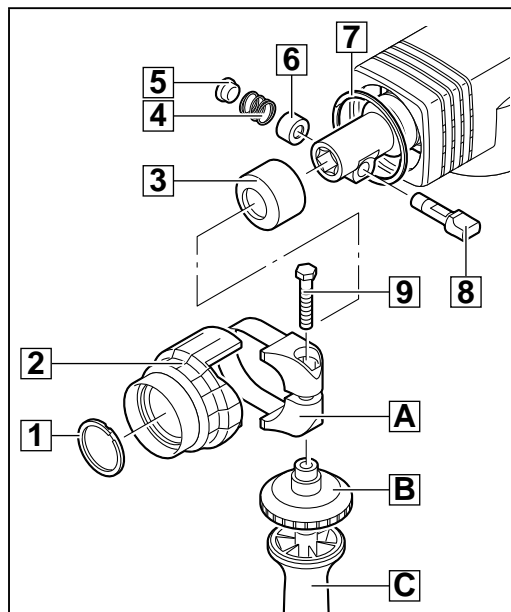
- 4 Fasten the carbon brush covers (2) with the screws (1).



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**PHE 6 H:
Assembling the
tool reception**

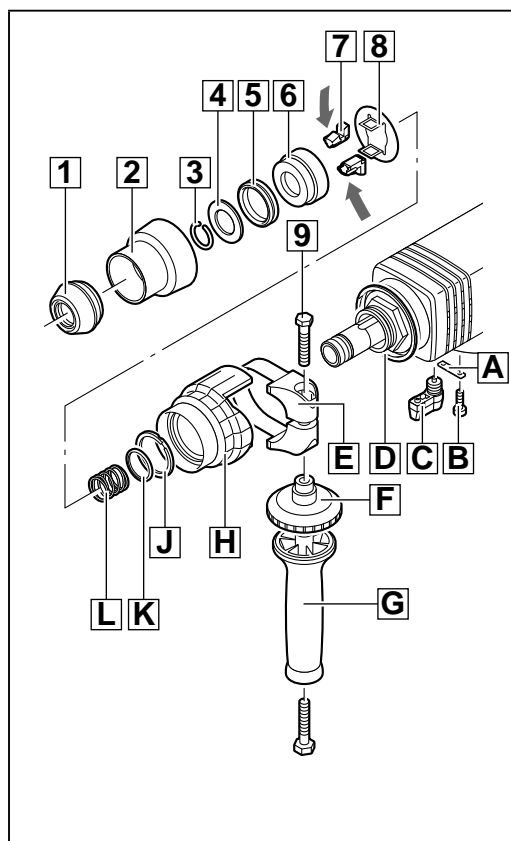
- 1 Insert the connecting ring (7).
- 2 Push the strap (A) over the neck of the machine and tighten it with the bearing bolt (9).
- 3 Mount the cone (2) and insert the restrictor (1).
- 4 Insert the latch (8) into the nosepiece.
- 5 Insert the distance sleeve (6) and the spring (4).
- 6 Knock in the latch (5) with light hammer blows until it is flush with the nosepiece.



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**PHE 6 S:
Assembling the
tool reception**

- 1 Insert the switch lever (C) such that it grasps the provided groove.
- 2 Slightly lift the switch lever (C), push the retaining strap (A) under it and fasten it with the two Allen screws (B).
- 3 Mount the connecting ring (D).
- 4 Push the strap (E) over the neck of the machine and tighten it with the bearing bolt (9).
- 5 Mount the cone (H) and insert the restrictor (J).
- 6 Mount the washer (K), the spring (L) and the retention plate (8).
- 7 Depress the retention plate (8) against resilience and insert the latches (7) at the sides.
- 8 Fit the retainer (6), the rubber stop (5) and the stop (4).
- 9 Mount the spring ring (3).
- 10 Fit the rubber cover (2) and push down the end cover cap (1).
- 11 Mount the auxiliary handle (G) completely with the clamping ring (F).



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Test Run

Test run the machine and pay attention to noises.
Let the machine run-in.

Electrical Test

Perform an electrical test on the machine (see chapter Electrical and Mechanical Test Instructions).