Special Tools Require

■ Forcing discs	4931 599 018
■ Allen key 4 mm	4931 599 001
■ Allen key 5 mm	4931 599 002
■ Sleeve	4931 599 098
■ Pin-type face spanner	4931 599 099

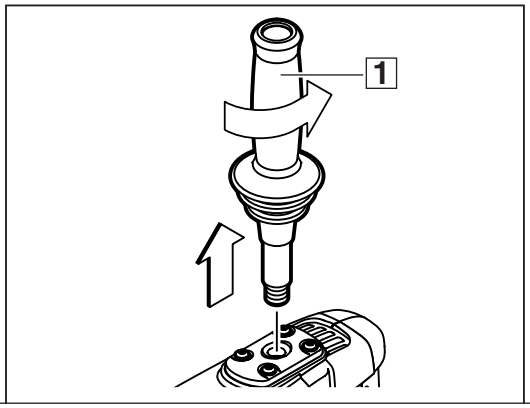
Important!

- 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!

Disassembly

Removing the auxiliary handle

1 Remove the handle (1) by turning it counter-clockwise.

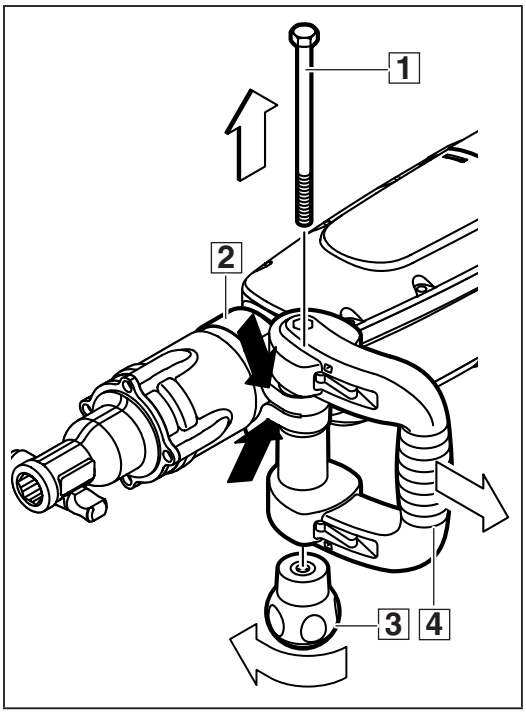


1

Disassembling the handle

1 Unscrew the knob (3) and remove the screw (1).

2 Press the spring ring (2) in direction of the arrow and remove the handle (4).

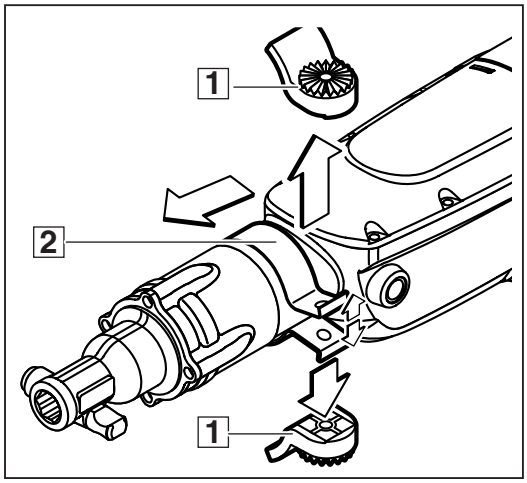


2

Removing the spring ring

1 Remove both retainers (1).

2 Slightly spread the spring ring (2) and pull it off the machine towards the front.



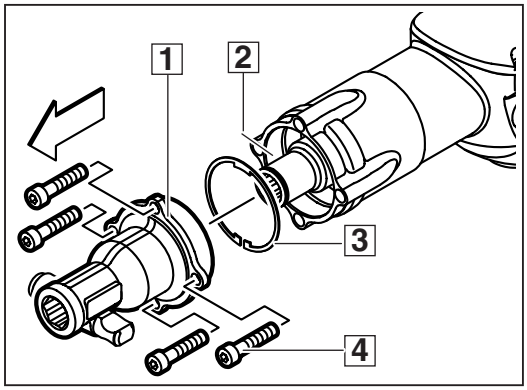
3

Removing the tool acceptance

1 Remove the four screws (4) with an Allen key and remove the tool acceptance (1).

☞ If necessary, tap the tool acceptance (1) with a plastic hammer for support!

2 Remove the seal ring (3) with circlip pliers from the gear box (2).

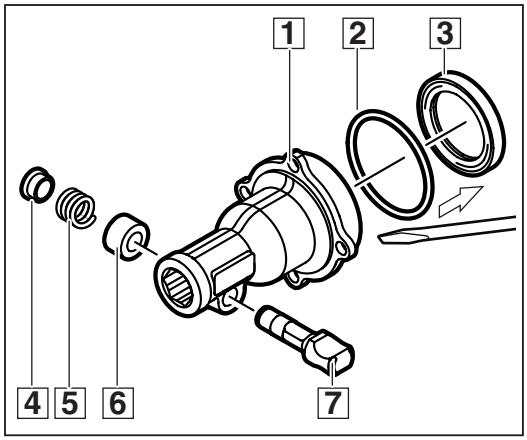


4

Disassembling the tool acceptance

1 Expel res. press off the latch bar (7) and remove the following parts:
- latch (4)
- spring (5)
- sleeve (6).

2 Lever off the seal ring (3) and the O-ring (2) from the tool acceptance (1) with a screwdriver.



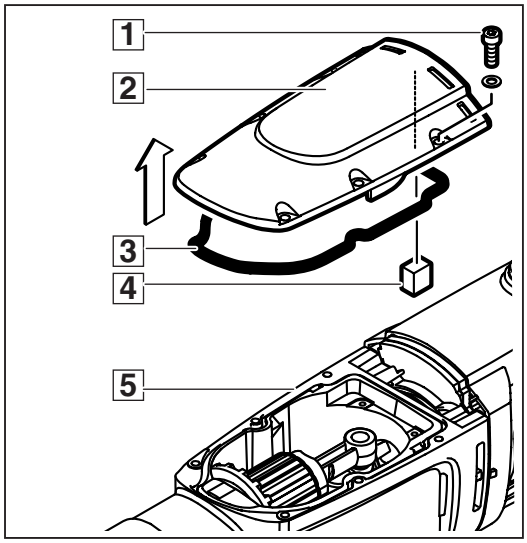
5

Disassembling the gear cover

1 Remove six screws (1) with washers from the gear cover (2).

2 Remove the felt (4) from the gear cover.

3 Remove the gasket (3) from the groove of the gear cover (5).

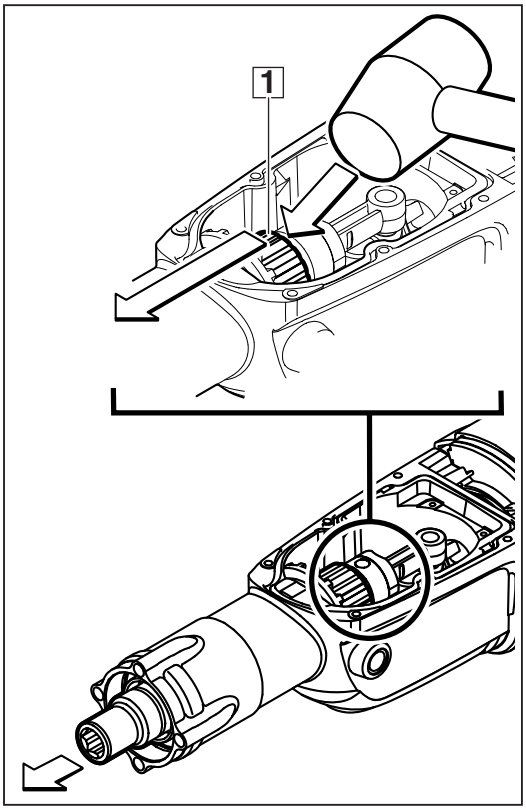


6

Combined drill/chisel hammer:

Removing the spindle

1 Expel the complete spindle assembly with light taps on the rear spindle end (1) with a plastic hammer.



7

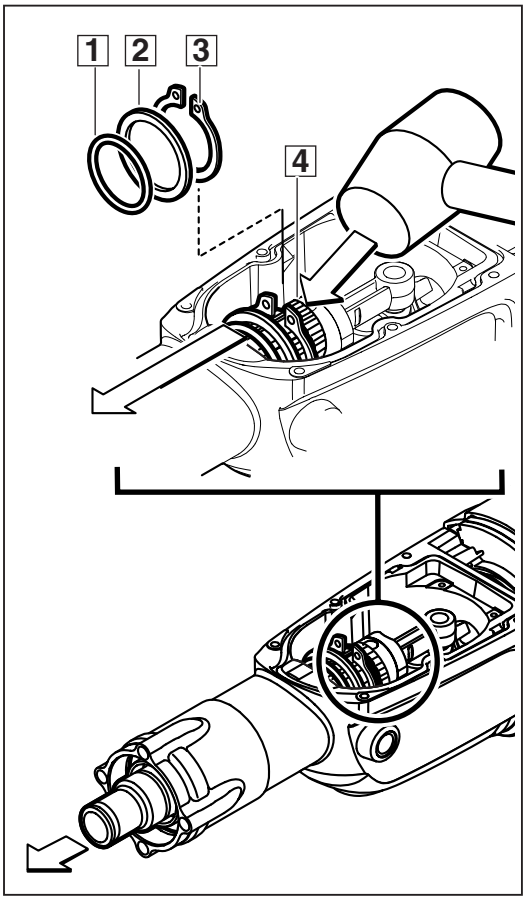
Chisel hammer:

Removing the spindle

1 Loosen the seal ring (3) with circlip pliers from the spindle groove.

2 Expel the complete spindle assembly with light taps on the rear spindle end (4) with a plastic hammer.

3 Remove the seal ring (3), the attachment ring (2) and the O-ring (1) from the gear box.



7

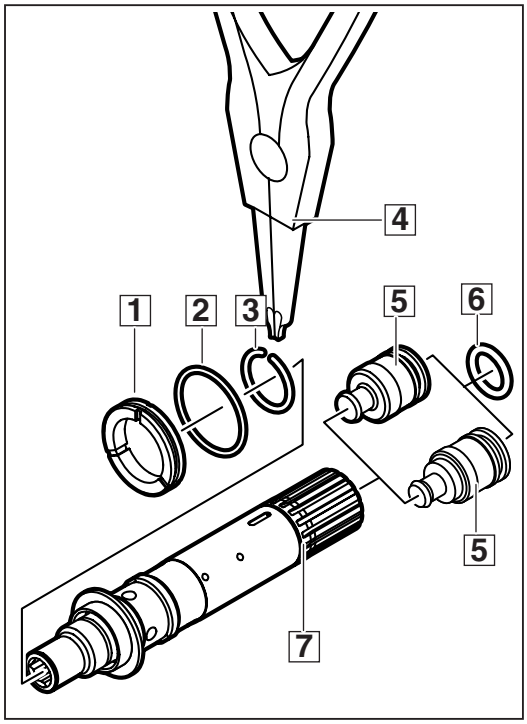
Disassembling the spindle

1 Remove the thrust collar (1) from the spindle (7). Remove the O-ring (2) from the thrust collar (1).

2 Expel the percussion body (5) from the spindle (7) by tapping it lightly with a plastic hammer.
Remove the O-ring (6) from the percussion body (5).

☞ The type of the percussion body (5) depends on the type of the spindle (7)!

3 Remove the Seeger circlip ring (3) from the spindle with Seeger circlip pliers (4).



8

Disassembling the spindle

☞ Illustration No. 9 shows the latest type of the spindle sleeve; further types are described on the following pages.

1 Remove the following parts from the spindle (C):
– ball race (1)
– disc (2)
– damping ring (3)
– attachment ring (4).

2 Remove the four rolls (B) with a magnetic screwdriver from the spindle (C).

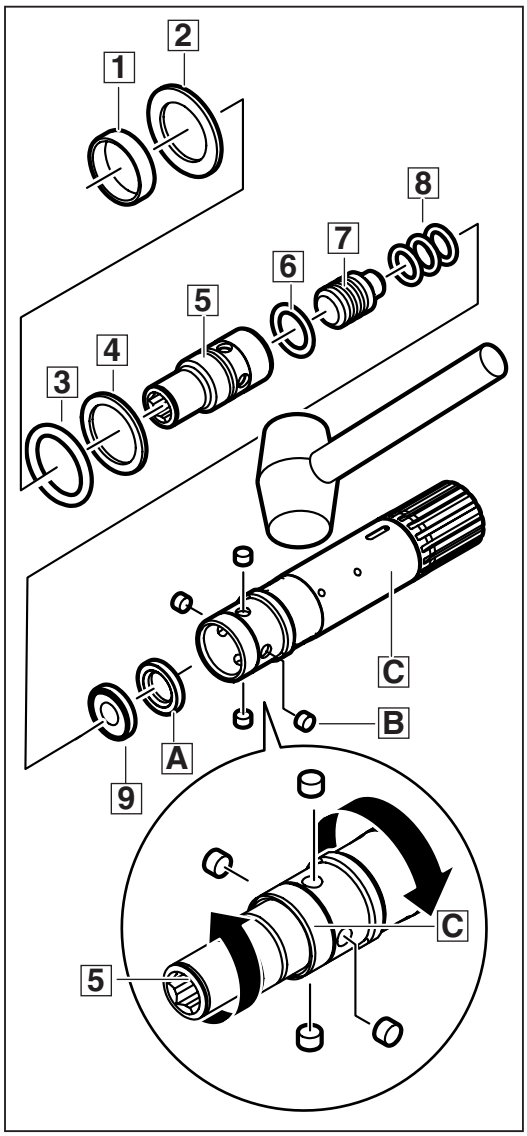
☞ Turn the driver sleeve (5) and the spindle (C) in opposite directions to remove the rolls (see enlargement below)!

☞ Should the rolls (B) be stuck, expel them with light blows with a plastic hammer.

3 **Combined drill/chisel hammer:** pull the driver sleeve (5) (with hexagon socket) from the spindle (C).
Chisel hammer: remove the driver sleeve (5) (without hexagon socket) from the spindle (C).

4 Remove the following parts from the driver/sleeve (5):
– snap die (7)
– O-ring (6).
Remove three O-rings (8) from the snap die (7).

5 Remove the thrust collar (9) and the backpressure ring (A) from the spindle (C).

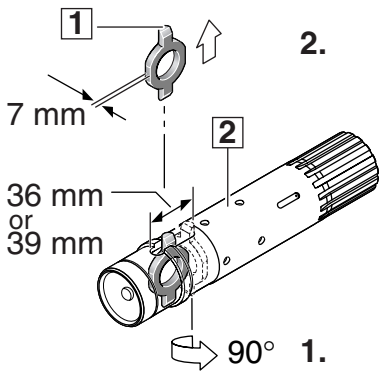


9

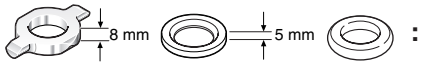
Disassembling the spindle

1 **Machines with date of manufacture up to 06/2004:** Turn the cross bracket (1) (width 7 mm) 90° and remove it through one of the openings i the spindle (2).

➡ **06/2004**

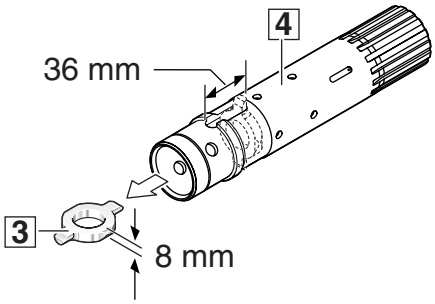


With reversion kit No. 4931 375 788

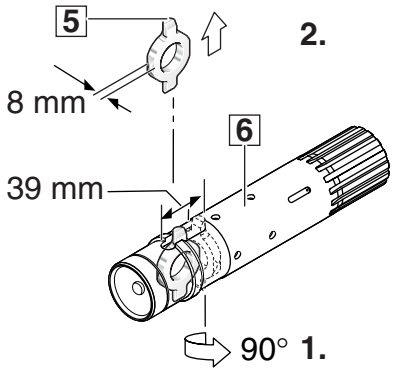


:

Spindle opening = 36 mm:
Remove the chromium platet cross bracket (3) (width 8 mm wide) from the front part of the spindle (4).

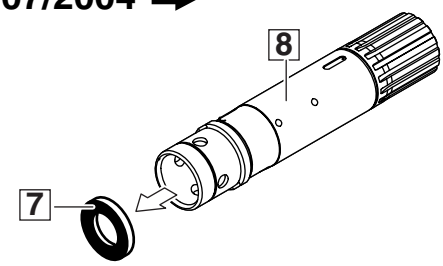


Spindle opening = 39 mm:
Turn the chromium platet cross bracket (5) (width 8 mm) 90° and remove it through one of the spindle openings (6).



Machines with date of manufacture from 07/2004: Remove the ring (7) from the front part of the spindle (8).

07/2004 ➡

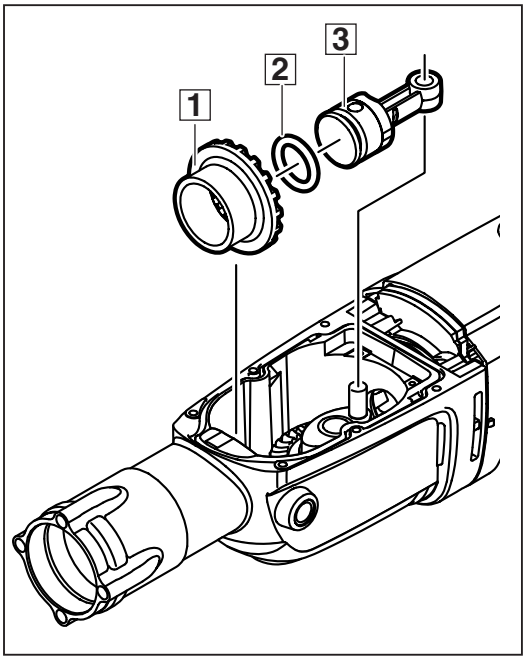


10

Removing the piston assembly

1 Bring the piston (3) into the upper dead centre position and remove it from the upwards position. Loosen the O-ring (2) from the piston (3).

2 **Combined drill/chisel hammer:** Additionally remove the spindle bevel gear (1).



11

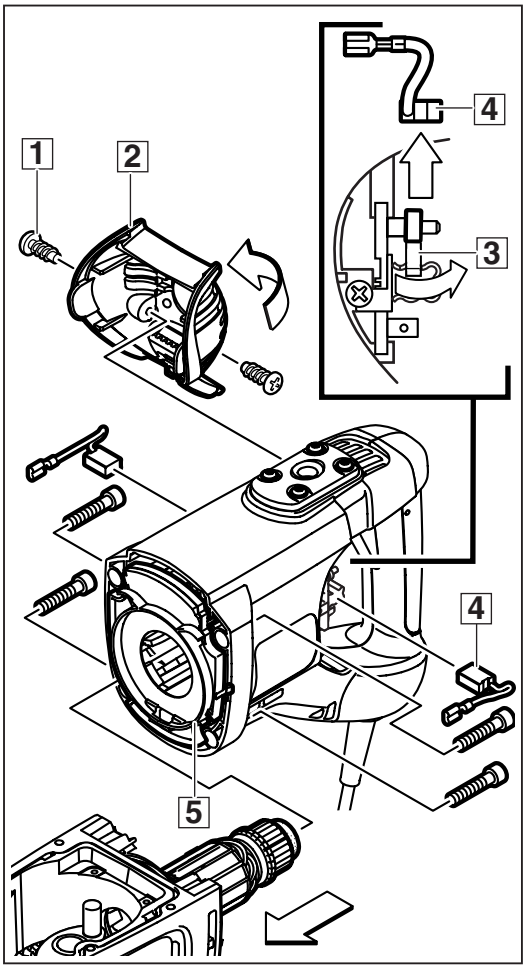
Dismantling the motor housing

1 Remove the two screws (1) from the service cover (2) and pull out the service cover (2) in direction of arrow.

2 Put aside the springs (3) on both sides of the carbon brush cover and pull the carbon brush out (4). Pull the carbon brush cable off.

3 Remove four Allen screws (4) from the motor housing.

4 Pull the gear box (5) with the armature from the motor housing.



12

Disassembling the armature

1 Loosen three Allen screws (8) from the bearing end plate (7) and pull the complete armature assembly (B) with the bearing end plate (7) from the gear box (1).

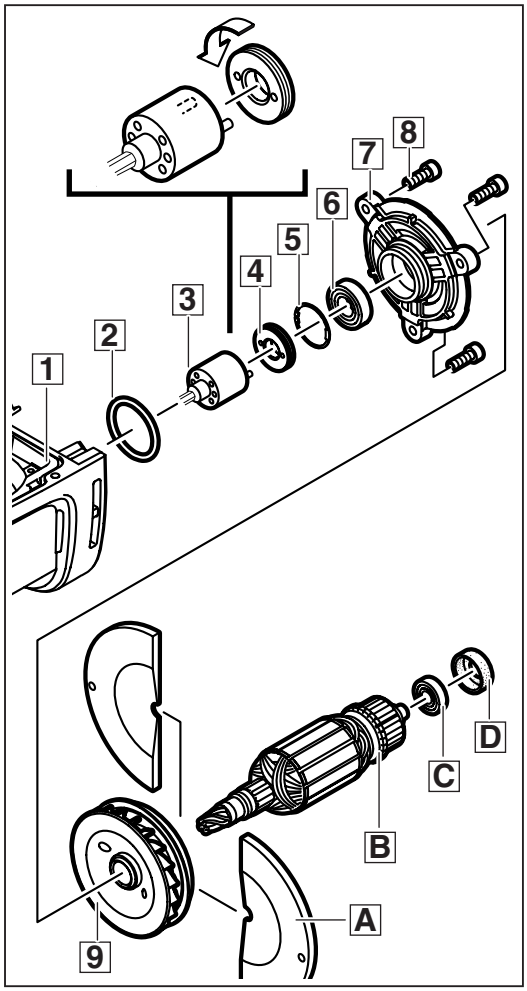
2 Remove the seal (2) from the gear box (1).

3 Insert the pin-type face spanner (service tool) (3) into the seal ring (4) and remove the seal ring (4) counter-clockwise. Remove the bearing end plate (7).

4 Remove the locking ring (5) from the bearing end plate (7) and press out the bearing (6).

5 Separate the fan (9) from the armature (B) with the forcing discs (A).

6 Remove the rubber sleeve (D) and press off the bearing (C).



13

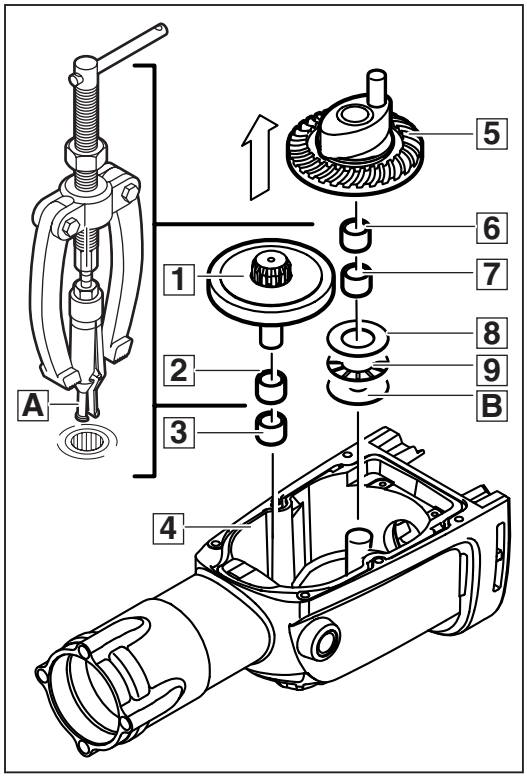
Detaching the crank wheel

1 Remove the following parts from the gear box (4):
- crank wheel (5)
- disc (8)
- axial bearing (9)
- disc (B).

2 Pull the needle bearings (6) and (7) with the interior extractor (A) from the crank wheel (5).

3 **Combined drill/chisel hammer:** Additionally remove the safety clutch (1) from the gear box (4). Pull the needle bearings (2) and (3) with the interior extractor (A) from the gear box (4).

☞ The **chisel hammer** does not have a safety clutch (1) and needle bearings (2) and (3)!

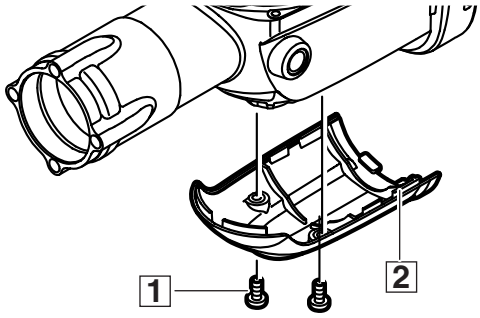


14

Removing the gear cover

1 Loosen two screws (1) and remove the gear cover (2).

☞ The exposed plane surface serves only for manufacturing the gear box and has no other function!



15

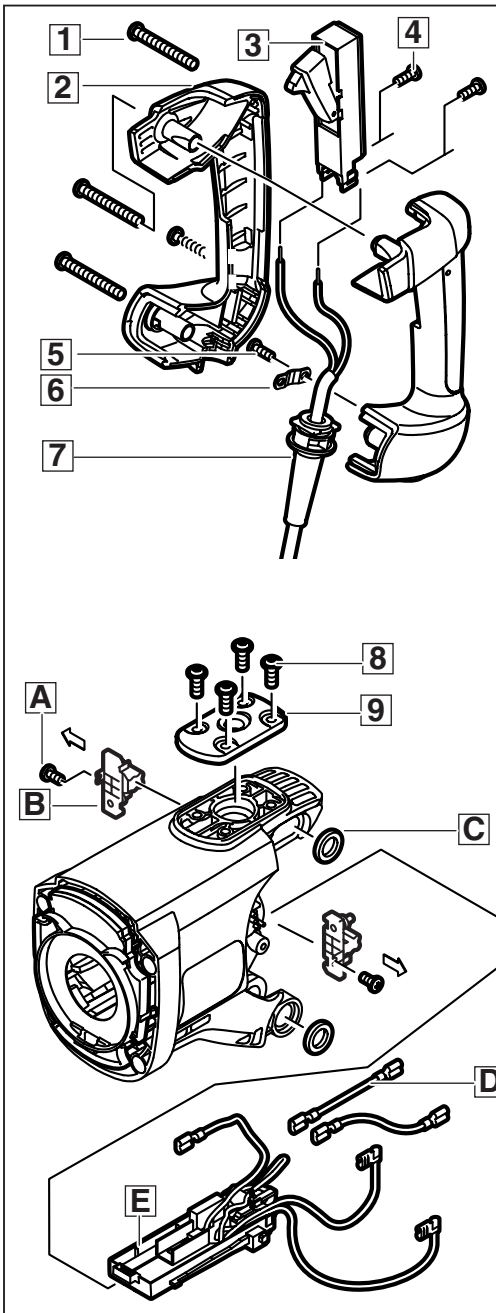
Disassembling the electronic component

1 Remove the four screws (1) from the handle and remove the handle half (2).

2 To branch off the mains cable, remove two screws (4) from the switch.

3 Remove the screw (5) from the strain relief (6) and remove the mains cable (7).

4 Detach the following parts:
- four O-rings (C)
- two wires (D)
- two screws (A)
- two carbon brush holders (B)
- electronic part (E)
- four screws (8)
- secured washer (9).



16

Removing the anti-vibration mechanism and the field

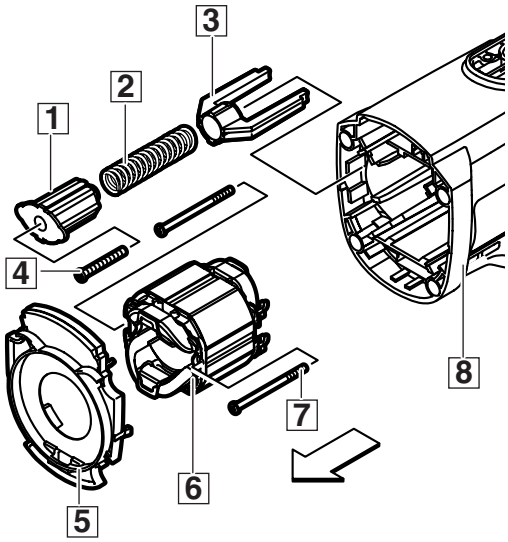
1 Remove the air deflector ring (5).

2 Remove the screw (4). Detach the following parts of the anti-vibration mechanism from the motor housing (8):
- thrust piece (1)
- spring (2)
- transition piece (3).

☞ Danger of injury! Pay attention when loosening the screw (4): the thrust piece (1) is under pressure and must be steadied!

3 Loosen two screws (7) and remove the field (6) from the motor housing (8).

☞ Should the field be stuck, tap the motor housing (8) lightly with a plastic hammer for support.



17

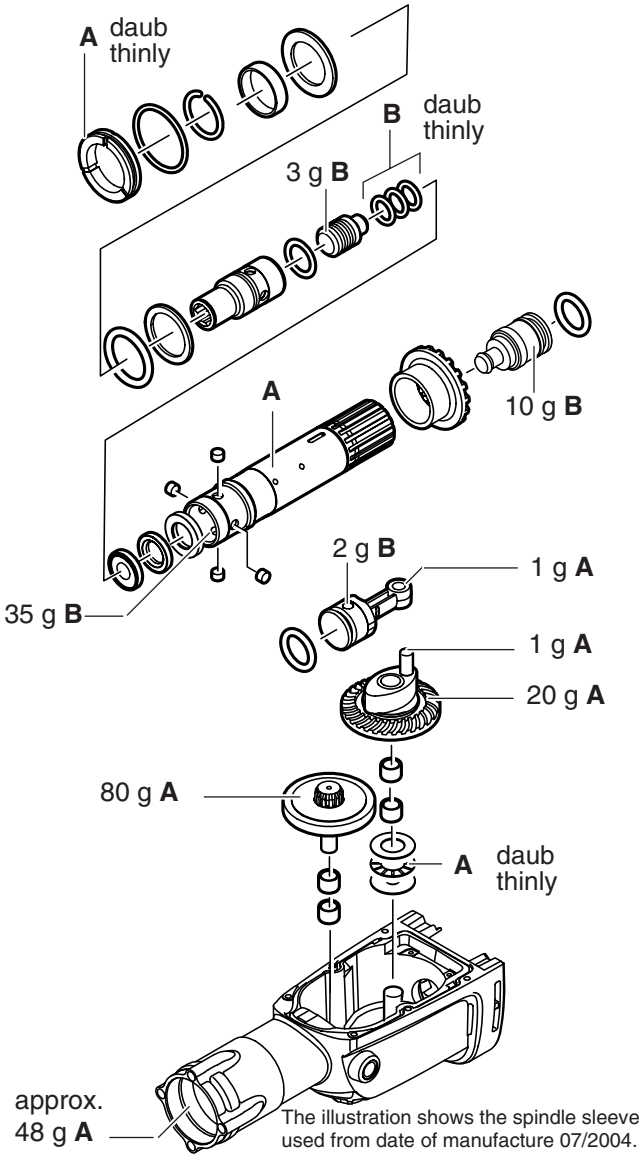
Maintenance

General	It is recommended that maintenance be performed on the machine at regular intervals or when the carbon brushes switch off at the latest.
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 lubricates 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. The service set no. 4931 375 659 contains all listed spare parts.

Lubrication chart: Combined drill/chisel hammer

A: Fill res. daub with a total of 150 g grease type Darina (order no.: 215 922, 100-g-tube).

B: Fill res. daub with 50 g grease type Urethyn (order no.: 4931 6243 75, 45-g-tube).

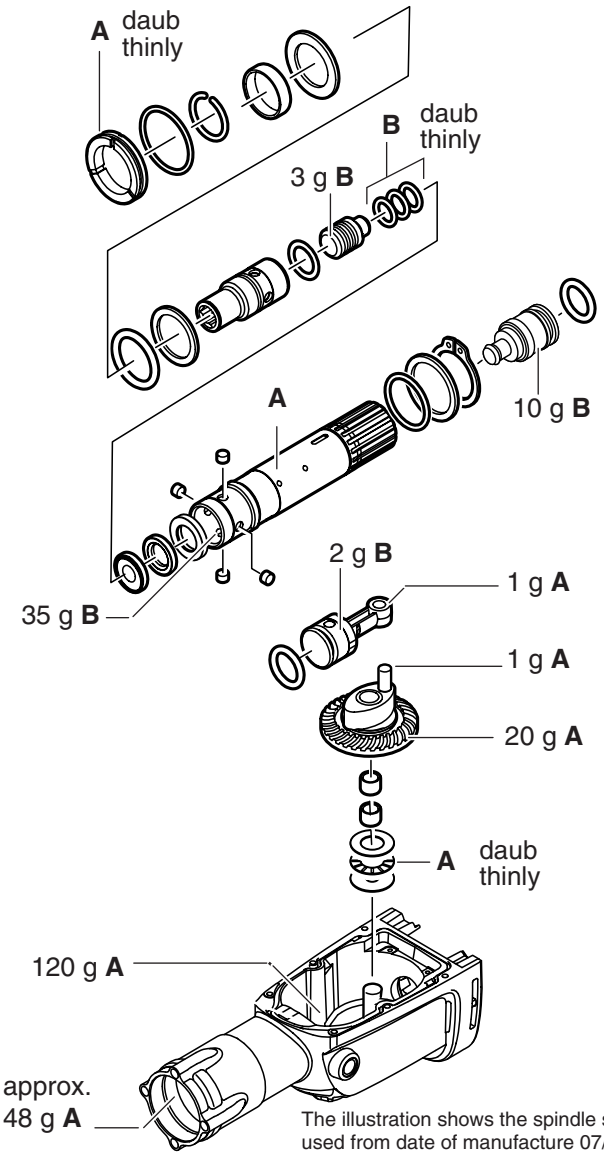


The illustration shows the spindle sleeve used from date of manufacture 07/2004.

Lubrication chart: Chisel hammer

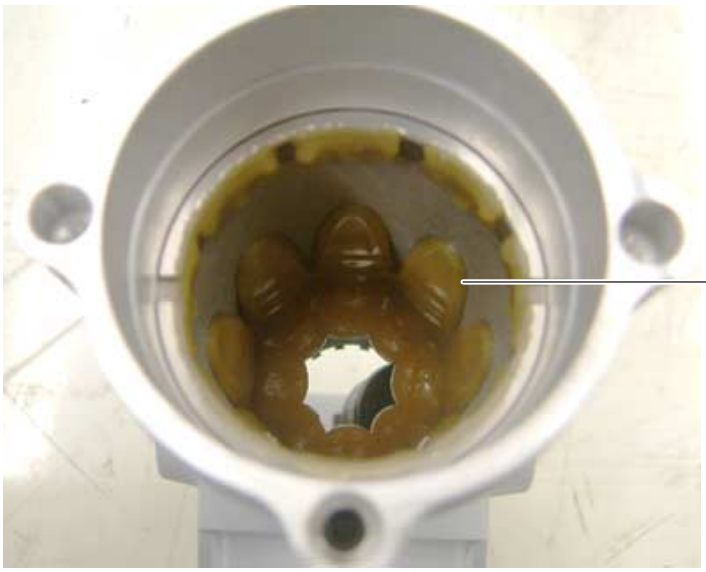
A: Fill res. daub with a total of 190 g grease type Darina (order no.: 215 922, 100-g-tube).

B: Fill res. daub with 50 g grease type Urethyn (order no.: 4931 6243 75, 45-g-tube).



The illustration shows the spindle sleeve used from date of manufacture 07/2004.

Lubrication: Combined drill/chisel hammer



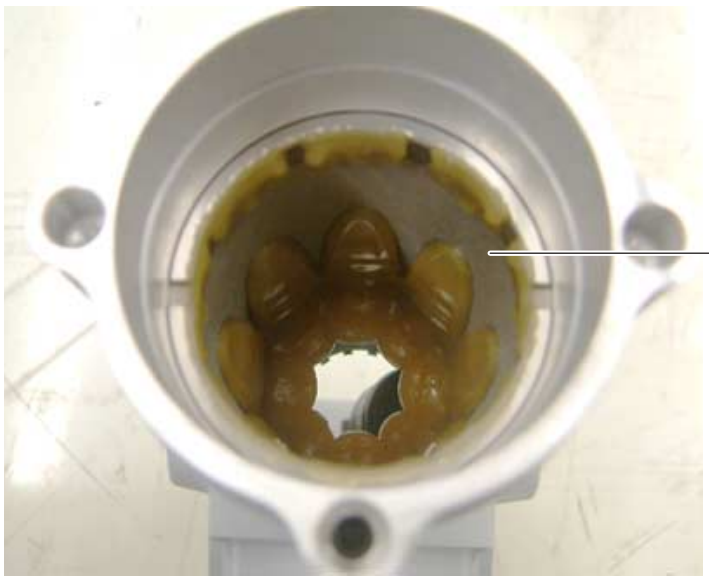
Put approx. 48 g of Darina grease (**A**) into the spindle housing (gear box from the front)

Fill 35 g grease Urethyn (**B**) into the spindle (the percussion body takes up some grease)

Apply 80 g grease Darina (**A**) to the safety clutch

Apply 20 g of Darina grease (**A**) to the crank wheel

Lubrication: Chisel hammer



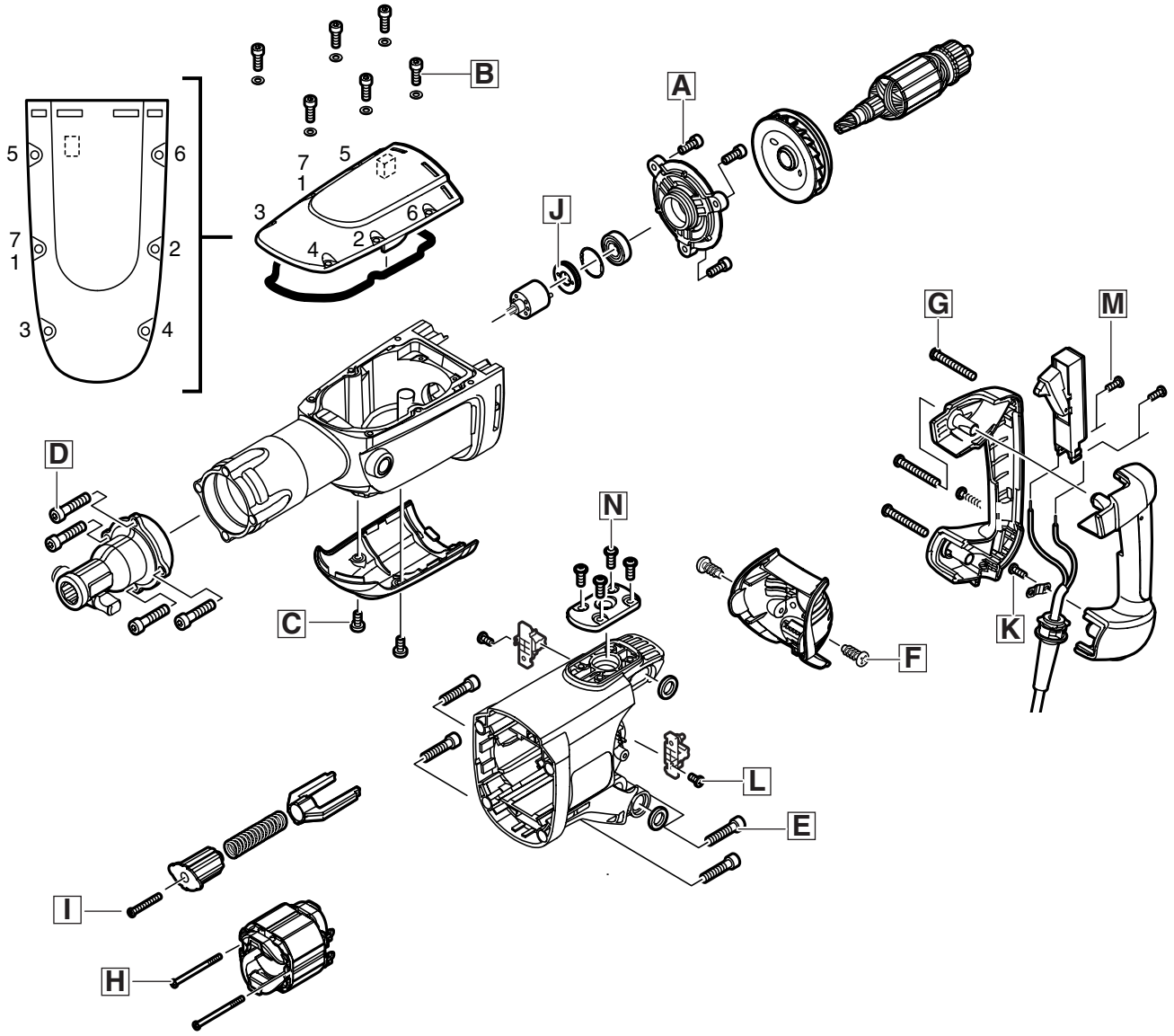
Put approx. 48 g of Darina grease (**A**) into the spindle housing (gear box from the front)

Fill 35 g grease Urethyn (**B**) into the spindle (the percussion body takes up some grease)

Put 20 g of Darina grease (**A**) to the crank wheel

Put 120 g of Darina grease (**A**) into the gear box

Sequence and torques of the screws:



Torques	Bearing cover	4 Nm	A [1)]
	Top gear cover	4.5 Nm	B [1)]
	Gear cover	3 Nm	C
	Chisel acceptance	18 Nm	D [1)]
	Motor housing	13 Nm	E [1)]
	Service cover	1.3 Nm	F
	Handle	3 Nm	G
	Field	2 Nm	H
	Anti-vibration mechanism	3 Nm	I
	Round nut	16 Nm	J
	Cable clip	1.3 Nm	K
	Carbon brush holders	1.3 Nm	L
	Connection wires switch	0.5 Nm	M
	Secured washer	4 Nm	N

[1)] Additionally secure the screws with a screw locking agent using an Omnifit 80 or Loctite 222.

Assembly

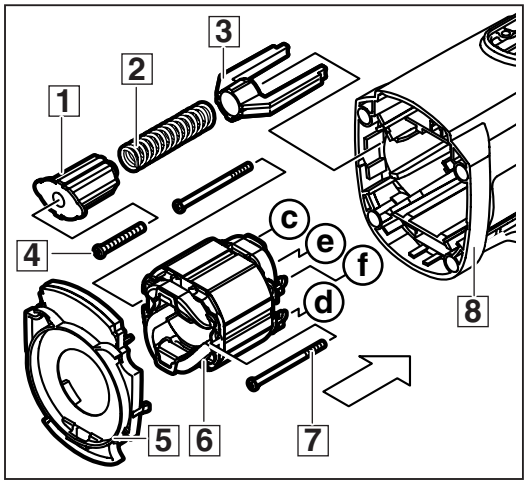
Mounting the anti-vibration mechanism and the field

1 Insert the field (6) into the motor housing (8) and fix it with two screws (7) (torque = 2 Nm).

2 Insert the following parts of the anti-vibration mechanism into the motor housing (8):
- transition piece (3)
- spring (2)
- thrust piece (1).

3 Fix the anti-vibration mechanism with the screw (4) (torque = 3 Nm).

4 Insert the air deflector ring (5) into the motor housing (8). Mind the right position!



1

Assembling the electronic component

1 Mount the following parts:
- secured washer (9)
- four screws (8) (torque = 4 Nm)
- electronic part (E)
- two carbon brush holders (B)

☞ Insert the end of the flat spiral spring (G) into the slot (H) in the pin of the carbon brush holder as indicated in the enlargement of the figure (meaning: hook the flat spiral spring (G) into the pin in the “11 o’clock” position!). Tension the flat spiral spring by 1 turn in clockwise direction. Afterwards position the other spring end (I) onto the carbon brush holder (“ready position”).

- two screws (A) (torque = 1.3 Nm)
- two wires (D)
- four O-rings (C).

☞ Take care that no wires are jammed or squeezed.

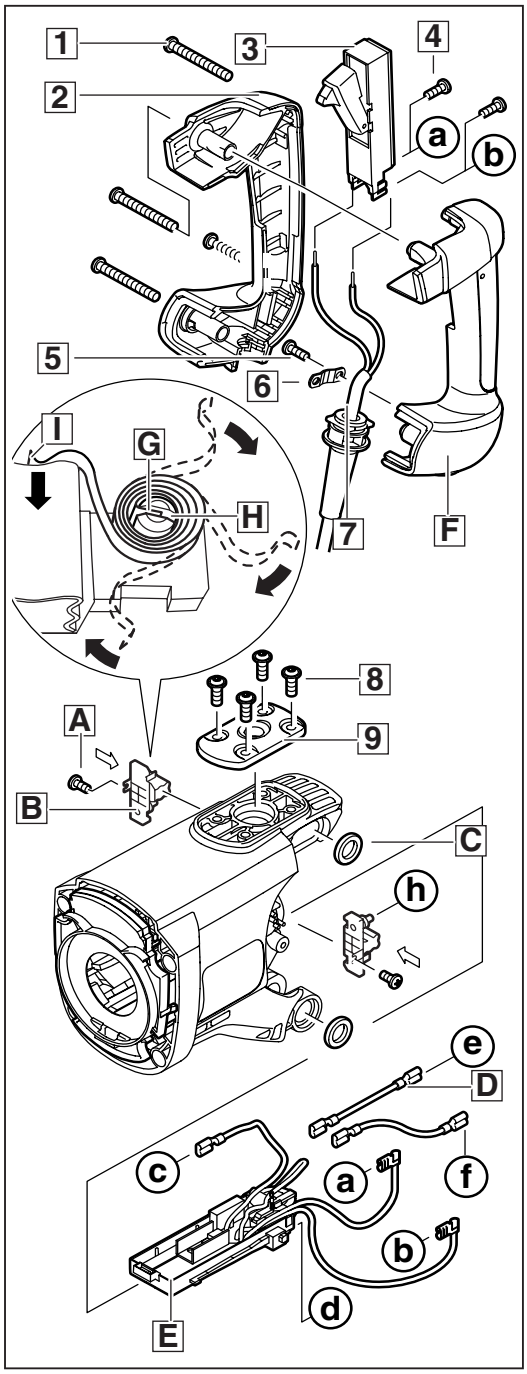
☞ All wires must be correctly inserted between the cable entry lugs (see pictures on page 15).

2 Insert the switch (3) into the handle half (F).

3 Insert the mains cable (7) and fix the strain relief (6) with the screw (5) (torque = 1.3 Nm).

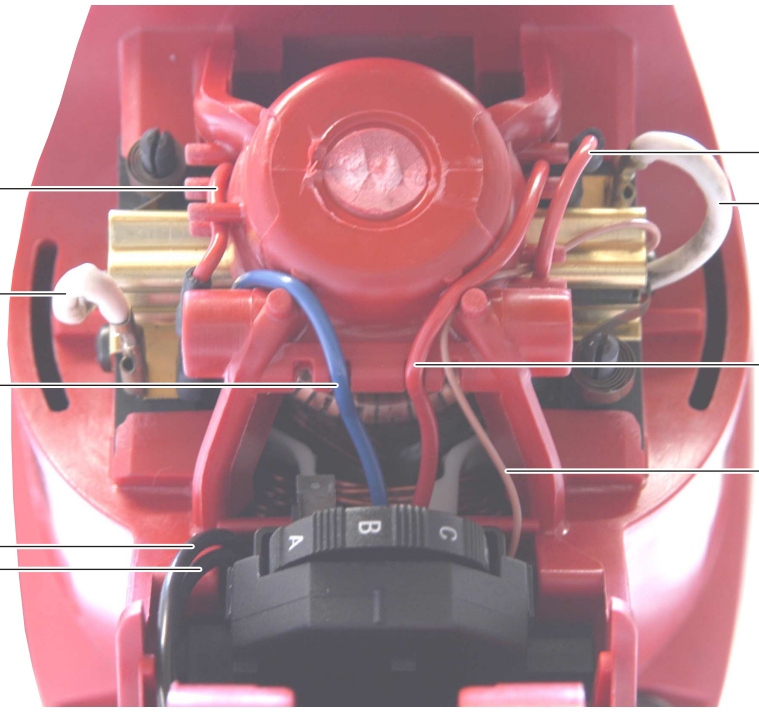
4 Connect the mains cable (7) with the switch (3) and with two screws (4) (torque = 0.5 Nm).

5 Mount the handle half (2) and fix the handle with four screws (1) (torque = 3 Nm).



2

Wiring in the machine



red:
field – carbon brush holder

white:
carbon brush holder – carbon brush

blue:
field – electronic

black:
electronic – switch

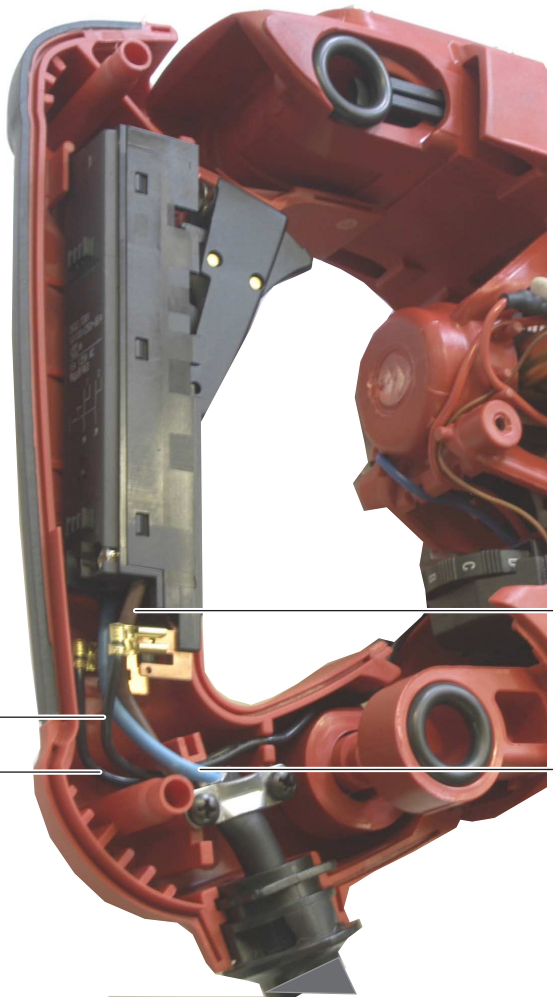
red:
field – carbon brush holder

white:
carbon brush holder – carbon brush

red:
field – electronic

brown:
carbon brush – electronic
(carbon brush cutoff)

Wiring in the handle



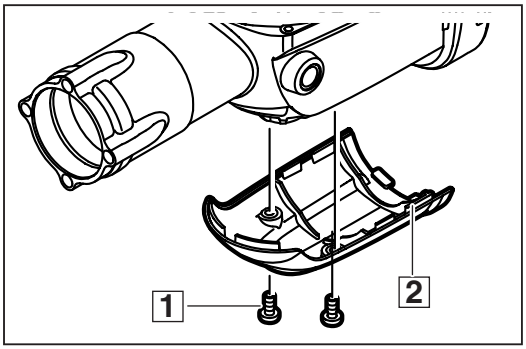
black:
switch – electronic

brown:
mains cable to switch

blue:
mains cable to switch

Mounting the gear cover

1 Fix the gear cover (2) with two screws (1) onto the gear box (torque = 3 Nm).



3

Mounting the crank wheel

1 **Combined drill/chisel hammer:** Press the needle bearings (2) and (3) flush into the gear box (4).

☞ The names on the needle bearings must be visible!

2 Press the needle bearings (6) and (7) flush into the crank wheel (5).

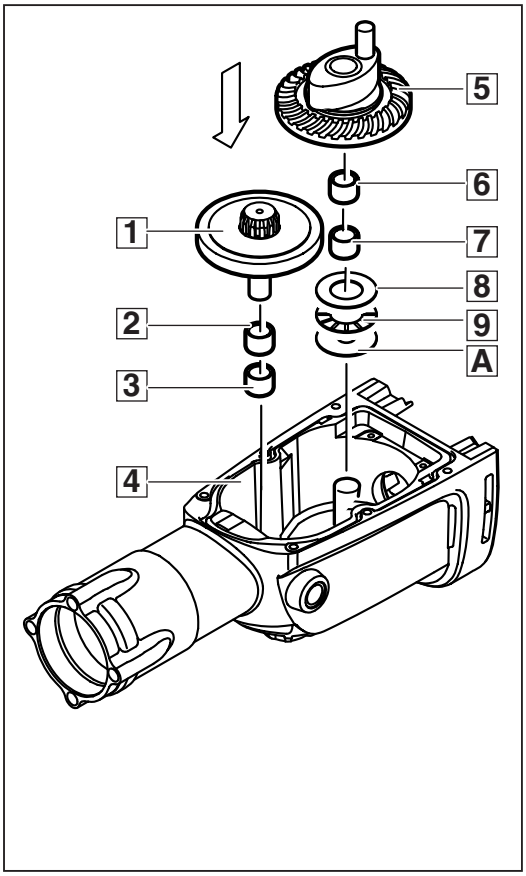
☞ The names on the needle bearings must be visible!

3 Insert the safety clutch (1) into the gear box (4).

☞ The safety cluth is pre-set and is released at:
34 Nm static
120 Nm dynamic.

☞ The safety clutch is only available as a complete assembly!

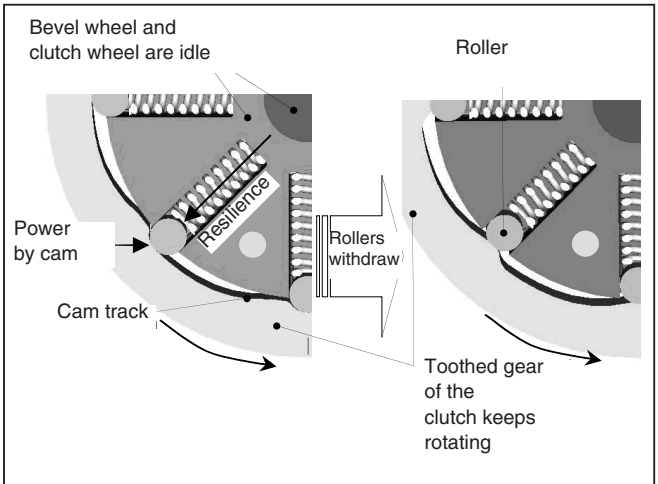
4 Insert the following parts into the gear box:
- disc (8)
- axial bearing (9)
- disc (A)
- crank wheel assembly (5).



4

Mode of operation of the safety clutch

If the rotational movement of the drill is blocked, the safety clutch protects the user from the rotation of the machine. The safety clutch limits the maximum torque of the drilling tool. As soon as this limit is exceeded, the rollers in the safety clutch withdraw, and the toothed gear of the clutch can rotate, whereas at the same time the bevel wheel and the clutch wheel are idle. This is due to the fact that the cam track applies greater force on the rollers than the spring. The driving mechanism from motor to drilling tool is interrupted.



Assembling the armature

1 Press on the bearing (B) and put on the rubber sleeve (C).

2 See illustration below:
Press the fan (9) onto the indicated bearing measure. Afterwards, apply some instant glue (e. g. Sicomet) on the armature shaft (marked with arrows).

☞ The distance between the upper side of the fan (9) and the lower side of the bearing (B) must be 159 mm (bearing measure) according to the below illustration.

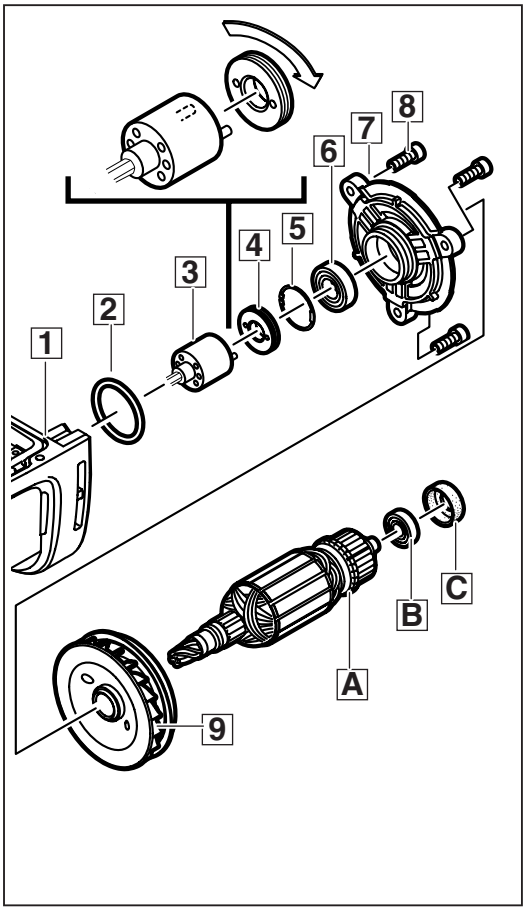
3 Press the bearing (6) into the bearing end plate (7) and insert the locking ring (5).

4 Put the bearing end plate assembly (7) on the armature.

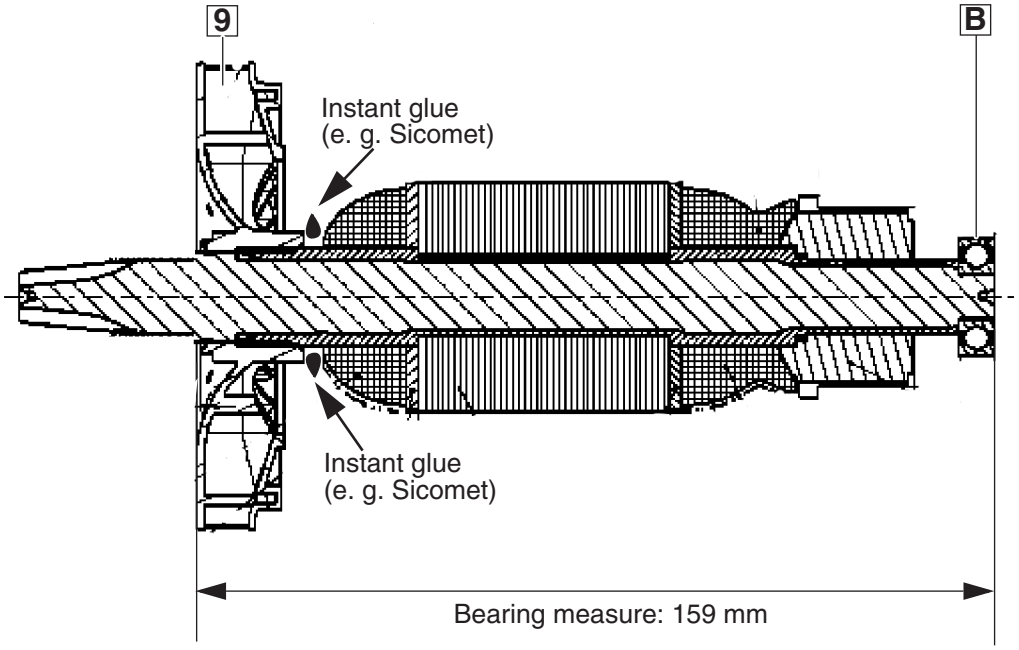
5 Screw in the seal ring (4) with the pin-type face spanner (service tool) (3) (torque = 16 Nm).

6 Insert the seal (2) into the gear box (1).

7 Apply locking agent to the three screws (8).
Insert the bearing end plate with the armature (A) into the gear box (1) and fix them with the three screws (8) (torque = 4 Nm).



5

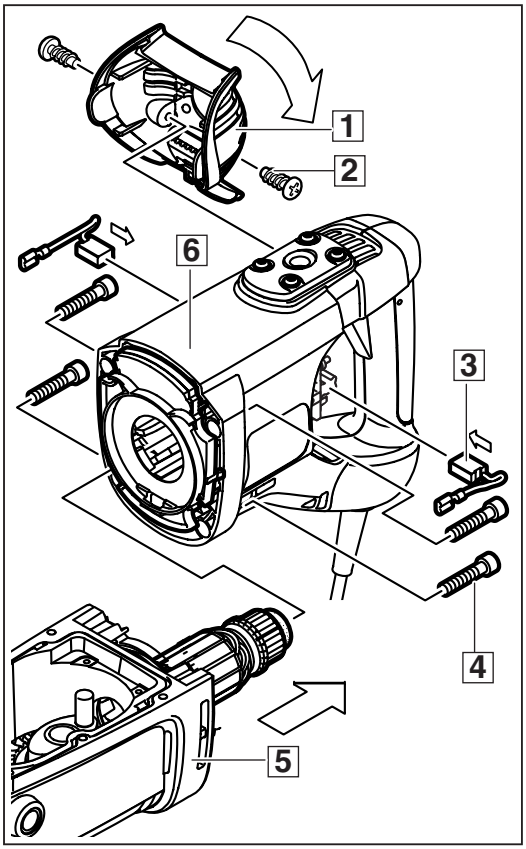


Mounting the motor housing

1 Apply locking agent on the four screws (4). Insert the gear box with the armature (5) into the motor housing (6) and fix them with the four screws (4) cross-wise (torque = 13 Nm).

2 Insert the carbon brushes (3) on both sides and connect them.

3 Insert the service cover (1) slanted and fix it with two screws (2) (torque = 1.3 Nm).



6

Checking the Clearance of the Gear (up to manufacturing date C2004)

1 Determine the gear clearance between the armature pinion and the crank wheel:

1. Position the depth gauge (A) onto the crank wheel (B) and determine the measuring value $M_{1.}$.

2. Pull up the crank wheel (B) by hand. Position the depth gauge (A) onto the crank wheel (B) and determine the measuring value $M_{2.}$.

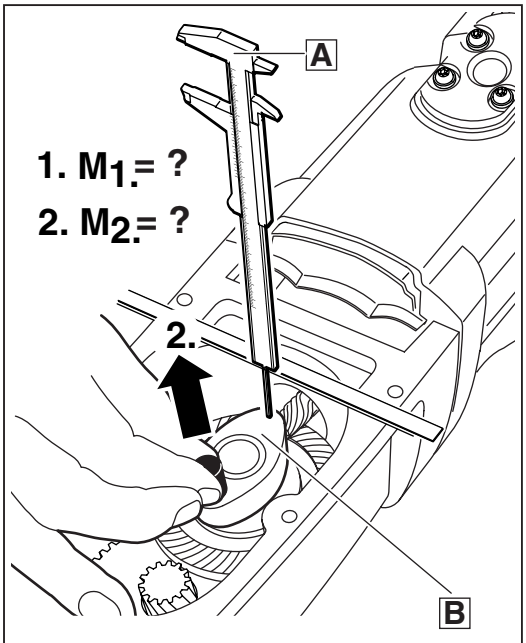
3. Calculate the **difference**: $M_{1.} - M_{2.}$

– **Difference between 0.1 mm and 0.44 mm:** O.K.

– **Difference < 0.1 mm:**
Replace two discs (see page 16, step 4, discs (8) and (A)) with two discs 4931 375 785 (2x0.92 mm).

– **Difference > 0,44 mm:**
Insert additional compensating discs under disc (A) (see page 16, step 4):

No. Compensating disc	Thickness [mm]
9170 0223 40	0.10
9170 0223 50	0.15
9170 0223 60	0.20
9170 0220 70	0.23
9170 0220 80	0.30
9170 0220 90	0.38
9170 0221 10	0.51



3. Difference = $M_{1.} - M_{2.}$

– Difference 0.1 mm up to 0.44 mm ⇒ OK

– Difference < 0.1 mm ⇒ 2 x 0.92 mm (⊚⊚ 4931 375 785)

– Difference > 0.44 mm ⇒ Compensating discs

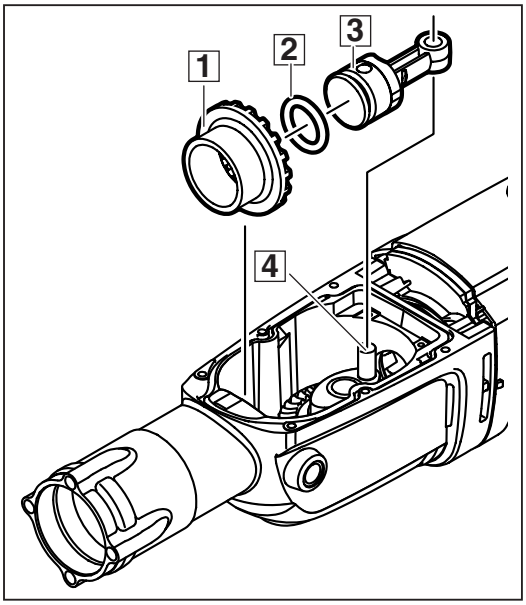
7

Mounting the piston

1 **Combined drill/chisel hammer:** Insert the spindle bevel gear (1) into the gear box.

2 Mount the O-ring (2) on the piston (3). Put the piston (3) on the tappet of the crank wheel (4).

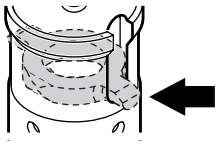
3 Insert the piston into the spindle bevel gear (1).



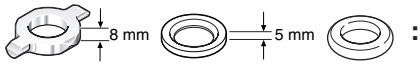
Assembling the spindle

1 Machines with a date of manufacture up to 06/2004: Insert the cross bracket (1) (width 7 mm) into the spindle openings (2) turn it 90°.

☞ The smooth side of the cross bracket (1) (illustrated dark ▬) must face the front towards the tool acceptance, in mounted condition!
The curve ot fhe cross bracket must fit into the curve of the spindle (2)!



When ordering the cross bracket, the reversion kit No. 4931 375 788 is delivered



:

Spindle opening = 36 mm:
Insert the chromium plated cross bracket (3) (width 8 mm) into the spindle (4) from the front.

Spindle opening = 39 mm:
Insert the chromium platet cross bracket (5) (width 8 mm) into the spindle openings (6) and turn it 90°.

Machines with a date of manufacture from 07/2004: Insert the ring (7) (black) into the spindle (8) from the front.

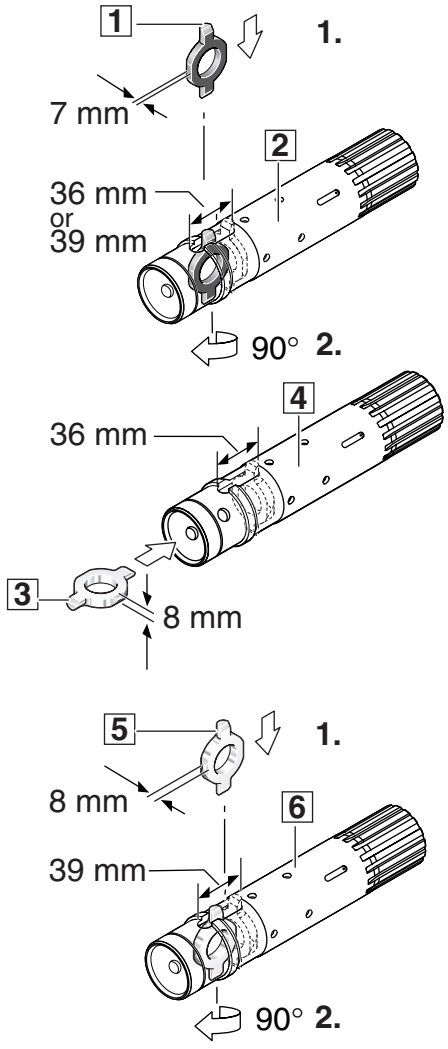
Exchanging the spindle sleeve

Please note when exchanging the spindle sleeve:

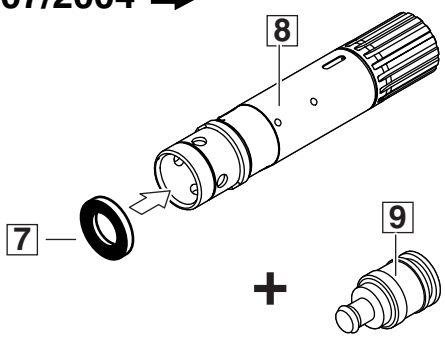
☞ When the old spindle sleeve (up to DoM 06/2004) is exchanged for the new spindle sleeve (8) (4931 375 803 (drill/chisel hammer), 4931 375 802 (chisel hammer)), it is **imperative** that the new percussion body (9) (4931 375 782) is used! Otherwise the spindle is destroyed when in operation.

☞ When the new spindle and the new percussion body are inserted, the rating plate of the machine must also be replaced (4931 375 809: new rating plate for drill/chisel hammer;
4931 375 819: new rating plate for chisel hammer)!

➡ 06/2004



07/2004 ➡



4931 375 782

Mounting the spindle

1 Insert the thrust ring (C) and the back pressure ring (B) into the spindle (E).

☞ Insert the back pressure ring (B) in the right position: the land of the back pressure ring (B) must face the snap die (8)!

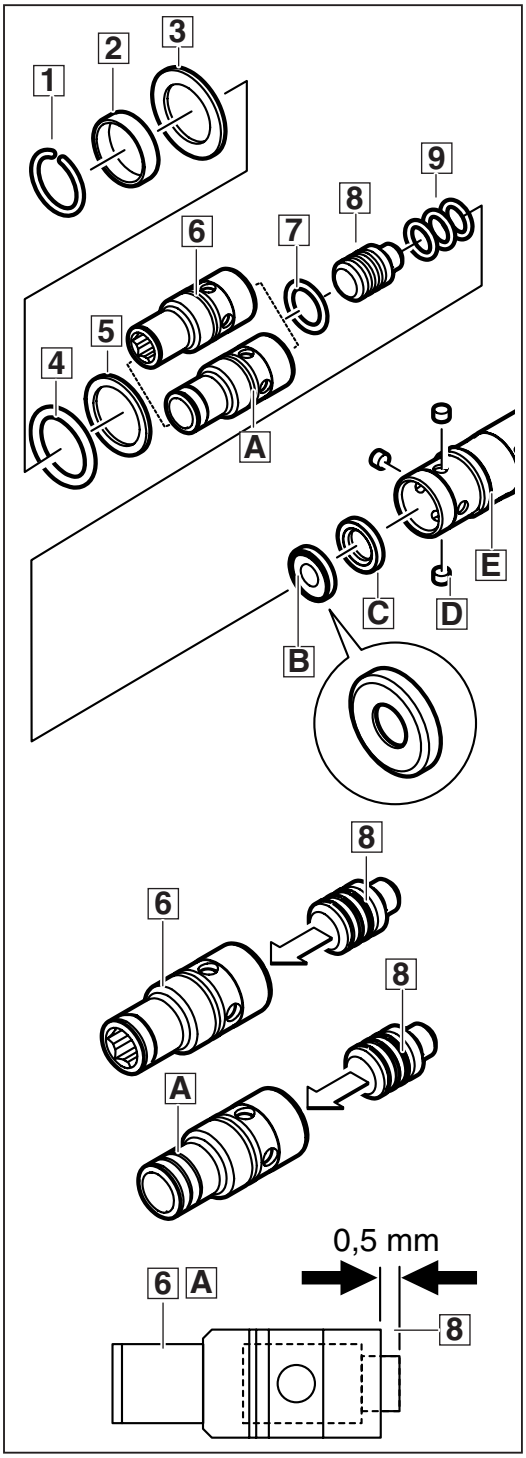
2 Mount the three O-rings (9) on the snap die (8).

3 **Combined drill/chisel hammer:**
Insert the O-ring (7) into the driver sleeve (6).
Insert the snap die (8) into the driver sleeve (6) (with hex socket, 1 outer ring).
Chisel hammer:
Insert the O-ring (7) into the driver sleeve (A).
Insert the snap die (8) into the driver sleeve (A) (without hex socket, 2 outer rings).

☞ The snap die (8) must protrude the driver sleeve (6) res. the sleeve (A) approx. 0.5 mm!
(The driver sleeve (6) can be identified with the hexagon socket and has one outer ring. The sleeve (A) can be identified with the two outer rings and has no hexagon socket.)

4 Insert the four rolls (D) into the spindle (E).

5 Mount the following parts on the spindle (E):
- attachment ring (5)
- damping ring (4)
- disc (3)
- ball race (2)
- locking ring (1).

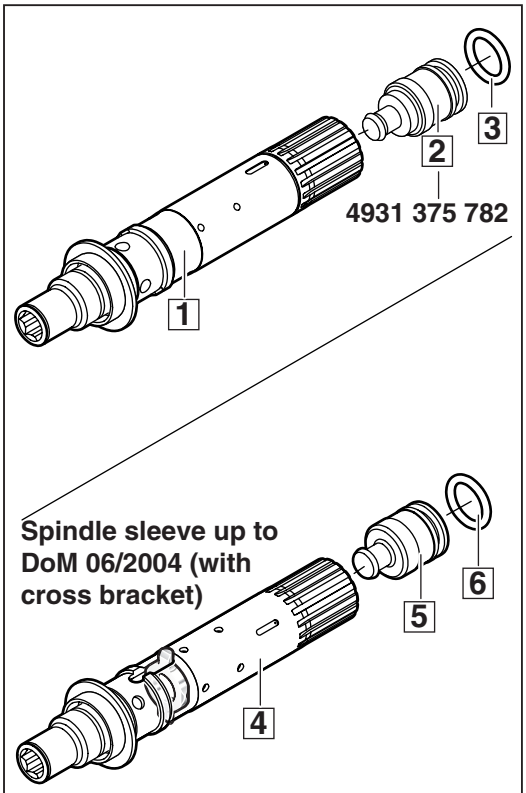


Mounting the percussion body

☞ If the old spindle sleeve (up to DoM 06/2004) was exchanged for the new one (4931 375 803 (drill/chisel hammer), 4931 375 802 (chisel hammer)), it is **imperative** that the new percussion body (9) (4931 375 782) is used! Otherwise the spindle is destroyed when in operation.

1 Mount the O-ring (3) on the percussion body (2)
or
mount the O-ring (6) on the percussion body (5).

2 insert the percussion body (2) into the spindle (1)
or
insert the percussion body (5) into the spindle (4).



11

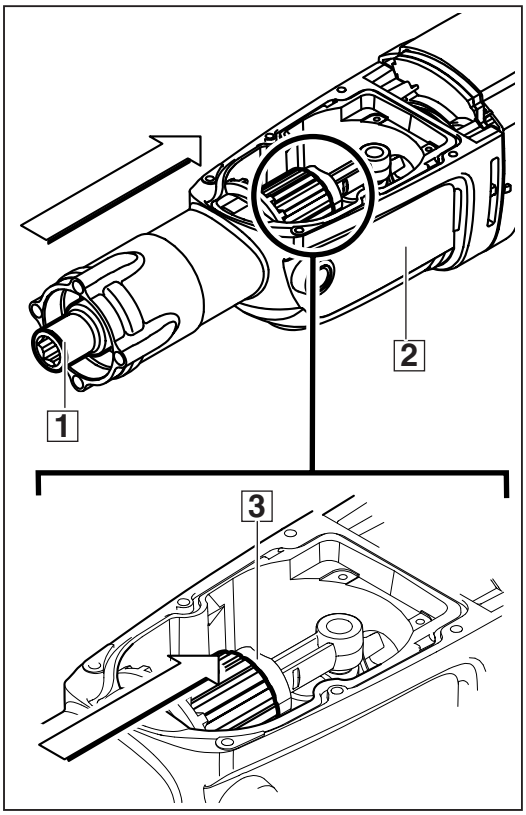
Combined drill/chisel hammer:

Inserting the spindle

1 Insert the complete spindle assembly (1) into the gear box (2) as far as it will go.

☞ The piston (3) must grasp the rear end of the spindle!

☞ The spindle (1) gets the necessary lubrication when it is inserted into the gear box (2).



12

Chisel hammer:

Inserting the spindle

1 To prepare insert the O-ring (1), the attachment ring (2) and the locking ring (3) into the gear box (5).

2 Insert the complete spindle assembly (4) into the gear box (5) and lead it through the O-ring (1), the attachment ring (2) and the locking ring (3).

☞ The spindle (4) gets the necessary lubrication when it is inserted into the gear box (5).

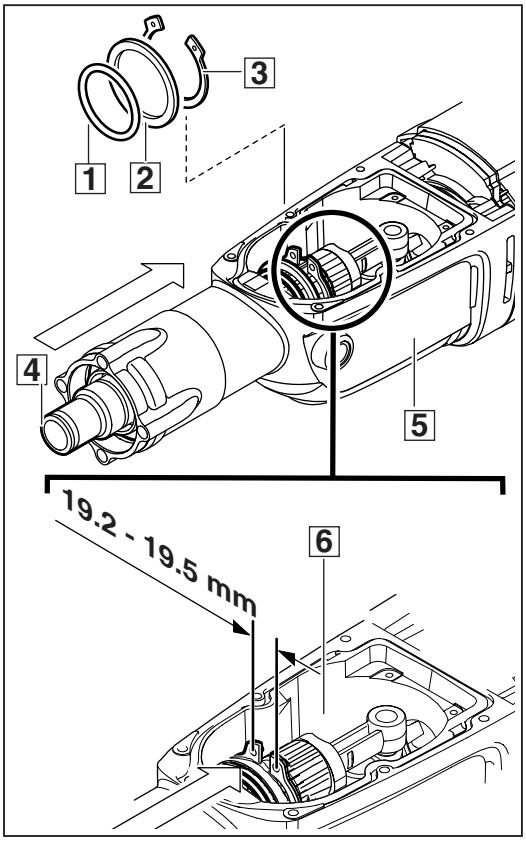
3 Insert the spindle (4) as far as it will go.

☞ The piston (6) must grasp the rear end of the spindle!

4 Fix the locking ring (3) in the spindle groove.

☞ The locking ring (3) must audibly engage in the spindle groove (4)!

☞ The distance of the borings of the correctly mounted locking ring (3) (centre-centre) must be between 19.2 – 19.5 mm!

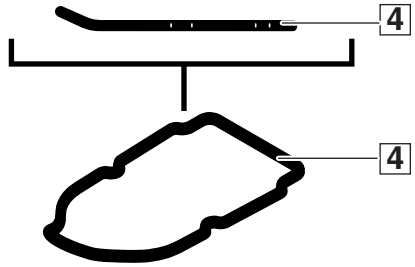


12

Mounting the top gear cover

1 Insert the gasket (4) into the gear box (6). Mind the right position!

☞ The gasket (4) is in accordance with the gear box pre-formed and fits the groove of the gear box (6) exactly!



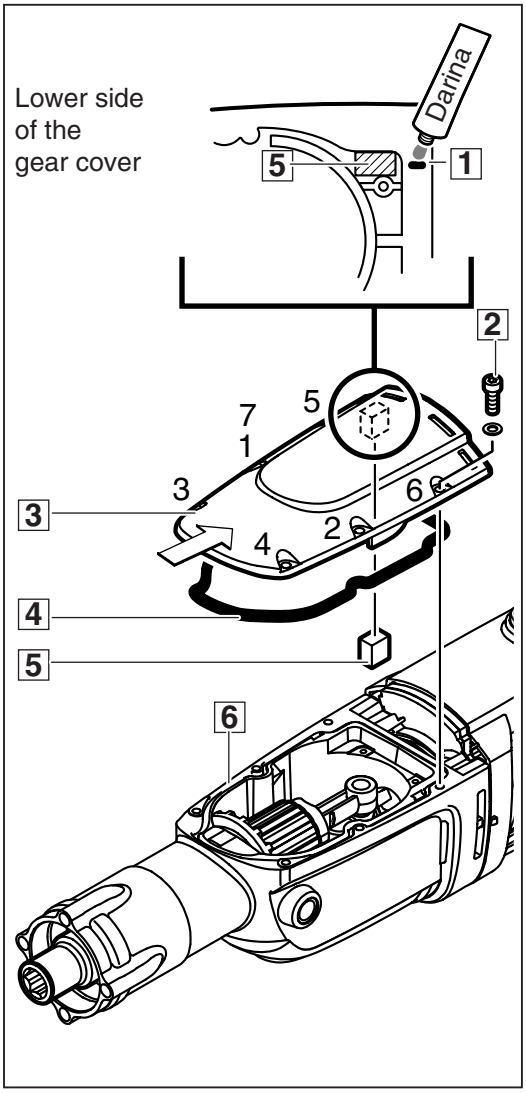
2 Insert the felt (5) into the top gear cover (3). Mind the right position! It serves to air the crank housing!

☞ The felt (5) must be inserted at the relief (1) into the lower part of the gear cover (3)

☞ Cover the groove (1) with a little grease Darina.

3 Insert six screws with washers (2) into the gear cover (3) and fix them (torque = 4.5 Nm).

☞ The six screws must be tightened according to the indicated numbers (1 – 7) in ascending sequence! Push the cover (3) slightly in direction of arrow!



13

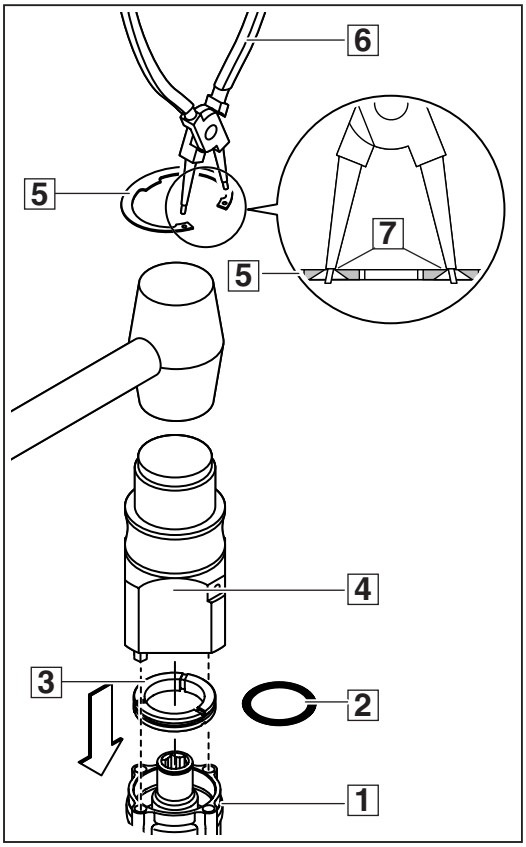
Inserting the thrust collar

1 Mount the O-ring (2) on the thrust collar (3).

2 Insert the thrust collar (3) into the gear box (1) and push it over the spindle as far as it will go.

☞ Put the sleeve (service tool) (4) on the thrust collar (1). Push in the thrust collar (3) with light blows on the sleeve (4) until the locking ring (2) can be mounted in the gear box (1).

☞ Both holes in the retaining ring (5) are tapered. When assembling, the small openings (7) must face upward!



14

Mounting the tool acceptance

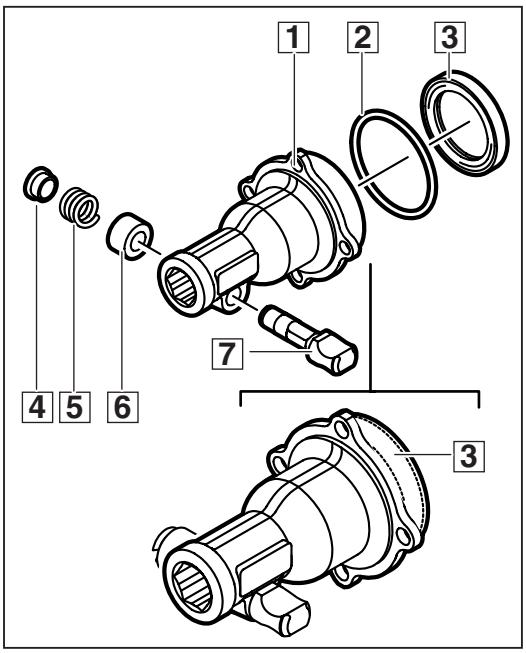
1 Insert the O-ring (2) and the seal ring (3) into the tool acceptance (1).

☞ Insert the seal ring (3) in the right position: The sealing lips must face the outside!

☞ The seal ring (3) must be flush with the tool acceptance (1), otherwise it would wear very quickly!

2 Insert the latch bar (7) into the tool acceptance (1), and insert the sleeve (6) and the spring (5) on the other side.

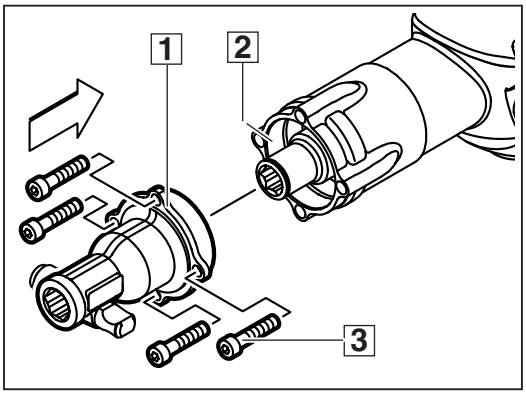
3 Mount the latch (4).



15

Inserting the tool acceptance

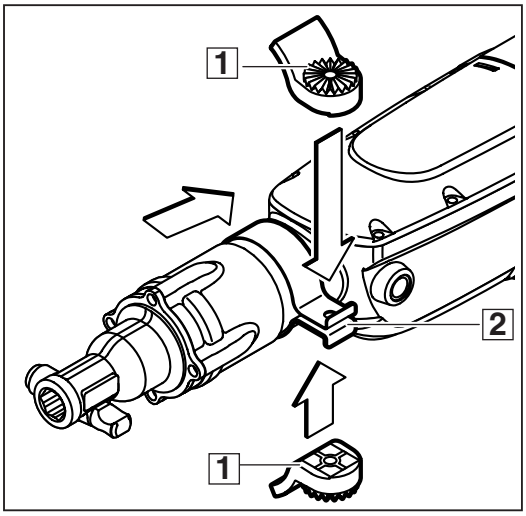
1 Daub the four screws (3) with screw locking agent.
Fasten the tool acceptance (1) with the four screws (3) on the gear box (2) (torque = 18 Nm).



16

Mounting the spring ring

1 Push the spring ring (2) over the machine from the front and mount both retainers (1).

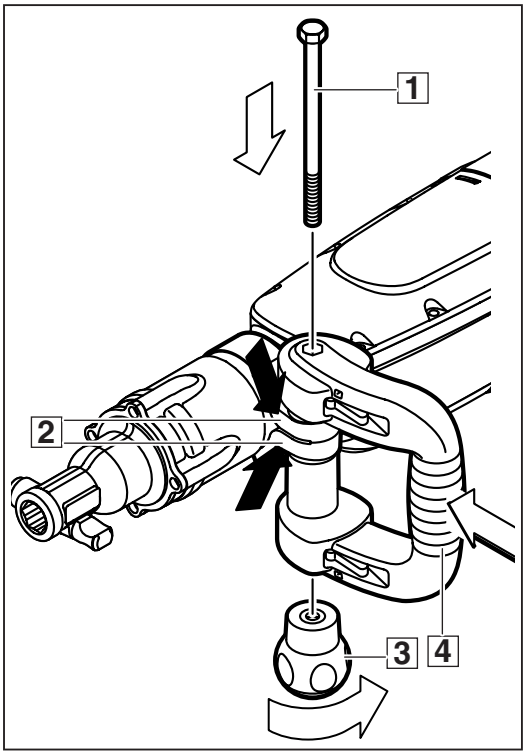


17

Mounting the handle

1 Press together the retainers (2) on both sides and mount the handle (4).

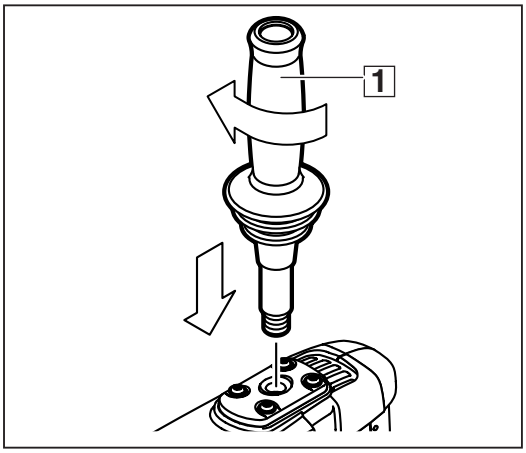
2 Insert the screw (1) and screw down the knob (3).



18

Mounting the auxiliary handle

1 Screw down the auxiliary handle (1).



19

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).