Special Tools
Require
- Torx-bit center guide bore 4931 599 085
- Torx TX20 bit 4931 5990 08
- Screwdriver Torx 20 4931 5990 05
- Forcing discs 4931 599 018
- Mounting device 4931 599 039

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 QUIK-LOK cable
1 Pull off the QUIK-LOK cable from the machine.
2 Loosen the screw (1) and take apart the plug into two parts (2) and (9).
   The screw (1) has a centrical pin (see enlargement). It can only be removed with a respective Torx screwdriver with a centrical boring (A)!
   This Torx screwdriver is part of the service tool kit. It can also be ordered with order number 4931 599 085.
3 Pull down the cable entry sleeve (7) slightly.
4 Loosen the screw (3) and disassemble the inner plug into three parts (4), (5), and (6).
5 Remove the contacts (8) with cables.

Removing the auxiliary handle
1 Unscrew the auxiliary handle (3) from the mounter (1) counter-clockwise.
2 Remove the washer (2).
Disassembling the mounter of the auxiliary handle

1. Pull the spacer (3) from the clip (1).
2. Bend open the clip (1) on both sides (see arrows) and pull out the set screw (2).
3. Remove the clip (1) from the chuck (see illustration below).

Removing the chuck

1. Unscrew the locking screw (2) clockwise with a screwdriver.
2. Should the screw (2) be stuck, it can be loosened as follows:
   Fix a wrench (1) in the chuck (3) and briefly hit it in the unscrew-direction (right-handed thread) of the chuck. After that the screw (2) can be removed.

   In order to steady the chuck, insert a chuck key (4) into the chuck (3) and hold them both tight.

3. Only applicable for two-speed machines: If the chuck cannot be removed due to stiffness, use the spindle-locking device for support (see page 4, illustration 6)!
Removing the gear case

For further disassembly of the machine, the mounting device (service tool 4931 599 039) can be used.

1 Remove three screws (1) from the gear case (2) and pull the gear case (2) from the machine.
2 Remove the gasket (3).

Single-speed machines:

Disassembling the gear

1 Remove the washer (5) and the disc (4).
2 Pull out the reduction gear assembly (3). Separate the toothed gear (3.1) from the shaft (3.2) with aid of forcing discs.
3 Remove the disc (2).
4 Remove the Seeger circlip ring (1) with Seeger circlip pliers.
Two-speed machines:
Disassembling the gear

1. Remove the washer (5), the disc (4), and the washer (F).
2. Pull out the reduction gear assembly (3). Separate the toothed gear (3.1) from the shaft (3.2) with aid of forcing discs.
3. Remove the drill spindle wheel (E).
4. Pull the two pins (9) from the jumper ring (8).
5. Pull out the retaining spring (B) and remove the switch handle (A).
6. Remove the pin (C) with the spring and sliding switch assembly (D). Pull the pin (C) from the sliding switch assembly (D).

Attention: Danger of injury due to spring release!

7. In case the chuck could not be removed due to stiffness, please proceed as follows: fix the spindle locking device (G) in a vice and mount the gear case; the jumper ring (8) must fit into the spindle-locking device (G). For further dismantling of the chuck, please proceed as described on page 2, illustration 4.

8. Remove the jumper ring (8), the drill spindle wheel (7) and the disc (6).

9. Remove the Seeger circlip ring (1) with Seeger circlip special pliers.
Single-speed machines:
Disassembling the spindle

1 Fix the gear case (1) in a vice provided with protective jaws as shown in illustration, and press out the spindle assembly (4).

2 Remove the following parts from the spindle (4):
   - percussion sleeve (A) (press off)
   - ball bearing (9) (press off)
   - disc (8)
   - spring (7)
   - seal ring (3).

3 Remove from inside the spindle:
   - pin (6)
   - ball (5).

4 Remove the drill spindle wheel (2) from the gear case (1).

Two-speed machines:
Disassembling the spindle

1 Fix the gear case (1) in a vice provided with protective jaws as shown in illustration, and press out the spindle assembly (3).

2 Remove the following parts from the spindle (3):
   - percussion sleeve (9) (press off)
   - ball bearing (8) (press off)
   - disc (7)
   - spring (6)
   - seal ring (2).

3 Remove from inside the spindle:
   - pin (5)
   - ball (4).
Disassembling the gear case

1. Carefully fix the gear case (1) in a vice provided with protective jaws.
2. Pull out the needle bearing (2) with aid of an interior extractor.
3. Remove the percussion sleeve (3) from the gear case (1) with a press.

Removing the carbon brushes

1. Remove the three screws (1) from the handle (2) and pull the handle (2) from the machine, if necessary lever it off with aid of a screwdriver.
2. Bend open the springs (3) of the carbon brush holders to the side and put them on the carbon brush holders (“holding position”).
3. Pull out the carbon brushes (4) on both sides.
Removing the bearing end plate

1 Pull the bearing end plate assembly (1) with the armature (2) from the housing (5).
2 Expel the armature (2) from the bearing end plate with a plastic hammer or press it out with aid of forcing discs.
3 Remove the rubber cap (4) from the ball bearing (3).

Disassembling the bearing end plate

1 Pull the pin (2) from the bearing end plate (4) (e.g. with a magnetic screwdriver).
2 Pull the switch handle (1) from the bearing end plate (4).
3 Extract two needle bearings (3) with aid of an interior extractor.

Disassembling the armature

1 Press off the following parts with aid of forcing discs:
   - ball bearing (5)
   - sleeve (1)
   - ball bearing (2)
   - bearing cover (3).
Removing the electric parts

1 Pull the air deflector ring (6) from the housing.

2 Remove the four silicone stoppers (7) from the air deflector ring (6).

3 Pull the wires (1) from the field (8), loosen the plug-in connection, and expel the field (8) from the housing.

4 Unclip the centering ledges (4) at the top and bottom of the field (8).

5 Remove the switch (5).

6 Pull out the carbon brush holders (3).

7 Remove the plug (9) from the housing.

8 Pull out the rating plate (2).
Maintenance

General
It is recommended to regularly submit the tool 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 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.

Lubrication chart:
- Cover res. fill with grease type Alvania RL 2 (45 g tube: Order-No. 4931 215 435).

Torques
Screws in plastic 1.7 Nm
Screws in metal 2.5 Nm
Assembly

Mounting the electric parts

1 Push the rating plate (2) into the provided space at the top of the machine.

2 Insert the carbon brush holders (3) on both sides of the machine.

3 Clip the centering ledges (4) on the top and the bottom of the field (8) and insert the field (8) into the housing. Mind the right position!

4 Connect the wires (1) to the field (8) (plug-in connection).

5 Mount the wires, the switch (5) and the plug (9).

For the wiring diagram, please refer to page 11.

6 Insert the four silicone rubbers (7) into the air deflector ring (6).

7 Insert the air deflector ring (6) into the housing. Mind the right position!

The “lugs” at the air deflector ring (6) must be positioned at the top and the bottom (see illustration).

Assembling the armature

1 Press the ball bearing (5) onto the armature (4).

2 Push the bearing cover (3) over the armature shaft.

The bulging must face the fan.

3 Press the ball bearing (2) and the sleeve (1) onto the armature shaft.
**Wiring diagram for 120 V machines**

<table>
<thead>
<tr>
<th>Wire-No.</th>
<th>Colour</th>
<th>Function</th>
<th>Position and marking on the switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>black</td>
<td>connection between plug and switch</td>
<td>underside, to 2 Ø</td>
</tr>
<tr>
<td>2</td>
<td>white</td>
<td>connection between plug and switch</td>
<td>underside, to 1 Ø</td>
</tr>
<tr>
<td>3</td>
<td>black</td>
<td>connection between switch and field</td>
<td>at the side, to 6</td>
</tr>
<tr>
<td>4</td>
<td>red</td>
<td>connection between switch and field</td>
<td>underside, to 2 Ø</td>
</tr>
<tr>
<td>5</td>
<td>black</td>
<td>connection between switch and field</td>
<td>at the side, to 5</td>
</tr>
<tr>
<td>6</td>
<td>red</td>
<td>connection between switch and field</td>
<td>underside, to 1 Ø</td>
</tr>
<tr>
<td>7</td>
<td>black</td>
<td>connection between switch and carbon brush</td>
<td>at the side, to 8</td>
</tr>
<tr>
<td>8</td>
<td>black</td>
<td>connection between switch and carbon brush</td>
<td>at the side, to 7</td>
</tr>
</tbody>
</table>
Assembling the bearing end plate

1. Press the needle bearing (3) flush into the bearing end plate.
2. Press the needle bearing (4) into the bearing end plate.
   - It must slightly protrude the fit, the pressing-in measure of 13.1 mm must be kept (see illustration below).
3. Lightly grease the O-ring on the switch handle (1) and insert the switch handle (1) into the bearing end plate (5).
4. Insert the pin (2) and lock the switch handle (1).

Inserting the bearing end plate

1. Insert the armature (2) into the bearing end plate (1), turning it slightly.
   - The short side (6) of the bearing cover must face downwards (see illustration).
   - The armature (2) engages audibly in the bearing end plate (1).
2. Put the rubber cap (4) correctly seated onto the bearing (3).
3. Insert the bearing end plate assembly (1) completely with the armature (2) into the machine (5).
   - The rubber cap (4) must not be jammed when being mounted (see illustration below)!

The rubber cap (4) must be exactly seated in the bearing.
Mounting the carbon brushes

1 Insert the carbon brush holders into the machine on both sides and insert the carbon brushes (4).
2 Put the springs (3) onto the carbon brushes (4) on both sides.
3 Mount the handle (2) on the machine and fix it with three screws (1).

⚠️ Take care that no cables are jammed or squeezed (for wiring diagram, please refer to page 11)!

Assembling the gear case

1 Press the needle bearing (2) into the gear case (1).

⚠️ Keep the pressing-in measures stated in the illustration below!

Pressing-in measures for the needle bearings for proper bedding of the reduction gear shaft

- Single-speed machines
- Two-speed machines
Assembling the spindle

1 Mount the following parts on the spindle (1):
   – spring (2)
   - The smaller diameter of the spring (2) must face the chuck.
   – disc (3)
   – bearing (4) (push on)
   – percussion sleeve (5) (press on)
   - The percussion sleeve (5) must be pressed on flush to stop on the spindle (1).

2 Press the percussion sleeve (6) into the gear case (8) as far as it will go.

3 Press the spindle assembly (7) into the gear case (8).

Mounting the Seeger circlip ring

1 Push the seal ring (3) over the spindle (4) and evenly depress it with a sleeve (2) (Ø = 30 mm) (if necessary, use a press).

2 Mount the Seeger circlip ring (1).

Single-speed machines:

1 Press the toothed gear (2) onto the spindle (3) with a suitable sleeve (1).
   - Be careful that the end of the spindle (4) is not damaged during this process!
**Single-speed machines:**

Assembling the gear

1. Press the toothed gear (3.1) onto the reduction gear shaft (3.2).
2. Insert the disc (2).
3. Insert the reduction gear shaft assembly (3) into the gear case.
4. Mount the disc (4) and the washer (5).
5. Insert the ball (6) and the pin (7) into the spindle.

**Two-speed machines:**

Assembling the sliding switch assembly

1. Insert the pin (3) into both parts of the sliding switch (1) and push the front part of the spring (2) over the pin. Depress the spring (2) with a screwdriver, then push the pin completely through the spring and the other half of the sliding switch (1).
Only applicable for two-speed machines:

Assembling the gear

1. Press the toothed gear (4.1) onto the reduction gear shaft (4.2).
2. Put the disc (7) and the larger drill spindle wheel (8) on the spindle in the gear case.
3. Put the sliding switch assembly (B) on the jumper ring (9) and insert them together into the gear case. Insert two pins (C) into the jumper ring (9).
   - The jumper ring (9) must grasp into the sliding switch assembly (B) (see top view).
4. Lightly grease the O-ring at the switch handle (2) and insert the switch handle (2) into the side of the machine.
   - The pin of the switch handle (2) must be positioned between the guide rails (1) of the sliding switch assembly (B)!
   - When mounted, the switch handle (2) must be able to move the sliding switch assembly (B) up and down!
5. Mount the retaining spring (A) (see top view).
6. Mount the drill spindle wheel (D) and the washer (E).
7. Insert the ball (F) and the pin (G) into the spindle (7) Insert the reduction gear shaft assembly (4).
8. Put the disc (5) and the washer (6) on the reduction gear shaft.

Mounting the gear case

1. Put the gasket (3) on the bearing end plate (4) and mount the gear case (2) on the machine.
   - Slightly turn the spindle while mounting the gear case!
2. Fix the gear case (2) to the machine (1) with three screws.
**Setting the end play**

1. The end play of the spindle (1) must be 0.35 mm.
   - The switch lever (2) must be in the "drill" position (as shown in illustration).
   - Measure the end play with a reference point:
     - **End play > 0,35 mm**: insert a larger ball
     - **End play < 0,35 mm**: insert a smaller ball.

   (Single-speed machines: ball see page 15, illustration 10, position 6
   res.
   two-speed machines: ball see page 16, illustration 10 B, position F.)

2. There are six different balls available: Ø 3.4; 3.6; 3.7; 3.8; 3.9; 4.0 mm.

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**Mounting the chuck**

1. Screw down the chuck (2) clockwise.
2. Tighten the screw (1) with a torque of 6 Nm, counter-clockwise.
Assembling the mounter of the auxiliary handle

1. Mount the clip (1) and bend it open slightly (see arrows).
2. Insert the set screw (2) and mount the spacer (3).

Mounting the auxiliary handle

1. Put the washer (2) on the spacer (1) and screw down the auxiliary handle (3).

Insulating the mains cable

1. Insulate the mains cable as shown in illustration. Meet the following measures:
   - Insulating length of wires: approx. 4 mm
   - Wire length with insulation: approx. 12 mm
Mounting the QUIK-LOK cable

Producing a strain relief

1 Insert the mains cable into the new crimping contacts (8) in accordance with regulations and make a correct crimp connection with aid of a crimping tool (see both illustrations of the crimp connection on the right).

Only a correct crimp connection can meet all mechanical and electrical requirements!

2 Insert the crimping contacts (8) with wires (6) into the sleeve.

3 Insert the plug halves (4) and (5) into the sleeve (6) on both sides and fix them with the screw (3).

Provide 3 mm wire for strain relief (see lower illustration)!

4 Insert the cable entry sleeve (7) and the assembled sleeve (6) into the plug (9).

5 Put together the two halves of the plug (2) and (9) and fasten them with the screw (1).

The screw (1) has a centrical pin (see enlargement). It can only be fastened with a Torx screwdriver with a respective centrical guide boring (A)!

This Torx screwdriver is part of the service tool kit.

It is also available as service bit Lfb (order number 4931 599 085).

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).