Power Tools Service Manual

CONFIDENTIAL
Dec. 2022

PRODUCT NAME

18 V Cordless Impact Driver Drill*1

Models DV 18DE, DV 18DEX*2

D

*1: “Cordless Combi Drill” for Europe
“Cordless Hammer Drill” for the USA and Canada
*2: Designed for operating in the USA and Canada only

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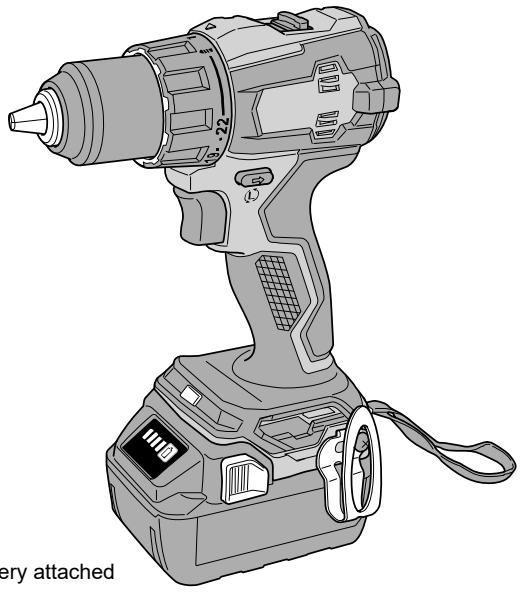


DV 18DE with BSL 1850MA battery attached

Koki Holdings Co., Ltd.

Overseas Sales Management Dept.

TROUBLESHOOTING GUIDE

Trouble	Possible cause	Checking method	Corrective action
Motor does not run.	• Faulty connection between switch and connector cable	• Check for connection between the DC-speed control switch and the connector cable. (See “1. Reassembly of the power supply unit and its vicinity” on page 6.)	• Insert the connector cable properly.
	• Faulty attachment of rotor magnets	• Check whether the magnets of the rotor pinion ass’y are flush with the end surface of the rotor core.	• Replace the rotor pinion ass’y.
	• DC-speed control switch failure	• Check the condition of the board surface for peeling silicone, missing element, and any indication of being dropped in the past. • Check the condition of the metallic terminal (pin) in the switch connector for corrosion.	• Replace the DC-speed control switch.
	• Stator controller ass'y failure	• Check the condition of the board surface for peeling urethane, missing element, and any indication of being dropped in the past.	• Replace the stator controller ass’y.
Rotation cannot be reversed.	• Faulty connection between switch and connector cable	• Check for connection between the DC-speed control switch and the connector cable. (See “1. Reassembly of the power supply unit and its vicinity” on page 6.)	• Insert the connector cable properly.
	• Switch connector failure	• Check the connector of the connector cable for corrosion. • Check the condition of the metallic terminal (pin) in the switch connector for corrosion.	• Replace the DC-speed control switch or the stator controller ass’y.
	• Faulty contact in the switch	• Check the connector cable of the stator controller ass’y and the switch connector for any abnormality.	• Replace the DC-speed control switch.
Rotation speed cannot be increased or changed.	• Stator controller ass'y failure	• Check the condition of the board surface for peeling urethane, missing element, and any indication of being dropped in the past.	• Replace the stator controller ass’y.
	• Faulty connection between switch and connector cable	• Check for connection between the DC-speed control switch and the connector cable. (See “1. Reassembly of the power supply unit and its vicinity” on page 6.)	• Insert the connector cable properly.
	• Switch connector failure	• Check the connector of the connector cable for corrosion. • Check the condition of the metallic terminal (pin) in the switch connector for corrosion.	• Replace the DC-speed control switch or the stator controller ass’y.
	• Faulty contact in the switch	• Check the connector cable of the stator controller ass’y and the switch connector for any abnormality.	• Replace the DC-speed control switch.
LED light does not turn on.	• Stator controller ass'y failure	• Turn on the switch and check whether the LED light turns on using a fully charged battery.	• Replace the stator controller ass’y.

REPAIR GUIDE

WARNING: Always remove the battery from the main body before starting repair or maintenance work. Because the tool is cordless, inadvertently activating the switch with the battery left in the main body will start the motor rotating unexpectedly, and could cause serious injury.

1. Precautions on disassembly and reassembly

[Bold] numbers in the description below correspond to the item numbers in the parts lists and exploded assembly diagrams for the Models DV 18DE and DV 18DEX.

Disassembly

1. Removal of the hook ass'y

Remove the Truss Hd. Screw M4 (Black) **[50]** and the Hook **[51]**. The Hook **[51]** need not be removed, but is removed here to facilitate disassembly work.

2. Removal of the tail cover and housing (A).(B) set

(1) Remove the two Tapping Screws (W/Flange) D3 x 16 (Black) **[42]** from the Tail Cover **[43]** and then remove the Tail Cover **[43]**.

(2) Remove the nine Tapping Screws (W/Flange) D3 x 16 (Black) **[42]** from the tool body. Hold Housing (A).(B) Set **[46]** at its battery mount portion, and then gently open it.

(3) After opening Housing (A).(B) Set **[46]**, lift up Clutch Dial (V) **[4]** to take out the built-in parts together from the inside of Housing (A).(B) Set **[46]**. The built-in parts are the Gear Box Ass'y **[3]**, Rotor Pinion Ass'y **[38]**, Pushing Button **[45]**, Stator Controller Ass'y **[37]**, Shift Knob **[40]**, and Strap (Black) **[52]** (Model DV 18DE only). Pull out the Gear Box Ass'y **[3]** from the Rotor Pinion Ass'y **[38]** attached to the Stator Controller Ass'y **[37]**.

NOTE: The Rotor Pinion Ass'y [38] is removed together with the stator because the rotor has strong magnetic force.

3. Disassembly of the gear unit

• Disassembly of the gear box ass'y and hand-clamping mechanism

(1) Turn the Motor Spacer **[36]** counterclockwise and remove it from the Gear Box Ass'y **[3]**. Remove the Shift Arm **[18]**.

NOTE: Be careful not to deform the Shift Arm [18] by applying excessive force to it.

(2) Turn Washer (B) **[35]** mounted in the Gear Case **[19]** counterclockwise and remove it. Then, take out the First Ring Gear **[34]**, Planet Gear (A) Set (4 pcs.) **[33]**, Pinion (B) **[32]**, Planet Gear (B) Set (4 pcs.) **[31]**, Pinion (C) **[30]**, and Slide Ring Gear **[29]** in this order.

(3) Push Needle Roller (A) Set D2.2 (2 pcs.) **[20]** with a thin pin and pull it out from the other side of the Gear Case **[19]**. Then, take out the Shift Dog **[28]**, Planet Gear (C) Set (5 pcs.) **[27]**, Carrier **[26]**, Ring Gear **[25]**, six Steel Balls D5 **[24]**, four Rollers **[23]**, Lock Ring **[22]**, and Washer (B) **[21]** in this order from the inside of the Gear Case **[19]**.

NOTE: Because the parts are very small, be careful not to lose them. Pay particular attention to the four Rollers [23] and six Steel Balls D5 [24] that may easily roll away.

4. Removal of the drill chuck

(1) Clamp the width-across-flats portion of the J-387 spindle lock jig (Code No. 370146) by using a vise. Insert the Spindle **[12]** into the square hole of the J-387 spindle lock jig. Fully open the jaws of the Drill Chuck **[2]** and turn the Hexalobula Screw (Left Hand) M6 **[1]** clockwise to remove it.

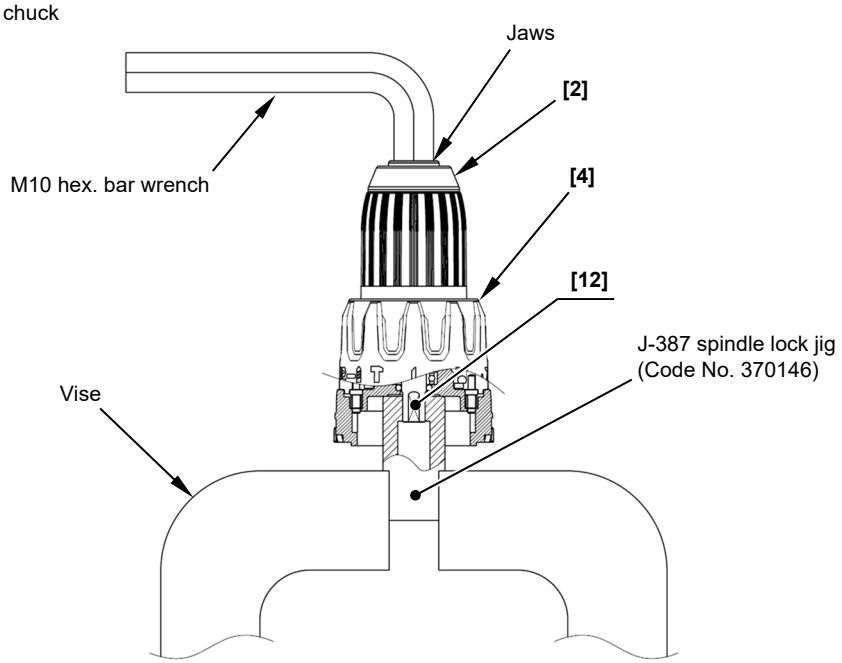
NOTE: The Hexalobula Screw (Left Hand) M6 [1] is a left-hand screw.

(2) Insert an M10 hex. bar wrench in the Drill Chuck **[2]**, and then turn the wrench counterclockwise to remove the Drill Chuck **[2]**. Use a pipe or other means of leverage in case the Drill Chuck **[2]** is difficult to loosen.

NOTE: • To remove the Drill Chuck [2], high torque is required because adhesive was applied to the internal thread portion of the Drill Chuck [2]. Be sure to follow the above steps to remove the Drill Chuck [2]. Do not hold the tool main body directly to remove the Drill Chuck [2]. If doing so, the Lock Ring [22] may be damaged.

• Remove adhesive hardened on the internal threaded portion of the Drill Chuck [2] and the external threaded portion of the Spindle [12] using a precision screwdriver completely when reusing the removed the Drill Chuck [2] and Spindle [12].

• Removal of the drill chuck



5. Disassembly of the clutch mechanism

(1) Disassembly of the clutch mechanism

• Remove the Click Spring **[5]** from the Gear Box Ass'y **[3]**.

NOTE: If it is hard to remove, use pliers to pull out the Click Spring [5] without applying excessive force.

• Remove the C-ring **[8]** and Cover **[7]**.

• Turn the Nut **[9]** counterclockwise to remove it from the Gear Case **[19]**. Remove the Spring **[10]** and Thrust Plate **[11]**.

(2) Disassembly of the impact mechanism

• The Spindle **[12]** is press-fitted in the Gear Case **[19]**. Support the Gear Case **[19]** and push the Spindle **[12]** on the opposite side of its threaded portion with a hand press slowly to remove the Spindle **[12]**, Spring (C) **[13]**, Ratchet (B) **[14]**, Washer (A) **[15]**, two Slip Blocks **[16]**, and two Stopper Springs **[17]**.

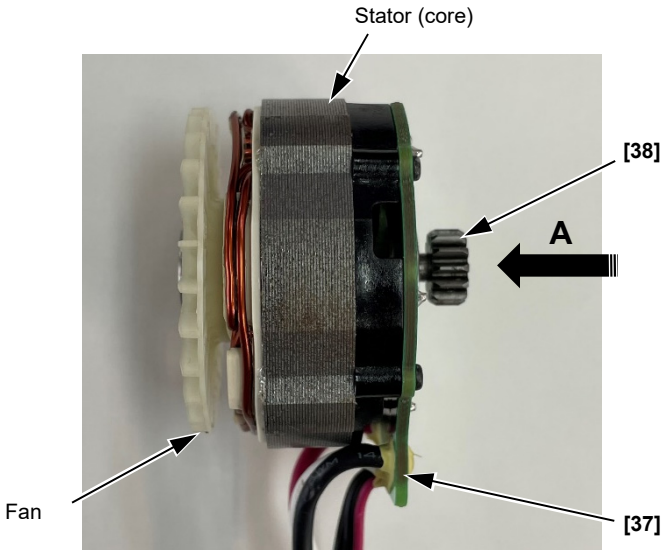
NOTE: Do not disassemble the Spindle [12] and Gear Case [19].

6. Removal of the rotor pinion ass'y

The Rotor Pinion Ass'y **[38]** has strong magnetic force. Firmly hold the stator (core) of the Stator Controller Ass'y **[37]** and slowly push the ball bearing (opposite to the pinion) of the Rotor Pinion Ass'y **[38]** in "A" direction as shown in the figure below.

NOTE: Be careful not to damage the fan.

• Removal of the rotor pinion ass'y

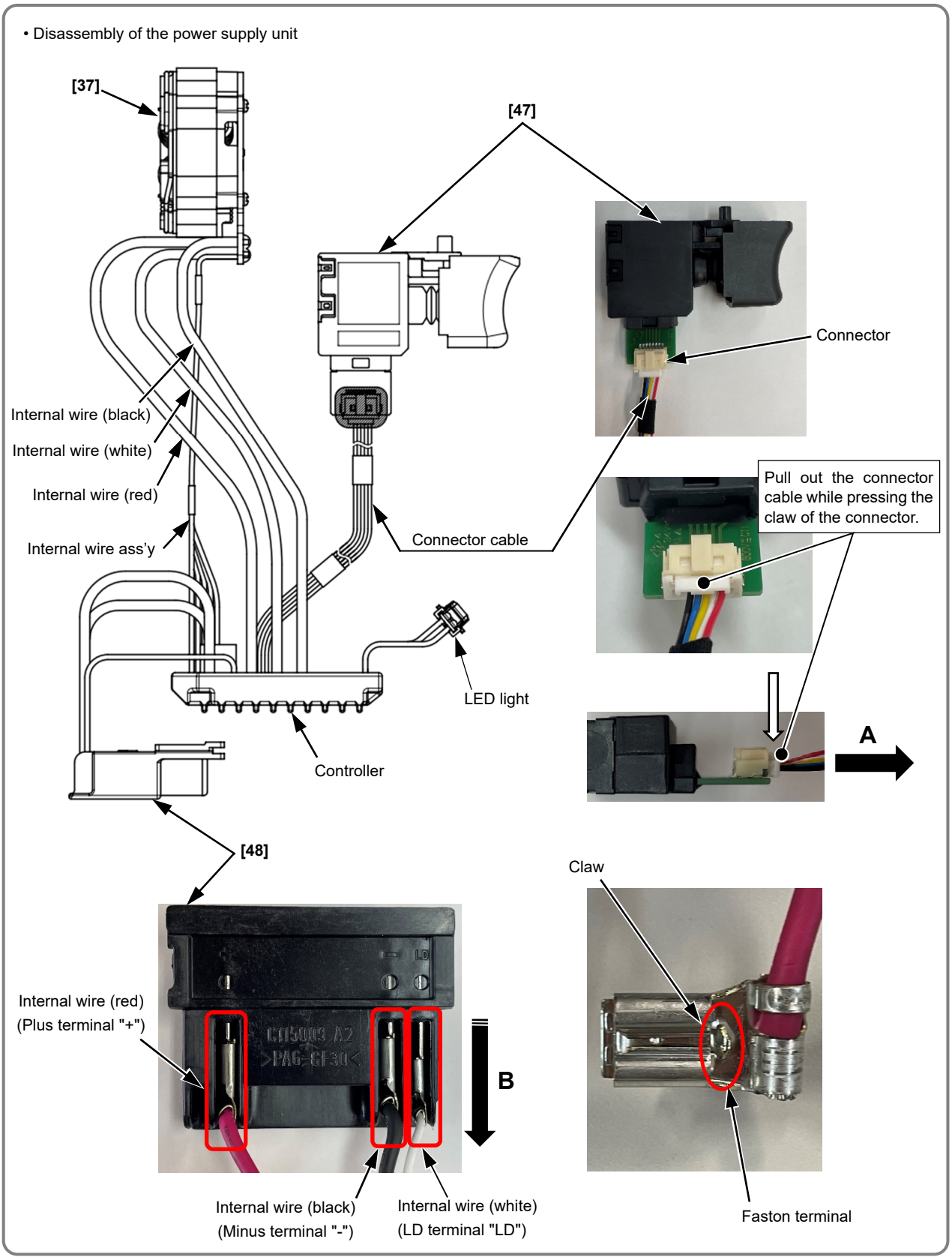


7. Disassembly of the power supply unit

(1) Peel silicone off the connector of the DC-Speed Control Switch **[47]** with a flat-blade screwdriver. To remove the connector cable of the Stator Controller Ass'y **[37]**, pull the connector cable lightly in "A" direction while pressing the claw of the connector.

NOTE: Be careful not to scratch the connector of the DC-Speed Control Switch [47] and the connector cable when peeling off silicone.

(2) Remove the Battery Terminal **[48]** from the Stator Controller Ass'y **[37]**. To remove the faston terminal, pull the internal wire in "B" direction while pressing the claw of the faston terminal.



Reassembly

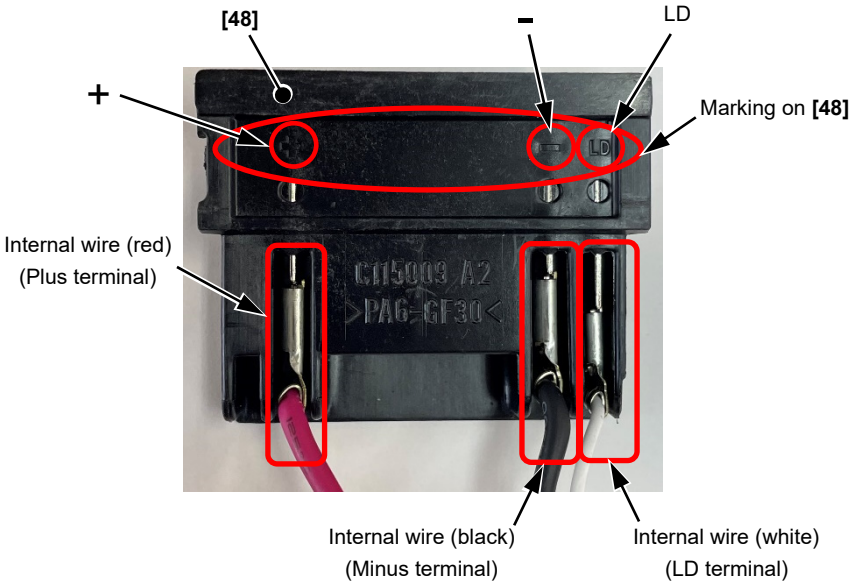
Generally perform reassembly by reversing the disassembly procedure. However, special attention should be given to the following items.

1. Reassembly of the power supply unit and its vicinity

(1) Insert the Battery Terminal **[48]** into the Stator Controller Ass'y **[37]** until the faston terminal clicks into place.

- Insert the red internal wire into the portion marked with "+" on the Battery Terminal **[48]**.
- Insert the black internal wire into the portion marked with "-" on the Battery Terminal **[48]**.
- Insert the white internal wire into the portion marked with "LD" on the Battery Terminal **[48]**.
- After inserting the internal wires, check that the internal wires are securely connected by pulling the internal wires lightly.

• Inserting the internal wires into the battery terminal



(2) Pay attention to the following when connecting the DC-Speed Control Switch **[47]**.

- Insert the connector cable into the connector as far as it will go.
- Align the red line on the connector cable parallel to the connector when inserting the connector cable.
- After inserting the connector cable into the connector, apply silicone (U-BOND UB511) to the connector entirely.
- Do not carry the Stator Controller Ass'y **[37]** by holding the connector cable. Do not pull the connector cable.

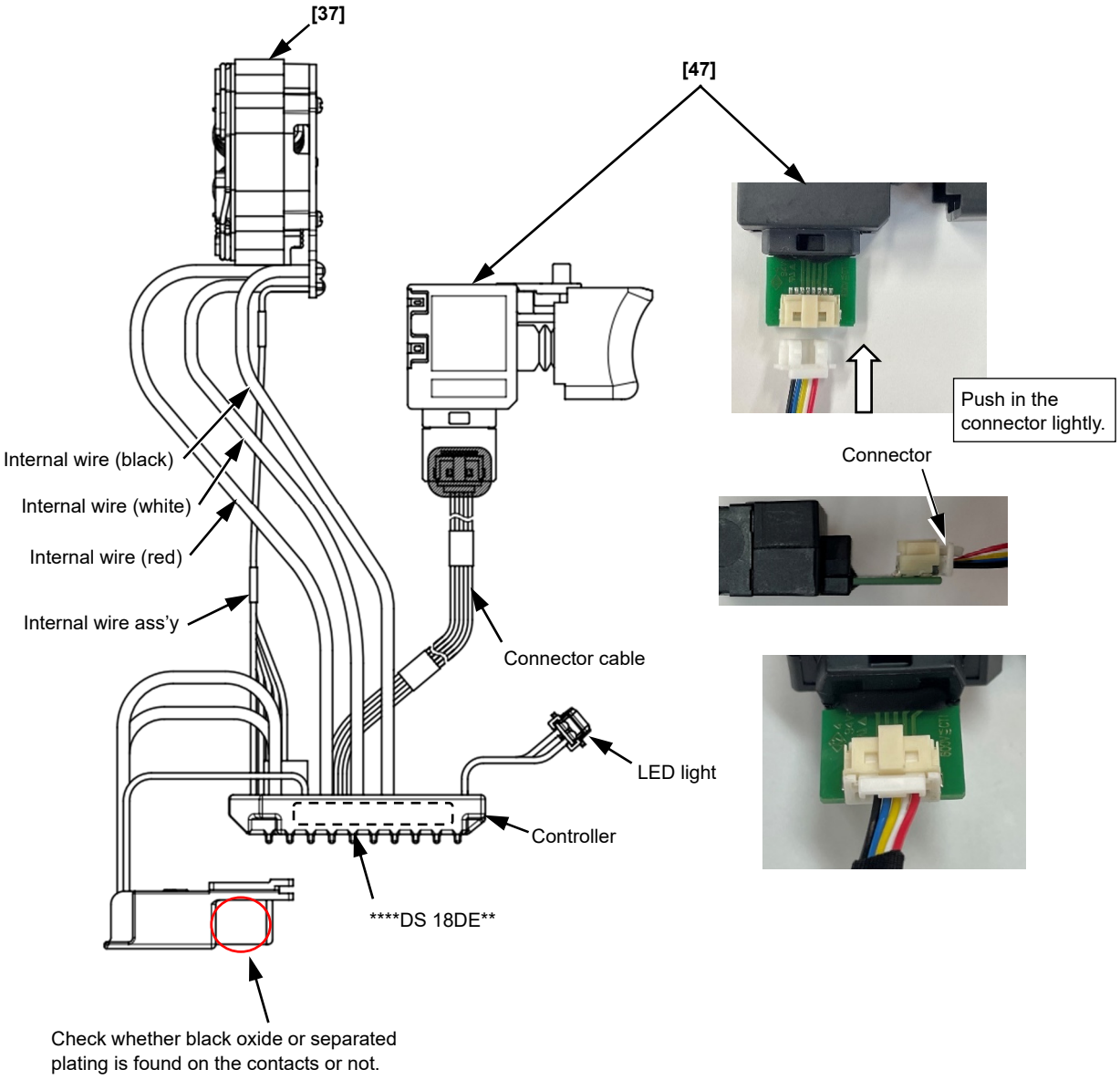
(3) Push the internal wire ass'y and each internal wire of the Stator Controller Ass'y **[37]** in the guide grooves of housing (A) securely to prevent the internal wires from being caught between housings (A) and (B).

(4) Put the connector cable between the screw bosses of housing (A) securely to prevent the connector cable from being caught between housings (A) and (B).

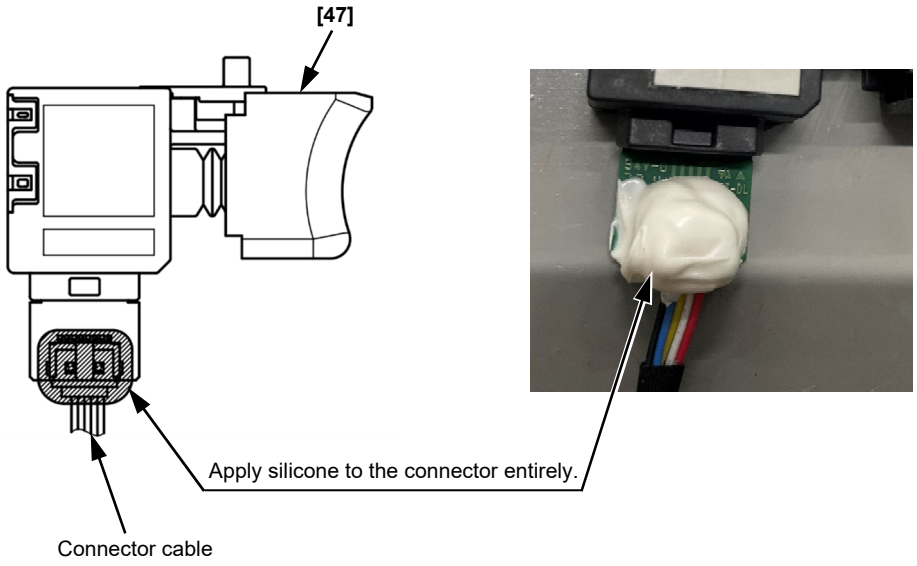
(5) Fit the protrusion of the direction selector lever on the top of the DC-Speed Control Switch **[47]** into the hole on the Pushing Button **[45]** and mount it to housing (A).

NOTE: If the contacts of the Battery Terminal [48] with the battery are covered with black oxide or not plated, the contacts may heat up, possibly resulting in breakdown of the battery or the tool main body. In such a case, replace the Battery Terminal [48] with new one.

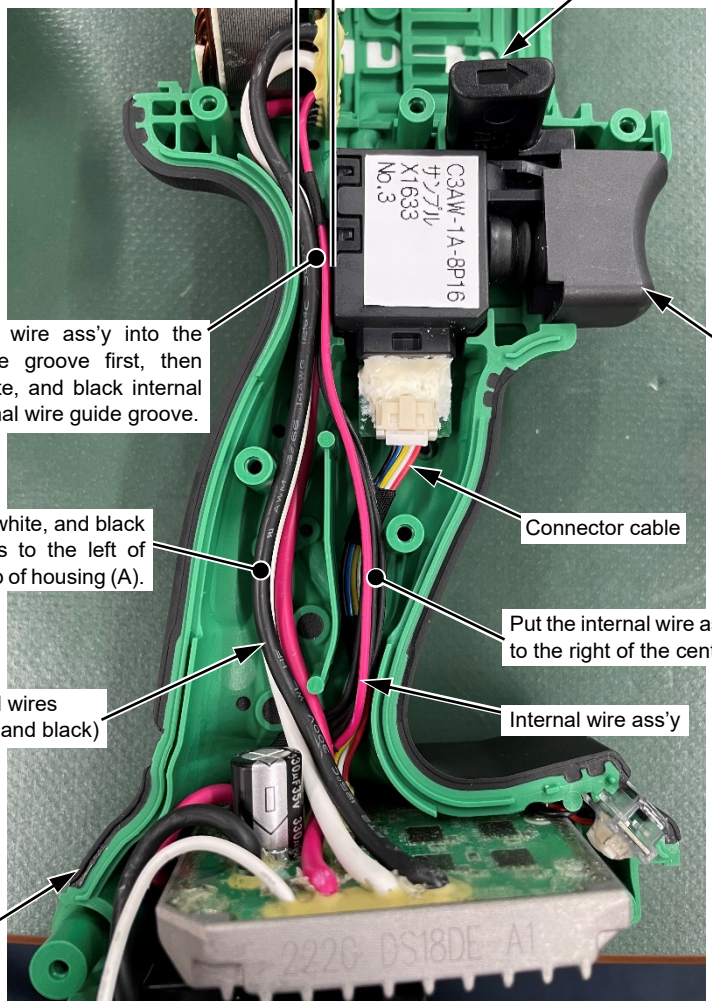
• Reassembly of the power supply unit and its vicinity (1)



• Application of silicone to the connector



• Reassembly of the power supply unit and its vicinity (2)



2. Reassembly of the gear unit

(1) Reassembly of the clutch mechanism

Mount the Thrust Plate **[11]** and Spring **[10]** to the Gear Case **[19]**. Mount the Nut **[9]** to the Gear Case **[19]** as shown in (A) and (B) of the figure "Mounting the nut" on page 10 and then turn the Nut **[9]** clockwise by a half turn to secure it in place as shown in (C). Fit the Cover **[7]** and C-ring **[8]** in the groove of the Nut **[9]** in the order of (A) to (B) as shown in the figure “Mounting the cover and C-ring” on page 11.

(2) Reassembly of the impact mechanism

Apply an appropriate amount of grease to Washer (A) **[15]**, Ratchet (B) **[14]**, and two Slip Blocks **[16]** according to “Lubrication points and type of lubricant” on page 16.

Mount the two Stopper Springs **[17]**, two Slip Blocks **[16]**, Washer (A) **[15]**, Ratchet (B) **[14]**, Spring (C) **[13]**, and Spindle **[12]** to the Gear Case **[19]** in series. Use the J-392 BB. press fit jig (Code No. 371218) to press-fit the outer ring of the ball bearing of the Spindle **[12]** into the Gear Case **[19]**.

NOTE: Be sure to mount the Thrust Plate [11], Spring [10], and Nut Cover Ass’y [6] before mounting the Spindle [12].

(3) Mounting clutch dial (V)

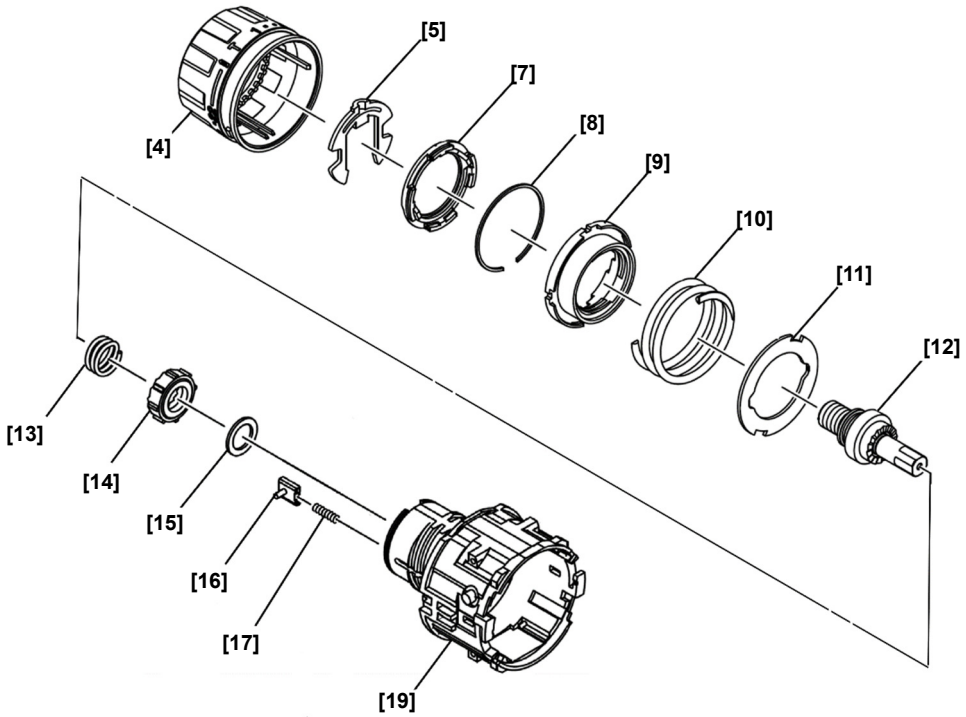
Insert the convex portion of the Click Spring **[5]** into the groove of the Gear Case **[19]** according to the figure "Mounting the click spring" on page 11.

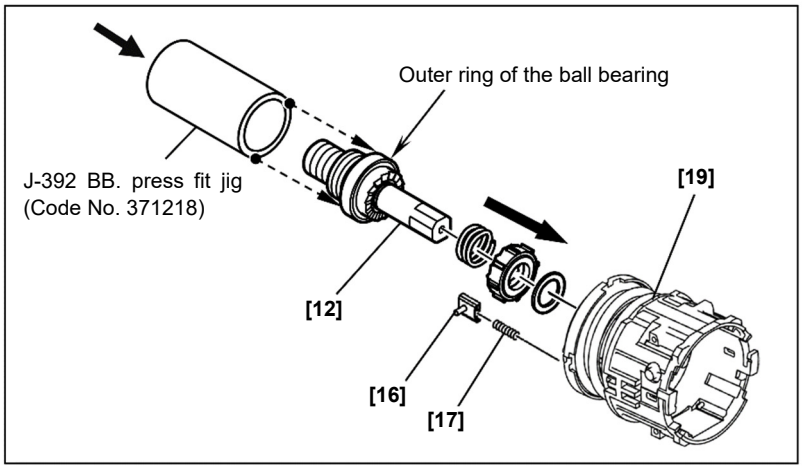
Mount the Nut Cover Ass’y **[6]** to Clutch Dial (V) **[4]** aligning the ribs of Clutch Dial (V) **[4]** with the grooves of the Nut **[9]** according to the figure "Mounting clutch dial (V)" on page 11.

(4) Mounting the drill chuck

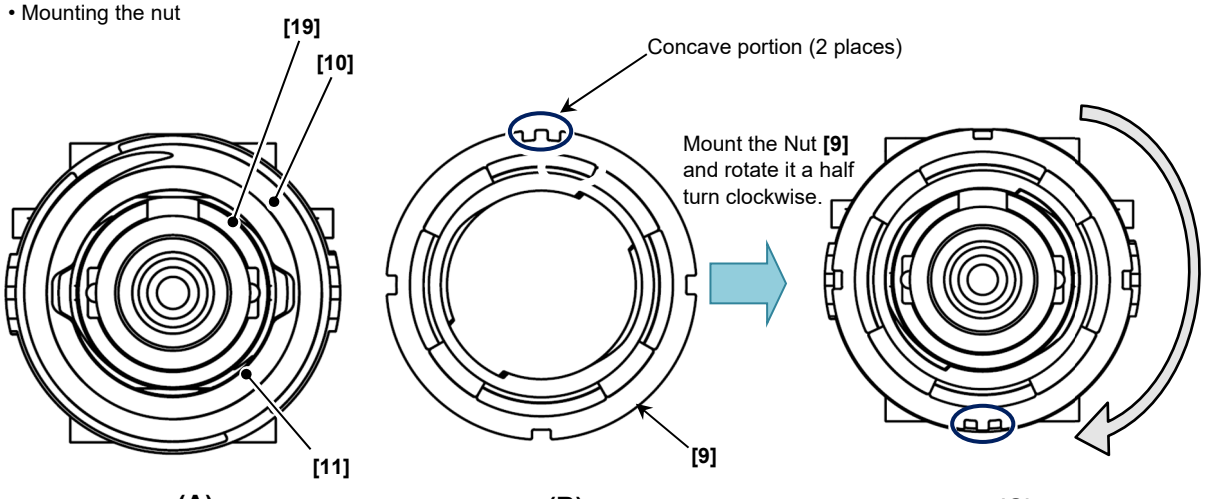
Hold the Spindle **[12]** using the J-387 spindle lock jig (Code No. 370146) as shown in the figure on page 3. Insert an M10 hex. bar wrench into the Drill Chuck **[2]** and turn the wrench to tighten the Drill Chuck **[2]**. Remove the M10 hex. bar wrench and turn the Hexalobula Screw (Left Hand) M6 **[1]** counterclockwise to tighten. There is no need to apply adhesive to the internal threaded portion of the Drill Chuck **[2]** and external threaded portion of the Spindle **[12]**.

• Reassembly of the clutch mechanism

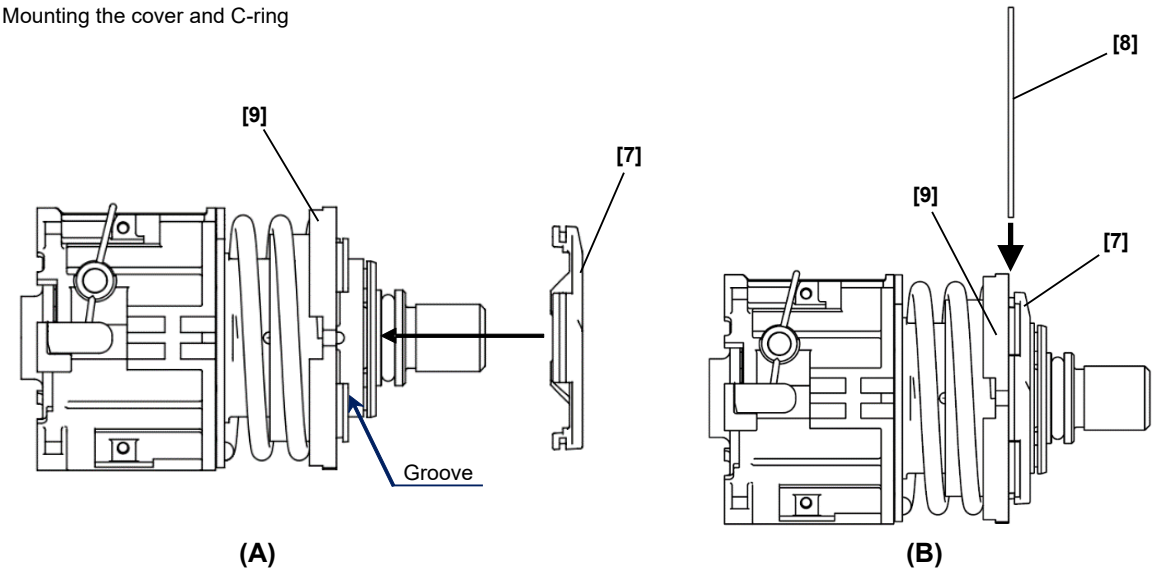




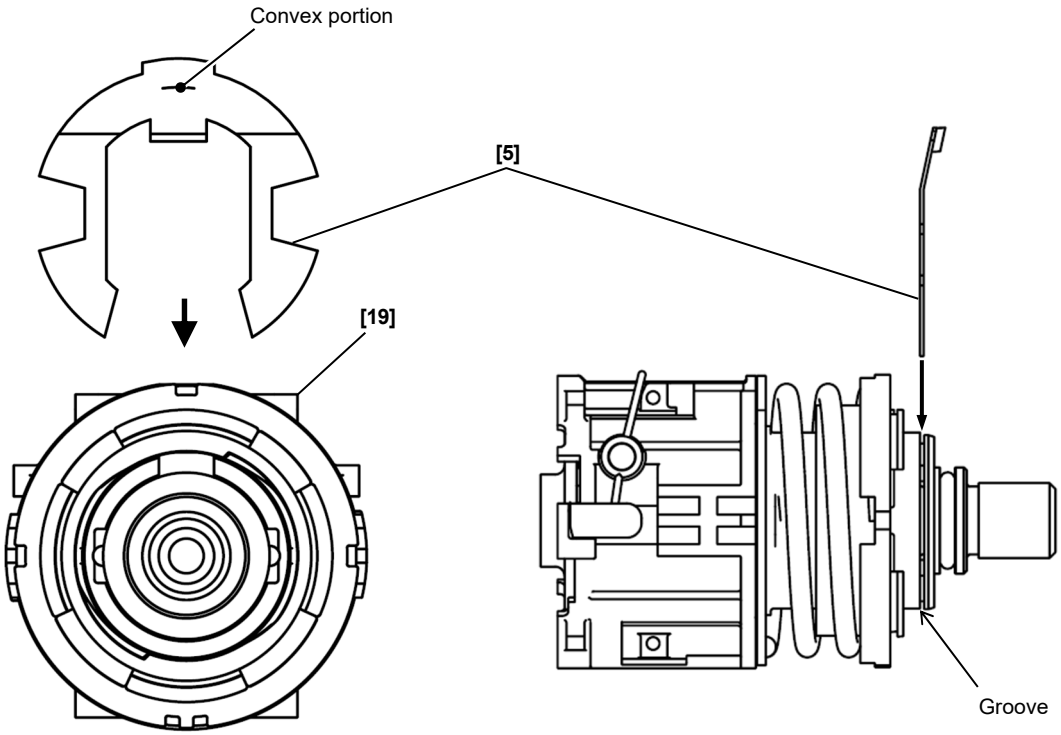
• Mounting the nut



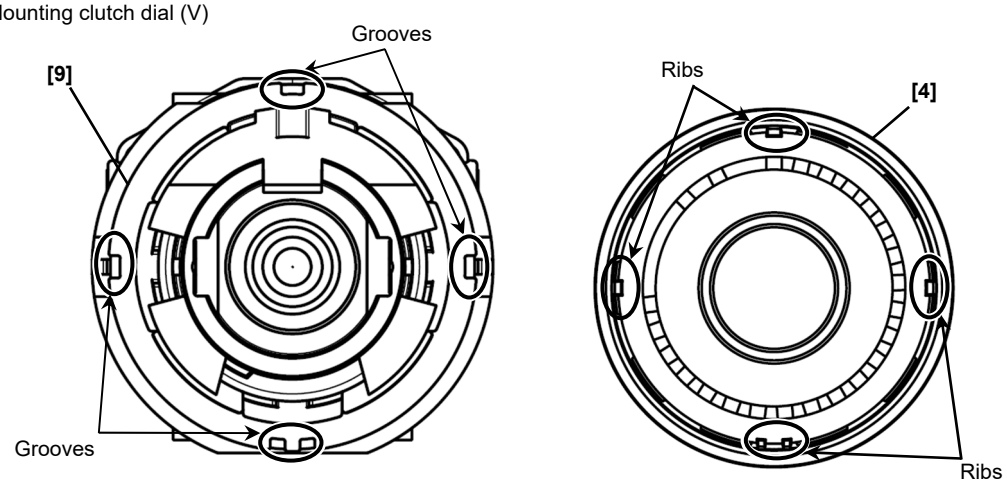
• Mounting the cover and C-ring



• Mounting the click spring



• Mounting clutch dial (V)

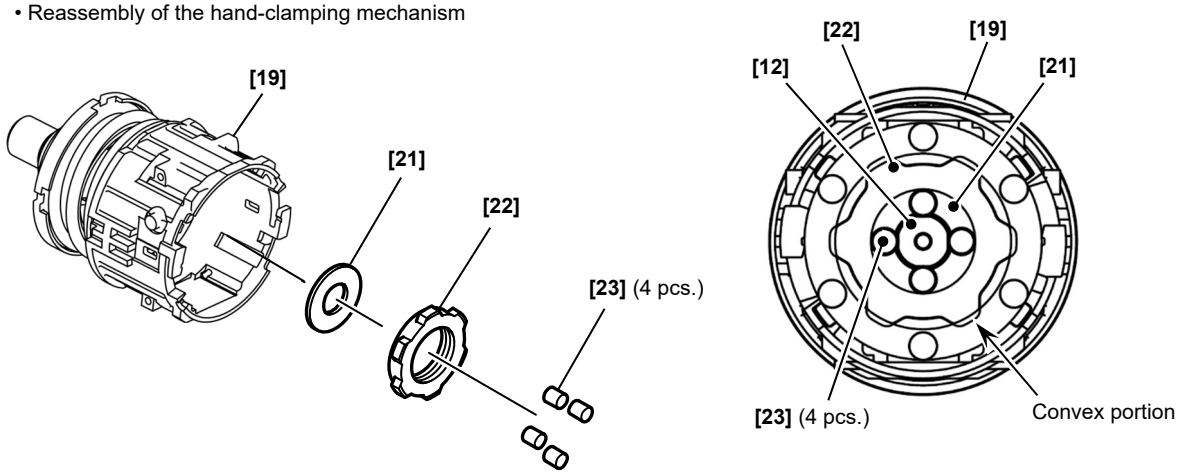


(5) Reassembly of the hand-clamping mechanism

Mount Washer (B) **[21]**, Lock Ring **[22]** and four Rollers **[23]** in the Gear Case **[19]** in this order.

NOTE: Fit the convex portions of the Lock Ring [22] in the concave portions of the Gear Case [19].

• Reassembly of the hand-clamping mechanism

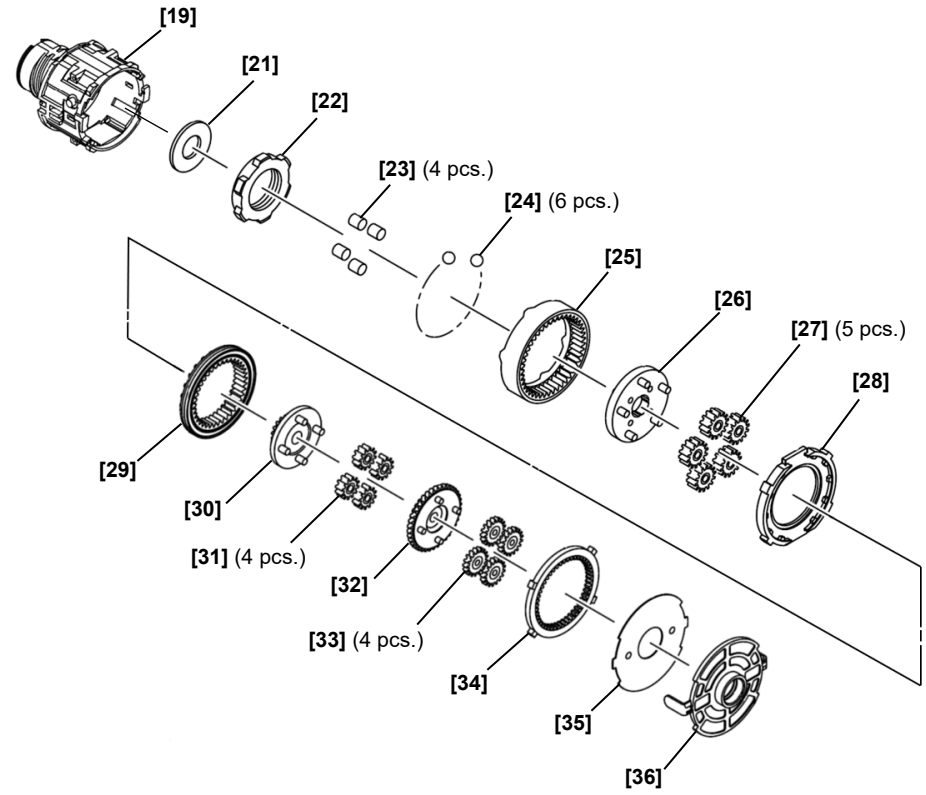


(6) Reassembly of the gear box ass'y

- Apply an appropriate amount of grease to each gear according to “Lubrication points and type of lubricant” on page 16.
- Mount the parts from the six Steel Balls D5 **[24]** to Washer (B) **[21]** in series to the assembly reassembled in the above “(5) Reassembly of the hand-clamping mechanism.”

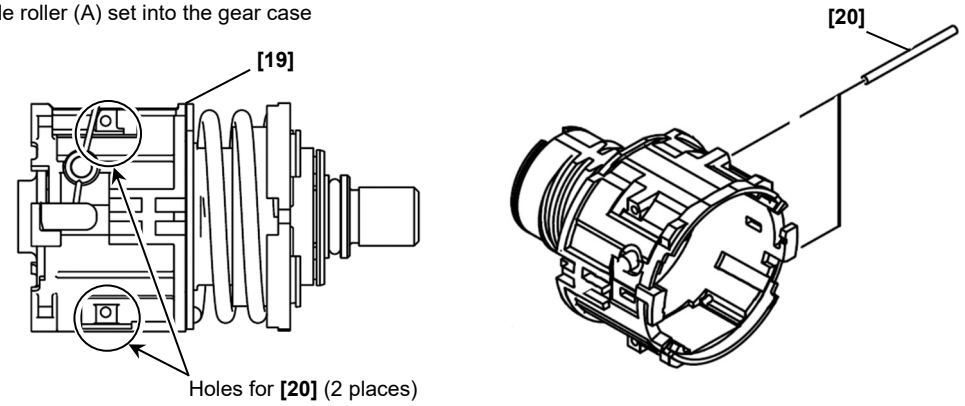
NOTE: The Ring Gear [25], Carrier [26], Shift Dog [28], Slide Ring Gear [29], Pinion (C) [30], and Pinion (B) [32] all have a specific orientation as shown in the figure below.

• Reassembly of the gear box ass'y



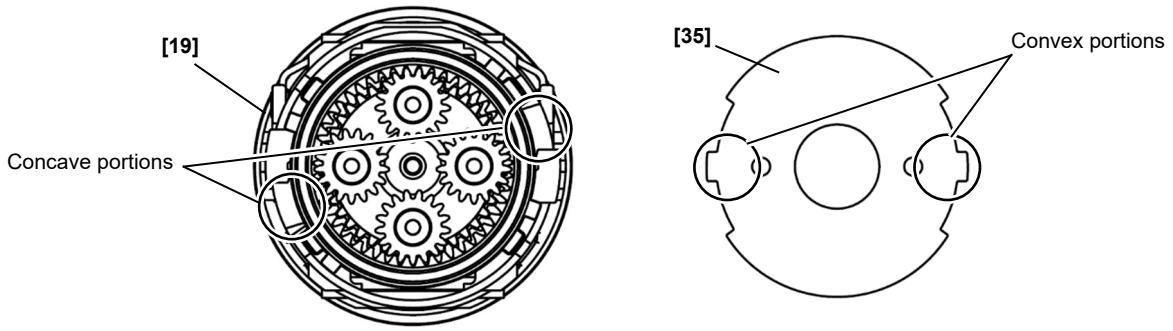
• After mounting the Shift Dog **[28]**, insert Needle Roller (A) Set D2.2 (2 pcs.) **[20]** into the Gear Case **[19]**.

• Inserting needle roller (A) set into the gear case



• Fit the convex portion of Washer (B) **[35]** into the concave portion of the Gear Case **[19]**, and then turn Washer (B) **[35]** clockwise viewing from the rotor side until it contacts the Gear Case **[19]**.

• Mounting washer (B) to the gear case

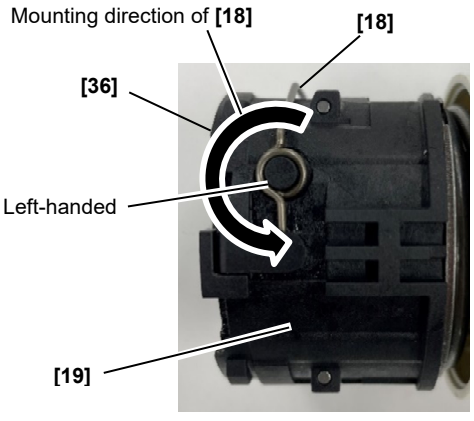


3. Reassembly of the drive unit

(1) Hook the loops of the Shift Arm **[18]** on the convex portions of the Gear Case **[19]**. Check that both ends of the Shift Arm **[18]** are put in the grooves of the Slide Ring Gear **[29]** built in the Gear Case **[19]**.
NOTE: The Shift Arm [18] has a specific orientation.

(2) Fit the claw of the Motor Spacer **[36]** in the concave portion of the Gear Case **[19]**. Turn the Motor Spacer **[36]** clockwise viewing from the rotor side until it contacts the Gear Case **[19]**.

• Mounting the shift arm



4. Reassembly of housing (A).(B) set

(1) Apply an appropriate amount of grease to the two Rear Bumpers **[44]** according to “Lubrication points and type of lubricant” on page 16.

(2) Insert the two Rear Bumpers **[44]** into housings (A) and (B).

(3) Mount the reassembled power supply unit, gear unit, and drive unit in housings (A) and (B) with the convex portions of the Gear Case **[19]** and the Motor Spacer **[36]** fitted in the concave portions of housings (A) and (B).

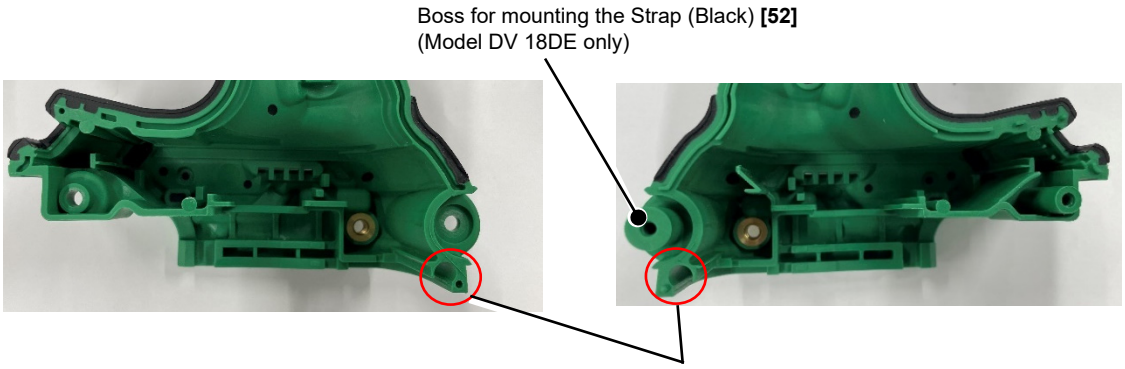
(4) Check that the protrusion of the direction selector lever of the DC-Speed Control Switch **[47]** is correctly put in the hole of the Pushing Button **[45]**.

(5) Fit the Shift Arm **[18]** in the groove of the Shift Knob **[40]** positioning the "2" marking on the Shift Knob **[40]** at the rear.

(6) Mount the Strap (Black) **[52]** (Model DV 18DE only) to housing (A).

(7) Put housings (A) and (B) together and fasten it with the nine Tapping Screws (W/Flange) D3 x 16 (Black) **[42]**.

• Reassembly of housing (A).(B) set



5. Mounting the rotor pinion ass'y and tail cover

(1) Apply an appropriate amount of grease to the tooth surface of the Motor Pinion **[39]** according to "Lubrication points and type of lubricant" on page 16.

(2) Press-fit the Rotor Pinion Ass'y **[38]** into Housing (A).(B) Set **[46]** from behind.

(3) Press-fit the Tail Cover **[43]** into Housing (A).(B) Set **[46]** and tighten the two Tapping Screws (W/Flange) D3 x 16 (Black) **[42]**.

(4) After reassembly, run the motor at low speed to check that the Rotor Pinion Ass'y **[38]** rotates smoothly.

NOTE: If the Rotor Pinion Ass'y [38] does not rotate smoothly, the gear is improperly engaged. In such a case, mount the Rotor Pinion Ass'y [38] properly. If the stator of the Stator Controller Ass'y [37] cannot be mounted to the housing properly, the core is out of position or there is a gap between housings (A) and (B) at the upper part of the motor. In such a case, mount the Stator Controller Ass'y [37] properly. Replace Housing (A).(B) Set [46] with new one if the ribs on Housing (A).(B) Set [46] for holding the stator are deformed.

(5) After completing reassembly up to step (4), check that each marking on Clutch Dial (V) **[4]** from "1" to hammer mark " T " is aligned with the triangle mark on Housing (A).(B) Set **[46]**, and that Clutch Dial (V) **[4]** rotates regularly. If number "1" or the hammer mark " T " on Clutch Dial (V) **[4]** is not properly aligned with the triangle mark on Housing (A).(B) Set **[46]**, the Nut **[9]** or other parts may be improperly mounted. Mount Clutch Dial (V) **[4]** or other parts correctly as described in "Reassembly of the clutch mechanism" on page 9. Check the operation of the Shift Knob **[40]**. Switch the Shift Knob **[40]** and make sure the speed is correctly switched between HIGH and LOW. If the speed change is disabled or abnormal, the Shift Knob **[40]** or other parts may not be properly mounted. Mount the Shift Knob **[40]** or other parts correctly as described in "Reassembly of the gear box ass'y" on page 12 or "Reassembly of the drive unit" on page 13.

6. Mounting the hook

Insert the Hook **[51]** into the groove at the bottom of the side of Housing (A).(B) Set **[46]** and fasten it with the Truss Hd. Screw M4 (Black) **[50]**. The Hook **[51]** can be mounted on either side of the tool body.

Checking after reassembly

After reassembly, install the battery and check for operation of each component as follows.

(1) Checking for lighting of the LED light

Check that the LED light turns on while pulling the switch and automatically turns off in about ten seconds when you release your finger from the switch.

(2) Checking for rotating direction of the drill chuck

Press the Pushing Button **[45]** and check that the Drill Chuck **[2]** rotates as indicated on the button. When you press the “R” side of the Pushing Button **[45]**, the Drill Chuck **[2]** turns clockwise as viewed from the rear of the tool body.

(3) Checking for runout of the drill chuck

Check that runout of the Drill Chuck **[2]** is up to 0.8 mm under the following condition.

• Set a 12-mm dia. test bar in the Drill Chuck **[2]** and measure runout of the Drill Chuck **[2]** at a position 110 mm away from the tip of the Drill Chuck **[2]**.

Tightening torque

Item No.	Part name	No. used	Tightening torque	
			N•m	kgf•cm
[1]	Hexalobula Screw (Left Hand) M6	1	4.41 ± 0.5	45 ± 5
[2]	Drill Chuck 13VLRU-N (W/O Chuck Wrench)	1	29.4 ± 2	300 ± 20
[42]	Tapping Screw (W/Flange) D3 x 16 (Black)	11	1.3 ± 0.3	13 ± 3
[50]	Truss Hd. Screw M4 (Black)	1	1.8 ± 0.4	18 ± 4

Type of silicone rubber

Please purchase the following silicone rubber as necessary.

Item	Registered part name	Net weight	Code No.
ThreeBond 1211	Silicone rubber	100 g	306927

Lubrication points and type of lubricant

Apply an appropriate amount of grease to the following portions.

MOLUB-ALLOY 777-1

- Tooth surface of Planet Gear (C) Set **[27]** and five needle rollers on the Carrier **[26]** that support Planet Gear (C) Set **[27]**
- Tooth surface of Planet Gear (B) Set **[31]** and four needle rollers on Pinion (C) **[30]**
- Tooth surface of Planet Gear (A) Set **[33]** and four needle rollers on Pinion (B) **[32]**
- Six protruded portions of the Ring Gear **[25]**
- Four needle rollers on the Carrier **[26]**
- Outer circumference of the O-ring of the Spindle **[12]**
- Mating portion between the Shift Arm **[18]** and Slide Ring Gear **[29]**
- Both sides of Washer (A) **[15]**
- Tooth surface of Ratchet (B) **[14]**
- Lateral sides of the two Slip Blocks **[16]**

NIPPECO SEP-3A

- Tooth surface of the Motor Pinion **[39]**
- Entire circumference of two Rear Bumpers **[44]**

Please purchase the following grease as necessary.

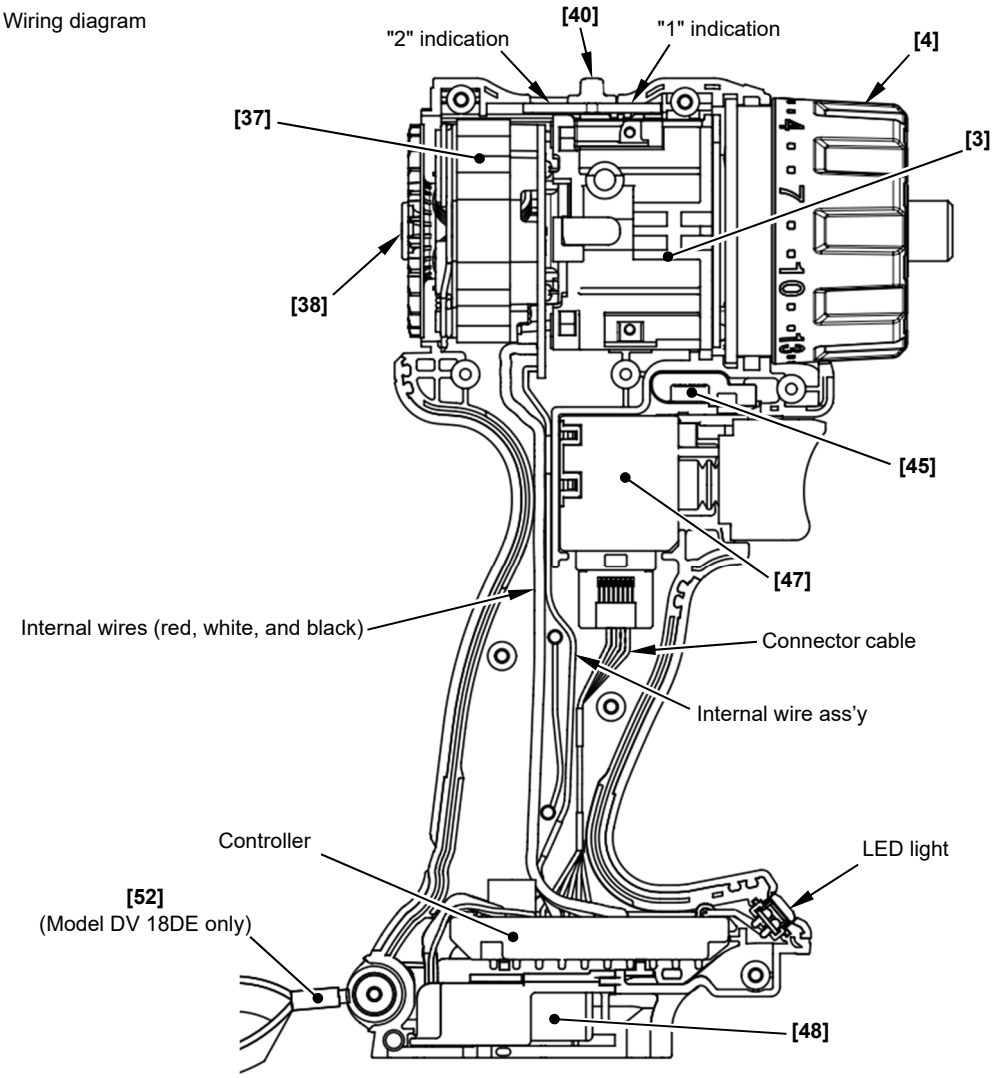
Item	Registered part name	Net weight	Code No.
MOLUB-ALLOY 777-1	Grease (Molub-Alloy No. 777-1) 75 g	75 g	375042
NIPPECO SEP-3A	Grease (SEP-3A) (100 g)	100 g	930035
	Grease (SEP-3A) (2.5 kg)	2.5 kg	930038

No-load current

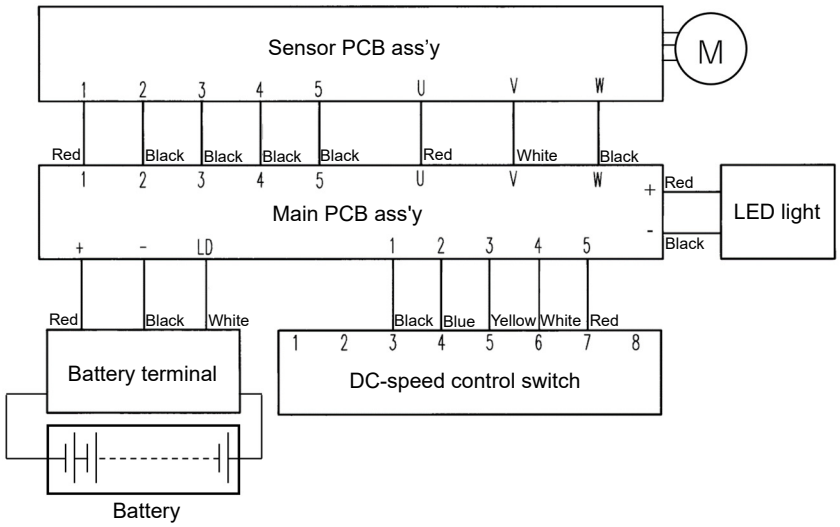
The no-load current should be 5.5 ± 1.0 A (DC 19.8 V—equivalent to the voltage of a fully charged battery) after no-load operation for 5 minutes in “1” (low speed) mode.

Wiring diagram

• Wiring diagram



• Connecting diagram



2. Precautions on disassembly and reassembly of the charger

Refer to the service manual for precautions on disassembly and reassembly of the chargers Model UC 18YFSL and UC 18YKSL.