

CORDLESS DRIVER DRILL DDF489

CORDLESS HAMMER DRIVER DRILL DHP489

REPAIR MANUAL



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2 CAUTION

Repair the machine in accordance with "Instruction manual" or "Safety instructions".

Follow the instructions described below in advance before repairing:

- Wear gloves.
- In order to avoid wrong reassembly, draw or write down where and how the parts are assembled, and what the parts are. It is also recommended to have boxes ready to keep disassembled parts by group.
- Handle the disassembled parts carefully. Clean and wash them properly.
- Remove Battery, except when it is necessary to check the operation of the machine.

3 NECESSARY REPAIRING TOOLS (FOR TOOLS)

Code No.	Description	Use for
1R223	Preset torque wrench 20-90N·m	tightening Keyless drill chuck 13
1R224	Ratchet head 1/2"	using with 1R223
1R298	1/2" drive hex socket 10	removing/ assembling Keyless drill chuck 13
1R467	Drill chuck removal jig A	removing Keyless drill chuck 13
1R473	Drill chuck removal jig	removing/assembling Keyless drill chuck 13
1R473-E	Spacer B	
1R473-G	Pinion gear D	
1R479	Shockless hammer (Small)	disassembling Stator

4 LUBRICANT AND ADHESIVE APPLICATION (FOR TOOLS)



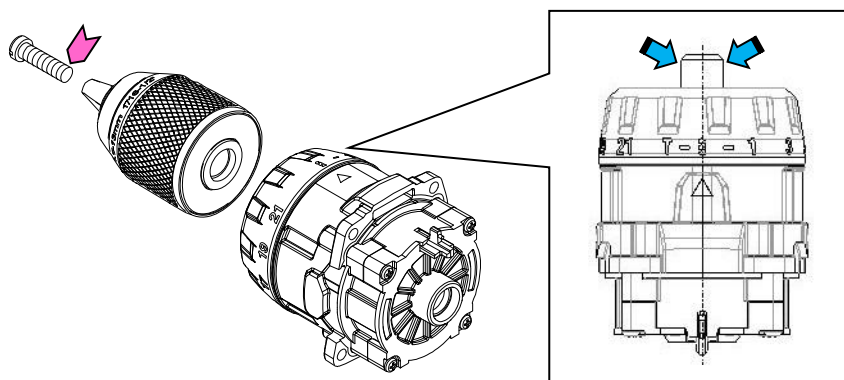
	Description	Amount
	Loctite 272	Apply a small amount evenly to two symmetrical portions.
	Loctite 243	a little

Fig. 1

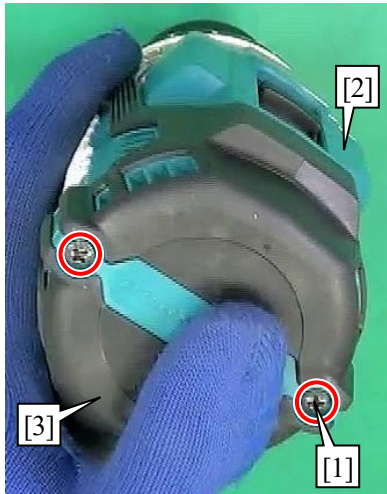


5 TIGHTENING TORQUE SPECIFICATIONS (FOR TOOLS)

Parts to fasten	Fastener and parts	Q'ty	Tightening torque [N·m]	Adhesion
Gear assembly ↔ Housing	Tapping screw 4x18	4	1.3 - 1.8	
Gear assembly ↔ Keyless drill chuck 13	Gear assembly	1	90 - 95	*1
Keyless drill chuck 13 ↔ Gear assembly	- Flat head screw M6x22	1	3.1 - 6.3	*2
<p>*1 Wipe off the adhesive portion on both new and reused bolts with carburetor cleaner and apply a small amount of Loctite 272 because the adhesive is attached.</p> <p>*2 Wipe off the adhesive portion on both new and reused bolts with carburetor cleaner and apply a small amount of Loctite 243 because the adhesive is attached.</p>				

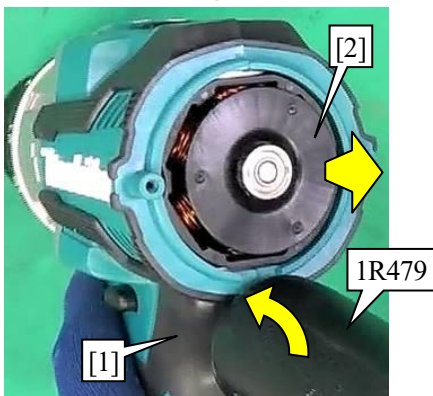
6 REPAIR (for Tools)
6-1 Housing section
6-1-1 Disassembling

Fig. 2



- 1 Remove Tapping screws bind PT 3x16 [1] (2 pcs), then remove Rear cover [3] from Housing [2].

Fig. 3



- 2 Tap Housing [1] with 1R479 to lift up Rotor section [2], then pull it out.

Fig. 4



- 3 Remove Tapping screws 4x18 [2] (4 pcs) from Gear assembly [1].

Fig. 5

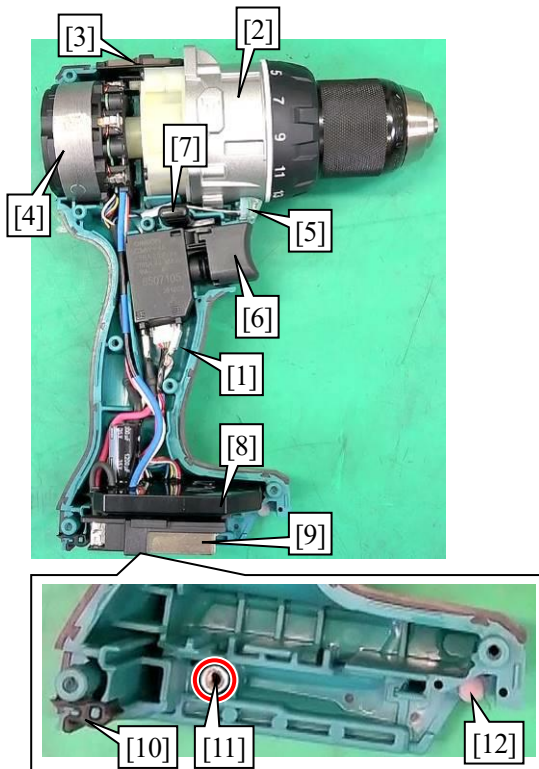


- 4 Remove Tapping screws bind PT 3x16 [1] (7 pcs), then remove Housing R [2].

Tips

Put the removed Tapping screws bind PT 3x16 [1] (7 pcs), Tapping screws bind PT 3x16 (2 pcs) and Tapping screws 4x18 (4 pcs) into Rear cover to prevent loss. (Fig. 1, Fig. 3)

Fig. 6



- 5 Remove the following parts from Housing L [1]:

- Gear assembly [2]
- Speed change lever [3]
- Stator [4]
- LED circuit [5]
- Switch [6]
- F/R change lever [7]
- Controller [8]
- Terminal [9]

- 6 Disconnect Connectors and Terminals.

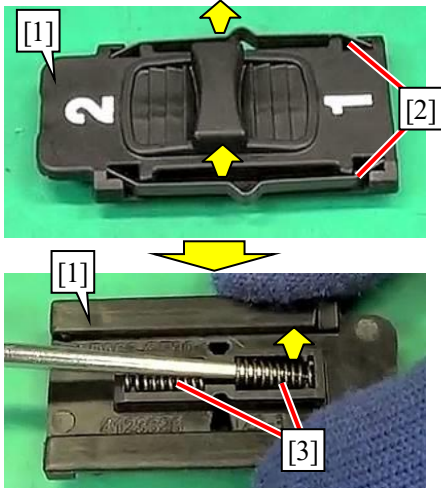
Tips

Cushion [10] is assembled only for DHP489. Remove and replace it if necessary.

Note

- Be careful with the assembling orientation of Cushion [10] for DHP489 only.
- In case Hex lock nuts 4-7 [11] (2 pcs) and Rubber pins 6 [12] (2 pcs) of Housing [1] fall off, get and assemble them.

Fig. 7



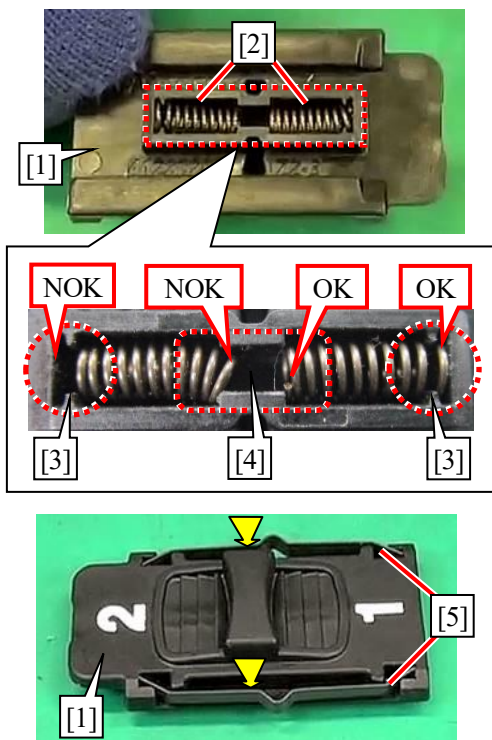
- 7 Remove Leaf springs [2] (2 pcs) and Compression springs 4 [3] (2 pcs) from Speed change lever [1].

Note

Compression springs 4 [3] may be deformed if they are forced to the side and removed, so use an awl to remove them by inserting it fully.

6-1-2 Assembling

Fig. 8



- 1 Assemble Compression springs 4 [2] (2 pcs) to Speed change lever [1].

Tips

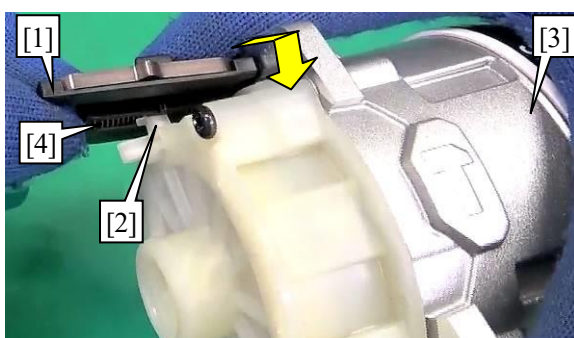
Hook only one roll of Compression springs 4 [2] around the ribs [3] (2 positions) of Speed change lever [2].

Note

The coil ends of Compression springs 4 [2] should not enter the center space [4] in Change lever [1].

- 2 Assemble Leaf springs [5] (2 pcs) to Speed change lever [1].

Fig. 9

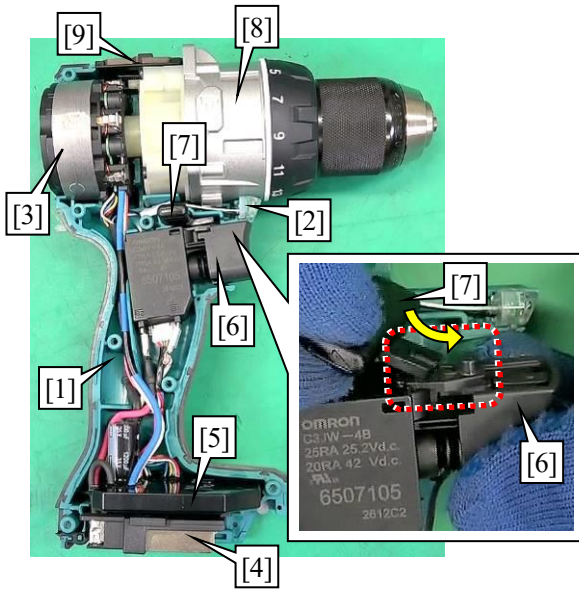


- 3 Assemble Speed change lever [1] to Change lever [2].

Tips

Insert the front side (Gear assembly side) of Speed change lever [1] into Gear assembly [3], then insert the top end of Switch lever [2] between the two Compression springs 4 [4], and then pull Speed change lever [1] toward the rear side (Rotor side).

Fig. 10



4 Assemble the electrical parts in accordance with Circuit diagram and Wiring diagram, then assemble the following parts to Housing L [1]:

- LED circuit [2]
- Stator [3]
- Terminal [4]
- Controller [5]

5 Assemble F/R change lever [7] to the protrusion of Switch [6], then assemble them to Housing L [1].

6 Assemble the unit of Gear assembly [8] and Speed change lever [9] to Housing L [1].

Note

Check that F/R change lever [7] and Switch [6] work properly after assembling them.

Fig. 11



7 Assemble Housing R [1] with Tapping screws bind PT 3x16 [2] (7 pcs).

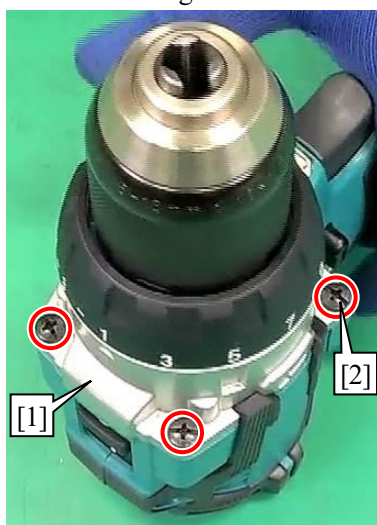
Tips

- Put Speed change lever toward the front (Gear assembly side).
- Assemble Housing R [1] by lifting Gear assembly slightly.

Note

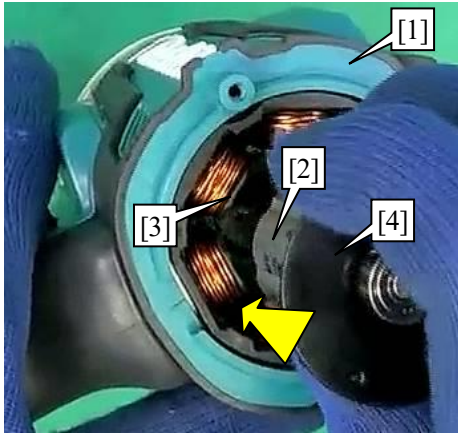
- Assemble Strap in advance, if it is used.
- Be careful not to pinch Lead wires.

Fig. 12



8 Assemble Gear assembly [1] to Housing by tightening Tapping screws 4x18 [2] (4 pcs).

Fig. 13



9 Insert Rotor [2] into Housing [1].

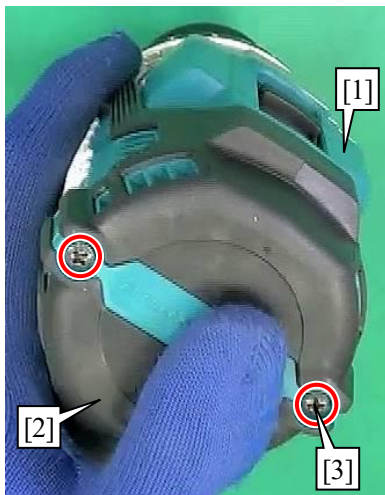
Tips

Turn Rotor [2] to engage the gears, then insert it to the bottom.

Note

Be careful not to pinch your fingers between Stator [3] and Fan [4] of Rotor [2] because they are pulled by a strong magnetic force.

Fig. 14



10 Assemble Rear cover [2] to Housing [1] with Tapping screws bind PT 3x16 [3] (2 pcs).

6-2 Drill chuck section

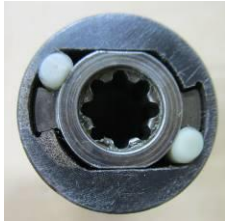

6-2-1 Disassembling and Assembling

Check the manual “[7 Repair for Keyless drill chuck 13](#)”.

7 Repair for Keyless drill chuck 13
7-1 NECESSARY REPAIRING TOOLS
7-1-1 Repair tools

Code No.	Description	Use for
1R223	Preset torque wrench 20-90N·m	tightening Keyless drill chuck 13
1R224	Ratchet head 1/2"	using with 1R223
1R298	1/2" drive hex socket 10	removing/assembling Keyless drill chuck 13
1R467	Drill chuck removal jig A	removing Drill chuck (Compatible models: See 7-1-2.)
1R467-A	Drill chuck removal jig B	
1R473	Drill chuck removal jig	removing/ assembling Keyless drill chuck (Compatible models: See 7-1-3.)
1R473-C	Pinion gear A	
1R473-D	Pinion gear B	
1R473-E	Spacer B	
1R473-F	Pinion gear C	
1R473-G	Pinion gear D	

7-1-2 1R467/467-A: Compatible models (as of December 1, 2022)

Side of use	Illustration	Compatible model
1R467 (Lock cam A side*) * where Rubber pins are fixed		DF001G/DDF441/DDF448/DDF451/DDF454/DDF458/ DDF481/DDF486/DDF489 HP001G/DHP441/DHP448/DHP451/DHP454/ DHP458/DHP481/DHP486/DHP489
1R467 (Lock cam B side*) * where Hex socket set screw M4x4 is fastened		DF002G/DDF343/DDF347/DDF446/DDF453/DDF456/ DDF457/DDF459 DDF470/DDF480/DDF482/DDF484/DDF485/DDF488 HP002G/DHP343/DHP347/DHP446/DHP453/DHP456/ DHP457/DHP459 DHP470/DHP480/DHP482/DHP484/DHP485/ DHP488/M6301D/6261D/6271D/8271D/8281D/8381D
1R467-A (Y groove side)		DF0300/DF332D/DF333D/DDF483/DDF487 HP0300/HP332D/HP333D/DHP483/DHP487 DHP453/DHP457/DHP488 (some specifications only)
1R467-A (X groove side)		DF330D/DF331D HP330D/HP331D

7-1-3 Pinion gear/Spacer for 1R473 by model (as of December 1, 2022)

Compatible model	Pinion gear	Spacer
DDF481/DDF486/DF001G DHP481/DHP486/HP001G	Pinion gear A (1R473-C)	/
DDF484/DF002G DHP484/HP002G	Pinion gear B (1R473-D)	Spacer B (1R473-E)
DDF487 DHP487	Pinion gear C (1R473-F)	/
DDF489 DHP489	Pinion gear D (1R473-G)	Spacer B (1R473-E)

7-2 TIGHTENING TORQUE SPECIFICATIONS

Parts to fasten	Fastener	Tightening torque (N·m)
Keyless drill chuck 13 ↔ Gear assembly		See specified torque for each model.
Keyless drill chuck 13 ↔ Gear assembly	- Flat head screw M6x22	3.1 - 6.3 *
*Wipe off the adhesive portion on both new and reused bolt with carburetor cleaner and apply a small amount of Loctite 243 because the adhesive is attached.		

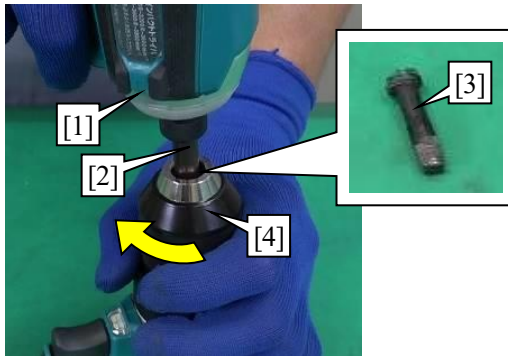
7-3 Disassembling

7-3-1 Disassembly of Keyless drill chuck 13 [1] (removal with an cordless impact wrench and 1R298)

* This method is not available in case of failure that the gear co-rotates in Drill mode.

- 1 Set the machine to Low speed mode and Drill mode.

Fig. 15



- 2 Attach a slotted bit [2] to an impact driver [1], then remove - Flat head screw M6x22 (left-handed screw) [3] by turning it clockwise.

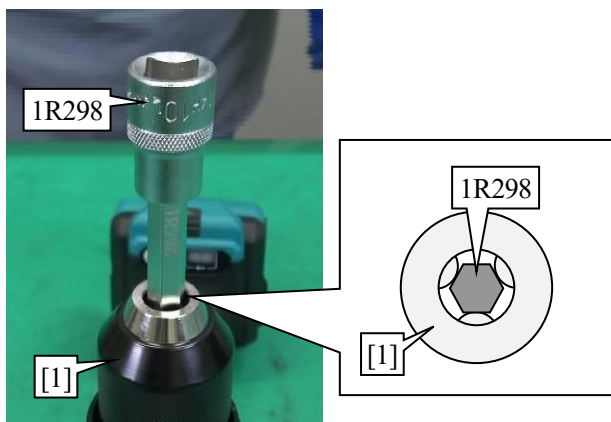
Tips

It will effectively prevent the slotted bit [2] from slipping out of the screw head slot to close the jaws of Drill chuck [4] with an appropriate space between the jaws and the bit. Therefore, cam-out damage can be minimized.

Note

- Flat head screw M6x22 (left-handed screw) [3] is securely fastened with adhesive. Therefore, put your weight on the impact driver [1], then loosen the screw little by little by repeating on and off with short intervals.

Fig. 16

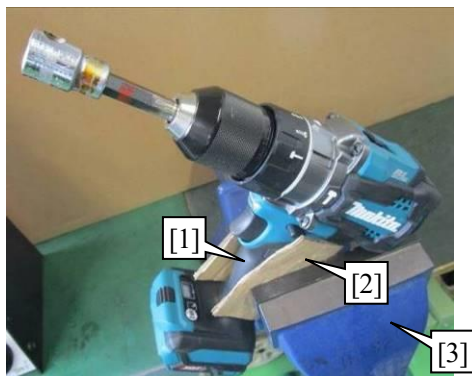


- 3 Attach 1R298 to Keyless drill chuck 13 [1].

Note

Tighten Keyless drill chuck 13 [1] firmly so that the jaws of the chuck hold the flats of the shaft of 1R298.

Fig. 17

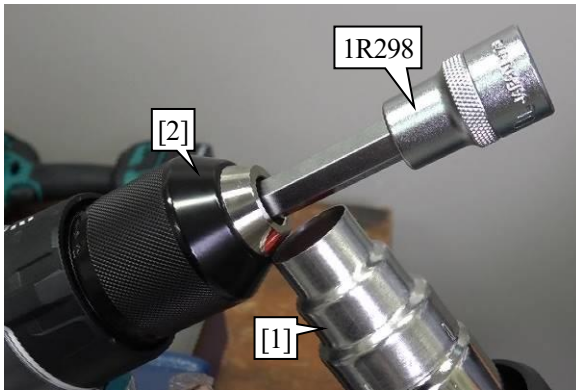


- 4 Protect Handle section [1] of the machine with a cardboard [2], then hold them in Vise [3].

Note

Be careful not to pinch Motor section or F/R change lever.

Fig. 18



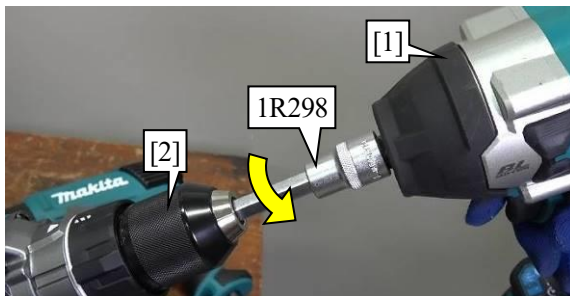
[For models with Keyless drill chuck 13 adhered to Gear assembly]

- 5 By heating the tip of Drill chuck [2] and 1R298 with a heat gun [1] for approx 3 minutes, dissolve the adhesive bonding the threads of Gear assembly and Drill chuck.

Note

- Be careful not to expose the plastic section to hot air.
- The heating time may vary depending on the adhesive condition of Gear assembly and the heating method. Therefore, adjust the heating time accordingly.

Fig. 19



- 6 Attach an impact wrench [1] (DTW450 or higher recommended) to 1R298, then remove Drill chuck [2] by turning them counterclockwise.

Tips

If 1R298 cannot be removed from Keyless drill chuck [2], remove it by turning the impact wrench [1] slightly clockwise.

Note

- Check that the machine is in Drill mode and Low speed mode.
- When using a heat gun, 1R298 and Keyless drill chuck [2] become hot. Therefore, be sure to wear leather gloves when working with the heat gun.
- If Keyless drill chuck [2] does not loosen in approx 2 seconds, give up and proceed to the next method.

7-3-2 Disassembly of Keyless drill chuck 13 [2] (removal with 1R473)

* This method is not available in case of failure that the gear co-rotates in Drill mode.

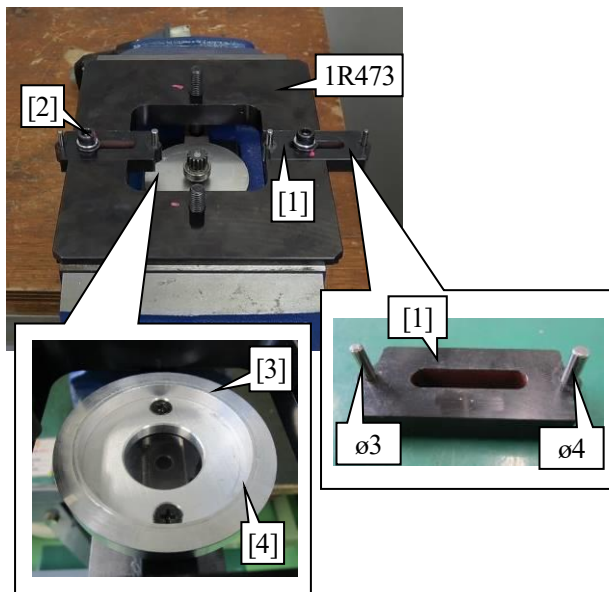
* See [7-1-2](#) for the compatible models.

- 1 Set the machine to Low speed mode and Drill mode in order to maximize the reaction force when loosing Gear assembly as much as possible and prevent damage to Gear assembly.

- 2 Remove - Flat head screw M6x22. ([Fig. 15](#))

- 3 Disassemble the machine, then remove Gear assembly together with Keyless drill chuck 13.

Fig. 20



- 4 Hold 1R473 in Vise.

Tips

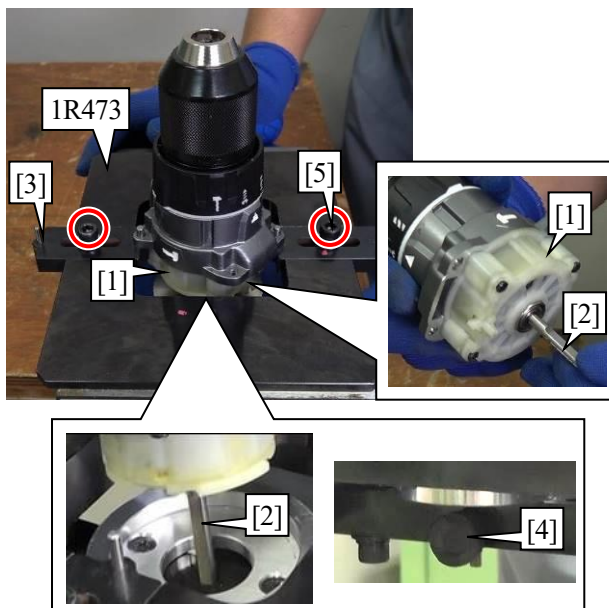
Assemble Set plates [1] (2 pcs) so that ø4 mm pin (thick pin side) faces the inside of 1R473.

Note

Loosen Hex socket head bolts M6x25 [2] (2 pcs) of 1R473 so that Set plates [1] (2 pcs) can slide for positioning. However, be careful not to loosen them too much because Set plates [1] (2 pcs) will be twisted and it will be difficult to move them.

- 5 Place a specified Spacer (1R473-E, etc.) [3] on Plate [4].

Fig. 21



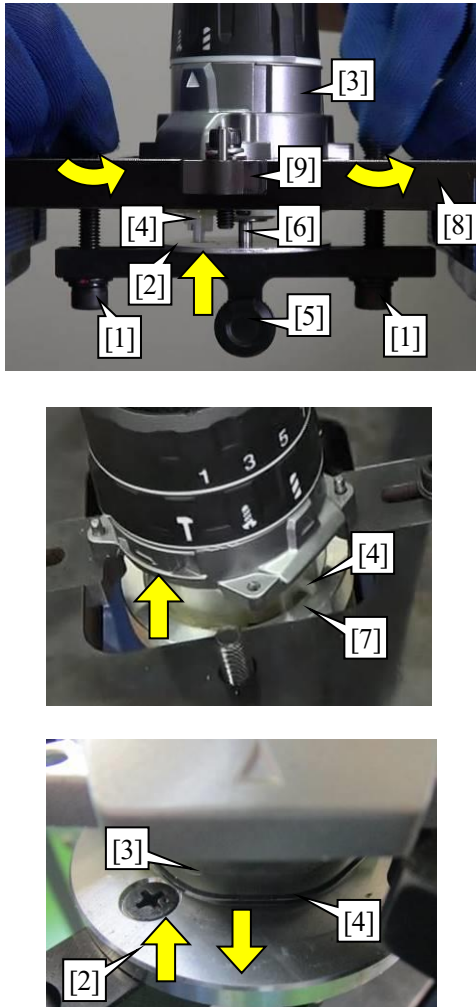
- 6 Select Pinion gear [2] in accordance with [7-1-3](#), then insert it into the motor inserting hole of Gear assembly [1].

- 7 Adjust the pin positions of Set plates [3] (2 pcs) of 1R473 so that they can fit in the two diagonally opposite holes of Gear assembly [1], then insert the pin portion of Pinion gear [2], with the flat of the pin portion facing the thumb screw side [4], into Gear assembly [1], and then tighten Hex socket head bolts M6x25 [5] (2 pcs) manually.

Tips

There is no need to use a tool to tighten Hex socket head bolts M6x25 [5] (2 pcs), because the necessary torque can be applied by manual tightening.

Fig. 22

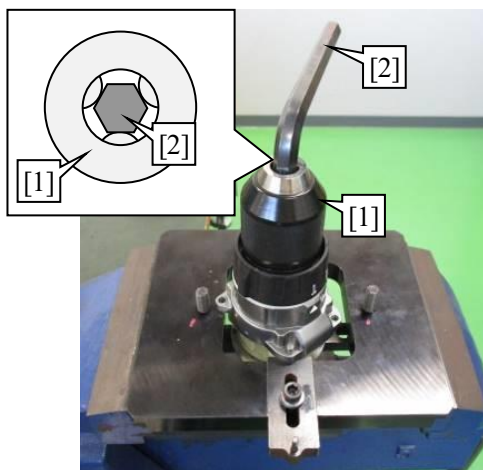


- 8 Turn the end of Hex socket head bolts M8x55 [1] (2 pcs) to raise Plate [2] until Speed change ring [4] (whose name varies by model) of Gear assembly [3] is pushed fully up to the low speed side, then tighten the thumb screw [5] to fix Pinion gear [6].
- 9 Use Spacer [7] (1R473-E, etc.), raise Spacer [7] fully up to the low speed side in the same way as described in Step 8, then fix Pinion gear [6].
- 10 In case of models where lower speed is selected by lowering Speed change ring [4] (whose name varies by model), follow the instructions in Technical Information to lower Speed change ring [4] until Plate [2] is raised to closely contact Gear assembly [3], then fix Pinion gear [6] in the same way as described in Step 8.

Note

Once Gear assembly [3] is raised off from Frame [8] or Set plate [9], Plate [2] or Spacer [7] is raised too much. Therefore, lower Gear assembly [3] slightly.

Fig. 23



- 11 Attach the largest attachable hex wrench [2] to Keyless drill chuck 13 [1].

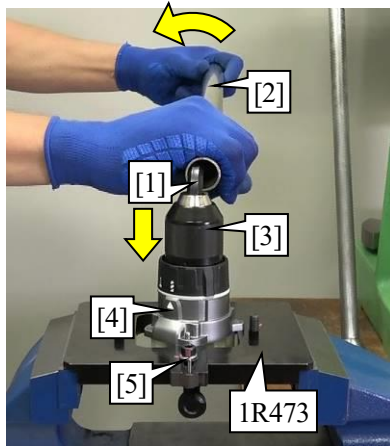
Note

Tighten Keyless drill chuck 13 [1] firmly so that the jaws of the chuck hold the flats of the hex wrench [2].

[For High-end models]

- 12 Heat Keyless drill chuck 13 with a heat gun. (Fig. 18)

Fig. 24



- 13** Attach an appropriate steel pipe [2] to the hex wrench [1], then remove Keyless drill chuck 13 [3] by turning it counterclockwise.

Tips

Turn the pipe [2] with one hand, while holding down Gear assembly [4] with the other hand to prevent it from falling off from 1R473.

Note

- [For High-end models] Be sure to wear leather gloves or the like because Keyless drill chuck 13 [3] and the hex wrench [1] become hot.
- Be careful not to break the pins press-fitted to Set plates [5] by turning the pipe [2] with Gear assembly [4] raised off Set plates [5].
- Press down Gear assembly [4] firmly from the top so that it does not come off, then turn it.

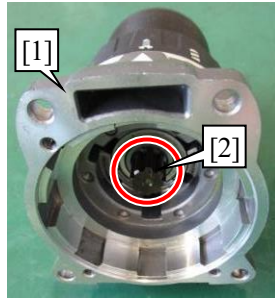
7-3-3 Disassembly of Keyless drill chuck 13 [3] (removal with 1R467/1R467-A)

* In case of failure that the gear co-rotates in Drill mode, disassemble the machine in this way.

* See [7-1-2](#) for the compatible models.

- 1 Disassemble the machine, then remove Gear assembly together with Keyless drill chuck 13.

Fig. 25

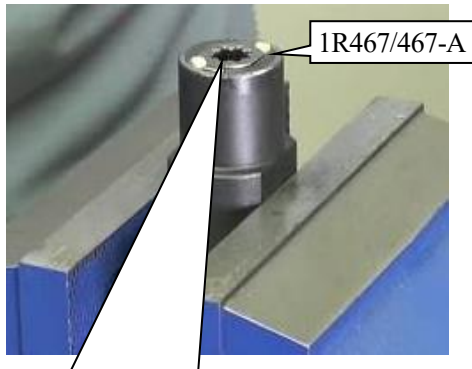


- 2 Disassemble Gear assembly [1], then remove all internal gears.

Note

If the spline shaft [2] of Spindle is broken and lost at this time, disassembling is impossible.

Fig. 26



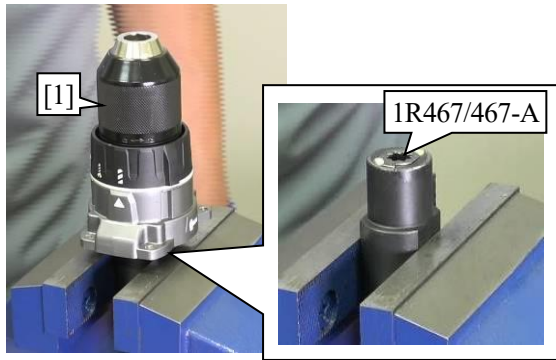
- 3 Hold 1R467 or 1R467-A in Vise with the working surface side facing upward.

Note

- Because the repairing tool (1R467 or 1R467-A) and the working surface side vary by model, use an appropriate repairing tool specified by [7-1-2](#).
- Hold 1R467 or 1R467-A in Vise with the working surface leveled.



Fig. 27

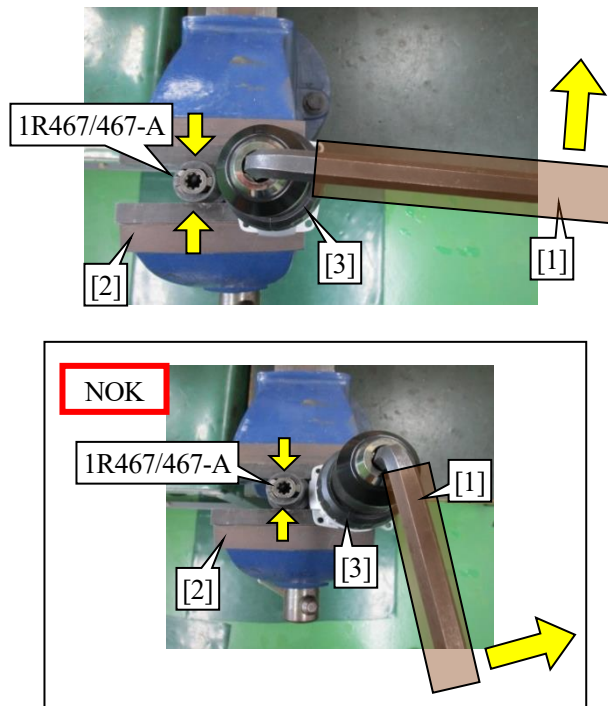


- 4 Hold 1R467 or 1R467-A by clamping its flats in Vise, then align the spindle portion of Gear assembly [1] with the hole of 1R467 or 1R467-A, then insert the spindle portion into the hole.

- 5 Remove - Flat head screw M6x22. (Fig. 15)

- 6 Attach the largest attachable hex wrench to Keyless drill chuck 13. (Fig. 23)

Fig. 28



- 7 When turning the steel pipe [1], set Gear assembly [3] onto 1R467 or 1R467-A so that turning force is applied in parallel to 1R467 or 1R467-A clamping direction of Vise [2].

[For High-end models]

- 8 Heat Keyless drill chuck 13 with a heat gun. (Fig. 18)

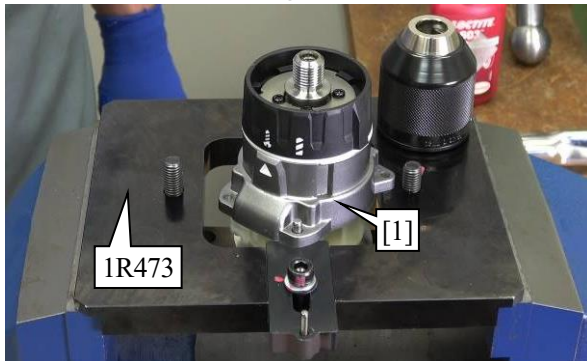
- 9 Attach an appropriate steel pipe to the hex wrench, then remove Keyless drill chuck 13 by turning them counterclockwise. (Fig. 24)

7-4 Assembling

7-4-1 Assembly of Keyless drill chuck 13 (with 1R473)

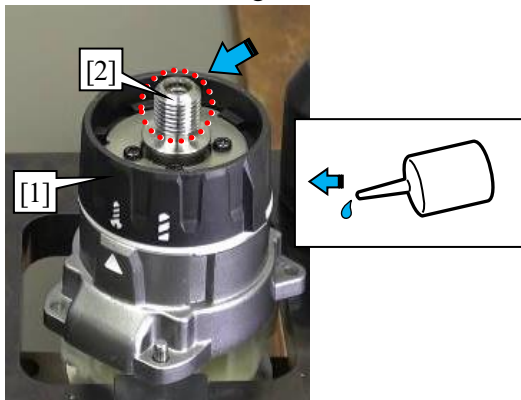
* Compatible model: See [7-1-2](#).

Fig. 29



- 1 Hold 1R473 in Vise. ([Fig. 20](#))
- 2 Set Gear assembly [1] onto 1R473, while adjusting the position of Speed change ring or Spacer. ([Fig. 21](#), [Fig. 22](#))

Fig. 30



[For High-end models]

- 3 Apply the specified adhesive to the threads of Spindle [2] on Gear assembly [1].

Note

Apply adhesive to the upper side of Spindle because it is easy to drip.

Fig. 31



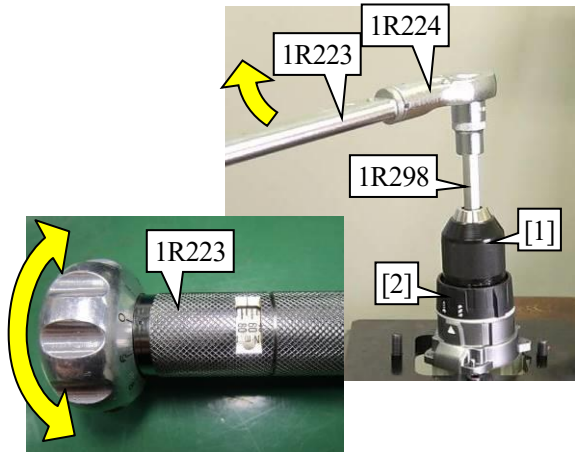
- 4 Temporarily tighten Keyless drill chuck 13 [1] to Gear assembly [2] manually.

Note

Tighten Keyless drill chuck 13 [1] until its jaws start to move.

- 5 Attach 1R298 to Keyless drill chuck 13. ([Fig. 16](#))

Fig. 32

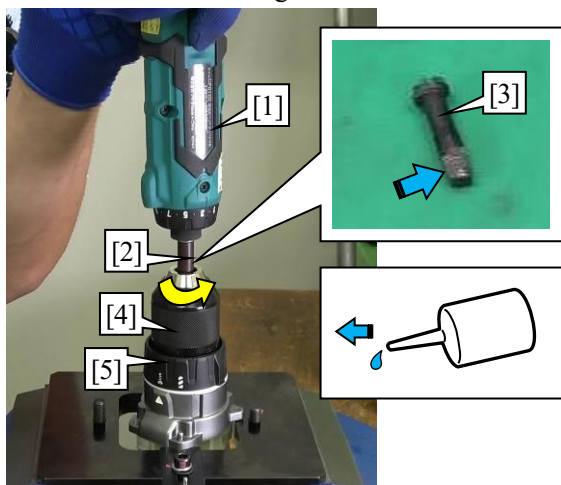


- 6 Set 1R223 to the specified torque, then insert 1R224 (1R223) into 1R298, and then turn 1R223 (1R224) clockwise to tighten Keyless drill chuck 13 [1] to the specified torque.

Note

- Be careful not to break the pins press-fitted to Set plates by turning the pipe with Gear assembly [2] being raised off Set plate.
- Hold Gear assembly [2] firmly from the top so that it does not come off, then turn it.
- Tighten 1R223 until the clutch works.

Fig. 33



- 7 Tighten - Flat head screw M6x22 [3] to the specified torque by turning it counterclockwise with DF012D [1] and a slotted bit [2].

Note

Apply the specified adhesive to - Flat head screw M6x22 (left-handed screw) [3] because it is a screw with thread locking patch.

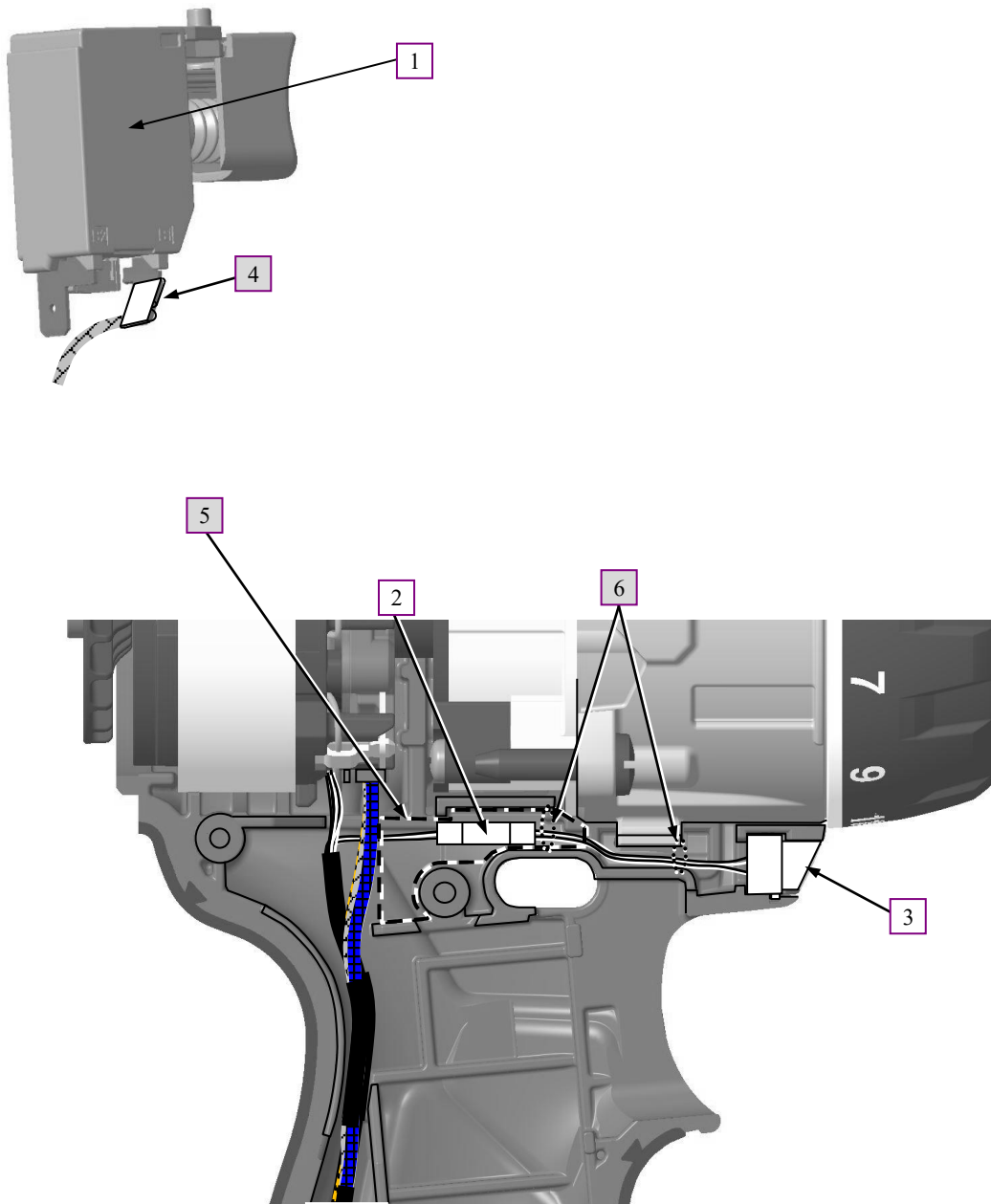
Tips

It will effectively prevent the slotted bit [2] from slipping out of the screw head slot to close the jaws of Keyless drill chuck 13 [4] with an appropriate space between the jaws and the bit. Thus cam-out damage can be minimized.

- 8 Assemble Gear assembly [5] to the machine.

9 WIRING DIAGRAM
9-1 Switch, LED section

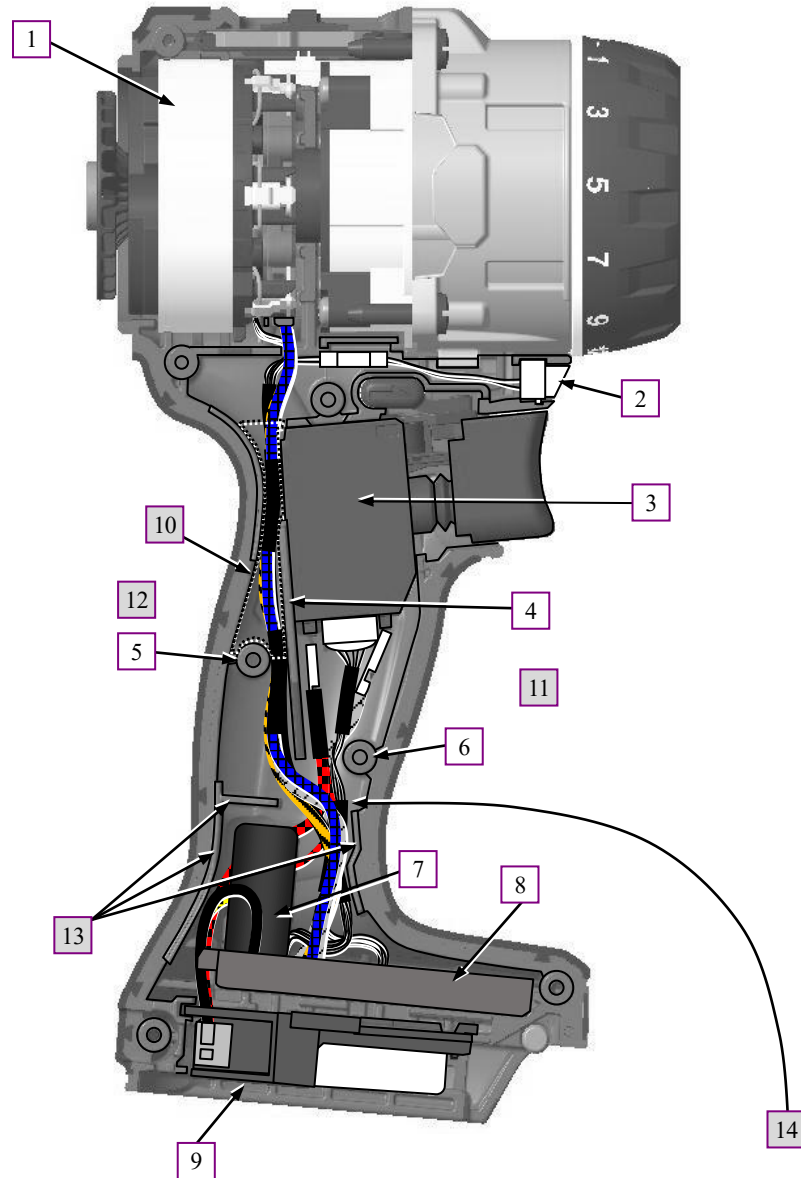
Fig.35



1	Switch	3	LED circuit
2	Connector		
4	Connect Flag receptacle to Switch as shown.		
5	Place Connector in this space.		
6	Fix LED circuit lead wires in these grooves.		

9-2 Electrical parts section

Fig.36



1	Stator	6	Boss B
2	LED circuit	7	Capacitor
3	Switch	8	Controller
4	Rib C	9	Terminal
5	Boss A		
10	Put the thick lead wires (Blue, White) for Stator on the other lead wires in this space.		
11	Route Lead wires for Switch between Rib C and Boss B.		
12	Route Lead wires for Stator/ LED circuit between Rib C and Boss A.		
13	Be careful not to put Lead wires on these ribs.		
14	Put Lead wire (Red) for Terminal under Lead wires for Stator/LED circuit and Capacitor.		

10 TROUBLESHOOTING

Whenever you find any trouble in your machine, first, see this list to check the machine for solution.

10-1 Note for Repairing

The content may vary depending on the model.

- 1 Use a full charged battery which has a star mark.
- 2 When Housing is disassembled, check the conditions of the electrical parts (Mechanical lock, Adherence of iron powder to Motor section, Disconnection of Connectors, Pinching and braking of Lead wires, Assembling of Stator, Connection of Terminal and Battery, etc.).
- 3 Be sure to test the machine 10 times to correctly diagnose functions such as Switch etc.
- 4 In order to make it easier to reproduce symptoms, run the motor at the lowest speed.
- 5 Use the following Repairing tools for diagnosing LED and Switch.

Repairing tools	Purpose
1R402	For checking variable resistance value or electrical continuity at contact points
1R402-B	
1R412	For checking whether LED lights up
1R413	For checking variable resistance value or electrical continuity at contact points

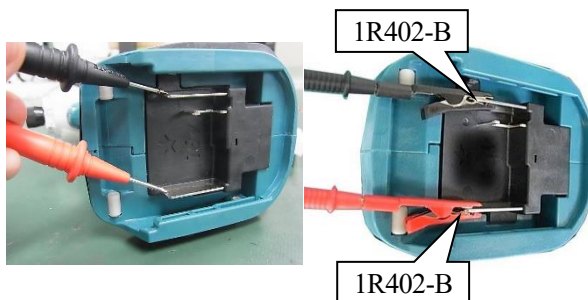
10-2 Test for checking the short-circuit in FET (Field Effect Transistor) of controller

Fig. 37



- 1 Set Digital tester (1R402) to Diode mode.

Fig. 38



- 2 Connect Black probe to the plus pole of Terminal, and Red probe to the minus pole.

Tips

By attaching 1R402-B to each probe of 1R402, you can make your hands free for easier check.

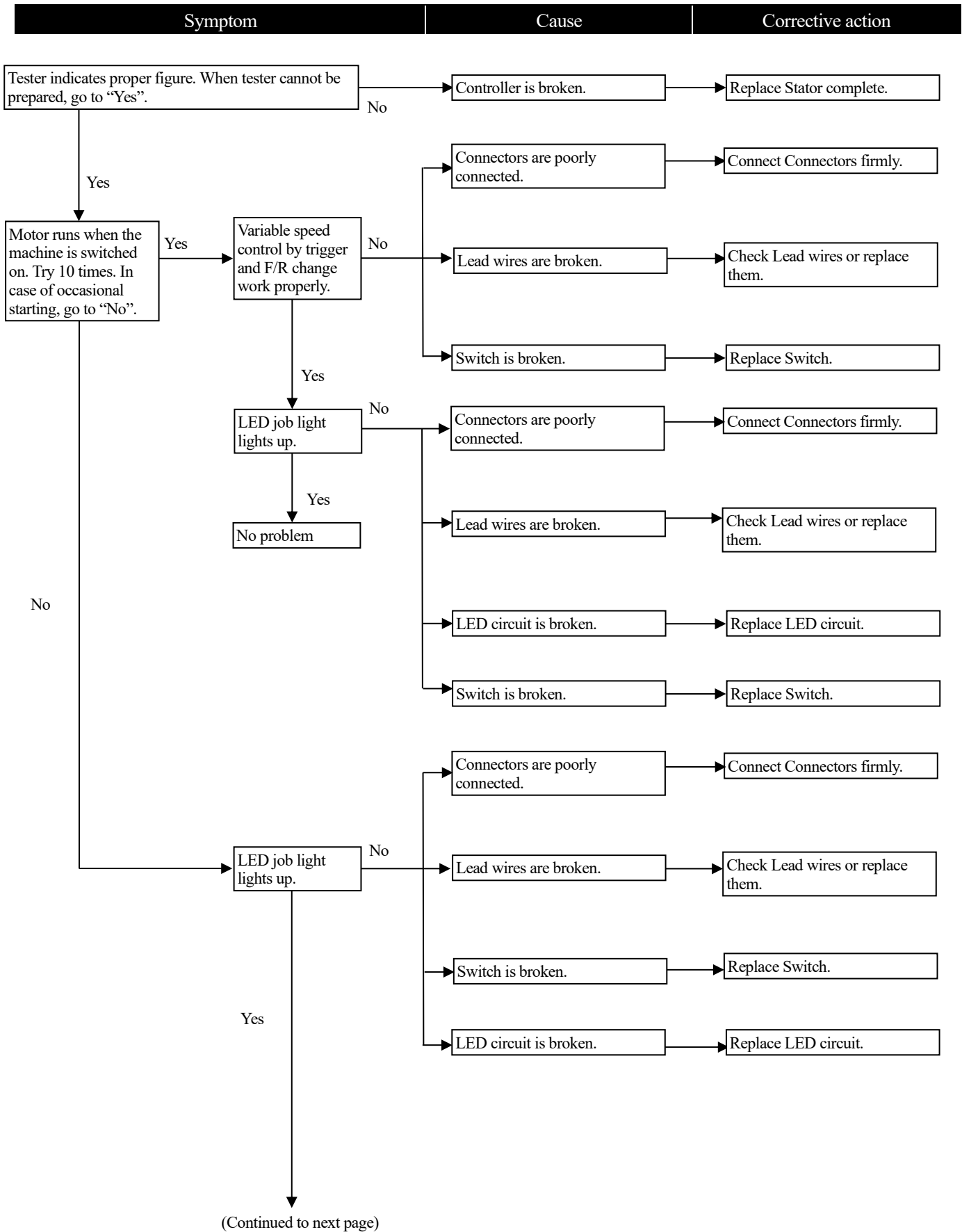
Note

Be careful not to reverse them. The reversed contacts could spoil the test.

- 3 Wait until the figure on Tester gets stable.
- 4 Controller is in order if Tester indicates $0.8 \pm 0.1V$. If Tester indicates any other voltage, Controller is broken. Replace it with a new one.

10-3 Flowchart for Troubleshooting

Check the items in the following flowchart in order from the top to bottom. Description of the item is referred to CIRCUIT DIAGRAM. After corrective action, return to the start of Troubleshooting and re-check again.



(Continued from previous page)

