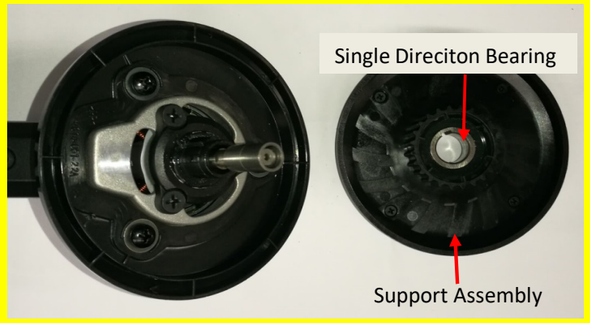
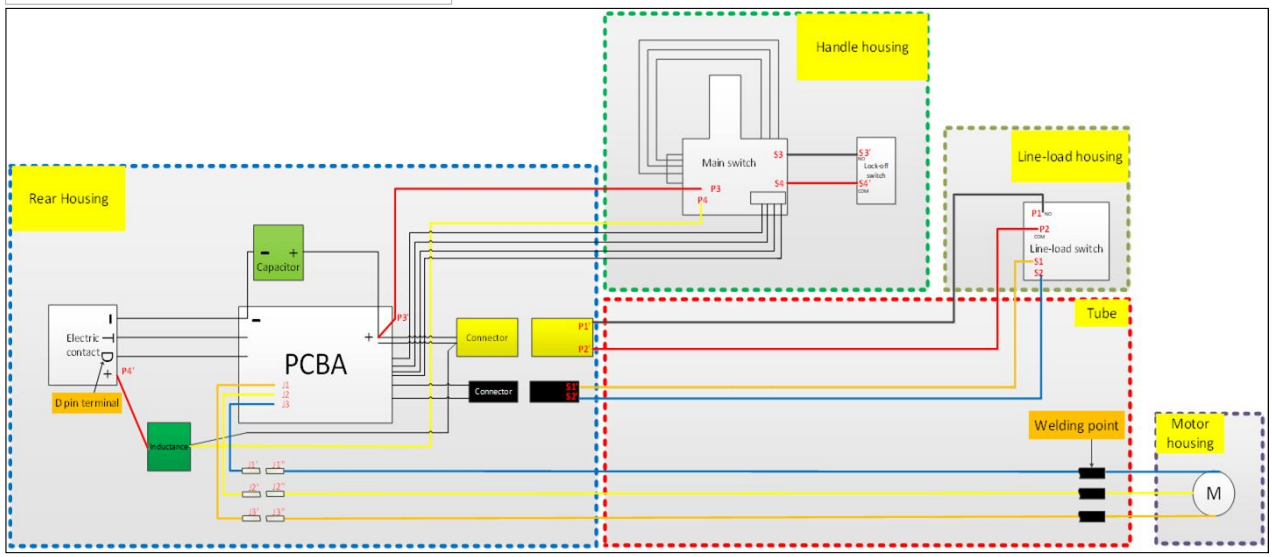
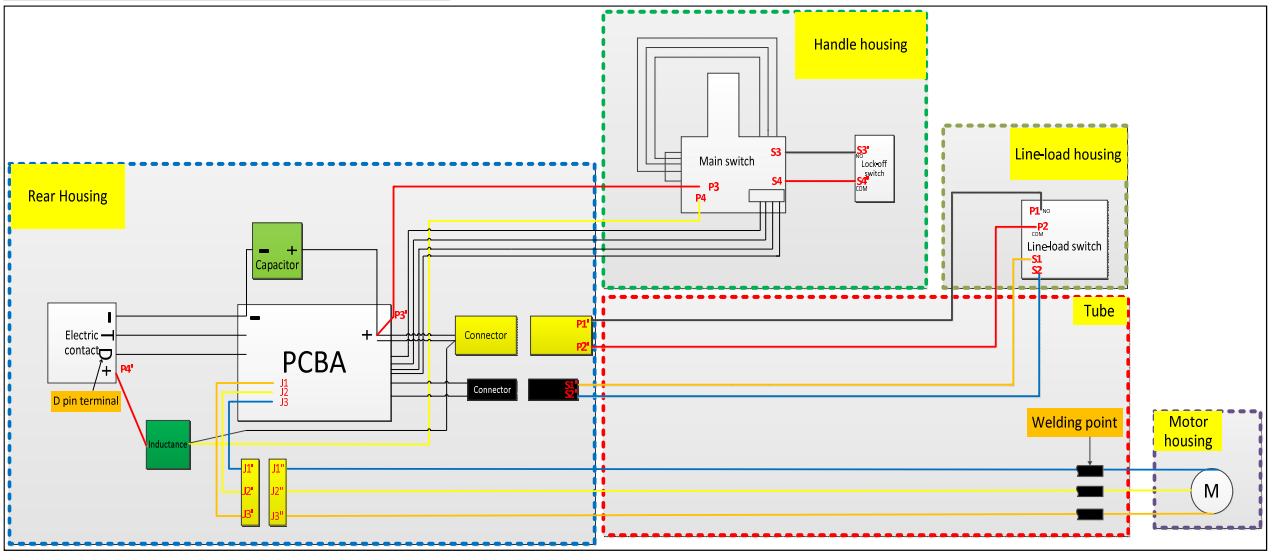
Problem	Phenomena on tool and battery			Problem Cause	Falty Position	Testing Method
	LED on Battery	Motor status	Conclusion			
Both of the string trimmer and the line-loading function doesn't work.	OFF	Begin to run for 2 seconds, then stop. Restart the tool, won't start.	signal wire issue	Signal wire connected with the D end is broken or in a poor contact	Rear housing	Open the housings and check the signal wire. If it is pinched broken, reconnect it. If it is cold soldered with the "D" Pin terminal, resolder it.
		Won't start	PCBA issue	PCBA is broken or the power wires connected to the PCBA are broken	Rear housing	Replace the PCBA with a new one to test its working condition.
	ON	Won't start	PCBA issue	PCBA is broken	Rear housing	Replace the PCBA with a new one to test its working condition.
	N/A	Burning smell	Motor issue	Motor is broken	Trimmer head	Remove the trimmer head, check the motor coil condition or smell it, if the coil is black or have burnt smell, it means the motor is burnt up.
The string trimmer works but the line-loading function fails to work.	OFF (when press the line-loading button)	Won't start	Line-load switch issue	Line-load switch is broken or the power wires connected with the line-load switch are cold soldered.	Line-load switch box	To test the line-load switch's condition, press the line-load switch trigger to test the resistance between P1 and P2, the resistance between S1 and S2 individually, if any value is infinite, means the switch is broken. To test the power wire's condition, test the resistance beween P1 and P1' , the resistance between P2 and P2' individually, if any value is infinite, means the power wire is broken. **NOTICE:** The line load switch is improved for better waterproof performance. When the switch is damaged, replace it with a switch assembly (Part# 4870786001), including the switch itself (no longer provided separately) and the line load switch support (improved, Part# 3129169002).
	ON (when press the line-loading button)	Press the main switch to let the motor run. Keep holding the main switch, press the line-loading button simultaneously, **if the motor keeps working, means something wrong with the line-loading switch.**	Line-load switch issue	1) Line-load switch is broken 2) or the power wires that connected with the line-load switch are broken or cold soldered 3) or the signal wires that connected with the line-load switch are broken or cold soldered.	Line-load switch box	To test the switch's condition, press the line-load trigger to test the resistance between P1 and P2, the resistance between S1 and S2 individually, if any value is infinite, means the switch is broken. To test the power wire's condition, test the resistance beween P1 and P1', the resistance between P2 and P2' individually, if any value is infinite, means the power wire is broken. To test the signal wire's condition, test the resistance beween S1 and S1', the resistance between S2 and S2' individually, if any value is infinite, means the signal wire is broken. **NOTICE:** The line load switch is improved for better waterproof performance. When the switch is damaged, replace it with a switch assembly (Part# 4870786001), including the switch itself (no longer provided separately) and the line load switch support (improved, Part# 3129169002).
		Press the main switch to let the motor run. Keep holding the main switch, press the line-loading button simultaneously, **if the motor STOPS working, means something wrong with the line-loading switch (S1/S2 are OK while P1/P2 are damaged).**	Line-load switch issue	Line-load switch is broken	Line-load switch box	To test the line-load switch's condition, press the line-load switch trigger to test the resistance between P1 and P2 (double ensuring that the P1 and P2 works correctly) and the resistance between S1 and S2 individually, if the latter value is infinite, means S1 and S2 are open circuit, that is the switch is broken. Replace the line-load switch with a new switch assembly to test its working condition. **NOTICE:** The line load switch is improved for better waterproof performance. When the switch is damaged, replace it with a switch assembly (Part# 4870786001), including the switch itself (no longer provided separately) and the line load switch support (improved, Part# 3129169002).
		Press the main switch to let the motor run. Keep holding the main switch, press the line-loading button simultaneously, **if the motor STOPS working, means something wrong with the LOCK-OFF SWITCH (Both the S1/S2 and P1/P2 of the line-loading switch are OK).**	Lock-off switch issue	Lock-off switch doesn't spring back or lock-off switch shorts out (Lock-off switch is a signal switch, whose S3'/S4' cannot be working at the same time of S1/S2 of the line-loading switch works).	Handle housing	Open the handle housing, check if the switch trigger is sprung back. If the trigger recovers back normally, test the resistance between S3' and S4', if the resistance is 0, it means the switch shorts out.

The line loading function works but the string trimmer fails to work.	OFF (when pull the main switch)	Won't start	Main switch issue	Main switch is broken or the power wires connected with the main switch are broken or cold soldered.	Handle housing	To test the main switch's condition, press the main switch trigger to test the resistance between P3 and P4, the resistance between S3 and S4 individually, if any value is infinite, means the switch is broken. To test the power wire's condition, test the resistance beween P3 and P3', the resistance between P4 and P4' individually, if any value is infinite, means the power wire is broken.
	ON (when pull the main switch)	Press and hold the line-loading button to let the motor run, with the line-loading button depressed, press the lock-off trigger simultaneously, **if the line-winding keeps working, means something wrong with the lock-off switch.**	Lock-off switch issue	Lock-off switch is broken or the signal wires connected with the lock-off switch are broken or cold soldered.	Handle housing	To test the lock-off switch's condition, press the lock-off switch trigger to test the resistance between S3' and S4', if the value is infinite, means the switch is broken. To test the signal wire's condition, test the resistance beween S3 and S3', the resistance between S4 and S4' individually, if any value is infinite, means the signal wire is broken.
		Press and hold the line-loading button to let the motor run, with the line-loading button depressed, press the lock-off trigger simultaneously, **if the line-winding stops, means something wrong with the line-load switch.**	Line-load switch issue	Line-load switch is not sprung back (the contact points inside didn't separate)	Line-load switch box	Replace the line-load switch with a new switch assembly to test its working condition. **NOTICE:** The line load switch is improved for better waterproof performance. When the switch is damaged, replace it with a switch assembly (Part# 4870786001), including the switch itself (no longer provided separately) and the line load switch support (improved, Part# 3129169002).
The auto-line winding system works, but the cutting line cannot be wound into the trimmer head properly.	ON	Works well when cutting grass.	Grass debris or dirt accumulated in the trimmer head.	Grass debris or dirt accumulated in the trimmer head and blocked the movement of line spool.	Trimmer head	Loosen the nut in the trimmer head and remove the spool assembly and upper cover. Clean the grass debris, dirt inside thoroughly.
		When it is in no-load condition, press the line-load button, the line-winding speed itself changes dramatically	Motor issue	The wires connected with the motor may be broken or in poor contact	Rear housing	Test the resistance between J1" and J2", the resistance between J1" and J3", between J2" and J3" individually, if any value is infinite, means the motor is broken or in a poor contact
		When turning the trimmer head by hands, it can rotate reversely.	Single direciton bearing issue	Single direciton bearing inside the support assembly is broken.	Trimmer head (Support Assembly)	Disassemble the trimmer head assembly to observe the conditon of the single direction bearing on the **support assembly(2825470002).** If it was worn or any damaged, replace the support assembly. 
The speed of cutting grass can't be changed or the speed can not be kept in a stable condition	ON	Working	Main switch issue	Main switch is broken, or the power wires connected with the main switch are broken or cold soldered.	Handle housing	To test the main switch's condition, press the main switch trigger to test the resistance between P3 and P4, if the value is infinite, means the switch is broken. To test the power wire's condition, test the resistance beween P3 and P3', the resistance between P4 and P4' individually, if any value is infinite, means the power wire is broken.

ST1520 & ST1520S & ST1510S



ST1520_A & ST1520S_A



REPAIR GUIDELINE

String Trimmer_ST1520/ST1520S/ST1510S

Issue Date: 2019/12/18
Update Date: 2020/11/17

Table of Contents

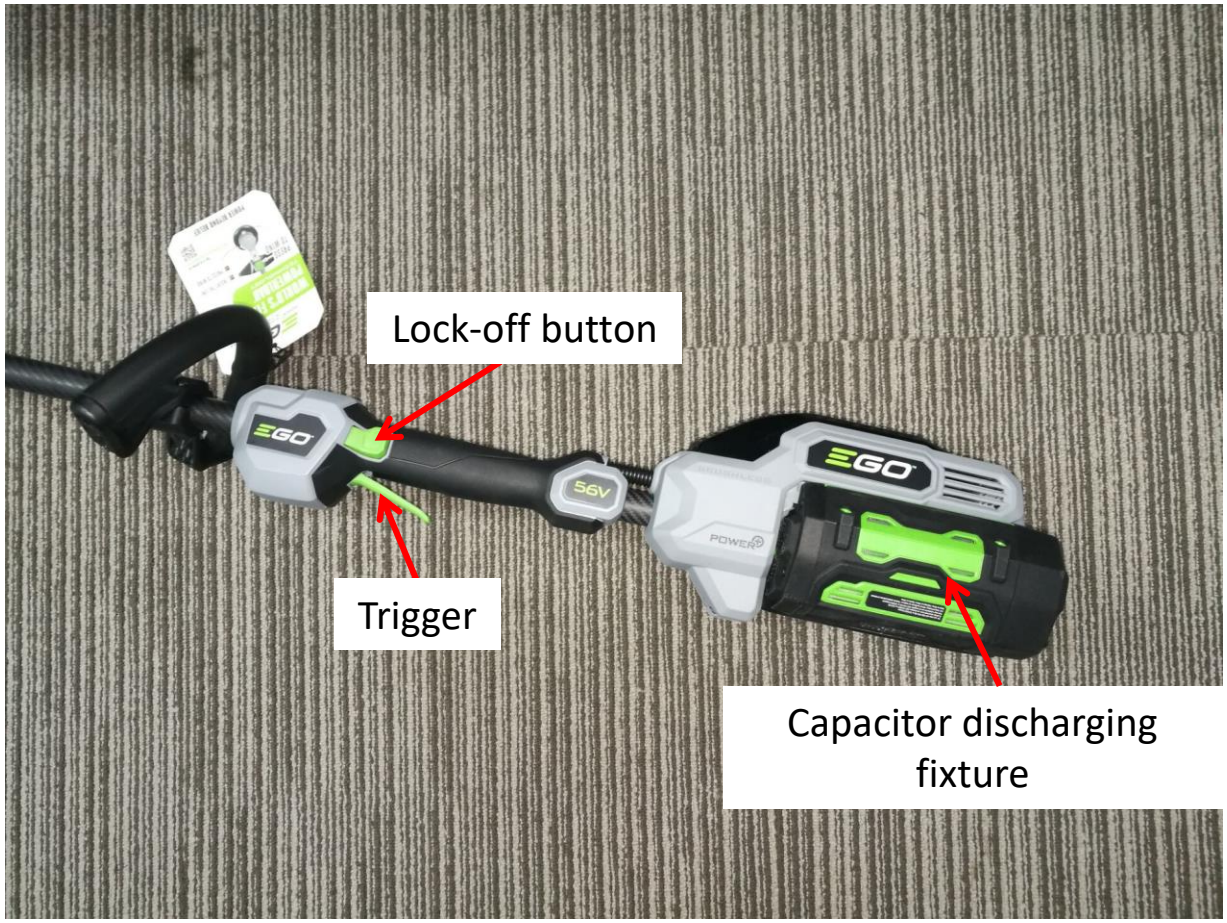
Tool List For Repair

NO.	Tool List	SPEC	Remark
1	Phillips	PH2, PH0	
2	Impact wrench	13mm	
3	Torx screwdriver	T15	
4	Hex wrench	M5	
5	Nipper pliers		
6	Electric soldering iron		
7	Heat gun		
8	Heat shrinkable sleeve		
9	Scissors		To remove the shrinkable sleeve

Part 1: How to detect the PCBA and motor

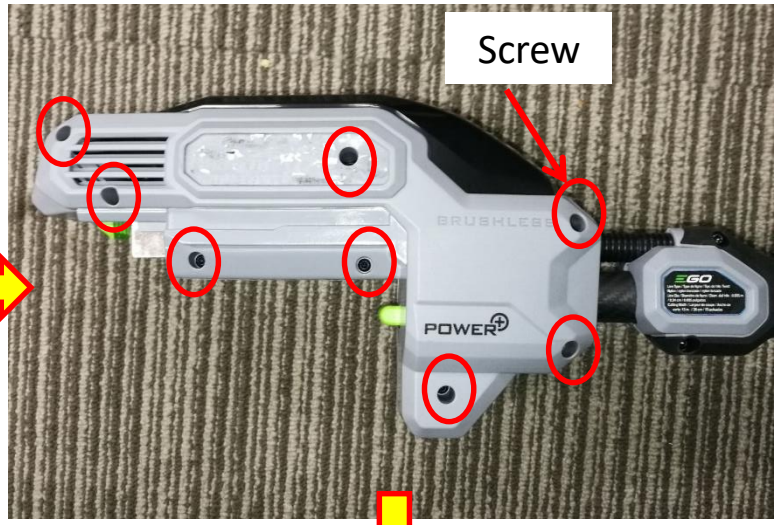
How to detect the PCBA and motor

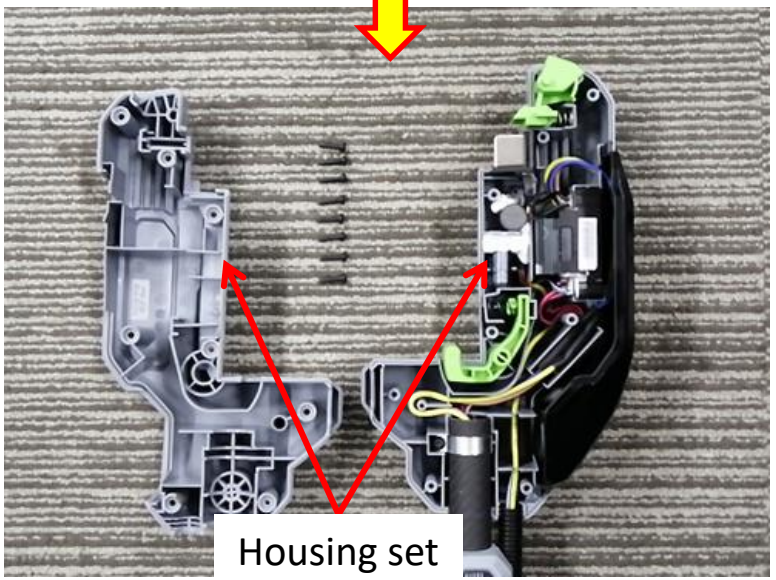
1. Insert the capacitor discharge fixture onto the battery base.
2. Press the lock-off button and trigger simultaneously for about 10s to completely discharge the capacitor connected with the PCBA, then pull the capacitor discharging fixture out of the battery base.



How to detect the PCBA and motor

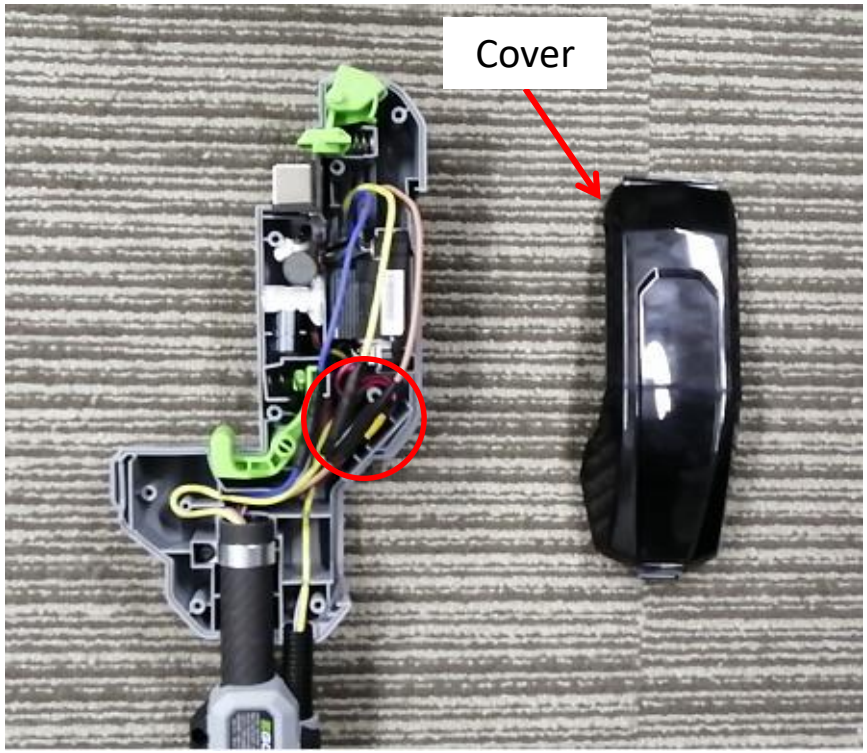
3. Remove the label on the housing set to loosen 8 pcs screws, then separate the right housing from the left housing.





How to detect the PCBA and motor

4. Remove the cover.
5. Remove the heat-shrinkable sleeves, remove the transparent sleeve aside.

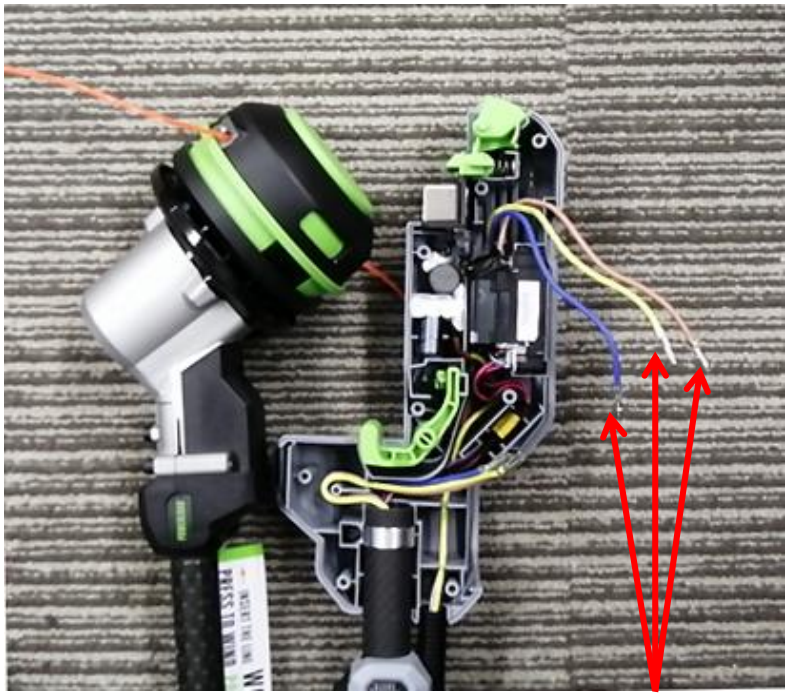


How to detect the PCBA and motor

6. Separate the three connectors and test the motor to judge if it is open-circuit.

NOTICE: Judge if there is any burning smell of the motor. If yes, the motor is burned. Replace it.

Otherwise, go on next detection.



Measure the resistance between any of the two terminals

a) Set the Multimeter function to “Resistance measuring” .

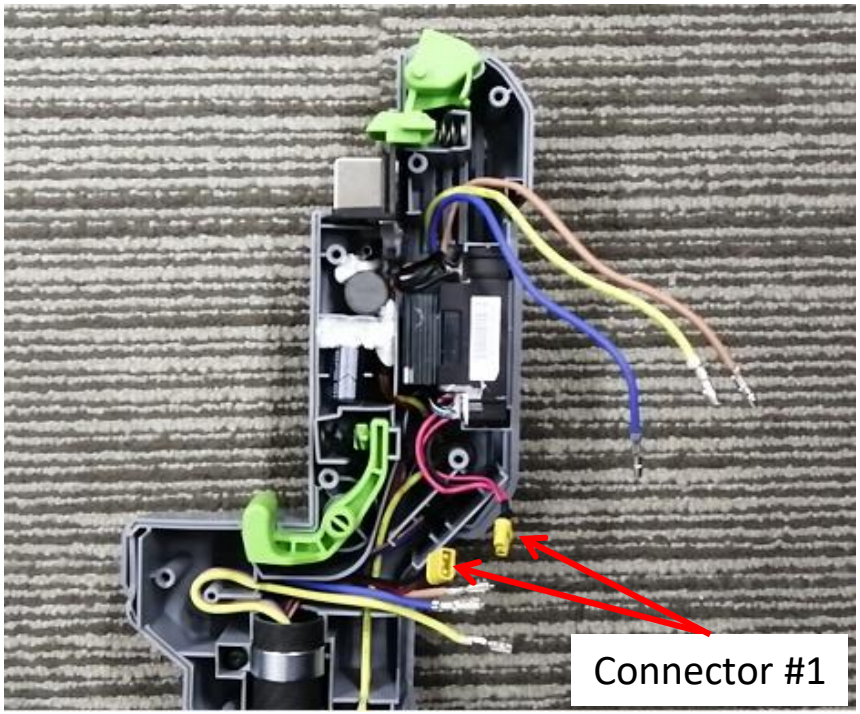
b) Measure the resistance between any of the two terminals.

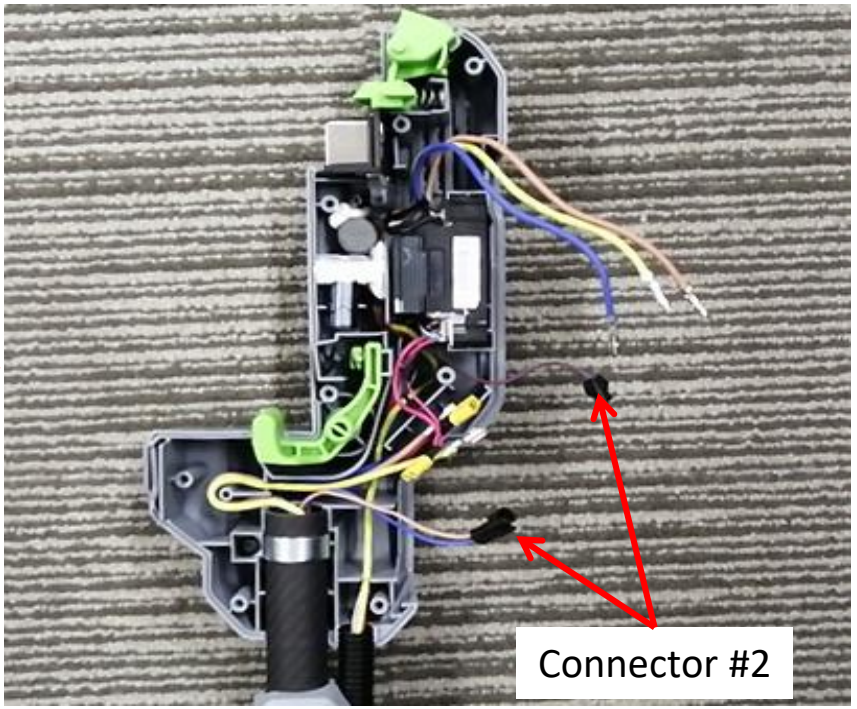
c) If any of the measurements is infinite, means the circuit between the two terminals is open circuit, the motor is damaged. Follow the procedure “Replace the motor” to replace a new one.

d) If the motor is shorted inside, Multimeter is not applicable for detection. Directly test with a new motor after disconnecting the connectors.

How to detect the PCBA and motor

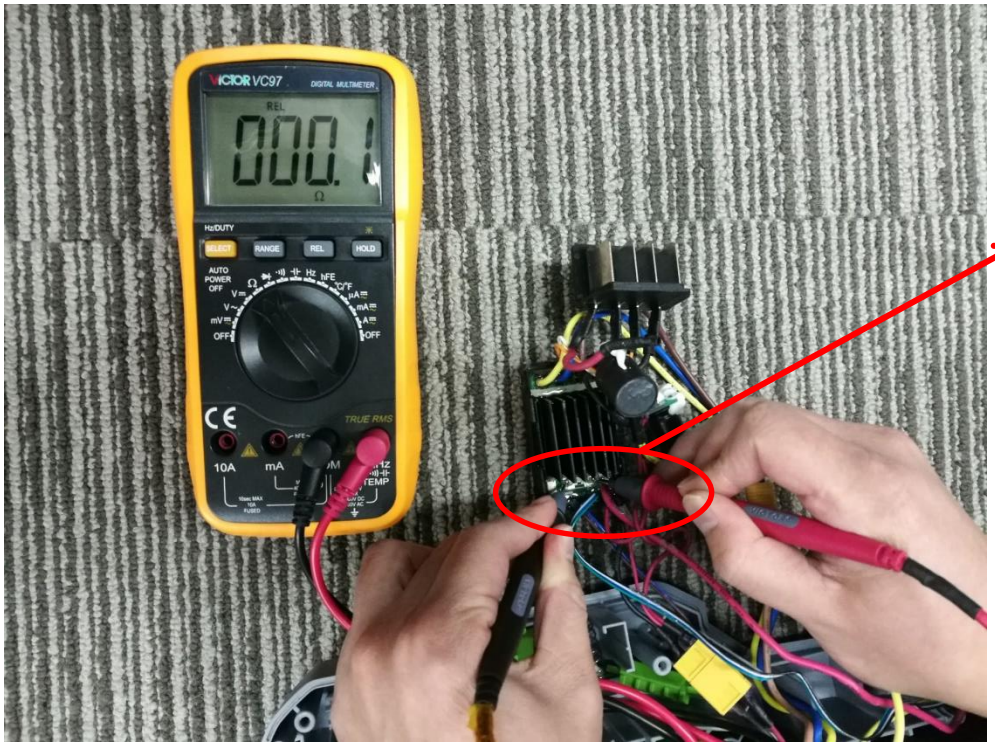
7. Disconnect connector #1 and connector #2.

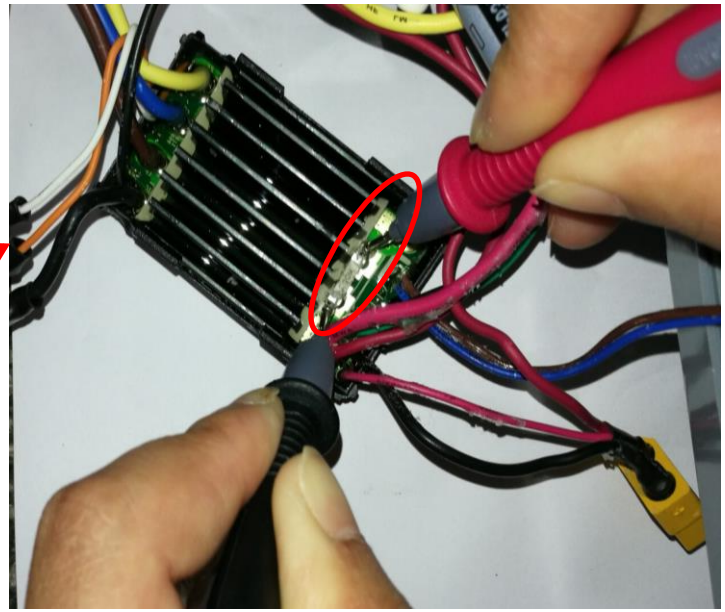




How to detect the PCBA and motor

8. Take the PCBA out of the housing set and measure the fuse in the PCBA. Detailed instructions please see next slide.





How to detect the PCBA and motor

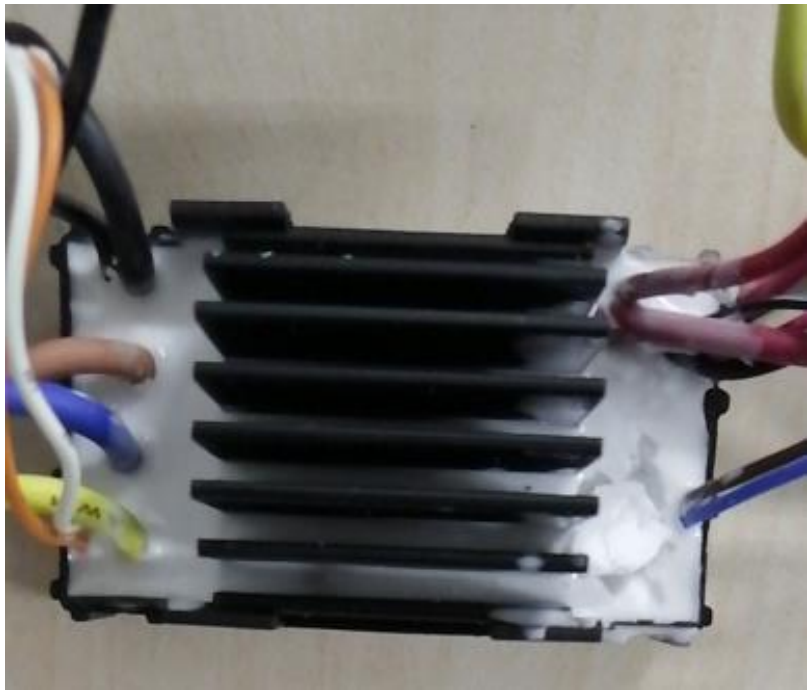
a) Set the Multimeter function to “Resistance measuring”.

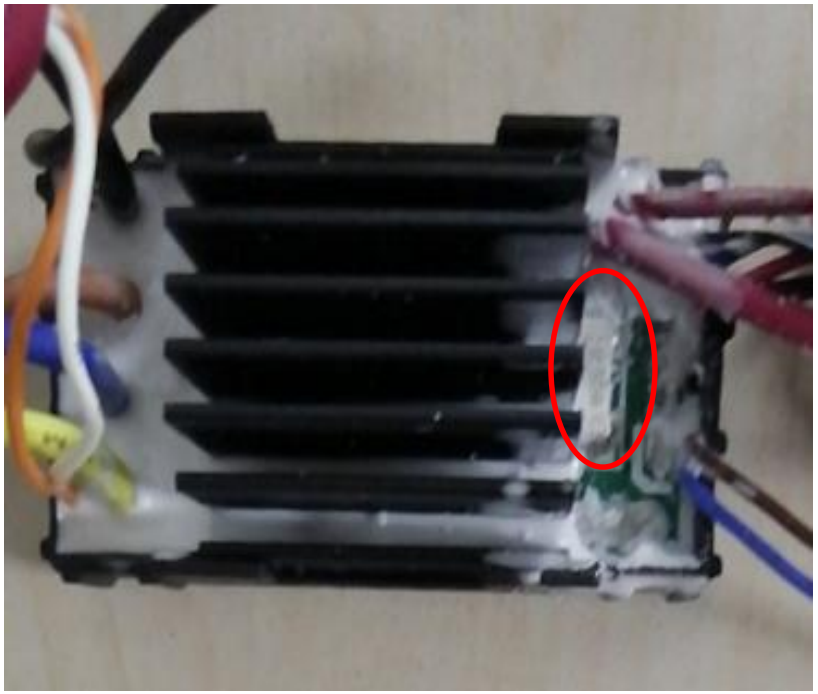
b) Contact one pen pin of the Multimeter to one end of the fuse and contact the other pen pin to the other end of the fuse.

c) If the resistance is below 1 Ω, means a good fuse, go to the next testing step; otherwise means a broken fuse. Follow the procedure “Replace the PCBA” to replace a new PCBA.

How to detect the PCBA and motor

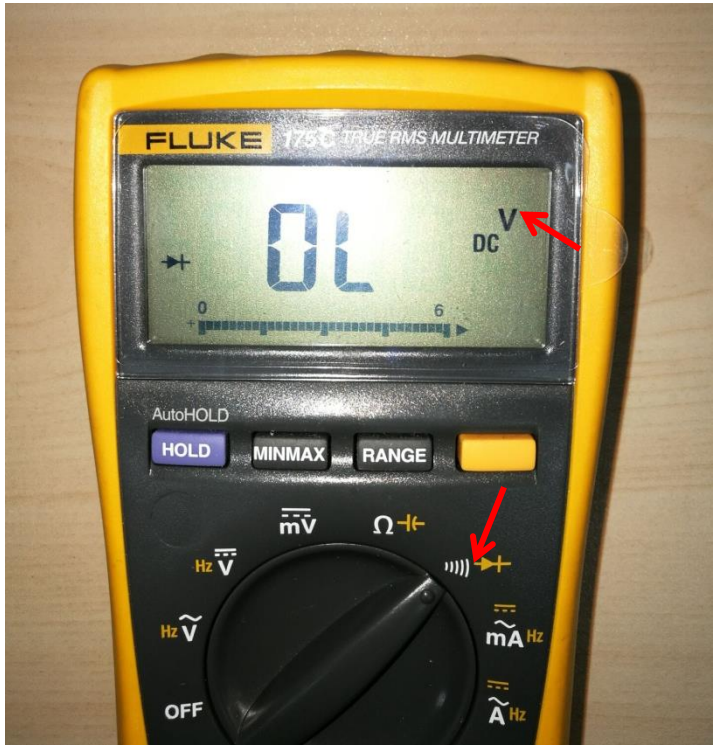
NOTICE: If the fuse cannot be seen and is covered with silica gel, remove the silica gel firstly and then test the fuse.





How to detect the PCBA and motor

9. Measure the MOSTET in the PCBA. (Step 1)



a) Set the Multimeter function setting at “Diode measuring”.

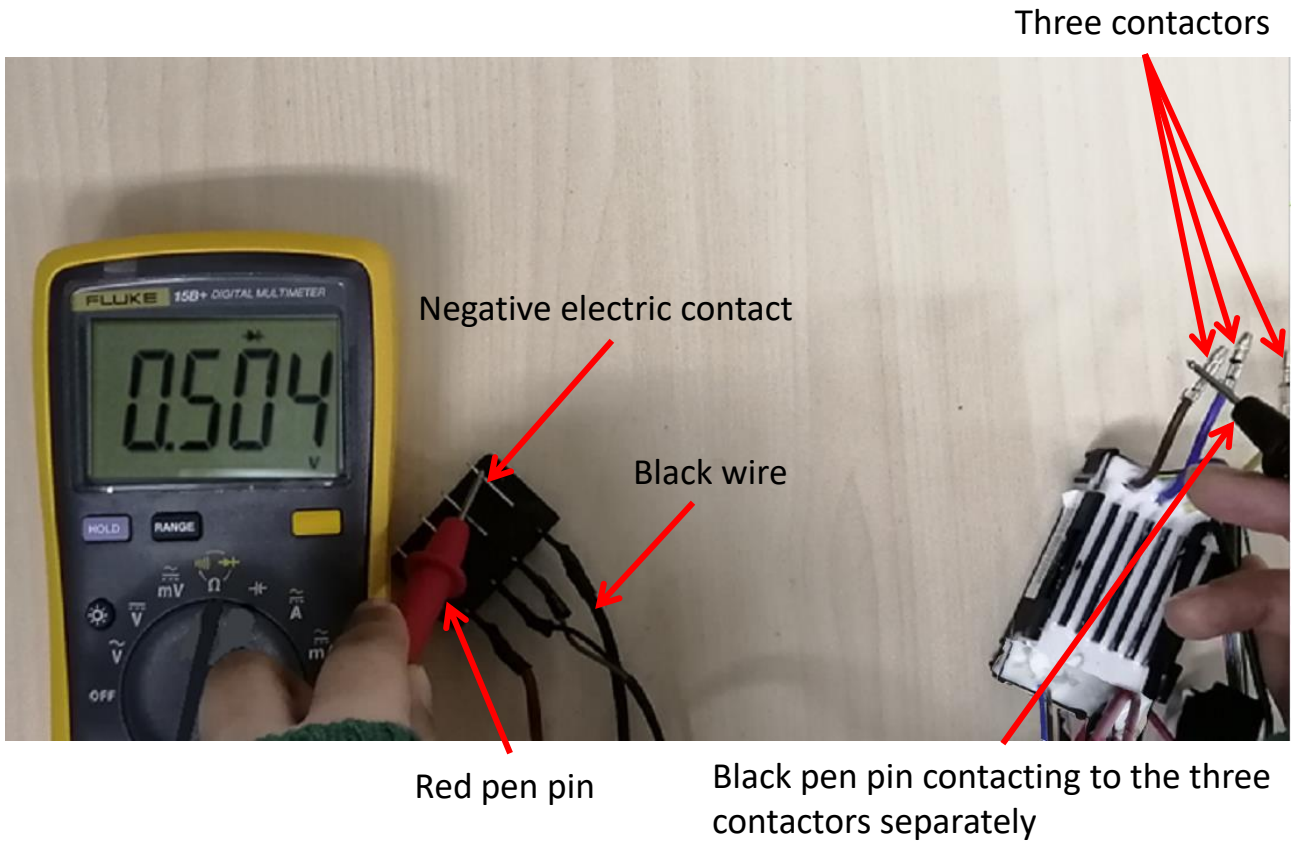
b) Contact the red pen pin to the metal panel connected with the black cable (Negative electric contact).

c) Contact the black pen pin to each of the three terminals separately and measure the voltage.

d) If the LCD displays 0.45~0.55V for each measurement, go to the next testing step, otherwise means the PCBA is broken. Follow the procedure “Replace the PCBA” to replace a new PCBA.

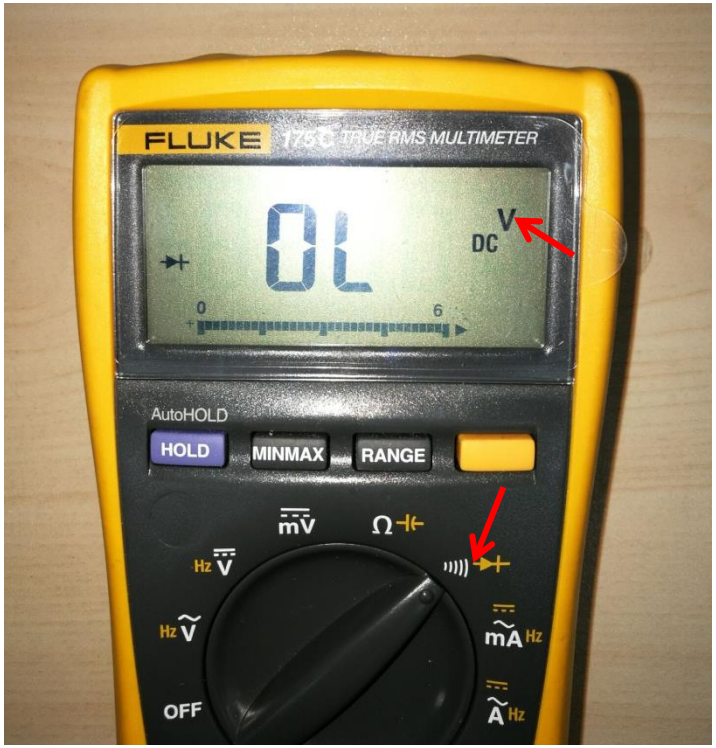
How to detect the PCBA and motor

Figure showing how to measure the MOSFET in the PCBA (Step 1)



How to detect the PCBA and motor

10. Measure the MOSTET in the PCBA. (Step 2)



a) Keep the Multimeter function setting at “Diode measuring”.

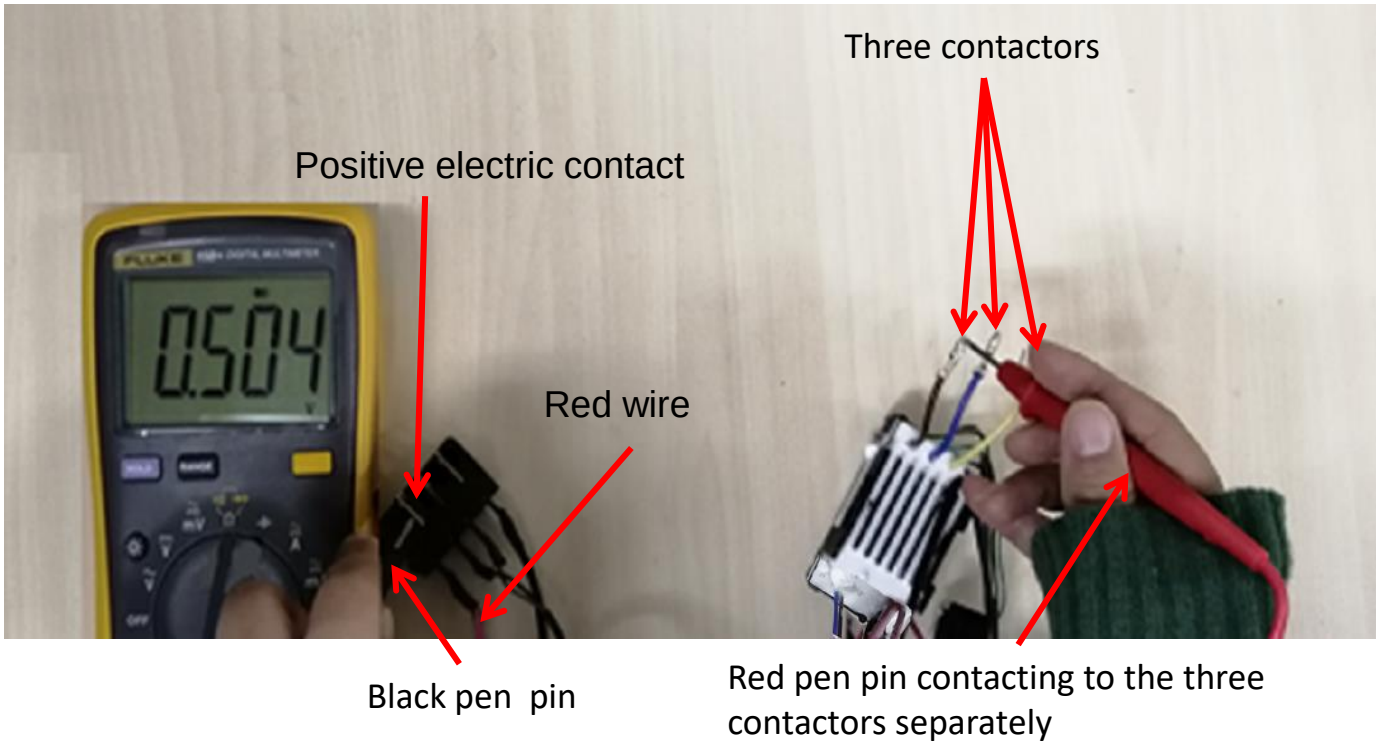
b) Contact the black pen pin to the metal panel connected with the red cable (Positive electric contact).

c) Contact the red pen pin to each of the three terminals separately, and then press the lock-off button and trigger simultaneously to measure the voltage.

d) If the LCD displays 0.45~0.55V for each measurement, the whole PCBA is good, otherwise means the PCBA is broken. Follow the procedure “Replace the PCBA” to replace a new PCBA.

How to detect the PCBA and motor

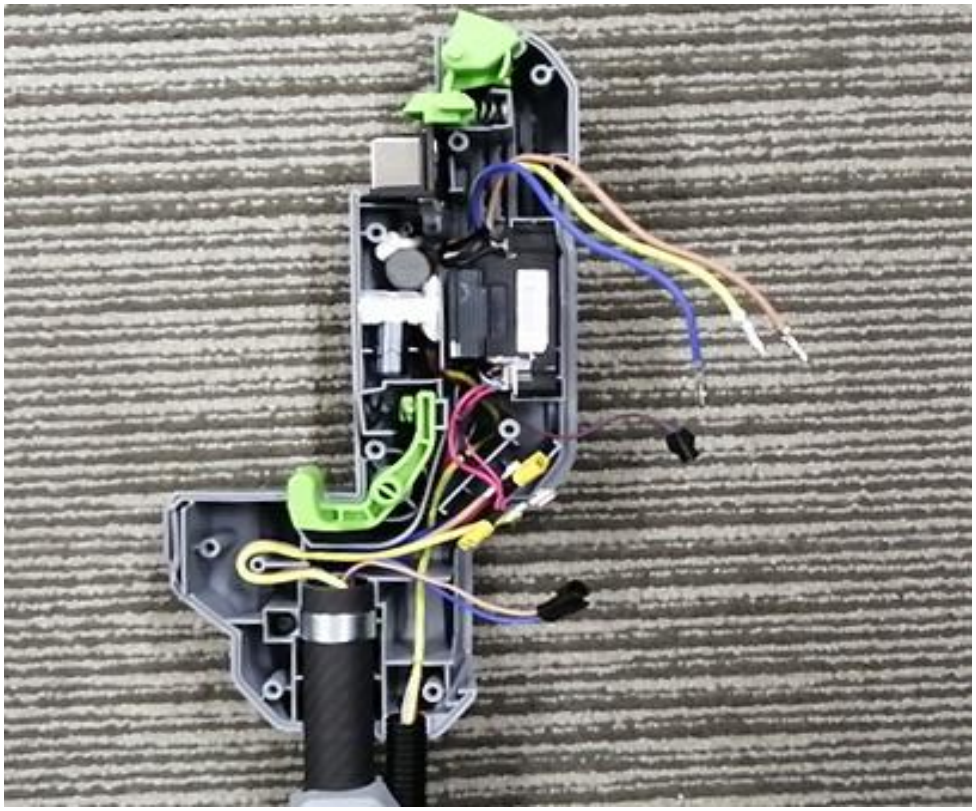
Figure showing how to measure the MOSFET in the PCBA (Step 2)



Part 2: Replace the PCBA

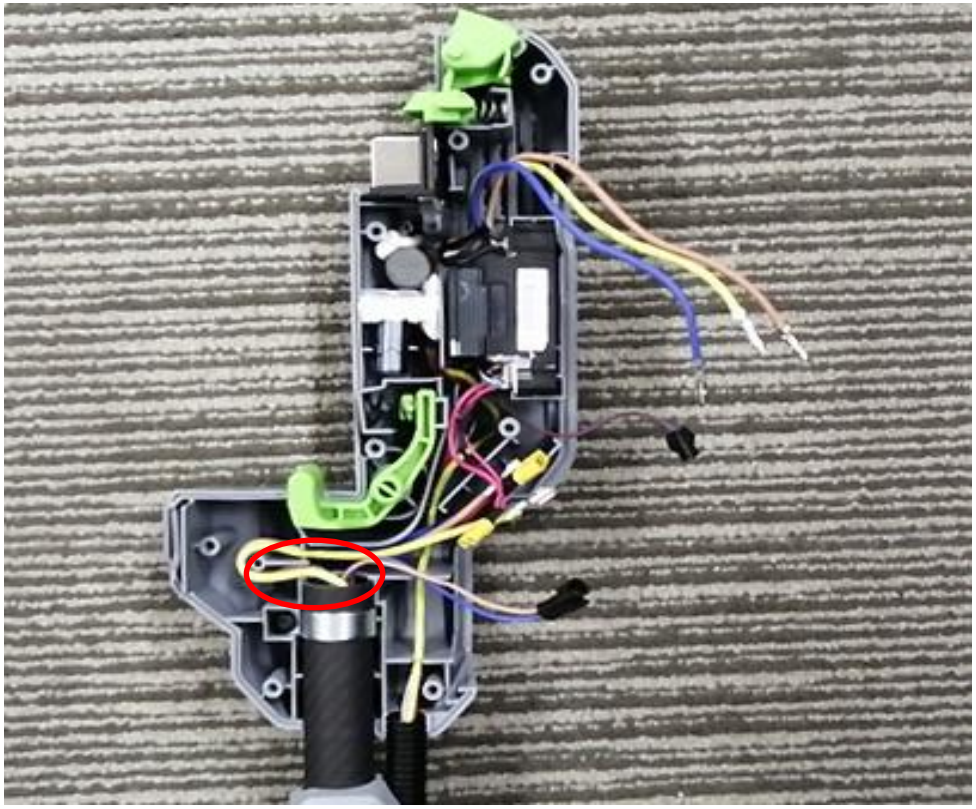
Replace the PCBA

1. Separate the housing set and disconnect the connectors as is shown in the “How to detect the PCBA and motor” section.



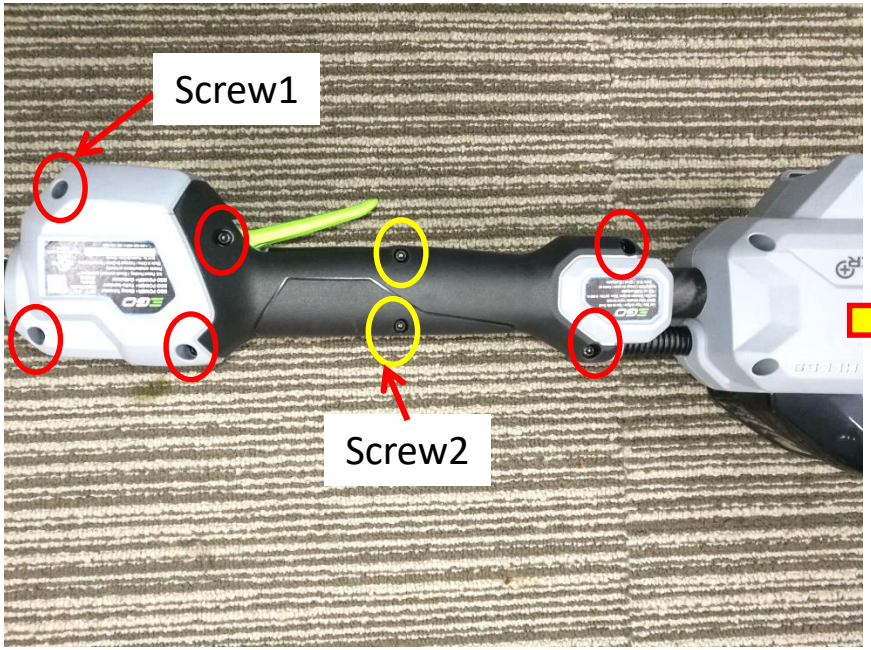
Replace the PCBA

2. Loosen the screw to remove the fixed ring



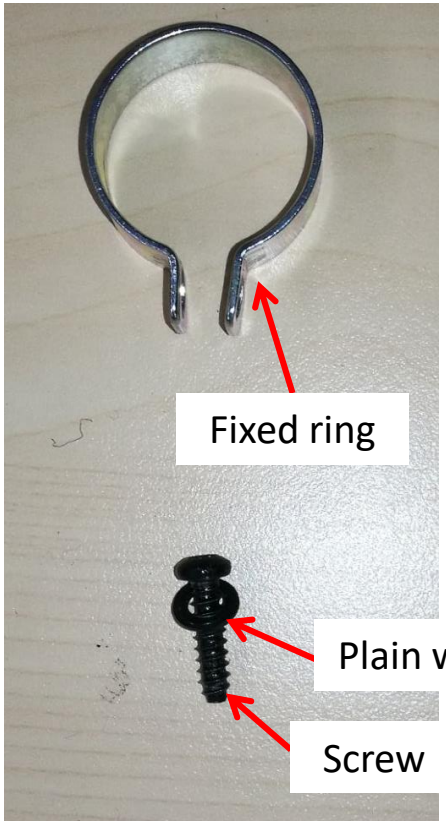
Replace the PCBA

3. Loosen 8 pcs screws to remove the right handle set.



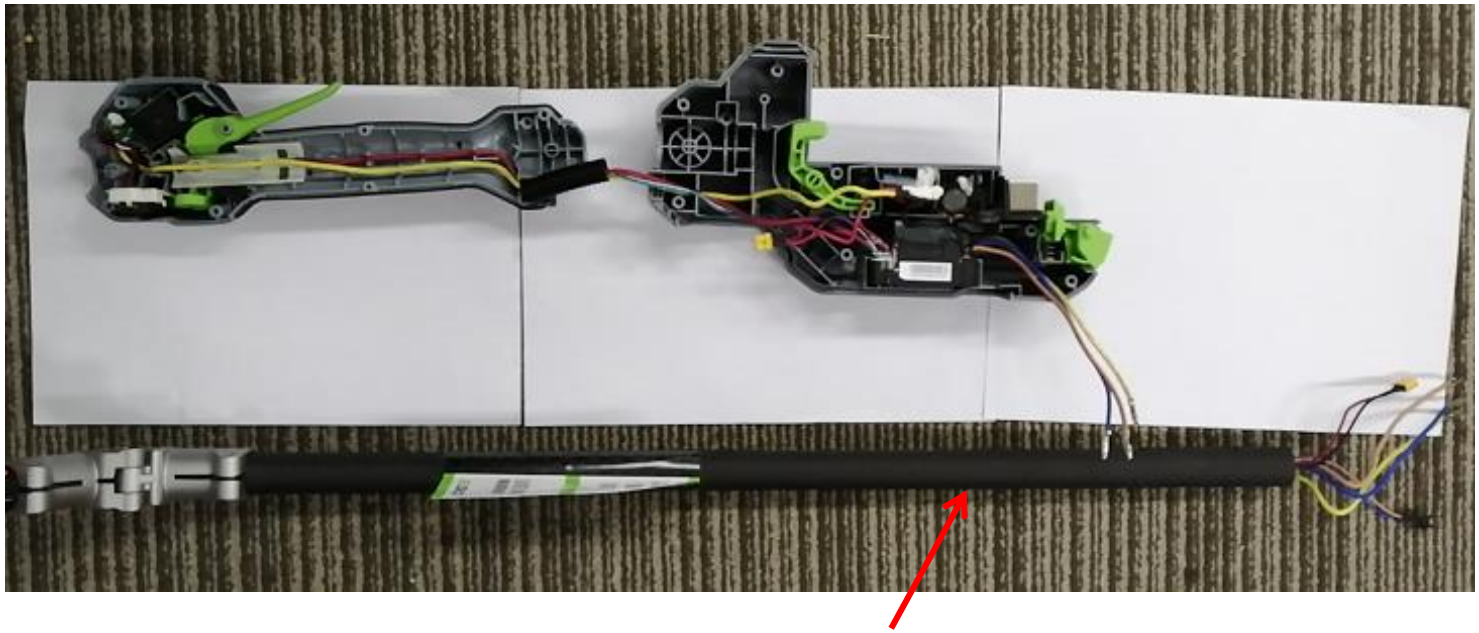
Replace the PCBA

4. Loosen the screw to remove the fixed ring.



Replace the PCBA

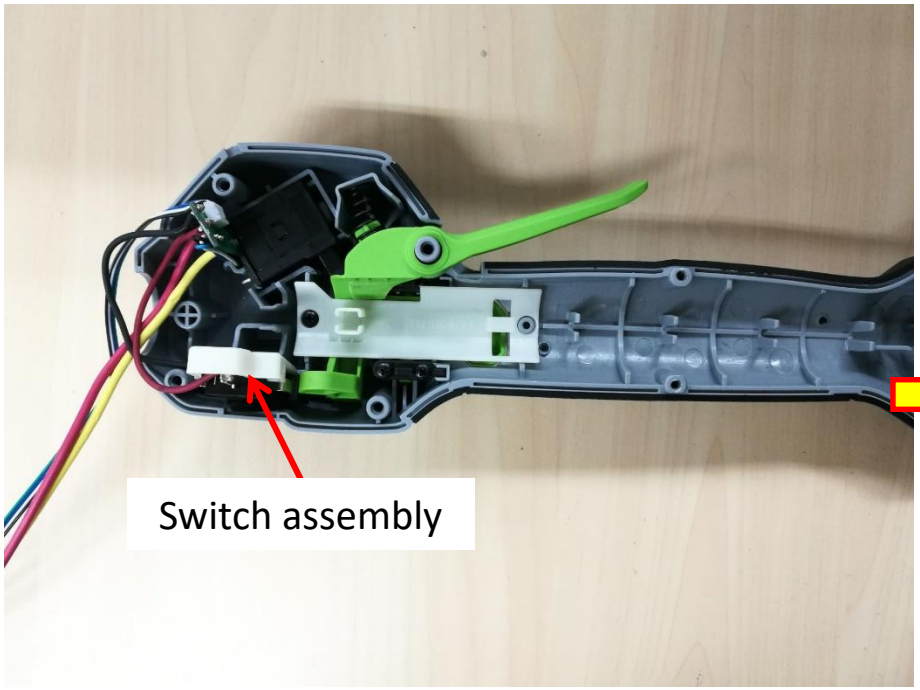
5. Remove the connecting tube assembly.

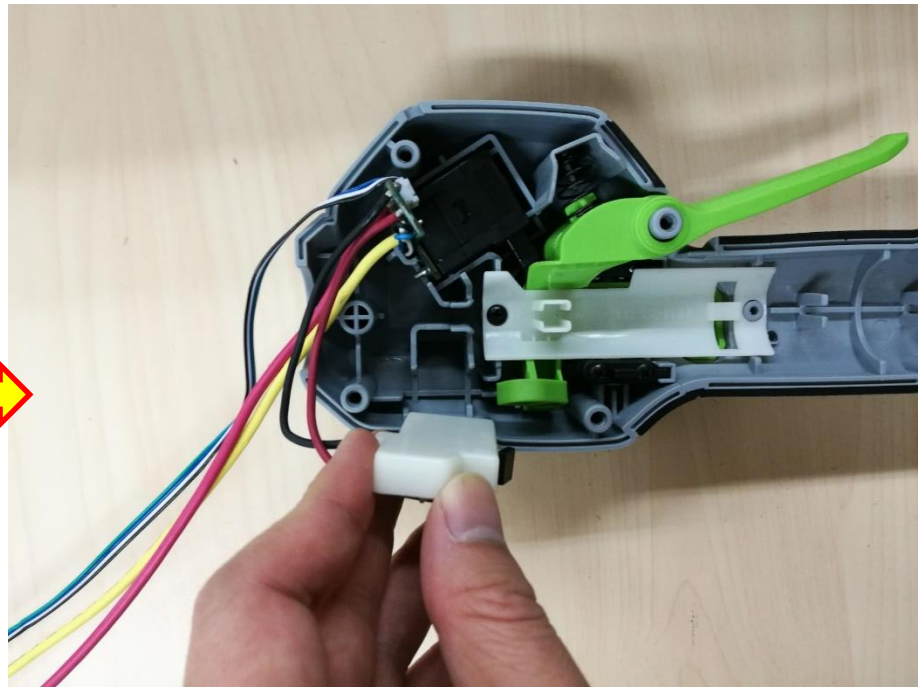


Connecting tube assembly

Replace the PCBA

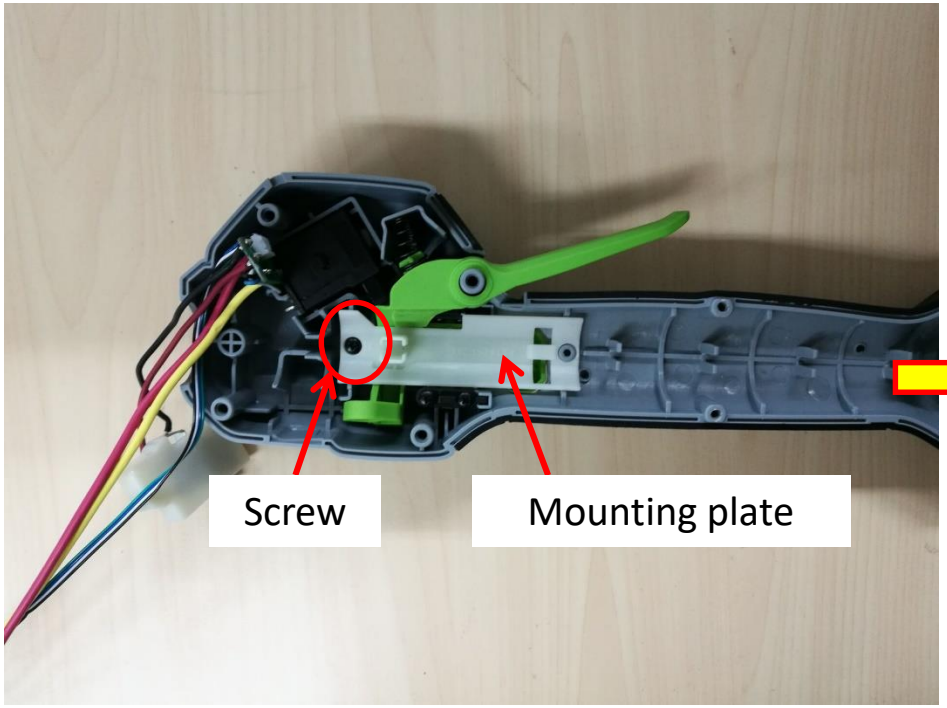
6. Take the switch assembly out of the groove of the handle set.

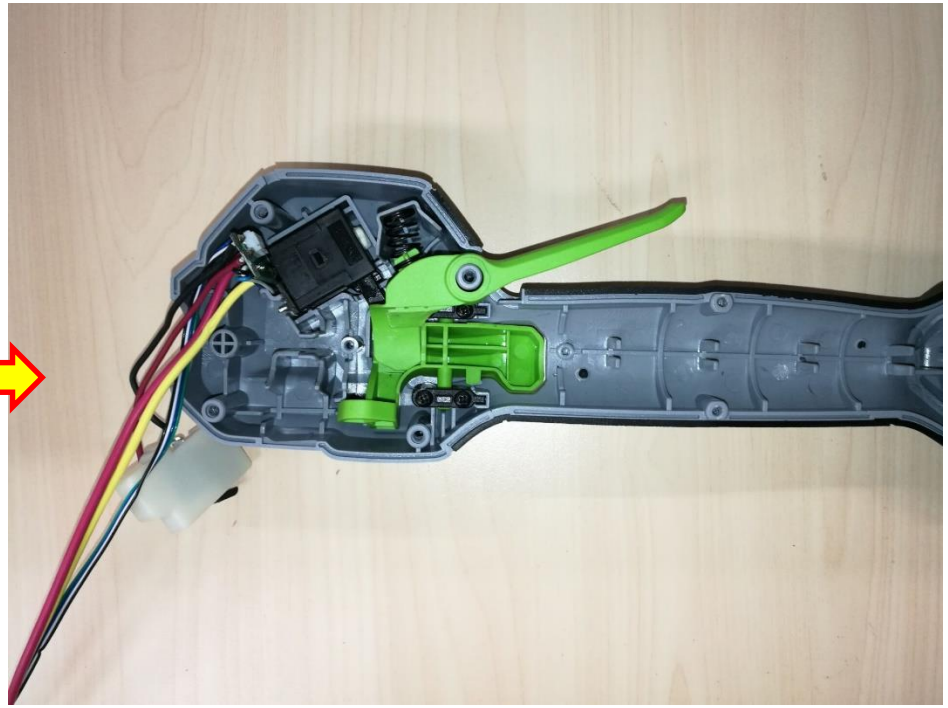




Replace the PCBA

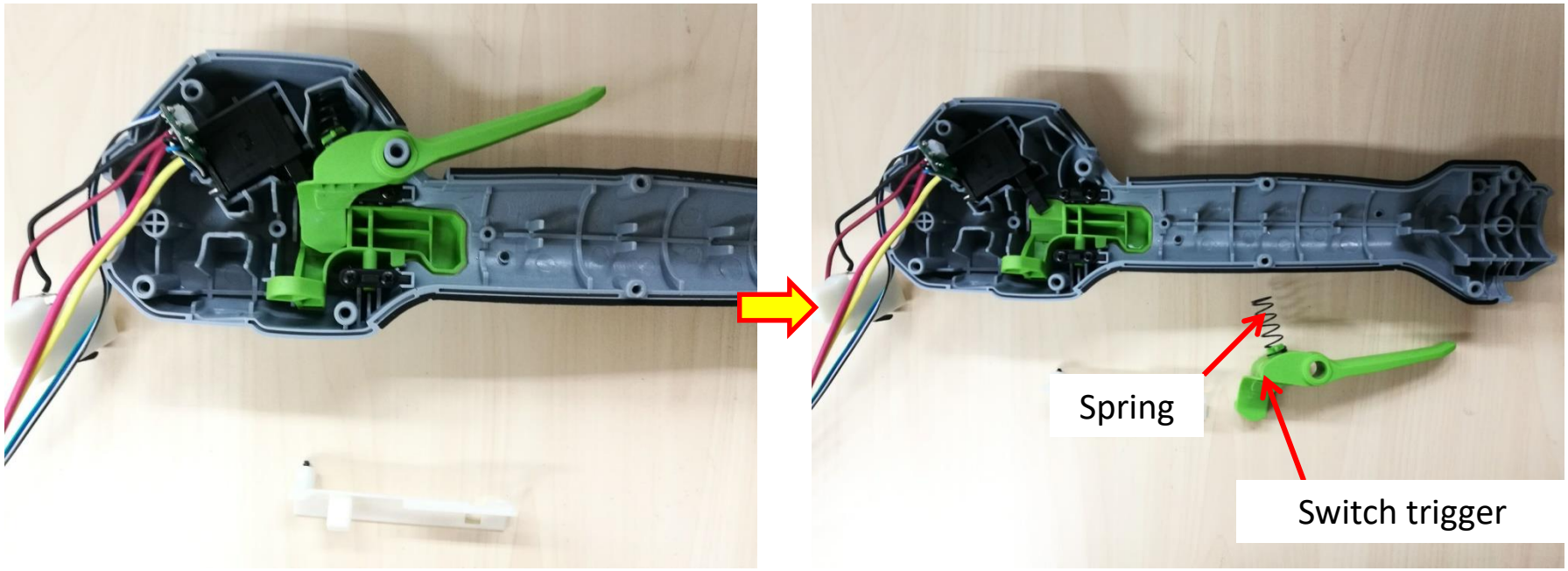
7. Loosen the screw to remove the mounting plate.





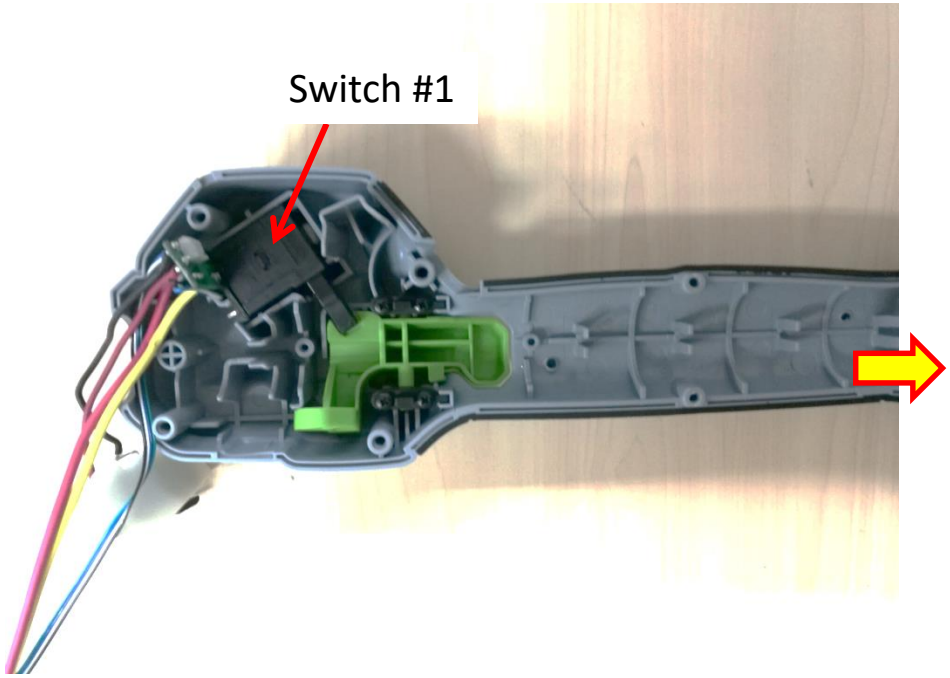
Replace the PCBA

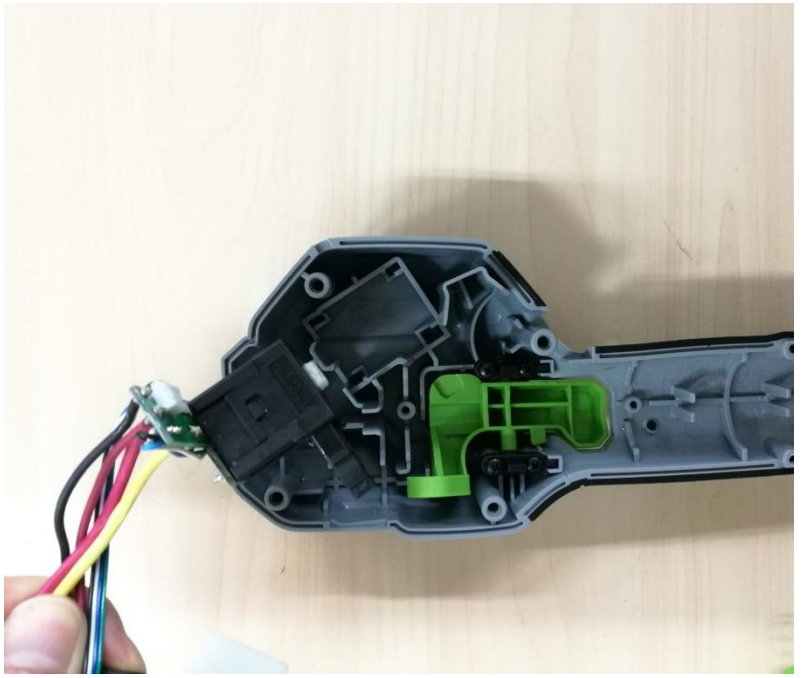
8. Remove the switch trigger and spring from the handle set. If any one is broken, replace it with a new one.



Replace the PCBA

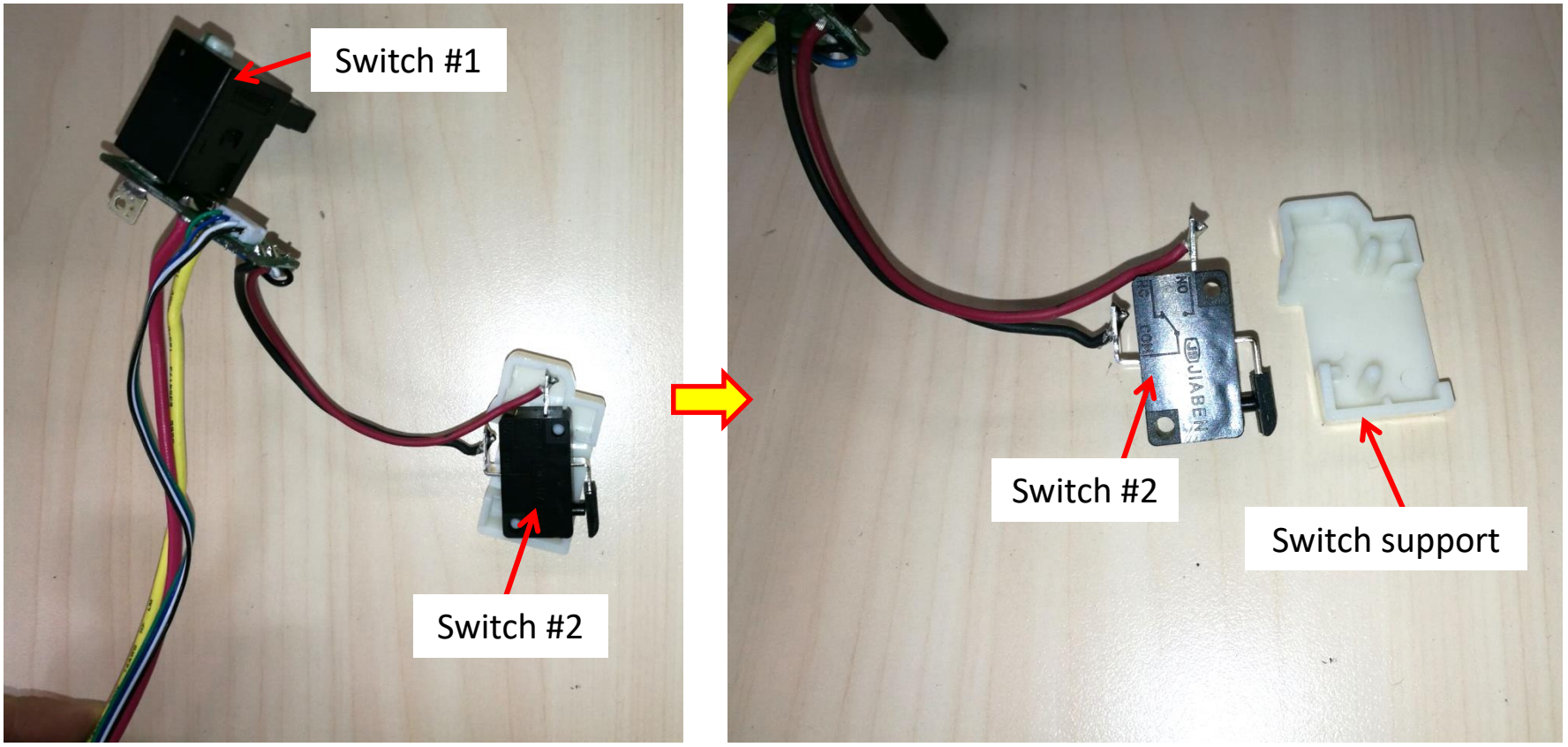
9. Take switch #1 out of the groove of the handle set.





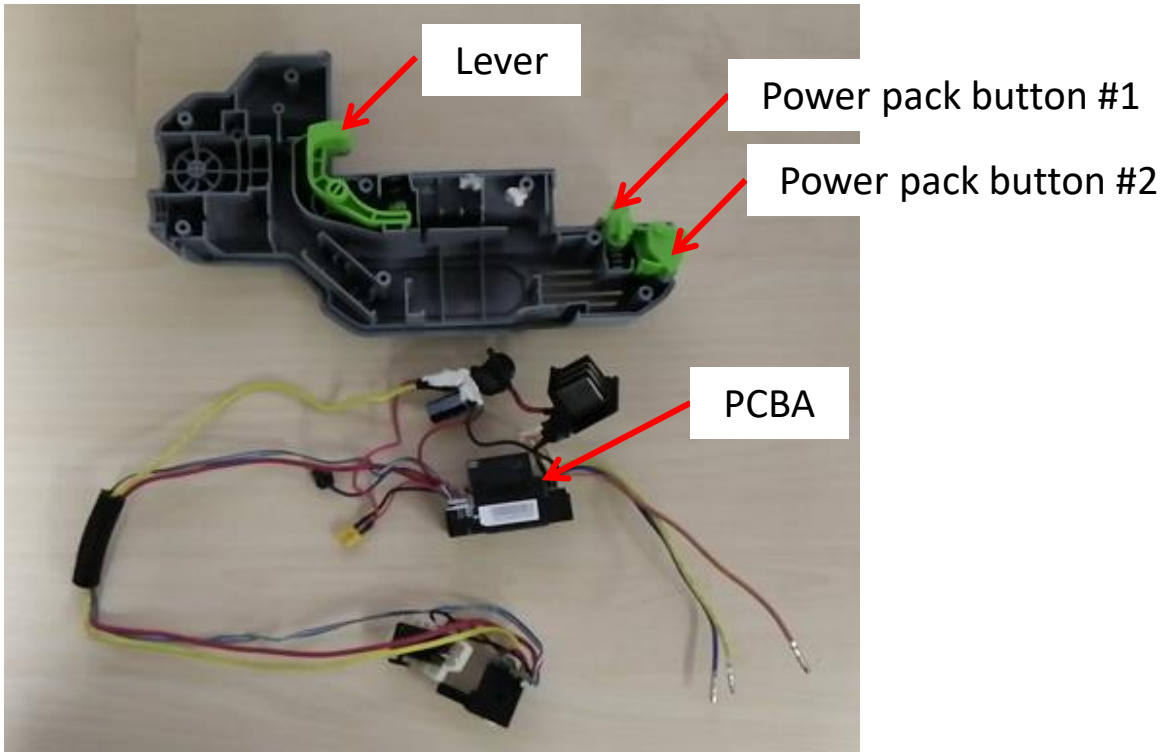
Replace the PCBA

10. Separate switch #2 from the switch support.



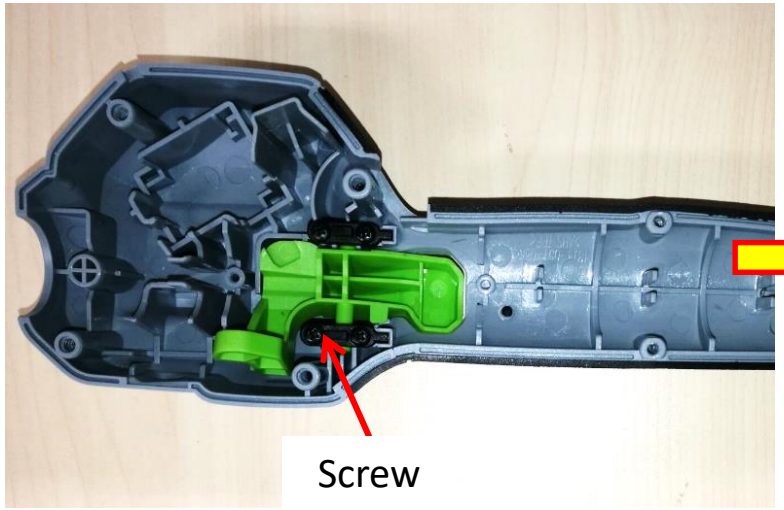
Replace the PCBA

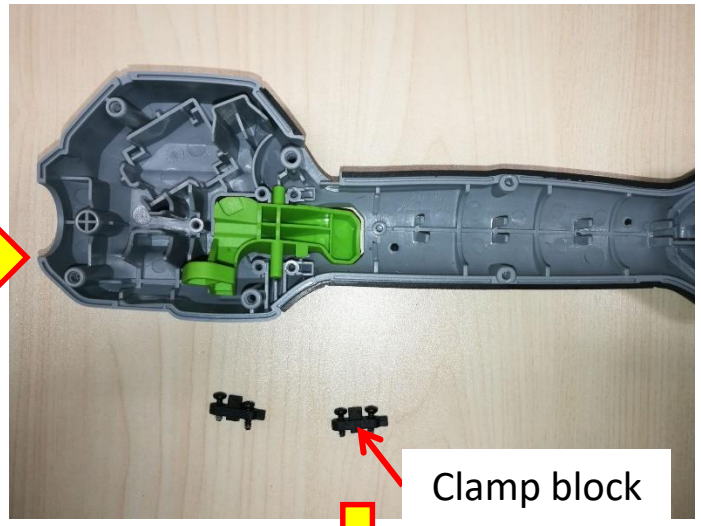
11. Take the PCBA out of the housing set and replace it with a new one, if lever or power pack button is broken, replace it with a new one.

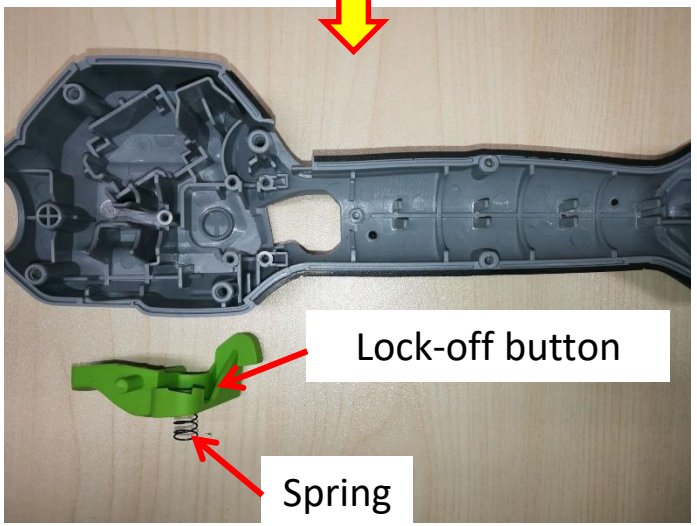


Replace the PCBA

12. Loosen the screws to remove the clamp block, then take the lock-off button and spring out of the handle set. If any one is broken, replace it with a new one.

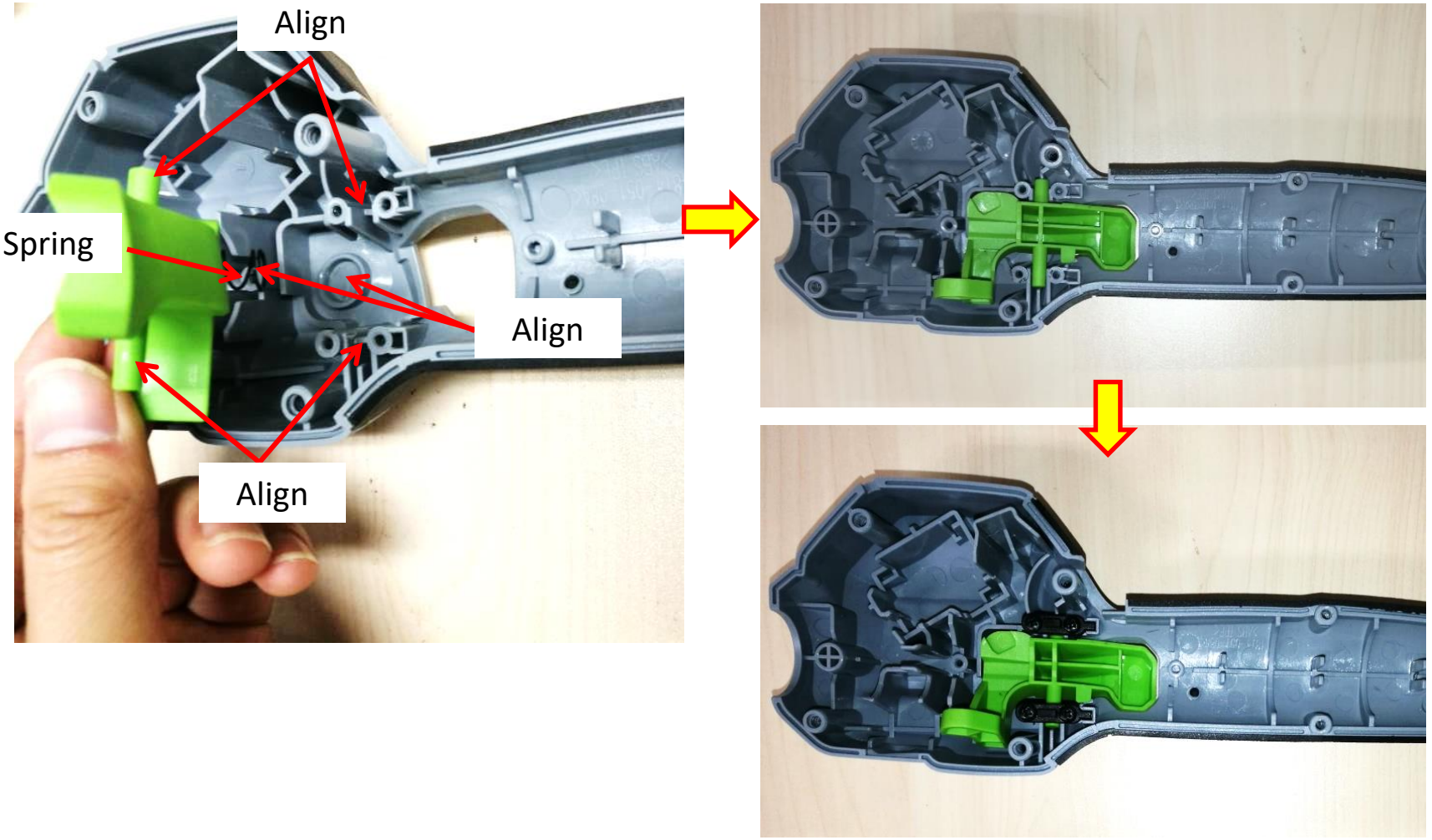






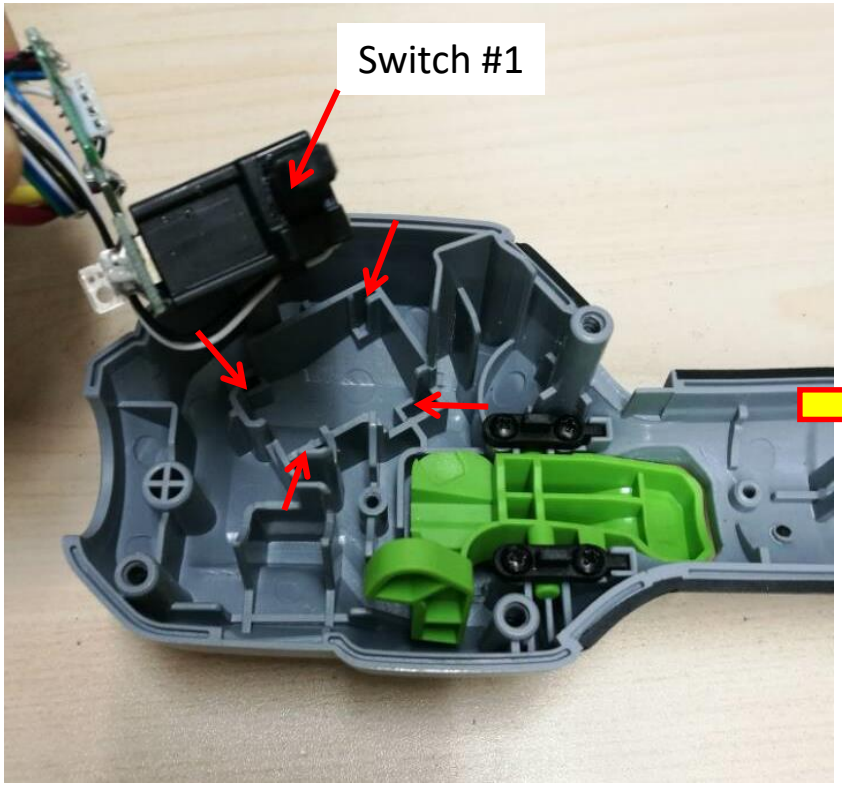
Replace the PCBA

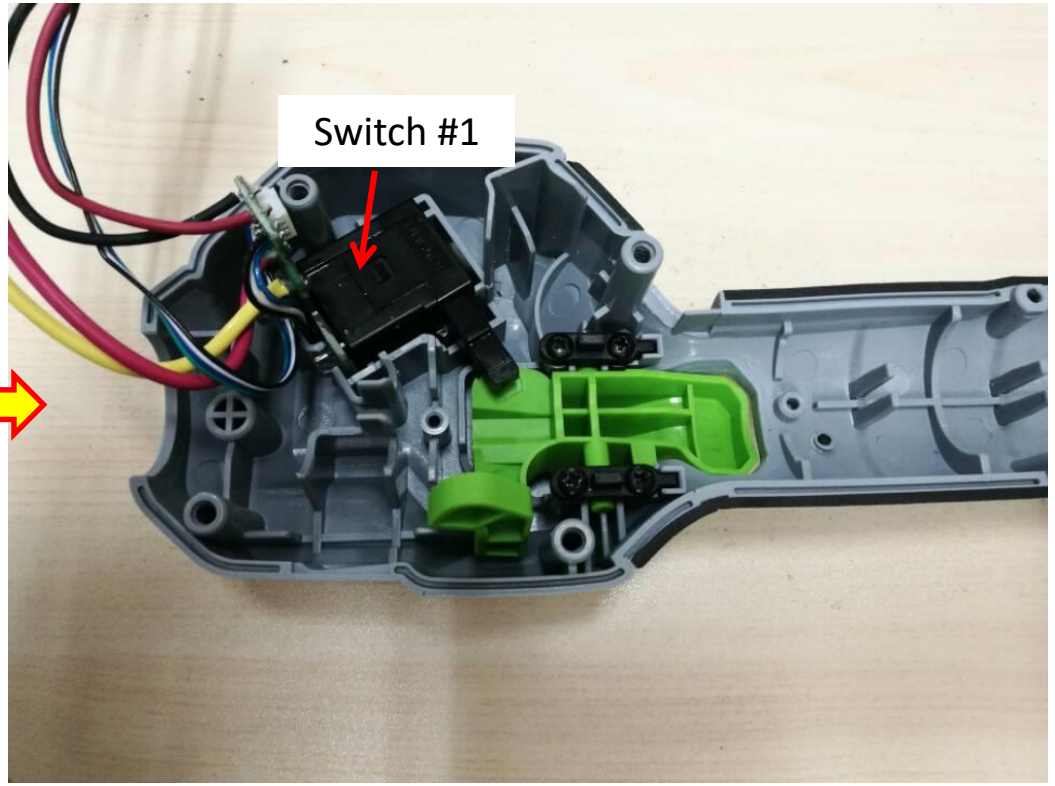
13. Assemble the spring with the lock-off button, then align the spring with the groove and align the ribs with the grooves to mount the lock-off button into the handle set and lock it with clamp blocks and screws.



Replace the PCBA

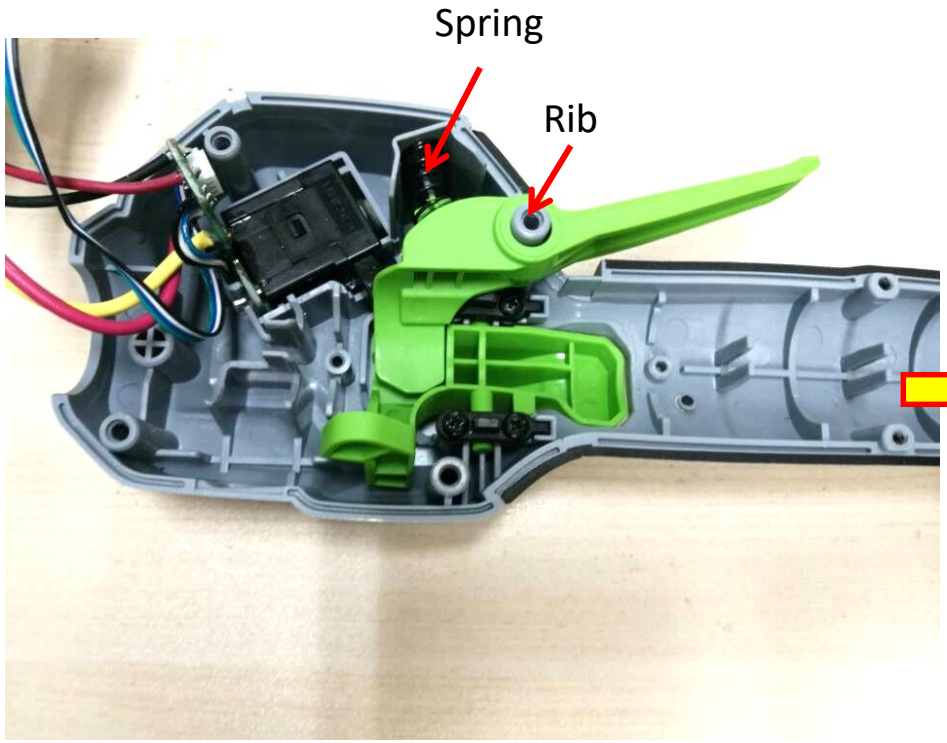
14. Mount switch #1 into the groove.

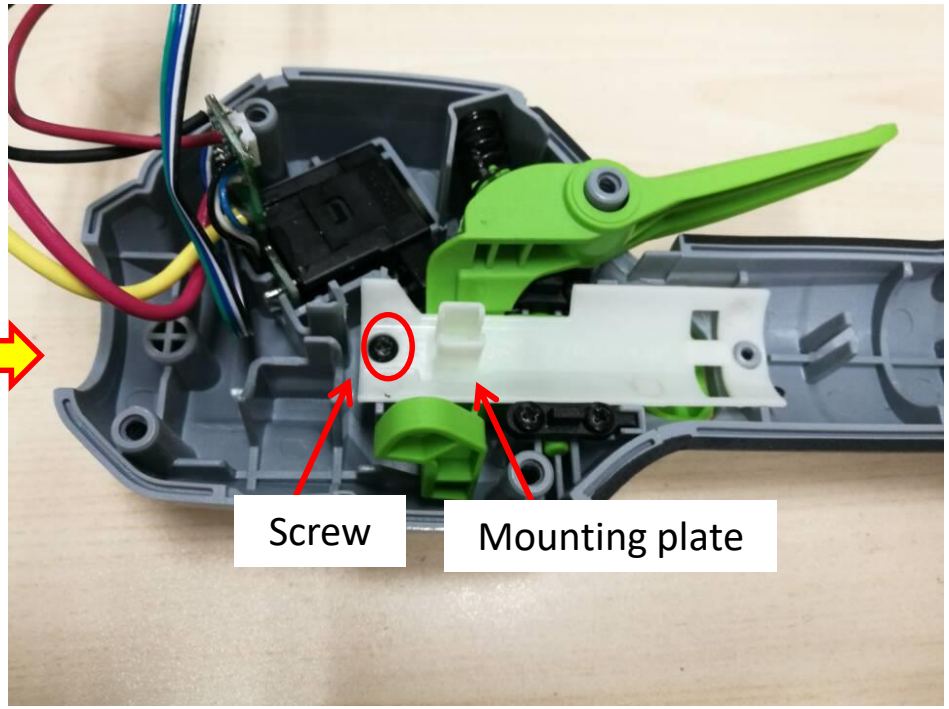




Replace the PCBA

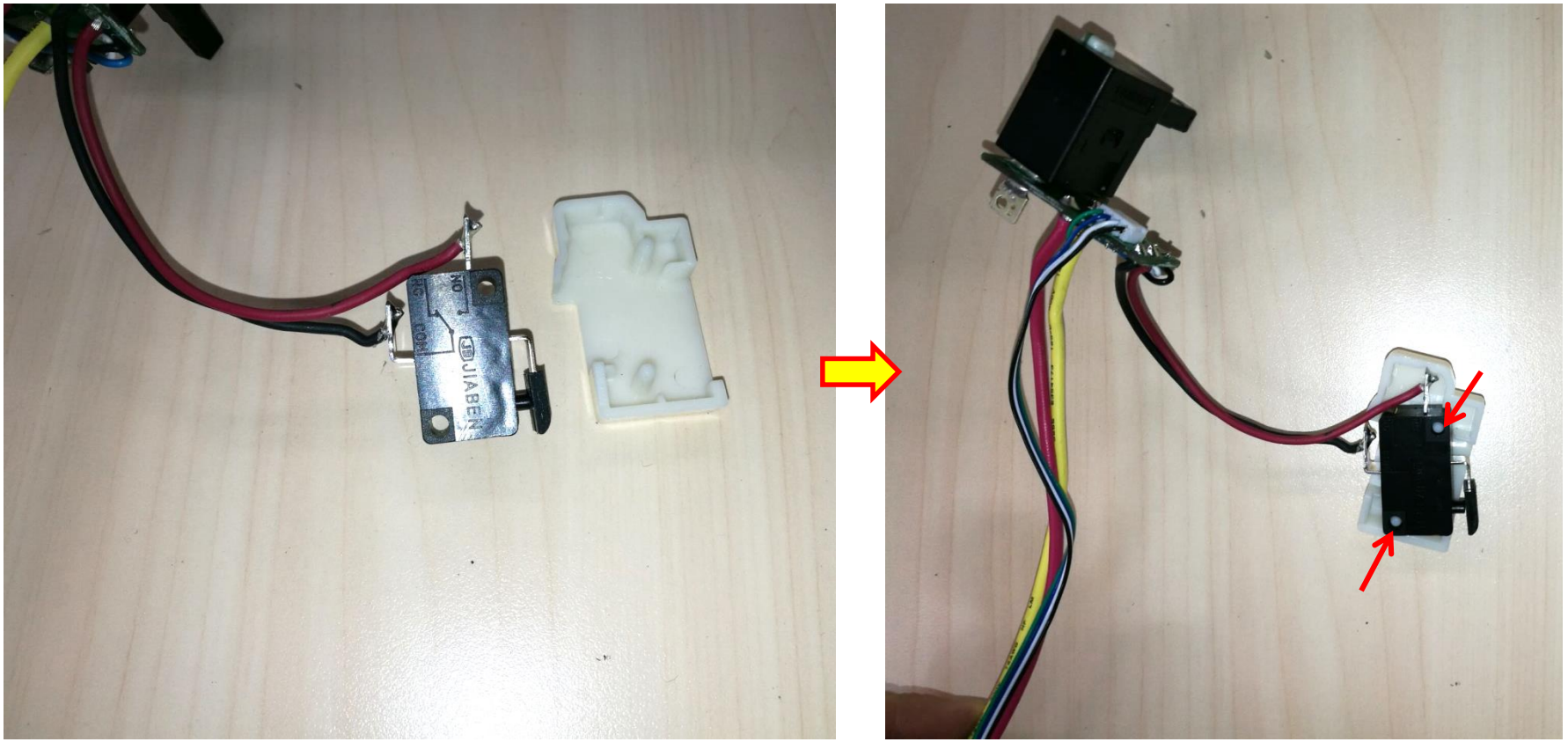
15. Assemble the spring with the switch trigger and mount the trigger onto the rib.
16. Mount the mounting plate into the handle set and lock it with screw.





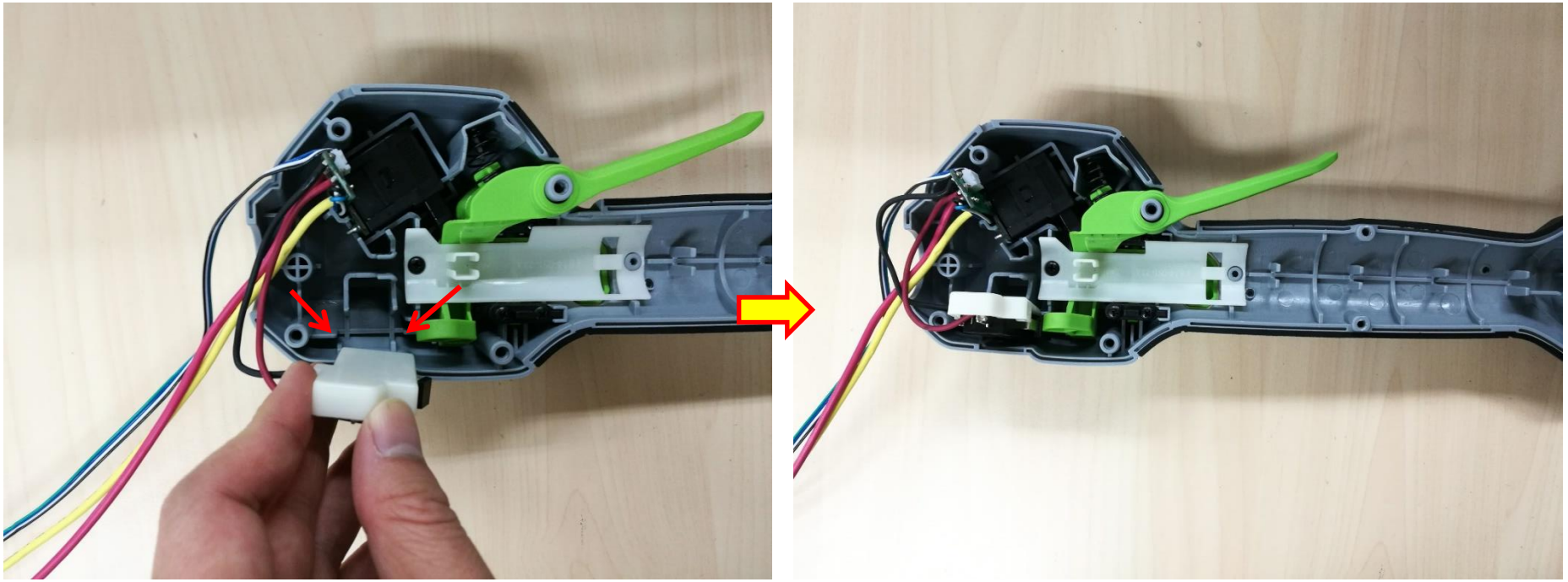
Replace the PCBA

17. Assemble switch #2 with switch support.



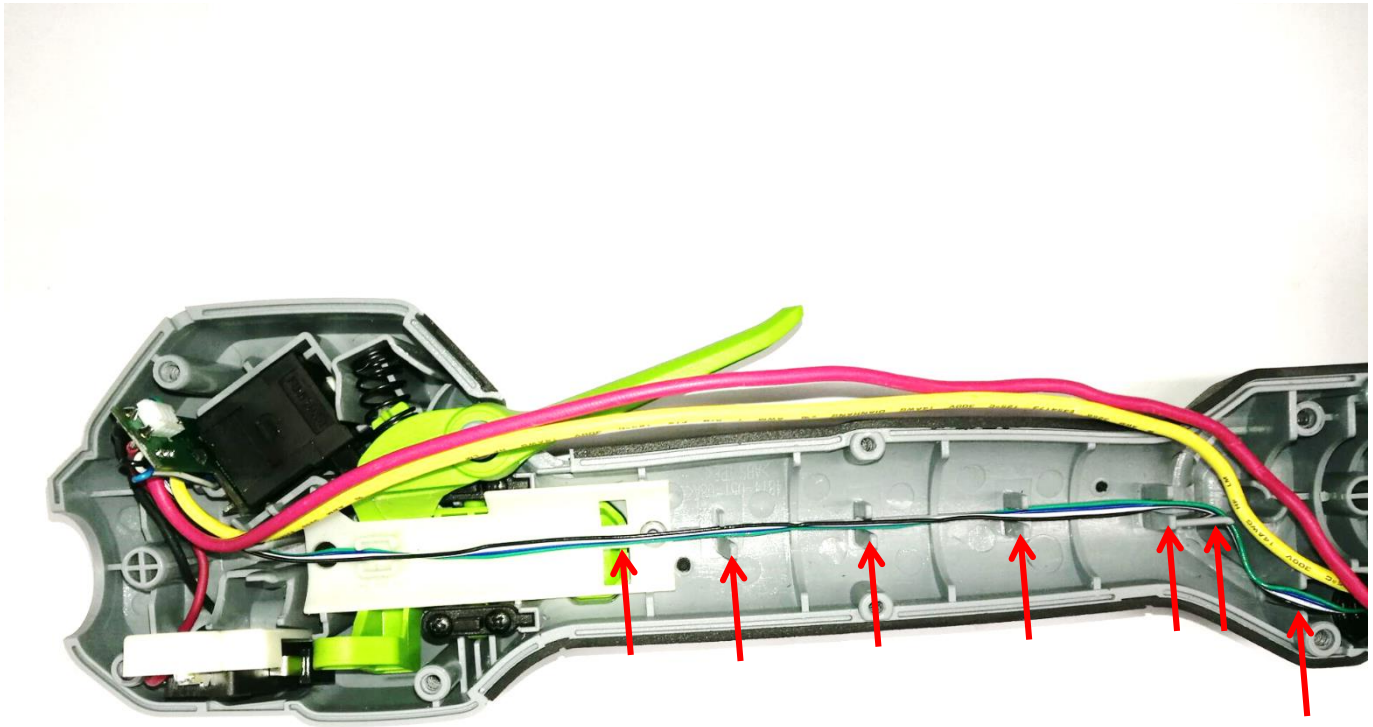
Replace the PCBA

18. Mount the switch assembly into the groove of the handle set.



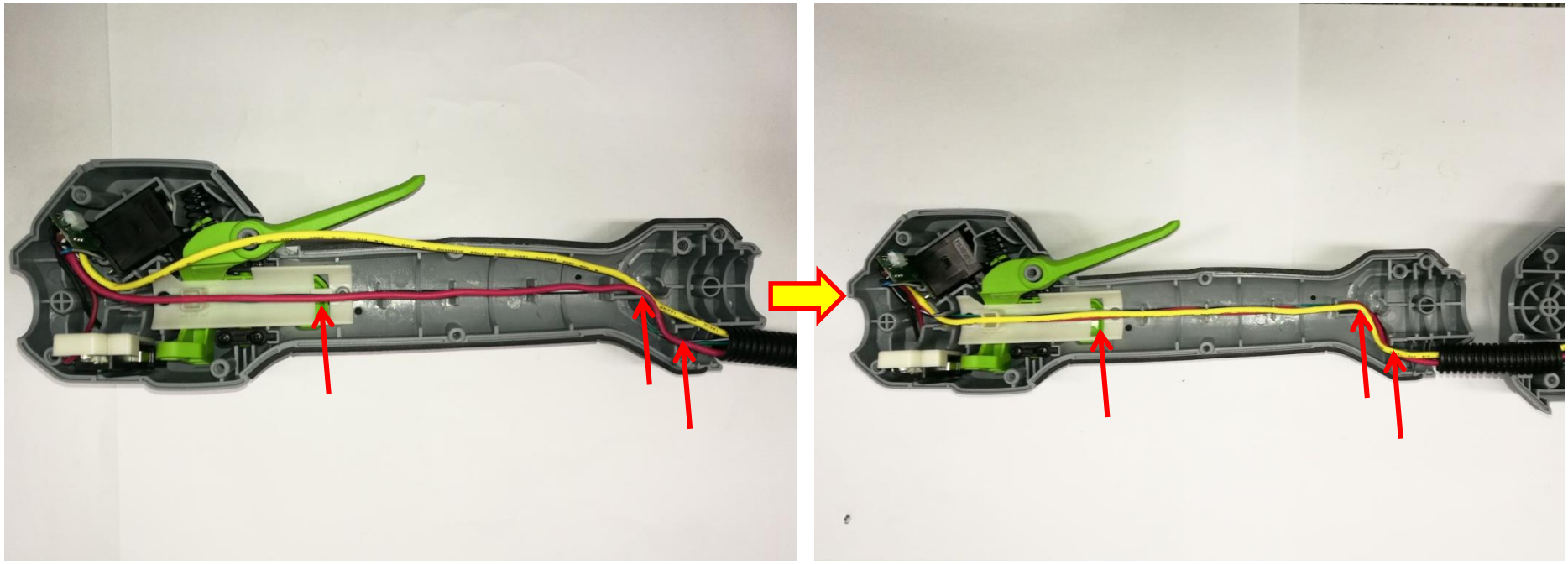
Replace the PCBA

19. Align the thin cables with the groove.



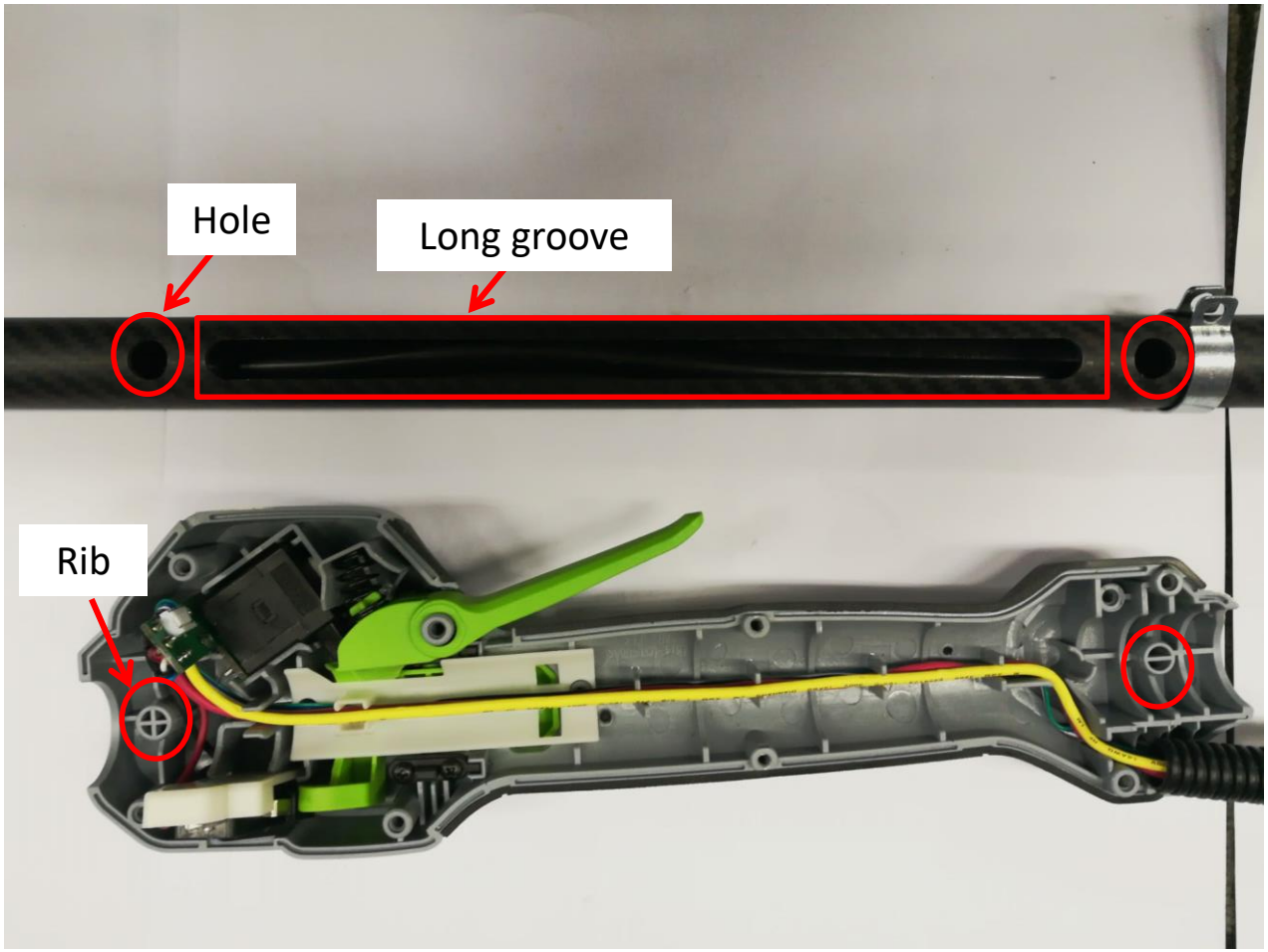
Replace the PCBA

20. Align the red cable and yellow cable with the groove in sequence.



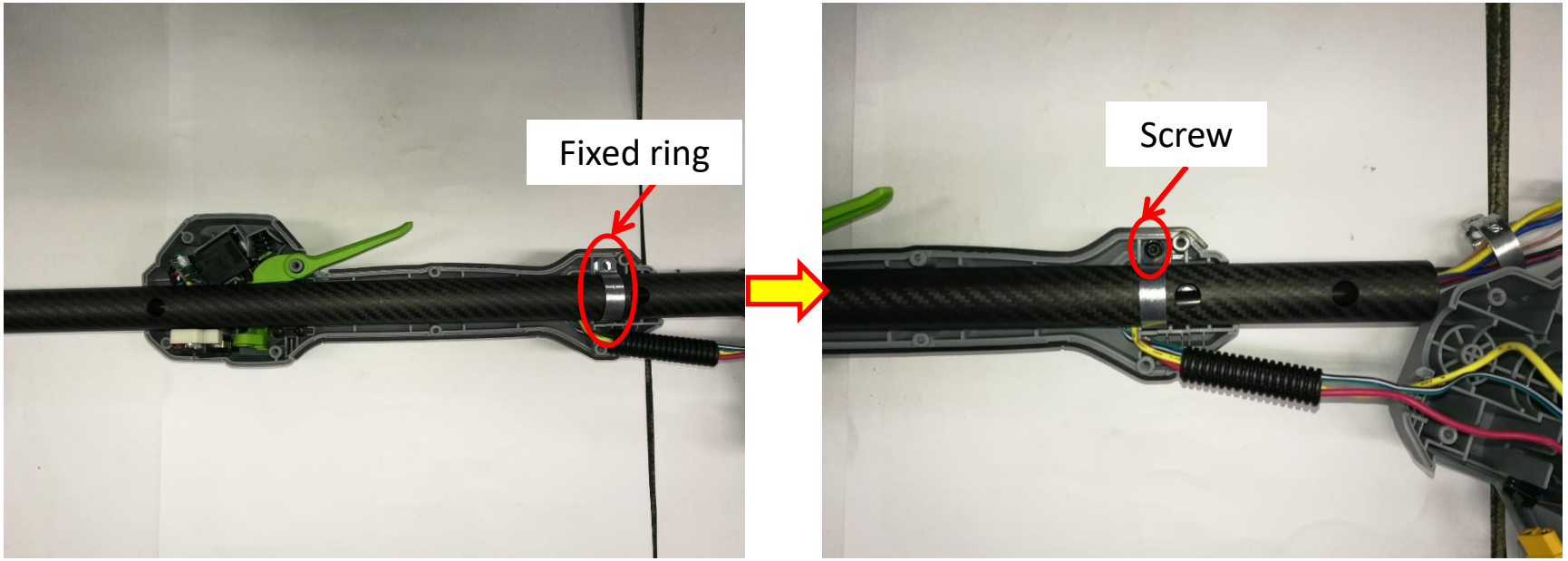
Replace the PCBA

21. Align the holes on the connecting tube with the ribs on the handle set and mount the connecting tube into the handle set with long groove facing inwards.



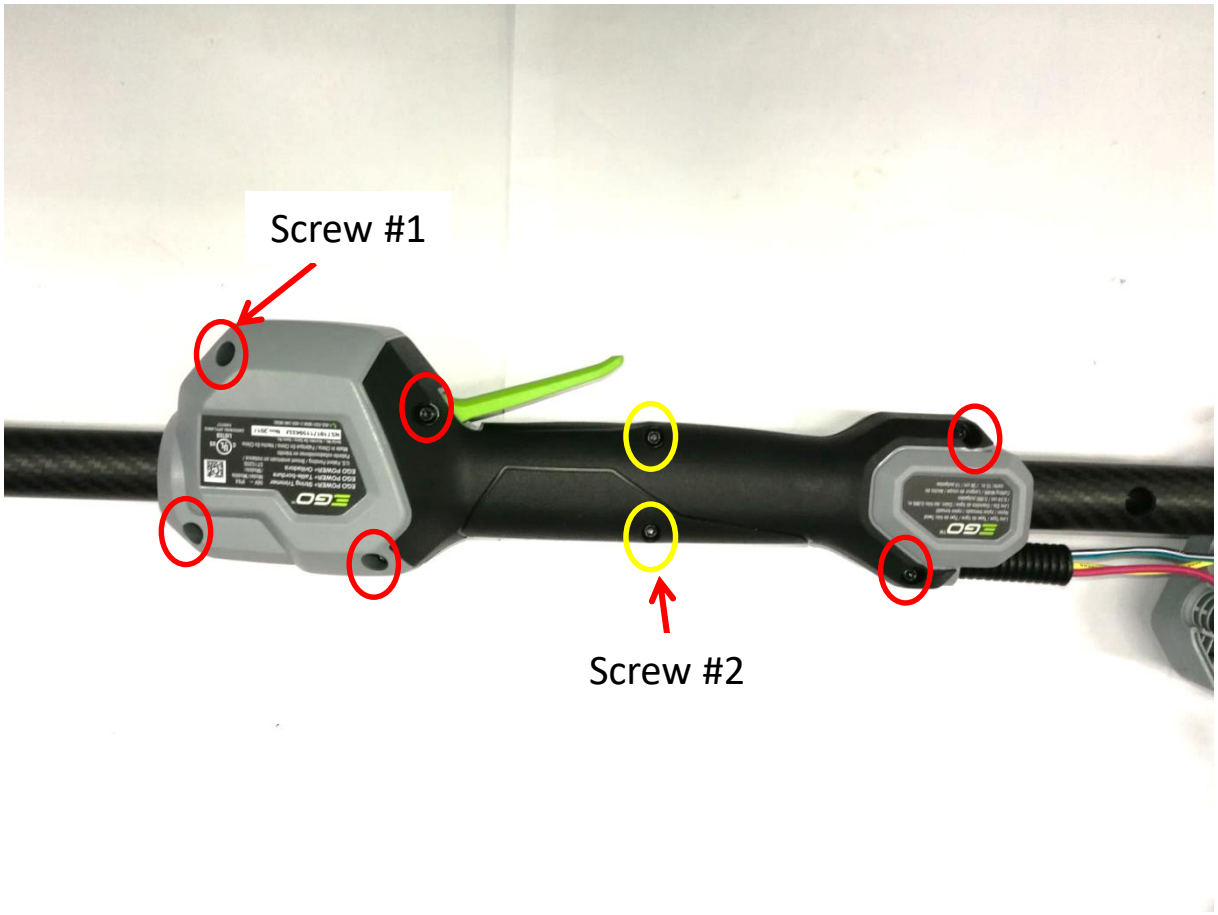
Replace the PCBA

22. Mount the fixed ring onto the connecting tube assembly and tighten it with screw.



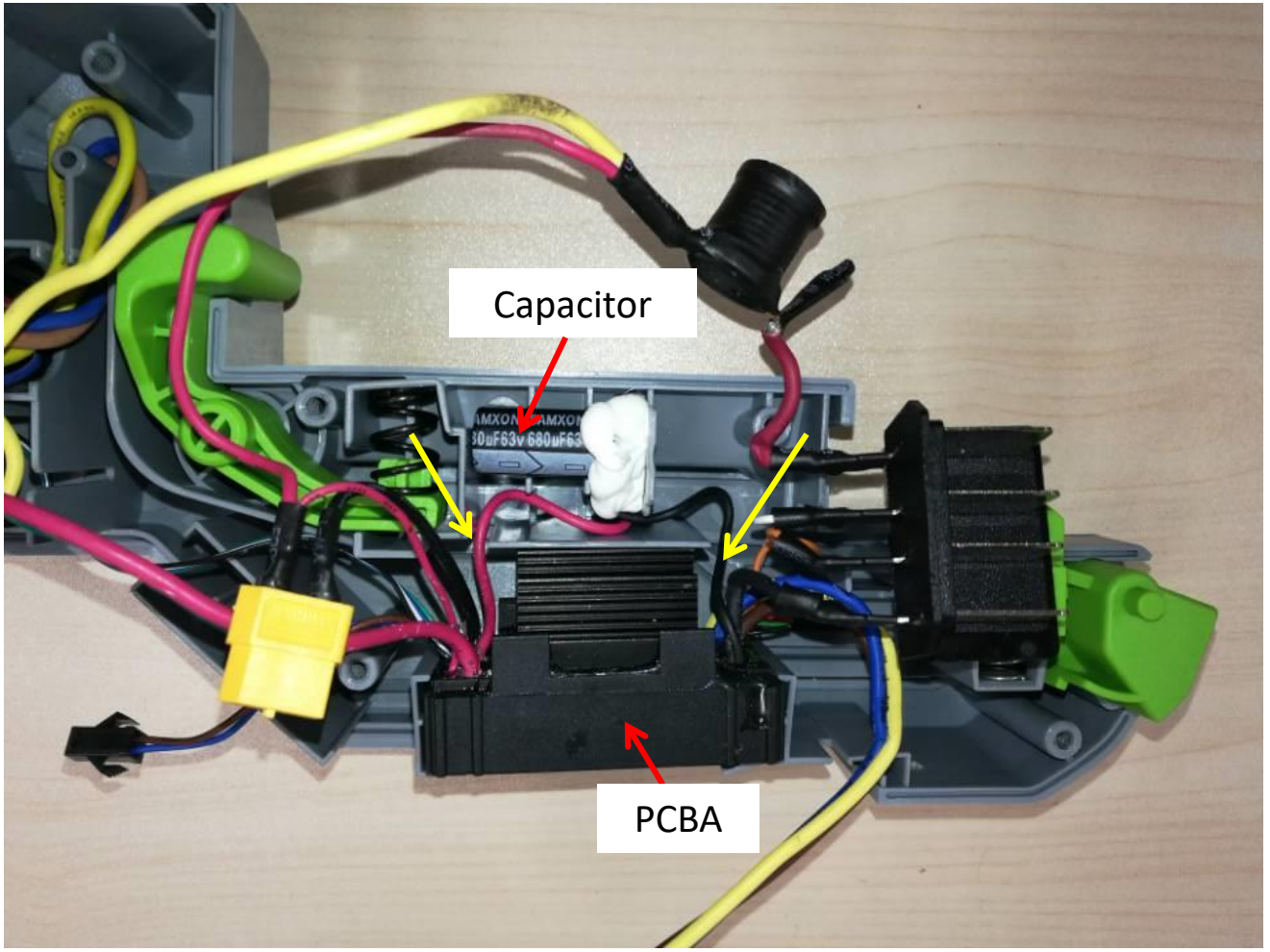
Replace the PCBA

23. Close the right handle set with the left handle set and fix them with screws.



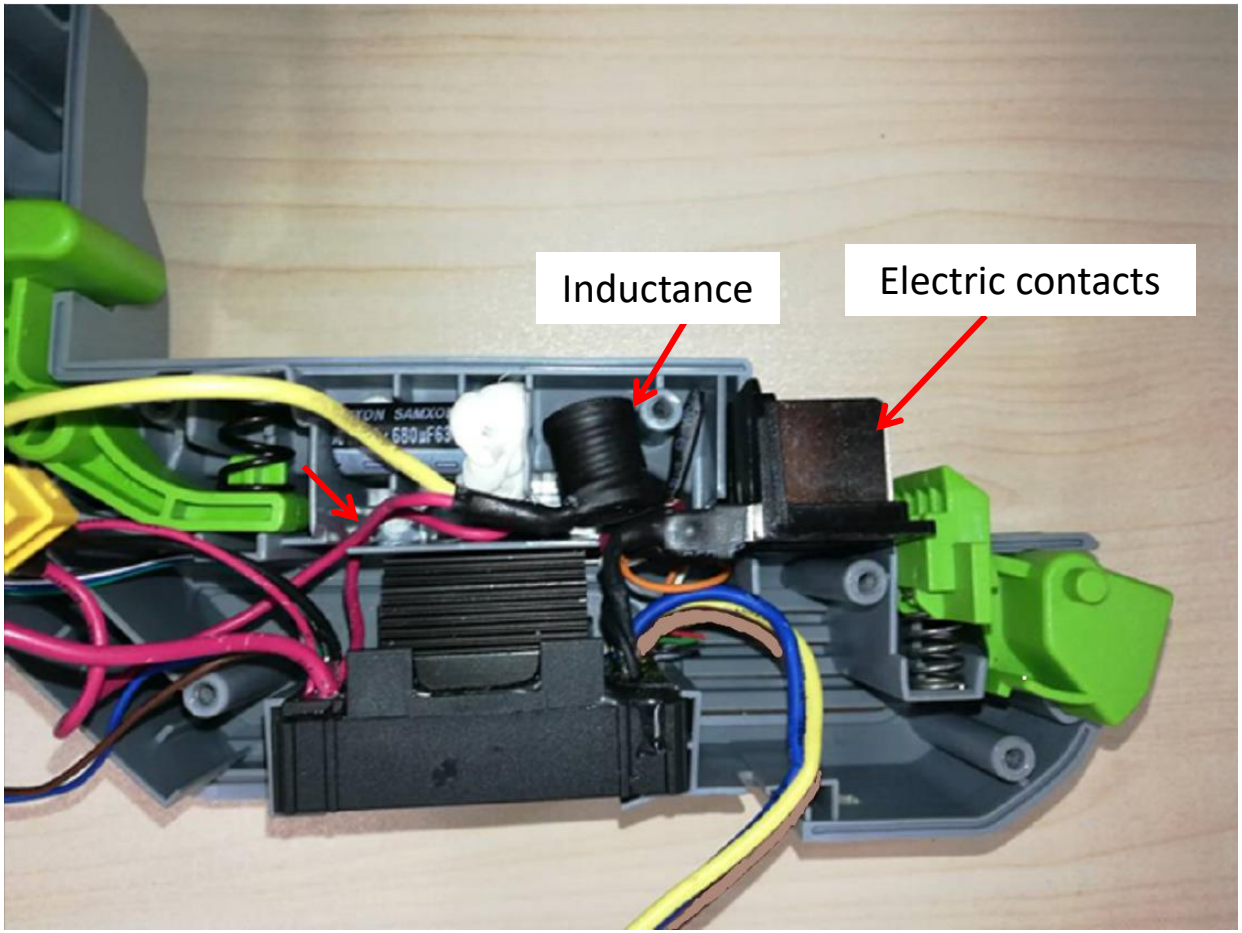
Replace the PCBA

24. Place the PCBA and capacitor into their position and align their cables into the housing grooves.



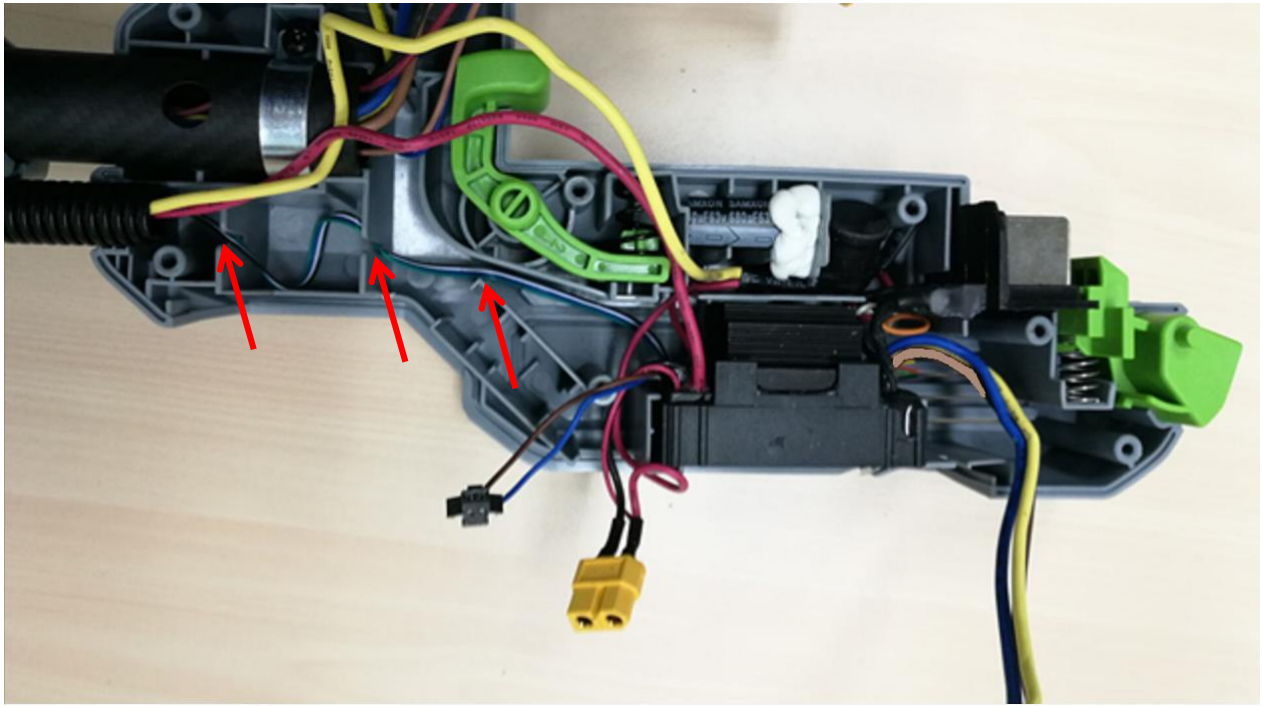
Replace the PCBA

25. Place the inductance and electric contacts into their position and align the red cable into the groove.



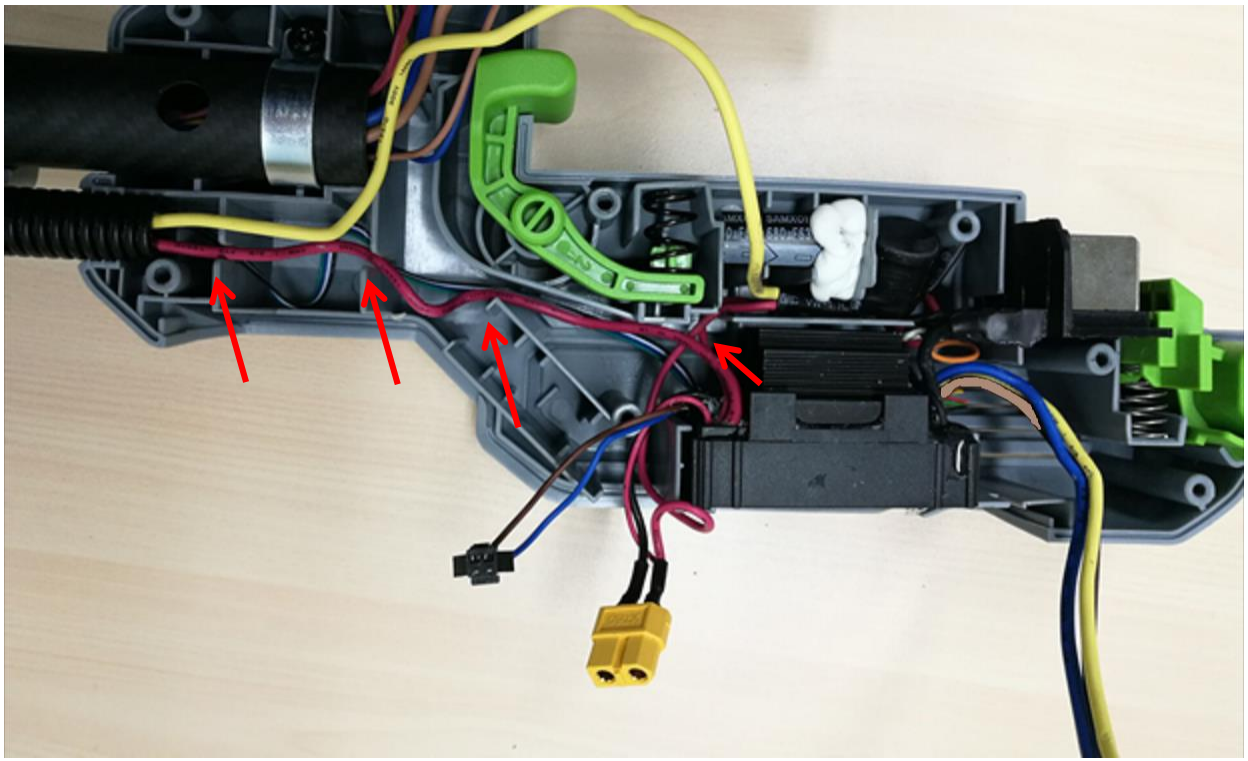
Replace the PCBA

26. Align the thin cables into the groove.



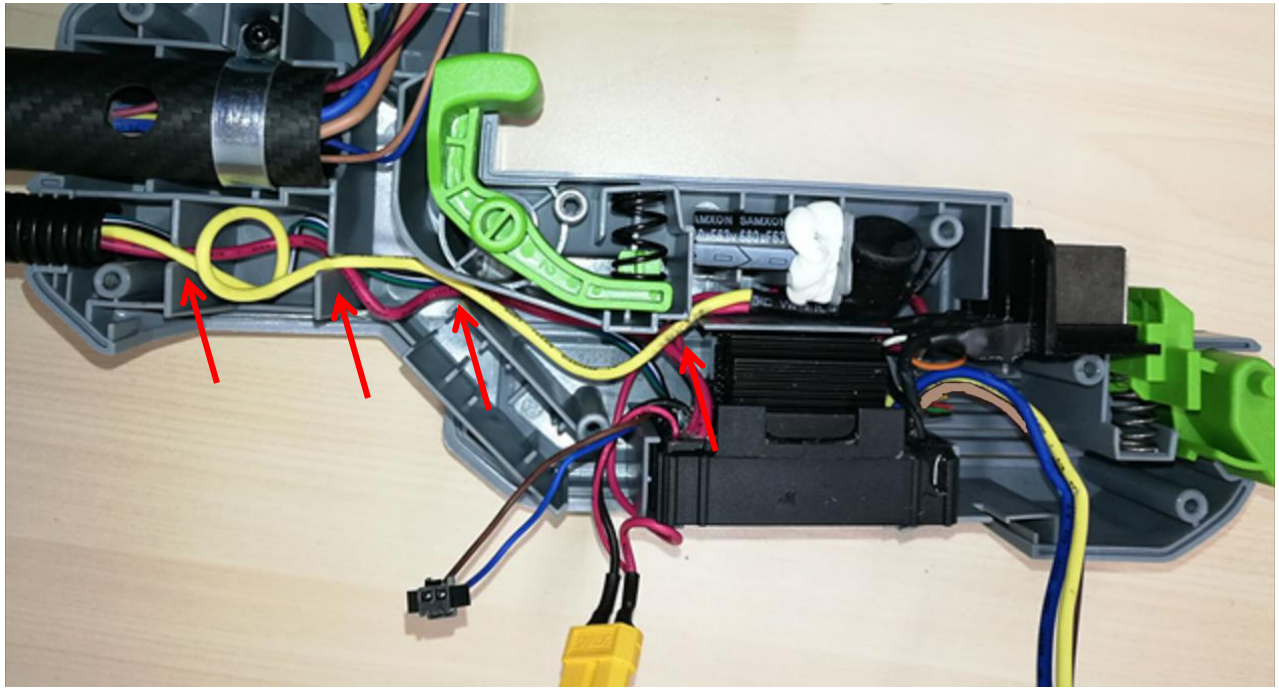
Replace the PCBA

27. Align the red cable into the groove.



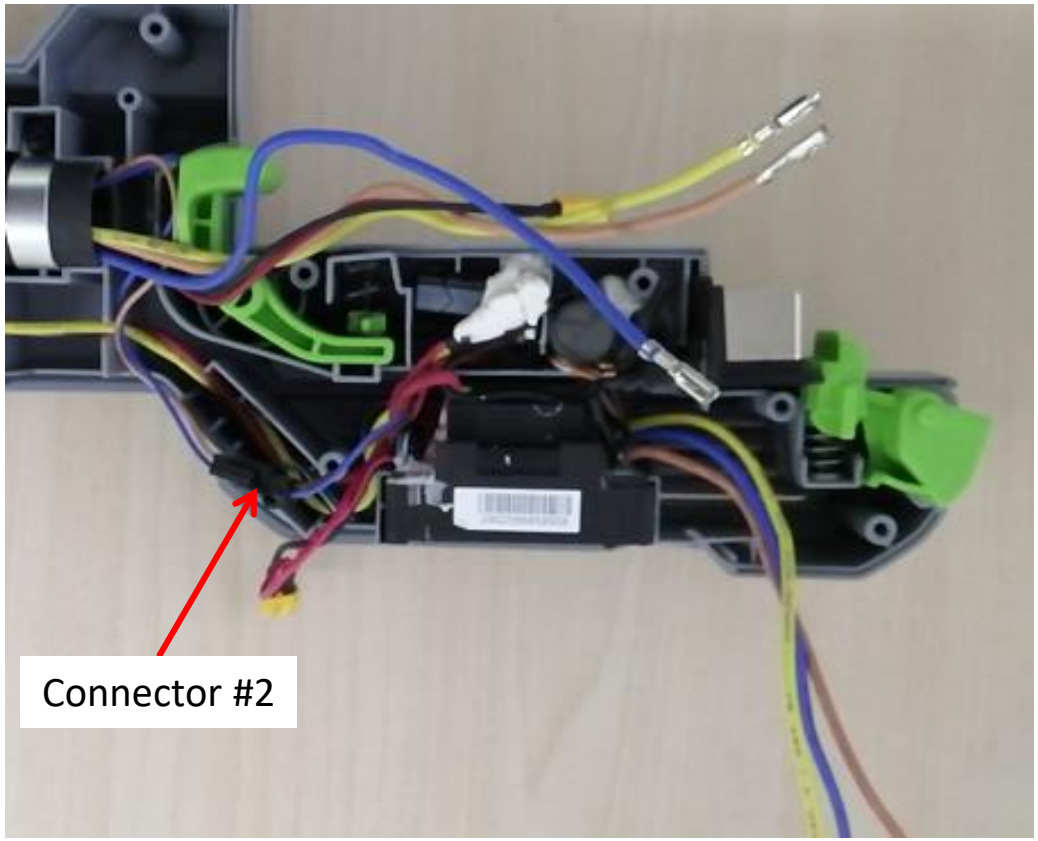
Replace the PCBA

28. Align the yellow cable into the groove.



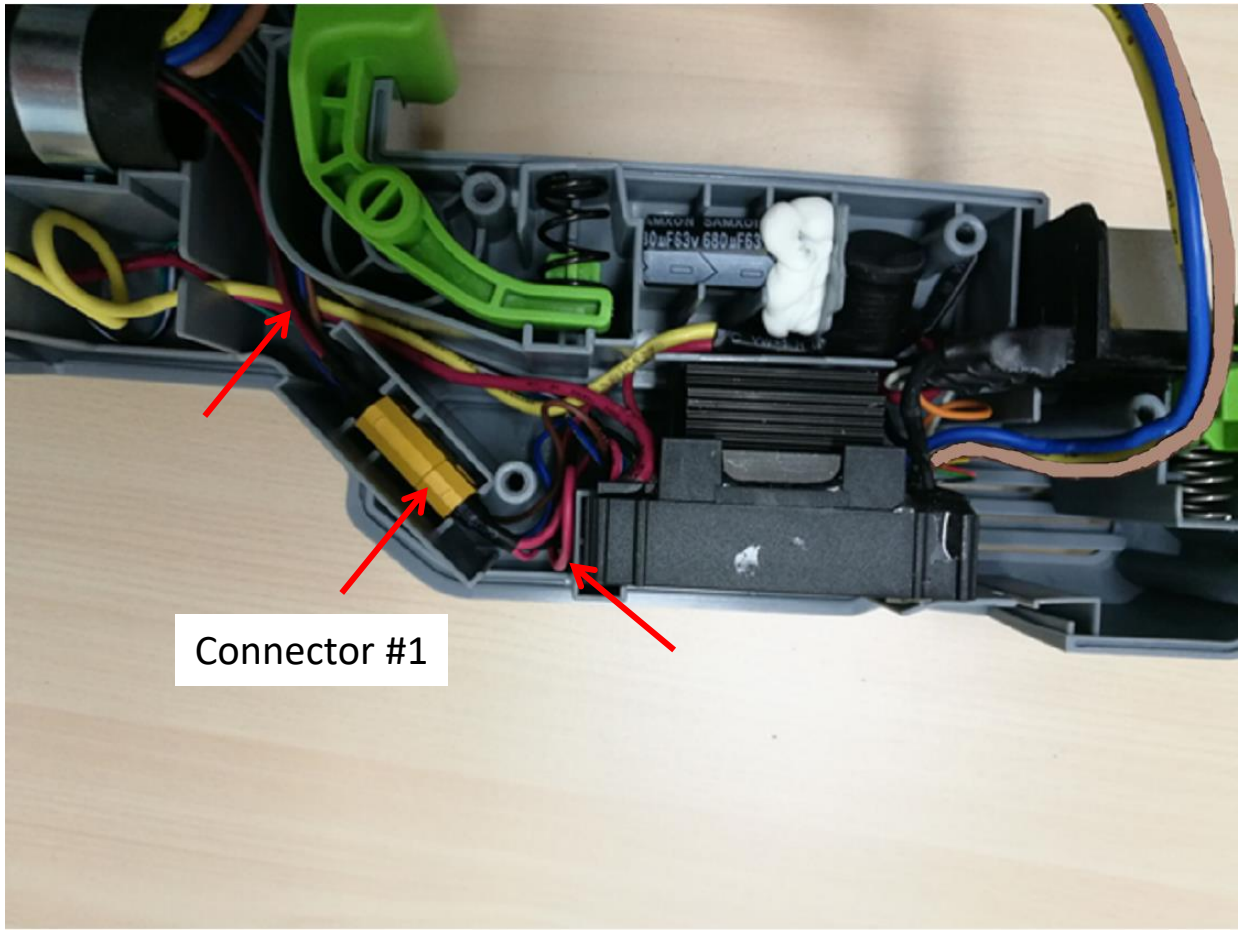
Replace the PCBA

29. Connect connector #2 and mount it into the groove.



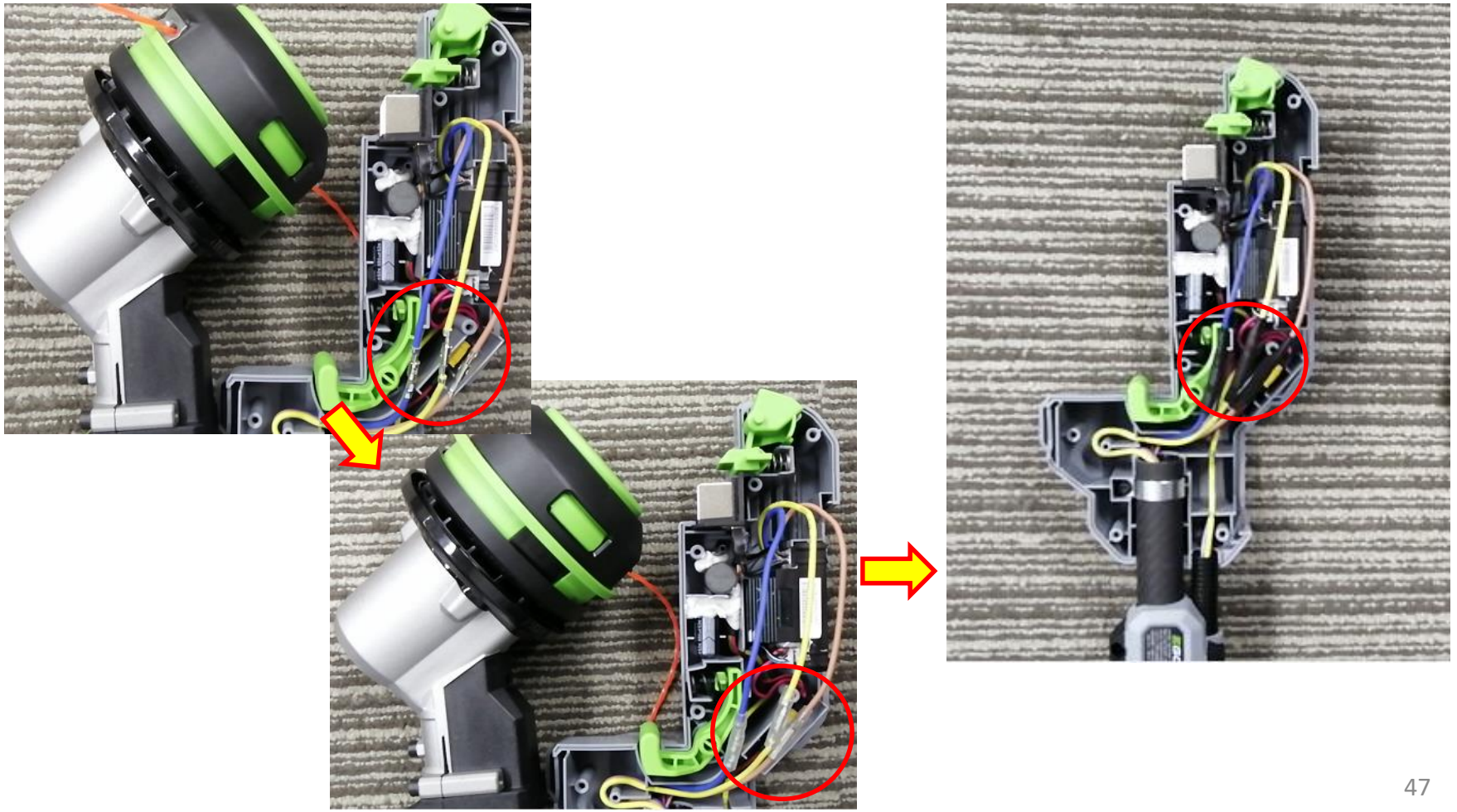
Replace the PCBA

30. Connect connector #1 and mount it into the groove.



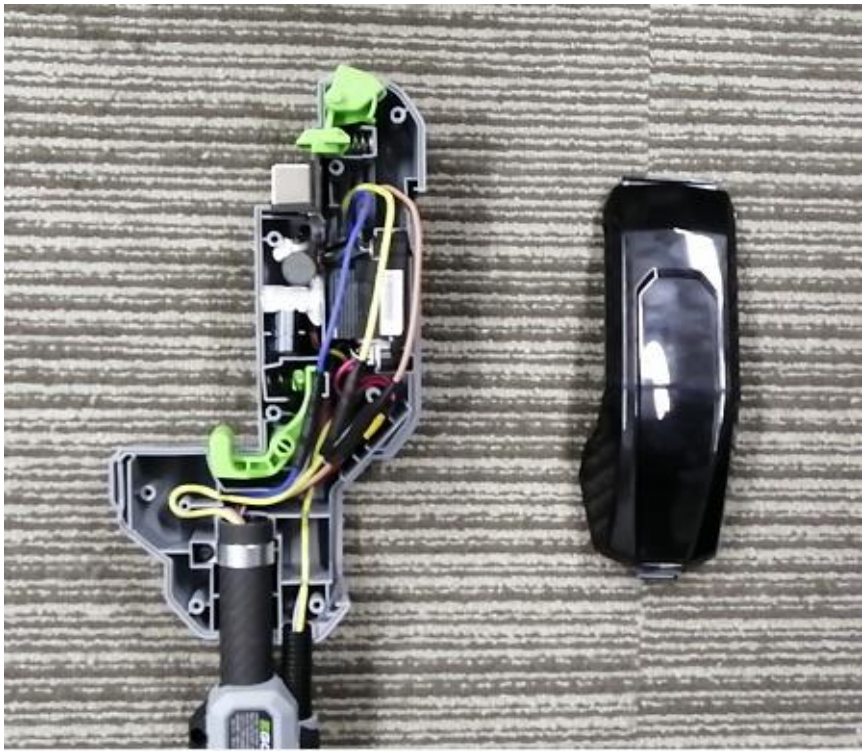
Replace the PCBA

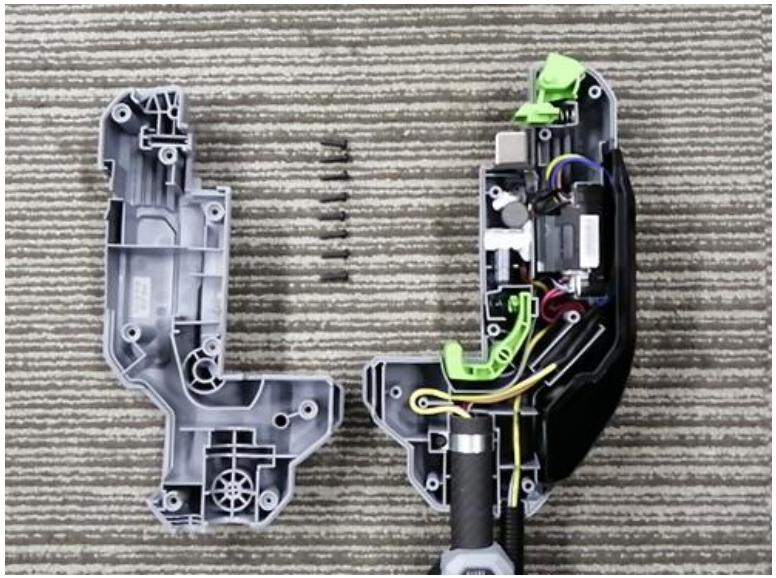
31. Put on the new heat-shrinkable sleeves onto one side terminals and then move the transparent sleeve aside before connecting the 3 connectors and then cover the connectors with the transparent sleeve. Finally use the heat gun to shrink the heat-shrinkable sleeves.



Replace the PCBA

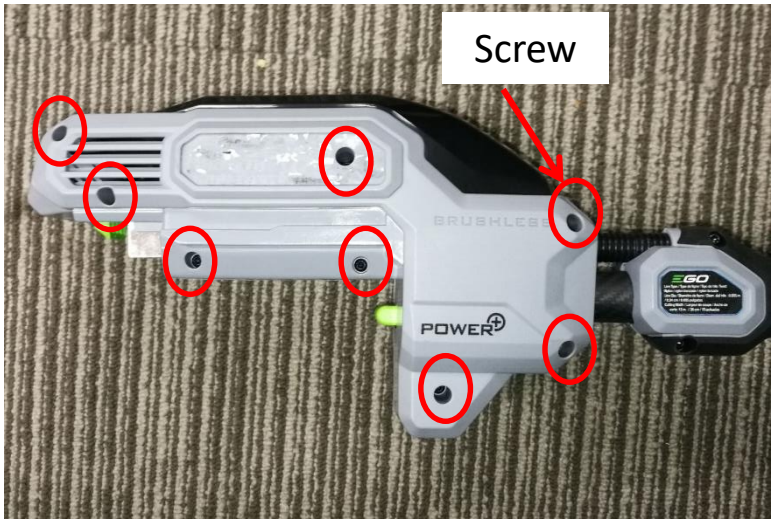
32. Mount the cover on the left housing.





Replace the PCBA

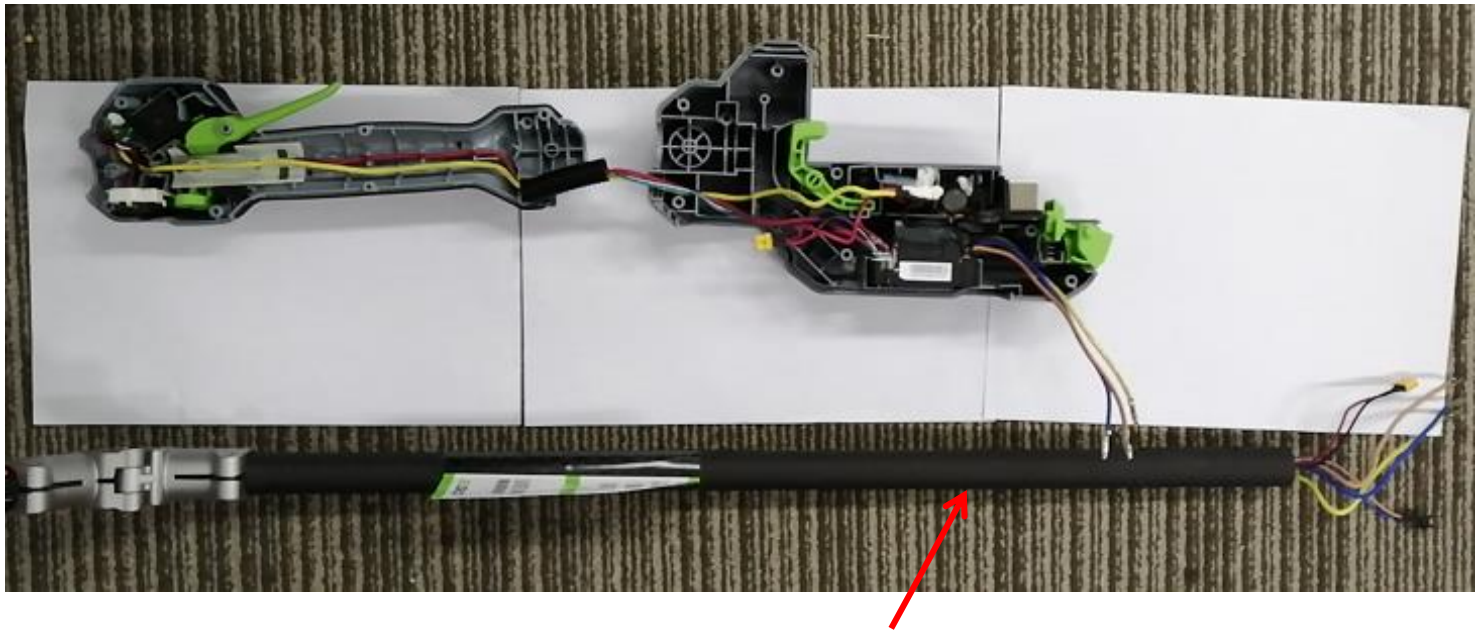
33. Mount the right housing on the left housing and assemble them with screws.
34. Stick the label on the housing set.



Part 3: Replace the motor

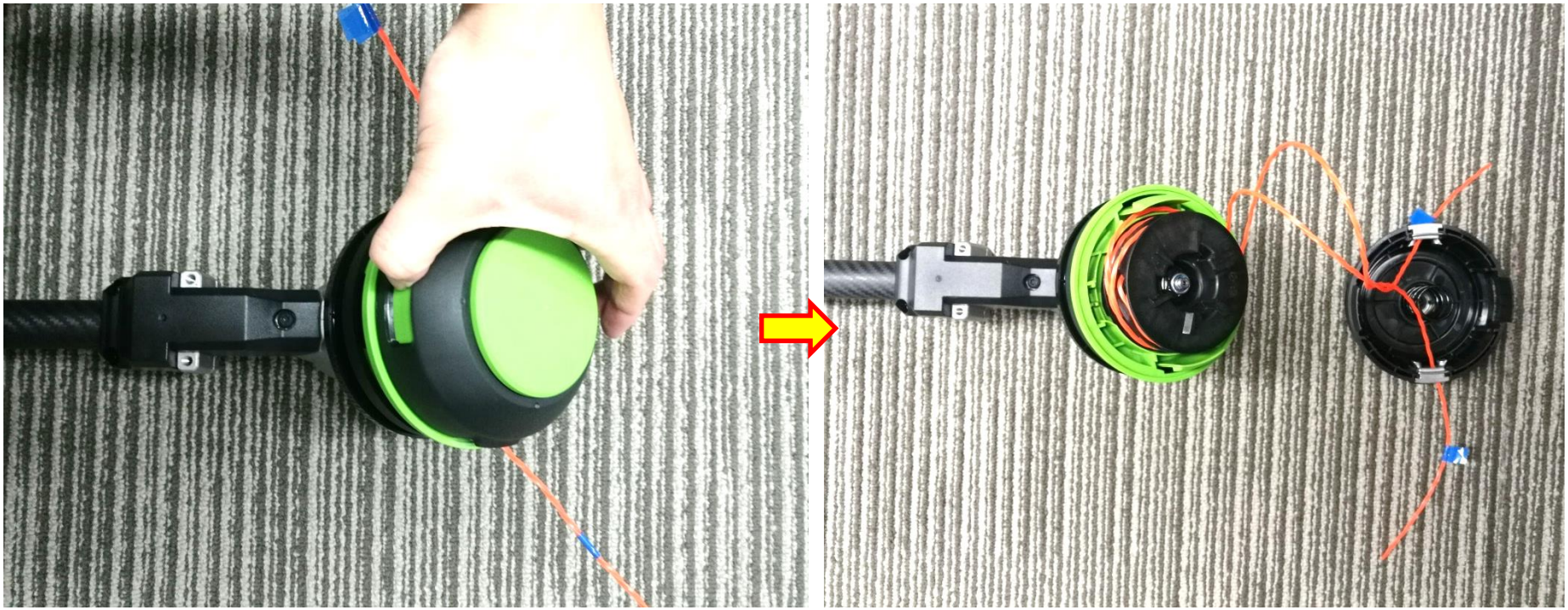
Replace the motor

1. Disassemble the housing assembly and handle assembly as shown in the “Replace the PCBA” section.



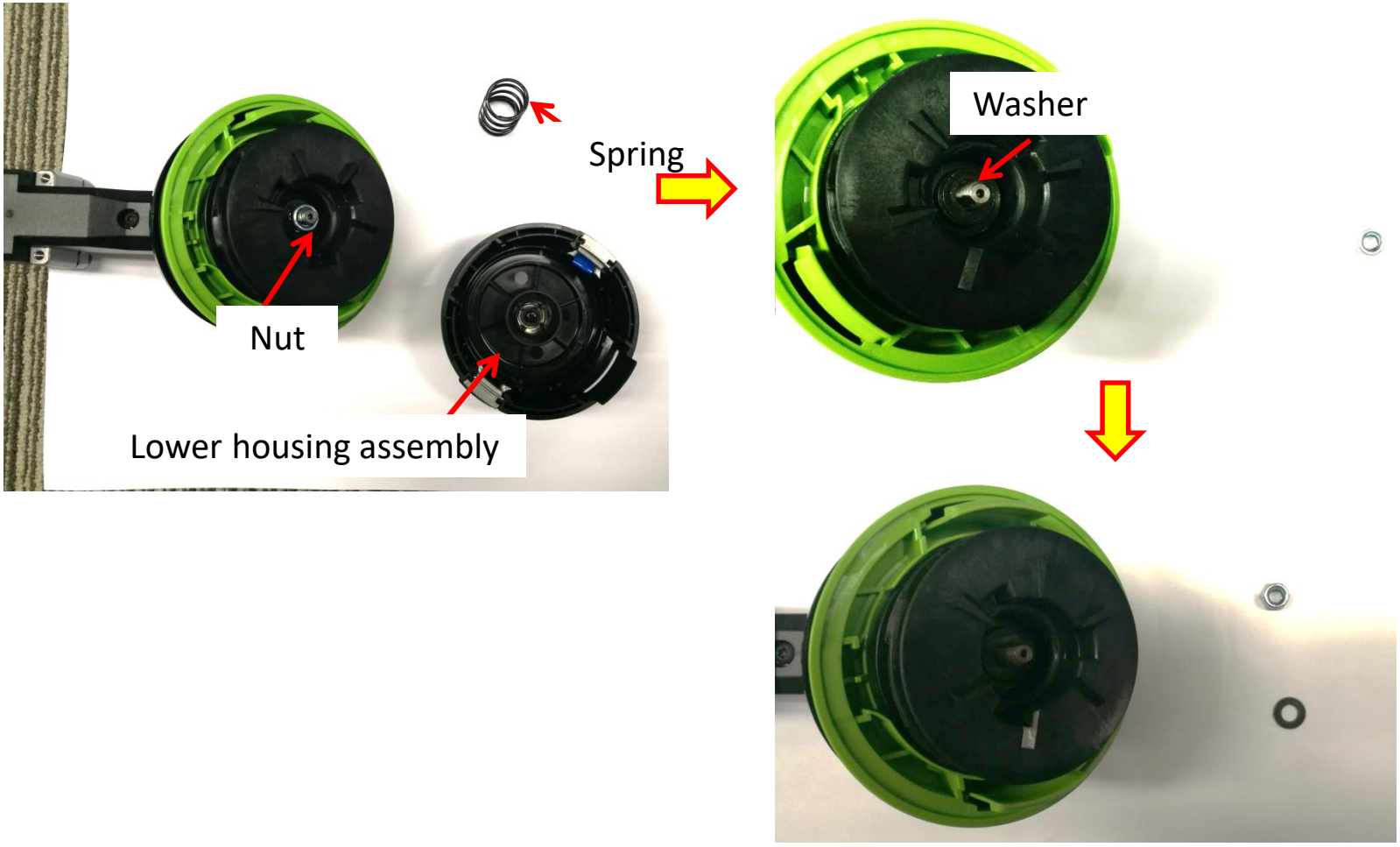
Replace the motor

2. Press the tabs on each side to remove the lower housing assembly, then remove the cutting line.



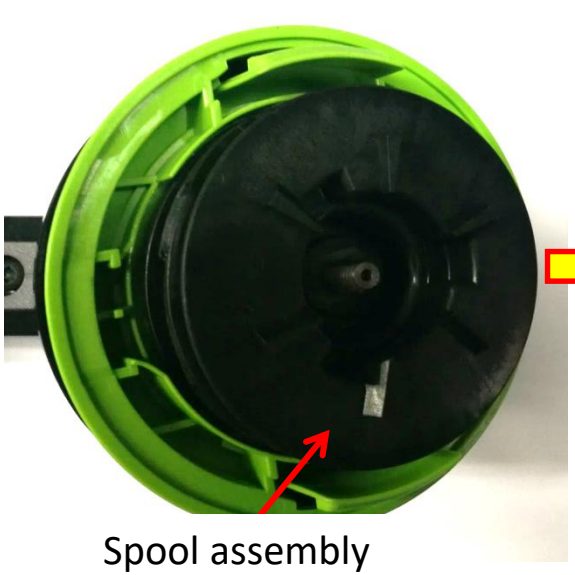
Replace the motor

3. Separate the spring from the lower housing assembly.
4. Loosen the nut with impact wrench(13mm) counterclockwise and remove it.
5. Remove the washer.



Replace the motor

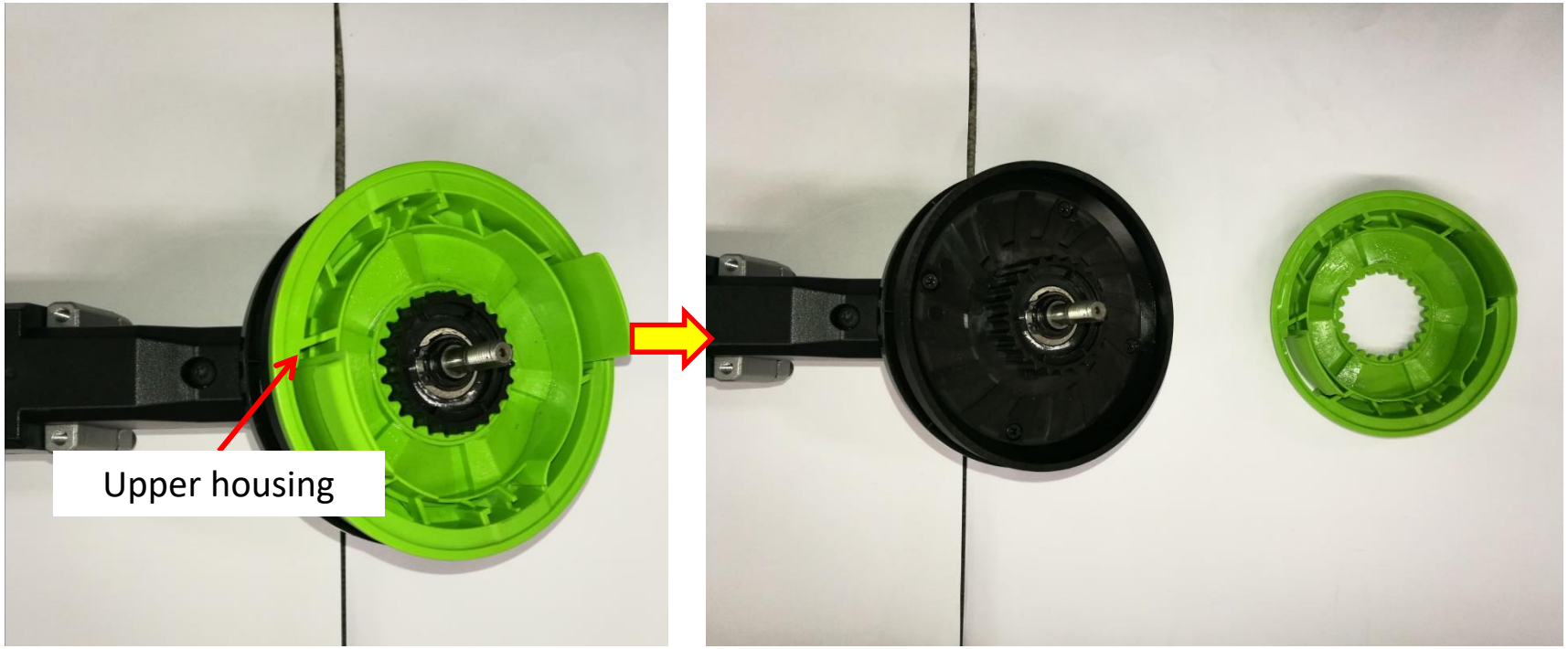
6. Remove the spool assembly.



Spool assembly

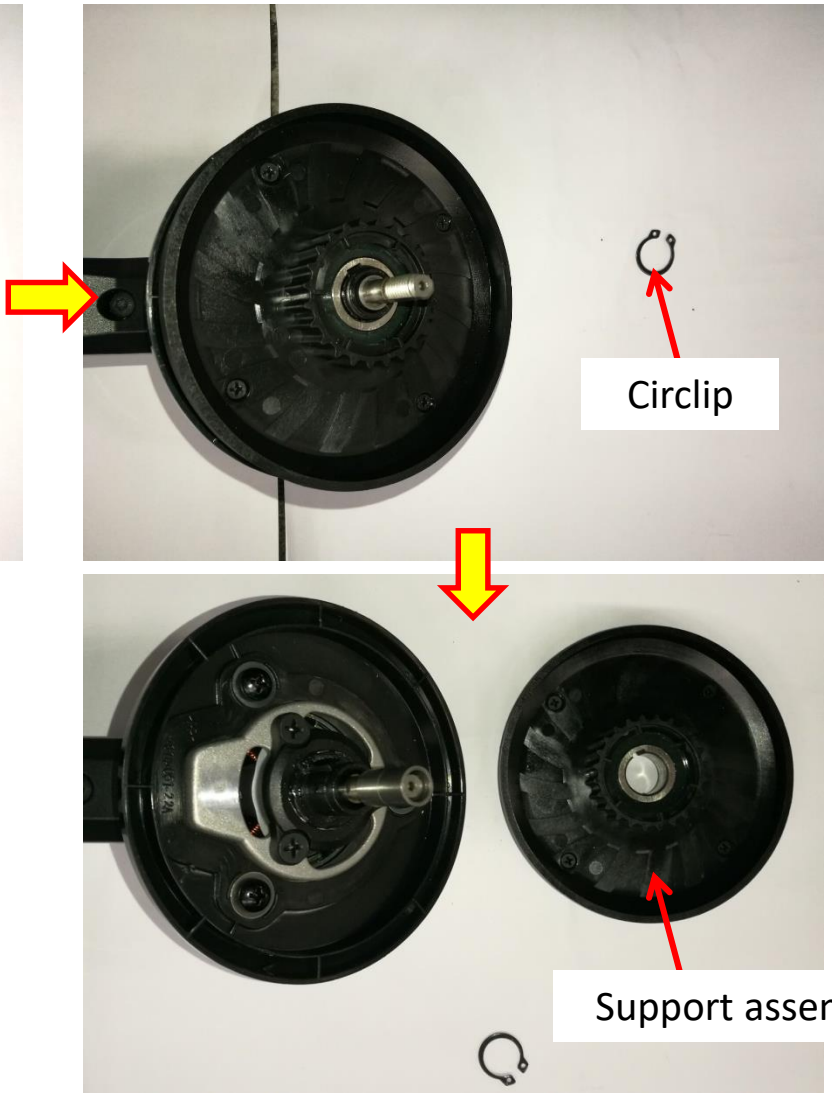
Replace the motor

7. Remove the upper housing.



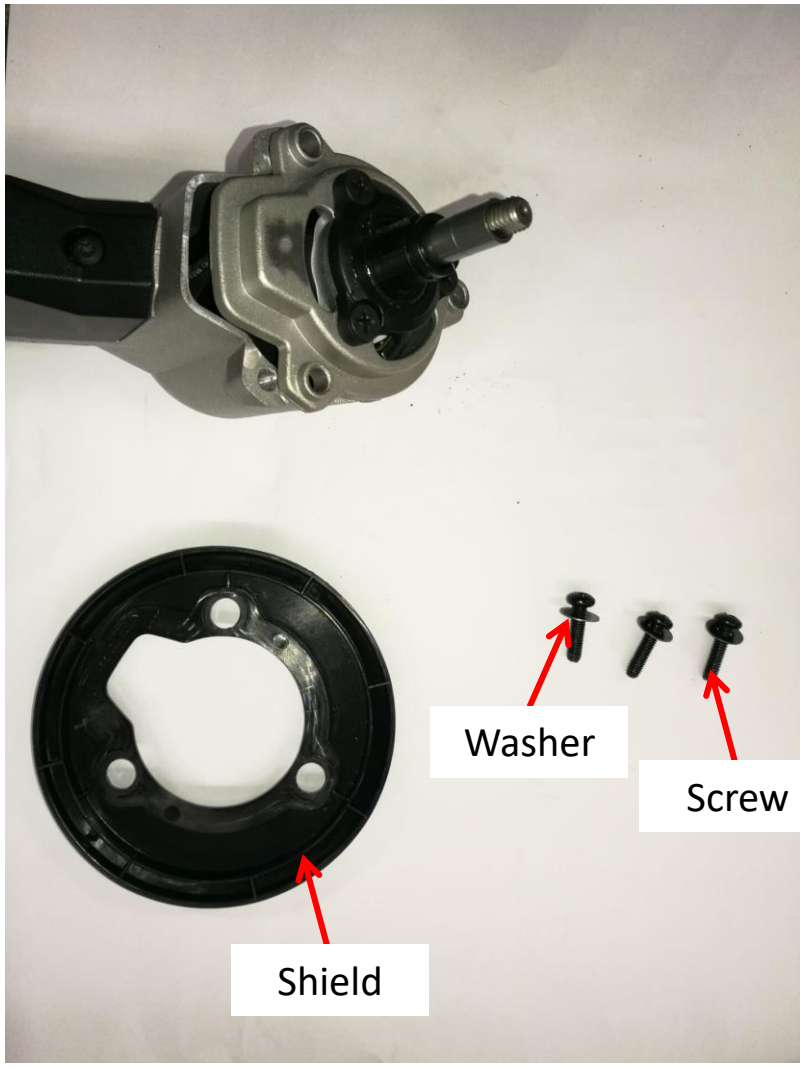
Replace the motor

8. Remove the circlip with nipper pliers.
9. Remove the support assembly.



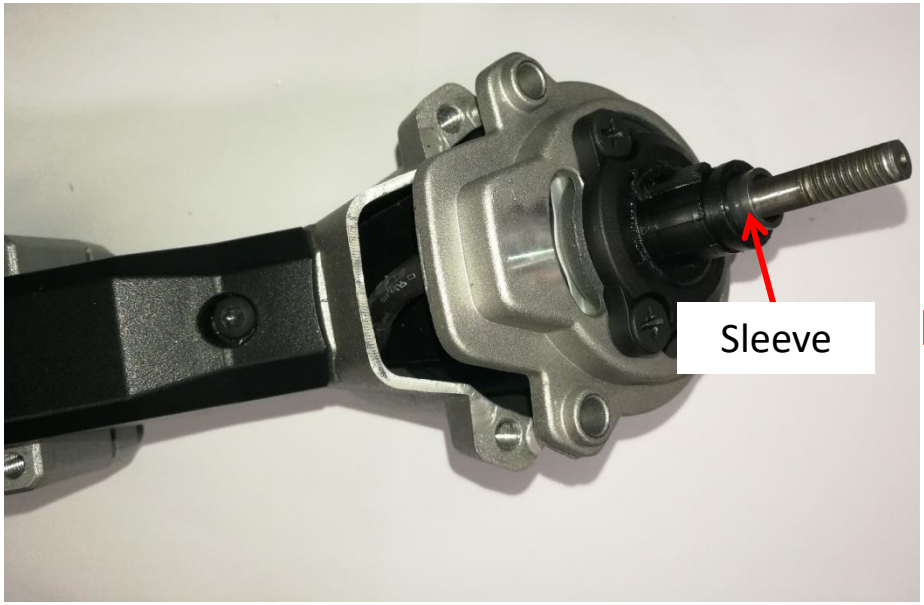
Replace the motor

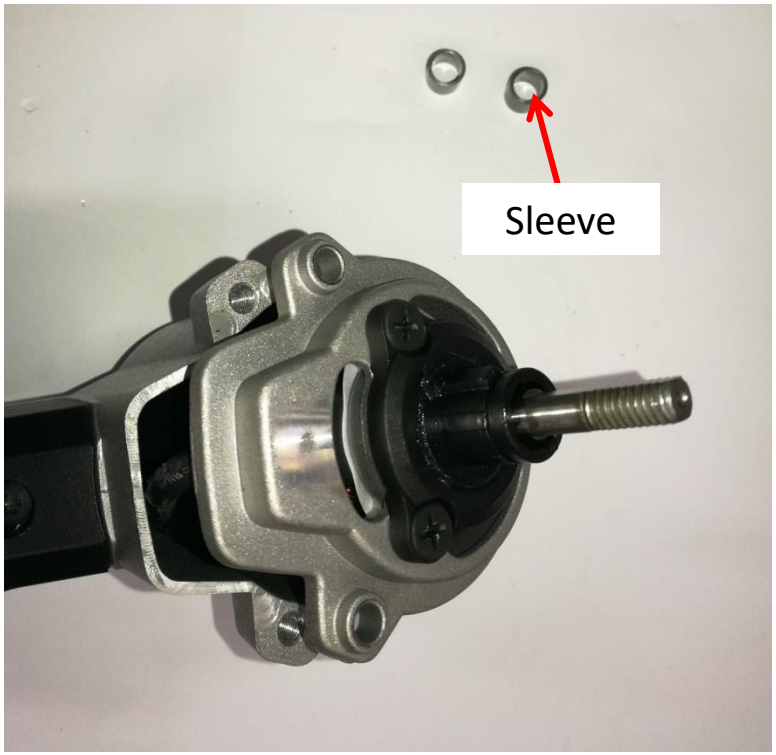
10. Loosen the screws to remove the shield.



Replace the motor

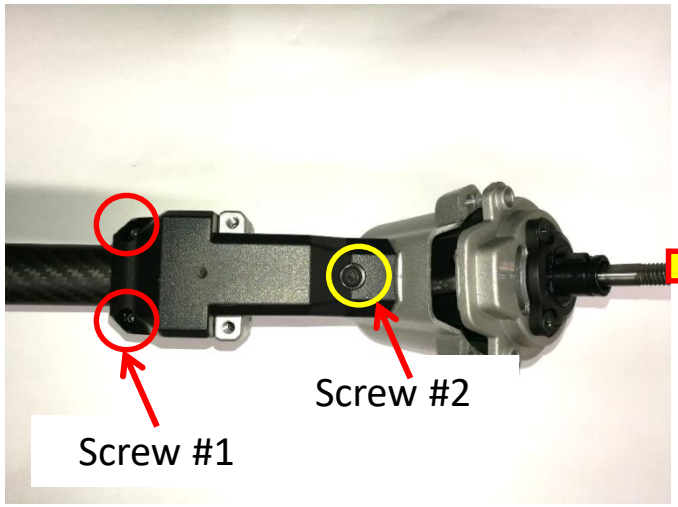
11. Take the sleeves out of the shaft.

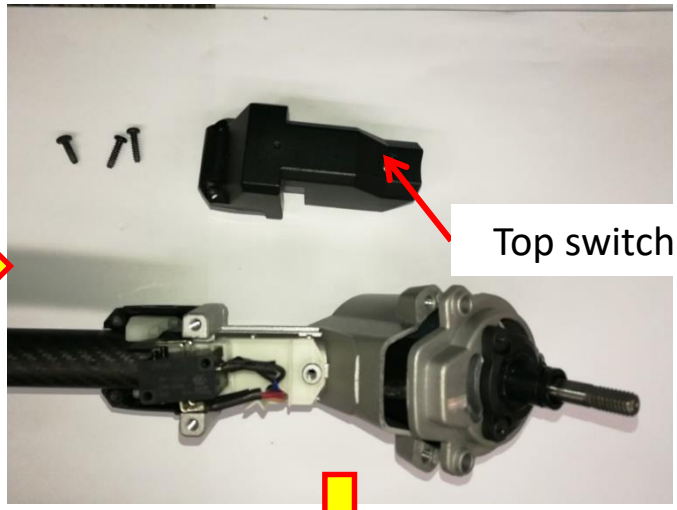


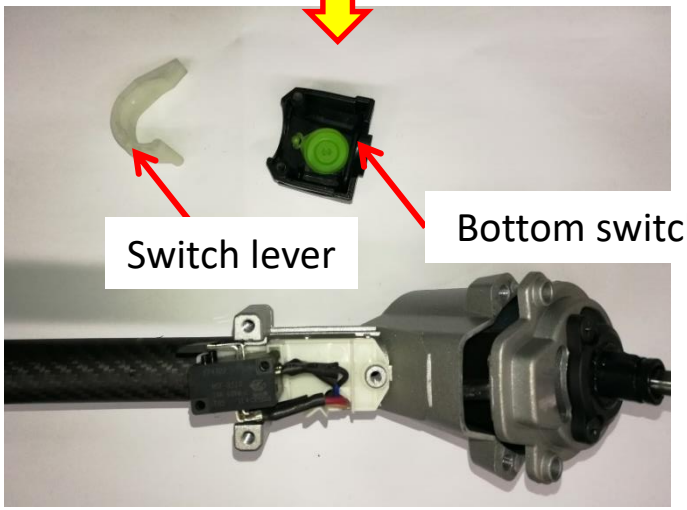


Replace the motor

12. Loosen the screws to remove the top switch box cover.
13. Remove the bottom switch box cover and switch lever.

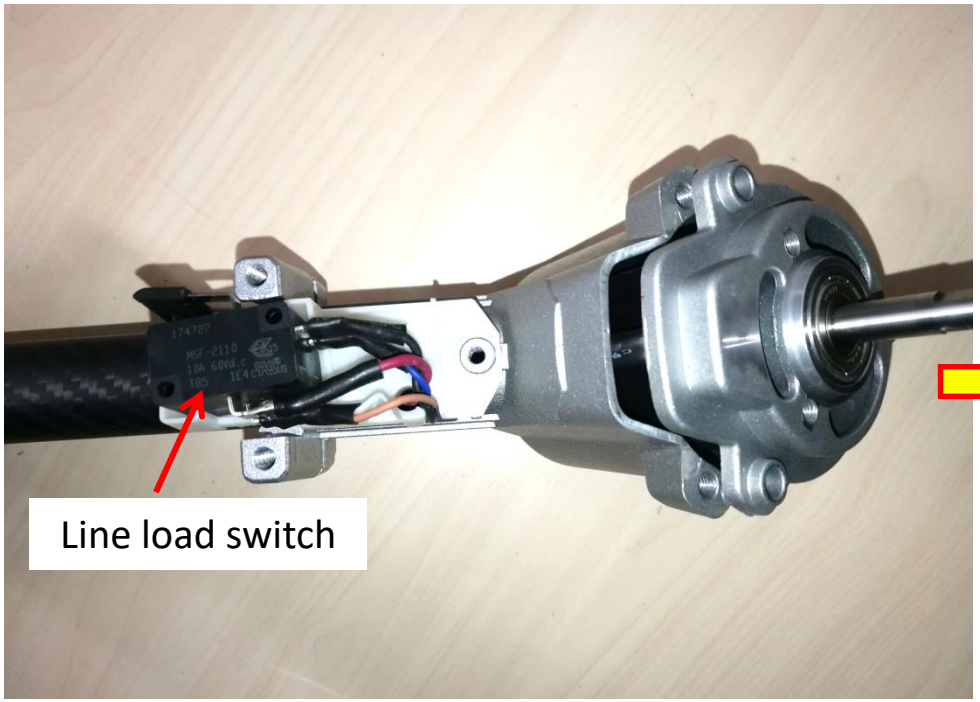


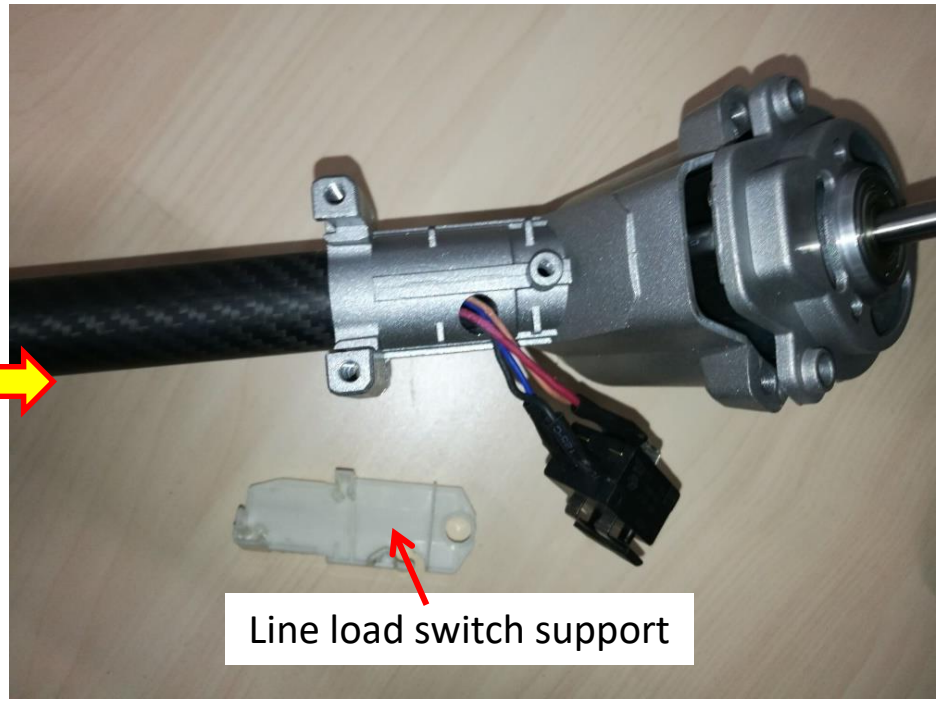




Replace the motor

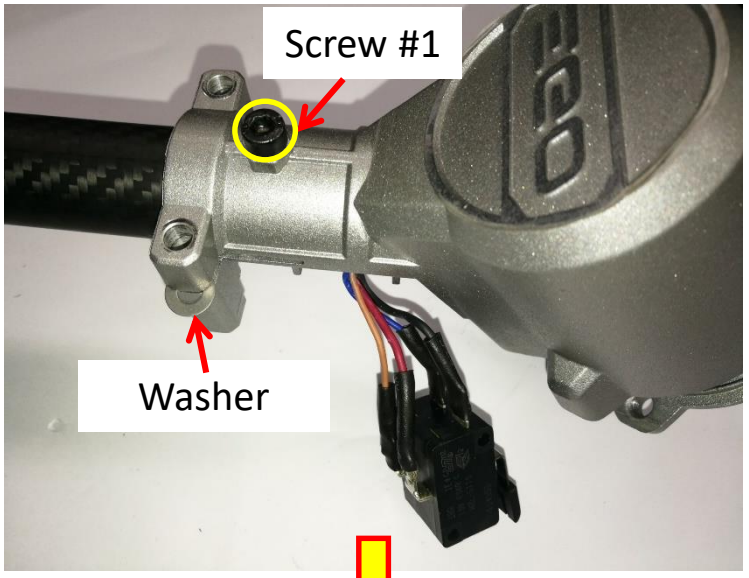
14. Separate the line load switch from the line load switch support and remove the switch support from the motor housing.





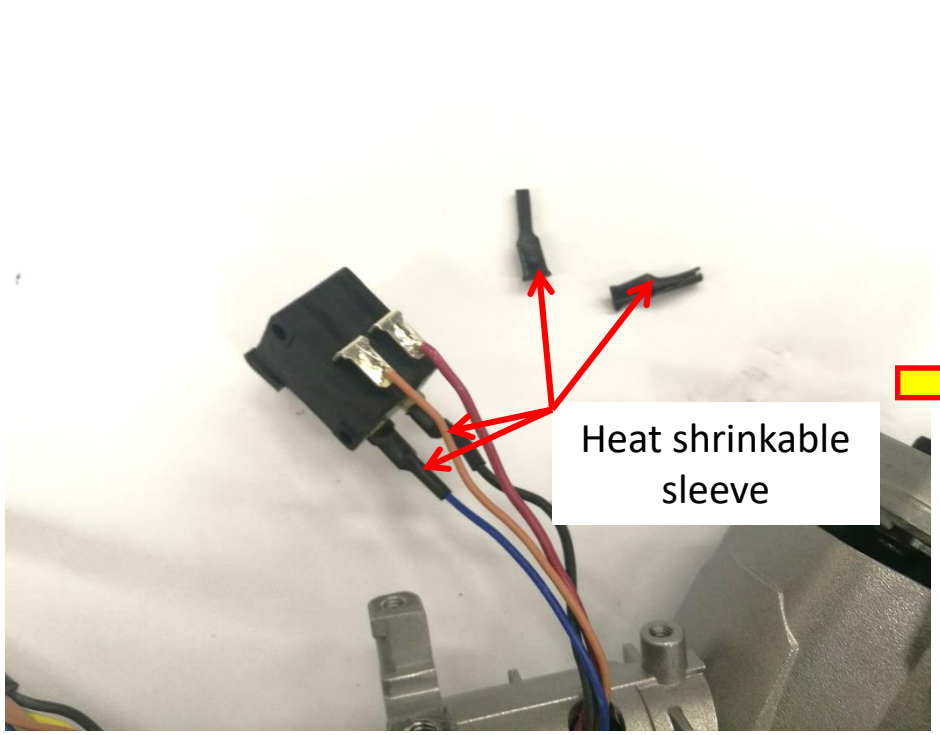
Replace the motor

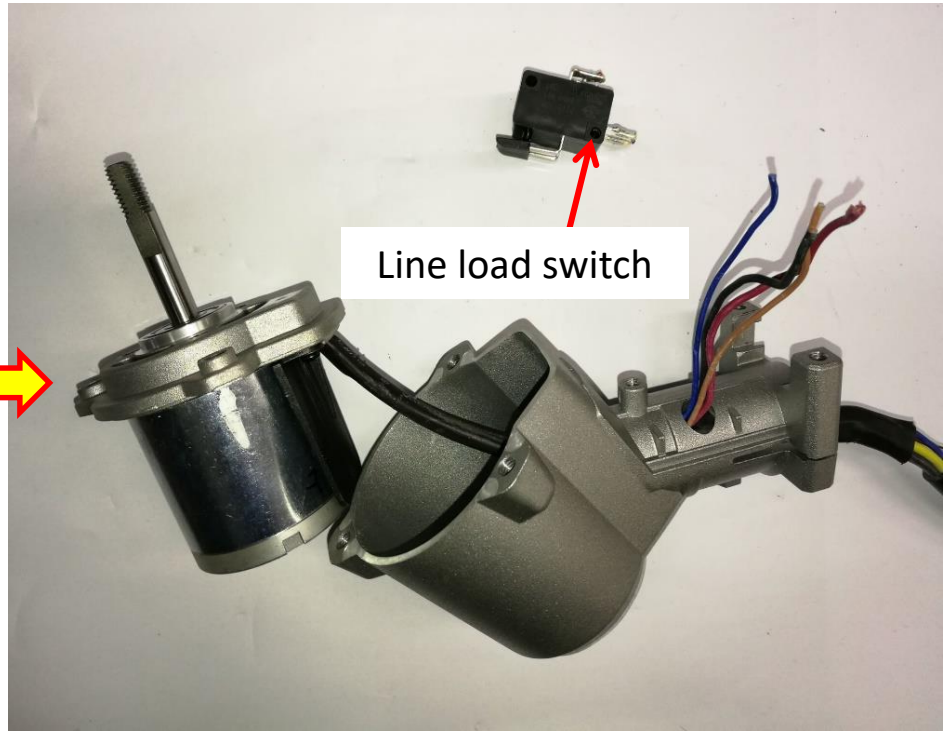
15. Loosen 2 pcs screw #2 and remove the washers, then loosen screw #1.



Replace the motor

16. Remove the heat shrinkable sleeves with scissors and disconnect the line load switch with electric soldering iron. If the switch is broken, replace it with a new one (see NOTICE).

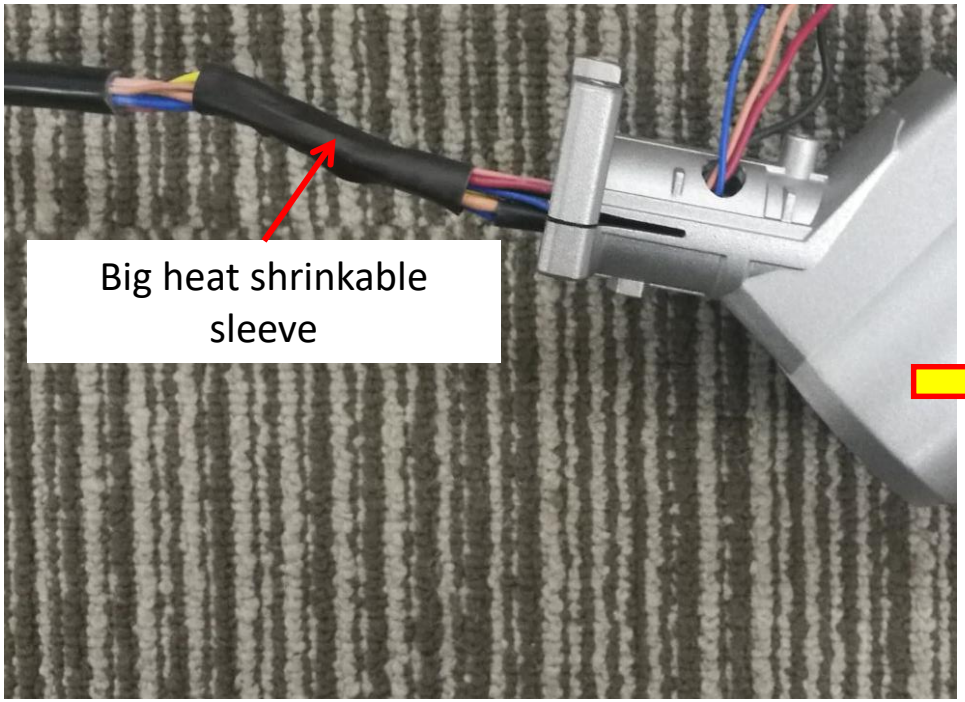


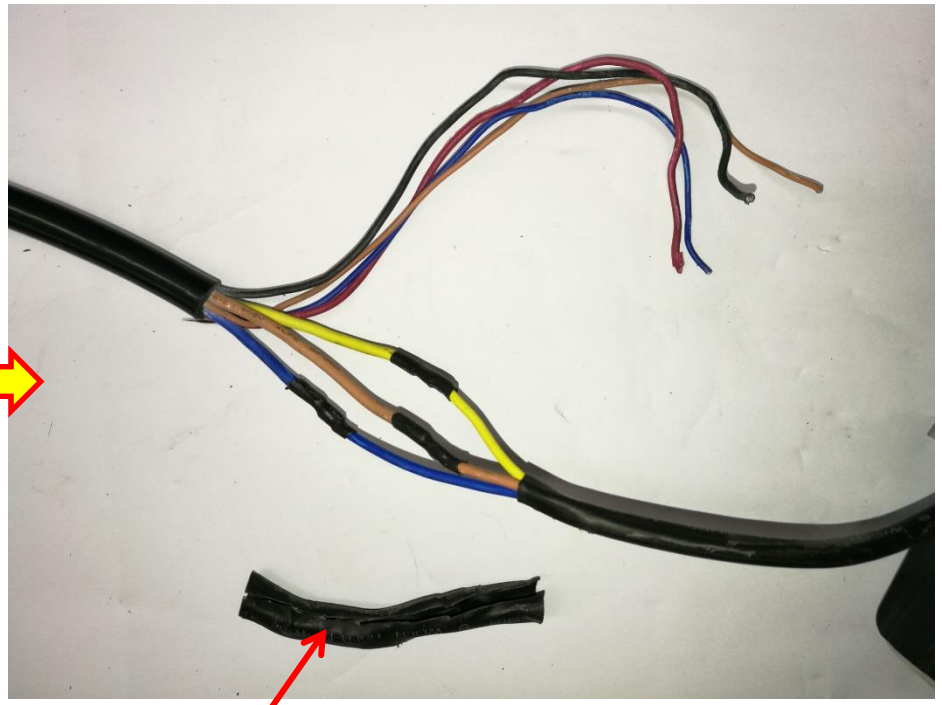


NOTICE: The line load switch is improved for better waterproof performance. When the switch is damaged, replace it with an switch assembly(Part# 4870786001), including the switch itself(no longer provided separately) and the line load switch support (improved, Part# 3129169002).

Replace the motor

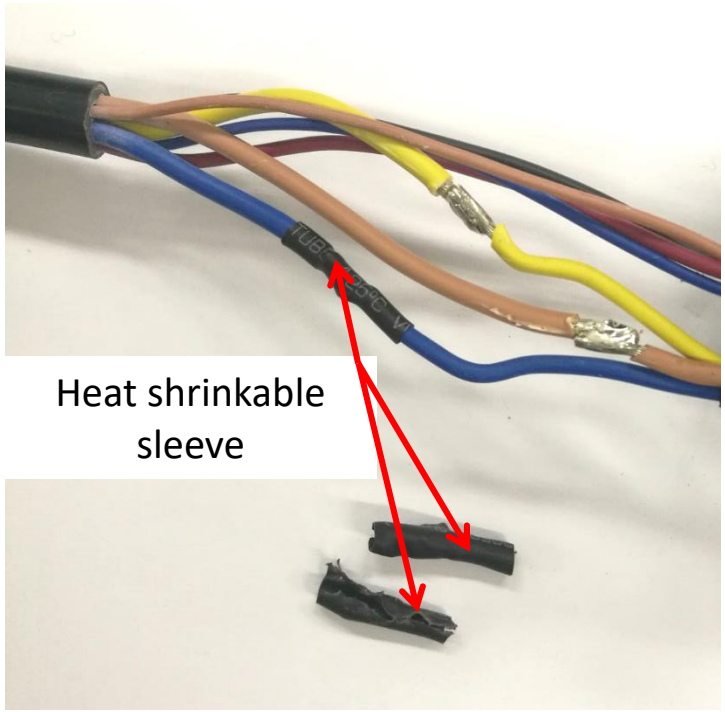
17. Remove the big heat shrinkable sleeve wrapping on the cables.

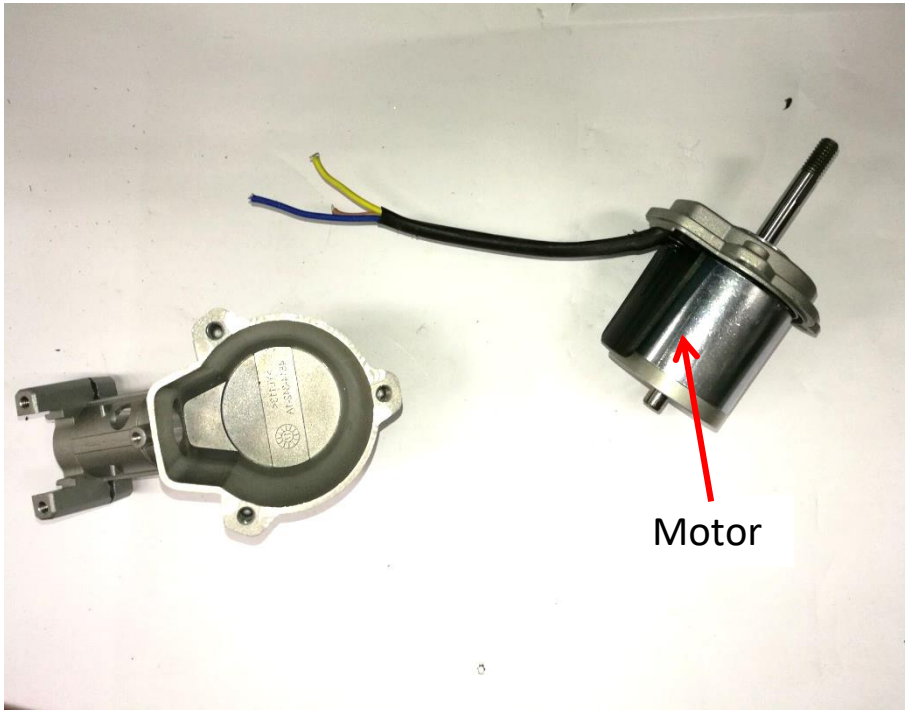




Replace the motor

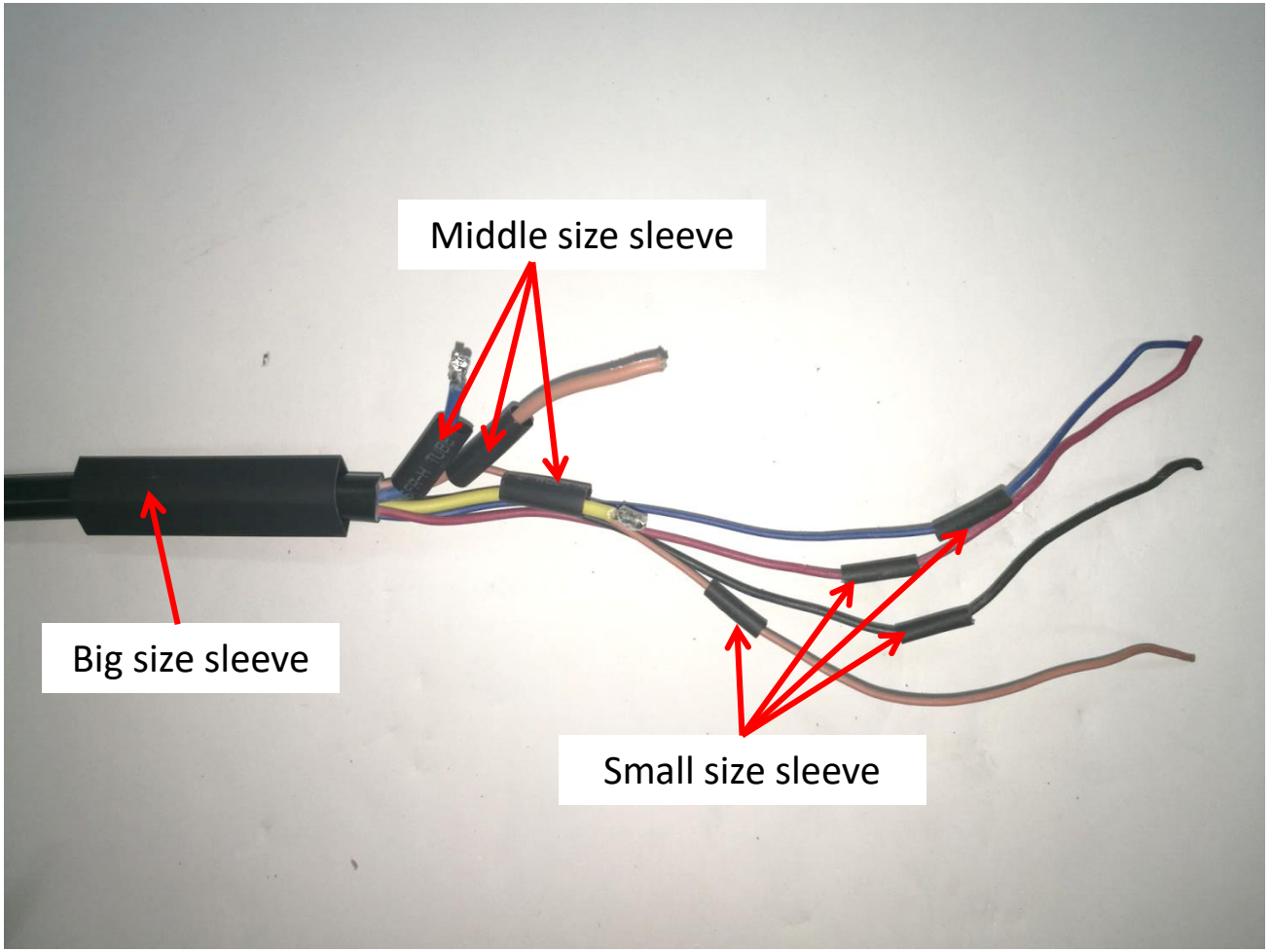
18. Remove 3 heat shrinkable sleeves and disconnect the cables to replace the motor with a new one.





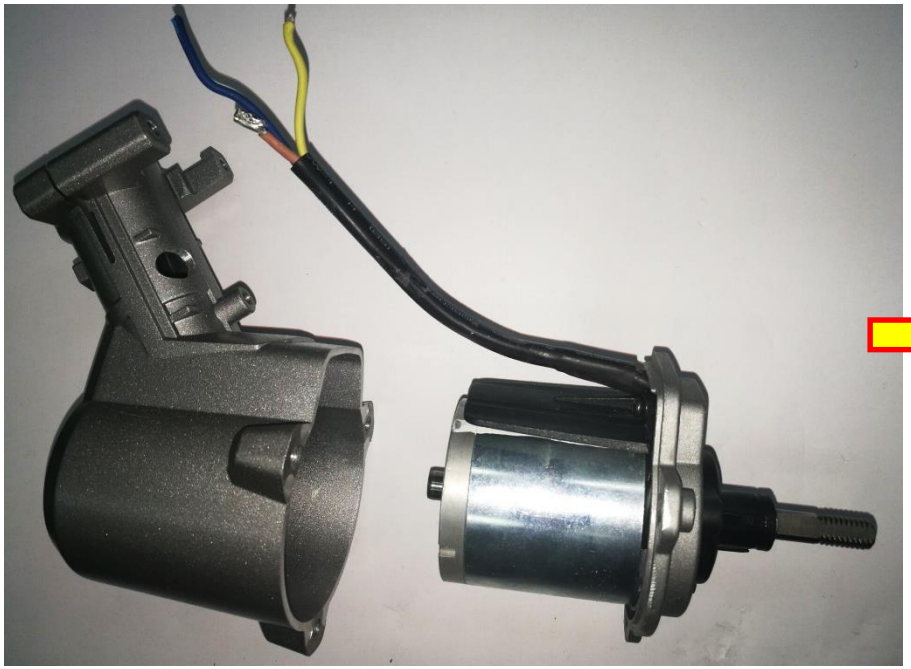
Replace the motor

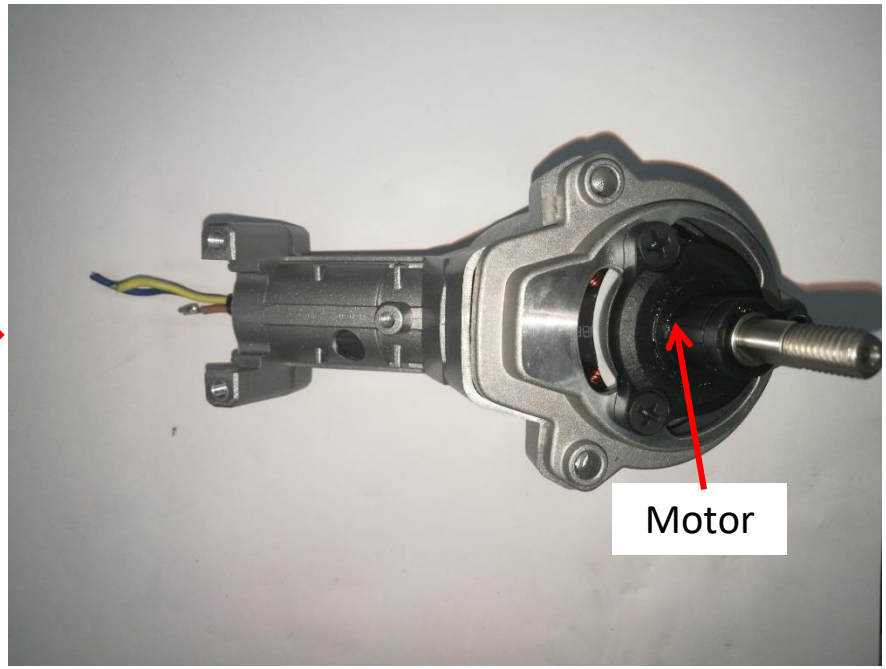
19. Mount 1 big size heat shrinkable sleeve, 3 middle size shrinkable sleeves and 4 small size heat shrinkable sleeves onto the cables.



Replace the motor

20. Assemble the new motor with the motor housing.

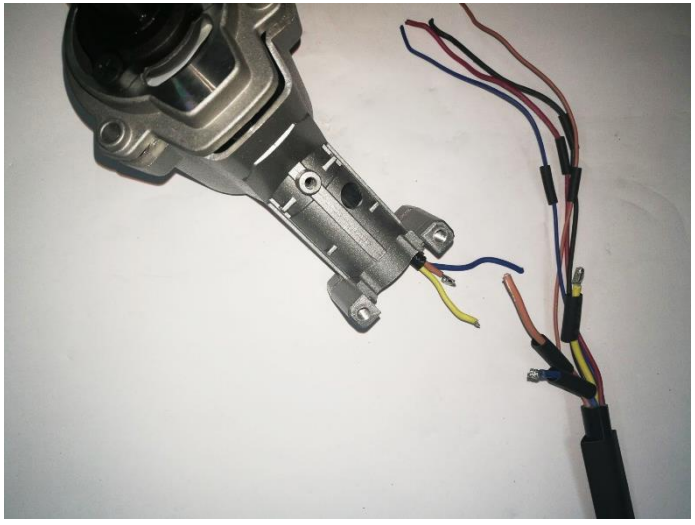


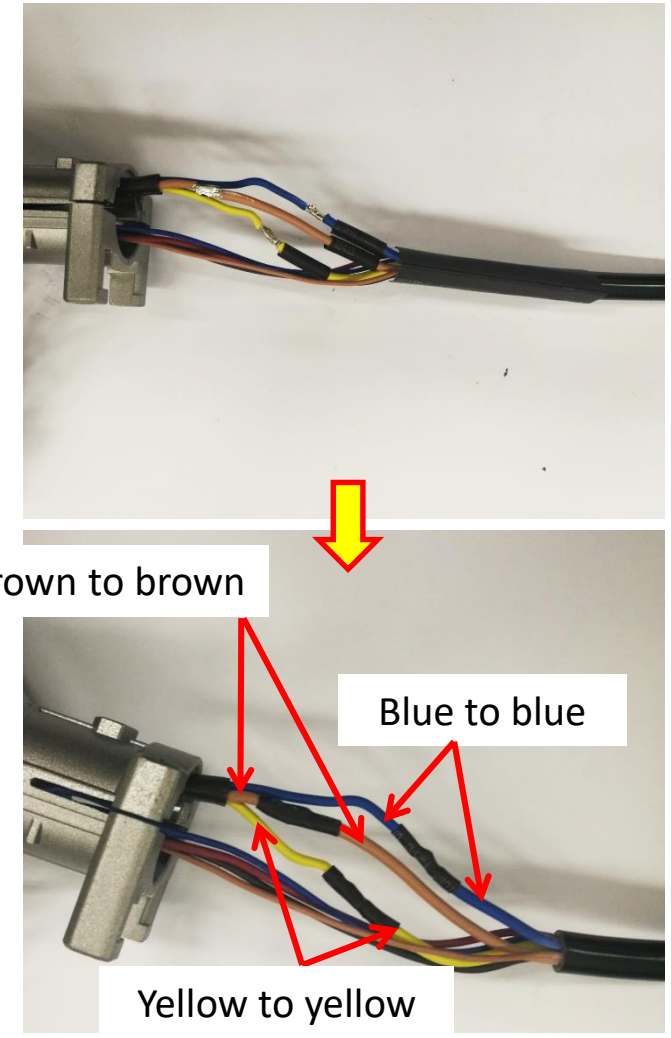


Replace the motor

21. Connect the cables with motor cables by electric soldering iron and shrink the three middle size sleeves by heat gun.

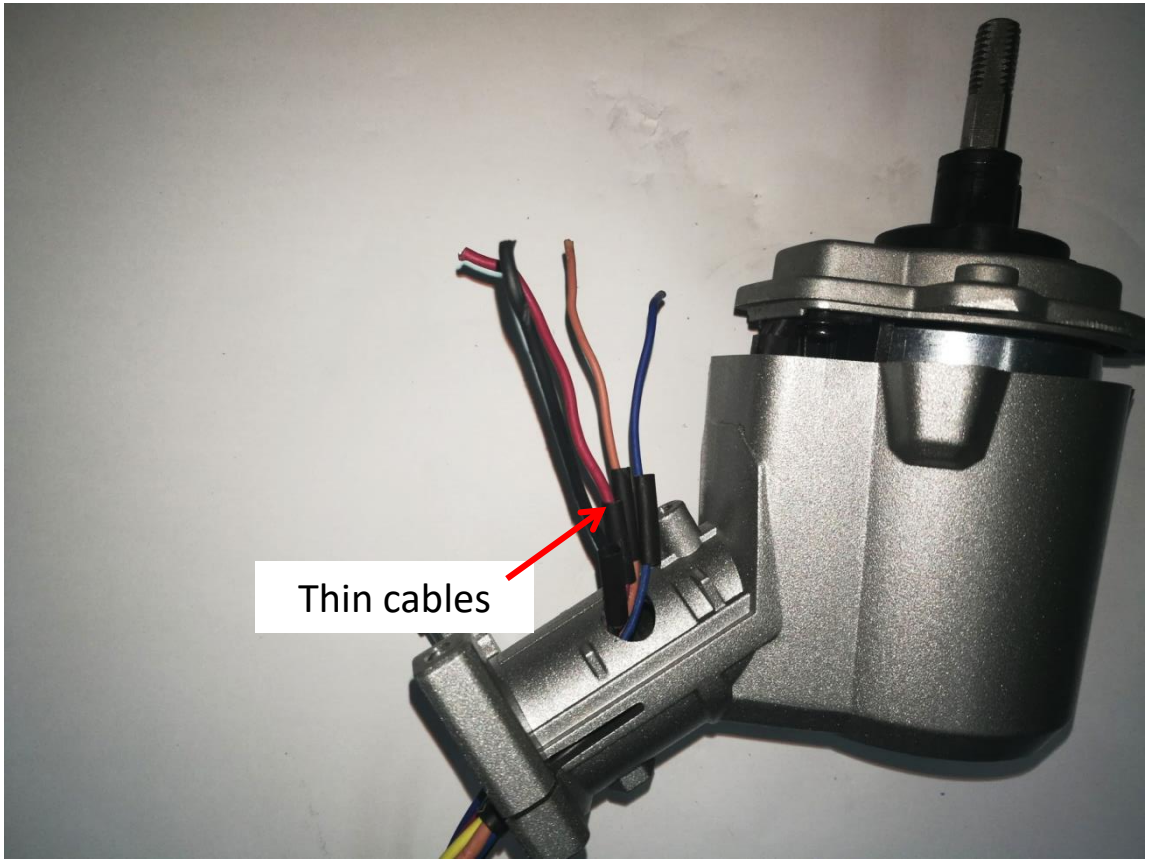
NOTICE: brown to brown, blue to blue and yellow to yellow.





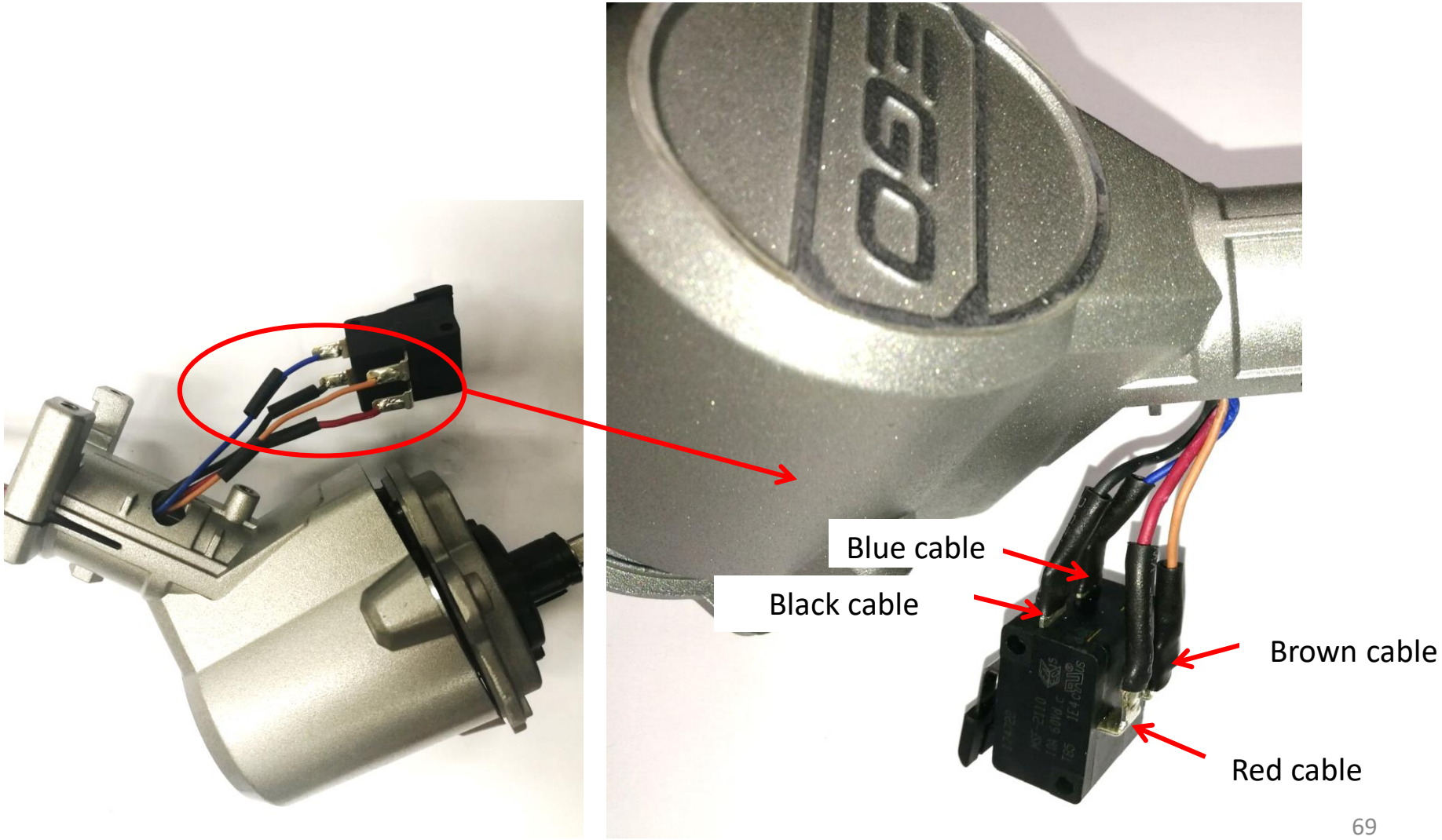
Replace the motor

22. Insert the 4 thin cables through the hole of the motor housing.



Replace the motor

23. Connect these cables with line load switch by electric soldering iron, cove these soldering points with the 4 small shrinkable sleeves and shrink them by heat gun.



Replace the motor

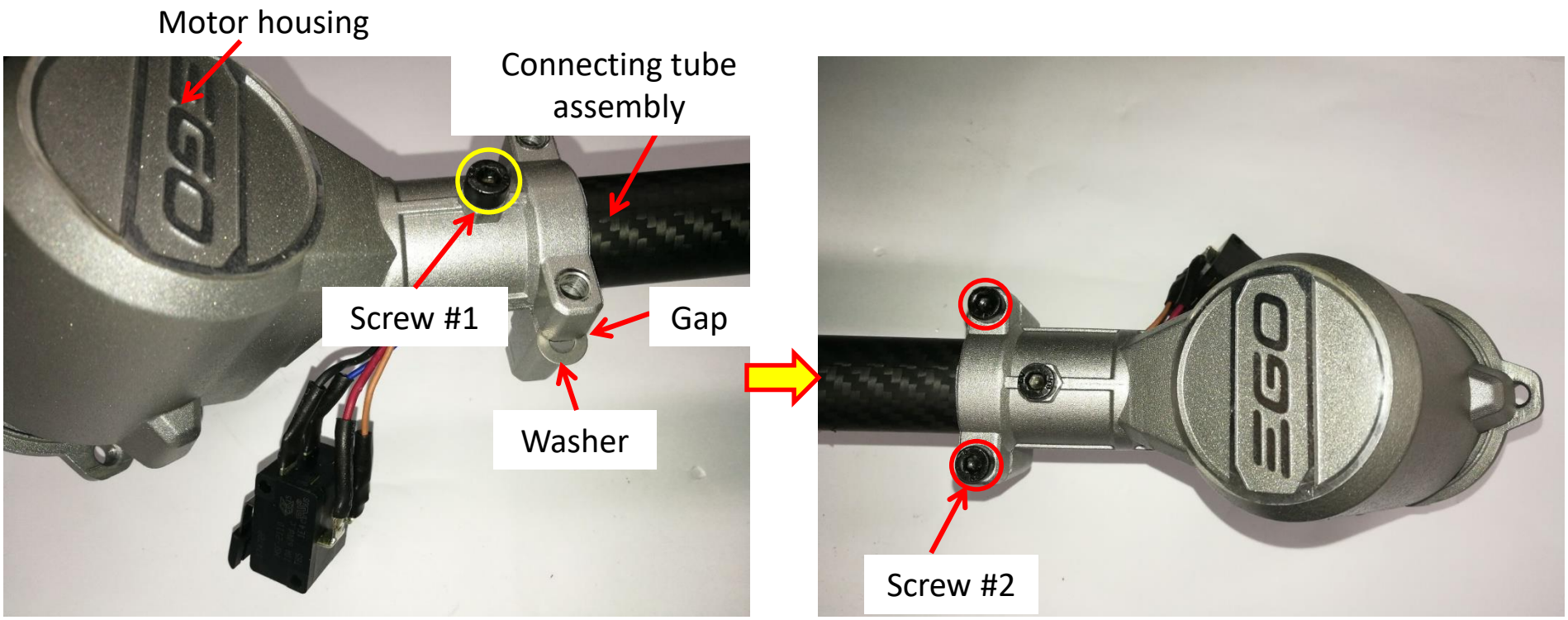
24. Finally cover the big heat shrinkable sleeve onto the 3 middle size heated sleeves to completely wrap the cables.

Replace the motor

25. Align the hole on the connecting tube with the hole on the motor housing, then insert the connecting tube assembly into the motor housing.

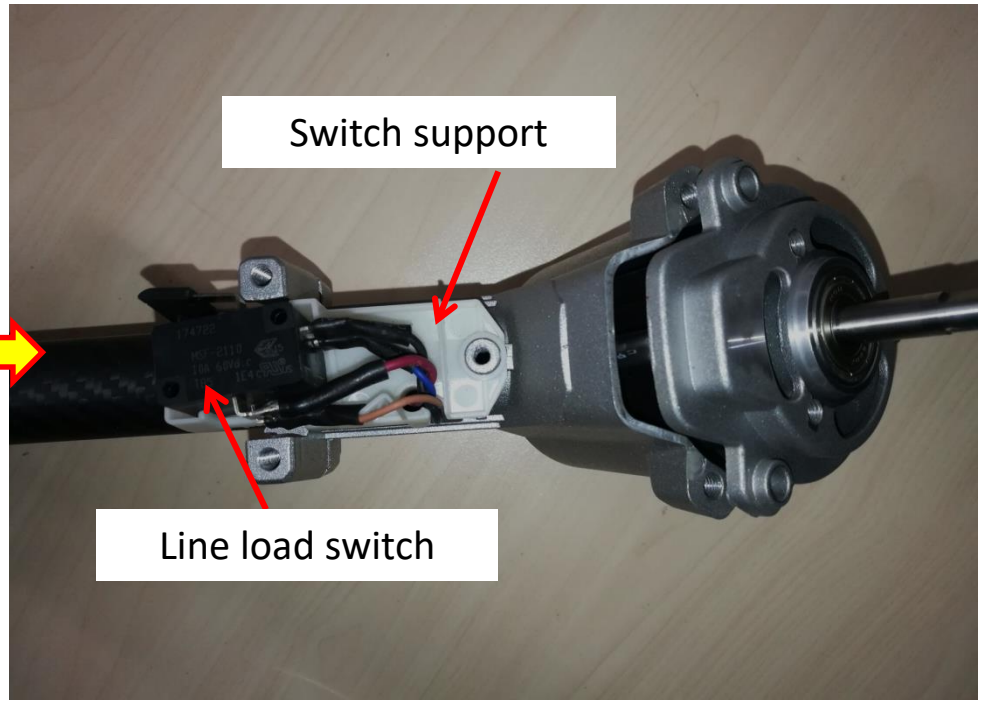
Replace the motor

26. Tighten the screw #1 to fasten the motor housing with the connecting tube assembly.
27. Insert the washer into the gap of each side of the motor housing.
28. Tighten the screws #2 to further fasten the motor housing with connecting tube assembly.



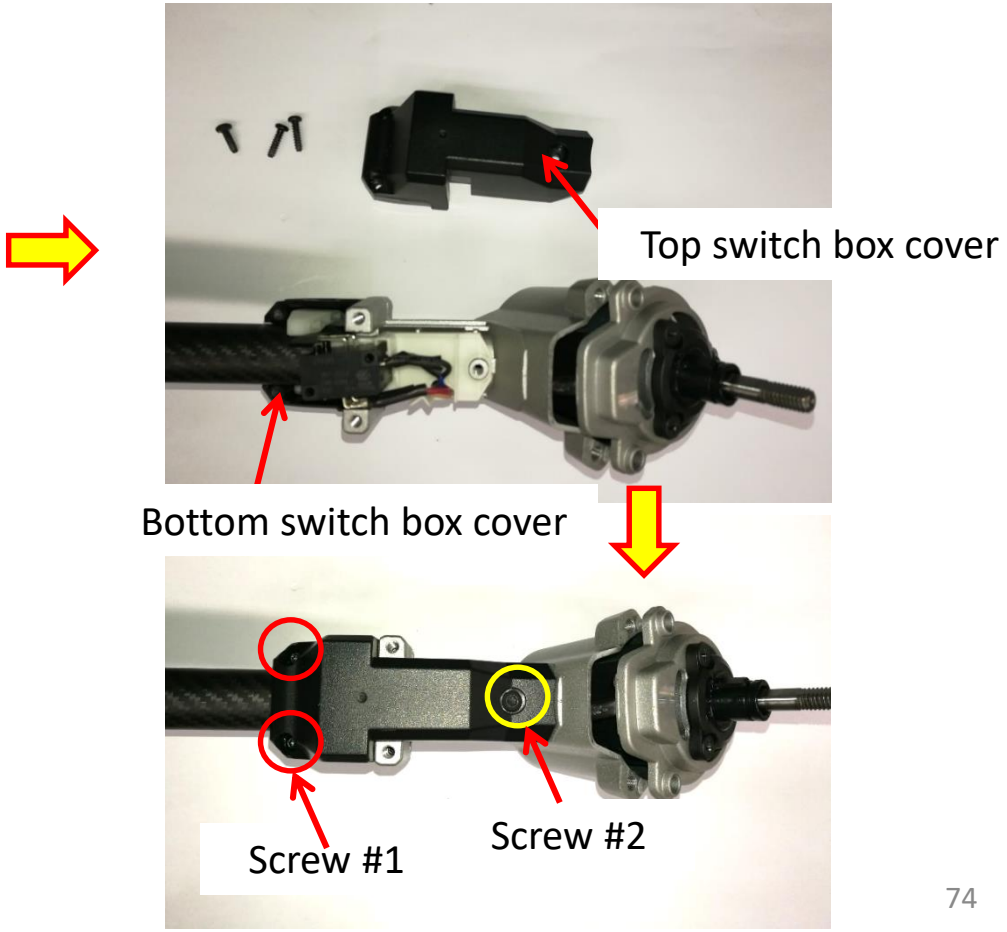
Replace the motor

29. Mount the line load switch support on the motor housing
30. Position the line load switch on the switch support.



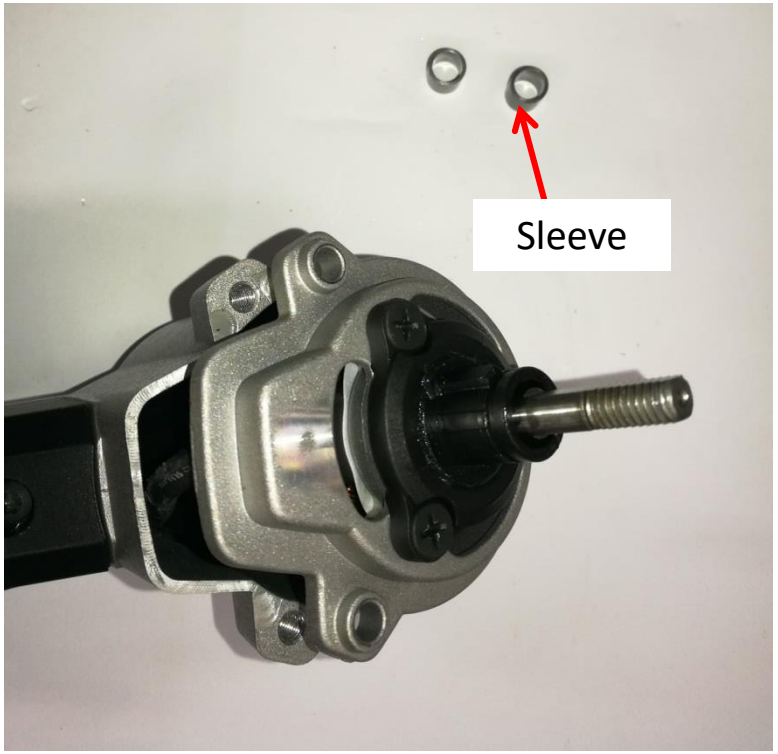
Replace the motor

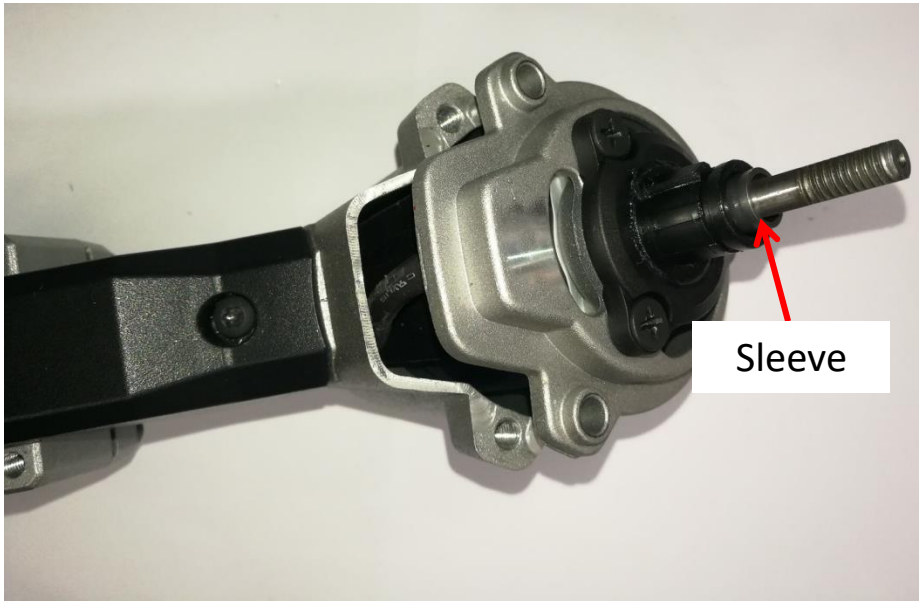
31. Assemble the switch lever with the bottom switch box cover and mount the connecting tube onto the bottom switch box cover.
32. Mount the top switch box cover on the bottom switch box cover and fasten the cover assembly with screws.



Replace the motor

33. Mount 2 pcs sleeves onto the shaft.





Replace the motor

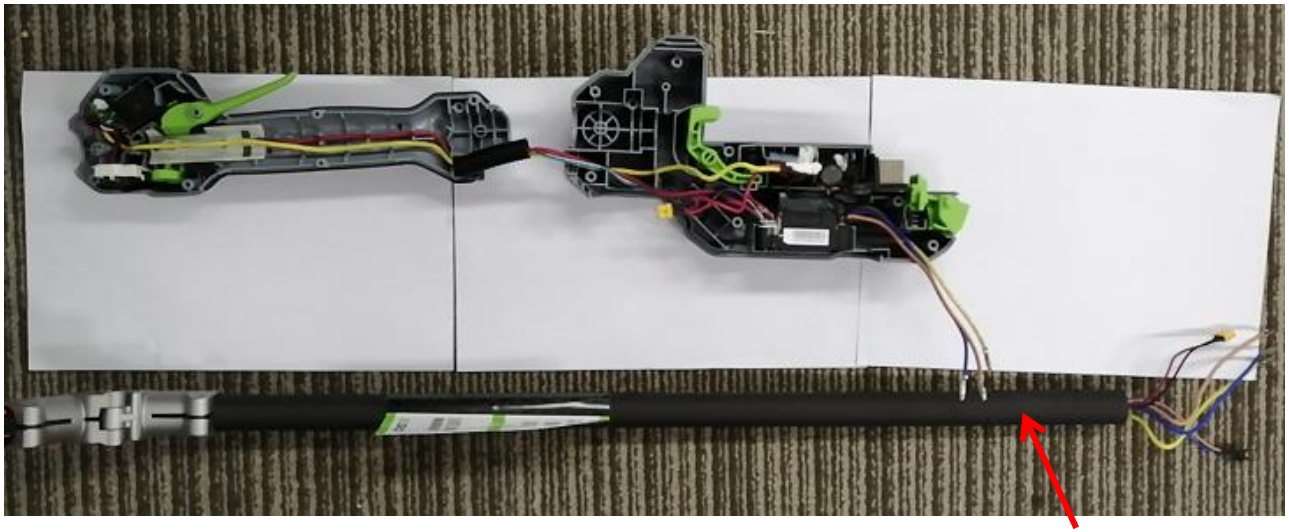
34. Assemble the shield with the motor and fasten them with screws and washers.

Replace the motor

35. Reverse the steps of disassembling the trimmer head to assemble the trimmer head.

Replace the motor

36. Align the cables and assemble the housing set and handle set as are shown in the “Replace the PCBA” section.

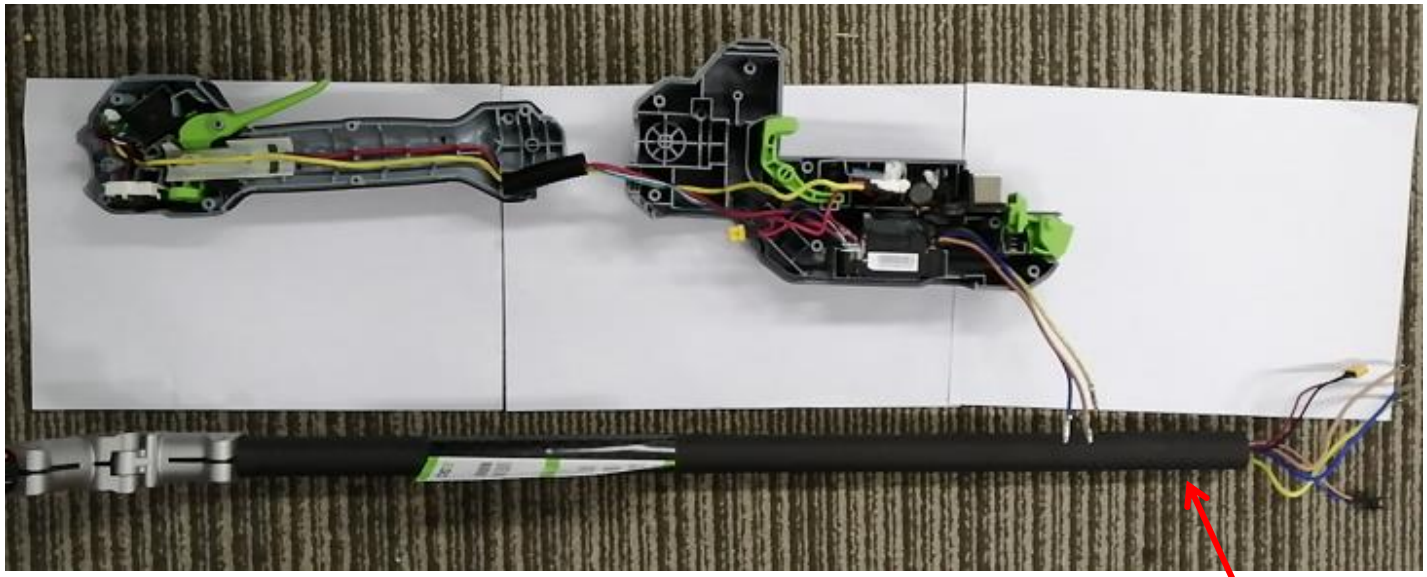


Connecting tube assembly

Part 4: Replace the connecting tube assembly

Replace the connecting tube assembly

1. Remove the connecting tube assembly from the handle set and housing set as is shown in the “Replace the PCBA” section.

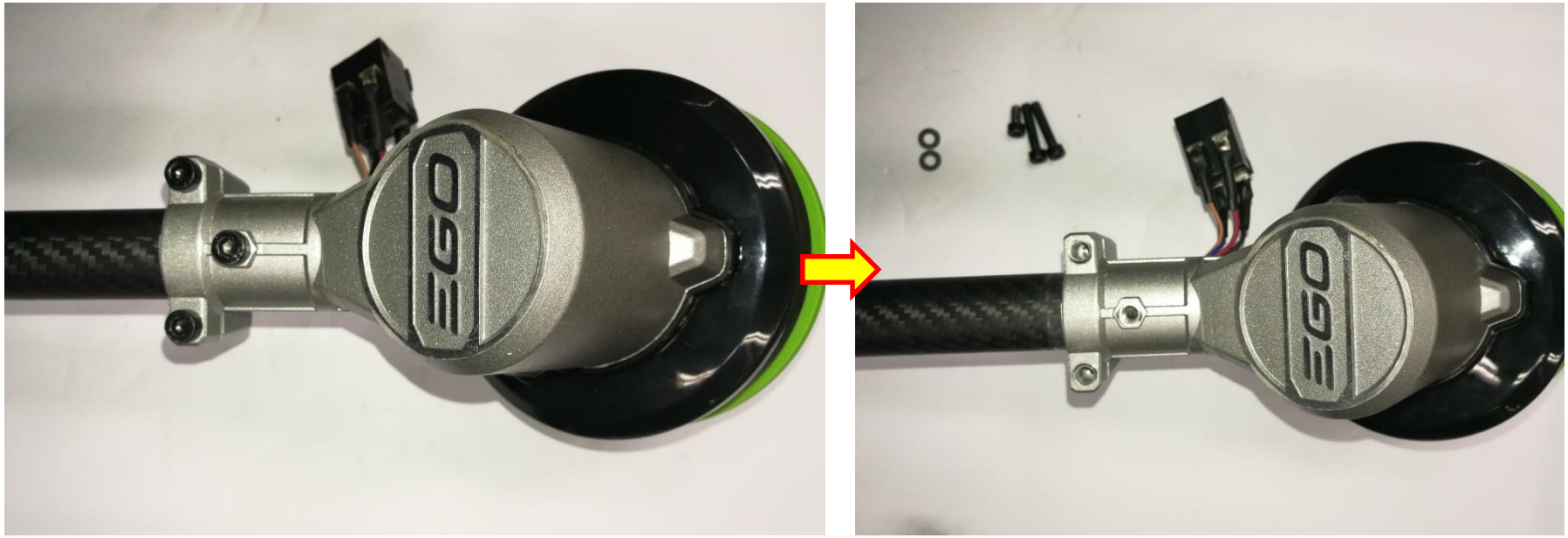


Replace the connecting tube assembly

2. Remove the top switch box cover, bottom switch box cover, switch lever and switch support as are shown in the “Replace the motor” section.

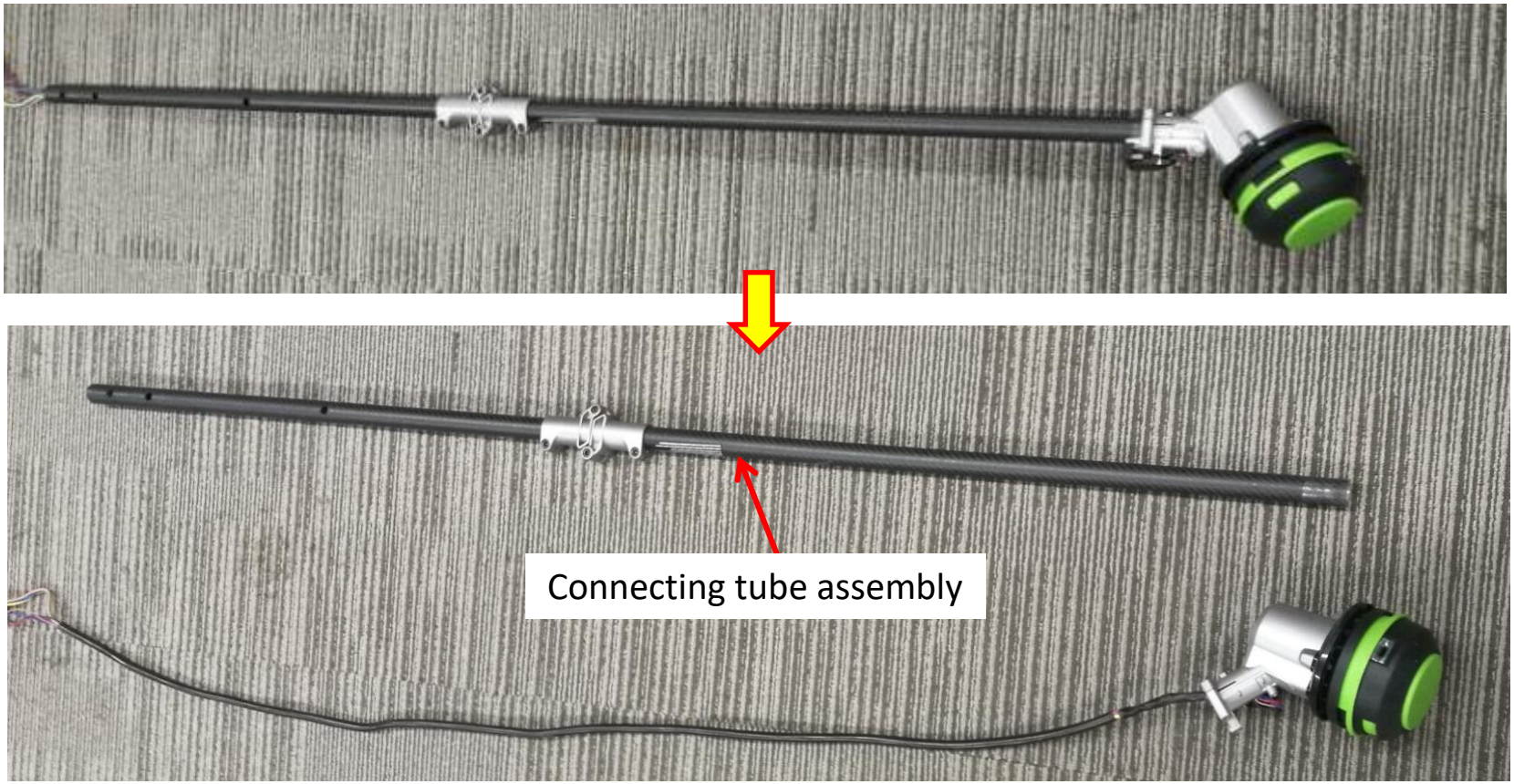
Replace the connecting tube assembly

3. Loosen screws and remove the washers as are shown in the “Replace the motor” section.



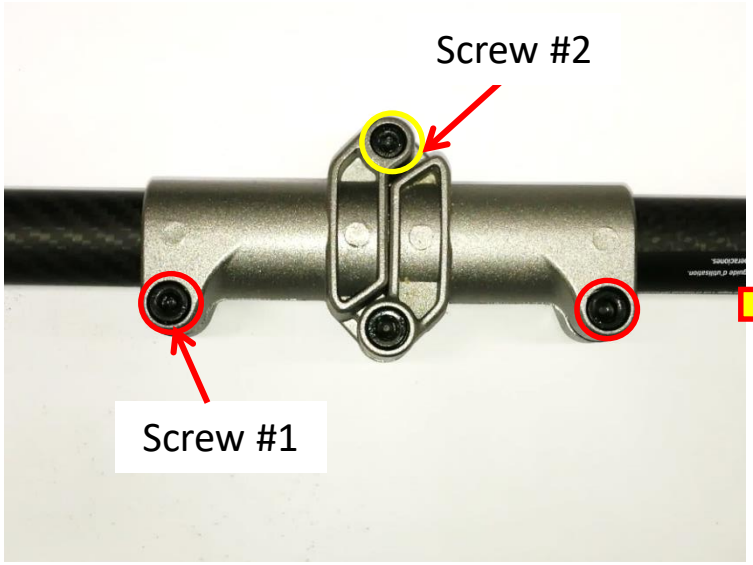
Replace the connecting tube assembly (for ST1520S/ST1510S)

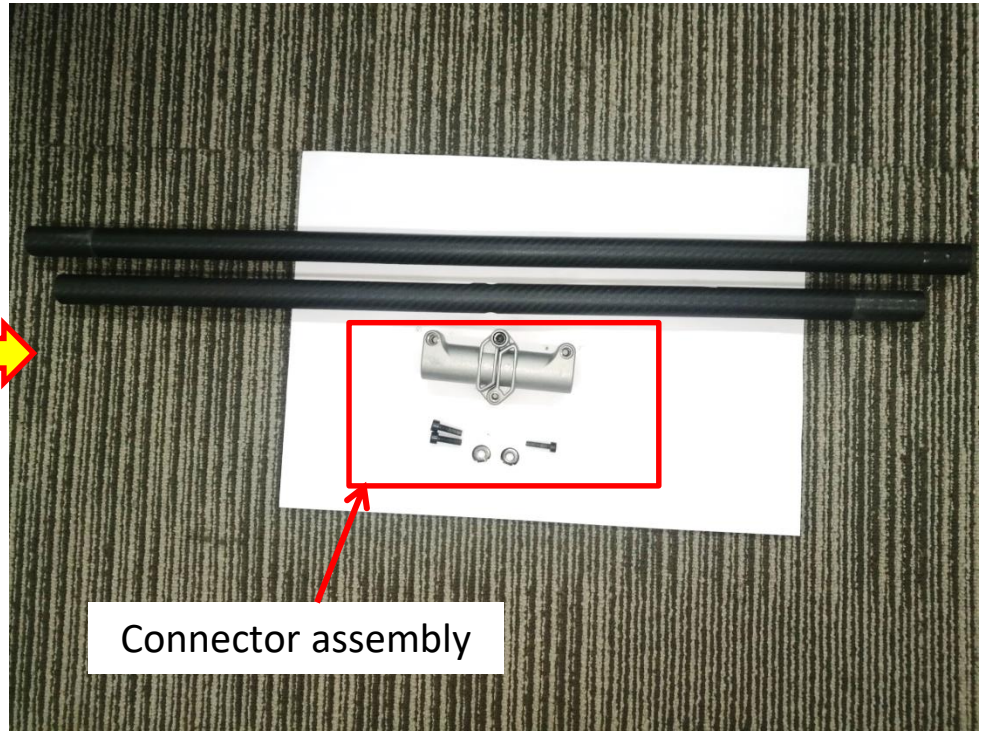
4.1 Pull the cables out of the connecting tube assembly. If the connecting tube assembly is broken, replace it with a new one.



Replace the connecting tube assembly (for ST1520S/ST1510S)

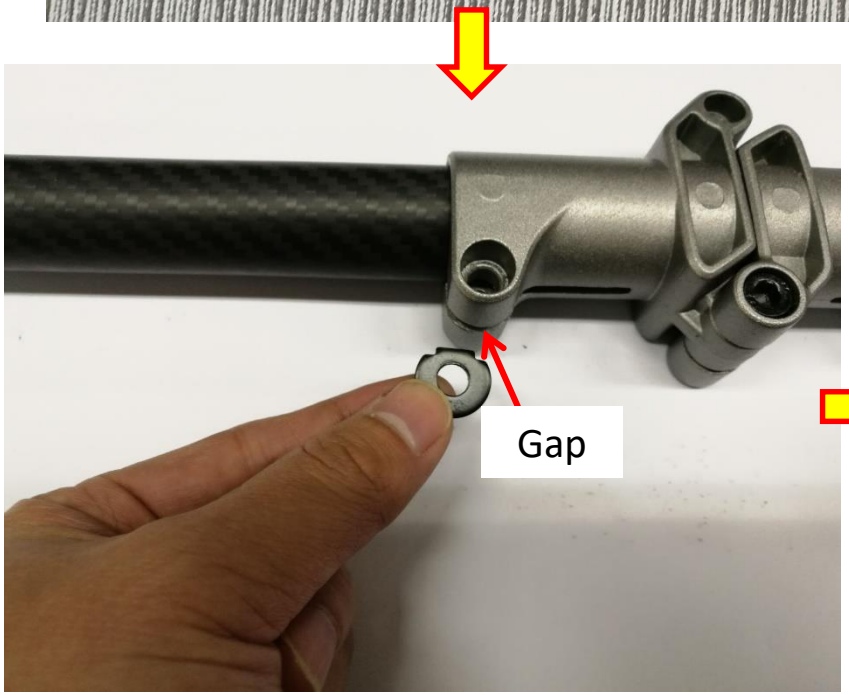
4.2 Loosen the screws to disassemble the connector assembly. If any part is broken, replace it with a new one.

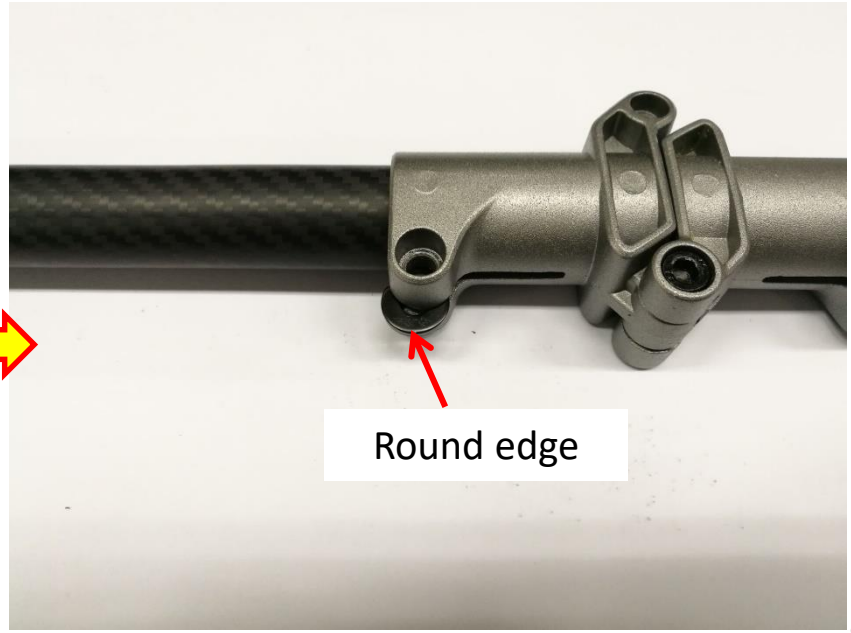




Replace the connecting tube assembly (for ST1520S/ST1510S)

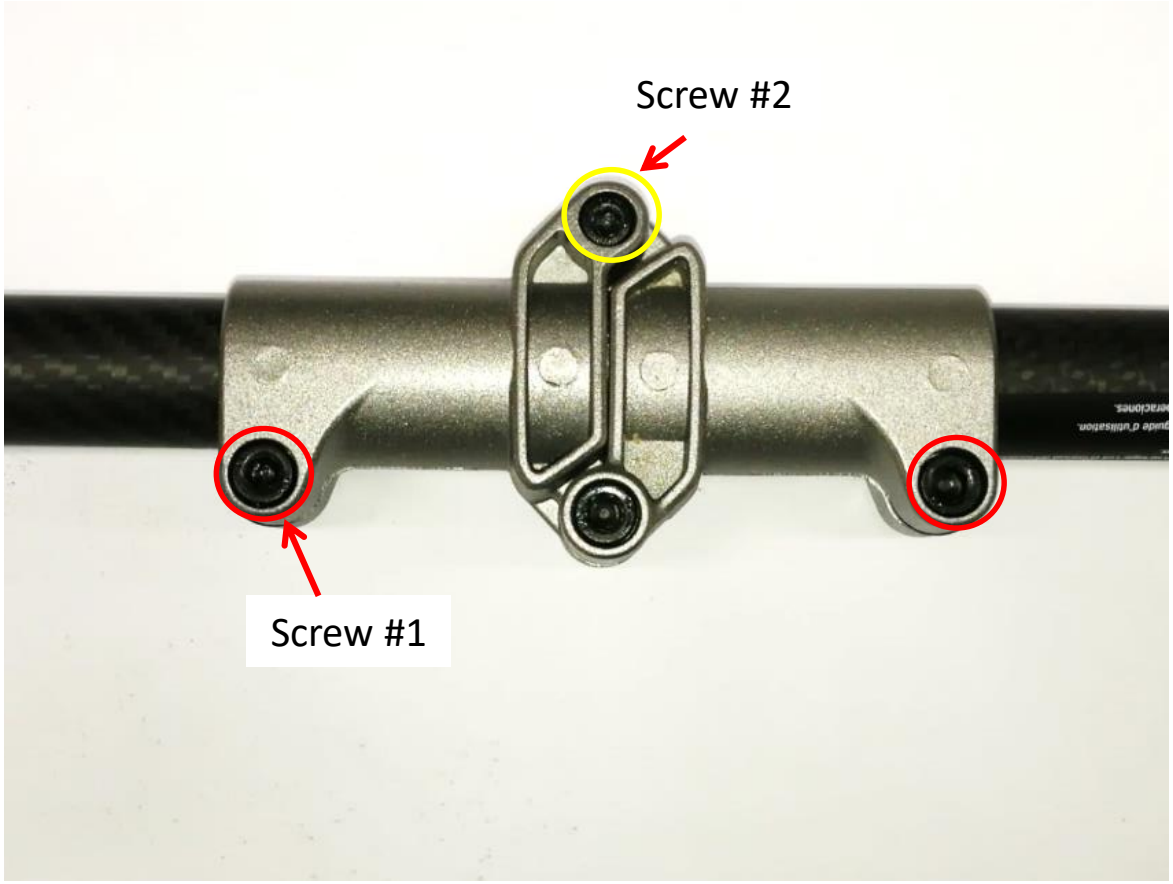
4.3 Assemble the connector assembly and insert the washer into the gab with round edge facing outside.





Replace the connecting tube assembly (for ST1520S/ST1510S)

4.4 Fasten the connector assembly with screws.

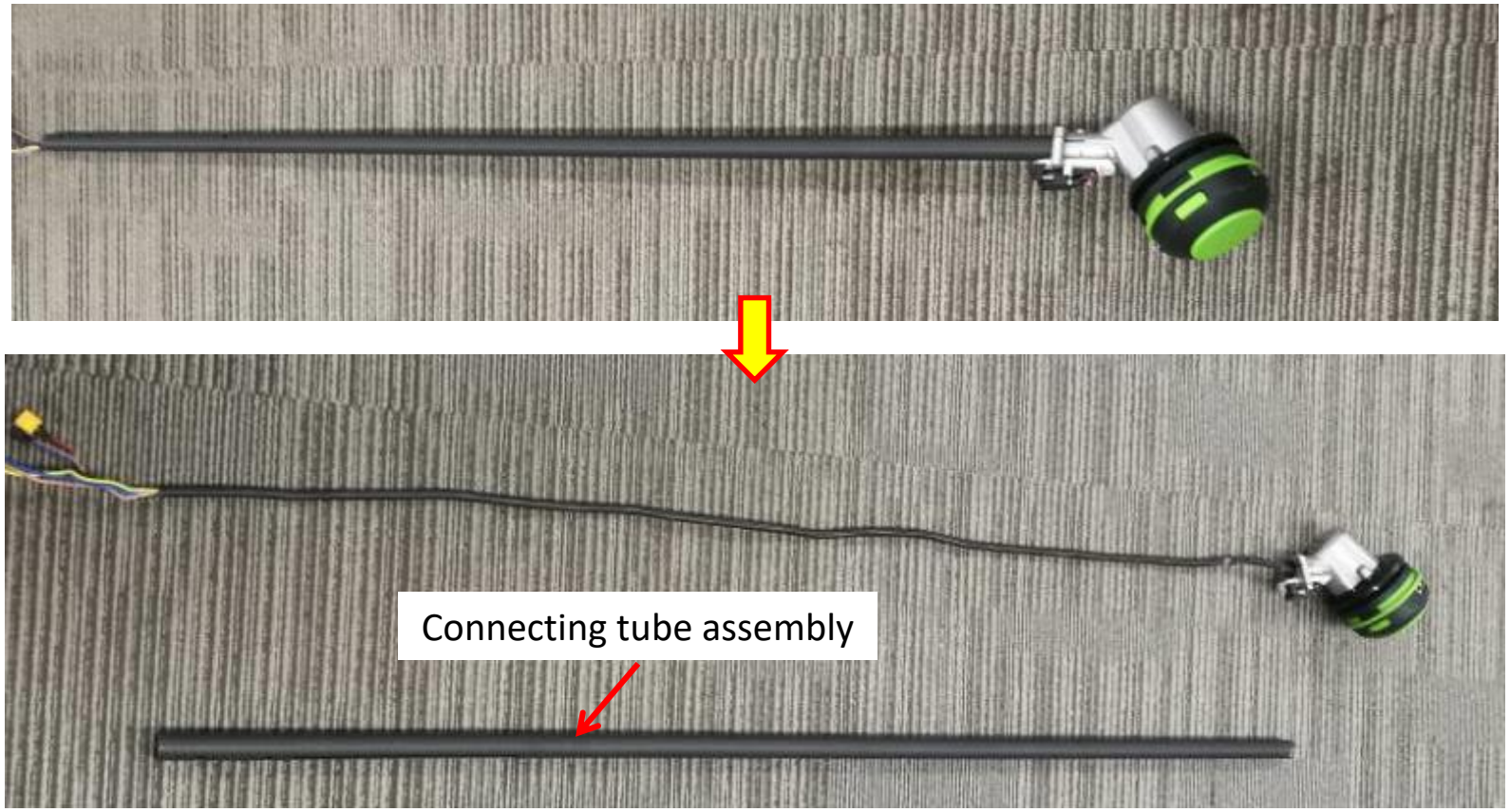


Replace the connecting tube assembly (for ST1520S/ST1510S)

4.5 Insert the cables through the connecting tube assembly.

Replace the connecting tube assembly (for ST1520)

4.1 Pull the cables out of the connecting tube assembly. If the connecting tube assembly is broken, replace it with a new one.

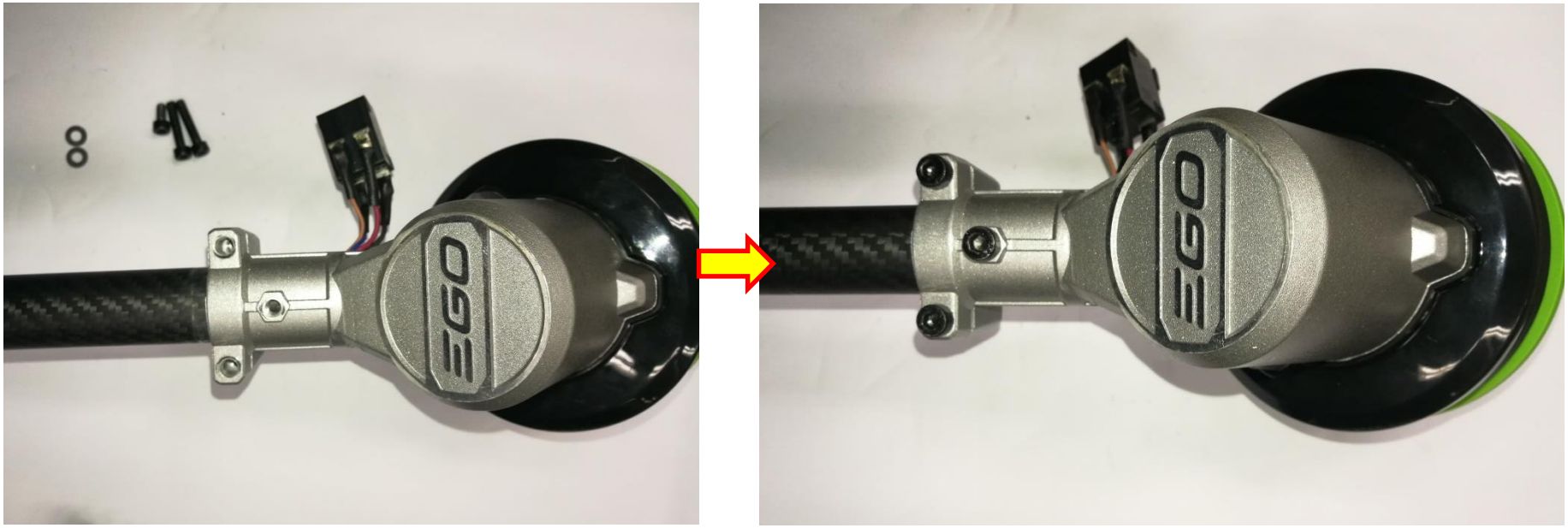


Replace the connecting tube assembly (for ST1520)

4.2 Insert the cables through the connecting tube assembly.

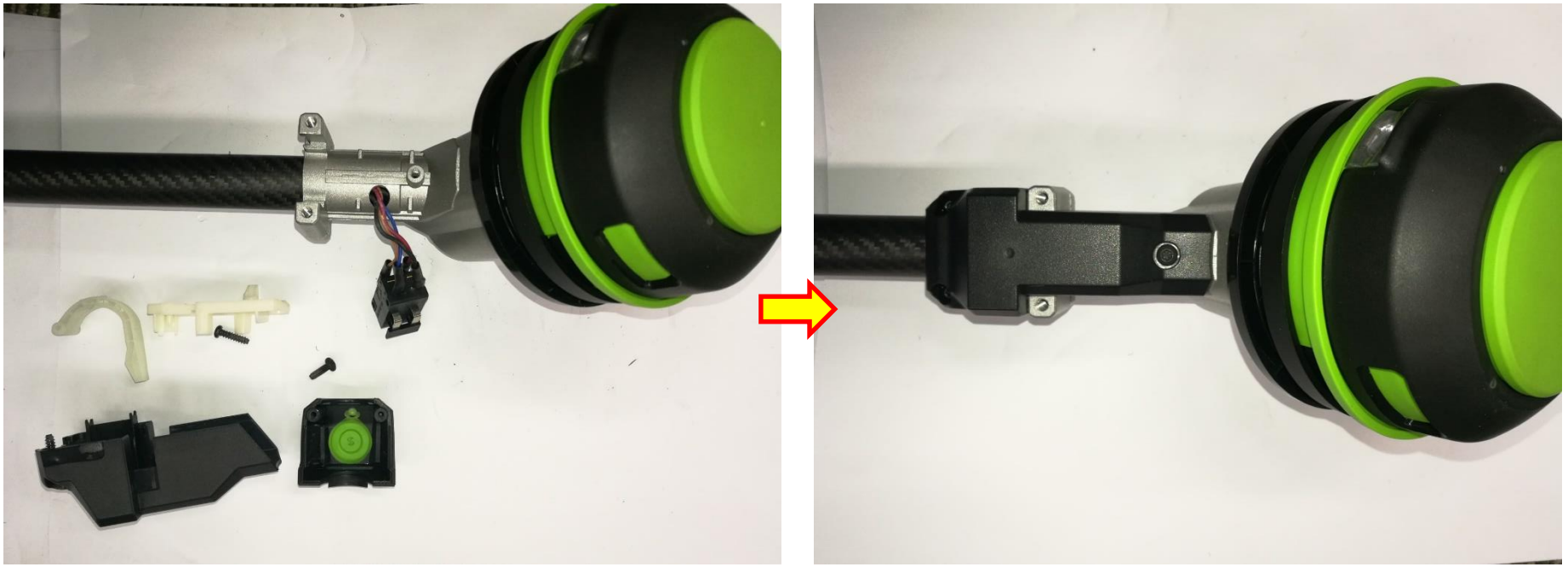
Replace the connecting tube assembly

5. Assemble the motor housing with connecting tube assembly as is shown in the “Replace the motor” section.



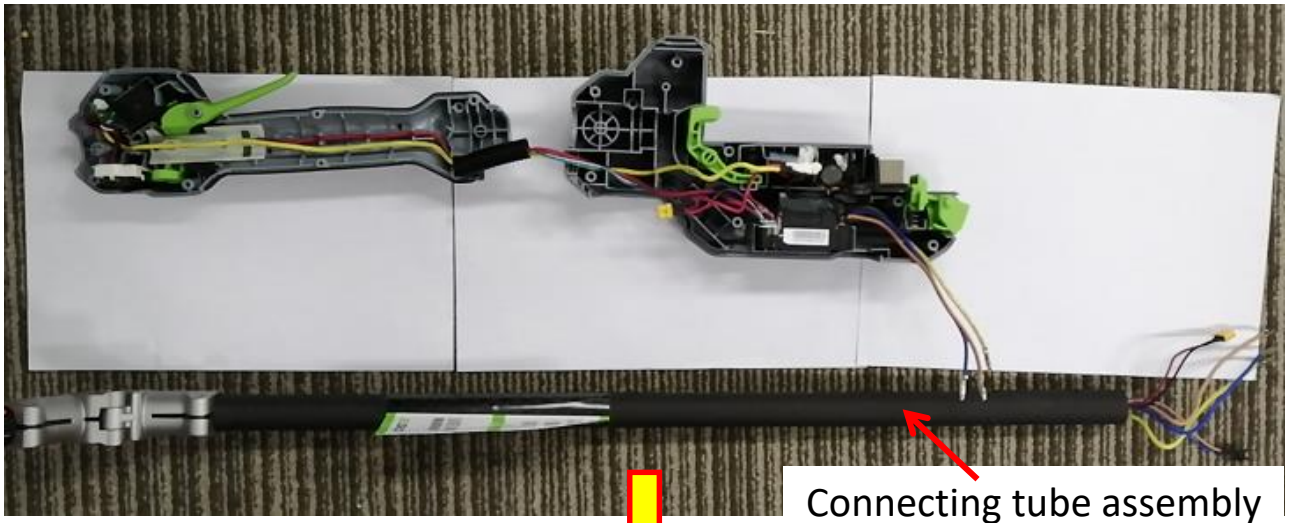
Replace the connecting tube assembly

6. Assemble the line load switch assembly as is shown in the “Replace the motor” section.



Replace the connecting tube assembly

7. Align the cables in the housing set and handle set, then assemble the housing set and handle set as are shown in the “Replace the PCBA” section.



THE END