

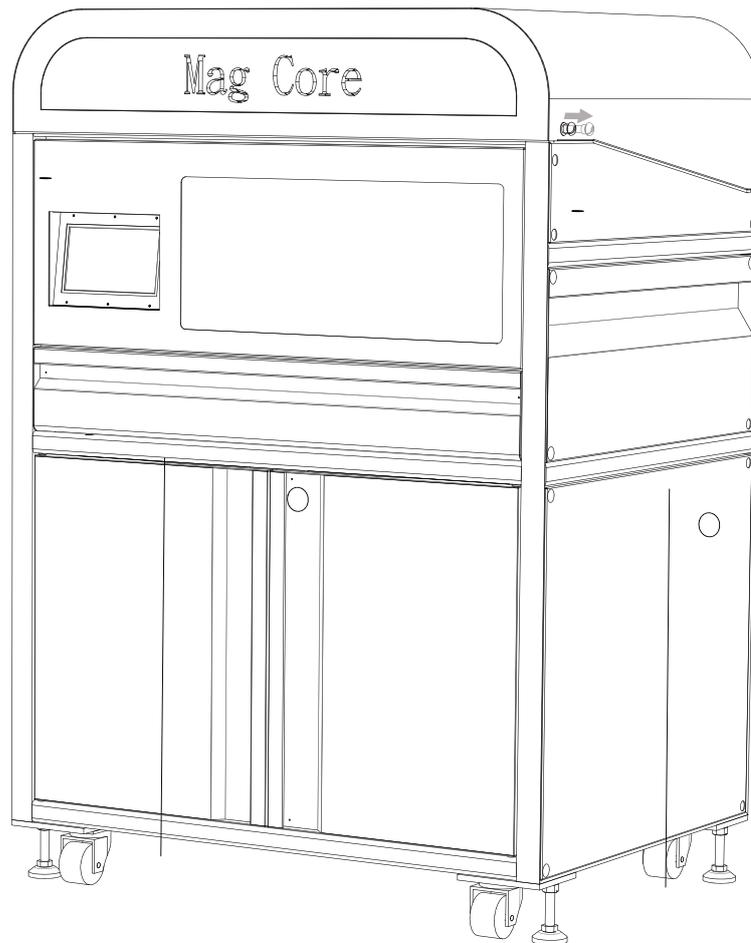


***RBCBioscience***



# MagCore<sup>®</sup>HF48

## Engineering maintenance manual



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# Safety Precautions

## Before use

These WARNINGS and CAUTIONS are intended to protect you and other persons from injuries and damages. To ensure safe operation, please follow them carefully.



<b>CAUTIONS</b>
<b>Risk Of Electric Shock Do Not Open</b>

### CAUTION:

To Reduce The Risk Of Electric Shock, Do Not Remove Cover (Or Back). No Userserviceable Parts Inside. Refer Servicing To Qualified Service Personnel.



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



Be aware of contamination by contagious specimens.



#### High temperature warning!!

DO NOT touch the heating block with this sticker attached, it may cause serious burning injuries.

### CAUTION:

- Handle the power supply cord carefully**  
Do not damage or deform the power supply cord. If it is damaged or deformed, it may cause electric shock or malfunction when used. When removing from wall outlet, be sure to remove by holding the plug attachment and not by pulling the cord.
- Do not open the top cover**  
In order to prevent electric shock, do not open the top cover.
- Do not place anything inside**  
Do not place metal objects or spill liquid inside the MagCore® System. Electric shock or malfunction may result.

### Note On Use:

	<b>Avoid high temperatures.</b> Allow for sufficient heat dispersion when installed on a rack.
	<b>Handle the power cord carefully.</b> Hold the plug when unplugging the cord.
	<b>Keep the set free from moisture, water, and dust.</b>
	<b>Unplug the power cord when not using the set for long periods of time.</b>
	<b>Do not obstruct the ventilation space.</b>
	<b>Do not let insecticides, benzene, and thinner come in contact with the set.</b>
	<b>Never disassemble or modify the set in any way.</b>
	<b>Do not let foreign objects in the set.</b>

## SAFETY INSTRUCTIONS

- Read Instructions** – All the safety and operating instructions should be read before the product is operated.
- Retain Instructions** – The safety and operating instructions should be retained for future reference.
- Heed Warnings** – All warnings on the product and in the operating instructions should be adhered to.
- Follow Instructions** – All operating and use instructions should be followed.
- Cleaning** – Unplug this product from the wall outlet before cleaning. Only allow to use 75% of EtOH to clean the surface of instrument.
- Attachments** – Do not use attachments not recommended by the product manufacturer as they may cause hazards.
- Water and Moisture** – Do not use this product near water – for example, near a bath tub, wash bowl, kitchen sink, or laundry tub; in a wet basement; or near a swimming pool; and the like.
- Accessories** – Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.
- Ventilation** – Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.
- Power Sources** – This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home, consult your product dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.
- Grounding or Polarization** – This product may be equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.
- Power-Cord Protection** – Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.
- Lightning** – For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.
- Overloading** – Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in a risk of fire or electric shock.
- Object and Liquid Entry** – Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.
- Servicing** – Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
- Damage Requiring Service** – Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
  - When the power-supply cord or plug is damaged,
  - If liquid has been spilled, or objects have fallen into the product,
  - If the product has been exposed to rain or water,
  - If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation,
  - If the product has been dropped or damaged in any way, and
  - When the product exhibits a distinct change in performance – this indicates a need for service.
- Replacement Parts** – When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.
- Safety Check** – Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
- Heat** – The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products that produce heat.

## Specification

Model	HF48 (under development)
Processing Capacity	Max .48 samples per batch
System Feature	Special Cartridge rack, T-Rack, Tube Rack design for easy installation
Power Supply	Voltage: AC 200V ~ 220V; Frequency: 50/60Hz;
Dimension	W1000 x D800 x H1600 (mm) W39.37 X D31.49X H62.99(inches)
Net Weight	250kg / 551.25Lb

## Operation parameters

Processing Capacity	1~48 samples per batch
Sample Volume	200/400/1200 $\mu$ l
Elution Volume	60/100/150/200/300 $\mu$ l
Purity	O.D. 1.8 -2.0 $A_{260/280}$ ratio

## Operation environment

Temperatures allowed during transportation storage packaging	15° C ~ 35° C
Temperatures allowed during operation	+18° C to +30° C
Pollution Degree	Indoor

## Applications

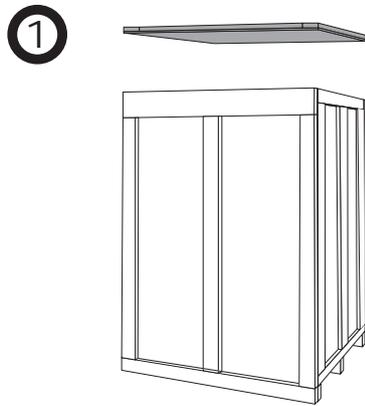
Whole Blood (200/400ul), Viral Nucleic Acid (DNA/RNA), Tissue Genomic DNA, Plant Genomic DNA Bacteria Kit, Total RNA Kit

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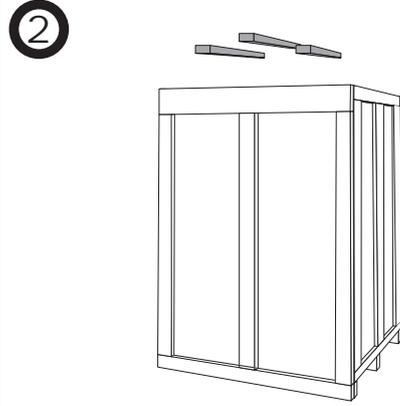
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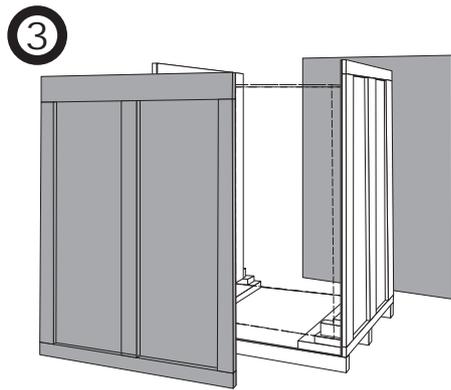
# Packed content Unpacking



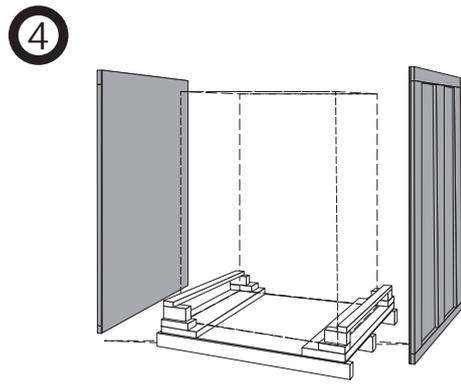
Disassemble the top cover



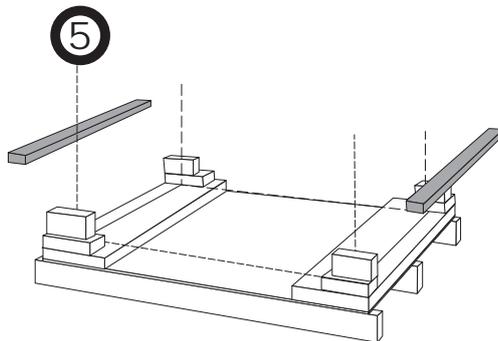
Disassemble the three fastening bars at the top



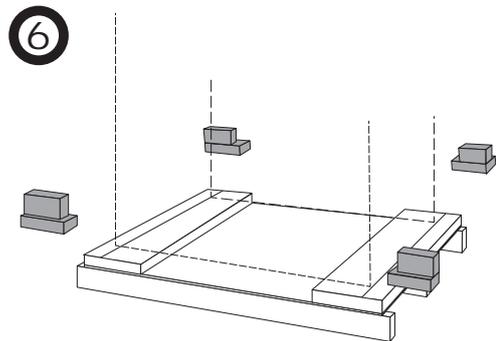
Disassemble the front cover and rear cover



Disassemble the side covers



Disassemble the bottom fastening bars



Disassemble the fastening blocks at the bottom



The packing materials are recyclable. It is suggested to keep the packing materials if you want to transport the machine to other places or give it to a resource recycle company.

# Attachments

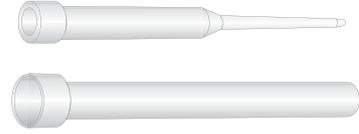
## System test tools



Cartridge X 20

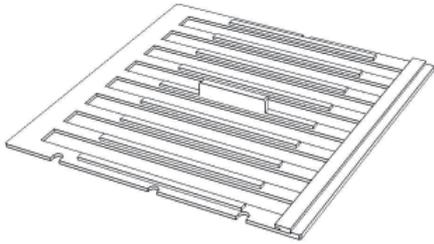


Sample Tube X 50

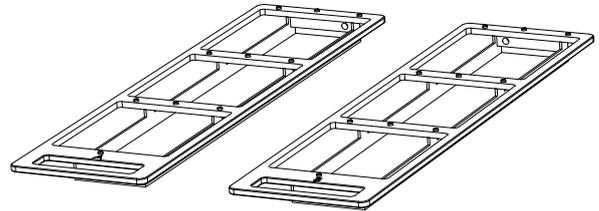


Tip / Tip Holder Set X 50

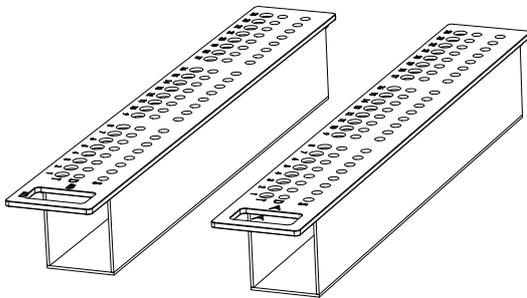
Please put the system test tools at a clear place and don't lose them.



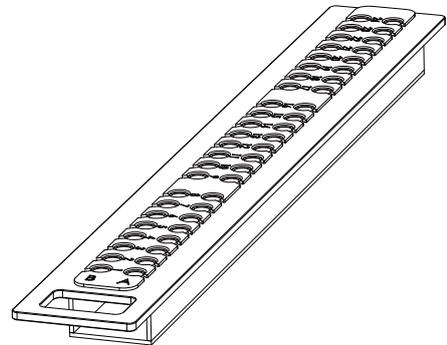
Cartridge Rack X 6



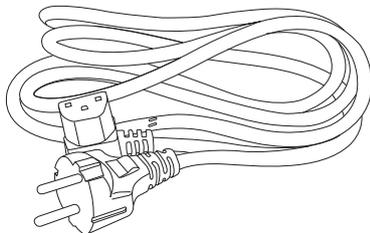
Cartridge Carrier B X 1 / Cartridge Carrier A X 1



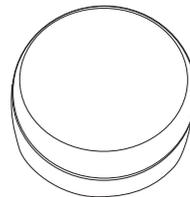
Tip Carrier B X 1 / Tip Carrier A X 1



Elution Carrier X 1



Power wire X 1



Lubricating oil X 1

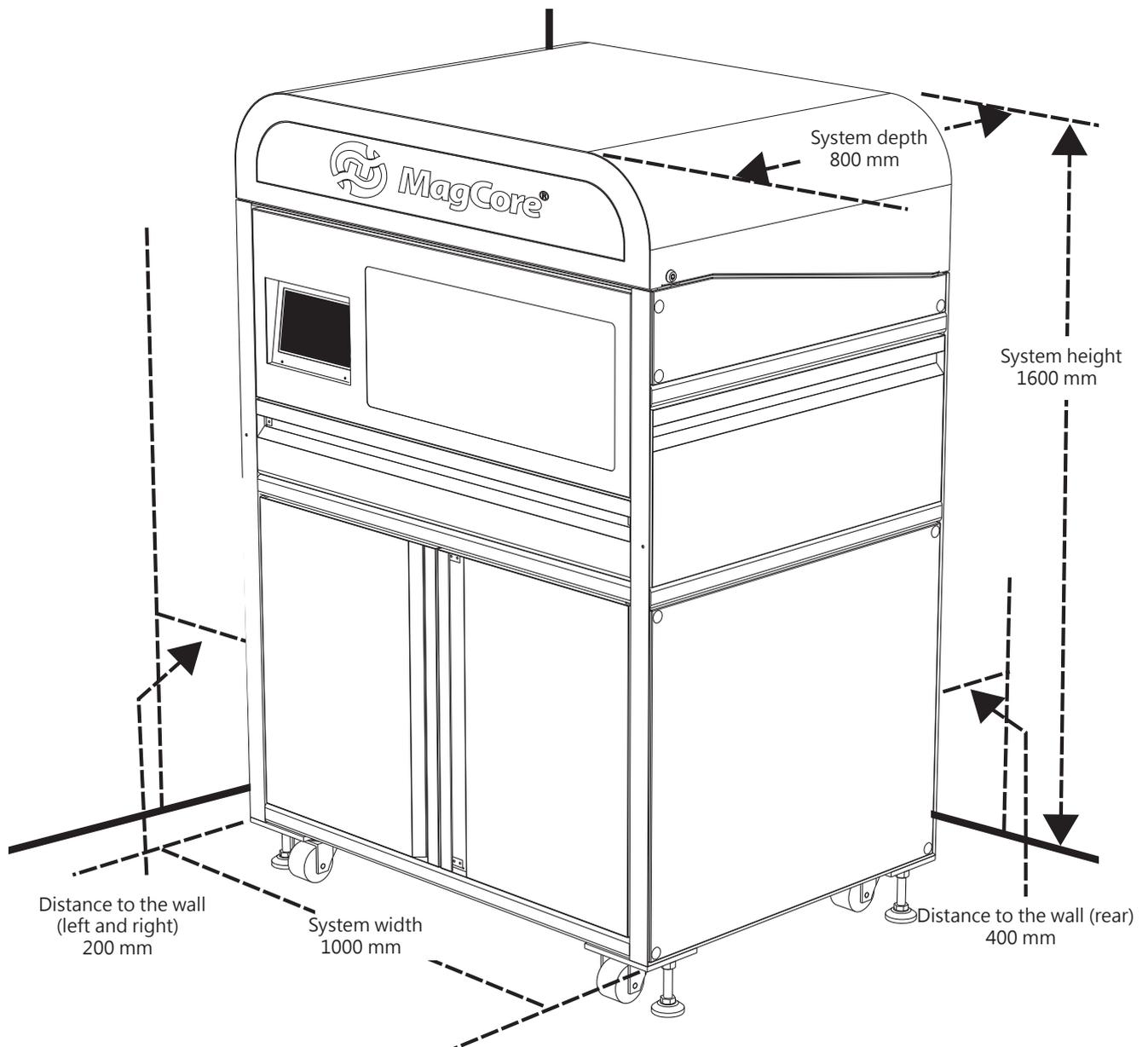


O-Rings X 24

# Installation

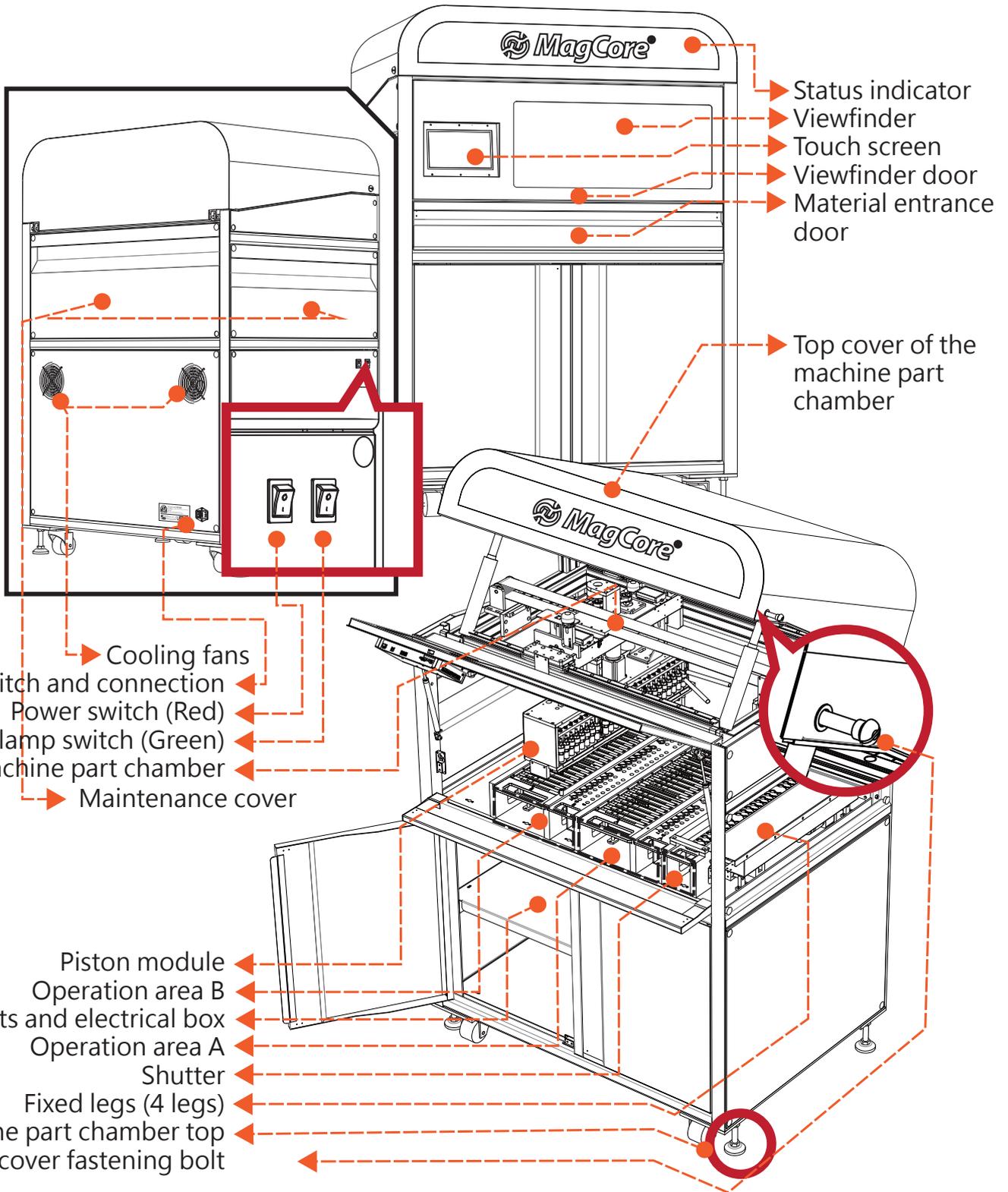
## Before installation

Please find a place near the power socket and having enough space to install the system and improve ventilation.

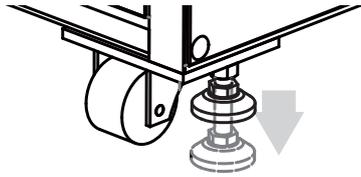


Please make sure that the ground is a horizontal surface. Please measure it by a horizontal ruler and fine tune it via the fixed legs.

# System guidance

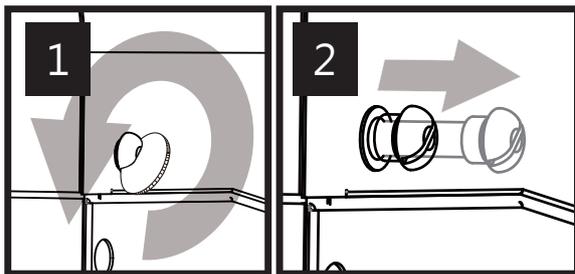


# Installation



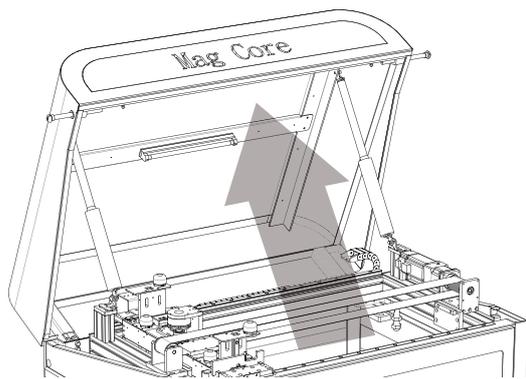
Please place the system at an appropriate place according to the page 5, and fine tune the system according to the levelness of the ground via the four fixed legs and then fasten the screws.

▼ **Next Step**



Please screw off the fastening bolts at the both sides of the top cover of the machine part chamber by coins and take them out.

▼ **Next Step**

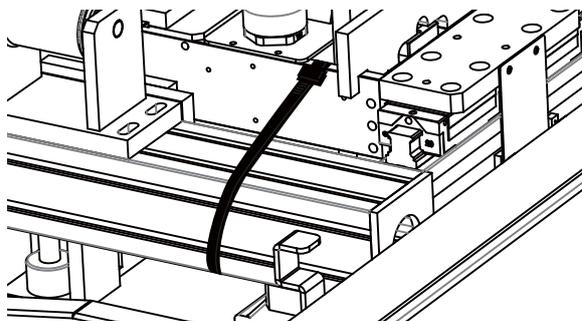


Please hold the fastening bolts to lift the top cover of the machine part chamber.



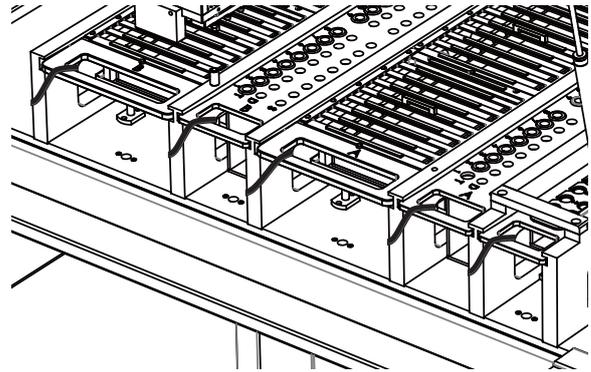
**Note that the top cover is very heavy; it may need two persons to lift it up.**

▼ **Next Step**



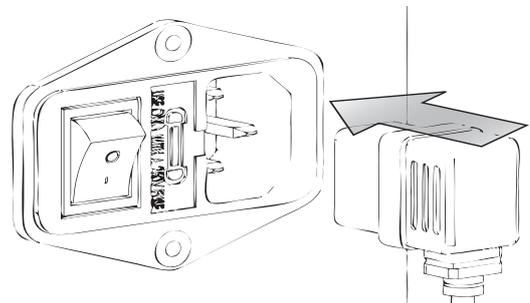
Cut the cable ties and close the top cover of the machine part chamber.

▼ **Next Step**



Cut the cable ties on the rack.

▼ **Next Step**

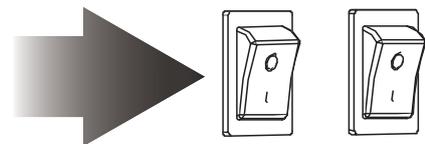


Plug in the power wire and turn on the main power switch.



Please make sure that the voltage of the socket is 220V~240V and keep your hands dry and make sure that the power supply of the machine is cut off. Then plug in the power wire and turn on the power switch.

▼ **Next Step**



The system will be automatically initialized after the power switch (Red) is turned on.



**When installing the system for the first time, please set the local time (Page 19) and then test the machine according to the "Piston test" (Page 15). Please carefully read the operation manual before performing any operations.**

# Touch panel and user interface



MagCore®HF48 provides 8.9 inches full-color touch screen and straightforward user operation interface. Operator can know the operation status and ending time of the system only by watching the screen.

## – Main menu

<b>Start</b>	Set basic setting parameters and operations.
<b>Load program</b>	Load the frequent-used settings stored by the users.
<b>Maintenance and other test functions</b>	System basic maintenance, UV sterilization, function tests...
<b>System time</b>	
<b>System status</b>	System basic information, serial number, export system error message.
<b>Setup</b>	Set up system time.

## – Panel function area

**Start**

**Function Operation Area**

24 Test		48 Test	
DNase I Treatment			
Sample Volume	Elution Buffer		
Elution Volume	Optical Detection		

**Message Notification Area**

Front door	Cartridge Carrier B	Tip Carrier B	Cartridge Carrier A	Tip Carrier A	Elution Carrier	Non-Detected
Open front door	non-equipped	non-equipped	未搭載	non-equipped	non-equipped	Normal

**Menu Area**

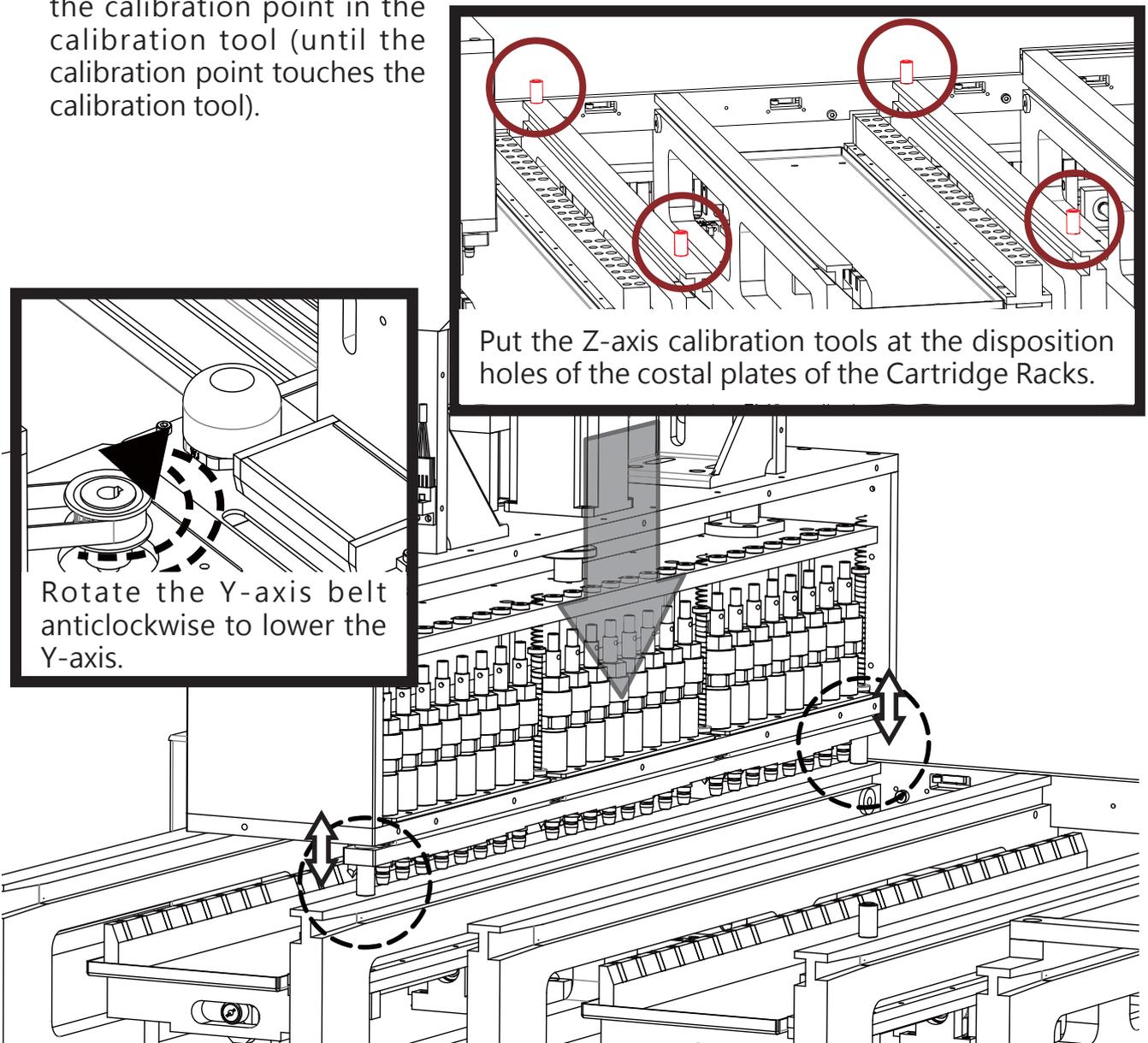
- Start
- Stop
- Save
- Load Program
- Back

訊息指示

## Test home value

After the installation of the machine is completed, it is necessary to make sure whether or not the machine conforms to the factory document if you want to perform advanced maintenance calibration or there is vibration or collision during shipping.

1. Please make sure that the power supply of the machine is cut off.
2. Disconnect the connection between the brake and the machine and then install the electronic brake thread.
3. Install Z-axis calibration tool on area A and manually rotate the Y-axis belt anticlockwise to lower the Y-axis to the home calibration tool and correctly insert the calibration point in the calibration tool (until the calibration point touches the calibration tool).



4. Repeatedly move the Y-axis up and down to make sure whether the calibration point can engage in or separate from the Z-axis calibration tool without any difficulties.
5. Prepare an engineering computer and connect it to the machine and then turn on the power.

6. Read the current home distance of the machine and record it according to the X-axis and Y-axis read values.
7. Repeat the step 3 to test area B.
8. Compare current home distance with the home distance in the factory document. If it fails to conform to the home distance in the factory document, please perform the machine calibration process.

### MagCore HF48 System Teaching Data Sheet

Serial No. J48M000123456 Date 10/25/2013 (mm/dd/yyyy)

UI Software 48-20131023-3-B-NTU PLC Software 20130717-01

Inspector \_\_\_\_\_

No	Sensor	Value
1	YA-axis	112.21
2	YB-axis	112.19
3	XA-axis	516.05
4	XB-axis	206.58

Note: Please store this data sheet because the maintenance person uses it.

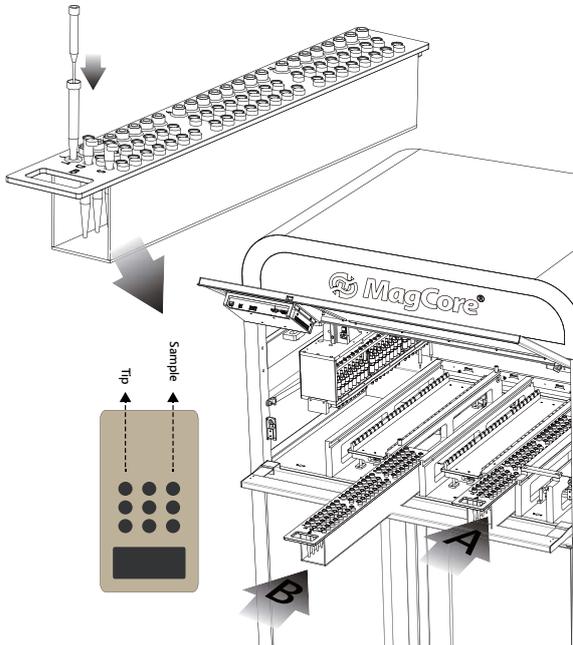
9. Disconnect the electronic brake thread and connect the connection of the machine brake to finish the test.

## Test the smooth of picking up the TIP/TIP leakage test

Please refer to the chapter-Piston test in Simple maintenance.

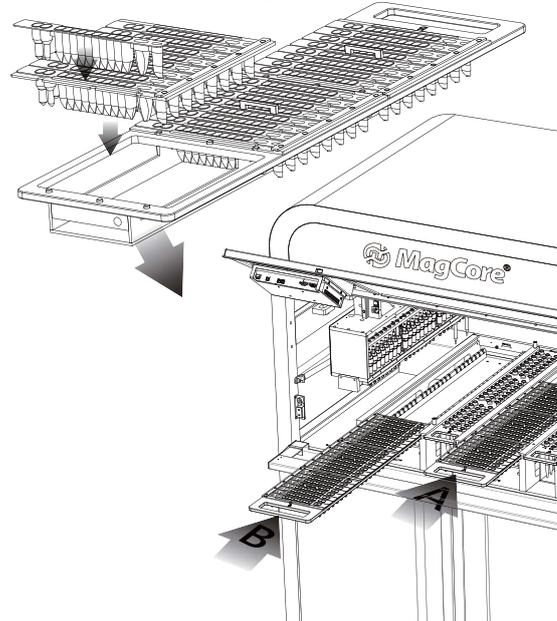
# Attachment installation

## Install Tip and Sample Tube.



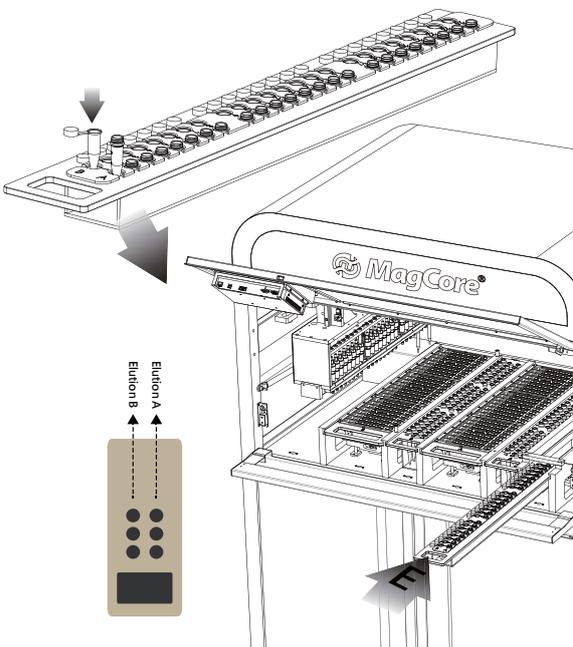
Insert the Tips and Sample Tubes in the slots of the Tip Carriers and then respectively put the whole sets of Tip carriers at the slots of the area A and area B according to the indicators.

## Install Cartridge



Insert the Cartridges in the Cartridge Racks and put the Cartridge Racks into the Cartridge Carriers and then respectively put the whole sets of Cartridge Carriers at the slots of the area A and area B according to the indicators

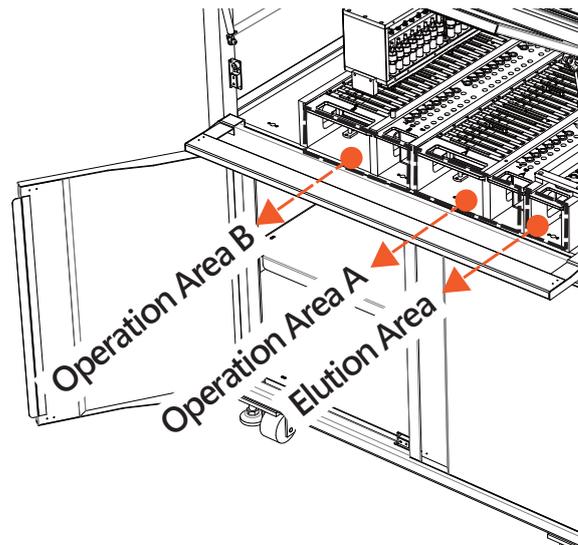
## Install Elution Tube



Put the Elution Tube in the corresponding positions according to the area A and area B and then put the Elution Carrier in the Elution slots.



**Warning:**  
The Carriers of the area A can only be used in the area A; similarly, the Carriers of the area B can only be used in the area B, or the system may not detect the Carriers and cannot work normally.



### Warning:

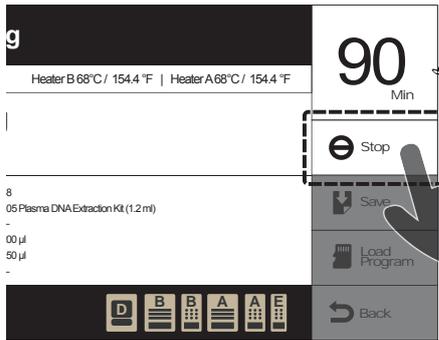
Please don't use any other centrifuge tubes to replace the Sample Tube of the reagent kit. The height of other sample tubes may be different from that of the Sample Tubes of the reagent kit, which may influence the extraction result.

# Emergency stop and warning



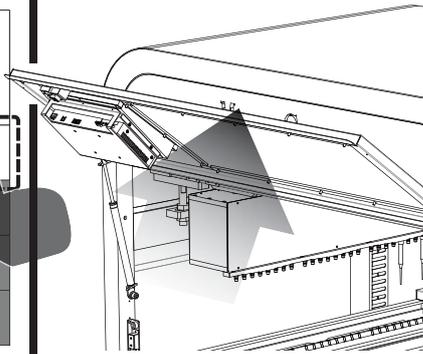
Please read the security information to stop the system immediately at the moment that the accidents take place.

## Method 1



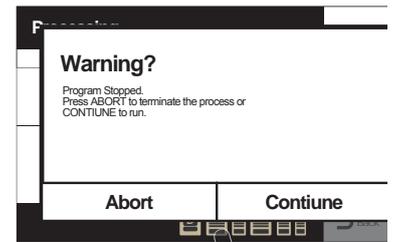
During the operation of the system, please press the Stop button to stop the system immediately when an emergency event takes place or you want to stop the operation of the system.

## Method 2



If the front door is opened during the execution of the program, the system will stop all the operations of the system immediately for security reasons.

## Lift



Please select "Continue" to lift the emergency stop and then continue the unfinished actions, or select "Abort" to end all operations.



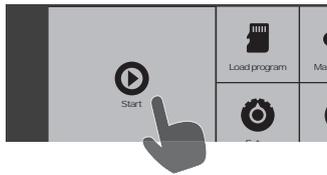
## Warning:

Please don't put your hands in the operation area during the operation of the system.

# Start



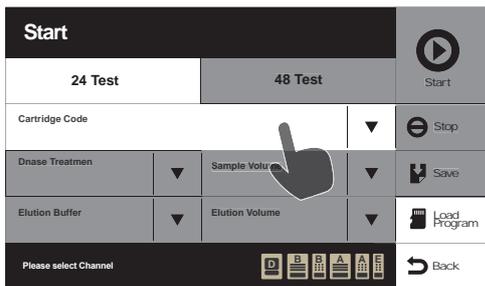
Install all attachments.



Press the Start button in the main function window.

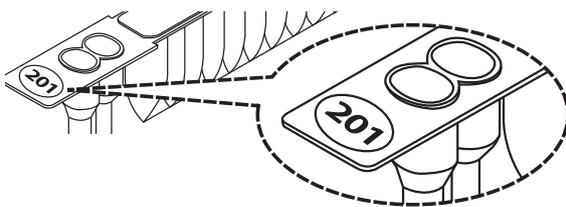
▼ **Next Step**

Select 24 or 48 test channels.



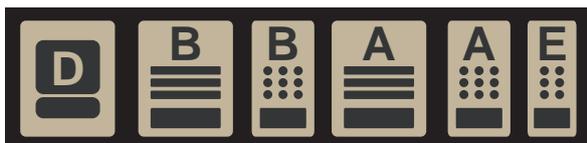
Select the Cartridge number.

Mark the Cartridge number on the Cartridge which you want to use.



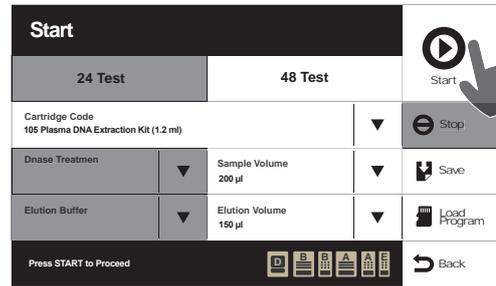
Please confirm the number which you selected again and choose all parameters.

▼ **Next Step**

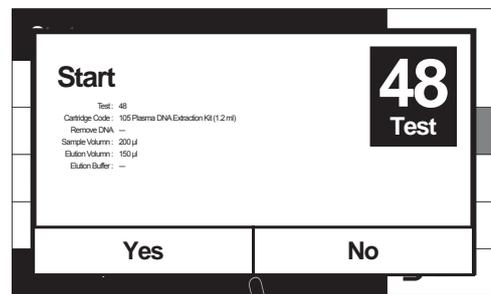


Please confirm all icons in the status bar are in normal status. If any of the icons shows "X" (indicated by a red circle with an X), the Start button will be in the "non-function" status and cannot work normally. Please perform trouble shooting according to the icon showing "X". (Please refer to the page 8 for the information about the warning indicators)

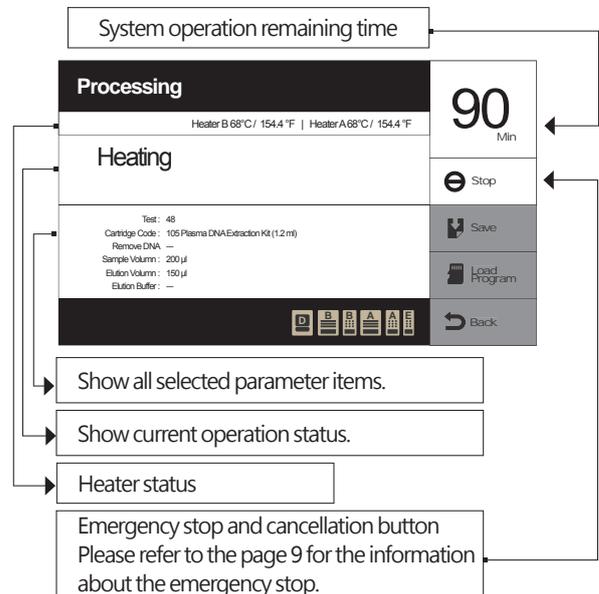
▼ **Next Step**



After you input all the parameters and press the Start button, a confirmation window showing all the parameter which you input will pop up. If these parameters are correct, please press Yes to run the system, if you want to modify the parameters, please press No.



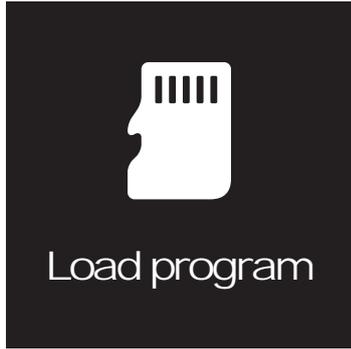
▼ **Next Step**



You can see the current operation status and remaining time. When the above operations are finished, the system will show you the completing page.

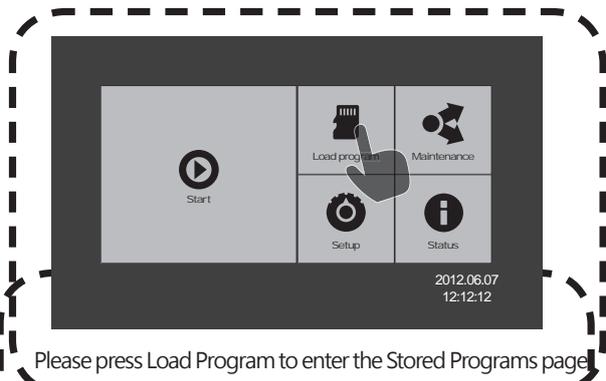


**Warning:** Please don't open the door of the viewfinder or material entrance unless an emergency event occurs, which may influence the extraction result.



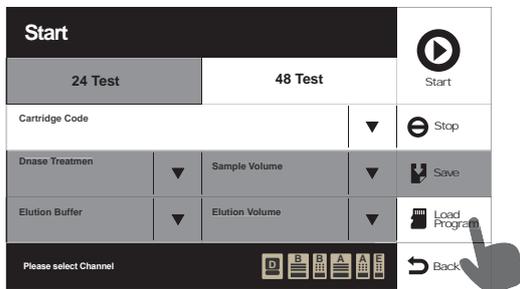
# Load program

You can customize the names of the programs which you use frequently and store them in the system to simply the operation of the system.



Please press Load Program to enter the Stored Programs page

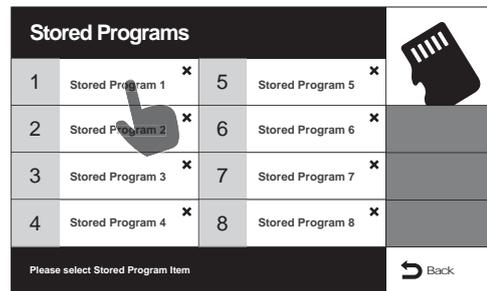
Or



After entering the Start page, please directly press Load Program button to enter the Stored Programs page.

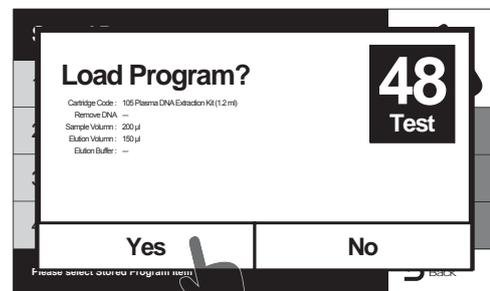
▼ Next Step

Please select a program that you want to use.



▼ Next Step

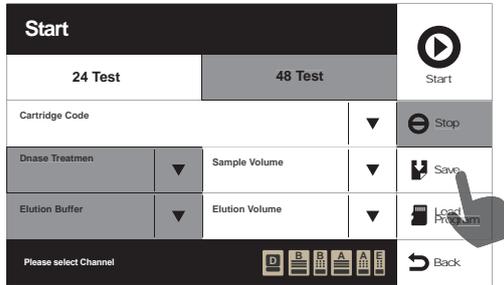
Please confirm whether the parameters are correct and then press Yes to load the parameters.



After entering the Start page, please directly press Load Program button to enter the Stored Programs page.

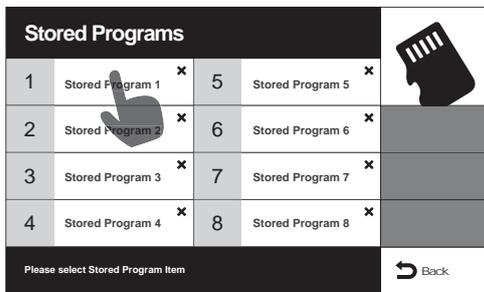
# Store programs

You can store 8 programs that you use frequently in the memory and give each of them a name that you can memorize easily.



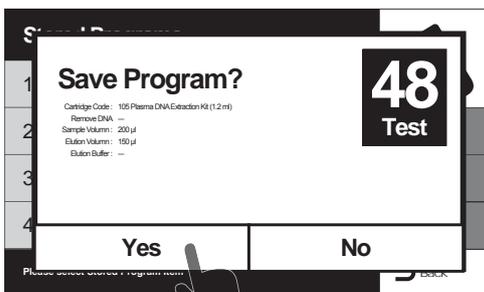
After selecting all parameters at the Start page, please press the Save button to enter the Stored Programs page.

**Next Step**



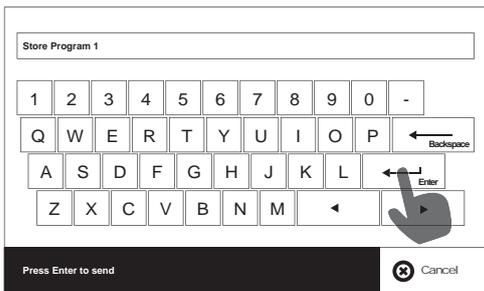
Please select an item to add or cover a program.

**Next Step**



Please confirm whether the stored parameters are correct.

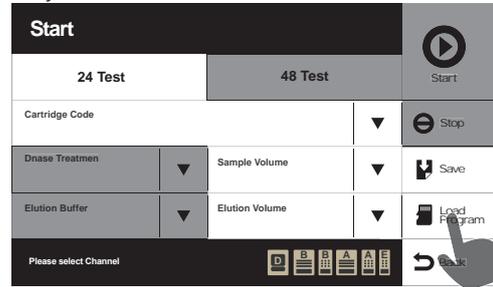
**Next Step**



Input the name which you want to save and press Enter to save it.

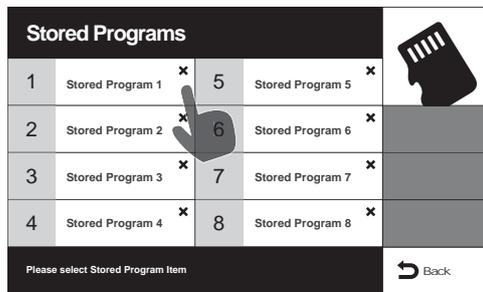
# Delete programs

You can delete the parameter which you use frequently from the memory.



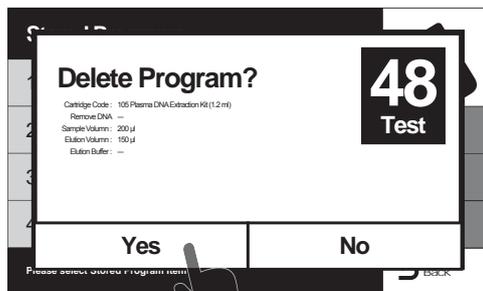
After entering the Start page, please directly press Load Program button to enter the Stored Programs page.

**Next Step**



Please select an item which you want to delete and press X.

**Next Step**



Please confirm whether the parameters which you want to delete are correct and press Yes to delete them.



# Simple maintenance

Simple maintenance lists all maintenance items which users need to do, which includes sterilization, clearing, simple tests and error message notification, etc. Users should perform the maintenance items periodically to make sure the system can work normally.

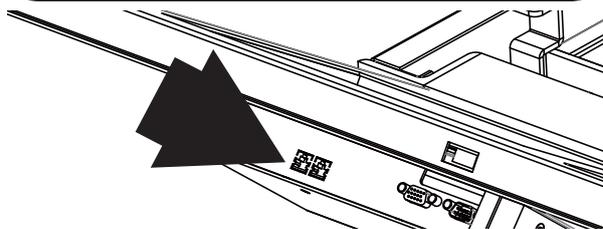
<b>Maintenance</b>		
UV Sterilization ▶	Moving Test ▶	
Piston Test ▶	Heater Test ▶	
O-Ring & Piercing Needles ▶	Rejection Tip ▶	
DC Motor Operate ▶	Update Program Files ▶	
Please select 'item'		Back

- ▶ **UV sterilization**  
UV sterilization
- ▶ **Piston test**  
Piston draining and leakage test
- ▶ **Moving test**  
Continuously moving test for each component
- ▶ **Heater test**  
Test the temperature of the heater.
- ▶ **Update program**  
Update program
- ▶ **Rejection Tip**  
Reject the Tip to the home and the system rejection.
- ▶ **O-Ring and piercing needles**  
O-Ring replacement process and piercing needles clearing process
- ▶ **Motor elevating operation**  
Rise or lower the motors of area A and area B and the protection cover of the Elution.

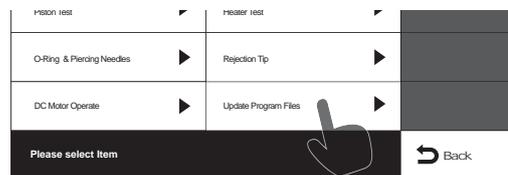
## Update program

Copy a new program to a USB Flash Driver. Please make sure there is a "48ExtractorUpdateProgram" folder in the USB Flash Driver.

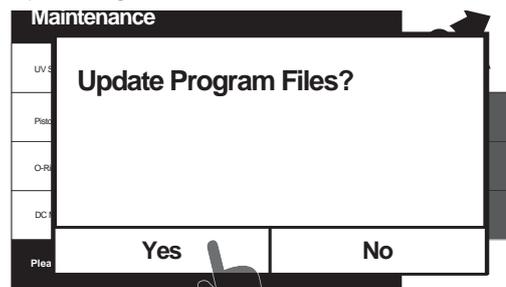
Please scan the USB Flash Driver to ensure there is no virus in the USB Flash Driver before insert the USB Flash Driver in the machine. Please don't modify any of the files in the "48ExtractorUpdateProgram" folder.



Lift the door of the viewfinder and insert the USB Flash Driver (self-prepared) into the slot behind the control panel and then press Export button to output the data to the USB Flash Driver.

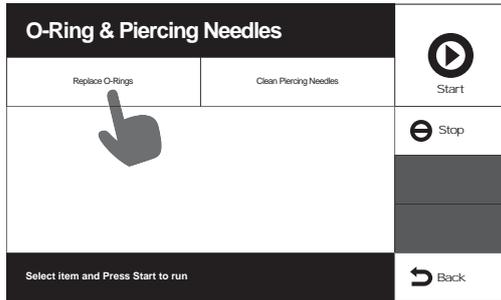


Select Update Program Files.



Press Yes to start to update the program files and the window will be closed automatically after the updating is finished.

## Replace O-Rings



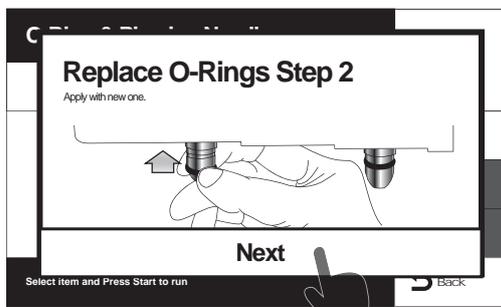
Please select the Replace O-Rings and press START.

▼ **Next Step**



Use a sharp blade to cut off the old O-Ring according to the step showing on the screen and then press NEXT after finishing the step.

▼ **Next Step**



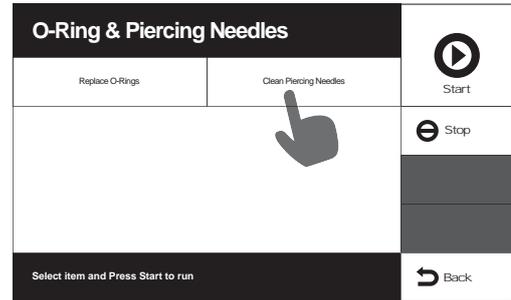
Replace the old O-Ring with a new one

▼ **Next Step**



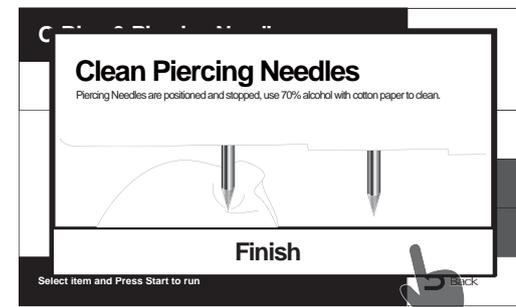
Spread lubricating oil on the O-Ring and press Finish.

## Clear Piercing Needles



Select Clean Piercing Needles and then press START.

▼ **Next Step**



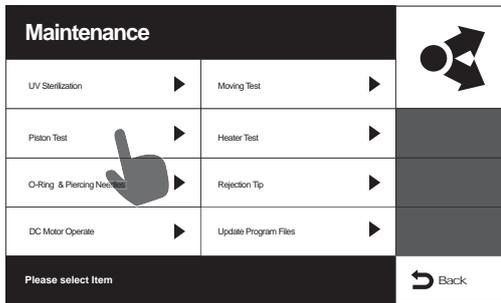
Please soak a paper towel in 70% alcohol and use the towel to wipe the needles.



Please don't use other cleaning agents except for 70% alcohol to clear the needles.

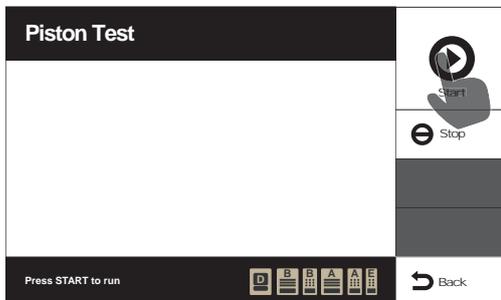
The piercing needles are very sharp. Please protect your hands from being hurt by the needles.

# Piston test



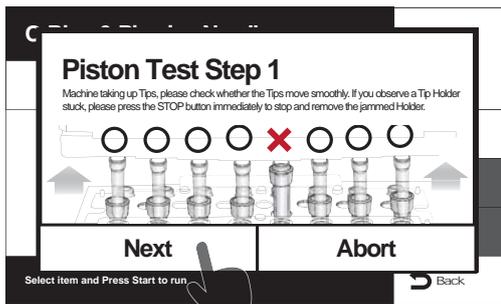
Please select the Piston test in the Maintenance menu.

▼ **Next Step**



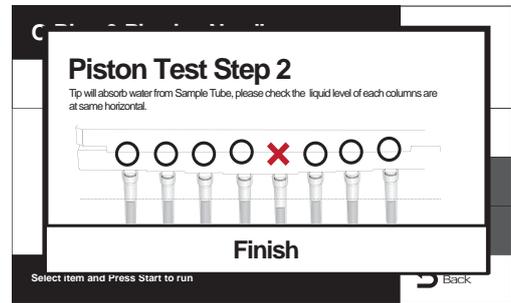
Please put the prepared "system test tools" in the area A. (Please refer to the page 7, where please put 1ml water in each of the empty Sample Tubes and then press Start to begin the test).

▼ **Next Step**



The step is mainly used to test the smooth of picking up a TIP. Please check whether the TIP can be picked up smoothly. If you find one of the TIPs gets stuck, please press Abort to end the test and put the stuck TIP in the Tip Holder and run the program repeatedly. If the problem takes place again, please contact the local distributor to deal with the problem. If the TIPs can be picked up smoothly, please press NEXT to go to the next test step.

▼ **Next Step**

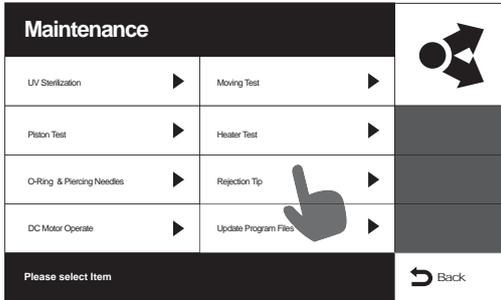


The step is mainly used to perform TIP leakage test.

Tip will absorb water from the Sample Tube, please check whether the liquid level of each columns are at the same horizontal level or whether the liquid level of each columns decreases slowly. If you find the liquid level of each columns are not at the same horizontal level or the liquid level of each columns decreases slowly, please press Finish to perform the test again. If the problem takes place repeatedly, please substitute a new O-Ring for the piston according to the page 14 and perform the test again. If the problem still cannot be improved, please contact the local distributor to deal with it.

# Rejection Tip

The function is mainly used to reset the system when the operation is interrupted due to emergency stop or power failure.



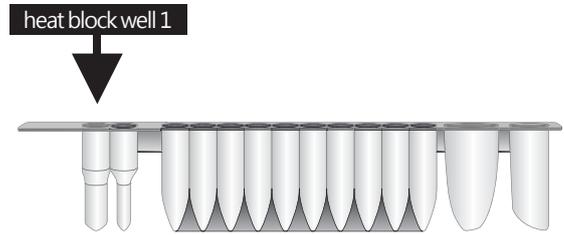
Please select Rejection Tip in the Maintenance menu.

▼ Next Step



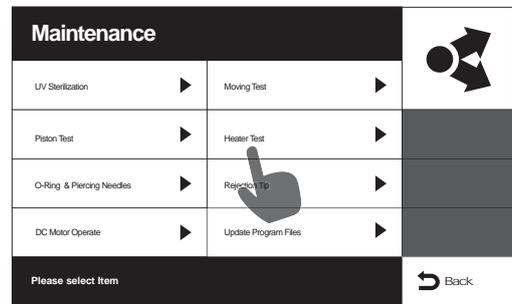
Please select Start to begin the process of Rejection Tip. After the process is finished, the system will be reset automatically.

# Heater test



Please put 500ul water in the heat block well 1 (as shown by the arrow) of the Cartridge prepared for test and put it on the Cartridge Rack and insert a thermometer in it.

▼ Next Step



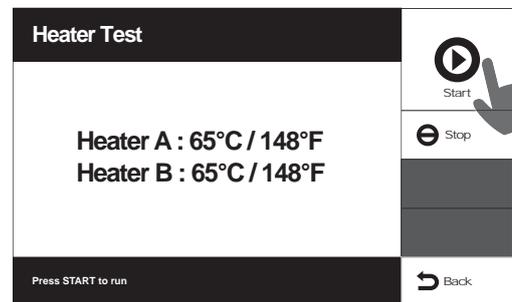
Please select heater test in the Maintenance menu.

Please press to begin the test. Now the touch screen will show the temperature of the heater measured by the system. Please compare it with the temperature shown on the thermometer.

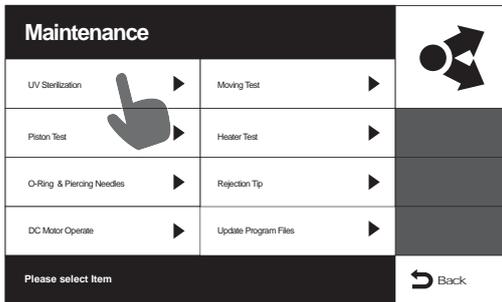
If you want to end the test, please press Stop button.



The temperature measured by the heat sensor of the system may be slightly different from which measured by the thermometer.



# UV Sterilization



Please select UV sterilization in the Maintenance menu.

▼ **Next Step**

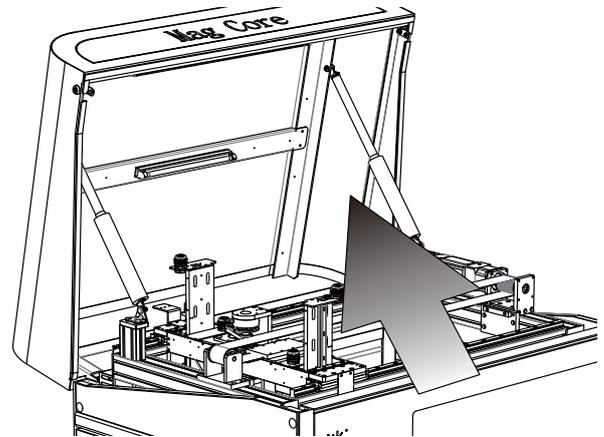


You can select thirty minutes process or sixty minutes process in the UV Sterilization menu and then press START to begin sterilization. During the process, the touch screen will show the remaining time for the sterilization and then show the completing screen after the sterilization is completed.

Please press Stop if you want the stop the sterilization.



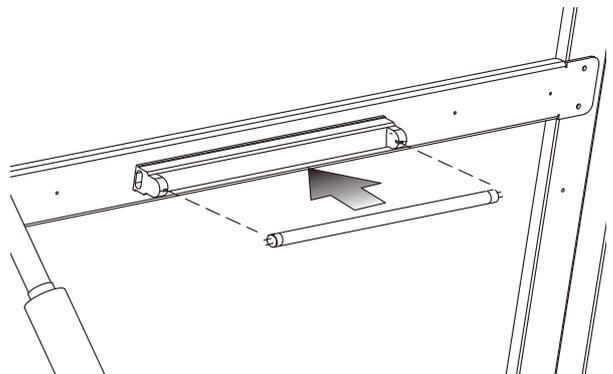
# Replace UV lamp



Open the top cover of the machine part chamber.

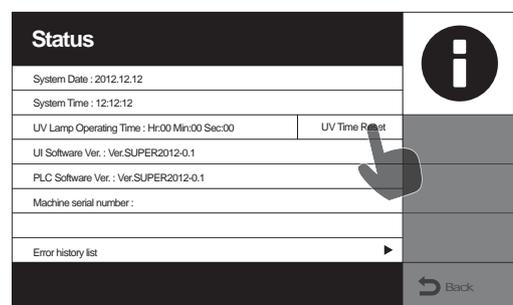
**Note that the top cover of the machine part chamber is very heavy; it may need two persons to lift it up.**

▼ **Next Step**



Replace the old UV lamp with a new one.

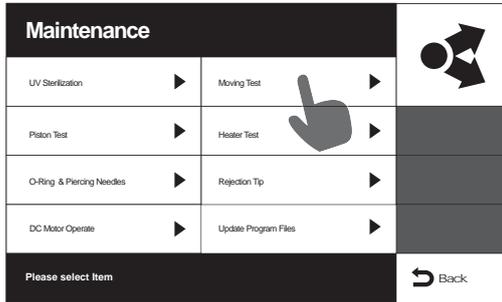
▼ **Next Step**



Select the Status button on the main menu, and then press UV Time Reset to reset the Operating hours of the UV lamp.

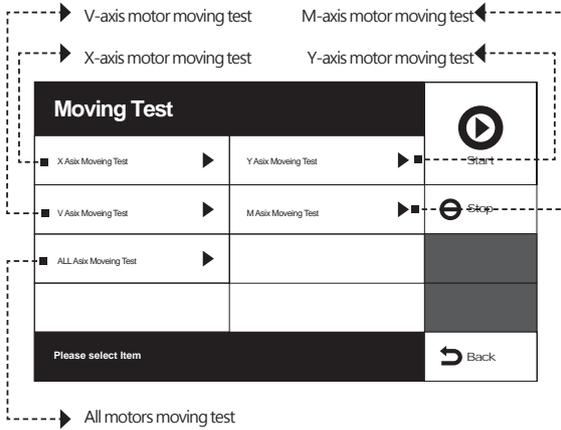
Please test whether the UV lamp can work normally after the replacement is completed.

## Moving test



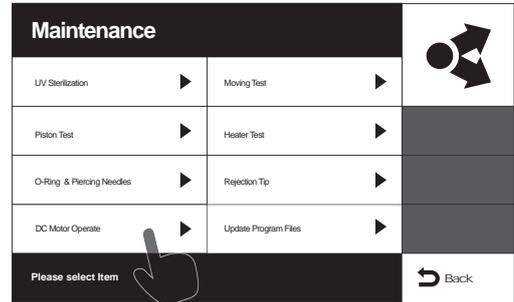
Select Moving Test in the Maintenance menu.

**▼ Next Step**



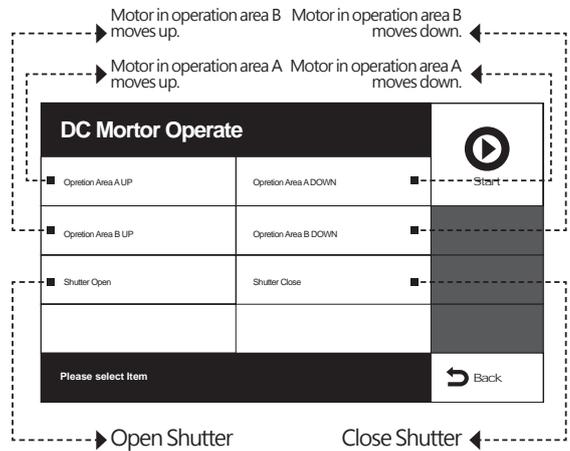
Select the item which you want to test and press Start to begin the test. The motor will run continuously until the user presses Stop.

## Motor elevating operation



Please select DC Motor Operate in the Maintenance menu.

**▼ Next Step**



When the test is stopped, all consumables are in the system, you can use the control interface to manually move the operation area up and down to take out the consumables.

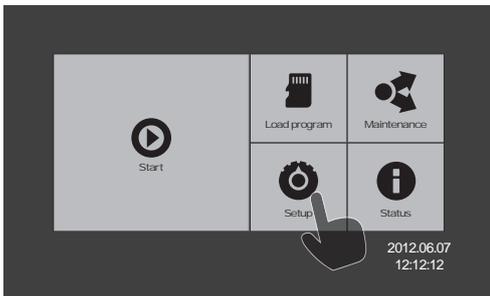
Please refer to the page 7 for the information about area configuration.

Please the area which you want to move and press Start to move the area. The motor will automatically stop when it reaches the top.

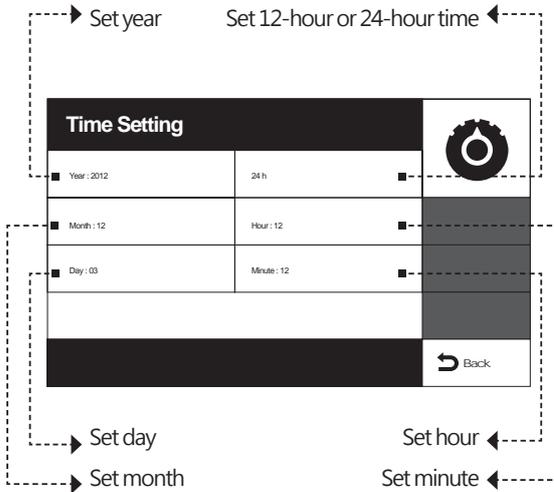


# Settings

You can set the system time in the step.

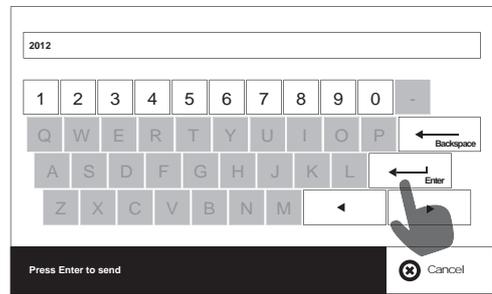


▼ **Next Step**

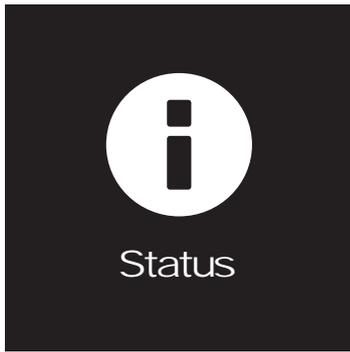


▼ **Next Step**

Please select the item which you want to change.



Please input the setting value and press Enter.

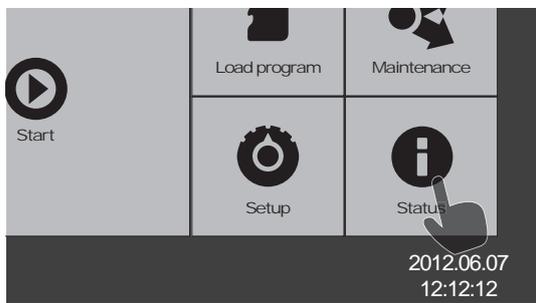


# System Status

System status records the user interface version, electrical control computer version, UV lamp operating time and reset, error history list and exported error history files.

## Export the error history files

You can export the error message about the errors which have occurred in the system via the touch screen to provide the error or malfunction information for the engineers.



Select the Status function in the main menu.

▼ **Next Step**

System time

System date

Reset the operating hours of the UV lamp.

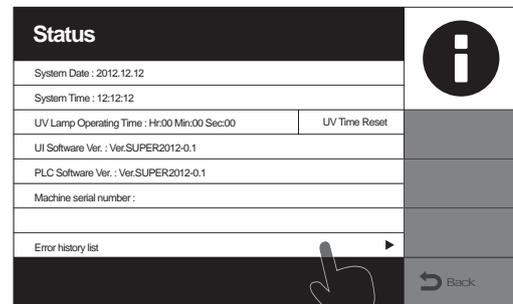
Machine serial number

Export the error history list.

PLC version number

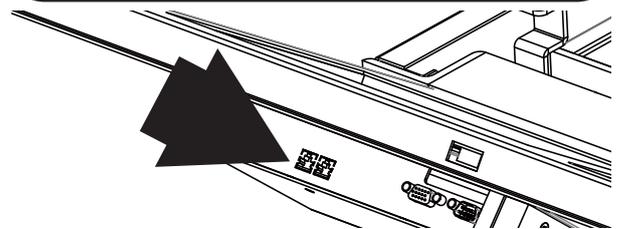
User interface number

UV lamp operating time



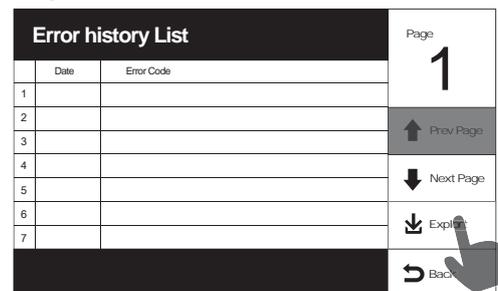
▼ **Next Step**

**Please scan the USB Flash Driver to prevent from virus before insert it.**



Open the door of the viewfinder and insert the USB Flash Driver in the USB slot behind control panel and press Export button to export the data to the USB Flash Driver.

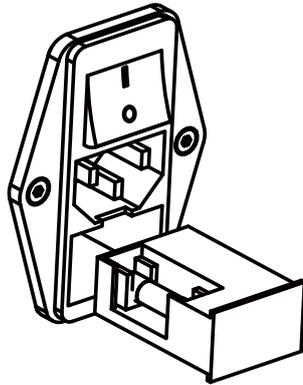
▼ **Next Step**



After the data are saved, the system will generate a .csv file in the USB Flash Driver. You can open the file with Excel software. If the engineers need the files to find out the error or malfunction which occurred in the system, you can export them for the engineers to fix the malfunctions.

# Others

## Replace fuse



250V 5A



Only specific fuses can be used in the machine. If you use the fuses with higher amperage, the machine may be burned.

Turn off the power and disconnect the power plug. Then detach the fuse base with a flathead screw driver and replace the old fuse with a new one.

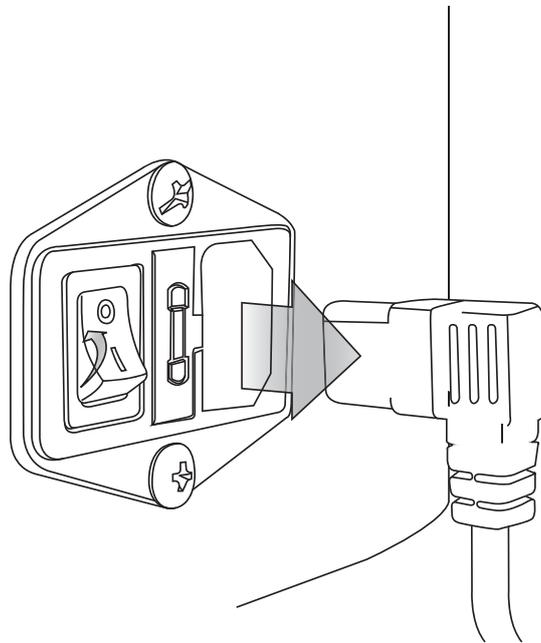
After the replacement of the fuse is finished, please plug in the power plug and turn on the power.

If the fuse is burned repeatedly, please disconnect the power plug right away and contact the local distributor to deal with the problem.



**Caution!**

**Turn off the power and remove power socket  
Before processing advanced maintenance !**



**Caution!**

**All advanced maintenance must be performed  
by trained Engineers!**



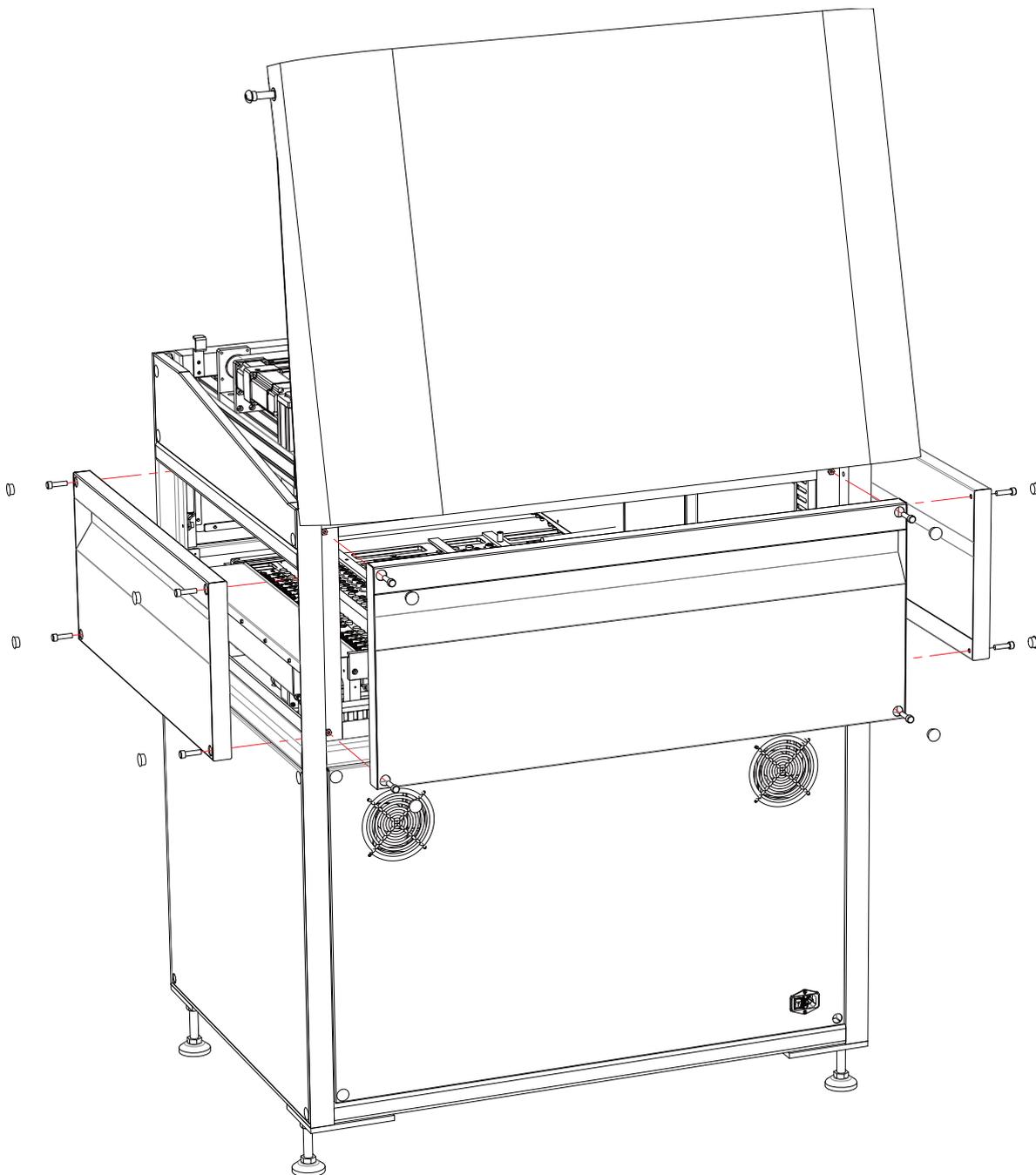
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## Advanced maintenance

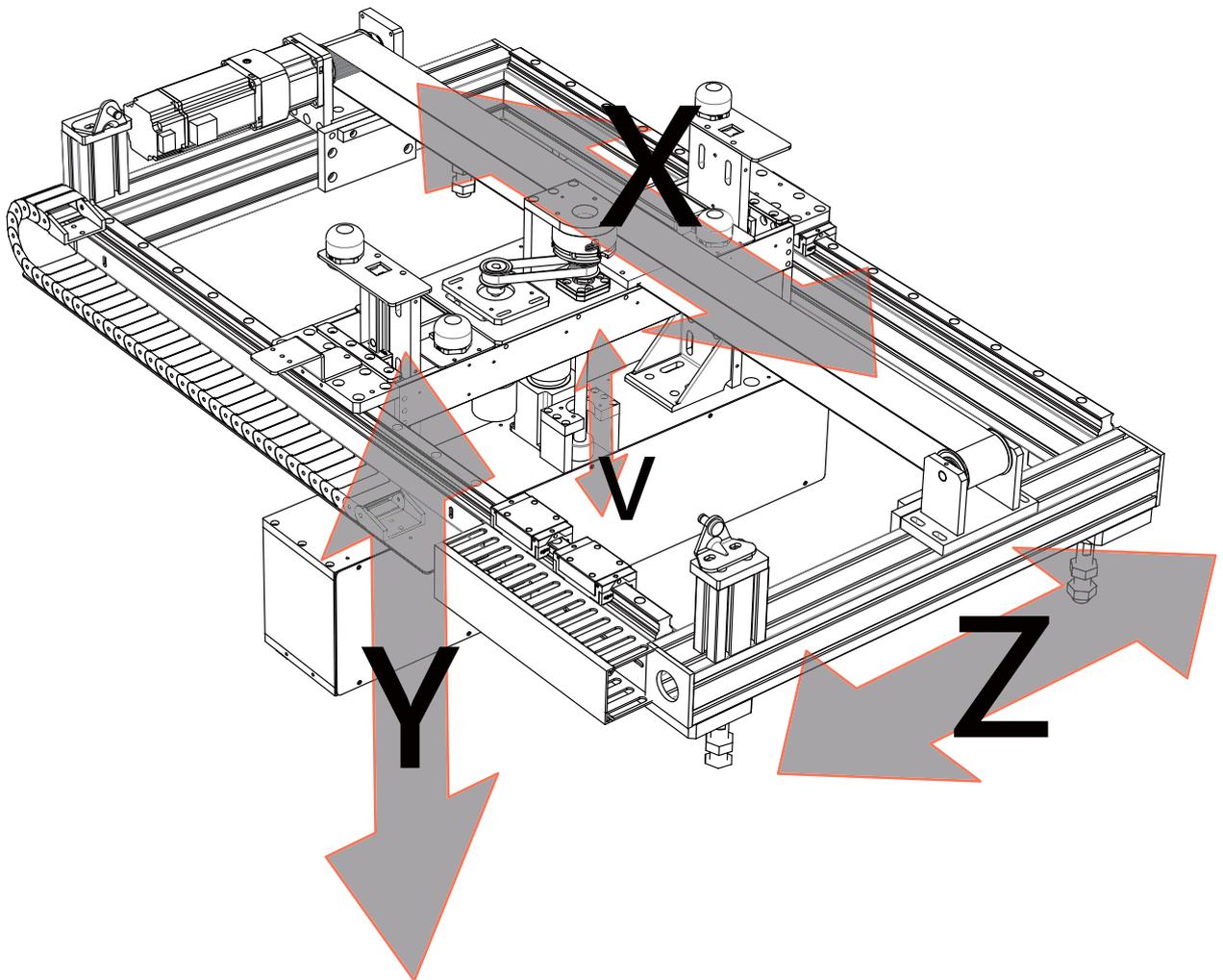
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Advanced maintenance includes key-point maintenance, component replacement and advanced machine calibration. Only trained engineers can perform the above operations.

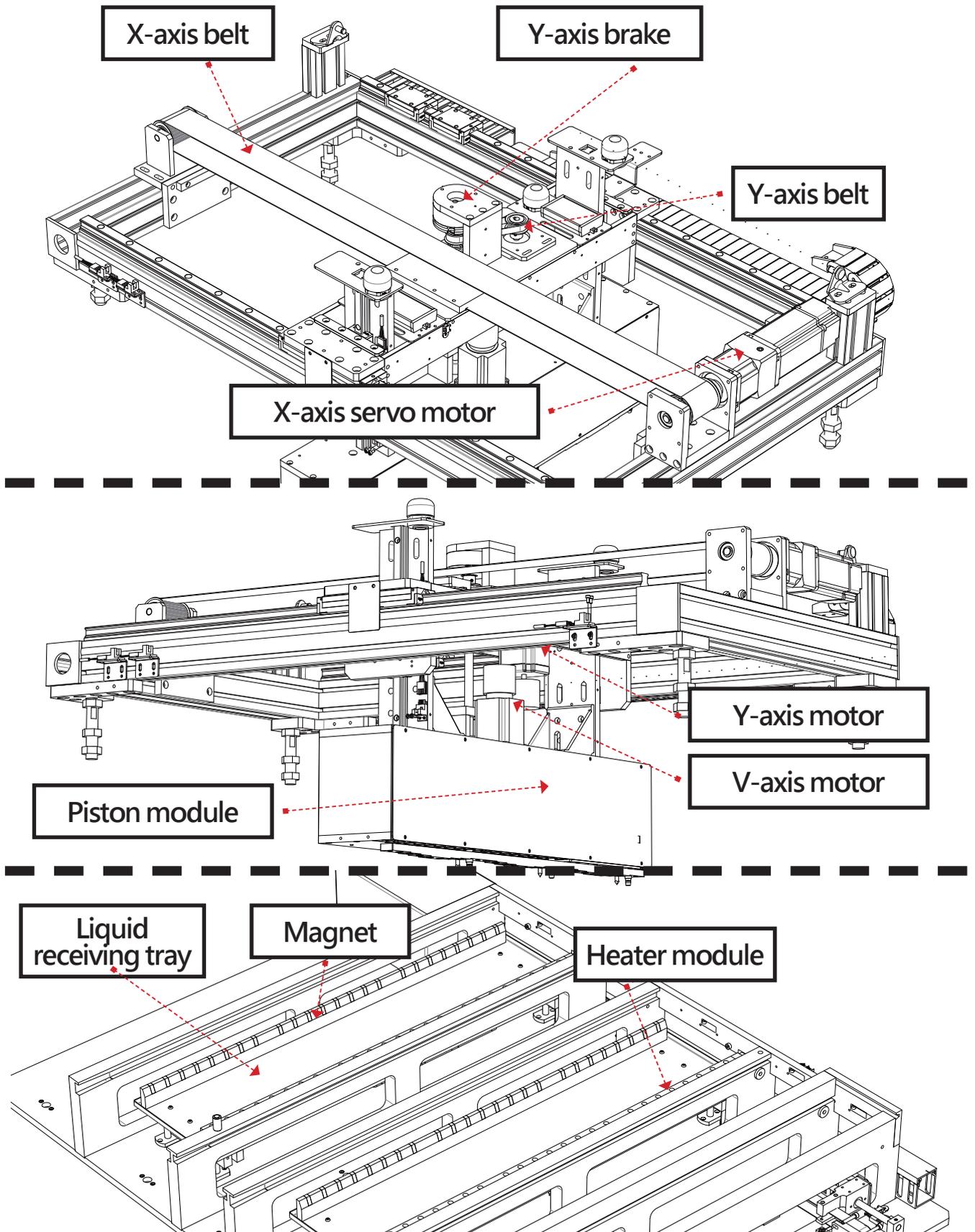
# Open the maintenance board



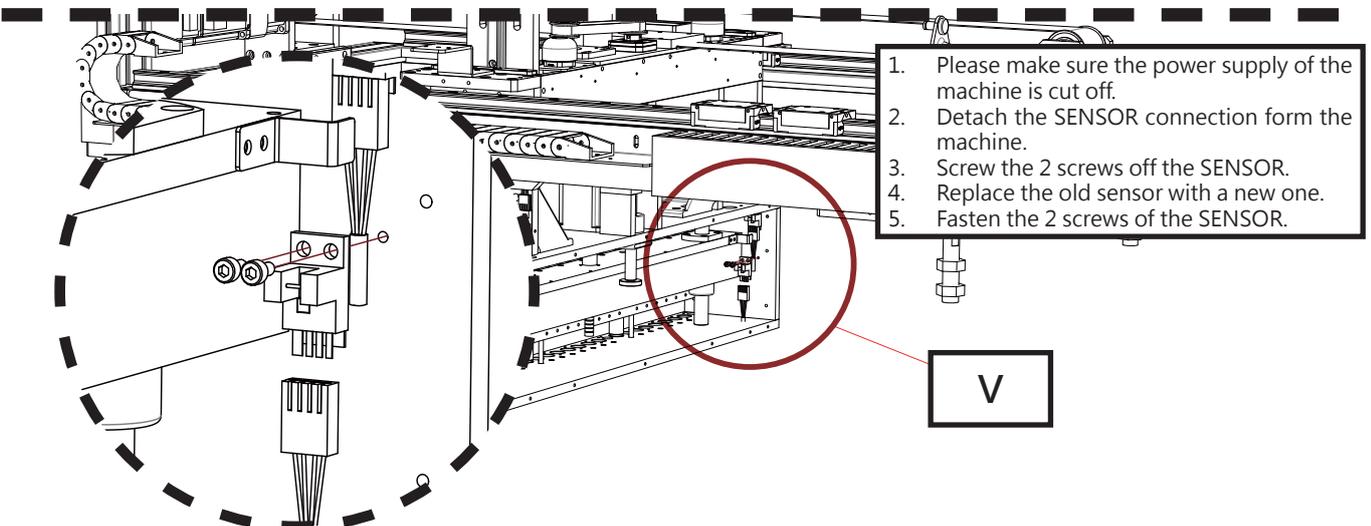
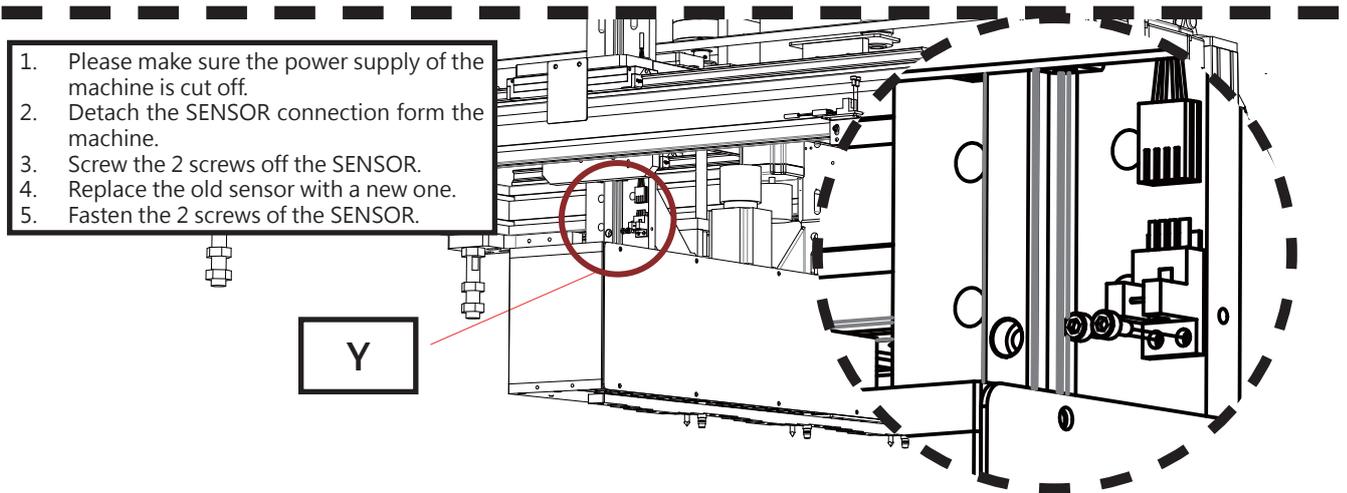
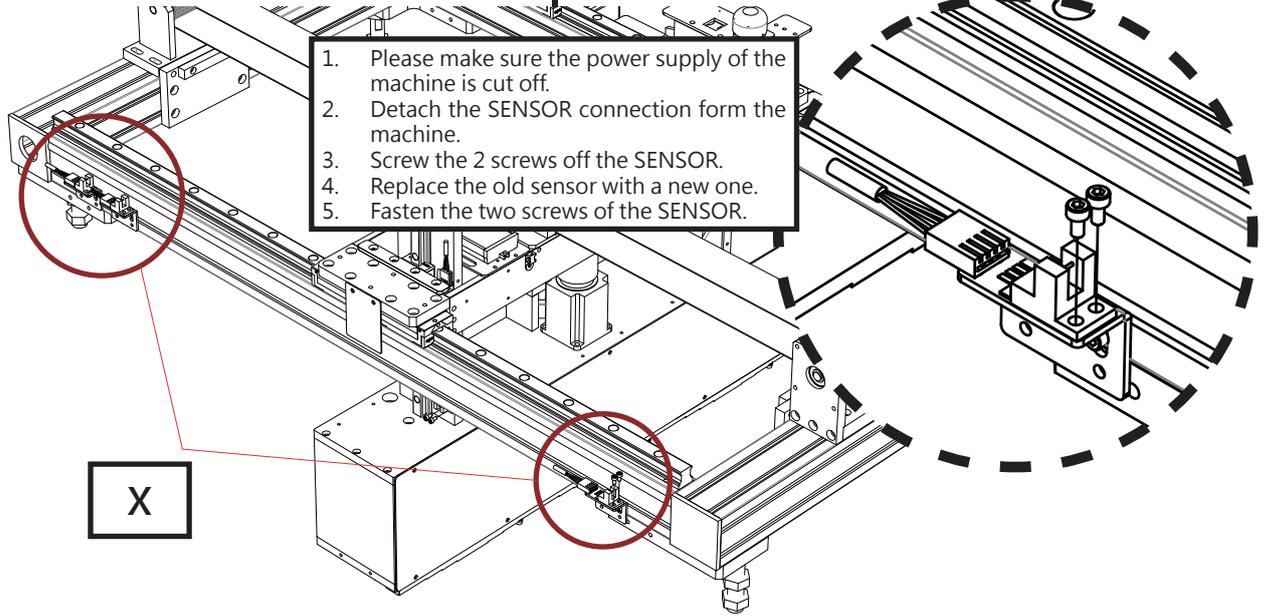
# Axis directions

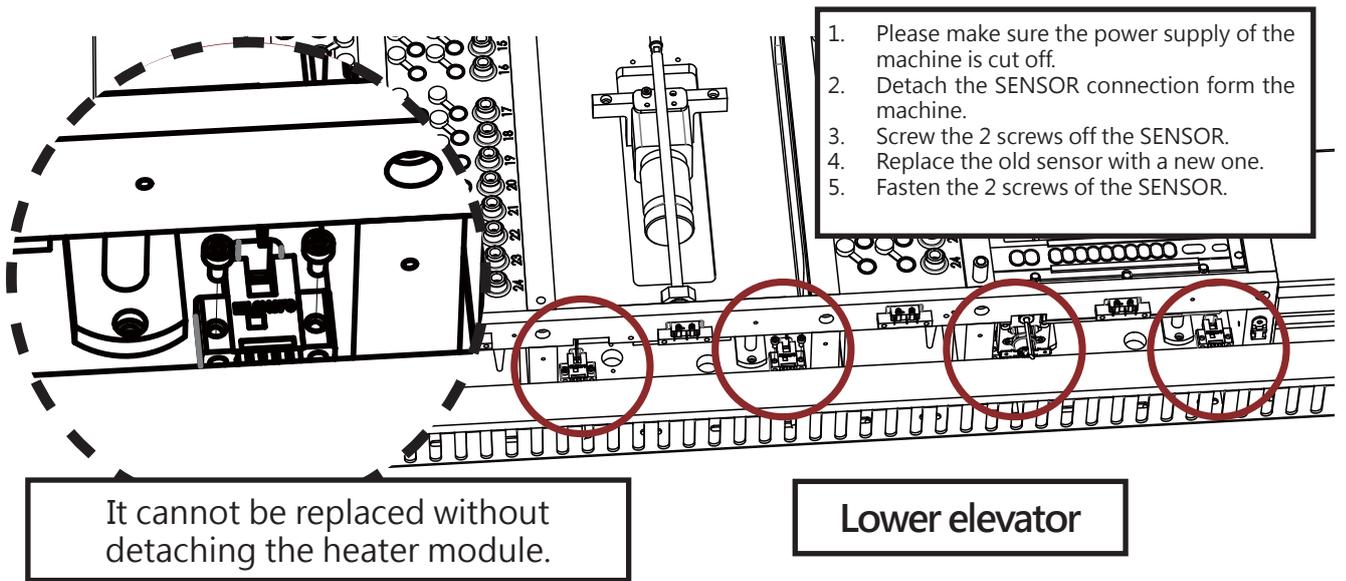


# Main component



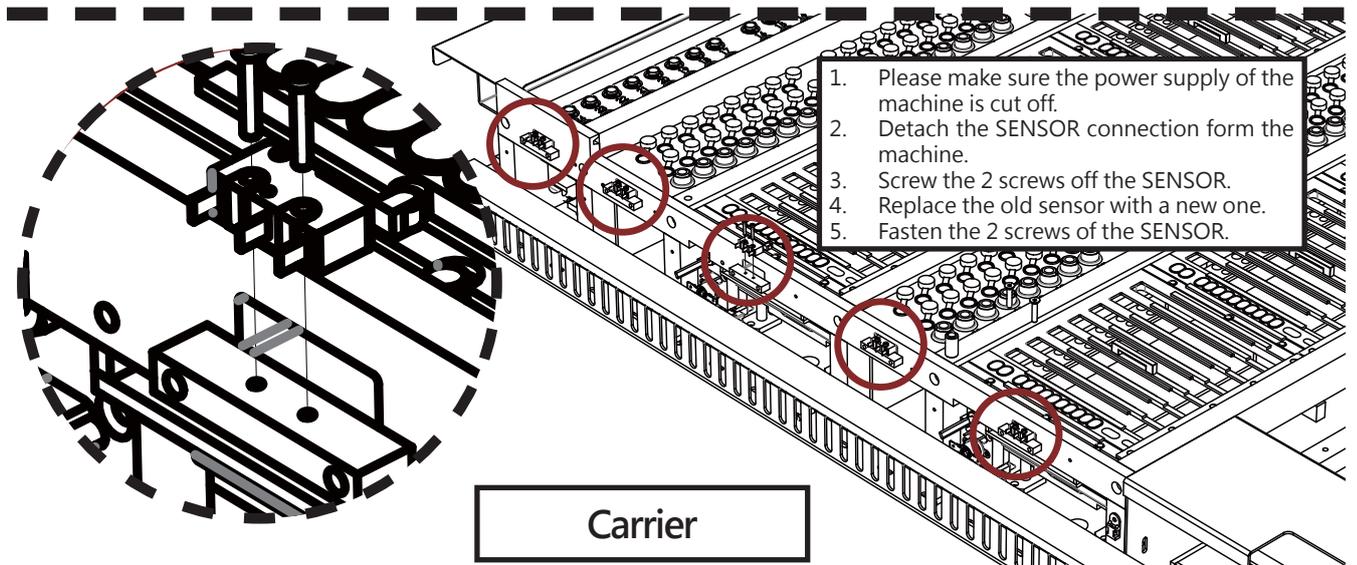
# Sensor distribution and replacement



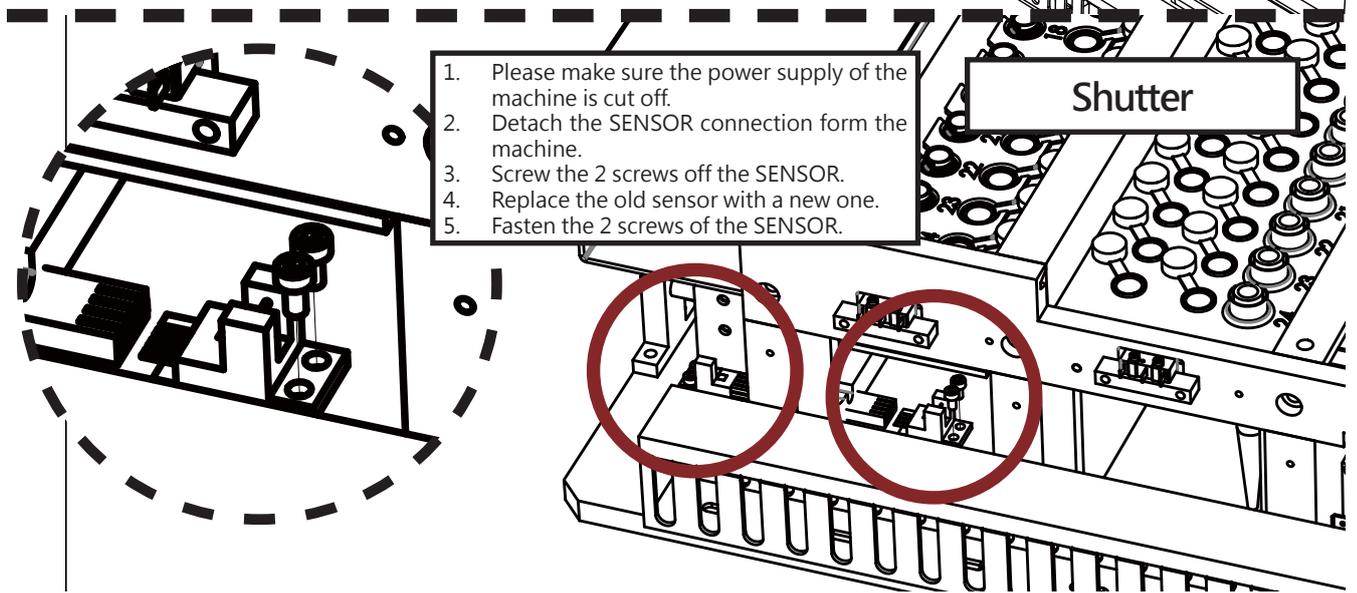


It cannot be replaced without detaching the heater module.

Lower elevator



Carrier



Shutter

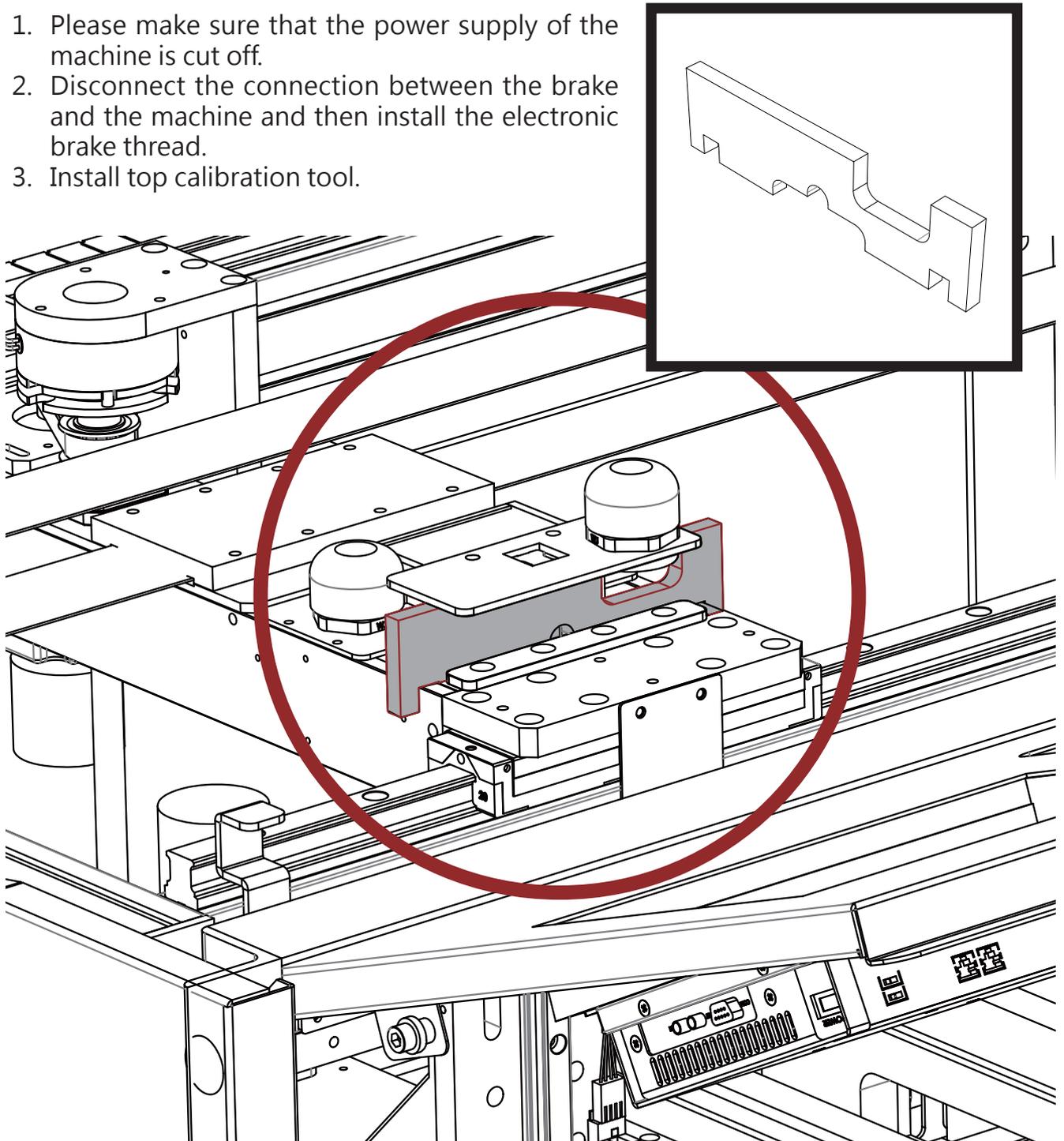
## Test home value

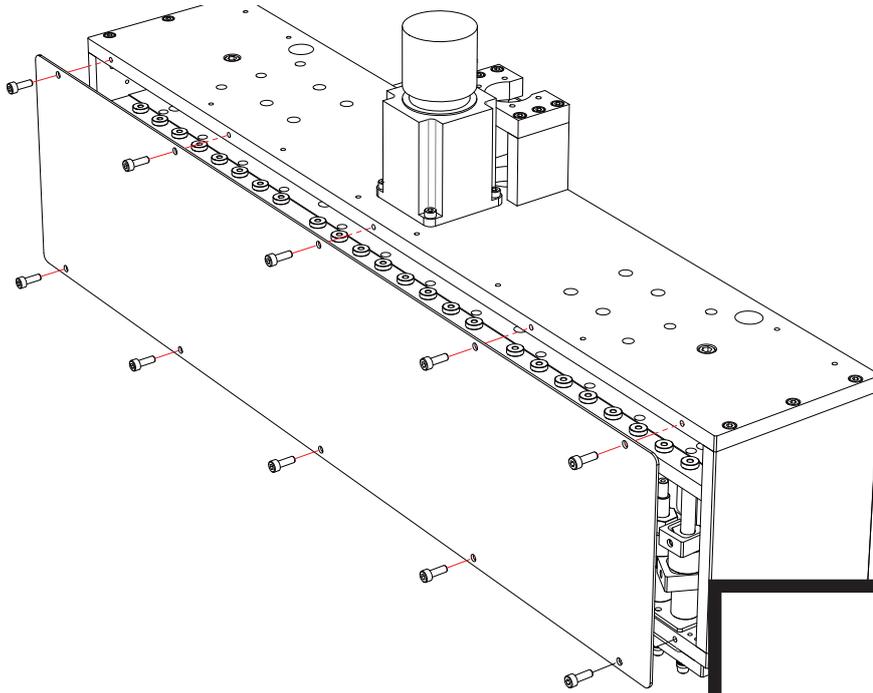
Please perform the operation according to the steps in the chapter-test home value.

### Measure the interval between Y axis and costal plate

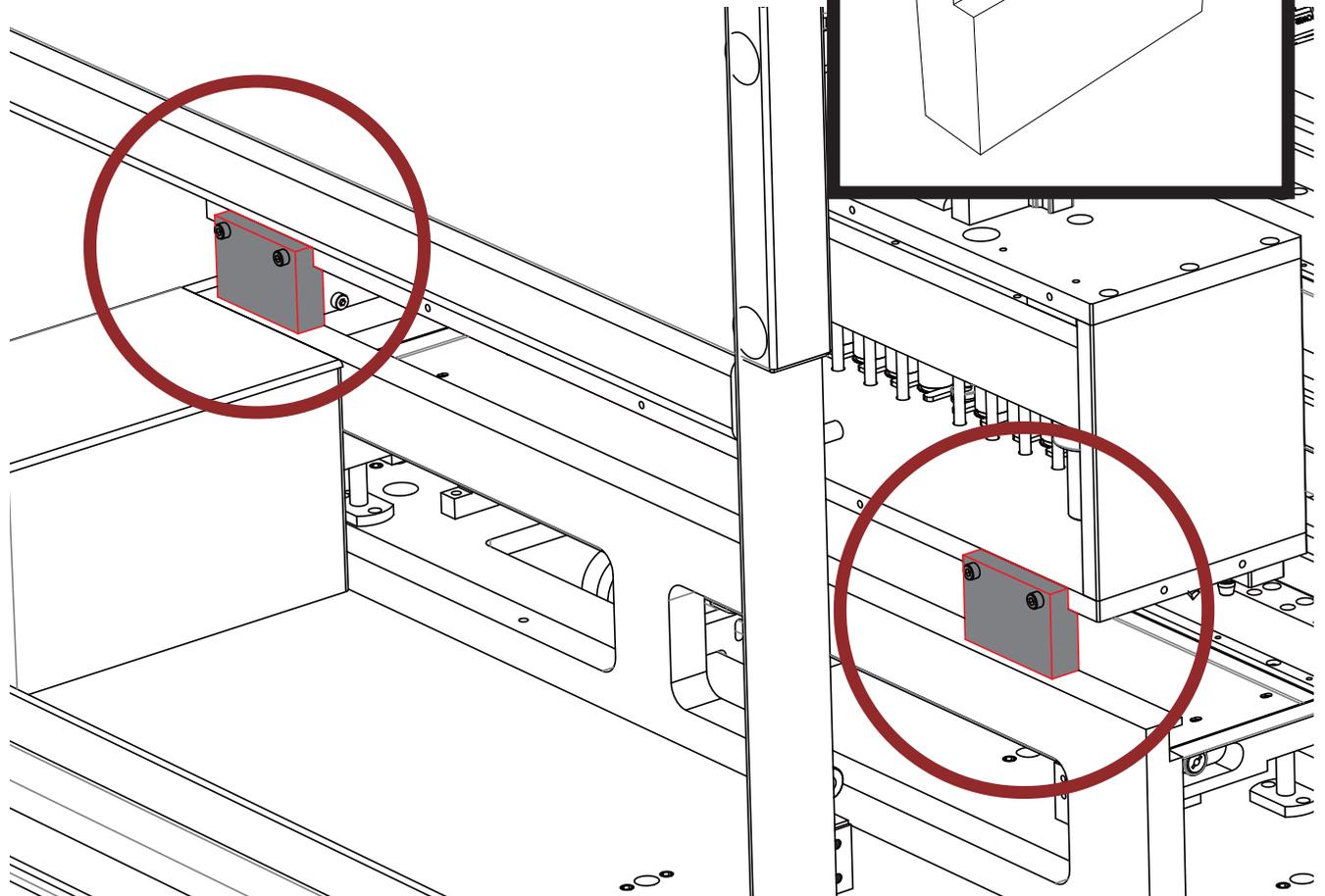
After the installation of the machine is completed, it is necessary to make sure whether or not the machine conforms to the factory document if you want to perform advanced maintenance calibration or there is vibration or collision during shipping.

1. Please make sure that the power supply of the machine is cut off.
2. Disconnect the connection between the brake and the machine and then install the electronic brake thread.
3. Install top calibration tool.

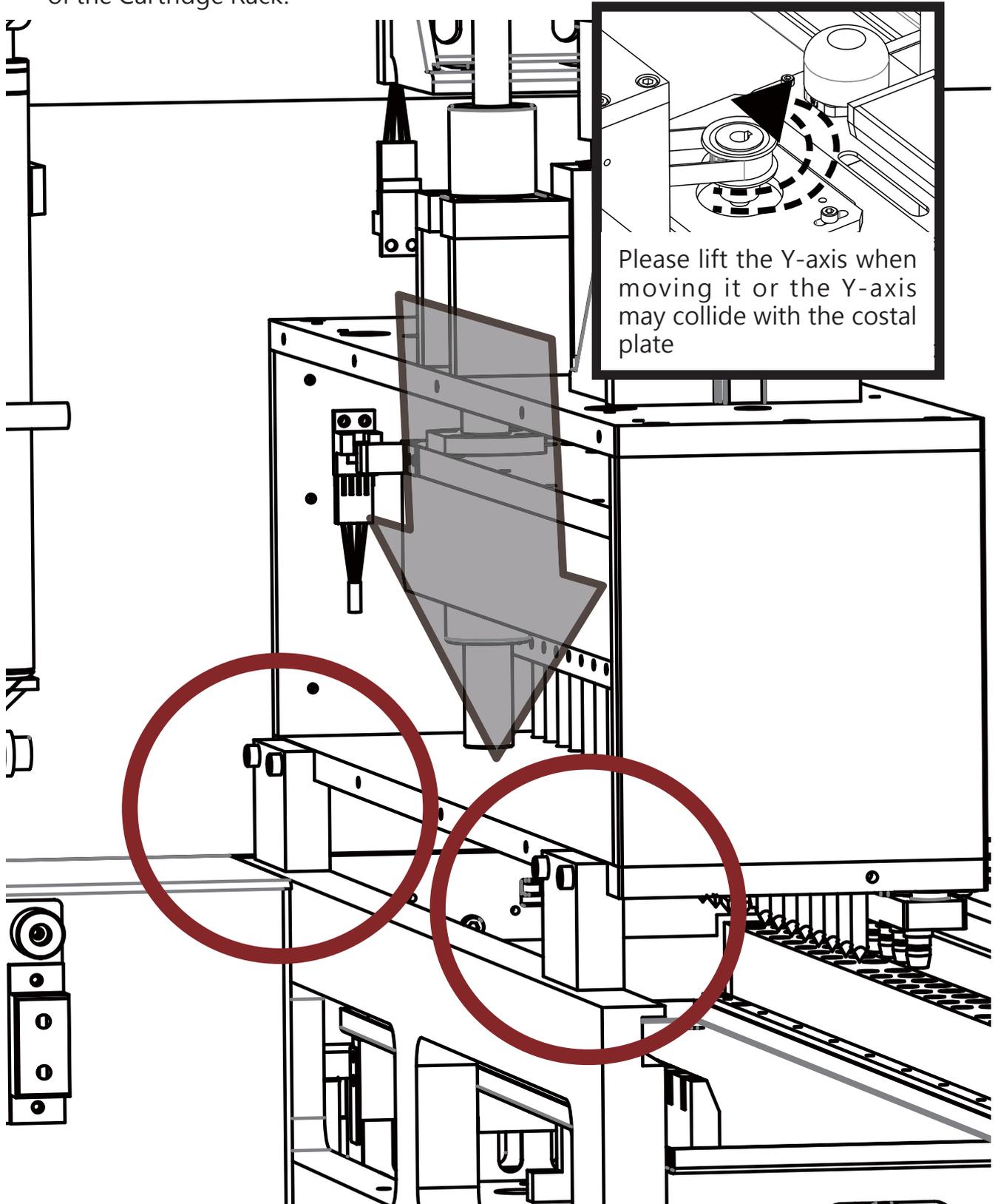




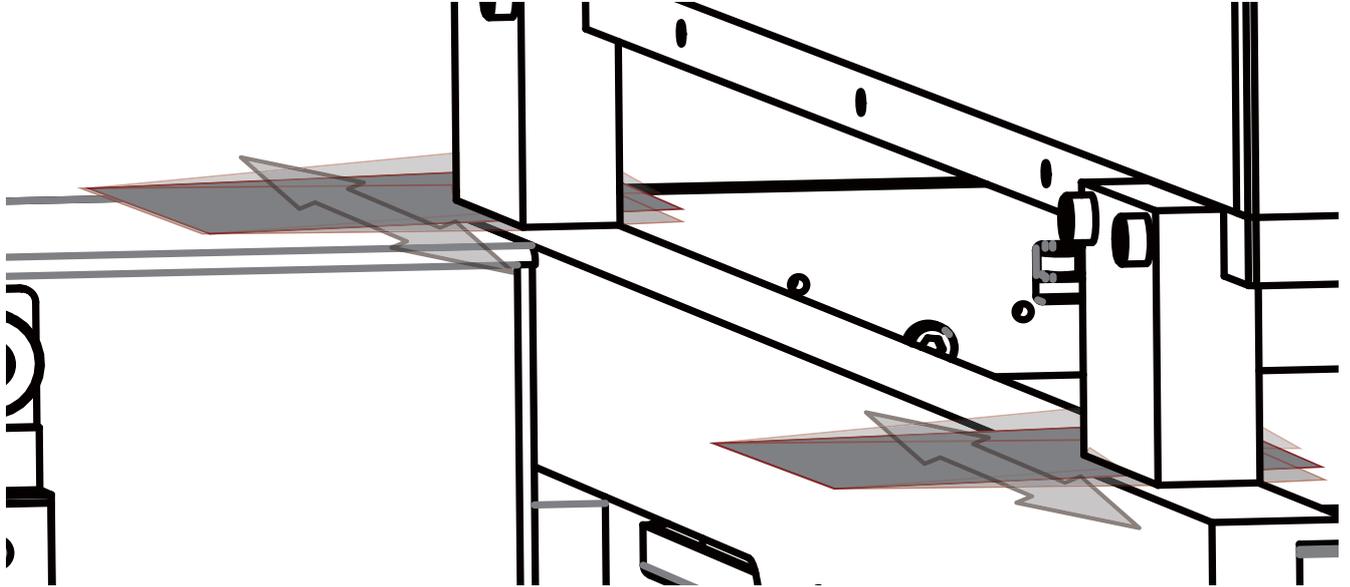
4. Screw the 10 screws off the side mask of the Piston module (hex wrench 2.5mm) and detach the side mask from the machine.



5. Use the screws of the side mask to fix two X-axis calibration tools on the two outer sides of the Piston module.
6. Move X-axis calibration tools to the top of the Cartridge Rack of the operation area A and lower the Y-axis until the Y-axis calibration tool leans against the costal plate of the Cartridge Rack.



7. Use a thickness gauge to measure the interval between the costal plate of the Cartridge Rack and the X-axis calibration tools, where the interval should lower than 0.2mm (try 0.1 mm thickness first and then try 0.2mm thickness). The interval needed by the operation area B is the same as the operation area A; please repeat the step 7 to measure the interval in the operation area B.



## Adjust the interval between Y axis and costal plate.

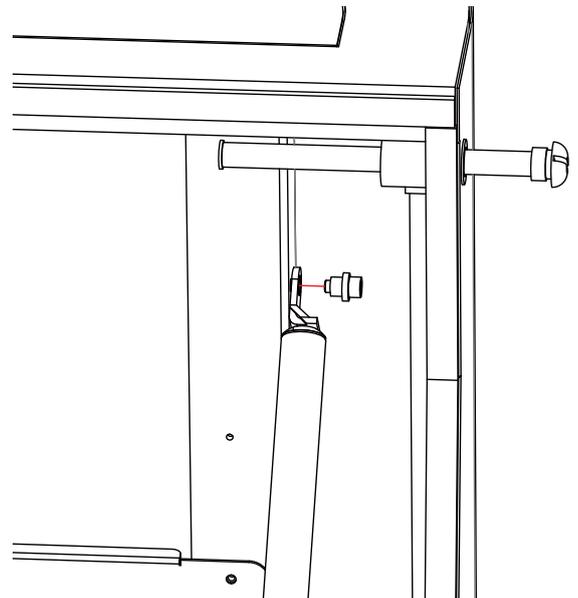
If the tolerance range is exceeded, please adjust it according to the following steps.

1. Support the top cover from its back.
2. Screw the top screws of the two nitrogen cylinders and detach them from the top cover.

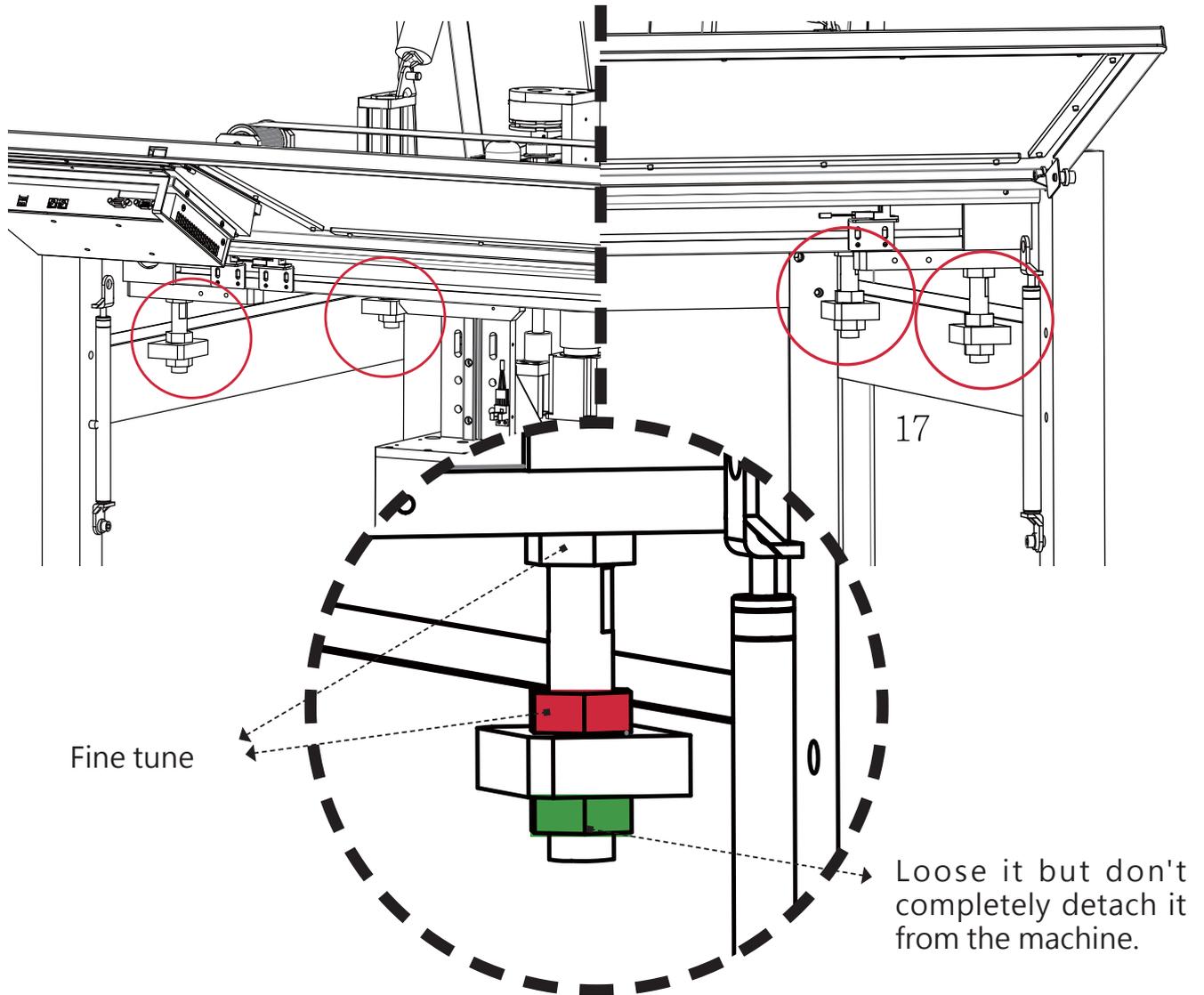
### **Caution!**



The top cover is very heavy. It may need many persons to perform the step. Please handle the top cover with care or the top cover buckles may break and people may get hurt.



3. Please use 30mm wrench to slightly loose the horizontal bolts and adjust the top screws (Please fine tune them, you can use a rubber hammer to lightly beat the monkey wrench) and repeatedly measure it until it conforms to the tolerance range. Then, please fasten the screws. Please use 30mm wrench to slightly loose the horizontal bolts and adjust the top screws (Please fine tune them).



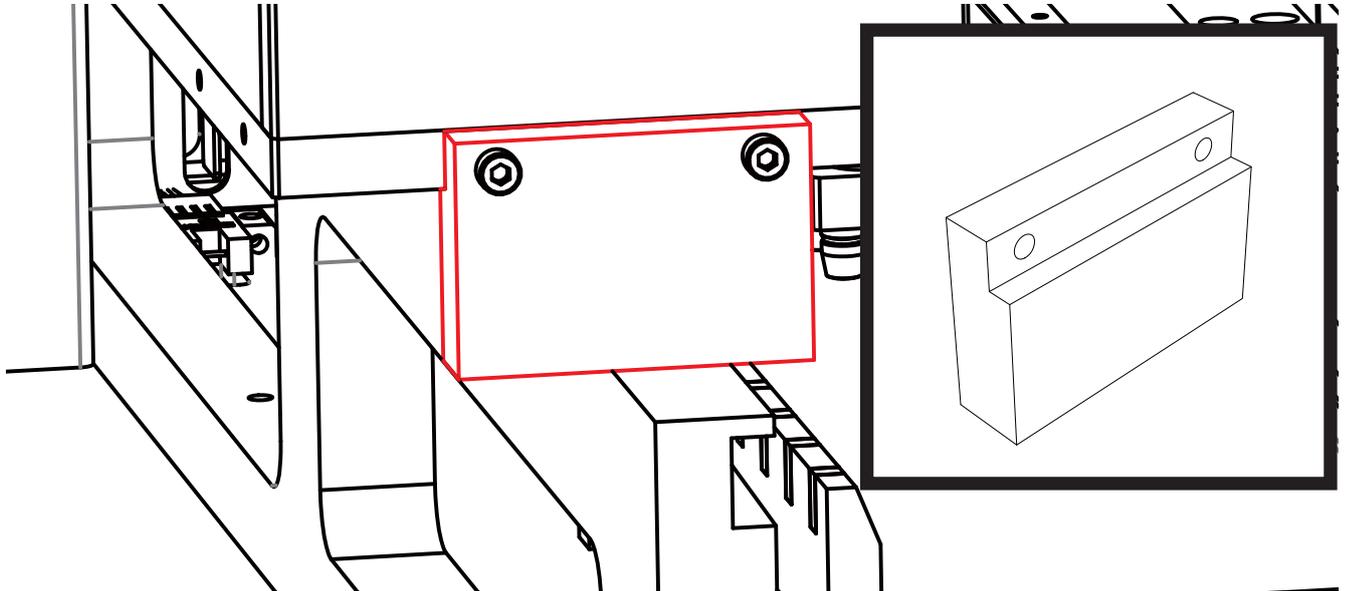
### **Caution!**



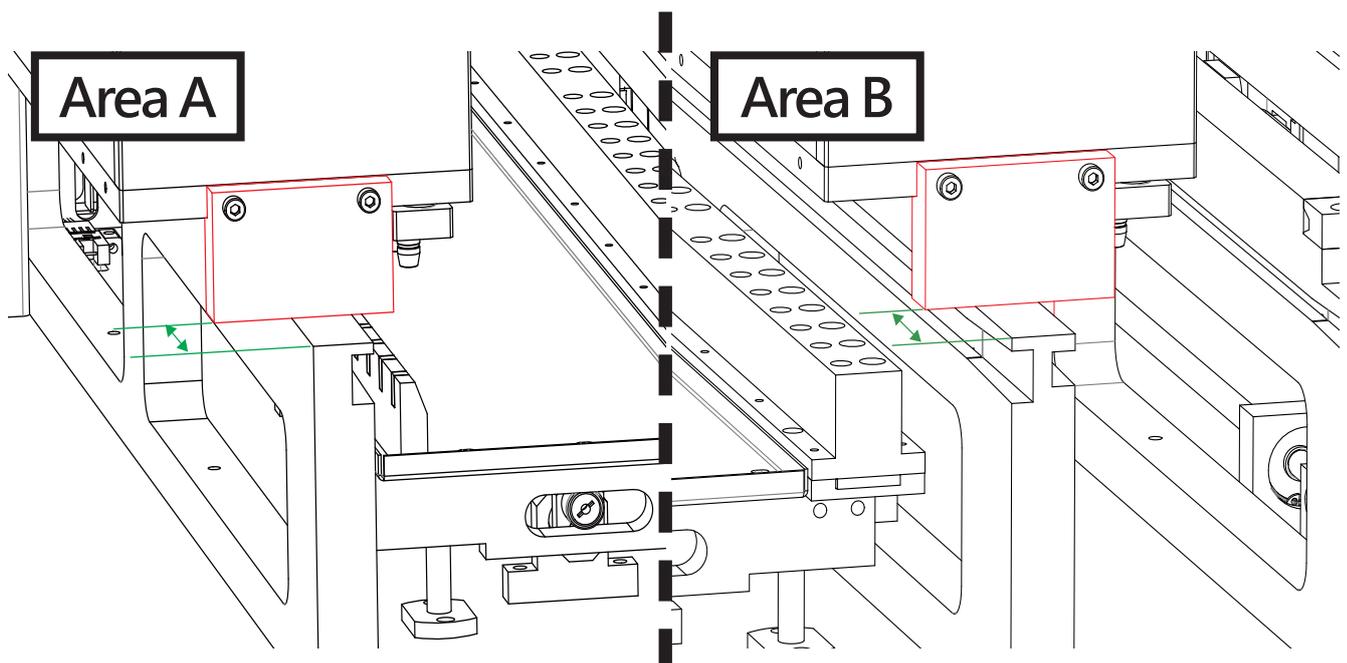
Generally speaking, it is not necessary to adjust the item unless the machine suffered serious collision, toppling, inappropriate disassembly and the like. Of course, we cannot ensure that the accuracy of the machine can be completely recovered via fine tuning the machine after serious collision.

## Measure the level height of X-axis and costal plates at operating area A and operating area B

1. Fasten the X-axis calibration tool at the front side of the Piston module with the screws of the mask.

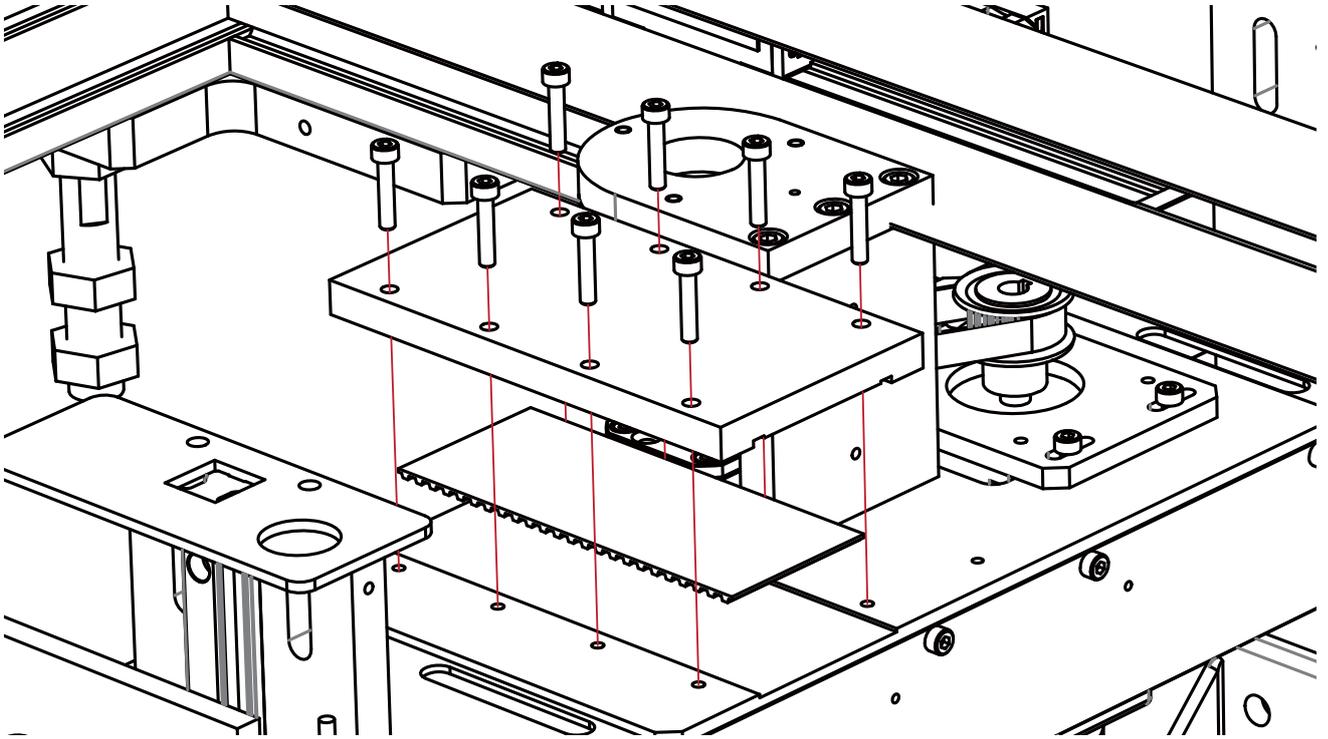


2. Move the X-axis calibration tool to the edge of the costal plate of the Cartridge Rack of the operating area A and measure the distance between the front edge of the costal plate and the Z-axis calibration tool by an electronic caliper with 0.01 accuracy and record it. Then move the X-axis calibration tool to the edge of the costal plate of the Cartridge Rack of the operating area B and measure the distance between the front edge of the costal plate and the Z-axis calibration tool by the electronic caliper with 0.01 accuracy. Next, make sure the error range between the two measured values is within  $\pm 0.2\text{mm}$ . If tolerance takes place, please adjust it according the next chapter.

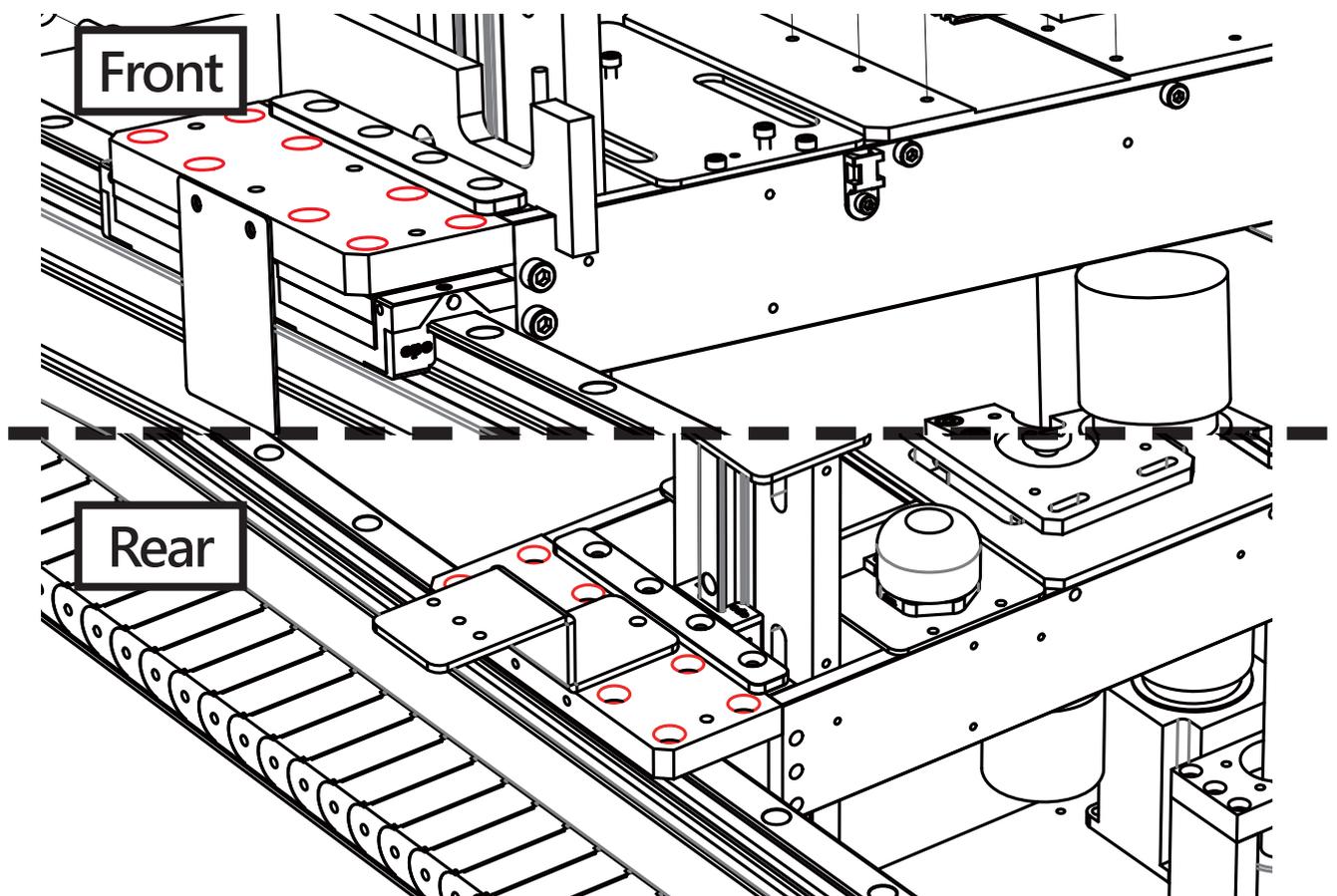


# Horizontally adjust X-axis to make the tolerance lower than 1mm

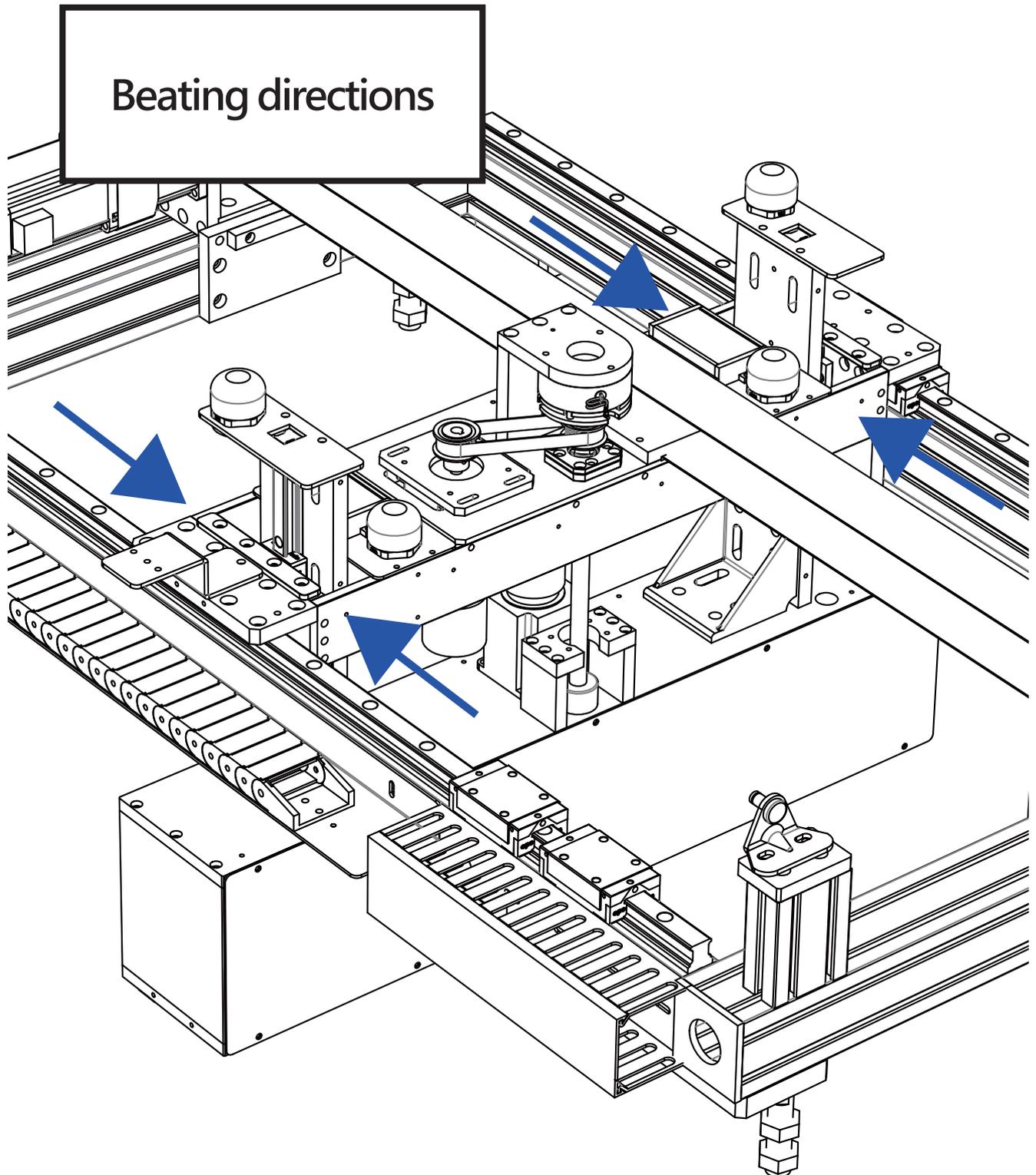
1. Loose the belt fastening board.



2. Use a hex wrench to loose the 8 adjustment screws at the top of the Piston module (totally 16 screws at the front side and the rear side).



3. Use a rubber hammer to lightly beat and adjust it and measure the tolerance range until the tolerance range is lower than 1mm or the both sides are equal to each other.



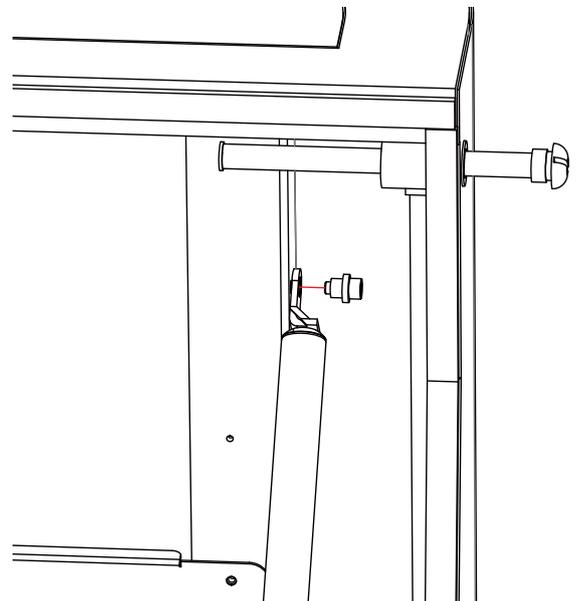
## Horizontally adjust X-axis to make the tolerance higher than 1mm

If the tolerance range is exceeded, please adjust it according to the following steps.

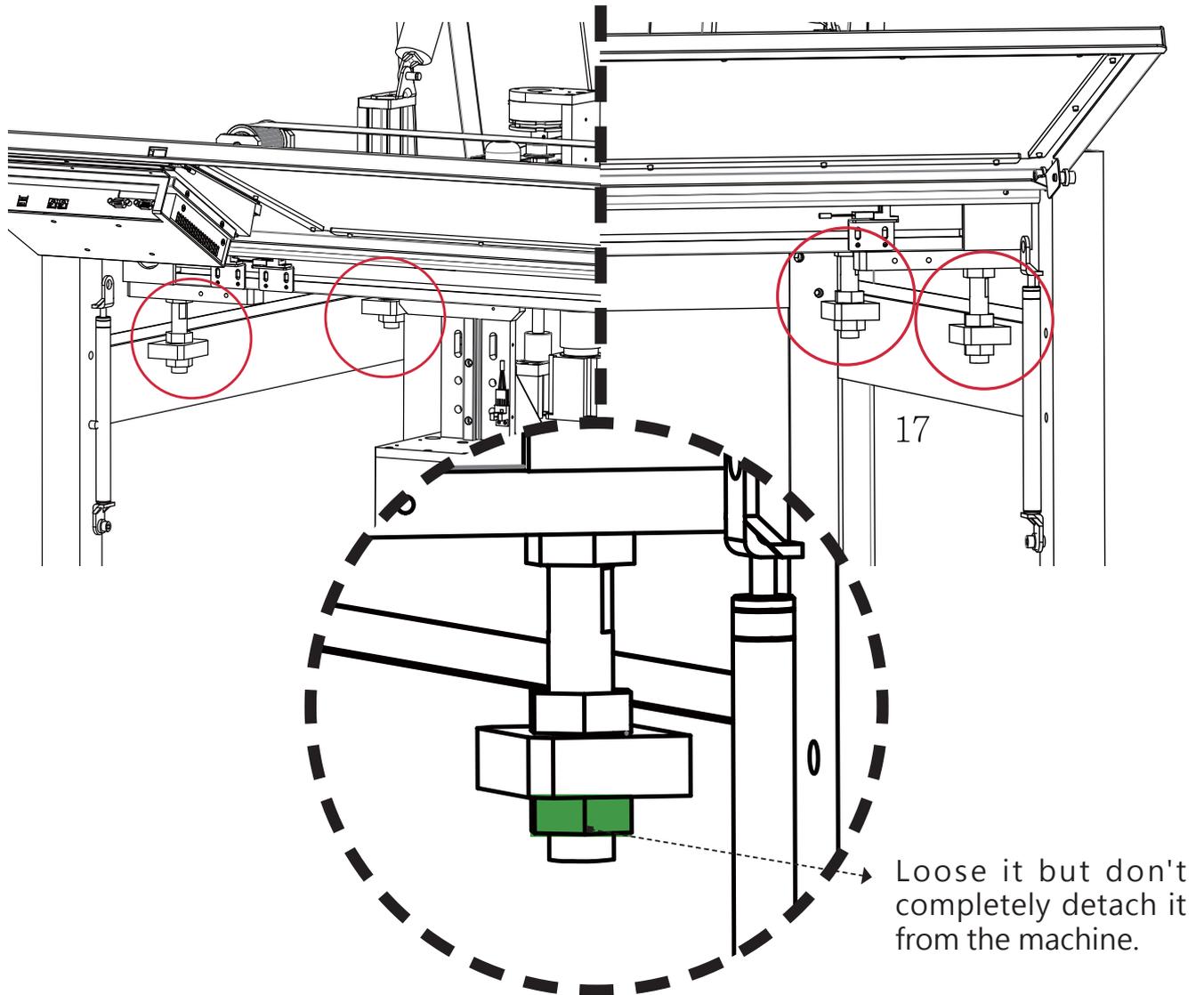
1. Support the top cover from its back.
2. Screw the top screws of the two nitrogen cylinders and detach them from the top cover.

### **Caution!**

The top cover is very heavy. It may need many persons to perform the step. Please handle the top cover with care or the top cover buckles may break and people may get hurt.



- Use a 30mm wrench to slightly loose the horizontal adjustment screws.

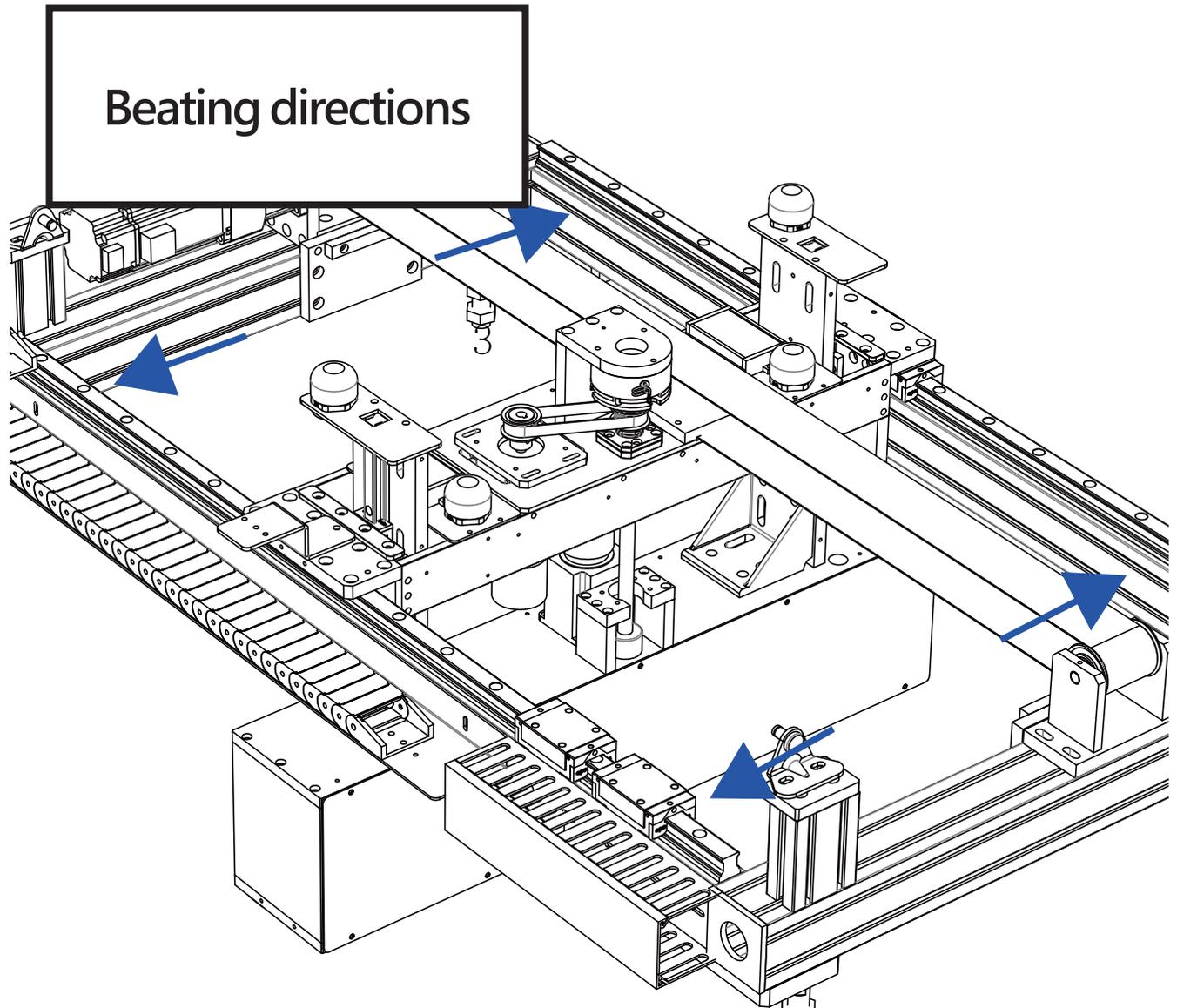


### **Caution!**



Generally speaking, it is not necessary to adjust the item unless the machine suffered serious collision, toppling, inappropriate disassembly and the like. Of course, we cannot ensure that the accuracy of the machine can be completely recovered via fine tuning the machine after serious collision.

4. Use a rubber hammer to lightly beat and adjust it and measure the tolerance range until the tolerance range is lower than 1mm or the both sides are equal to each other. After the tolerance range is determined, please fasten the screws.

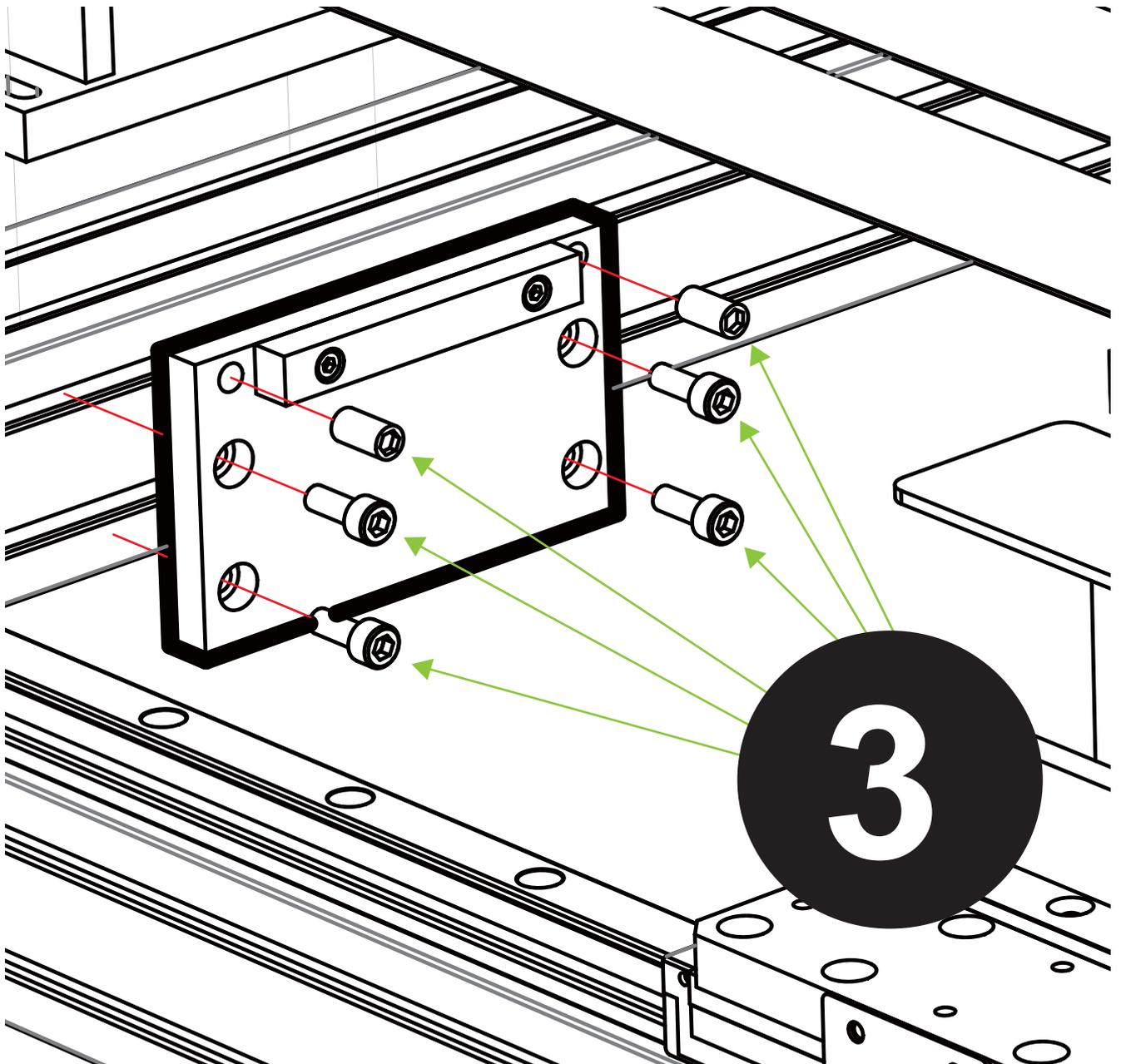


5. If the adjustment is finished, please test it according to the steps in "Test home value" and write in the fine tune values in programs. (Please refer to "Engineering software" → "Home reading" for more information)

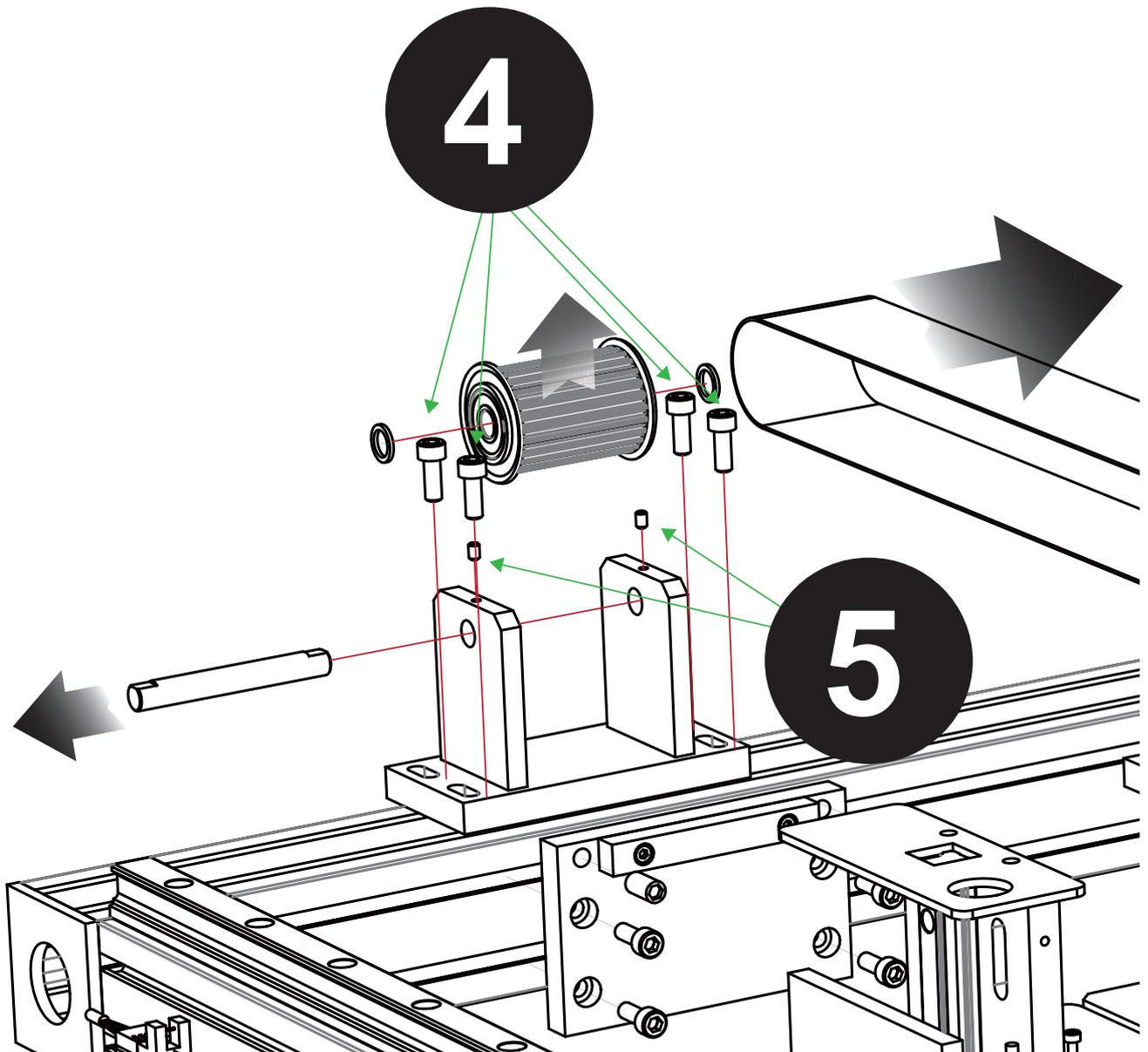
## Replace components

### Replace X-axis servo motor belt

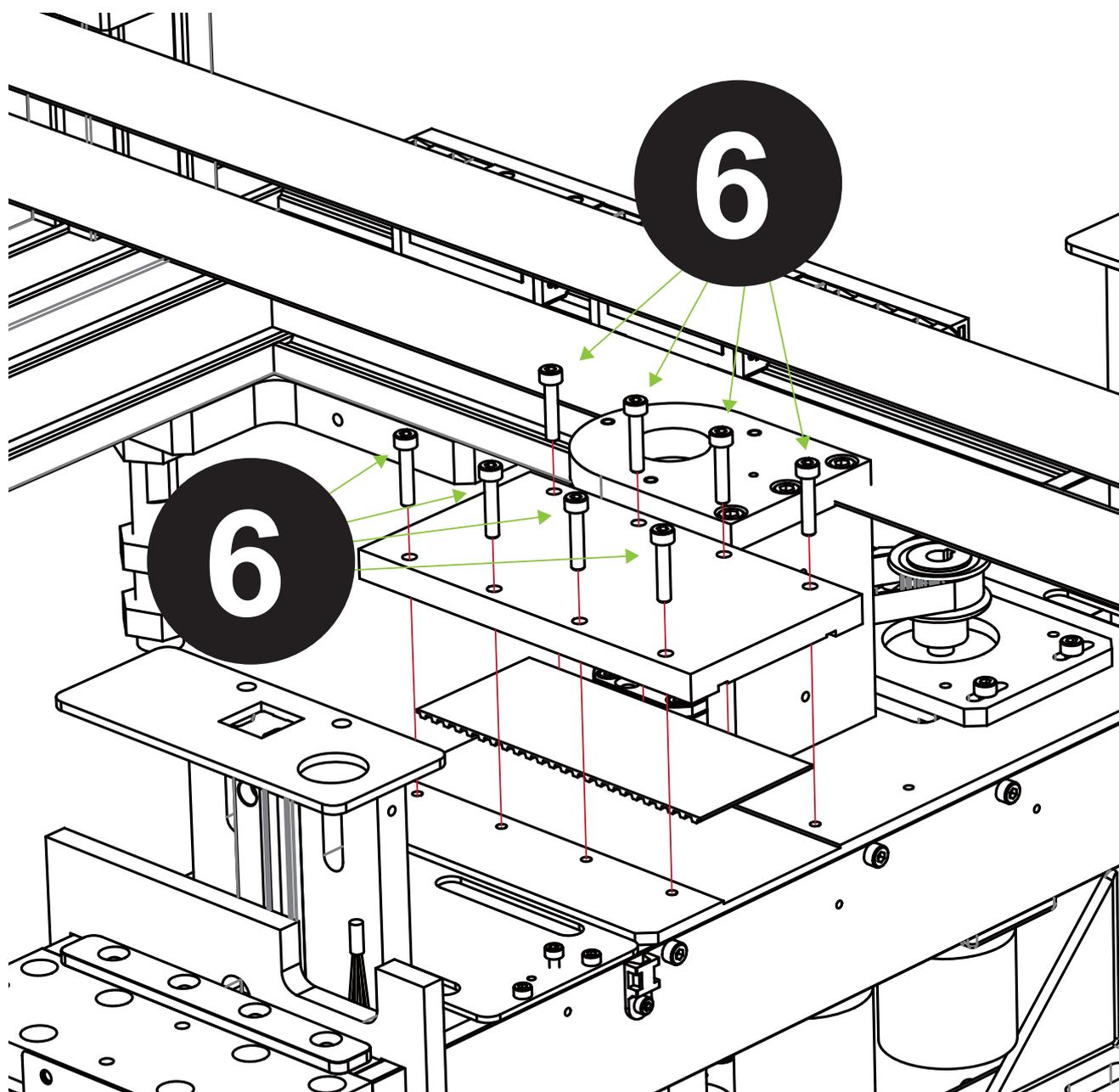
1. Please make sure the power supply of the machine is cut off.
2. Disconnect the X-axis servo motor connection and the SENSOR connection.
3. Detach the X-axis belt. Screw off the 4 screws (5mm hex wrench) of the front barrier ship of the driving wheel and the 2 pushing screws (6mm hex wrench).



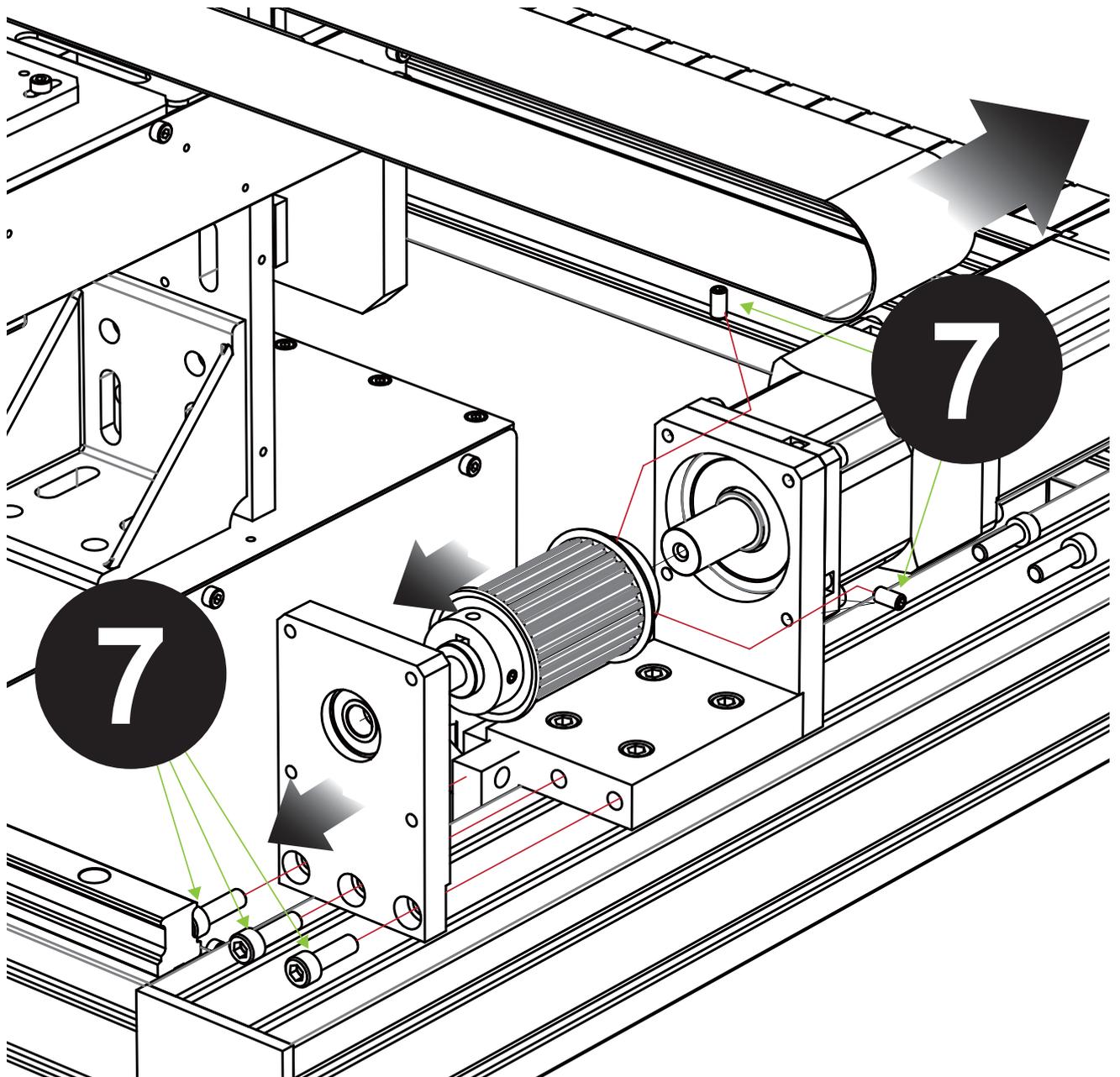
4. Screw off the X-axis from the 4 screws (5mm hex wrench) of the base of the driving wheel.
5. Screw off the X-axis from the 2 screws (2.5 mm hex wrench) of the axle core of the driving wheel and take them from the axle core of the driving wheel (the axle bearings are not limited to the direction but the pads should be toward to inner side).



6. Screw off the 8 screws (3mm hex wrench) of the fixing plate of the X-axis belt.

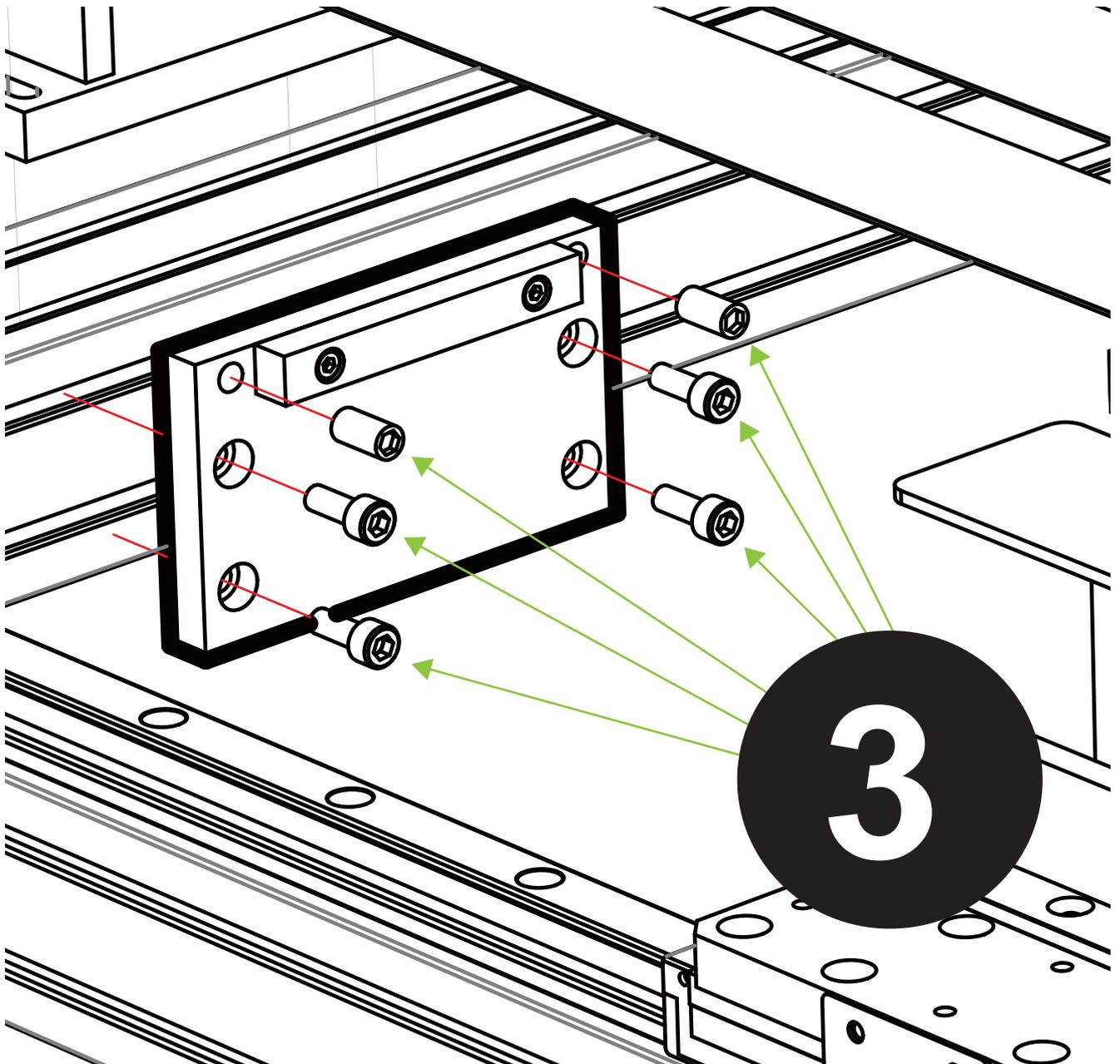


7. Screw off the 3 screws (5mm hex wrench) of the side barrier ship of the X-axis timing wheel and the 2 fixing screws (2.5mm hex wrench) above the timing wheel and then detach the X-axis belt and the timing wheel from the axle core of the motor.
8. Replace the old belt with a new one.
9. Fasten the belt fixing ship and the new X-axis belt.
10. Attach two gears on the both sides of the X-axis.
11. The replacement of the X-axis servo motor belt is finished.

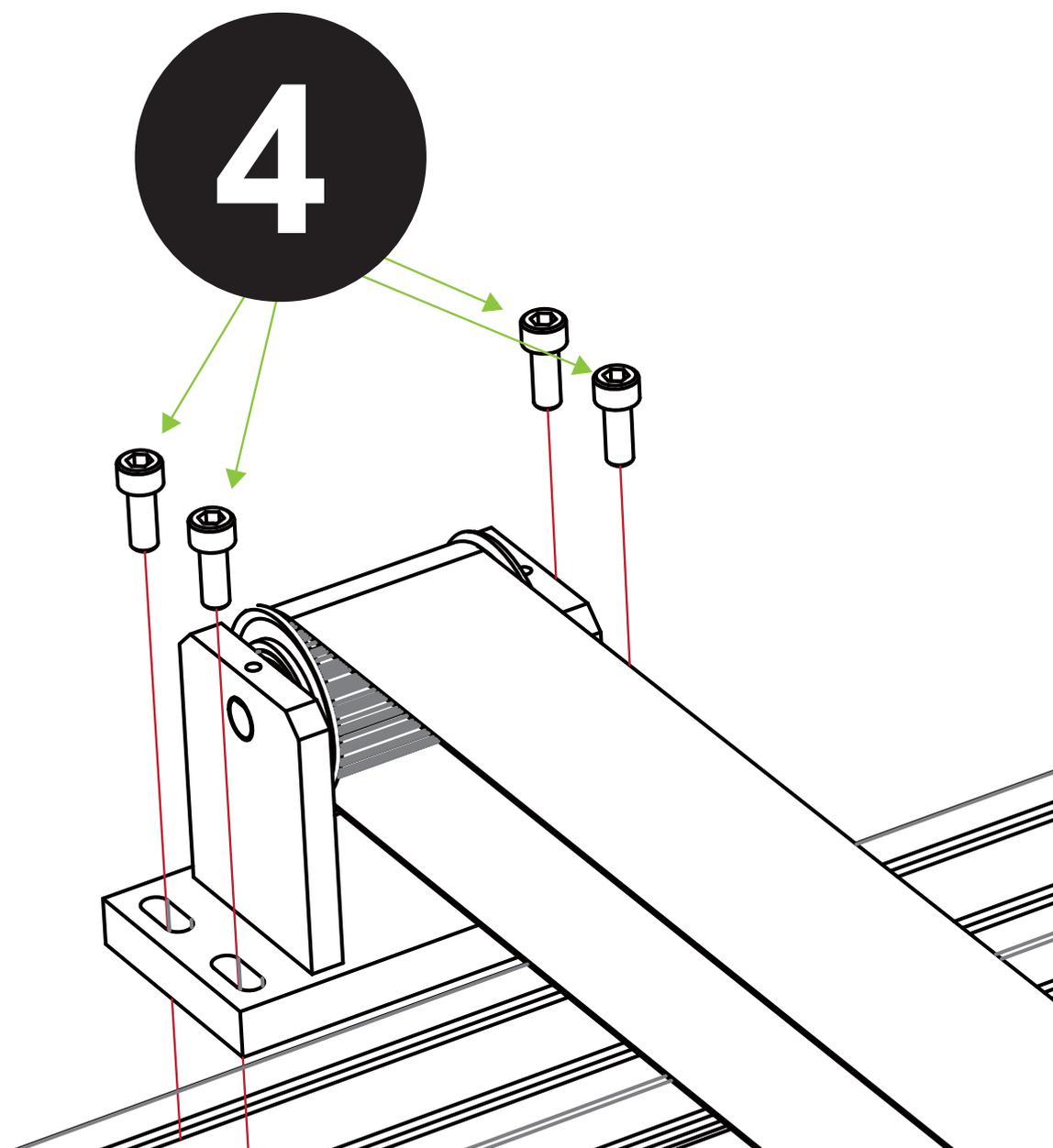


## Replace X-axis servo motor

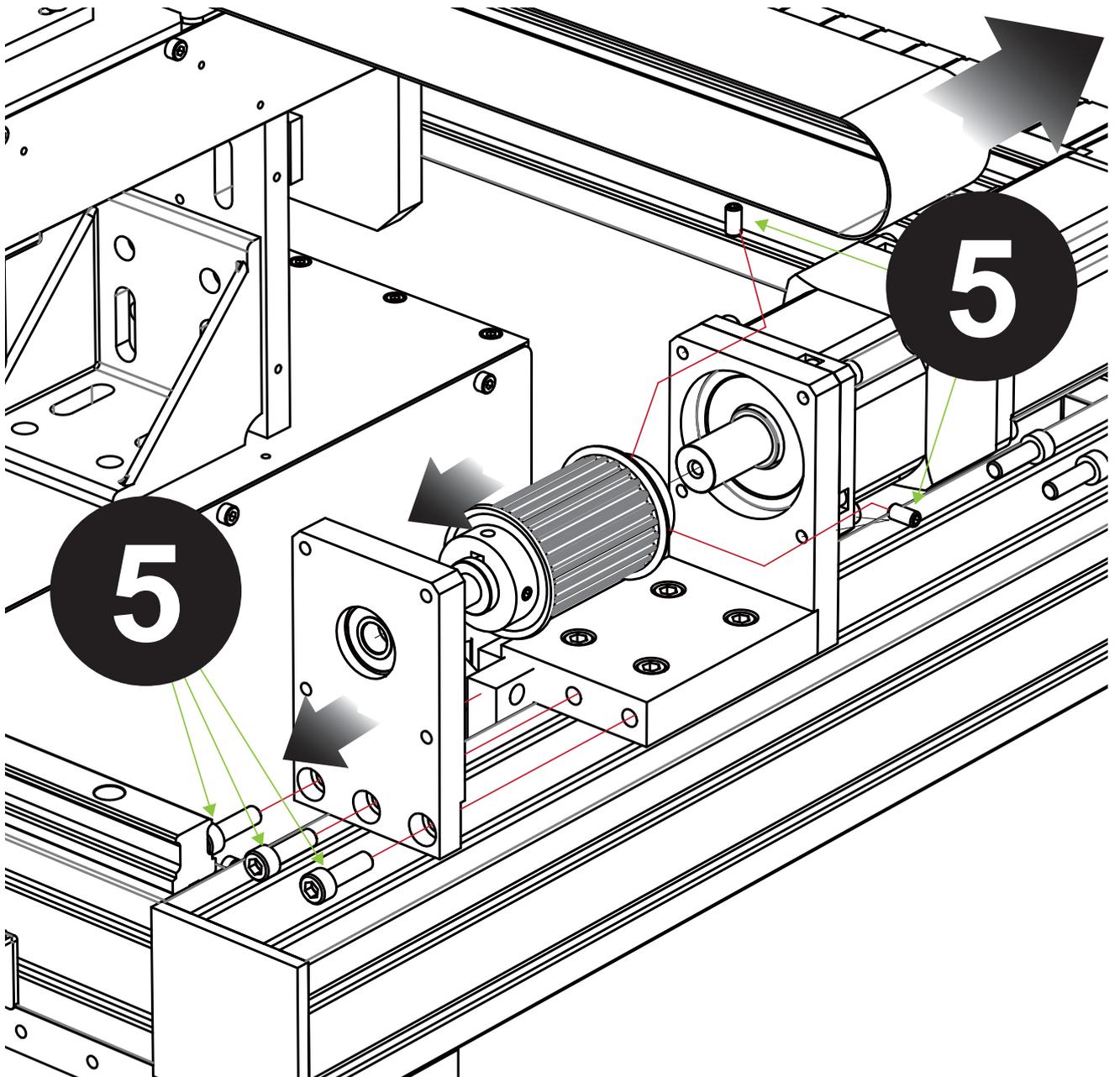
1. Please make sure the power supply of the machine is cut off.
2. Disconnect the X-axis servo motor connection and the SENSOR connection.
3. Detach the X-axis belt. Screw off the 4 screws (5mm hex wrench) of the front barrier ship of the driving wheel and the 2 pushing screws (6mm hex wrench)



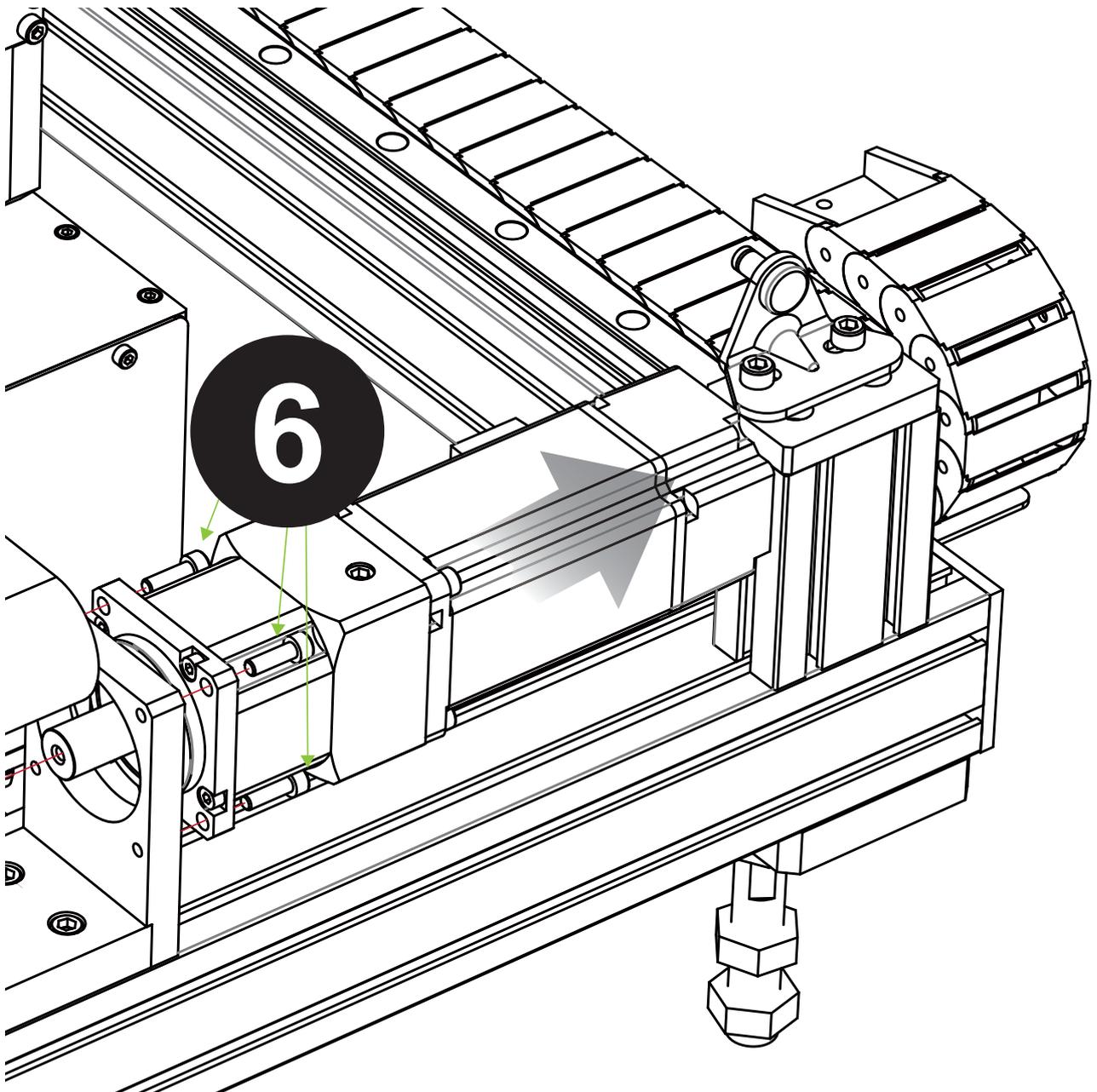
4. Screw off the X-axis from the 4 screws (5mm hex wrench) of the base of the driving wheel.



5. Screw off the 3 screws (5mm hex wrench) of the side barrier ship of the X-axis timing wheel and the 2 fixing screws (2.5mm hex wrench) above the timing wheel and then detach the X-axis belt and the timing wheel from the axle core of the motor.

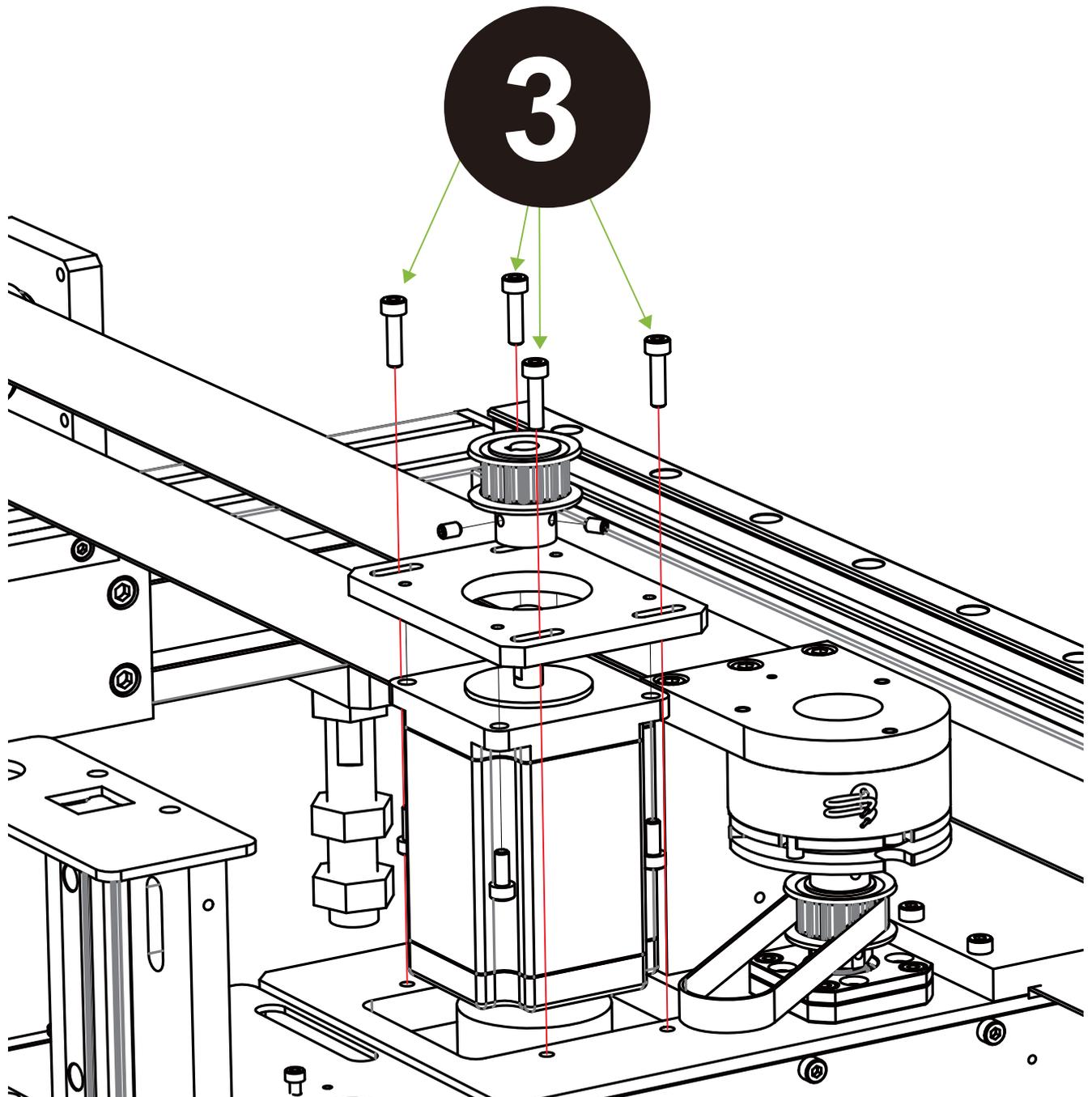


6. Screw off 4 screws (4mm hex wrench) of the X-axis servo motor.
7. Detach the whole X-axis servo motor off the machine.
8. Detach the shackles of the connecting bars of the X-axis servo motor.
9. Install the new X-axis servo motors one by one.
10. The replacement of the X-axis servo motor is finished

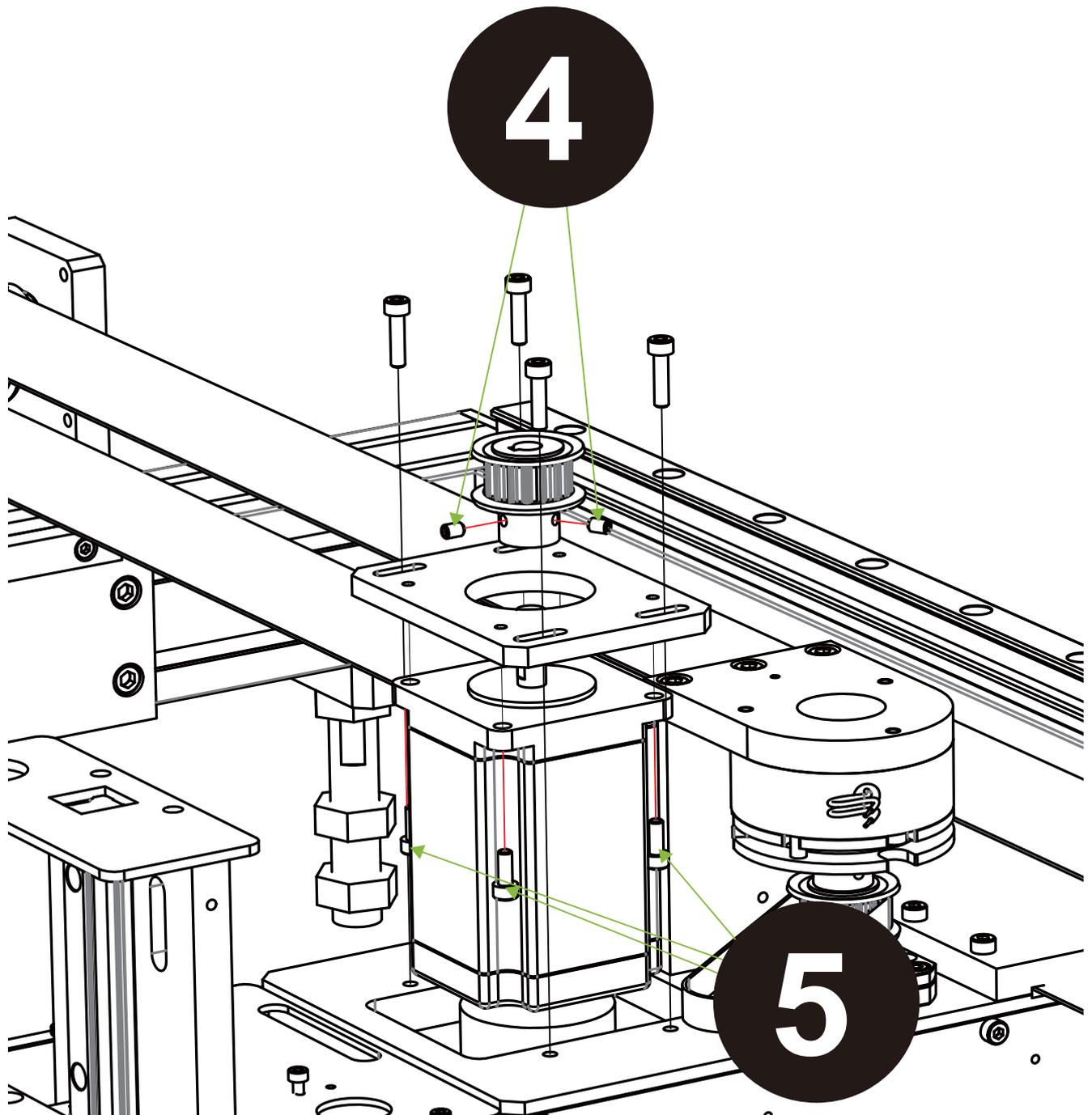


## Replace Y-axis motor

1. Please make sure the power supply of the machine is cut off.
2. Disconnect the Y-axis servo motor connection and the SENSOR connection.
3. Screw off the 4 screws (3mm hex wrench) of the fixing plate of the Y-axis motor and move the Y-axis motor up to detach from the machine.

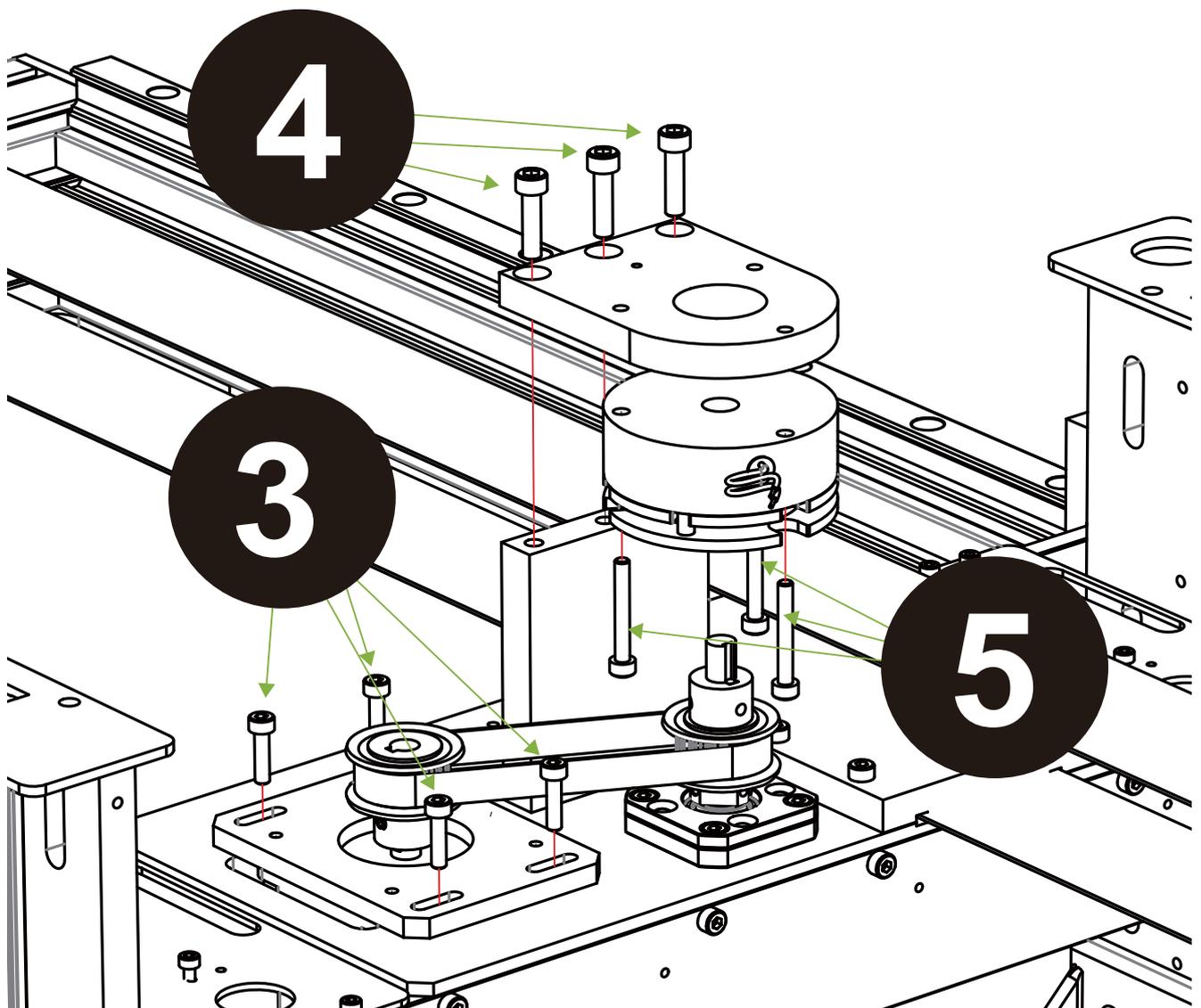


4. Screw off the 2 screws (2mm hex wrench) of the timing wheel of the Y-axis belt and move the belt gear up to detach it from the machine.
5. Screw off the 4 screws (3mm hex wrench) of the fixing plate of the Y-axis motor and detach off the Y-axis motor.
6. Install a new Y-axis motor.
7. Attach the belt gear on the Y-axis motor.
8. Plug in the power plug of the Y-axis motor and the connection of the SENSOR.
9. The replacement of the Y-axis motor is finished.



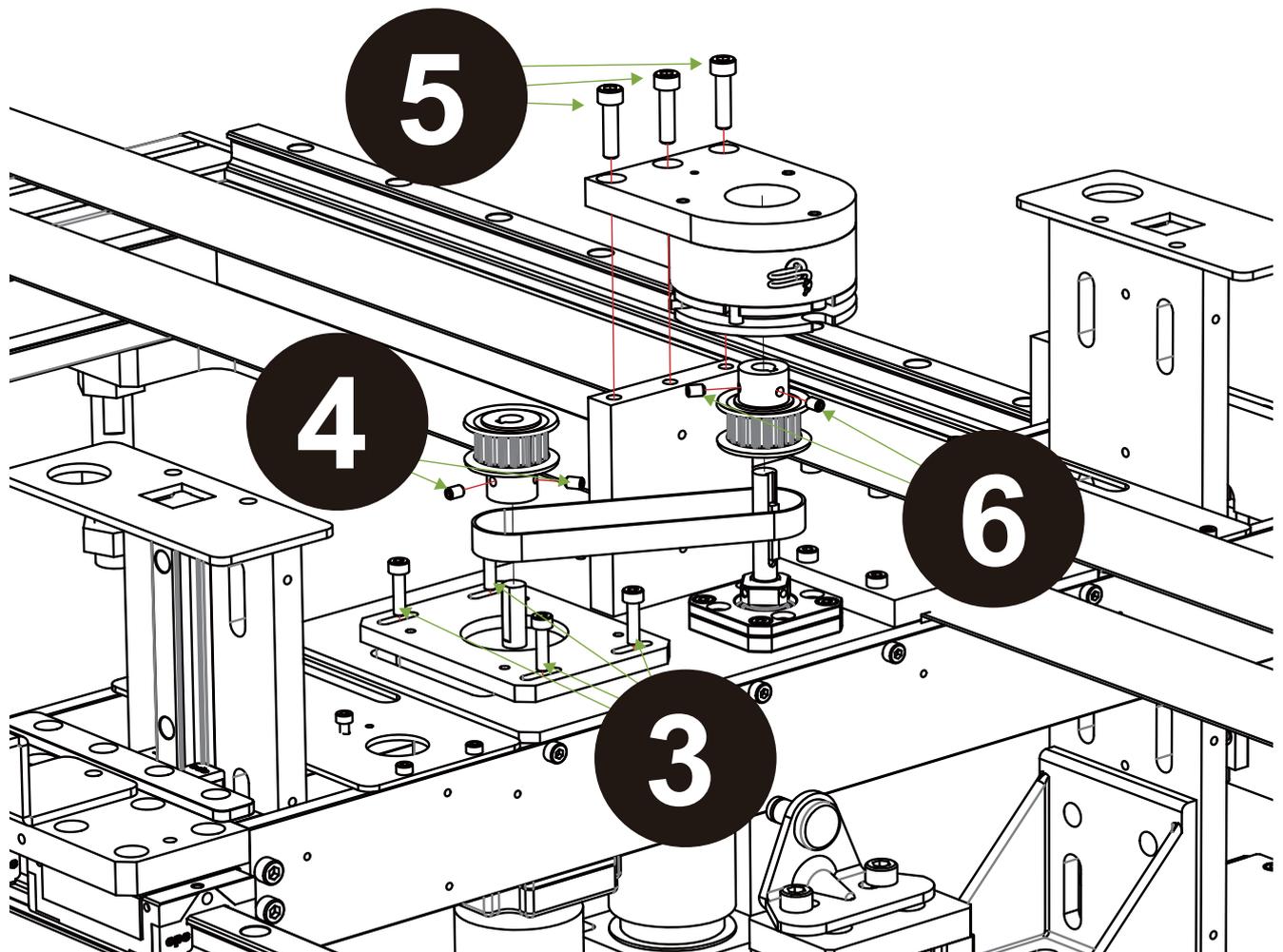
## Replace Y-axis brake component

1. Please make sure the power supply of the machine is cut off.
2. Detach the power plug of the Y-axis brake component.
3. Screw off the 4 screws (3mm hex wrench) of the fixing plate of the Y-axis motor.
4. Screw off the 3 screws (4mm hex wrench) above the rack of the Y-axis brake component.
5. Screw off the 3 screws (3mm hex wrench) of the connector of the Y-axis brake component.
6. Pull up both the damaged Y-axis brake component and the top cover to detach the brake from the belt gear.
7. Install the Y-axis brake component and push it forward to fasten the brake and screw rod and attach the rack and the connector.
8. The replacement of the Y-axis brake component is finished.



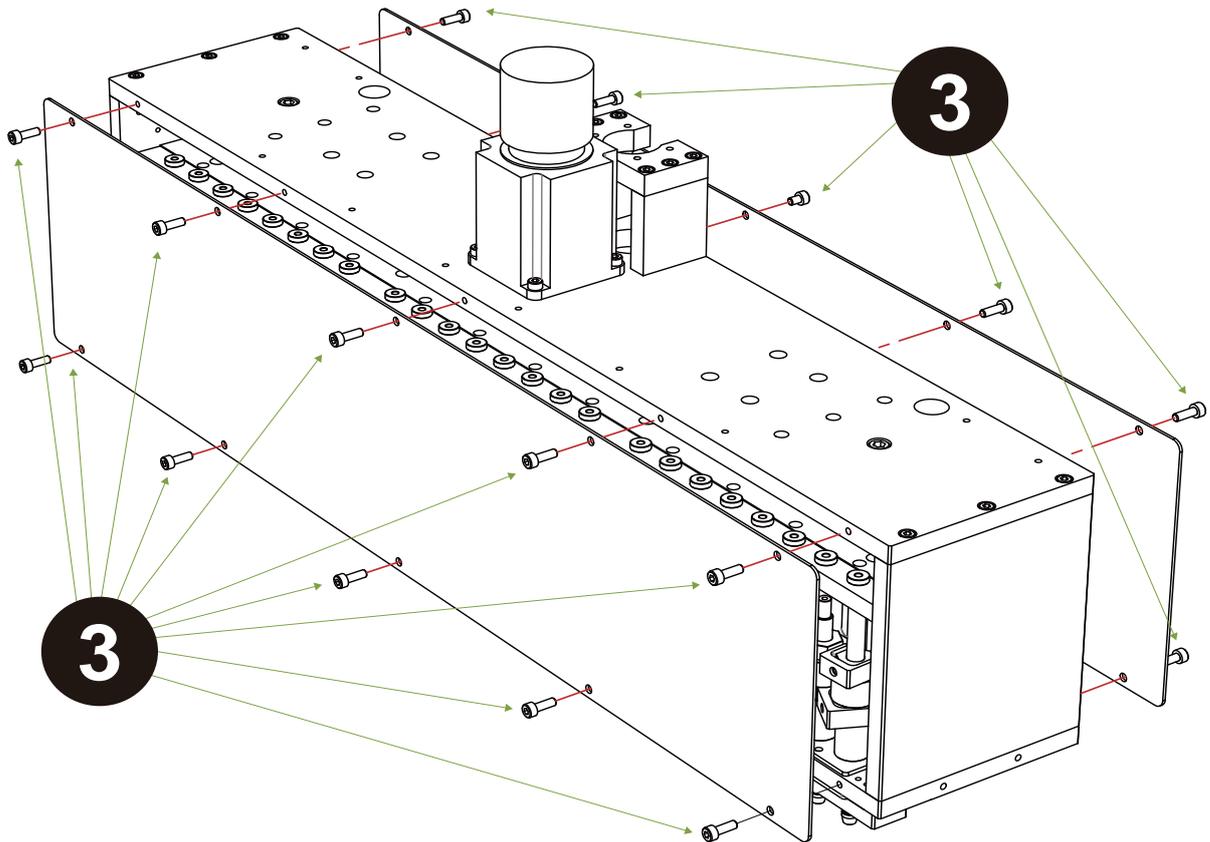
## Replace Y-axis belt

1. Please make sure the power supply of the machine is cut off.
2. Disconnect the Y-axis servo motor connection and the SENSOR connection.
3. Screw off the 4 screws (3mm hex wrench) of the fixing plate of the Y-axis motor.
4. Screw off the 2 screws (2mm hex wrench) of the timing wheel of the Y-axis belt and move the belt gear p to detach it from the machine.
5. Screw off the 3 screws (4mm hex wrench) above the rack of the Y-axis brake component.
6. Screw off the 2 screws (2mm hex wrench) of the timing wheel of the Y-axis brake and detach off the timing belt.
7. Attach the belt gear on the Y-axis motor.
8. Install the Y-axis brake component and push it forward to fix the brake and screw rod and attach the rack and the connector.
9. Plug in the power connection of the Y-axis motor and the connections of the SENSOR.
10. The replacement of the Y-axis motor is finished.

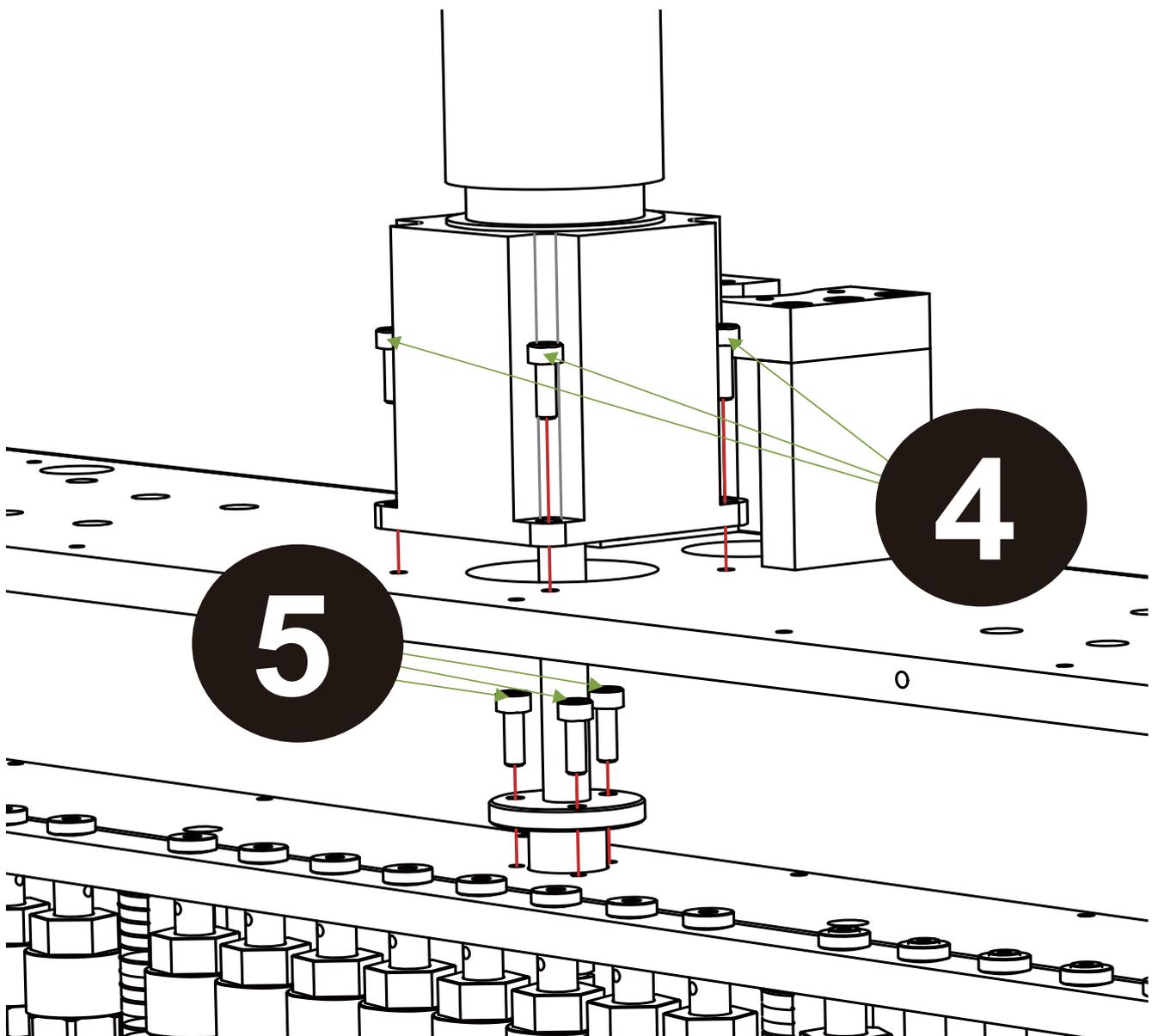


## Replace V-axis motor

1. Please make sure the power supply of the machine is cut off.
2. Disconnect the Y-axis servo motor connection and the SENSOR connection.
3. Screw off the 20 screws (2.5mm hex wrench) of the barrier ships on the both sides of the Piston module.

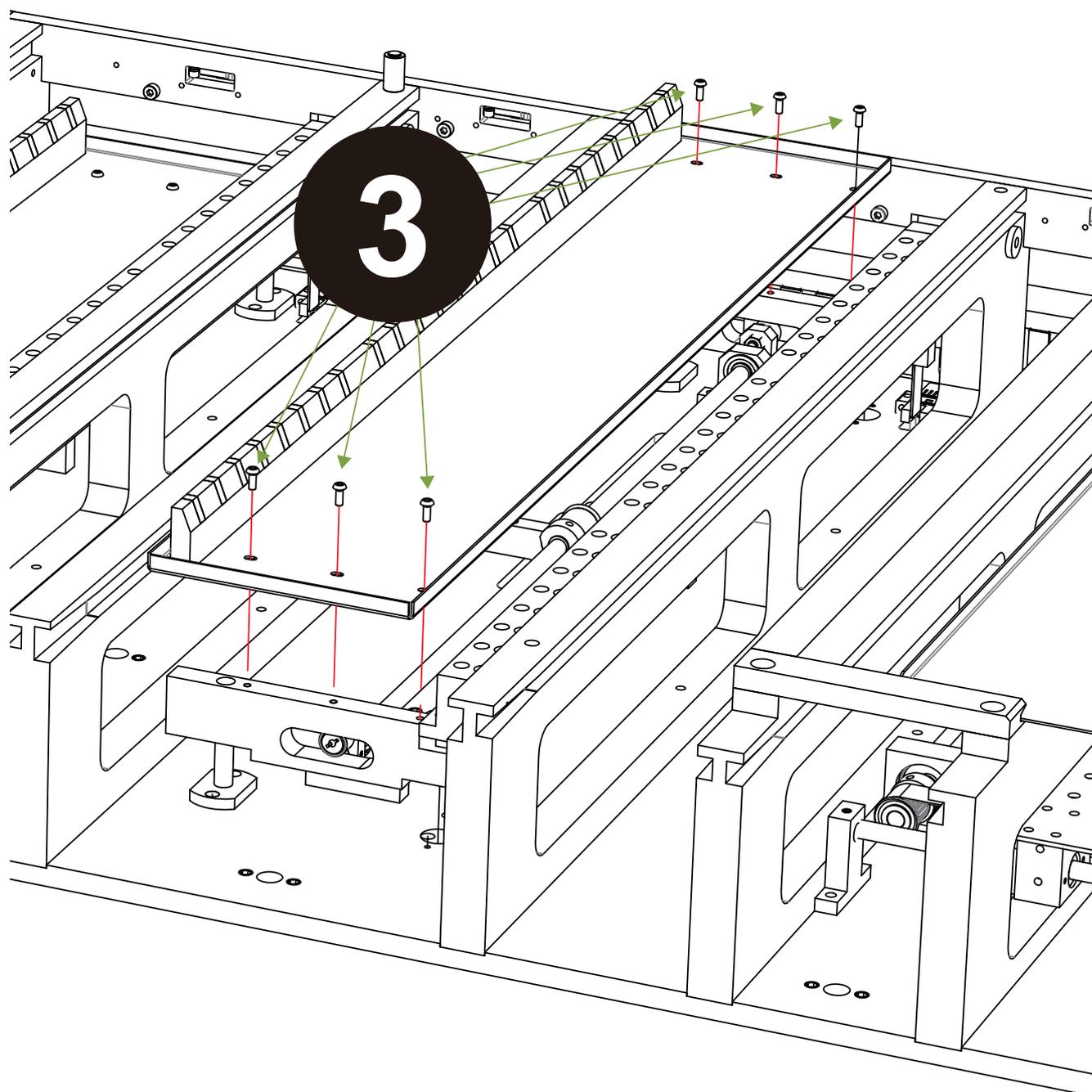


4. Screw off the 4 fixing screws (3mm hex wrench) of the V-axis motor.
5. Screw off the 3 screws (2.5mm hex wrench) of the screw rod and detach off the V-axis motor.
6. Install a new V-axis motor.
7. Fasten the 3 screws of the screw rod and the 4 screws of the motor.
8. Plug in the connection of the V-axis motor and the connection of the SENSOR.
9. The replacement of the V-axis motor is finished.

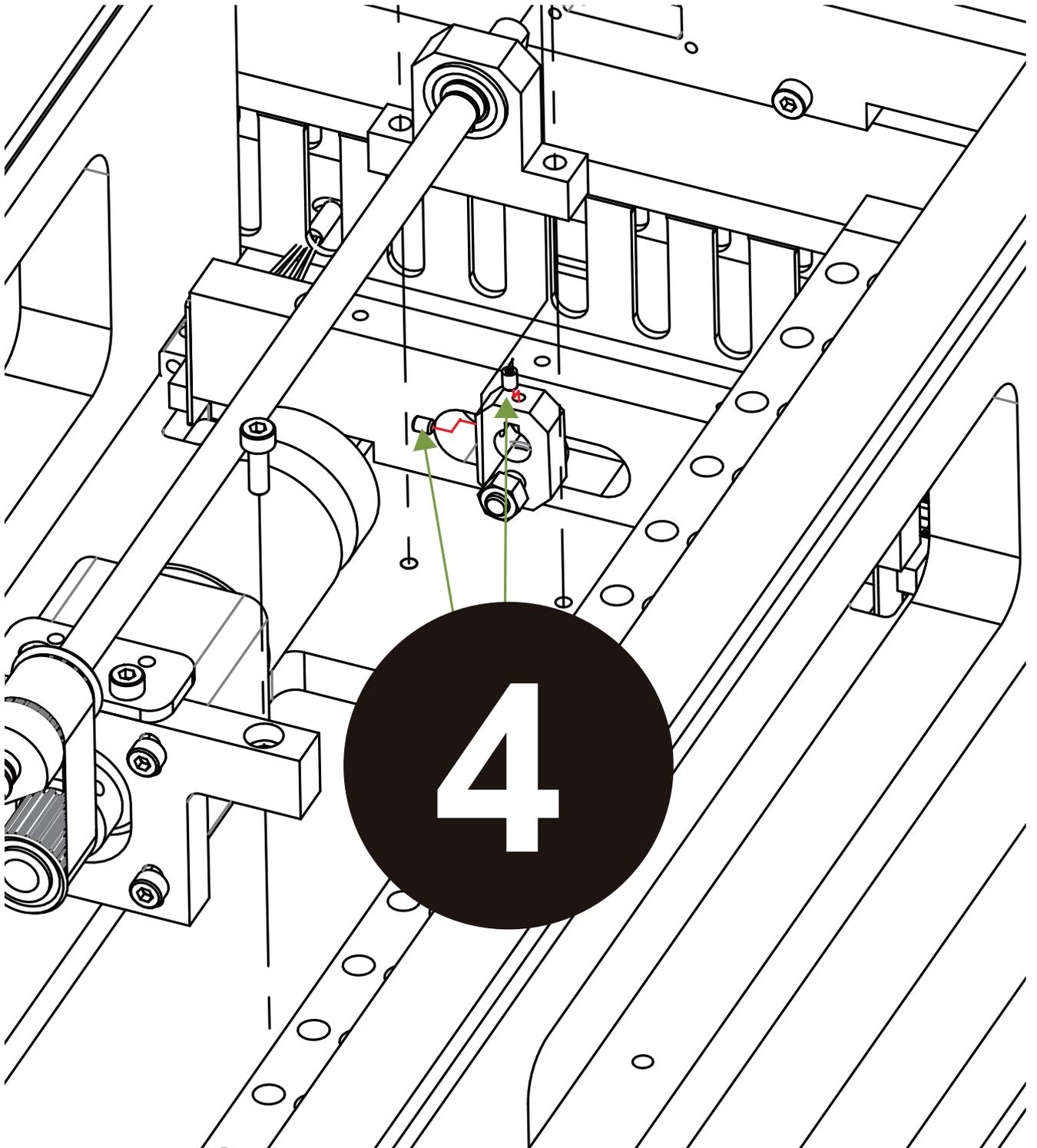


## Replace base elevator motor

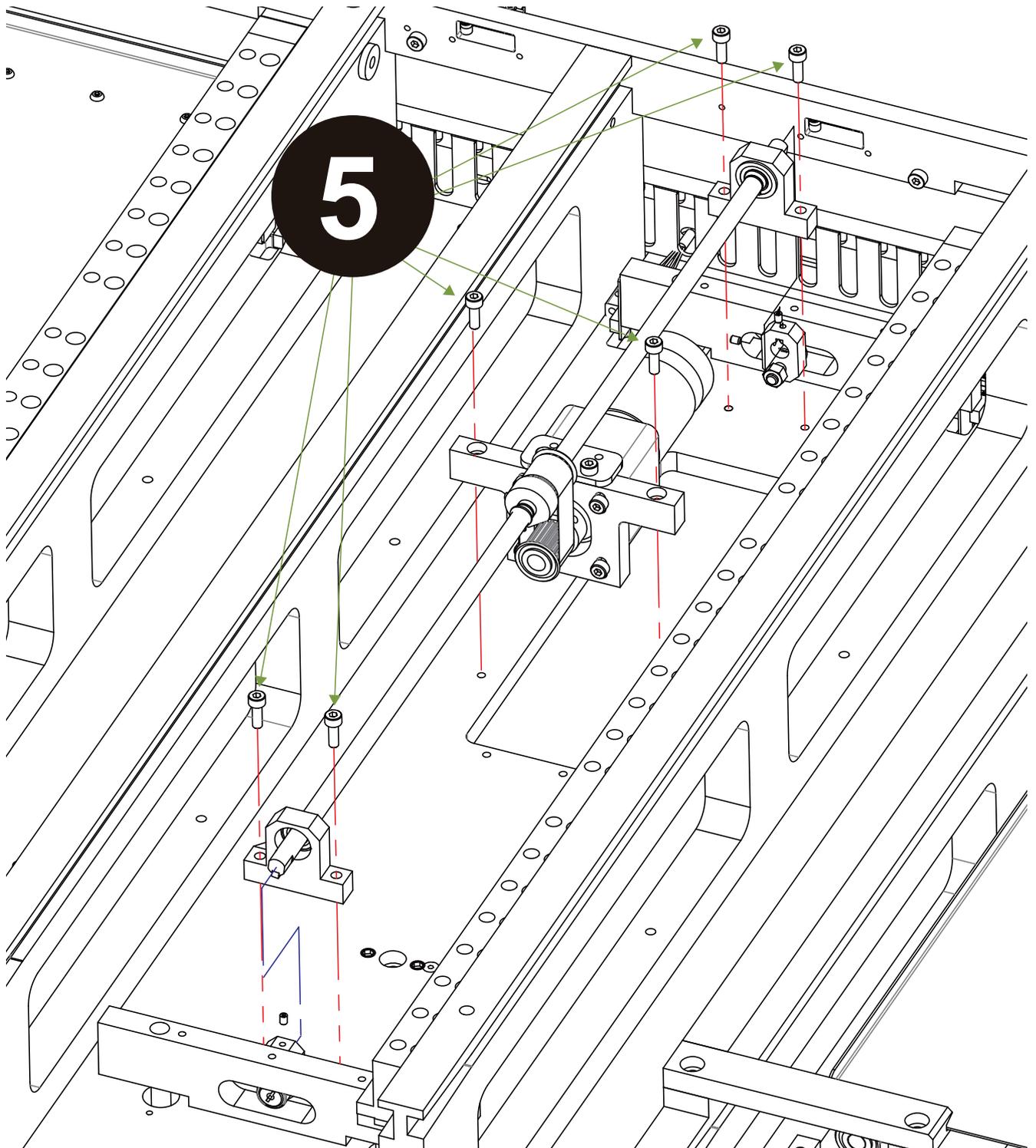
1. Please make sure the power supply of the machine is cut off.
2. Disconnect the power connection of the elevator motor.
3. Screw off 6 screws (2mm hex wrench) of the sheet metal of the elevator liquid receiving tray.



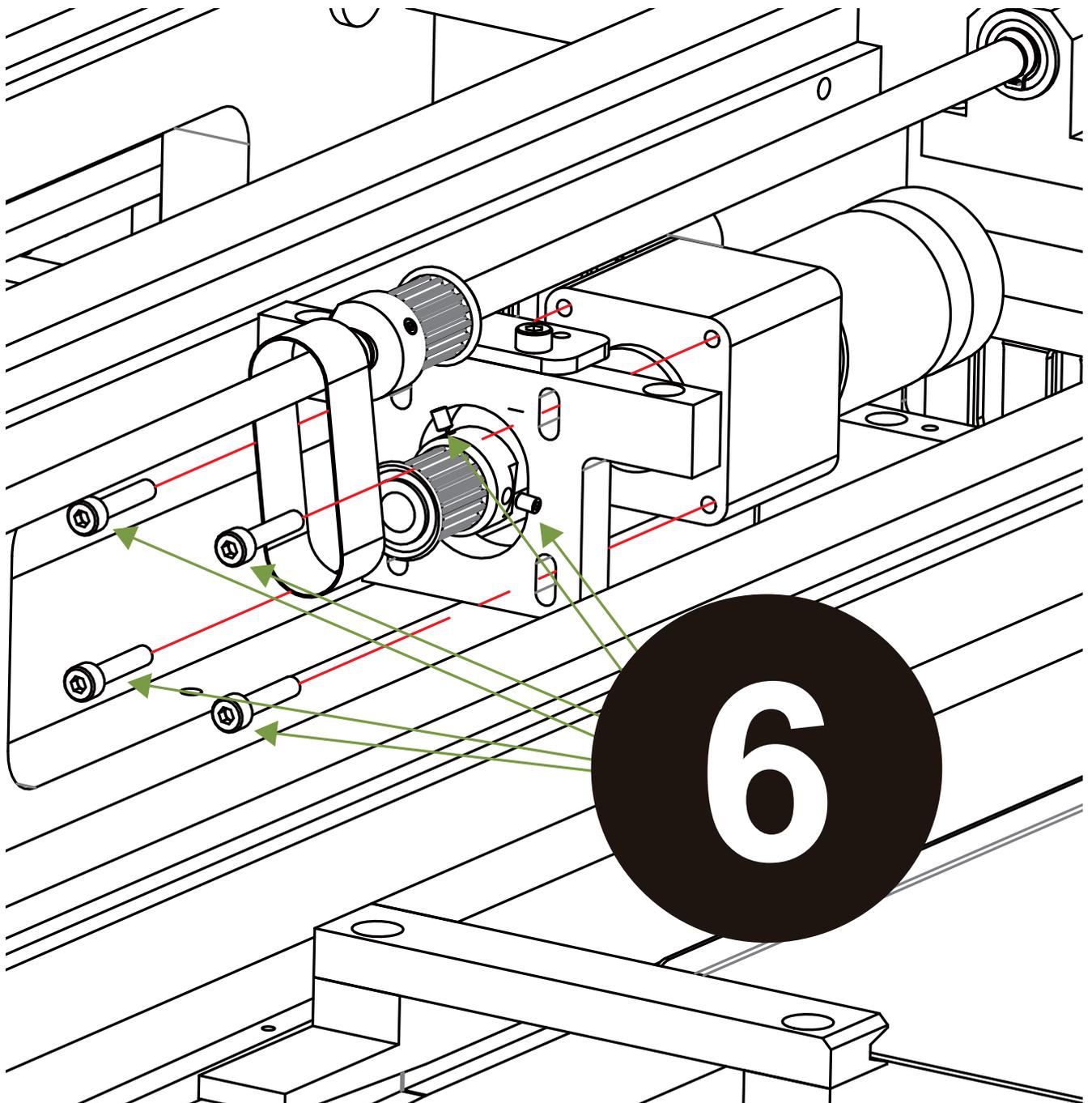
4. Screw off the 2 screws (totally 4 screws at both sides, 1.5mm hex wrench) of transmission axle and the elevator set eccentric wheel, and then detach the eccentric wheel from the transmission axle (note that there are square buttons in the axle).



5. Screws off the 2 screws (3mm hex wrench) of the fixing base of the elevator motor and the 4 screws (2.5mm hex wrench) of the fixing base of the axle bearing, and then move up the motor and the transmission axle to detach them from the machine.

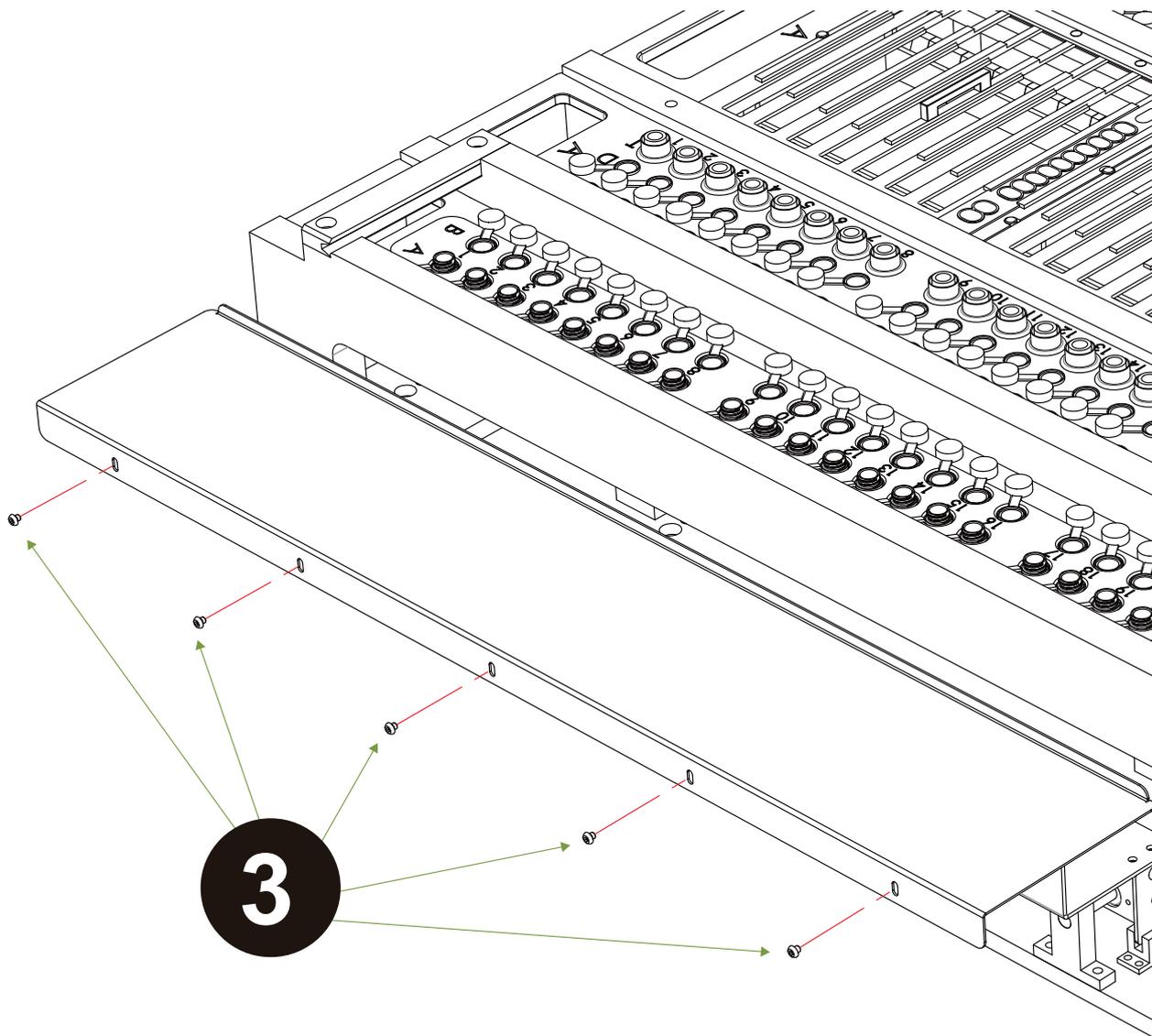


6. Screws off the 4 fixing screws (3mm hex wrench) of the elevator motor and the 2 screws (1.5mm hex wrench) of the timing wheel, and then detach the elevator motor from the machine.
7. Install a new elevator motor.
8. Attach the timing belt and the timing wheel on the elevator motor.
9. Attach the transmission axle and eccentric wheel in order.
10. Plug in the power connection of the elevator motor.
11. The replacement of the elevator motor is finished.

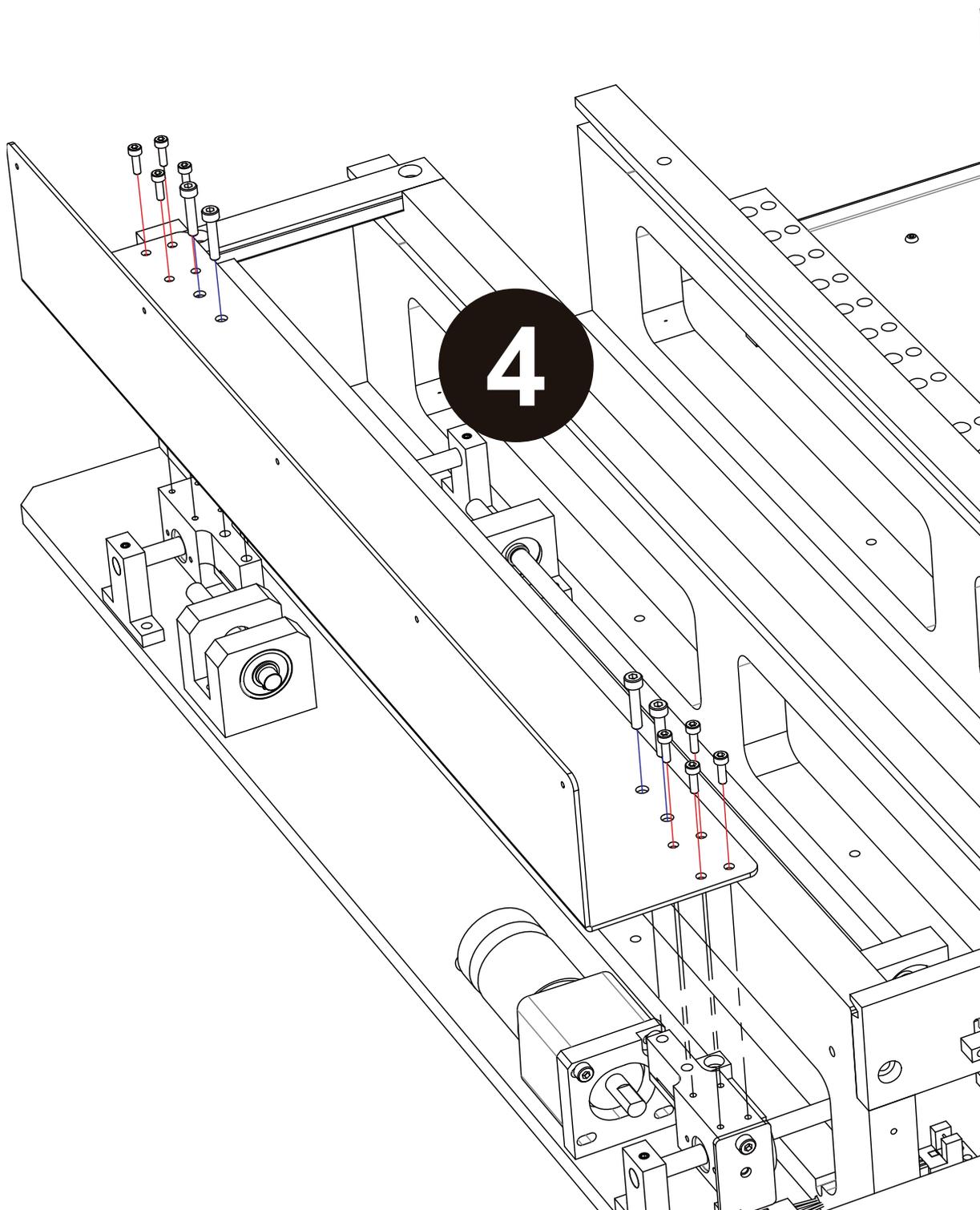


## Replace Shutter motor

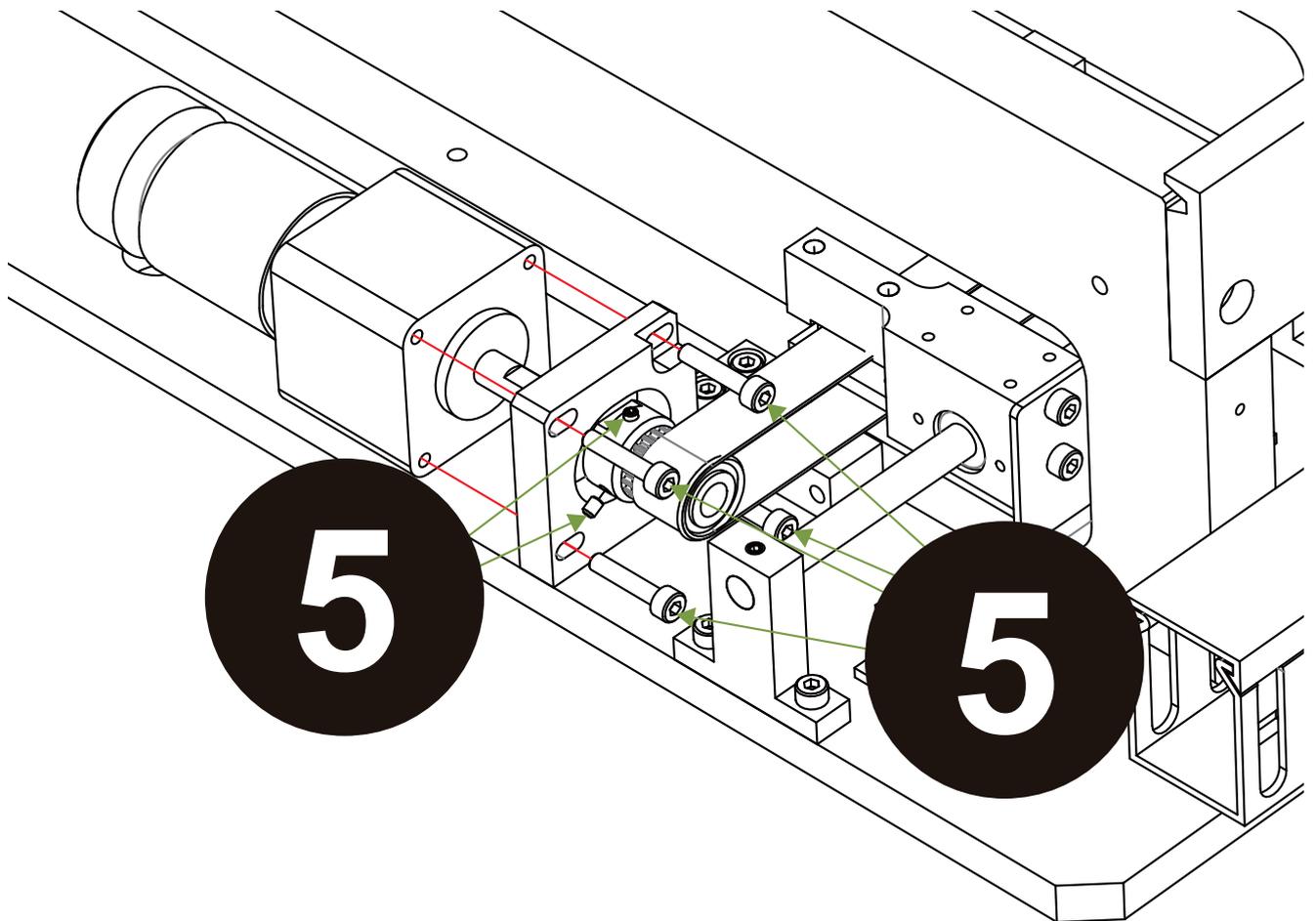
1. Please make sure the power supply of the machine is cut off.
2. Disconnect the power connection of the Shutter motor.
3. Screw off the 5 screws (2mm hex wrench) of the sheet metal of the top shutter.



4. Screw off the 12 screws (2.5mm hex wrench (8 screws), and 3mm hex wrench (4 screws)) of the slide L sheet metal of the Shutter.

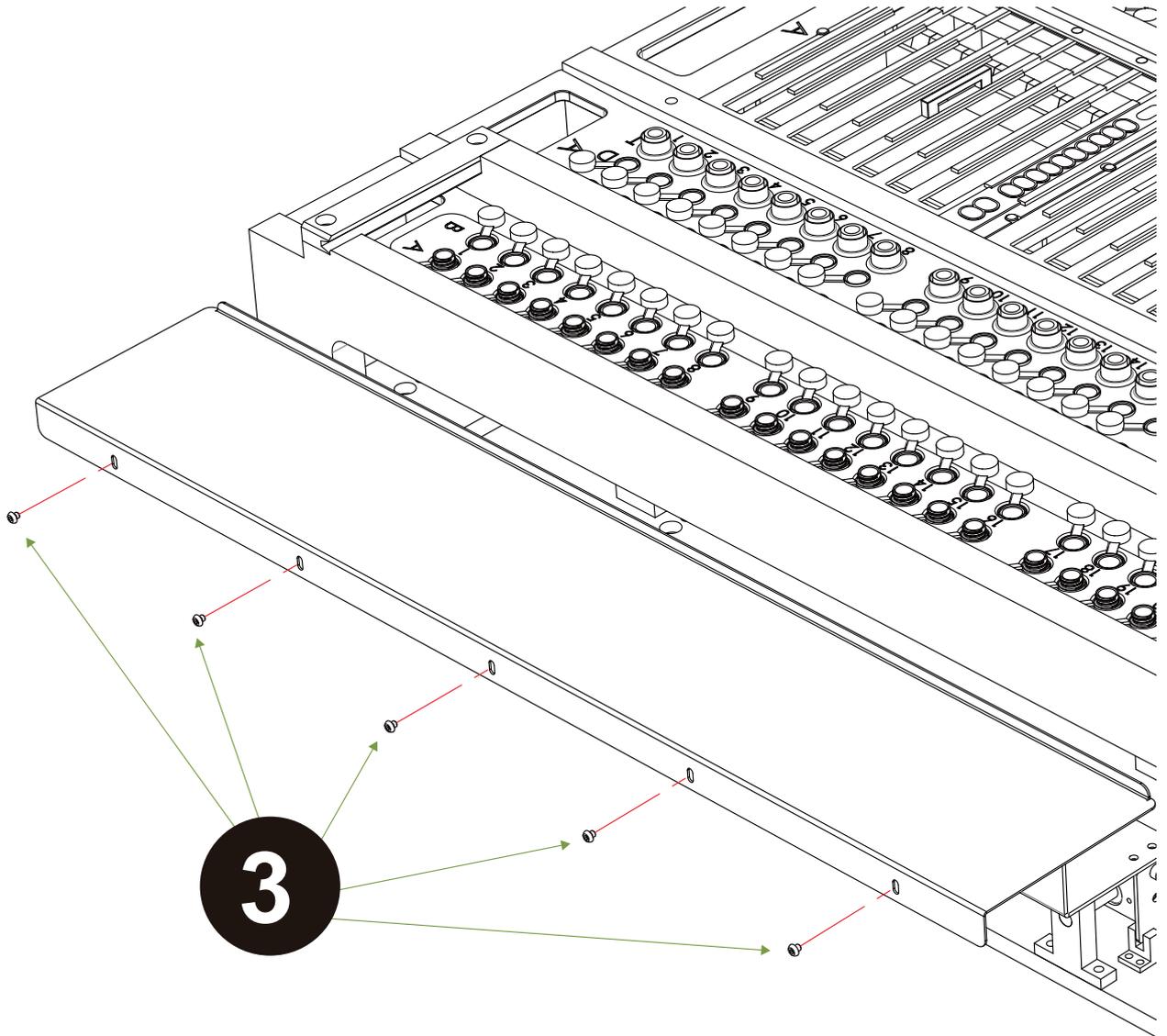


5. Screw off the 4 screws (3mm hex wrench) of the base of the Shutter motor and the 2 screws (2mm hex wrench) of the timing wheel.
6. Install a new Shutter motor.
7. Attach the timing belt on the Shutter motor.
8. Push the Shutter motor backward and fasten the screws on the side of the Shutter motor.
9. Attach the sheet metal mask on the machine in order.
10. Plug in the power plug of the Shutter motor.
11. The replacement of the Shutter motor is finished.

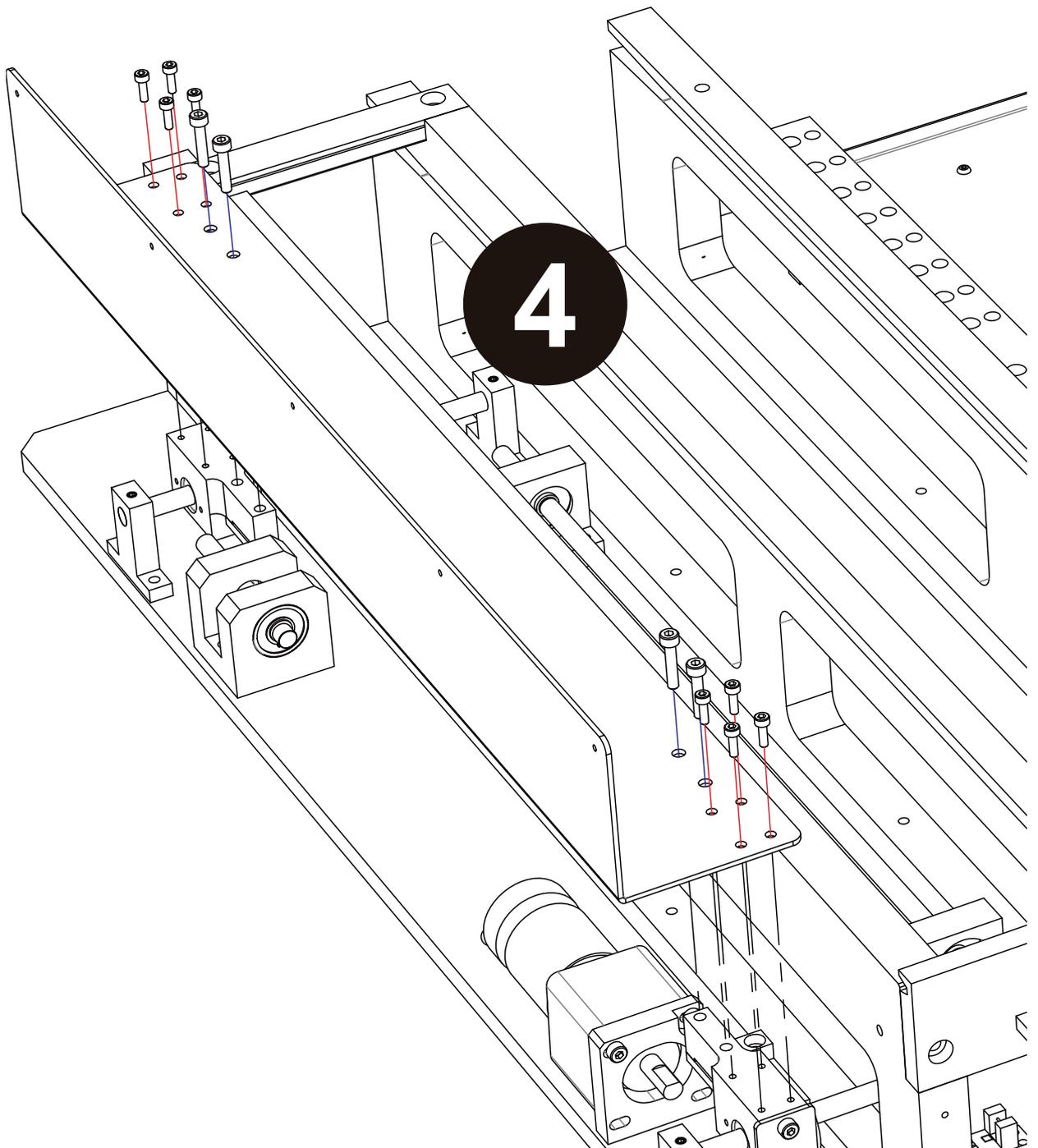


## Replace Shutter timing belt

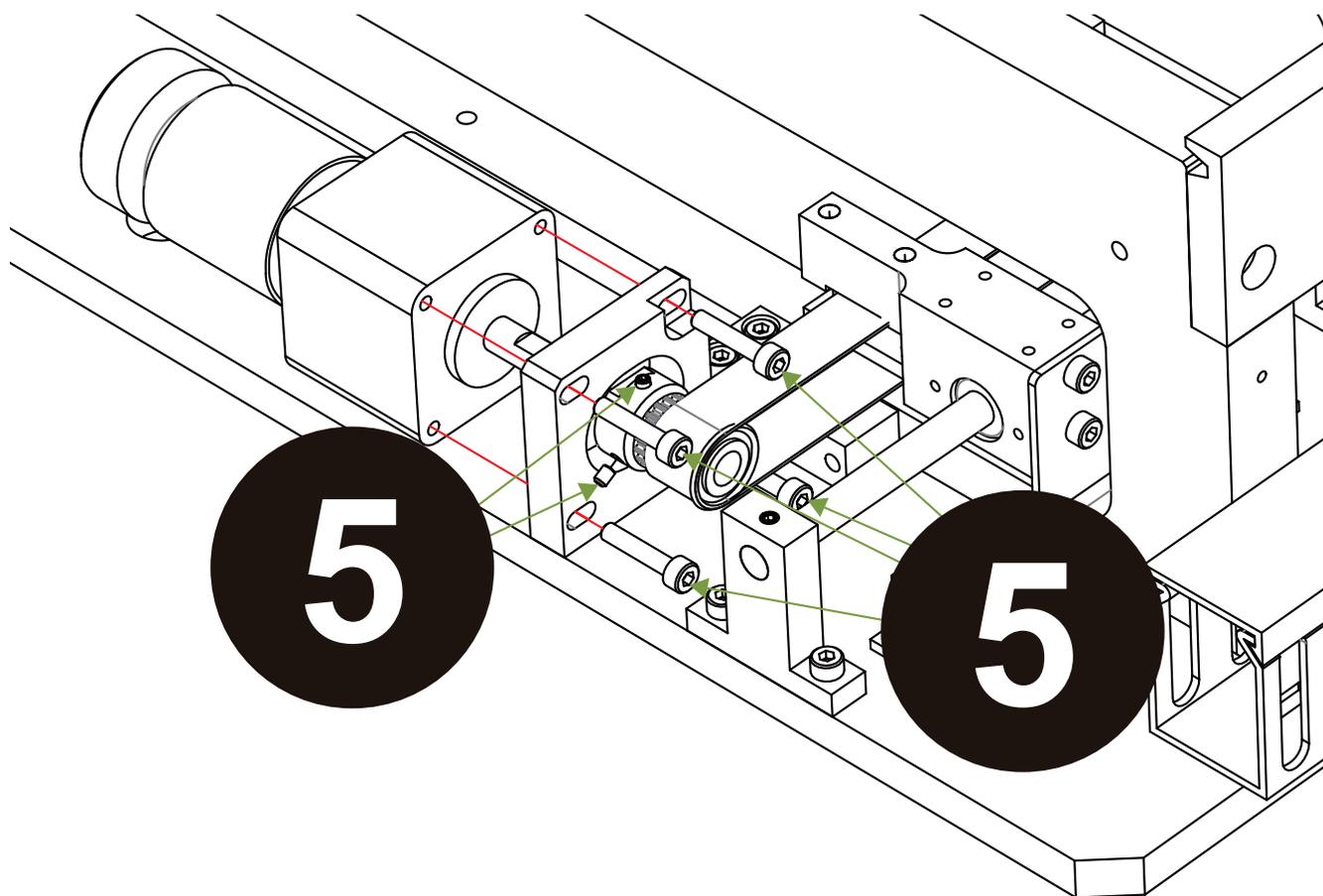
1. Please make sure the power supply of the machine is cut off.
2. Disconnect the power connection of the Shutter motor.
3. Screw off the 5 screws (2mm hex wrench) of the sheet metal of the top shutter.



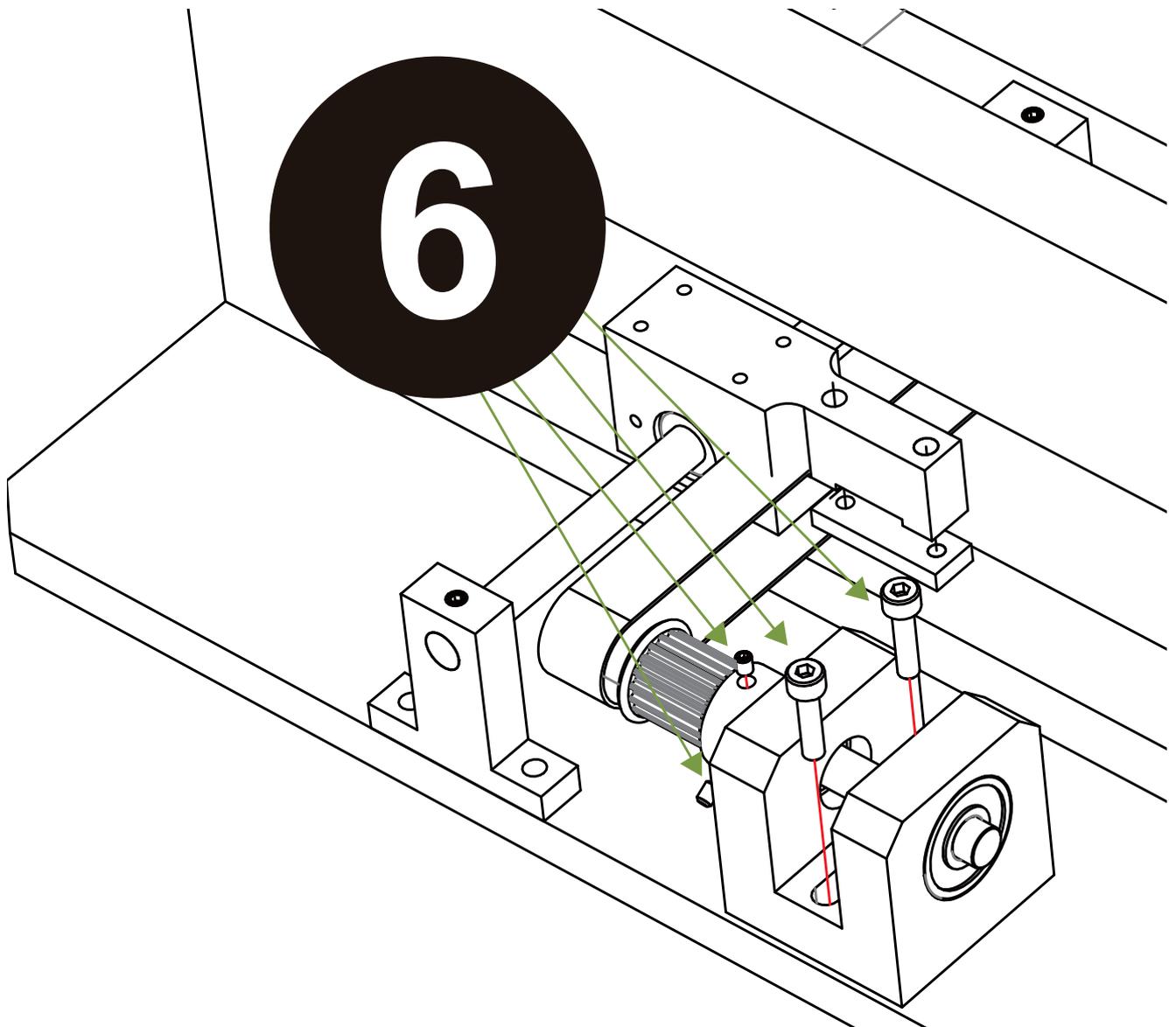
4. Screw off the 12 screws (2.5mm hex wrench (8 screws), and 3mm hex wrench (4 screws)) of the slide L sheet metal of the Shutter.



5. Screw off the 4 screws (3mm hex wrench) of the base of the Shutter motor and the 2 screws (2mm hex wrench) of the timing wheel.

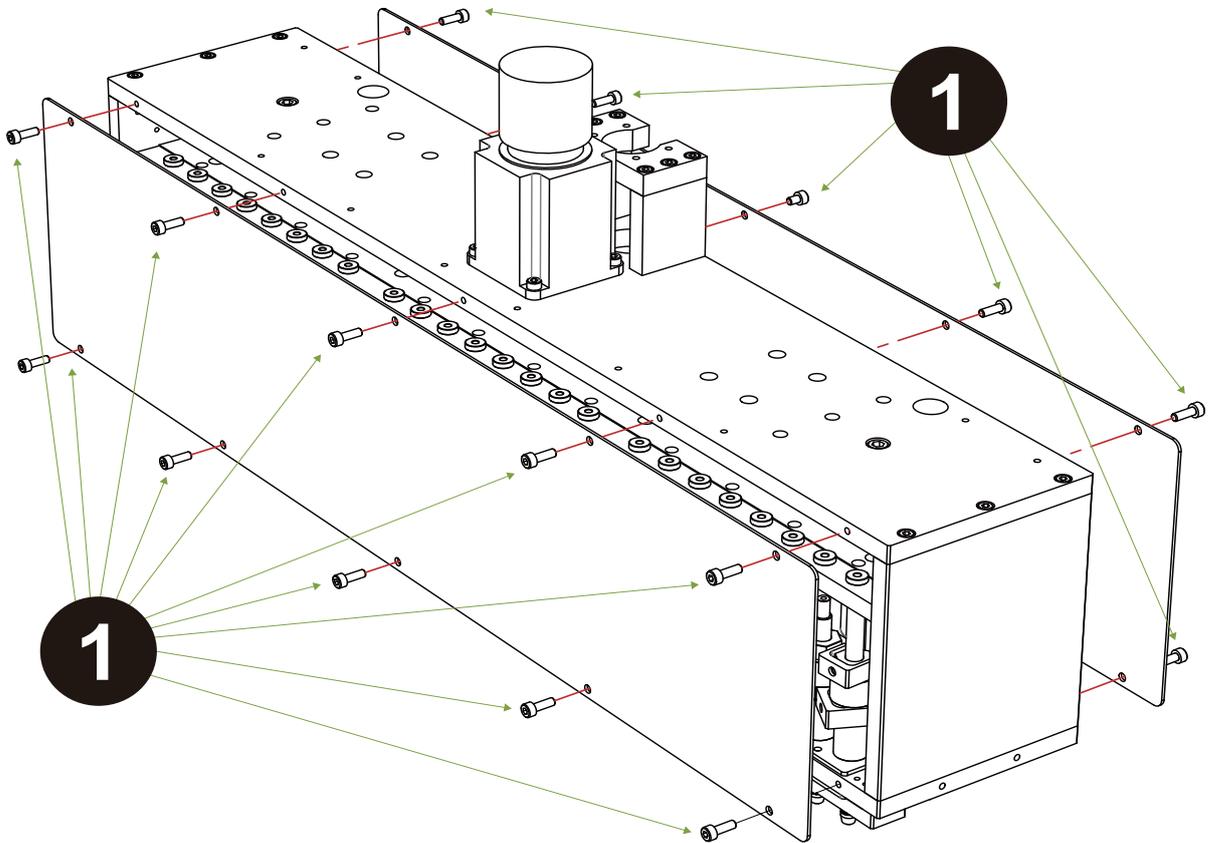


6. Screw off the 2 screws (3mm hex wrench) of the base of the axle bearing at the other end of the Shutter and the 2 screws (2mm hex wrench) of the timing wheel.
7. Install a new timing belt.
8. Push the fixing base of the axle bearing of the Shutter backward and fasten the screws.
9. Push the Shutter motor backward and fasten the screws at the side of the Shutter motor.
10. Attach the sheet metal mask on the machine in order.
11. Plug in the power plug of the Shutter motor.
12. The replacement of the Shutter belt is finished.

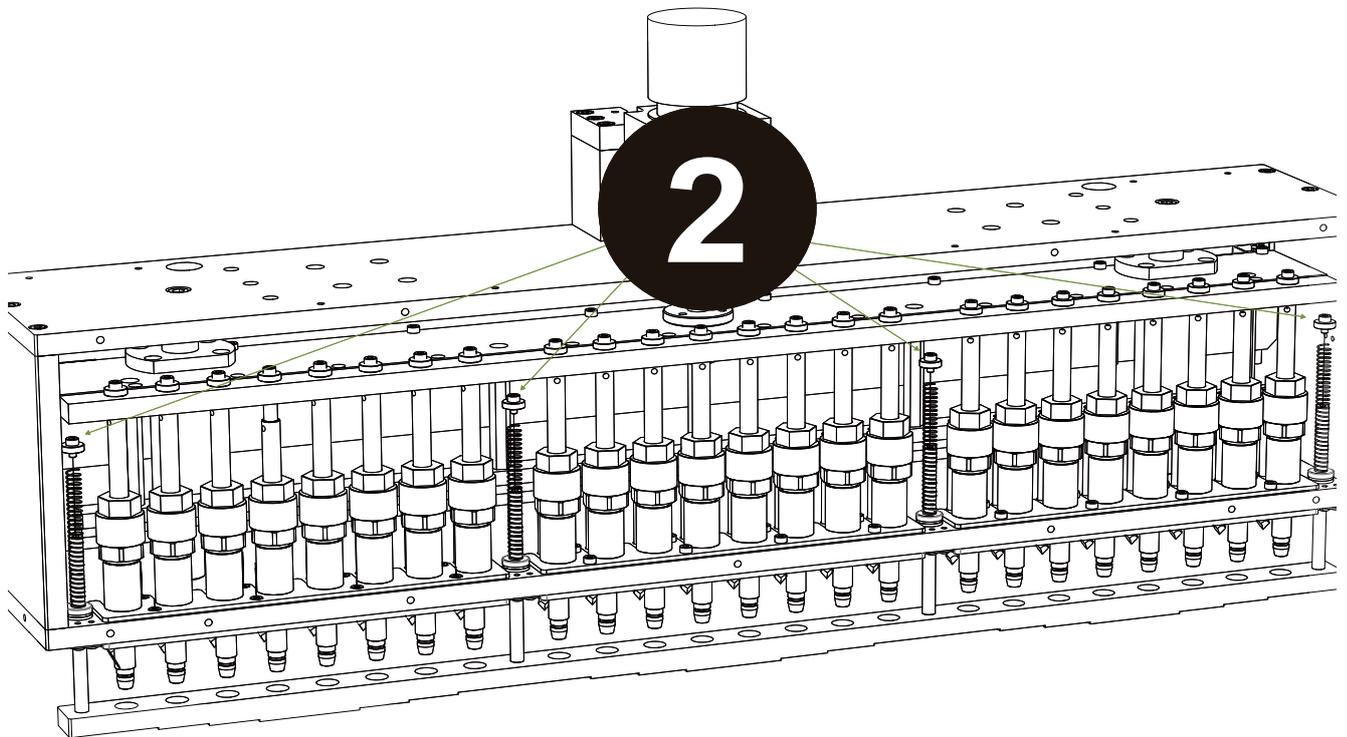


## Replace ejector rod module

1. Screw off the 20 screws (2.5mm hex wrench) of the masks at the both sides of the Piston module.

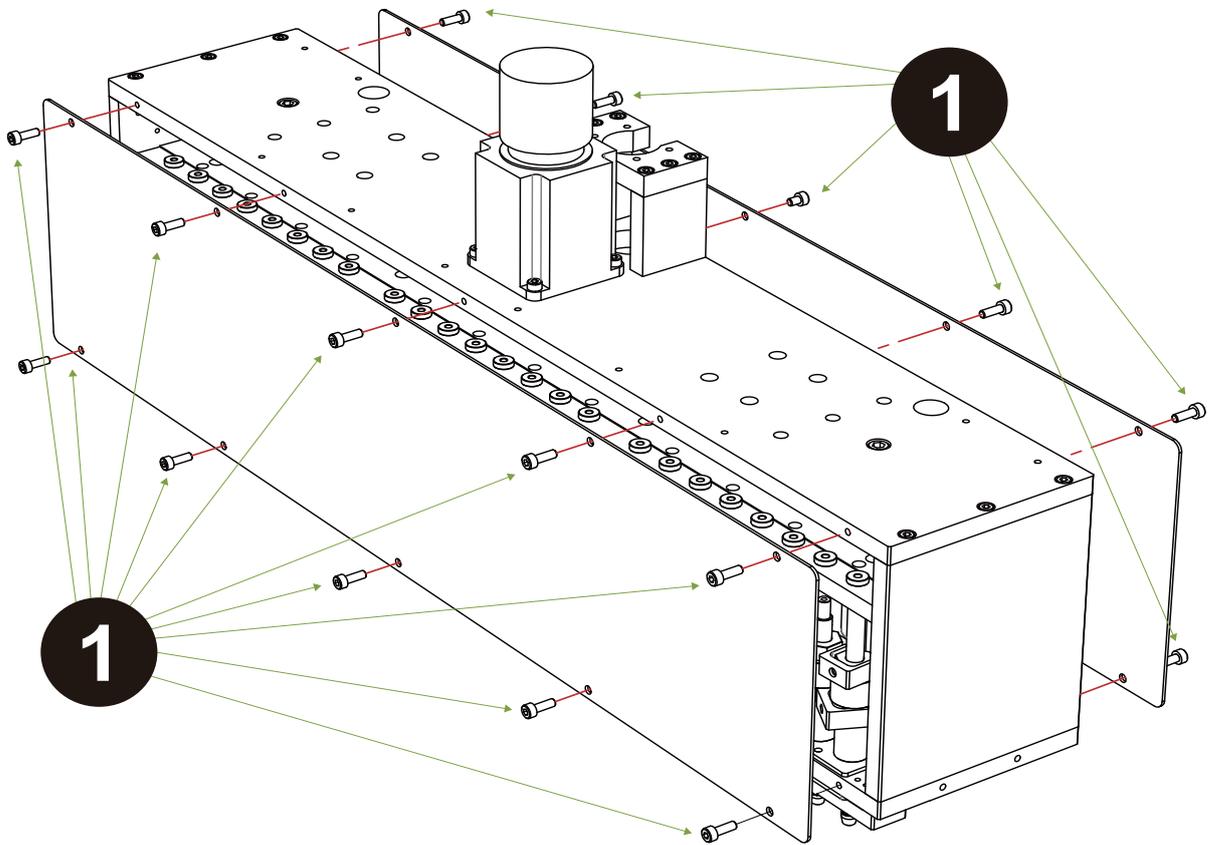


2. Screw off the screws (2.5mm hex wrench) above the 4 guide posts of the ejector rod. Note that the springs, screws and pads may bound off the machine.
3. Move the old ejector rod module down to detach it from the machine.
4. Replace the old one ejector rod module with a new one. Please move the new ejector rod module up from the bottom of the Piston module to install it.
5. Attach the springs, screws and pads in order.
6. The replacement of the ejector rod module is finished.

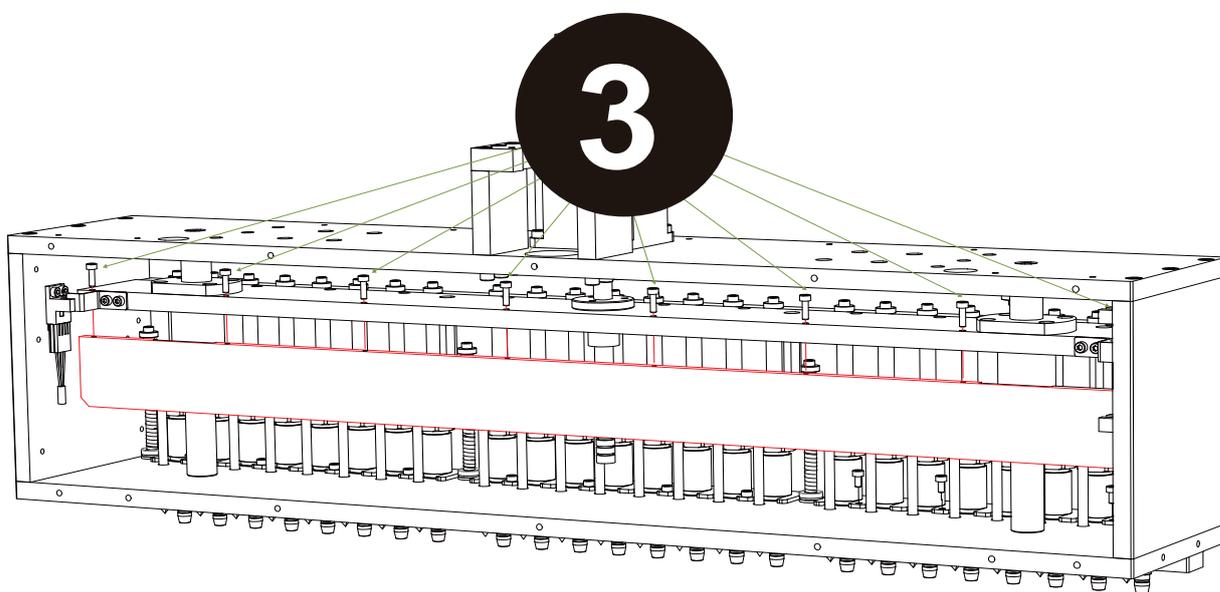


# Replace Piston

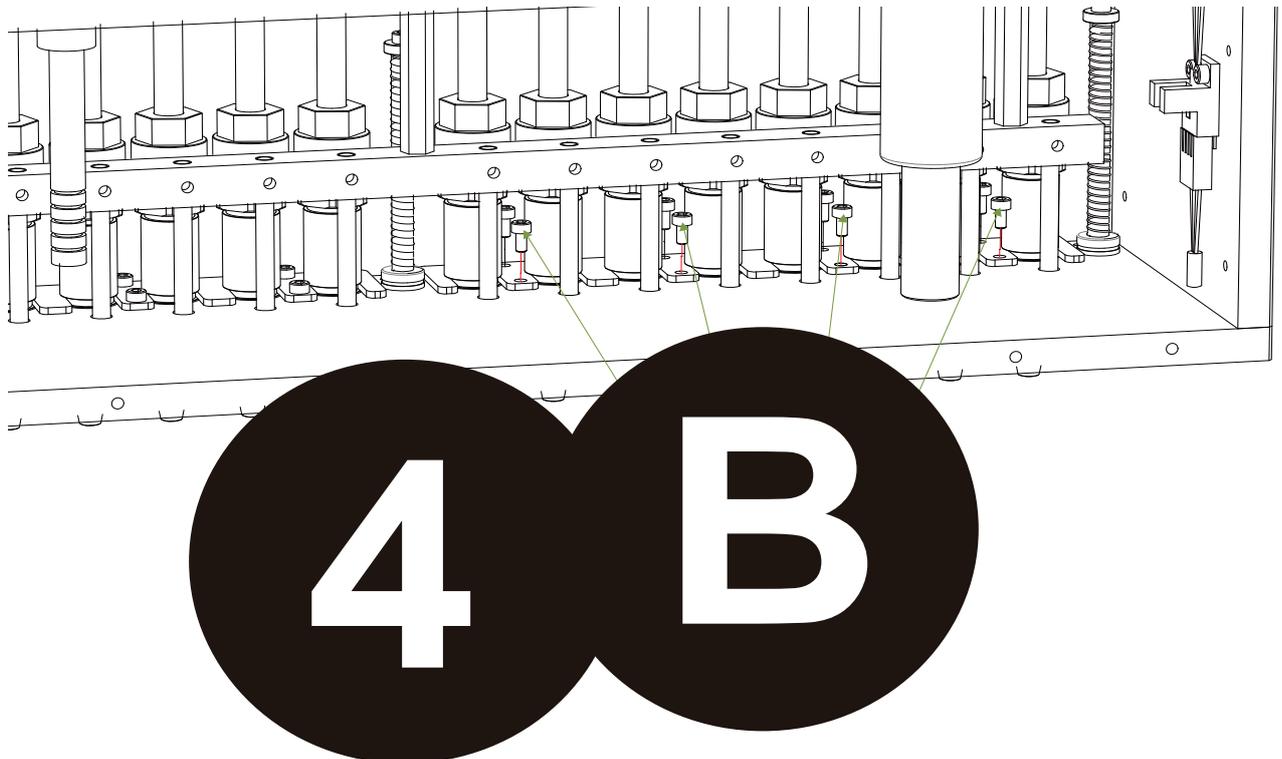
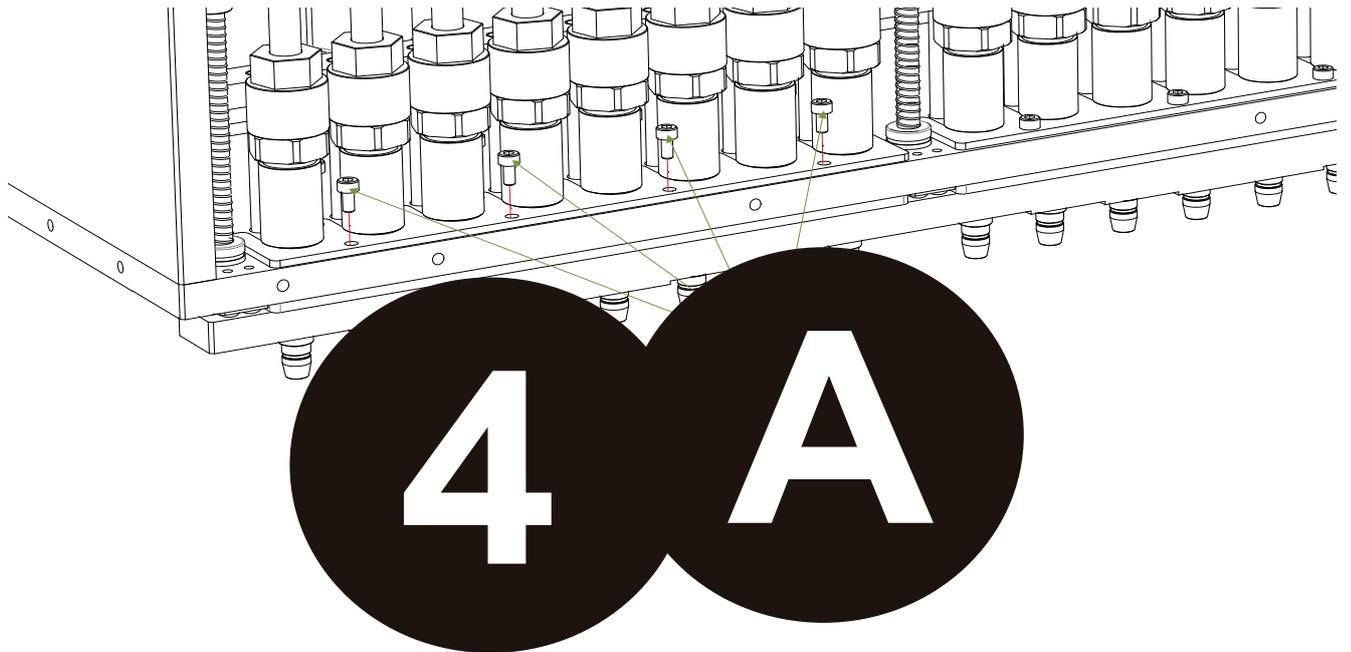
1. Screws off the screws of the masks at the both sides of the Piston module.



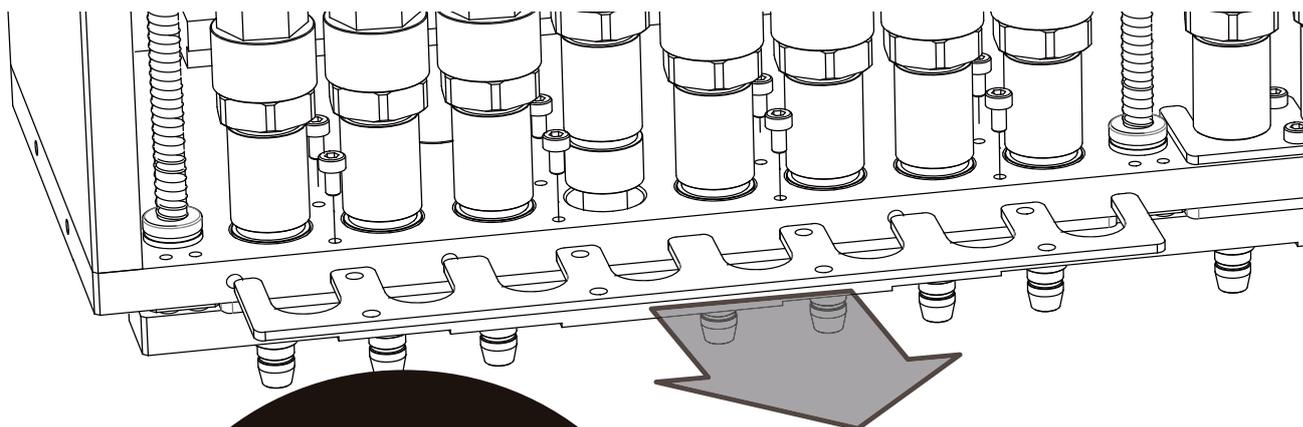
2. Push the V-axis down with your hands.
3. Screws off the 8 screws (2.5mm hex wrench) of the assistant costal plate at the rear of the Piston module.



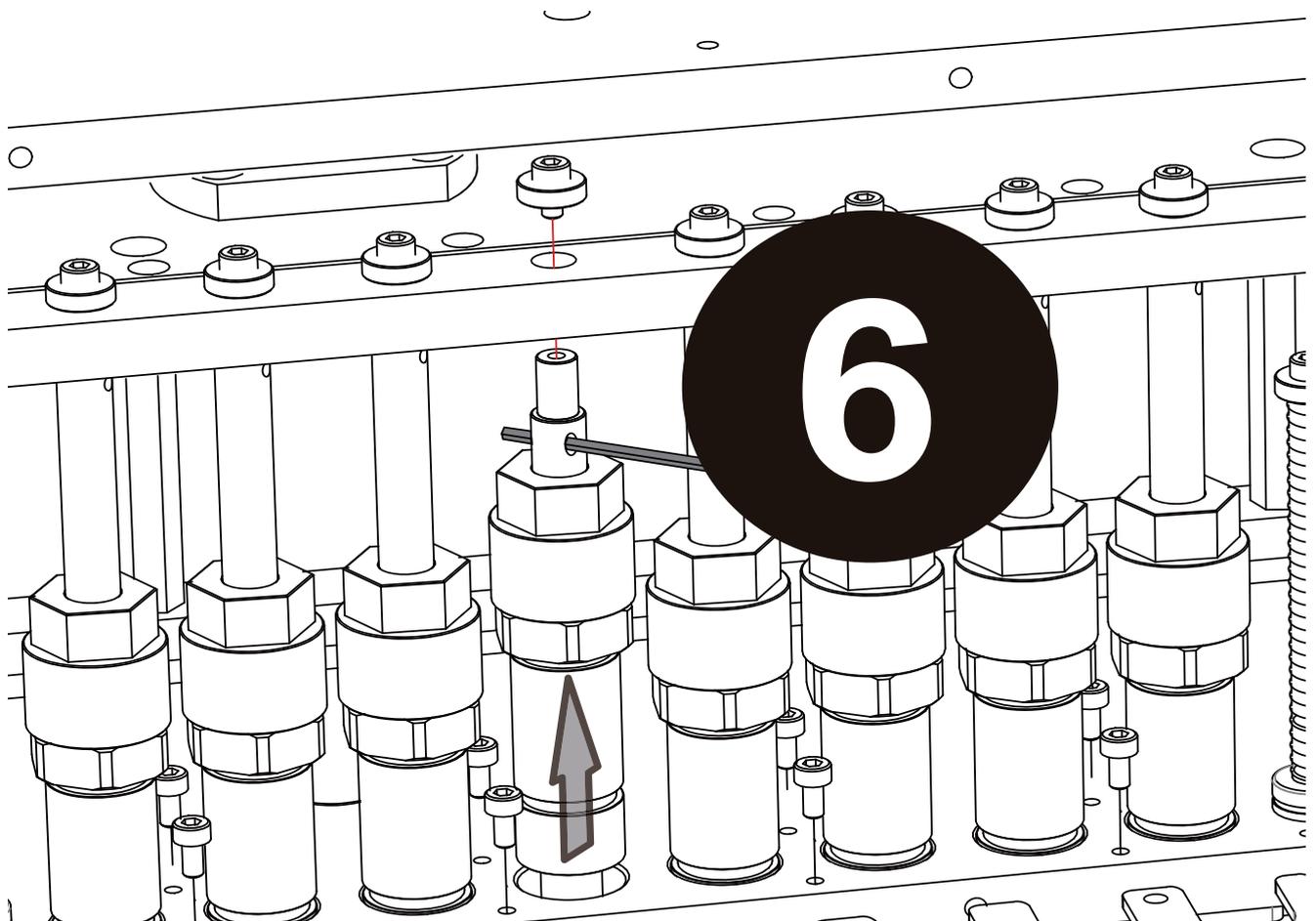
4. Screws off the 8 screws of the fixing pad of the Piston module (4 screws at the inner side (2.5mm hex wrench), and 4 screws at the outer side ((special) 2.5mm hex wrench)).



5. Detach the fixing pad from the machine.

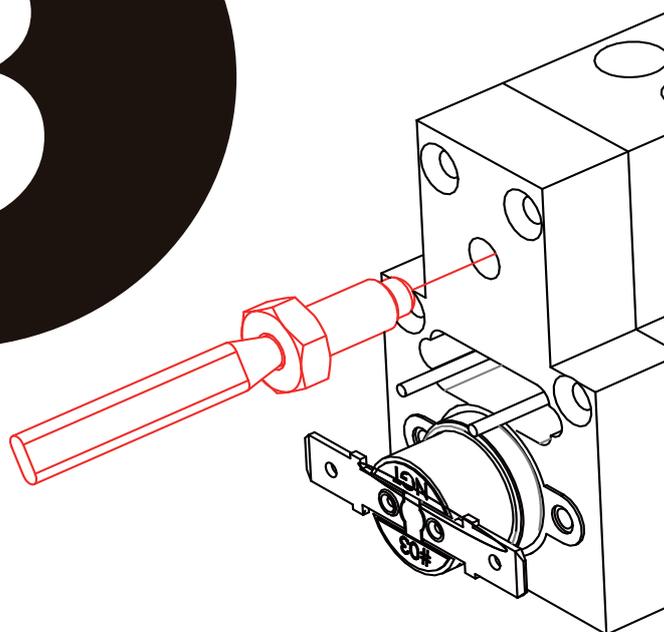


6. Insert a 2mm hex wrench into the hole and screw off the fixing screws (2.5mm hex wrench) to replace the damaged Piston with a new one.
7. Fasten the 8 screws (4 screws at the inner side, and 4 screws at the outer side) of the fixing pad of the Piston module.
8. Fasten the screws of the assistant costal plate at the rear of the Piston module.
9. Attach the protection covers on the both sides of the Piston module.
10. After the replacement is finished, please perform "Test the smooth of picking up the TIP" and "TIP leakage test" .

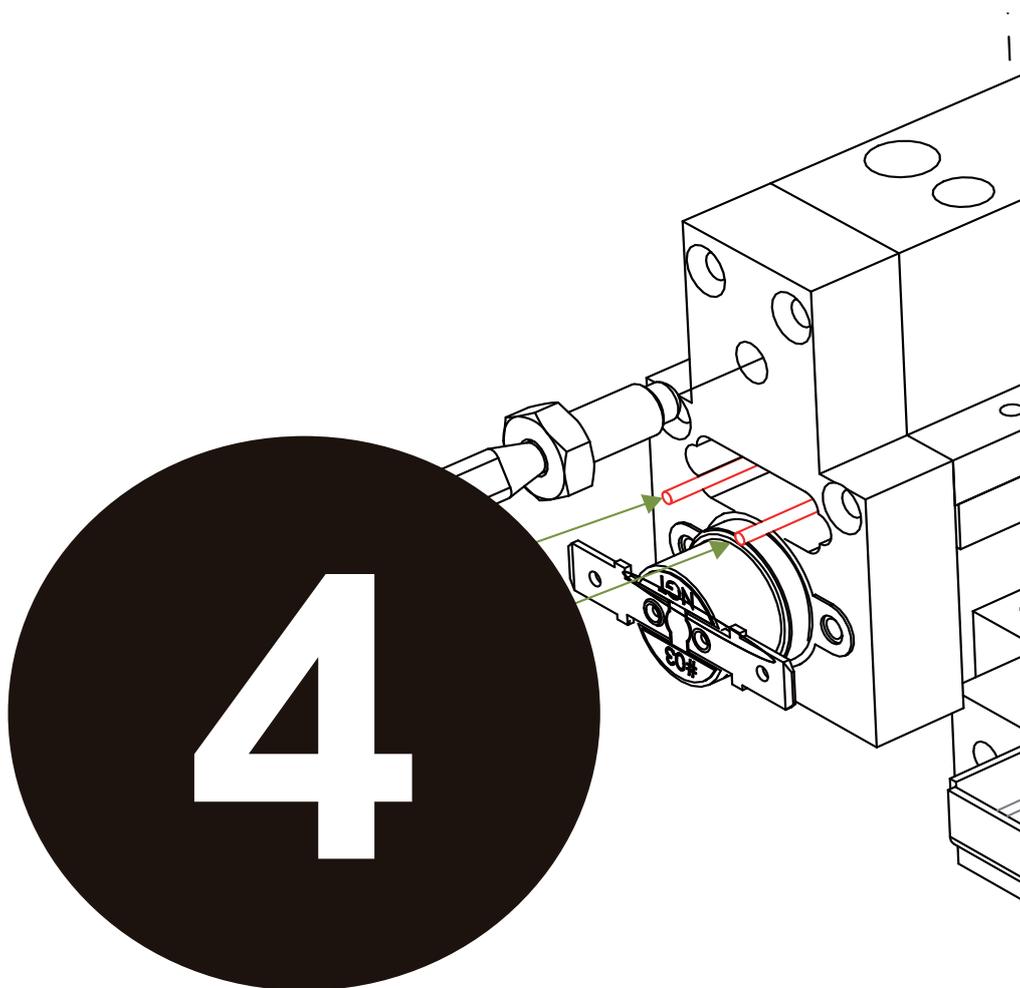


## Replace heater module

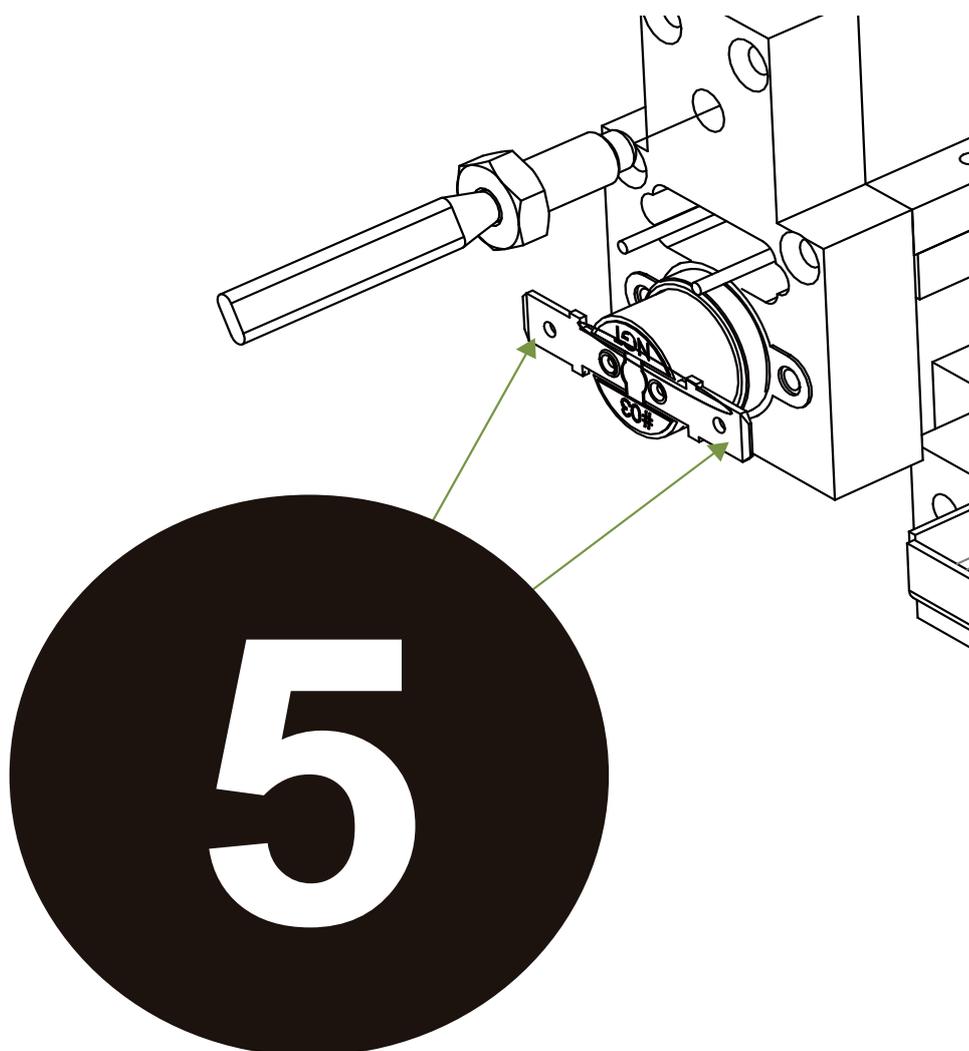
1. Please make sure the power supply of the machine is cut off.
2. Open the maintenance cover at the rear of the machine.
3. Detach the temperature probe of the heater module from the machine (10mm wrench).



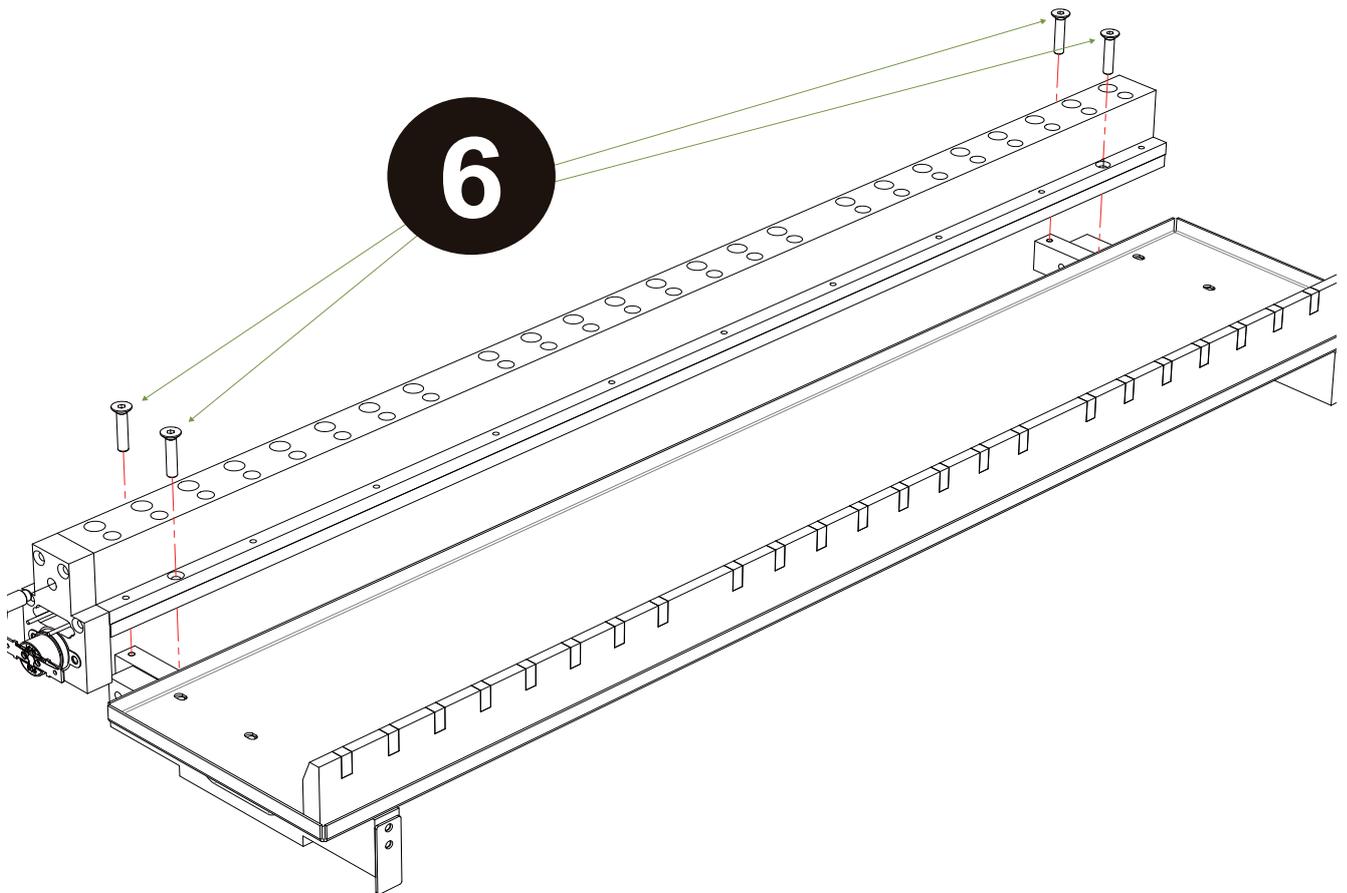
4. Detach the connection wires of the heater from the machine.



5. Detach the wires of the protection switch of the heater from the machine.

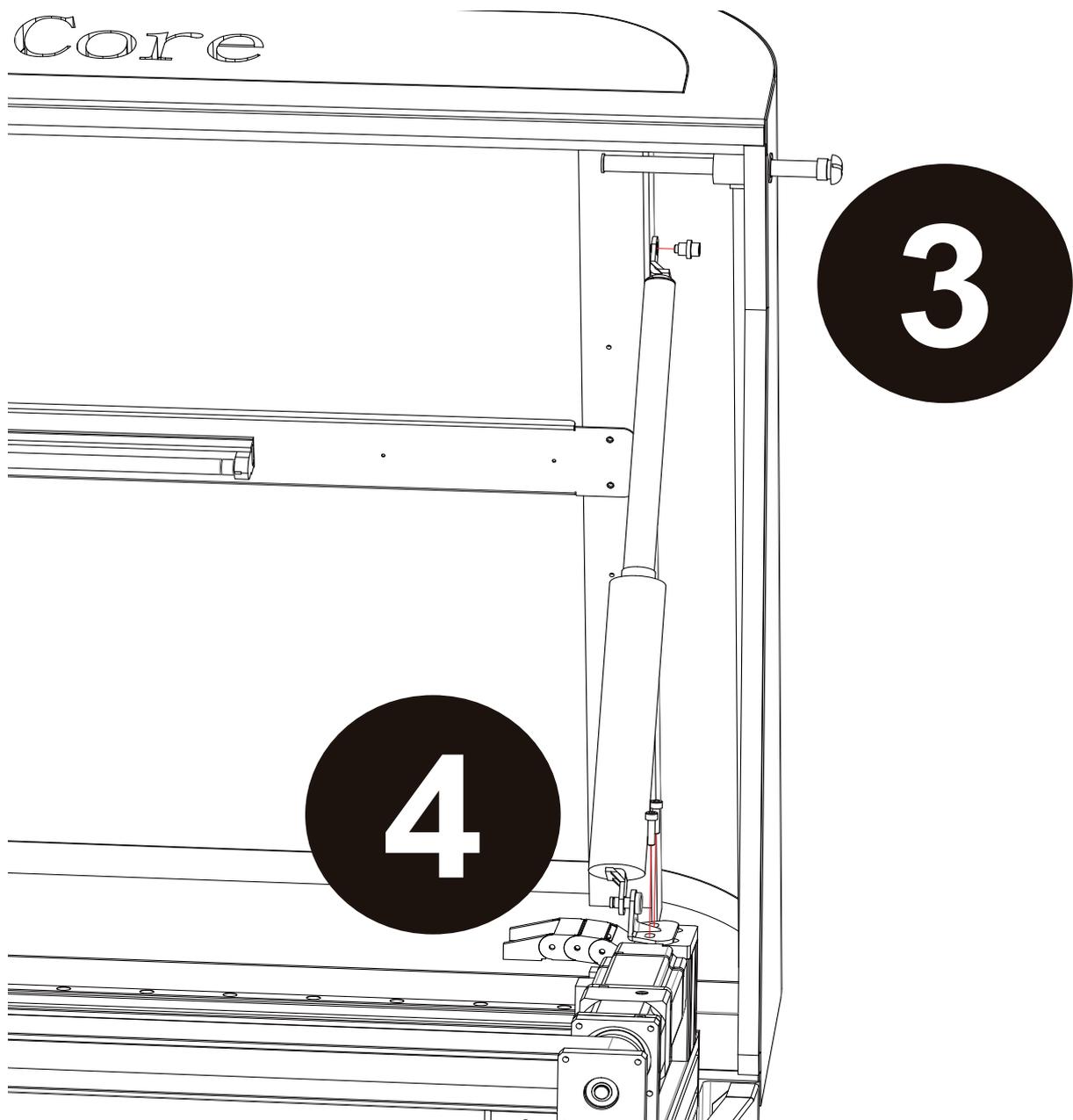


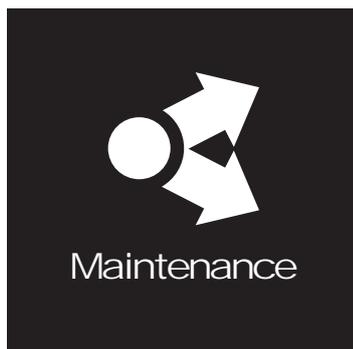
6. Screw off the 4 screws (2.5mm hex wrench) above the heater module.
7. Screw off the fixing screws of the heater module and replace it with a new one.
8. The replacement of the heater module is finished.



## Replace the nitrogen cylinders of the top cover

1. Please make sure the power supply of the machine is cut off.
2. Open the top cover.
3. Screw off the screws (5mm hex wrench) of the cylinder above the top cover.
4. Screw off the screws (5mm hex wrench) at the end connected to the machine (You can only replace the nitrogen cylinder for one side at a time).
5. Replace the old nitrogen cylinder with a new one.
6. Repeat the same steps to replace the nitrogen cylinder at the other side.
7. The replacement of the nitrogen cylinders is finished.



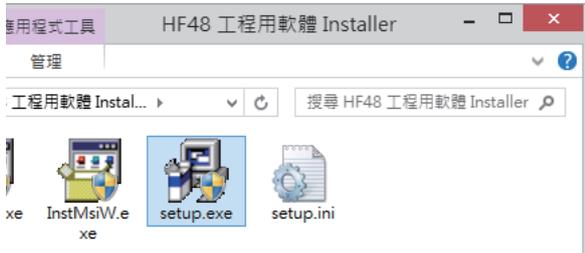


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# Engineering software

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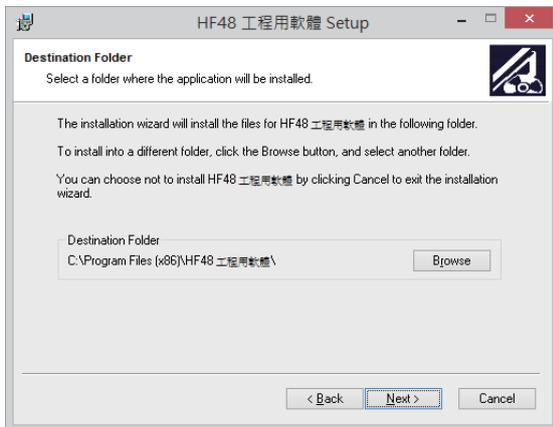
# Software installation



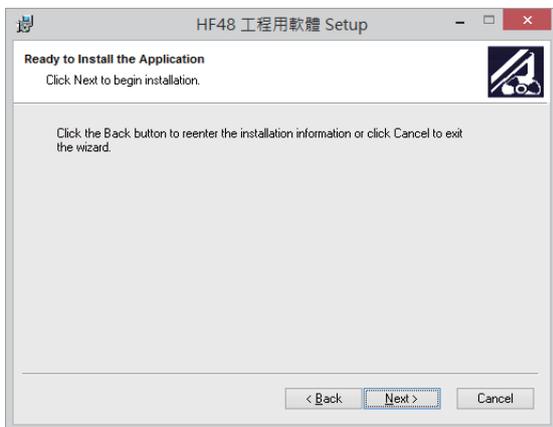
1. Click setup.exe.



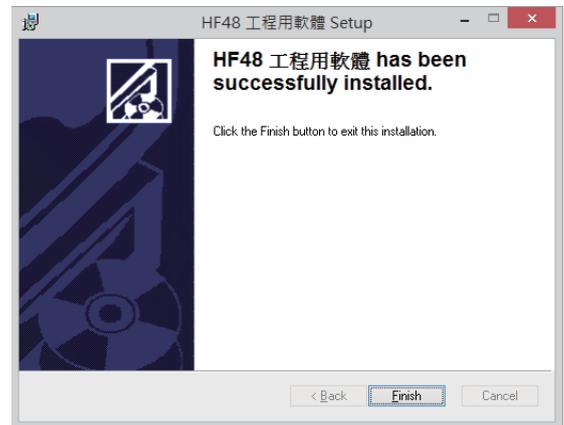
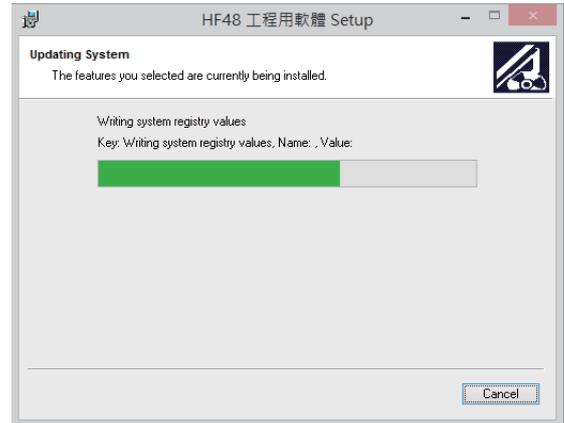
2. Select next.



3. Select next.



4. Select next.



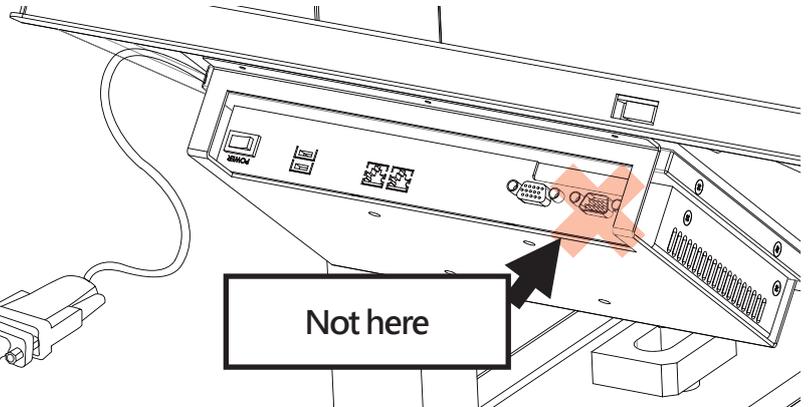
5. The installation is finished.

# Test home distance

1. Please refer to "Installation" → "Test home value" for the information about the pre-steps.
2. Turn on the power.

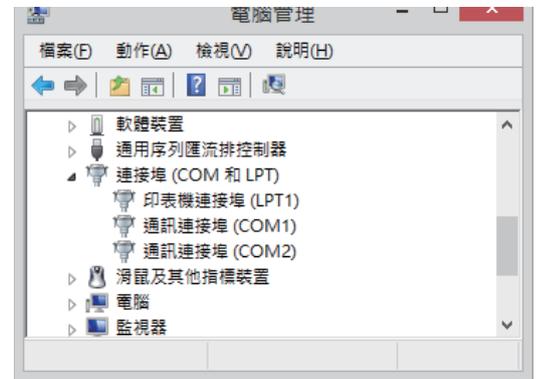
Detach the RS232 wire from the machine and connect the computer to the PLC wire.

Connected to the computer



Not here

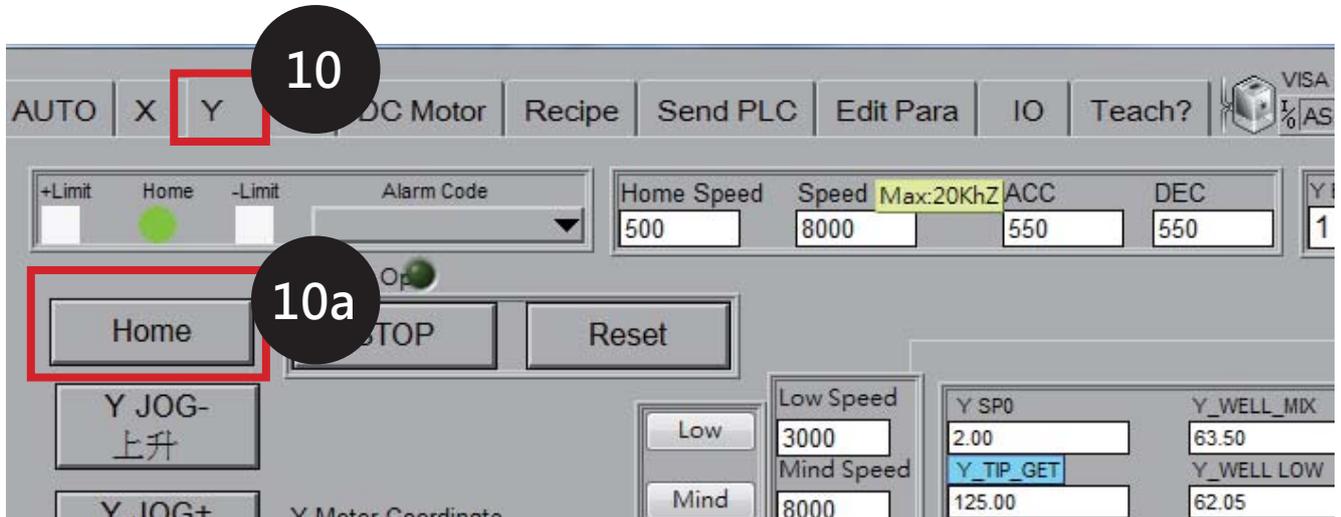
3. Connect RS232 to USB to the computer and make sure the connection port number of the USB wire is COM# in the device manager.
4. Open the engineering software.



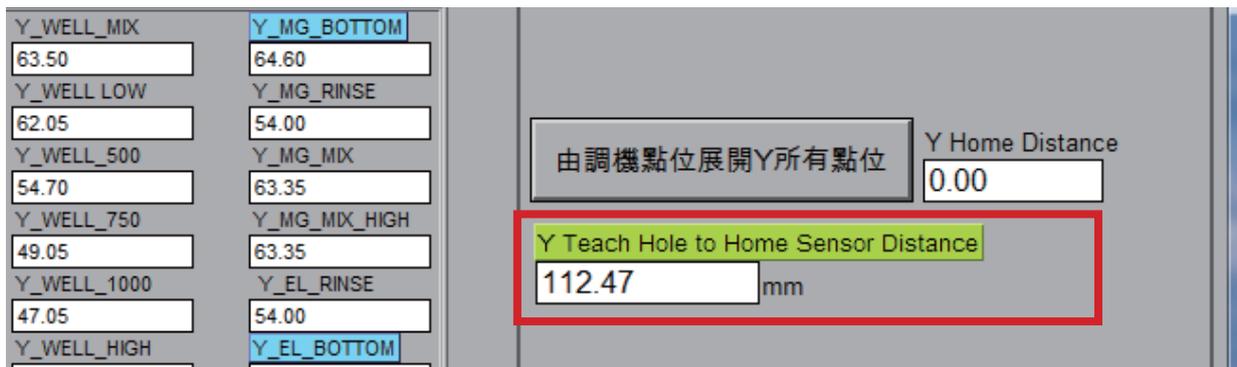
5. Change it to the port number of the USB connection wire and turn on the power. Now the connection icon shows "connected".
6. Select (6a) 「AUTO(TAB PAGE)」 → 「PM operation (item)」 → (6b) 「Initinal(Select)」 → (6c) 「PM Start(Button)」 → (6d) confirm 「reset P2P command」
7. Turn off the power.

5

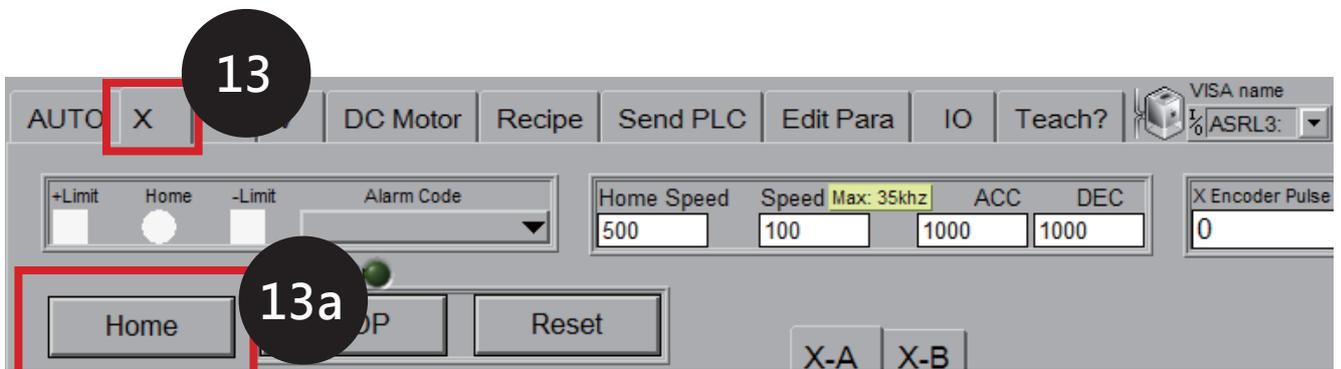
8. Move the Piston module to the position of the calibration tool of the operating area A again.
9. Turn on the power.
10. Select the Y tab in the engineering software → (10a) press HOME button.



11. Now the Y-axis will move up slowly to measure the distance.
12. Please record the measured values after the measurement is finished.



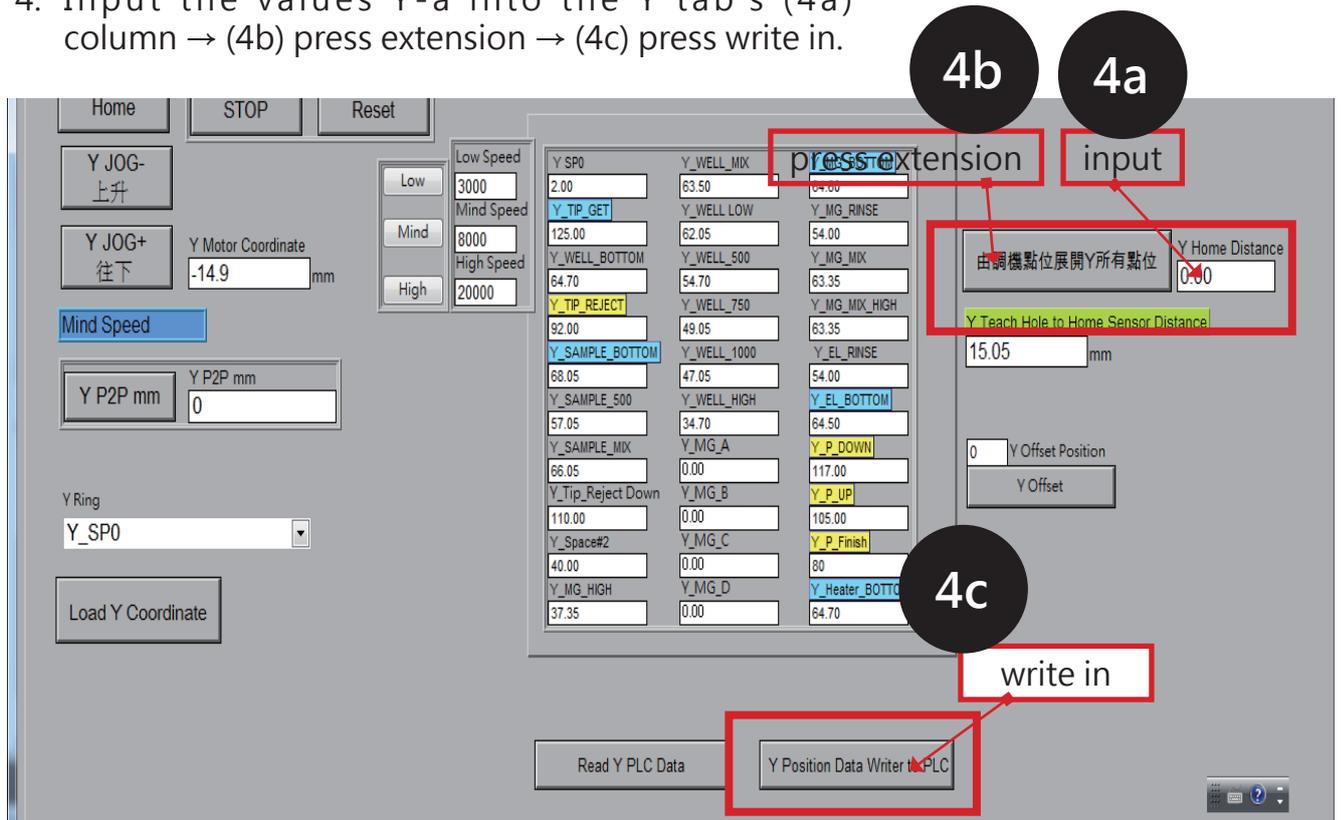
13. Select the X tab in the engineering software → (13a) press HOME button.



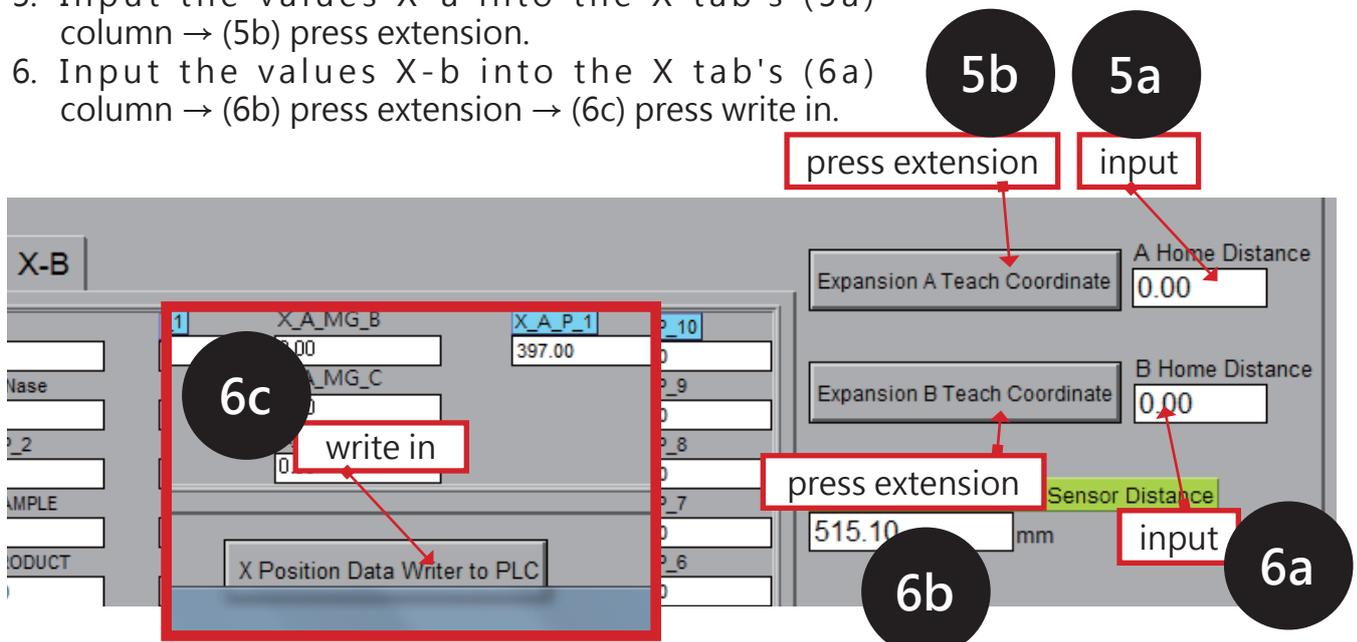
14. Now the X-axis will move up slowly to measure the distance.
15. Please record the measured values after the measurement is finished.
16. Cut off the power and test the operating area B according to the above steps and then record the test result.

## Write in home distanc

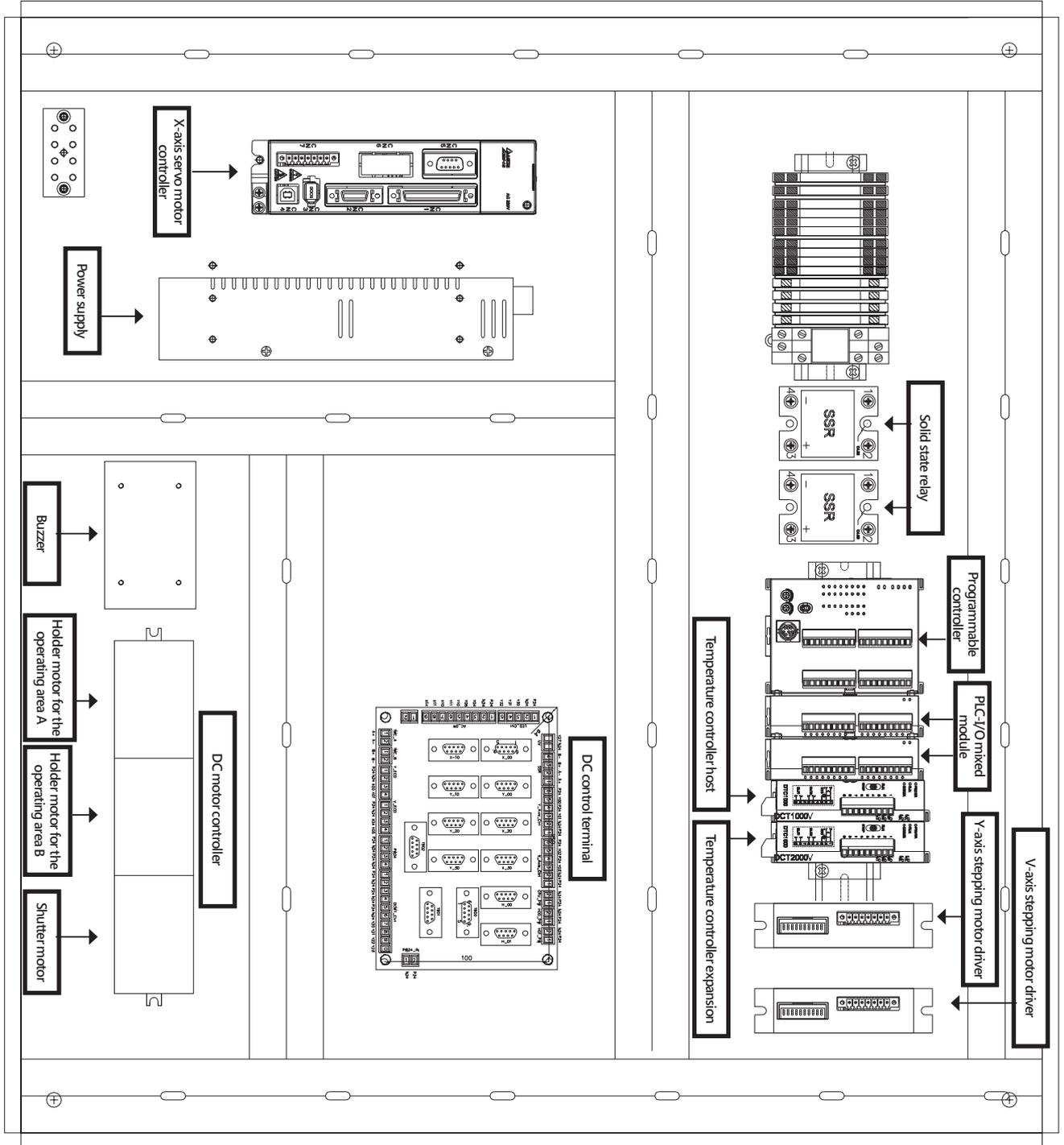
1. Please refer to "installation" → " Test home value" → " Measure the interval between Y axis and costal plate" → " Measure the level height of X-axis and costal plates at area A and area B" for the information about the pre-steps to make sure whether the accuracy of the machine drifts before writing in the home distance.
2. Prepare the 4 values (Y-a/X-a/Y-b/X-b/) measured by the step- "Test home distance" .
3. Turn on the power.
4. Input the values Y-a into the Y tab's (4a) column → (4b) press extension → (4c) press write in.



5. Input the values X-a into the X tab's (5a) column → (5b) press extension.
6. Input the values X-b into the X tab's (6a) column → (6b) press extension → (6c) press write in.



# Power panel components configuration figure









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