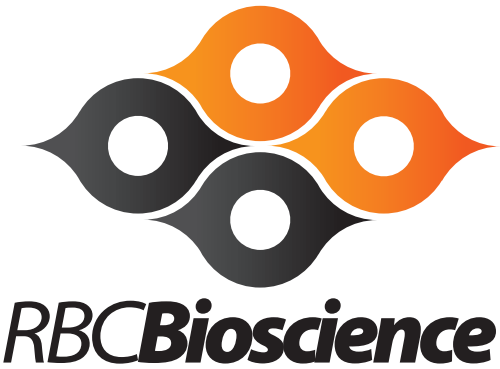
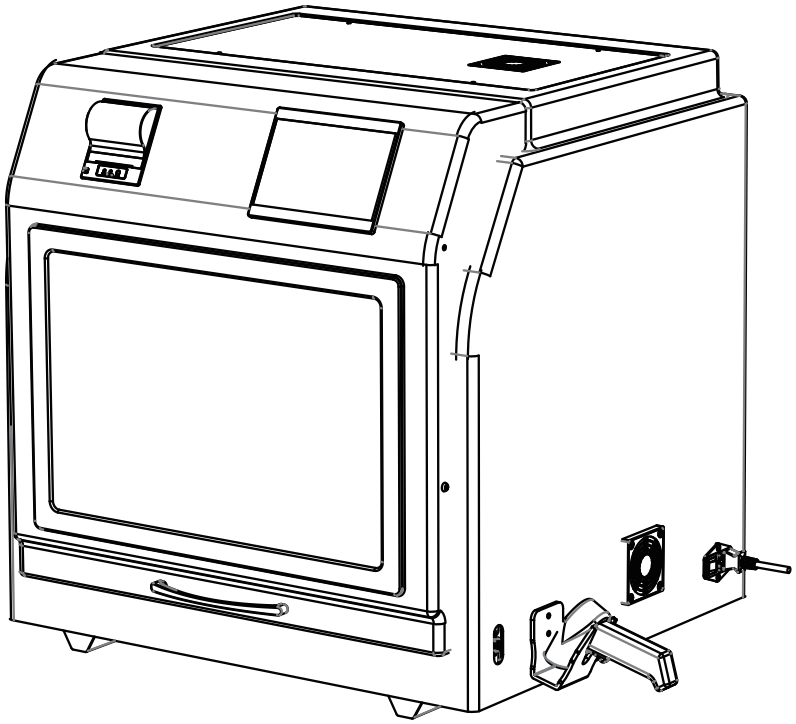

RBCBioscience

MagCore®

MagCore® Super
MagCore® HF16 Plus

Service Manual



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Ver. 2014-1
www.rbcbioscience.com

CE IVD

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.

CAUTIONS
Risk Of Electric Shock Do Not Open

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 isintended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Be aware of contaimination by contagious specimens.

High temperature warning!!

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

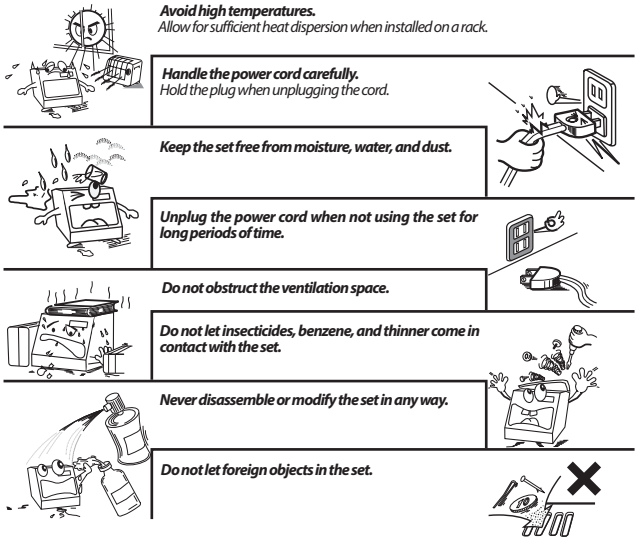
CAUTION:

1. 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.

2. Do not open the top cover
In order to prevent electric shock, do not open the top cover.

3. 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:



SAFETY INSTRUCTIONS

1. ***Read Instructions*** *– All the safety and operating instructions should be read before the product is operated.*
2. ***Retain Instructions*** *– The safety and operating instructions should be retained for future reference.*
3. ***Heed Warnings*** *– All warnings on the product and in the operating instructions should be adhered to.*
4. ***Follow Instructions*** *– All operating and use instructions should be followed.*
5. ***Cleaning*** *– Unplug this product from the wall outlet before cleaning. Only allow to use 75% of EtOH to clean the surface of instrument.*
6. ***Attachments*** *– Do not use attachments not recommended by the product manufacturer as they may cause hazards.*
7. ***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.*
8. ***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.*
9. ***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.*
10. ***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.*
11. ***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.*
12. ***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.*
13. ***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.*
14. ***Overloading*** *– Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in a risk of fire or electric shock.*
15. ***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.*
16. ***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.*
17. ***Damage Requiring Service*** *– Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:*
    - ***a)*** *When the power-supply cord or plug is damaged,*
    - ***b)*** *If liquid has been spilled, or objects have fallen into the product,*
    - ***c)*** *If the product has been exposed to rain or water,*
    - ***d)*** *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,*
    - ***e)*** *If the product has been dropped or damaged in any way, and*
    - ***f)*** *When the product exhibits a distinct change in performance*

    – this indicates a need for service.
18. ***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.*
19. ***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.*
20. ***Heat*** *– The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products that produce heat.*

Specification

Model	Super / HF16 Plus
Processing Capacity	Max. 16 samples per batch
System Components	1. Pipetting Unit: Dispensing, transferring, X-Y two axis movements. 2. Electric Control: PLC module and Arm-based main board embedded in. 3. UV Light: Power 8W, life duration 10,000 Hrs. 4. D2 Lamp life: 800 hours. (MagCore Super Only) 5. Heating Block: RT~90°C. 6. OD detection range: ABS <6. (MagCore Super Only) 7. Detection source: D2 lamp. (MagCore Super Only) 8. Detection wavelength: 260nm, 280nm, 320nm. 9. Display Screen: 7 inch colored touch panel. 10. Accessories: T - Rack, Cartridge Rack. 11. Barcode Scanner(MagCore HF16 Plus optional), embedded thermal printer. (MagCore Super only)
Power Supply	Voltage: AC 100V~ 240V; Frequency: 50/60Hz
Dimension	W760 x D710 x H770 (mm) / W27.95 x D29.92 x H30.31 (inches)
Net Weight	76.5kg / 168.68LB (MagCore Super) / 68.5kg / 151LB (MagCore HF16 Plus)

– Operating Parameters

Processing Capacity	1~16 samples per batch
Processing Time	30-90 minutes (depends on sample type and method)
Sample Volume	200/400/1200 µl
Elution Volume	60/100/150/200 µl
Purity	DNA : O.D $A_{260/280}$ ratio 1.8 ± 0.1 RNA : O.D $A_{260/280}$ ratio 2.0 ± 0.2

– Operating Environment

Temperatures allowed during transportation storage packaging	15℃~35℃
Temperatures allowed during operation	18℃~30℃
Pollution Degree	Indoor

– Applications

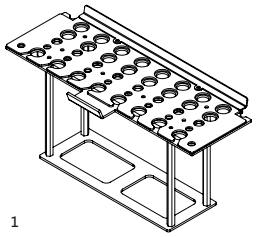
Whole Blood (200/400µl), Viral Nucleic Acid (DNA/RNA), Tissue Genomic DNA, Plant Genomic DNA, Bacteria Kit, Total RNA Kit

INDEX

Safety Precautions 1
Specification 2
Accessories 5
Installation 6
Before Install 6
System Overview 7
Installation settings and test 8
Touch Panel and User Interface 9
Install MagCore® Cuvette 10
Install reagent cartridge 10
Install Tube, Tip 10
Emergent Stop 11
Start Programs 12
If the test result of the optic measurement is over detection (MagCore Super Only) 13
Stop 15
Enable the barcode function (MagCore HF16 Plus Only) 15
Barcode scanning and editing (MagCore HF16 Optional) 16
Optic data (MagCore Super Only) 16
Easy maintenance 17
Replace O-Ring 17
Piston Test 17
Clean Piercing Needles 19
Reject Tip 19
Heater Test 20
Optic Test 20
UV sterilization 21
Alarm History 21
System Status 22
Set up the system time 22
Update Program 23
Clean the Waste Box 23
Replace thermal paper 24
Replace fuse 24
Advanced maintenance 25
Disassemble the back service lid 27
Disassemble the top service lid 28
Axis directions 29
Replace the UV lamp 30
Replace LED Light 31

Replace the optic lamp (MagCore Super Only) 32
Replace the pistons 33
Replace the ejector rod module 34
Replace the heater module 36
Replace the gas spring on front door 37
Replace the M-axis sensors 38
Replace the sensors of C, V, X and Y axes 39
Replace the X-axis stepper motor 40
Replace the Y-axis motor 41
Replace the Y-axis belt 42
Replace the V-axis motor 43
Replace the C-axis motor 45
Replace the C-axis timing belt 46
Replace the lift motor of the base 47
Replace the timing belt of the lift motor of the base 48
Electrical control and engineering software 49
Main board configuration 50
Copy the engineering software to the desktop 51
Install the HMI updating software 51
Create an uploading folder 52
Install the driver 53
HMI updating 55
PLC updating 56
Position Teaching Tools 58
The pre-operation before calibration 59
X-axis calibration 60
Y-axis calibration 61
C-axis calibration (Magcore Super Only) 62
Trouble Shooting for Alarm Code 64

Accessories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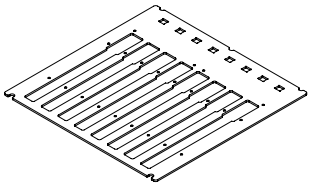
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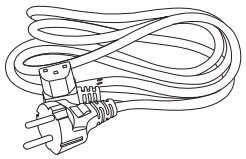
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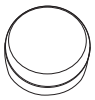
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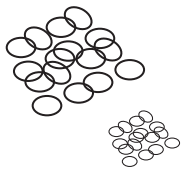
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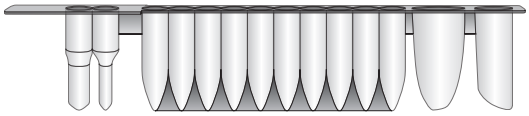
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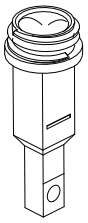
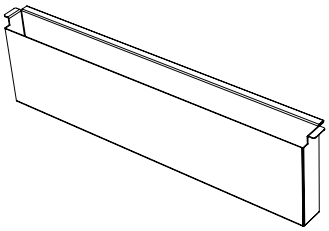

10
(MagCore Super Only)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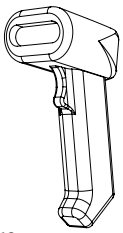
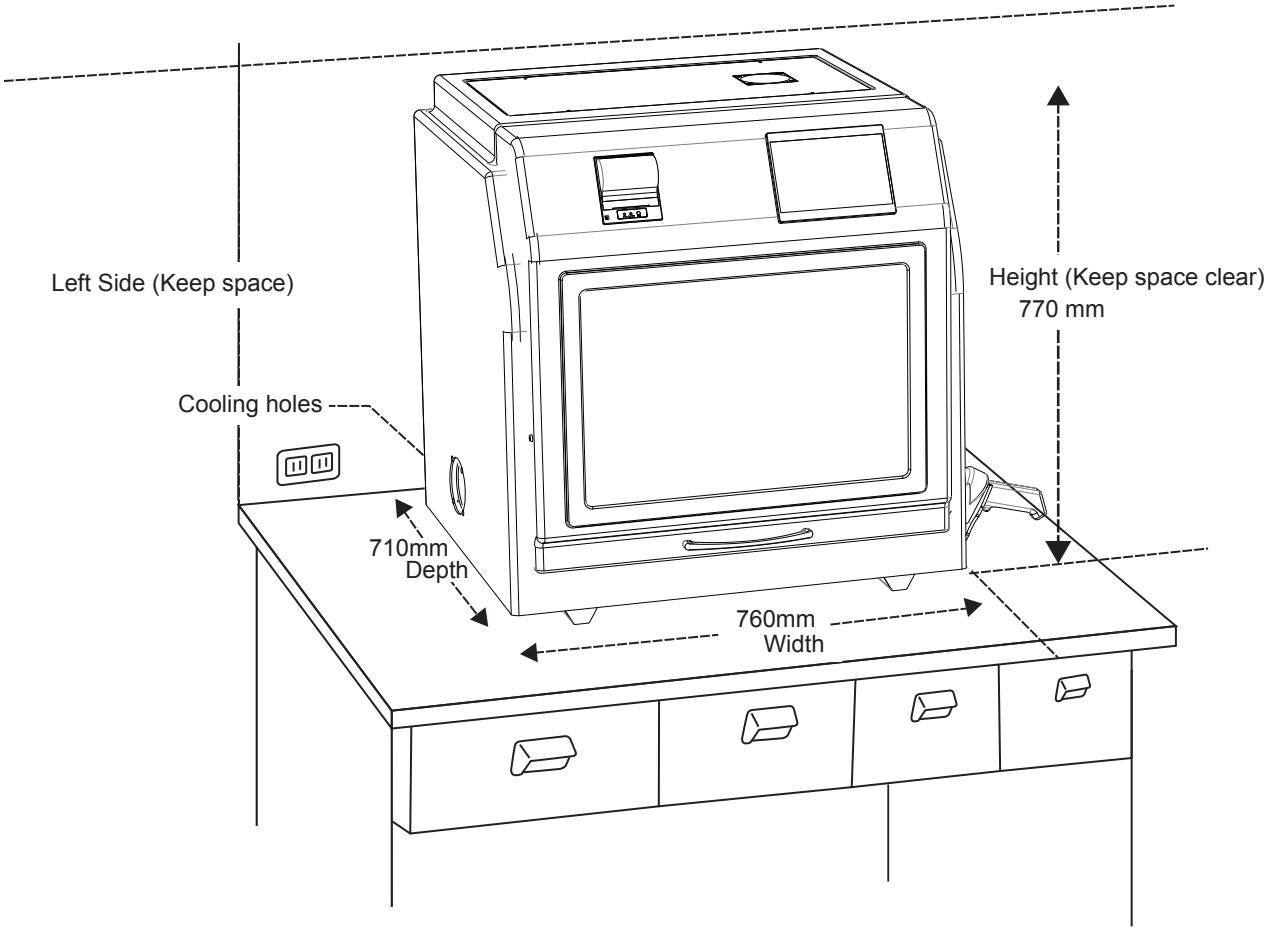

12
(MagCore HF16 Optional)

1. T-Rack X 2
2. Cartridge Rack X 2
3. Power Cable X 2 (Europe standard and U.S.A standard)
4. Grease X 1
5. 3mm O-Rings X 16
6. 5mm O-Rings X 16
7. Empty Cartridge X 10
8. Sample Tube /Elution Tube X 20
9. Pipette Tip X 20
10. MagCore Cuvette Set(10pcs) X 1
11. Waste Box X 1
12. Barcode Scanner X 1 (MagCore Super Only)

You can purchase Cat. No.: MSC100 MagCore Cuvette Set (X100) from the local distributor.

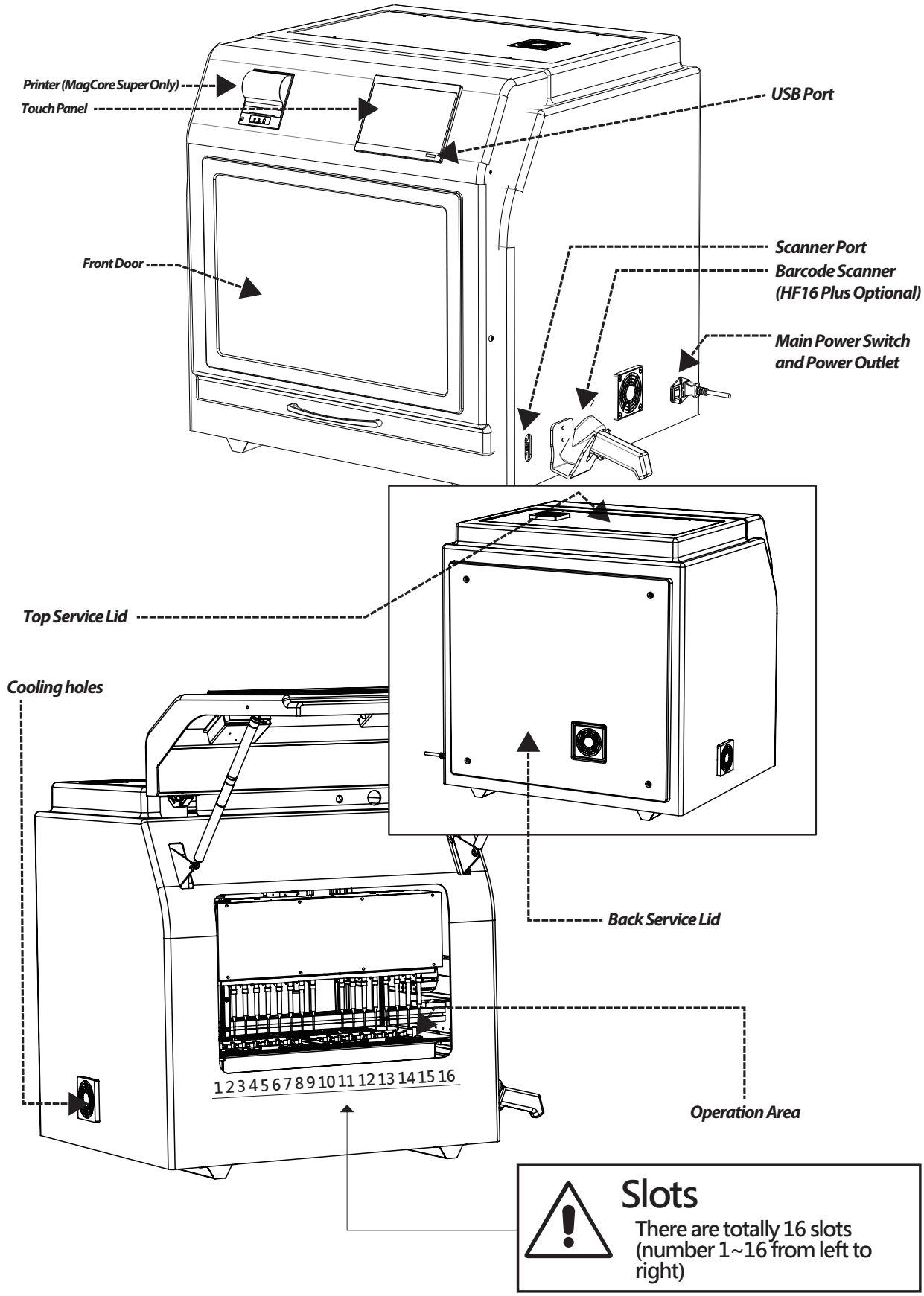
Installation

– Before Install



Please refer to the machine size shown in the above figure to prepare an appropriate position for the machine and reserve space for thermal dissipation.

– System Overview

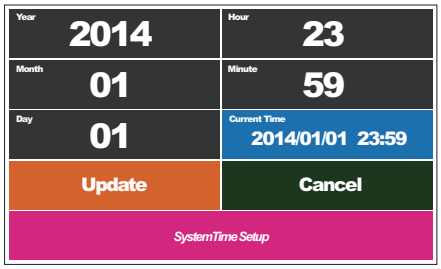


Slots

There are totally 16 slots (number 1~16 from left to right)

– Installation settings and test

Step 1.
Please set up the local time.



Please refer to System Status chapter for the information about the operation.

Step 2.
Test piston

Please refer to Piston Test chapter for the information about the operation.

Step 3.
Test heater

Please refer to Heater Test chapter for the information about the operation.

Step 4
Test optic module
(MagCore Super Only)

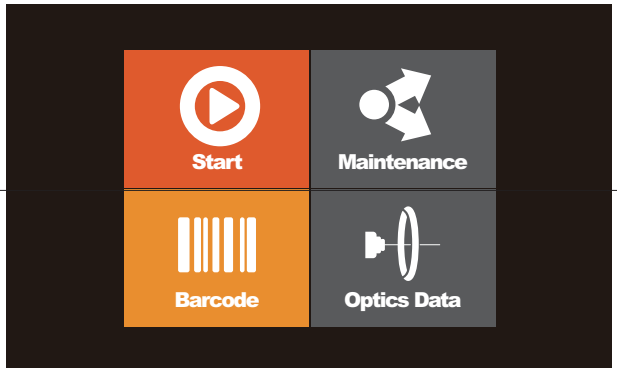
Please refer to Optic Test chapter for the information about the operation.

When the optic module test is finished, please compare the result with the factory document to make sure the function of optic module.

Touch Panel and User Interface

Start
Execute the extraction process

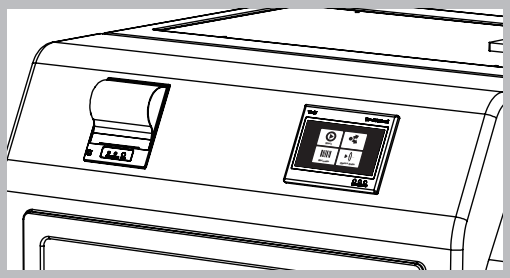
Barcode
Barcode scanning, editing, printing functions
(MagCore HF16 Plus optional)



Maintenance
Easy maintenance and system setting functions

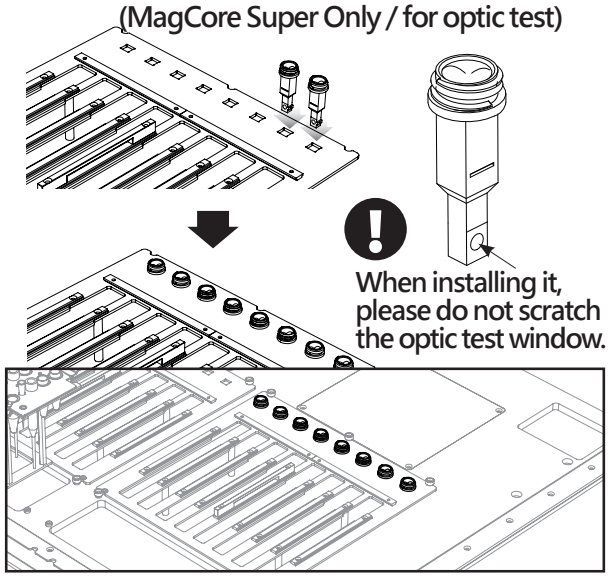
Optics
Optics data browsing and output functions
(MagCore Super only)

MagCore® Super / HF16 Plus provides 7-inch full-color touch panel and easy-to-use user interface. Operator only needs to pay attention to the panel to know the current status, ending time and test report of the machine. The above figure shows the function list of the operation screen and the description of the status icons.



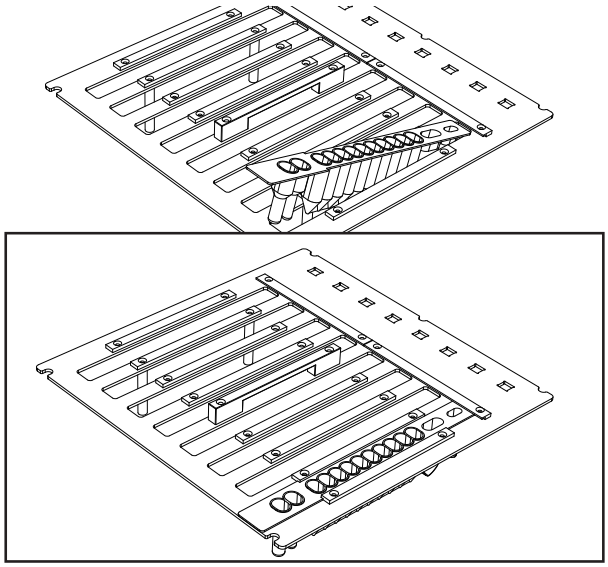
– Install MagCore® Cuvette

(MagCore Super Only / for optic test)



1. Please put MagCore® Cuvette into the corresponding sample's well. The installation of Cuvette is directional. It is impossible to put it into the well if the direction is not correct.
2. Put the 200 µl SP tip into the W4 of the T-Rack.

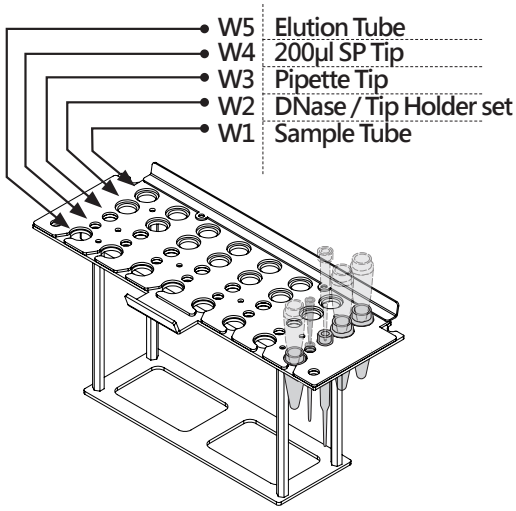
– Install reagent cartridge



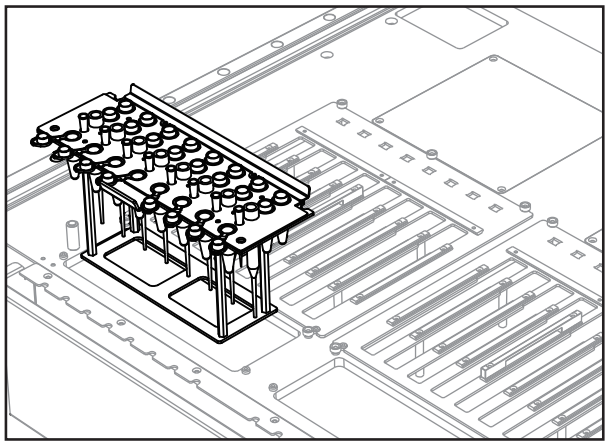
Please insert the front end of the cartridge into the space below the fixing plate of the Cartridge Rack.

Please insert the Cartridge Rack before the T-Rack.

– Install Tube, Tip



1. Put the tip into the corresponding well according to the left figure.
2. Put the T-Rack on the machine.



Please install the Tip and Tube according to the instructions of extraction kit user manual.

Warning :

Please do not use the Tips and Tubes which are not provided by the original manufacturer. The test result may be not correct and the machine may be damaged due to different Tips and Tubes.

– Emergent Stop

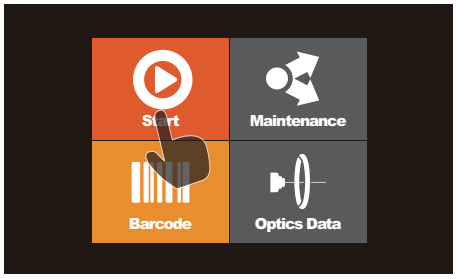
Please read the security information to correctly stop the machine when an accident takes place.

When an emergency situation occurs and the machine is running, please press the stop button or open the door of the machine to stop the machine immediately.

– Start Programs

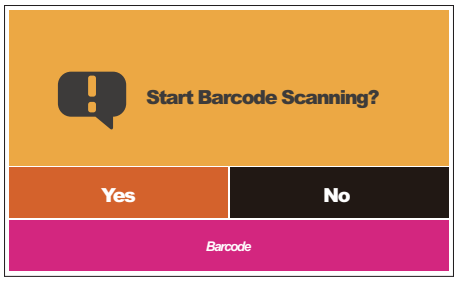
1

Please pretreat the sample according to the instructions of the user manual of the MagCore® Kit and put consumables into the machine.

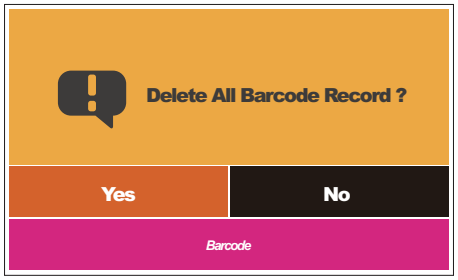


Press Start to go to the next step.

2



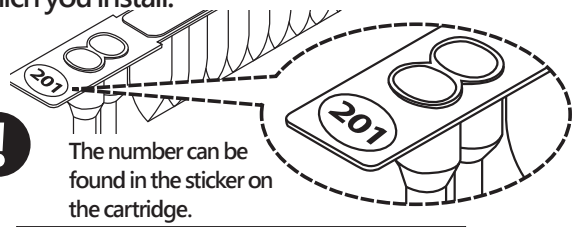
System will ask you whether or not to scan the barcode.



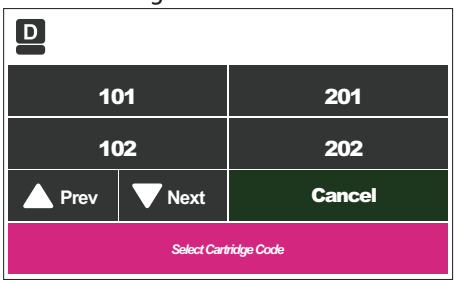
If there is a barcode record from previous test processes, the system will ask you whether or not to delete previous barcode record. If there is no barcode record, the system will not ask you. (MagCore Super only; HF16 Plus optional)

3

Please confirm the number of the reagent set which you install.

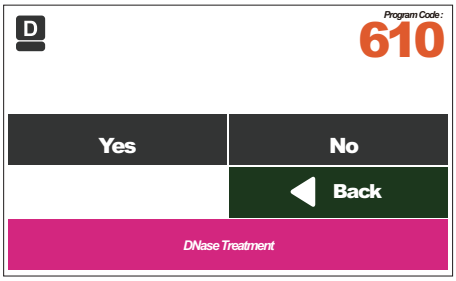


The number can be found in the sticker on the cartridge.



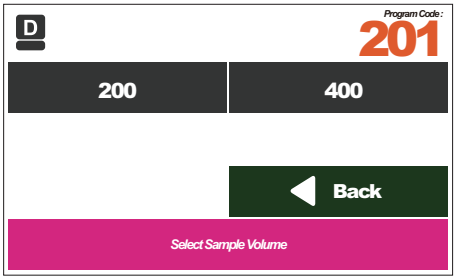
Select the number of the cartridge.

4



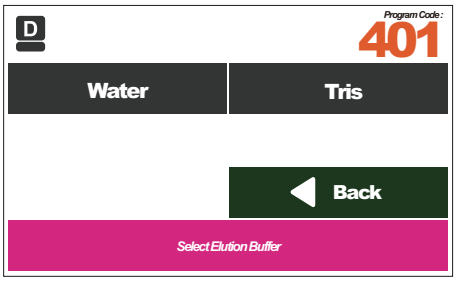
Select DNase Treatment. (Only for RNA kit.)

5



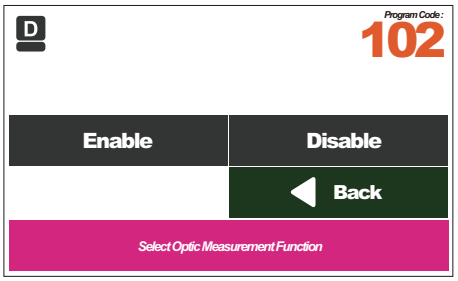
Select Sample Volume.

6



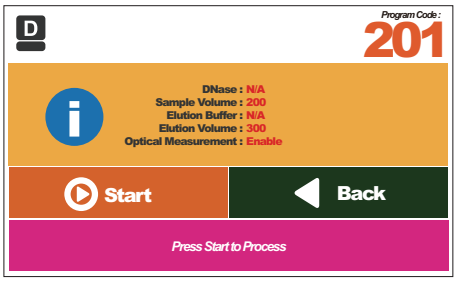
Select Elution Buffer. (Only for tissue kit.)

7



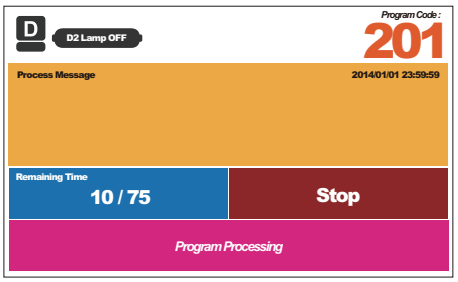
Select to enable or disable the optic measurement function. (MagCore Super Only)
(201, 202, 211, 105 without the function)

8



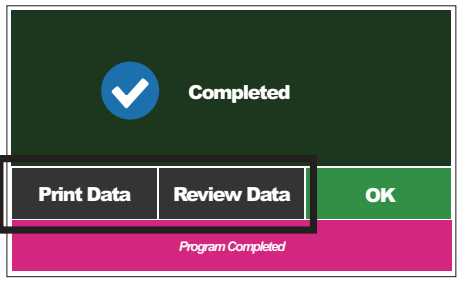
Please confirm the parameters and press the Start button to execute the program.

9



Automatic extraction process.

10



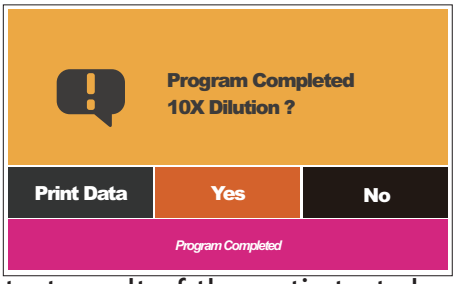
The extraction process is completed.

If you select the optic measurement funtion, you can browse, print or output the test result to a USB Flash Drive (please refer to the optic data chapter).

– If the test result of the optic measurement is over detection

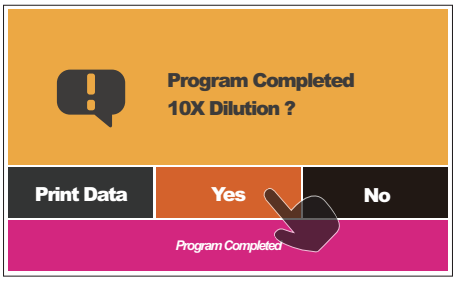
(MagCore Super Only)

1

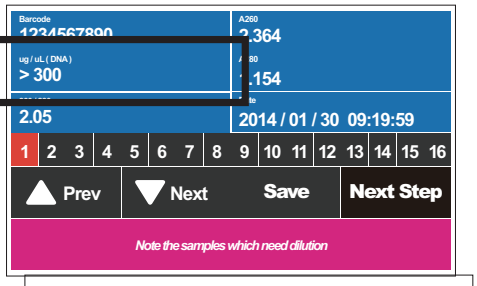


If the test result of the optic test shows the concentration is over detection (DNA >300ng/µl / RNA > 240 ng/µl), the system will ask you to dilute.

A.Please record and save the current measured data.



Please select YES.

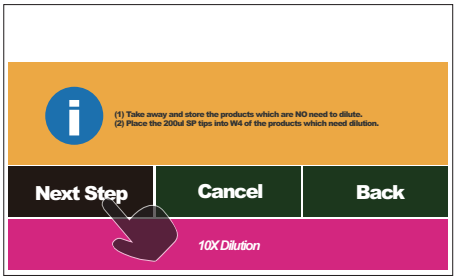


The values are DNA >300 ng/µl / RNA > 240 ng/µl

Please check the value of each sample. If there is a value showing DNA >300 ng/µl or RNA > 240 ng/µl, please record the number of the sample. It means the sample needs to be diluted. After recording the number of the slot, please insert the USB Flash Drive and press the Save button to save to current measured data. After finishing the above steps, please press Next Step.

Please save the data in the USB Flash Drive and transfer to computer, or the data in the USB Flash Drive may be overwritten later.

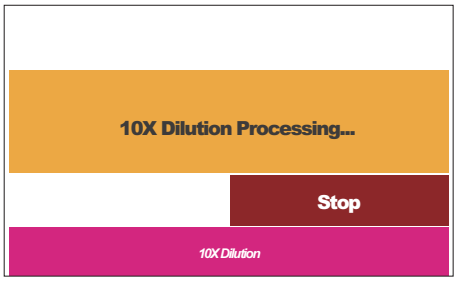
File name: OpticsSampleData.cvs



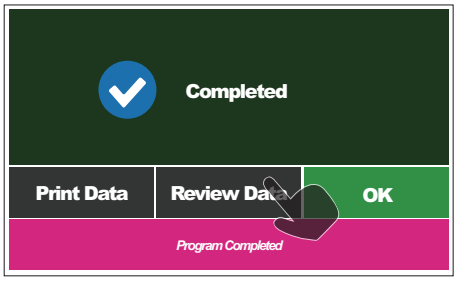
B.Prepare to dilute

1. Please take out the elution products which are no need to be diluted.
2. Please put a new 200μl SP Tip in the W4 corresponding to the sample to be diluted.
3. Press Next Step to continue the process.

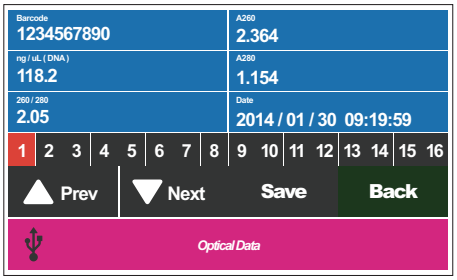
Please confirm and press Start to dilute it.



Diluting.



The diluting process is completed; please press Review Data to show the measured value after dilution.



C. Record and save the measured values.

1. Insert the USB Flash Drive and then press the Save button to save the current measured values after the USB icon shows in the status bar. Please take out the USB Flash Drive and then you can perform other operations after the icon of USB Flash Drive disappears.
2. The file saved last time and this file are all data obtained from this test.

If the file saved last time is lost, you can retrieve this file according to the instructions of optic test data chapter.

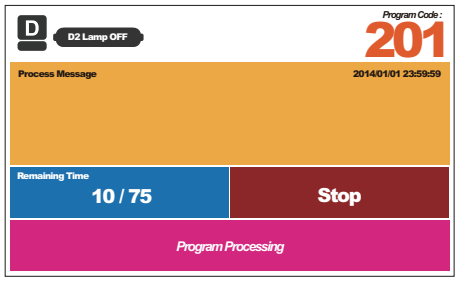
Please save the data in the USB Flash Drive and transfer to computer, or the data in the USB Flash Drive may be overwritten later.

File name:
OpticsSampleData.cvs

Previous file name:
Pre_OpticsSampleData.cvs

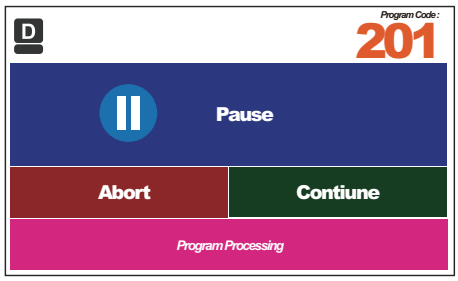
– Stop

1



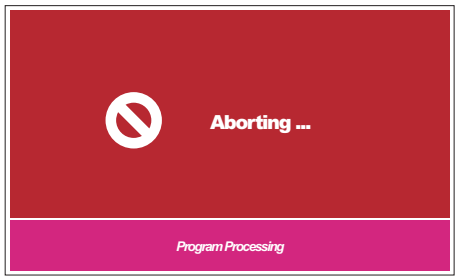
During the test process, please press the Stop button if you want to pause.

2



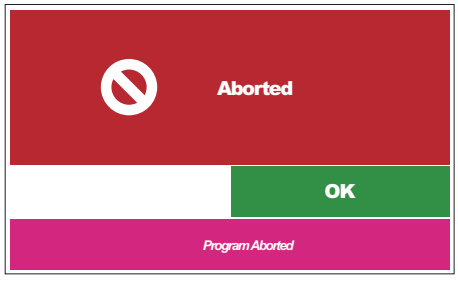
Please press the Abort button if you want to end the test.

3



The test is aborting, and the machine is returning to the original position. Please do not operate the machine during the process.

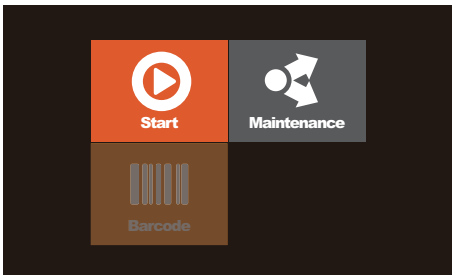
4



The machine has been stopped and reset, please press the OK button to go back to the main menu.

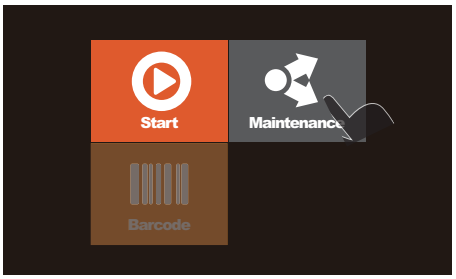
– Enable the barcode function

(MagCore HF16 Plus Only)



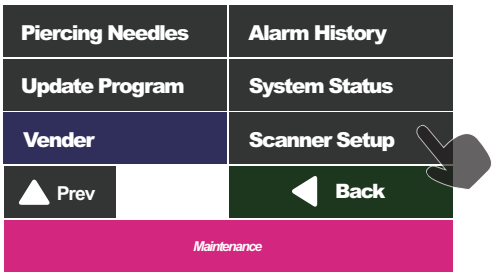
The barcode function of MagCore HF16 Plus is not enabled by default. If you already purchase the barcode scanner, you have to enable the scanner function.

1



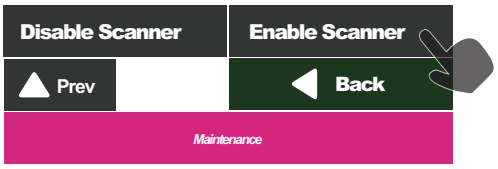
Select maintenance.

2

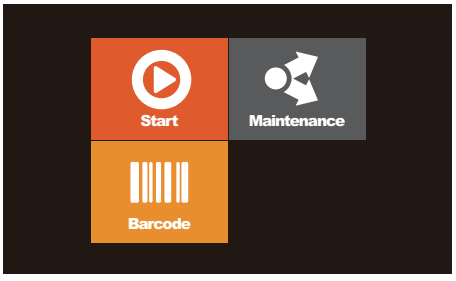


Select Scanner Setup.

3



Select Enable Scanner.

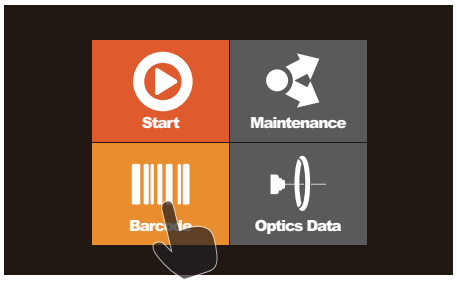


The Barcode function is enabled.

– Barcode scanning and editing

(MagCore HF16 Optional)

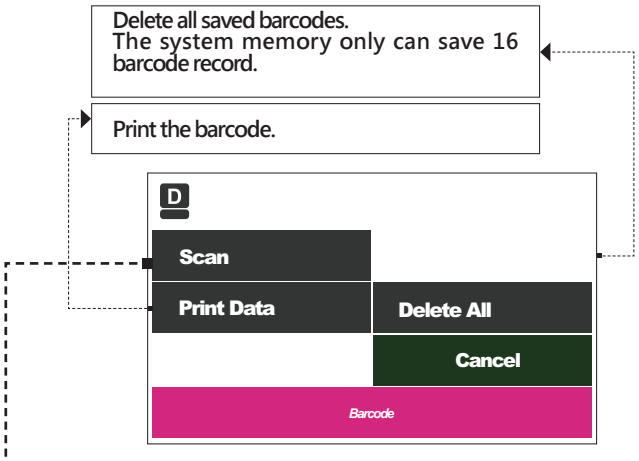
1



Please select the Barcode button in the main menu.

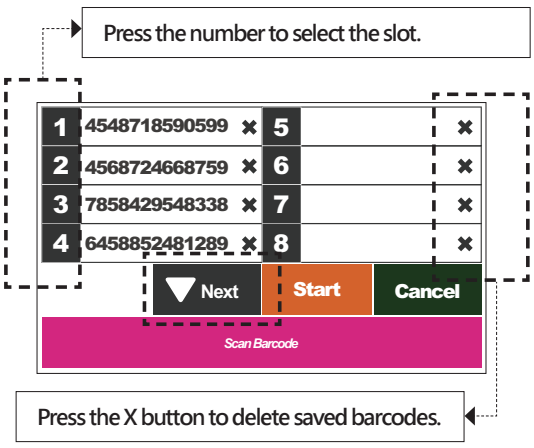
2

[Barcode main menu]



Please press the Scan button if you want to scan it.

3

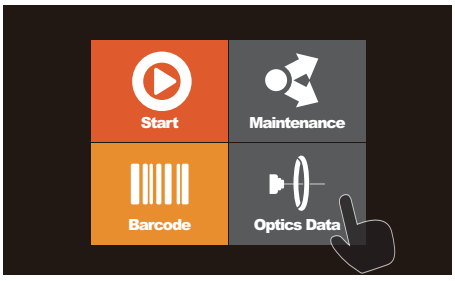


You can press the Start button to execute the test after scanning.
Please refer to the System Overview chapter for the information about the numbers of the wells to be scanned.

– Optic data

(MagCore Super Only)

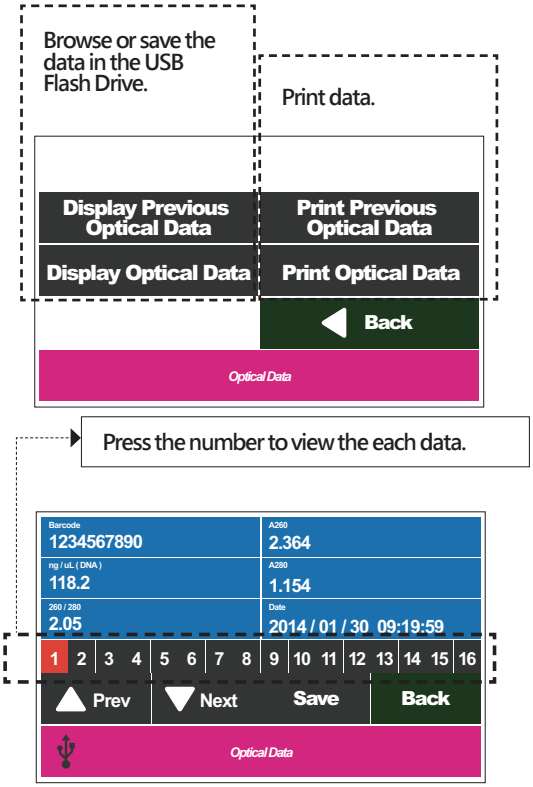
1



Please select the Optics Data button in the main menu.

2

[Optics Data main menu]
The machine will automatically save two batches of data in the memory.

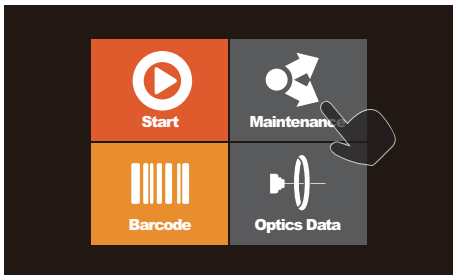


Save file
Insert the USB Flash Drive and then press the Save button to store the current measured values after the USB icon shows in the status bar. Please take out the USB Flash Drive and then you can perform other operations after the icon of USB Flash Drive disappears.
Please refer to the System Overview chapter for the information about the numbers of the slots.

Please save the data in the USB Flash Drive and transfer to computer, or the data in the USB Flash Drive may be overwritten later.

File name:
OpticsSampleData.cvs
Previous file name:
Pre_OpticsSampleData.cvs

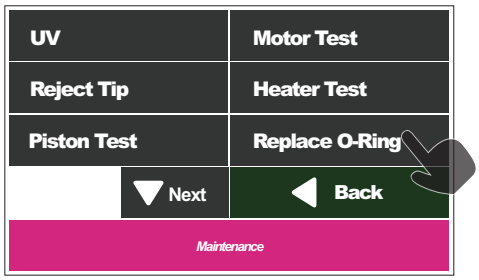
Easy maintenance



Easy maintenance includes the maintenance items which need to be done by users. These items include sterilization, clearing, simple test and error message report, etc. Users must perform these items periodically to ensure the system status is always good.

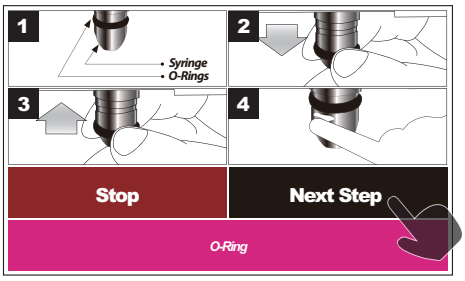
– Replace O-Ring

1



Please select the Replace O-Ring button.

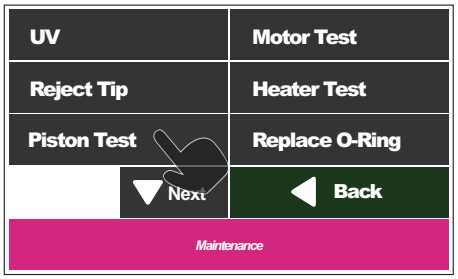
2



1. Please disassemble the damaged O-Ring.
2. Replace a new O-Ring.
3. Greasing the O-Ring, and perform the Piston Test.

– Piston Test

The Piston test includes the tests for three Tip types, which mainly test the tightness of Piston O-Ring and Tip, and the smooth of taking the Piston from the T-Rack.



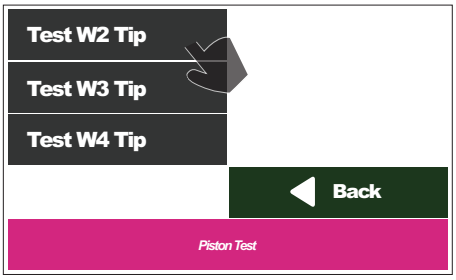
Please select the Piston Test button.

Maintenance:

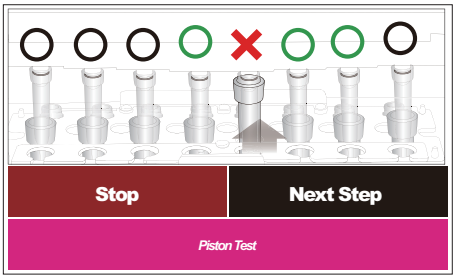
Please perform the Piston Test once a month and greasing on the O-Ring.

A. Test the Tip of the W2.

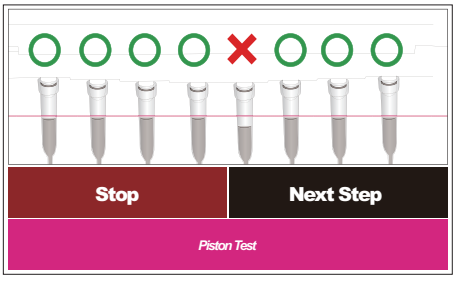
1. Please put the Tip Holder Set (not provided in accessary) into the W2 of T-Rack.
2. Please add 1 ml water to the Sample Tube and put it in the W1 of the T-Rack.
3. Please select the Test W2 Tip.



4. The test can be divided into two stages. The first stage is to observe the smooth of taking the tip out of the Tip Holder. Please check whether the tip holder is taken out together with the tip. If the Tip Holder is taken out together with the tip, please reset the Tip Holder and try it again.

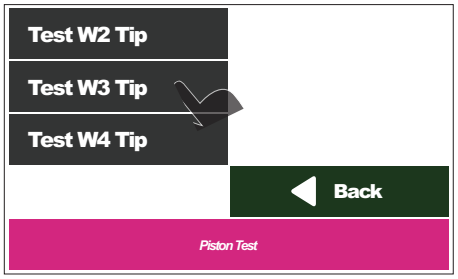


5. Please check whether the liquid levels of all tips are consistent with each other. If the liquid levels of all tips are not consistent with each other, please check the O-Ring (Please refer to the Replace O-Ring chapter for more information).

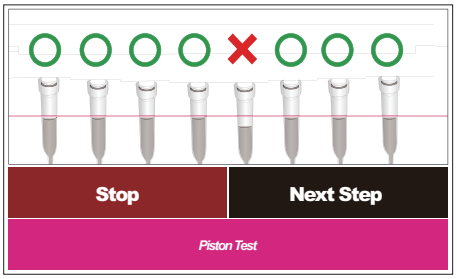


B. Test the Tip of the W3.

1. Please put the Pipette Tip into the W3 of T-Rack.
2. Please add 1 ml water to the Sample Tube and put it in the W1 of the T-Rack.
3. Please select the Test W3 Tip.

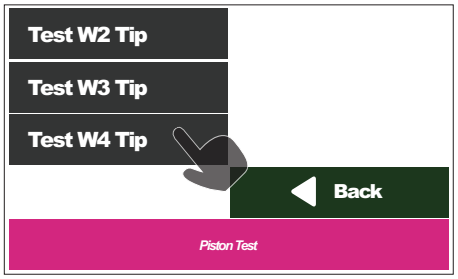


4. Please check whether the liquid levels of all tips are consistent with each other. If the liquid levels of all tips are not consistent with each other, please check the O-Ring (Please refer to the Replace O-Ring chapter for more information).

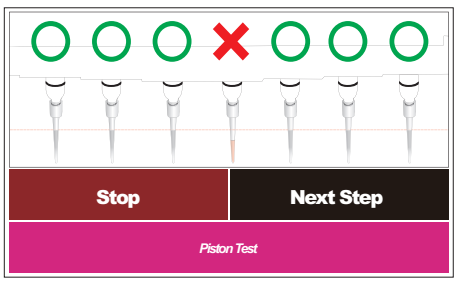


C. Test the Tip of the W4. (MagCore Super Only)

1. Please put the 200µl SP Tip into the W4 of T-Rack.
2. Please add 1 ml water to the Sample Tube and put it in the W1 of the T-Rack.
3. Please select the Test W4 Tip.

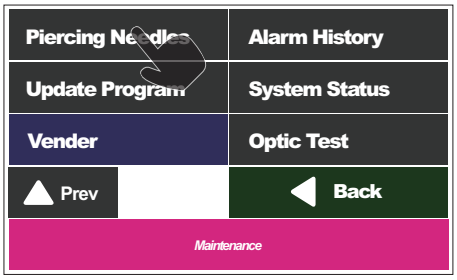


4. Please check whether the liquid levels of all tips are consistent with each other. If the liquid levels of all tips are not consistent with each other, please check the O-Ring (Please refer to the Replace O-Ring chapter for more information).



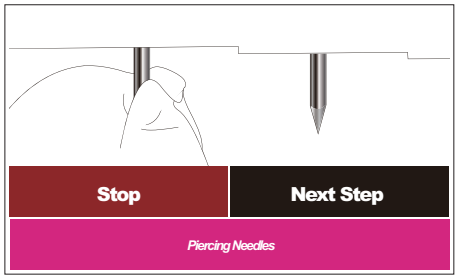
Clean Piercing Needles

1



Please select the Piercing Needles button.

2



1. Please prepare a soft cloth with 70% alcohol.
2. Please clean the Piercing needles by the cloth.

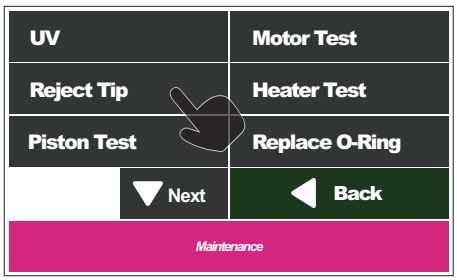
Warning!

The tips of the Piercing Needles are extremely sharp. Please clean them carefully.

Reject Tip

If the system is stopped from power failure or other abnormal conditions and the tips are still stayed on the pistons, you have to press Reject Tip to remove the tips from the pistons.

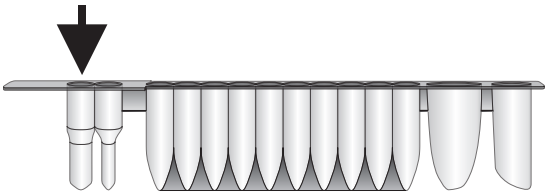
1

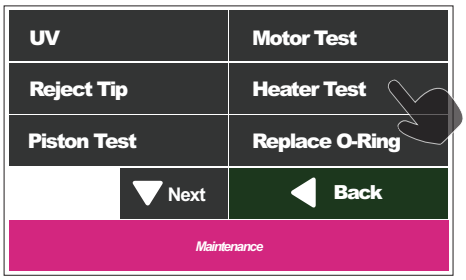


Please select the Reject Tip button.

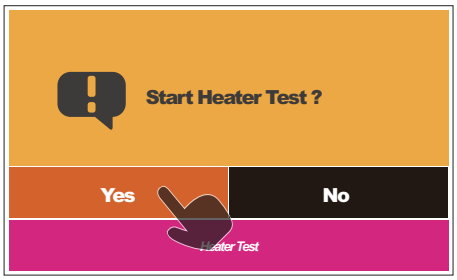
– Heater Test

Before testing the heater, please add 500µl water into the heat block well 1 (as shown by the arrow) of the cartridge, and then put the cartridge into the cartridge rack and put the thermometer in the water.

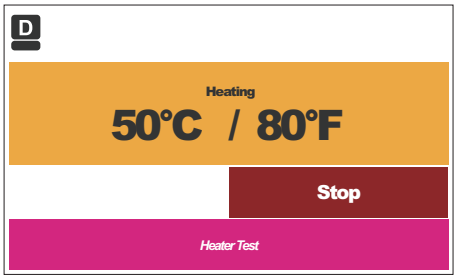




Please select the Heater Test button.



Please select the Yes button to start the test.

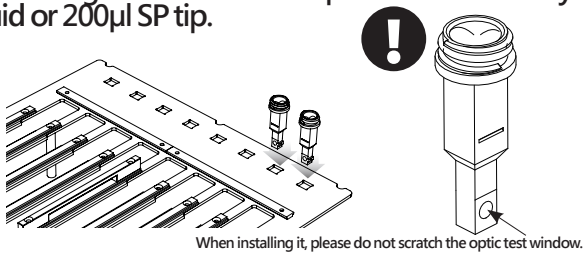


Now the heater will be heated up to 60° C, please check whether the temperature shown on the thermometer is consistent with that shown on the screen.
The acceptable temperature range is 60± 5° C.

– Optic Test

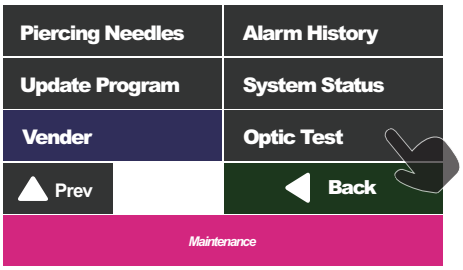
(MagCore Super Only)

Please put the cuvette in the attachment pack into the cartridge rack before the optic test without any liquid or 200µl SP tip.

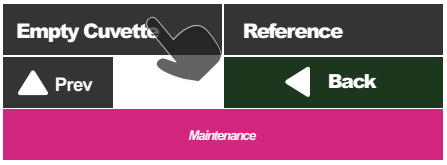


When installing it, please do not scratch the optic test window.

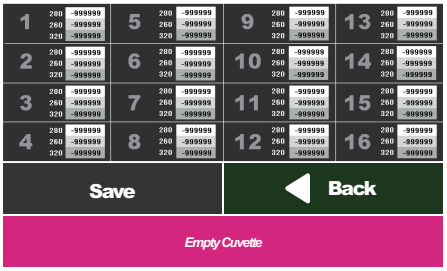
Please refer to the Install MagCore® Cuvette chapter.



Please select the Optic Test button.



Please select the Empty Cuvette and then wait for 15 minutes to perform the test.

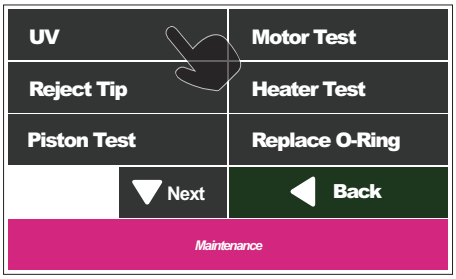


The test may take some time to wait the D2 lamp prewarm. The screen will show the measured values after the test is finished. You can insert the USB Flash Drive and then press the Save button to store the current data after the USB icon shows in the status bar. Please take out the USB Flash Drive and then you can perform other operations after the icon of USB Flash Drive disappears. The acceptable range of the count value > 7000

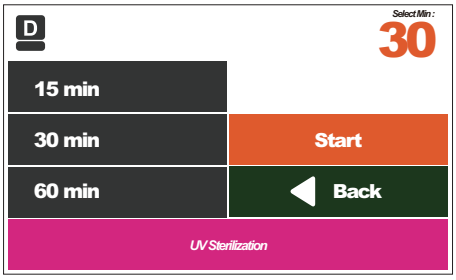
Please save the data in the USB Flash Drive in a personal computer, or the data in the USB Flash Drive may be overwritten later.

File name: OpticalCuvetteCount.cvs

– UV sterilization



Please select the UV button.



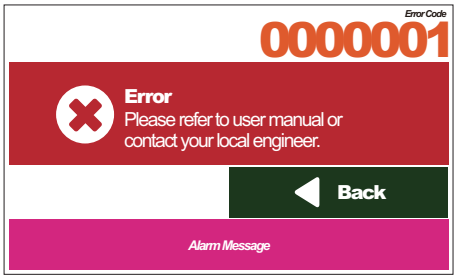
Please select the sterilization time.

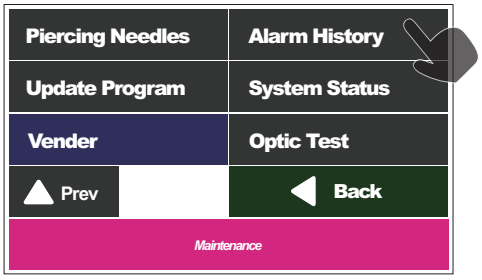
Warning!

The UV lamp is dangerous. Please do not look straight at the inner of the machine when operating the machine.

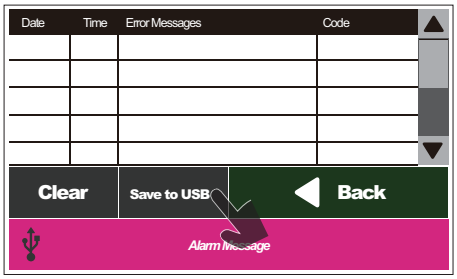
– Alarm History

If the machine malfunctions or the following messages appear, the engineers may ask you to download the error records for them to diagnose the machine in advance.





Please select Alarm History.



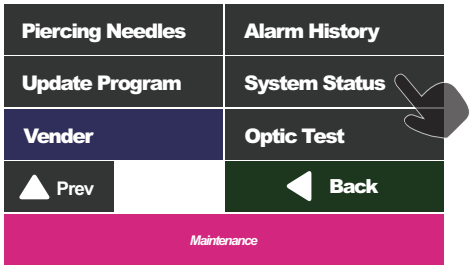
Save files
Insert the USB Flash Drive and then press the Save button to store the current data after the USB icon shows in the status bar. Please take out the USB Flash Drive and then you can perform other operations after the icon of USB Flash Drive disappears.

Please save the data in the USB Flash Drive and transfer to computer, or the data in the USB Flash Drive may be overwritten later.

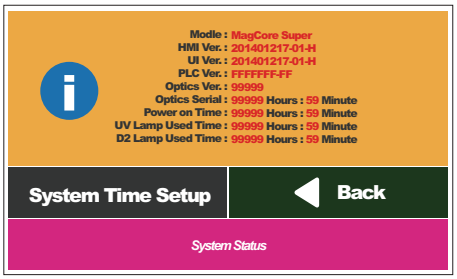
File name: AlarmHistory.cvs

– System Status

You can check the system status and set up the system time in the menu.

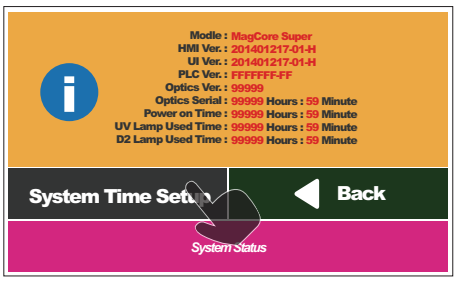


Please select System Status.



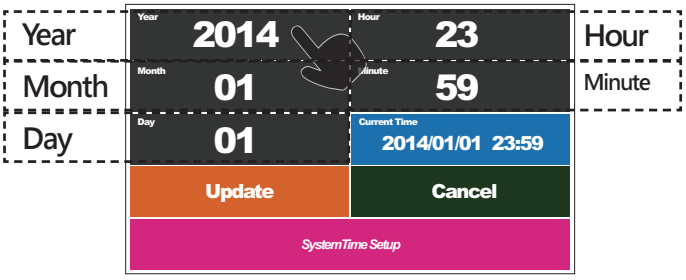
Information

Modle :	System model
HMI Ver. :	Human-machine interface version
UI Ver. :	Program version
PLC Ver. :	PLC version
Optics Ver. :	Optic module version (MagCore Super Only)
Optics Serial :	Optical module serial number (MagCore Super Only)
Power on Time :	The total time that the machine is powered on
UV Lamp Used Time :	The used time of the UV lamp
D2 Lamp Used Time :	The used time of the D2 lamp (MagCore Super Only)



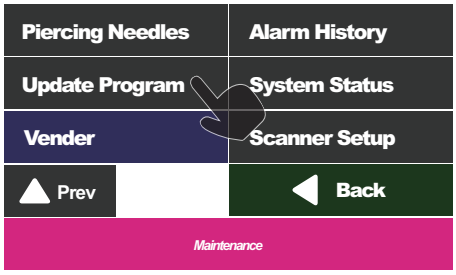
Select System Time Setup to set up the system time of the machine.

Set up the system time



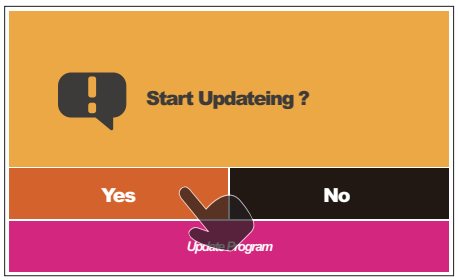
Please input the local date and time and then press the Update button to save the system time. You can see the time that you changed in "Current Time" after the change is finished.

– Update Program

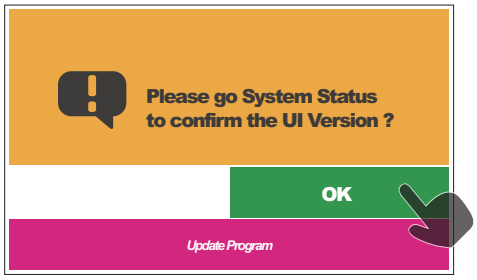


You can use the USB to update the system.

Please copy the downloaded program to the root directory of the USB Flash Drive. Then insert the USB Flash Drive into the USB Port of the machine. Please press "Update Program" after the USB icon appears in the status list.



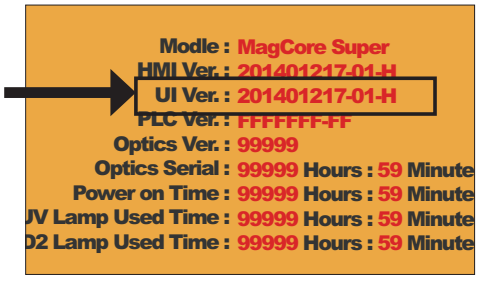
Please select YES.



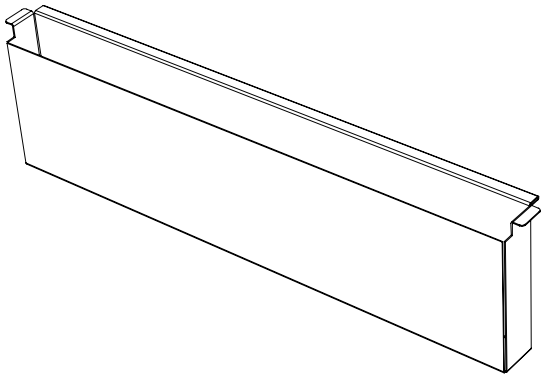
The update is finished, please press OK to check whether the UI version is correct.

Warning!

Please confirm the name of UI version. If the version is not correct, please execute the update program again.

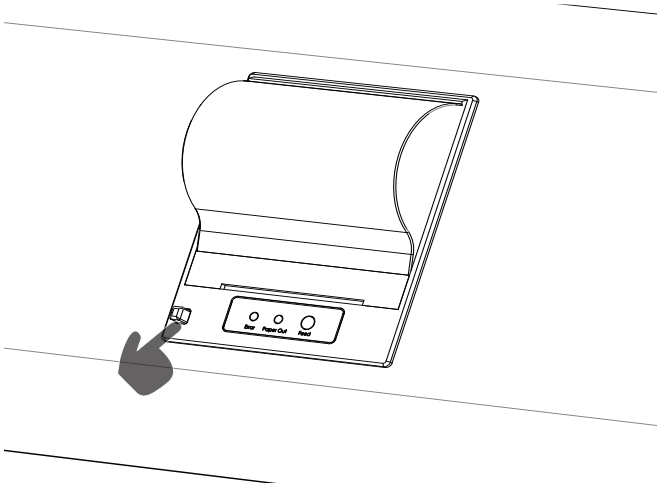


– Clean the Waste Box

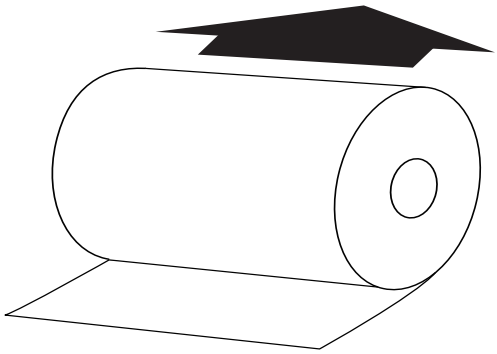


Please dump the waste when the program is completed, and wash the waste box every day.

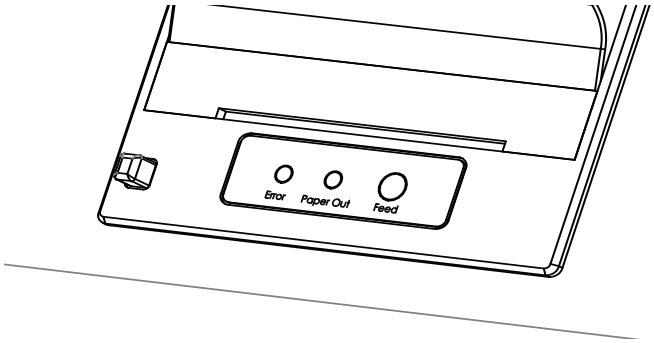
– Replace thermal paper



Open the cover of the printer and take out the thermal paper tube running out of thermal paper. Put the new thermal paper into machine according to the direction shown as the following figure and then close the cover of the printer.

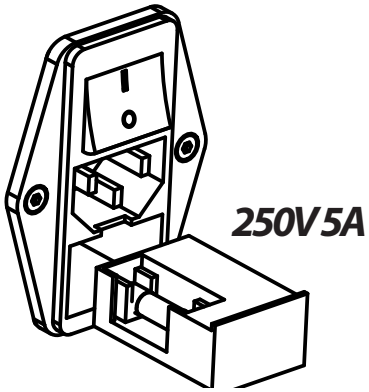


If the position of the thermal paper roll is not correct, the red/yellow lamp will blink. Please press the Feed button to confirm the installation is finished.



You can purchase the Cat. No.: MSP005 Thermal Paper from the local distributor.

– Replace fuse



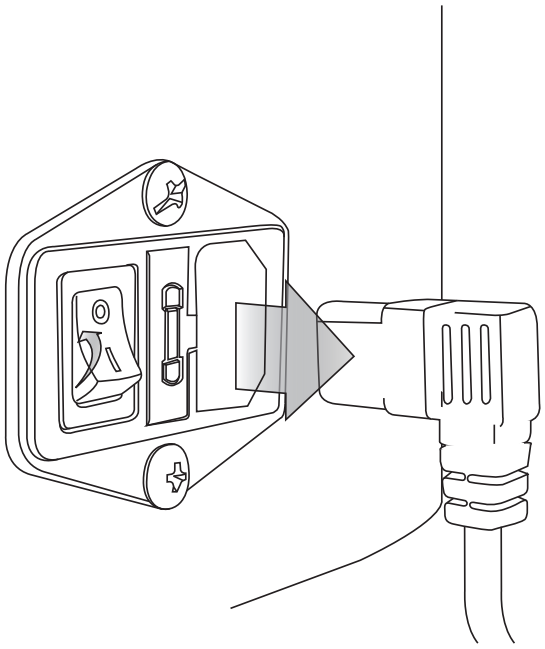
Please use the specific fuse. If you use the fuse with higher specification in the machine, it may be burned.

Advanced maintenance

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

Caution !

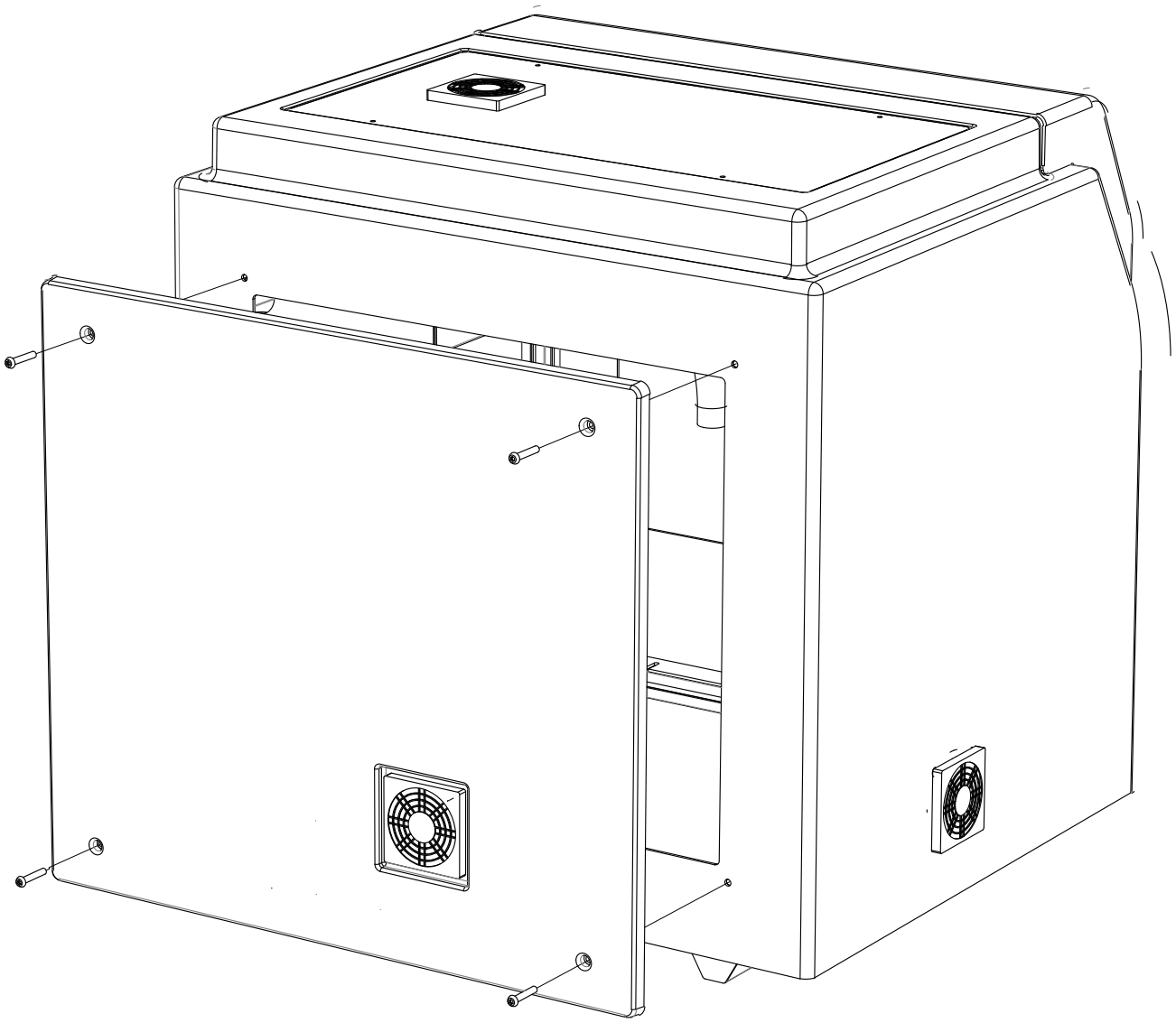
Turn off the power and remove power socket Before processing advanced maintenance !



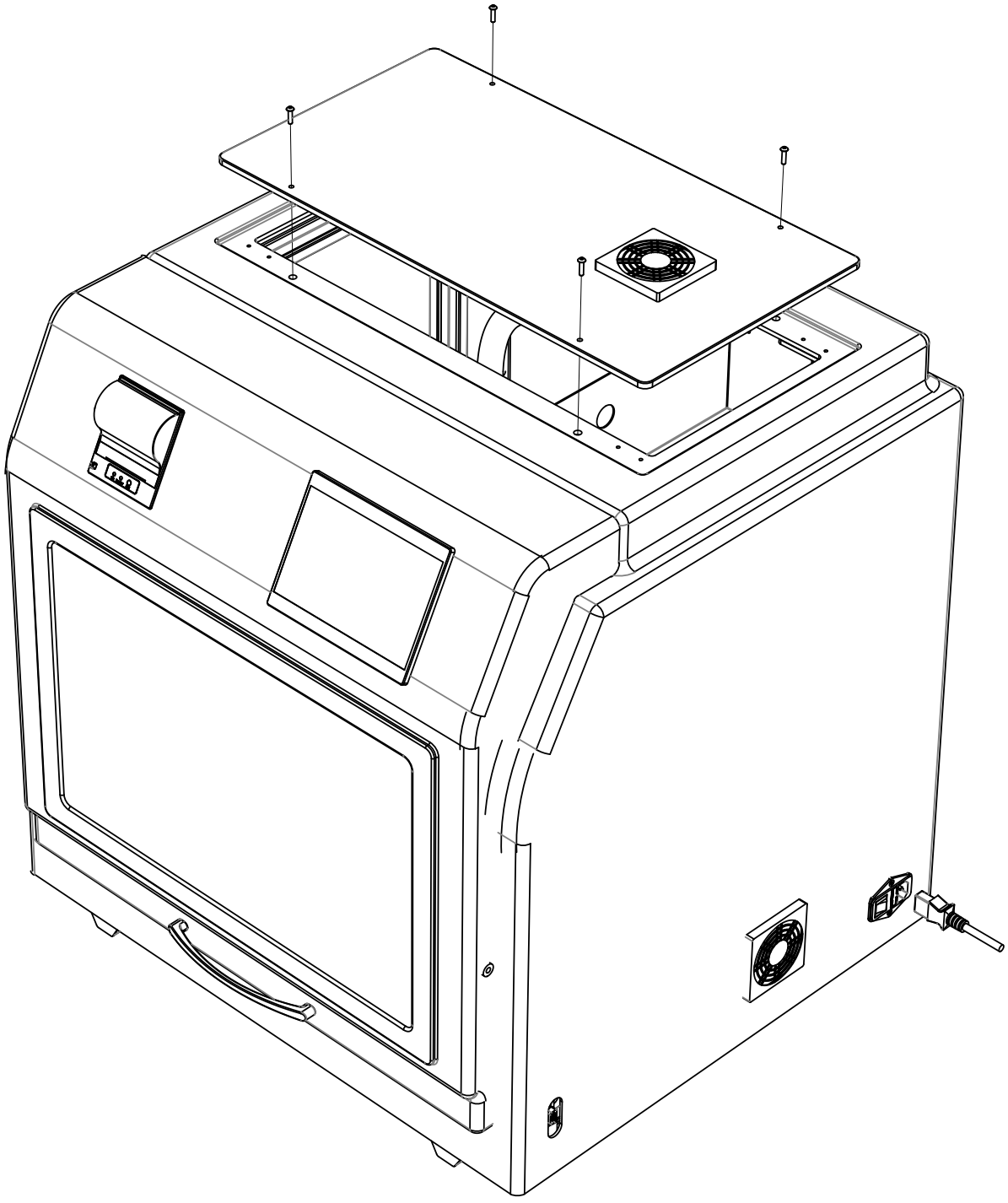
Caution !

All advanced maintanence must be performed by trained Engineers !

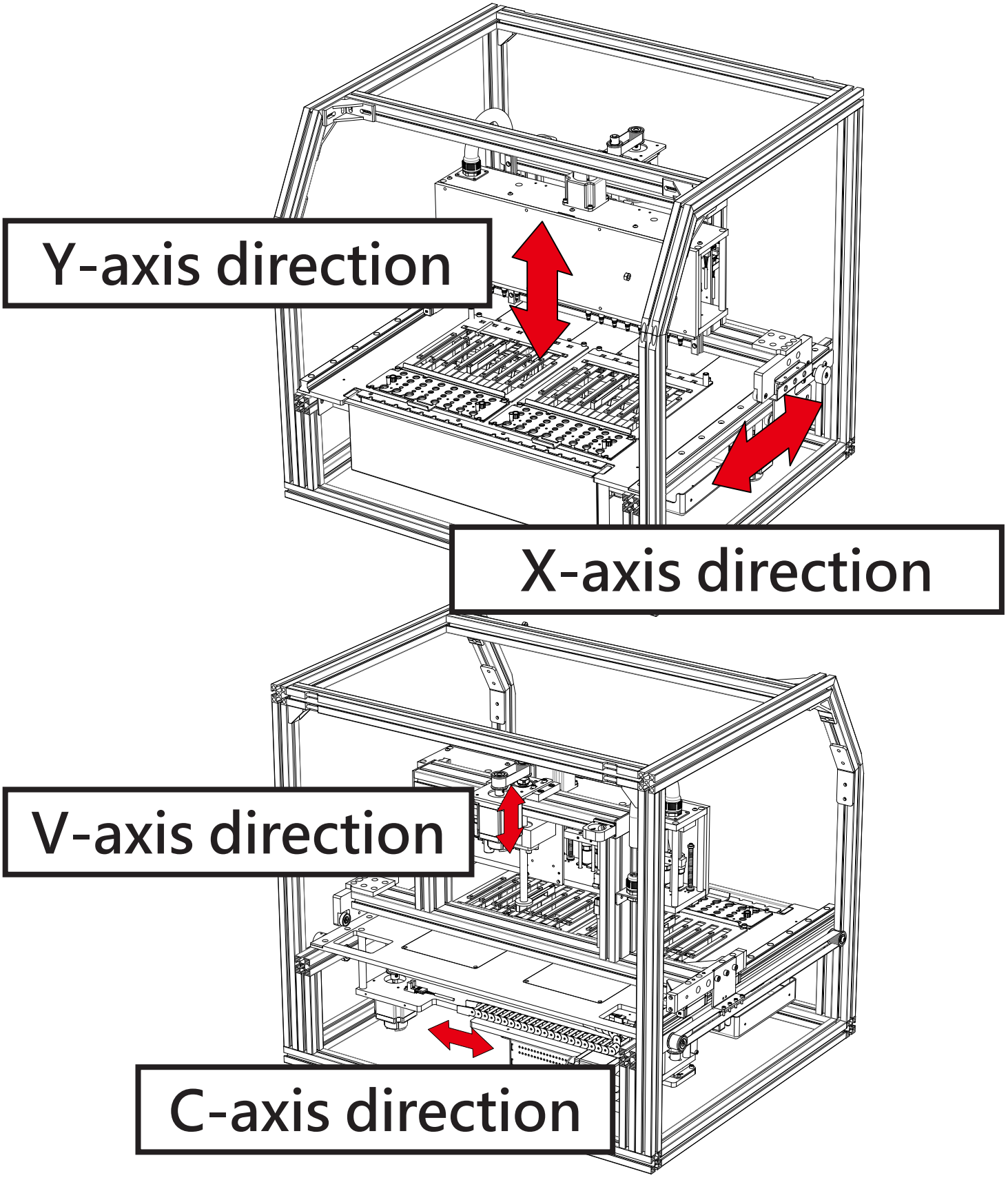
Disassemble the back service lid



Disassemble the top service lid



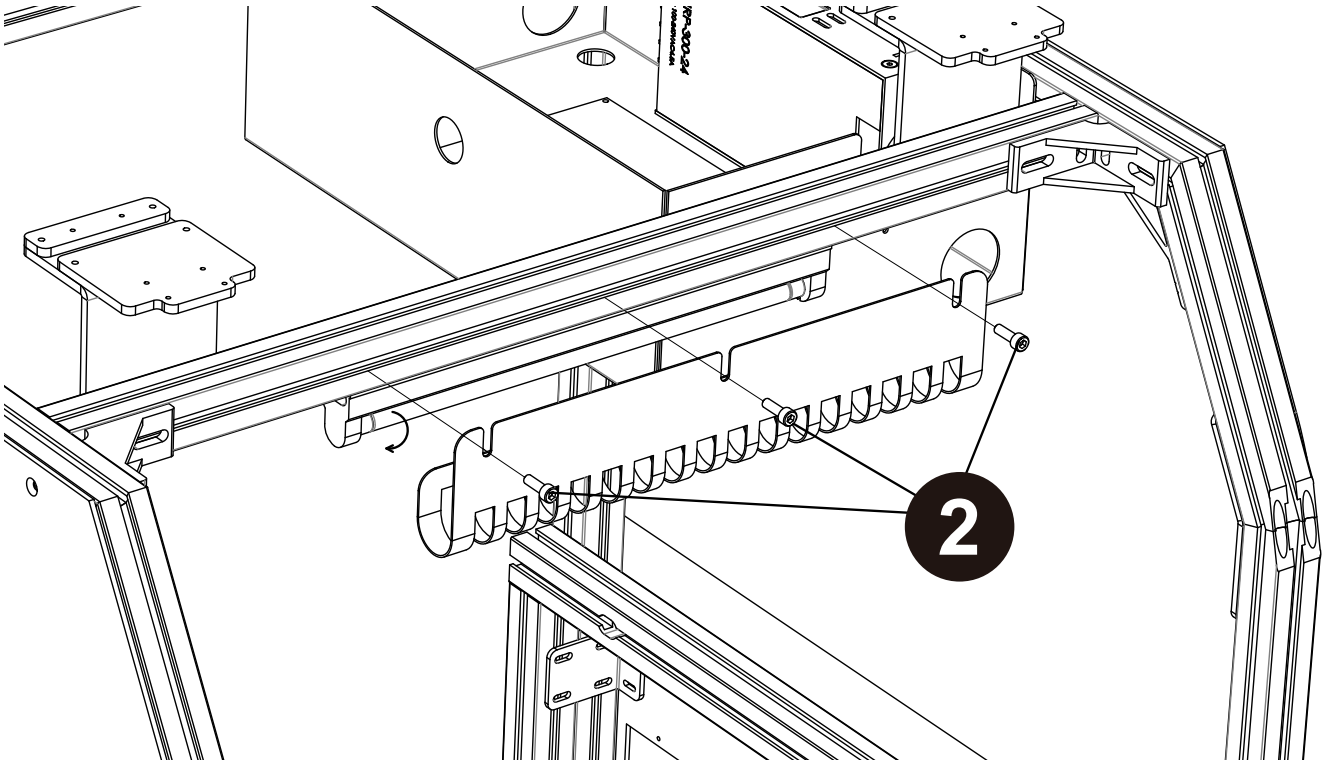
Axis directions



Replace the UV lamp

Open the front door.

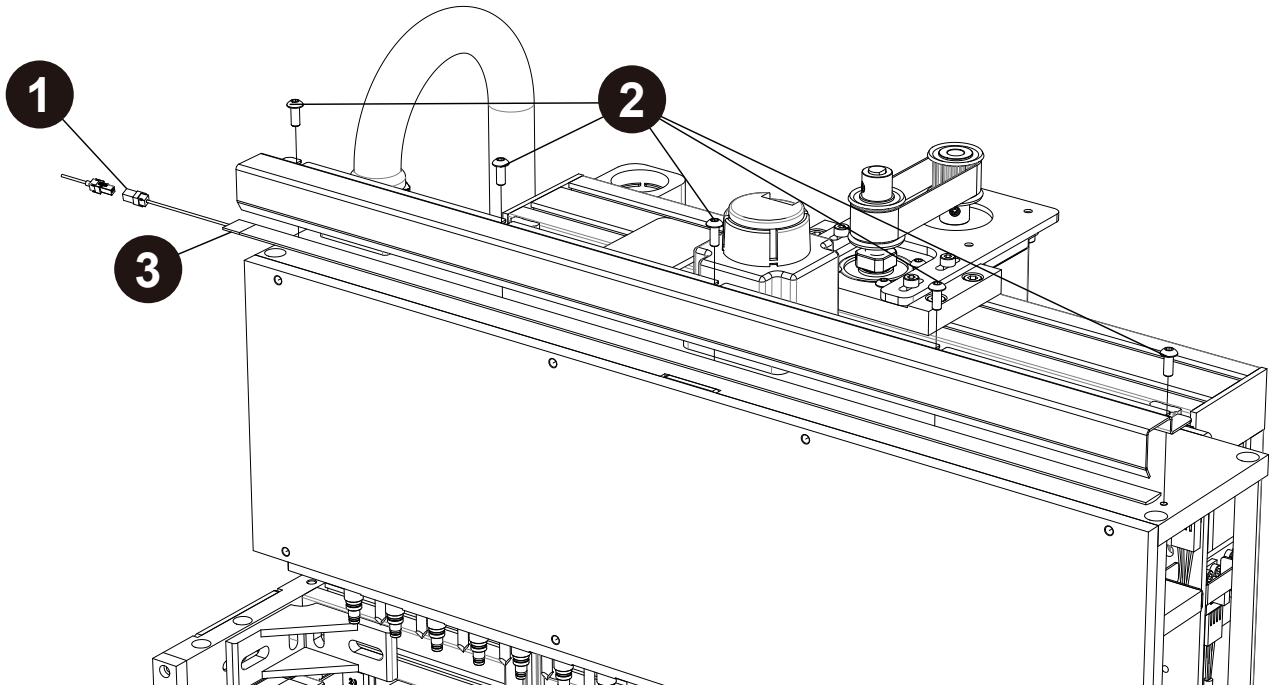
1. Switch off the power supply.
2. Loosen the three screws of the protection metal sheet (4mm Hex wrench), and take off the sheet.
3. Replace a new lamp and lock back all the parts.



Replace LED Light

Open the front door.

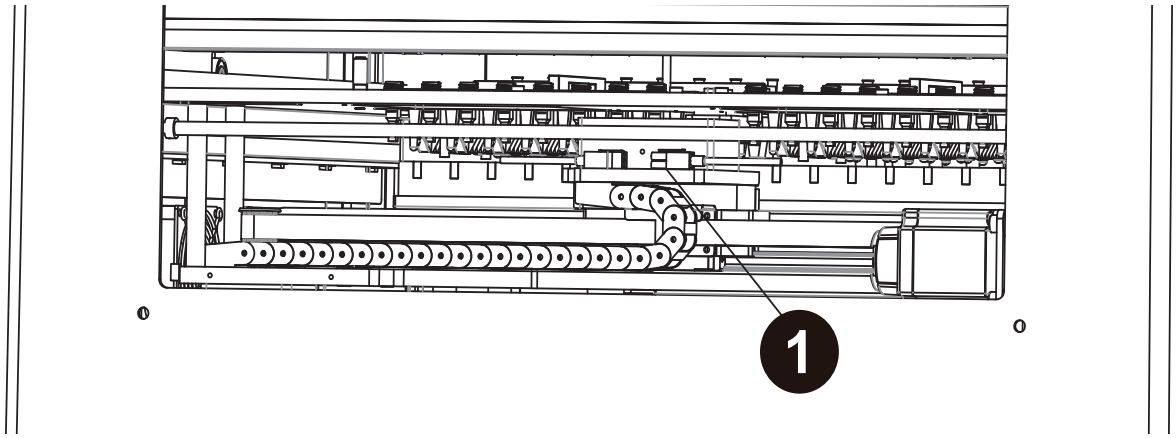
1. Unplug the wire connector of the LED.
2. Loosen the three screws on the top of the piston module (3 mm Hex wrench), and take off the LED module.
3. Replace a new LED light bar and lock back all the parts.

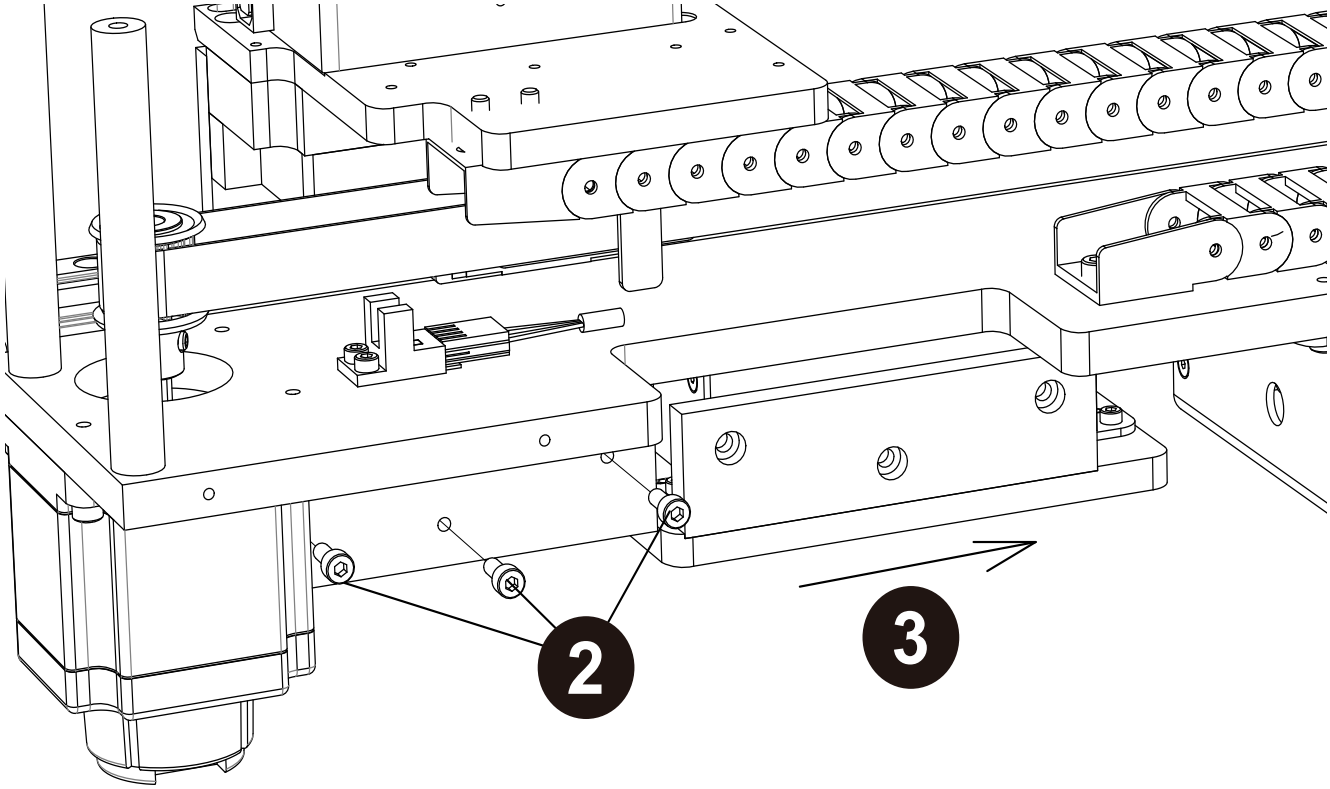


Replace the optic lamp (MagCore Super Only)

Open the back service lid.

1. Unplug the wire connector of the LED.
2. Screw off the three screws of the optic lamp module (3mm Hex wrench).
3. Move the lamp module toward the right side and take out the module.
4. Replace a new optic lamp and orderly reinstall the optic lamp module on the machine.

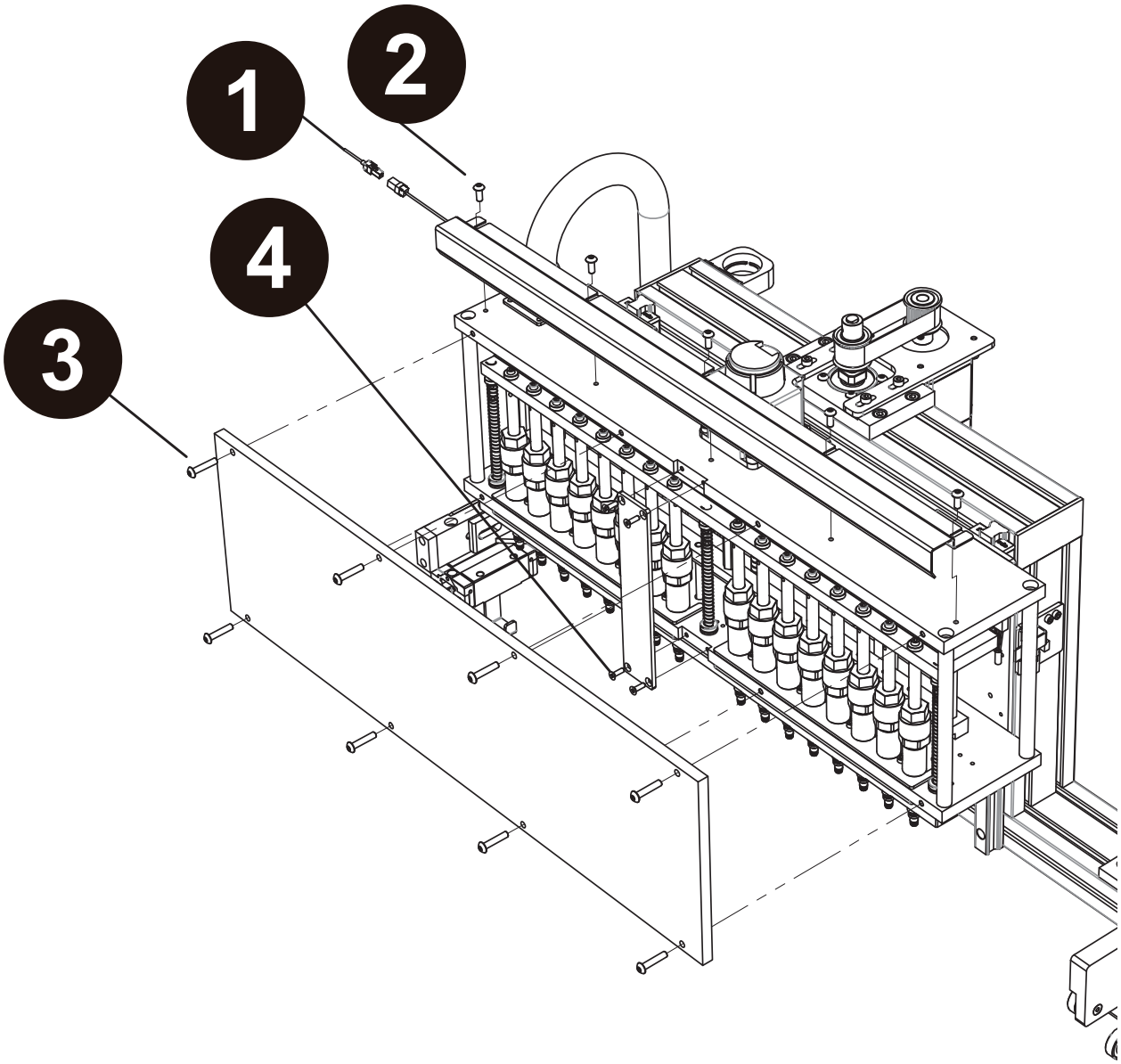




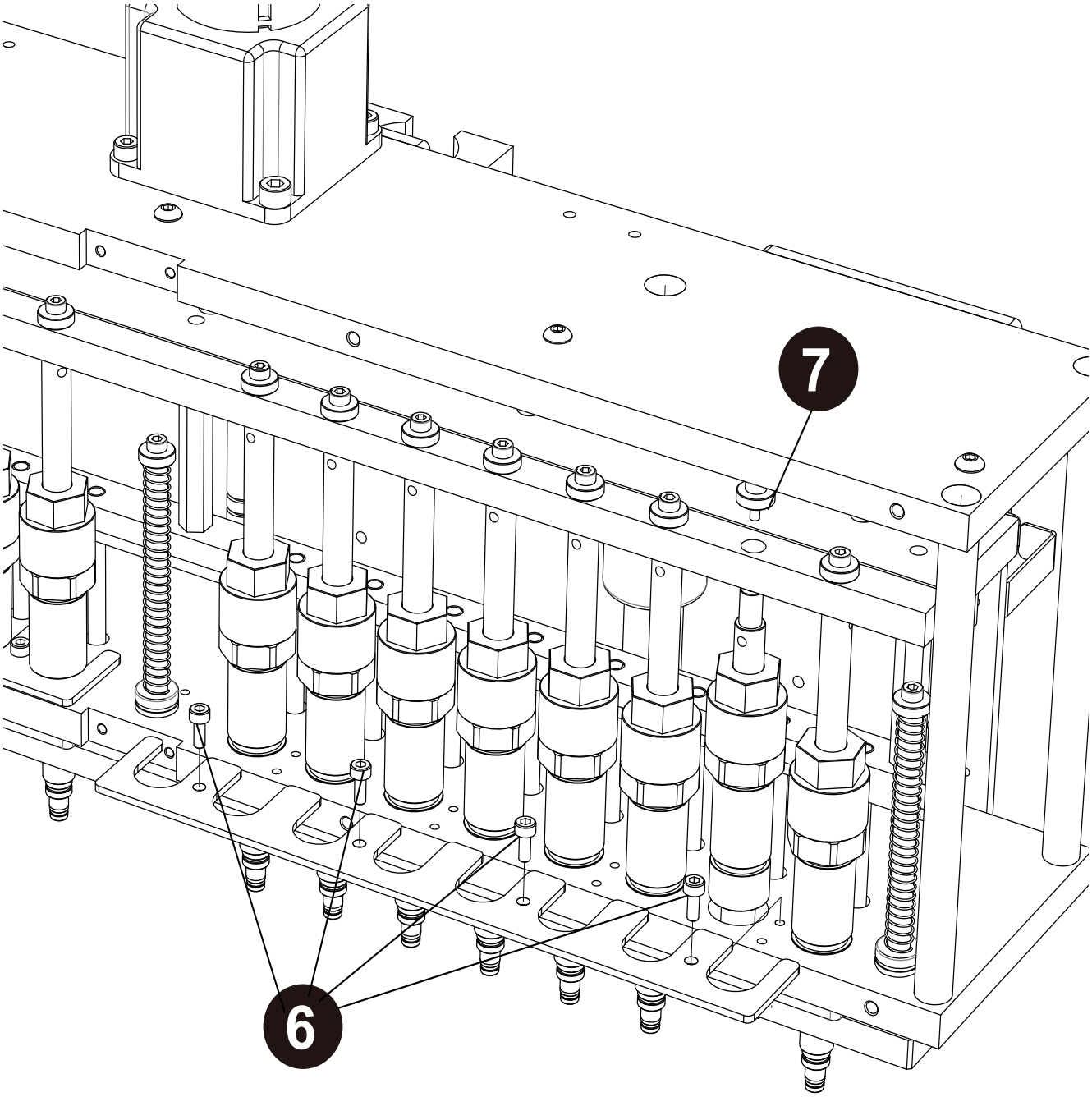
Replace the pistons

Open the front door.

1. Unplug the wire connector of the LED.
2. Loosen the three screws on the top of piston module (3mm Hex wrench), and take off the LED module.
3. Screw off the eight screws of the acrylic nameplate at the front side (2.5mm Hex wrench).
4. Screw off the four screws of the reinforced metal sheet (2.5mm Hex wrench).



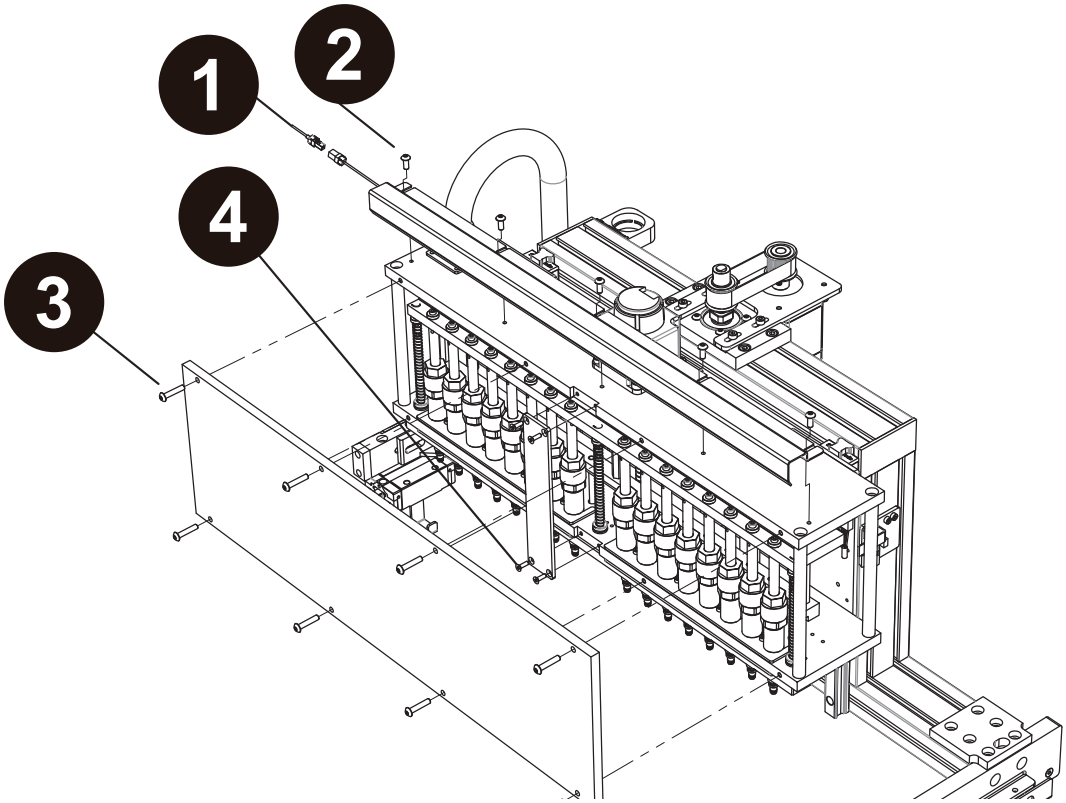
5. Press the V-axis downward until the tool can be put into the screw holes above the pistons.
6. Screw off the four screws (2.5mm Hex wrench).
7. Disassemble the fault pistons and install new pistons (2.5mm Hex wrench).
8. Screw up the four screws (2.5mm Hex wrench).
9. Screw up the screws above the piston (2.5mm Hex wrench).
10. Reinstall the acrylic nameplate of the piston module and the LED lamp on the machine.
11. After the above steps are finished, please perform "Piston Test " to check all processes are successful.

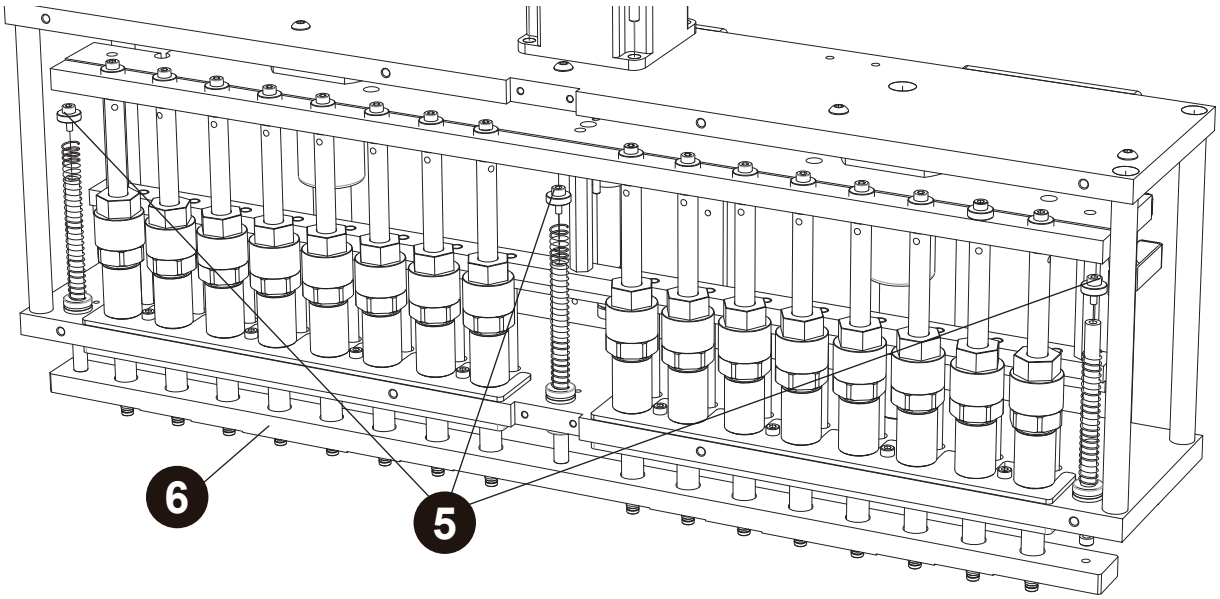


Replace the ejector rod module.

Open the front door.

1. Unplug the wire connector of the LED.
2. Loosen the three screws on the top of piston module (2.5mm Hex wrench).
3. Screw off the eight screws of the acrylic nameplate at the front side (3mm Hex wrench), and take off the LED module.
4. Screw off the four screws of the reinforced metal sheet (2.5mm Hex wrench).
5. Screw off the three screws of the axle core of the ejector rod (2.5mm Hex wrench).
6. Take out the ejector rods downward.
7. Replace new ejector rods and reinstall the ejector rod module orderly.

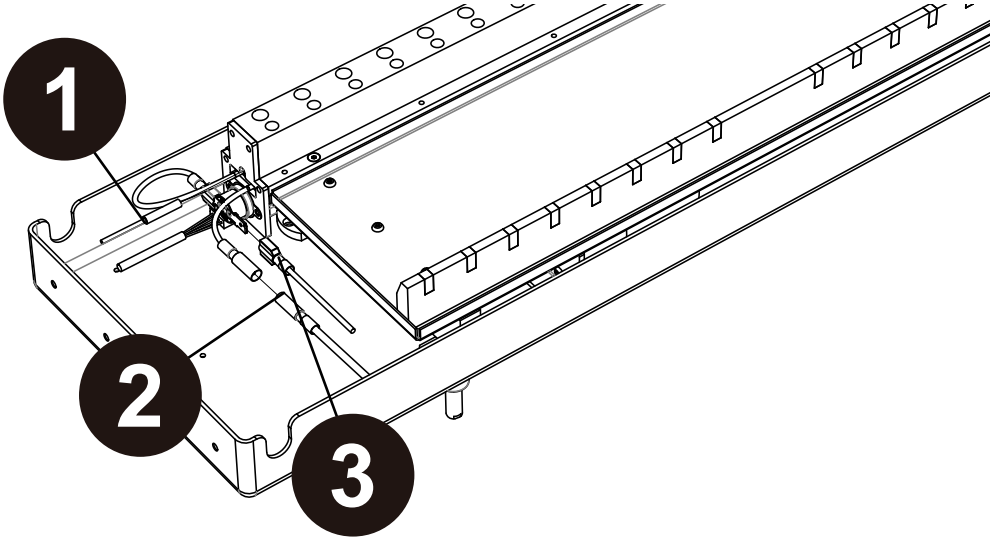


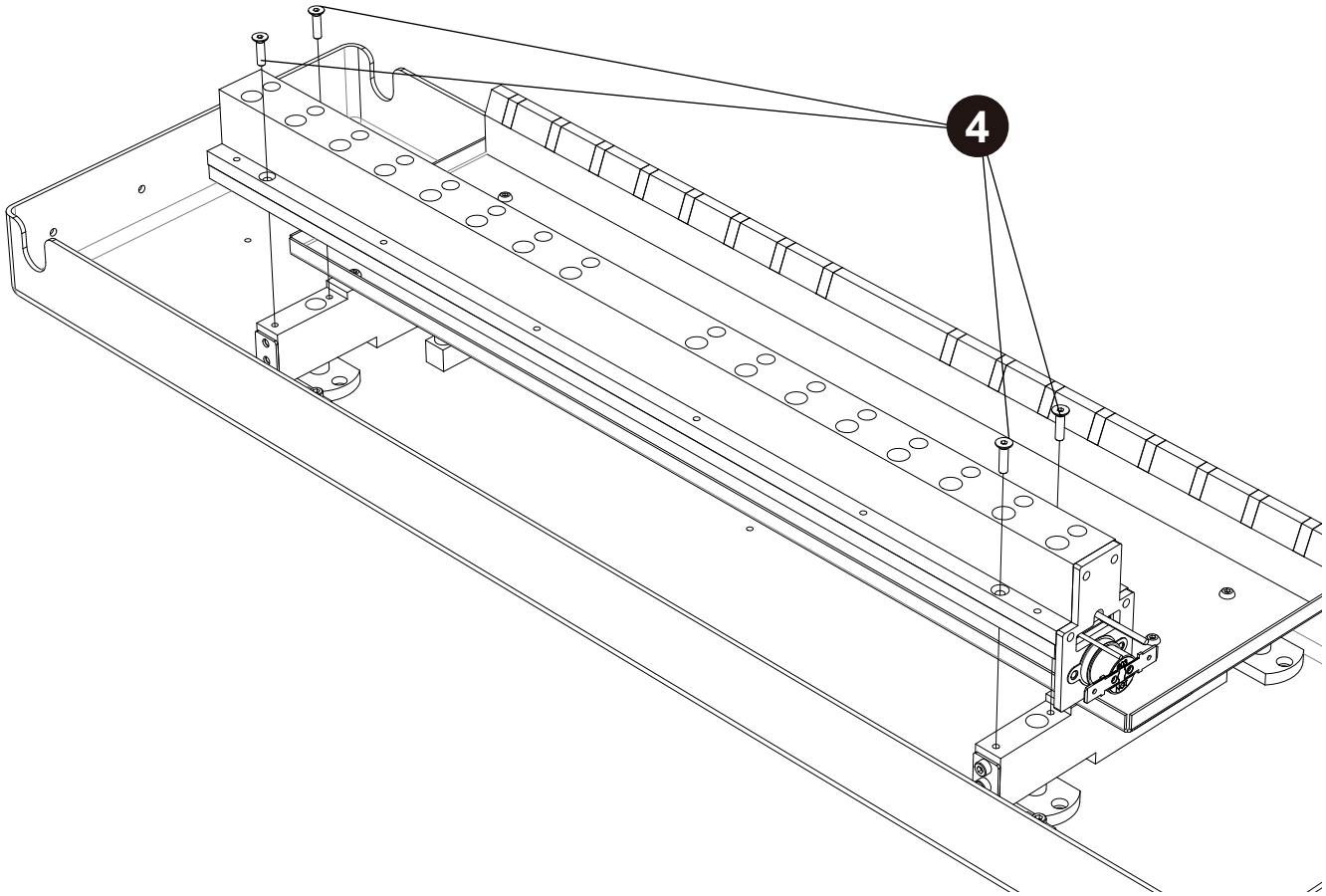


Replace the heater module

Open the front door and take out the waste box, cartridge rack and T-rack.

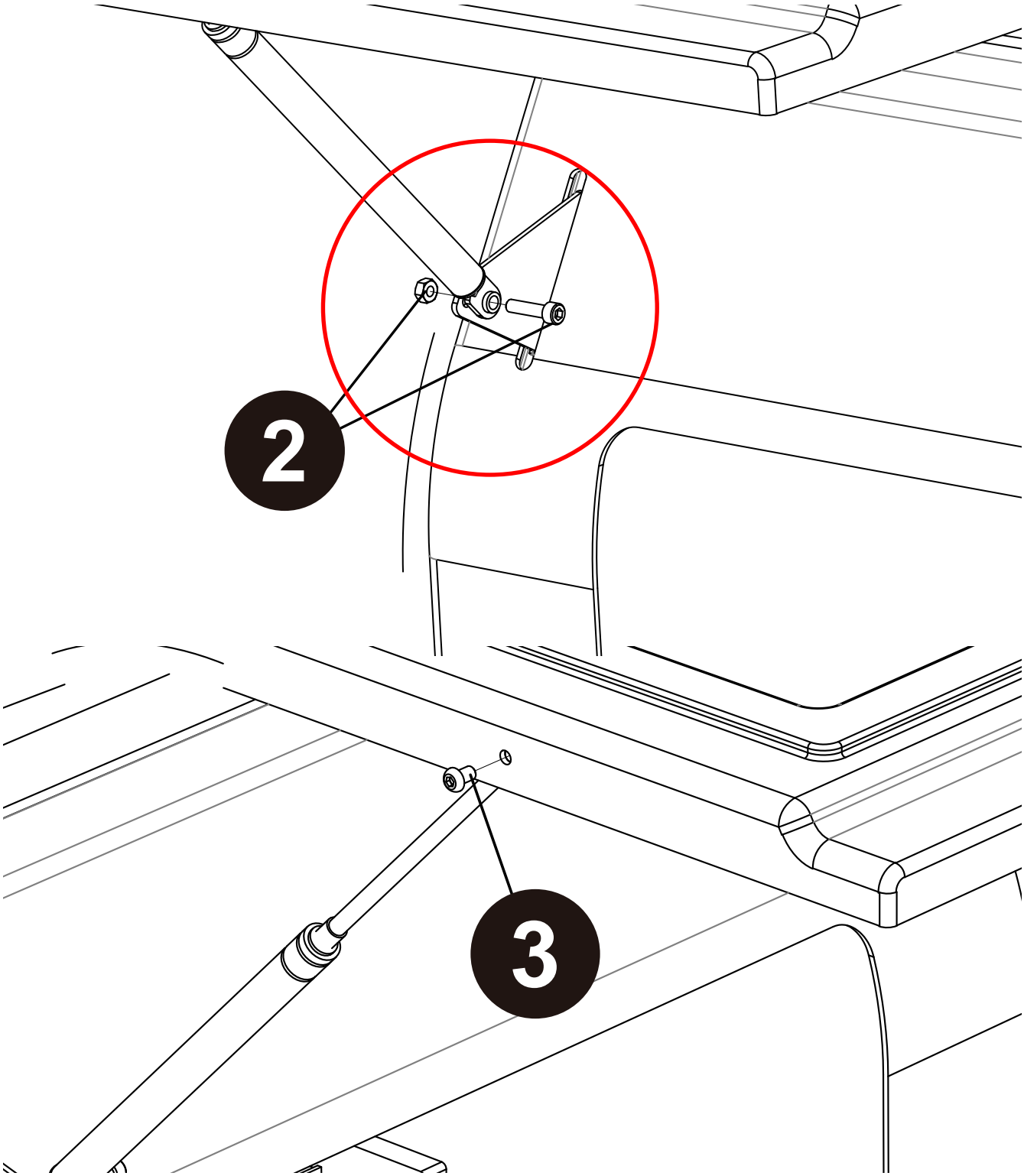
1. Screw off the four screws of the heating module (2 mm Hex wrench).
2. Pull out the temperature probe of the module.
3. Remove the connection wire of the heater.
4. Remove the protection switch wire of the heater.
5. Take out the heating module from the bottom.
6. Install a new heating module and lock back all the parts.





Replace the gas spring on front door

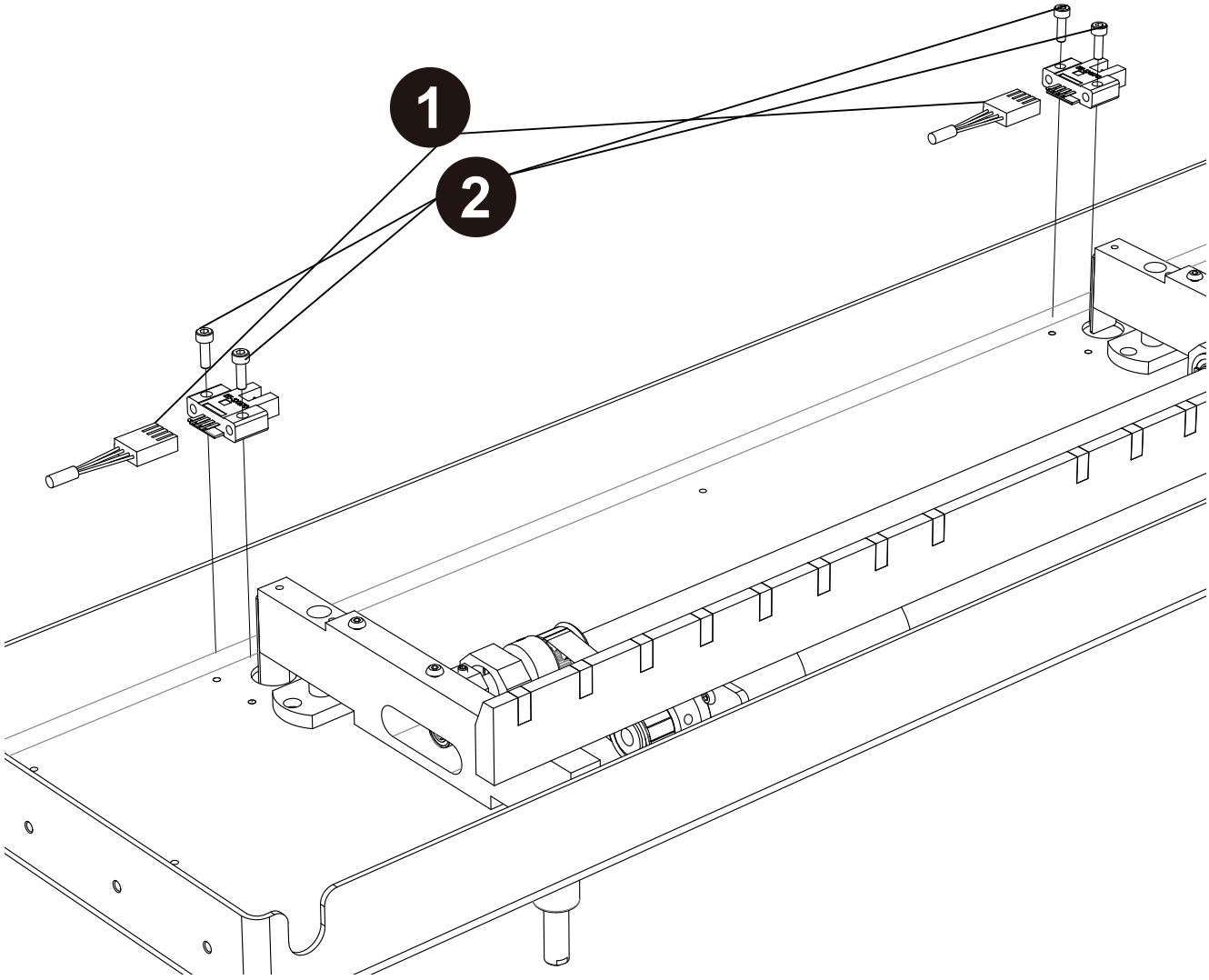
1. Open the front door.
2. Screw off one screw and one nut (4mm Hex wrench) (Note that you can only replace one gas spring at a time).
3. Screw off the screw of the front door (3mm Hex wrench).
4. Replace a new gas spring and screw up the screws.



Replace the M-axis sensors

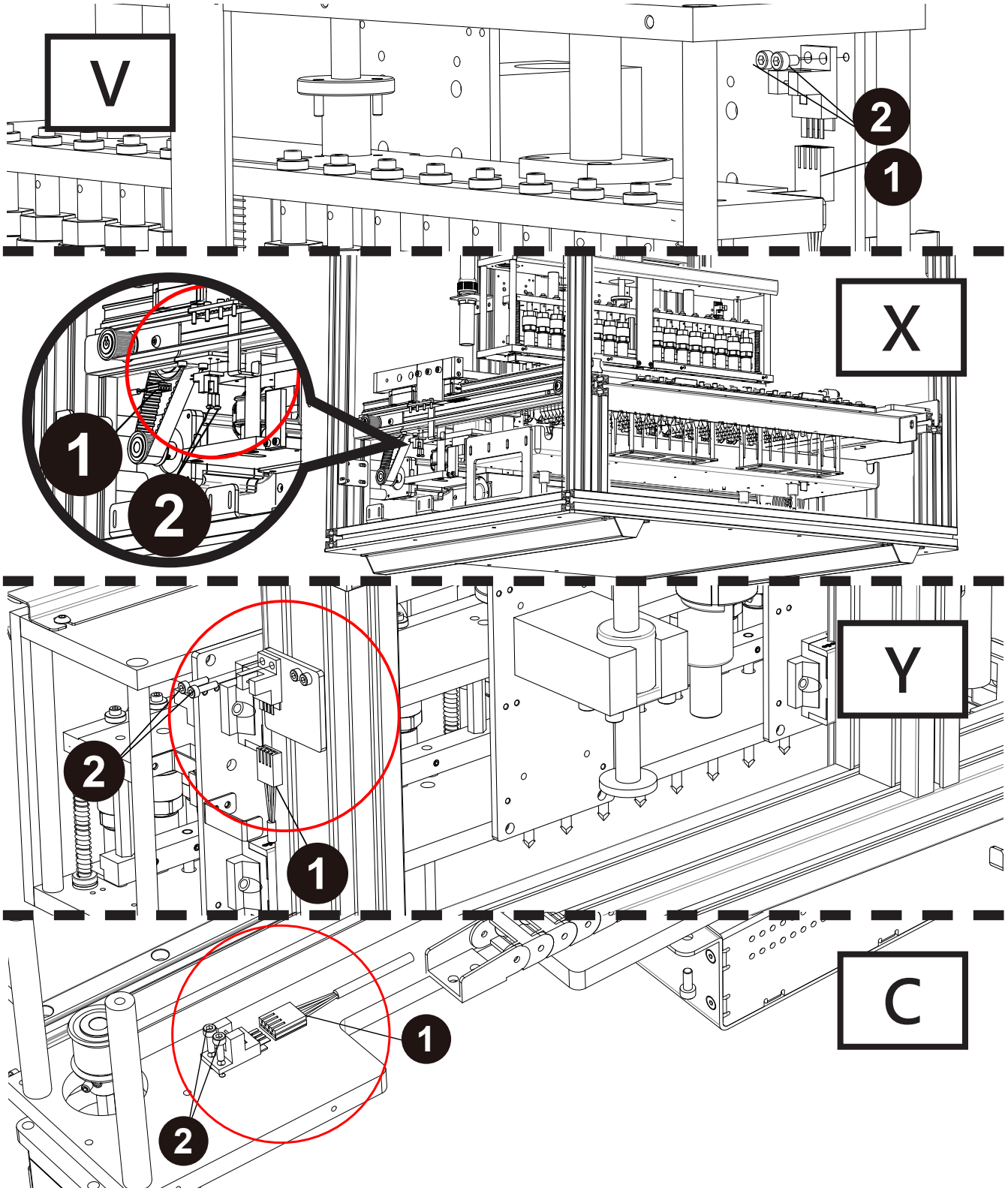
Open the front door and take out the waste box, cartridge rack and T-rack.

1. Screw off the two screws of each sensor.(2.5mm Hex wrench).
2. Remove the wires connected with sensors.
3. Replace new sensors and screw up the screws.



Replace the sensors of C, V, X and Y axes

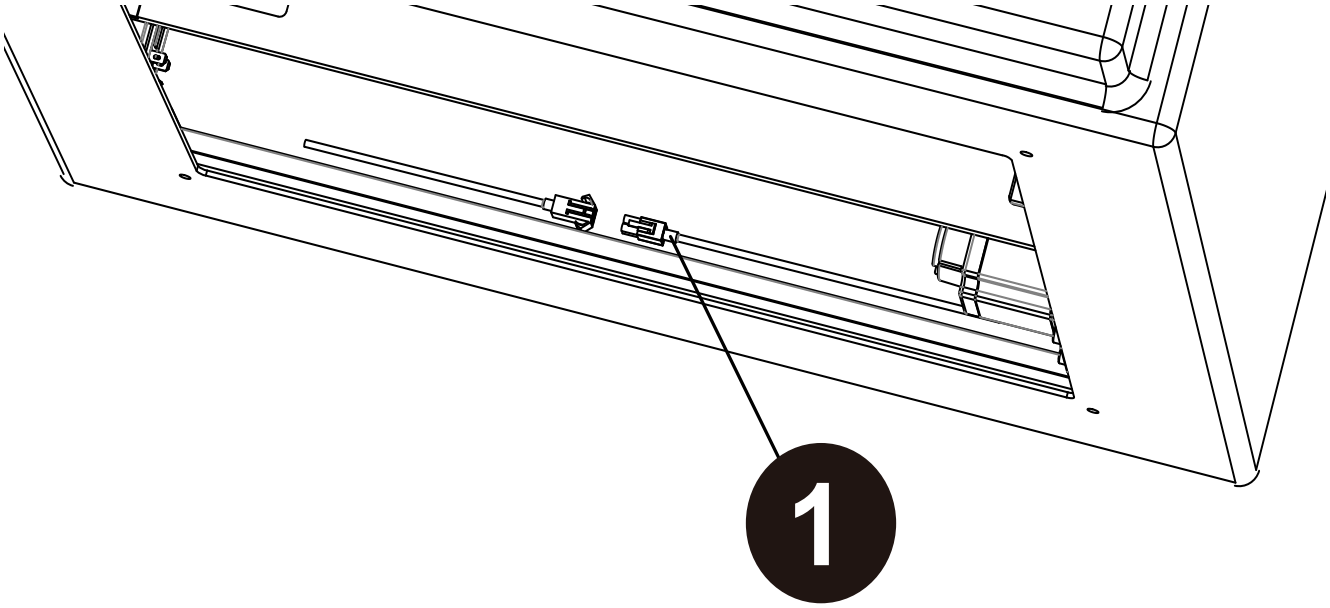
1. Remove the wires connected with sensors.
2. Screw off the two screws of each sensor(2.5mm Hex wrench).
3. Replace new sensors and lock back all the parts.

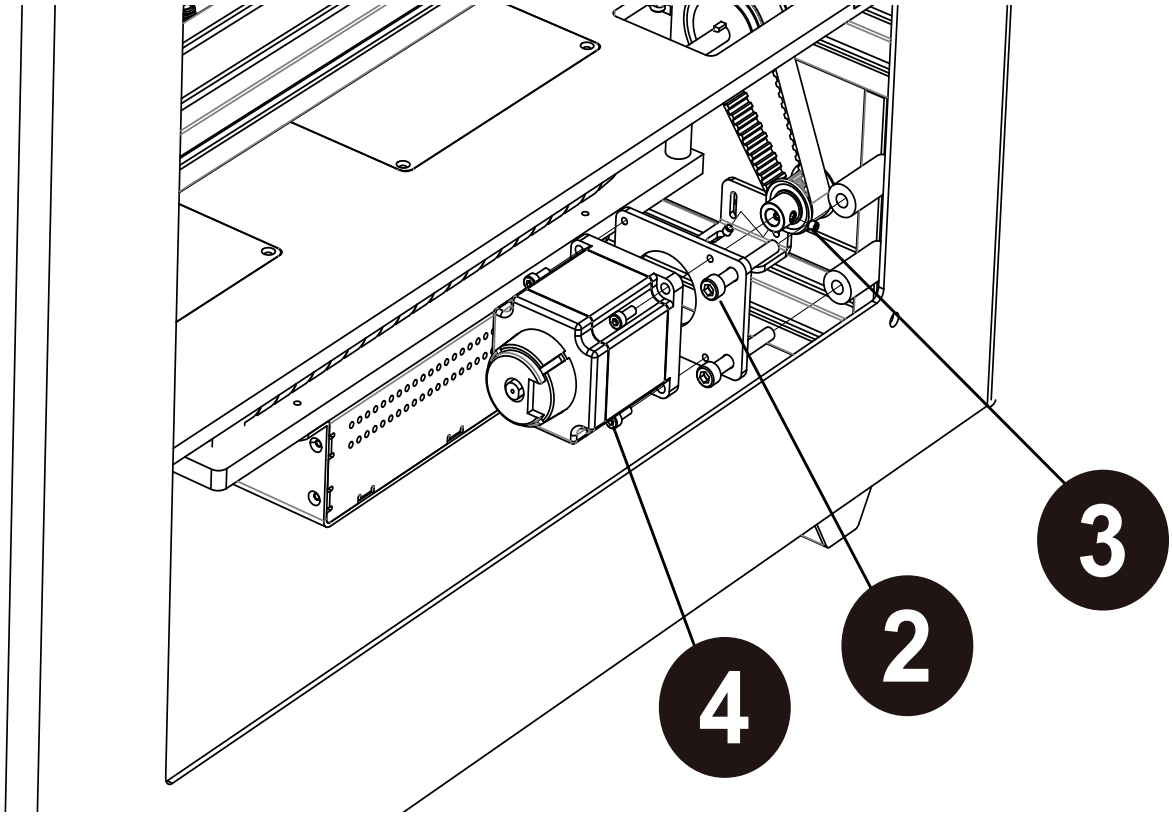


Replace the X-axis stepper motor

Open the back service lid.

1. Unplug the connector of the X-axis motor.
2. Screw off the two screws of the holder of the motor (5mm Hex wrench).
3. Screw off the two screws of the timing gear (1.5mm Hex wrench).
4. Screw off the four screws of the motor (3mm Hex wrench).
5. Replace a new X-axis motor.
6. Install the new X-axis motor orderly on the machine.

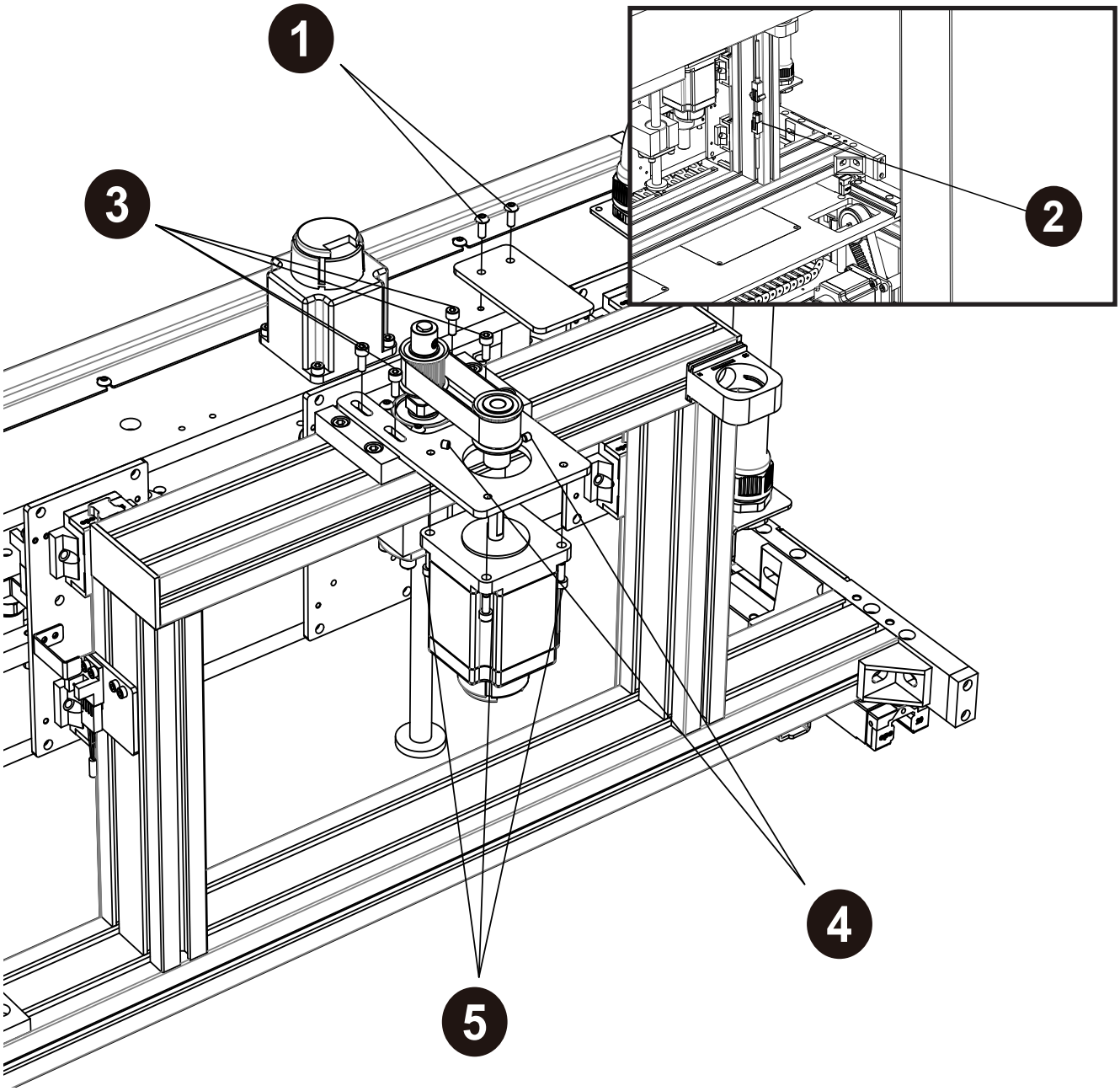




Replace the Y-axis motor

Open the back service lid.

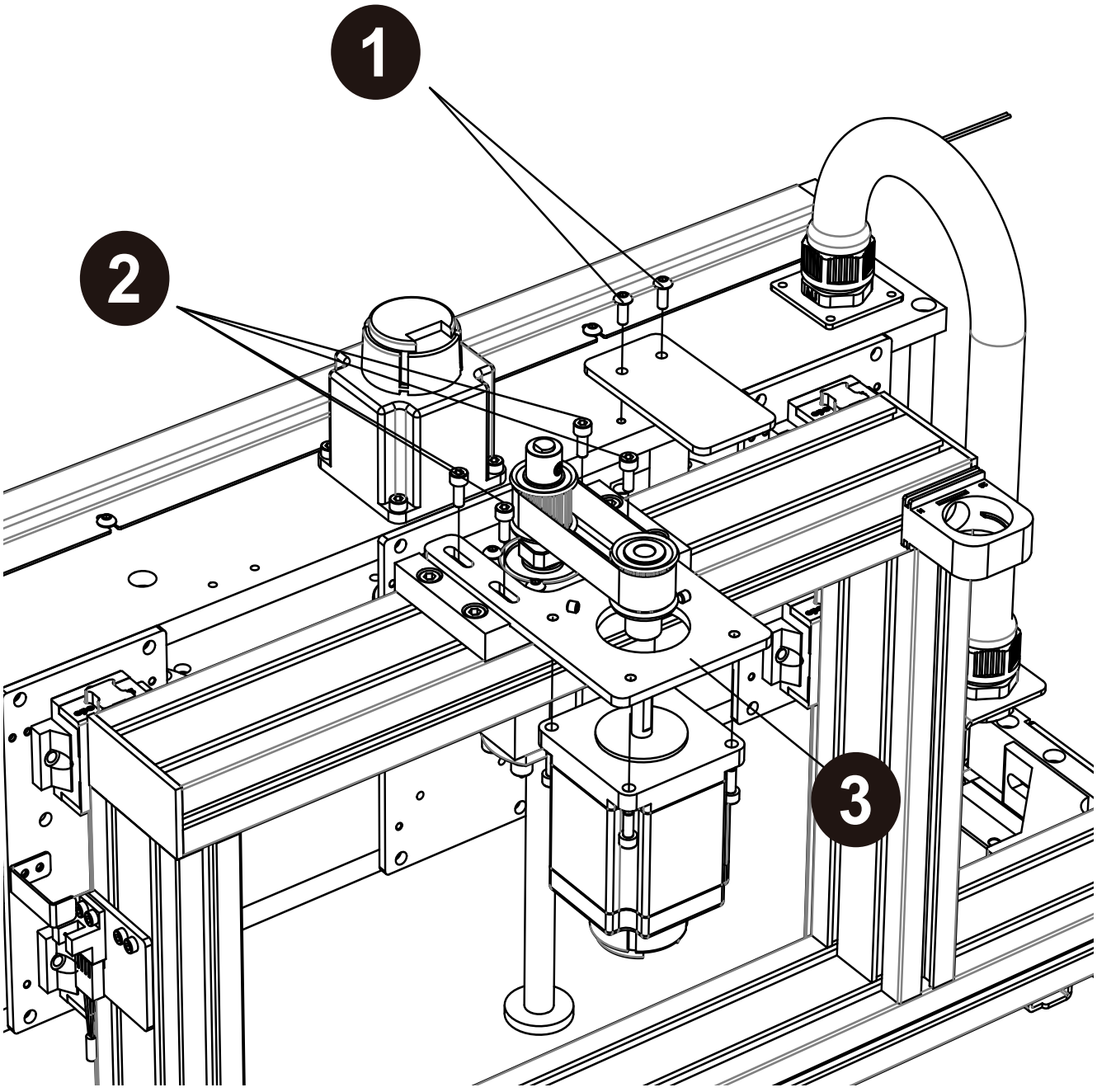
1. Install the Y-axis fixing plate on the machine and screw up the two screws. (Phillips screwdrivers).
2. Unplug the connector of the Y-axis motor.
3. Screw off the four screws of the metal sheet of the Y-axis motor (3mm Hex wrench).
4. Screw off the two set screws of the timing gear (2 mm Hex wrench).
5. Screw off the four screws of the motor (3mm Hex wrench).
6. Replace a new Y-axis motor.
7. Install the new Y-axis motor orderly on the machine.
8. Note that the belt should have always some tension when reinstalling it.
9. Disassemble the Y-axis fixing plate and screw off the two screws (Phillips screwdriver).



Replace the Y-axis belt

Open the back service lid.

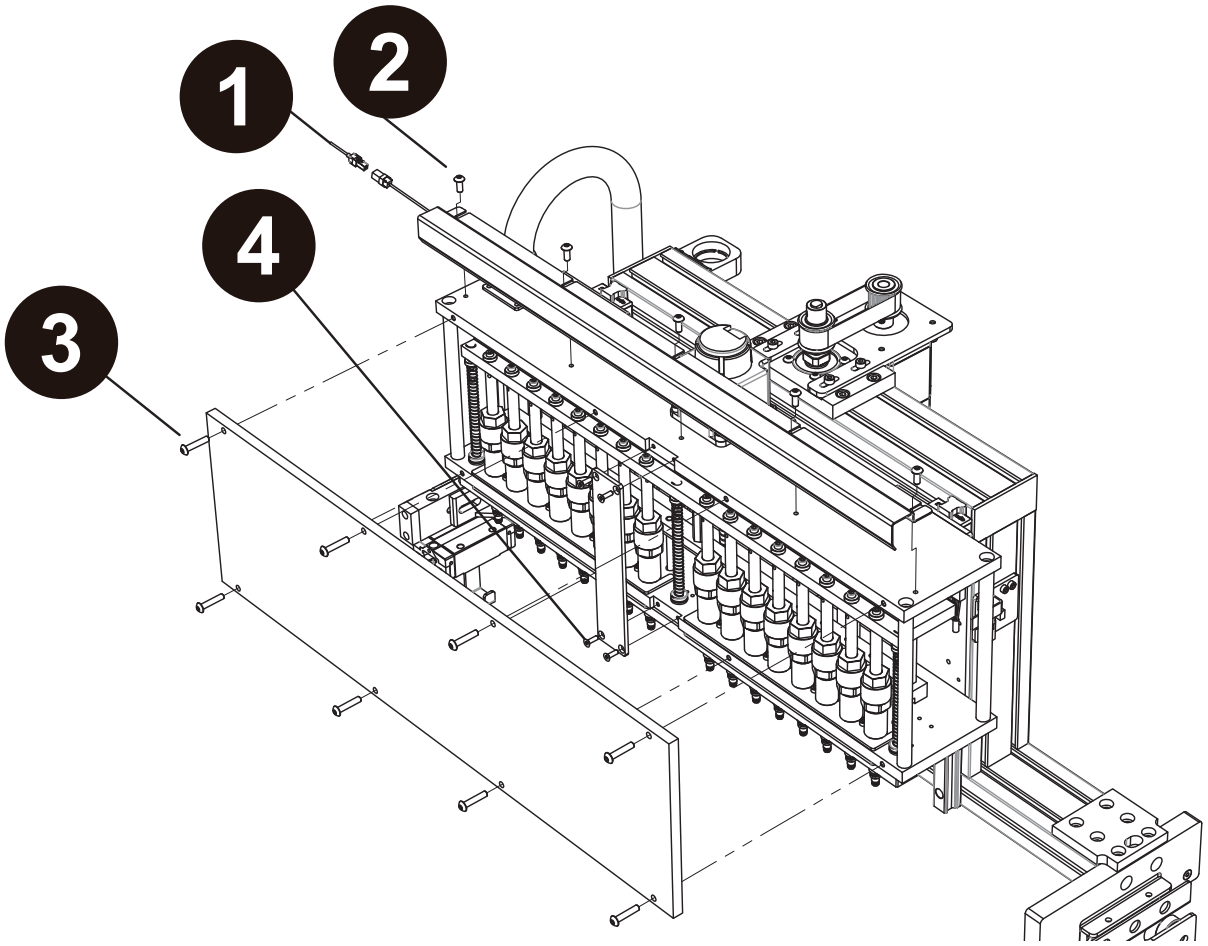
1. Install the Y-axis fixing plate on the machine and screw up the two screws (Phillips screwdriver).
2. Screw off the four screws of the metal sheet of the Y-axis motor (3mm Hex wrench).
3. Push the metal sheet of the motor forward.
4. Replace a new timing belt.
5. Install the Y-axis motor orderly on the machine.
6. Note that the belt should be a little tight when reinstalling it.
7. Disassemble the Y-axis fixing plate and screw off the two screws (Phillips screwdriver).



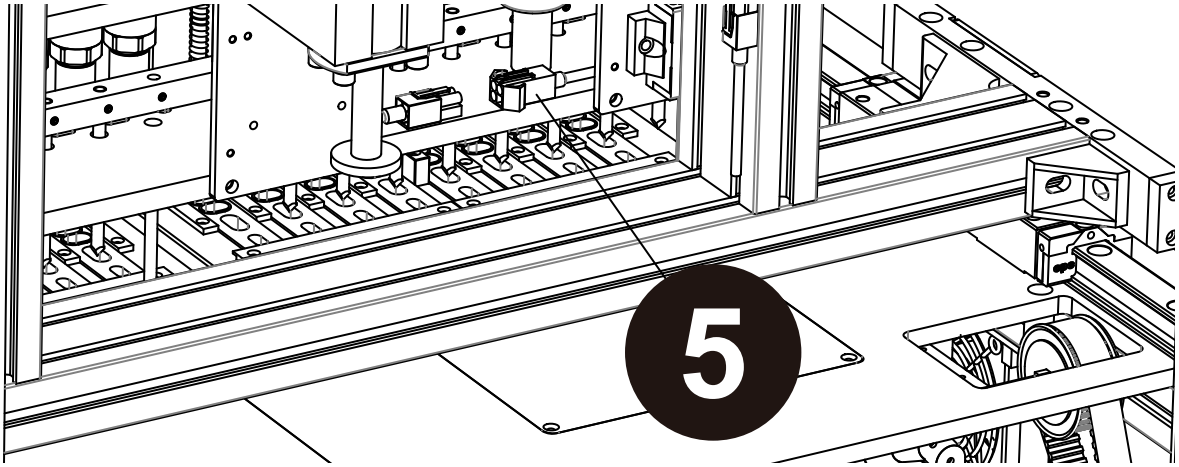
Replace the V-axis motor

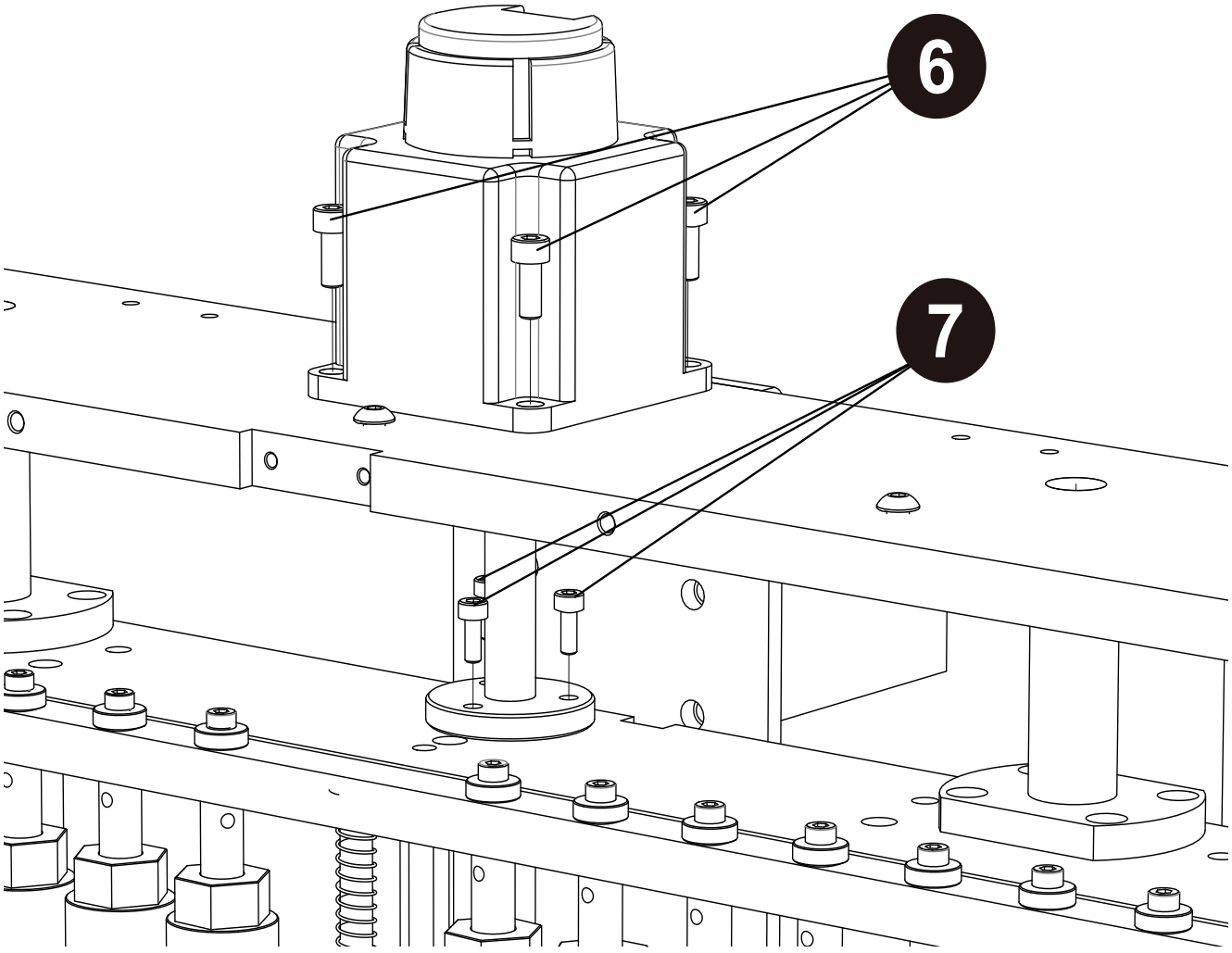
Open the front door.

1. Unplug the wire connector of the LED.
2. Loosen the three screws on the top of piston module (2.5mm Hex wrench), and take off the LED module.
3. Screw off the eight screws of the acrylic nameplate at the front side (2.5mm Hex wrench).
4. Screw off the four screws of the reinforced metal sheet (1.5mm Hex wrench).



5. Unplug the connection wire of the V-axis motor.
6. Screw off the four screws of the motor (3mm Hex wrench).
7. Screw off the three screws of the axle sleeve (2.5mm Hex wrench).
8. Replace a new V-axis motor.
9. Install the new V-axis motor orderly on the machine.

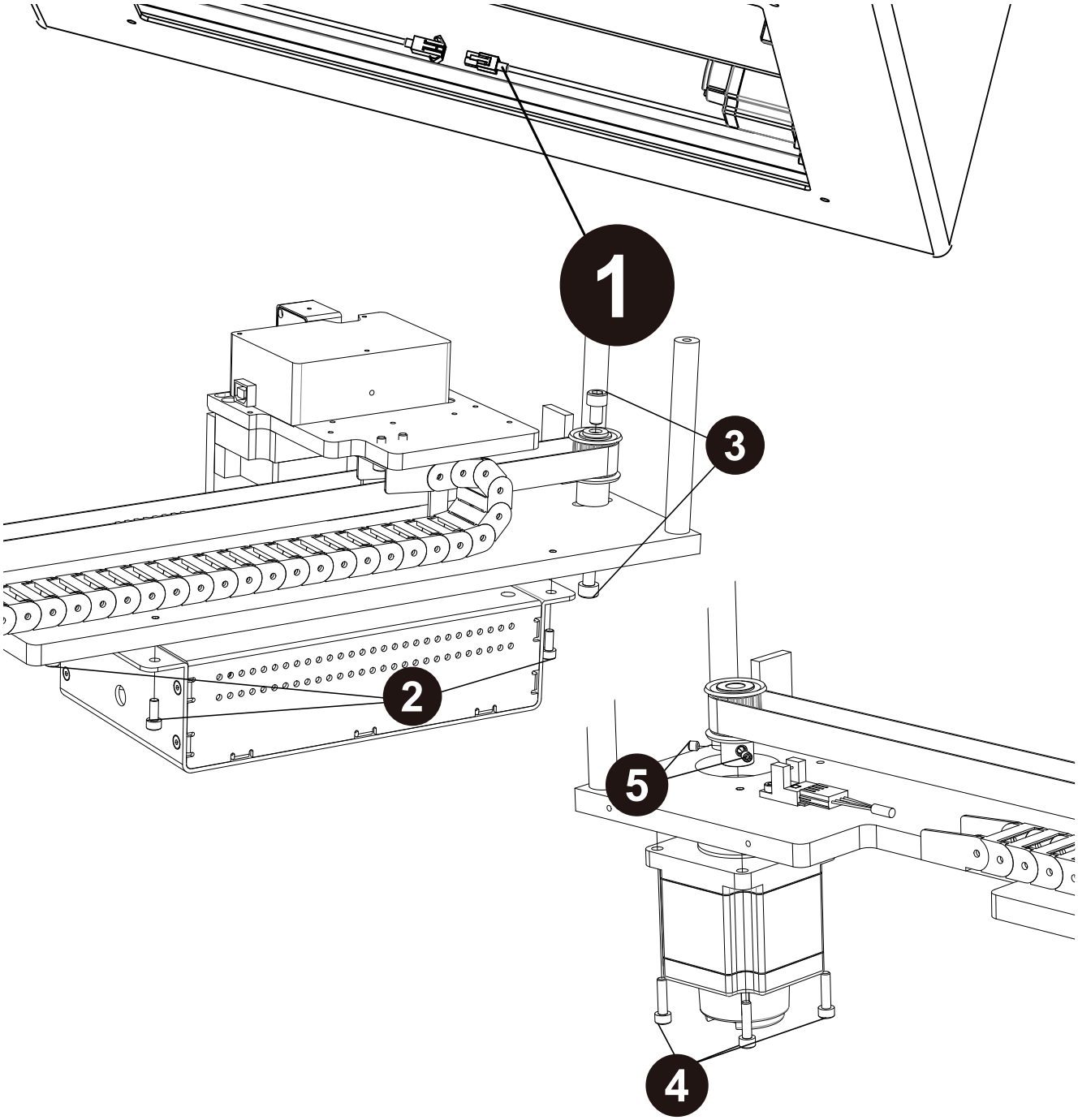




Replace the C-axis motor

Open the back service lid.

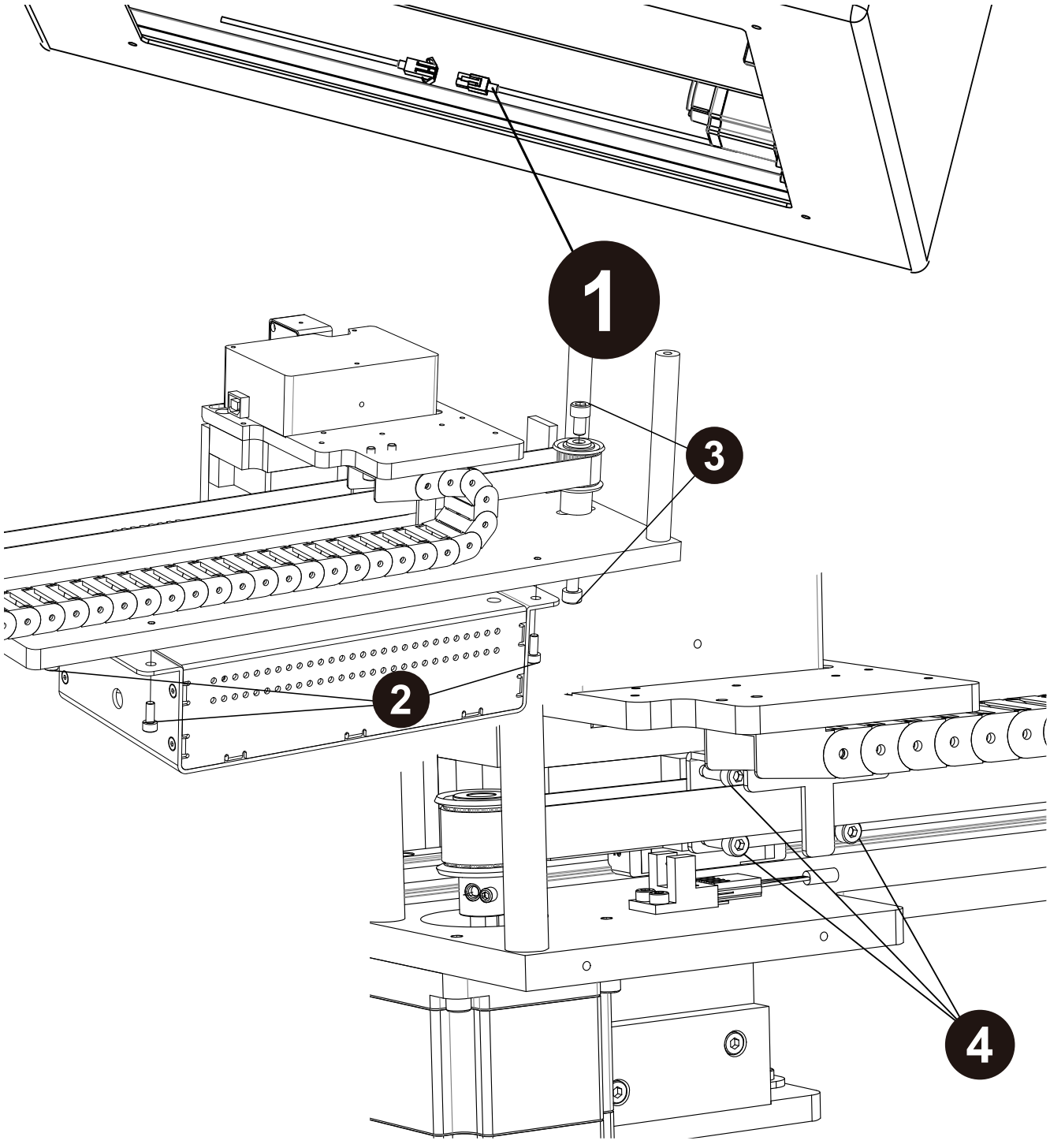
1. Unplug the connector wires of the C-axis motor.
2. Screw off the four screws of the optic lamp driver (3mm Hex wrench).
3. Screw off the two screws of the driven timing gear (4mm Hex wrench).
4. Screw off the four screws of the motor (3mm Hex wrench).
5. Screw off the two set screws of the timing gear (1.5mm Hex wrench).
6. Replace a new C-axis motor.
7. Install the new C-axis motor orderly on the machine.
8. Note that the belt should be a little tight after installation.



Replace the C-axis timing belt

Open the back service lid.

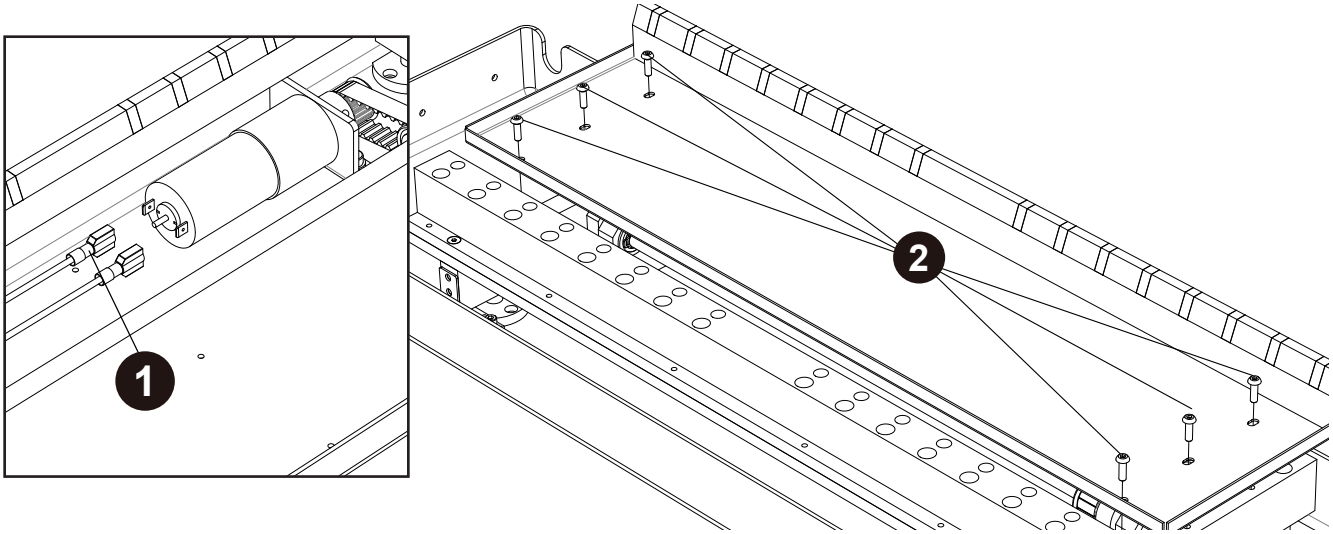
1. Unplug the connector of the optic lamp driver.
2. Screw off the four screws of the optic lamp driver (3mm Hex wrench).
3. Screw off the two screws of the driven timing gear (4mm, 5mm Hex wrench).
4. Screw off the four screws of the pressing metal sheet (3mm Hex wrench).
5. Replace a new C-axis timing belt.
6. Note that the belt should be a little tight.
7. Reinstall the above components orderly.

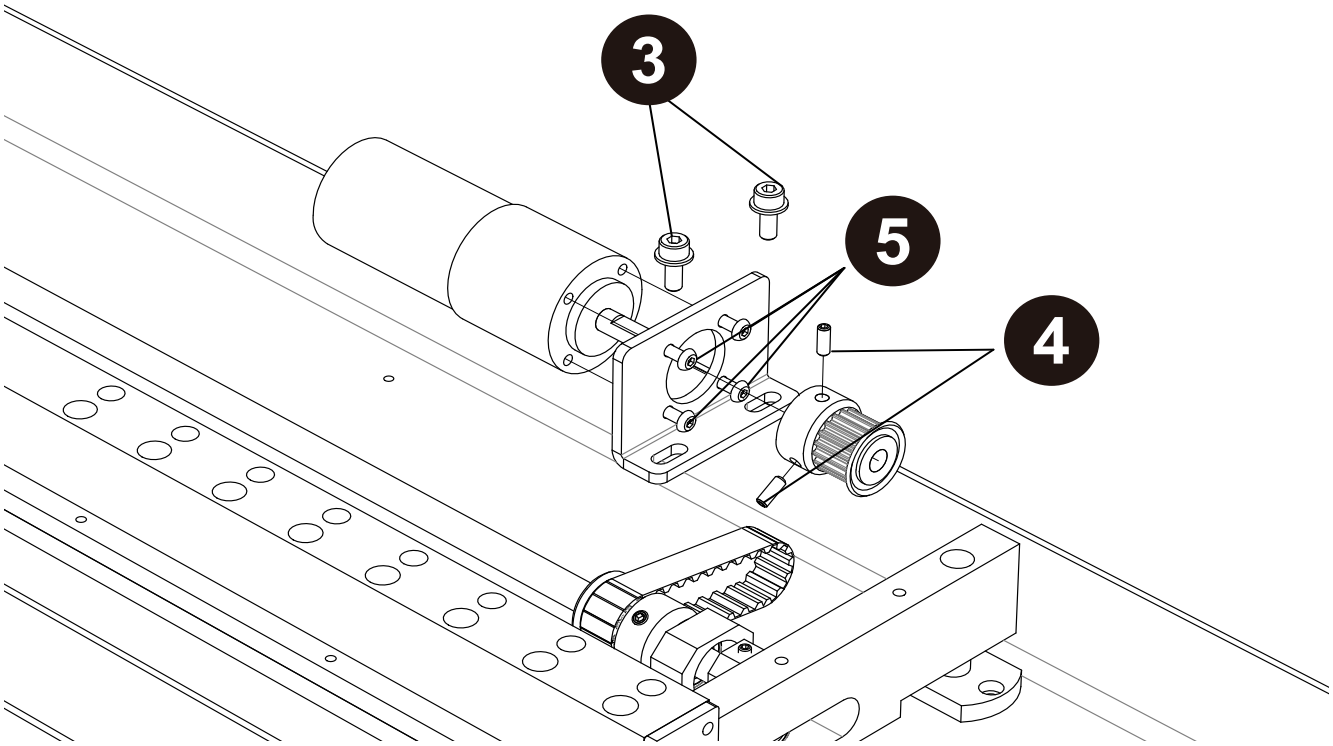


Replace the lift motor of the base

Open the front door and take out the waste box, cartridge rack and T-rack.

1. Unplug the power connector of the lift motor.
2. Screw off the six screws of the liquid container above the heating module (2mm Hex wrench).
3. Screw off the two screws of the reinforced metal sheet of the motor (3mm Hex wrench).
4. Screw off the two screws of the timing gear (2.5mm Hex wrench).
5. Screw off the four fixation screws of the motor (2.5mm Hex wrench).
6. Replace a new lift motor.
7. Install the new lift motor orderly on the machine.
8. Note that the belt should be a little tight after installation.

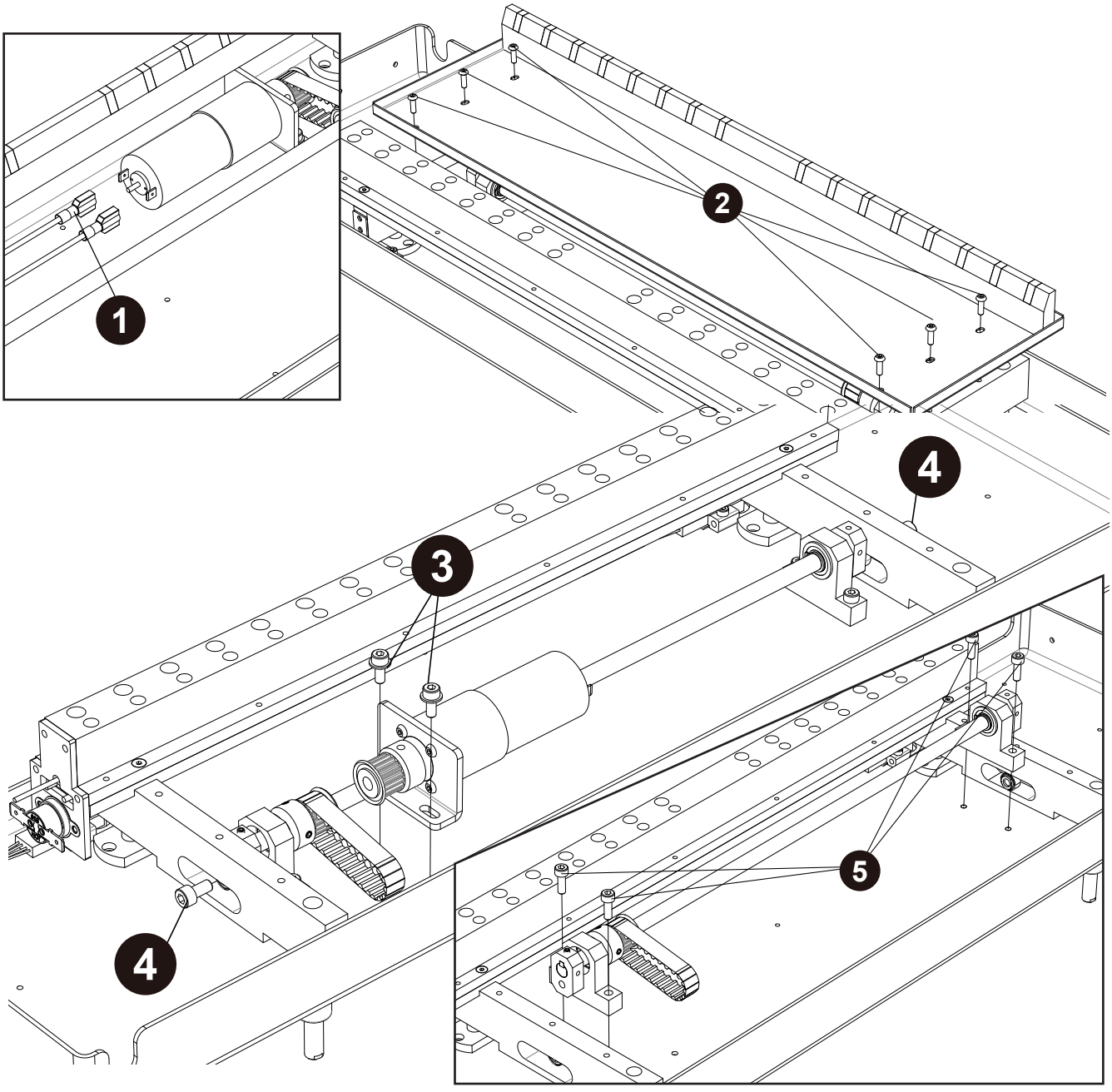




Replace the timing belt of the lift motor of the base

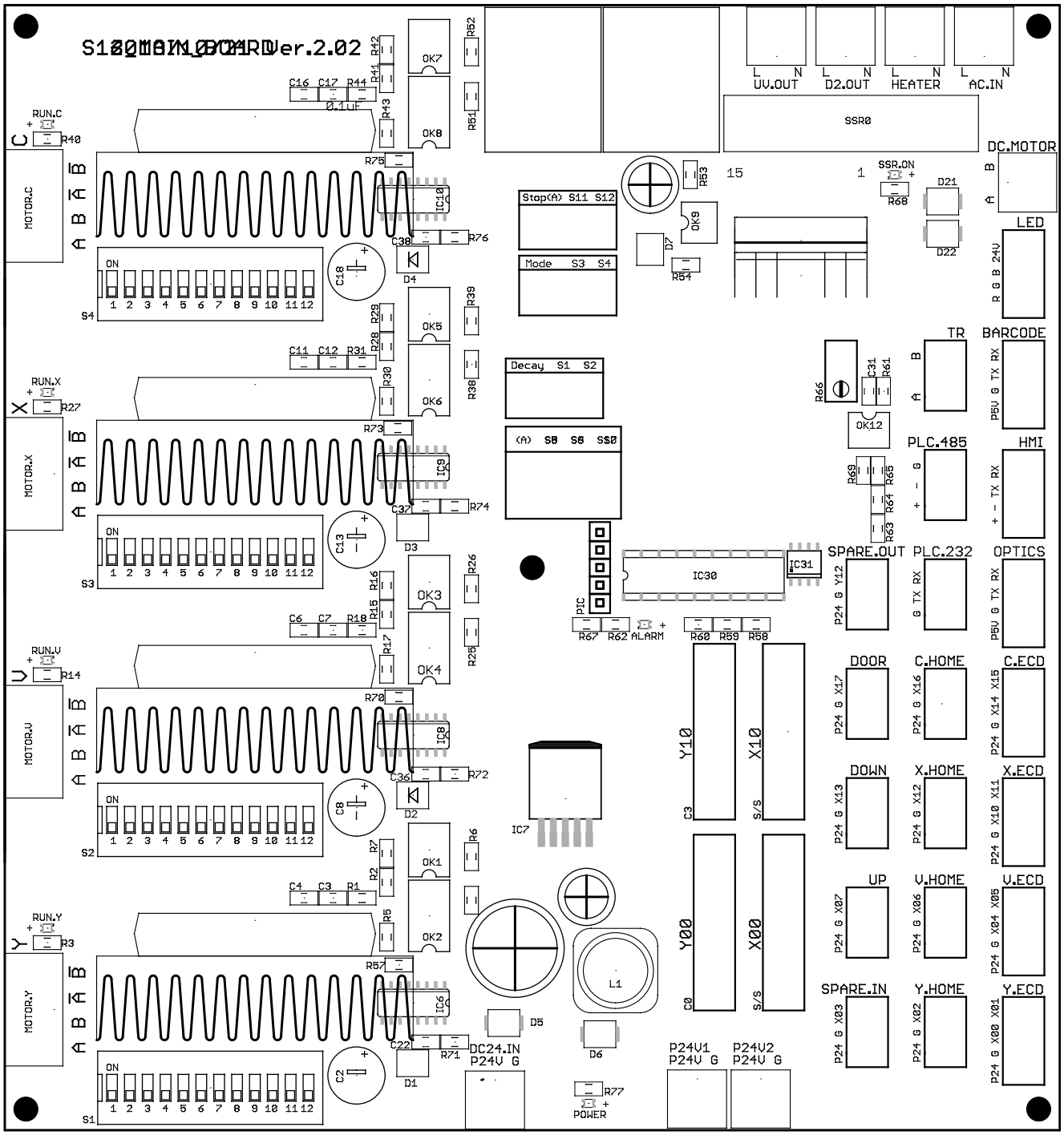
Open the front cover and take out the waste box, cartridge rack and T-rack.

1. Unplug the power connector of the lift motor.
2. Screw off the six screws of the liquid container above the heating module (2mm Hex wrench).
3. Screw off the two screws of the reinforced metal sheet of the motor (3mm Hex wrench).
4. Screw off the two screws of the bearings at the lateral grooves (4mm Hex wrench).
5. Screw off the four fixation screws of the bearing fixation bases and move the drive module upward (3mm Hex wrench).
6. Replace a new timing belt.
7. Note that the belt should be a little tight.
8. Install the lift motor, timing belt and timing gear on the machine.



Electrical control and engineering software

Main board configuration

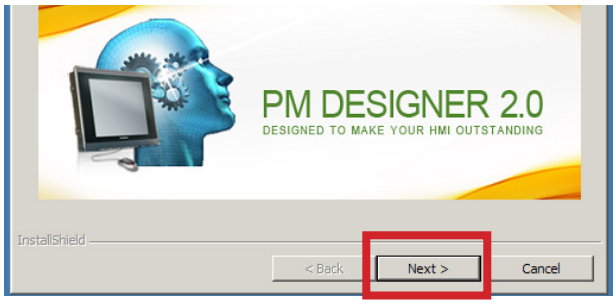


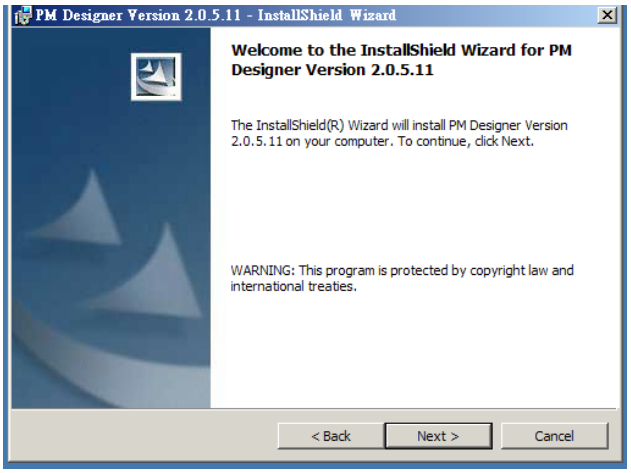
Copy the engineering software to the desktop

1. Copy the engineering software "SHF16 Install Tool Software" to the desktop.
2. Open the folder and select "EasyDownload_v1.83" (for updating PLC).
3. Open the folder and select "PM_2.0.5.11" (for updating HMI).

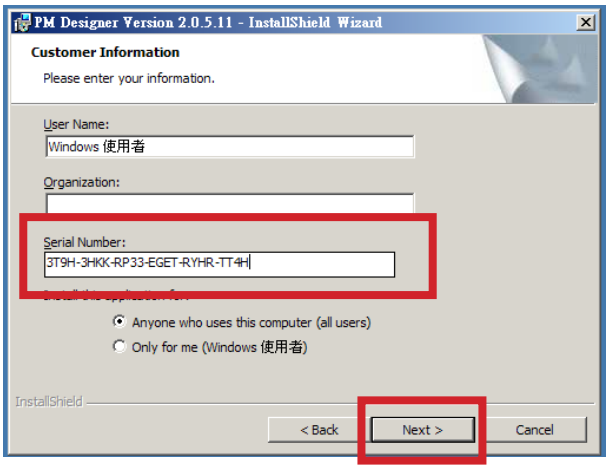
Install the HMI updating software

1. Open "PM_2.0.5.11" folder.
2. Open the file, "OemKeyV3_00.txt", and copy the key serial number.
3. Select "PM Designer Version 2.0.5.11" to install the software.

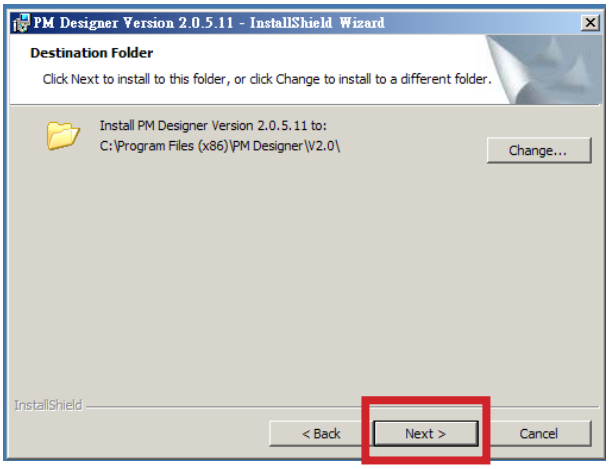




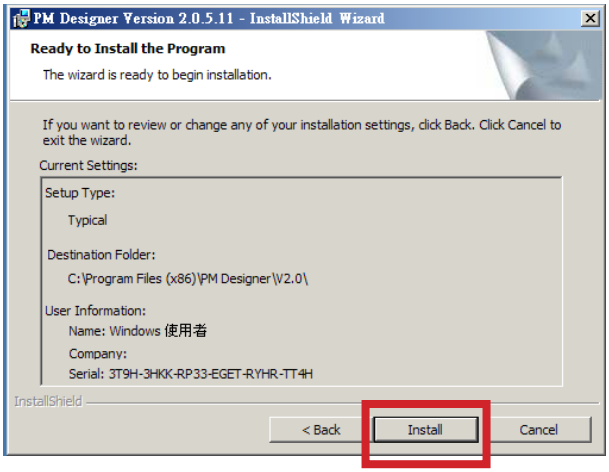
4. Input the serial number in "Serial Number"



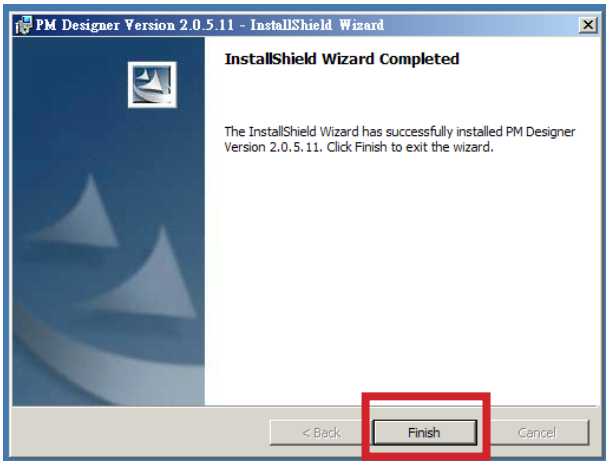
5. Select a destination folder.



6. Press Install button to install the software.

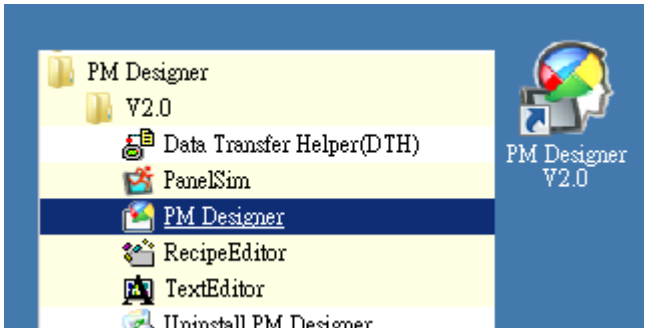


7. After the installation process is finished, please click "finish" to complete the installation.

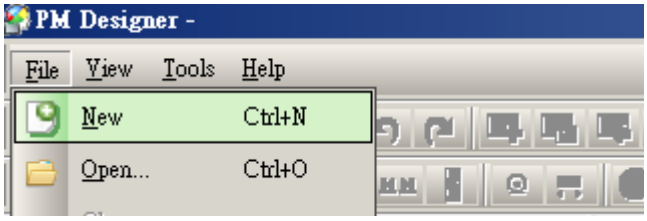


Create an uploading folder

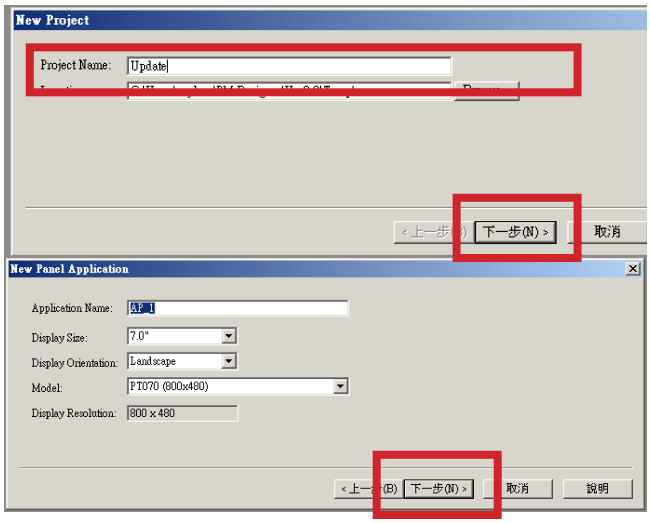
1. Select the icon of PM Designer at the folder or desktop.



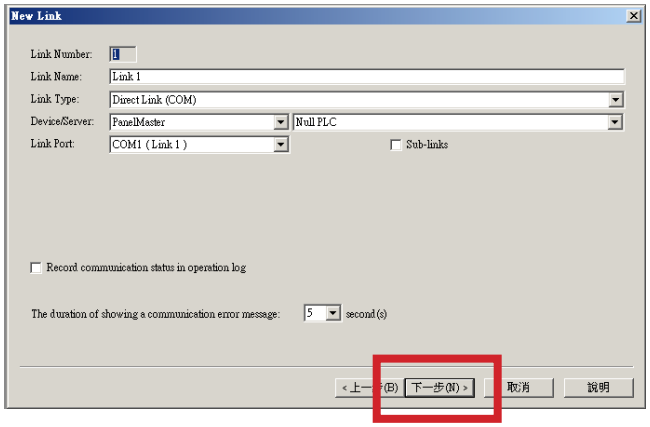
2. Select New in the File to create new data.



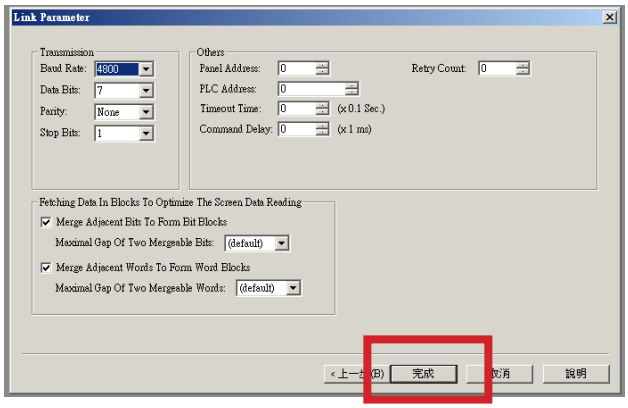
3. Input "Update" at the project name column and press "Next".



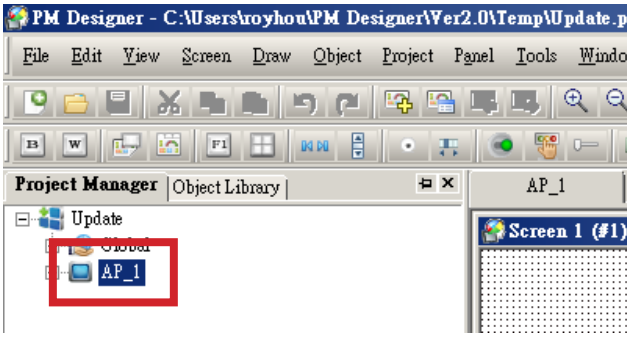
4. Select a connecting method and then press Next.



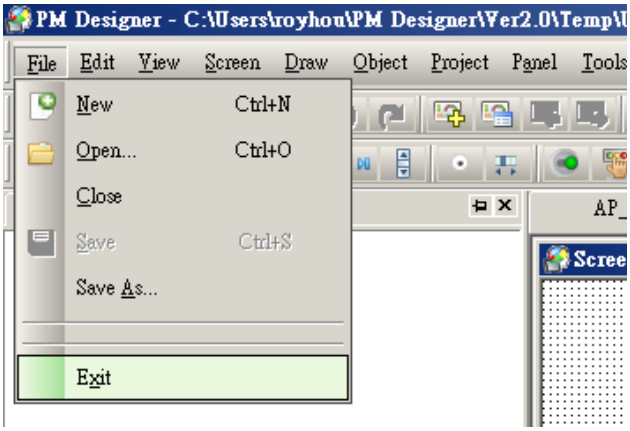
5. 選擇連接速度及參數，並按完成，完成設定



6. Confirm the new project has been created.



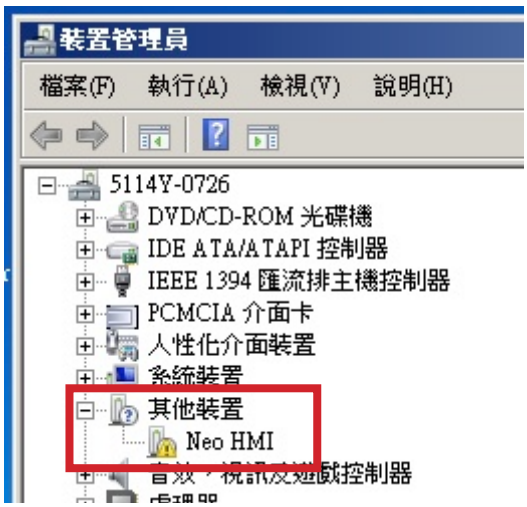
7. Select File -> Exit and close the software.



Install the driver

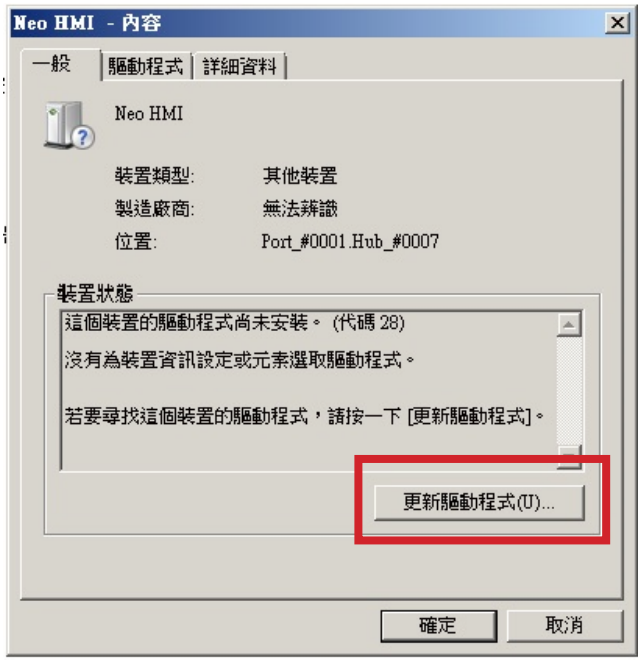
1. Connect HMI to the computer by a transmission wire .
2. If the driver fails to be installed successfully, please enter the "Control Panel" to modify the settings.

3. Please enter the "Control Panel" and select "hardware and Sound" , and then select "Device manager" .

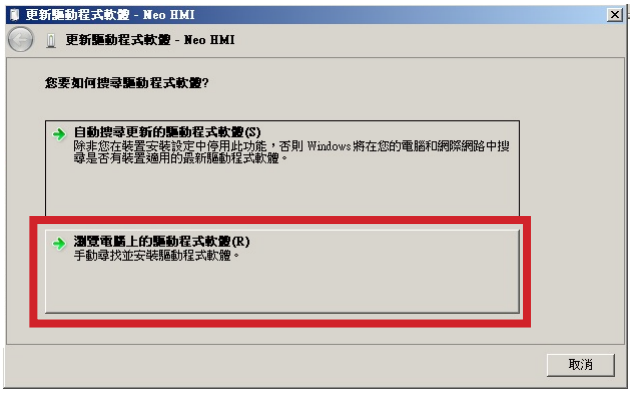


4. Select "NEO HMI" in "Other Devices" .

5. Select "Update Driver" at the "General" subpage.

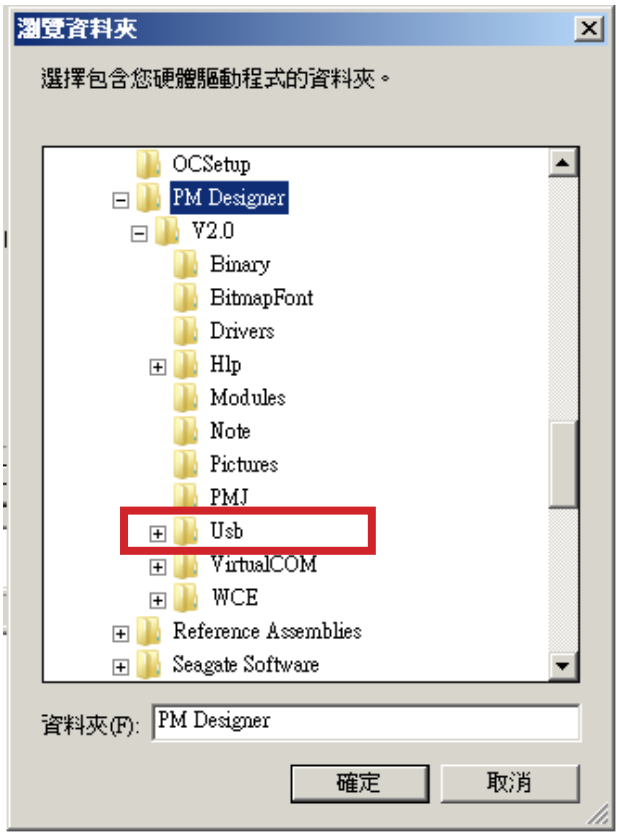


6. Select "Browse my computer for driver software"



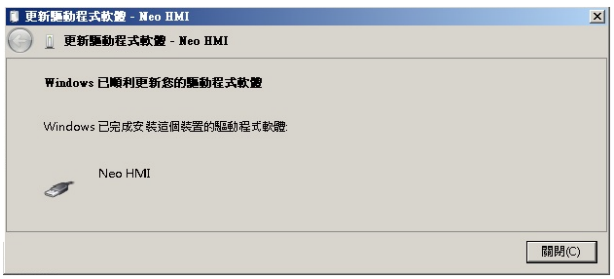
7. Select "Browse" to search the "Program Files(X86)" in the partition C to find out the sub-folder, "PM Designer" .

8. Find the "V2.0" folder at the sub-folder, "PM Designer", and select "Usb" folder at the "V2.0" folder and then press "Confirm".



9. Trust the software and install it.

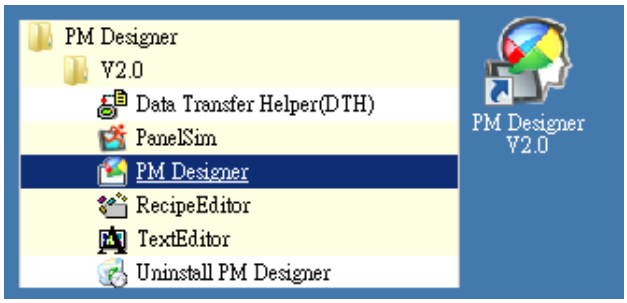
10. The driver updating is finished.



HMI updating

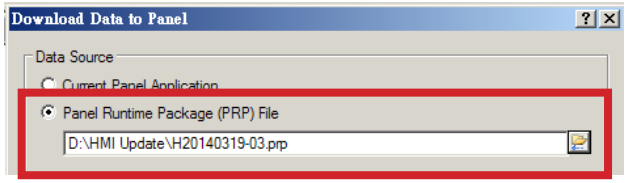
1. Connect HMI to the computer by a USB transmission wire.

2. Start the PM Designer software.



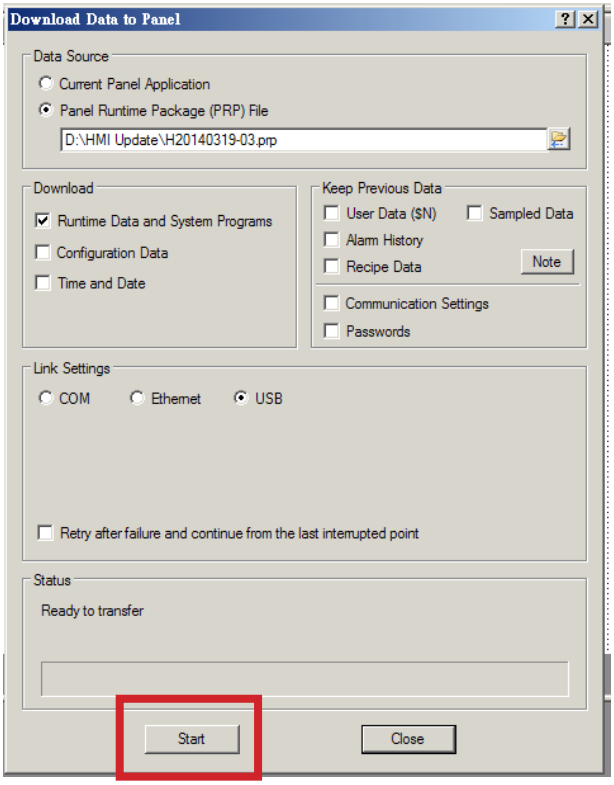
3. Press the download icon.

4. Select the prp file to be uploaded.



5. Select a connection mode.

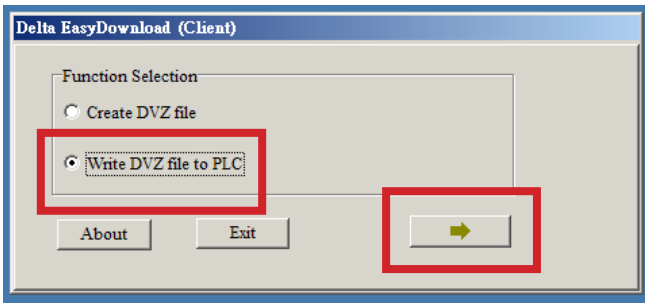
6. Begin to upload and finish the updating.



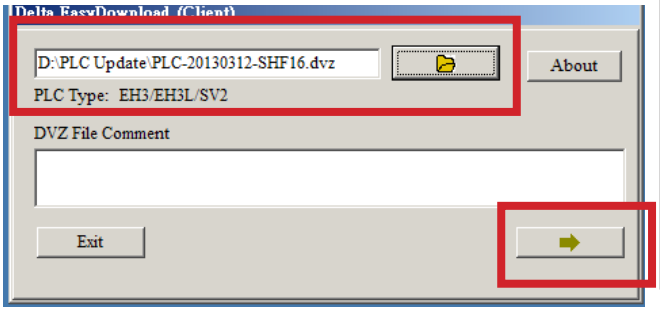
PLC updating

1. Turn off the power supply of the machine.
2. Switch the switch of the PLC from "Run" to "Stop", and replace the connection wire with the PLC-RS232 communication connection wire.

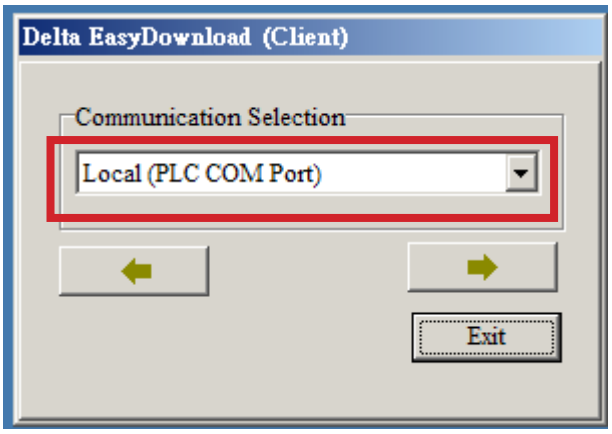
3. Turn on the power supply of the machine.
4. Open the "EasyDownload_v1.83" folder and open "EasyClient" software.
5. Select to write DVZ into PLC and click Next.

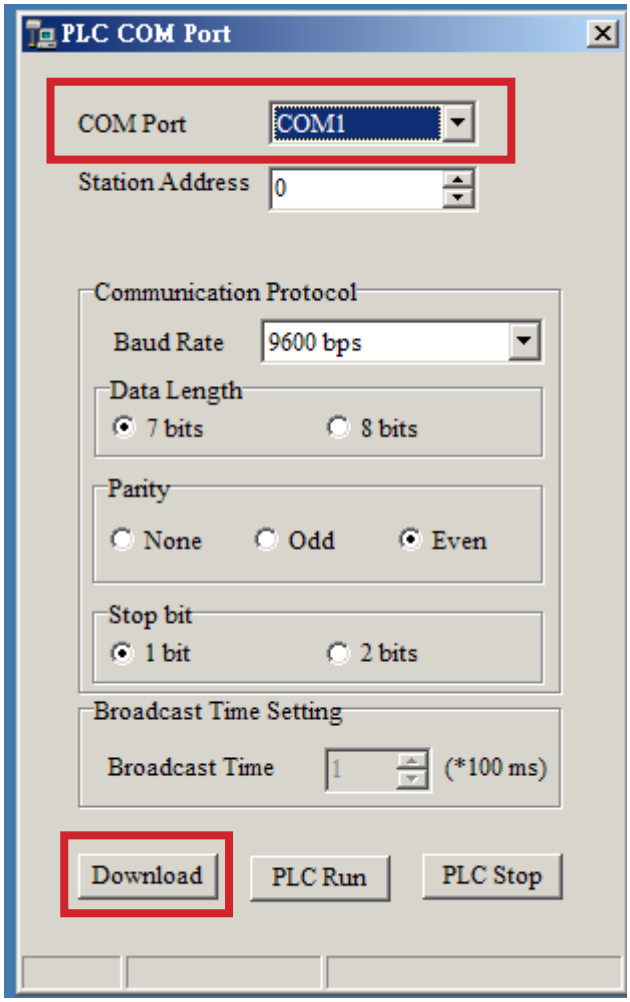


6. Select a DVZ file to be uploaded and press Next.

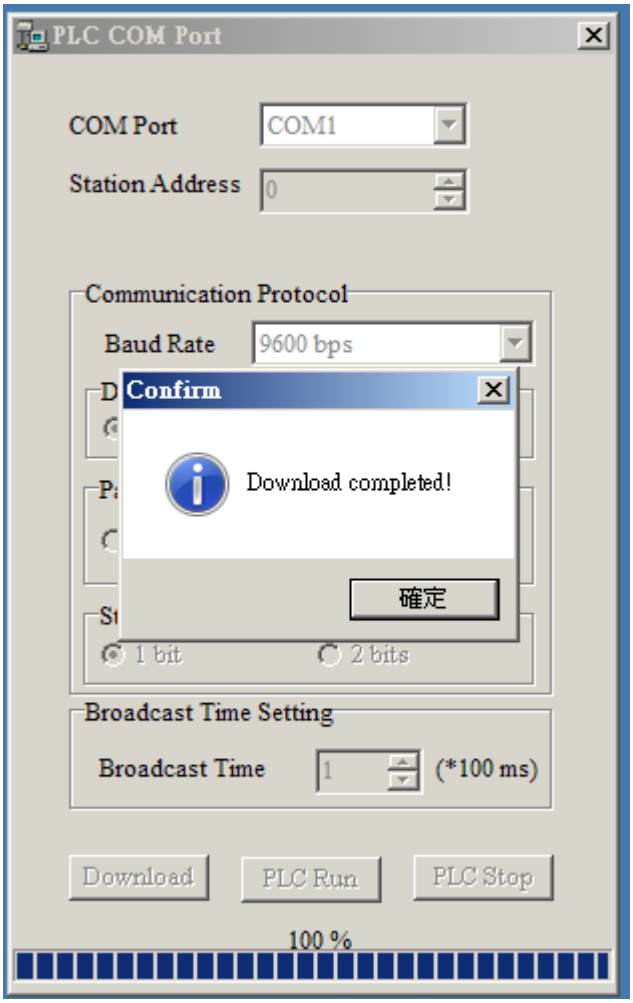


7. Select a communication method and click "Download" to start the download.



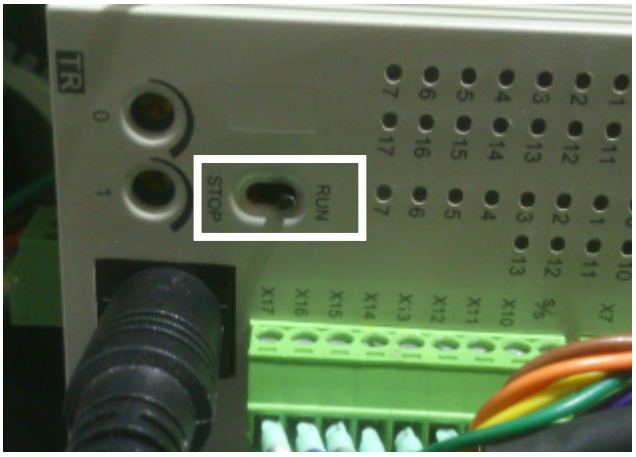


8. After the screen shows "Download Completed", please select "Confirm" to finish the data transmission.

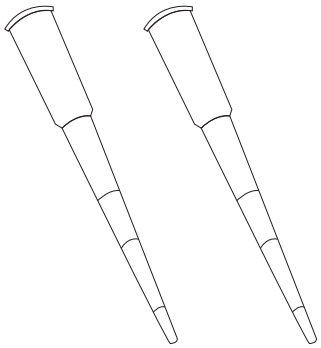


9. Turn off the power supply of the machine.

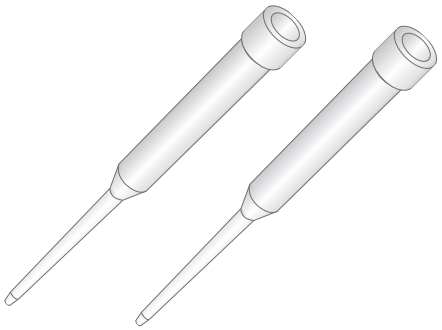
10. Reconnect the original connection wire and switch the switch to "Run" to finish the installation.



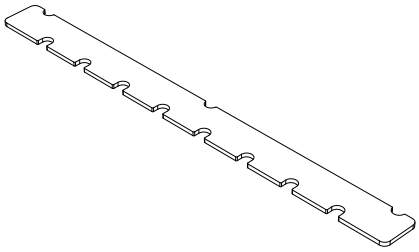
Position Teaching Tools



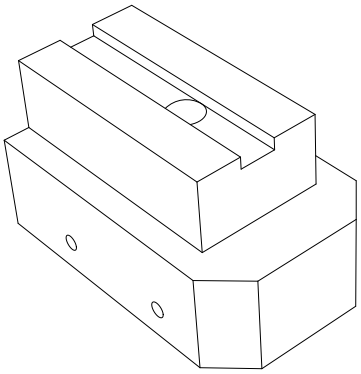
200 µl SP Tip



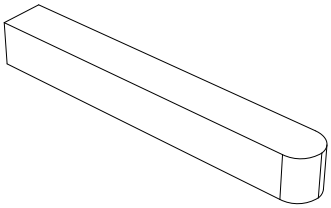
Pipette Tip



tool A



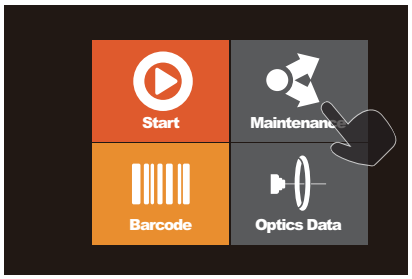
tool B



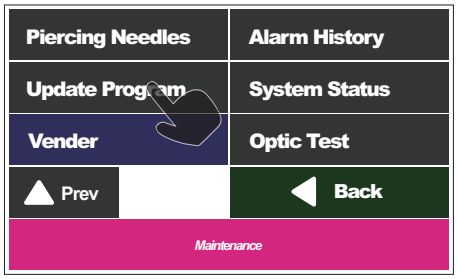
tool C

The pre-operation before calibration

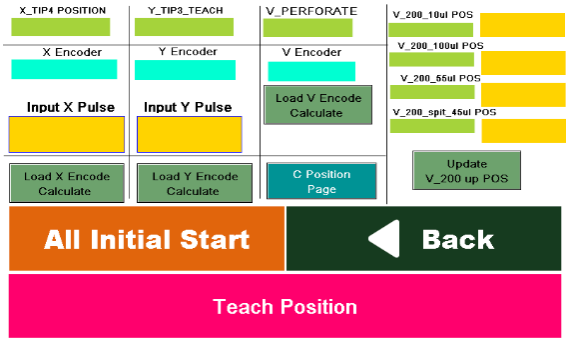
1. Select Maintenance.



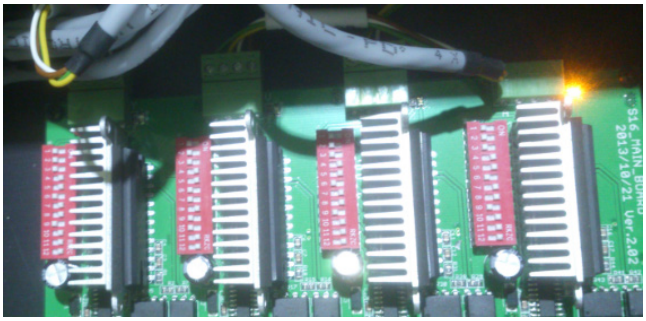
2. Select Vender and input password.



3. Select Teach Position and enter the teaching page.



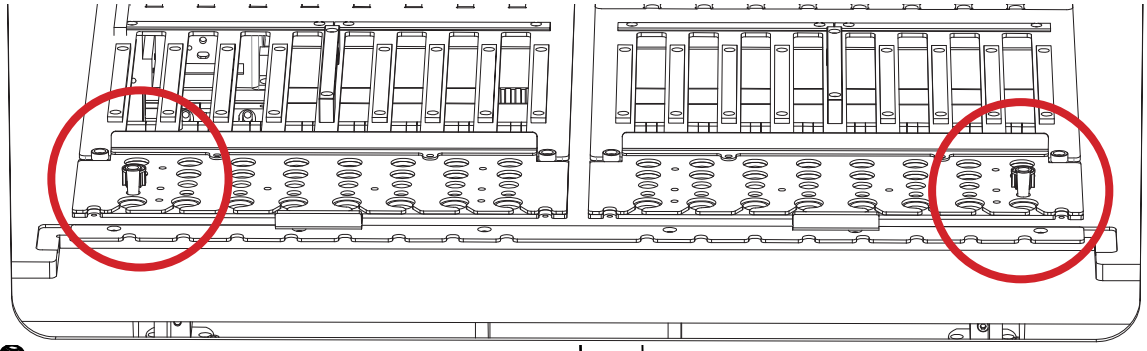
4. The wiring configuration of the connector of the motor on the main board.

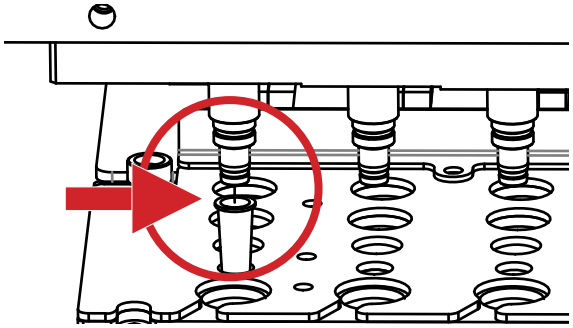


Y V X C

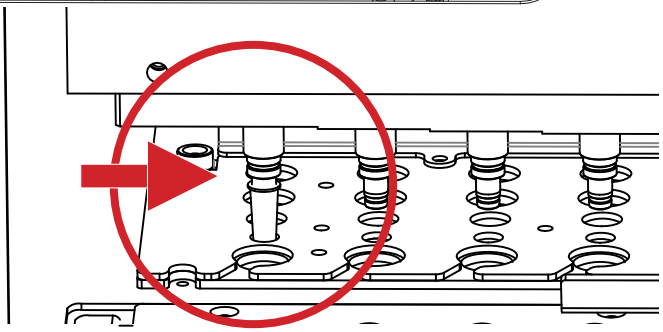
X-axis calibration

1. Remove the connectors of the X-axis motor on the main board.
2. Put the 200µl SP Tips at the W4 at the both sides of the T-rack.
3. Move the X-axis and Y-axis to the position that the piston take out the 200µl SP Tip.



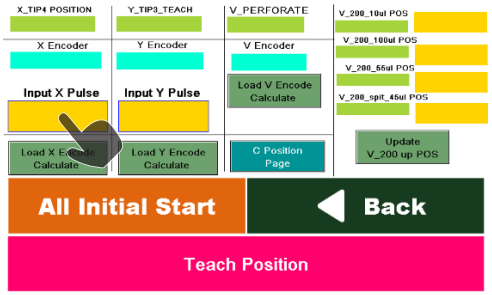


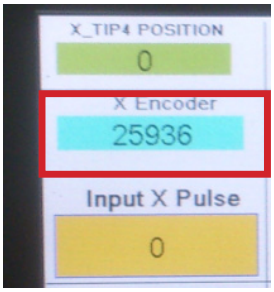
Move the piston to align with the tip.

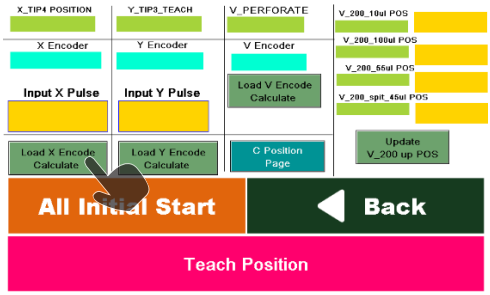


Move the piston downward to insert the piston into

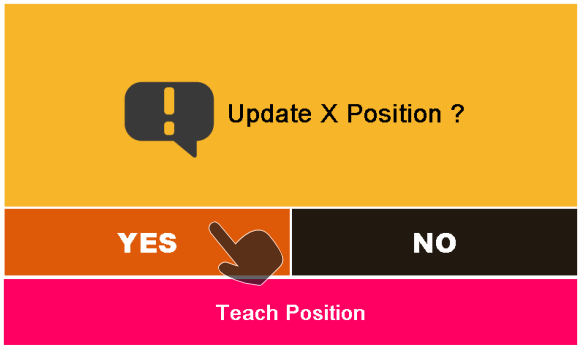
4. Select "Input X Pulse" and input the X Encoder value shown at the top side, and then select "Load X Encode Calculate".







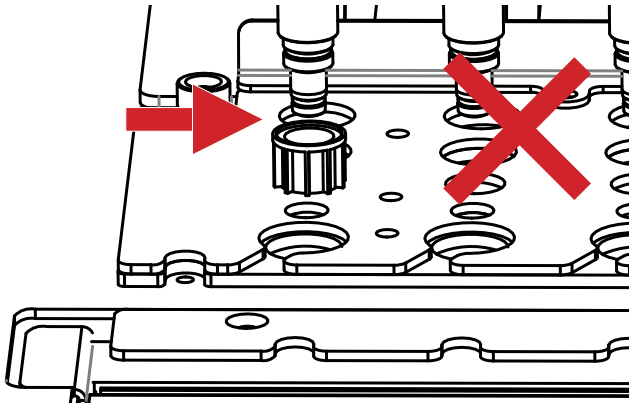
5. Select "Yes" to update the position of the X-axis.



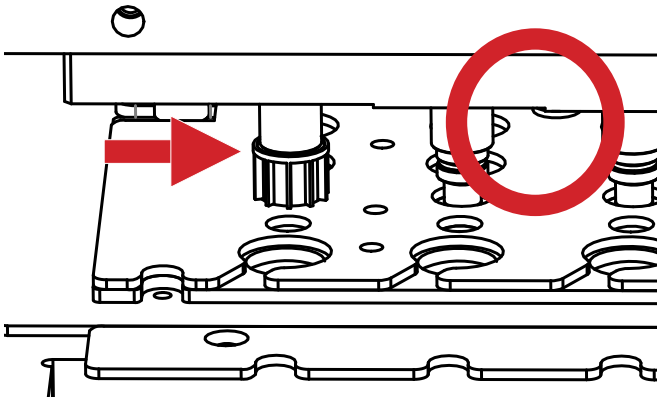
6. Replug the connectors of X-axis motor to the main board.

Y-axis calibration

1. Remove the connectors of the Y-axis motor on the main board.
2. Put the Pipette Tips at the W2 at the both sides of the T-rack.
3. Move the X-axis and Y-axis to the position that the piston take out the Pipette Tip, and press it until the piston completely inserts into the Tip.

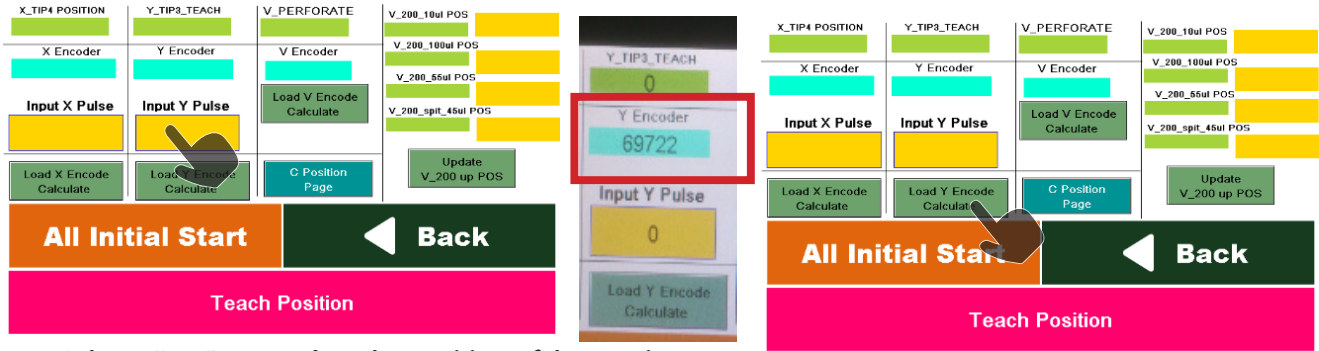


Wrong: not completely insert the piston.

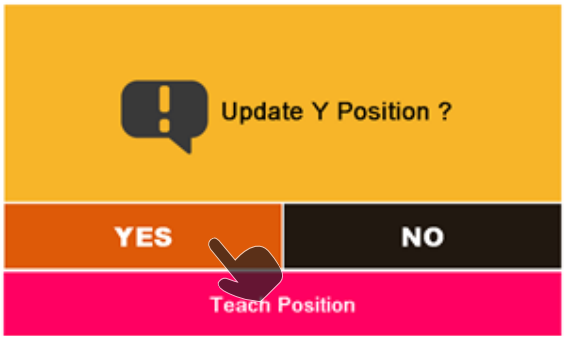


Correct: completely insert the piston.

4. Select "Input Y Pulse" and input the Y Encoder value shown at the top side, and then select "Load Y Encode Calculate".



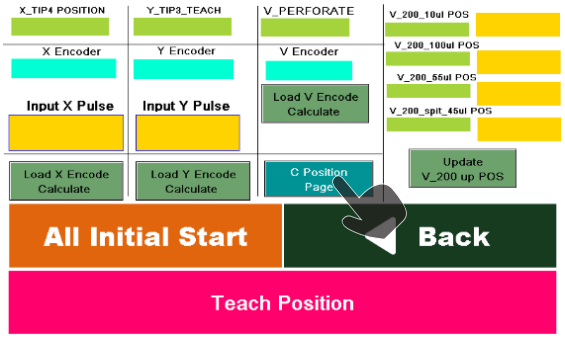
5. Select "Yes" to update the position of the Y-axis.



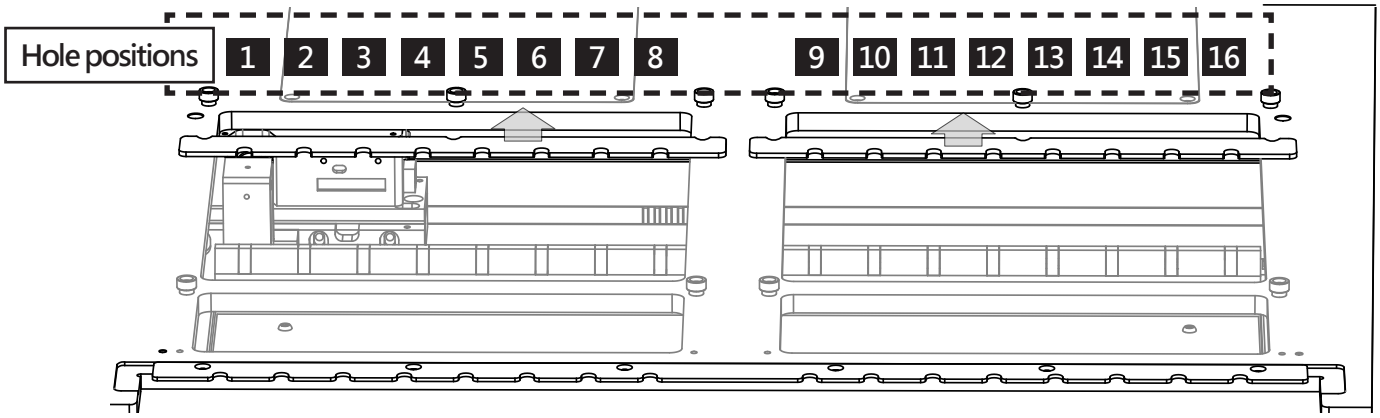
6. Replug the connectors of Y-axis motor to the main board.

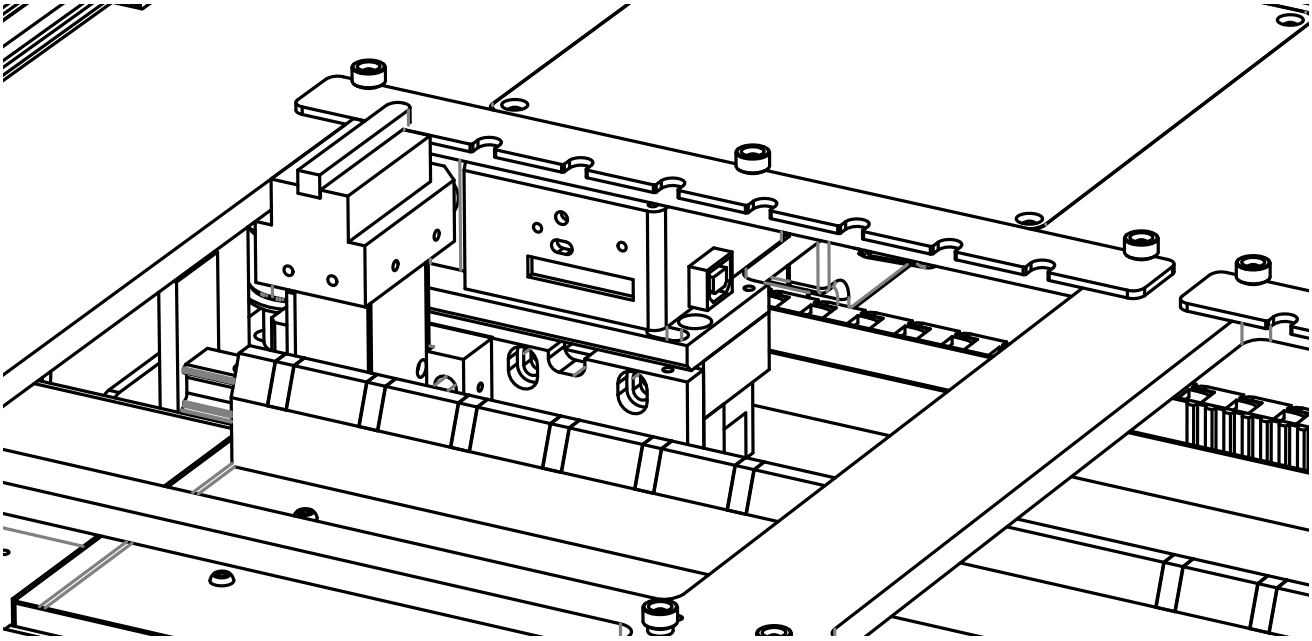
C-axis calibration (Magcore Super Only)

1. Remove the connectors of the C-axis motor on the main board.
2. Select "C Position Page" at the "Teach position" page to enter the C-axis correction page.

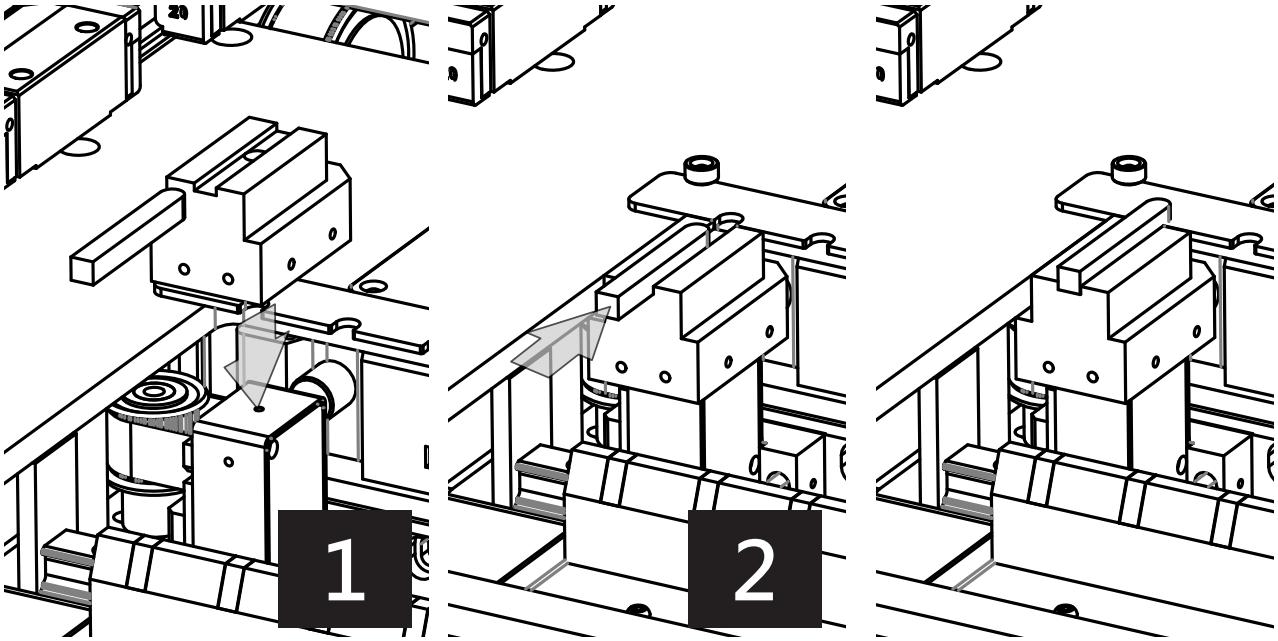


3. Insert the teaching tool A into the area below the fixation plug of the cartridge rack.

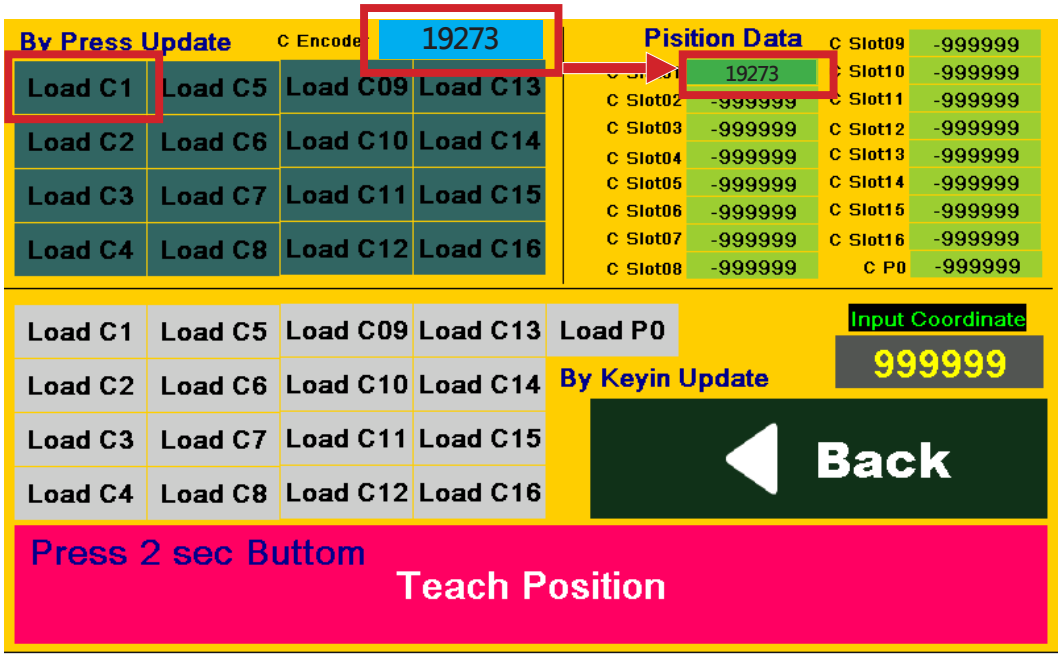




4. [1] Align the groove of the tool B with the hole positions of the tool A.
   [2] Insert the tool C into the groove to fix the relative position between the tool A and the tool B.



5. Long press "Load C1" for two seconds and check whether the value of the C Encoder has been written into the C Slot 01 at the right side.



6. Orderly perform the correction of the 16 hole positions.
7. Remove the tool A, B and C after all calibrations are finished.
8. Replug the connectors of Y-axis motor to the main board.

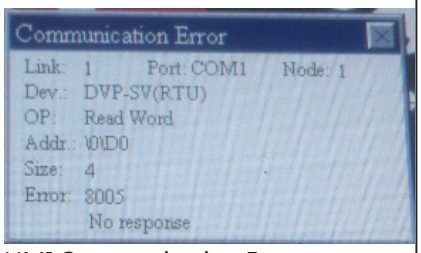
Trouble Shooting for Alarm Code

Code No.	Content	Causes and solutions
4	DC Motor Up Time Out	[Causes] The motor is not functional or the block plate of the sensor is at wrong position. [Solutions] (1) Check whether the motor is functional. (2) Check whether the cable dropped off. (3) Adjust the position of the block plate of the sensor.
5	DC Motor Down Time Out	[Causes] The motor is not functional or the block plate of the sensor is at wrong position. [Solutions] (1) Check whether the motor is functional. (2) Check whether the cable has dropped off. (3) Adjust the position of the block plate of the sensor.
6	Y_SoftLimt+	[Causes] Manual Y JOG+ operation exceeds the distance of the software. [Solutions] (1) Alarm Reset (2) Manual Y JOG- operation.
7	Y_SoftLimt-	[Causes] Manual Y JOG- operation exceeds the distance of the software. [Solutions] (1) Alarm Reset (2) Manual Y JOG- operation.
8	Y_Encode no change	[Causes] No signal response from the Encoder. [Solutions] (1) Replace the cable connected to the Encoder. (2) Replace the motor module.
9	Y_Position Over 60 Pulse	[Causes] The position command coordinate greatly differ from the Encoder coordinate. [Solutions] (1) Check whether the terminal of the PLC Y00 Cable has dropped off. (2) Replace the cable connected to the power of the motor. (3) Replace the main board. (4) Replace the motor module.

Code No.	Content	Causes and solutions
10	Y_Home Sensor Fail	[Causes] When performing the motor initial, the Home sensor has no response and the motor collides with hard stop. [Solutions] (1) Check whether the cable has dropped off. (2) Replace the sensor.
11	V_SoftLimt+	[Causes] Manual V JOG+ operation exceeds the distance of the software. [Solutions] (1) Alarm Reset (2) Manual V JOG- operation.
12	V_SoftLimt-	[Causes] Manual V JOG- operation exceeds the distance of the software. [Solutions] (1) Alarm Reset (2) Manual V JOG+ operation.
13	V_Encode no change	[Causes] No signal response from the Encoder. [Solutions] (1) Replace the cable connected to the Encoder. (2) Replace the motor module.
14	V_Position Over 60 Pulse	[Causes] The position command coordinate greatly differ from the Encoder coordinate. [Solutions] (1) Check whether the terminal of the PLC Y00 Cable has dropped off. (2) Replace the cable connected to the power of the motor. (3) Replace the main board. (4) Replace the motor module.
15	V_Home Sensor Fail	[Causes] When performing the motor initial, the Home sensor has no response and the motor collides with hard stop. [Solutions] (1) Check whether the cable has dropped off. (2) Replace the sensor.
16	X_SoftLimt+	[Causes] Manual X JOG+ operation exceeds the distance of the software. [Solutions] (1) Alarm Reset (2) Manual X JOG- operation.

Code No.	Content	Causes and solutions
17	X_SoftLimt-	[Causes] Manual X JOG- operation exceeds the distance of the software. [Solutions] (1) Alarm Reset (2) Manual X JOG+ operation.
18	X_Encode no change	[Causes] No signal response from the Encoder. [Solutions] (1) Replace the cable connected to the Encoder. (2) Replace the motor module.
19	X_Position Over 60 Pulse	[Causes] The position command coordinate greatly differ from the Encoder coordinate. [Solutions] (1) Check whether the terminal of the PLC Y00 Cable has dropped off. (2) Replace the cable connected to the power of the motor. (3) Replace the main board. (4) Replace the motor module.
20	X_Home Sensor Fail	[Causes] When performing the motor initial, the Home sensor has no response and the motor collides with hard stop. [Solutions] (1) Check whether the cable has dropped off. (2) Replace the sensor.
21	C_SoftLimt+	[Causes] Manual C JOG+ operation exceeds the distance of the software. [Solutions] (1) Alarm Reset (2) Manual C JOG- operation.
22	C_SoftLimt-	[Causes] Manual C JOG- operation exceeds the distance of the software. [Solutions] (1) Alarm Reset (2) Manual C JOG+ operation.
23	C_Encode no change	[Causes] No signal response from the Encoder. [Solutions] (1) Replace the cable connected to the Encoder. (2) Replace the motor module.

Code No.	Content	Causes and solutions
24	C_Position Over 60 Pulse	[Causes] The position command coordinate greatly differ from the Encoder coordinate. [Solutions] (1) Check whether the terminal of the PLC Y00 Cable has dropped off. (2) Replace the cable connected to the power of the motor. (3) Replace the main board. (4) Replace the motor module.
25	C_ Home Sensor Fail	[Causes] When performing the motor initial, the Home sensor has no response and the motor collides with hard stop. [Solutions] (1) Check whether the cable has dropped off. (2) Replace the sensor.
26	Optics Device Off-Line	[Causes] The optical module and PLC are off-line and have no response. [Solutions] (1) Check whether the optical communication cable has dropped off. (2) Replace the optical communication cable. (3) Replace the PLC RS232 optical communication cable (4) Replace the optical module.
27	Y_ Motor Hit Hard stop	[Causes] When performing the motor initial, the motor collides with hard stop. [Solutions] (1) Check whether the terminal of the PLC Y00 Cable has dropped off. (2) Replace the cable connected to the power of the motor.
28	V_ Motor Hit Hard stop	[Causes] When performing the motor initial, the motor collides with hard stop. [Solutions] (1) Check whether the terminal of the PLC Y00 Cable has dropped off. (2) Replace the cable connected to the power of the motor.
29	X_ Motor Hit Hard stop	[Causes] When performing the motor initial, the motor collides with hard stop. [Solutions] (1) Check whether the terminal of the PLC Y00 Cable has dropped off. (2) Replace the cable connected to the power of the motor.

Code No.	Content	Causes and solutions
30	C_ Motor Hit Hard stop	[Causes] When performing the motor initial, the motor collides with hard stop. [Solutions] (1) Check whether the terminal of the PLC Y00 Cable has dropped off. (2) Replace the cable connected to the power of the motor.
	 HMI Communication Error	[Causes] HMI, PLC or the temperature controller has no response. [Solutions] (1) Check whether the main board has damaged (2) Check whether the PLC RS485 and HMI R 485 Cable has dropped off. (3) Replace new main board. (4) Replace new PLC. (5) Replace new HMI

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