

# mDrawBot User Guide



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## 1. Preparation

### 1. Hardware:

mDrawBot

mDrawBot Mechanical Assemble Instruction

### 2. Software:

#### a. Must have:

[mDraw \(Please click here to download\)](#)

[Inksape \(Please click here to download\)](#)

#### b. Optional:

[Arduino IDE](#)

[Makeblock mainboard Driver](#) (*Note: If using Mac OS system, go to the website to download and install the driver. If using Windows system, mDraw software will automatically install the driver.*)

### Tip 1

*mDrawBot can be assembled into 4 configurations. For the accuracy of your robot, please strictly follow the assemble instruction, and carefully adjust your robot. Please pay attention to the position of axles, transmission parts, servo arm, and the levelness of robot.*

### Tip 2

*Pictures in this article are only for reference. Specifications and software are subject to change without notice, please pay attention to our website <http://www.makeblock.cc>.*

## 2. Introduction

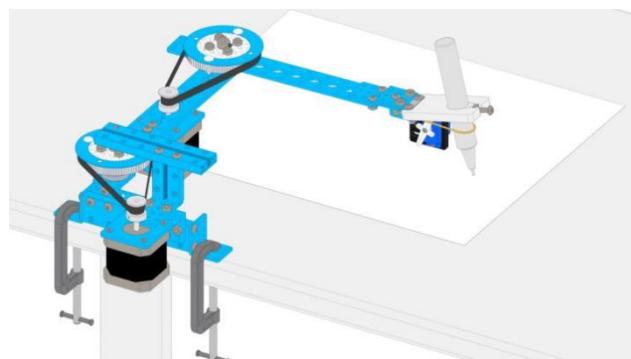
### 1). mDrawBot

mDrawBot is an advanced transformable drawing kit based on Makeblock platform. It can be assembled into 4 configurations which are named as mScara, mSpider, mEggBot and mCar. Besides the well-designed hardware, a software called mDraw will also be provided to work with mDrawBot.

#### A. mScara

Scara stands for Selective Compliance Assembly Robot Arm. mScara is a drawing robot in cylindrical coordinate type which includes 2 structures.

- a. Standard: the end of it is the Pen Lift Mechanism.



- b. Advanced: the end of it is a 405nm/500mW blue-violet laser diode.



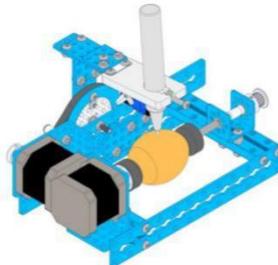
#### B. mSpider

mSpider is a wall drawing robot driven by 2 high-strength Dacron rope. This name comes from the spider-like structure.



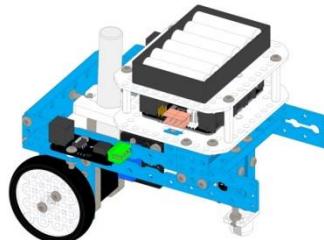
### C. mEggBot

mEggBot is a drawing robot which is able to draw amazing pattern on the surface of eggs, cylinder, and spheroid.



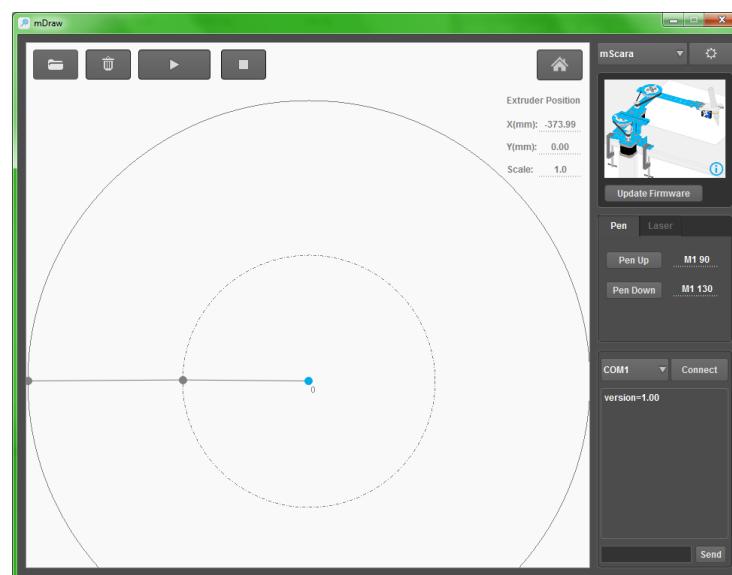
### D. mCar

mCar is a 3-wheel drawing robot which can draw patterns in a large area on floor. It can be upgraded to a self-balancing car, a photographic car, a scout ear, and so on via adding some electronics.



## 2). mDraw

[mDraw](#) is a drawing software designed for mDrawBot. mDraw supports the 4 configurations of mDrawBot perfectly, and support the dual mode of Makeblock XY Plotter kit 2.0 as well.



Not only is mDrawBot a robot integrated mechanics, electronics, and software, but an entertaining robot that makes art out of your hand.

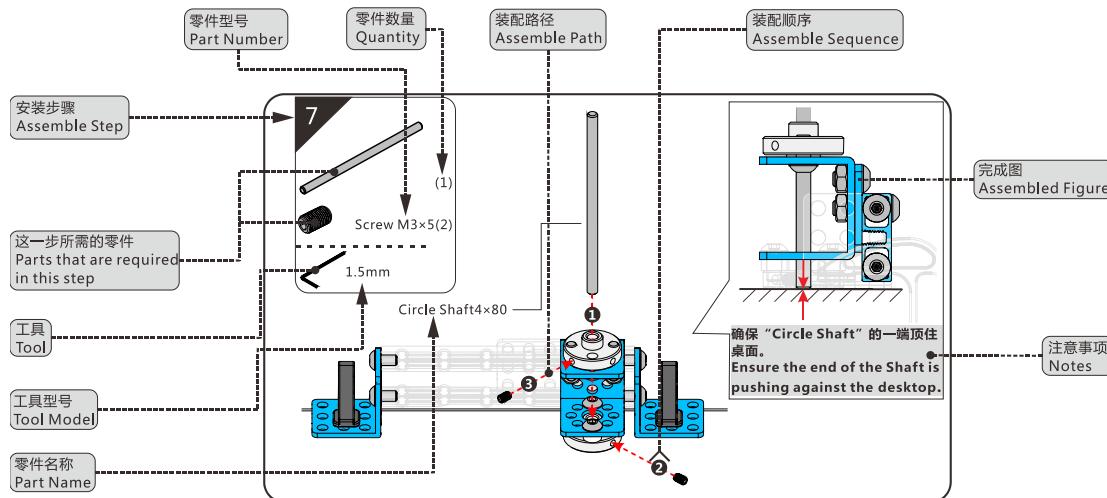
### 3. Mechanical Assembly

#### 提示 Tip

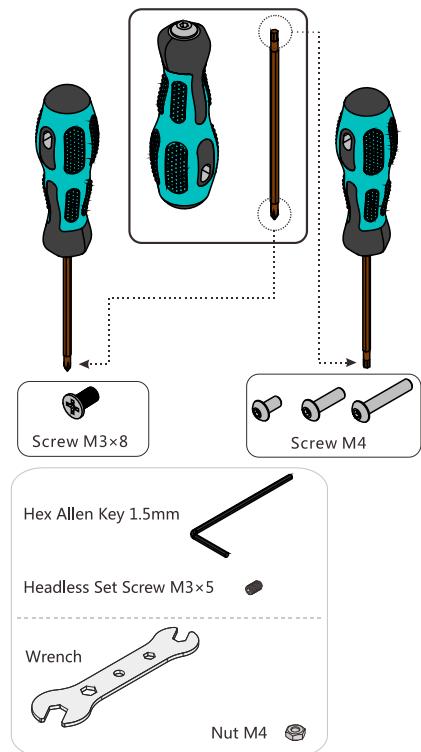


※由于此产品的零部件比较多，组装时要按说明书的指示步骤去组装。特别要注意带有“O”“X”的图示，一定要按照带“O”的图示的要求去组装，否则会损坏零件，使组装出来的机器人无法正常工作。  
 ※With too many parts contained in this product, please assemble the Drawbot as per the steps indicated in this instruction to avoid confusion. Pay special attention to the mark of “O”, “X”. Make sure you are doing exactly as required by the diagram marked with “O”. otherwise the parts may be broken and the robot may fail to work normally.

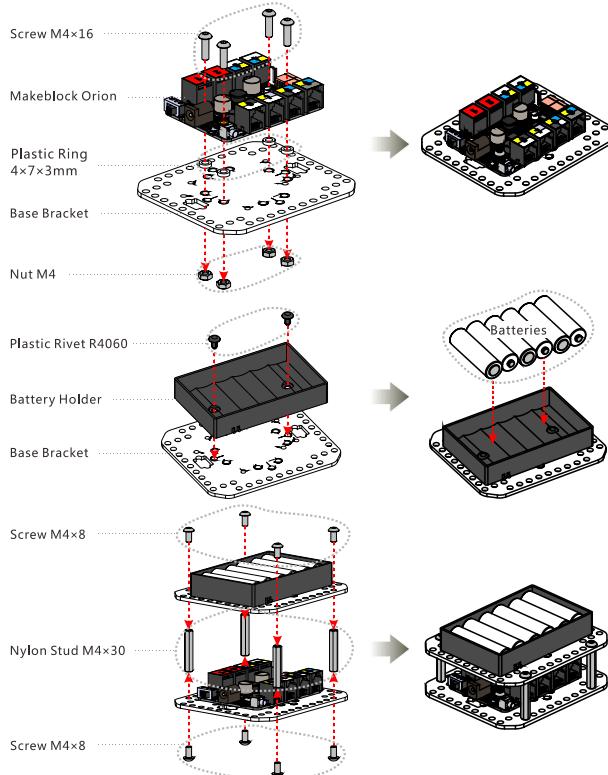
#### 使用说明指南 Instruction Guide



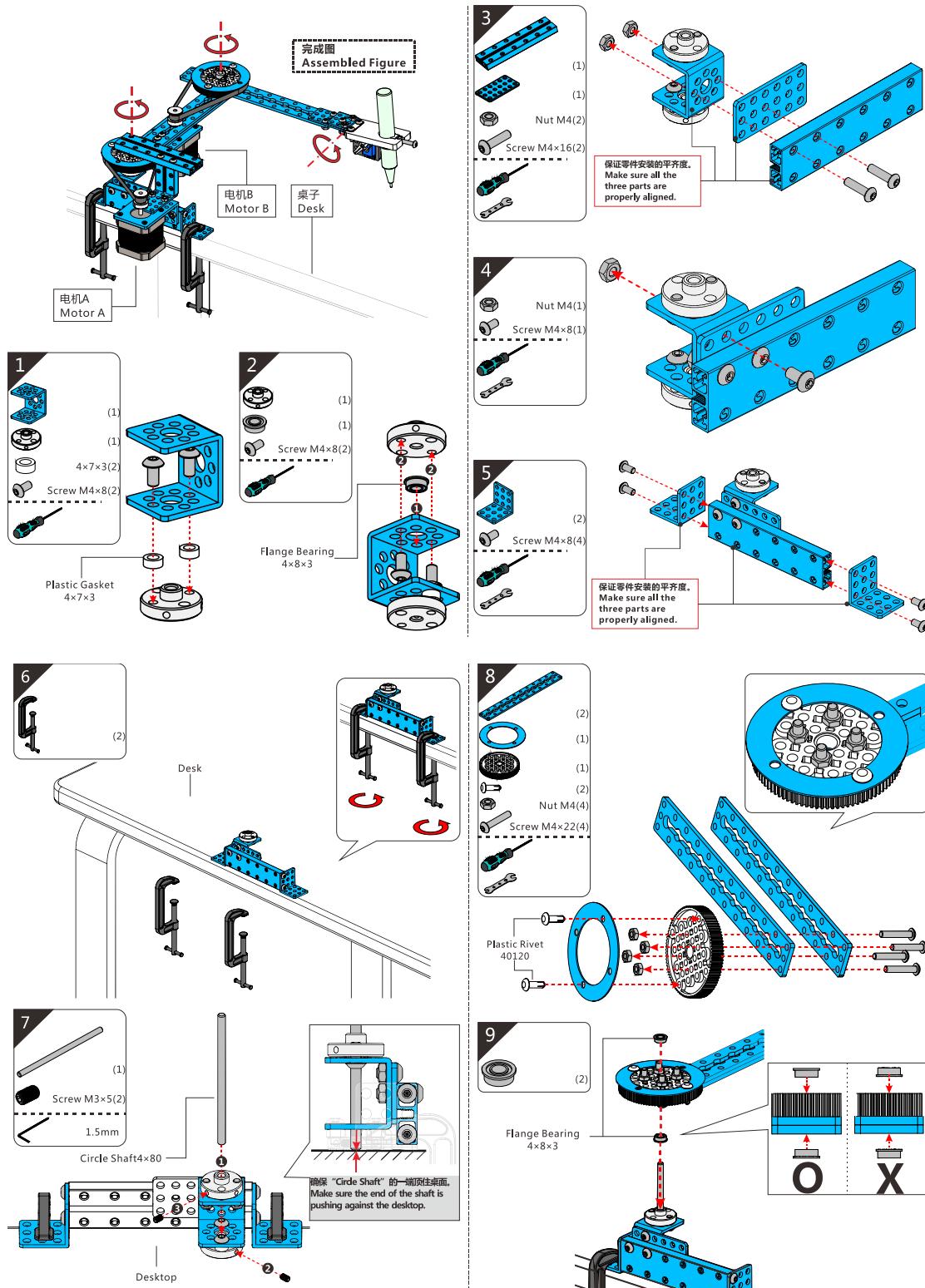
#### 工具 Tools

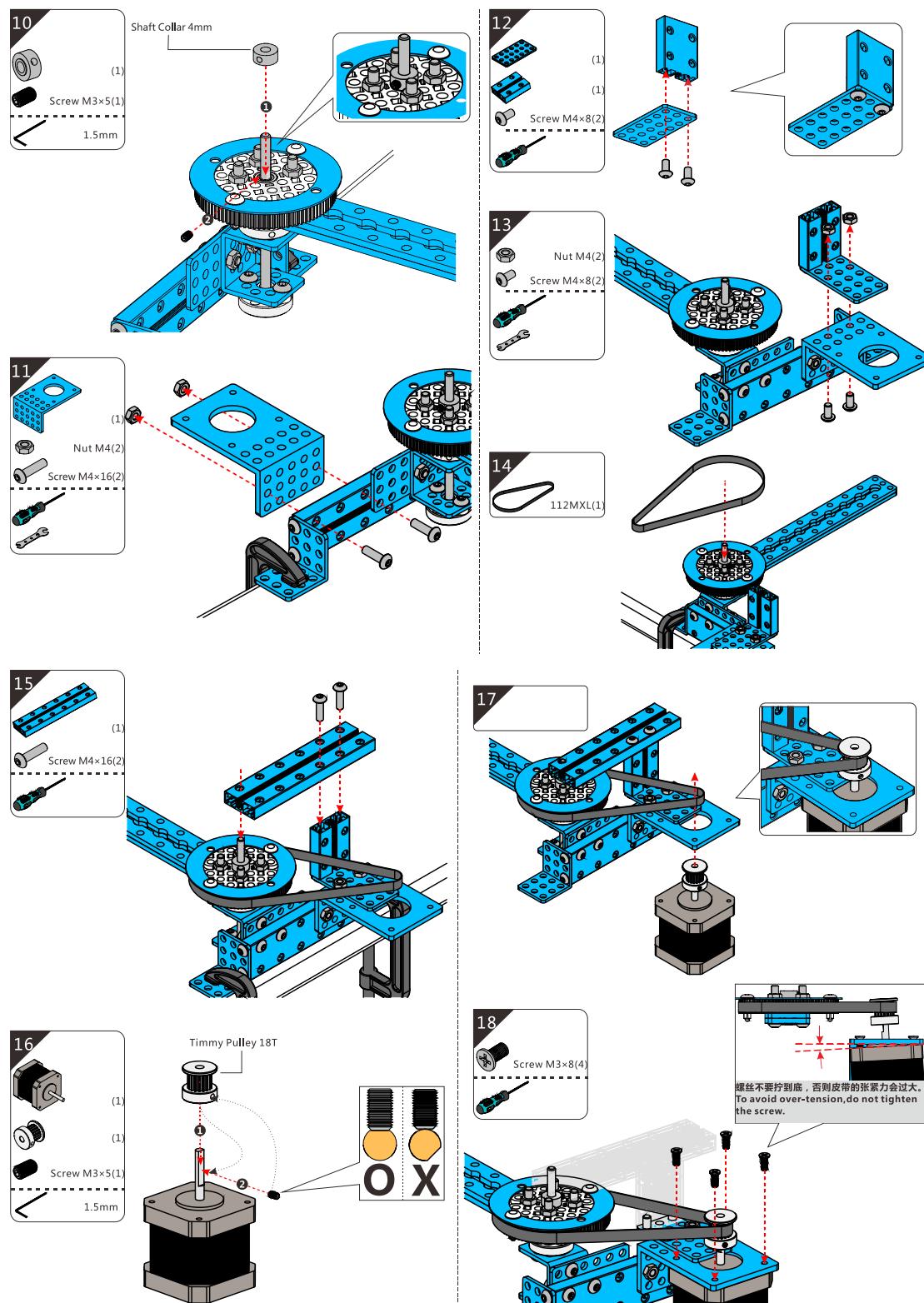


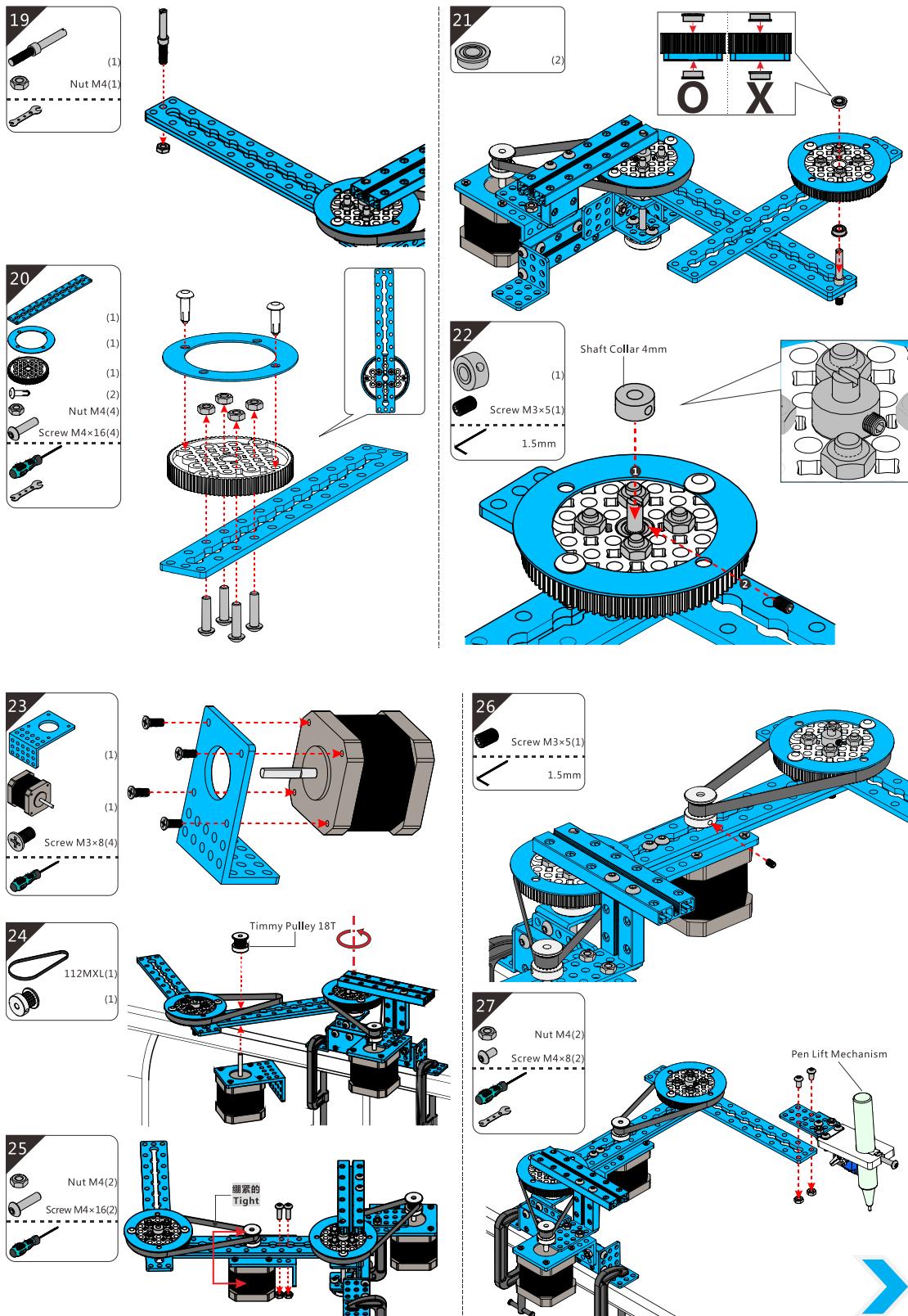
#### 主控板&电池盒 Makeblock Orion & Battery Holder



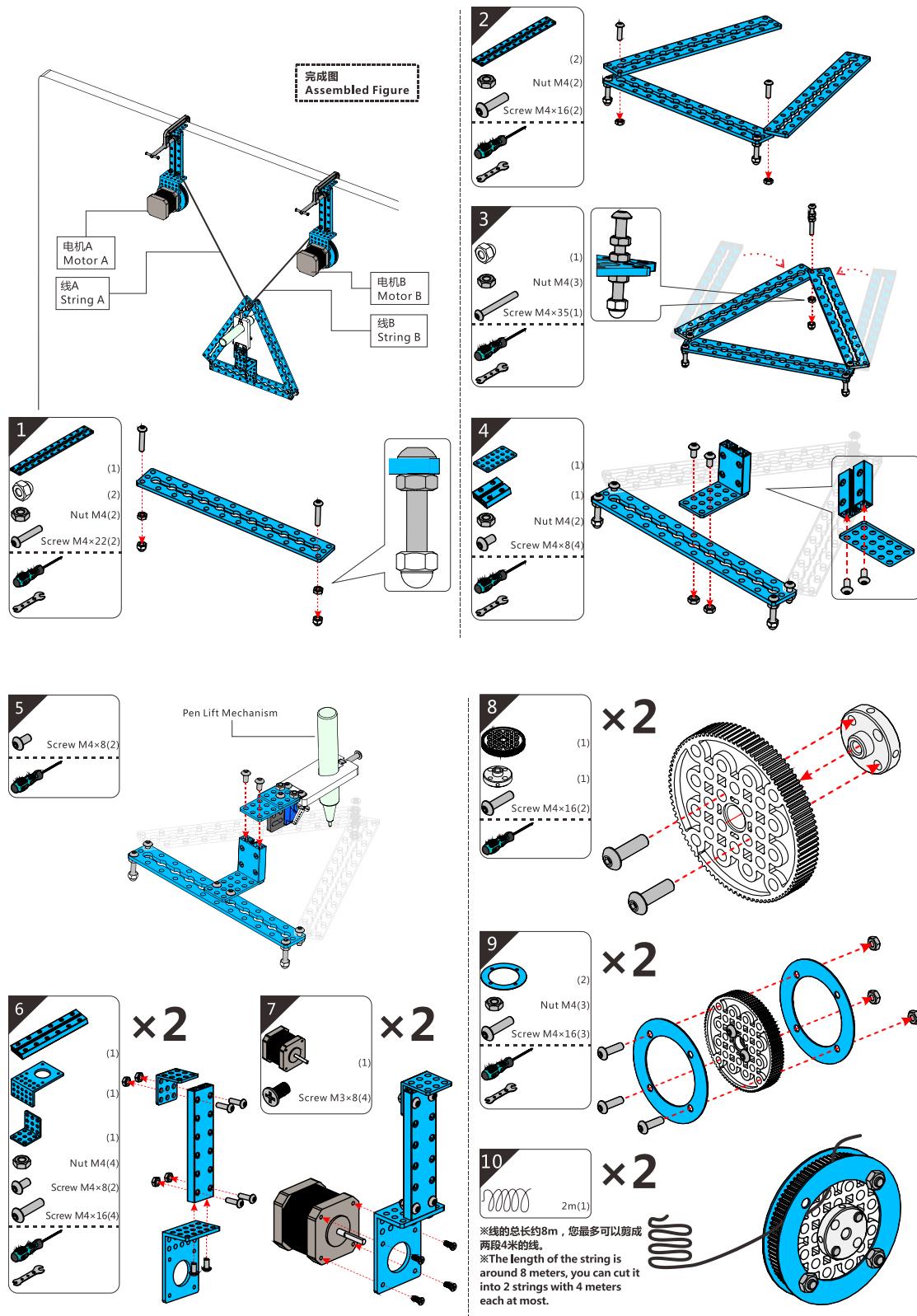
## 1). mScara

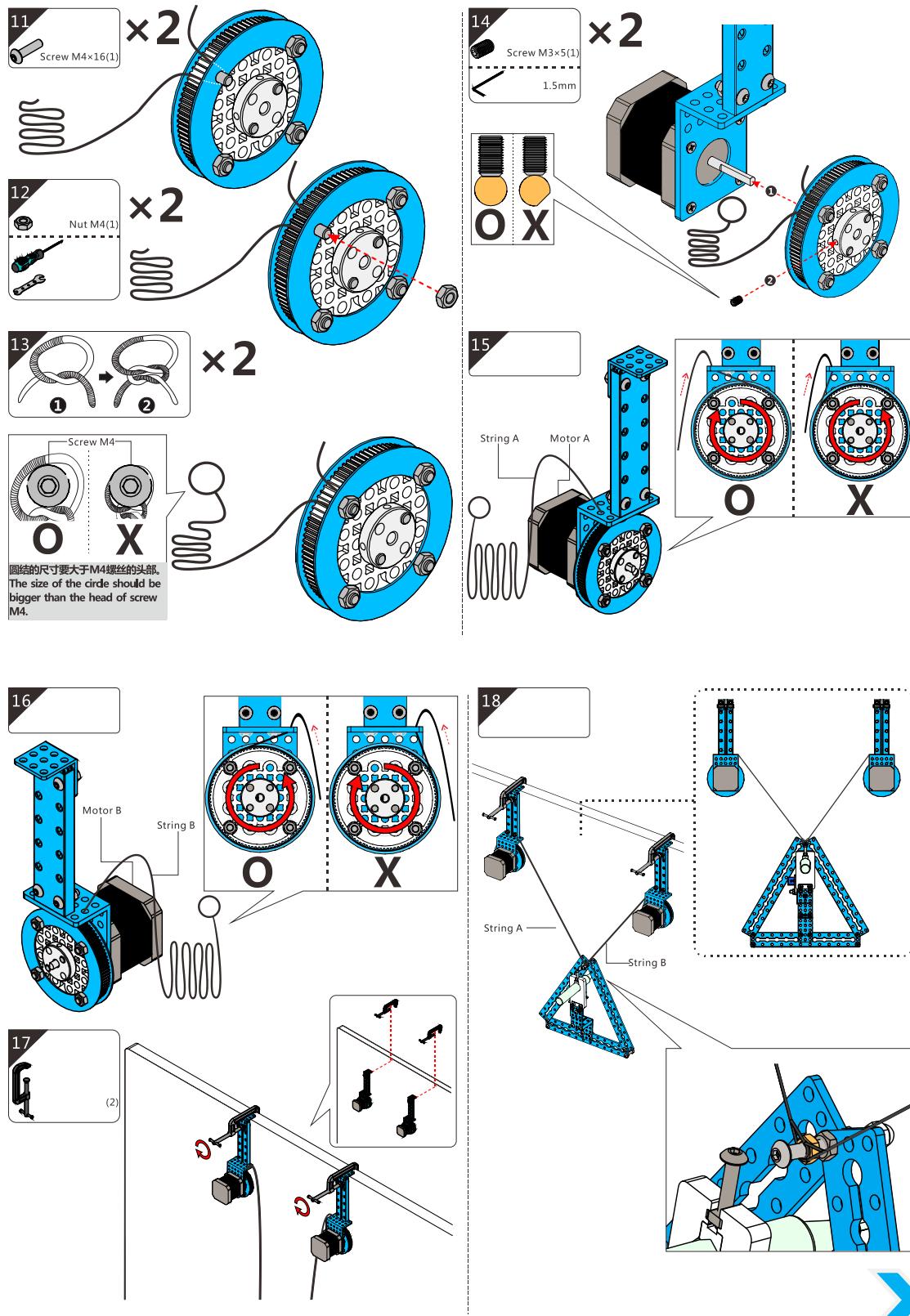




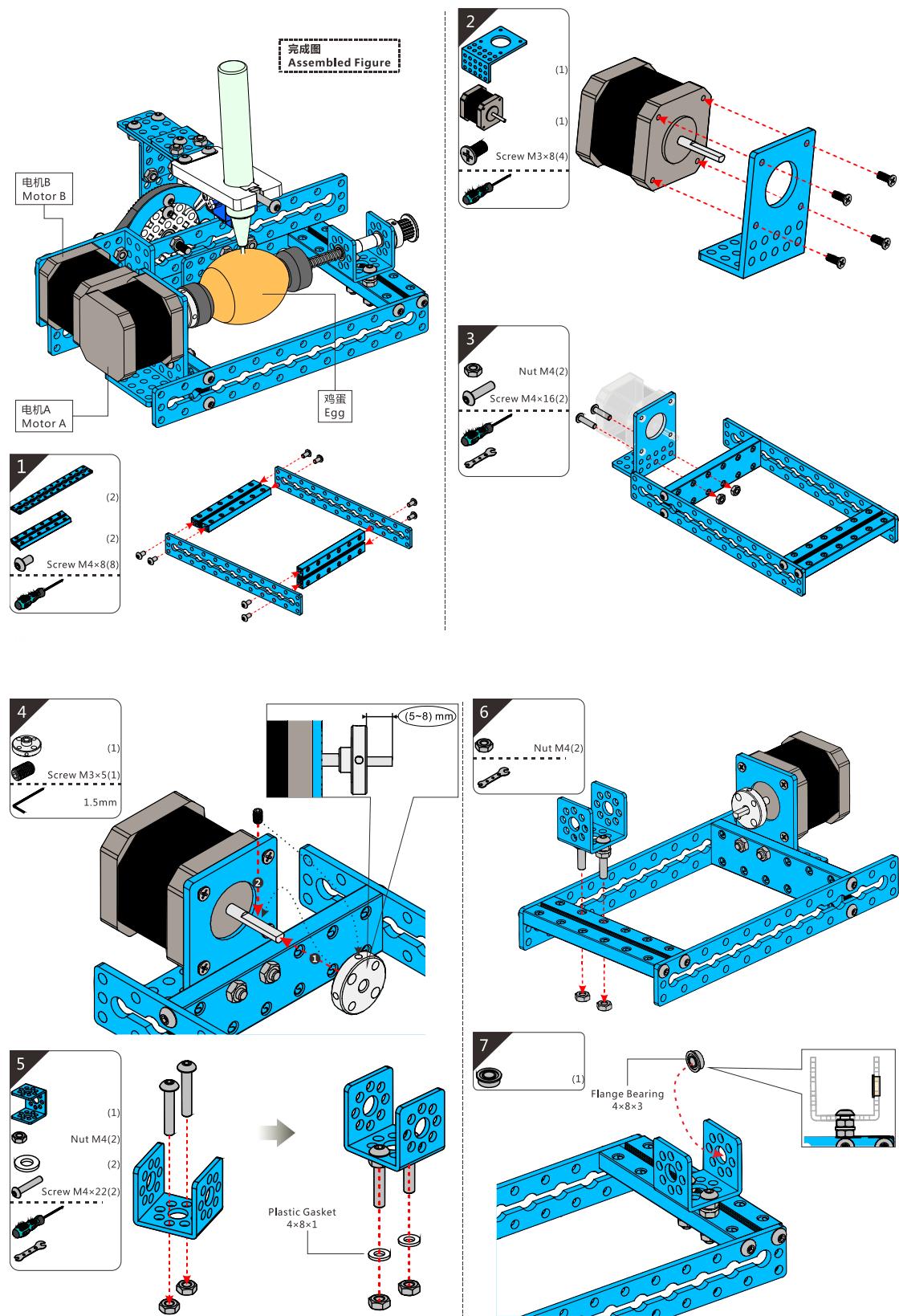


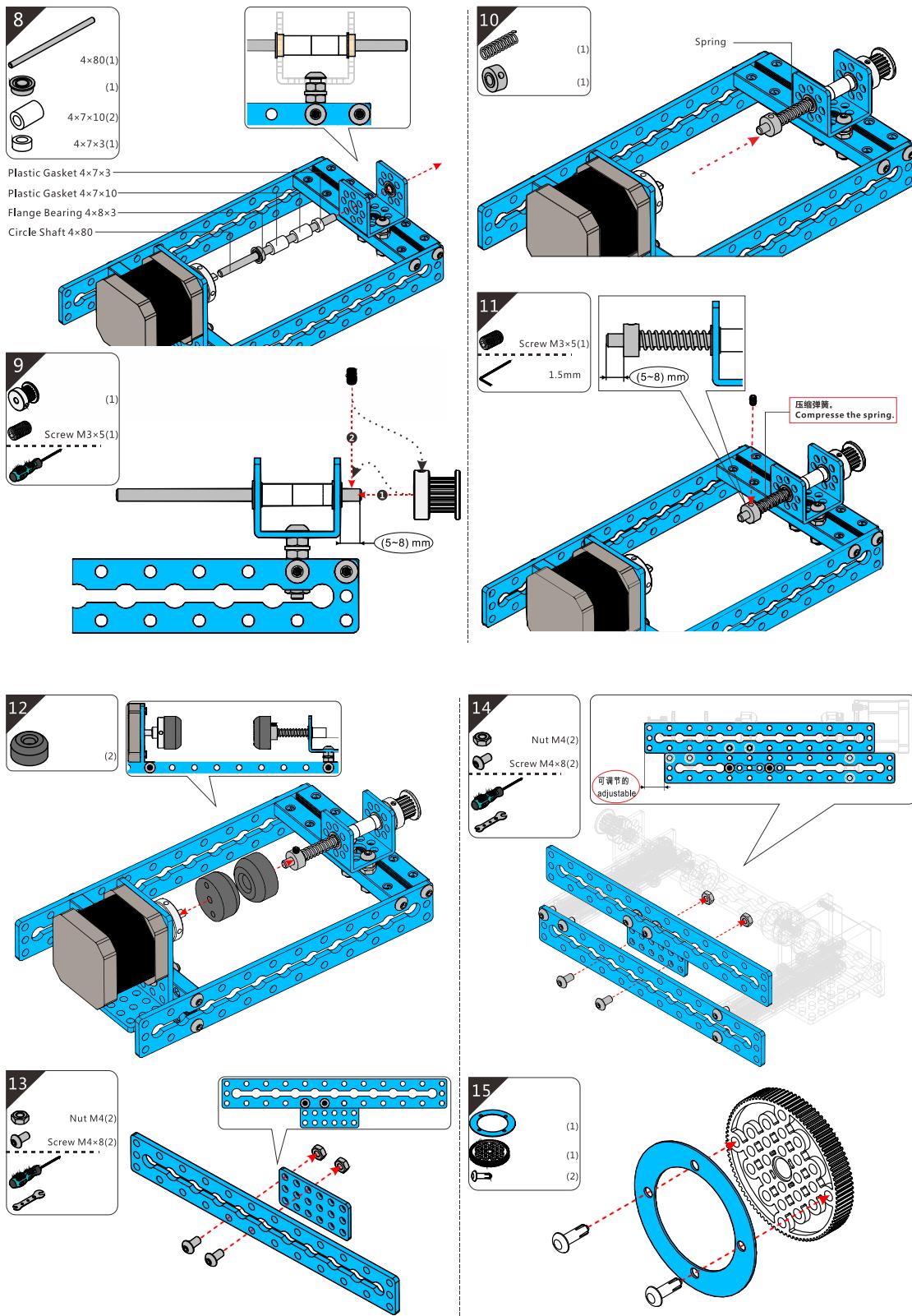
## 2). mSpider

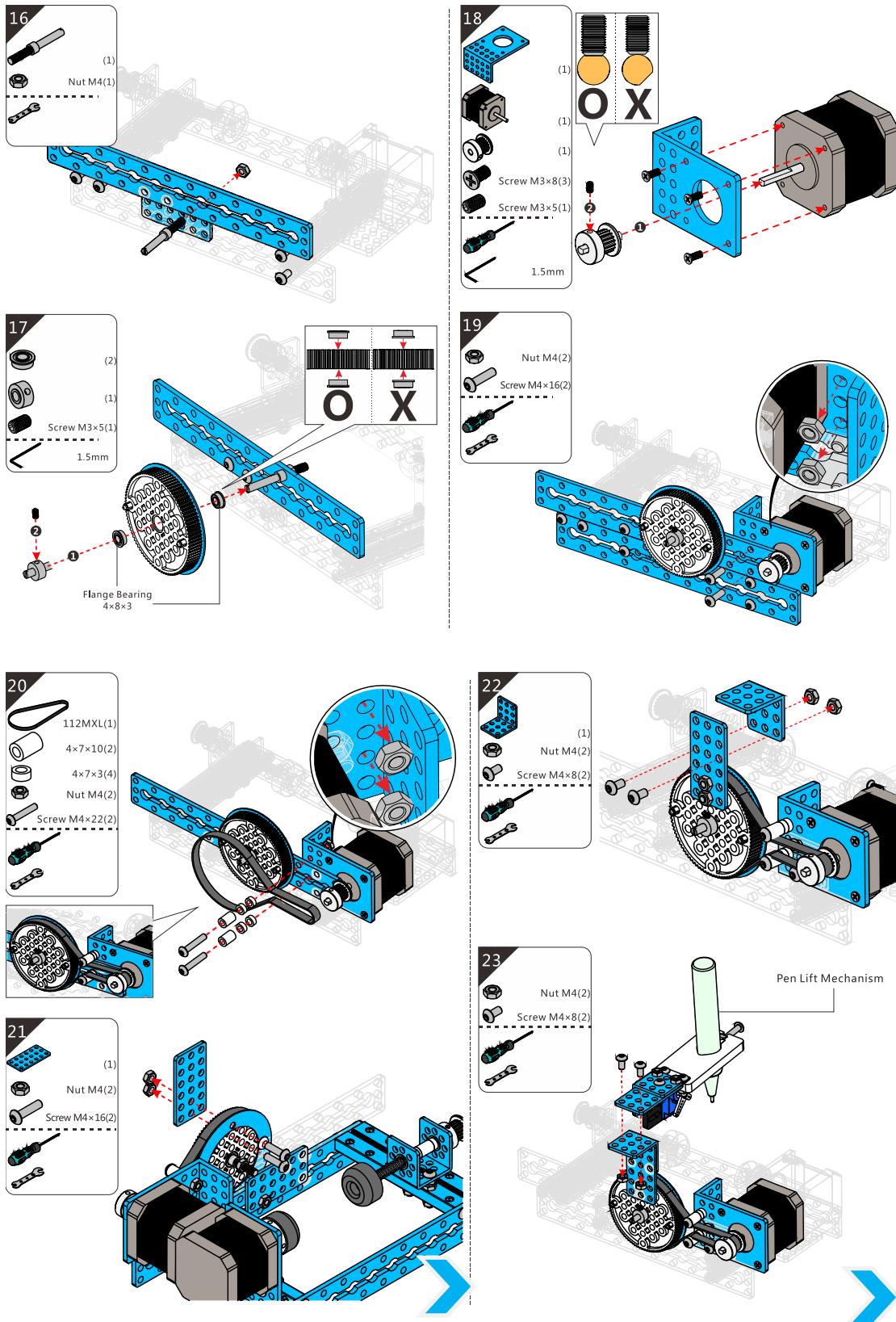




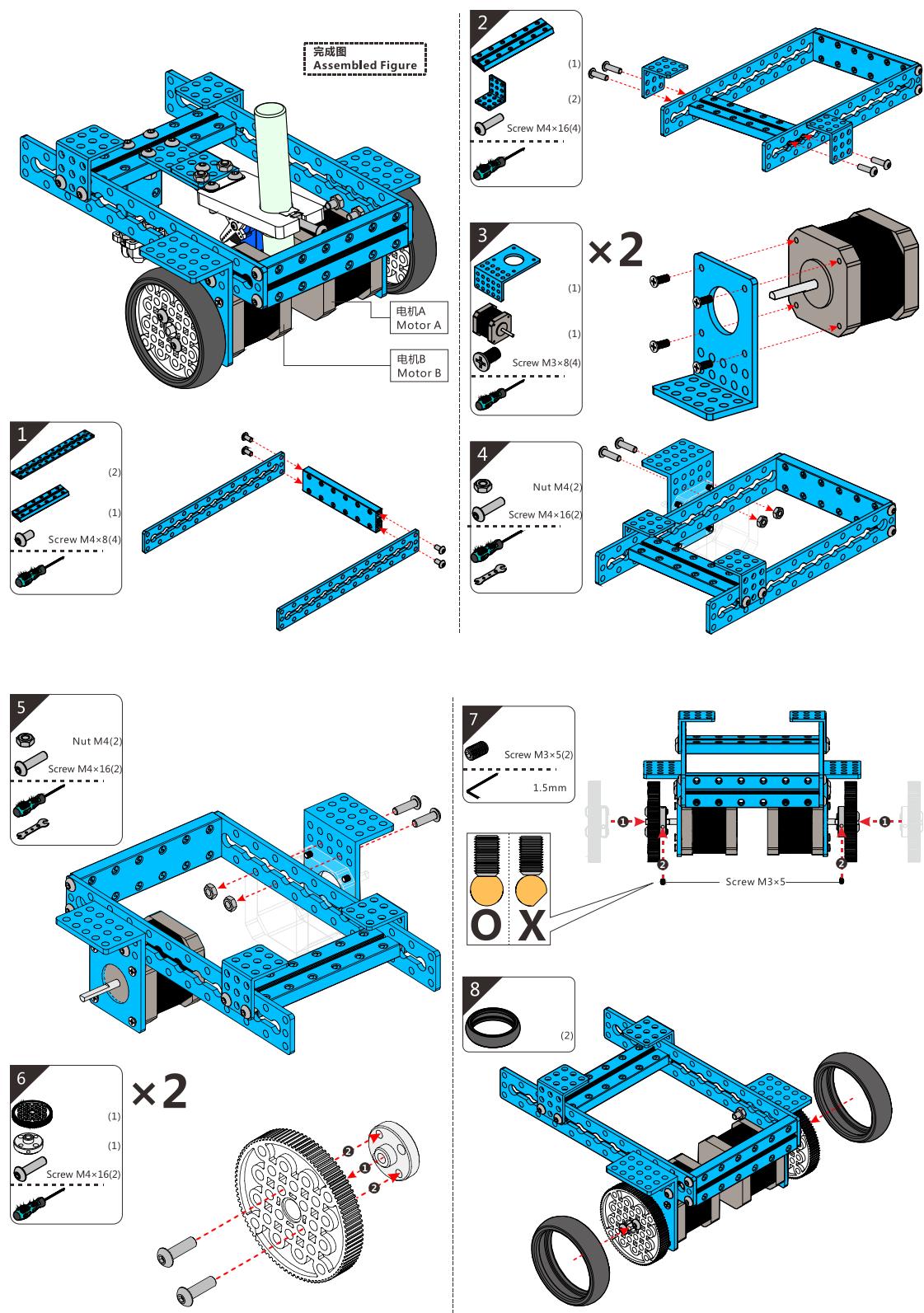
### 3). mEggBot

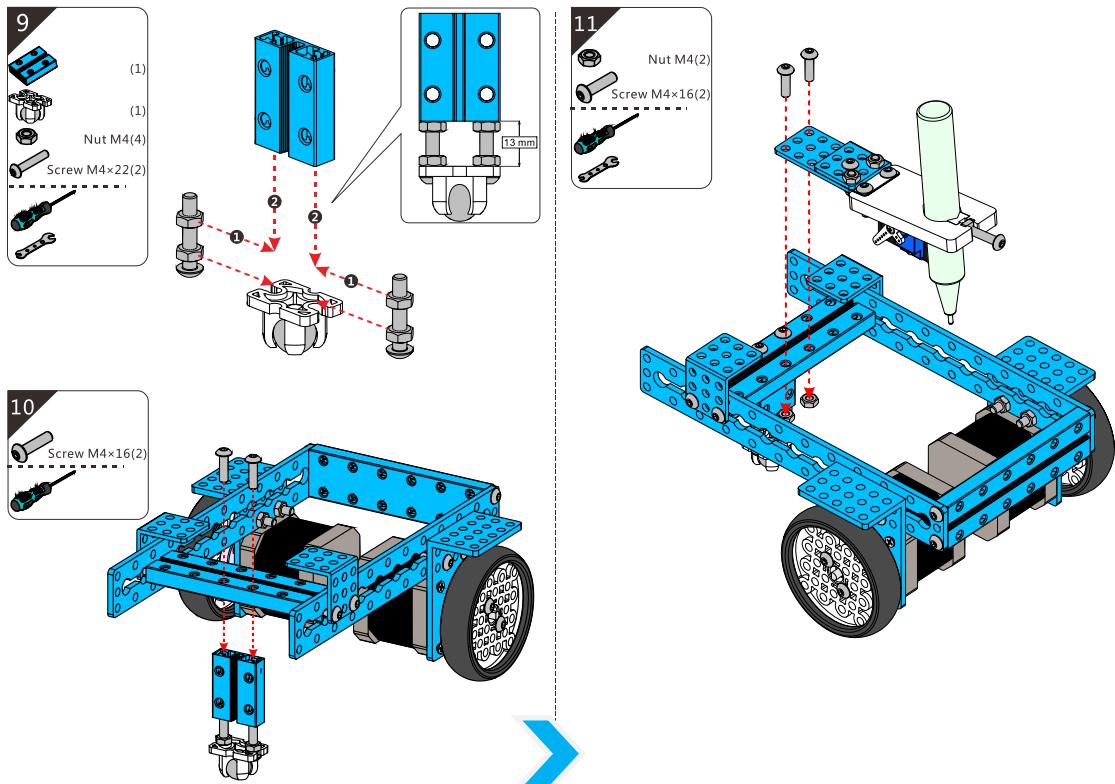




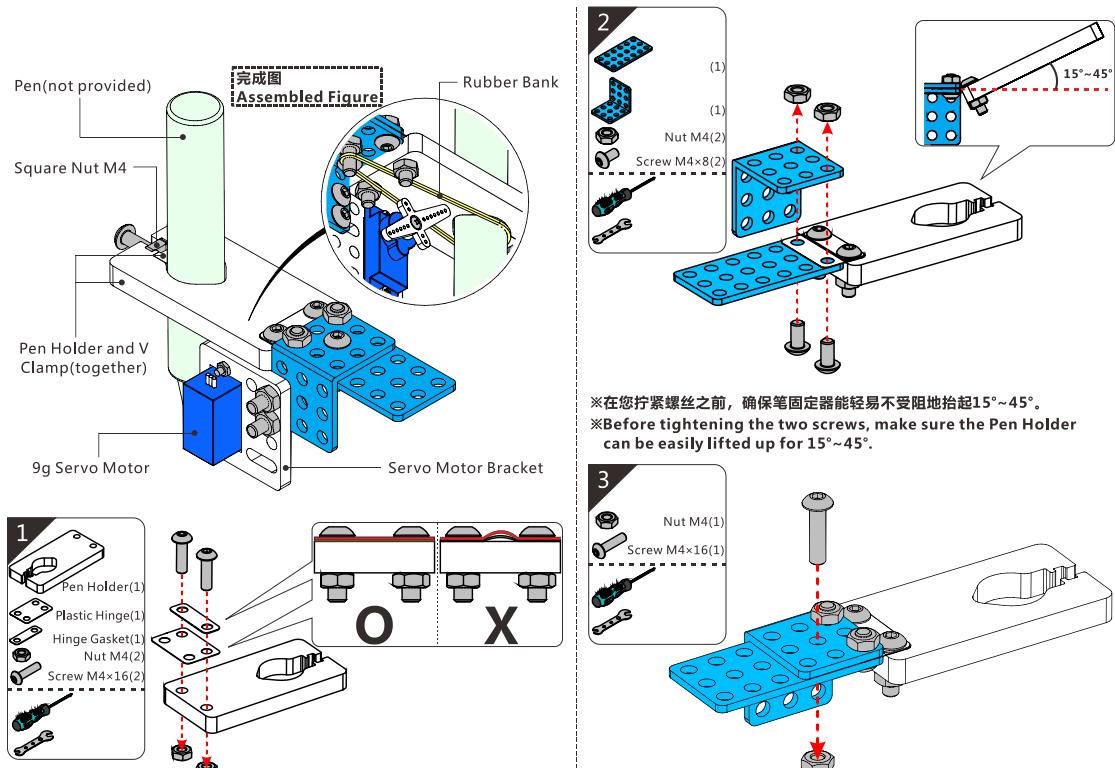


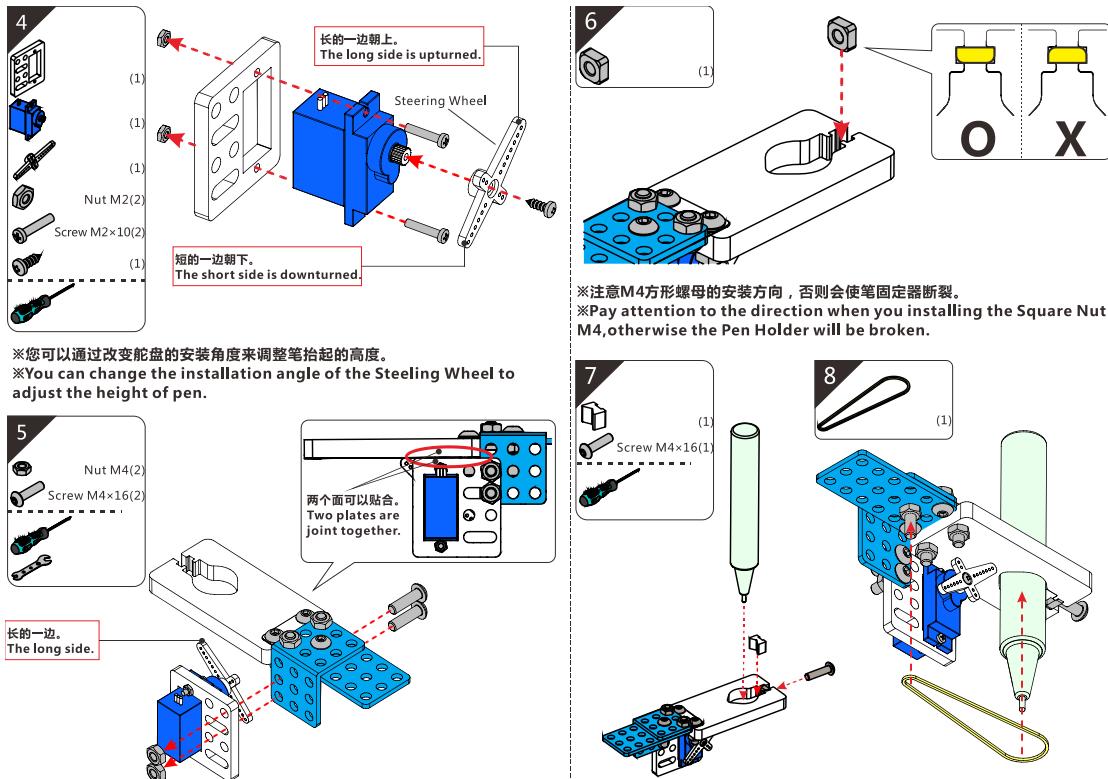
#### 4). mCar



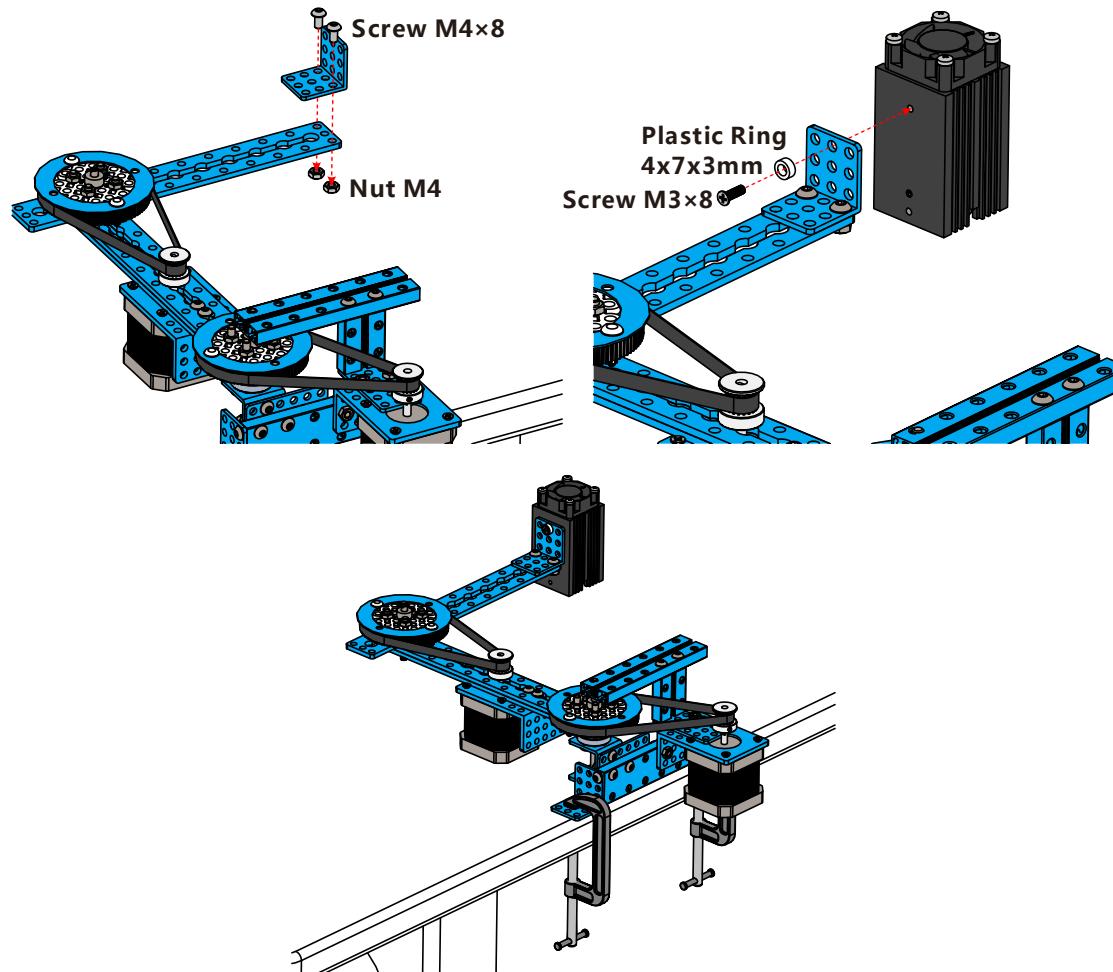


## 5). Pen Lift Mechanism



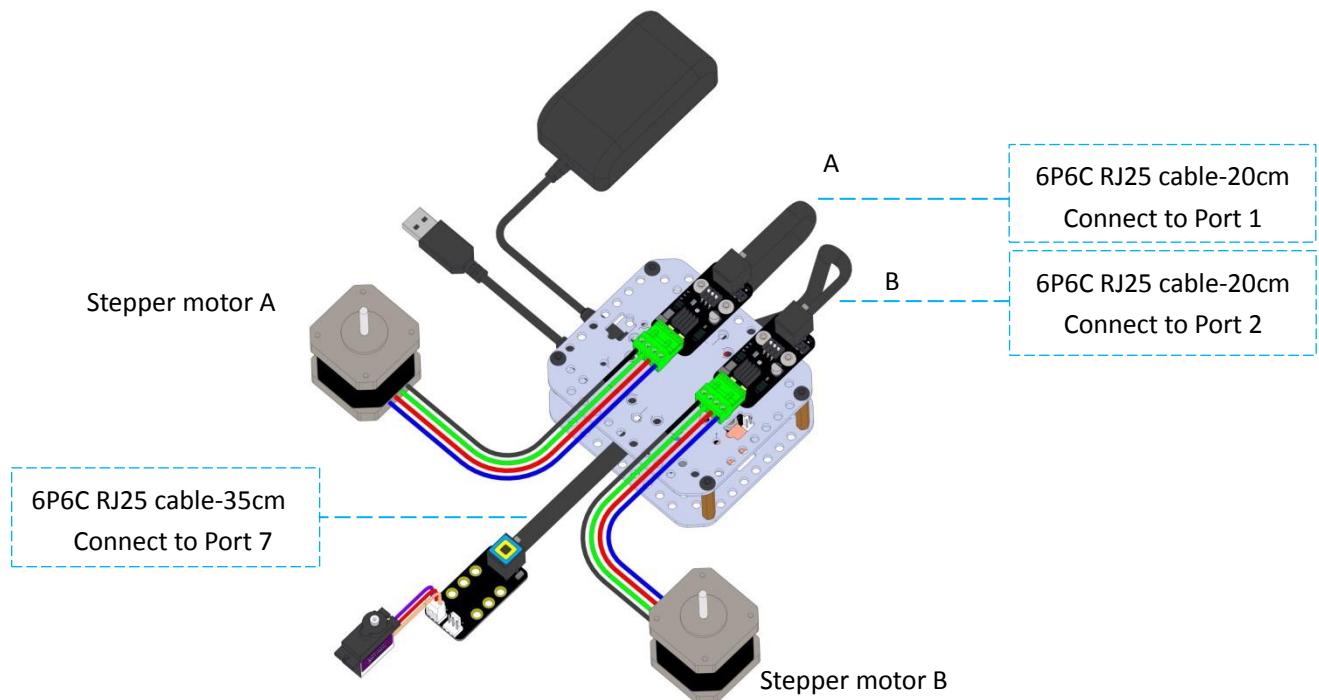


## 6). Laser Upgrade Pack



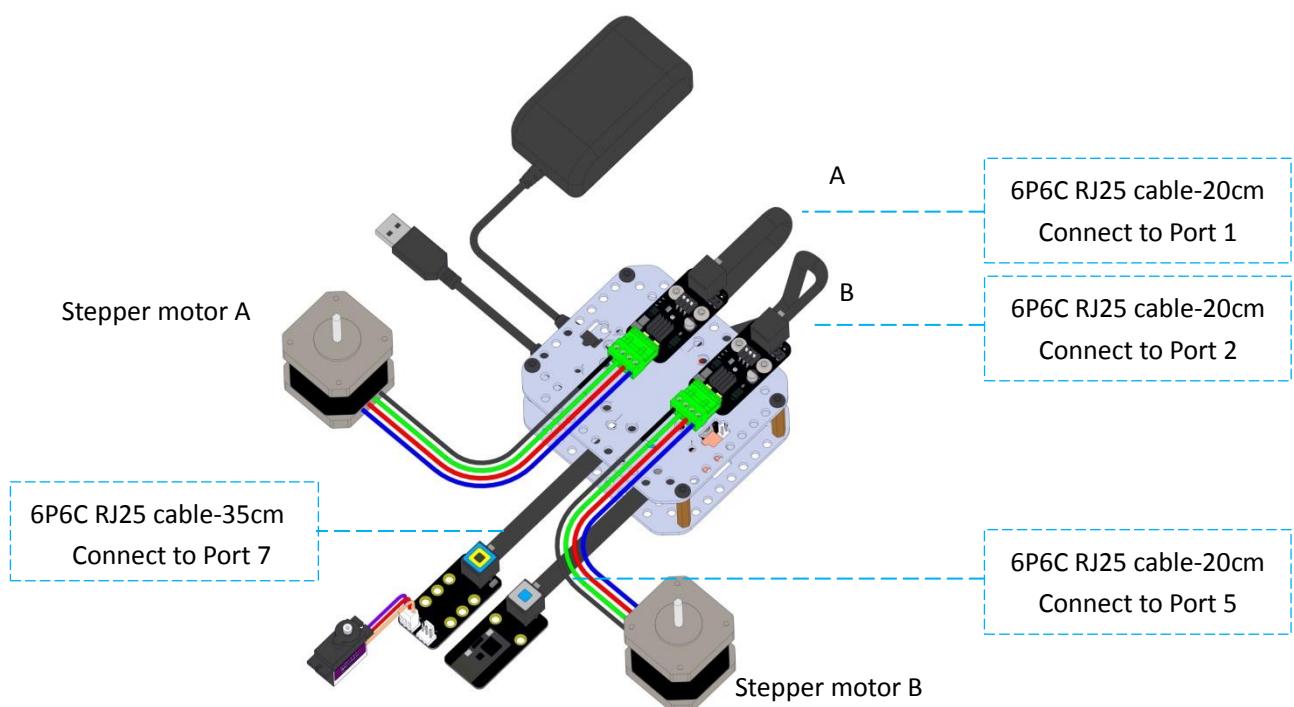
## 4. Wiring-Layout Recommendation

### 1). Standard Version



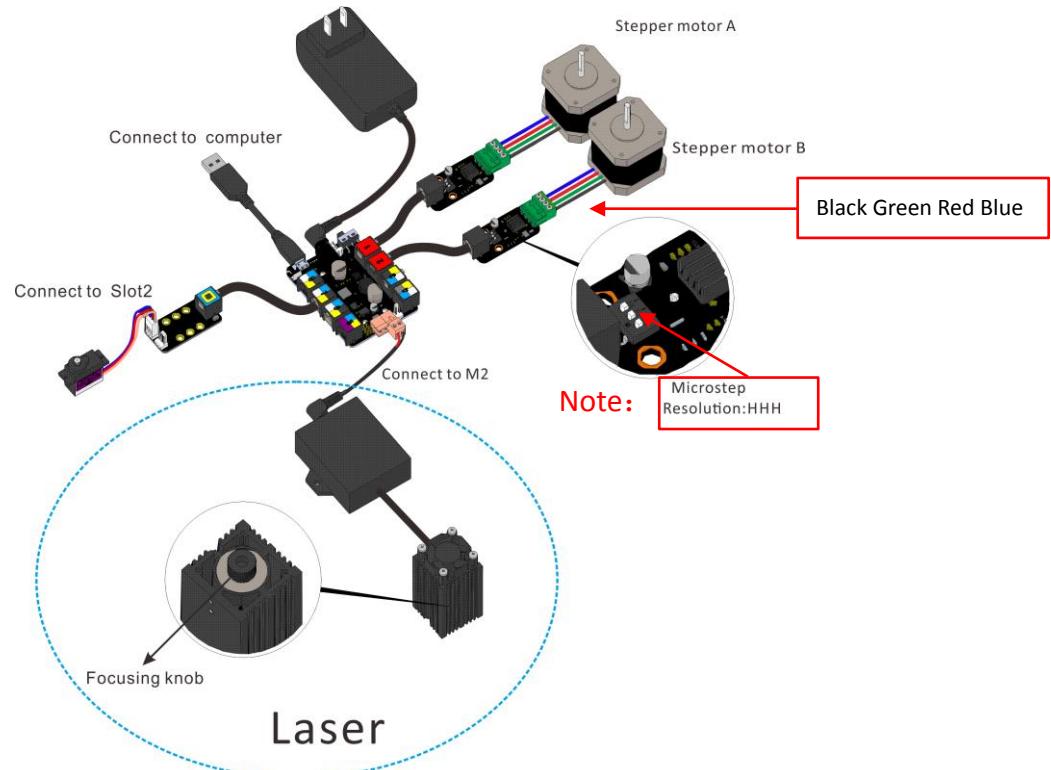
### 2). Bluetooth Version

(Attention: please connect Bluetooth module to Port\_5 on Me Orion.)

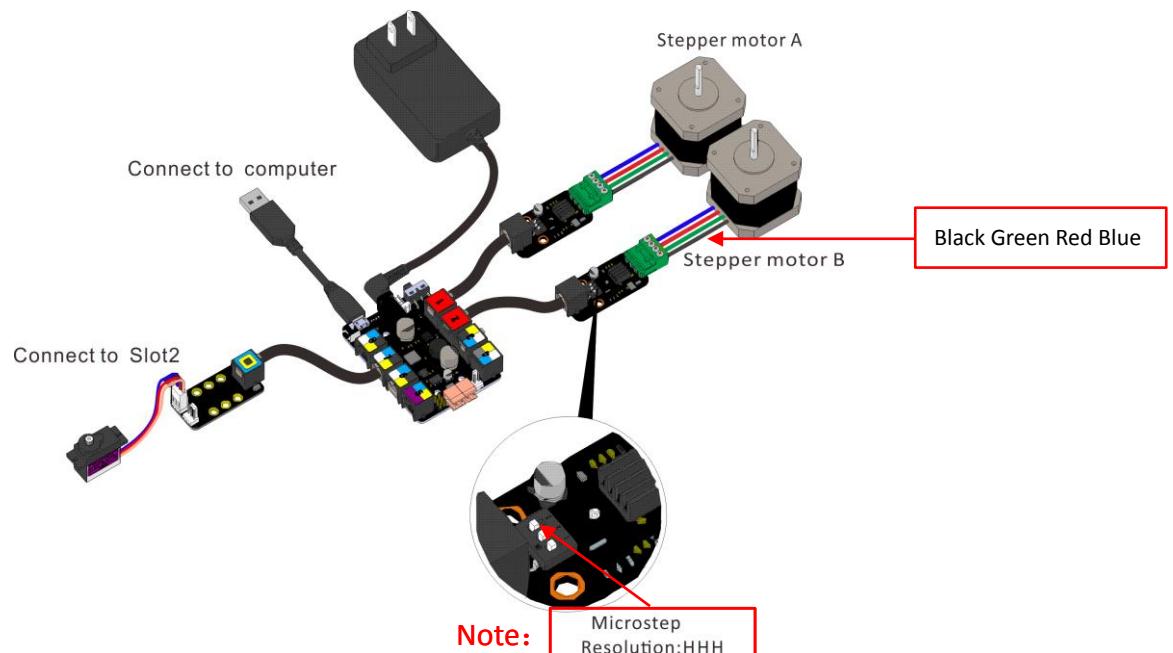


## 5. Wiring of mDrawBot

### 1). mScara



### 2). mSpider & mEggBot & mCar



Up till now, you've finished the assembly of hardware. Now let's move to the next stage of drawing a picture with your assembled mDrawBot. Here's the introduction of the software mDraw.

## 6. Software mDraw

### 1). Introduction of mDraw

mDraw is an open-source cross-platform software developed by Makeblock.

**Compatibility:** mDrawBot (mScara, mCar, mEggBot, mSpider), XY Plotter kit (servo mode, laser mode)

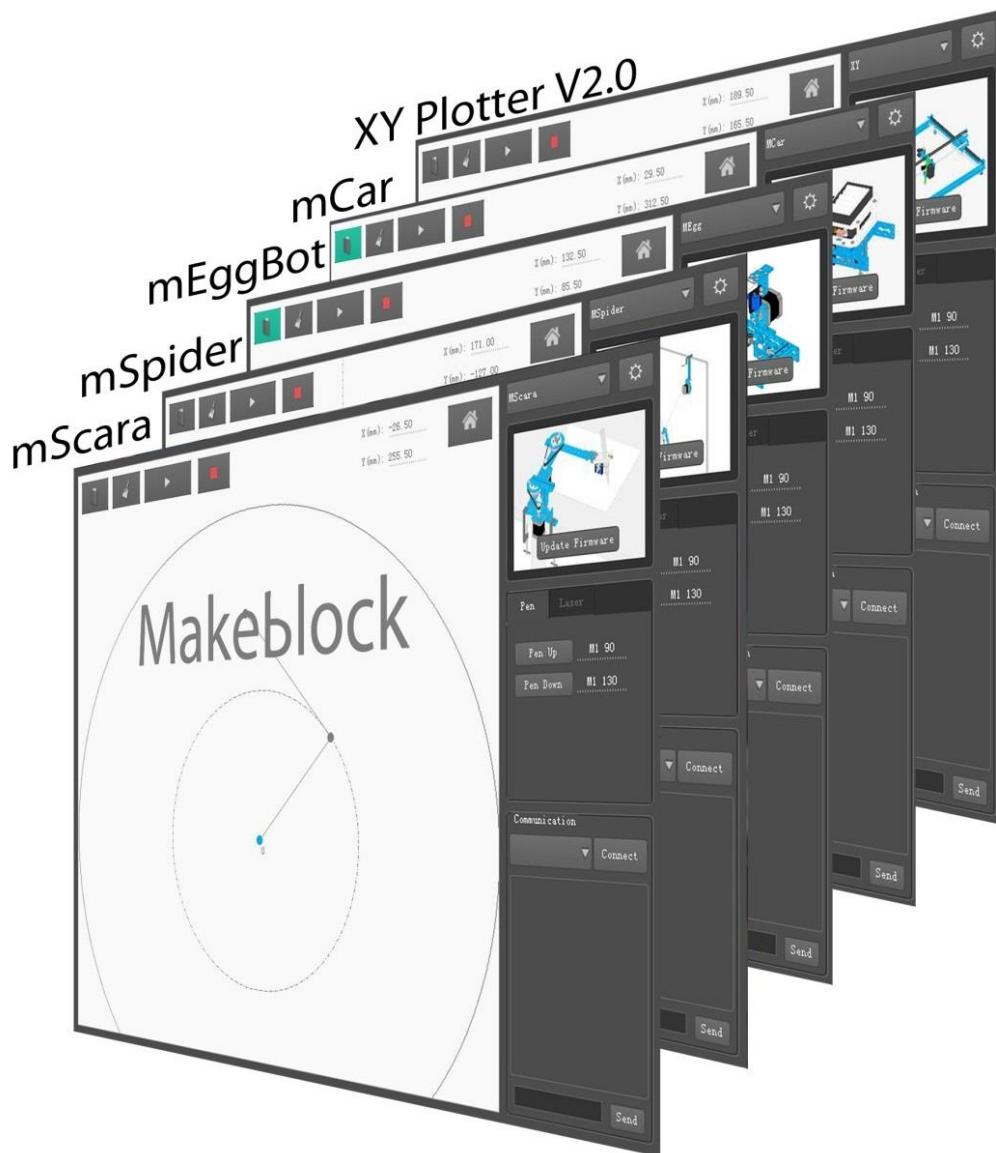
**OS Environment:** Windows, Mac, Linux

**Supported File Type:** \*.svg, \*.bmp (convert to \*.svg)<sup>1</sup>

### 2). Installation

Download and open the installation pack of [mDraw](#), follow the prompts to install mDraw.<sup>2</sup>

### 3). 5 in 1 Main UI



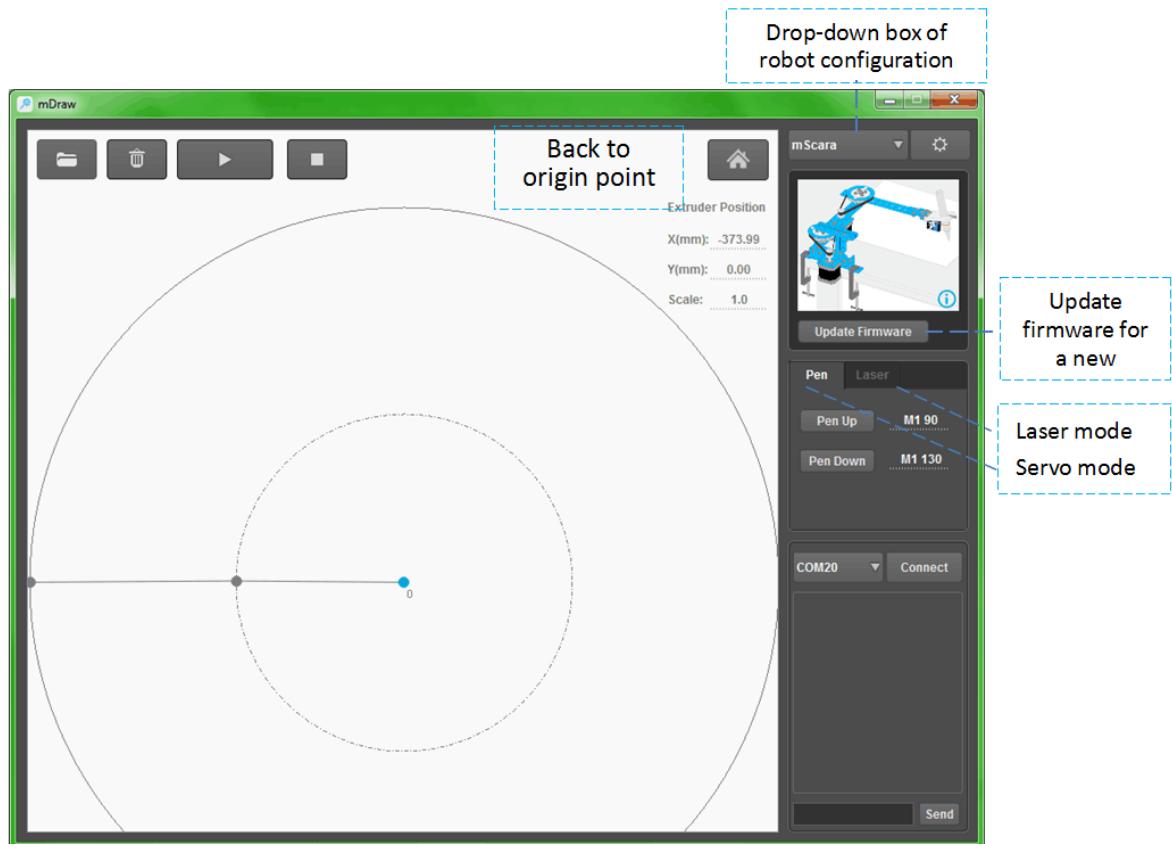
<sup>1</sup> All file must be named in English.

<sup>2</sup> The installation directory must be named in English.

## 4). Button Function in Main UI

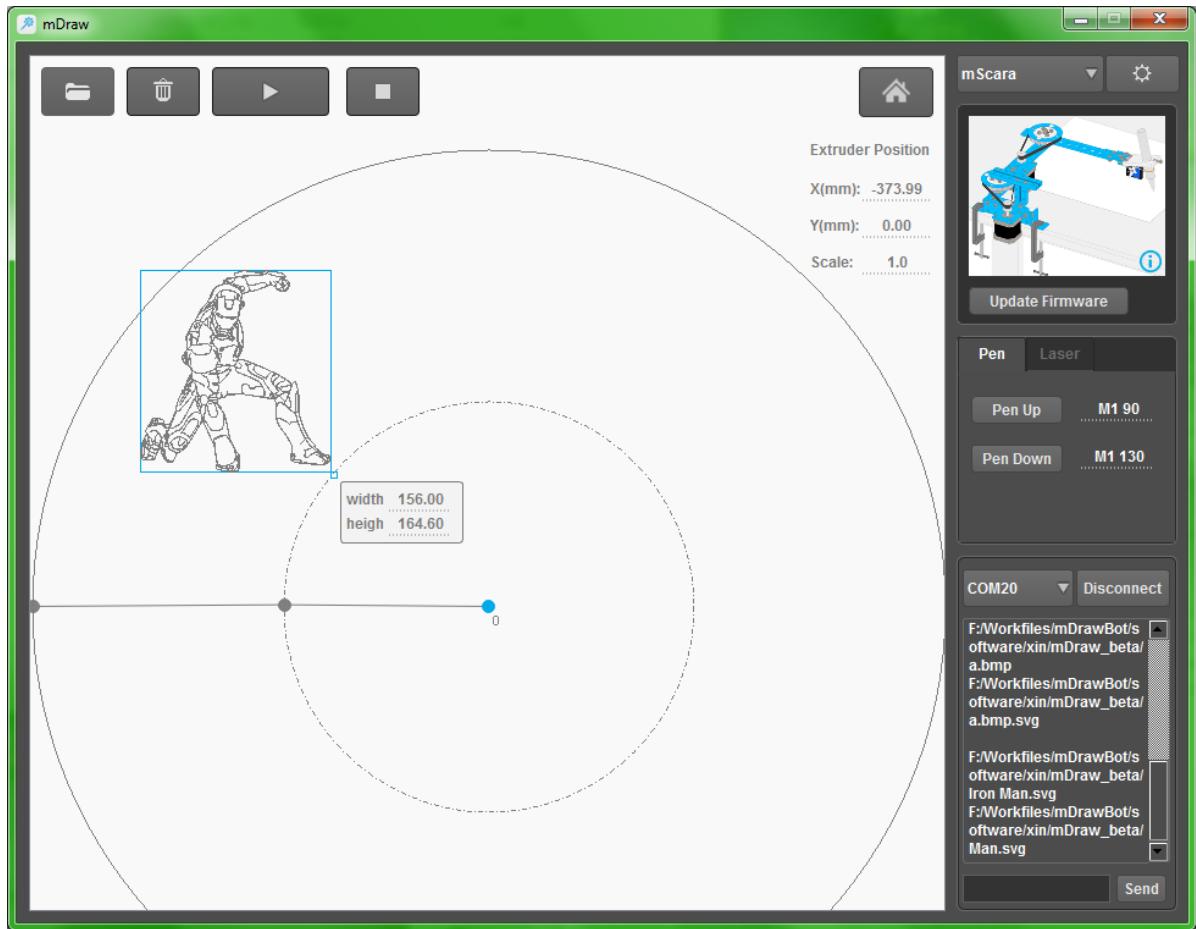
Please check the function of buttons in main UI as below figure.

- Click in the Drawing zone to move the robot accordingly;
- Drag the loaded SVG graphics in the Drawing zone to adjust the size and the position of graphics;
- Input the values manually in the right down window to adjust the size;
- For mSpider and mCar, users can change the drawing ratio directly in the Setting



After a BMP file is imported, the mDraw will pop up a dialogue for converting SVG file. Follow the prompts to convert the BMP file into a SVG file.

Here's the effect picture of Iron Man SVG file imported.



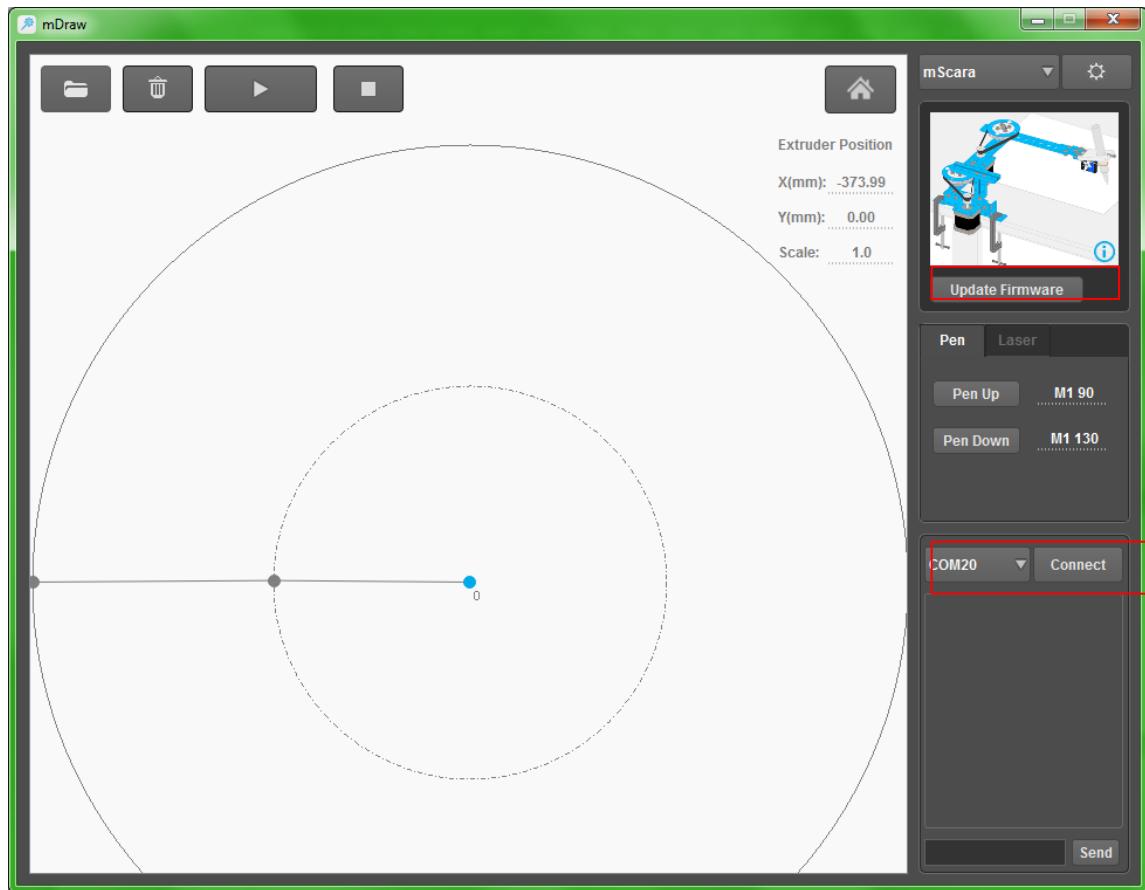
## 5). Setting

### (1) mScara (Standard Version)

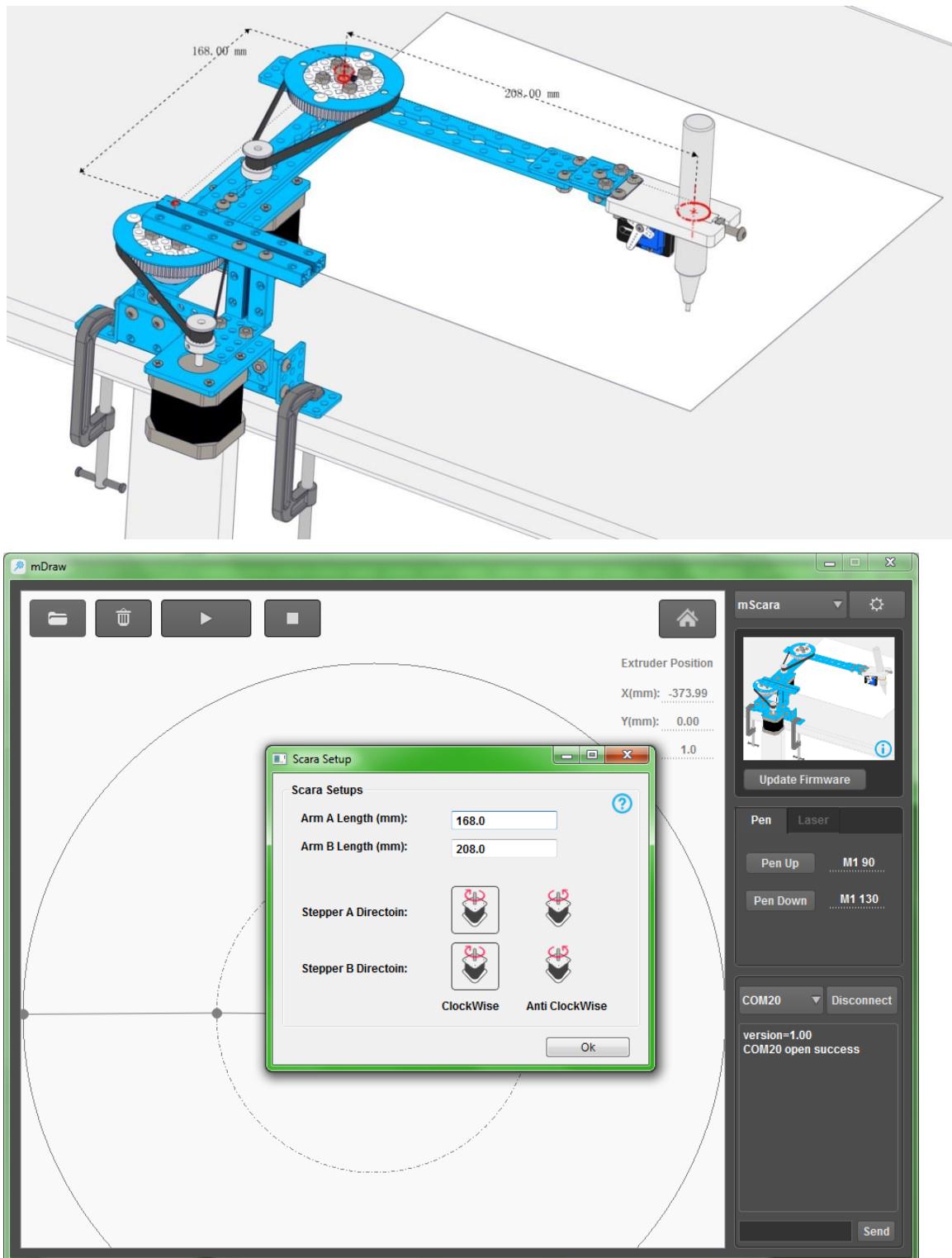
- Check and make sure all wirings are correct. Connect the robot to computer via USB cable.<sup>3</sup>
- Select the correct COM port, click “connect”, and then click “Update Firmware”).<sup>4</sup>

<sup>3</sup>For Bluetooth connection, please be sure that you've installed the Bluetooth driver software in computer.

<sup>4</sup>You need to click “update firmware” for the first time you use a new configuration, and each time you switch a robot configuration.



- c. Click button  to enter the setup window. Please keep default value unless you changed the A/B arm length of mScara. Please measure the length of A arm before you use mScara.
- d. Please keep graphics stay in the second quadrant of the circle zone, or it will cause abnormal drawing.
- e. Please turn off the power on the mainboard after settings settled. Move the meScara to the specific position as shown in below figure by hand, and then turn on the power of mainboard.

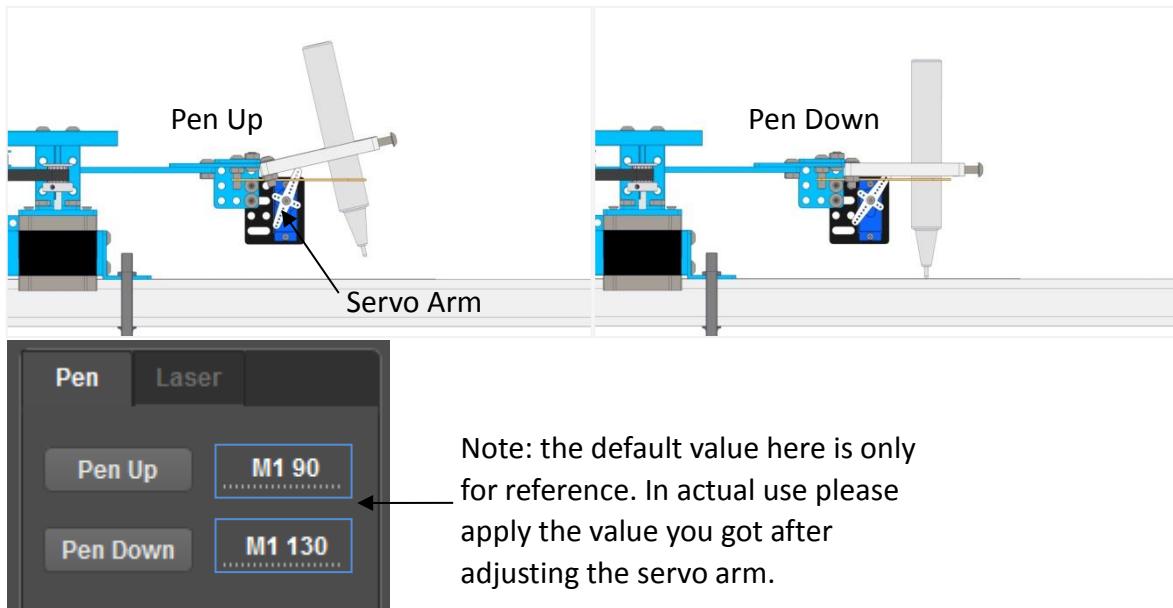


## (2) Configurations of Pen Up and Pen Down

Input the value of Pen Up and Pen Down in mDraw, and observe the movement of the Pen Lift Mechanism of mDrawBot. If the feedback is correct as below, that means your settings are correct.<sup>5</sup>

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<sup>5</sup>If the servo arm cannot reach to below angle, please uninstall the servo arm to re-adjust the installation angle. Please adjust the tightness of rubber band if necessary.



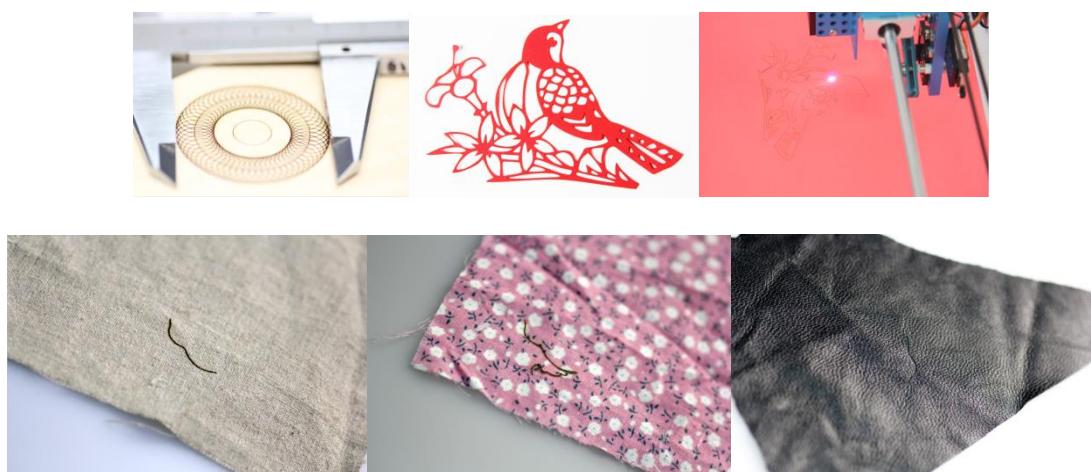
### (3) Precaution of Using Scara Laser Pack

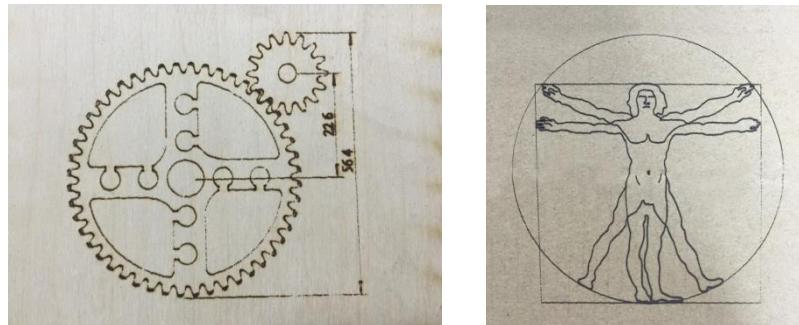
Due to the high energy density of laser, please make sure you have proper protection before using the laser pack.

- Avoid direct eye exposure;
- Avoid putting anyone else into laser exposure

The laser this product uses is a 405nm/500mW blue-violet semiconductor laser, whose working voltage is DC 12V, working temperature 0°C-50°C, and storage transportation temperature -40°C-85°C.

**Materials that can work with this laser pack:** wooden board, non-transparent Acrylic plate, paper (paperboard), foam paper, dark cloth (denim, cotton, linen), leather, and other low-melting-point materials with high absorbance.



**Materials that are forbidden to use with the laser pack:**

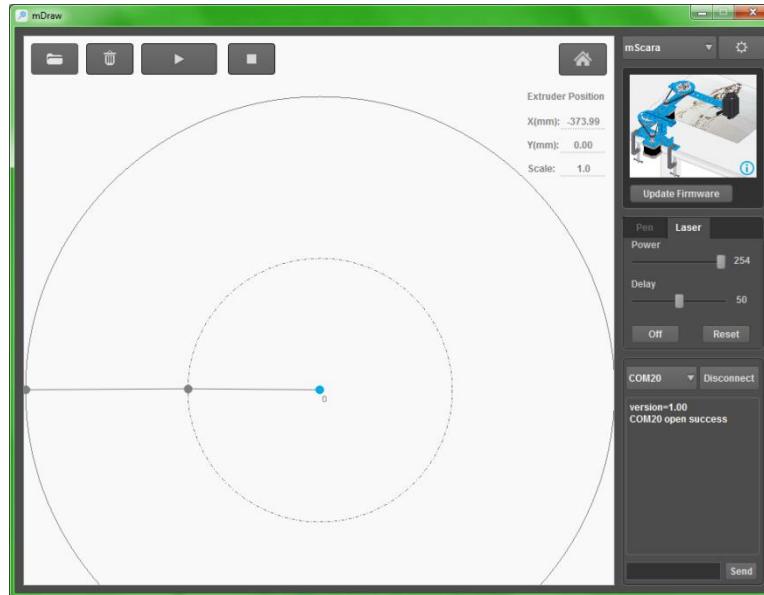
- Aluminum, stainless steel, and other metals.
- Mirror, glass, china, and other materials with high melting point, high reflectivity, and high projectiveness

**Warning:****Wavelength  $\lambda = 405\text{nm}$  blue-violet diode laser****Avoid Direct Eye or Skin Exposure****Note:**

- ⚠ • Make sure you have proper eye protection before using laser.
- ⚠ • Make sure you have proper ventilation measure in case any poisonous gas emitting while the laser is cutting some specific materials.
- ⚠ • Keep children and people who is not familiar with laser away from this laser pack.

#### (4) mScara (Laser Version)

Click button “Laser” to switch mode. “Power” stands for the output laser intensity, “Delay” stands for the laser engraver time (unit: ms). Other procedures are the same as [mScara \(Standard Version\)](#).



##### Note:

Activate laser before carving, with 8-12 as laser intensity. Put on your goggles and observe the laser spot. Adjust the knob under the laser to adjust the focal point.

##### Tips for adjusting the focal points:

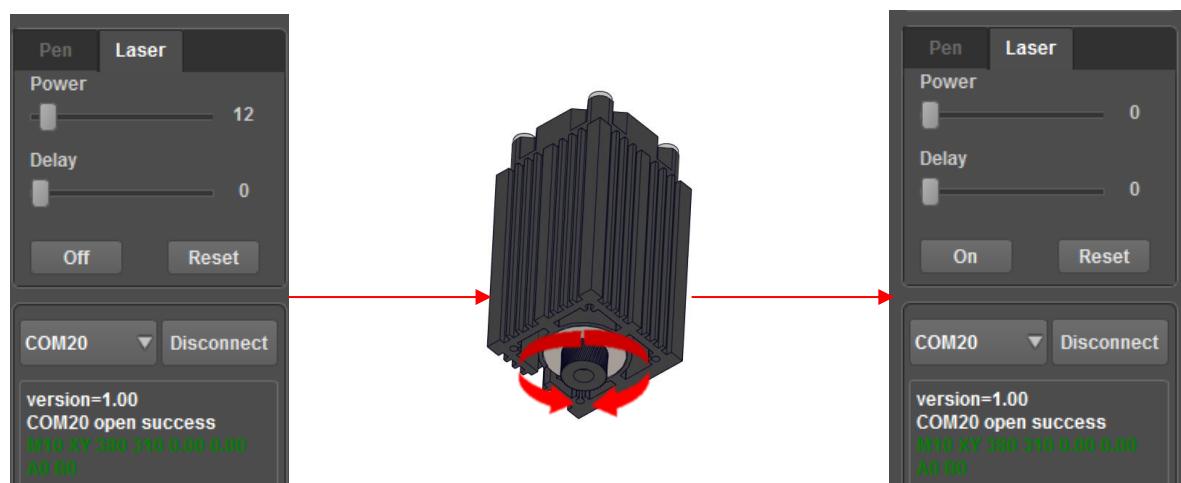
Adjust the knob clockwise, observe the changes of the spot on the wooden board. Then switch the knob anticlockwise to observe the changes of the spot on the wooden board. Try several times until you find out the smallest spot.

Turn off the laser after the smallest spot has been found out.



##### Warning:

Wavelength  $\lambda = 405\text{nm}$  blue-violet diode laser. Avoid Direct Eye or Skin Exposure.

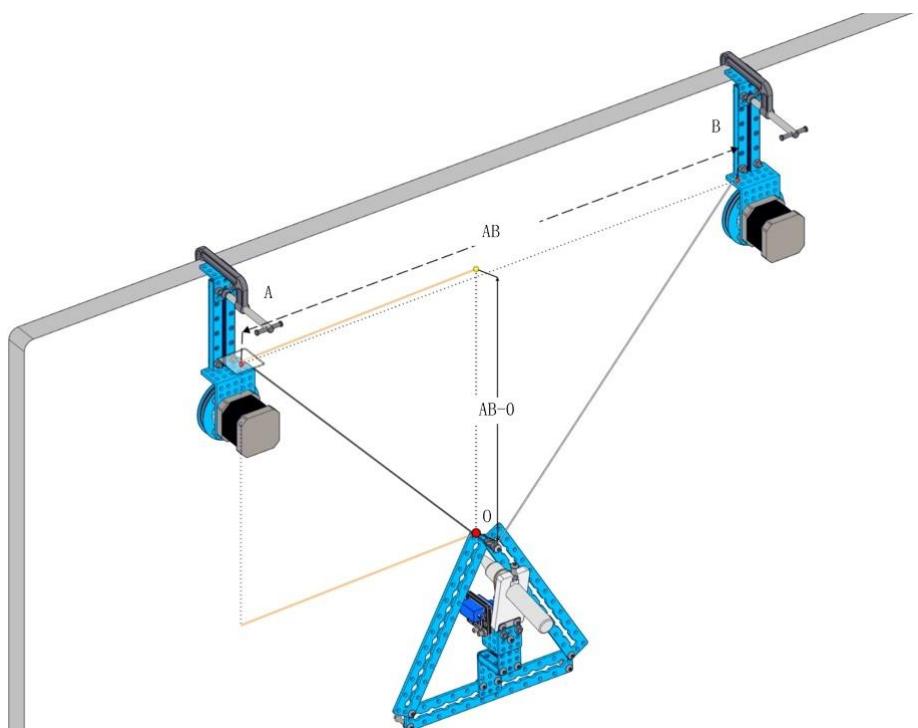


- Make sure the imported image is within the bow area, otherwise the drawing will be abnormal
- Reset to the original spot before drawing.

When everything is ready, you can start to import SVG file and adjust the position. Open the laser, set the intensity and the time, and the carving can be started.

## (5) mSpider

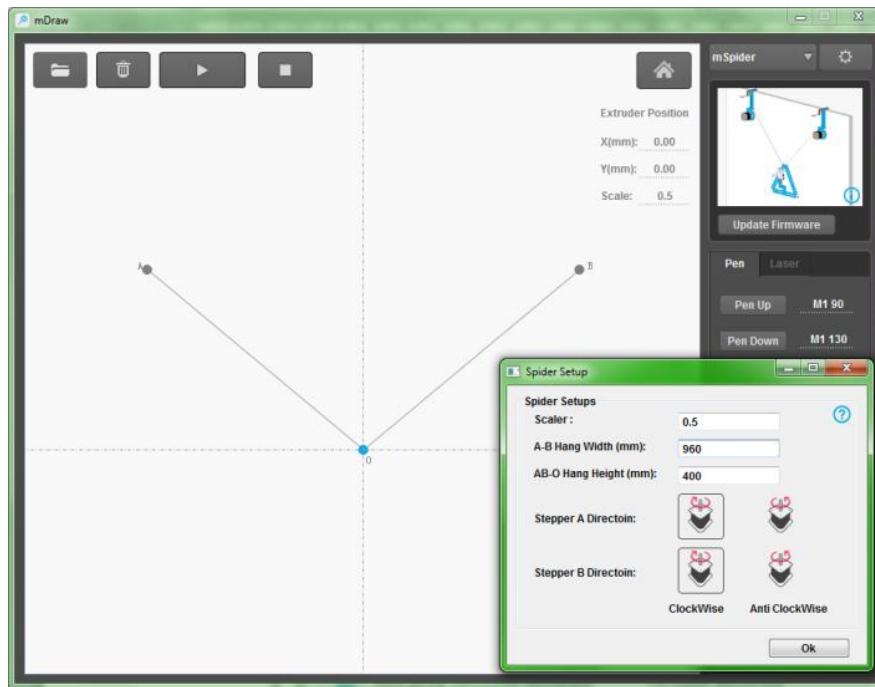
- Check and make sure all wirings are correct. Connect the robot to computer via USB cable.<sup>6</sup>
- Select the correct COM port, click “connect”, and then click “Update Firmware”).<sup>7</sup>
- The scaler in mSpider setup is the setting of the global drawing ratio, with default value being 0.5 which means double the size of the graphics. See the below 3D diagram for better understanding on A-B Hang Width and AB-O Hang Height. The point A & B are 2 holes where 2 Dacron ropes go across the beam, point O is where the top screw of the Pen Lift Mechanism touches the wall. While assembling mSpider, please measure the length of AB and AB-O, then fill it in mDraw, click OK, done!




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<sup>6</sup>For Bluetooth connection, please be sure that you've installed the Bluetooth driver software in computer.

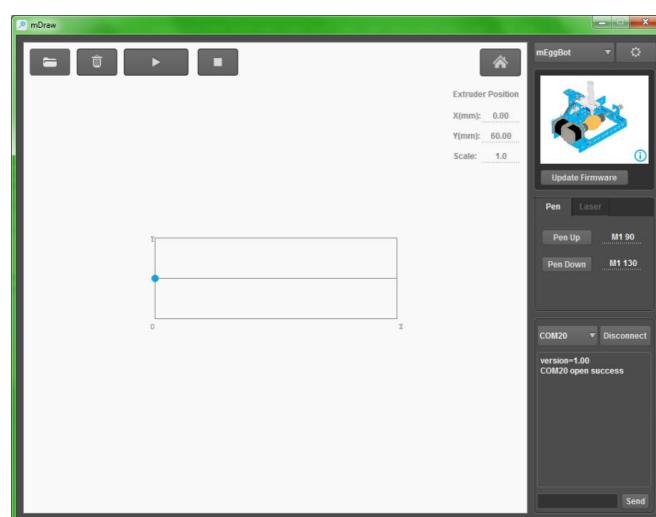
<sup>7</sup>You need to click “update firmware” for the first time you use a new configuration, and each time you switch a robot configuration.



- d. Please check the Configurations of Pen Up and Pen Down [Here](#).
- e. Turn on the power of mainboard, rotate the **90T Timing Pulley** until the Pen Lift Mechanism locates over the perpendicular bisector of AB (which is O). Other procedures are the same as [mScara \(Standard Version\)](#).

## (6) mEggBot

- a. Check and make sure all wirings are correct. Connect robot to computer via USB cable.<sup>8</sup>
- b. Select the correct COM port, click “connect”, and then click “Update Firmware”).<sup>9</sup>
- c. Please check the Configurations of Pen Up and Pen Down [Here](#). Please move the Pen Lift Mechanism to the center position, and make sure the object to be drew is clamped.
- d. Other procedures are the same as [mScara \(Standard Version\)](#).

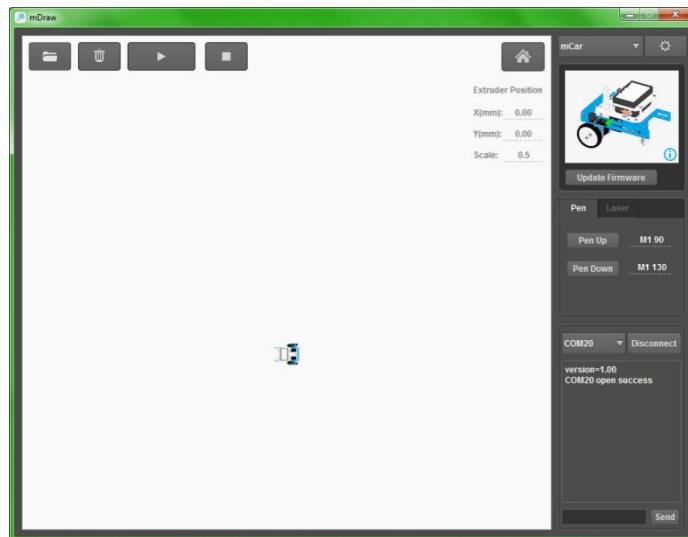


<sup>8</sup>For Bluetooth connection, please be sure that you've installed the Bluetooth driver software in computer.

<sup>9</sup>You need to click “update firmware” for the first time you use a new configuration, and each time you switched robot configuration.

## (7) mCar

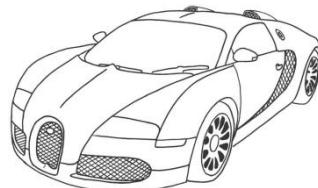
- a. Check and make sure all wirings are correct. Connect robot to computer via USB cable.<sup>10</sup>
- b. Select the correct COM port, click “connect”, and then click “Update Firmware”).<sup>11</sup>
- c. Please check the Configurations of Pen Up and Pen Down [Here](#).
- d. mCar may possibly slightly slide on the floor, thus influence the accuracy of the drawing. You can also upgrade it to other form by yourself, such as a self-balancing car or a photographic car by adding gyroscope, a camera module, and so on.



## 7. Samples for Software mDraw and Inkscape

mDraw supports SVG file which is based on open-source software Inkscape. For better experience of mDraw, please learn the basic operation of Inkscape.

1. Install Inkscape.
2. Create a new vector graphic or open a vector graphic in Inkscape. Inkscape supports the conversion from other vector types to SVG file, like \*.dxf, \*.cdr (please save as an earlier version) files. Here is a simple sample.
3. We suggest-choosing sketch for BMP as below sample.

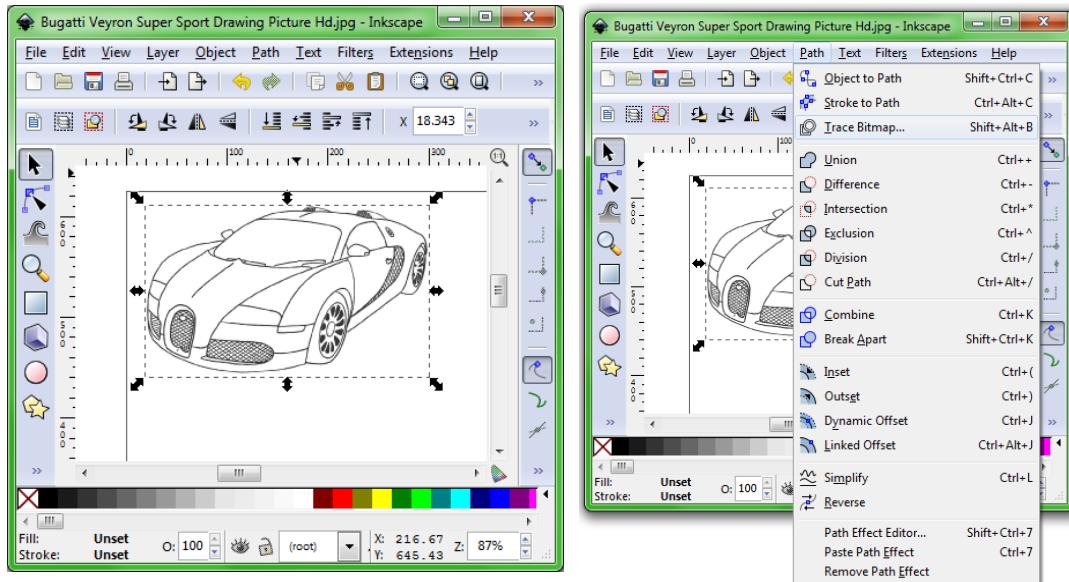


4. Open a BMP file with Inkscape, select the picture, and then click Path->Trace Bitmap.

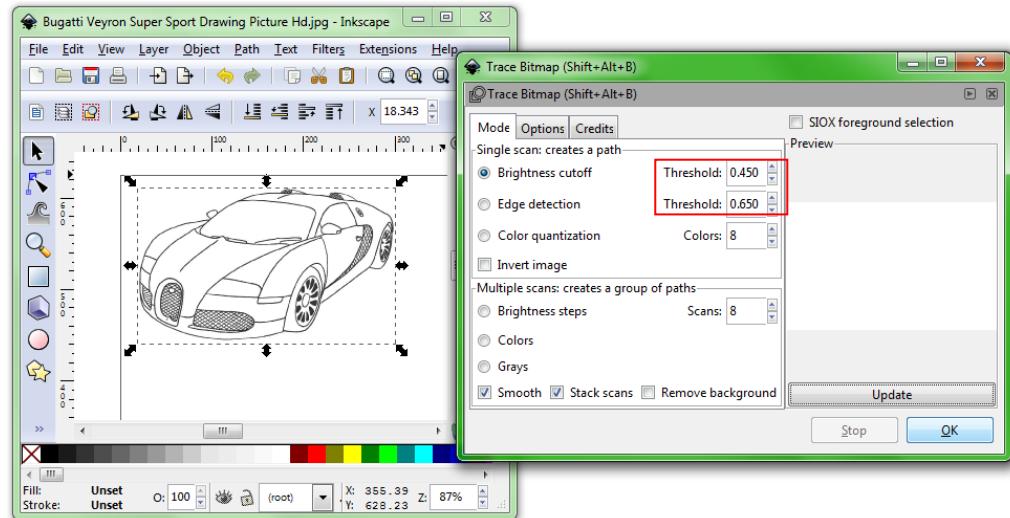
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<sup>10</sup>For Bluetooth connection, please be sure that you've installed the Bluetooth driver software in computer.

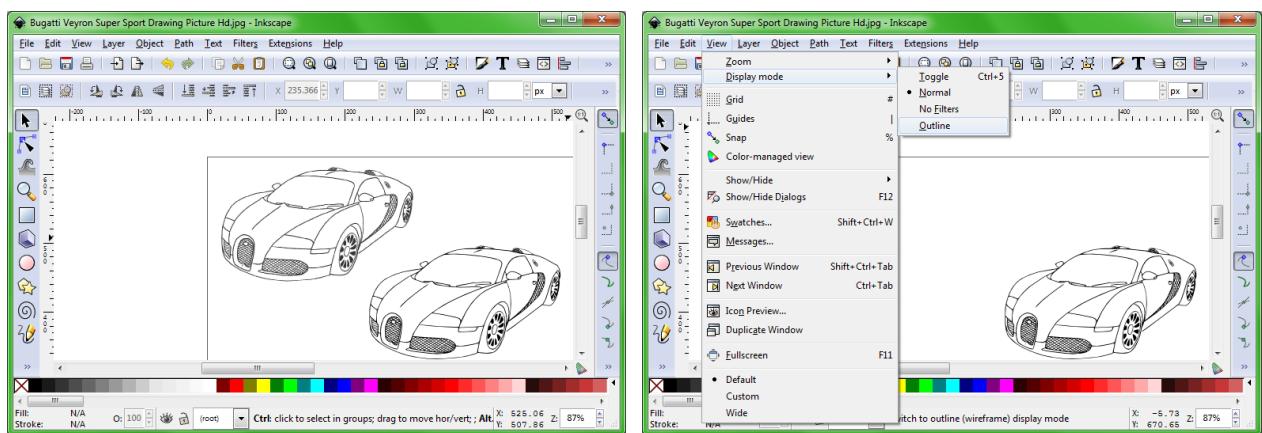
<sup>11</sup>You need to click “update firmware” for the first time you use a new configuration, and each time you switched robot configuration.



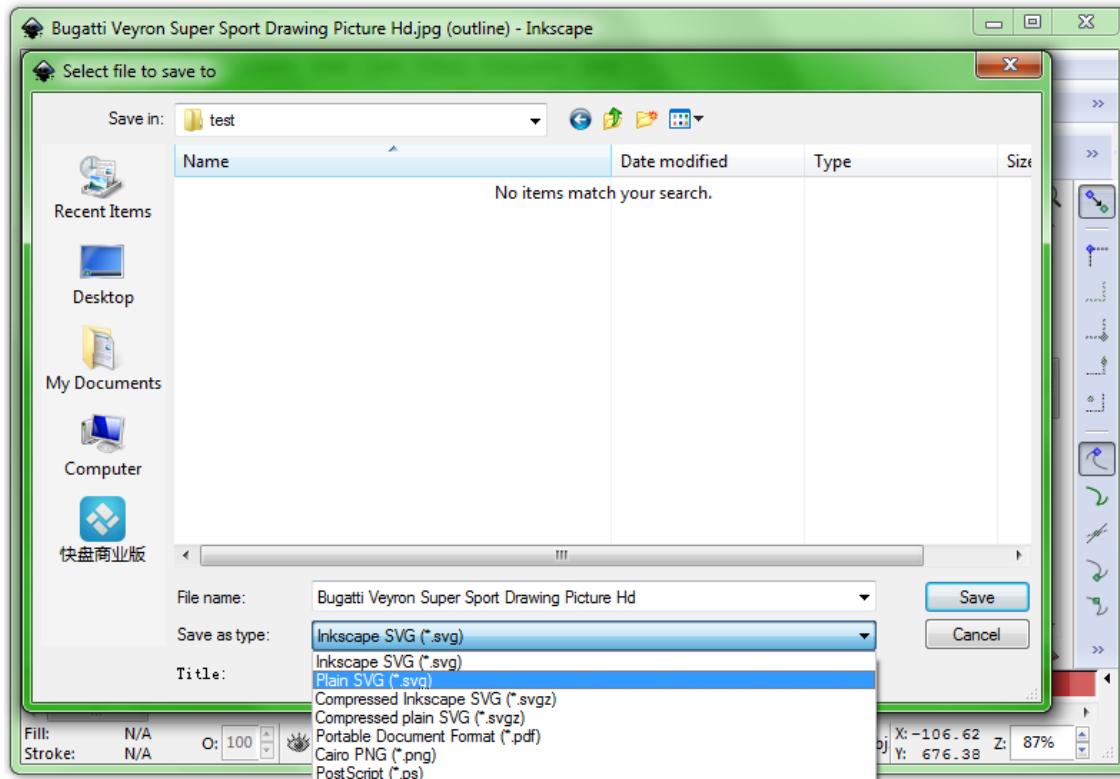
5. Set value for Threshold, click Update->OK.



6. Drag out the generated vector graphic, select View -> Display mode -> Outline. Delete the original BMP picture.

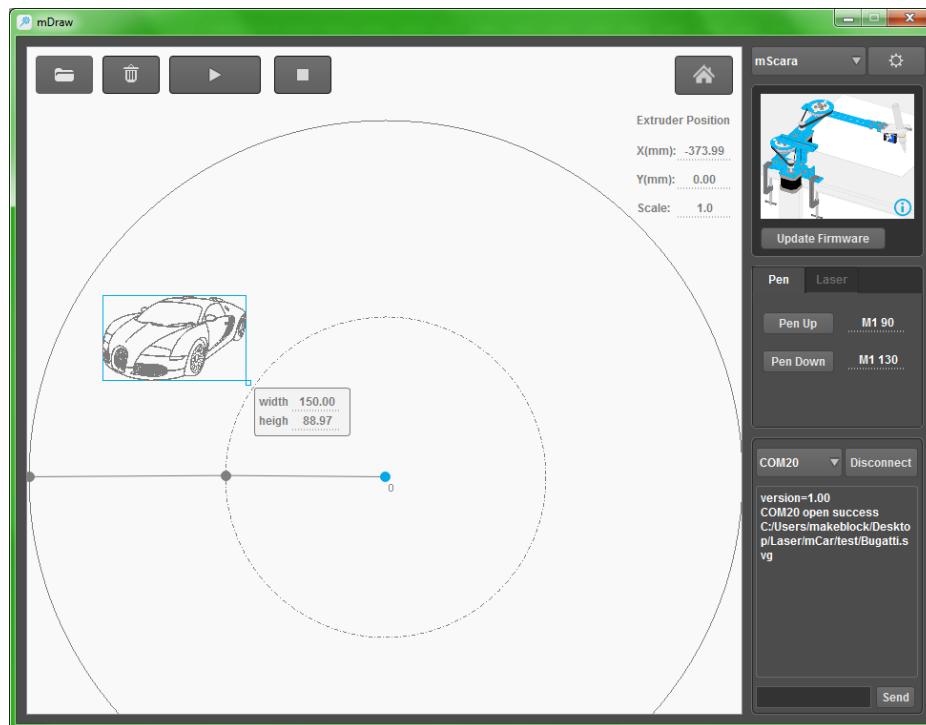


7. Save file as type Plain SVG (\*.svg)<sup>12</sup>.



8. Open the SVG file you just saved as below, adjust the position and size, and then click

button  to start drawing.<sup>13</sup>



<sup>12</sup>Please be sure to choose the correct file type, or it will be unsupported.

<sup>13</sup>Before you start drawing anything, please check the manual and be sure that the mDrawBot is located at the same position in software.

## 8. FAQs

**Q: Why my driver installation for Makeblock Orion failed?**

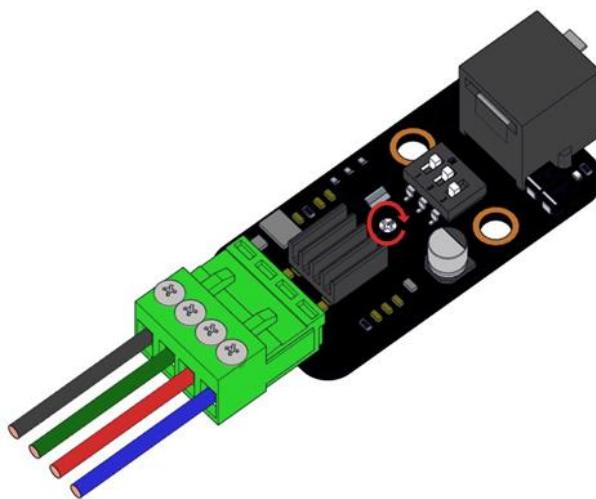
A: If the auto installation of driver for Makeblock Orion does not go successfully, please download the driver here and install it manually.

Makeblock Orion driver download link:

[http://learn.makeblock.cc/driver\\_installation/](http://learn.makeblock.cc/driver_installation/)

**Q: How to adjust the torque and electric current of stepper motor?**

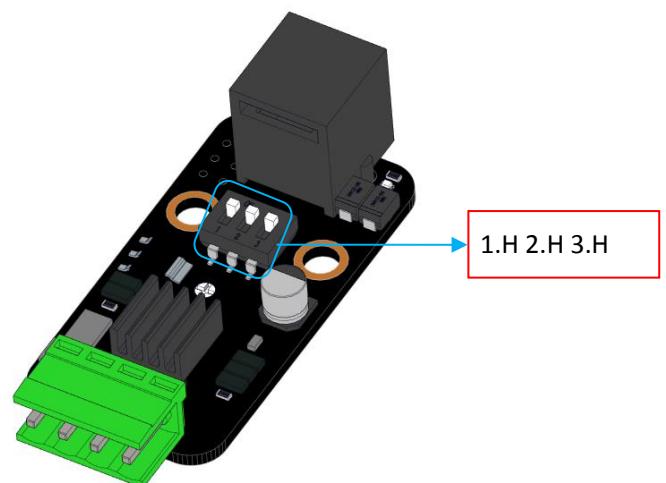
A: You can swirl the tiny knob of stepper motor driver module in “+” direction to increase the torque output if it's not enough.



**Q: Why the speed and ratio are incorrect?**

A: The micro stepping the mDraw adopts to control stepping operation is HHH1/16. Thus if you find the speed and ratio are incorrect, please check the setting. Here are the setting chart and the default setting picture.

	1	2	3
Full speed	L	L	L
1/2	H	L	L
1/4	L	H	L
1/8	H	H	L
1/16	H	H	H



**Q: What if the height difference has exceeded the required one? How can I fix it?**

A: Make sure the levelness of the desktop you are using. If it is not level enough, please change to another one. If the problem still exists, please check and fix the levelness of Plate 0324-184 manually.

**Q: How to download the related sources and 3D models?**

A: Please download related sources at [our website](#).

**Q: How to convert BMP into SVG?**

A: Please refer to below teaching videos.

<https://www.youtube.com/watch?v=W0V-4O9x9Uk>

<https://www.youtube.com/watch?v=-yBMB5KtZj4>

**Q: How to share your work?**

A: Welcome to upload and share your work at

<http://forum.makeblock.cc/category/showcase>.

**Q: How to contact Makeblock?**

A: Welcome to email us at [support@makeblock.cc](mailto:support@makeblock.cc). Or you can contact us at below.

[https://www.facebook.com/Makeblock?ref=br\\_tf](https://www.facebook.com/Makeblock?ref=br_tf)

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