

# Product specification

## Micromake DIY

Micromake Digital Co.,Ltd.

# Catalog

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2. Assembly of the bottom Vertex

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- 2.Assembly of the bottom Vertex

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4. Assembly of Endstop

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- 2.Assembly of belt connector pieces and effector

6. The overall assembly

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- Circuit section

7. Assembly of circuit

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- 1.Assembly of Print platform

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## The gadgets in the assembly



M2.5\*16mm cap screw



M4\*25mm round head cap screw



M3 wing nut



M3 nut



M4 nut



M3\*20mm cap screw



M4\*30mm round head cap screw



M5 nut  
(only using in pulley type)



M3\*12mm cap screw



M4\*10mm round head cap screw



Square nut



Washer



T type nut  
(only using in linear rail)



M5\*25mm cap screw  
(only using in pulley type)



M4\*8mm round head cap screw



Small spring (in effector)

## —、Assembly of the top Vertex

1.M2.5 Allen Key	1
2.Black short OpenBeam	3
3.Top vertex	3
4.M4 black Square nut	12
5.M4*10 cap screw	12

Steps :

1.Take a top vertex. The side having the hexagonal groove in the center is on bottom. Pay attention to distinguish top and bottom. (As the picture1.1). Then attach the M4\*10 screw into the 4 holes in the flank. You should attach them from inside. After that, put on the M4 square nuts from outside (attention: you needn't turn them so tightly, just turn 3 circles.) (As the picture 1.2)

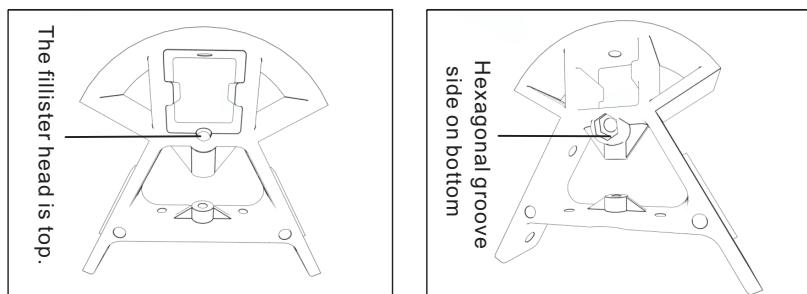


Figure1. 1

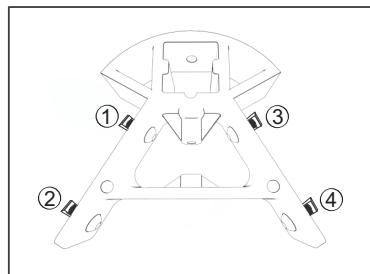


Figure1. 2

2. Put down the top vertex. And the side with hexagonal groove is on the bottom. Slip short OpenBeam in the flank of the vertex. (Because of the gap you leave between screws and the nuts, it's easy to slip in). Using the M2.5 Allen Key fasten the screws tightly from the inside. ( As the picture1.3).

3. Next, assemble the remaining top Vertexes with the short OpenBeams, like the step1&step2. Attention: the bottom of the vertex is the side with hexagonal grooves. And the assembly of the OpenBeam with top Vertex is in the same side as the step 2. ( As picture1.3)

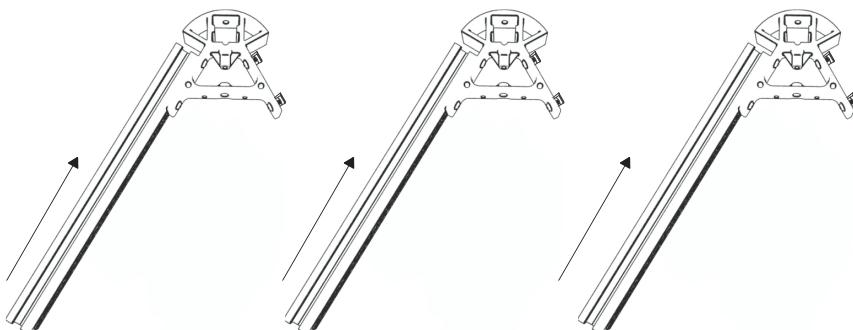


Figure1. 3

4. Sequence 3 assembled top Vertexes like picture1.4, then put them together slowly. At last, tighten the all screws up. ( As the picture1.5)

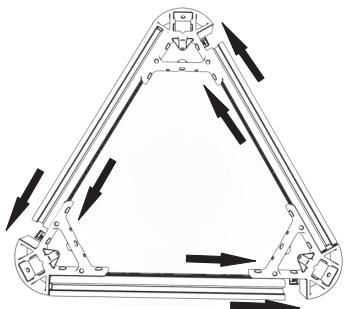


Figure1. 4

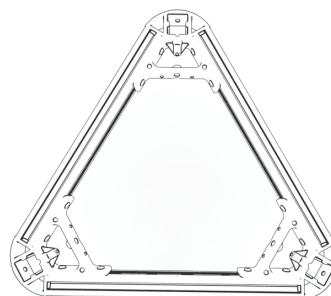


Figure1. 5

5. Install the belt guide bearing. The picture1.6 is one group of component including M3 nut, M3\*20 screw and two Flanged Bearings. We need 3 groups. Assemble the belt guide bearing as the picture1.7&1.8. Attention to the direction of the Flanged Bearings. You should install three top vertexes. (Like picture1.10)

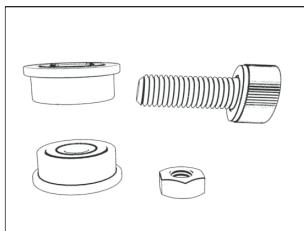


Figure1. 6

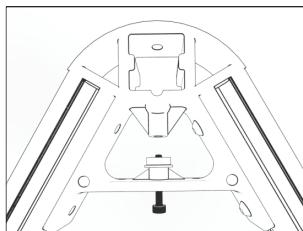


Figure1. 7

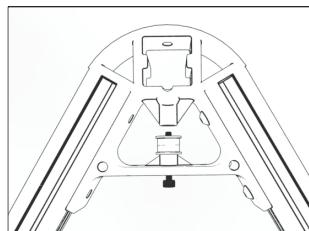


Figure1. 8

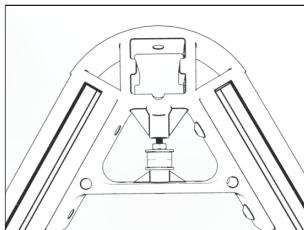


Figure1. 9

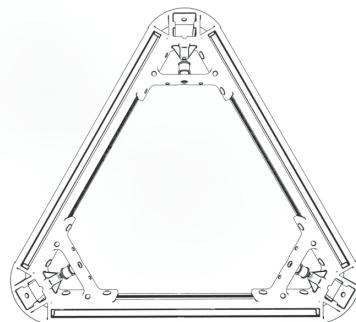


Figure1. 10

## 二、 Assembly of the bottom Vertex

### (1) Assembly of the control board bracket

1. Fix the board. The materials: 2 M4\*8 round head cap screw, 2 M4 Square nut and one control board bracket.(like picture 2.1). Firstly, we should put the M4\*8 screws into the screw holes in the control board bracket. Then install M4 Square nuts on screws. (Attention: just turn 3 circles). (Like the picture2.2). Next, we slip this control board bracket in the slot guide of the OpenBeams, then fasten the screws to fix the board. (Suggestion: fix the board in the center of the OpenBeams ).(Like the picture2.3)

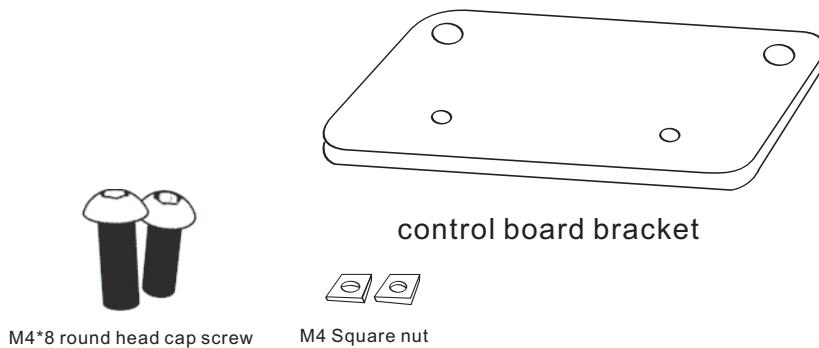


Figure2. 1

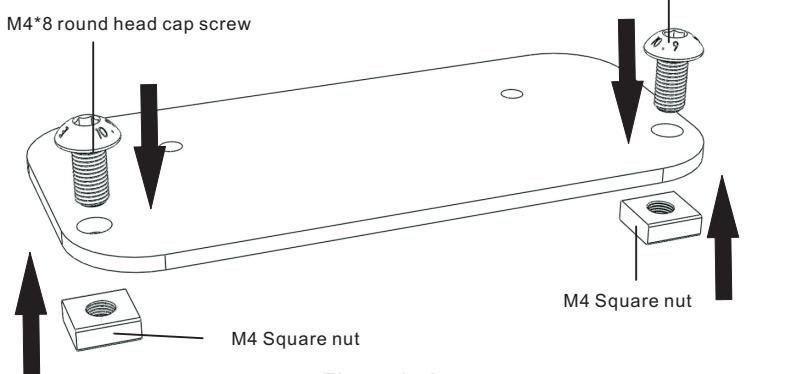


Figure2. 2

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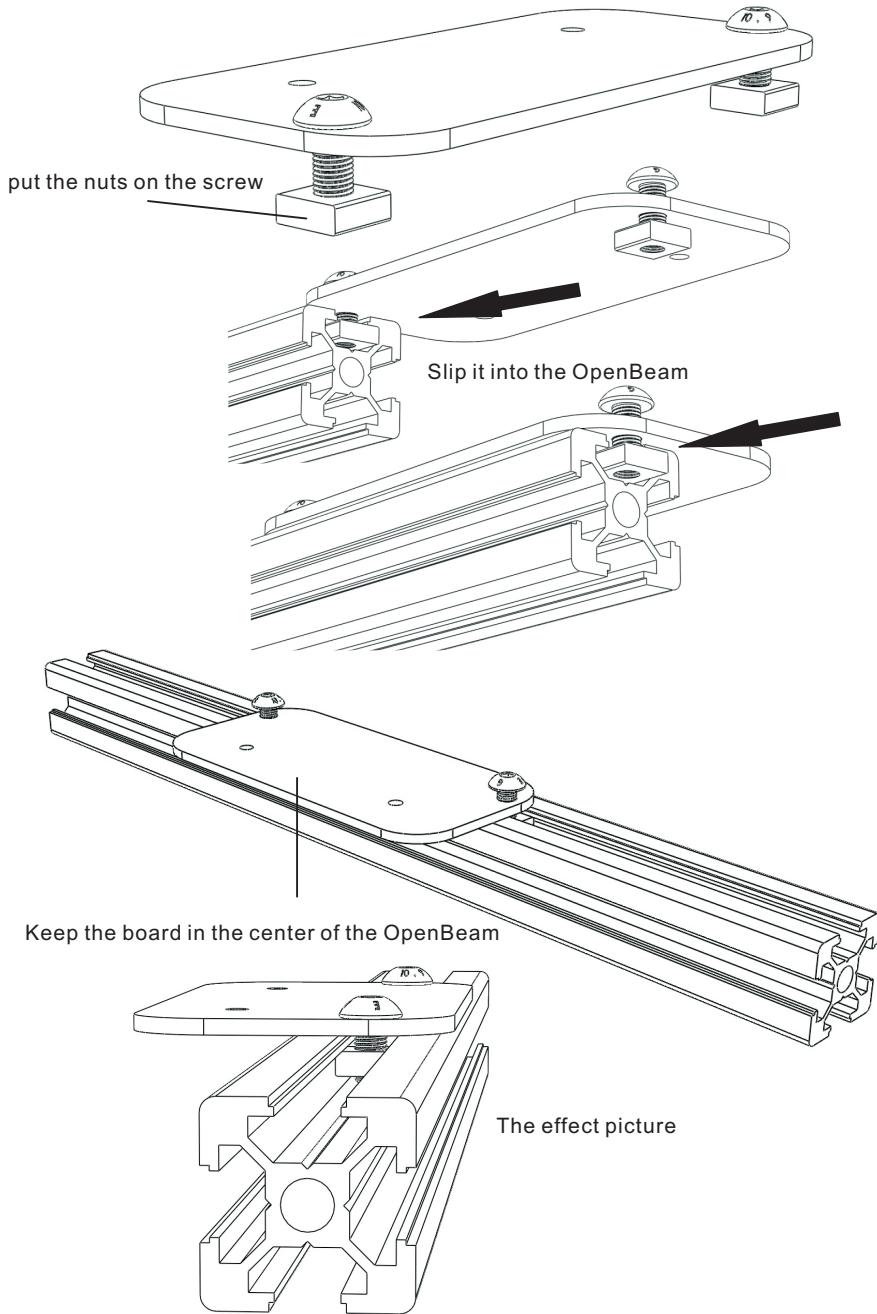
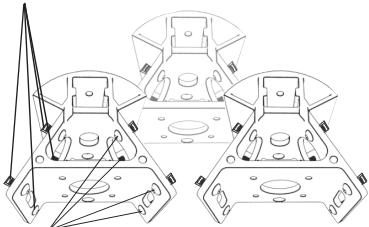


Figure2. 3

## (2) Assembly of the Bottom Vertex

1. The assembly of the bottom vertex is the same as the top Vertex. (Like picture 2.4). Firstly, attach the Square nut and the M4\*10mm round head screw on the bottom vertex. Then slip the OpenBeams in the bottom vertexes. (like the picture 2.5).

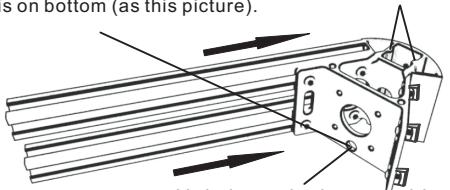
4 groups of screws and nuts



4 groups of screws and nuts

Attention: the side near the little hole is on bottom (as this picture).

Having two clamping parts is on the top.



Hole is on the bottom side.  
It's for the wire of the endstop.

Figure2. 4

Figure2. 5

2. Assemble the 3 installed bottom vertexes like the top vertex. (Like picture 2.6). (picture 2.7 is the effect picture)

Attention to distinguish the top and bottom. The hole is on bottom.

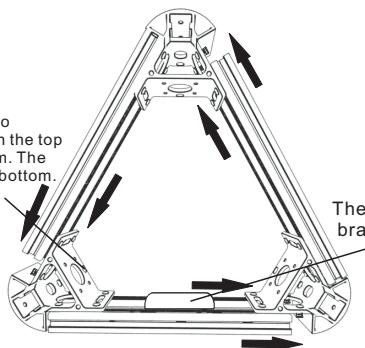


Figure2. 6

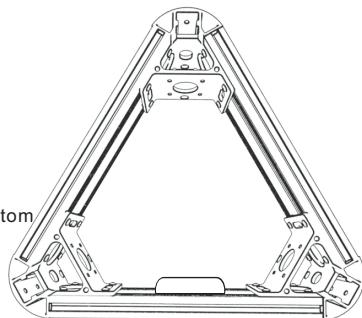


Figure2. 7

### 三、Assembly of motor's piece parts

Materials: M1.5 Allen key. 1  
Synchronous wheel. 3  
Motors with short wires. 3

Steps :

1.Take one motor. There is a flat groove in cylindrical of the motor. (Like picture 3.1). Put the Synchronous wheel on the cylindrical, whose set screw corresponds the flat groove. ( The black hole in the Synchronous wheel is the set screw.)(Like picture 3.2). You should put the Synchronous wheel in the center of the cylindrical, then fix the Synchronous wheel with turning the set screw until it can slip but cannot down the flat groove. After that, tighten the other set screw.

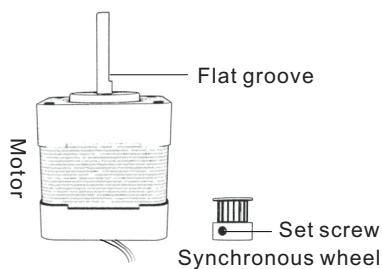


Figure3. 1

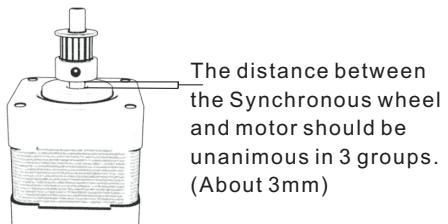


Figure3. 2

2.The assembly of the motor with the bottom vertex.

Materials: M2.5 Allen Key. 1  
M3\*8 screw 12  
Installed motor 3  
Bottom vertex 3

(Attention: in 3 installed motors, the distance between the Synchronous wheel and motor should be unanimous.)

Firstly, take 4 M3\*8 screws into the screw holes in the vertex. (Like picture 3.3)

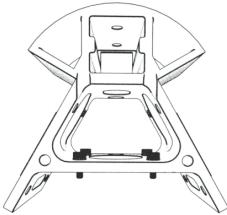


Figure3. 3

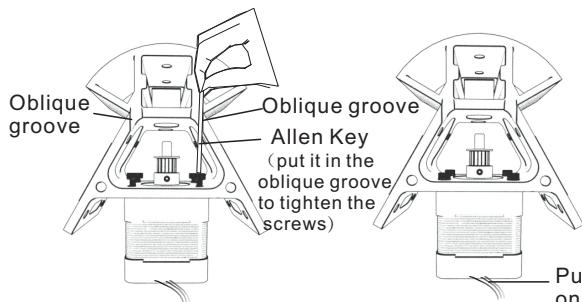


Figure3. 4

Put the wire  
on the bottom  
(the frontage  
side of the  
bottom vertex  
is the top.)

3. When assemble the motor, put the wire on the top, then you can tighten the screws with hands at first, using the allen key's round head next, using the short head of the allen key at last.(like picture 3.4). The picture 3.5 is the effect picture.

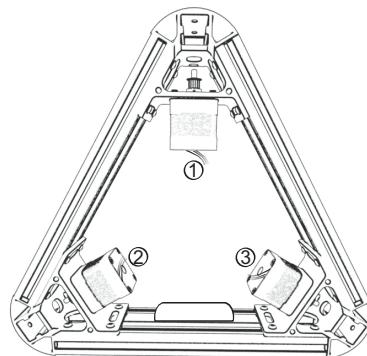


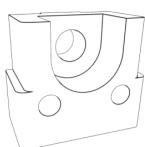
Figure3. 5

## 四、Assembly of limit switches

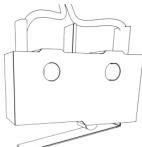
Materials: Endstop	3
OpenBeam	3
Terminal block	3
M4 Square nut	3
M4*10 round head screw	3
M2.5*16 screw	6
(Like the picture 4.1)	

Steps:

1. Firstly, put the M4 square nut and M4\*10 round head screws on the limit block and turn about 3 circle,(like picture 4.2). Then fix the endstop on the limit block using the M2.5\*16 screws, just screw them on the bottom,(like picture4.3).



Terminal block



Endstop

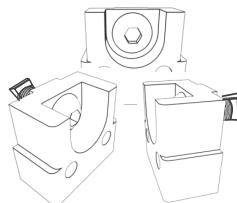


Figure4. 2

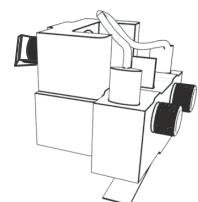


Figure4. 3

2. Insert the 2020\*680mm OpenBeam into the corresponding hole in the bottom vertex. (Attention to distinguish the top and bottom of the vertex like picture4.4). Then tighten the M4 screw up. (Picture4.5 is the effect pi

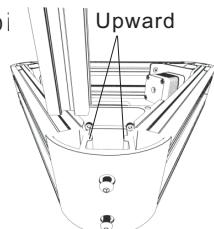


Figure4. 4

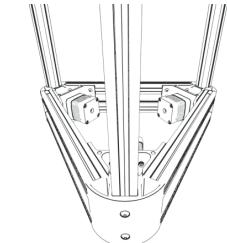
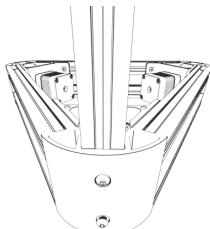


Figure4. 5

3.lay down the installed frame, then penetrate the wire of the endstop through the hole in the middle of OpenBeam. (Like picture4.6). Then make it out from the other side. (Like picture4.7). After that, let it out from the prepared hole in the endstop.

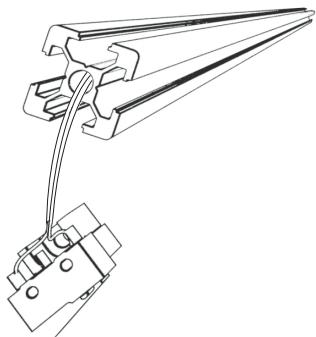


Figure4. 6

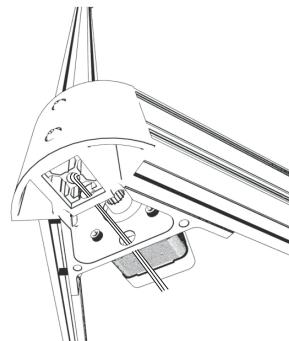
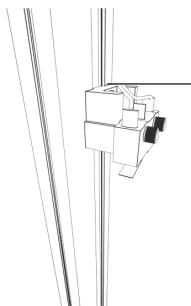


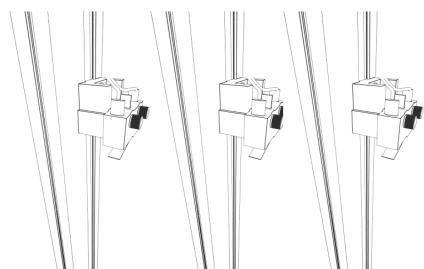
Figure4. 7

4.Slip the fixed limit block into the clamping groove of the OpenBeam, leaving about a 5cm gap. (Attention: the distance in 3 OpenBeams should be consistent.). Then fixed it up(Like picture4.9)



The distance between  
the top of OpenBeam  
and limit block is about  
5cm.

Figure4. 8



The distance in 3 groups should be consistent.

Figure4. 9

## 五、Assembly of effector

### (1) Print head' components

1. The assembly of the print head with the heating rod. (Picture5.1 is the print head and heating rod). Insert the heating rod into the round hole of the heating aluminum block, then the induction temperature head into the little hole nearby the round hole. (Like picture5.2). (Attention to the distances leaving on both sides of the heating rod should be symmetrical. And the induction temperature head should in the center of the heating block). Then fix the set screws using the Allen Key. Attention to the direction of the heating block like picture5.2

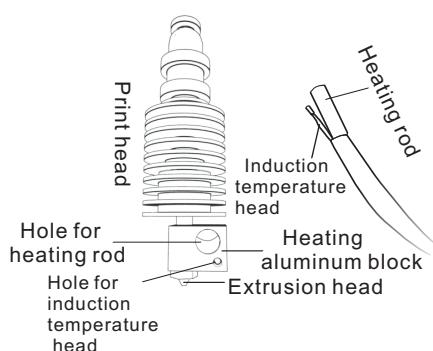


Figure5. 1

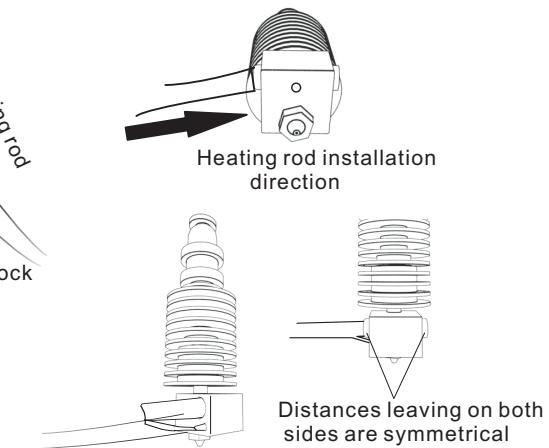


Figure5. 2

### 2. Assembly of the auto-alignment effector.

Materials:	2.5*16 screw	2	M3 nut	2
	M3*12 screw	9	M4 nut	1
	M3*8 screw	2	Endstop	1
	M3*20 screw	1		
	M4*30 screw	1		
	Little spring	1		

non-standard parts of injection molding effector: external part, internal part, duct part, the jig of print head (Like picture 5.3)

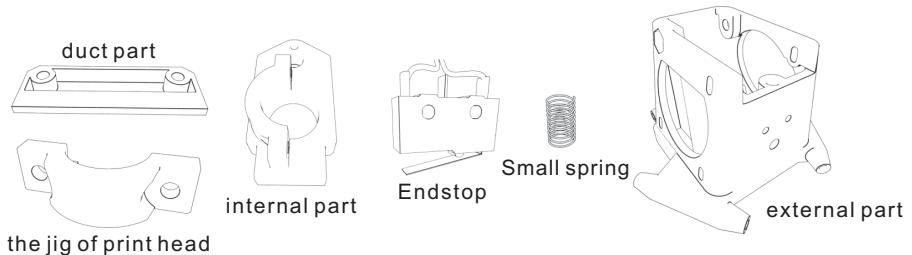


Figure5. 3

3. Install the wire of the endstop into the big hole in the side with 3 holes. Then install 2 M2.5\*16 screws into the remaining 2 holes. (Like picture 5.4)

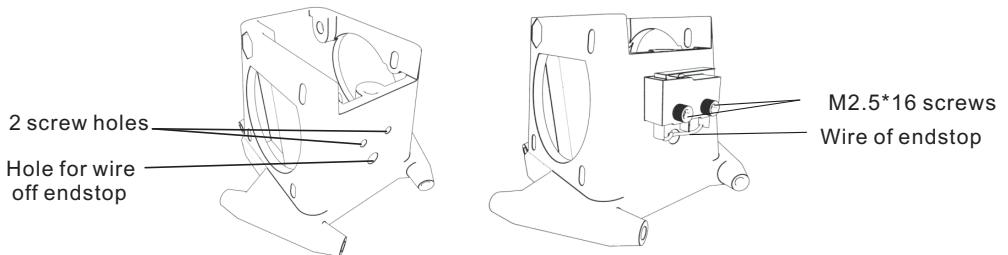


Figure5. 4

4.Cover the extrusion head with internal part. Then put the extrusion head in the external part. Let the wire out from the external part. (Like picture5.5). Using the clamping edges of the jig of print head to fix the metal groove in the bottom of the extruder motor adaptor. (Like picture5.6). Then install the 2 M3\*12 screws into the holes in the internal part, tighten them with M3 nuts. (Like picture5.7).

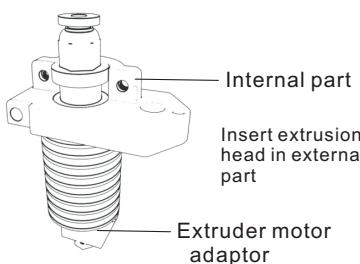


Figure5. 5

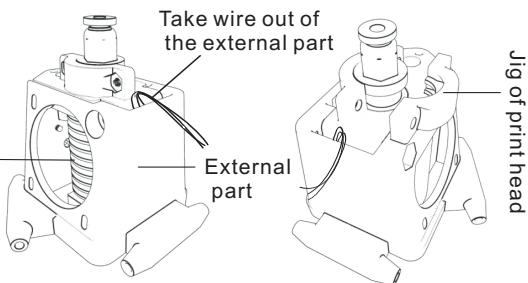


Figure5. 6

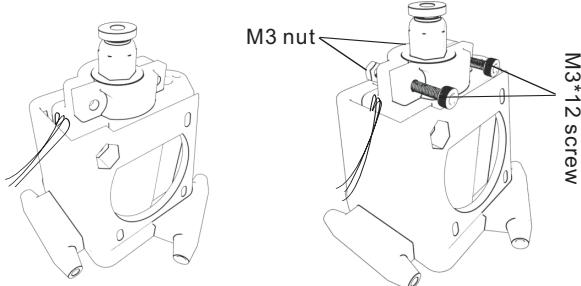


Figure5. 7

5.Insert the M4\*30 screw into the round groove of the external part. (Attention to distinguish the round groove and hexagonal groove like picture5.8). Then insert the M4 nut on screws and turn it on but not so tightly, you can just turn about 4 circles. (Like picture5.9)

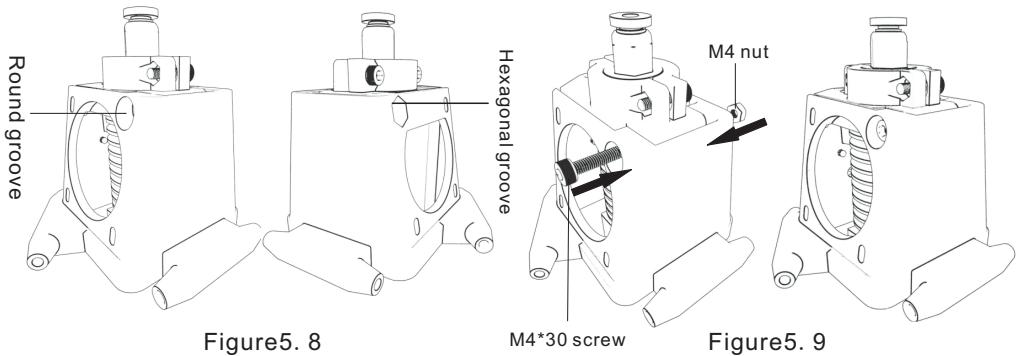


Figure5. 8

M4\*30 screw

Figure5. 9

6. Fix the ducts part in groove in bottom of the external part, using 2 M3\*8 screws. (Attention to assemble it on the cooling wind path.(Like picture5.10)

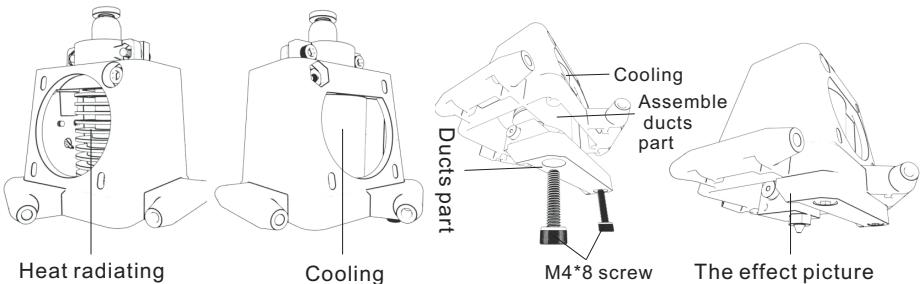


Figure5. 10

7. Pin the jig using hands, then insert the M3\*20 screw into the marginal hole. Put the spring on the M3\*12 screw, then screw them in the big hole. (Like picture5.11).you shouldn't turn it so tightly. You can check the resilience when you press the Extruder motor adaptor. If the resilience isn't enough, you can fix the screw more. You can do reciprocal adjustment between the small screw and the big one. You should keep the spring do effective response and can turn on the endstop, When you press the Extruder motor adaptor. The endstop will loosen up and you can hear a sound of touching the bottom, when press the print head.

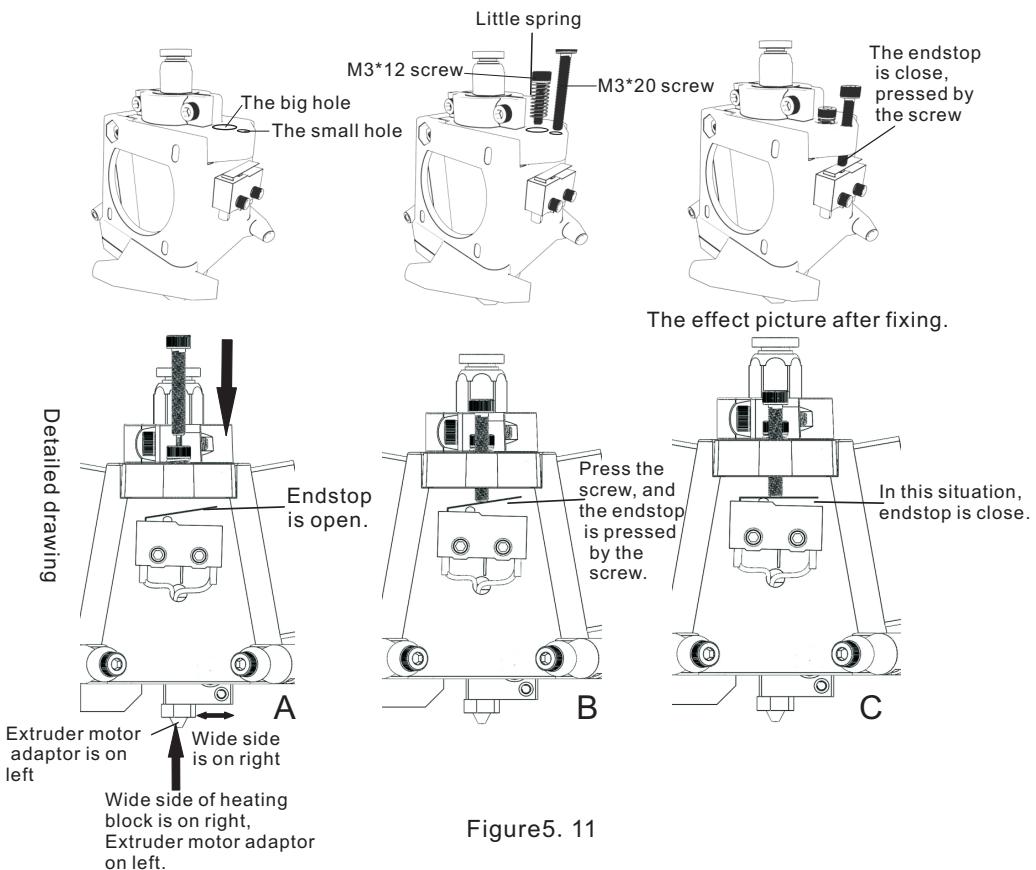


Figure 5. 11

8. Assemble the fan. The side with hole of the fan is the outside. Fix the fan using 3 M3\*12 screw in. (Like picture 5.12). Do the same operation with another fan. The one with fan groove is the cooling fan. You should access the wire of the cooling fan into the control board. Attention: Red connect positive electrode, black connect negative. (Like picture5.13). (the cooling fan start working when printing cover the bottom. But the other is working when power-on).

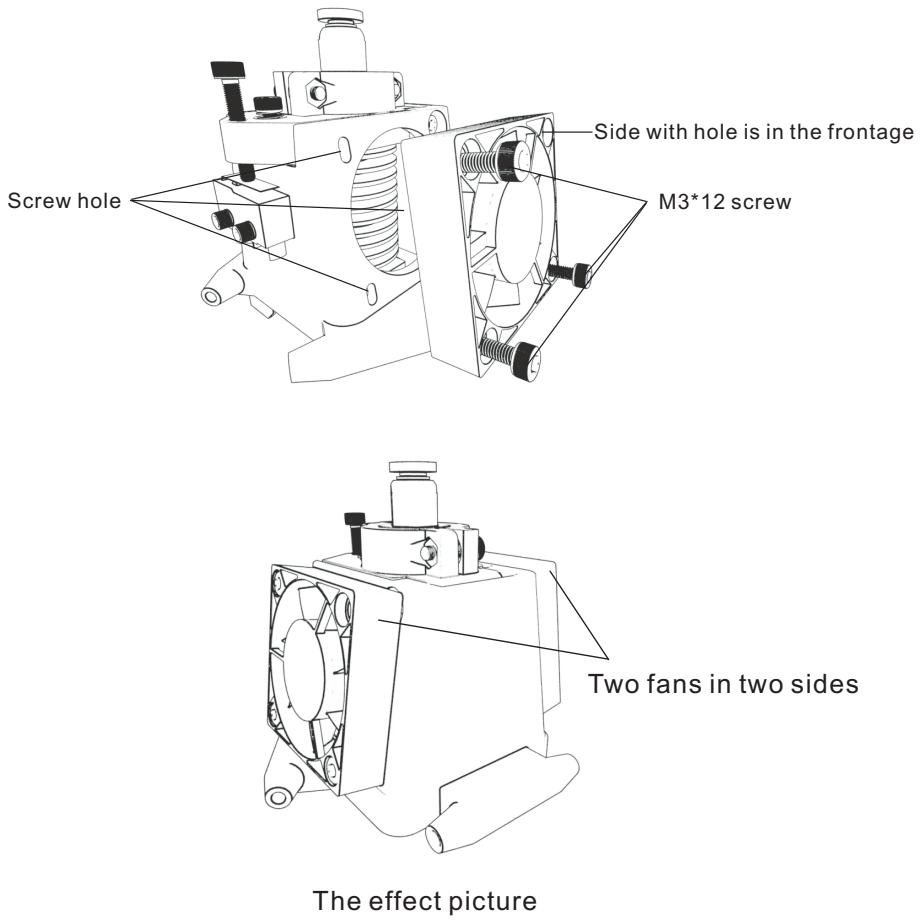


Figure5. 12

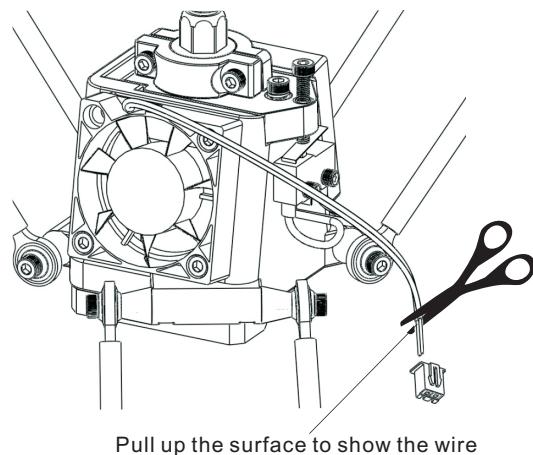
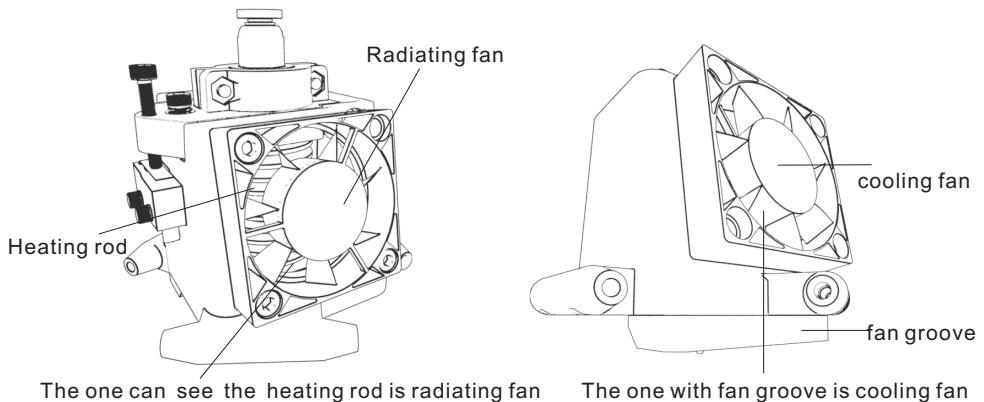


Figure5. 13

9. Insert the end of the wire of the endstop in the auto-alignment part into the three Frequency horned head (like the picture)

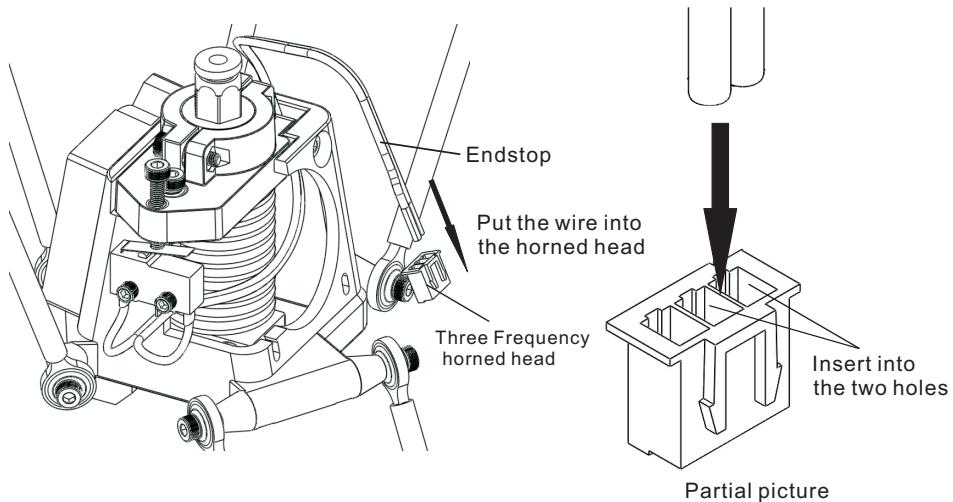


Figure5. 14

## (2) Assembly of belt connector pieces and effector

Materials: M3\*20 screw, M3 nut, belt connector pieces, parallel manipulator.

1. Firstly, install M3 nut in the bottom of the effector and the M3\*20 screw in the parallel manipulator. (Like picture 5.15). Assemble the other one the same as first one. (Effect picture5.16)

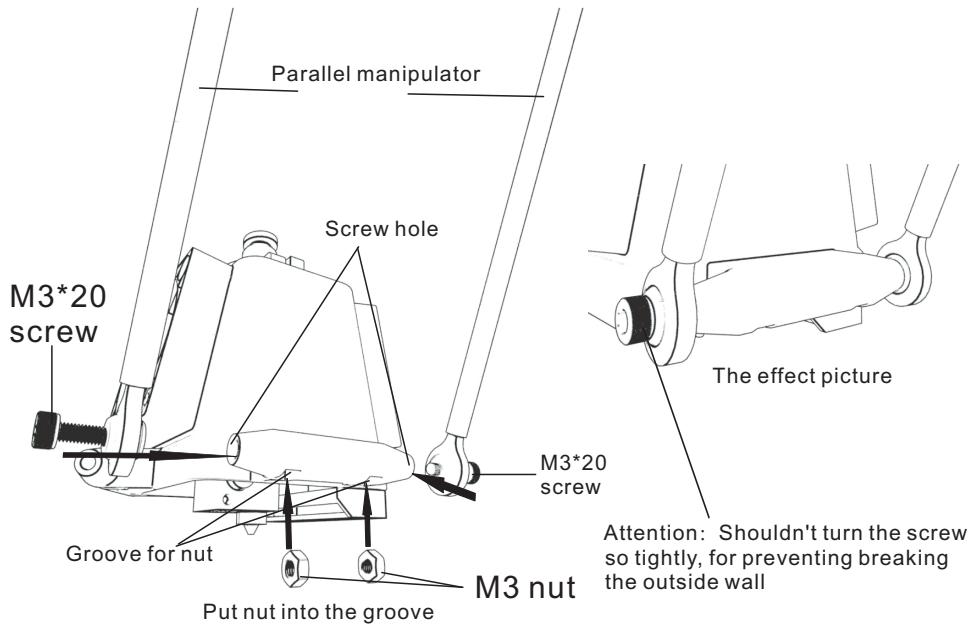
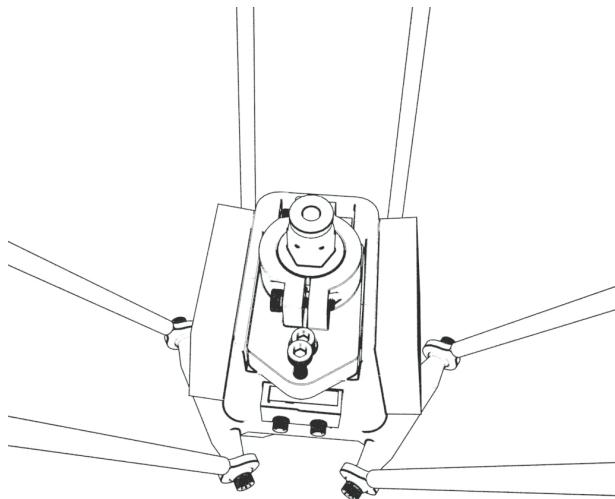


Figure5. 15



Final effect picture

Figure5. 16

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2.Put the parallel manipulator and effector in right way. (Like picture5.17). Put the belt connector piece like the picture5.18. (Attention: do not put it in opposite side). Put the M3 nut in the hole in the back side of the belt connector piece. Then using the M3\*20 screw fix the parallel manipulator with belt connector piece. (Like picture5.19). (Attention: you should assemble them in pairs. And attention to the direction of the belt connector piece). The effect picture like picture5.20

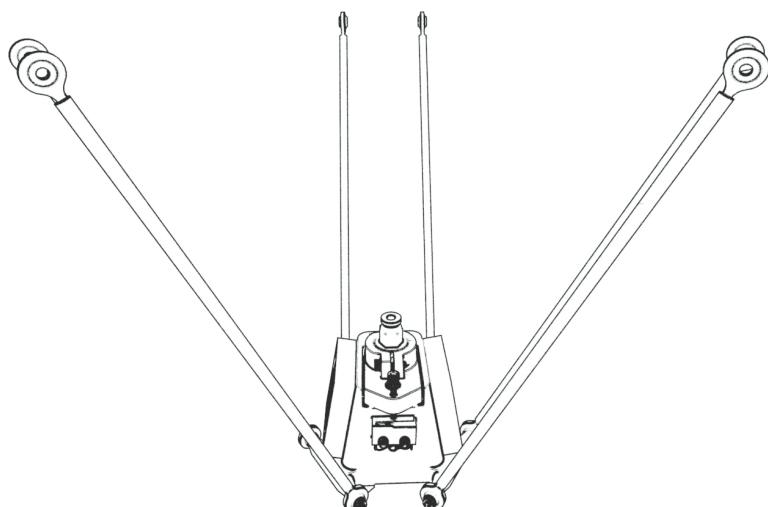


Figure5. 17

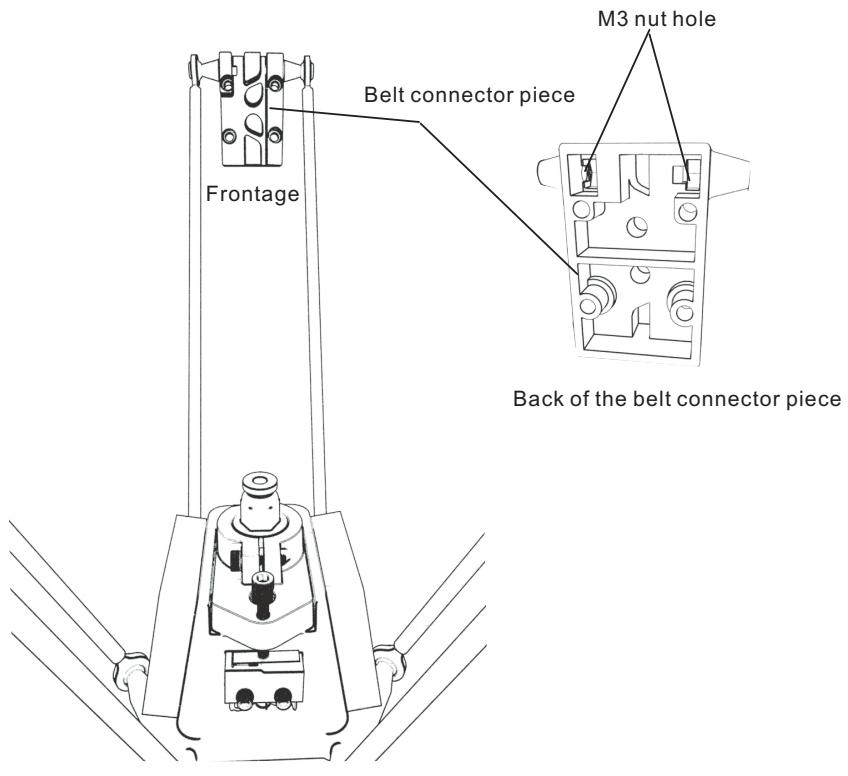
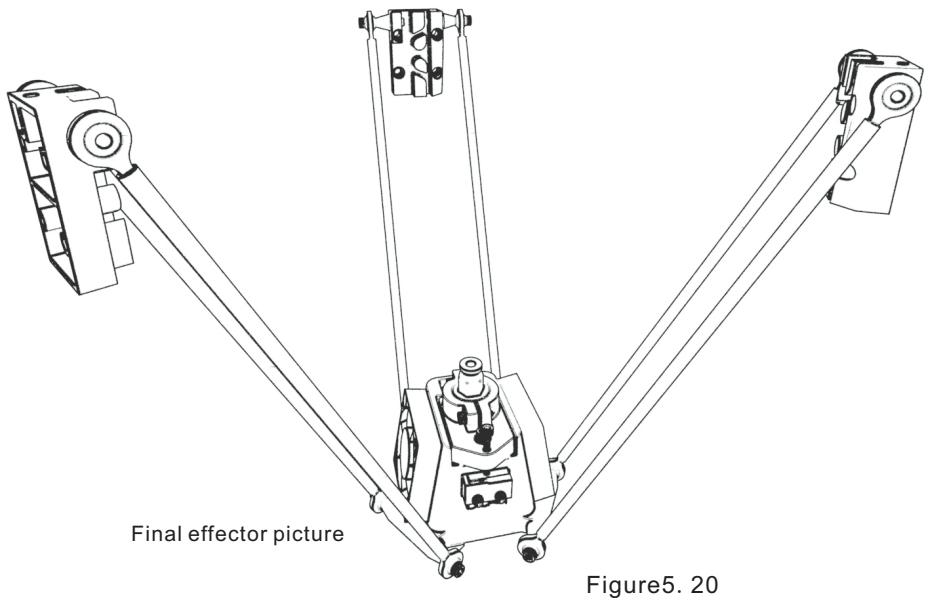
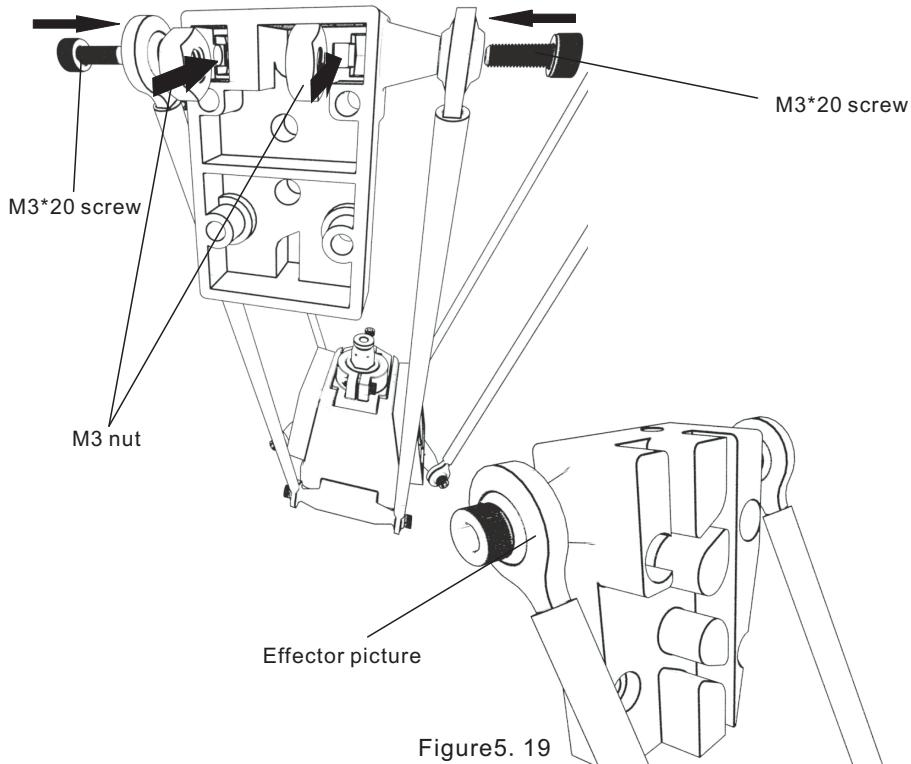


Figure5. 18



## 六、The overall assembly

### 【1】wire gauge type

#### ( 1 ) Assembly of the linear rail and the whole frame

1. Assembly of the linear rail. Take 3 linear rail with slider. (Like picture6.1). And 12 M3\*8 screws and M3 nuts.

Like picture6.2, attach the 4 groups of M3\*8 screws and M3 nuts in the screws holes of one linear rail.

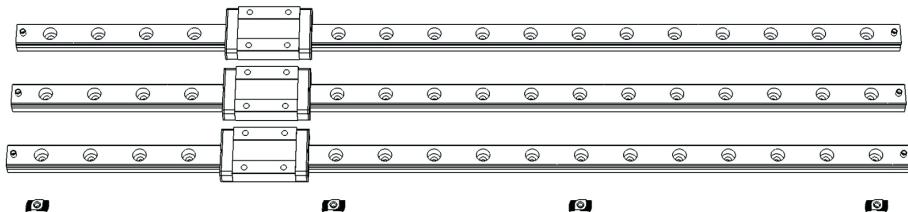


Figure6. 1

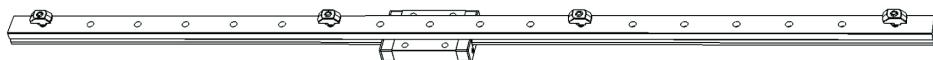


Figure6. 2

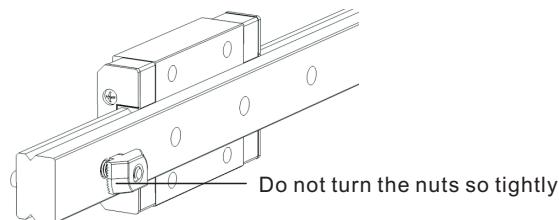


Figure6. 3

# Micromake Digital Co.,Ltd.

Slip the assembled linear rail in the slot guide of the OpenBeam, as picture 6.4. Picture 6.5 is the effect picture.

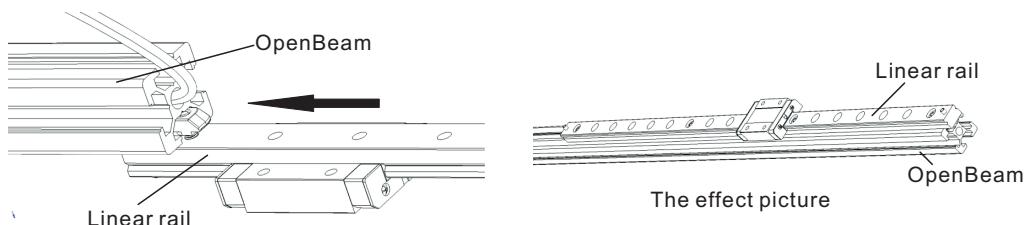


Figure6. 4

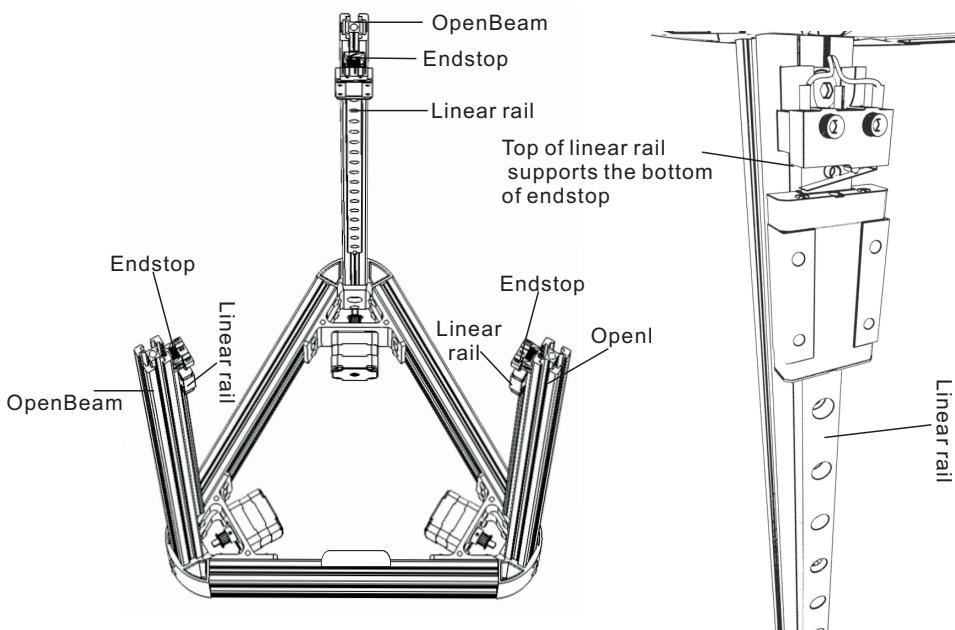


Figure6. 5

Figure6. 6

2. Fix the linear rail, like picture 6.6. Align the linear rail with the top of the endstop, so that it can protect the sliders from sliding out.
3. Assembly of top vertex with the frame. Put the M4\*25 screws, washers and M4 nuts in the top vertex(as picture 6.7). You shouldn't turn them so tightly. These screws are for adjusting the belt tightness and limitation of the top vertex. Then put the M4\*10 screw and square nut on, but not turn tightly.(as picture6.8)

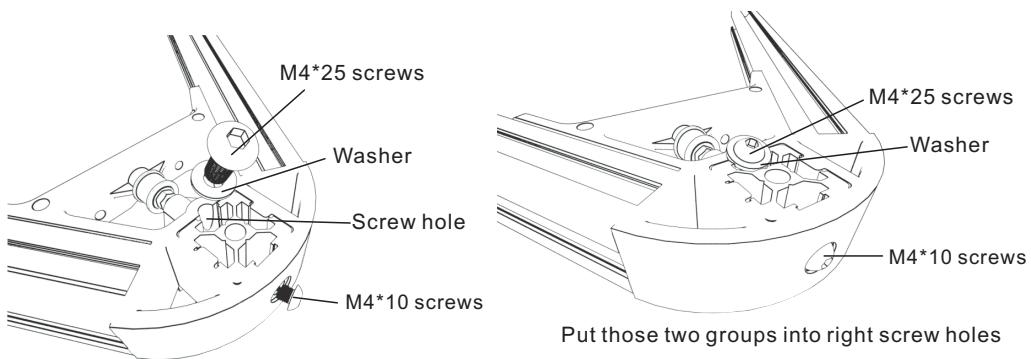


Figure6. 7

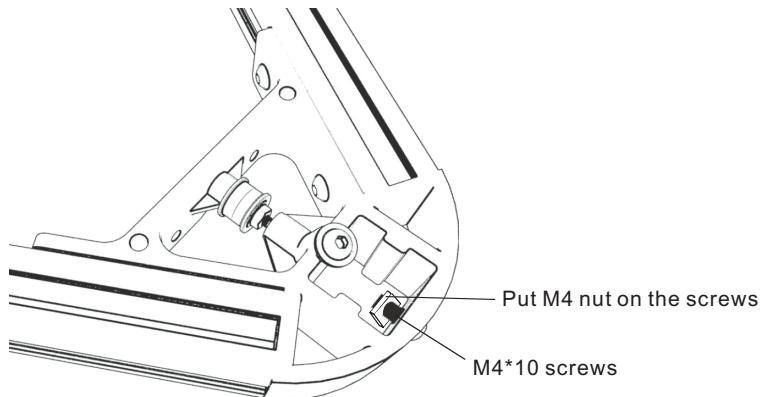


Figure6. 8

Slip the OpenBeams into the 3 top vertexes at same time, then tighten the screws in the flank of the top vertexes. (As picture 6.9).

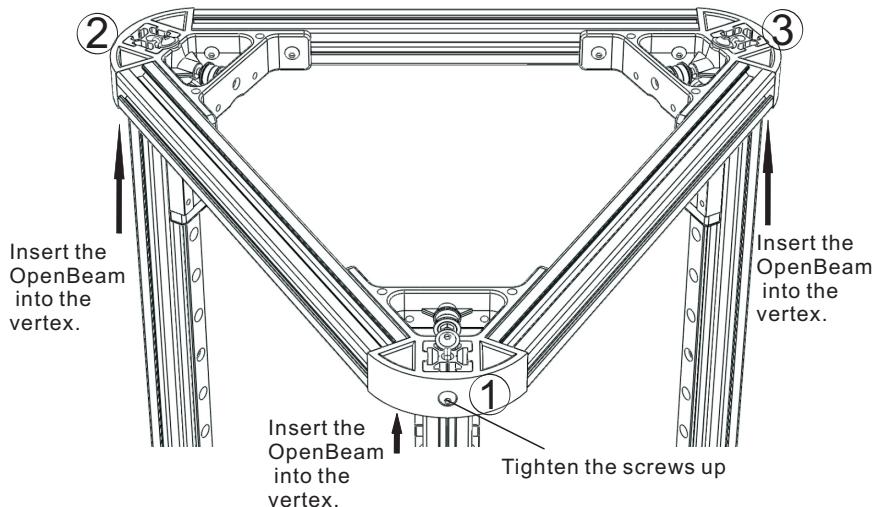


Figure6. 9

## (2) Assembly of the belt connector pieces

Keep the 4 holes in the belt connector pieces with the holes corresponding in the slider of the linear rail. Then fix them with M3\*12 screws (Like picture6.10). Attention to prevent falling of the print head. The effect picture as picture6.11

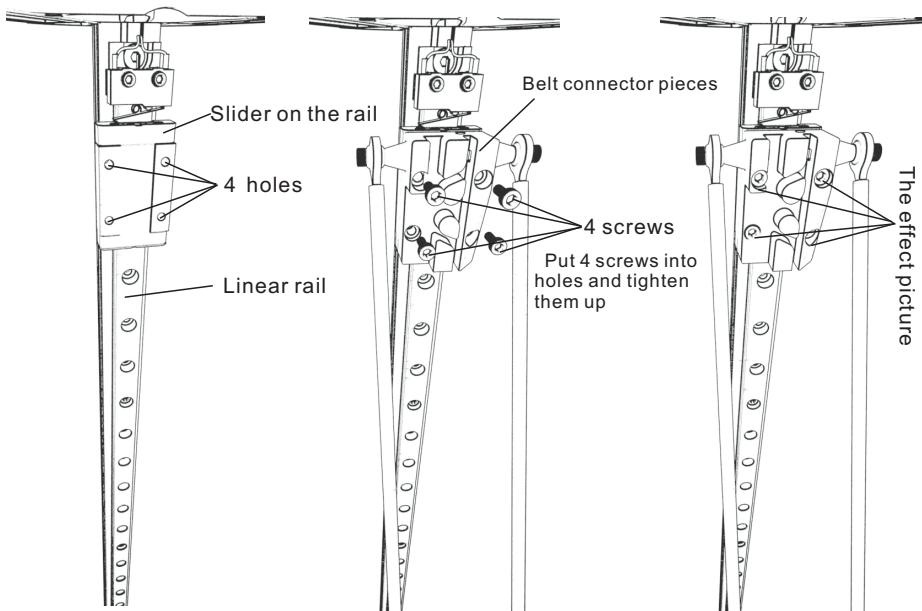
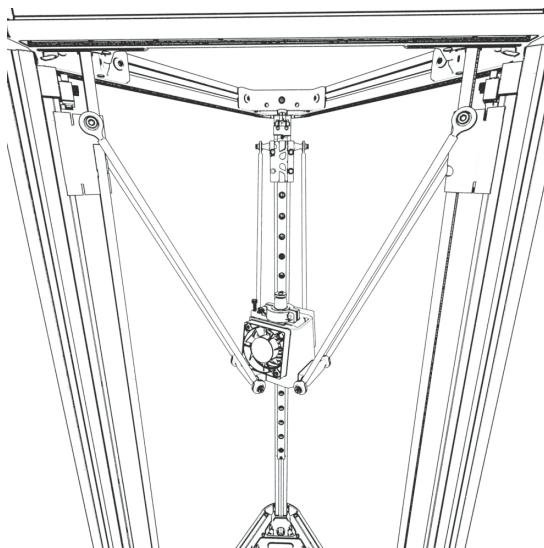


Figure6. 10



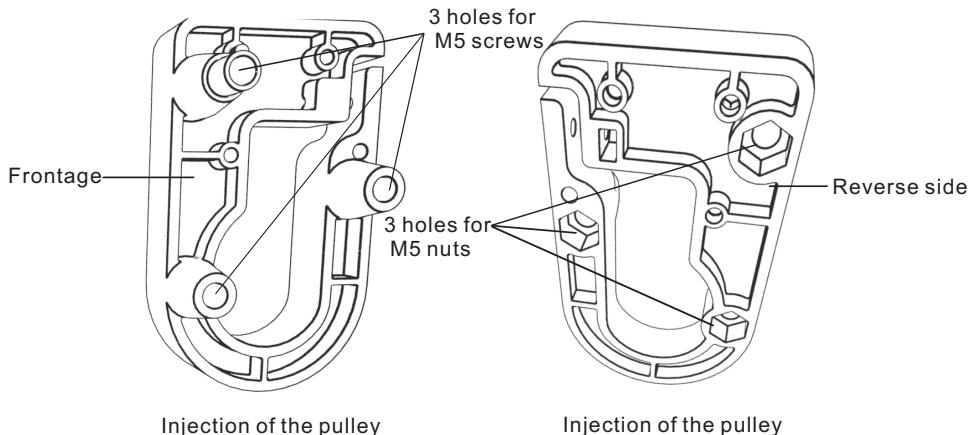
the final effect picture

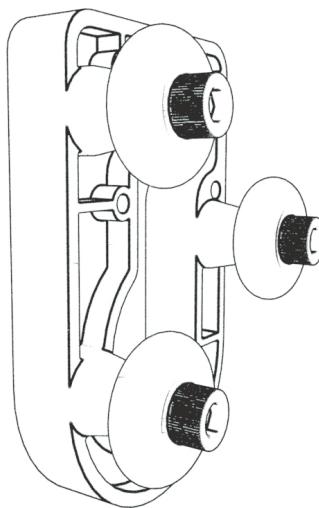
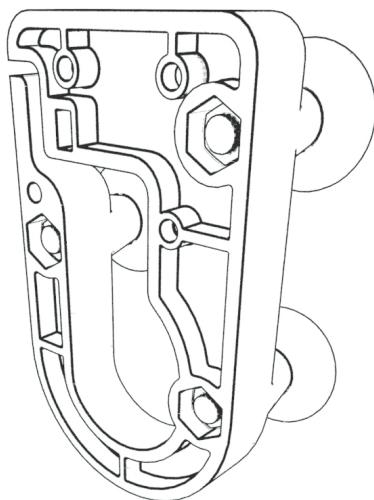
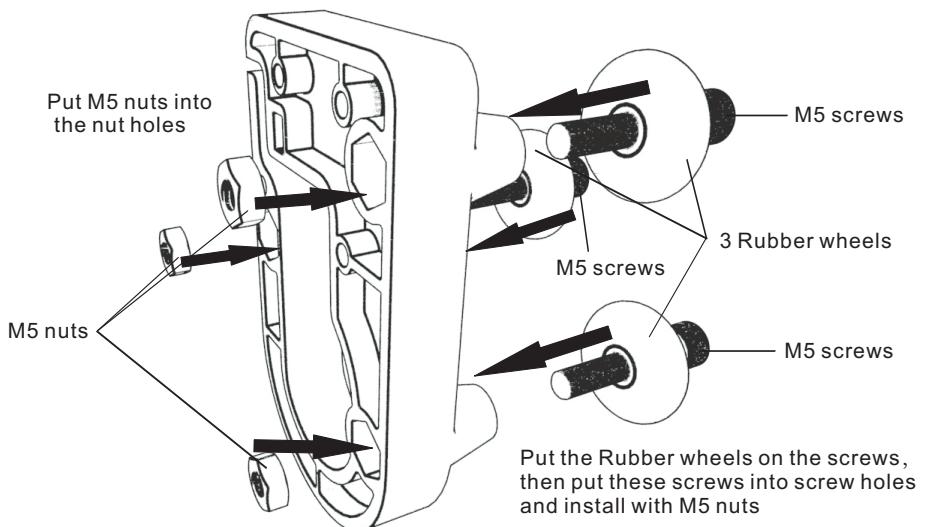
Figure6. 11

## 【2】 Pulley type (assembly of the slider)

Materials:	Injection parts of the pulley	3
	Rubber wheel	9
	M5 nut	9
	M5screws	9
	M4 square nut	3
	M3*20 screws	3
	M3 nut	3

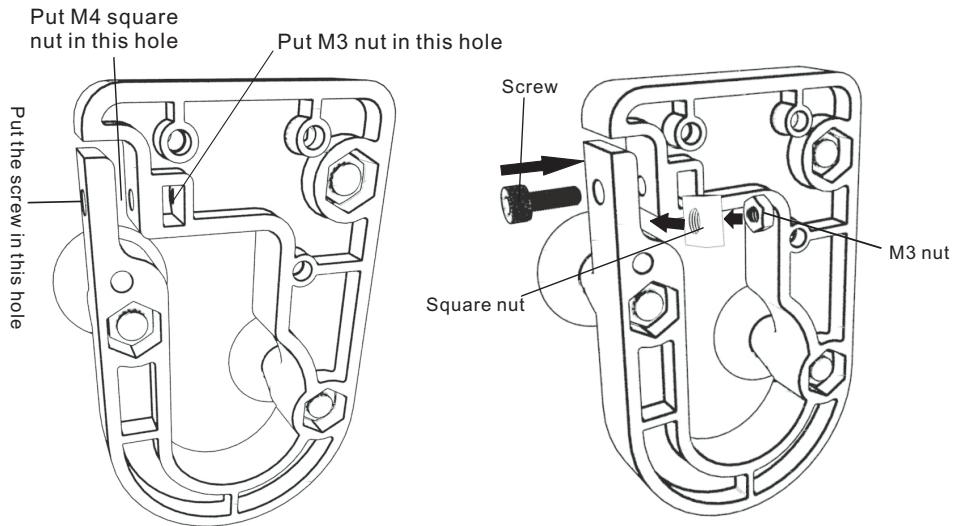
1. Firstly, put the M5 nuts into the holes for nuts in the injection part of the pulley. Then put the Rubber wheels on the M5 screws, and install these screws with the M5 nuts.(like picture1.1)



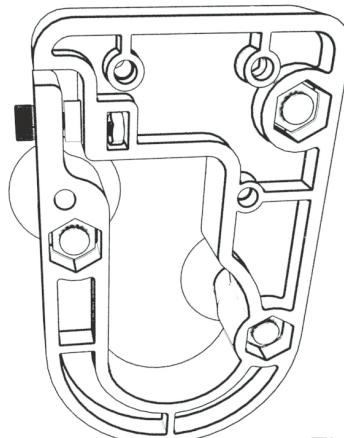


The effect picture

Put the M3 nut into the hole in the flank of the injection part of the pulley. Then put the square nut into the hole in the center. After that, install them with screws.

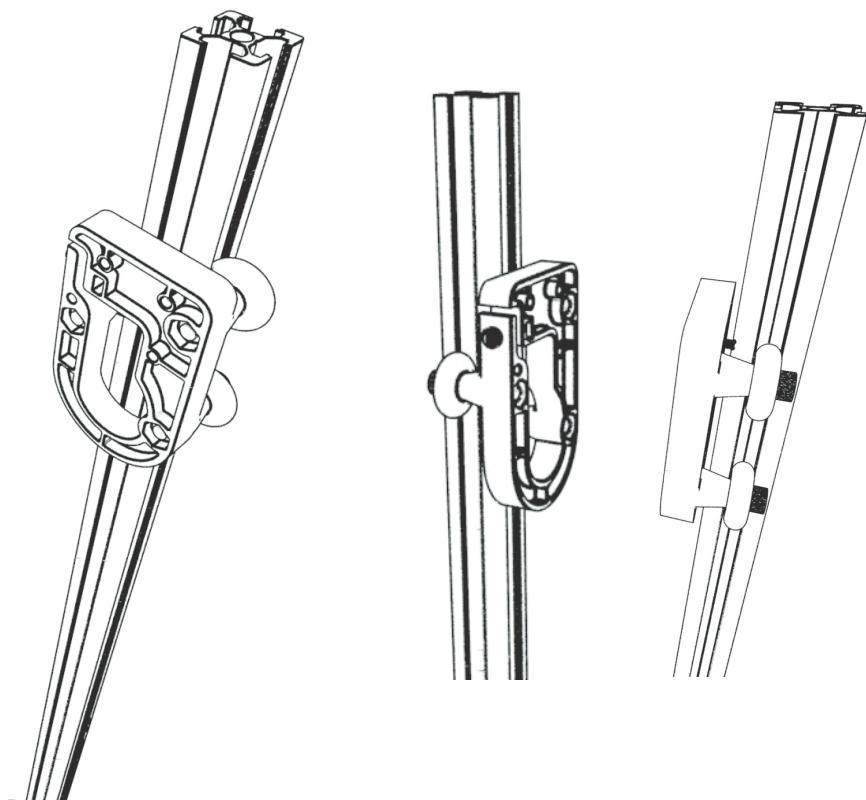


Attention: Align the M3 nut, M4 square nut and screw

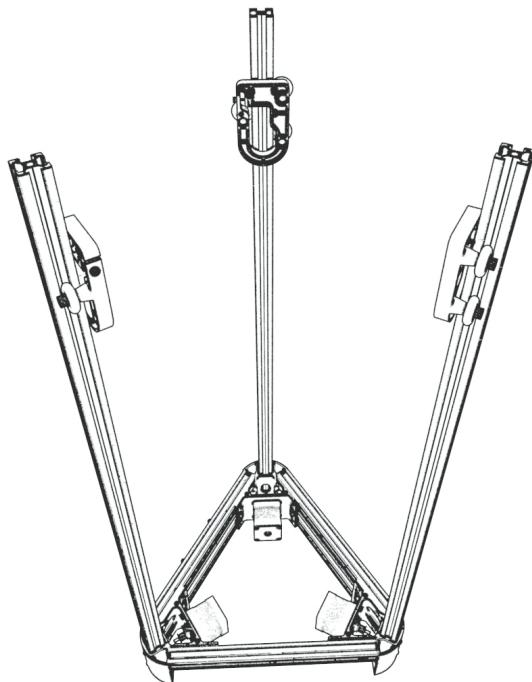


The effect picture.

Slip the assembled pulley in the slot guide in the OpenBeam. (like picture1.2)

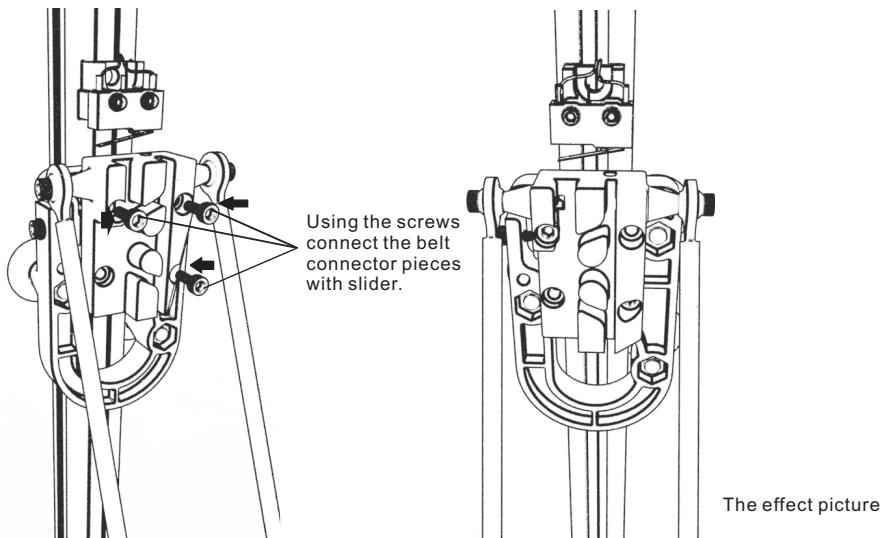


The details of partial picture



The final effect picture after assembling the 3 pulleys

The assembly of the endstop on the pulley is the same as the wire gauge type. The assembly of the belt connector pieces is also the same as the wire gauge type. Attention: Connect the belt connector pieces just use 3 screws.

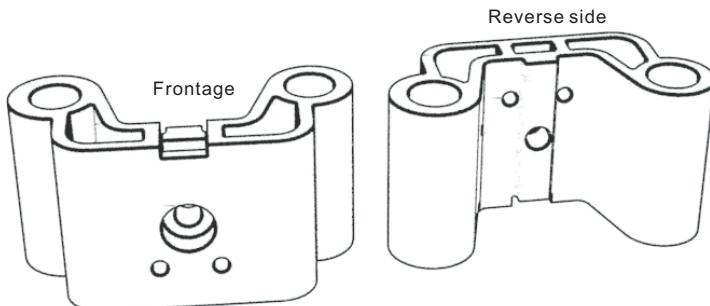


Some other assembly steps are the same as the wire gauge type.

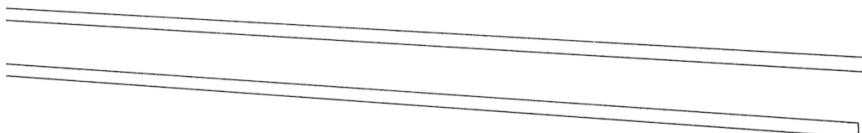
### 【3】 Optical axis type (assembly of the optical axis)

Materials : Upper fixture	1
Bottom fixture	1
Injection parts with clamping	
groove of Linear bearing	1
Linear bearings	2
Optical axis	2
M4*10 screws	2
M4 square nut	
M2.5*12screw	

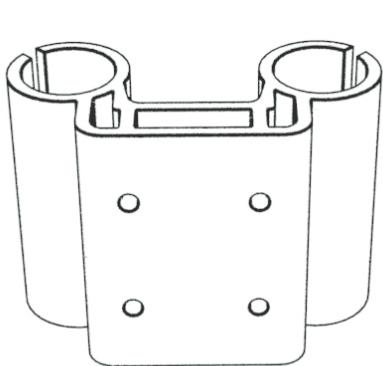
(Attention: All these materials are just one group. We need 3 groups like this.). (Like picture1.1)



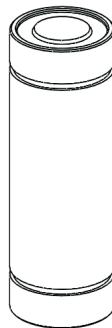
Fixtures of Optical axis



Optical axis

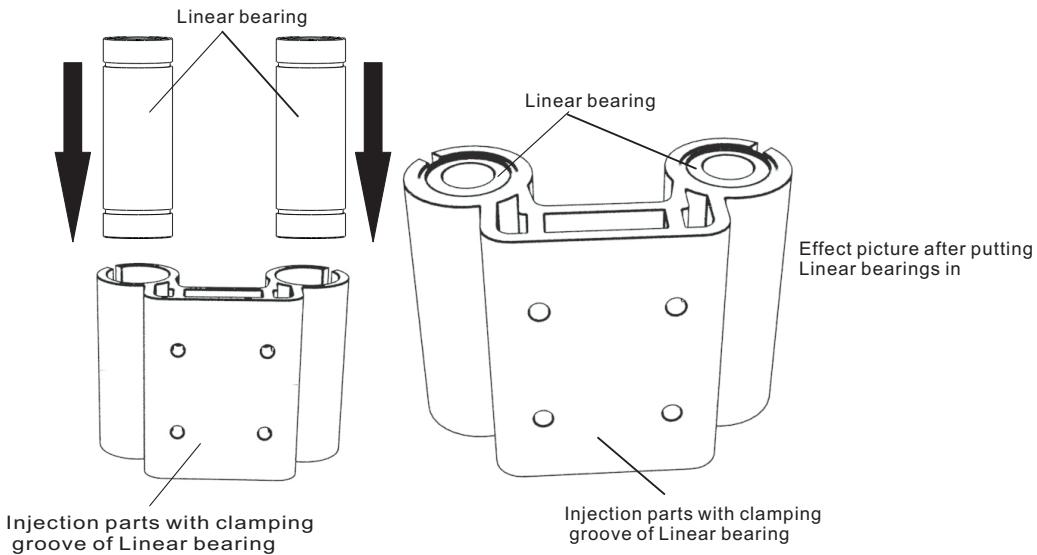


Injection parts with clamping groove of Linear bearing

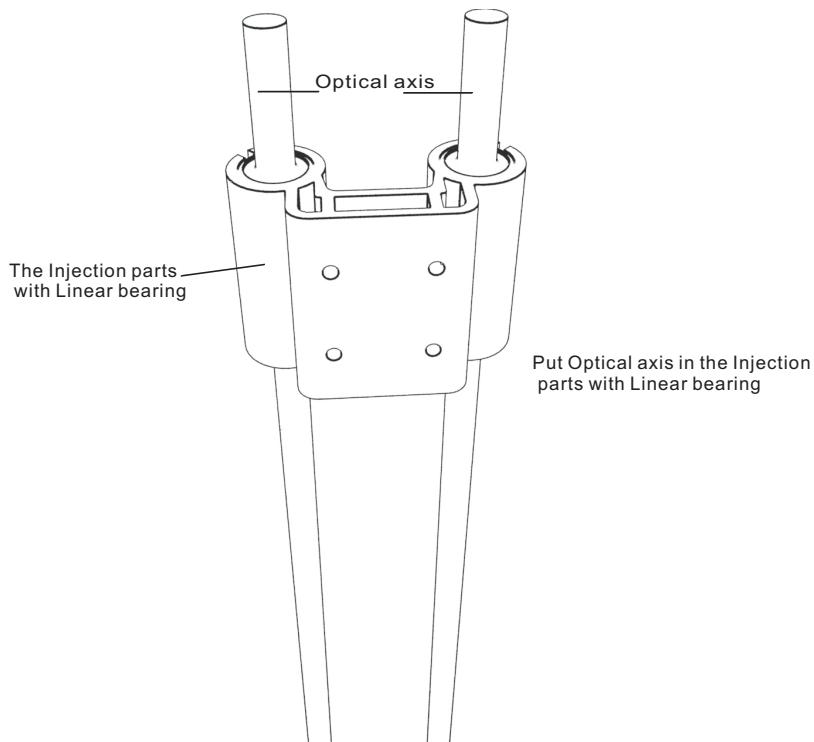


Linear bearing

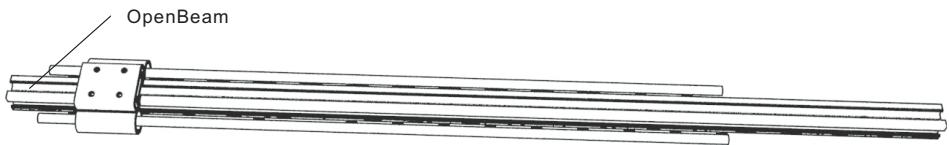
1. Firstly, put the linear bearings into the clamping grooves of the Injection part. Attention: The smooth side is the frontage. Then put the Optical axis into the Injection parts.



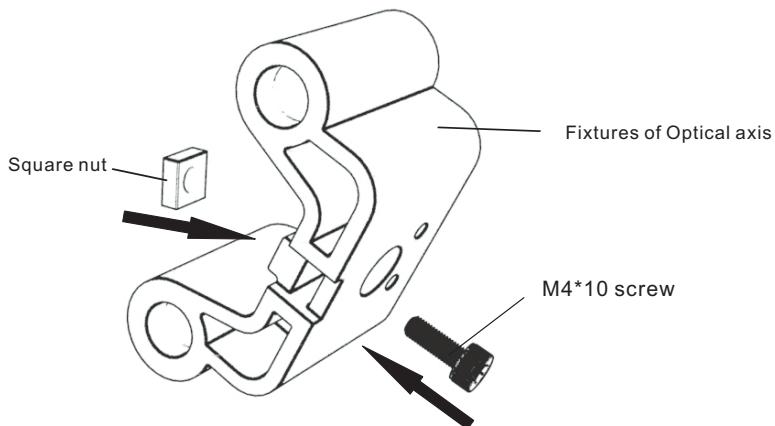
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Put this assembled part in OpenBeam, then put M4\*10 screws in fixtures of Optical axis, and fix them with nuts. (Attention to do not turn them tightly, because you should slip it into the OpenBeam. Then install the Optical axis). Finally, slip the Optical axis in Fixtures then tighten the screws up. (Like picture1.3)



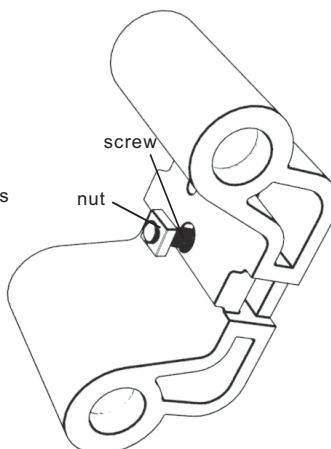
Put the assembled Optical axis in OpenBeam



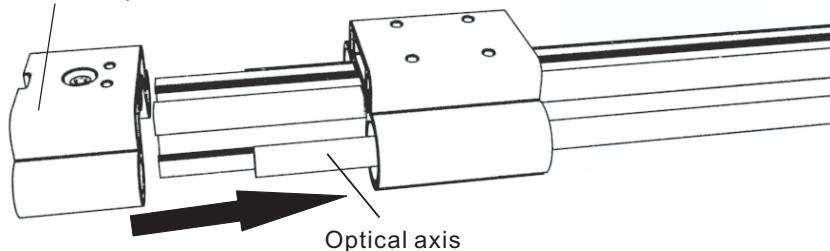
Needn't turn the screw  
so tightly with nut.  
Assembly of the 2 Fixtures  
is in the same way.

screw

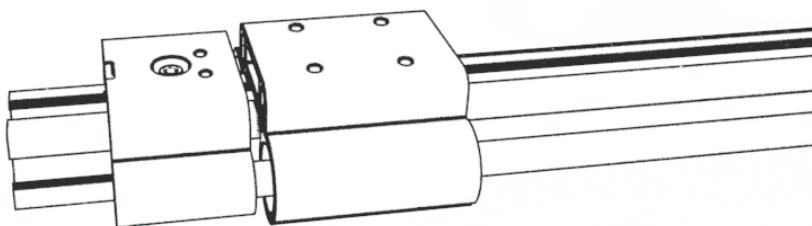
nut



Fixtures of Optical axis



Optical axis



Effect picture after fixing the screws

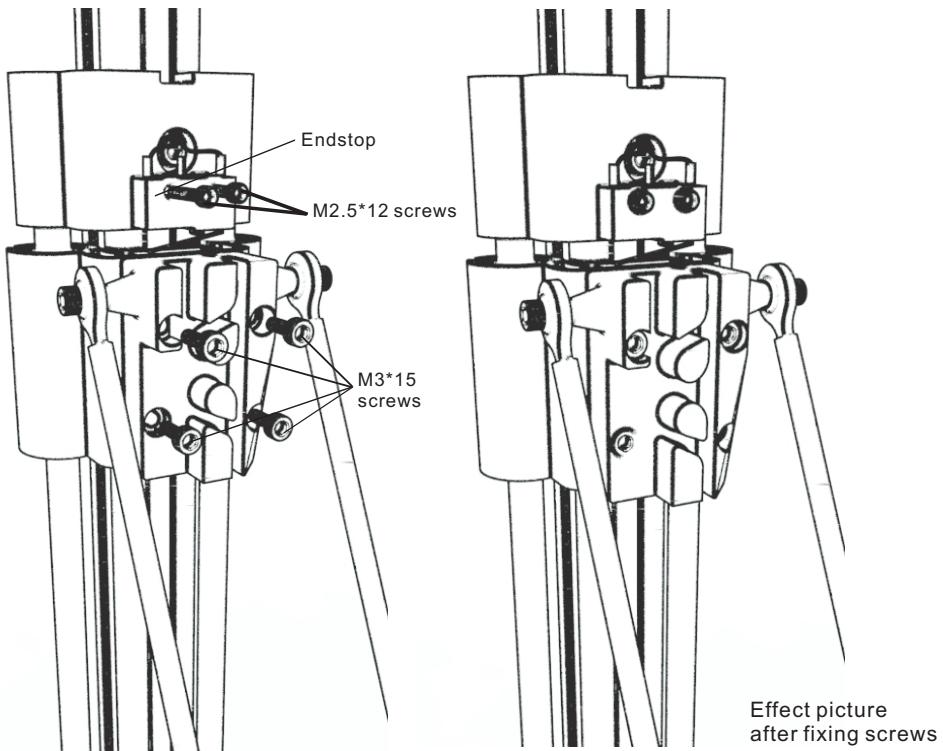
Assembly in the other side is the same as this one.

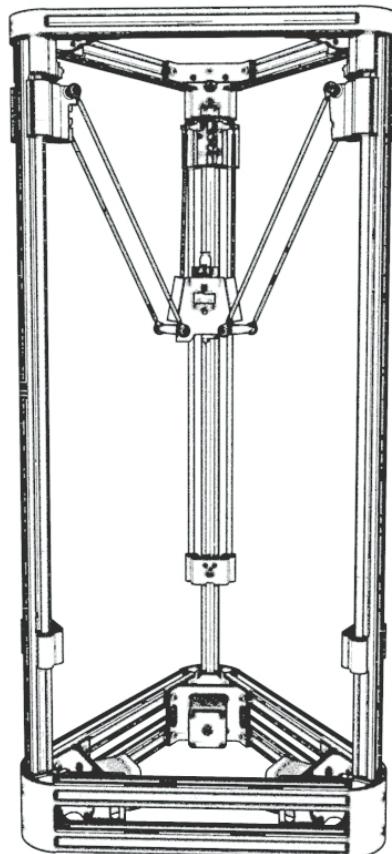


Final effect picture

(assemblies of remaining 2 OpenBeam are the same)

For connecting the Optical axis and belt connector pieces, you can install 4 M3\*15 screws in the holes of the belt connector pieces. Fix the endstop using M2.5\*16 screws. (Like this picture).





Final effect picture

Other assembly steps are the same as the wire gauge type.

### ( 3 ) Assembly of the belt

Divide the belt into 3 equal parts. Put one in the guide bearing in one top vertex (Like picture6.12) and on the synchronous pulleys in bottom vertex. (Like picture6.13). Then put the connectors on both ends on the belt connector pieces (like picture6.14). Attention: the belt shouldn't so loose. Assembly of another two vertexes is the same as this one.

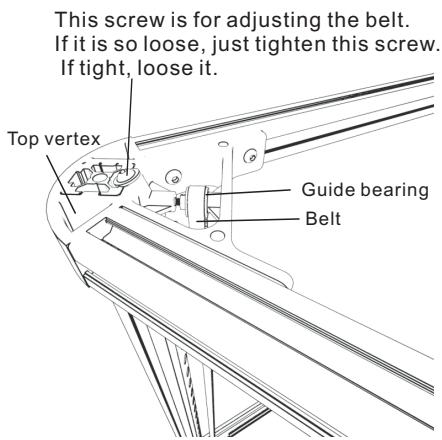


Figure6. 12

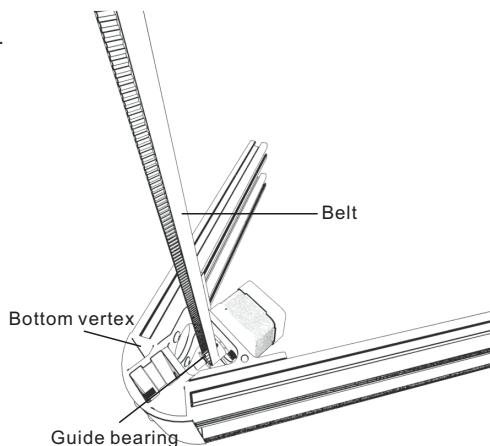


Figure6. 13

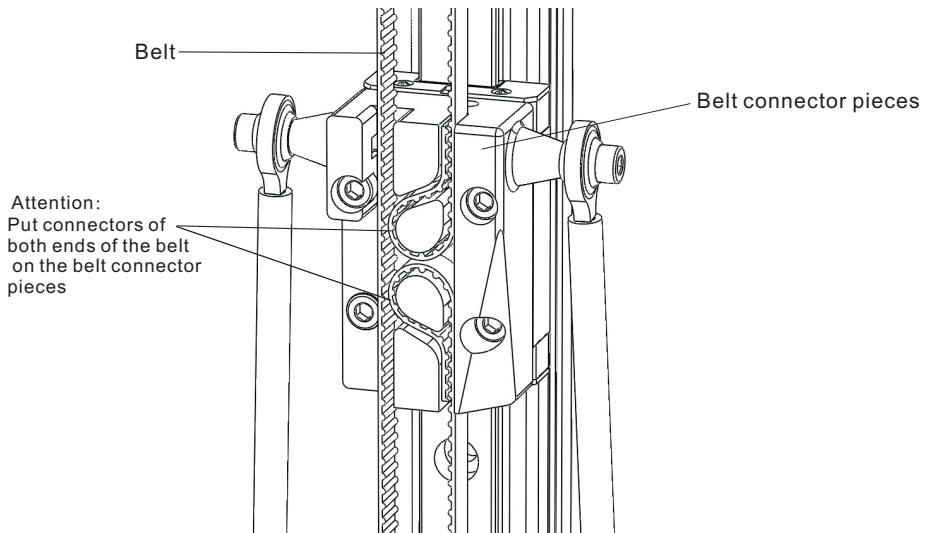


Figure6. 14

#### ( 4 ) Assembly of the wire feeder

1. Materials are in the picture6.15. Install wire feeder roll in the motor shaft of wire feeder, leaving about 2mm on the motor shaft. You can adjust the leaving distance after installing the consumable material. (Attention: ensure the groove in the wire feeder roll and the 2 holes in the frame of the wire feeder are corresponding in a straight line). Then install the frame on the wire feeder, and fix it using 3 M3\*8 screws in the screw holes. (like picture6.17)

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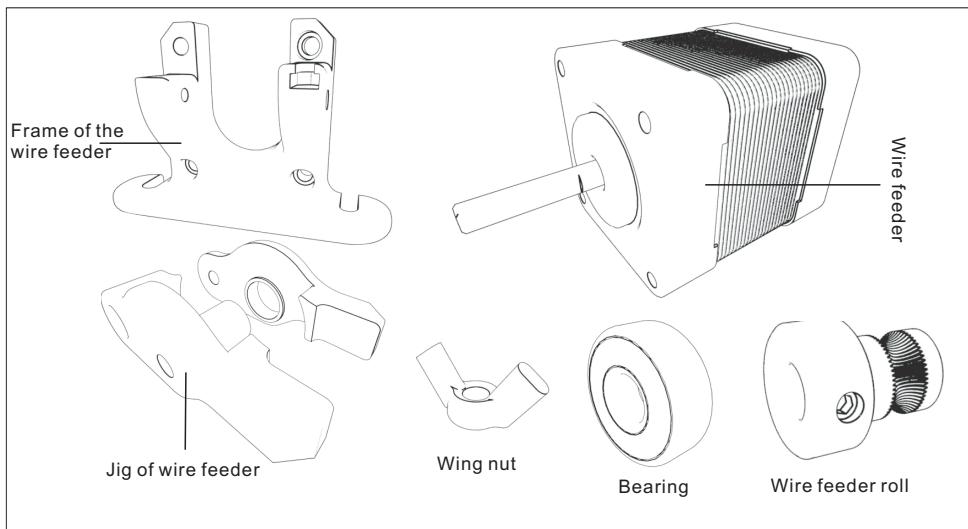


Figure6. 15

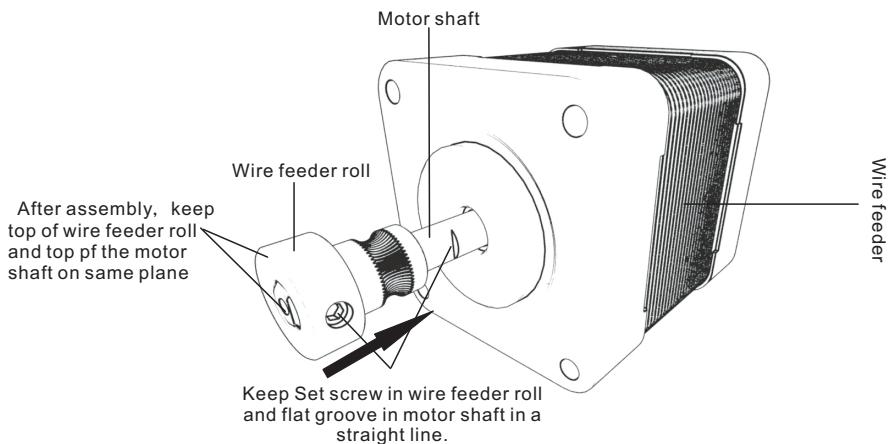


Figure6. 16

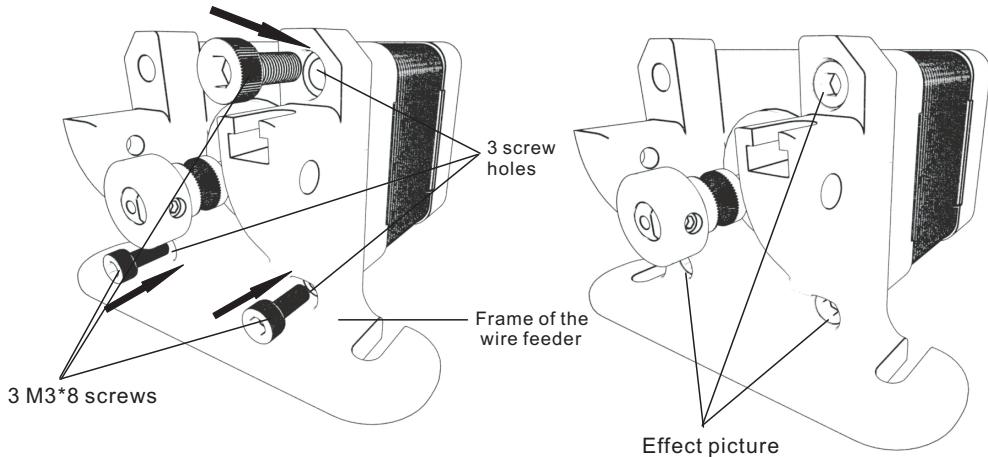


Figure6. 17

2. Install the bearing on the jig of wire feeder, then fix it using M3\*20 screws with washers and nuts. Fix the jig on the wire feeder using M3\*20 screws.(like picture6.19)

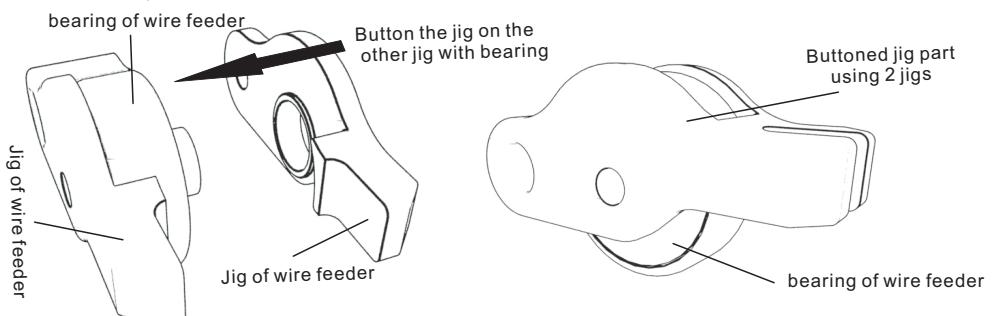


Figure6. 18

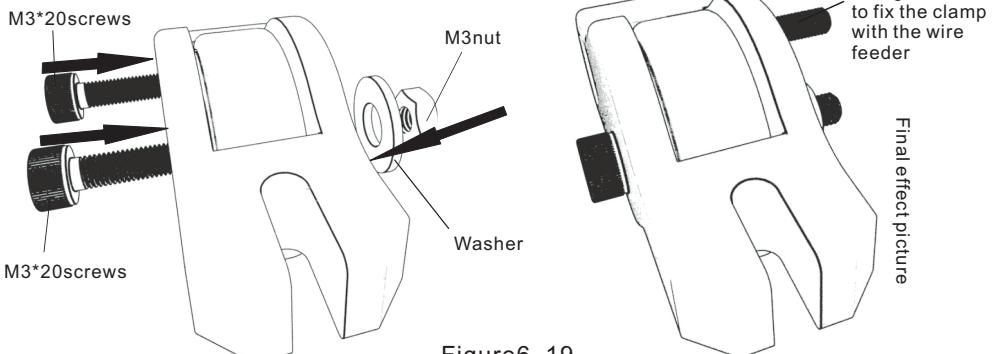


Figure6. 19

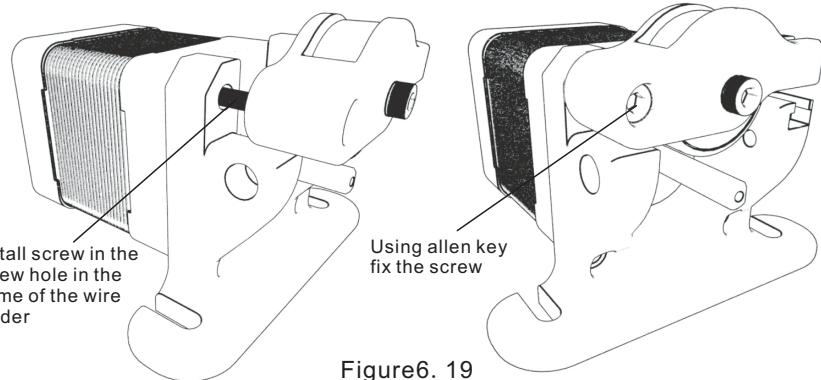


Figure6. 19

Then put the M3 nut in the frame. (Like picture6.20). Put the wing nut and the washer on the M3\*20 screw (Attention: do not slip the wing nut on the top). Then align this screw with the M3nut in the frame and fix it. (Like picture6.21)

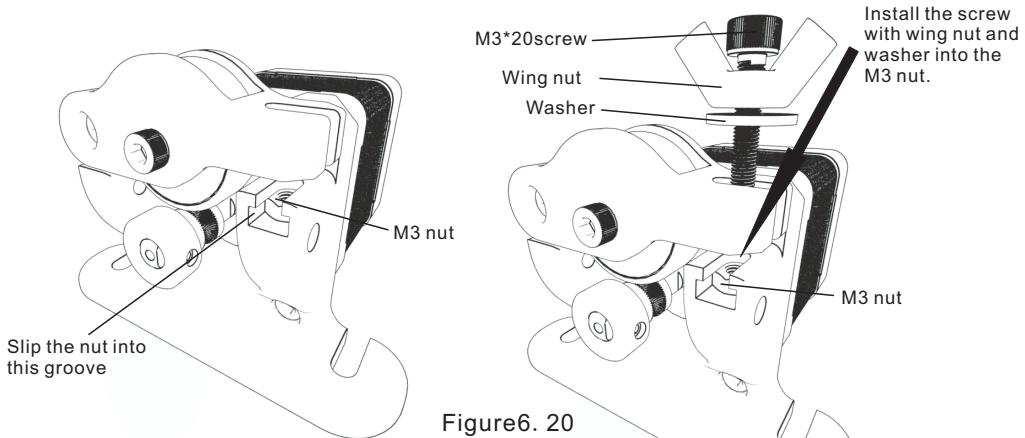


Figure6. 20

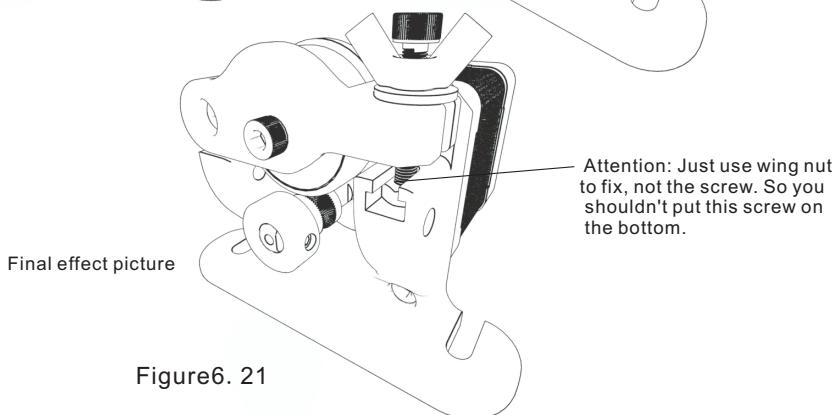


Figure6. 21

3. Install quick-acting plug in the hole. (like picture6.22). Just install it on the bottom.

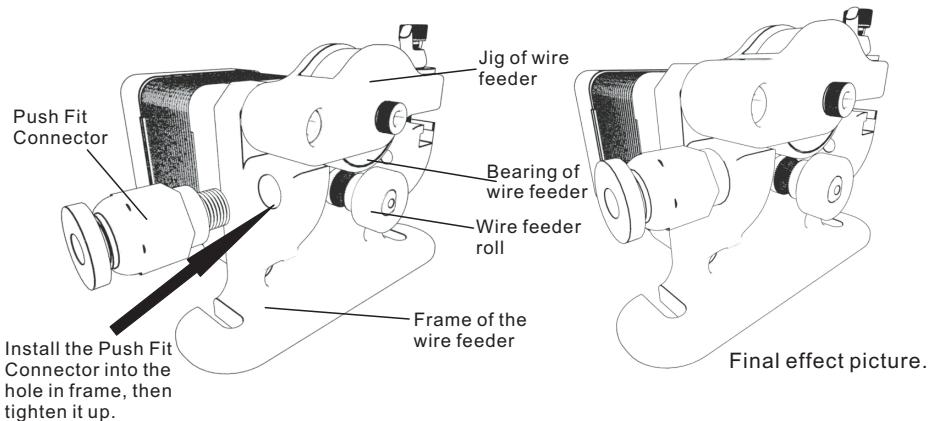


Figure6. 22

4. Put 2 groups of M4\*10 screw and M4 square nut in the holes in the flank of the jig. Then put the jig into the groove in the one of the 3 OpenBeams. (Like picture6.24). Fix it in the center of the OpenBeam. Support the wire feeder, when you fix it.(like picture6.25).

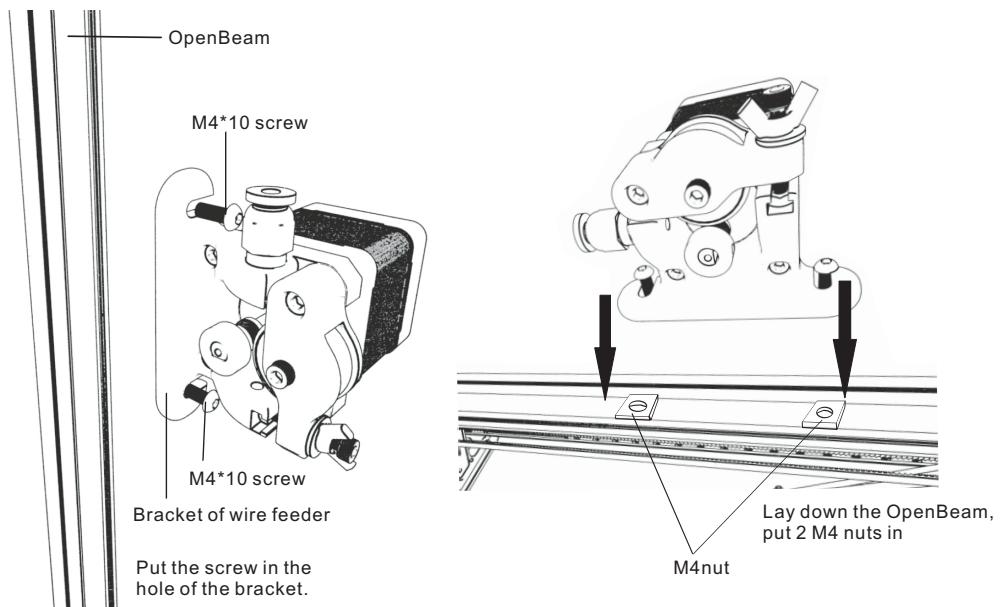


Figure6. 23

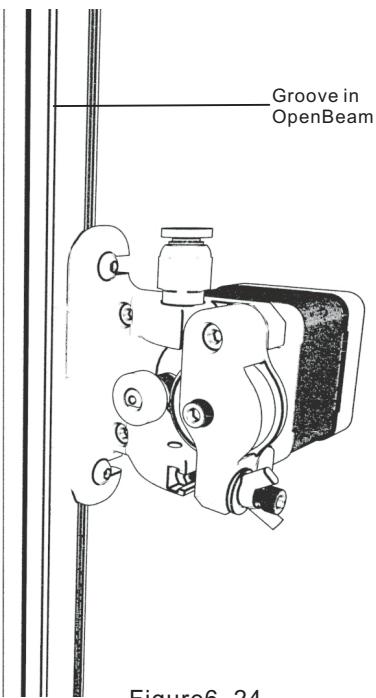


Figure6. 24

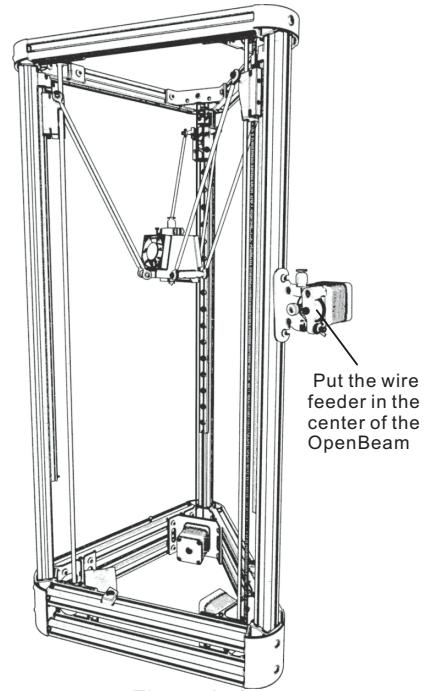


Figure6. 25

5. Then we can wrap the wire of the effector using beam-line belt(like picture6.26-6.27)

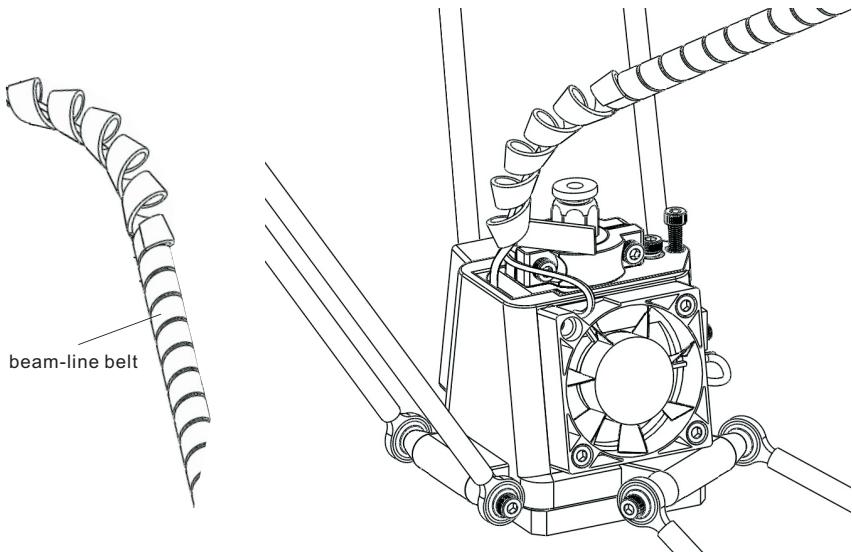


Figure6. 26

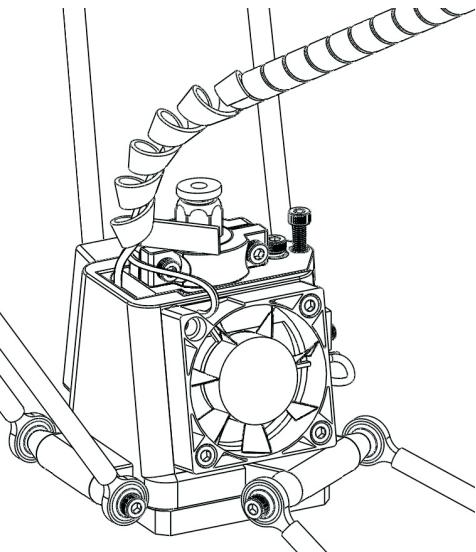


Figure6. 27

## ( 5 ) Assembly of the material feed tube and the PLA

1. Put the material feed tube (PTFE tube) in the Push Fit Connector of the wire feeder (like 6.28). And the other end in the Push Fit Connector of print head.(like picture6.29).

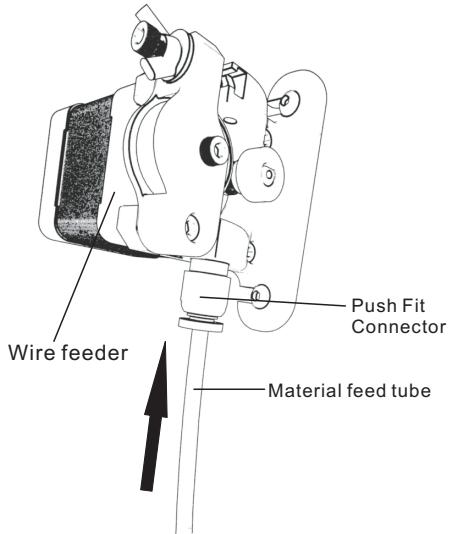


Figure6. 28

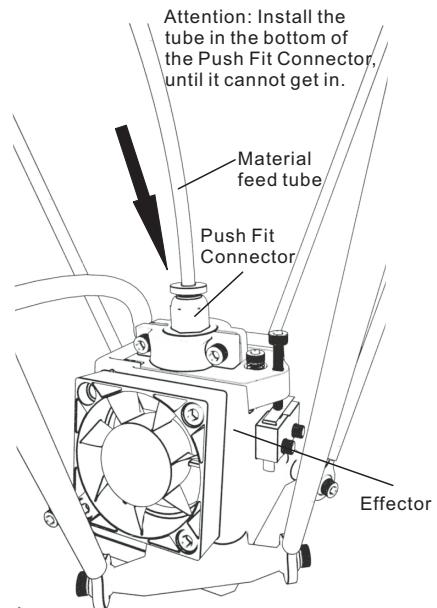


Figure6. 29

2. After that, put the PLA into the hole in the bottom of the print head, then get through the wire feeder roll. (like picture6.30). Then pass the Push Fit Connector to the material feed tube. Then turn the wire feeder roll to get the PLA into the print head, until it cannot get in. (like picture6.31). PLA can get the place above the Push Fit Connector on the print head about 50mm.

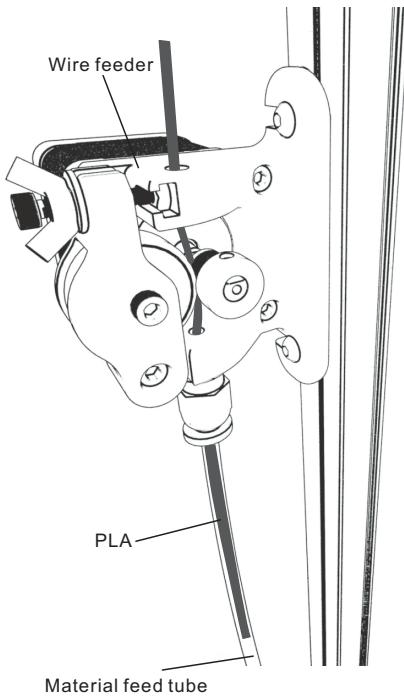


Figure6. 30

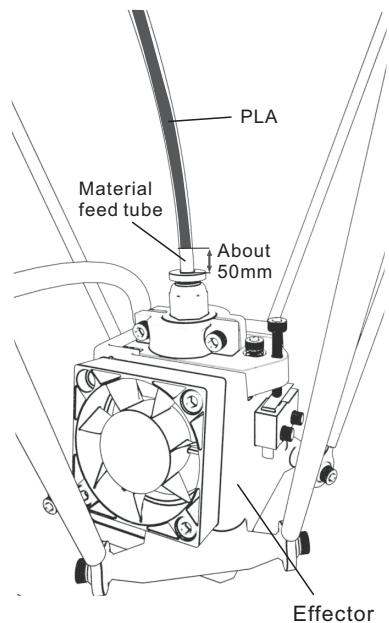


Figure6. 31

## 七、Assembly of circuit

### (1) Assembly of LCD screen

1. Material : Bracket of the LCD screen, housing of the screen, 4 M3\*8 screws , 2 M4\*10 screws, 2 M4 square nut

Install the bracket on the LCD screen. (like picture7.1)

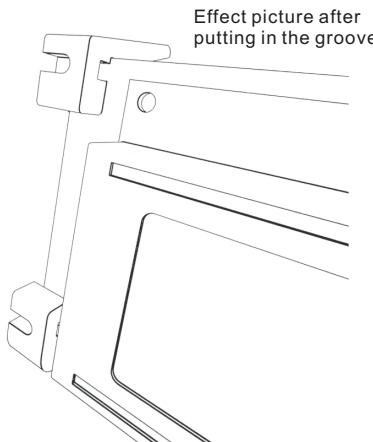
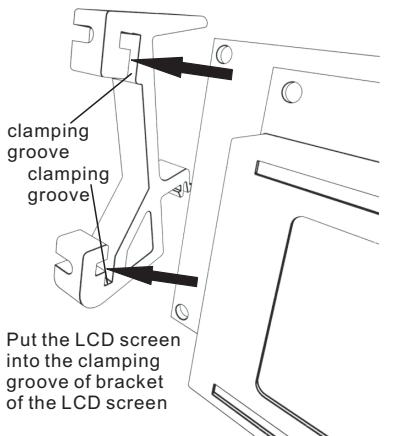
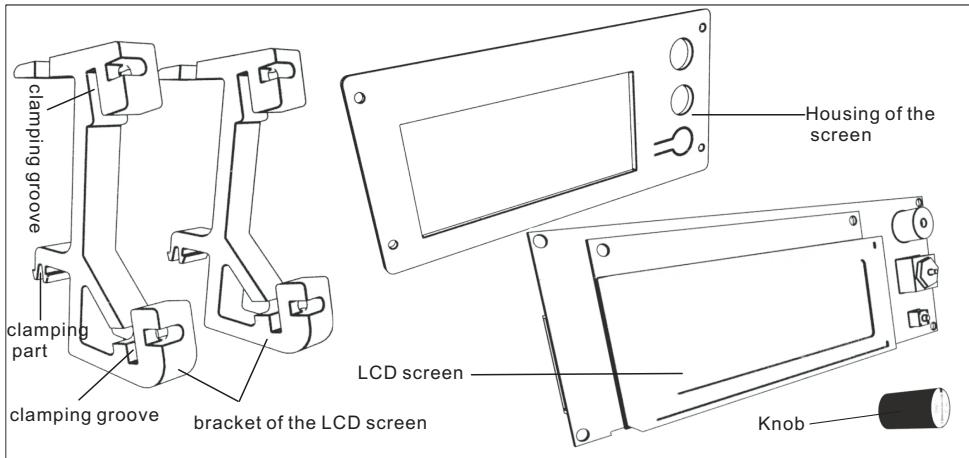


Figure7. 1

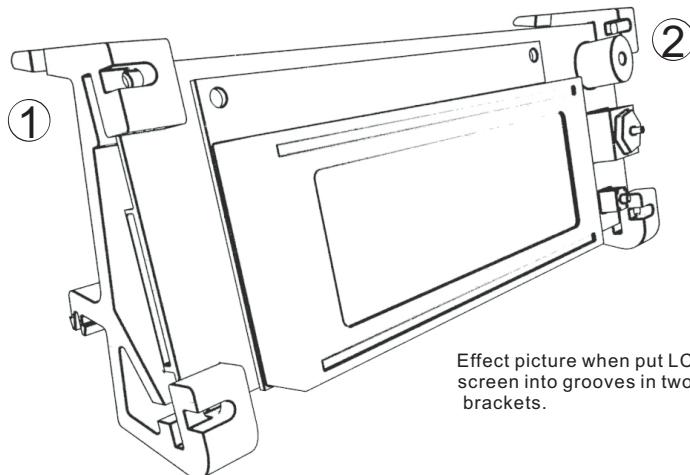


Figure7. 1

2.Put the clamping part of the bracket of the LCD screen in the fame of the bottom vertex.(like picture7.2)

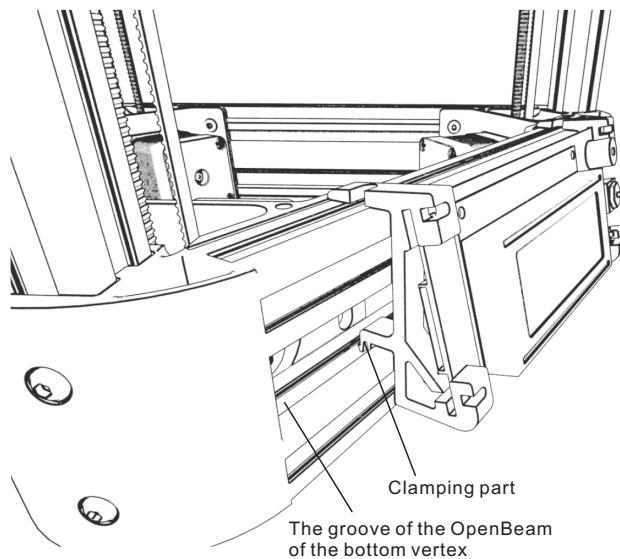


Figure7. 2

3.Assembly of the Housing of the screen. Fix the housing on the LCD screen using M3\*8 screws. (Like picture7.3). Then install the knob on the LCD screen (like picture7.4). the final effect picture like picture7.5

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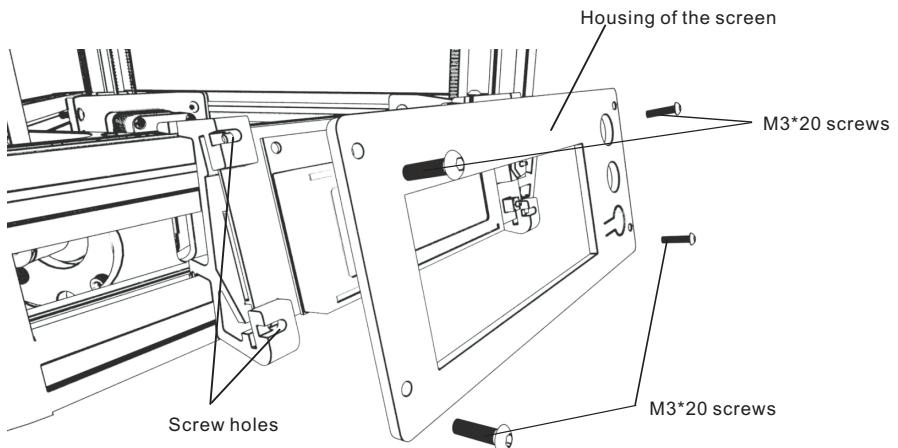


Figure7. 3

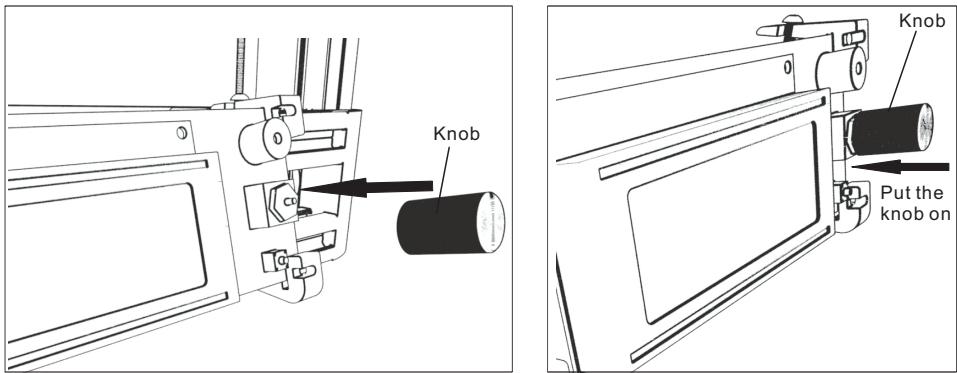


Figure7. 4

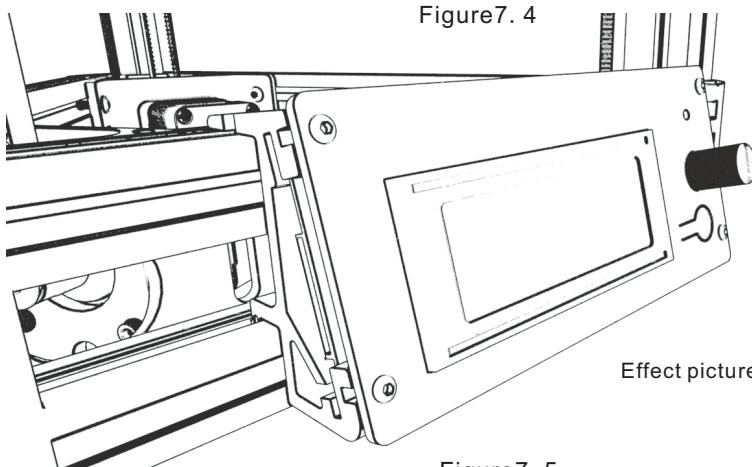


Figure7. 5

4. Put the M4 square nut in the bottom hole in the bracket on the bottom vertex. (Like picture7.6). Then put M4\*10 screws in the right holes, tighten them up.(like picture7.7)

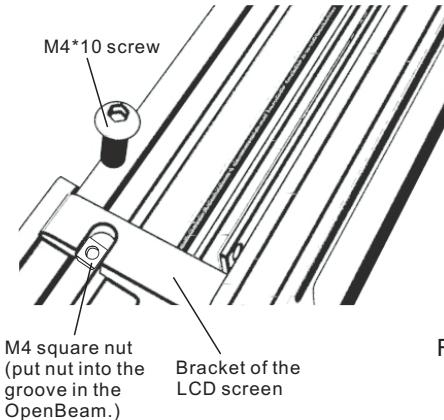
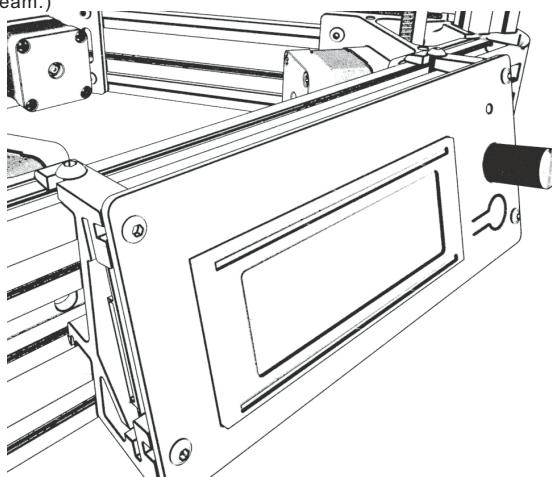
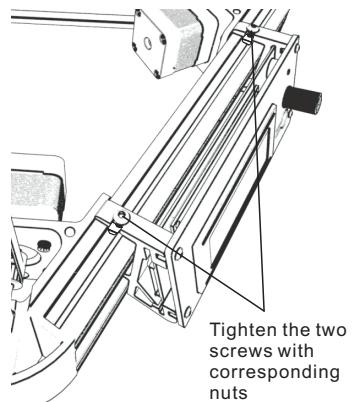


Figure7.6



The effect picture  
(Fix the screen on the OpenBeam).

Figure7.7

## (2) Assembly and wiring of the control board

1. Material :M2.5 allen key, acrylic back cover, 4 M3 nuts, 4 M3\*8 screws
2. Assemble the control board on the bracket. Align the control board to the hole in the bracket. Then fix it using M3\*8screws and M3 nut.(like picture7.8)

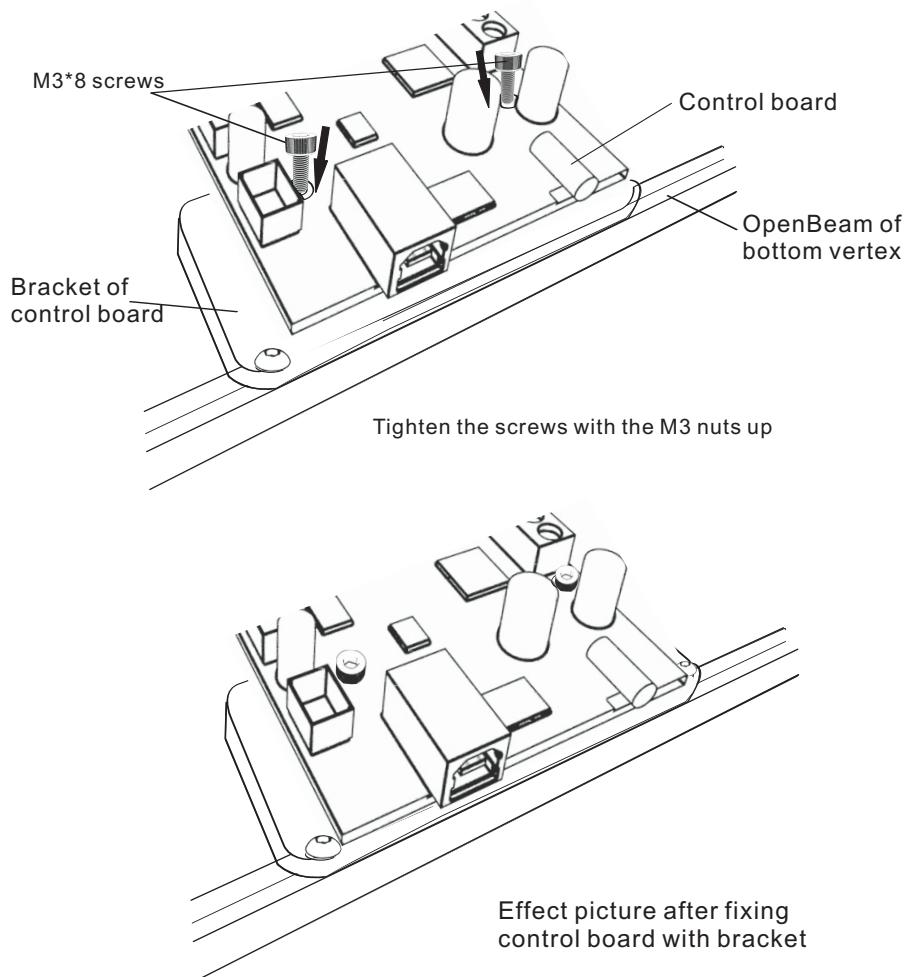


Figure7.8

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3. Assembly of the back cover. Need 4 M4 square nuts and 4 M4\*8screws. Put the 4 M4 nuts into the groove of the bottom vertex (like picture7.9). Then put on the back cover on. Align the nuts with the holes in back cover, then install the screws.(like picture7.10)

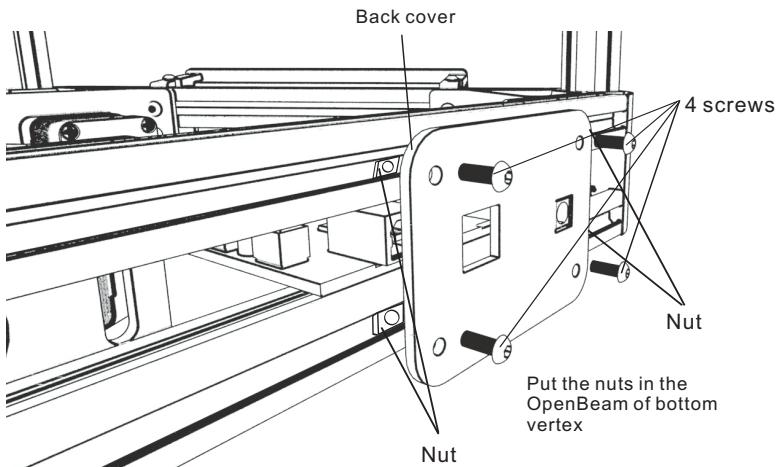


Figure7.9

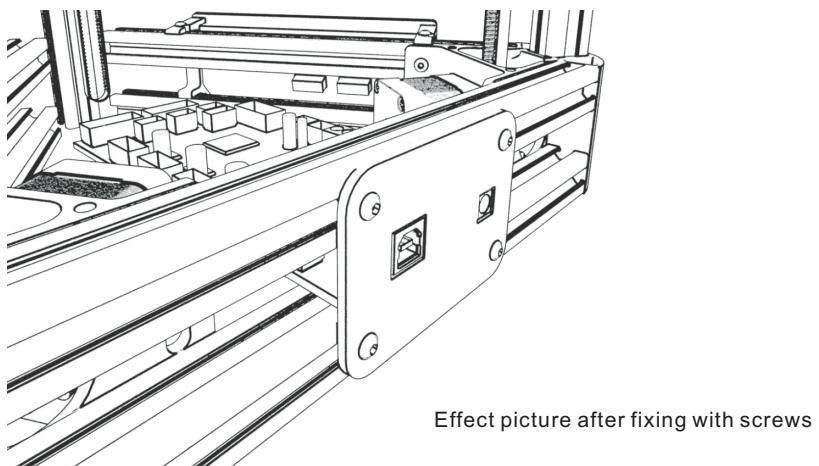


Figure7.10

4.Wiring the endstop and the motor. Firstly, we name the 3 motors as X-axis, Y-axis and Z-axis in anti-clockwise. (like picture7.11). So the endstop is also named as X-axis limit switch, Y-axis limit switch and Z-axis limit switch. On the control board, the interfaces with red, blue, green and black are respectively correspond the X-axis, Y-axis, Z-axis and E. Then insert the wires of the motors in 3 axis insert in the corresponding interfaces and Insert the wire of extruder in the E interface. The interfaces nearby the E interface insert the corresponding wires of the endstop. The corresponding way just like the interfaces on the control board.

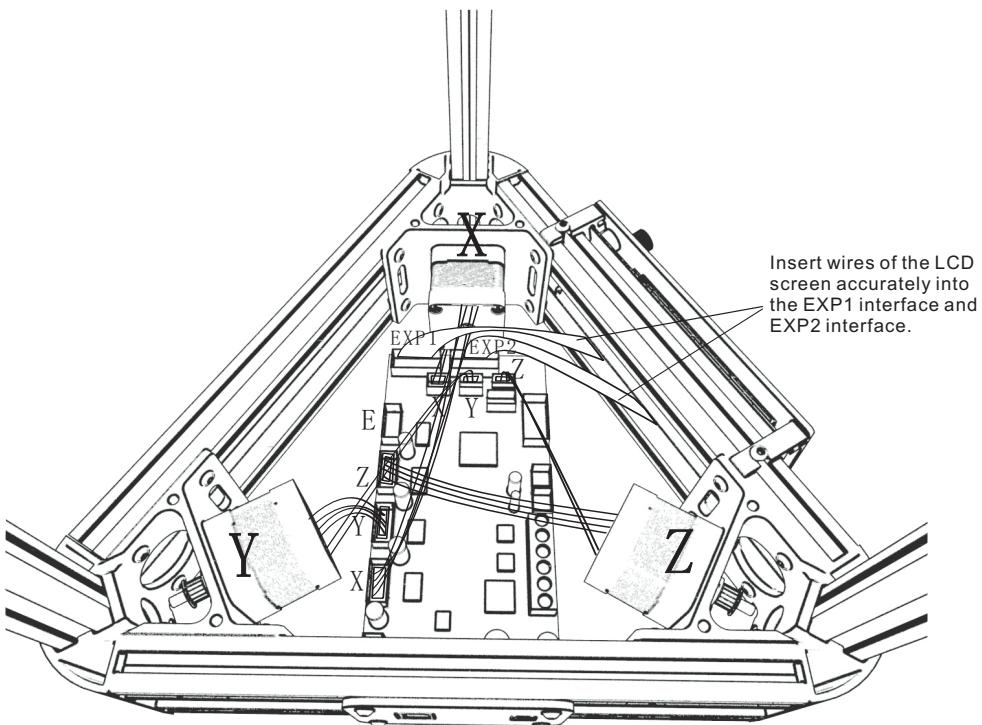


Figure7.11

5.Next, wiring wires as picture7.12

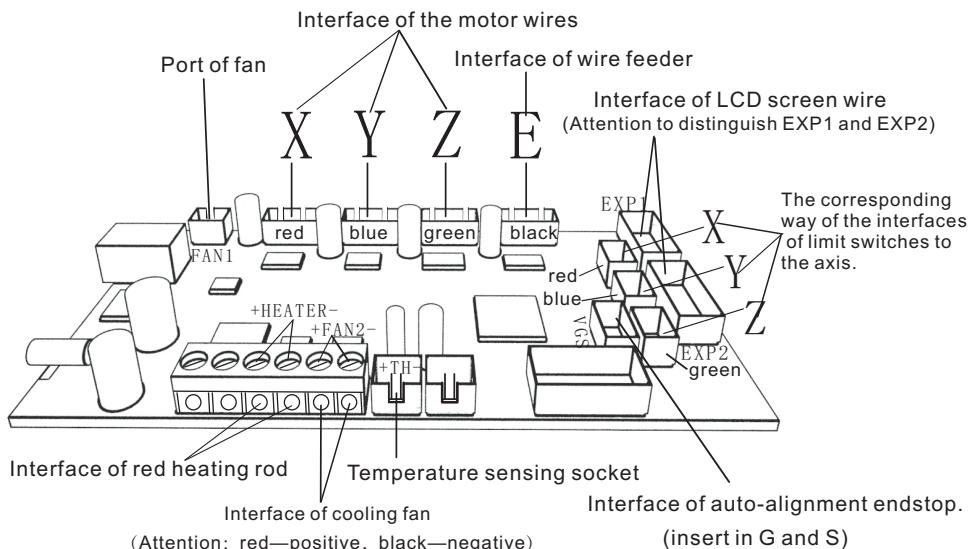
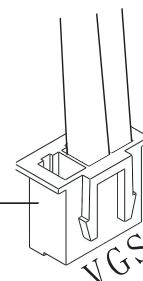


Figure7.12



Partial picture

Figure7.13

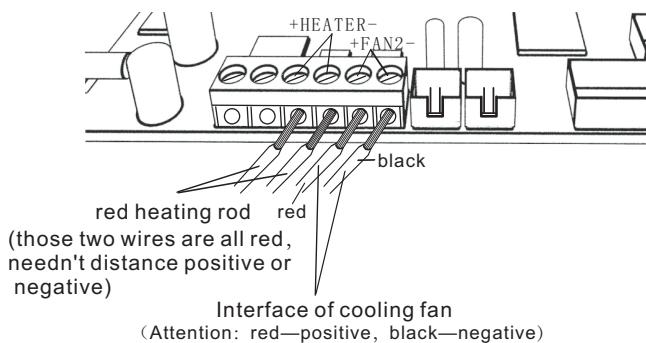
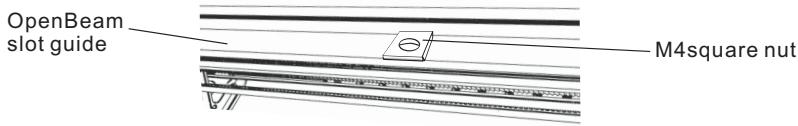


Figure7.14

- 6.Insert auto-alignment endstop wire。 Insert the only black wire with auto-alignment plug in the auto-alignment jack on the control board. In this jack, marked with VGS. We should put it in GS, leaving the V empty.(like picture7.13)
- 7.The white wire in remaining wire is the heat wire. Insert it into the second frequency hole marked TH on the control board.
- 8.Wiring the fan. The two groups with black wire and red wire are the fan wire. Insert one group wires with second frequency plug in the second frequency jack marked FAN1. Insert the remaining wires in the holes marked FAN2 in the control board(Attention: red—positive, black—negative).(like picture7.14)
- 9.Wiring the heating rod. Leaving two red wires, these two wires needn't distance positive or negative. Insert them in the jack hole marked HEATER in the control board.
- 10.Wiring LCD screen. Insert these two wires into the jacks marked EXP1 and EXP2, corresponding the name of the wires.

## 八、Assembly of the print platform

We should do this step after Assembling of circuit. Install 3 vitreous sliders with M4\*10screw and M4 square nut, and fix it up until you adjust the slider depending on vitreous platform. The effect picture8.1.



Insert nuts into OpenBeam slot guide and screws in the slider. Fix the nuts with the screws finally.

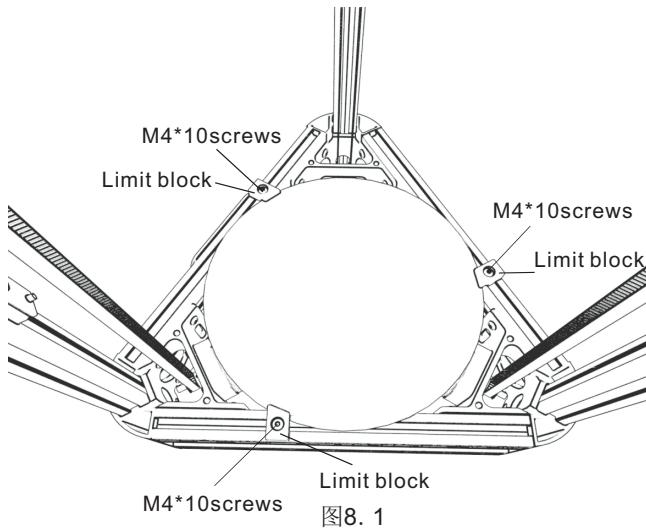
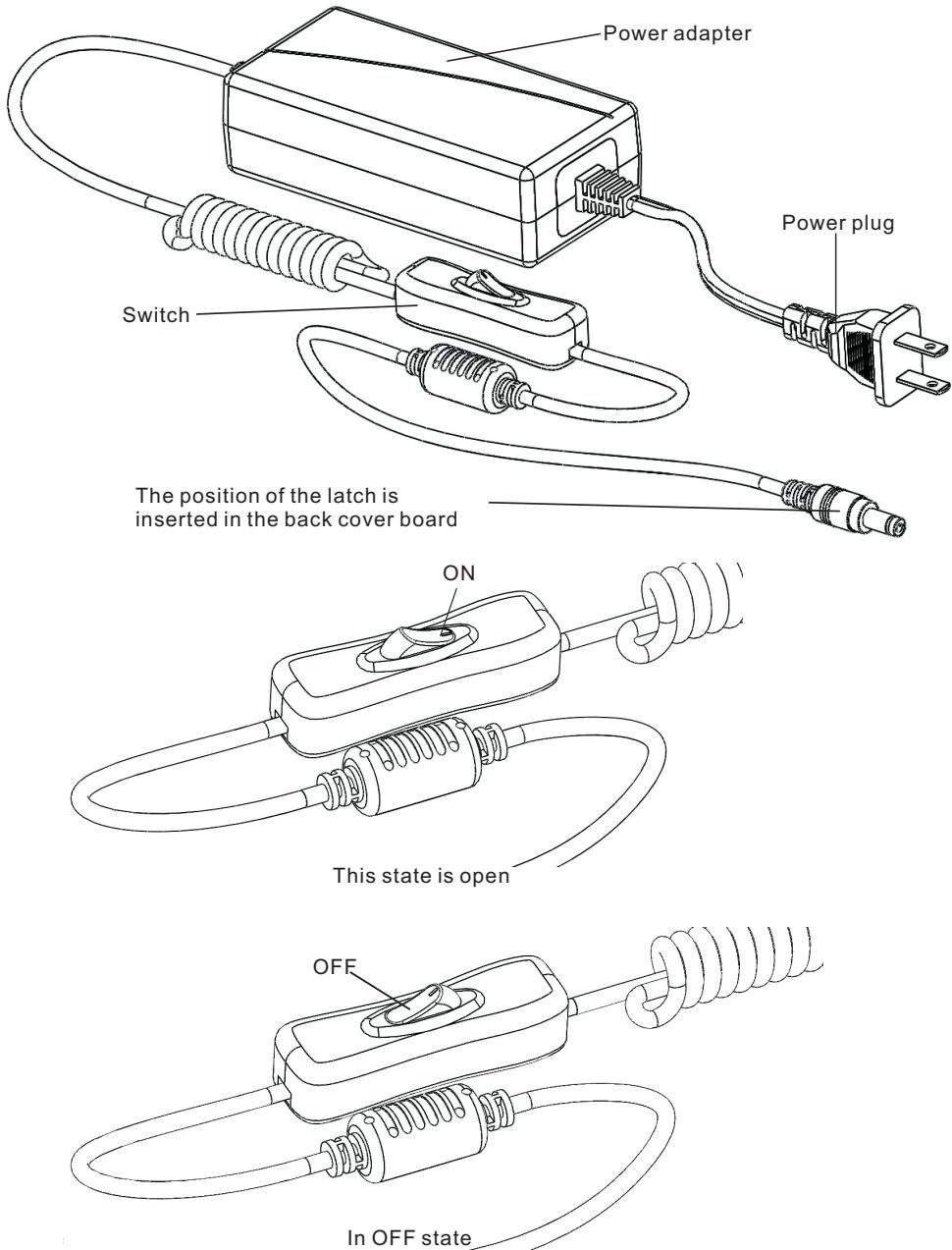
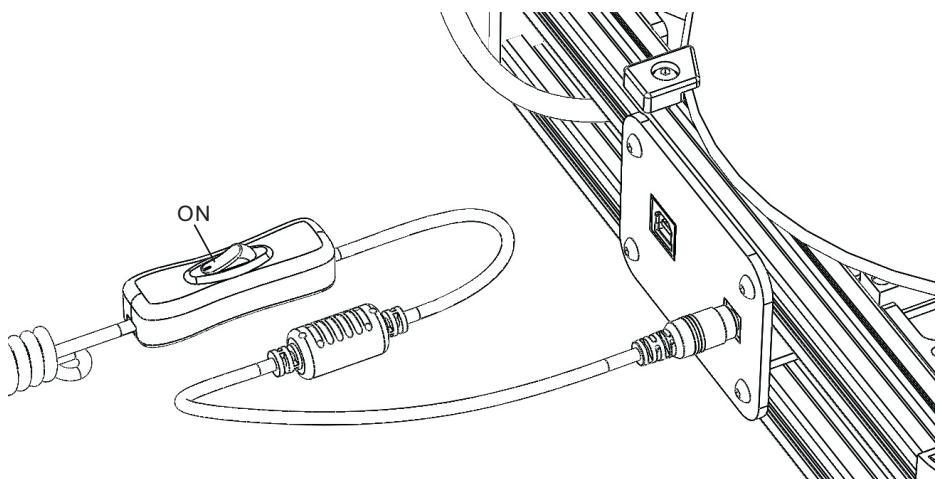
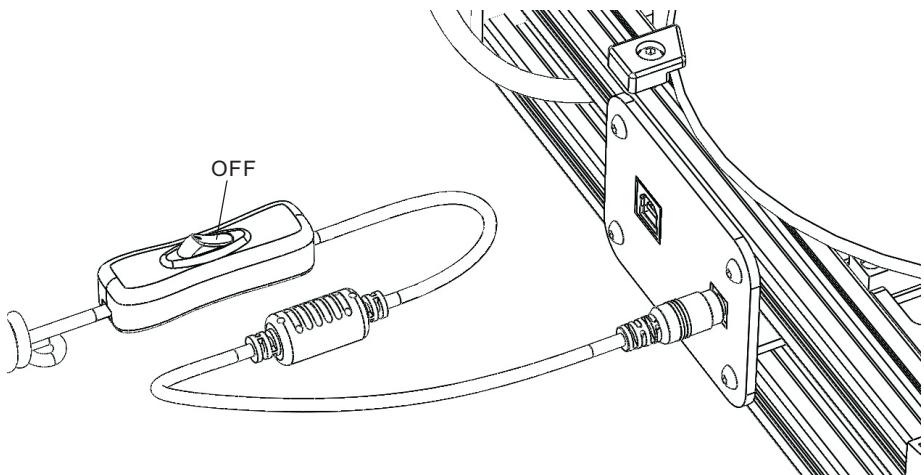


图8. 1

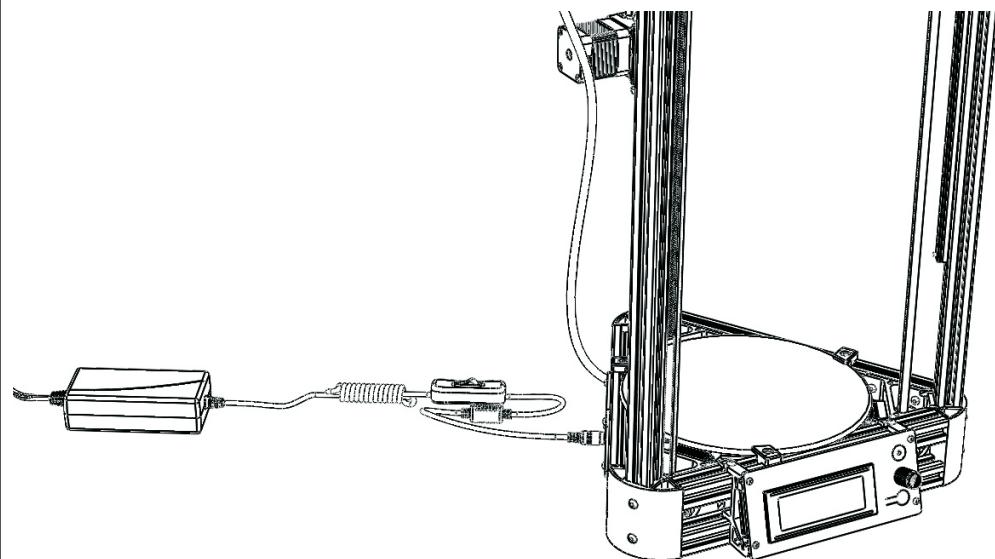
Finally, insert the wire of switch and turn on

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The effect Picture after connecting the  
switch wire and the print head.

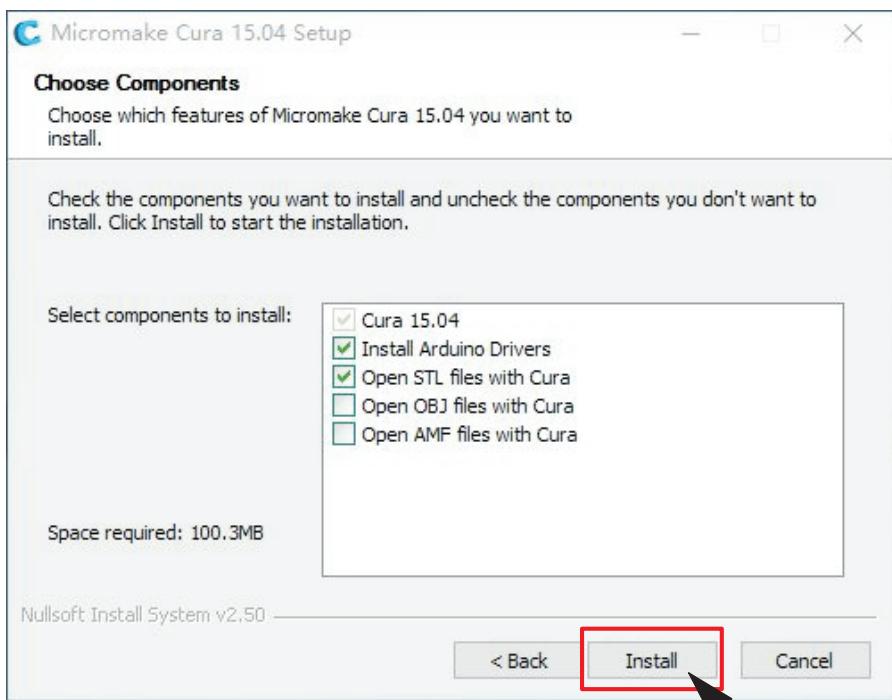


Final effect picture

# Software installation

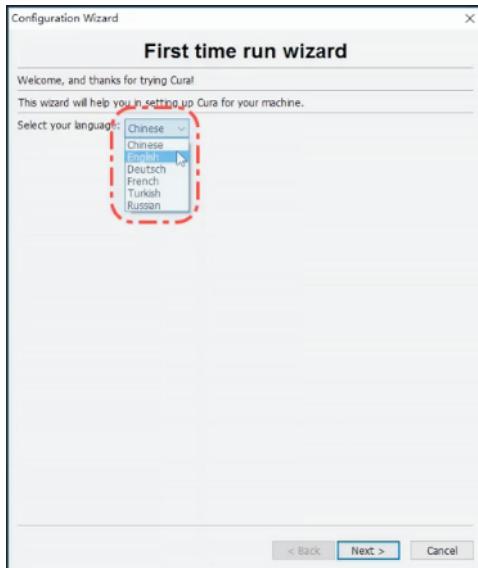
## Installation of Software and drive

Assess the official website of MICROMAKE : <http://www.micromake.cn> then click on “( download ) ”and get in the SkyDrive, then get in the MICROMAKE folder. Download and install the “Cura\_15.04.exe”. You can change or not the installation path by yourself. (like this picture). The slicing,drive installing,firmware installing and calibrating machine of 3D printing document can be completed by this software.If the newsoftware do not register in the white list,it will appear an warning about security. If you use the security software like 360, please choose to allow or add it to trust list. Then click on "Install", there will be a installing path,you can change it by yourself. Attention to do not choose the Chinese path.Then click on "Next",and the"Install" to install the software and drive.



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After installing, click on “Next” to get through next operation. Then click on “Finish” to run the Cura. It will get in the Wizard mode when you run this software firstly.(like this picture). This picture shows the dialog box for choosing the language, in which you can choose your language. Then click on “Next” to get in the box for choosing the type of your machine. We choose the first default option “Micromake D1”, then click on “Next”, and “Finish” to complete this operation. Then get into the main program.



Now, we complete installing the Cura. Then we need check out the installation and the connection of the driver. Check out the connection of the USB wire of port in the printer with the printer. If connect well, we can check out if the other USB wire connect well with your computer or tablet PC. If well, we can get into the device manager: click on the menu--device manager---port ( COM and LPT)

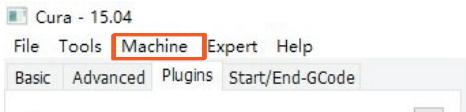


In Win10, it shows the USB serial device (COM3) . When we pull the USB cables inserting in computer or in printer, the option “USB serial device (COM3) ” will disappear. If you insert the USB cables, it will appear again. In this situation, the installation of the driver has no problem. Oppositely, if there is an unknown equipment or a Com equipment with exclamation mark, the installation is not successful.

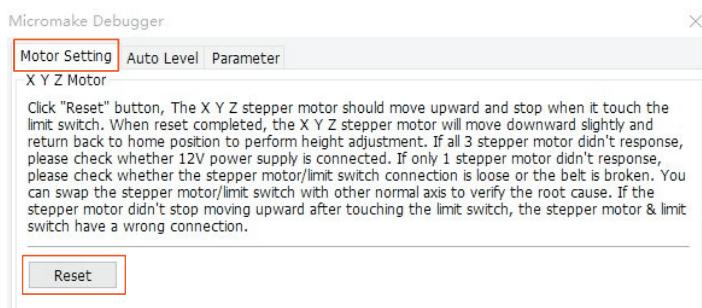
These problems main because that the operating system lacks of some system files. You can get back to the SkyDrive, and download the package of solving the problems in installation of driver. Then solve your problems according to the installation instructions in this package. After solving problems, install the driver again.

## Motor test and auto level

After installing the driver, click on “Machine”-“Machine Debugger”



At this time, the “Reset” is becoming clickable and is in black. If it doesn't turn black, you should check the connection of the USB wire or the installation of the driver. Then click on the “Reset”, the X Y Z stepper motor should move upward and stop when it touch the endstop. When reset completed, the X Y Z stepper will move downward slightly and return back to home position to perform height adjustment. If all 3 stepper motor didn't response, please check whether 12V power supply is connected or check if you turn on the switch.



After normal “Reset”, click on “Heat”. The temperature of the LCD screen will raises to 200'C, then click on “Extrude”. After that, the extruding machine will begin to turn and the PLA will come from print head.

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## E Motor

Click "Heat" button, wait for the temp raise to 200'C before perform extrude/retract operation. If temp can't raise up, or Temp display is wrong, please check the thermistor connector (loose or break). When Temp hit 200'C, try manual feeding the filament using hand first to check whether filament extrude properly. If can't extrude, disassemble the connector on top of nozzle, align the filamentto enter extruder and heat chamber. Rotate the filament bearing manually, if filament doesn't extrude, tighten the filament bearing screw. If there is no problem above,click "Extrude" & "Retract" button, to test the stepper motor operation. If there is no movement,check the stepper motor connection.

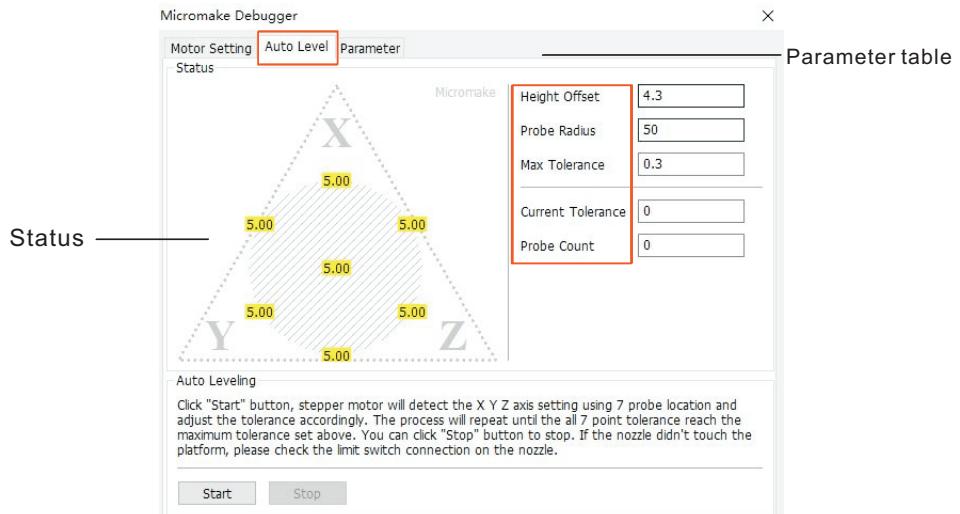
Heat

Extrude

Retract

After "Heat" and "Extrude", we can get in the operation "Auto Level". Before "Auto Level", we should turn off the heat part. Firstly, click on "Machine"- "Machine Debugger", the temperature on the screen turns down on the screen, and the print head doesn't heat. We should clean the print head up. Then stick the masking tape on the black glass. Click on "Auto Level", it shows the graphics state of the printer at present. And it shows the coordinates of X Y Z. In the right side of this box, there are some parameters: (1) Height Offset. This is the point compensation after auto-level. When complete the auto-level of printer, we can start printing. If it cannot touch the platform, we should turn up the height difference. If the print head scratch the masking tape, we should turn down the height difference. The height difference unit is millimeter. (2) Probe Radius. It is the point radius of leveling. The default is 50mm. If you want accelerate the auto-level process, you can turn down this value. We suggest you according to the default. (3) Max Tolerance. This is the accurate setting about auto-level. Default is 0.3. If you want it more level, you can turn down this value. But it will increase the number of probes. Suggest you use the default. (4) Current Tolerance. It is the difference value of the previous value and the value after leveling (5) Probe Count. It is the numbers of probes when we start leveling.

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Click on “start” to start “auto-level”. At that time, the print head begin resetting and turning down. It turns slowly near the glass. After that, it starts the checkpoint, clicking the center point firstly, then the point in X-axis, in Y-axis and Z-axis in turn. This is the actual probes with X Y Z in turn. It probes the difference value in 7 points and calculates the deviations of the limit of 3 endstops , and compensates this deviations. We can see there is a number of the “Current Tolerance” in Parameter table. And the “Probe Count” shows 1. Then do the second time of probe. In this time, it will stop probing points until the difference value reaches the maximum number we set.

The principle of the auto-level: It probes the center point at first, and calculates the height of the Z-axis. Then probe values of the X-axis, Y-axis and Z-axis in turn. For example: Click the point of X-axis and calculate the difference value with the opposite point. Then do self- compensate of the limit switch to get these two values more nearly. So that it can make the limit switches in the same flatness. This process is fully automated by this software.

## Parameter setting and print mode

When we complete the “auto-level”, click on the “Parameter”, to adjust “Printing Height”. In this box, we can see the value of height. You can remember this virtue, such as 300, then click on “Bottom”, the print head will turn down to the platform. We can put one A4 paper or note paper or a card on the bottom of the print head and slip it. If the distance between print head and platform is so long , we can increase the “Printing Height”. If too short, we can decrease it. For example, increase the number 300 to 300.2, then click on “Bottom” and using the paper to measure the distance, if also so long, increase 0.2 . Repeat this step until the distance is just suitable. For guaranteeing we shouldn't adjust it every time, we can change the “Height Offset” in “Auto Level” , then click on “Start” to level. After that, click on the “Parameter” , the value of “Printing Height” will change to the suitable number. Then repeat the operation of “Bottom”. We can see the print head in the suitable position, and it can get this right position by “auto-level” every time. We can keep this value until the parameter has changed.

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Micromake Debugger X

[Motor Setting](#) [Auto Level](#) [Parameter](#)

**Firmware Setting**

Print Height	300
Rod Length	210
Horizontal Radius	92
Flow Rate	150.0

**Limit Switch**

X Axis Adjustment	100
Y Axis Adjustment	100
Z Axis Adjustment	100

**Manual Leveling**

If the nozzle not level when printing, the 3 Axis limit switch height is incorrect setup.  
Adjust the limit switch adjustment to level the nozzle using below method.

[Reset](#) [Bottom](#) [Save](#) [Load](#) [Clear](#)

After the adjusting of the height, we can get in the printing test. Click on the “Load model file” in “File”, then click on a stl format file. There will be a little robot in the platform of this software. ( It acquiescently unfold this robot in first installation.) .Then we can start printing.

There are two situations. (1) Printing connects the computer. Firstly, ensure the USB cable connect the printer and computer or tablet PC. Then click on the “Print” in “File”. At that time, if the button “connection” turns to grey, we can ensure that the computer connects with the printer and we can start printing by clicking on the “Print”. Then we can see the temperature increasing. It is heating. It will start printing when it reaches the specified temperature. (If it doesn't increase, it may because you don't plug in. You should check out if plug in or turn on.) This type of printing should keep the computer connects the print all the time. And the home page of this software shouldn't turn off. If not, it will stop printing. (2) Printing off-line. We can insert one SD card in computer. Then this software has an icon to get in SD card. Click on this icon, we can change the print document in GCode document and put into the SD card. (Attention: 1.you just can name this document with English or number. 2. If the SD cart cannot be read, pay attention to the format of the SD card. It just supports the FAT 32 format. If it also cannot be read, you may need change a SD card.) . When after saving, put out this SD card and put it into the groove of the screen. Then turn the button to select the printing document in the SD card, then push button to start printing.  
After printing, we can take the model out using the little shovel.