

6-DOF Robot Arm Installation Instruction



Assembly

1. Checklist

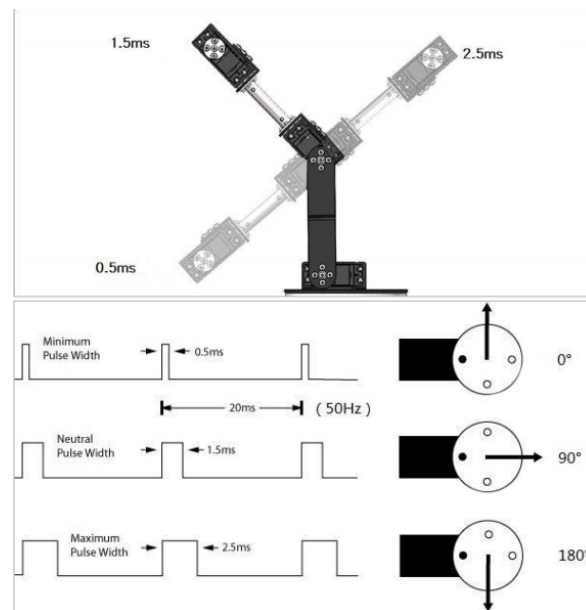
Before installation, please check whether there are any missing or problematic parts against the item list, and make sure that the parts are complete before starting the installation.

2. Tools

Phillips screwdriver.

3. Test

Before installing the chassis, please test whether the steering gear is operating normally, and adjust the steering gear angle (as shown in the 1.5ms position).



The 1.5ms(90°) position in the figure is the midpoint of the steering gear we need to find (it doesn't need to be particularly accurate), and for a 180-degree steering gear, it is a 90-degree position, so 0 degree corresponds to 0.5ms position, and 180 degree corresponds to 2.5ms position.

2.5ms position: In this way, the installed mechanical arm just works within the required range of motion.

Therefore, it is very important to determine the midpoint (or 0 degree point, 180 degree point) of the steering gear before installation. There are usually two types of steering gears on the market, one with limited positions inside; the other without limited positions inside. Usually the ones without limit are digital servos. The best way to judge is to turn the rudder angle by hand after installing the rudder angle. If the rudder angle cannot be turned after a certain angle, it means that it is internally limited; if it can keep rotating, it is not internally limited.

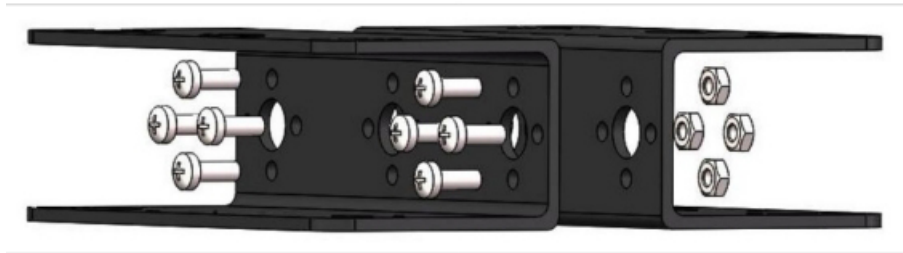
The servo with limit position is 0 degree position when it is rotated counterclockwise, and it is 180 degree position when it rotates clockwise. Location. The test can be done by writing code yourself, or using a dedicated steering gear controller.

The controller can accurately set the initial angle of the servo so that its initial value is 90 degrees (1.5ms) to ensure that the subsequent servo operation will not be damaged due to the blocking of the support due to the limit of the support.

The installation of the steering gear in any degree of freedom must follow the above process, otherwise unexpected failures will occur.

4. Assemble the manipulator

4.1 U-shaped beam



The beam is the base of the mechanical arm, which needs to be fixed on the bottom plate to prevent the mechanical arm from toppling.

M3 * 8mm screw X 8.

M3 nut X 8.

4.2 Multifunctional bracket and beam



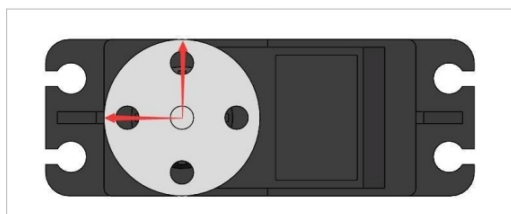
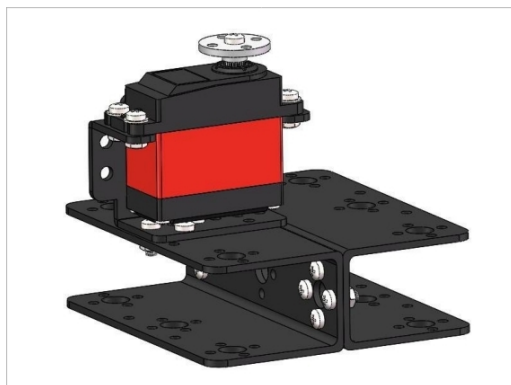
The red circle in the picture above is the fixing hole of multifunctional bracket.

Rotate the steering gear at the bottom, and select the steering gear with low torque parameters, such as MG996.

M3 * 8mm screw X 4

M3 nut X 4

4.3 Fixed rotary steering gear



The steering gear is fixed on the multifunctional bracket and fixed with screws with gaskets, and the steering gear and screw direction are not required.

The steering wheel is fixed on the steering gear output shaft. After calibrating the steering gear angle, the steering wheel is vertically fixed, as shown in Figure 2, and the steering wheel is installed in this way in the future without special instructions.

The steering wheel is on the rear side in the directional diagram, and the steering gear can be rotated 180 degrees to take it out of the front end of the shaft installation.

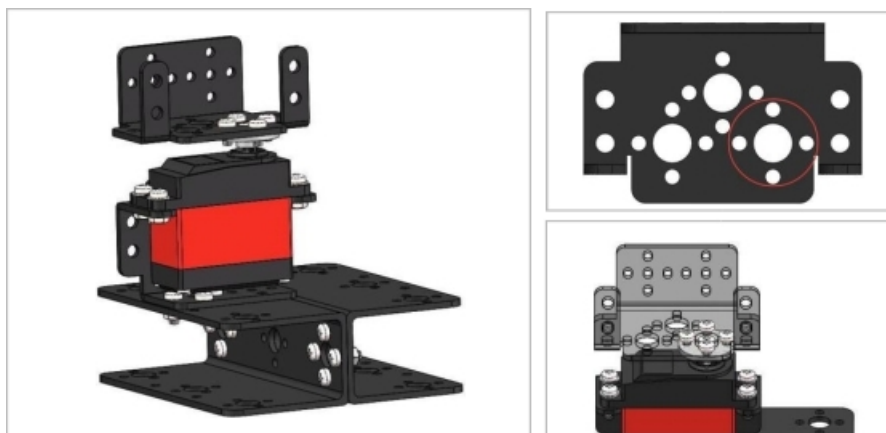
According to their own actual needs, do not make specific requirements.

M3 * 8mm washer screw X 4

M3 nut X 4

M3 * 6mm washer screw X 1 (in the middle of steering wheel)

4.4 Fixing the arm base



Fix the multi-function bracket to the rudder plate of the bottom rotating servo, align the holes and screw in the screws.

The middle hole is to fix the rudder disc to the steering gear shaft. This can prevent the bracket and the rudder disc from falling off, and it must be fixed tightly during installation.

M3 * 6mm screw X 4

4.5 Long U bracket



The long U bracket is fixed back to back, and the screws are fixed and tightened.

M3 * 8mm screw X 4

M3 nut X 4

4.6 Fix the steering gear and bearing of the lifting arm





Fix the bearing to the side of the multi-function bracket and fix it with screws. Before fixing, fix the long U bracket on the flange bearing.

The bearing is fixed on the same side as the output shaft of the steering gear. The angle of the steering wheel is adjusted and the long U bracket is fixed.

This part bears the greatest force, so the maximum torque steering gear should be selected.

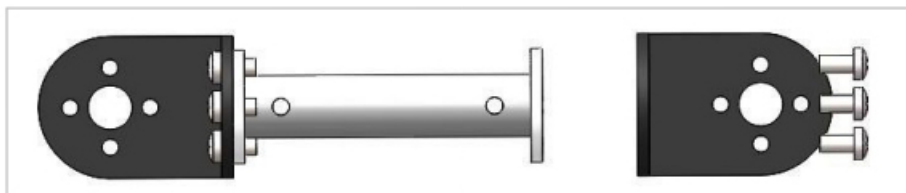
M3 * 8mm washer screw X 4 [?]

M3 nut X 5

M3 * 6mm screw X 5 [?]

M3 * 8mm screw X 1

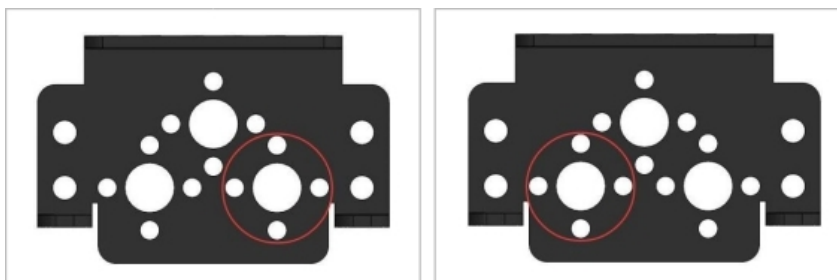
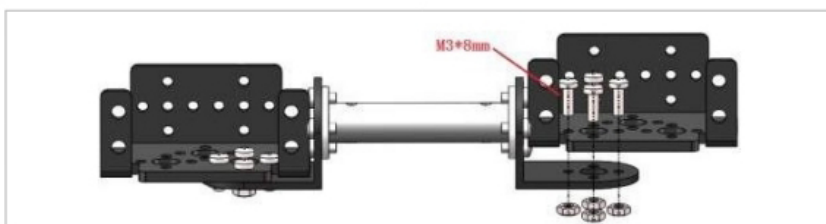
4.7 L-shaped bracket and flange pole



The left and right mirrored installations are symmetrical, the short side is fixed to the flange rod, the bracket is asymmetrical, the flange rod screw can be loosened and then the bracket can be rotated, and it can be tightened after finding a suitable position.

M3 * 5mm screw X 4

4.8 Fixing the multi-function bracket to the flange rod

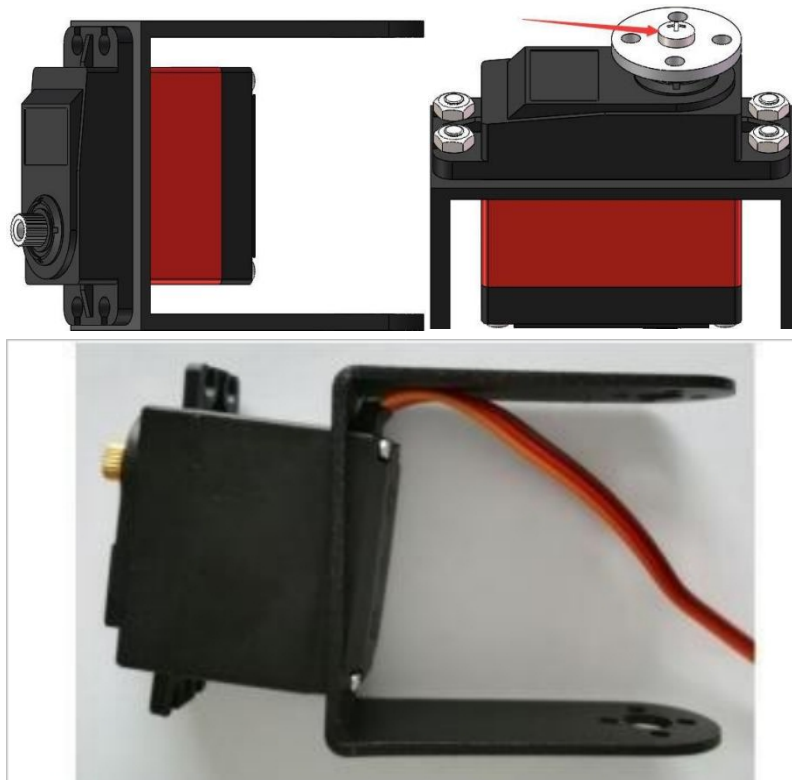


The multi-function bracket is installed in a mirror image on the left and right, and the nut is on the outside.

M3 * 8mm screw X 8

M3 nut X 8

4.9 Fix the servo to the different U bracket



First put one end of the wire into the bracket, and put the wire close to the back of the bracket, and press the other side firmly.

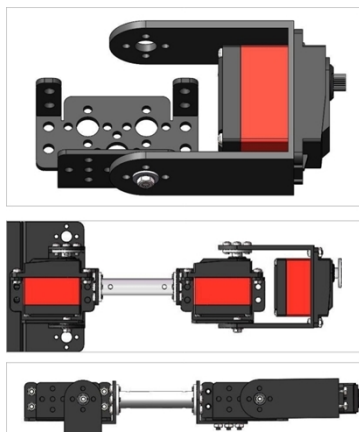
Press it in to loosen the bottom screw and install it to ensure that the accessories do not fall.

The fixing hole of the servo is on the outside of the bracket. Do not install from the inside to the outside. The nut is on the outside and the screw is inside, so that it is easy to install and tighten.

M3 * 8mm screw X 4

M3 nut X 4

4.10 Connect the bracket and fix the steering gear



Connect the brackets according to the previous bearing fixing method. First fix the bearing and the bracket and then fix the steering gear. The steering wheel of the steering gear is fixed on the other side of the U-shaped bracket.

The bearing uses the ribs to block the bracket to prevent the bracket from falling off.

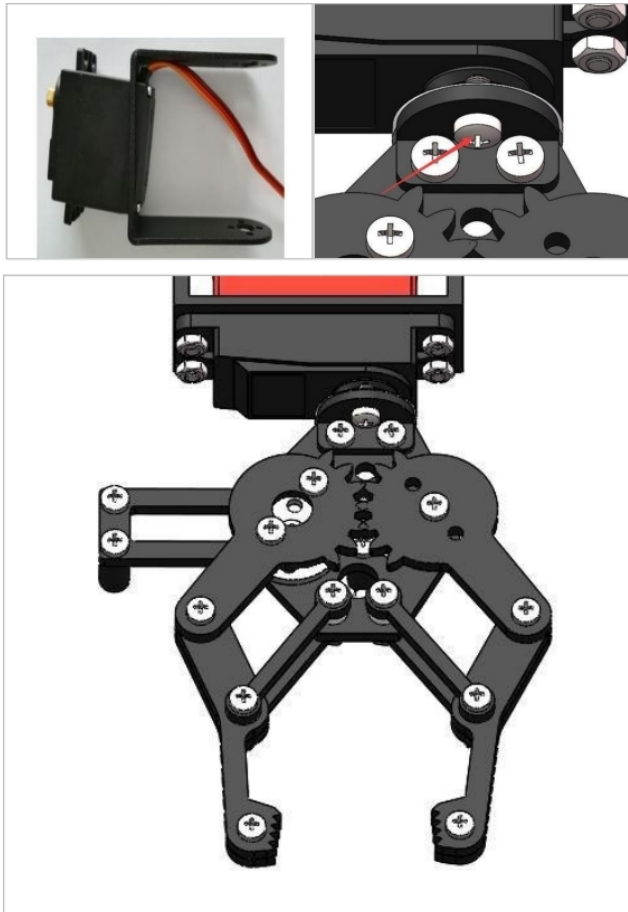
M3 * 8mm washer screw X 8

M3 nut X 10

M3 * 6mm screw X 10

M3 * 8mm screw X 2

4.11 Fixed gripper

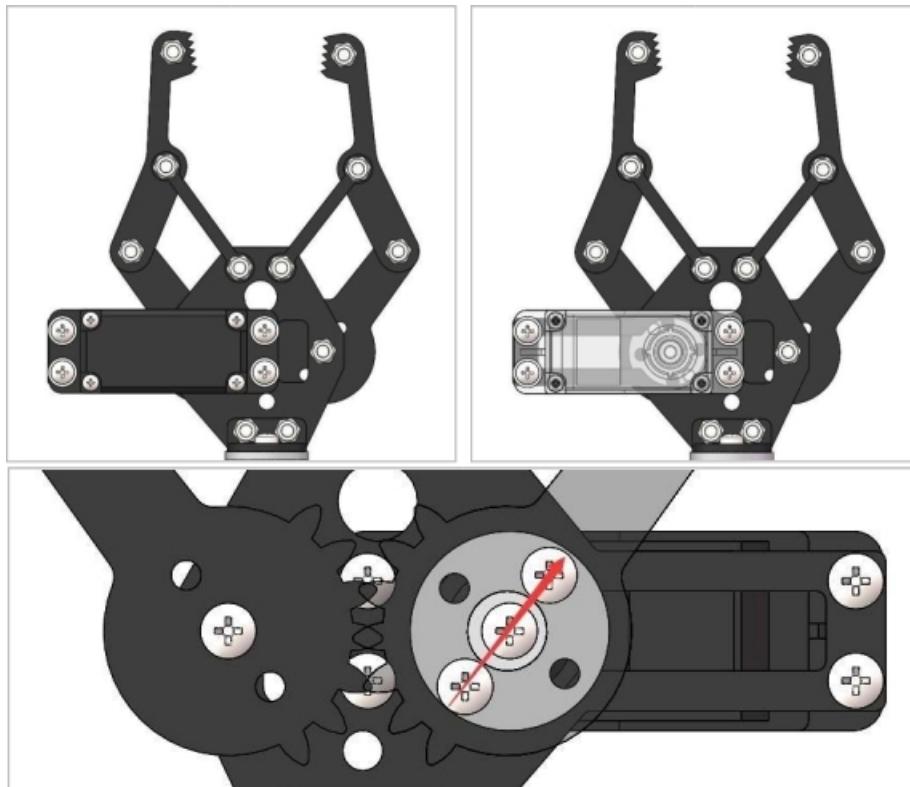


Fix the steering wheel to the steering gear first, and install the middle screw when fixing it to prevent the claw from falling when using it. Then fix the claw on the rudder plate and tighten it with screws.

There is no limit to the angle of the rotating servo part, and it is enough to keep enough line length when fixing.

M3 * 6mm screw X 3

4.12 Fix the servo at the gripper



The steering gear is fixed to the gripper, and the steering gear output shaft corresponds to the inner side. After the steering gear is fixed, fix the steering wheel to the steering gear output shaft. The angle is shown in the figure.

When the steering wheel is fixed, make sure that the steering gear angle has been reset to the 90 degree position. This will calibrate the subsequent control. If the position is not correct, if the given angle exceeds the mechanical limit, the steering gear will be blocked and damaged.

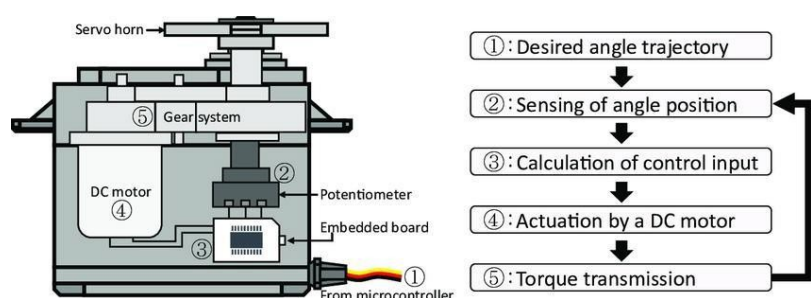
M3 * 6mm washer screw X 4 (fix the servo) [?]

M3 * 6mm screw X 3

Illustrate

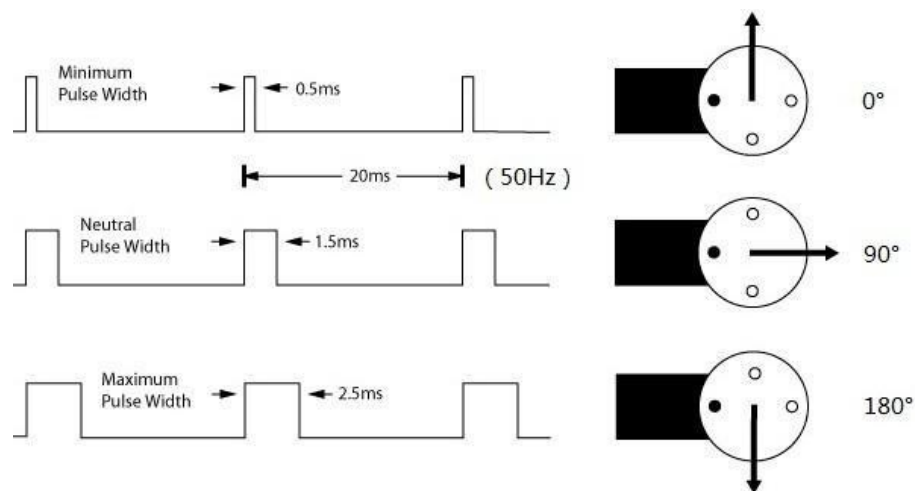
1. Introduction and principle of steering gear

The control signal enters the signal modulation chip from the MCU port to obtain the DC bias voltage. There is a reference circuit inside, which compares the obtained DC bias voltage with the voltage of the potentiometer to obtain the voltage difference output, and the positive and negative output of the voltage difference is output to the motor drive chip to determine the positive and negative rotation of the motor. When the motor speed is constant, the potentiometer is driven to rotate through the cascade reduction gear, so that the voltage difference is 0, the motor stops rotating.



The steering gear control needs about 20ms time base pulse, the high level part of this pulse is generally the angle control pulse part in the range of 0.5ms-2.5ms, and the total interval is 2ms.

Take the 180 degree angle servo as an example, the corresponding control relationship is as follows:



Servo line sequence

Brown: GND (negative)

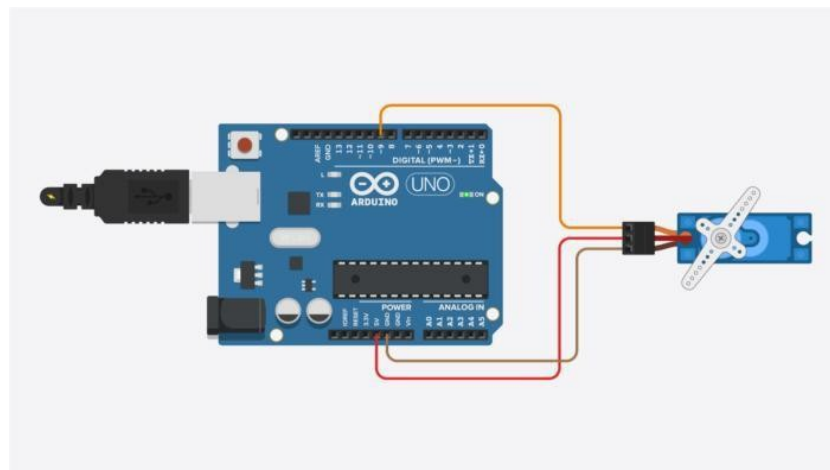
Red: VCC (4.8-6v)

Yellow: S (signal)



2. Servo control

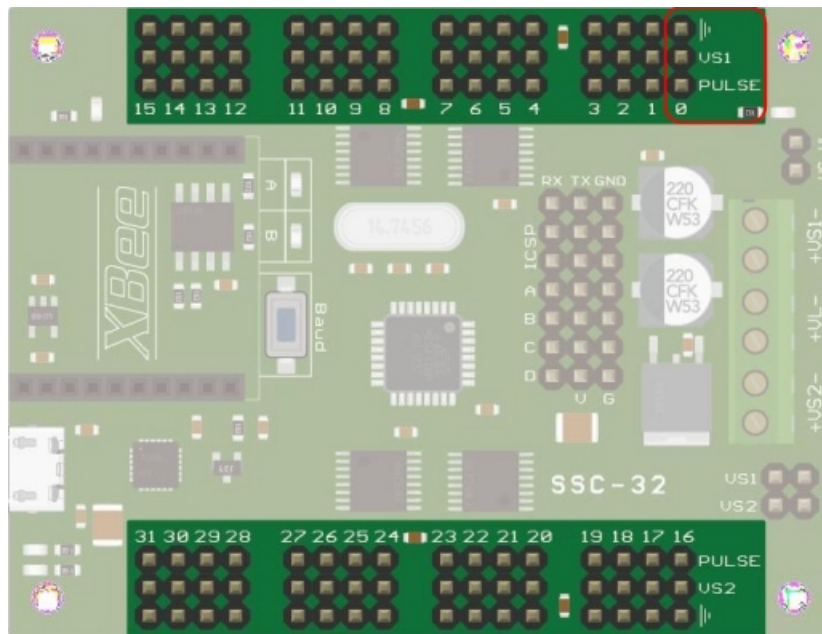
1. Arduino



There are many robotic arm servos. This connection can be used for a single test. 6 simultaneous work requires an external power supply. It uses a 6V battery or a regulated power supply, and the output current is more than 5A to ensure the normal operation of the arm.

The other controllers can also be controlled in the same way, such as STM32, Raspberry Pi, ESP32, etc., multiple power supplies need to share the ground.

2. 32-way steering gear controller



The steering gear controller can control up to 32 steering gears. The port power supply uses 6v, and the wiring adopts straight pin headers. Pulse is the signal port, corresponding to the yellow (or white) wire of the steering gear; the positive pole of the middle power supply (VS1, VS2), Corresponds to the red wire of the steering gear; the outermost is GND, which corresponds to the brown wire of the steering gear.

Attention

This product has no waterproof function, so it is strictly forbidden to use it in water or humid environment.

It is forbidden to reversely connect the power supply of the module.

It is forbidden to short-circuit the positive and negative poles.

It is forbidden to run with overload and locked-rotor.