THE DEXTEROUS HANDS INSTRUCTIONS

Instructions for Dexterous Hands

RH56 Series Dexterous Hand is a mechanical dexterous hand (hereinafter referred to as "Dexterous Hand") designed to integrate the servo actuator with small volume and large torque. It is equipped with six servo actuators. For the user interface, RS485 communication interface is used. There is a sensitive built-in pressure sensor. By setting different threshold values, the user can easily grip objects with different hardness. Concise and efficient interface control instructions enables the user to quickly manipulate and control the dexterous hand. The excellent performance makes this dexterous hand suitable for applications such as service robot, teaching aids, prosthetics, etc.

RH56 Series Dexterous Hand has six degrees of freedom (DOF) and 12 motor joints. Its weight is 500 g. The recommended supply voltage is 24 V. The maximum current is 5 A.

The serial port communication parameters of RS485 are 115200bps, 8 data bits, 1 stop bit, and no parity.

Please refer to the following instructions (RH56DF3-1R as an example):
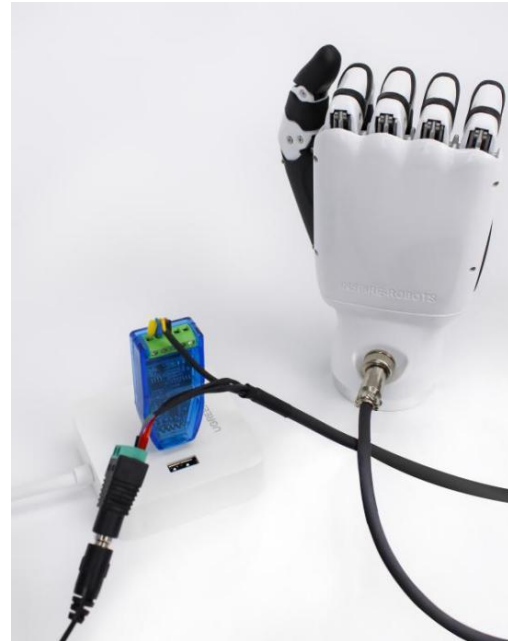

Exterior View of RH56DF3-1R

1. Connect the DC terminal of the aviation plug cable to the power adapter. Connect the aviation plug port to the aviation plug of the dexterous hand. Connect the USB port of the USB-RS485 cable to the PC. Turn on power supply.


Test Cable Picture

RS485 Interface Picture

2. Start "Dexterous Hands - PC Test Software". Click "Connection Search" in the upper left corner. Select the corresponding serial port number. Click "Search" to connect. At that time, "UART successfully connected" will appear in the lower right corner.Updated data such as angle and current in real time will also be displayed in the lower right of the software screen.
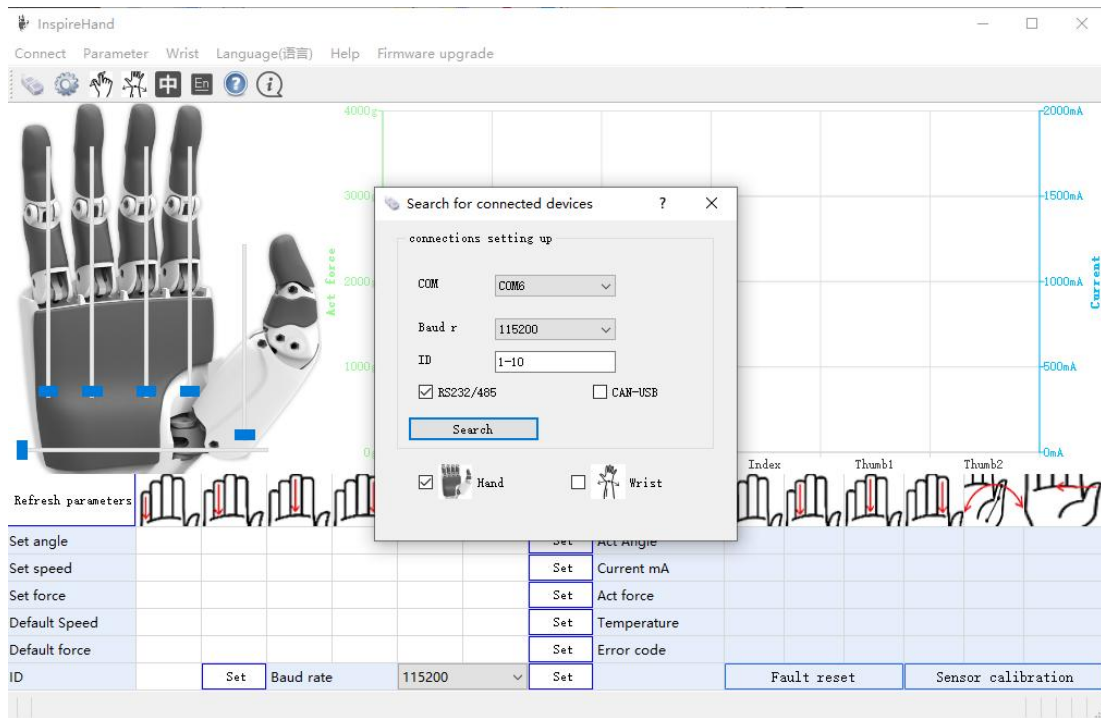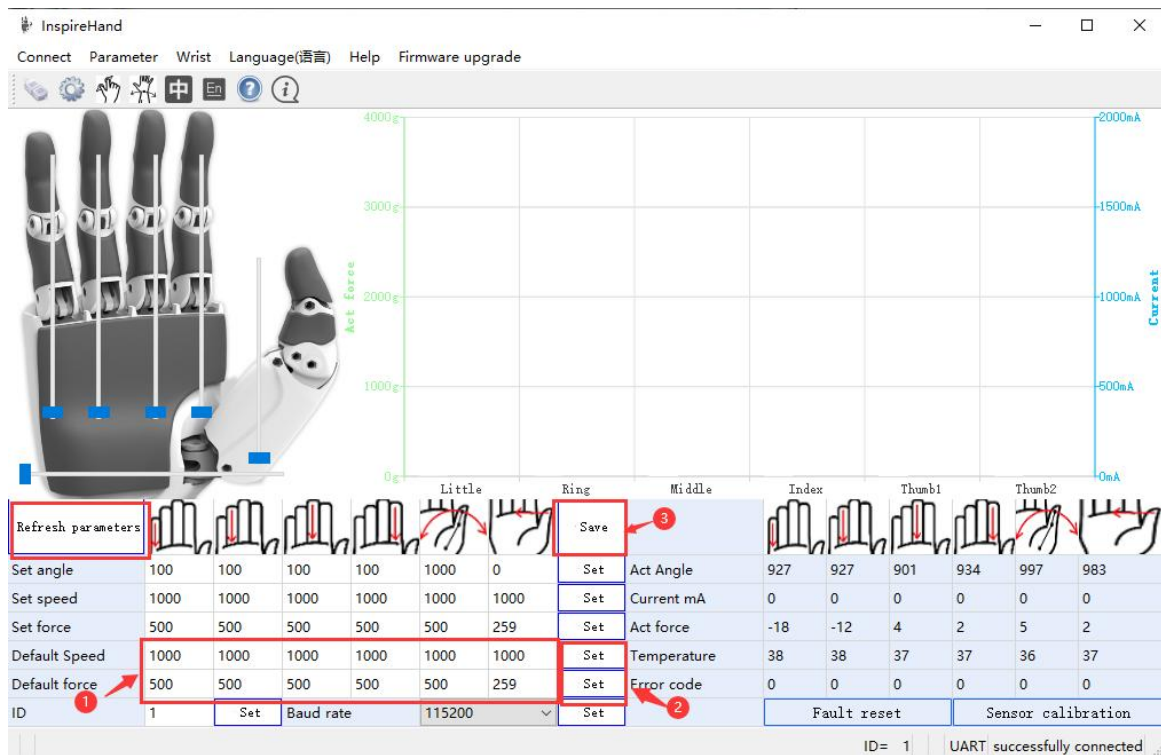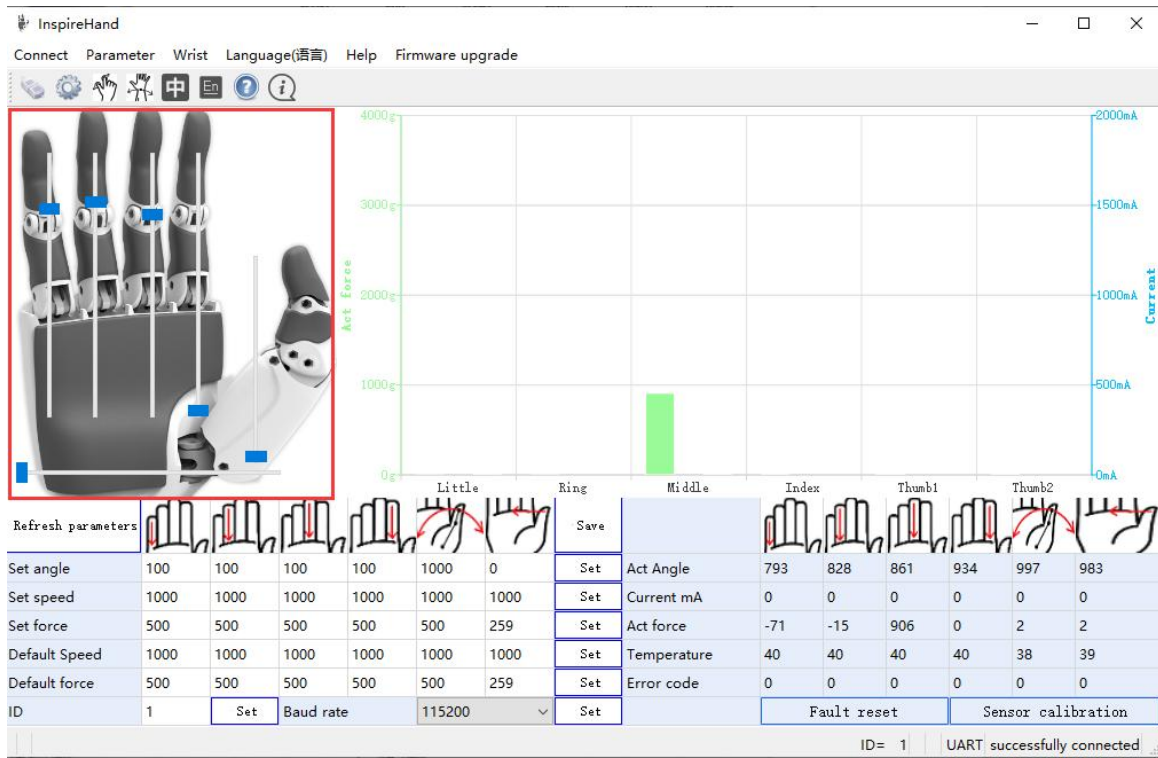

PC Connection Diagram ①
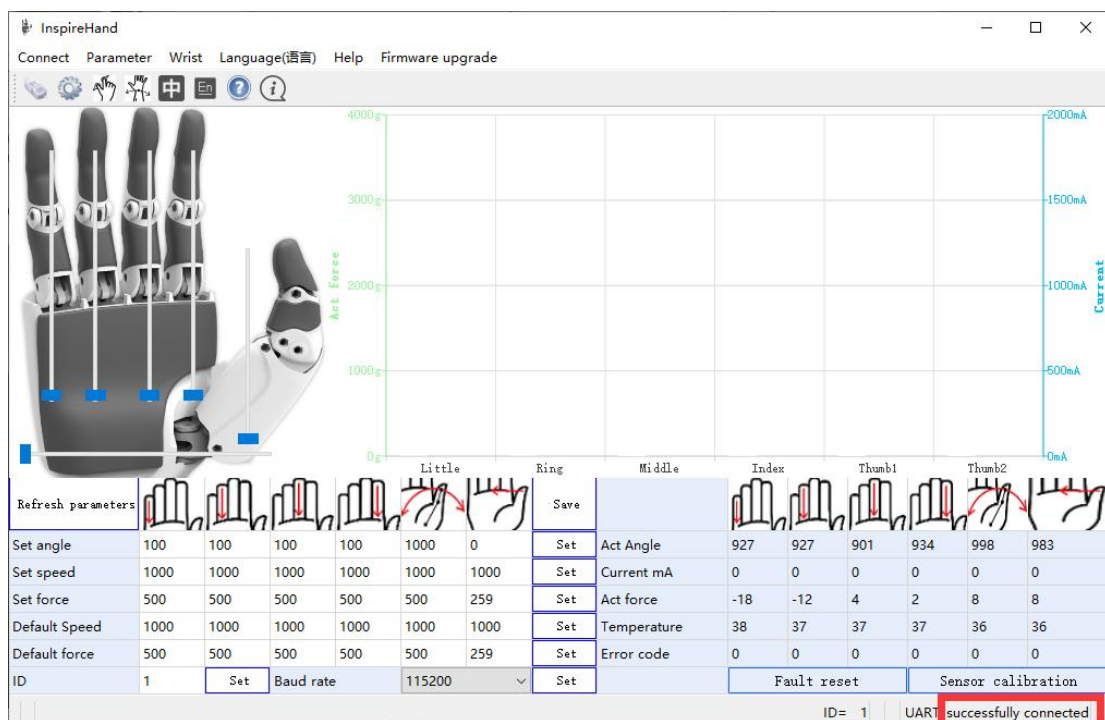
PC Connection Diagram ②

3. The ID of the servo actuator in the little finger is 1; that in the ring finger is 2; that in the middle finger is 3; that in the index finger is 4; that for the bending motion of the thumb is 5; and that for the rotational motion of the thumb is 6.

4. Click "Refresh Parameters" to view parameters of servo actuators in the dexterous hand, or to modify the default power-on speed and the default magnitude of force in the parameters by following the steps below: ① double-click the servo actuator value to be changed, and then change it; ② click "Setting"; ③ click "Save"; ④ Perform power-off and reboot.

PC Connection Diagram ③

5.   Drag the hand position module in the left diagram of the PC test software to control the dexterous hand, as shown in the figure below.

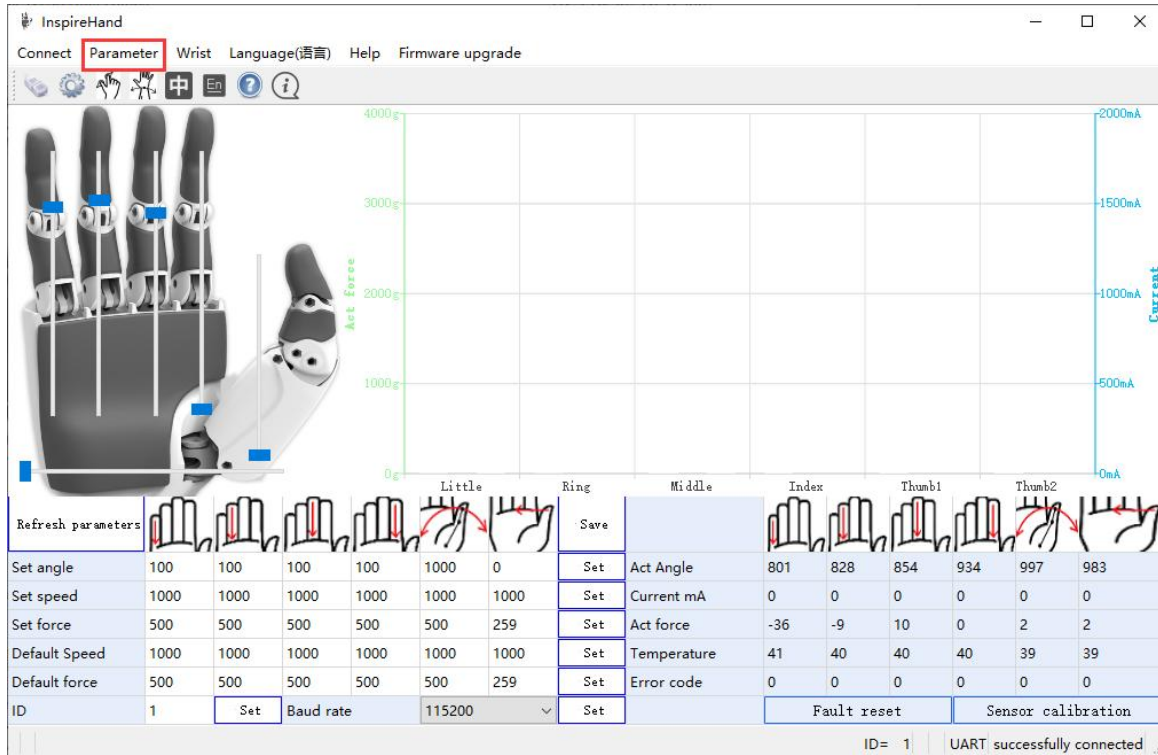

PC Connection Diagram ⑤

Dexterous Hand Action Diagram ①

6.   Actions can be implemented through the hand model in the PC. Actions of the dexterous hand can also be set using internal parameters. Click "Parameters" and select "Action Sequence Parameter".Upload: Action parameters in the dexterous hand are uploaded to the PC software;

Download: Action sequence parameters edited in the PC software are downloaded into the dexterous hand;

Test: Execute the actions with list numbers currently selected by the PC software.

PC Connection Diagram ⑥
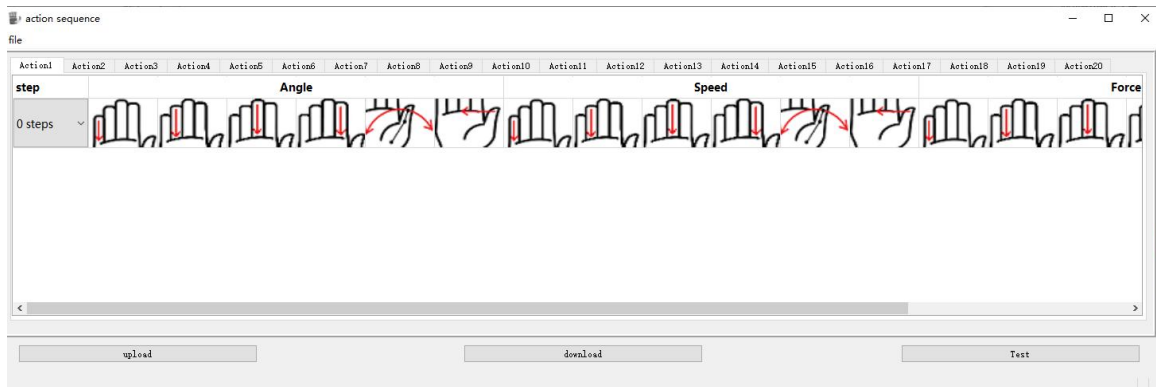
PC Connection Diagram ⑦

7. 13 actions are preset in the PC software, including:

Action1 - hold the palm open; Action2 - grasp the water bottle; Action3 - quickly grasp the water bottle; Action4 - pinch a ball with three fingers; Action5 - quickly pinch a ball with three fingers; Action6 - pinch with three fingers; Action7 - quickly pinch with three fingers; Action8 - laterally pinch with the thumb; Action9 - laterally pinch with the thumb quickly; Action10 - bend four fingers; Action11 - bounce ping-pong with the index finger; Action12 - operate the joystick; Action13 - fist clenching

For the action parameter, click "Test" in the lower left corner to implement this action.

Take Action8 (laterally pinch with the thumb) as an example. Define 0-1000 for the servo actuator angle of fingers, 0-1000 for the speed, and 0-1000 for the gripping force. First of all, set the angle of the little, ring, middle and index fingers to 0; set the angle of two servo actuators that control the thumb to 1000; and set the speed and the gripping force to 1000. After the delay time of 1000ms, adjust the angle of thumb servo actuators that control the bending motion to 0, the speed to 200, and the gripping force to 1000. This action can be implemented.
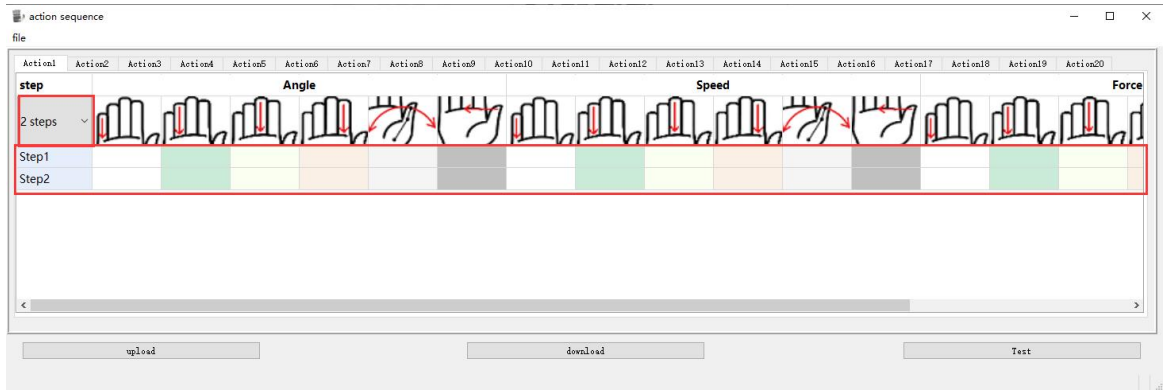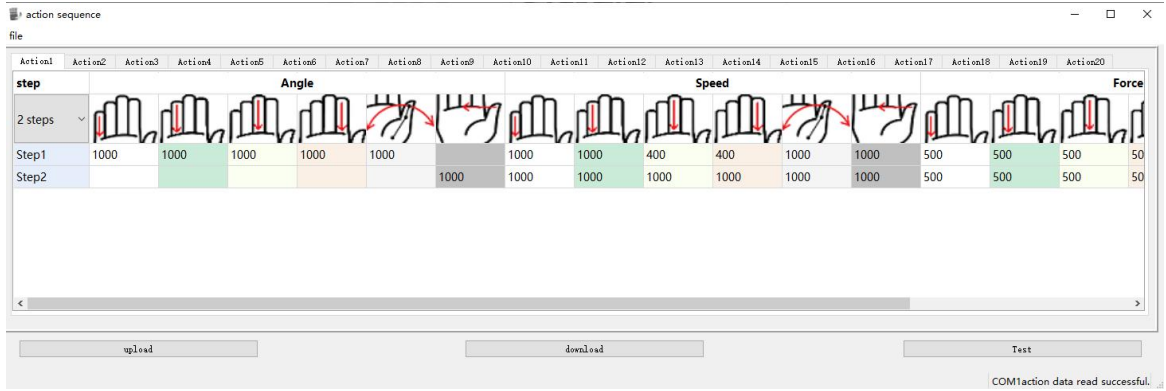
PC Action Picture ②

8. Actions can be set through the PC software. For example, the gesture "OK" can be set. In Action14, after selecting "Total step count" on the left side, the corresponding "Step" will appear. The angle, speed, magnitude of force, and delay time can be set to control the dexterous hand and complete actions. For example, the gesture "OK" needs two steps. Step 1: change the angle of Servo Actuators 1, 2 and 3 to 1000, and the angle of Servo Actuator 6 to 0. Step 2: after the delay time of 1000ms, change the angle of Servo Actuators 4 and 5 to 500, and set the speed to 200; the gesture "OK" can be completed.

If you are not sure about the specific angle, you can move the hand position module to adjust the angle.
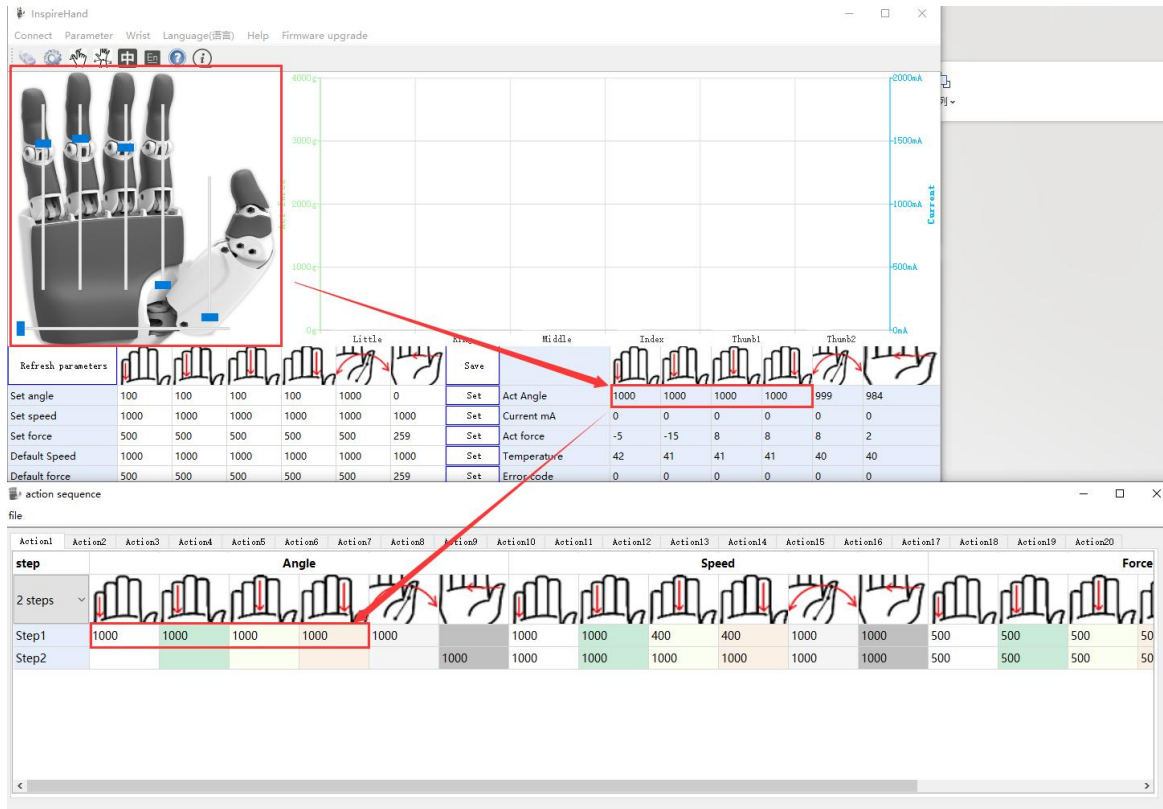
Dexterous Hand Action Setting Diagram ①

Dexterous Hand Action Setting Diagram ②

Dexterous Hand Action Setting Diagram ③

PC Action Picture ③