

Ver 3.15

## **Parameters:**

Hardware	32 channels	24 channels	16 channels			
Operating Voltage		5V				
Servo motor Input Voltage	A	According to the servo motor				
CPU		32bit				
Baud Rate (USB)		115200				
Baud Rate (Bluetooth、WIFI、UART)	4800、96	4800、9600、19200、38400、57600、115200				
Flash Capacity		16M				
Servo motor synchronous quantity	32	<b>32</b> 24 16				
Max Action Groups		255				
control precision		1us				
Servo motor signal isolation		Yes				
Current limiting protection	No	Yes	Yes			
MPU6500	No Yes		NO			
External sensor support	No	No No				
3D Virtual	All	All	Part			
	1.CPU power indicator led (red)					
Indicator led	2.Servo motor power indicator led (green)					
	3. wi	reless remote control (Yello	ow)			
Size	64mm X 45mm	64mm X 47.5mm	58.5mm x 45mm			
Communication Protocol		UART				
		Windows 10 or later				
Computer Software		Mac OS 10.8 or later				
		Linux (kernel 3.0 or later)				
Low pressure alarm		Default Open				
Servo motor initial value		Default 1500				
Support servo motor type		9G~55G				
Second development	C51、Arduino、AR	RM、MSP、DSP、WIFI、Blu	etooth、Compute			
wireless remote control		1. one servo motor control				
		2. action groups control				

#### 32 channels:



### 16 channels:

GND 5V	j.				PS2 CR	•			0
	X RX	2							
						2			224
22 C ×	• •	~			 15		•	н (	245
52 C . *	• •	ω 📲			14 14		•	• ]	244
<b>2</b> 43	a a	* •••			13	•	•	•	XX
52 C 🔳		o 🖌			 <u> </u>			н	244
<b>2</b>	1	o 🛃 🛛	-0		° =		- 1	•	225
<b>D</b> • <b>C</b>		7	<b>0-0 0</b> -1		2			•	205
<b>2</b> 23 <b>×</b>	a 🛛 a	∞			• • • o			•	233
GND	VCC			a a			VCC	GND	
0		•							$\bigcirc$

#### 24 channels:



# Instruction:

#### **Communication Protocol:**

serial communication	baud rate	parity bit	data bits	stop bits		
TTL	9600(default)	none	8	1		
Instruction format:						
name	Instruction		description			
			Data 1 refers to the	e channel of the servo		
			motor			
			Data 1500 refers to	the position of the		
Controller single servo			servo motor, with a	a range of <mark>500-2500</mark>		
	#1P1500T1000	D800\r\n	Data <mark>1000</mark> refers to	the execution time and		
motor			represents the spe	ed, with a range of <mark>0</mark> -		
			9999			
			Data 800 refers to the delay time between			
			instructions, with a range of 0-9999			
			Data 1、2 refers to	the servo motor		
			channel			
			Data 1500 Refers to the servo motor			
Controller multiple servo			location, in the range 500-2500			
motor	#1P1500#2P15	00T1000D800\r\n	Data 1000 refers to	the time of execution		
motor			and represents the speed, in the range 0-			
			9999			
				the Instruction interval		
			of delay time, in the range 0-9999			
Run action groups	G1F3\r\n		Data 1 refers to the	e group's channel		
Run action groups	GIIS(I)(II		Data 3 refers to the	e frequency of runs		
Stop action groups	~ST		Stop running actio	n groups ( <mark>Note: not</mark>		
			pause)			
Restart CPU	~RE		Restart CPU			

Note: "\r\n" in hexadecimal is "0X0D 0X0A"; all instructions are in ASCII code. "0x0D"== "\r "== "CR" "0x0A"== "\n "== "LF"

Note: If the function or software used in the program has a "rn" feature, it is not necessary to add it at the end. After the instruction is executed, the controller will provide feedback with "OK".

# Wiring methods:

## I. Power supply connection method, as shown in Position 1 in *Figure 1:*



**VCC:** This is the input for the servo motor power supply VCC, which can be connected to a 4.2V - 9.6V power supply. Please connect the positive pole of the power supply. **Note:** The VCC interface of the controller is the power input of the servo motor. The VCC interface should be selected according to the requirements of the servo motor, for example, if one servo motor requires a peak voltage of 6V and a current of 2A, and ten servo motors require a power supply of 6V voltage and 10A current.

**GND:** This is the overall GND of the servo motor controller, which can be connected to the GND of the servo motor power supply or the CPU power supply. Please connect the negative pole of the power supply.

**VDD:** This is the CPU power supply input of the servo motor controller, with a power supply range of 5V-9.6V. Please connect the positive pole of the power supply.

**USB** (1): This is both the CPU power supply input and the data communication interface of the servo motor controller.

**Note:** The USB(①) interface and the VDD interface (②) cannot be connected at the same time. Only one can be selected as the power supply end of the controller CPU.

# **II**. Servo motor wiring method, as shown in Position **(3)** in *Figure 2:*





**Yellow pin header:** This is the I/O input of the servo motor, generally yellow or beige in color.

**White pin header:** This is the VCC input of the servo motor, generally white, red or dark red in color.

**Black pin header:** This is the GND input of the servo motor, generally brown or black in color.

# II. UART wiring method, as shown in Position (4) *in Figure 3*. Please refer to *Figure 4* for details:



Figure 4

**Green circle:** This is the GND input of the CPU power supply of the servo motor controller.

**Yellow circle:** This is the VCC input of the CPU power supply of the servo motor controller, which can only be connected to 5V.

**Purple circle:** This is the RX port of the UART of the servo motor controller, generally connected to the TX port of other UART devices.

**Orange circle:** This is the TX port of the UART of the servo motor controller, generally connected to the RX port of other UART devices.

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# IV. Bluetooth and Wi-Fi sensor wiring method, as shown in Position (4) in *Figure 5:*





Position ④ in *Figure 5* uses four DuPont wires to connect with the Bluetooth or Wi-Fi module, 5V-VCC, GND-GND, RX-TX, TX-RX.

Pair the mobile phone with the Bluetooth module and install the mobile control software to perform control. To use the Wi-Fi module, install and open the mobile control software, and enter the TCP address set by the Wi-Fi module for control.

Note: Before using the mobile phone remote control in practice, connect the Bluetooth or Wi-Fi module to the computer and use a serial port debugging software to see if the corresponding instructions can be received.

The first time you use the mobile software, you need to enter the verification code, which is: **RTrobot** (pay attention to the case).



## V. Potentiometer wiring method, as shown in *Figure 6:*

The potentiometer module is connected to the servo motor controller, as shown in Figure 6, connect 1 - 1, 2 - 2, and 3 - 3...

Each potentiometer can be set to control which channel of servo motor through the upper computer software "Setting"->"Hardware".

lardware			? ×
rvo initial value	Servo deviation value	Potentiometer	
Potentiometer 1	Potentiometer 2	Potentiometer 3	Potentiometer 4
Potentiometer 5	Potentiometer 6	Potentiometer 7	Potentiometer 8
ART Baud Rate	9600	Buzzer	Open 🚽
art automatic ru	n No	automatic run grou	IP 0
utomatic run tim	es(max:254; loop:0;)	0	•
A	pply	Cl	ose

## VI. Wireless joystick wiring method, as shown in *Figure 8:*



Connect the wireless remote receiver with the servo motor controller, as shown in figure 8, 1 - 1, 2 - 2, 3 - 3...

Don't forget that the joystick also needs two batteries for power. (After the wiring is correct, the LED lights of the power receiver and the remote control will be on constantly, indicating that the pairing is complete.)

The wireless remote control has two control modes.

Mode 1 (yellow light off) is for controlling a single servo motor.

Mode 2 (yellow light on) is for controlling an action group.

The functions of the buttons are different in different modes, but some buttons have the same function in both modes.

**Note:** After the power is turned on, you must press "START" once to start the servo motor.



#### http://rtrobot.org

Hardware	32 channels	24 channels	16 channels					
First group servo motor serial number	1、3、5、7、9、11、13、15	1、3、5、7、9、11	1、3、5、7					
First group control button	<ul> <li>L2: Switch to the previous servo motor in the first group</li> <li>R2: Switch to the next servo motor in the first group</li> <li>L3-Left: Increase the value of the selected servo motor in the first group</li> <li>L3-Right: Decrease the value of the selected servo motor in the first group</li> </ul>							
Second group servo motor serial number	2、4、6、8、10、12、14、16	、4、6、8、10、12、14、16 2、4、6、8、10、12 2、4、6、8						
Second group control button	<ul> <li>L1: Switch to the previous servo motor in the second group.</li> <li>R1: Switch to the next servo motor in the second group.</li> <li>R3-Left: Increase the value of the selected servo motor in the second group.</li> </ul>							
Third group servo motor serial number	17、19、21、23、25、27、29、31	13、15、17、19、21、23	9、11、13、15					
Third group control button	Left: Switch to the previous servo mo Right: Switch to the next servo moto L3-Up: Increase the value of the sele L3-Down: Decrease the value of the	otor in the third group. Ir in the third group. cted servo motor in the third selected servo motor in the t	l group. third group.					
Fourth group servo motor serial number	18、20、22、24、26、28、30、32	14、16、18、20、22、24	10、12、14、16					
Fourth group control button	Down: Switch to the previous server Up: Switch to the next serve motor i R3-Up: Increase the value of the sele R3-Down: Decrease the value of the	motor in the fourth group. n the fourth group. ected servo motor in the four selected servo motor in the	rth group. fourth group.					

one of the serv	vo motor to control	Action groups to control		
32 servo mot	or Mode	•		
	Servo	Value		
Square	All 👆	2500 🛨		
Cross	All 👆	1500 🛨		
Round	All 🌗	500 ÷		
Triangle	All 🌗	1500 主		-
			Apply	Close

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#### **Execution of Action Group:**

Button	L2	L1	R2	R1	Up	Left:
action group	0	1	2	3	4	5
Button	Down	Right	L3-Up	L3-Left	L3-Down	L3-Right
action group	6	7	8	9	10	11
Button	R3-Up	R3-Left	R3-Down	R3-Right	Square	Cross
action group	12	13	14	15	16	17
Button	Round	Triangle				
action group	18	19				

One of the	e servo motor to control	Action groups to	control	
L2	G0F1	R2	G2F1	
L1	G1F1	R1	G3F1	
UP	G4F1	Square	G16F1	
Left	G5F1	Cross	G17F1	
Down	G6F1	Round	G18F1	
Right	G7F1	Triangle	G19F1	
L3-UP	G8F1	R3-UP	G12F1	
L3-Left	G9F1	R3-Left	G13F1	
L3-Down	G10F1	R3-Down	G14F1	
L3-Right	G11F1	R3-Right	G15F1	

#### Single servo motor control (6 Servo Mode):

Each time the button is pressed, the specified servo motor value will increase or decrease. For example, pressing the "L2" button will decrease the value of servo motor 1 to change its angle.

One of the servo motor to control	Action groups to control				
6 servo motor Mode	•				
L2 🗕 🚺 🖶	R2	-	4	•	
L1 🕂 🚺 🐇	R1	+	4	€	
Down 🗕 🛛 🕹	Square	- (	5	€	
UP 🕂 2 👆	Round	+ (	5	₽	
Left 🗕 🖪 👆	Cross	- (	6	•	
Right 🕂 3 👆	Triangle	+	6	•	

If you need to customize the buttons on the wireless joystick, please use the software and click "Setting"-> "Wireless controller" to edit.

**Note:** When the servo motor controller is plugged into the USB boot, the wireless joystick does not work.

## Wiring Examples:

## I. Using a computer to control:



Connect the servo motor and its power supply first, and then use a USB cable to link the computer to the servo motor controller.

Refer to **Wiring methods: I** for connecting the servo motor power supply (remember not to connect the VDD power supply port).

**Note:** The servo motor power supply should be selected according to the requirements of the servo motor.

## **I**. Automatic run of the controller:



Before the servo motor automatic operation, set the automatic operation parameters using the software, see the software usage section for details.

**Note:** If USB is needed to supply power to the CPU, the red wire of the VDD port should not be connected. After setting the automatic operation parameters with the software, plug and unplug the USB port to start automatic operation.

## **II**. Using MCU to control

#### Servo motor controller powered by MCU:

Take Arduino Uno as an example here, and refer to this section for other MCUs. Connect the servo motor controller 5V to Arduino Uno's 5V, servo motor controller GND to Arduino Uno's GND, servo motor controller TX to Arduino Uno's RX, and servo motor controller RX to Arduino Uno's TX. See *Figure 15*. Note: At this time, all power is supplied by one battery.



#### Servo motor controller supplies power to MCU:

Connect the servo motor controller 5V to Arduino Uno's 5V, servo motor controller GND to Arduino Uno's GND, servo motor controller TX to Arduino Uno's RX, and servo motor controller RX to Arduino Uno's TX. See *Figure 16.* 

Note: The computer supplies power to Arduino Uno and the controller, while the servo motor is powered independently.



Raspberry Pi users can use a USB cable to connect the servo motor controller to the Raspberry Pi and treat it as a computer.



Figure 17

## **Software Operation Instructions:**

Note: The serial port needs to be opened to use all the functions of the software.

## I. Language Setting:

Click "Setting" -> "Language" to select the language.

🖶 RTrobot Servo Controller Ver: 3.2.0						- 0	
Setting Help							
Software		•				Interface	
Hardware						● COM ○ TCP	
Wireless controller S2 1500 + S3 1	500÷ \$4 1500÷	S5 1500 ÷	S6 1500 ÷	S7 1500 ÷	S8 1500 ÷	Serial NO COU51	
3D Virtual						Denial IVO. Comon	
Language English						Baud Rale T15200	
简体中文						DisConnect	
S9 1500 ÷ 正體中文/繁體中文 11 1	1500 ÷ \$12 1500 ÷	\$13 1500÷	\$14 1500 ÷	<b>\$15</b> 1500 ÷	S16 1500 ÷	ONLINE	
						Speed(ms) 500	
						Speed(iiis)	
S17 1500 ÷ S18 1500 ÷ S19 1	500 ÷ \$20 1500 ÷	S21 1500 ÷	S22 1500 ÷	\$23 1500÷	S24 1500 ÷	Delay(ms) 500	_
						Add Delete	•
						Import Clear	
						Export Stop	
S25 1500 ↔ S26 1500 ↔ S27 1	500 ÷ \$28 1500 ÷	S29 1500 <u>↔</u>	\$30 <u>1500</u> ÷	S31 1500 <u>÷</u>	S32 1500 ÷	Run Loon	
						Dand Atting Ore	
						Read Action Gro	ups
All Channel:		0				Download Erase	
Instruction Conder						Sustem Infe	
Instruction Sender						System Into	
1						System Initialized COM51 connected OK	
						Thanks to use Servo	
						Controller	
						Clear 0%	=
	v					070	

Figure 18

## **II.** Software Settings:

Click the "•" in the servo motor window to name each servo motor individually and set the maximum and minimum values, colors, and locked position.

🛞 RTrobot Servo Controller Ver: 3.2.5	- 🗆 X
Setting Panel Help	
Panel 51 1500 ↔ 52 1500 ↔ 53 1500 ↔ 54 1500 ↔ 55 1500 ↔ 57 1500 ↔ 58 15000 ↔ 58 15000 ↔ 58 15000 ↔ 58 15000000000000000000000000000000	Interface © COM O TCP Serial NO. COM28 Baud Rate 115200
59         1500 ÷         510         510         510         511         Allas name         S13           Min Value         500 ÷         513         1500 ÷         514         1500 ÷         515         1500 ÷           Max Value         2500 ÷         1         1         1         1         1         1         1         1         516         1         500 ÷         1         1         516         1         500 ÷         1         1         1         1         1         1         500 ÷         1 <t< th=""><th>ONLINE Speed(ms) 500</th></t<>	ONLINE Speed(ms) 500
\$17         1500÷         \$18         1500÷         \$22         1500÷         \$22         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$20         :         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$24         1500÷         \$26         \$21         1500÷         \$26         26         26         26	Delay(ms) 500 Add Delete Import Clear
S28         1500 +         S27         1500 +         S28         1500 +         S28         1500 +         S28         S28         1500 +         S28	Export Stop Run Loop Read Action Groups Download Erase
Instruction Sender	System Info
	System Initialized COM26 connected OK Thanks to use Servo Controller
Group 0 Index 0 0	

Figure 19

coftware

Click "Setting" -> "Software" to set the software, as shown in *Figure 20.* Software Panel: Set the software control panel.

Servo On/Off: Displays the number of the servo motor that needs to be controlled. After completing the software settings, click "OK" to automatically restart the

RTrobot Servo Con	troller Ver: 3.2.0		- 0
ing Help			
Panel			Interface
	_		◉ СОМ ○ ТСР
S1 1500 🛨	S2 1500 ÷	S3         1500 ÷         S5         1500 ÷         S6         1500 ÷         S7         1500 ÷         S8         1500 ÷	Serial NO. COM51
	-0-	🕒 Configuration ? 🗙 🗉	Baud Rate 115200
		Servo Value Software Panel	DisConnect
S9 1500÷	<b>\$10</b> 1500 ÷	Min Value 500 🚖 Panel Default 🕂	ONUINE
<b>—</b> • <b>—</b>		Max Value 2500 🔄 Themes Light -	ONLINE
			Speed(ms) 500
S17 1500	S18 1500 ÷	Servo On/Off	Delay(ms) 500
		🗹 Servo 1 🗹 Servo 2 🗹 Servo 3 🗹 Servo 4 🗹 Servo 5 🗹 Servo 6	Add Delete
		🛛 Servo 7 🖓 Servo 8 🖓 Servo 9 🖓 Servo 10 🖓 Servo 11 🖓 Servo 12	Import Clear
S25 1500	S26 1500 ÷	🛛 Servo 13 🗹 Servo 14 🗹 Servo 15 🗹 Servo 16 🗹 Servo 17 🗹 Servo 18	Export Stop
-0-	-0-	🗵 Servo 19 🗹 Servo 20 🗹 Servo 21 🗹 Servo 22 🗹 Servo 23 🗹 Servo 24	Run Loop
		🛛 Servo 25 🖾 Servo 26 🖾 Servo 27 🖾 Servo 28 🖾 Servo 29 🖾 Servo 30	Read Action Grou
I Channel:		Servo 31 Servo 32 All ON ALL OFF	Download Erase
struction Sender			System Info
		OK Cancel	System Initialized
			COM51 connected OK
			Controller
Group 🚺 🕹	Index 0	0	Clear 0%

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### Figure 20

After selecting the Software Panel interface, you can specify the servo motor number for each position, as shown in *Figure 21*.

**Note:** If there are duplicate servo motor numbers, they cannot be saved.

RTrobot Servo Controller Ver: 3.2.5	- 🗆 X
Setting Panel Help	
-Panel-	Interface
	● COM ○ TCP
S1         1500÷         S2         1500÷         ● Configuration         ? × •         ●	Serial NO. COM26
Software Panel	Baud Rate 115200 🕂
Panel 18-DOF Spider	DisConnect
S9 1500 ↔ S10 1500 ↔ Themes Light	
	ONLINE
18-DOF Spider	Speed(ms) 500 🚽
S17 1500÷ S18 1500÷ 2 ♣ 17 ♣	Delay(ms) 500 🚽
	Add Delete
	Import Clear
	Export Stop
	Read Action Groups
All Channel: 8 🕹 [11 🕹	Download Erase
Instruction Sender	System Into
	System Initialized
	Thanks to use Servo
	Controller
Group 0 Undex 0 0	Clear 0%

Figure 21

## **II**. Servo motor controller settings:

Click "Setting" -> "Hardware" to set the controller, as shown in *Figure 22*.

Servo Initial Value: Set the initial value for each servo motor when powered on.

Servo Deviation Value: Set the deviation value for each servo motor (valid value: - 99~99), as shown in *Figure 23*.

UART Baud Rate: Set the serial port baud rate at position (4) in *Figure 5.* 

Buzzer: Low voltage alarm switch.

Start Automatic Run: Switch for automatic running of action group at startup.

**Automatic Run Group**: Set the action group number to be automatically run at startup. This option is invalid when the automatic running is set to action group mode only.

**Automatic Run Times**: The number of times the action group runs at startup. This option is invalid when the automatic running is set to action group mode only.

**Note:** After setting, remember to click "Apply" and wait for the settings to be completed. The controller needs to be restarted for the settings to take effect after each setting.

🖶 Hardware		? ×	🕀 Hardware		? ×
Servo initial value Servo deviatio	on value		Servo initial value Servo	deviation value	
Servo 1 1500 🖨 Se	ervo 2 1500 🗘 S	ervo 3 1500 🕏	Servo 1 0	Servo 2 0	Servo 3 0
Servo 4 1500 🖨 Se	ervo 5 1500 🖨 S	ervo 6 1500 🖨	Servo 4 0	Servo 5 0	Servo 6 0
Servo 7 1500 🖨 Se	ervo 8 1500 🖨 S	ervo 9 1500 🖨	Servo 7 0	Servo 8 0	Servo 9 0
Servo 10 1500 🖨 Se	ervo 11 1500 🖨 S	ervo 12 1500 🖨	Servo 10 0	Servo 11 0	Servo 12 0
Servo 13 1500 🖨 Se	ervo 14 1500 🖨 🛛 S	ervo 15 1500 🖨	Servo 13 0	Servo 14 0	Servo 15 0
Servo 16 1500 🖨 Se	ervo 17 1500 🖨 🛛 S	ervo 18 1500 🗘	Servo 16 0	Servo 17 0	Servo 18 0
Servo 19 1500 🖨 Se	ervo 20 1500 🖨 🛛 S	ervo 21 1500 🗘	Servo 19 0	Servo 20 0	Servo 21 0
Servo 22 1500 🖨 Se	ervo 23 1500 🖨 🛛 S	ervo 24 1500 ≑	Servo 22 0	Servo 23 0	Servo 24 0
Servo 25 1500 🖨 Se	ervo 26 1500 🖨 🛛 S	ervo 27 1500 ≑	Servo 25 0	Servo 26 0	Servo 27 0
Servo 28 1500 🖨 Se	ervo 29 1500 🗘 S	ervo 30 1500 🖨	Servo 28 0	Servo 29 0	Servo 30 0
Servo 31 1500 🖨 Se	ervo 32 1500 🗘 🛛 A	Il Servo 1500 🖨	Servo 31 0	Servo 32 0	All Servo 0
UART Baud Rate 9600	Buzzer	Open 🚽	UART Baud Rate 9600	) 🖶 Buzzer	Open 🚽
Start automatic run No	automatic run group	0	Start automatic run No	automatic	run group 🛛 🕹
automatic run times(max:254; loo	op:0;) 0	•	automatic run times(max:	254; loop:0;) 0	ł
Apply	Close	e	Apply		Close

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#### Figure 22

#### Figure 23

## **IV. 3D Display Effect:**

Click "Setting" -> "3D Virtual" to display the 3D effect interface.

**Note:** To display the 3D effect interface, you need to first select the control interface on the "Software" settings page and then open the serial port.

🖶 RTrobot Servo Controller Ver: 3.2.0	– 🗆 X	🛞 RTrobot Servo Controller 4-DOF Robot —	
Setting Help			
Panel	Interface		
	● COM ○ TCP		
	Serial NO. COM51 🛛		
S2 1520 - S3 1627 -	Baud Rate 115200 🔱		
	DisConnect		
	ONLINE	. <b></b>	
	Speed(ms) 500 👆		
S1 1755-÷	Delay(ms) 500 👆		
	Add Delete		
	Import Clear		
	Export Stop		
	Run Loop		
All Channel:	Download Erase		
Instruction Sender	System Info		
1	System Initialized		
	COM51 connected OK		
	Controller		
Group 0 🚽 Index 0 0	Clear 0%	Because the computer system can not achieve accurate microsecond timing.	
		So if the speed is inaccurate, please try to modify the base here.	15 🗢

Figure 24

## V. Software Control:

1. Choose a suitable wiring method and connect it to the computer with a USB cable.

2. Open the "ServoController.exe" software.

3. Select the serial port and open it. If using WIFI mode, select TCP and enter the TCP address and port set by the WIFI module's TCP server.

**Note:** Only when connected to the computer with a USB cable can all functions be used.

### 1) Single servo motor operation:

As shown in *Figure 25*, the angle value of the servo motor can be changed by dragging or filling in the value.



## 2) Multiple servo motor operation:

As shown in *Figure 26*, first select the action group number to be edited in the "Group" selection box under the instruction information box, then set the first line of the operation value for each servo motor, and set the operating speed "Speed" and the delay time "Delay" after execution. Click "Add" to add, and then set the second line of the operation value for each servo motor and click "Add" to add. After all preset actions are set, click "Run" to test. If "Loop" is selected, it will run indefinitely.

Servo motor running speed "Speed": Complete the instruction within the specified time (cannot exceed the physical maximum speed of the servo motor).

Servo motor completion wait time "Delay": Delay the specified time after completing the current instruction before executing the next instruction.





## 3) Action instruction saving:

Click "Export" to save the action instruction to a text file for future import use. Note: Here it is saved as instructions for all action groups.

## 4) Use file import operation:

Click "Import" to import previously saved action instructions into the software. **Note:** Here it is imported as instructions for all action groups.

## 5) Action instruction editing:

Click on the instruction that needs to be edited in the instruction information box, right-click and select "Edit" or use the shortcut key "Ctrl + E" to edit.



Figure 27

## 6) Offline operation:

After all instructions are edited, click "Download" to download the instructions for all action groups.

In the "Setting"-> "Hardware" interface, turn on the controller's automatic operation switch and select the action group number to be run.

## 7) Read instructions:

Click "Read" to read all instructions that have been downloaded to the controller.

### 8) Erase all action groups:

Click "Erase" to erase all instructions that have been downloaded to the controller. The erasing time is about 30 seconds.

## 9) Manual instruction editing:

Click "Instruction" to manually enter or edit instructions in the pop-up dialog box.

roup 0	Index 3 of 3	Alias	Instru
ure 28			

## **VI. Action Group Editing:**

Click "Action group" to open the action group running and editing window, as shown in *Figure 29*. Here, only the action group instructions can be edited, such as:

G1F3		
G17F5		

G1 represents action group 1, and F3 represents running 3 times.

After editing is complete, you can click "Run" for testing. After successful testing, you can download and save it to the controller. When you open the software next time, you can use the "Read" function to read the previously downloaded action group instructions. If you need to run automatically, please change the automatic running switch to "Action Group Only" in the hardware settings.



Figure 29

# VII. MPU6500 (Only for 24-channel servo motor controller):

Click "Setting" -> "MPU6500" to open the MPU6500 setting interface, as shown in *Figure 30*. Click the "Disable" button to change the status to "Enable" to turn on the MPU6500. Pitch, Roll, and Yaw are the XYZ values of the MPU6500. After filling in the allowable deviation value, the action group and the number of runs to be performed when the values are exceeded, tilt the controller to trigger the running state and press the "Apply" button to make it effective and restart the controller. When the tilt direction of the controller reaches the set value, the previously set action group and the number of runs will be triggered and executed. (When debugging with the upper computer software by connecting to the computer via a USB cable, the MPU6500 will not be triggered.)

If the number of runs is set to "0", it will not be triggered, and only the MPU6500 value will be fed back through the serial port.

21	,	-2	,	-21	\r	\n
0X32 0X31	0X2C	0X2D 0X32	0X2C	0X2D 0X32 0X31	0X0D	0X0A
Pitch	,	Roll	•	Yaw	\ <b>r</b>	\n

(P) MPU6500				2 X
51				
Enable	Bitch	<b>B</b> -11	Marrie	Baulatian
	Pitch	KOII	Yaw	Deviation
Current value	21	-2	-21	50 🔹
S1 Perform value	21	-2	-21	
ActionGroups	0	RunTimes	0	

Figure 30

**Note:** Before executing the action group, the serial port will first feedback "TRIGGER", and after executing the specified action group, it will feedback "OK".

# **Ⅲ**. 6-channel digital level sensor interface (Only available on the 16-channel servo motor controller):



#### Figure 31

The six digital level sensor interfaces highlighted in the red circle of *Figure 31* can independently control six action groups or maintain the current position of designated servo motors., which can independently control six action groups or maintain the current position of specified servo motors (only supports 3.3/5V digital level sensors).

If using the USB cable to connect to a computer and debugging with the upper computer software, the external sensor will not trigger.

**Note:** The GND of each sensor needs to be connected to the GND of the controller. When multiple INs are triggered at the same time, the one with the lower sequence number is effective;

#### IN1 > IN2 > IN3 > IN4 > IN5 > IN6

Example 1: IN2 and IN3 are triggered at the same time, only the action group specified by IN2 will be executed. If IN2 is released and IN3 is still triggered, the action group specified by IN3 will be executed.

Example 2: IN1 triggers the execution of an action group, while IN6 maintains the current position of a servo motor. When both are triggered at the same time, they do not affect each other, and both IN1 and IN6 are effective.

itomatic run times(m	1ax:254; 100p:0;)	0	•	Group	0	
Start automatic run	Yes 🚽	automatic run group		IN 6	Disabl 🚽	23
JART Baud Rate	9600	Buzzer	Open 🔸	Group	0	
				Group	O Stop	
			All Servo 1500 🕏	IN 5	Disabl -	m
				Group	0	
				Group	Stop	
				IN 4	Disabl 🐣	
ervo 16 1500 🜲				Servo	5	e
iervo 13 1500 ≑	Servo 14	4 1500 🜩	Servo 15 1500 🜩	O Group	<ul> <li>Stop</li> </ul>	p
				IN 3	Low 👆	Ν
iervo 10 1500 🖨	Servo 1	1 1500 🗘	Servo 12 1500 ≑	Group	211 🚽	
iervo 7 1500 🗘	Servo 8	1500 🜲	Servo 9 1500 🜩	Group	Stop	0
iervo 4 1500 루	Servo 5	1500	Servo 6 1500 👻	IN 2	High 👆	
		4500 4		Group	2	а
iervo 1 1500 🗘	Servo 2	1500 ≑	Servo 3 1500 🜩	Group	Stop	e
Servo initial value S	ervo deviation value			IN 1	Low 🚽	Le .

**INx** three options:

- Disable: Off (Trigger is invalid)
- High: Trigger on high-level signal
- Low: Trigger on low-level signal

**Group**: Action group executed after triggering.

Stop: Stop the servo motor after triggering and maintain the current position.

**Note**: Before executing the action group, the serial port will first provide feedback "TRIGGER", and after completing the specified action group, it will provide feedback "OK".

Note: AC level sensors are invalid.

## IX. Firmware upgrade method:

- 1. Download the latest PC software from "http://www.rtrobot.org/software" website.
- 2. Open the latest version PC software.
- 3. Hold down the button on the servo motor controller while connecting the USB data cable, and then release the button.



```
Figure 33
```

- 4. Open the serial port in the latest PC software. The firmware will start to upgrade. After the upgrade is complete, a message will be displayed: "Update Success, Restart the controller, please."
- 5. Restart the servo motor controller
- 6. If the firmware is already up to date, the message "ERROR Don't need update!" will be displayed.

# **Dimensional drawing:**











# X. About

Thank you for using the servo motor controller produced by RTrobot. If you have any questions about the controller during use and need to consult, you can email us at admin@rtrobot.org.