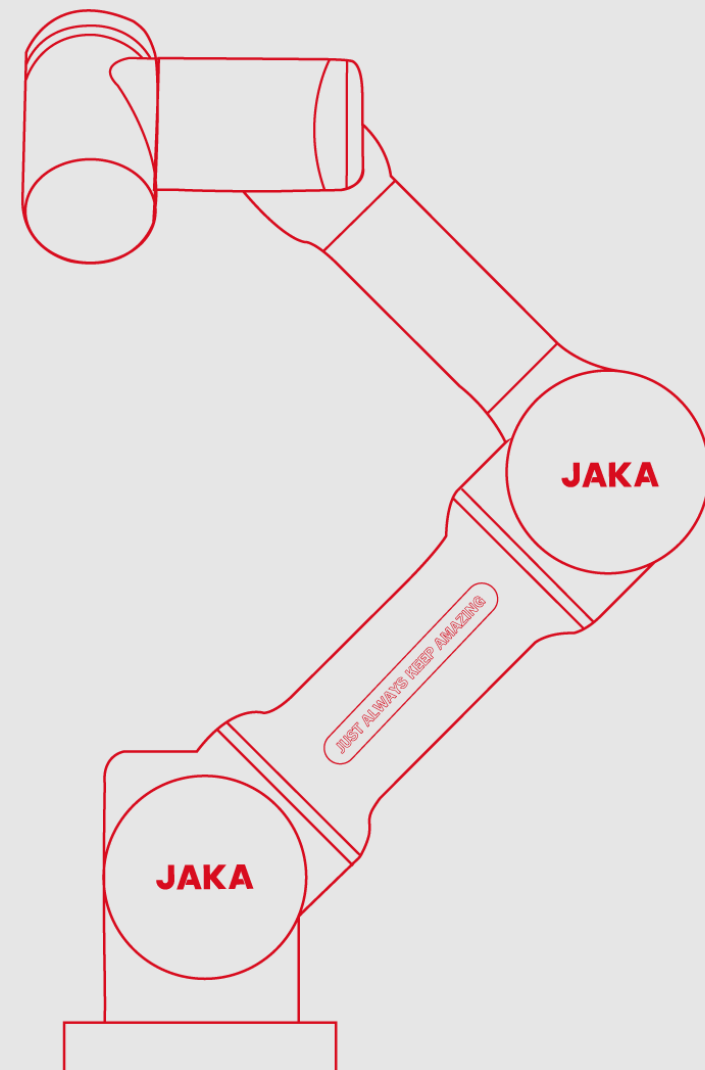


JAKA® | 节卡

Just Always Keep Amazing

JAKA Zu Cobot Training Lesson





CONTENTS

01

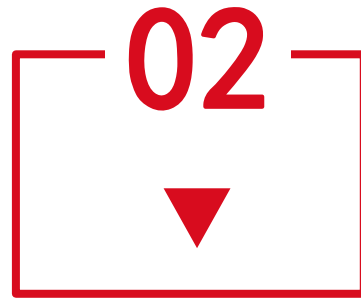
Robot features

02

Basic content training

03

Maintenance and service



Basic content



Basic content

01**Hardware introduction****02****Start up and run****03****Interface introduction****04****System Settings****05****Basic Commands****06****Services****07****Safety standards**

01

Hardware introduction

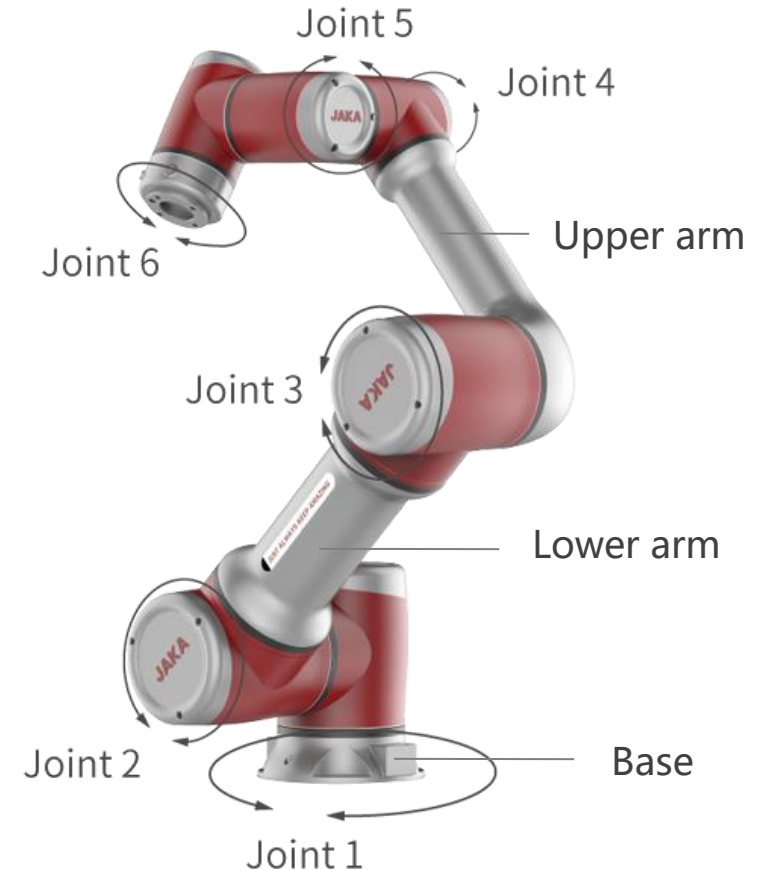


Structural characteristics (Eg. Zu 7)

- Six-axis joint robot
- Base, 6 joints, 2 linkages
- Axis 1 is the rotating base
- Axis 2 is perpendicular to Axis 1
- Axis 2、3、4 are parallel
- Axis 5 is perpendicular to Axis 4
- Axis 6 is perpendicular to Axis 5
- Axis 1、2、3 use high-power joint
- Axis 4、5、6 use low-power joint
- Joint 6 has output flange
- Joint 6 has tool IO interface
- Joint 6 has indicator light and drag-and-drop button



Electrical cabinet





Integrated

- Driver board
- Motor
- Reducer
- Encoder

Delicate

- Small size
- Light weighted
- Easy to replace

Safe

- Torque detection
- Overcurrent protection
- Overload protection
- Overtemperature protection

Parameters

	JAKA Zu [®] 3	JAKA Zu [®] 7	JAKA Zu [®] 12	JAKA Zu [®] 18	
Character	Payload	3kg	7kg	12kg	18kg
	Weight (W cable)	12.2kg	22kg	41kg	34.8kg
	Work radius	587mm	814mm	1327mm	1073mm
	Repeatability	±0.03mm	±0.03mm	±0.03mm	±0.03mm
	Axis	6	6	6	6
	Programming	graphical programming, free-drive			
	Teach pendant	MT (PAD/Mobile) APP			
	Collaborative operation	Accordance with GB11291.1-2011			

Parameters

JAKA Zu® 3 JAKA Zu® 7 JAKA Zu® 12 JAKA Zu® 18

Scope and speed	Robot	Work scope	Max speed	Work scope	Max speed	Work scope	Max speed	Work scope	Max speed
	Joint 1	±270°	180°/s	±270°	180°/s	±270°	120°/s	±270°	120°/s
	Joint 2	-85°, +265°	180°/s	-85°, +265°	180°/s	-85°, +265°	120°/s	-85°, +265°	120°/s
	Joint 3	±175°	180°/s	±175°	180°/s	±175°	120°/s	±175°	180°/s
	Joint 4	-85°, +265°	180°/s	-85°, +265°	180°/s	-85°, +265°	180°/s	-85°, +265°	180°/s
	Joint 5	±270°	180°/s	±270°	180°/s	±270°	180°/s	±270°	180°/s
	Joint 6	±270°	180°/s	±270°	180°/s	±270°	180°/s	±270°	180°/s
	Max speed	/	1.5m/s	/	2.5m/s	/	3m/s	/	3.5m/s

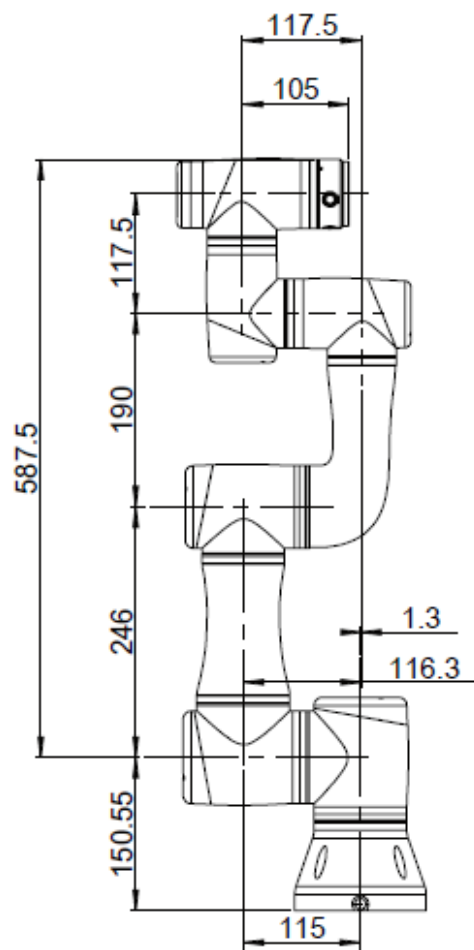
Parameters

JAKA Zu® 3JAKA Zu® 7JAKA Zu® 12JAKA Zu® 18

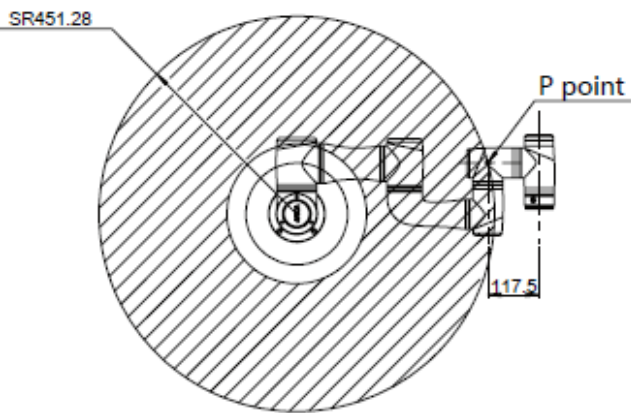
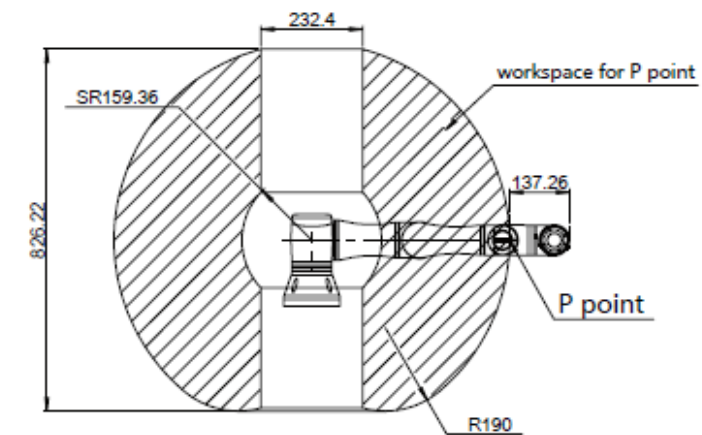
Specifications	Rated power	150W	350W	500W	600W
	Temperature range	0-50°C	0-50°C	0-50°C	0-50°C
	IP Specification	IP54	IP54	IP54	IP54
	Installation	Installation at any Angle	Installation at any Angle	Installation at any Angle	Installation at any Angle
	Tool I/O	Digital input 2	Digital input 2	Digital input 2	Digital input 2
		Digital output 2	Digital output 2	Digital output 2	Digital output 2
		Analog input 1	Analog input 1	Analog input 1	Analog input 1
	Tool I/O power	24V	24V	24V	24V
	base diameter	129mm	158mm	188mm	188mm
	Materials	Aluminum、PC	Aluminum、PC	Aluminum、PC	Aluminum、PC
	Tool I/O size	M8	M8	M8	M8
	Cable length	6m	6m	6m	6m

Dimensions

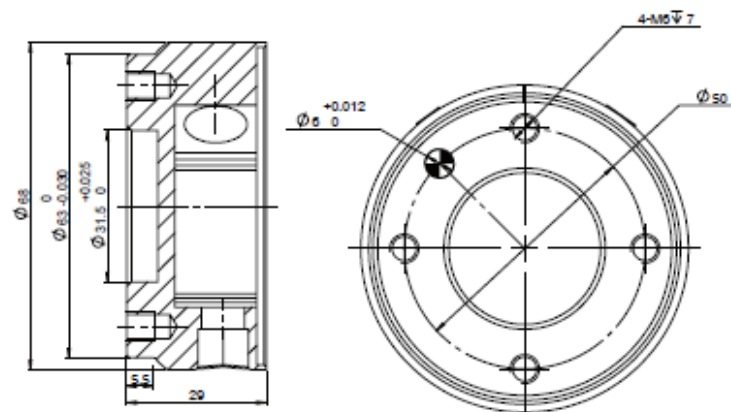
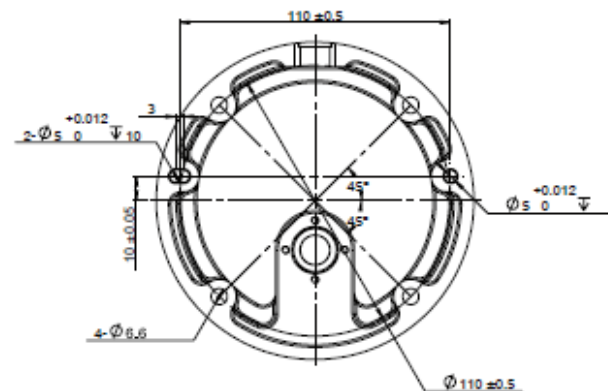
JAKA Zu 3 Layout



JAKA Zu 3 work radius



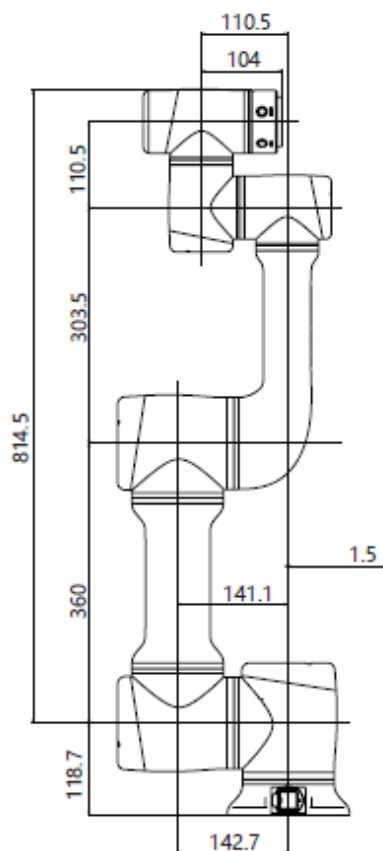
JAKA Zu 3 P point front view / top view



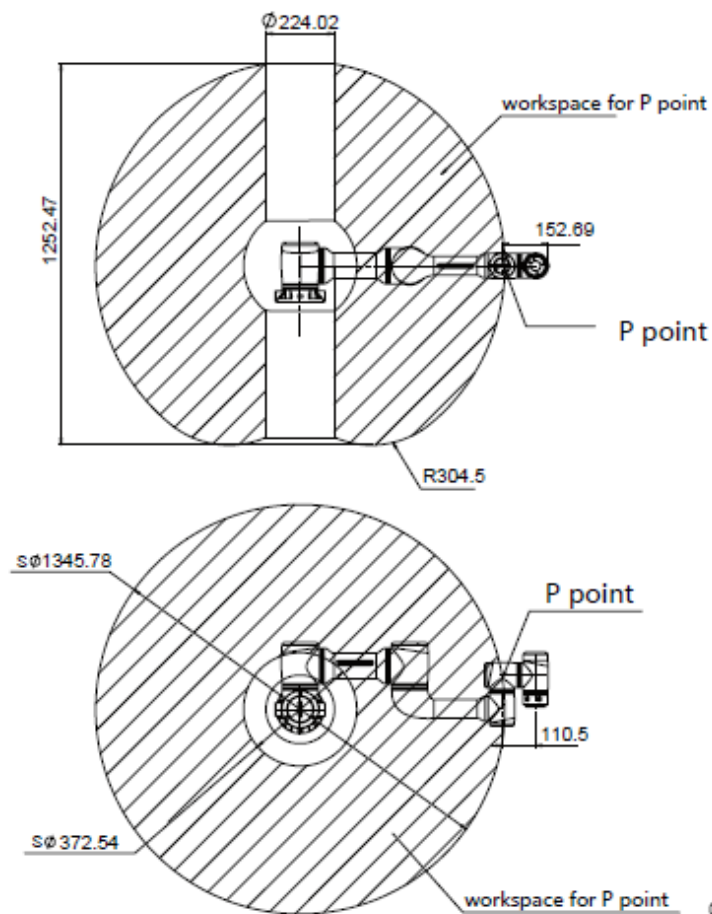
JAKA Zu 3 base / flange

Dimensions

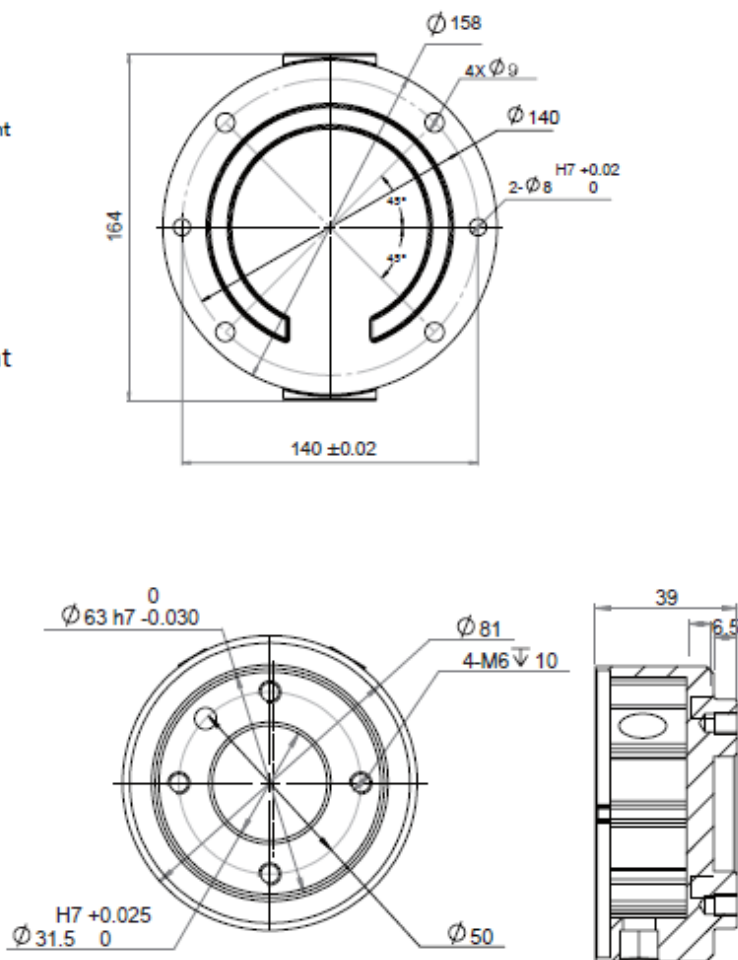
JAKA Zu 7 Layout



JAKA Zu 7 work radius



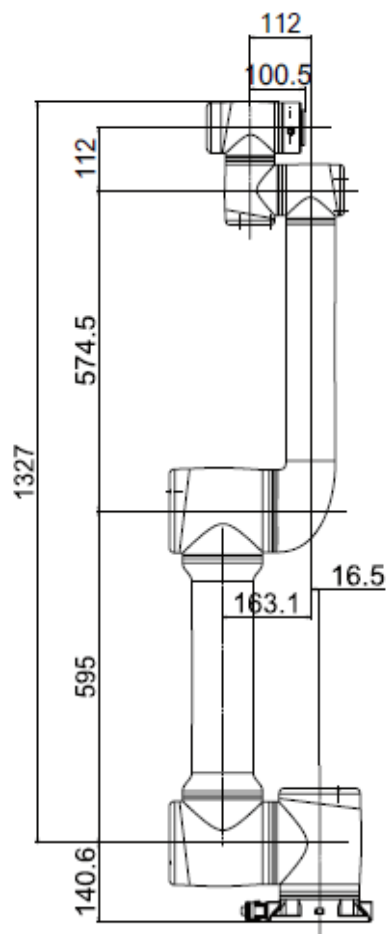
JAKA Zu 7 P point front view / top view



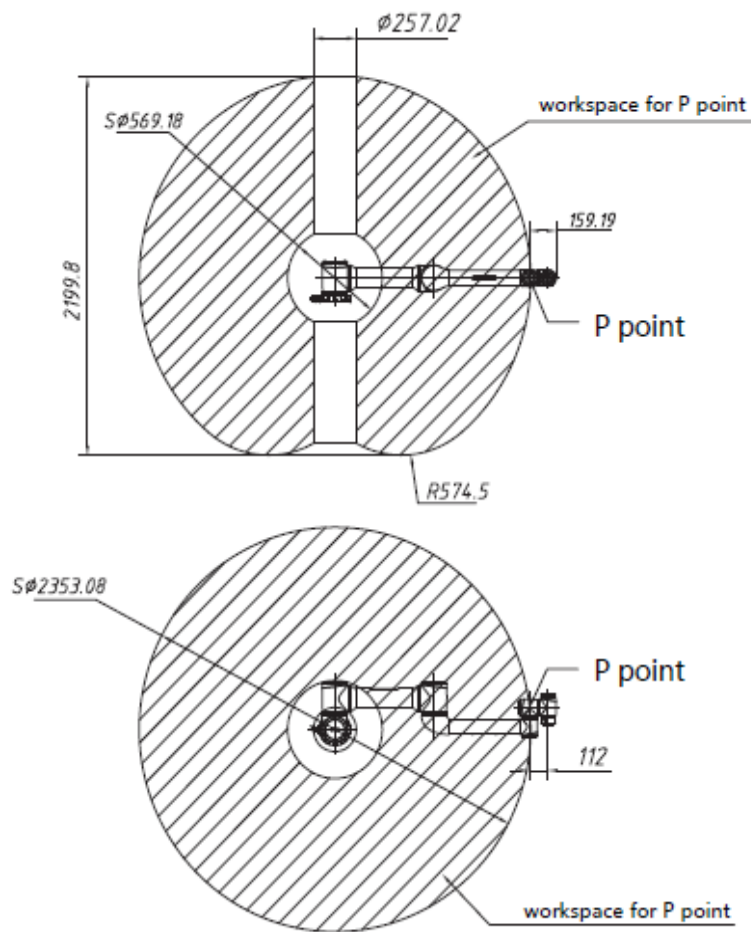
JAKA Zu 7 base / flange

Dimensions

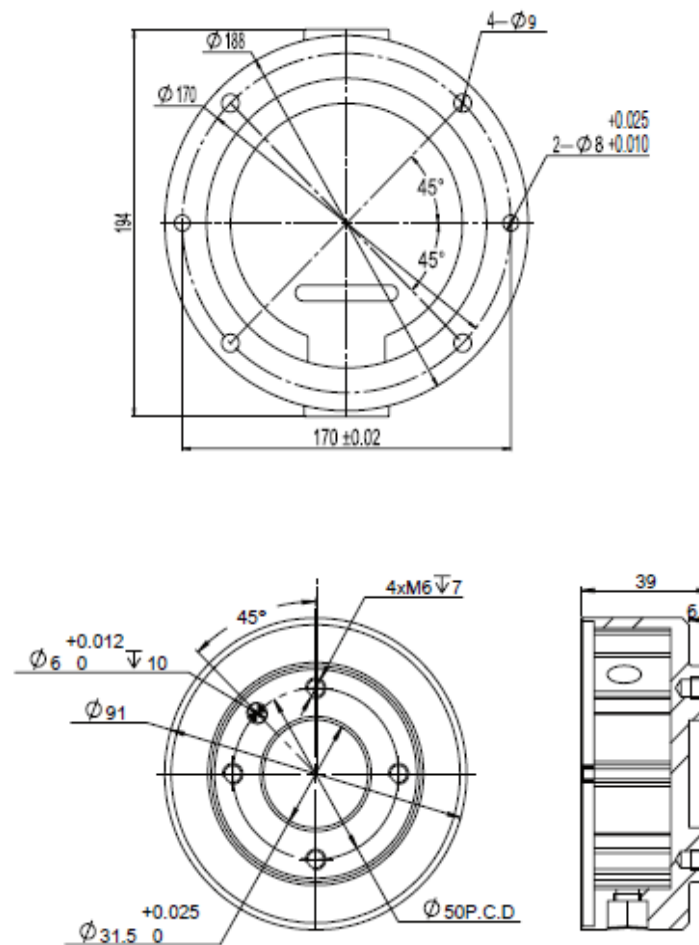
JAKA Zu 12 Layout



JAKA Zu 12 work radius



JAKA Zu 12 P point front view / top view



JAKA Zu 12 base / flange

Technical drawing of a vertical assembly with the following dimensions:

- Overall height: 1073
- Top section height: 115
- Section height: 400
- Section height: 510
- Bottom section height: 142.65
- Top width: 103.5
- Section width: 115
- Section width: 142.65
- Section width: 39
- Bottom width: 181.65

Technical drawing of the SR272.11 robot arm in its workspace. The drawing shows a top-down view of the robot arm, which is a cylindrical structure with a diameter of $\varnothing 308$. The arm is positioned within a circular workspace. The workspace is defined by a circle with a radius of 162.19. The robot arm is labeled "SR272.11". The workspace is labeled "workspace for P point". The distance from the center of the workspace to the end effector (P point) is indicated as 162.19. The overall height of the robot arm is indicated as 1820.

The technical drawing consists of three views of a circular mechanical part:

- Front View (Top):** A circular view showing concentric circles with diameters $\varnothing 188$ and $\varnothing 170$. It features four holes with diameter $\varnothing 9$ and two holes with diameter $2-\varnothing 8$. The distance between the centers of the $\varnothing 8$ holes is $+0.025$. The distance between the centers of the $\varnothing 9$ holes is $+0.010$. The overall diameter is 170 ± 0.02 . There are two 45° chamfers.
- Top View (Bottom):** A circular view showing concentric circles with diameters 60 and 91 . It features four holes with diameter $4 \times M6$ and a central hole with diameter 10 . The distance between the centers of the $M6$ holes is $+0.012$. The overall diameter is 31.5 . There are two 45° chamfers. The text "50 P.C.D." is present.
- Side View (Right):** A cross-sectional view showing the internal structure of the part, including a central hole and a flange with a diameter of 39 .

Pedestal installation

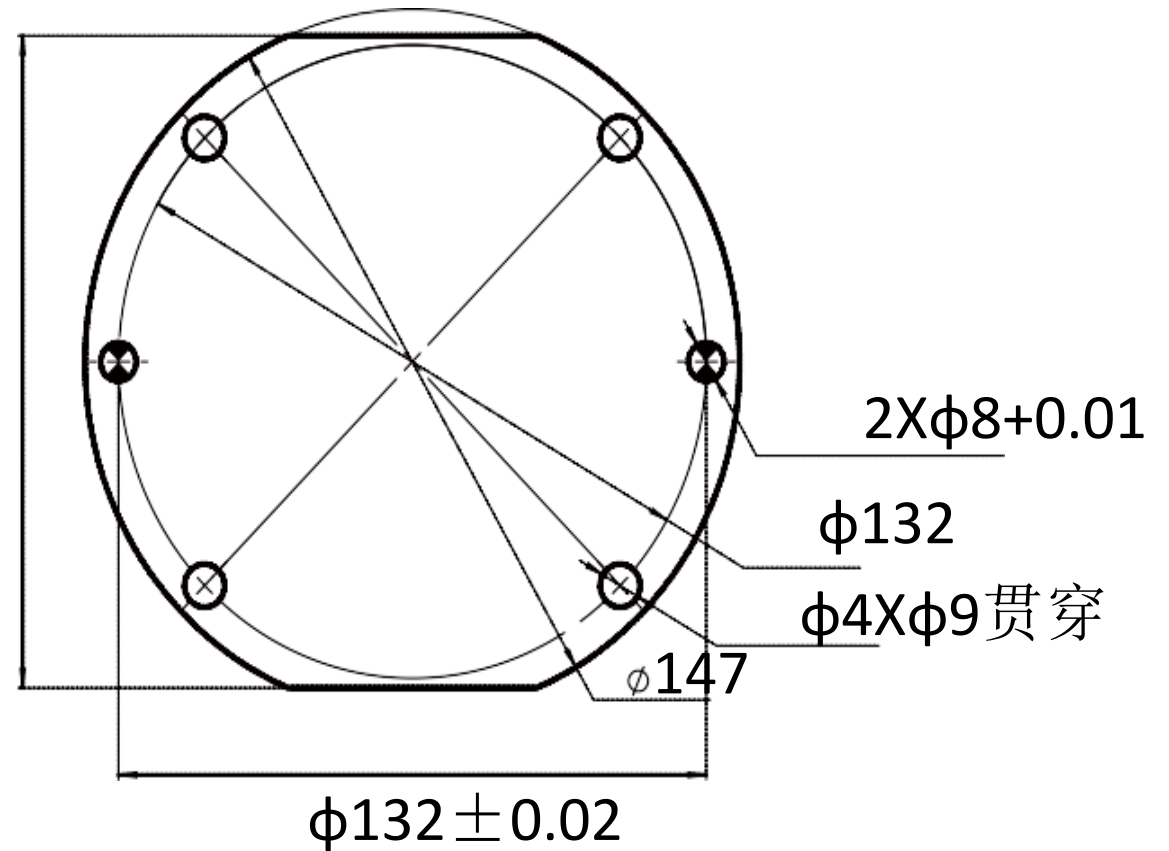
Zu 3 base installation dimensions

- Installation requirements
- Solid surface / platform
- The installation platform is firm
- 4 M6 bolts
- 2 locating pin holes

Pedestal installation

Zu 7 base installation dimensions

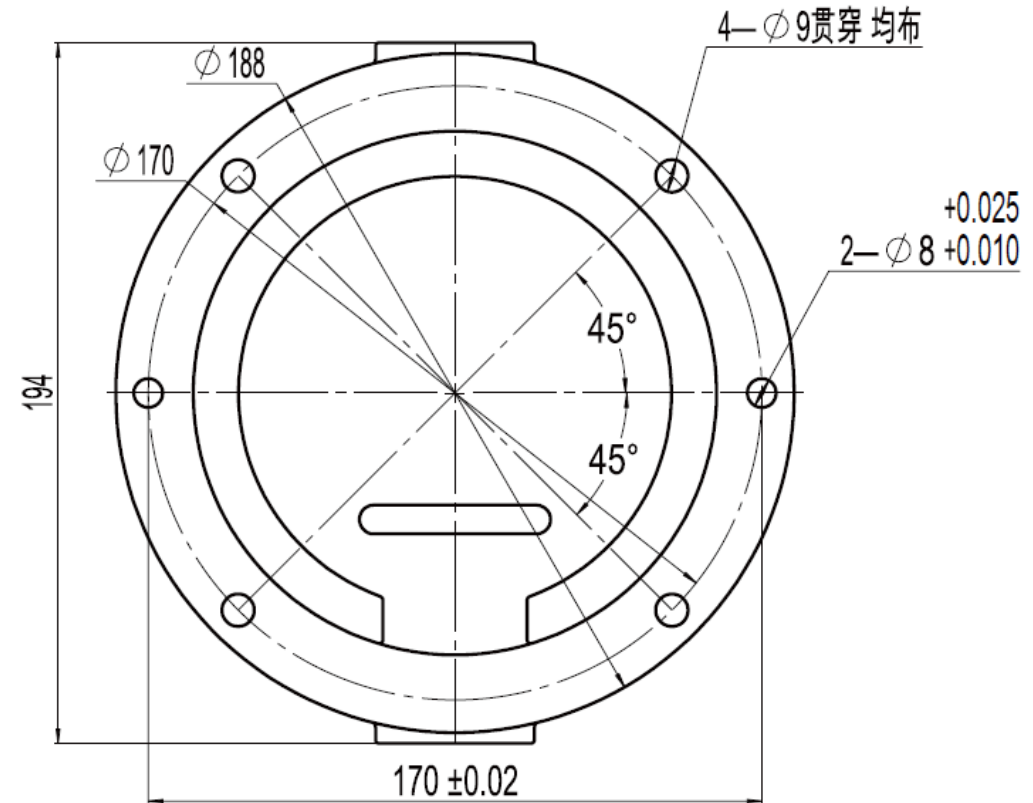
- Installation requirements
- Solid surface / platform
- The installation platform is firm
- 4 M8 bolts
- 2 locating pin holes



Pedestal installation

Zu 12 base installation dimensions

- Installation requirements
- Solid surface / platform
- The installation platform is firm
- 4 M8 bolts
- 2 locating pin holes



Tool installation dimensions

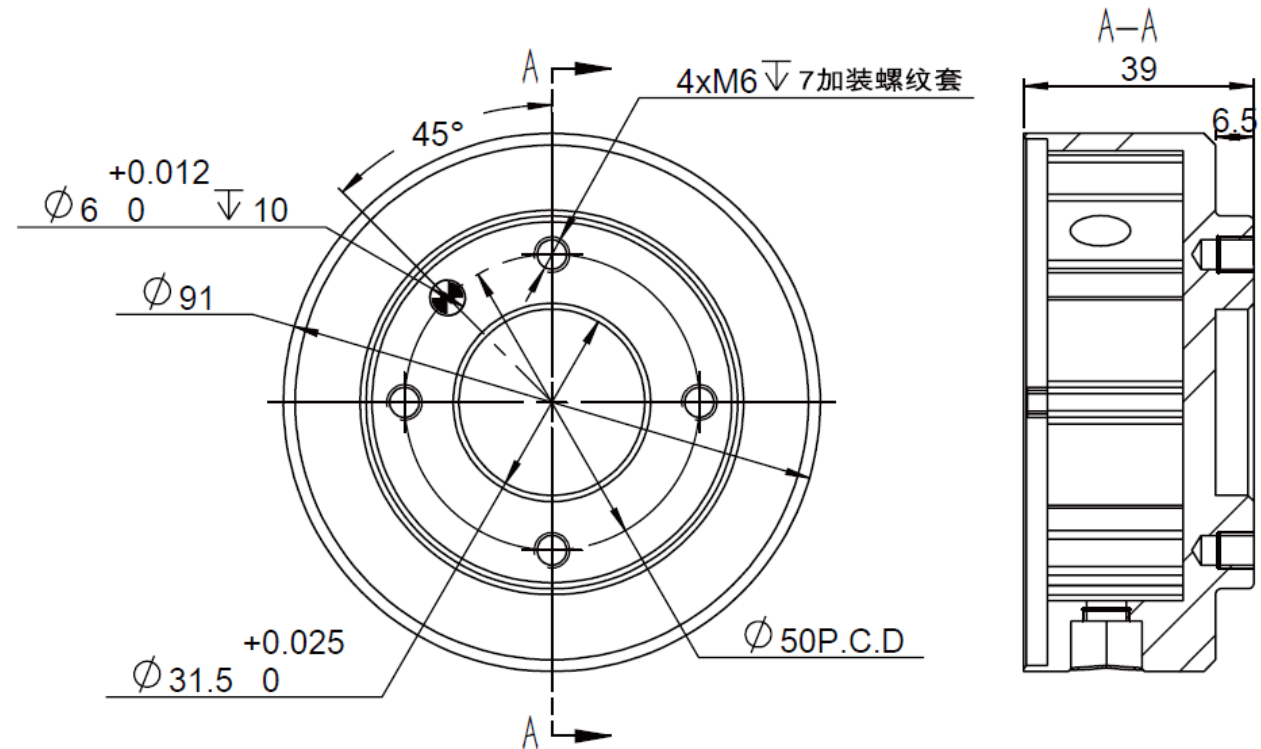
- Installation standard
- ISO 9409-1-50-4-M6
- Tool signal connector

24V power output


2 digital inputs

2 digital outputs

1 analog input



Electrical cabinet

<div>Control Cabinet</div> 	IP Specification	IP20
	Tool I/O	16 Digital input/16 Digital output /2 Analog input or output
	I/O Power	24V
	communication	TCP/IP,MODBUS TCP/RTU
	power	100-240VAC,50-60Hz
	size	400x230x260(mm) (WxHxD)
	weight	15.5kg
	material	Stainless steel

Electrical cabinet

■ Functions

- Power the robot
- Safety system
- Motion control
- Providing extended IO
- Interacting with users via APP

■ Bottom interface

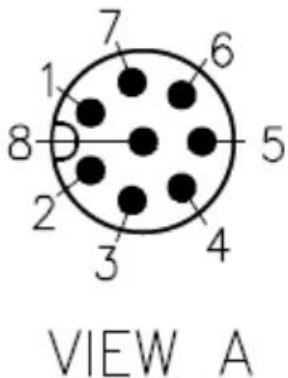
- Controller socket
- 100-240VAC power socket
- Ethernet port
- Robot cable interface

■ Size

- 400×230×260 (mm)
(W×H×D)



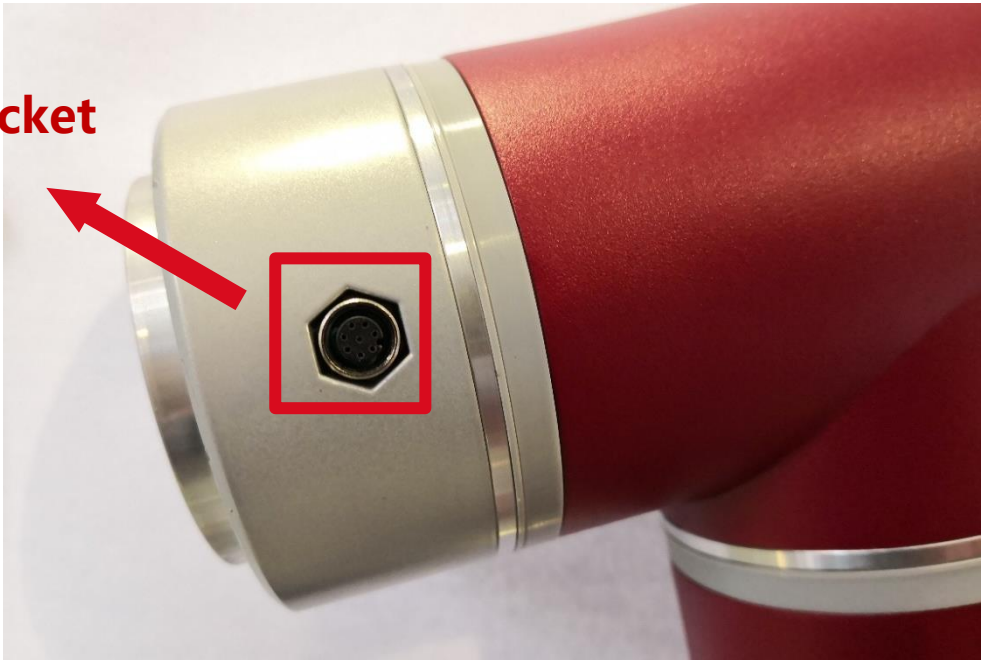
Tool IO



接线定义			
Pin	线性颜色	颜色	定义
1	Red	红	+24V
2	Blue	蓝	DI1
3	Green	绿	DI2
4	Yellow	黄	DO1
5	Pink	粉	DO2
6	Brown	棕	AIN_P
7	White	白	AIN_N
8	Grey	灰	GND

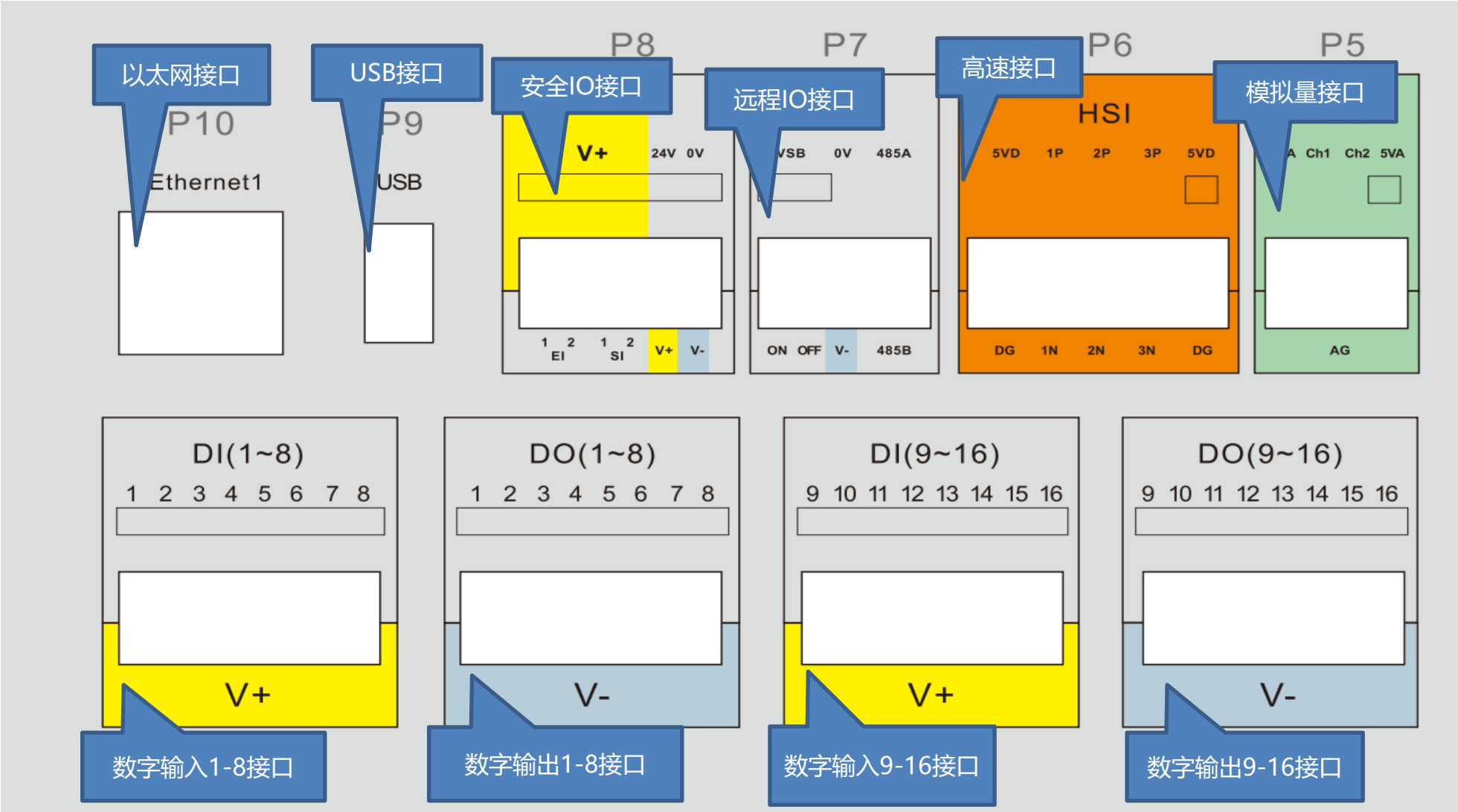
PIN	DEFINE	I/O	DESCRIPTION
1	+24V	-	24V positive. Maximum continuous current to 1.0A
2	DI1	I	Digital input 1. Optocoupler Cathode input. Internal connect4.7k resistor.
3	DI2	I	Digital input 2. Optocoupler Cathode input. Internal connect4.7k resistor.
4	DO1	O	Digital output 1. Open Drain output. Current ≤0.5A per channel.
5	DO2	O	Digital output 2. Open Drain output. Current ≤0.5A per channel.
6	AIN_P	I	Anolog input.Supports -10V~+10V voltage input. Decouple with the AIN_N pin.
7	AIN_N	I	Anolog input:Negative. Decouple with the AIN_P pin.
8	GND	-	GND. 24V Power Ground.

Tool IO socket

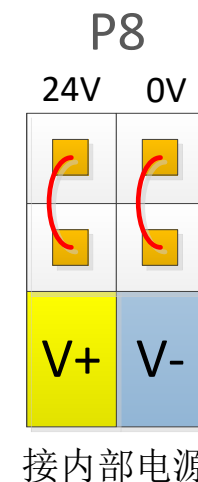
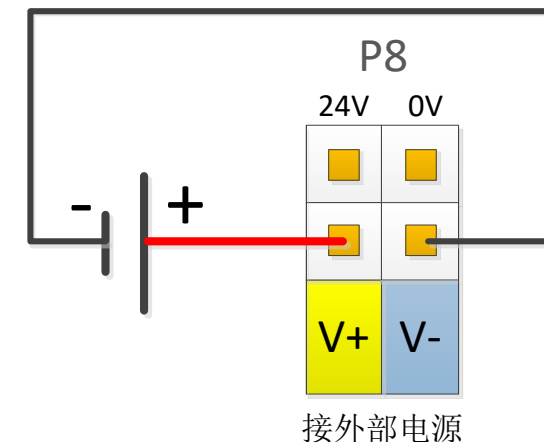
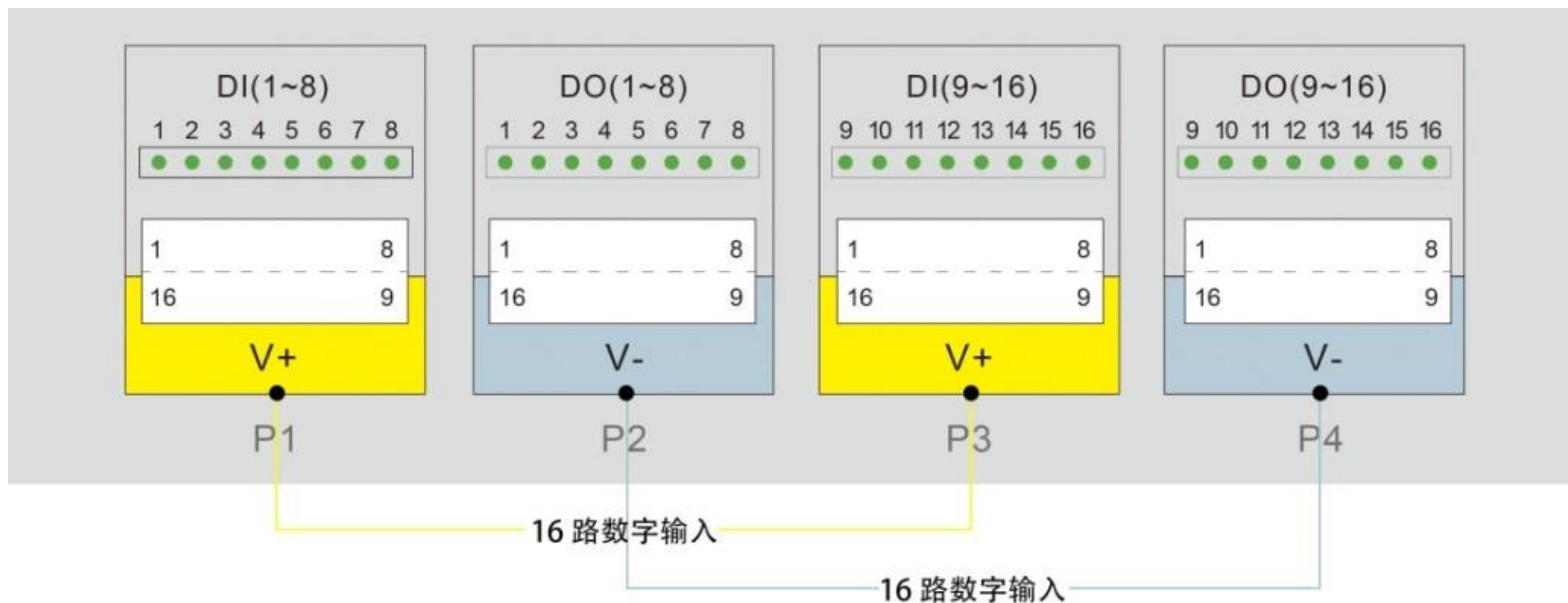


Note:
When the emergency stop button is pressed, the robot will lose power, and 24V output and DO output will not be controllable
(IO ports in the electrical cabinet are the same)
You must do a safety assessment before using TIO

Electrical cabinet IO



Signal input



The digital I/O can be powered by the 24V power supply provided inside the electrical cabinet, with 1.5A output capacity (the output will be turned off in case of overload). If the user needs more output power, the V+ power supply can be connected to the external power supply. 24V is the internal power positive, 0V is the internal ground. V+ is the positive of all universal digital I/O interfaces, and V- is the negative. The factory default configuration is using the internal power supply, as shown in the right figure:

02

Start up and run



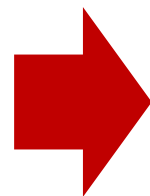
Connect the robot



01

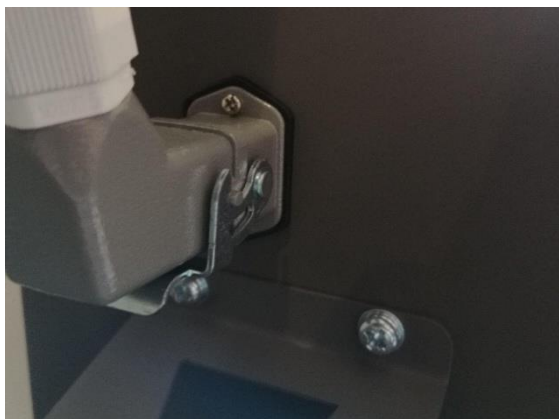


02

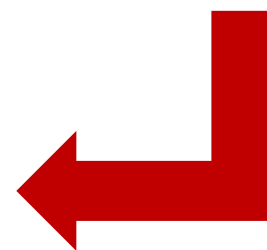
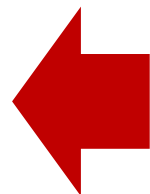


03

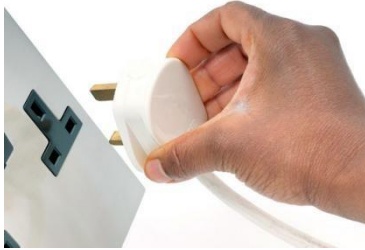
05



04



Start up the robot



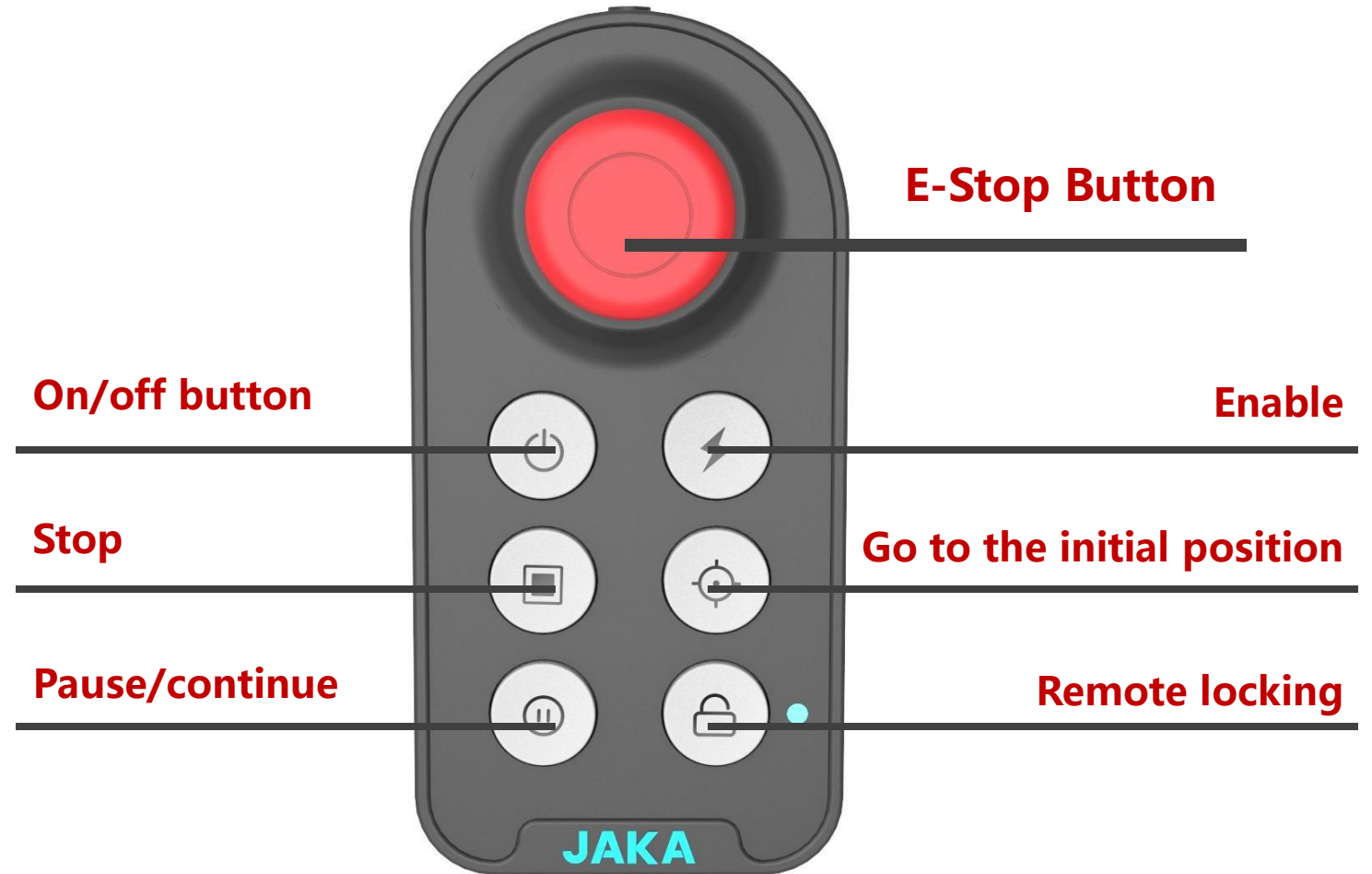
220V power



Release E-Stop Button



Press on/off button



Start up



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ON/OFF	<p>ON: Press the power button for 1 second and release it, The buzzer will ring and the electric control cabinet will start up.</p> <p>OFF: Press and hold the power button for more than 3s, the handle buzzes 6~7 times, and the electric control cabinet is turned off.</p>
Enable	<p>Turn on robot: When robot turned off, short press the button to turn on the robot.</p> <p>Turn off robot: When robot turned on, short press the button to turn off the robot.</p> <p>Enable robot: When robot turned on, short press the lock button and enable button.</p> <p>Disable robot: When robot enabled, short press the lock button + enable button</p>
Terminate	<p>Run program: press the terminate button to start the default loaded program. After robot moves to the initial position of the program, execute the default program .</p> <p>Terminate program: When program operating, short press the button to terminate the program.</p>
Reset	<p>Reset: After robot enabled, when no program is operating, press continuously to control the robot to run to the set default position. When robot moves to the default position, press continuously and the lock indicator light is blue.</p>
Pause	<p>Pause: When the robot moving automatically, press to pause the program.</p> <p>Recovery: When robot paused, press to recover the program running.</p>
Lock	<p>Locking handle: Press and hold the lock button for 3 seconds, and the lock indicator light will be orange.</p> <p>Unlock handle: Press and hold the lock button for 3 seconds, and the lock indicator light will go out.</p> <p>Combination function: Other buttons and lock button can be pressed in combination.</p>
Lock indicator	<p>Locked state: When locked, the indicator is orange. Except for the unlock button, other buttons are invalid. APP can control the robot.</p> <p>Unlocked state: When unlocked, the indicator is off and the handle can be used. The APP interface is gray and you can not control the robot.</p>
Emergency button	<p>For emergency stop.</p> <p>Note: The emergency stop button is only used in emergency situations and cannot be used as a general power-off device.</p>

Networking

Network connection

1. Connect the network port at the bottom of the electrical cabinet to the LAN port of the wireless router with the network cable
2. Wireless function of the wireless router should be turned on

Attention:

1. The robot and the PAD with the JAKA APP need to be in the same subnet
2. The wireless router, switch, AP or other network devices can be shared with other devices
3. Try to maintain wireless transmission signal strength and transmission stability
4. It is feasible whether the router is connected to the internet or not
5. Support 5G

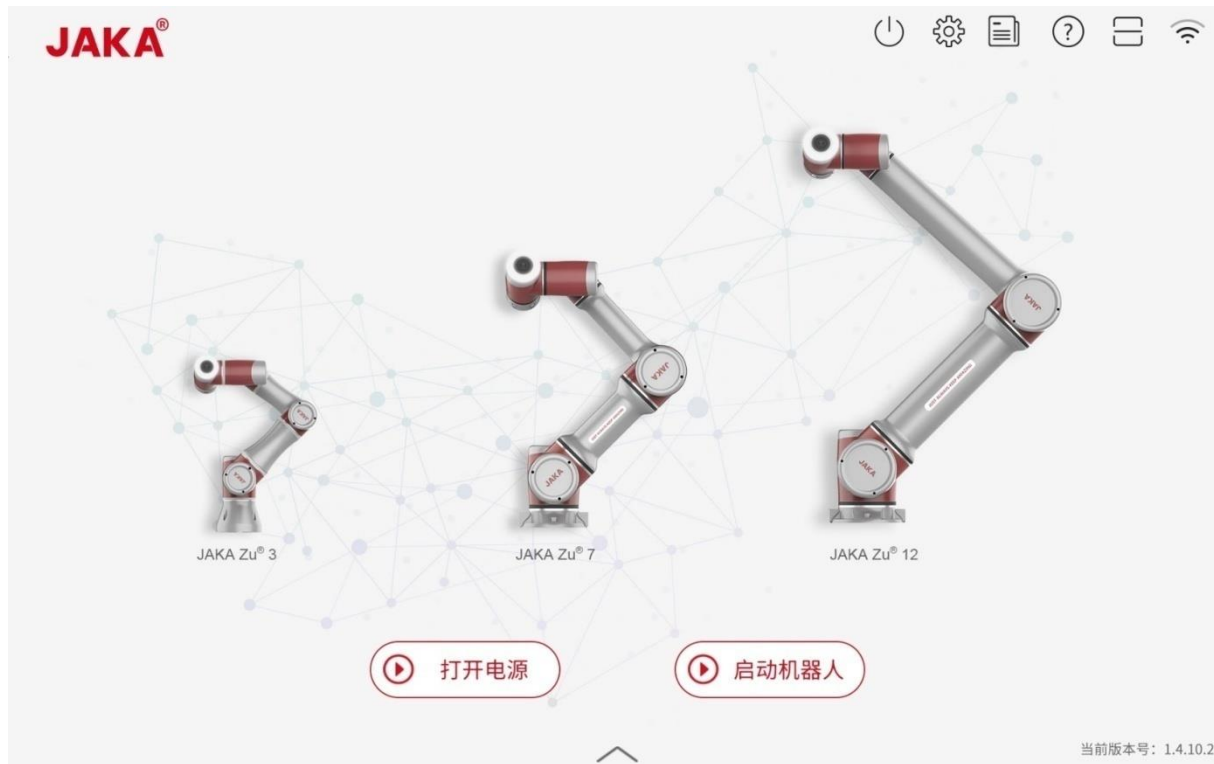
Ethernet port at the bottom of the electrical cabinet



Network cable



Connect the robot

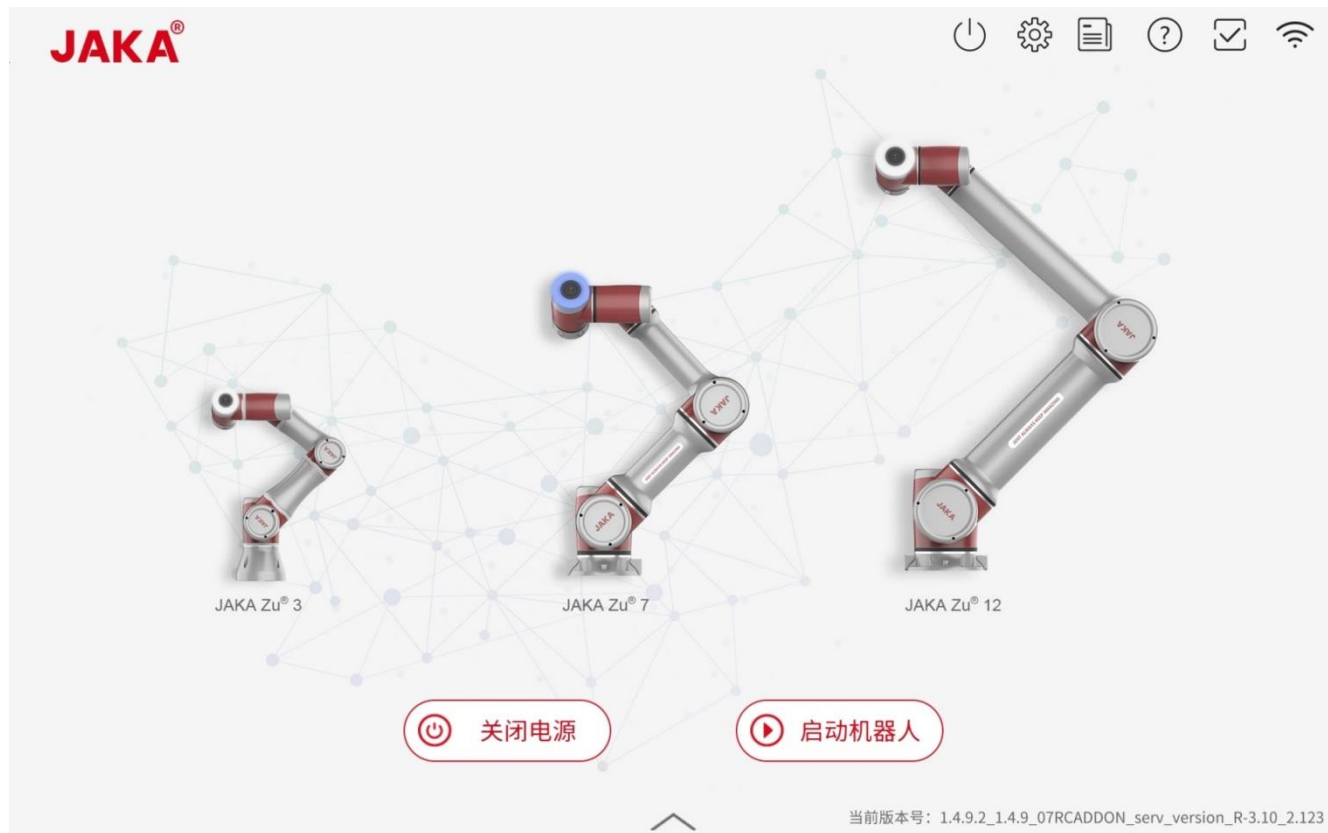


Connect the robot

- Click the connection button on the homepage of the APP
- Click the IP address of the wanted robot
- Click the “Comfirm connection” button

User name: “管理员”
Password : jakazuadmin

Start the robot



Start the robot

- Click "Turn on the power" button
- Click "Start the robot" button

03

Interface introduction



JAKA Zu APP introduction

JAKA Zu

- Developed by JAKA
- Free update

Operating system

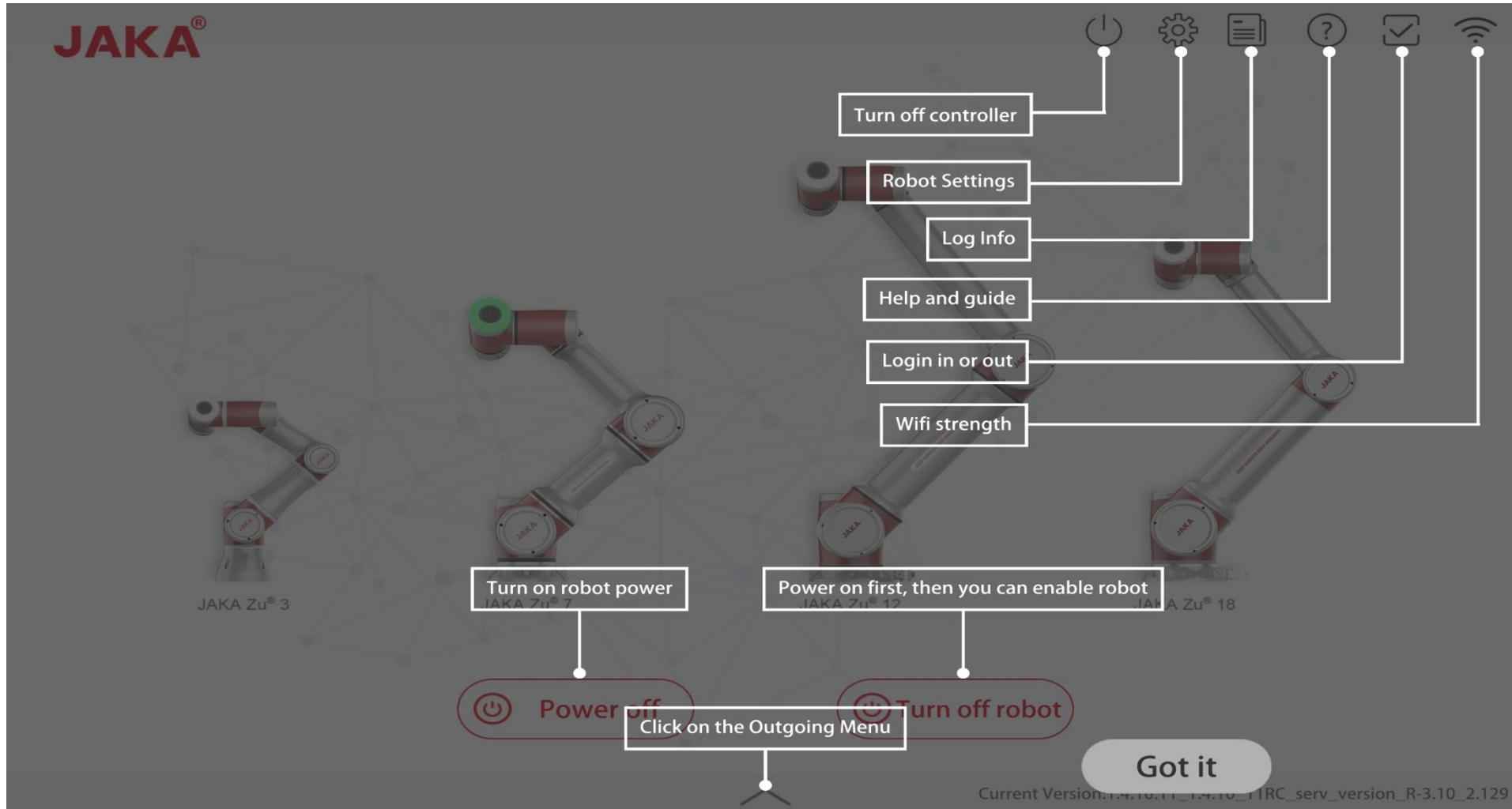
- Android
- iOS (under development)

How to get the APP

- Contact JAKA
- Download form the JAKA official
- website www.jaka.com

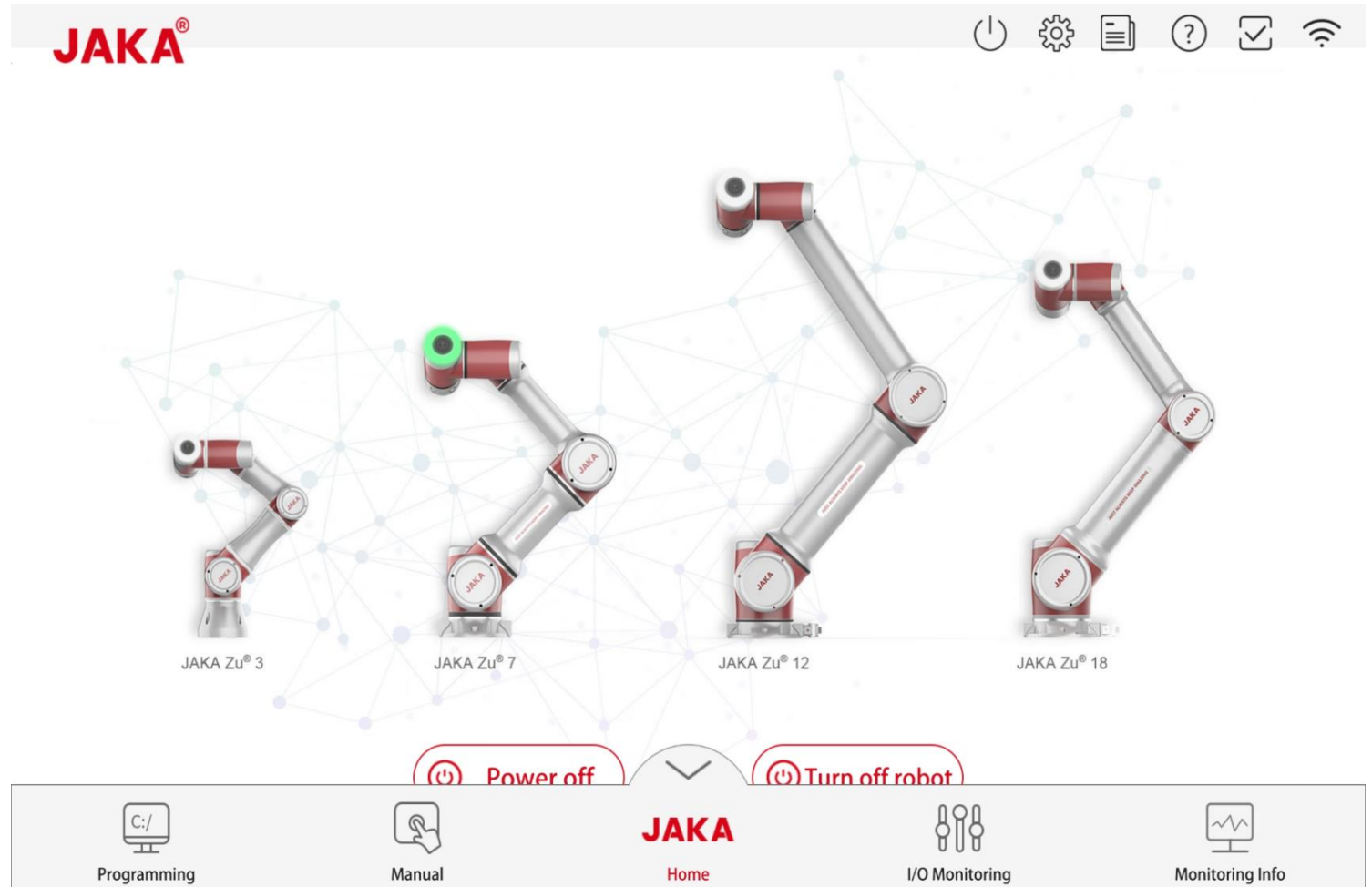


Homepage interface



The interface contains

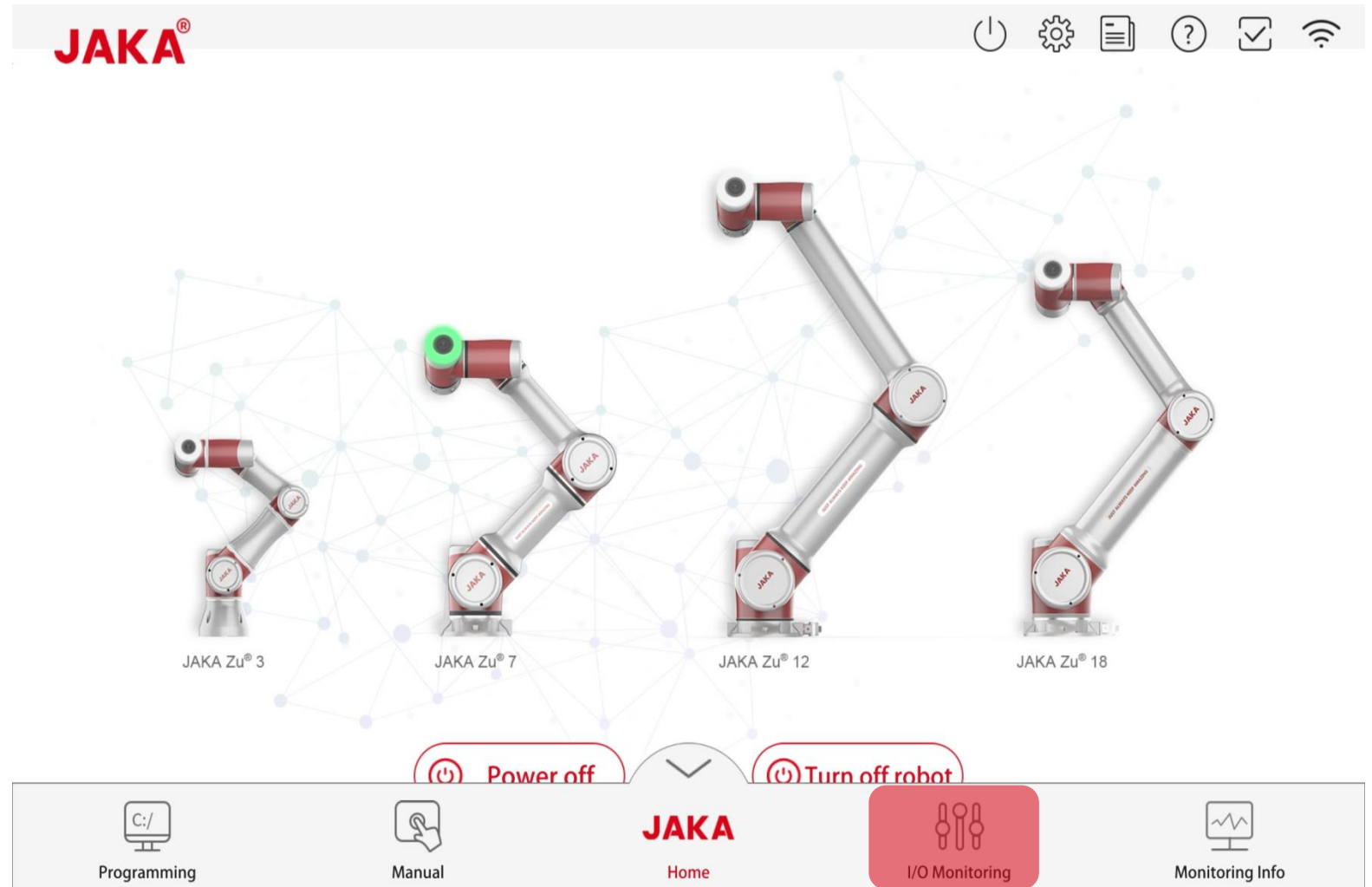
- Programming
- Manual operation
- Home
- I/O monitoring
- Monitor information
- Turn on/off the power
- Turn on/off the robot
- Turn off the electrical cabinet
- Setting
- Log information
- Help
- Connection status
- Wireless signal strength



IO Interface

I/O monitoring

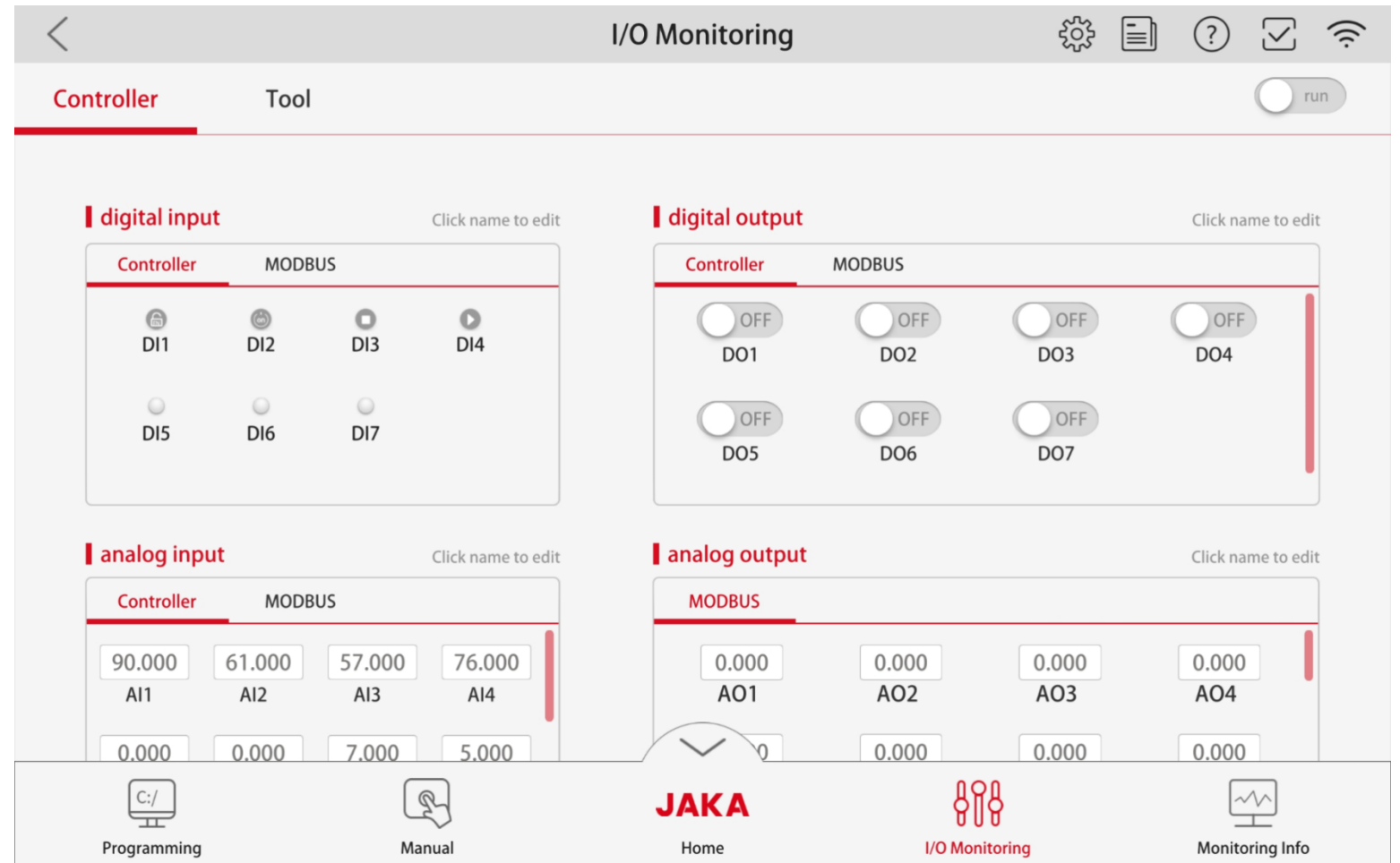
- Monitor digital input signal
- Activate digital output signal
- Monitor tool end input signal
- Activate tool end output signal



I/O inspection and control

I/O

- Monitor digital input signal
- Activate digital output signal
- Monitor tool end input signal
- Activate tool end output signal
- The output signal can be switched between on and off



IO inspection and control

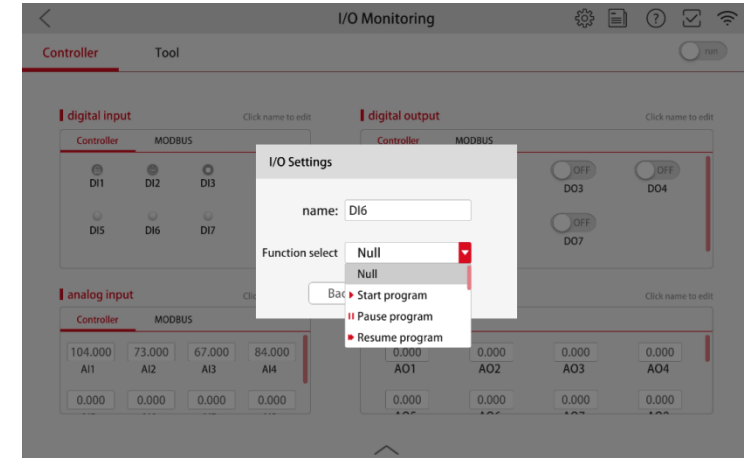
Dedicated I/O

Digital Input

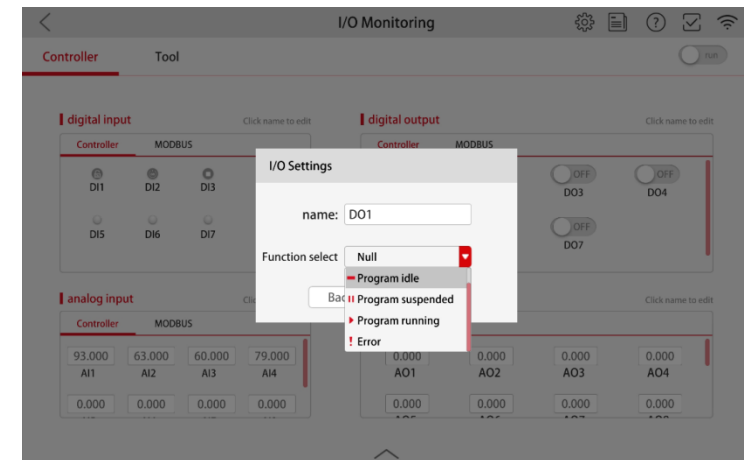
- Start the program
- Pause the program
- Continue to run the program
- Stop the program
- Turn on the power
- Turn off the poewer
- Enable the robot
- Disable the robot

Digital Output

- Idle
- Program paused
- Program running



Digital input signal

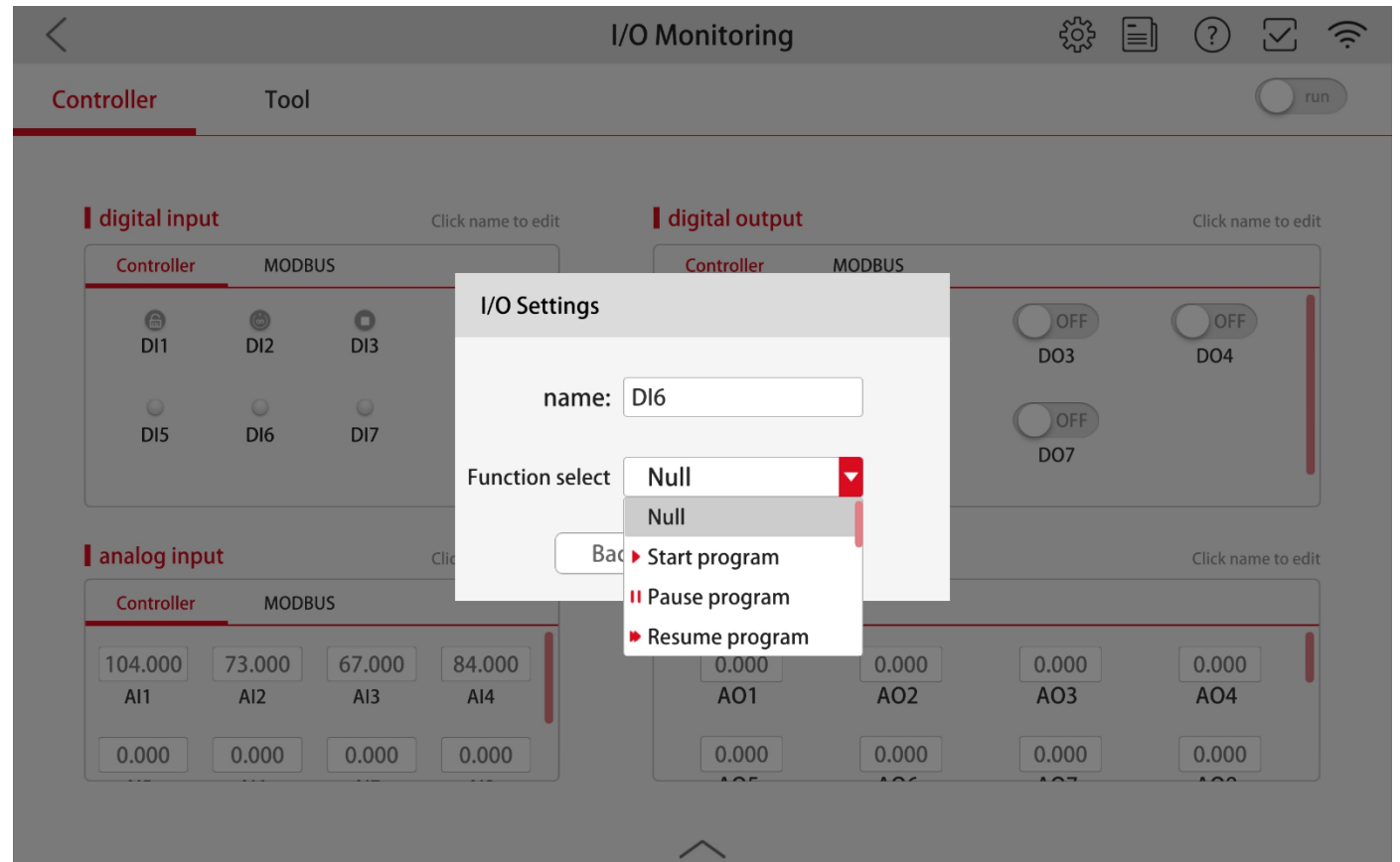


Digital output signal

IO inspection and control

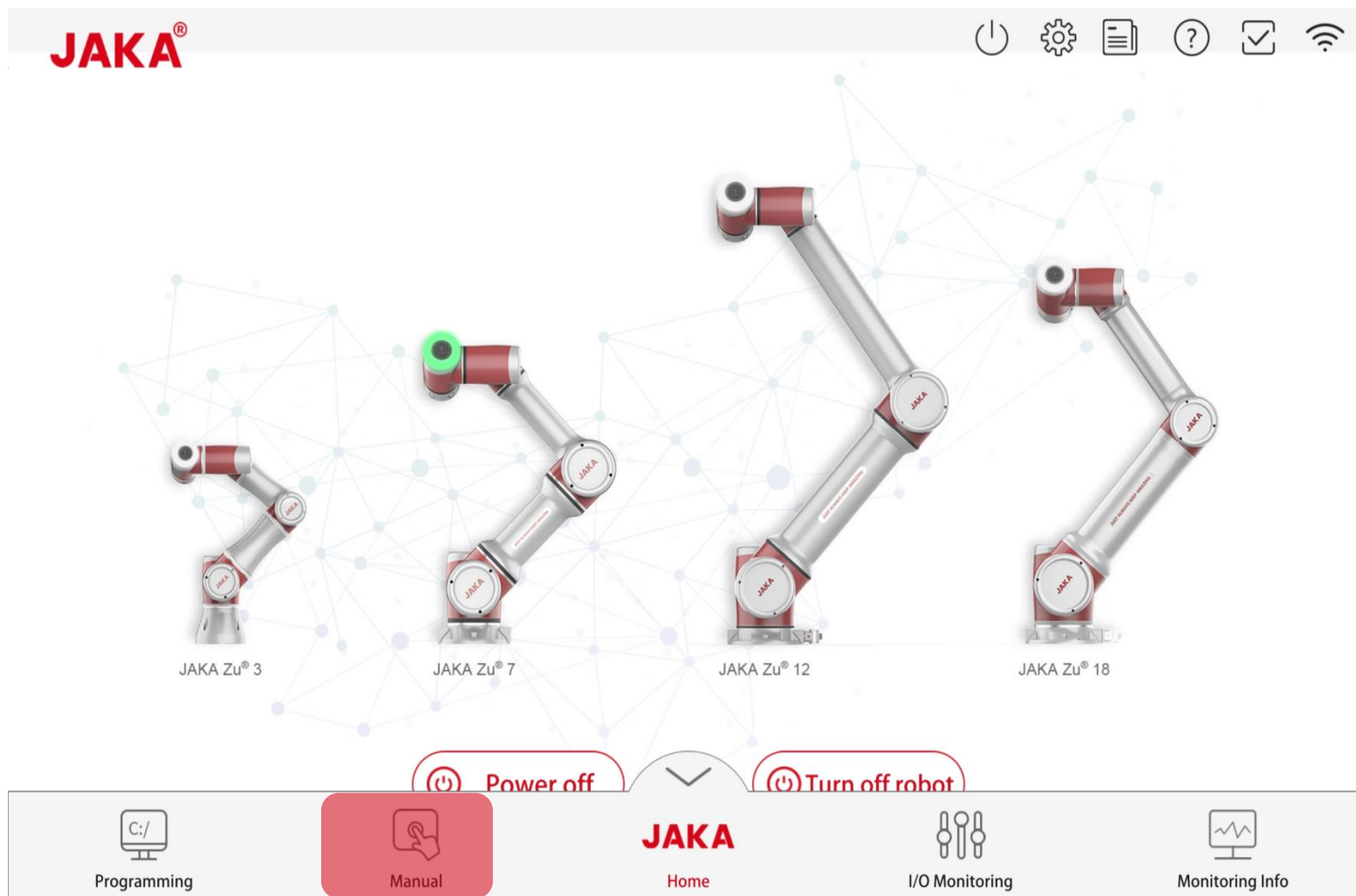
Dedicated I/O instructions

- Connect the robot
- Disable the robot
- Open IO monitoring menu
- Click the corresponding DI or DO
- Select the desired function from the “Function select” pull-down menu, click OK
- Go back to the homepage, enable the robot, and the configuration is complete



Manual operation

Manually move the robot



Movements

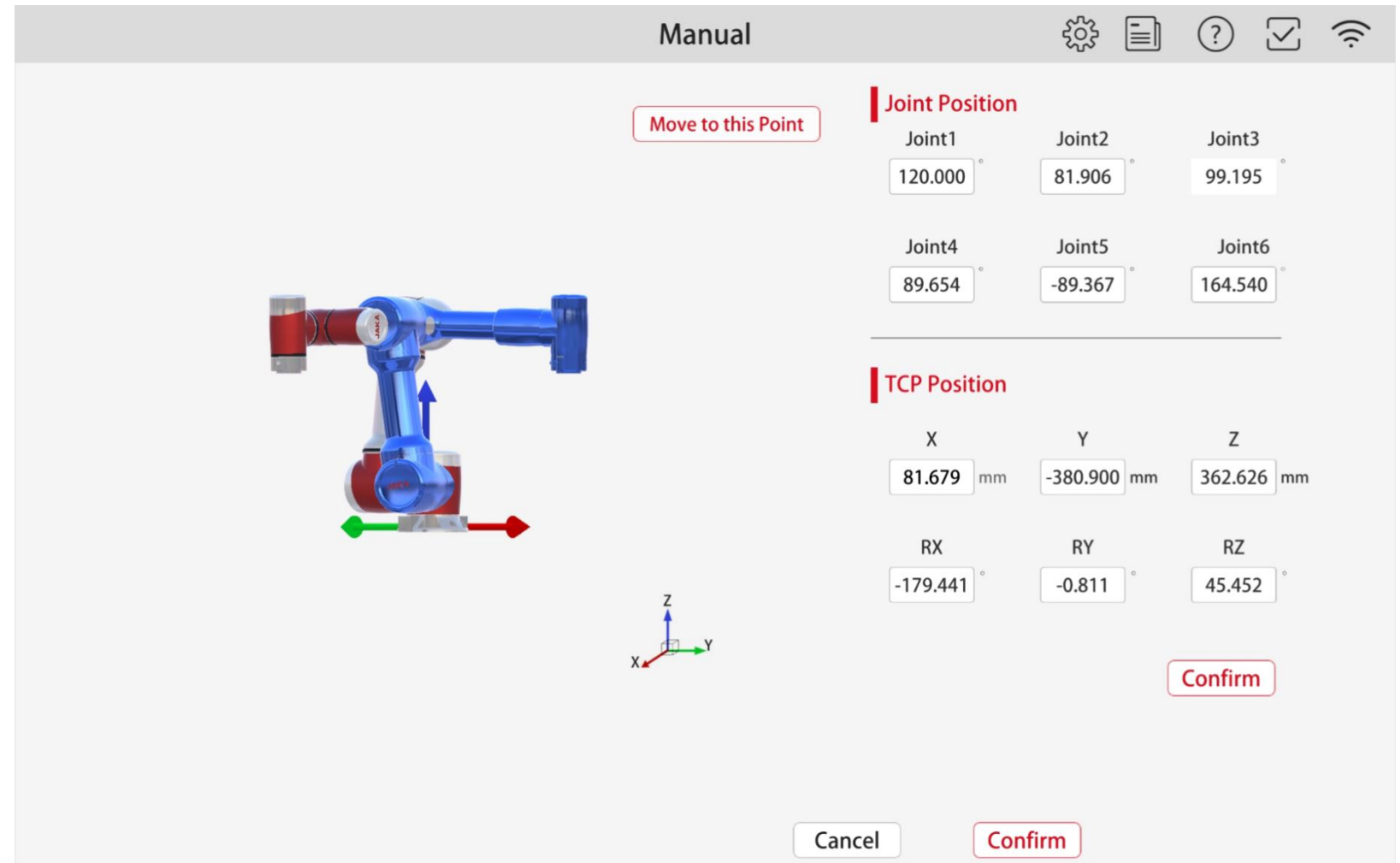
Manually move the robot

Display the actual position



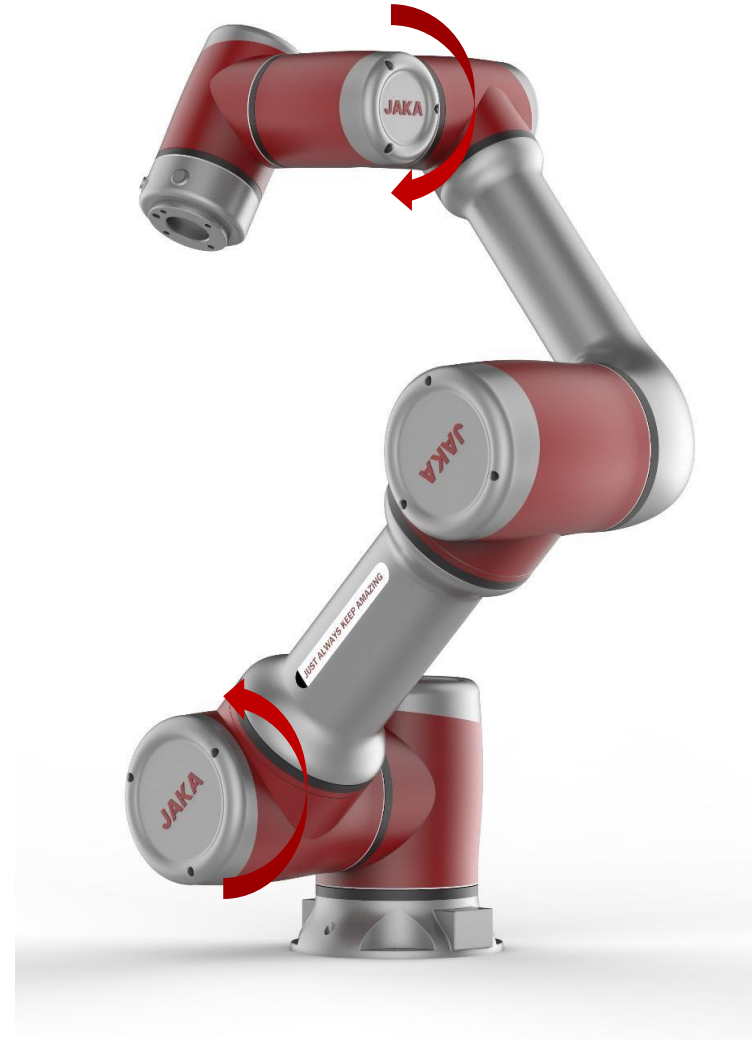
Position of the robot

- Display the actual position of the robot
- Edit and move to the target position



Joint coordinate system

The joint coordinate system is the coordinate system that is set on the joint of the robot. The origin of the coordinate system is located at the joint of two adjacent linkages. The positive direction of the Z axis is along the joint axis, corresponding to 6 degrees of freedom. There are positive and negative directions for the joint 1~6 axis.

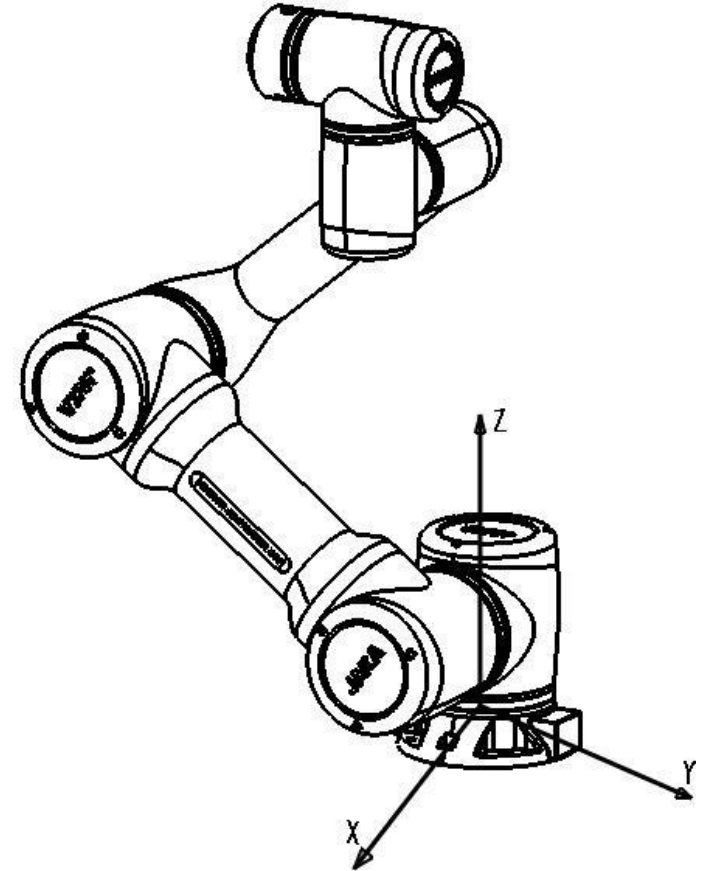


World coordinate system

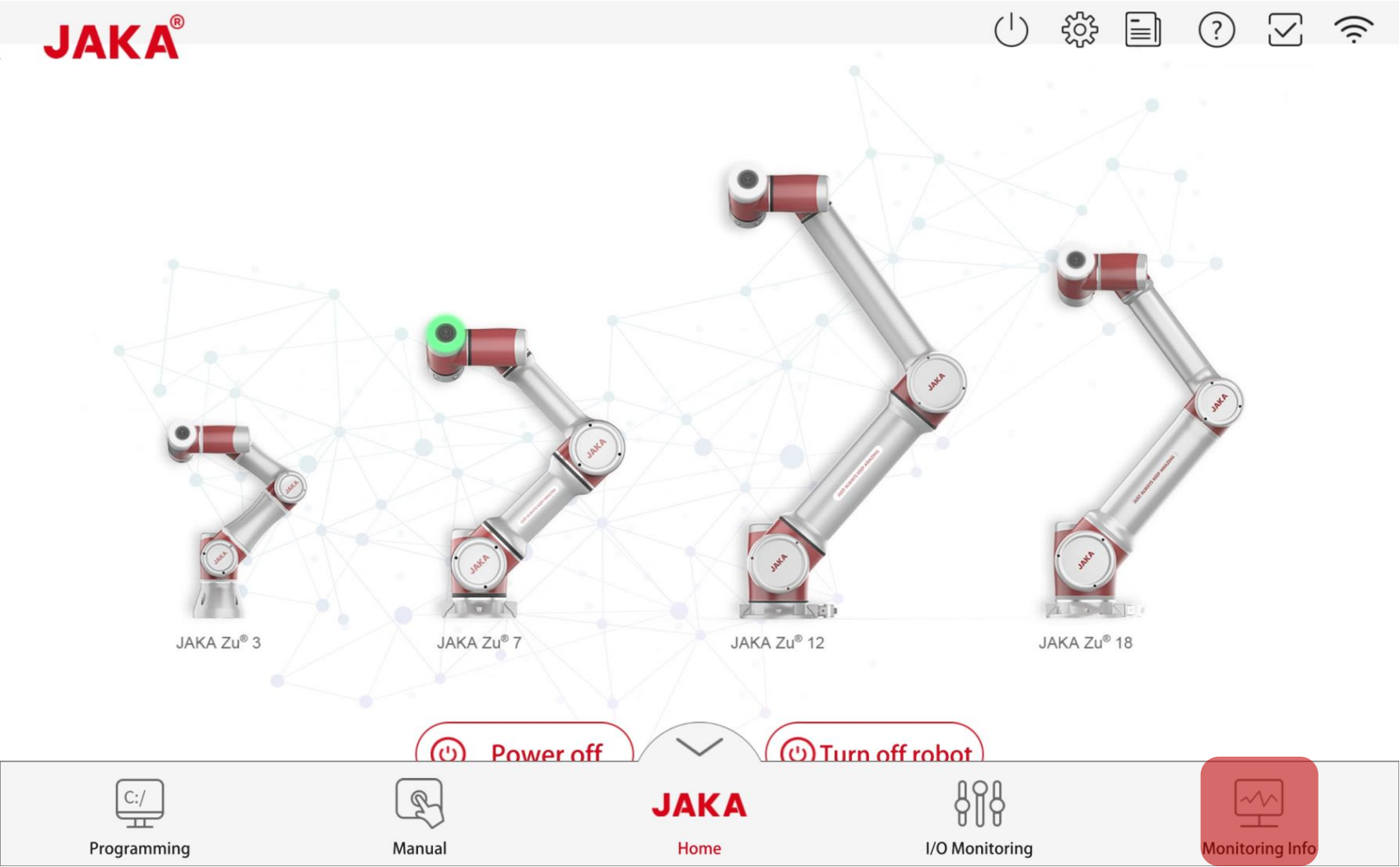
The world coordinate system is a standard rectangular coordinate fixed in space which is fixed in a position predetermined by the robot. In general, the Z axis is perpendicular to the ground.

Advantage

The world coordinate system has a corresponding zero point at the base of the robot, which makes the movements of the fixed robot predictable. So it's very helpful to move a robot from one position to another.



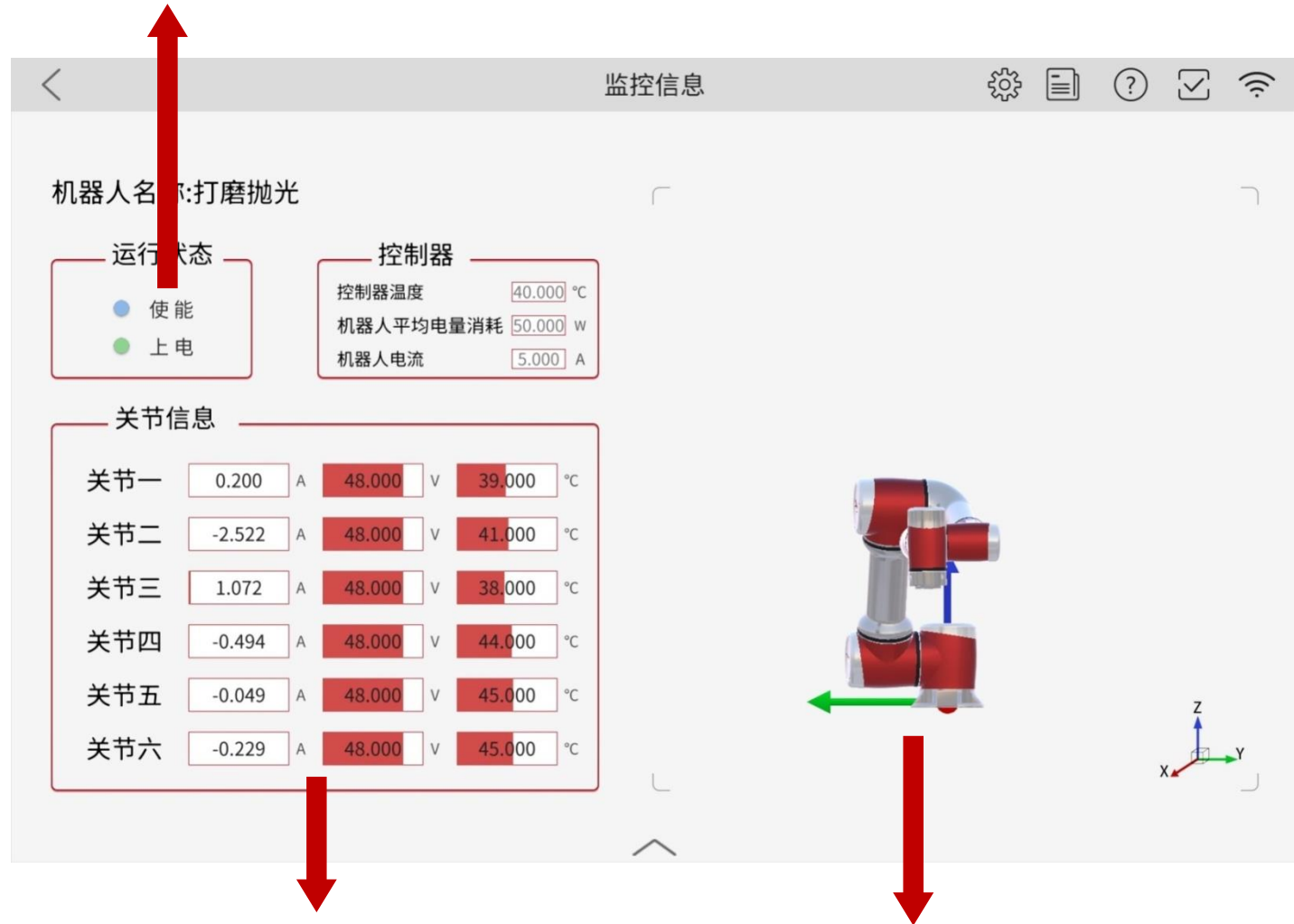
Monitoring Info



Monitoring Info

- Display real-time status of the robot
- Display temperature, voltage and current

The status of the robot

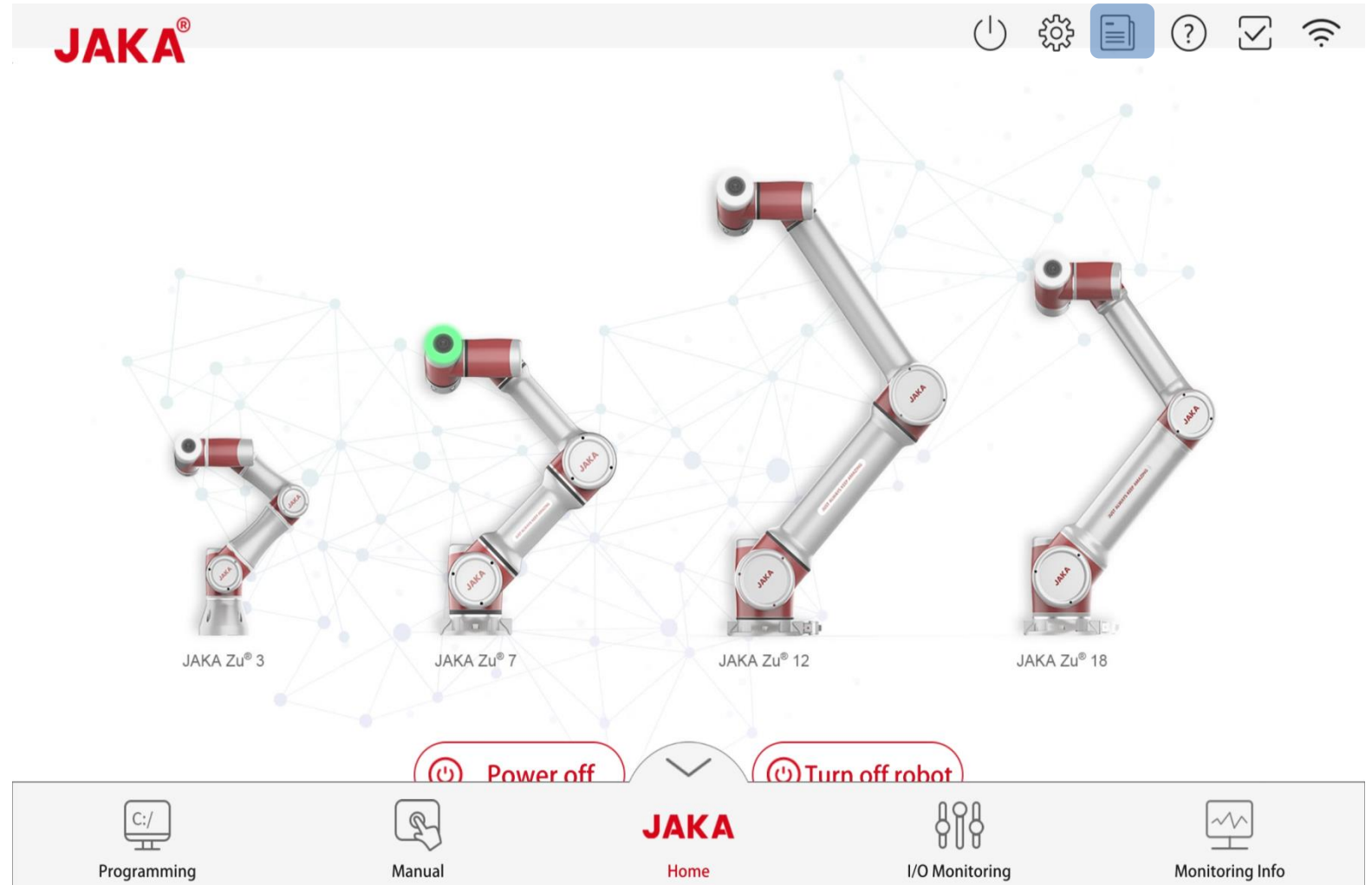


Current, Voltage and Temperature

Real time 3D model of the robot

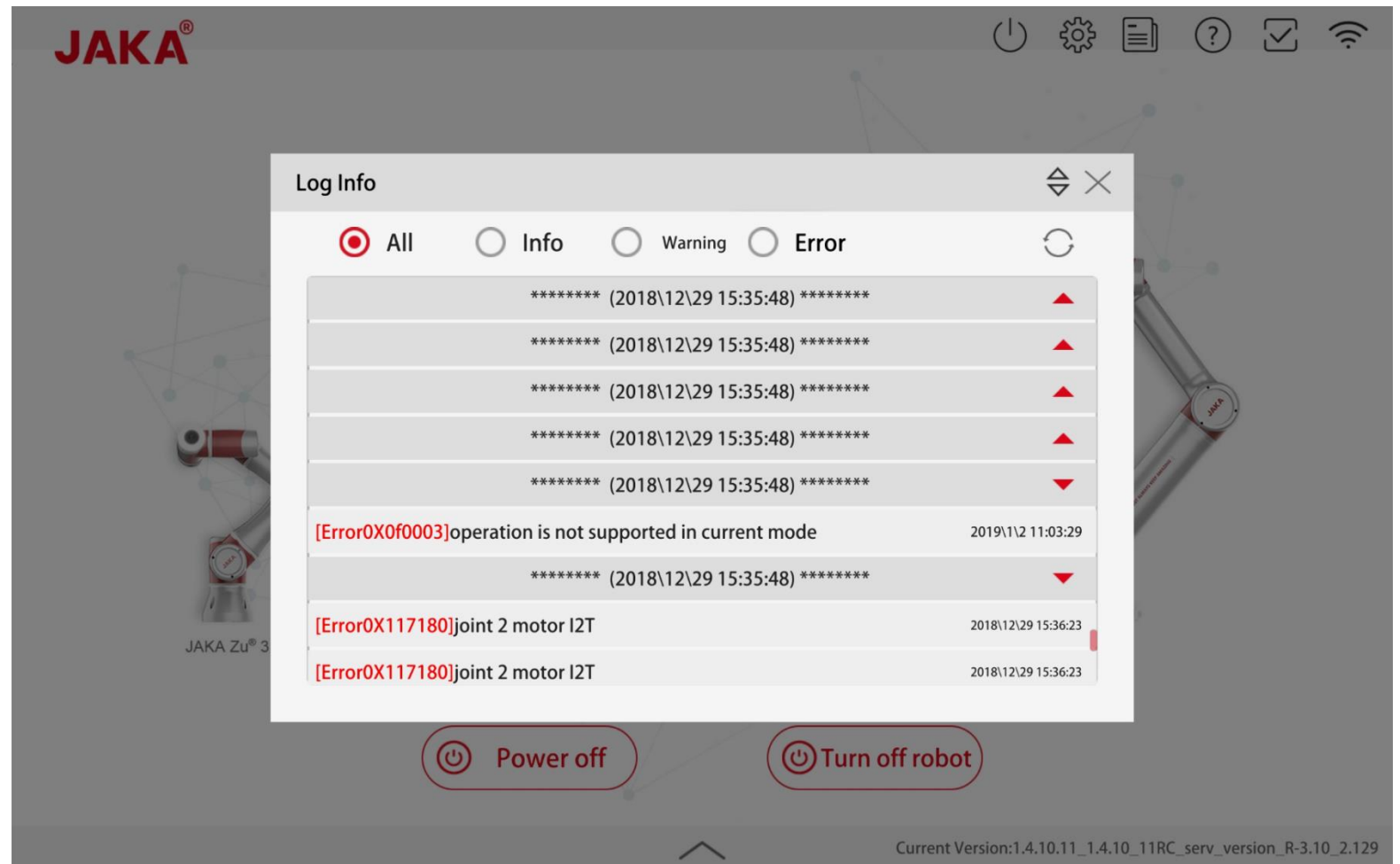
Log information

- Show robot log information
- Show robots in the network

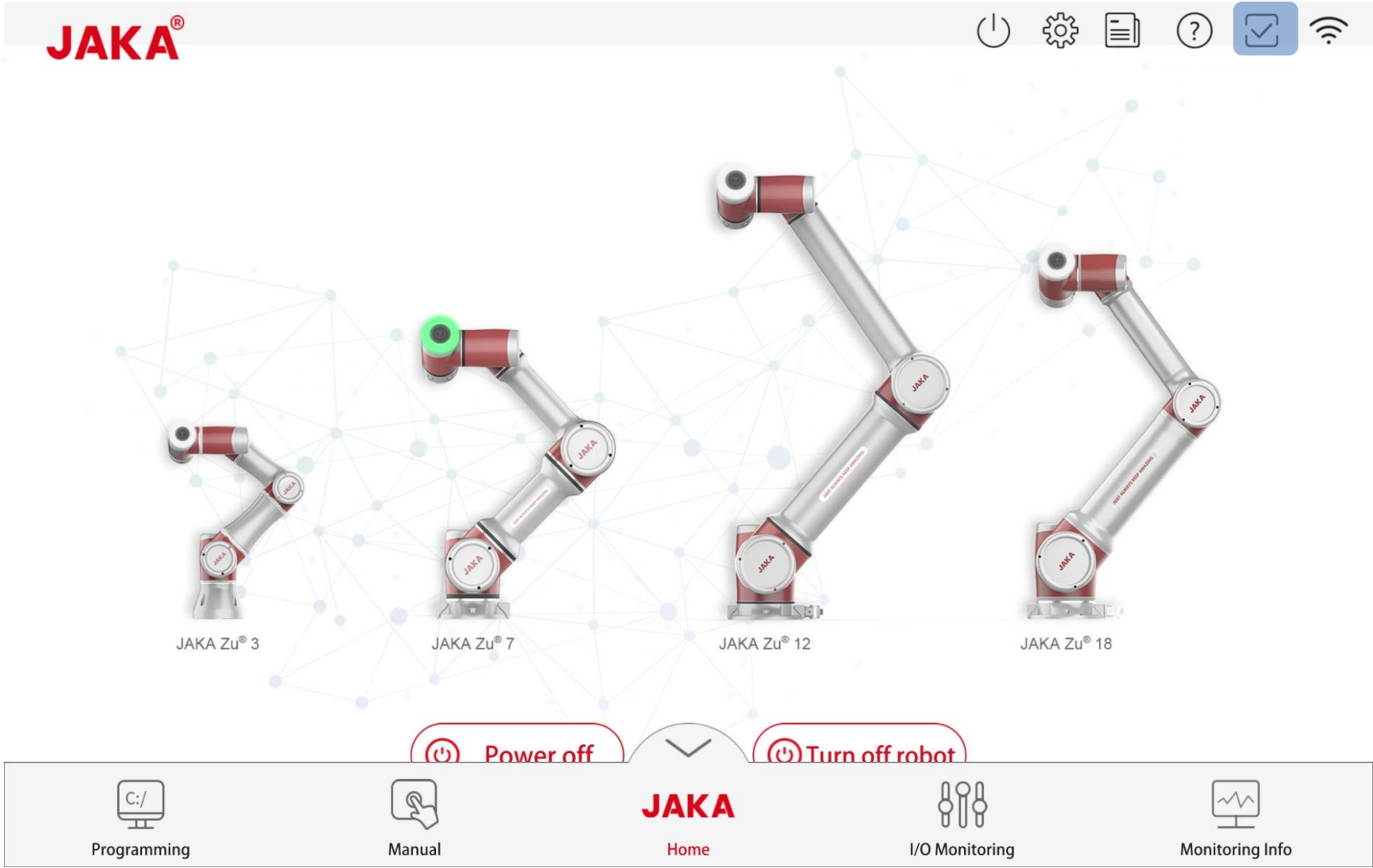


Log information

- Show robot log information
- Show robots in the network

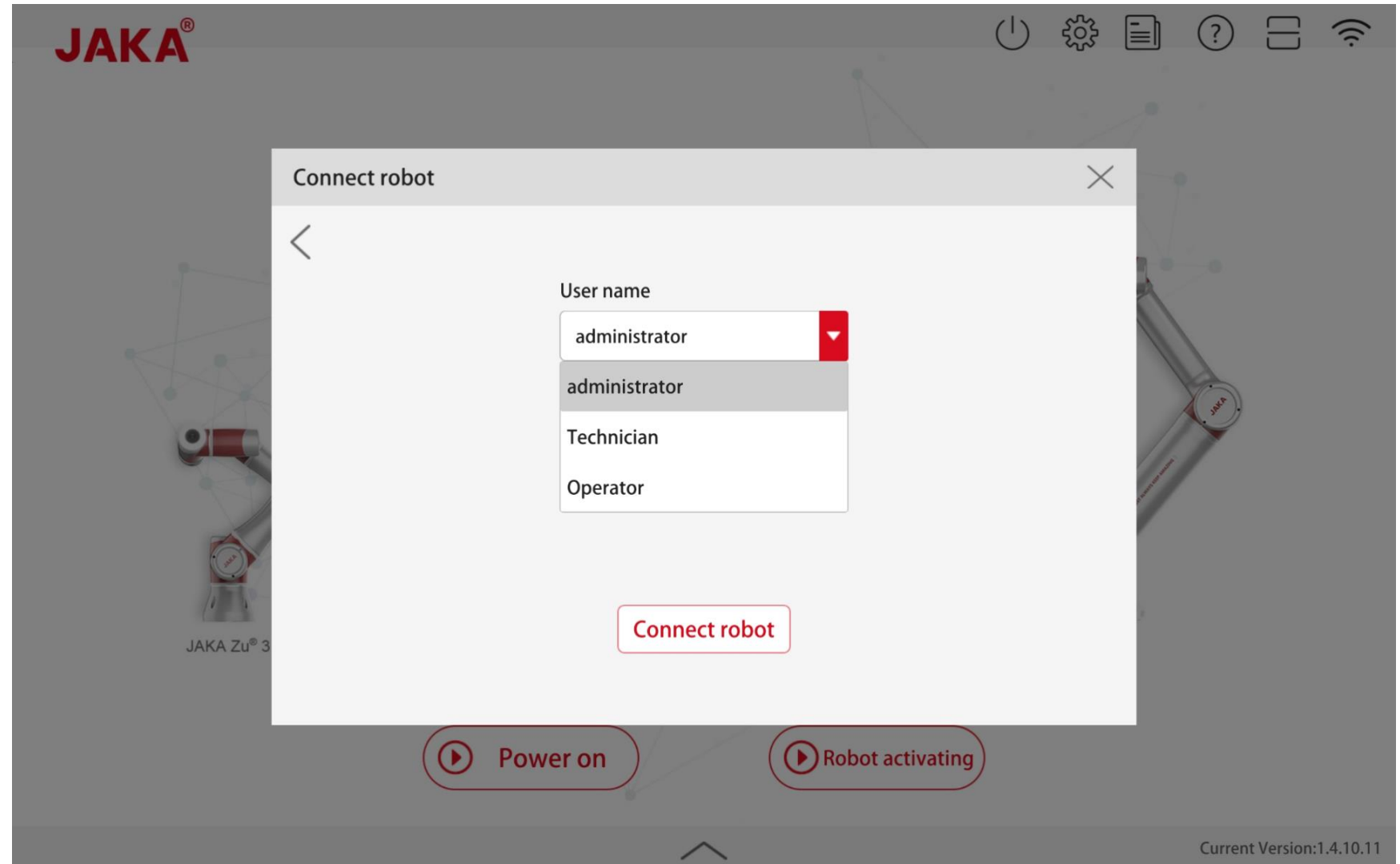


Connection Status





Connection Status



04

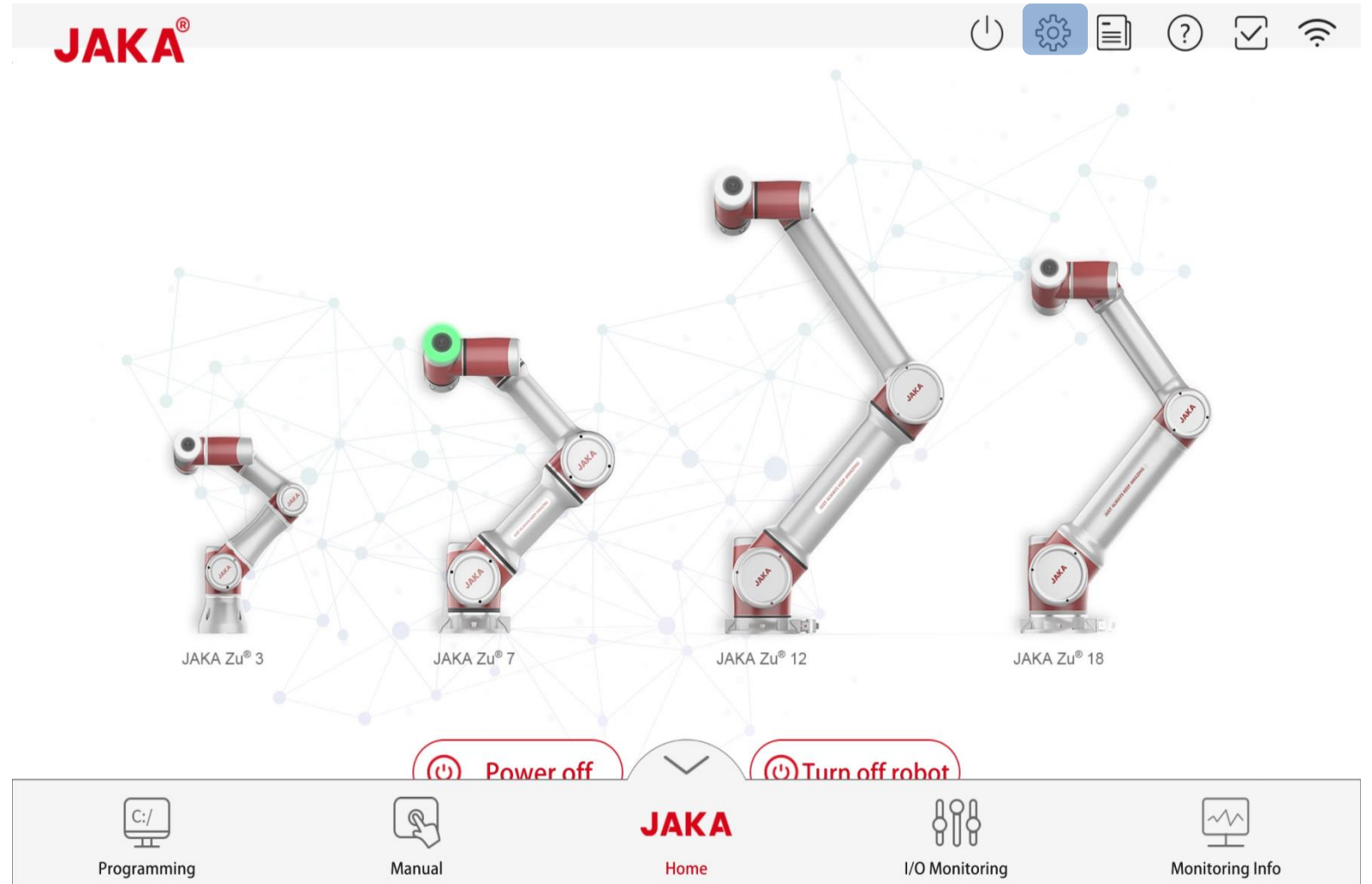
System Settings



Settings for the robot

Set the robot

- System settings



System settings

Initial settings

- Rename the robot
- Languages

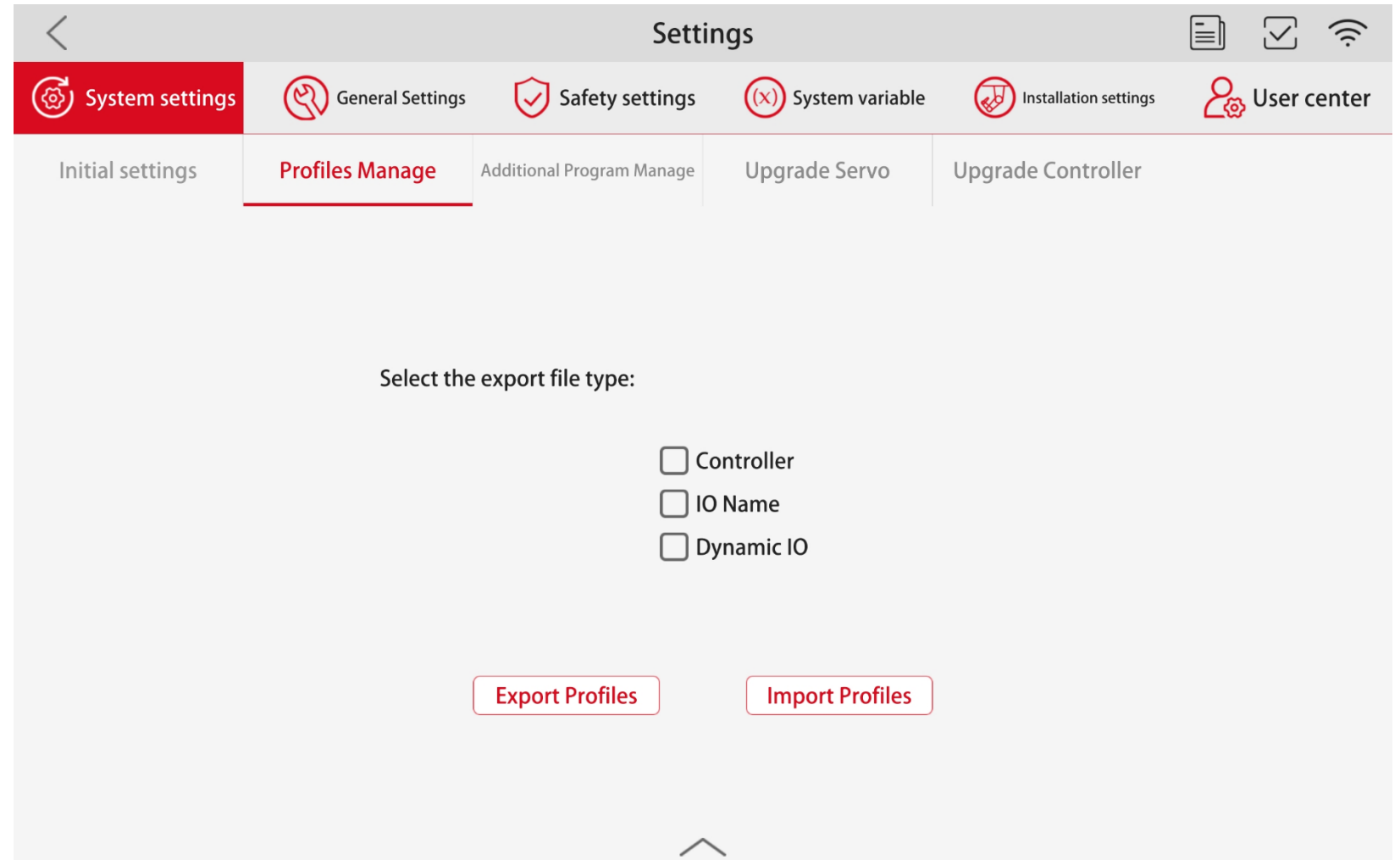
Profiles Manage

- Export profile
- Import profile

Additional Program Manage

Upgrade servo

Upgrade Controller



System settings

Initial settings

- Rename the robot
- Languages

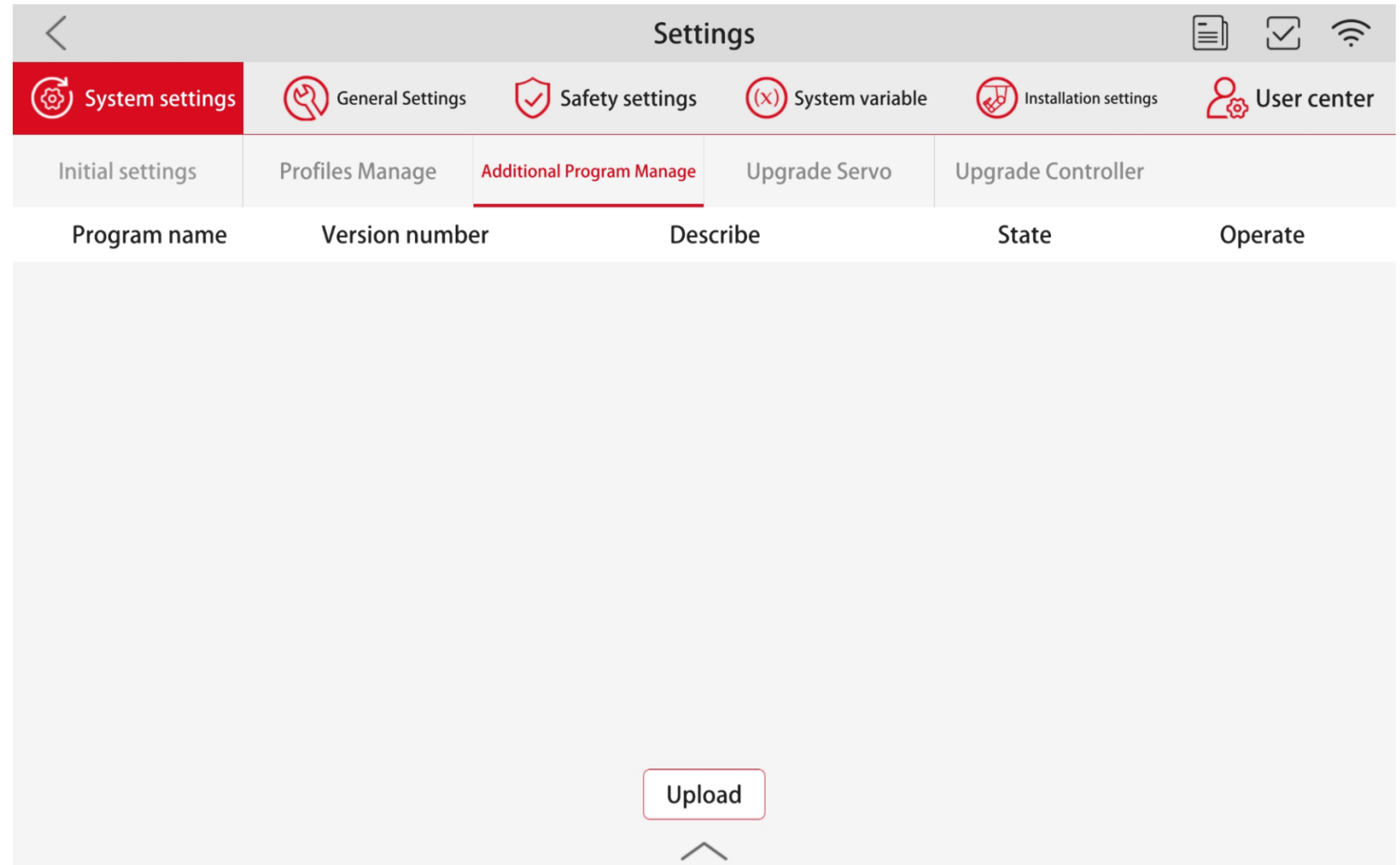
Profiles Manage

- Export profile
- Import profile

Additional Program Manage

Upgrade servo

Upgrade Controller

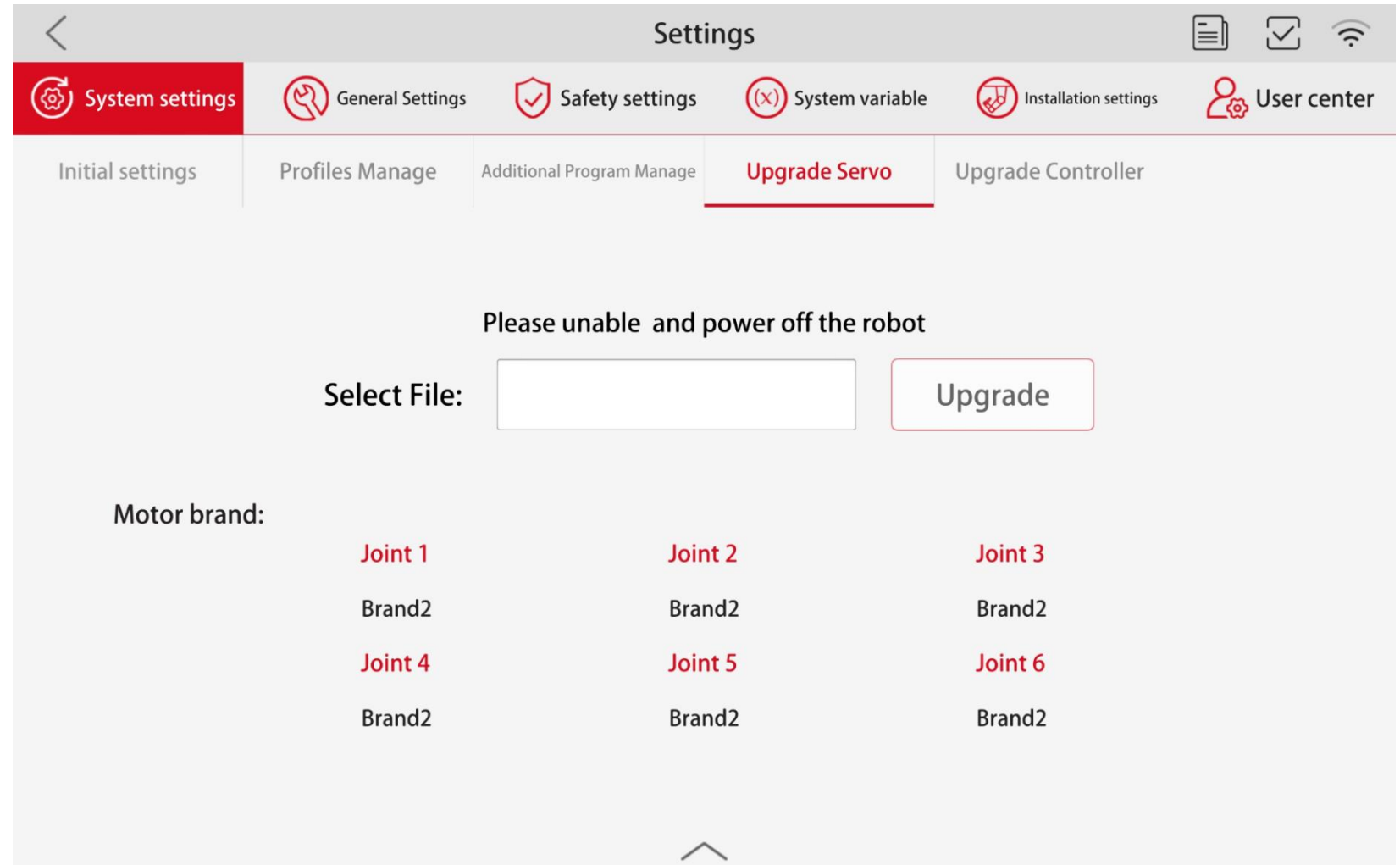


- Rename the robot
- Languages

- Export profile
- Import profile

Upgrade servo

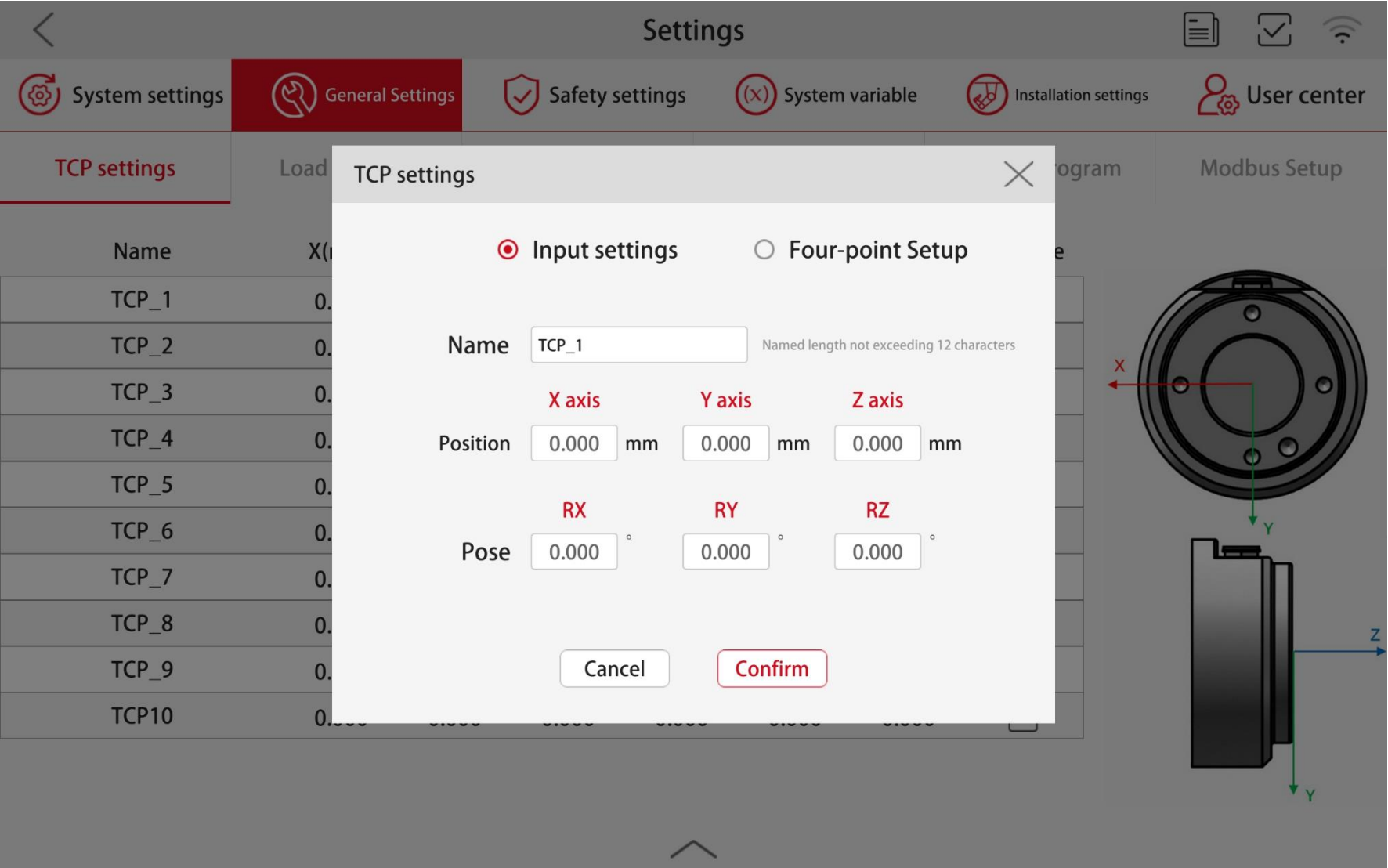
Upgrade Controller



General settings

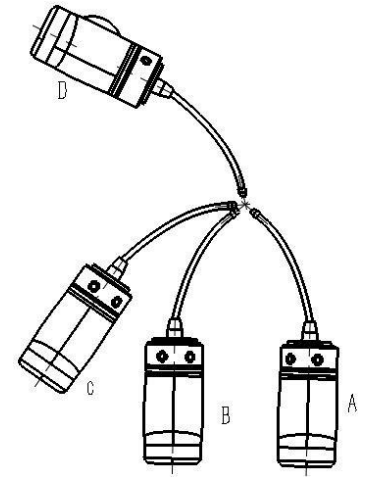
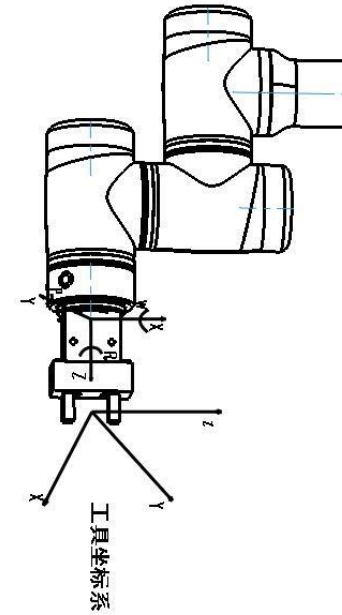
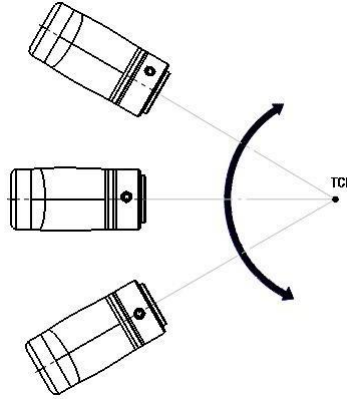
TCP settings

- Load Settings
- User coordinate
- Terminal Sensor
- Default program
- Modbus Setup



Tool coordinate system

Used to define the location of TCP and the tool coordinate system of the tool



Advantages

After the tool coordinate system is established, the control point of the robot is shifted to the tip of the tool. In this way, the attitude of the tool can be adjusted while the tip of the tool remain fixed, and the trajectory of the robot program can be more precise.



General settings

TCP settings

Load Settings

User coordinate

Terminal Sensor

Default program

Modbus Setup

Settings

System settings

General Settings

Safety settings

System variable

Installation settings

User center

TCP settings

Load Settings

User coordinate

Terminal Sensor

Default program

Modbus Setup

Manual input mode

Automatic identification mode

Payload settings:

3.000

kg

Centroid: X:

0.000

mm

Y:

0.000

mm

Z:

20.000

mm

Cancel

Confirm

Whether to carry:

Yes

No

Joint3

Setting the Start Point

Pilot operation

Start identification

Joint4

Setting the Start Point

Pilot operation

Start identification

Joint5

Setting the Start Point

Pilot operation

Start identification

Joint6

Setting the Start Point

Pilot operation

Start identification

Reset

Obtaining identification results

General settings

Load settings

- Manually input
- Automatic identification

Note: When setting the start point for Joint 3, make sure Joint 4 is 90° , Joint 5 is $\pm 180^\circ$, Joint 6 is 0° . When setting the start point for Joint 4, make sure Joint 5 is $\pm 180^\circ$, Joint 6 is 0° . When setting the start point for Joint 5, make sure Joint 4 is 90° , Joint 6 is 0° , the axis of Joint 5 should be parallel to the ground. When setting the start point for Joint 6, make sure Joint 5 is $\pm 180^\circ$.

Settings

System settings

General Settings

Safety settings

System variable

Installation settings

User center

TCP settings

Load Settings

User coordinate

Terminal Sensor

Default program

Modbus Setup

☒ Manual input mode

☐ Automatic identification mode

Payload settings: kg

Centroid: X: mm

Y: mm

Z: mm

Cancel

Confirm

Whether to carry: ☒ Yes ☐ No

Joint3	<div>Setting the Start Point</div>	<div>Pilot operation</div>	<div>▶ Start identification</div>
Joint4	<div>Setting the Start Point</div>	<div>Pilot operation</div>	<div>▶ Start identification</div>
Joint5	<div>Setting the Start Point</div>	<div>Pilot operation</div>	<div>▶ Start identification</div>
Joint6	<div>Setting the Start Point</div>	<div>Pilot operation</div>	<div>▶ Start identification</div>

Reset

Obtaining identification results

Load Settings

Terminal Sensor

Default program

Modbus Setup

 \wedge

General settings

- TCP settings
- Load Settings
- User coordinate
- Terminal Sensor**
- Default program
- Modbus Setup

Settings

System settings

General Settings

Safety settings

System variable

Installation settings

User center

TCP settings

Load Settings

User coordinate

Terminal Sensor

Default program

Modbus Setup

editor

Type Selection of Force Sensor

IP address:

192.168.2.228

Port:

49152

Load quality:

0.449

kg

Centroid G:

X:

0

mm

Y:

0

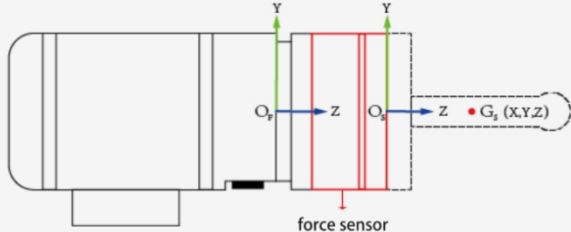
mm

Z:

20

mm

Confirm





General settings


- TCP settings
- Load Settings
- User coordinate
- Terminal Sensor
- Default program**
- Modbus Setup


<


Settings


 System settings

 General Settings

 Safety settings

 System variable

 Installation settings

 User center

TCP settings

Load Settings

User coordinate

Terminal Sensor

Default program

Modbus Setup

Current default program

焊锡丝

...

☒ Load default program on startup.

Cancel

Confirm

>

General settings

TCP settings

Load Settings

User coordinate

Terminal Sensor

Default program

Modbus Setup

Settings

24% 上午10:17

System settings General Settings Safety settings System variable Installation settings User center

TCP settings Load Settings User coordinate Terminal Sensor Default program **Modbus Setup**

☒ MODBUS-TCP ☐ MODBUS-RTU

IP: 172.16.71.105

port: 6502

Slave node number:

Baud rate: 4800

Data bit length: 8

Stop bit length: 1

Verification method: Even

cancel Confirm

Safety settings

Set positive and negative limits for six joints

Joint limit

Robot pose

Protection system

Collision protection

Settings

System settings

General Settings

Safety settings

System variable

Installation settings

User center

Joint limit

Robot pose

Protection system

Collision protection

Joint 1

Joint 2

Joint 3

Joint 4

Joint 5

Joint 6

Positive limit

270.000

°

Positive limit

230.000

°

Positive limit

155.000

°

Negative limit

-270.000

°

Negative limit

-50.000

°

Negative limit

-155.000

°

Positive limit

265.000

°

Positive limit

270.000

°

Positive limit

270.000

°

Negative limit

-85.000

°

Negative limit

-270.000

°

Negative limit

-270.000

°

Cancel

Confirm

Safety settings

Joint limit

Robot pose

Protection system

Collision protection

Settings

System settings

General Settings

Safety settings

System variable

Installation settings

User center

Joint limit

Robot pose

Protection system

Collision protection

Factory pose

-90.000

0.000

152.000

120.000

0.000

0.000

Move to this Point

Open pose

0.000

90.000

0.000

90.000

180.000

0.000

Move to this Point

Reset pose

-90.000

0.000

152.000

120.000

0.000

0.000

Move to this Point

Moving Speed

10%

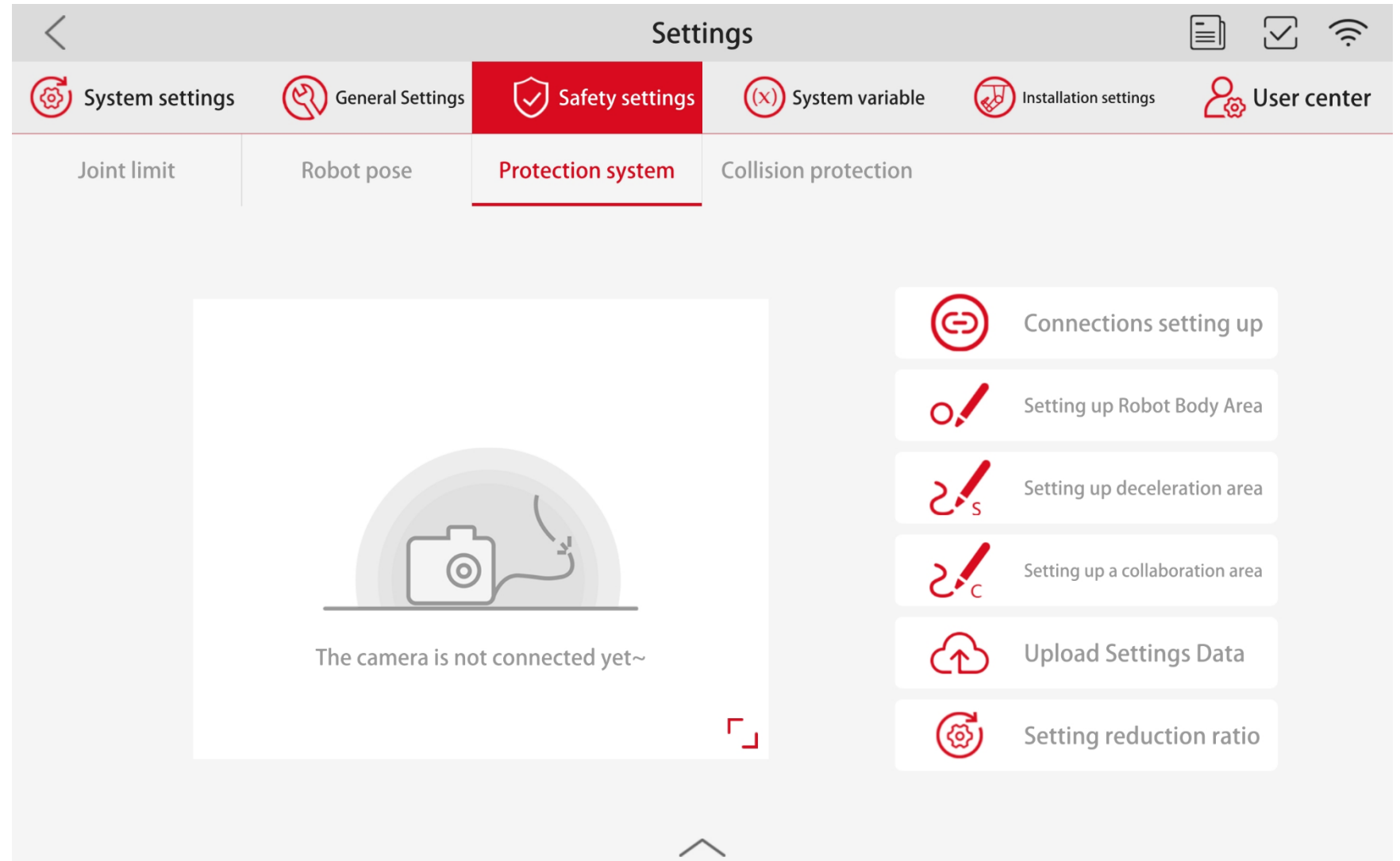
Safety settings

Joint limit

Robot pose

Protection system

Collision protection



Safety settings

Joint limit

Robot pose

Protection system

Collision protection

Settings

System settings

General Settings

Safety settings

System variable

Installation settings

User center

Joint limit

Robot pose

Protection system

Collision protection

Collision detection sensitivity:

Close

Close

Level1(25N)

Level2(50N)

Level3(75N)

Cancel


Confirm


System variables


Set variable parameters


<


Settings


System settings

General Settings

Safety settings

System variable

Installation settings

User center

Variable name

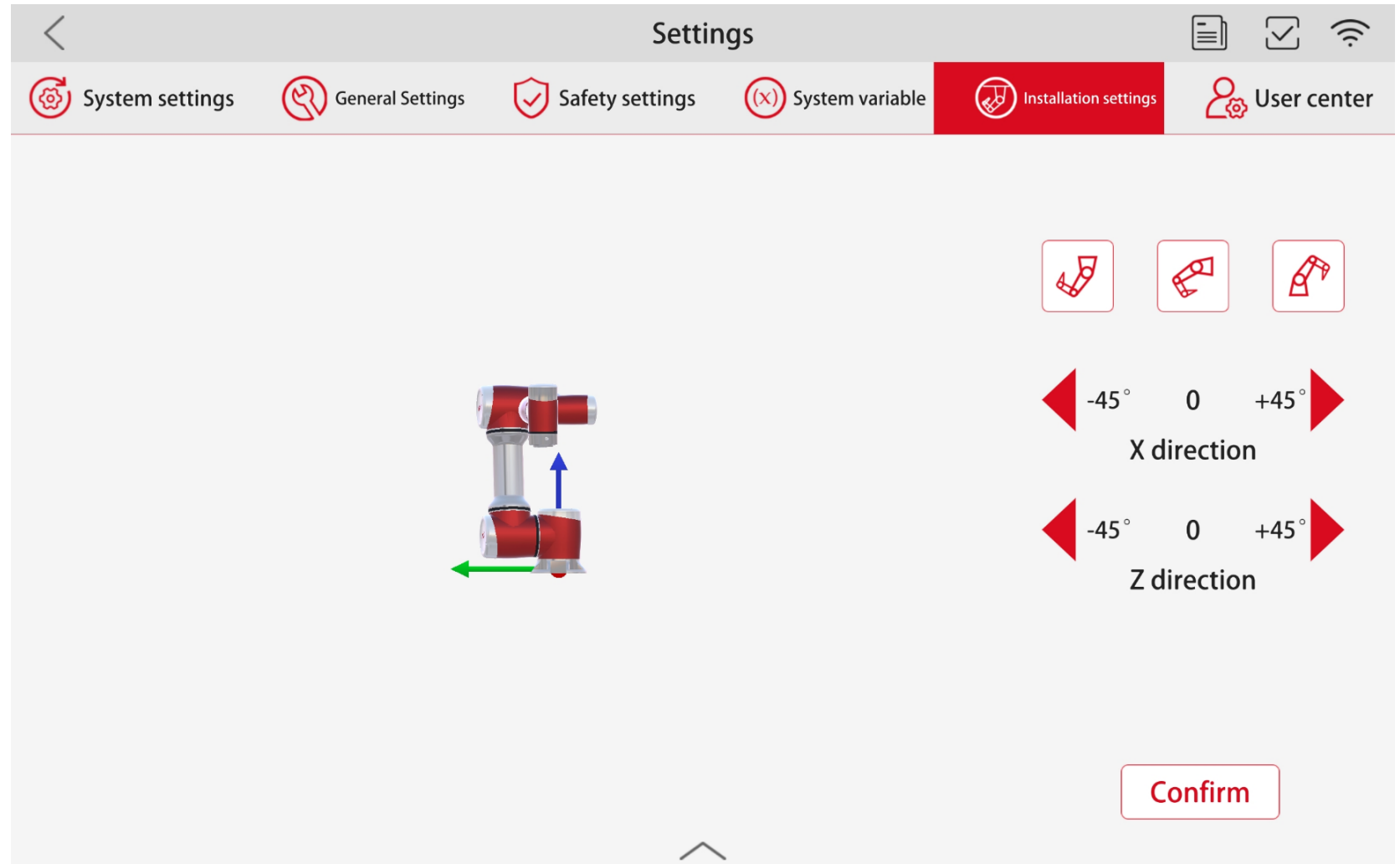
value

Operate

New

Installation settings

Choose the corresponding
installation attitude





User center


Manage different
user levels


<


Settings


System settings




General Settings

Safety settings

System variable

Installation settings

User center

User level	Operate
administrator	
operator	
visitor	

05

Basic Commands



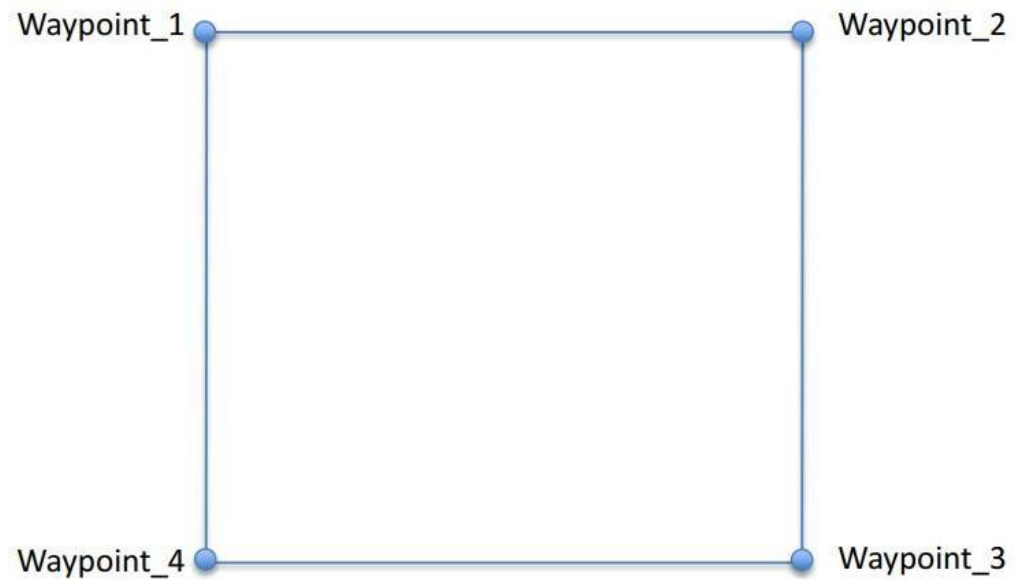
Programming

- (Waypoint) indicates the target point
- (Move Joint) indicate the trajectory of the robot to the target point



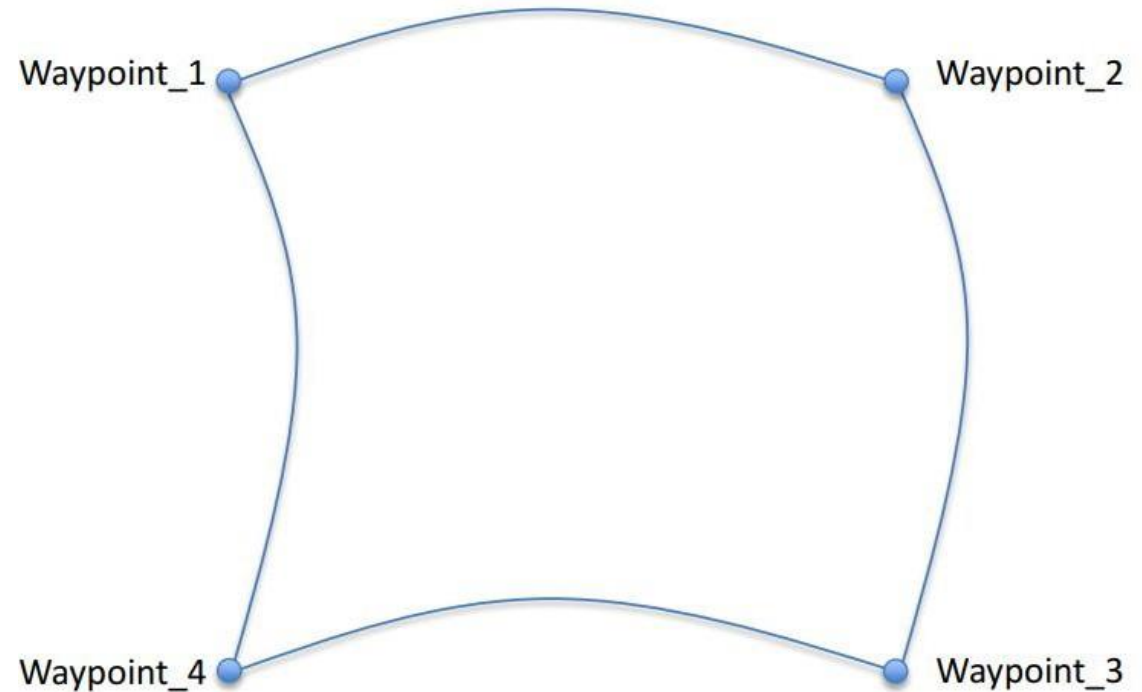
MoveL Command

- Interpolation needed
- TCP moves linearly



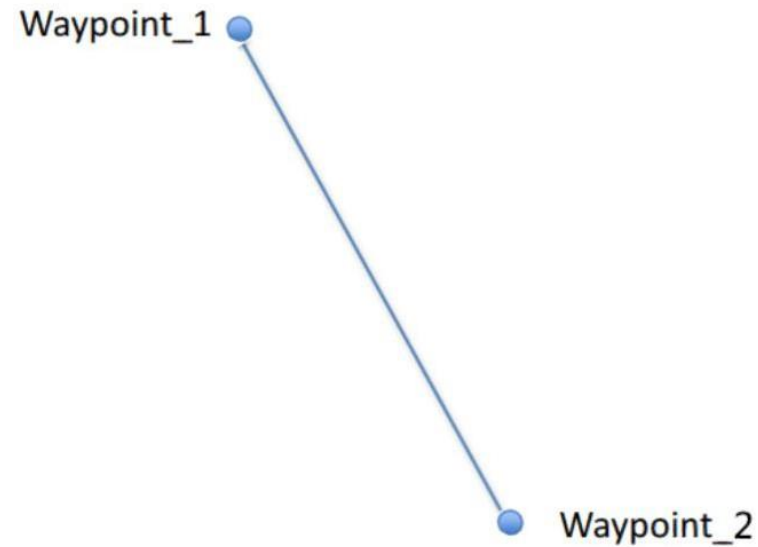
MoveJ Command

- No interpolation needed
- The fastest way of moving
- For unobstructed space movement



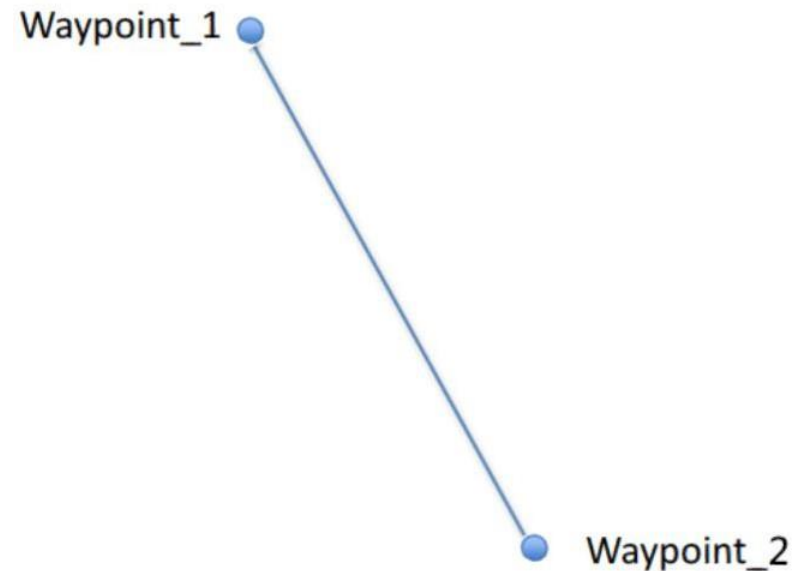
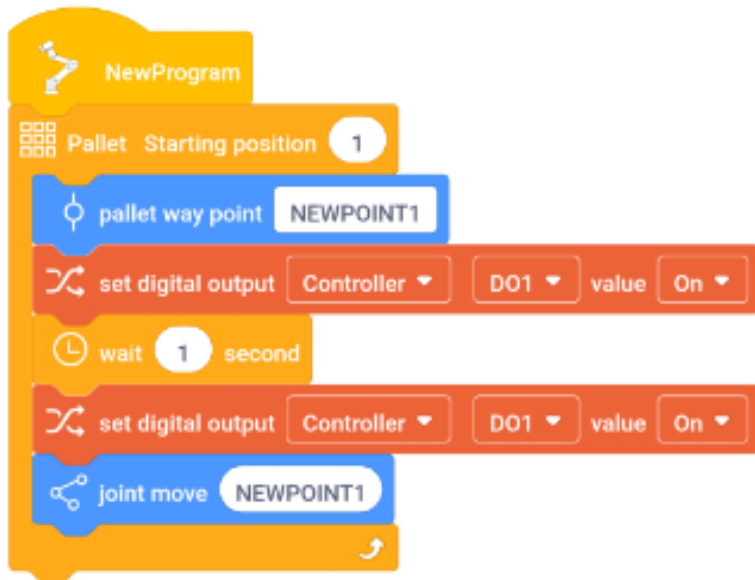
Relative Linear Move Command

- Similar to the MoveL command, but moving related to the current point
- Set the distance offsets X, Y, Z for the relative movement, or the angle offsets RX, RY, RZ



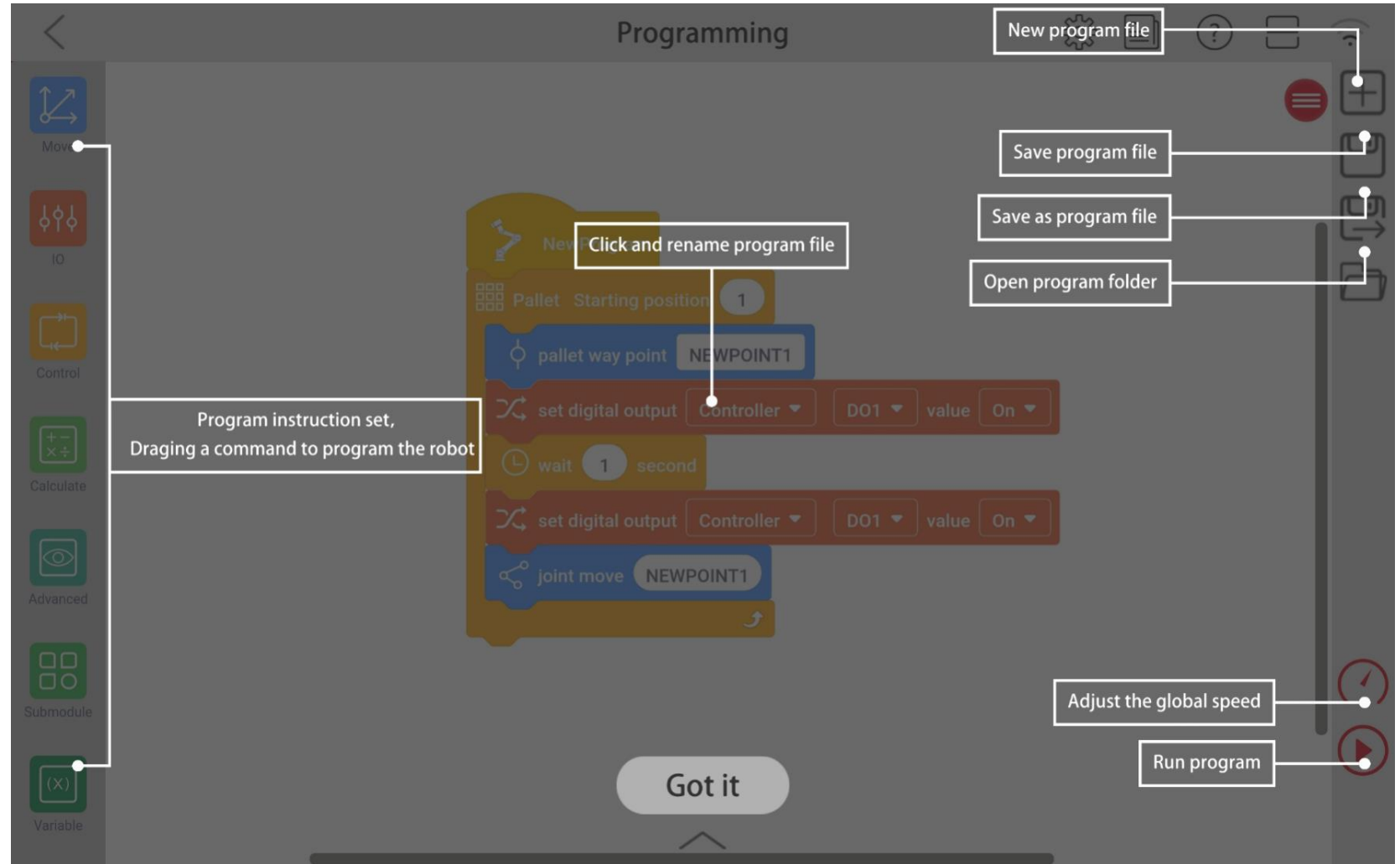
Pallet Way Point Command

- Linear movement
- Used with the pallet command, the pallet way point command is a relative linear move command related to the pallet point



Programming control

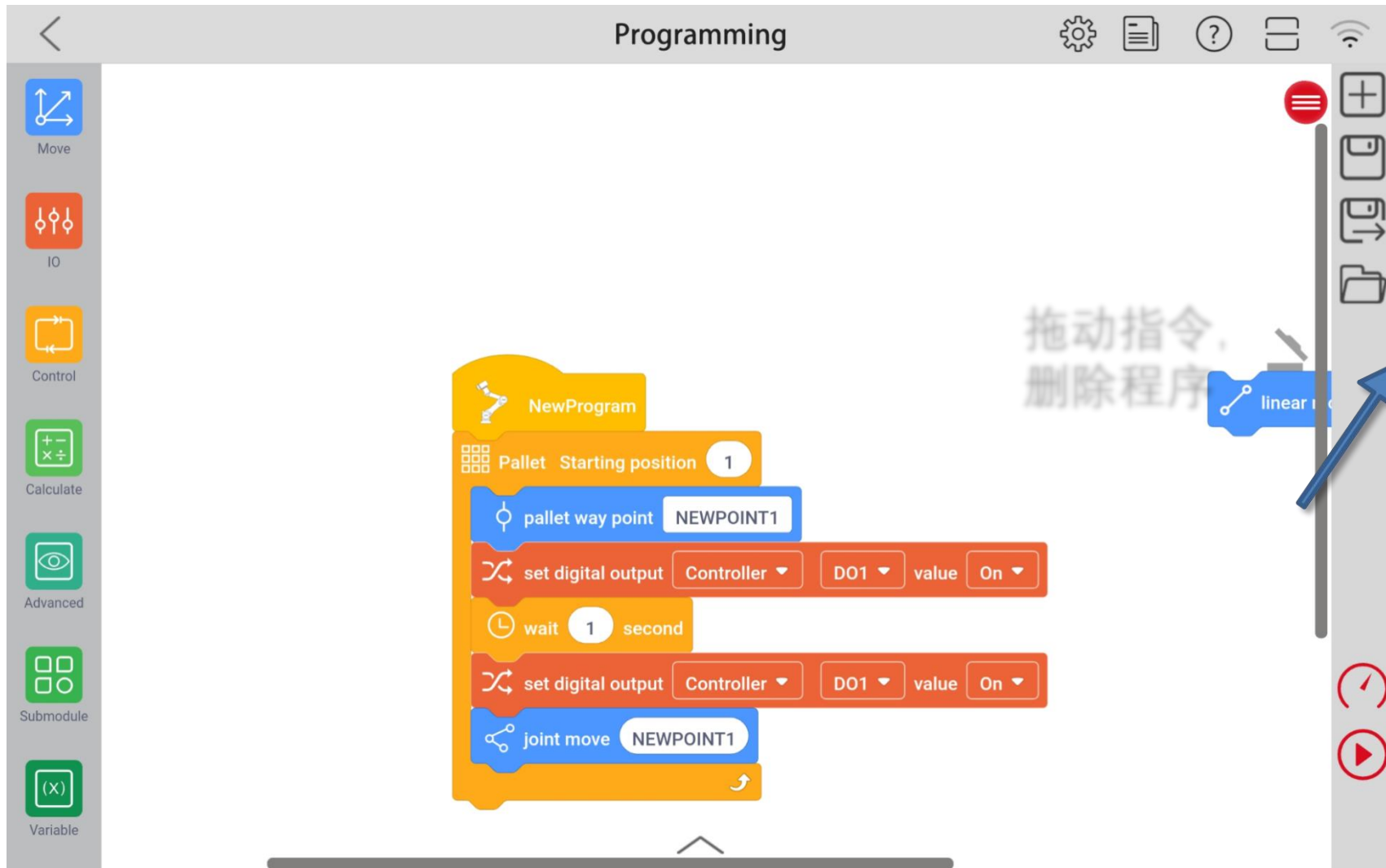
- Robot program interface
- Robot programming
- Robot program control



Drag the command, and add it to the program.

The screenshot displays the JAKA Programming software interface. At the top, a header bar contains a back arrow, the title "Programming", and icons for settings, a list, help, a window, and a wireless signal. On the left, a vertical block palette is organized into categories: Move (blue), IO (orange), Control (yellow), Calculate (green), Advanced (green), Submodule (green), and Variable (green). The "Move" category is expanded, showing several blue blocks: "linear move NEWPOINT", "joint move NEWPOINT", "relative linear move NEWPOINT", "Arc movement CIRCLEPOINT CIRCLEPOINT", and "pallet way point NEWPOINT". A blue arrow points from the "joint move NEWPOINT" block towards the main workspace. The main workspace shows a sequence of blocks: a "Pallet Starting position 1" block, a "pallet way point NEWPOINT1" block, a "set digital output Controller DO1 value On" block, a "wait 1 second" block, another "set digital output Controller DO1 value On" block, and a "joint move NEWPOINT1" block. At the bottom, two more "set digital output Controller DO1 value On" blocks are visible, with the last one having a "in motion" label. On the right side, a vertical toolbar contains a red menu icon, a plus icon, a save icon, a copy icon, a folder icon, a red speedometer icon, and a red play button icon.

Drag the command to the trash bin to delete the command.



The Pose Editor

Edit joint movement

Modification

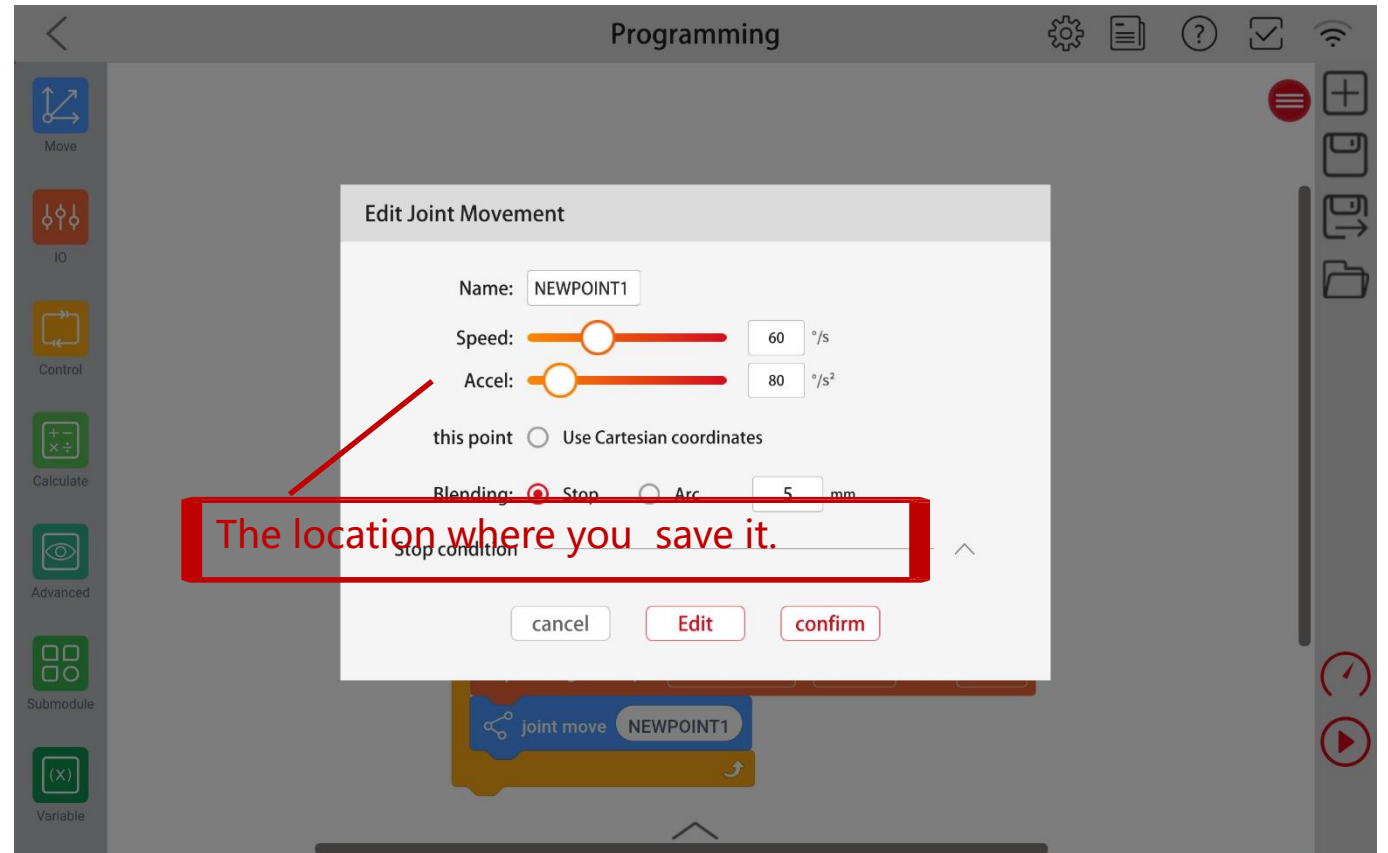
- Absolute values
- Addition and subtraction of values

Position of joints

- Angles (The unit of angle is degree)

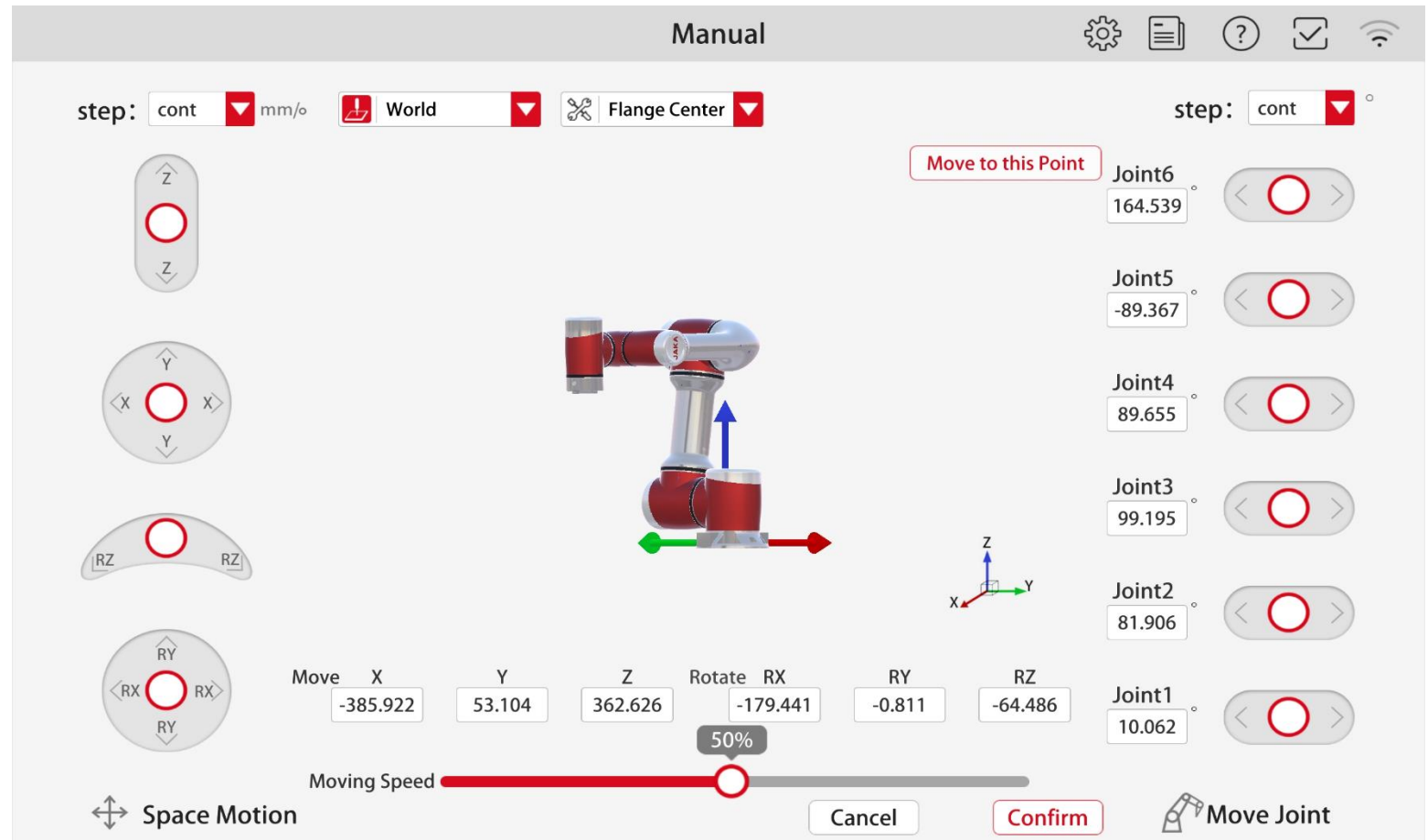
Position of tools

- mm for Cartesian coordinate XYZ.
- The unit of rotation angles can be defined.



The Pose of the robot

- Display the actual position
- Modify the coordinate position of the robot and move it to the target position



Motion

Control

Calculation

Advanced

Submodule

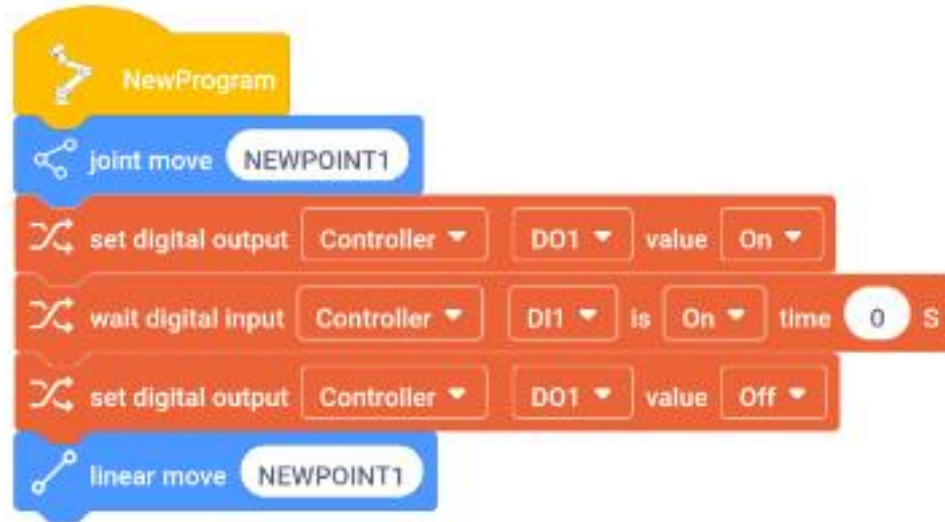
Variable

The screenshot displays the 'Programming' interface of the JAKA system. The left sidebar contains icons for different functional categories: Move (blue), IO (orange), Control (yellow), Calculate (green), Advanced (teal), Submodule (dark green), and Variable (light green). The main workspace shows a sequence of programming blocks under the 'IO' category:

- set digital output**: Controller, DO1, value On
- set digital output**: Controller, DO1, value On, in motion
- wait digital input**: Controller, DI1, is On, time 1 S
- set analog output**: Controller, AO1, value 1
- set analog output**: Controller, AO1, value 1, in motion
- digital output**: Controller, DO1, is On
- set digital input**: Controller, DI1, is On
- get analog output**: Controller, AO1
- get analog input**: Controller, AI1

At the bottom, there are buttons for 'Set TCP' and 'NewTCP'. The right sidebar includes a menu icon, a plus sign, and a vertical toolbar with icons for saving, undo, redo, and a play button.

- Output
- I/O control
- Set output signal status when program is not running



Repeat Commands

■ Definition

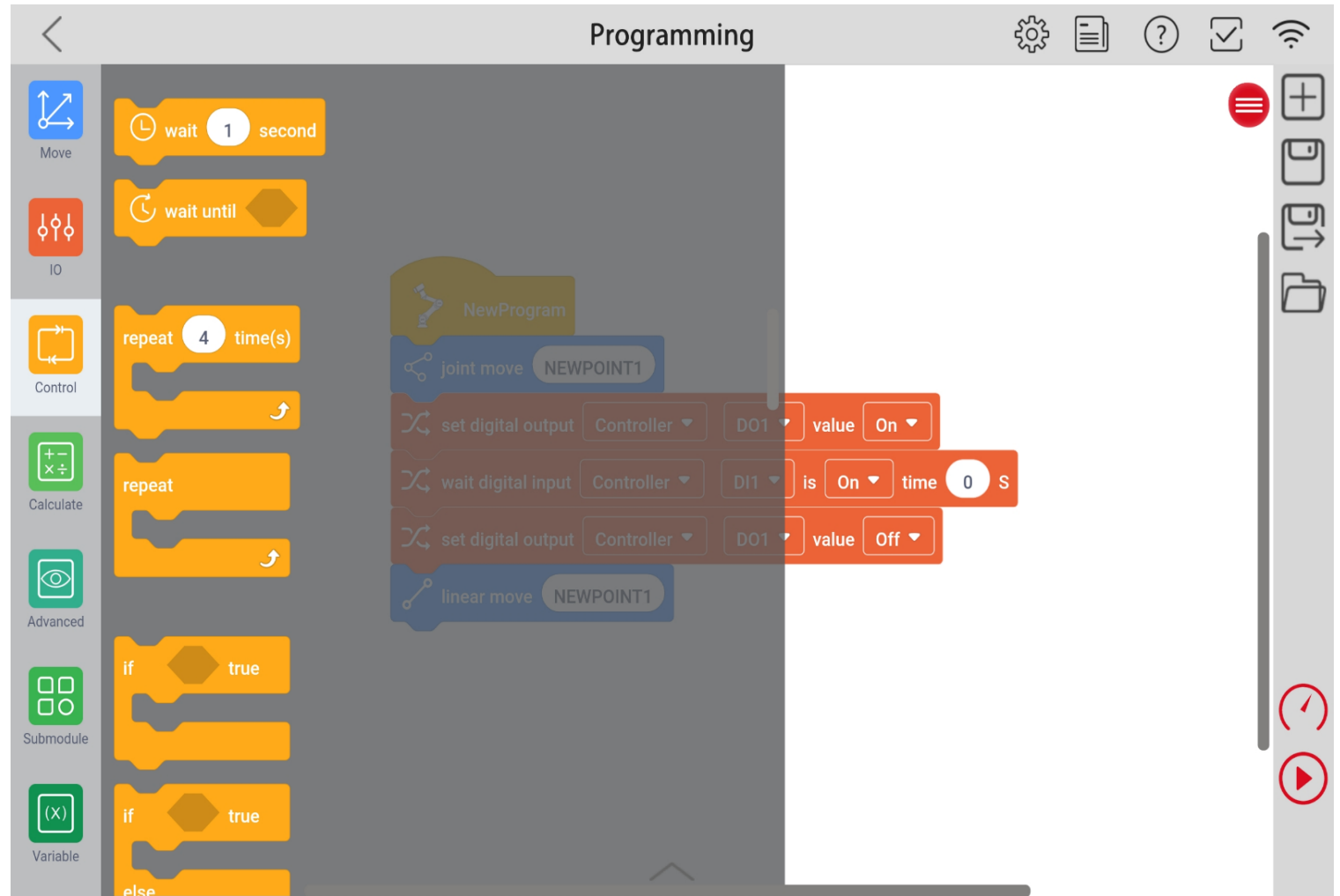
- Repeat the program within the repeat command.
- Types of repetition
 - always repeat
 - repeat n times
 - repeat<expression>



Wait Commands

■ Wait on the conditions

- Waiting time (S)
- Wait for digital input
- Wait for<expression>

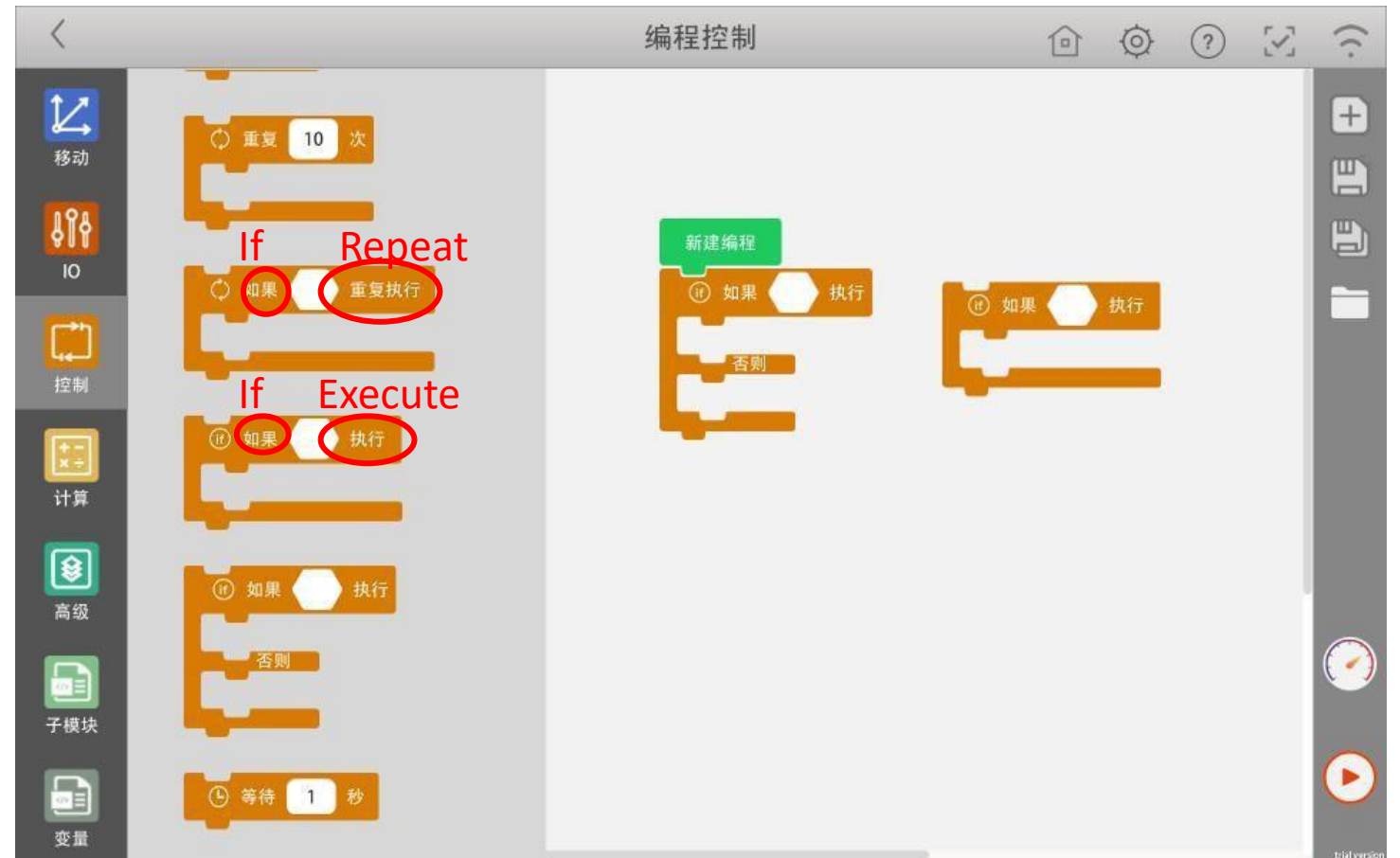


Judge

If...execute Command

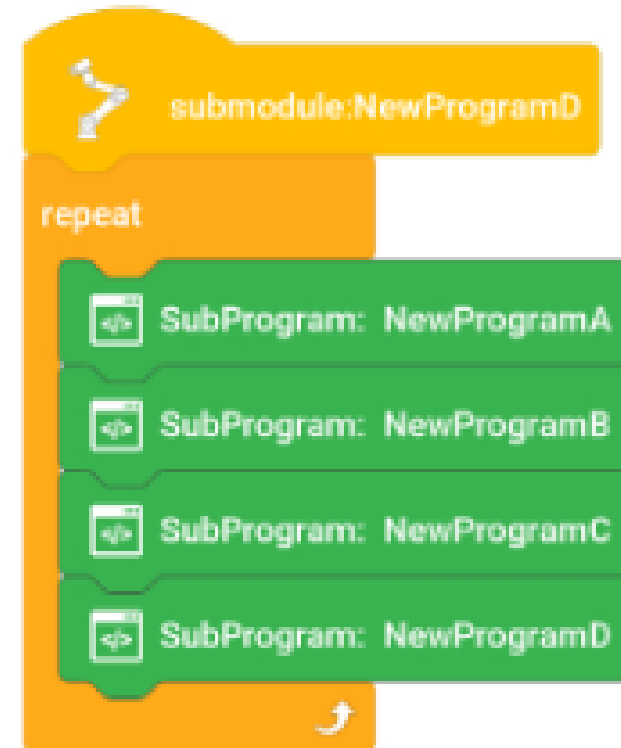
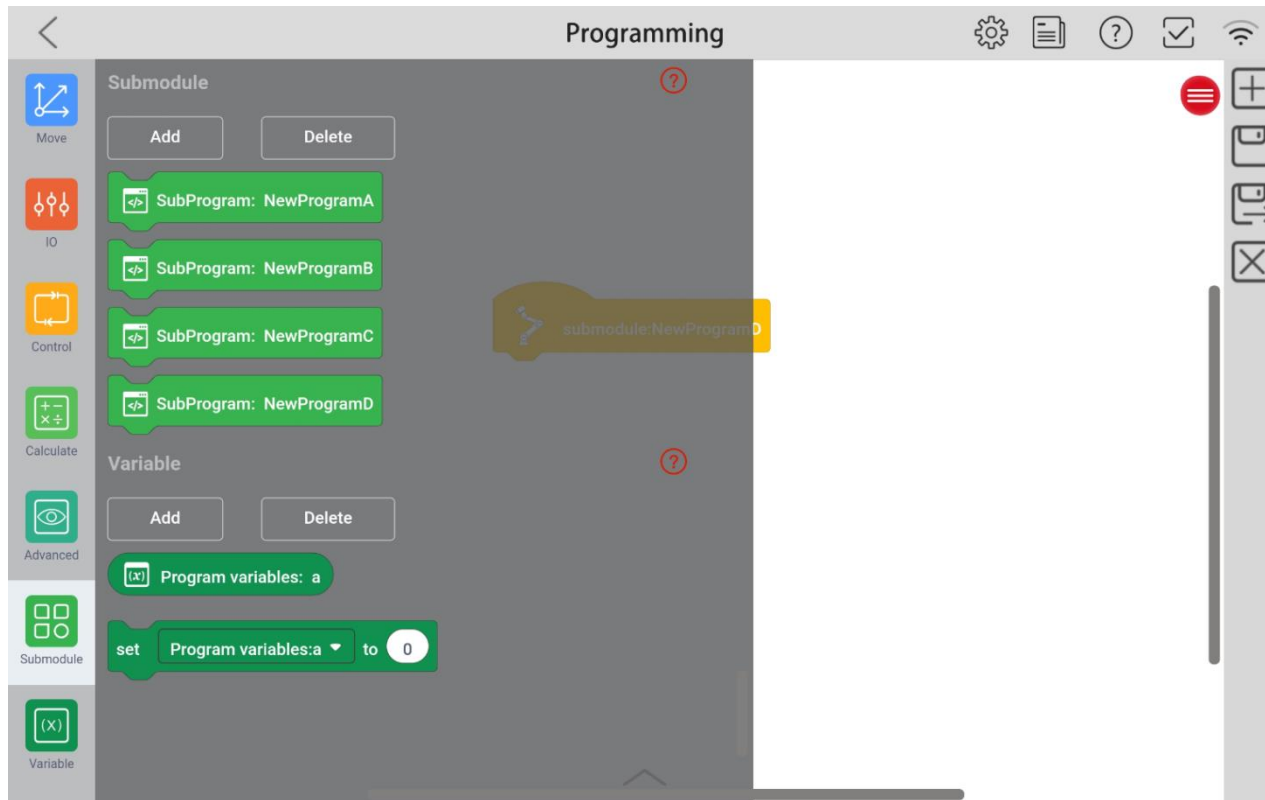
■ If

- The state of sensors
- Variable values
- The combination of variables status
- If condition = True
- execute the following commands



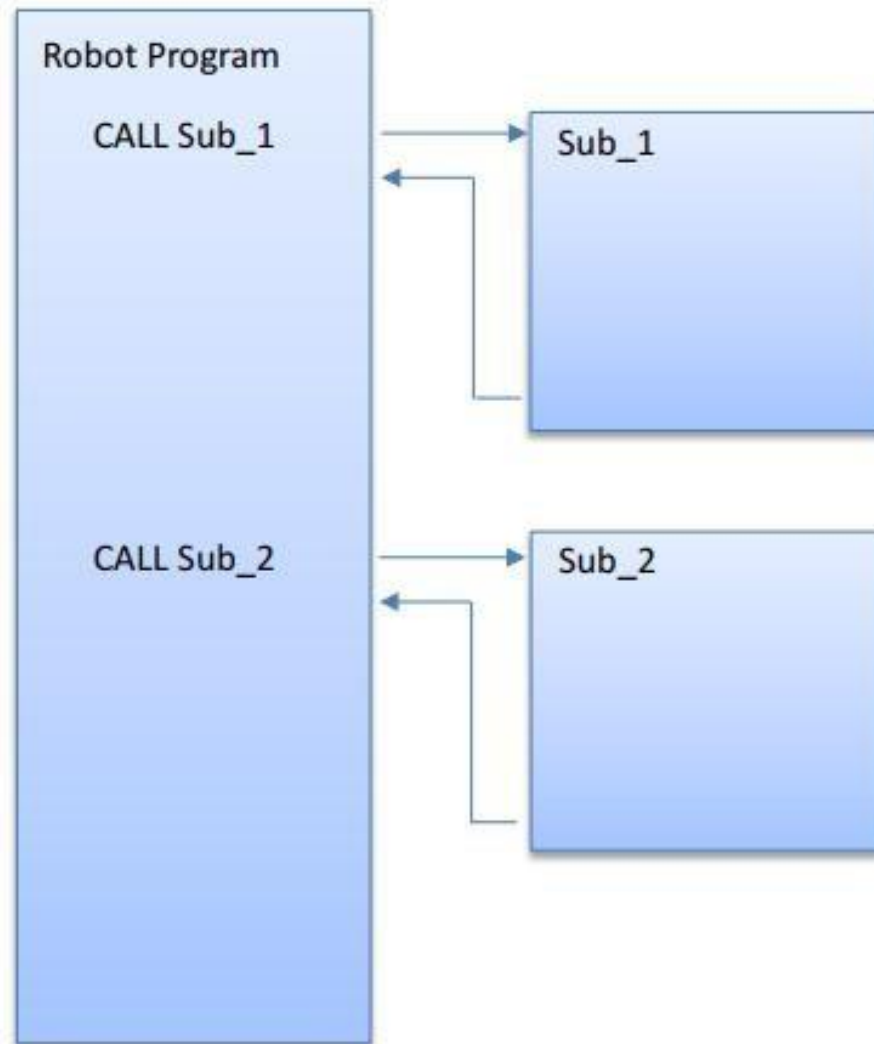
Call the subprogram

- Organize the program
- Multiple subprograms can be used in the main program

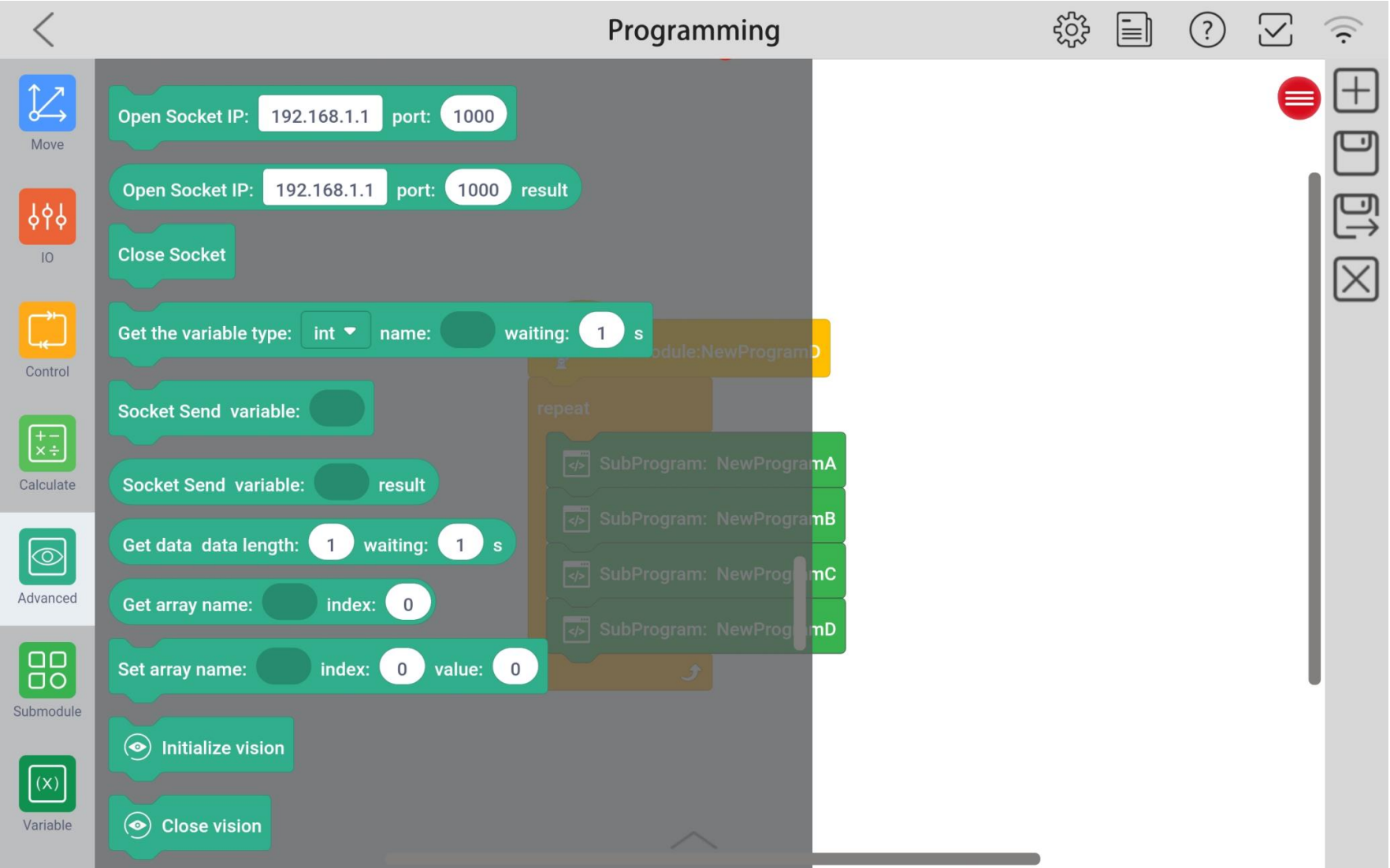


Call a subprogram

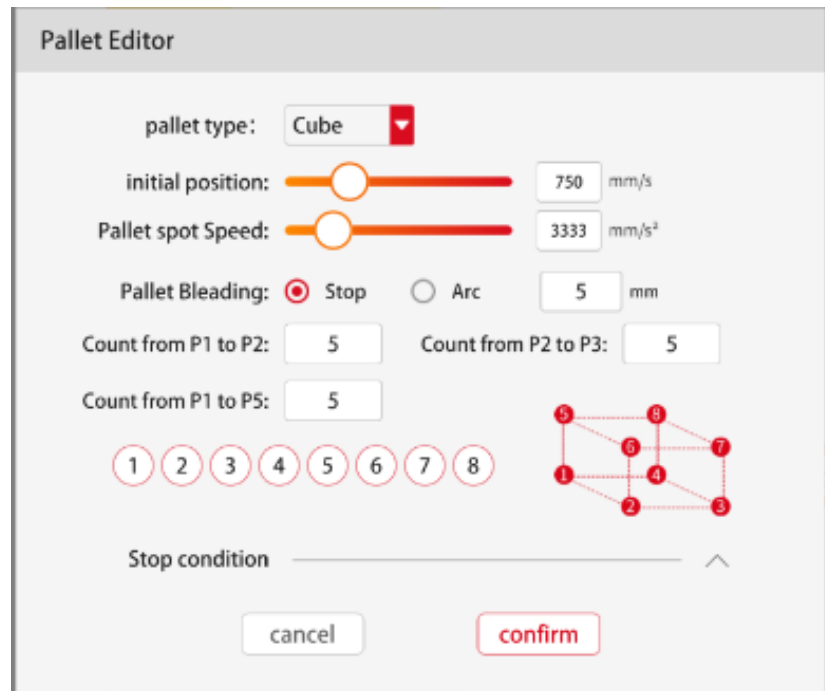
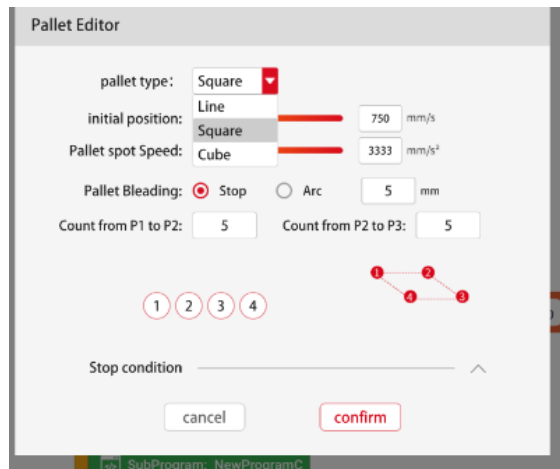
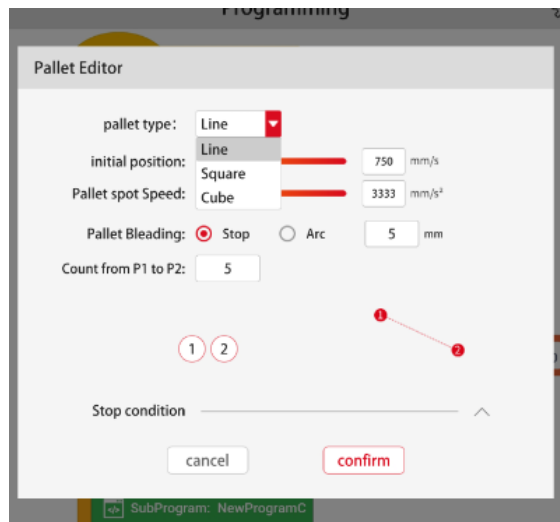
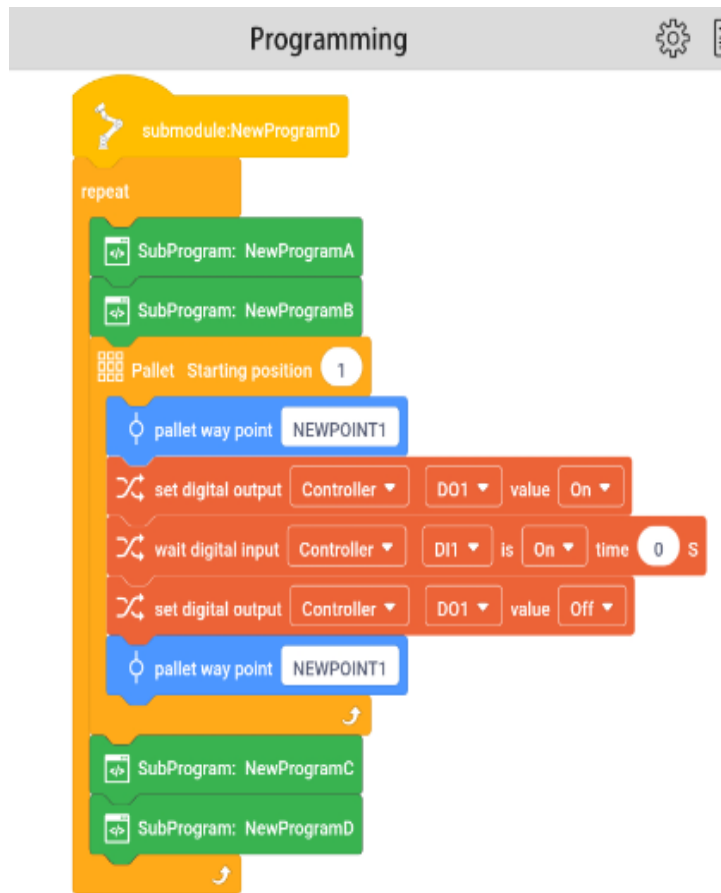
- All commands will be executed in the subprogram
- After executing the subprogram, it will return to the main program
- There is no limit on how many times subprograms can be called



Visual system



Pallet Command



- **Server (Slave equipment)**

- An equipment serves as a server
- Monitoring for requests from clients

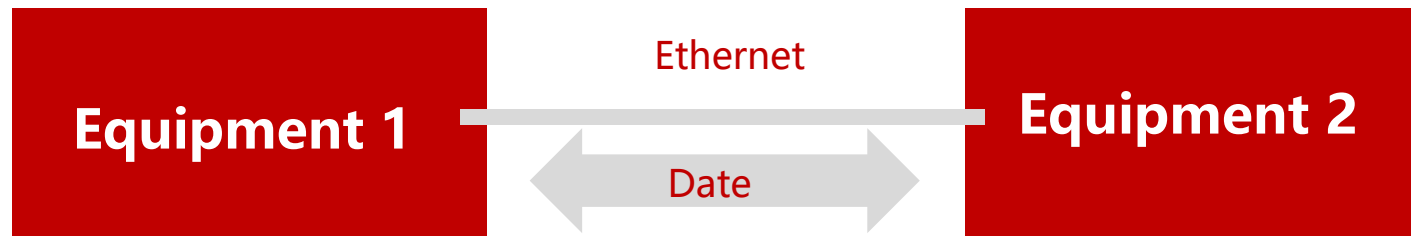
- **Client (Master equipment)**

- Other equipments serve as clients
- Send requests to the server
- Each equipment must have a unique IP address



Modbus TCP

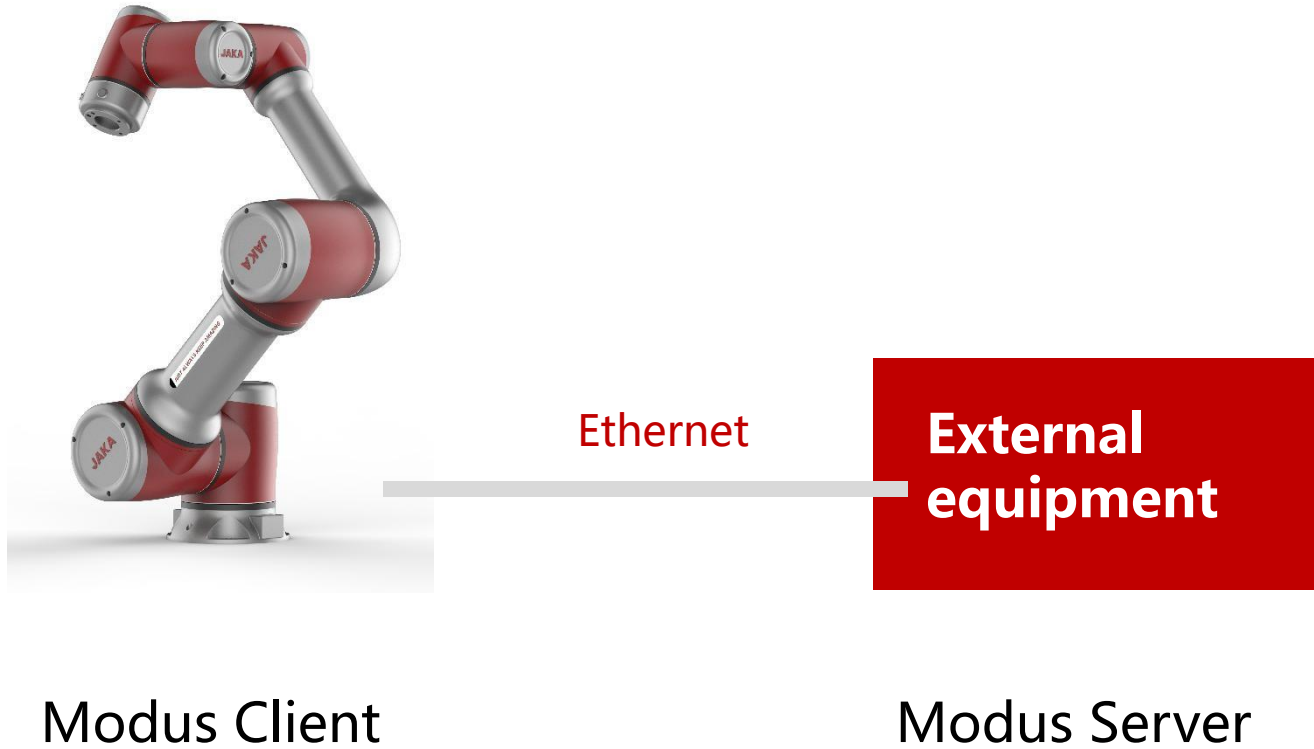
- Communication protocol based on Ethernet
- Protocol is a common language for communication between equipments
- Data can be transmitted between equipments



The relationship between client and server

■ Example

- Use the robot as client and connect it to the server



06

Services



Downloads and Tips

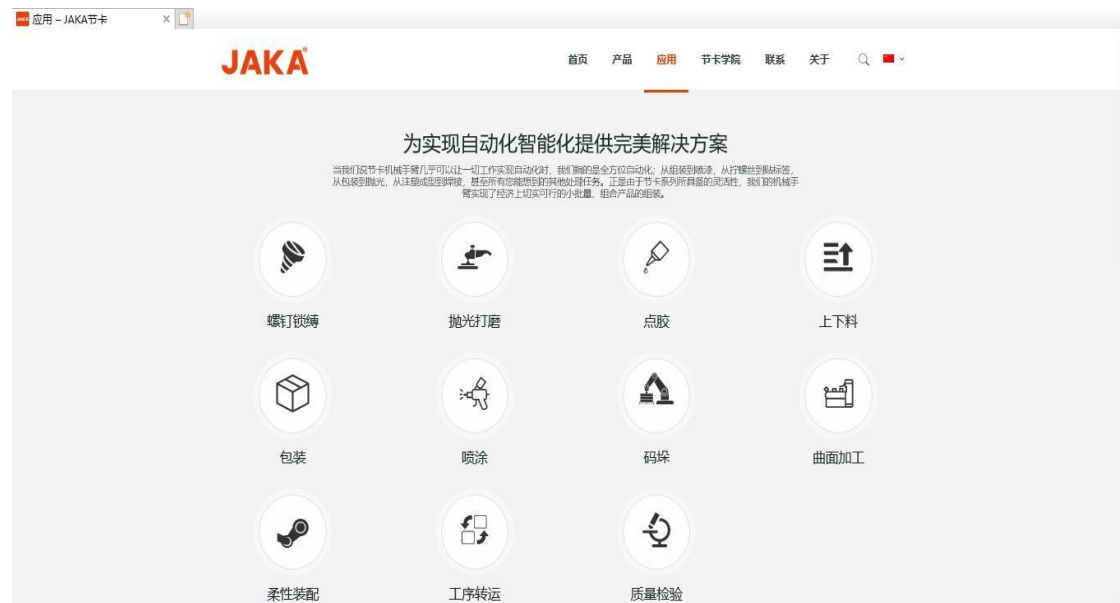
Q&A

- How to do
- Downloads
- APP and Firmwares
- Simulation software (such as RoboDK)
- CAD drawings
- Manuals

WeChat Subscription:

(Please scan the QR code)

Official website: www.jaka.com



JAKA Zu APP Introduction

- Independent innovation by JAKA
- Free update
- Support Android system
- For the latest version, please contact JAKA



Emergency service process

When the robot encounters malfunctions, customers can call JAKA's technical service hotline to start the emergency service process.

The engineer who answers the call will give proper response immediately after recording customers' description about the malfunction.

If the problem cannot be solved online or if customers need field service, JAKA will offer the field service.

If engineers find out that it is due to equipment failure, then the spare parts service process will be initiated.

Finally, engineers will record the malfunction description, analysis, and solving solutions into the "Emergency Services Records" and "Work Records". And this emergency service process is completed.

Spare Parts Service Process

If the malfunction is due to equipment failure, the spare parts service process will be initiated.

JAKA will obtain the spare parts from the manufacturers according to the contract with them.

Technical service engineers will complete the spare parts' installation, configuration and testing.

Finally, engineers will record this process into the "Spare Parts Changing Records" and "Work Records". And this spare parts service process is completed.

Spare Parts Sales Process

When the warranty is still valid, if customers want to buy the spare parts, JAKA will provide door-to-door service. Technical support engineers will be sent to customers' work site. The fee caused by that will be covered by JAKA.

If the warranty has expired, JAKA could renew the warranty at a preferential price with the customers.

07

Safety standards



Complied with international standards

- The collaborative robot system will meet the following international standards:

Standards	Description	Person in charge
ISO 10218-2	Safety related parts of control system	Manufacturer
ISO TS 15066	Safety requirements for industrial robots	
ISO 10218-2	Safety requirements for integration of robots	Integrator
ISO TS 15066	Collaborative robots technical specifications	
ISO 12100	Guidance for performing risk assessment	

ISO 13849-1: 2008

Description

- Safety of machinery-Safety-related parts of control systems

Purpose

- Provide design principles for robot manufacturers

Content

- Define safety categories and execution levels (PL)
- The safety execution level of the JAKA Zu robots is PL-d
- PL-d is the second highest reliability safety category, which means very reliable.

BRITISH STANDARD

Safety of machinery — Safety-related parts of control systems

Part 1: General principles for design
(ISO 13849-1:2006)

BS EN ISO
13849-1:2008

ISO 10218-2: 2011

Description

- The safety standard for integration of robots

Purpose

- Providing guidance for industrial robot system integrators
- Considering the design when use and install of robots

Consideration

- Defining workspace, limit area, collaboration area
- The arrangement of electrical cabinet and emergency stop
- Design of the end-effector
- Motion and speed of robots
- Operator' s position

INTERNATIONAL
STANDARD

ISO
10218-2

First edition
2011-07-01

**Robots and robotic devices — Safety
requirements for industrial robots —**

**Part 2:
Robot systems and integration**

*Robots et dispositifs robotiques — Exigences de sécurité pour
les robots industriels —*

Partie 2: Systèmes robots et intégration

ISO/TS 15066

Description

- Collaborative robot technical description
- Officially released in 2016
- Including detailed guidelines for deploying collaborative robots for integrators
- Force limitation of collaborate robots



ISO 12100: Risk Assessment

Compulsory

- System integrators must do risk assessment

Non-compulsory

- The compliance of this standard is recommended
- Failure cases:
 - The integrators comply with this standard: the prosecutor has the burden of proof
 - The integrators do not comply with this standard: the integrators has the burden of proof



ISO 10218-1: 2011

Description

- Robots for industrial environments - safety requirements

Purpose

- Providing guidelines for robotic manufacturers on design principles

ISO 10218-1 is for traditional robots

- ISO 10218-1 part 5.10: Robots designed for collaborative operation shall provide a visual indication when the robot is in collaborative operation and shall comply with one or more of the requirements in 5.10.2 to 5.10.5.
 - 5.10.2 Safety-rated monitored stop
 - 5.10.3 Hand guiding
 - 5.10.4 Speed and separation monitoring
 - 5.10.5 Power and force limiting by inherent design or control
 - JAKA Zu robots comply with 5.10.5: power and force control limits are always activated.

INTERNATIONAL
STANDARD

ISO
10218-1

First edition
2006-06-01

**Robots for industrial environments —
Safety requirements —**

**Part 1:
Robot**

*Robots pour environnements industriels — Exigences de sécurité —
Partie 1: Robot*

JAKA® | 节卡

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