

完成伯朗特  
2049就是  
造福全人类



Operation manual of industrial robot ( HC+CRP )

## 伯朗特董事长寄语伯朗特员工

您们加入的是一家到2049年要通过伯朗特应用商模式和伯朗特供应链规则培养136个百亿富豪和11744个亿万富翁且伯朗特董事长要培养11880个董事长的公司届时伯朗特2049必定实现，我将无我、天人合一，您们尽管努力，伯朗特自有安排：如果您们想成为百亿富豪未来就做伯朗特一级应用商或一级供应商；如果您们想成为亿万富翁未来就做伯朗特二级应用商或二级供应商；如果您们仅仅想成为百万富翁未来就做伯朗特三级应用商或三级供应商，136家伯朗特一级应用商和一级供应商从具备百亿富豪的潜能到成为百亿富豪您们都要历经九九八十一难，期待伯朗特成就您们的梦想。



伯朗特董事长：尹荣造

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**伯朗特机器人股份有限公司成立于2008年，注册资本2.25亿，研发、生产、销售机器人、机械手及其零部件，伯朗特的核心竞争力是在“完成伯朗特2049就是造福全人类”的“伯朗特的千年文化”引领下通过伯朗特应用商模式和伯朗特供应链规则打造伯朗特生态圈。**

**BORUNTE ROBOT CO., LTD. was founded in 2008. The registered capital is 225 million RMB. BORUNTE is also a enterprises of R&D, production, sales of industrial robots, IMM robot and its parts. The core competence of BORUNTE is to create BORUNTE ecosystem through the BORUNTE integrator style and the BORUTNE supply chain rules under the guidance of BORUNTE millennium culture, which to to achieve annual sell 40,000,000 robots to supply 40,000,000 global labor and break the revenue of trillions by 2049. The completion of produce 40 million robots and break the revenue of trillions will benefit the whole mankind.**

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## 伯朗特董事长寄语伯朗特员工

你们加入的是一家到2049年要通过伯朗特应用商模式和伯朗特供应链规则培养136个百亿富豪和11744个亿万富翁且伯朗特董事长要培养11880个董事长的公司届时伯朗特2049必定实现，我将无我、天人合一，你们尽管努力，伯朗特自有安排：如果您们想成为百亿富豪未来就做伯朗特一级应用商或一级供应商；如果您们想成为亿万富翁未来就做伯朗特二级应用商或二级供应商；如果您们仅仅想成为百万富翁未来就做伯朗特三级应用商或三级供应商，136家伯朗特一级应用商和一级供应商从具备百亿富豪的潜能到成为百亿富豪你们都要历经九九八十一难，期待伯朗特成就你们的梦想。

  
伯朗特董事长：尹荣道  
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# 2049的方法论

## 伯朗特2049破万亿营收路径图分三步走

第一步：完成年销售40万台机器人；（营收百亿级）

第二步：完成年销售400万台机器人；（营收千亿级）

第三步：完成年销售4000万台机器人。（营收万亿级）

释义：完成伯朗特2049就是造福全人类是指：伯朗特的目标到2049年完成年销售破4000万台BORUNTE机器人补给全球4000万以上劳工营收破万亿就是造福全人类且在践行“构建人类命运共同体”。

尹荣造始于2018年7月28日 定于2020年3月10日

## 伯朗特生态圈

① 伯朗特的核心竞争力是在“完成伯朗特2049就是造福全人类”的“伯朗特的千年文化”引领下通过伯朗特应用商模式和伯朗特供应链规则打造伯朗特生态圈。伯朗特的目标是通过伯特应用商模式和伯朗特供应链规则到2049年要培养11772家伯朗特应用商和108家伯朗特供应商挂牌新三板实现资产证券化且108家伯朗特一级应用商和28家一级供应商从新三板的精选层转板科创板或创业板实现上市，伯朗特与伯朗特应用商或伯朗特供应商之间都是相互独立的法人单位，与伯朗特是对等的法律主体且相互之间不存在持股的关系。

② 伯朗特应用商模式中的一级、二级、三级应用商门槛分三步走：第一步：2850万、285万、28.5万；第二步：2.85亿、2850万、28.5万；第三步：28.5亿、2850万、28.5万，伯朗特的目标是发展108家一级应用商，每家一级应用商建一个“100台BORUNTE机器人实训室”，每家一级应用商发展108家二级应用商，每家二级应用商发展108家三级应用商， $108 \times 108 \times 108 = 1259712 \times 40$  每家 =  $50388480$  台  $\times 28500$  元/每台 =  $1.43607168$  万亿元完成伯朗特2049实现BORUNTE机器人造福全人类。

③ 伯朗特供应链规则：成本、品质、交期，新进入供应商必须比老供应商成本下降20%以上才能通过研发中心品质和生产中心交期的验证，只要您具备足够的成本、品质、交期，伯朗特的大门永远都是开放的，这就是规则的力量。

④ 伯朗特应用商和供应商可能是伯朗特前员工就是在践行“我将无我、天人合一”即伯朗特应用商模式和伯朗特供应链规则已经突破传统管理的边界了。

尹荣造始于2018年11月3日 定于2020年3月10日

## 1.11 伯朗特文化节是智能制造的“伯朗特宣言”

伯朗特文化节

它是宣言书

向智能制造发出呐喊

王侯将相宁有种乎？

伯朗特文化节

它是播种机

在智能制造播洒希望

星星之火，可以燎原！

伯朗特文化节

它是指明灯

为智能制造指明方向

路途遥远、行则将至！

1.11伯朗特文化节

一场智能制造的饕餮盛宴

智能制造，世界大同

同心者同路！

释义：① 每年的1月11日是伯朗特员工+伯朗特供应商+伯朗特应用商的狂欢节日（开启篇章）；


② 伯朗特的千年文化是指：伯朗特的“伯朗特的千年文化”的魂是“我将无我、天人合一”其落脚点就是“完成伯朗特2049就是造福全人类”。


尹荣造始于2018年11月17日 定于2020年3月10日

## Safety Attentions

Please read carefully and understand totally of these instructions and other related documents BEFORE using this system. Please start using the system ONLY AFTER mastering all equipment knowledge, safety knowledge, and notices.

Safety attentions in this instruction are graded into four categories- DANGER, CAUTION, MUST, and FORBID

 **DANGER** indicating that death or severe injury will result if wrong operation is taken.

 **CAUTION** indicating that medium or slight injury or equipment breakdown will result if wrong operation is taken.

 **MUST** instructions that must be obey.

 **FORBID** operations that mustn't be taken.

It should be noticed that things labeled with CAUTION may also result into severe consequences in different situation. So it's very important to pay attention to every CAUTION instructions, and stay strictly with them.

Some instructions even may not be labeled with DANGER or CAUTION, but users should also obey them.

# DANGER

★Before operating the robot, press the “emergency stop” button on the teach box and make sure main power supply of servo is off and motor is in “off-power and brake” status. After cutting off the servo power, servo power button on the teach box is red.

Under an emergency, personal injury or equipment damage may result if robot cannot be stopped in time.

Emergency stop button



★When emergency is removed and servo power need connecting, please remove and deal properly with the incidence which causes the emergency, and then connect the servo power.

Personal injury may result due to the unwanted robot movement from wrong operation.

Rotate the button according the white arrow to remove the emergency stop



★When teaching within the robot movement region, please obey the following principle: keep observe the robot from the front

follow the operation manual strictly

consider the backup plan if robot move suddenly toward yourself

set up the shelter just in case

Personal injury may result due to the unwanted robot movement from wrong operation.

★When following processes are operated, make sure nobody is in the robot movement region and operator is in the safe position: powering the robot control electric tank

controlling the robot using teaching programmer

test run of robot

reoccurrence automatically

Personal injury may result when entering the robot movement region or contacting the robot.

Press the emergency stop button immediately when exception occurs.



**★Following items need confirming before operating robot:**

Operator is well-trained with robot-operation;  
 Operator has adequate knowledge of the movement feature of robot;  
 Operator is fully aware of the danger of robot;  
 Operator hasn't drink alcohol;  
 Operator hasn't take drugs that affect the nerve system and make reaction slow.

**★Following items need checking before robot teaching process. If any abnormal is found, fix it or take other necessary measurement immediately.**

Movement of robot is normal or not;  
 Zero point adjustment is correct or not;  
 Auxiliary equipment connected to robot is normal or not.

**★Please put the teach equipment to original position after usage, and place it firmly.**

Please don't put the teach programmer on robots, claps or ground. Otherwise, personal injury or equipment damage may result when teach programmer has collision with robot or claps.

Please be cautious with the incidental falling of teach programmer, which may leads to wrong movement of robot, personal injury and equipment damage.



**Safe operation protocols**

**★All the operators of robot systems should participate in system training, study safety protection measurements and understand robot functionality.**

**★Make sure no abnormal or dangerous situation of robot and auxiliary equipment occurs, before starting operating robot.**

**★ Unplug the power or press emergency stop button before entering the operation region, even robots aren't running.**

**★ When programming within the movement region of robot, corresponding guard should be set to make sure that robot can be stopped under emergency circumstances. Please don't wear gloves when teach and inch the robot. Please take the slow mode when inching the robot, in case emergency occurs and robot can be stopped efficiently.**

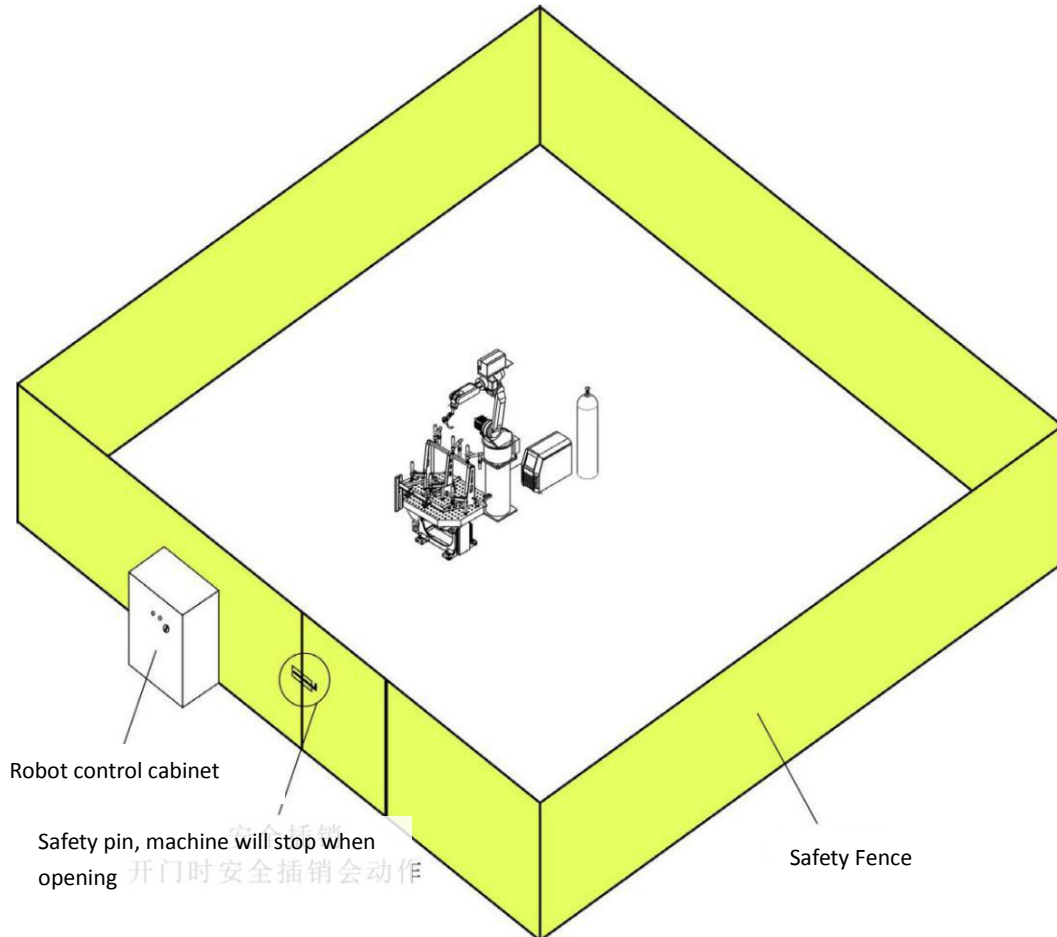
**★Operators must be familiar with the emergency stop buttons on the robot controller and periphery controller, to the degree that these buttons can be pressed exactly under emergency.**

**★Never think that static status of robot means the finish of program. Static robot is likely to receive the input signal to get moving.**

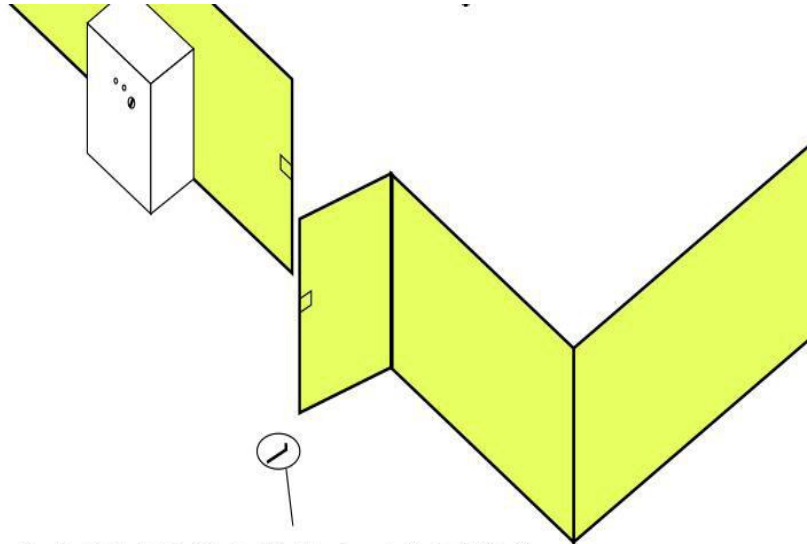
# Security related instructions

## 1.Danger

- 1 .The operation of the robot controller must be assigned to a dedicated operator, and the person must undergo safety training and pass the assessment before they can be employed.
- 2 . A safety fence is placed around the robot's range of motion. The safety fence must be able to effectively prevent the robot from popping out or protruding out of the fence due to errors or arm falling off, material falling off, etc. The safety door on the fence should have a safety pin. Only the safety switch can be opened to enter the fence, and the robot must automatically stop safely after the safety pin is removed.

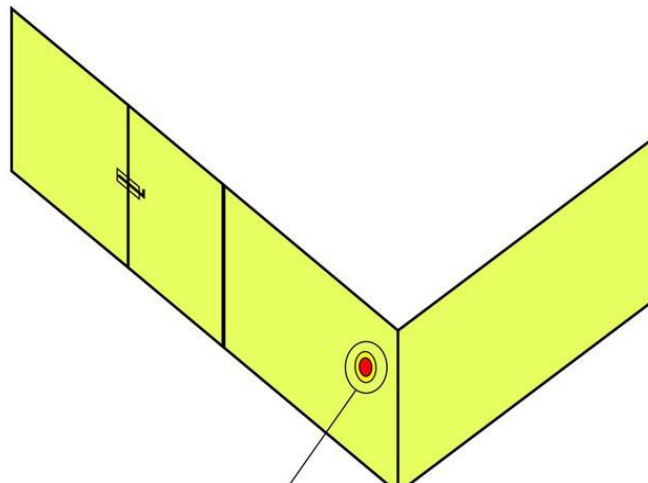


- 3 . Separation of man and machine: During the movement of the robot (automatic, manual), it is forbidden for anyone to enter the scope defined by the safety fence of the robot.
- 4 . If there are several operators working together in the robot application system, it is important that all operators and their associated personnel know that the robot has been enabled before starting the robot.
- 5 . When it is necessary to inspect the robot, the operator should carry the safety pin on the body and cut off the power of the robot or press the "emergency stop" button to prevent the third party from operating the robot.



Before entering into the working area of the robot, the safety pin is take to the body or locked it.

- 6 . An emergency stop device is provided at the position where the operator is most convenient to press, ensuring that the operator can perform an "emergency stop" operation quickly and easily when abnormal movement of the robot occurs.



Set emergency stop device at the location where the operator is most convenient to press.

- 7 . Before starting the robot, first confirm the safety conditions and clear the obstacles on the robot's running path, especially to ensure that there is no human activity within the robot's range of motion. Never try to stop the movement of the robot with tools or body. Remember to press the "Emergency Stop" button to stop the robot immediately.



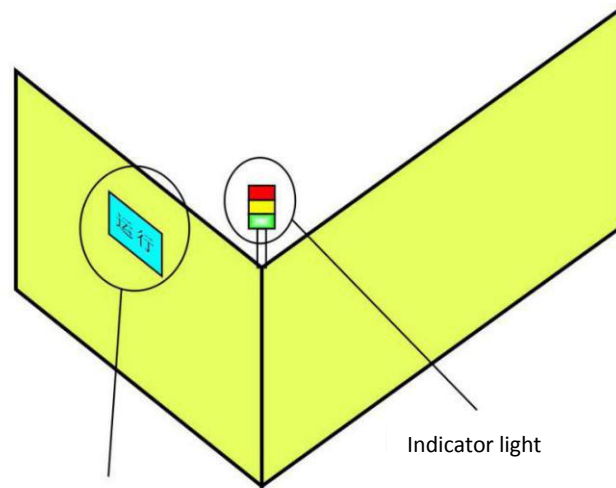
Emergency Stop

- 8 . Do not operate the robot beyond its rated capacity, including: load, speed, range of motion, operating environment.

## 2.Notice

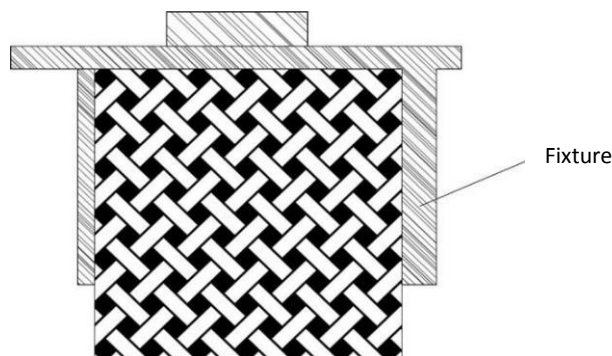
- 1 . The safety fence must be strong enough to be fixed and immovable to prevent the operator from easily breaking or removing the safety fence. The safety fence itself should be free of sharp edges and sharp corners and must not have potentially dangerous parts.

- 2 . The outside of the safety fence must clearly indicate what state the robot is currently in (teaching, running, maintenance). In order to prevent people from mishandling robots and peripheral devices through teaching devices, man-machine interfaces, etc.



Robot working status display

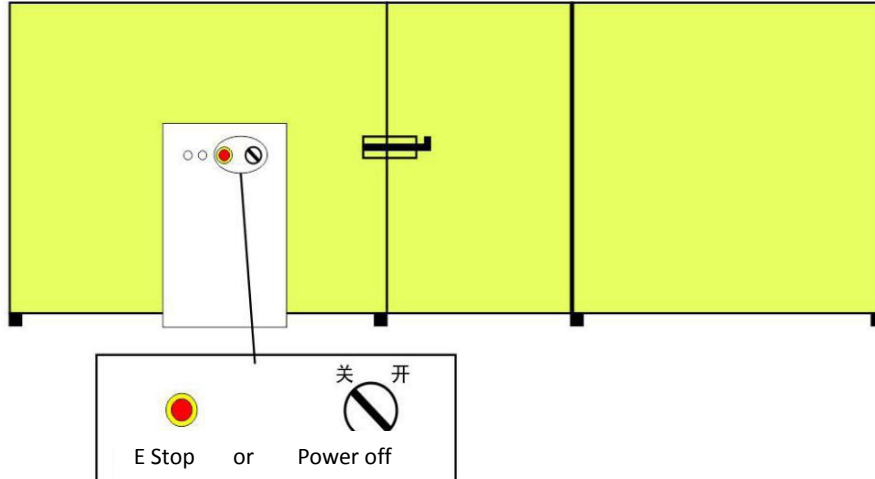
- 3 . Please paint on the ground with hazardous areas, including the range of motion of the robot and peripherals. In addition, leave enough safety space around and install safety guards for the operator to avoid during abnormal operations or emergency situations.
- 4 . Before operating the robot, you need to first confirm whether the "Emergency Stop" button function is normal. Check the names of the switches, displays, and signals necessary for all robot operations and their functions.
- 5 . Before operating the robot, make sure that the origin of the robot is correct and that the axes are working properly. During operation, the operator should always keep looking at the robot from the front.
- 6 . In the teaching and maintenance operations, safety supervisors must be deployed outside the safety fence. If the robot exhibits abnormal movement during teaching or maintenance, the supervisor must perform the "emergency stop" operation very quickly and easily. In addition, the safety supervisor must be the person who has completed the safety training and passed the safety assessment.
- 7 . When the teach pendant is used up, it must be replaced and ensure that it is securely placed. If the teach pendant is placed on the robot, fixture or ground, when the robot moves, the teach pendant may collide with the robot or fixture, causing personal injury or equipment damage. Prevent the robot from malfunctioning due to accidental fall of the teach pendant, causing personal injury or equipment damage.
- 8 . To restart the robot after an emergency stop, reset and restart outside the safety fence. At the same time, confirm all safety conditions to meet, confirm the robot's range of motion, and there are no personnel and obstacles left in the safety fence.
- 9 . After the robot motion teaching is completed, set the soft limit of the robot to a distance outside the robot's teaching range.
- 10 . When the workpiece is gripped by a pneumatic gripper, electromagnetic method, etc., use a fail-safe system to ensure that the workpiece is not ejected once the drive force of the mechanism is suddenly disconnected.



Power off clamping state

### 3. Forcibly

1. All robot system operators should participate in the training of this system to learn about safety protection measures and the functions of using robots.
2. Before starting the robot, make sure there are no abnormalities or dangerous conditions around the robot and peripherals.
3. Turn off the power or press the emergency stop button even if the robot is not running before entering the operating area.

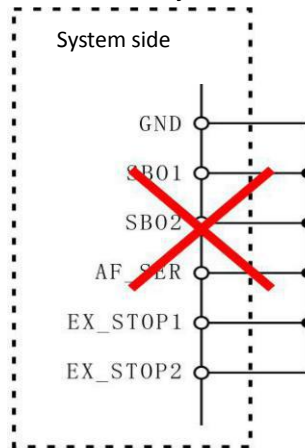


Turn off the power or press the emergency stop button before entering the operating area.

4. When programming in the robot work area, set the corresponding guard to ensure that the robot can stop in an emergency. Do not use gloves to teach and jog the robot. When jogging the robot, try to use low speed operation. In case of abnormal conditions, the robot can be effectively stopped.
5. The position of the emergency stop button on the robot controller and peripheral control unit must be known so that these buttons can be pressed accurately in an emergency.
6. Never think that the program is complete when the robot is in a stopped state. Because at this point the robot is most likely an input signal waiting for it to continue moving.

### 4. Prohibited

1. Do not plug or unplug any electrical connectors while the robot is powered on.
2. Do not use any method to short circuit the safety device.



Do not short circuit above signals

3. It is forbidden to operate and use robots without personnel through safety training and assessment.
4. It is forbidden to work after drinking alcohol.
5. It is forbidden to disassemble or modify any parts of the controller. The company (Bronte) will not bear any responsibility for any equipment and personnel damage caused by unauthorized modification.

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# Chapter 1. Precautions for Robot Handling and Installation

## 1.1 Unpacking the robot

- Six-axis industrial robots are shipped in a uniform wooden box. The bottom plate is fixed between the load-bearing portion of the package and the inner package; the inner package does not sway on the bottom plate is a force portion of the crane or forklift handling. The outer casing and the upper cover only play a protective role, the bearing capacity is limited, the heavy weight cannot be placed on the packaging box, and it cannot be dumped or rained.



- Please check if there is any damage before unpacking. If there is any damage, please contact the transportation or supplier. After confirming that there is no damage, use a crowbar, a wrench and other tools to remove the cover first, then remove the surrounding casing, taking care not to damage the inner product. Finally move the robot to a position that is ready to be fixed. Check that the robot system components are complete according to the checklist provided below.

Goods	Quantity
Electric control box	1 set
Six-axis robot body	1 set
Controller	1 pcs
Control box connected cable	1 pcs (with electric box)
Industrial robot manual	1 book
Other accessories	Depending on the purchase order

**note:**

**The above is only a list of machine configurations. It may be packaged. If there are two or more internal devices, the configuration list will be multiplied by the standard. For details, please check the shipping list, which is subject to the shipping order.**

## 1.2 Requirements for installing the robot

- The ambient temperature should be between 0 and 45 ° C (32 to 113 ° F) during operation and -10 to 60 ° C (14 to 140 ° F) during handling and maintenance.
- Must be used in an environment with an average altitude of 0-1000M.
- The humidity must be below the dew point (less than 10% relative humidity).
- Locations with less dust, oil, fumes, and water.
- Flammable materials and corrosive liquids and gases are not allowed in the work area.
- Locations where the vibration or impact energy of the robot is small (vibration below 0.5G).

- There should be no large electrical noise sources (such as gas shielded welding (TIG) equipment), electromagnetic interference sources, and electrostatic discharge.
- There is no potential hazard of collision with moving devices such as forklifts.

### 1.3 Robot installation

- First ensure the robot installation environment and space, and the robot installation location. The plant layout, ground leveling, power supply, etc. of the robot installation should be evaluated first, and then the robot position should be arranged according to the range of motion described. To ensure that the robot has enough space for movement, if there is a corresponding application space, refer to the instruction manual or contact the supplier to determine whether it can be used safely. Refer to the operating range and parameters of the equipment in the following chapter for details of the robot's motion range.
- After confirming the installation position, use a tool such as a forklift to transport the robot to the installation position. The robot must be firmly fixed in the installation position because the robot itself has a large inertia when moving. If the installation position is not heavy enough or the installation is unstable, it is easy causes the robot to dump excessively due to excessive force, causing unnecessary damage. It may even damage personal safety.
- The safety fence is designed to prevent people from entering the robot's range of motion or colliding with the robot to prevent personal injury.
- After placing the robot and control box, insert the power box control cabinet cable and body. Control cabinet cable plugging Note: First of all, for the power and code socket, gently close the socket and lock it tightly. If the force is too strong, the socket will be damaged. According to the six-axis robot electric box nameplate identification, connect the corresponding power supply. Note that the equipment must be grounded to the ground and ensure good grounding. Finally, insert the teaching box into the control box.
- Other installations and port wiring, please check the relevant information or consult the agent.

### 1.4 Robot inspection test before leaving the factory

The components used in the equipment are purchased strictly according to the requirements. The hardware and so on must be tested strictly according to the drawings. After passing the assembly, the finished products are assembled. The assembled semi-finished products also need to be inspected according to the requirements before they can flow into the next process. Please check the inspection items attached to the machine for details.

Each robot will do several important tests and checks before leaving the factory.

1. Whether the parts of the robot body are installed stably, whether they meet the installation requirements, and whether the appearance has scratches. Whether the connection line between the robot and the control box is normal, whether the buttons of the teaching box are valid, and whether the commands of the touch screen can be normally received.
2. Whether the robot control box emergency stop button, teaching box emergency stop button, and brake release button can work normally.
3. Speed test. First, the speed test of the manual movement is performed in the teaching mode. When the joint mode, right angle mode, and tool coordinate mode are tested, whether the motion speed is within the standard range, and then modify the speed to see if the speed control is valid.
4. Stability test. A general test program has been written in the company. Each axis of the robot performs the maximum range of motion, and the speed is incremented step by step and then decremented step by step. After running for a certain period of time, the test machine is stable.
5. Qualified after the above tests and inspections (within the specified range). The robot is a high-precision installation equipment, and it is inevitable that errors will occur during installation. In order to prevent the accuracy of the robot movement, each machine must be subjected to precision instrument calibration detection and compensation correction before leaving the factory. In the reasonable accuracy range, the shaft length, the speed reducer, the eccentricity and other parameters are compensated to ensure the equipment movement and the track accuracy. After the calibration compensation is within the qualified range (see the calibration table for details), if the compensation commissioning is not within the qualified range, it will be returned to the production line for re-analysis, debugging and assembly, and then calibrated until qualified.

### 1.5 First use of robot production attention

1. When the robot is used for the first time and the program has been programmed to be ready for production, a safety test is required:
2. The test should be run in a single step to confirm whether each point is reasonable and whether there is a risk of impact.
3. Reduce the speed to a standard that can be reserved for sufficient time, then run, and test whether the external emergency stop and protective stop are normal use, whether the program logic meets the requirements, whether there is a risk of collision, and need to be checked step by step.

**Note: The test procedure must be followed by a single step in the order of the program action.**

### 1.6 Precautions of changing robot parts

When changing the robot components, including updating the system software, it is necessary to be operated by a professional, and the test is performed by a professional to meet the usage requirements before being used again. Non-professionals are prohibited from performing such operations.

1. Confirm the operation under power off.
2. Turn off the input power first, then disconnect the output and ground cable.
3. Do not use too much force when disassembling. After replacing the new device, connect the output and ground wire before connecting the input cable.
4. Finally check the line and confirm before power on to testing.

**Note: Some key components may affect the running track after replacement. In this case, you need to find the reason, whether the parameters are not restored, whether the hardware installation meets the requirements, etc. If necessary, you may need to return to the factory for calibration to correction for hardware installation errors.**

### 1.7 Safeguard

Robots are often different from other mechanical equipment, such as its large range of motion, fast operation, and rapid movement of the arms, all of which pose a safety hazard.

Read and understand the instruction manual and related documents, and follow the various procedures to avoid personal injury or equipment accidents. It is the responsibility of the user to ensure that their safe operating environment complies with and complies with local and national safety laws and regulations.

- The teaching and maintenance of robots must comply with the following regulations:

- Law on industrial safety and health.
- Mandatory order regarding industrial safety and health laws.
- Corresponding regulations on industrial safety and health laws.

Other relevant laws are:

- American occupational safety and health law.
- German factory law.
- UK work safety and health law.
- EU's 89/392 Machinery Industry Directive and the European Community's 91/368.

- Prepare

- Safety technical rules

Conduct safety management in accordance with specific policies that comply with relevant regulations.

- Observe

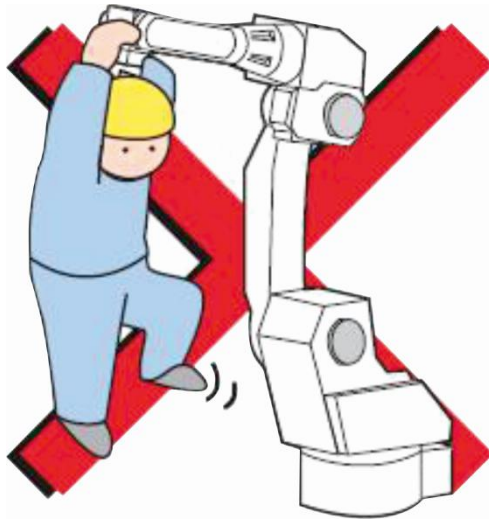
- Safe operation of industrial robots (ISO 10218).

- Supplement

- Safety management system

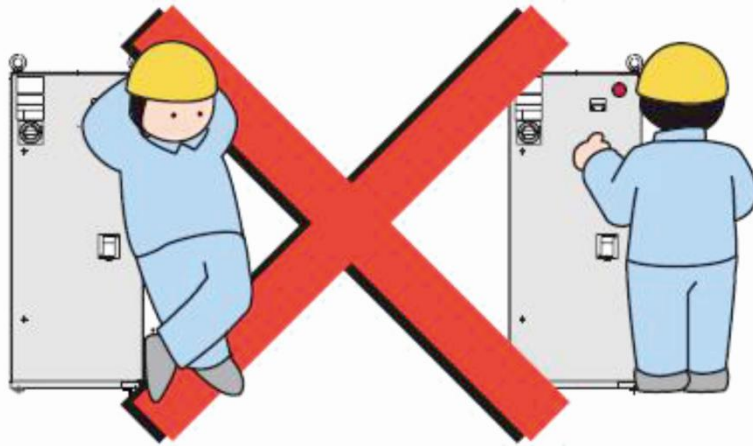
Designate authorized operators and safety managers and provide further safety education.

- The work of teaching and repairing robots is included in the "dangerous operation" of industrial safety and health laws.



- **Never lean on a robot or other control cabinet; Don't push the action button at random**

Otherwise, it may cause unexpected movements of the robot, resulting in personal injury and equipment damage.



- **During operation, no non-staff member is allowed to touch the robot.**

Otherwise, it may cause unexpected movements of the robot, resulting in personal injury and equipment damage.

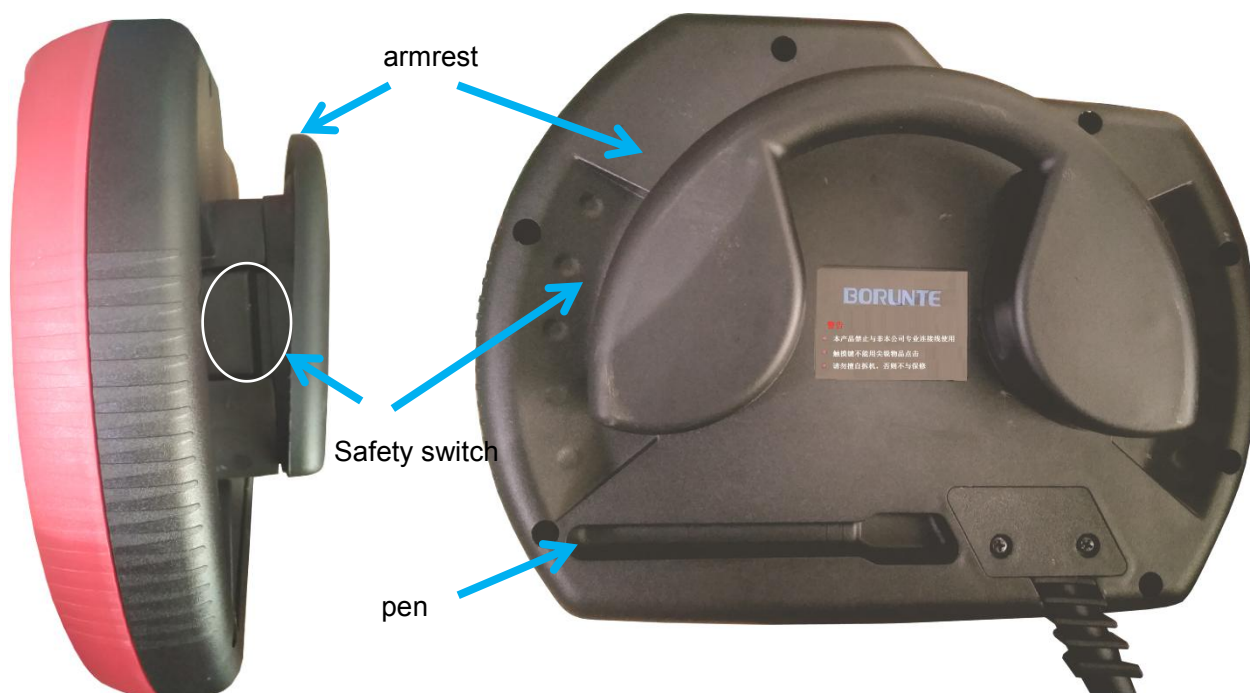
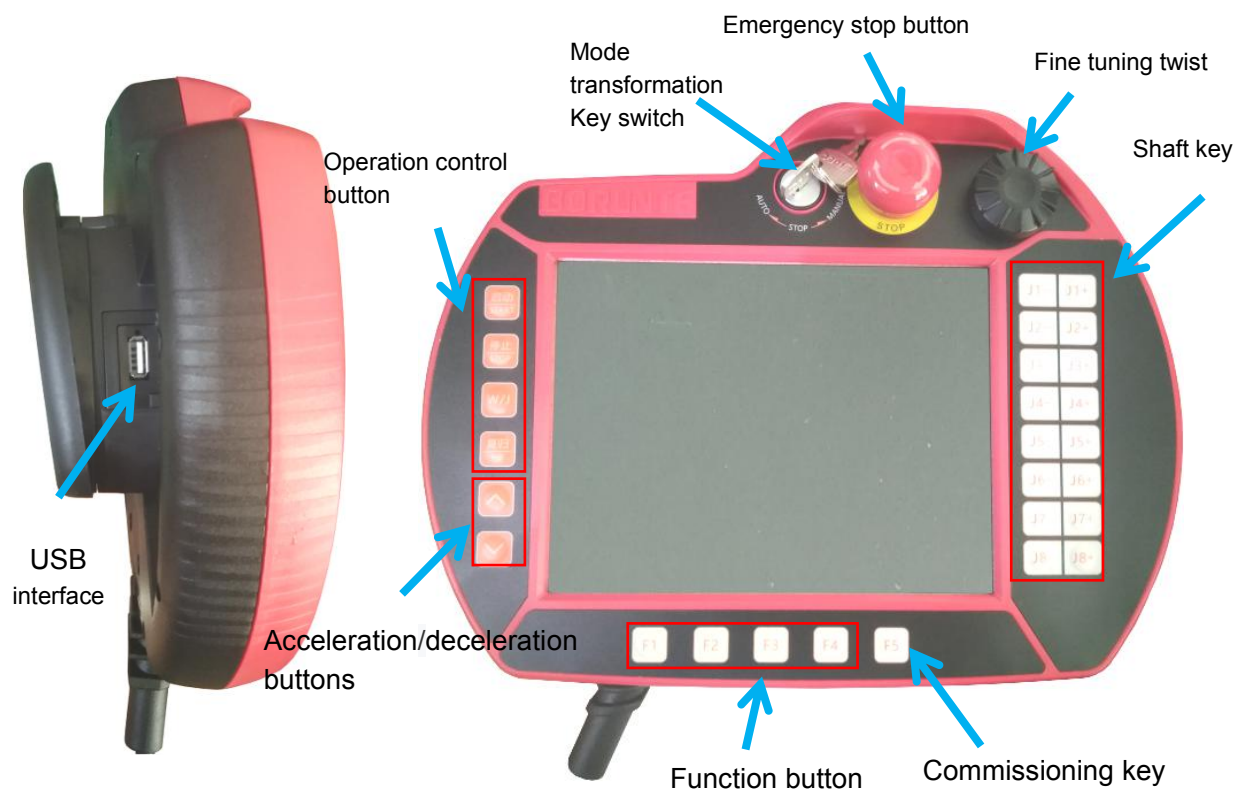
### **1.8 guidelines for rescuing trapped personnel**

When the robot starts to run, it is necessary to make sure that no one is in the range of motion of the robot. If there are still workers trapped by the robot, please carefully perform the following steps:

1. When a worker is found trapped, he/she should immediately take a quick stop to stop the operation of the equipment.
2. Rescue personnel will hold the robot beside, but the robot should not move to avoid greater harm to trapped personnel.
3. Open the protection device and press the button of manually unlocking the brake, then the rescue personnel will move the trapped robot manually and rescue the trapped personnel.

## Chapter 2.Shows and Operates


### 2.1 appearance and description





## 2.2 Key function description

### 2.2.1 State selection switch

Manual control of the state is divided into three kinds, manual, stop, auto.

"Manual" : The status selector switch to the left to enter the manual state, the upper left corner of the screen icon becomes As shown in Fig  In this state, manual operation and programming can be performed.

"Stop": The status selector switch to hit the middle of the state into the stop, the upper left corner of the screen icon becomes Figure  In this state, parameter setting is possible

"Auto": The status selector switch to the right to enter the automatic state, the upper left corner of the screen icon becomes Figure  In this state can be fully automatic and the corresponding settings.

### 2.2.2 Function keys

"Start" key: Press "Start" key in automatic state to enter the automatic running state. Press the [Reset] key and then the [Start] key to return to the home position.

"Stop" key: Function 1: Press this button to enter the single cycle mode. In the automatic mode, the system will stop in the single-cycle mode. After pressing the [Stop] key again, the robot Stop motion.

Function 2: In the event of an alarm, press this key in the stop state to clear the alarm display that has been resolved.

"Origin" key: In the stop state, press this key, then press "start" key to start the home return operation.

Note: You can select the way of homing and the order of homing in this key. For details, please refer to 3.2.1.17 Function description of origin command.

"Reset" key: Press the [Reset] key and then press the [Start] key to return all the axes to the home position.

Note: You can also add other commands to this key, for example, to turn off an output point when you press the reset button. For details, see section 3.1.

### 2.2.3 Axis action keys

X +key: Pressing this key moves the axis in the positive direction at the current speed.

X- key: The axis moves at the current speed in the negative direction.

Y1- key: The axis moves at the current speed in the negative direction.

Y1+ key: The axis moves at the current speed in the positive direction;

Z + key: Pressing this key moves the axis in the positive direction at the current speed.

Z- key: The axis moves at the current speed in the negative direction.

U + key: Pressing this key moves the axis in the positive direction at the current speed.

U- key: The axis moves at the current speed in the negative direction.

V + key: Press this key to move in the positive direction at the current speed.


V- key: The axis moves in the negative direction at the current speed.

W + key: Pressing this key moves the axis in the positive direction at the current speed.

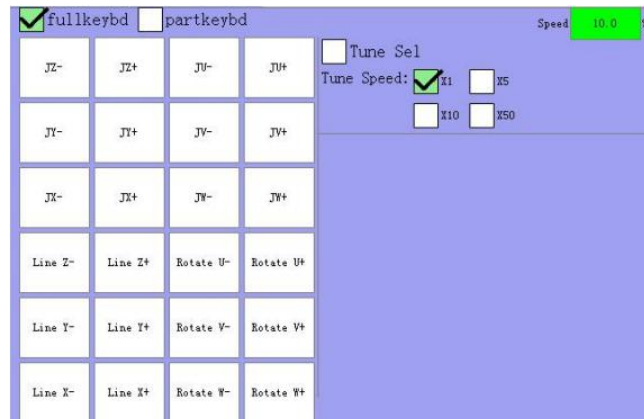
W- key: The axis moves at the current speed in the negative direction.

There are two types of axis motion, one is the world coordinate motion and the other is the joint movement. Pressing the axis type in manual mode and pressing the axis action button will activate the corresponding axis.

### Operating procedures:

1, In manual mode, click this icon  once to open the manual keyboard button.


2, The icon after opening the icon below, in this figure, select the axis movement type and press the appReturn to originate axis keys (keyboard keys or hand control button), the corresponding axis will act.



3, Manual speed control: in manual mode can press the acceleration and deceleration keys can be adjusted speed, can also be fixed in the manual speed, the corresponding setting can be entered in the stop state "parameter" → "machine settings" → "run parameters (Chapter 4.2.1) of the Standalone Control Manual option.

### 2.2.4 Fine-tuning knob

Function: You can use this knob to precisely move the axis when the manual mode is fine-tuned.

To do this, click the Open button  click the [Tune sel] option, select the tune speed, select the axis to be fine-tuned in the left box, or press the axis button (on the hand controller) The fine adjustment knob moves the axis one point at a time to the target point.



X1: The movement of a grid axis is 0.01mm or the axis is rotated by 0.01 degree.

X5: moving a grid axis 0.05mm or axis rotation 0.05 degrees.

X10: moving a grid axis movement 0.1mm or axis rotation 0.1 degrees.

X50: moving a grid axis moving 0.5mm or axis rotation 0.5 degrees.

World coordinates: The position and attitude of the end point of the tool with the center of the robot base as the origin.

Joint coordinate: The coordinate value of the motor coordinate converted by the mechanism coupling relationship.

### 2.2.5 Emergency button

Function: Press the emergency stop button in emergency, it will cut off all axes to enable, the system alarm "emergency stop", after the knob is unscrewed, press "stop" key to cancel the alarm.

## 2.3 Main screen and axis definition

### 2.3.1 Main screen description



#### 2.3.1.1 Authority management

Login: Click "Login" to enter the login interface, first select the user type, enter the password, then click "login". To exit to the minimum privilege, click "Logout". The operation diagram is as follows:



Note 1: Please log on before setting the system, because different user names have different administrative rights.

Note 2: Create a new user name to see section 4.3.6.

**Op(Operator)** : The permission can only be moved in the manual state can not enter the teaching page to teach the page, automatic state can start the robot, adjust speed, stop state can enter the home return.

**Admin(Administrator)** : This permission can only move the axis in the manual state can not enter the teaching page to teach, automatic state can start the robot, adjust the speed, stop state can enter the home return.

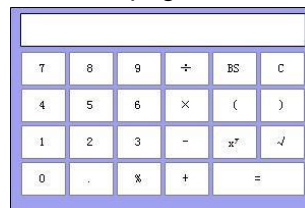
**Super**: The user can perform all the operations except for user management, the default login password 123456.

**Root(Super administrator)**: the user can perform all the operations under the default login password 12345678.

Permissions Size: Op <Administrator <Super < Root

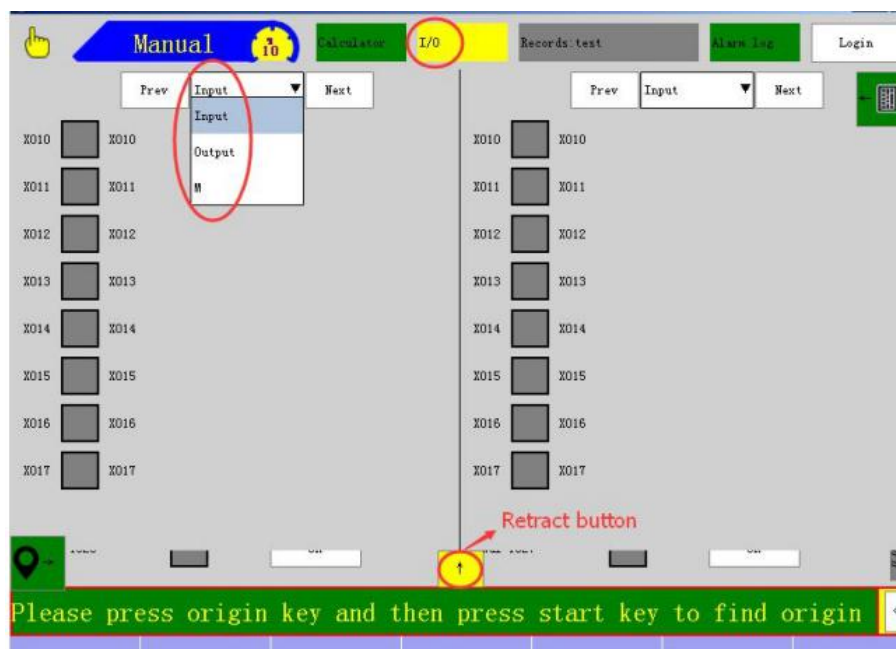
### 2.3.1.2 Calculator

Click once to open the counter and click the second page to retract.



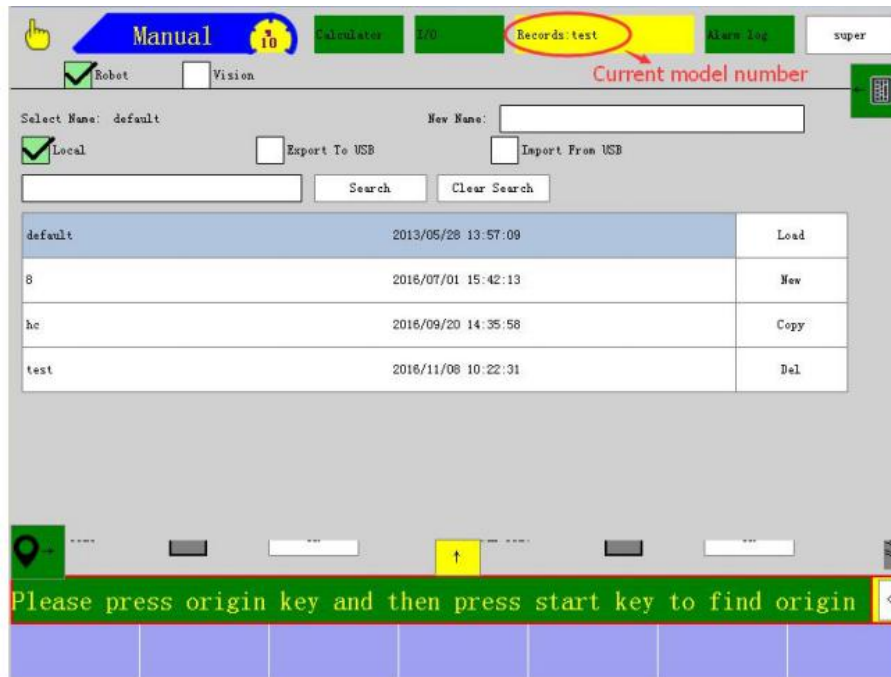
### 2.3.1.3I / O monitoring

Click once to view the I / O points and intermediate variable on / off status and click the second page retraction.



### 2.3.1.4 Model

Click the model number to enter the model management page can be "new", "load", "copy", "delete" specific operation is as follows:



**New** : in the new file name text box to enter the new model name, and then click "New" button, you can create a new model of the blank program, model name can enter letters and numbers.

**Copy**: After entering a new name in the new module name text box, click the saved model name, and then click the [Copy] button to copy the stored model number program to the new model number program .

**Load** : Click the stored model number, and then click "Load" button, you can load the selected model number, run automatic ally when running the program.

**Del**: Click the stored model number, and then click the [Delete] button to delete the module. The currently loaded module can not be deleted.

**Export**: Click the saved module number, and then click [export to U disk] button, you can export the selected model number.

**Import**: insert U disk to USB port of manual controller Click "Import from U disk" button, select the module to import. Click "Open" button and then "Load" to import the module.

**Search**: Enter the model name in the edit box and click "Search" button to search the existing model number.

**Clear search**: Click once to clear your search history.

### 2.3.1.5 Alarm log

Click the [Alarm Log] button to view the alarm log and the operation log.

Alarm Logging Page:



Note: Drag up or down to see more.



## 2.4 Operating mode

The manipulator has manual, stop, automatic three states, the status selector switch to the left gear position for the manual state, in which the state of the robot manual operation. Rotate the status selector switch to the neutral position to stop the robot. In this state, the robot will stop all the movements and return the robot to the home position. Rotate the status selector switch to the right position and press the "Start" button once, the robot will enter the automatic running state.

### 2.4.1 Origin Reversion

In order for the robot to operate correctly and automatically, the Return to origin operation is performed every time the power is turned on and stopped. The Return to origin operation will drive each axis of the robot to its home position.

Return to origin operation method:

Condition 1: Operation flow without origin setting.

1. Move all axes to the home position in the manual mode.
2. To save the home position: In the stop state, go to "Setting" → "Mechanical Conf"

→ "Motor Configs" page, click "Set All Origin" or "Set as Origin" button, and then click "Save Origin" button Can be.

Condition 2:The flow of operation has been set to the origin.

Press the "OPEN" key in the stop state to display the selection dialog box as shown in the following figure. Select the option according to the actual situation (if you do not understand the options, please click the [Help] button) The robot starts the Return to origin operation.

"Display Help" Details:

- ☐ Near the origin: The position is probably used in the vicinity.
- ☐ Emergency shutdown before shut down: Only make sure the camera has been photographed before shutdown can be used.
- ☐ re-homing: has not returned in the vicinity of the origin of the time, once again when the original point of use.

Note: You can not perform manual, automatic operation and parameter setting on the robot during the Return to origin. In case of an emergency, press the [STOP] key to stop the Return to origin or press the [EMERGENCY STOP] button.

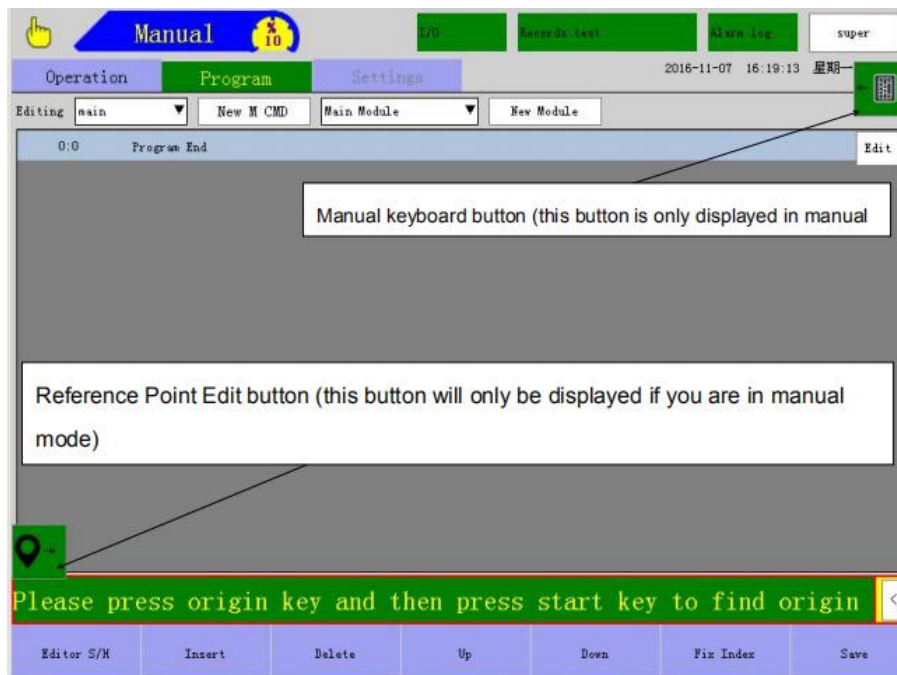
## 2.5 commissioning

Before the use of the control system, please first according to the above described wiring, and then let the manipulator for a simple test run, test run normal and then according to their own needs to teach the program running.The trial operation steps are as follows:

Step	operate
1	Check that all wiring is correct (see section 2 for details) and that there is no damage to the wiring
2	Check whether the servo parameters are correct
3	Test whether the positive and negative rotation direction and pulse feedback of each shaft motor are normal (see section 4.2.2 for details)
4	Set motor parameters (see section 4.2.2 for details)
5	Take the emergency stop, manually move the manipulator to a safe position, and click "all set as the origin" button on the motor parameter page to set the origin
6	Switch to manual state and press the axis action key of each axis to check whether the axes move normally
7	When the parameters are correct, switch to the stop state for origin restoration (see section 2.4.1 for details)
8	Switch to manual and teach the program (see chapter 3 for details)
9	Switch to automatic running program (see section 5 for details)

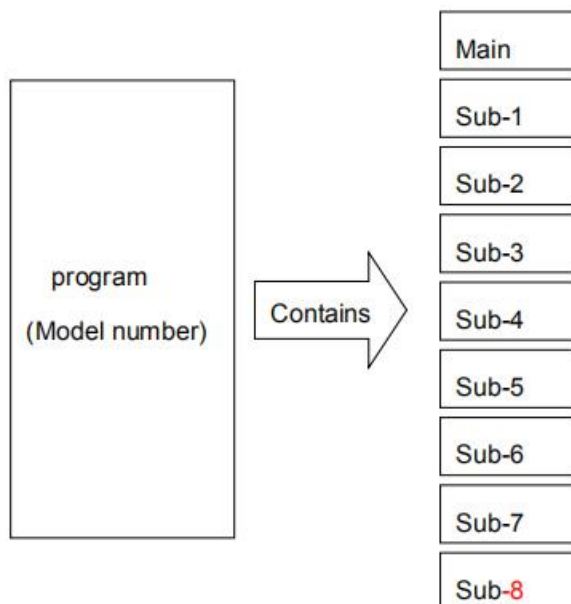
## Chapter 3.Manual Status

The manual knob on the third gear hit the "manual" into the manual state, the state can be carried out on the robot to teach action. As shown below:



### 3.1 Program

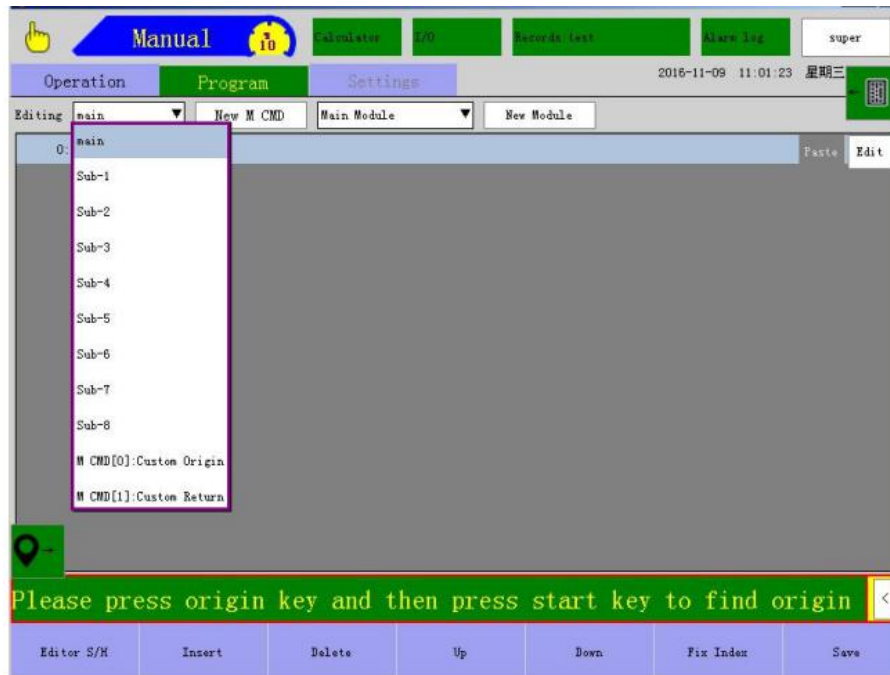
Modulus of the composition: a set of molds contains a main program and eight subroutines can be selected according to their actual use.



Program selection method: Pull down the "Edit" menu, select the program (click once that means selected).

Special subroutine: Subroutine 8(Sub-8), the program itself in the default Subroutine 8(Sub-8), regardless of the state (auto / manual / stop) will automatically run.

Tip: In the case of the program to teach to run automatically when the subroutine and the main program is running at the same time.



"Programmable Keys(New M CMD)": You can program in a self-defined key name.

New Programmable Keys(New M CMD): Click "New Programmable Keys(New M CMD)" → edit the name of the button. Click OK → pull down the "Edit" menu. Move the page up and down to find the programmable key. Click once to edit the name of the button to enter the instruction page. teach.

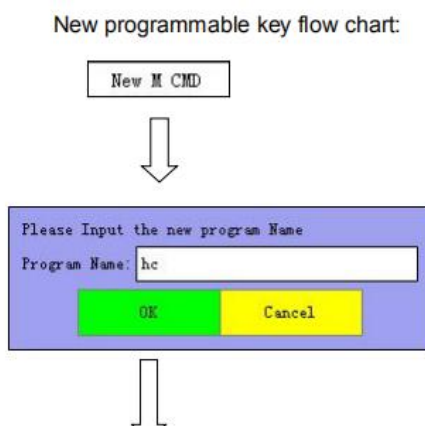
Special Programmable Keys(New M CMD):

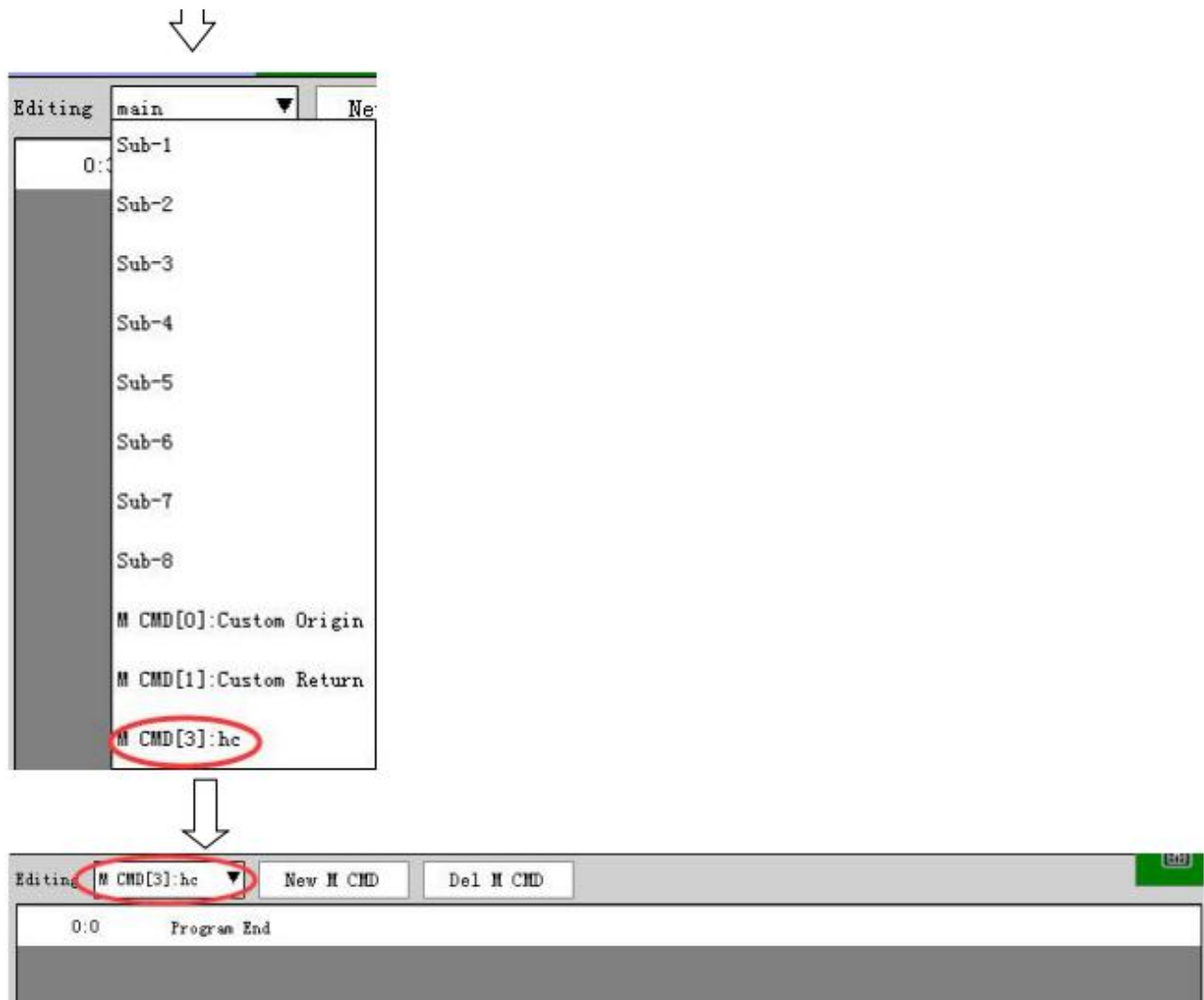
"Origin" If you perform homing in the stop mode (pressing the home key again to start), the system will execute the program that has been edited in the "Origin" key if the sequence of homing or other actions is instructed in this key.

"Reset" Pressing the [Reset] key once in the stop state, the system will execute the program which has been edited in the reset button.

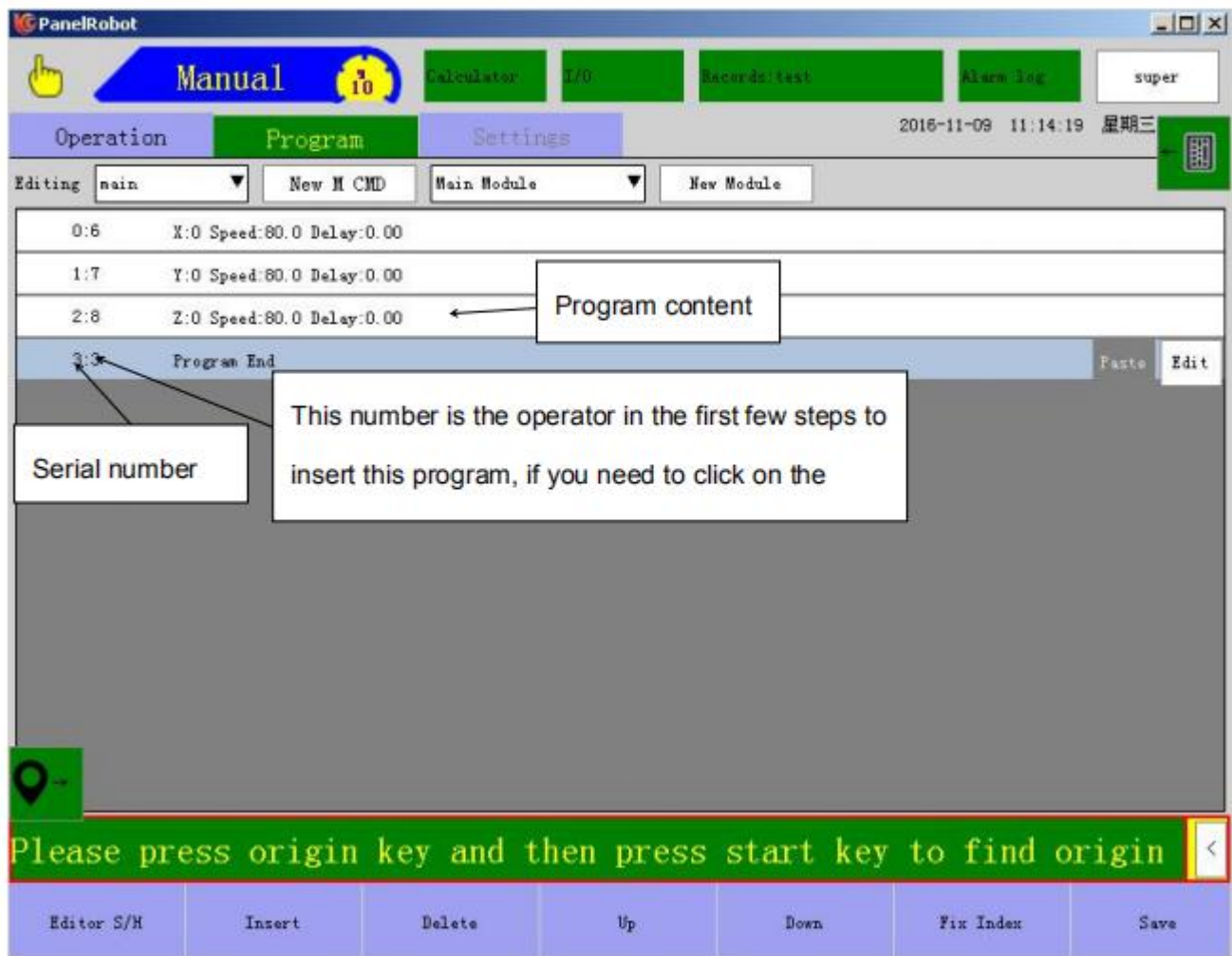
Deleting Programmable Keys(New M CMD): Select the name of the button in the drop-down "Edit" and then click the [Delete Programmable Keys(New M CMD)] button.

New programmable key flow chart:





## Programming interface:

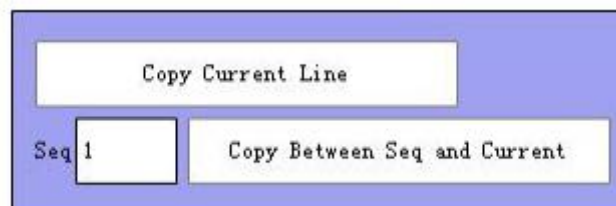


"Trial": press this button, the robot will go to run this step.

"Up": Click on the program to move to the previous line.

"Down": Click to move to the next line.

"Copy": Click the [Copy] button to pop up the contents of the selected copy of the selection box as shown below:

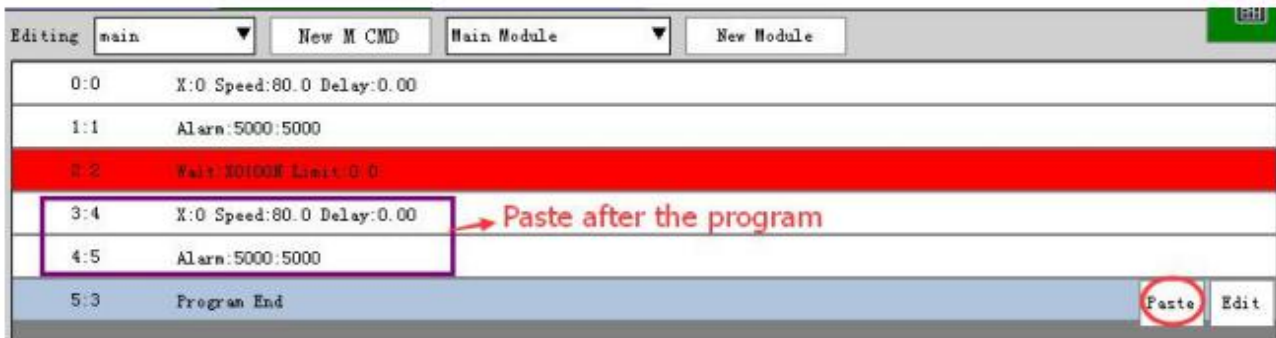


NOTE: The number entered in the "Selected Line" edit box indicates the program number.  
Copy the use case: Suppose you want to copy the sequence number 0 and 1 to wait for the program X011 pass the following steps are as follows:

Step 1: Click the Copy button, enter 1 in the "Selected Row" edit box and then click the [Copy Selected Row to Current Row] button.



Step 2: Select the next line you want to paste the program Click the [Paste] button.



Note: If the copy of the "end of the module," this sentence is pasted into the program is invalid, the module must be the end of this sentence in the final step.

"Paste": Paste the copied program in a single click.

"Edit": Click [Edit] button to pop up the edit dialog box to edit the program content.

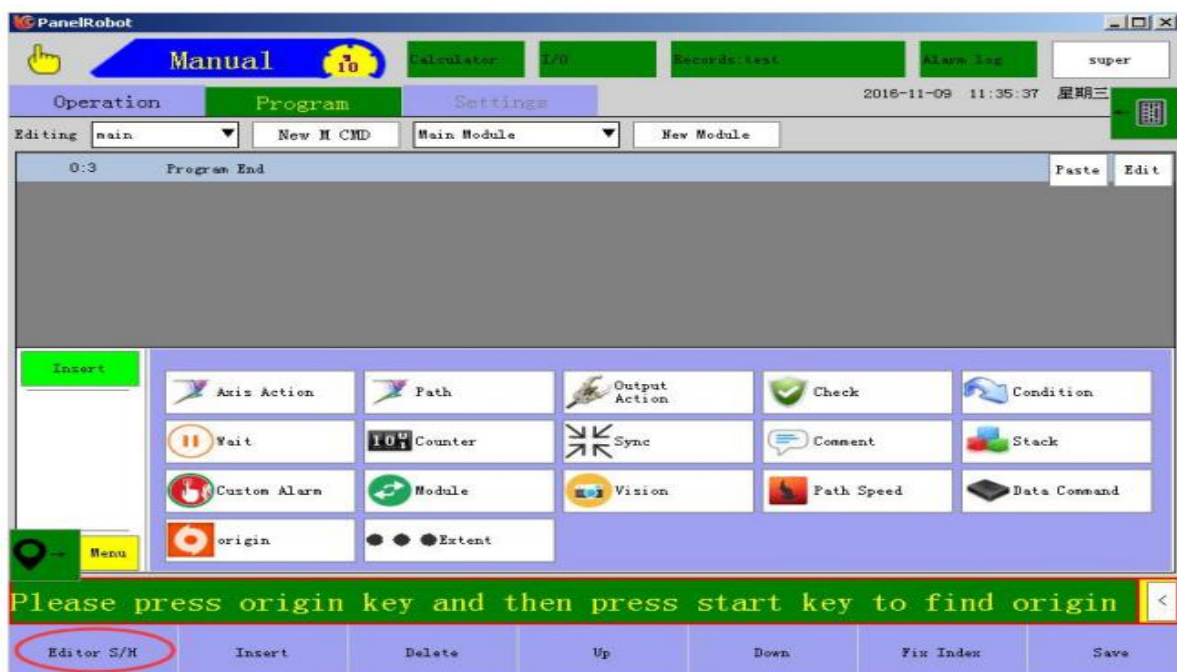
"Shield": click that shield, if you want to cancel and then a "shield" can be.

"Delete": Click delete to delete the program.


"Fix index.": Click the number in the auto-finishing sequence.

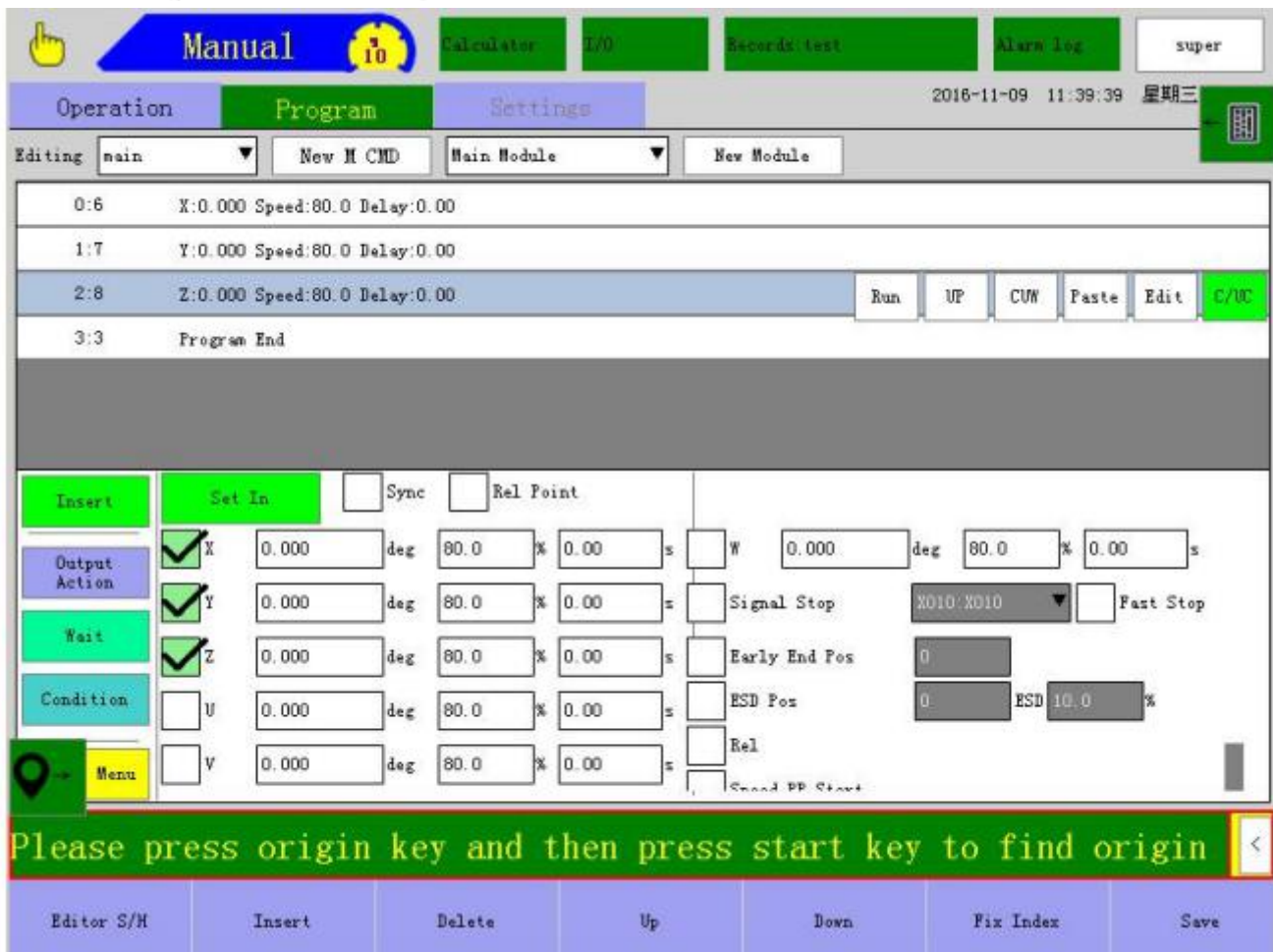
### 3.2 Action menu

Click "Editor S/H" to enter the action type interface to teach, this interface a total of 17 actions, click the corresponding action button to enter the action editor interface to set. As shown below. Click once for the Open menu, and a second for the Close menu.



### 3.2.1Axis action

Click the button  to enter the following interface.



**Insert:** In the instruction page, select the location where you want to insert the action and choose to teach the action. Click Insert to insert the action into the program.

**Insert:** When the axis and the target location click "set" and then click "Insert" to teach the location of the target point to the program.

**Sync:** Select several axes and then select "Synchronize" the axis will be in motion at the same time movement.

**Rel point:** Check the coordinates of the axis after the point of the optional use of the edited reference point.

**Early End Pos:** Inserting this step into teachings indicates that the next movement has started when the axis has not reached the target position when it reached the end position.

**Use case:** If the advance position is set to 200 and the position is set to 1000, the axis moves to the position of 800 (1000-200) and the next step is carried out, and the procedure continues to 1000.

**ESD POS:** Insert this step in the teachings to indicate that the axis will decelerate at the set speed when it reaches the advanced deceleration position.


**Use case:** If the advance position is set to 200, the advance deceleration rate is 5%, the position is set to 1000, and the speed is set to 80%. Then the axis from 0-800 to 80% of the speed of operation, 800-1000 to 5% speed.

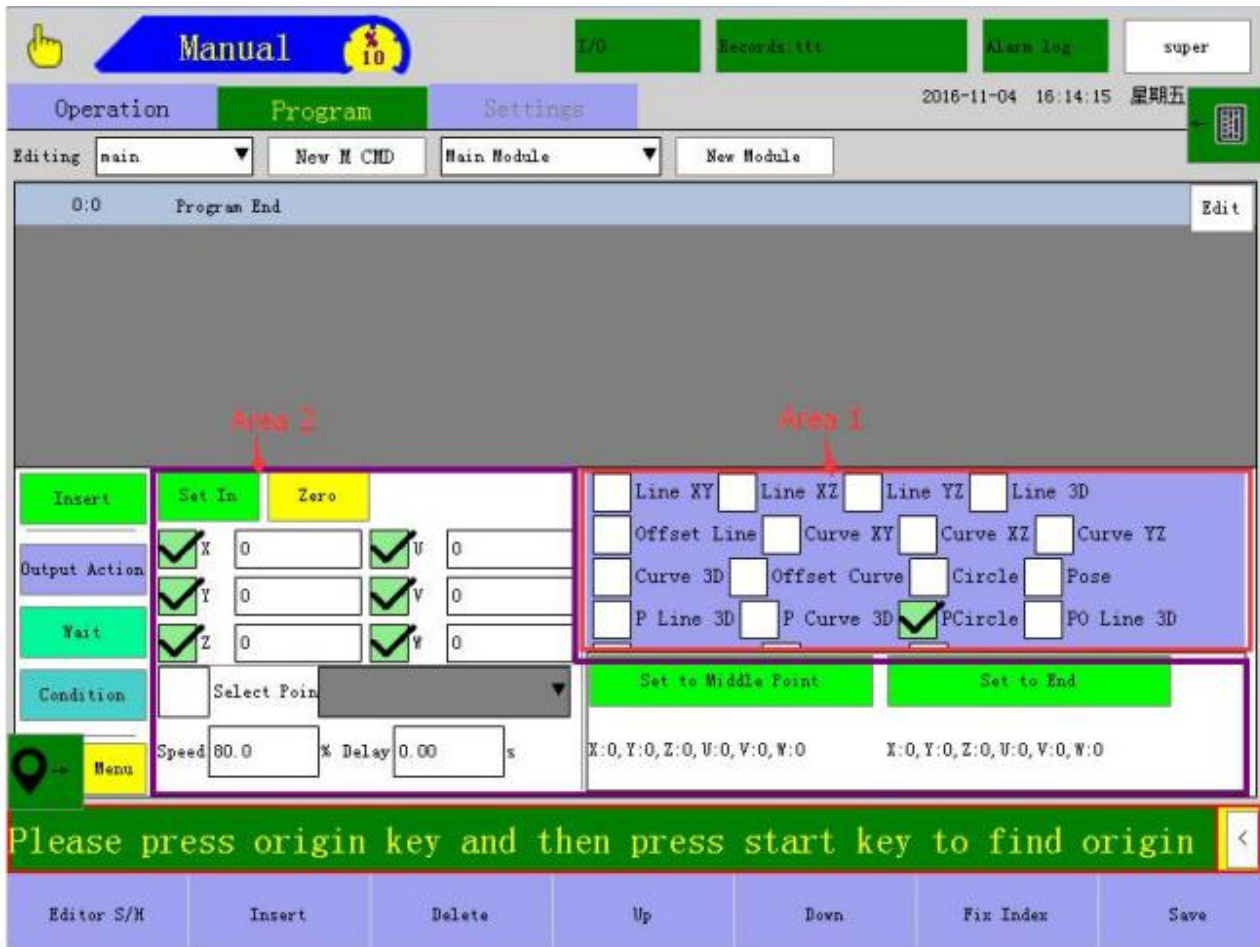
**Signal stop or Fast stop:** When the input signal is detected, it will decelerate to stop or stop immediately.

**Rel(Relative):** Moves the set distance relative to the current position.

**Stop:** When **selecting** an axis and selecting "Stop", the program will stop immediately when running.

### 3.2.2 Path

Click the button  to enter the following interface.



**Area 1 is the type of action to insert:**

**Line 2D (Line XY, Line XZ, Line YZ):** Holds the position in a plane from the current position to the "end point" position.

**Line 3D:** In the space, from the current position to "set to end" position to maintain a position to go straight.

**Curve 2D (Curve XZ, Curve XZ, Curve YZ):** Holds the arc in a plane from the current position to the position set to the intermediate point and the position set as the end point.

**Curve 3D:** In the space, from the current to "set to the middle point" position and "set to the end of the" position to maintain a position to take a curve

**Posture:** from the current position into the target position.

**Relative line:** The current point as a starting point, the direction of the offset coordinates.

**Relative Curve:** The current point as a starting point, the direction of the offset coordinates.

**Posture straight line:** from the current point of conversion into the target position to "set the end" of the location of a straight line.

**Pose curve:** from the current point of change into the target position to "set to the middle point" and "set to the end" of the position to take the curve.

**Pose full circle:** from the current point of conversion into the target position to "set to the middle point" and "set to the end of the" circle.

**Free path:** no track movement, the movement of the axis at the same time moving simultaneously.

**Relative Joint:** Offset in the axial direction relative to the joint.

**Relative posture line:** Starting from the current point, U, V, W keep a posture in the direction of coordinate offset.

**Relative posture curve:** from the current point as a starting point, U, V, W to keep a

posture in the direction of coordinate offset.

**Full circle:** Draws a circle with three known points.

**Area 2 is to set the coordinates of the location method, set in two ways:**

The first one: If it is the current manual control to display the coordinates of the coordinates of the edit position to edit the box you need to first hit the [set] button and then click [set the end] can be, if you want to zero is a direct click [Zero] button.

Second: use the reference point, check the reference point selection box 111 drop-down triangle arrows to select "point", and then click "set to the middle point" or "Set the end point(Set Epos)" button to replace the coordinates of the target point Coordinate value can be.

Reference point button Edit method:

Step 1: Check the box to use it.

Step 2: Click this icon in the lower left corner to open the reference point edit button interface, as shown below:

Reference point role: to facilitate the user for the location of a point to re-use.

Note! : The free path can only refer to the joints, and the relative joints can only refer to the offset points. The rest of the action types can only refer to path points.

Points of the editing process:

Step 1: Position Instruction: Edit the value directly Move the axis to the target point and then click "Set World Position or "Set Joint Position" (choose according to the type of new point).

Step 2: Create a new point name in the Point Name dialog box.

Step 3: Click once to create a new type point (new node, the new path, the new offset point) to edit the point of editing a blank point to the dialog box.

Delete method: select the point you want to delete into a light blue and then click the "Delete" button.

Replace Location Method: Edit the "New Location" and click the "Replace Location" button to complete the replacement.

### 3.2.3 Signal output

Click  信号输出 button enters the following interface:

Output signal insertion method: Select the output point type (☐Y/☐ board output/☐ intermediate variable/☐ time output Y/☐ interval output Y/☐ interval output M)→select the output point on/off (☐on/☐off) → Set the delay time → click the [Save] button → select the position you want to insert on the teaching page and click [Insert].

Note: Clicking on an output button turns green and the output point outputs a signal.

Y: Y is turned on or off after waiting for the delay.

Board output: By selecting the board type as IO board or M board, the board ID is the number of IO boards or the board waiting for the delay to output, as shown below:

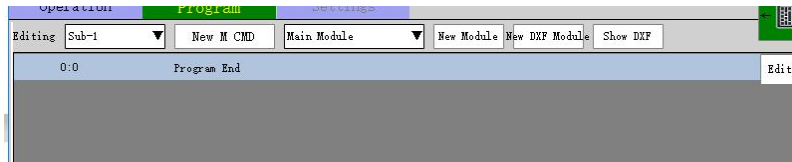
Intermediate variable: A variable value that can be changed.

Example of intermediate variable use: In the main program, teach the intermediate variable output of M027 (alarm status) and wait for the intermediate variable M027 (alarm status) in the subroutine.

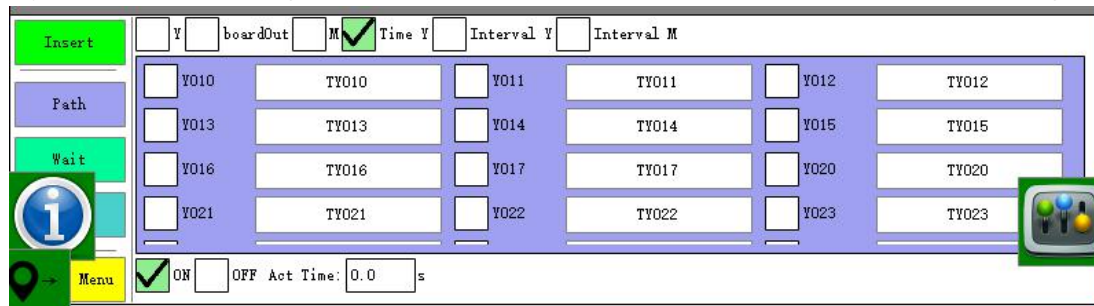
Teaching of the main program:

Editing	main	New M CMD	Main Module	New Module	New DXF Module	Show DXF
0:30	obsolete-Line3D:Next:X:500.000,Y:0.000,Z:0.000 Speed:80.0 Delay:0.00 Smooth:None					
1:31	obsolete-Line3D:Next:X:400.000,Y:0.000,Z:0.000 Speed:80.0 Delay:0.00 Smooth:None					
2:32	obsolete-Line3D:Next:X:400.000,Y:200.000,Z:0.000 Speed:80.0 Delay:0.00 Smooth:None					
3:33	obsolete-Line3D:Next:X:400.000,Y:-200.000,Z:0.000 Speed:80.0 Delay:0.00 Smooth:None					
4:34	obsolete-Line3D:Next:X:400.000,Y:-200.000,Z:100.000 Speed:80.0 Delay:0.00 Smooth:None					
5:35	obsolete-Line3D:Next:X:400.000,Y:-200.000,Z:-100.000 Speed:80.0 Delay:2.00 Smooth:None					

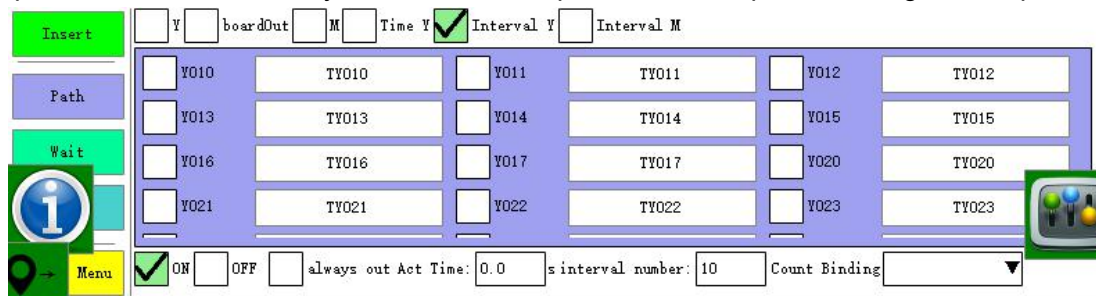
Subprogram teaching:



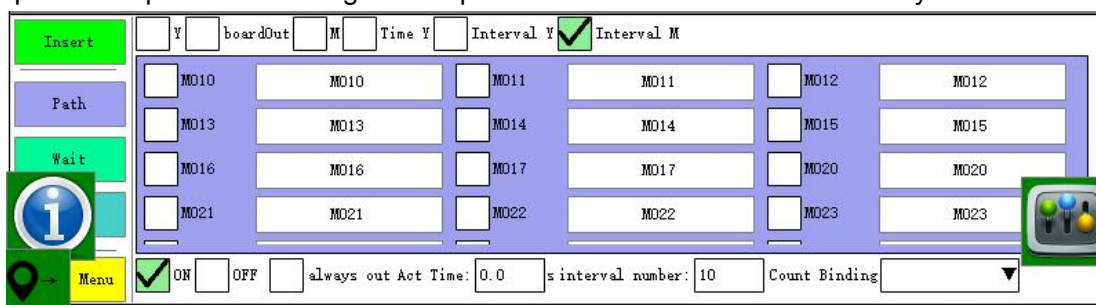
Time output Y: When the program is executed to this step, the Y output will be turned on and then automatically turned off according to the set time. The next action will be executed while waiting.



Interval output Y: The modulus set by the interval is output and Y is output according to the operation time.

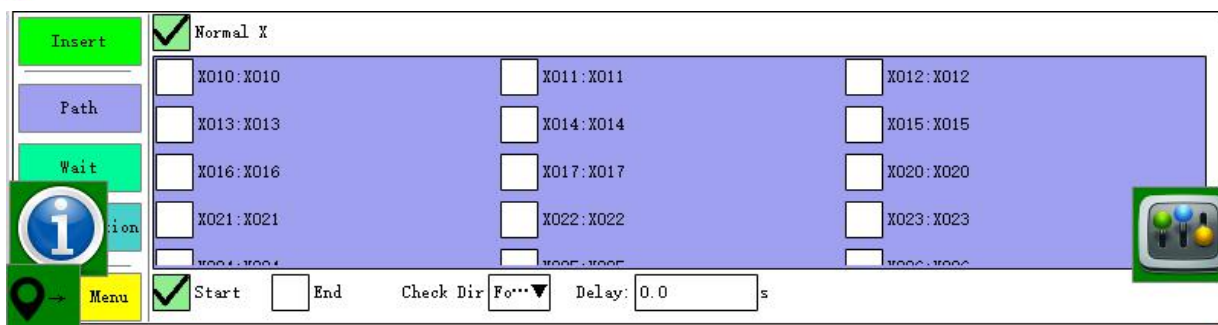


Interval output M: Outputs M according to the operation time after the modulus set by the interval.



### 3.2.4 Signal Detection

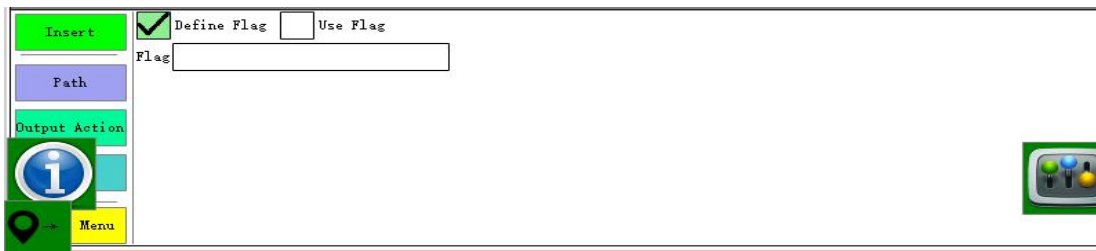
Click  信号检测 button enters the following interface:



The insertion start detection and the end detection operation are performed to detect the presence or absence of an input signal from the start of the detection operation to the end detection operation, and the alarm is immediately satisfied when the condition is satisfied.

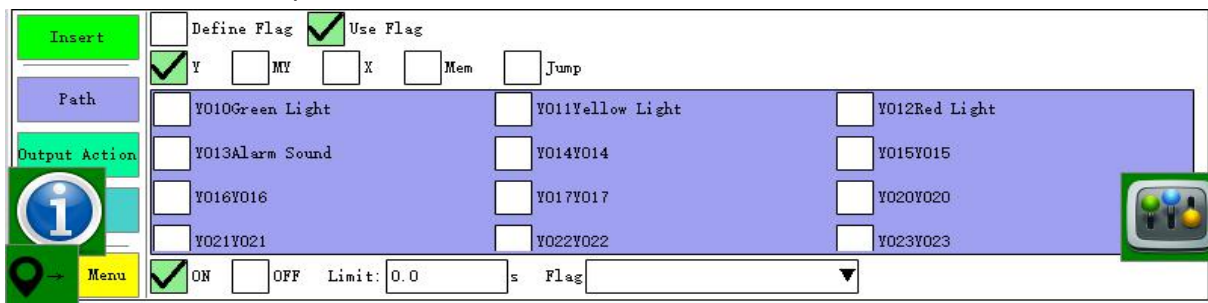
### 3.2.5 Conditional jump

Click  条件跳转 button enters the following interface:



Label usage:

- 1、Select“ ☒ Define Labels option, click the label edit box "Label  "Pop up keyboard edit name.
- 2、Insert the label name from the previous step in the position where you need to jump in the program.
- 3、select“ ☒ Define Labels option”Enter the condition selection interface:

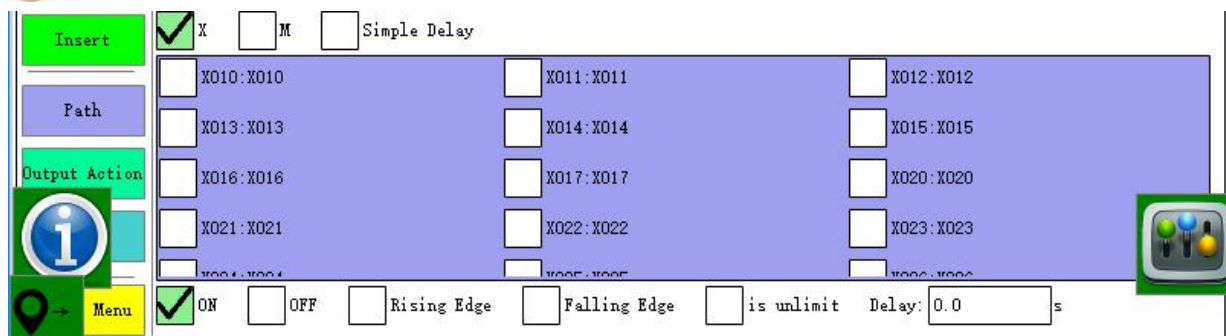


- 4、After editing the conditions, click the [Insert] button at the position you want to insert.

Note: Always use the conditional jump to insert the label first.

### 3.2.6 Wait

Click  等待 button enters the following interface:



Wait signal insertion method: Select the wait point type (X or intermediate variable) → select the wait for on or off or the rising or falling edge signal type → set the delay time → click the [Save] button → the position to be inserted on the teach page Next click [Insert].

Simple delay: After inserting a simple delay action, the run automatically runs until the action waits for the set delay time before continuing to run the next action.

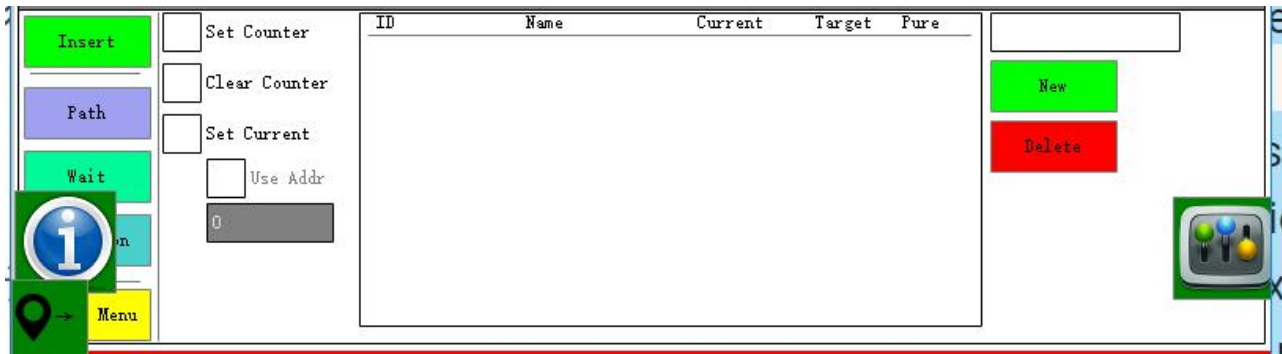
Rising edge: The signal is from nothing.

Falling edge: Signals from yes to no.

Remark: When the action is executed after inserting, the system will alarm when the set waiting time condition is not reached.

### 3.2.7 Counter

Click  计数器 button enters the following interface:



The counter can be edited under this interface.

Counter classification: 1 1 type counter    Clear type counter    Set the current value counter.

Counter new method: Select counter type → New counter name → click the [New] button → click the [Save] button → Finish.

Current: The count value of the current counter. The value can be set according to the actual situation of the user.

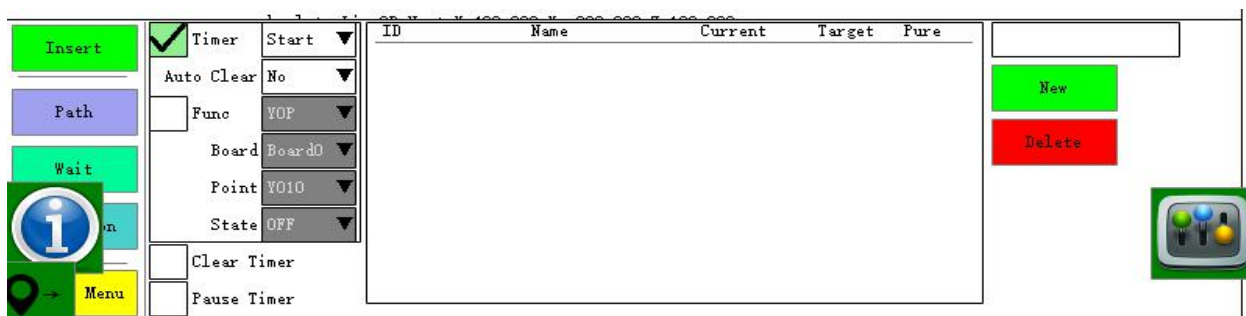
Use case for current value setting: If the counter used when defining the stack is a self-defined counter, assuming that the current value of the self-defined counter is set to 2, then the robot will start stacking things from the second item when running the first model. .

Target: The target yield of the counter count.

Set the current value counter: If you select the current value and input the value directly in the input box under the address, it means the value is the current value of the counter; if you select the current value and check the use address, the input box The value entered in the value is the current value of the counter under the value address.

### 3.2.8 Timer

Click  计时器 button enters the following interface:



If the timer is selected to start, it means that the automatic first mode starts to count when the action is reached, and the timer does not count or clear after reaching the target value;

If the reset is selected, it means that the timer is cleared and re-timed when the timer reaches the target value and runs to the action.

When the auto reset function is selected, the timer reset is automatically performed for the time in the timer and the timer is reset. When the action is reached, the retime is started.

Single-point output: Outputs or disconnects a Y value on the IO board after the timer expires.

Whole board output: After the chronograph time in the timer, select an IO board in the IO board to output or disconnect all Y values on the whole IO board.

EU output: Output or on/off at an EU point on the EU board after the timer expires.

M point output: When the timer expires, the M value point on the M board is output or disconnected.


M board output: Select one M board in the IO board bar to output or disconnect all M values on the whole M board after the timer expires.

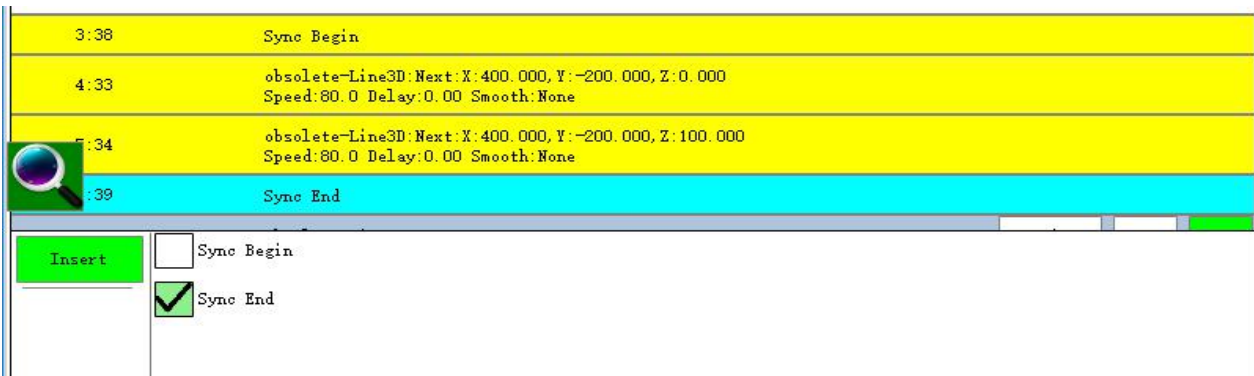
Detection input: Whether there is a signal on an X input point on the IO board after the timer expires, and if it detects that the condition is not met, it will alarm immediately. If the target value of the timer is 5, the detection input X25 is activated. When the automatic running timer reaches 5s, the X25 signal is detected. If there is no signal input for X25, it will alarm immediately.

Reset timer: resets when running to the action timer (only re-times when running to start timer action)

Pause timer: running to the action timer will pause the timer (only when running to the start timer action will continue to count)

### 3.2.9 Sync

Click  同步 button enters the following interface:



Inserting a sync start and a sync end before and after a program indicates that the program is combined and moved at the same time.

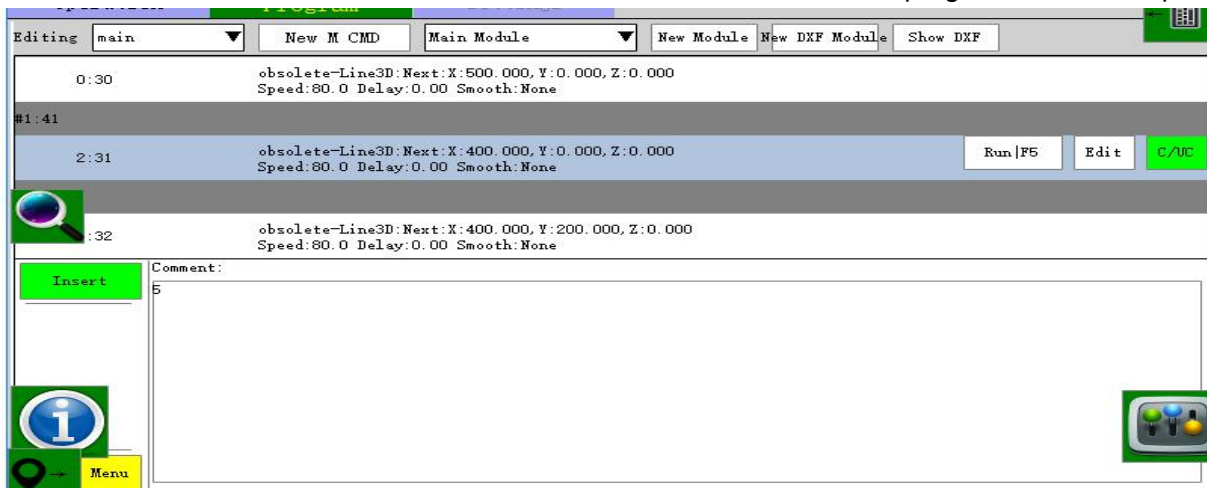
Note:

1. Synchronization cannot be nested with each other.
2. The jump cannot use the sync function.
3. A certain combination of synchronization start and synchronization end occurs. When synchronization starts, it is necessary to teach another synchronization end.
- 4, conditions can use the synchronization function.

### 3.2.10 Comment

Click  注释 button enters the following interface:

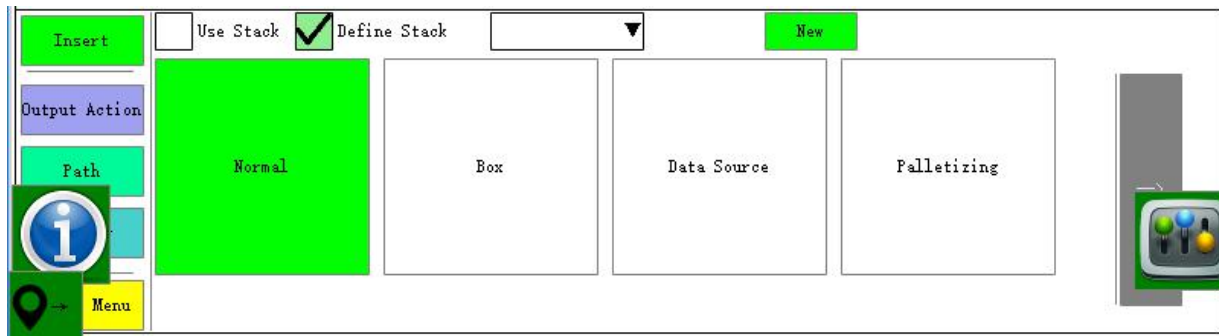
The comment is the meaning of the mark. When the user teaches a lot of programs, if too many looks seem messy, then the different comments can be made before and after the different programs to find the problem.



Comment editing method: Open the text edit box in the blank click → edit the name and click the [Save] button → select the next line of the position to be inserted and click [Insert].

### 3.2.11 Stack

Click  堆叠 button enters the following interface,



The stack types are classified as: general stacking box and stacking in the box data source stacking 4 yards four categories.

Generally, the general stacking of stacks can be divided into two categories: a rectangular shape, and as the name implies, a square object can be stacked;

Offset stacks can be stacked in a diamond shape or stacked on a slope (Z-axis offset).

Stack out the rectangular operation method:

1. First click the "New" button to create a new stack name or open a built file name.
2. Click "→" to enter the stack editing interface.
3. Set the starting point coordinates and spacing. There are two ways to set it up:

Use the three-point method to set up: The three-point method is to automatically calculate the offset and spacing using the three points that have been set.

The stack types are classified as: general stacking box and stacking in the box data source stacking 4 yards four categories.

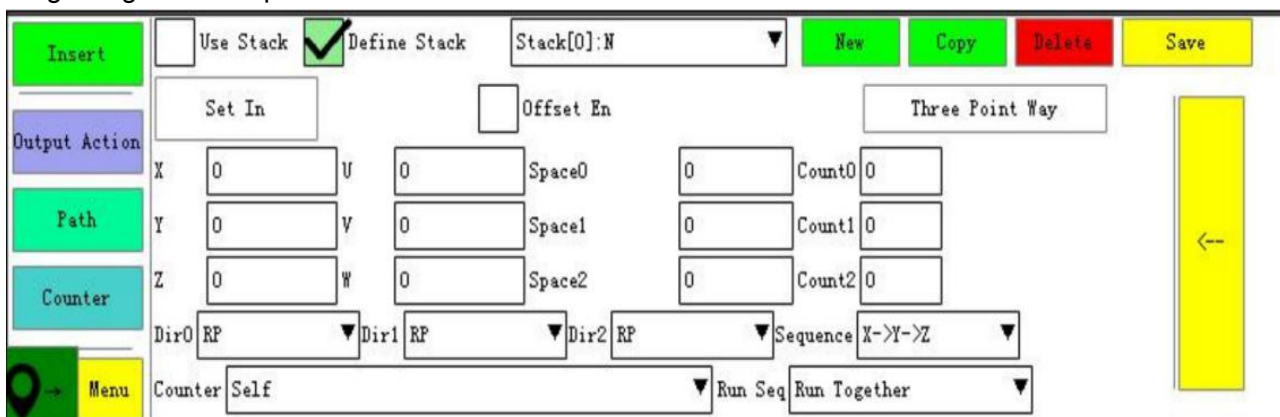
Generally, the general stacking of stacks can be divided into two categories: a rectangular shape, and as the name implies, a square object can be stacked;

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Stack out the rectangular operation method:

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2. Click "→" to enter the stack editing interface.
3. Set the starting point coordinates and spacing. There are two ways to set it up:

Use the three-point method to set up: The three-point method is to automatically calculate the offset and spacing using the three points that have been set.



In the second step, move the robot to the starting position of the stack and then click the "Set In" button to set the current coordinate value into the coordinates edit box of each axis.

In the third step, move the manipulator to the next point in the X1 axis direction and then click the [Set] button to set the coordinate value to the X1, Y1 coordinates edit box. Then move the robot to the next point in the Y1 axis direction and then click the [Set] button to set the coordinate value to the X1, Y1 coordinates edit box.

Step 4 Click the [OK] button to return to the previous page for other settings.

Do not use the three-point method: Calculate the spacing manually.

In the first step, enter the interface as shown in the figure below. Move the robot to the stacking start point manually and then click the [Set] button to set the current coordinate value to the coordinate edit box of each axis.

In the second step, manually measure the spacing between the points in each axis and edit the spacing values into the corresponding edit boxes.

In the third step, set the direction of stacking of each axis, and the positive direction refers to the direction of the axis position + (press the axis button on the hand controller to identify the direction of the axis position).

4、 set the stack count, order, counter and run the order, the interface as shown below: :

Arm selection: When using XYZUVW six axes, arm 1 is XYZ axis stack, arm 2 is UVW axis stack, arm 3 is ZUV axis stack, arm 4 is XYW axis stack, and the arm to be stacked can be selected according to the situation.

Count: Set the number of heap points on the axis.

Run Sequence: Sets the order in which each axis is stacked.

Counter selection: "self" means that the program runs a mode, the system default counter has been increased by 1; custom counter (in the action menu -> [counter] to set).

6, edit the data and click [Save] button.

7, playing √ "using the stack" in the "stack" in the choice of using the stack, and set the stack speed, choose a good location in the program click on "set" to edit the stack to teach.

8, if the use of custom counters to be inserted in the process of teaching the stack counter plus 1 otherwise the counter does not count.

The offset heap method of operation:

The use of offset stacks can be piled into a diamond shape or stacked on a sloped surface (Z-axis offset)

1, first click the "New" button to create a new stack name or open the file name has been built.

2, click "→" to enter the stack editing interface.

3. Check the [Use Offset] option

4, Set the starting point coordinates and spacing.

Diamond-shaped heap when the starting point and spacing of the set there are two ways:

Use the three-point method to set: three-point method is to use has been set to automatically calculate the three points offset and distance.

The first step, in the manual state click "three-point method set" button to enter the edit page shown below.

In the second step, move the robot to the starting position of the stack and then click the [Set] button to set the current coordinate value into the coordinates edit box of each axis.

In the third step, move the manipulator to the next point in the X1 axis direction and then click the [Set] button to set the coordinate value to the X1, Y1 coordinates edit box. Then move the robot to the next point in the Y1 axis direction and then click the [Set] button to set the coordinate value to the X1, Y1 coordinates edit box.  
Step 4 Click the [OK] button to return to the previous page for other settings.

Not using the three-point method: manually calculate the offset distance and spacing of the axis.

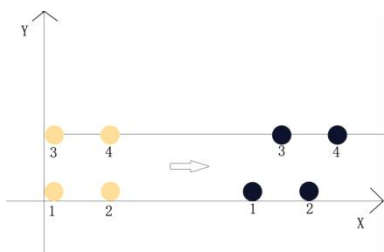
In the first step, enter the interface as shown in the figure below. Move the robot to the stacking start point manually and then click the [Set] button to set the current coordinate value to the coordinate edit box of each axis.

In the second step, manually measure the distance and offset between points in each axis and edit the spacing and offset values into the corresponding edit boxes.

The third step is to set the stacking direction of each axis, and the positive direction refers to the direction of the axis position + (press the axis key on the hand controller to identify) the reverse refers to the direction of the axis position.

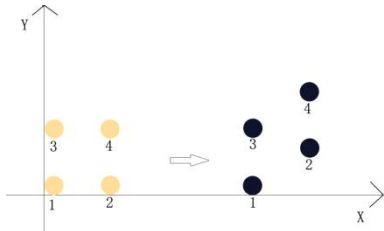
X, Y offset effect map:

The effect of the X offset is shown below, with the left unbiased and the right shifted by the X offset.



Before unbiased      After the offset

The effect of the Y offset is shown below, with the left unbiased and the right shifted by X offset.



Before unbiased      After the offset

Inclined pile starting point, pitch setting mode:

The first step is to move the manipulator to the stack start position manually and then click the [Set] button to set the current coordinate value to the coordinates edit box for each axis.

In the second step, set the offset distance in the Z direction (default is Z in the X direction). If you want to offset Z in the Y direction, check the [Y direction offset Z] option.

The third step, set the stacking direction, count, order, counter and run the order.

Direction: Direction, direction of axis position +, direction of minus axis, axis direction.

Count: Sets the number of points to be stacked on the axis.

Run Sequence: Sets the order in which each axis is stacked.

Counter selection: "self" means that the program runs a mode, the system default counter has been increased by 1; custom counter (in the action menu -> [counter] to set).

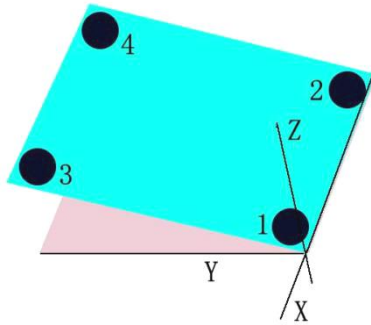
The fourth step, edit the data and click [Save] button.

The fifth step, playing  $\sqrt{\text{"using the stack"}}$  in the "stack" in the choice of using the stack, and set the stacking speed, choose a good location in the program click on "Settings" to edit the stack to teach.

The sixth step, if you use a custom counter to be inserted in the process of teaching the stack counter plus 1 or counter does not count.

Slope offset Stacking Example:

Suppose you need to pile up four circles in the following heap position



## Teaching Page Setup:

Editing	main	New M CMD	Main Module	New Module	
0:3	Flag[0]:0000				
1:1	NormalStack[0]:N Speed:80.0 Counter[0][T:4][C:0]:444				
2:2	Plus 1Counter[0][T:4][C:0]:444				
3:5	Output:Y0210N Delay:0.0				
4:4	IF:Counter[0][T:4][C:0]:444 Arrive Go to Flag[0]:0000.				
5:0	Program End				
Edit					
Insert	<input type="checkbox"/> Use Stack	<input checked="" type="checkbox"/> Define Stack	Stack[0]:N	New	Copy
				Delete	Save
Output Action	Set In	<input checked="" type="checkbox"/> Offset En	<input type="checkbox"/> Offset Z with Y	Three Point Way	
Path	X	0	U	0	X Offset 0
Counter	Y	0	V	0	Y Offset 0
	Z	0	W	0	Z Offset 10.000
	Dir0	PP	Dir1	PP	Dir2
					RP
					Sequence X->Y->Z
	Counter	Counter[0][T:4][C:0]:444		Run Seq	Run Together

Note: 1, because the counter is selected from the definition of the technology will need to teach more than one stack after the counter plus 1

2, if the counter is full, such as after the start of the new conditions, the need to use conditions to clear the jump, conditional Jump page settings as shown below:

Editing	main	New M CMD	Main Module	New Module	
0:3	Flag[0]:0000				
1:1	NormalStack[0]:N Speed:80.0 Counter[0][T:4][C:0]:444				
2:2	Plus 1Counter[0][T:4][C:0]:444				
3:5	Output:Y0210N Delay:0.0				
4:4	IF:Counter[0][T:4][C:0]:444 Arrive Go to Flag[0]:0000.				
5:0	Program End				
Edit					
Insert	<input type="checkbox"/> Define Flag	<input checked="" type="checkbox"/> Use Flag			
	<input type="checkbox"/> Y	<input type="checkbox"/> MY	<input type="checkbox"/> X	<input checked="" type="checkbox"/> Counter	<input type="checkbox"/> Mem
				<input type="checkbox"/> Jump	
Path	<input checked="" type="checkbox"/> Counter[0][T:4][C:0]:444				
Output Action					
Check					
	<input checked="" type="checkbox"/> >=T	<input type="checkbox"/> <T	<input type="checkbox"/> Auto Clear	Flag	Flag[0]:0000

General stacking usage example: Known conditions:

1. The size, width and height of the small square of the item are: 100\*100\*100(mm)

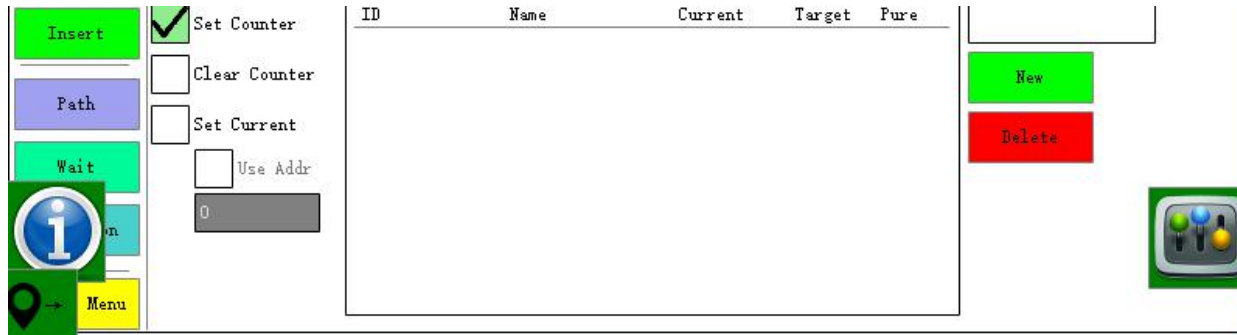
2, need to stack 3 products in the positive direction of XYZ

3, the product front and rear left and right distance 20mm each

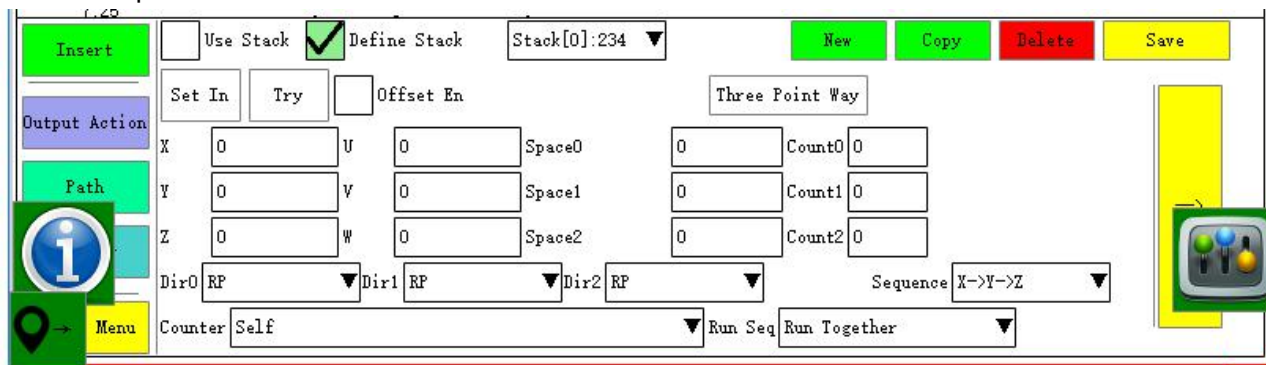
4. The counter uses a custom counter, and a new counter called "stack counter" is added to the counter.

The specific settings are as follows:

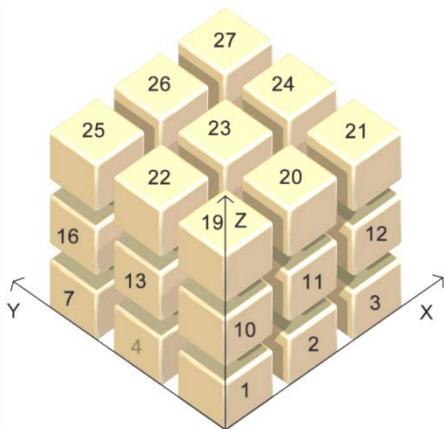
The first step: first customize a counter.



Step 2: Enter the stack page and make the settings as shown in the figure below. Set all coordinates of the stack start point to 0.



The final heaping effect is shown in the following figure: Note: The serial numbers marked in the figure below indicate the order of the stacked products.



### Stacking Original Point

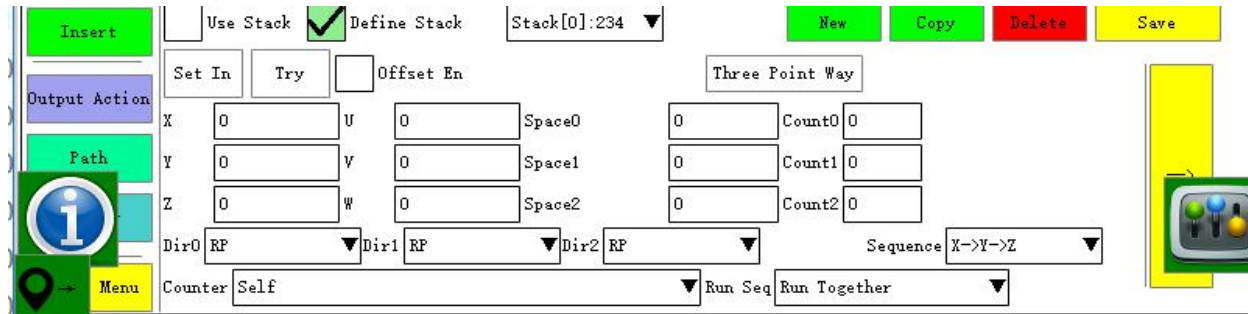
Packing and stacking in the box and stacking in the box:

1. Select the "Packing and stacking in box" option.
  2. Click "→" to enter the stack editing interface.
  3. First click the "New" button to create a new stack name.
  4. Set the spacing, quantity, order, direction and counter selection between the products in the first box under this interface.
  5. Click "→" to enter the next editing interface. This interface sets the spacing, quantity, sequence, direction and counter selection between each stacking box.
  6. Set all the data and click the Save button.
  7. Hiccup [Use Stack] Select which stack to use in [Stack], and set the stacking speed. Select the location in the program and click "Set" to edit the stack into the teaching.
- [Use Offset]: After checking, the set distance is offset from the previous stack point.

Example of stacking in the box: Known conditions in the box:

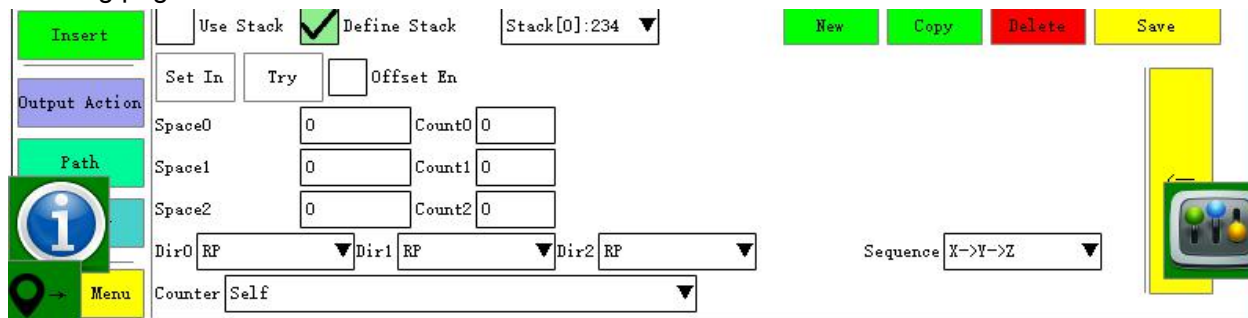
1. The size, width and height of the small square of the item are: 100\*100\*100 (mm).
2. There are 3 products in the XYZ direction, and the total number of products in the box is 27.
- 3, the product front and rear left and right distance 20mm each
4. The counter uses a custom counter, and a new counter called "box counter" is added to the counter.

The teaching page is as follows:

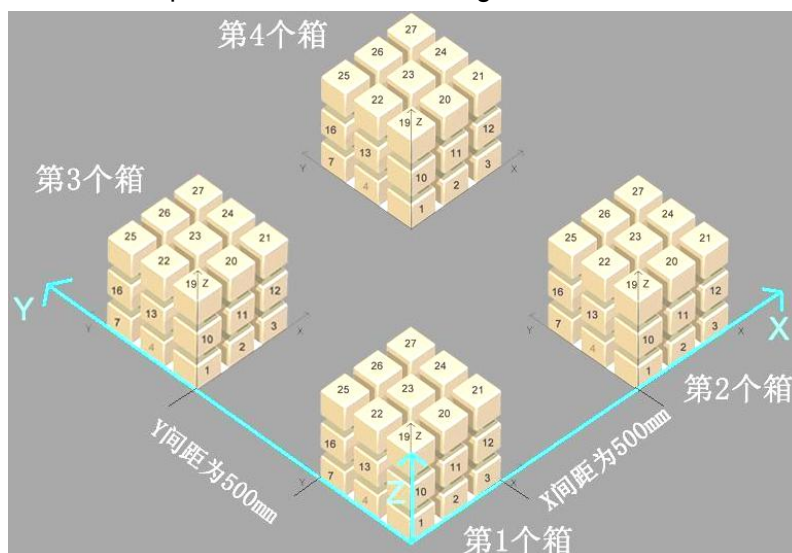


Known conditions outside the box:

- 1, a total of 4 boxes
2. It is necessary to stack 2 boxes in the positive direction of the X axis, stack 2 boxes in the positive direction of the Y axis, and stack 0 boxes on the Z axis. The stacking order is: X→Y→Z.
3. The distance between the boxes is 500mm and the distance between the top and bottom is 0mm. The teaching page is set as follows:



The final heap effect is shown in the figure below.:



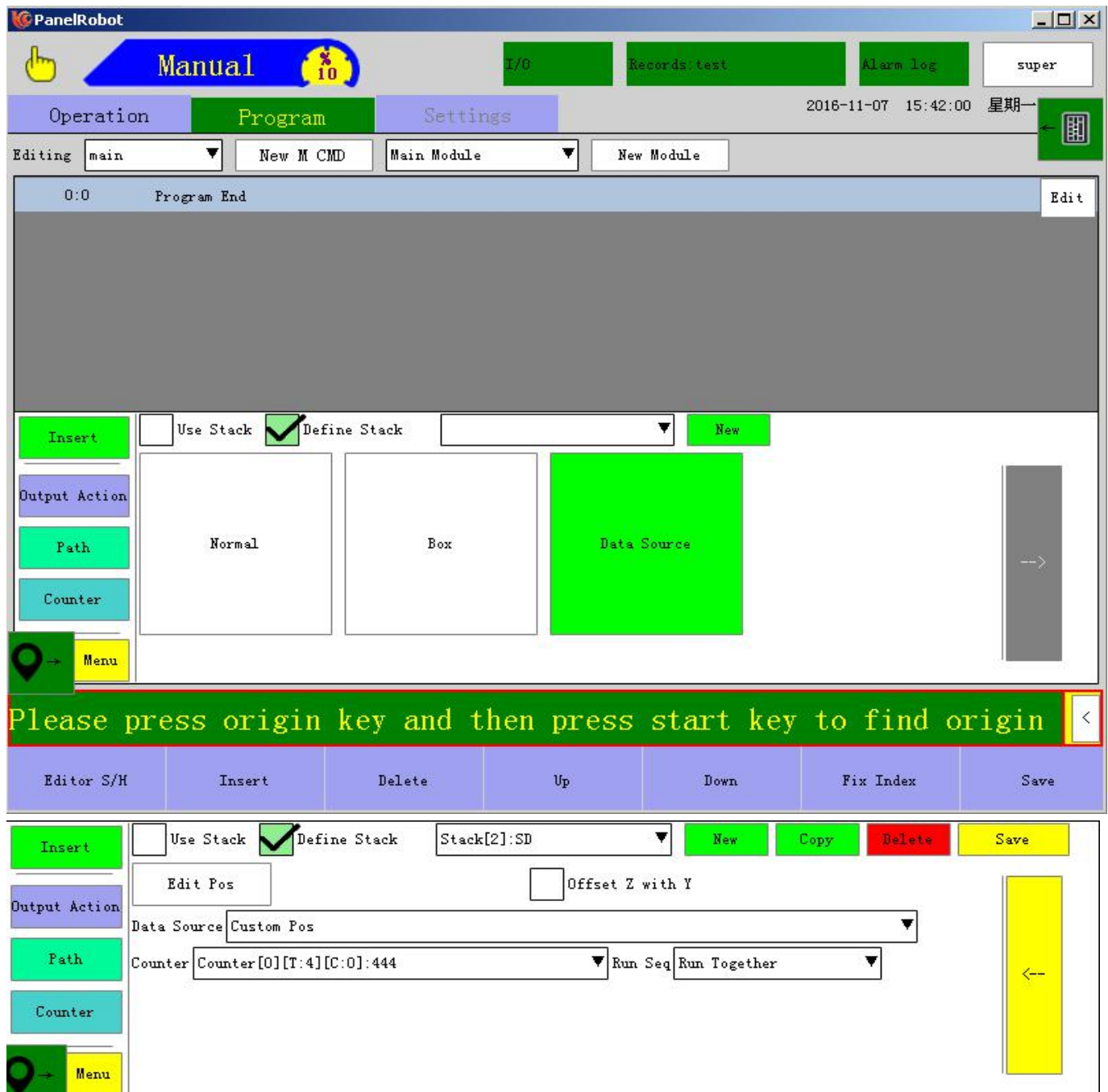
Data source stacking

Data source stack usage:

- 1, select the "data source stack" option.
- 2, first click the "New" button to create a new stack name.
- 3, click "→" to enter the stack editing interface.

4, select the data source type, the data source type is divided into two types of irregular points (for irregular stacking), such as select this and then click "Edit Point" into the edit point box on the specific editing specific user ID.

5, playing  $\sqrt{}$  "use stack "stack" in which to choose which stack to use, and set the stack speed, select a good location in the program click on "set" to edit the stack to teach.



Data source type option "irregular points" and then click "edit point" button to enter the point editing interface as shown below:

Set In

X: 20.000

Y: 52.000

Z: 6.000

U: 99.000

V: 77.000

W: 5.000

New

Save

Sync Replace

Total: 6

Close

1: (X:0, Y:0, Z:0, U:0, V:0, W:0)

2: (X:20.000, Y:0, Z:0, U:0, V:0, W:0)

3: (X:20.000, Y:52.000, Z:0, U:0, V:0, W:0)

4: (X:20.000, Y:52.000, Z:6.000, U:0, V:0, W:0)

5: (X:20.000, Y:52.000, Z:6.000, U:99.000, V:0, W:0)

6: (X:20.000, Y:52.000, Z:6.000, U:99.000, V:77.000, W:5.000)

Point Name: 6

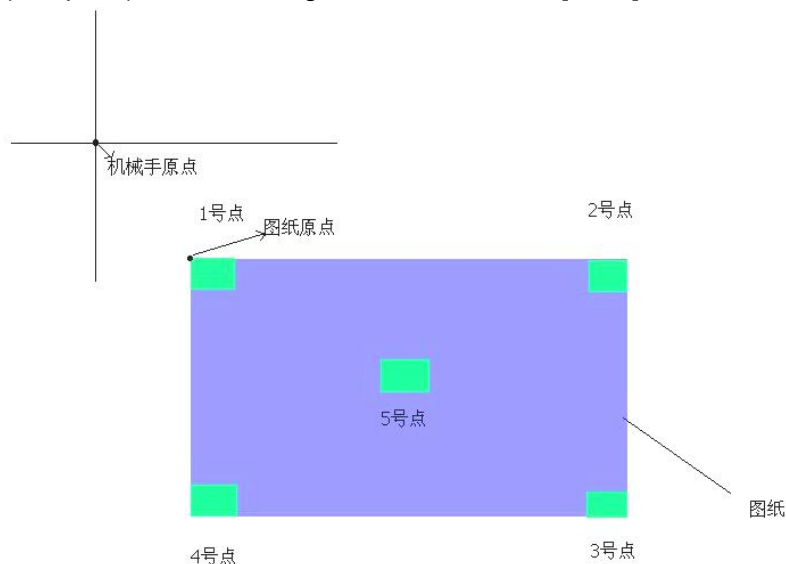
Delete

Replace

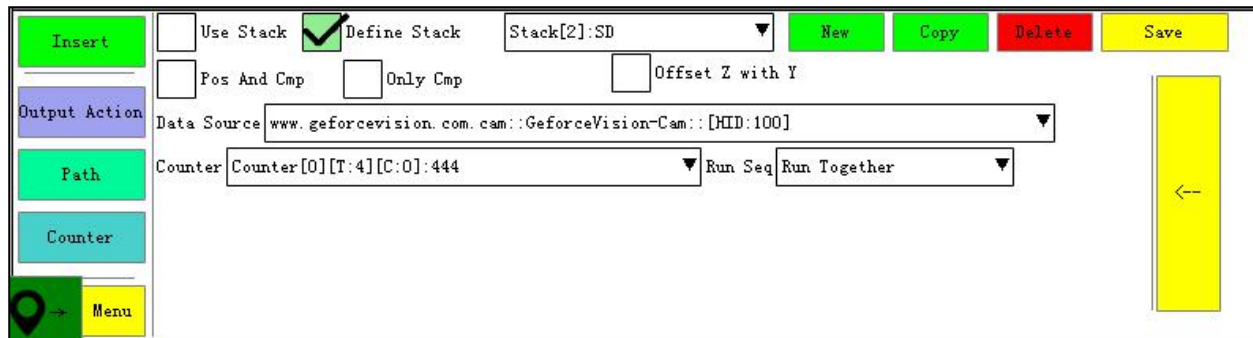
"Replace position": Click the edited position Click "Replace position" button to replace the old coordinate position with the current position.

"Synchronization Replacement": If the user has the position drawing and the starting coordinate of the drawing is inconsistent with the origin coordinate of the manipulator, it can be easily set in the irregular point by synchronous replacement.

Click the first point to change the coordinate value of the current point to the coordinate value of the origin (first point) of the drawing, and then click the [Save] button, as shown in the following figure:

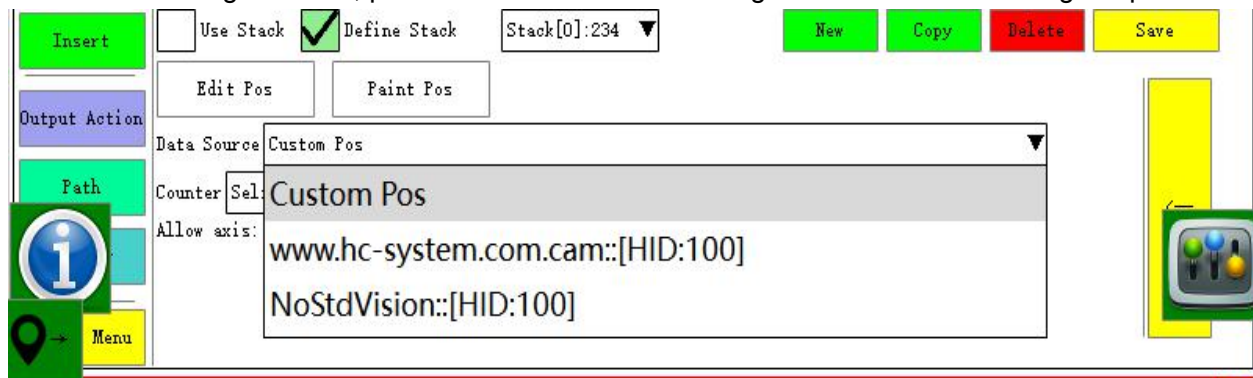


Dedicated user ID display interface:



Example of irregular stacking: Take the example of stacking 6 irregular points on a horizontal plane. After setting the six positions on the point editing page and selecting the counter, you can complete the setting as shown in the following steps:

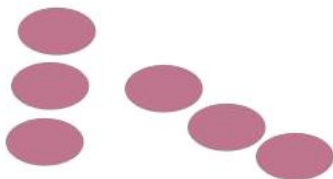
Enter the following interface, pull down the data source triangle arrow and select "irregular point".



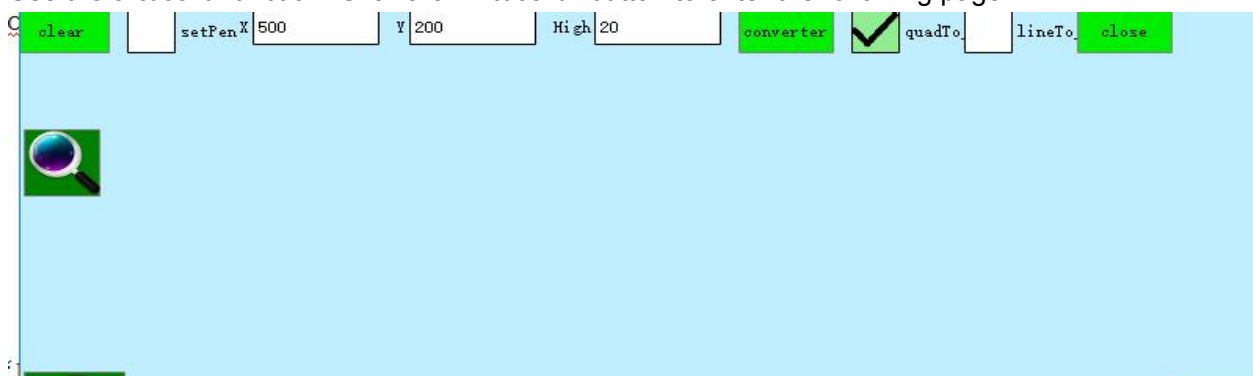
2. Click the [Edit Point] button to enter the edit point box to teach six positions.

3. Select the counter type. The default is to select its own counter.

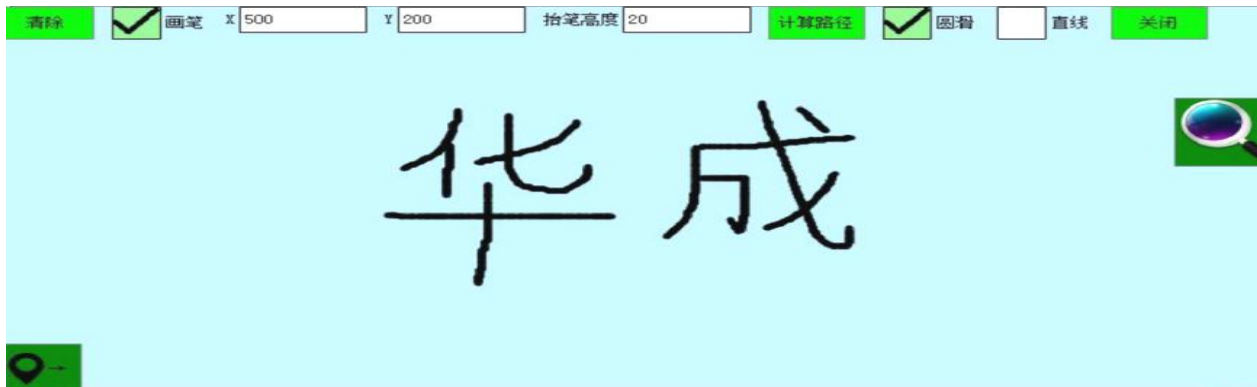
Can be stacked as shown below:



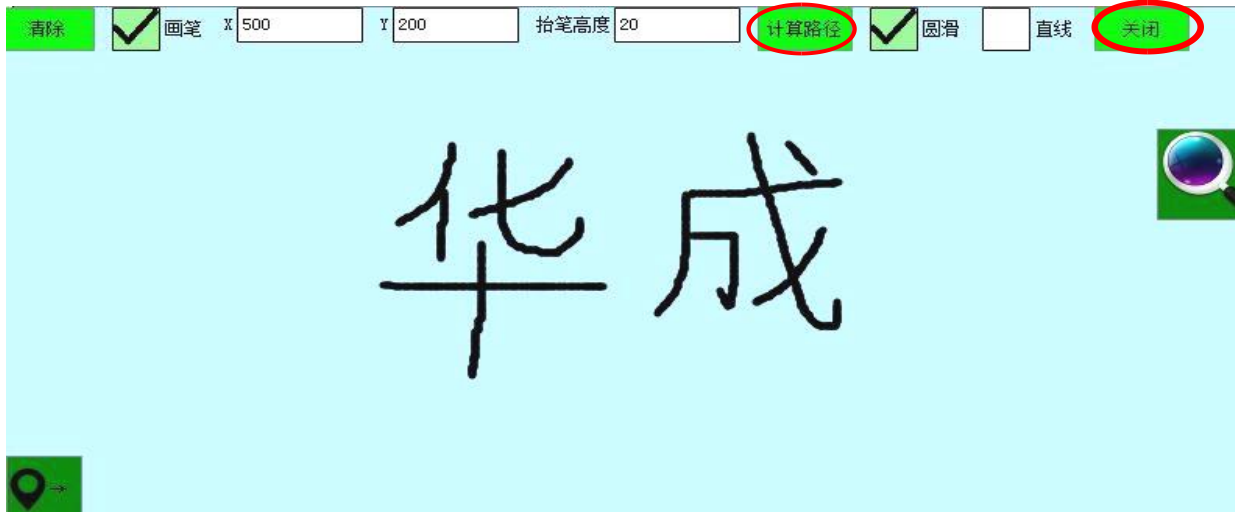
Use the artboard function: Click the "Artboard" button to enter the following page.



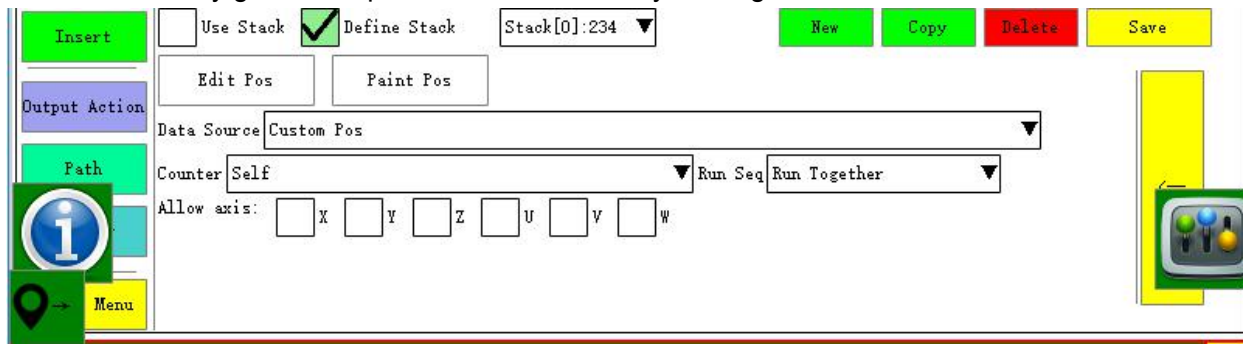
Check the "brush" to set the position of the XY axis and the height of the pen. If you select a smooth or straight line, you can write in the light blue edit box. If you write incorrectly during writing, you can click the "Clear" button. Clear all and rewrite, as shown below:



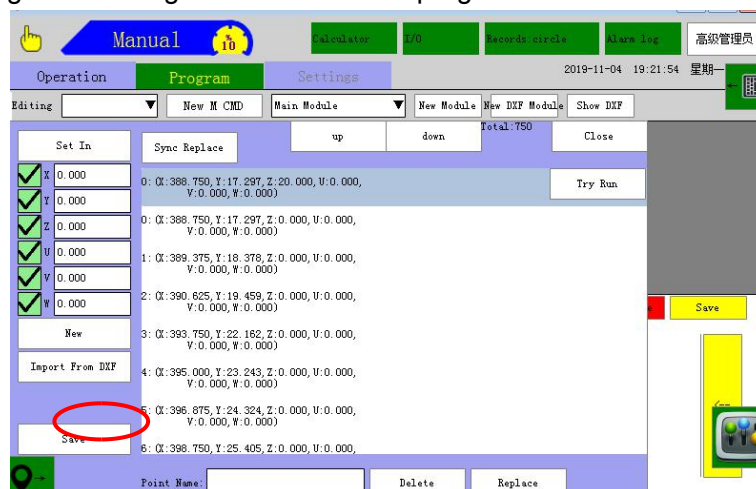
Clicking the "Calculate Path" button after writing is done will automatically generate the point, then click Close.



The automatically generated points can be viewed by clicking "Edit Points":

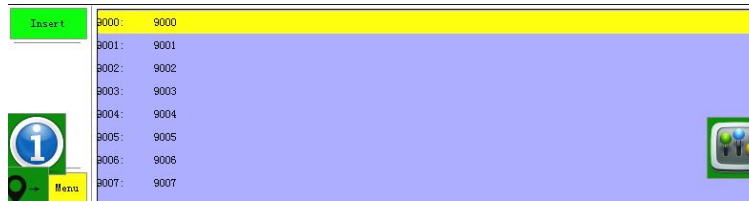


press "save" and inserting the stacking action to the main program



### 3.2.12 custom alarm

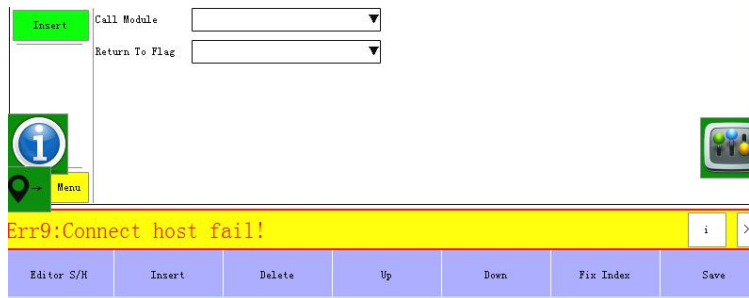
Press "custom alarm" button to enter this interface:



Select the alarm No and press **【insert】** to insert the alarm part to the program, when it runs to the alarm part, the robot will alarm and stop. The content of custom alarm can be modified, we have a software for it, if you need please contact us.

### 3.2.13 module

Click **【model】** to enter this interface, we can call module in here:



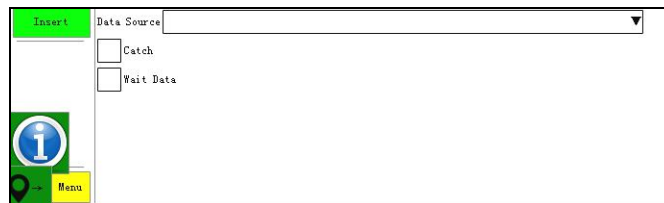
Create a new module: press **【new module】** →insert module name→ **【save】** →set the program in the module→ **【save】**。

Delete module: pull down module menu, select module and press **【delete】**。

Way to insert module: drop down“call module”and select the module need to be inserted in the menu→drop down“return to flag” (remark: please define the flag before you insert) →选 select the line and press **【Insert】**。

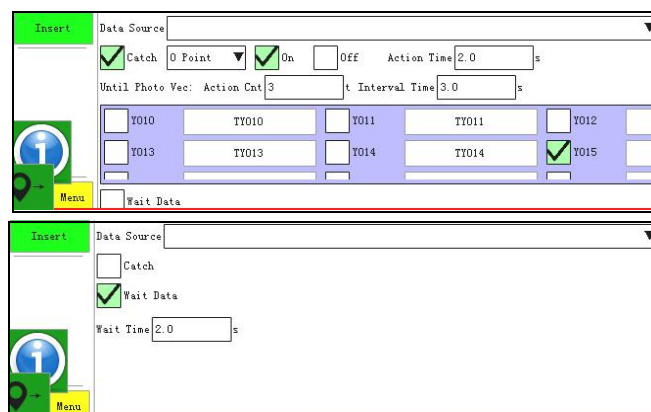
### 3.2.14 Visual instruction

press Vision button to enter the following interface:



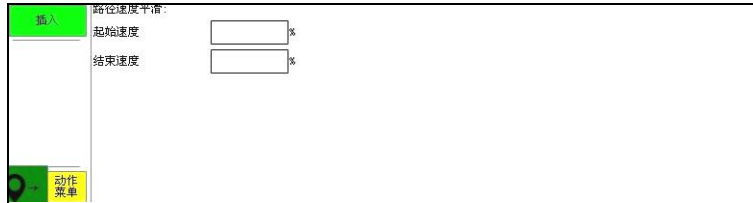
select data source: select “catch”, select a certain output, set the action time, action time and interval time, it means a certain output catch time, the interval time for catching, and times for catching, insert this to the program then enter the vision interface to set the wait time, if it failed to catch, the robot will alarm

For an example,we set output Y15 to catch for 2s, the interval time for output is 3s, after three times for catching, 2s later, if the camera failed to catch, the robot will alarm, the parameter setting is as below pictures:



### 3.2.15 Path speed

Click path speed button to enter the following interface:



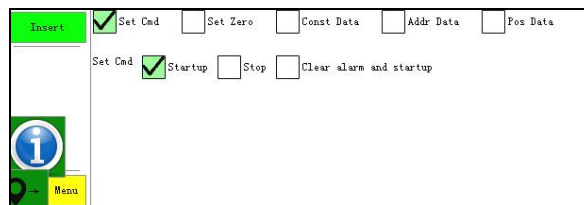
function: adjust the trajectory movement speed

Scope: only applies to the straight line in the path and curve movement

Original speed: If it is inserted between the straight line and curve, the original speed will be the same as the one with a faster speed.

### 3.2.16 Data command

Click Data command to enter the following interface:



Function of origin command: set the sequence and speed of each axis homing

The way back to the origin is divided into six kinds, the user can choose according to their own institutions:

1、manually set the origin plus switch.

Set a random position with origin signal as home position manually, then this will be the origin position for every homing .

Process for setting the home position:

In manual mode, adjust all axis to the origin switch, (the switch light is on) → in stop mode, enter “settings” → “machine setting” → “motor configs”, click **【set to origin】** or **【factory set all origin】**, then **【save origin】**.

2、Find the Z pulse directly.

Process to set home position by finding the Z pulse signal of motor:

In manual mode, adjust all axis to the origin switch, (the switch light is on) → in stop mode, enter “settings” → “machine setting” → “motor configs”, click **【set to origin】** or **【factory set all origin】**, then **【save origin】**.

When robot need to be home, in the manual mode, press **【origin】** then press **【start】**.

3、Short origin (automatically set the origin plus switch). when backing to origin, when it hits the origin metal plate, the home process finished when the origin switch is on.

First time to set origin or modify the way back to origin: press **【origin】** then press **【start】** button, robot will go home as the sequences. When each axis finished backing origin, it will alarm and ask “origin has been changes, reset the origin position?” if you need to reset, press the **【reset origin】**, if you don't need to reset, press **【stop】** option.

4、automatically set the origin plus switch (long origin). When homing, it hits the origin metal plate, it still go over the metal plate, the end of the plate is the origin position.

Mid origin, The middle point of the metal plate is the origin.

6、similar origin, when homing, when each axis is near to the origin position with origin signal, it is the origin press **【origin】** then press **【start】** button, robot will go home as sequence, when axis go to the position near to the origin, the system will think it has been in the origin.

Remark:

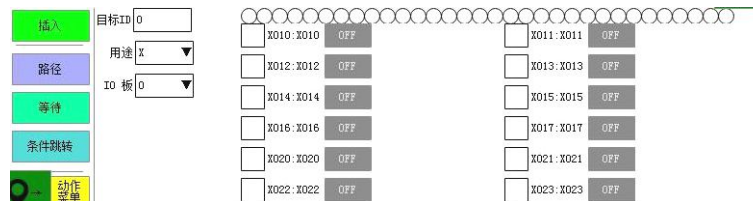
- 1、The origin instruction must be edited in the programmable button [0] (serial number 0).
- 2、When program, the sequence of inserting is the sequence for homing。
- 3、in this interface, we can set the speed for homing (remark: the speed can't be too fast otherwise it will cause collision)

remark: in the stop mode, actual speed=origin speed (value of motor) \*axis speed

- 4、axis can do the home movement simultaneously by inserting the simultaneous start and end

### 3.2.18 CAN command

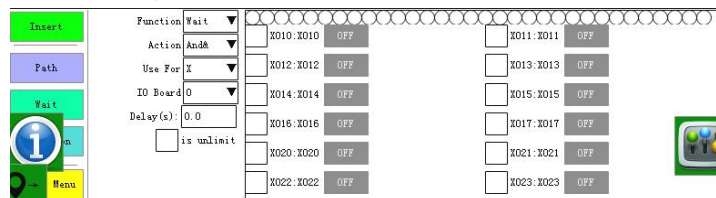
Press CAN command to enter Can command interface:



remark: this function only can be used in the CAN internet communication mode

### 3.2.19 And Or Action

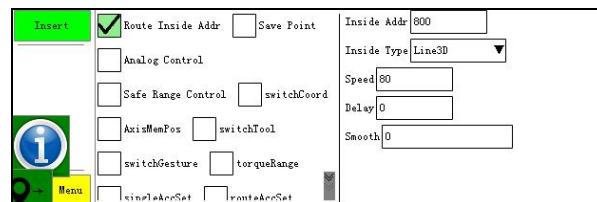
Press "And Or Action" to enter following interface:



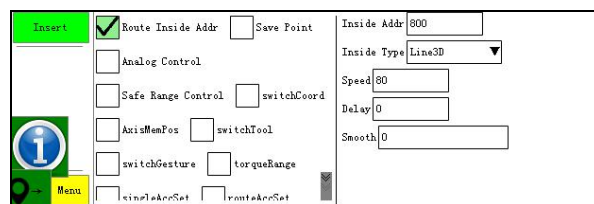
And Or Action are used for waiting for signals, And action means robot must wait for several signals at a time, if lack of any of the signals, the robot will alarm. Or action means it needs to wait for signals, when robot receive any of the signals, the robot will not alarm.

### 3.2.20 extend

click extend button to enter this interface:



#### 3.2.20.1 Route inside address



The route inside address function is to run the route by using the address. Before use this function, we need to set the parameter for the address.。

Inside address: it can be 800-890 address.

Types of address: line 3D, posture line and free path.

line 3D: it is only used for XYZ axis to run line, If the address is 800, X axis is 800, Y axis is 801, Z axis is 802.

Line 3D pose: use XYZUVW six axis to run line 3D pose, if the inside address is 800, X axis is 800, Y axis is 801, Z axis is 802, U axis is 803, V axis is 804, W axis is 805805

Free point: Use XYZUVW six axis to run free points, if the inside address is 800, X axis is 800, Y axis is 801, Z axis is 802, U axis is 803, V axis is 804, W axis is 805805

### 3.2.20.2 Save point

Save point function is to save the present point as memory, when we press stop button and restart it, the robot will run the points again

Save types: world coordinate- XYZ、world coordinate- XYZUVW、joint coordinate, world coordinate XYZ only save world coordinate of XYZ axis, world coordinate XYZUVW only save the world coordinate of XYZUVW axis, joint coordinate save the joint coordinate of XYZUVW .

save address: address 800-890 can be saved

Action choose: only current pos and current pos add deviation. .

### 3.2.20.3 analog control

Channel: 6 Channel can be used.

Analog value: setting range is 1-6.

Delay: delay time for analog value.

### 3.2.20.4 safety area

√safe range and set the safe range for the axis.

The setting range for limited axis and limit axis is 801~899 , value (801~899) doesn't represent the exact distance, it represent the address, the exact distance needs to set in the data command  
example: If X axis is 300~500, Y changed or Y is 0~100, the alarm will be "5001".

First Step: setting for limited axis range remark: 801/802 is not a distance concept, actual distance range should be set in **data command**:

Less than X axis (limited axis) setting:

More than X axis(limited axis )setting:

Second step: limited axis condition setting 设 1: When Y axis (limited axis) changed, it will be a alarm "5001".

When Y (limited axis) is out of 0~100 range, it be be a alarm No "5001".

**Remark:** 803/804 is not a distance range. Distance range should be set in data command, way of setting is as the picture show: set Y (limited) MINI range:

Set limited axis Max range:

### 3.2.20.5 axis mepos

This function is for memorizing last position.as the pic shows: Y will go to position 20 with a speed of 80 , then it will continue to go with the speed of 10, when there is a signal in X010, if the position is 60, it will remember this position. When next module starts, Y axis will run in the speed of 80 to the position 60, the rest of 40, it will run in a speed of 10. when there is signal of X010, it will remember this position.

remark: 1.if we set position as 30, for the fist action, Y axis will go with a speed of 80 to the position 50

2.saving address should be 800--899 .

## 3.2.20.6 switch tool

Insert

AxisMemPos ☒ switchTool

switchGesture ☐ torqueRange

singleAccSet ☐ routeAccSet

Target Follow ☐ setServoEn

physicalSpeedEn ☐ stopActionEn

toolID: 1

Menu

## 3.2.20.7 switch gesture

Insert

AxisMemPos ☐ switchTool

☒ switchGesture ☐ torqueRange

singleAccSet ☐ routeAccSet

Target Follow ☐ setServoEn

physicalSpeedEn ☐ stopActionEn

gesture: LeftGesture

raise height: 0.000

speed: 80.0

delay: 0.00

Menu

## 3.2.20.8 torque range

Insert

AxisMemPos ☐ switchTool

switchGesture ☒ torqueRange

singleAccSet ☐ routeAccSet

Target Follow ☐ setServoEn

physicalSpeedEn ☐ stopActionEn

Axis: X

if Torque Range in: 0.0 ~ 0.0 %

Out Range: no disable servo

will Alarm Num: 5000

Menu

## 3.2.20.9 physical speed en

Insert

AxisMemPos ☐ switchTool

switchGesture ☐ torqueRange

singleAccSet ☐ routeAccSet

Target Follow ☐ setServoEn

☒ physicalSpeedEn ☐ stopActionEn

Use Physical speed: ☒ m/s

No Use Physical speed: ☐

Menu

## 3.2.20.10 routeaccset

Insert

AxisMemPos ☐ switchTool

switchGesture ☐ torqueRange

singleAccSet ☒ routeAccSet

Target Follow ☐ setServoEn

physicalSpeedEn ☐ stopActionEn

Route Acc:

rAcc: 0.001 s

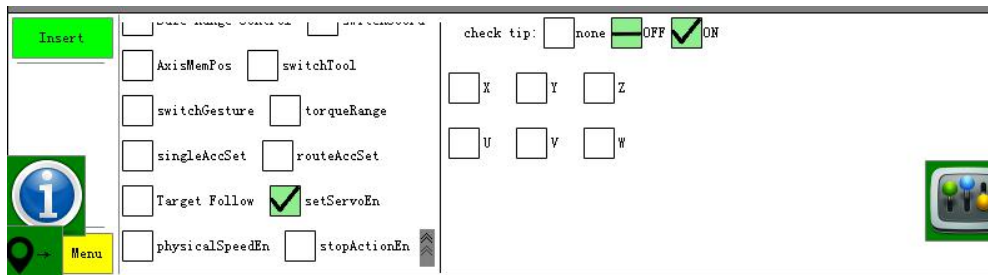
rDec: 0.001 s

Reset Acc: ☐

Menu

## 3.2.20.11 set servoEn

We can make the servo function on or off in this interface.



When the program runs to “set servoEn”: X off; Y on; ” X axis servo is off, Y axis servo is on, it will alarm because the X axis servo is off.

### 3.3 Manual

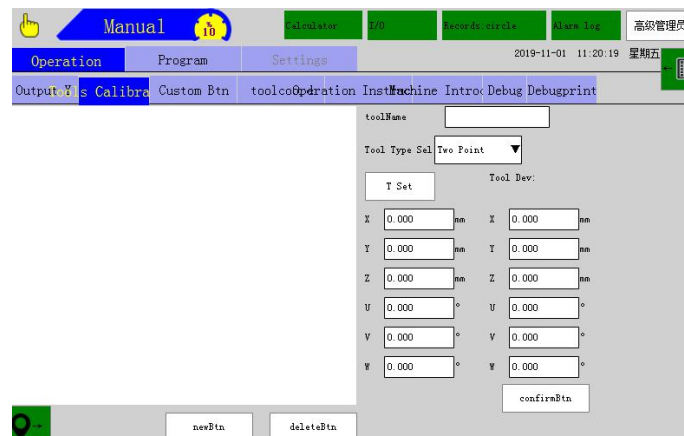
#### 3.3.1 output

In this interface, we can select a output, click 【on】 the light will be green, it means there is a output.



When IO boards are 2-5 IO , click next can switch the IO board to check

#### 3.3.2 tools calibration



After setting the tool coordinate, the robot control point comes to the tool end, in this way we can adjust the tool posture in a more accurate way.

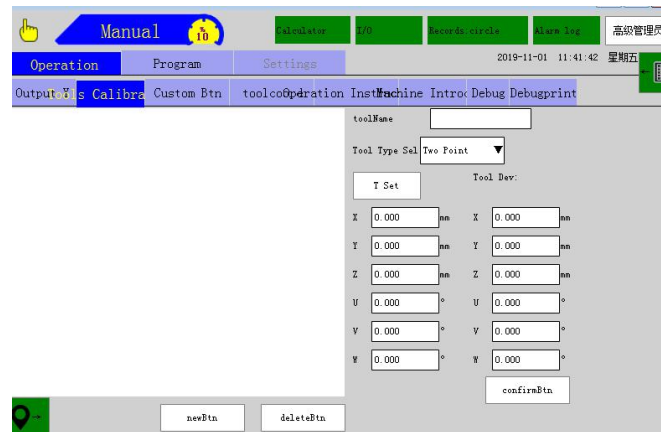
Two Point: user only can use “two point” when user knows the deviation of the tool.

process:

Step 1: when robot is in home position, click 【T set】 to set the value of the coordinate.

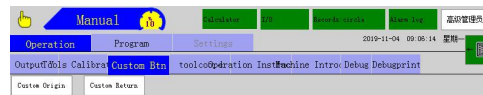
Step 2: input the deviation value of each axis.

Step 3: click confirm button when finish the settings.



### 3.3.3 custom button

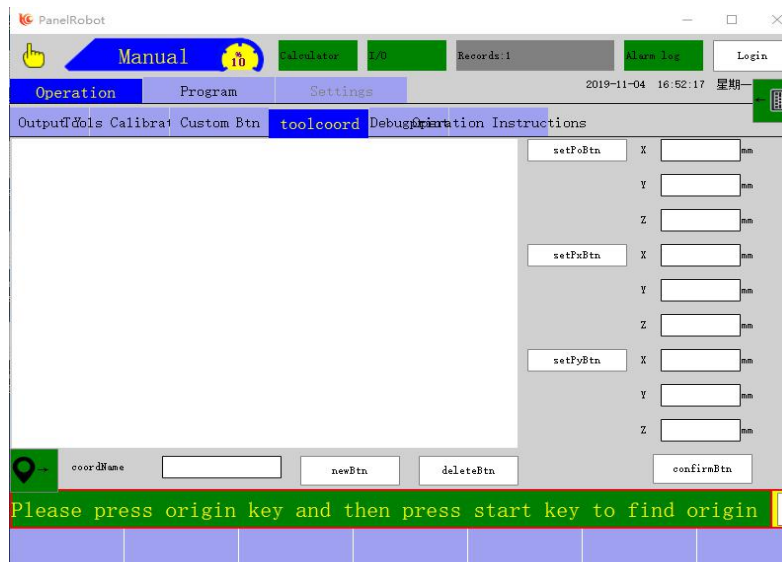
In this interface we can check and use the custom button.



Way for using this button: press this button that has already edited well, robot arm will run the program in it.

### 3.3.4 Table calibration

The worktable can be calibrated under this interface.:



PO: Starting point position。

PX: Position on the X axis。

PY: Position on the y-axis。

process of Establish workbench :

1. Enter the coordinate system and click the [New] button to create a new coordinate system.。
2. Set PO, PX, PY points on the workbench.。
3. Click the “OK modify” button to convert coordinates.。

Note: The PO PX and PO PY lines intersect at 90° and the right hand four fingers are held from the X-axis Y-axis. The thumb should face up.。

### 3.3.5 Operating instructions



Insert the U disk scan manual and the installation manual in the "parameter"- "picture", where the instructions can be displayed. .


# Chapter 4.Stop status

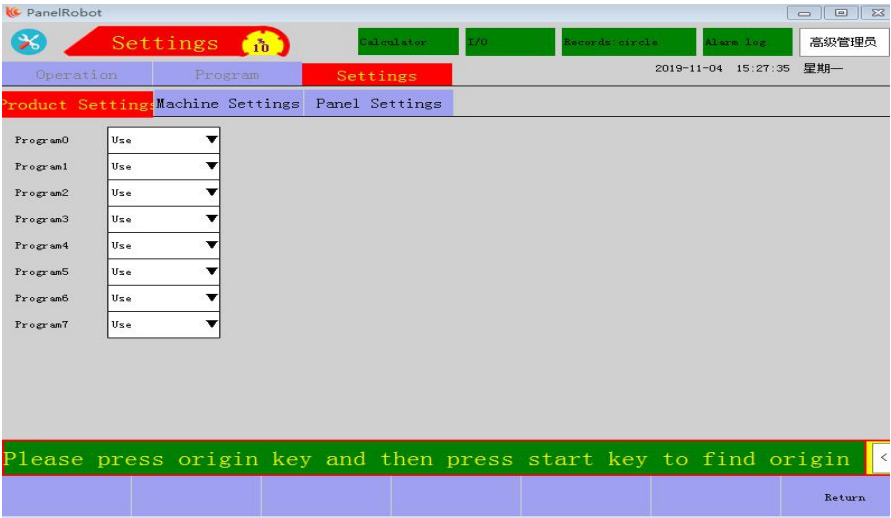
The setting of all parameters can be viewed without manual operation when the three-speed knob is turned to the intermediate position and enters the "stop"-state interface to be stopped.。

## 4.1 Settings



### 4.1.1 Product setting

Click  Button to enter the following interface, if you choose to use a subroutine, face it at this interface to use the.。



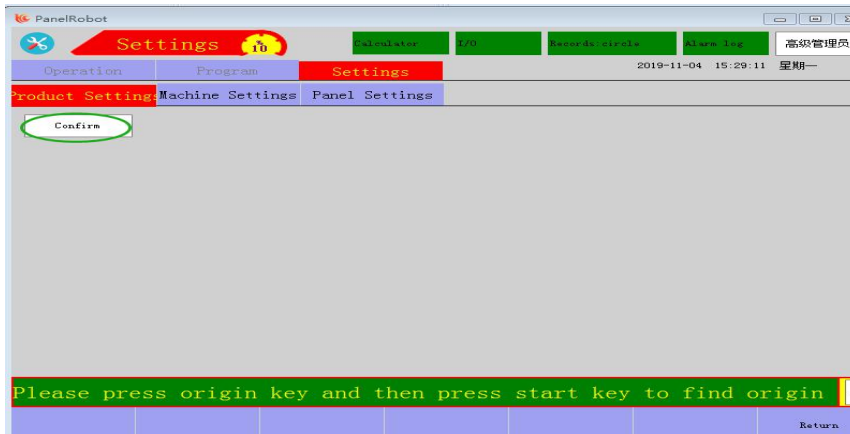
Program: multiple programs can be used at the same time in a set of programs. At first, the system defaults to the use of the main program, and the subroutine is not used. If you want to use the subroutine, you can drop down the triangle arrow to select it as the use of the.。

- Special note:**
- 1. the main program and the subroutine can be run at the same time.
  - 2.You can use subprograms alone without using the main program to program.

### 4.1.2 Valve setting



Click Button to enter the following interface:



Note: this page is displayed only after editing and upgrading the IO program using our word modification tool software, otherwise this page is empty

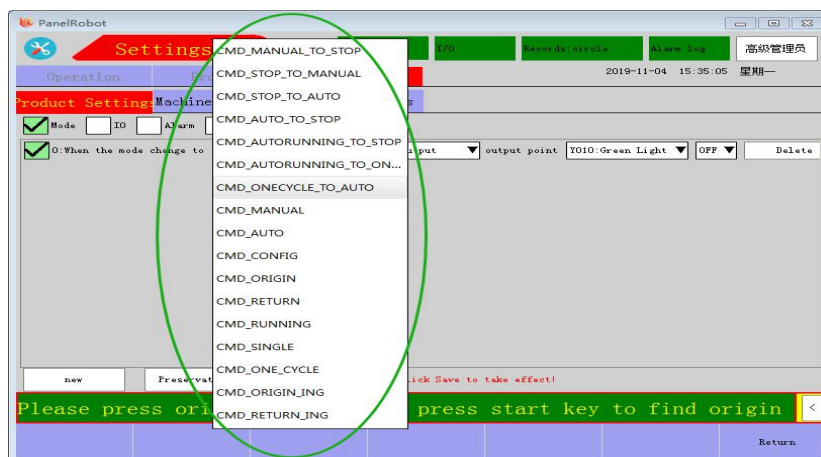
### 4.1.3 IO Settings



Click Button to enter the interface shown below,IO can be set.



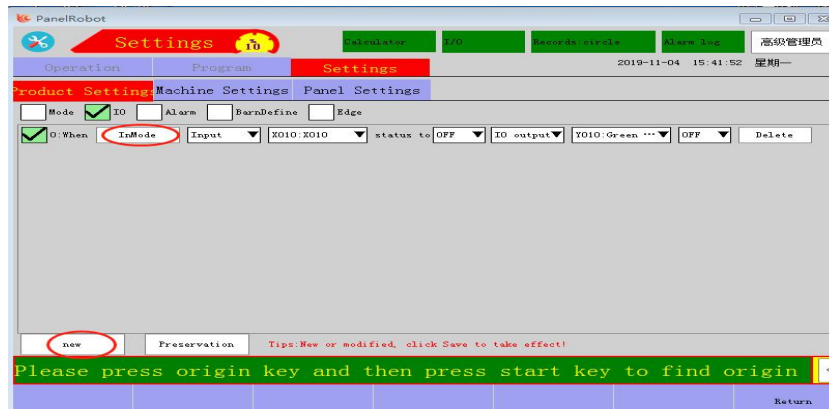
1、The mode state function is mainly used to automatically control the on-off state of the signal after switching to a certain mode.



First click the “new” button, and then select the corresponding state in "switch mode to", such as manual to stop, stop to manual, stop to auto and so on. Then select the IO output or M value output, and then select the appropriate point in output Point

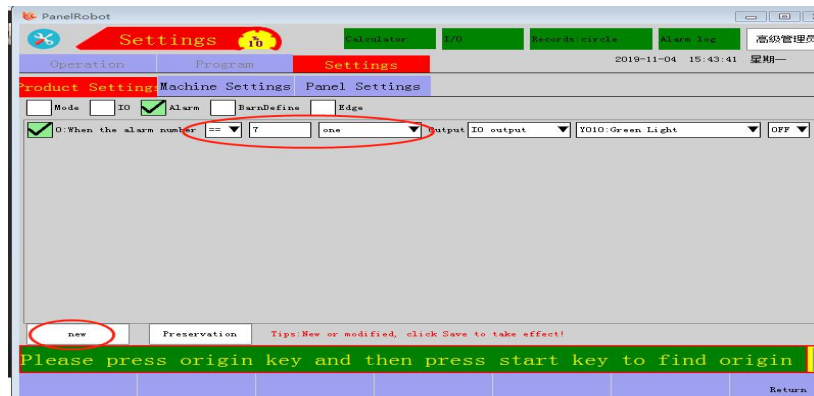
Note: you can create more much program and only click save to take effect, and you can get rid of it when you don't need it. Or click on the delete after (you also need to click save)

- 2、The IO state function is mainly used to automatically turn on and turn off another output signal by controlling the on-off state of one input and output signal in some modes.。

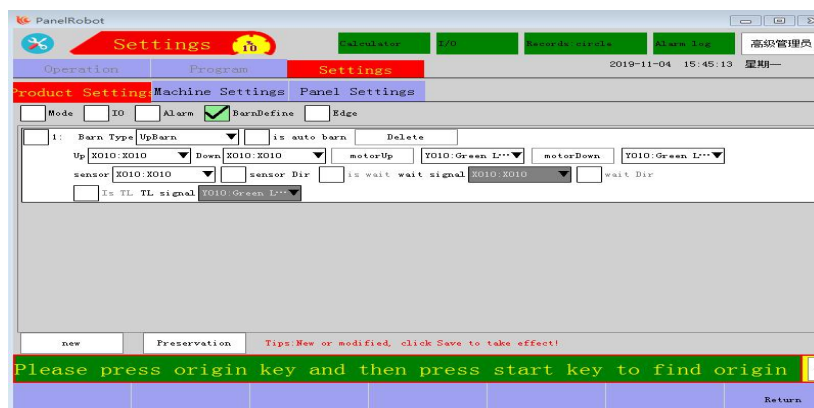


First click the New button and check the newly built, and then click "in Mode" to select the appropriate status, such as manual mode, stop mode, automatic mode, and so on. When you select an input or output point on or off, you can turn on & turn off an output point.

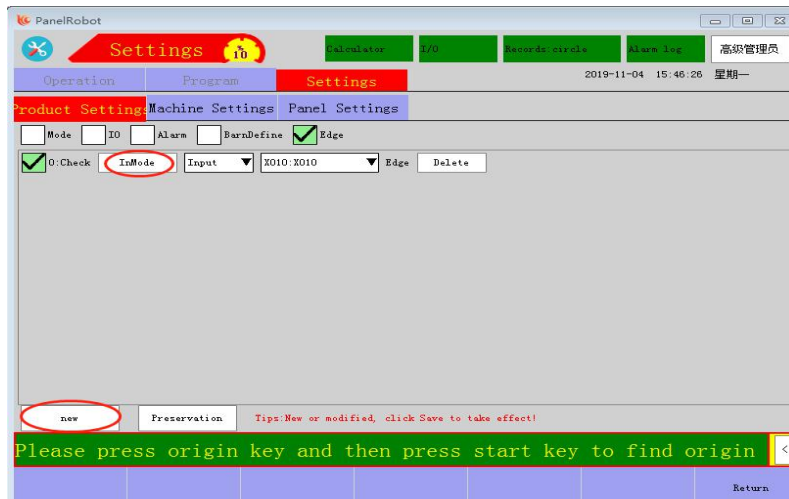
- 3、The alarm operation function is mainly used to control the on-off of an output signal when the alarm number meets a certain condition.



- 4、The silo definition function is used to define the silo.。

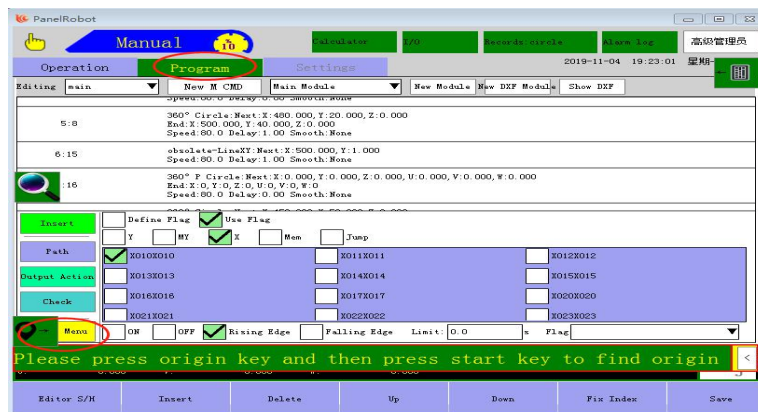


- 5、The edge signal function is mainly used to check whether there is a rising edge or a falling edge signal in some modes, that is to say, the edge signal can not be detected only in automatic operation, but also in parallel when there is an edge signal in a non-automatic state.。

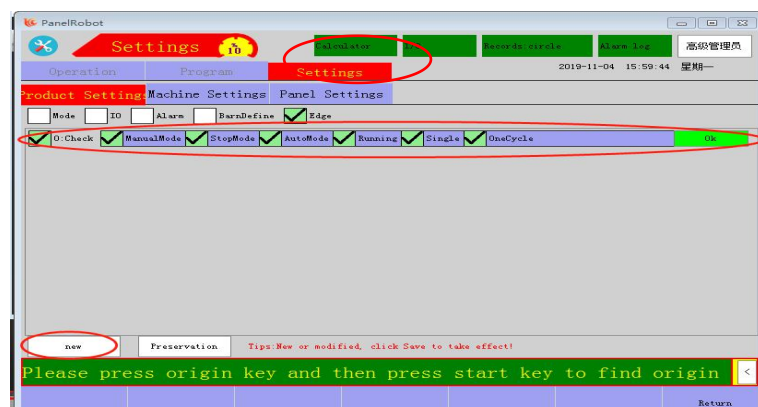


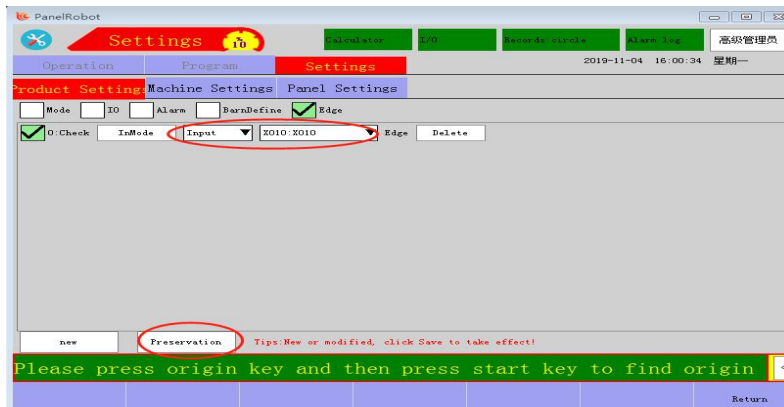
First click "New button" and check the newly built one, and then click "in Mode" to select the appropriate state, such as manual mode, stop mode, automatic mode, and so on. Select the input type and input point again. The specific applications are as follows:

1、Switch Program surface: Testing Teach X - axis motion to move Y - axis only if there is an X 10 rise signal. :



1、Switch stop state, enter the IO settings page, check along the signal, create a new check along the signal, click the "in mode" button to select manual, stop, automatic mode, automatically run and click on the OK button. Then select the input signal X10 and click the save button. .

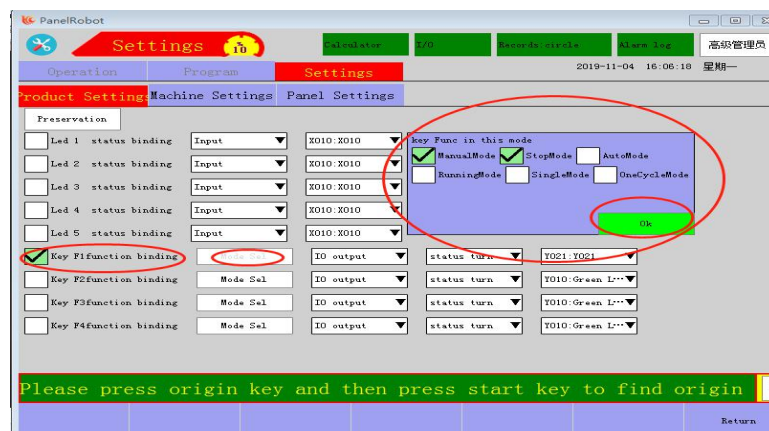




3、In manual state or stop state or automatic state or automatic operation, an X10 rising edge signal is given directly to automatic running, and the Y axis also moves after X axis motion. .

#### 4.1.4 Keystrokes and indicator lights

Click  button to enter the interface shown below, and the IO can be set at this interface.



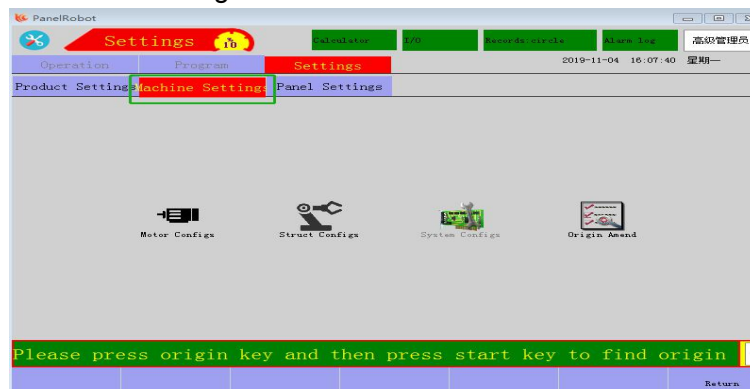
1.The function of the LED1--5 state is the same as the IO setting, and the on-off of the LED lamp on the hand control is controlled by selecting the corresponding input, output, and M values.

2.In the key F1--F5 function binding, the on-off state of the IO point and the M value is controlled by the use of the key F1-F5 in some mode. If the function binding of the key F1 is checked, click the "mode selection" button to select the manual mode and the stop mode, then click OK, then select the M value, the state is on, the M is M10, press the F1 button when the button is pressed to the manual state or the stop state, and the M10 output.

3When the "state inversion" is selected, the M10 output is pressed by pressing F1, and the output is turned off by pressing the M10 again. When selecting the "pulse", press F1, M10 output, loosen F1, M10 open the output, select the "to pass through", press F1, M10 always output will not be broken. Press F1 while selecting the "break", and M10 is always open.

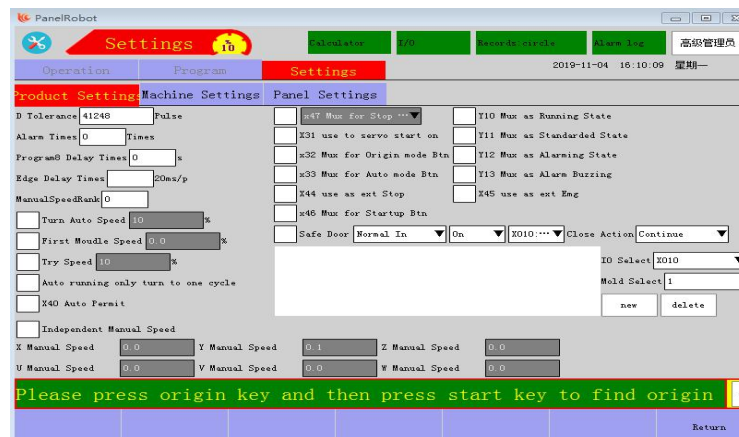
#### 4.2 Machine setting

Click "Machine Setup" to enter the following interface where the machine can be set.



### 4.2.1 Running Configs

click  button to enter the following interface:



**D Tolerance:** The difference between the transmitted pulse and the feedback pulse.

**Turn auto speed:** The default running speed setting when Worker switch auto automatic state to run automatically.

**Alarm times:** How many time will Y013 output point flash when alarm appears.

**Manual speed rank:** Adjust the manual speed, that is, when the manual speed is 10% at the same manual speed, when the manual speed level is 1, press the manual shaft button to move only two and three millimeters, and the manual speed level is 10, press the manual shaft button to move approximately 20 mm.

**First Mouldle speed:** The speed of the first mode under automatic running status

**Safe Door:** Define the signal point of the safety door. Check that the corresponding input point will be on or off automatically when the safety door is used. Otherwise, the alarm Err36 will be alarm, resulting in the failure to run automatically.

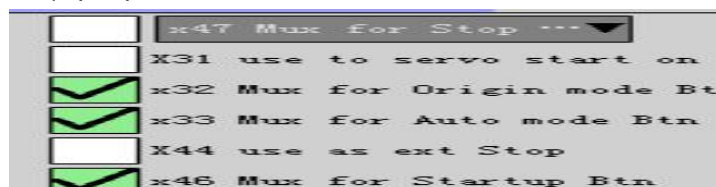
**Close Action:** Under automatic operation, the operation of the mechanical arm after the safety door is closed when the safety door is in alarm. The function is matched with the function of the safety door. When the safety door is selected for use, it is assumed that the setting safety door signal is X10, when the X10 signal is opened, the safety door is opened, and the alarm safety door is opened, at this time, if the clear alarm is selected to continue, If the safety door is closed, that is, the X10 signal is turned on, the automatic clear alarm manipulator will continue to operate, and if the stop is selected, the safety door is closed, that is, after the X10 signal is turned on, the automatic clear alarm manipulator is suspended, and the start key manipulator can be pressed to continue to operate, and if the selection is selected, After the reset is started, the safety door is turned off, that is, after the X10 signal is turned on, the alarm is automatically cleared and the operation is reset.

**Independent manual speed:** Check this item to set the speed of each shaft in the manual state.

**Program 8 delay time:** When subroutine 8 is taught, the delay time for subroutine 8 to start

**Edge Delay times:** The maintenance time of the effective edge signal, if the filtering level along the signal is set to 1, the edge signal needs to be maintained at the 20ms time to be regarded as the effective edge signal, and if it is lower than 20ms, it is the invalid edge signal.

Remote control function (input point reuse function button) :



Check "X32 reuse: enter origin mode", "X33 reuse: enter automatic mode", "X46 reuse: start", "X47 reuse: pause" these options can be used for remote control of [origin] key, [start] key, [stop] key and "enter automatic state"

- ☒ X32 reuse: entering the origin mode is equivalent to pressing the hand controller [origin] button;
- ☒ X33 multiplexing: entering the automatic mode is equivalent to turning to the (automatic) mode;
- ☒ X46 reuse: starting the light is equivalent to pressing the hand controller [boot] button;
- ☒ X47 reuse: pausing lighting is equivalent to pressing the hand controller [stop] button;

pecial explanation:

- 1、When the X47 is lit once, the robot stops immediately. If the system has an alarm, light up the X47 once to clear the alarm that has been resolved。
- 2、Using the reuse button can make the origin return action in the automatic state, but in this state, pressing the [origin] button on the hand control and then pressing the [start] button will not return to the origin (the knob has to be pressed automatically to be valid).


Note: The point that is used for multiplexing is not allowed to do other functions.

Servo start on:

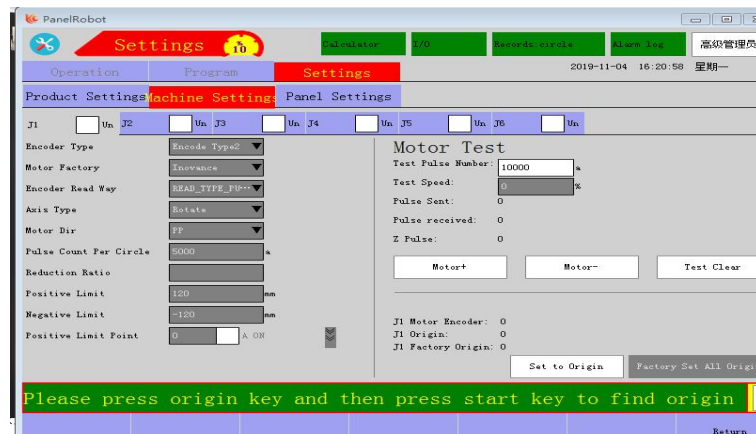


After checking this function, the external X31 input point can be used for external switch control. If the X31 signal is turned on, all the shafts can be servo enabled, and when the X31 signal is disconnected, the servo enable of all shafts will be disconnected. If any axis action is carried out, the alarm servo will not be enabled.

## 4.2.2 Motor Configs

Click  Button to enter the following interface:

the Axis can be selected, used and set under this interface,




Axis use: all axis are selected for use by default. If you do not need to use them, check the none selection box。

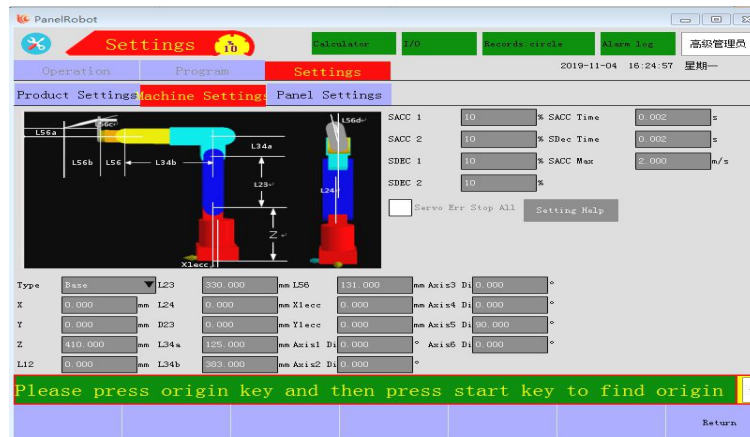
Encoder type: Encode Type 2

Motor factory: Inovance

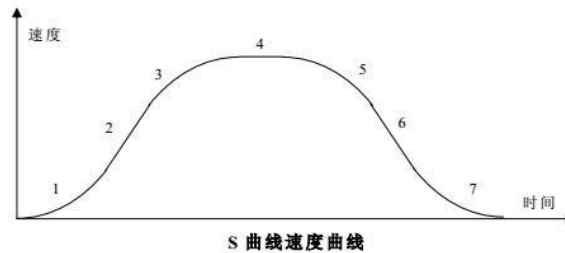
Encoder Read Way: READ\_TYPE\_PU

## 4.2.3 Struct Configs

Click  Button to enter the following interface:



S-curve acceleration:



1. Variable acceleration section: the acceleration increases from 0 to the maximum acceleration according to the set acceleration, and the velocity increases according to the acceleration.
2. Uniform acceleration section: the acceleration keeps the maximum acceleration unchanged, and the velocity increases according to the maximum acceleration.
3. Variable acceleration section: the acceleration decreases from the maximum acceleration to 0 according to the set acceleration, and the velocity increases according to the acceleration.
4. Uniform speed section: the acceleration is 0, and the velocity remains the same as the target speed.
5. Variable deceleration section: the acceleration increases from 0 to the maximum acceleration according to the set acceleration, and the velocity decreases according to the acceleration.
6. Uniform deceleration section: the maximum acceleration is kept unchanged, and the velocity decreases according to the maximum acceleration.
7. Variable deceleration section: The acceleration is decreased from the maximum acceleration to zero according to the set acceleration, and the speed decreases according to the acceleration.

The S acceleration and deceleration settings correspond to the above line segments as follows:

- S Acceleration 1: paragraph 1 "variable acceleration paragraph".
- S Acceleration 2: paragraph 3 "variable acceleration section"
- S Deceleration 1: paragraph 5 "variable deceleration section"
- S Deceleration 2: paragraph 7 "variable deceleration section"

Number of injection IO boards: number of injection IO boards to be connected.

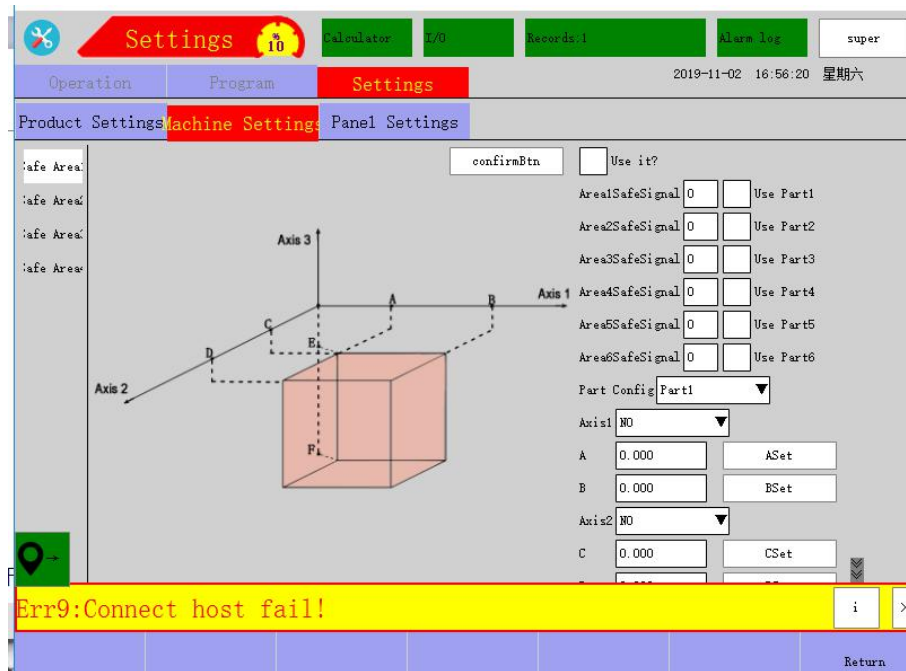
Number of IO boards: the number of IO boards that need to be connected.

Number of EU67 boards: the number of EU67 boards that need to be connected.

Servo alarm turn off all enable: when servo alarm is checked and used, all enable will be turned off.

**Analog module enable: when using analog module, we need to check analog module enable to use normally, this analog module is purchased.**

## 4.2.4 Safety Zone Parameters



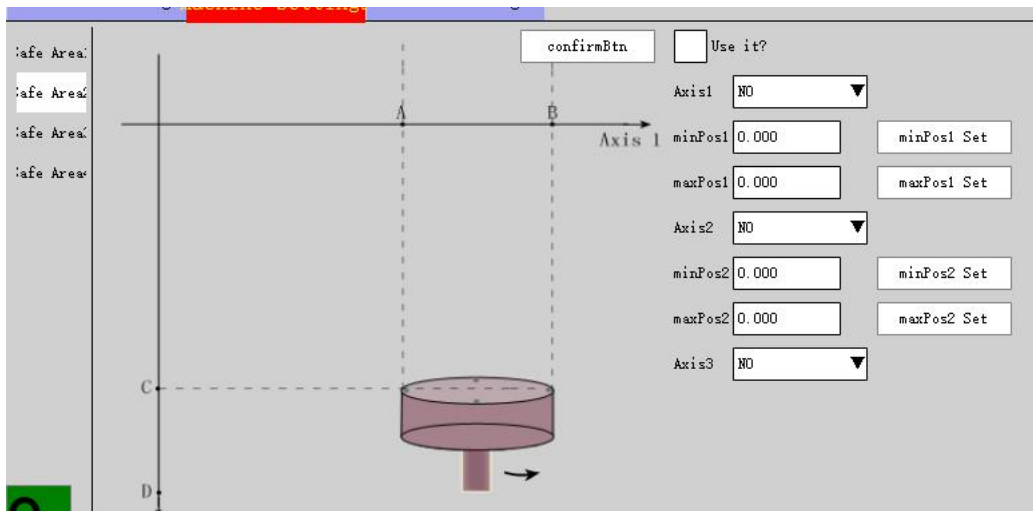
Type 1: Up to 6 security zones can be set in this interface. Note: The red area indicates the non-safe area. Zone safety zone signal: The value entered in this edit box means that the safety zone limit is invalid when there is a signal at an input point (similar to the mold opening signal), and when there is no signal at an input point, the robot cannot enter the planned non-safety. Area range. The regional safety signal value comparison table is as follows:

1	X10	9	X20	17	X30	25	X40
2	X11	10	X21	18	X31	26	X41
3	X12	11	X22	19	X32	27	X42
4	X13	12	X23	20	X33	28	X43
5	X14	13	X24	21	X34	29	X44
6	X15	14	X25	22	X35	30	X45
7	X16	15	X26	23	X36	31	X46
8	X17	16	X27	24	X37	32	X47

Use the operation process:

<p>1. Set the zone security signal point</p> <p>SafeSig1 0 <input type="checkbox"/></p> <p>SafeSig2 0 <input type="checkbox"/></p> <p>SafeSig3 0 <input type="checkbox"/></p> <p>SafeSig4 0 <input type="checkbox"/></p> <p>SafeSig5 0 <input type="checkbox"/></p> <p>SafeSig6 0 <input type="checkbox"/></p>	<p>2. Check the area used.</p> <p><input checked="" type="checkbox"/> Use Part1</p> <p><input type="checkbox"/> Use Part2</p> <p><input type="checkbox"/> Use Part3</p> <p><input type="checkbox"/> Use Part4</p> <p><input type="checkbox"/> Use Part5</p> <p><input type="checkbox"/> Use Part6</p>
<p>3. Select and set the limit point position on each axis, you can directly edit the position or move the axis target point in the manual state and then set the position in the stop state.</p> <p>A 0.000 ASet</p> <p>B 0.000 BSet</p> <p>Axis2 NO <input type="button" value="v"/></p> <p>C 0.000 CSet</p> <p>D 0.000 DSet</p> <p>Axis3 NO <input type="button" value="v"/></p> <p>E 0.000 ESet</p> <p>F 0.000 FSet</p>	<p>4. After setting the limit points of all axes, check the use box and click the [OK] button.</p>

Type2:

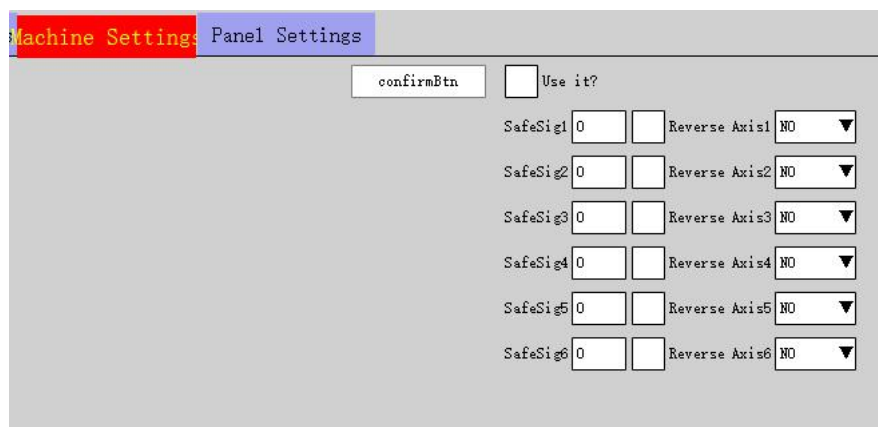


When the robot enters the area formed by A, B, C, D, the turntable in this area cannot be rotated.

Setting method:

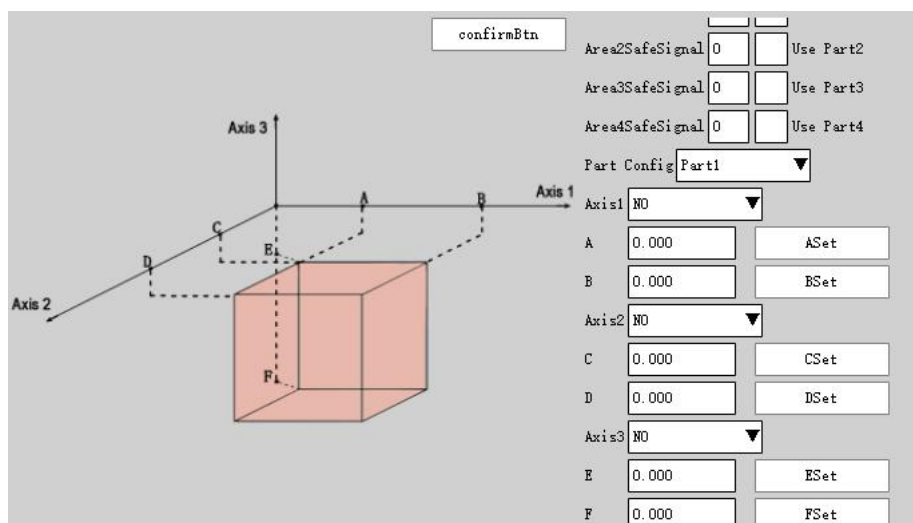
1. Set the axis represented by Axis1 and Axis2 (the pull-down triangle arrow) to select.
2. Set the position of each point of A, B, C, D, you can directly input the coordinate position or manually move the axis to the target point, and then click the [Set] button to set the current coordinate value into the edit box.
3. Finally, click the [Use] button to complete the setup.

Type3:



When the reverse is not checked, it means that there is a safety signal to move the axis. If the reverse is checked, it means that the axis can be moved when there is no safety signal.

Type4:



Type 4 is divided into two parts. The first part is to limit the safety distance between the two axes, and the second part is to limit the safety area between the two axes. The two parts can be used alone or in combination.

first part:

Zero Interval: The distance between two axes after the origin is restored.

Safety distance: The safety distance maintained by the two axes. If the distance between the two axes is less than or equal to this safety distance, the alarm will be given immediately.

Safety signal: When there is a safety signal input, it will alarm immediately. If the reverse direction is checked, it will alarm when there is no safety signal input.

The specific use is as follows


Assume that the distance between X1 and X2 is 800mm after the return of the origin. It is not safe when the distance between X1 and X2 is 100mm. To ensure that X1 and X2 do not collide, set relative axis 1 to X1 and relative axis 2 to X2. Set to 800, check the distance detection enable, set the safety distance to 100, then when the X1 axis moves to 400mm, the X2 axis can only move up to 295mm ( $800 - 400 - 100 = 300$ , but for safety reasons, when X2 moves to about 5mm, it will alarm when it reaches 300.)

If the check signal detection is enabled and the safety signal is set to 1, the alarm will be triggered as soon as there is a safety signal X10 regardless of the distance between X1X2.

the second part:

The usage method is similar to that of type one, and can be directly referred to the use of type one


#### 4.2.5 Origin setting

Click the button  to enter the following interface:

Operation	Program	Settings
2019-11-02 17:13:25 星期六		
Product Settings Machine Settings Panel Settings		
SACC 1	20 % SACC Time	0.001 m/s' <input type="checkbox"/> Servo Err Stop All
SACC 2	20 % SDec Time	0.001 m/s' IO Board Num 2
SDEC 1	20 % SACC Max	2.000 m/s zhuIO Board Num 0
SDEC 2	20 % <input type="checkbox"/> Analog En	EU67 Board Num 1
<div> <div>0.000 mm L23</div> <div>0.000 mm L34b</div> <div>0.000 mm Axis1 Di</div> <div>0.000 ° Axis5 Di</div> <div>0.000 °</div> </div> <div> <div>0.000 mm L24</div> <div>0.000 mm L56</div> <div>0.000 mm Axis2 Di</div> <div>0.000 ° Axis6 Di</div> <div>0.000 °</div> </div> <div> <div>0.000 mm D23</div> <div>0.000 mm X1ecc</div> <div>0.000 mm Axis3 Di</div> <div>0.000 °</div> </div> <div> <div>0.000 mm L34a</div> <div>0.000 mm Y1ecc</div> <div>0.000 mm Axis4 Di</div> <div>0.000 °</div> </div>		

On this page, you can set the origin mode, origin order, origin speed, reset sequence and reset speed of each axis. After setting, click Save to take effect.


#### 4.2.6 Automatic tuning

Click the button  to enter the Auto Tuning page:

Operation	Program	Settings
2019-11-02 17:13:25 星期六		
Product Settings Machine Settings Panel Settings		
<div>StartTest</div> <div>Test Item: Motor ← Test, valve on-off Test</div> <div>Test Condition: Please left 2r for the motor test Please make sure the valve can be on or off</div>		

Click the “Start Test” button to test the motor's forward and reverse conditions and valve continuity.

#### 4.2.7 Servo parameters

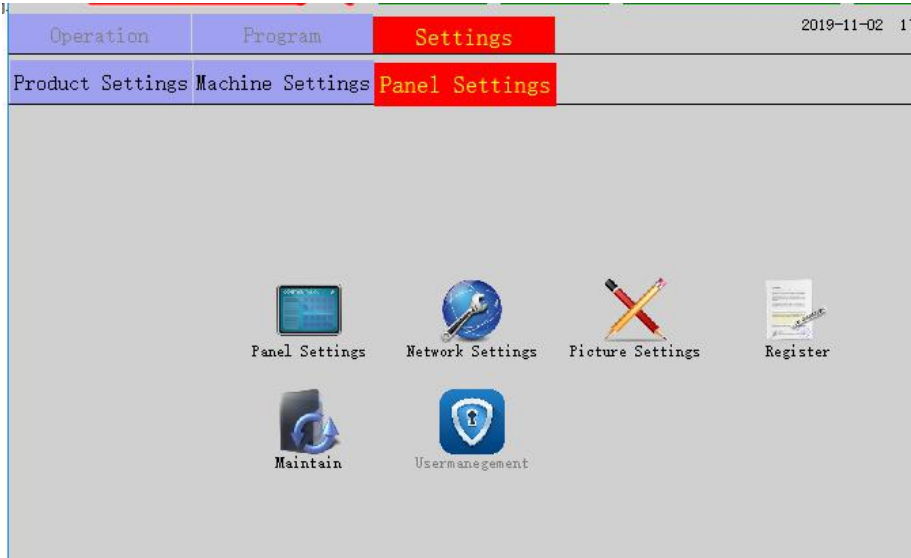
Click the button  to enter the servo parameter page, where you can set the servo parameters of each axis.

Operation	Program	Settings
2019-11-02 17:13:25 星期六		
Product Settings Machine Settings Panel Settings		
<div>StartTest</div> <div>Test Item: Motor ← Test, valve on-off Test</div> <div>Test Condition: Please left 2r for the motor test Please make sure the valve can be on or off</div>		
torX+test: R0 S0 Z0		
torX-test:		
torY+test:		
torY-test:		
torZ+test:		
torZ-test:		
torU+test:		
torU-test:		
torV+test:		
torV-test:		
torW+test:		
torW-test:		


Note: The motor code must be checked for correctness. Compare the motor code in Table 1 of the appendix of this manual.

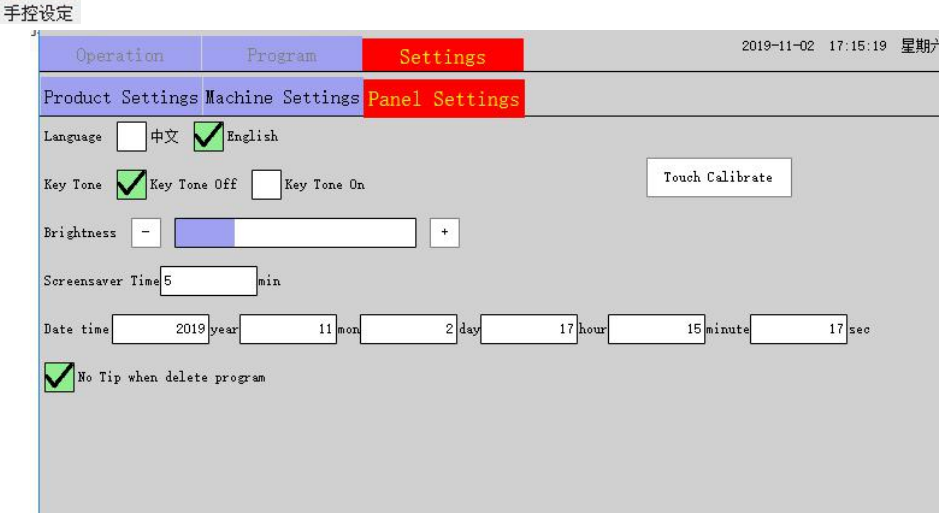
4.3 Manual Setting

Click the [Manual Settings] button to enter the manual setting interface, as shown below:



4.3.1 Manual setting

Click the button  to enter the following interface:



Button sound: button sound on and off.

Language: Choose Chinese or English.

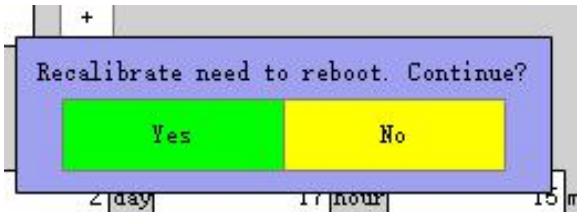
Date and time: The date and time displayed by the system. Select the date and time and press the plus or minus keys to change.

Screen saver time: that is, the backlight time, set the time when the backlight is on during standby.

Screen brightness: Adjust the brightness of the display.

Touch correction: Click the [Touch Correction] button and follow the prompts to correct the action, or rotate the third gear knob and use the shortcut button on the manual controller to press F5 → F1 → F4 → F1 → F3 → F1 → F2 → F5 Enter the calibration screen and press the prompt to perform the calibration.


Delete teaching does not prompt: When this function is checked, the manual teaching page deletion program will not have any deletion confirmation prompt. If this function is not checked, the following deletion confirmation dialog will pop up immediately when the manual teaching page deletes the program action.

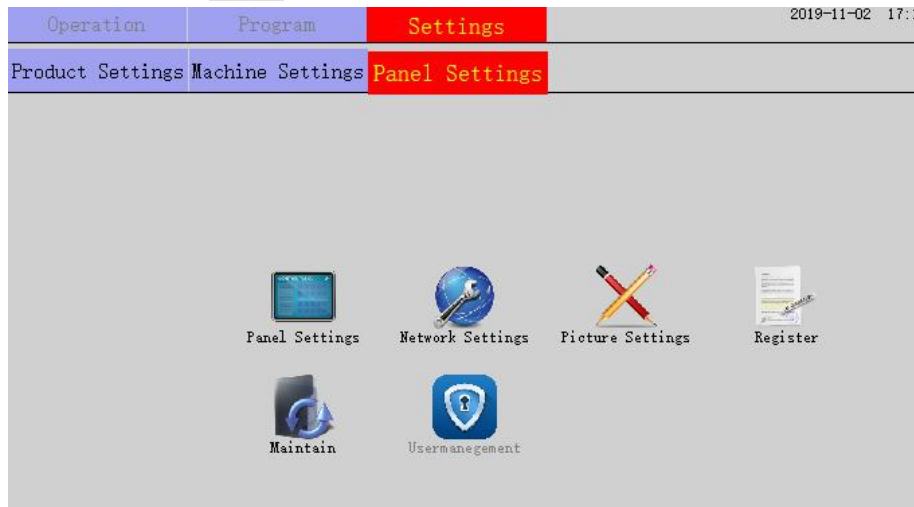


Mobile teaching no longer prompts: When this function is checked, the manual teaching page moving

program will not have any movement confirmation prompt. If this function is not checked, the following mobile confirmation dialog will pop up immediately when the manual teaching page moves the program action.

### 4.3.2 Network Configuration

Click the button  to enter the following interface:



Network enable method:

1. Check it. ☒ Network En

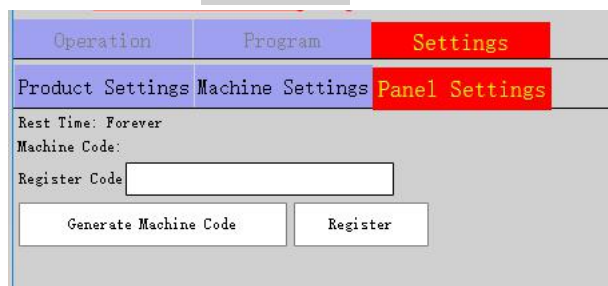
Set whether to enable remote control. If you select Use, the “Command List” button appears.

3. Set whether to communicate with the host network.
4. Set the name of the machine.
5. Robot IP address (only the opponent controller has a network port valid).
6. Fill in the peripheral destination IP address.
7. Select the communication mode.
8. Click the [Save] button to save the set data.
9. Click the [Send Test Data] button.
10. Waiting for the external feedback data to the hand controller indicates that the network configuration is successful.

Note: This setting is for the manual network port setting.

### 4.3.3 Registration

Click the button  to enter the following interface:



The screenshot shows a software interface with three tabs: 'Operation' (blue), 'Program' (blue), and 'Settings' (red). Under the 'Settings' tab, there are three sub-tabs: 'Product Settings' (blue), 'Machine Settings' (blue), and 'Panel Settings' (red). The main area displays 'Rest Time: Forever', 'Machine Code:', and a 'Register Code' input field. At the bottom, there are two buttons: 'Generate Machine Code' and 'Register'.

Registration process:

1. Log in to the highest authority to view the vendor code and click the [Generate Machine Code] button to generate a 6-digit machine code.
2. Provide the manufacturer code and machine code to the supplier to have the supplier register the production registration code.
3. Enter the "Registration Code" edit box according to the 20-digit registration code provided by the manufacturer.
4. Click the [Register] button to complete the registration.

### 4.3.4 Maintenance


Click the button  to enter the following interface:

In this interface, you can view the version number, upgrade version, and backup/restore parameters.

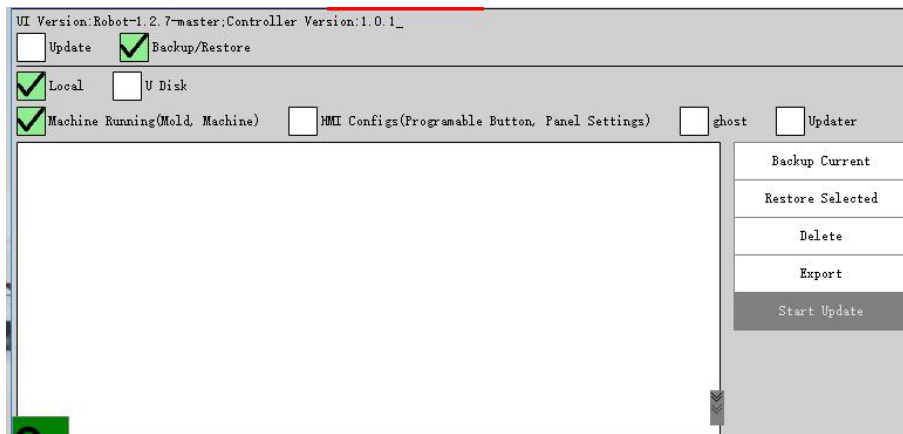


The screenshot shows a software interface with three tabs: 'Operation' (blue), 'Program' (blue), and 'Settings' (red). Under the 'Settings' tab, there are three sub-tabs: 'Product Settings' (blue), 'Machine Settings' (blue), and 'Panel Settings' (red). The main area displays 'UI Version: Robot-1.2.7-master; Controller Version: 1.0.1\_'. There are two checkboxes: 'Update' (checked) and 'Backup/Restore' (unchecked). On the right side, there are two buttons: 'Scan Updater' and 'Start Update'.

Version update method:

1. Check the Update Rotation box. 
2. Plug in the U disk for a few seconds.
3. Click [Scan Update Package] (If there is no display program, please check whether the U disk program or U disk format meets the requirements for identification).
4. Select the version you want to upgrade.
5. Click the [Start Update] button to enter the update interface to update.

## Backup/Restore:



Machine parameters: refers to the setting of the axis parameters, including the software limit, the distance per revolution.

Manual parameters: parameter settings in the programmable buttons and all settings under the manual settings.

Ghost: All backups, backing up all data of the current hand controller.

Update package: This system will automatically save the upgraded version. If you need to upgrade the previous version again, you can check ☒ Local and select ☒ Updater the version number to update the version. You can also export the program to the U disk for other manual controllers ☒ Local . Update.

Backup operation flow: Tick → Select to back up data (machine parameter / manual parameter / ghost) → click backup current status → enter the backup name in the pop-up backup name dialog box → click OK.

1. The above steps are to back up the parameters to the machine. To back up to the U disk, insert the U disk on the above steps and select the parameter name just backed up to the machine → click the export button → pop up the export completion dialog box. Click OK.

2. You can also rotate the third gear knob and use the shortcut button on the manual controller to press F5 → F3 → F4 → F3 → F2 → F3 → F1 → F5 to enter the backup interface and follow the prompts for backup.

Restore operation flow: check ☒ Local or ☒ U Disk → select to restore data (machine parameter / manual parameter /ghost) → click [Restore selected backup] button → according to the prompt, the manual controller will restart and wait for the restart to complete.

## 4.3.5 User Management

Click the button  to enter the following interface:

In this interface, administrator permissions can be set and passwords can be modified.

System operator default password:

Operator: 123

Administrator: 123

Senior administrator: 123456

Super administrator: 12345678

Op: The permissions of this item are:

1. The axis can be moved in the manual state, but can not enter the teaching page for teaching;
2. The robot can be started and the speed can be adjusted in the automatic state;
3. In the stop state, the home position return and the product setting page setting parameters can be performed;
4. You can enter the registration page.

Mold: This permission has:

1. Op all permissions;
2. Relevant settings related to the model number;
3. You can enter the teaching page for teaching;
4. Automatically edit and modify the position, speed and delay of the program action.

System: This permission has:

1. Op all permissions;
2. The machine parameters can be modified;
3. Can enter most of the manual settings page.

User: This permission has:

1. Op all permissions;
2. Can enter the user management page.

Root: This permission has:

1. Op all permissions;
2. The manufacturer code of the registration page is visible.

Auto Modify: This permission has:

1. Op all permissions;
2. Automatically edit and modify the position, speed, delay, etc. of the program action.

New User Name: Edit User Name → Set Password → Check Permission ☐ Op → Click [OK].

Admin

☐ Super

☐ System

☐ User

☐ Root

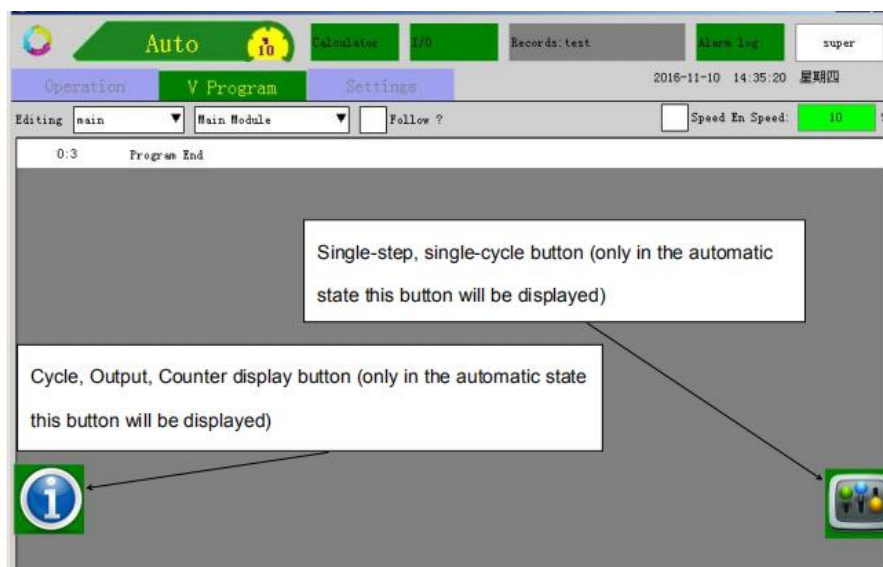
Auto Modify

Delete user name: Check the user list → click the [Delete] button

## Chapter 5 Automatic Mode

The third gear knob to "automatic" into the automatic state is as follows:

In this interface, press the start button on the hand controller, the robot will start the movement to teach a good program.



**Speed control enable:** After checking, press the key speed deceleration key on the manual controller to adjust the speed.

**Follow:** Select the program to run after the step to which step the color will become dark.


**Single-step mode:** single-step operation in automatic mode.

Please refer to the following figure for the method of use:



**Single-cycle mode:** The program moves from the first step to the end of the module.

**Cycle Time:** The time taken by the entire program to go to the end of the module.

**Cycle Display Button:** Click this button  to display the cycle time and the current cycle time. You can also view all counter count status, timer timing and stack parameter settings.



## Chapter 6. Alarm information and alarm reasons

### 6.1 Alarm Clear Operation

When an alarm occurs, firstly, analyze the cause of the alarm and solve it, then switch to the stop mode and press the stop button to clear the alarm.

### 6.2 Alarm number and countermeasures

Alarm number	Alarm information	countermeasures
Err1	Initialization is not completed	Automatically cleared after startup
Err2	Master axis configuration and manually controlled-axis configurations difference	Select master or manual control according to demanding
Err3	Master axis configuration parameter error	No
Err4	Not enough memory	Teaching program for too long, will reciprocate the same action using module integration. Press the stop key to clear the alarm.
Err5	Teaching data parsing errors	Teach error manual and host application version does not match the type matches the version of the program. Press the stop key to clear the alarm.
Err6	Teaching data parsing errors	Edit error overload mode, or create a new model number. Press the stop key to clear the alarm.
Err7	Emergency stop	Release the emergency stop then press the stop button to clear alarms Reason: 1, And the emergency stop switch is pressed. 2, no wiring emergency stop switch ports on the host, if not required, separately that is, switch, you will need to STOP port is shorted.
Err8	Auto run jumping errors	Press the stop key to clear the alarm. Reason: 1, Teaches programs jump label is invalid or was deleted.
Err9	Failed to connect to host	Host empty programs or the wrong version
Err10	Teaching program errors	Press the stop key to clear the alarm.
Err11	Configuration parameters are stored fails	Restart or press the stop key to clear the alarm.
Err12	Robot model set errors	Press the stop key to clear the alarm.
Err13	Single step / Single-loop debugger setting errors	Press the stop key to clear the alarm.
Err14	Read DATA errors from the host FLASH	Read DATA from the host FLASH
Err15	IO Communication failure	1, Check wiring connections; 2, Check main board and IO board.
Err16	Servo absolute value read failed	Check robot and servo wiring connection
Err17	Servo absolute value failed to read the calibration	Check robot and servo wiring connection
Err18	Read function code error servo absolute value	Check robot and servo wiring connection
Err19	Servo absolute position read timeout	Check robot and servo wiring connection
Err20	IO 2 Communication failure	1, Check wiring connections; 2, Check main board and IO board.
Err21	IO 3 Communication failure	1, Check wiring connections; 2, Check main board and IO board.
Err22	IO 4 Communication failure	1, Check wiring connections; 2, Check main board and IO board.
Err23	IO 5 Communication failure	1, Check wiring connections; 2, Check main board and IO board.
Err24	FPGA Alarm, power failure, please restart	No
Err25	Analog output module output verification error	No
Err26	Analog output module read timeout	No

Err27	The current workbench coordinate system is wrong, so the switch failed.	No
Err28	Stack interval output failed	No
Err29	Position stable	No
Err30	No current workbench coordinate system	No
Err31	Current carousel is not defined	No
Err32	The current workbench coordinate system is wrong, so the switch failed.	No
Err33	No current workbench coordinate system	No
Err34	EUIO 1 Communication failure	No
Err35	EUIO 2 Communication failure	No
Err36	Safety door opened	Close safety door
Err37	Single axis dynamic reference address error	No
Err38	Path reference address error	No
Err39	Axis mapping error	No
Err40	Manual control and host teaching procedures are inconsistent	No
Err90 Err97	Motor 1-8 Alarm	Motor wires connection failure, or the host circuit failure Reason: 1, Host, and servo-drive connection problem; 2, Servo alarm failure;
Err100 Err107	Axis 1-8 sports failure	Press the stop key to clear the alarm. Movement again. Reason: 1, Teaches the same axis at the same time campaigns; 2, Main program and subroutine has the same shafts at the same time campaigns; 3, Teach single axis motion trajectory and run at the same time;
Err110 Err117	Axis 1-8 Speed setting error	Press the stop key to clear the alarm. Movement again.
Err120 Err127	Axis 1-8 movement over-speed	Press the stop key to clear the alarm. Movement again. Reason: 1, Tracks acceleration setting too large
Err130 Err137	Axis 1-8 Positive Limit alarm	Press the stop key to clear the alarm. Movement again. Reason: 1, Soft limit, sporting more than single-axis, reset uni axial soft limit; 2, Teaches procedures uni axial soft position out of range limit, modify the guidance program location.
Err140 Err147	Axis 1-8 negative limit alarm	Press the stop key to clear the alarm. Movement again. Reason: 1, Soft limit, sporting more than single-axis, reset uni axial soft limit; 2, Teaches procedures uni axial soft position out of range limit, modify the guidance program location.
Err150 Err157	Axis 1-8 Large deviation	Machine setting -> Operating parameters, Tolerance set, press the stop key to clear the alarm. Movement again. Reason: 1, Servo feedback signal not in the motor page to test motor positive inversion. 2, Tolerance is set too small, campaigns, feedback pulse and pulse output there is a gap, the tolerance value is set to a reasonable position.
Err160 Err167	Axis 1-8 Acceleration alarm	Press the stop key to clear the alarm. Movement again. Reason: 1 And acceleration setting too large.
Err170 Err177	Axis 1-8 Positive Limit Signals alarm	Press the stop key to clear the alarm. Movement again. Reason: 1, And ultimate disconnect signal 2, Limit signal normally closed or normally open odds with the switch installation; 3, And limit signal connected to the wrong port
Err180	Axis 1-8 Negative Limit Signals	Press the stop key to clear the alarm. Movement again.

Err187	alarm	Reason: 1, And ultimate disconnect signal 2, Limit signal normally closed or normally open odds with the switch installation; 3, And limit signal connected to the wrong port
Err190 Err197	Axis 1-8 original signals is not set	Press the stop key to clear the alarm. Reset. Cause: the axis origin signals not set system parameters. Original point teaches the Executive with the original signal.
Err200	Motion failed	Press the stop key to clear the alarm. Movement again. Reason: there are some singular points in the trajectory, through single-axis motion around the singularity.
Err201	Manual linear trajectory starting coordinates are not set	No
Err202	Manual linear trajectory ending coordinates are not set	No
Err203	Joint exercise starting coordinates manually is not set	No
Err204	Joint exercise ending coordinates manually is not set	No
Err205	Move line relative coordinates manually is not set	No
Err206	Joint line relative coordinates manually is not set	No
Err207	Teach straight line trajectory starting coordinates is not set	No
Err208	Teach straight line trajectory ending coordinates is not set	No
Err209	Teaches joint starting coordinates are not set	No
Err210	Teaches joint ending coordinates are not set	No
Err211	Guidance line relative coordinates is not set	No
Err212	Teach joints move relative to the coordinate is not set	No
Err213	Tracking movement of the arc starting point coordinates manually is not set	No
Err214	Manual arc trajectory point coordinates in the middle is not set	No
Err215	Manually track movement of the arc ending coordinates is not set	No
Err216	Taught arc trajectory starting point coordinates is not set	No
Err217	Taught arc trajectory coordinates is not set	No
Err218	Taught arc trajectory endpoint coordinates is not set	No
Err219	Motion speed setting failed	Press the stop key to clear the alarm. Movement again. Reason: 1, Speed is set to 0 ; 2, Trajectory in the movement, move on to the next motion, such as a track is running the main program, subroutine starts another trajectory.
Err220	Trajectory planning of failure	Press the stop key to clear the alarm. Slow movement again. Reason: there are some singular points in the trajectory, through single-axis motion around the singularity.
Err221	Trajectory planning failure	Reason: 1 Too fast, track movements, in a number of amendments to track speed, a joint motion is still too fast.
Err222	Timed out waiting for stack data source	Reason: 1, Visual picture is not successful. 2, Disconnect, Visual Communications.
Err223	Stack data source error	Check the stack counter settings
Err300	Counter is not defined	Press the stop key to clear the alarm. Reset.

Err301	Counter is not defined	No
Err500 Err507	Axis 1-8 Over current alarm	No
Err510 Err517	Axis 1-8 z Pulse errors	Check the servo wiring connection and the servo
Err520 Err527	Axis 1-8 No z Pulse	Check the servo wiring connection and the servo
Err530 Err537	Axis 1-8 Origin offset	Origin has changed, please reset the origin point
Err600 Err605	Non-safe area 1-6 alarm	Please move arms to safe area
Err900 Err907	Motor 1-8 Encoder battery failure	Battery is exhausted, please replace the battery
Err910 Err917	Motor 1-8 Encoder on/off failure	Please reset original point after replace the battery
Err920 Err927	Motor 1-8 is not recognized and needs to be restarted	No
Err1000 Err1007	Servo 1-8 failure, servo is not enabled	Check Servo motor
Err1010	Control, read and write parameters timed out	No
Err1011	Control, read and write parameters did not start successfully	No
Err1012	Control, read torque timeout	Check communication wires
Err1013	Control, read torque did not start successfully	Check communication wires
Err1014	Drive, the system timer expires, after the fault is processed, it needs to be restarted.	No
Err1020 Err1027	RTEX, driver 1-8 failure	No
Err1498	Manufacturers choose not the same	Each axis servo manufacturer needs to choose the same
Err1499	Control mode selection is different	The servo control mode of each axis needs to be consistent.
Err1500 Err1507	Axis 1-8CAN communication timeout	Check if the CAN communication line or terminating resistor is connected
Err1508 Err1515	Read axis 1-8 CAN date error	No
Err1516 Err1523	Write axis 1-8 CAN data error	No
Err1524 Err1531	Axis 1-8 Servo over-current	No
Err1532 Err1539	Axis 1-8 drive main circuit over-voltage	No
Err1540 Err1547	Axis 1-8 drive main circuit under-voltage	No
Err1548 Err1555	Axis 1-8 servo control under-voltage	No
Err1556 Err1563	Axis 1-8 servo output shorted to ground	No
Err1564 Err1571	Axis 1-8 power cord phase loss warning	Check if the power line is wired correctly
Err1572 Err1579	Axis 1-8 Servo braking resistor overload	No
Err1580 Err1587	Axis 1-8 driver overload	No
Err1588 Err1595	Axis 1-8 motor power line disconnection	Replace power line
Err1596 Err1603	Axis 1-8 drive heatsink overheated	Check if fans works normally
Err1604 Err1611	Axis 1-8 drive parameter storage failure	No

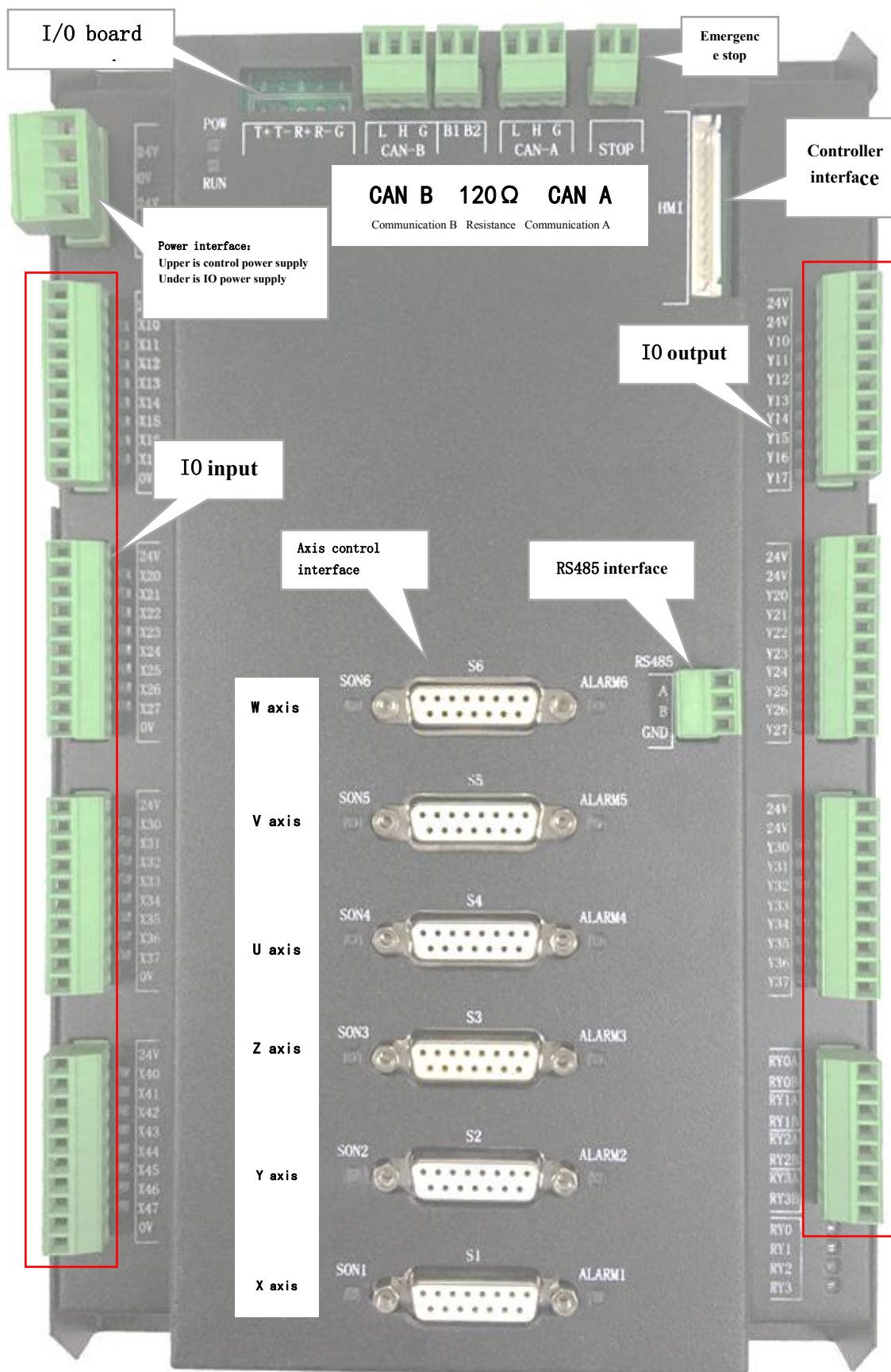
Err1612 Err1619	Axis 1-8 drive setting parameter is abnormal	No
Err1620 Err1627	Axis 1-8 servo motor stall	No
Err1628 Err1635	Axis 1-8 Encoder internal fault	No
Err1636 Err1643	Axis 1-8 Servo motor over-speed	Correctly set the maximum motor speed
Err1644 Err1651	Axis 1-8 drive position deviation is too large	Set the drive tolerance to a large or increase the acceleration and deceleration
Err1652 Err1659	Axis 1-8 driver pulse anomaly	No
Err1660 Err1667	Axis 1-8 CANopen node protection or heartbeat timeout	No
Err1668 Err1675	Axis 1-8 CANopen PDO transmission length error	No
Err1676 Err1683	Axis 1-8 servo alarm, reaching the reverse switch	No
Err1684 Err1691	Axis 1-8 Servo alarm	No
Err1692 Err1699	Axis 1-8 servo stroke limit alarm	No
Err1700 Err1707	Axis 1-8EEPROM read and write error	No
Err1708 Err1715	Axis 1-8 CANopen communication is abnormal	1. Check if CANopen is opened on the servo drive 2. Check if the CAN communication line is connected correctly. 3. Check if the terminating resistor is connected
Err1716 Err1723	Axis 1-8 servo over-load	No
Err1724 Err1731	Axis 1-8 Servo synchronization error	No
Err1732 Err1739	Servo 1-8 failure, IGBT overheating	No
Err1740	Online detection of no one or multiple first machines	Only set up one first machine
Err1741 Err1756	Online Robot arm 1-16 Communication Timeout	Check the CAN communication line or CAN communication settings
Err1757 Err1772	Online robot arm ID number 1-16 conflict	Setting the only ID number
Err1773 Err1788	Online robot arm 1-16 are not in automatic mode	No
Err1800	Remote emergency stop	No
Err1850	can Encoder read failed	No
Err1900	can Encoder setting failed	No
Err2048	IO alarm start address	Press the stop button to clear the alarm
Err4095	The IO alarm end address is currently only up to 3583	Press the stop button to clear the alarm
Err5000	Custom alarm start	Press the stop button to clear the alarm
Err10000	Custom alarm end	Press the stop button to clear the alarm
Err1 (0-5) 001	Emergency alarm from (1-6) station	Check for servo failure, Err10001 is the alarm from station 1, Err11001 is the alarm from station 2, and so on
Err1 (0-5) 002	Axis 1 over-current from Station (1-6)	Check for servo failure
Err1 (0-5) 003	Axis 2 over-current from Station (1-6)	Check for servo failure
Err1 (0-5) 004	External bus disconnect from Station (1-6)	Check for servo failure
Err1 (0-5) 005	Axis 1 over-load from Station (1-6)	Check for servo failure
Err1 (0-5) 006	Axis 2 over-load from Station (1-6)	Check for servo failure

Err1 (0-5) 007	Axis 1 motor initialization from Station (1-6)	Check for servo failure
Err1 (0-5) 008	Axis 2 motor initialization from Station (1-6)	Check for servo failure
Err1 (0-5) 009	Axis 1 three phase error from Station (1-6)	Check for servo failure
Err1 (0-5) 010	Axis 2 three phase error from Station (1-6)	Check for servo failure
Err1 (0-5) 011	VDC under-voltage from Station (1-6)	Check for servo failure
Err1 (0-5) 012	VDC over-voltage from Station (1-6)	Check for servo failure
Err1 (0-5) 013	Axis 1 over-speed from Station (1-6)	Check for servo failure
Err1 (0-5) 014	Axis 2 over-speed from Station (1-6)	Check for servo failure
Err1 (0-5) 015	Driver overheating from Station (1-6)	Check for servo failure
Err1 (0-5) 016	Write EEPROM failure from Station (1-6)	Check for servo failure
Err1 (0-5) 017	Read EEPROM failure from Station (1-6)	Check for servo failure
Err1 (0-5) 018	Axis 1 position deviation is too large from Station (1-6)	Check for servo failure
Err1 (0-5) 019	Axis 2 position deviation is too large from Station (1-6)	Check for servo failure
Err1 (0-5) 020	Axis 1 encoder error from Station (1-6)	Check for servo failure
Err1 (0-5) 021	Axis 1 testing speed abnormal from Station (1-6)	Check for servo failure
Err1 (0-5) 022	Axis 1 encoder initialization from Station (1-6)	Check for servo failure
Err1 (0-5) 024	External bus ERR from Station (1-6)	Check for servo failure
Err1 (0-5) 025	Axis 1 position buffer full from Station (1-6)	Check for servo failure
Err1 (0-5) 026	Axis 2 position buffer full from Station (1-6) from Station (1-6)	Check for servo failure
Err1 (0-5) 027	EEPROM parameter check exception	Check for servo failure
Err1 (0-5) 028	Axis 2 encoder error from Station (1-6)	Check for servo failure
Err1 (0-5) 029	Axis 2 testing speed abnormal from Station (1-6)	Check for servo failure
Err1 (0-5) 030	Axis 2 encoder initialization from Station (1-6)	Check for servo failure
Err1 (0-5) 031	Clear alarm too fast from Station (1-6)	Check for servo failure
Err1 (0-5) 032	EEPROM need to recover from Station (1-6)	Check for servo failure
Err1 (0-5) 033	Ethercat communication timeout from Station (1-6)	Check for servo failure

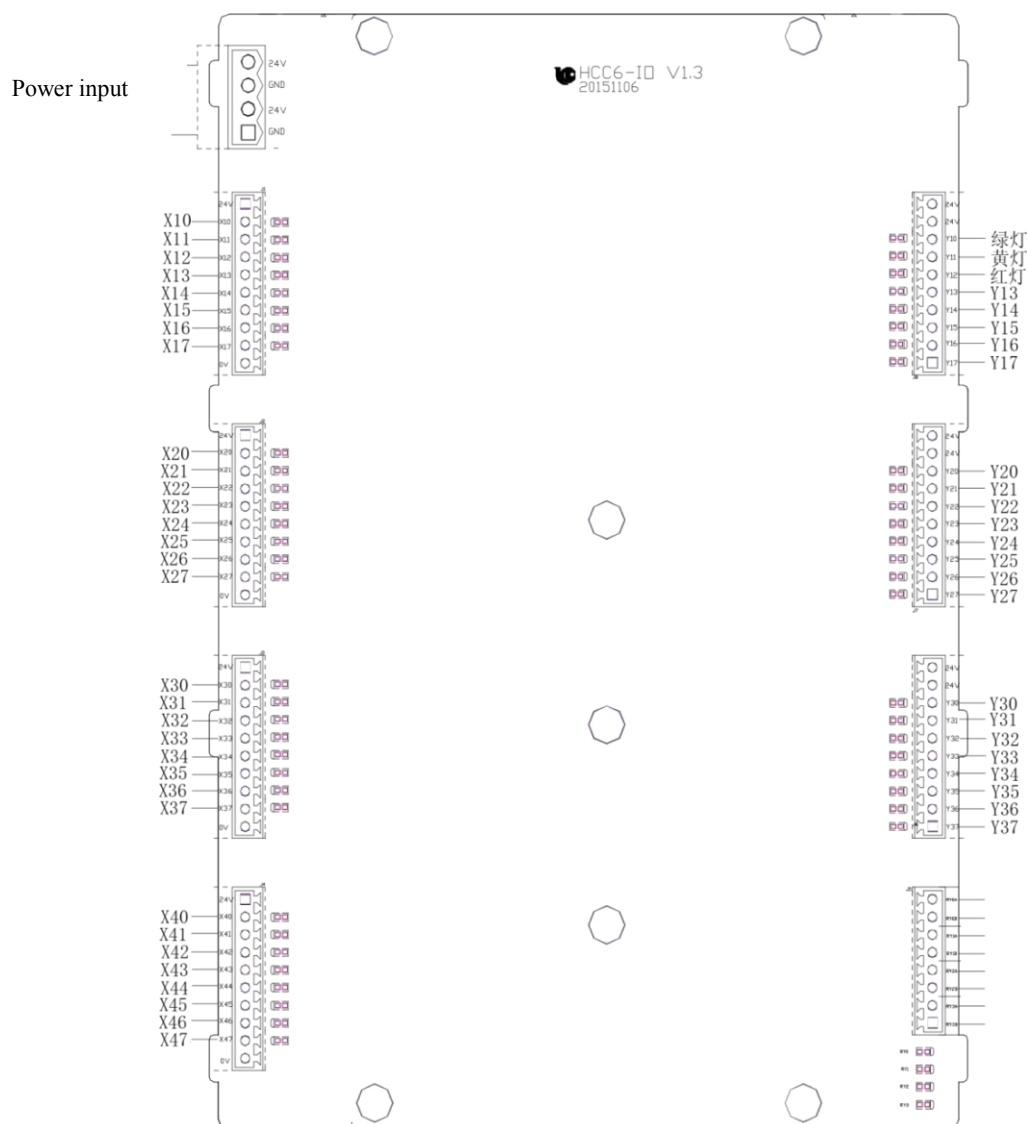
(Err10001-Err10033 is the alarm from station 1, Err11001-Err11033 is the alarm from station 2, and so on)

# Chapter 7.Board Port Definitions

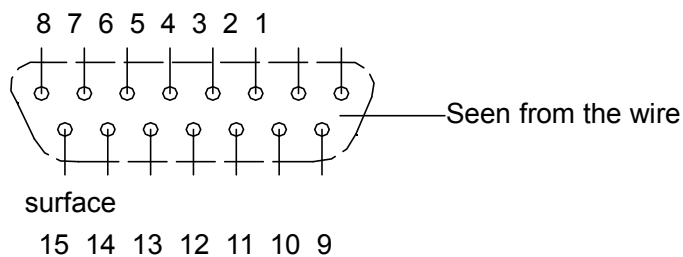
## 7.1 Single board-Main control board serial port definition



## 1、Port definition for the I/O board

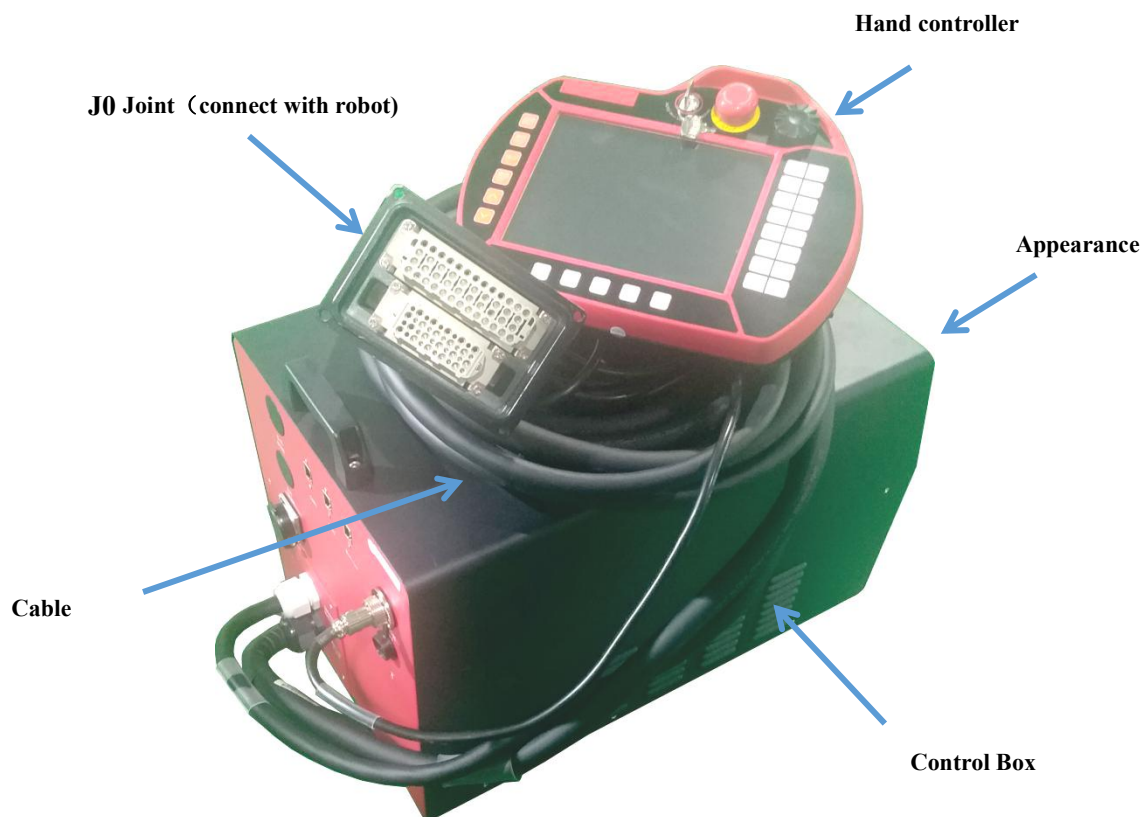


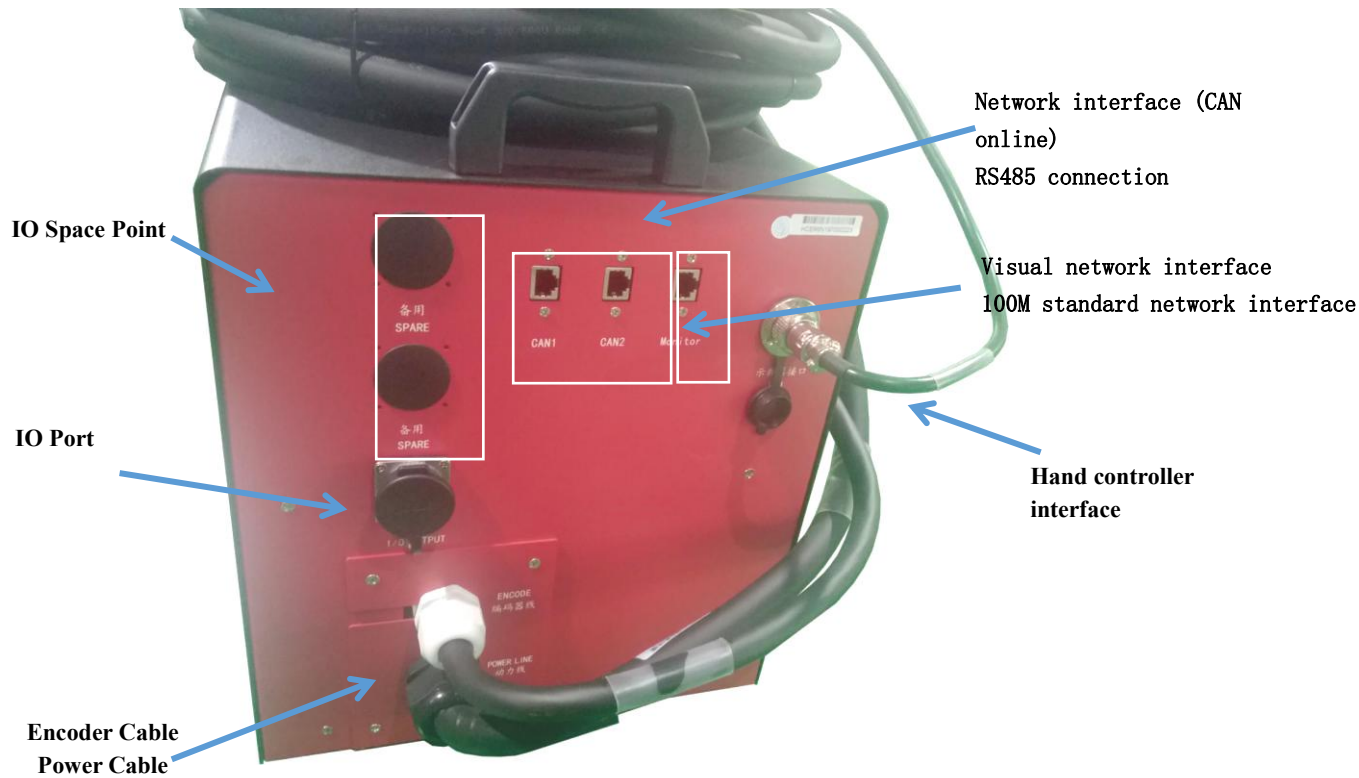
## 2、Servo driver interface definition



No.	definitions	No.	definitions
1	+24V	9	0V
2	OA+	10	P+
3	OA-	11	P-
4	OB+	12	BRAKE
5	OB-	13	N+
6	OZ+	14	N-
7	OZ-	15	ALM
8	SON		

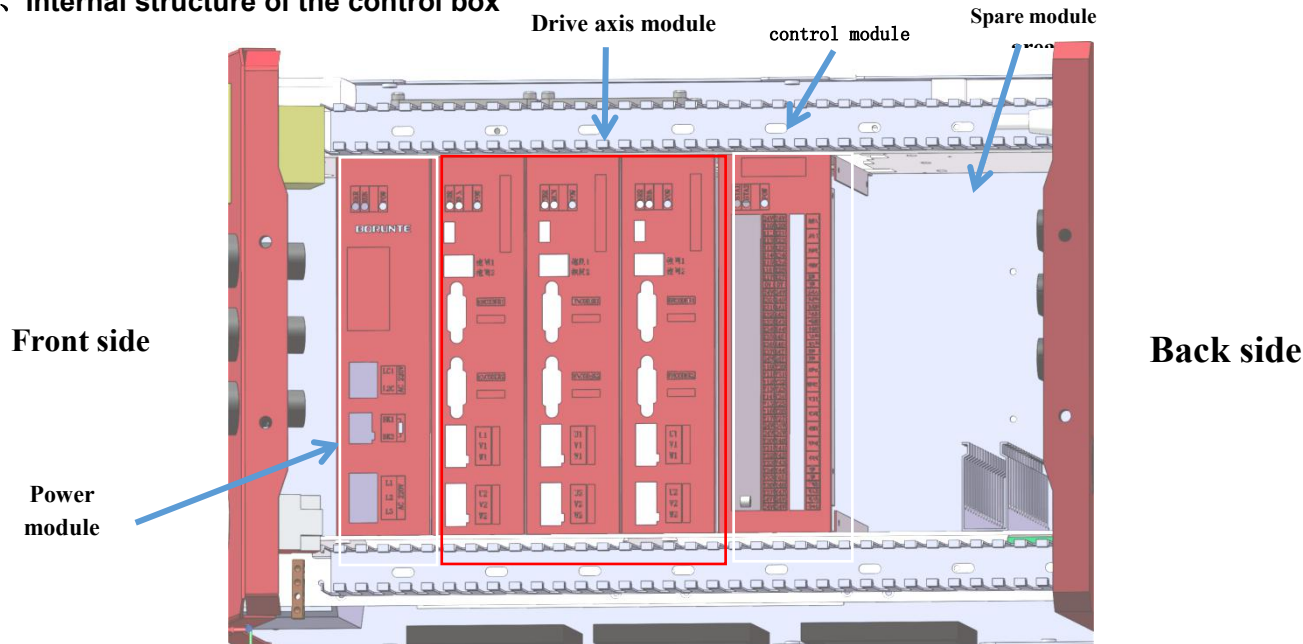
## 7.2 Drive-control integrated appearance





7.2.1 Drive-control integrated port definition description

1、Internal structure of the control box



2、Power module

Terminal	Name	Function	Note
L1C	Auxiliary power terminal	Exchange single phase 220V/50/60HZ	The auxiliary power supply is the internal control circuit power supply.
L2C			
BK1	Brake resistor terminal	External brake resistor access point	External resistance (50Ω200W) Only for reference
BK2			
L1	Main circuit power terminal	Exchange single or three phase220V 50/60HZ	The main circuit power supply is an internal power high voltage power supply.
L2			
L3			

### 3、Drive module mapping

Drive module mapping				
For 6 axes	For 4 axes	Port (UVW)	Encoder Port	Brake signals
1 axis	1 axis	S1	ENCODER1	Suck 1
6 axis	4 axis	S2	ENCODER2	Suck 2
2 axis	2 axis	S3	ENCODER3	Suck 3
5 axis	3 axis	S4	ENCODER4	Suck 4
3 axis	/	S5	ENCODER5	Suck 5
4 axis	/	S6	ENCODER6	Suck 6

**Note:**  
 1. If 7/8-axis are added, the module is installed in the control board installation position, so the control board is moved backward, and the 7- and 8-axis brake relays are installed in the module spare area.  
 2. The analog module can be installed on the side.  
 3. pay attention to the brake board wiring details to view the circuit diagram of the latter chapter.

### 4、Control module

This module is the core control area, including the control board, input and output IO (32 input, 32 output) board and injection IO board.

### 5、Spare module

This area is an optional or extended installation area. Standard is not installed.

### 6、Module indicator status description

Terminal	Name	Function	Note
ERR	Status display light	Error display	Operating status error indication
RUN		Work display	System operation indication
POW		Power display	Power indication
SAT1		Status Display	Software application layer status display
SAT2			Software core layer status display

### 7、16-core return joint definition

16-core return joint definition			
No.	I/O	No.	I/O
1	24V	9	Y20
2	X20	10	Y21
3	X21	11	Y22
4	X22	12	Y23
5	X23	13	Y24
6	X24	14	Y25
7	X25	15	Y26
8	X26	16	0V

**Note:**  
 1、 This table defines the wiring for the standard spare point of the six-axis general-purpose robot standard.  
 2、 If the technology package is enabled, the IO function may be occupied by the definition, as described in the related process package.

### 8、CAN Communication network port



CAN Communication network port			<b>Note:</b> 1. When the CAN is connected, in order to make the communication smooth, pay attention to the resistance between the first machine and the tail CANL line and the CANH line and a resistance value of 120Ω (the factory can be directly plugged in with the connector). 2. RS-485 is used for communication with other devices. 3. Use the network cable to connect to CAN communication, which must be used for standard pressure line. Do not use the interface for the online port.
No.	Define		
1	CANL		
2	CANH		
3	CAN_GND		
4	RS-485_A1		
5	RS-485_B1		
6	RS-485_GND		
7	RS-485_A2		
8	RS-485_B2		

**Note:** The above definition defines communication for the CAN1 and CAN2 interfaces, and should not be confused with the monitor interface. The monitor interface is a standard Ethernet interface that can be used for visual and remote communication.

## Chapter 8. User Application Usage

### 8.1 Stamping application

#### 8.1.1 Stamping process function instruction

No.	Instruction note	Instruction use function description
1	Take material then standby	Standby is ready to take the material, and when the slave is online, the condition is satisfied before it can run. When the material is in standby and other conditions are also met, you can click the allow button to force the action. Note that when setting as the host, please teach the corresponding waiting signal before the action, and the signal will be satisfied.
2	Take material above	Take material above point
3	Take material point	For the position of the item to be taken, please insert the corresponding action valve into the front or the back of the action. Please follow the actual teaching programming action.
4	Back to take material above	Back to take material above
5	Take material finished	The normal reclaiming is completed. When the slave is in operation, the normal completion of the operation will send a communication to allow the machine to discharge the signal. When using a stand-alone or a host, if there is a signal fit for use with the front machine, please teach the insertion signal output point after this action.
6	Release material standby	Put into the punching machine to prepare the stamping instructions, and the conditions are met before they can run. When the standby level is set and other conditions are also met, the button can be forced to operate.
7	Release material above	Release material above point
8	Release material point	At the point of releasing material, please insert the corresponding action valve into the sub-action, please follow the actual teaching programming action.
9	Back to release material above	Back to release material above
10	Release material finished	After the normal releasing material completed, the output punching signal will be output (single board Y43, drive Y24). Note that whether the output stamping signal is related to the setting, the stamping is not enabled, the output will not be output, and the safety point signal will not be output. Stamping signal. Note: When online, the normal stamping completion will send a communication to allow the machine to pick up the signal.
11	Release material to punch 1	Single machine loading and unloading, can be used this time, normal discharging is completed (discharge punching), binding output punching signal (single board Y43, drive Y24). Note whether the output stamping signal is related to the setting. If the stamping is not enabled, it will not be output, and the punching signal will not be output when the safety point signal is not connected. Note: The difference from the discharge completion signal is that the communication signal is not sent and waits for the stamping to complete. This command does not work when online.
12	Release material to punch 1	Single machine loading and unloading, can be used this time, normal discharge is completed (discharge stamping 2), binding output punching signal (single board Y42, drive Y25), note, whether the output stamping signal is related to the setting, not enabled Stamping, will not output, no safety point signal is not connected and the stamping signal is not output. Note: The difference from the discharge completion signal is that the communication signal is not sent and waits for the stamping to complete.
13	Take material safety point	Transition point
14	Release material safety point	Transition point

Note:

The above instructions can only be used after the stamping process is turned on. The command is only bound to the attitude line or free path instruction (can be used with other instructions, but not recommended). The specific use depends on the actual application. Feeding stamping, discharge stamping 2 function instructions for single machine loading or unloading or 1 robot for 2 machine usage, specific details of the case program reference.

#### 8.1.2 Stamping Application IO Definition and Related Function

No.	Single Board S6	Drive- control	IO Note	Feature instructions
1	stop	X26	Emergency stop input	Curing IO, the curing function is valid when checked. If there is no signal, it will report emergency stop (equivalent to emergency stop). Unchecked can be used as a normal point.
2	X41	X21	Wait for taking material	The teaching defines IO, which can be used interchangeably, before the standby reclaim instruction.
3	X42	X23	Stamping machine once	Curing IO, the curing function is valid when checked, and it cannot be operated when there is no signal. Unchecked can be used as a normal point.
4	X43	X25	Punch machine Apex 2	Curing IO, punch 2 origin point, it must be signal
5	X45	X24	Punch machine Apex 1	Curing IO, punch 1 origin point, it must be signal
6	X47	X22	Safety point	Curing IO, allows for stamping safety points, no signal, no stamping
7	Y23	Y23	Take material finished	The teaching definition IO, which can be used interchangeably, is taught after the replenishment completion instruction.
8	Y40	Y26	Emergency stop	Solidified IO, machine abnormal output and vice versa.

			output	
9	Y41	Y22	Safety point	Curing IO, related to safety point setting, mainly controls the machine's material discharge stamping and interlock control.
10	Y42	Y25	Start stamping 1	Curing IO, start punch 2 control point
11	Y43	Y24	Start stamping 2	Curing IO, start punch 1 control point
12	Y30	Y30	Grip 1 valve	Curing IO, Grip 1 valve check detection, detection binding is valid, unchecked, common use and teaching use
13	Y31	Y31	Grip 2 valve	Curing IO, Grip 2 valve check detection, detection binding is valid, unchecked, common use and teaching use
14	Y32	Y32	Suck 1 valve	Curing IO, Suck 1 valve check detection, detection binding is valid, unchecked, common use and teaching use
15	Y33	Y33	Suck 2 valve	Curing IO, Suck 2 valve check detection, detection binding is valid, unchecked, common use and teaching use
16	Y34	Y34	Broken vacuum	The teaching defines IO, breaks the vacuum, uses it with the suction valve, and teaches use.
17	X30	X30	Grip 1 detection	Curing IO, corresponding to Grip 1 valve check detection, binding is valid and unchecked, it can be used at ordinary points.
18	X31	X31	Grip 2 detection	Curing IO, corresponding to Grip 2 valve check detection, binding is valid and unchecked, it can be used at ordinary points.
19	X32	X32	Suck 1 detection	Curing IO, corresponding to Suck 1 valve check detection, binding is valid and unchecked, it can be used at ordinary points.
20	X33	X33	Suck 2 detection	Curing IO, corresponding to Suck 2 valve check detection, binding is valid and unchecked, it can be used at ordinary points.
Note: The above definitions are divided into IO-based curing IO (not replaceable) and teaching definition (alternative).				

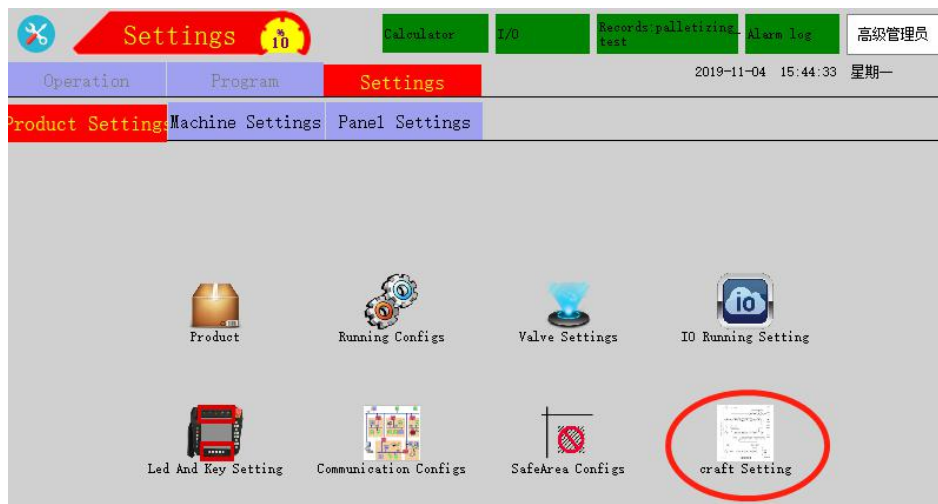
### 8.1.3 Stamping wiring connection instructions

No.	Single Board S6	Drive- control	IO Note	Explanation
1	X41	X21	Wait to take material	Optional wiring. The first machine or single machine can be used in conjunction with the reclaiming. Please use it according to actual needs and teach it.
2	X47	X22	Safety point	It must be wired. Safety signal, please pick it up as required. Do not use if you do not use it, otherwise the stamping will not output.
3	X42	X23	Stamping once	Optional wiring. Check the selection to be effective, and connect (isolated and connect) the punch safety cycle signal. Automatic operation without this signal will not be able to punch normally. It is recommended to check the connection. If you don't use it, please leave it unchecked.
4	X45	X24	Punch apex 1	The standard must be connected to the signal. Punch 1 origin, if no sign, or the pump can not detect the signal change within one time within the set time range, it will report the punch on/off timeout or the original point break alarm during operation.
5	X43	X25	Punch apex 2	Use mandatory wiring. Punch 2 origin, if do not use, please short with 0V. Use the equivalent punch 1 to use the mandatory signal. If the signal is not available, or the signal cannot be detected within one time of the stamping set time range, the stamping on/off timeout or the running origin break alarm is reported.
6	stop	X26	Emergency stop input	Must be wired. If it is not used, please short it with 0V, otherwise the alarm will not be used, it is equivalent to emergency stop. When the board is used, it needs to be connected in series with the emergency stop line.
7	Y41	Y22	Safety point	Optional wiring. It is related to the setting of the safety point. It mainly controls the punching and punching control of the upper machine and does not need to be connected.
8	Y23	Y23	Pick-up finished	Optional wiring. The first machine or stand-alone machine can be used in conjunction with non-standard work. Please use it according to actual needs and teach the use.
9	Y43	Y24	Start stamping 1	The standard must be wired. Check the stamping, automatic operation, and output the stamping 1 control signal after the discharging is completed. If no check, stamping 1 will be not output
10	Y42	Y25	Start stamping 2	Use mandatory wiring. Check the stamping, automatic operation, and output the stamping 2 control signal after the discharging is completed. If no check, stamping 2 will be not output
11	Y40	Y26	Emergency stop output	Use mandatory wiring. Press the emergency stop output and the reset alarm stops. It can be used on demand.
Note: For the above definition, the optional wiring should be determined according to the actual application. If necessary, please wire as required.				

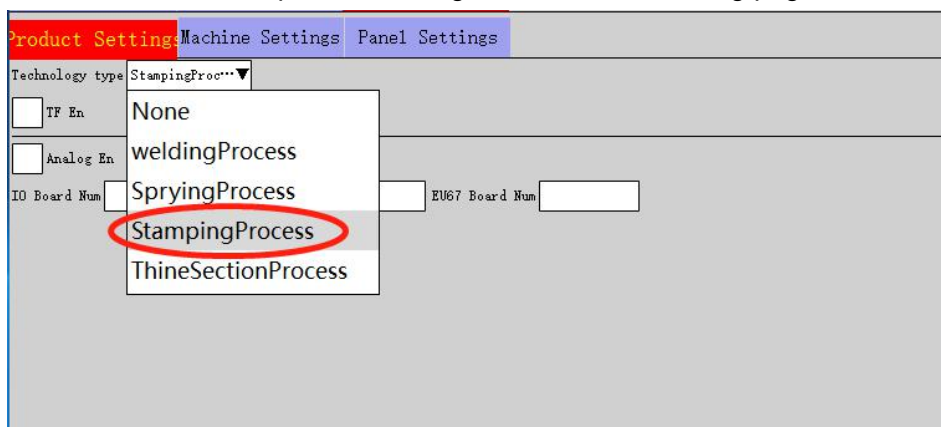
## 8.2 Open process description

### 8.2.1. Open the use process

Login permission, enter the Process Settings item.



Click on the process settings to enter the following page:



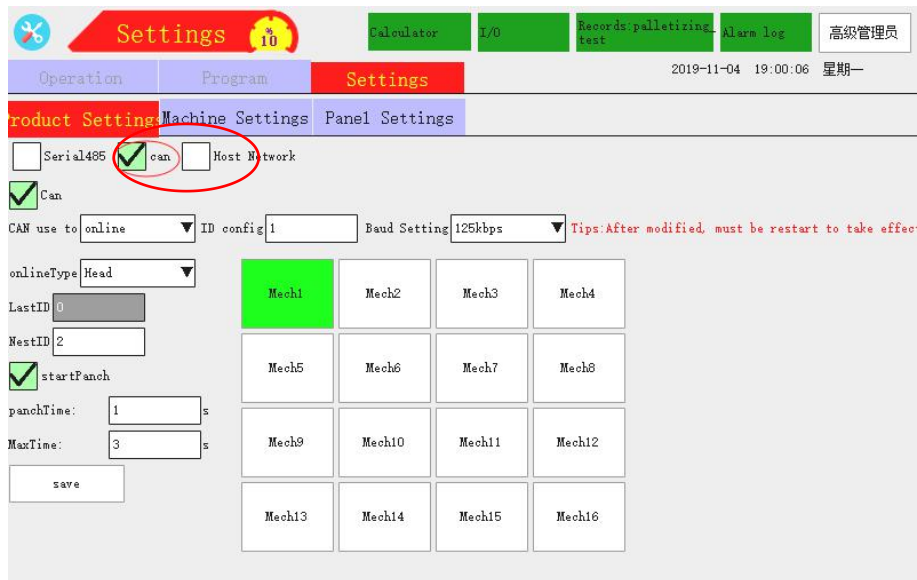
Click on the process type and select Stamping

### 8.2.2 Set online parameters

Click on the communication configuration to set the online parameters that must be set for stamping (single unit/online must be set).



CAN online setting and stamping process related parameter setting



Note: Please set the board according to the enabled port.

#### Description:

In order to use the stamping process normally, the stamping process must first be turned on, and the stamping related parameters (CAN setting "online") must be set. Otherwise, the stamping process may not be used normally. After modifying the above parameters (turn on the stamping process and CAN settings online), please restart the system.

#### 8.2.3. Stamping process stand-alone / online operation

1、When used in a single machine, it can be taught according to the stamping process instructions.

2、Multiple online operations

1.Connection: When using multiple units (more than one, up to 15 units), the control unit can be directly connected to the CAN1 or CAN2 socket of the control box with a network cable (straight network cable). Note that the first and tail machines must be shorted to the terminating resistor (terminal resistor plug-in) to be inserted into the first and tail CAN ports. For the board, please enable the port wiring according to the corresponding settings.

2. Set the relevant online parameters (Note: use the stamping process, CAN communication is online, this parameter can be set and normal use).

1, Find the CAN setting item in the communication parameters, and select the connection in the use, configure the ID (the local ID), the baud rate (all parameters must be the same online connection, modify this parameter need to restart the system).

2, Set the machine type, according to the online sub-machine, the intermediate machine, the tail machine (change this parameter needs to restart the system).

First machine: Select the mechanical type of this robot as the "first machine" when you select it as the first robot under online conditions.

Intermediate machine: If the robot is in the middle position under online condition, please select the mechanical type of this robot as "intermediate machine".

Tail machine: If it is the last machine in the case of online, please select the type of machine of this mechanical mobile phone as "tail machine."

Note: When doing the first machine, please put all the participating slaves (except the first machine, the others are slaves) corresponding to the ID point (display green). Only the first machine ID is selected when the slave is on.

3.Set the stamping time, the longest stamping time, etc.

Note: Start stamping, automatic (punching sheets) only check to be effective. Otherwise the function is invalid. The stamping time is the starting stamping time, the longest time is, and the whole cycle time after the normal stamping is completed is the judgment condition for detecting whether the stamping is abnormal.

#### Description:

1, Configuration ID: such as 3 machines online, the first machine configuration is 1, slave 2 (intermediate),

slave 3 (tail). Other multi-machine online settings are similar.

2, The control integrated box only has CAN setting, two ports (CAN1 and CAN2) are used together. When using CAN communication as the host or tail machine, the terminal resistance plug-in needs to be inserted in the other port.

The board is divided into two separate ports, CANA and CANB. B1 and B2 are equipped with a terminating resistor interface for the CANB port. When the first and last machines are enabled and the CANB port is used for CAN communication, short wires can be used. Specify the port usage for the intermediate machine and set the relevant port parameters.

3, stand-alone / online mode is determined by the choice, operation: login permission, under the stop file, click the stand-alone or online button to switch (only the punch function can be displayed to display the secondary button).

**Special note: After the stamping process is started, the communication must be set to be online, and the stamping process can be used normally. Otherwise, the button will not be displayed, and the function options will not be displayed.**

### 8.2.4 Stamping process teaching example program

Standard stamping template (standard online template)

Number	Command Action	Description
1	<b>Reclaiming standby</b>	Prepare to take the stamped material into the punch.
2	Waiting for IO (teaching wait)	Practical application is used.
3	<b>Above the reclaim</b>	
4	<b>Reclaiming point</b>	
5	Takeout output pass (teach IO output pass)	Teach the suction valve or the pinch valve, but also other IO.
6	<b>Retrieve back</b>	
7	<b>Reclaiming completed</b>	The online reclaiming is completed automatically allowing the machine to discharge. A single machine may not be needed.
8	Retrieval completion output signal (teach signal)	Practical application teaching use (not required online).
9	<b>Discharge standby</b>	When you are online, wait for the next machine to allow the material to be discharged. Single machine to do security confirmation action.
10	<b>Above the discharge</b>	
11	<b>Discharge point</b>	
12	Discharge output break (teach IO output off)	Teach the suction valve or the pinch valve, but also other IO.
13	<b>Put back on</b>	
14	<b>Finishing</b>	The stamping signal is output, and the stamping is completed when the line is completed, allowing the machine to take the material.
15	Program end	

Note: The above templates are for reference only, please teach them flexibly according to the actual application.

### Single punch single take (up and down) template

Number	Command Action	Description
1	Teaching to prepare to take the stamped material action	
2	Waiting for IO	Practical application of the teaching signal to allow for reclaiming
3	Teaching reclaiming action	
4	, , ,	
5	, , ,	The middle action is not in the narrative.
6	Retrieve complete output signal (note collision)	Practical application teaching allows the machine to discharge
7	<b>Above the discharge</b>	Material into the punch
8	<b>Discharge point</b>	
9	Discharge output break (teach IO output off)	Teach the suction valve or the pinch valve, but also other IO
10	<b>Put back on</b>	
11	<b>Feed stamping (or discharge stamping 2)</b>	Start the stamping signal, complete the stamping and prepare for reclaiming
12	Teaching take action	Material removal punch
13	, , ,	
14	, , ,	The middle action is not in the narrative.
15	Take out the material into the bin action	At the end of the discharge, the cycle is repeated.
16	Program end	

Note: The above templates are for reference only, please teach them flexibly according to the actual application.

### Single punching (loading and unloading)

Number	Command Action	Description
1	<b>Label 1</b>	
2	Teaching to prepare to take the stamped material action	
3	Waiting for IO	Practical application of the teaching signal to allow for reclaiming
4	Teaching reclaiming action	
5	, , ,	The middle action is not in the narrative.

6	, , ,	
7	Retrieve complete output signal (note collision)	Practical application teaching allows the machine to discharge
8	<b>Discharge standby</b>	
9	<b>Judge if M value passes status jump tag 2</b>	
10	, , ,	The middle action is not in the narrative. The program starts running and discharging once.
11	<b>Discharge point</b>	
12	Discharge output break (teach IO output off)	Teach the suction valve or the pinch valve, but also other IO
13	<b>Put back on</b>	
14	<b>Finishing</b>	According to the control machine using signal instructions
15	Output M value pass	
16	Unconditional jump 1	
17	<b>Label 2</b>	
18	Teaching the removal of material action in the punch	Note that here is to take the punch material first, then refill the punch into the press.
19	, , ,	
20	, , ,	The middle action is not in the narrative.
21	Take out and put in the material	Take out the material that has been washed and replace it with the material to be flushed
22	Teaching to put punch material action	
23	, , ,	
24	, , ,	The middle action is not in the narrative.
25	Exit the punching action after discharging	
26	<b>Finishing</b>	According to the control machine using signal instructions
27	, , ,	The middle action is not in the narrative.
28	Take out the material into the bin action	The middle action is not in the narrative. At the end of the discharge, the cycle is repeated.
29	Program end	

Note: The above templates are for reference only, please teach them flexibly according to the actual application.

### Single machine one tow 2 template

Number	Command Action	Description
1	Teaching to prepare to take the stamped material action	
2	Waiting for IO	Practical application of the teaching signal to allow for reclaiming
3	Teaching reclaiming action	
4	, , ,	
5	, , ,	The middle action is not in the narrative.
6	Retrieve complete output signal (note collision)	Practical application teaching allows the machine to discharge
7	<b>Above the discharge</b>	
8	<b>Discharge point</b>	
9	Discharge output break (teach IO output off)	Teach the suction valve or the pinch valve, but also other IO
10	<b>Put back on</b>	
11	<b>Release stamping</b>	Start punch 1 and complete the punching
12	Teaching to remove the material action in the punch 1	
13	, , ,	
14	, , ,	The middle action is not in the narrative.
15	Teaching the discharge into the punch 2 action	
16	, , ,	
17	, , ,	The middle action is not in the narrative.
18	Exit the punch 2 after the discharge	
19	<b>Feeding stamping 2</b>	Start punch 2, press ready to reclaim
20	Teaching to take out the punch 2 material action	
21	, , ,	
22	, , ,	The middle action is not in the narrative.
23	Take out the material into the bin action	At the end of the discharge, the cycle is repeated.
24	Program end	

Note: The above templates are for reference only, please teach them flexibly according to the actual application.

## 8.3 Palletizing craft package

### 8.3.1 Palletizing craft instruction notes

Number	instruction	Description
1	Transition point	When the craft number is taken, it is the first point position of the style, and the position is a variable. Matching numbering craft of palletizing. <b>Transition point position = numbering palletizing craft current layer position + transition point offset bit</b> <b>Instruction display: stack number + transition point</b>
2	Ready to work point	The craft number is above the object and the position is a variable. Matching numbering craft of palletizing. <b>Ready to work point position = current style layer item height + numbering palletizing craft</b>

		<b>current number position + ready to work position and offset position</b> <b>Instruction display: stack number + ready to work point</b>
3	Palletizing point	Numbering the position of palletizing craft and the position is a variable.Matching numbering craft of palletizing. <b>Preparation point position = current style layer item height + numbering palletizing craft</b> <b>current number position (this position is related to layer and style formatting digits)</b> <b>Instruction display: stack number + palletizing point</b>
4	Leave away point	The palletizing craft number is taken from the top and the position is a variable.Matching numbering craft of palletizing. <b>Leave away point position = current style layer item height + numbering palletizing craft</b> <b>current number position + leaving position and offset position</b> <b>Instruction display: stack number + leave away point</b>
5	Palletizing	Call number process display: stack number + palletizing
6	Depalletizing	Call number process display: stack number + depalletizing

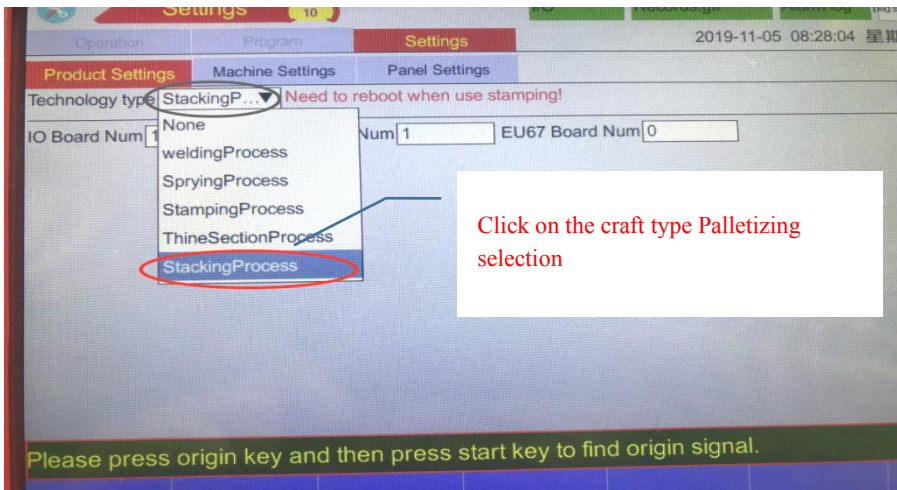
Note:  
Only when the palletizing process is started, the command can be displayed and used. If the palletizing process instruction is used, the numbering palletizing process must be read first, and the corresponding operation position of the process instruction is calculated according to the numbering palletizing, the process and the current working number, and then the process instruction is adopted. The instruction must also be the same as the previously read number, otherwise the location may not be correct.Number palletizing count If you need to use the counter, please increase the number of counters after the action is completed, otherwise the position may be abnormal. The target value of the counter is the total number of the numbered palletizing, otherwise it will be abnormal.

8.3.2 Palletizing process data setting operation flow

Operating procedures

1.Opening process

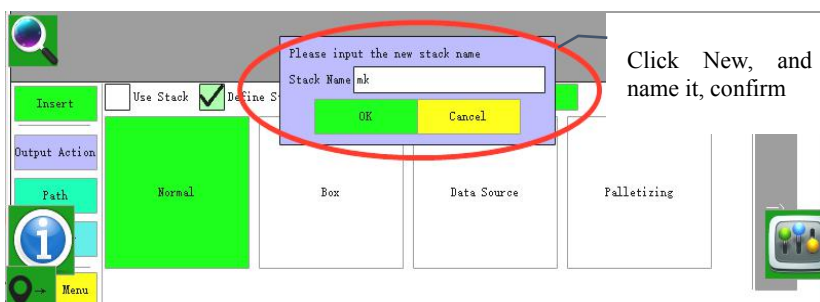
Process usage can be skipped.



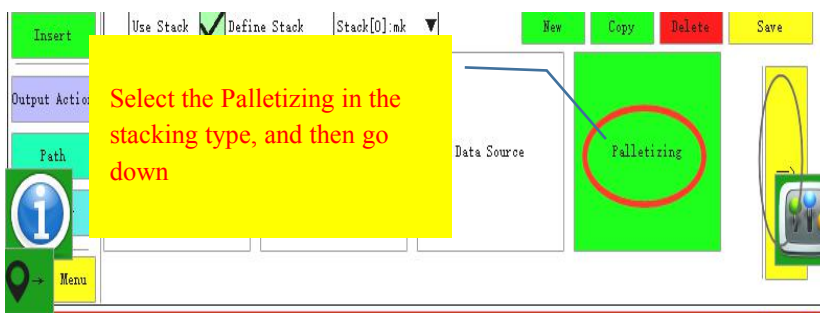
2.Establish palletizing craft parameters



Enter the pallet parameters, modify and new must enter from here.

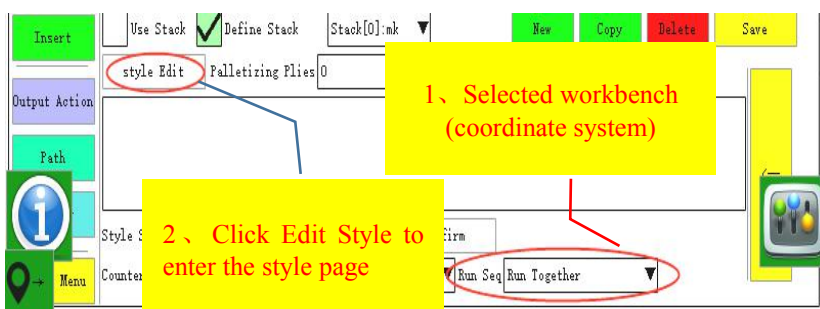


Create stack name

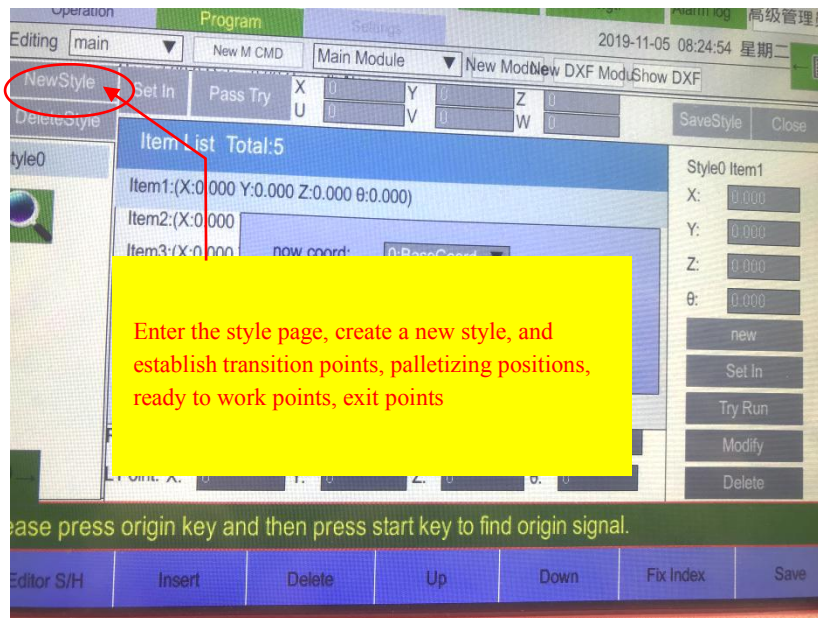


Check the stack as a pallet and move on.

Note: It is only valid when the palletizing process is turned on and the stacking is set to palletizing, otherwise the built-in process parameters may not be available.



Note: To enter the previous page, you must first select the workbench and then do the style editing.



Note: 1. New style, internal transition point, palletizing position, ready point, point must be saved after saving.

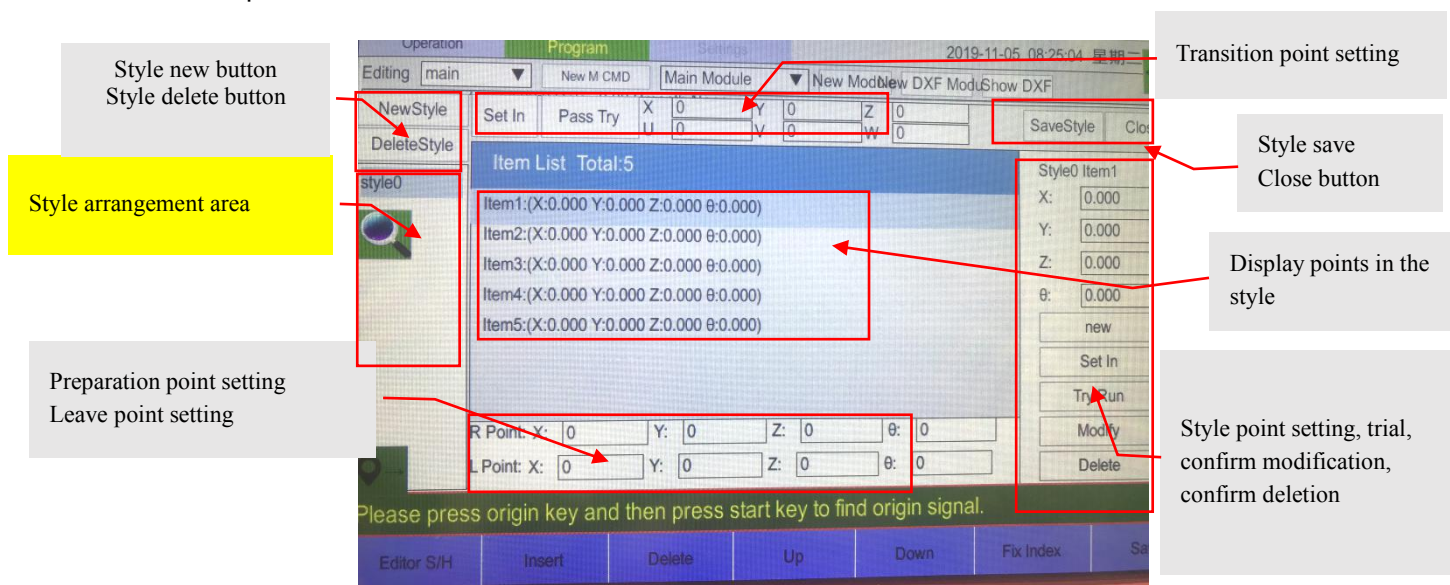
The data can be saved, otherwise the data is invalid (not saved).

2. After the palletizing position is modified, you must click Confirm to modify the data.

3. Transition point, point transition point trial can be moved to the transition point position. The palletizing position must select the palletizing position and then click the trial button to the palletizing position.

4. Select the palletizing position, click to set, you can save the current position into the selected palletizing position; if you modify the data, you must confirm the modification and valid.

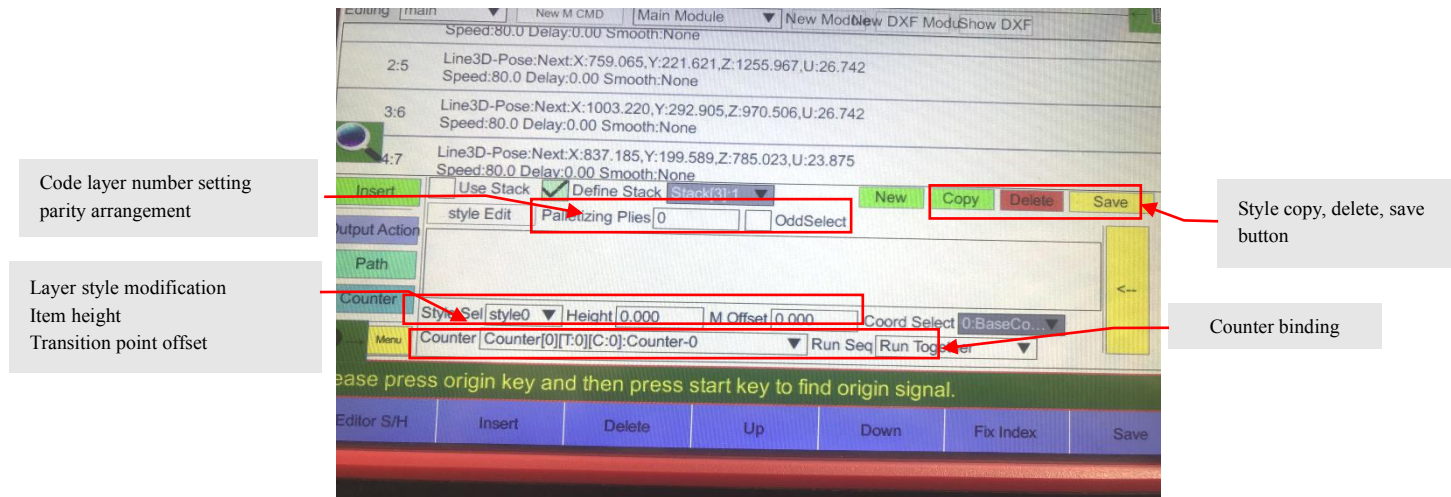
Detailed operation buttons as shown below:



The above picture style data is completed and the page is closed.

Note:

- 1, the above style can be used to call all the code in the template program. Please call the corresponding style correctly when calling.
2. The transition point can be directly set to the specified position. The preparation point and the departure point are only X, Y, Z, and theta offsets for the position of the item. The value is directly filled in.
3. The position of the palletizing item can be moved to the specified point, and the point can be set. If you make fine adjustments, click the item, position and modify the corresponding data. Click OK to modify to change the item's location data.
4. After all the data in the style has been modified, you must save the style button to be valid, otherwise the data may be lost. Delete style, must be selected to remove from the bottom (last created).

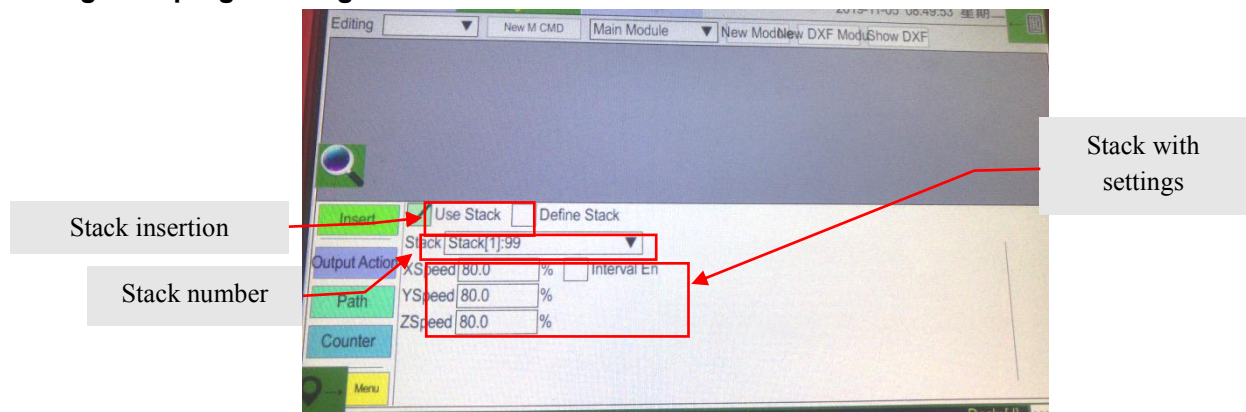


Note: The above picture is the setting:

- 1, The number of layers, layer arrangement.
- 2, Modify the palletizing binding counter (counter number).

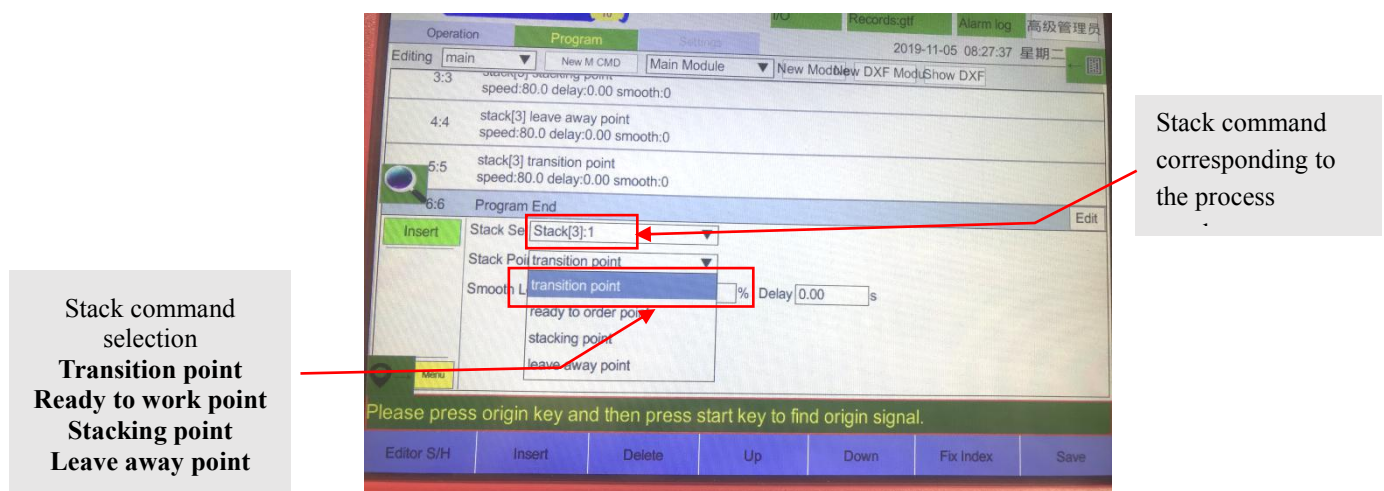
The above settings complete the point save to completely save the current pallet all relevant setting parameters. If you need to delete the delete button, you can delete it.

### 8.3.3 Using craft programming



Description:

- 1、 Use stacking, insert palletizing parameters.
- 2、 Select the created pallet number to be called, insert the code to teach before the action.
- 3、 Pallet with settings, please set the actual situation, otherwise the default.
- 4、 Pallet type: Only the parameters of the selected pallet class are displayed. When inserting, the palletizing or depalletizing selection is displayed. Palletizing is from low to high, while depalletizing from high to low.



Description:

- 1、 Insert the process instruction, there are 4 instructions: **transition point**, **ready to work**

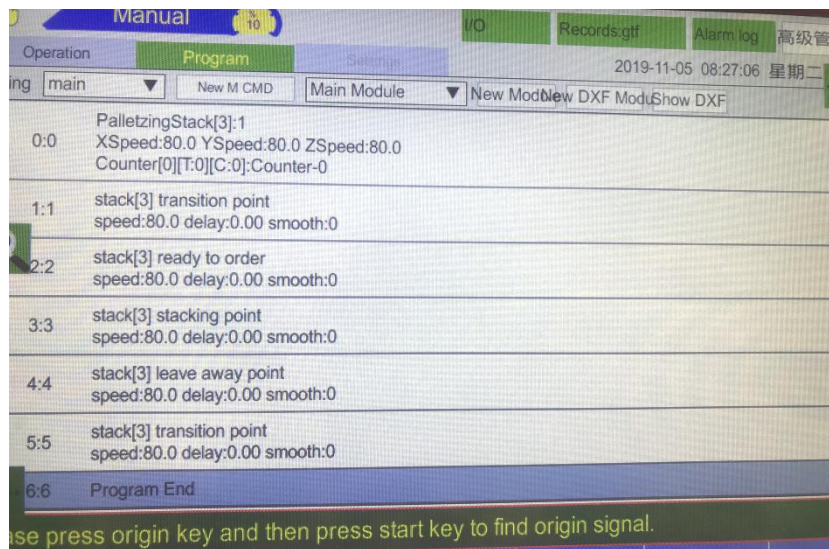
**point, stacking point, and leave away point.** Please refer to the explanation of the instructions for details.

2、Stacking instruction corresponding number: Select stacking number.

Instruction use condition description:

- 1、There must be palletizing stack parameters in the current program.
- 2、The palletizing stack parameter (palletizing/depalletizing) must be inserted before use.
- 3、The use must be used in conjunction with the called palletizing stack parameter.
- 4、The instruction action is a variable type instruction, which is related to the current working position in the palletizing stack parameter. Can't be tried.

Edit the program as shown below:



### 8.3.4 Using palletizing routines

#### 1.Palletizing operation

Number	Programming Instruction	Step Description
1	Teaching action	Other action reclaiming actions are not described in detail, please teach the action yourself.
2	Palletizing	Number palletizing craft name (read number palletizing craft )
3	Transition point	Numbering palletizing excessive point (transition point)
4	Ready to work point	Number palletizing ready to work point (ready to work point)
5	Palletizing point	Number palletizing point (palletizing point)
6	Output IO	Action IO (please teach the action position according to the actual application)
7	Leave away point	Numbering palletizing leaving point (leave away point)
8	Transition point	Numbering palletizing excessive point (transition point)
9	Up counter	Up counter (using counter counting code, using the built-in counter can not use the secondary action)
10	Teaching action	Other actions are not described in detail, please teach the action yourself.
11	Program end	

Note:

When palletizing or depalletizing, please determine the position of the operating point of the technology command when calling the insert teaching action. When using, you must first call the numbering craft and then use the corresponding numbering technology command. The pallets are from low to high, while the depalletizing from high to low.

#### 2.Depalletizing operation

Number	Programming Instruction	Step Description
1	Teaching action	Other preparation actions are not described in detail, please teach the action yourself.
2	Depalletizing	Number palletizing craft name (read number depalletizing craft )
3	Transition point	Number palletizing ready to work point (ready to work point)
4	Ready to work point	Number palletizing preparation point (preparation point)
5	Palletizing point	Number palletizing point (palletizing point)
6	Output IO	Action IO (please teach the action position according to the actual application)
7	Leave away point	Numbering palletizing leaving point (leave away point)
8	Transition point	Numbering palletizing excessive point (transition point)
9	Up counter	Up counter (using counter counting code, using the built-in counter can not use the secondary action)
10	Teaching action	Other actions are not described in detail, please teach the action yourself.
11	Program end	

Note:

When palletizing or depalletizing, please determine the position of the operating point of the technology command when calling the insert teaching action. When using, you must first call the numbering craft and then use the corresponding numbering technology

command. The pallets are from low to high, and the depalletizing is from high to low.

## 8.4 Spraying/tracking craft

### 8.4.1 Prepared work

Prepare relevant components and connect the circuit correctly before using the spraying process.

1, RS485 communication analog module, RS485 encoder.

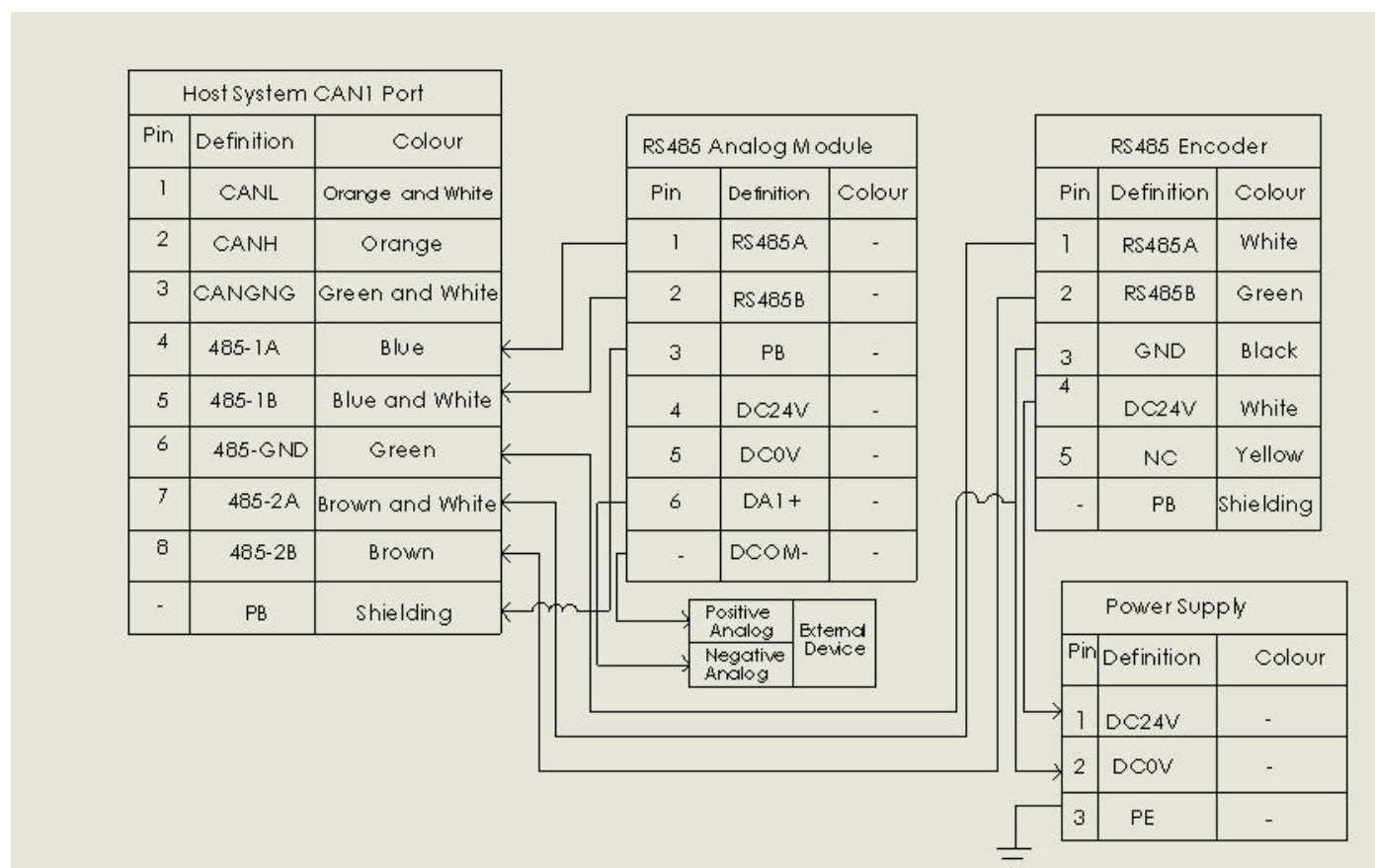
2, correctly connect the external encoder, analog module and system port signal docking.

**Note: Currently only analog modules and encoders that support RS485 communication**

### 8.4.2 Component wiring

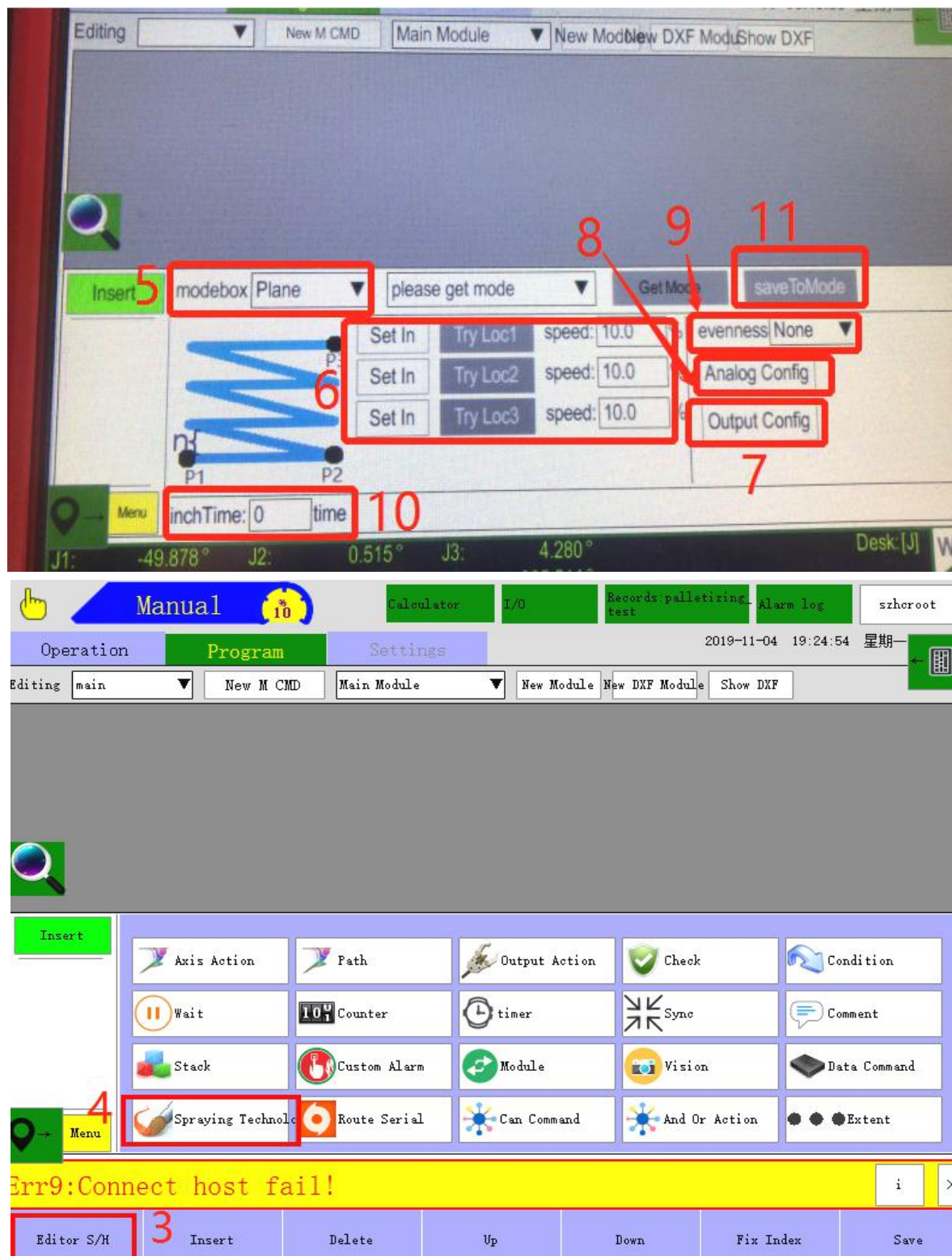
Please refer to the corresponding port manual for wiring.

RS485 communication analog module, RS485 encoder, etc. and host CAN1 port wiring.



### 8.4.3、Spray process setup steps

#### 1.Spraying process setting page description



Definition interpretation:

- ① Manual control: Rotate the state selector switch to the left gear position to the manual state, in which the robot can be manually operated.
- ② User login permission: Log in to obtain the appropriate permissions before performing manual operations. Advanced Administrator Password: 123456
- ③ Action menu: Enter the action type interface to teach, click the corresponding action button to enter the action editing interface to set
- ④ Process: Enter the spray process settings page
- ⑤ Mode selection: There are options such as line, arc, plane, plane inching, arc surface, arc inching, etc. Please select the desired mode for operation.
- ⑥ Corresponding point in the corresponding track mode: as shown in the diagram, P1: plane mode track

starting position, P2: plane mode track intermediate point position, P3: plane mode track end position.

The unrecorded display is grayed out and the recorded display is green. When the display is green, the test run can be performed at that point.

Note: P1~P3 cannot be set on the same line.

⑦ Output point setting: user-defined

⑧ Analog setting: 6 groups of channels 0~5, can output analog voltage of 0~10V

Note:

You need to select the corresponding port function under the communication settings, and check the analog encoder under the process setting to be used normally. (For example: the wiring diagram shown above, you need to set it first), RS485 Port1 Fun RS485 Encoder

☒ Analog En at this point, the analog encoder can be used normally.)

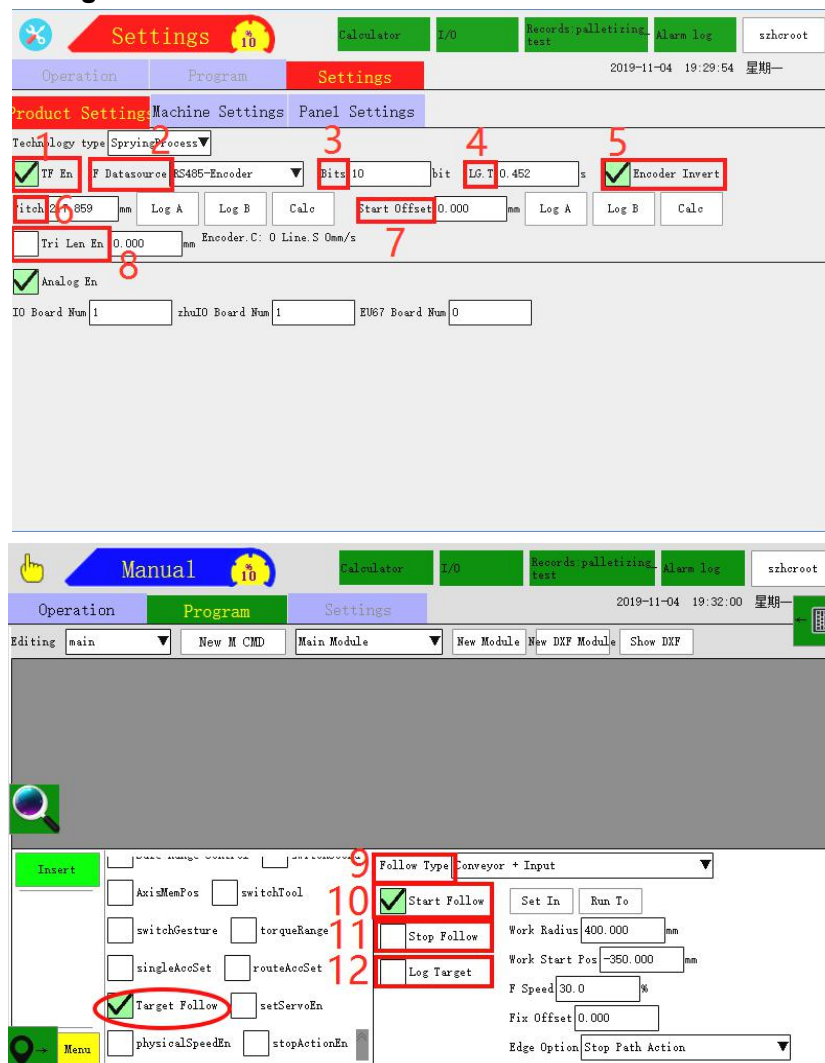
⑨ Smoothness: The higher the smoothness level of the two straight lines connected to each other, the larger the arc angle

⑩ n times: as shown in the figure, N corresponds to a notch for 1 time, and the column chart has 3 notches. The number of times n is set to 3 times, and the rest is pushed by this column.

⑪ Save to module: Generate all module settings for the user, let the client call.

Note: When generating, the last option will be given, the new model number or the current model number will be used, and the current model number will be used to overwrite the original program.

## 2.Tracking process settings instructions



### Definition of interpretation:

① **Follow Enable:** Check the process to take effect after checking.

② **Data source:** RS485-encoder, Can encoder (not supported at this time).

③ **Accuracy:** Encoder number (column such as 1024 resolution encoder, the value is filled in 10).

- ④ **After the feedback band** (unit: s): Refers to the tracking error caused by the conveyor belt speed deviation or the encoder sampling deviation during the tracking process. The accuracy is compensated by this value. The setting range is 0~0.511s.
- ⑤ **Reverse counting**: Check to change the counting direction of the current encoder.
- ⑥ **Distance per revolution**: The distance the encoder rotates one turn to the actual running distance of the conveyor belt.

Example of calculating the operation mode per revolution distance:

First, calibrate the coordinates of the table of the robot. The Y+ direction of the workbench must be the flow direction of the conveyor belt. After calibrating the workbench, place the calibration rod on the conveyor belt and flow into the robot arm span. Stop the conveyor belt. The end moves to the top of the calibration rod by teaching and aligns with the calibration rod. At this point, click the "Record A" button, start the conveyor belt, run a distance, stop the conveyor belt. At this time, the calibration rod is still in the robot arm span range. At this time, the robot end is moved to the top of the calibration rod through teaching. Calibration rod alignment. At this point, click the "Record B" button, then click Calculate, the value is displayed directly in the distance per revolution.

- ⑦ **Starting point offset**: After setting, it is offset from the tracking starting point by a fixed distance according to the set value.

Start offset operation example:

Place the calibration rod on the conveyor belt to the tracking starting point and stop the conveyor belt. At this point, click the "Record A" button to start the conveyor belt, run to the distance that needs to be offset, and then stop the conveyor belt. Click "Record B" button, then click on the calculation, the value is directly displayed in the starting point offset.

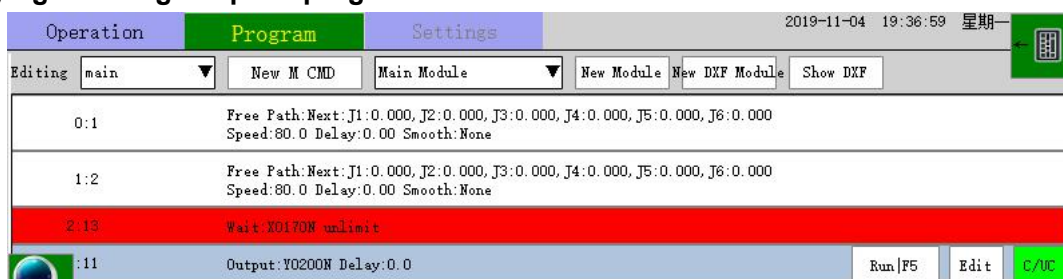
- ⑧ **Interval trigger**(unit: mm): Refers to a fixed distance trigger photo (used only in the visual tracking process).
- ⑨ **Target following instruction-following type**: The follow type currently supports two modes, one is the conveyor + the signal and the other is the conveyor + vision.
- ⑩ **Target following command - Start following**: Set the robot's following starting position, following range distance (tracking radius), following speed. When the following product is recorded and the target is flowed within the range distance, the robot starts to follow.
- ⑪ **Target following command - stop following**: The recorded target product stops following when it exceeds the working range, or the following track stops following the running.
- ⑫ **Target following command - Record target**: When the sensor is on, check the recording target and click to set the current position. That is, each time the sensor is illuminated, the product position is recorded and followed. When the position enters the tracking range, the robot starts to follow and the record is accumulated.

E.g:

The first product flows over, the robot is following, the follow-up is not over, and the second product is sensed, then the position of the second product will be recorded, and the second product will follow the second immediately after the end of the product. Products, of course, also need the second product to enter the tracking range to follow.

## 8.5 Teaching template program

### 8.5.1 Spraying teaching template program



4:3	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
5:4	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
6:5	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
7:6	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
8:7	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
9:8	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
10:9	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
11:10	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
12:12	Output:Y0200FF Delay:0.0
13:0	Program End



Note: Lines 3 to 14 are the traces generated by the spray process setting as the contents of the module [1].

For the sake of easy understanding, the content is expanded to the main model number.

### 8.5.2 Spray tracking teaching template program

1、Teaching the instructions under subroutine-8, the teaching template is shown below

Teaching the main program, the teaching template is shown below

	9:7	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
	10:8	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
	11:9	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
	12:10	Line3D-Pose:Next:X:0.000,Y:0.000,Z:0.000,U:0.000,V:0.000,W:0.000 Speed:80.0 Delay:0.00 Smooth:None
	13:12	Output:Y0200FF Delay:0.0
	14:19	End Target Follow: type: 传送带信号
	15:20	Switch Coord:[CoordID0]world coord
	16:0	Program End

Note: Lines 4 to 16 are the traces generated by the spray process setting as the contents of the module [1].  
For easy understanding, the content is expanded to the main model number.

# CRP-S80/SA80

---

## Operation instruction

This system supports several types of robot, and make a part instruction about the six-joint robot. Please refer to this instruction and debug manual for other type of robots.

---

---

Please make sure the operator of this product  
accepted the instruction related

---

CRP Co., Ltd 2016-11-4

# Chapter 9 Introduction to System

## 1 Introduction to system hardware

### 1.1 Basic information of system

CRP-S80 industrial robot is designed with the control system based on the international-popular open platform for software and hardware, with the specified multi-axes movement control card, data collector card, specified robot connection terminal, and security connector, which are developed independently. Program design is modeled, specified to different tool structure, applied industry, and functions. In structure, this system can control the vertical multi-joint tandem robot, vertical multi-joint parallelogram robot, vertical multi-joint L-shape wrist robot, vertical multi-joint spherical wrist robot, polar coordination robot, Delta robot, and so on. In functions, this system can control the robot to work in the areas, such as lifting, welding, painting, palletizing, cutting, polishing, and so on. Standard computer main wire can extend to on-site main wire, robot vision system, and so on.

Technology features:

- Optimized structure algorithm, which can adapt to various structure formation of structure control.
- Modularized functions settings, which can adapt to various applied scenarios.
- 8-axes control to realize the control of outside axis (walking axis, positioner).
- Adaptive to multi-pulse shape, Incremental, absolute servo.
- Open structure, synchronized internationally, easy to extend.
- Software PLC functions, easy for logical control.
- Process function, simplified program operation.
- Improved connecting method of computer main wires for reliability and practicability.
- Security module for safe production of robot.

### 1.2 System specification parameters

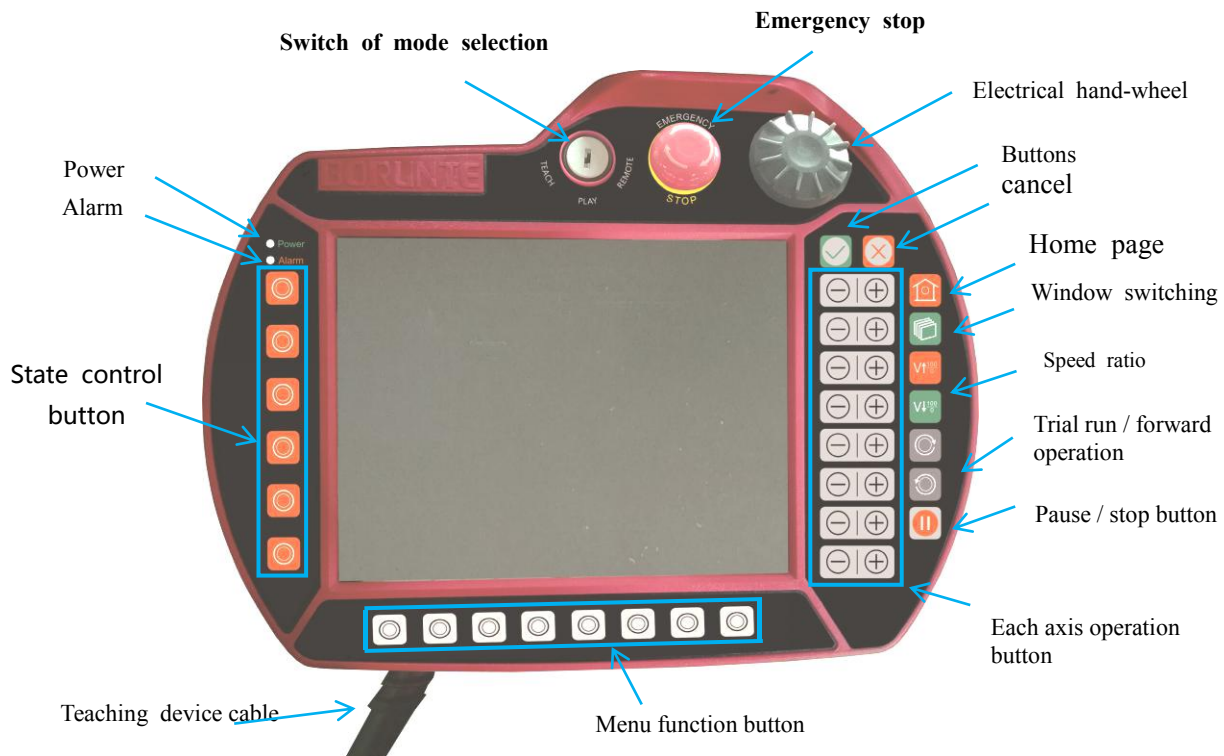
Robot	CRP-S40	CRP-S80
Number of control axis	4 axis	6+2axis
User storage space	200M	
Teach	8-inch TET-LCD, full keyboard, mode-selection switch, security switch + emergency stop (touch screen is optional)	
Ports	Digital I/O connector, 24 input/24 output (can be extended)	
	4 output of analogous signal of 0-10V, 12 digitals.	
	1 connector of programmer signal (orthogonal pulse)	
	Robot exclusive connector, Hard limit, anti-collision, maintenance switch, switching control	
Security Module	Connected emergency stop, abnormal signal of robot leads to quick stop of robot (optional)	
Controllable servo	Incremental, absolute servo: domestic, Taida, Anchuan, Sanling, Sanyang, Songyang, and so on.	
Operation mode	Teach, replay, remote	
Program mode	Teach replay, process program	
Movement functions	Point to point, linear, circle	
Instruction system	Movement, logic, process, calculate	
Control mode	Position	
Coordination system	Joint Coordination, Right-angle coordination, user coordination, and tool coordination.	
Software functions PLC	Edited using ladder diagram, 5000 steps	
Abnormal detection functions	Emergency stop abnormal, servo abnormal, anti-collision, security maintenance, arc start abnormal, user coordination abnormal, tool coordination abnormal, etc.	
Structure algorithm	vertical multi-joint tandem robot	
	vertical multi-joint parallelogram robot	
	vertical multi-joint L-shape wrist robot	
	polar coordination robot	
	Horizontal joint robot (SCARA)	
	Deltarobot	
	Special structure robot	

Applications	Lifting, welding, painting, palletizing, cutting, polishing, forging and stamping, pouring, etc.
Zero point functions	Absolute: Battery memory; Incremental: reset after opening

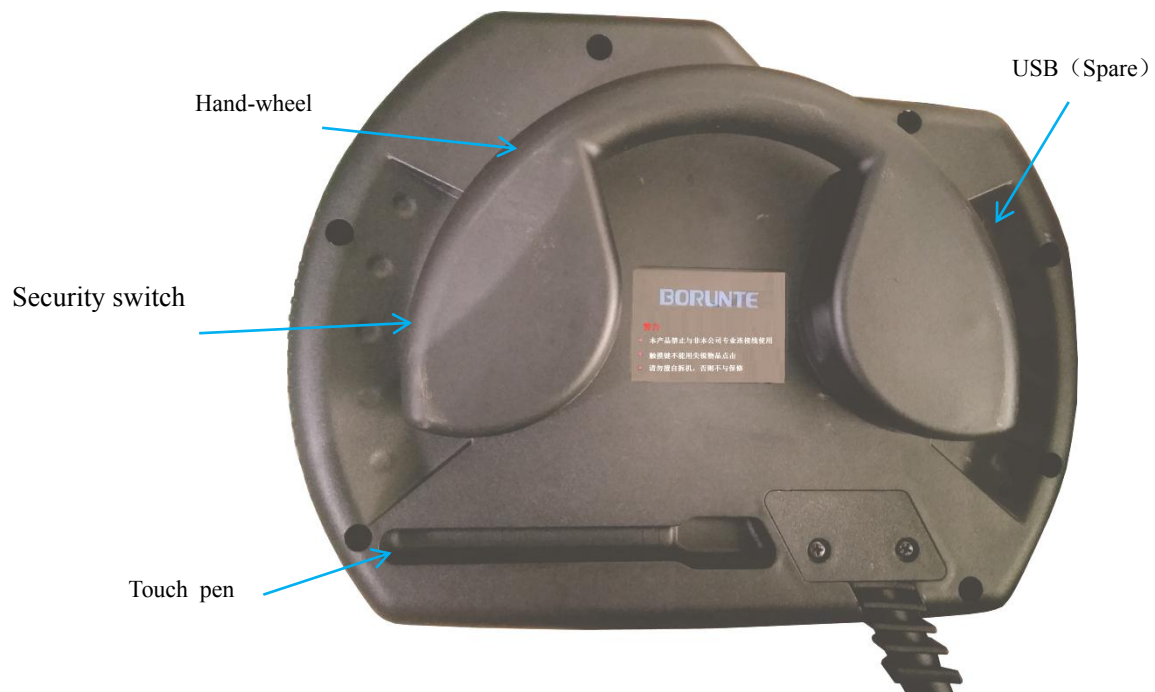
## 2 System exterior

### 2.1 Teach

Operation button is on the teach machine for teach and program.



The Front view of teach machine



The back view of teach machine

### 2.1.1 Emergency stop button

rotate the button according the white arrow to remove the emergency stop.



Notice: The use of emergency stop should cooperate with circuit design, and they should be safe and reliable. Otherwise, robot may not be stopped in emergency, which can be a safe problem.

### 2.1.2 Switch of mode selection



Used to choose the operation mode of robot. In this system, there are three modes: TEACH, PLAY, REMOTE.

### 2.1.3 Security switch



In teach mode, when security switch is in the middle gear, the robot will be powered. If hold tightly or release the security switch, power will be cut off and electric motor will be in the brake state.

Description: There are three gears of security switch, outside gear and inside gear are off-power, middle gear means power connected.

Notice: When security switch is in middle gear, robot will have power to move. So nobody is allowed within the range of robot movement in case of accidents.

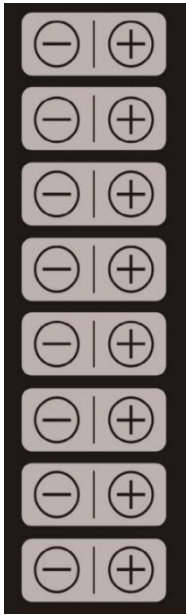
### 2.1.4 Electrical hand-wheel



Used as electrical scroll wheel, which is effective in Manu categories, parameters interface, variables interface, etc.

In teach mode, electrical hand-wheel can also be used to control slight movement of robot (note: only versions after V2.0 have this function).

### 2.1.5 Coordination buttons



Coordination buttons are used to manually control joint of robot in teach mode.

Coordination buttons are used to modify the operation speed and operation mode in replay mode.

Coordination buttons are used to switch the correspondent functions in non-axis movement interface.

### 2.1.6 State control buttons in hardware



: State cancel button, cancel current state, return to previous interface.



: Windows switch button, switch the cursor position in different windows among general display, monitor, and information prompt.



: Stop button, stop the robot in replay mode..

Notice:

There will be a time period between pressing the button and robot total stop, for the reasons such as up/down speed of system, servo driver parameters, and mechanical structure tenacity.

After pressing the stop button to stop the robot, the robot stop the program movement, but it has power to move at any time. So at this time, no operator is allowed within the movement area of robot, otherwise accident may occur.



: Operation button, used to test the current program segment selected by current cursor; used to start the program in replay mode.

Notice:

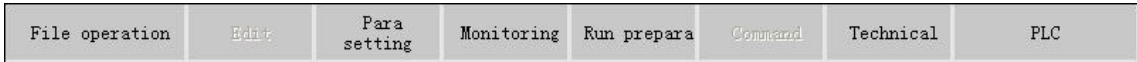
After the press of start button, robot will move. Please make sure that robot is in normal condition and no people or obstacles are within the robot movement area before the press of this button. Otherwise, accident may occur.

2.1.7 State control buttons in software



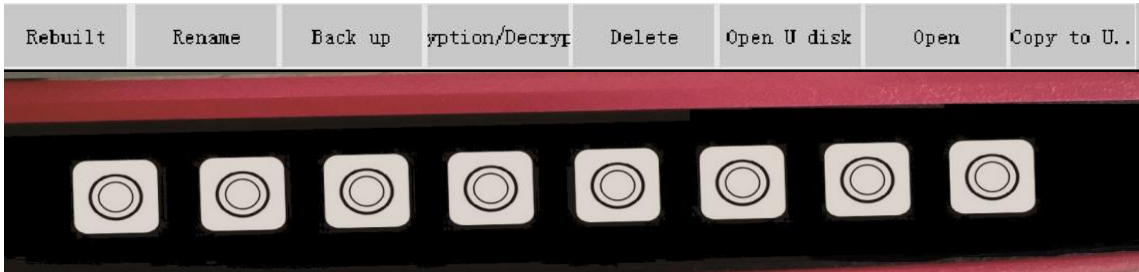
Display and operation may differ in different software functions. Usually, control buttons are to control the power state and movement mode, and to switch the coordination systems.

2.1.8 Main menu bar



Main menu bar is used to invoke the correspondent menus. Menus include file operation, program edit, parameters setting, monitor, operation preparation, program instructions, user process, PLC.

2.1.9 Sub menu bar



Display and operation may differ in different software functions.

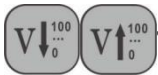
2.1.10 Confirm button




: To confirm certain operations, such as parameters modification, data instruction input, and so on.

2.1.14 Speed adjustment button

Notice: Speed adjustment button can only be found on v1.1 version keyboard.



To adjust the movement speed of robot, and result will show in the status bar Speed50%.

This button can only adjust the speed in teach mode. In replay and remote mode, user should use auto-operation speed multiplier  and correspondent coordination button+/- to increase or decrease the speed. result will show in the


status bar Speed85%.

3 Display of Teach

3.1 Main interface domains

Screen of teach is a 8-inches colorful screen, which can display digital, character, and symbols.

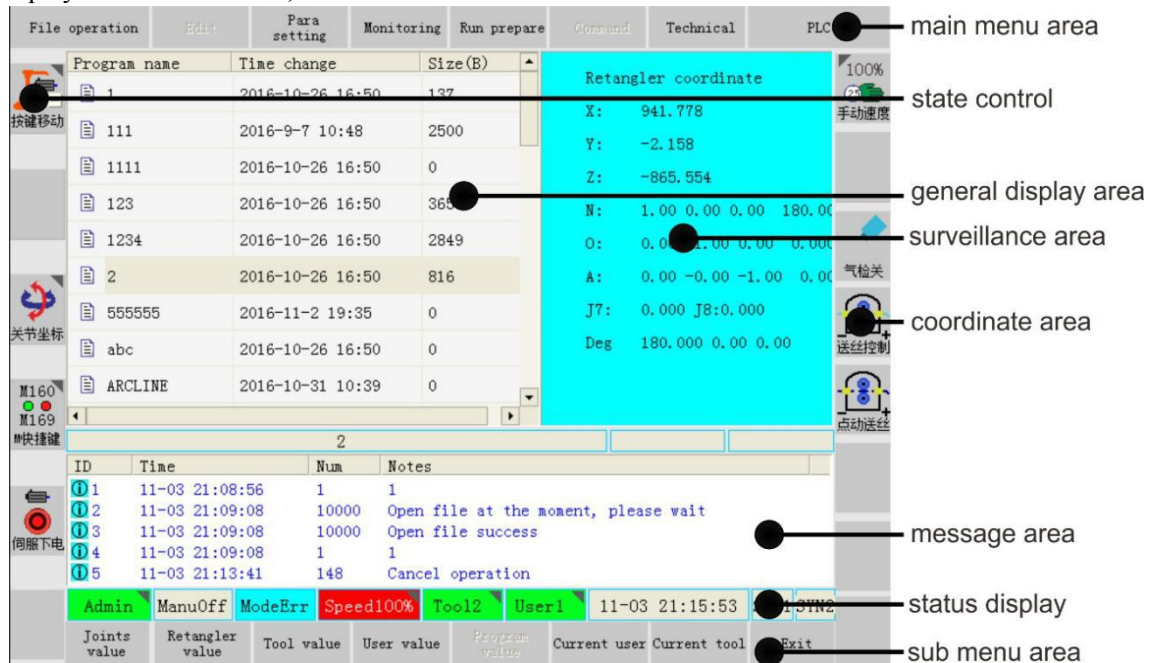
Display interface consists three main display area (general display area, monitor are, and information area), in addition, main menu, operation 1, operation 2, status bar, sub menu are located around.

The three main areas can switch by . When certain area is selected, the background will change or cursor bar appears. When switching display areas, main menu and submenu will change accordingly.

Monitor area can be closed. When monitor area is shown, general display area will automatically shrink into half-screen display. After closing the monitor area, general display area will automatically enlarged into whole screen display.

Status control area, main menu area, coordination area, sub menu area can be operated by the correspondent button.

Specific display is shown as below, monitor area is selected.

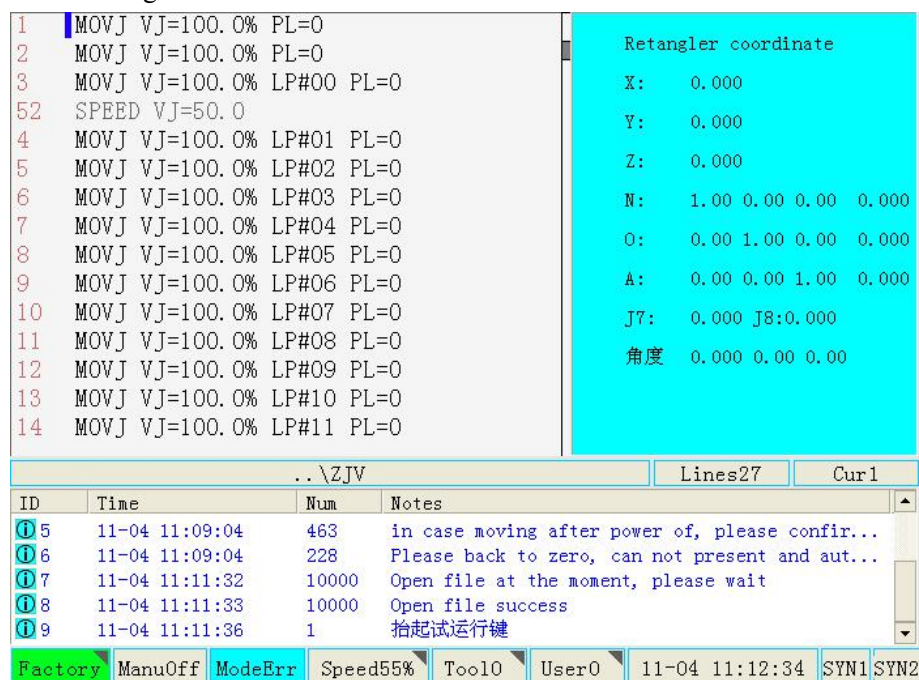


### 3.2 General display area

General display area is used for program list, program edit, parameters setting, coordination setting, and process setting, and so on.

General display area will automatically shrink into half display; and extend to full display after monitor window is closed.

Interface example is as following:



Program edit and input monitor (half display)

1	MOVJ VJ=100.0% PL=0	Retangler coordinate X: 0.000 Y: 0.000 Z: 0.000 N: 1.00 0.00 0.00 0.000 O: 0.00 1.00 0.00 0.000 A: 0.00 0.00 1.00 0.000 J7: 0.000 J8:0.000 角度 0.000 0.00 0.00
2	MOVJ VJ=100.0% PL=0	
3	MOVJ VJ=100.0% LP#00 PL=0	
52	SPEED VJ=50.0	
4	MOVJ VJ=100.0% LP#01 PL=0	
5	MOVJ VJ=100.0% LP#02 PL=0	
6	MOVJ VJ=100.0% LP#03 PL=0	
7	MOVJ VJ=100.0% LP#04 PL=0	
8	MOVJ VJ=100.0% LP#05 PL=0	
9	MOVJ VJ=100.0% LP#06 PL=0	
10	MOVJ VJ=100.0% LP#07 PL=0	
11	MOVJ VJ=100.0% LP#08 PL=0	
12	MOVJ VJ=100.0% LP#09 PL=0	
13	MOVJ VJ=100.0% LP#10 PL=0	
14	MOVJ VJ=100.0% LP#11 PL=0	

Program list(full display)

```

1  MOVL VL=500.0MM/S PL=0
2  RUNIOCUTIN#(1)
3  GETTRACKDATA#(1) X#( 0.0) Y#( 0.0) Z#( 0.0)
4  TRACKSTART#(1)
5  ADD GP#51(3) 10.000
6  MOVL VL=500.0MM/S GP#51 PL=0
7  MOVL VL=100.0MM/S GP#50 PL=0
8  DOUT Y#(0)=ON
9  MOVL VL=500.0MM/S GP#51 PL=0
10 TRACKEND#(1)
11

```

Program edit (full display)

Number	速度参数	Value	
U 1	K1 (1-20)	2	
U 2	K2 (1-20)	1	
U 3	level of joint's raising-reducing speed	10.00	
S 4	level of linear raising-reducing speed	10.00	
S 5	Back up	1	
S 6	max linear speed	2000.00	
S 7	max manual moving speed	100.00	
M 8	max rotating speed	200.00	
M 9	max manual rotating speed	50.00	
M 10	max joint speed of J1	134.00	

Parameters(full display)

Tools coordinate system settings

Tools number  Tools note

X dir migration  Around A migration

X dir migration  Around B migration

X dir migration  Around C migration

Coordination setting (full display)

Function choose(0-4)	0	Spray distance	0.000	mm
Encoder(exclusive-0 second(5axis-5	0	Workpiece distance(Function6 works)	0.000	mm
Low speed IO / High speed IO (0/1)	0	Tracking speed compensation(0-1000)	0.000	mm
Error adjustment	0.000	Conveyor speed mm/s for function 4	0.000	
Tracking acceleration(necessary)	0.000	Permit fluctuation value mm/s for	0.000	
Start point from tracking area(A start)	0.000	Output M131(analog interval time s)	0.000	
Termination point from tracking area(A	0.000	Tracking proportion adjustment(time	0.000000	
X compensation for tracking	0.000	EncoderA digital display	0	
Y compensation for tracking position	0.000	EncoderB digital display	0	
Z compensation for tracking position	0.000	Encoder value when IO get in	0	
Range of detect(d)	0.000	Proportion about encoder and	0.0000	

Process (full display)

### 3.3 Monitor area

Monitor area is used to show: coordination data, time data, TV data, I/O data, PLC internal relay, timer, counter condition, main wire info, hardware info, software info, appointment status, program variables status, and so on. Monitor area can be closed. Monitor area is shown on the right side of general display area. When general output ports and PLC auxiliary relay M960M799 are displayed in monitor area, status control area will show the mode-switch logo, which can be used to switch the Y\*\* or M\*\* status of current cursor position.

Details can refer to “Chapter 5 Monitor”.

Example onitor area interface is as follows:

关节坐标	理论	反馈	差值	Power time	00 M 00 S	Artr...	使用	Attribute
J1:	0.0000	0.000	0.000	Running time	00 M 00 S	M0	无	急停
J2:	0.0000	0.000	0.000	Boot time	00 M 00 S	M1	无	刚启动
J3:	0.0000	0.000	0.000	Time on the da	00 M 00 S	M2	无	示教模式
J4:	0.0000	0.000	0.000	Single time	0.000 S	M3	无	再现模式
J5:	0.0000	0.000	0.000	Total time	00 Times	M4	无	远程模式
J6:	0.0000	0.000	0.000	Move times	00 Times	M5	无	按键进给模
J7:	0.0000	0.000	0.000	当前时间:2016-11-4 11:16:59		M6	无	手轮进给模
J8:	0.0000	0.000	0.000			M7	无	禁止进给模
						M8	无	安全开关

Art...	V...	使用	Art...	Position feedback	Soft status
T0	0	无	10A	J1: 0	Modified 10-27 15:44
T1	0	无	10A	J2: 0	
T2	0	无	10A	J3: 0	Size 14237696
T3	0	无	10A	J4: 0	
T4	0	无	10A	J5: 0	Version 160501
T5	0	无	10A	J6: 0	
T6	0	无	10A	J7: 0	
T7	0	无	10A	J8: 0 External0 0	
T8	0	无	10A		

### 3.4 Information area

Information area mainly shows the latest operation, movement operated by system, log info such as alert. Information area will record the latest information. If unknown problem occurs, users can use the up/down cursor button to check the info and find out the reason.

Information area is shown below:

ID	Time	Num	Notes
① 995	11-04 11:08:18:898	1	抬起试运行键
① 996	11-04 11:09:04:290	1	in case moving after power of, please confir...
① 997	11-04 11:09:04:290	1	Please back to zero, can not present and aut...
① 998	11-04 11:11:32:944	1	Open file at the moment, please wait
① 999	11-04 11:11:33:010	1	Open file success

### 3.5 Main menu area

main menu area is divided into eight main menus: file, program, parameters, monitor, operation preparation, program instruction, user process, PLC. Menu structures are as follows:

#### 3.5.1 file

File menu is used to update/backup program files, robot parameters, and PLC file. File menu also consists system software update. The drop-down menu is shown as below figure.

For detailed file operation, please refer to [-----].

File operation	Edit
1 Save file to Udisk	▶
2 Import from U disk	▶
3 Software upgrade	
4 Save notes to U disk	▶
5 Import note from Udisk	▶
7 Eject U disk	

#### 3.5.2 program

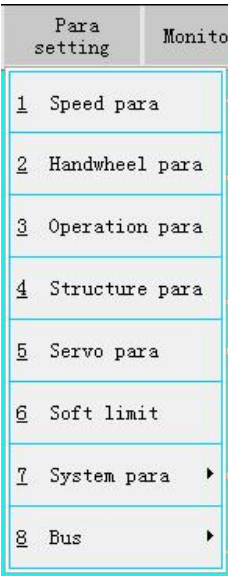
Program menu is used to edit program line in program interface. For detailed description, please refer to [Program edit chapter].

Edit	se
1 Copy	▶
2 Paste	
3 Shear	▶
4 Delete	
5 Search	
6 Replace	
7 Go to	
8 Adjust L-num	
9 Program reset	

3.5.3 Parameter setting:

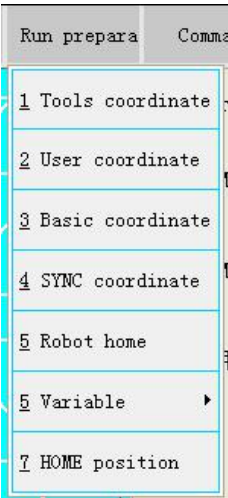
Parameter setting is used to set the robot parameters, in order to control the robot. The drop-down menu is shown as below figure.

Detailed parameters description can be found in [parameter chapters] and “Commissioning manual of S80/40 control system”.



3.5.4 Operation preparation:

The operation preparation is used to set the zero point of robot coordination system and to set the variables. The drop-down menu is shown as below figure.



3.5.5 Monitor

Monitor menu is used to check the information related with robot and periphery ports. The drop-down menu is shown as below figure.

Monitoring	Run prepa
1	Coordinate ▶
2	Time ▶
3	Motor ▶
4	IO port ▶
5	PLC ▶
6	Bus ▶
7	Hardware ▶
8	Software ▶
9	Appointment ▶

### 3.5.6 Program instructions

Structures info can be found in [Chap2 2.5 program instruction].

Command	Technical
1	Movement ▶
2	Logic ▶
3	Arithmetic ▶
4	Palletizing ▶
5	Welding ▶
6	Assistant command ▶
7	Visual ▶
8	Follow ▶
9	Correspondence ▶
10	Special instruct ▶

### 3.5.7 User process:

User process menu is used to set the specific process applied to robot. The drop-down menu is shown as below figure.

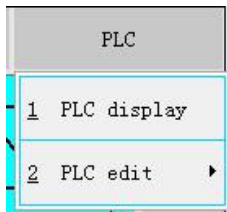
Detailed description of user process can be found in “Welding process”, “Palletizing process”, “Track process”, “vision process”.

Technical	PL
1	Palletizing ▶
2	Paint ▶
3	Arc_welding ▶
4	Other tech ▶
5	Spot welding ▶

Description: Among the palletizing, painting, welding process, only one process can be chosen, i.e. two processes cannot be applied at the same time. Painting process is the internal function of system, which is not available temporarily.

### 3.5.8 PLC:

PLC menu is used to observe the operation status of PLC in trapezoid diagram.



Detailed PLC descriptions can be found in “CRP-S40/S80 manual”.

Notice: PLC edit function in PLC menu is not perfect now, please don't use this function.

### 3.6 Status control area

This area is used to switch and display: manual control, coordination system, speed multiplier, output ports, auxiliary relay, and so on.

Follows are list of frequently used logos. Logos may differ in different process. Details can be found in “Process manual”.

Manual control status:



Axis forbidden. Meaning: In teach mode, move robot through coordination button is forbidden.



Axis permit. Meaning: it's allowed to control robot movement through coordination button on the right side of screen.

Robot coordination status:



Robot joint coordination status: showing the current joint coordination system.



Robot rectangular coordination system: showing the rectangular coordination system is used currently.

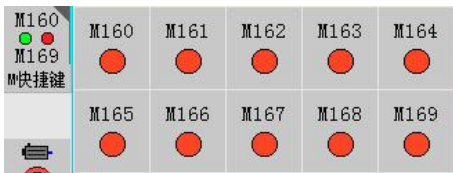


Robot tool coordination status: showing the tool coordination system is used currently.



Robot user coordination status: showing the user coordination system is used currently.

Auxiliary M16\* relay switch:



Pressing the correspondent status control button can switch the auxiliary relay M16\*, e.g. open M160. Pressing the correspondent status control button can switch the auxiliary relay M16\*, e.g. close M160.

Servo electric machine status button:



Servo permit: red means servo electric machine is not allowed to work. Green means servo permit.

As for absolute servo drive, red means system will communicate among the different divers and collect the absolute position data.



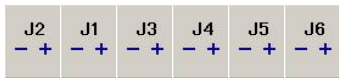
“R”reset button. When system info area shows the prompt alert or notice, pressing this button can reset the prompt alert or notice.

In auxiliary monitor interface, it’s effective to select relay using cursor. In auxiliary monitor interface, it’s ineffective to select relay using cursor. In general output ports monitor interface, it’s ineffective to select relay using cursor. In general output ports monitor interface, it’s effective to select relay using cursor.

3.7 Coordination button area

Coordination button area is used to operate the correspondent movement by coordination button in teach mode.

Frequently used buttons are listed as below. Buttons may differ in different process. Details can be found in process manuals.



In joint coordination system, move the joint by pressing the correspondent +/- button.



In rectangular, tool, user coordination system, moves the robot along the coordination axis

by pressing the correspondent +/- button



Manually adjust speed multiplier. Speed can be adjusted by pressing the correspondent +/- button or pressing the



button. Results are shown in the status bar **Speed100%**



Automatically speed multiplier. Speed can be adjusted by pressing the correspondent +/- button or pressing the

button. Results are shown in the status bar **Speed55%**



Play/remote mode: Continuous cyclic operation。 Program can be operated in a continuous cyclic way. After

program is suspended, users can switch among continuous mode, single program mode, and single line mode by pressing the correspondent +/- button.



Play/remote mode: Single program operation。 Program is operated from cursor position to the end of current

program. After program is suspended, users can switch among continuous mode, single program mode, and single line mode by pressing the correspondent +/- button.

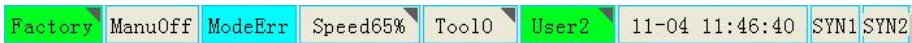


Play/remote mode: Single line operation。 Single line is operated, then suspend, and operated next line after

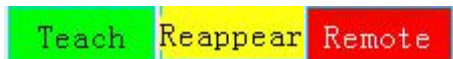
pressing starting button. After program is suspended, users can switch among continuous mode, single program mode, and single line mode by pressing the correspondent +/- button.

3.8 Status display area

Status display area is used to show the current working status: such as number panel condition, robot movement condition, work mode, operation speed, tool coordination number, work piece coordination number, current time.



**ManuOff** Meaning: current working status of robot, including manual stop, manual operation, automatic stop, automatic operation, remote stop, remote operation.



Working mode, correspondent with working condition.

In teach, working conditions are manual stop, manual operation. In replay mode, working conditions are automatic stop, automatic operation. In remote mode, working conditions are remote stop, remote operation.

**Speed10%** Meaning: current speed multiplier. In teach, it shows manual operation speed multiplier; in replay and remote mode, it shows automatic operation speed multiplier.

**Tool0** Meaning: current tool coordination number. In tool coordination setting interface, after selecting certain coordination number, number will show in this area and the setting coordination is invoked. Please make sure the tool coordination number is correct.

**User2** Meaning: current user coordination number. In user coordination setting interface, after selecting certain coordination number, number will show in this area and the setting coordination is invoked. Please make sure the user coordination number is correct.

**11-04 11:48:04** Current time

**SYN1 SYN2**Synergy condition: when showing**协同1 协同2**, it means the open condition of synergy axis.

3.9 Sub menu area

This area has different content according to the active interface. Pressing the buttons to operate in correspondent way.

Relay M00-95	Relay M96-191	Relay M192-287	Timer	Scaler	porgram exit reset	porgram exit hold	Exit
Change inst	Movement	Logic	Edit	Last inst	Save	Close	
information	important information	alarming information	[operation record]				

# Chapter 10 TEACH MODE

## 1 Available movement in Teach mode

- ★Related parameters setting, equipment commissioning, and equipment maintenance. Reference: 【】 and 《》 .
- ★Coordination system setting, zero return operation. Reference: 【---】 and 《Commissioning manual》 。
- ★Code, modify the teach program. Reference: 【----】 .
- ★Process document and parameters setting. Reference: 《Process manual》 .
- ★Monitor of working data. Reference: 【 ---】 .
- ★Peripheral USB disk operation. Reference 【---】 .

## 2 Simple manual movement

Please obey the following rules within the robot movement region:

Observe the robot from the front.  
 Keep strictly with operation steps.  
 Consider the backup solution if robot move towards the people suddenly.  
 Make sure to set the shelter in case of emergency.  
 Notice: People injury may result due to the wrong movement of robot.

Following conditions should be satisfied before robot movement:

- Equipments have been commissioned properly, and they are in good condition.
- Self-check has finished, and no error or alarm is found.

### 2.1 Correct gesture to use teach box

1. Grab the standing hole with the security switch on the back of teach box by left hand through the rope. Index finger is on the position of security switch. (Gesture is shown in below figure).



2.Raise the teach box, turn it with the front side up, and hold the box at the proper position on the belly. Operate the teach box button or switch using right hand. (Gesture is shown in below figure).





3. Stand beyond the movement region of robot on the front or side direction. Pay attention to observe the robot movement. Pay attention to the obstacles or peoples that enter the movement region. If any emergency occurs, press the emergency stop button to stop the robot.

## 2.2 Simple manual movement

1. Open power supply of the robot control box, power the robot.
2. Make sure no alarm info is shown in info bar.



3. Switch the mode into teach mode.





Press  related button, power the servo. After the power, the logo turns into .

Notice:

When servo is powered, system will receive the feedback of programmer to calculate the current coordination. As for the absolute programmer servo institute, system can directly receive the feedback and calculate the coordination and system allows the replay and remote operation. As for incremental programmer servo institute, system cannot calculate using the feedback of programmer after servo is powered. So it's necessary to operate the zero return in <operation preparation>-<zero point setting of lathe> manually. For detailed info, please refer to “Zero return” and “commission manual”.

4. Press  &  to manipulate the speed multiplier.

5. Choose the proper coordination system. Joint coordination system is suggested .

6. Press  related button, cancel the forbidden movement robot, and logo should turn into , which means robot is allowed to move.

7. Press the +/-button 

J1	J2	J3	J4	J5	J6
-	+	-	+	-	+

 to move every joint slowly.

## 3 Coordination system

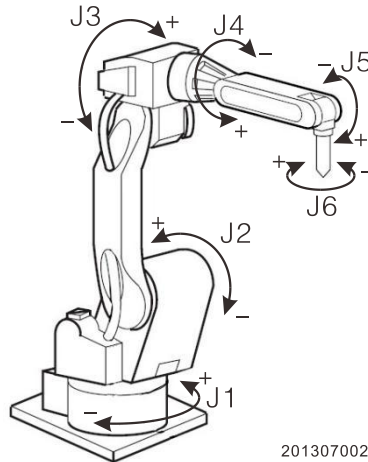
### 3.1 Types of coordination system

When axis operation is required for robot, the following coordination systems are useful.

#### Joint coordination system

Robot can move along the axis independently in joint system. Joint coordination system is set after the robot commission and unchanged afterwards.

Since this system can support various robot types, please refer to commission manual to check the move direction of different joint coordination system.



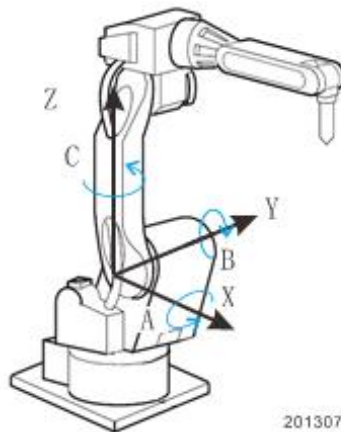
201307002

### Rectangular (ground) coordination system

Robot Rectangular system is also called ground coordination system. Axis direction and zero point position may differ of different rectangular system.

After the setting of related robot parameters, zero point and axis directions are determined in rectangular system. And rectangular system cannot be modified unless parameters are changed.

Robot can move along the preset x, y, z axis, no matter where the robot is. As for 6-axis robot, robot can also rotate along A, B, C, A axis rotates around the X axis, B axis rotates around the Y axis, C axis rotates around the Z axis. Rule is right-handed twisted rule.

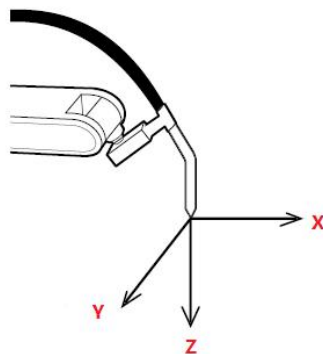


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### Tool coordination system

In tool coordination system, z axis is defined along the effective direction of tool held in the flange plate of robot wrist, and zero point is defined at the sharp end point of tool.

0# tool coordination system is the basic tool coordination system, unchanged, unmodified and same as rectangular system. 1-49# tool coordination systems can be set by users according to the real situation. Detailed setting steps can be found in 【---】.

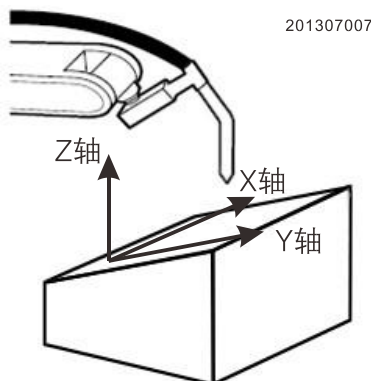


### User coordination system

Robot can move along the specific user coordination system axis.

In the coordination systems except joint system, it's allowed to change the tool gesture without changing the tool sharp point position (control point), which is called static control point movement.

0# user coordination system is the basic user coordination system, unchanged, unmodified and same as rectangular system. 1-49# user coordination systems can be set by users according to the real situation. Detailed setting steps can be found in 【---】.



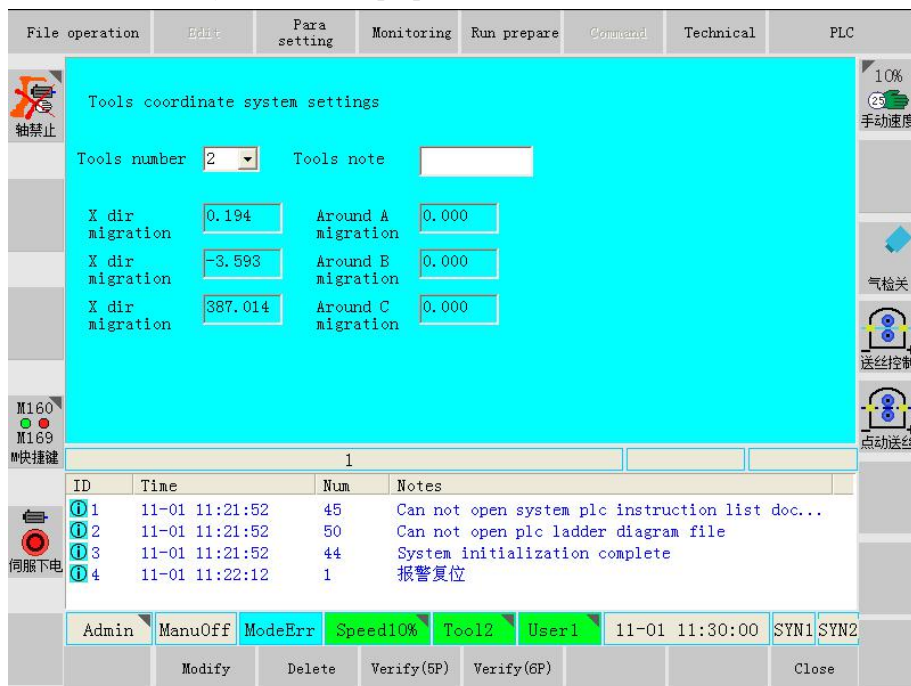
### 3.2 Invoke and switch coordination system

Joint coordination system and rectangular coordination system can be switched by pressing the status control button, then using +/- button to move the robot in the current system, or programming to invoke the correspondent coordination system.

User coordination system and tool coordination system should satisfy two conditions: invoke proper coordination number, switch to desired coordination system. After the conditions are satisfied, desired system can be used by move the robot in manual or programmable way, in teach mode.

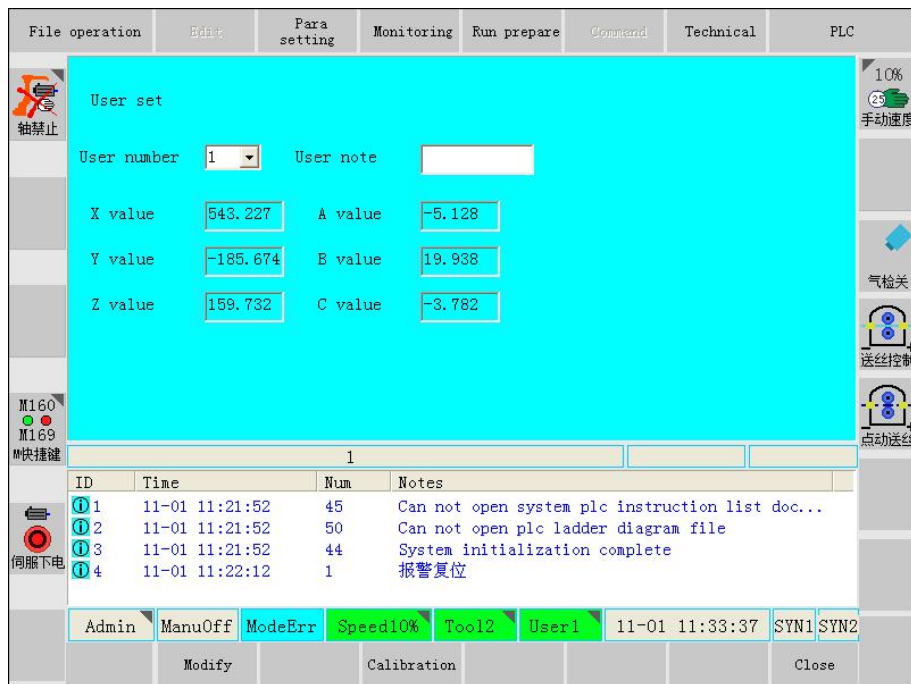
#### 3.2.1 Invoke the coordination system:

Steps to invoke the tool coordination system: <Run prepare>-<Tools coordinate>-<Tool number>-<close>



In the above interface, using cursor button to move cursor into tool coordination number area, then using up/down button to select the desired number. Then press the submenu close. At this time, tool coordination invoke is finished.

Steps to invoke the user coordination system: <Run prepare>-<User coordinate>-<confirm>-<User number>-<close>.



In the above interface, using cursor button to move cursor into user coordination number area, then using up/down button to select the desired number. Then press the submenu close. At this time, user coordination invoke is finished.

### 3.2.2 Switch the coordination system:

In teach mode, pressing correspondent coordination button in condition control area can switch the coordination system in a cyclic way: joint, rectangular, tool, user coordination system. Display button is the current used coordination system. Following is the display logo and correspondent coordination system in the system switch



关节坐标

Robot joint coordination, meaning the current coordinationsystem is joint coordination system.



直角坐标

Robot Rectangular (ground) coordination, meaning the current coordination system is Rectangular (ground) coordination system.



工具坐标

Robot tool coordination, meaning the current coordination system is tool coordination system.



用户坐标

Robot user coordination, meaning the current coordination system is user coordination system.

In the Edit process in teach mode, selected coordination system will be transferred into the teach program. So please select and set the coordination system properly.

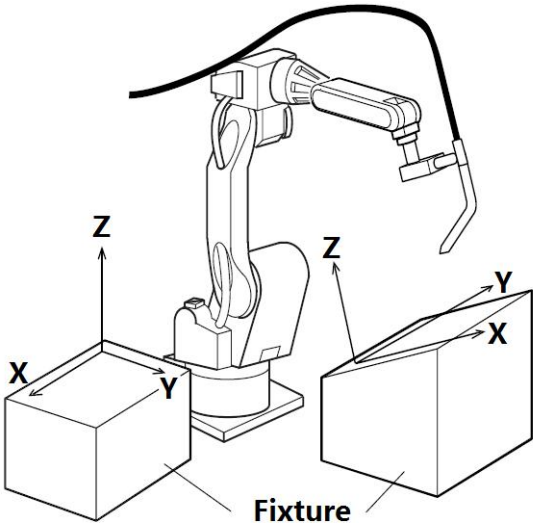
### 3.3 Set the coordination system

Setting of joint coordinationsystem andrectangular system is finished after the robot commissioning, which cannot be changed afterwards.

Tool coordination system and user coordination system can be set by users. Related content can be found in “welding process”.

#### 3.3.1 User coordination system setting

It's convenient to program in teach mode after establish the usercoordination system. As shown in below figure, where there is a tooling surface, there should be a user system.



Setting steps for user coordination system:  
<Run prepare>-<User coordinate>. Set the user coordination system in the prompt interface (as shown in below). Every tool needs a user coordination system (also called tool coordination system).

File operation

Edit

Para setting

Monitoring

Run prepare

Command

Technical

PLC

轴禁止

M160

M169

快捷按钮

伺服下电

Program name	Time	Size(B)
1	2016-	137
111	2016-	2500
1111	2016-	0
123	2016-	3659
1234	2016-	2849
2	2016-	816
abc	2016-	0
ARCLINE	2016-	0
call	2016-9-5 22:47	folder
FK	2016-10-26 16:50	58790

1

ID	Time	Num	Notes
1	11-01 11:21:52	45	Can not open system plc instruction list doc...
2	11-01 11:21:52	50	Can not open plc ladder diagram file
3	11-01 11:21:52	44	System initialization complete
4	11-01 11:22:12	1	报警复位

Admin

ManuOff

ModeErr

Speed10%

Tool2

User1

11-01 11:42:25

SYN1

SYN2

New

Rename

Back up

Delete

Open U disk

Open

Copy to U..

10%

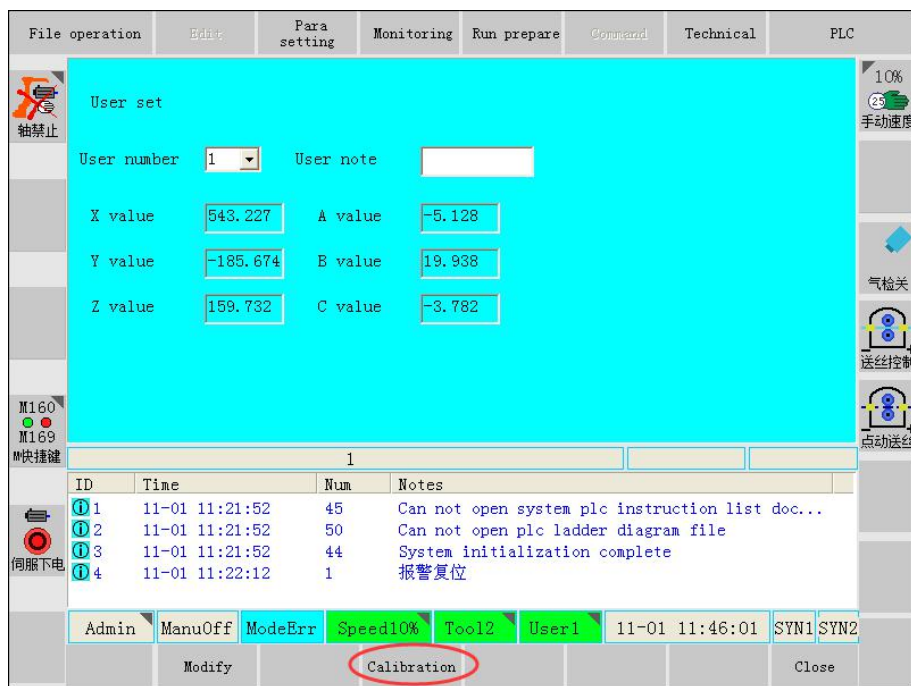
手动速度

气检关

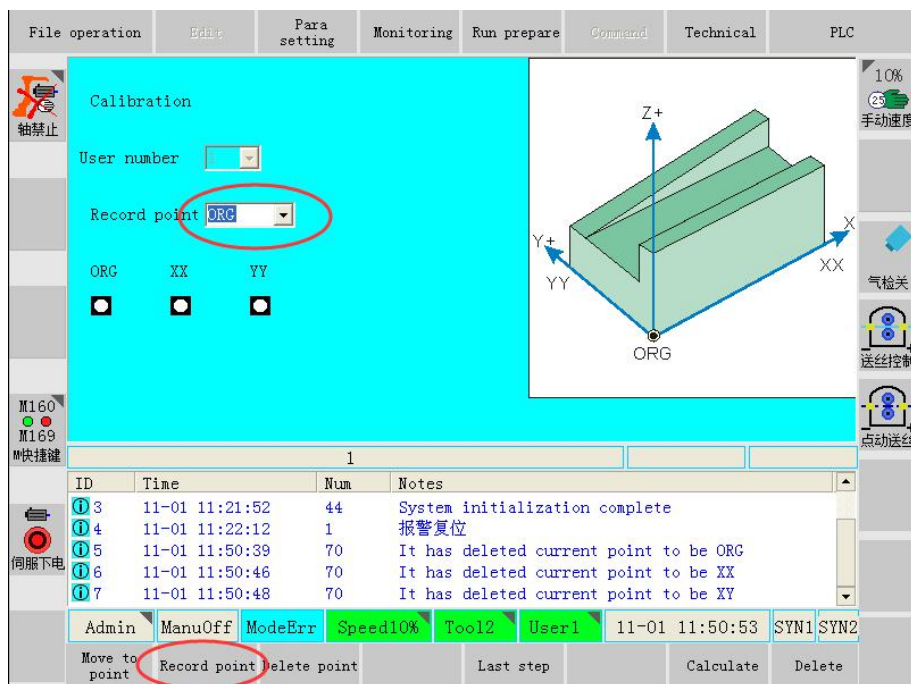
送料控制



点动送料


Setting interface of user coordination system

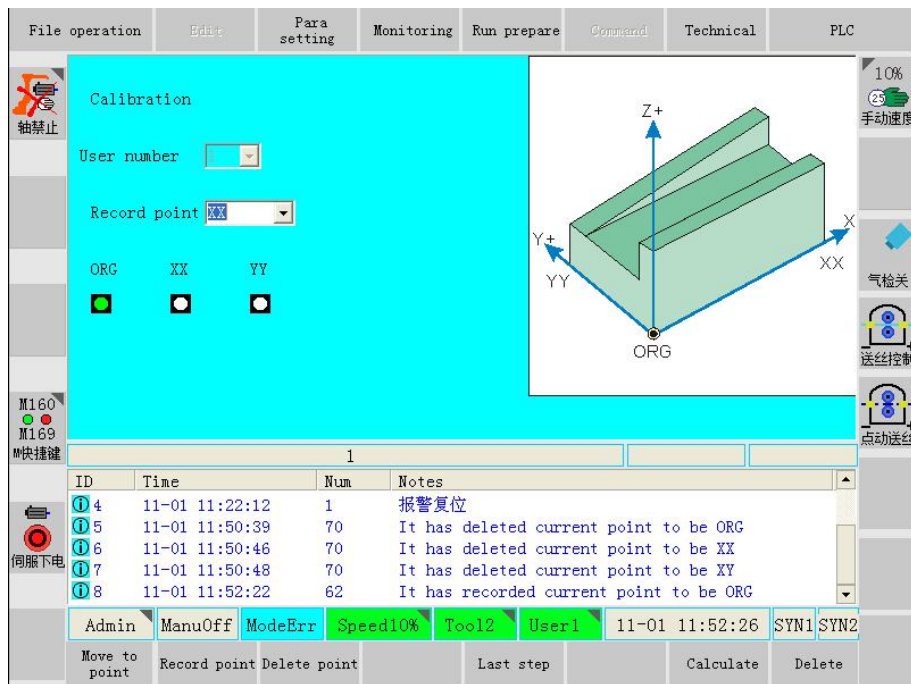




As shown in above, select the user coordination system number, click the <Calibration> , and enter the user coordination setting, as shown in below.

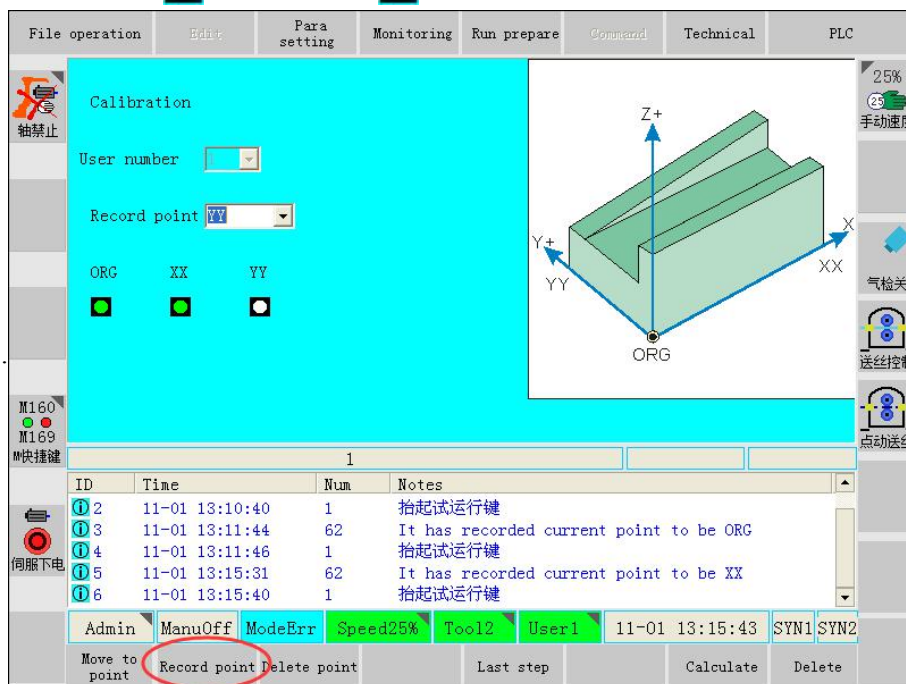




In the above figure, firstly set the zero point of user (tool) coordination system (ORG value), i.e. move the robot sharp end (welding wire in the welding machine) to one terminal of an angle on the tool. Then click <record current point> button to record the zero point. At this time, the logo below the ORG value on the screen  should become .

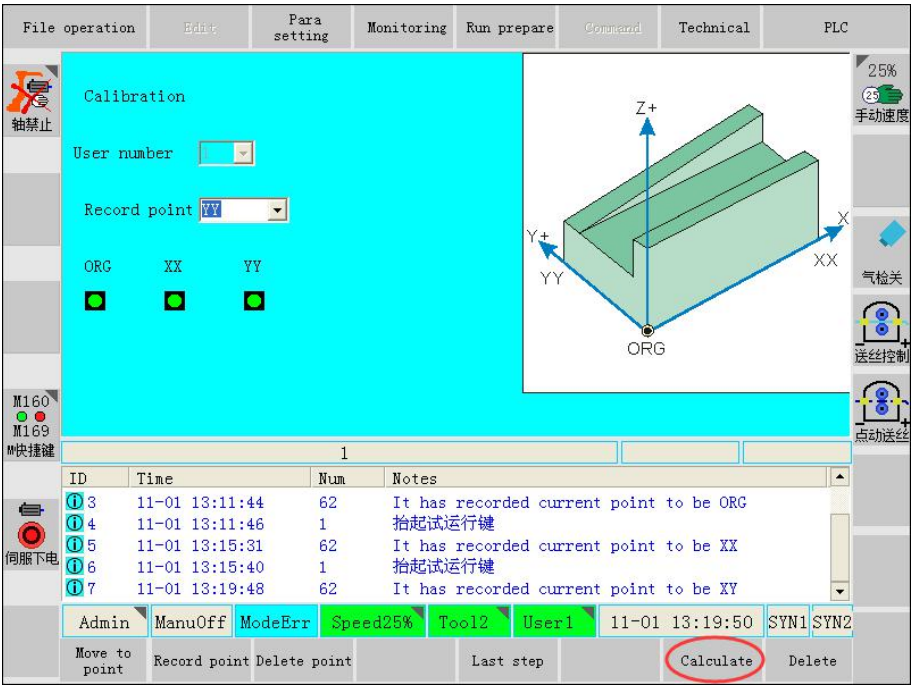
Select recoding point  . switch to "XX direction "todetermine the x edge, as shown in below.



In the above interface, set the x direction of user (tool) coordination system, i.e. move the terminal end point at the edge of tool. Then press <record current point> button to record the XX direction in user (tool) coordination system. At this time, logo below the XX direction  should become .



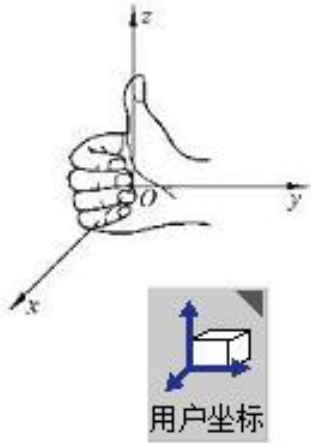
In the above interface, set the Y direction of user (tool) coordination system, i.e. move the terminal end point at the other edge of tool. Then press <record current point> button to record the YY direction in user (tool) coordination system. At this time, logo below the YY direction  should become .



After determining the zero point (ORG), XX direction, YY direction (all logos become green), press <calculate> button. Then system will automatically calculate the current user (tool) coordination system, determining the coordination system and axes on the tool.

Discription

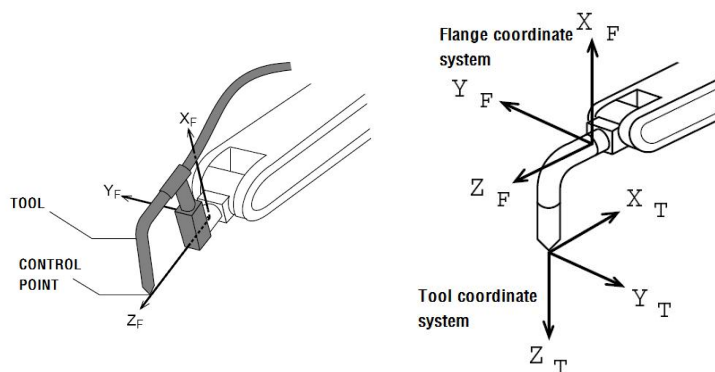
User coordination takes the right-handed spin rule (shown in below figure), i.e. orientation of Z axis is defined along the thumb direction when right hand is spin from x axis to y axis. Usually when tool coordination is setup, orientation of Z axis points away from the tool, so it should be considered which edge on the tool should be x axis, and which edge should be y axis.



After the calculation of user coordination system, users can switch to the user coordination system and verify if the tool direction is set as desired. After verification, press <cancel> to quit.

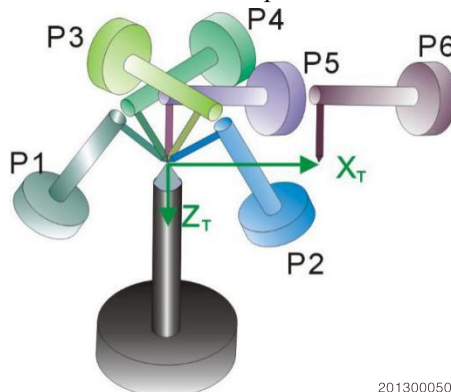
3.3.2 Tool coordination system setting

In order to control the robot for the correct linear/circle interpolation etc. movement, size information should be inputted correctly and position of control point should be defined. User coordination is determined by setting up 6 sets of terminal end of robots, then automatically calculating the position of tool control point, and inputting into the tool files. The coordination of control point in flange plate coordination system can be inputted using the tool verification, as shown in below.



Tool size is based on the coordination of robot's terminal (left figure); Relationship of tool coordination and terminal flange plate coordination (right figure)

When tool verification is operated, 6 different gesture should be taught based on the control point. Then tool size can be automatically calculated according to these 6 data. Selection of point is shown as below:

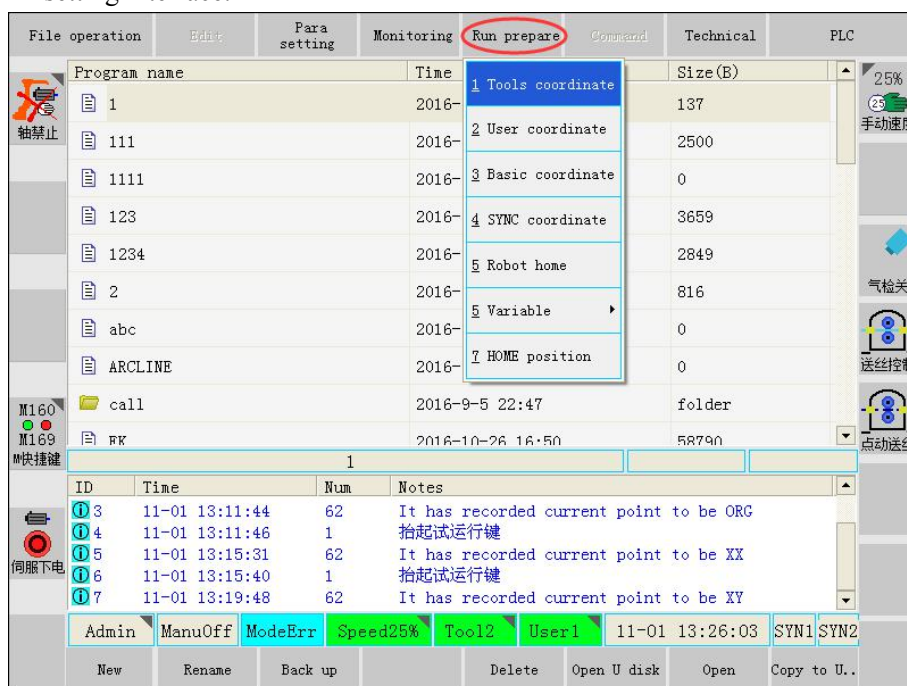


201300050

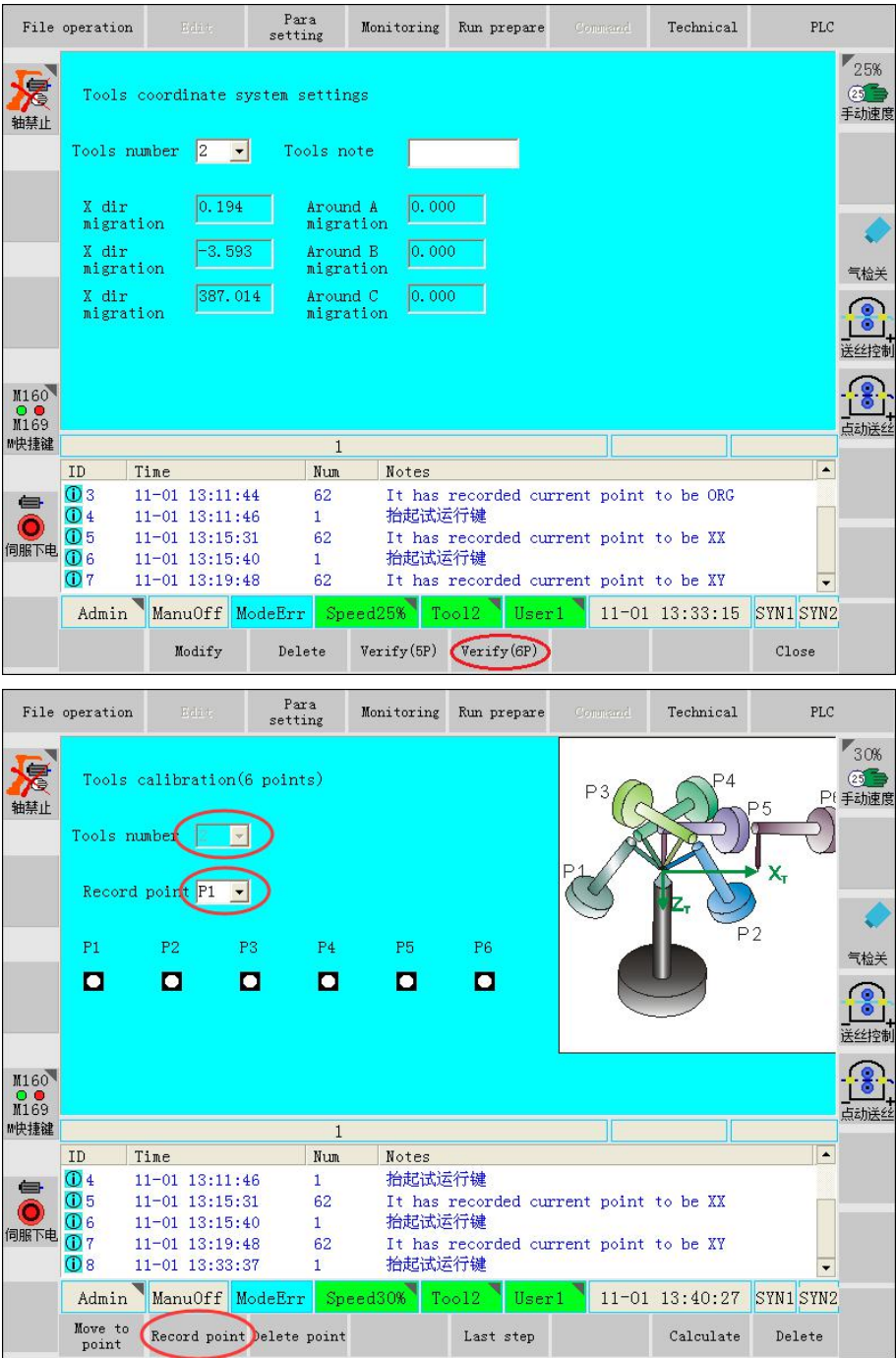
### Discription



As shown above, gesture of P1-P4 should be changed as largely as possible. At P5 point, welding wire (the straight part of welding gun) must in a straight line with verification machine. P6 point is for determination of x axis of tool coordination system, which means line connected P5 and P6 is the x axis of tool coordination system.

Steps for tool coordination system setup are as following: <Run preparation>-<Tools coordinate>, then set the tool coordination system in setting interface.



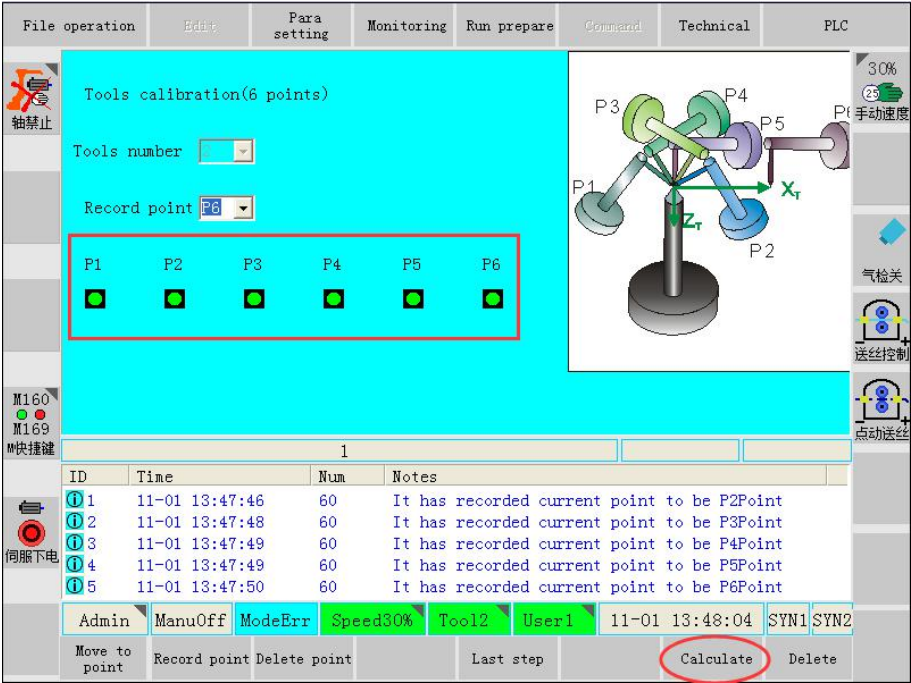
Tool coordination system setup interface.



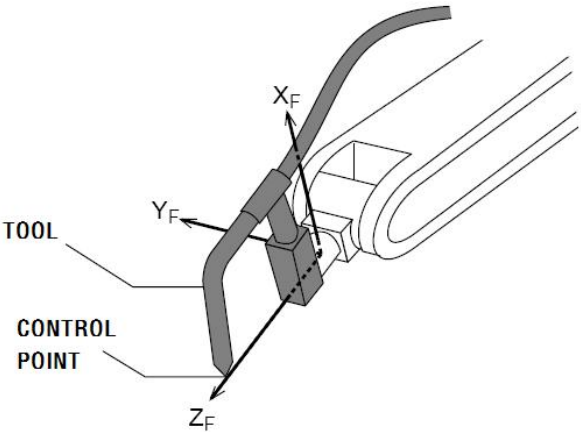
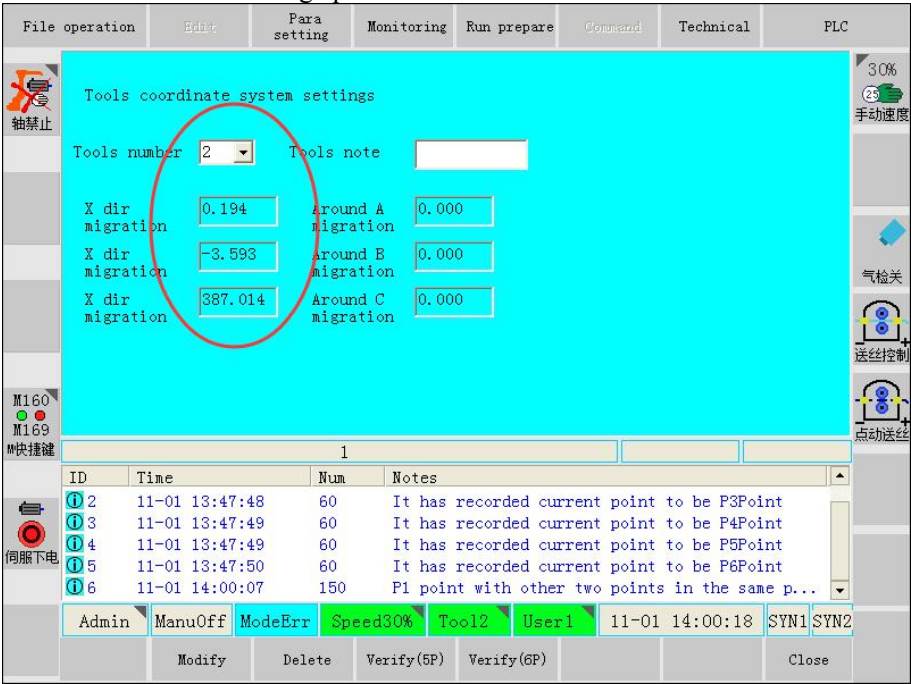
In the above figure, checks if “Tool number” is correct. Then select “record point”. Then select point, and move the welding machine sharp end (welding wire) to the correspondent position, press <Record point>, then logo below P1  will become green .Repeatedly, select point and move the welding machine sharp end (welding wire) to the correspondent position, press <Record point>, then logo below P2 will become green.

In a cyclic way, set the P3-P6, make sure the logo below the P1-P6 turns green, as shown in below figure.

Discription
As shown above, gesture of P1-P4 should be changed as largely as possible. At P5 point, welding wire (the straight part of welding gun) must in a straight line with verification machine .P6 point is for determination of x axis of tool coordination system, which means line connected P5 and P6 is the x axis of tool coordination system.

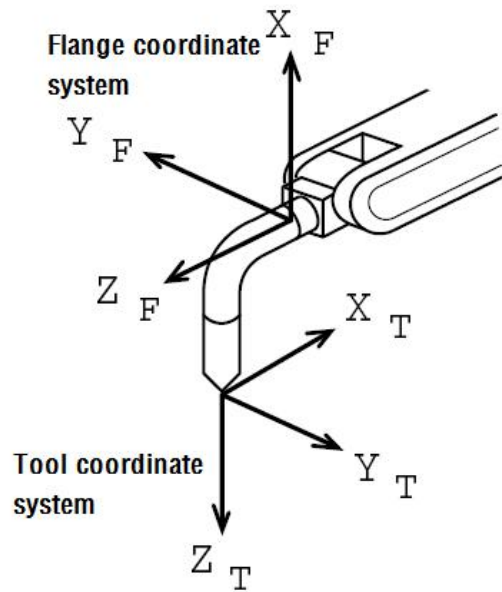


Click <calculate> in above interface, system will automatically calculate the current tool coordination, determine the coordination system and orientation on the tool. Click <cancel>, size of tool sharp point in obtained according to the flange plate at the terminal of robot.




Description

Tool size is determined according to the above figure.



Description
Tool coordination system is shown in above figure, based on the Cartesian coordination system at the tool sharp point.

After the calculation of coordination system, user can verify if the setup coordination has the desired orientation of tool axis by switching to user coordination  .

After the verification, press <close> to quit.

4 Zero return operaion

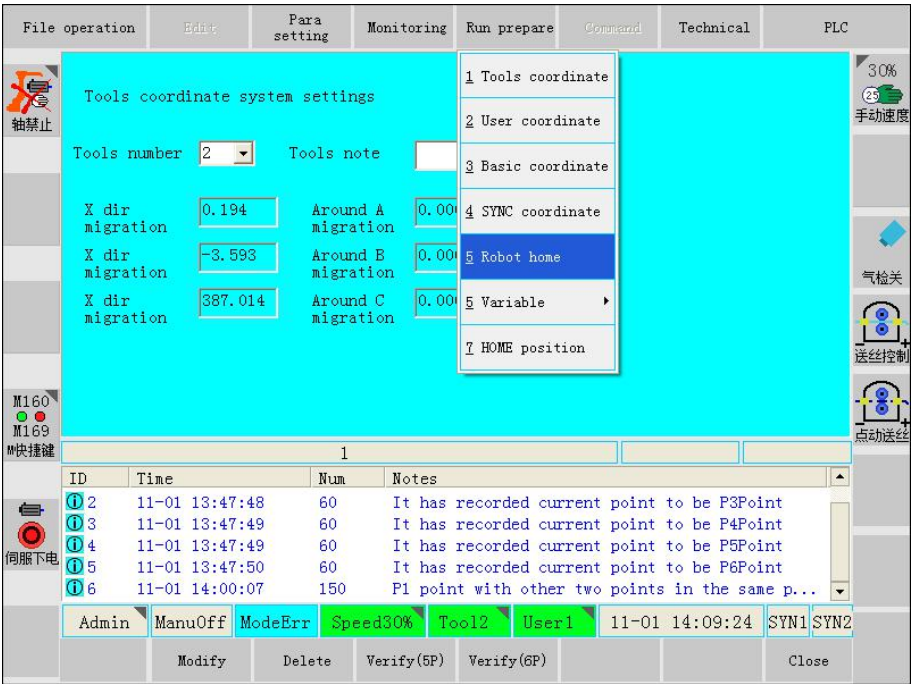
Zero return operation: System reads the feedback of servo electric machine programmer after certain operations (e.g. institute operation to zero position switches, servo electric machine seek for zero position at low speed). Then system will calculate the current system coordination based on the preset relationships.

4.1 Absolute programmer servo institute:

After fixing the absolute servo electric machine onto the mechanical body, since the absolute programmer has absolute unique position, system can calculate the coordination value based feedback position. So coordination calculation can be finished at the time servo is powered and reading the programmer. In this way, extra zero return process is unnecessary.

4.2 Incremental programmer servo institute:

Since the incremental programmer cannot guarantee the absolute and unique position, system cannot calculate the coordination value based feedback position. So it's necessary to operate the zero return to every incremental axes. Following is the description of zero return process in incremental programmer servo institute. Firstly, <Run prepare>-<Robot home>, as shown in below.

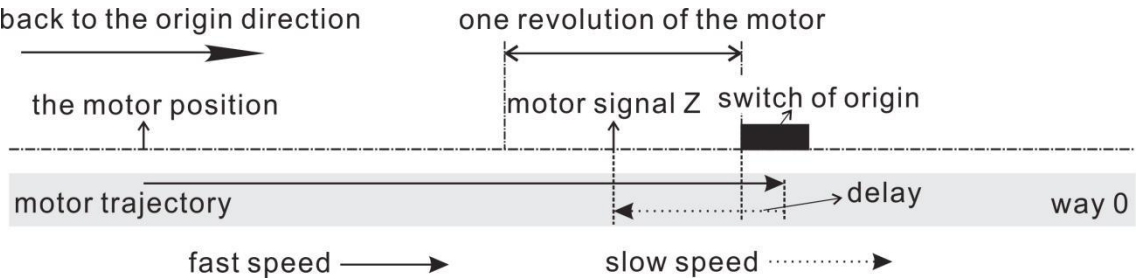


System has 5 ways to operate zero return process for incremental programmer servo institute. Specefic operation may differ in different methods. Every method is describe below:

Method 0: Detect switch

Meaning: At the current position find the zero switch at high speed (positive speed) according the preset direction. After touch the switch, reverse the direction at low speed (nagetive speed), detouch the switcha and find the z signal. Stop with one circle of electric machine, otherwise failure.

Please make sure zero switch movement normal, zero switch installation position normal, and switch is positioned ahead of the current point according the zero return direction. Move the cursor to correspondent axis position, press <security switch>-<move to zero>-<confirm>. Correspondent axis will move quickly to touch the zero return switch, stop, reverse the direction, detouch with the zero switch, detect the programmer z signal in one circle starting from separation with zero switch. Then system will show zero retun successful, indicating light of zero return becomes green, and joint coordination system will be refreshed to the correspondent coordination value.



Description
1、 It's suggested to repeat the zero returen operation to verify the accuracy of zero return operation. Feedback position fluctuates of electric machine on the driver should also be observed; usually fluctuation is the 2-3 units of instruction pulse (It's needed to shift the effective value of electric machine feedback according to the electric gear wheel).
2、 If no Z signal is found within the one circle, system will control the electric machine to reverse the direction to the starting position of the previous circle, and seek for the z signal at the low speed. If the above process has been operated for three times and no z signal is found, the system will show zero return failure. If zero return failure is frequently occurs, users can lower the reverse speed.

Mehond 1: Seek for Z pulse without zero return switches

Meaning: Seek for the z signal from the current position according the preset direction at the low speed (negative speed). If signal can be found within one circle, zero return is finished. Otherwise, zero return fails.

It's necessary to set a zero return range to guarantee the zero return consistency, i.e. the value of electric machine at certain position.

Steps to determine the zero return range:

Operate the zero return at positive direction (Move cursor to correspondent axis position, <security switch>-<back to zero>-<confirm>, and then z signal is found within one circle of electric machine. System shows zero return succeeds, indicating light of “zero condition” turns green and joint coordination is refreshed to the calculated coordination value).

After the zero return, draw a line at the static/move part of joint.

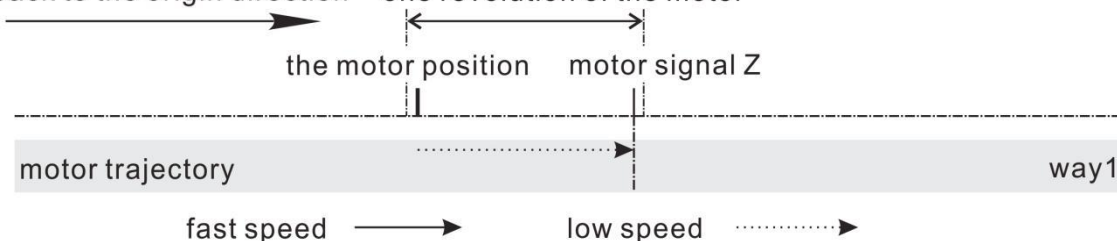
Set the speed at the lowest in teach mode, inch forward the axis joint (slight movement).

Operate the zero return again. After success, draw a line at the static joint along the rotation line of joint.

In this way, there is one line on the move joint and two lines on the static joint (These two lines determine the one circle range of electric machine).

Move into this range before zero return, which can guarantee the consistency of zero return every time.

back to the origin direction      one revolution of the motor



Description
<p>1、 The lines drew on the static joint should be observed easily. This is related with speeddown ratio and joint outside diameter. If speeddown ratio is large and joint diameter is small, the two lines will be close and easy to wrong operation.</p> <p>2、 To guarantee the two lines on the static joint is the one circle of electric machine, it's necessary to operate the zero return in two lines. After the zero return, the lines on the static and move joint will be on one line.</p> <p>3、 If system cannot find the z signal within one circle, system will control the electric machine to reverse the speed, move back to the starting point, and seek for z signal at low speed. If this process has been operated three times without z signal, system will show zero return failed. At this time, it's necessary to operate zero return instructions. If zero return failed frequently, set the “reverse speed” lower.</p> <p>4、 To test the consistency of zero return, it's suggested to repeat the zero return operation to verify the success percentage and accuracy.</p>

Method 2: Detection of detouch with switch at positive direction

Meaning: Starting according to the preset speed and direction to seek the zero switch, until detouch with the switch.

Method 3: Detection of detouch with switch at negative direction

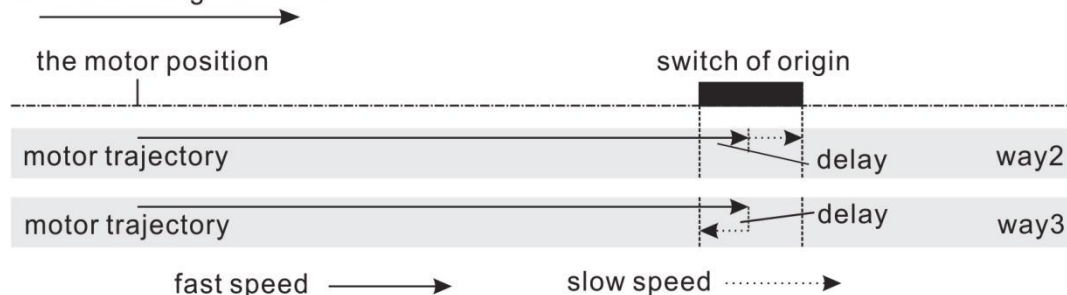
Meaning: Starting according to the preset direction to seek the zero switch. If switch is touched, move at the preset negative speed until detouch with the switch, stop.

Before the operation, please make sure zero return reference normal, switch movement normal, and switch installation properly.

Move the cursor to the correspondent axis position, press <security press>-<zero return>-<confirm>, correspondent axis will touch the decelerate switch quickly and then stop after touching the switch. Then axis will rotate along the positive direction, and system will show zero return succeed once the switch is off-touched. At this time, zero position indicating light will turn green, and joint coordination will be refreshed by correspondent coordination value.

Description
This return method isn't accurate based on zero return speed and switch conditions.

back to the origin direction



Method 4: Direct record operation:

<Run preparation>-<Robot home>-<confirm>. In the prompt interface, press <parameters modification> to modify the “correspondent coordination” bar (Parameters modification switch should be open with the users’ factory access.) into angular value in zero position of different types of robots (The specific angular value can be referred to “Commissioning manual”).

In teach mode, move every joint to the zero position of the certain type of robot (refer to “commissioning manual”), press <record>, then the indicating light of zero position will turn green, and joint coordination will be refreshed by correspondent coordination value.

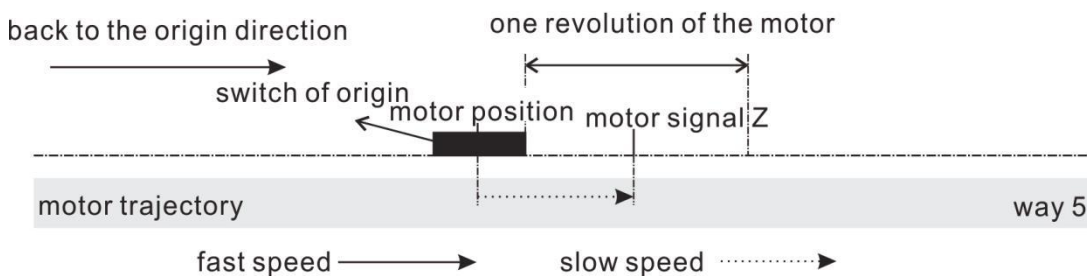
Discription
This method cannot guarantee the reproductivity, for the inconsistency is not guaranteed in every observation.

Method 5: Zero return when pressing the switch:

Before the operation, please make sure the switch movement of zero return reference point is normal and switch installation position is normal.

Move the cursor to the correspondent axis position, press <security press> to move the correspondent axis sensor switch direction. After the zero position indicating light will turn green, press <zero return>- <confirm> to detouch the axis. System will seek for programmer Z pulse within the one circle of electric machine. If system finds the z pulse, she will say the zero return succeed and, zero point position logo turn green, and joint coordination will be refreshed by correspondent coordination value.

If system cannot find the programmer z pulses, system will control the electric machine move backwards, and return to starting position and seek for the z signal slowly. If above three search isn’t work, system will advise the zero return failed. At this time, system will show zero return, and users should operate the zero return process.



Description
1、 Please make sure the indicating light of “position zero” should become green, otherwise repeat of experiment is common.
2、 If system cannot find the programmer z pulses, system will control the electric machine move backwards, and return to starting position and seek for the z signal slowly. If above three search isn’t work, system will show the zero return failed. At this time, system will show zero return, and users should operate the zero return process. Usually, if system continuously reminds you of zero return failed, users can set the lower negative speed.

## 5 Program instructions

### 5.1 Invoke of program instruction

Turn the mode security switch to teach mode.

Switch to the programlist interface, create or open a program.

Click the < **Command** > button in the status control bar, , or click the < **Movement** **Logic** > button in the functional button area to invoke the frequently used instructions. When using functional area buttons, repeat clicking the button will result into the different instructions under the menu. Click < **Last inst** > button to invoke the instructions used last time.

After the input of correct instruction parameters, click < **Inst correct** > button to input the instruction; click the


< **Inst exit** > button to cancel the instructions input. These two operation should be carried out while pressing the security switch.

## 5.2 List of program instructions

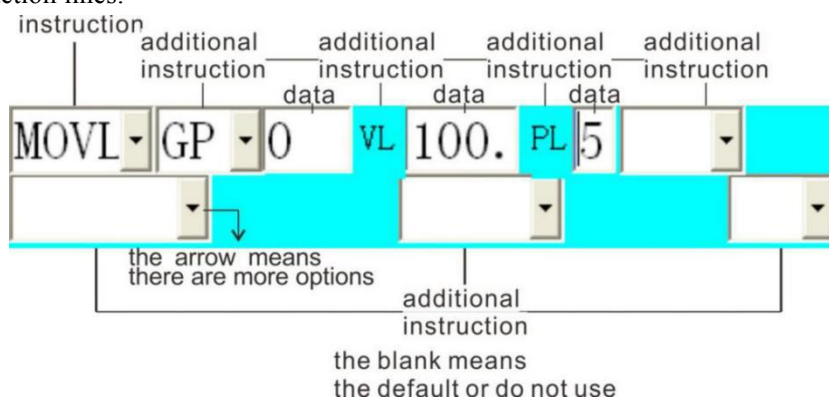
Type	Instructions in English		Type	Instructions in English	
1 Movement	1	MOVJ	8 Auxiliary Instructions	4	END IF
	2	MOVL		3	FOR
	3	MOVC		4	WHILE
2 Logic	1	DOUT		1	WHILE
	2	AOUT		2	END WHILE
	3	WAIT		5	SWITCH
	4	TIME		2	CASE
	5	PAUSE		4	DEFAULT
	6	JUMP		5	BREAK
	7	CALL		6	END SWITCH
	8	;		6	PULSE TRANSFORM
	9	*		7	PULSE TRANSFORM END
	10	RET		8	IMPUTED
	11	TDOUT		9	ZERO
3 Calculation	1	ADD		10	MOTION FINISH
	2	SUB		11	CHANGE USE
	3	MUL		12	FORBID AXIS
	4	DIV		13	FORBID AXIS END
	5	INC		14	COUNT COORD
	6	DEC		15	CHANGE USE
	7	SET	10 Vision	1	RUN VISION
4 Lifting	1	PALLET		2	GET VISION DATA
	1	ARC START		3	CLEAR VISION DATA
	2	ARC END		4	TRIGGER VISION
5 Welding	3	WEAVE		5	CHANGE VISION
	4	WEAVE END	11 Track	1	TARCK START
6 Painting	1	GUN ON		2	TARCK END
	2	GUN OFF		3	GET TRACK DATA
	3	GAS ON		4	CLEAR TARCK DATA
	4	GAS OFF		5	RUN IO CUTIN
7 Pouring			12 Communication	1	READ IO BCD
				2	READ DATA TO
8 Auxiliary Instructions	1	SPEED	13 Special instructions	1	RESET
	2	IF		2	CHANG EPOINT
		ELSE IF			
		ELSE			

### 5.3 Intruduction of program instructions

Description of instrucitons:

1.  $\diamond$  contains the selected or input content. [Blank] contains nothing, meaning don't use.
  3. Program instructionline should select or input the following tpyes of content: intrucitons, judgement symbol, data, status, number.
- Instructions: instructions need invoking, e.g.MOVJ,JUMP,GP, LI, etc.
- Judgement symbol: Used to judge the condition relationship, e.g. ==,>,<,>=,<=.
- Assignment: Set the certain port into the certain condition, e.g. Y0=ON, M24=OFF.
- Data: Data can be divided into digital, integer, minus, and characters according to the different instructions.
- Status: (ON=1, OFF=0) . The status can be used as the number 0, 1.
- Number: Number should be integer larger than 0 (0 included) according to the different instructions. The number range may alao differ.
4. The additions may differ attached to the different instructions. Please pay attention to the additions.
  5. Positions with downwards arrow symnol  should be inputted by <up/down arrows>selecting rather than directly input. Otherwise errors may occur.
  6. Please select the instructions according to the reality where many instructions are available in additional instructionsposition.
  7. 【Shortcut: 8 5 1】 Invoke the instructions using shortcut. After showing the program instruction list, instructions can be invoked by using number button, arrow button, and enter button. Examples are as following:
    - 【Shortcut: 8 5 1】 Press 8,5,1to invoke SWITCH
    - 【Shortcut: 2 1 E】 Press 2,1, enter button to invoke RET
    - 【Shortcut: 8 ↑ ↑ E】 Press8, upward arrow, upward arrow, enter button to invoke FORBIDAXISEND.

Structure of instruction lines:



Description of additional options:

Additional option formats and definition	Descriptions
VJ=<%>: Joint movement speed	Units: 1%, Max: 100%. Actual speed = highest speed of the axes in parameters× VJ × automatic operation multiplier
VL=<straight movement speed>: straight movement speed	Units: MM/S, Max: Highest straight movement speed in parameters. Actual speed = VL×automatic operation multiplier
Smoothness <Smoothness>:	Range 0-9. Basically, it's the radian of transition, which determines if the transition is performed in rectangular or circle way. Suppose two straight lines need connecting, parameters should be set to determine the radian of the transition line. The below figure is the scheme of value selection.

UNITL <condition>: Condition judgement	Parameters can be used to judge: X<variable #>, M<variable #>, T<variable #>, C<variable #>; The condition of user judgment is effective (ON=1), ineffective (OFF=0). E.g. UNTIL X#(0)==ON to judge X0 port is effective; UNTIL M#(3)==OFF to judge the M3 auxiliary relay is ineffective.
X<Variable #>: General input X port	General input X port: this port is related to hardware physical port. Status variable (ON=1, X<variable #>: general input OFF=0), range: 0-111. Port status can be monitored in the "Monitor"- "I/O port"- "general input port monitor". variable # can be referred to "Hardware operation manual"
M<variable #>: Internal auxiliary 0-800.	Internal auxiliary M relay. Status variable (ON=1, OFF=0), range: 0-800 The function definition, variable # of the auxiliary relay can be referred to "PLC manuals". The status of relay can be monitored in the "Monitor"- "PLC"- "M".
GI<variable #>: global I variable	range: 0-99, values should be integer, with positive or negative symbol. So when Program first invokes the same variable number, the value of the variable is same. When Program secondly invokes the variable number, the value of the variable will be covered. This variable can be monitored in "operation preparation"- "variables"- "global I variables" list.
LI<variable #>: local I variable	range: 0-1000, values should be integer, with positive or negative symbol. When different programs invoke the same variable number, the correspondent values are not same, and will not interface and independent. This variable can only be shown in the variable list when the program is open.
GD<variable #>: Global D variable	range: 0-99, values should be float, with three decimal places (.000) and positive or negative symbol. So when Program first invokes the same variable number, the value of the variable is same. When Program secondly invokes the variable number, the value of the variable will be covered. This variable can be monitored in "operation preparation"- "variables"- "global D variables" list.
LD< variable #>: local D variable	range: 0-1000, float variable, values should be float, with three decimal places (.000) and positive or negative symbol. When different programs invoke the same variable number, the correspondent values are not same, and will not interface and independent. This variable can only be shown in the variable list when the program is open.
GP< variable #><data number>: Globla P variable	GlobleP variable, combination of multi-data, used to record the joint gesture, coordination, etc., of lathe. Variable range: 0-999, number range: 0-11. Data number refers to the certain data in the GP variables combination. Data number is difined as: 0: operate the whole data combination; 1: operate the x axis data; 2: operate the y axis data; 3: operate the z axis data; 4: operate the J1 axis data; 5: operate the J2 axis data; 6: operate the J3 axis data; 7: operate the J4 axis data; 8: operate the J5 axis data; 9: operate the J6 axis data; 10: operate the J7 axis data; 11: operate the J8 axis data; So when Program first invokes the same variable number, the value of the variable is same. When Program secondly invokes the variable number, the value of the variable will be covered. So when using the previously used variable numer, please pay attention in case of wrong movement or danger.

	This variable can be monitored in “operation preparation”-“variables”-“global P variables”list.
LP< variable #><data number>: Local P variable	<p>Local P variable, combination of multi-data, used to record the joint gesture, coordination, etc., of lathe. Variable range: 0-1000, number range: 0-11.</p> <p>Data number refers to the certain data in the LP variables combination. Data number is defined as:</p> <p>0: operate the whole data combination;  1: operate the x axis data;    2: operate the y axis data ;  3: operate the z axis data :    4: operate the J1 axis data ;  5: operate the J2 axis data ;    6: operate the J3 axis data ;  7: operate the J4 axis data ;    8: operate the J5 axis data ;  9: operate the J6 axis data ;    10: operate the J7 axis data ;  11: operate the J8 axis data ;</p> <p>When different programs invoke the same variable number, the correspondent values are not same, and will not interface and independent. For example, when one program invokes variable L90, and another program invokes variable L90, these two L90 variables are independent and will not interface. This variable can only be shown in the variable list when the program is open.</p>
Y<variables>: general output port	<p>General output port, which is related with hardware physical port.</p> <p>Status variable (ON=1, OFF=0) , range 0-79.</p> <p>This variable can be monitored in “Monitor”-“IO port”-“general output monitor”. Variable number is referred to “Hardware manual”.</p>
T<variable #>: Timer	<p>T&lt;variable #&gt; Internal timer number, status variable (ON=1, OFF=0) , range 0-59. The status of this variable is ON or OFF.</p> <p>Status of timer can be monitored in “Monitor”-“PLC”-“monitor of timer”.</p>
TC<variable #>: value in the timer	<p>T&lt;variable #&gt;internal timer data, number variable.</p> <p>This data can be monitored in “Monitor”-“PLC”-“monitor of timer”.</p>
C< variable #>: counter	<p>C&lt;variable #&gt;internal counter number, status variable (ON=1, OFF=0) , range 0-19.</p> <p>This counter status can be monitored in “Monitor”-“PLC”-“monitor of conter”.</p>
CC< variable #>: value in the counter	<p>C&lt;variable number&gt;internal counter data, number variable, range 0-19.</p> <p>This data can be monitored in “Monitor”-“PLC”-“monitor of conter”.</p>
GS< variable #>: global character string variable	<p>GS character string variable, range 0-99. This variable is mainly used to read the barcode and to edit data from external I/O port. This variable should be used with READ DATA TO or READ IO BCD instructions. E.g.:</p> <p>READ DATA TO GS# (0) : read barcode to variable GS0</p> <p>PAUSE IF GS#(0)=123456 : pause when GS0=123456</p> <p>.....</p>
D< variable >: user-defined numer variable	User-defined numer variable, which is the specific data user can input. This variable can use +/- symbol, and can be a decimal.
==: judge equal	<p>Judge if two variables are equal or not. Both number variable and status variable is available.</p> <p>E.g.:</p> <p>X0==ON; LI0=LI2; etc.</p>
>: judge greater than	<p>Judge if the former variable is greater than the later one. Number variable is used here. E.g.:</p> <p>LD0&gt;LI2; CC0&gt;LD1; etc.</p>
<: judge less than	<p>Judge if the former variable is less than the later one. Number variable is used here. E.g.:</p> <p>LD0&lt;LI2; CC0&lt;LD1; etc.</p>
>=: judge equal or greater than	<p>Judge if the former variable is equal to or greater than the later one. Number variable is used here. E.g.:</p> <p>LD0&gt;=LI2; CC0&gt;=LD1; etc.</p>
<=: judge equal or less than	<p>Judge if the former variable is equal to or less than the later one. Number variable is used here. E.g.:</p> <p>LD0&lt;=LI2; CC0&lt;=LD1; etc.</p>
=: Setting symbol	<p>Set the former variable into the certain status, e.g.:</p> <p>Y0=ON, M24=OFF, etc.</p>

### 5.3.1 Movement instrument

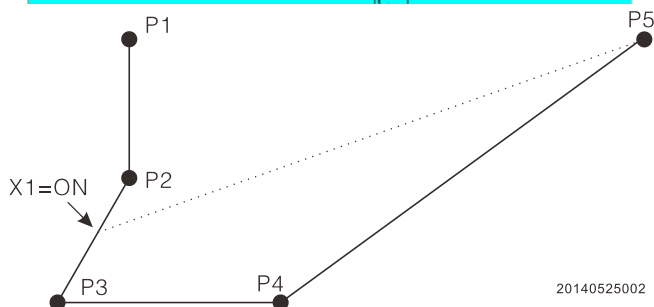
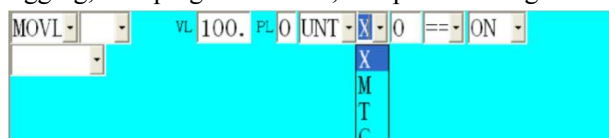
Movement instructions include three instructions: MOVJ、MOVL、MOVC

1Joint move (MOVJ)	functions	Move to the teach position in joint interpolation way. Movement speed of each joint is axis speed×VJ×automatic multiplier.	
	additions	[blank] GP<variable> LP< variable>	Position data, blank is shown in this bar on screen. GP variable, variable#: 0-999 LPvariable, variable#: 0-999
		VJ=<%>	VJ speed percentage, percentage: 1%-100%.
		PL=<smoothness>	PL smoothness: 0-9
		[blank] UNTIL<condition>	Not available Condition. When condition is satisfied, the current line will be stopped, and the next will be executed. Detailed can be found in addition description 1.
		[blank] COORD COORD1 COORD2	Not available Added axis 1 and 2 is cooperated simultaneously Added axis 1 cooperated independently Added axis 2 cooperated independently Detailed refer to “chap9 1 cooperation manual”
	example	MOVJ VJ=30% PL=3 MOVJ VJ=30 GP#0 PL=3 UNTIL M#(0)==ON	

Addition description 1: example of UNTIL:

Execution condition. Then condition is satisfied, current program line will be stopped, and next line will be executed. Otherwise, execute current line before executing the next line. X, M, T, C can be used as condition.

This function could be used in digging, scooping aluminium, and plate loading.



position	line	program
P1	1	MOVJ VJ=30% PL=0
P2	2	MOVL VL=500MM/S PL=0
P3	3	MOVL VL=200MM/S PL=0 UNTIL X#(1)==ON
	4	JUMP *22 IF X#(1)==ON
P4	5	MOVL VL=200MM/S PL=0
	6	*22
P5	7	MOVJ VJ=30% PL=0

Notice:

After X1 is effective, system will jump out of the current 3# line, and execute the 7# line.

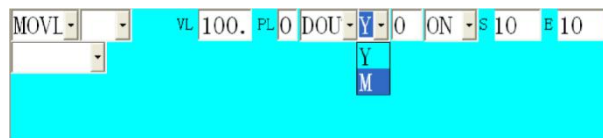
The effective time of X1 should be long, otherwise system will execute 5 lines.

2straight move (MOVL)	fucntions	Move to the teach position in a straight interpolation way. Each joint will move in straight interpolation way with the speed of VL×multiplier.	
	additions	[blank] GP<variable> LP< variable>	Position data, blank in this bar on the screen. GP variable, variable #: 0-999 LPvariable, variable#: 0-999
		VL=<straight move	Straight move speed, unitMM/S, max parameter of straight move

		speed>	highest speed.
		PL=<smoothness>	PLsmoothness: 0-9
		[blank] UNTIL<condition> DOUT<addition> AOUT<addition>	Not available UNTIL: When condition is satisfied, stop executing the current line and move to next line. Details can be found in addition description 1 of MOVJ. DOUT: output signal in movement. Details can be found in addition description 2 of MOVJ. AOUT: output analogous index in movement. Details can be found in addition description 3 of MOVJ.
	example	[blank] COORD COORD1 COORD2	Not available Added axis 1 and 2 is cooperated simultaneously Added axis 1 cooperated independently Added axis 2 cooperated independently Detailed refer to “chap9 1 cooperation manual”
		MOVL VL=500MM/S PL=0 MOVL VL=500MM/S GP#3 PL=5 UNTIL X#(0)==ON MOVL VL=500MM/S PL=0 DOUT Y#(0)==ON START 10.0 END 10.0 MOVL VL=500MM/S PL=0 AOUT A1=2.0 A2=2.0	

Addition description 2: DOUT example:

This addition is used to set a distance where the program should switch certain signal (M、Y) effective or ineffective, and to set a distance where restore that signal.

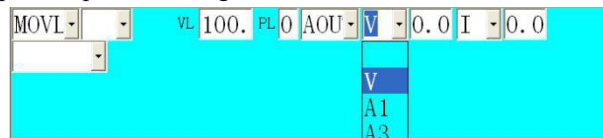


Example: MOVL VL=500MM/S PL=0 DOUT Y#(0)==ON START 10.0 END 10.0 Description: After executing this program, 10MM later, Y0 port change into open (ON) . Robot keep moving to the point 10MM away from the end, and Y0 change to close (OFF) . Then program come to the end.

This function can be used to open/close the gun in painting operation.

Addition description 3: AOUT example:

This addition is used to output the preset analogous index in the movement or at the end point.



### 1) V I analogous output:

VI analogous index output can only be used among the welding instructions. If V1 is not among the welding instructions, when this line is executed, system will alert and prompt: no welding info, AOUT is not allowed to change the welding current and voltage during the movement.

V is correspondent to welding voltage, while I is correspondent to welding current. When this instruction is executed from the beginning to the end, analogous voltage will change linearly from welding voltage to setting voltage.

Example:

Welding current 200A~analogous index 4.95V, welding voltage 20V~ analogous index 4.95V; Welding current 400A~analogous index 9.95V, welding voltage 40V~analogous index 9.95V.

ARCSTART# (0)

MOVL VL=500MM/S PL=0 AOUT V=40.0 I=400.0A

ARCEND# (0)

Description:

When 1<sup>st</sup> line is executed, A1 and A2 will output the arc start voltage. When 1<sup>st</sup> line is finished, A1 and A2 analogous index output is 4.95V (Welding current and voltage) .When 2<sup>nd</sup> line is finished, A1 and A2 analogous index output change linearly from 4.95V to 9.95V. When 3<sup>rd</sup> line is executed, voltage become arc ending voltage.

This function can be used in the situation where welding current and voltage need changing.

A1 A2 analogous output:

When this instruction is between the welding instructions, it's ineffective, and system will output according with the welding process settings.

When this instruction isn't between the welding instructions, system will output the A1 and A2 analogous index at the end of this instruction line. This is called point output for short.

A3 A4 analogous output:

No matter if this instruction is between the welding instructions or not, when system execute this instruction, robot will operate from the beginning to end, A3 and A4 analogous index will change linearly from starting point to the end point. This is called linear output for short.

Example:

MOVJ VJ=30% PL=0 ; Point A A3=0 A4=0

MOVL VL=500MM/S PL=0 AOUT A3=10.0 A4=10.0 ; Point B

Description: Robot moves from point A to point B, and A3 and A4 analogous index change linearly from 0V to 10V.

3.Circle move (MOVC)	functions	Move to the teach position in the circle interpolation way. Each joint will move in the circle interpolation with the speed of VL×automatic multiplier. The whole circle consists of two circular arcs, using at least four circular arc instructions. Details should refer to integrated example.	
	additions	[blank] GP<variable> LP<variable>	Position data, blank in the bar on the screen GPvariable, variable#: 0-999 LPvariable, variable#: 0-999
		VL=<straight move speed>	Straight move speed, units MM/S , max is parameters of highest straight move speed.
		PL=<smoothness>	PL smoothness: 0-9
		<variable>POINT	Range: 1-3. One circular track must be realized by three circular instructions. Three circular instructions define the arc starting point, middle point, and end point. 1POINT is the starting point of arc, 2POINT is the middle point of arc, 3POINT is the end point of arc.
		[blank] UNTIL<condition> DOUT<addition> AOUT<addition>	Not available UNTIL: When condition is satisfied, system will stop executing the current line and move to the next line. Details can be found in the MOVJ addition description 1. DOUT: output signal during movement. Details can be found in MOVL additions description 2. AOUT: output analogous index during movement. Details can be found in MOVL additions description 3.
	example	[blank] COORD COORD1 COORD2	Not available Added axis 1 and 2 is cooperated simultaneously Added axis 1 cooperated independently Added axis 2 cooperated independently Detailed refer to “chap9 1 cooperation manual”
		[blank] COORD COORD1 COORD2	Not available Added axis 1 and 2 is cooperated simultaneously Added axis 1 cooperated independently Added axis 2 cooperated independently Detailed refer to “chap9 1 cooperation manual”

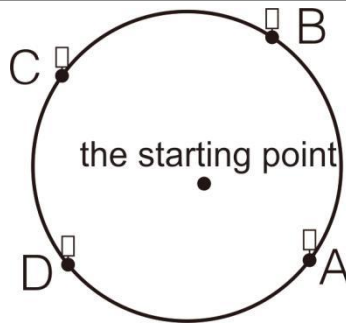
Integrated example of circular program without gesture:

Description
In order to move smoothly, please set the PL of every point (including starting point and every point on the arc) as 9.

Whole circle consists of ABC arc and CDA arc. Terminal of robot is located at the starting point. Program as follows:

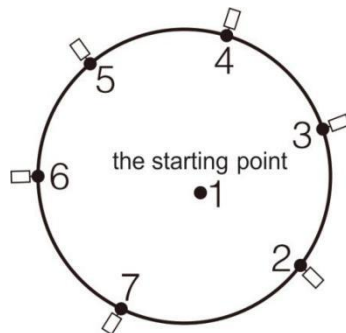
MOVL VL=500MM/S PL=9	Move from starting point to point A, taking A as the first point on the arc.
MOVC VL=500MM/S PL=9 POINT=2	Move from A to B, taking B as the second point on the arc.
MOVC VL=500MM/S PL=9 POINT=3	Move from B to C, taking C as the third point on the arc and as the first point

	on the arc CDA.
MOVCL VL=500MM/S PL=9 POINT=2	Move from C to D, taking D as the second point on the arc.
MOVCL VL=500MM/S PL=9 POINT=3	Move from D to A, taking A as the third point on the arc.



Whole circle with gesture consists of three arcs.

6points is needed (2 3 4 5 6 7)as follows:



MOVCL VL=500MM/S PL=9	Move from starting point to point 2, taking 2 as the first point on the arc.
MOVCL VL=500MM/S PL=9 POINT=2	Move from point 2 to 3, taking 3 as the second point on the arc.
MOVCL VL=500MM/S PL=9 POINT=3	Move from point 3 to 4, taking 4 as the third point on the arc and as the first point on the next arc.
MOVCL VL=500MM/S PL=9 POINT=2	Move from 4 to 5, taking 5 as the second point on the arc.
MOVCL VL=500MM/S PL=9 POINT=3	Move from 5 to 6, taking 6 as the third point on the arc and as the first point on the next arc.
MOVCL VL=500MM/S PL=9 POINT=2	Move from 6 to 7, taking 7 as the second point on the arc.
MOVCL VL=500MM/S PL=9 POINT=3	Move from 7 to 2, taking 2 as the third point on the arc. At this time, whole circle with gesture is finished.

### 5.3.2 Logic Instructions

1 Digital quantity output (DOUT)	Functions	Control the status of variables. Only two types of index exists, i.e. “ON（effective）” 和“OFF（ineffective）”.		
	Additions	Y<variable>= M<variable>=	ON OFF	Control the output port Y <variable>in ONor OFFstatus. Range of variables numbers should refer to “hardware manual” or “PLC manual”. Control the auxiliary relay M<variables>in ONor OFF status. Range of variables numbersshould refer to “PLC manual”.
	example	DOUT Y#(0)=ONControl output port Y0 into ON status DOUT M#(0)=OFF Contorl the auxiliary relay M0 into OFF status		
2Analogous output (AOUT)	functions	Output the analogous voltageof analogous port.		
	additions	AO#<variable>=	Set the anaologous output port, range from A1-A2 in S40 and A1-A4 in S80.	
		<variable>	Variable is the output analogous voltage, range0.000-10.000V	
	example	AOUT AO#(1)=0.000 output analogous 0V voltage in A1 port. AOUT AO#(2)=10.000 output analogous 10V voltage in A2 port.		
3 conditional wait	functions	When condition is satisfied, program will execute the following code. When condition is not satisfied, program will wait until condition is satisfied. However, there is a		

( WAIT )		waiting time setting, when the condition is not satisfied but waiting time reaches the set time, program will move on .				
	additions	X<variable>== M<variable#>==		ON OFF	Judge if the input port X<variable> is ON or OFF. Range of variable number should refer to“hardware manual”. Judge of the auxiliary relay M<variable#>is ONor OFF 。 Range of variable number should refer to “PLC manual”.	
		DT=<variable>		Instruction waiting time, units 1MS. DT = 0 means waiting the condition forever. DT ≠0 means whether condition is satisfied or time is reached, program will move on.		
		CT=<variable>Signal last time, units 1MS.CT=0 means once condition is satisfied, program will move on. CT≠0 means condition need to last for a set time, then condition is regard as satisfied and program will move on.				
	example	WAIT X#(0)==ON T=0 Waiting X0 into On status forever. WAIT M#(1)==OFF T=500 Waiting M1 relay into ON status in 500MS, otherwise, program will move on.				
4 Delay ( TIME )	functions	Waiting for asetting time (relay time), then program can move on.				
	additions	T=<variable>		Set the waiting (relay) time, units1MS, range: 1-9999999MS		
	example	TIME T=50        waiting for 50MS				
5 pause ( PAUSE )	functions	Pause without condition: pause until pressing “operation” button. Pause with condition: when following condition is satisfied, pause, or operate continuously.				
	additions	[blank]			Pause without condition	
		IF	X<variable#>	==	ON OFF	Pause with condition: If        condition        is satisfied,pause, otherwise,execue in order.
			M<variable#>			
			Y<variable#>			
			T<variable#>			
			C<variable#>			
			GI<variable#>	>	GI<variable#> LI<variable#> GD<variable#> LD<variable#> GP<variable#> LP<variable#> TC<variable#> CC<variable#> D<variable#>	
			LI<variable#>	<		
			GD<variable#>	>=		
			LD<variable#>	<=		
			GP<variable#><data#>	=		
			LP<variable#> <data#>			
TC<variable#>						
CC<variable#>						
GS<variable#>		<character string>				
example	PAUSE PAUSE IF X#(0)==ON PAUSE IF GD#(1)==LD#(1)			Pause without condition If X0=ON, pause. Otherwise, continue. If GD1=LD1, pause. Otherwise, continue.		
6        condition jump ( JUMP )	functions	Jump with condition and without condition. description: 1、 When using this instruction, star symbol ( * ) should be used to lable which line program need to jump to. Jump without condition: once program is executed here, jump to the labeled postion. Jump with condition: when this line is executed, if condition is satisfied, program will jump to the labeled line. If condition is not satisfied, program will executed in order.				
		addition	*<variable>		Jump to symbol: jump to the position labeled with *<variable> ; variable can be any character or number.	
	[blank]		jump without condition			
	IF		X<variable#>	==	ON OFF	Jump with condition: If condition is satisfied, jump to the position labeledwith *<variable>.
			M< variable#>	>		
Y< variable#>		<				
T< variable#>		>=				

			C< variable#>	<=		If condition is not satisfied, program will be executer in order.	
			GI< variable#>		=		
			LI< variable#>				GI< variable#>
			GD< variable#>				LI< variable#>
			LD< variable#>				GD< variable#>
			GP< variable#><data#>				LD< variable#>
			LP< variable#><data#>				GP< variable#>
			TC< variable#>				LP< variable#>
			CC< variable#>				TC< variable#>
			GS< variable#>				CC< variable#>
							<character string>
	example	1 * 345T : label *345T positin ..... 6 JUMP *SES IF M#(1)==ON : if M1=ON, jump to *SES position ..... 12 JUMP *345T : Jump to *345T position without conditoin 13 *SES : label *SESposition ..... : Following lines					
7 call the sub program (CALL)	functions	Call the sub program, including call with condition and call without condition. descriptions : 1、The difference of main program and sub program is that sub program is ended with RET. % is the subprogram users want to call. If no condition attached, program will call the sub program at this line. If condition is attached with call instruction, program will judge if the condition is satisfied. If satisfied, then call the subprogram. When using call without condition, there are fixed internal subprograms inside the robot to control the sliding table and spray gun (e.g. auto rotation 90, quick strat, etc.).					
		additions	%<program name>		name of sub program users want to call		
			[blank]		Call without condition. Call<program name >sub program when this line is executed.		
			IF	X<variable#>	== > < >= <= =	ON OFF	Call with condition: If condition is satisfied, call the <program name> sub program. If condition is not satisfied, program will be executed in order.
				M< variable#>			
				Y< variable#>			
				T< variable#>			
				C< variable#>			
				GI< variable#>		GI<variable>	
				LI< variable#>		LI <variable>	
				GD< variable#>		GD<variable>	
LD< variable#>	LD<variable>						
GP< variable#><data#>	GP<variable>						
LP< variable#><data#>	LP<variable>						
TC< variable#>	TC<variable>						
CC< variable#>	CC<variable>						
GS< variable#>	D<variable>						
	<character string>						
	example	CALL 125 call the subprogram with name of 125 CALL %SBS IF LD#(1) > LD#(2) If LD1>LD2, call SBS sub program.					
8 notes ( ; )	function	Note for explain. When program comes to this line, notes will not be executed. Notes are used to help users to understand the program.					
	addition	; <notes>			Users can write the notes to check and understand the program.		
	example	; tqzl : notes are tqzl, which will not be executed.					

9jump symbol	function	Label the jump position. It should cooperate with jump instruction.		
	addition	*<variable>	Variable can be any character or number.	
	example	* ssb4 : label jump position: *ssb4 .....		
10subprogram return 10 (RET)	function	RET instruction means the current program is sub program. System will return to main program when RET instruction is executed.		
	addition	none		
	example	..... RET : return from sub program to mian program		
11output with time (TDOU) 【shortcut: 2 1 1 E】	function	When this instruction is executed, after a certain period of time, Y or M will switch to the specific condition difined in the instruction.		
	addition	none		
	example	TDOU Y#(0)=ON T=1000 : After1S, Y0 port will switch to ON status.		

### 5.3.3 Calculation instructions

1Add (ADD) 【shortcut: 3 1】	function	Add the former variable with later variable, and the result will be set to the former variable. E.g. : A=A+B. This instruction can only be used with number variables.		
	addition	GI<variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#> LP< variable#><data#>TC< variable#> CC< variable#>	GI< variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#> LP< variable#><data#>TC< variable#> CC< variable#> D< variable#>	Add the former variable with later variable, and the result will be set to the former variable.
	example	ADD TC#(4) GP#1(1) : TC4=TC4+GP1 x axis coordination ADD CC#(1) 20.5 : CC1=CC1+20.5		
2 subtraction (SUB) 【shortcut: 3 2】	function	Substrect latter variable from the former one and the result will be setto the former variable. E.g. : A=A-B. This instruction can only be used with number variables.		
	addition	GI< variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#> LP< variable#><data#> TC< variable#> CC< variable#>	GI< variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#> LP< variable#><data#> TC< variable#> CC< variable#> D< variable#>	Substrect latter variable from the former one and the result will be setto the former variable.
	example	SUB TC#(4) GP#1(1) : TC4=TC4-GP1 x axis coordination SUB CC#(1) 20.5 : CC1=CC1- 20.5		
3 multiplication (MUL) 【shortcut: 3 3】	Function	Multiply the former variable with the latter one and the result will be set to the former one. E.g. : A=A×B。 This instruction can only be used with number variables.		
	addition	GI< variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#> > LP<	GI< variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#> LP< variable#><data#> TC< variable#> CC< variable#>	Multiply the former variable with the latter one and the result will be set to the former one.

		variable#><data#> > TC< variable#> CC< variable#>	D< variable>	
	example	MUL TC#(4) GP#1(1) : TC4=TC4×GP1 x axis coordination MUL CC#(1) 20.5 : CC1=CC1×20.5		
4 division ( D I V ) 【 shortcut : 3 4】	function	Devide the former variable with the latter one and the result will be set to the former one. E.g.: A=A÷B。 This instruction can only be used with number variables.		
	additions	GI< variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#> LP< variable#><data#> TC< variable#> CC< variable#>	GI< variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#> LP< variable#><data#> TC< variable#> CC< variable#> D< variable>	Devide the former variable with the latter one and the result will be set to the former one.
	example	DIV TC#(4) GP#1(1) : TC4=TC4÷GP1 x axis DIV CC#(1) 20.5 : CC1=CC1÷20.5		
5 incresement +1 ( I N C ) 【 shortcut : 3 5】	functions	Add 1 to the variable, and the result will be set to the variable. E.g.: A=A+1. This instruction can only be used with number variables, and usually it's used to count.		
	additions	GI< variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#> LP< variable#><data#> TC< variable#> CC< variable#>	Add 1 to the variable, and the result will be set to the variable.	
	example	INC TC#(4) : TC4=TC4+1 INC CC#(1) : CC1=CC1+1		
6 decrease -1 ( D E C ) 【 shortcut : 3 6】	functions	Substract 1 from the variable and the result will be set to the variable. E.g.: A=A-1. This instruction can only be used with number variables, and usually it's used to count.		
	additions	GI< variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#> LP< variable#><data#> TC< variable#> CC< variable#>	Substract 1 from the variable and the result will be set to the variable.	
	example	DEC TC#(4) : TC4=TC4-1 DEC CC#(1) : CC1=CC1-1		
7 set ( S E T ) 【 shortcut : 3 7】	functions	Set the former variable value as the latter one. E.g.: A=B. This instruction can only be used with number variables		
	additions	GI< variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#>	GI< variable#> LI< variable#> GD< variable#> LD< variable#> GP< variable#><data#>	Set the former variable value as the latter one.

		LP< variable#><data#> TC< variable#> CC< variable#>	LP< variable#><data#> TC< variable#> CC<variable#>D<data#>	
	example	SET TC#(4) GP#1(1) : TC4=GP1 X axis coordination SET CC#(1) TC#(1) : CC1=TC1 SET TC#(1) 5.000 : TC1=5		

### 5.3.4 Pallet instruction

1Pallet (PALLET) 【 shortcut : 4 E】	Function	Operate pallet process. When this instruction is operated, program will call the preset palletizing process. Variablenumber is the process number, range 0-9. Detailed palletizing infos can be found in “palletizing process manual”.	
	addtion	#<variable#>	Variable is thepalletizing process number users want to call.
	example	PALLET#(1) : Call palletizing process 1#	

### 5.3.5 Welding instructions

1Start arc (ARC START) 【shortcut: 5 1】	function	When this instruction is executed, system will call the preset welding parameters and start the arc. Variable number is the welding document number, range 0-7. The ARC START and ARC END are used in pair. Speed of program line will not be controlled by the auto multiplier. Only MOVL and MOVC can be used between ARC START and ARC END. Detailed welding infos can be found in “Welding process manual”.	
	addition	#<variable#>	Variable number is the welding parameter document number that user wants to call.
		Blank % MM/S	Method to treat the welding speed. Blank: Program between arc start and arc end is executed in 100% speed, without control of multiplier; %: Set the percentage of speed between arc start and arc end; MM/S: Set the execution speed of program between arc start and arc end. In this way, speed of program setting is not available any longer.
		V I	Set the welding current and voltage. Arc start and arc end is still according to the preset process, while welding current and voltage become the V I setting value.
2 end arc (ARC END) 【快: 5 2】	example	ARCSTART#(1) 8 MM/S V=20V I=200A ..... ARCEND#(1)	Call welding parameter document 1#, start arc, welding speed 8 MM/S, welding voltage is 20V, welding current is 200A. starting welding Arc end, and welding finish.
	function	When this instruction is executed, system will call the preset welding parameters and end the arc. Variable number is the welding document number, range 0-7. The ARC START and ARC END are used in pair. Detailed welding infos can be found in “Welding process manual”.	
	addition	#<Variable#>	Variable number is the welding parameter document number that user wants to call.
Weave ( WEAVE ) 【快: 5 3】 Weave end (WEAVEEND) 【快: 5 4】	example	ARCSTART#(1) 50% ..... ARCEND#(1)	Call the welding parameters document 1, start arc, welding program is executed with the speed of 50% of speed set by program. Start welding End the arc, welding finished.
	function	When this instruction is executed, system will call the preset weldingweave parameters and weave. Variable number is the welding weave document number, range 0-7. The WEAVE START and WEAVE END are used in pair. Detailed welding infos can be found in “Welding process manual”.	
	addition	#<variable#>	Variable number is the welding parameter document number correspondent to the used weave instructions.
	example	WEAVE#(1) ..... WEAVEEND#(1)	Call the weave document 1#, weave, weave track, Weave end

Integrated welding example:

ARCSTART # (1) 10MM/s V=20V I=200A	Call the 1# welding parameter document, speed 10MM/S, welding voltage 20V, welding current 200A
WEAVESINE # (1)	Call the 1# welding weave parameters
MOVL VL=100MM/S PL=0	Move along the welding track, speed is 10MM/S according to the ARCSTART
WEAVEEND	End weave
ARCEND # (1)	End the arc according to 1# welding process, end.

### 5.3.6 Painting Instruction (Backup Function)

### 5.3.7 Pouring Instruction (Backup Function)

### 5.3.8 Auxiliary Function

1 Speed change (SPEED) 【Shortcut: 8 E】	Function	This instruction is used to change the speed after this instruction by multiply the additional percentage with the program line speed. VJ<percentage> is effective to the VJ speed after this line. VL<percentage> is effective to the VL speed after this line. SPEED VJ=100or SPEED VL=100 can cancel the speed change function. This instructionis mainly used to change the speed of certain part in the program. In replay mode, the operation multiplier is effective to the whole program.		
	Addition	VJ=<percentage> VL=<percentage >	Range: 1-100, effective to the VJ speed afterwards; Range: 1-100, effective to the VL speed afterwards;	
	Example	SPEED VL=30 MOVL VL=500MM/S PL=0 SPEDE VL=100 MOVL VL=500MM/S PL=0	VL speed afterwards will multiply 30%.VLspeed change to: 500X30%=150MM/S. VL speed afterwards will multiply 100%.VLspeed change to: 500X100%=500MM/ S. (Equal to no speed change or cancel of speed change.)	
2 Condition ( IF→IF ) 【shortcut: 8 2 1】	Function	IF condition judgement instruction. The whole instruction should consist of four parts: IF,ELSEIF (can be omitted or be used repeatedly) ,ELSE,ENDIF. Firstly, judge if the condition is satisfied, if satisfied, the instruction after the IF will be executed; if not satisfied, judge the condition after ELSEIF (ELSEIF can be used according to the situation or not used). If condition after ELSEIF is satisfied, the instructions after ELSEIF will be executed. If not satisfied, the instruction after ELSE will be executed. At the end of the IF condition judgement, use ENDIF to lable the end.		
	Addition	X<Variable#> M<Variable#> Y< Variable#> T< Variable#> C< Variable#>	ON OFF	IF condition judgement instruction. If condition is satisfied, the instructions after the IF will be executed. If IF condition is not satisfied, judge the ELSEIF condition. If ELSEIF condition is satisfied, the instructions after the ELSEIF will be executed.If IF condition and ELSEIF condition(s) are not satisfied, the instructions after the ELSE will be executed. ENDIF to end the IF judgement.
		GI< Variable#> LI< Variable#> GD< Variable#> LD< Variable#> GP< Variable#><data#> LP< Variable#><data#> TC< Variable#> CC< Variable#>	== > < >= <= =	
		GS< Variable#>	<Character string>	
		Instruction structure label. In a complete structure, number should be accordant, otherwise, program will alart or jump out. The numbers used in one complete instructionsturture can be identical with the numbers used in another complete instruction structure. Range: 0-8		
Example	IF X#(0)==ON 0IF X0=ON, execute INC TC#(0)TC0=TC0+1 ELSEIF X#(1) = =OFF 0IF X0=OFF, execute DEC TC#(0)TC0=TC0-1 ELSE 0If above two conditions are not satisfied, ADD TC#(0) TC#(0) execute TC0=TC0+TC0 END IF 0End IFinstruction			

2 condition (IF→ELSEIF) 【shortcut：8 2 2】	Function	IF condition judgement instruction. The whole instruction should consist of four parts: IF, ELSEIF（can be omitted or be used repeatedly）, ELSE, ENDIF. Firstly, judge if the condition is satisfied, if satisfied, the instruction after the IF will be executed; If not satisfied, judge the condition after ELSEIF (ELSEIF can be used according the situation or not used). If condition after ELSEIF is satisfied, the instructions after ELSEIF will be executed. If not satisfied, the instruction after ELSE will be executed. At the end of the IF condition judgement, use ENDIF to lable the end.			
	Addition	X<Variable#> M<Variable#> Y< Variable#> T< Variable#> C<Variable#>		ON OFF	IF condition judgement instruction. If condition is satisfied, the instructions after the IF will be executed. If IF condition is not satisfied, judge the ELSEIF condition. If ELSEIF condition is satisfied, the instructions after the ELSEIF will be executed.If IF condition and ELSEIF condition(s)are not satisfied, the instructions after the ELSE will be executed. ENDIF to end the IF judgement.
		GI< Variable#> LI< Variable#> GD< Variable#> LD< Variable#> GP< Variable#><data#> LP< Variable#><data#> TC< Variable#> CC< Variable#>	== > < >= <= =	GI< Variable#> LI< Variable#> GD<Variable#> LD<Variable#> GP<Variable#> LP<Variable#> TC<Variable#> CC<Variable#> D<Variable#>	
		GS< Variable#>		<Character string>	
		<number>	Instruction structure label. In a complete structure, number should be accordant, otherwise, program will alart or jump out. The numbers used in one complete instructionsturture can be identical with the numbers used in another complete instruction structure. Range: 0-8		
	Example	IF X#(0)==ON 0IFX0=ON, execute INC TC#(0)TC0=TC0+1 ELSEIF X#(1)==ON 0IF X1=ON, execute ADD TC#(0) 2.000TC0=TC0+2 ELSEIF X#(2)==ON 0If X2=ON, execute ADD TC#(0) 3.000TC0=TC0+3 ELSE 0Otherwise, execute ADD TC#(0) TC#(0)TC0=TC0+TC0 ENDIF 00#IFinstruciton structure end			
2 condition judge ( IF→ELSE ) 【shortcut：8 2 3】	Function	IF condition judgement instruction. The whole instruction should consist of four parts: IF, ELSEIF（can be omitted or be used repeatedly）, ELSE, ENDIF. Firstly, judge if the condition is satisfied, if satisfied, the instruction after the IF will be executed; If not satisfied, judge the condition after ELSEIF (ELSEIF can be used according the situation or not used). If condition after ELSEIF is satisfied, the instructions after ELSEIF will be executed. If not satisfied, the instruction after ELSE will be executed. At the end of the IF condition judgement, use ENDIF to lable the end.			
	Addition	<number>	Instruction structure label. In a complete structure, number should be accordant, otherwise, program will alart or jump out. The numbers used in one complete instructionsturture can be identical with the numbers used in another complete instruction structure. Range: 0-8		
	Example	IF X#(1)==ON 0If X1=ON, INC TC#(0)execute TC0=TC0+1. ELSE 0Otherwise, ADD TC#(0) 3.000execute TC0=TC0+3 END IF 00#IFinstruction structure end IF X#(1)==OFF 0If X1=OFF, ADD TC#(0) 4.00execute TC0=TC0+4 ELSE 0otherwise, ADD TC#(0) 5.00 execute TC0=TC0+5 END IF 00#IFinstruction structure end			
2 Condition (IF→ENDIF) 【shortcut：8	Function	IF condition judgement instruction. The whole instruction should consist of four parts: IF, ELSEIF（can be omitted or be used repeatedly）, ELSE, ENDIF. Firstly, judge if the condition is satisfied, if satisfied, the instruction after the IF will be			

2 4】		executed; If not satisfied, judge the condition after ELSEIF (ELSEIF can be used according the situation or not used). If condition after ELSEIF is satisfied, the instructions after ELSEIF will be executed. If not satisfied, the instruction after ELSE will be executed. At the end of the IF condition judgement, use ENDIF to lable the end.				
	Addition	<number>	Instruction structure label. In a complete structure, number should be accordant, otherwise, program will alart or jump out. The numbers used in one complete instructionsturture can be identical with the numbers used in another complete instruction structure. Range: 0-8			
	Example	IF <condition><number>IF condition ..... Program if IF condition is satisfied. ELSEIF < condition ><number>ESLEIFcondition ..... Program if ELSEIF condition is satisfied. ELSE<number> Program if the previous conditions are not satisfied. ..... END IF <number>ENDIFto end IF structure				
3 FOR (backup)	Function	Backup instruction				
	Addition					
	Example					
4While ( WHILE →WHILE ) 【 shortcut : 8 4 1】	Function	WHILE loop instruction. The complete structure should consist of WHILEand ENDWHILE. When WHILE condition is satisfied, i.e. WHILE condition is ON, the program between WHILE and ENDWHILE will be executed until WHILE condition is no longer satisfied. Then jump out of this loop. WHILE condition must be set inside the loop part, otherwise, endless loop may occur.				
	Addition	X<Variable#> M<Variable#> Y<Variable#> T<Variable#> C<Variable#>	== > < >= <= = =	ON OFF	WHILEloop condition instruction. When WHILE condition is satisfied, i.e. WHILE condition is ON, the program between WHILE and ENDWHILE will be executed. If WHILE condition is not satisfied, jump out of the loop, and execute the program following ENDWHILE.	
		GI< Variable#> LI< Variable#> GD< Variable#> LD< Variable#> GP< Variable#><data#> LP< Variable#><data#> TC< Variable#> CC< Variable#>		GI< Variable#> LI< Variable#> GD<Variable#> LD<Variable#> GP<Variable#> LP<Variable#> TC<Variable#> CC<Variable#> D<Variable#>		
		GS< Variable#>		<Character string>		
		<number>		Instruction structure label. In a complete structure, number should be accordant, otherwise, program will alart or jump out. The numbers used in one complete instruction sturture can be identical with the numbers used in another complete instruction structure. Range: 0-8		
	Example	SET TC#(1) 0.000 WHILE TC#(1) < 20 0 IF X#(1)==ON 0 INC TC#(1) ELSE 0 ADD TC#(1) 2.000 ENDIF 0 ENDWIHILE 0 SET TC#(1) 15.000	SET TC1=0 IF TC1<20, Execute IFstructure IFjudge: if X1=ON, then TC1=TC1+1 Otherwise if X1≠ON, then TC1=TC1+2 IFstructureend If TC1 ≯20, execute TC1=15			
4 while (WHILE →ENDWHIL	Function	WHILE loop instruction. The complete structure should consist of WHILEand ENDWHILE.				
	Addition	<number>	Instruction structure label. In a complete structure, number			

E) 【 shortcut : 8 4 2】			should be accordant, otherwise, program will alert or jump out. The numbers used in one complete instruction sturture can be identical with the numbers used in another complete instruction structure. Range: 0-8
	Example	WHILE <condition><number> ..... ENDWHILE <number>	Judge condition, Satisfied: Execute .....part; Unsatisfied: Execute the program behind ENDWHILE.
5 switch ( S W I T C H →SWITCH) 【 shortcut : 8 5 1】	Function	SWITCH condition selection instruction. The complete selection structure consists of SWITCH,CASE (can be used repeatedly) ,BREAK,DEFAULT, ENDSWITCH. Claculate the variable value behind the SWITCH, judge the value is equal to which value behind CASE. After finding the matched CASE, program will be executed from that line until the ENDSWITCH. If no identical value can be found, program behind DEFAULT will be executed until the ENDSWITCH. Notice: The different positions of BREAK may result into different result.	
	Addition	X<Variable#> M< Variable#> Y< Variable#> T< Variable#> C< Variable#>	Status variables, CASE= 0or 1
		GI< Variable#> LI< Variable#> GD< Variable#> LD< Variable#> GP< Variable#><data#> LP< Variable#><data#> TC< Variable#> CC< Variable#>	Number variables, CASE equal to specific number
		GS< Variable#>	Character string, CASE equal to specific character.
		<number>	Instruction structure label. In a complete structure, number should be accordant, otherwise, program will alert or jump out. The numbers used in one complete instruction sturture can be identical with the numbers used in another complete instruction structure. Range: 0-8
	example	SWITCH TC#(2) 0 CASE 10 0 AOUT AO#(1)=1.000 BREAK 0 CASE 20 0 AOUT AO#(1)=2.000 BREAK 0 CASE 30 0 AOUT AO#(1)=3.000 BREAK 0 CASE 40 0 AOUT AO#(1)=4.000 BREAK 0 CASE 50 0 AOUT AO#(1)=5.000 BREAK 0 CASE 60 0 AOUT AO#(1)=6.000 BREAK 0 CASE 70 0 AOUT AO#(1)=7.000 BREAK 0 CASE 80 0 AOUT AO#(1)=8.000 BREAK 0 CASE 90 0	case10 if TC2=10 output 1V vaoltage in A1 port case10 break to end switch case20 if TC2=20 output 2V voltage in A1 port case20 break to end switch case30 if TC2=30 output 3V voltage in A1 port case30 break to end switch case40 if TC2=40 output 4V voltage in A1 port case40 break to end switch case50 if TC2=50 output 5V voltage in A1 port case50 break to end switch case60 if TC2=60 output 6V voltage in A1 port case60 break to end switch case70 if TC2=70 output 7V voltage in A1 port case70 break to end switch case80 if TC2=80 output 8V voltage in A1 port case80 break to end switch case90 if TC2=90 output 9V voltage in A1 port

		AOUT AO#(1)=9.000 BREAK 0 DEFAULT 0 AOUT AO#(1)=10.000 ENDSWITCH 0	case90 break to end switch if TC2 not equal to the above values, execute output 10V in A1 port. end 0# switch.
5 condition selection ( S W I T C H → C A S E ) 【 shortcut : 8 5 2】	Function	SWITCH condition selection instruction. The complete selection structure consists of SWITCH, CASE (can be used repeatedly) , BREAK, DEFAULT, ENDSWITCH. Calculate the variable value behind the SWITCH, judge the value is equal to which value behind CASE. After finding the matched CASE, program will be executed from that line until the ENDSWITCH. If no identical value can be found, program behind DEFAULT will be executed until the ENDSWITCH.	
	Addition	<data>	Possible values behind SWITCH.
		<number>	Instruction structure label. In a complete structure, number should be accordant, otherwise, program will alert or jump out. The numbers used in one complete instruction structure can be identical with the numbers used in another complete instruction structure. Range: 0-8
	example	SWITCH TC#(1) 0 CASE 1 0 CASE 2 0 CASE 3 0 CASE 4 0 CASE 5 0 DOUT Y#(18)=ON BREAK 0 DEFAULT 0 DOUT Y#(18)=OFF ENDSWITCH 0	SWITCHcalculate variable TC1 TC1=1/2/3/4/5, execute output effective in Y18 port (Y18=ON) . CASE1-5 to ENDSWITCH TC1 not equal to the above value, execute output ineffective in Y18 port (Y18=OFF) . SWITCHend.
5 switch ( S W I T C H →DEFAULT) 【 shortcut : 8 5 4】	Function	SWITCH condition selection instruction. The complete selection structure consists of SWITCH, CASE (can be used repeatedly) , BREAK, DEFAULT, ENDSWITCH. Calculate the variable value behind the SWITCH, judge the value is equal to which value behind CASE. After finding the matched CASE, program will be executed from that line until the ENDSWITCH. If no identical value can be found, program behind DEFAULT will be executed until the ENDSWITCH.	
	Addition	<number>	Number range: 0-8。
	Example	SWITCH <variable><number> CASE <value><number> ..... BREAK <number> DEFAULT <number> ..... ENDSWITCH <number>	
5 switch ( S W I T C H → B R E A K ) 【 shortcut : 8 5 5】	Function	SWITCH condition selection instruction. The complete selection structure consists of SWITCH, CASE (can be used repeatedly) , BREAK, DEFAULT, ENDSWITCH. BREAK jump out of the current line to ENDSWITCH. Notice: The different positions of BREAK may result into different result.	
	Addition	<number>	Number range: 0-8。
	Example	SWITCH <variable><number> CASE <value><number> ..... BREAK <number> DEFAULT <number> ..... ENDSWITCH <number>	
5 switch ( S W I T C H →ENDSWITC H) 【 shortcut : 8	Functions	SWITCH condition selection instruction. The complete selection structure consists of SWITCH, CASE (can be used repeatedly) , BREAK, DEFAULT, ENDSWITCH. End symbol of SWITCHstructure.	
	Additions	<number>	Number range: 0-8。
	Example	SWITCH <variable><number>	

5 6】		CASE <value><number> ..... BREAK <number> DEFAULT <number> ..... ENDSWITCH <number>	
6 Pulse transform between axis (PULSETRANSFORM) 【shortcut : 8 6】	Function	This complete instruction structure consists of PULSETRANSFORM andPULSETRANSRORMEND. Thisfunction will transfer the pluse from output axis to input axis, i.e. originally system sends pulse to output axis to move; after the execution of this instruction, pulse will be sent to input aixs, and input axis will move according to the input pluse, and output aixs will stop, and original input pluse will become ineffective. This instructionis effective to joint coordination.	
	Addition	<output axis#><input axis#>	Output axis is the axis which user wants to transfer pluse from; input axis is the axis which user wants to transfer pluse into. Axis number range: 1-8.
	Example	PULSETRANSFORM#(1)(2) ..... PULSETRANSFORMEND	
7End of pulse transform between axis (PULSETRANSFORMEND) 【shortcut : 8 7】	Function	This complete instruction structure consists of PULSETRANSFORM andPULSETRANSRORMEND PULSETRANSRORMEND will end the pluse transform. And each axis will operate according to the pulse received by itself.	
	Addition	[none]	
	Example	PULSETRANSFORM#(1)(2) ..... PULSETRANSFORMEND	
8impute (IMPURED) 【shortcut : 8 8】	Function	Treat the specific axis joint coordination: divide the coordinationby 360, and the remainder will be set as the current coordination. In this way, when zero return, joint will not rotate the whole angle. E.g.: J1 coordnaiton is 860.245. After inputing, coordination is 140.245. In zero return operation, J1 should rotate 140.245 rather than 860.245. This function is mainly used to the joints with incremental programmer.	
	Addition	<axis#>	Axis need imputing.range: 1-8
	Example	IMPURED#(1) IMPURED#(2)	Impute J1 Impute J2
9zero return (ZERO) 【shortcut : 8 9】	Function	This zero return instruction is specifically used for incremental programmer. When zero return instruction is executed, system will execute the mechanicalzero reture movement according the set aixs number and the zero return parameters of this axis.	
	Addition	<axis#>	Axis need zero return.range: 1-8
	Example	ZERO #(1) ZERO #(2)	Zero return of axis 1 Zero return of axis 2
1 0 Finish of motion (MOTIONFINISH) 【shortcut : 8 1 E】	Function	Motion finish is effective to theMOVJ, MOVL instructions before the motion finish line. Working process: The move instruction will move to the set position precisely. In motion finish process, system will compare the electrical machine feedback data with the setting data of program until two data is identical (i.e. when system pluse is about to finish, electric machine will also stop at the position, and position error is within the allowed limit.), MOTIONFINISH will end. Otherwise, when time is longer than the internal set time, system will prompt that motion finish time out.	
	Addition	[none]	
	Example	MOVL VJ=10% PL=5 MITIONFINISH	Effective to the previous MOVL instruction to make sure the robot can move to the accurateposition.
11Change tool coordination (CHANGEUSE) 【8 1 1 E】	Function	Change tool coordinationinstruction. When this instruction is executer, program will change from the current coordination number to the coordination set by CHANGUSE. If change is from 0# coordination to other coordination or none-0# coordination to 0# coordination, there's no need to use this instruction. If change is from onenone-0# coordination to another none-0# coordination, this instruction is needed. This operation may cause danger, please check the coordination number carefully and make	

		sure there's no danger if robot works in the coordination.	
	Addition	<coordination#>	Number of coordination need changing, range: 0-49。
	Example	MOVJ VJ=10% PL=0      tool coordination 0# MOVJ VJ=20% PL=0 USE=3      change to 3# CHANGEUSE#(4)      change to 4# MOVJ VJ=20% PL=0 USE=4      change to 4# MOVJ VJ=20% PL=0      change to 0#	
12 axis forbidden ( FORBID AXIS ) 【shortcut: 8 1 1 1 E】 1 3axis forbidden end ( FORBID AXIS END ) 【shortcut: 8 ↑ ↑E】	Function	FROBIDAXISand FORBIDAXISEND should be used in pair. Forbid the set axis to move, and cancel this forbid. Used in the situation where certain axis is not allowed to move. Later, this forbid may need removing. This instruction is effective to joint move, but ineffective to straight move. This instruction is effective in replay and remote mode, but ineffective in teach mode. Then switching to replay and remote mode, it's becomes effective again. Forbid of axis is ineffective after program is closed.	
	Addition	<axis#>	The axis that need forbiddingmove or removing the forbid. Range: 1-8~J1-J8axis.
	Example	FORBIDAXIS#(1):forbid J1 move ..... ..... FORBIDAXISEND# (1) :remove the forbid status of J1	
14 Coordinaiton count (COUNT COORD ) 【shortcut: 8 ↑ ↑E】	Function	When this instruction is executed, system will read the current axis programmer data, and then calculate the current coordination.	
	Addition	parameters: 0 or 1	0: Coordination calculation time out or beyond the error range, system will alert. 1: Coordiantion calculation operating, no alarm.
	Example	COUNTCOORD(0)Read all axis programmer data, calculate the coordination, and alert if any error. COUNTCOORD(1)Calculate coordination without alarm.	
11Change user coordination (CHANGE USE) 【8 ↑E】	Function	Change tool coordinationinstruction. When this instruction is executer, program will change from the current coordination number to the coordination set by CHANGUSE. If change is from 0# coordination to other coordination or none-0# coordination to 0# coordination, there's no need to use this instruction. If change is from onenone-0# coordination to another none-0# coordination, this instruction is needed. This operation may cause danger, please check the coordination number carefully and make sure there's no danger if robot works in the coordination.	
	Addition	<coordination#>	Number of coordination need changing, range: 0-49。
	Example	MOVJ VJ=10% PL=0      tool coordination 0# MOVJ VJ=20% PL=0 USE=3      change to 3# CHANGEUSE#(4)      change to 4# MOVJ VJ=20% PL=0 USE=4      change to 4# MOVJ VJ=20% PL=0      change to 0#	

### 5.3.9 Vision Instruction

1 vision run ( R U N VISION) 【shortcut: 1 1 E 1】	Function	Vision run instruction: system will call the process number related parameters, and establish the connection with the system. If process document has start based on time or touch, after this instruction, vision system will start continous start according the preset. Data will be stored in the system. If connection process is during the program execution, connection process will continue until program finish and quit. If there are many vision-run instructions in one program, only the first one is effective, i.e. when program is executed continuously, the first execution of vision run instruction is effective and the rest instructions will not be effective.	
	Addition	<process#>	Vision document number, range 0-9. One process document is correspondent to one set of vision system.
	Example	RUNVISION# (0)      Establish the connection of system and vision with the	

		parameters in 0# process document.	
2 Get vision data ( GET VISION DATA ) 【shortcut: 1 1 E 2】	function	Import vision cache data into the GP52 and GP52 (the values of GP52 and GP52 is same.).	
	addition	<process#>	Vision document number, range 0-9. One process document is correspondent to one set of vision system.
	example	GETVISIONDATA #(0) Import data into GP52 and GP53.	
3 Clear vision data ( CLEAR VISION DATA ) 【shortcut: 1 1 E 3】	function	Clear the vision data in current cache area.	
	addition	<process#>	Vision document number, range 0-9. One process document is correspondent to one set of vision system.
	example	CLEARVISIONDATA #(0) Clear the tool data acquired by 0# process camera in the cache.	
4 vision trigger ( TRIGGER VISION ) 【shortcut: 1 1 E 4】	function	When trigger instruction is chosen in certain process document, this instruction can trigger the vision system, calculate the tool data, write the acquired data into vision cache, and write the number of data into GI50. In order to get rid of delay, this instruction will directly trigger the vision system via output port Y.	
	addition	<process#>	Vision document number, range 0-9. One process document is correspondent to one set of vision system.
	example	TRIGGERVISION #(0) trigger the 0# process vision system	
5 Camera program change ( CHANGE VISION ) 【shortcut: 1 1 E 5】	function	When this instruction is executed, system will change the tool calculation parameters document by the data connect wire to the vision system.	
	addition	<documentname>	The document userd want to switch into. The system only supports number name, so document in vision system need naming by number.
	example	The calculation parameter document related to tool A is 111, while the calculation parameter document related to tool B is 222. Currently, vision system is executing the tool A document. CHANGVISION# (222) Vision system will call the tool B calculation parameters document (222).	

Integrated vision example:

RUNVISION #(0)	run 0# vision process
*22	jump symbol *22
TRIGGERVISION #(0)	Trigger for first time, acquir camera calculation data of tool (相机计算工件数据).
TIME T= 200	delay 200ms
JUMP *22 IF GI#(50)<=0.000	Judge if GI50 has data. If no, jump to *22, trigger again.
GETVISIONDATA #(0)	Acquir data from vision cache, write them into GP52 and GP53.
ADD GP#53(3) 10.000	Move GP53 for 10MM in Z direction, in case of collision.
MOVL VL=500MM/S GP#53 PL=0	Move to GP53 safe point.
MOVL VL=100MM/S GP#52 PL=0	Move to GP52 grab point (抓取点).
DOU Y#(1)=ON	Grabe
MOVL VL=500MM/S GP#53 PL=0	Move to GP53 safe point.
.....	Following release track and move.

### 5.3.10 Track instructions

1Strat track(TARCK START) 【shortcut: 1 1 E 1】	function	When this instruction is executed, system will call the track process parameters, write the the current tool position of cache into the GP50 and GP51 (the values of GP52 and GP52 is same). At this time, the data in GP50 and GP51 is real-time changing. Then system will call the GP50 and GP51 data to start tracking.	
	addition	<process#>	Tracking document number, range 0-9.
	example	TRACKSTART #(0) Prepare the GP50 and GP51 data	
2 End track(TARCK	function	Track end, robot will stop tracking tool. Data of GP50 and GP51 will not be real-time any longer.	

END) 【shortcut: 1 1 E 2】	addition	<process#>	Tracking document number, range 0-9.
	example	TRACKEND# (0) End of tool tracking.	
3Acquir track data(GET TRACK DATA) 【shortcut: 1 1 1 E 3】	function	Call the track document set parameters, judge the data in tracking cache. If no data in tracking cache, wait. If tool hasn't entered the AB region, wait. If tool has gone beyond the B, abandon the data and wait.	
	addition	<process#>	Tracking document number, range 0-9.
		X<data> Y<data> Z<data>	Compensation data for each axis. If no compensation is need, set the data into 0.
	example	GERRTRACKDATA# (0) X# (0.0) Y# (0.0) Z# (0.0) Judge if the tracking cache has effective data. No compensation for XYA axis.	
4 clear track data (CLEAR STACK DATA) 【shortcut: 1 1 1 E 4】	function	Clear the tracking cache data related with the set tool number. This instruction is used in the cache cleanup situation.	
	addition	<process#>	Tracking document number, range 0-9.
	example	CLEARTRACKDATA#(0) Clear the 0# tracking document-related data in cache.	
5back stage IO detection (RUN IO CUTIN) 【shortcut: 1 1 E 5】	function	When this instruction is executed, IO detection point will detect if there is object pass through the detection point. If object passing, write the current data into cache for further call.	
	addition	<process#>	Tracking document number, range 0-9.
	example	RUNIOCUTIN# (0) IO detection starts in backstage. Detection point will detect continuously.	

Integrated tracking example:

MOVL VL=500.00MM/S PL=0	Move to the air above the middle point, waiting for grab.
RUNIOCUTIN #(1)	Start backstage IO detection. If there is object passing, the current position data will be written into cache.
GETTRACKDATA#(1) X#(0.0) Y#(0.0) Z#(0.0)	Judge the data in tracking cache. If no data in tracking cache, wait. If tool hasn't entered the AB region, wait. If tool has gone beyond the B, abandon the data and wait.
TREACKSTART #(1)	Track start; write the current tool data of cache into GP50 and GP51.
ADD GP#51(3) 10.000	Move GP51 for 10mm in Z direction, set this point as safe point. The meaning of (3) can refer to the data single-axis operation of GP variable.
MOVL VL=500MM/S GP#51 PL=0	Move ot GP51 safe point.
MOVL VL=100MM/S GP#50 PL=0	Move to GP50 tracking point.
DOU Y#(0) =ON	Output Y0 is effective; grab objective.
MOVL VL=500MM/S GP#51 PL=0	Lift the objective, move to GP51 safe point.
TRACKEND #(1)	Track end.
.....	Following operation.

### 5.3.11 Communication instructions

1Read BCD data of IO port 【shortcut: ↑↑ E 1】	function	Read the status of input port X, and write the data into set variable.	
	addition	GI<variable> X<port> B<number>	Data storage variable. Read the initial position of X input port. Read the number of X ports.
	example	READIOBCD #(20) #(0) #(4) Read the status data of X0-X3 (4 ports) into GI20 variable.	
2read data to (READ DATA TO) 【shortcut: ↑↑ E 2】	function	Communicate the data to the latter variable through serious port. Communication port # and communication fuction should bet in operation parameters. This function is mainly to read barcode, code, etc.	
	addition	GI<variable#> GD< variable#> GS< variable#>	Communicate data to GI variable. Communicate data to GD variable. Communicate data to GS variable
	example	READDATATO GI# (20) Read the port data into variable GI20.	

### 5.3.12 Special Instructions

1reset(RESET) <b>【 shortcut: ↑ E 1 】</b>	function	When this instruction is executed, system will return backwards to the first line of the program line to line. Even if current execution is within the subprogram, system will quit the subprogram and return to the first line of main program after this instruction is executed.	
	addition	[none]	
	example	1 ..... CALL 123 ..... ----- 1 ..... RESET RET	Main program XX calls 123 subprogram Lines after subprogram is end -----subprogram123 program reset subprogram return
		In the above program, when the RESET line in the 4 <sup>th</sup> line of subprogram is executed, system will directly return to main program XX until the first line. If there is no RESET instruction in subprogram 123, when RET is executed, system will return to main program and execute the 9 <sup>th</sup> line in the main program.	
2 Program pointer jump (CHANG EPOINT) <b>【 shortcut: ↑ E 2 】</b>	function	Move the automatic line pointer when operation. E.g. line pointer stops at 18 <sup>th</sup> line in automatic operation. After the use of CHANGEPOINT# (-2), the program stop line will jump to 18-2=16 <sup>th</sup> line.	
	addition	<line number>	The lines of jump users want. Positive value means jump backwards, and negative value means jump forwards.
	example	CHANGEPOINT#(-2) Stop line move 2 lines afterwards. E.g. line pointer stops at 18 <sup>th</sup> line in automatic operation. After the use of CHANGEPOINT# (-2), the program stop line will jump to 18-2=16 <sup>th</sup> line.	

## 6 Teach program

Teach program is the process of creating a user program in teach mode, including selecting correct coordination system, manually move the terminal of robot into the desired position; call the current coordination data, operation track, and process instructions by certain operation (e.g. press button to select the instructions, coordination data is invisible).

Movement instruction line includes move instruction, additional speed, smoothness, and joint data of robot (joint data is invisible in the data program edit interface).

If variables are used, the shutdown data of robot is contained in the variables.

The following sections are the examples to describe the teach program steps. For more program example, please refer to “process manual”.

This system supports the Chinese character display of program.

Correspondent parameters:

parameter type	parameter	value	description
operation parameters	program display	0	Letters: program is shown with letters.
		1	Characters: Program is shown with Chinese characters.

Specific steps:

Firstly, <parameter settings>-<7 system parameters>-<1 operation authority selection>-<confirm>. Input the integrator password in the prompt interface, click <confirm>, the authority will be changed to integrator authority.

Then, <parameter settings>-<3 operation parameters>-<confirm>. Choose [program display] using cursor in the prompt program list. Click <modify> in the sub menu. Input number 1 in the prompt input window, click <confirm>, as shown in below figure.

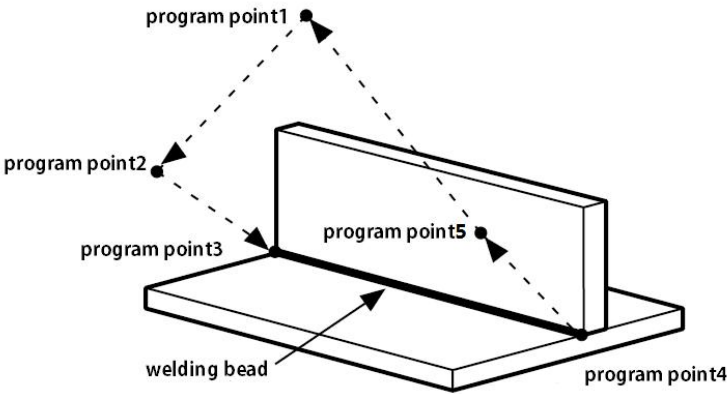
Number	operating parameter	Value
4	Fourth axis for delta code back to zero detection switch 0-...	4
5	Fifth axis for delta code back to zero detection switch 0-d...	4
6	Sixth axis for delta code back to zero detection switch 0-d...	4
7	Seventh axis for delta code back to zero detection switch 0...	1
8	Eighth axis for delta code back to zero detection switch 0-...	1
9	Program display 0—letters 1—characters	1
10	0—display instruction 1—display text	1

At this time, teach program in the system will be displayed in Chinese character, as shown in below:

```
1  关节运动 关节速度=10.0% 平滑=0
2  直线运动 直线速度=100.0MM/S 平滑=0
3  圆弧运动 直线速度=100.0MM/S 平滑=0 点=1
4  输出 DOUT Y#(0)=ON
5  子程序调用 CALL 111
6  延时 TIME T=500
7  等待信号 WAIT X#(0)=ON T=0
8  
```

6.1 Welding teach program

Scheme as follows:



related instructions:

MOVJ: joint move

MOVL: Line move

VJ: speed multiplier of joint move

VL: Speed multiplier of straight move

PL: smoothness

USE: tool coordination

ARCSTART: arc strat

ARCEND: arc end

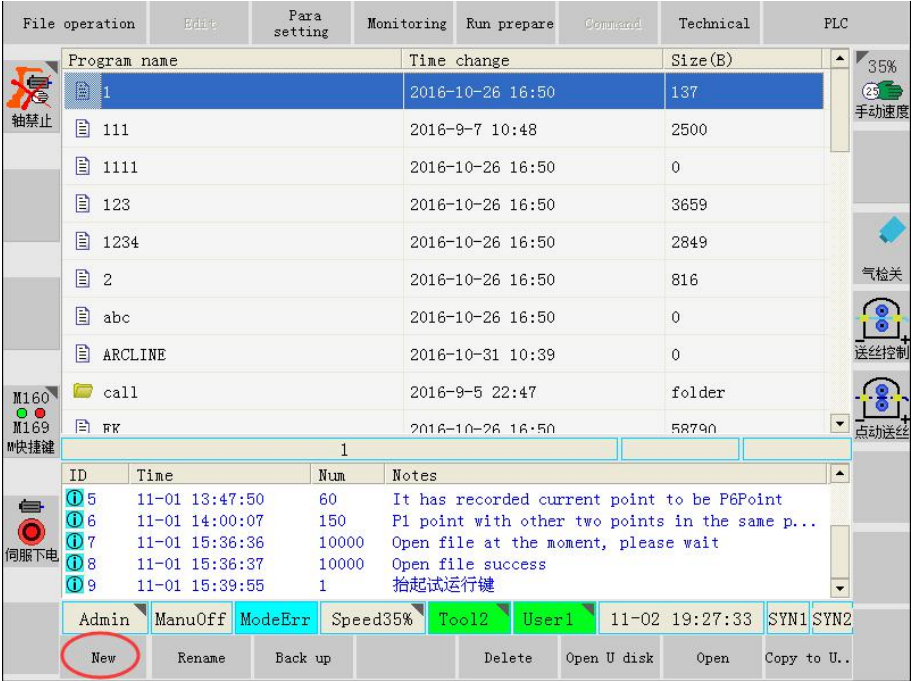
Program list

program instructions	dscriptions
MOVJ VJ=50% PL=9 USE=1	In user coordination syetem USE=1, MOVJ joint move, VJ=50 %( multiplier), PL=9(smoothness), move to program point 1, reach the prepare point.
MOVJ VJ=50% PL=9 USE=1	In user coordination syetem USE=1, MOVJ joint move, VJ=50 %( multiplier), PL=9(smoothness), move to program point 2, approach to objective.
MOVJ VJ=25% PL=0 USE=1	In user coordination syetem USE=1, MOVJ joint move, VJ=25 %( multiplier), PL=0(smoothness), move to program point 3, touch the objective.

ARCSTART#(0)	arc start
MOVL VL=100.0MM/S PL=0 USE=1	In user coordination syetem USE=1, MOVL joint move, VL=100MM/S, PL=0(smoothness), move to program point 4, operate in welding track.
ARCEND#(0)	arc end
MOVJ VJ=50% PL=9 USE=1	In user coordination syetem USE=1, MOVJ joint move, VJ=50 %( multiplier), PL=9(smoothness), move to program point 5, depart from the objective.
MOVJ VJ=50% PL=9 USE=1	In user coordination syetem USE=1, MOVJ joint move, VJ=50 %( multiplier), PL=9(smoothness), move to program point 1, return to prepare point.

Teach program steps

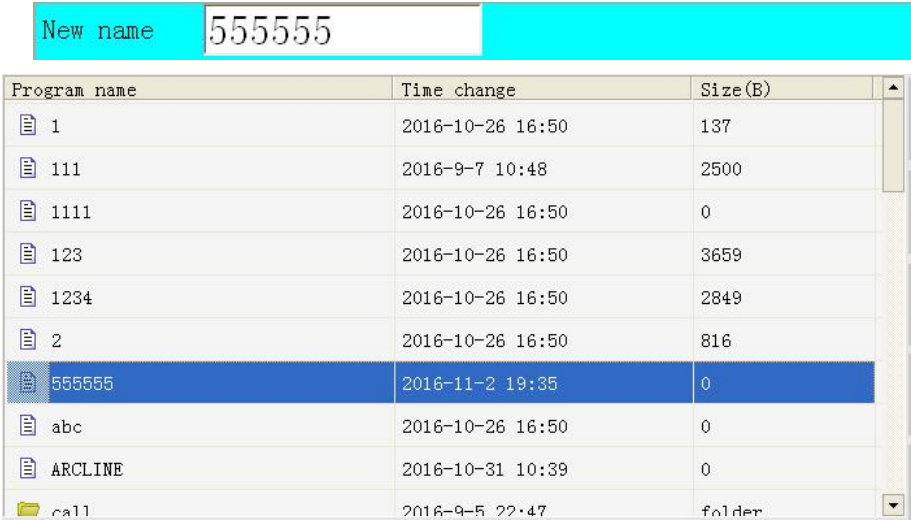
- 1. Switch to teach mode.
- 2. Choose proper coordination system.
- 3. Enter the program list interface.

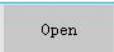


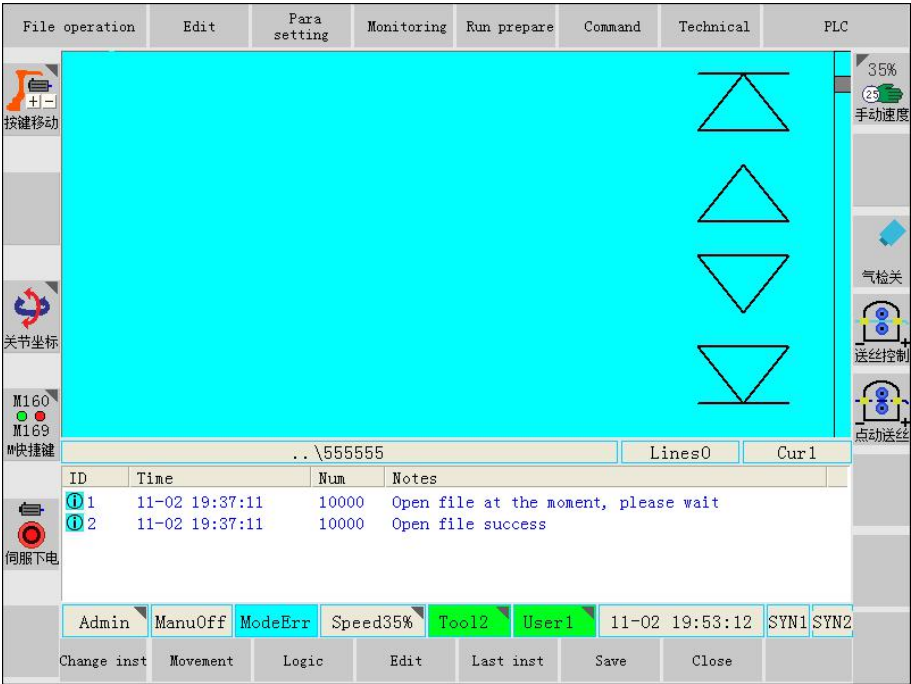
4. Click  button.

5. Input the new program name (e.g. 555555) in the prompt interface. After the input, click <confirm>. At this time, the new program will shown in the program list interface, as follows:

Description
If input the new program name, system will create a new program and highlight it by blue bar. If input the already-exist program name, system will highlight the program.



6. .Click submenu  button, open program edit window:

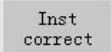


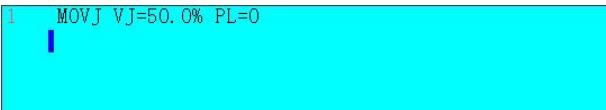
7. Holding security switch, move the terminal of robot into program point 1 by coordination button on the teach box. Click <Movement>-<MOVJ>.



Prompt instruction edit window.

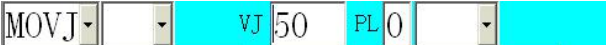


Input related parameters, press  . Instruction will show in program edit window.



Finish of instruction edit of program point 1.

8. Holding security switch, move the terminal of robot into program point 2 by coordination button in the teach box. Click<Movement>-<MOVJ>. MOVJ instruction edit window will prompt as follows:



Input related parameters, press **Inst correct** . Instruction will show in program edit window.

```
1  MOVJ VJ=50.0% PL=0
2  MOVJ VJ=50.0% PL=0
```

Finish of instruction edit of program point 2.

9. Repeat step 7 or 8, change VJ speed to 25%, PL=0. Input the instruction line of program point 3.

MOVJ  VJ= 25.0 % PL= 0

```
1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4
```

10. Click<program instruction>-<5 welding>-<1 ARC START>-<confrim>, following window will prompt.

ARCSTART

Input related parameters, press **Inst correct** ,Instruction will show in program edit window.

```
1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ARCSTART#(0)
5
```

Input related parameters, press **Inst correct** Instruction will show in program edit window.

```
1  MOVJ VJ=50.0% PL=0
2  MOVJ VJ=50.0% PL=0
3  MOVJ VJ=50.0% PL=0
4  ARCSTART#(0)
```

11. Repeat the above steps, and input the every program points and instructions as follows:

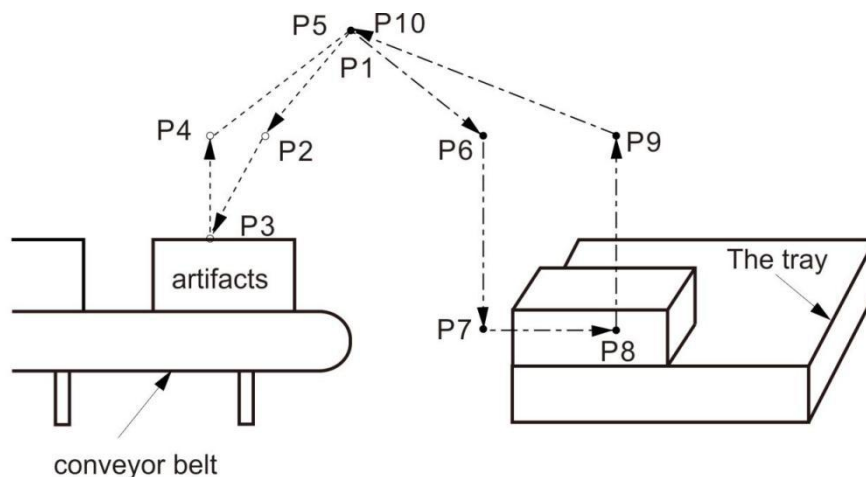
```
1  MOVJ VJ=50.0% PL=0
2  MOVJ VJ=50.0% PL=0
3  MOVJ VJ=50.0% PL=0
4  ARCSTART#(0)
5  MOVL VL=100.0MM/S PL=0
6  ARCEM#(0)
7  MOVJ VJ=50.0% PL=0
8  MOVJ VJ=50.0% PL=0
```

The welding program is created by the above steps.

12 Click sub menu **Save** ,then **Close** , close program edit window.

## 6.2 Lifting program example

scheme as follows:



MOVJ: joint move

MOVL: joint move

VJ: speed multiplier of joint move

VL: Speed multiplier of straight move

PL: smoothness

USE: tool coordination

DOUT: number index output

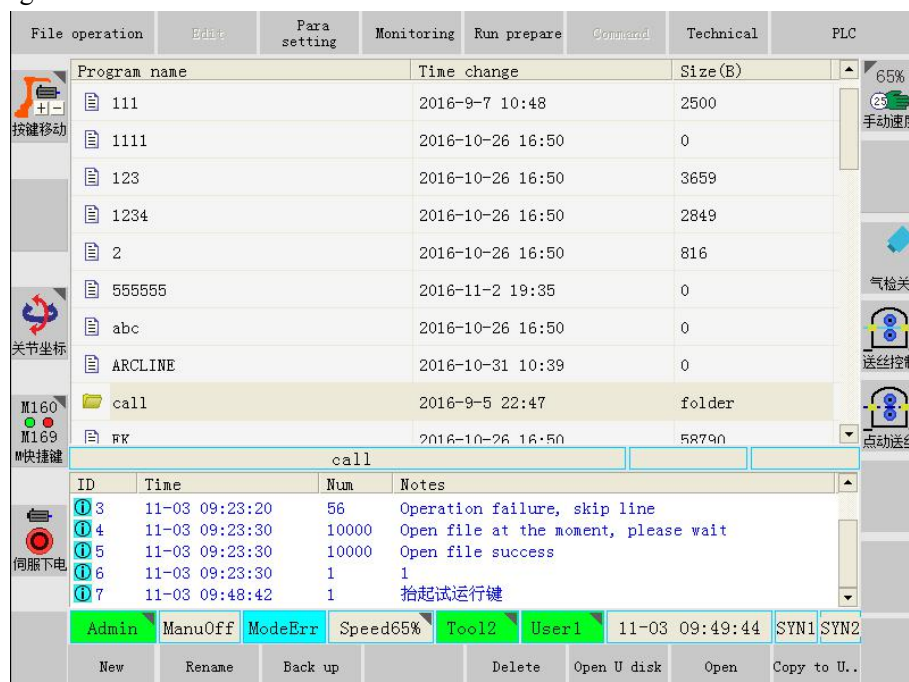
WAIT: conditional wait

### 6.2.1 program list

program instructions	dsecriptions
MOVJ VJ=50% PL=9 USE=1	In user coordination syetem USE=1, MOVJ joint move, VJ=50 %( multiplier), PL=9(smoothness), move to program point 1, reach the prepare point.
MOVJ VJ=50% PL=9 USE=1	Move to program point 2, approach to objective (before grab)
MOVL VL=100MM/S PL=0 USE=1	Move to program point 3, touch the objective (grab position)
DOUT Y#(0)=ON	grab
WAIT X#(0)=ON T=O	detect if grab is finished
MOVL VL=200MM/S PL=9 USE=1	Move to program point 4, leave objective (after grab)
MOVJ VJ=50% PL=9 USE=1	Move to program point 5, back to initial position
MOVJ VJ=50% PL=9 USE=1	Move to program point 6, approach put position
MOVJ VJ=50% PL=9 USE=1	Move to program point 7, reach auxiliary put point
MOVL VL=100MM/S PL=0 USE=1	Move to program point 8, reach put position
DOUT Y#(0)=OFF	put
WAIT X#(0)=OFF T=O	detect if put is finished
MOVL VL=200MM/S PL=9 USE=1	Move to program point 9, leave put position
MOVJ VJ=50% PL=9 USE=1	Move to program point 10, back to initial position

### 6.2.2 Steps for teach program

1. Switch to teach mode.
2. Choose proper coordination system.
3. Enter the program list interface.



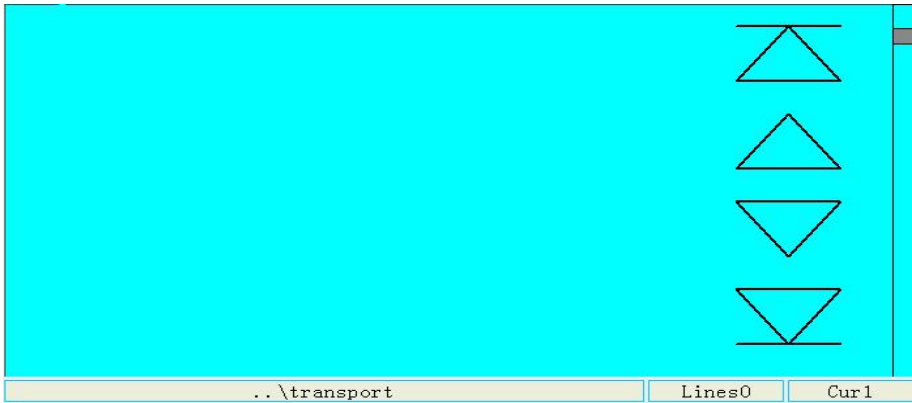
4. Click the **New** button.

5. Input the new program name (e.g. transport) in the prompt interface. After the input, click <confirm>. At this time, the new program will show in the program list interface, as follows:

Description
If input the new program name, system will create a new program and highlight it by blue bar. If input the already-exist program name, system will highlight the program.



6.Click sub menu Open button,open program edit window.



7. Holding security switch, move the terminal of robot into program point 1 by coordination button on the teach box. Click <Command>-<Movement>-< MOVJ>-



Prompt instruction edit window.



Description
<span>VJ= 50.0</span> Is the input window, data can be written into it.

Input related parameters, press Inst correct . Instruction will show in program edit window.

```
1  MOVJ VJ=50.0% PL=0
```

Finish of instruction edit of program point 1.

8. Holding security switch, move the terminal of robot into program point 2 by coordination button in the teach box. Click <Command><1 MOVJ>. MOVJ instruction edit window will prompt as follows:

MOVJ VJ= 50.0 % PL= 9

Input related parameters, press **Inst correct**. Instruction will show in program edit window.

```
1  MOVJ VJ=50.0% PL=0
2  MOVJ VJ=50.0% PL=0
```

Finish of instruction edit of program point 2.

9. Repeat step 7 or 8, change VJ speed is 100MM/S, PL=0. Input the instruction line of program point 3.

MOVL VL= 100 PL= 0

```
1  MOVJ VJ=50.0% PL=0
2  MOVJ VJ=50.0% PL=0
3  MOVL VL=100.0MM/S PL=0
```

10. Click<Command>-<2 Logic>-<1 DOUT>, following window will prompt.

DOUT Y#0 = ON

Input related parameters, press **Inst correct**. Instruction will show in program edit window.

```
1  MOVJ VJ=50.0% PL=0
2  MOVJ VJ=50.0% PL=0
3  MOVL VL=100.0MM/S PL=0
4  DOUT Y#(0)=ON
```

11. Click <Command>-<2 logic>-<3 WAIT>, prompt follow window:

Input related parameters, press **Inst correct**. Instruction will show in program edit window.

```
1  MOVJ VJ=50.0% PL=0
2  MOVJ VJ=50.0% PL=0
3  MOVL VL=100.0MM/S PL=0
4  DOUT Y#(0)=ON
5  WAIT X#(0)==ON DT=0 CT=0
```

12. Repeat the above steps, and input the every program points and instructions as follows:

```
1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVL VL=200.0MM/S PL=0 TOOL=1
4  DOUT Y#(0)=ON
5  WAIT X#(0)==ON T=0
6  MOVL VL=200.0MM/S PL=9 TOOL=1
7  MOVJ VJ=50.0% PL=9 TOOL=1
8  MOVJ VJ=50.0% PL=9 TOOL=1
9  MOVJ VJ=50.0% PL=9 TOOL=1
10 MOVL VL=100.0MM/S PL=0 TOOL=1
11 DOUT Y#(0)=OFF
12 WAIT X#(0)==OFF T=0
13 MOVL VL=200.0MM/S PL=9 TOOL=1
14 MOVJ VJ=50.0% PL=9 TOOL=1
15
```

13. Click sub menu **Save**, then click **Close** close program edit window

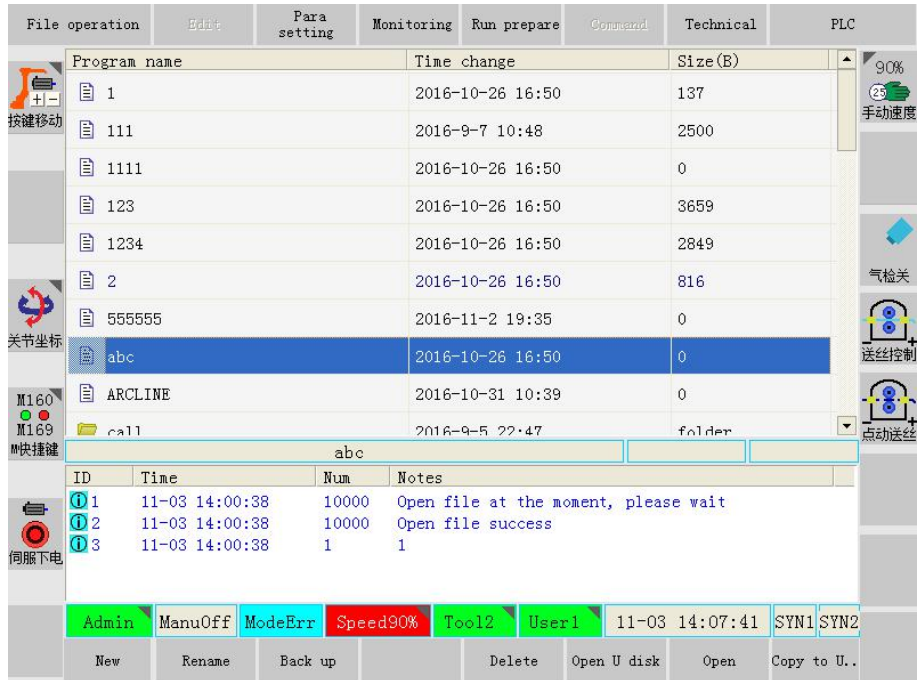
The lifting program is created by the above steps.

## 7 Program edit functions



Program edit functions mainly include: program list edit, mainly used to create, rename, backup, delete, and etc. of program; Program interface edit, mainly used to copy, cut, delete, find, replace and etc. of program line.

### 7.1 Edit in Progrma list


Create, rename, backup, delete, open U disk, oped or copy to U disk.




#### 7.1.1 : Create program

Clickbutton, Create program window will prompt  , type the program name in the blank, click  , Close input window. At this time, cursor will jump to the new program just created, and highlight it. If input the already-exist program name, system will highlight the program.


Progrma name can be any letters, number, Chinese character, and their combination.

If users want to cancel the input, press  to quit.

#### 7.1.2 : Rename the already-exist program

Users should move the cursor at the program need renaming, then click  , windows as follows will prompt:


 , type the modified name in the blank, and

click  , the input window will close. At this time, cursor will jump at the renamed program in the program list.



Progrma name can be any letters, number, Chinese character, and their combination.

If the typed name is the same as one already-exist program , the info area will show:

1 test 更名为 test 存在相同的名称, 更名失败!

If users want to cancel the input, press  to quit.

#### 7.1.3 : Copy the current program and paste into another program with another name.

Users should move the cursor at the program need backup, then click  , windows as follows will prompt: 

Type the new name in the blank, and click **Confirm**, the input window will close. At this time, cursor will jump at the renamed program in the program list.

Program name can be any letters, number, Chinese character, and their combination.  
If the typed name is the same as one already-existing program, the info area will show:

1      test 更名为 test 存在相同的名称, 更名失败!

If users want to cancel the input, press **Exit** to quit.

**7.1.4    **Delete** : Delete the current program**

Users should move the cursor at the program need deleting, then click **Delete**, windows as follows will prompt:

Whether delete test Program?

**Yes**, confirm delete. The program will disappear.

If user wants to cancel press **No**, button to quit

Description
Delete is irreversible, so be cautious with delete operation.

**7.1.5    **Open U disk** : Open the content list of U disk**

This list only shows the user program that system can recognize; other types of document will not show. If U disk is not inserted or not recognized, system will show: please check if U disk is inserted or disinstalled. Users should insert U disk again.

**7.1.5.1 :    **Copy to system** : Copy the program to system.**

This button is to copy the selected program (by cursor) to the system program list. Click **Copy to system**, system will prompt:

Whether to copy program from U disk To system?

Click **Yes**, Copy the selected program to the system program list. If users want to cancel, press **No** button to quit.

**7.1.5.2    **Un U disk** Uninstall the current U disk:**

Uninstall the current U disk, and quit the U disk content disk, return to system program list. Info bar shows: U disk uninstall succeed.

**7.1.5.3 EXIT    **Exit** :**

Quit from U disk content, and return to system program list.

7.1.6 **Open** : Open the selected program and enter the program edit interface.

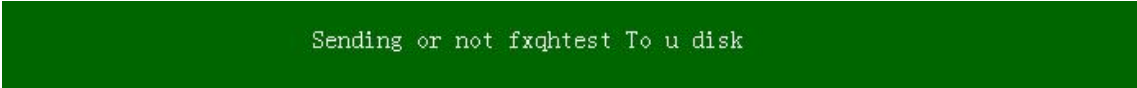
Description
1. Teach program and program edit should be operated in program edit interface. 2. Operation in play mode should also require program is open. 3. Operatoin in remote mode doesn't need open the program manully. After the power-on of driver, system will automatically open the program, whose name has been set in the remote process.

Users should move cursor at the program users want to open, and then click the button; system will enter the program edit interface of selected program. The already-exist program line will show as follows:

```
1 MOVJ VJ=10.0% PL=0
2 MOVJ VJ=10.0% PL=0
3 MOVL VL=100.0MM/S PL=0
```

7.1.7 **Copy the program to U disk** Copy to U..

Insert the U disk system can recognize, then select the program (by cursor) that users want to copy. Click the button, the following window will prompt:

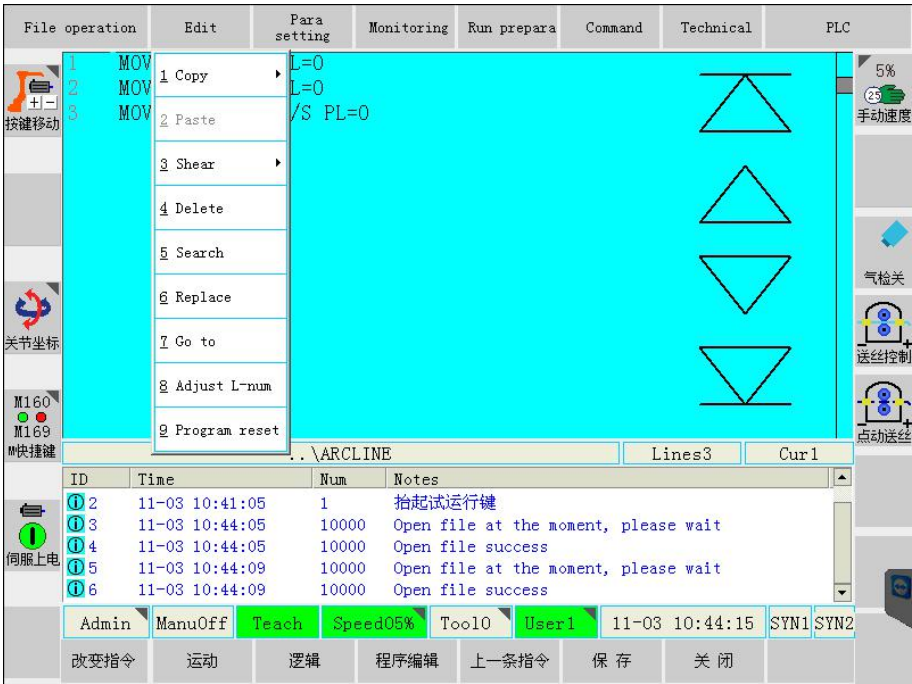


click **Yes** Copy the selected program and send it to U disk. If users want to cancel, press **No**

button to quit. After copy, click **Open U disk** to check if there is the program in the U disk conten list. Check if the copy has completed.

7.2 Edit in progrma edit interface

copy-copy current line、copy –copy section、paste、cut-cut current line、cut –cut section、delete、find、replace、turn into、modify as time sequence、reset.



7.2.1 1copy->1 copy current line:

Copy cursor located lineto backstage

## description

When copy the program line, teach point data will also be copied. So please pay attention to the execution position of the copied program line.

Move the cursor to the line need copying, select <copy current line>; move cursor to the position of paste, use <paste> to past the line before the cursur line. E.g., copy the line 4 ARCSTART#(0) to the line before line 8. The specific operation is following:

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ARCSTART#(0)
5  MOVL VL=50.0MM/S PL=9 TOOL=1
6  ARCEND#(0)
7  MOVJ VJ=25.0% PL=0 TOOL=1
8  MOVJ VJ=50.0% PL=9 TOOL=1
9

```

1. Move cursor at the line 4, as above figure.
2. Choose<Edit>-<1 copy>-<1 copy current line>-<confirm>, info bar shows multiple program line copy succeed.
3. Move the cursor at the line 8, as below figure.

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ARCSTART#(0)
5  MOVL VL=50.0MM/S PL=9 TOOL=1
6  ARCEND#(0)
7  MOVJ VJ=25.0% PL=0 TOOL=1
8  MOVJ VJ=50.0% PL=9 TOOL=1
9

```

4. Choose <Edit>-<2 paste>-<confirm>, info bar shows paste succeed. The pasted line will appear at the position between line 7 and line 8, while cursor is at this line, as below figure:

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ARCSTART#(0)
5  MOVL VL=50.0MM/S PL=9 TOOL=1
6  ARCEND#(0)
7  MOVJ VJ=25.0% PL=0 TOOL=1
8  ARCSTART#(0)
9  MOVJ VJ=50.0% PL=9 TOOL=1
10

```

### 7.2.2 1copy->2 copy section :

Copy the contains between strating line and end line to the backstage

## description

When copy the program section, teach point data will also be copied. So please pay attention to the execution position of the copied program line.

Copy the contents between starting line and end line to the backstage, and then move the cursor the position of paste, use <paste> to past the section before the cursur line. E.g., copy the line 2 and line 3 to the line before line 8. The specific operation is following:


```


1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ARCSTART#(0)
5  MOVL VL=50.0MM/S PL=9 TOOL=1
6  ARCEND#(0)
7  MOVJ VJ=25.0% PL=0 TOOL=1
8  MOVJ VJ=50.0% PL=9 TOOL=1
9

```

1. Choose<Edit>-<1 copy>-<2 copy section>-<confirm>. The following window will prompt:

Copy first 2 Copy end 3  
caution: when operating block, line number displaying is

Input 2 in the starting line, and input 3 at the end line, click  , and info bar shows multiple program

lines copy succeed. If users want to cancel the copy operation, click  button to quit.

2. Move cursor to line 8, as below figure:

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ARCSTART#(0)
5  MOVL VL=50.0MM/S PL=9 TOOL=1
6  ARCEMD#(0)
7  MOVJ VJ=25.0% PL=0 TOOL=1
8  ☐MOVJ VJ=50.0% PL=9 TOOL=1
9

```

3. Choose<Edit>-<2 paste>-<confirm>, info bar shows past succeed. And the copied section (line 2 and line 3) will appear between the line 7 and line 8, while cursor is at the line 8, as below figure shows:

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ARCSTART#(0)
5  MOVL VL=50.0MM/S PL=9 TOOL=1
6  ARCEMD#(0)
7  MOVJ VJ=25.0% PL=0 TOOL=1
8  ☐MOVJ VJ=50.0% PL=9 TOOL=1
9  MOVJ VJ=25.0% PL=0 TOOL=1
10 MOVJ VJ=50.0% PL=9 TOOL=1
11

```

### 7.2.3 2paste : used to past after copy and cut

Paste the copied or cut program into the line where cursor is located.

### 7.2.4 3cut->1 cut the current line :

Copy the line where cursor is and delete this line.

Move the cursor to the line need cutting, then click “cut current line”. The selected line will be copied to backstage and current line will be deleted. Move cursor to the desired position, click <paste>, and the cut line will appear at the cursor position. E.g. cut the line 4 ARCSTART# (0) to the position before line 8. The specific steps are as follows:

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ☐ARCSTART#(0)
5  MOVL VL=50.0MM/S PL=9 TOOL=1
6  ARCEMD#(0)
7  MOVJ VJ=25.0% PL=0 TOOL=1
8  MOVJ VJ=50.0% PL=9 TOOL=1
9

```



1. Move cursor to the line 4, as above figure.

2. Click<Edit>-<3 cut>-<1 cut current line>-<confirm>. System will show: current line has benn cut successfully. At this time, line 4 ARCSTART# (0) is copied to the backstage. And line 4 is deleted in program edit interface, as below figure:

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ☐MOVL VL=50.0MM/S PL=9 TOOL=1
5  ARCEMD#(0)
6  MOVJ VJ=25.0% PL=0 TOOL=1
7  MOVJ VJ=50.0% PL=9 TOOL=1
8

```

If users want to cancel the cut operation, press  to quit before clicking  . If users want to restore the cut line, move cursor to the proper position and paste the cut line back.

3. Move the cursor to the line 8 (line 7 after cut).

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  MOVL VL=50.0MM/S PL=9 TOOL=1
5  ARCEND#(0)
6  MOVJ VJ=25.0% PL=0 TOOL=1
7  ☐MOVJ VJ=50.0% PL=9 TOOL=1
8

```

Click<Edit>-<2 paste>-<confirm>. At this time, the cut line will appear at the position above line 8, as below figure:

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  MOVL VL=50.0MM/S PL=9 TOOL=1
5  ARCEND#(0)
6  MOVJ VJ=25.0% PL=0 TOOL=1
7  ☐ARCSTART#(0)
8  MOVJ VJ=50.0% PL=9 TOOL=1
9

```

### 7.2.5 3cut->2 cut section:

Copy the contents between starting line and end line to the backstage, and delete them

Cut the content between starting line and end line to the backstage, and then delete them. Move the cursor to the position of paste, use <paste> to paste the section before the cursor line. E.g., copy the line 4, 5, and 6 to the line before line 8. The specific operation is following:

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ☐ARCSTART#(0)
5  MOVL VL=50.0MM/S PL=9 TOOL=1
6  ARCEND#(0)
7  MOVJ VJ=25.0% PL=0 TOOL=1
8  MOVJ VJ=50.0% PL=9 TOOL=1
9

```

Choose<Edit>-<3 shear>-<2 cut block>. The following window will prompt:

Cut first  Cut end   
caution: when operating block, line number displaying is

Input 4 in the starting line. Input 6 at the end line, click , and info bar shows multiple program lines cut succeed. At this time, the content between line 4 and line 6 has been deleted:

```

1  MOVJ VJ=50.0% PL=0
2  MOVJ VJ=50.0% PL=0
3  MOVJ VJ=50.0% PL=0
7  MOVJ VJ=50.0% PL=0
8  MOVJ VJ=50.0% PL=0

```

If users want to cancel the cut operation, click  button to quit. If users want to restore the cut lines, move cursor to the proper position and paste the cut lines back.

2. Move cursor to line 8.

3. Choose<Edit>-<2 paste>, info bar shows paste succeed. And the cut section (line 4, 5, 6) will appear between the line 7 and line 8, while cursor is at the line 8, as below figure shows:

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ARCSTART#(0)
5  MOVL VL=50.0MM/S PL=9 TOOL=1
6  ARCEND#(0)
7  MOVJ VJ=25.0% PL=0 TOOL=1
8  ☐MOVJ VJ=50.0% PL=9 TOOL=1
9

```

### 7.2.6 4Delete :

Delete the line where cursor is located

Description
Delete of program line is irreversible, please be cautious with delete operation!

Move cursor at the line users want to delete. Click <Edit>-<4 delete>-<confirm>. Info bar will show:

Whether delete current line program

If users want to cancel the delete operation, press cancel button to quit before pressing confirm.

Notice: After pressing confirm button, the deleted line cannot be restored.

### 7.2.7 5find :

To find specific content, cursor will locate at the found line.

Firstly, move the cursor at the first line, click <edit>-<5 Search>, and following window will prompt:

Search

Then select the addition users want to search, and input the addition values, as shown in above. Then click 5 Search , system will search. The nearest line with the same addition value will be found, and cursor will locate at the line. System prompt: find. If no addition value has been found, system will prompt: no result.

If there are many addition value is the same with the search condition, every time user clicks 5 Search button, system will search from the cursor position and find the nearest addition value. The rest can be found in the same manner.

If users don't want to continue, click Cancel to quit.

Additions users can search include: PL、VJ、VL、X、Y、M、GP、LP、GD、LD、GI、LI。

### 7.2.8 6Replace :

Replace the original content with the new content.

Firstly, move the cursor at the first line, click <Edit>-<6 replace> , and following window will prompt:

Be replace   Replace

Then select the addition users want to replace, and input the original addition values 0 and replaced value 9, as shown in above. Then click Replace , system will search. The nearest line with the same addition value will be found, original value will be replaced by new one and cursor will locate at the line. System prompt: replace succeed. If no addition value has been found, system will prompt: no result.

If there are many addition value is the same with the search condition, every time user clicks Replace button, system will search from the cursor position and find the nearest addition value. The rest can be found in the same manner, until every additions with the original value have been replaced.

If users don't want to continue, click Cancel to quit.

Additions users can search include: PL、VJ、VL、X、Y、M、GP、LP、GD、LD、GI、LI。

### 7.2.9 7Turn :

Locate the cursor at specific line.

E.g.: move cursor to line 6 using Turn function.

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ARCSTART#(0)
5  MOVL VL=50.0MM/S PL=9 TOOL=1
6  ARCELD#(0)
7  MOVJ VJ=25.0% PL=0 TOOL=1
8  MOVJ VJ=50.0% PL=9 TOOL=1
9

```

Click <Edit>-<7 Go to>, following window will prompt.

Skip line

Type the number 6 into the blank. And click < Skip > button. Then cursor will be located at the line 6, as below figure.

```

6  MOVJ VJ=50.0% PL=0
7  MOVJ VJ=50.0% PL=0

```

If users don't want to move the cursor at the turn window, users can press < Cancel > button to quit.

### 7.2.10 8Modify as timesequence :

Backup functions, under development, not available now

### 7.2.11 9 Program reset :

Reset to original condition

Click <Edit>-<9 turn>-<confirm>, system will prompt: Reset.

### 7.2.12 Modify instructions:

Modify the current program line.

Move cursor to the line users want to modify, click **Change inst**, windows prompt the current program edit

interface. After the modification, users can click **Inst correct** to confirm modification, or click **Inst exit** to cancel the modification.

The specific steps are as follows:

```

1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1

```

Move cursor at the line 2, click **Change inst**, following window will prompt:

MOVJ VJ= 50.0% PL= 9

In this status, click submenu <move> or <logic>, or click main menu < Command > to select other instructions to modify the current line. It's also allowed to modify the addition without program modification.

#### Description

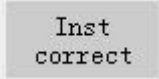
As for modification of the move instructions with move gesture, it's necessary to hold the security switch to record the position and gesture.

As for modification of the move instructions without move gesture, it's unnecessary to hold the security switch.

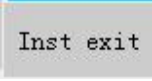
As for modification of the non-move instructions, it's unnecessary to hold the security switch.

Modify the VJ speed to 30%, PL to 5, as following:

MOVJ VJ 30 PL 5

Click  confirm modification. Then program is:

```
6 MOVJ VJ=30.0% PL=5
7 MOVJ VJ=50.0% PL=0
```

Click  button to cancel modification.

### 7.2.13 move: Call move instruction

In program edit interface, click this button, system will prompt the move instructions windows as follows (can also be called by < Command >-<Movement>-<MOVJ>):

 MOVJ VJ= 50.0 % PL= 9

Click this button for many times, the instructions will change in the order of the list < Command >-<Movement>, e.g. MOVJ-MOVL-MOVC-MOVJ.....

### 7.2.14 logic: Call logic instructions

In program edit interface, click this button, system will prompt the logic instructions windows as follows (can also be called by <Movement>-<1 logic>-<1 DOUT>-<confirm>):

 DOUT Y 0 = ON

Click this button for many times, the instructions will change in the order of the list < Command >-<logic >-<confirm>, e.g. DOUT-AOUT-WAIT-TIME-PAUSE-JUMP.....

### 7.2.15 Open process: Open process button

When program line uses CALL instruction, and program calls the process document, users can open the process interface by pressing this button.


### 7.2.16 last instruction: Call last instruction

If other instructions have been used before, the last instruction window will be open after pressing this button.

e.g. In program edit interface, MOVJ line is created as follows:

```
1 MOVJ VJ=50.0% PL=9 TOOL=1
2
```

Click <previous instruction>, the MOVJ window used last time will appear:

 MOVJ VJ= 50.0 % PL= 9

This button is mainly for convenient call of the same instructions.

### 7.2.17 save: Save the program

After the program editing, click the save button to save the program. Then status bar will show document saved.

### 7.2.18 close: Close the program edit interface.

Clicking this button can close the program edit window. However, if program hasn't been saved, the edited content may lost.

## 8 Program test-run

Program test-run refer to: after the editing of program, users can allow robot to operate line by line of the program by certain operation. This is useful to help user to compare the actual move and move track and to judge is move or track is correct.

### 8.1 Preparation:

#### 8.1.1 Related parameters

parameter type	Parameter	vaue	description
Operatoin	Cursor move in order in	0	no move: Cursor stop at the line after test-run


parameters (integrator authority)	test-run	1	move downwards: Cursor stop to the next line after test-run
---	----------	---	--





Specific steps for parameters modification:

Firstly, <parameter settings>-<7 system parameters>-<1 operation authority selection>-<confirm>. Input the integrator password in the prompt interface, click <confirm>, the authority will be changed to integrator authority.

Then, < parameter settings >-<3 operation parameters>-<confirm>. Choose [cursor move in test-run] using cursor in the prompt program list. Click <modify> in the sub menu. Input number 0 or 1 in the prompt input window, click <confirm> to finish the modification of parameter of cursor move in test-run.

8.1.2 Other preparation

1 Switch to robot movement allowance status .   
 按键移动

2 Modify the speed into a proper speed by pressing  or  button or speed multiplier . It's suggested that speed multiplier is less than 50%. The modified speed multiplier can be found in statu display area .

8.2 Steps for program test-run:



1. Return to program list interface as follows:

Program name	Time change	Size (B)
1	2016-10-26 16:50	137
111	2016-9-7 10:48	2500
1111	2016-10-26 16:50	0
123	2016-10-26 16:50	3659
1234	2016-10-26 16:50	2849
2	2016-10-26 16:50	816
555555	2016-11-2 19:35	0
abc	2016-10-26 16:50	0
ARCLINE	2016-10-31 10:39	0
call	2016-9-5 22:47	folder

2. Move cursor to the line users want to run, as the 555555 in above figure. Then click submenu <open> button to open this program. Users will enter the program edit interface, as follows:

```
1  MOVJ VJ=50.0% PL=0
2  MOVJ VJ=50.0% PL=0
3  MOVJ VJ=50.0% PL=0
7  MOVJ VJ=50.0% PL=0
8  MOVJ VJ=50.0% PL=0
```

3. Move cursor at the beginning of the line that users want to test-run, for example, at the beginning of second line.

4. Holding security switch, then press   button in character keyboard. System will control the robot to execute the current line, such as robot movement, IO output, calculation, logic.....

Notice
When cursor is located within the IF, WHILE, SWITCH structure, system will prompt error alert. So before the test-run, move the cursor beyond the above instruction structure.
When MOVJ is test-run of define the points, robot move track will be straight.

# Chapter 11 PLAY & REMOTE mode

## 1 PLAY mode

### 1.1 Preparation

- Please make sure the program is correct using test-run before execute it in play mode.
- Please make sure there is no person or obstacle in the movement area of robot.

### 1.2 Program call

Return to the program list interface (resource manager).

Move cursor by <↑><↓> at the program users want to execute. For example, execute 555555 program, the example program in the chapter 2 6.1 welding teach program.

Click<Open> bottun, open the program edit interface, as follows



```
1  MOVJ VJ=50.0% PL=9 TOOL=1
2  MOVJ VJ=50.0% PL=9 TOOL=1
3  MOVJ VJ=25.0% PL=0 TOOL=1
4  ARCSTART#(0)
5  MOVJ VL=100.0MM/S PL=0 TOOL=1
6  ARCEND#(0)
7  MOVJ VJ=25.0% PL=0 TOOL=1
8  MOVJ VJ=50.0% PL=9 TOOL=1
9  □
```

Move the cursor to the beginning of the program (first line).

### 1.3 Program execution

#### 1.3.1 START


1. Switch mode to play mode (“PLAY”). Then “play mode” will show in status bar.

2. Choose the properoperation method: single line execution  , single program execution  , cyclic

execution  .  
无限循环


Notice

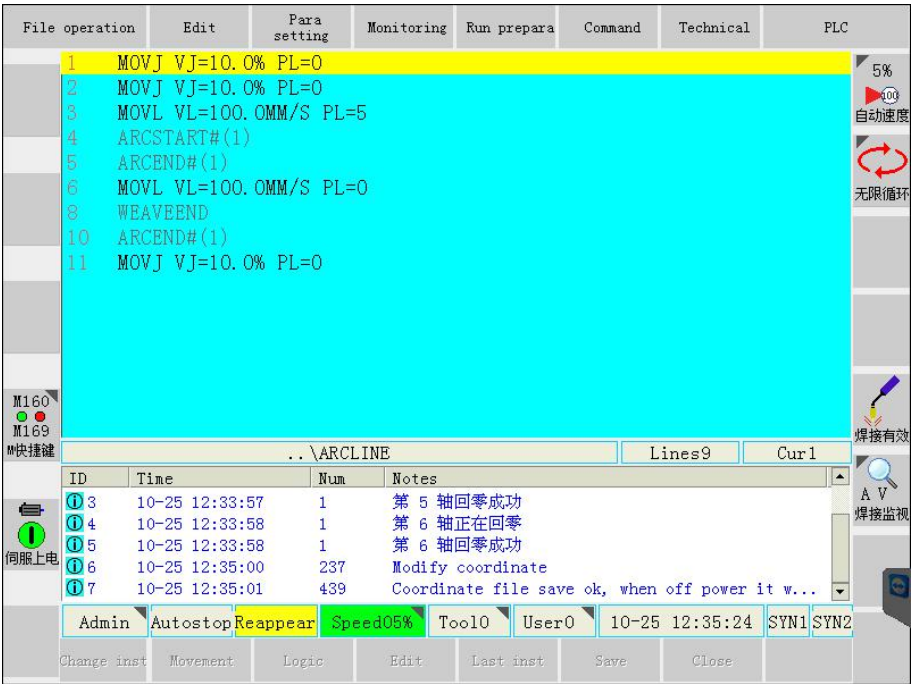
It’s suggested to use single-line mode for first-time execution, which is benifitial for deal with the problem. Please pay attention that program will be executed slowly in single line mode.  
After the single line operation is successful, choose single program execution.  
After the single program operation is successful, choose cyclic execution and robot starts to work.

3. Choose proper operation speed. Click multiplier logo, and the status bar will showL:  .

Notive


It’s suggested the speed is slow at first. Then accelerate the speed after the first successful operation.



4. After the previous preparation, press  button, and program will start operation according to the position (点位), move, and logic in teach mode. The operation interface is shown in below figure:




1.3.2 Pause (stop)

Notice

The pause and stop is the same status in this system, i.e. after pressing the stop button, system will stay at the stop (pause) status. In this status, speed can be modified, and operation mode can also be switched. Press  button, program can continue. Switching to the teach mode will result in quit of program.

■ During the execution of the program, if users want to suspend or stop the execution, press  button, then system decelerate the execution of program and the movement of robot till stop. If stop the program by this way, the related internal status, output prots, counter, variables will maintain. After start again, press  button, and program will be executed as normal. This way is high recommended.

To ensure the security, it's suggested to click  button for several times or press it for a longer time and to observe the info area to show: program stops, please continue after reset (程序停止，请复位后运行!).



- When program is executed in the single line mode , after the execution of the last line, system will

decelerate and stop the program and robot. But robot is in still status rather than stop status. Users should click


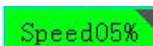


button to stop the program.


- Switching to teach mode or play mode will stop the program forcibly. In this way, system will cut off the pulse, power off the supply, start brake, which may cause the **lash (冲击)** on the robot. So it's not suggested to switch mode during program execution.

### 1.3.3 Modify speed, switch operation mode.



- Modify speed:

In pause (stop) status, click  button and coordination button <+> and <-> to modify the speed multiplier. Status bar will show: .


Description: When program is executed in single line mode , and the current line has been executed and robot is

static, users should click  button to stop the program, then modify the speed multiplier by multiplier logo and <+> and <-> button.

- Switch the operation mode:

1. In cyclic operation mode , click the correspondent button  can switch to the single line operation mode.

2. In pause (stop) status, click operation logo  and coordination button <+> and <-> to switch and operation mode.

3. In play or remote mode, if program is executed in cyclic mode , if M216 auxiliary relay is effective, program will

switch directly to single program operation mode . After the single program is executed and stop, system will reset

the M216 relay into ineffective, and program operation mode is reset to cyclic mode. This function is mainly used to stop the cyclic program after one single execution, which is beneficial for stop the robot at a certain status.

Notes: When this function is needed, PLC need modifying as follows:



#### ■ Switch the operation mode during execution:


In play mode, if users want to switch operation mode when program is being executed, it's needed to press the stop





button to stop the execution. Then switch to the desired mode (teach mode or remote mode).

#### 1.3.4 Continue after stop

##### ■ Operation mode is still play mode

In this mode, press the stop button , program will stop and robot will decelerate the execution and move. Program-related internal status, output ports, counters, variables are all kept.

Press  or  button, program will start again and be executed continuously.



##### ■ Operation mode changed to teach mode.

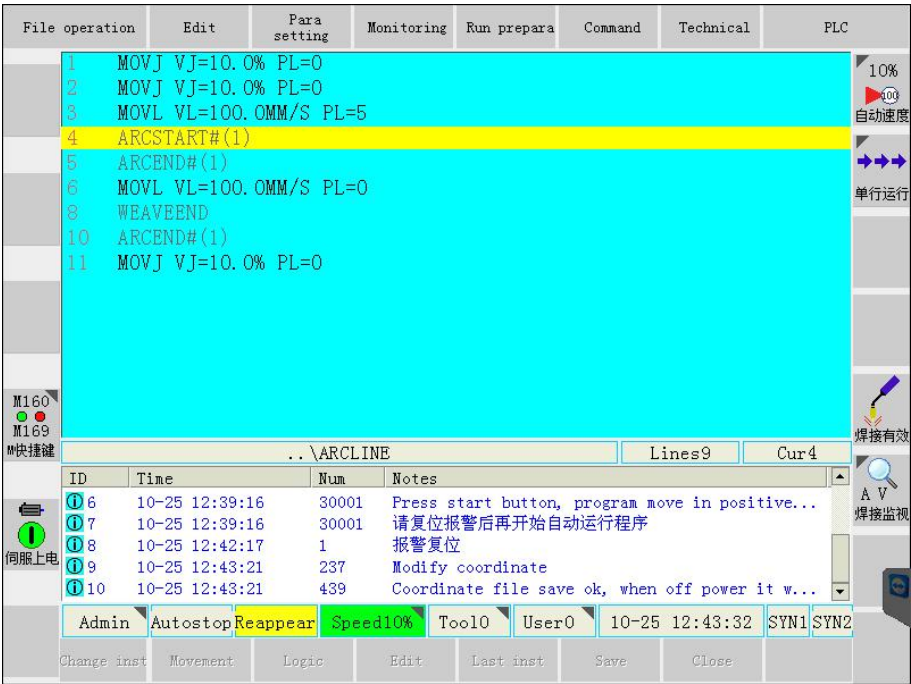
1. Realted parameters (Integrator authority) : <Parameters setting>-<3 operation parameter>

Parameter type	parameter	value	description
Operation parameters	18 Initial cursor position in cyclic execution mode.	0	Current line: When operation mode is changed from teach mode to play and remote mode in cyclic mode, cursor will locate at the current line as in the teach mode.
		1	Beginning of program: When operation mode is changed from teach mode to play and remote mode in cyclic mode, cursor will locate at the beginning of the program.


#### 2. Strat process with different parameters

When <operation parameter>-“18 Initial cursor position in cyclic execution mode” is zero:

Cyclic execution mode : switch to play mode, and click  button, program will be executed from the current line where cursor is located in teach mode, as shown in follows:



When <operation parameter>-“18 Initial cursor position in cyclic execution mode” is 1:

Cyclic execution mode  : switch to play mode, cursor will jump to first line of the program. After clicking



button, program will be executed from the start of the program as shown in follows:



1.3.5 Emergency stop

warning
1. In automatic operation, if abnormal is found, uses should press the emergency stop button as soon as possible. 2. After the emergency stop, the status of robot may be abnormal. So pay careful attention when system alert after reset the machine.

When robot is operated in play mode, stop the program while program is executed. Restart of robot should be done as the following steps:

Firstly, check the robot: if tool clamps is abnormal? Can the program be executed again? （The number in the following figure starts from 2）

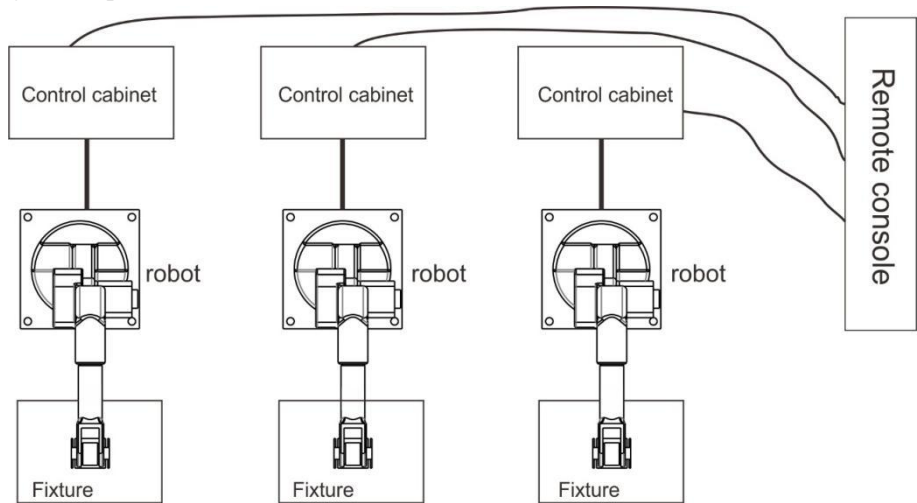
- 1 Swirl to loosen the emergency stop button
- 2 Press R button, reset the current alert info
- 3 Click servo power button, power the servo
- 4 Decelerate the speed, switch to single line operation mode
- 5 Press start button for several times, judge if program can be executed normally.
- 6 After confirm no abnormal, accelerate the speed and change to cyclic operation mode.
- 7 Click start button, robot start to work.

2 remote mode

2.1 Remote operation mode.

The remote operation mode refers to: control the move and stop of the robot from the position away from the robot teach box. This operation mode is mainly used in following situations: remote control of several robots, working position is far away from operator, etc.

After switching to remote mode, the following buttons is ineffective:  
run, reverse run, program stop buttons on the teach box.



Details can be found in "CRP-S40 S89 remote function description".

2.1.1 preparation

1 related parameters (integrator authority): <parameters setting>-<3 operation parameters>

Parameter type	parameter	value	description
Operation parameter	External IO confirm time	1000	This parameter is the lasting time of remote/appoint signal. Remote/appoint signal is effective only in the complete form: uphill edge, uphill lasting time, downhill edge. Appoint stop signal and timely response is not controlled by this parameter.

1. Connection of lines can refer to “CRP-S40 S80 remote function description”.

2. Edit of operation program

It’s necessary to edit the working program in teach mode, and to test the correctness of program in play mode.

Notice: The program should end with RET if users want to execute it in remote mode, as shown in follows:

```
1  TIME T=10000
2  MOVL VL=1500.0MM/S PL=0
3  MOVL VL=1500.0MM/S PL=0
4  MOVL VL=1200.0MM/S PL=0
5  MOVL VL=1000.0MM/S PL=0
6  MOVL VL=1200.0MM/S PL=0
7  MOVL VL=1500.0MM/S PL=0
8  RET
9
```



3. Working conditions preparation of robot

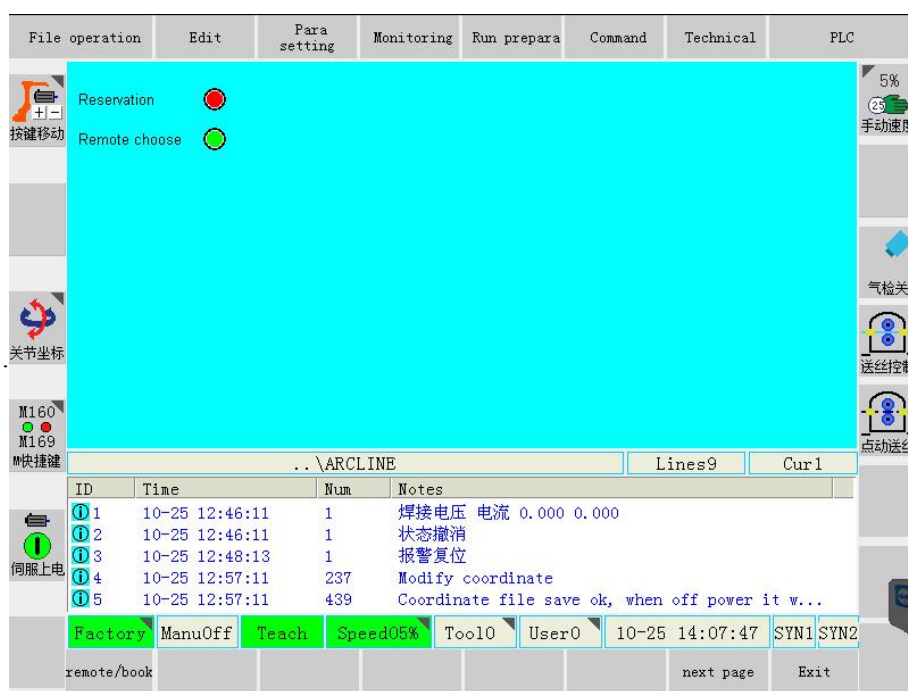
Check the robot clamps is ready, the used product is reasonable. In the test-run process, robot should work with all clamps and products to test if program, product and clamps can work properly.

Notes: When robot is going to interact with other robots or external equipments, make sure to properly deal with each signal in logic, connection, **timeliness**, etc. Otherwise, interaction may be abnormal, which may result into equipment damage and personal injury.

### 2.1.2 Program call

#### 1. Choose remote mode

Click<technical>-<other>-<remote>-<confirm> to open the following window. Click submenu <remote/appoint> switch button, choose [remote choose], and  will turn into .



#### 2. Edit the remote working program

Click sub-menu <next page> to enter remote program edit interface, as shown in below figure:



Type the program name users want to operate in remote mode. Click <quit> to quit the remote setting. If the typed program name is wrong or the program doesn't exist, info area will show: program name wrong, please type the name again after check.

### 2.1.3 Remote operation

#### 2.1.3.1 Remote start

Switch to remote mode using mode switch;

Power the servo by pressing servo power button, and open the remote operation program simultaneously.

Press the start button, hold the button and release the button. At this time, the system will start to execute the working program.

Notice: When system is collecting the remote start signal, it's necessary to collect three conditions including uphill edge, voltage duration, and downhill edge. (这三个术语不太会翻, 上升沿 下降沿 电平保持时间, 或者翻成 rising edge, voltage duration, trailing edge)

#### 2.1.3.2 Remote speed adjust

Only after stop the program can users adjust the speed. So when users want to adjust the speed, press the remote stop button to stop the robot, and then adjust the operation speed on the teach box.

#### 2.1.3.3 Remote pause/ stop

Press the remote stop button, then program will stop.

Notice: There may be delay after pressing the remote stop button until the stop of robot movement. So if emergency occurs, press the emergency button first, rather stop button.

#### 2.1.3.4 Remote restart after stop

After remote stop, users can adjust the robot clamps, or switch to teach mode to teach the robot.

When users want to restart, move the cursor to the program line users want to start, then press the remote operation button, hold it and then release. In this way, program will be executed from the line where cursor is located.

#### 2.1.3.5 Remote reset and restart

When robot has alert, robot will stop the movement. At this time, users can press the remote reset button to reset the alert status. Or press the "R" button on the teach box to reset the alert status.

Restart after reset:

High-level alert will clear the power status on the servo. When restart, users need to power the servo by remote servo power button, then press the remote operation button to start the program.

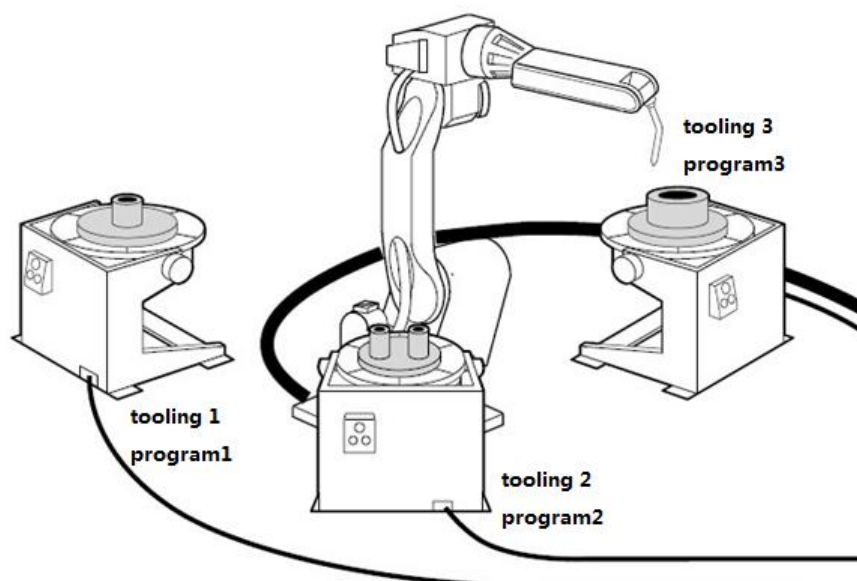
### 2.2 Reservation operation

Reservation operation is to preform the functions of programs on every tool in the appointed order, by the start button on every tool.

When switch to reservation operation, the following buttons will be ineffective:

<operation>, <reverse operation>, <program stop> buttons on the teach box.

<EX-RUN>, <EX-HLAT> buttons in remote ports.



Details can refer to “CRP-S40, S80 appointment operation instructions”.

### 2.2.1 Preparation

1. Related parameters (Integrator authority) : <Parameters setting>-<3 operation parameters>

Parameter type	parameter	value	description
Operation parameter	External IO confirm time	1000	This parameter is the lasting time of remote/appoint signal. Remote/appoint signal is effective only in the complete form: uphill edge, uphill lasting time, downhill edge. Appoint stop signal and timely response is not controlled by this parameter.

1. The connection of wire can refer to “CRP-S40, S80 appointment operation instructions”

2. Edit of operation program

It's necessary to edit the working program in teach mode, and to test the correctness of program in play mode.

Notice: The program should end with RET if users want to execute it in remote mode, as shown in follows:

```

1  TIME T=10000
2  MOVL VL=1500.0MM/S PL=0
3  MOVL VL=1500.0MM/S PL=0
4  MOVL VL=1200.0MM/S PL=0
5  MOVL VL=1000.0MM/S PL=0
6  MOVL VL=1200.0MM/S PL=0
7  MOVL VL=1500.0MM/S PL=0
8  RET
9

```



3. Working conditions preparation of robot

Check the robot clamps is ready, the used product is reasonable. In the test-run process, robot should work with all clamps and products to test if program, product and clamps can work properly.

Notes: When robot is going to interact with other robots or external equipments, make sure to properly deal with each signal in logic, connection, timeliness (时效性), etc. Otherwise, interaction may be abnormal, which may result into equipment damage and personal injury.

### 2.2.2 Program call

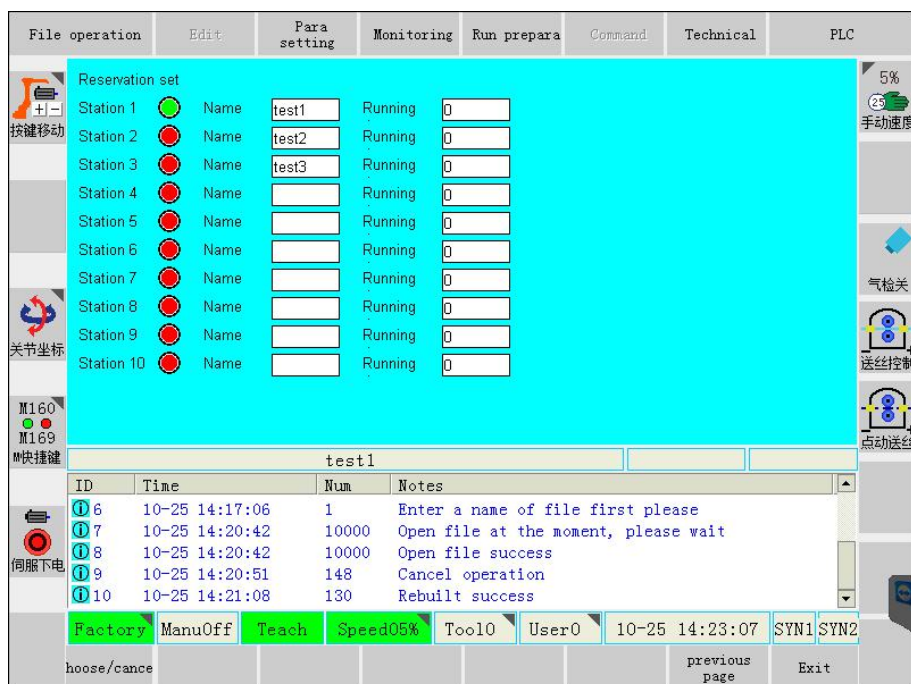
1. Choose remote mode

Click<technical>-<other>-<remote>-<confirm> to open the following window. Click submenu <remote/appoint> switch button, choose [remote choose], and  will turn into 





## 2. Edit the reservation operation working program

Click sub-menu <next page> to enter reservation program edit interface, as shown in below figure:



In the above interface, type the correspondent program name in every station name box, for example, station 1 is correspondent to program test1, station 2 is correspondent to program test 2, and station 3 is correspondent to program test 3.

Then move cursor to the station name bar that users want to open. Clicking <choose/cancel> button will switch the indicating signal light. When the light shows , it means the station reservation is open. When the light shows , it means the station reservation is closed.

After the setting, click <quit> to quit the setting. When quitting, if typed program name is not exists or has error, system will prompt: file name error, please type the name again after cheking. Then system will clear the wrong program name, and close the reservation funtions of this station.

2.2.3 Reservation operation

2.2.3.1 Reservation start

Description
1. The effectiveness of M33X and M34X of correspondent station is required for the start of reservation operation.
2. During the reservation operation, when program is stopped, system will switch to teach mode. If users close the opened reservation program, then all the reservation status will be cancelled. If users don't close the opened reservation program, all the reservation status will be cancelled except the current program.

Switch to remote mode using mode switch;

Power the servo by pressing servo power button.

After the preparation of station 1, press the station 1 reservation start button, and hold it for a certain time period. Then release the button. At this time, the Station 1 program is starting to operate.

After the preparation of station 2, press the station 2 reservation start button, and hold it for a certain time period. Then release the button. At this time, if robot is operating the other station program, the Station 2 will be in queue status.

After the preparation of station 3, press the station 3 reservation start button, and hold it for a certain time period. Then release the button. At this time, if robot is operating the other station program, the Station 2 will be in queue status.



Attention

When system collects the reservation start signal, it's necessary to collect three conditions, including rising edge, voltage duration time, and trailing edge.

2.2.3.2 Cancel of queue reservation

When users want to cancel the reservation of one station which is in queue status, it's needed to press the reservation start button. Hold it and release. At this time, the reservation status will be cancelled of this station.

If users want to set reservation again, press the reservation start button. Hold it and release. At this time, the station will be in queue status.

2.2.3.2 Speed adjust in reservation operation

Only after stop the program can users adjust the speed. So when users want to adjust the speed, press the remote stop button to stop the robot, and then adjust the operation speed on the teach box.

2.1.3.3 Pause/ stop in Remote

Press the remote stop button, then program will stop.

Notice: There may be delay after pressing the remote stop button until the stop of robot movement. So if emergency occurs, press the emergency button first, rather stop button.

#### 2.1.3.4 Restart after stop in reservation mode

After reservation stop, users can adjust the robot clamps, or switch to teach mode to teach the robot.

Notice: When closing the opened reservation program, all the reservation in queue status will be cleaned.

After switching to teach mode, when users want to restart, move the cursor to the program line users want to start, and switch to remote mode. Then press the reservation operation button, hold it and then release. In this way, program will be executed from the line where cursor is located. After the finish of this station, system will move on to the following station in queue.

Attention
If program is closed in teach mode, the reservation status will be cleaned. In this situation, restart is similar to first-time reservation start.

#### 2.1.3.5 Reset and restart in reservation mode

When robot has alert, robot will stop the movement. At this time, users can press the remote reset button to reset the alert status. Or press the “R” button on the teach box to reset the alert status.

Restart after reset:

High-level alert (高等级报警) will clear the power status on the servo. When restart, users need to power the servo by remote servo power button, then press the remote operation button to start the program.

# Chapter 12 File operation

File operation is mainly used for the interaction between system and U disk. For example, software update, parameters backup, data import/output, and etc. After the commissioning of new equipment, it's suggested to backup the parameters in case of unexpected need. Meanwhile, if users is confronted with problems, users can also backup the system data, and send the complete data (5 files, 1 folder) to our company to analyze and deal with the problem.

In this chapter, “\*”refer to U disk symbol.

Pre-requisites:

- 1 one recognizable, formatted U disk with the storage more than 20M.
- 2. When it's needed to read the system, the file route and name is correct.

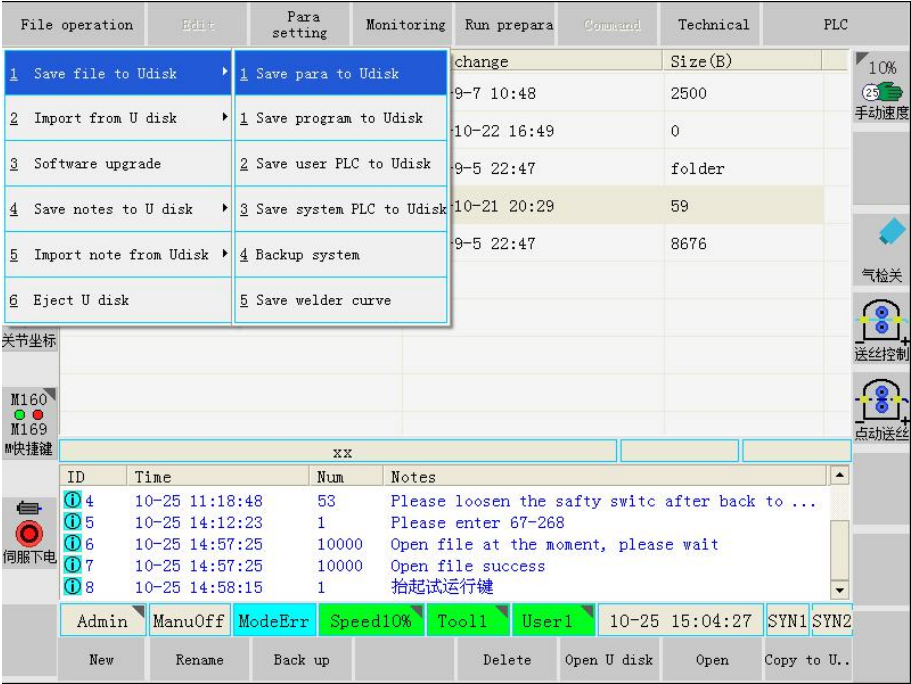
## 1 Save files into U disk

### 1.1 Save parameters into U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<1 save files into U disk>-<1 save para to U disk>-<confirm>.

The system parameters will be saved in the root dictionary on U disk (\*:\para.txt) , ans info area will prompt:

Parameters file has been saved in U disk. If you want to pull the U disk out, please uninstall the U disk.



Warning

System parameters are the key parameters of the equipment. Please don' t modify the backup data, otherwise data error may occur, which may cause incident.

If U disk is not inserted or not recognized, info area will prompt: [Failuer of parameters file save, please check if U disk is inserted.](#)

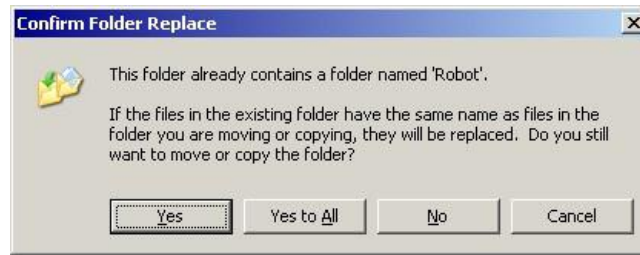
### 1.2 Save users' program to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<1 save files into U disk>-<2 save program to U disk>-<confirm>. The following window will prompt:



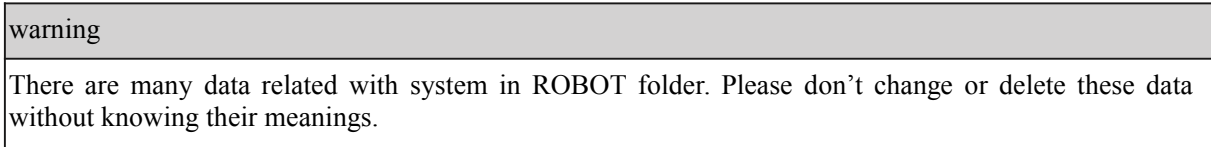
[Copy progress bar]

If there has been ROBOT folder, the following window will prompt:



[Whether overwrite the current folder]Using cursor to select [Yes to All] and confirm.

The users' program will be saved in the root dictionary on U disk (\*:\ROBOT) , and info area will prompt: **ROBOT folder has been saved in U disk. If you want to pull the U disk out, please uninstall the U disk.**



If U disk is not inserted or not recognized, info area will prompt: **Failuer of users'program save, please check if U disk is inserted.**

### 1.3 Save user PLC to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<1 save files into U disk>-<3 save users PLC to U disk>-<confirm>.

The users' PLC will be saved in the root dictionary on U disk (\*:\plc.plc plc.lad) , and info area will prompt: **plc.lad folder has been saved in U disk. If you want to pull the U disk out, please uninstall the U disk.**

If U disk is not inserted or not recognized, info area will prompt: **Failuer of plc.lad folder save, please check if U disk is inserted.**

### 1.4 Save system PLC to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<1 save files into U disk>-<4 save system PLC to U disk>-<confirm>.

The system PLC will be saved in the root dictionary on U disk (\*:\system.plc system.lad) , and info area will prompt: **system.lad folder has been saved in U disk. If you want to pull the U disk out, please uninstall the U disk.**

If U disk is not inserted or not recognized, info area will prompt: **Failuer of plc.lad folder save, please check if U disk is inserted.**

### 1.5 One key system backup

One key backup can backup all the users' data in the system to U disk. When users want to restore the data, users can user the <one key read system> function to read the system.

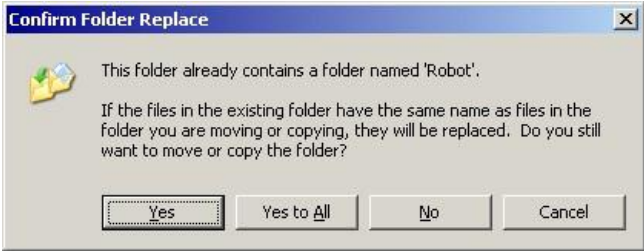
Or when users are confronted with obstacles or problems, users can backup the complete data (including 5 files and 1 folder, see more in the following notice) and send these data to our company. We can restore the users' system situation using the complete data, and help users to deal with the obstacles or problems.

Insert the U disk into the USB connector on the main case. Click<file operation>-<1 save files into U disk>-<5 backup system>-<confirm>. The following window will prompt:



[Copy progress bar]

If there has been ROBOT folder, the following window will prompt:



[Whether overwrite the current folder]Using cursor to select [Yes to All] and confirm.

After the complete of copy progress bar, the related files will be saved in the root dictionary on U disk (\*:\) , and info area will prompt: Parameters file has been saved in U disk. If you want to pull the U disk out, please uninstall the U disk. ROBOT folder has been saved in U disk. If you want to pull the U disk out, please uninstall the U disk. Plc.lad folder has been saved in U disk. If you want to pull the U disk out, please uninstall the U disk. System.lad folder has been saved in U disk. If you want to pull the U disk out, please uninstall the U disk.

If U disk is not inserted or not recognized, info area will prompt: Failuer of system.lad folder save, please check if U disk is inserted. Failuer of system.plc folder save, please check if U disk is inserted.

Attention

1. It's highly suggested to backup the system after the commissioning by equipment sailor.

2. After one key backup, there are 5 files and 1 folder, as shown in below:

Robot

para  
文本文档  
3 KB

plc.lad  
LAD 文件  
7 KB

plc.plc  
PLC 文件  
4 KB

system.lad  
LAD 文件  
13 KB

system.plc  
PLC 文件  
7 KB

2 Import from U disk

2.1 Import parameters to system

Insert the U disk into the USB connector on the main case. Click<file operation>-<2 import from U disk>-<1 import para>-<confirm>.

The files in the root dictionary on U disk (\*:\para.txt) will be imported into the system, and overwrite the previous parameters. And info area will prompt: Import parameters succeed.

File operation

Edit

Para setting

Monitoring

Run prepara

Command

Technical

PLC

1 Save file to Udisk

2 Import from U disk

3 Software upgrade

4 Save notes to U disk

5 Import note from Udisk

6 Eject U disk

1 Import para

2 Import user program

3 Import user PLC

4 Import system PLC

5 Restore system

6 Import welder curve

Time change

2010-9-7 10:48

Size(B)

2500

0

folder

59

8676

关节坐标

M160

M169

M快捷按钮

伺服下电

ID

Time

Num

Notes

4

10-25 11:18:48

53

Please loosen the safty switc after back to ...

5

10-25 14:12:23

1

Please enter 67-268

6

10-25 14:57:25

10000

Open file at the moment, please wait

7

10-25 14:57:25

10000

Open file success

8

10-25 14:58:15

1

抬起试运行键

Admin

ManuOff

ModeErr

Speed10%

Tool1

User1

10-25 15:16:11

SYN1

SYN2

New

Rename

Back up

Delete

Open U disk

Open

Copy to U..

10%

手动速度

气检关

送丝控制

点动送丝

Warning

1. System parameters are equipment key parameters. Please be cautious, for the wrong imported parameters will result into abnormal operation of equipment and cause damage further!

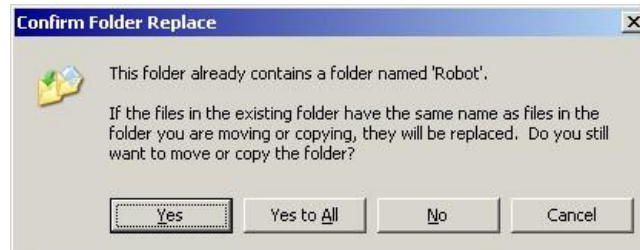
2. The zero position parameters are also in parameters files. Please make the imported data are acoordent with the equipment. Otherwise, the zero position of robot will be changed. So please be cautious!

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

If the parameters route is incorrect or files don't exist, info area will prompt: [Failuer of parameters import, please check the files and U disk.](#)

## 2.2 Import user program into system

Insert the U disk into the USB connector on the main case. Click<file operation>-<2 import from U disk>-<2 import user program>-<confirm>. The following window will prompt:



[Whether overwrite the current folder]Using cursor to select [Yes to All] and confirm. The following progress bar will prompt:

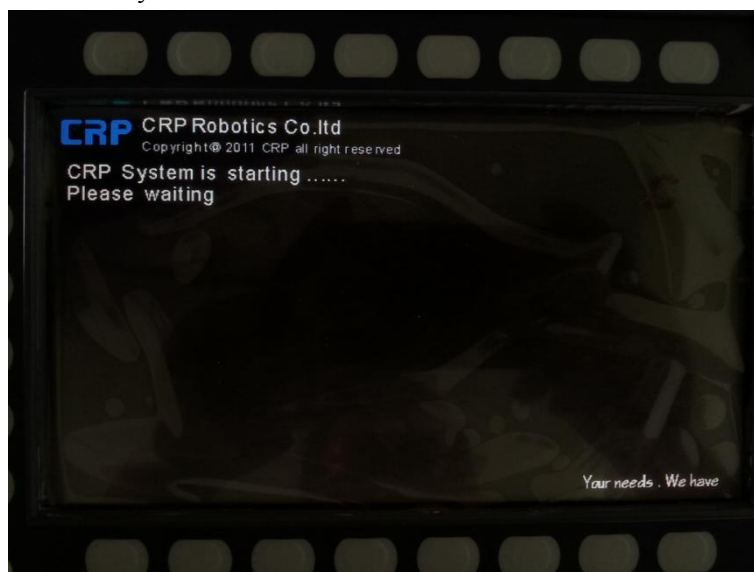


[Copy progress bar]

When the progress bar is finished and disappear, the folder in the root dictionary (\*:\robot) will be imported in to the system, and overwrite the files with the same name. And info area will prompt: [Import users program succeed.](#) And the following window will prompt simultaneously:



Click <confirm> button to restart the system.



Users cannot pull the U disk out until the presence of the above interface. After the finish of system restart, the user program import is completed.

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

If the parameters route is incorrect (\*:\robot) or files don't exist, info area will prompt: [Failuer of parameters import, please check the files and U disk.](#)

### 2.3 Impor users PLC into system

Insert the U disk into the USB connector on the main case. Click<file operation>-<2 import from U disk>-<3 import user PLC>-<confirm>. The info area will prompt: [pcl.lad has been copied to the system. System will restart.](#) And the following window will prompt simultenuouly:



Click <confirm> button, and system will restart. The following steps are the same as the steps in 【2.2 import user program into system】.

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

If the parameters route is incorrect (\*:\plc.lad plc.plc) or files don't exist, info area will prompt: [Imcomplete user PLC files, plc.plc plc.lad are needed.](#)

### 2.4 Import system PLC to the system

Insert the U disk into the USB connector on the main case. Click<file operation>-<2 import from U disk>-<4 import system PLC>-<confirm>. The info area will prompt: [system.lad has been copied to the system. System will restart.](#) And the following window will prompt simultenuouly:



Click <confirm> button, and system will restart. The following steps are the same as the steps in 【2.2 import user program into system】.

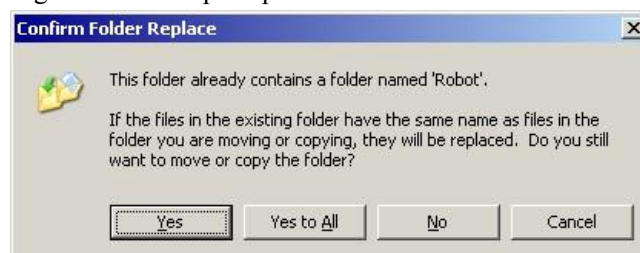
If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

If the parameters route is incorrect (\*:\system.lad system.plc) or files don't exist, info area will prompt: [Imcomplete system PLC files, system.plc system.lad are needed.](#)

### 2.5 One key restore system

One key restore system can restore the backup data from the U disk by <one key backup system> function to the system. One key restore system is mainly used to restore the system data.

Insert the U disk into the USB connector on the main case. Click<file operation>-<2 import from U disk>-<5 restore system>-<confirm>. The following window will prompt:



[Whether overwrite the current folder]Using cursor to select [Yes to All] and confirm. The following progress bar will prompt:

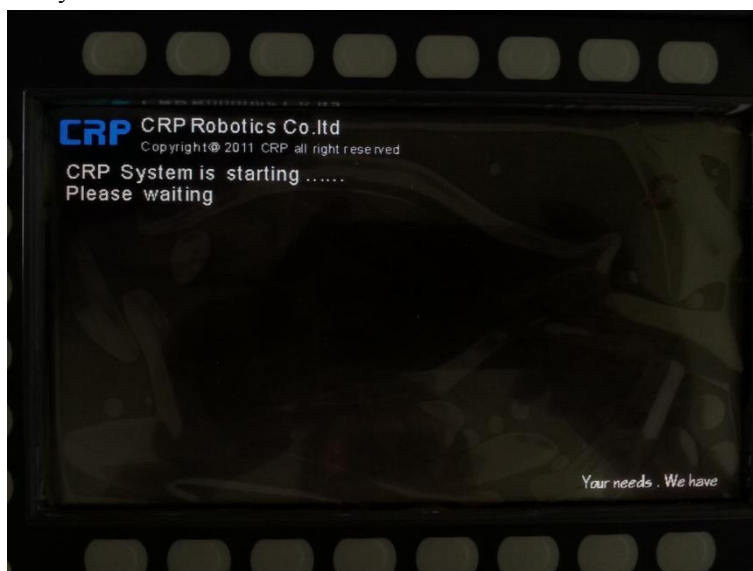


After the [copy progress bar] is finished and disappear, the related files and folders will be imported into the system and overwrite the files with the same name. Info area will prompt: [Import of parameters files succeed](#). [Import of user program folder succeed](#). [Plc.lad folder has been copied into the system, and system will restart](#). [Plc.plc folder has been copied into the system, and system will restart](#). [System.lad folder has been copied into the system, and system will restart](#). [System.plc folder has been copied into the system, and system will restart](#).

The following window will prompt simultaneously:



Click <confirm> to restart the system.



Users cannot pull the U disk out until the presence of the above interface. After the finish of system restart, one key restore is completed.

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled](#).

If the files in U disk is not complete, info area will prompt: [Several items import succeed, and several items failed](#).

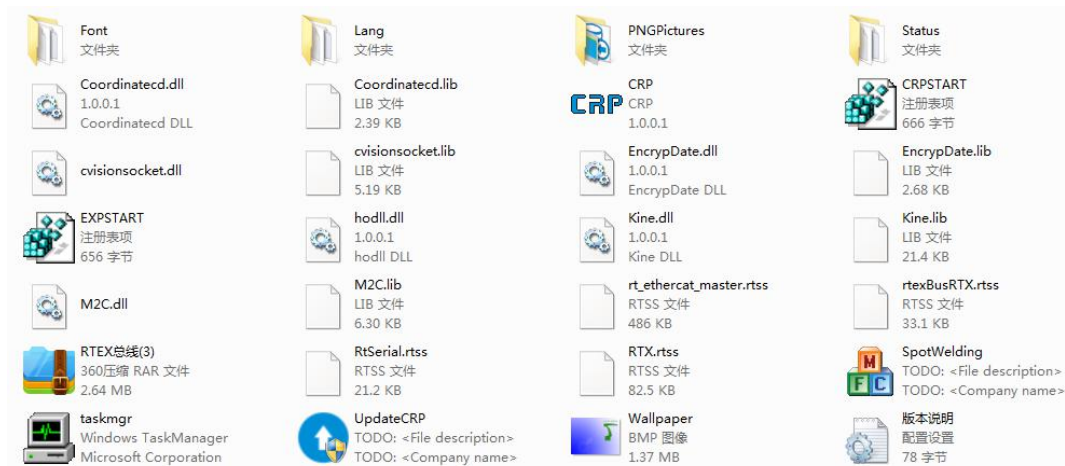
#### Warning

1. The files and folders in U disk have strict requirement of route. If these files and folders have wrong route, they cannot be imported.
2. Some unnecessary files can be deleted. When one key restoring the system, files and folders in the correspondent route will be imported. Others will not be imported.
3. Please be cautious about the treat of U disk files. If treat is improper, failure of data import may result, and damage may occur.
4. Users mustn't modify the Parameter files (para.txt) and import them.

### 3 Software upgrade

#### Preparation

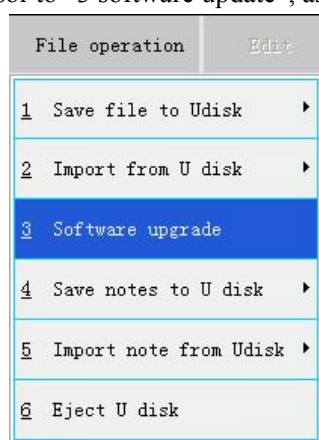
Prepare a empty U disk to copy the update software (as shown in below figure) and the files need updating into the root dictionary of U disk.



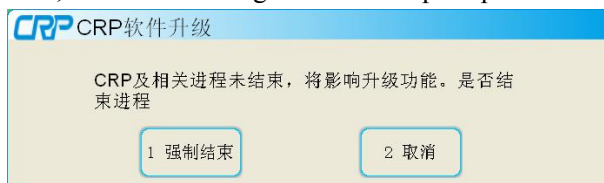
Notice: UpdateCRP.exe file is need to locate in the root dictionary of U disk, which will copy all the upgrated files into root dictionary of U disk.

Insert the U disk into the USB connector in system main case.

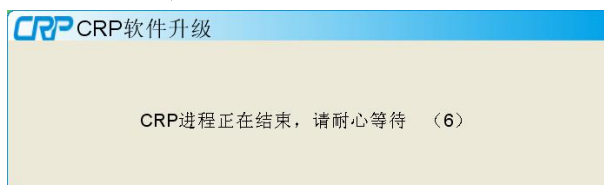
Press "file operation" in main menu, move cursor to "3 software update", as shown in below figure:



Press confirm button on the teach box, and the following window will prompt:



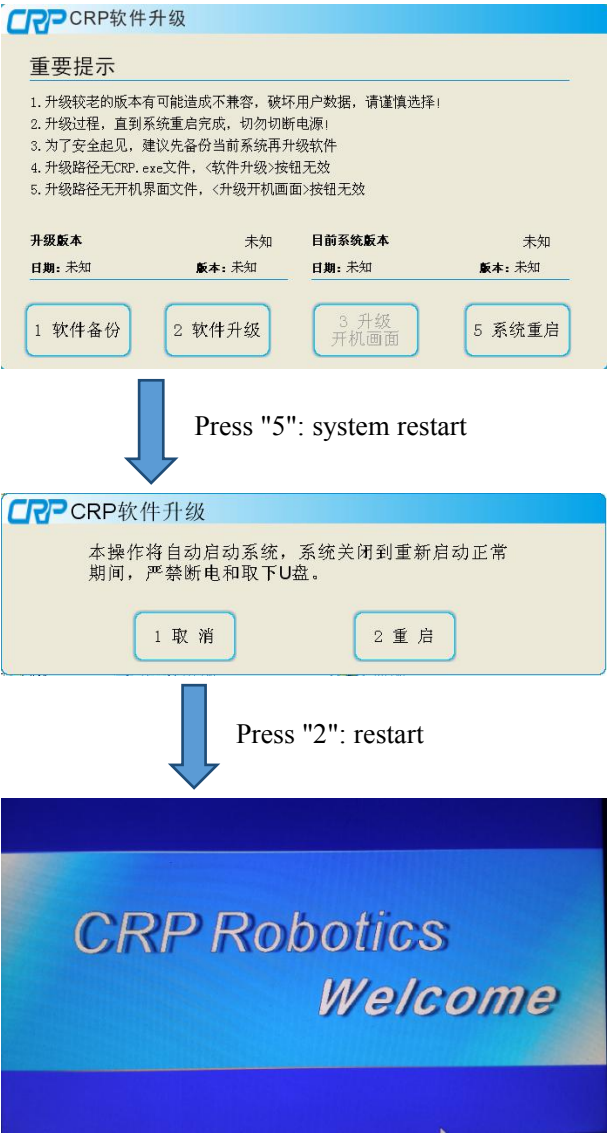
press "1": forced stop



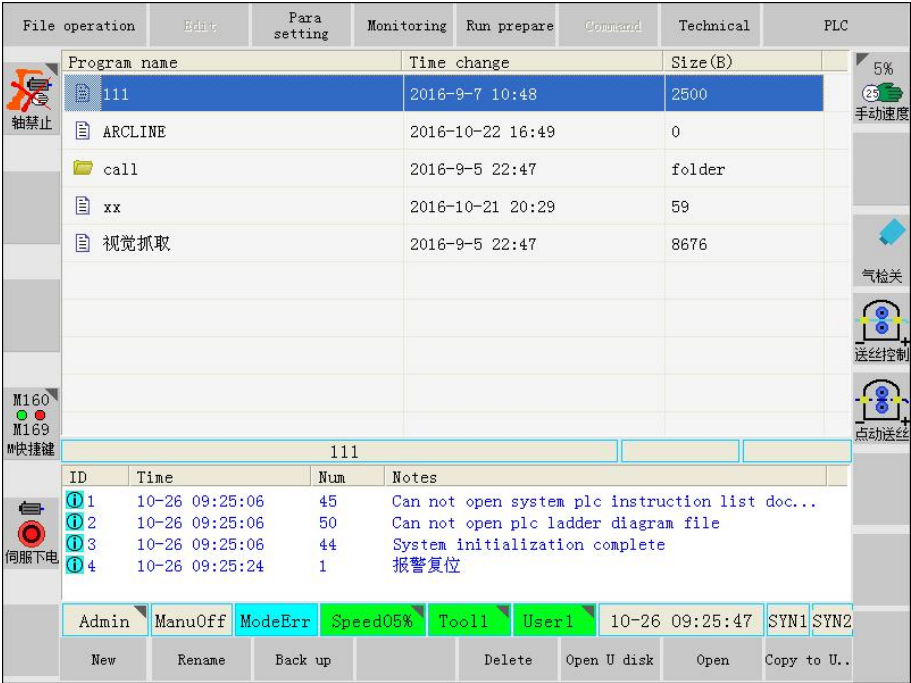
After 9s,

the following window will prompt automatically

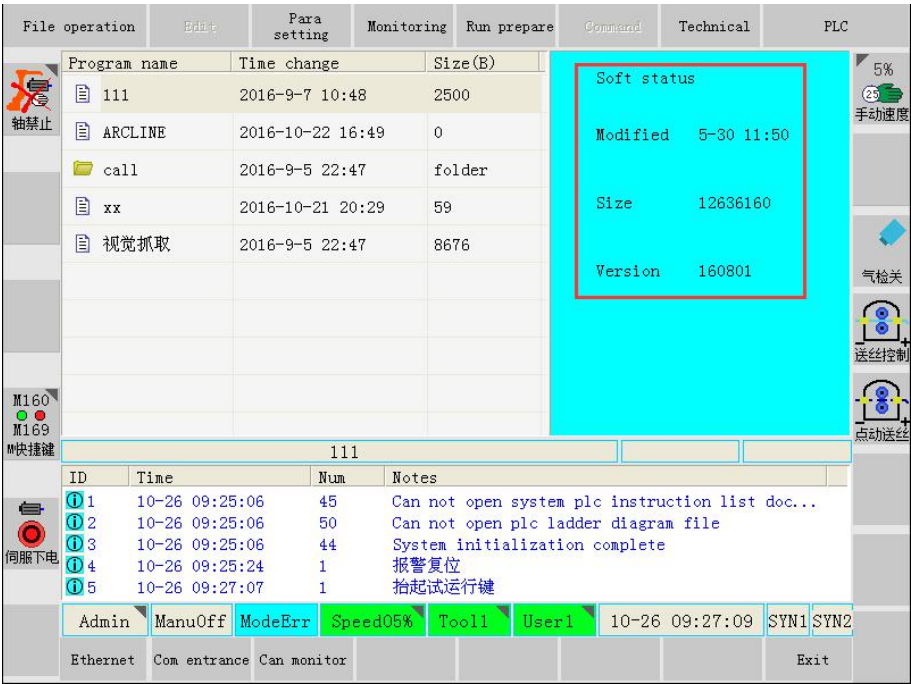




5、Please don't cut off the power or pull out the disk until the normal system starting interface is shown:



6、After the system restart, check if the version upgraded into 16\*\*\*\* (Modified\*\*--\*\*) in “monitor”->”software info” interface:



Notice

Power mustn't be cut off during the restart process.

4 Save notes to

Notes files store the notes of system internal relay, timer, IO port, variables, which is useful to help users to understand the functions when checking the related info. Users can output the correspondent files, modify the files, and import them.

Format of notes files: number + “,” + notes + “;” + “enter”. Please pay attention to the comma, semicolon, and enter symbol.

The following will be an example of modification of IO input notes file InNotes.txt:

Open the InNotes.txt using the notepad software:



We can modify the notes of X06 into 防护门开 (attention: don't change the format) as follows:



Then save, and import this file into the system according to the steps in 【5.1 Import IO input notes】.

Click system <monitor>-<4 IO port>-<1 general input port monitor>-<confirm>, and open the input monitor interface as follows:

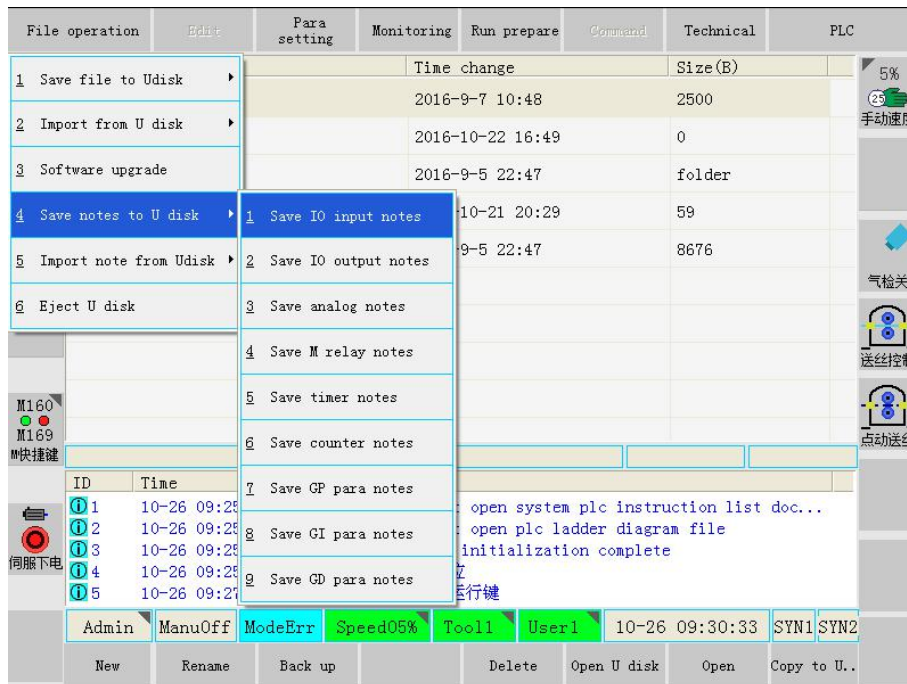
← X00	Unused	输入口X00
← X01	Unused	输入口X01
← X02	Unused	吸气1检测
← X03	Unused	吸气2检测
← X04	Unused	吸气3检测

Then we can see the modified notes of X06.

Warning	
Notes files have strict format requirement. So please modify the notes files according the format. Otherwise system cannot recognize them.	

#### 4.1 Save IO input notes to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<4 save notes to U disk>-<1 save IO input notes>-<confirm>.



System will send the notes files to U disk (\*:\InNotes.txt) . Info area will prompt: [file copied to U disk, please uninstall the U disk before pulling the U disk out.](#)

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

#### 4.2 Save IO output notes to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<4 save notes to U disk>-<2 save IO output notes>-<confirm>.

System will send the notes files to U disk (\*:\OutNotes.txt) . Info area will prompt: [file copied to U disk, please uninstall the U disk before pulling the U disk out.](#)

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

#### 4.3 Save analog notes to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<4 save notes to U disk>-<3 save analog notes>-<confirm>.

System will send the notes files to U disk (\*:\AOutNotes.txt) . Info area will prompt: [file copied to U disk, please uninstall the U disk before pulling the U disk out.](#)

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

#### 4.4 Save M relay notes to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<4 save notes to U disk>-<4 save M relay notes>-<confirm>.

System will send the notes files to U disk (\*:\MNotes.txt) . Info area will prompt: [file copied to U disk, please uninstall the U disk before pulling the U disk out.](#)

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

#### 4.5 Save timer notes to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<4 save notes to U disk>-<5 save timer notes>-<confirm>.

System will send the notes files to U disk (\*:\TimeNotes.txt) . Info area will prompt: [file copied to U disk, please uninstall the U disk before pulling the U disk out.](#)

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

#### 4.6 Save counter notes to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<4 save notes to U disk>-<6 save counter notes>-<confirm>.

System will send the notes files to U disk (\*:\CountNotes.txt) . Info area will prompt: [file copied to U disk, please uninstall the U disk before pulling the U disk out.](#)

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

#### 4.7 Save GP parameters to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<4 save notes to U disk>-<7 save GP para notes>-<confirm>.

System will send the notes files to U disk (\*:\GPNNotes.txt) . Info area will prompt: [file copied to U disk, please uninstall the U disk before pulling the U disk out.](#)

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

#### 4.8 Save GI parameters to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<4 save notes to U disk>-<8 save GI para notes>-<confirm>.

System will send the notes files to U disk (\*:\GINotes.txt) . Info area will prompt: [file copied to U disk, please uninstall the U disk before pulling the U disk out.](#)

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

#### 4.9 Save GD parameters to U disk

Insert the U disk into the USB connector on the main case. Click<file operation>-<4 save notes to U disk>-<9 save GD para notes>-<confirm>.

System will send the notes files to U disk (\*:\GDNotes.txt) . Info area will prompt: [file copied to U disk, please uninstall the U disk before pulling the U disk out.](#)

If U disk is not inserted or not recognized, info area will prompt: [Please check if U disk is inserted or has been uninstalled.](#)

## 5 Import notes from U disk

Import notes function will import notes files on U disk to system. The save notes function can refer to **【4 save notes to U disk】**.

### 5.1 Import IO input notes to system

Insert the U disk into the USB connector on the main case. Click<file operation>-<5 import notes from U disk>-<1 import IO input notes>-<confirm>. The following overwrite window will prompt:



[whether to overwrite the files] click <yes> to overwrite or <no> to cancel.

System will import the notes files from U disk (\*:\CountNotes.txt) to the system. Info area will prompt: [file imported from U disk](#).

If U disk is not inserted or not recognized or file doesn't exist, info area will prompt: [Import from U disk to system failed, please check if U disk is inserted or files exist](#).

### 5.2 Import IO output notes to system

### 5.3 Import analog notes to system

### 5.4 Import M relay notes to system

### 5.5 Import timer notes to system

### 5.6 Import counter notes to system

### 5.7 Import GP para notes to system

### 5.8 Import GI para notes to system

### 5.9 Import GD para notes to system

Steps are similar to **【5.1 import IO input notes to system】**, except the file name and route:

Notes name	File name and route	Notes name	File name and route
IO outputnotes	*:\OutNotes.txt	Analog notes	*:\AOutNotes.txt
M relay notes	*:\MNotes.txt	Timer notes	*:\TimeNotes.txt
Counter notes	*:\CountNotes.txt	GP para notes	*:\GPNNotes.txt
GI para notes	*:\GINotes.txt	GD para notes	*:\GDNNotes.txt

## 6 Uninstallization of U disk

Warning
<ol style="list-style-type: none"> <li>1. For the data consistency, fiel completeness, and system stability, it' s highly recommended to operate as the following steps before pulling the U disk out.</li> <li>2. Pulling out the U disk forcely is not allowed when files is being imported or uninstallization hasn' t completed.</li> </ol>

When users want to pull the U disk out, click <file operation>-<6 eject U disk>-<confirm>. And system will uninstallize the U disk and info area will show: [uninstallization of U disk succeed](#).

# Chapter 13 Special function

## Special auxiliary relay

1、M100 Cursor back to first line

### 1.1 condition

In the reproduction or remote (without reservation) mode, the servo is turned on and the brake is released, and a program is running normally. Click [Stop button] to stop the program. After resetting the alarm, enter M100 to be valid by input and move the cursor to the main The first line of the program.

Related parameters:

Parameter category	Parameter item	Parameter value	Description
Operating parameters	No. 20: external IO button confirmation time ms	1000	The time that the system can receive the input signal to be confirmed.

### 1.2 Edit PLC

Example: Use input port X0 to signal M100 auxiliary relay, IO confirmation time is 1000ms (operation parameter 20).



### 1.3 Run the program

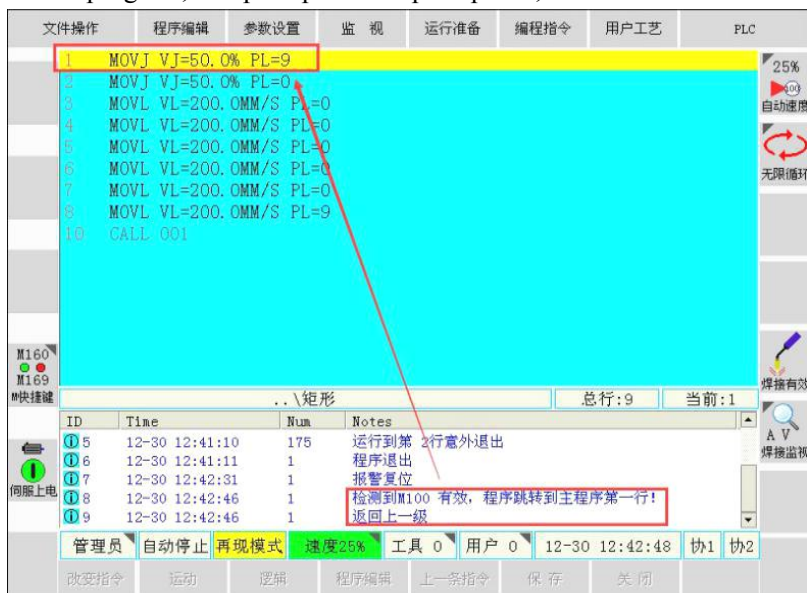
Turn the mode switch selection key to the reproduction mode, open the rectangular program, and click [Run button], as shown in the figure below:



When the program runs into the CALL subroutine, click [Pause], as shown in the figure below:



Click the X0 input button, M100 is valid (rising edge), the cursor automatically jumps to the first line of the main program, and prompts in the prompt bar, as shown below:



# Chapter 14 CRP Appendix

## Codicil appendices

### 1、Handwheel instructions

#### 1、Parameter Settings

1.1 Turn on the handwheel parameters and click <Parameter Setting>-<Operating Parameters>, set parameter No. 38 to 1, and turn on the handwheel, as shown in the figure below:

38	手轮	0-关闭 1-打开	1
----	----	-----------	---

1.2 Set the handwheel parameters. Set the relevant parameters correctly. The following are the factory default settings. The user can adjust them correctly according to the actual situation.

Parameter number	Parameter definition	Initial value	Unit
1	Maximum linear motion speed (%)	200	
2	Rotation speed (mm / s)	200	
3	J1 axis maximum speed	50	
4	J 2 axis maximum speed	50	
5	J3 axis maximum speed	50	
6	J4 axis maximum speed	50	
7	J5 axis maximum speed	50	
8	J6 axis maximum speed	50	
9	Number of smooth lines	5	
10	Momentum	0.05	

### 2、Instructions

#### 2.1 Select handwheel control

Click the operation mode button and select the handwheel control, as shown in the figure below:



#### 2.2 Choose the right coordinate system

Click the coordinate system switch button to select the correct coordinate system, as shown in the figure below:



#### 2.3 Handwheel control motion

Press and hold the safety switch (second gear), the axis movement icon (joint movement) appears on the right side of the teach pendant screen, as shown below:



Click the corresponding button to the right of each axis icon (moving robot must press the button), the icon changes from white to blue (as shown in the figure above + J1- icon) to indicate that it is valid. Roll the handwheel to move the J1 axis.

When selecting Cartesian coordinate system, tool coordinate system, user coordinate system, press and hold the safety switch, the axis movement icon XYZABC appears on the right side of the teach pendant screen (XYZ is linear motion, ABC is relocation, control point layout, attitude change) as follows Pictured:



Click the corresponding button to the right of each axis icon (the mobile robot must press a key), and the icon changes from white to blue (such as the X-axis icon in the figure above) to indicate that it is valid. Roll the handwheel to control the robot to move linearly in the X direction.

2、Joystick description

1、Hardware introduction

1.1, Joystick control box



1.2, 485 to 232 adapter



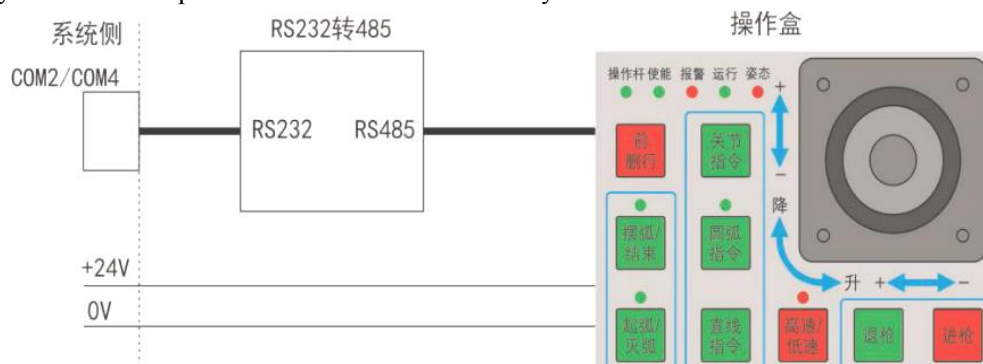
RS232 to RS485 connector: Z-TEK ZY092



Dite DT-9000

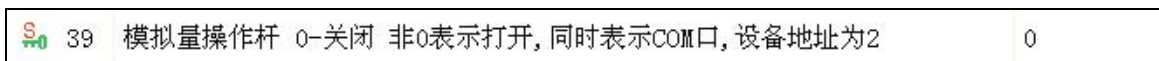
## 2、Wiring

RS232 to 485 communication port, the 232 end is plugged into the COM2 or COM4 of the system; the 485 end is connected to the DB interface of the quick operation box. Quick operation box power + 24V and 0V are connected to the system's 24V output. It is unclear to refer to the System Hardware Manual. As shown below:



## 3、Parameter settings

3.1, Turn on the joystick parameters and click <Parameter Settings>-<Operation Parameters>, set parameter 39 to 2 and turn on the joystick, as shown in the figure below:



Parameter No. 39 is set to 2: 2 means use the COM2 address (the COM4 port is connected to the chassis), and the communication method is RS323.

3.2. Set the joystick parameters. Set the relevant parameters correctly. The following are the factory default settings. The user can adjust them correctly according to the actual situation.

Parameter number	Parameter definition	Initial value	Unit
1	Maximum linear motion speed (%)	200	
2	Rotation speed (mm / s)	200	
3	J1 axis maximum speed	50	
4	J2 axis maximum speed	50	
5	J3 axis maximum speed	50	
6	J4 axis maximum speed	50	
7	J5 axis maximum speed	50	
8	J6 axis maximum speed	50	
9	Number of smooth lines	5	
10	Momentum	0.05	
11	Joystick jog start 0-start 1-not start	1	
12	Joystick fluctuation 0-150	50	
13	Joystick mode: joint speed at high speed (1-100%)	50	
14	Joystick mode: joint speed at low speed (1-100%)	10	
15	Joystick mode: linear speed at high speed (mm / s)	50	
16	Joystick mode: linear speed at low speed (mm / s)	8	
17	Joystick mode: High-speed hem gun speed (mm / s)	30	
18	Joystick mode: Low-speed hem gun speed (mm / s)	10	
19	Joystick mode: Speed of rotating gun at high speed (mm / s)	30	
20	Joystick mode: Rotary gun speed at low speed (mm / s)	10	
21	Joystick mode: Welding speed (mm / s)	10	
22	Joystick mode: non-welded joints (1-100%)	50	
23	Joystick mode: non-welded straight line, arc speed (mm / s)	300	
24	Joystick mode: welding process	1	
25	Joystick mode: Swing arc process	1	

Note:

1. With or without delay: Jog set to 0 - delay, no jog set to 1 - no delay.
2. Control zero drift, generally set to 40-50.

## 4、Instructions

4.1 Select joystick control Click the operation mode button, select joystick control, the prompt bar prompts to activate the joystick, as shown in the figure below:



4.2 Select the correct coordinate system using joystick control, the system will automatically switch to the tool coordinate system.

4.3 Joystick to control movement Press and hold the safety switch (second gear), the axis movement icon (tool coordinates) appears on the right side of the teach pendant screen, as shown in the figure below:



Hold down the safety switch (second gear), push the joystick, XYZ linear motion robot. Press and hold the button on the joystick to switch to ABC posture motion.

Icon introduction:



: Represents XYZ linear motion.



: Represents ABC relocation movement (control points are unchanged, attitude changes).



: It indicates non-guided movement. It moves the axis XYZ direction (rectangular coordinate, user coordinate, tool coordinate) with pulse change. It may move in multiple directions.



: The robot can be controlled to move along the tool coordinate Z direction.



: By clicking this button, the joystick movement speed is switched between high speed and low speed.

The indicator lights up at high speed.



: Press the corresponding button once to add a corresponding instruction. But between the arcs P1P2P3)



: Press the corresponding instruction, the system will automatically determine that the program adds an arc start, arc extinguish, swing start, swing end command. When it is between arc start and swing arc, the corresponding indicator lights. It is prohibited to use MOVJ for starting and extinguishing.



: When you press this key once, the program automatically deletes a line. When deleted, it enters the corresponding state: arc, arc start, swing arc, the corresponding indicator lights up.

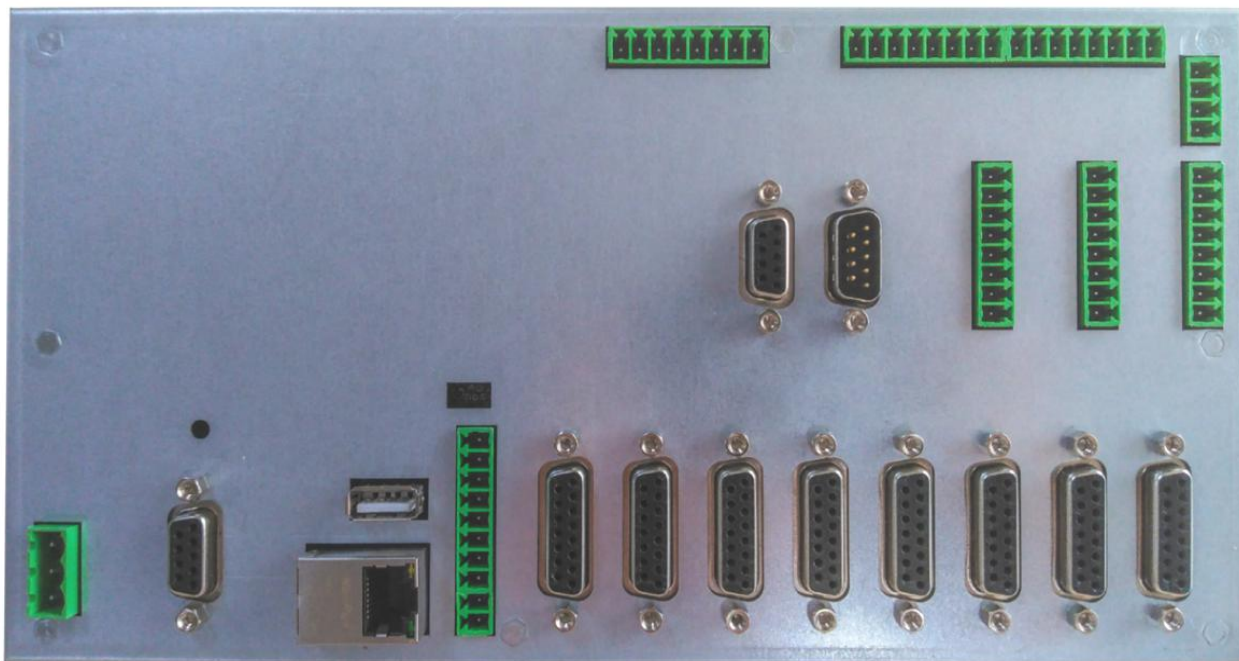
When using the joystick control box to edit the program, the user needs to create a new program. Press and hold the safety switch and the mobile robot edits the program.

# Chapter 15 CRP\_SA80 Control system introduction

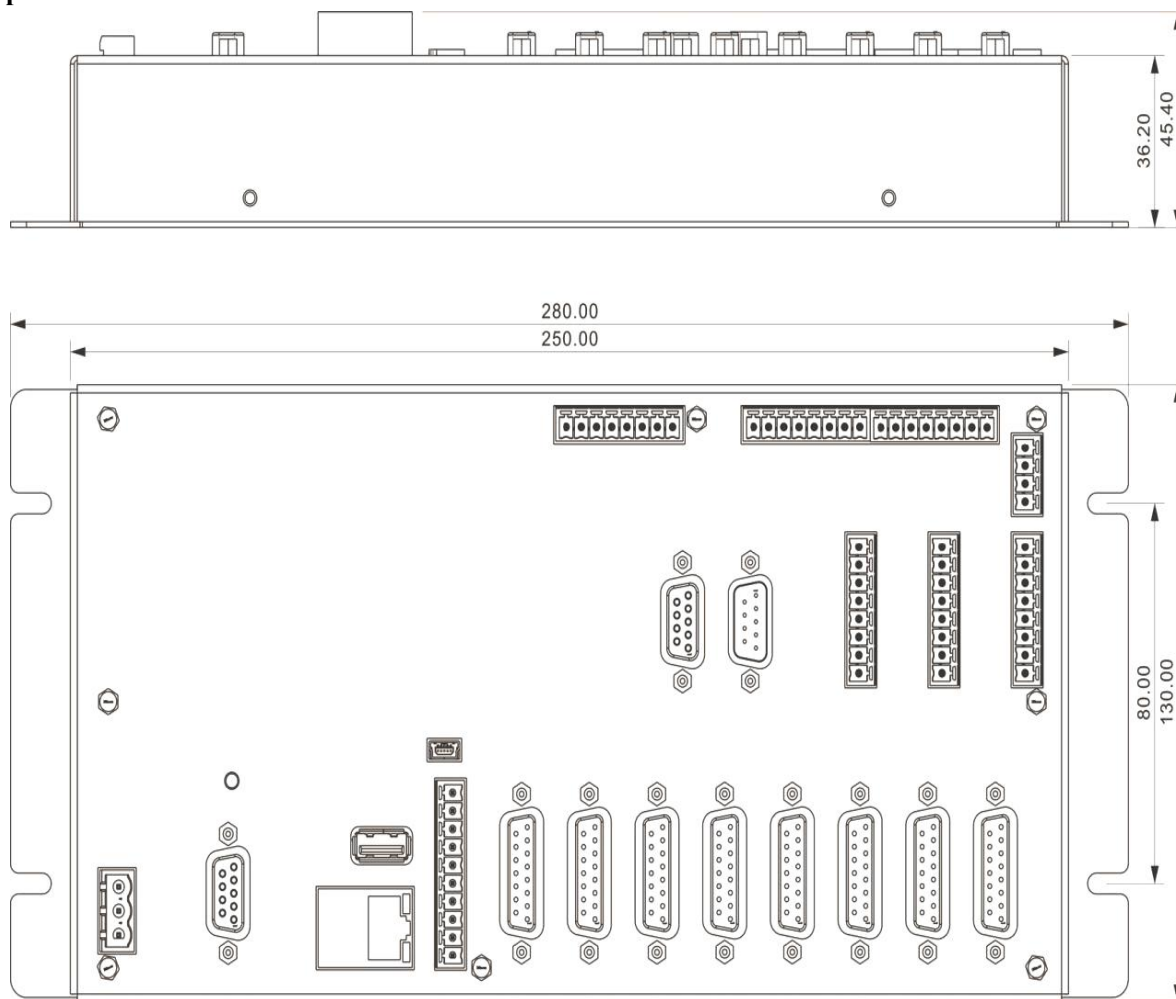
## 1、Control system introduction

### 1.1、The main chassis

#### 1.1.1 Host appearance

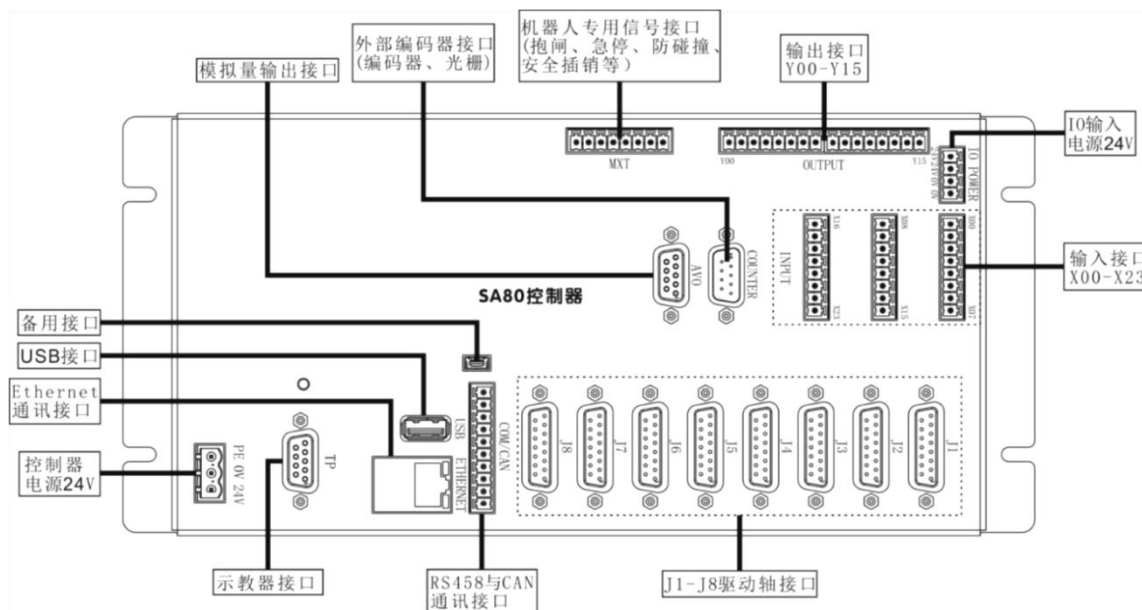


#### 1.1.2 Space installation dimensions



Installation dimensions of main box

### 1.1.3 Main Box Interface Distribution



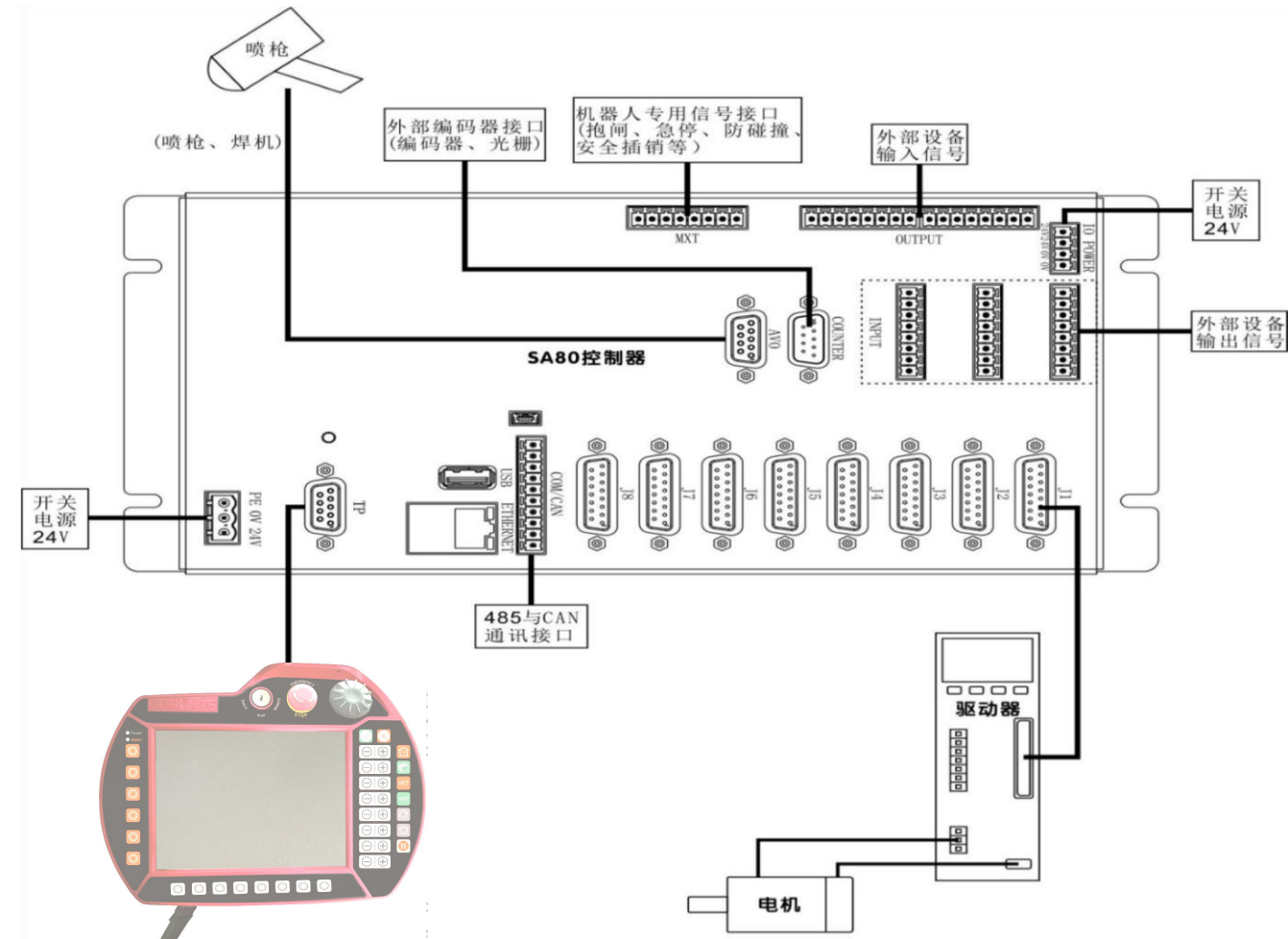
### 1.2 、Teach Pendant



The appearance is the same as the S80 system operator, but it cannot be universal. Pay attention to the interface.

2、Controller control section

Electrical interconnection diagram



Note: 1. The main power of the system is DC24V. Connect the external DC (DC24V) switching power supply. The system power and the IO power can use the same power (note the power).

3、Controller installation environment

The controller must be firmly installed in the electric cabinet, and a certain space (not less than 100mm) should be reserved around it to ensure that the air flows up and down; there should be no strong magnetic and strong electric interference sources around the controller, and it should be kept away from flammable, explosive materials and Various dangerous goods. The specific environmental requirements of the controller are as follows:

Temperature	Run	0 °C ~ +45°C
	Store	-20 °C ~ +60°C
Humidity	10 ~90RH	
Vibration	≤0.5G	
Power supply	DC24V≥100W	
Surroundings	Avoid dust, oil mist and decay, corrosive gases, and good ventilation	

4、Controller interface description

4.1 、Controller power

Controller power supply, the power supply is DC24V, and the capacity is not less than 100W.

Note: The controller must be reliably grounded, otherwise it will cause equipment failure or accident.

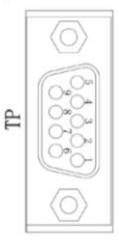
Warning: It is strictly forbidden to connect the power supply of other specifications, otherwise the controller will be damaged and no warranty will be given.

Role: Controller power input interface				
	Pin	Name	Definition	Valid state
	-	PE	Protected area	Input
	-	0V	0V power supply	Input
	-	+24V	+24V power supply	Input

#### 4.2 、Teach Pendant Interface (TP)

This interface is connected to the teaching pendant, and its standard cable length is 6 meters. Please contact the system manufacturer when using different specifications, and do not change the cable length at will.


TP interface pin definition

	Pin	Name	Definition	Valid state
	1	GND	Ground 0V	Output
	2	24V	+24V	Output
	3	E_STOP	Emergency stop signal	0 V Valid (Input)
	4	SAFE-SW1	Selector switch 1	0 V Valid (Input)
	5	SAFE-SW2	Selector switch 2	0 V Valid (Input)
	6	TD+	Data signal	
	7	TD-	Data signal	
	8	RD+	Data signal	
	9	RD-	Data signal	
	-	FG	Shield	Connected to the shell (inner and outer shield)


#### 4.3 、Ethernet

This system provides one 1000 Mbps Ethernet interface, which can be made according to standard network cables.

Ethernet Interface pin definition

Role: network interface				
	Pin	Name	Definition	Valid state
	1	-	-	-
	2	-	-	-
	3	-	-	-
	4	-	-	-
	5	-	-	-
	6	-	-	-
	7	-	-	-
	8	-	-	-

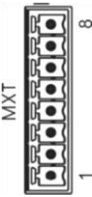
#### 4.4 、USB interface

	Definition	Description	Note
USB	-	External U disk, keyboard, mouse, etc.	Backup parameters, programs, PLCs, upgrade software, etc.

#### 4.5 、Robot-specific terminals (MXT)

The MXT interface contains some dedicated safety signals.

Note: The 24V power supply of the MXT interface cannot be mixed with the 24V power supply of the general I / O interface. MXT pin definition

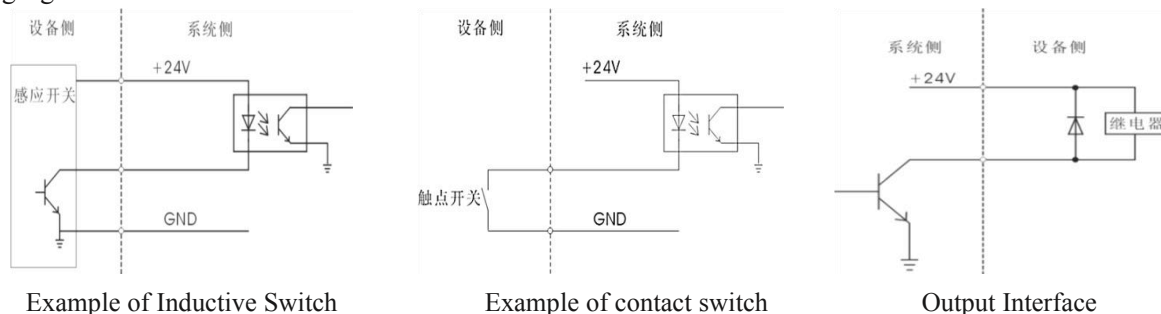
Role: Connect robot-specific signals				
	Pin	Name	Definition	Valid State
	1	AF_SER	Anti-collision sensor	0 V Valid (Input)
	2	EX_STOP1	External emergency stop 1	0 V Valid (Input)
	3	SA_B01	Safety latch 1	0 V Valid (Input)
	4	BK-T	Brake status detection	0 V Valid (Input)
	5	BKCON	Brake control	0 V Valid (Output)
	6	STOP_OUT	Hardware emergency stop output	24 V Valid (Output)
	7	GND	Ground 0V	Output
	8	+24V	+24V	Output

- AF\_SER anti-collision sensor detection signal. This signal is normally closed (connect it to GND when not in use). When this signal is invalid, it indicates that the anti-collision sensor is operating, and the system will stop the equipment to ensure safety.
- EX\_STOP1 External emergency stop input signal. This signal is normally closed (connect it to GND when not in use). When this signal is invalid, it indicates that it is in an emergency stop state. The system will stop the equipment to ensure safety.
- SA\_B01 safety latch signal, usually installed on the door of the robot fence and linked with the door. When the door is opened, the switch is disconnected, that is, the signal is normally closed. When the signal is invalid, it indicates that it is in maintenance state, and the system will stop the equipment. To ensure safety.
- BK-T brake state detection signal is used to detect whether the brake of each axis has been opened.

- e) BKCON brake control output signal is used to control the brake status of each axis motor.
- f) STOP\_OUT is the robot emergency stop status output signal (active high level), which is used to indicate that the robot is in the emergency stop state and warns the operator to pay attention to safety. Either the emergency stop signal (STOP) on the teach pendant or the external emergency stop (EX\_STOP1) on MXT is valid, and STOP\_OUT outputs low level.
- g) +24V and GND are the power output interface provided in the system. The voltage is DC24V and the rated output current is 0.5A.

#### MXT Interface principle diagram:

a) The input interface and the input of the MXT interface are both active low. The wiring principle is shown in the following figure:



Note:

1. The contact of the switch is normally open and normally closed, depending on the interface definition.
2. The capacity of the switch is not less than 16mA, and the voltage is less than 1.5V.
3. Select NPN when selecting induction switch.

b) Output interface, when the output of the MXT interface is active low. The wiring principle is shown in the figure above:

Note:

1. The system has an open collector output for the transistor.
2. The maximum load current is 100mA. The effective voltage is up to 0.7V.
3. Freewheeling diodes must be connected when controlling inductive loads such as relays.

#### 4.6 、 Communication interface (COM / CAN)

The COM / CAN interface of this system includes 2 RS485 and 1 CAN interfaces for communication with external equipment. COM2 (RS485) is used for communication between controller and servo, and COM3 (RS485) is used for communication between controller and external equipment.

Function: COM / CAN communication interface				
COM/CAN	Pin	Name	Definition	Remark
	1	485A (COM2)	Signal positive	Used for communication between host computer and servo
	2	485B (COM2)	Signal negative	
	3	-	-	Do not connect
	4	-	-	Do not connect
	5	CAN_H	CAN high	Communication data
	6	CAN_L	CAN low	Communication data
	7	485A (COM3)	Signal positive	Used to communicate with external devices
	8	485B (COM3)	Signal negative	
	9	GND	Ground cable	
	10	FG	Shield	

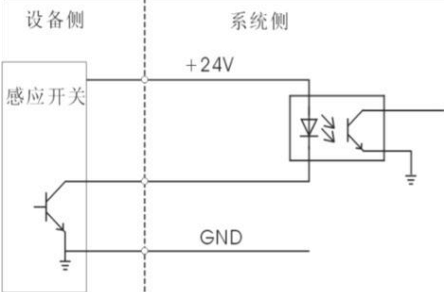
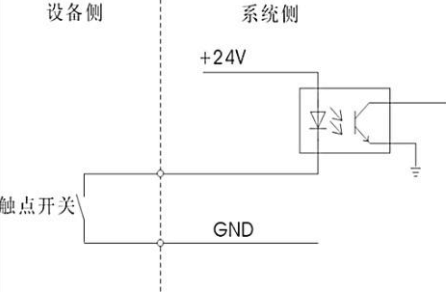
Note: Use this interface for communication with Ore SD20, Hechuan, and Maixin drives. The cables must use twisted-pair shielded wires. The length depends on the system host and drive layout.

#### 4.7 、 I/O Input Signal

I / O input signal Input, input ports X00-X23, a total of 23 channels.

Input Interface pin definition

Role: I / O interface X00 to X23 input				
X00-X23 input interface schematic	Pin	Name	Definition	Valid state
	1	X00	Universal input	Low level (0V)
	2	X01	Universal input	Low level (0V)
	3	X02	Universal input	Low level (0V)
	4	X03	Universal input	Low level (0V)
	5	X04	Universal input	Low level (0V)
	6	X05	Universal input	Low level (0V)
X00-X23 input interface schematic	7	X06	Universal input	Low level (0V)

diagram:		8	X07	Universal input	Low level (0V)
 <p>Example of Inductive Switch</p>		9	X08	Universal input	Low level (0V)
		10	X09	Universal input	Low level (0V)
		11	X10	Universal input	Low level (0V)
		12	X11	Universal input	Low level (0V)
		13	X12	Universal input	Low level (0V)
		14	X13	Universal input	Low level (0V)
		15	X14	Universal input	Low level (0V)
		16	X15	Universal input	Low level (0V)
		17	X16	Universal input	Low level (0V)
		18	X17	Universal input	Low level (0V)
		19	X18	Universal input	Low level (0V)
		20	X19	Universal input	Low level (0V)
		21	X20	Universal input	Low level (0V)
		22	X21	Universal input	Low level (0V)
		23	X22	Universal input	Low level (0V)
 <p>Example of contact switch</p>		24	X23	System occupation	Low level (0V)

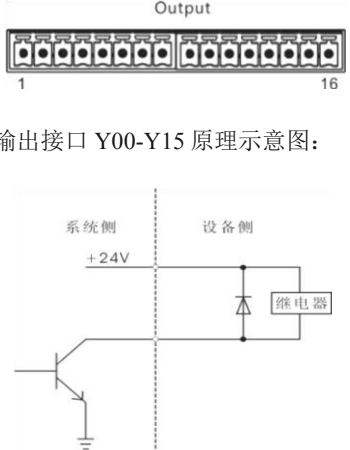
Note:

1. The contact of the switch is normally open and normally closed, depending on the interface definition.
2. The capacity of the switch is not less than 16mA.
3. Select NPN when selecting induction switch.

#### 4.8 、I/O Output Signal

I / O output signal Output, input ports Y00-Y15, a total of 16 channels. Output interface pin definition

Role: I / O interface Y00 to Y15 input

 <p>输出接口 Y00-Y15 原理示意图:</p>		Pin	Name	Definition	Valid state
		1	Y00	Universal output	Low level (0V)
		2	Y01	Universal output	Low level (0V)
		3	Y02	Universal output	Low level (0V)
		4	Y03	Universal output	Low level (0V)
		5	Y04	Universal output	Low level (0V)
		6	Y05	Universal output	Low level (0V)
		7	Y06	Universal output	Low level (0V)
		8	Y07	Universal output	Low level (0V)
		9	Y08	Universal output	Low level (0V)
		10	Y09	Universal output	Low level (0V)
		11	Y10	Universal output	Low level (0V)
		12	Y11	Universal output	Low level (0V)
		13	Y12	Universal output	Low level (0V)
		14	Y13	Universal output	Low level (0V)
		15	Y14	Universal output	Low level (0V)
		16	Y15	Universal output	Low level (0V)


Note:

1. The system has an open collector output for the transistor.
2. The maximum load current is 100mA.
3. Freewheeling diodes must be connected when controlling inductive loads such as relays.

#### 4.9 、Input and output power supply (IO 24V)

IO24V power supply is used to power the input and output ports.

AVO interface pin definition

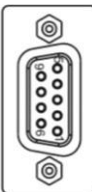
Role: IO24V input power				
	Pin	Name	Definition	Remark
	1	+24V	+24V power supply	Input
	2	+24V	+24V power supply	Input
	3	0V	0V power supply	Input
	4	0V	0V power supply	Input

#### 4.10 、 Analog output (AVO)

This system provides 4 analog interfaces, DA1-DA3. When it is used for welding machine control, please connect DA1 (current), DA2 (voltage) to 'Modular Isolation Transfer (Component Selection)' or directly connect to welding.

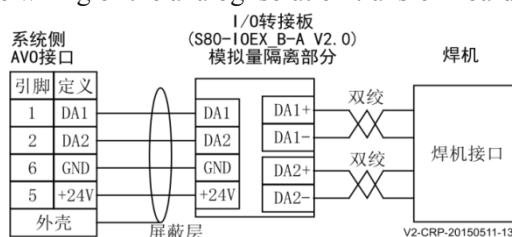
Note: The analog quantity is directly connected to the welding machine, the signal is easy to receive interference and cause voltage fluctuation. It is recommended to select the analog isolation adapter board.

AVO interface pin definition

Role: analog output interface				
	Pin	Name	Definition	Remark
	1	DA1	Analog output channel 1	0-10 V
	2	DA2	Analog output channel 2	0-10 V
	3	DA3	Analog output channel 3	0-10 V
	4	DA4	Analog output channel 4	0-10 V
	5	+24V	+24V power supply	Output
	6	GND	Power ground	Output
	7	GND	Power ground	Output
	8	GND	Power ground	Output
	9	GND	Power ground	Output

Explanation:

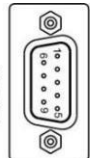
1. The analog output range is 0-10V, and the precision is 12 digits.
2. The analog output wiring must use twisted-pair (signal and 0V) shielded wires.
3. Refer to the figure below for the wiring of the analog isolation transfer Board.



#### 4.11 、 Encoder interface (Counter)

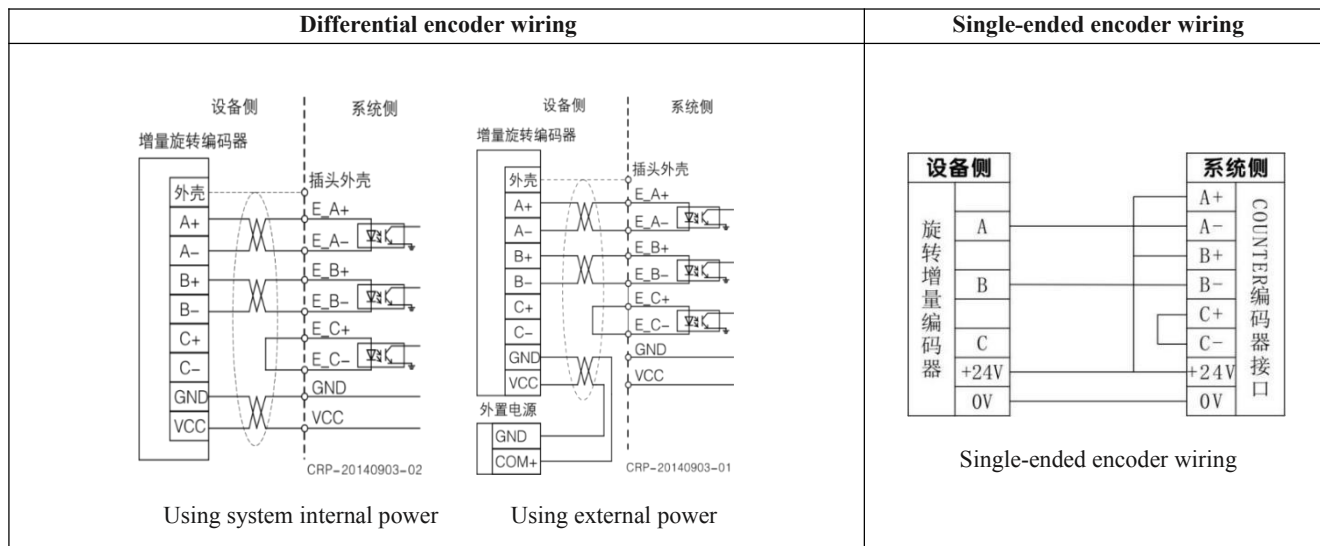
The Counter interface is an incremental encoder interface and is connected to a rotary encoder. Used to detect speed or location information of external devices. For stable operation and good anti-interference effect, a differential encoder is recommended.

Counter interface pin definition

Role: encoder interface				
	Pin	Name	Definition	Valid state
	1	E A+	A + pulse input	\
	2	E B+	B+ pulse input	\
	3	E C+	C+ pulse input	\
	4	VCC	+5V power supply	\
	5	+24V	Output +24V	\
	6	E A-	A- pulse input	\
	7	E B-	B- pulse input	\
	8	E C-	C- pulse input	\
	9	GND	Ground 0V	\

Explanation:

1. This interface is used for the detection of quadrature pulse signals of rotary incremental encoders. The maximum number of encoder lines is 2500p / r.
2. Twisted shielded wire must be used for wiring.
3. This input is optocoupler isolated. The external encoder can use the + 5V power provided by the system, or it can be connected to other + 5V power.
4. When the encoder is connected, the Z + \ Z- signal of the encoder is not connected, and at the same time, pins 3 and 8 of the counter interface are short-circuited.



Note: When the encoder line exceeds 10 meters, or the encoder terminal voltage is lower than 4.7V, the nearest power supply is needed to avoid the inaccurate encoder data caused by too large voltage drop.

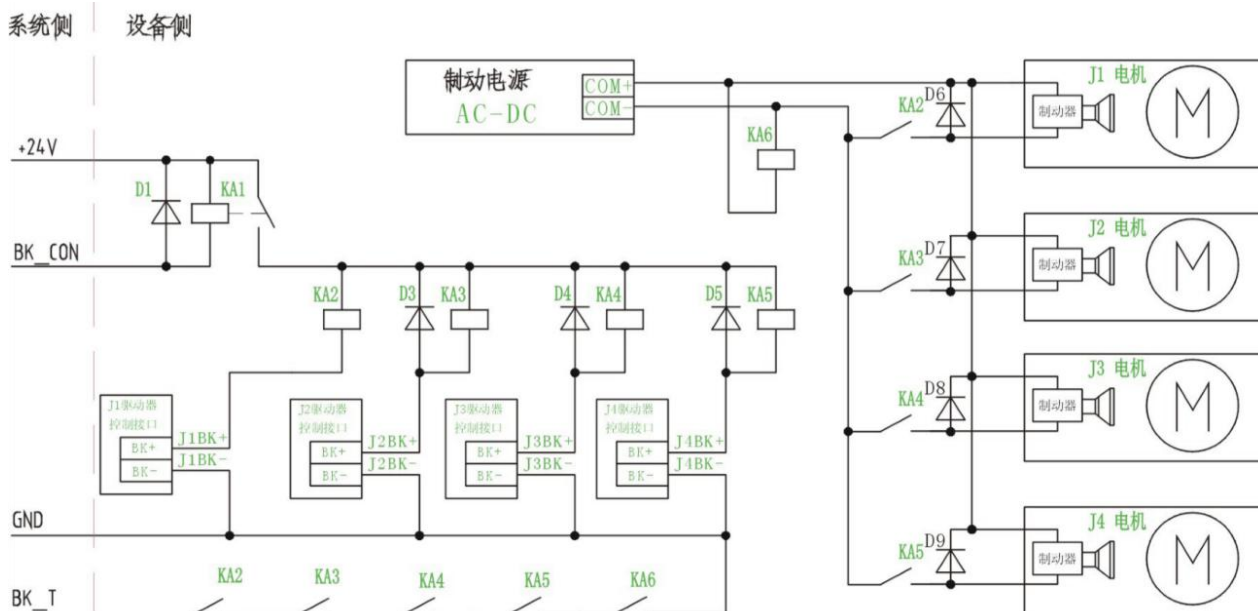
## 5、Other wiring

### 5.1 SA80 brake circuit wiring

SA80 does not have a dedicated brake plate, and the brake circuit needs to be constructed by the user.

In this system, BK\_CON is used as the total signal for the brake control of each axis, controlling a relay, and introducing 24V power to one end of the relay coil of each axis. The other end of the relay coil that controls the brake of each axis is connected to the servo drive brake output positive terminal (JxBK +), and the servo drive brake output negative terminal (JxBK-) is connected to GND. Use one normally open contact in each axis relay to control the motor holding brake.

Connect the positive ends of all motor holding brakes with a brake to the switching power supply + 24V, and the negative end of the brake to the corresponding shaft relay normally open. One end of the contact, the other end of the normally open contact is connected to the switching power supply 0V. The other normally open contact of the relay is used for the brake detection signal (on and off of GND and BK\_T), and relay KA6 is used to detect whether the switching power supply 0V and 24V have output. When the KA1-KA6 coils are all energized, the GND signal can be connected to the system BK-T, which means that the brakes of each axis are open. The wiring diagram is shown below:



### 5.2 SA80 adapter drive wiring (spare)

# Chapter 16 Robot aerial insertion and welding wire definition

## 1、46PIN Definition of Heavy Duty Connector Ferrule

46 PIN heavy-duty connector ferrule definition (6-axis universal)										
Ferrule hole	1	2	3	4	5	6	7	8	9	10
Line code definition	U1	V1	W1	Brake 1-1	Brake 1-2	U2	V2	W2	Brake 2-1	Brake 2-2
Comment	Axis (1)					Axis (2)				
Ferrule hole	11	12	13	14	15	16	17	18	19	20
Line code definition	U3	V3	W3	Brake 3-1	Brake 3-2	U4	V4	W4	Brake 4-1	Brake 4-2
Comment	Axis (3)					Axis (4)				
Ferrule hole	21	22	23	24	25	26	27	28	29	30
Line code definition	U5	V5	W5	Brake 5-1	Brake 5-2	U6	V6	W6	Brake 6-1	Brake 6-2
Comment	Axis (5)					Axis (6)				
Axis number	J1	J2	J3	J4	J5	J6	Reserve			
Ferrule hole	31	32	33	34	35	36	37	38	39	40
Line code definition	PE	PE	PE	PE	PE	PE	/	/	/	/
Comment	Each axis corresponds to ground					Reserve				
Ferrule hole	41	42	43	44	45	46				
Line code definition	/	/	/	/	/	/				
Comment	Reserve									

Remarks:  
46PIN heavy-duty connector ferrule. (HEE-046-MC, HEE-046-FC, 16A / 500V), wire (36 \* 0.75mm<sup>2</sup>), silver-plated pin (0.5-0.75mm)  
Note: Please match the wiring size and pins of the body according to the actual situation.

### Explanation:

Unused ports can be added with corresponding pins and wires. This table is applicable to the general industrial robot body and electrical box. This socket is only suitable for motor power line definition pins. The male end (the body) and the female end (the electrical box) have the same configuration. The ground wire must be connected to the connector ground.

46PIN heavy-duty connector ferrule definition (four-axis stamping process standard machine)										
Ferrule hole	1	2	3	4	5	6	7	8	9	10
Line code definition	U1	V1	W1	Brake 1-1	Brake 1-2	U2	V2	W2	Brake 2-1	Brake 2-2
Body cable color	White 1	Black 1	Red 1	Brown 1	Blue 1	White 2	Black 2	Red 2	Brown 2	Blue 2
Cable No.	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
Axis No.	Axis (1)					Axis (2)				
Ferrule hole	11	12	13	14	15	16	17	18	19	20
Line code definition	U3	V3	W3	Brake 3-1	Brake 3-2	U4	V4	W4	Brake 4-1	Brake 4-2
Body cable color	White 3	Black 3	Red 3	Brown 3	Blue 3	White 4	Black 4	Red 4	Brown 4	Blue 4
Cable No.	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
Axis No.	Axis (3)					Axis (4)				
Ferrule hole	21	22	23	24	25	26	27	28	29	30
Line code definition				24V	0V	Y32	Y34	X32	X33	Y33
Body cable color				Brown	Blue	Yellow	Green	Pink	White	Gray
Cable No.	#21	#22	#23	#24	#25	#26	#27	#28	#29	#30
Axis No.	Reserve			7-core definition (main body)						
Ferrule hole	31	32	33	34	35	36	37	38	39	40
Line code definition	PE	PE	PE	PE						
Body cable color	Yellow-green 1	Yellow-green 2	Yellow-green 3	Yellow-green 4						
Cable No.	#31	#32	#33	#34						
Axis No.	Reserve				Reserve					
Ferrule hole	41	42	43	44	45	46				
Line code definition										
Body cable color										
Cable No.	Reserve									

### Explanation:

The above heavy-duty connection is applicable to the 4-axis stamping process standard machine, and the stamping robot body is connected to the electrical box. This socket is only suitable for motor power line definition pins. The male end (the body) and the female end (the electrical box) have the same configuration. The ground wire must be connected to the connector ground.

## 2、Definition of 40 PIN Heavy Duty Connector Ferrule

Definition of 40 PIN Heavy Duty Connector Ferrule											
Define Axis No.		Axis (1)				Axis (2)				/	/
A row	Ferrule hole	1	2	3	4	5	6	7	8	9	10
	Line hole definition	PS+	PS-	+5V	GND	PS+	PS-	+5V	GND	Reserve	
Define Axis No.		Axis (3)				Axis (4)				/	/

B row	Ferrule hole	1	2	3	4	5	6	7	8	9	10
	Line hole definition	PS+	PS-	+5V	GND	PS+	PS-	+5V	GND	Reserve	
Define Axis No.		Axis (5)				Axis (6)				/	/
C row	Ferrule hole	1	2	3	4	5	6	7	8	9	10
	Line hole definition	PS+	PS-	+5V	GND	PS+	PS-	+5V	GND	Reserve	
		/	/	/	/	/	/	/	/	/	/
D row	Ferrule hole	1	2	3	4	5	6	7	8	9	10
	Line hole definition	Reserve									
Remarks: 40PIN heavy-duty connector ferrule. (HD-040-MC, HD-040-FC, 10A / 250V), wire (28 * 0.25), silver-plated pin (0.37-0.5) The shielded wire is connected to the pin shell. Be careful to use a heat shrink tube to protect the short circuit of other wires. The above lines are for reference only, please refer to production.											

Explanation:

This connector is a coding line definition. For the definition of each axis color, please refer to the welding wire information. The spare socket can be used with pins according to the actual situation. The purpose is self-defined. The encoder battery is not connected to the electrical box (installed in the body base), so it is undefined. 5-axis 4-axis punching robot, 6-axis are reserved. Please use the wiring separately if needed.

### 3、Definition of welding line

#### 3.1、Huacheng (CRP SA80-A7) System Control Line

Hechuan X3E series / Huichuan IS620P series / Rujing SEA3 series control line definition for Huacheng system (Kanopp SA80-A7 system and Huacheng pair Huichuan welding wire)

Hechuan X2E series / Huichuan IS620P series / Confidence SEA3 series definition of Huacheng system control line					
Huacheng 15Pin	Color	HE CHUAN 50Pin	HUICHUAN 44Pin	RUjing 50Pin	Signal definition
1	Red blue	3	11	11	COM+(24V)
2	Red	36	21	1	A+
3	Yellow	37	22	2	A-
4	Green	38	25	26	B+
5	Brown	39	23	27	B-
6	Pink	40	13	3	Z+
7	Blue	41	24	4	Z-
8	Yellow brown	4	33	12	SON
9	White green	12, 22	2, 14, 26	19, 22, 25	COM-(0V)
10	Purple	26	38	17	P+
11	White	27	36	18	P-
12	Yellow white	/	8	/	ALM-CLR
13	Gray	30	42	43	S+
14	Black	31	40	44	S-
15	Brown gray	21	1	24	ALM
Welding of brake wire		13	3	23	BK
Shielded wire connection shell					
Note: 1. The brake is used for external welding, and the length is appropriate. 2. The definition of the line color should be based on the actual situation. It must be a twisted pair, and the pulse, direction and feedback must be a twisted pair. CRP SA80-A7 system and Huacheng pair Huichuan welding wire.					

#### 3.2、CRP system control line

Hechuan X3E series / Huichuan IS620P series / Rujing SEA3 series define the control line of CRP S40, S80 system (SA80-A7 system is not applicable to the following welding wires)

Hechuan X3E series / Huichuan IS620P series / Rujing SEA3 series define the control line of CRP system					
CRP (26Pin)	Color	Hechuan 50Pin	Huichuan 44Pin	Rujing 50Pin	Signal definition
1	Red white	27	36	18	_CP-
2	Orange white	31	40	44	_DIR-
3	Brown white	37	22	2	PA-
4	Yellow white	39	23	27	PB-
5	Black white	41	24	4	PZ-
6	Green white	21	1	24	ALM

7	Purple white	4	33	12	SRV-ON
8	Blue	3	11	11	+24V
9	Blue white	12, 20, 22	2, 6, 26	19,22,25,49	GND(0V)
10	Red	26	38	17	_CP+
11	Orange	30	42	43	_DIR-+
12	Brown	36	21	1	PA+
13	Yellow	38	25	26	PB+
14	Black	40	13	3	PZ+
15	Green	19	7	48	SRDY
17	Purple	5	8	13	ALM-CLR
Welding of brake wire		13	3	23	BK-
Note: 1. The brake is used for welding and can be used in proper length. 2. The definition of the line color should be based on the actual situation. It must be a twisted pair, and the pulse, direction and feedback must be a twisted pair. 3. The SA80-A7 system is not suitable for the above welding wires.					

### 3.3、System and servo RS485 communication definition

Hechuan X3E series / Huichuan IS620P series / RJ45 SE series RJ45 crystal head to Huacheng system / CRP system line definition

Huacheng RS485 port	CRP S80 COM1 9Pin	CRP SA80-A7 Communication port COM2	Hechuan servo RS485 communication pin		Huichuan servo RJ45 crystal head		Rujing SEA3 Servo RJ45 crystal head		Definition
A	2	1 (2A)	A	Blue	4	Blue	5	Blue white	RS-485A+
B	1	2 (2B)	B	Blue white	5	Blue white	4	Blue	RS-485B-
GND	9	9 (GND)	SG	Brown	8	Brown	1	Orange	GND/shield
Note: 1. It is recommended to use a shielded network cable. 2. Please use standard network cable for the crystal head, and the corresponding line color of the pin. The above is for reference only. 3. For details of RS-485 definition on the servo side, refer to the servo manual.									FG (shield)

### 3.4、Definition of servo system encoder line and motor line

#### 1、Hechuan Servo X3E Series

Hechuan encoder line definition					
drive end 6Pin	Color	Motor end 6Pin	Motor Over 1KW	Definition	Description
5	Yellow / blue	2	5	PS+	
6	Green / purple	3	6	PS-	
1	Brown / white	4	1	5V	
2	White / black	5	2	GND	Battery-
		1	4	BAT+	Battery+
Shell	Shielded wire	6		Shield	
Note: The negative battery voltage is shared with the encoder GND. The thread color is subject to the definition of workmanship.					

Hechuan motor power line definition			
Driver definition	Color	Motor 4Pin/2Pin	Motor over 1KW
U	Red	1	A
V	White	2	B
W	Black	3	C
PE	Yellow	4	D
Brake line 1	Brown	1	1
Brake line 2	Blue	2	2
Note: The thread color is subject to the definition of workmanship. Brake: 1, 2 is made of 2Pin heads separately butt joint.			

#### 2、Huichuan Servo IS620P Series

Huichuan encoder line definition					
Drive end 9Pin	Color	Motor end 9Pin	Motor over 850W	Definition	Description
1	Yellow / blue	3	A	PS+	
2	Green / purple	6	B	PS-	
7	Brown / white	9	G	5V	
8	White / black	8	H	GND	
Shell	Shielded wire	7	J	Shield	
	Red	1	E	V+	Battery-
	Black	4	F	V-	Battery+
Note: Pay attention to the positive and negative of the encoder battery. The thread color is subject to the definition of workmanship.					

Huichuan motor power line definition				
Driver definition	Color	Motor 6Pin	Aviation 20-18	Aviation 20-22
U	Red	1	B	A
V	White	2	I	C
W	Black	4	F	E
PE	Yellow	5	G	F
Brake 1	Brown	3	C	B
Brake 2	Blue	6	E	D
Note: The thread color is subject to the definition of workmanship.				

### 3、Rujing Servo SE A3 Series

Confucian competition encoder line definition					
Drive end 6Pin	Color	Motor end 9Pin	Rujing over 1KW	Definition	Description
5	Yellow / blue	4	K	PS+	
6	Green / purple	5	L	PS-	
1	Brown / white	7	H	5V	
2	White / black	8	G	GND	
Shell	Shielded wire	3	J	Shield	
	Red	1	T	V+	Battery-
	Black	2	S	V-	Battery+

Note: Pay attention to the positive and negative of the encoder battery.  
The thread color is subject to the definition of workmanship.

Definition of Confucian Motor Power Line			
Driver definition	Color	Motor 4Pin/2Pin	Rujing over 1KW
U	Red	1	F
V	White	2	I
W	Black	3	B
PE	Yellow	4	E
Brake 1	Brown	1	G
Brake 2	Blue	2	H

Note: The thread color is subject to the definition of workmanship.

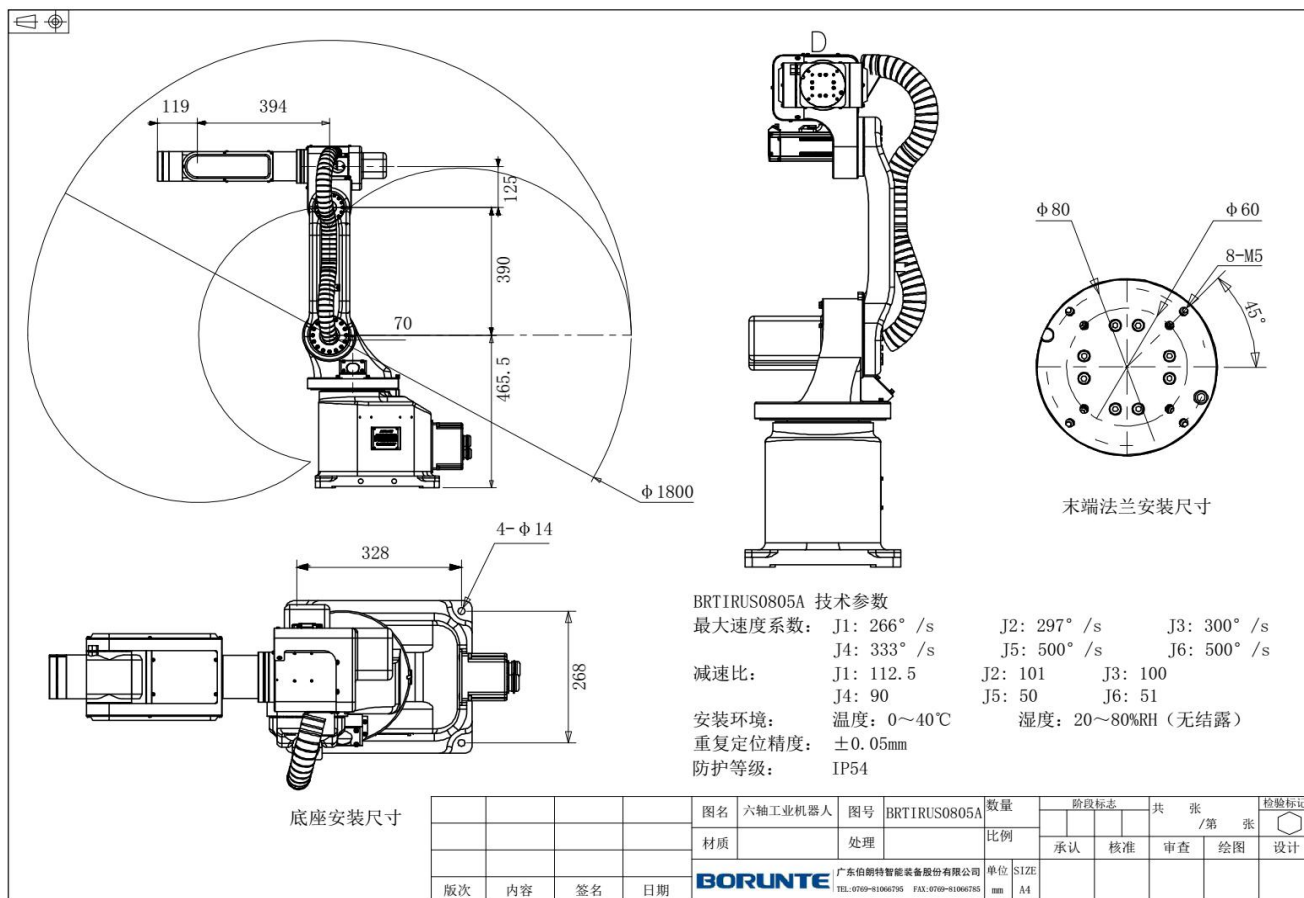
Brakes: 1, 2 are 2Pin heads separated and docked.

Note:

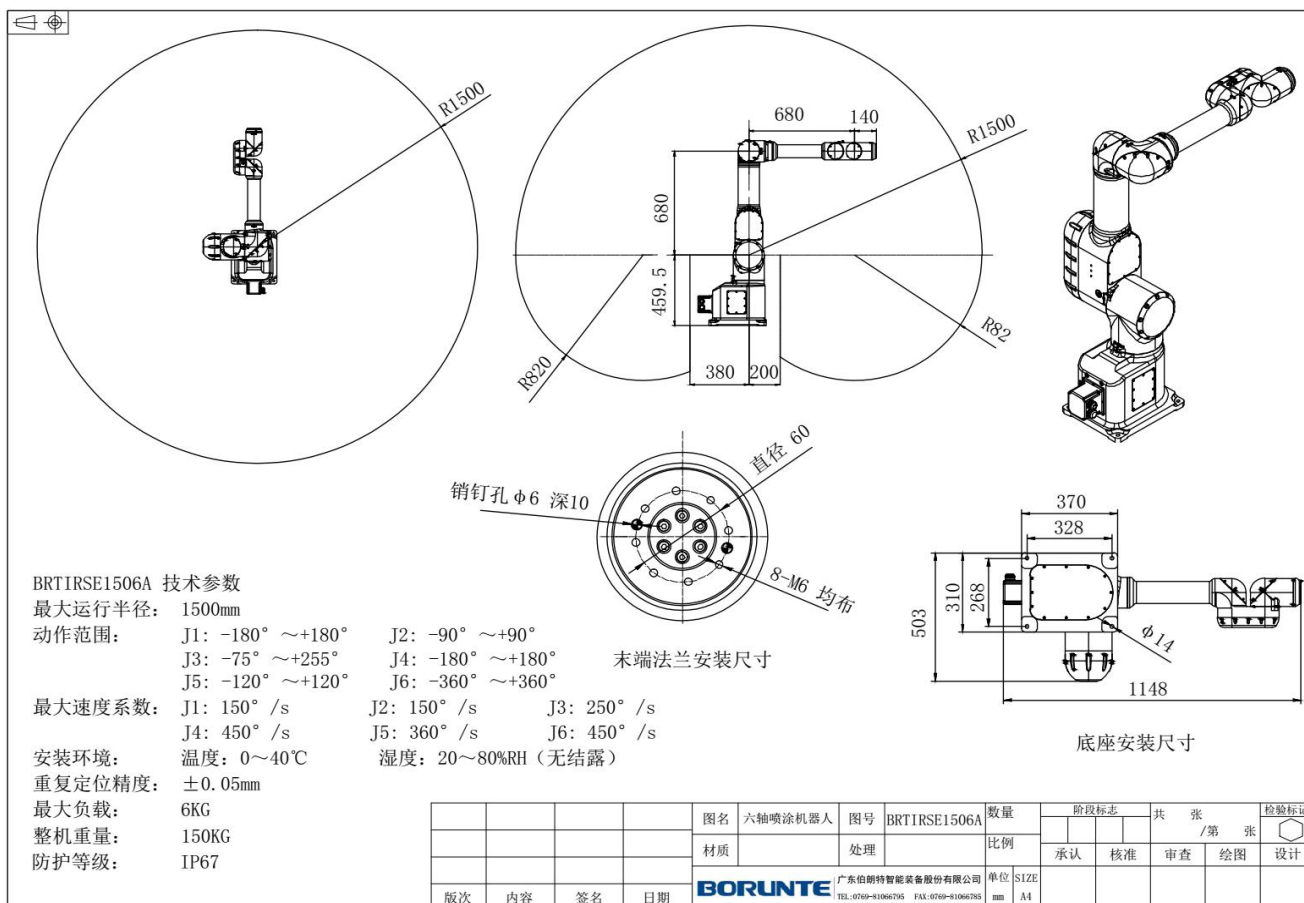
The above information is for reference only, please refer to the relevant instruction manual for the definition of the docking details. If there are changes, please consult our company's after-sales technical support.

# Chapter 17 Equipment operating range and parameters

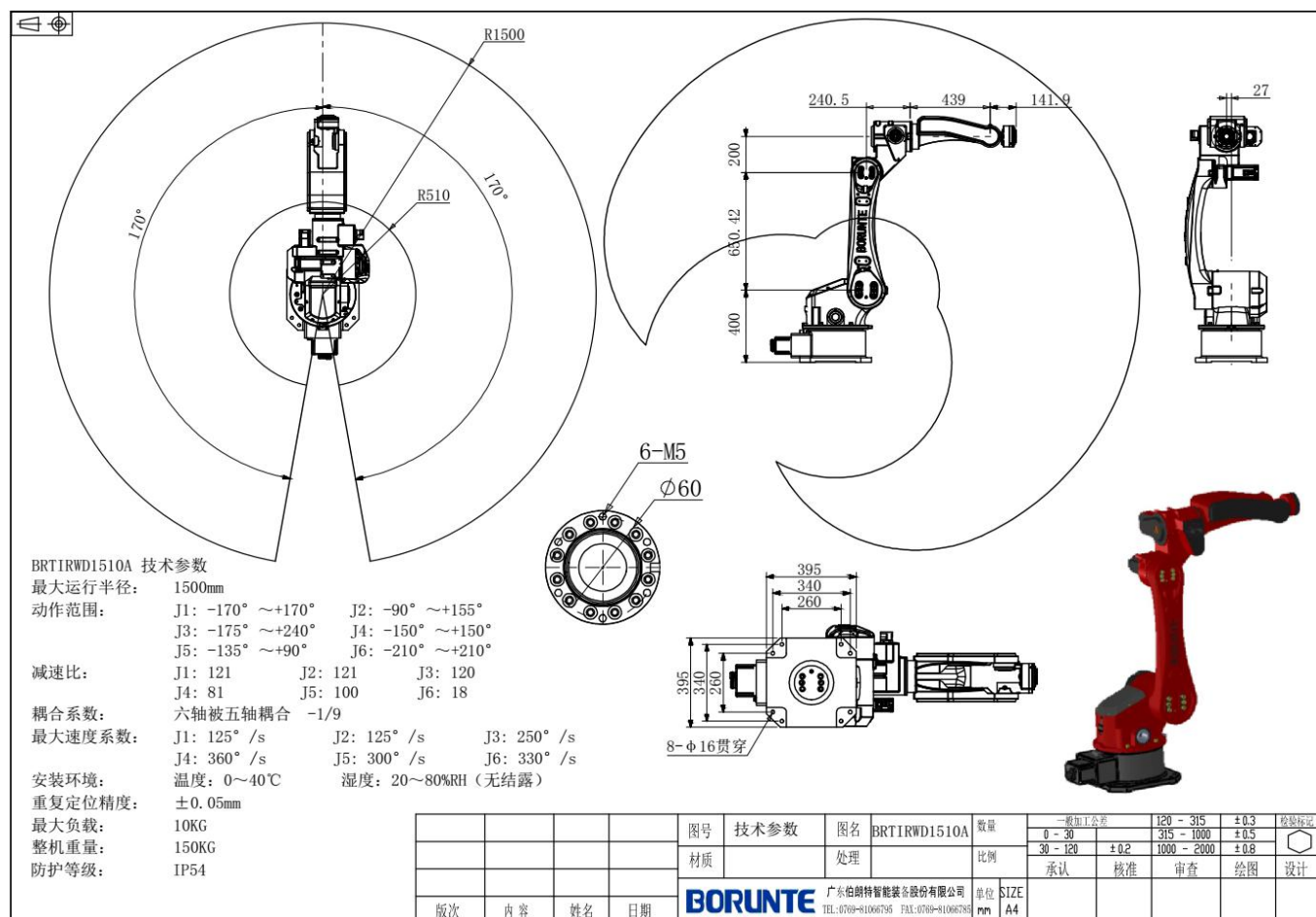
## 1、BRTIRUS0805A



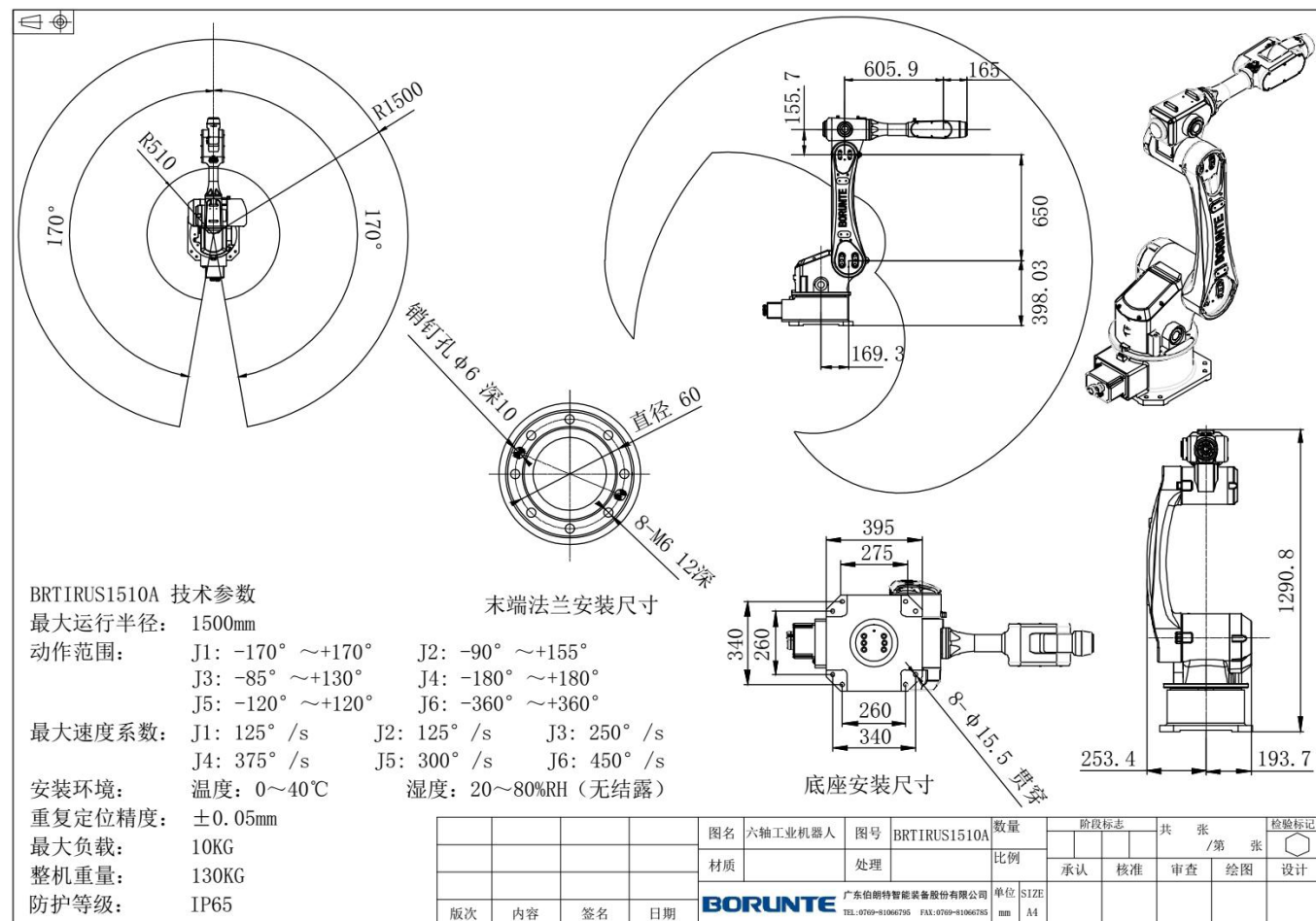
## 2、BRTIRSE1506A



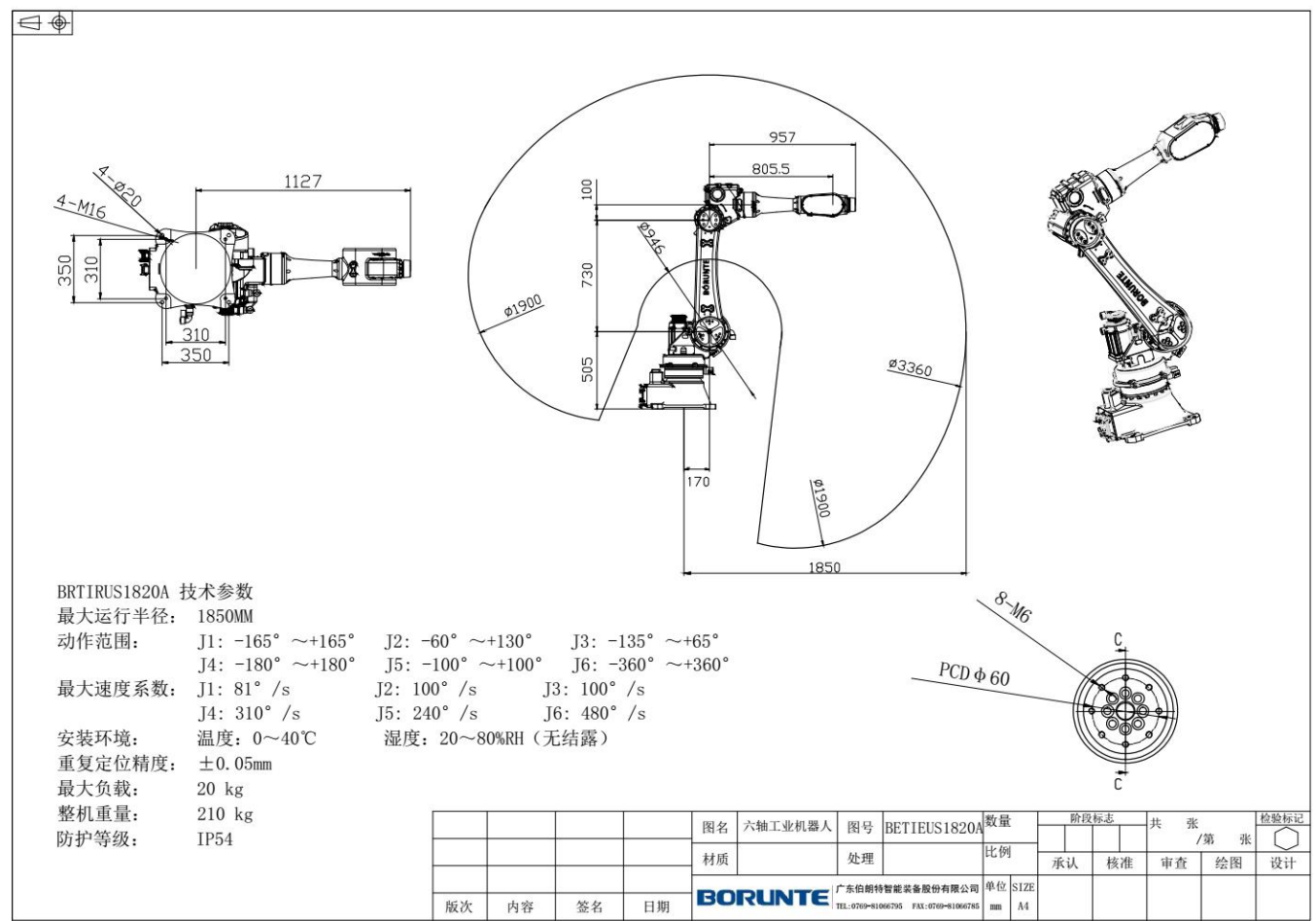
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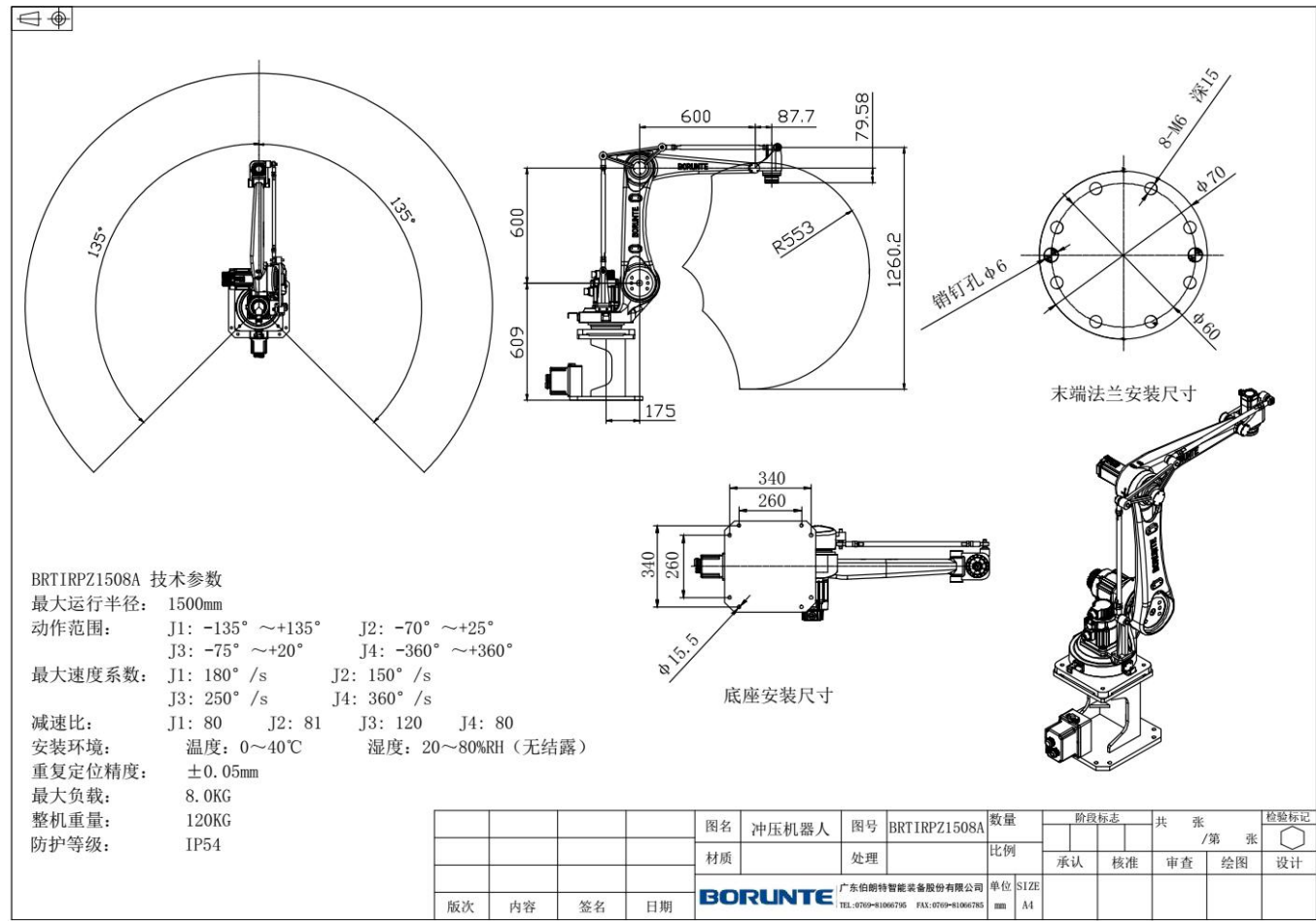
## 4、BRTITUS1510A 10KG



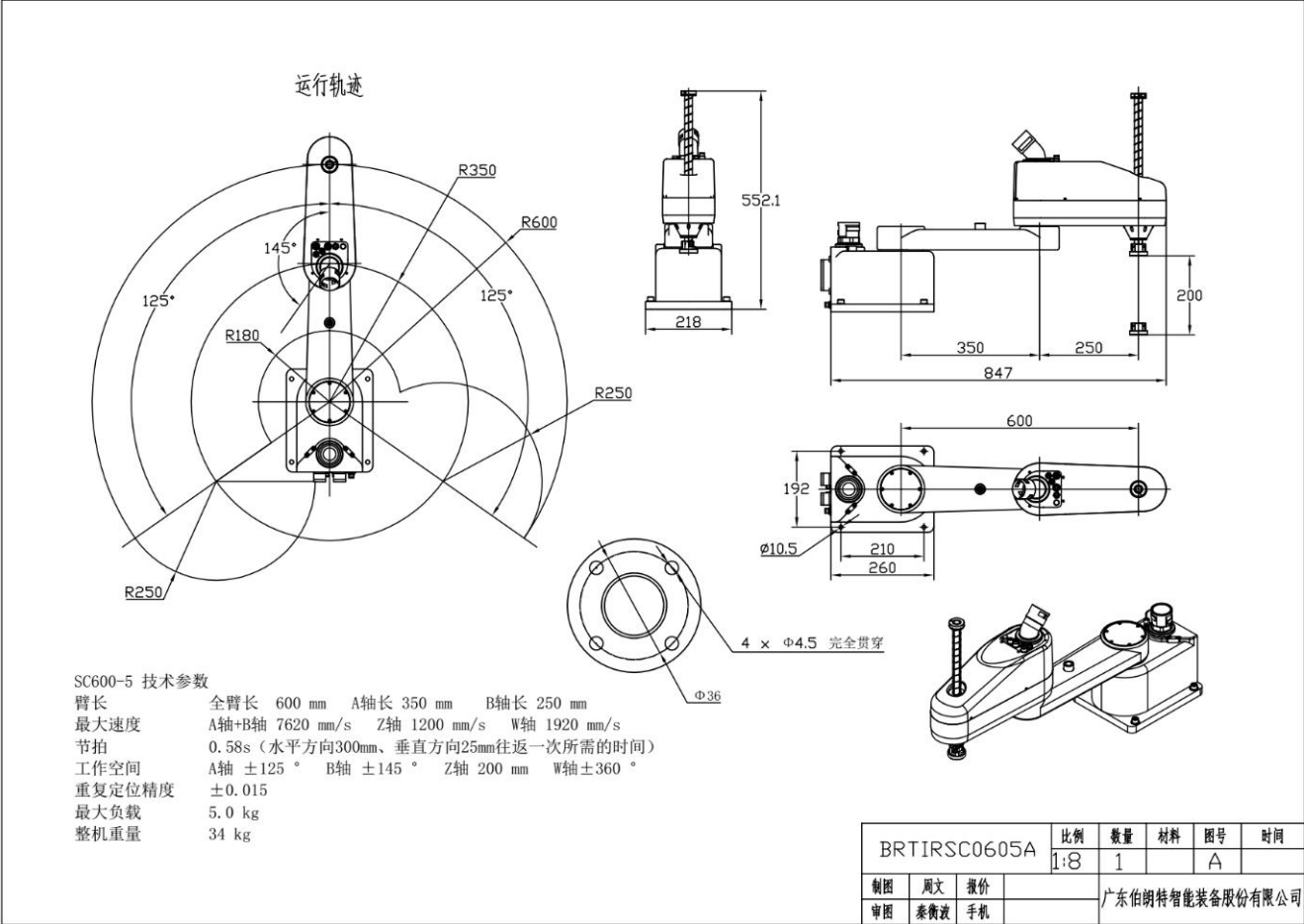
5、BRTIRUS1820A 20KG



6、BRTIRPZ1508A



7、BRTIRSC0605A



Note: The structure stroke parameters of the model are for reference only. If there are amendments, please use the new structure parameters.

## Chapter 18 Maintenance matters

Warning: Before servicing the robot, please read the following safety regulations carefully to avoid danger!

### Maintenance considerations

When overhauling and replacing control cabinet parts, the following precautions should be observed for safe operation.

1. When replacing parts, turn off the power once, and then perform the operation after 5 minutes. (Do not open the door of the control device within 5 minutes after turning off the power once). Also, do not work with wet hands.
2. When repairing and debugging, please set up warning signs such as warning signs around the machine to prevent others from entering the warning area.
3. Replacement must be performed by personnel who have received our robotics or school maintenance training.
4. It is strictly forbidden for one person to adjust the handle with the other person while the other person is disassembling parts or staying around the machine; in principle, only one person is allowed to debug and operate the machine.
5. The body (hand) of the operator and the "GND terminal" of the control device must be kept electrically shorted, and work should be performed at the same potential.
6. When replacing, do not damage the connecting cable. Also, do not touch the printed circuit board's electronic parts, wiring, and the touched parts of the connector.
7. Maintenance and commissioning can only be converted to automatic test machine after manual commissioning confirmation is OK.
8. Please do not arbitrarily replace or change original parts.

#### Note:

**The above maintenance table is for reference only. If the usage period and environment change, the monthly / half-year / year time may be appropriately shortened or extended.**

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Website：www.borunte.com

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因拍摄需要，某些部件有所增减，请按实际订单为准。

All stated here is subject to change without advance notice. Some parts have been increased or deleted because of the shooting needed, please order as the actual standard.