

The most practical robot controller

NEWKer数控
鑫科瑞数控

NEWker-i8



Making the most ideal and practical product to service CNC world

Robot controller

Manual

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CHENGDU NEWKer CNC-TECHNOLOGY CO.,LTD

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Chapter 1 Safety

Pay attention:

Before using the controller (Including install、work、transportation、maintain、detection), please read this manual carefully, after knowing all knowledge about safety.



Danger

Dangerous, could be injured or death!



Attention

Pay attention, could be injured!



Forced

Must follow the noticed!



Forbid

Must forbid doing!

Even some places without “Attention” or “Danger”,but also need to be pay attention and very carefully.



Danger

- **Before operating, press the Emergency button on the upper right corner.**



- **Before remove Emergency, need to solve the accident.**



- **Before using teach function in the motion range of robot, please follow the steps:**

- Keeping in the front to watch the robot.
- Follow the steps.
- Please be careful in case of robot move to you.
- Please make sure the safe place in case of accident.

- **Must make sure there is no person in the motion range of robot, the operator should be in safe place:**

- When powering up the robot
- Using teach function
- Try to run

Please press emergency if somebody get in the motion range of robot or some accident happens.



Must be sure when operating

The operator knows how to operate.

Knows how it works.

Knows how dangerous it is.

★Need detect before using teach function.

The motion of robot is no abnormalities.

The original point is right or not.

The external accessory equipment is no abnormalities.

★The controller need to take care and put it to the fixed place after using

If the controller is falling down, it will cause robot motion to damage equipment or get somebody injury.



Safety operation

- 1、 All operators need to know all function of robot and the safety operation.
- 2、 Make sure there is no dangerous before running.
- 3、 Must press emergency and power off when in the motion area.
- 4、 Should watch and be careful when programming in case of press emergency in time.
- 5、 No gloves when using teach function or move in manual,make sure it is in low speed.
- 6、 Must know the function and how to stop the external accessory equipment.
- 7、 Never trust the robot is stop, it maybe wait the signal to work the next program.

Chapter 2 Summary

NEWker-i8 robot controller use the international embedded bus type,the controlling circuit use the newest industrial high speed ARM CPU、 Mass programming FPGA technology, multilayer PCB, the whole machine adopts high integration chip and surface mount element, the structure is more compact and reasonable, and better ensure the reliability and stability of the system.The software is module designed, to suit the different structure, industrial application requirements.The robot controller can realize vertical multi joint robot,vertical articulated parallelogram robot, vertical multi joint robot, L wrist shaped vertical multi joint robot, spherical wrist robot, Delta robot ,pole coordinate robot and so many kinds. It is widely used and could be worked in handling, welding, spraying, palletizing, cutting, polishing,welding and so on.

The controller adopts bus structure with absolute motors, simple structure, practical and reliable.Use 800X600 TFT LCD technology, LED got uniform brightness and long service life.

2.1 Functional Characteristics

- 1) Structure optimization algorithm, adapt to the various kinds of robot;
- 2) Modular functions, to adapt to a variety of applications;
- 3) 8 axis control, could realize the auxiliary axis(walking axis, position control);
- 4) Adapt multi loop absolute motor;
- 5) Embedded bus type, easy and expand function;
- 6) 48x32 input and output points,edit PLC online;
- 7) all kinds of robot process function, simplify the programming and operation;
- 8) TCP function, tracking function of weld seam;
- 9) security module structure, strong practicability, high reliability.

2.2 Technical Parameter

Axis	6 axis robot + 2 axis accessory axis
Controller	8 inch TFT-LCD, touch, mode switch, safe switch, emergency
Motor	Bus absolute type
Connection	1) 48x32 input and output points; 2) 2 ways for analog 0-10V output;

	3) 1 way for quadrature input of encoder; 4) 6 ways for output of brake motor; 5) The special terminal for robot connection;
Operation	Teach、Reappear、Remote;
Programme	Keyboard、Teach、Technique;
Motion	Point to point、Straight、Arc;
Instruction	Motion、Logic、Calculation、Technique,also could use the code of CNC controller;
Coordinate system	Joint Coordinate、User Coordinate、Tool Coordinate、World Coordinate
PLC	Ladder graph,8000 steps;
Alarm	Emergency、Driver alarm、Safety maintenance、Arcing abnormal、coordinate system abnormal;
Type of robot	1) vertical multi joint serial robot; 2) vertical articulated parallelogram robot; 3) vertical multi joint L shape wrist robot;Pole coordinate robot; 4) SCARA robot; 5) Delta robot; 6) Special robot;
Application	Handling, welding, spraying, palletizing, cutting, polishing, forging, casting and so on



Attention

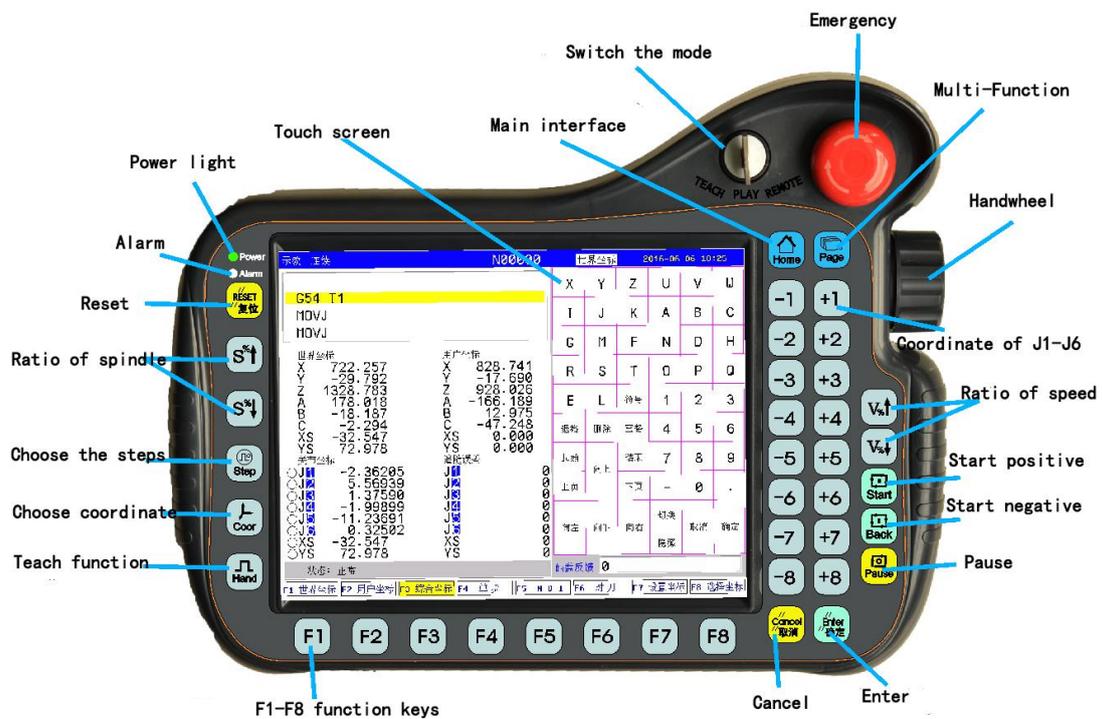
If the operation is wrong with our controller to cause some accident,read the manual and operate carefully, must follow the steps from manual,otherwise the result is no relations with our company!!!

Chapter 3 Operation

3.1 Summary

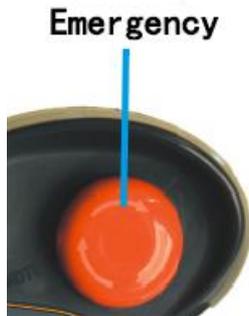
Knowing the parameter of controller.edit program, teach function, reappear function will be easy to use robot.

3.2 Controller



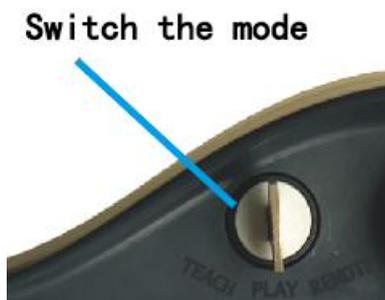
3.3 Function

3.3.1 Emergency



Pay attention: Usage for emergency need match with the circuit, must be safe and reliable, otherwise it can't stop.

3.3.2 Switch the mode



Usage for choosing the mode of operating the robot, total 3 kind of mode: Teach function, reappear, remote.

3.3.3 Safety switch



Safety switch is on back of controller, when the switch is pressed in the middle, the robot could move in Teach mode; If press it hard or loose it, the robot will stop, the controller will stop giving the signal.

Note: The switch got total 3 gears, the outermost and the innermost could stop the robot, only middle gear could let robot move.

Pay attention: The person can't be in the motion range of robot, the robot will move when the press is in the middle, in case of accident.

3.3.4 Handwheel



Handwheel



There are 3 gears could be chosen, 0.001, 0.01, 0.1, chosen by

The handwheel also could be used in program, it means use handwheel to run the program, move handwheel positive, the program will run forward, move handwheel negative, the program will run back.

3.3.5 Function



Reset, to stop program;

Pay attention: Reset may close some output (Relate with PLC), be careful



Enter;



Cancel;



Main interface;



Multi Function, could choose "program" "parameter" "compensation"

"diagnosis"



Choose the incremental value in teach function or handwheel mode;



Select the coordinate system in teach function, could choose "Joint" "User" "Tool" "World"



F1-F8 Function;



The program will start forward in reappear mode;



The program will start backward in reappear mode;

Pay attention: The robot will move when press Start. Must be carefully.



Pause, the program will pause when pressing this button.



To choose each axis of robot in teach function.

3.3.6 Adjust the ratio

(1) Ratio of rapid

Use VJ= to specify the ratio of rapid. For example, VJ=90, but the ratio can't be over 100%.

(2) Ratio of feeding



Total 16 gears in 0%~150%.

(3) Ratio of spindle



Total 16 gears in 5%~150%, it is set effectively for the first spindle S.

3.4 Teach operation

Switch the key into position of TEACH, press in the middle of safety switch, then could move each axis.

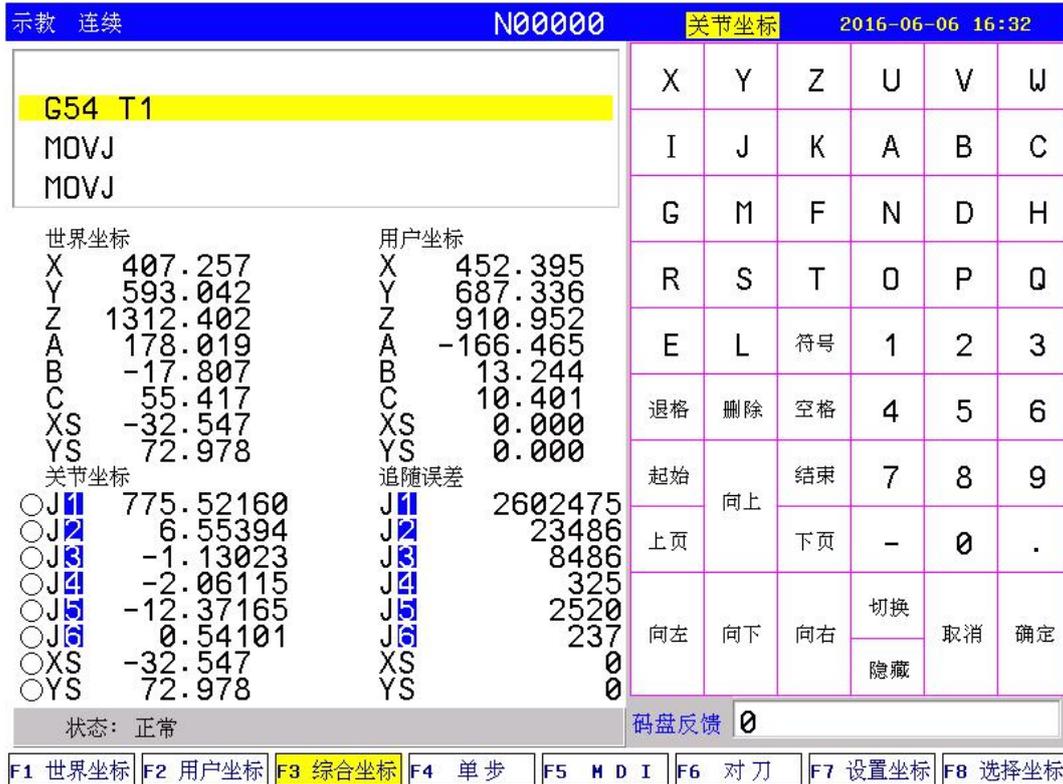
Be noticed when operating:

- 1) Keep watching in front of robot
- 2) Must follow the steps;
- 3) Think a plan in case of the robot will run to person to get injury;
- 4) Make sure the safety place;
- 5) The wrong operation may get somebody injury;

The controller use the first level operation, easy and fast, got full of information.

The controller is power up and enter the main interface, or press"Home" to enter main interface.

示教 连续		N0000		关节坐标		2016-06-06 16:31									
G54 T1				当前程序 111											
MOVJ				指令代码											
MOVJ				G54											
				T01 D0											
世界坐标				状态											
X	407.257	用户坐标	X	452.395	M05	M09	M10	不选停							
Y	593.042	Y	687.336	M78	M33	M70	跳段								
Z	1312.402	Z	910.952	MOVJ X100%											
A	178.019	A	-166.465	V600 X100%											
B	-17.807	B	13.244	A2000 V1000											
C	55.417	C	10.401	世界坐标											
XS	-32.547	XS	0.000	X	407.257	A	178.019								
YS	72.978	YS	0.000	Y	593.042	B	-17.807								
关节坐标		追随误差		Z	1312.402	C	55.417								
○J1	775.52160	J1	2602475	XS	-32.547	YS	72.978								
○J2	6.55394	J2	23486	单件时间 0:0											
○J3	-1.13023	J3	8486	焊接件数 400											
○J4	-2.06115	J4	325	码盘反馈 0											
○J5	-12.37165	J5	2520	状态: 正常											
○J6	0.54101	J6	237												
○XS	-32.547	XS	0												
○YS	72.978	YS	0												
<table border="1"> <tr> <td>F1 世界坐标</td> <td>F2 用户坐标</td> <td>F3 综合坐标</td> <td>F4 单步</td> <td>F5 M D I</td> <td>F6 对刀</td> <td>F7 设置坐标</td> <td>F8 选择坐标</td> </tr> </table>								F1 世界坐标	F2 用户坐标	F3 综合坐标	F4 单步	F5 M D I	F6 对刀	F7 设置坐标	F8 选择坐标
F1 世界坐标	F2 用户坐标	F3 综合坐标	F4 单步	F5 M D I	F6 对刀	F7 设置坐标	F8 选择坐标								



Press “Page” to enter the program management, could edit, modify, search, delete, copy and so on.

Press “Page” again to enter parameter management, could modify and check the parameter.

The Teach function is used for adjust the coordinate of robot and the motion of accessory axis to programme.

Adjust position of touch screen: If the position of button is wrong, you can press “6” or “Pause” in code parameter and press enter, then restart the power.

3.4.1 Button in Teach function

- (1) “F” or “V”: Set the feeding speed of Joint;
- (2) “Step” or “Hand”: Switch “Continuous”、 “ Incremental”、 “Handwheel”.
- (3) “S” or “A”: Set the speed of the first spindle (The first analog output), the max value is up to the No.43 parameter in speed parameter.
- (4) “I”: Modify the value of I in Step mod.
- (5) “T” : Set the number of the current tool and TCP point in world coordinate as the base point of tool set.
- (6) “V↑”: The ratio of feeding speed will increase 10% if press once, total 16 gears in 0—150%.
- (7) “V↓”: The ratio of feeding speed will decrease 10% if press once, total 16 gears in 0—150%.
- (8) “S↑”: The ratio of spindle speed will increase 10% if press once, total 16 gears in 5—150%.

(9)“S↓”: The ratio of spindle speed will decrease 10% if press once, total 16 gears in 5—150%.

(10)“R”: The current user coordinate backs to zero point, input “XYZABC78” correspond to “XYZABCXsYs” go back to zero point, if input “0”, then all axis go back.

(11)“Set coordinate F7”: In user coordinate system (G54.1-G54.48/G54-G59) to set the value of (G54.1-G54.48/G54-G59), update the value of coordinate system; Use “MDI” or F8 to set the user coordinate system (G54.1-G54.48/G54-G59).

3-points method to set user coordinate system: P1 as original point O, P2 as the direction of +X, P3 as the direction of +Y.

(12)Feed coordinate: Press “+1、-1、+2、-2、+3、-3、+4、-4、+5、-5、+6、-6、+7、-7、+8、-8” correspond to J1-J6, Xs、Ys to move + or -.

(13)“Tool set F6” or “H”, use for making sure the coordinate in tool coordinate system.

Two methods to set tool coordinate of 6 axis robot: 3-points and 5-points.

(A) 3-points: P1P2P3 for changing the motion of robot and keep the TCP point to be the same position, the motion of 3-points tool coordinate is the same as motion of electrical connection coordinate system.(The coordinate system of the 6th axis flange of robot wrist).

(B) 5-points: P1P2P3 are the same as 3-points, but the motion of tool coordinate system is settled by P3P4P5. P3 means the original position, P4 means the direction of +X, P5 means the direction of +Z.

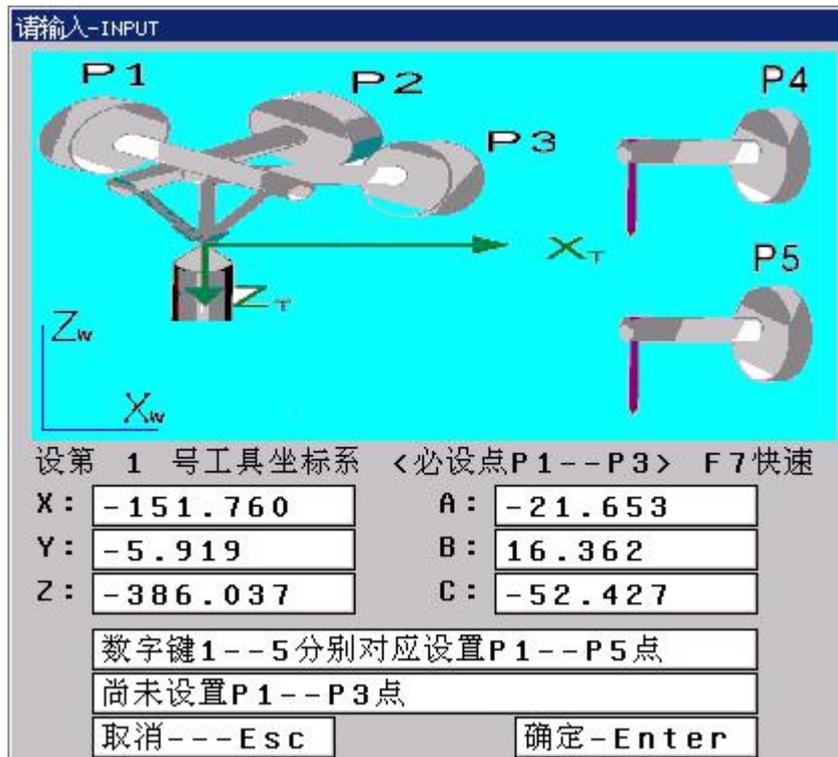
Press “Start” in the set process, the status will show “O”, then press “12345” to adjust the speed to back to the point set the last time, easy to modify. After once operation, this function will be closed automatically.

The posture of P3P4P5 in 5-points need to be the same(Value of ABC in world coordinate should be the same) [The interface need without N letter].

After input P1P2P3 3 points in tool set, the controller will calculate the position and posture of tool coordinate in world coordinate, if 3 points is too near, then it can't be exist P1P2P3, the controller can't calculate the value, it will delete P2P3 automatically.

XYZ of tool set mean the original point of tool coordinate in world coordinate, ABC mean the 3 axis posture in space(position and direction) of tool coordinate in world coordinate.

Pay attention:P1P2P3 in 3-points need be different posture;But the tool posture of P3P4P5 in 5-points need to be on the same straight line(It is fine if it isn't straight line, just the direction of Z axis in tool coordinate is not on the same straight line with weld gun)



3.4.2 Flush function of robot

Press “-” or “,” on controller, it will flush according to the MOVL mode, the speed is the speed in teach.

Press “.” or “j” on controller, it will flush according to the MOVL mode, the speed is the rapid speed of each joint.

Flush function is let the tool coordinate system parallel or perpendicular to user coordinate system or world coordinate system.

3.4.3 Switch feed mode of wrist joint

The world coordinate or user coordinate in teach mode, press “N” in main interface could switch the feeding mode of wrist joint.

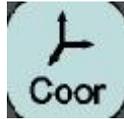
1) When the interface shows N letter, it means move XYZ is the motion of J1J2J3 of world coordinate or user coordinate in teach mode, the J4J5J6 will not move, it means not consider the change of robot posture in the end, just consider the flange position of robot in the end. In the same time, interface of user coordinate show the flange of robot in user coordinate. In the same time, interface of world coordinate show the flange of robot in world coordinate.

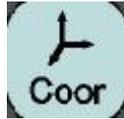
2) When the interface didn't show N letter, it means when it is world coordinate or user coordinate in teach mode, the end posture of robot will be keep the current status when move XYZ, the end position of robot will be keep the current position when move ABC. The interface of user coordinate will show tool TCP of robot in user coordinate. The interface of world coordinate will show tool TCP of robot in world coordinate.

3.4.4, Calibration or tool set of robot, the easy operation when locating

Firstly, move J4J5J6 in joint coordinate, or move A or B or C of world coordinate in wrist feeding mode to modify the posture(Only J4J5J6 move, J1J2J3 will not move). The posture of P1 is more important when tool setting, the axis of weld gun need perpendicular to workpiece. Move X or Y or Z to the target point in world coordinate in wrist feeding mode(only J1J2J3 move, J4J5J6 will not move).

3.4.5 Choose coordinate system

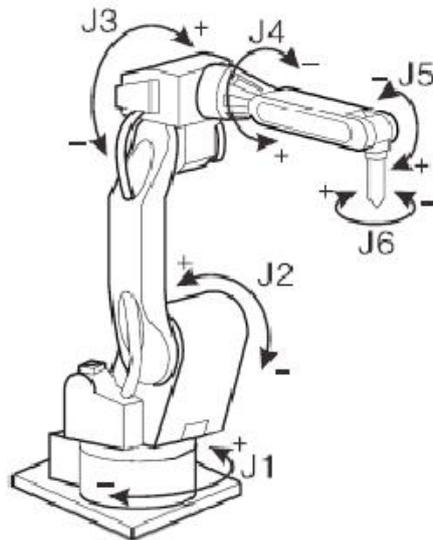


Press  to choose the coordinate system, in the teach mode, could choose “Joint coordinate” “User coordinate” “Tool coordinate” “World coordinate”;

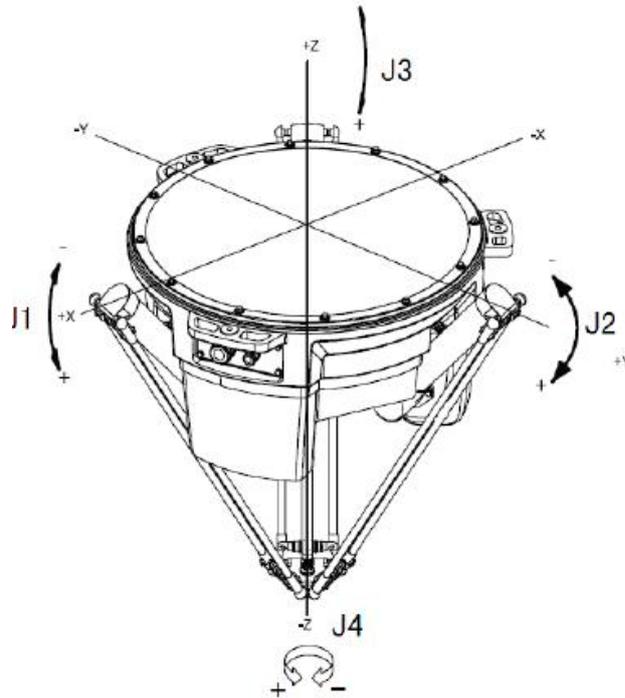
1) Joint coordinate system

The robot move along the each axis line, all used coordinate system named joint coordinate system. The joint coordinate system is settled down when robot is settled down, can't change.

The controller can support many kinds of robot, please look up to the definition of robot to make sure the motion direction of each joint coordinate system, for example:



Six axis serial joint robot



4 axis Delta robot



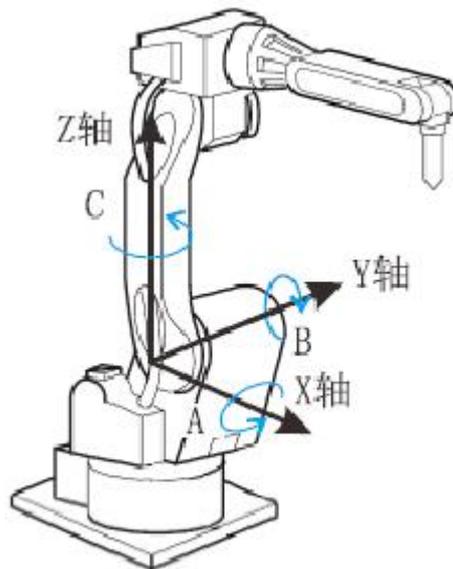
4 axis rotary joint palletizing robot

2) World coordinate system

World coordinate of robot, named right angle coordinate, also named ground coordinate, the same as robot coordinate in cnc controller. Different kind of robot correspond to different direction of right angle coordinate, the different right angle coordinate correspond to different original position.

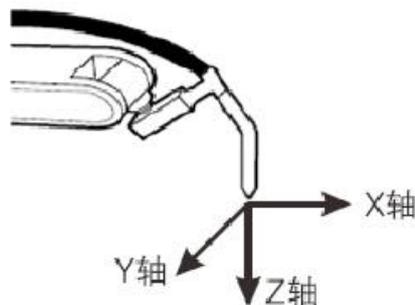
After setting the relative parameter of robot, the zero point and direction can be made sure, can't modify the right angle coordinate if not to modify the parameter.

Wherever the robot, it can along X axis, Y axis, Z axis move parallelly. For 6 axis robot, it also could rotate A, B, C, A axis rotate around X axis, B axis around Y axis, C axis rotate around Z axis, according to the right-hand rule.



3) Tool coordinate

The tool coordinate is the same as tool set coordinate in cnc controller, tool coordinate make the effect direction of the tool in flange of robot wrist as Z axis, and define the coordinate as the tip point of tool. No.0 tool coordinate is the base tool coordinate, can't be modified.



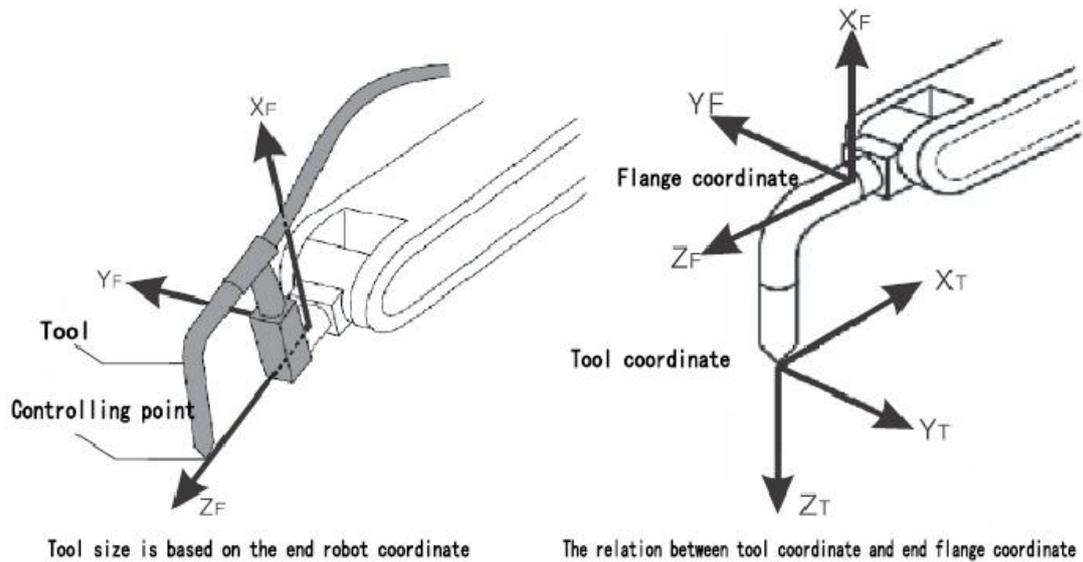
So the direction of tool coordinate is changing when the wrist is moving.

The tool coordinate move according to the direction of tool, no relative with position of robot or posture, so it is better to move parallelly so that not to change the posture of tool.

The robot carries out the straight line interpolation, the circular interpolation and so on interpolation movement need to input the right size information of tool, position of definition controlling point. Build tool coordinate is by the different data of 6 groups of end robot, the controller will calculate the position of tool controlling point.

Use tool check is input the coordinate of tool controlling point of flange. As the

following:

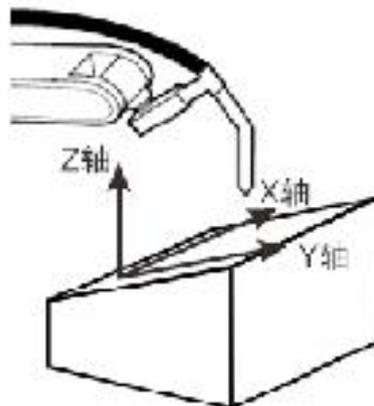


4) User coordinate

The robot move parallel to the specified each axis in user coordinate. User coordinate is the same as workpiece coordinate in CNC controller.

In other coordinate system except joint coordinate, all could just change the posture of tool, no need to change the position of tip point tool(controlling point), named invariant movement of controlling point.

G53 user coordinate is the base, can't be modified, the same as right angle coordinate. User coordinate could be set by G54/G55/G56/G57/G58/G59/G54.1-G54.48



The usage for joint and world coordinate, use the switch for changing the mode, and then use +/- to move the robot or programme.

User and tool coordinate need 2 conditions, use the suitable coordinate number, change into suitable coordinate system. After these conditions, you can use Teach function to programme in this coordinate.

Pay attention: The coordinate you choose will be taken into the teach program when editing in the teach mode, so need to make sure the coordinate system.

3.5 Reappear(PLAY) operation

Switch the mode into reappear(PLAY) position.

PLAY mean reappear the current editing or teaching program. The controller could work in any point, from any line to work. If work from any point or any line, then need edit with absolute coordinate. Reappear function can't work with teach.

Select the running program: Press “↑”“↓” to select the program and press “C”.

To change to coordinate: Press “F1”“F2”“F3” to change”world coordinate” “User coordinate” “comprehensive coordinate”.

3.5.1 Start

Choose “Single or continuous”: Press “F4 single” to switch.

“Continuous” means after pressing “start”, the program will run until to the end or stop instruction.

“Single” means only run the current segment of program, press “start” again to run the next segment.

3.5.2 Start from any line

A、 Start from real line:

Press “-” to input the number of line in reappear mode, press Enter to make sure, or Press “↑、 ↓” to select the program line in status of reappear coordinate, this line will be the start line. **It will starts from the input line when press “start”.**

Pay attention:

- 1、 This line is the real line of the program, not the line is specified by N.
- 2、 Start from the real line, the default line is the line when pause the program, so that user could operate easily.

B、 Start from marked line:

The controller could start the program from the marked line. Press “N” in reappear mode and input the number of line which be marked, press enter to make sure. It will start from the number of line you enter when pressing start.

3.5.3 Program start

First change into reappear(PLAY) position, there are two ways.

- (1) Press “Start” on panel or connect external “RUN” signal.
- (2) Press “Back”, the program goes back (No.14 parameter in other parameter need to be 40).

3.5.4 Program stop

Program stop:

- (1) Instructions M00、M01、M02、M30、M20;
- (2) Press “Single” to move a segment and stop;
- (3) Connect external “HALF” signal, the program will pause;
- (4) Press “Reset” to stop all motion of robot.

3.5.5 Real-time control in reappear

- (1) Modify rapidly: By VJ instruction;
- (2) Feeding speed: Press “V↑” “V↓”.
- (3) Spindle speed: Press “S↑” “S↓”.
- (4) Stop in process: Press “Single” in continuous mode, it will finish the current segment and wait for the next signal.
- (5) Pause: Press “Pause” or connect external “HALT” to pause. Press “Run” or “Start” , it will continue; Press “Reset”, it will quit the status of reappear, at the same time, the program will go back to the first line.
- (6) Keep feeding: When it is pause (external HALT 、 press “Pause” or “Single”) ,change the mode into “Teach”, keep feeding in reappear, could adjust the coordinate, change the mode into “PLAY” mode, press “Start”, it will move to the point of pause and continue to work.
- (7) Quit process: Press “Reset”.

3.5.6 MDI

Press “F5 MDI” to enter MDI mode in “Teach” or “PLAY”. “MDI” mode is input segment of program, run segment of program, press “Back” in the process to quit, press “Start” to run.

3.5.7 Handwheel

Press “Hand” in “PLAY”, it will goes in handwheel process mode, the program will run by handwheel. F speed and ratio of feeding according to the speed of handwheel rotate. Usually this method is used to try to work with program.

3.6 Remote

Remote mode: Many robots connect together to control remotely.

“Start”“Back”“Pause” on panel are no effective in remote code, only use “RUN” and “HALF” signal to control.

3.7 Safety operation and alarm

3.7.1 Emergency stop

The controller will stop all motion of robot when pressing this button, the controllers show emergency and wait for pressing up the button. M67 output the effective signal when No.19 parameter in other parameter set as effective.

It is the best to run “M500” to read the position of motor again if press this button when robot is working, because it maybe cause the position change.

3.7.2 Reset

The controller will stop all operation when pressing this button.

3.7.3 Alarm

The screen will show the tip of alarm, the light will be red, the movement and program will stop, need to make detection to clear. No.19 parameter in other parameter to set M67.

3.8 Parameter

Press “Page” to enter. The parameter includes “Processing” “Speed” “Axis” “Technique” “Other parameter” “Coordinate” “Code”.

Note:

The instruction of controller contains parameter of CNC controller, so there is some parameter about CNC.

1, 半径C补偿的建立方	0
2, 半径C补偿的撤消方	0
3, 程序运行须主轴转	0
4, 指令M20运行次数	-1
5, 加工件数自动统计	1
6, 进给轴反向延时	0
7, G01/G02/G03段	0
8, G00后延时(ms)	0
9, 连贯运动是否对G0	1
10, M03/M04/S指令	1
11, 主轴编码器每转的	10000
12, 主轴编码器检测线	1
13, 是否检测主轴位置	1

当前程序	111
指令代码	G54 T01 D0
状态	M05 M09 M10 不选停 M78 M33 M70 跳段 MOVJ X100% V66.0 X100% A2000 V1000
世界坐标	X -52.375 A 178.026 Y -1264.984 B -11.241 Z 1002.029 C -92.305 XS -32.564 YS 72.978
单件时间	0:0
焊接件数	400
码盘反馈	0

状态: 正常

F1 加工参数	F2 速度参数	F3 轴类参数	F4 工艺参数	F5 综合参数	F6 坐标系	F7 密码	F8 返回
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3.8.1 Processing parameter

★、1, The establish mode of radius C compensation

The establish mode of radius C compensation in G41/G42, 0 means A type, 1 means B type.

★、2, The cancel mode of radius C compensation

Set the cancel mode of radius C compensation in G41/G42, 0 means A type, B means B type.

★、3, The program run need the spindle rotate[1 means Yes, 0 means No]

If set as 1, the spindle needs rotate when program running(Need detect the encoder rotation when it is M03); Set as 0, then no need to detect.

★、4, The running times of M20

The loop times of M20 in program, infinite loop when it is minus.

★、5, The counts of workpiece will be counted automatically[1 means Yes, 0 means No]

★、6, The delay time of feeding axis to go reversal(ms)

Set it as 0 when it is highly requirement.

★、 7, The delay time of segment in G01/G02/G03(ms)(>100 effective)

This parameter solves the overcut problem in the corner.

★、 8, Delay time of G00 (ms) (>100 effective)

★、 9,Continuous motion is worked in G00[16 means Yes, 1 means No]

If set as 16, then it will not reduce, continuous work.

★、 10,Instruction M03/M04/S is detecting the rotation speed of spindle to the requirement(0 means M69 relay, 8 means detect the feedback encoder)

When setting as effective, must detect the rotation speed of spindle and wait for the speed to the requirement and run the next segment of program.

★、 11, The number of pulse of each round of spindle encoder.(4 times the number of encoder)

★、 12, The alarm value of spindle encoder(Diagnosis value)[>10 effective]

Set it as the same as the diagnosis value.

★、 13, Detect the feedback position of spindle(1 means Yes, 0 means No)

Set it whether to detect the feedback signal of spindle position, the spindle encoder signal. 1 means to detect, 0 means not to detect.

★、 14,Set the error of encoder feedback detection(rpm)

The error between the real speed and the set speed.

★、 15,Detect the overcut in G41/G42 tool compensation or not(2131970 means detect strictly,34818 means not to detect,6326274 means read ahead rapidly)

★、 16,From the end of the last segment program if start from the middle line.[8 means Yes, 0 means No]

Set as 8, it will starts from the end of the last segment program.

★、 17, Start the program by the input point [D2-D7(+4...+128) correspond to X26-X31, D8-D15(+256...+32768) correspond to X16-X23]

Set as +4+8=12 , when X26 or X27 is effective to choose the program HIDEFILEX26 or X26 or HIDEFILEX27 or X27.

★、 18, The protection time of screen(minutes)(<2 not to protect)

3.8.2 Speed parameter

★、 1-6,The speed of J1-J6 MOVJ(degree/s)

The most speed of J1-J6 MOVJ in rapidly speed instruction

★、 7,8,G00 speed of Xs,Ys axis(mm/min)

The most speed G00 of XsYs axis

★、 9,The max feeding speed in teach(mm/min)

Pay attention:Set as 50% to make sure the safety.

★、 10,The max feeding speed in PLAY(mm/min)

The max is 30000

To make sure the efficiency, could set this to bigger than G00.

★、 11,Default speed of MOVL/MOVC(mm/min)

If the first interpolation not specify the speed, this will be the speed in PLAY.

★、 12,The speed of dry running(mm/min)

★、 13,Feeding speed in teach(mm/min)

The range: The max feeding speed in teach

Pay attention: Press F or V to set in teach, it will refresh this value

★、 14,The rotation speed of spindle in teach(rpm)

Pay attention: Press S or A to set in teach, it will refresh this value

★、 15,The initial speed of feeding axis(mm/min)

If the running speed of feeding axis is lower than this, it will reach to the speed directly, if the running speed of feeding axis is higher than this, the start speed with this and reach to the set speed.

Pay attention:

This value is relative to the equipment of robot, not suitable will cause accident or fault.

★、 16,The max variety value in the moment of feeding axis(mm/min)

★、 17,Limit the speed of G1G2G3[1 mean Yes, 0 means No]

★、 18-25,The highest speed of XYZABCXsYs axis in G1G2G3(mm/min)

★、 26,The acceleration and deceleration constant in PLAY[≥ 500]

Normally not to set this parameter, it just need to be set when there is a big difference between PLAY and teach.

★、 27,The speed when handwheel is stop(mm/min)[>18]

The bigger value, the sooner will be stop.

★、 28,The acceleration and deceleration constant of handwheel[500--30000]

The bigger value, the sooner will be faster and slower.

★、 29,The acceleration and deceleration constant of handwheel runs program[>500]

The range is 500-32000, the bigger, the sooner faster and lower.

Pay attention: Invalid when lower than 500, each axis will work according to the normal.

★、 30,The speed of handwheel in G00(mm/min)[>10]

The speed of handwheel in dry running.

Pay attention:Invalid when lower than 500, each axis will work in G00 according to the normal.

★、 31,The type of acceleration and deceleration[0 means straight line,8 means curve line(S type)]

Pay attention:The set is relative with driver, normally, step type use curve, servo use straight line.

★、 32,The initial acceleration and deceleration constant in curve type[≥ 10]

The bigger value, the sooner faster.

Pay attention: Effective bigger than 10.

★、 33,Quadratic constant of acceleration and deceleration in curve[≥ 10]

Pay attention: Effective bigger than 10.

★、 34,The max acceleration and deceleration constant in curve[≥ 500]

Pay attention:It is effective when bigger than 500, otherwise only use straight line.

★ 、 35-42,The speed backs to reference point of XYZABCXsYs axis(mm/min)[>1]

★ 、 43-47,The max rotation speed of spindle in high gear(rpm)

Set the rotation speed which 10V instruction is specified.

Pay attention: The first spindle use S or A, the second spindle use SS.

★ 、 48-51,Interpolation compensation in Arc(+1 means length compensation +2 means fixed loop compensation is specified by G17G18G19,+4 means from center of circle to the end point which is IJK,+8 means the compensation way B of interpolation is specified by parameter)

When D3=0, A type: When interpolation compensation of arc reversal, the speed of compensation is effective with reversal interpolation value, the bigger value, the faster speed to make sure tool will not pause, but the compensation speed can't over 10000mm/min;

+8(D3 bit),B mode: When interpolation compensation of arc reversal, the compensation speed is specified by No.49-No.51 parameter.

+1(D0 bit): Length compensation mode is B mode, otherwise is A mode. A mode is always compensate in Z axis, B mode is specified by G17/G18/G19, G17 compensate Z, G18 compensate Y, G19 compensate X.

+2(D1 bit): The fixed loop mode is B mode, otherwise is A mode. A mode is always compensate in Z axis, B mode is specified by G17/G18/G19, G17 compensate Z, G18 compensate Y, G19 compensate X.

+4(D2 bit): IJK is coordinate from the end point to centre of circle in arc programme, plus 4 means the IJK is to the end point in G02 G03, otherwise is to start point.

★ 、 52,The start reduce speed in hard limit(mm/min)

Servo needn't reduce, set as 1 normally.

★ 、 53,Active speed pre-treatment function[1 means Yes, 0 means No]

Set as 1 to active, set as 0 not to active.

★ 、 54-58,Start the smooth function(+4 means teach;+8 means handwheel;+16 means program in PLAY)

The range is 50-100, smaller value the faster reduce, but bigger vibration. The time constant is set by No.55-No.58.

★ 、 100-105,The max speed of J1-J6 in teach when not in joint coordinate

system(deg/min)[>1]

Not in joint coordinate means world coordinate or user coordinate.

★、 106-111,The max speed of robot J1-J6(deg/min)[>1]

★、 112-115,The additional ratio of robot handwheel in world, user, tool coordinate[1-10]

Maybe the robot work discordant, set this value will be better, No.113-No.114 is the same.

★、 116-123,The starting speed of robot J1-J6 XsYs(deg/min)[>=1]

Set initial speed when J1-J6 XsYs starting to work, also the end speed when reduce the speed. If the running speed is lower than this value, there is no process to raise or reduce speed.

★、 124-131,The max variety value of robot J1-J6 XsYs(deg/min)[>1]

Mainly set this to increase the coherence of multi-axis interpolate continuously.

★、 132-139,The acceleration and deceleration constant of robot J1-J6 XsYs(deg/min/s)[>1]

The range: 1-99999.

Pay attention: The value is relative with robot equipment, set not right will cause some fault or accident. Usually, the more heavy the smaller value.

3.8.3 Axis parameter

★、 1, Soft limit

[D2 means X axis;D3 means Y axis;D4 means Z axis;D5 means A axis;D6 means B axis;D9 means C axis;D10 means Xs axis;D11 means Ys axis;1 means not limit;D12 means MOVE;D14 means no limit in changing tool]

Set each axis in each bit.

Example: If set soft limit of X axis, then set as:00000100

★、 2-17,The max movement in positive and negative direction of XYZABCXsYs axis(mm)

This value is based on the world coordinate system.

★、 18-29,The max movement in positive and negative direction of J1-J6(deg)

The value is based on the joint coordinate system.

★、 30-37,Reversal interpolation compensation of J1-J6 Xs Ys(um)

★、 38-42,The direction signal of J1-J5[1 means normal, 0 means reversal]

★、 43,The reversal direction signal of J6 XsYs(+2 means J6,+4 means Xs axis,+8 means Ys axis)

Set as 0 means reversal direction, set as 1 means the same as direction is specified.

★、 44,Close the electrical gear of feeding axis[1 means Yes, 0 means No]

★、 45-56,The numerator and denominator of electrical gear of J1-J6(1-999999)
numerator=10000 x Reduce ratio;
denominator =36000000;

★、 57-60,The numerator and denominator of Xs Ys axis(1-999999)
numerator =10 x Reduce ratio;
denominator=Screw pitch;

★、 61,The requirement for feeding axis back to zero point
[1 means no need, 0 means prompt, 8 means force, 9 means super force]

★、 62,Floating zero point
[D3 means X axis;D4 means Y axis;D5 means Z axis;D6 means A axis;D7 means B axis;D8 means C axis;D9 means Xs axis;D10 means Ys axis;1 means floating zero point, 0 means mechanical zero point]

★、 63-70,Set the floating zero point in world coordinate system of XYZABCXsYs axis

Set this parameter as the current coordinate of XYZABCXsYs axis, each axis goes back to zero point to here.

★、 71-76,Function of XsYs axis[0 means straight line,1 means rotation]

★、 300,The number of bus bits of bus motor encoder
If the encoder is 17bits bus absolute encoder, set as 17.

★、 511,No.8 parameter of drive which is J1,The bigger, the bigger current.

★、 512,No.9 parameter of drive which is J1,The smaller, the sound smaller

- ★、513, No.10 parameter of drive which is J1, The bigger, the bigger vibration
- ★、514, No.11 parameter of drive which is J1, The bigger, the stronger rigidity
- ★、515, No.32 parameter of drive which is J1, The rated current of motor(x0.1A)
- ★、516, No.33 parameter of drive which is J1, The rated torque of motor(x0.1Nm)
- ★、517, No.44 parameter of drive which is J1, The smaller, the stronger following
- ★、518, No.30 parameter of drive which is J1, M133 mode(0 means constant speed, 1 means reciprocate, 2 means fixed distance)

★、518-1, No.40 parameter of drive which is J1, The swing distance of M133(low 16 bits)

★、518-2, No.41 parameter of drive which is J1, The swing distance of M133(high 16 bits)

★、518-3, No.46 parameter of drive which is J1, The pause time in swing of M133(ms)

511-518/521-528/531-538/541-548/551-558/561-568/571-578/581-598

correspond to the drive parameter of J1-J6/Xs/Ys axis(Press “7” to refresh the parameter in parameter interface).

3.8.4 Technique parameter

★、1-0, The basic technique parameter in welding[0-9]

Arc weld instruction AS* to use.

★、1-1, Basic technique group: Open the function of “Back” or not[8 means open, other means closed]

Set as 8 means, press “Back” got the back function when it is pause.

★、1-2, Basic technique group: The back distance of restart(um)

★、1-3, Basic technique group: The speed of restart(mm/min)

★、1-4, Basic technique group: The detection times of cladding

★、1-5, Basic technique group: Open the scrape function or not[8 means open, others mean closed]

★、1-6, Basic technique group: The scrape distance in weld(um)

★、1-7, Basic technique group: The backing speed of scrape in weld(mm/min)

★、1-8, Basic technique group: Starting of arc and arc extinction:+2 means the

starting of arc; +4 means arc extinction

- ★、 1-9,Basic technique group: The voltage of starting of arc
- ★、 1-10,Basic technique group: The current of starting of arc
- ★、 1-11,Basic technique group: The voltage of welding port treatment
- ★、 1-12,Basic technique group: The current of welding port treatment
- ★、 1-13,Basic technique group: The voltage of after treatment
- ★、 1-14,Basic technique group: The time of gas purge(ms)
- ★、 1-15,Basic technique group: The present time of delivery gas(ms)
- ★、 1-16,Basic technique group: The detection time of electrical arc(ms)
- ★、 1-17,Basic technique group: Starting time(ms)
- ★、 1-18,Basic technique group: Time of behind delivery gas(ms)
- ★、 1-19,Basic technique group: Time of welding port treatment(ms)
- ★、 1-20,Basic technique group: Time of behind treatment(ms)
- ★、 1-21,Basic technique group: Delay time of cladding detection instruction(ms)
- ★、 1-22,Basic technique group: Delay time of cladding detection (ms)
- ★、 1-23,Basic technique group: Time of cladding detection(ms)
- ★、 1-24,Basic technique group: Reserve
- ★、 2-0,The group number of weaving in weld[0--9]
- ★、 2-1,Weaving mode[1 mean Z type; 2 means circle type]

- ★、 2-2,Distance of weaving(um)
- ★、 2-3,Extent of weaving(um)
- ★、 2-4,The pause time to A point(ms)
Weave weld to A point and the pause time(ms).
- ★、 2-5,The pause time to B point(ms)(ms)
Weave weld to B point and the pause time(ms).
- ★、 3-0,Search the technique group[0--9]
- ★、 3-1,Search technique group: Mode and type
- ★、 3-2,Search technique group: The distance of search(um)
- ★、 3-3,Search technique group: The speed of search(mm/min)
- ★、 3-4,Search technique group:
- ★、 3-5,Search technique group:
- ★、 501,Check the data of position point
- ★、 502,Adjust the data of position point
- ★、 503,Save the data of the current position point[Pay attention to the current tool number and user coordinate system]
Pay attention: The current tool number and user coordinate system.
- ★、 504,Check the data of movement value
- ★、 505,Modify the data of movement value
- ★、 506,Calculate the data of movement value according to the two position point[Pay attention to the current tool number and user coordinate system]
Modify the data is specified by SN*. According to No.501-No.503 to calculate.
- ★、 The parameter of robot reversal palletizing

- ★、 601,The basic parameter of reversal palletizing
- ★、 602,The teach for piling point of reversal palletizing
- ★、 603,The teach for approach and back point of reversal palletizing
- ★、 604,The special set for each floor layout number of reversal palletizing
- ★、 605,The special set for each floor height of reversal palletizing
- ★、 606,The set or teach for special regular layout data of reversal palletizing
- ★、 607,The set or teach for special ruleless layout data of reversal palletizing
- ★、 608,The set or teach for special floor with special approach and back point
- ★、 609,Copy data of some number reversal palletizing
- ★、 610,Copy data of some number layout mode
- ★、 611,Delete the data of some number reversal palletizing
- ★、 612,Delete the data of some number layout mode
- ★、 613,The M instruction before reversal palletizing(880--889)
- ★、 614,The M instruction when reversal palletizing to point 1(880--889)
- ★、 615,The M instruction when reversal palletizing approach to the summing point to offset(880--889)
- ★、 616,The M instruction when reversal palletizing approach to the summing point(880--889)
- ★、 617,The M instruction when reversal palletizing back to the overlap point to offset(880--889)
- ★、 618,The M instruction when reversal palletizing back to point 1(880--889)

These are parameter of reversal palletizing, includes 3 files to save palletbase.txt and palletlayout.txt and palletcurr.txt, if need delete these 3 files, then input PALLET and enter in No.15 other parameter. Note for files:

(1) The basic parameter of file palletbase.txt (The range is 1--99)

The parameter:

The number of reversal palletizing;

The type is palletizing or reversal palletizing;

The operation sequence of line and column of reversal palletizing(This parameter is only effective when the layout type set as 0);

The number of line, column and layer.

The distance between the line or column of reversal palletizing;Pay attention: If not specify or 0, it will be useless, it will calculate according to the end point of teach and number of line and column.

Approach point(2 points in the most);

The number of back points(2 points in the most);

The approach speed;

The back speed;

Reach with low speed and the offset distance of leave the overlap points;

Reach with low speed and the offset speed of leave the overlap points;

The layout type:

0 means generate layout type of each layer automatically(The posture is the teach posture of basic point).

1 means every layer is the first layout mode of teach.

2 means the layout type according to the parity layer(Odd layer correspond to the first kind of layout mode, even layer correspond to the second layout mode).

3 means definition of set, every layer need specify the corresponding the layout mode.

The coordinate of 4 teach points;

The coordinate of approach point and back point;

The layout number of every layer, 0 means the default;

The special set for height of every layer, 0 means the default;

The logic control for loose and tight is user-defined instruction M880--M889, set by parameter.

Format of file, six parts:

BaseParam: Basic parameter

RCLcharac: Characteristic points of pile

ApprRtret: Point of approach and back

NumLayout: Special set for layout number of each layer

LayHeight: Special set for height of every layer

ApRtSpecl: Teach of back point and special approach in special

layer

BaseParam: Includes these parts:

The first data means the current number of reversal palletizing

(1--99)

B-Type: Type

B-Sers: Sequence

B-Rnum: Number of line

B-Cnum: Number of column

B-Lnum: Number of layer

B-Rdst: Distance of line

B-Cdst: Distance of column

B-Ldst: Distance of layer

B-ApPt: Number of approach points

B-RtPt: Number of back points

B-ApFd: Approach speed

B-RtFd: Back speed

B-LowD: Distance of slow move

B-LowF: Speed of slow move

B-Lout: Layout format

RCLcharac: Includes these parts:

The first data means the current number of reversal palletizing

(1--99)

R-OrgX: X of original

R-OrgY: Y of original

R-OrgZ: Z of original

R-OrgC: C of original

R-RowX: X of line end point

R-RowY: Y of line end point

R-RowZ: Z of line end point

R-RowC: C of line end point

R-ColX: X of column end point

R-ColY: Y of column end point

R-ColZ: Z of column end point

R-ColC: C of column end point

R-LayX: X of layer end point

R-LayY: Y of layer end point

R-LayZ: Z of layer end point

R-LayC: C of layer end point

Pay attention: Also need to set original point and layer end point, needn't set the line end point and column end point.

ApprRtret: Includes these parts:

The first data means the current number of reversal palletizing

(1--99)

A-Ap2X: X of approach point 2

A-Ap2Y: Y of approach point 2

A-Ap2Z: Z of approach point 2

A-Ap2C: C of approach point 2

A-Ap1X: X of approach point 1

A-Ap1Y: Y of approach point 1

A-Ap1Z: Z of approach point 1

A-Ap1C: C of approach point 1

A-Rt1X: X of back point 1

A-Rt1Y: Y of back point 1

A-Rt1Z: Z of back point 1

A-Rt1C: C of back point 1

A-Rt2X: X of back point 2

A-Rt2Y: Y of back point 2

A-Rt2Z: Z of back point 2

A-Rt2C: C of back point 2

NumLayout: Includes these parts:

(1--99)
The first data means the current number of reversal palletizing
One by one to arrange every layer which correspond to layout
number.

LayHeight: Includes these parts:

(1--99)
The first data means the current number of reversal palletizing
One by one to arrange every layer height which correspond to layout
number.

This height means from the bottom to this layer, unit:mm

ApRtSpecl: Includes these parts:

The first data is consist of 6 bis number:

The highest 2bits mean the current number of reversal
palletizing (1--99)

The middle 2bits mean the current layer number of reversal
palletizing (1--99)

The lowest 2bits mean the current layer point number of reversal
palletizing (1--99)

A-Ap2X: X of approach point 2;

A-Ap2Y: Y of approach point 2;

A-Ap2Z: Z of approach point 2;

A-Ap2C: C of approach point 2;

A-Ap1X: X of approach point 1;

A-Ap1Y: Y of approach point 1;

A-Ap1Z: Z of approach point 1;

A-Ap1C: C of approach point 1;

A-Rt1X: X of back point 1;

A-Rt1Y: Y of back point 1;

A-Rt1Z: Z of back point 1;

A-Rt1C: C of back point 1;

A-Rt2X: X of back point 2;

A-Rt2Y: Y of back point 2;

A-Rt2Z: Z of back point 2;

A-Rt2C: C of back point 2;

(2) paltlayout.txt save the data of layout(The range is 1--99)。

Includes these parameters:

The number of line, column and 3 characteristic points with regular layout;
Coordinate of each point with irregular.

Pay attention:1. In the same number of layout, it only to be regular or irregular, can't be together in the same number.

2.The teach for regular or irregular layout is from the bottom.

Format:

PalLayout: Regular or irregular

The first data means the current number of reversal palletizing (Regular is marked as with Y, irregular is marked with N) ;

Layout for regular:

P-OrgX: X of the original point ;

P-OrgY: Y of the original point ;

P-OrgZ: Z of the original point ;

P-OrgC: C of the original point ;

P-RowX: X of the line end point ;

P-RowY: Y of the line end point ;

P-RowZ: Z of the line end point ;

P-RowC: C of the line end point ;

P-ColX: X of the column end point ;

P-ColY: Y of the column end point ;

P-ColZ: Z of the column end point ;

P-ColC: C of the column end point ;

P-Rnum: Number of line ;

P-Cnum: Number of column ;

The fixed operation sequence of line and column are RCL with these conditions.

Layout for irregular:

P-***N: Specify the number of every stack, for example:P-002N:

P-012N: P-006N:

Arrange every XYZC coordinate which correspond to every stack one by one.

If there is N in coordinate, it means there is no set for this stack.

(3) palletcurr.txt to save the current status of reversal palletizing(The current stage)

Format:

Palltcode:

The data behind is:

The number;

The times of stack been executed[Start from 0 to count];

The number of the current layer[Start from 0 to count] (If palletizing then count from bottom to top, if reversal palletizing then count from top to bottom);

The current line number [Start from 0 to count] (The meaning of palletizing is the same as reversal palletizing);

The current column number [Start from 0 to count] (The meaning of palletizing is the same as reversal palletizing);

The number of the stack in the current layer [Start from 0 to count].

- ★、 650,DH parameter of robot
- ★、 651,Dialog box 1 of integrated parameter
- ★、 652,Dialog box 2 of integrated parameter
- ★、 653,Dialog box 3 of integrated parameter

It's an example for dialog box of integrated parameter, it's easier to operate and set parameter, the file need to be modified, for example:

BeginIntegraP20005 ; Means start

0,20,80,420,300, please input DH parameter of robot <F1-Clear, F8-Clear to 0> ; Four data mean the dialog l/t/w/h, the behind mean the prompt information of dialog.

4,3,3,280,190,fillpict5.bmp ; File name of picture

1,282,10,60,25,P1: ; The first data means type of control, the 4 data behind mean l/t/w/h, the last mean the macro number or prompt information.

3,330,10,85,25,800,I; Correspond to macro #800, and it is the integer.

1,282,40,60,25,P2:

3,330,40,85,25,802, ; Correspond to macro #802, and it is type of floating point

1,282,70,60,25,P3:

3,330,70,85,25,840,I

1,282,100,60,25,P4:

3,330,100,85,25,850,

1,282,130,60,25,P5:

3,330,130,85,25,6122,

1,200,195,100,25,P6:

3,300,195,90,25,845,

1,200,223,100,25,P7:

3,300,223,90,25,825,

2,30,253,100,26, Make sure

2,240,253,100,26,Cancel

EndIntegraP ; Means the end equipment

Type of control: 0 means the dialog box; 1 means user-defined static text; 2 means user-defined button; 3 means user-defined edit dialog; 4 means picture;8 means

user-defined static text with small letters; 5 means static text of MiniGUI; 6 means the button of MiniGUI; 7 means the edition box of MiniGUI.[Pay attention: Useless when type of control is 5,6,7].

The file name of picture:fillpict1, fillpict2, fillpict3 and must be 16 colors(4bits) or 256 colors(8bits) or 16 bits or 24bits bmp picture.

Pay attention: Try to use 16 colors(4bits) or 256 colors(8bits) to save the memory.

3.8.5 Other parameter

★、 1,Filter constant of input signal

[+256+512+1024 correspond to X0-X7, the filter is 2/4/8ms, +2048+4096+8192 correspond to the filter 2/4/8ms of other signal]

Filter for input points, for example: input 256 correspond to X0-X7 filter 2ms,input 2304 correspond to all input point filter 2ms.

★、 2,The band switch of feeding axis[1 means yes, no means no]

Reserve, this controller must set as 0.

★、 3,The band switch of spindle[1 means yes, no means no]

Reserve, this controller must set as 0.

★、 4,The type of handwheel[1 means held,0 means panel]

Reserve, this controller must set as 0.

★、 5、 Lubrication automatically

0 means effective, 1 means invalid

Pay attention: This is set by the running time

★、 6、 The time of lubrication(10ms)

M32 to keep the effective time.Unit: 10ms.

★、 7、 The interval time of lubrication(s)

★、 8,Detection of door switch(M12)[0 means not detect,1 means detect]

Pay attention:1. M12 to realize the function.

2. After setting as detect, when M12 is effective, coordinate could move in teach function, but program will be pause in PLAY.

★、 9,Door switch[0 means always open, 1 means always close]

★、 10, Bit parameter

D1=1 clear to 0; D2=1 space ; D5=0 close spindle; D6 speed; D8=1 save M10 when power on; D10=1 arrange; D12=1 skip is invalid; D13=1 back to 0 is invalid

The format: D15D14.....D1D0。

D0 bit: Default as 1, can't change.

D1 bit: Set as 1 means the number of workpiece clear automatically when power on, set as 0 means keep.

D2 bit: Set as 1 means insert space into letters automatically when editing the program, set as 0 mean not insert.

D3 bit: Default as 0, can't change.

D4 bit: Default as 0, can't change.

D5 bit: Set as 1 means not stop spindle rotation and cooling when pressing RESET, 0 means stop, default is 0.

D6 bit: Set as 1 means each axis work according to own speed, work with nonlinear trajectory, 0 means linkage, reach at the same time. Default is 1.

D7 bit: Default as 0, can't change.

D8 bit: Set as 1 means save the status M10/M11 of spindle loose or tight when power off, recover this status when power on again. Set as 0 means spindle will be tight automatically when power on. Default is 1.

D9 bit: Default as 1, can't change.

D10 bit: Set as 1 means the number of line is arranged automatically when programming.

D11 bit: Set as 1, the output analog of the first spindle is the same time from the first, second spindle channel, the function of the second spindle is valid.

D12 bit: Set as 1, shield the skip function, “/” in front of the segment means invalid.

D13 bit: Default as 0, can't change.

D14 bit: Default as 0, can't change.

D15 bit: Set as 1, the tool set show the relative value, otherwise it shows the absolute value.

Pay attention: This parameter includes the bit which can't be changed, if change this bit, it will cause some problem with controller.

★、 11, The incremental value of editing number

★、 12, The operation mode of delete [0 means delete the behind, 1 means delete the in front]

★、 13,Teach mode[0 means MOVJ/MOVL/MOVC,1 means G0/G1/G6]

★、 14,Back function of running program[+8 means the handwheel, +32 means the back button of panel]

★、 15,The inner parameter of power on[6 means automatically,7 means press, 8 means allow import,9 means clear]

If input PALLET, then delete the reversal palletizing file palletbase.txt 、 paltlayout.txt、 palletcurr.txt.

★、 16,Emergency alarm[0 means always open,1 means always close]

Set the input point X209.

★、 17,Lubrication alarm[0 means always open,1 means always close]

Set the input point X09.

★、 18,Output of running(M69 runs,M65 stop)[0 means invalid,1 means valid]

Pay attention: This signal could be the status of robot according to the equipment of robot.

★、 19,Alarm output(M67)[0 means invalid, 1 means valid]

Pay attention: This signal could be the status or protection of robot according to the equipment of robot.

★、 20,The brake time of spindle(10ms)

The time of M05, the less time the faster to brake, the longer time the slow to brake.Unit:10ms.

★、 21,Long signal of spindle brake[0 means long signal, 1 means short signal]

★、 22,The interlock between spindle rotation and chuck[1 means Yes,0 means No]

Consider for safety, set as 1 will be safer.

★、 23,The brake of motor is work or not[1 means check the X40 when motor with brake, 0 means without brake]

If without brake, then set as 0(X40 could be used for other function); If set as 1,then motor with brake, controller check the X40 signal, it means the circuit is normal, otherwise there is some problems, please check the problem and solve.

★、 30,Language of controller[1 means Chinese, 0 means English]

★、 31,Logical of robot I/O[1 means start,0 means stop]

Set the status of inner PLC, 1 means start(100ms), 0 means stop, the total of PLC is 8000 steps at the most.

Pay attention: This parameter usually be test parameter, set as 1 in actual use, otherwise the motion of robot could be wrong.

★、 32,Logical of robot high speed I/O[0 means stop, 18 means start with high speed, 28 means super speed]

Super speed means 2ms, high speed means 8ms.

Pay attention: This parameter usually be test parameter, set as 1 in actual use, otherwise the motion of robot could be wrong.

★、 35,Soft limit is effective in teach when no back to zero[1 means Yes,0 means No]

Pay attention:The set of parameter is relative with safety operation.

★、 36,Time[Year-Month-Day-Hour-Minute]

For example: June 6,2016 6: 06 AM, then input 2016-06-06-06-06

★、 37,Communication speed of serial port

Baud rate : 0=7200; 1=9600; 2=14400; 3=19200; 4=38400; 5=57600; 6=115200

注： 1、 The bigger, the faster, but more unstable.

2、 The baud rate of each side of communication must be the same.

★ 、 39, 40, Special parameter

★、 41,Backup the current parameter

Pay attention: Press this parameter twice to backup.

★、 42,Restore the parameter which is backup

Pay attention: The parameter will be recover after set this parameter.

★、 200-204,The error of J1-J6/Xs/Ys axis between feedback pulse and running pulse, alarm when pulse is [>1]

Bigger than 1 is valid. Press “G” to clear the feedback position ,clear position, clear the alarm.

★、 205-209,The tracking error of J1-J6/Xs/Ys alarm(pulse)[>1]
Bigger than 1 is valid.

★、 210-214,Numerator of electrical gear of J1-J6/Xs/Ys
For example: Screw pitch is 6mm, encoder is 2500 rate, then input:
L6000M2500.

Special attention:

1)、 **First need to input electrical numerator and denominator of each axis according to LxxxxMxxxx mode;**

2)、 **Read the encoder data through the serial port must according to this mode.**

3)、 **This controller set as 10000**

★、 215-219,Denominator of electrical gear of J1-J6/Xs/Ys

★、 300-303,Feeding axis with or without absolute motor
[J1-D2,J2-D3,J3-D4,J4-D5,J5-D6,J6-D7,Xs-D8,Ys-D9,0 means No, 1 means Yes]

Special attention:

The communication address:1-8 correspond to J1-J6/Xs/Ys axis.

★、 304-308,The number of each circle of absolute encoder of J1-J6/Xs/Ys axis
When it is absolute motor, set it as 131072.

★、 309-313,The length correspond to each circle of absolute encoder in J1-J6/Xs/Ys axis(nm)

★、 314-318,The offset of absolute encoder of J1-J6/Xs/Ys axis[Input E to clear]

★、 319,The current/speed/torque of absolute driver(284/283/435)
Press “F3” in main interface to show the load of driver.

★、 320-324,The electrical reduce ratio of J1-J6/Xs/Ys axis
For example: The reduce ratio of J1 is 121, then No.320=121.

★、 330,Function of controller and interface(11 means weld;12 means palletizing;13 means painting)

★、 351-366, The link rod of robot parameter1-16(um)

★、 367,Reversal calculate the inner coordinate of robot(+4;+8;+16:32;+64;+128)
D2=1 then +4 reversal calculate coordinate of J1 ; D3=1 then +8 reversal calculate coordinate of J2; D4=1 then +16 reversal calculate coordinate of J3; D5=1 then +32 reversal calculate coordinate of J4 ; D6=1 then +64 reversal calculate coordinate of J5; D7=1 then +128 reversal calculate coordinate of J6.

★、 368-373,The inner calculate offset of robot J1-J6 coordinate(1/1000 degree)

★、 374,The coordinate of robot J1-J6 reduction(+4;+8;+16:32;+64;+128)
D2=1 then +4 correspond to J1 to reduction; D3=1 then +8 correspond to J2 to reduction; D4=1 then +16 correspond to J3 to reduction; D5=1 then +32 correspond to J4 to reduction; D6=1 then +64 correspond to J5 to reduction; D7=1 then +128 correspond to J6 to reduction.

★、 375-385,Coupling function of robot(+4 means J1J2; +8 means J3J4; +16 means J4J5; +32 means J5J6; +64 means J4J6)

D2=1 then +4 means J1J2 coupling , P376,P377 is the numerator and denominator;

D3=1 then +8 means J3J4 coupling , P378,P379 is the numerator and denominator;

D4=1 then +16 means J4J5 coupling , P380,P381 is the numerator and denominator;

D5=1 then +32 means J5J6 coupling , P382,P383 is the numerator and denominator;

D6=1 then +64 means J4J6 coupling , P384,P385 is the numerator and denominator;

★、 451,Controlling mode of robot(100--9999)

0 means the standard CNC controller, could control the feeding and unloading, also could be held milling controller.

262: Means 2 axis SCARA;

363: Means 3 axis SCARA;

440: Means 4 axis rotating joint non parallelogram robot;

441: Means 4 axis rotating joint parallelogram robot;

442: Means 4 axis palletizing parallelogram robot, the same as RMD of GSK;

464: Means 4 axis SCARA;

480: Means 4 axis Delta;

565: Means 5 axis SCARA;

600: Means 6 axis serial joint robot;

601: Means 6 axis parallelogram robot;

666: Means 6 axis SCARA;

2600: Means 8 axis serial joint robot;

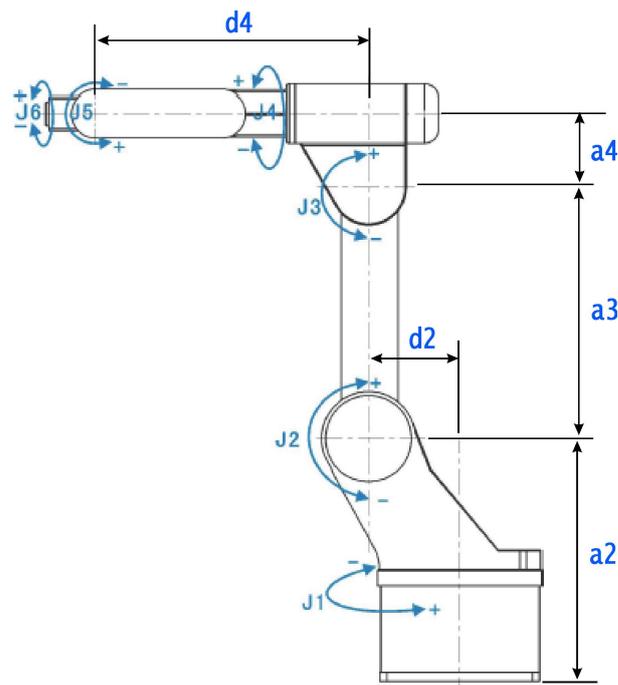
2601: Means 8 axis parallelogram robot;

★、460, Calibration robot

The zero point need very high accuracy, otherwise the error is big, need very precise to make the right zero point, this is the regular method, it is the best to use professional equipment to measure.

★、461-482 Connecting rod and the error compensation.

(1) Connecting rod of six degree of freedom joint and the error compensation



Six axis serial joint robot(No.451=600 or 2600)

Pay attention: 2 needn't to be set, e2 be set as 0

★、351, The error compensation of link rod parameter1(um)a2

★、352, The error compensation of link rod parameter2(um)a3

★、353, The error compensation of link rod parameter3(um)a4

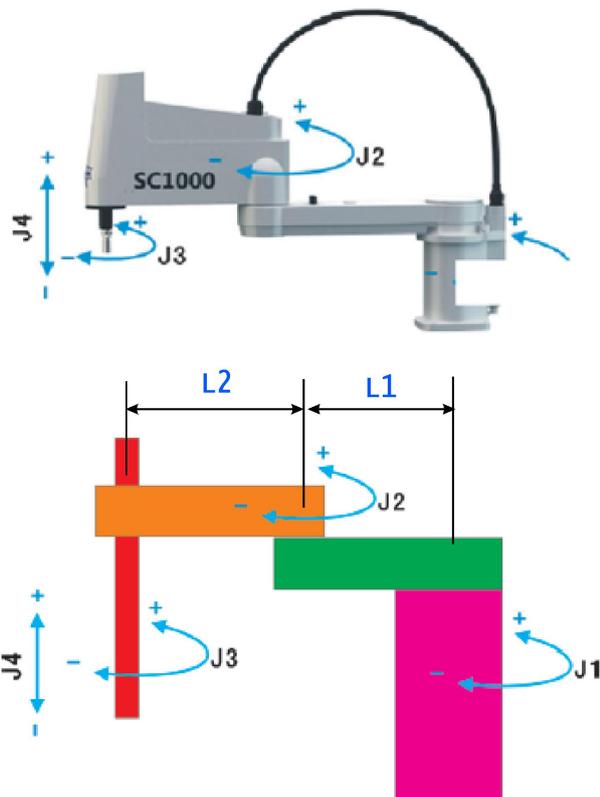
★、354, The error compensation of link rod parameter4(um)d2

★、355, The error compensation of link rod parameter5(um)d4

★、356, The error compensation of link rod parameter6(um)e2

- ★、 461, The error compensation of No.351(nm)a2
- ★、 462,The error compensation of No.352(nm)a3
- ★、 463,The error compensation of No.353(nm)a4
- ★、 464,The error compensation of No.354(nm)d2
- ★、 465,The error compensation of No.355(nm)d4
- ★、 466,The error compensation of No.356(nm)e2

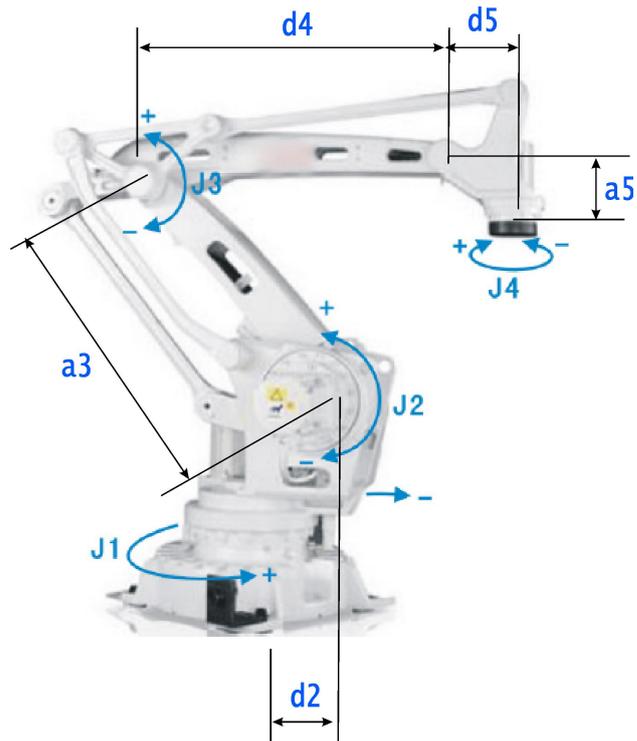
(2)Connecting rod of four degree of freedom SCARA and the error compensation



Four axis SCARA robot(P451=464)

- ★、 351, The connecting rod parameter 1(um)L1
- ★、 352, The connecting rod parameter 2(um)L2
- ★、 461, The error compensation of No.351(nm)L1
- ★、 462, The error compensation of No.352(nm)L2

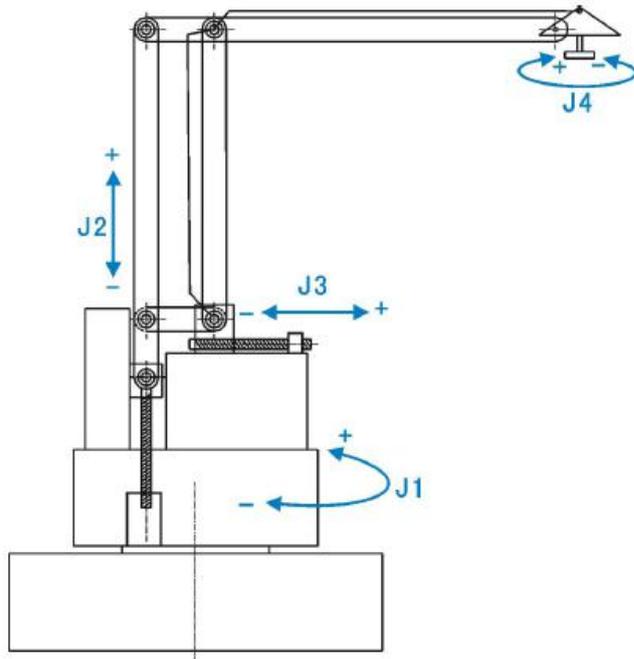
(3) Connecting rod of four degree of freedom rotation joint palletizing and the error compensation



Four axis rotation joint palletizing robot(P451=441)

- ★、 352, The connecting rod parameter 2(um)a3
- ★、 354, The connecting rod parameter 4(um)d2
- ★、 355, The connecting rod parameter 5(um)d4
- ★、 357, The connecting rod parameter 7(um)a5
- ★、 358, The connecting rod parameter 8(um)d5
- ★、 462, The error compensation of No.352(nm)a3
- ★、 464, The error compensation of No.354(nm)d2
- ★、 465, The error compensation of No.355(nm)d4
- ★、 467, The error compensation of No.357(nm)a5
- ★、 468, The error compensation of No.358(nm)d5

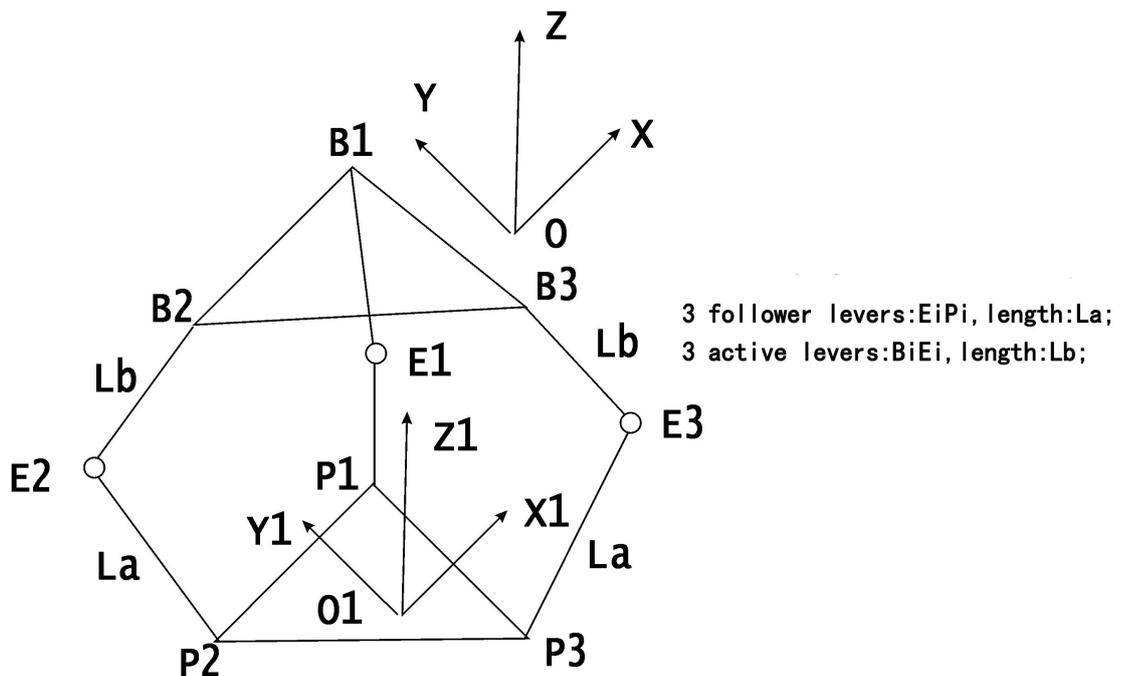
(4) Four axis connecting rod of palletizing parallelogram robot and the error compensation



Four axis connecting rod of palletizing parallelogram robot (P451=442)

- ★、 351, The connecting rod parameter 1(um)L1
- ★、 352, The connecting rod parameter 2(um)LEF
- ★、 353, The connecting rod parameter 3(um)LDE
- ★、 461, The error compensation of No.351(nm)L1
- ★、 462, The error compensation of No.352(nm)LEF
- ★、 463, The error compensation of No.353(nm)LDE

(5) Four degree of freedom Delta and the error compensation



Four axis Delta(P451=480)

La means the length of follower lever, Lb means the length of active lever;

Rmax means the size of static platform(The centre of static platform to the vertex of equilateral triangle in static platform);

Rmin means the size of moving platform(The centre of moving platform to the vertex of equilateral triangle in moving platform).

- ★、 351, The connecting rod parameter 1(um)La
- ★、 352, The connecting rod parameter 2(um)Lb
- ★、 354, The connecting rod parameter 4(um)Rmax
- ★、 355, The connecting rod parameter 5(um)rmin
- ★、 461, The error compensation of No.351(nm)La
- ★、 462, The error compensation of No.352(nm)Lb
- ★、 464, The error compensation of No.354(nm)Rmax
- ★、 465, The error compensation of No.355(nm)rmin

(6) The error compensation of each joint

- ★、 477, The error compensation of robot J1 joint(1/1000000 degree)
- ★、 478, The error compensation of robot J2 joint(1/1000000 degree)
- ★、 479, The error compensation of robot J3 joint(1/1000000 degree)
- ★、 480, The error compensation of robot J4 joint(1/1000000 degree)
- ★、 481, The error compensation of robot J5 joint(1/1000000 degree)
- ★、 482, The error compensation of robot J6 joint(1/1000000 degree)
- ★、 489,Set coordinate system of positioner
- ★、 490,Set the Xs world coordinate of positioner P3P4P5 point(um)
- ★、 491,X position of positioner(um)
- ★、 492,Y position of positioner(um)
- ★、 493,Z position of positioner(um)
- ★、 494,A position of positioner(degree)
- ★、 495,B position of positioner(degree)
- ★、 496,C position of positioner(degree)
- ★、 497,Reversal calculate the coordinate of positioner(Xs+6;Ys+8)

No.489 to set the coordinate, set as 3 with single positioner, set as 5 with double positioner to generate No.490-No.496.



Press “Start” in the setting process, the status will show “O”, and press “12345” to back to the last setting point with the current joint speed in manual, so that modify easier. Press “Start” to open or close this function, after finish once, this function will close automaticall.

After setting, use M601 or M602 to use the function of positioner, rotate XS axis to see it is the same as the move direction of robot or not, if not the same, then reversal calculate $+6(D1, D2=1)$. Use M602 to rotate YS axis to see it is the same as the move direction of robot or not, if not the same, then reversal calculate $+8(D3=1)$.

Pay attention: If there are 2 positioners, XS and YS should be vertical intersection, YS should be rotation axis, XS should be trip axis.

★、500,Internet[0 means close, 1 means open, 8 means open automatically]

★、501,IP address of gateway

Set as you want, it is the best to set 3 numbers in front to be the same, for example: 192.168.1.1.

★、502,IP address

It is the best to set 3 numbers in front to be the same, for example: 192.168.1.103

★、503,MAC address

Make sure every piece should be different, for example:255:255:255:1

★、 504,IP address of internet service

The IP address of computer, it is the best to set 3 numbers in front to be the same, for example: 192.168.1.13

★、 601,One key to set stepper type

★、 602,One key to set servo type

★、 903,Inner parameter[2start function of SD card]

★、 904,The number of controller

★、 905,The number of robot

★、 906,The number of user-defined

3.8.6 Coordinate system

6 user coordinate system and 1 world coordinate system G53. 1 program could be set 1 user coordinate system, also could set multi user coordinate system, could move its original point to change.

Use G54 to G59 could set 54 coordinate system (G54 -G59、 G54.1-G54.48, could set the original point of 54 user coordinate system in interface of setting coordinate system.

★、 1-0,The current group of user coordinate system[G54-G59]

★、 1-1/1-9, X of user coordinate system G54-G59(mm)[Input incremental, E means absolute]

★、 2-0,The current group of user coordinate system[G54.1-G54.48]

★、 2-1,X of user coordinate system G54.1-G54.48(mm)[Input incremental, E means absolute]

★、 1-8,XYZABCXsYs of user coordinate system G54(mm)[Input incremental, E means absolute]

★、 11-18,XYZABCXsYs of user coordinate system G55(mm)[Input incremental, E

means absolute]

★、 21-28,XYZABCXsYs of user coordinate system G56(mm)[Input incremental, E means absolute]

★、 31-38,XYZABCXsYs of user coordinate system G57(mm)[Input incremental, E means absolute]

★、 41-48,XYZABCXsYs of user coordinate system G58(mm)[Input incremental, E means absolute]

★、 51-58,XYZABCXsYs of user coordinate system G59(mm)[Input incremental, E means absolute]

★、 61-151,XYZABCXsYs of user coordinate system G54.1-G54.10(mm)[Input incremental, E means absolute]

Operation:

1、 Build the user coordinate system

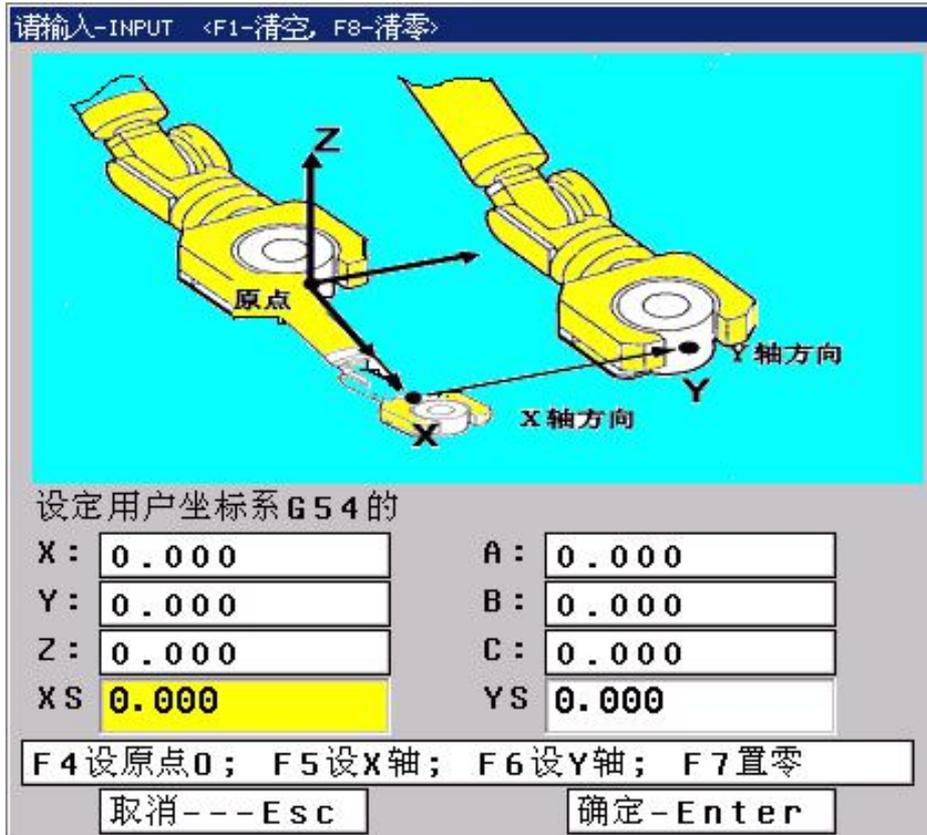
Usually in status of teach:

(a) Press “F8” or “F5” to choose the corresponding user coordinate system(G54-G59).

(b) Move coordinate to the fixed position(so that to measure the position), measure the point to the position of zero point in user coordinate system

(c) Press “F7” ,set P1P2P3 points(correspond to F4F5F6).

3-points: P1 is original point, P2 is the direction of +X, P3 is the direction of +Y.



2、Offset of user coordinate system

If still need adjust after setting:

Choose the corresponding axis in interface of coordinate system, press enter, input the offset(incremental, example:offset 10mm negative, then input -10), input E and absolute offset. Press enter to adjust.

Note:

- 1、 After modifying the parameter, refresh the coordinate system.
- 2、 The value in brackets is the offset so that operator to check and adjust.

3.8.7 Code

In case of the parameter can't be modified, the controller adopt the authority code.Including "CNC" "Machine" "User", "CNC" arrange inner parameter; "Machine" arrange the equipment and electrical parameter of robot; "User" arrange the technique, function and working.

If want to use this function, need use initial code to open, and set the new code, the initial code will be invalid when setting the new code, must remember the code.

★、 1, The protection of "CNC"

★、 2, The protection of "Machine"

The initial code is "NEWNEW".

★、 3, The protection of “User”

The initial code is “KERKER”.

★、 4, Change the code of “CNC”

★、 5, Change the code of “Machine”

★、 6, Change the code of “User”

★、 7, Using time of controller

★、 8, Version of software

3.9 Parameter of tool set

Press “Page” to enter interface of tool set in any interface, including “Radius compensation” “Length” “Clear all value” “Clear current value” “Set tool” “Posit tool” “Set”, total 7 functions, correspond to press “F1-F7” to enter corresponding interface, press “Esc” to back the primary menu interface.

3.9.1 Radius compensation

Press “F1 radius compensation” in interface of tool set. Set the radius of tool, it’s compensation of CNC controller.

Method: Press “↑ ↓” to make cursor move to the corresponding tool and press “Enter” to popup a dialog box, import corresponding tool radius(Absolute value), press “Enter” at last.

3.9.2 Length of redeem

Press “F2” to enter length of redeem interface. The parameter is used to modify the length which is adopt or reset the length.

示教 连续 N00000 关节坐标 2016-06-08 00:20

对刀基准设置情况: No

T01	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T02	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T03	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T04	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T05	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T06	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T07	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T08	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T09	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T10	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T11	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T12	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0
T13	X: 0.000	Y: 0.000	Z: 0.000	A: 0.0

当前程序 MILL

指令代码
G54
T00 D0

状态
M05 M09 M10 不选停
M78 M33 M70 跳段

MOVJ X100%
V20.0 X110%
A1000 V1000

世界坐标
X 243.544 A 177.931
Y -296.886 B -5.242
Z 986.774 C -51.536
XS -33.401 YS 72.978

单件时间 0:0
焊接件数 400
码盘反馈 0

状态: 正常

F1 半径补偿 F2 长度补偿 F3 全部清零 F4 当前清零 F5 对刀 F6 刀套表 F7 设置 F8 返回

请输入-INPUT <F1-清空, F8-清零>

输入工具号01的位置和姿态:

X: 9.000 A: 0.000
Y: 0.000 B: 0.000
Z: 0.000 C: 0.000

取消---Esc 确定-Enter

Initialize the tool radius and the method of length compensation:

3.9.3 Tool set(Redeem)

To build and set the tool coordinate system.

Two methods of setting coordinate system of 6 freedom angle robot: 3-points and 5-points.

(A) 3-points: P1P2P3 to change the different posture of robot, the tool posit TPC point should be kept the same position, the posture in 3-points is the same as the posture of electrical connection.(The sixth flange coordinate of electrical wrist).

(B) 5-points: P1P2P3 is the same as 3-points, but the posture of 5-points need P3P4P5 to make sure.P3 means the original position of tool coordinate posture, P4 means direction of +X tool coordinate posture, P5 means direction of +Z tool coordinate posture.

Press "Start" in the set process, the statues will show "O", then press "12345" to adjust the speed to back to the point set the last time, easy to modify. After once

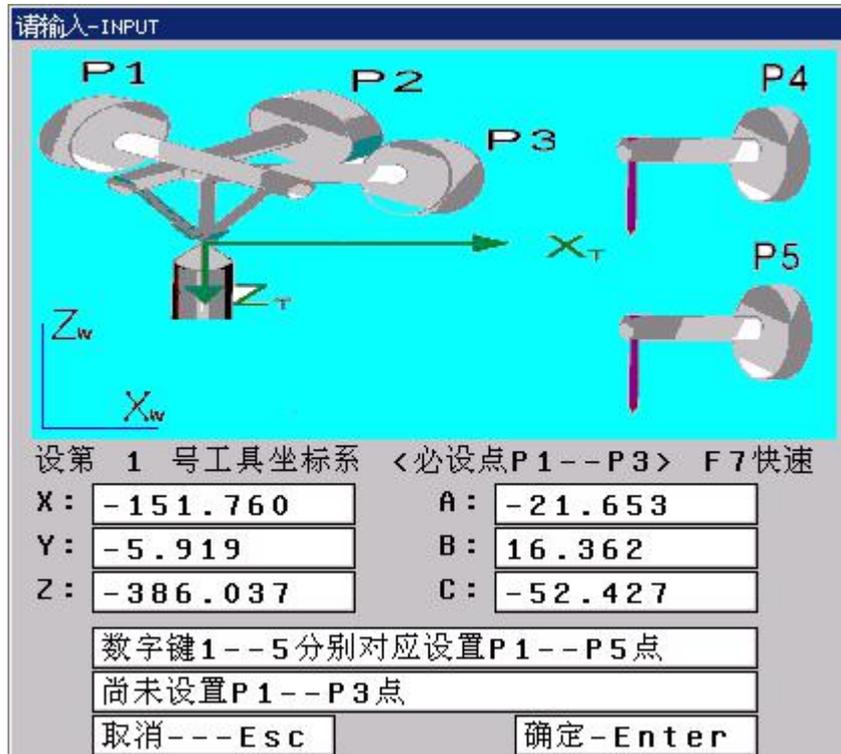
operation, this function will be closed automatically.

The posture of P3P4P5 in 5-points need to be the same(Value of ABC in world coordinate should be the same) [The interface need without N letter].

After input P1P2P3 3 points in tool set, the controller will calculate the position and posture of tool coordinate in world coordinate, if 3 points is too near, then it can't be exist P1P2P3, the controller can't calculate the value, it will delete P2P3 automatically.

XYZ of tool set mean the original point of tool coordinate in world coordinate, ABC mean the 3 axis posture in space(position and direction) of tool coordinate in world coordinate.

Pay attention:P1P2P3 in 3-points need be different posture;But the tool posture of P3P4P5 in 5-points need to be on the same straight line(It is fine if it isn't straight line, just the direction of Z axis in tool coordinate is not on the same straight line with weld gun)



3.9.4 Table for tool-case

Press “F6” in redeem interface. To set the tool-case type when radius of tool is compensating.

Method: Press “↑”“↓” to chose the number of tool and press “Enter”, input the type of tool-case will be fine.

Press “F1” to initialize the tool-case type of all tool.

3.9.5 Set the number of tool

Press “F7” in redeem interface, could set as 99 tools in the most.

3.10 Diagnosis

Press “Page” again to enter this interface.

Could check all input, output and alarm.

1 means effective, 0 means invalid.

示教 连续		N00000								关节坐标	2016-06-08 00:20							
输入点										当前程序	MILL							
0	0	0	0	0	0	0	0	0	0	指令代码	G54							
X00	X01	X02	X03	X04	X05	X06	X07				T00 D0							
引弧检测	变频报警			冷却报警						状态								
0	0	0	0	0	0	0	0	0	0	M05	M09	M10	不选停					
X08	X09	X10	X11	X12	X13	X14	X15			M78	M33	M70	跳段					
	润滑油报警									MOVJ	X100%							
0	0	0	0	0	0	0	0	0	0	V20.0	X110%							
X16	X17	X18	X19	X20	X21	X22	X23			A1000	V1000							
				ALM	ALM1	ALM2	ALM3			世界坐标								
0	0	0	0	0	0	0	0	0	0	X	243.544	A	177.931					
X24	X25	X26	X27	X28	X29	X30	X31			Y	-296.886	B	-5.242					
KHALT	KRUN	M24	M22	M18	M12	M14	M16			Z	986.774	C	-51.536					
0	0	0	0	0	0	0	0	0	0	XS	-33.401	YS	72.978					
X32	X33	X34	X35	X36	X37	X38	X39			单件时间	0:0							
1	0	0	0	0	0	0	0	0	0	焊接件数	400							
X40	X41	X42	X43	X44	X45	X46	X47			码盘反馈	0							
松闸到位										状态: 正常								
<table border="1"> <tr> <td></td> <td>F2 I/O</td> <td>F3 梯图状态</td> <td>F4 报警</td> <td>F5 梯图编辑</td> <td>F6 复位驱动</td> <td></td> <td>F8 返回</td> </tr> </table>												F2 I/O	F3 梯图状态	F4 报警	F5 梯图编辑	F6 复位驱动		F8 返回
	F2 I/O	F3 梯图状态	F4 报警	F5 梯图编辑	F6 复位驱动		F8 返回											

示教 连续		N00000								关节坐标	2016-06-08 00:21							
输入点二										当前程序	MILL							
0	0	0	0	0	0	0	0	0	0	指令代码	G54							
X48	X49	X50	X51	X52	X53	X54	X55				T00 D0							
1	0	0	0	0	0	0	0	0	0	状态								
X56	X57	X58	X59	X60	X61	X62	X63			M05	M09	M10	不选停					
										M78	M33	M70	跳段					
1	1	1	1	1	1	1	1	1	1	MOVJ	X100%							
X64	X65	X66	X67	X68	X69	X70	X71			V20.0	X110%							
VDK0	VDK1	VDK2	VDK3	VDS0	VDS1	VDS2	VDS3			A1000	V1000							
0	1	1	1	1	1	1	1	1	1	世界坐标								
X72	X73	X74	X75	X76	X77	X78	X79			X	243.544	A	177.931					
										Y	-296.886	B	-5.242					
1	1	1	1	1	1	1	1	1	1	Z	986.774	C	-51.536					
X200	X201	X202	X203	X204	X205	X206	X207			XS	-33.401	YS	72.978					
										单件时间	0:0							
0	1	1	0	0	0	0	0	1	1	焊接件数	400							
X208	X209	X210	X211	X212	X213	X214	X215			码盘反馈	0							
										状态: 正常								
<table border="1"> <tr> <td></td> <td>F2 I/O</td> <td>F3 梯图状态</td> <td>F4 报警</td> <td>F5 梯图编辑</td> <td>F6 复位驱动</td> <td></td> <td>F8 返回</td> </tr> </table>												F2 I/O	F3 梯图状态	F4 报警	F5 梯图编辑	F6 复位驱动		F8 返回
	F2 I/O	F3 梯图状态	F4 报警	F5 梯图编辑	F6 复位驱动		F8 返回											

示教 连续 N00000 关节坐标 2016-06-08 00:21

0	0	0	0	0	1	0	0
Y00	Y01	Y02	Y03	Y04	Y05	Y06	Y07
M61	M63	M65	M67	M69	松闸使能	M73	M59
0	0	0	0	0	0	0	0
Y08	Y09	Y10	Y11	Y12	Y13	Y14	Y15
M32	M79	M10	M08	M05	M04	M03	M75
0	0	0	0	0	0	0	0
Y16	Y17	Y18	Y19	Y20	Y21	Y22	Y23
M71							
0	0	0	0	0	0	0	0
Y24	Y25	Y26	Y27	Y28	Y29	Y30	Y31

当前程序 MILL
指令代码 G54
T00 D0

状态
M05 M09 M10 不选停
M78 M33 M70 跳段

MOVJ X100%
V20.0 X110%
A1000 V1000

世界坐标
X 243.544 A 177.931
Y -296.886 B -5.242
Z 986.774 C -51.536
XS -33.401 YS 72.978

单件时间 0:0
焊接件数 400
码盘反馈 0

状态: 正常

F2 I/O F3 梯图状态 F4 报警 F5 梯图编辑 F6 复位驱动 F8 返回

Alarm information interface

The first line in this interface shows the number of spindle encoder, the number of current and historical alarm information is record total 10, the superfluous part is clear automatically, only shows 10 alarm information recently.

示教 连续 N00000 关节坐标 2016-06-08 01:14

清除历史报警按C键, 刷新报警信息按R键

主轴编码器线数检测: 0 [第1编码器]

1, [当前报警]: 无

2, [2016-6-7 10:15]: 紧急停止

X	Y	Z	U	V	W
I	J	K	A	B	C
G	M	F	N	D	H
R	S	T	O	P	Q
E	L	符号	1	2	3
退格	删除	空格	4	5	6
起始	向上	结束	7	8	9
上页		下页	-	0	.
向左	向下	向右	切换	取消	确定
			隐藏		

状态: 正常 码盘反馈 0

F2 I/O F3 梯图状态 F4 报警 F5 梯图编辑 F6 复位驱动 F8 返回

Check and edit PLC

Press "F3" to check PLC, "F5" to edit, "S" to search. After finishing edit, please

restart the controller.

The screenshot displays a CNC control interface. On the left, a ladder logic diagram shows various components: M04 (紧急停车), M999 (0000), M04 (0001), M44 (冷却过载, 0002), M47 (润滑缺油, 0003), M39 (主轴报警, 0004), T13 (K1800, 0005), T13 (定时器, 0006), T02 (定时器, 0007), and M51 (润滑, 0008). Below the diagram is the text 'R---重载梯形图'. On the right, a keypad contains the following keys:

X	Y	Z	U	V	W
I	J	K	A	B	C
G	M	F	N	D	H
R	S	T	O	P	Q
E	L	符号	1	2	3
退格	删除	空格	4	5	6
起始	向上	结束	7	8	9
上页	向下	下页	-	0	.
向左	向右	切换	取消	确定	
		隐藏			

At the bottom, the status bar shows '状态: 正常' and '码盘反馈 0'. Below the status bar are function keys: F2 I/O, F3 梯形状态, F4 报警, F5 梯形编辑, F6 复位驱动, and F8 返回.

3.11 Operation of program

Press “Page” to choose the program.

Program management is the same as file management, the storage of the system is 128M(The max could be expand to 32G) bits to contain program and there is no limit for quantity of program. Programming adopts full screen operation.



Center part of screen for program display, current program is showed by reverse display, press “PgUp”、 “PgDn” to choose program, and then press“Enter”to edit current program. Functional keys“F1、 F2、 F3、 F4、 F5、 F6、 F7、 F8” include: “new file/search”、 “copy”、 “rename”、 “information”、 “last grade”“USB disc”、 “execute program”、 “cancel”.

3.11.1 Editing

Select “New file/search” to popup a dialog box to import the name of program, if the name is existent, the quondam program is called up; If the name is inexistent, the system will build a new file.

The name of program can be number, letter or mix, the length is 100 bits.

The system doesn’t allow the namesake, build a new program or select a program and press “Enter” to enter the editing interface.



The screen prompts the editing program name at the top left corner in the editing status; The left is the content, the right is the information for lathe status, the operation in the editing status as follows:

(1) The current cursor locate:

Press “↑ ↓ ← →” to move the cursor to any position of program content

Press "Pgup" to the last page.

Press "Pgdn" to the next page.

(2) Character modification: Delete the character at the position of the cursor, then enter the new character.

(3) The character insertion: Enter a new direct character at the cursor position. When the input is the letter, the letter in front of automatically generating space. If you want to enter a space, first enter a letter, and then delete this letter.

(4) The character deletion: Press "Del" directly at the cursor position

(5) Insert the line: Press "Enter" directly, insert a line in front of the current line if the cursor is at the first line, otherwise insert a line after the current line.

(6)“F7>>”The next page:

The first page of function:

A、“F1”: Compile the current program.

B、“F2”: To the first line or the last line of program.

C、“F3”: Teach function, could press “F2/F4/F5” to record the current user coordinate of XYZABCXsYs.

No.13 parameter in other parameter to set the mode of teach: 1 is generate MOVJ/MOVL/MOVC instruction; Another is generate G0/G1/G6 instruction.

F2: When in the first line, press this mean this line is the first line of PLAY,

otherwise it will generate MOVJ or G0 instruction.

F3: Teach, be used for open and close the teach function.

F4: Record the end point, be used for record the end point of straight line interpolation and arc interpolation, generate MOVL/MOVC instruction or G1/G6.

F5: The centre of arc, record the centre point of arc, after pressing this button, it will shows MOVC..... or G6 I**J**K** , to prompt user the next end point position of arc.

Pay attention:

(1) If use MOVJ/MOVL/MOVC instruction, press “F2” or “F4” to input VJ=or V= or PL=, press enter to not input.

(2) The beginning of program must use MOVJ or G0,otherwise if the starting point is not the same, the trajectory will be different.

Steps:

(1) Press “F3” to open teach function;

(2) Press “F2”;

(3) Move to the starting point, Press “F2”;

(4) Move to the next point according to the trajectory and requirement:

A) Rapid instruction: Press “F2” to input the rapid ratio and position level. It will generate rapid instruction MOVJ.

请输入 <F1-清空, F8-清零>

快速倍率和位置等级 [不需要则不输入] :

VJ= 80

PL=

确定 -Enter 取消 ---Esc

B) Straight line instruction: Press “F4” to input feeding speed, position level and position point, to generate straight line instruction MOVL.

请输入 <F1-清空, F8-清零>

进给速度和位置等级和位置点 [不需要则不输入] :

v= 200

PL=

位置点号 PT 1

确定 -Enter 取消 ---Esc

C) Arc instruction: Press “F5” to record the centre of arc, move to the end point

of arc, press “F4” to input feeding speed, position level and position point, it will generate arc line instruction MOVJ.

For example:

The screenshot shows a CNC control interface. At the top, there's a status bar with '示教 连续' (Teach Continuous), 'N00000', '用户坐标' (User Coordinate), and '2016-06-08 03:45'. Below this is a program editor window titled '编辑程序: /NC/XX' containing the following code:

```
G54 T0
MOVJ
MOVL
MOVJ V=300.0 :PT2
```

The editor shows '第5行 / 共5行' (Line 5 of 5). To the right is a keypad with the following layout:

X	Y	Z	U	V	W
I	J	K	A	B	C
G	M	F	N	D	H
R	S	T	O	P	Q
E	L	符号	1	2	3
退格	删除	空格	4	5	6
起始	向上	结束	7	8	9
上页		下页	-	0	.
向左	向下	向右	切换	取消	确定
			隐藏		

At the bottom, there's a status bar with '状态: 正常' (Status: Normal) and '码盘反馈 0' (Encoder Feedback 0). A function key bar at the very bottom includes: F1 编译, F2 开头/快速, F3 示教, F4 记录终点, F5 圆弧中点, F6 行删除, F7 >>, F8 中文.

D、“F4”：Locate to the specified line.

E、“F5”：To input

The screenshot shows a dialog box titled '请输入 <F1-清空, F8-清零>' (Please input <F1-Clear, F8-Reset>). The main text says '请输入指令对应的序号' (Please input the sequence number corresponding to the instruction). Below this, there are several options:

- 3-开启平移SN; 4-关闭平移功能SF
- 5-弧焊开始AS; 6-弧焊结束AE; 7-摆焊开始WS; 8-摆焊结束WE

At the bottom, there's a label '指令' (Instruction) next to a yellow input field containing the number '3'. Below the input field are two buttons: '确定--Enter' (Confirm--Enter) and '取消--Esc' (Cancel--Esc).

(1) Input 3 to use translation instruction SN*, * means the number of group it will use in technique parameter 0-99. It can be checked and modify by No.501-No.506 technique parameter.

SN*,SF instruction can let robot generate translation motion, be used in palletizing and flitting, could make programme easier.

(2) Input “4” to close the translation function SF.

(3) Input “5” to execute instruction AS*,execute the corresponding program ProgramUser0 (User could edit this file as they want).“*” means it will use 0-9 group of technique parameter, could be checked and modified by No.1-0/No.1-9 technique parameter.

(4) Input “6” to the end of arc welding instruction AE*,execute the corresponding program ProgramUser1 (User could edit this file as they want)。

(5) Input “7” to the start of swing welding instruction WS*,”*” means it will use 0-9 group of technique parameter, could be checked and modified by No.2-0/No.2-9 technique parameter.

WS* , WE instruction mean it will swing when execute MOVL and MOVC according to the parameter, used when weld bead is very wide.

(6) Input “8” to end of swing welding instruction AE*.

F: “F6”: Delete the current line.

G: “F7”: The first, second page to choose.

H: “F8”: Chang into Chinese and letters.

The second page:

A: “F1”: Delete the program.

B: “F2”: Copy the program.

C: “F3”: Arrange the program.

D: “F4”: Search the specified letters.

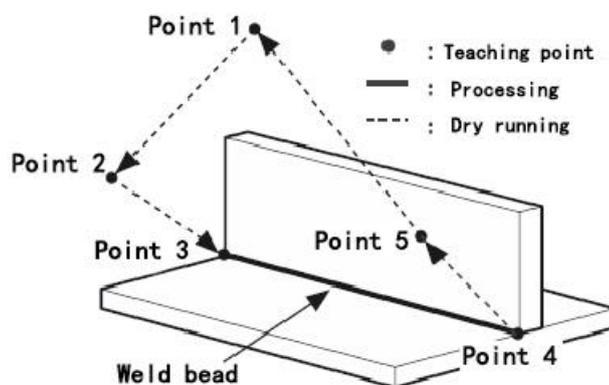
E: “F5”: Replace the specified letters.

F: “F6”: Replace the specified letters with all content.

G: “F7”: Choose the first or second page.

H: “F8”: Chang into Chinese and letters.

3.11.2 Teach of welding programme



G54 T1 ; G54 user coordinate system, T1 tool coordinate system

AA1000 ; Welding current correspond to output analog 3.33V

VV1500 ; Welding voltage correspond to output analog 5V

MOVJ VJ=80.0 PL=9.0 ; Smoothness PL=9, 80% move rapidly to program point 1

MOVJ VJ=50.0 PL=9.0 ; Smoothness PL=9, 50% move rapidly to program point 2

MOVJ VJ=25.0 PL=0 ; Smoothness PL=0, 25% move rapidly to program point 3

AS3 ; Start arc weld, the third group technique

MOVL V=100 PL=0 ; From program point 3 with arc weld to point 4, speed is 100mm/min

AE3 ; End of arc weld

MOVJ VJ=50.0 PL=9.0 ; Smoothness PL=9, 50% move rapidly to program point 5

MOVJ VJ=50.0 PL=9.0 ; Smoothness PL=9, 50% move rapidly to program point 1

M02 ; The end

3.11.3 Copy

Press “ ↑ ↓ ” in program main interface to select program which need to copy and press “F2” to popup a dialog box to import a new name of program, to copy which is the same content but different name so that to modify, rename and back-up copy.

3.11.4 Delete

Press “ ↑ ↓ ” in program main interface to select program which need to delete and press “Del” to delete the program.

Pay attention : The operation of delete need to be careful, it can't be recovery after deleting.

3.11.5 Rename

Press “ ↑ ↓ ” in program main interface to select program which need to rename and press “F3” to popup a dialog box to import a new name.

3.11.6 Information

Press “ ↑ ↓ ” in program main interface to select program which need to check and press “F4” to popup a dialog box to check the size of program and the remainder space of the system.

3.11.7 Folder management

You can build a file in this system, Press “F1” in program main interface to import a file name and press “.” to build a folder and it will prompt a “folder” after

the name.

Move the cursor to the file name and press “Enter” to open to build a new file or folder in it.

Press “F5” go to the last folder.

Move the cursor to the file name and press “Del” to delete the folder.

3.11.8 Select automatical program to run

Press “ ↑ ↓ ” in program main interface to select a program and press “F7” to select the program and switch into the last interface.

3.11.9 Program communication

The system could adopt the RS232 serial port to deliver files.

Delivery (Transport)

Deliver the selected program in this system to another system or to PC to save. Press “ ↑ ↓ ” in program main interface to select program and press “T” to deliver, press “Reset” to interrupt in the deliver process.

Reception

Receive the selected program in another system or PC (Must be text file form). Press “R” to import a name of received program into the dialog box in program main interface, press “Reset” to interrupt in the receive process.

Pay attention: 1. Using the exclusive communication software to deliver program in User’s PC.

2. The speed of deliver of PC must be the same as the speed of receive, defeat otherwise.

3. The length of RS232 can’t greater than 10 meters.

4. The number of serial port must be the same as the system setting.

5. Editing program of PC must be text file form.

3.11.10 U-disk management

To exchange files of parameter or program with other system or PC by U-disk. It also can upgrade or back-up the software or parameter in system.

Pay attention: The name of folder can’t have space symbols.

Press “F6” to enter the U-disk management interface in program main interface when U-disk connects the USB port. Press “F6” again to back to the system interface.

A. The processing program management

Copy the files or folder of U-disk into system

After connecting the U-disk, press “F6” to enter the U-disk directory in program main interface. Press “ ↑ ↓ ” to move cursor to select file or folder to copy and press “F4” to popup a dialog box to import name, press “Enter” to confirm. If there is the same name of program in the system, it will popup a dialog box to ask if cover the file or folder or not.

Press “R” to copy all the program in USB into system.

Copy the files or folder of system into U-disk

Press “↑ ↓” to move cursor to select file or folder and press “F6”, press “F3” to popup a dialog box to import name in U-disk interface and press “Enter” to confirm. If there is the same name of program in the system, it will popup a dialog box to ask if cover the file or folder or not.

Press “T” to copy all the program in system into USB.

Pay attention: Before unplugging the U-disk must return to the display system of program files directory interface. (Exit U-disk interface)

Otherwise the data which is copied just now will be loss.

The name of folder can't have space symbol when using U-disk.

B. Using U-disk to manage parameter and system software

The system could use U-disk to deliver files or system software to upgrade and update, back-up files and parameter, the method of operation is as follows:

Using U-disk to copy parameter and system software into system(Upgrade, update).

First U-disk inserts the USB port and press “Program” to enter program main interface, press “F6” to show the files in U-disk. Press “↑ ↓” to move the cursor to select a folder which is going to be copied into system and press “Enter” to open it, press “F2” to import code when appearing the files and press “Enter” to confirm, wait for seconds to copied the parameter successfully. Press “F6” to exit U-disk after copying successfully, restart the system, the system will reloads the new files to upgrade the parameter.

Pay attention: The parameter is better to be derived into a separate folder in U-disk to defend from the error operation to destroy the system files.

To derive or back-up parameter files by U-disk

First U-disk inserts the USB port and press “Program” to enter program main interface, press “F6” to show the files in U-disk. Press “F1” to import the code and press “Enter” to confirm, wait for seconds to derive successfully. The parameter in system is already derived into U-disk. Press “F6” to exit U-disk.

Pay attention: The U-disk is empty better to arrange the files (Parameter files is lots of about several dozens) so that derive parameter or create a folder on your computer first, open the folder before deriving to derive the parameters into the folder.

Chapter 4 Programming

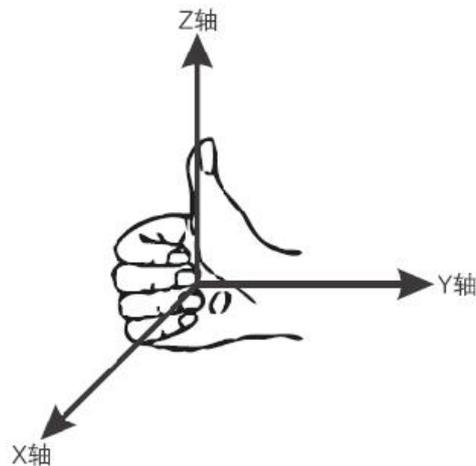
Note: This robot controller could use the instruction of CNC milling controller, please check the instruction of CNC milling with milling controller manual.

4.1 Basic conception

Segment: Made by the instruction and date.(Program line)

Program: Run all program lines according to the logic.

User-coordinate system: 用户坐标系的建立是以右手螺旋法则确定的笛卡尔直角坐标系作为编程标准坐标系（如下图），Z的正方向在X向Y旋转的大拇指方向。在建立工件坐标时，Z的正方向通常是远离工件，为此需要在建立工件坐标时考虑X、Y方向的边分别是那一条



Two methods to set user coordinate system:

- 1 、 Press “F8” in teach status;
- 2 、 Use G54/G54.1-G54.48/G55/G56/G57/G58/G59 instruction;

Must use these methods if use absolute value.

Programme with absolute coordinate : Absolute coordinate is relative to the original point of processing. Use G90 instruction, X、 Y、 Z、 A、 B、 C、 Xs、 Ys.

For example: G00 G90 X200 Y200 Z300

Relative coordinate: Also named incremental coordinate, means the direction and direction from the end point to starting point. Relative coordinate means the motion position relative with the in front position, not relative to the fixed position. Use G91, X、 Y、 Z、 A、 B、 C、 Xs、 Ys.

For example: G00 G91 X200 Y200 Z300

The minimum unit: 0.001mm.

Mode instruction: Means keep the status, not only work in this program, but also the behind program until the other mode instruction to replace.

Maybe there are multi mode instructions, such as M03, M04, M05 are mode, it is a mode group. Only be one of them in any time, because of the only status, such as M05.

Stop mode: Such as M30, it means end, back to the starting status.

Non-mode: Without keep function, only working in this program.

4.2 Programme instruction

4.2.1 Programme

(1) Multi instructions: Could be multi instructions in one program line, but the same group instruction can't be in the same program line.

(2) You can edit the sequence as you want

Example: M03 G01 X20 Y-30 Also could be: G01 Y-30 X20 M03

(3) The same instruction can't be two times in one program line.

(4) Can't be irrelevant data or parameter in the same program line.

(5) 0 in front of the instruction could be ignore, example: G01 M03, also could be G1 M3.

(6) Start from any point and any line, after changing tool, must use absolute to programme.

(7) Non-mode instruction only works in the specified program line, example: G04.

(8) Mode instruction is always working before the same group appear.

4.2.2 Instruction of robot controller

(1) Analog output AA/S,VV/SS

AA means welding current; S could be this meaning.

VV means welding voltage; SS could be this meaning.

AA and VV could be edited in the same line, but S and SS can't be the same line.

AA/S output the first analog 0~10V, VV/SS output the second analog 0~10V.

(2) Start arc welding AS*

Start arc welding: AS*. Execute the corresponding program ProgramUser0(User could edit this file as they want).

“*” means the group number 0-9 of technique parameter, correspond to No.1-0.

The program will use the arc welding parameter.

Example:

AS1 ; Use group 1 technique parameter of arc welding technique to start

..... ; The route of arc welding
AE1 ; The end

Pay attention: This instruction need to be one line, can't be with other instruction in one line.

(3) The end instruction of arc welding AE*

Execute the corresponding program ProgramUser1(User could edit this file as they want).

(4) Start swing welding WS*

“*” means the group number 0-9 of technique parameter, correspond to No.2-0.

The program will use the swing welding parameter.

Example:

WS2 ; Use group 1 technique parameter of swing welding technique to start
..... ; The route of swing welding
WE ; The end

(5) The end instruction of swing welding WE

WS*, WE swing according to the parameter when executing MOVL and MOVC, be used for wide weld bead.

(6) Motion instruction of robot (Simple instruction and whole instruction)

a, Joint: MJ or MOVJ or G0.

b, Straight line: ML or MOVL or G1.

c, Arc:MC or MOVC or G6.

Joint motion: MJ or MOVJ or G0 or ML or MOVL or or G1. Could be specified by joint coordinate value of each axis, incremental programme with G91, absolute programme with G90.Format: MOVEJ J1=*** J2=*** J3=*** J4=*** J5=*** J6=***. MJ or MOVJ can't be ignored with 6 axis robot.

Data of position is hidden when setting as robot mode(No.13 other parameter to be 0), but if set as other mode, then it will shows(No.13 other parameter to be 1).

Pay attention:

1) 30000 lines in the most if use MOVJ/L/C instruction in teach.

2) When a point set as to be the centre of circle arc, its posture will be ignored.

3) The first point of program must use MOVEJ to specify, if starting point without joint coordinate, it will cause the configuration of controller is different in each time.

(7) Speed V/F

Use V= to specify the feeding speed. Unit is mm/min, example V=120. Also could use F to specify, the unit is the same.

Use V= in G0 or MJ or MOVJ, it will prompt error.

This is mode code, works all the time.

(8) Rapidly speed VJ

Use VJ= to specify the rapidly feeding ratio. Example VJ=90, but the ratio can't be over 100%.

If not specify by VJ=, then it will work according to the ratio on controller.

Use VJ= in G0 or MJ or MOVJ, it will prompt error.

This is non-mode code, only work in the current segment.

(9) Variable PL

Use PL= to specify the continuous variable between the segments, the smaller the more accuracy, PL=0 means the speed is 0 to transition.

This instruction could be used in any segments.

This is non-mode code, only work in the current segment.

(10) Start translation SN*

“*” means the group number 0-99 of technique, corresponding No.501-No.506 parameter.

(11) End translation SF

SN*,SF specify the robot to transit, flitting, palletizing.

(12) Start searching position ST* P*

The “*” behind ST means the group number of parameter in this research[0--9];

The “*” behind P means the data number of transition in this research[0--99];

It will clear the transition which is behind P when executing this code

(13) End searching SE

(14) Search in straight running

SX or SX+, search X axis positive;

SX- search X axis negative;

SY or SY+ search Y axis positive;

SY- search Y axis negative;

SZ or SZ+ search Z axis positive;

SZ- search Z axis negative;

The number behind SX/SY/SZ means the repeat times, controller will calculate the average, the most times is 9, only once if no number. “-” need to put in the last, “+” can’t be omitted.

Example:

G54 T1 ;Specify the user coordinate system and tool number
MOVJ ;Locate to the starting point of search
ST2 P3 ;Start searching, use parameter group 2, it will saves into data number 3 of transition data
MOVJ ; Locate to the starting point of search
SX ; Search in the positive direction of X axis
MOVJ ; Locate to another starting point of search

SX- ; Search in the negative direction of X axis
MOVJ ; Locate to another starting point of search
SY3 ; Search in the positive direction of Y axis(Repeat 3 times)
SE ; End searching
MOVJ ; Locate to the middle point
SN3 ; Specify the number 3 of position offset data
AS4 ; Start arc welding
MOVL ; Execute straight line weld
MOVL ; Execute straight line weld
AE4 ; End arc welding
SF ; Close position offset

(15) Read the current user coordinate PK***

Example: PK5 means set the current user coordinate position of robot as the data of fifth point in controller.

(16) Calculate the transition according to 2 number of position

$PX^{***}=PT^{***}-PT^{***}$

Example: $PX3=PT5-PT6$ means the number 5 position of robot minus the number 6 position, the result as the number 3 transition data.

(17) Plus and minus in transition $PX^{***}=PX^{***}+PX^{***}$ and

$PX^{***}=PX^{***}-PX^{***}$

Example: $PX3=PX3+PX8$ means the number 3 position of robot plus the number 8 position, the result as the number 3 transition data.

$PX3=PX5-PX7$ means the number 5 position of robot minus the number 7 position, the result as the number 7 transition data.

(18) Programme for specified position

MOVJ or MJ PT*** means rapidly locate to the position specified by PT address according to the joint coordinate mode.

MOVL or ML PT*** means move to the position specified by PT address according to the straight line mode.

MOVC or MC PC*** PT*** means move to the position specified by PT address according to the circle arc mode, PC address specify the centre of circle arc.

Pay attention: The tool number and user coordinate system is the same as the number tool and user coordinate system in program when reading the position data of robot.

(19) Function of positioner

User instruction: M601 open a positioner axis function of XS.

User instruction: M602 open two positioner axis function of XS and YS.

User instruction: M600 Closed the function.

Parameter:

489, Set coordinate of positioner

490, The world coordinate of XS when setting P3P4P5 coordinate of positioner(um)

491, The position of positioner in X(um)

492, The position of positioner in Y(um)

493, The position of positioner in Z(um)

494, The posture of positioner in A(degree)

495, The posture of positioner in B(degree)

496, The posture of positioner in C(degree)

497, Calculate reversal with coordinate of positioner(XS+6;YS+8)

By parameter“489,Set coordinate of positioner”Set 3-points(single axis positioner) and 5-points(double axis positioner), it will refresh the No.490-No.496.



Could press “Start” when setting, the status will show “O”, then press “12345”, it will back to the position which is set the last time with the current manual speed, press “Start” to open and close, it will be closed automatically after once.

After setting, use M601 or M602 to open the function of positioner, rotate XS axis to see the direction of robot is the same or not, if not the same, then the parameter of calculate reversal +6(D1, D2=1). Use M602 to open the function, rotate YS to see the direction of robot is the same or not, if not the same, then the parameter of calculate reversal+8(D3=1).

Pay attention:If got two positioners, the axis line of Xs and Ys should be vertical intersection, Xs is flip axis, Ys is rotation axis.

(20) Whole operation of reversal palletizing PW**

Before executing PW**, controller will execute PR** once automatically to reset the current value.

Note:

1) The macro variable of reversal palletizing #9001--#9099 correspond to total number of each number of reversal palletizing, all finished if it is negative number.

2) The macro variable of reversal palletizing #9101--#9199 correspond to the current layer number of each number of reversal palletizing.

(21) Reset the current value of reversal palletizing PR**

Pay attention:

1) If the number is 9999, then controller finished the Reset;

2) The current value of reversal palletizing includes the current line, column, layer, stack, total stack;

(22) Whole operation of once reversal palletizing PA**

After finishing PA**, need to execute PR** to reset, then execute PA**.

(23) Choose user coordinate system (G54.1-G54.48/G54-G59)

G54 user coordinate system 1

G54.1/G54.48 user coordinate system 54.1/54.48

G55 user coordinate system 2

G56 user coordinate system 3

G57 user coordinate system 4

G58 user coordinate system 5

G59 user coordinate system 6

(24) Choose tool coordinate system (T01-T99)

T01 Number 1 tool coordinate system

T01 Number 2 tool coordinate system

.....

T01 Number 99 tool coordinate system

(25) Programme mode (G90/G91)

Two kinds of movement: Absolute and incremental. User G90 and G91 to specify, in absolute, it's coordinate of end point. In incremental, it's movement.

Pay attention: Absolute programme of rotation axis is proximity to calculate, incremental programme is program to calculate.

(26) Rapidly locate (G00)

Format: G00 X-Y-Z-A-B-C-Xs-Ys-

Note: X, Y, Z, A, B, C, Xs, Ys, could use absolute or incremental to programme.

Each axis goes rapidly to the end point in G00 separately. Also could use linkage mode: No.10 other parameter D6=0 to set.

The speed of G00 is set by speed parameter.

(27) Interpolation of straight line (G01)

Format: G01 X-Y-Z-A-B-C-Xs-Ys- F-

Note: X, Y, Z, A, B, C, Xs, Ys, could use incremental or absolute to programme. The speed is specified by F.

Feeding speed of G01 F could be modified by feeding ratio on panel, the range is 0%~150%.

(28) Circle arc in 3D space G06

Format: G06 X__ Y__ Z__ I__ J__ K__ F__

Function: If don't know the centre and radius of circle arc in 3D space. But know 3 points on arc, then could use G06, could make sure the direction of arc by the starting point, end point and the third point between them.

Note:G06 is mode code;

I:The coordinate from the middle point to the starting point of circle arc(X)(direction);

J:The coordinate from the middle point to the starting point of circle arc(Y)(direction);

K:The coordinate from the middle point to the starting point of circle arc(X)(direction).

Pay attention:

- 1),Middle point: Between the starting point and the end point on circle arc;
- 2),If three points on the same line, it will alarm;
- 3),I=0,K=0 and J=0 when not specify;If not specify three points, it will alarm.
- 4),I、 J、 K like the I, J, K in G02/G03 which is from centre to the starting point;
- 5),G06 can't be used in circle.

For example:

G54

G0 X10 Y28 Z10

G06 X30 Y98 Z10 I5 J-6 K-5 F100

X130 Y198 Z120 I55 J-86 K-65

G0X0Z0

M02

(29) Delay (G04)

Format: G04 P_ ;or
G04 X_ ;or
G04 U_ ;

Function:Every axis is stop and mode instruction is still working when carry out this instruction, after delaying the specified time to carry out the next program segment.

Instruction introduction:

- a.The unit of P delay time is ms(Millisecond)/
- b.The unit of X and U delay time are S.

c.Example:

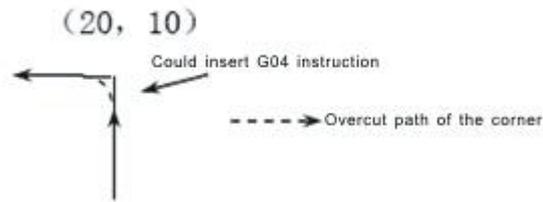
G04 X1; delay 1s.

G04 P1000; delay 1s.

G04 U1; delay 1s.

d.Special application:G04 can be accurate stop instruction, such as processing corner kinds of workpiece, it appears over cutting sometimes, if use G04 instruction around the corner, it will clear the over cutting.

Example as follows:



```

Program: ... ..
N150 G01 X20 Z10 F100;
N160 G04 P150; (Clear the over cutting)
N170 G01 W-10;
.....

```

Pay attention: Also could set No.7 processing parameter to clear the over cutting.

(30) Return Reference(G28-G288G301-G308)

```

G281      ;only X return to reference
G282      ;only Y return to reference
G283      ;only Z return to reference
G284      ;only A return to reference
G285      ;only B return to reference
G286      ;only C return to reference
G287      ;only Xs return to reference
G288      ;only Ys return to reference
G301      ;X axis return to zero
G302      ;Y axis return to zero
G303      ;Z axis return to zero
G304      ;A axis return to zero
G305      ;B axis return to zero
G306      ;C axis return to zero
G307      ;Xs axis return to zero
G308      ;Ys axis return to zero

```

(31) Program circulation instruction (G22--G800)

G22 is program circulation instruction, G800 is an instruction to end circulate. But G22 must be used with G800 for repeated processing. L means circulation times, the range is 1-99999.The circulation instruction can nest.

```

Format:  G22 L2          ;begin
         :
         :               ;circulating

```

G800 ;end

(32) Go back the starting point of program (G26/G261-G268)

Format : G26 ; ZXY all go back.
G261 ; X go back.
G262 ; Y go back.
G263 ; Z go back.
G264 ; A go back.
G265 ; B go back.
G266 ; C go back.
G267 ; Xs go back.
G268 ; Ys go back.

(33) Remember the current point(G25)

Format: G25 ; To remember the coordinate of X Y Z A B C Xs Ys

(34) Return to the memorial point(G61/G611-G618)

Format: G61 ; Return to X Y Z of memorial point
G611 ; Return to X of memorial point
G612 ; Return to Y of memorial point
G613 ; Return to Z of memorial point
G614 ; Return to A of memorial point
G615 ; Return to B of memorial point

Note: Go back with G00 speed.

(35) Check skip(G31、 G311)

Format: G31 X_Y_Z_A_B_C_Xs_Ys_F_P_ ;No alarm
G311 X_Y_Z_A_B_C_Xs_Ys_F_P_ ;alarm

P: N line+(X00/X39+1000 or 2000), 1000 means availability skip,2000 mean invalidation skip.

For example: G31 X50 Z100 F100 P331022 ;if X22 availability then go to N33.

G311 X50 Z100 F100 P2021 ;if X21 invalidation then go to next line.

Pay attention: Number X00-X47 could be checked on the diagnosis.

(36) M Function

Y05: Output of motor with brake, X40 is the input to check brake;

Y09: Output of start weld in arc, output automatically, X00 to check;

M03: Feeding welding wire or spindle rotate CW, output Y18;

M04: Back welding wire or spindle rotate CCW, output Y19;

M05: Stop welding or spindle, output Y12;

M203: The second spindle rotate CW, output Y28;

M204: The second spindle rotate CCW, output Y29;
 M205: The second spindle stop, close Y28, Y29;
 M11/M10: Loosen/Tighten tool, output Y10;
 M08/M09: Cool switch, output Y11;
 M32/M33: Lubrication, output Y08;
 M59/M58: Huff, output Y20;
 M73/M72: Cladding switch, output Y21, input X02 to check;
 M3330/M4330: User-defined output 0, output Y00;
 M3331/M4331: User-defined output 1, output Y01;
 M3332/M4332: User-defined output 2, output Y02;
 M3333/M4333: User-defined output 3, output Y03;
 M3334/M4334: User-defined output 4, output Y04;
 M3336/M4336: User-defined output 6, output Y06;
 M3337/M4337: User-defined output 7, output Y07;
 M3343/M4343: User-defined output 13, output Y13;
 M3344/M4344: User-defined output 14, output Y14;
 M3345/M4345: User-defined output 15, output Y15;
 M3346/M4346: User-defined output 16, output Y16;
 M3347/M4347: User-defined output 17, output Y17;
 M3352/M4352: User-defined output 22, output Y22;
 M3353/M4353: User-defined output 23, output Y23;
 M3354/M4354: User-defined output 24, output Y24;
 M3355/M4355: User-defined output 25, output Y25;
 M3356/M4356: User-defined output 26, output Y26;
 M3357/M4357: User-defined output 27, output Y27;
 M3360/M4360: User-defined output 30, output Y30;
 M3361/M4361: User-defined output 31, output Y31;

Pay attention: M3330-M3361, M4330-M4361 can't be in the same segment

M12/M13: (Pxxxx) Check X29(Start from Nxxx line if there is P);
 M14/M15: (Pxxxx) Check X30(Start from Nxxx line if there is P);
 M16/M17: (Pxxxx) Check X31(Start from Nxxx line if there is P);
 M18/M19: (Pxxxx) Check X28(Start from Nxxx line if there is P);
 M22/M23: (Pxxxx) Check X27(Start from Nxxx line if there is P);
 M24/M25: (Pxxxx) Check X26(Start from Nxxx line if there is P);
 WAT+/- : User defined input, X03/X05-X08/X10-X19;
 /X32-X39/X42-X47,total 30 ways;
 M97: Program Pxxx skip and starts from Nxxx program line;
 M98: Pxxx Lyyy to use sub program xxx, times is yyy;

M99: Back to use sub program;
M87: Number of workpiece plus 1 if No.5 processing parameter set as 0;
M00: Pause
M01: Program could stop, input X41 and pause when execute M01;
M02: Program end;
M30: M05、 M09 program end;
M20: Repeat the program automatically;
M500: Read joint coordinate of absolute motor J1-J6 Xs Ys;
M501-M508: Read the encoder of J1-J6XsYs separately;
M312-M319: Clear the current user coordinate of XsYsABCXYZ separately;
M412-M419: Clear the joint coordinate of J6XsYsJ4J5J1J2J3;

(37) Use program M97、 M98、 M99

Skip with none-addition

M97 Pxxx skip to the line number which is specified by P without addition;

Use sub program

In this controller the subroutine should be an independent program.

M98 P L unconditional call subroutine instruction. P is to specify the name and path of subroutine call, L refers to the calling times address of subroutine.

The M98 instruction can be omitted without writing, format: PP file name, the file name can be hidden files, the first character of hidden files must be "HIDEFILE" at the beginning. Such as the file "HIDEFILE01", this program in the program area is not displayed, can use the instruction M98 PHIDEFILE01 or M98 P*01 or PP*01 or PPHIDEFILE01 when calling.

For example:

P sub/1390 means subroutine is tmp/NC/sub/1390

Note:

- 1.tmp/NC/ is the system's default path, sub is a folder for the following
- 2.The subroutine must be a independent program.
- 3.Method of the main program in USB calls the subroutine in USB: P[or P].

For example:

M98 P[A1234 means calling the subroutine A1234 in USB;

M98 P]SS12 means calling the subroutine SS12 in USB;

PP[FFDE means calling the subroutine FFDE in USB;

It needs to write the path of file if call the subroutine in folder of USB.

There must be space in front of L(Subroutine calling times). Return to the next program segment of main program when subroutine running to the end.If the program contains a fixed sequence or repeated pattern, then the sequence or pattern can be compiled to subroutine to save in memory storage in order to programme easily, the subroutine can be called by main program which is also can be called by another subroutine.

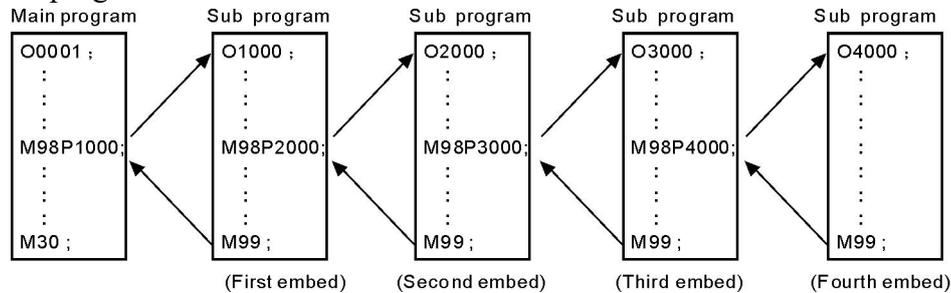
M99 is an instruction of ending subroutine return, must have this instruction to end

the subroutine.

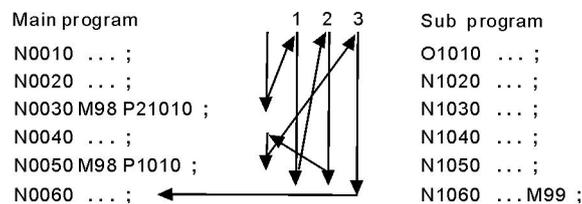
Pay attention:

- 1) M99 in the main program is the same as M02;
- 2) M99 with P in the main program is the same as M97;
- 3) M99 returns to main program call in subroutine is in the next line;
- 4) M99 with P in the subroutine returns to P program line in main program;

The Sub-program can embedded call as follow :



For example:



The calling instruction can be used for 9999 times in the most.

(38) Macro program

1. Input instruction: WAT

Waiting for the input port X valid or invalid instruction

Format: WAT+ (-) X

Note: "+" to means the input is effective;

"-" means the input is invalid;

"X" means the input port X00-X55; see the I/O diagnosis;

2. The output instruction: OUT

Set the output port Y is valid or invalid instruction

Format: OUT +(-)Y

Note: "+" means the output is effective;

"-" means the output is invalid;

"Y" means the output port Y00-Y31; see the I/O diagnosis;

3. Variable and assignment: =

1) #0--#20 local variable: local variables only can be used to store data in macro program, such as a result of operation, when power is off, the local variables are initialized to the empty. The argument assignment to the local variable when calling the macro program.

2) #21--#600 global variables: The meanings are the same in different macro program.

When power is off, the variable #21--#100 is initialized to zero, the variable #101--#600 data is saved not to loss even if the power is off.

3) #1000-- system variable: the system variables are used to change various data when reading the running CNC. For example, the current position and the compensation of tool.

Special note: macro variables #100--#155 and #190--#202 have been used by the system, users can not use.

4) The macro variables #1001--#1099 corresponds the X axis offset value of lathe T1--T99(Unit: micron)

The macro variables #1401--#1499 corresponds the Z axis offset value of lathe T1--T99(Unit: micron)

Could read the value, for example: #200=#1003; To read the X axis offset value of the third tool into macro variables #200.

Could modify the value, for example: #1003=23000; To modify the X axis offset value of the third tool to 23000 micron.

#1003=#1003+50; To increase the X axis offset value of the third tool 50 micron.

5)The I/O variables:

#1800: X00-X07 (D0-D7)

#1801: X08-X15 (D0-D7)

#1802: X16-X23 (D0-D7)

#1802: X16-X23 (D0-D7)

#1803: X24-X31 (D0-D7)

#1804: X32-X39 (D0-D7)

#1805: X40-X47 (D0-D7)

#1806: X60-X67 (D0-D7)

#1808: Y00-Y15 (D0-D15)

#1809: Y16-Y31 (D0-D15)

Format:#i=Expression

4.The arithmetic and logic operation

Table:

Function	Format	Note
Definition	#i = #j	
Addition	#i = #j + #k ;	
Subtraction	#i = #j - #k ;	
Multiplication	#i = #j * #k ;	
Division	#i = #j / #k ;	
Sin	#i = SIN(#j) ;	90.5 degrees mean 90 degrees 30 minutes
Asin	#i = ASIN(#j);	
Cos	#i = COS(#j) ;	
Acos	#i = ACOS(#j);	
Tan	#i = TAN(#j);	
Atan	#i = ATAN(#j);	
Square root	#i = SQRT(#j);	
Absolute value	#i = ABS(#j) ;	
Rounding off	#i= ROUND(#j);	
Round down	#i = FIX(#j);	

Round up	#i = FUP(#j);	
Natural logarithm	#i = LN(#j);	
Exponential function	#i = EXP(#j);	
Or	#i = #j OR #k ;	Executing with binary system
Exclusive or	#i = #j XOR #k ;	
And	#i = #j AND #k ;	

5. Unconditional transfer: GOTO N

Transfer to the program line with sequence number appears error when specifying beyond the 1-99999, could use expression to specify the sequence number.

For example: GOTO 5, GOTO#100

6. Conditional transfer: IF (Conditional expression) GOTO or THEN

If the conditional expression specified met, execute this segment; if the conditional expression specified does not meet, execute the next segment.

For example: IF (#100 EQ 2) THEN #100=5

IF (#101 GT 2) GOTO 6

IF (#101 GT 2) GOTO 6

Operation meaning:

EQ equal

NE not equal

GT greater than >

GE greater than or equal

LT less than <

LE less than or equal

7. Cycle: WHILE (conditional expression) DO 1, 2, 3

Specifies a conditional expression in front of WHILE. When the specified conditions are met, execute the program between DO and END. Otherwise, turn to the program line after END. Cycle of the embed is 3 at the most.

For example: WHILE (#100 LT 3) DO 1

.....

WHILE (#103 EQ 5) DO 2

.....

WHILE (#200 GE 20) DO 3

.....

END 3

.....

END 2

.....

END 1

8. Non-mode to call macro program: G65

Format: G65 P- L- <A-B-C-..... Argument passing data >

P is the name of macro program, L is the calling times, A B C are argument, the name of argument as follows:

#0->A、#1->B、#2->C、#3->D、#4->E、#5->F、#6->H、#7->I、#8->J、#9->K、
#10->M、#11->Q、#12->R、#13->S、#14->T、#15->U、#16->V、#17->W、#18->X、

#19->Y、#20->Z.

Special attention: The address G、L、N、Q、P can't be used in argument.

For example:

```
Main program:9000
G00 X0 Z0
G65 P8000 L1 A5 B6
G0 X0 Z0
M30
Macro program:8000
N1 #2=#0+#1
N2 IF (#2 EQ 10) GOTO 4
N3 GOO X#2
N4 G00 Z#1
N5 M99 ; Return
```

9.Mode to call macro program:G66 G67

G67 instruction is to cancel G66 instruction.The format is the same as G65.

For example:

```
Main program:9000
G00 X0 Z0
G66 P8000 L2 A5 B6
A8 B1
A9 B10
G67
M30
Macro program:8000
N1 #2=#0+#1
N2 IF (#2 EQ 10) GOTO 4
N3 GOO X#2
N4 G00 Z#1
N5 M99 ; Return
```

10、 Prompt dialog

Format: MSG(parameter) or MSG[parameter]; Parameter is information string, pause.

Pay attention: This instruction usually be used in NC program(not macro).

After prompting dialog, controller switch into pause status automatically.

Format: STAF(parameter) or STAF[parameter]; not pause if the parameter is information string.

(39) User-defined macro program (G101—G170, M880—M889)

Must use PC to edit and copy into controller.

1、 G101-G170 is macro program of G code, correspond to ProgramGxxx, use instruction of robot controller.

2、 M880-M889 is inner macro program, correspond to macro ProgramUser0 —

ProgramUser9:

1) Output: OUT

Format: OUT+(-/A)Y(M)**+

Note: "+" output effective;

"-" output invalid;

"A" output reversal(effective to invalid, invalid to effective);

For example: OUT+Y5-Y7+Y9+Y11-Y15

Mean: Y5,Y9,Y11 output effective; Y7,Y15 output invalid

For example: OUT+M12-M13+Y14+Y8-Y16

Mean: M12,Y14,Y8 output effective; M13,Y16 output invalid

2) Wait instruction: WAT

Wait X, Y, M effective or invalid

Format: WAT+(-)X(Y/M)**+(-)X**+(-)X**+(-)X**+(-)X**

Note: "+" wait for effective;

"-" wait for invalid;

Y or M only to be one or none, X could be used many times.

2.1,The longest time of WAT: MAXWAT

Format: MAXWAT****

Note: The range is 0-99999, unit is ms.

Controller will alarm and quit the running program when time is over.

2.2,Hold time and wait: HOLDWAT

Format: HOLDWAT****

Note: The range is 0-99999, unit is ms.

2.3,The longest wait mode: MODWAT

This instruction work with MAXWAT

Format: MODWAT1/MODWAT2/MODWAT3/MODWAT4;

Default: MODWAT1。

MODWAT1 the controller will alarm and quit when time is over;

MODWAT2 the controller will alarm and continue to run;

MODWAT3 not alarm and quit when time is over;

MODWAT4 not alarm and continue to run.

For example: Wait 5s to get X0 signal, it will alarm No.9

MODWAT4

MAXWAT5000

WAT+X0

IF (-X0) THEN

OUT+M89

ERREXIT

ENDIF

- 3) Delay: PAUS
 Format: PAUS****
 Note: The range is 0-99999, unit is ms.
- 4) Assignment: =
 Assignment for variable
 Format: =
 Example: #251=890.34
- 5) Prompt dialog
 Format: MESSAGEBOX(parameter 1);parameter 1 is information string.
 Also could use MSG.
- 6) Information of changing tool
 Format: STATUSINFO(parameter 1);parameter 1 is information string.
 Also could use STAH.
 Pay attention: If only use STATUSINFO or STAF or STATUSINFO() or STAF() , it will close the current prompt.
- 7) Condition instruction
 Format: IF (Relay or input point or macro variable) THEN
 ENDIF
 +Mxx means relay is effective.
 -Mxx means relay is invalid.
 +Xxx means input point is effective.
 -Xxx means input point is invalid.
 +Yxx means output point is effective.
 -Yxx means output point is invalid.
 +#xx means macro variable is not 0.
 -#xx means macro variable is 0.
- 8) Move coordinate axis
 Format: MOVE(parameter G,parameter F,parameter XYZABCXsYs,parameter W)
 The first parameter is G90 or G91 to specify it is relative or absolute;
 F to specify the speed, XYZABCXsYs to specify the coordinate;
 W to specify some input signal satisfy the condition, it will stop, for example:W+5 means it will stop when X5 input point is effective.
- 9) Set the current user coordinate and save
 Format: SETWK(parameter XYZABCXsYs);
- 10) Go to some line: GOTO xx
- 11) Return: RETURN

Chapter 5 User Technique

5.1 Technique for weld

Setting: Including <Equipment> and <Main setting>.

Equipment: Be used for<Swing weld>,<Parameter>and<Condition for points>.

Main setting: Be used for <Setting for equipment>and<Main setting>。

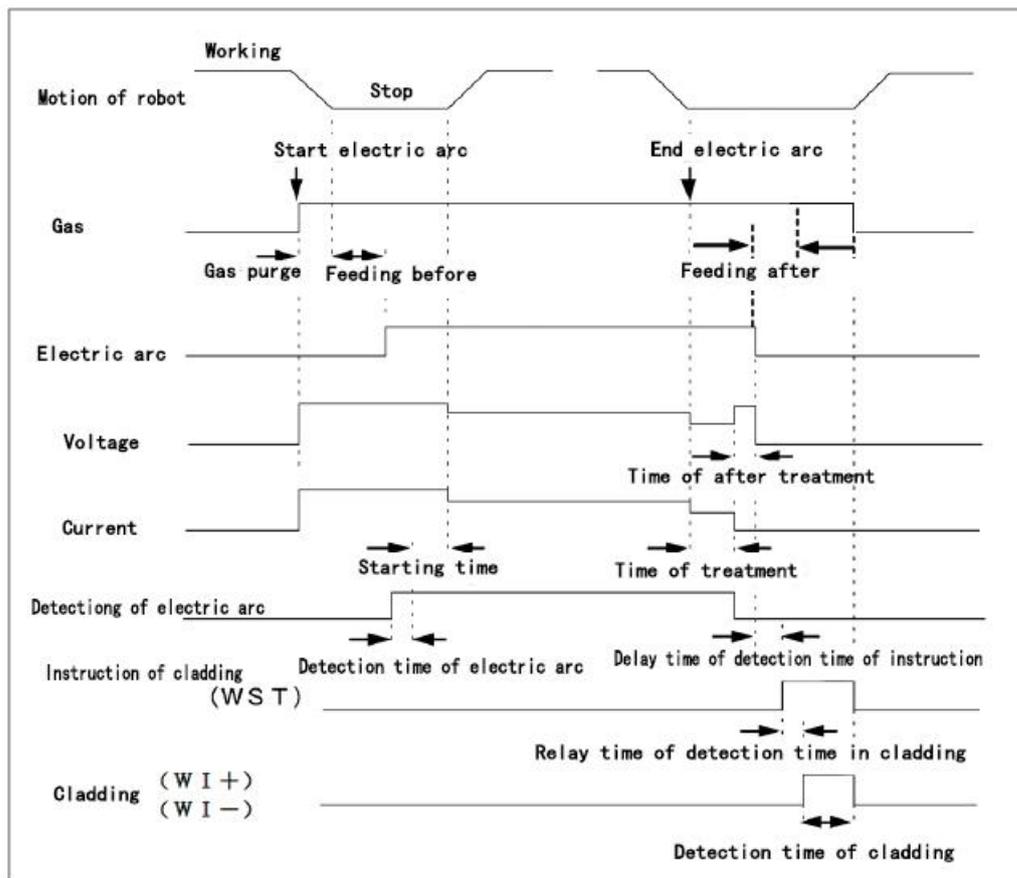
It will works with tool coordinate and user coordinate.

5.1.1 Relative parameter

(1) Other parameter

★、330,Interface and function of controller(11 Weld;12 Palletizing;13 Painting)

(2) Technique parameter(Please check 3.8.4 technique parameter)



5.1.2 Set for weld

(1) Output the weld current, set the max analog correspond to the max output current of welder.

No.43 speed parameter to set AA when output 10V.Example: P43=3000,AA1500, the

controller output 5V; AA3000 the controller output 10V.

(2) Output weld voltage, set the max analog correspond to the max output current of welder.

No.47 speed parameter to set VV when output 10V. Example: P47=3000, VV1500 the controller output 5V to welder; VV3000 the controller output 10V to welder.

Pay attention: Analog output use separator in case of interfere.

5.1.3 Output

Feeding tin wire: M03, output Y18 effective;

Back tin wire: M04, output Y19 effective;

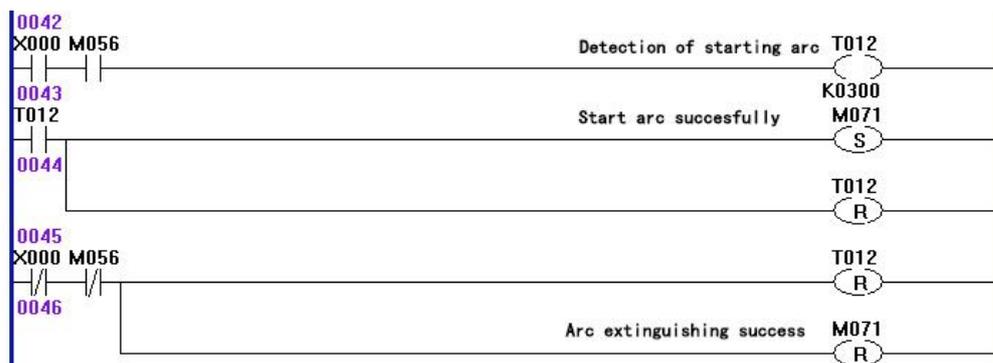
Close move tin wire: M05, output Y12 effective;

Huff: M59/M59, output Y20;

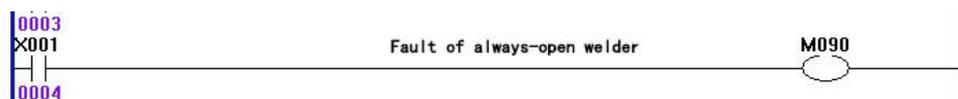
Cladding: M73/M72, output Y21, X02 is detection of cladding;

5.1.4 I/O Input and output

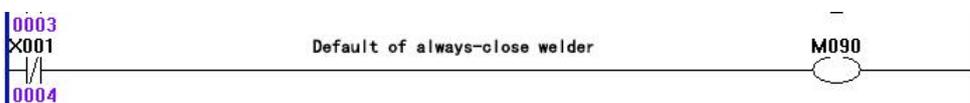
(1) X00 is detection signal of starting arc



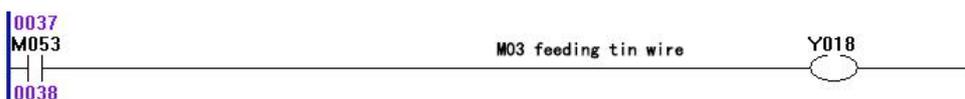
(2) X01 is alarm of welder, this is always-open PLC



If alarm of welder is always-closed signal, then PLC is:



(3) M03(Y18) is output signal of feeding tin wire

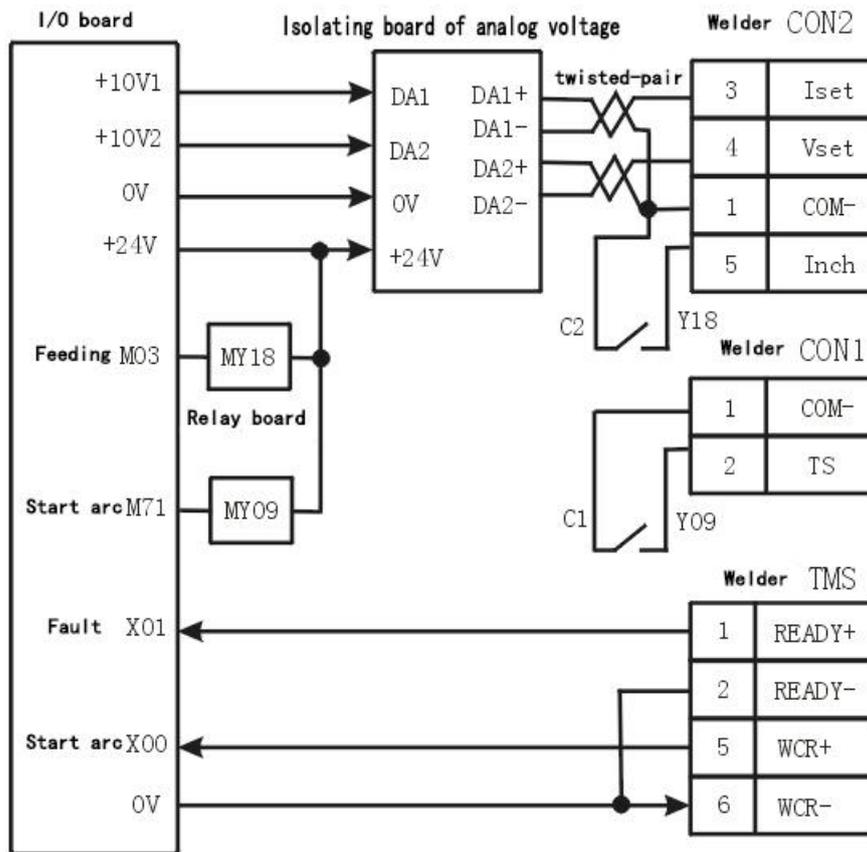


(4) M04(Y19) is output signal of back tin wire

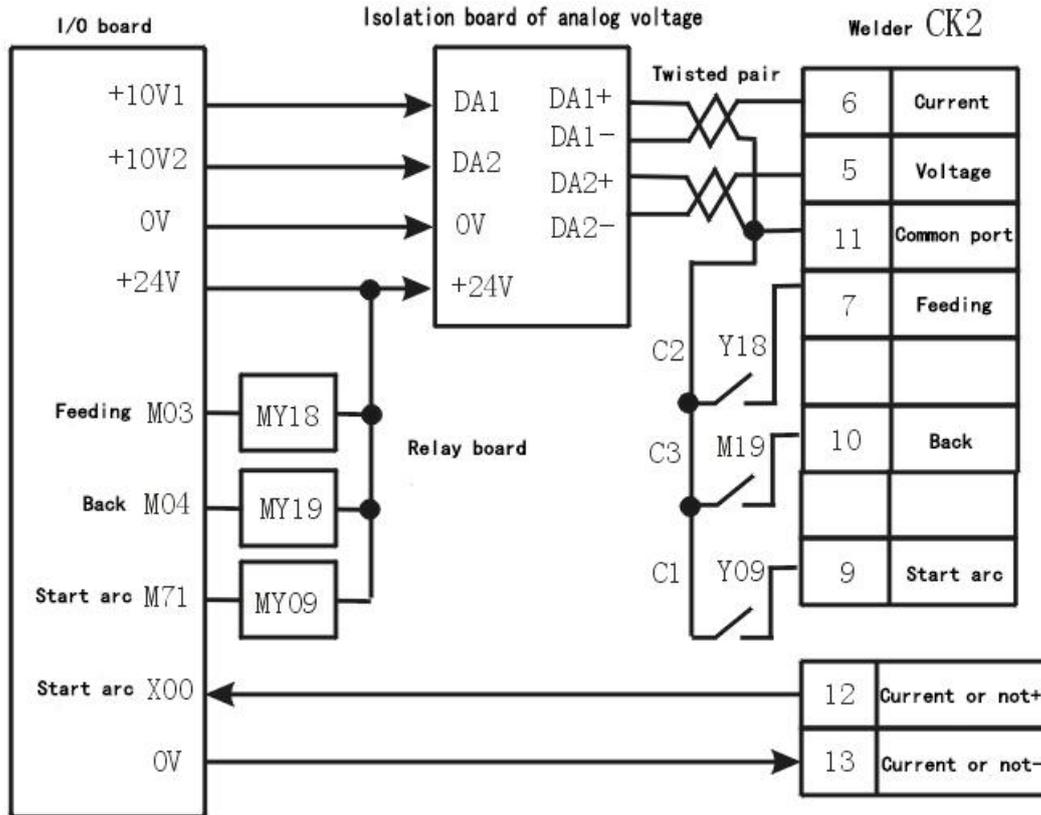


(5) Y09 is output signal of starting arc in weld

(6) The controller connect with welder OTC CPVE-500



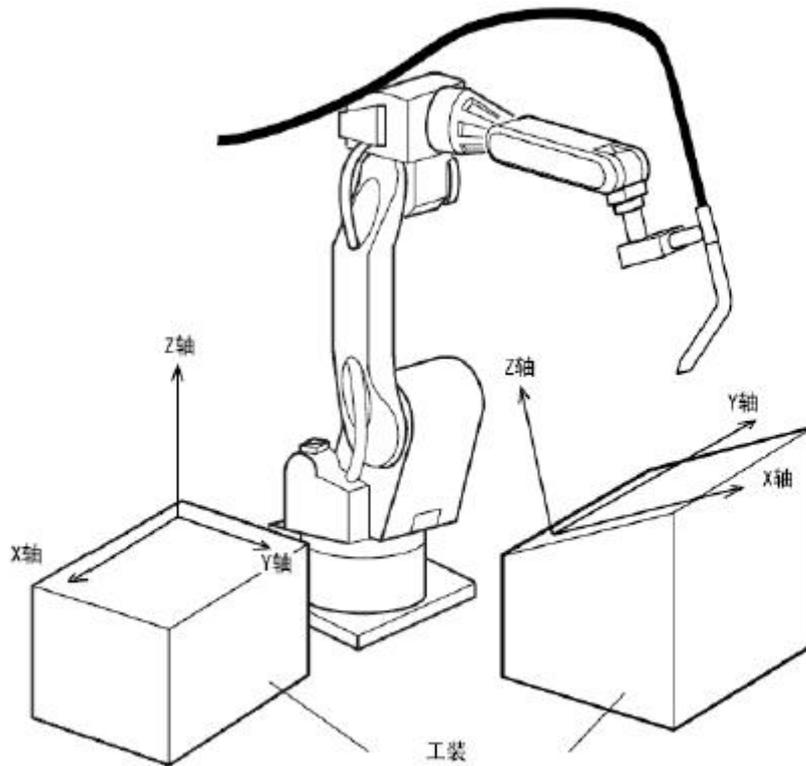
(7) The controller connect with welder MIG-350R



5.1.5 Steps of setting technique in weld

5.1.5.1 Build user coordinate system

Build user coordinate system so that programme. As follow picture, the quantities of faces need quantities of user coordinate system (got 2pcs G54,G55) .



Usually build user coordinate system with teaching status, steps as follow:

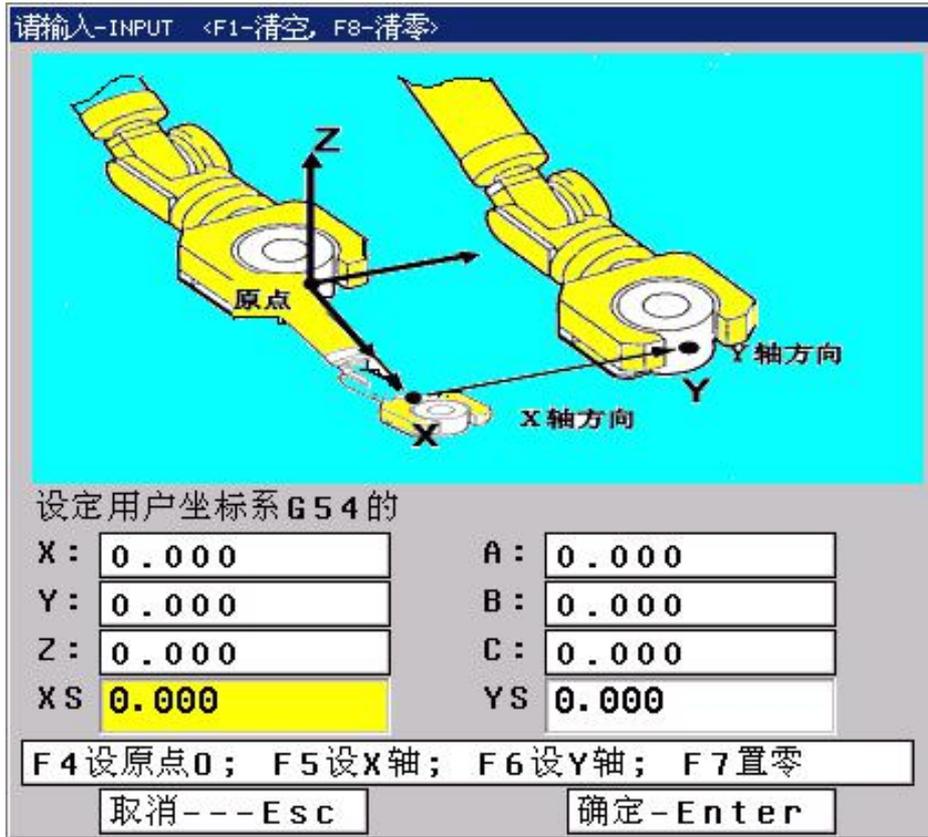
(a) Press “F8 choose coordinate” or “F5 MDI” to choose corresponding user coordinate system (G54-G59) .

(b) Move axis to fixed position(The position is easy for measure), measure the distance from this point to the corresponding zero point of user coordinate system.

(c) Press “F7” to set P1P2P3 points(Corresponding to F4F5F6).

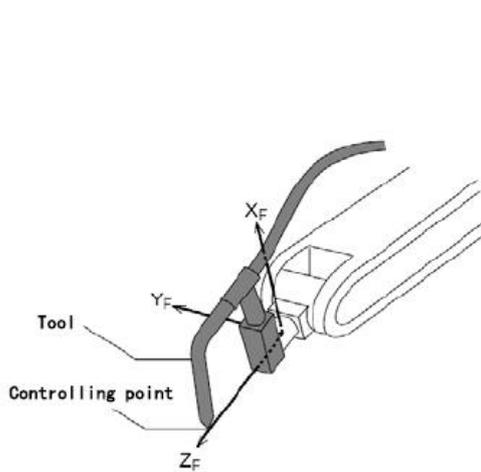
3-points: P1 is original point O, P2 is direction of +X, P3 is direction of +Y.

Press “Start”, the status will show “O”, then press F4F5F6 back to the last setting point with the current joint speed in manual so that modify. Press “Start” to open or close this function, after executing once operation, it will be closed automatically.

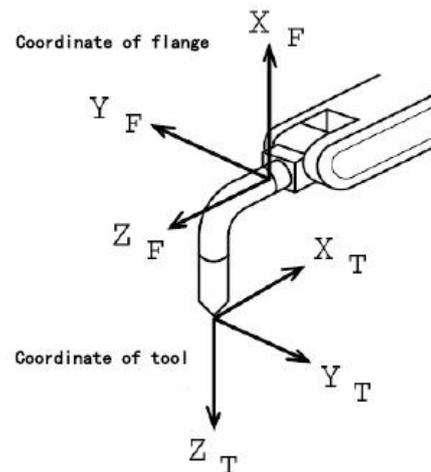


5.1.5.2 Build tool coordinate system

Build tool coordinate system is for making sure the interpolation of straight line, circle arc. Need to input right size of welder and position of defined controlling point. As follow:



Coordinate of flange



The relation between tool coordinate and flange coordinate

- (1) Choose number of tool coordinate system, example: User MDI to run tool coordinate system of "T01";
- (2) Press "F6" or "H" in main interface, or press "F5" in interface of tool set.

(A) 3-points: P1P2P3 to change the different posture of robot, the tool posit TPC point should be kept the same position, the posture in 3-points is the same as the posture of electrical connection.(The sixth flange coordinate of electrical wrist).

(B) 5-points: P1P2P3 is the same as 3-points, but the posture of 5-points need P3P4P5 to make sure.P3 means the original position of tool coordinate posture, P4 means direction of +X tool coordinate posture, P5 means direction of +Z tool coordinate posture.

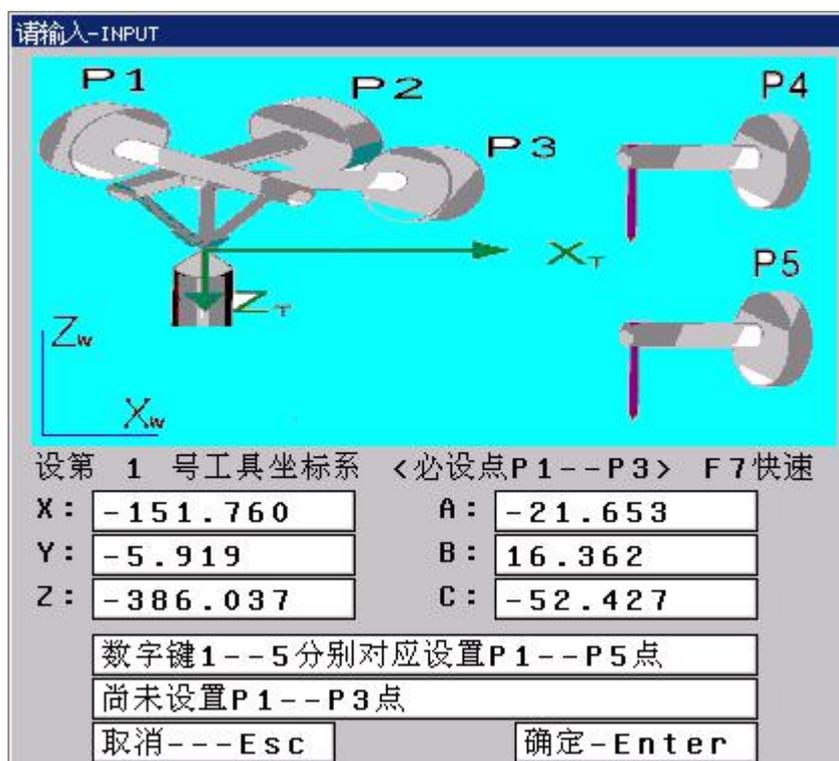
Press “Start” in the set process, the statues will show “O”, then press “12345” to adjust the speed to back to the point set the last time, easy to modify. After once operation, this function will be closed automatically.

The posture of P3P4P5 in 5-points need to be the same(Value of ABC in world coordinate should be the same) [The interface need without N letter].

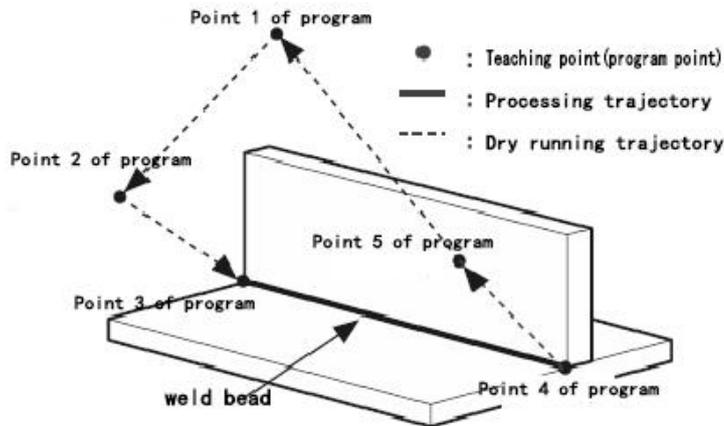
After input P1P2P3 3 points in tool set, the controller will calculate the position and posture of tool coordinate in world coordinate, if 3 points is too near, then it can't be exist P1P2P3, the controller can't calculate the value, it will delete P2P3 automatically.

XYZ of tool set mean the original point of tool coordinate in world coordinate, ABC mean the 3 axis posture in space(position and direction) of tool coordinate in world coordinate.

Pay attention:P1P2P3 in 3-points need be different posture;But the tool posture of P3P4P5 in 5-points need to be on the same straight line(It is fine if it isn't straight line, just the direction of Z axis in tool coordinate is not on the same straight line with weld gun)



5.1.6 Example for weld



Teaching program:

G54 T1 ; G54 user coordinate system, T1 tool coordinate system
 AA1000 ; The welding current correspond to output analog 3.33V of controller
 VV1500 ; The welding voltage correspond to output analog 5V of controller
 MOVJ VJ=80.0 PL=9.0 ; Smooth PL=9,80% rapidly speed to program point1
 MOVJ VJ=50.0 PL=9.0 ; Smooth PL=9,50% rapidly speed to program point2
 MOVJ VJ=25.0 PL=0 ; Smooth PL=0,25% rapidly speed to program point3
 AS3 ; Start arc weld, No.3 technique parameter
 WS3 ; Start swing weld, No.2 technique parameter
 MOVL V=100 PL=0 ; From program point 3 weld to program point 4 with
 100mm/min
 WE ; End swing weld
 AE3 ; End arc weld
 MOVJ VJ=50.0 PL=9.0 ; Smooth PL=, 50% rapidly speed to program point5
 MOVJ VJ=50.0 PL=9.0 ; Smooth PL=9, 50% rapidly speed to program point1
 M02 ; End

5.2 Technique for palletizing

Palletizing is for arrange the product, interface of palletizing is for setting mode of arrangement, point and data.

Will use user coordinate in technique.

5.2.1 Relative parameter

- ★、 601,The basic parameter of reversal palletizing
- ★、 602,The teach for piling point of reversal palletizing
- ★、 603,The teach for approach and back point of reversal palletizing

- ★、 604,The special set for each floor layout number of reversal palletizing
- ★、 605,The special set for each floor height of reversal palletizing
- ★、 606,The set or teach for special regular layout data of reversal palletizing
- ★、 607,The set or teach for special ruleless layout data of reversal palletizing
- ★、 608,The set or teach for special floor with special approach and back point
- ★、 609,Copy data of some number reversal palletizing
- ★、 610,Copy data of some number layout mode

5.2.2 Palletizing

(1) Whole operation of reversal palletizing PW**

Before executing PW**, controller will execute PR** once automatically to reset the current value.

Note:

- 1) The macro variable of reversal palletizing #9001--#9099 correspond to total number of each number of reversal palletizing, all finished if it is negative number.
- 2) The macro variable of reversal palletizing #9101--#9199 correspond to the current layer number of each number of reversal palletizing.

(21) Reset the current value of reversal palletizing PR**

Pay attention:

- 1) If the number is 9999, then controller finished the Reset;
- 2) The current value of reversal palletizing includes the current line, column, layer, stack, total stack;

(22) Whole operation of once reversal palletizing PA**

After finishing PA**, need to execute PR** to reset, then execute PA**.

Chapter 6 PLC

6.1 Function of PLC

Edit PLC:

①Edit PLC on controller directly;

②Edit PLC on PC (Use the PLC software of NEWKER-CNC which is NEWKER-PLC.EXE, open PLC.LAD file could be edited; After editing and saving, then lead into controller will be fine, there are 3 files: (PLC.LAD) ,(PLC.PLC), (PLC-NOTE).Then restart controller will be fine.

Execute instruction: Table of instruction

Memory of program: 10000 steps

Execute cycle: Super high-speed is 2ms, high-speed is 8ms, low-speed is 100ms

Mode: Sequence①、 Cycle②

Basic: Inner relay、 Timer、 Counter、 Input relay X、 Output relay Y

Pay attention:

- 1) ,Input X0-X47. X0-X7 and X40-X47 could be 0V effective, also could be 24V effective(Select by pin of connection board), X8-X39 is 0V effective.
- 2) , Output Y0-Y31, 0V effective.

6.2 Inner relay M of PLC

	Code	Function	Note
1	M00	Forbid feeding	Forbid feeding of each axis(input) when this relay is effective
2	M01	Teach	When controller is in teaching status, this relay is effective(status)
3	M02	Just start	When controller just start, this relay is effective(status)
4	M03	Forbid PLAY	Forbid program PLAY when this relay is effective(input)
5	M04	Emergency	Emergency when it is effective(input)
6	M08	Feeding	The relay is effective when axis is feeding
7	M10	Open protection door	Protection door opens when this relay is effective(input)

8	M12	Alarm	This relay is effective when emergency or driver alarm or limited or user-defined (Input)
9	M22	Output run	The relay is effective when controller is in PLAY(output)
10	M23	Output alarm	The relay is effective when controller alarm(output)
11	M26	M01	When got M01, then this signal is pause effective(Input)
12	M32	Driver alarm of J1	Driver of J1 is alarm when this relay is effective.(Input)
13	M33	Driver alarm of J2	Driver of J2 is alarm when this relay is effective.(Input)
14	M34	Driver alarm of J3	Driver of J3 is alarm when this relay is effective.(Input)
15	M35	Driver alarm of J4	Driver of J4 is alarm when this relay is effective.(Input)
16	M36	Driver alarm of J5	Driver of J5 is alarm when this relay is effective.(Input)
17	M314	Driver alarm of J6	Driver of J6 is alarm when this relay is effective.(Input)
18	M315	Driver alarm of Xs	Driver of Xs is alarm when this relay is effective.(Input)
19	M316	Driver alarm of Ys	Driver of Ys is alarm when this relay is effective.(Input)
20	M38	Run ()	In the progress of PLAY, it will execute the program in “()” when this relay is effective.(Input)
21	M39	Alarm of spindle	Spindle is alarm when this relay is effective.(Input)
22	M44	Cooling overload	Cooling overload of motor will be alarm when this relay is effective.(Input)
23	M45	Cooling liquid	Cooling liquid will be alarm when this relay is effective.(Input)
24	M46	Lubrication overload	Lubrication overload of motor will be alarm when this relay is effective.(Input)
25	M47	Lack of lubricating	Lack of lubricating will be alarm when this relay is effective.(Input)

26	M48	Cooling	Execute cooling when this relay is effective. (output, Use M08/M09 to control)
27	M51	Lubrication	Execute Lubrication when this relay is effective. (output, Use M32/M33 to control)
28	M53 M54 M55 M231 M232	Stop rotate CW and CCW of the first spindle Rotate CW and CCW of the second spindle	Spindle rotate CW and CCW when this relay is effective. (output , could use M04/M03/M05/M203/M204 to control)
29	M59	Output of user-defined	Correspond to M61/M60 (output)
30	M63	Output of user-defined	Correspond to M63/M62 (output)
31	M52	Output of user-defined	Correspond to M65/M64 (output)
32	M60	Output of user-defined	Correspond to M67/M66 (output)
33	M105	Output of user-defined	Correspond to M69/M68 (output)
34	M56	Output of user-defined	Correspond to M71/M70 (output)
35	M57	Output of user-defined	Correspond to M73/M72 (output)
36	M50	Output of user-defined	Correspond to M59/M58 (output)
37	M61	Output of user-defined	Correspond to M79/M78 (output)
38	M49	Output of user-defined	Correspond to M11/M10 (output)
39	M80-M95	User-defined No.0-No.15 alarm	The controller will be alarm correspond to PLC.(Input)
40	M114	Remote run	Run program when this relay is effective. (Input) Use external RUN button.
41	M115	Remote stop	Strop program when this relay is

			effective.(Input) Use external HALT button.
42	M122	Run program	Program will run automatically when this relay is effective(Status)
43	M123	Program pause	Program will be pause when this relay is effective(Status)
44	M128	Stop J1	Stop J1 when it is effective.(Input)
45	M129	Stop J2	Stop J2 when it is effective.(Input)
46	M130	Stop J3	Stop J3 when it is effective.(Input)
47	M131	Stop J4	Stop J4 when it is effective.(Input)
48	M132	Stop J5	Stop J5 when it is effective.(Input)
49	M318	Stop J6	Stop J6 when it is effective.(Input)
50	M319	Stop Xs	Stop Xs when it is effective.(Input)
51	M320	Stop Ys	Stop Ys when it is effective.(Input)
52	M200	Running status	X move positive
53	M201	Running status	X move negative
54	M202	Running status	Y move positive
55	M203	Running status	Y move negative
56	M204	Running status	Z move positive
57	M205	Running status	Z move negative
58	M206	Running status	A move positive
59	M207	Running status	A move negative
60	M208	Running status	B move positive
61	M209	Running status	B move negative
62	M210	Running status	C move positive
63	M211	Running status	C move negative
64	M212	Running status	Xs move positive
65	M213	Running status	Xs move negative
66	M214	Running status	Ys move positive
67	M215	Running status	Ys move negative
68	M824	Status of backed to zero	X backed to zero already
69	M825	Status of backed to zero	Y backed to zero already
70	M826	Status of backed to zero	Z backed to zero already
71	M827	Status of backed to zero	A backed to zero already

72	M828	Status of backed to zero	B backed to zero already
73	M829	Status of backed to zero	C backed to zero already
74	M830	Status of backed to zero	Xs backed to zero already
75	M831	Status of backed to zero	Ys backed to zero already
76	M265		Press Reset, M265 is effective, from NC layer to PLC layer, need use PLC to reset the relay.
77	M282--M289	Bus type connection	Connection status of number 1-8, normal when effective(Status)
78	M290-M297	User-defined	Execute corresponding motion when the relay is effective according to PLC (Input/Output)
79	M298--M313	User-defined	Execute corresponding motion when the relay is effective according to PLC, status could be saved after power off (Input/Output)
80	M317	Be ready	Effective when controller is ready(Status)
81	M321 M325 M329	User-defined	Execute corresponding motion when the relay is effective according to PLC (Input/Output)
82	M330--M377	User-defined	Use M3330/M4330-M3377/M4377 to control; Execute corresponding motion when the relay is effective according to PLC (Input/Output)
83	M999		High-speed or super high-speed of PLC before
84	M1014		Reset emergency, lower the speed
85	M1050		Automatically status when it is effective
86	M1069		Manual status when it is effective

6.3 Function module of PLC

6.3.1 Account, timer

Total 16 account(C0-C15), 80 timer(T1-T79),normal 10ms timer is T0---3,T16---31 ; 10ms totalizer is T4---7 ,T32---47; normal 1s timer is T8---11 ,T48---63; 1s totalizer is T12---15,T64---79.

6.3.2 Basic

1、--[/]: [Basic instruction]:Negation of output winding



Y00 output signal when X00 is invalid.

Y00 is invalid when X00 is effective.

2、--[U]: [Basic instruction]:Up along output winding



Output Y02 when X01 is invalid to effective.

3、--[D]: [Basic instruction]:Down along output winding



Output Y03 when X02 is effective to invalid.

4、--[US]:[Basic instruction]:Up along setting winding



Setting Y04 when X03 is invalid to effective.

5、--[DS]: [Basic instruction]:Down along setting winding



Setting Y05 when X04 is effective to invalid.

6、--[UR]:[Basic instruction]:Up along reset winding



Reset Y06 when X05 is invalid to effective.

7、--[DR]: [Basic instruction]:Down along reset winding



Reset Y07 when X06 is effective to invalid.

6.3.3 Definition of logic calculation

Pay attention: 1、 Parameter C is always address.

2、 Range of constant is 0---255.

1、 CMP: Comparison of data

Conditions:

0 means 8 bits data, parameter A and B are both address;

1 means 16 bits data, parameter A and B are both address;

2 means 8 bits data, parameter A is address, parameter B is constant;

3 means 16 bits data, parameter A is address, parameter B is constant;

4 means 8 bits data, parameter A is constant, parameter B is address;

5 means 16 bits data, parameter A is constant, parameter B is address;

8 means parameter A and B are both constant.

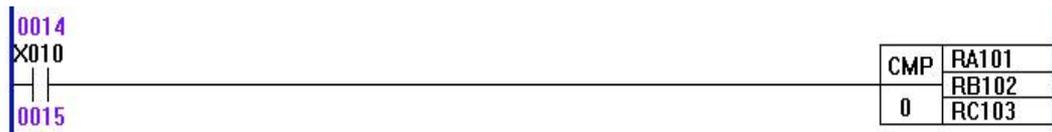
Rules:

When parameter A>B, evaluation C(low 3 bits) is 1;

When parameter A=B, evaluation C(low 3 bits) is 2;

When parameter A<B, evaluation C(low 3 bits) is 4.

Example 1:



When condition is 0, parameter A and B are both address.

When X10 is effective, parameter A= 01000101, parameter B=00010010, A>B and evaluate R103, if R103 is 0, then R103=00000001 after evaluating.

Example 2:

When condition is 1, parameter A and B are both address.

When X10 is effective, parameter A= 000001011010000, parameter B=0000010110100000, A>B and evaluate R103, if R103 is 0, then R103=0000000000000001 after evaluating.

2、 MOV: Movement for data

Conditions:

0 means 8 bits data, parameter A and B are both address;

1 means 16 bits data, parameter A and B are both address;

2 means 8 bits data, parameter A is address, parameter B is constant;

3 means 16 bits data, parameter A is address, parameter B is constant;

Rules:

Evaluate parameter B to A, parameter A is always address.



parameter A is address, parameter B is constant.

When X03 is effective, parameter B=7, also 00000111, then R105=00000111 of parameter A.

3、BIT: Bit calculation

Condition: Consist 2bits.

Left bit:

1 means and;

2 means or;

3 means exclusive or;

4 means not. Evaluate A not and to C, no relative with B.

5 means move left.

6 means move right.

Right bit:

0 means 8 bits data, parameter A and B are both address;

1 means 16 bits data, parameter A and B are both address;

2 means 8 bits data, parameter A is address, parameter B is constant;

3 means 16 bits data, parameter A is address, parameter B is constant;

4 means 8 bits data, parameter A is constant, parameter B is address;

5 means 16 bits data, parameter A is constant, parameter B is address;

8 means parameter A and B are both constant.

Example : Condition is 305 means: 16bits data and exclusive or,A is constant, parameter B is address.

Rules:

(1) And: Parameter C = (Parameter A & Parameter B).



When M77 is effective, condition is 10, means and,parameter A and B are both address. When address of parameter A 10=10000111, address of parameter B 12=01100001, address of parameter C 15=00000001.

(2) Or: Parameter C = (Parameter A | Parameter B).



When M77 is effective, condition is 20, means or, parameter A and B are both address. When address of parameter A 10=10000111, address of parameter B 12=01100001, address of parameter C 15=11100111.

(3) Exclusive or: Parameter C = (Parameter A ^ Parameter B).

0005
M071
0006

ADD	RA23
	RB34
0	RC132

When M71 is effective, condition is 0, parameter A and B are both address. When address of parameter A 23=10000111, address of parameter B 34=01100001, address of parameter C 32=11101000.

5、SUB: Data minus

Conditions:

- 0 means 8 bits data, parameter A and B are both address;
- 1 means 16 bits data, parameter A and B are both address;
- 2 means 8 bits data, parameter A is address, parameter B is constant;
- 3 means 16 bits data, parameter A is address, parameter B is constant;
- 4 means 8 bits data, parameter A is constant, parameter B is address;
- 5 means 16 bits data, parameter A is constant, parameter B is address;
- 8 means parameter A and B are both constant.

Rules:

Parameter C = Parameter A - Parameter B.

0003
X022
0004

SUB	RA30
	RB11
0	RC45

When X22 is effective, condition is 0, parameter A and B are both address. When address of parameter A 30=10100000, address of parameter B 11=01100000, address of parameter C 45=01000000.

6、MUL: Data times

Conditions:

- 0 means 8 bits data, parameter A and B are both address;
- 1 means 16 bits data, parameter A and B are both address;
- 2 means 8 bits data, parameter A is address, parameter B is constant;
- 3 means 16 bits data, parameter A is address, parameter B is constant;
- 4 means 8 bits data, parameter A is constant, parameter B is address;
- 5 means 16 bits data, parameter A is constant, parameter B is address;
- 8 means parameter A and B are both constant.

Rules:

Parameter C = Parameter A x Parameter B.

0001
M070
0002

MUL	RA10
	RB20
0	RC15

When M70 is effective, condition is 0, parameter A and B are both address. When address of parameter A 10=10100111, address of parameter B 20=00000101, address of parameter C 15=01000011.

7、 DIV: Data divide

Conditions:

- 0 means 8 bits data, parameter A and B are both address;
- 1 means 16 bits data, parameter A and B are both address;
- 2 means 8 bits data, parameter A is address, parameter B is constant;
- 3 means 16 bits data, parameter A is address, parameter B is constant;
- 4 means 8 bits data, parameter A is constant, parameter B is address;
- 5 means 16 bits data, parameter A is constant, parameter B is address;
- 8 means parameter A and B are both constant.

Rules:

Parameter C = Parameter A/Parameter B.



When X00 is effective, condition is 0, parameter A and B are both address. When address of parameter A 1=10100111, address of parameter B 2=00000101, address of parameter C 111=00100001.

6.3.4 Control the steps

1、 END1 : [Control the steps] :The end of the first level
END1 in front of PLC is high-speed, every cycle is 8ms.

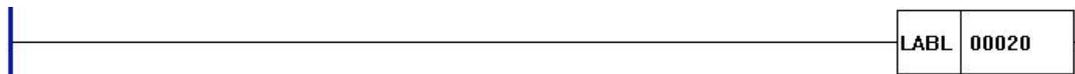


2、 END2 : [Control the steps] :The end of the second level
END2 in front of PLC is low-speed, every cycle is 100ms.



3、 LABL : [Control the steps] :Mark of position

Specify a mark in the ladder, use JMPB to jump to this position, LABL mark.



LABL number 1-9999.

4、 JUMP : [Control the steps]: With or without condition to jump

The program will jump to marked position to run. Could use the same mark in multi-jump; Can't jump over END1 or END2; Can't jump out of sub program; Could jump forward and backward.



Condition:

Not jump when M78 is invalid, execute the next segment behind the JUMP.

Jump to the marked position when M78 is effective and execute the next segment.
 JUMP number 1-9999.



Note: Jump over 45-49 lines and execute 51 line when X11 is effective.

Execute 45 line when X11 is invalid.

5、CALL : [Control the steps]: With or without to use sub program

Use sub program, could use multi call instruction in the same sub program; Call instruction could be nested; Can't be used in the first level program; Sub program must be edited behind END2.



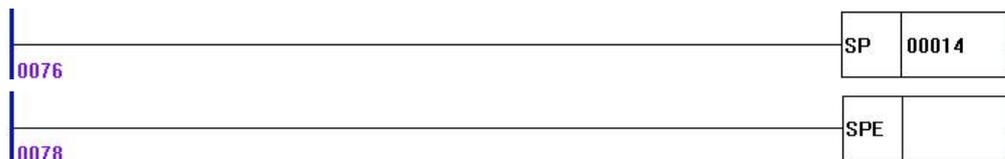
Note: Call and execute the specified sub program when M72 is effective(example CALL 16).

Execute the next instruction after executing CALL when M72 is invalid.

6、SP : [Control the steps] Start sub program

7、SPE : [Control the steps] End sub program

SP to generate a sub program, the number of sub program as the name of sub program, SPE is the mark of the end of sub program. When the instruction is executing, it will be back to the main program, SP and SPE to specify the range of sub program.The sub program must be edited behind END2.



SP16 sub program.



Note: Call sub program SP16 when M288 is effective.

8、 RETN : [Control the steps]Return from sub program

When satisfying condition of call sub program and RETN, then back to the main program directly.

When satisfying condition of call sub program, but not RETN, then finish the sub program and then back to the main program.



Note: Execute sub program SP22 when X11 is effective; Condition of RETN is satisfied when M285 is effective, then back to the main program directly and execute 13 line.

Execute sub program SP22 when X11 is effective;Condition of RETN is not

satisfied when M285 is invalid, then execute 18 line of sub program to the end, then back to the main program.

6.3.5 Table of parameter address :

1、 Definition of input and output parameter address :

Definition of parameter address	Parameter
1	X0-X7
2	X8-X15
3	X16-X23
4	X24-X31
7	X50-X57
8	X58-X65
9	X66-X73
10	X74-X81
13	X151-X158
14	X159-X166
15	X167-X174
16	X175-X182
17	X183-X190
18	X191-X198
31	X200-X207
32	X208-X208
51	Y0-Y7
52	Y8-Y15
53	Y16-Y23
54	Y24-Y31
55	Y50-Y57
57	Y71-Y78
58	Y79-Y80

2、 Definition of parameter address of relay :

Definition of parameter address	Parameter
101	M0--M7
102	M8--M15
103	M16--M23
104	M24--M31
105	M32--M39

106	M40--M47
107	M48--M55
108	M56--M63
109	M64--M71
110	M72--M79
111	M80--M87
112	M88--M95
113	M100--M107
114	M108--M115
115	M120--M127
116	M128--M135
117	M200--M207
118	M208--M215
119	M250--M257
120	M258--M265
121	M266--M273
122	M274--M281
123	M218--M225
124	M226--M233
125	M234--M241
126	M242--M249
127	M282--M289
128	M290--M297
129	M298--M305
130	M306--M313
131	M800--M807
132	M808--M815
151	Total of tool
153	The current number of tool-case
155	Number of target tool-case

Pay attention:

- 1、 Odd address could use 8 bits parameter, also could use 16 bits parameter;
- 2、 Even number only use 8 bits parameter, can't use 16 bits parameter;
- 3、 For 16 bits odd address, including this odd address and a parameter of even number behind;
- 4、 Constant could be 8 bits number in the most.

Chapter 7 Connection

7.1 Character of robot controller

- High performance industrial level 32 bits ARM+DSP+FPGA
- 128M(Could be expand to 32G) user storage
- 800x600 TFT LCD touch screen
- USB connection
- Power supply of high anti-interference
- Hand held
- 48x32 I/O
- 2 ways 0-10V analog output
- 1 way orthogonal input of encoder
- 6 ways output of motor with brake

7.2 Technical index

- Number of controlling axis: XYZABCXsYs 8 axis
- Pulse value: 0.001mm
- The max speed: 240m/min
- Processing speed: 0.01-30000mm/min
- The minimum input unit: 0.001mm
- Range of programme size: ± 99999.999 mm
- Programme code: ISO-840 international standard
- Definition of programme coordinate system: ISO-841 international standard
- Time of fault-free on average(MTBF): Bigger than 6000 hours

7.3 Using environment of controller:

- Power: AC 220V (+10%,-15%), frequency 50Hz \pm 1%
- Torque of power \leq 150W
- Power supply must use isolation transformer
- Running temperature 5 \sim 45 $^{\circ}$ C, relative humidity 40-80%
- Temperature of storage and transportation 0 \sim 55 $^{\circ}$ C, relative humidity less than 90%(40 $^{\circ}$ C)
- To avoid an oil mist and dust, corrosive gas, corrosion, good ventilation

7.4 Installation connection

Firstly check the controller, power, motor, electrical board is good or not.

Must save some space around, keep air circulation, the position of controller need to be easy to operate and avoid scalding when machine is working.

Leave away from strong electricity in case of interference, all input signal is the best not connect with controller directly; Must connect with ground.

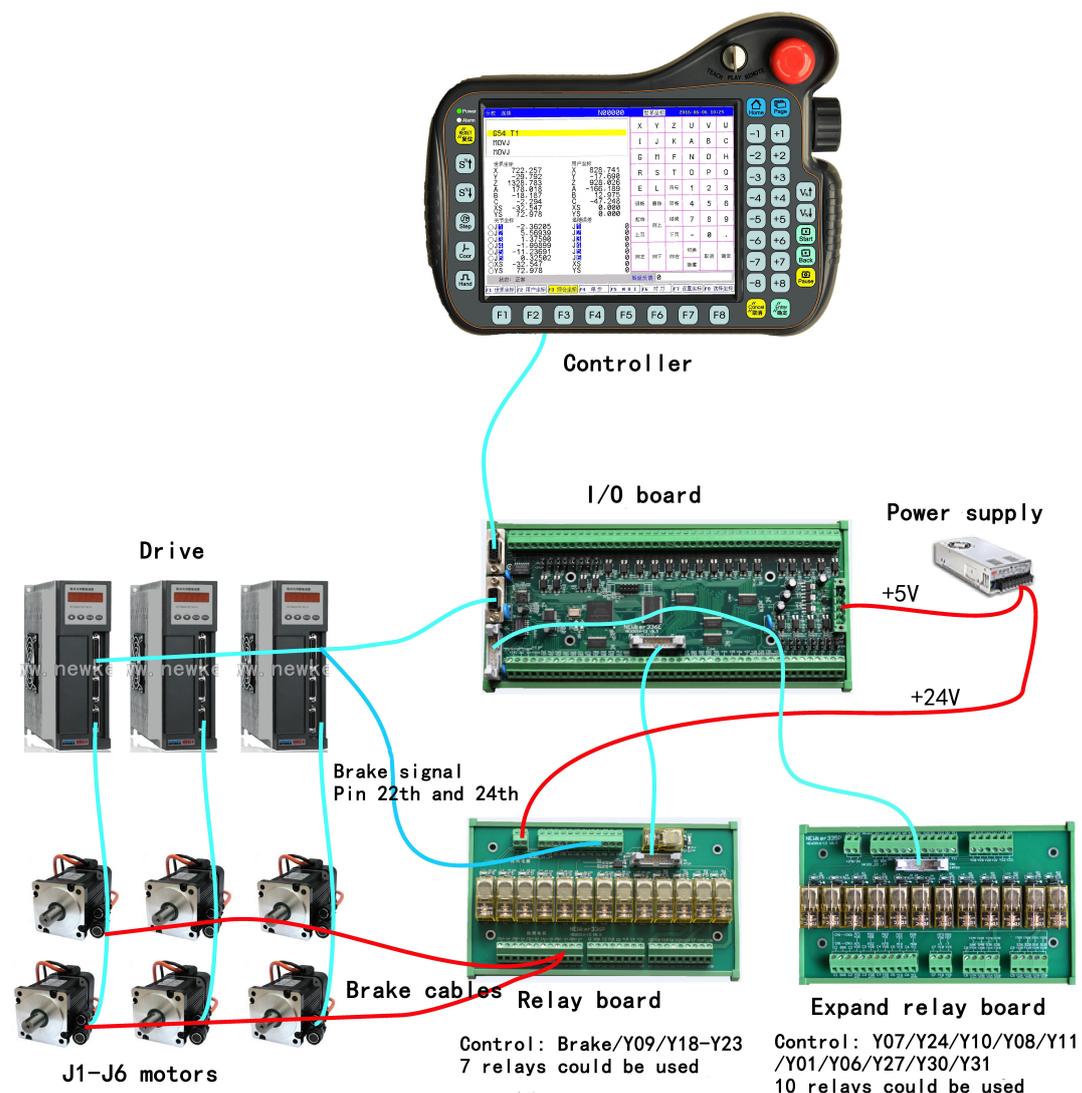
Can't hot-plugging all cables when power on.

Put controller into clean and fixed position.

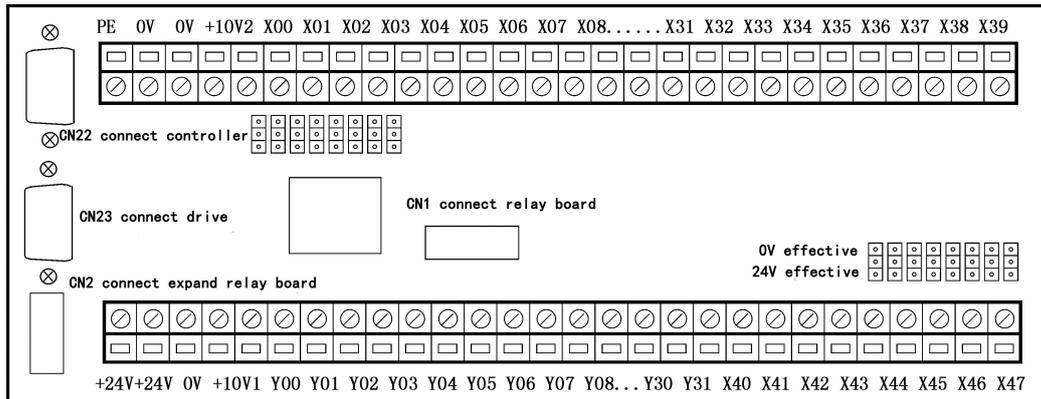
Pay attention:

- 1、 Controller need to install a place which got lightning-protection
- 2、 Controller must be a fixed place in case of vibration
- 3、 Keep controller away from combustible

7.4.1 Connection diagram



1、 I/O board of input and output



- 1) CN22 connect with CN22 of controller.
- 2) CN23 connect with driver.
- 3) CN1 connect with CN1 of relay board, including:
 - 1 relay of controller output brake control;
 - 6 relays of brake of motor;
 - 7 relays of Y09,Y18,Y19,Y20,Y21,Y22,Y23;
- 4) CN2 connect with expand relay board CN1, including:
 - 1 relay of brake of motor;
 - 11 relays of Y07,Y24,Y10,Y08,Y11,Y01,Y05,Y06,Y27,Y30,Y31. Y05 is relay of controller output brake control,user can't use this in other way.
- 5) Input signal X00-X07,X40-X47 could choose +24V or 0V effective, chosen by pin.X40 is detection signal of brake,user can't use this in other way.
- 6) PE connect terminal and ground in case of interfere.

Note:

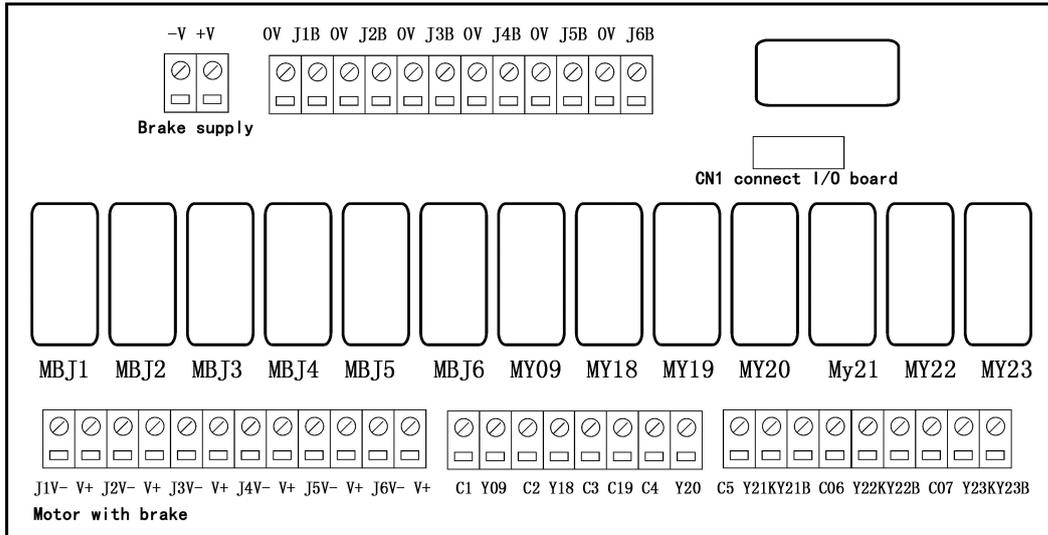
1、 X0 is detection of start arc,X01 is default of welder, X02 is alarm of inverter,X04 is alarm of cooling,X09 is alarm of lubrication,X20 is alarm of driver ALM, X21 is external alarm ALM1,X22 is external alarm ALM2,X23 is external alarm ALM3,X24 is remote pause HALT, X25 is remote start RUN,X40 is detection of motor brake.

So, user could use X02,X03,X05-X08,X10-X19,X26-X39,X41-X47, total 37 input points

2、 Y05 is relay of controller output brake control.

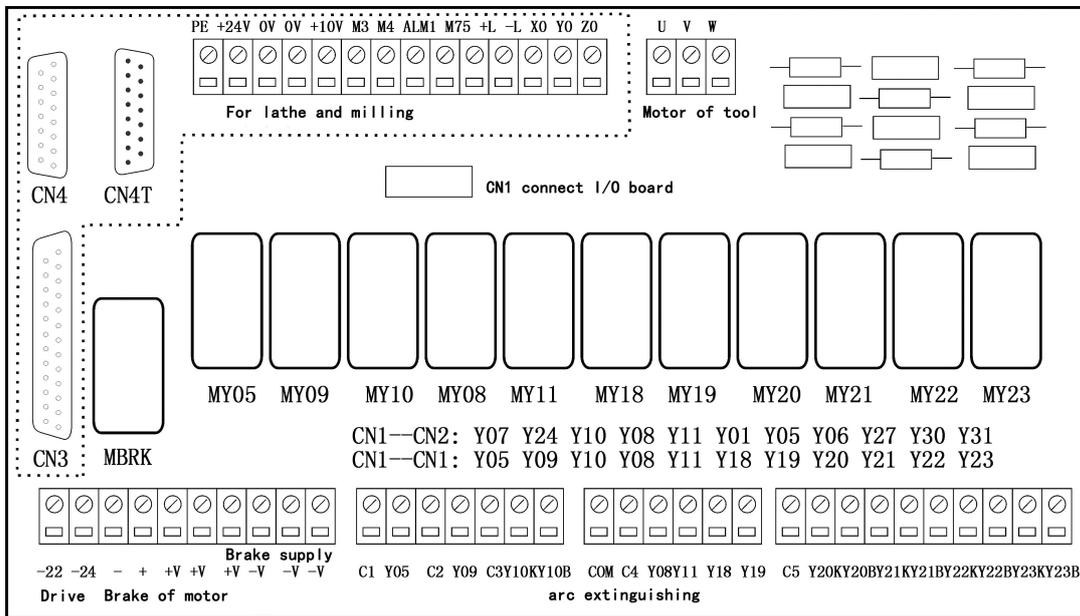
So, user could use Y00-Y04,Y06-Y31, total 31 output point.

2、 Relay board of controller



- 1、 CN1 connect with CN1 of I/O electrical board, control output:
Y09,Y18,Y19,Y20,Y21,Y22,Y23 user could use 7 relays.
- 2、 0V of brake connect CN3-22 pin of driver, J1B/J2B/J3B/J4B/J5B/J6B connect with CN3-24 pin of driver.
- 3、 -V,+V connect with power of brake.
- 4、 J1V-/J2V-/J3V-/J4V-/J5V-/J6V-,V+ connect with brake motor.

3、 Expand relay board of controller

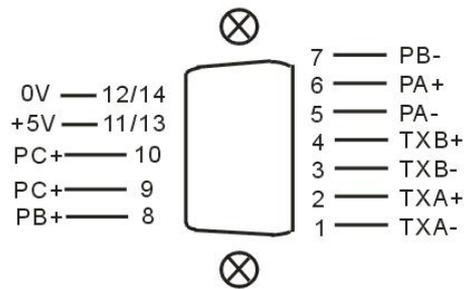


This board is an option

- 1、 CN1 connect with CN2 of I/O electrical board, control output:
Y07,Y24,Y10,Y08,Y11,Y01,Y05,Y06,Y27,Y30,Y31,total 11 relays, Y05 is relay of controller output brake control, user can't use this in other way. Total 10 relays could be used.
- 2、 _22 connect with CN3-22 pin of driver, _24connect with CN3-24 pin of driver
- 3、 -,+ connect with brake motor.

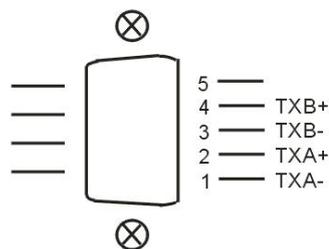
4、-V,+V connect with brake power.

7.4.2 CN22 of bus encoder connect with DB15



Signal	Pin	I/O	Function
TXA-	1		Negative signal of A
TXA+	2		Positive signal of A
TXB-	3		Negative signal of B
TXB+	4		Positive signal of B
PA-	5	IN	Negative signal of encoder A
PA+	6	IN	Positive signal of encoder A
PB-	7	IN	Negative signal of encoder B
PB+	8	IN	Positive signal of encoder B
PC-	9	IN	Negative signal of encoder Z
PC+	10	IN	Positive signal of encoder Z
+24V	12/14	OUT	24V power supply
0V	11/13	OUT	Ground of power
+5V	9/11/13	OUT	5V Power

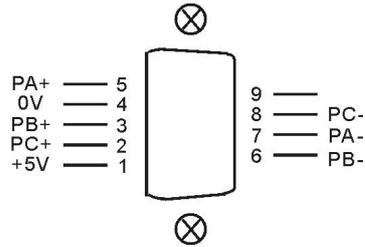
7.4.3 CN23 of bus driver connect with DB9



Signal	Pin	I/O	Function	Effective power
0V	4	OUT	Ground of power	0V
+5V	1	OUT	5V Power	+5V
PA+	5	IN	Positive signal of A	5V
PA-	7	IN	Negative signal of A	

PB+	3	IN	Positive signal of B	5V
PB-	6	IN	Negative signal of B	
PC+	2	IN	Synchronization signal positively of Z	5V
PC-	8	IN	Synchronization signal negatively of Z	

7.4.4 CN9 of spindle orthogonal encoder connect with DB9

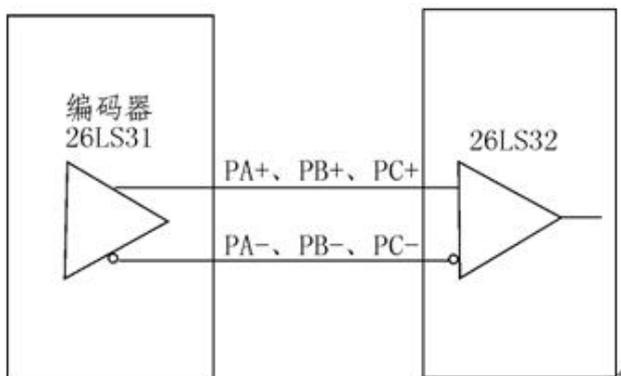


Signal	Pin	I/O	Function	Effective power
0V	4	OUT	Ground of power	0V
+5V	1	OUT	5V Power	+5V
PA+	5	IN	Positive signal of A	5V
PA-	7	IN	Negative signal of A	
PB+	3	IN	Positive signal of B	5V
PB-	6	IN	Negative signal of B	
PC+	2	IN	Synchronization signal positively of Z	5V
PC-	8	IN	Synchronization signal negatively of Z	

Pay attention:

- 1、 Output signal of encoder use long-wire output mode, power is +5V.
- 2、 Signal wire must use shielded twisted pair cable, the length can't be over 20m.

Schematic diagram of input signal PA、 PB、 PC of encoder:



Chapter 8 Debugging

8.1 Steps

- 1、 Ready before debugging;
- 2、 Set No.56 number of driver;
- 3、 Modify PLC according to the requirement;
- 4、 Test the motor when power on, not alarm;
- 6、 Relative parameter of machine: Reduction ratio、 Length of link rod、 coupling relation、 Reversal gap;
- 7、 Set parameter of motor in controller: Absolute encoder;
- 8、 Zero point of robot;
- 9、 Soft limited of each joint;
- 10、 Power on to check the joint coordinate;
- 11、 Set error of location;
- 12、 Accuracy of location;
- 13、 Backup parameter;
- 14、 Test for working;

8.2 Ready for working

Must check the connection before debugging.

- 1、 Make sure the power supply is right(3 phase 380V, ground,sectional area of cable);
- 2、 Make sure the power supply of driver and controller is right(Isolation,220V,sectional area of cable);
- 3、 Make sure the voltage of brake is right, and it's DC voltage;
- 4、 Make sure all signal and connection are right(Driver, encoder use Shielded twisted pair wire, other signal use normal shielded wire)
- 5、 Check all route of connection(Especially AC power, DC24V power, encoder use 5V power);
- 6、 Try to power on:Level by level to power on.

8.3 Set parameter of driver

- 1、 Code: P1=1(Default);
- 2、 Set No.56 parameter of driver in each joint, set as 1-8 correspond to J1-J6\Xs\Ys;

3、 Save the parameter;

Pay attention:

Restart power, the circle in front of coordinate need to be green, otherwise some problems with bus, please check the set and cable.

8.4 Set relative parameter of machine

8.4.1 Controlling type of controller

1) Type of robot, it is better to make sure the type of robot before ordering.No.330 other parameter to set robot, 11 means weld, 12 means palletizing, 13 means painting.

2) Controlling mode of robot, could control 20 kinds of robot, use No.451 other parameter to specify, only to check , can't be modified.

0: Means the standard function of CNC controller, could control the robot of loading and unloading, also could be held controller of engraving machine.

262: Means 2 axis SCARA;

363: Means 3 axis SCARA;

440: Means 4 axis rotating joint non parallelogram robot;

441: Means 4 axis rotating joint parallelogram robot;

442: Means 4 axis palletizing parallelogram robot, the same as RMD of GSK;

464: Means 4 axis SCARA;

480: Means 4 axis Delta;

565: Means 5 axis SCARA;

600: Means 6 axis serial joint robot;

601: Means 6 axis parallelogram robot;

666: Means 6 axis SCARA;

2600: Means 8 axis serial joint robot;

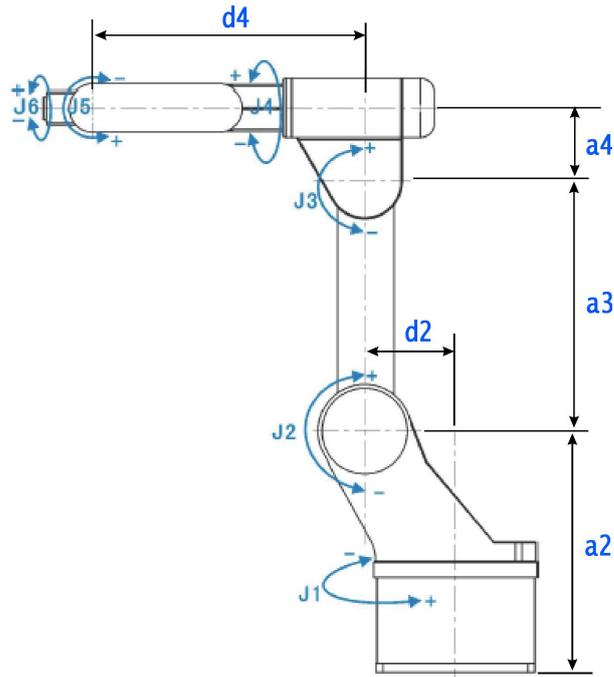
2601: Means 8 axis parallelogram robot;

8.4.2 Length of link rod, No.351-No.366 other parameter, No.461-No.376

for error compensation

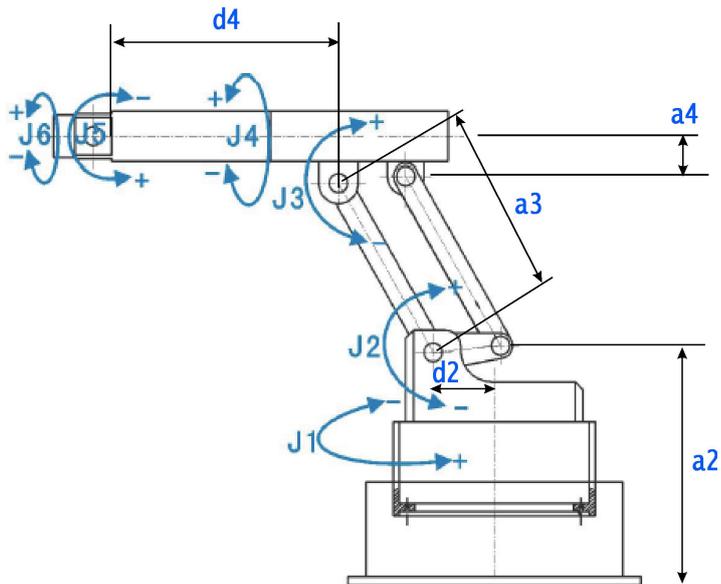
Name for parameter : “a” means vertical distance between joint; “d” means horizontal distance between joint;“L” means length of link rob. a3 means the vertical distance between zero point of J2 and zero point of J3; d5 means the horizontal distance between zero point of J5 and zero point of J4;La means length of slave, Lb means length of active.

No.351-No.366 axis parameter to set link rob of each axis, No.461-No.476 parameter to set error compensation of link rob,parameter could be different according to different structure of machine.



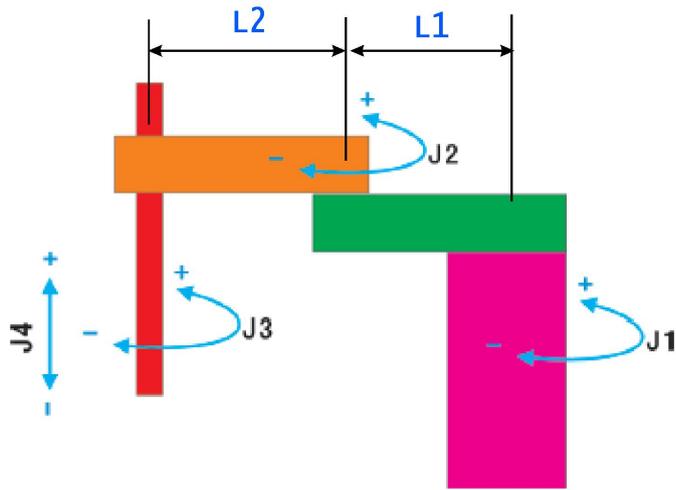
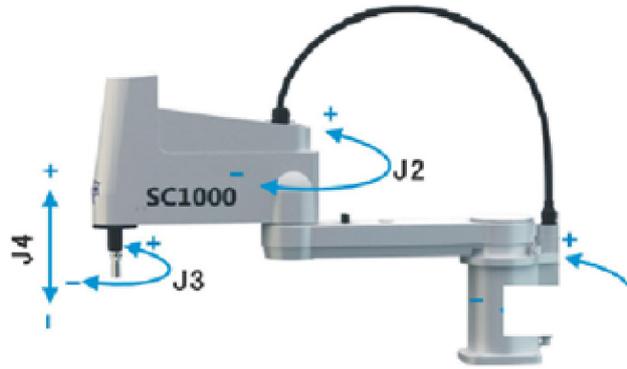
Robot1 6 axis serial joint robot(P451=600 or 2600)

Pay attention: a2 could be not specified, e2 could be 0

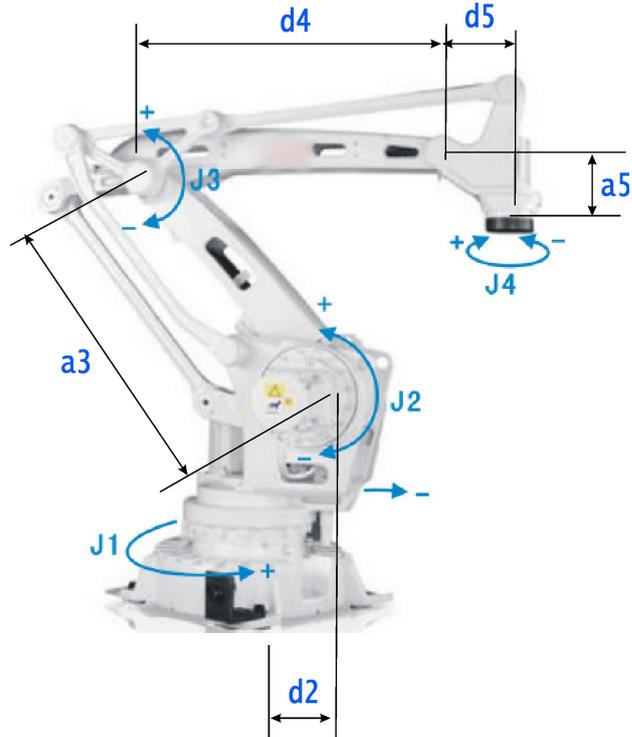


Robot2 Six axis parallelogram robot(P451=601 or 2601)

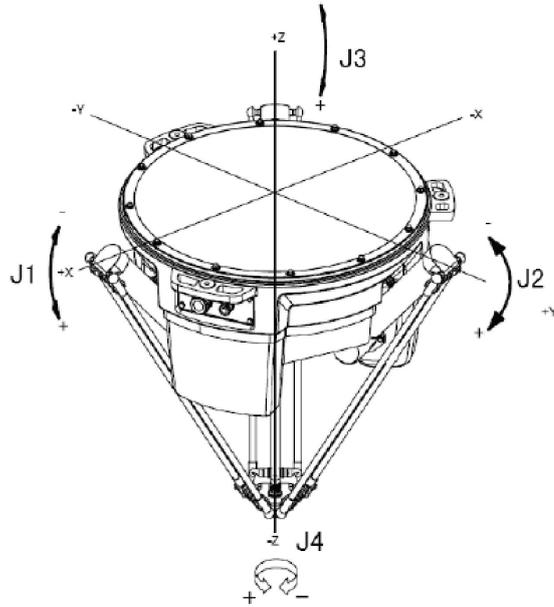
Pay attention: a2 could be not specified, e2 could be 0



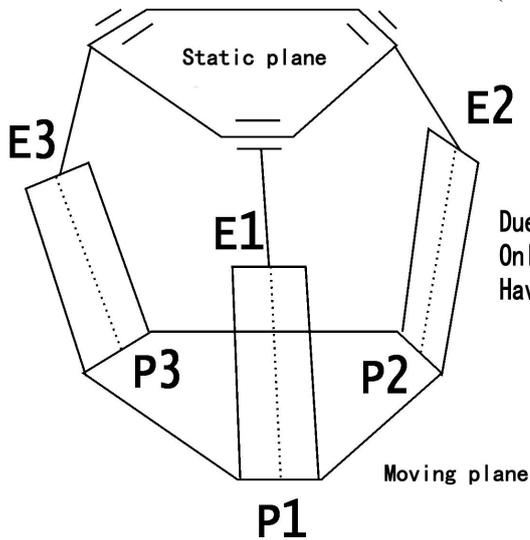
Robot3 4 axis SCARA(P451=464)



Robot4 4 axis rotary joint palletizing robot(P451=441)



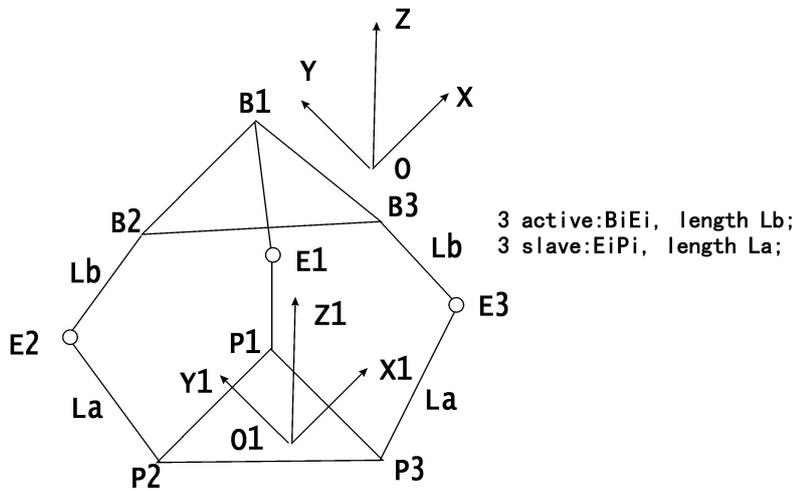
Robot5-1 4 axis Delta(P451=480)



Due to the action of three parallelogram,
Only 3 direction(XYZ) move in moving plane,
Haven' t got motion of rotation axis.

=

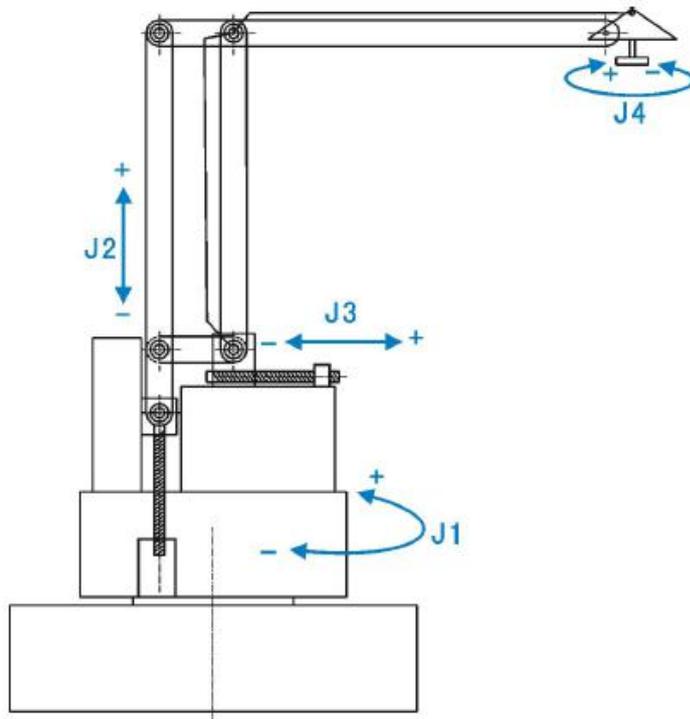
Robot5-2 4 axis Delta(P451=480)



3 active: $B_i E_i$, length L_b ;
3 slave: $E_i P_i$, length L_a ;

Robot5-3 4 axis Delta(P451=480)

La means length of slave, Lb means length of active;
 Rmax means size of static plane(Centre to vertices of equilateral triangle);
 Rmax means size of moving plane(Centre to vertices of equilateral triangle).



Robot6 Four axis palletizing parallelogram robot (P451=442)

8.4.3 Reduction ratio of machine, relative parameter No.44-No.60

1、 Calculation of electrical gear of vertical multi-joint robot

1) 、 P44=0;

2) 、 Numerator of electrical gear:

J1-J6\Xs\Ys correspond to P45\P47\P49\P51\P53\P55\P57\P59, reduction ratio is x1000.

Example: Reduction ratio of J1 is 121, then No.45=1210000;

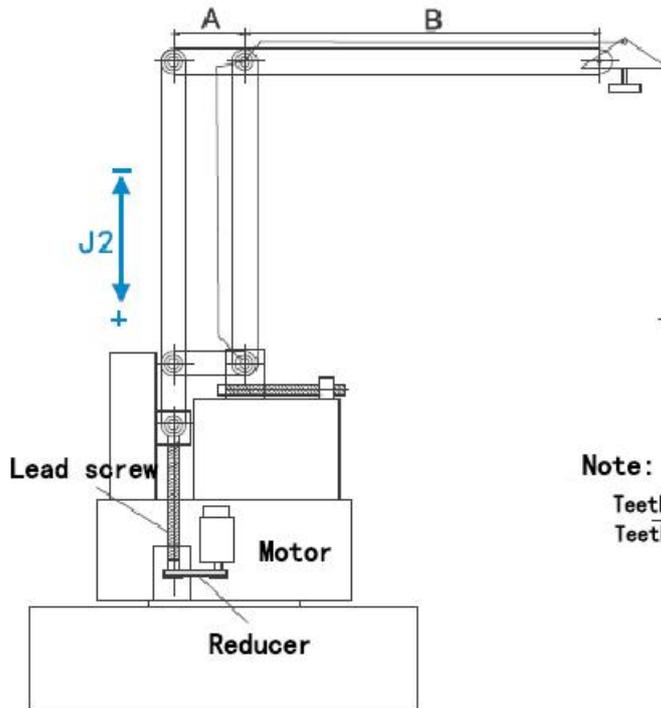
3) 、 Denominator of electrical gear:

A、 J1-J6 correspond to P46\P48\P50\P52\P54\P56, set as 36000000;

B、 Xs\Ys correspond to P58\P60, if it is rotation axis then set as 36000; If it is straight line axis, then set as 10000.

2、 Calculation of electrical gear of palletizing robot

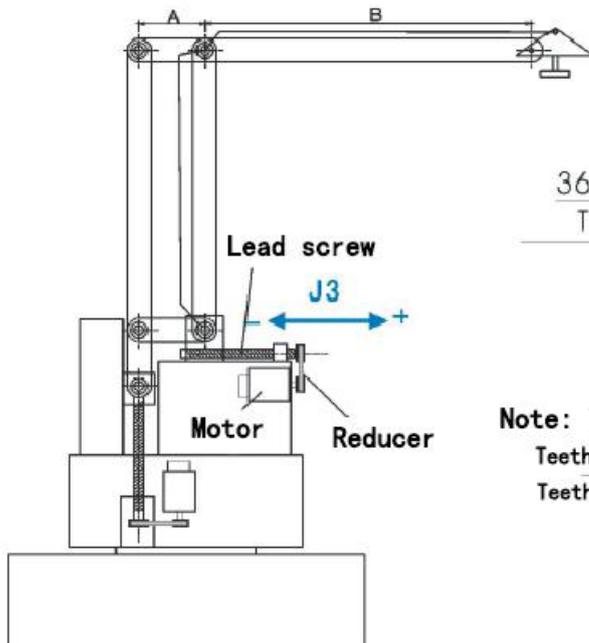
The setting way of J1、 J4 axis is the same as robot 1-3. The set of reduction ratio of J2、 J3 as follow:



$$\frac{\frac{360}{T} \times \frac{\text{Teeth of screw}}{\text{Teeth of motor}}}{\frac{B}{A}}$$

Note: T is screw pitch, unit:mm
 Teeth of screw
 Teeth of motor : Reduction ratio of reducer

Calculation of reduction ratio J2 of robot 4



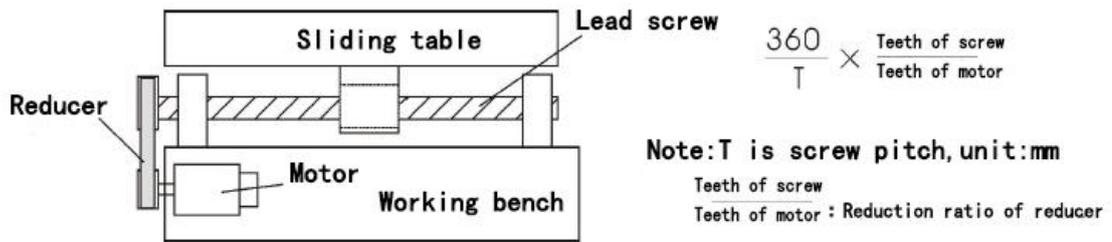
$$\frac{\frac{360}{T} \times \frac{\text{Teeth of screw}}{\text{Teeth of motor}}}{\frac{A+B}{A}}$$

Note: T is screw pitch, unit:mm
 Teeth of screw
 Teeth of motor : Reduction ratio of reducer

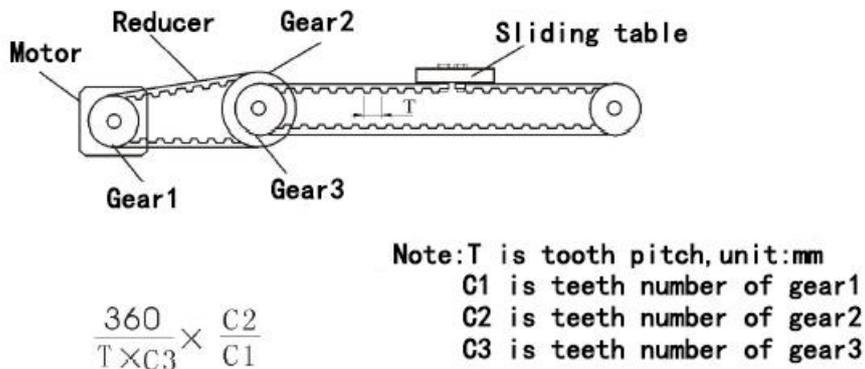
Calculation of reduction ratio J3 of robot 4

3、 Calculation of electrical gear in straight line axis 4 of robot:
 Straight line axis is different according to the structure, two kinds usually: Lead screw, gear drive(Synchronous pulley).

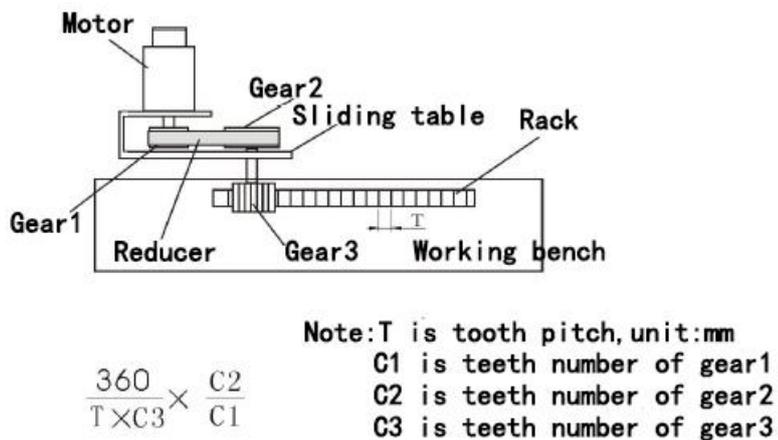
Calculation of reduction ratio of lead screw



Calculation of reduction ratio of lead screw



Calculation of reduction ratio of gear drive(Synchronous pulley)(1-3 axis of reciprocating machine is set as this)



Calculation of reduction ratio of rack drive

8.4.4 Coupling relation, relative other parameter No.375-No.385

Coupling relation of robot solve the structure problem, move an joint separately, the other joint will follow move with ratio relation, if need this joint not move, then it will give the compensation pulse to let it stay, example: J5J6 coupling, J6 moves

when J5 moving, this movement is the distance of J5 times numerator and divide by denominator.

No.P375 is parameter to set this function.

D2=1 +4 means J1J2 got coupling relation, No.376 and No.377 is numerator and denominator of coupling;

D3=1 +8 means J3J4 got coupling relation, No.378 and No.379 is numerator and denominator of coupling;

D4=1 +16 means J4J5 got coupling relation, No.380 and No.381 is numerator and denominator of coupling;

D5=1 +32 means J5J6 got coupling relation, No.382 and No.383 is numerator and denominator of coupling;

D6=1 +64 means J4J6 got coupling relation, No.384 and No.385 is numerator and denominator of coupling;

1、 J5J6 got coupling relation in vertical multi joint serial robot、 parallelogram robot;

2、 J4J5 and J5J6 got coupling relation in Vertical mulit-joint L wrist robot;

3、 SCAR is composite lead screw, the reduction ratio is 360/T of lead screw;

4、 Palletizing without coupling;

5、 The 4th 5th axis got coupling in pole coordinate robot;

6、 The 4th 5th axis got coupling in reciprocating machine1;

7、 The 4th 5th axis got coupling in reciprocating machine2;

8.4.5 Reversal gap, relative axis parameter No.30-No.37

Use to set when J1-J6/Xs/Ys axis move reversal, the drive got reversal gap.Unit: μm .

8.5 Each axis parameter of driver in controller

1、 Direction of motor

No.38-No.43 axis parameter set the motor direction of J1-J6/Xs/Ys;

2、 Mode of floating back to zero point

No.62=1111111011 in axis parameter to set each axis;

3、 Bus absolute function

No.300=111111110 in other parameter, if it is absolute motor, then set as 1;

4、 Address of absolute encoder

No.301=92,No.302=91,No.303=90 in other parameter;

5、 Number of pulse when motor in each cycle

P304/P305/P306/P307/P308 in other parameter=131072,correspond to

J1-J6/Xs/Ys joint;

6、 Coordinate distance when motor in each cycle

Set P309/P310/P311/P312/P313=360000000 in other parameter which correspond to J1-J6/Xs/Ys joint, set as 10000000 if it is straight line axis;

7、 The reduction ratio of motor in each cycle

Set P320/P321/P322/P323/P324=reduction ratio in other parameter which correspond to J1-J6/Xs/Ys joint;

8、 Direction and coordinate of machine :

1) Move J1-J6 in teach, remember the corresponding coordinate of joint;

2) MDI to run M500, read the absolute coordinate to see it is the same as before or not, if not the same, then change the symbol of P309/P310/P311/P312/P313 in other parameter, example: J1 is not the same, then P309=360000000, change it into P309=-360000000;

3) Repeat step 1) 2) two times until the coordinate is the same;

Pay attention:

The little circle should be green when using M500 to read, otherwise the bus is something wrong, please check the set and cables.

9、 Zero point of robot joint

Move J1-J6/Xs/Ys near the zero point in teach mode, set P314/P315/P316/P317/P318 in other parameter(correspond to J1-J6/Xs/Ys axis), press “Enter”, then press “E” to clear, set this position as the zero point of joint.

10、 Set soft limit of each joint

P18-P29 axis parameter to set soft limit of each joint;

11、 Set error of location and position

1) Error of position

If need make sure the location position, when PL=0 in program, controller will wait the motor until it reaches to the position; PL≠0, not to wait.

It will takes time of program, this is about driver parameter, strong rigidity, reasonable, short time.

Set parameter of driver, No.511-No.588 correspond the relative parameter.

(1) P511/P521/P531/P541/P551/P561/571/P581 correspond to No.8 parameter of J1-J6/Xs/Ys the bigger value the bigger current;

(2) P512/P522/P532/P542/P552/P562/572/P582 correspond to No.9 J1-J6/Xs/Ys, the bigger value the bigger noise;

(3) P513/P523/P533/P543/P553/P563/573/P583 correspond to No.10 J1-J6/Xs/Ys, the bigger value the bigger vibration;

(4) P514/P524/P534/P544/P554/P564/574/P584 correspond to No.11 J1-J6/Xs/Ys, the bigger value the stronger rigidity, more accuracy;

2) The error of position

This error is in PLAY or remote mode, the error between ideal position and thereal feedback position. It will be alarm when over the set.

(1) Electrical gear of feedback

Other parameter P210-P214=10000, correspond to the numerator of J1-J6/Xs/Ys;

Other parameter P215-P219=131072, correspond to the denominator of J1-J6/Xs/Ys;

(2) The error of alarm

Could use this in highly requirement for accuracy, other parameter P200-P204 correspond to J1-J6/Xs/Ys joint, if the tracking error is over set in progress, it will be alarm; Other parameter P205-P209 correspond to J1-J6/Xs/Ys,if the tracking error is over set when stopping, it will be alarm

Pay attention :

Error of position usually be used in case of circuit fault, wrong parameter, wrong driver to cause wrong motion, in case of crushing.

12、 Set other parameter P41 in controller, backup the current parameter

No.42 to restore the parameter.

8.6 Calibration accuracy of location and repeat location of robot

1、 First calibration

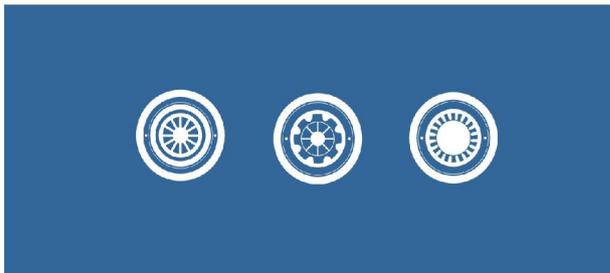
In teach mode, switch into world coordinate, move X Y Z to check it is straight or not, if not straight, then need to check electrical gear of driver, number of pulse in controller, reduction ratio, link rod parameter.

2、 Accuracy calibration

Edit a segment to run straight, run the segment with a reference to see it is straight or not.Or use measure to check.

8.7 Continuous running test of robot

Teach edit program with different posture of robot, continuous to run and check the tracking error of each axis is changing or not, the same position can't be over 2 unit changes.



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