



Program Editor Instruction Manual for GR Painting Robot Series.

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CMA

CMA (WUHU) Robotics Company Limited

Supplier of Intelligent Painting Robots

Statement

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This manual is an indispensable part of the whole manual collection and all the professionals involved in operation, teaching, maintenance, and inspection are required take CMA special training on the knowledge instructed by the following manuals:

- ☐ ZL-GR-001-V1: Safety Manual for GR Painting Robot Series.
- ☐ ZL-GR-002-V1: Maintenance Manual for GR Painting Robot Series.
- ☐ ZL-GR-003-V1: Explosion Protection Manual for GR Painting Robot Series.
- ☐ ZL-GR-004-V1: Remote Assistance Manual for GR Painting Robot Series.
- ☐ ZL-GR-005-V1: IO Communication Instruction Manual GR Painting Robot Series.
- ☒ ZL-GR-006-V1: Program Editor Instruction Manual for GR Painting Robot Series
- ☐ ZL-GR6150-001-V1 Installation and Connection Instruction Manual for GR6150 Painting Robot.
- ☐ ZL-GR6150-002-V1 Mechanical Operation and Maintenance Manual for GR6150 Painting Robot.
- ☐ ZL-GR6150-003-V1 Electrical Operation and Maintenance Manual for GR6150 Painting Robot.
- ☐ ZL-GR6150-004-V1: Electrical Schematic Diagram for GR6150 Painting Robot.

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About the Manual

The target readers of the manual include professionals involved in robot operation, maintenance, and technical service. This manual intends to explain how to use the program editor for all the GR painting robots designed by CMA. The warning pictograms are classified into four categories, “danger”, “caution”, “attention” and “important” respectively. These warnings are relevant to safety and must be observed.

 Danger	Danger! This warning means death might occur, if an operation is not properly performed.
 Caution	Caution! This warning means death or severe physical injury might occur, if an operation is not properly performed.
 Attention	Attention! This warning means minor physical injury or minor material damage may occur, if an operation is not properly performed.
 Important	Important! This warning means special attention should be paid to a certain operation.

Warnings titled by “attention” might also lead to severe consequence in different cases. Therefore, it is strongly recommended that anything titled by “attention” should be handled with extreme caution.

- Please read the manual and the files attached carefully and master all the required knowledge about the robot and the safety instructions before use.
- A cover or safety shield is taken out only for the purpose of illustration. Please ensure to restore the cover or safety shield before any operation.
- The figures and photos contained in this manual are for the purpose of illustration only and they might be different from the product purchased.
- The manual is subject to change without prior notice for the purpose of product improvement, specification change and instruction update.
- The manual will be reissued and a new version number will be specified if the contents are renewed.
- Contact the service department with the information printed on the back cover to purchase a new manual if the present one is damaged or lost.
- CMA is not responsible for any consequence caused by any unauthorized modification or change of the robot.

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Chapter One Preface

1.1 Introduction to Control Cabinet

The main power switch and the cabinet lock are installed on the front and the Ethernet interface and USB interface are located on the side of the control cabinet.



1.2 Program Editor

The teach pendant is an interactive equipment between the operator and the robot. An operator can complete all the designed functions of a robot through the teach pendant, such as manual jogging, programmed jogging, and IO configuration etc.



Item	Parameters
Display size	6.5 inches
Touch screen	Yes
Function keys	E-stop、Rocker handle、Mode Switch (Manual or Auto) ,31 keys
Power	DV24V
Working conditions	Environment Temperature: -20°C~70°C



Tool	Function
	Mode switch
	Rocker handle



E-stop button

The half-ring handle of the teach pendant can be held by a left hand or right hand.



Three-staged press switches are installed on both sides of the teach pendant. Stage 1: Servo-OFF, Stage 2: Servo-On, Stage 3: Servo-OFF

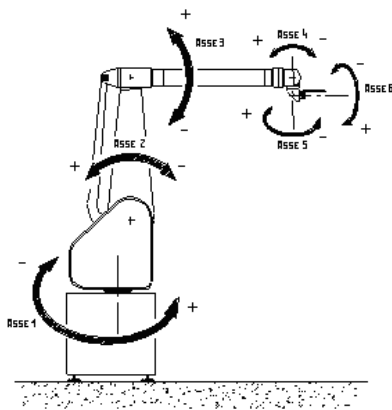


1.2.1 Key Function Description

Motion Control Keys



Keys	Functions
	Enable or disable the motor
	Clear the alarms
	Move the robot in the negative direction



	Move the robot in the positive direction
	Choose an auxiliary axis

The left side figure illustrates the positive or negative movement of the robot axis.



Warning

Mandatory: Please ensure the motion space of the robot is safe before any operation.

1.2.2 Display Keys



Keys	Functions
	Auto spray
	Manual spray
	Start to run in the Auto mode
	Operation suspended
	Operation terminated
	Operation completed
	Wash cycle

1.2.3 Function keys



The keys illustrated above have different functions in different categories. The functions are shown above the keys.

Chapter Two CMA.net Introduction

2.1 Introduction

CAM.net is the controlling software of CMA painting robots which integrates the operator-robot interaction and motion control. The current version number is 14.0.2. The navigation bar includes menus of “Main Frame”, “Files”, “Diagnosis”, “Log” and “Settings”.

2.2 Software Main Frame

Main		Manual	
		Teaching	Create a new file
			Load a file
			Edit a file
	Auto	REG	Speed
			Spray distance
			Running time
			Program progress
		LIST	Add
			Parameter
			REP
			Clear
			Save
			Input
			Repeat
		AO	Analog output

Diagnostics	Motion axis	Motion axis	Encoder
			Motion information
			Motor information
	Auxiliary axis	Delivery device	
		Auxiliary axis	Encoder information
			Motion information
			Motor information
		Advanced instruction	
	Digital input	Digital input 1	

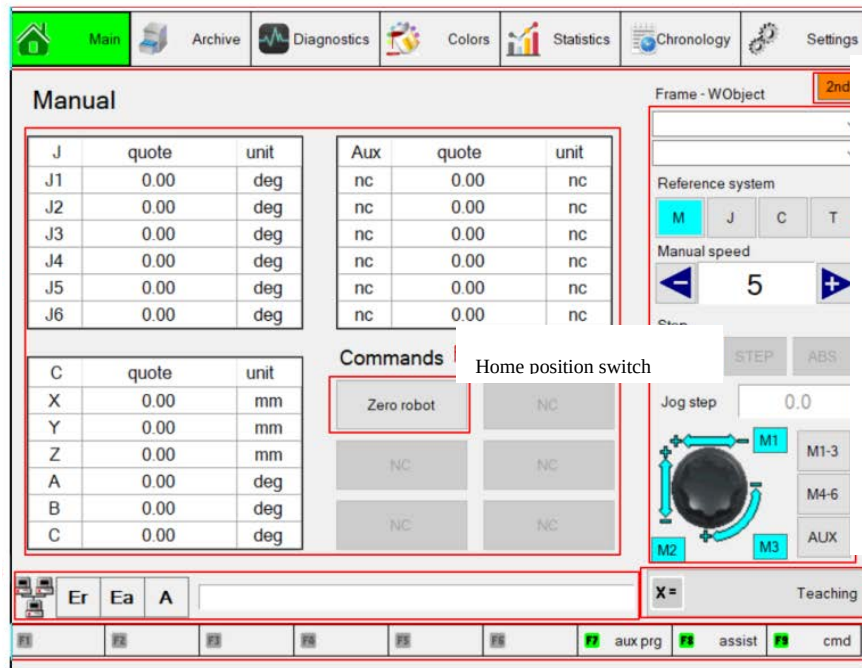
		Digital input2
		Digital input3
		Digital input4
		Digital inputProfibus
	Digital output	Digital output1
		Digital output2
		Digital output3
		Digital output4
		Digital outputProfibus
	Analog	Analog
		PID par
	Modbus input	
	Color	Receipts
		Washing cycles
		Advanced
	User-defined instruction	
		Output signal forced
	Advanced instruction	Synchronization
		Motor clutch ON
		Wash cycle
		Home position data management
		Riavvio CPU

Setting	Tool parameters configuration	
	User parameters configuration	
	Wash cycle	
	Auto balance system	
	ProgramMapping	
	Brush Table	
	Advanced settings	Hardware
		Axis
		Config
		Model
		Limits
		Analog
		Conveyor
		Free in
		Free out
		Com
		Security
		Language
		Service
		Axps

Archives	CART	Create
		Delete
		Rename
		Update
		Export
		Restore
	PROG	Properties
		Delete
		Rename
		Copy
		Move
		Export
		Restore

(1) Manual Mode

Main frame switch

Robot coordinates and
advanced instructionsRobot status and alarm
Auxiliary keys

Auxiliary axis

Coordinate switch

Teaching speed

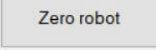
Motion type

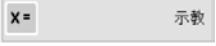
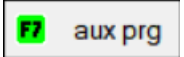
Foot length

Rocker handle

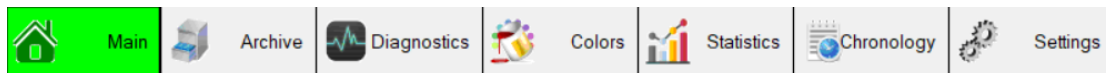
Teaching switch

Teaching button

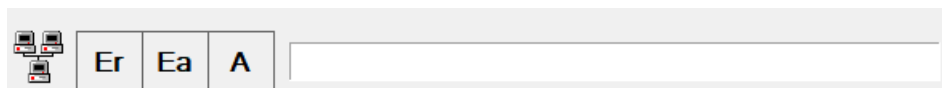
Keys	Functions
	Switch to the main frame
	Double click on the button and all the six joints move to the home position.
	Users can control the motion of the auxiliary axis by pressing the keys “+”or “-” on the teach pendant when this button turns orange.
	Electric motor mode
	Joint coordinate system
	Rectangular coordinate system
	Tool coordinate system
	Increase or decrease the teaching speed by pressing the keys “+”or “-”.

	Hold the keys “+” or “-” to control the motion of the robot.
	Press the keys “+” or “-” to control the robot to move with a set foot length.
	Press the keys “+” or “-” to control the robot to move to the set point.
Jog step 0.0	Click on the textbox to configure the distance or position parameter.
	Control the first 3 axes with the rocker handle.
	Control the second 3 axes with the rocker handle.
	Control the auxiliary axis by the rocker handle.
 示教	Switch to teaching mode.
	Minimize the display window

The navigation bar includes menus of “Main Frame”, “Files”, “Diagnosis”, “Statistics”, “Log” and “Settings”. The chosen menu is displayed with a green background.



Status monitor and alarm display include the following information, such as robot communications, robot motor servo status, auxiliary axis motor servo status, alarm display and alarm confirmation.



Icons	Status
	Indicate whether the communication between the robot and the controller is turned on or off.
	Indicate whether the robot motor servo is on or off.
	Indicate whether the auxiliary axis motor is on or off.
	Indicate whether the alarm information is confirmed.

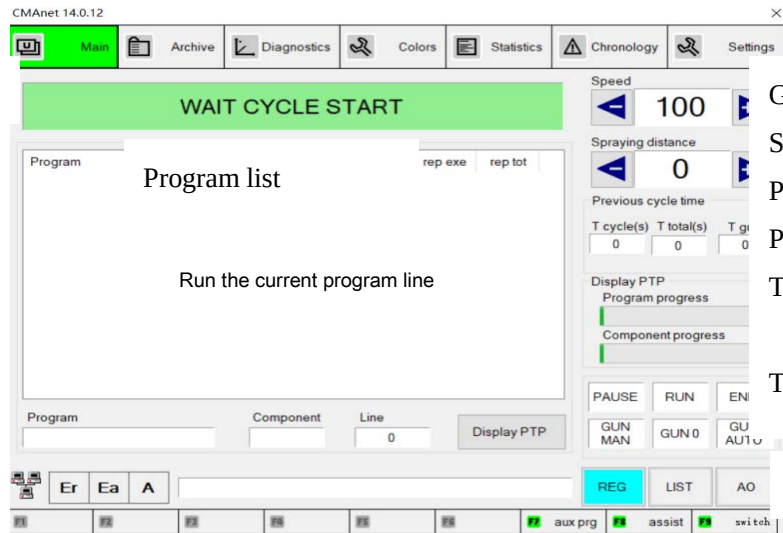
Display the latest alarm message.

(2) Auto Mode

Turn the mode switch to Auto mode on the teach pendant and enter the Auto mode interface.

The running status of the robot

Program name



Global speed

Spray distance

Program information

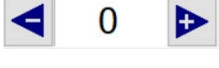
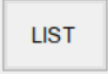
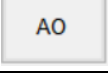
Progress information

The current status of the robot

The current status of the painting gun

Common parameters

Enter the display page of the current program line details

Keys	Functions
Display PTP	Display the details of the current program line.
	Increase or decrease the global speed by pressing the keys “+” or “-”.
	Increase or decrease the spray distance by pressing the keys “+” or “-”.
	Common parameters. The color blue signifies the current status.
	Display the operation list of the chosen program segment.
	Analog Output

WAIT CYCLE START

Program	par	cmp exe	cmp tot	rep exe	rep tot
WASH.csv	0	0	0	0	1

Program

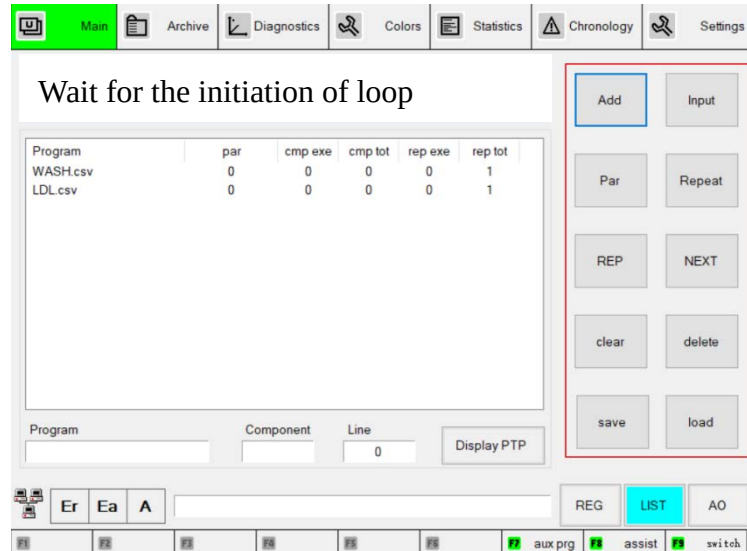
Component

Line

Display PTP

Parameters	Definitions
Program	Program name
Parameter	The parameter configuration of a program.
Program segment	A segment in a program being executed.
Total number	The total number of the segments in a program.
Times looped for	Display the times that the program has been looped for.
Planned loop times	Set the times that the program is to be looped for.

Click on LIST to enter the program segment configuration page.

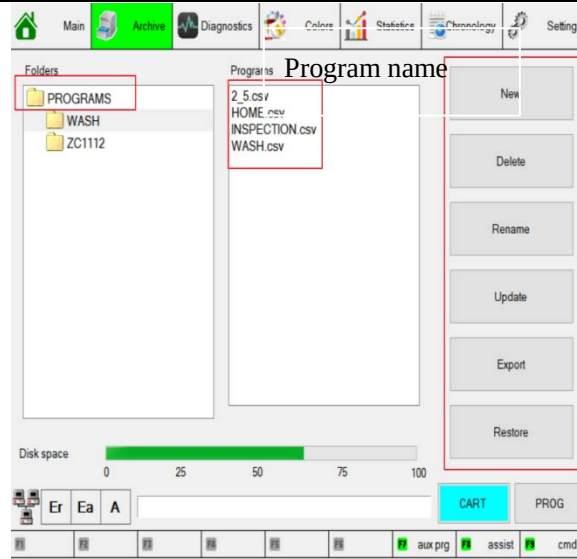


Keys	Function Description
Add	Add a new program to the program tree and the added routine will be displayed in the last line.
Par	Configure the program parameters.
Repeat	Set the repetition times of a single program.
REP	Set the loop time of a set of programs.
NEXT	Execute the next loop.
Clear	This is used to empty the current program list.
Delete	Delete the chosen program from the program list.
Save	Save the loaded programs in the program list and the saved programs will be executed automatically when the robot is restarted next time.
Load	Load the programs saved in the program list.

(3) Archives

Click on Archives on the navigation menu to switch to the CART configuration page.

Program path



Create a new file holder

Delete a file holder

Rename a file holder

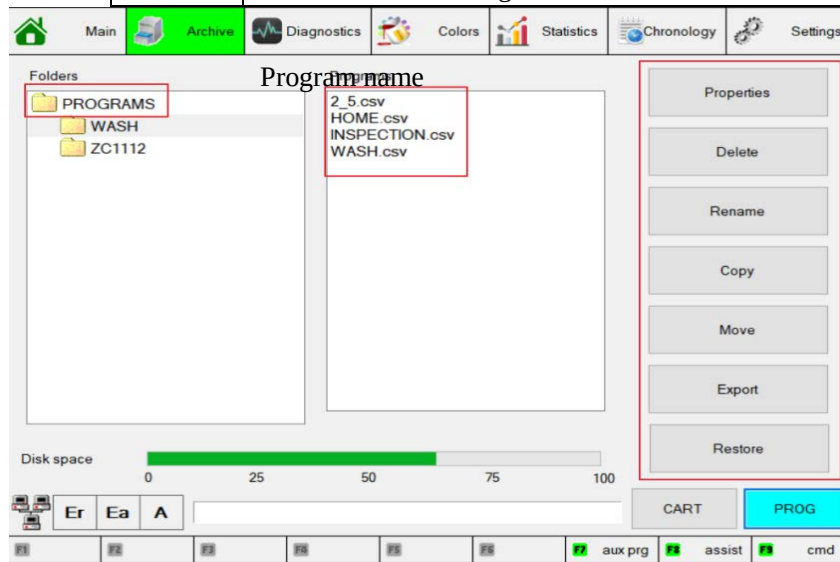
Refresh a file holder

Back up all the configuration data including spraying programs

Restore a saved configuration

Keys	Functions
Create	Create a new file holder.
Delete	Delete a file holder.
Rename	Rename a file holder.
Refresh	Refresh a file holder.
Export	Back up all the configuration data including spraying programs.
Restore	Restore a saved configuration.

Program path



Display the program properties

Delete a program

Rename a program

Copy a program

Move a program to another file holder

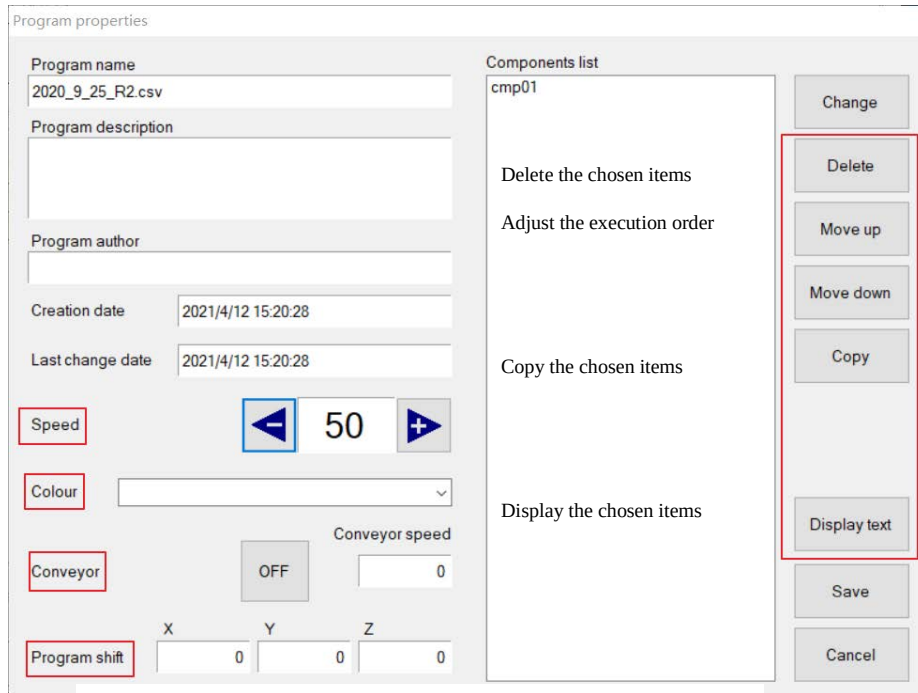
Export a program to an external device

Restore a program from an external device

Keys	Functions
Properties	Display the program properties.
Delete	Delete a program.
Rename	Rename a program.
Copy	Copy a program.

Move	Move a program to another file holder.
Export	Export a program to an external device.
Restore	Restore a program from an external device.

Click on PROG to enter the configuration page.

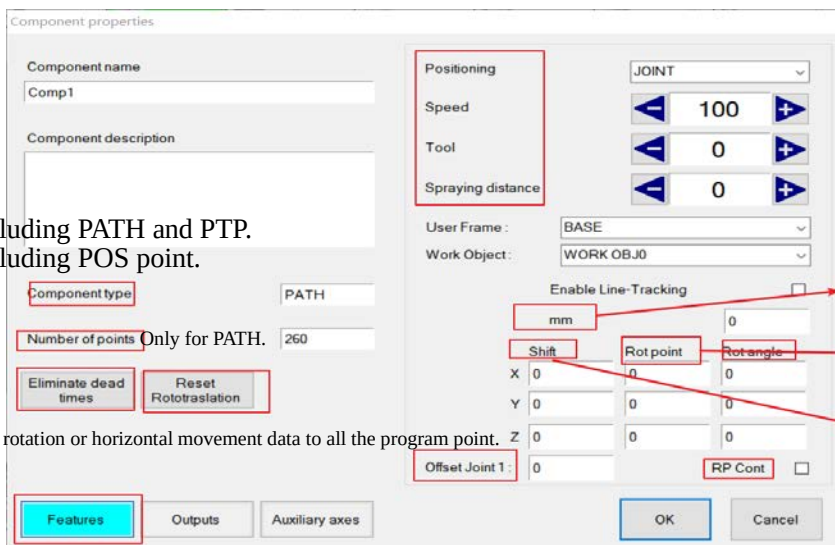


Check and set the execution speed.

Click on Program shift to switch between the teaching mode and the test mode. The conveyor moves in the teaching mode and holds still in the test

Set the parameters for X/Y/Z axis to configure the deviation range.

Click on Edit to enter the detailed configuration page.



Set the type for the first calibration point.

Set the motion speed for the chosen items.

Set the X/Y/Z coordinates in the tool coordinate system.

Set the distance between the painting gun and the work piece.

Set the distance between the work piece and the conveyor.

Set the rotation point and angle.

Set the position of the program in the robot coordinate system.

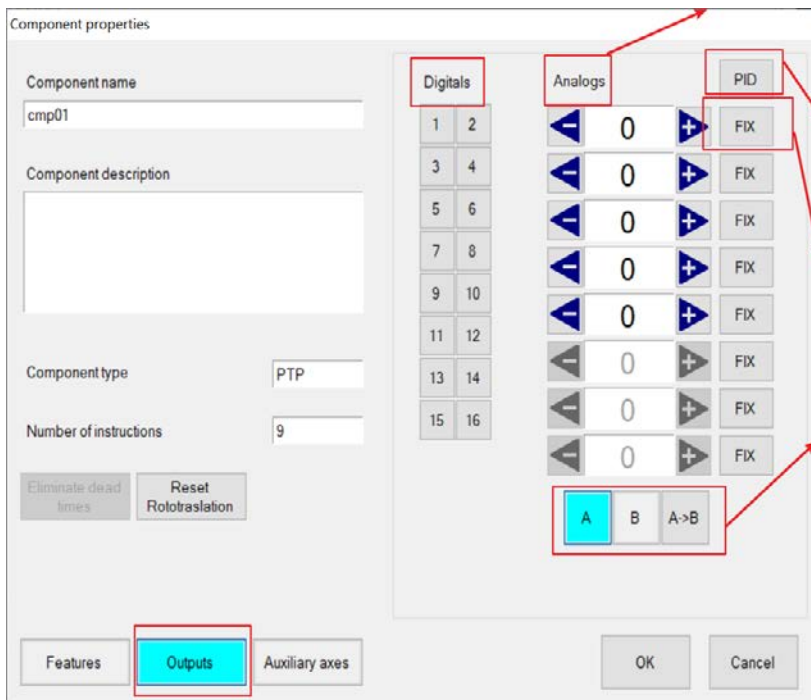
Spray program generated from CMA offline programming.

Including PATH and PTP.
Including POS point.

Apply the rotation or horizontal movement data to all the program point.

Click on Edit to enter the detailed configuration page (output configuration) .

The first digital output is for the spraying gun.



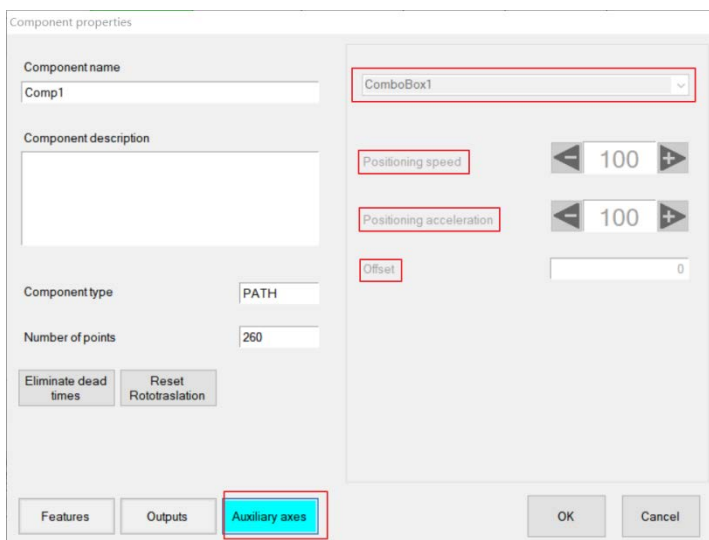
The first three analog outputs are used to control the spraying speed, atomization and range (Range can be configured if a CAPV device is available.)

Configure the proportional, integral and differential control of the output. This function can be done if an extra device is equipped.

Configure the analog output for the chosen items during the entire process.

Control the analog output either with the parameters set in group A or in group B. The third key is used to copy the parameters of group A to group B.

Click on Edit to enter the detailed configuration page (auxiliary axis configuration) .



Select the auxiliary axis whose base parameters need to be edited.

Set the speed for the auxiliary axis to move the calibrated point.

Set the acceleration speed for the auxiliary axis to move the calibrated point.

The deviation is relevant to the original point set by the program.

(4) Diagnostics

Click on Diagnostics to enter the configuration page.

Axis information:

- 1.Encoder information
- 2.Motion information
- 3.Electric motor information

Joint

Motor

Absolute Encode

Cartesian Coordinate System

P Act(w): Current power
P Max: Maximum allowable power

Ten modules under diagnosis

Click on Motion Information to enter the configuration page.

Current error

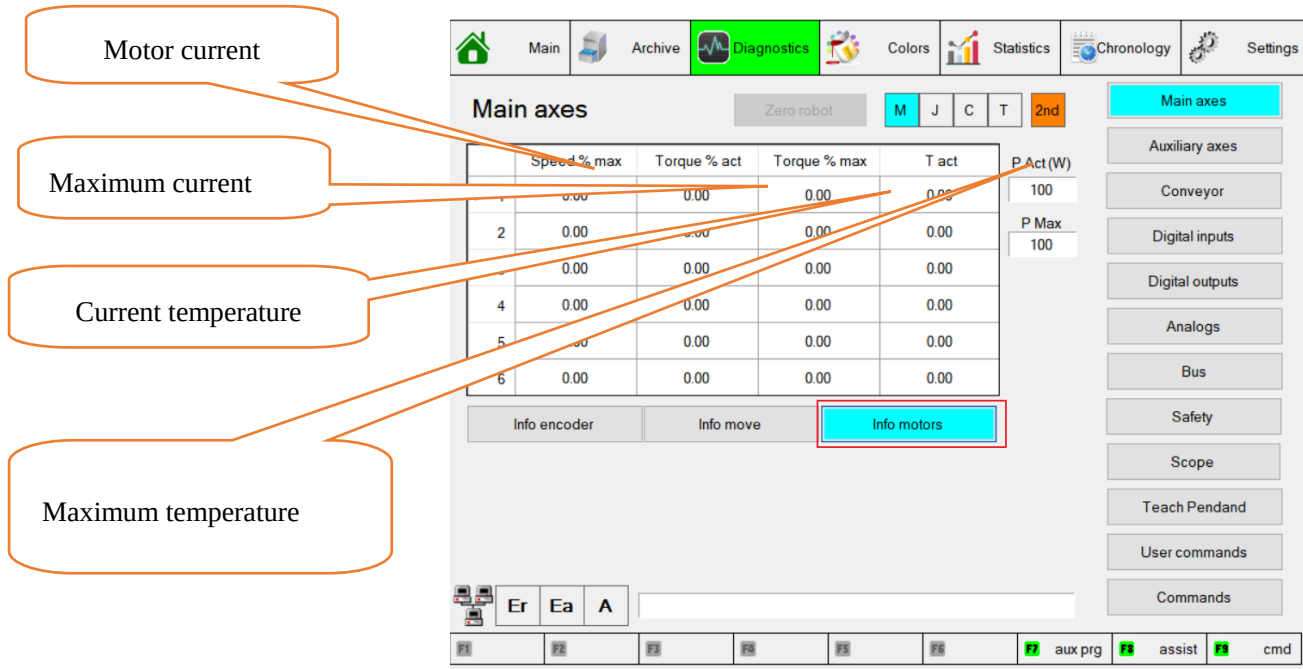
Maximum error

Current velocity

Maximum velocity

Info move

Click on Electric Motor Information to enter the configuration page.



Motor current

Maximum current

Current temperature

Maximum temperature

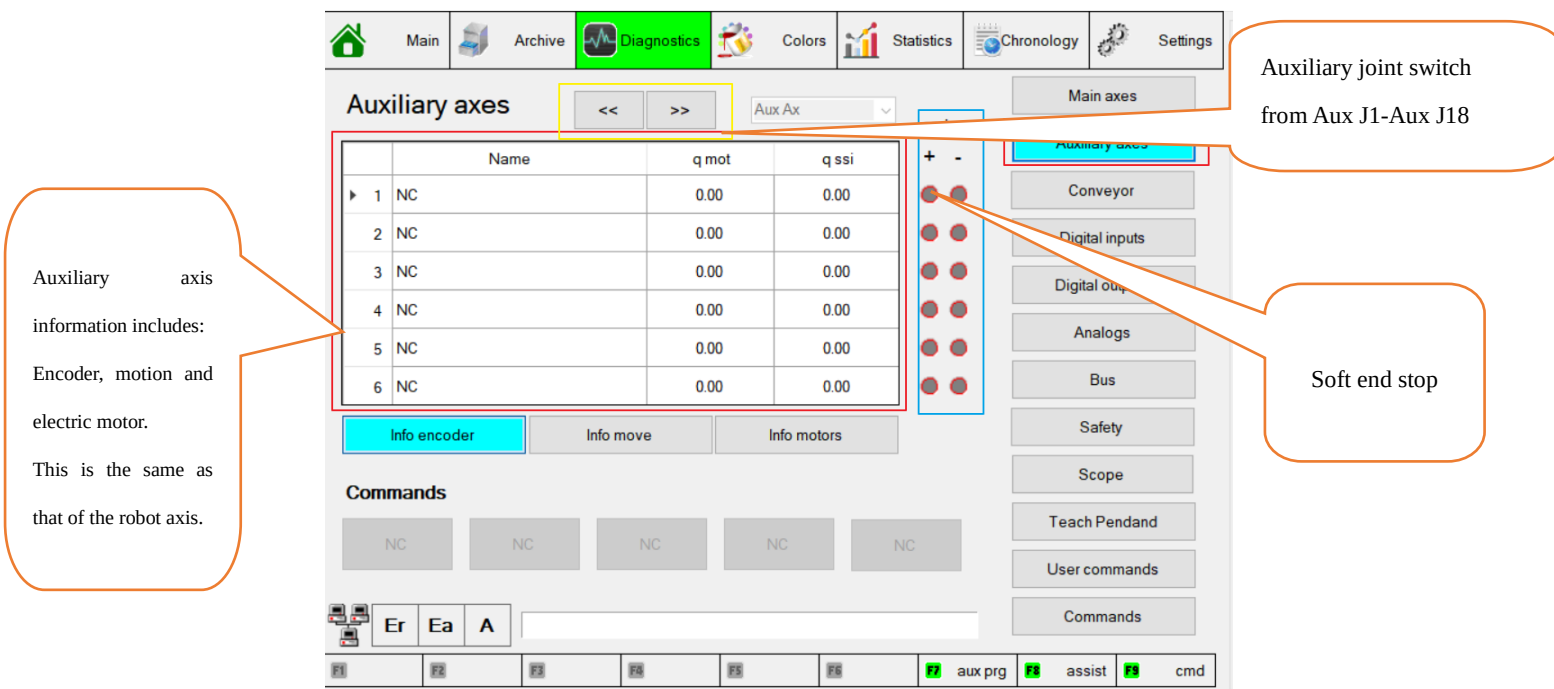
	Speed % max	Torque % act	Torque % max	T act	P Act (W)	P Max
1	0.00	0.00	0.00	0.00	100	100
2	0.00	0.00	0.00	0.00		
3	0.00	0.00	0.00	0.00		
4	0.00	0.00	0.00	0.00		
5	0.00	0.00	0.00	0.00		
6	0.00	0.00	0.00	0.00		

Info encoder Info move Info motors

Er Ea A

F1 F2 F3 F4 F5 F6 F7 aux prg F8 assist F9 cmd

Click on Auxiliary Axes from the list on the right side to enter the auxiliary axes encoder configuration page where the both the motion information and the electric motor information can be checked.



Auxiliary joint switch from Aux J1-Aux J18

Soft end stop

Auxiliary axis information includes:
Encoder, motion and electric motor.
This is the same as that of the robot axis.

	Name	q mot	q ssi
1	NC	0.00	0.00
2	NC	0.00	0.00
3	NC	0.00	0.00
4	NC	0.00	0.00
5	NC	0.00	0.00
6	NC	0.00	0.00

Info encoder Info move Info motors

Commands

NC NC NC NC NC

Er Ea A

F1 F2 F3 F4 F5 F6 F7 aux prg F8 assist F9 cmd

Click on Conveyor from the list on the right side to enter the conveyor configuration page.

Conveyor

Conveyor parameters:

mm: Current location of the conveyor belt

Vm/min: Velocity (meter/minute)

Step: Previous step

Act mm: Location of current step

n st: Number of starting signals received

OFF: Turn the conveyor on or off

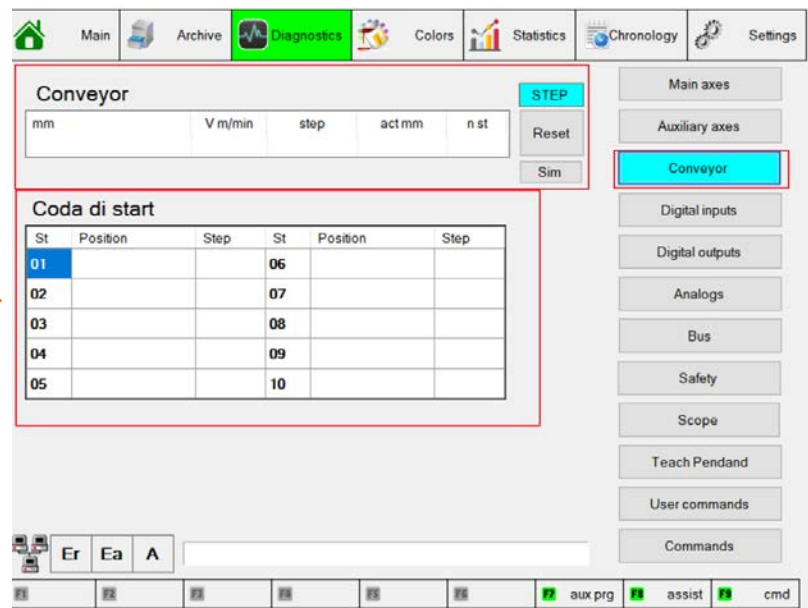
Sim: Simulated test

Start queue:

St: Signal number

Position: Location

Step: Previous step



St	Position	Step	St	Position	Step
01			06		
02			07		
03			08		
04			09		
05			10		

Click on Digital Inputs from the list on the right side to enter the digital inputs configuration page.

Digital input configuration:

Digital input 1

Digital input 2

Digital input 3

Digital input 4

Digital input profibus

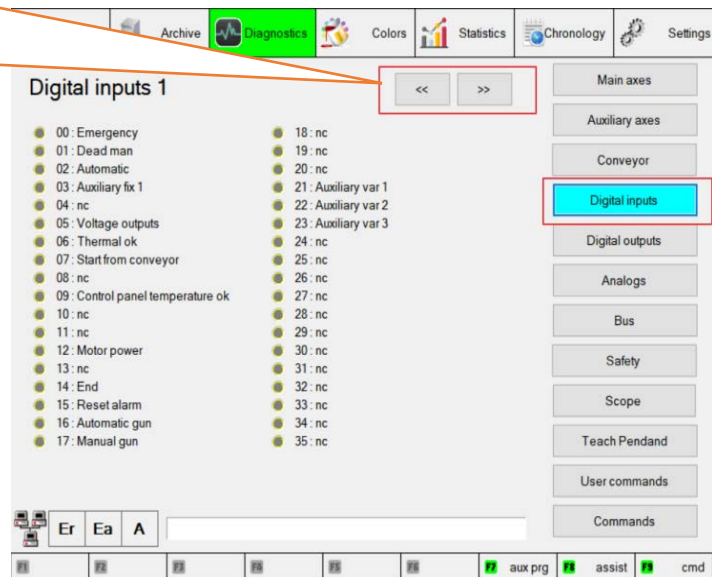
Digital input (Signal for the robot from an external device)

There are 180 inputs which match the free in signals under advanced setting.

1-43: Yellow: electric cabinet and robot.

44-59: Green: drag teaching and CAPV.

60-71: Blue: CCO. 72-83: Purple: other



Signal	Signal
00: Emergency	18: nc
01: Dead man	19: nc
02: Automatic	20: nc
03: Auxiliary fix 1	21: Auxiliary var 1
04: nc	22: Auxiliary var 2
05: Voltage outputs	23: Auxiliary var 3
06: Thermal ok	24: nc
07: Start from conveyor	25: nc
08: nc	26: nc
09: Control panel temperature ok	27: nc
10: nc	28: nc
11: nc	29: nc
12: Motor power	30: nc
13: nc	31: nc
14: End	32: nc
15: Reset alarm	33: nc
16: Automatic gun	34: nc
17: Manual gun	35: nc

Click on Digital Outputs from the list on the right side to enter the digital outputs configuration page.

Digital output configuration:

Digitaloutput 1

Digitaloutput 2

Digitaloutput 3

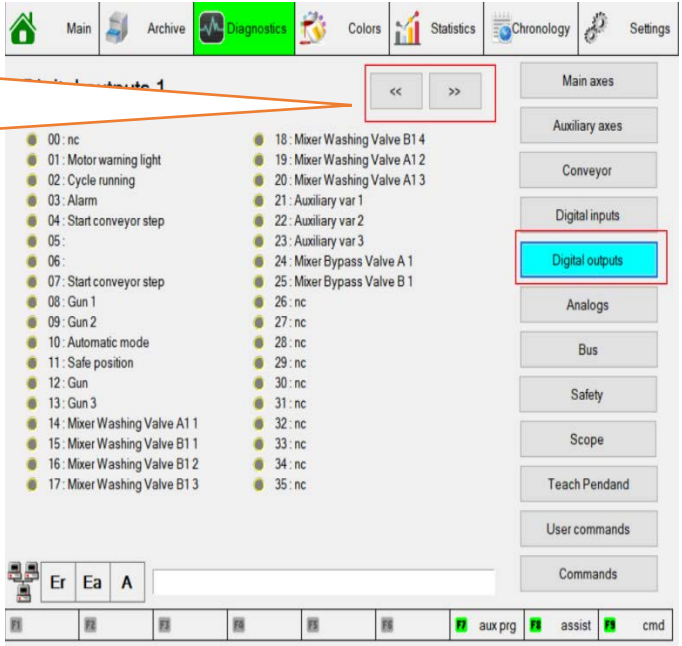
Digital output 4

Digital output profibus

Digital output (Signal foran external device from the robot)

There are 180 outputs which match the free out signals under advanced setting.

1-43: Yellow: electric cabinet and robot. 44-59: Green: drag teaching and CAPV. 60-71: Blue: CCO. 72-83: Purple: other functions.



Click on Analogs from the list on the right side to enter the analog input /output configuration page.

COLORE: Spray flow

ATOMIZZAZIONE: Atomization

VENTAGLIO: Spray range

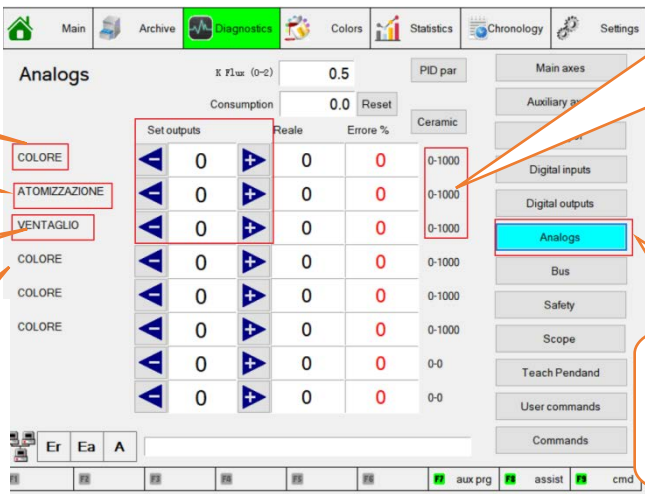
COLORE: S Analog output range:0-1000

Normal input air pressure:6 bars

Unit 1=0.006 bars

Analog output range:0-10000

Refer to Analog in advanced settings for more details.



Click on Teach Pendant from the list on the right side to enter the teach pendant configuration page.

The robot axes and their status can be monitored and controlled in this interface.

GUN MAN: Use the gun in manual mode

GUN AUTO: Use the gun in Auto mode

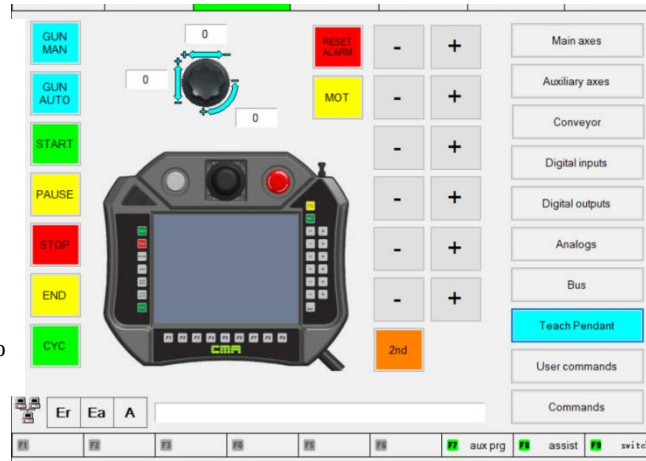
START: Start to the Auto mode

PAUSE: Pause the Auto mode

STOP: Stop the Auto mode

END: End the Auto mode

CYC: Confirm whether to loop the Auto



RESET ALARM: Clear and reset the alarms

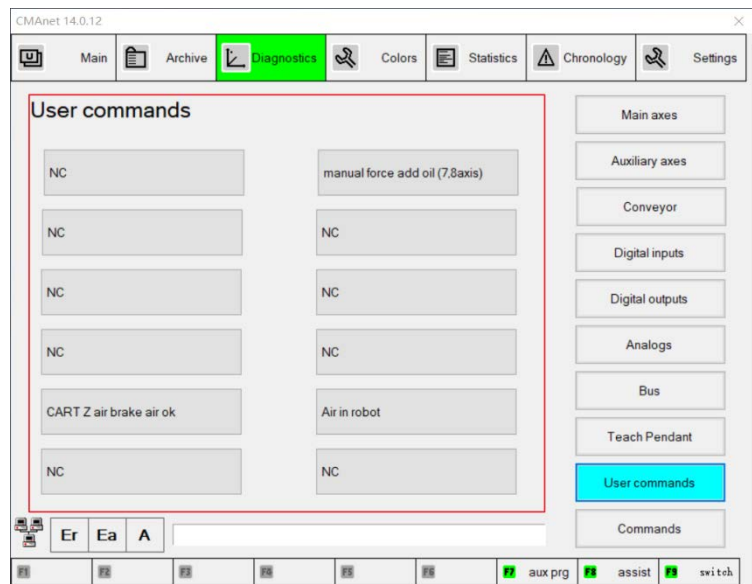
MOT: Confirm whether to turn the servo on

This key is used to jog both robot axes and the auxiliary axes

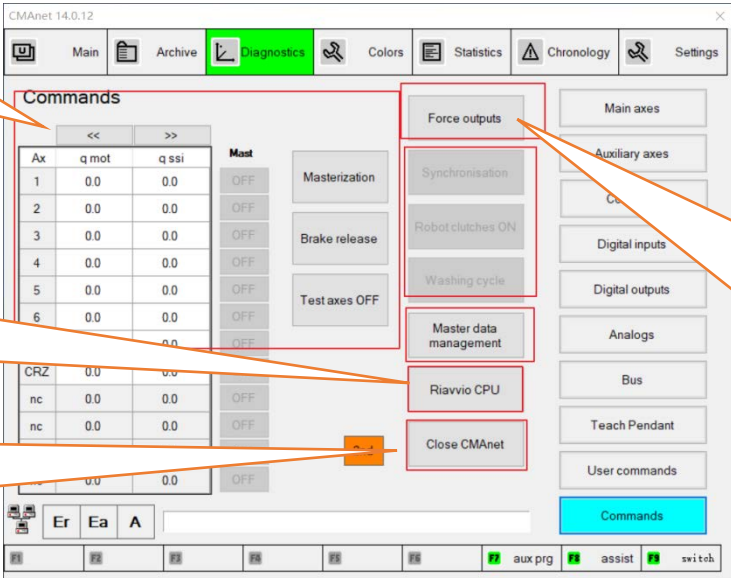
Press on 2nd to switch between the robot axes and the auxiliary axes

Click on User Commands from the list on the right side to enter the user-defined instruction page. Input ports numbered 132-143 can be customized. Configure the corresponding functions in free in under the advanced settings.

Customized instructions are mainly used for robot debugging. Customized instructions are configured in debugging a certain logical function if the desired physical input is unavailable.



Click on Advanced Instructions from the list on the right side to enter the corresponding configuration page.



Home position test
Brake test and single joint test

Restart CPU

Close CMAAnet

Click to enter the force outputs configuration and check the output signal status.

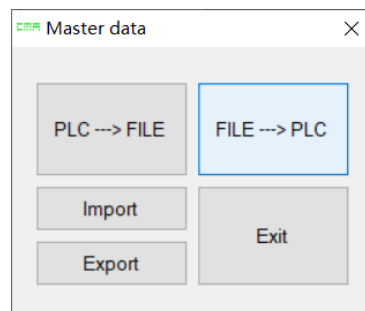
The screenshot shows the CMAAnet 14.0.12 interface. The 'Diagnostics' tab is selected. The 'Commands' section on the left contains a table with columns 'Ax', 'q mot', 'q ssi', and 'Mast'. The 'Mast' column has buttons for 'Masterization', 'Brake release', and 'Test axes OFF'. The 'Force outputs' section on the right contains buttons for 'Synchronisation', 'Robot clutches ON', 'Washing cycle', 'Master data management', 'Riavvio CPU', and 'Close CMAAnet'. The 'Commands' button at the bottom right is highlighted in blue.

Enter the forced output signal page and check the signal status

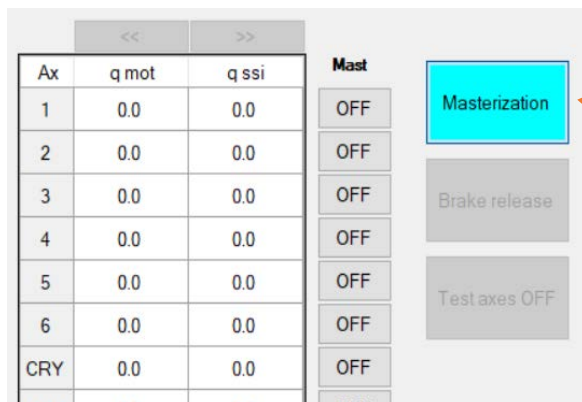
Not activated

Save PLC Save File data

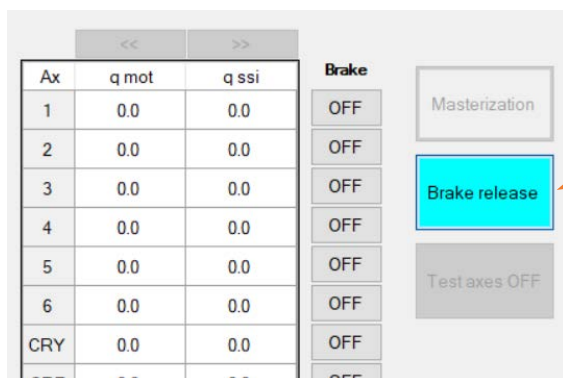
data to file to PLC



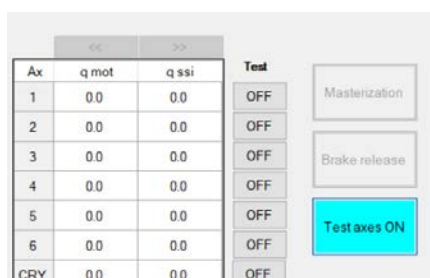
Click on Advanced Instructions, Home Position, Brake Release and Single Joint Test one by one.



Inaccurate home position or part position might occur in robot transportation or operation. Therefore, home position calibration is required. Method: Move the robot to the physical home position by the teach pendant and click on ON/off of each axis.



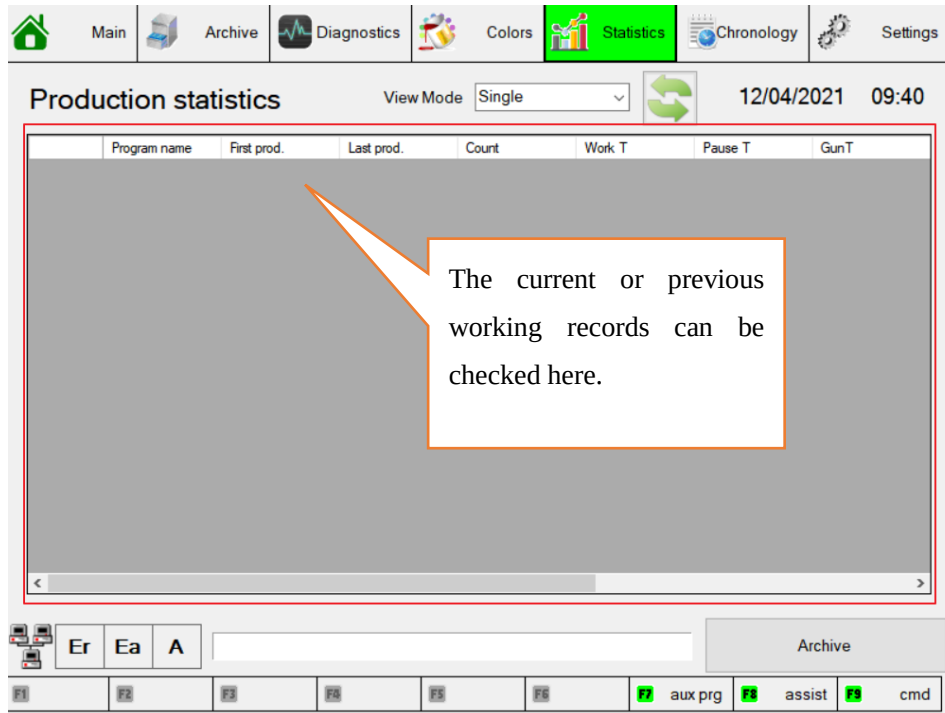
Brake is release for joint inspection in case of an alarm or mechanical malfunction. Warning: Robot damage might occur if axis 2 or axis 3 is not physically supported.



This key is used to test a single joint.

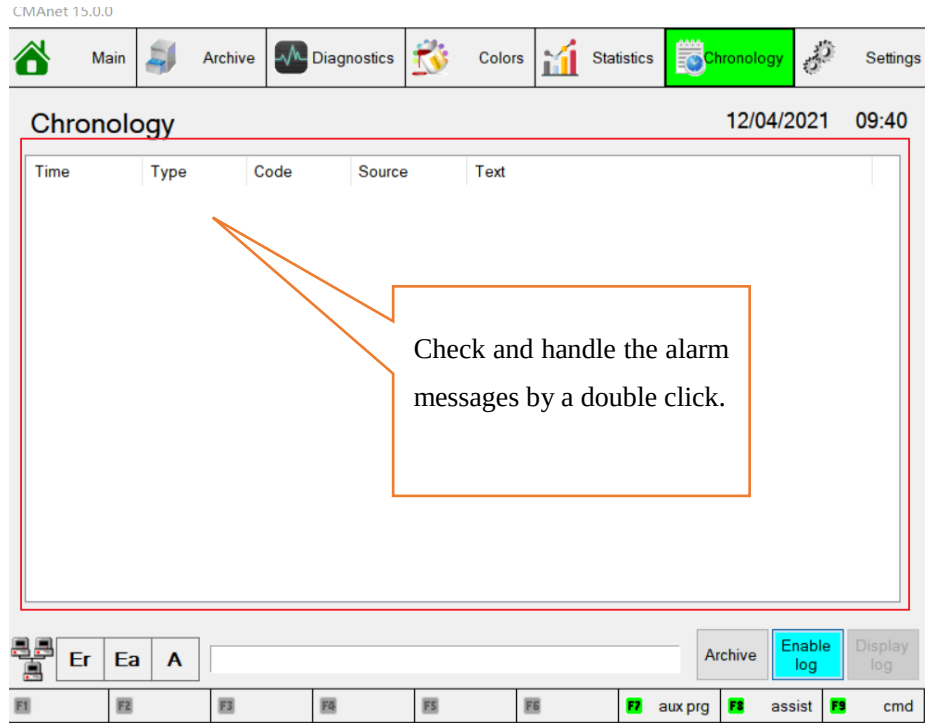
(5) Production statistics

Click on Statistics to enter the corresponding configuration page.



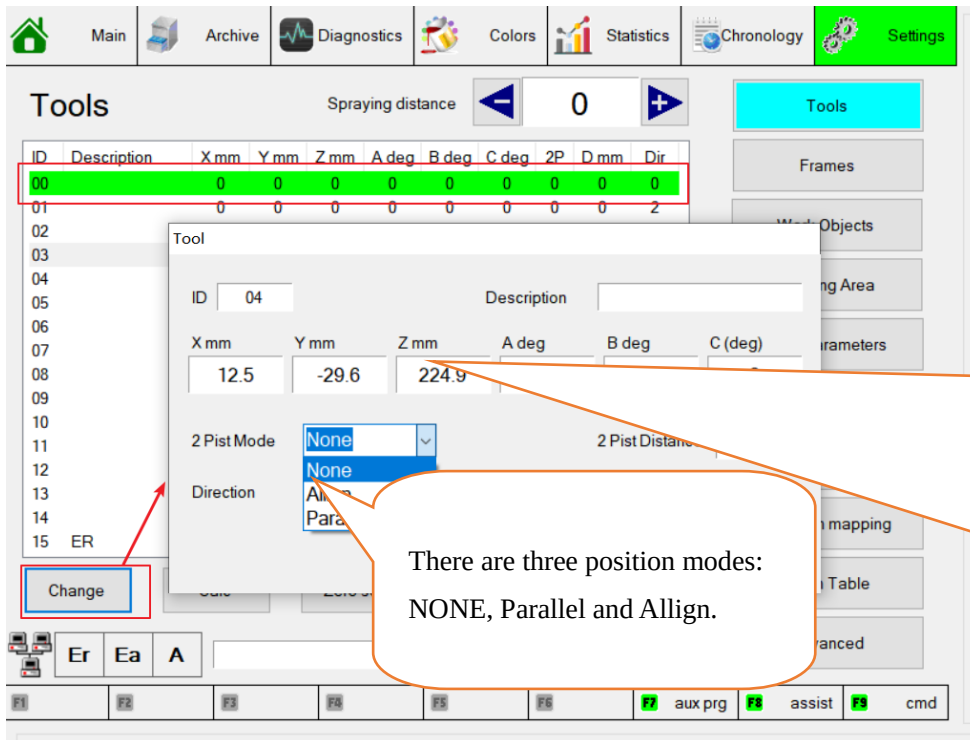
(6) Chronology

Click on Chronology to enter the corresponding configuration page.



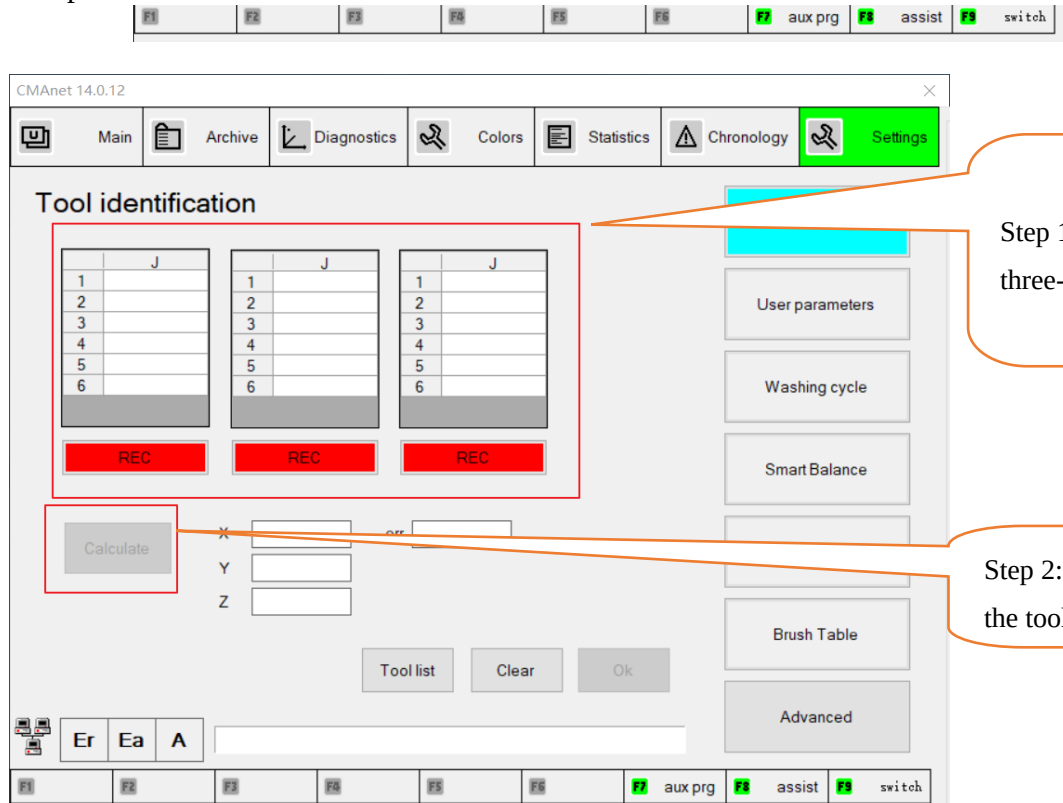
(7) Setting

Click on Setting to enter the corresponding configuration page.

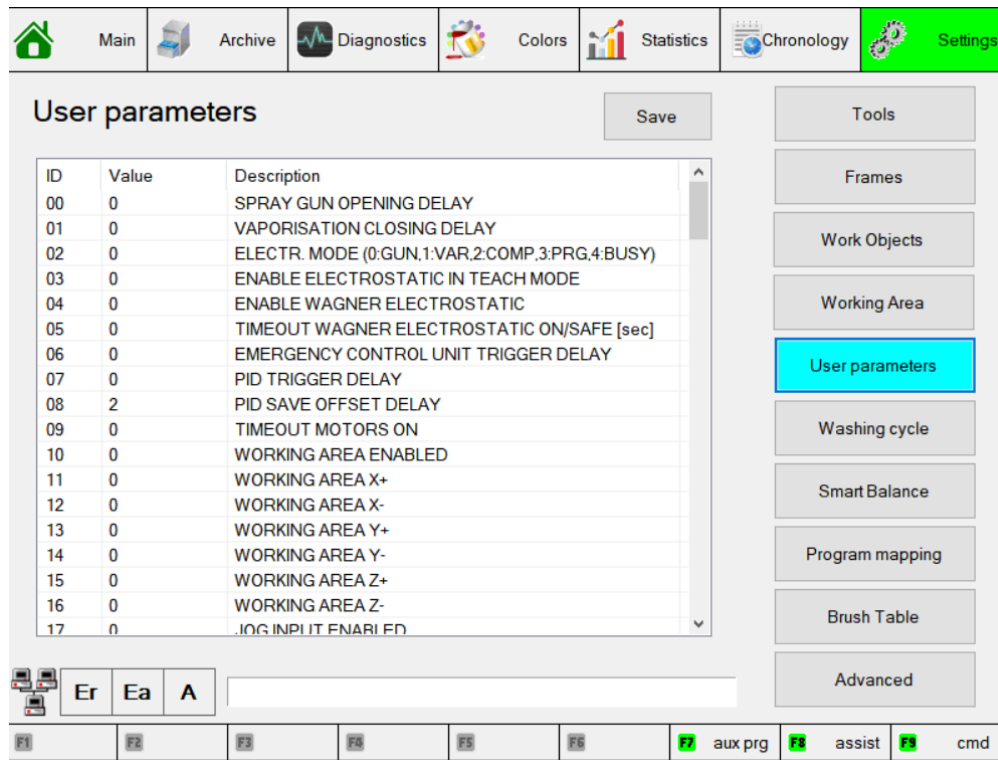


Click to enter Tool configuration. Set the parameters for axes X/Y/Z and for angles A/B/C. In dual gun mode, nozzle distance and direction need to be configured. Axis Z is vertical to the tool end surface. In tool coordinate system, A is rotating around axis Z, and B, around axis X, and C, around axis Y.

Click on Calc in tool configuration page to enter the tool coordinate system interface. Set the tool position with three coordinates.



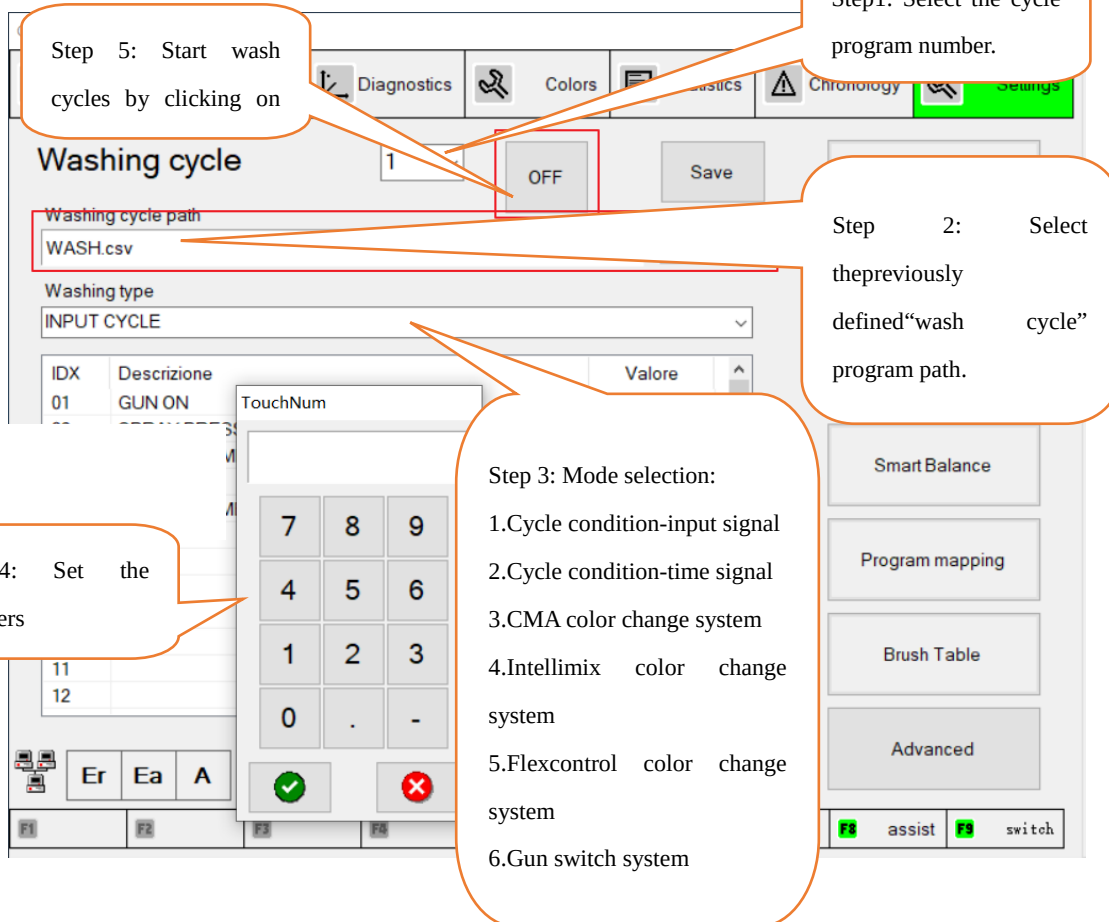
Click on User Parameters to enter the parameter configuration page.



No.	Parameter Function	Remarks
00	Delay to open the spray guns.	The spray guns are delayed after the atomized air is open.
01	Delay to close the atomized air.	The atomized air is delayed after the spray gun is stopped.
02	Electrostatic mode	Electrostatic generator control mode if applicable.
03	Delay to trigger the emergency control unit	The time interval after the emergency control unit is triggered and before the driver is turned off.
04	Delay to trigger PID	Delay to trigger PID controller alarm.
05	Delay to save PID deviation	To reserve space for loading programs in PLC cache.
06	Electric motor run overtime	The electric motor is turned off when the robot performs no task for a set limit of time. The function is disabled if the time limit is set to zero.
07	Working area enabled	The following parameters are used to define the working area for a robot. An alarm occurs and the robot is stopped if the robot moves outside of the

		working area in a program.
08	Working area X+	Refer to parameter #7.
09	Working area X-	Refer to parameter #7.
10	Working area Y+	Refer to parameter #7.
11	Working area Y-	Refer to parameter #7.
12	Working area Z+	Refer to parameter #7.
13	Working area Z-	Refer to parameter #7.
14	Jogging switch enabled	Set the parameter to 1 and jog the robot with the parameters set for the corresponding axis.
15	Loop end pulse	Setting any value other than 0 can generate a set value pulse after robot loop ends. (unit: ms)
16	Loop end pulse handshake	This parameter is used to set a waiting time after loop end pulse handshake. An alarm occurs if no handshake signal is received within the waiting time.

Click on Washing Cycles under setting to enter the corresponding pa



Step 1: Select the cycle program number.

Step 2: Select the previously defined "wash cycle" program path.

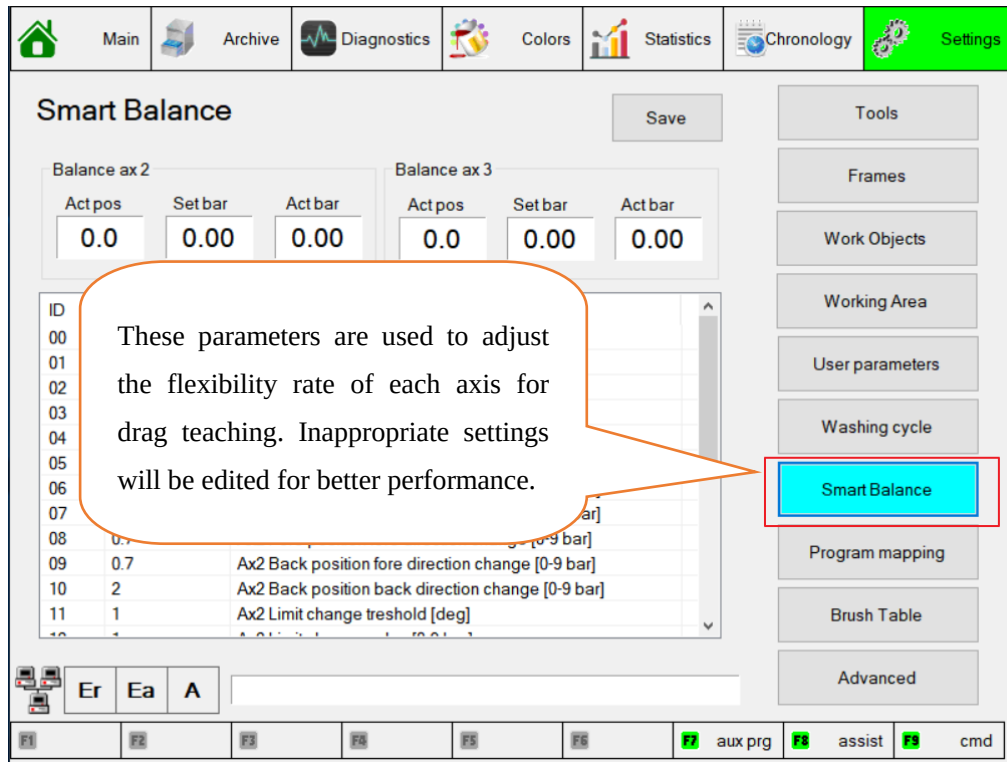
Step 3: Mode selection:

1. Cycle condition-input signal
2. Cycle condition-time signal
3. CMA color change system
4. Intellimix color change system
5. Flexcontrol color change system
6. Gun switch system

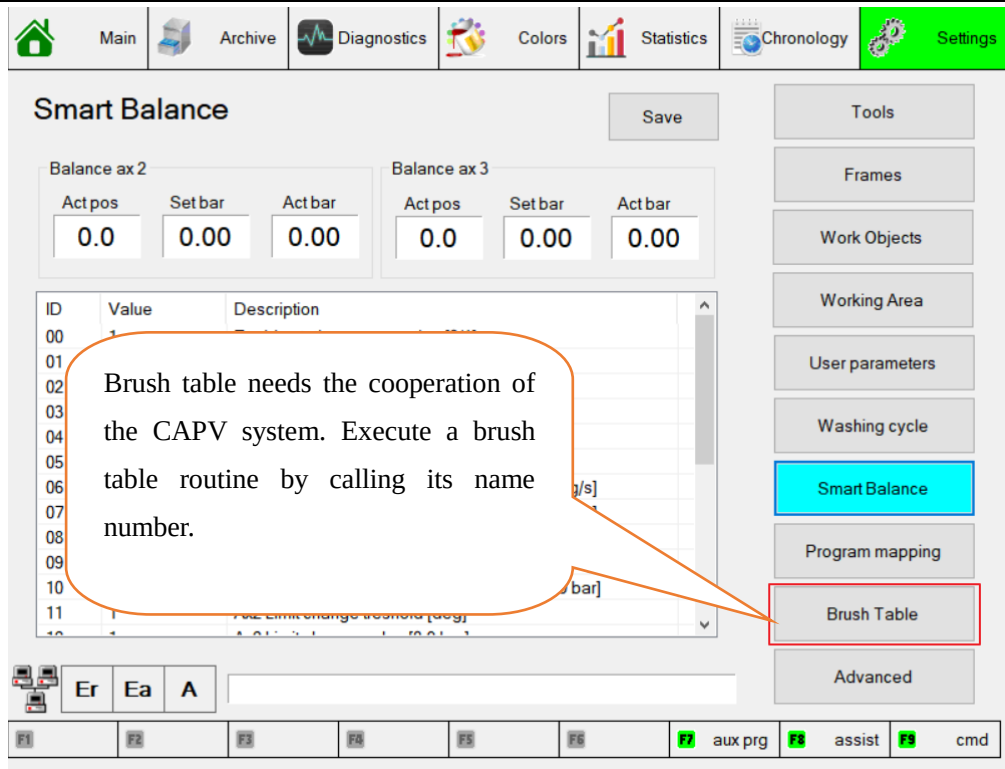
Step 4: Set the parameters

Step 5: Start wash cycles by clicking on

Click on Smart Balance System to enter the corresponding configuration page. Smart balance system is only applicable in drag teaching.



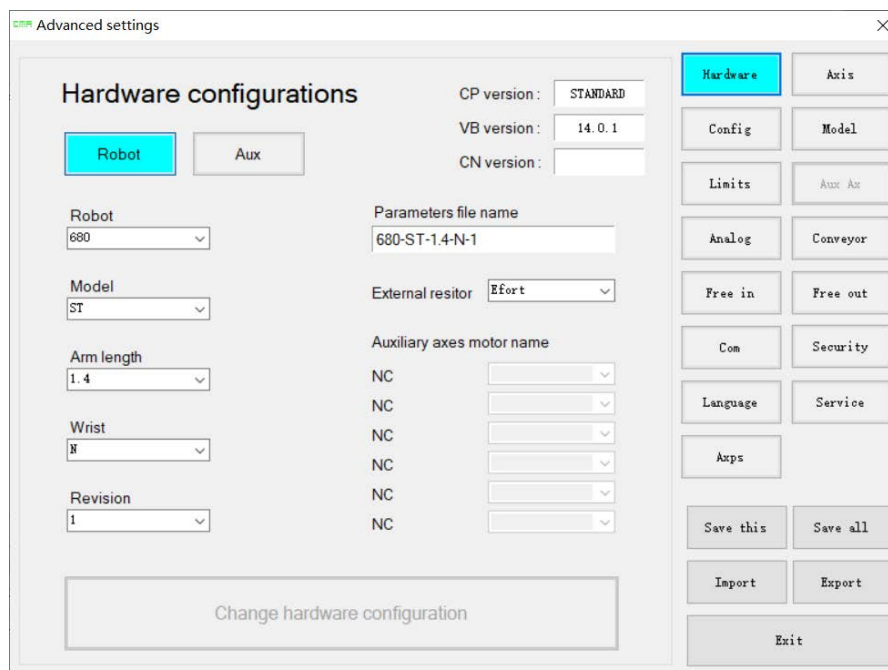
Click on Brush Table to enter the configuration page.



(8) Advanced Settings

Click on Advanced Settings in the navigation bar to enter the configuration page.

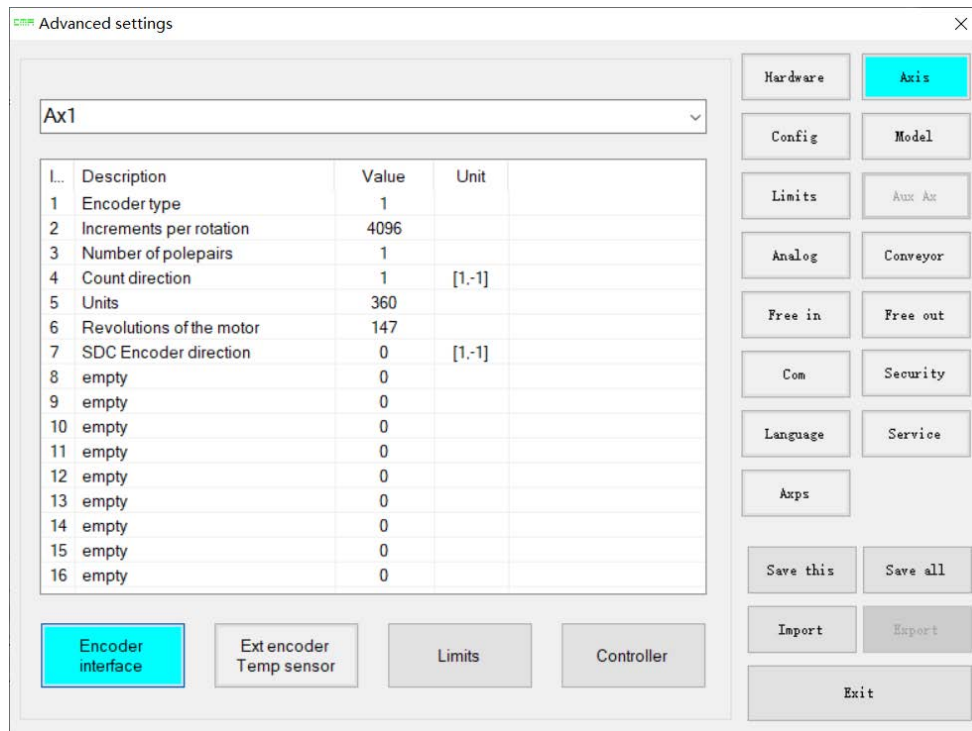
Hardware Configurations: Robot Model and Version



Axis Configuration: Axis parameters are set when the robot is manufactured in factory. No edition is needed unless in rare situations. The axis configuration includes the interfaces for encoder, external encoder

temporary encoder, mechanical limits and controller.

The encoder parameters are not editable.



Advanced settings

Hardware **Axis**

Config Model

Limits Aux Ax

Analog Conveyor

Free in Free out

Com Security

Language Service

Axps

Save this Save all

Import Export

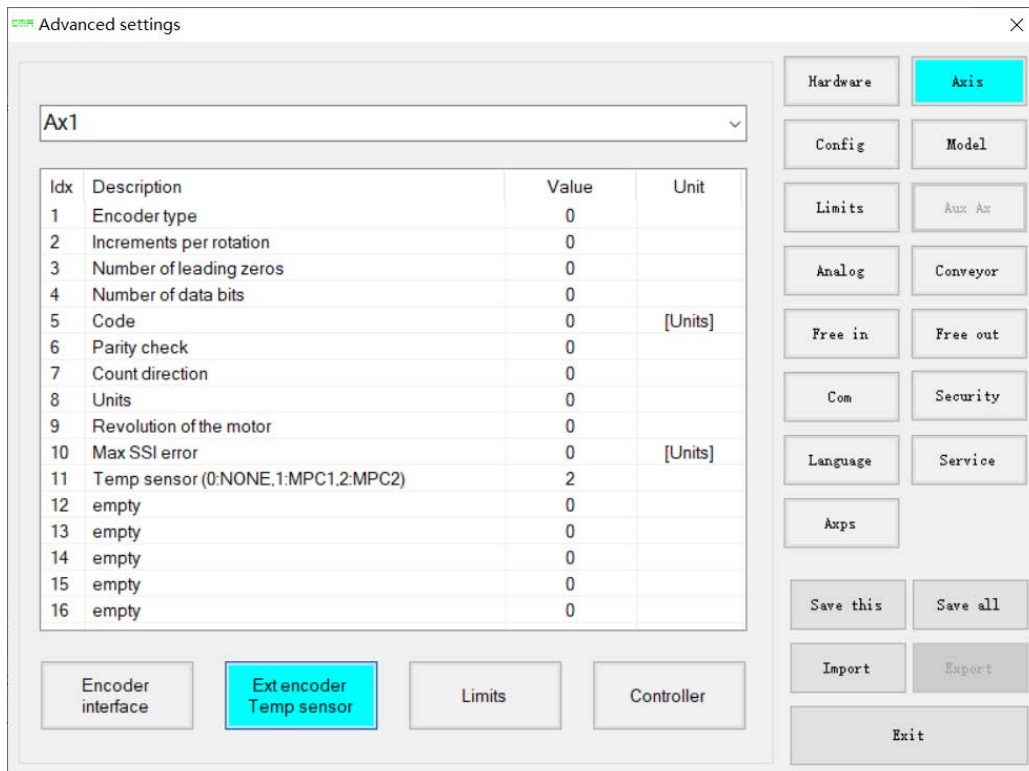
Exit

Ax1

I...	Description	Value	Unit
1	Encoder type	1	
2	Increments per rotation	4096	
3	Number of polepairs	1	
4	Count direction	1	[1..1]
5	Units	360	
6	Revolutions of the motor	147	
7	SDC Encoder direction	0	[1..1]
8	empty	0	
9	empty	0	
10	empty	0	
11	empty	0	
12	empty	0	
13	empty	0	
14	empty	0	
15	empty	0	
16	empty	0	

Encoder interface Ext encoder Temp sensor Limits Controller

The external encoder and temporary encoder parameters can be edited when in need.



Advanced settings

Hardware **Axis**

Config Model

Limits Aux Ax

Analog Conveyor

Free in Free out

Com Security

Language Service

Axps

Save this Save all

Import Export

Exit

Ax1

Idx	Description	Value	Unit
1	Encoder type	0	
2	Increments per rotation	0	
3	Number of leading zeros	0	
4	Number of data bits	0	
5	Code	0	[Units]
6	Parity check	0	
7	Count direction	0	
8	Units	0	
9	Revolution of the motor	0	
10	Max SSI error	0	[Units]
11	Temp sensor (0:NONE,1:MPC1,2:MPC2)	2	
12	empty	0	
13	empty	0	
14	empty	0	
15	empty	0	
16	empty	0	

Encoder interface **Ext encoder Temp sensor** Limits Controller

limit: The axis limit parameters are generally not editable.

Advanced settings

Ax1

Idx	Description	Value	Unit
1	Speed 速度	150	[Units/...
2	Acceleration 加速度	400	[Units/...
3	Jolt time 晃动时间	0.2	[s]
4	Time in position 就位时间	0	[s]
5	Positive limit 正限位	180	[s]
6	Negative limit 负限位	-180	[Units]
7	Servo error 1 伺服误差1	1	[Units]
8	Servo error 2 伺服误差2	1	[Units]
9	Interpolator acceleration 插补器加速度	10000	[Units/...
10	Timeout current limit 电流超时限制	5	[s]
11	Nominal current 额定电流	0	[A]
12	Max current 最大电流	0	[A]
13	Limited speed 限制速度	60	[Units/...
14	Limited Acceleration 限制加速度	10000	[Units/...
15	Joint limit+ 关节限制+	0	[Units]
16	Joint limit- 关节限制-	0	[Units]

Encoder interface Ext encoder Temp sensor Limits Controller

Hardware Axis Config Model Limits Aux Ax Analog Conveyor Free in Free out Com Security Language Service Axps Save this Save all Import Export Exit

Controller: The controller parameters are not editable.

Advanced settings

Ax1

Idx	Description	Value	Unit
1	Position : Kv	200	[1/s]
2	Position : Tn	0	[s]
3	Position : t_predict	0.0003	[s]
4	Position : t_total	0.0003	[s]
5	Position : p_max	1000000	[Units/s]
6	Position : i_max	1000000	[1/s]
7	empty	0	
8	empty	0	
9	empty	0	
10	empty	0	
11	Speed : Kv	2	[Asec/rev]
12	Speed : tn	0	[s]
13	Speed : t_filter	0.0002	[s]
14	empty	0	
15	empty	0	
16	empty	0	

Encoder interface Ext encoder Temp sensor Limits Controller

Hardware Axis Config Model Limits Aux Ax Analog Conveyor Free in Free out Com Security Language Service Axps Save this Save all Import Export Exit

Config: The config parameters, not editable unless in rare situations, are set before a robot leaves the factory.

Advanced settings

Idx	Description	Value	Unit
00	End list exit	0	结束列表退出 (完成删除清单)
01	Repeating cycle	1	重复循环
02	Conveyor abilitation	2	输送辅助
03	Conveyor line tracking abilitation	3	输送线跟踪辅助
04	Conveyor unlock hook system	4	输送机解锁钩系统
05	Remote start on stand by	5	待机远程启动
06	Component start	6	组件启动 (每个程序段需要信号运行)
07	CAN presence	7	能存在 (CAN通讯)
08	Statistics at set end	8	设置结束时统计
09	Remote start on positioning	9	远程启动定位 (给信号, 到POS点)
10	Save list automatic	10	自动保存列表
11	Send statistics	11	发送统计信息
12	Send alarms	12	发送报警
13	Ptp points edit enabled	13	启用enabled点对点编辑edit
14	Bezier path interpolator	14	贝塞尔路径插补器
15	Add list group	15	添加列表组 (求一个信号, 才会加入自动运行表中)
16	Memorize remote start	16	记住远程启动
17	nc	17	喷雾混合Rac
18	Enable manual gun in automatic mode	18	在自动模式下启用手动枪
19	Joystick teach run selector	19	操纵杆教学运行选择器
20	Enable edit list in automatic mode	20	在自动模式下启用编辑列表
21	Bar code inibit in step mode	21	步进模式inibit条形码 (扫码后输送运行)
22	Advanced ptp atomization	22	高级点对点雾化
23	Profibus communication enable	23	总线通信使能

Hardware Axis

Config Model

Limits Aux Ax

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Free in Free out

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Axps

Save this Save all

Import Export

Exit

Advanced settings

Idx	Description	Value	Unit
24	Auto add list enable	24	启用自动添加列表
25	Disable statistics	25	禁用统计
26	Turning station enable bridge	26	翻转工位启用桥 (转台上电启用)
27	Analog table	27	模拟表
28	Analog table variable mode	28	模拟表变量模式
29	Input communication	29	输入通信
30	Auto wrist home	30	自动手腕家 (4/6转动一个周期后计数清零)
31	Enable rototraslation	31	启用轮转
32	Enable resume automatic cycle	32	启用恢复自动循环 (急停后恢复自动运行)
33	Enable rolling calculation	33	启用滚动计算
34	Automatic atomization analog off	34	关闭自动雾化模拟
35	Plane step gun on	35	PLANE指令中STEP段是否开枪
36	Sir configuration of analog outputs	36	模拟输出SIR配置
37	IMA communication enable	37	库存管理通信使能
38	Resume component after shut down	38	关闭后恢复组件 (机器人关闭重启后恢复)
39	Keep program on list after program abort	39	程序终止后保持程序在列表 (运行结束之类)
40	Spraying Aux do	0	
41	Profinet communication enable	0	
42	Transfer all programs	0	
43	Binary program format	1	
44	Program mapping	0	
45	Teach Pendant model [0:B&R,1:Keba,2:Hauto]	2	
46		0	
47		0	

Hardware Axis

Config Model

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Save this Save all

Import Export

Exit

Model: The model parameters describe the dimensions of each axis of the robot which are generally not editable.

Advanced settings

Mechanical couplings

	1	2	3	4	5	6
1	1	0	0	0	0	0
2	0	1	0	0	0	0
3	0	0	1	0	0	0
4	0	0	0	1	0	0
5	0	0	0	1	1	0
6	0	0	0	0	-1	1

Lambda: 0.25
Wrist: 0
Eulerian: XYZY
E sel: Min B+C

Model parameters

	a (mm)	d (mm)	K Jacob	Max Err	Master
1	206.7398	598.6	300	1	0
2	999.7356	0	300		0
3	1500.101	-3.0588	300		0
4	0	115	300	0.05	0
5	0	139.4331	300		0
6	0	88.5	300		0

Hardware

Axis

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Save this

Save all

Import

Export

Exit

Limits: Limits parameters are used to define the manual speed and the acceleration of a robot.

Advanced settings X

Joint Movement

Joint movement	Jog Velocity	Jog Acceleration	Auto Velocity	Auto Acceleration	Deceleration
1	20	40	150	450	400
2	20	40	145	435	400
3	20	40	150	450	400
4	40	80	600	1200	2000
5	40	80	600	1200	2000
6	40	80	720	1440	3000
NC	150	150	120	120	400
NC	0	0	0	0	0
NC	0	0	0	0	0
NC	50	30	50	30	200
NC	0	0	0	0	0

Cartesian Movement Jog Velocity Jog Acceleration Auto Velocity Auto Acceleration

	v jog u/s	a jog u/s ²	v auto u/s	a auto u/s ²
Position 位置 (平移)	200	400	1000	3000
Orientation 方向 (旋转)	20	40	300	900

Positioning % 移动到POS点速度 Test % 示教

Diagnosis % 诊断页面进行判断

Import Export

Exit

These parameters are used to define axis velocity limit in joint movements, the translational or rotating velocity limit in Cartesian movements and the velocity limit in robot test or diagnosis.

Judge on the diagnosis page

Velocity for moving to the POS point

Analog: Parameters used for analog spray.

Advanced settings

Analog Out 1 OFF FIX

Label: COLORE

Default value: 0

Voltage

IN min	0
IN max	10
OUT min	0
OUT max	10

Scale

Measure unit text:

Time unit: None

Scale OUT: 1000

Scale IN: 1000

Proportional

Enable: OFF

Kv: 0

PID

Enable: OFF

Ymin	0
Ymax	0
Kp	0
FF	0
Ti	0
Td	0
dYmax	0
Kw	0
Tf	0
Kfbk	0
Max Error %	0
Time Error	0

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Save this

Save all

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Exit

conveyor: Parameters used for conveyor device.

Advanced settings

Idx	Description	Value	Unit
00	Encoder resolution	0	编码器分辨率
01	bit/mm	1	编码器速率
02	Start distance	2	开关到机器人距离 (act计数)
03	Working area	3	工作空间 (左右单独)
04	Dead line	4	安全界线 (ACT计数超出值停止工作)
05	Warning distance	5	报警距离 (告诉机器人来件act后)
06	Angle	6	角度 (输送与机器人Y+同为0)
07	Spray interception	7	喷雾截留
08	Spray restoration	8	喷雾修复
09	Position lead	9	位置引导
10	Filter time	10	过滤时间
11	Back threshold	11	反向阈值 (输送微小移动忽略)
12	Start filter positive edge	12	启动滤波正边 (触发后移动值认为有效)
13	Start filter negative edge	13	启动滤波负边 (触发后移动值认为有效)
14	Standard controlled speed	14	标准控制速度
15	Reciprocator end repetitions	15	往复端重复
16	Roller distance	16	滚子距离
17	Roller length	17	滚子长度 (辊长)
18	rp clutch delay	18	RP离合器延迟
19	hook lock delay	19	钩锁延迟
20	Hook lock delay in step mode	20	步进模式钩子锁定延迟
21	Lost start manager	0	[0/1]
22	Working area advanced manager	0	[0/1]
23	Step conv queue n	0	

Hardware

Axis

Config

Model

Limits

Aux Ax

Analog

Conveyor

Free in

Free out

Com

Security

Language

Service

Axps

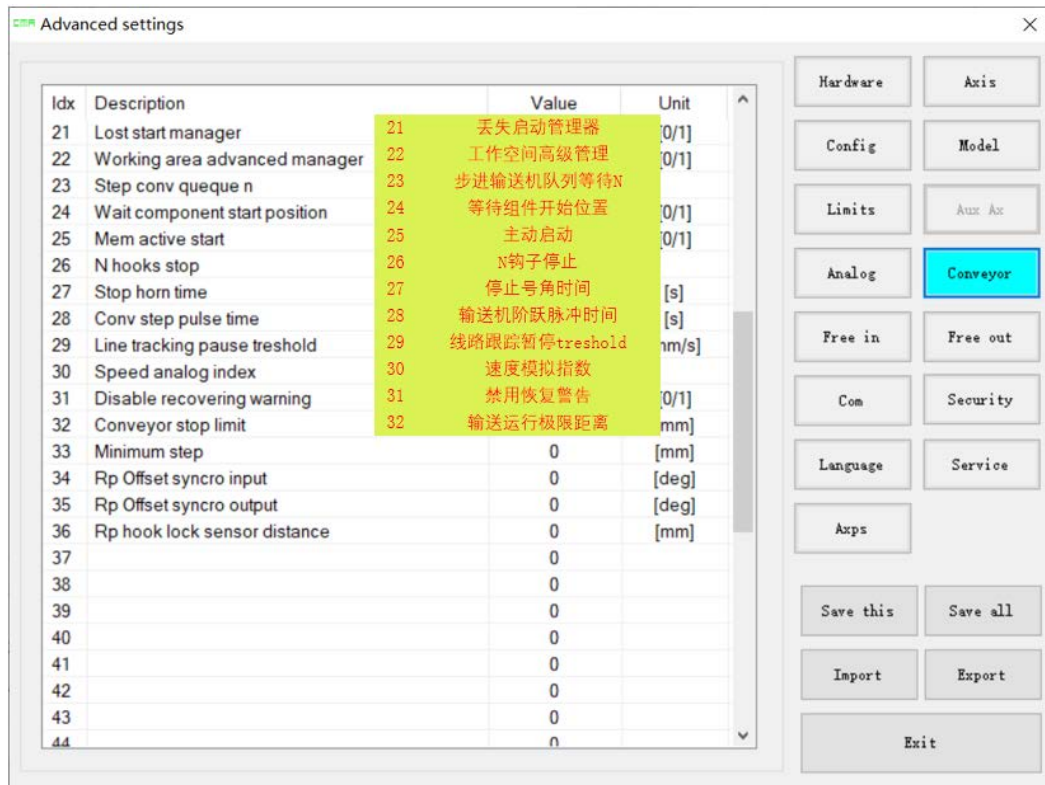
Save this

Save all

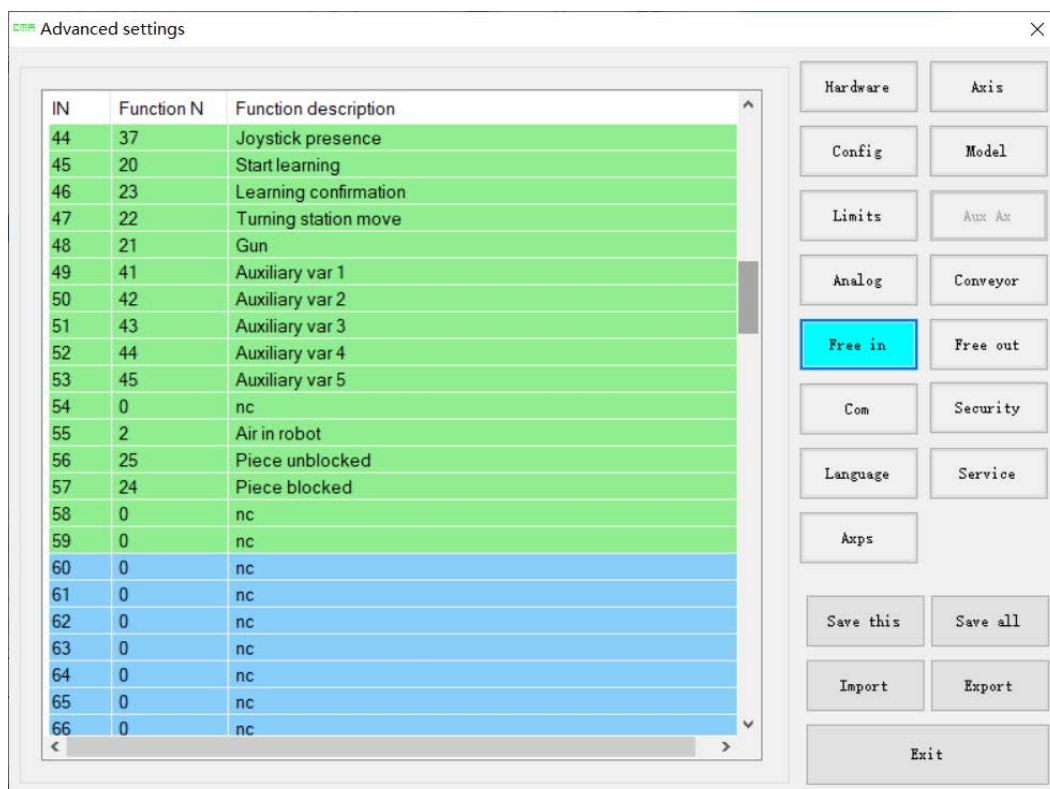
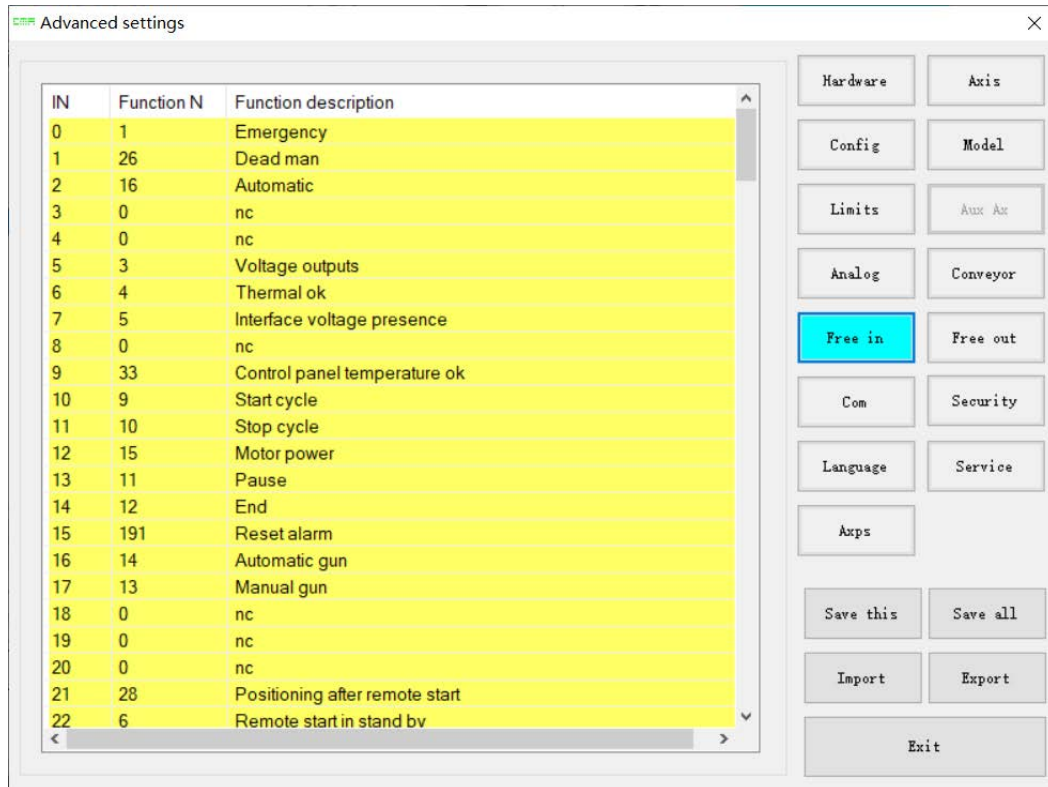
Import

Export

Exit

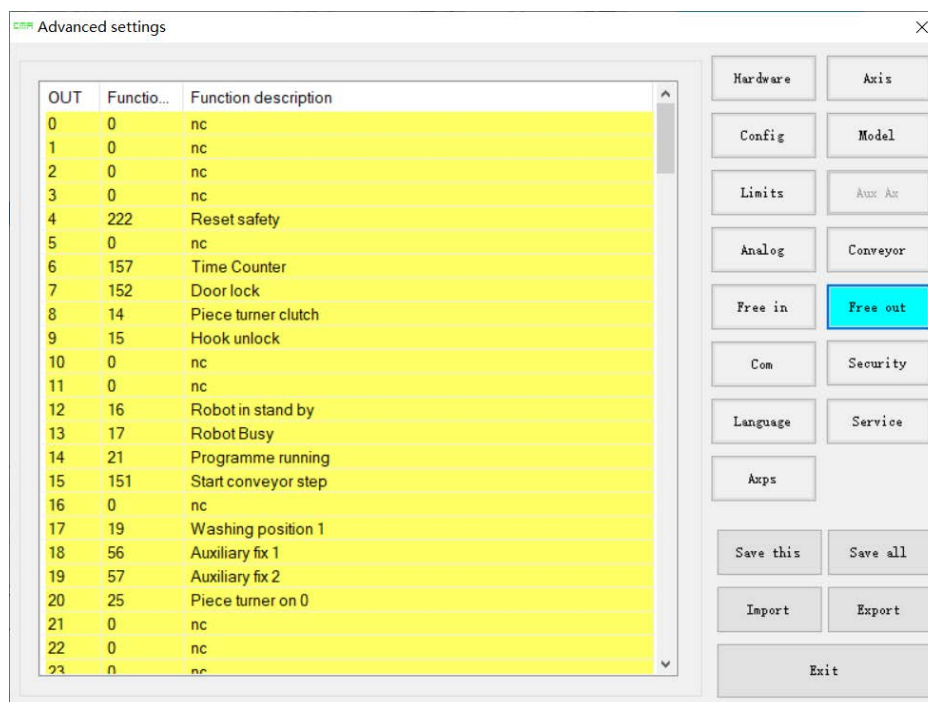


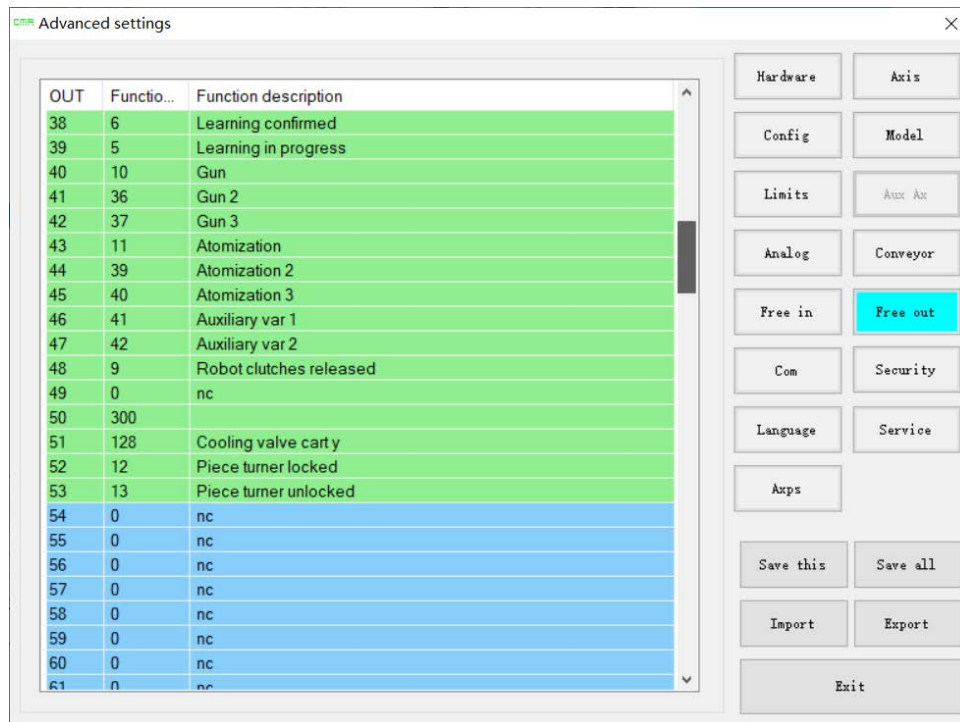
Free in: Match with the forced output signals in advanced instructions under Diagnosis.



Code	Background Color	Remarks
0-43	Yellow	Signals for control cabinet and robot.
44-59	Light green	Signals for auxiliary axes, drag teaching and CCO
60-71	Light blue	CCO signals for color change system.

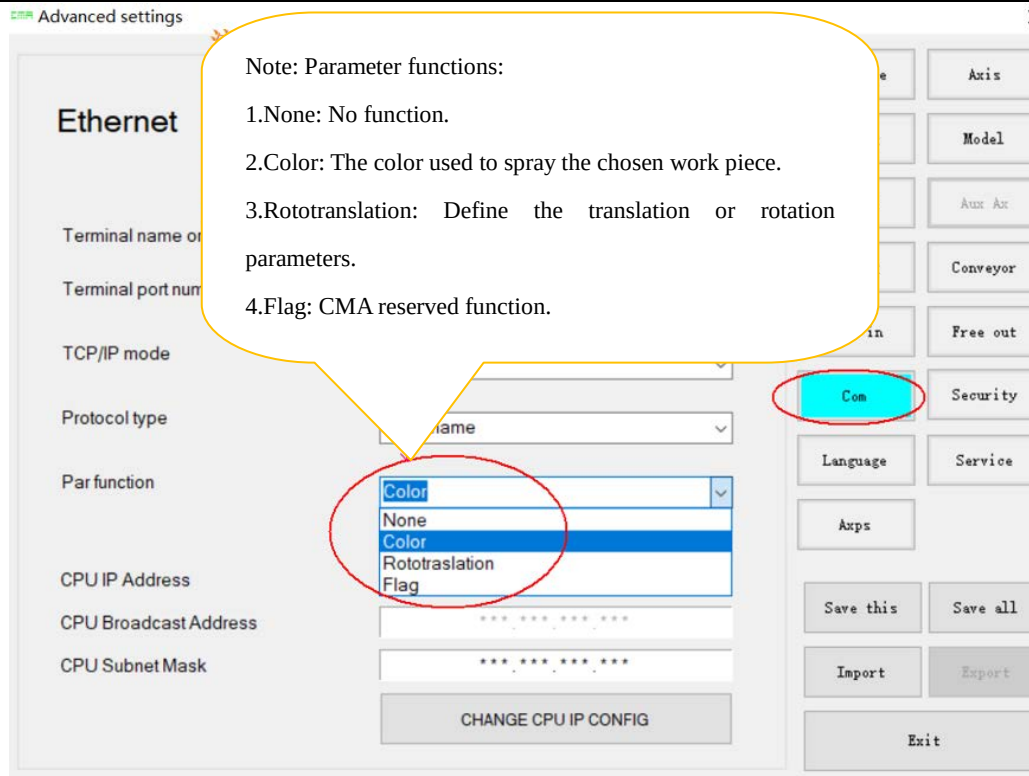
Free out: Output signals



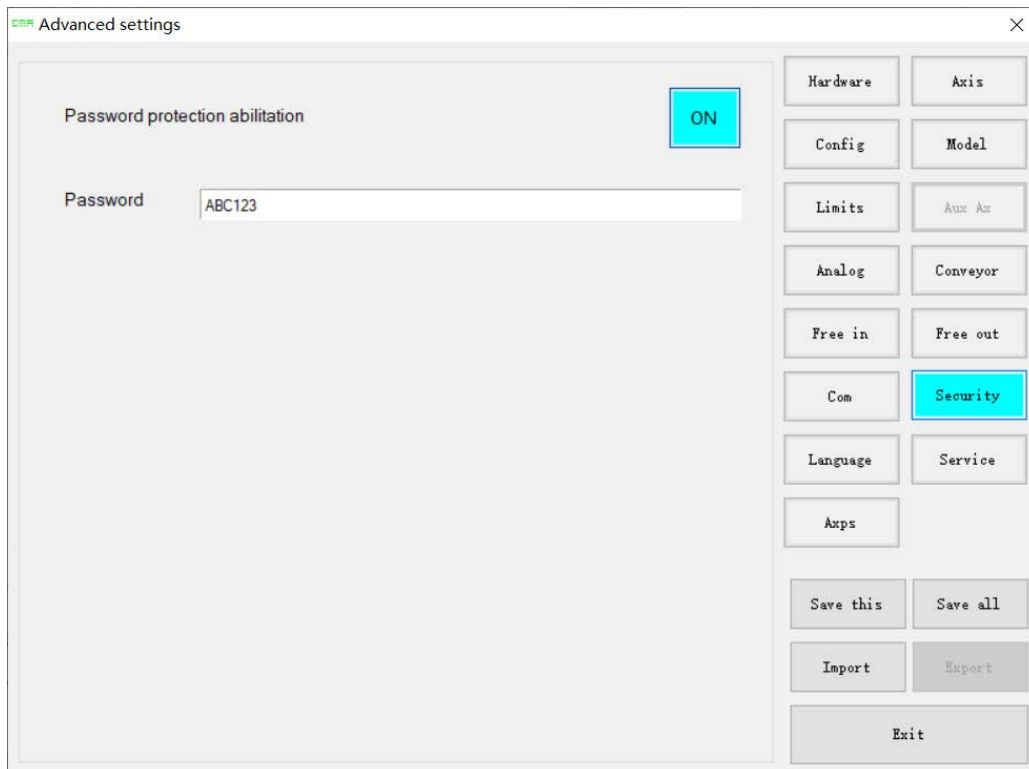


Code	Background Color	Remarks
0-43	Yellow	Common output signals
44-53	Light green	Signals for spray guns and auxiliary variables
54-77	Light blue	Signals for auxiliary fixture and piece turner.
78-101	Purple	Signals for color and wash cycles.

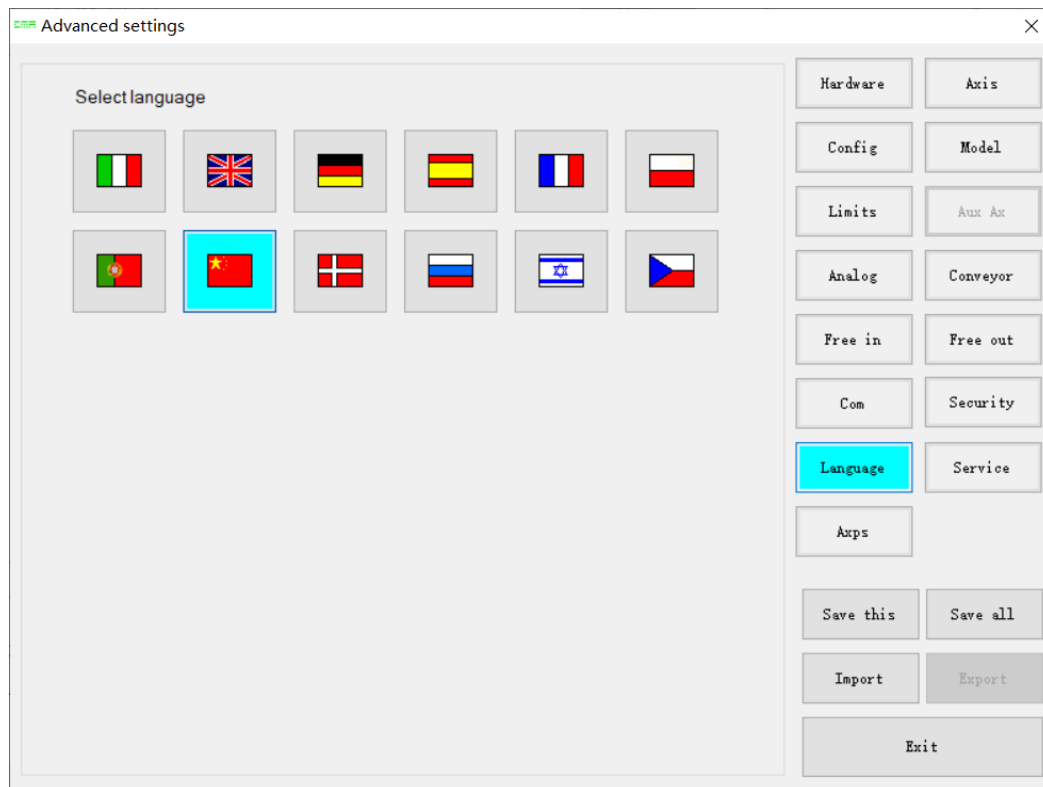
Ethernet(com): Parameters used for Ethernet communications.

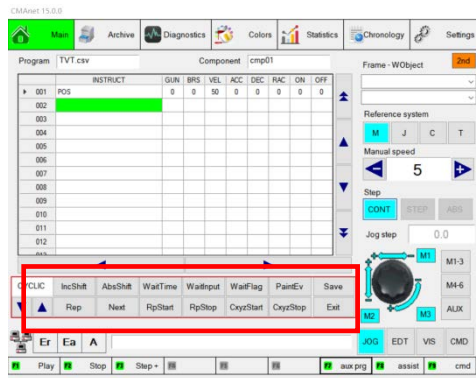


Security: Set the passwords for the teach pendant.

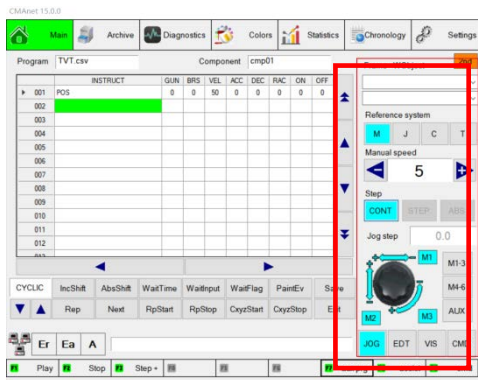


Language: Select the display language for the teach pendant.





No.	Introduction
2	In the instruction selection area, instructions can be divided into motion instructions and cyclic logic instructions.



No.	Introduction
3	Function area: - Parameter settings of the robot motion (speed, reference coordinate system, motion mode including continuous and single step) - Instructions of programs' trial operation.

Programming Instruction Sheet

	INSTR	SPD	ACC	DEC	RAC	PST	ON	OFF
001								
002								
003								
004								
005								
006								
007								
008								
009								
010								
011								
012								
013								

Name	Introduction
INSTR	instruction
SPD	the running speed of an instruction unit: mm/s
ACC	acceleration unit: mm/s ²
DEC	deceleration unit: mm/s
RAC	angle accuracy unit: mm
PST	switch gun instruction 1: on 0:off
ON	The time for opening the spray gun is delayed. unit: mm
OFF	The time for closing the spray gun is delayed. unit: mm

	X	Y	Z	A	B	C	AUX1	AUX2	AUX3
▶ 001									
002									
003									
004									
005									
006									
007									
008									
009									
010									
011									
012									
013									

Name	Introduction
X	X coordinate of track point
Y	Y coordinate of track point
Z	Z coordinate of track point
A	rotation angle relative to X axis
B	rotation angle relative to Y axis
C	rotation angle relative to Z axis
AUX1	position of auxiliary axis 1
AUX2	position of auxiliary axis 2
AUX3	position of auxiliary axis 3

	D01	D02	D03	D04	D05	D06	D07	D08	D09	D10	D11	D12	D13	D14	D15
▶ 001															
002															
003															
004															
005															
006															
007															
008															
009															
010															
011															
012															
013															

Name	Introduction
DO1~ DO15	value of digital output

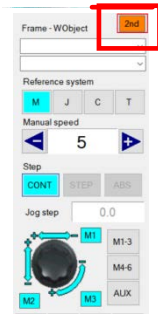
	BRUSH	A01	A02	A03	A04	A05	A06	A07	A08
▶ 001									
002									
003									
004									
005									
006									
007									
008									
009									
010									
011									
012									
013									

Name	Introduction
BRUSH	Brush the number of the table
AO1~ AO8	Value of analog output

	COMMENT
▶ 001	
002	
003	
004	
005	
006	
007	
008	
009	
010	
011	
012	
013	

Name	Introduction
COMMENT	Remarks

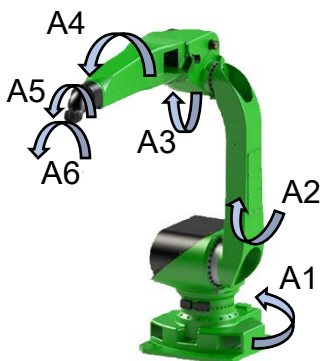
3.3 Function Operations



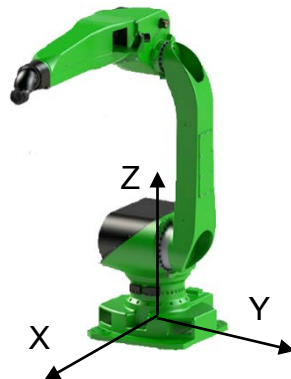
Item	Introduction
	Control switch button of main body and external axis 1. Press this button, and it turns orange to control the external axis. 2. Press this button again, and it turns gray to control the 6 axes of the main body.



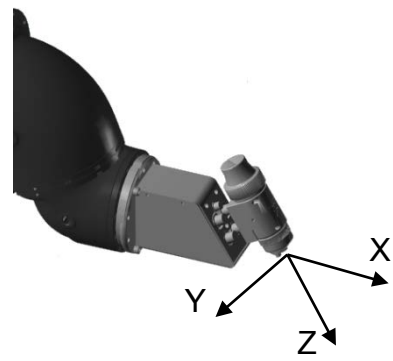
Item	Introduction
	Motor mode. A single motor of the robot can be operated by pressing the  and  or using the joystick handle.
	Joint coordinate system. The single joint of the robot can be operated by pressing  and  or using the joystick handle.
	Cartesian coordinate system. The robot can be controlled to move along X, Y, and Z directions in this system by the joystick handle.
	Tool coordinate system. The robot can be controlled to move along X, Y, and Z directions in this system.



Motor/joint
coordinate system



Cartesian
coordinate
system



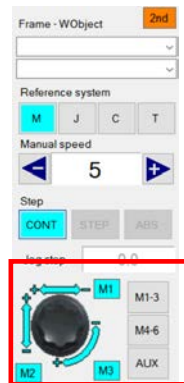
Tool
coordinate
system



Item	Introduction
	Reduce the running speed of the robot manually during teaching. The minimum value is 1.
	Increase the running speed of teaching the robot manually. The maximum value is 10.



Item	Introduction
	Continuous operation mode
	Single step operation mode: the distance of a single step can be set in [jog step]. unit: mm
	Absolute single step operation mode: the distance of a single step can be set in [jog step]. unit: mm



Item	Introduction
Joystick handle	The joystick handle has only three gears, which means that the robot can only control movement in three directions at most at a time. In different reference coordinate systems (M, J, C, T), the highlighted buttons in the red frame have different definitions. These buttons can be used to switch the movement controlled by the joystick handle.

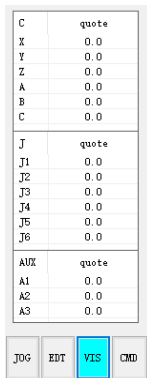


Warning

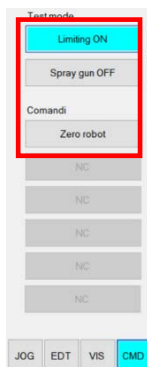
In single-step motion mode, when using the joystick handle, the robot will run a distance preset in the single-step jog dialog box, which has nothing to do with the holding and releasing of the joystick handle. Please always make sure that the robot has enough safety space to move.

The functions of these three buttons can be summarized as follows:

Motor		Joint		Cartesian		Tool	
	Motor 1,2,3		Joint 1,2,3		X, Y, Z axes		Spray gun X, Y, Z
	Motor 4,5,6		Joint 4,5,6		Rotate		Rotation of the spray gun
	Motor of auxiliary axis		Motor of auxiliary axis		—		



Click on VIS to view the Cartesian coordinate value (X~C) of the spray gun, the value of every axis of the robot, and the value of the auxiliary axes.



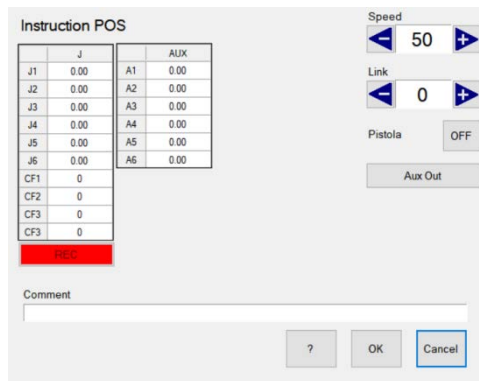
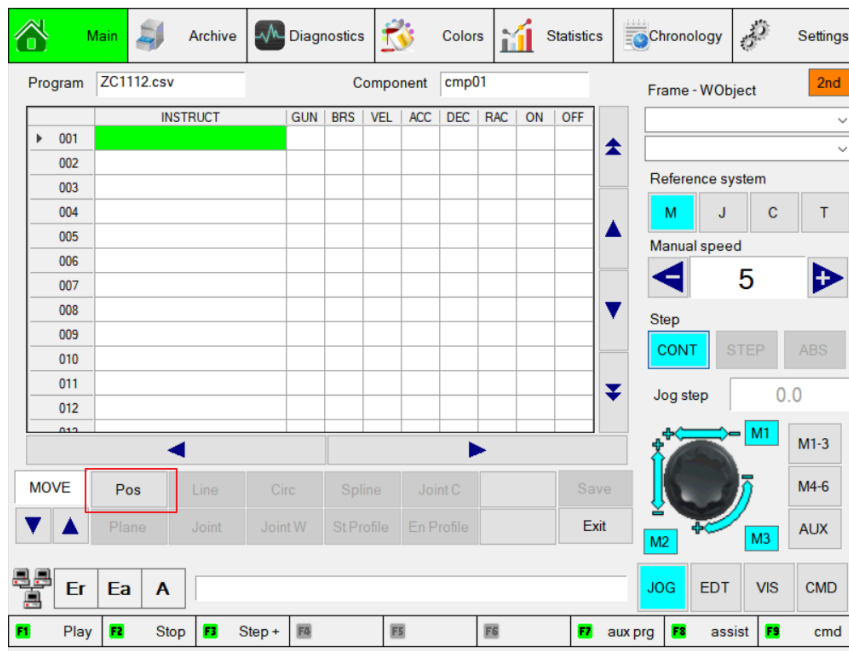
Click on CMD to set special commands for the robot.

Item	Introduction
Limit ON	The speed limit function of the robot is enabled.
Spray gun OFF	The spray gun is closed during the test phase.
Zero robot	a command that makes the robot return back to zero position quickly

3.4 PTP Instruction Settings

3.4.1 POS Instruction

In a robot program, the first instruction is always the Pos instruction. The first point of the robot program is stored in this instruction.



Procedures

Introduction

1

Click on REC to record the point.

2

Click on OK.



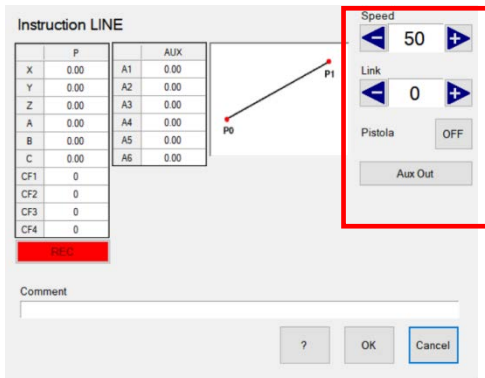
Warning

Be sure to select a point that is far enough away from the workpiece as the first point, so that the robot will not collide with the waiting workpiece when it reaches the spraying position.

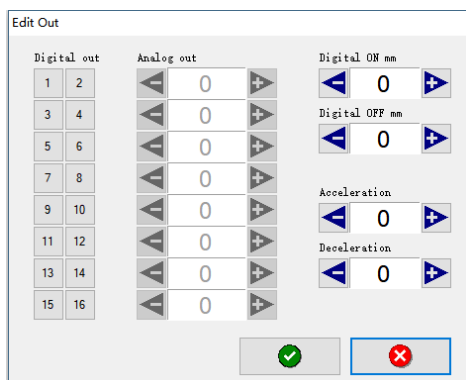
3.4.2 Line Instruction



The line instruction connects the P0, the previously stored point, and the current point P1 by a linear motion instruction.



Item	Introduction
Speed	You can set the speed required to reach this point. The value range of the speed is 1%~100%.
Circular arc transition	The range of the circular arc transition of straight line is 0~10. The robot will stop for a while when it reaches P1 and then move to the next point, if the value of circular arc transition is set to 0. When the value of circular arc transition is set to 10, the robot will approach P1 as much as possible before moving to the next point, in order to achieve the continuity of the speed.
Pistola	The spray gun of the robot will open during the movement from P0 to P1, if ON is selected.



Click on [Aux Out] to pop up [Edit Out] menu to make the corresponding selection:

16 output states (1 is spray gun)

8 analog output values

During linear motion, from the starting point to the delay of the opening of spray gun, unit: mm

During linear motion, from the end point to the position where the spray gun is closed in advance, unit: mm

The acceleration and deceleration in motion; they are calculated automatically, if the value is 0.

The acceleration and deceleration are the same. And they will adopt the set value, if the value is not equal to 0.

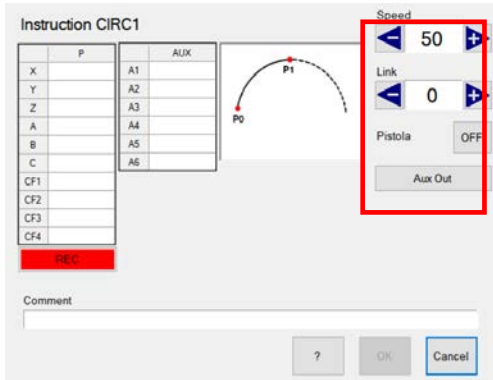
Click on REC to record this point.

Click on  to confirm this instruction.

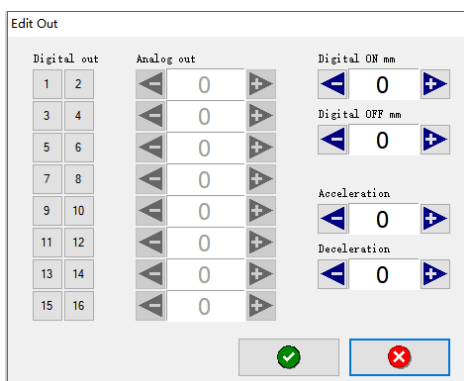
3.4.3 Circular Arc Instruction



The circular arc instruction consists of two instructions, which are RC1 AND CIRC2.



Item	Introduction
	When clicking on [Circ] for the first time, the first sub-arc will be inserted, which is from the previous point P0 (the previous point in the command) to P1 (the second point that determines the arc).
Circular arc transition	The range of the circular arc transition of straight line is 0~10. The robot will stop for a while when it reaches P1 and then move to the next point, if the value of circular arc transition is set to 0. When the value of circular arc transition is set to 10, the robot will approach P1 as much as possible before moving to the next point, in order to achieve the continuity of the speed.
Pistola	The spray gun of the robot will open during the movement from P0 to P1, if ON is selected.



Click on [Aux Out] to pop up [Edit Out] menu to make the corresponding selection:

16 output states (1 is spray gun)

8 analog output values

During linear motion, from the starting point to the delay of the opening of spray gun, unit: mm

During linear motion, from the end point to the position where the spray gun is closed in advance, unit: mm

The acceleration and deceleration in motion; they are calculated automatically, if the value is 0.

The acceleration and deceleration are the same. And they will adopt the set value, if the value is not equal to 0.

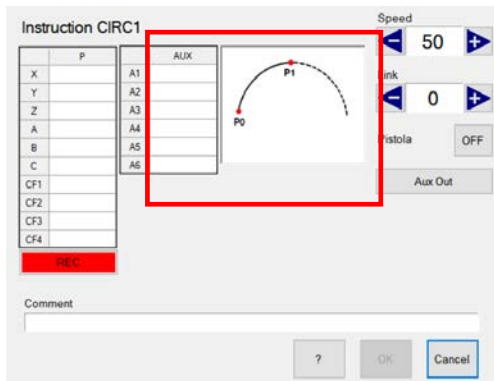
Click on REC to record this point.

Click on  to confirm this instruction.

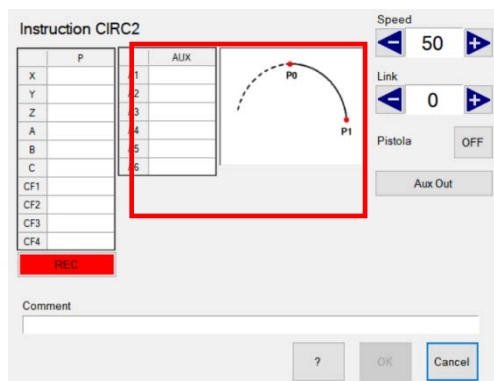
3.4.4 Circular Arc Instruction



The circular arc instruction consists of two instructions, which are CIRC1 AND CIRC2.



Procedures	Introduction
1	When clicking on [Circ] for the first time, the first sub-arc will be inserted, which is from the previous point P0 (the previous point in the command) to P1 (the second point that determines the arc).

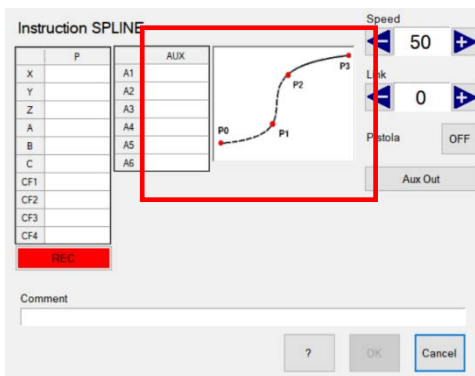


Procedures	Introduction
2	Click on [Circ] again, another circular arc instruction is inserted, which is called CIRC2
3	Click on REC to record the new point P1, which determines the third point. As for a full circle, you can use the circular arc instruction.
4	Click on OK.

3.4.5 Spline Instruction



Spline instruction consists of two instructions, which are Spline1 and Spline2.



Procedure	Introduction
s	
1	When clicking on [Spline] for the first time, the first sub-arc will be inserted.
2	Click on [Spline] again, and another spline instruction will be inserted.
3	Click on OK.



Attention

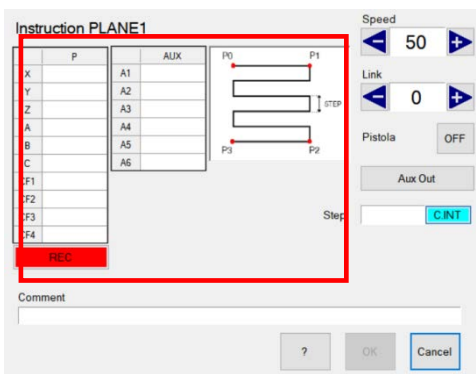
1. The use of spline instruction and line instruction is very similar.
2. The spline instruction does not have the format requirement for circular arc instruction.
3. Due to the uncertainty of the trajectory of the curve in the same segment, it is not recommended to use it when editing the trajectory.

3.4.6 Plane Instruction



Plane instruction is an instruction that is used for robot to spray flat surfaces, which is defined by defining four points and a step size.

The sprayed surface may be horizontal, vertical and slant. The sprayed plane is the plane defined by the four points.

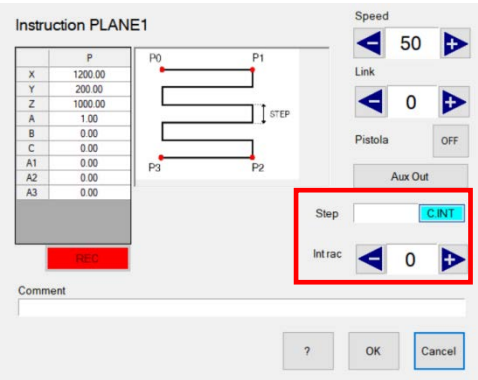


Procedures	Introduction
1	The first point is P0, which is the end point before the PLANE instruction.
2	Configure the other three points by entering the parameters in the plane instruction page.
3	Click on REC to record it. The PLANE1, PLANE2 and PLANE3 instructions can be

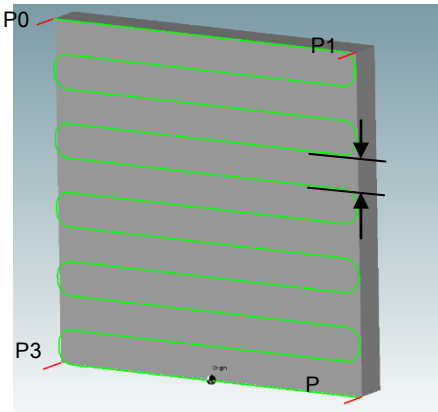
inserted.

o

,



Procedures	Introduction
5	Click on step to set the amplitude of the step, unit: mm
6	<Int. Rac> value can set the transition of the robot in different motion directions at the transition point, which ranges from 1 to 10. 0: no transition. And the robot will stop. 10: the biggest transition.
7	Click on OK.



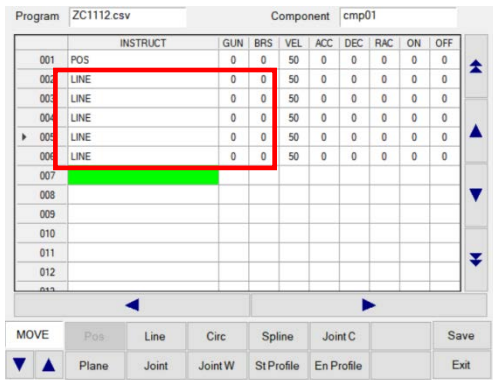
The figure on the left shows an example of the trajectory executed by the robot.

3.4.7 Profile Instruction

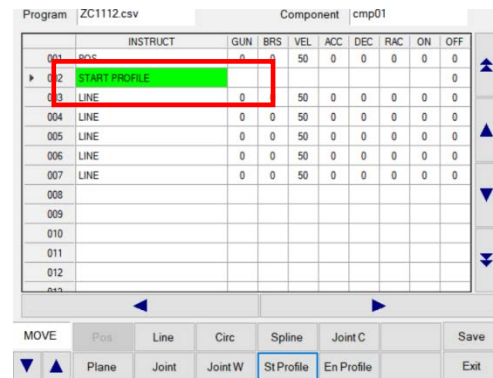


Profile instruction is composed of many instructions between START PROFILE and END PROFILE.

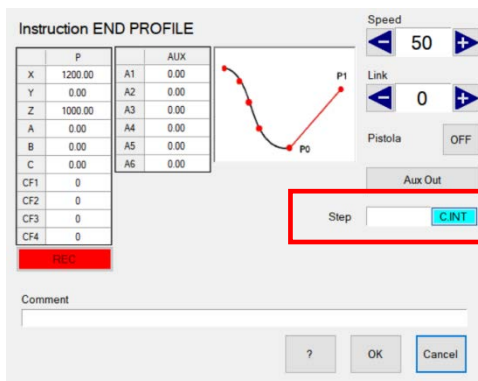
Its goal is to use straight lines and arcs to describe such a profile, and then to use a step size parameter which is similar to that in plane instruction to achieve repetitions.



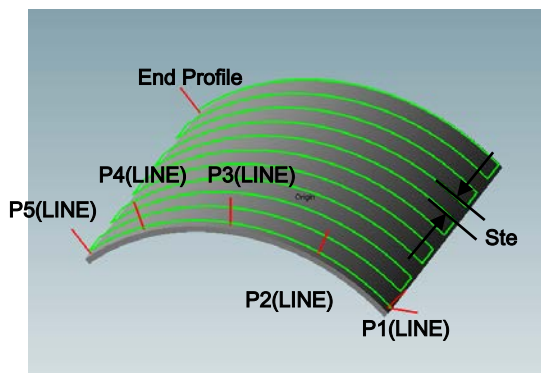
Procedures	Introduction
1	Insert the point of the relevant single line.
	LINE can be used, but Spline is not recommended to use.



Procedures	Introduction
2	Insert START PROFILE at the starting position.

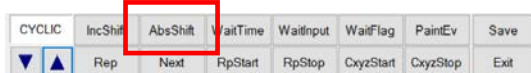


Procedures	Introduction
3	Insert END PROFILE at the end.
4	Click on REC to record the last point.
5	Enter the amplitude of the step in <Step>, unit: mm
6	Click on OK.

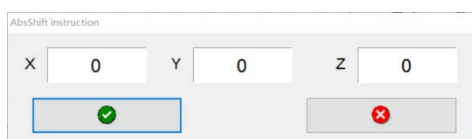


The figure on the left shows an example of the trajectory executed by the robot.

3.4.8 Absolute Shift Instruction



Absolute shift instruction can add an offset value to all points after the instruction. For example, when the program on the left represents a square in the YZ plane, input ABSSHIFT instruction (0,-100,0) between the POS instruction and the first LINE instruction, and then a square will move at the position that is 100mm away from the right of the robot.



Procedures	Introduction
1	Click on [AbsShift] to pop up a dialog box.
2	In this box, the absolute coordinate value of the offset can be entered

3.4.9 Loop Instruction



REP and NEXT instructions can be used to execute the instructions between REP and NEXT repeatedly.

[REP] + [NEXT] instructions can realize loop nesting.

REP#1 (7)

Introduction

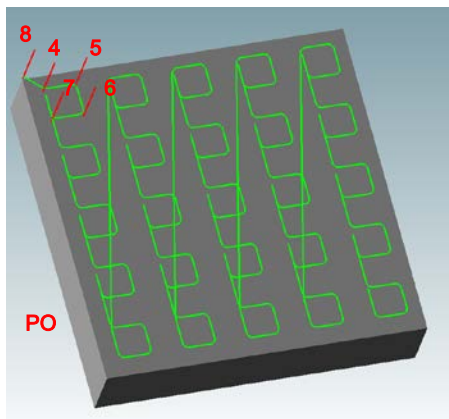
represents the number of REP-NEXT loops, and the maximum nested layers are 16.

	INSTR	SPD	ACC	DEC	RAC	PST	ON	OFF
001	POS							
002	REP#1 (5)							
003	REP#2 (5)							
004	LINE	50	0	0	0	0	0	0
005	LINE	50	0	0	0	0	0	0
006	LINE	50	0	0	0	0	0	0
007	LINE	50	0	0	0	0	0	0
008	INCSHIFT (0, -100, 0)							
009	NEXT#2							
010	INCSHIFT (500, -100, 0)							
011	NEXT#1							
012								
013								

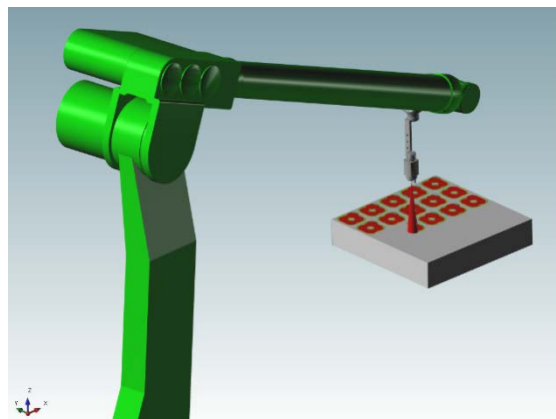
Program Example

In the instruction table on the left, the instructions from line 4 to line 7 represent a square, and the number of repetitions is 25 times.

The number of times to repeat a sequence of instructions can be specified: Press the representative key to call the following numeric keyboard, and the number of instruction loops that need to be executed can be set. Press [Rep] to pop up the following numeric keys.

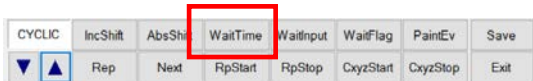


Schematic Diagram of Trajectory

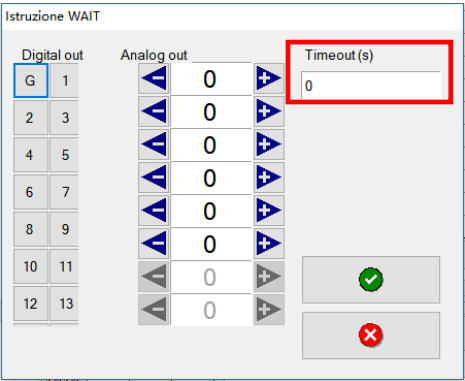


Operation Diagram

3.4.10 Delay Instruction

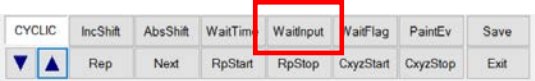


Click on [WaitTime] to set a pause time during program execution. Set the pause time in <Timeout> area.

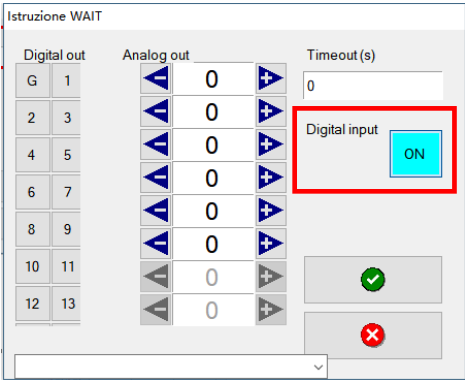


During the pause, 16 digital outputs and 8 analog outputs can be set. 1 represents the spray gun.

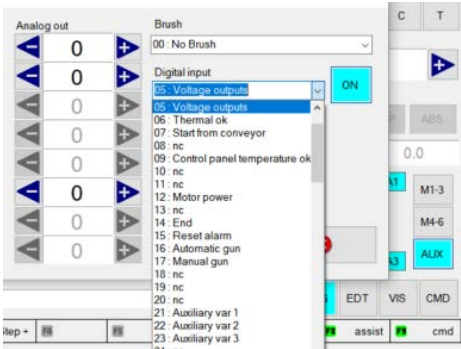
3.4.11 Wait for Input Instruction



This instruction can be written by selecting [WaitInput]. Only when the state of the corresponding signals changes, this instruction will be executed. Otherwise, it will wait for the input signal to meet the conditions.

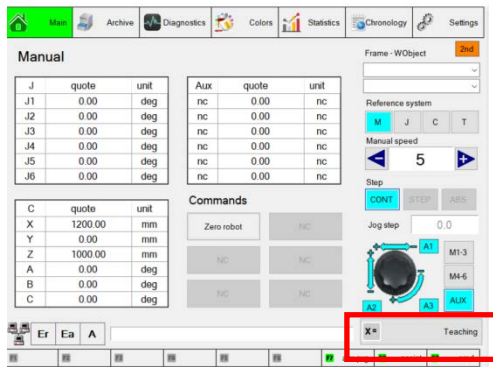


Procedures	Introduction
1	Select ON in <DigItal input>.
2	Select the signal in <Digital out>.



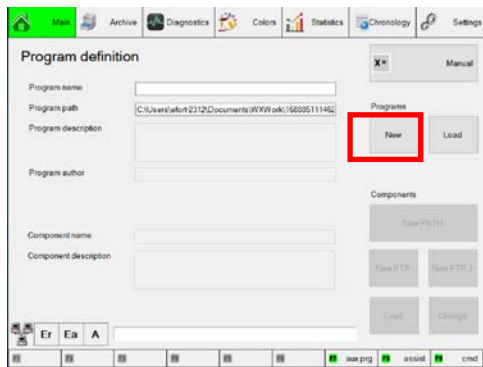
Procedures	Introduction
3	Select the required signal point in the pop-up signal table that have been configured.
4	Click on  .

3.5 Create PTP Program

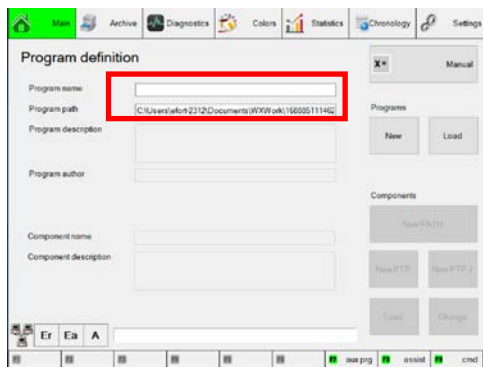


No.	Procedures
1	Switch [Auto-Teach] to teaching

No.	Procedures
2	Click on Teaching in the main interface.



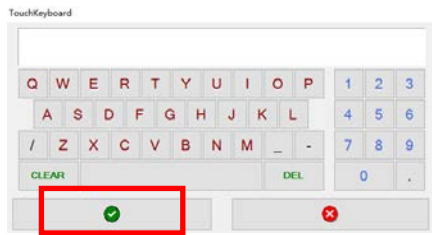
No.	Procedures
3	Click on New.



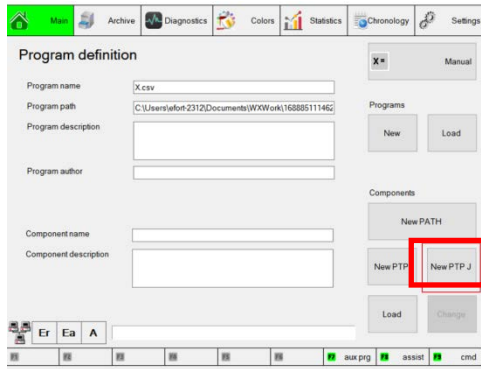
No.	Procedures
4	Click on the text box of Program Name.



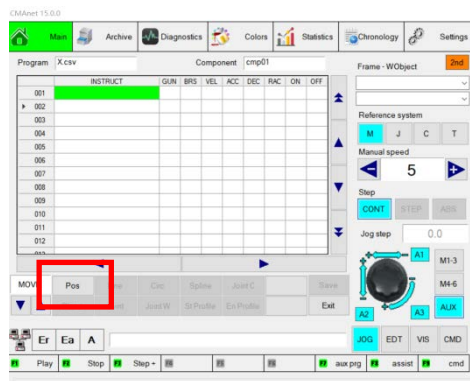
No.	Procedures
5	Enter the program name in the pop-up box by the virtual keyboard.



No.	Procedures
6	Click on  .



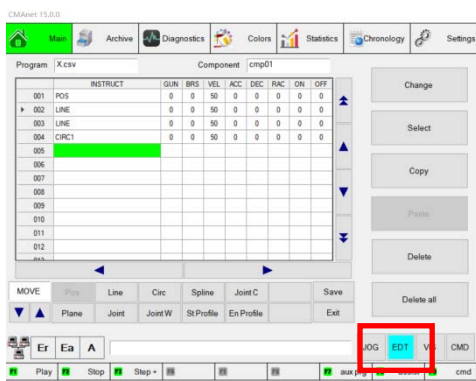
No.	Procedures
7	Click on New PTP J.



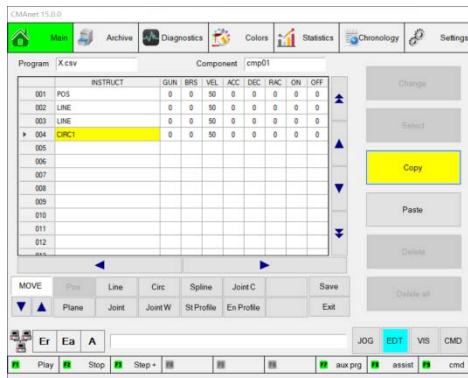
No.	Procedures
8	After confirming the work origin of the robot, click on POS to confirm the position of the work origin.
9	And then start the formal trajectory programming.

3.6 Edit PTP Program

3.6.1 Copy Program Line



No.	Procedures
1	To edit the stored instructions, click on EDT and select the instructions that need to be edited.
2	Click on EDT to pop up the standard interface, where instructions can be selected.



Delete the selected instruction?

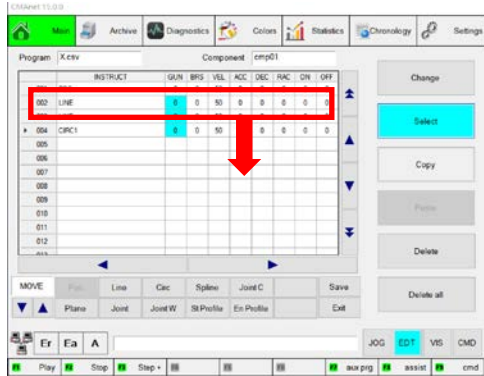
确定

取消

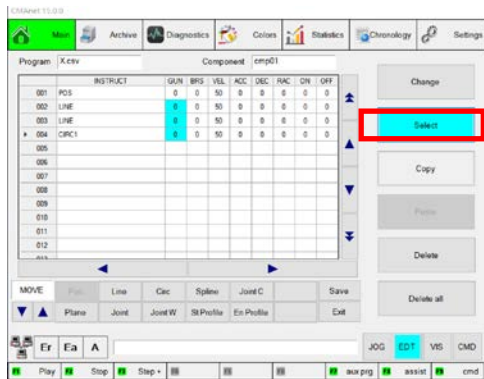
No.	Procedures
1	In order to copy one or more lines of instructions, select them (the selected lines will be yellow)
2	Click on Copy and select a command line to copy it.
3	Click on Paste, and select whether to delete the original point in the pop-up window. The corresponding instruction will be copied if No is selected.

Description	Procedures
1	Click on Yes, indicating deleting the selected instruction, which is equivalent to the realization of the “cut”-“paste” function.

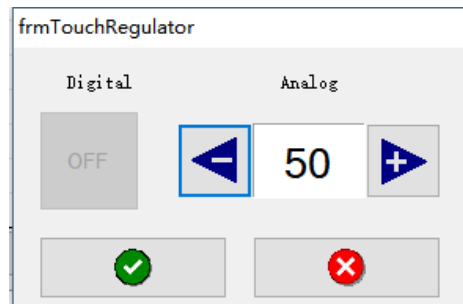
3.6.2 Modify Instructions in Batches



	Procedures
Description	To delete the instructions in the program in batches.
1	Select the starting line that needs to be modified, drag it to the last line that needs to be modified. At this time, all lines are shown in blue, indicating that they are selected.



	Procedures
Description	To modify the instructions in the program in batches.
2	Click on EDT.



	Procedures
Description	To modify the instructions in the program in batches.
3	Enter the value in the pop-up dialog box and click on  .

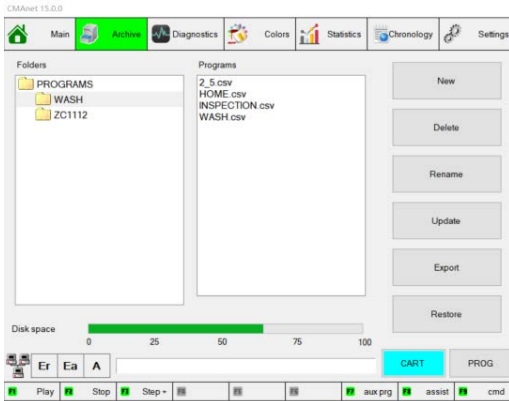


Attention

This method is only suitable for batch modification of control instructions, like switch gun, running speed, transition accuracy, brush table number, etc.

3.7 Utilities

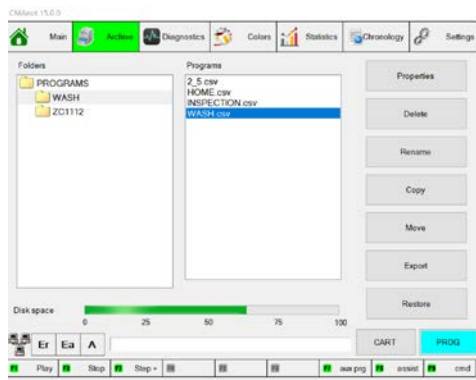
3.7.1 Document Management



In File menu bar, click on CART and then perform some operations on the program folder.

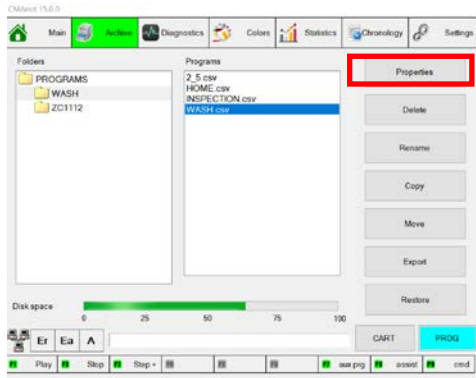
Item	Description
[New]	Create a new folder
[Delete]	Delete an existing folder
[Rename]	Rename a folder
[Update]	Refresh a folder
[Export]	Make a backup of all configurations, including painting procedures
[Restore]	Load a configuration that is saved previously

In File menu bar, click on PROG and then perform some operations on the painting program files.

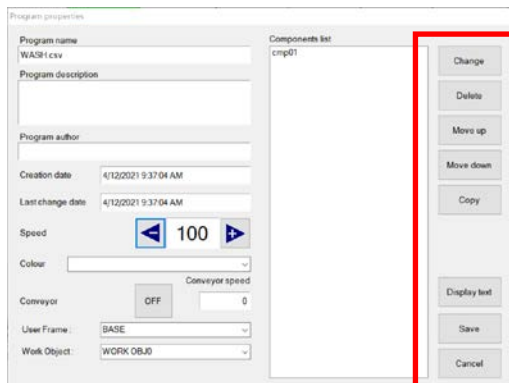


Item	Description
[Properties]	Display the properties of the program
[Delete]	Delete an existing program
[Rename]	Rename a program
[Copy]	Copy a program
[Move]	Move a program to another folder
[Export]	Copy a program to external device
[Restore]	Copy a program from the external device to the robot

3.7.2 Program Properties

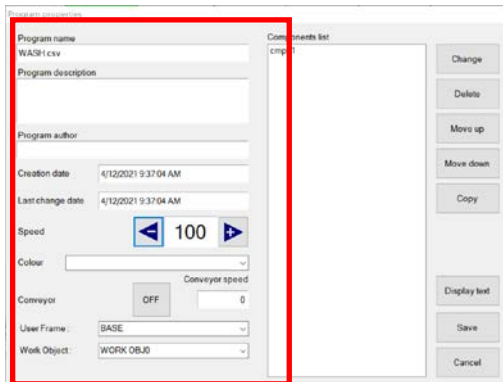


Click on Properties to display the properties of the painting program.



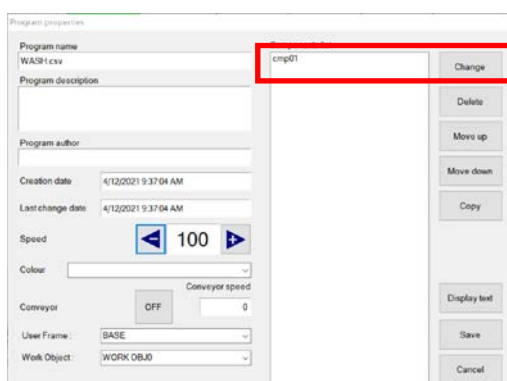
In the program properties page, the composition of the program can be viewed, and the related properties can be edited and modified.

Item	Description
Change	The properties of the program segment can be changed
Delete	Delete an existing program
Move up	Move the selected program segment up in the list
Move down	Move the selected program segment down in the list
Copy	Copy the selected program segment
Display text	Display the details of the program in the program segment
Save	Save the modifications to the structure of the program
Cancel	Cancel the modifications to the structure of the program

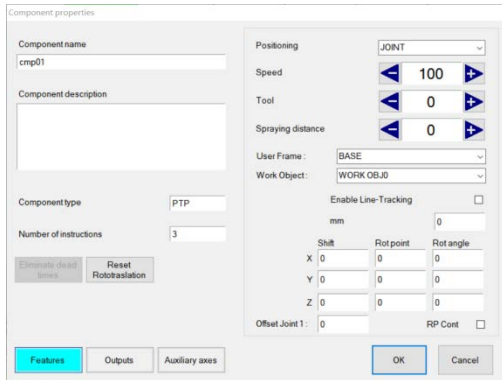


Item	Description
Program name	Click on it to modify the program name
Program Description	Click on it to add and modify the program description
Program author	Click on it to add the description of the program author
Creation date	Check the creation date of the program, which cannot be modified
Last change date	Check the modification time of the program, which cannot be modified
Speed	The running speed of the entire program can be modified by clicking on  and 
Colour	Painting colour can be chosen
Conveyor	Press OFF to disable the storage of the conveyor belt during testing, if the conveyor belt is moving during the teaching of the program
Program shift	According to the on-site specific conditions of the robot and external equipment, the program can be shifted along X, Y, and Z directions with reference to the robot base system without adjusting the position of the robot

3.7.3 Program Segment Management

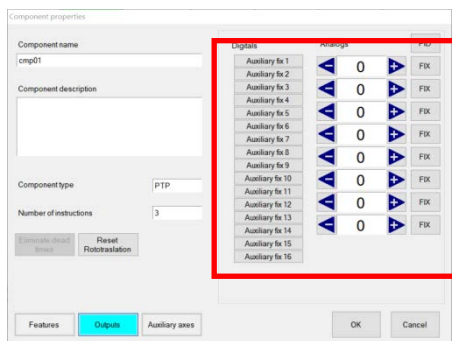


Procedures	Description
1	Select the program segment that needs to be modified
2	Click on Change

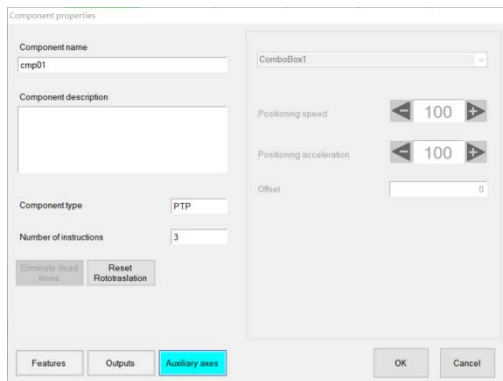


Procedures	Description
Component name	Select the program segment that needs to be modified
Component description	Click on Change
Component type	Display the type of the current program segment
Number of instructions	Display the total number of instructions in the current program segment
Positioning	Default POS point type
Robot Rototraslation	This function can be used, if the rotation and translation data need to be applied to all program points. The program will use Shift, and the current input value of the Rot Point and Rot angel parameters can also be reset (special for rotating system)
Speed	The speed of the program segment can be set by + and -
Tool	Use tool coordinate system
Spraying distance	Display the distance of spraying
Enable Line-Tracking	Decide whether this program segment is to be tracked during the tracking of the painting
mm conveyor chain	Track the encoder value of the conveyor chain at the beginning of this program segment during painting
shift	Modify the value of the program segment in the X, Y, and Z directions with reference to the Cartesian coordinate system of the robot
Rot point	Special for Axsps system
Rot angle	Special for Axsps system

Offset joint1	Offset of the first joint axis
RP Cont	The parameters specifically refer to the painting program generated by CMA offline programming software (special for offline software)



Output	Description
Analog	With the control of 16-bit analog
FIX/VAR	Manual setting is valid/program instruction automatic control is valid, which is realized by brushing table
A	A path
B	B path (it requires B path)
A-B	A-B path (relevant functions need to be configured)



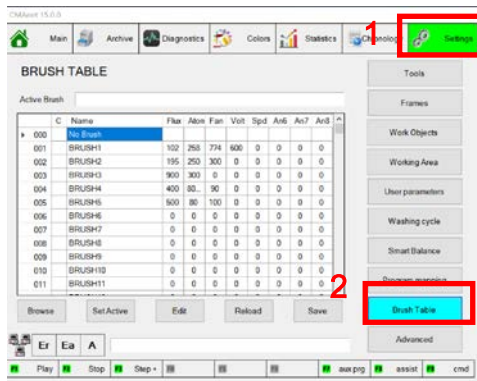
Auxiliary axes	Description
Positioning speed	Special for auxiliary axis system
Positioning acceleration	Special for auxiliary axis system
Offset	Special for auxiliary axis system

Chapter Four Process and Control

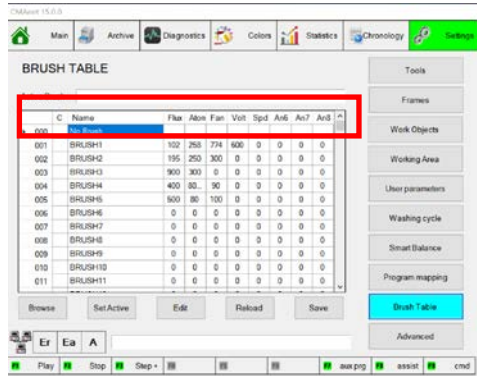
4.1 Brush Table

In order to automatically control the related painting parameters, CMA.NET provides a table of relevant control parameters. For each painting trajectory program, a painting brush table is generated separately.

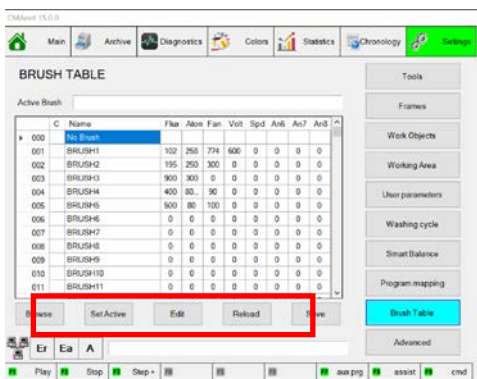
Click on Settings, and then click on Brush Table to enter BRUSH TABLE interface.



Procedures	Description
1	Click on Settings
2	Click on Brush Table



[BrushTable]	Description
C	Define related colors
Name	Remarks/name
Flux	Flux, [unit: bar]
Atom	Atomization, [unit: bar]
Fan	Fan, [unit: bar]
Volt	High voltage, [special for electrostatic system]
Spd	Rotation speed, [special for rotary cup system]
An6~8	Reserved



[BrushTable]	Description
Set Active	Select by force
Edit	Edit
Reload	Reload
Save	Save



Attention

In condition that the robot is running or editing the trajectory program, the brush table can be edited.

4.2 Wash Table

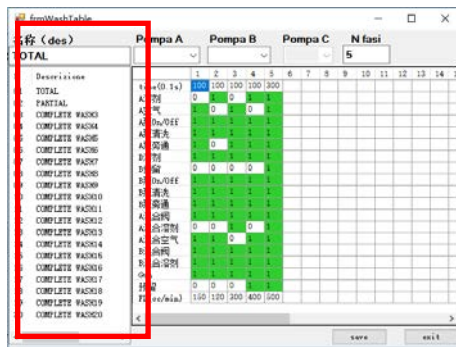
CMA.NET is also equipped with a wash table for automatic cleaning.

4.2.1 Basic Operations

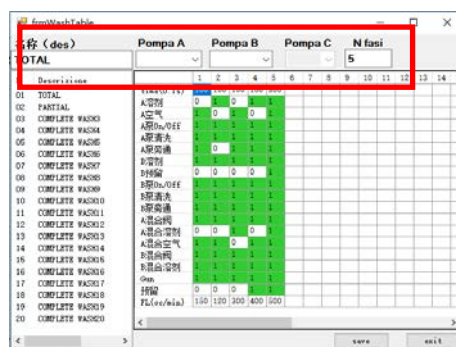


Procedures	Description
1	Click on Colors
2	Click on Wash

4.2.2 Interface Description



[Wash cycles]	Description
TOTAL	In the wash table list, up to 20 different washing parameters can be provided.



[Wash cycles]	Description
PompaA	Metering pump 1 [special for flux control system]
PompaB	Metering pump 2 [special for flux control system]
PompaC	Metering pump 3 [special for flux control system]
N fasi	The effective number of steps to wash the table



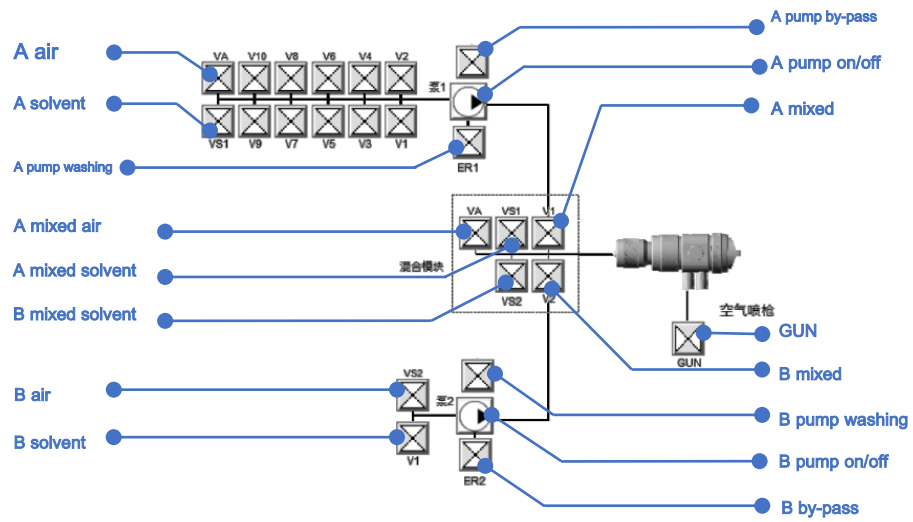
Attention

The effective number of steps determines the actual number of steps finally executed by the wash table. And it will not be executed if the setting data of wash table exceeds the effective steps.

Parameters of Wash Table

	1	2	3	4	5
► Gun 1	ON	ON			
Gun 2	OFF	ON			
Gun 3	OFF	ON			
Gear pump A	ON	OFF			
Gear pump B	OFF	ON			
Washing valveA Water	ON	OFF			
Washing valveA Solvent	OFF	OFF			
Washing valveA Pump	OFF	OFF			
Washing valveB Solvent	ON	ON			
Quick valve gun 1	OFF	OFF			
Bypass A	OFF	OFF			
Digital pressure regulator A	OFF	OFF			
Time/cc A	60	10			

[Wash cycles]	Description
A solvent	1# channel solvent switch valve
A air	1# channel purge air valve
A pump on/off	1# channel metering pump on/off
A pump washing	1# channel metering pump washing valve
A pump by-pass	1# channel metering pump by-pass valve
B solvent	2# channel solvent switch valve
B reserved	2# channel reserved valve
B pump on/off	2# channel metering pump on/off
B pump washing	2# channel metering pump washing valve
B pump by-pass	2# channel metering pump by-pass valve
A mixing valve	hybrid module 1# channel main agent valve
A mixed solvent	hybrid module 1# channel solvent valve
A mixed air	hybrid module 1# channel purge air valve
B mixing valve	hybrid module 2# channel main agent valve
B mixed solvent	hybrid module 2# channel solvent valve
B mixed air	hybrid module 2# channel purge air valve
GUN	gun valve
Reserved	reserved
FL(cc/min)	the setting of flux



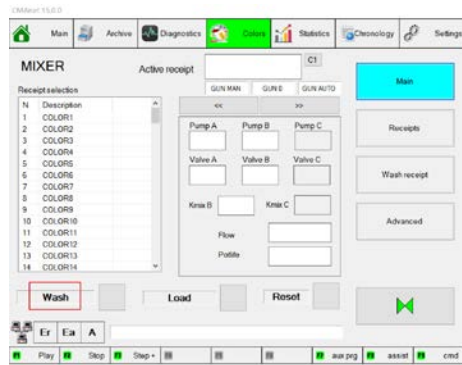
System Diagram



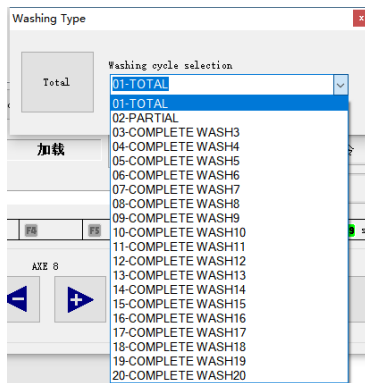
Attention

For all states, ON is on and OFF is off. This table is suitable for two-component systems with metering pumps.

4.2.3 Manual Operations of the Wash Table

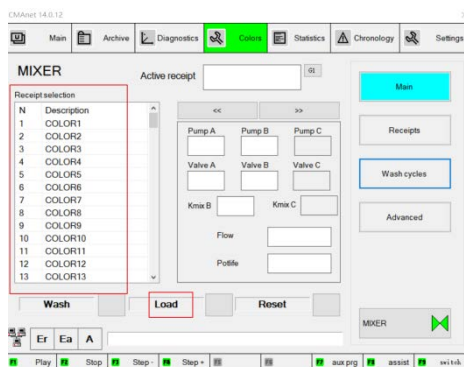


Procedures	Description
1	Click on Wash



Procedures	Description
2	Select the table to be executed in the pop-up Washing type
3	Click on Total to execute the washing program

4.2.4 Load Colors Manually

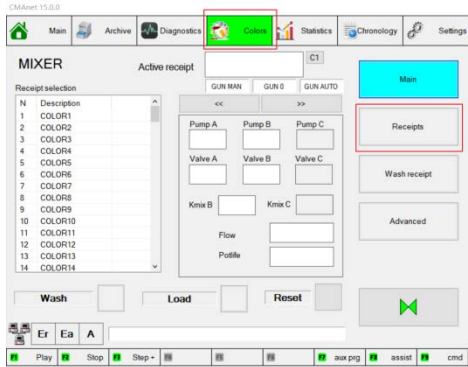


Procedures	Description
1	Select the color to be loaded in the list of colors
2	Click on Load to load the colors

4.3 Formula Table

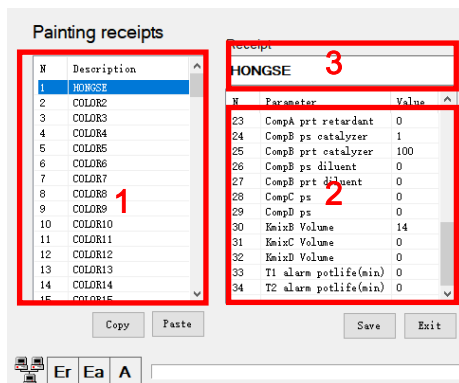
CMA.net designs a formula table system for two-component or three-component systems to facilitate customers to set relevant painting ratios according to the on-site situation.

4.3.1 Basic Operations



Procedures	Description
1	Click on Colors
2	Click on Receipts

4.3.2 Interface Introduction



[Painting receipts]	Description
1	Recipe table list
2	Details of recipe table
3	Click on the text box 3 to modify the name of the current table

4.3.3 Parameter Description

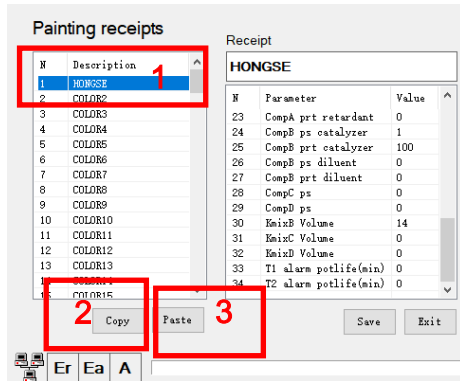
N	Parameter	Value
01	Gun	0
02	PumpA	1
03	PumpB	1
04	PumpC	0
05	PumpD	0
06	ValveA	1
07	ValveB	1
08	ValveC	0
09	ValveD	0
10	KmixB	14
11	KmixC	0
12	KmixD	0

[Painting receipts]	Description
GUN	Spray gun
PumpA	pump A
PumpB	pump B
PumpC	pump C
PumpD	pump D
ValveA	ValveA
ValveB	ValveB
ValveC	ValveC
ValveD	ValveD
kmixB	Mixing valve B
kmixC	Mixing valve C
kmixD	Mixing valve D

N	Parameter	Value
13	Color change cycle	1
14	Potlife washing cycle	1
15	Pre-washing cycle	1
16	Loading quick (s/cc)	0
17	Loading gun (s/cc)	62
18	CompA ps color	1
19	CompA prt color	100
20	CompA ps diluent1	0
21	CompA prt diluent	0
22	CompA ps retardant	0
23	CompA prt retardant	0
24	CompB ps catalyzer	1
25	CompB prt catalyzer	100
26	CompB ps diluent	0
27	CompB prt diluent	0
28	CompC ps	0
29	CompD ps	0
30	KmixB Volume	14
31	KmixC Volume	0
32	KmixD Volume	0
33	T1 alarm potlife(min)	0
34	T2 alarm potlife(min)	0

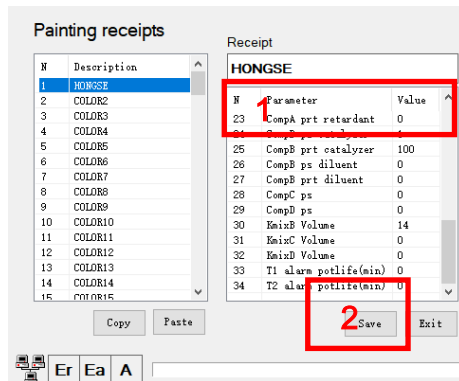
[Painting receipts]	Description
Color change cycle	Change the color
Potlife washing cycle	Wash
Pre-washing cycle	Wash before the change of color
Loading quick(s/cc)	Fast valve load flow
Loading gun(s/cc)	Spray gun load flow
CompA ps diluent1	Component A diluent 1
CompA prt diluent	Component A diluent
CompA prt retardant	Component A flame retardant
CompB ps catalyzer	Component B catalyzer
CompB ps diluentr	Component B diluent 1
CompB prt diluent	Component B diluent
CompC ps	Component C
CompD ps	Component D
KmixB Volume	Mixed B
KmixC Volume	Mixed C
KmixD Volume	Mixed D
T1 alarm potlife(min)	Alarm time 1
T2 alarm potlife(min)	Alarm time 2

4.3.4 Copy of the Brush Table



Copy	Description
1	Select the table in the list
2	Click on Copy
3	Click on Paste

4.3.5 Modification of the Brush Table

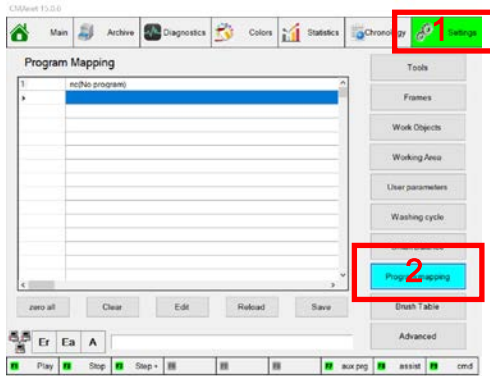


Edit	Description
1	Select the required parameters in the list. Enter the value in the pop-up keyboard.
2	Click on Save

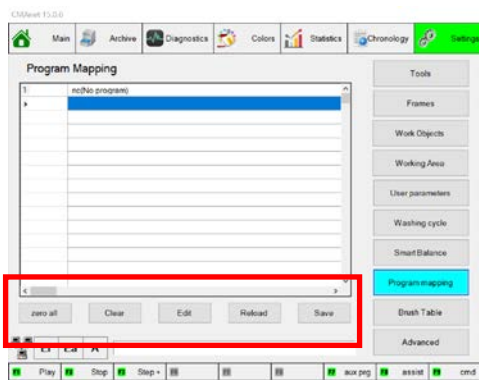
4.4 Program Mapping Table

In automatic operation, when the external device sends the robot program code via communication, the robot system needs a corresponding table to find the relevant program stored in the system, which is called the program mapping table referring to the external and internal comparisons.

4.4.1 Mapping of Trajectory Program



Procedures	Descriptions
1	Click on Settings
2	Click on Program Mapping



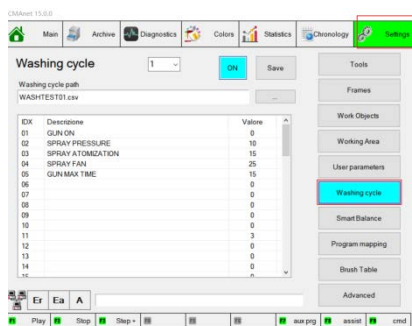
[PROGRAM MAPPING]	Descriptions
Clear all	Clear all comparative relations
Delete	Delete the selected comparative relation
Edit	Select the corresponding line and click on Edit to edit the mapped program
Reload	Reload the programming map
Save	Save the change



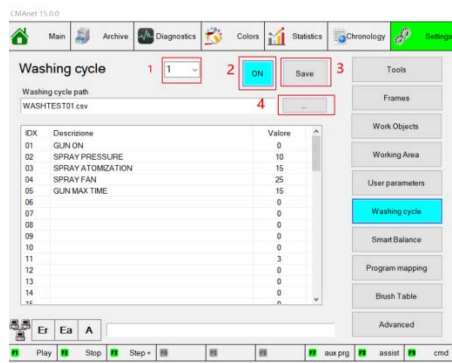
Attention

All operations should be saved!

4.4.2 Mapping of Washing Cycle



Procedures	Descriptions
1	Click on Settings
2	Click on Washing Cycle



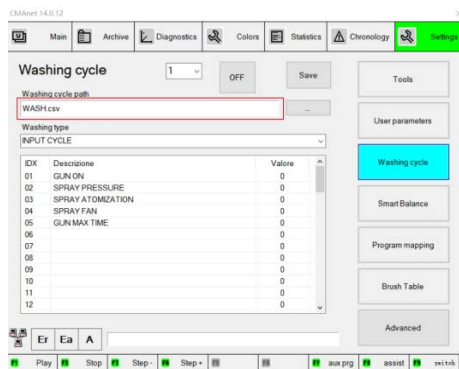
Procedures	Descriptions
1	Click on pop-down list, then choose the number of the desired mapping table(default setting 1~8)
2	Click on button On to activate the table
3	Click on Washing Cycle and choose the desired washing path in the popped dialog.
4	Click on Save



Attention

The short washing and weekend washing functions in the system are mapped with 1 and 2 in the washing cycle list and cannot be occupied by other programs.

4.4.3 Mapping of Other Programs



Mapping	Descriptions
1	Refer to 4.4.2 for mapping operation.
2	For Washing cycle path, choose other corresponding programs.
3	The one-click return to HOME function maps the HOME program.
4	The one-click to maintenance and repair position function maps the MAITAN program.
5	The one-click to zero position function maps the ZERO program.

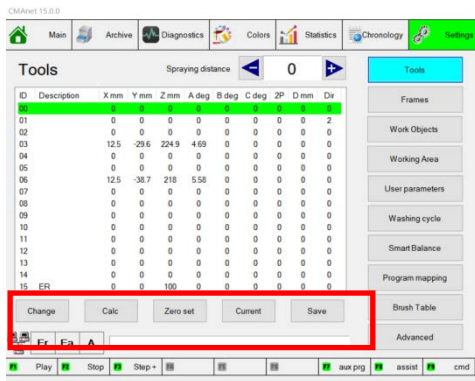


Warning

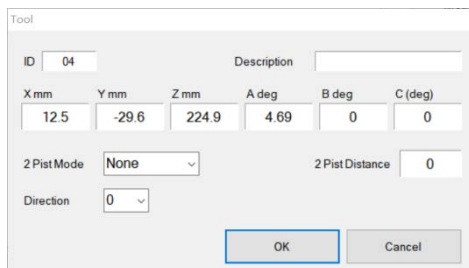
- Once the corresponding program is modified, remapping should be done according to the above method.
- The trajectory programs of HOME, maintenance, and repair position, washing position, and zero position are in the PROGRAMS\SYS folder. Only the relevant trajectory positions can be modified, and the corresponding programs are prohibited to be deleted!

4.5 Gun(Tool) Coordinate System

4.5.1 Interface Introduction

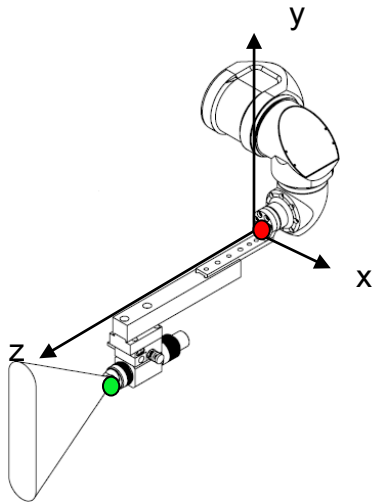


[Parameter Setting of Tools]	Descriptions
Change	Click on Change to edit the selected tool, and the tool coordinate system dialog pops up.
Zero Set	Click on Zero to clear the selected coordinate system.
Current	Click on Current to select the coordinate system and apply it. The selected coordinate system will be saved in the new program.
Save	Click on Save.

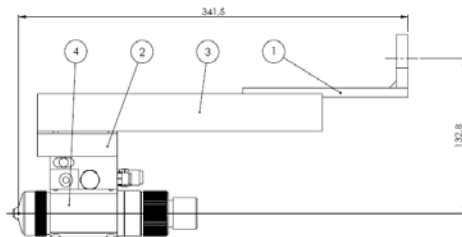


Coordinate System	Descriptions
Descriptions	coordinate system description
X(mm)	offset value of X
Y(mm)	offset value of Y
Z(mm)	offset value of Y
A(deg)	rotation degree value relative to Y axis
B(deg)	rotation degree value relative to X axis
C(deg)	rotation degree value relative to Z axis
2Gun Mode	two pistol mode
2Gun Distance	distance between the two pistols (refer to example 3)

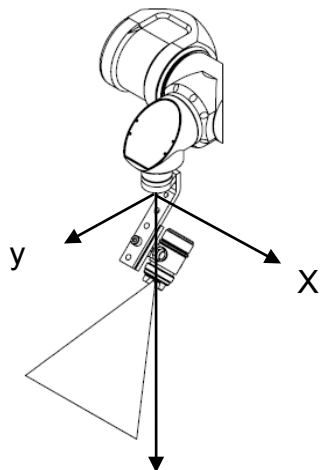
4.5.2 Demonstration of Setting Spray Gun (Tool) Coordinate System



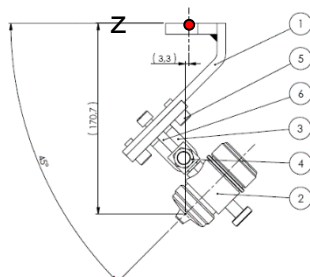
Demo 1	Descriptions
	When the spray gun is installed as shown in the left figure:
	Y=-132.8
	Z=341.5
	Essentially, it is necessary to describe the numerical distance from the red dot to the green dot (nozzle).



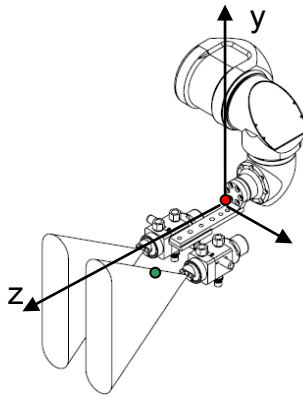
Tool						
ID	01					
Description	KREMLIN					
X (mm)	Y (mm)	Z (mm)	A (degrees)	B (degrees)	C (deg)	
0	-132.8	341.5	0	0	0	
2 Plot Mode			2 Plot Distance			
None			0			
OK			Cancel			



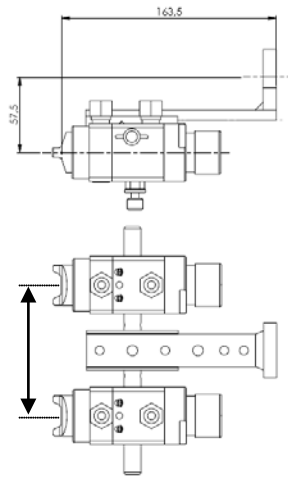
Demo 2	Descriptions
	When the spray gun is installed as shown in the left figure:
	Y=-170.7
	Z=3.3
	B=45° (equivalent to X axis rotation)



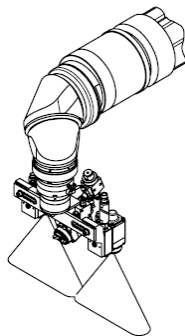
Tool						
ID	01					
Description	MSD					
X (mm)	Y (mm)	Z (mm)	A (degrees)	B (degrees)	C (deg)	
0	3.3	170.7	0	45	0	
2 Plot Mode			2 Plot Distance			
None			0			
OK			Cancel			



Demo 3	Descriptions
	When the spray gun is installed as shown in the left figure:
	Y=-57.5
	Z=163.5
	2Gun Mode=parallel
	2Gun Distance = 100



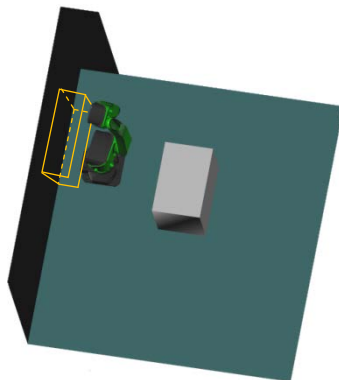
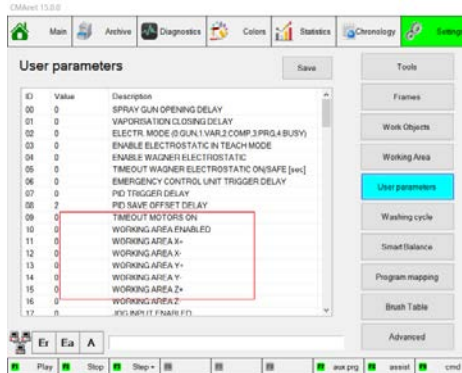
Tool						
ID	01					
Description	VIPER					
X (mm)	Y (mm)	Z (mm)	A (degrees)	B (degrees)	C (deg)	
0	-57.5	163.5	0	0	0	
2 Plot Mode			2 Plot Distance			
Parallel			100			
OK			Cancel			



Demo 4	Descriptions
	When the spray gun is installed as shown in the left figure:
	2Gun Mode = Aligned

Chapter Five PTP Teaching

5.1 Confirm Working Area



Safe Working Area Diagram

Procedures	Descriptions
1	Click on Settings
2	Click on User Parameters

User Parameters	Descriptions
[10]	Whether or not to enable the safe working area
[11]-[16]	confirm the safe working area



Warning

1. When confirming the safe position of the robot, it is necessary to fully take into account the posture change of the robot in the tracking state.
2. When transporting the robot, be sure to operate it at low speed to prevent collision with the chamber/workpiece.
3. When transporting the robot, make sure no human movement or workpiece interference occur within the robot's motion range.

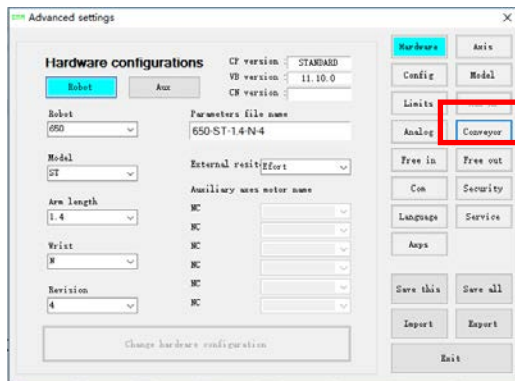


Attention

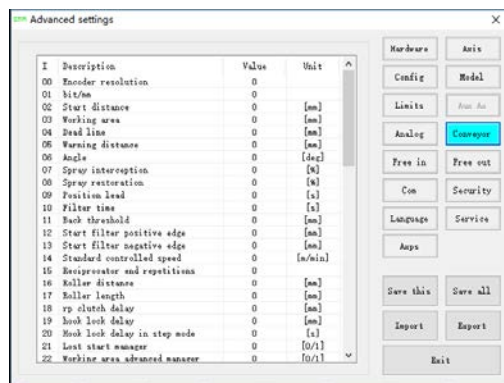
1. All operations to confirm the safe position should be performed by CMA personnel or personnel authorized by CMA.
2. Be sure to confirm that the operator has the above operating qualifications.
3. Equipment damage due to parameter modification operated by unauthorized personnel will affect warranty service of CMA.

5.2 Continuous PTP Teaching

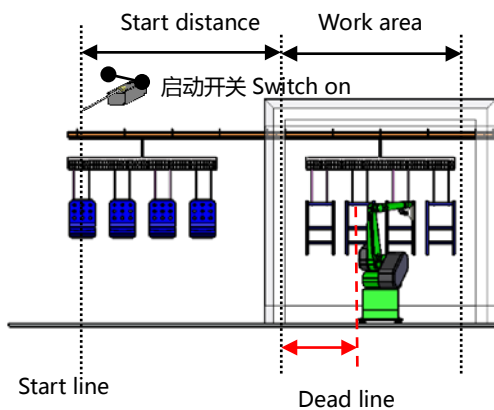
5.2.1 Relevant Parameters



Procedures	Descriptions
1	Click on Settings
2	Click on Advanced Settings
3	Click on Conveyor



<Advanced settings>	Descriptions
[02]Start distance	the distance from switching on to robot's starting operation
[03]Work area	robot's working range (unit: mm)
[04]Dead line	exceed the maximum distance allowed by the robot to start (If the workpiece exceeds the distance, the robot gives up spraying it. unit: mm)



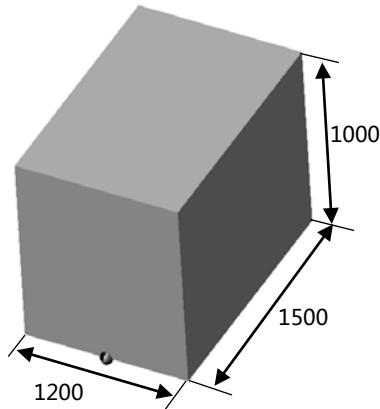
Diagram



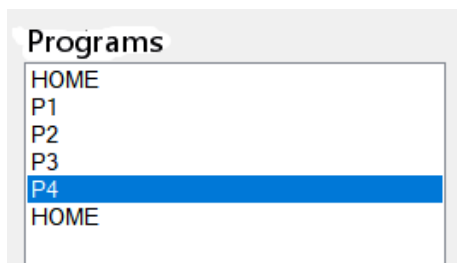
Attention

1. In systems that do not require robots to use the production queue function, the start distance is generally set to 0.
2. In a relatively high tempo system, the abandonment distance is generally set to 0.
3. The robot work area varies in accordance with the robot spraying workpiece and placement position.

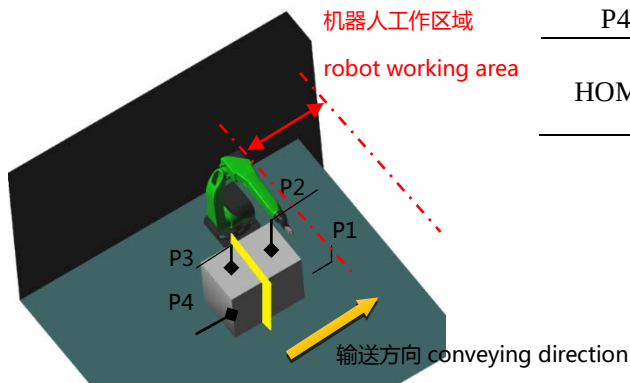
5.2.2 Trajectory Demonstration



Dimensions	Descriptions
length	1500 mm
width	1200 mm
height	1000 mm



Program Structure	Descriptions
HOME	start point to spray location
P1	workpiece front side
P2	the front of workpiece side
P3	the rear of workpiece side
P4	workpiece back side
HOME	complete the program and return to the start point



Diagram

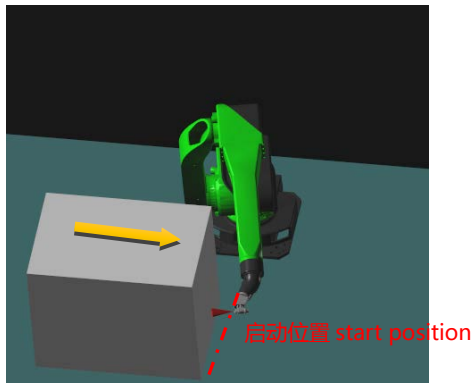


Attention

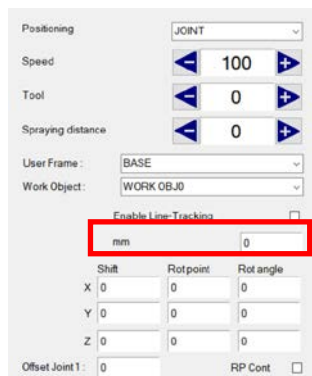
1. Robot tracking is not required in the HOME program segment, so the [tracking] option in the program property should be unchecked.
2. The speed of each section needs to be calculated to match the actual chain speed, so the robot can complete the spraying before the workpiece finishes walking the current area.

5.2.3 Continuous PTP Programming

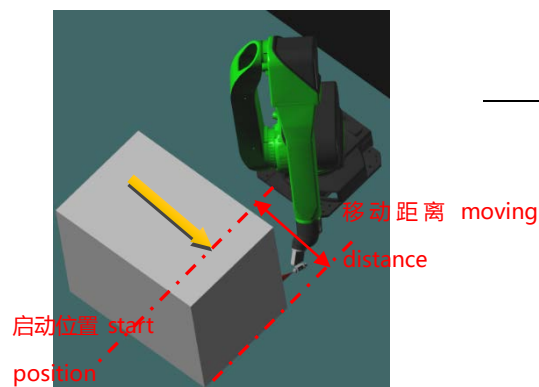
The tracking PTP program adopts the segmented static teaching mode of the workpiece.



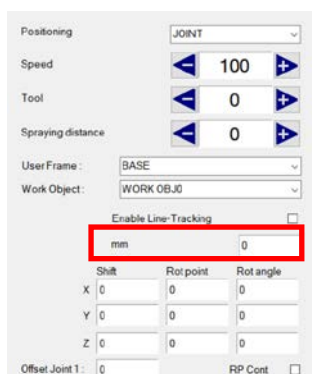
Diagram



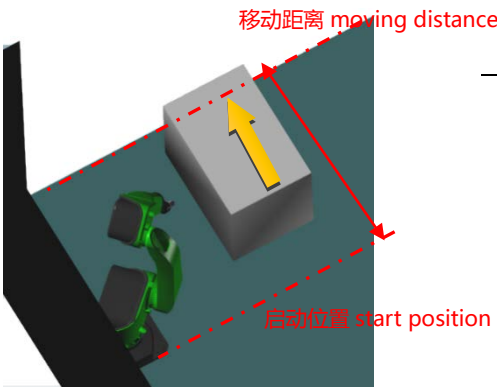
P1	Descriptions
	If the start position is at the red line, P1 should be immediately executed after the workpiece arrives at the position. The conveyor chain should be set as 0.



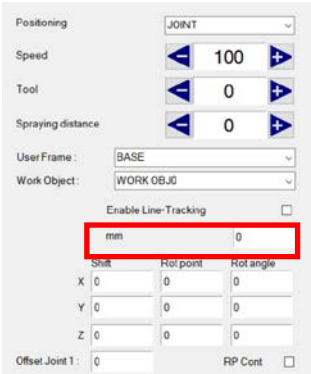
Diagram



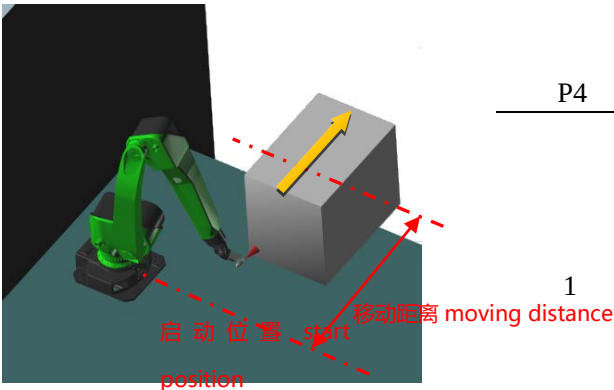
P2	Descriptions
1	Switch on the conveyor chain to move the workpiece. Half of the length of a workpiece, 750, can be satisfied for a 1500 long workpiece. Make adjustment in teaching based on real situations. The moving distance in the diagram is 1000.
2	The position of the conveyor chain of the P2 section should be set as 1000.



Diagram



P3	Descriptions
1	Switch on the conveyor chain to move the workpiece. Half of the length of a workpiece, 750, can be satisfied for a 1500 long workpiece. Make adjustment in teaching based on real situations. The moving distance in the diagram is 1500.
2	The position of the conveyor chain of the P2 section should be set as 1500.



Diagram



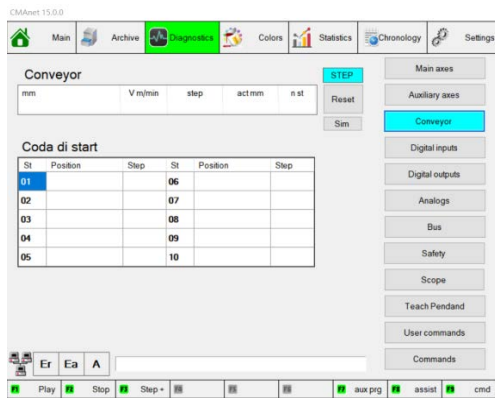
P4	Descriptions
1	Switch on the conveyor chain to move the workpiece. Half of the length of a workpiece, 750, can be satisfied for a 1500 long workpiece. Make adjustment in teaching based on real situations. The moving distance in the diagram is 2000.
2	The position of the conveyor chain of the P2 section should be set as 2000.

**Attention**

1. The distance between each segment should not be longer than the maximum distance allowed by the process.
2. The operation trajectory should not be longer than the maximum tempo allowed by the process.

5.2.4 Modification of the workpiece position of Continuous PTP

In the case of errors made by conveyor chain or absence of workpiece, distance set in the segment program cannot be satisfied in the modification of continuous PTP trajectory. Follow the next steps to complete the setting of relevant distance.



Procedures	Descriptions
1	Click on Diagnostics button.
2	Click on the Conveyor button.
3	Click on the Sim Button



Virtual keyboard

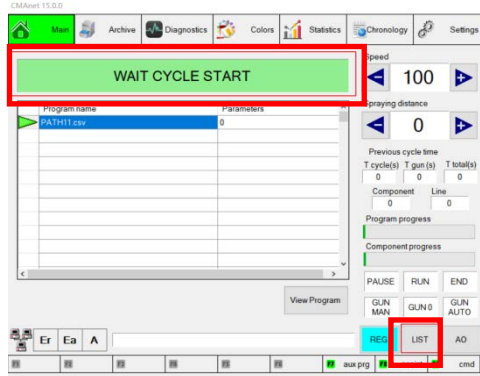
Conveyor Simulation	Descriptions
1	Click on the Simulation enable button.
2	Click on the Set active mm button.
3	Input values in the pop-up virtual keyboard.

**Attention**

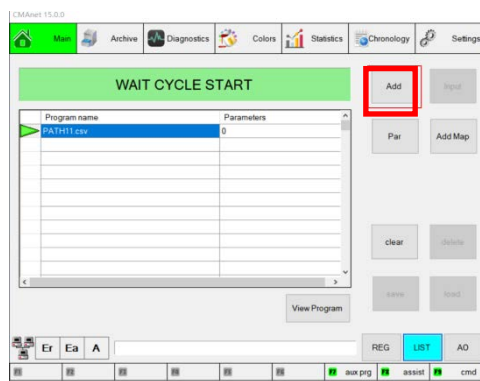
When the modification of the program is completed manually and the program is ready for automatic operation, the Simulation enable button must be clicked again to be disabled. 【The button displays green colour when switched on and grey when switched off.】

Chapter Six Program Reproduction and Operation

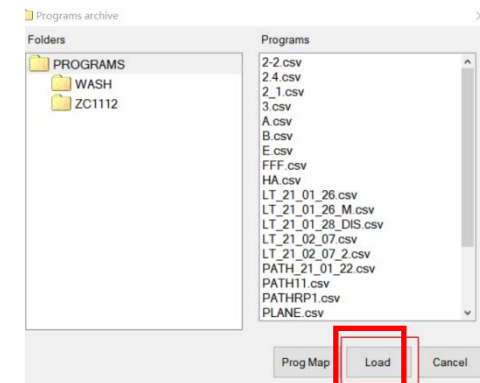
6.1 Automatic Operation



Procedures	Descriptions
1	Select Automatic switch on [Manual-Automatic]
2	Click on the Servo Power On button. If the setting is normal, the green button will be turned on.

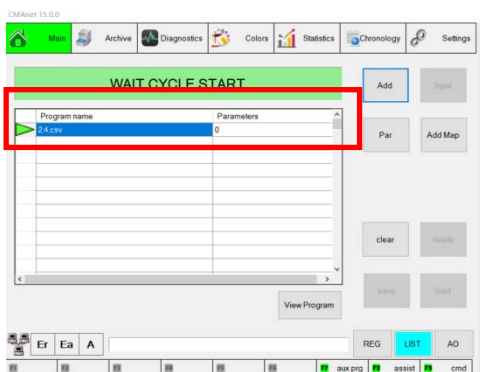


Procedures	Descriptions
	WAIT CYCLE START is prompted in the interface.
3	Click on the LIST button.



Procedures	Descriptions
4	Click on the Add button.

Procedures	Descriptions
5	Click on the to-be-loaded program.
6	Click on the Load button.



State	Descriptions
7	The program will be loaded to running list.

State	Descriptions
	1. In Local mode: press the start button, and the robot will start to run the program. 2. In Remote mode, the robot will wait for external start signals before the operation.

**Danger**

Make sure neither human activities or interfering objects are within the robot's motion range in the automatic operation.

6.2 End Operation in Automatic Mode

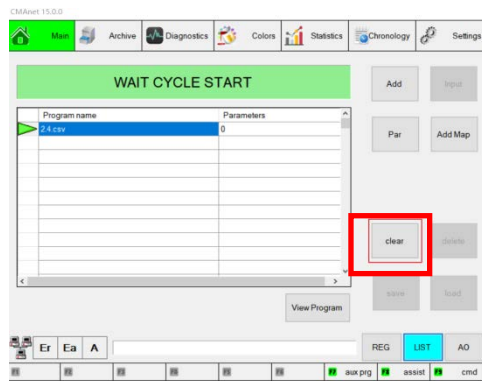
6.2.1 End Automatic Cycle

Procedures	Descriptions
	1. Select End on [Hold-Operate-End] 2. Select Hold on [Hold-Operate-End]

**Warning**

1. The End button will stop the robot from entering the automatic cycle after executing the current program. If other programs are no longer needed to be executed, press the Servo Power On button and confirm the servo is off.
2. The Hold button will enable the robot to enter the pause state. Once it resumes to Run, the robot will immediately complete the unfinished program!

6.2.2 End Operation



Procedures	Descriptions
1	Click on the LIST button.
2	Click on the clear button to clear the programs in the wait list.

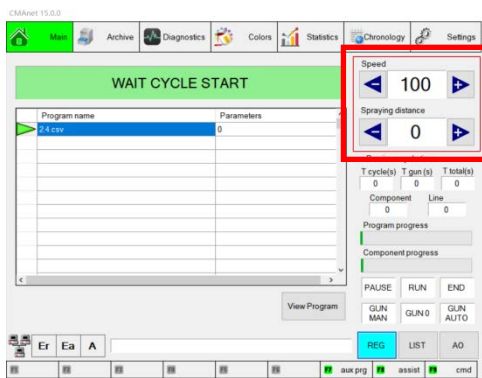
Procedures	Descriptions
1	Click on Servo to switch off it.
2	Select Manual on [Teach-Automatic]



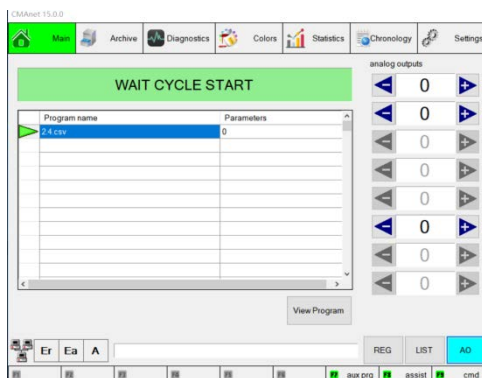
Warning

1. In order to avoid unnecessary damage, make sure the robot completes all the relevant programs before stopping operation.
2. To prevent the robot loading unnecessary programs in restart, make sure the programs in the list are cleared after stopping operation.

6.3 Parameter Adjustment in Automatic Mode



[REG]	Descriptions
<speed>	Adjust the speed of the current program, unit: %.
<spraying distance>	Adjust the distance between the gun and the workpiece.



[AO]	Descriptions
analog outputs	Eight sets of analog outputs are reserved for adjusting relevant parameters in program operation.



CAPV

**Attention**

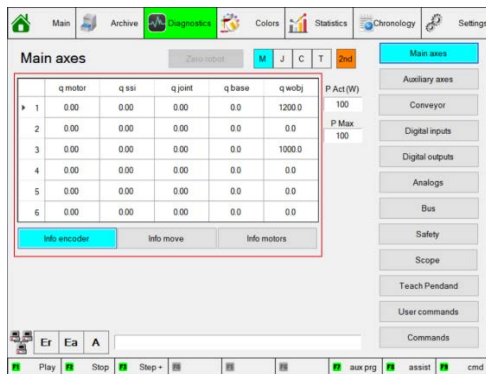
After configuring the relevant parameters, the process parameters of flux, atomization, and fan can be manually controlled effectively in combined with the CAPV system.

**Attention**

This function needs to be applied in combination with the CAPV system of CMA.

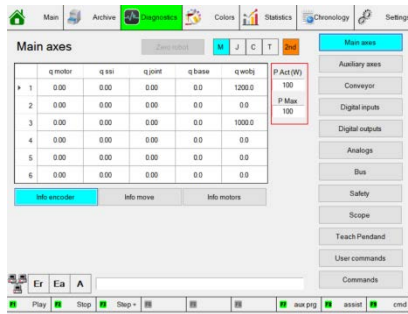
6.4 Equipment Parameter Monitor

6.4.1 Main Axes



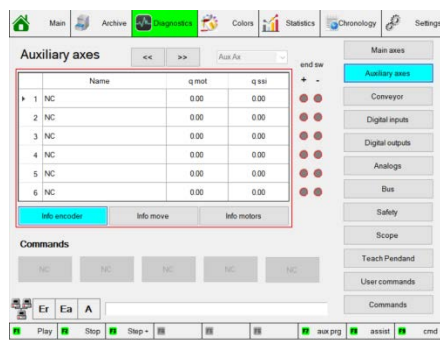
Procedures	Descriptions
1	Click on the Diagnostics button.
2	Click on the Move button.

Main Axes	Descriptions
<info encoder>	monitor the position of axes 1-6
<info move>	monitor the speed of axes 1-6
<info motors>	monitor the motors of axes 1-6



speed	Descriptions
P Act(W)	Click on the Diagnostics button.
P Max(W)	Click on the Main Axes button.

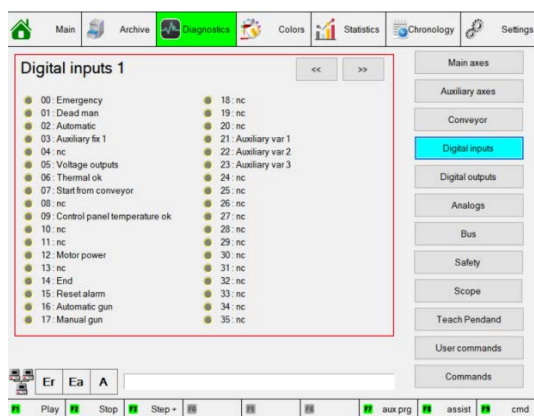
6.4.2 Auxiliary Axes



Procedures	Descriptions
1	Click on the Diagnostics button.
2	Click on the Main Axes button.

Main Axes	Descriptions
<info encoder>	monitor the position of axes 1-6
<info move>	monitor the speed of axes 1-6
<info motors>	monitor the motors of axes 1-6

6.4.3 Digital Inputs



Procedures	Descriptions
1	Click on the Diagnostics button.
2	Click on the Digital Inputs button.

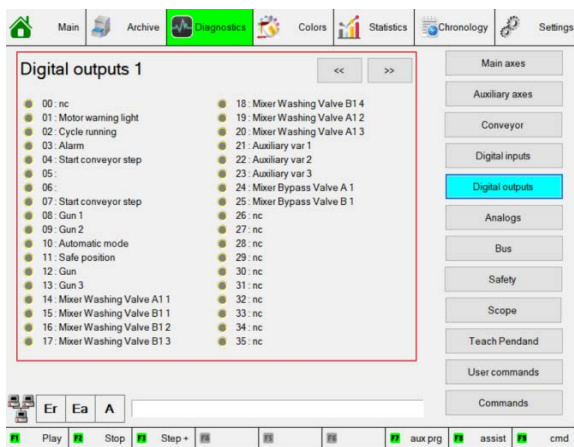
< Digital Inputs >	Descriptions
Digital Input 1	【00】 - 【35】
Digital Input 2	【35】 - 【71】
Digital Input 3	【72】 - 【107】

Digital Input 4	【108】 - 【143】
Profibus	【144】 - 【179】

**Attention**

1. The digital numbers may vary in accordance with some of the input signals required by the system.
2. All the signals can be configured. For configuration method and relevant hardware points, please refer to the operation manual of other parts of CMA.

6.4.4 Digital Outputs



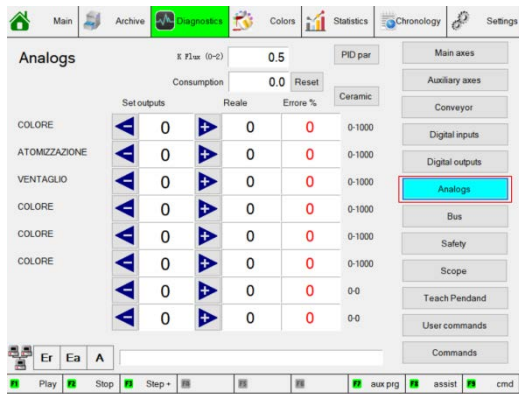
Procedures	Descriptions
1	Click on the Diagnostics button.
2	Click on the Digital Inputs button.

< Digital Inputs >	Descriptions
Digital Input 1	【00】 - 【35】
Digital Input 2	【35】 - 【71】
Digital Input 3	【72】 - 【107】
Digital Input 4	【108】 - 【143】
Profibus	【144】 - 【179】

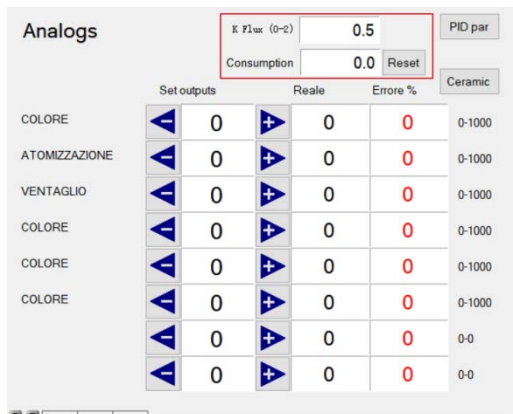
**Attention**

1. The digital numbers may vary in accordance with some of the output signals required by the system.
2. All the signals can be configured. For configuration method and relevant hardware points, please refer to the operation manual of other parts of CMA.

6.4.5 Analogs



Procedures	Descriptions
1	Click on the Diagnostics button.
2	Click on the Analog button.



<Analog>	Descriptions
K Flux(0-2)	display the current flux
Consumption(cc)	display the estimated amount of paint consumption

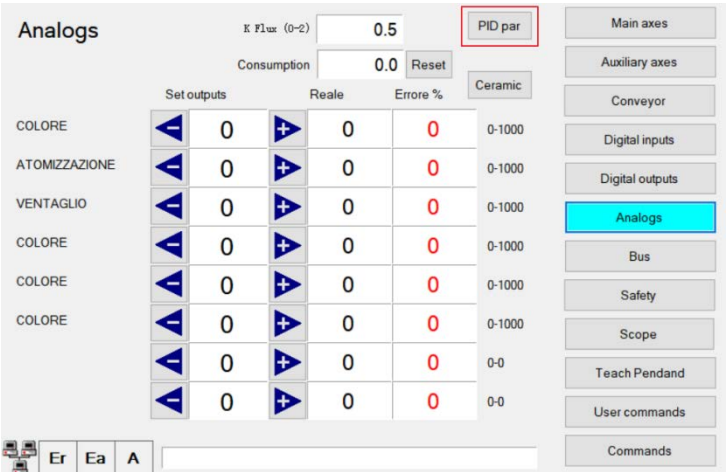


<Analog>	Descriptions
COLORE	display the values of flux
ATOMIZZAZIONE	display the values of atomization
VENTAGLIO	display the values of fan

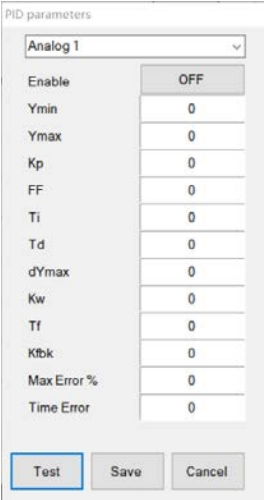


Attention

This function should be applied in combination with CMA and CAPV systems.



<Analog>	Descriptions
PID par	Click on the PID par button and the PID parameter window pops up.



<PID>	Descriptions
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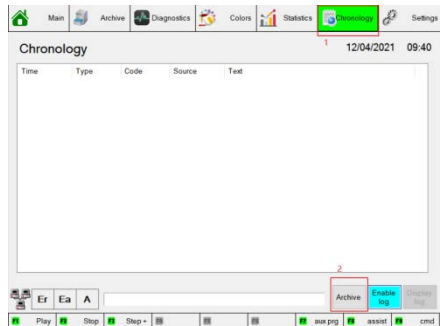


Attention

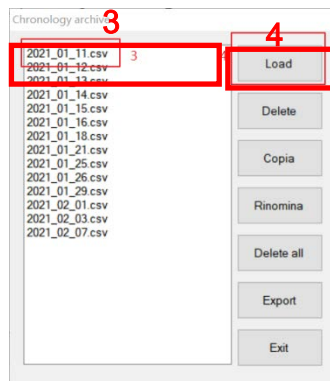
This function should be applied in combination with the PID module of CMA.

Chapter Seven Fault Codes and Troubleshooting

7.1 Interface Introduction



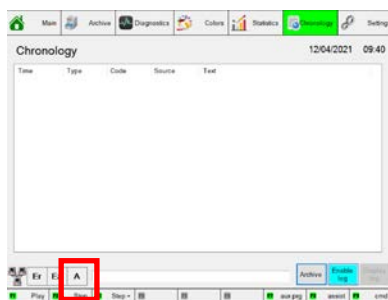
Procedures	Descriptions
1	Click on the Chronology button
2	Click on the Archive button
3	Select the desired file in the pop-up fault files
4	Click on the Load button



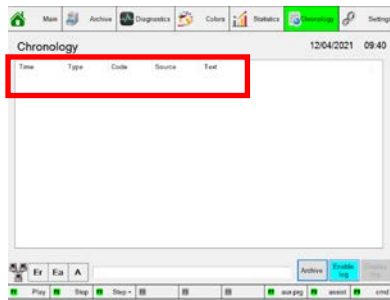
<Fault File>	Descriptions
Load	Load the selected file
Delete	Delete the selected file
Delete All	Delete all the files
Export	Export the selected file[format : CSV]
Exit	Exit the Fault File Dialog

Note:	Descriptions

Click  and the Chronology menu pops up. It displays a series of events, which are classified as three types as shown below.



Info	Info
Warning	Advise information that needs to be paid attention to (Indicator A will display a yellow background and the operation in progress will not stop.)
Fault	fault information (Indicator A will display with a red background and the operation will stop)



Other Info	Descriptions
time	the time that the event happens
type	type of the event(info, warning, fault)
fault code	ID number of the event
fault source	the source of the event

7.2 Axis Fault Info (code01)

Fault Code	State	Fault Info	Reason	Solution
40	A	The current value is higher than the maximum value.	The set parameters are bigger than the maximum value.	This fault only occurs in the axis parameter setting.
54	A	The current value is lower than the minimum value.	The set parameters are smaller than the minimum value.	This fault only occurs in the axis parameter setting.
1002	A	Parameter exceeds the valid value range.	The parameters cannot be accepted.	This fault only occurs in the axis parameter setting.
1003	A	When the control loop is activated, parameters cannot be input.	The parameters cannot be accepted.	Turn off the Servo Enable before saving the parameters.

7.3 Trajectory Info (code02)

Fault Code	State	Fault Info	Reason	Solution
01	A	exceed the maximum speed of axis#	The speed needed is higher than the maximum operation speed.	
02	A	exceed the maximum speed of axis#	The speed needed is over 50% higher than the maximum operation speed.	reduce operation speed
03		exceed the maximum acceleration of axis#	unused	
04	A	The robot is out of the Cartesian working area	\	Re-teach to ensure the robot works in the Cartesian working area
05	A	exceed the motion range of the axis	Each axis of the robot is set a soft limit, which is exceeded.	Re-teach to ensure the robot works in the Cartesian working area

7.4 Modal Info (code03)

Fault Code	State	Fault Info	Reason	Solution
01	A	wrong enter position	exceed the maximum speed of the gun(X,Y,Z)	reduce operation speed in path program
02	A	wrong enter position	exceed the maximum speed of the gun(X,Y,Z)	reduce operation speed in path program
03	A	wrong exit position	robot singularity	modify the path of the robot
04	A	wrong exit posture	robot singularity	modify the path of the robot
05	A	The determinant value is less than the threshold.	robot singularity	modify the path of the robot
06	A	model initialized	unused	

7.5 Transmission Info (code04)

Fault Code	State	Fault Info	Reason	Solution
01	A	The component header file is empty.	program files damaged	delete program and re-teach
02	A	The PTP program is empty.	program files damaged	delete program and re-teach
03	A	The path program is empty.	program files damaged	delete program and re-teach
04	A	The transmission of the component header file is overtime.	Ethernet and PLC communication fault	enable customer remote support system
05	A	The transmission of the path block is overtime.	Ethernet and PLC communication fault	enable customer remote support system
06	A	The transmission of the PTP block is overtime.	Ethernet and PLC communication fault	enable customer remote support system

7.6 Teaching Info (code05)

Fault Code	State	Fault Info	Reason	Solution
01	A	transmission buffer empty.	Ethernet and PLC communication fault	enable customer remote support system
02	A	inconsistent index	Ethernet and PLC communication fault	enable customer remote support system
03	A	conveyor chain not activated	no workpiece in the working area	refer to 8.2.4 for trajectory programming in conveyor chain's movement and 8.2.4.4 for trajectory programming in conveyor chain's stationary mode
04	A	conveyor chain stays still in tracking	The conveyor chain stops when teaching in non-stationary mode.	refer to 8.2.4.3 for path teaching during conveyor chain's movement
05	A	conveyor chain runs in linear tracking	The conveyor runs when teaching in forbidden mode.	refer to 8.2.4.4 for path teaching in conveyor chain's stationary mode
06	A	robot exceeds the soft limit	The trajectory in teaching exceeds the soft limit of the equipment.	maintain in the limit
07	A	turntable not in the correct position	turntable not in the correct position	rotate the turntable
08	A	rotating device not enabled	The motor must be enabled in order to use the rotating device.	turn on motor enable

7.7 PTP Info (code06)

Fault Code	State	Fault Info	Reason	Solution
01	A	command transmission	unknown command appears in programming	check PTP program
02	A	command editing	unknown command appears in programming	check PTP program
03	A	command executing	unknown command appears in execution	check PTP program
04		invalid joint command parameter	unused	
05		invalid command parameter	unused	
06	A	invalid arc command parameter		ensure the points are not overlapped or collinear
07	A	invalid plane command parameter		ensure the points are not overlapped or collinear
08	A	plane command cannot be executed backwards	F3 Step command cannot be used for plane command in the test phase	
09	A	wait for input command timeout	input signal does not arrive after reaching the maximum command time	check input signal
10	A	axis speed too high	C initial function cannot be used	disable C initial function

7.8 Automatic Mo

Fault Code	State	Fault Info	Reason	Solution
01	A	component number	The program in conveyor chain's non-stationary mode has more than one component.	For re-teach, refer to 8.2.4.3 for path programming in conveyor chain's movement.
02	A	Cycle start request with robot not powered		turn on motor enable
03		robot pause	unused	
04		robot end	unused	
05	A	The storage cache is full and the program cannot run.		enable customer remote support system
06	A	stop cycle input activated		check input signal
07	A	wrong mode of the conveyor chain	program operation mode does not match the conveyor chain operation mode	modify the operation mode of the conveyor chain

08	A	rotating device is not synchronized with the hook	In conveyor chain's single-step mode, the hook is not released, which means no hook is in front of the robot.	operate in one mode
09	A	position exceeds soft limit	The first point of the program exceeds the soft limit.	re-teach
10	A	offline simulation serial number not found	A program generated by an offline simulation software attempts to run without authorization.	insert authorization in PLC

7.9 Conveyor Chain Info (code08)

Fault Code	State	Fault Info	Reason	Solution
01	A	negative speed	conveyor chain running backwards	ensure the conveyor chain runs forward
02		exceed the maximum speed	unused	reduce the speed of the conveyor chain
03	A	miss the workpiece	robot is still running spraying program after the request	reduce the speed of the conveyor chain
04	A	unable to follow the workpiece	Because the conveyor chain runs too fast in the linear tracking mode, the robot falls behind the workpiece when it enters the spray booth.	reduce the speed of the conveyor chain
05	A	roller distance is less than the start distance	wrong parameter setting	warning in equipment installation, improper parameter setting or the workpiece roller not match the conveyor chain
06	A	chain pitch shorter than roller length	roller length cannot exceed the chain pitch	warning in equipment installation, improper parameter setting or the workpiece roller not match the conveyor chain
07	A	roller miss the hook		warning in equipment installation, improper parameter setting or the workpiece roller not match the conveyor chain
08	A	The hook overtakes the roller, and the movement is not allowed.	no hook in front of the roller	move the hook to the front of the roller

7.10 Parameter Info (code09)

Fault Code	State	Fault Info	Reason	Solution
01	A	download parameters when the motor is working		switch off the motor servo before saving parameters

7.11 Configuration Info (code10)

Fault Code	State	Fault Info	Reason	Solution
01		component header	unused	
02		path component	unused	
03		PTP component	unused	
04		conveyor chain	unused	

7.12 Power Info (code11)

Fault Code	State	Fault Info	Reason	Solution
01	A	The robot has no compressed air.	The robot is not supplied with compressed air.	check the supply of compressed air
02	A	no input power		refer to the control cabinet manual
03	A	thermal fused		refer to the control cabinet manual
04	A	no air in proportional valve	component CAPV has no compressed air	check the supply of compressed air
05	A	no zero point for the axis. The servo cannot be used.	zero point must be calibrated for the axis for the first time	enable customer remote support system
06	A	The axis is not calibrated to zero point. The servo cannot be used.	position sensor reading error	enable customer remote support system
07	A	The axis is not synchronized. The servo cannot be used.	The axis is not synchronized after teaching.	Refer to the synchronization instructions in section 8.4.2.6.
08	A	servo on axis error	axis drive problem	enable customer remote support system
09	A	overheated control cabinet	The temperature in the control cabinet is over the maximum 40°C.	Check whether the ventilator or air conditioner (if installed) is working properly.
10	A	no ventilation equipment in the spray booth	The lack of ventilation equipment will activate the alarm and disable spraying.	turn on the ventilation equipment in the spray booth
11	A	The movement of auxiliary axis is prohibited.	The movement of the turntable equipment is prohibited.	The ST version robot is equipped with a turntable equipment. Check the sensor of the hook.
12	A	robot not running for a long period of time, servo powered off	robot not working for a long period of time, servo of the motor powered off (energy efficiency)	

13	A	Robot I/O is not powered.	The auxiliary 24V power does not meet the requirements.	enable customer remote support system
14	A	The joystick is connected to the robot and cannot start cycle.	The programming joystick is connected to the base of the robot and cannot start production cycle.	contact programming joystick
15	A	Axis# overcurrent for a long time	Axis# is in the rated current working state for a long time.	check for mechanical faults, such as the hose of the spray gun.
16	A	activate soft limit	The limit switch of the auxiliary axis of the C model is activated.	refer to the descriptions in other sections for operation

7.13 PID Controller Info (code12)

Fault Code	State	Fault Info	Reason	Solution
01	A	exceed the maximum error percentage	The PID controller with analog output cannot track the set value.	enable customer remote support system

7.14 Hardware Info (code 13)

Fault Code	State	Fault Info	Reason	Solution
01	A	internal IO module not found	The internal I/O module in the control cabinet is invalid.	enable customer remote support system
02	A	module of the encoder not found	The synchronization module of the conveyor chain is invalid.	enable customer remote support system
03	A	IO module of the robot not found	The internal I/O module is invalid.	enable customer remote support system
04	A	I/O module of the proportional valve not found	The I/O module of the proportional valve accessory (CAPV) fails.	enable customer remote support system
05	A	CPU power is too low		refer the control cabinet manual for replacing the battery of CPU
06	A	I/O module of the color change system not found	I/O module of the color change system fails.	enable customer remote support system
07	A	I/O module of the scanning device not found	I/O module of the scanning device fails (only for AWPS).	enable customer remote support system

7.15 SSI Info (code14)

Fault Code	State	Fault Info	Reason	Solution
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01	A	Encoder and resolver are not synchronized.	The encoder value of the axis of the GR630 and GR650 robots does not match the resolver of the motor. Therefore, a fault occurs with a servo, while a warning is signalled without a servo.	refer to the main axis and motor commands described in other manuals to synchronize them
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7.16 Jog Info (code 15)

Fault Code	State	Fault Info	Reason	Solution
01	A	reach the limit	Axis reaching the limit in manual operation generates the warning.	

7.17 Hand Press Info (code16)

Fault Code	State	Fault Info	Reason	Solution
01	A	hand press		for reference only
02	A	hand press		for reference only

7.18 Spray Gun Cleaning info (code18)

Fault Code	State	Fault Info	Reason	Solution
01	A	Gun washing cycle not enabled	In the case that the spraying gun is not enabled, a cleaning request is received.	enable gun washing cycle, refer to the cleaning setting describe in section 8.4.54
02	A	robot not enabled and receives a cleaning request	In the case that the motor is not enabled, a cleaning request is received.	enable motor
03	A	send cleaning request in automatic mode		refer to robot automatic mode
04	A	washing cycle activated	The robot receives another cleaning request while doing washing cycle.	
05	A	load cleaning program error	Ethernet communication error	enable customer remote support system
06		robot not in cleaning position	unused	

7.19 Conveyor Info (code24)

Fault Code	State	Fault Info	Reason	Solution
01		abnormal conveyor position	unused	

02		abnormal conveyor positioning	unused	
03		Conveyor is transplanted by input signal	unused	

7.20 Ethernet Communication Info (code 32)

Fault Code	State	Fault Info	Reason	Solution
01		The robot is connected to the server.	the connection information with the program management terminal if it exists	
02		The robot is disconnected to the server.	connection information with the program management terminal if it exists	
03		server not found	connection information with the program management terminal if it exists	
04		cannot connect to server	connection information with the program management terminal if it exists	
05		cannot add in teaching	The program cannot be added to the list in teaching.	
06		program not found	The program that needs to be loaded does not exist in the robot files.	
07		program added	The program is added to the operation list correctly.	
08		loaded program error		
09		check error	Ethernet communication error	enable customer remote support system
10		automatically load new characters in the list	the information the program automatically loads to the list	

7.21 Emergency Stop Info (code33)

Fault Code	State	Fault Info	Reason	Solution
01		robot in emergency stop state		
02		emergency stop eliminated, please reset		

7.22 Teach Pendant Info (code34)

Fault Code	State	Fault Info	Reason	Solution
01		enable	unused	
02		disable	unused	
03		CMAnet cannot be turned off in motor's servo state		

7.23 Server Download Info (code35)

Fault Code	State	Fault Info	Reason	Solution
01		The teach pendant is connected to the download server.	information	
02		connection error with the download server		power off and re-power on the control cabinet
03		The teach pendant is disconnected with the download server.	information	



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