Mechanical Arm Series

Manual for Joint Manipulator Operation and Welding Procedures

Leading Numerical Controller

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1. Description of screen configuration

The system operation screen configuration can be modified according to the on-site operation requirements. For detailed usage, please refer to the "Application Manual". The default operation screen of the machine is configured as follows



Head column and left function area

You can edit it yourself using the HMI editor. A commonly used modification is the Logo graphic in the upper left corner.

UNC V09.00 Operator) or		Display the system version number, the current login level, click on this area to enter the permissions page.
World	X Y Z	0.00 454.00 754.99	A B C	0.00 90.00 0.00	U V W	0.00 0.00	This area will display the coordinate values in the coordinate system according to the system mode (maintenance, automatic, teaching), and the selected
							coordinate system (world, work, tools, joints).

free 0.0 0.0	Displays the welder status of the command and the AO1 and AO2 voltage displays.
1115.tch	Displays the name of the currently executing teach-in program.
F1.wild off	The Function Key function displays the functions currently used by F1.
Ready 100.0 % Click on the upper half to switch the start status of servo.	Displays the percentage of the system running speed in the current system state and automatic mode. Unprepared: Stays in this state until the coordinates of any of the motors are not confirmed. In this state, the automatic mode cannot be used, and the teaching mode operation can only be the joint coordinates. Prepared: When the coordinates of each motor have been confirmed, it will become prepared state. After the preparation is completed, there is a way to enter the "automatic mode", because the kinematics calculation path of the robot of the system is meaningful after the coordinates of each axis are correct. Running: The automatic program is running. Pause, section stop: The system has been running but entered the pause state for reasons. Teaching: Performing teaching.
X 0.00 A 0.00 U 0.00 Y 454.00 B 90.00 V 0.00 Z 754.99 C 0.00 W 0.00	Enter the connection to the coordinate page.
Alarm Varnin Reset	Prompt whether the system currently has an alarm warning. Click on the alarm warning area to display the current alarm warning content. Click "Reset" to clear the current alert warning if the conditions of establishment for the alert warning has disappeared.

Auxiliary buttons, which can be used to customiz functions.					
Click the lock button	Screen lock function: It can make the system enter the screen lock state, which need to operate by entering the correct passwords. If you click Cancel, a small box of "Forbid" will be displayed in the upper right corner. Click it and a window for passwords will pop up.				
AUTO TEACH	These three buttons switch system modes: Maintenance mode: Operation control of a single motor. Usually used for the time of matching the machine. Automatic: Use to start the program, or to operate specific moves on each page. Teaching: You can move with the direction of the coordinate system such as "world", "work", "tool" and "joint" as a reference for motion.				

Right quick-operating area

+ F%	Automatic mode: adjust the percentage of speed during automatic operation Maintenance and teaching mode: the percentage of speed when the machine is manually operated
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	In the automatic mode, program execution can be performed.
PAUSE	In the automatic mode, make the running program enter the pause state.
• FINISH	In the automatic mode, the executed program stops running.

Manual operating area

		TOOL	WORK	WORLD	MPG		• XI		• x 100
	PZ+	rY+ V+	rX+ U+	C+	B+	A+ J4+	Z+ J3+	+Y +5L	X+
Alm Rst	rZ-	rY-	гХ-	C-	В-	A-	Z-	Y-	Х-

Use to select the coordinate, continuity, and speed ratio of the moves, then press the move button to move manually.

2. Introduction to basic concepts

Introduction to spatial coordinates (position and attitude) The coordinates of the manipulator generally refer to the position and attitude of the end point. Refer to the following figure, which is a schematic diagram of a six-joint manipulator with additional tools.

The origin of the world coordinate system of Advantech LNC joint robot (base coordinate system) is defined in the center of the base. The direction definition of the XYZ axis can think of the arm as a person, in the same direction as our well-known axis, with +X on the right, +Y on the front, and +Z above.



To represent the space coordinates, there is an attitude in addition to the position. The position in the space is as commonly understood and commonly used (X, Y, Z), but the attitude information (A, B, C) is not so easy to understand.

ABC is used to indicate the direction of the end point. It has a specific rule, collectively called Euler's rotation theorem, which is used to indicate the possibility of various directions. The description of the Euler's rotation theorem can be found online for a more detailed explanation. The rules of the Euler's rotation theorem are not necessarily the same in each robot system.

The Euler's rotation theorem of Advantech LNC is defined as ZXZ, the universal right-hand rule, ie

A is the angle of rotation around the +Z axis.

B is the angle at which the axis rotates around (+X after A rotation).

C is the angle at which the axis rotates (+Z after AB rotation).

Various coordinates and their relevance

This system contains a variety of robot types, all of which are developed with the same concept, the following are some of the specific nouns:

Motor Coordinate: The actual coordinate value of the motor is independent of the coaction between the mechanisms.

Joint coordinate: The coordinate value after the motor coordinate is converted by the mechanism coupling relationship. (visual mechanism state of appearance)

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

Forward kinematics: An algorithm that converts motor coordinates to world coordinates.

Inverse kinematics: an algorithm that converts from world coordinates to motor coordinates.

		Motor coordinates		$\hat{1}$	
Forward	ki	nematics	Mechanism coupling relations		
		Joint coordinates	Inverse	k	inematics
			Mechanism type and size		
		World coordinates			
		7			

Comparison of characteristics of several common robot types

Туре	Standard six joints	Scara	Delta	XYZABC
Appearance				
Degree of freedom	XYZABC	XYZA	XYZA	XYZABC
Origin of	Base center	Seat center	Fixed disk center	Arbitrary custom
world				origin of world
coordinates				coordinates
Tool	Offset X	Offset X	Offset X	Offset X
calibration	Offset Y	Offset Y	Offset Y	Offset Y
items	Tool length			Tool length
Tool calibration items				

Work coordinates

When the manipulator is used for glue coating, polishing, etc., all the motions are determined according to the position of the workpiece. When the production line requires multiple manipulators to perform the same work, each manipulator should use the same machining program, but because the relative position between the machine and the workpiece is difficult to achieve during installation, a coordinate system is required to be defined to describe the position of placement and rotation angle of the workpiece.

When you are editing a program, it is better to follow a certain work coordinate system, so that when the reference position of the subsequent action is modified, the program can be transferred simply by changing the definition of the work coordinate system without re-modifying the relevant action points.

As shown in the figure below, the two sets of workpieces are the same, just that the position and angle are different. Therefore, when editing the program, the path can be edited in the work coordinate system for the normally placed workpiece. When the other set of workpieces is to be machined, it's ok to switch the work coordinate system to the reference position of the set of

workpieces.



Description of application sequence of various coordinate system setting methods

Direct setting

Fill in the value of the coordinate system directly.

It is suitable for use in the development environment where any input value or coordinate system is fixed.

World record XYZ

Set the position (X, Y, Z) in the set world record number to "Work coordinate system", but set (A, B, C) to 0.

It is suitable for the situation where the table is placed on the right angle machine without tilting and rotation. It is convenient to set the coordinate system only by calibrating one point.

World record XYZABC

Set the position (X, Y, Z) and (A, B, C) in the set world record number to "Work coordinate system".

It is suitable for the purpose of loading and unloading. And it only needs to calibrate the point at which the material of loading and uploading, then can be applied to the complete action position of material of loading and uploading. The method is to first set the world record point as the coordinate system, and then move to the position under the coordinate system, for example:

G54 O2 P15	// Set P15 as the coordinate system
G01 X0 Y0 Z10 A0 B0 C0 F3000	// Straight line to the position of Z10 of coordinate system
G01 Z0 F1000	// Move slowly to the position of coordinate system Z0 $$
G22 O201 S1 P100	// O201 is set to On and waits for 100ms.
G01 Z10 F3000	// Move up to Z10 position

Coordinate system record

Set the coordinate system record to "Work coordinate system". Suitable for multiple sets of coordinate systems that need to be calibrated.

Current position and attitude

Set the world coordinate position (X, Y, Z) and (A, B, C) when the program is executed to this line to the "work coordinate system".

It is suitable to perform multiple moves according to the position after moving to a certain position while teaching the recording program, and if the point is modified later, all the subsequent moves can be automatically adjusted based on the modified point.

Tool coordinates

During the running of the program, it is sometimes necessary to move in the direction of the tip of the manipulator. For example, the loading and uploading action of the lathe needs to be taken out and placed according to the direction of the end of the current arm. Because the tip of manipulator will definitely install another tool, it is called the tool coordinate system. When the program needs to use the current attitude as a reference, it can be set to use the tool coordinate system.





Safety precautions

- 1. The operating robot must first confirm the space for safe operation.
- 2. Keep a certain safe distance from the operator when the machine is in operation.
- 3. When editing the program for the first time, you must first simulate it in handwheel mode to confirm whether the robot action meets the requirements.
- 4. If any abnormal deviation from the expected action is detected during the robot motion, quickly press the emergency stop switch in the upper right corner of the controller to ensure safety.
- 5. If the operator is not familiar with the controller, do not operate the robot that has been edited by others and is already running automatically.

- 6. If you want to leave the robot for a long time and do not do any automatic operation, please press the emergency stop switch in the upper right corner.
- 7. Do not play, chat, cause distraction, etc. when operating the robot. Please focus on the moves of the robot when pressing the move button.
- 8. If the robot has been completely set up to operate automatically, it is recommended to mark the sign of prohibition of entering in the working area of the robot.
- 9. After the auto-running robot is set up, if the operator wants to leave and let the robot run automatically, it is recommended to lock the screen to prevent others from operating the controller.
- 10. When editing robot motions, please optimize the motion path to make it softer, and avoid some manipulators to make sudden stop or sharp turns after long distance of motion.

Product name	Item	Specifications					
SIOA1730	Input points	21 points					
	Input specification	DC24V optocoupler input, available for NPN/PNP switching					
	Output points	24 points					
	Output specification	Y1~Y6 Relay dry contact output Y7~Y16 Relay common connection point output Y17~Y24 Crystal low level output					
	Power requirements	DC24V±10%					

Uses of IO version

Product overview of SIOA1730:



3. Basic operating instructions

Prepared conditions

Prepared state, indicating that the system is in a situation where the motion command can be sent to the axis. Each axis in the system that must be controlled must meet the following conditions before it is in the prepared state.

Axis coordinate state

Depending on the difference of hardware used for pulse control or communication control, the method for knowing the coordinates of each axis is different. The following are general rules for the numerical significance of the axis coordinate state:

Less than 0: When reading the pulse type absolute encoder value using COM communication, a reading failure occurs.

Equal to 0: Any action of set coordinates has not been executed when using pulse control, or the axis has not been servo-started when using communication control.

1~9: The process of rotating the motor to find the reference point or the process of reading the absolute encoder when using pulse control.

10: The reference point has been found or the status of the absolute encoder value has been successfully read.

11~19: The process of estimating coordinates based on the results of state 10.

20: The state of the coordinates has been calculated.

21~22: The process of setting coordinates

23: : Set the state of coordinate completion when using pulse control, or start the servo of the axis when using communication control.

Axis servo starting

When the axis servo is started, the axis can execute the motion command issued by the controller, so the axis servo start is a necessary condition for completion of preparation.

The axis servo can be started after the emergency stop button is released, and is automatically started according to the built-in sequence. It is also possible to temporarily close the operating interface with the emergency stop button released, for example to force the shaft to be released for unpowered dragging.

Axle brake

When the axle brake is released, the axis can normally execute the motion command issued by the controller, so the shaft servo start is a necessary condition for preparation. In order to avoid the jitter when the axis servo is started, or ptosis of the mechanism when the brake is released, the axle brake will automatically release according to the built-in sequence after releasing the emergency stop button, or it can be temporarily closed on the operation interface when the emergency stop button is released, for example, the shaft is forcibly released for unpowered dragging.

Axis release command

When the axis has a forced release (R23023.x) (forced servo Off, brake On), it shall be unable to become completion of preparation.

Axis emergency state

When the axis servo is not started or the brake is not released, the axis must be in an emergency state. In this state, the servo will update the command coordinates with the encoder feedback coordinates.

In the program, the command can also be forced to temporarily enter the emergency state to achieve the purpose of updating the command coordinates by feedback coordinates. For example, after performing the origin calibration, the axis can be forced into an emergency state to reset the current coordinates.

Classification of operations

System operation can be divided into two categories: manual operation and automatic operation. It contains:

Operation	Mode	State	Coordinate	Speed	Description
method			system	reference	
Manual	Maintenance	In	Motor	Manual	Operates against a single
operation		maintenance		parameters	motor, regardless of the
					effects of mechanical
					coupling. Usually used in
					the matching and
					calibration process.
	Teaching	In teaching	Joint	Manual	When in the unprepared
			World	parameters	state, only the joint
			Work		coordinates can be selected.
			Tools		
	Teaching	In action of	According	Manual	In the non-handwheel
		to be	to the	parameters	mode, the action is
		prepared for	purpose of		performed when pressed,
		completion	action		and stopped when released.
					In the handwheel mode, it's
					controlled at the handwheel
					rotation speed after
					starting.
Automatic	Automatic	In action of	Joint	Automatic	Use the method of starting
operation		to be	World	parameters	after releasing the time of
		prepared for	Work		duration of pressing to
		completion	Tools		avoid accidental pressing.
		Pause			
		Section stop			

Maintenance and teaching mode

Before performing coordinate adjustment, you need to switch to "Teaching mode" to start the adjusting procedures.





Handwheel mode: switch whether to operate with the handwheel

CONT/INCR



Press the CONT button to switch the way of motion, which is CONT /INCR.

Under "CONT", pressing the 18 buttons will cause the adjusting motion to continue to move according to the selected function until the button is released. The speed of the motion can be determined by the three speed selections below.

Under " INCR", pressing the 18 button will only move the manipulator a certain distance, and the length of the distance will be determined by the three distance selections below.

The usual usage is to use the "CONT" method when it is far enough away from the target point, so that the target point can be approached quickly; when the target position is approached, the "INCR" mode is used so that the target point can be accurately adjusted.

The basis coordinate system of the motion



The direction of the motion is converted by the coordinate system depending on the selected coordinate system.

Note: If the system status is "Unprepared", It can only be "Joint Coordinates" in "Teaching".

World coordinate system: It is fixed, and the coordinate system axis referenced during adjustment is determined according to the definition of world coordinates.

Work coordinate system: The coordinate system axis referenced during adjustment is determined according to the set value of the work coordinate system.

Tool coordinate system: Determines the coordinate system axis referenced when adjusting

according to the set value of the tool coordinate system.

When the position and attitude of the current end point are set to the current tool coordinate system, you can press "Tool" again, and the value next to it will also change to 0. This value represents the spatial distance between the position of the end point after the motion and the position of the end point when the "Tool" is pressed.

Joint coordinate system: is fixed and based on the definition of joint coordinates.

Motion button

Depending on the difference of selected motion (CONT/INCR), speed (1%, 10%, 100%) or distance (x1, x10, x100) and the selected coordinate system (world/work/tool/joint), the moves when pressing the motion button will be different.

Buttons	Description	Remarks
Z+ Y+ X+ J3+ J2+ J1+ Z- Y- X- J3- J2- J1-	Joint coordinates: Joints 1~3 move positively and negatively. For world, work and tool coordinates: The end point moves to the selected coordinate system axis.	
C+ B+ A+ J6+ J5+ J4+ C- B- A- J6- J5- J4-	Joint coordinates: Joints 4~6 move positively and negatively. For world, work, and tool coordinates: Determine the direction of rotation when clicking according to the settings in the "Setting page/Teaching mode" parameters.	Please refer to the "Introduction to Basic Concepts" to understand the meaning of ABC.
PZ+ PY+ PX+ W+ V+ U+ PZ- PY- PX- W- V- U-	Additional U, V and W axes move positively and negatively.	



System alarm/warning reset button.

Direction rotation during teaching

There are three ways to rotate the direction during teaching. You can choose the options that are easier to understand according to the type of mechanism and personal habits. The options are as

follows.

Teach Rotate Mode Change ABC Value

Spatial rotation mode ABC coordinates

Directly operate the ABC value of the current coordinate of the selected coordinate system, which is more suitable for the end axis of the orthogonal robot.

Teach Rotate Mode	Tilt Always By Tool Coor
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Teaching rotation mode Tilting in the direction of the selected coordinate system Rotate the XYZ axis of the selected coordinate system and maintain the rule of same angle with the coordinate axis to rotate in different directions.

Teach Rotate Mode	Tilt By Selected Coor
	_

Space rotation mode Tool direction

Regardless of the currently selected coordinate system, it is forced to change to the direction of the tool. It can be imagined that people sit in the tip of the tool, the eyes are facing the Y+ direction, the joystick is in the hand, A+ and A- are equivalent to the left and right of the joystick, which will cause the tool to tilt in the X direction; B+, B- is equivalent to the front and rear of the joystick, which will cause the tool to tilt in the Y direction; C+, C- means rotate in place.

4. Common pages

Booting

When the system is booting, the "Booting" page will be displayed first. You can see the coordinate status of each axis on this page. The number in the "Status" column represents the result of the set coordinates, 23 represents the completion of the set coordinates, and the remaining numbers represent "Unset", "Setting" or "Setting failure".

LNC	V09.00 System	rld X 0.00 Y 454.00 Z 754.99	A 0.00 U 0.0 B 90.00 V 0.0 C 0.00 W 0.0	0 free 111 0 0.0 0.0	5.tch	F1.wild on	NotRe	eady <mark>Alarm</mark>) % arnir	Reset
$\sum_{n=1}^{\infty}$	Joint	Status	JointPos	Cali Pos	Generation				10.
prog	J1	23	0.000	0.000					<u>،</u>
P. 08	J2	23	0.000	0.000		Auto So	et Po	5	+
point	J3	23	-90.000	-90.000	L				50 %
manu al	J4	0	0.000	0.000					-
Param	J5	0	0.000	0.000		To Cal	i Pos		
•	J6	23	0.000	0.000		a A ati			
sys					Hou	r Mi	nute5	econd	्रि
Syner					2	2	29	29	
<i>5y</i>					Res	set Act	ion Ti	ime	

Perform automatic set coordinates:

In the automatic mode, pressing this button automatically executes the program for which coordinates are to be set.

Note 1: The operation of setting the coordinates differs depending on the "absolute motor" used. If "absolute motor" is used, the set coordinates will directly read the motor's encoder and convert it to the coordinates in the controller, there will be no actual mechanism motion. If a "non-absolute motor" is used, there will be an actual mechanism motion to find the reference point (origin Sensor or Z-phase signal).

Note 2: The preset is to set the coordinates at the same time. If there is a need to set the coordinates (return to the origin) in each axis, you can edit the maker_func_ins_macro7 to replace it. If this need exists, please refer to the "Rx8000 Development Manual".

Return to the correction point:

In the "automatic" mode, the coordinates of the mechanism may gradually move toward the correction point when pressed, and stop when it arrives or is released.

	Permissions							
LN	V09.00 System World Y 454.00 E Z 754.99 C	A 0.00 U 3 90.00 V 2 0.00 W	0.00 free 0.00 0.0 0	0.0 1115.tch	F1.wild NotRea	ady <mark>Alarm</mark> % arnin	eset	
Ĵ	Now Level 4) (:	**		
р			MchLock	Reboot	PowerOn	Authorize	Π	
p	Log Out		Record	Coor	Safe Pos	Language	%	
m	Password		Recipe	Transfer	Network	Resource	Æ	
Pa	New Pwd	Change	Option	IO Set	Comm	Install	ain	
Sy	Defeult UNI Sele	•	Tuning	Limit	Calibrate	CaliFix] <mark> </mark> +	
			Hardware	GearRatio	ServoParam	MainBody	H J	

Calling mode of the permission page, click on the area on the screen: This system is divided into five types of permissions:



- 0. Operator: the operator of end-customer, who is responsible for operating the machine. This is the preset permission to power when booting.
- 1. Manager: The management of the end customer, who is responsible for the editing and writing of the program. Please ask the factory personnel for the default password of factory.
- 2. Developer: The action process developer, who is responsible for writing the machine action process. Please ask the machine factory for the default password.
- 3. Machinery factory: The machinery factory that manufactures robots, which is responsible for robot debugging, origin calibration, limit and authorization settings. Please ask the machine factory for the default password.
- 4. System level: The person responsible for system setting, who is responsible for setting the mechanism and motor parameters of the robot. Please ask the machine factory for the default password.

The default permission of the system after booting is the operator.

The method of login permission: Click on one of the managers, developer and machine factory and the input password screen will pop up. After inputting correctly, you can see the functions that can be performed.

Change password: Enter the current password and new password, and press "Change" after confirming the password.

Coordinates

This page contains functions of coordinate system display and settings, coordinate display and



Ν	C V09.	00 World	X Y 4	0.0 454.0	0 A 0.00 0 B 90.00	U 0.00 V 0.00	free	_ 1	11!	5.tch F1.	wild	lotReady	larm	Reset
Fro	mDef	-1 Fr	omC	ur	880.989 Measure	Path B	ack	eset	t	Close	Wor	ld Wo	rk Jo	oint
	Default	Curre	nt		WorldPos	WorkPos	ToolPos			JointPos		Join	tPos	
x	260.000	260.	000	x	0.000	260.000	0.00	00 J	1	0.000	J1	-	0.0	000
Y	352.000	352.	000	Y	454.000	-102.000	454.00	, oc	2	0.000	J2		0.0	000
z	277.000	277.	000	z	755.000	478.000	755.00	, oc	3	-90.000	JЗ		0.0	000
A	0.000	0.	000	A	0.000	180.000	0.00	-1 00	4	0.000	J4		0.0	000
в	0.000	0.	000	в	90.000	90.000	90.00	J 00	5	0.000	J5		-90.0	000
c	180.000	0 180.	000	c	0.000	0.000	0.00	00 J	6	0.000	J6		0.0	000
Set	AsDef T	o Zero	То	Cal	i MPG	x1	x10	x10	0	Auto	Ge	tCur	Go	Го

Coordinate system and settings

	Default	Current]	Preset:					
x	260.000	260.000		When the power is booted, the system will set this set value to the current work coordinate system. You can enter					
Y	352.000	352.000	ä	a value on the content of the field.					
z	277.000	277.000	0	Coordinate system: In the currently used work coordinate system, you can					
A	0.000	0.000	e	enter a value on the contents of the field.					
в	0.000	0.000							
с	180.000	180.000							
FromDef]	Reapply the settings in the preset coordinate system to the work coordinate system.					
	From	Cur		Set the coordinate system with the current world coordinates. You can also click on a field in the world coordinates to set the value of the field to the current coordinate system.					

SetAsDef	Set the current coordinate system value to the preset coordinate system for next booting
To Zero	Move straight to the origin of the coordinate system
To Cali	Move quickly to the correction point

Current coordinates display

			Current coordinate system display			
	WorldPos	WorkPos	ToolPos		JointPos	
x	0.000	260.000	0.000	J1	0.000	
Y	454.000	-102.000	454.000	J2	0.000	
z	755.000	478.000	755.000	J3	-90.000	
A	0.000	180.000	0.000	J4	0.000	
в	90.000	90.000	90.000	J2	0.000	
с	0.000	0.000	0.000	Je	0.000	

	Zero the current tool coordinates to understand the distance of motion or to
	obtain the relative relationship between the two points via the tool coordinate
	information.
	Note: When the "tool" selected by the coordinate is pressed, or when the
880.989	action of a tool coordinate system is pressed, the current world coordinate is
Measure	automatically set to the tool coordinate system, that is, all the content of tool
	coordinate XYZABC will become 0. After that, as soon as it is moved, the
	value of the tool coordinates will change, and the XYZ value in the tool
	coordinates will be used to calculate the actual offset distance between the
	current position and the tool coordinate system.

Motion operation

To Zero	Press this button to move the robot to the origin of the coordinate system. Stop when it is released or arrives.							
0 Path Back	he system will automatically record the path that has been his function can be used to reverse back in accordance wi hat has passed. In the automatic mode, press this button ar op if released. Path Back Number of records control of the running time of the ackground program, the default is to record one every 50r	em will automatically record the path that has been moved. etion can be used to reverse back in accordance with the path bassed. In the automatic mode, press this button and it will leased. Path Back Number of records currently It is determined according to the running time of the and program, the default is to record one every 50ms, it will						
To Cali	cord when each motion is found, which up to 20,000. ress this button to move the robot to the calibration point. is released or arrives. Just like "Return to Calibration Poi pot page.	Stop when int" in the						
To the self-set coordinates World Work Jo WorkPos X 0.0 Y 0.0 Z 0.0 A 0.0 B 0.0 C 180.0	 Coordinates selection: The coordinates of "World", "Work" and "Joint" of selected. Coordinates input: You can click on the field of the coordinate value value directly, or press "Get Current" first, then b current coordinate value and then modify it for the items. Motion to coordinates: Press "To" to move to the target coordinate value stops when it is released. 	 coordinates selection: The coordinates of "World", "Work" and "Joint" can be selected. Coordinates input: You can click on the field of the coordinate value, input the value directly, or press "Get Current" first, then bring in the current coordinate value and then modify it for the specific items. Motion to coordinates: Press "To" to move to the target coordinate value, which stops when it is released. 						
Reset	If an alarm occurs during the motion, press this b clear the alarm.	utton to						
Close	Click this button to close this page							

Alert and warning page

This page shows current and historical alerts and warnings. History records historical alarm content and codes!



5. Common functions

Limits

In addition to the limited rotation angle or trip of each joint, the limit includes items such as cusp range, process range, and coordinate compensation. These items are used to limit the range of action.

	Although each type of mechanism has a
	mathematically computable range when
	performing calculations, such a large range
System Word X 4.50.00 A 0.00 free 1115.tch F1.wild NotReady Narm Reset System Z1 754.99 [C 0.00 W 0.00 0.0	may not be allowed to be rotated due to the
JointLimit TCP Position Compansate	relationship of mechanism interference or
prog j1 -45.5 < 0.0 > 120.0 point j2 -35.0 <	the relationship of wire rolling and tearing.
alw j4 -190.0 <	For various types of mechanisms, if the first
ys J6 -115.0 < 0.0 > 115.0 → 115.0 < 0.0 > 115.0 → 115.0 < 0.0 > 115.0 → 115.0	axis is a rotating axis, the default limit of
Syner gv	the mechanism algorithm is -210~210.
	Release: Servo Off, brake On, you can
	manually push the mechanism and directly
	observe the coordinate values of each axis.
	This range is used to set the allowable
	active area of the tip of tools after the tool
V09.00 vord v 454.00 8 90.00 v 0.00 ree 1115.tch F1.wild NotReady larm Reset	parameters setting. If the value in the XYZ
System IZ 754.99 C 0.00 W 0.00 0.0 0.0 0 50.0 W arnin JointLimit TCP Position Compansate Image: Compans	direction of the field is filled with 0, it
prog Appearance TCP Active Block +	means that the range of motion is not
0 P1 P2 50 % point X 0.000 0.000 6	limited.
Manu 1 Cylinder EndP Y 0.000 0.000	
Param	The tolerance of the ambiguous point:
sys 3 Ball Center Get P1 Get P2	represents the maximum positional
syner 4 Any Position	tolerance value if the coordinates of the
	same value with the ideal value are not
	obtained at the path point during the
	calculation of the algorithm.
	This range is used to limit the maximum
	allowable offset range when using the
	process for offset of the path.

											Set t	he maximum compens	ation value when		
	/09.00 System	World X	0.00 A 454.00 B 754.99 C	0.00 U 90.00 V 0.00 W	0.00	free 0.0 0	.0 11	15.tch	F1.wild NotReady A	larm Reset	using	g the R value to determ	nine the		
JointLimit TCP Position Compansate									Compansate	19.	compensation amount to avoid the danger of				
prog						Max I	nst Ch	ange	Speed Step	• <u>+</u>	inpu	t errors.			
point		Enable Compe	ensate Rar	No		L 10.0	JI J2	2.0	0	50 %	Dynam	nic compensation (R23040~10)			
manu		World	Work	Tool			J3	2.0	0		40	Dynamic position compensation start flag	0 Close v 1 Start v 2 Clear		
	Х	0.0	0.0	0.0			J4	2.0	0	@'AUSE	41	Dynamic position compensation X			
Param	Y	0.0	0.0	0.0			J5	2.0	0		42	Dynamic position compensation Y	World coordinate compensation		
svs	Z	0.0	0.0	0.0	J	[J6	2.0	0	5 T	43	Dynamic position compensation Z			
•		By R23	8040~R230)49]		U	2.0	0	AUTO	44	Dynamic position compensation X			
gy	Bu	f Time(ms)	0			V	2.0	0		45	Dynamic position compensation Y	Working coordinate compensation		
							w	2.0	0	TEACH	46	Dynamic position compensation Z			
											47	Dynamic position compensation X			
											48	Dynamic position compensation Y	Tool coordinate compensation		
											49	Dynamic position compensation Z			

Origin correction

Origin calibration process: perform tool calibration first, then origin correction

I. Tool correction

1). TX, TY correction

1. Tool Calibration: After installing the calibration tool, use the "Installation Application/Tools" to correct the approximate tool size TX, TY

1. Select TX, TY and press "Clear"

2. Adjust the two cuspidal points to align and press "Point 1"

3. Rotate the world coordinate C about 180 degrees, then move the XYZ to realign the two cuspidal points and press "Point 2".

4. Press "Calculation" and the system will display "Error X" and "Error Y".

5. Click the white box to display the error value and add the error value to the tool parameters.

6. Press and release emergency stop to make the changed content effective.

2) TZ correction

1. Select TZ and press "Clear"

2. Adjust the two cuspidal points and align, press "Point 1"

3. Rotate the world coordinate B (tool direction) about 30~60 degrees (do not exceed J5=0), then move XYZ to align the two cuspidal points, and click "Point 2".

4. Press "Calculation" and the system will display "Error Z".

5. Click on the white box showing the error value and add the error value to the tool parameters.

6. Press and release emergency stop to make the changed content effective

1 Salaat tha	orld X 0.00	0 A 0.00 0 B 90.00	U 0.00 V 0.00	free 0.0 0.0	1115.tch	F1.wild No	otReady Alarm	Reset		
1. Select the	2 734.9	9[C] 0.00	W 0.00							
tool group	Current	0.000	0.000	0.000	0.000	0.000	0.000	3. Clear		
number	_ R105400	Offset X	Offset Y	Offset Z	Angle A	Angle B	Angle C	previous data		
(0-3) to be	0	0.000	0.000	0.000	0.000	0.000	0.000	that having		
calibrated	1	0.000	0.000	0.000	0.000	0.000	0.000	that having		
for a total of	2	0.000	0.000	0.000	0.000	0.000	8	points		
four groups	3	0.000	0.000	0.000	0.000	0.000	0.000	O'AUCA		
of tools			Assistar	nt to get Too	ol Param			(Click on		
				_		Offy	0.000	o. Click on		
eve	ТХ, ТҮ	Х	Y	Z	Clear		0.000	the error field		
2. Select		0.000	0.000	0.000	Get Pos1	Off Y	0.000	to add the		
the item to	12	0.000	0.000	0.000	Get Pos2	Off Z	0.000	error value to		
be	ABC						Obtain	the tool		
calibrated		Max IX an	d IY Change		change 180			parameters.		
canorated										
4. After aligning cuspidal points, if the pressing point is a four-axis mechanism, only the first two points are required.5. Calculate the error of the items based on the content of the current point.										

II. Origin correction:

1. Press "Clear" to clear the original data of calibration points.

2. Arbitrarily take 8~10 points with large changes in attitude, and then click "Point" after alignment.

3. Select J2~J5, TX, TY, TZ as the items to be calculated, and then press Calculation to calculate the deviations and "maximum error".

4. If the value of "maximum error" is greater than 2, it means that the system may have a problem that the reduction ratio is incorrect or the size of the mechanism is incorrect. The result of the calculation is also meaningless, skipping the next steps.

5. Click on the field that displays the error to bring the error value into the system.

6. Press and release emergency stop to make the changed content effective



Note: Tool Calibration: After replacing with the tools in actual operation, use the Install Application/Tools to correct the exact sizes of tools.

Point records

There are two types of coordinate records: world records, joint records. Pressing the "points record" button, which is the coordinates record page. The page is as follows:

LNC	V09.0 System	00 Wol	x 0.0 rld <u>Y 454.0</u> Z 754.9	0 A 0 B 9 C	9	0.00 U 0.00 V 0.00 W	0.00 0.00 0.00	free	0.0	15.tch	F1.v on	vild	NotReady Ala 50.0 % arr	rm Reset
<u> </u>			World R	ecor	rd					Joint	Recor	ď		to
RW	0	0	ww		Get	World	d Rec	0	0	wait		G	et Joint Rec	
prog	1	1	rr		х	-	1.453	1	1	left		J1	10.856	+
point	2	2	SS		Y	433	3 285	2	2	right		12	-2 530	50 %
manu	3	3	ff		-			3	3	med		-	2.000	[–]
al	4	4			Z	444	4.312	4	4			J3	-146.029	()'AUSE
Param	5	5	vv		A	-14	1.338	5	5			J4	11.712	
sys	6	6			в	(0.000	6	6			J5	58.162	onaintain کر ک
Syner	7	7			с	14	1.338	7	7	ggg		J6	-344.223	AUTO
gy	8	8						8	8					
	9	9			То	World	Rec	9	9				To Joint Rec	

World record

Contains 100 sets of records, you can click the column of record number to select the record, or press the six buttons of record motion to select. The world record has three function buttons:

Get World Rec

: Update the currently selected world record with current world coordinates

To World Rec

: The straight path is calculated and moved according to the current and target

positions.

Joint record

Contains 100 sets of records, you can click the column of record number to select the record, or press the six buttons of record motion to select. You can click the field next to the column of record number to set a name for point position. The name can be up to 11 English letters. The joint record has two function buttons:



: Update the currently selected world record with current world coordinates

: Move to the selected joint record position in a fast moving manner.

Security point

During the running of the program, the starting position of the restarting program may be different from the ideal starting position due to a sudden power failure or reset. If the manipulator is parked in a location that might be used for interference, it is dangerous to start the program rashly. Therefore, the system provides this function, which is convenient for checking the current position of the manipulator arm in the program, thereby reducing the occurrence of danger and the loss of property.

The system plans five sets (0~4) of the inspection interval of joint coordinate, five sets (0~4) of the inspection interval of world coordinate, and the setting of position interval can be set through the following pages.



Coordinate system

Use of the coordinate system

In the field processing, because the relative position between the workpiece placement position and the manipulator body is not the same as when writing the program, a method must be provided to adapt to the change. The coordinate system is used for such purposes. The coordinate system of this joint manipulator system can compensate for rotation and tilting in addition to the offset of the spatial point.

Because a manipulator may have multiple working areas at the same time, the system provides up to 10 sets of coordinates for customers to use according to actual needs.

The following figure can be divided into two areas, the left side is used to view the current coordinate system record, and the right side is a three-point coordinate system method to help calculate the positional offset, direction rotation and tilting of the coordinate system.

	V09.0	0 Wo	x vrld Y	0.00 A	0	.00 U	0.00	fre	e	1115.tch	F1.wild	NotReady	۱arn	Reset
	Syster Syster	n ^m	Z	754.99	0	.00 W	0.00	0.0	0.0		on	50.0 %	arniı	n
\sum_{n}	0	Ge	et Cu	r Pos		Descript								10.
prog	1	Х	-14	5.191							Ca	li Axis		¢ •
	2	Y	48	1.439							P0->P1	**		+
point	3	Z	15	5.330							P0->P2	+Y	•	50 %
manu	4	А	90	0.000			or Dir							-
	5	В	1	.716		A	0.000			Get P0	Get P1	Get P	2	()'AUSE
Param		С	-9(0.000		в	0.000			PO(Ori)	P1	P2		••
	6					c	0.000		Х	0.000	0.000	0.00)	
sys	7					_			Y	0.000	0.000	0.00	0	<u></u>
Syner	8					G	et XYZ		Z	0.000	0.000	0.00)	
63	9					G	et ABC			To PO	To P1	To Pa	2	
		S	etAs	Now										

After the coordinate system is determined using three points, it can be stored in the coordinate system record for use in the program.



Coordinate system record

 $0 \sim 9$: Click to select the coordinate system number to be operated.

Principle and operation of three-point coordinate system

In mathematics, we can determine a coordinate system through three-point positions, where: P0: origin of the coordinate system

P1: the point on the main axis

P2: point on the secondary axis (on the plane)

According to the difference of the actual workpiece or the direction of the action path, the main axis may be a point on +X, -X, +Y, -Y, +Z, -Z, and the secondary axis is also the same, so 24 kinds of three-point definition can be provided.

Select XYZ: Bring the XYZ of the right P0 into the coordinate system record.

Select ABC: Bring the "Coordinate System Attitude" ABC calculated from the right three-point coordinate system into the coordinate system record.

Set to current: Set the selected coordinate system record value to the current work coordinate system.

After selecting the relative position of the object in the working area and the manipulator arm, the three-point coordinate system can be set. The operation mode is as follows:

- 1. When using for the first time, first set the attitude to teach, or to the teaching page, adjust the arm attitude to the teaching attitude, and then press "record calibration attitude" so that each teaching is taught in the same attitude.
- 2. Press "To Calibration Attitude" to adjust the manipulator to the recorded calibration attitude.
- 3. First select the origin P0 and P1, P2 to be used as the basis for the calculation of the coordinate system.
- 4. According to the axial direction where P1 and P2 are located, click the upper axial selection to switch the axis.
- 5. Press XYZABC below to align the tip to P0, then press "P0" to bring "Current World Coordinates" into P0 coordinates.
- 6. If you only intend to use the position of the offset coordinate system and do not intend to change the rotation of the coordinate system, just correct P0.
- 7. Press XYZABC below to align the tool tip to P1, then press "P1" to bring "Current World Coordinates" into P1 coordinates.
- 8. Press XYZABC below to align the tool tip to P2, then press "P2" to bring "Current World Coordinates" into P2 coordinates.
- 9. The system automatically calculates the attitude of the coordinate system.

Program classification

Use	Included items	Actionc description
Manual operation	Calibration point	In the non-handwheel mode, the action is
(specific action)	Path return	performed when pressed, and stopped when
	Specified coordinates	released.
	Point record	In the handwheel mode, it's controlled at the
	Security point	handwheel rotation speed after starting.
Automatic	Teaching procedure	Use the method of starting after releasing the
operation	Program list	time of duration of pressing to avoid accidental
(Files edited by the	NC execution	pressing.
user)		

Options

Key tone: On/Off Touch tone: On/Off Tone length (ms): $0 \sim 1000$ Backlight brightness (%): 0~100 Backlight control: On/Off Sleep time (seconds): When the backlight 1115.tch Reset control is On, how long it takes to enter the 10. Edit Option Button Option Start Option lay/T prog + low backlight state. Button Voice Off point Touch Voice Off Touch Cali Low backlight brightness (%): 0~100 AUS Voice Time(ms) 100 manu al 50 Back Light(%) Low backlight time (seconds): The time to Param Light Control Off TimeToSleep(sec) 0 maintain a low backlight state. When the sys Low Light (%) 0 Syner gy time is up, the backlight is completely dark. Low Light (sec) 0 Touch correction: When the touch is not correct, click this button to enter the touch correction function. After the calibration is completed, you need to manually perform the shutdown and restart.

Screen lock password: set the password when the screen is locked. Lock screen when booting: Whether to lock the screen when booting. When opening a program file: Whether to change the speed ratio and its value. The program page speed shows the denominator: the speed denominator is in minutes or seconds. Hiding coordinates of program page: Whether the program page should hide the coordinates as it is not understood by the general operators. Manually start the servo after an emergency

stop: After the emergency stop is released, whether to manually start the servo, the servo can be started by pressing "Prepared" or "Unprepared" on the head list.

Time required for brake clamping: When the emergency stop is pressed, the brake will be clamped first, and the servo will be turned off after the set time has passed.

Switching mode of the security button: Whether to use the security button to switch

the auto/teaching mode.

Safe button control servo in manual mode: In manual mode, the servo will be started only when the security button is pressed, which is used in large robots to ensure safe operation. Default speed ratio (%): How much the speed ratio should be changed when the F% key is pressed and when rebooted.

Adjusting space of the speed percentage: How much the speed percentage changes when the +, - key is pressed.



manu al 0 Duration for Brak Updating Pos Delay after break 0 . Param witch MPG when enter Manual No sys Default Multiplier x100 Syner gy 50 Default Speed Ratio Speed Ratio Step 10

Default speed multiplier: The default speed multipliers when booting is x1, x10, x100. Overload automatic deceleration: When the load of any axis exceeds 100%, whether to automatically reduce the speed so that the load is reduced to less than 100%. When turning off the handwheel mode: whether

to reset the program or change the speed percentage.

The automatic mode requires a security button: whether it is necessary to press the security button to start the program in the automatic mode.

The automatic mode requires a security button: whether it is necessary to press the security button to act in the automatic mode. The automatic mode requires a security button: whether it is necessary to press the security button to pause the program in the automatic mode.

Start the program by CONT button: In the automatic mode, whether to start the program directly by pressing the CONT button.

When the action button is released: In the teach mode, pause or reset the action when the action button is released.

It must be at the security point 0 when starting: whether to check if it is at the position of joint security point 0 when starting the program, if not, an alarm will be issued.

Continued unfinished program: When Yes is selected for this option, if the program is not completed and interrupted, the system will record the last line that was executed, and the start button of the program page will turn red, indicating that if the program is started directly, the system will continue to execute since the line. If you do not plan to continue, press the system reset button to clear the continuous action.



Time required for start (ms): How long it takes for the start button to be valid. Time required for CONT (ms): How long it takes for the CONT button to be valid. Automatic pop-up window when warning: Whether the alarm window pops up automatically when a warning occurs. Determined according to operating habits. O point closed at reset: When pressing reset, the O point to be closed at the same time can be filled in four numbers.

Files transfer

The files transfer page can be used to transfer files between the controller and the USB flash drive.



X

Click this button, you can see the folders to be backed up in the select menu and click on the items to be backed up for backup.

- 1. Teaching files: program edited in program page
- 2. Manufacturer macro: macro program
- 3. PLC: The user uploads his own PLC here.
- 4. Mechanical parameters: system parameter data, such as: reduction ratio, speed and other parameters
- 5. 5. Upgrade files: When upgrading the system, upload the system files here

6. Programs

This feature provides a process for editing a program without using a PC editor.

Description of motion behavior and motion path Motion behaviors and motions can be roughly classified as follows:

Motion	Location	Speed	Use
behaviors	division	conversion	
Fast-moving	No	No (moving	This command can be used when the joint 3 and
		speed)	5 have a span of 0 degrees of current joint
			coordinates and the target joint coordinates.
			The change process of each joint is
			proportionally converted according to the
			difference of the joint coordinates between the
			current coordinates and the target coordinates, so
			that the target point can be reached most quickly.
			However, since the attitude change during the
			actual conversion process is related to the current
			coordinates, the change process cannot be
			ensured, so care should be taken when using it.
Direct	No	Yes	It is similar to fast moving, but the equivalent
motion		(Linear	speed that moves the current position to the
		speed)	target position matches the set value of the linear
			speed.
			This motion method is usually combined with an
			external CAD/CAM to split the motion path into
			small line segments to obtain GM code
			processing program, which is directly used by
			the joint manipulator system.
Path motion	Yes	Yes	The system automatically generates the motion
		(Linear	path according to the set coordinates and
		speed)	commands of each path point, and ensures that
			the overall moving speed is consistent with the
			set linear speed.

When using path motion, the path can be represented by the point coordinates in the set space and its point attributes. The following figure is a diagram of point attribute and path:



During the motion process, in addition to the end point of the tool as the calculation basis, the system also calculates the amount of attitude change, and performs an equal proportion of attitude change with the distance motion.

LNC	Curre	ent files name program 1115.tcf	of the (Total lines of program	s	Total p t:	rocessing ime		Total number of processing 0 =	d 1 0.00	Av proces	ec/Pcs	Reset	
	1	Line:Joint	Coor, So	ft=0, Spe	ed=0	, X=20.7	, Y=35.0, 2	Z=4	93.2, A=0.0	, B=0	.0,		Click to zero	o the
prog	2	Line:Joint	Coor, So	ft=0, Spe	ed=0	, X=20.7	, Y=26.5, 2	Z=5	30.0, A=0.0	, B=0	.0,…	pro	cessing info	rmation
point	3	Line:Joint	Coor, So	ft=0, Spe	ed=0	, X=45.5	, Y=35.0, 2	Z=5	30.0, A=0.0	, B=0	.0,	\mathbf{x}	50 %	
manu	4	Line:Joint	Coor, So	ft=0, Spe	ed=0	, X=45.5	, Y=35.0, 2	Z=5	30.0, A=0.0	, B=0	.0,…	~	-	
al	5	Matrix Ac	tion:Matr	ix								Near	PAUSE	
Param	6	Line:Joint	Coor, So	ft=0, Spe	ed=0	, X=45.5	, Y=35.0, 2	Z=5	30.0, A=0.0	, B=0	.0,…	Near		
	7	Set 0:020	00=0 (Use	r define	DO),	Wait=50						\sim		
sys	*											\mathbf{x}	৻৾৴	
	Detai	Simple	G Code	4686	/	99999	Cycle		Here		Start			

Programs running in automatic mode

Miller.tch

Display the current files names, click to open other saved files, or

operate on the saved files. The screen is as follows:

L	V09.00 System	0.00 A 454.00 B 754.99 C	0.00 U 90.00 V 0.00 W	0.00 fre 0.00 0.0	e 0.0	1115.tc	h F1.wild on	NotRea 50.0	ady Alarm <mark>%</mark> arnin	Reset
	Fi	ile Oprat		Filter						
	Filename	Size	Da	ateTime			urrent No	-	1115 tch	
1	0320.tch	400	週二 3月 27	16:31:32 201	8		urrent Na		1115.001	
2	0521.tch	200	週一 5月 21	15:12:54 201	8		Power o	n Load		
3	1025.tch	1924	週三 10月 2	5 22:03:08 20)17	Т	De	lete Sel	ected file	
4	1108.tch	2924	週三 11月 8	10:56:22 201	7					
5	1115.tch	800	週二 11月 2	7 17:53:40 20)18					.tch
6	1117.tch	1324	週五 11月 1	7 14:17:38 20)17		Save a	as	Creat	te
7	123.tch	4200	週四 11月 1	5 17:54:28 20	18					
8	2017-INSPECT.tch	200	週五 7月 6 0	9:59:08 2018	3	\checkmark	Cance	el	Оре	n



:The way that the screen is displayed can be switched.



: Sets the number of times the target program runs and displays the current

number that it has been running under "Repeat" execution. If the target is set to 0, it means that continuous operation with no stop. The current number of times can also be filled in according to the actual situation.



execution.

Here

Start

: Whether to start execution from the selected line when the program starts.

: Run the current program.

The average processing time: perform the times box to zero the count.

0.00	1	0	=	0.00	Sec/Pcs
------	---	---	---	------	---------

Editing program in maintenance mode or teaching mode Note: editing program need to have "administrator" privileges to operate.

LNO	V09.0	00 World	X 45 Z 75	0.00 A 4.00 B 4.99 C	0.00 90.00 0.00	U 0.0 V 0.0 W 0.0	0 free 0 0.0	0.0 1115	.tch <mark>F1</mark> on	wild NotR.	eady <mark>Aları</mark> <mark>0 %</mark> arni	n Reset
\sum_{RW}		1115.to	:h		7	Save	BlockOP	Record	BasicCmo	ExtCmd	ProdAct	10.
prog	1	1:	Lin	e			Line	- Abs	sol - Joi	int Coo	- 0	•
	2 2	2:	Lin	e				Set	t Value	Cur V	alue	
point	3 4	4:	Lin	e			J1		45.488	3	0.000	50 %
manu	4 !	5:	Lin	e		~	J2		34.999	9	0.000	-
al🔫	5	7:	Ma	trix Act	ion	Near	J3		530.000) -	90.000	O 'AUSE
Param	6 (5:	Lin	e			J4		0.000)	0.000	
-	7 (5:	Set	0		$\mathbf{\sim}$	J5		0.000)	0.000	Maintain
sys	*					$\mathbf{\mathbf{S}}$	J6		87.239)	0.000	िर्
Syner gy						Y	Get Cur			Speed	0 /m	
	Detail	1~N	Cut	Сору	Past	e Up	Dn	Backward	Forward	Step	ок	

Block operation

BlockOP

: Used to perform moving of a whole process of program. After pressing the block operation, the command details will display the following contents. You can click the line number of the side and press "Start Column", "End Column" or "All Columns" to set it. Then, according to the need to copy or move, press "Cut", "Copy" and "Paste" to complete the operation. After the completion, press the block operation again to end the action.

BlockOP R	ecord Basi	cCmd ExtC	md ProdAct	Start column, end column: After selecting a column in the list, press the
Begin Ro 1 Cut	w End Copy	Row 1 Paste	 two buttons to set the processing range. Cut: Cut the set range down Copy: Copy the set range. Paste: Paste the cut or copied portion to selected column of the current list. Offset XYZ: Offsets all the items of 	
X 0	Y 0	Z 0	"World Coordinate" and "Work Coordinate" in the set range. Export: Export the current files to the o	
				files.
O File	0	End	Export	Note: The exported O files can be called as a subroutine or operated in the
				NC execution.

Recording

The recording function is mainly for the convenience of quickly teaching a motion path, so only a few path commands and output control commands are placed on the screen.

BlockOP Record	BasicCmd Ex	tCmd ProdAct	On the list of programs, after selecting the position where the recording		
🕱 Select Coor	Joint	Coor -	command is to be inserted, click the button on this screen.		
Cen	Pass	Fast	After moving the robot to the preset		
End	Mid	Line	position, press the action to be performed to move to this position.		
Output ID 0	On	OnAutoOff1	This process is called "recording". Because each robot position has a variety of coordinate system		
Delay 0	Off	OnAutoOff2	representations, the recording is directly using the coordinate system used in the		
InPos Delay	On Pulse	OnAutoOff3	current teaching, or specifying which coordinate system to record.		

Keys	Record command	Command parameters
Select coordinate	Select coordinate	The coordinate system selected is used as the
system	system	recorded coordinate system.
Fast	Fast path	If the "Select Coordinate System" function is not on,
Linear	Linear path	the coordinate system of the teaching motions is
Arc midpoint	Arc midpoint	used as the recording coordinate system to generate a
Arc transition	Arc transition	command line that moves to the current position.
Arc center	Arc center	If the "Select Coordinate System" function is on, the
Arc end	Arc end	coordinate system selected at rear is the recorded
		coordinate system.
In place	In place/delay	In place or not and delay time
Delay	In place/delay	In place or not and delay time
Number O	Soft number at O	Enter the output number to execute
	200	
ON	Set O	Output number, ON
OFF	Set O	Output number, OFF
ON pulse	Set O	Output number, ON pulse signal
ON background	Set O	Output number, receive command ON and then
OFF		background OFF

Note: "Welding" and "Drilling" are achieved through custom commands (process packages). For detailed use, please refer to the development manual.

Insert built-in commands

The built-in commands contain the complete command content. Each click insert will display the various available commands. After clicking one of them, the details of item will appear for editing. After editing, press "OK" to add commands to the program list.

LNC	V09.	00 World <u>Y</u>	0.00 454.00 754.99) A) B) C	0.00 90.00 0.00	U V W	0.0 0.0 0.0	0 free 0 0.0	0.0	1115	.tch	F1.a ope	n s	otReady <mark>Alar</mark> 50.0 % arn	rm Reset
		1115.tch			7	S	ave	BlockOP	Re	cord	Basic	Cmd	ExtCn	nd ProdAct	19.
prog	1	1: 2·	Line					Mark		Jum	p	I Ju	mp	R Jump	•+
point	3	4:	Line					Wait I	T	Wait	R	Set	0	Set R	50 %
manu	4	5:	Line		tion		^	Delay		InPo	os			Call G	- 1
Param	5 6	7: 6:	Line	X ACI	tion	N	lear	Skill		DvnP		Norl	dRec	LointRec	@'AUSE
	7	6:	Set O					JKII		bynn			unee	Jointkee	
Sys	*						$\boldsymbol{>}$	Coor		Cer	י	Pa	ss	Fast	
gy		· · · ·			Y			L,		Enc		м	id	Line	
	Detail	1~N	Cut (Сору	Pas	te	Up	Dn	Back	kward	Forw	ard	Step	ОК	

Note 1: "Graphics", "Tool Parameters", "Sensing Stop", "Security Point", and "Program List" are built-in process package commands.

Note 2: "Parameter Process" and "Coordinate Process" are for developers to write industry-specific commands (process packages) and integrate the operation interface into the program page. For details, please refer to the development manual.

Editing

Detail	1~N	Cut	Сору	Paste	Up	Dn	Backward	Forward	Step	ОК

Delete: Delete the currently selected column.

Up: Moves the currently selected column up.

Down: Moves the currently selected column down.

Copy: Copy the currently selected column.

1~N: Re-arrange the order in the description based on the column number of the program. The main purpose of this action is to let the operator understand the order of the operations, so that when the insertion position is mishandled, it is convenient to know how to adjust the order of the commands by "up", "down" and "segment operation".

Comment: Switch the information displayed in the left half of the command list.

Back: If the current position is matched with the selected command line, pressing this button will move back one space and then press the single step to let the robot return along the path until the previous command point.

Forward: If the current position is matched with the selected command line, pressing this button will forward one step, allowing the robot to forward along the path until the next command point.

Single step: Move the robot to the position where the command line is currently selected.

Description: The single step, forward and back functions are especially suitable for confirming the accuracy of the track and speeding up the debugging program.

Program content and instruction description

The commands included in the system can roughly be classified as follows:

Process control

Command name and description	Screen
Label	BlockOP Record BasicCmc ExtCmd ProdAct
Set the label of the command line for the jump setting reference.	Mark 0
	Dn Backward Forward Step OK
Skip	
Skip directly to a line.	
Row Type Absolute Row ID/Num Absolute Relative Mark Line number type: Repeat Times	BlockOP Record BasicCmd ExtCmd ProdAct JudgeWhen(BlockLeft) 0
Absolute line number: (ie the actual program	
line number).	
Relative line number: (relative to the current	Row Type Absolute -
line of line number, for example, currently	Row ID/Num 0
line 8, -4 means skipping to the 8 - $4 = $ line	Repeat Times 0
4).	Dn Backward Forward Step OK
Label: (ie the label column set previously)	
Last skip: Return to the next line of the last	
calling skip command.	
Line number / lines: refer to skip mode	
Times: Repeat the times of this skip action	

I Skip Skip to the specified line when the conditions of I or A match.		Blo	ckOP	Record Base	sicCmd ockLeft	t)	0 On	dAct
No: number of point I Value: When the state of point I is in accordance				Status	Off			•
with this setting, the skip action is performed.					_			
Skip mode: refer to skip command				Row Type	Abs	olute		•
			R	low ID/Num		0		
			Dn	Backward Fo	rward	Step	C	Ж
R Skip		Blog	ckOP	Record Bas	sicCmo	ExtCmd	d Pro	dAct
When the condition of R matches skin to the			J	udgeWhen(Bl	ockLef	it)	0	
specified line.				Reg ID	89	000	0	
No.: R value number Comparison method:				Cmp Rule	Equ	al		•
Value: Constant (fixed value), R value (refer to the				Стр То	Con	ist		•
content of another R value). Right box (constant				Value		0	0	
content of another R value). Right box (constant				Row Type	Abs	olute		•
content of another R value). Right box (constant value / R value number) Skip mode: refer to skip command			R	low ID/Num		0		

Waiting type

Command name and description	Sci	reei	n					
Waiting for I		Blo	ckOP	Record Basi	cCmd E	xtCmd	ProdA	Act
Wait and continue after waiting for I to match the status			Ju	udgeWhen(Blo I or A ID	ckLeft) 201		0 Dff	
Number: number of point I Value: When the status of point I is in accordance				Status	Off		•	
with this setting, the next action is performed.			J	Jump Mark 0				
Waiting: The longest waiting time.				Wait	0		ms	
Failure processing: processing after waiting time				Fail Do	Кеер	On	-	
				Alarm	0		0	
			Dn	Backward For	ward	Step	ОК	

Waiting for R	BlockOP Record BasicCmd ExtCmd ProdAct	
Wait and continue after waiting for R value to	JudgeWhen(BlockLeft) 0	
match the status	Reg ID 8900 0	
No.: R value number		
Comparison method:	Cmp Rule Cmp To Value	
Value: Constant (fixed value), R value (refer to the	== • Const • 0 0	
content of another R value). Right box (constant	Wait 0 ms	
value / R value number)	Fail Do Keep On 👻	
Skip mode: refer to skip command	Alarm 0 0	
Waiting: The longest waiting time.	Dn Backward Forward Step OK	
Failure processing: processing after waiting time		
Delay	BlockOP Record BasicCmd ExtCmd ProdAct	
Moves after waiting time		
Delay: The time need to wait		
	Delay 100 ms	
	Dn Backward Forward Step OK	
Arriving	BlockOP Record BasicCmd ExtCmd ProdAct	
Move after waiting for arriving the position		
Arriving: 1/1000 degree or 1um		
Note: The range of arriving will only be checked		
after the commands have been sent. So, setting a	Range 100 LU	
very large value may not have the desired effect.		
	Dn Backward Forward Step OK	

Status setting

Set O Set the status of point O Number: the number of the point O Value: Off, On, commutation (change to another state based on the current state of the point O) Wait: Set how long to wait before executing the next line. Dn Backward Forward Step OK Set R Set the content of R value Number: the number of R value Number: the number of R value Yupe of value: Absolute: directly set the content of the R value to the content of current R value. No.: Set the R value of the specified R number in the Value field to this R value. Add 1 to the circulation: Add 1 to the current R value and set it to 0 when the value is greater than the set value in the Value field. Value: Reference mode description Waite: O Waite: O Value: Reference mode description	Command name and description	Screen
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Value: Off, On, commutation (change to another state based on the current state of the point O) Wait: Set how long to wait before executing the next line.	Number: the number of the point O	
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field based on the content of current R value. No.: Set the R value of the specified R number in the Value field to this R value. Add 1 to the circulation: Add 1 to the current R value and set it to 0 when the value is greater than the set value in the Value field. Value: Reference mode description Waiting. Set how long to wait before executing the	Relative: Accumulate the content of the Value	Reg ID 2500
No.: Set the R value of the specified R number in the Value field to this R value. Add 1 to the circulation: Add 1 to the current R value and set it to 0 when the value is greater than the set value in the Value field.Value TypeAbsolute ValueImage: No.: Value TypeValue TypeAbsoluteImage: No.: Value TypeImage: No.: Value TypeImage: No.: Value TypeImage: No.: Value TypeAdd 1 to the circulation: Add 1 to the current R value and set it to 0 when the value is greater than the set value in the Value field.Image: No.: Value TypeImage: No.: Value TypeValue TypeAbsoluteImage: No.: Value TypeImage: No.: Value TypeImage: No.: Value TypeValue TypeAbsoluteImage: No.: Value TypeImage: No.: Value TypeImage: No.: Value TypeValue TypeAbsoluteImage: No.: Value TypeImage: No.: Value TypeImage: No.: Value TypeValue TypeAbsoluteImage: No.: Value TypeImage: No.: Value TypeValue TypeImage: No.: Value TypeImage: No.: Value TypeImage: No.: Value TypeValue TypeImage: No.: Value TypeImage: No.: Value TypeImage: No.: Value TypeValue TypeImage: No.: Value TypeImage: No.: Value TypeImage: No.: Value TypeValue TypeImage: No.: Value TypeImage: No.: Value TypeImage: No.: Value TypeValue TypeImage: No.: Value TypeImage: No.: Value TypeImage: No.: Value TypeValue TypeImage: No.: Value TypeImage: No.: Value TypeImage: No.: Value TypeValue TypeImage: No.: Value TypeImage: No.:	field based on the content of current R value.	
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Add 1 to the circulation: Add 1 to the current R value and set it to 0 when the value is greater than the set value in the Value field. Value: Reference mode description Waiting.	in the Value field to this R value.	Value Type Absolute •
R value and set it to 0 when the value is greater than the set value in the Value field. Wait 0 ms Value: Reference mode description -1:Wait Write, -2:Fast Write	Add 1 to the circulation: Add 1 to the current	Value 0 0
greater than the set value in the Value field. Value: Reference mode description Waiting. Set how long to wait before executing the	R value and set it to 0 when the value is	Wait 0 ms
Value: Reference mode description Waiting. Set how long to wait before executing the	greater than the set value in the Value field.	-1:Wait Write, -2:Fast Write
Waiting. Set how long to wait before executing the	Value: Reference mode description	
watting: Set now long to wait before executing the	Waiting: Set how long to wait before executing the	
next line. When this value is filled in -1, the system Dn Backward Forward Step OK	next line. When this value is filled in -1, the system	Dn Backward Forward Step OK
will wait until the previous command is executed,	will wait until the previous command is executed,	
and then continue to interpret, which can be used	and then continue to interpret, which can be used	
to avoid synchronization during the motions, but it	to avoid synchronization during the motions, but it	
may make the motions less continuous. When set to	may make the motions less continuous. When set to	
-2, it means to write immediately, not to write until	-2, it means to write immediately, not to write until	
the motions arriving to this line.	the motions arriving to this line.	

Motion command

Command name and description	Screen
World record	BlockOP Record BasicCmd ExtCmd ProdAct
World record location Record number: based on the record number. World record: Display the value of the world record directly based on the record number. Current world coordinates: Display current world coordinates. Point type: fast, linear Speed: If the speed is 0, it means the default linear	Rec ID 1 rr Absoli - WorldRec hange/Rel Cur World X 167.700 0.000 Y 366.967 454.000 Z 584.453 755.000 A -147.351 0.0000 B 13.297 90.000 C -24.622 0.0000 Line r 0 Speed 0 /m
-1~-100 represents the percentage of the set speed in the debugging page. Joint record	Dn Backward Forward Step OK BlockOP Record BasicCmd ExtCmd ProdAct
Joint record location Record number: based on the record number. Joint record: Display the value of the Joint record directly based on the record number. Current joint coordinates: Displays the current joint coordinates. Point type: fast, linear Speed: If the speed is 0, it means the default moving speed.	Rec ID 3 med Absol ~ JointRec hange/Rel Cur Joint J1 0.000 0.000 J2 0.000 0.000 J3 -100.000 -90.000 J4 0.000 0.000 J6 0.000 0.000 Fast v 0 Speed 0 /m
-1~-100 represents the percentage of the set speed in the debugging page.	Dn Backward Forward Step OK

Set coordinate system

Set work coordinate system

Direct setting: Use the content entered in the table as the current work coordinate system.

World record XYZ: Set the position (X, Y, Z) in the set world record number to "Work coordinate system", but set (A, B, C) to 0.

World record XYZABC: Set the position (X, Y, Z) and (A, B, C) in the set world record number to "Work coordinate system".

Coordinate system record: Set the coordinate system record to "Work coordinate system".

Current position and attitude: Set the world coordinate position (X, Y, Z) and (A, B, C) when the program is executed to this line to the "work coordinate system". Dynamic position and attitude: The content is read from the set R value as the value of the

"work coordinate system".

Process setting

Set whether to use special movement when the path moves.

Stop process: If there is a process started, this command will generate a linear path from the process offset position to the original position.

Start process: If the process is not started, this command will generate a linear path that moves the current position to the process offset position. If the process is already enabled, this command will generate a linear path that moves the current process offset position to the new process offset position.

Process coordinate system: The coordinate system on which the process path is based.

				_					
BlockC	PR	Record BasicCm			ExtCmd	ProdAct			
World Rec(XYZABC)									
Rec	ID	0			WW				
	S	et Val	lue		Use Va	lue			
Х		23.691			23.691				
Y		366.965			366.965				
z		58	34.446		58	34.446			
A		-14	7.371		-14	7.371			
В		13.295			3.295 13.29				
с		-24.607			-24.607				
Dn	Ba	ckward	Forwar	d	Step	ОК			

Blo	ockOP	Record	Embeddeo	ParamAct	PosAct
Pa	ttern				•
	Ski	ill Coor	World (Coor	•
	Patte	ern Type	Circle		•
	R	lange		0.000	
	In	iterval		0.000	
	In	iit Dist			
			Speed	0	/m
-					
	Dn	Backward	Forward	Step	ОК

Sample type: There are three types of winding, moving back and forth, moving left and right, and can be expanded according to actual needs in the future. Moving range: The swing range, that is, the maximum distance from the original path. Paragraph distance: The position of the swing is	
the path. Initial movement amount: The amount of movement at the beginning of the process when the movement distance is 0.	
Dynamic process: Same as Start, except that the parameters of the process are determined by the content of the R value.	
Note: When using this function, the actual calculated process offset value must be smaller than the "Max Range of Process" column in the "Options Page/Run", otherwise the alarm will pop	
Fast, Linear, Arc transition, Arc midpoint, Arc	BlockOP Record Resict md Extend Broddet
center, Arc end	
Absolute/relative: The content representing the set	Line - Absoli - Joint Coo - 0
value is either absolute to the selected coordinate	Set Value Cur Value J1 45.488 0.000
system or relative to the current coordinate of the	J2 34.999 0.000
target coordinate system.	J3 530.000 -90.000
Coordinate system: the coordinate system used to	J4 0.000 0.000
represent the contents of the set value	J5 0.000 0.000
Set value: AYZC Speed: If the speed is 0, it means the default	J6 87.239 0.000
moving speed	Get Cur Speed 0 /m
$1 \sim 100$ represents the percentage of the set speed	
in the debugging page	Dn Backward Forward Step OK
Bring in the current: Fill the current coordinates of	
the coordinate system into the set value according	
to the selected coordinate system.	

Dynamic location

World record location

Absolute/relative: The content representing the set value is either absolute to the selected coordinate system or relative to the current coordinate of the target coordinate system.

Coordinate system: the coordinate system used to represent the contents of the set value

Number of XYZC set value: Source buffer for obtaining XYZC coordinate information. If this field is blank, it means that the previous coordinates are used.

Number of speed set value: Get the source buffer number of the speed information. If it is blank, it means the default linear speed is used.

The dynamic position is always in the form of a "Linear path".

This command is suitable for filling the target position with the vision system or PC, and notifying the manipulator for moving.

External command calling

Command name and description	Screen
GM code	BlockOP Record BasicCmc ExtCmd ProdAct
Call G code built-in by the system or manually	maker macro g 530
written by the developer to provide greater	FastMove(L:Coor.XYZABC:Pos)
flexibility	Param A(#1)
Parameter A(#1) : The first parameter to be	Param B(#2)
transmitted to the G-code.	
Parameter B(#2) : The second parameter to be	Param C(#3)
transmitted to the G-code.	Param D(#4)
Parameter C(#3) : The third parameter to be	Param P(#16)
transmitted to the G-code.	Param L(#12)
Parameter D(#4) : The forth parameter to be	
transmitted to the G-code.	Dn Backward Forward Step OK
Parameter P(#16) : The fifth parameter to be	

Bloc	ockOP Record BasicCmd		Ex	tCmd	Prod	Act			
			Ał	osol	ute	•	World	d Coo	r
	Reg	g ID	F	leg ∖	Val	T	Cur I	Pos	Ī
Х								0.000)
Y							45	4.000)
Z							75	5.000)
A								0.000)
В							9	0.000)
с								0.000)
Line	•	-	()	Spe	ed		0	/m
0)n	Backv	vard	For	ward		Step	Oł	(

transmitted to the G-code.	
Parameter L(#12) : The sixth parameter to be	
transmitted to the G-code.	

Process package of built-in instructions

Six practical command process packages are available in the built-in command

External	Program list	You can call a program file selected in the list page by
Files		numbering.
	Calling O files	Can call a file generated in variety of types, including the
		O files generated by the sample page.
		The program page uses O files exported by the block
		operation.
		O files generated by external CAM software.
		But the O files generated by the establishment of the
		motor files are excluded
	Program list	The calling calls the corresponding program according to
		the storage location of program.
Drawing	Load drawing files	Load the drawing files in the list of drawing files into the
files		data of drawing files.
	Drawing edging	Based on the current data of drawing files, the path
		calculation of the edging class is performed and run.
		(Running without path direction with the tool tip follow
		up).
	Drawing cutting	Based on the current data of drawing files, the path
		calculation of the cutting class is performed and run.
		(Running without path direction with the tool tip follow
		up).
	Rotary polishing	According to the current data of drawing files, the path of
		the robot clamping workpiece for polishing is calculated
		and operated.
Tool	Default tools	Apply the parameters of one of the four sets of tools
parameters		preset in the tool page as the location of the cuspidal
		points of tools.
	Any tools	Fill in any tool parameter values yourself to define the
		location of the new tool's cuspidal points
IO-related	Sensing stop (world	The relative position of the movement is defined by the
	coordinates)	world coordinates, and if the set signal is triggered during
		the movement, the motion is stopped.
	Sensing stop (work	The relative position of the movement is defined by the
	coordinates)	work coordinates, and if the set signal is triggered during
		the movement, the motion is stopped.
	Sensing stop (tool	The relative position of the movement is defined by the
	coordinates)	tool coordinates, and if the set signal is triggered during

		the movement, the motion is stopped.
	Issue a warning if	Run the "Wait I" command, if it exceeds the set time, an
	"Wait I" timeout	alarm will be issued.
Security	Inspection of world	Check if the current location is at the world security point
point	security point	of the command. If not, an alert will be issued. This
		command is usually written in the first line of the
		program to prevent the risk of collision when the position
		is incorrect at startup.
	Inspection of joint	Check if the current location is at the joint security point
	security point	of the command. If not, an alert will be issued. This
		command is usually written in the first line of the
		program to prevent the risk of collision when the position
		is incorrect at startup.
	World security point	Move straight to the specified world security point
		position. This command is usually added to the last line
		of the program to match the security insolution of the
		first line of the program for circular operation.
	Joint security point	The joint moves to the specified joint security point
		position. This command is usually added to the last line
		of the program to match the security insoection of the
		first line of the program for circular operation.
Matrix	Stack motion	A stack motion is performed with the settings of the stack
stack		page.
	Stack reset	Reset of stack motion is performed with the settings of
		the stack page.
	Stack completion	Completion of stack motion is performed with the
		settings of the stack page.
	Matrix motion	A matrix motion is performed with the settings of the
		matrix page.
	Matrix reset	Reset of matrix motion is performed with the settings of
		the matrix page.
	Matrix completion	Completion of matrix motion is performed with the
		settings of the matrix page.



The parameter process includes a variety of welding process packages: torch output, arc welding, swing welding, tungsten inert gas welding and subscribe package!

Monitoring

It can be used to monitor the magnitude of the command voltage and current and the output voltage and current, as well as the output and input of the signal during the welding process.

Manual

In the maintenance mode, you can click on the arc, gas, wire feeding, and wire drawing! Make sure the signal is correct!



Parameters

Divided into arc welding parameters, appointed parameters, welding IO parameters, and others!

Among them, arc welding is divided into welding sequence, arc welding parameter setting, output setting!

1. Welding sequence

There are 10 sets of arc welding sequences and can be manually selected by the customer in the program. The parameter settings refer to the settings on the following pictures.



Switch the arc welding process according to different welding materials and environments.

2. Parameter setting

LNO	V09.00 X 0.00 World Y 454.00 System Z 754.99	A 0.00 U B 90.00 V C 0.00 W	0.00 0.00 0.00	free	0.0 1115.tch	F1.arc open	NotReady 50.0 %	Alarm arnin	Reset
5	Welding arc Par	am set	Check s	set	Other				ĮQ.
Arc	Simulation pat	h ignoring v	velding		Hold Anew	Arc On C	of		+
RSV	Arcing gas Ope	n flag			Hold Anew	Arc Retr	oversion		50 %
	Pre Gas Time	0	ms	<u>'</u>	Distance	י	0	mm	-
10	Delay Gas Time	0	ms	Retr	oversion Sp	eed	0	%	PAUSE
other	Wire Off before	e Arc Off							11
	Wire Off Time	0	ms						
									AUTO
									<u>O</u>

You can set the arc monitoring time, arc monitoring time, welding interruption, etc.!

Arc monitoring time: The time from the controller to send an arc signal to the system receiving the arc from the welding machine! If the system does not receive the success of arcing during this time, the system will issue an alarm of arcing failure!

Arc monitoring time: The time when the controller sends out the arc command and disconnects the arcing signal! If the arcing success signal persists, the system triggers the arcing failure!

Monitoring time of welding interruption: After the value is successfully arcing, the system will issue the arcing command during this period, but after the arcing success signal is disconnected for more than the set time due to external reasons, the system will trigger the signal monitoring error in welding!

3. Define the functions and button forms of F1 F2! Set the number corresponding to the welding analog quantity!

LNC	V09.00 X World Y 45 System Z 75	0.00 A 0.00 U 54.00 B 90.00 V 54.99 C 0.00 W	0.00 free 0.00 0.0 0.0	1115.tch	F1.arc open	NotReady <mark>Alarm</mark> 50.0 % arnin	Reset
5	Welding arc	Param set	Check set	Other			10.
Arc	F1 button Type	Switch	•				2
AIC	F2 button Type	Switch	-				+
RSV	F1 funtion	Manual oper	n arcing▼			Ľ	50 %
	F2 funtion	de-wire	•			4	
ю	Weld machine Type	AIAO	_			L L	-
				-	1	ľ	AUSE
other	AO V Rref	10	Cancel	force			••
	AO I Rref	10	ArcOn v	vithout O Ou	to		
	AI V Rref	10	_				<u></u>
	AI I Rref	, 0	8				AUTO
		·					1 †_

4. Appointed setting

The appointed setting refers to the start time of the function starting and the signal of appointed button.

LNC	V09.00 X 0.00 A World Y 454.00 B 9 System Z 754.99 C	0.00 U 0.00 0.00 V 0.00 0.00 W 0.00	free 1115.tch	F1.arc openNotReady 50.0 %Narm arnin	eset
ſ	Reservation set			<u>)</u>	₽,
RSV Se	Reservation box fun	ction		•	
L ashad	Reservation start sec	0	ms		t
ule	Reservation cancle sec	no use	ms	50	0%
	Reservation flicker sec	0	ms		-
				e *	AUSE
					EACH

Schedule is the position of placement of the subroutine of the appointed program! A total of 20 program locations are available for placement.

LNC	V09 Sys	9.00 World	X 0.00 A Y 454.00 B Z 754.99 C	0.00 U 90.00 V 0.00 W	0.00 0.00 0.00	fre 0.0	e 1115.tch	F1.arc open	NotRea 50.0	dy Alarm <mark>%</mark> arnin	Reset
ſ	Se	lection	Del Select	4686	/ 99999	9 (Cycle		Rur	Select	JQ.
RSV Se t	0	11	15.tch			10					•
sched	1					11					50 %
ule	2					12					0
	3					13					
	4					14					
	5					15					A laintain
	6					16					्रि
	7					17					
	8					18					
	9					19					Q

Welding IO

Point I: soft number of arcing success signal and torch collision point I number and point I number of the appointed box

LNC	V09.00 System	0.00 A 0.00 U 454.00 B 90.00 V 754.99 C 0.00 W	0.00 free 0.00 0.0 0.0	1115.tch	F1.arc open	NotReady <mark>Alarr</mark> 50.0 % arni	n Reset
5	I	0 0					, 10 ,
Arc		Arc Single Welding Single	1	_			+
RSV	Rsv	Collision I	201				50 %
		尋位	70	_			•_
IO							AUSE
other							
					1		TEACH
LNC	V09.00 System	0.00 A 0.00 U 454.00 B 90.00 V 754.99 C 0.00 W	0.00 free 0.00 0.0 0.0	1115.tch	F1.arc open	NotReady Alarn 50.0 % arni	n Reset
J	I	0)Q.
Arc		RsvBox Single1	no use 🛛	RsvBox Sin	gle11	no use	•
		RsvBox Single2	no use 🛛	RsvBox Sin	gle12	no use	Ŧ
RSV	🕄 Rsv	RsvBox Single3	no use 🛛	RsvBox Sin	gle13	no use	50 %
10		RsvBox Single4	no use	RsvBox Sin	gle14	no use	-
		RsvBox Single5	no use	RevBox Sin	gle15	no use	O 'AUSE
other		RSVBOX Single6				no use	
		RsvBox Single8	no use	RsvBox Sin	gle18	no use	
		RsvBox Single9	no use 🛛 🖡	RsvBox Sin	gle19	no use	
		RsvBox Single10	no use 🛛	RsvBox Sin	gle20	no use	
		Rsv Hold single	no use			O Updata	TEACH

Point O: arcing gas wire feeding and the output of the starting light of appointed box

LNO	V09.00 System	0.00 A 0.00 U 454.00 B 90.00 V 754.99 C 0.00 W	0.00 free 0.00 0.0 0.0	1115.tch F1.ard open	NotReady Alarm 50.0 % arnin
כ	I	0)
Arc	Arc	Arc	no use	·	•
		Gas	no use		
RSV	👕 Rsv	Wire On	no use		50 %
•		Wire Off	no use		1 – 1
10		尋位	2004	ĺ	QAUSE
other					T II
other					Aintain
					<u></u>
					AUTO
					↑ ↓

LNO	V09.00 System	0.00 A 0.00 U 454.00 B 90.00 V 754.99 C 0.00 W	0.00 free 0.00 0.0 0.	0 1115.tch F1.arc	NotReady <mark>Alarn</mark> 50.0 % arni	n Reset
5	I	0				, 10.
Arc	Arc	RsvBox light1	no use	RsvBox light11	no use	•
		RsvBox light2	no use	RsvBox light12	no use	т
RSV	👕 Rsv	RsvBox light3	no use	RsvBox light13	no use	50 %
-		RsvBox light4	no use	RsvBox light14	no use	-
10		RsvBox light5	no use	RsvBox light15	no use	AUSE
other		RsvBox light6	no use	RsvBox light16	no use	
other		RsvBox light7	no use	RsvBox light17	no use	Antain
		RsvBox light8	no use	RsvBox light18	no use	র্তি
		RsvBox light9	no use	RsvBox light19	no use	AUTO
		RsvBox light10	no use	RsvBox light20	no use	1 t
					O Updata	TEACH

Others: Turn on the anti-collision function and the handling mechanism after anti-collision!

LNC	V09.00 System	0.00 A 454.00 B 754.99 C	0.00 U 90.00 V 0.00 W	0.00 0.00 0.00	free 0.0 0.0	1115.tch	F1.CL collide	NotReady Alarn 50.0 % arni	n Reset
כ	Other	Power s	etting						1Q .
Arc	✓ collision	avoidanc	e function	7		Check pro	gram a	rc instructic	+
RSV	collision mec Inspectio	nanism a on T	0	 ms		Show all ii	nspecti	on seconds	50 %
IO	Remove Coll	iston T	0	ms					-
other	Locking r	ate in tea	ching mo	de					● ^{AUSE}
other	Teach locking	ig rate	0 to mode	%					Maintain
	Auto lockin	g rate	0	%					

You can set the collision mechanism here: alarm warning pause

Collision detection time: collision signal duration in milliseconds

Release the alarm time: Click F1 to temporarily release the collision alarm. If the collision alarm still exists during this time, the system will continue to alarm!

Program examples

1. General welding procedures



l	.NO	V09.0 Syste	00 World	(0. (454 Z 754	.00 A .00 B .99 C	0.00 90.00 0.00	U V W	0.00	0 free 0 0.0	0.0 1115	i.tch	1.CL ollide	NotR 50.	eady <mark>Aları</mark> 0 % arni	n Reset
			1115.tch			5	Sav	ve	BlockOP	Record	BasicCm	d Ext	Cmd	ProdAct)Q.
	prog	1 :	3:	Line	•				🗙 Sele	ct Coor		oint	Coo	•	
		2	1:	Arc	ON				Ce	n	Pass		F	ast	Т
F	ooint	3 4	4:	Line	•										50 %
r	nanu	4 :	2:	Arc	OFF				En	d	Mid		L	ine	[–]
	al🔫	5	5:	Fast	:		Ne	ar							AUSE
Р	aram	*							Output ID	0	On		OnA	utoOff1	
	sys								Delay	0	Of	f	OnA	utoOff2	
S	yner gy								InPos	Delay	On Pu	Ilse	OnA	utoOff3	
		Detail	1~N	Cut	Сору	Pas	te	Up	Dn	Backward	Forward	t s	tep	ОК	TEACH

Examples of swing welding:

LNC	V09.	.00 World	X 0 Y 454 Z 754	.00 A .00 B .99 C	0.00 90.00 0.00	U 0.0 V 0.0 W 0.0	00 free 00 0.0	0.0	i.tch F1	.CL NotRe llide 50.0	eady Alarn <mark>0 %</mark> arnii	n Reset
		1115.to	:h		6	Save	BlockOP	Record	BasicCmo	ExtCmd	ProdAct)Q.
nrog	1	3:	Line	•			Coordi	nate syst	tem:Path	n X+World	±z -	•
prog	2	1:	Arc	ON			Movin	g range	5	mm		+
point	3	6:	Coo	rdinat	e s…		Moving	distance	3	mm		50 %
manu	4	4:	Line	2		~	Spe	eed				-
al🔻	5	2:	Arc	OFF		Near	· ·					AUSE
Param	6	5:	Fas	t								Ĩ
•	*											
sys						$\boldsymbol{\boldsymbol{\succ}}$						રુદ
िyner gy						Ť						
	Detai	1~N	Cut	Сору	Pas	te Up	Dn	Backward	Forward	Step	ОК	TEACH

Examples of tungsten inert gas:

LNO	V09. Syste	00 World	X 0.0 Y 454.0 Z 754.9	0 A 0 0 B 90 9 C 0	0.00 U 0.00 V 0.00 W	0.0	0 free 0 0.0	0.0 1115	5.tch F1	no NotRe ed 50.	eady <mark>Alarr</mark> 0 % arni	n Reset
\sum_{n}		1115.tc	h	6	Sa	ive	BlockOP	Record	BasicCmd	ExtCmd	ProdAct	10.
prog	1	3:	Line				Fish sca	le_1			-	0
P. 08	2	1:	Arc (D N			Weld	l nun	2			+
point	3	6:	Fish	scale_1		\sim	We	ld T	500	ms		50 %
manu	4	4:	Line		-	~	Arc C	ount	20			~ -
al🚽	5	2:	Arc (DFF	N	ear	Spe	ed		mm/s		@'AUSE
Param	6	5:	Fast				Del	avT		ms		
sys	*					~ ~		,				
Syner gy						Z						
	Detail	1~N	Cut	Copy P	Paste	Up	Dn	Backwarc	Forward	Step	ОК	

Appointed welding settings:

1. Set startup of appointment

LNC	V09.00 X 0.00 A 0 World Y 454.00 B 99 Z 754.99 C 0	0.00 U 0.00 0.00 V 0.00 0.00 W 0.00	free rsv count 0 0.0 0.0 cur rsv 0	F1.no NotReady Alarm used 50.0 % arnin	eset
ſ	Reservation set			,×	₽.
RSV Se	Reservation box fun	ction	_	•	L
	Reservation start sec	1000	ms		Г
ule	Reservation cancle sec	no use	ms	50)%
	Reservation flicker sec	500	ms	.	_
					AUSE
				Ľ	
					aintain
				2 ^c	्र

2. Start the point I and pause signal of the appointed program!

LNO	V09.00 System	0.00 A 0.00 454.00 B 90.00 754.99 C 0.00	U 0.00 V 0.00 W 0.00	free 0.0 0	rsv count .0 cur rsv	0	F1.no used	NotReady Alarm 50.0 % arnir	Reset
5	I.	0 0							Q .
Arc		RsvBox Single	1	510	RsvBox	Sing	gle11	no use	•
		RsvBox Single	2	511	RsvBox	Sing	gle12	no use	+
RSV	👕 Rsv	RsvBox Single	3 n	o use	RsvBox	Sing	gle13	no use	50 %
		RsvBox Single	4 🚺 n	o use	RsvBox	Sing	gle14	no use	_
10		RsvBox Single	5 n	o use	RsvBox	Sing	gle15	no use	
other		RsvBox Single	6 🚺 n	o use	RsvBox	Sing	gle16	no use	
other		RsvBox Single	7 🚺 n	o use	RsvBox	Sing	gle17	no use	 Valotalo
		RsvBox Single	8 n	o use	RsvBox	Sing	gle18	no use	502
		RsvBox Single	9 n	o use	RsvBox	Sing	gle19	no use	AUTO
		RsvBox Single	10 n	o use	RsvBox	Sing	gle20	no use	1.+
		Rsv Hold sing	e	509				O Updata	TEACH

3. For the setting of the appointed light, set the corresponding output point O as required!

LNO	V09.00 System	0.00 A 0.00 U 454.00 B 90.00 V 754.99 C 0.00 W	0.00 free 0.00 0.0 0.	0 1115.tch F1.arc	NotReady Alarr 50.0 % arni	n Reset
5	I	00				, 10.
Arc	Arc	RsvBox light1	no use	RsvBox light11	no use	•
		RsvBox light2	no use	RsvBox light12	no use	т
RSV	👕 Rsv	RsvBox light3	no use	RsvBox light13	no use	50 %
		RsvBox light4	no use	RsvBox light14	no use	-
IO		RsvBox light5	no use	RsvBox light15	no use	PAUSE
other		RsvBox light6	no use	RsvBox light16	no use	
other		RsvBox light7	no use	RsvBox light17	no use	Maintain
		RsvBox light8	no use	RsvBox light18	no use	র্ি
		RsvBox light9	no use	RsvBox light19	no use	AUTO
		RsvBox light10	no use	RsvBox light20	no use	t t
					O Updata	TEACH

4. Addition of appointed subroutine

1 rogram 1 and program 2 are also established in the progra	1、	Program 1 and	d program 2	are also	established	in the program
---	----	---------------	-------------	----------	-------------	----------------

LNC	V09.0	00 World	X (Y 454 Z 754	0.00 A 4.00 B 4.99 C	0.00 90.00 0.00	U 0.0 V 0.0 W 0.0	0 free 0 0.0	0.0	sv coun cur rsv	0 0	F1.nd used	Noti	Ready .0 %	Alarn arnii	n Reset
		1.tch			6	Save	BlockOP	Rec	ord	Basic	md E	xtCmd	Prod	Act	ĮQ.
prog	1	1:	Lin	e			Line	-	Abs	ol -	Joint	Coo	- ()	•
	2	2:	Arc	: ON					Set	Valu	e	Cur	/alue		T
point	3	3:	Fis	h scale	_1		J1			0.	000		0.00	0	50 %
manu	4	4:	Lin	e		~	J2			0.	000		0.00	0	-
al🔻	5	5:	Arc	OFF		Near	J3			-90.	000		90.00	0	AUS6
Param	6	6:	Fas	st			J4			0.	000		0.00	0	
	*						J5			0.	000		0.00	0	Alintali
sys						\mathbf{i}	J6			0.	000		0.00	0	2
Syner gy						Y	Get Cur				Sp	eed	0	/m	
	Detail	1~N	Cut	Сору	Pas	te Up	Dn	Back	ward	Forwa	ard	Step	0	к	
	V09.	00	X (0.00 A	0.00	U 0.0	free	r	sv coun	t 0	F1.nc	Not	Ready	Alarn	Deser

	Syste	m	Z 754	1.99 C	0.00	W 0.0	0.0	0.0 cur rsv	/ 0 <mark>US</mark>	ed 50.	<mark>0 %</mark> `arni	in
		2.tch	_		5	Save	BlockOP	Record	BasicCmo	ExtCmd	ProdAct)Q.
prog	1	1:	Lin	e			Line	- Abs	sol - Joi	int Coo	0	۹.
F 0	2	2:	Arc	ON				Set	t Value	Cur V	alue	+
point	3 4	4:	Lin	e			J1		0.000)	0.000	50 %
manu	4 !	5:	Arc	OFF			J2		0.000)	0.000	° _
al	5	5:	Fas	t		Near	J3		-90.000	9	90.000	AUSE
Param	*					INCAT	J4		0.000)	0.000	TH I
						$\mathbf{\sim}$	J5		0.000)	0.000	Alaintal
sys						\mathbf{X}	J6		0.000)	0.000	{৾}
Syner												AUTO
gy							Get Cur	·J		Speed	0 /m	1
	Detail	1~N	Cut	Сору	Past	te Up	Dn	Backward	Forward	Step	ОК	

2、 Add programs 1 and 2 to the appointed program!

LNC	V09 Sys).00 World	X 0.00 A Y 454.00 B Z 754.99 C	0.00 U 90.00 V 0.00 W	0.00 0.00 0.00	fre 0.0	e rsv count 0 F1.no 0.0 cur rsv 0 used	NotRea	dy Alarm <mark>%</mark> arnin	Reset
5	Se	lection	Del Select	4686	/ 99999	ə 🕻	ycle	Rur	n Select)Q.
RSV Se	0		1.tch			10			Ĩ	1
sched	1		2.tch			11			ŀ	50 %
ule	2					12			C	3 7
	3					13			ļ	-
	4					14				
	5					15			7	Maintain
	6					16				্ট
	7					17				
	8					18				
	9					19			1	

Click here

L	V09.00 System	0.00 A 454.00 B 754.99 C	0.00 U 0.00 90.00 V 0.00 0.00 W 0.00	free 0.0 0.0	rsv count cur rsv	0 F1.no 0 used	NotRea	ady Alarm <mark>%</mark> arnin	Reset
	F	ile Oprat	e			Filter			
	Filename	Size	DateTime					TECTAch	
1	0320.tch	400	週二 3月 27 16:31:3	32 2018		urrent Nar	ne	TEST.tch	
2	0521.tch	200	週一 5月 21 15:12:5	54 2018		Power o	n Load		
<	1.tch	700	週日 12月 9 20:16:3	32 2018	Т	Del	ete Sel	ected file	
4	1025.tch	1924	週三 10月 25 22:03	:08 2017					
5	1108.tch	2924	週三 11月 8 10:56:2	22 2017					.tch
6	1115.tch	700	週日 12月 9 20:16:2	26 2018		Save a	IS	Create	e
7	1117.tch	1324	週五 11月 17 14:17	:38 2017				L	
8	123.tch	4200	週四 11月 15 17:54	:28 2018	$\mathbf{\sim}$	Cance	el	Oper	n

- 1 Click on the programmed program
- 2 After selecting, click Start

The program will enter the appointment schedule

By analogy, the same is true for program 2!

3. Create the main program: Click on the appointed process, click on the picture and click

OK! Then start automatic mode, click repeat and click start!



After that, the system will perform welding according to the order of clicking on the appointed box!