Rice Mfg. ROBOTICS Welding Process Instructions

This system is available for several types of robots, while this manual takes 6-joints robots as an example to present some of the instructions. For other types of robots, please refer to this manual and commissioning manual.

Please make sure that related manual/instructions can be reached by the direct users.

Contents

Welding process refer to the automatic robot welding of controlling the welding tools and manipulating the process, by the meanings that set up coordination of tools, set up parameters of welding machine, set up parameters of welding and set up the basic method of welding.

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Safety Attentions

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

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

MUST, and FORBID



if wrong operation is taken.

CAUTION equipment breakdown will result if wrong operation is taken.

MUST instructions that must be obey. OFORBID operations that mustn' t be taken.

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

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



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

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



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

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



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

follow the operation manual strictly

consider the backup plan if robot move suddenly toward yourself

set up the shelter just in case

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

★When following processes are operated, make sure nobody is in the robot

movement region and operator is in the safe position: powering the robot control electric

tank

controlling the robot using teaching programmer

test run of robot

reoccurrence automatically

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

Press the emergency stop button immediately when exception occurs.



★ Following items need confirming before operating robot:

Operator is well-trained with robot-operation;

Operator has adequate knowledge of the movement feature of robot;

Operator is fully aware of the danger of robot;

Operator hasn' t drink alcohol;

Operator hasn't take drugs that affect the nerve system and make reaction slow.

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

Movement of robot is normal or not;

Zero point adjustment is correct or not;

Auxiliary equipment connected to robot is normal or not.

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

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

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



Safe operation protocols

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

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

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

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

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

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

1 Basic concept description

1.1 Concept of coordination

When axial operations of robots are taken, the following coordination systems are proper to adapt.

1.1.1 Joint coordination

Axes of robots can operated separately in joint coordination system.

1.1.2 Cartesian coordination

Robots can translational move along the x axis, y axis and z axis in Cartesian coordination system.

1.1.3 Tool coordination

In tool coordination system, Origin Point is set at the sharp end of the tool, and z axis is set along the effective direction of tool which is taken by the flange in the wrist of robot.

1.1.4 User coordination

Robot can move along the axes which are defined by users.

In the coordination systems except joint coordination system, fixed-control-point-move is refer to the move in which tool gesture is changed while sharp end of tool keeps unchanged.



Joint coordination & Cartesian coordination



Tool coordination & User coordination

1.2 Match with the welding power

CRP system controls the welding power through the following signals: Two ways of

0-10V analog signal to control welding current and voltage.

M190 output, control the **arc starting**. M191 and M188 control the **wire feeding and backward**.

M180 input detects the arc success signal. M181 detects breakdown of welding power.

Logic pin need programming to use. **PLC diagrams** are shown in the user PLC.

M190	Y000 ARC STARTING
0000 M191 M188 	
M191 M188	. Y002 MANUAL WIRE BACK
X000	M180 ARC DETECT SIGNAL
0003 ₩001 ⊣/	M181 WELDER FAULT DETECTION SIGNAL

Definitions : Inputs and outputs canbe adjusted according to the real wiring connection.

Above PLC means:

M190(Normally open)------Yxx (arc starting signal)

M191(Normallyopen)--M188(Normallyclose)------Yxx (manual wire feeding,)

M191((Normallyopen)--M188((Normallyclose)-----Yxx (Manual wire back)

Xxx(open)------M180 (arc detect signal , detect if arc is successful)

Xxx(close)------M181 (Welding machine fault detectiondetect if there is trouble with welding power)



Wiring diagram of OTC CPVE-500 (for reference)



Wiring diagram of AUTAI MIG-350R (for reference)



Wiring diagram of MegmeetEhave CM350 (for reference)

1.3 Welding instructions

1ARC START 【 fast : 5 1 】 Instruction functions	 When this instruction is executed, program will invoke the pre-set welding parameters, and then start arc. Variation number is welding document number, ranging from 0 to 7. ArcStart and ArcEnd should be used in pair. Execution between ArcStart and ArcEnd is not controlled by multiplier. Only MOVL and MOVC instructions can be used between ArcStart and
---	--

		ArcEnd.							
		For more inform "Welding Proc	nation abo ess Descri	out welding, please refer to iption".					
		# <variation number></variation 	n number is the number of document that need g.						
	Additions	Blank % MM/S	Treatment of welding speed. Blank : Program between ArcStart and ArcEnd is executed in 100% speed without the control of multiplier. % : Set the speedpercentage (%)of program execution between ArcStart and ArcEnd. MM/S : Set the speed of program execution between ArcStart and ArcEnd. Speed of program						
		VI	Set weld starting by the p welding VI define	ing voltage and current. Arc and ending will still executed rocess instruction, while voltage and current is set as es.					
	Example program	ARCSTART#(1) V=20V I=200A ARCEND#(1)	8 MM/S	Invoke welding parameter document 1, start arc, welding speed 8 MM/S, voltage 20V, current 200A. Start welding. End arc, finish welding.					

2ARC END	Instruction functions Additions	When this instruction is executed, program will invokethe pre-set welding parameters, and then end arc.Variation number is welding document number,ranging from 0 to 7.ArcStart and ArcEnd should be used in pair.For more information about welding, please refer to"Welding Process Description"#< variationVariation number is the number of						
[fast: 5 2]		number>	weldii	ng document that need ing				
	Example program	ARCSTART#(1) 509	Invoke welding parameter document 1, start arc, welding program will be executed at 50% of set speed. Start welding. End arc, finish welding.					
3 WEAV E 【fa st:	Instruction functions	When these instru invoke the pre-set weave. Variation n number, ranging fr Weave and Weave For more informat "Welding Process	ctions weave umber rom 0 1 End sh ion ab	are executed, program will e parameters, and then r is weld weavedocument to 7. hould be used in pair. out weave, please refer to ription".				
3] 4 WEAV EEND [fast: 5	Additions	#< variation number>	Variat weldi corre instru	tion number is the number of ng document which is spondence to weave action.				
	Example program	WEAVE#(1) WEAVEEND#(1)	Invoke weave parameter document 1, weave, weave route,					

	weave end.

Comprehensive welding example:

ARCSTART #(1) 10MM/s V=20V	Invoke #1 welding parameter document,
I=200A	start arc, speed at 10 MM/S, welding
	voltage 20V, current 200A.
WEAVESINE #(1)	Invoke #1 weave parameters.
MOVL VL=100MM/S PL=0	Move along the welding route, Speed at 10
	MM/S as set in ArcStart.
WEAVEEND	Weave end.
ARCEND #(1)	End arc using #1 welding process.

MOVL and MOVC instructions are allowed between ARCSTART and ARCSTARTEND, MOVJ is not allowed between them.

Notice

Notice

Execution speed of program between ARCSTART and ARCSTARTEND is not controlled by multiplier. Specific execution speed is determined by the following rules:

ARCSTART#(1) Blank: Execution speed is VL speed (as program set) × 100%

ARCSTART#(1) 50%: Execution speed is VL speed (as program set) × 50%

ARCSTART#(1) 8MM/S: Execution speed is 8 MM/S (VL speed in program is invalid)

For details of ARCSTART, Please refer to "Operation Manual"

2 Setup procedures for welding process

2.1 preparations

2.1.1 Set up user coordination

User coordination is benefit for teach programming. As shown in below figure, the number of user coordination is the same as the number of tooling surface.



Set up procedures of user coordination:

<Run prepara>-<User coordinate> (as shown in below figure). Every tool needs a user coordination (also refer to working coordination).

File	operation	ı Edit	Para setting	Mor	nitoring	Run prepare	Connexid	Technical	PLC	
-	Program name				Time	1 Tools coor	dinata	Size(B)		5%
爱	111				2016-	<u>1</u> 10015 C0010	umate	2500		25
轴禁止	ARCLINE					<u>2</u> User coord:	inate	0		戶动速度
	🧰 cal	1			2016-	<u>3</u> Basic coord	3 Basic coordinate folder			
	🖹 xx				2016-	4 SYNC coord:	inate	59		
	目 视觉	的抓取			2016-	5 Robot home		8676		
						<u>5</u> Variable	•			
						<u>7</u> HOME posit:	ion		Ĩź	 + 送丝控制
M160 M169									-	
M快捷键				111					î	«чолд <u>—</u>
	ID	Time	N	um	Notes					
一 何服下电	 1 2 3 4 5 	10-26 09:25:0 10-26 09:25:0 10-26 09:25:0 10-26 09:25:1 10-26 09:27:0	06 43 06 50 06 44 24 1 07 1	5 0 4	Can not Can not System 报警复位 抬起试运	open system open plc la initializati 行键	n plc instr ndder diagr on complet	uction list am file e	doc	
	Admin	ManuOff M	lodeErr	Speed()5% To	oll 🚺 User	1 10-20	5 09:49:32	SYN1 SYN2	
	New	Rename	Back up	ų.		Delete	Open U disk	Open	Copy to U	

Setup interface of user coordination

As shown above, after choosing user coordination number, user coordination setup window will prompt, as following figure.

File	operatior	ı Edit	Para setting	Monitoring	Run prepa	are Co		Technical	PLC	
えていた。	Calib	ration	_				Z+			5% ② 5 手动速度
	User ni	mber 📔 📐							>>	
	Recor	d point ORG			Ŷ	(*			, XXX	•
	ORG	XX Y	(Y			YY		/		气检关
							ORG			
										法经控制
M160 • • M169										
M快捷键			11	1						-
	ID	Time	Num	Notes						
e	$\bigcirc 1$	10-26 10:07:	53 45	Can no	t open sys	stem plo	: instru	action list	doc	
	02	10-26 10:07:	53 50	Can no	t open plo	c ladder	diagra	m file		
伺服下电	03	10-26 10:07:	53 44	System	initializ	zation c	complete	-		
1.246 1.10	<u>U</u> 4	10-26 10:08:	06 1	报警復(<u>▼</u> = 4= 5a					
	U 5	10-26 10:08:	16 1	10 ACTAN	石打谜					
	Admin	ManuOff M	lodeErr Sp	eed05% T	ooll 🚺 U	ser1	10-26	10:11:42	SYN1 SYN2	
	Move to point	Record point	Delete point		Last ste	p		Calculate	Delete	

In the above interface, firstly set the zero point of user coordination system, i.e. move the robot' s sharp end (using welding wire on the welding gun) onto one edge end of tool. Then click "Record point" to record zero point of user (tool) coordination.

Then choose "xx direction" to define x axis, as shown below.



In the above interface, set the x axis of user coordination, i.e.move the robot's sharp end onto one edge of tool. Then click "Record point" to record x axis of user coordination.



Choose "YY direction" to define y axis, as shown below.

In the above interface, set the y axis of user coordination, i.e.move the robot's sharp end onto the other edge of tool. Then click "record current point" to record y axis of user coordination.

File	operation	Edit	Para setting	Monitori	ng Run prep	oare C	onnand	Technical	PLC	1
えていた。	Calibr	ation					Z+		1	5% 25 手动速度
	User nu	nber 🔟	2					//		
	Record	point YY	•			Y+			-	
	ORG	XX	YY			YY	VŤ	~	XX	气检关
			0				ORC			<u>.</u>
N1 CO							One			医丝控制
M169										
M快捷键			1	11						
	ID 7	ſime	Nu	un Note:	3					
e	1 :	10-26 10:07:	:53 45	i Can i	not open sy	stem plo	c instru	action list	doc	
	02 :	10-26 10:07:	:53 50	Can 1	not open pl	c ladder	r diagra	m file		
伺服下电	U 3 :	10-26 10:07:	:53 44	: Systi 北区描述	em initiali ≢ <i>k</i> ÷	zation (complete			
	<u>0</u> 5	10-26 10:08: 10-26 10:08:	:16 1	抬起	式运行键					
	Admin	Manu0ff	ModeErr 🤅	Speed05%	Tooll 🖣 l	Jser1 🚬	10-26	10:12:26	SYN1 SYN2	
s	Move to point	Record poin	t Delete poi	nt	Last st	ep	C	Calculate	Delete	

After the setup of zero point, XX direction and YY direction, click the <calculate>button, then system will automatically calculate the coordination of current user tool, determine the coordination system and direction on the tool, which is beneficial for coordination setup when palletizing.

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

After the calculation of user coordination system, user can switch to the user coordination to



verify if the calculated system takes the desired tool axis orientation.

After the verification, click <cancel> to quit.

2.1.2 Setup of tool coordination system

In order to control the robot for the correct linear/circle interpolation etc. movement, size information should be inputted correctly and position of control point should be defined.

User coordination is determined by setting up 6 sets of terminal end of robots, then automatically calculating the position of tool control point, and inputting into the tool files.

The coordination of control point in flange plate coordination system can be inputted using the tool verification, as shown in below.



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

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



Scheme of 6-point verification

Real 6-point verifications are shown below:





Description

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

Steps for tool coordination system setup is as following: setting the tool coordination system

in <Run prepare>-<Tools coordinate> (shown in below).

File	operation Edit.	Para M setting M	onitoring	Run prepara Comm	and Technical	PLC
-	Program name		Time	1 Toola coordinate	Size(B)	25%
爱	111		2016-	1 roors coordinate	2500	25
轴禁止	📁 call		2016-	<u>2</u> User coordinate	folder	手动速度
	🖹 视觉抓取		2016-	<u>3</u> Basic coordinate	8676	
				4 SYNC coordinate		
				5 Robot home		気を発
				<u>5</u> Variable 🔸		
				7 HOME position		
M160						<u></u>
₩快捷键		111				点动法丝
	ID Time	Num	Notes			
(日本) (同服下电	① 4 10-21 19:48 ① 5 10-21 19:49 ① 6 10-21 19:51 ① 7 10-21 19:51 ① 7 10-21 19:51	3:00 62 0:03 1 :16 62 :28 62	It has 抬起试运 It has It has	recorded current p 行键 recorded current p recorded current p	point to be XX point to be ORG point to be XY	
	Admin ManuOff	ModeErr Speed	125% To	ol4 User1 1	0-21 20:10:37	SYN1 SYN2
	Rebuilt Rename	Back up		Delete Open U	disk Open	Copy to U

Tool coordination system setup interface.

File	operation	1 E		Par setti:	a ng	Monitoring	Run prepara		ad Teo	chnical		PLC
えていた。	Tools	coord	inate	system s	etting	ţs						「15% (2 5」 手动速度
	Tools 1	number	1	- Too	ols no	te 🗌						
	X dir migra	tion	0.00	o ,	Around migrat	IA 0.00	0					
	X dir migra	tion	0.00	0	Around migrat	1 B 0.00	0					气检关
	X dir migra	tion	0.00	0	Around migrat	1 C 0.00	0					
												送丝控制
M160 M169												
₩快捷键					111							
	ID	Time			Num	Notes						
6	<u>()</u> 6	10-21	19:51	:16	62	It has	recorded cu	rrent po	int to b	e ORG		
	17	10-21	19:51	:28	62	It has	recorded cu	rrent po	int to b	e XY		
伺服下中	08	10-21	19:51	:31	1	抬起试过	行键					
телях тчез	09	10-21	20:12	:27	393	Delete	the current	tool co	ordinate	e system	L I	
	010	10-21	20:12	:39	1	抬起试过	E行键					-
	Admin	Man	10ff	ModeErr	Spe	ed15% To	oll Use:	r1 10	-21 20:	12:41	SYN1 S	YN2
		M	odify	Dele	te	Verify(5P)	Verify(6P)				Clos	e

As shown in above, choose (press " \uparrow " " \downarrow " button) the number of tool coordination system, then click <Verify (6P)> to enter the tool coordination system setup interface, as shown in below.

File	operation	L Edit	Para setting	Monitoring	Run prepara	Connand	Technical	PLC	
えていた。	Tools	calibration(6 points)			P3	P4	P5 Pt手就	5% 全 加速度
	Recor	d point P1	D			Pl	R P	2 ×	•
	P1	P2 F	°3 P4	P5	P6			T t	检关
									• +
M160 M169									
₩快捷键			11:	-0					
	ID	Time	Num	Notes					
0	(1) 6 (1) 7 (1) 8	10-21 19:51: 10-21 19:51: 10-21 19:51:	16 62 28 62 31 1	It has It has 抬起试过	recorded cur recorded cur 行键	rrent point	to be ORG to be XY		
伺服下电	() 9 () 10	10-21 20:12: 10-21 20:12:	27 393 39 1	Delete 抬起试这	the current 运行键	tool coord	inate system	i 🚽	
	Admin	ManuOff M	lodeErr Sp	eed15% To	oll User	1 10-21	20:13:49	SYN1 SYN2	
	Move to point	Record point	Delete point		Last step		Calculate	Delete	

In above interface, after choosing [Tool number], choose the record point number and move the sharp point of welding gun (welding wire) at the correspondent position, press "Record point". At this time, correspondent indicator light should turn green.

After the recording of P1-P6, all indicator lights should turn green (As shown in below).

Description

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

File	le operation Edit se		Para settir	a 1g	Monitoring	Run prepar	a Conna	nd Tech	nical	PLC
えていた。	Tools Tools r	calibratio	n(6 points	;)			P3			20% 20% Pt 手动速度
	Record	d point <mark>P6</mark>	•				P1	ZT	B P2	r 🔶
	P1	P2	P3	P4	P5	P6				气检关
									1	
M160 M169										- _ 点动送丝
M快捷键				111	10.000 200					
	ID	Time		Nun	Notes					
e	U 3	10-21 20:1	5:39	60	It has	recorded c	urrent po	oint to be	P3Point D4D.int	
0	0 5	10-21 20:1:	5:40 5:41	60	It has	recorded c	urrent po	int to be	P5Point	1
伺服下电	06	10-21 20:1	5:41	60	It has	recorded c	current po	oint to be	P6Point	
	1 7	10-21 20:1	5:49	1	抬起试运	行键				-
	Admin	Manu0ff	ModeErr	Spe	ed20% To	oll Us	er1 10	0-21 20:1	5:52 SYN	1 SYN2
	Move to point	Record poi	nt Delete p	ooint		Last step		Calc	ulate D	elete

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

File	operation	Edit	Para setting	Monitoring	Run prepar	a Conna	ad Te	chnical	PLC	1
えていた。	Tools	coordinate sys	tem setti:	ngs						20% 25 手动速度
	Tools r	umber 1 🔹	Tools n	ote						
	X dir migrat X dir migrat	tion 24.000	Arou migra Arou migra	nd A 0.00 ation nd B 0.00 ation	0					
	X dir migrat	tion 203.558	Aroun migra	nd C 0.00 ation	0					
M160 M169									i -	
₩快捷键			11	1						
	ID	Time	Num	Notes						
6	() 3	10-21 20:15:39	60	It has	recorded c	urrent po	int to	be P3Poi	nt	
	(] 4	10-21 20:15:40	60	It has	recorded c	urrent po	int to	be P4Poi	nt	
伺服下电	05	10-21 20:15:41	60	It has	recorded c	urrent po	int to	be P5Poi	nt	
	0 6 0 7	10-21 20:15:41 10-21 20:15:49	60 1	It has 抬起试道	recorded c 运行键	urrent po	oint to	be P6Poi	nt 🗸	
	Admin	ManuOff Mod	leErr Sp	eed20% To	ooll Us	er1 10	-21 20	:18:10	SYN1 SYN2	
Similar		Modify	Delete	Verify(5P)	Verify(6P)				Close	



Description	
Tool size is determined according to the above figure.	



Tool coordination system is Cartesian coordination according to the sharp point of tool, as shown in above.

After the calculation of coordination system, user can verify if the setup coordination has the

desired orientation of tool axis by switching to Tool coordination 工具坐标.

After the verification, press <close> to quit.

2.1.3 Parameters setup for welding machine

In this process, parameters related with the welding machine control are needed.

Parameters related with welding machine control is set up in <Technical>-<Arc-welding>- <Welding device>-<Arc-welding> (as shown in below).

File	operation	. 1	Edit	Par setti:	a M	onitorin	g Run ;	prepara	Command	Technical	L	PLC	
1 十一 按键移动	1 AI 2 T: 3 AI	RCSTA IME T RCEND	RT#((=400(#(0))))						<u>1</u> Palleti <u>2</u> Paint	zing '	(手	5% 25 5 章
								<u>1</u> Tech	para	3 Arc_wel	ding)		
								<u>2</u> Weldi	ing device	1 Welder			
										2 Arc-weld	ing		司检关
										<u>6</u> 折弯工表	艺	- {	8
小主小											7	- 送	丝控制
M160 M169													· · · · · · · · · · · · · · · · · · ·
M快捷键	1				\xx					Lines3	Cur 1		
	ID	Time			Num	Notes							
6	<u>()</u> 4	10-24	20:34	:47	10000	Open	file at	the mo	oment, ple	ase wait			
	05	10-24	20:34	:47	10000	Open	file su	locess				8	
伺服下由	06	10-24	20:34	:47	1	1							
1-500 L 1-65	07	10-24	20:35	:28	10000	Open	file at	the mo	oment, ple	ase wait			
	08	10-24	20:35	:28	10000	Open	file su	locess				-	
	Admin	Man	u0ff	ModeErr	Speed	105%	Tooll	User	1 10-2	4 20:35:37	7 SYN1 S	YN2	
	Change in	st Mo	vement	Logi	.c	Edit	Last	t inst	Save	Close			

Setup interface of welding machine is shown in below:

File	operation	Edit	Pan setti	a ng	Monitoring	Run prepara	Command	Technical	PLC	
	Restart	t distance	5.00 m	1	Arc break	detect 💌 10				20%
<mark></mark> + +☆\$#¥2=h	Rest	tart speed	10.00 m	n/s2	Power	failure 🗖 🔟				手动速度
拉链检动	start e	error time	2.00 s	ec (3)	Coolant s	hortage 🗖 (12)				
	Arc de	etect time	0.30 s	ec (4)	Return	to path 🗖 🛛				
	c loss e	error time	0.30 s	ec (5)	Scrate	h start 🗹 1 4				
	Scratch	n distance	2.00 m	n <u>6</u>	Collide	detect 🗹 (15)				-
	Sora	atch speed	20.00 m	n/s7	li -	Reserve 🗖 16				气检关
9	Gas pre	eflow time	0.60 s	ec (8)						
关节坐标	Gas post	tflow time	0.50 s	ec (9)						
										医空腔刺
M160										· the second sec
M169 M快捷键				100			T	ines?	Cur 1	点动送丝
P C IAL MAL	ID	Time		Nun	Notes			IIICSU	⊂ui i	
_	1 5	10-24 20:3	4:47	10000	Open fi	le success				
	() 6	10-24 20:3	4:47	1	1					
	① 7	10-24 20:3	5:28	10000	Open fi	le at the mor	ment, pleas	se wait		
间服下电	08	10-24 20:3	5:28	10000	Open fi	le success				
	() 9	10-24 20:3	6:58	1	抬起试过	回行键			•	
	Admin	Manu0ff	ModeErr	Spe	ed20% To	ool1 Userl	10-25	09:43:25	SYN1 SYN2	
	open/clos	e			output current graph	output voltage graph	input current graph	niput voltage graph	Exit	

Settings include the following items, in mean interface of welding machine setup:

2.1.3.1 Basic parameters:

- 1) **Restart distance** : used to define the retreat distance of second-time arc start if first-time arc start failed or arc broken on the half way.
- 2) **Restart speed** : used to define the retreat speed of second-time arc start if firsttime arc start failed or arc broken on the half way.
- 3) **Arc start error time** : used define the time delay of arc detection after the arc start.
- 4) Arc detect time : used to define the time duration that system can detect the success of arc start, i.e. arc start is successful only when system can detect the arc signal over a specific time, which is arc detection verification time.
- 5) **Arc loss error time** : used to define the time duration that system can detect the arc depletion, i.e. arc depletion is successful only when system can detect the arc depletion signal over a specific time, which is arc depletion detection time.
- 6) **Scratch distance** : used to define the forward movement distance of next-time arc start, if arc re-start is unsuccessful.
- 7) **Scratch retreat speed** : used to define speedbackward to arc-breaking point after next-time arc start succeed, if arc re-start is unsuccessful.
- 8) **Gas preflow time** : used to define the time period to charge the protective gas before arc start.
- 9) **Gas postflow time** : used to define the time period to stop charging the protective gas after arc depletion.

2.1.3.2 Function options

10) **Arc break detection (during welding)**: used to set if arc broken detection works or not. When this function is effective, if arc-break occurs during welding, system

will stop the welding process and save the break point. When restarting next time, robot will move backward to break point, start arc and then operate.

If user wants to cancel "arc break detection" function, switch to TEACH mode, press R ARC S.

the 焊接复位button to reset the break point. Correspondent auxiliary relay is M180.

11) **Power failure**: used to detect if welding power has a problem. When this function works, if welding machine has power emergency, system will stop welding process; otherwise, system will not detect if welding power is normal or not.

Time to make this function work: when system is starting up, select "Welding power abnormal detection" function, and this function will work after the arc start instruction.Correspondent auxiliary relay is M181.

12) **Coolant shortage:** used to detect if water cooling system has a problem. When this function works, if water cooling system has a problem, system will stop welding process.

Time to make this function work is very similar to "**Power failure**" function. Correspondent auxiliary relay is M182.

- 13) **Return to path:** used to set if system has the restart function. When this function works, system will restart arc after welding beginning or arc arc depletion. The restart speed and retreat distance is set up according to the basic parameters.
- 14) **Scratch start:** used to set if system has the scratch function. When this function works, if restart is unsuccessful, system will retreat for a certain distance at certain speed. Retreat distance and speed is set up according to the basic parameters.
- 15) Collide detection: used to set if system has the anti-collision detection function. When this function works, after anti-collision sensor detects collision, system will stop the welding process and servo power-off.

Time to make this function work: after system has power, anti-collision detection will work. Correspondent auxiliary relay is M13.

Notice

For safety reasons, it' s highly recommended to add anti-collision sensor and set **Collide detection** effective. This is beneficial to stop robot quickly if collision occurs

at robot terminals.

Method to cancel **Collide detection**:To add the M193 normally closed in M13 circle in PLC

When anti-collision sensor alerts, clicklogo, a bogo will disappear, and M193 is effective. M13 circle is disconnected, pressto reset alert, presst Repair over servo, and mov bot into safe place manually. 30s later, M193 reset to ineffective automatically, and above circle will work as normal.

2.1.3.3 Welding current match setup.

This process is used to set the welding current of welding machine when system export 0-10V analogous signal. Press "output current graph" to enter the setup interface.

Welding current setup interface

File	operation] se	Para tting	Monitoring	Run prepara	Command	Technical	PLC		
	Restart	distance [5.00	mm	Arc break	detect 🗹				25%
	Resta	irt speed 🛛	10.00	mm/s	Power	failure 🗖				手动速度
按键杨石	start er	ror time 🛛	2.00	sec	Coolant s	hortage 🗖				
	Arc det	ect time 🛛	0.30	sec	Return	to path 🗖				
	c loss er	ror time 🛛	0.30	sec	Scrate	h start 🗹				
	Scratch	distance [2.00	mm	Collide	detect 🗹				
_	Scrat	ch speed	20.00	mm/s		Reserve 🗖				气检关
٩	Gas pref	low time	0.60	sec						
关节坐标	Gas postf	low time ∫	0.50	sec						
M160										- <mark>18</mark> }
mito5 M快捷键	1			\x	x			lines3	Cur 1	点动送丝
	ID T	ime		Nun	Notes					
dama,	① 5 1	0-24 20:34	:47	1000	0 Open fi	le success				
	() 6 1	0-24 20:34	:47	1	1				-	
	() 7 1	0-24 20:35	:28	1000	0 Open fi	le at the mo	oment, plea	se wait		
间版下电	08 1	0-24 20:35	:28	1000	0 Open fi	le success				
	① 9 1	0-24 20:36	:58	1	抬起试过	运行键			-	
	Admin	Manu0ff	ModeE	rr Sp	eed25% To	ooll User	1 10-2	5 10:17:13	SYN1 SYN2	2
	open/close			C	output current graph	output voltage graph	input current graph	niput voltage graph	Exit	

File	operation	Edit	Para setting	Monitoring	Run prepare	Connand	Technical	PLC	2
※	Ana 10000 1 2.500 2 Welder	log: V V r(A) 67.000	Current cur	268.000 4	構 開始	連扒量测试说明 <u>算収理测试</u> :新 運到成為、系統時 (中国民对应要化、 。 <u>2相值测试</u> :新 (公標机值面测试)、 应規拟皮值1:和 に 此值仅在焊机 反回2:系統关闭 st analog A ¥elder te ler correspo	注 入積拟里0-10%, (出设定模拟里0-10%, (出设定模拟里), (出设定模拟里, (出立定体和实践), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (計算), (注), (注), (注), (注), (注), (注), (注), (注		10% ② ● 手动速度 气检关 送丝控制
M109 M快捷键			11	1					点动送丝
	ID	Time	Nim	Notes					
-	1	10-26 10:07:	53 45	Can no	t open syste	m plc instr	uction list	doc	
	02	10-26 10:07:	53 50	Can no	t open plc 1	adder diagr	am file		
	() 3	10-26 10:07:	53 44	System	initializat	ion complet	e		
伺服下电	1 4	10-26 10:08:	06 1	报警复	Ϋ́				
	105	10-26 10:08:	16 1	抬起试	运行键				
	Admin	ManuOff N	ModeErr Sp	peed10% T	ooll Use	r1 10-26	5 11:43:16	SYN1 SYN2	
						analog test	welder value test	return	

Parament Notes:

- 1 Max voltage of analogous output
- 2 Min voltage of analogous output
- 3 Min output current of welding machine
- 4 Max output current of welding machine
- 5 Test of analogous output of AO1 port
- 6 Test of output of welding machine
- 7 Return value of welding machine

Discription

```
To verify the welding current correspondent to output voltage, user can set system
to output 0V and 10V (program : AO#1=0 andAOUT AO#1=10 ), and observe the
correspondent current and input into above interface.Process as follows:
a)Program :
AOUT AO#1=0
TIME5000
AOUT AO#1=10
b) Execute, and observe the show value on welding current detector.
c)Input the current correspondent to 0V and 10V, and input correspondence of
curve.
```

2.1.3.4 Welding voltage match setup:

This process is used to set the welding voltage of welding machine when system export 0-10V analogous signal. Press "output voltage graph" to enter the setup interface.

File	operation		I set	Para tting	Monitoring	Run prepare	Connand	Technical	PL	2
10	Restart	distance	5.00	mm	Arc break	detect 🗹				5%
	Rest	art speed	10.00	mm/s	Power	failure 🗖				25 1 手动速度
粗奈正	start e	rror time	2.00	sec	Coolant s	hortage 🗖				
	Arc de	tect time	0.30	sec	Return	to path 🗖				
	c loss e	rror time	0.30	sec	Scrate	h start 🗹				_
	Scratch	distance	2.00	mm	Collide	detect 🗹				
	Scra	tch speed	20.00	mm/s		Reserve 🗖				气检关
	Gas pre	flow time	0.60	sec						\bigcirc
	Gas post	flow time	0.50	sec						101 174 44 mm
										医丝栓带
M160										
M169 ₩快捷键	-			111	6					点动送丝
	ID 1	Fime		Num	Notes					
6	1 1	10-26 10:07	:53	45	Can not	t open syste	em plc instr	ruction list	doc	
	1 2 1	10-26 10:07	:53	50	Can not	t open plc l	ladder diagr	am file		
	🛈 3 🛛 1	10-26 10:07	:53	44	System	initializat	tion complet	e		
何服卜甩	() 4 1	10-26 10:08	8:06	1	报警复位	Ż				
	① 5 1	10-26 10:08	8:16	1	抬起试过	运行键				
	Admin	Manu0ff	ModeE:	rr Spe	eed05% To	ooll 🚺 Use	r1 10-2	6 10:21:41	SYN1 SYN	2
	open/close				output current	voltage	input current	niput voltage	Exit	

Welding voltage setup interface

File	operation	E	ldit	Par setti	a ng	Monitoring	Run prej	pare Co	onnaad	Technical		PLC
補禁止	Ana 10.000 3.500 Welde	log: V V r(V)	10.600	Voltage	curve	30.200	↓ ,	模拟量 I模拟测试 流线。 I <u>提</u> 和电压; 线。 I <u>提</u> 和成功 对应机对 成一个。 一个。 不是,此 公厅回 下 State Weider c	测试门: 航 测试]: 航 (>, 对应]: 系统 面]: 新 面]: 前 []: 新 面]: 前 []: 新 面]: 前 []: 新 面]: 前 []: 新 面]: 前 []: 新 面]: 前 []: 前]: 前 []:]: 新 面]: []: 新 面]: []: 新 面]: []: 新 面]: []: 新 面]: []: 新 面]: 前 []: 新 面]: []: 新 面]: []: 新 面]: []: 新 面]: []: 新 []: 新 []: 新 []: 新 []: 新 []:]: []: 新 []: []: 新 []:]: []: 新 []:]: []: []: []: []: []: []: []: []: [、 模拟里0-10V, 出设定規拟里。 用 于现试电 違次 系統細式匹配相和 子型示焊和 出述の一個 の の の 2 2 1 3 1 2 1 1 1 2 1 3 1 1 1 1 1 1 1 1 1 1 1 1 1	按焊。电	5% 20 手动速度 气检关 送丝控制
M160 ● ● M169 M快捷键					111					1		点动送丝
	TD	Time			Mum	Notec						
何服下电	 1 2 3 4 5 	10-26 10-26 10-26 10-26 10-26 10-26	10:07:5 10:07:5 10:07:5 10:08:0 10:08:1	53 53 53 53 06 16	45 50 44 1 1	Can not Can not System 报警复位 抬起试道	t open sy t open pl initiali 这 运行键	ystem plo lo ladden ization o	c instru r diagra complete	action list am file e	doc	
	Admin	Manu	uOff <mark>M</mark>	odeErr	Spe	ed05% To	0011	User1 anal	10-26 .og test	10:31:40 welder value test	SYN1 retu	SYN2 m





2.2 Welding process setup

2.2.1 Set up basic welding parameters

This operation is to set the welding current and voltage.

File	operation	Edit	Para setting	Monitor	ing Run	prepara	Connand	Technical	PI	LC
	Program r	name		T:	ime chan	ge		1 Palletiz	ing 🕨	35%
2	111			2	016-9-7	10:48		1 14110412		25
轴禁止	🧰 call			2	016-9-5	22:47		<u>2</u> Paint	•	手动速度
	🖹 xx			2	016-10-2	<u>1</u> Tech	para 🔸	<u>1</u> Welding p	ara 🕨	
	🔋 视觉执	【取		2	016-9-5	<u>2</u> Weldi	ng device 🔸	<u>2</u> Swing arc	para 🕨	
								<u>3</u> Locating p	oara 🕨	气榆关
								<u>6</u> 折弯工艺		
										_ + 送丝控制
M160										
00 M169										
M快捷键			XX							
	ID T	ime	Num	Not	es					
-	(i) 1 1	0-21 20:30:5	2 172	Cod	ing has	not full	y read suce	cess		
	02 1	0-22 09:04:2	0 1	抬起	试运行键					
伺服下电	() 3 1	0-22 11:29:2	2 125	Fil	e save s	uccess				
	Admin	ManuOff Ma	deErr Sp	eed35%	Tool1	User	1 10-22	11:30:53	SYN1 SYN	V2
	Rebuilt	Rename	Back up		D	elete	Open U disk	Open	Copy to U	. .

As shown above, <Technical>-<Arc-welding>-<Tech para>-<Welding para>, and enter the welding parameters setting interface, as shown in below figure.

File	operation Edit Provident Set			Para setting	y Mon:	itoring	Run pr	epare	Comman	d	Technical	Ĺ	PLC	
1	File n	umber	0 <u>-</u>	1 Co	mment 🗌			2						5% 25
轴禁止	#eld curr	rent	0.000	A3 St	arting	(A)	0.000	11						手动速度
	#eld vol	tage	0.000	V(4)St	arting	()	0.000	12						
	Arc End	ing	0.000	A5 St	arting	(s)	0.000	13						
	Arc End	ing	0.000	V6	Reserv	e04	0.000	14						
	remove s	tick	0.000	A(7)	Reserv	e05	0.000	15						
	remove s	tick	0.000	V 8	Reserv	e06	0.000	16						气检关
	Arc End	ing	0.000	s9	Backir	ng out	avid 🗖	17						
	Proof s	tick	0.000	s10		Reser	ve07 🗖	18						+ 送丝控制
M160														
M169														
M快捷键					111									·····/////
	ID 1	Fime		N	ium 1	Notes								
e	1 1	10-26	10:07:53	4	5	Can not	open	system	m plc ins	struc	ction lis	t doc		
	<u>()</u> 2 1	10-26	10:07:53	5	i0 (Can not	open ;	plc la	adder dia	agram	file			
伺服下由	<u>()</u> 3 1	10-26	10:07:53	4	4	System	initia	lizati	ion compl	lete				
	1 4	10-26	10:08:06	1		报警复位	Ż							
	0 5 1	10-26	10:08:16	1		抬起试过	运行键							
	Admin	Manu	ı0ff <mark>Mo</mark>	deErr	Speed0	5% T<	ooll 🔪	Usei	1 10-	-26	10:52:50	5 SYN1	SYN2	
	open/close											Ex	it	

Every parameter is described as follows:

- 1 Choose the document number (range 0-7) in the [File number] above. Each number is correspondent with a set of welding parameters.
- 2 Add files comments

3、4 Weld voltage and welding current is the set value for normal welding. Specific value is determined by on-site process.

5、6Arc end voltage and arc end current is used when arc end is not adequate. Normally, values of arc end voltage and arc end current are smaller than welding ones.

7、8 Remove-stick voltage and remove-stick current is used when welding wire adhesion occurs. Normally, remove-stick current is 0, and remove-stick voltage is higher than welding voltage.

9Arc end time is defined for duration time when arc end voltage and arc end current is maintained. If arc end time is too long, resurfacing welding may happen at the welding end position. If arc end time is too short, welding crater may occur at the welding end position. So arc end time need setting according to real situation. 10Remove-stick time is defined for duration time when remove-stick voltage and remove-stick current is maintained.

11 12 Arc start voltage and arc start current is used when arc start is difficult. Higher voltage and current can be taken for more efficiently arc starting.

13 Arc start time is defined for duration time when arc start voltage and arc start current is maintained. If arc start time is too long, resurfacing welding may happen at the welding start position.

14 15 16 17 18 reserve

ARCEND ARCSTART move robot stop gas postflow time gas detect signal gas preflow time prevent stick time Yxx arc loss arc start error time arc starting signal error time arc ending time delay Yxx arc detect time arc detect signal arc starting time Xxx welding arc ending arc starting current prevent stick current current current welding currentwelding arc ending prevent stick voltage arc starting voltage current voltage welding voltage.

Time sequence chart of welding control is shown below:

Welding parameters should be saved as formation of document number after the parameter setup. Then these parameters can be used by invoking the correspondent document number. One program can invoke several set of welding parameters.

Example: How to use welding parameters in program`

ARCSTART#1 Invoke 1# parameters for welding

MOVL VL100=MM/S PL=0 Move along the welding track

ARCEND #1 End of 1# welding process

2.2.2 Setup welding weaves parameters

This operation is to set welding weave parameters if wide seam need welding.

As shown above, <user process>-<welding process>-<welding setting>-<parameters setting>, and enter the welding parameters setting interface, as shown in below figure.



As shown above, <Technical>-<Arc-welding>-<Teach para>-<swing arc para>, and enter the welding weave parameters setting interface, as shown in below figure.

File	oper	ation			Para setting	Monitoring	Run prepare	Connan	Technical	PLC	:
えていた。	F	file n Comu	number ment:	0 💽	1	Name <mark>程序0</mark>		2) 3)			5% 25 手动速度
		Weav Mod	e set- el	(Z字形 ・	4) Stop:0-	move 1-rest	0 9				
		Fre Ampl	q Litude	0.0	Hz 5	Radius 0.	D nn(1)				•
		R-dv L-dv	vell vell	0.0	sec7						
M160											送丝控制
● ● M169 M快捷键					11	.1					_ , 点动送丝
	ID		Time		Num	Notes					
=		L 2	10-26 10-26	10:07:53 10:07:53	45 50	Can no Can no	t open syste t open plc l	em plc ins ladder dia	struction lis agram file	t doc	
伺服下电		3 1	10-26 10-26	10:07:53 10:08:06	44 1	System 报警复(initializat 文 =∕=∕+	tion compl	.ete		
	A	dmin	10-26 Man	10:08:16 uOff Mod	eErr S	治起试 beed05% T	五行键 ool1 <mark>Use</mark>	r1 10-	-26 11:20:10	SYN1 SYN1	2
										Exit	

1 Choose the weave file number (range 0-9) in the [weave document number] above. Each number is correspondent with a set of welding parameters.

2 3 Some detailed information can be input into [Name] and [Comment] column, which is beneficial for operators to understand the welding weave.

In the [weave set] column, [mode selection], [weave frequency], [weave extent], [left stay time], [right stay time] can be input, and press quit after setup.

4 Model:Only zigzag weave function is available up to now. Other types of weave functions are under development.

5 Freq: used to set weave frequency, unit is Hz.

6 Amplitude: used to set one-side movement distance, unit is mm.

7 R-dwell: used to set duration time at the left weave apex, unit is s.

8 L-dwell: used to set duration time at the right weave apex, unit is s.

9 Set left-right stay: 0-no stay, 1-stay.

10 circular radius (not available up to now)



Weave schemeWeave coordination

Description: Weave parameters should be saved as formation of document number after the parameter setup. Then these parameters can be used by invoking the correspondent document number. One program can invoke several set of welding parameters.

Weave is based in the weave coordination. Ifonward direction is circle, x axis is orientated along the normal line of circle. e.g. : How to use welding parameters in program

ARCSTART#1 Invoke 1# parameters for welding

WEAVESINE #1 Invoke 1# parameters for weave MOVL VL100=MM/S PL=0 move along the welding track WEAVEEND End of weave ARCEND #1 End of 1# welding process

3 Example for welding program

After the above setting, welding program can be operated. Below is an example for

welding program steps taking the below welding workpiece as an example.



3.1 Program example

Basic program is as follows for the above workpiece :

MOVJ VJ=50.0% PL=5 move quickly to program point 1, wait

MOVJ VJ=50.0% PL=5 move quickly to program point 2, welding prepare

MOVL VL=200 MM/S PL=0 move quickly to program point 3, welding start

ARCSTART#1 Invoke 1#welding parameters, start arc

WEAVESINE #1 Invoke 1# welding weave parameters

MOVL VL=50MM/S PL=0 move along the welding track, move straight to program point 4

WEAVEEND weave end

ARCEND #1 1# welding process end

MOVJ VJ=50.0% PL=3 move quickly to program point 5, safe point

3.2 Program teach steps

Description :

- a. Wait point of program point 1# should at the position with no interaction with workpiece and holding clamp.
- b、When program point 5 is moving toward program point 1, it also shouldhas no interaction with workpiece and holding clamp.

c. During welding process (teach program point 3# to point 4#), surface constitute of welding wire and x direction should be perpendicular to welding formation surface (as shown in below). Otherwise, y direction of weave coordination is unparallel with welding formation surface, and weave will be high at one edge and low at the other edge.



d、Wire length in re-production should be same with the length in teach. Use the wirefeedingto give out welding wire. Please cut the welding wire of proper length (~10mm).

e. During teach, when welding wire bends after the touch with workpiece, give out welding wire for 50-100mm, cut the welding wire of proper length, and teach continues.

f、 After teach, please use for pilot run and check if track is correct.

3.2.1 New file

In teach mode. In main interface, press "New" button, establish the new program.

File	operation	a Edit	Para settir	a Mor	nitoring	Run prepara	Connand	Technical	PL	с
-	Program	name			Time	change		Size(B)		15%
凌	111				2016-	9-7 10:48		2500		25 -
轴禁止	📁 cal	1			2016-	9-5 22:47		folder		于如本反
	🖹 xx				2016-	10-21 20:29		59		
	🖹 视觉	的抓取			2016-	9-5 22:47		8676		
_										
										气检关
										送丝控制
M160										
₩快捷键	1			111						
	ID	Time		Num	Notes					F
6	1	10-22 16:45:	31	45	Can not	open system	n plc instru	uction list	doc	
	(i) 2	10-22 16:45:	31	50	Can not	open plo la	adder diagr	am file		
	() 3	10-22 16:45:	31	44	System	initializati	ion complet	в.		
间版下电	(i) 4	10-22 16:45:	40	1	报警复位	ž –				
	05	10-22 16:45:	43	1	抬起试过	行键				
	Admin	ManuOff M	lodeErr	Speed	15% Ta	ooll 🚺 User	1 10-22	16:46:26	SYN1 SYN	12
	New	Rename	Back v	up		Delete	Open U disk	Open	Copy to U.	

Input program name "ARCLINE" in the below interface.

File	operatio	n E	di t s	Para etting	Monitoring	Run prepara		Technical	PLC	
-	Program	n name			Time	change		Size(B)		15%
爱	111				2016-	-9-7 10:48		2500	(
轴禁止	🧰 1fi	.le			2016-	-9-5 22:47		folder	÷	-4加速度
	ARC	CLINE			2016-	-10-22 16:49		0		
	📁 cal	.1			2016-	-9-5 22:47		folder		
	🖹 xx			_	2016-	-10-21 20:29		59		
	New n	ame (ARCLI	NE	\mathbf{r}					气检关
				-						
									ž	长丝控制
M160										B
M快捷键				ARCLI	INE				,	和历史之
	ID	Time		Num	Notes					
6	1	10-22	16:50:01	112	Passwo	rd correct, n	now in fact	ory mode		
Ō	1 2	10-22	16:50:20	148	Cancel	operation				
伺服下电										
	Factor	y Manu	10ff Mode	Err Spe	eed15% T	ooll 🚺 User	1 10-2:	2 16:51:19	SYN1 SYN2	
								Confirm	Exit	

Click<OK> button, program new name has been selected, and appears in the resource management, as shown in below.

File	operation		Para setting	Moni	toring	Run prepara		Technical	PLC	
-	Program	name			Time	change		Size(B)		15%
凌	111				2016-	9-7 10:48		2500		25
轴禁止	🧧 1fil	e			2016-	9-5 22:47		folder		于初速度
	ARCL	.INE			2016-	10-22 16:49		0		
	🧰 call				2016-	9-5 22:47		folder		
10	🖹 xx				2016-	10-21 20:29		59		~
	📔 视觉	抓取			2016-	9-5 22:47		8676		气检关
										送丝控制
M160										-
M169										
M快捷键			ARCL	INE						
	ID	Time	Num	1	lotes			5415		
_	<u>()</u> 1	10-22 16:50:0	1 112	I	Passwor	d correct, 1	now in facto	ory mode		
	<u>U</u> 2	10-22 16:50:2	.0 148	(ancel	operation				
PER NUMBER										
	Factory	ManuOff M	odeErr Sp	eed1	5% To	ooli 🚺 User	10-22	16:53:12	SYN1 SYN2	2
	New	Rename	Back up	yptio	n/Decryj	. Delete	Open U disk	Open	Copy to U	

In above interface, press "Open" button, enter the program edit interface, as shown in below.

File	operation	Edit	Para setting	Monitoring	Run prepara	Command	Technical	PLC	
える							\square		15% ② 〔 〕 F动速度
							$\sum_{i=1}^{n}$		٠
								7	
M160 M169	E		<u> </u>	$\overline{}$		10.00			
™厌捷键	TD	T •	. \ARG	CLINE			ines0	Curl	
一日 何服下电	1D 10 10 10 10 10 10 10 10 10 10	Fime 10-22 16:50:0 10-22 16:50:2 10-22 16:56:0 10-22 16:56:0	Num)1 112 20 148 59 100 59 100	Notes Passwor Cancel 000 Open fi 000 Open fi	rd correct, r operation ile at the mo ile success	now in fact oment, plea	ory mode se wait		
	Factory Change ins	ManuOff M	odeErr Sp Logic	peed15% To Edit	Last inst	1 10-22 Save	2 16:57:05 Close	SYN1 SYN2	

Interface for program edit

3.2.2 Program point 1

Adjust the manual operation speed, in robot coordination system, press the safe button, move the robot to program point 1. Press "Movement" button, choose MOVJ mode, and input correspondent speed.



In above interface, click "instruction correct" button to record the point (effective status of safe switch), as shown in below.

File	operation	n Edit	Par setti	a Mo ng Mo	onitoring	Run prepara	Command	Technical	PLC	
えていた。	1 M	OVJ VJ=10.	0% PL=	5				\sum		「15% ② 手动速度
M160									> 7 7	
M169							1000			+ 点动送丝
M快捷键			••	ARCLIN	E			ines1	Cur 1	
	ID	Time		Num	Notes			100		
(回服下电	U 1	10-22 17:05	:36	1	抬起 试;	百行键				
	Factor	y ManuOff	ModeErr	Speed	15% T	ooll Use:	r1 10-22	2 17:05:38	SYN1 SYN2	
	Change in	st Movement	Log:	.c	Edit	Last inst	Save	Close		

3.2.3 Program point 2

Adjust the manual operation speed, in robot coordination system, press the safe button, move the robot to program point 2. Press "move" button, choose MOVJ mode, and input correspondent speed.

File	operation	ı		se	Para etting	Monitoring	Run prepara	Command	Technical	PLC	
えていた。	1 M	OVJ	VJ=10. (0% P	'L=5						15% ② 了 手动速度
	MOVJ	•		1	/J 50	PL 5		-			
M160 M169									16		
M快捷键					\ARCL	INE			Lines1	Cur2	4
	ID	Time	3		Num	Notes					
(回服下电	₩1 Factor	10-2	22 17:05:	36 Iode ^F	1 Inn Sne	行起试道 ed15%		1 10-2	7 17.08.07	SAN 1 SAN 3	
	T	, Ma	W COLL	ioder		curow r	USEI USEI	10 2	2 11.00.01	Inst	
	Inst exi	t 🔪	Movement	1	Logic				(correct	

In above interface, click "instruction correct" button to record the point (effective status of safe switch), as shown in below.

File	operation	Edit	Para setting	Monitoring	Run prepara	Command	Technical	PLC	
える	1 MOV 1 MOV	J VJ=10.0% J VJ=10.0%	PL=5 PL=5				\sum	2	20% ② 5 手动速度
M160								∑ 7 7	
M169 M性均素键				ITNE		T	:	C2	点动送丝
IN DCINE NEE	TD T	Ima	. (ARC.	Notes			mesz	Curo	
e	10 1 10 10 1 10 10 2 10)-22 17:05:36)-22 17:09:09	1 241	hotes 抬起试道 Paste s	运行键 success				
何服下电	10 3 10 10 4 10	0-22 17:09:22 0-22 17:09:34	163 1	Please 抬起试道	remove alarm 运行键	L.			
	Factory	ManuOff Mod	leErr Sp	eed20% To	ooll 🔪 User	1 10-22	17:09:56	SYN1 SYN2	
	Change inst	Movement	Logic	Edit	Last inst	Save	Close		

3.2.4 Program point 3

Adjust the manual operation speed, in robot rectangular coordination system 直角坐标, press the safe button, move the robot to program point 3. Press "move" button, choose MOVJ mode, and input correspondent speed.

File	operation	Edit	Para setting	Monitoring	Run prepara	. Com	mand	Technica	1	PLC
》 十二 按键移动	1 MOVJ 1 MOVJ	VJ=10.0% VJ=10.0%	PL=5 PL=5							「30% (き うう 手动速度
ジ	MOVL		VL 100	. PL 5		·				
M160 M169										
M快捷键			\ARCL	INE			L	ines2	Cur3	
	ID Time	e	Num	Notes						
	① 5 10-3 ① 6 10-3	22 17:10:32 22 17:11:04	53 1	Please 抬起试过	loosen the 行键	safty	switc	after bac	k to	
「日眠下申」	7 10-2	22 17:11:05	53	Please	loosen the	safty	switc	after bac	k to	
	₩8 10-3	22 17:11:09	1 52	沿起试迟 Please	们键	cofter	awi ta	after has	le to	
	Factory M Inst exit	anuOff Mod Movement	leErr Spe Logic	ed30% To	oll Use	r1	10-22	17:11:4	9 SVN1 S Inst corre	YN2

In above interface, click "instruction correct" button to record the point (effective status of safe switch), as shown in below.



Notice: That is welding starting point. Welding wire should be perpendicular to welding formation surface.

3.2.5 arc start; weave

After the determination of welding starting point, arc start and weave instruction should be input. As shown in below, click "arc start" in the "Command" - "Welding" .

File	operation	Edit	Para setting	Monitoring	Run prepara	Comm	and Techni	cal	PLC	
を しんしょう しんしょ しんしょ	1 MOV 2 MOV 3 MOVI	J VJ=10.0 J VJ=10.0 L VL=100.	% PL=0 % PL=0 DMM/S PL=5	5		<u>1</u> Mov <u>2</u> Log: <u>3</u> Ari 4 Pal	ement ic thmatic letizing)))	-	「5% ② 「 」 手动速度
				1 ARC STA	RT 起弧	<u>5</u> Wel	ding	•	7	
				2 ARC END <u>3</u> WEAVE	火弧 摆弧开始	<u>6</u> Ass: <u>7</u> Vis	istant command ual		7	 送丝控制
M160 M169) 40 01	4 WEAVE E	ND 摆弧结束 点焊	<u>8</u> Fol: <u>9</u> Corr	low	•		小小 点动送丝
11.戊提键	ID Ti	me	(ARCL.	6 STITCHS	TART 鱼鳞纹鸠	<u>1</u> 0 Spe	cial instruct	•	/ur 4	
(日) 何服下电	0 5 10 10 6 10 10 7 10 10 8 10 10 9 10	-24 15:24:1 -24 15:24:1 -24 15:24:4 -24 15:24:4 -24 15:24:3	2 10000 2 10000 7 10000 7 10000 8 1	7 STITCHE Open fi 的起试送	ND 鱼鳞纹焊接 ie at the m le success 行键	<u>1</u> 1 折弯 oment,	踏合 piease wait	,	Ţ	G
	Admin : Change inst	ManuOff . Movement	feach Spe Logic	ed05% To Edit	bold User Last inst	20 1 Sav	.0-24 15:28 re Clos	:48 ST	/N1 SYN2	



In the above figure, input welding document number into arc start instructions. Then click "instruction correct" button to finish the arc start instruction, as shown in below.

File	operatior	1	Edit	Para setting	Monitoring	Run prepara	Command	Technical	PLC	
えていた。	1 M 2 M 3 M 4 A	OVJ OVJ OVL RCST	VJ=10.0% VJ=10.0% VL=100.0 CART#(1)	PL=O PL=O MM/S PL=	=5			Ζ	Ζ	10% 25 5 手动速度
								$\sum_{i=1}^{i}$		
								\sim	7	
M160 M169									_	
M快捷键				\ARC	LINE		L	ines4	Cur5	
	ID	Time		Num	Notes					
	06 07	10-2 10-2	4 15:24:12 4 15:24:47	1000 1000	00 Open f 00 Open f	ile success ile at the mo	oment, plea:	se wait		
伺服下电	08	10-2	4 15:24:47	1000	0 Open f	ile success				
1 SAMA TO C	09	10-2	4 15:28:38	1	沿起试 D	运行键				
	010	10-2	4 15:35:00	164	Progra	m line operat	e success		·	
	Admin	Ma	anuOff Te	each Sp	eed10% 1	'ool0 User	0 10-24	15:35:14	SYN1 SYN2	
	Change in	st 1	Movement	Logic	Edit	Last inst	Save	Close		

After the input of arc start instructions, as shown in below, choose <Command>- <Welding>-<Weave>.

File	operation	Edit s	Para etting	Mon	nitoring	Run p	repara		Command	Technical		PLC	_
5	1 MOV 2 MOV	/J VJ=10.0% H /J VJ=10.0% H	PL=0 PL=0					1	Movement	ļ	-		15%
轴禁止	3 MOV	/L VL=100.OMM Start#(1)	M∕S PL=8	5				2	Logic				手动速度
	1							3	Arithmati	.c I			
								4	Palletizi	ng I			
				1	ARC STAF	RT	起弧	<u>5</u>	Welding	10	7		
				2	ARC END		灭弧	<u>6</u>	Assistant	command)	ſ		气检关
				<u>3</u>	WEAVE	摆弧	开始	7	Visual	į	7		
W160	and the second se			4	WEAVE EN	ⅅ 摆弧	结束	8	Follow	,	ľ		
M169				5	SPOT	6	点焊	2	Correspor	idence P			
M'厌捷键	ID T	ine	\ARCL	<u>6</u>	STITCHST	TART 🗐	鱼鳞纹鸠	<u>1</u> 0	Special i	nstruct 0	Cur	5	
	1 1	0-24 15:36:01	1	7	STITCHEN	₪ 鱼鱼	粦纹焊接	<u>1</u> 1	折弯指令	ı	•		
伺服下电				_							-1		_
		N055 77		- 21	EW T .	-10	11	0	10-94	15.27.01	CUM	CYNO	
	Change inst	Movement	Logic	eal	Edit	Last	inst	.0	Save	Close	SINI	SIN2	

File	operation	ı Edit	Para setting	Monitoring	Run prepara	Command	Technical	PLC
糖	1 M 2 M 3 M 4 A	OVJ VJ=10.0 OVJ VJ=10.0 OVL VL=100. RCSTART#(1))% PL=O)% PL=O OMM/S PL:	=5				20% ② 手动速度
(ARCE	END 1)					
M160 M169								
M快捷键			\ARC	LINE		L	ines4	Cur5
	ID	Time	Num	Notes		1.1		
(日本) (月服下电	1	10-24 15:36:0	01 1	抬起试道	至行键			
	Admin Inst exi	ManuOff t Movement	Teach Sp Logic	eed20% To	ool0 User	0 10-24	15:40:20	SYN1 SYN2 Inst correct

In above interface, input parameters document number. Then click "instruction correct" button to finish the weave instruction input, as shown in below.

File	le operation Edit			Para setting	Monitor	ing Run p	repara	Command	Technical	PLO	;
援	1 N 2 N 3 N 4 A 5 A	MOVJ MOVJ MOVL ARCST ARCEN	VJ=10.09 VJ=10.09 VL=100.02 CART#(1) ND#(1)	% PL=0 % PL=0 OMM/S PI	J=5				\sum	Ζ	20% 2 5 手动速度
									\sim	2 7	
M160 M169								1			
11 伏 / 建键		022020		\AR	CLINE				inesb	Curb	
(日本) (回服下电	1D 1 2	Time 10-2 10-2	: 24 15:36:0 24 15:40:5	1 1 7 164	n <u>Not</u> 抬起 4 Pro	es 试运行键 gram line	operat	e success			0
	Admin Change i	n Ma nst	anuOff N Movement	f <mark>each S</mark> Logic	peed20% Edit	Tool0 Last	User inst	0 10-24 Save	15:41:01 Close	SYN1 SYN	2

3.2.6 Program point 4

Adjust the manual operation speed, in robot rectangle $\frac{1}{2}$ coordination system, press the safe button, move the robot to program point 4.

Press "Movement" button at the below interface, choose MOVL function, and input correspondent movement speed.



In above interface, click "instruction correct" button to finish the weave instruction input (effective status of safe switch), as shown in below.



Notice: This is welding end point. In order to finish the weave function, welding wire should be perpendicular to welding formation surface.

3.2.7 Arc end, weave end

After the finish of welding, click OK, and then input weave stop and arc end instruction (weave end first, then arc end).

In below figure, choose "WEAVE END" in the <Command>-<Welding>.

File	operation	Para setting	Monitor	ing F	dun prepara	ara Command Technical		PLC			
	1 MOVJ 2 MOVJ 3 MOVI	VJ=10.0% VJ=10.0% VI=100.0	PL=0 PL=0 MM/S PI=5				1	Movement	•	-	20%
按键移动	4 ARCS 5 ARCE	TART#(1)					<u>2</u> 3	Logic Arithmati	ic •		于幼稚
	6 MOVL	, VL=100.0	MM/S PL=C)			4	Palletizz	ing 🔸		
				<u>1</u> ARC	START	起弧	<u>5</u>	Welding		7	
\$				<u>2</u> ARC	END	灭弧	6	Assistan	t command 🕨		
关节坐标				<u>3</u> WEA'	νΈ	摆弧开始	7	Visual	•	7	
M160				<u>4</u> WEA'	VE END	摆弧结束	8	Follow	•		
● ● M169 M中排动律) ARCI :	<u>5</u> SPO	Г	点焊	<u>9</u>	Correspon	ndence 🕨	Cum7	+ 点动送丝
DC DE ME	ID Tin	ıe	Num	<u>6</u> STI	ICHSTA	RT 鱼鳞纹燃	<u>1</u> 0	Special i	instruct 🕨		
	() 4 10- () 5 10-	-24 15:46:35 -24 15:46:35	1 164	<u>7</u> STI	ICHEND	鱼鳞纹焊持	<u>1</u> 1	折弯指令	•		
伺服上电	 ○ 6 10- ○ 7 10- ○ 8 10- 	-24 15:46:37 -24 15:46:37 -24 15:46:37	90 237 439	Pile Modi Coor	fy co dinat	ordinate file sa	ve	ok, when	off power i	.t w 👻	
	Admin	lanu0ff Te	each Spe	ed20%	Too	10 User	r0	10-24	15:48:29	SYN1 SYN2	
	Change inst	Movement	Logic	Edit		Last inst		Save	Close		



In above figure, press "instruction correct", and finish the input of weave end, as shown in below.

File	operation	Edit	Para setting	Monitoring	Run prepara	Command	Technical	PLC	
11-1 按键移动	1 MO 2 MO 3 MO 4 AR 5 AR	VJ VJ=10.0 VJ VJ=10.0 VL VL=100. CSTART#(1) CEND#(1)	% PL=0 % PL=0 OMM/S PL	=5			\sum_{α}	2! 2 至动	5% 一) 速度
シャー	6 MO 8 WE	VL VL=100. Aveend	OMM/S PL	=0				Z #	
M160 M169	8			11 TATE					控制
… 仄 推進		22.5	\ARU	LINE			ines(Curs	
(日本) (月服上电	ID T 0 1 1 0 2 1 0 3 1	ime 0-24 15:50:3 0-24 15:50:8 0-24 15:52:0	Num 33 134 35 1 97 164	Notes File du 抬起试试 Program	elete success 运行键 m line operat	e success			0
	Admin Change inst	ManuOff Movement	Teach Sp Logic	eed25% T Edit	ool0 User Last inst	0 10-24 Save	15:52:13 Close	SYN1 <mark>SYN2</mark>	

After the input of weave stop, input arc end instruction. Choose "Arc end " in <Command>-<Welding>.

File	operation	Edit	Para setting	Monitoring	Run prepara		ara Command Technical		PLC	
11-1 按键移动	1 MOVJ 2 MOVJ 3 MOVI	「 VJ=10.0% 「 VJ=10.0% 」 VL=100.0	PL=0 PL=0 MM/S PL=5	5		1 2	Movement Logic	•		25% ② 手动速度
	5 ARCE 6 MOVI	IND#(1) VL=100.0	MM/S PL=()		<u>3</u>	Arithmati	ic 🕨		
	8 WEAV	EEND		<u>1</u> ARC ST	ART 起弧	<u>4</u> 5	Welding	.ng •	2 7	
シャンシャンシャンシャンシャンシャンシャンションションションションションションションションションションションションション				<u>2</u> ARC EN <u>3</u> WEAVE	D 灭弧	<u>6</u> 7	Assistan Visual	: command >		
M160				4 WEAVE	END 摆弧结束	8	Follow	•		法经控制
M169 ₩快捷键	ID Tin	ne	\ARCL	5 SPOT 6 STITCH	点焊 START 鱼鳞纹炉	<u>9</u> 10	Correspor Special i	ndence •	Cur 8	点动送丝
(日本) (月服上电	1 10- 2 10- 3 10- 1 3 10-	-24 15:50:33 -24 15:50:55 -24 15:52:07	134 1 164	7 STITCH	END 鱼鳞纹焊括 m line opera	11 te	折弯指令 success	Þ		
	Admin I Change inst	ManuOff Te Movement	ach Spe Logic	ed25% T Edit	ool0 User Last inst	r0	10-24 Save	15:54:07 Close	SYN1 SYN2	

File	operation	Edit se	Para etting	Monitoring	Run prepara	Command	Technical	PLC	
按键移动	1 MC 2 MC 3 MC 4 AF 5 AF 6 MC 8 WE	VJ VJ=10.0% P VJ VJ=10.0% P VL VL=100.0MM CCSTART#(1) CCEND#(1) VL VL=100.0MM CAVEEND	L=0 L=0 /S PL=5 /S PL=(5					30% ② 手动速度
ジ ^{关节坐标}	ARCE	ND 1							
M160 M169									<u>小</u> 点动送丝
M快捷键			\ARCL	INE		L	ines7	Cur 8	
	ID	Time	Num	Notes					
	03 04 05 06	10-24 15:52:07 10-24 15:54:07 10-24 15:55:11 10-24 15:55:25 10-24 15:55:29	164 1 164 173 134	Program 抬起试运 Program Start t File de	line operat 行键 line operat rail move	e success e success			
	Admin	ManuOff Tead	h Spe	ed30% To	ol0 User	0 10-24	15:56:31	SWN1 SYN2	
	Inst exit	: Movement I	Logic				(Inst correct)

In above figure, after input the welding document number in arc end instructions, click "instruction correct", shown below.

File	operation	. Edit	Para setting	Monitoring	Run prepara	Command	Technical	PLC	
上 一 技健移动	1 M 2 M 3 M 4 A	DVJ VJ=10.0 DVJ VJ=10.0 DVL VL=100. RCSTART#(1) RCEND#(1))% PL=0)% PL=0 OMM/S PL=	=5			\sum		「30% ② 「 手动速度
	6 M 8 W 10 A	OVL VL=100. EAVEEND RCEND#(1)	OMM/S PL=	=0					
ジ ^{关节坐标}							\sim	7	
M160 M169								_	
₩快捷键			\ARCI	LINE		L	ines8	Cur 9]
	ID	Time	Num	Notes					
6	105	10-24 15:55:	11 164	Program	a line operat	te success			
	06	10-24 15:55:	25 173	Start 1	trail move				
伺服上中	07	10-24 15:55:	29 134	File de	elete success	5			
PUBRICH	08	10-24 15:56:	31 1	抬起试过	运行键				
	09	10-24 15:57:	05 164	Program	a line operat	te success		-	0
	Admin	Manu0ff	Teach Sp	eed30% To	ool0 User	0 10-24	15:57:13	SYN1 SYN2	
	Change in	st Movement	Logic	Edit	Last inst	Save	Close		

Finish the arc end instruction.

3.2.8 Program point 5

Adjust the manual operation speed, in robot coordination system, press the safe button, move the robot to program point 1. Press "Movement" button, choose MOVJ mode, and input correspondent speed.



In above interface, click "instruction correct" button to finish the point record (effective status of safe switch is needed), as shown in below.

File	operation	Edit	Para setting	Monitoring	Run prepara	Command	Technical	PLC	
11-1 按键移动	1 MC 2 MC 3 MC 4 AF)VJ VJ=10.0%)VJ VJ=10.0%)VL VL=100.01 RCSTART#(1) RCEND#(1)	PL=0 PL=0 MM/S PL=	:5			\sum	Ξ	「30% ② 「 手动速度
	6 MC 8 WH 10 AH 11 MC	OLLAD#(1) OVL VL=100.01 RCEND#(1) OVJ VJ=10.0%	MM/S PL= PL=0	:0					•
。 关节坐标							\sim	7	
M160 M169							\rightarrow	_	
₩快捷键			\ARCI	LINE		L	ines9	Cur10	
	ID	Time	Num	Notes					
6	1	10-24 16:00:57	164	Program	line operat	e success			
	02	10-24 16:00:58	90	File sa	ive success				
伺服上由	<u>()</u> 3	10-24 16:00:58	237	Modify	coordinate				
PURCE	(1) 4	10-24 16:00:58	439	Coordin	nate file sav	e ok, when	off power i	.t w	
	Admin	ManuOff Te	ach Sp	eed30% To	ool0 User	0 10-24	16:01:05	SYN1 SYN2	
	Change in:	st Movement	Logic	Edit	Last inst	Save	Close		

Finish of program edit, click "save" to save program in the above interface.

3.3 Program test-run verification

After the program edition, test-run can be launched in teach mode to test if program

track is correct. Operation methods are as follows:

Open the program in teach mode.

Move the cursor to the correspondent program line.

Press security switch and press webutton at the same time. Then program will be

executed in low speed of test-run.

Discription
 After the execution of current program line, cursor will move to next line automatically.
2、 Arc start, arc end, weave, weave end can be tested in test-run.
3、 Weave movement will not be executed.

3.4 Program reoccurrence

3.4.1 Empty run without arc

After the verification of movement track, it's needed to automatically execute the program without arc to verify the actual welding speed and weave situation.



Open the program in teach mode, move the cursor to the first line.

Switch to reoccurrence mode.

Set the operation speed and operation mode. Switch the arc starting mode into



Press to start the program.

Description

1、Press **III** for stop in the half way.

2. After the intermediate stop, if program need executing from the beginning, user should reset the program (as shown in below figure). Otherwise, welding program will be executed from the stop position.

File	operation	Edit	Para etting	Monitoring	Run prepara	Command	Technical	PLC	
	1 MOV 2 MOV	1 Copy	L=0 L=0						5%
▲ 土三 按键移动	3 MOV 4 ARC	<u>2</u> Paste	/S PL=	5				\geq	手动速度
	5 ARC	<u>3</u> Shear 🔸	/S PI-	'n					
	8 WEA	4 Delete	1010-	.0				\sum	
1	10 ARC 11 MOV	5 Search	L=0				<u> </u>	7	
2		<u>6</u> Replace							
工具坐标		<u>7</u> Go to					<u> </u>	7	
M160		<u>8</u> Adjust L-num					\rightarrow		
M169		<u>9</u> Program reset							+
M快捷键			. \ARCI	LINE		L	ines9	Cur 1	
	ID T:	ime	Num	Notes					
	1 1	0-24 18:42:12	1000	0 Open fi	ile success				
	Factory	ManuOff Tea	ch Spe	eed05% T	ool0 User	0 10-24	18:42:21	SYN1 SYN2	
	Change inst	Movement	Logic	Edit	Last inst	Save	Close		

3.4.2 Arc start and operation

After the verification of actual speed and weave situation on-track, actual welding process can be operated.



Switch to program re-occurrence mode.

Set the operation speed and operation method.

Switch the arc starting mode into



	Description												
	1、Press for stop in the half way.												
	2、After the intermediate stop, if program need executing from the beginning, user												
	should	reset the p	orogram (as shown	in below	figure). C)therwise,	welding p	rogram will be				
	executed from the stop position.												
File	operation	Edit	Para setting	Monitoring	Run prepara	Command	Technical	PLC					
F	1 MOV 2 MOV	1 Copy	L=0 L=0					- 5	5%				
✓土二 按键移动	3 MOV	<u>2</u> Paste	/S PL=	=5				上 手动	〕速度				
	5 AR	<u>3</u> Shear	·	-0									
	8 WEA	4 Delete	VO FL-	-0									
	10 ARG 11 MOV	<u>5</u> Search	L=0				<u> </u>	7					
2		<u>6</u> Replace	_				\sim		2				
工具坐标		<u>7</u> Go to					<u> </u>	7 送线	▶ 」 ↓ 注控制				
M160		<u>8</u> Adjust L-r	תנוג				\rightarrow						
M169 M快捷鍵		<u>9</u> Program re	eset			T T	incel						
DCIVE ME	ID T	ine	Num	Notes][L	Ines9	Curi	<u>19 - 19</u>				
	1 1	0-24 18:42:1	12 1000	00 Open f	ile success								
	Factory	Manu0ff	Teach Sp	eed05% T	ool0 User	0 10-24	18:42:21	SYN1 SYN2					
3	Change inst	Movement	Logic	Edit	Last inst	Save	Close						

3.5 Welding performance adjustment

Welding parameters can be adjusted according to the actual welding.

3.5.1 Welding current and voltage

Welding current and voltage can be adjusted in the correspondent parameters

File	operatio	on	idii t	Para setting	Monitori	ng Run pre	epara Con	mand	Technical	PLC	:
F	File	number	1 💌	Сол	ment						5% 25
轴禁止		₩eld	0.000	A St	arting (A)	0.000					手动速度
		₩eld	0.000	∛ St	arting (V)	0.000					
	E	nding	0.000	A St	arting (S)	0.000					
	E	nding	0.000	V	Reserve04	0.000					
	Proof	stick	0.000	A	Reserve05	0.000					~
	Proof	stick	0.000	V	Reserve06	0.000					气检关
	En	dging	0.000	s	Backing ou	ut avid 🗖					
	Proof	stick	0.000	s	Res	erve07 🗖					 送丝控制
W160											
M169											
₩快捷键					111						
	ID	Time		N	um Note:	s					
(1	10-24	18:13:38	4	5 Can i	not open s	ystem plc	instru	action list	doc	
	2	10-24	18:13:38	5	O Can i	not open p	lc ladder	diagra	m file		-
	3 🛈	10-24	18:13:38	4	4 Syste	em initial	ization co	omplete	F		
回版下电	4	10-24	18:13:50	1	报警2	复位					
	0 5	10-24	18:14:39	1	抬起	式运行键					
	Admin	n 🔪 Man	uOff Mod	leErr	Speed05%	Tool1	User1	10-24	18:14:48	SYN1 SYN2	2
	open/cl	ose								Exit	

document, as shown in below.

3.5.2 Weave frequency and weave amplitude adjustment

Weave frequency and weave extend can be adjusted in the correspondent

parameters document number, as shown in below.

File operation			Edit F		Para setting	Para Monitoring		Run prepare		e Com	Command Technical		1	PLC	
えていた。	F	ile n Comm	umber ent:	0 <u>-</u>]	Name	程序0								10% ② ○ 手动速度
		Weave	set-												
		Mode	1	Z字形	- Stop:	0-move	1-rest	0							
		Freq		0.0	Hz	Radiu	s 0.0)	mm						
		Ampli	itude	0.0	mm										气检关
		R=dwe	ell	0.0	sec										
		L-dwe	e11	0.0	sec										
M160															<u>, 181</u>
M169 M快捷键						111									点动送丝
	ID	T	ime		N	ันก	Notes								
-	1	. 1	.0-26	10:07:53	4	5	Can not	t open	syste	em plc	instru	action lis	st doc.		
	1 2	2 1	.0-26	10:07:53	5	io	Can not	t open	plc 1	ladder	diagra	am file			
	3 10-3		0-26	10:07:53	4	4	System initialization complete								
何服下电	1	L 1	.0-26	10:08:06	1		报警复位	文							
	105	5 1	.0-26	10:08:16	1		抬起试试	运行键							
	A	dmin	Manı	uOff Mod	deErr	Speed1	0% T	0011	Use	er 1	10-26	11:40:0	5 SYN:	SYN2	
													E:	kit	

3.5.3 Welding speed

Welding speed can be adjusted by modify the program. In program interface,

move the cursor to correspondent program line, click "change instruction", then

below interface will appear.

File	operation	Edit	Para setting	Monitoring	Run prepara	Command	Technical	PLC	
上 二 按键移动	1 MO 2 MO 3 MO 4 AR 5 AR 6 MO 8 WE	VJ VJ=10.09 VJ VJ=10.09 VL VL=100.0 CSTART#(1) CEND#(1) VL VL=100.0 AVEEND	5 PL=0 5 PL=0 DMM/S PL= DMM/S PL=	:5				3	5% ② 了 F动速度
「具坐标	10 AR MOVI	CEND#(1)	VL 10(). PL ()	P	•			
M160 M169								-	
M快捷键	\ARCLINE Lines9 (
	ID 1	lime	Num	Notes			100		
自服上电	3 1	.0-24 18:42:21 .0-24 18:42:22	. 389 ? 1	Stop tr 抬起试道	ial move 运行键				Ľ
	05 1	.0-24 18:42:22	389	Stop tr	ial move				
	06 1	.0-24 18:42:21	389	Start t	rail move				
	07 1	.0-24 18:50:20) 1	沿起试迟	至行键				
	Factory	ManuOff T	each Sp	eed05% To	ool0 User	r0 10-24	18:52:39	SYN1 SYN2	
	Inst exit	Movement	Logic				(Inst correct	

Input the correspondent speed in above interface.

Click "instruction correct" to finish the speed adjustment.

Discription

During the program modification, security button should not be pressed, otherwise, program coordination will change.

After the adjustment, press we to start program and verify the operation performance.

Thank you very much to choose our product!

Please keep all related manuals safely for check if necessary! If equipment is passed to third party,

please give the related documents along with the equipment!

Buttons, functions or options not mentioned in related manuals should be regarded as invalid, please don't use!

Modification log:

2014-9-26 modify the PLC scheme and description

2015-2-11 add AOTAI connection description and wiring diagram