KIOXIA LIGHT RING EQUIPMENT GROUP CO.,LTD.
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KXY-820 6-axis Air Core Vertical Winding Machine



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Machine Function Introduction

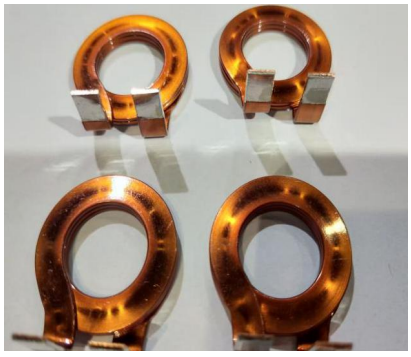
1. operational principle ：

The machine employs computer numerical control (CNC) programming to define the required movements along six axes (X, Y, Z, A, B, and C) during product forming. These movements are executed by high-precision servo motors through data output. By integrating auxiliary equipment such as peeling machines, soldering ovens, and flux dispensers, the system enables one-step processes for product peeling, soldering, and foot bending. This configuration meets customers' demands for automated production, enhanced efficiency, and quality assurance.

2. Key technical parameters:

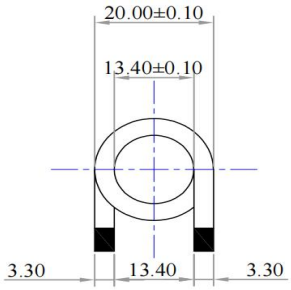
winding diameter	0.2 ~ 2.0 mm (copper wire), ≤ flat wire 5 square, width and thickness 5/1
going	5 kW / single-phase 220V
working air pressure	0.4 ~ 0.8mpa/cm
Maximum cable length	42mm
Maximum winding turns	999T
shape of product	A〔Tap〕, E2〔Tap〕, D〔Tap〕, K〔Tap〕, single-layer, multi-layer torsion spring/coil
production efficiency	0~55pcs/min
External dimensions [length*width*height]	Approximately 1250*850*1650 mm

3. Available styles:

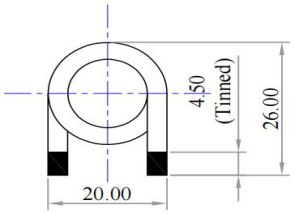




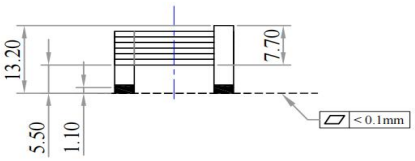
Provide customer drawing styles



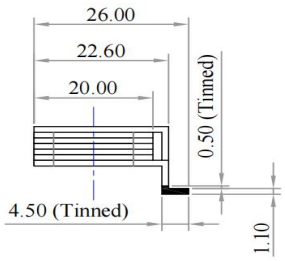
TOP VIEW



REAR VIEW



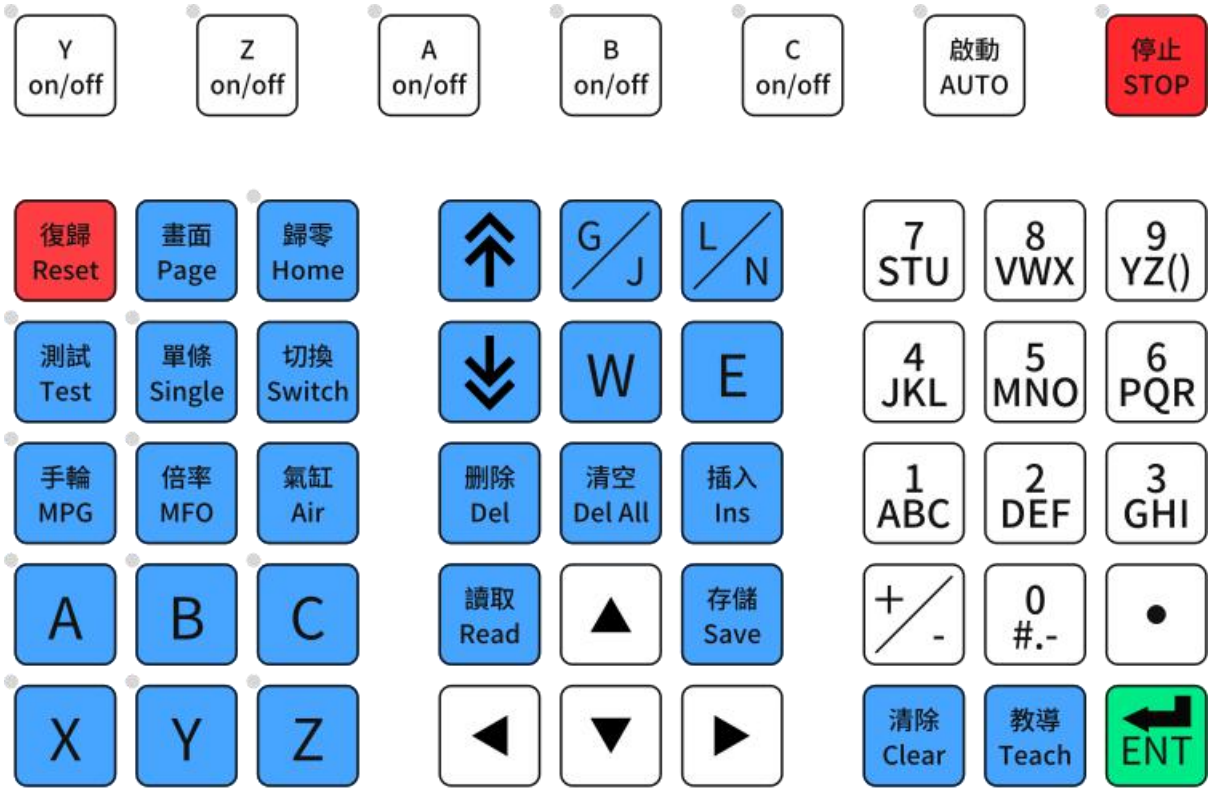
FRONT VIEW



SIDE VIEW

1. Operation panel description

1.1 Keyboard and Key Description





Axis switch key

When the axis is closed, the corresponding handwheel shaft cannot be selected. The LED light on this key illuminates to indicate the axis is in the closed state.



Program startup, test button

Program startup buttons allow direct switching between them.

Start": The machine is in continuous processing mode.

Test mode: The machine is in test mode, where the test knob and handwheel can be used.

Note: The LED light in the upper left corner of the button indicates the program is running in this mode.



Program stop button

When in the "Start" state, press this button to stop the machine after it completes the current spring production.

In other states, pressing this button will stop the machine.



Press this key to return to the Programming page in any case.



On the [Programming] page, scrolling displays programs; on the [File] page, scrolling displays files.



Press this key on the [Programming] page to move the cursor to the top of the screen, where you can set speed, probe, and output.



The Y/Z/A/B/C axes reset to zero at the preset speed. If zeroing is not completed within 25 seconds after initiation, a "Zeroing Timeout" fault is indicated. This button can be used in the "Stop State", "Test State", or "Handwheel State".



Clear previously generated alarm display information.



Cylinder switch

When the handwheel is in the stopped position, pressing this button activates/deactivates the cylinder test function. In the cylinder test activation state, pressing the numeric keys 1－8 enables/disactivates the corresponding cylinder. Holding the numeric keys continuously causes the corresponding cylinder to perform on/off cycles at a frequency of 2Hz.

The LED light on this key illuminates to indicate that the cylinder test is in the open state.



手轮相关按钮，对于扭簧机，“A 轴”无效。

For torsion spring machines, the handwheel-related buttons are invalid for the 'A-axis'.

Handwheel button: Used to activate or deactivate the handwheel function. The corresponding LED light illuminates to indicate the handwheel is in the open position.



A/B/C/X/Y/Z buttons: When the handwheel is open, select the corresponding axis with only one axis active. When the axis is closed, the selected axis cannot be chosen. The corresponding LED light illuminates to indicate the axis is selected.

“倍率”按钮：手轮模式处于高速或低速状态，对应的 LED 灯亮表明处于高速状态。



The 

"

Gear 

Ratio" button: When the handwheel is set to high or low speed, the corresponding LED light illuminates to indicate high-speed operation.

Command button for programming.



Jump 

instructions

, loop instructions, delay instructions, and end instructions are used in programming.

Program Editing Button

Delete: On the [Programming] page, delete the line at the cursor position.

“清空”：在【编程】页，常按此键 2 秒以上，则删除全部程序。

Clear: On the [Programming] page, holding this key for more than 2 seconds will delete all programs.



Insert: On the [Programming] page, insert a blank line of code at the cursor position.

在【文件】页，按该键，读出选中的程序。此功能只在原程序未运行的情况下有效，否则系统提示“运行中，禁止操作”。



On the [File] page, press this key to read the selected program. This function is only available when the original program is not running; otherwise, the system will display "Running, operations are prohibited."

在【编程】或【文件】页，按该键 2 秒以上，可将程序存储在当前程序号中。此功能只在原程序未运行的情况下有效，否则系统提示“运行中，禁止操作”。



On the [Programming] or [File] page, hold down this key for more than 2 seconds to save the program under the current program number. This function is only available when the original program is not running; otherwise, the system will display "Running, operations are prohibited."

此按键有三种功能：

1、 This button has three functions:

2、 In numeric input mode, pressing this key clears the previous input data.

3、 The dialog box is displayed. Press this key to close it.



On the [Programming] page, when the number is selected, pressing this key clears the selected data to blank.

在【编程】页，此按键可将当前数据直接输入到程序对应光标中，节省输入程序的时间。

1.2 On the [Programming] page, this button allows you to directly input current data into the program cursor, saving time on program input.

Panel button description

The control panel has two buttons and a handwheel.

Emergency stop button:

Test knob:

In "TeTest knob:

In "Test Mode", rotating the knob clockwise increases the machining speed, while counterclockwise rotation decreases it until stopping. When stationary, turning the handwheel activates the program according to its speed.

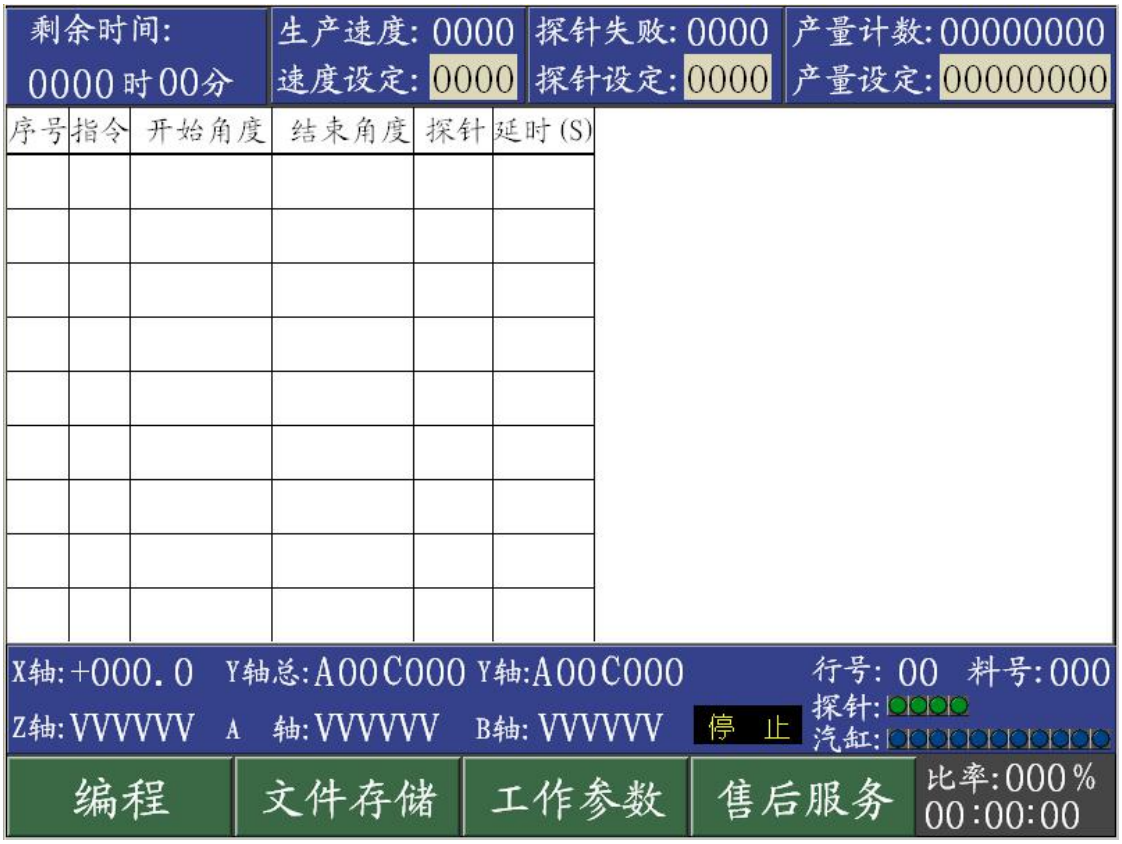
Handwheel:

In "Manual Wheel Mode", rotating the handwheel triggers corresponding shaft movements to achieve single-axis manual operation. In "Test Mode", when the speed ratio is set to 0, rotating the handwheel enables multi-axis synchronization to accomplish manual spring machining.

2 Operation interface and resource description

2.1 Programming Page





Resource description:

Serial number: Indicates the current program line number. If empty, the line is invalid.

1） Instruction: Specifies the instruction used by the program in the current line.

2） Start angle:

a、For standard commands, it indicates the starting angle of the X-axis.

b、Indicates the line number for the jump instruction.

c、Represents the number of times a command is repeated.

d、When used with delay instructions, it indicates the delay time.

3） End angle: X-axis end angle setting.

4） Spooling: Set the number of coils and turns.

5） Z-axis: Configuration of Z-axis movement, in mm.

6） A-axis: A-axis movement configuration, in mm

7） B-axis: B-axis movement configuration, in mm

8） Speed ratio: Sets the relative speed for single-step operation. The default value is 100, with a range of 0-600.

9） Cylinder: Current cylinder action configuration.

10） Probe: Current row probe number configuration.

11） Delay: Execute the next line after delaying the current line for this configuration time.

12） Enter the probe. To set the delay, right-click the direction in the cylinder programming

row to access this page.

13） Probe settings: Maximum number of probe failures allowed (setting to 0 indicates no consideration of probe failure attempts).

14） Probe failure: Count the current number of probe failures. When the failure count reaches the set threshold, display a "Probe Failure" alert.

15） Production setting: Target production output for the product (setting to 0 indicates no consideration of production count reaching).

16） Production Count: The product quantity count is complete. When the set target quantity is reached, a "Count Reached" alert is generated.

17） Ratio: Current speed ratio in test mode, range: 0% to 100%.

18） Remaining time: The duration required to achieve the set production target at the current continuous production rate.

19） Probe cylinder indicator: The corresponding indicator light will illuminate when probe input or cylinder output is detected.

20） Line number: The current line number in the program

21） Material ID: The current program is executing the file storage page sequence number

2.2 File storage page



Resource description:

22） You can store up to 60 files and navigate between pages using the "Previous Page/Next Page" buttons.

23） Current program number: The program storage file number currently called on the [Programming] page.

24） Serial number: The file serial number is displayed.

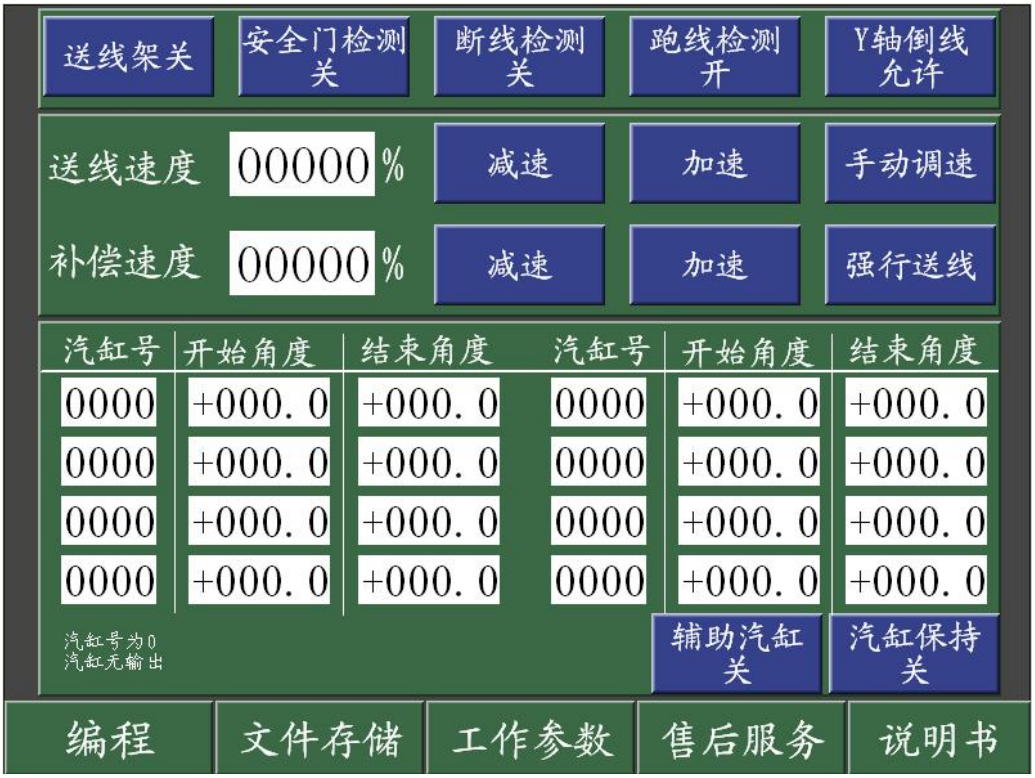
25） File name: The identifier of the user's stored data file.

26） Status: The current file status. "OK" indicates valid stored data, and blank indicates no valid data.

27） To read, first select the file you want to read, then press the "Read" button.

28） To save, first select the file you want to access, then hold the "Save" button for more than 2 seconds.

2.3 Work Parameters Page



Resource description:

29） Auxiliary cylinder description: A total of 11 cylinder channels are available, supporting 8 input angle sets. The same cylinder can be reused, or different cylinders can be used for the same angle.

a、 Cylinder number: Set to 1–11. If not used, set to 0.

b、 Start angle: Enter a range from-360.0 degrees to 360.0 degrees.

c、 End angle: Enter a range from-360.0 degrees to 360.0 degrees.

d、 Auxiliary cylinder: Only when the auxiliary cylinder is activated, the 8 parameter sets in the table become effective.

e、 Cylinder retention: The cylinder remains open after a single product is completed in the absence of a probe.

30） Line feeder description: Line feeder activation enabled

a、 Wire feeding switch button: When in interlock mode, pressing this button activates the automatic wire feeding function of the wire feeder.

b、 Force wire feeding: Press this button to enable the wire feeder to feed the wire at compensation speed without conditions.

c、 Cable break detection switch: Enables or disables cable break detection.

d、 Tracing detection switch: Detects tracing functionality.

e、 Y-axis inversion: Select whether to allow inversion of the Y-axis handwheel.

f、 Feed line speed: Set the automatic feed line speed. During continuous machine operation, this speed will be automatically adjusted according to production speed in "Automatic Speed Control Mode" to achieve automatic control of the feed line frame function.

g、 Compensation speed: Set the compensation feed rate.

h、 Automatic/manual speed adjustment: Select automatic or manual speed adjustment mode. When automatic speed adjustment is selected, the feeding line speed will automatically adjust according to the production speed.

Feed line speed; during manual speed adjustment, manually regulate the feed line speed to align with production requirements.

i、 Automatic acceleration (deceleration): Pressing this key once increases (decreases) the wire feeding speed by 1; holding the key continuously increases (decreases) the wire feeding speed.

j、 Compensation acceleration (deceleration): Pressing this key once increases (decreases) the wire feeding speed by 1; holding the key continuously increases (decreases) the wire feeding speed.

k、 Safety door detection: Enable safety door detection.

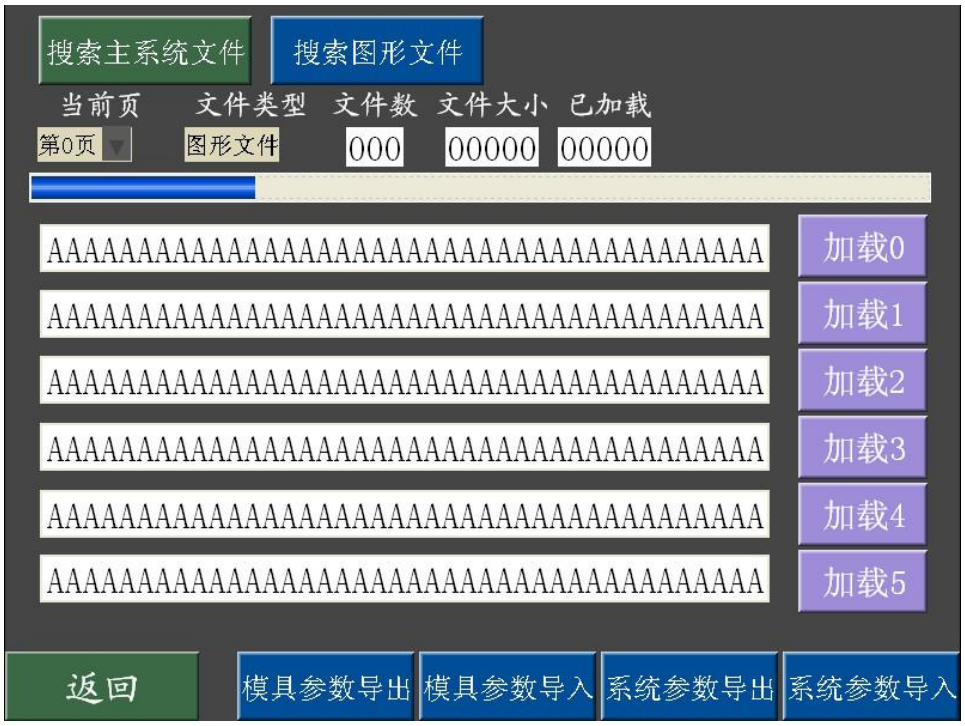
2.4 IO page



Resource description:

1) IO status light: On indicates signal input/output.
2) Defective product detection: The machine will identify defective products within the range from "starting angle" to "ending angle".
3) Probe sensitivity: Set the probe sensitivity, with 1 being the highest sensitivity.
4) Probe sensitivity: When the product requires high probe sensitivity, use Probe No.1 or No.2. If the "probe premature contact" alarm frequently occurs, use Probe No.3 or No.4.

2.5 System Upgrade Page



Upgrade steps:

1) Copy the upgrade files to the USB drive (Note: Do not create new folders; just copy them directly to the USB drive).
2) Insert the USB flash drive into the monitor's USB port.
3) Click "Search Main System Files" or "Search Graphic Files" to find the files to upgrade.
4) Click the "Load" button to the right of the file you want to upgrade.
5) After the loading progress bar completes, the message "Loading completed" appears, indicating the upgrade is finished.
6) Power off and restart to use the latest program.

Data backup steps:

1) Insert the USB drive into the monitor's USB port.
2) Click 'Export Mold Parameters' to export all saved program directories to a USB drive.
3) The export is complete after the progress bar loads.
4) The steps for using the 'System Parameter Export' function are the same as above.

Data import steps:

1) Insert the USB flash drive into the monitor's USB port.
2) Click "Import Die Parameters" to find importable files.
3) After selecting the appropriate file, click 'Load' to import the generated file into the controller.
4) The usage steps for the 'System Parameter Import' function are identical to those described above.

3 Instructions and Examples

3.1 Instruction Description

Instructions:

instruct	parameter	explain
S or blank	not have	Execute standard commands based on program X/Y/Z data
J	line number	Probe jump instruction: If the probe detection in the previous line fails, the program jumps to the specified line for execution; otherwise, it proceeds directly to the next line.
G	line number	Absolute jump instruction: The program jumps directly to the specified line for execution.
L	number of replication	Repeat the start command and use it with the repeat end command N
N	not have	Repeat End Command
W	time	Delay instruction (unit: 0.01 seconds). Execute the next line after the specified delay time.
E	not have	end directive
M	not have	The manipulator waits for commands. The program pauses upon reaching this line and waits for the manipulator signal. Once the signal is received, execution resumes.

3.2 Example Routine One

order number	instruct	Start angle	End angle	Unwind (Open)	Z-axis (Open)	gear ratio	air cylinder	probe	delayed
0		20	60	1.08	1				
1		60	100	5	10.03	60	1		
2		100	110	-0.01					
3		110	130				2		
4		130	180	10	20	50			
5		180	220				-2		
6		220	300	1	-2				
7		300	330				-1		
8	E								

explain ：

0: The X-axis moves at default speed to the 20-degree position. Then, the X-axis rotates from 20 degrees to 60 degrees while the Y-axis synchronously winds the cable forward by 1 full turn (80 degrees) and the Z-axis moves forward synchronously by 1 mm.
1: During execution, the system first activates Cylinder No.1. The X-axis rotates from 60 degrees to 100 degrees at 60% of the default speed, while the Y-axis simultaneously winds the cable forward by 5 turns and the Z-axis moves forward synchronously by 10.03mm.
2: The X-axis rotates from 100 degrees to 110 degrees at default speed, while the Y-axis rotates 10 degrees in the opposite direction.
3: During execution, the system first activates Cylinder No.2, then rotates the X-axis to 130 degrees at default speed.
4: The X-axis rotates from 130 degrees to 180 degrees at 50% of the default speed, while the Y-axis simultaneously winds the cable forward by 10 turns and the Z-axis moves forward synchronously by 20mm.
5: During execution, first shut down Cylinder No.2 and rotate the X-axis to 220 degrees at default speed.
6: The X-axis rotates from 220 degrees to 300 degrees at default speed, while the Y-axis simultaneously advances the cable by one full turn in the forward direction, and the Z-axis moves backward by 2mm synchronously.
7: During execution, first close Cylinder No.1 and rotate the X-axis to 330 degrees at default speed.
8: Rotate the X-axis clockwise to 0 degrees while synchronizing the Y-axis and Z-axis to reset to zero position.

3.3 Example Routine Two

order number	instruct	Start angle	End angle	Unwind (Open)	Z-axis (Open)	gear ratio	air cylinder	probe	delayed
0		20	60	0.3	3		1	1	
1	L	5							
2		60	130				2		
3		130	180	10	20	50			0.5
5	N								
6		300	330				-2		
7		180	220						
8	E								

explain ：

0: The X-axis moves at default speed to the 20-degree position while activating Cylinder No.1. Subsequently, the X-axis rotates from 20 degrees to 60 degrees, with the Y-axis synchronously advancing the wire by 300 degrees and the Z-axis moving forward by 3mm, while simultaneously detecting Probe No.1. Two scenarios may occur: a) If the probe is detected, Cylinder No.1 closes immediately and the current operation sequence terminates; b) If no probe is detected, Cylinder No.1 closes after completing the current operation sequence.

1: Set a loop start flag and set the loop count to 5

2.3: a) Open Cylinder No.2 and rotate the X-axis to 130 degrees at default speed; b) Rotate the X-axis from 130 degrees to 180 degrees at 50% of the default speed while the Y-axis simultaneously winds the cable 10 turns in the forward direction and the Z-axis moves forward synchronously by 20mm; c) Pause for 0.5 seconds. The program executes sequentially in the a->b->c->a->b->c cycle, terminating after completing 5 iterations.

4: Set a loop termination flag.

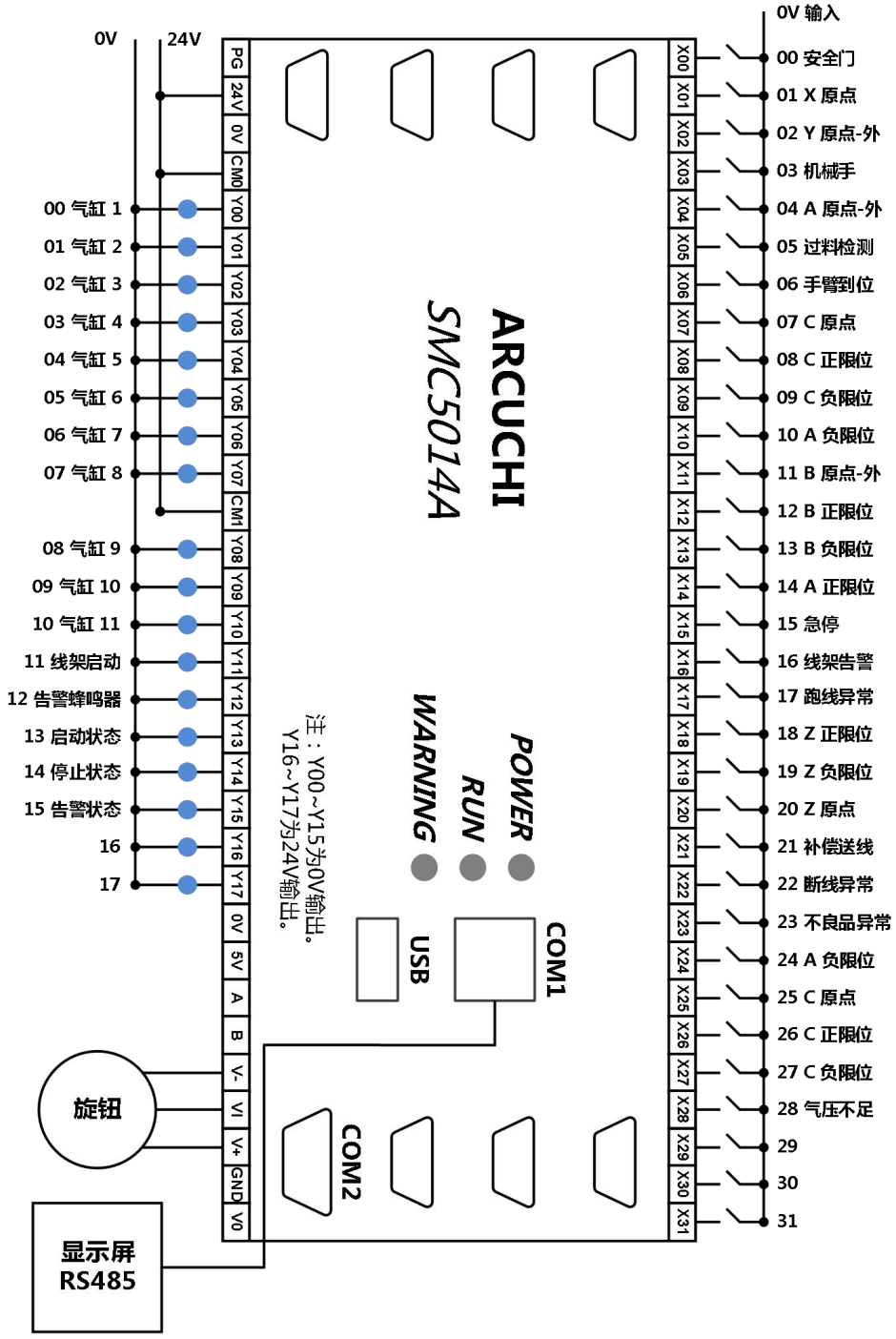
5: During execution, first shut down Cylinder No.2 and rotate the X-axis to 330 degrees at default speed.

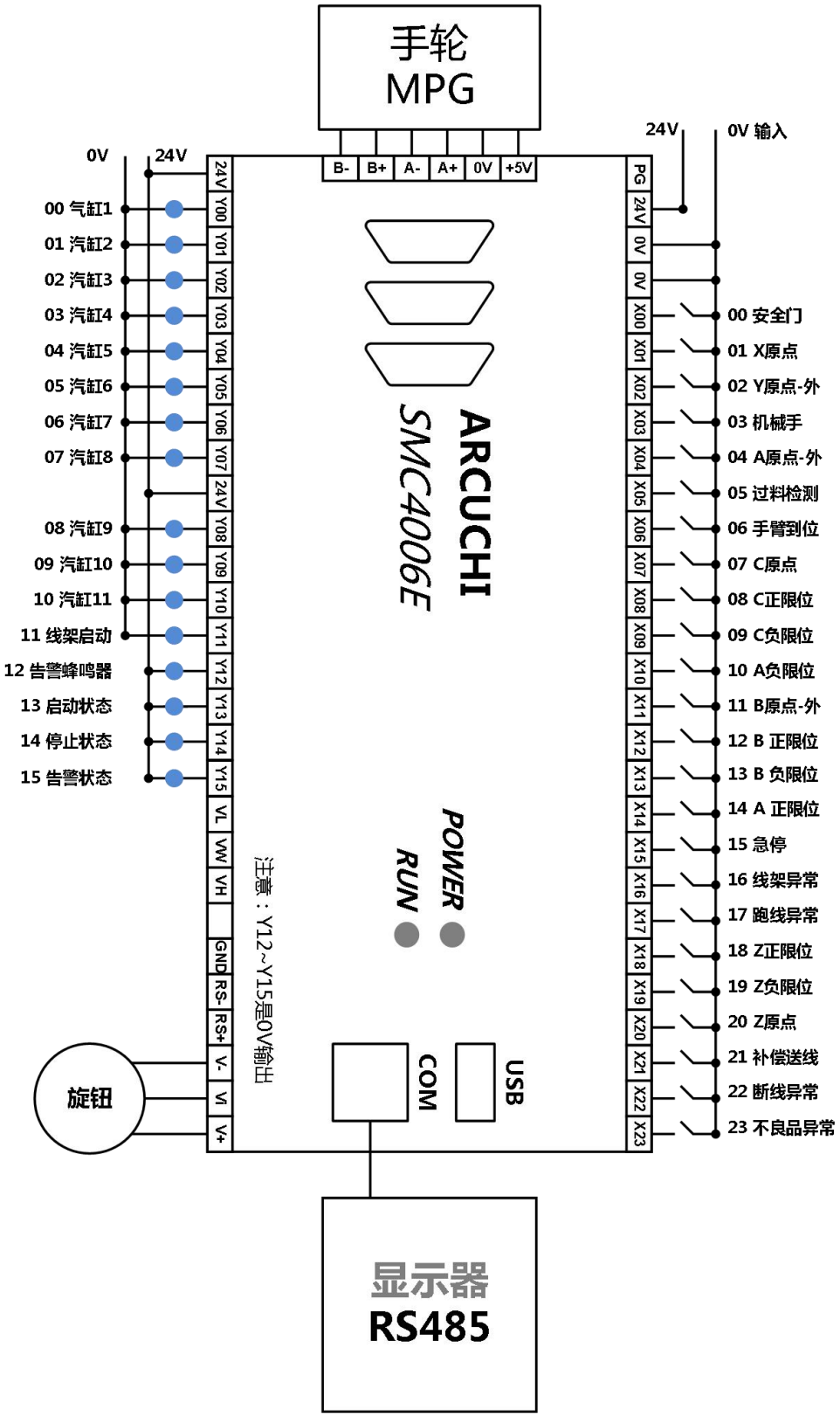
6: The X-axis rotates from 180 degrees to 220 degrees at the default speed, while the Y-axis reverses to zero and the Z-axis returns to its original position.

7: End line: Rotate the X-axis clockwise to 0 degrees while synchronizing the Y-axis and Z-axis to reset to zero position.

4 Electrical connection

4.1 Distribution Diagram 5014A/4006E





Appendix A: Analysis of Common Causes

1) After starting the controller, the program cannot be accessed, and only a peak sound is heard, with no display on the screen.
The system startup file may be corrupted. Contact the supplier.

2) If the buzzer continues to sound after starting the controller, it may indicate a severe startup failure in the system. In this case, please contact the supplier as soon as possible.

3) The system has been powered on, but all or some keys are unresponsive. In this case, you can select the I/O detection interface to test each key individually. If the test results are abnormal, it may indicate a problem with the keyboard keypad. Please contact the supplier for assistance.

4) The system has been activated, but the screen continuously displays X alarm or Y alarm while no alarm is shown on the servo driver. In this case, the alarm output logic of the servo parameters should be modified. Check the servo driver to verify whether its preset alarm output logic can be inverted. If so, adjust the parameter accordingly; otherwise, proceed to modify the alarm logic in the system parameters.

5) After system startup, manual rotation of each axis only allows unidirectional movement while the other axis vibrates simultaneously. In this case, the servo drive parameters must be reset to pulse-plus-direction configuration.

6) After system startup, manual rotation of all axes functions normally but processing operations cannot be initiated. First, verify that the zero position has been correctly reset. Second, inspect for wire breakage. For wire feeders unable to provide wire breakage signals, short-circuit the wire breakage input signal as it operates as a normally closed contact. Additionally, check whether the processed quantity exceeds the target limit. If exceeded, initiate processing cannot be activated.

7) The system starts normally, but shows no response after pressing the reset button. Check whether the selected axis is the feed axis, as the feed axis cannot reset.

8) The system starts normally. Pressing the reset button immediately displays a reset failure. In this case, check whether the "emergency stop" button has been pressed. If the reset failure is displayed after a period of time following reset, inspect the origin switch to verify whether its input signal is normal.

9) The cylinder fails to extend. Ensure the operating current does not exceed 500mA.

10) The probe consistently fails. Ensure the probe delay setting is sufficiently long and that the machine shares a common ground with the controller system.

11) After system startup, an alarm (a prolonged controller sound) will be triggered, indicating that the spring production quantity may have exceeded the preset target. To resolve this, press the "Reset Count" button to clear the current output or adjust the cursor to the target quantity setting for reconfiguration.

12> After power-on, the controller does not generate pulses but the motor moves. In this case, check the wiring, verify the ground connection, and adjust the servo filter parameters.

Precautions and Maintenance of Controllers

I. Precautions:

① It is strictly prohibited to strike or collide with the motor top or computer screen in any manner.

②. Before powering on, first verify that the power supply is correct.

③. Apply oil to lubricate rotating and sliding components.

④. It is strictly prohibited for any body parts (clothing, scraps of fabric) or tools to come into contact with the rotating parts of the machine.

II. Machine Adjustment Steps:

① Confirm the product shape and prepare the corresponding nozzle according to product requirements, including the wire passing nozzle.

② Power on the device. After turning on the screen, in single-axis, Z-axis, or manual mode, gently rotate the handwheel to elevate the Z-axis to a higher position, then press the reset button. Wait until the machine completes automatic zeroing before proceeding to the next step.

③ Wire threading: Adjust the height of the wire-clamping triangular iron and the center offset between the conductor slot base and the wire according to the wire diameter and winding direction, then install the machine nozzle.

④ Select appropriate slide tables based on the sequence of product forming operations, configure forming tools and fixtures, and edit the program (refer to program editing for programming modes).

⑤. For the second foot, select the corresponding forming jig based on its shape.

⑥. For the first foot, select the corresponding forming jig based on its shape.

3-cylinder adjustment:

① When the machine nozzle is in zero position, after the wire feeder completes wire feeding and the nozzle is about to start operation, the wire pressing cylinder immediately retracts (lifts) the coil upon winding completion and then lowers it down (the subsequent cylinder timing is determined based on the part shape).

4. Tin furnace temperature control:

① The temperature of lead-tin furnaces is generally maintained at 280℃ ±10℃.

② The temperature of lead-free tin furnace is generally maintained at 310℃ ±10℃.

3. Cylinder Call Programming Method:

1. The cylinder numbering principle follows a left-to-right sequence, where open cylinder code is 1 and closed cylinder code is-1.
2. The sequence is 1, 2, 3, 4, 5; -1, -2; -3, -4, -5.
3. The wire feeding cylinder is the first cylinder, the wire pressing cylinder is the second cylinder, the skinning depth cylinder is the third cylinder, the skinning length cylinder is the fourth cylinder, and the air blowing cylinder is the fifth cylinder.
4. Reversing the positions of the two air pipes on the exchange cylinder can alter the cylinder programming method: i.e., 1 becomes-1, and-1 becomes 1.
5. Before and after program editing in automatic shutdown or reset mode: Press the cylinder key—when the indicator light turns on, then sequentially press 1, 2, 3, 4, and 5 to observe the position of each cylinder.

matters need attention

Safety considerations:

1. Do not open the casing without permission.
2. When the controller is not in use for an extended period, disconnect the power supply.
3. Special attention must be paid to prevent dust and iron powder from entering the control chamber.
4. Handle with care during transportation to avoid damaging the controller.

Precautions for proper use;

Incorrect usage may cause abnormal operation, and in severe cases, could even damage the controller.

Therefore, please follow the following precautions for proper use of control valves.

1. Check whether the connected power supply meets the requirements to prevent damage to the controller.
2. The lifespan of the controller is significantly influenced by ambient temperature. If the processing site temperature is excessively high, installation should be performed accordingly.

Cooling fan. The controller allows an operating ambient temperature range of 0℃ to 60℃.

3. Avoid use in environments with high temperature, humidity, dust, or corrosive gases.

4. In areas with intense vibrations, rubber shock-absorbing pads should be added for cushioning.

maintenance

Precautions during maintenance and inspection

1. The power supply of the main circuit must be disconnected first before performing maintenance and repair on the controller.

2. The operator must personally verify that the power supply has been disconnected to prevent accidents.

Check items and cycles

Under general operating conditions (environmental conditions: daily average temperature 30°C, load rate 80%, operating duration 12 hours per day), perform routine inspections and periodic checks according to the following items.

Maintenance of Mechanical Components

1. Daily maintenance:

① Before turning on the machine daily, first inspect all components for normal operation. Clean the machine surface with a gas gun, wipe clean the sliding parts, and apply lubricating oil.

② During equipment cleaning, the air gun must not be directed at the solder surface or flux cup to prevent injury from molten solder or flux splashes, as well as scalding of the trachea.

③ Timely clean and recycle tin slag and flux residues.

II. Regular Maintenance:

① Apply grease to the grease nozzle area using a grease gun every three months. When applying grease, ensure sufficient quantity until clean grease emerges from the gaps.

② Temperature control gauge and barometer shall be calibrated annually, while mechanical components shall undergo maintenance every six months. Early maintenance should be performed if abnormalities are detected.

③. If the machine is not in use for an extended period, the surface contaminants

must be thoroughly cleaned, lubricated, and wrapped with a waterproof plastic cloth to prevent moisture ingress and surface dust contamination.

FACTORY:

We-KIOXIA LIGHT RING EQUIPMENT GROUP CO.,LTD. has 28 years of experience in winding machine lines. Our KIOXIA series (including the KX3B-L model) is equipped with ISO9001:2015 and CE certifications, proprietary machine patents, and the qualification of a government-recognized "high-tech enterprise".



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