

Instruction manual
on the control system for the milling machine
RichAuto A11



Table of contents

Introduction 5

Section 1. Description of the RichAuto system 6

 1.1. RichAuto Delivery Package:..... 6

 1.2. Description of the controller 7

 1.3. Adapter board (interface board) 8

Section 2. Controller operation 9

 2.1. Introduction..... 9

 2.2. Operation 9

 2.3. Detailed description of the buttons 10

Section 3. Commissioning of the system and control panel 13

 3.1. Input terminal..... 13

3.1.1. Sensor input.....13

3.1.2. Connecting a calibrator to adjust the instrument along the Z axis 14

 3.2. Output terminal..... 15

3.2.1. Stepper motor 15

3.2.2. Servo drive.....15

 3.3. Connecting the inverter (frequency controller) of the spindle 16

3.3.1. Without the ability to control the frequency from the controller 16

3.3.2. With the ability to control the frequency from the controller 16

3.3.3. Settings of spindle cells in the controller 17

 3.4. Output connections: Y5 is the output terminal of the status indicator, and Y6 is the operating indicator 17

Section 4. Introduction to the control panel menu 18

 4.1. Machine setup (Machine setup) 18

4.1.1. Pulse equivalent (Setting gear ratios).....18

4.1.2. Table size (Working field) 19

4.1.3. Spindle Setup (Spindle Settings) 19

4.1.4. "Home" setup ("Home" Settings).....19

4.1.5. Accel (Acceleration) 20

4.1.6. Start speed (Starting speed) 20

4.1.7. Voltage setup (Voltage setting).....20

4.1.8. C.A.D. Thickness (Zero position sensor of the Z axis of the workpiece) 21

4.1.9. Max Spd Limit (Maximum speed limit).....21

4.1.10. Dist Time limit (Time limit of manual movement mode) 21

4.1.11. Input confi (Loading configuration) 21

4.2. Auto Pro Setup Menu	21
4.2.1. Work Speed (Working speed)	22
4.2.2. Safe Height	22
4.2.3. Auto Scale (X and Y axis gradation)	22
4.2.4. Fall scale (Z-axis gradation).....	22
4.2.5. Stop Statue (Stop Status).....	22
4.2.6. G Code Setup (Setting up G code processing)	23
4.2.7. Pro Attribute (Additional settings)	24
4.2.8. Circle Limit (Rotation limit).....	24
4.2.9. Work Array (Working with arrays)	24
4.3. System Settings	25
4.3.1. Languages.....	25
4.3.2. Data Initial (Data Recovery).....	25
4.3.3. Inner Format (Internal formatting)	25
4.3.4. Wipe cache (Clearing cache memory)	26
4.3.5. Function configure (Setting parameters)	26
4.3.6. Probation Password (Trial password).....	26
4.3.7. Backup Pas (Password for data backup)	26
4.3.8. Input port (Checking input signals)	26
4.3.9. Output port (Checking output signals)	27
4.3.10. Buttons Check (Button test).....	27
4.3.11. Backup Data (Data backup).....	27
4.3.12. Restore Data (Data Recovery)	27
4.3.13. Auto Update (Automatic update).....	27
4.4. File Operations	27
4.4.1. Copy File (Copying files).....	27
4.4.2. Delete File (Deleting files).....	27
4.4.3. View File (View files)	27
4.4.4. Processing Info (Production information).....	28
4.4.5. Check pro time (Check file execution time)	28
4.5. System Version Information.....	28
Section 5. Machine control	29
5.1. Return to the starting position.....	29
5.2. Importing files for machine control	29
5.3. Manual processing operations	29

5.3.1. Precise adjustment of the movement speed	29
5.3.2. Manual movement modes.....	30
5.4. Automatic processing modes	31
5.5. Processing operations	33
5.5.1. Adjustment of the displacement speed coefficient and the spindle rotation speed	33
5.5.2. Pausing processing and fine tuning	34
5.5.3. Interruption of the working process and protection against voltage shutdown	35
5.5.4. Voltage shutdown protection	36
5.6. Advanced processing.....	36
5.6.1. Array Work (Working with an array)	37
5.6.2. Resume Work	37
5.6.3. Tool Changing	38
5.6.4. Part Work (Working with parts).....	38
5.6.5. Calculate Bound (Calculation of the workpiece boundary)	38
5.6.6. Mill plane (Surface milling)	39
5.6.7. Calculate work time (Calculation of file execution time)	41
5.6.8. Find break No (Find the number of the corrupted line).....	41
5.6.9. Scale work	41
Section 6. Automatic system update	42
Section 7. Elimination of major malfunctions	43

Introduction

The manual will provide you with detailed information about the characteristics of the control system, the procedures of its installation, operation and maintenance, as well as safety requirements when working with the device. Please read these instructions carefully before installing and using the device – this will help you use it optimally and extend its service life.

Precautions:

- it is strictly forbidden to use the device in conditions of a strong magnetic field. Operating temperature range: 0-70 degrees C⁰; humidity: 0-90% (non-condensing);
- insert the Flash disk in the right direction. Do not disconnect the 50-pin cable while the device is running;
- during the execution of files from a Flash disk, do not try to pull out the disk in order to avoid file damage.;
- carefully avoid ingress of metal chips, dust and other conductive substances into the controller casing;
- the housing of the device must be connected to a ground cable to ensure the safety of work and avoid interference;
- it is forbidden to carry out independent disassembly or repair of the device;
- in case of a long period of downtime, disconnect the power supply and ensure proper storage conditions;
- keep your workplace clean;
- do not use caustic chemicals to clean the device;

Important notice!

The company is not responsible for damages and breakdowns caused by improper use of the device or violation of safety regulations.

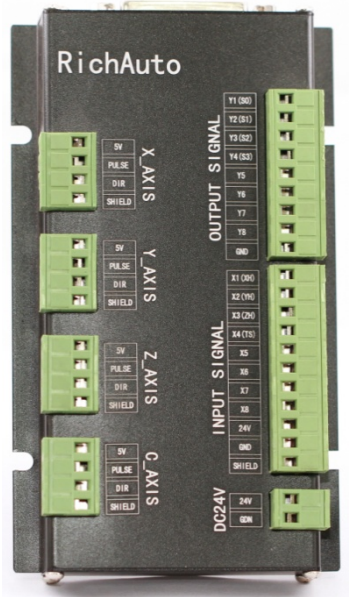
Section 1. Description of the RichAuto system

The control unit **RichAuto** for the CNC machine includes the following components: a manual motion control controller, an embedded adapter board, a 50-pin information cable and a USB cable.

1.1. RichAuto Delivery Package:



Master controller



Interface board



50-pin cable



USB A-B Cable

1.2. Description of the controller

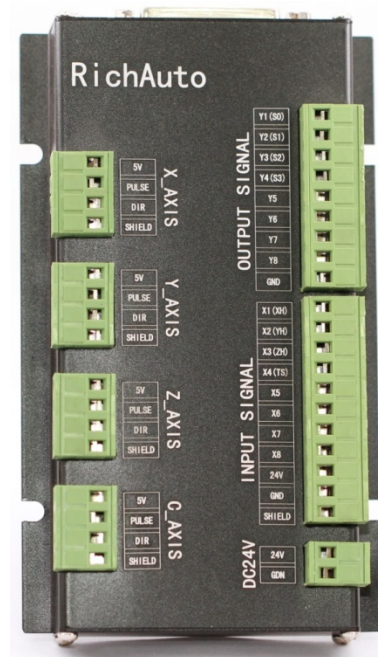
The motion control controller includes the following modules:



1. USB interface. Interface for connecting external USB memory modules. The file system of the plug-ins must be either FAT16/32.
2. LCD screen with a resolution of 128x64mm. It is used to display the direction of movement and other information, such as system settings
3. Keyboard. It contains 16 buttons designed for entering system settings and direct process control.
4. Connector for a 50-pin cable.
5. Interface for connecting USB A-B. Connecting the USB information cable. It is used for communication between the computer and the controller.

1.3. Adapter board (interface board)

Communication between the main computer and the machine itself is carried out using an interface board. It can be divided into 5 components:

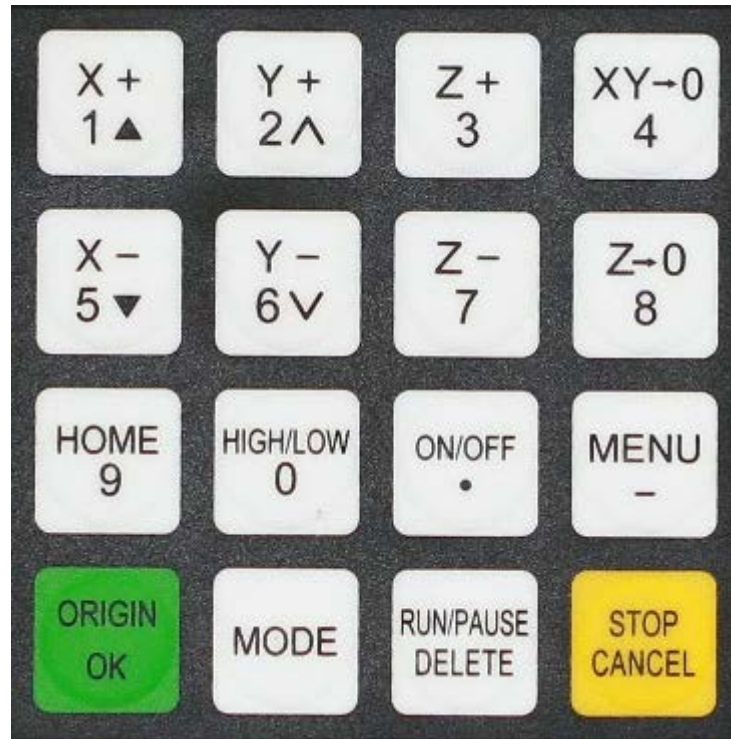


1. Input for 50-pin cable. This cable connects the machine drive mechanism with the **RichAuto A11** system.
2. Control output terminals. They control the start and stop of the spindle, as well as the speed of rotation. Different connection methods lead to different control options. For more information, please refer to the Help section, "Setting up the spindle".
3. Control input terminals. Input terminal for receiving feedback information from the machine.
4. Power connection terminals. Input terminal for connecting power from the power unit (DC24V 3A)
5. Motor control output terminals. Output terminal for connecting the motor control cable.

Section 2. Controller operation

2.1. Introduction

The motion control controller contains 16 function buttons. Each button has several functions depending on the operating mode of the keyboard and the device itself.



2.2. Operation

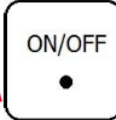
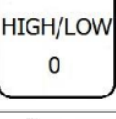
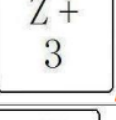
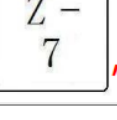
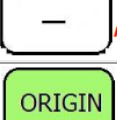
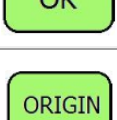
The **RichAuto A11** control system uses two types of commands using input buttons: single button pushing or combinations of buttons.

Single button push: Push one button on the controller.

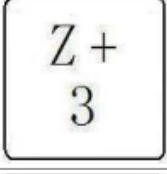
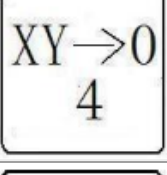
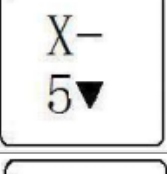
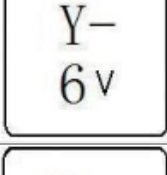
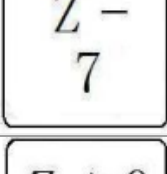
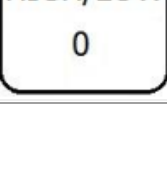
Button combination: To assign certain commands and operations, several (two or more) buttons must be pushed simultaneously. This action consists of two steps: push and hold the function button, then push the additional button (see the table below), and finally release both buttons to give a combined command.

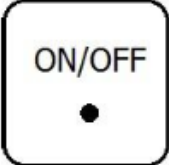
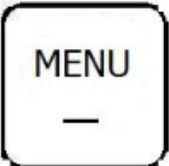
2.3. Detailed description of the buttons

Below is a list of combined commands:

No	Button combination	Command
1	 + "0—9"	Switching between coordinate systems. 0 for the mechanical coordinate system. 1-9 for working coordinate systems
2	 + 	Starting tool calibration on the Z axis
3	 + "1—8"	Starting interrupted tasks
4	 + 	Starting advanced operating modes (see clause 5.6)
5	 +  / 	Starting the spindle, increasing the speed of revolutions
6	 + 	Repeat the last assigned command
7	 + 	Machine control via coordinate parameters mode
8	 + 	System update
9	 + 	Quick button check

List of basic commands with a single push:

Button	Command
	Positive movement along the X-axis; in the menu - "Up", enter the number 1
	Positive movement along the Y axis, entering the number 2, changes the value in the selected menu item
	Positive movement along the Z axis, entering the number 3, increasing the speed of rotation of the spindle in operation
	Zeroing the spindle along the X,Y axes, entering the number 4
	Negative movement on the X-axis, in the menu - "Down", entering the number 5
	Negative movement on the Y axis, slowing down the cutting speed, number 6, changes the value in the selected menu item
	Negative movement along the Z axis, entering the number 7, reducing the speed of rotation of the spindle in operation
	Zeroing the spindle along the Z axis, entering the number 8
	Going home on all axes, entering the number 9
	Manual motion control mode, switching between high and low speed, entering the number 0, switching between the working and mechanical coordinate system when working in automatic mode

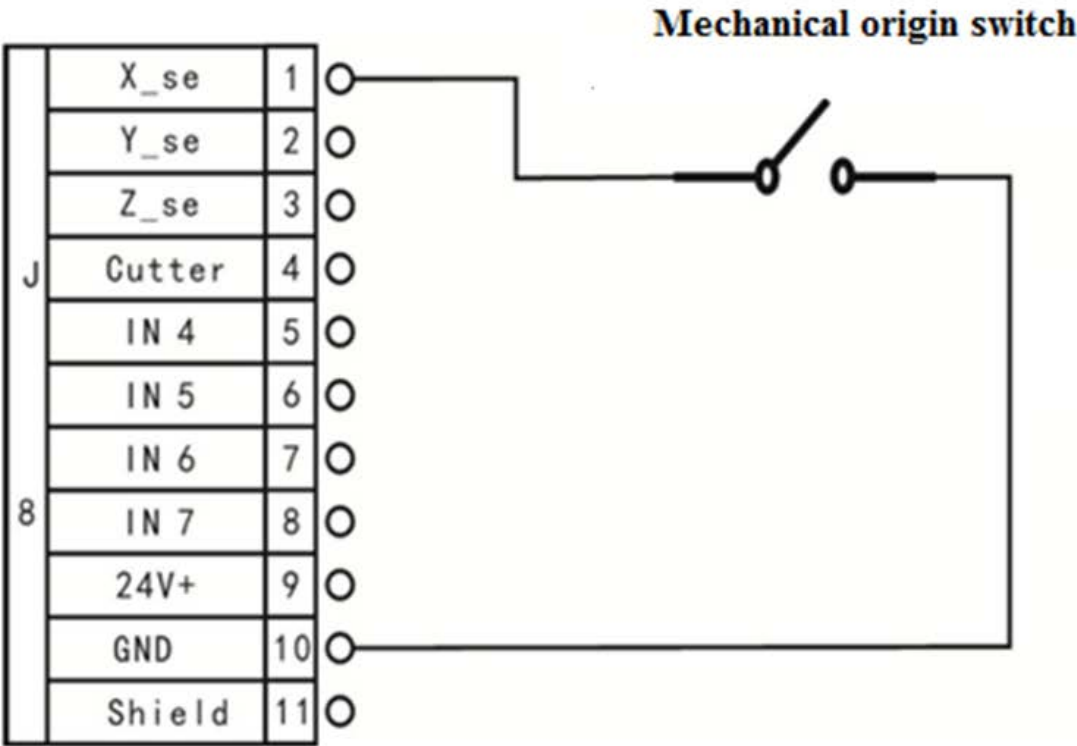
	Starting/stopping the spindle, entering the decimal point
	Launching the menu, entering the "-" symbol, checking the status of the operation
	Moving the tool to the working position on all axes, confirmation of movement, input, operation execution
	Manual control, modes: continuous, step-by-step, and full cycle.
	Start\pause, delete incorrectly entered symbols
	Stopping the operation, stopping the movement, canceling the operation input

Section 3. Commissioning of the system and control panel

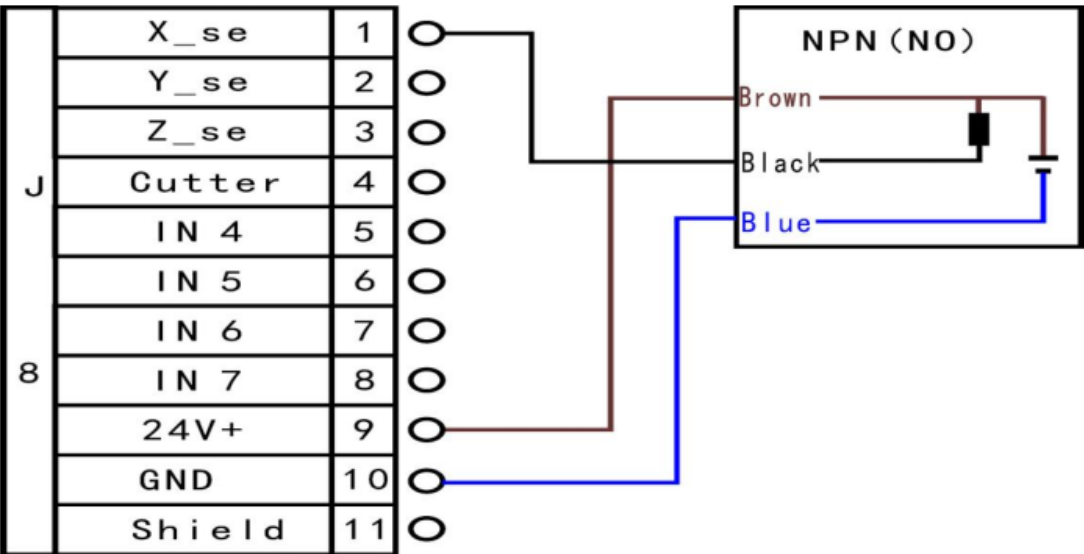
3.1. Input terminal

3.1.1. Sensor input

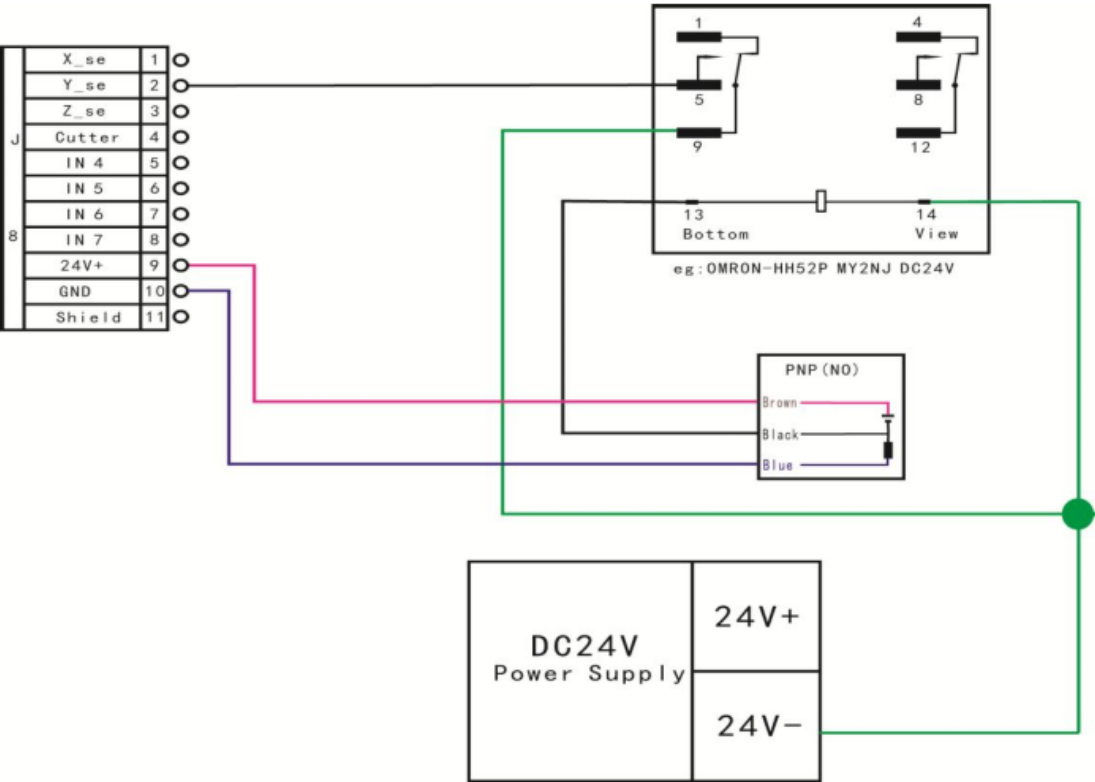
Mechanical sensors Y and Z are installed in the same way as X.



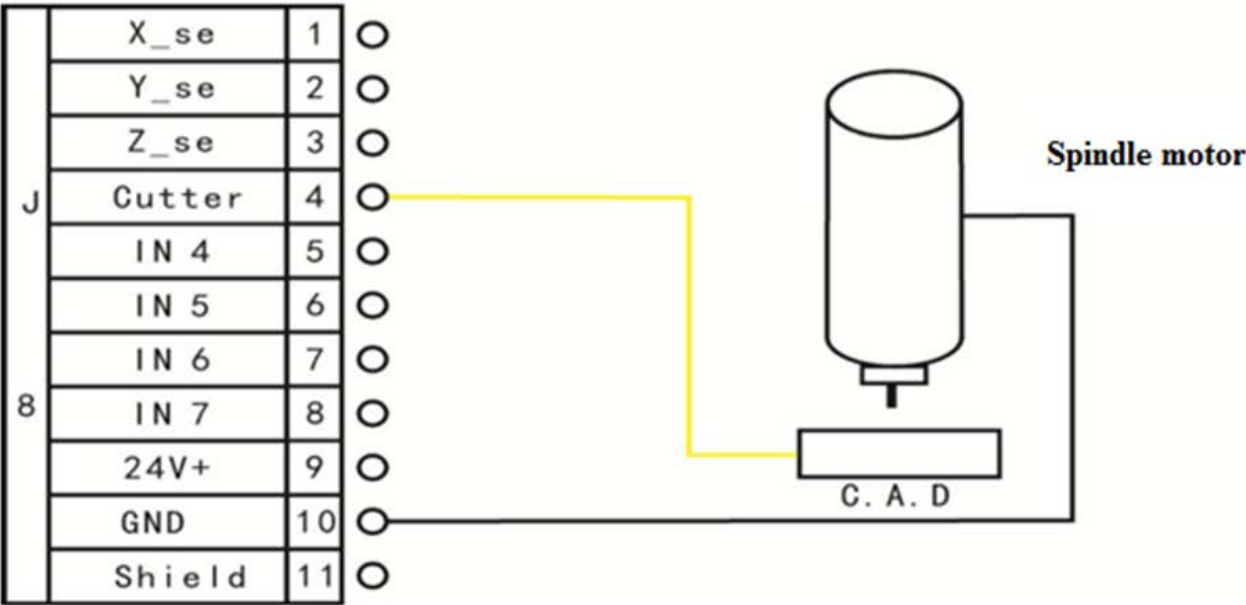
NPN(NO): Y and Z are the same as X



NPN(NO): X and Z are the same as Y

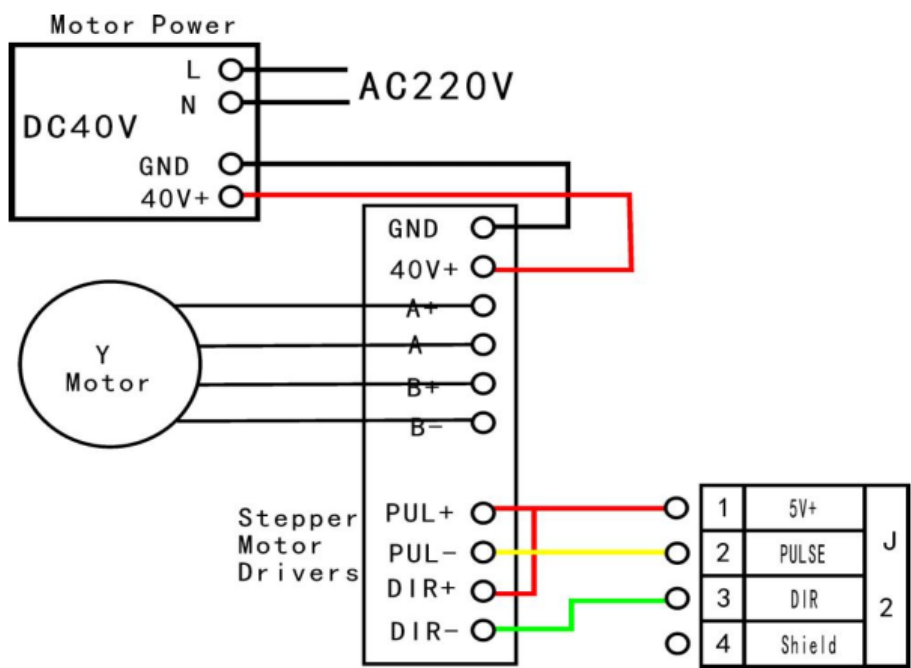


3.1.2. Connecting a calibrator to adjust the instrument along the Z axis

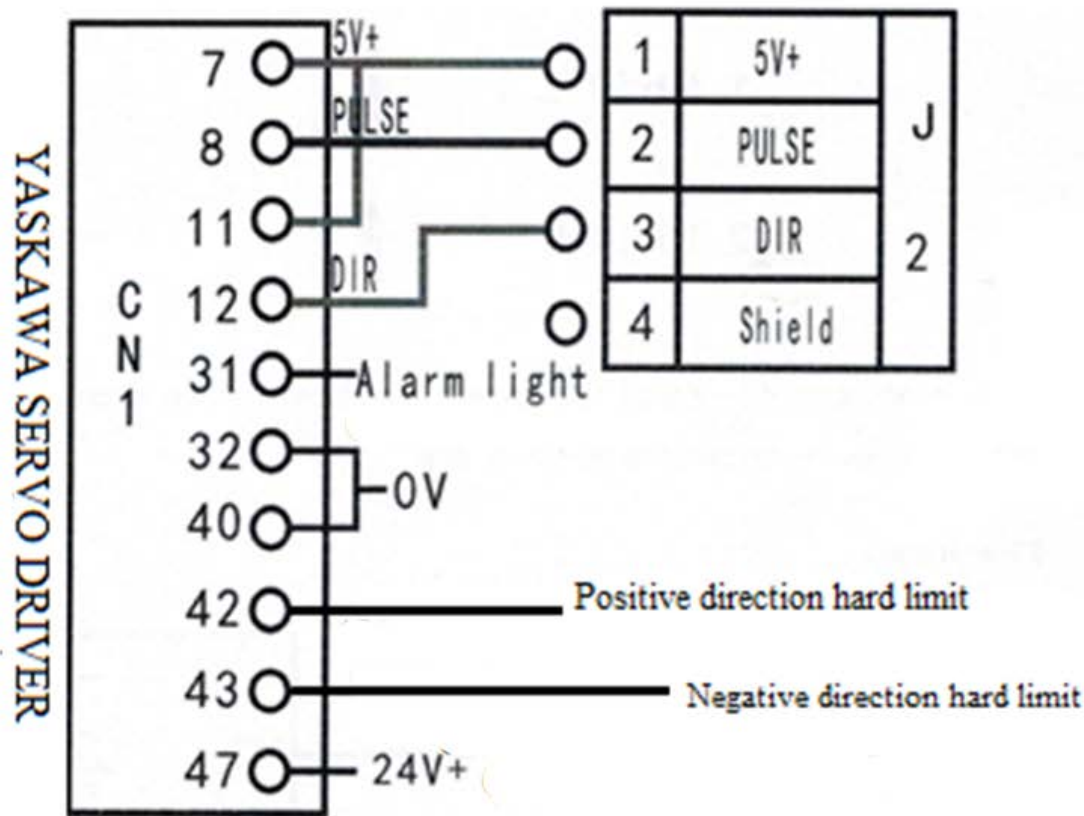


3.2. Output terminal

3.2.1. Stepper motor

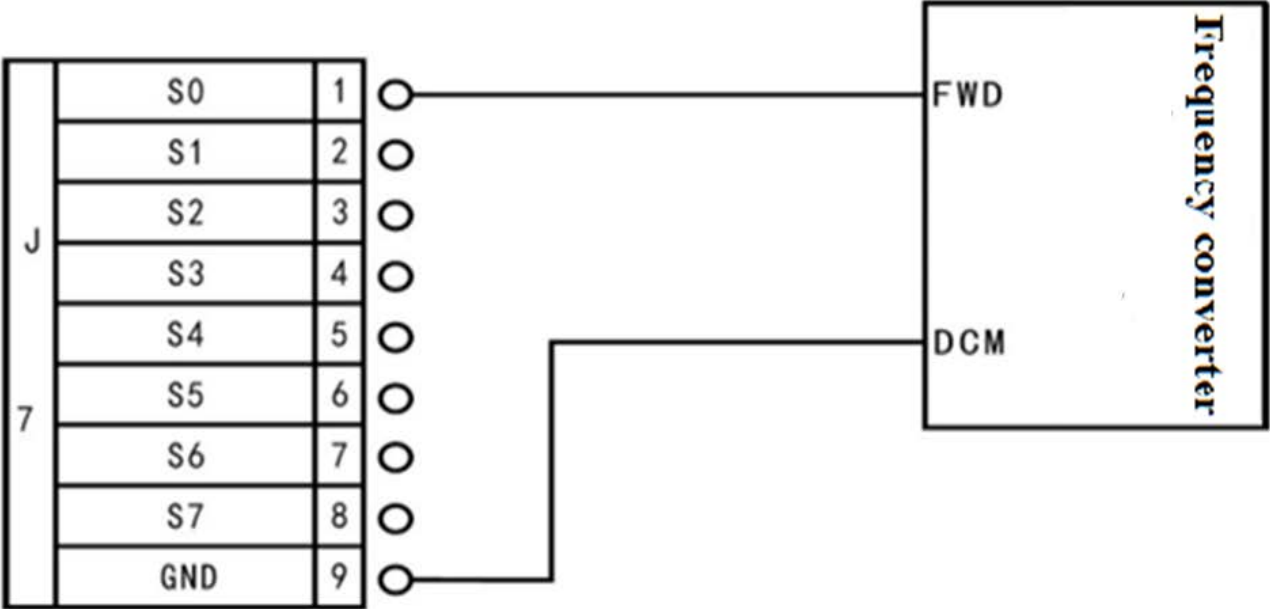


3.2.2. Servo drive

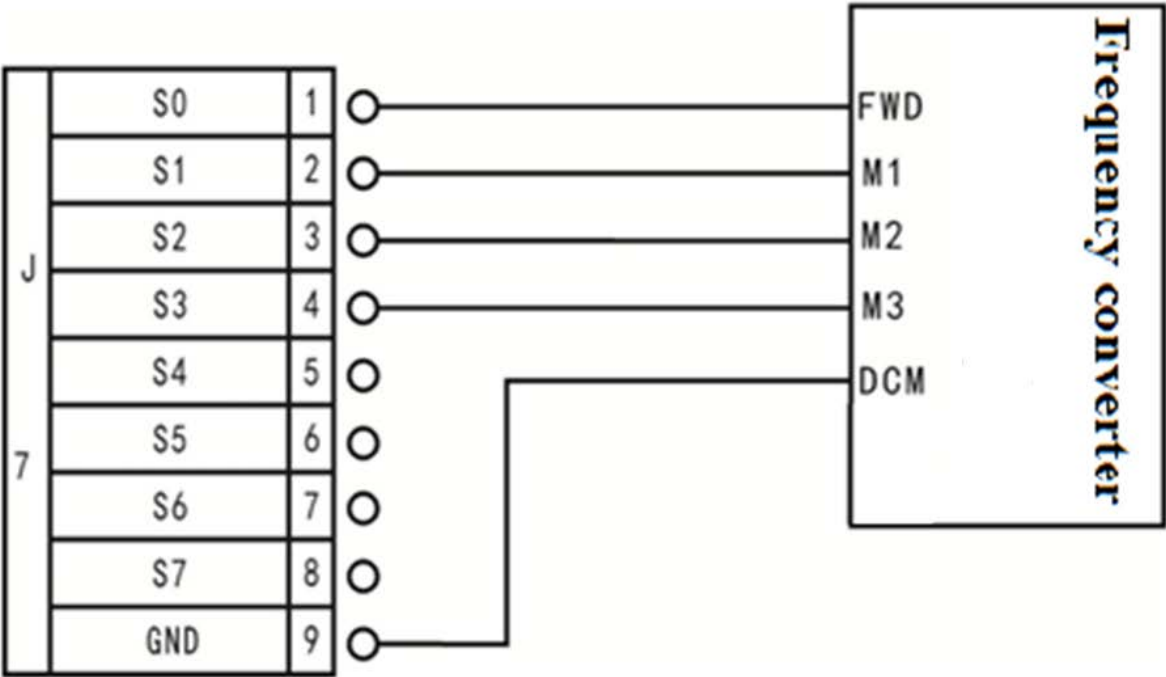


3.3. Connecting the inverter (frequency controller) of the spindle

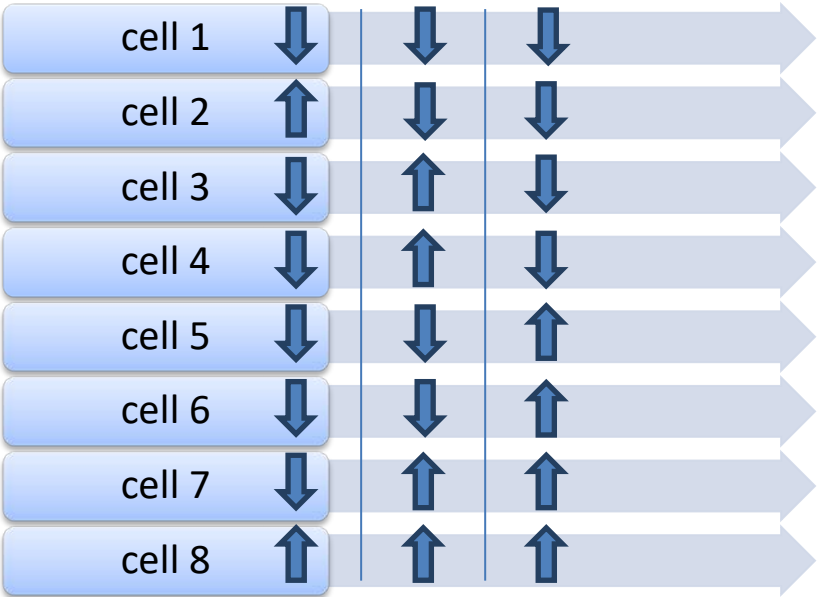
3.3.1. Without the ability to control the frequency from the controller



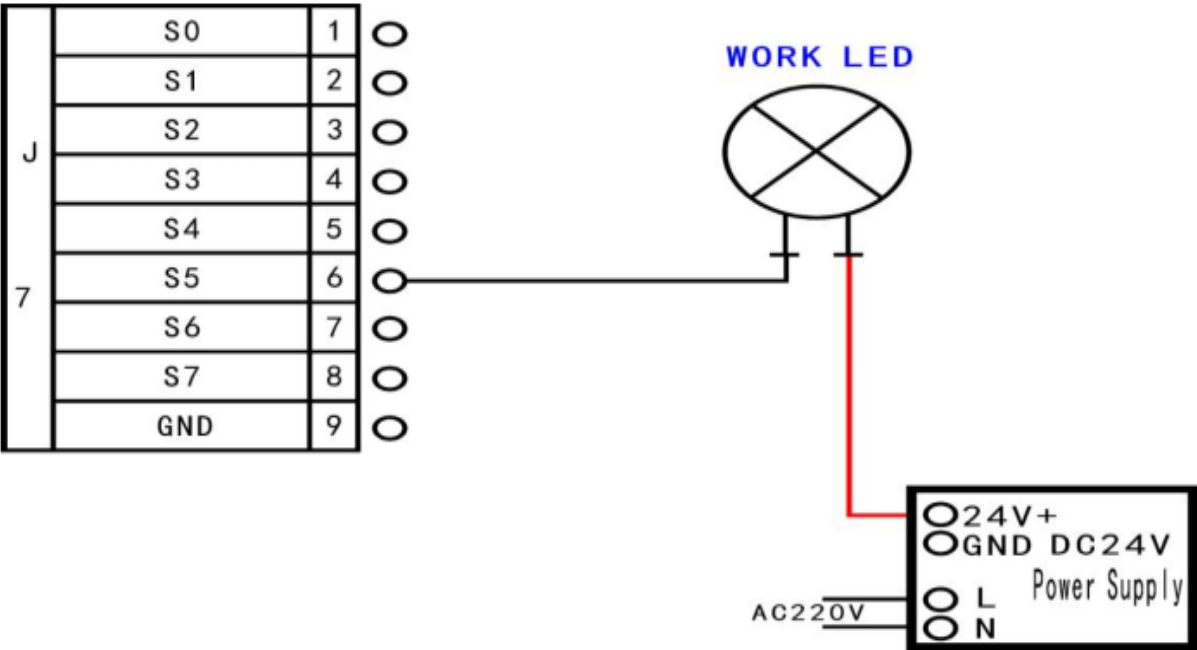
3.3.2. With the ability to control the frequency from the controller



3.3.3. Settings of spindle cells in the controller



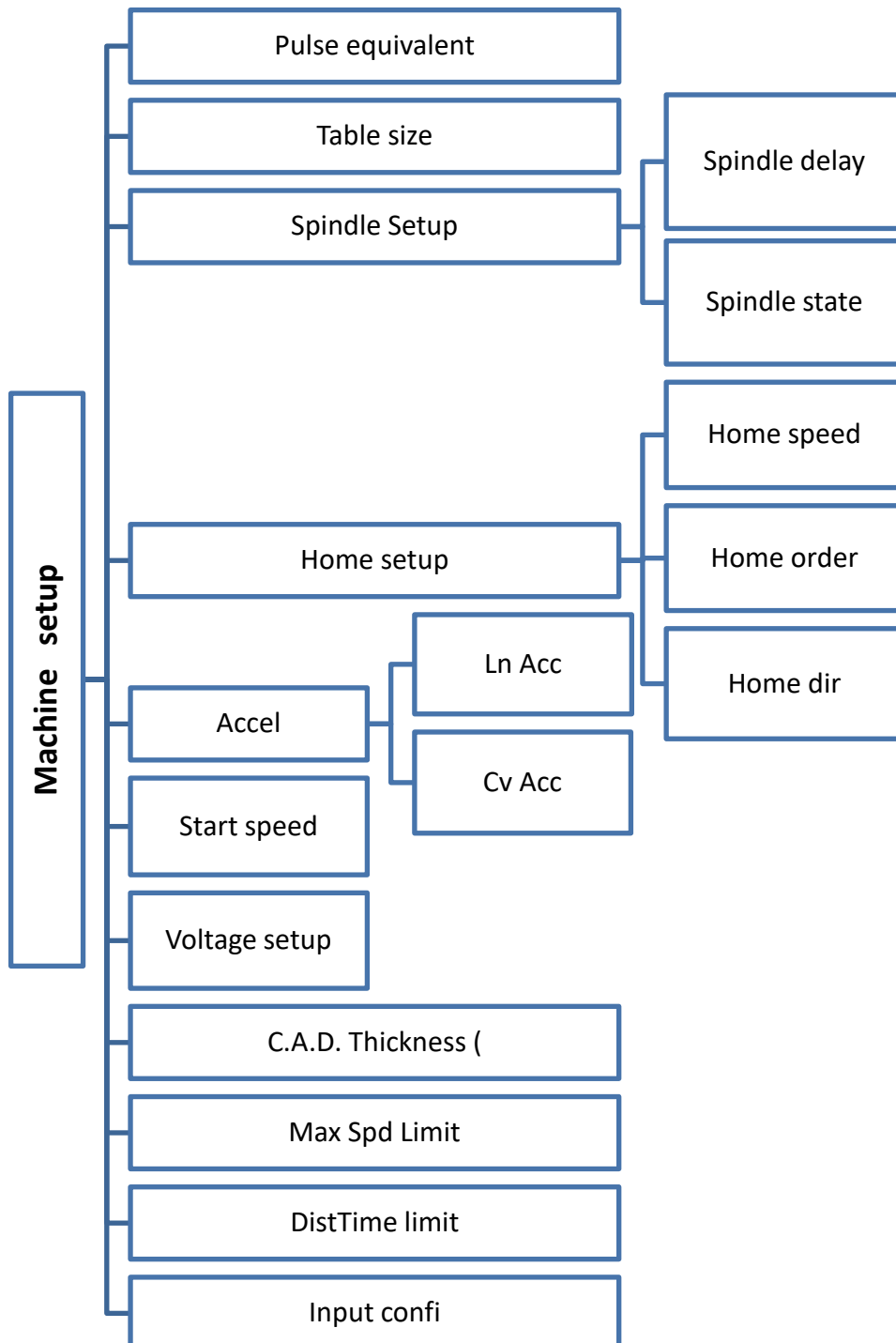
3.4. Output connections: Y5 is the output terminal of the status indicator, and Y6 is the operating indicator



Section 4. Introduction to the control panel menu

The **RichAuto** system menu is divided into several submenus: **machine setup**, **auto pro setup**, **system setup**, **operate file**, **version view**, each of which has corresponding subsections.

4.1. Machine setup (Machine setup)



4.1.1. Pulse equivalent (Setting gear ratios)

Pulse Equivalent - sets the number of pulses to move per unit length (millimeter). Depends on the installed stepper motor, the value of the gear ratio, the set number of step division (on the motor driver). If

the value is unknown, then it can be selected experimentally by changing the values and checking the amount of displacement.

4.1.2. Table size (Working field)

Table size sets the size of the working field for all three axes. Since the system uses not hardware, but software limiters on the axes, the size of the processed working field must exactly correspond to the actual one. If the size of the processed area is correctly set and the HOME or GOTO HOME operation is performed, the system will not allow the tool to leave the working field. When you go outside the working field, the inscription will appear on the screen: OVER THE LIMIT.

When entering this menu, the cursor will automatically select the X-axis. Enter the required value and

click "ORIGIN OK" to save the new value. The movement of the axis values is carried out by the and buttons "ORIGIN OK" and "STOP CANAEL". The [1-0] buttons cannot be used to move the cursor, because they enter the corresponding numeric values.

If the dimensions of the processed part exceed the dimensions of the working field, the system will issue a warning about the impossibility of processing. Change the dimensions of the part so that they correspond to the size of the working field.

4.1.3. Spindle Setup (Spindle Settings)

4.1.3.1. Spindle delay (Delay before spinning the spindle)

Sets the spindle start time in ms. This value also determines the time interval after which the system starts the spindle after reading the processing file.

4.1.3.2. Spindle state (Setting speed cells)

Spindle state – setting the spindle speeds. The controller provides the ability to change the spindle speed. If the spindle inverter and the control board are connected appropriately, the spindle speed can be changed using the controller when executing the program.

4.1.4. "Home" setup ("Home" Settings)

4.1.4.1. Home Speed (The speed of going home)

Sets the speed of movement on each axis and returns to the starting position. Default speeds: X,Y – 3000 mm/min, Z – 1800 mm/min.

4.1.4.2. Home order (procedure of going home)

1) Z and X,Y

2) Z,X,Y

- 3) Z,Y,X
- 4) Only Z
- 5) X and Y,Z
- 6) X,Y,Z
- 7) Y,X,Z
- 8) Initial position XY
- 9) X, initial position Y
- 10) Y, initial position X
- 11) Without initial position

4.1.4.3. Home dir (The polarity of the axes when going home)

Setting: Go to the "home dir" menu, press  or  to change the value, press  to change the initial direction, then click on  to save the changes.

4.1.5. Accel (Acceleration)

This parameter is used for more stable drawing of straight lines (LnAcc) and curved lines (CvAcc). Designation: mm/s². By default, the acceleration value is 800mm/s²

4.1.6. Start speed (Starting speed)

Unit: mm/min. The default starting speed of the system is 100,000 mm/min. Reduces the noise from the engine running at low speeds, the engine accelerates smoothly from the starting speed to the operating speed.

4.1.7. Voltage setup (Voltage setting)

This option is used to adjust the state of the input and output voltage, ↓ means that the terminal is open and working normally, ↑ - closed and working normally.

The arrows pointing upwards are responsible for setting the input voltage:

Set the voltage status of the input terminal. The variable voltage values are 4 (0,1,2,3), respectively, for the zero point of the X axis, the zero points of the Y and Z axes, and for the tool itself (milling cutter).

Arrows pointing downwards:

The arrows pointing upwards are responsible for setting the input voltage: Set the voltage status of the input terminal. Variable voltage values are 4 (0,1,2,3), respectively, for turning on/off the spindle and voltage status for multi-step 1, multi-step 2, multi-step 3 modes.

Setup: Enter the "input voltage setup" or "output voltage setup" menu, press "" and "" to hover the cursor, then press "", "" to change the arrows pointing up or down respectively, then press "" to change the voltage state.

4.1.8. C.A.D. Thickness (Zero position sensor of the Z axis of the workpiece)

This parameter must be set exactly according to the actual parameters, otherwise the cutter will either cut the clamp or will not touch the workpiece.

4.1.9. Max Spd Limit (Maximum speed limit)

Sets the maximum speed limit.

4.1.10. Dist Time limit (Time limit of manual movement mode)

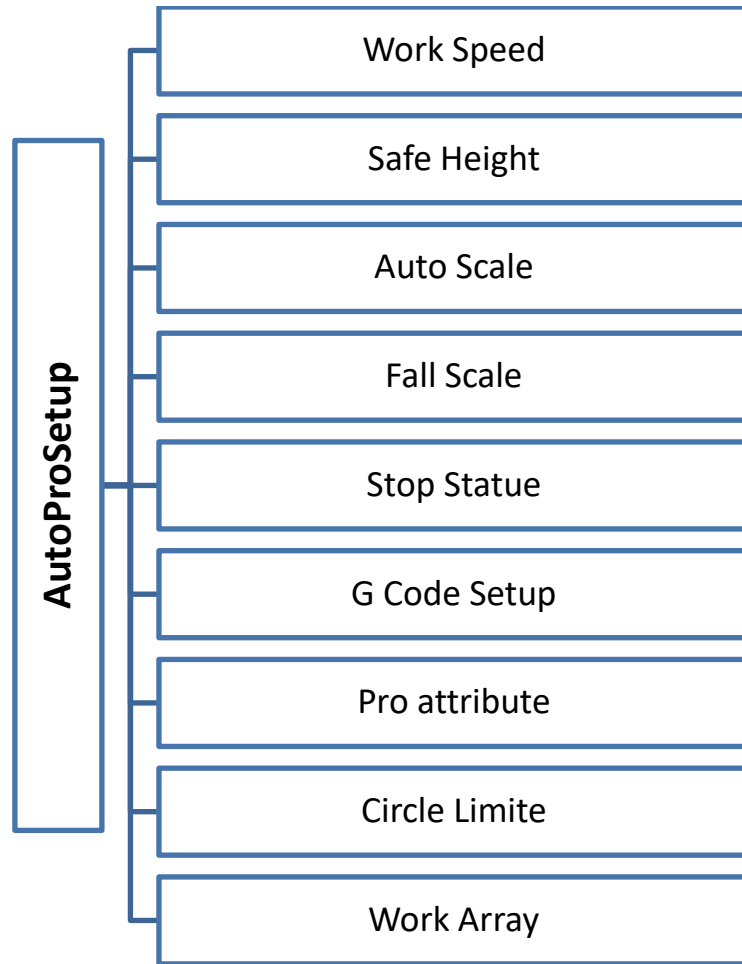
If you have selected the "Distance mode" mode and the machine has not performed any movements for a certain period of time (30 seconds by default), the system automatically switches to the "Continuous mode" mode.

4.1.11. Input confi (Loading configuration)

Loading the controller configuration from previously saved ones.

4.2. Auto Pro Setup Menu

This submenu contains the workflow settings, as well as the settings of the working layout file.



4.2.1. Work Speed (Working speed)

Designation: mm/min. Includes processing speed and moving speed. By default, the working speed is 3000 mm/min, and the moving speed is 6000 mm/min.

4.2.2. Safe Height

This indicator determines the height of the spindle along the Z axis during idle motion while executing a file.

4.2.3. Auto Scale (X and Y axis gradation)

The current task execution speed on the X and Y axes = Autoscale * processing speed. Does not apply to the movement speed.

4.2.4. Fall scale (Z-axis gradation)

The current speed of execution of the task on the Z axis = Fallscale * the speed of movement.

4.2.5. Stop Statue (Stop Status)

Setting the stop position after a stop:

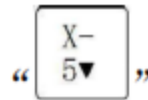
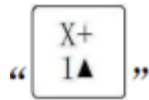
Work stop state

Finish action pick up

Xcoordinate 0.000

Ycoordinate 0.000

Zcoordinate 0.000



To set the work end position, press “X+ 1▲” or “X- 5▼” to search for the desired value, and then press “RUN/PAUSE DELETE” and enter the new required value.



Click “ORIGIN OK” to save the changes. Click again “RUN/PAUSE DELETE” to go to the next submenu:

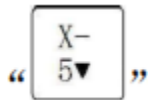
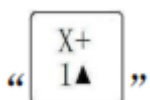
Pickup Z

Back to work origin

Back home

Back position

None move



Click “X+ 1▲” or “X- 5▼” to change the status value and then “ORIGIN OK” to save the changes.

4.2.6. G Code Setup (Setting up G code processing)

Sets special G code execution modes, including:

F read	Use the processing speed from the program
T read	Use the tool changer function

S read	Use the spindle rotation speed from the program
Read G54	Reading the command "Switch to the coordinate system specified by the operator"
Read G49	Reading the G49 command "Canceling the correction for the length of the cutting tool". The G49 command cancels the positive correction and the negative correction for the length of the tool, i.e. the G43 and G44 commands.
Read G40	Reading the G40 command "Cancellation of tool radius compensation". The G40 command cancels the positive correction and the negative correction for the tool radius, i.e. the G41 and G42 commands.

4.2.7. Pro Attribute (Additional settings)

Adj Z	Forward or reverse direction of spindle torsion
Adjust WP	Is the water sensor used
Ignore Z	Reading commands to move along the Z axis
CirLmt	Rotation limit

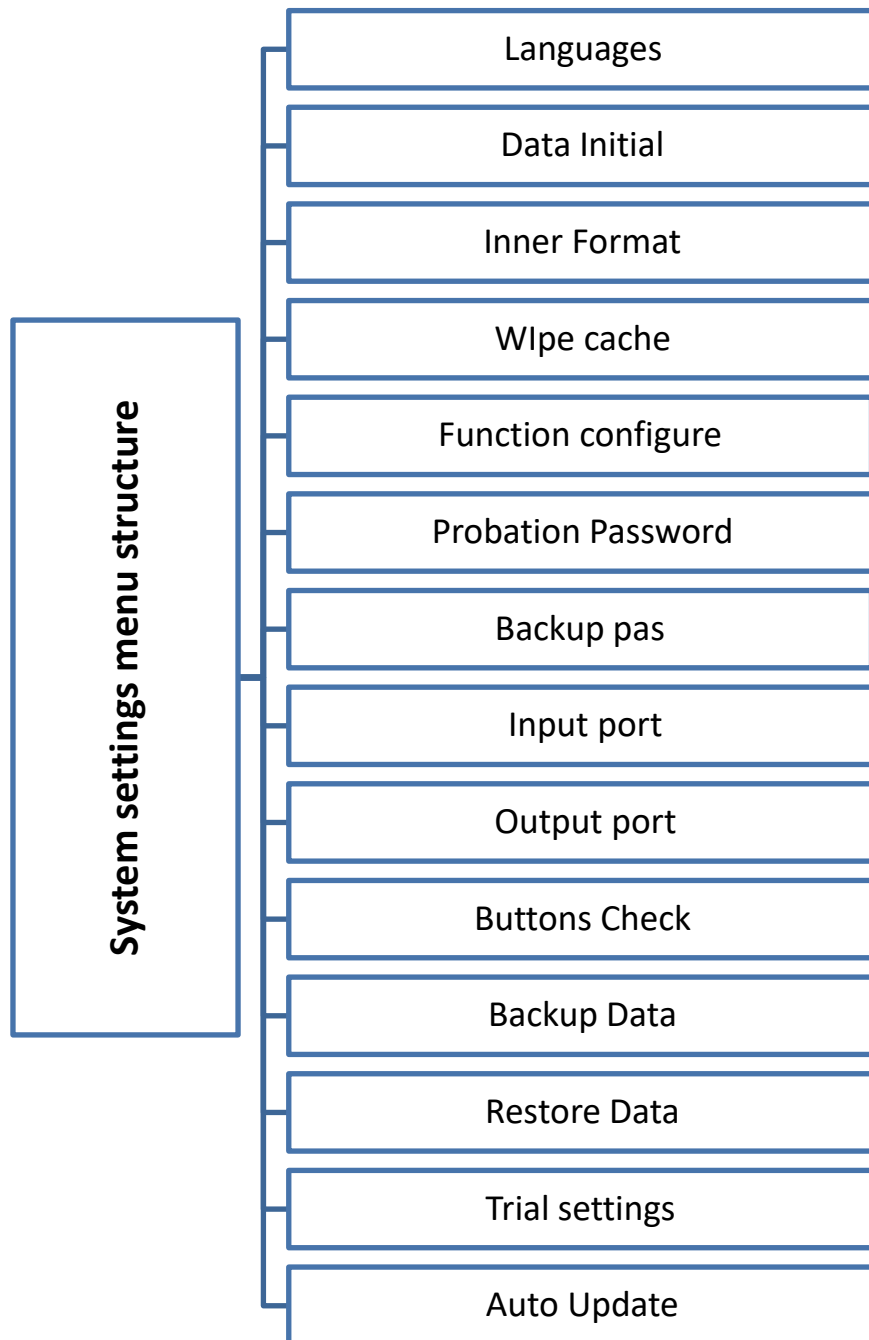
4.2.8. Circle Limit (Rotation limit)

By default, the system rotation limit is 1000.000.

4.2.9. Work Array (Working with arrays)

Setting parameters for working with arrays. Includes: **Column count** (number of columns), **row count** (number of rows), **column space** (distance between columns), **row space** (distance between rows), **interval** (time interval (units - ms)).

4.3. System Settings



4.3.1. Languages

Select the system language and menu language. Chinese or English.

4.3.2. Data Initial (Data Recovery)

Restoring the original system parameters.

4.3.3. Inner Format (Internal formatting)

Formats system files.

4.3.4. Wipe cache (Clearing cache memory)

Performing defragmentation and error checking. Do it every time after updating the system.

4.3.5. Function configure (Setting parameters)

Allows you to configure the following parameters:

- PausePkup (whether to lift the spindle along the Z axis by pressing the "Pause" button)
- Scale Fast
- Manual (idle movement mode)
- Pretrt
- QueryPara
- StartHome (the mode of movement towards home when the machine is turned on)
- Filesort (sorting files in the controller memory)
- Copy work
- RetOrg PZ
- TolstAct
- Paus rstr
- NI Mode

4.3.6. Probation Password (Trial password)

On the website <http://www.richauto.com.cn/en/> you can get a 20-digit access code to unlock all functions, which you can then change.

4.3.7. Backup Pas (Password for data backup)

Prevents accidental erasure or overwriting of default parameters. Provides default data recovery in case of an operation execution error.

You can cancel this password by selecting the menu item "enter new password" - do not enter a new password, just click "OK".

4.3.8. Input port (Checking input signals)

1,2,3: signal of the X,Y,Z axes 4: input signal from the tool(milling cutter)

5-7: driver alarm, severe restriction of movement, engine stop signal.

4.3.9. Output port (Checking output signals)

1: spindle on/off signal; 2-4: spindle speed signal; 5: driver alarm signal; 6; working indicator light signal

4.3.10. Buttons Check (Button test)

Checking whether the assignment of buttons corresponds to their functions. The test interface on the screen "highlights" the correctly assigned buttons. Press "OK" + "cancel" to exit this menu.

4.3.11. Backup Data (Data backup)

Creates a backup copy of the settings, which will not be affected by formatting.

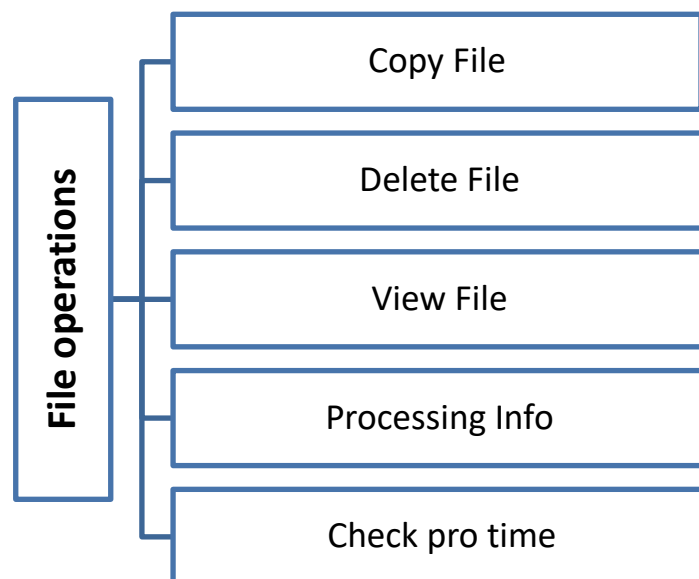
4.3.12. Restore Data (Data Recovery)

Restores settings from a specially created backup.

4.3.13. Auto Update (Automatic update)

Updating the controller firmware. Supported file format is *******.PKG**

4.4. File Operations



4.4.1. Copy File (Copying files)

Copying files from a USB storage medium to the built-in memory.

4.4.2. Delete File (Deleting files)

Deleting files from the built-in memory

4.4.3. View File (View files)

Viewing files on a USB drive or on the built-in memory

4.4.4. Processing Info (Production information)

Statistics on the number of successfully executed layout files.

4.4.5. Check pro time (Check file execution time)

4.5. System Version Information

Includes:

- 1) Product ID (Equipment ID)
- 2) Soft Version (Software Version)
- 3) Emergency Version (The version of the software downloaded in an emergency)
- 4) Update Version (Firmware Version)
- 5) Soft type (Software type)
- 6) Hardware type (Controller type)

Section 5. Machine control

5.1. Return to the starting position

When turned on, the device will display the following dialog box on the display of the manual motion control controller: "All axis home" - return the tool to its initial position on all axes, "Z home only" - return only the Z axis to its initial position, and "none axis home" - do not return the tool axes to their initial position. You can choose any option.

In some cases, if the work was completed normally, but the workpiece processing is not finished, you can continue and finish the processing program that you started. This is possible due to the fact that the system remembers the coordinate values.

5.2. Importing files for machine control

Before you start working, you need to set the program by importing layout files. There are usually 2 ways to do this: via USB media or from the internal memory of the device.

- 1) You can copy files from your computer to a USB disk – the controller recognizes them
- 2) You can copy files from the USB drive to the built-in memory of the device.

5.3. Manual processing operations

Manual processing means that we use the controller keyboard. We can also change the processing speed on the go. After returning the tool to its initial position, the display will show the following:

1X	0.000	manual
1Y	0.000	stop
1Z	0.000	high
Continue		

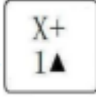
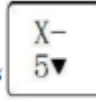
5.3.1. Precise adjustment of the movement speed

There are two modes: low speed and high speed. You can change the modes with the button . The screen displays the speed modes from which we can select the desired one.



Fine setting: In manual mode, press "cancel" to display the current speed mode. If the low speed mode is set, the following will appear on the screen:

Low spd, mm/min	
X axis:	1200.00
Y axis:	1200.00
Z axis:	600.00

Move the cursor (selection) to the X-axis, press “” or “” to change values, then press “” to enter a new value, then press “” to save the changes, and “” to exit this menu. If the entered value is out of the possible range, you can delete it by clicking “”.

In order to ensure the accuracy of work and debugging, such a concept as a grid is implemented in the system. In other systems of similar functionality, it is also present. The cell diameter of this grid varies from 0.5 to 1.0 mm. When selecting the step-by-step processing mode, the milling cutter will move along this grid.

In the case of high-speed mode, manual motion control is configured in the same way.

5.3.2. Manual movement modes

In order for manual motion control to be used in a variety of situations, our system offers several modes of operation: continuous, step-by-step and distance mode. The modes are switched by the button . A small icon at the bottom of the screen of the manual control controller shows the current processing mode.

1. Continuous mode.

In this mode, there are no special control restrictions, just press the buttons corresponding to the directions of movement:

(, , , , , ) , the machine will follow these directions and comply with the current speed limit.

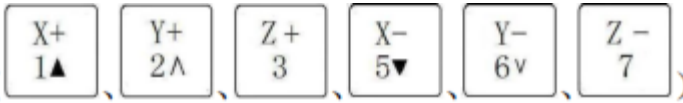
Note: if pressing the buttons in this mode is too short (less than 0.5 seconds), the machine will move to the next border of the grid. It will also stop at the border of the grid in case of switching to another mode. This mode is suitable for raw preprocessing of the workpiece.

2. Step-by-step mode.

This mode always works at a low speed, the movement goes along the coordinate grid, one cell in 0.5 seconds. This mode is characterized by its accuracy of operation and is suitable for fine-tuning the coordinates of the machine.

3. Distance mode (distance).

In this mode, the machine operates based on the distance set by the user. When the user clicks on the direction buttons:

() , the tool will move the specified distance in this direction.

The grid cannot affect this type of movement. The tool moves the specified distance, ignoring the grid cells.

If the user needs to change the distance, it is necessary to switch to the distance mode and reassign it.

5.4. Automatic processing modes

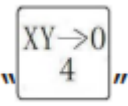
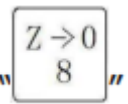
Automatic processing assumes that files from a USB storage medium or located in the controller's internal memory are used as a working program. Before switching to automatic processing, all parameters and settings of the **RichAuto** system of the machine itself must be precisely configured.

System Setup Steps:

1. Define and set the dimensions of the workpiece

The values of the coordinates along the X,Y,Z axes are actually the dimensions of the workpiece. Before working, we should carefully measure it and make changes to the system. To do this, you will need to perform the following operations:

Move the tool (milling cutter) to the position from which processing begins according to the layout file.

Click  to set the starting position on the X, Y, and axes  to set the starting position on the

Z axis. If the "tool setting" function is used, there is no need to press , and the combination of buttons for configuring the tool will be  + .

2. Select the file to process.

After we have set the initial position and dimensions of the workpiece, click , the following dialog box will appear:

Select work file

Udisk File

Internal File

Press the and buttons   to move the cursor, then press  to select the desired source. The first three files located on this medium will be displayed. Press  or  to move the cursor, as well as  or  to move the cursor selection through 2 lines, and  to exit this dialog.

3. Configure processing parameters

After selecting the working program file, click  and proceed to setting the processing parameters, which include processing speed, moving speed, speed coefficient, spindle depth coefficient.

Set work parameter

Workspeed 6000.000

Fastspeed 6000.000

Spindle Scale 1.000 (см 5.5.1)

Falldown Scale 0.200 (5.5.1 для оси Z)

Click “” or “” to move the cursor, click “” to enter new values, then click “” to save the values for the selected parameter. After that, proceed to change the following parameters using

the “” and buttons “”. After you have finished the setup, click “”, and the system will start checking the settings and the working program file. In this case, the number of pulses cannot change, it is only displayed. If you need to change it, go to the "machine setup" menu we talked about earlier. During processing, the handle display will display the current line, the current speed, the speed

coefficient and the operating time. This option can be disabled by clicking “”.

5.5. Processing operations

5.5.1. Adjustment of the displacement speed coefficient and the spindle rotation speed

Setting the speed coefficient:

During processing, press the buttons “” and “”. They directly change the coefficient. Current speed = speed in settings (speed mode) * Speed coefficient, with each click the “” coefficient decreases by 0.1. The maximum speed coefficient is 1.0, the minimum is 0.1. The displayed speed will change accordingly, but the processing time will remain unchanged.

Adjusting the spindle rotation speed:

This function will have an effect when the "multi-speed" parameter is enabled. During operation, press

the buttons “” and “” to change the spindle speed. Each click on “” increases the speed by 1 division. The maximum is S8. Each click on “” increases the speed by 1 division. The minimum is S1.

5.5.2. Pausing processing and fine tuning

To pause processing, click “”. The system status in the upper right corner will change from "run" to "pause". The machine will stop moving (but the spindle will continue to rotate!). The remote control screen will show something like the following:

1X	7.200	Pausz
1Y	41.300	S-ON
1Z	-0.200	Step
Line No.	356	

In this situation, you can adjust the position of the tool along all three axes, by default, the movement mode is step-by-step mode, the speed is low. The user can change the situation, this means that the tool will move at a low speed along the edges of the grid for each click, if we need to quickly and significantly change

the distance, we can change the speed mode by pressing “”. Then the movement mode will change to "continuous".

After that, when you click “” we will get the following:

1X	7.200	Pauz
1Y	41.300	S-ON
1Z	-0.200	Step
Restore Position?		

Restore Position? - The system asks the user for confirmation to save the changed settings. If you click  , the system will return to its original settings, and all changes will be canceled. Click  - and the system will continue processing with the new settings.

5.5.3. Interruption of the working process and protection against voltage shutdown

If for some reason you decide to stop or interrupt the processing of the product in the middle of the processing program, click  . The display will display something like the following:

1X	7.200	RUN
1Y	41.300	S1
1Z	-0.200	1.0
Save break?		

The system will offer to save the parameters relevant to the moment the process is stopped. If you want to save them, click  . The display will then display a list of 8 slots, you can use the buttons  or  to select the specific slot into which you want to save the stop parameters. Then press  and the system will automatically return the tool to its initial position on all axes. If we want to continue processing from the moment we stop, we need to use a button combination  +1-8". First, you will

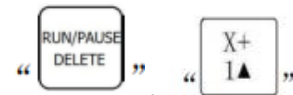


need to press and hold the button and press the button from 1 to 8 at the same time, then release them simultaneously, and the system will start processing from the saved stop point.



If you want to make a backup recovery from the stop point, click and enter the line number, and then click  - the system will start working from a new line (apparently, the table in the layout file is meant).

Before the recovery process, the system must return to its initial position. For example, if we want to



continue processing from the stop point, we can choose the combination + - so the system will restore the interrupted operation from slot 1, the same as from 2-8.

5.5.4. Voltage shutdown protection

In case of a sudden power outage during operation, the system will automatically save the current coordinates and settings, and when the power supply is restored, the system will continue processing from the moment of shutdown. Before that, the system needs to return to the initial position, then a dialog box will appear on the display:

Want to restore ?



To continue the unfinished processing process, click , to cancel the restoration of the processing process, click  .

5.6. Advanced processing

Advanced processing is a set of functions that satisfy a highly specialized request. The list of these functions includes: working with arrays, changing tools, working with parts, calculating faces, the button



combination: + calls this menu:

Advance Work

Array Work

Resume Work

Tool Changing

Part Work

Calculate Bound

5.6.1. Array Work (Working with an array)

1. Press  or  to move the cursor, press  to enter, and then press  or  to select various files.

2. Set the process parameters, other operations are the same as in the main process, and the system will start multiple processing according to the user settings.

3. You can also configure this function in the menu "Auto Pro" - "Work Array".

5.6.2. Resume Work

First we need to set the processing parameters in the "advanced setup" section, and after that we can use this function.

Setup:

Press  or  to hover the cursor over "Resume Work", press  to enter the submenu, then press  and  to select the desired recovery point, select, press  and the system will start restoring the interrupted workflow at the selected point.

5.6.3. Tool Changing

Manual tool change function. Click  to enter the settings and click again  to return to the workflow.

5.6.4. Part Work (Working with parts)

Working with parts means that the user can select the start line and the end line from the layout file, thus processing the product using part of the layout file.

Setup:

Press  to enter the menu, then press  or  to move the cursor to the layout file you need.

Then click  to select the desired file and start viewing it.

The first line of the code will be displayed on the display, press , and you will be prompted to manually enter the desired line from which to start processing. Enter the desired line or navigate to it using the buttons  or , then press again .

If such a line does not exist or it is impossible to start the work process from it, click  to delete the entered number.

Next, click , the operation with the end line will have a dialog box "input end number" (enter the end number). In it, enter the line number from the layout file table that you plan to finish processing. Then click  to confirm the changes.

5.6.5. Calculate Bound (Calculation of the workpiece boundary)

Calculation of the workpiece boundary:

Setup:

To enter the settings, tap , then tap  or  to select the appropriate list of files.

Click  to enter this list of files and click  and  to select the appropriate file.

Click  to select a file, after that the system will start calculating the faces.

5.6.6. Mill plane (Surface milling)

Milling Type

Scan Mill

Encircle Mill

5.6.6.1. Scan mill (Scanning):

1. Press  or  to select different types.

2. Click  to enter the plane settings. These include the scan type, height, width, diameter, depth, and Z-axis pitch.

Scan Mill Set	
ScanType	X Scan
Width	100.000
Height	100.000
Diameter	10.000
Depth	0.000
Z Step	0.100

3. Press “” or “” to select the parameter you want to change.

Click  to select the scan type (Y-scan or X-scan) and the parameter. Click  to save the changes.

5.6.6.2. Encircle mill (Circular processing):

1. Press “” or “” to select different types.

2. Click  to enter the plane settings. These include the scan type, height, width, diameter, depth, and Z-axis pitch.

Encircle Mill Set	
ScanType	AC
Width	100.000
Height	100.000
Diameter	10.000
Depth	0.000
Z Step	0.100

Press “” or “” to select the parameter to be configured. Click  to select the scan type (clockwise or counterclockwise) and the parameter itself. Click “” to save the changes.

5.6.7. Calculate work time (Calculation of file execution time)

5.6.8. Find break No (Find the number of the corrupted line)

Finds a line of program code. If your tool accidentally broke and the user did not stop the program, then you can restart the machine, change the tool, bring the tool along the X and Y axes, close to the point where

the previous tool broke, click “” on the “Find break No” line and select the previous file. The system

will start scanning the file code, after which it will prompt you to click “” to continue executing the

file, or click “” to check the line of code proposed by the system, with which it was suggested to continue executing the file.

5.6.9. Scale work

If you currently need to mill a file, but of a different size, then you can select the “**Scale work**” parameter and increase or decrease the size of your file.

Section 6. Automatic system update

Updating via USB media.

This method is an upgrade using the USB interface of a manual controller, so there is no need to connect the system to a PC. The extension for update files is *.PKG. To update, follow these steps:

1. Save the update files on a USB storage medium and insert it into the USB interface of the manual controller.

2. Click , select "system setup", then click  to enter the submenu, and click  or  to go to the "system update" section.

3. Click  to enter the submenu and select "U disk files", select the extension for the update files(*.PKG). The system will start updating automatically.
4. After the end of the update, the manual motion controller should be restarted.

Section 7. Elimination of major malfunctions

Malfunction: erratic screen flickering and cyclical system reboot

Causes and solutions:

1. Insufficient power supply. Check the power connection, cables and wiring, switch to better network maintenance.
2. The local network is unstable, there are significant voltage drops. Check the stability of the mains voltage. If you have a transformer with manual control, increase the voltage.
3. The problem lies in the controller power chip. The same problem appears when the device is connected to a computer via a USB power port. In this case, you will need to replace the controller.

Malfunction: inability to set operating settings

Causes and solutions:

1. You can switch to a mechanical coordinate system. Press "menu" + "1" to switch to the initial coordinate system.
2. The buttons may be incorrectly assigned. Go to "menu" - "systemsetup" - "buttoncheck" to check the correct assignment of buttons.

Error: The size of the workpiece does not match the actual distance that the milling cutter passes

Causes and solutions:

1. The number of pulses is set incorrectly
2. You have chosen the wrong tool

Error: The "beyond limit" error is displayed on the screen during the workpiece processing

Causes and solutions:

1. At the end of the work last time, the machine was not returned to its original (initial) position and now the system cannot set the coordinates of the current position. Return the tool to its initial position.
2. After determining the working dimensions, it turns out that the distance reserved for the workpiece is less than the length of the workpiece. Measure the length of the workpiece again and set the correct working dimensions.
3. You imported the wrong layout file. Check the path to the file and, if necessary, import another file.

Error: The Z-axis (spindle) descends too fast during operation

Causes and solutions:

1. The value of the operating speed is beyond the speed characteristics of the Z axis (significantly exceeds the maximum speed). "machine setup" - "max speed limit" - set a safe value for the maximum speed limit.
2. Clutch losses or transmission slippage. It is recommended to adjust and, if necessary, replace these parts.
3. Violation of the connection between the built-in adapter card and the power electromechanics of the machine. Connect the connections.

4. Error executing the processing sequence from the layout file. Check the integrity and damage of the file, download another file from a USB drive or use the built-in memory.

5. Problems in the connection of the Z-axis motor and its driver. Check the connection, reconfigure if necessary.

Problem: every time after returning to the initial position, the program for processing the same layout file is repeated, but with different values of the processing depth along the Z axis

Causes and solutions:

1. Most likely, the workpiece is incorrectly fixed or the geometry of the clamp is broken. Adjust the clamp plane.

2. The Z-axis position recognition sensor repeats the cyclic error, causing an incorrect return to the original position of the tool on the Z-axis. Replace the sensors

3. A large amount of interference when moving the tool to its original position along the Z axis. Reconfigure the connection

Problem: When returning to the starting position, the rotation of the tool does not stop and the machine continues to work

Causes and solutions:

Double-click on the "menu" button, testing the input signal of the position recognition sensor, if the detection signal is triggered, check the connection:

1. The position recognition sensor is faulty. Replace it with a new one.

2. The distance between the sensor and the scanned surface (workpiece or clamp) is too large. Reduce this distance.

3. Problems in the integrated circuit board. Replacement of the board is required.

4. Malfunction (rupture or twisting) of the 50-pin information cable. Replace the cable.

Problem: when the tool returns to its original position, the machine moves in the opposite direction

Causes and solutions:

1. The detection sensor does not match the definition of the corresponding level. Change the level. (Normally open type corresponds to the level of determining the direction of the down arrow, normally closed type corresponds to the level of determining the direction of the up arrow).

2. The position recognition sensor is faulty. Replace it with a new one.

3. The position recognition sensor is incorrectly connected to the built-in card. Check the correctness and reliability of the connection

4. The level of interference or electromagnetic field is too high, leading to false alarms of the sensor.

5. Problems in the integrated circuit board. Replace the board.

6. Malfunction (rupture or twisting) of the 50-pin information cable. Replace the cable.

Problem: abnormal behavior of the machine when executing the program from the layout file, or the difference between the actual program being executed and the theoretical one contained in the file

Causes and solutions:

1. Disruption of the program.

2. Too strong external interference or electromagnetic field. Reconnect the main units, disconnect and reattach the GND terminals.

Problem: when the automatic tool setting is turned on ("automatic tool setting"), the tool does not stop moving after swinging the surface with the probe

Causes and solutions:

1. The signal line of the milling cutter is unstable connected to the integrated circuit board. Check the connection.
2. The terminals of the "GND" terminal of the integrated circuit board are unstable connected to the spindle shell. Check the connection.

Problem: the machine does not respond to control from the controller

Causes and solutions:

If one of the axes does not move, the problem may be an incorrect connection. Perhaps the fault lies in the built-in board or 50-pin cable. If the axle is still not moving when checking the latter, it is necessary to check the corresponding driver and motor.

Problem: the tool normally moves from one working position to another, but the return to the starting position is incorrect

Causes and solutions:

Most likely, the problem is mechanical in nature. Check the connections of the moving parts.

Problem: when the manual motion controller is turned on, spontaneous movement of the tool along one of the axes or along all axes is observed

Causes and solutions:

1. Incorrect connection of the drive of the corresponding axis to the integrated circuit board. Check that the connection is correct.
2. Problems in the integrated circuit board. Replace the board.
3. The drive is damaged. Replace the drive.

Problem: there is no response to control from a manual controller from a specific axis drive

Causes and solutions:

1. The connection terminals of the pulsation and the direction of movement were confused. Connect the terminals correctly.
2. The negative power terminal of the 5V drive is not connected. Connect the terminal.
3. The drive is damaged. Replace the drive.
4. Problems in the integrated circuit board. Replace the board.

Problem: The display of the manual controller does not light up when it is turned on. When connected to a computer via a USB power interface, the problem goes away and the screen lights up

Causes and solutions:

1. The controller is not connected to the power supply system. Check that the DC24V cable is connected correctly, if it is connected correctly, check the connection to the built-in board.
2. The 50-pin cable or its connection interface is damaged.

Problem: The manual controller does not respond to the power button. Connecting to a computer via a USB power interface does not solve the problem

Causes and solutions:

1. There may be mechanical damage to the controller as a result of impact or fall. Repairs are required.
2. There may be problems in the circuits of the device. Repairs are required.
3. The operator has connected too much voltage. Repairs are required.