

# 2-Axis Move Controller

**HC**130-2 (3.25)

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## 1. Notice:

**★Please read this manual carefully before operating the system and then continue the related operations.**

Read the operating instructions carefully and user safety guidelines, and take necessary safety measures. Please contact with the company if you have any other problems.

### **Work environment and protection:**

1. The work environment temperature of the control system is 0-40 °C, the system will doesn't work well even crash wait for a phenomenon if the environment temperature out of this range. If the temperatures are too low (minus), liquid crystal display won't display properly.
2. Relative humidity should be controlled in 0-85%.
3. If the work temperature is under high-temperature, high- humidity, caustic gas, must adopt the special defend measure.
4. Control system should be insulated from outside to avoid dirt and powder entering and result in control system working abnormally, system parts damaged, etc.
5. The LCD screen is fragile and proper care is necessary in the process of operation : make it far away from the sharp objects; Avoid the air object hit the screen; When the screen have dust to clean, use the soft tissue or cotton application gently erased.

### **System operation:**

Operating system need press the corresponding operation key, when you press the button, you should use forefinger or middle finger belly press, avoid by all means use a nail press buttons, or it will cause the damage of the buttons face film, and affect your use.

The first operator of the operation, should be in understanding the correct way of using the appropriate functions, conducted only after the corresponding operation, for not familiar with the function or parameters, forbidden and optional operation or changing the system parameters.

The initial actions of the operator may carry out the appropriate action after understanding the correct way of using the appropriate functions, for those familiar with the functions or parameters, no arbitrary

For the problem of the operation you used, we will provide the telephone consultation service.

### **System maintenance:**

When the system is in an abnormal condition, need to overhaul corresponding link line or socket joint, you should cut off power supply system firstly. Then make the necessary repairs.

The system operator should be strictly trained and specified special operator.

### **Special statement:**

The quality warranty of this product is twelve months since its manufacturing date covering the faults specified by this user's manual.

Paid service is available for faults caught beyond the warranty period and outside the quality warranty coverage.

The following cases are not covered by the manufacturer's quality warranty:

Any violation of the usage of human failure or accidental failure, especially voltage reverse fault;

Damage caused by hot plugging system socket;

Damage due to natural;

Damage caused by unauthorized actions such as demolition, alteration, disassembly, modification, repair, etc.

### **Other matters:**

If this statement is inconsistent with the system function, and not exhaustive, is subject to the system software functions.

If the control systems functions have change or improve (upgrades) it is subject to the change and without prior notice.

## **2. Overview:**

"Motion controller" adopts high-performance 32-bit CPU is our company's latest product,

drive device used subdivision of stepper motors or servo motors, are equipped with liquid crystal displays, hermetic touch keyboard. The system has Characteristics of the high reliability and high accuracy, low noise, easy to operate and so on.

The controller can control four motor sports, **point, linear interpolation** operations can be realized. It has loops, jumps, and other functions. Simple, clear parameters make your operation more easy and fast. Input/output settings feature can facilitate your use and maintenance.

## 2.1 Key features:

Parameter settings: you can set all control parameters and processes, operations, make the processing effects reach the best.

Manual operation: high and low-speed manually, **point move, back to program parts and mechanical parts and zero out the coordinates**, etc. Those functions can be realized

Program management: you can create, delete, modify, reading, save, saving, importing, and exporting the program. Teaching function (that is built with a manual way to have access to programs)

Automatic processing: can realize the single/continuous, free running, paused, and other functions.

External Manual: can define a variety of external manual functions and it's convenient to use

Free choice of input: make limited input port can realize all kinds of customers

Directive rich: nineteen multifunctional instructions to meet the various functions you need

Quick point: axis top speed can improve efficiency

Subprogram: subroutine calls, can be nested to eight layers

Broken: moving into current interruption by external signal processing

Follow-up: the move of the axis movements in the process according to the input shaft

Logging stopped: To suspend the current program done execution after you see the input points effective

Counter: plus, minus one, setting, the jump

## 2.2 System:

CNC system mainly consists of the following parts:

- high performance, high speed 32-bit
- liquid crystal displays (resolution: 192 x 64)
- special motion control chip (signal output for: 5 V TTL)
- input/output (no. 10 photoelectric isolated 24 V input, 10 road photoelectric isolated 24 V

- user processing program memory (can store 48 programs)
- biggest line number 400 line program
- film button array (28 key)

### 2.3 Specification:

- minimum data unit 0.001 mm
- biggest data size + /-9999.999 mm
- fast movement speed limit point 8000 mm/min (pulse equivalent to 0.001 mm)
- highest speed processing speed limit 8000 mm/min (pulse equivalent to 0.001 mm)
- the highest pulse output frequency 150 KHz
- number of control shaft 2 axis (X, Y)
- number of linkage shaft Round 2-axis (x, y), circular interpolation
- electronic gear molecules (n): 1-65535, the denominator (m): 1-65535
- system main function: automatic and manual, program editor, system parameters, bit, setting, etc

### 2.4 Appearance and panels:

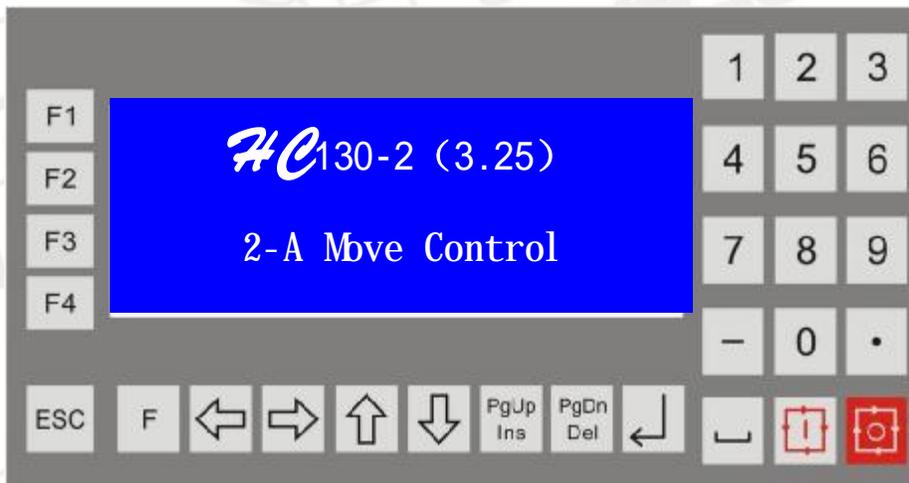
Overall dimensions: length 172, width 94, thickness 30

Embed size: length 162, wide 84, thickness of the front panel 4

## 3. Operating instructions:

### 3.1 Splash

You will see the following screen after the control system work



Waiting for a few seconds or press any key to enter the following main screens:

AutoProg	X 0000.000
Man Oper	Y 0000.000
Program	Z 0000.000
Parm.Set	T00.00 F0000 100% 0001

Now through F1-F4 on the left of the function keys to select the appropriate function for the various operations.

At the same time in the main screen press "return" + "F1" access "key test", then press the appropriate key, the screen will display, this feature can help us detect whether the press is operating normally.

### 3.2 Manual

Under main screen, press F2 and enter the manual operation state

HighFeed	X 0000.000
PlusOper	Y 0000.000 N001
ProgZero	Z 0000.000
MachZero	T00.00 F0000 100% 0001

High speed manual: manual high or low speed switch, when it display is to show the low speed (Fl) movement, and the invert at high speed (Fh) movement

Move action: Access points dynamic state, to set the value for the step, press key movements.

Press the "point start operation", this time can enter the point start value, then press enter

Back to the program zero: Return to coordinate zero, click this button, it will immediately returned to reference point (0, 0) points by the highest speed. The other note: when you elected the "the automatic" which in the "Settings" of the "system" in "options", each axis movement with the highest speed, first come first stop.

Mechanical zero back: return to mechanical zero point, (note: click this button was chosen be white, need continue to press an axis in a certain direction)

Manual key: X+: →, x-: ←, Y+: ↑, Y-: ↓

Speed rate of key: rate increase: Pg Up, rate of decrease: Pg Dn

Coordinates are zero: In the interface, press the " + 0" clear all the coordinates of shaft for 0, press "Spaces + 1" only the X axis, similarly press "Spaces + 2" only clear the Y axis

When "the manual" effective, under main screen or manual function, the manual button are effective.

### 3.3 External operational functions

External start: the start button of external by "the start" the option of control, and is equipped with effective input points.

Outside the pause: external pause button, by "the pause" option control, and is equipped with effective input points.

Speed up: external speed rate rise button, the "speed up" option control, and is equipped with effective input points.

Speed down: external speed rate drop button, the "slowed" option control, and is equipped with effective input points.

External Manual: external manual button, by "the manual" option control, and is equipped with effective input points.

External X+: external X axis positive movement button

External X-: external X axis negative movement button

External Y+: external Y positive movement button

External Y-: external Y negative movement button

The process zero: external back to program (coordinates) zero

Outside knob machine zero: external back to mechanical zero button, according to X Y order

The high speed: external high or low speed movement switch

The point of move: external point move/continuous selector switch

Note: the machine for external mechanical zero back button, press the X, Y order to return to mechanical zero, **when a shaft of mechanical zero not set effective input points (number is 0), the shaft will not return to mechanical zero. The directions are negative of back to the zero.**

### 3.4 Automatic

Under main screen by pressing F1 or the "start" button or the "external start" button to automatically process status

When the "parameter" in the "system parameters" under "options" in the "no execute" is selected, press F1 or the "start" button or the "external start" will enter the main screen automatically, but does not execute the program (when you press start the program running again); Otherwise directly started the execution of the program

	X 0000.000	
	Y 0000.000	N001
NoOper	T 0000.000	
Si ngl Seg	P0000 F0000 100% 0001	

Empty run: when properly processed, Invert is empty when you run.

Single period of execution: when was to run continuously, for single-segment run against time.



Cycle start: used to start the execution procedures or pause, after the period you can continue execution.



Campaign pause: used to suspend the execution of the program.

Manual adjustment: the option "pause" is selected, can be suspended for manual adjustment

High speed manually: speed when you switch manual

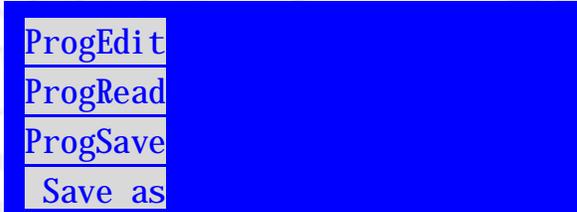
Movement: according to the set length movement

Return to the stopping point: return to pause's position

Set to stop: sets the current location to suspension points (trajectory panning)

### 3.5 program management

On the main screen by pressing F3 to enter program management menu



Program editor: enter the program input and modify state.

Program read: reading the processing programs saved in the system.

Program resident: to save the current program.

Save the program: the program with a new file name (not already has the same name as the program name, or you will overwrite the original, and programs).

Through the "F" key to achieve the menu switch.

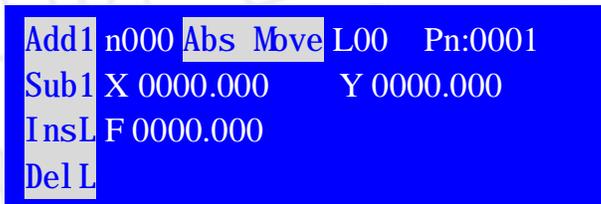
New program: will clear the current program area.

Program to remove: through the "enter" button to delete the cursor in the program files.

Document receiving: received by the host computer sends the program file (this feature must purchase another this company worthy of industrial communication lines)

Documents send: sent by the machine controller up program files (this feature must be purchased in addition to this company worthy of industrial communication lines)

#### 3.5.1 Screen display shows



The first line from left to right, for:

N: the current line number (0-999);

The end: command name field, control directive total 14 control orders (see the fourth chapter);

**L: the bank marking, the only when a jump will jump to the bank, need to select a label value from 1-99, 0 are not tagged;**

Pn: the name of the current program

The second, third, and fourth is the content of the show for (different instructions different data input instructions):

X, Y: coordinates or incremental values of sports instruction.

T: delay if delay value (0.1 seconds), the loop to loop (0-9999 value);

F: velocity specified on the "linear interpolation", "circular interpolation" effective;

P: input/output designated, the input value of 1-10, the output value of 1-10;

N: jump instructions label for the purpose specified, demand jumps to the label, value of 1-99

S: input/output state, a value of 0 or 1

### 3.5.2 Description press Edit State

←: Move the cursor forward, when you move to the best bits of the field, then you continue press it will does not work, automatically skip the decimal point

→: Move the cursor back, when you move to the lowest level for this field, then you continue press it will does not work, automatically skip the decimal point

↑: Forward moving, cursor in the command field, press again and then you will go to the previous program

↓: Back field, the cursor in the last field, press again and then you will enter a segment

**F1 (plus one):** when you enter a location when the cursor is in the digital, Digital Plus, plus automatically carry 9 o'clock;

When the cursor is in the sign bit, then the "-" and turn of the air, **when the cursor is in the instruction field, cycling forward select different instructions.**

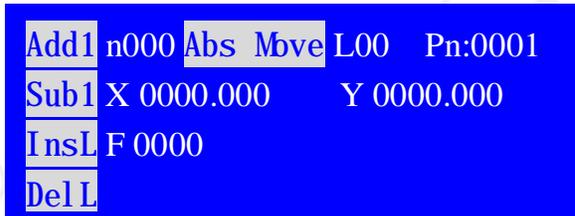
**F2 (minus one):** when the cursor is in numbers when you enter a location, number minus one, borrow automatically reduced to 0 o'clock; **When the cursor is in the sign bit, then the "-" and turn of the air, when the cursor is in the instruction field, cycling back to select a different directive.**

F3: inserts a line (End) at the end of the current line

F4: delete the current program line

PgUp: forward one line

PgDn: backward one line



### 3.5.3 Program reads

After you enter this function, screening 48 user programs, through the top, bottom, left and right cursor keys to select the program name and choose the right press "enter" key, then read in the contents of the program.

Note: shows "----" for no program

### 3.5.4 Program deletes

After you enter this function, screening will have 48 user programs, through the top, bottom, left and right cursor keys to select the program name and choose the right press "enter" button, the program is removed.

Note: shows "----" when no program

### 3.5.5 Program management description

If you modify the error, "reading program into" read into the program instead of modify.

If you want to save the current changes, use the "Save" feature (if more programs may be stored for a long time, please be patient).

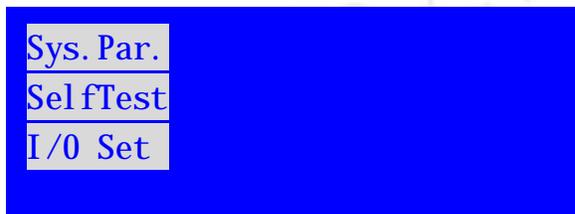
If you save, with different file name and click "Save" directly after entering the file name can be determined;

Note: If you press "space" key, you can switch nine numeric keys represents a letter, number that is representative of the number keys can be used to represent letters, so that the name can be saved into name consisting of letters and numbers.

Note and is overwritten when the file the same name as the original file.

## 3.6 Parameter settings

On the main screen press the F4 key to enter into the argument is set under Settings menu



System parameters: enter the system parameter setting function.

System self-test: enter the system self-test.

I/O settings: enter the I/O Setup function.

### 3.6.1 System parameters

Select the "system parameters" enter the system menu:

Option: the selected related to control options

System: system parameters with control

Value: restore factory value, misuse of this feature, you can keep turn off the power on again.

Save: saves the current parameters

#### 1. Selected top



```

ctrl  LintX+   Li mtX- 
syst  LintY+   Li mtY- 
defa alarm   Emergency stop 
save  X zero    Y zero 

```

X is limit: X is to limit the prohibition or effective.

X-limit: negative limit ban x or effective.

Y is limited: y is to limit the prohibition or effective.

Y negative limit: y negative to limit the prohibition or effective.

Alarm: alarm signal 1 to prohibit or effectively.

Emergency stop: emergency stop input ban or effective.

X-zero-point: mechanical zero x switch normally open or normally closed.

Y-zero: mechanical zero y switch normally open or normally closed

**Note: zero point setting does not tick tick time is normally closed, normally open, running speed is zero by manual runs high speed**

External start: external start button to prohibit or effectively.

External suspension: external moratorium on button to prohibit or effectively.

Speed up: external speed-speed knob prohibited or effectively.

Speed: spin external buttons to prohibit or effectively.

GM code: after the tick, command names are displayed when editing a program for GM code

English: software interface English switch, check for English, don't check in Chinese

External Manual: external manual control function (program zero, back to the mechanical zero, external high speed switching, switch points out the linkage, external manual control motor positive inversion) is valid, the default is invalid, or check is valid.

Turn off the output: when you press the emergency stop because an emergency situation, all output is closed. Default is none, ticked off.

Coordinates: when the program is started automatically by default coordinates are zero, after the check, when you start the program automatically saves the current coordinates

The automatic: don't check, back to the coordinates 0 o'clock on all axis linear interpolation maximum speed at the same time back to zero at the same time, after the tick, are the highest speed of each axis coordinates back to zero point, close, far back in place.

Recorded coordinates: after shutdown is recorded at coordinates

Suspended: following a suspension can be manually adjusted

**Note: set the tick above as valid, don't check for prohibited**

With the up and down cursor keys to select the option you want to change, and move with the cursor. Enter to switch the two states. Parameters will affect the status of the implementation of some features, it must be corresponds to the actual.

Limit, alarm, abrupt stop are often closed switch. Switch mechanical zero can choose to often open or closed.

The key operation (start, pause, acc, slow down, External control) are often open.

## 2. System parameters

<u>ctrl</u>	Xn00000001	Xm00000001
<u>sys</u>	Yn00000001	Ym00000001
<u>defa</u>	speed00100	highest06000
<u>save</u>	time00500	point06000

X molecules: X electronic gear molecules (value range 1-65535)

X the denominator: X electronic gear the denominator (value range 1-65535)

Y molecules: Y electronic gear molecules (value range 1-65535)

Y the denominator: Y electronic gear the denominator (value range 1-65535)

The speed: motor starts faster (unit: mm/points)

Highest: motor top speed (unit: mm/points)

Time: motor acc time (unit: milliseconds)

Point: the highest processing speed (unit: mm/points)

High speed: manual high speed (unit: mm/points)

Low speed: manual low speed (unit: mm/points)

Zero velocity: back to zero to return to speed (unit: mm/points) incremental: a dynamic incremental value

X gap: value of the X axis reverse gap

Y gap: value of the Y axis reverse gap

X zero: X axis machine zero point coordinates

Y zero: the Y axis machine zero point coordinates

### E-gear set

Molecules and the denominator show the numerator and the denominator of the x, y, z axis e-gear respectively. The numerical values of the range of 1-65535

### Method of determining numerator and the denominator:

Motor rotation needed a week of one-way pulse several (n)

Motor one-way turn a week moving distance (in microns for unit) (m)

Be simplification as a fraction in lowest terms, and the numerator and denominator are integers of 1-65535. When you are infinite decimals (such as  $\pi$ ), multiply the numerator and the denominator the same the same number (Calculator test ride many times and remember the value of determining recalculated after eliminating calculation errors) to the numerator or denominator decimals with minimal impact. But an integer numerator and denominator should be 1-65535.

Ex 1: ball screw transmission: stepping motor drive for a turn 5000 steps segments, or servo driver every turn 5000 pulse, ball screw guide process for 6 mm, slow down, ratio of 1:1, or 1.0

$$\frac{5000}{6 \times 1000 \times 1.0} \Rightarrow \frac{5}{6}$$

Namely: molecular for 5, the common denominator for six.

Example 2: super-modulus gear: stepping motor drive for a turn 6000 steps segments, or servo driver every turn 6000 pulse, gear 20, module 2.

The gear turns a week rack movement  $20 \times 2 \times \pi$ .

$$\frac{6000}{20 \times 2 \times 3.14159265358979 \times 1000} \Rightarrow \frac{1}{20.943951} \Rightarrow \frac{107}{2241.00276} \Rightarrow \frac{107}{2241}$$

Namely: molecular for 107, the common denominator for 2241, the error for 2241 mm difference within 3 microns (attention should be precise enough impedance).

### The calculation method of electronic gear (adjust the method is as follows:

- (1) Firstly set an electronic gear ratio, an example: 1:5;
- (2) Move a standard distance (as long as possible) on the machine, measure actual distances, brought into the following formula

"Molecular" X [walking distance]

"The common denominator" X [actual walk distance]

Simplify the fraction in lowest terms on

Cases: preliminary design of electronic gear ratio, for example: 1:5, 1000 mm, actual 1837 mm.

$$\frac{1 \times 1000}{5 \times 1837} = \frac{200}{1837}$$

### Use electronic gear precautions

1. If using ac servo, as far as possible the controller electronic gear set to 1, and change the servo drive electronic gear set.
  2. **Electronic gear ratio (molecular and the denominator than) should as far as possible or 1,** when electronic gear than 1 highest speed can be up to 9m/points, when electronic gear than was 2 top speed up to 4.5m/points, when electronic gear for 0.5 top speed of 18m/min. This is the theory of system speed, and mechanical, electrical power by, motor speed factors.
  3. Electronic gear molecules, and are not the denominator for zero, negative or decimal.
  4. Electronic gear of a ball screw, rack linear error of linear compensation.
  5. System of electronic gear can step into the drive with fine points, servo motor electronic gear together modification. To ensure the electronic gear ratio is not more than 1. Anyhow, the system to set the most running at a high speed, the output of the highest frequency should be < 150 KHz. Otherwise there will be no accurate phenomenon.
  6. When using stepping motor, and electronic gear ratio of 1:1, the system in the process of sport vibration and noise will reduce, or there may be some vibration or noise
- Electronic gear ratios for the reciprocal of the pulse equivalent--that is a system of a pulse, mechanical practical movement distance (unit for micron).

### ●Rise-and-fall profile setting

Start velocity (speed): starting speed of the motor starts (units: mm/min, min 60);

Speed limit (maximum): motor needs to achieve maximum speed (unit: mm/min, up to 9,000);

Speed-speed of time (hours): boot speed to the speed limit required time (unit: MS, Max 1000)

**Description:** boot speed, speed limit, speed increase and speed curve relating, this system on the basis of the above three parameters, automatic calculation of an s-shaped curve. The actual lifting speed curve parameter and the motor type and manufacturers, the

highest speed of the motor, motor start frequency, mechanical drive transmission ratio, the weight of the machinery, mechanical inertia, the size of the reverse clearance, mechanical transmission resistance, the motor shaft and ball screw shaft of the coaxial degree, in the process of transmission power loss, drives the output power of the state, drive the set, pay attention to set reasonable, otherwise will appear the following phenomena:

Throw step: start high speed/acc time too short/high speed limit

Stall: start high speed/acc time too short/high speed limit

Vibration: start high speed/acc time too short

Slow: start speed too low/acc time too long

When using a stepping motor, lifting speed curve should not stall, don't throw step as a benchmark, through the change, the ultimate speed, starts faster acc time, make the movement process to achieve the ideal state (high speed limit, acc time is shorter), but should be reserved the safety of certain amount, lest because the long-term use of and cause mechanical resistance increases, the motor torque resistance, then, the decline reasons caused stall, lost the phenomenon such as step.

When using servo motor, lift quickly curve should be to efficient, without overshoot as a benchmark, through the change, the ultimate speed, starts faster acc time, use the movement process to achieve the ideal state.

- Determination of the maximum speed

When using a stepping motor, the highest speed than limit speed should be, if the maximum speed limit far smaller than the actual processing speed, but will the a value of top speed.

When using servo motor, the highest speed limit should be "rate, or limit speed minus 3%.

- Determination of the high speed, low speed manual

High-speed, low-speed manually is two basic speed of high speed manually.

The speed manual  $\leq$  the limit speed when you using the stepping motor.

When you use servo motors, high speed  $<$  speed limit, limit speed around minus the 3%.

Low manual speed is typically used for knives, when used, can be determined according to needs.

- Reverse clearance

During exercise direction, due to the screw clearance, clearance, contact the drive chain such as rigid and elastic degeneration causes, and appeared opposite clearance (the reverse of

the previous paragraph when no actual movement). General should be determined after measuring. Using the fill method of the system, that is, no pauses during exercise (separate reverse gap).

The reverse gap difference between no-load and load.

Reverse clearance values cannot be negative.

Because of the cutting force of reason (when cutting force is greater than the friction of the bench), joined the clearance machining error compensation may be increased, the best approach is: by mechanically eliminating reverse gap and improve rigidity.

### 3. Restore factory value

When you select this function, system restore factory settings when the parameters, if you misuse this feature allows the system to power on again, parameters are set for the original parameter. (Note: this function will return the system parameters and options parameters)

### 4. Save parameters

When determining the long-term when you save changes made to the parameter you want, select the feature and save the modified parameter, not recovery.

Note: changing the parameter value for the parameter memory before all, for misuse of the recovery.

**Note: If the parameter State, press the three keys: space 8 6, the system will automatically set the current parameter values to factory values, then press "values", the system will be restored to the current set of factory number**

### 3.6.2 System self-test

When the system fails, you can use this feature to make the necessary tests. Entering the test of the input state after enter this feature automatically.

Input test

1. Input test

In	01●	02○	03○
SetI	04○	05○	06○
Out	07○	08○	09○
Set0	10○		

Digital serial number 01-10 which correspond to the input 01-10, when the corresponding line and 24V input message when short, the corresponding led to, otherwise 0. Through this you can test whether the input signal properly. Solid represents close idle 0 represents the normally open

To improve the reliability of the input signal, the system with interference filters, signals

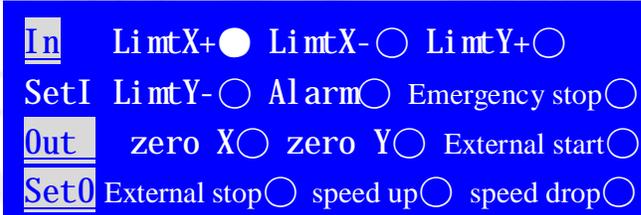
When there is no change, may be as follows:

24V power supply is not working properly

The input signal cable connection does not work correctly

The input signal circuit failure

## 2. Located in test



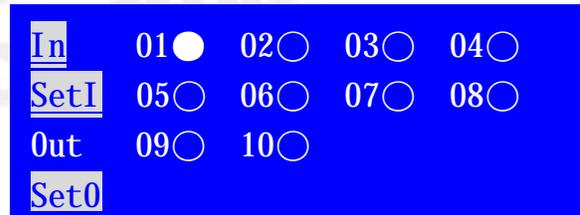
When the corresponding line and 24V input message shorting, the corresponding led to ●, otherwise ○. By this you can test the corresponding input signal is normal, **solid representatives close idle 0 represents the normally open**

When there is no change, may be as follows:

Sets the error entry point (see setting function)

The input signal is not normal (see input test)

## 3. Output test



Digital serial number 01-10 which corresponding to the output 01-10.

Through the upper and lower key to adjust the chosen output point, the cursor moves along with it. **Press "Enter"**, the corresponding indicator from ○ to●, or ●by ○. ● is open output, DC24V voltage can be produced between. The output with + 24 V, ○ represents the close output.

When there is no change, may be as follows:

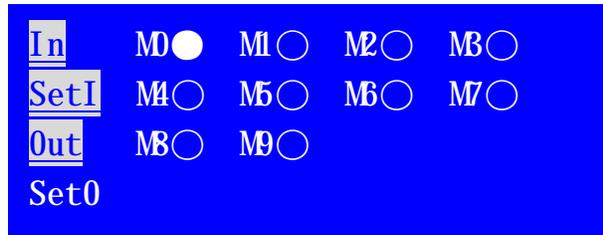
24V power supply is not properly working

The output signal cable connection does not work correctly

Corresponding relay can't normal movement

The output signal circuit failure

## 4. Set up test



Through the upper and lower key to adjust the chosen output point, the cursor moves along with it. **Press the Enter key**, the corresponding indicator from ○ to ●, or ● by ○. While the corresponding output from open to closed, or closed to become disconnected.

When there is no change, may be as follows:

Output Settings incorrectly (see setting function)

The output signal is not normal (see output test)

### 3.7 I/O settings

To avoid errors, only officers shall modify this parameter.

#### 3.7.1 Input settings

<u>In</u>	Li mtX+00	Li mtX- 00
<u>Out</u>	Li mtY+00	Li mtY- 00
<u>Add1</u>	Al arm00	Emergency stop 00
<u>Sub1</u>	zero X 00	zero Y 00

#### Input feature list:

#### **X is restricted, negative limit X, Y are limited, Y-negative limit, alarm, emergency stop**

These features must be closed normally, that is disconnected effective or meet NPN closed open when the mouth short to 24 V.

**Zero X, Y-zero:** This feature in the options parameter, you can tick normally open signal or no close signal

#### **Start outside, outside the pause, speed up, speed**

These features must be normally opened, namely you can control the program start, stopped and run-time speed up and down of the operation when the mouth with 24 V effective.

#### **External X+, External X-, External Y+, External Y-,**

These features must be opened normally, you can control a motor forward reverse individually when the mouth with 24 V effective.

**Outside the range zero:** this feature must also always be open, this function is equivalent to zero back to program or back to the coordinates of the zero point, the several axes will back at the same time when it effectively.

**Outdoor zero:** this feature must be always opened, when in force, will be back in the order of X,Y,Z axis mechanical zero point, when an axis is not set the machinery zero this axis will direct skip.

**External high speed:** when often opened manually run on a low speed, when always closed manually running by high speed.

**Points out:** when it always open external manually will linkage run, manually run on a point value when it closed, incremental default parameter values, once you hit F2 after you manually modify the points value, by modifying values.

**Note: The hardware input has only ten, so you can use it according to your own situation.**

Set the corresponding input slogan by use of input function.

Move the cursor by the up and down cursor keys, the cursor moves along with it.

Enter the number of the input function type corresponds, a range of values for 1-10.

Please closing this input function when you enter a value of 0.

When the input port have hardware failure, can choose input port of unused to realize this input function, and avoid the input port which failed.

**For example: 1 input is set to x are limit function, you can modify the behind of x o 01 in the setting screen.**

Note: you cannot select the same input on different input function.

**Value cannot be negative or greater than 10**

### 3.7.2 Output settings

<u>In</u>	M0 00	M1 00	M2 00
<u>Out</u>	M3 00	M4 00	M5 00
<u>Add1</u>	M6 00	M7 00	M8 00
<u>Sub1</u>	M9 00		

Set the output number used by the output function.

Move the cursor by the up and down cursor keys, the cursor moves along with it.

Enter the number of the output function type corresponds, a range of values for 1-10.

Please closing this output function when you enter a value of 0.

When the output port have hardware failure, can choose output port of unused to realize this output function, and avoid the output port which failed.

**For example: change the output set M1 to the output port 1 (change M1 to 01)**

**(That is, the 11th of the 20 core cable wire or output 01 on the terminal block OUTPUT)**

Note: you cannot select the same output on different outlet.

Value cannot be negative or greater than 10

Output directive: The output state is P1 S1 represents the output is open the relays which under the control of the first output.

Add1	n000	Output	L00	Pn: 0001
Sut1	P1		S1	
InsL				
DelL				

As shown above, you will understand that the P in the program edits "output state" with the M in the actual output settings are corresponding, but M can define which lose exports to open the output

If it is difficult to understand, you can propose the following settings:

If you need some outlet, set several output in accordance with the order, for example:

I need three output to control the relay, so I will change M1 to 01, M2 to 02, and M3 to 03, the benefits of this is that P1 corresponds to the first outlet in the program (that is, the 11th line or the output 1 on the tandem Panel), P2 was corresponding to the second output in the same program (that is, the 12th line, or the output 2 on the tandem Panel).

If you need five outputs, please change M1-M5 to 01-05.

## 4. System instructions and programming

### 4.1 Programming concepts/symbols instructions

#### 4.1.1 Related concepts

1. Feed feature: with the designated speed make the tool movement and cutting workpiece called the feed, the speed using numerical specified. Example: let the tools to 150 mm/points speed cutting, instructions for: F150. This value is modality, and subsequent effective.

2. Procedures and instructions: CNC process every step of the action, have been conducted according to the established procedures, each processing procedure is made up of several **procedure words**, each program must start with a letter, followed by a specific parameter value (no spaces).

3. Reverse gap: means an axis when direction changes caused by the empty process error. Their size and ball screw nut gap, the transmission chain of the machine tool, the rigid. When

using, should try to pass from the machinery in gaps, or even set this parameter, under certain conditions, still can cause processing is not ideal.

4. Speed rate: the current F speed change, namely times speed range. General in the commissioning process test the best processing speed, after the completion of the trial should be the corresponding to the actual speed F best rate, or normal processing, speed rate of 100% in the position.

5. The line Numbers and label: marking and line Numbers (automatically generated) different, when jump or loop, should be given the purpose of jump to label (Non-line number), the entrance of the corresponding should be given the label, and the purpose of after the jump instruction label the same. The line Numbers are automatically generated serial number, the label is referring to do the procedure, and only jump to the entrance designated label, the entrance procedures section does not need to specify the label (in). Label the values of 1-99. Different programs do not the same label (00 except).

#### 4.1.2 The program words and conventions

X	X axis incremental/absolutely coordinates
Y	Y incremental/absolutely coordinates
T	cycles or delay in time
L	Given the current procedures done label (each the entrance of jump must be given, when 0 for no label)
F	specified in speed
P	input/output specified
S	input/output state specified
N	the jump label purposes are given

#### 4.2 Instructions

For easy of use, this controller using Chinese characters command options mode, through plus one (F1) key, minus one (F2) button cycle selection operation instruction. To avoid program, the input of the characters, each instruction with fixed program format, prompting the input the corresponding program data. Not for the input data don't modify (using the default data). The maximum number of system lines is 450 lines.

##### 4.2.1 Program ends

End the program performance. When there is not another instruction also as a "process ended" instructions.

```

Add1 n000 Prog End L00 Pn: 0001
Sub1
InsL
DelL

```

**Parameters: no**

#### 4.2.2 Absolute motion

This directive can achieve **rapid linear interpolation** to designated location. When the displacement, the system from the current point to the absolutely coordinate position with the highest speed multiplied by the rate of speed.

The movement speed by powerful influence, **but has nothing to do with the current F speed.**

```

Add1 n000 Abs Move L00 Pn: 0001
Sub1 X 0000.000 Y 0000.000
InsL F0000
DelL P0 S0

```

**Parameters: X (to the absolute X-coordinate), Y (to the absolute Y-coordinate), F (for subsequent directives specify speed, can be 0)**

**P, S: P parameters (other than 0) State select input to s (zero-first) is waiting**

The first situation: the axis are movement with the highest speed when selecting "parameter setting" "system" in the "options" of the "automatic", first-come-first stop, all into one program. Otherwise by multiple-axis linear interpolation motion, the difference with linear interpolation: each turn all press top speed (and not the current rate) movement.

The second situation: when p is 1, S is 0, e that is, the movement for the execution of the test of the mouth after input 1 state, when disconnecting the time to wait, after connect on to perform, P for 2, S is 1, namely after the movement for the execution after detecting input 2 mouth the state, When connected, wait, and executing after it was disconnected.

The third case: can separate some axis movement and other axis don't exercise, as follows:

When P is 0, S is 0, two axis operation at the same time as usual with the absolutely coordinates

When P is 0, S is 1, just X axis movement with the absolutely coordinates, other shaft motor and coordinate not move

When P is 0, S for 2, just Y axis movement with the absolutely coordinates, other shaft

### 4.2.3 Incremental movement

This directive can achieve rapid linear interpolation to designated location. When the displacement, the system from the current point to the increment value with the highest speed multiplied by the rate of speed.

The movement speed by powerful influence, **but has nothing to do with the current speed of F.**

```
Add1 n000 Inc Move L00 Pn: 0001
Sub1 X 0000.000 Y 0000.000
InsL F0000
DelL P0 S0
```

**Parameters: X (X direction movement increment), Y (Y motion increments), F (for subsequent directives specify speed, can be 0)**

**P, S: P parameters (other than 0) State select input to s (zero-first) is waiting**

Each axis are movement with the highest speed when selecting "parameter setting" "system" in the "options" of the "automatic", first-come-first stop, all into one program. Otherwise by multiple-axis linear interpolation motion, the difference with linear interpolation: each turn all press top speed (and not the current rate) movement.

### 4.2.4 Linear interpolation

The speed to F multiplied by **the speed rate** of given the incremental values along the straight line.

This movement influenced by the speed rate, and it relevant to the current speed of F.

```
Add1 n000 Line L00 Pn: 0001
Sub1 X 0000.000 Y 0000.000
InsL F0000
DelL P0 S0
```

**Parameters: X (X direction movement increment), Y (Y motion increments), F (velocity)**

**P, S: P parameters (other than 0) State select input to s (zero-first) is waiting**

When P is 0, S for 1, perform unlimited campaigns. The specified coordinates has nothing with the end of campaign, and set only the proportional relationship with each axis. In the process of sports support the operation: "pause"

#### 4.2.5 Plus circular interpolation

Along the direction to round by the speed of F multiplied by the speed rate of given the incremental values. Only the X, Y axis realized circular interpolation.

This movement influenced by the speed rate, and it relevant to the current speed of F.

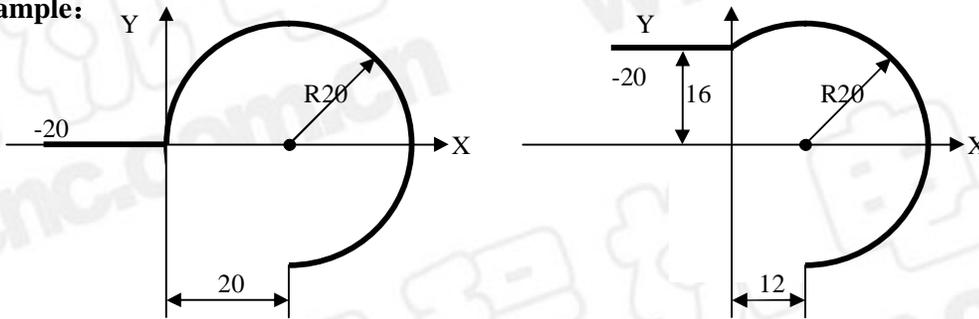
```

Addl n000 S_Arc L00 Pn: 0001
Subl X 0000.000 Y 0000.000
Insl I 0000.000 J 0000.000
DelL F0000 P0 S0
    
```

Parameters: X (X direction movement increment), Y (Y motion increments), I (X relative to the center of the Delta), J (Y relative to the center of the Delta), F (velocity)

P, S: P parameters (other than 0) State select input to s (zero-first) is waiting

Example:



Left: linear interpolation X20.000

Along the circular interpolation X20.000 I20.000

Right: linear interpolation X20.000

Along the circular interpolation X12.000 I12.000

In a word: (x, y) is an arc end point relative to the incremental coordinate of the starting point of arc, (I,J) for arc-center relative to the incremental coordinate of the starting point

#### 4.2.6 Inverse circular interpolation

Along the inverse round direction by the speed of F multiplied by the speed rate of given the incremental values. Only the X, Y axis realized circular interpolation.

This movement influenced by the speed rate, and it relevant to the current speed of F.

```

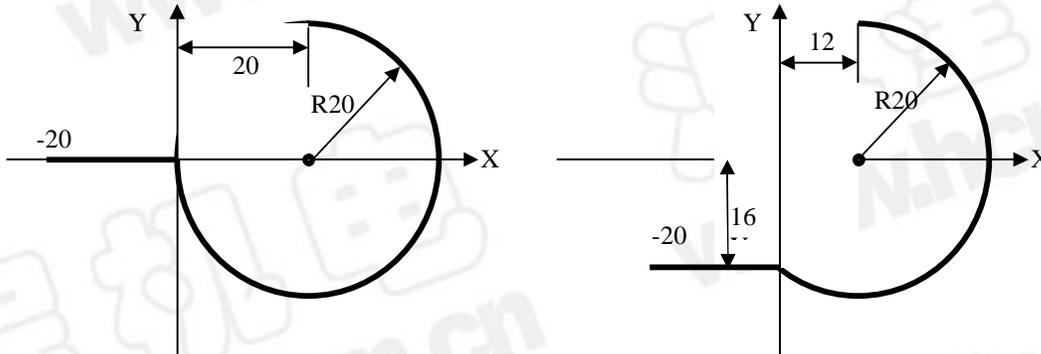
Add1 n000 N_Arc L00 Pn: 0001
Sub1 X 0000.000 Y 0000.000
InsL I 0000.000 J 0000.000
DelL F0000

```

Parameters: X (X direction movement increment), Y (Y motion increments), I (X relative to the center of the Delta), J (Y relative to the center of the Delta), F (velocity)

P, S: P parameters (other than 0) State select input to s (zero-first) is waiting

Example:



Left: linear interpolation X20.000

Inverse circular interpolation X20.000 I20.000

Right: linear interpolation X20.000

Inverse circular interpolation X12.000 I12.000

In short: (X, Y) is an arc end point relative to the incremental coordinate of the starting point of arc, (I,J) for arc-center relative to the incremental coordinate of the starting point

#### 4.2.7 Delay waiting

Delay corresponding time. Unit of time: 0.01 seconds.

```

Add1 n000 Delay L00 Pn: 0001
Sub1 T000. 0
InsL
DelL

```

Parameters: t (delay time X10)

Value range: t (1-9999), (if 0 then pause, performing the following procedure after waiting for the next boot)

### 4.2.8 Absolute jumps

Jump to the specified label.

```

Add1 n000 Jump L00 Pn: 0001
Sub1 N00
InsL
DelL

```

Parameters: n (objective grade)

Value range: n (1-99), (Note: N01 program to jump to a label l 01)

### 4.2.9 Program cycle

Implemented by the transfer to the specified label and executed n times.

```

Add1 n000 Loop L00 Pn: 0001
Sub1 T0000 N00
InsL
DelL

```

Parameters: t (loop), n (objective grade)

Value range: t (1-9999), and n (1-99), (Note: N01 for programs from grade l-01 cycle)

### 4.2.10 Lateral jumps

Test status of the specified entry points, qualifying jump, or end of line, continuing on to the next line.

```

Add1 n000 JumpBi t L00 Pn: 0001
Sub1 P00 S0
InsL N00
DelL

```

Parameters:-p (enter number), s (enter), n (objective grade)

Value range: P (1-12), S (0, 1), N (1-99)

For example 1: P1 S1 N01

Is jump to the program line “label L” 01 when the input 1 with 24 V were disconnects state, otherwise continue execution procedures

For example 2: P3 S0 N05

Is jump to the program line “label L” 05 when the input 3 with 24 V were disconnects state, otherwise continue execution procedures

#### 4.2.11 Coordinate setting

Set the current coordinate value.

Add1	n000	SetCoord	L00	Pn: 0001
Sub1	X 0000.000	Y 0000.000		
InsL				
DelL				

Parameters: x (x-coordinate), y (y-coordinate)

#### 4.2.12 Output status

Set the output state.

Add1	n000	Output	L00	Pn: 0001
Sub1	P0	S0		
InsL				
DelL				

Parameters: P (output slogan), S (output state) value range: P (1-3), S (0, 1)

**Example 1: P0 S1**

For open the output port at M0 lose export, if M0 is 03 open the third outlets.

**Example 2: P3 S0**

For close the output port at M3 lose export, if M3 is 05 close the fifth outlets.

**If you still do not understand, you can view the output settings on page fourteen.**

#### 4.2.13 Return to mechanical zero

Parameters: p (select axis), s (return to zero)

Value range: p (0, 1, 2, 3), s (0, 1)

Add1	n000	MachZero	L00	Pn: 0001
Sub1	P0	S0		
InsL				
DelL				

**Note: P'0 for the X axis, 1 for the Y axis, 2 for the Z axis;**

**S'0 for directions back to the mechanical zero, 1 negative direction back to the machine to zero**

**Example 1: P0 S1** For the X axis direction toward negative return for mechanical zero

**Example 2: P2 S0** For the Z axis positive direction back toward the axial mechanical zero

#### 4.2.14 Subroutine

Parameters: L (program label) N (be the subroutine name), P (procedure command):

(P0 for subroutine, into the N a specified program date)

(P1 for son program started, the current subroutines Numbers N definition)

(P2 of subroutines end, N value meaningless)

Scope: P (0, 1, 2)

<u>Add1</u>	n000	<u>SubRout</u>	L00 Pn: 0001
<u>Sub1</u>	NO		P0
<u>InsL</u>			
<u>DelL</u>			

Examples below:

N00 linear interpolation X100 F1000 (X axis motor rotating distance 1000 with speed 100)

N01 subroutine L00 **N02 PO** (Note: calling the subroutine name 02, P0 is the command "calls the subroutine")

N02 linear interpolation Y200 F1200 (Y-axis rotating distance 1200 with speed 200)

N03 subroutine L00 N03 **PO** (Note: calling the subroutine name 03, P0 is the command "calls the subroutine")

N04 linear interpolation X-100 Y-200 F3000 (X axis turn 100 to the negative direction, Y axis turn 200 to the negative direction with the rate of 3,000)

N05 program ended

N06 subroutine L00 N02 P1 (Note: named 02 subroutine begins, P1 is the order "program start")

N07 output P2 S1 (opened the second outlet)

N08-delay waiting T2 (wait 2 seconds delay)

N09 output P2 S0 (close the second outlet)

N10 subroutine L00 N00 P2 (Note: the end of the subroutine, P2 is the command "program end")

N11 subroutine L00 N03 P1 program begins

N12 output state P5 S1

N13 delay waiting T8

N14 output state P5 S0

N15 subroutine L00 N00 P2 end of subroutine

The program of the above is a very simple process:

First of all, the X axis motor turns 100,

And call the subroutine 02 (that is, open outlet 2 delay 2 seconds off),

Then the Y-axis motor turns 200, when calling a subroutine 03 (that is, open outlet 5 delayed 8 seconds off),

Last 100, X axis go 100 to the negative direction and Y axis go 200 to the negative direction

#### 4.2.15 Location movement

Along a straight line by the speed of F multiplied by **the speed rate** of given the incremental values. Only the X, Y axis realized circular interpolation.

This movement influenced by the speed rate, and it relevant to the current speed of F.

<u>Add1</u>	n000	<u>Mve To</u>	L00 Pn: 0001
<u>Sub1</u>	X0000.000		Y0000.000
<u>InsL</u>	Z0000.000		C0000.000
<u>DelL</u>	F0000		P0 S0

Parameters: X (X direction movement increment), Y (Y motion increments), Z (Z-direction movement increment), C (C to motion increments), F (velocity)

P, S: P parameters (other than 0) State select input to S (zero-first) ended prematurely, remaining amount ignored

There has two end condition: movement to end or in motion in the input is valid.

**For example: location sport 1000 X100, F1000, P1 S0 is the x axis runs at a speed of**

100 of the distance, running during the test input 1, when 1 port is connected to the State has been performing this procedure until you have to go 100, if you disconnect in the Middle, they are immediately end this campaign, run the next program.

**This directive with "linear interpolation" there are similarities, but the difference is that this directive can at any time terminate the current command and go to the next procedure.**

#### 4.2.16 Set the servo axis

Set some axis direction of a shaft input point control movement

<u>Add1</u>	n000	<u>Follow</u>	L00 Pn: 0001
<u>Sub1</u>	N0		F0000
<u>InsL</u>	P0		S0
<u>DelL</u>			

Parameters: N (axis and direction encoded), F (velocity), P (enter number), S (input)

N parameters is positive X axis (0), negative x axis (1), Y+ (2),negative Y axis (3), Z+ (4), Z- (5), C+ (6), C-axis (7)

F speed cannot be too high (lifting speed is not performed), if you do need a high speed servo motor

S is 0 or 1 represents a valid state input. (S-1 is the force at the mouth with 24V through)

Valid of the corresponding input, the corresponding axis by setting the direction of motion, invalid stop

Set to on Board of the servo axis corresponds to data in the range is not valid. If you had set a positive or negative, then the shaft is the servo axis. You can set up to 4 servo control points.

**For example: set N0 P1 S1 of the servo axis after the program runs here, servo axis effective program continues down the implementation at this time, no matter what the next program is, as long as input 1 to connect with 24V, x axis motor speed is set by rotating toward the being, is not subject to any influence,and does not affect the program.**

#### 4.2.17 Intermit

Set the break (pause the current campaign, transferred to the interrupt routine) entry which caused by the input state changes, or continue by the break back to the breakpoint.

Add1	n000	Intermi t	L00 Pn: 0001
Sub1	N00		P0
InsL	S0		
DeLL			

Parameters: n (interrupt entry grade), p (enter number), s (input status/function)

When the corresponding input is valid, end the current (pause) campaign, Implementation when it turn to the specified label of the entrance of the program, when it comes to return end interrupt, returns the point of interruption.

N: interrupt entry label, but also the differences between different interrupt flags, different interrupt cannot be in the same grade.

P: Specifies the interrupt source, enter a number in value from 1-9

S:0: specify input 0 (disconnected) effective

1: 1 specify the input (with 24V through) the effective

2: interrupt returns, breaks were not complete when the movement continues, regardless of N,P

3: break return, ignoring interrupts were not complete when the campaign and continue, regardless of N,P

4: Cancel interrupts, when n is set to number, p-independent

You can set up to four interrupt entry

Interrupts do not have priority, then interrupt can interrupt the program or the interrupt routine. **Does not complete execution of interrupt (suspended interruption), will be ignored again.**

**For example: there are two interrupt A and B, the corresponding interrupt handling procedures for the A program and B program.**

**When the program is being carried out, A interrupt appear, then turn to A program; In A program execution process, A interrupt appeared again is ignored, B interrupt appear, then turn to B program; In the process of program execution B, A interrupt appeared again, for A program does not perform finished, is ignored, B interrupt appeared again, for B procedure not the completion of the execution is ignored.**

**When the program is being carried out, B interrupt appear, then turn to B program; In the process of program execution in B, B interrupt appeared again is ignored, A interrupt appear, then turn to A program; In the execution of A program in the process, A interrupt appeared again, for A program does not perform finished, is**

ignored, B interrupt appeared again, for B procedure not the completion of the execution is ignored.

Examples below:

N00 Intermit N01 P1 S1 (interrupt start, when the input 1 mouth with 24 V to jump to the label for the program L01 do)

N01 linear interpolation X200 F1200 (X axis of rotation speed motor to 1200 200 distance)

N02 program ended

N03 output state L01 P1 S1 (note: open the output M1 mouth)

N04 delay waiting for T5 (delay five (5) seconds)

N05 output state P1 S0 (note: close the output M1 mouth)

N05 program ended

**Understand: the execution procedures, the interrupt started at the same time, with the operation of the X axis 1200 200 distance, the X axis in the process of running 200 distance, at any time and detecting input 1 mouth state, when input port 1 to 24 V through land, the X axis to immediately stop running and jump to the label for the program that is open L01 do lose export 1 waiting for 5 seconds after the close. If the X axis in the operation process is not to break down N02 execution procedures and the programming is over.**

#### 4.2.18 Counters

Realization of counter plus one, minus one, set of jump, equal to jump, greater than jump, less than jump.

**Parameters: N (jump purpose labels), T (counter), S (features)**

N: when need to jump the purpose of when marking, the scope: 1-99

T: set the initial value or jump function the comparison of the value, the value range: 0-9999

S: value range: 0, 1, 2, 3, 4, 5

0: counter add one, N, T value have nothing to do

1: one less than the counter, N, T-independent

- 2: set the initial value is equal to the counter T, N value have nothing to do
- 3: counter with T value is the present value and jump to N designated label
- 4: counter the current values greater than T value to jump to the designated label, N
- 5: counter the current value is less than a T value specified label jump to N

#### 4.2.19 Swing movement

Implementation the swings of single-, dual-axis

Parameters: X (X Delta), Y (Y-Delta), I (X reversing positive and negative input number or a negative increment), J (Y, reversing positive and negative input number or a negative increment), f (velocity), T (pause time when reversing), S (features)

I, J: A.00U、 B.00V:     A: X axis negative switch,     B: Y negative switch

U: X positive switch,     V: Y positive switch

Scope: 1-9

F: movement speed

T: delay time, value range: 0-9999

S: value range: 0, 1, 2, 3, 4, 5

0: X axis positive movement to accurate, reverse movement I value, Y, J, not to finish over. **(This feature not available)**

1: X axis positive movement X value, reverse motion to negative points, Y, J, not to finish over. **(This feature not available)**

2: X axis positive movement to accurate, reverse motion to negative points, Y, J, not to finish over. **(This feature not available)**

3: X axis motion X value, reverse movement I value, Y to sports Y, reverse motion J value, keep movement. **(This feature not available)**

4: positive movement to the X axis punctual, reverse motion to negative points, the Y axis positive movement to accurate, reverse motion to negative point, their respective sports, keep movement. **(This feature not available)**

5: X axis positive movement to accurate, reverse motion to negative points, the Y axis positive movement to accurate, reverse motion to negative points, encounter some all stop, corresponding points of the shaft reversing, the other axis to continue. Keep

#### 4.2.20 Several descriptions

The relevant instructions with input, it corresponds to the input number, the value from 1 to 9,

The relevant instructions with output, which corresponds to a value in value from 0 to 9

Counter sets child features should be outside of the loop count

When set for servo x axis or y axis shaft, circular motion is not performed

In programs related to the servo axis data will be ignored

Behind the break should be placed in the main program

Subroutine should be placed behind the main program

Subroutines can be called subroutine, nested up to 8 layers

Label l is different from line number n

To reduce the number of directives, some instructions are multifunctional, please read

#### 4.2.21 Reference table of instruction in Chinese, English, GM code

Serial number	Chinese name	English name	GM says
1	程序结束	Prog End	M02
2	绝对运动	Abs Move	G00.0
3	增量运动	Inc Move	G00.1
4	直线插补	Line	G01
5	顺圆插补	S_Arc	G02
6	逆圆插补	N_Arc	G03
7	延时等待	Delay	G04
8	绝对跳转	Jump	M94
9	程序循环	Loop	M95
10	测位跳转	JumpBit	M96
11	坐标设置	SetCoord	M97

12	输出状态	Output	M98
13	回机械零	MachZero	M99
14	子程序	SubRout	M93
15	测位运动	Move To	G00.2
16	设随动轴	Follow	M80
17	中断操作	Intermit	M81
18	计数器	Counter	M82
19	摆动运动	Swings	M83

### 4.3 Select tutorials

In the process of programming, when choosing is "absolute movement", "the incremental motion", "linear interpolation" orders, into the teaching function by press the "F" button.

When is "absolute movement" the current coordinates will be reproduced, "the incremental motion" or "linear interpolation" data will be reset.

This time can choose "high speed" or "low", the "point move" or "continuous" to control the manual way.

According to the corresponding motion control key, move to the corresponding position (program coordinates at any time change). And the program data will change. Press "enter" keys will exit choice demonstration, and into the next procedure line input.

When you press the "ESC" button will exit choice demonstration, the cursor in the current program.

No matter "enter" key or "ESC key, the data are already beginning to program.

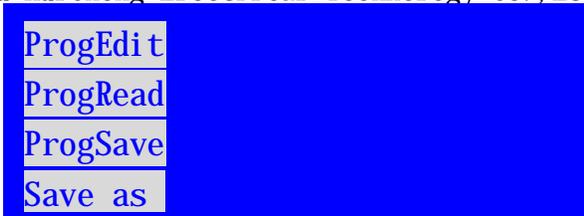
You can modify the data of program by the data input.

Choose demonstration teaching function only in the above three orders can be used.

### Specific operation:

Enter the Edit State, when you choose (linear interpolation, absolute motion, incremental movement) these three directives, it will switch to the manual function by "F" keys at the same time you can implement the program edit through the mechanical position. This feature while maintaining a program to edit method before, at the same time adding a manual edit function

First of all press the F3 key to enter menu of program management under the main screen



```

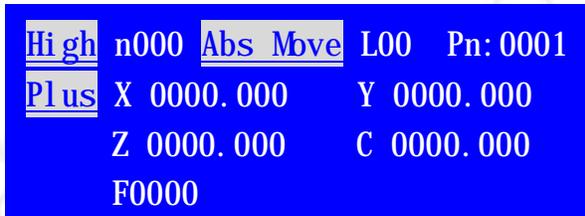
ProgEdit
ProgRead
ProgSave
Save as

```

Then press "new program" or "program edit" enter the program edit status  
Press F1 or F2 to select the command you want, such as "absolute motion", "incremental movement", "linear interpolation"

Normally at this time is to move the cursor to input a value for each position to implement editing.

The additional features: by pressing "F" will switch the Edit program control of hands under this edit screen, as the following chart



```

High n000 Abs Mvve L00 Pn: 0001
Plus X 0000.000 Y 0000.000
      Z 0000.000 C 0000.000
      F0000

```

**Focus:** at the moment of pressing "F",

If it is "**absolutely movement**" instruction words, coordinate would immediately into the machinery of **the current coordinates**, according to the direction of each axis's key can move the mechanical motion and change the coordinate at the same time, if the position determined, can make sure by press "enter".

If is "**the incremental motion**" instruction words, coordinates will keep for 0, according to the direction of each axis's key can move the mechanical motion and change the coordinate, if the position determined, can make sure by press "enter".

If is "**linear interpolation**" instruction words, coordinates will keep for 0, according to the direction of each axis's key can move the mechanical motion and change the coordinate, if the position determined, can make sure by press "enter".

#### 4.4 Demonstration programming

Enter the teaching program state by press "space" and then click "." under the function of program management".

Used "F" switch the function menu.

Manual function can be supported under this function, and also the "point movement", "linear interpolation," "circular interpolation", "processing speed" function.

Operation method:

Press the relevant movement key, to the position was selected.

If you need change the processing speed, please enter new speed input values after press "processing speed" and press "enter".

If is the point (fast) movement, please press "point movement"

If a straight line processing movement (according to F speed movement), please press "linear interpolation"

If be circular arc processing movement, please choose a point on circular arc (as far as possible in the middle position), and press the "arc halfway point"; Then choose the end of circular arc, and press "arc end"

Press the "point movement", "linear interpolation," "arc end" directly formed a program after the bank, and it will be transferred to the next procedure done demonstration.

After the teach completion, press "ESC" to quit this function and then go to the program edit check program content.

If need to save, can be used to keep the current program function will be endure to the user program area.

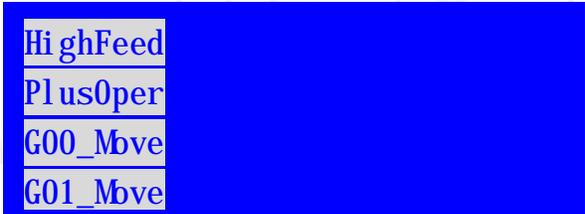
### Specific action:

On the main screen by pressing the F3 key to enter the program management menu



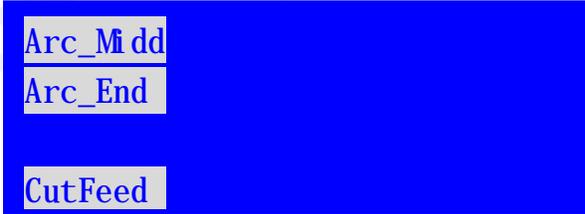
ProgEdit  
ProgRead  
ProgSave  
Save as

Then press "space" and then ".", the menu will go to the teach function screen, as follows:



HighFeed  
Plus0per  
G00\_Mbve  
G01\_Mbve

You can switch the menu through "F" realization.



Arc\_Mi dd  
Arc\_End  
CutFeed

Manually Express: this tutorial under the State can still switch manual high speed or low speed, low speed by default, selected for high speed

Jog operation: this tutorial under the State still can use the move function to move a a separate axis

By "space" also can clear coordinates for 0 under this state

### Teaching commands:

Sports: equivalent command in "absolute motion" to manually move, and press the key, you edit one instruction: absolute motion x-coordinate, y-coordinate

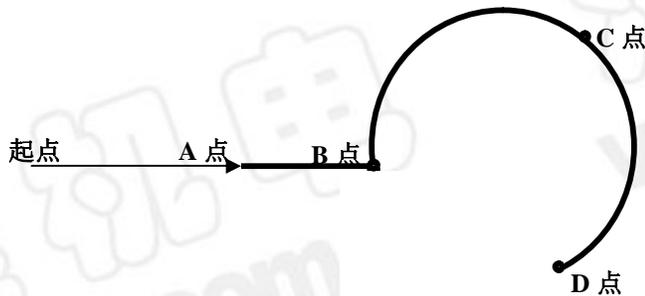
Linear interpolation: with the command "linear interpolation" exactly the same

Point of arc: any point between the running tracks of arc

End point of arc: arc track last end

### Examples:

**Machine run to point A with high speed, and then run to point B with the processing speed in a straight line, processing speed in circular way by point C running to point D finally stopped.**



One: firstly enter the teaching mode, and then manually move each axis machining to your **expected starting point**, press "space" to clean the coordinates for zero.

Two: manually move the machine to point A, coordinate displays point coordinates, for example, is (X 22.45, Y 1.456), and then press F3 to "movement" actually has generated a directive at this time:

**[ absolutely move X 22.45, Y1.456 ].**

Three: manually move the machine to point B, assuming the b point coordinates are (X 45.02, Y 3.26), press the F4 "linear interpolation", at this time in fact are created instructions:

**[ linear interpolation X (45.02-22.45), Y (3.26-1.456) ]**

Four: manually move the machine to point C, press "F" turn to the next page, then press F1 "arc midpoint", and then continue to manually move to D, press F2 "end point of Arc", and generates the arc instructions:

**[ Plus circular interpolation X\*\*\*\*, Y\*\*\*\*, I\*\*\*\*, J\*\*\*\* ]**

Five: if the program has been completed, but have not saved up yet, press the "ESC" key, back to program administration page, press F4 to "save the program" when the cursor is displayed, enter your own name, the track program is complete.

Note: If you want to change the speed for each processing instruction, or insert other instructions (for example, delayed waiting, output, loop command, absolute jumps, and so on), just enter "program edit" to modify or insert rows on it.

## 5. System connection

### 5.1 Interface definition

Systems and external connection, through the two plugs on both sides of the controller implementation, **note the red line is 1**

Electrical plugs (14) defined

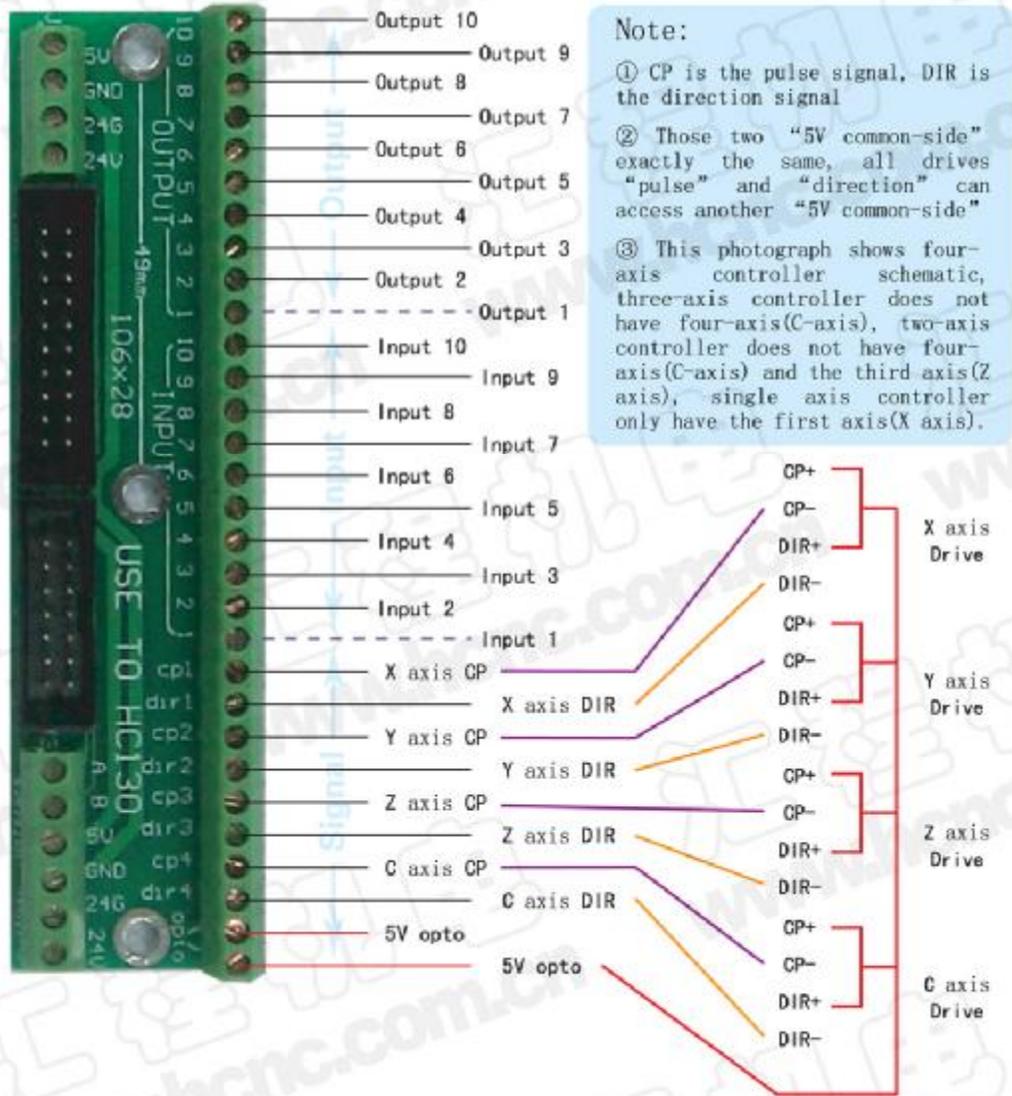
PIN number	Define
1	
2	
3	<b>Public side of motor signals (opto)</b>
4	<b>Public side of motor signals (opto)</b>
5	
6	
7	
8	
9	<b>Ydir</b>
10	<b>Ycp</b>
11	<b>Xdir</b>
12	<b>Xcp</b>
13	<b>B</b>
14	<b>A</b>

Input/output (line 20) defines

PIN number	Define
<b>1</b>	<b>Input 1</b>
<b>2</b>	<b>Input 2</b>
<b>3</b>	<b>Input 3</b>
<b>4</b>	<b>Input 4</b>
<b>5</b>	<b>Input 5</b>
<b>6</b>	<b>Input 6</b>
<b>7</b>	<b>Input 7</b>
<b>8</b>	<b>Input 8</b>
<b>9</b>	<b>Input 9</b>
<b>10</b>	<b>Input 10</b>
<b>11</b>	<b>Output 1</b>
<b>12</b>	<b>Output 2</b>
<b>13</b>	<b>Output 3</b>
<b>14</b>	<b>Output 4</b>
<b>15</b>	<b>Output 5</b>
<b>16</b>	<b>Output 6</b>
<b>17</b>	<b>Output 7</b>
<b>18</b>	<b>Output 8</b>
<b>19</b>	<b>Output 9</b>
<b>20</b>	<b>Output 10</b>

5.2 Wiring diagram:

Wiring diagram for HC130 controller with drive



5.3 Motor connection

Non-difference drive connection: dir, cp access the drive's dir, cp respectively, opto access the public side of the drive.

Differential drive connection: dir, cp access the drive's dir-, cp- respectively, opto access dir+, cp+.

## 5.4 Systems electrical connection description

Define power supply: **Green 24V+**, white, 24V, **red 5V+**, black 5V, (**Please be sure to use a total switching power supply**)

DC5V, DC24V provided by the internal power supply for the system and cannot be used as other electrical power supply.

24V power supply such as land, housing, cannot be shorted, when distance larger, thicker lines of electrical connection should be used.

All input signals such as spacing, such as emergency stop, are made of normally closed joined, others can be set according to the system's requirements, parameters, and so selected.

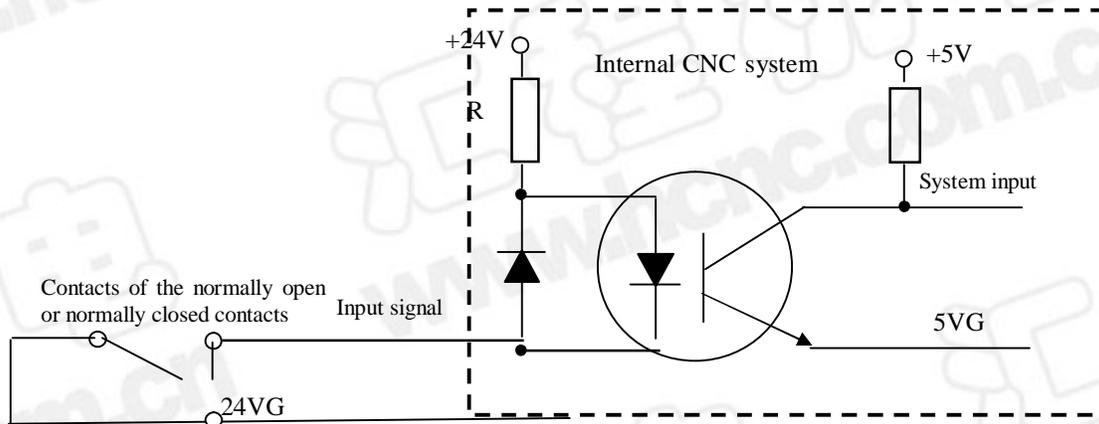
From this system to drive the connection you must use shielded cables, reducing interference.

Electrical wiring in the Cabinet, should pay attention to the strong separation of electricity, light current, avoid strong electric mixed with light current, and minimize government, attention to the electromagnetic interference effects on the system.

System grounding wire should be a thicker copper wire, should be greater than 4 mm square in General. And shorten the distance from the earth terminal.

## 5.5 Systems electrical connection diagram

Principle of system input: as the following diagram connection.



### Input method:

24V connection shall be closed, with 24V break open. External connection cable should be not less than 0.2mm square, connection should be reliable.

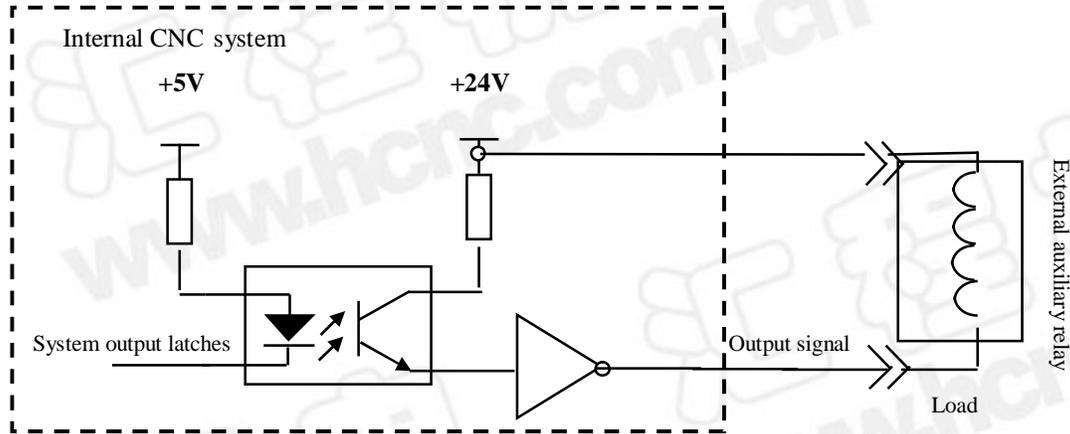
Limit: are going into closed (connected with 24G When there is no effective)

Emergency stop: normally closed (connected with 24G when there is no effective).

Switch of zero point: can be normally open or normally closed.

External buttons: for normally open (effective 24G when connecting)

**Principles of system output:** according to the following diagram connection

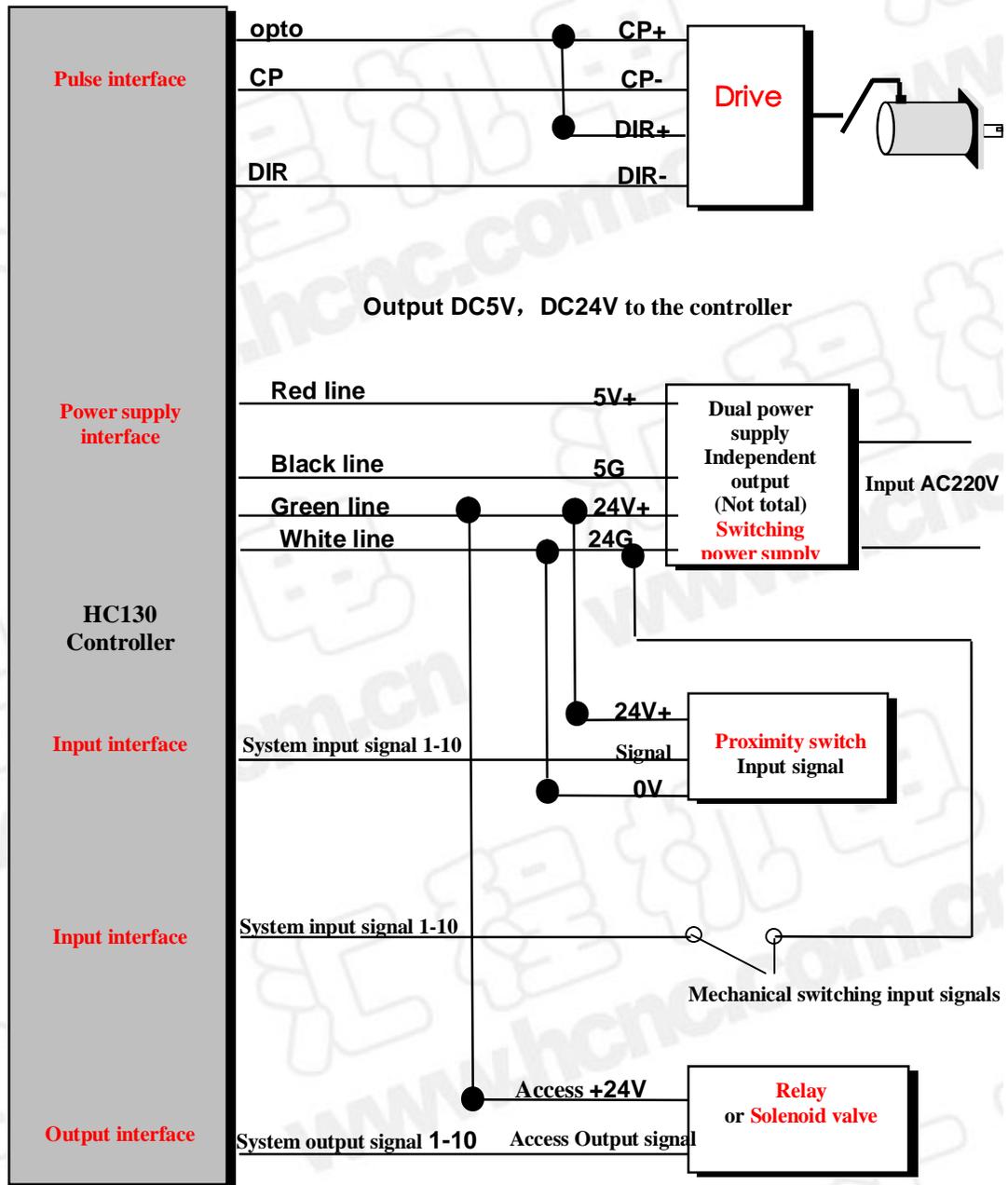


**Output connection:**

Output connected to 24V after load (typically intermediate relay), and load should be less than 50 Ma, otherwise easily lead to damage of the System Board (consequences of user responsible).

Controls the actual load by the auxiliary relay after the load is too large

5.6 Pulse and input/output port connection diagram:



## 6. Common failures and trouble shooting

### 6.1 Manual without movement:

This direction may be limited, or the emergency stop button is pressed.

Molecular of the electronic gear is 0. Or the electronic gear's denominator is 0

Alarmed by the servo-drive or stepping drive.

Signal cable joins between control systems and drives in error.

Signal cable connection is wrong from the system to drive (can be swap Dir and Cp signal cable joins).

## 6.2 Movement distance is error

E-gear ratio is not appropriate. Change electronic gear of the servo actuator system or the systems'.

Speed of more than 8 m/min (1 micron is equivalent or electronic gear at 1:1).

Motor stall or lose (resistance is too large, or poor performance, or motor power is too small).

## 6.3 Invalid input/output

Input/output settings and use do not correspond to lines.

Number of input/output setting is not present or is set to 0.

Input/output hardware is at fault (on a swap to a port that is not used).

24 V power doesn't work properly.

## 6.4 Error alert

Labeling error: jump labels (cannot be 0) does not exist in the to-go to program line (l) given with the same label.

## 6.5 The screen is not displayed properly

A blue or white screen: first of all, check the 5V power supply is normal, good contact, if it has no problems, you can adjust the controller selected below the left button to adjust the screen contrast.

## 6.6 Automatic page function can not enter, but the F1 key no problem

Please contact our company.

## 6.7 Program management function or parameter settings or other page can not enter

Please contact our company.

## 6.8 System function declarations

**If this statement is not correct, not exhaustive, is subject to the system software functions.**

**If the control function has change (upgrade), it is subject to change without prior notice.**