Spring Former Control System

ADT-CNC820

User Manual

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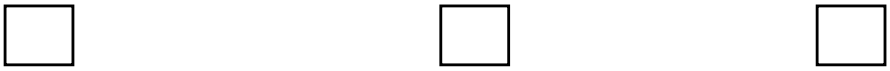
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Version Upgrading Instruction

NO	Version Number	Modification Date	Instruction
XT20081116	1.0	2009/9/2	The First Version

Remarks: the meanings of the three numbers in the version number are as follows:



Bank Main Version Number/ Bank Secondary Version Number/ Reservation

Notes: the above version table only refers to the version updating of the modification of the instruction

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Chapter One Brief System Introduction

I. Brief Function Introduction

1. 2-to 6-axis servo motor control, single motion or synchronous motion, and flexible and convenient programming method can be performed.

2. 4 to 8 groups of probes or cylinders for selection, the high speed probe detection ensures the working accuracy of the spring.

3. Matching with the wire delivering frame kinking, broken wire alarming detection, and wire delivering frame acceleration output, the flexible control of the wire delivering frame is realized.

4. The debug machining and test machining function of the hand wheel makes the debugging more convenient.

5. Flexible skip function, matching with a length detecting device, the automatic separation of the waste spring can be realized.

6. The program can be modified at any moment during the operation, and the working efficiency is improved.

7. A complete and visual visible system running system monitoring system, the problem can be found by the user in time, and the failure can be easily eliminated.

8. Multi-item password protection function is built inside, which is secure and practical.

9. The memory capacity is large, which is enough for 1000 processing file.

10. The programming is visible, simple, and easy to learn.

11. The system updating is convenient, and the newest updating program can be downloaded through the Internet.

II. Visual Effect Drawing



III. System Accessories

CNC820 Controller: 1 set

Instruction Manual: 1

TH836 Motion Card:1

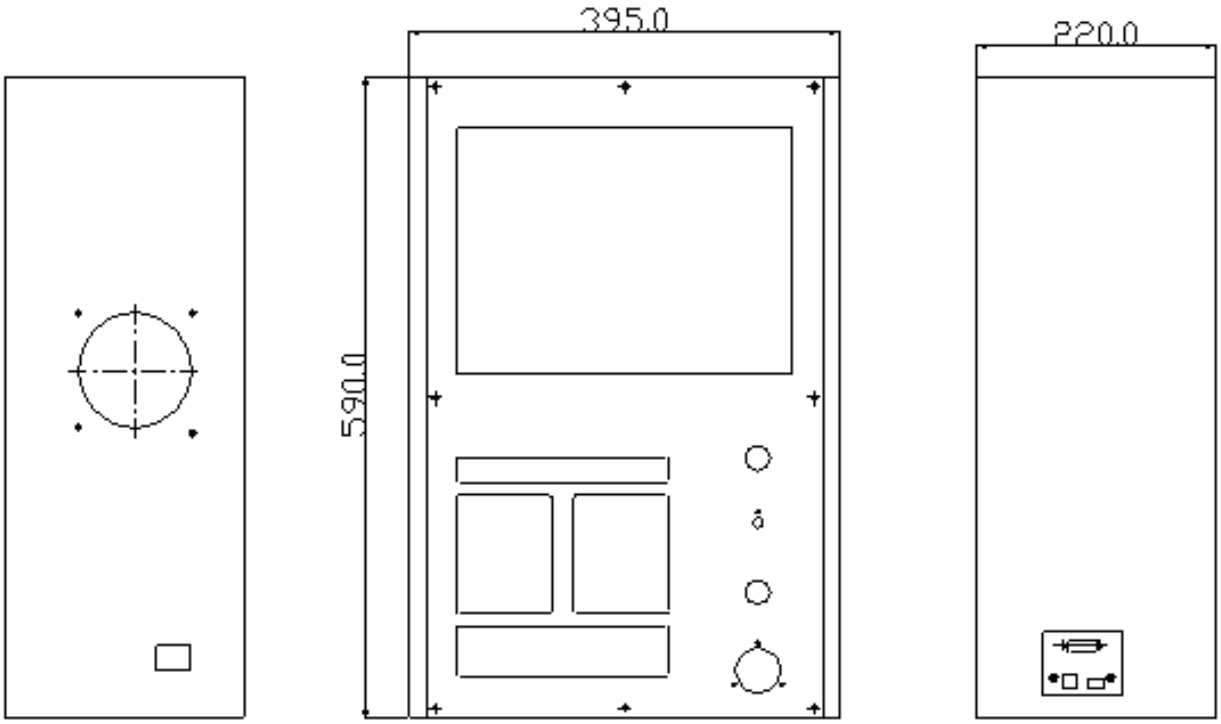
ADT-TH834F5 Plate: 1

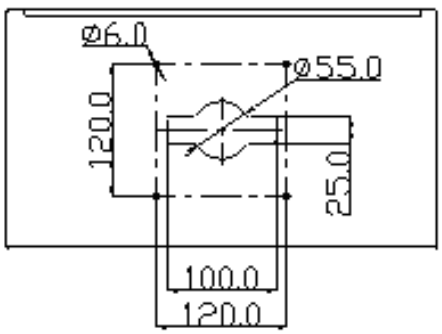
25-pin male-to-male cable: 1

9-pin servo cable:3

Chapter Two External Dimensions and Electrical Connection

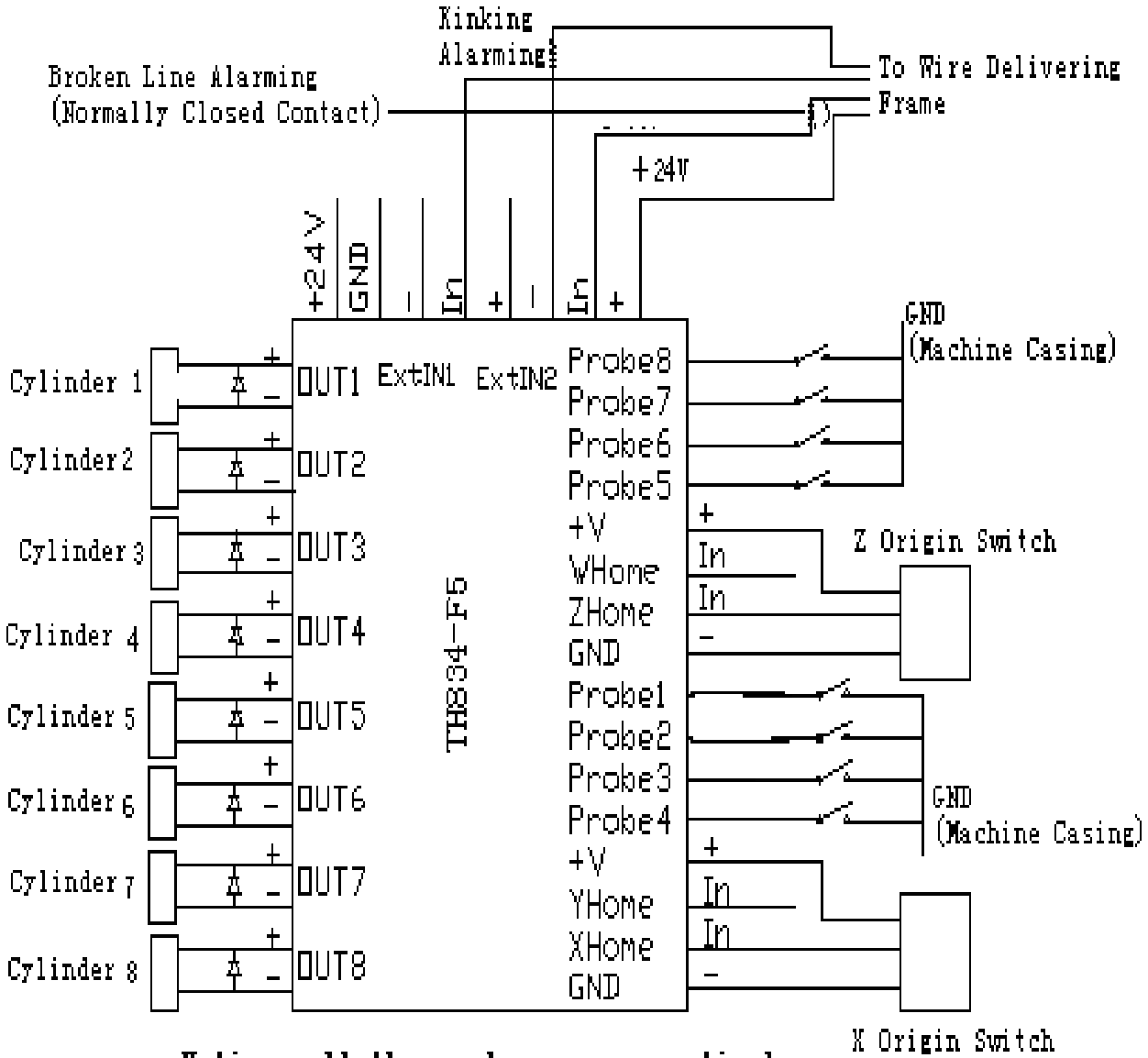
I. External Dimension Drawing





II. Wiring Diagram

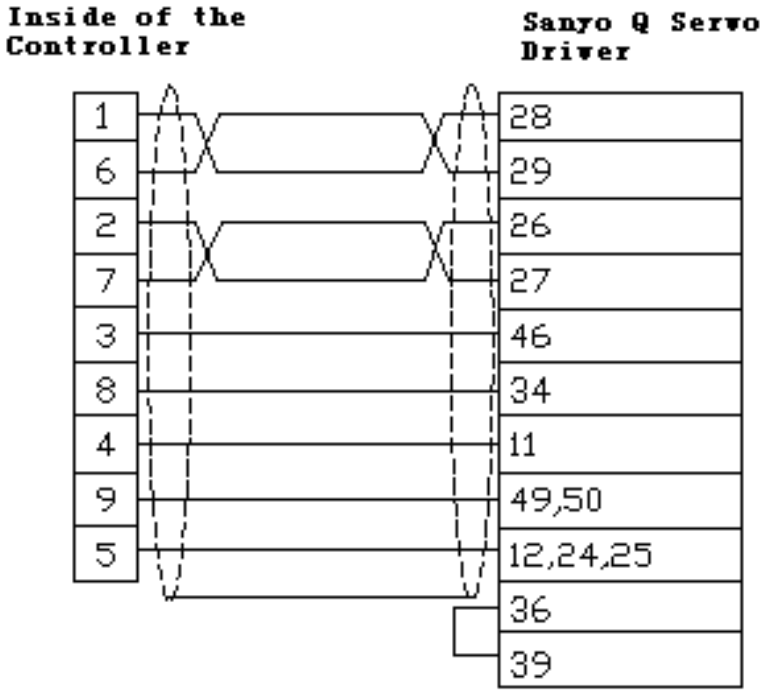
1. The external input signal and output signal of the controller is listed as following:

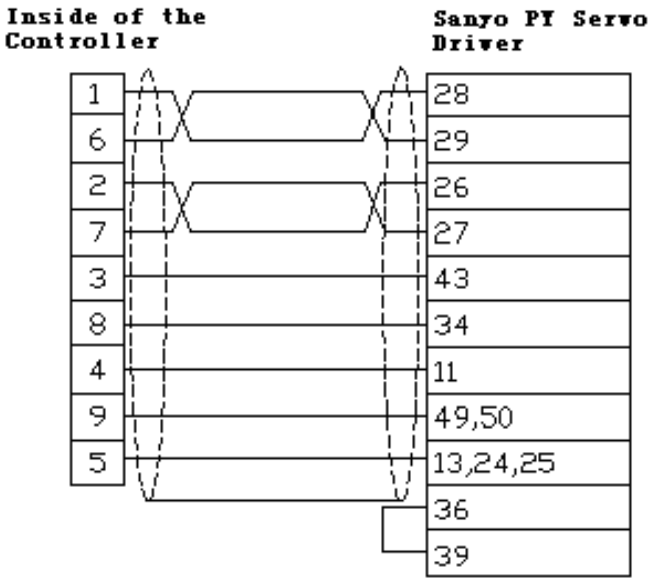


Notice: all the anodes are respectively shorted with +24 V, all the cathodes are respectively shorted with GND, and the purpose of leading-out is to convenient the wiring.

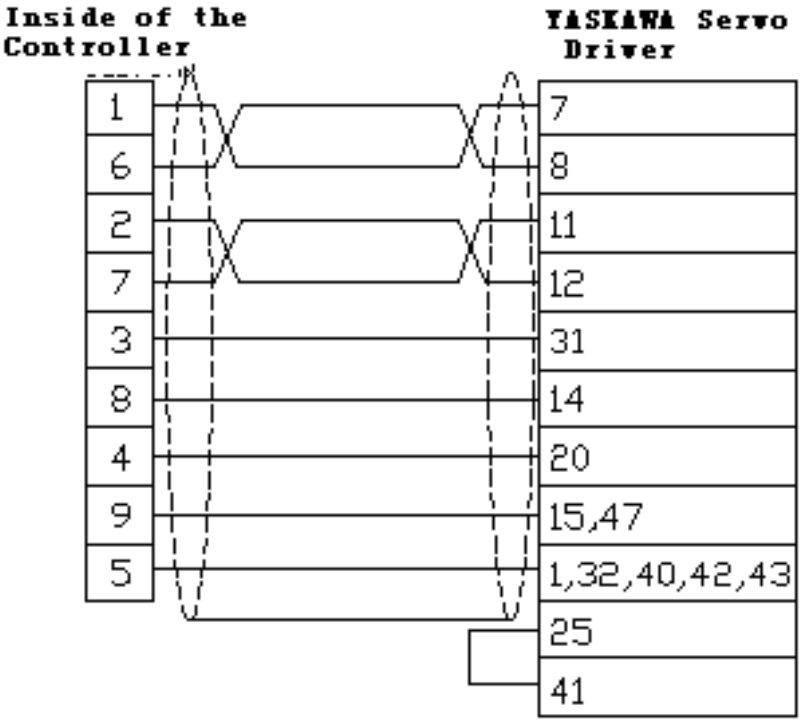
2. The wiring of the controller servo driver is as following:

1). Wiring with Sanyo servo driver signal (pay attention to the shielding of both ends):

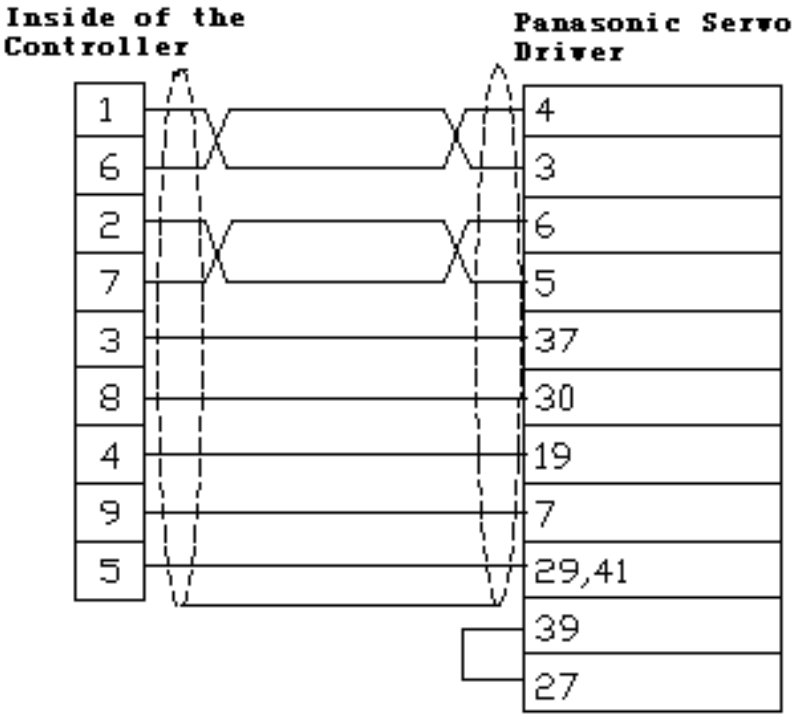




2) Wiring with YASKAWA Servo Driver Signal



3)Wiring with Panasonic Servo Driver Signal



(For any unclear part, see the Drawing Sheet of Spring Machine Wiring)

Chapter Three Operation Instruction

I. Operation Panel Instruction

1. Instructions of Control Panel and Buttons

Reset	YSwitch	ZSwitch	ASwitch	BSwitch	CSwitch	Cylinder	Stop	Test
File	S	G	M		Save	7	8	9
ProbeClr	ProbSet	J	E		Cancel	4	5	6
CountClr	CountSet	Insert	L		-	1	2	3
YClear	Work Para	Delete	N		UP	.	0	Enter
Ratio	SpeedSet	DelAll	SysManag		DOWN	Clear	LEFT	RIGHT
+X	+Y	+Z	+A	+B	+C	.	Start	End
-X	-Y	-Z	-A	-B	-C			HandSW

Reset: the reset switch allows you to perform the reset operation, and the reset sequence is cam, wire delivering, eddy core, coil, and clip. After the

reset is finished correctly, the respective lamp on the switch will blank off.

YSwitch: the stopping wire axis switch allows you to switch on or switch off the operation of the stopping wire axis. Once the stopping wire axis switched off, the respective indicator on the switch illuminates in red, and screen displays “stopping wire e (OFF)”, otherwise the indicator blanked off, and the screen displays “stopping wire (ON)”.

ZSwitch: the eddy core axis switch allows you to switch on or switch off the operation of the eddy core axis. Once the eddy core axis switched off, the respective indicator on the switch illuminates in red, and screen displays “eddy core (OFF)”, otherwise the indicator blanked off, and the screen displays “eddy core (ON)”.

ASwitch: the coil axis switch allows you to switch on or switch off the operation of the coil axis. Once the coil axis switched off, the respective indicator on the switch illuminates in red, and screen displays “coil (OFF)”, otherwise the indicator blanked off, and the screen displays “coil (ON)”.

CSwitch: the clip axis switch allows you to switch on or switch off the operation of the clip axis. Once the clip axis switched off, the respective indicator on the switch illuminates in red, and screen displays “clip (OFF)”, otherwise the indicator blanked off, and the screen displays “clip (ON)”.

Cylinder: The test switch on the cylinder allows you to enable or disable the test mode to test the cylinder. This mode can be entered only when the system is in OFF state. Once the system accesses the mode, the indicator on the switch illuminates in red. At the time, you can press the numeric switches from “1”-“8” to enable No. 1-No. 8 cylinders correspondingly. Press it for the first time, and the cylinder will extend out; for the second

time, it retreats. To quit the mode, press the Cylinder switch. Then, No. 1-No. 8 cylinders will be automatically turned off. You can also press “Single”, “Clear”, “Test” and “ES” to exit. In addition, under the cylinder test mode, insert the U-disk beforehand (the U-disk must be formatted as FAT, the ADT root directory is built, and the updating file is put into the ADT directory), if the U-disk is not inserted, the system will automatically download the updating program from the ADT directory of and electronic disk. Press 0 switch for 5 seconds, the system will remind to update the system program, and then press YES to update the system program. Otherwise, the update will be given up. Under the cylinder test mode, press “.” switch for 5 seconds allows you to backup the system configuration file, then press YES to backup the system configuration file, otherwise, the backup will be given up. Ensure that all the system parameters are correctly adjusted before backup the system configuration file. Under the cylinder test mode, press “-” for 5 seconds allows you to restore the system configuration file, then press YES to restore the system configuration file, otherwise, the restore will be given up. After restored the system configuration file, if system configuration reading error is occurred during the starting-up of the system, the system will automatically pop up a dialogue box to require the re-configure the system file.

Stop: under the normal machine stopping state, press this switch to machine a spring, during the continuous machining or the testing machining, press this switch, the automatic machine stopping can be realized after the machine of this time is finished, in any other single axis driving or reset, press this switch will stop the current driving immediately.

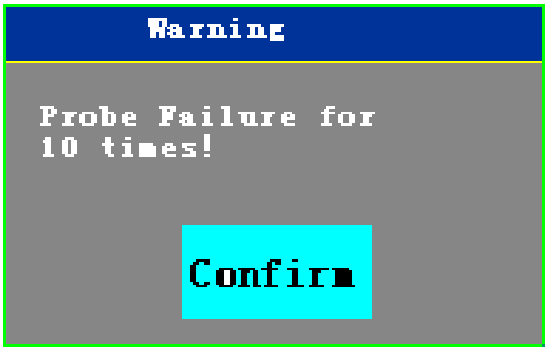
Test: this switch is the conversion switch of the automatic mode and the testing mode in the main interface. Under the automatic mode, the machining can be switched on to perform the normal machining operation, then machining quantity will automatically increased by 1 after the machining of each time is finished. During the automatic machining, press this switch, the system will automatically enters the testing mode, the testing machining is started, and the testing machining operation can be performed through hand wheel or testing knob.

File: select the serial of the file to be machined, if the current file is modified and not saved, the system will remind you to save the current operation, enter a new material number and press ENTER to load the new material number, if you enter a new material number and press SAVE switch, the current material content will bill saved to the new material number.

S	G	M	J	E	L	N

Varied programming command, see the later commands code instruction.

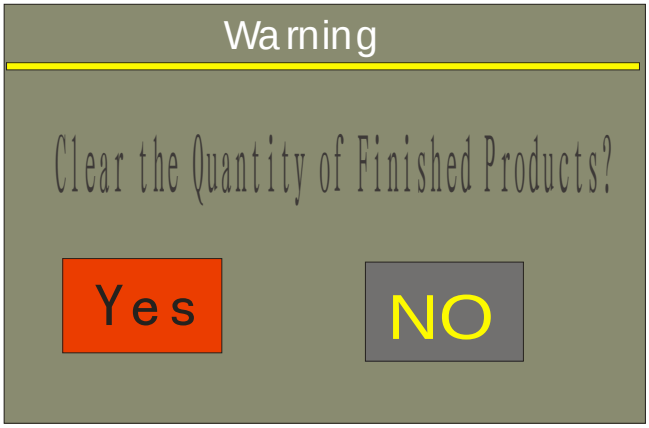
ProbeClr: to clear the failure times of the probe. When the failure times of the probe reach the set value, the system will pop up the dialogue box to prompt that the failure times have reached the value shown in the figure, then press ENTER, the probe failure times all will be cleared.



ProbeSet: setting the probe failure times, if the system has probe operation,

the probe failure times will be accounted, and when the set failure times is reached, the system will be stopped automatically, and the warning dialogue box will be popped up.

CountClr: clearing the machined quantity, press this switch, the reminding dialogue box will be popped up as shown in the figure to ensure whether you want to clear the machined quantity, press YES to clear the machined quantity, otherwise, the machined quantity will not be cleared.



When the continuous machining quantity reaches the set target quantity, the system will pop up a dialogue box as shown in the following figure, and then press ENTER, the machined quantity also can be cleared.

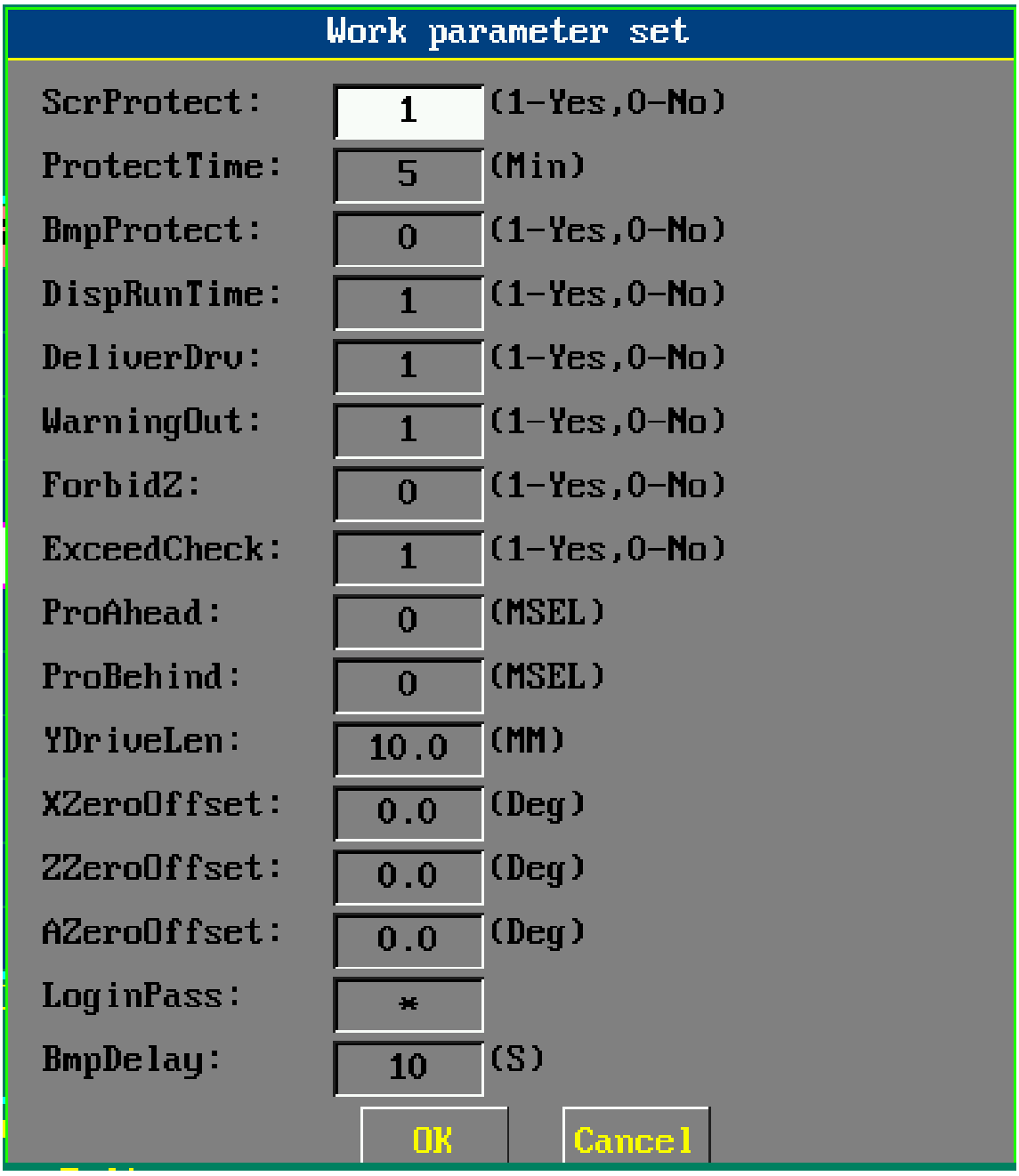


CountSet: setting the required machining quantity of the spring in this batch, when the machined quantity reached the set value, the system will be stopped automatically and the dialogue box will be popped up as shown in

the above figure to remind the user that the machined quantity is reached.

YClr: clearing the wire delivering axis position.

WorkPara: setting varied working parameters of the system, as shown in the figure:



1) ScrProtect: setting whether the system need screensaver

function (1 for yes, and 0 for no).

2) ProtectTime: setting the time quantum (unit: minutes) for entering screensaver mode, when the screensaver function is enabled and the screensaver mode is entered, press any switch to quit the screen saver state.

3) BmpProtect: setting whether the system need picture screensaver function, this function needs the screensaver function enabled, and when setting the picture screensaver function is enabled, the system will automatic select the starting image as the screensaver when the set screen time is reached, otherwise, the display will be blank and the screensaver is enabled

4) YHandBack: setting when eddy the hand wheel and separately move the Y axis, whether the back wiring is enabled, 1 for Yes, and 0 for No.

5) DeliverDrv: specify whether the last cylinder output point need to drive the wire delivering frame, 1 for yes, and 0 for no. Notice: when the parameter is set as 1, please do not use the last cylinder during the cylinder array programming.

6) WarningOut: specify whether the second cylinder output point need to output the alarming, 1 for yes, and 0 for no. Notice: when the parameter is set as 1, please do not use the last but one cylinder during the cylinder array programming.

7) ForbidZ: forbid the eddy operation core or not, when set as 1 the eddy core operation is forbidden, then press the eddy core switch, the eddy core will not be switched on and kept in switch off state.

8) ExceedCheck: whether the line exceed check is enabled during the system machining process, select YES, the system will automatically select the last probe input point as the line exceed check input point, the two-axis system should select the number 4 probe input point, and the system with more than 3 axis should select the number 8 probe input point. The function normally is used for spring machine, and will be reserved and not used herein.

9) ProAhead (unit: millisecond): The time delay mainly is used during the machining of the high precision spring, if the parameter is not 0, then the program line with the probe detection will display the respective cylinder, and the time is delayed for the in-position of the probe, during the time delay, if the probe detects the signal after the time is over, the system will record probe failure for once, the program for jumping over the probe detection line will be automatically executed, otherwise, the program will be executed in normal method, and in this way, the error phenomenon that the recording of the probe failure due to the detection of the probe signal beforehand can be prevented.

10) ProBehind (unit: millisecond): Setting the delay time during the detection of the probe, during the high speed execution of the program, the in-position of the servo is hysteretic than in-position of the software, namely, the time for detecting the probe is hysteretic than the actual program execution, the setting value is the delay hysteretic time, if the probe is

detected during this period of time, the system will automatically execute downward, if the probe can not be detected during this period of time, the probe failure will be recorded for once, and the machining will be kept on.

11) YDriveLen (unit: millimeter): setting the output length of the wire frame driving output, namely, under the automatic machining mode, when the wire delivering length is larger than this valve, the wire delivering frame will be outputted, otherwise, it will not be outputted, and the presupposition of the output is that the wire frame driving switch is switched on.

12) XZeroOffset (unit: degree): setting the shift position of the Axis X, namely is the eddy degree after the home switch is found on the Axis X, and the purpose is to convenient the random setting of the home on the Axis X.

13) ZZeroOffset (unit: degree): setting the shift position of the Axis Z, namely is the eddy degree after the home switch is found on the Axis Z, and the purpose is to convenient the random setting of the home on the Axis Z (only effective with the system with more than three axis).

14) AZeroOffset (unit: degree): setting the shift position of the Axis A, namely is the eddy degree after the home position switch is found on the Axis A, and the purpose is to convenient the random setting of the home on the Axis A (only effective with the system with more than four axis).

15) Password: the password for the machine to enter the system

after power-on, when set as 0 the log-in of the system needs no password (the default value of the system is 0).

Ratio⇕: the high and low speed ratio selecting switch for inching each axis and manual moving each axis, during the high speed, press the +switch and the –switch of each axis, then the system will each axis with the distance of inching motion distance × inching ratio.

Speed: setting the value of the inching motion speed and the ratio of each axis.

Insert: inserting a line of command program before the white cursor.

Delete: delete the program in the cursor line.

DelAll: Delete all the programs and only the speed setting line is reserved, and before deleting all the data, the system will remind for whether all the data are deleted.

SyManag: this switch allows you to set varied ancillary functions, see the operation instruction of the ancillary function.

Save: save the edited program, it is recommended that this switch should be press after large modification of the program to prevent the data loss caused by unexpected power break-down, in varied of parameter modification interfaces, this switch is the modification saving and quit switch, under the material number editing mode, press this switch after entered a new material number, the current data will be saved into the respective material number.

Cancel: during the selection of the program, press this switch will give up

the pressing of the switch, in varied of parameter modification interfaces, this switch is the modification giving up and quit switch.

Clear: clearing the content in the current edit box.

←→↑↓ allows you to realize the up, down, left and right moving of each edit box during the programming.

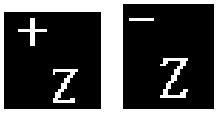
◄——| the **Enter** switch allows you to confirm the input data, name this switch should be press after the editing is finished, and the edit box will be automatic moved down.



: the two switches are the switches for moving the cam axis manually, when the switches are pressed, the cam axis is driven to realize the positive rotation and the negative rotation, and the driving is stopped when the switches are not pressed. Under the state that "the hand wheel is ON", the rear switch can performs the selection of the cam axis to realize the driving operation of the hand wheel to each axis.



: the two switches are switches for moving the wire delivering axis manually, when the switches are pressed, the wire delivering axis is driven to realize the positive rotation and the negative rotation, and the driving is stopped when the switches are not pressed. Under the state that "the hand wheel is ON", the rear switch can performs the selection of the cam axis to realize the driving operation of the hand wheel to each axis.



: the two switches are switches for moving the eddy core axis manually, when the switches are pressed, the eddy core axis is driven to

realize the positive rotation and the negative rotation, and the driving is stopped when the switches are not pressed. Under the state that “the hand wheel is ON”, the rear switch can performs the selection of the eddy core axis to realize the driving operation of the hand wheel to each axis.



: the two switches are switches for moving the coiling axis manually, when the switches are pressed, the coiling axis is driven to realize the positive rotation and the negative rotation, and the driving is stopped when the switches are not pressed. Under the state that “the hand wheel is ON”, the rear switch can performs the selection of the coiling axis to realize the driving operation of the hand wheel to each axis.



: the two switches are switches for moving the coiling axis manually, when the switches are pressed, the coiling axis is driven to realize the positive rotation and the negative rotation, and the driving is stopped when the switches are not pressed. Under the state that “the hand wheel is ON”, the rear switch can performs the selection of the coiling axis to realize the driving operation of the hand wheel to each axis.



: the two switches are switches for moving the coiling axis manually, when the switches are pressed, the clipping gudgeon is driven to realize the positive rotation and the negative rotation, and the driving is stopped when the switches are not pressed. Under the state that “the hand wheel is ON”, the rear switch can performs the selection of the clipping gudgeon to realize the driving operation of the hand wheel to each axis.

Start： the current position of the cam axis is adjusted to the original angle position.

End： the data of the cam axis is adjusted to the final angle position, and the system will automatically increase one line when the data of the other axis are adjusted to the corresponding position.

HandSet： hand wheel start-close selection switch, after the switch is pressed, the start-close state of the hand wheel will be displayed on the screen, and simultaneously the indicator on the switch illuminates and can be applied to the hand wheel to perform operation at this time. The switch is valid only to the system which is equipped with the hand wheel device.

2. Panel Button Instruction

An inching button, a testing knob and a mushroom-shaped button switch are arranged on the controller, wherein the green inching button adopts a processing start button, namely, the automatic processing starts through pressing the button at one time, the mushroom-shaped button adopts an emergency stop button, namely, when any abnormal condition occurs, the current driving is stopped through pressing the button, any other button and switches are all invalid under the condition that the button is pressed, and the interface shall be aromatically canceled and exits without any save through pressing the button under the set interface of each parameter. The testing knob is used for testing process, during the

testing process, the knob is rotated to the right, the speed of the testing process is quickened until the highest speed reaches the speed set by the program, the knob is rotated to the left, and the speed of inching process will slow down when the knob is rotated to the left, and the process is stopped until the speed is the lowest. In addition, some controllers are equipped with hand wheels, in the system equipped with a hand wheel, the hand wheel installation in the system parameter must be set into 1 firstly, otherwise the hand wheel is invalid, after the hand wheel is installed, the system can select the open-close state of the hand wheel through “the hand wheel of each axis”, and the hand-operated motion only plays a role under the open state of the hand wheel.

3、 Online Programming Function

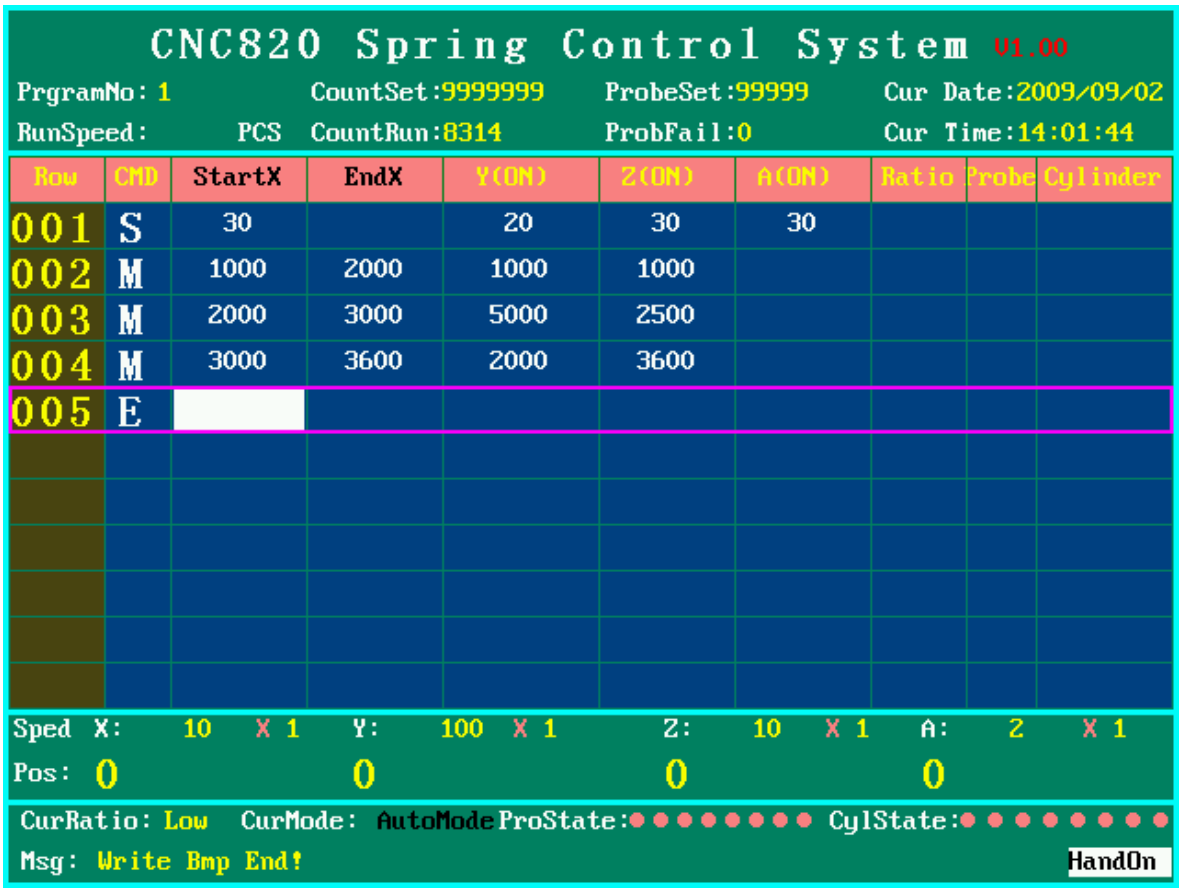
The system has the online programming function at present, namely, the system can modify the program contents while performing processing, so as to facilitate the adjustment operation of the spring, the online programming function only plays a role during the automatic processing process, and the modified program shall be valid automatically when the next spring is processed.

Precautions: during the process of automatic processing or testing processing, after an emergency stop, the system shall be in an emergency stop state, at this time the reset switch, the plus minus switch for each axis

rotation, and the starting button are only available, other switches are all invalid, and the system shall be restored into normal state automatically after resetting or pressing the starting button.

Ⅱ Operation Interface Resource and Instruction

1 Main Interface



Resource Instruction:

- Prgram No: it is the serial number for program save, and the range is 0-999.
- RunSpeed: when automatic processing is performed, the current quantity processed per min is displayed.
- CountSet: the product quantity can be automatically processed, the value can be input manually, with the range (0-9999999), the edit box is moved to the position of the target quantity by using the “Production Setting” switch, and editing can be performed. When the target quantity is 0, the processing operation of the

quantity statistics is not performed, and namely, the unrestricted continuous processing can be realized.

- CountRun: the quantity of the finished products, when the value is equal to the target quantity value, a message that the target quantity reaches will be displayed and a prompt is provided, and simultaneously the automatic processing is stopped. At this time, press the “Enter” switch and automatic reset will be performed to the finished product quantity. The maximum value is (9999999), and when the target quantity does not reach during the processing process, the value can be cleared through pressing the “Output Reset” switch.

- ProbeSet: the probe contacting failure times are set and can be input manually, the range is (0-99999), the edit box is moved to the probe setting position by using the “Probe Setting” switch, and editing can be performed, press “Enter” switch or “Cancel” switch to exit the probe editing state, when the set value is 0, the probe failure times is not detected, and when the set value is 1, the system is in off state immediately after the system detects the probe failure, otherwise the system is in off state immediately after the system accomplishes the spring processing and after the probe failure times have reached.

- ProbFail: when the specified probe cannot capture the contact signal and the set value of the probe is not zero, the value would be increased, if the value is larger than or equal to the set value of the probe, the processing operation is stopped after one current product is processed, a reminding message is provided when the

probe failure times reaches the set value of the probe. At this time, press the "Enter" switch, and the probe failure times will be automatically cleared. Press the "ProbeReset" switch to clear the value before the probe failure times reaches the set value of the probe.

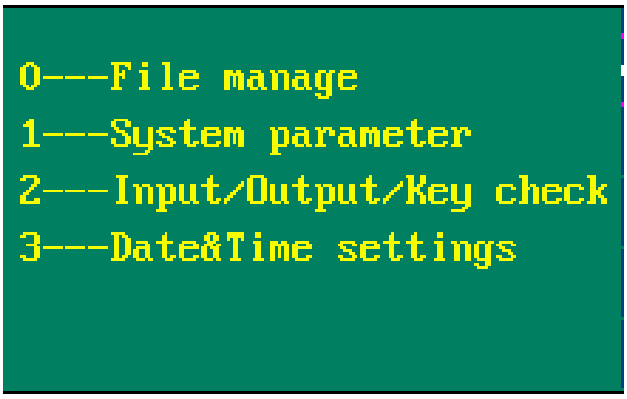
- Display current date and time for the user's reference.
- CurRatio: Display the selection condition of the current ratio, and divide into two states of high speed and low speed.
- X= Display the current rotation angle of the axis X (-3600-3600)
- Y= Display the current wire delivering length of the axis Y.
- Z= Display the current twisting angle of the axis Z (-3600-3600).
- CurMode: Display the current mode state "automatic mode" or "testing mode"
- HandOn: display the current on-off state of the hand wheel, the system on which a hand wheel is not installed cannot display the current on-off state.
- Display and retain the reminding message which appears last.
- ProbeState: indicate the current state of each probe, black indicates that a probe signal is input, and red indicates that a probe signal is not provided.
- CylState: indicate the current state of each cylinder, black indicates that the cylinder will extend out, and red indicates that the cylinder retreats.

Programming Contents:

- Programming line number (0-99)
- Program command (M, S, L, N, J, G and E)
- The original angle of the axis X (-3600-3600, and unit: 0.1 degree)
- The terminal angle of the axis X (-3600-3600, unit: 0.1 degree, and the angle of the axis X is absolute rotation angle)
- The wire delivering length of the axis Y (-99999-99999, and unit: 0.01 mm)
- The eddy core turning angle of the axis Z (-3600-3600, and unit: 0.1 degree)
- Speed ratio: the running speed ratio from the original angle position in the line to the terminal angle position is set, and the speed ratio is set for the wire delivering axis when the terminal angle is not provided.
- Probe appointment: input range (1-8)
- Cylinder appointment: input range (00000000-11111111)

2. Ancillary Function Operating Interface:

Press the “SysManag” switch and a figure appears as follows:



Press the corresponding numeric switch at this time and you can access into different interfaces.

A press “0” and you can access into the file processing management interface shown in the figure:

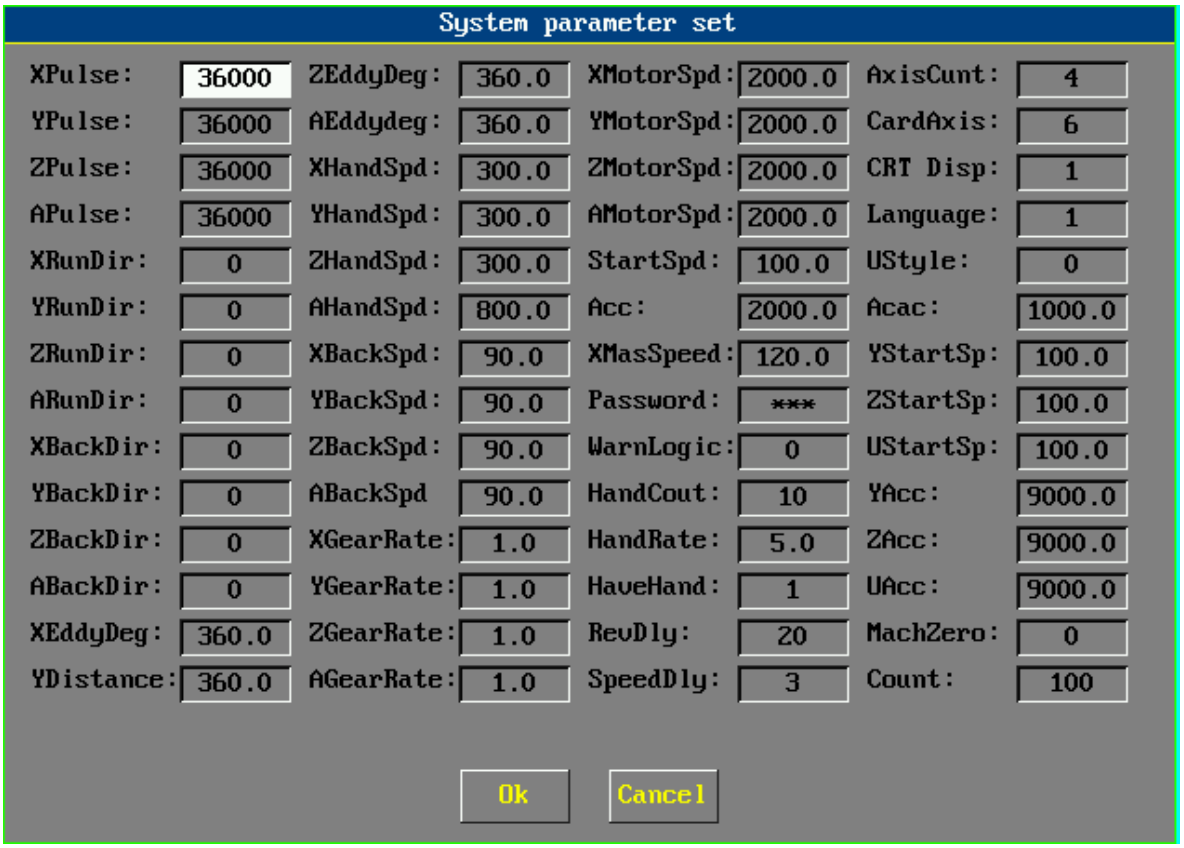


Press the arrow up and arrow down switches, and the right and left arrow switches and select the corresponding files, the corresponding operation is performed according to the corresponding numeric

switches, press “1” and perform the disc switching, if a mobile U-disk is inserted into the system, operation can be performed to the mobile U-disk (the directory of the mobile U-disk display: USB;), press “2” and perform the copy operation to the selected files or directories, press “3” and paste the files or contents which selected copy just now, press “4” and delete the selected files, press the “Enter” switch for the operation confirmation when the system provides a reminding message “Y/N”, and you cancel the operation through pressing the “Cancel” switch.

Notice: the mobile U-disk must be formatted into the FAT format when the operation is performed during the operating process of the mobile U-disk, otherwise the file read may be not normal.

B Press “1” and access into the system parameter setting interface shown in the figure after through the code verification (the initialized default code of the system is 123).



- Pulse of X, Y, Z and A: pulse number required by the executing mechanism of each axis for eddy for one turn
- RunDir of X, Y, Z and A: the eddy running direction of each axis
- BackDir of X, Y, Z and A: the running direction of each axe during the process of reset
- EddyDeg of X, Z and A: the eddy degree of each axis eddy during the process of sending the first item set corresponding pulse number, and the set value is 360 normally.
- YDistance of Y: the length of the wire delivering when the pulse number set in the first item is sent by the wire delivering axis, namely, the perimeter of the wire delivering wheel in general.
- BackSpd of X, Y, Z and A: the running speed can be obtained when all axis are reset.

- GearRate of X, Y, Z and A: mechanical speed reducing ratio of each axis
- MotorSpd of X, Y, Z and A: motor rated eddy speed of each axis
- The manual speed of X, Y, Z and A: manual speed of each axis
- StartSpd: running initial speed (unit: r/min) of the interpolation is set during the mechanical operating process
- Acc：the running acceleration of the interpolation is set during the processing operation
- XMasSpeed: the maximum speed set by the Axis X is set, and a reminding message is provided when the input speed is larger than the numerical value.
- Password: the codes accessing to the interface are set.
- Warnlogic: setting servo alarming logic, 1: high level alarming, 0: low level alarming.
- HandCout: the counting statistic parameter is set during the processing process of the hand wheel, when the numerical value is larger, a hysteretic phenomenon that the manual processing stops relatively to the manual operating will occur, when the numerical value is too small, a processing dithering phenomenon maybe occur when the hand wheel is rotated slowly, the numerical value is about 2 in general, and please don’t change it with ease.
- HandRate: the speed changing rate is set during the manual processing process, the change is not obvious when the numerical value is smaller, the change is more obvious when the numerical value is layer, and the numerical value is about 150 in general.

- HaveHand: a system is set to judge whether the hand wheel is installed or not, 1: enable; 0: disable
- PosDly&RevDly: the time relay proportion is set during the reversing rotation process of the system.
- SpeedDly: the time delay proportion factor which changes with speed is set.
- AxisCunt: setting the axis number required by the system (3 to 4 axis is temporarily supported only)
- CardAxis: setting the axis number controlled by the control card
- CRT Disp: selecting whether the CRT display is used or not (1: CRT display, 0: LCD display)

  Notice: because the parameter is damaged carelessly, some controllers using the CRT don't provide a display after the system is started, any switch can be pressed unceasingly during the startup process of the system at this time, and the CRT display way would be automatically restored after the system is started.
- Language: selecting the language used by the system (1: English, 0: Chinese)
- AStyle: selecting the control mode of the axis A(coiling) (1: number of turns, 0: angle)

Notice: when the angle control mode is used to control the axis A(coiling), the basic programming accords with the eddy core, and the input angel can reach -36000 to 36000 degrees to facilitate to realize the multiturn running. As for the control mode of number of turns, the contents of the line is taken up, namely, number of turns + angle mode

(for example, 2.123 indicates two turns and 123 degrees, the minimum unit is 1 degree), simultaneously the coordinate also indicates: number of turns + angle mode (for example, 2C200 indicates 2 turns and 200 degrees), and the data value is different from the absolute value of the angle at this time and is an increment value, namely, a variation relative to the previous position, in addition, under the control mode of the number of turns, the data 0 or +0 is input, the program is positively rotated to the home position after executing to the position, and if the date -0 is input, the program will be reversely rotated to the home position after executing to the position.

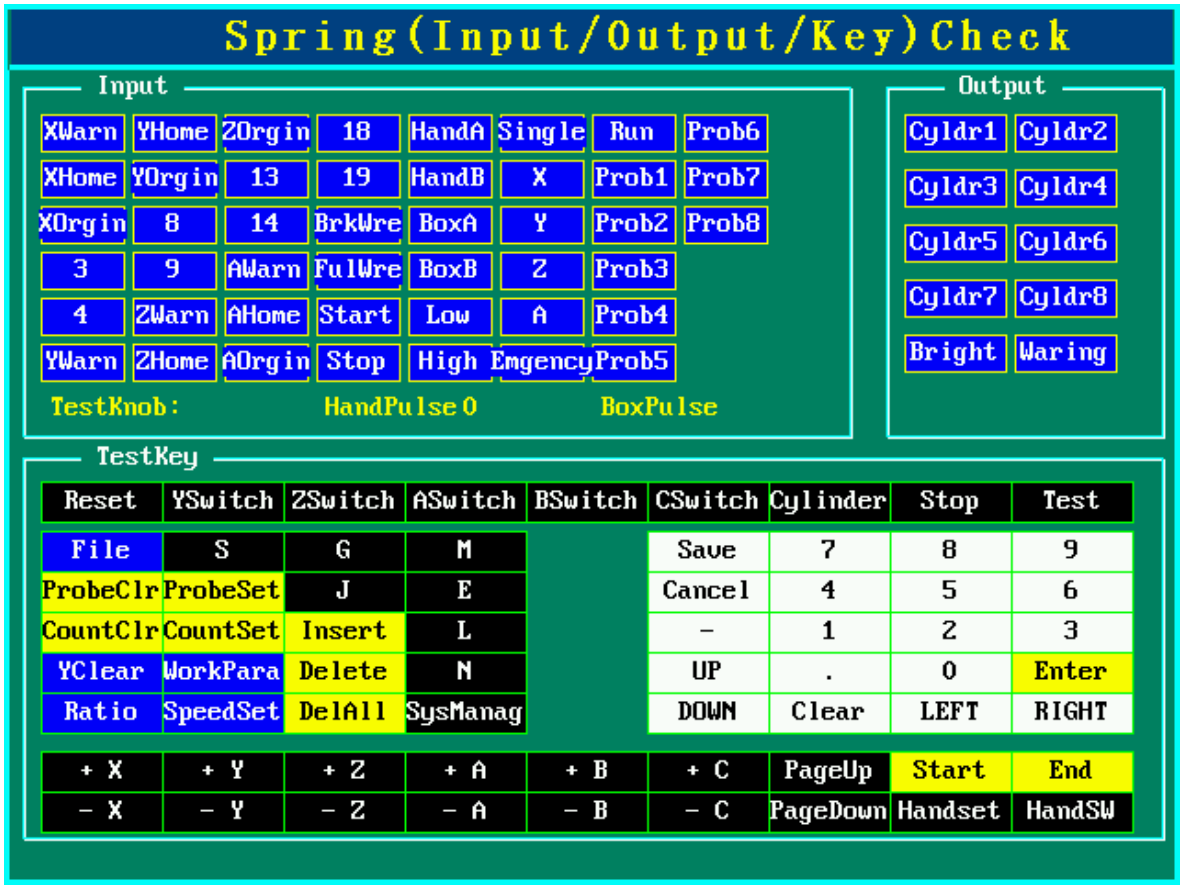
Power supply is provided again to ensure the validity of the data analysis after the parameter is modified, and the data content of the coiling axis is checked at the same time, otherwise, the phenomenon that the coiling axis continuously works for a long time is easy to occur.

Acceleration: the S curve acceleration of the entire system is set, when reaching 1000, a trapezoidal acceleration curve is used, the smaller the numerical value, the longer the acceleration time of the system, and you can select l000 and use the trapezoidal acceleration curve.

- Y, Z, A StartSpd: the running initial speed of all the axis Y, Z and U is set, if you use the speed accelerating and decelerating operation, please set the numerical value: 20, otherwise the numerical value is 1000 available.
- Acc of Y, Z, and A: the acceleration of all the axis Y, Z and A is set, the larger the numerical value, the faster the acceleration, and you can set the relevant numerical value according to actual needs.

- After modification is accomplished, you can press the "Save" switch and exit; you can also press the "Cancel" switch, and the modification is invalid.
- **Notice: the system parameter is the necessary condition for ensuring the running of the system, and you had better not change the system parameter with ease in general.**

C press "2" and access into the I/O interface detection shown in the figure.



- An input port is arranged in an input border, when a signal is provided for the corresponding input port, the rectangular box illuminates in red, when the signal detection is performed to the probes from 1 to 8, the signals will change color and be displayed

along with some previous signals which are indicated by using digitals, if the previous digital signals change only, the rear probe signals don't change, a control card problem appears, and therefore the control card is required to be replaced.

- An input port is arranged in an input border, the digital signals of 0-9 can be output according to the digitals from 0-9, and when a digital signal is input, the system displays a red rectangular box. Otherwise the system displays a blue rectangular box shown in the figure.
- When the contents in a switch test border display a switch state, you can press the "Test" switch to access into a switch testing state, and at this time you can press the corresponding switch on the switchboard panel to check whether it works or not, in normal circumstances, the display is shown in the figure, when a switch is pressed, the switch illuminates in red, and meanwhile if an indicator is arranged in the switch, the indicator will illuminate, and the switch is pressed again for closing and the original state is restored. If you need to exit the switch testing stat, press the "Test" switch again.
- Press "3" and You can access into the date and time setting interface, please guarantee the correctness of the date and time, otherwise an incorrect system startup failure maybe occur.

III Program command and illustration instruction

1 Command and Instruction

Command	Instruction
S	Setting Driving Axis Speed
L	Circulation Body Head Mark
N	Circulation Body Tail Mark
M	Wire Delivering, Eddy, Eddy Core, Tracing Wire Delivering, Speed Ratio, And Probe Sharing With Cylinder
J	Phenomenon Skip Command
G	Absolution Skip Command
E	Procedure End Command

2. Command Format:

Line Number	S	X Speed		Y Speed	Z Speed			
Line Number	L	Cycling Times						
Line Number	N							
Line Number	M	X Original Angle	X Terminal Angle	Y Length	Z Twisting Angle	Speed Proportion	Probe Number	Cylinder Number
Line Number	J	Skip Line Number For Probe Inspection Failure						
Line Number	G	Absolution Skip Liner Number						
Line Number	E							

3 M, J, and G Command Operation Instruction is Listed as follows (only used for demonstration and no any relevance exists between any two statements):

Line Number	M	200	300	2000	100				The axis X reaches 20 degrees firstly, and then is matched and linked with the axis YZ. The speed of the axis YZ adopts the tracing speed. The wire delivering length is 20 mm, and the axis Z is rotated to the position of 10 degrees.
Line Number	M	450		10000		0.2			After the axis X reaches 45 degrees firstly, the wire delivering length of the axis Y is 100 mm, and the wire delivering speed adopts the wire delivering speed x 0.2 set by an S command.
Line Number	M	300	500	10000	30		2	01	After the axis X reaches 30 degrees firstly, No. 2 cylinder will extend out, and then the axis X is matched and linked with the axis YZ. The speed of the axis YZ adopts tracing speed. when the axis X is rotated to 50 degrees, simultaneously the wire delivering length of the axis Y is 100 mm, the axis Z is rotated to the position of 30 degrees, No. 2 probe contacting detection is performed, during the running process, if a probe signal is contacted, the program will automatically stop the current processing and the cylinder retreats, the system will continue to perform processing through

									switching to the next line, otherwise the cylinder retreats after accomplishing the processing, and then the system will continue to perform processing through switching to the next line again.
Line Number	J	7							The condition jump command is executed, When the probe detection is performed in the line before this line, the command is valid, otherwise the command is invalid, the system will automatically jump over the line and continue to perform downward, when the probe detection exists in the previous line, if a probe is contacted during the running process, the jumping is not performed, and the system will perform downward in sequence, or jump over to the specified line number 7 and then perform downward. Pay attention to the rationality of the jumping position, otherwise the system maybe perform a program in an unlimited circulating way.
Line Number	M			20000	-15				The axis YZ are linked; the axis Y will feed wire of 200 mm, and the axis Z is rotated to 15 degrees. The speed of the axis Z is the tracing speed of the axis Y. The speed of the axis Y is the speed set by the S command.
Line Number	M				450				When the axis Z is rotated to 45 degrees, the speed is the speed set by the S command.
Line	G	6							Absolute jump command, after

Number									the program executes to the line, the absolute jump command will jump to the specified line number 6 immediately and continue to perform downward, and through being matched with the J command, special processing operation to the spring which fails to detect the probe can be realized to be more convenient for the detection of waste products.

Notice: when the data is input, and the program logging is finished, you must press the “Save” switch to store the program to a hard disk, so as to avoid that the data is lost and invalid after unexpected power failure. After the processing is accomplished, processing is performed according to the latest edited data when the next processing is started.

4 Program Illustrations:

Line Number	Command	Original Angle	Terminal Angle	Wire Delivering	Eddy Core (ON)	Speed Ratio	Probe	Cylinder
00	S	60		50	60			
01	M	100	200	2000	300			00000001

02	M	300		10000		0.3		
03	M	450	750	5000			1	1
04	J	14						
05	M	900	1000	10000				
06	L	6						
07	M	1200	1500	3000	300		2	01
08	J	14						
09	M	1800	2000		-100			
10	N							
11	M	2300	3000		0			
12	M	3600						00000 000
13	E							
14	M	1800	2500	20000				
15	M	3300			0			
16	G	12						

Statement Explanation:

00 The rotation speed of the axis X is set: 60 turns per minute, the wire delivering speed of the axis Y is 50 m per minute, and the rotation speed of the axis Z is 60 turns per minute.

01 The axis X is rotated to 10 degrees firstly, then the eighth output point is

ON, and drive the wire delivering frame to rotate fast, or drive No. 8 cylinder to extend out, then the axis X is rotated to the position of 20 degrees again, simultaneously the axis Y feeds wire of 20 mm through tracing, and the axis Z is rotated to the position of 30 degrees through tracing.

02 The axis X is rotated to 30 degrees firstly, and then is rotated to the position of 45 degrees, simultaneously the axis Y feeds wire of 100 mm, and the wire delivering speed is 50 m/min ×0.3 set by the S command.

03 The axis X is rotated to 45 degrees firstly, No. 1 cylinder will extend out, then the X is rotated to position of 45 degrees, the axis Y feeds wire of 50 mm through tracing, the contacting detection is performed to No. 1 probe, if the probe signal is detected out, the program will automatically stop executing program of the previous line, and call the cylinder back, and execute the program of the next line directly, otherwise the program is executed downward after accomplishing the program execution of the line.

04 If a probe signal is detected out during the process of the 03 line program execution, the program execution is continued downward and a jumping operation is not performed, otherwise the program execution is continued downward when the program jumps to the 14^{th} line.

05 The axis X is rotated to the position of 90 degrees firstly, and then is rotated to the position of 100 degrees, and the axis Y feeds wire of 100 mm through tracing.

06 A circulation body head mark is set, and the cycling times is 6.

07 After the axis X is rotated to 120 degrees, No. 2 cylinder extends out, then the axis X is rotated to the position of 150 degrees, the axis Y feeds wire of 30 mm through tracing, the contacting detection is performed to No. 2 probe, if a

probe signal is detected out, the program will automatically stop executing program of the current line, call the cylinder back, and execute the program of the next line directly, otherwise the program is executed downward after accomplishing the program execution of the line.

Notice: the operation of the probe and the cylinder must adopt a one-one correspondence way, No. 1 probe only use No. 1 cylinder correspondingly, No. 2 probe only use No. 2 cylinder correspondingly, and so on, as for cylinder: the first line indicates No. 1 cylinder, the second line indicates No. 2 cylinder, and so on, and four cylinders can be used in all. If the line indicates 1, namely, after the system reaches the original angle shown in the line, the cylinder with the number will extend out, 0 indicates that a cylinder with a modified number retreats, and the cylinder state keeps unchanged under the condition of null value (without data).

If a probe signal is detected out during the process of program execution of the 07 line, the program execution is continued downward, and a jumping operation is not performed, otherwise the program execution is continued downward when the program jumps to the 14th line.

The axis X is rotated to 180 degrees firstly, and then is rotated to 200 degrees, the axis Y is not moved, and the axis Z is rotated to the position of -10 degrees through tracing.

A circulation body tail mark is set, and when the specific cycling times is equal to the times set by the L command, the program performs the 11^{th} line program, otherwise, the cycling will be operated to the 06 sentence from the 09 sentence in the opposite direction and continue to operate downward.

The axis X is rotated to 230 degrees firstly, and then linked with the axis Z and operated to the position of 300 degrees, and simultaneously the axis Z is

operated to the position of 0 degree through tracing and reset operation is performed.

The axis X is operated to the position of 360 degree, and is returned to the home. The system closes the 8th output point and stops the quick input of the wire delivering frame or calls the No. 8 cylinder back.

The program is finished.

The axis X is operated to the position of 180 degree firstly, and then is matched and linked with the axis Y and is operated to the position of 250 degree, and simultaneously the axis Y feeds wire of 200 mm through tracing.

The axis X is operated to the position of 330 degree, and then the eddy core axis is returned to the home position.

The program jumps to the position of the 12th, so as to ensure the running accomplish.

Ⅳ System Parameter Restoring

In practical operation, the data in the hard disk or the system parameter is damaged mainly because of improper operation or sudden power failure, even an error will occur when the system works, the mentioned above cannot occur in general, the system has the default parameter error correction function, and if the mentioned above occur, the system will show a statement, for example, “Please reset the system parameter! Press any switch and configure the system parameter…”at this time, you can access the system and select the system parameter editing interface, edit each parameter

manually, then save and exit, and then restart the controller, if an error still occurs, please contact with our company and seek the solution method.

Chapter Four Attention Points and Service

Ⅰ. Precautions

Precautions of the Security Aspect:

1. Please don't open the machine casing arbitrarily without permission.
2. Please cut off power supply when the controller is not used for a long time.
3. Please pay more attention not to let dust and iron power in the controller.
4. Please handle with care during the transportation process, and don't cause the damage to the controller.

Precautions for Proper Operation:

An abnormal operation would be caused because of an incorrect operation method, and even the controller is damaged for the worst, so please follow the following the attention points to operate the controller properly.

1. Check the connected power supply to know whether it meets the requirement or not, and stop burning the controller out.
2. The service life of the controller has a lot to do with the environment temperature, and if the field temperature for processing is too high, please install a heat emission fan. The range of the allowable operating environment temperature of the controller is between 0 DEG C to 60 DEG C.
3. Avoid using it in high temperature, in humidity, in a dusty environment or in an environment with corrosive gas.
4. In the place with intense shock, a rubber quakeproof pad for buffering should be added.

Ⅱ Maintenance and Service

Precautions during the Maintenance and Inspection

1. Don't perform the maintenance and service of the controller until the power supply of the main circuit is cut off firstly.
2. The operator self should make sure that the power supply has been cut-off, to avoid an unexpected accident.

3. Inspection Item and Period

Under normal use (environmental conditions: average daily: 30 DEG C, Load rate: 80%, and operating ratio: 12h/day), please perform the daily inspection and periodic inspection according to the following items.

Daily Inspection	Daily	● Confirm environment temperature, temperature, and dust foreign impurity. ● Whether abnormal vibration and noise exists or not ● Whether the air hole is block or not by a yarn
Periodic Inspection	One Year	● Whether the firm components are loosened or not ● Whether the terminal block is damaged or not

Appendix A: Common Failure Analysis

1. You cannot access into the program after starting the controller, as long as you hear humming sound of a buzzer, any display is provided on the system screen, and a startup file of the system is maybe damaged at this time, so please contact with the supplier.
2. If the humming sound continues after starting the controller, a serious startup failure of the system maybe occur, so please contact with the supplier at this time as soon as possible
3. When the system is started, and shows “cannot find a control card”, the contact with a board or a CPU board is maybe poor at this time, please turn off the machine, dissemble the machine casing and reinsert the card or reinsert the CPU board, and if the failure cannot be eliminated, please contact with the supplier.
4. The system has been started, but the testing knob, the hand wheel the starting button or the emergency stop button is invalid, at this time you can access into the I/O detection interface to perform test to all functions, and if the test is abnormal, the switchboard switch panel or the control card maybe has a problem, so please contact with the supplier.
5. The system has been started, but all or partial switches don’t have

response, you can access into the I/O detection interface at this time and perform test to all switches, and if the test is abnormal, the switchboard switch panel maybe has a problem, so please contact with the supplier.

6. The system has been started, but an X alarm or a Y alarm is displayed on the screen constantly, an alarm message is not displayed on the servo driver yet at this time, the alarming output logic of the servo parameter should be modified at this time, simultaneously you can check the servo driver to make sure that the alarming output logic can be inverted, and if yes, the parameter can be modified, otherwise you can access into the system parameter modifying interface to modify the alarming logic.
7. After the system is started, each axis is operated manually, and only one direction is moved, so please check the servo parameter to make sure that the servo parameter is set into pulse + direction mode.
8. If the direction of the movement of each axis is opposite to the anticipated direction, please modify the operating direction of the corresponding axis in the system parameter or modify the operating direction in the servo parameter.
9. After the system is started, each axis is operated manually and is moved normally, but the processing operation cannot be started, at this time, firstly guarantee that the reset is correct, next check whether a wire breaks or not, as for some wire delivering frames which cannot provide

the wire breakage signals, the broken wire should be short-circuited, in addition, you should also check that whether the quantity processed exceeds the target quantity or not, and if yes, the initial processing cannot be started.

10. If the system is started normally, press the “Reset” switch, and a reset failure is displayed immediately, you should check whether the “Emergency Stop” button is pressed or not at this time. If a reset failure is displayed after the reset for a certain time, you should check the origin point switch, and check whether the input signal of which is normal or not.
11. If the cylinder cannot extend out, please guarantee the operating current of the cylinder not exceed 500 mA.
12. If the probe is not successful constantly, please guarantee the time set by the probe time delay to be adequate large, and in addition, you should ensure that the machine itself and the controller system share the ground.
13. If the controller is energized, no pulse is sent out, but the motor is moved, you should check the wire connecting condition at this time, check the connecting condition of the ground wire, and set the wave filtering parameter of the servo.

Appendix B: See the Setting of Servo Parameter

All parameters all refer to the divers of Sanyo Q series, and please select the corresponding options as for other modes.

Ⅰ System Parameter (ru)

Page	Parameter Meanings	Ex-factory Value	Set Value	Remarks
00	Inputting the Power Supply Type (three-phase/single-phase)	00	01	00: Three-phase 01: Single-phase
01	Encoder Type	00	00	00: Increment Type 01: Absolute Value Type
02	Increment Type Encoder Setting	00	00	
03	The Number of Turns of the Increment Type Encoder Setting	------	2000	The pulse number feed-backed by each turn of the motor is shown in the motor

				instruction, and is 2000 in general.
08	Working Method	------	02	00: Torque Method 01: Speed Method 02: Position Method 03: Speed-torque Method 04: Position-torque Method 05: Position-speed Method The System Adopts the Position Controlling Method.
09	Position Method Encoder Selection	00	00	00: Internal Encoder 01-02: External Encoder
0B	Braking Resistor Selection	------	00	00: Without Braking Resistance 01: Internal Braking Resistor 02: External Braking

				Resistor

Ⅱ Basic Parameter (PA)

Parameter Group 0

Page	Parameter Meanings	Ex-factory Value	Set Value	Remarks
00	Position Ring Proportional Gain 1	30	80~200	The rigidity of the system can be enhanced and the in-position time can be reduced through increasing the set numeric value.
01	Position Ring Integration Time Constant 1	1000.0	1.0~100.0	The rigidity of the system can be enhanced and the in-position time can be reduced through decreasing the numeric value.
02	Speed Ring	50	80～200	The rigidity of the system

	Proportional Gain 1			can be enhanced and the in-position time can be reduced through increasing the set numeric value.
03	Speed Ring Integration Time Constant 1	20.0	1.0~1000.0	The rigidity of the system can be enhanced and the in-position time can be reduced through decreasing the numeric value.
04	Position Ring Proportional Gain 2	30	20~100	The start-stop rigidity of the system can be enhanced and the in-position time can be reduced through increasing the set numeric value, but the noise will increase during the startup process.
05	Position Ring	1000.0	1.0~100.0	The start-stop rigidity of

	Integration Time Constant 2			the system can be enhanced through decreasing the numeric value.
06	Speed Ring Proportional Gain 2	50	30～100	The start-stop rigidity of the system can be enhanced through increasing the set numeric value.
07	Speed Ring Integration Time Constant 2	20.0	1.0~1000.0	The start-stop rigidity of the system can be enhanced and the in-position time can be reduced through decreasing the numeric value.
0A	Feed-forward Gain	0	0～80	Rigidity selection option, the rigidity of the system can be enhanced and the in-position time can be reduced through

				increasing the set numeric value.
0E	Position Wave Filtering Parameter	0（ms）	0～200.0	The start-stop pulse, the acceleration and the wave filtering parameter of the system are set.

Parameter Group 1

Page	Parameter Meanings	Ex-factory Value	Set Value	Remarks
00	Servo In-position Range	100	5～200	Setting the Servo In-position Signal Output Time
01	Servo In-position Approaching Range	500	5～1000	Setting the Servo In-position Approaching Range Time
04	Electronic Gear Ratio	1/1	?/?	1/1 is 8000 pulse/turn (as for the 2000 wire motor, the pulse number of each turn of the used motor must be

				confirmed before setting the numeric value, and simultaneously the pulse number is corresponding to the pulse number of each axis in the first system parameter.)

Parameter Group 3

Page	Parameter Meanings	Ex-factory Value	Set Value	Remarks
00	Pulse Wave Filtering	00	??	00：800ns（1.25MHz） 01：200ns （5MHz） 02：400ns （2.5MHz） 03：1.6us （625KHz） 04：3.2us（312.5 KHz） 05：6.4us （156KHz） 06：100ns （10MHz） 07：66.7ns （15MHz）
02	Co-rotation	??	00 or 40	

	and Reverse Rotation Selection			

Parameter Group 4

Page	Parameter Meanings	Ex-factory value	Set value	Remarks
00	Pulse Selection	00	20	00: Pulse/Pulse 10: Orthogonal Pulse 20: Pulse/Direction The system supports the pulse/direction mode and the pulse/pulse mode.

Parameter Group 7

Page	Parameter Meanings	Ex-factory Value	Set Value	Remarks
00	Deviation Clearing Function	08	08	Constantly Valid
02	Speed Ring Proportion	04	00	The CONT2 taken as the proportion switching switch is

	Switching			canceled.
03	Gain Switching Function	00	04	The CONT2 is taken as the gain switching switch.

Parameter Group 8

Page	Parameter Meanings	Ex-factory Value	Set Value	Remarks
00	Servo ON Signal Setting	02	01	Constantly Valid
04	Co-rotation Limit	0D	0C	Using the Normally Open CONT6
05	Reverse Rotation Limit	0B	0A	Using the Normally Open OONT5

Parameter Group 9

Page	Parameter Meanings	Ex-factory Value	Set Value	Remarks
00	Servo In-position	18	19	Setting the Output Signal of

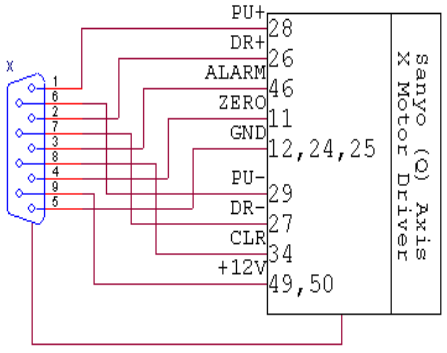
	Switch Setting			the Servo in-position Switch
07	Servo Alarming Setting	39	38	Servo Alarming Switch Setting

Common Used Alarming

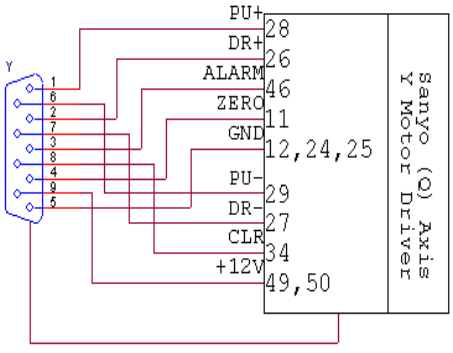
Alarm	Instruction	Processing Method
41	Overload or UVW wire connection error or the driver not being matched with the motor	Reducing the Overload or Modifying the UVW Wiring or Modifying the Motor Mode in the Driver
43	Braking Resistance Failure	Checking the Arrangement and Wiring of the Braking Resistor
61	Power Supply	Checking the Power Supply
85	Encoder Error	Checking the Encoder Wiring
D2	Positioning Command Pulse Frequency Error	Checking the Pulse Wave Filtering Parameter Setting in 00 Page of the third Group

Appendix C: Spring Former Wiring Diagram

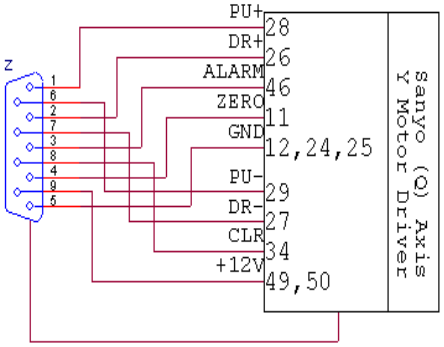
Sanyo Servo Control Wiring As for the controllers of the PY series, the quantity of the pins should be changed into 13 from 12, and changed into 43 from 46



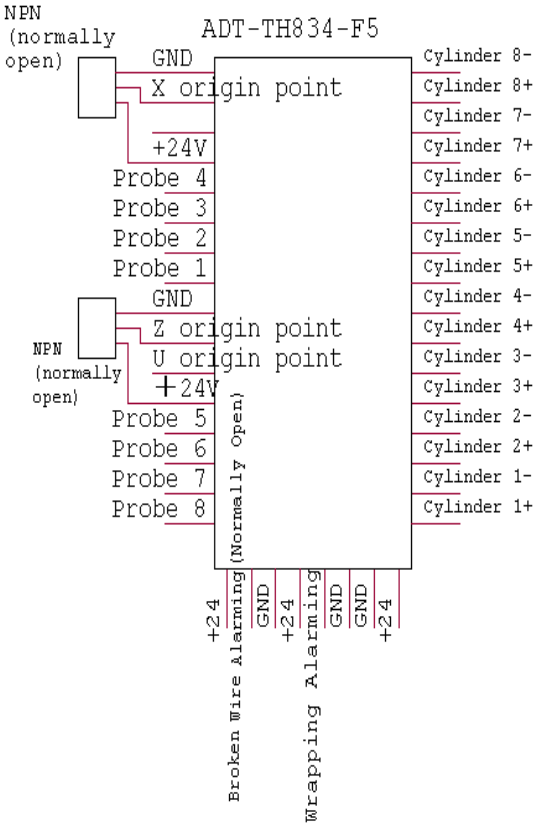
Axis X Servo Wiring



Axis Y Servo Wiring

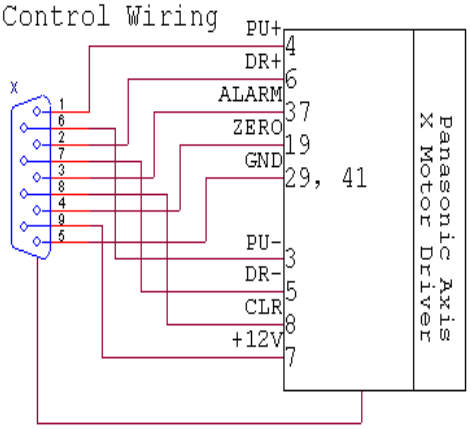


Axis Z Servo Wiring

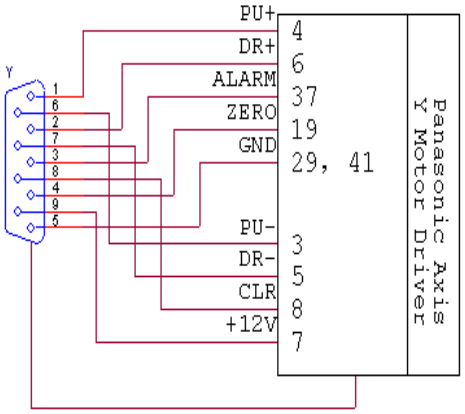


Client	Adtech				
Drawing	CNC 502 Spring Machine				
Date	07.04.06	Version	A	Page Number	1/1
Drawn by	Fan Zhizhou	Verified by		Approved by	B
Adtech (Shenzhen) CNC Technology Co., Ltd					

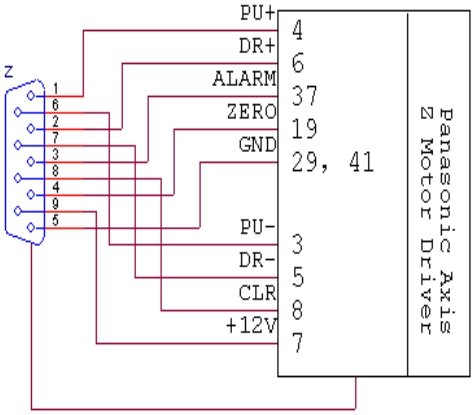
Panasonic Servo Control Wiring



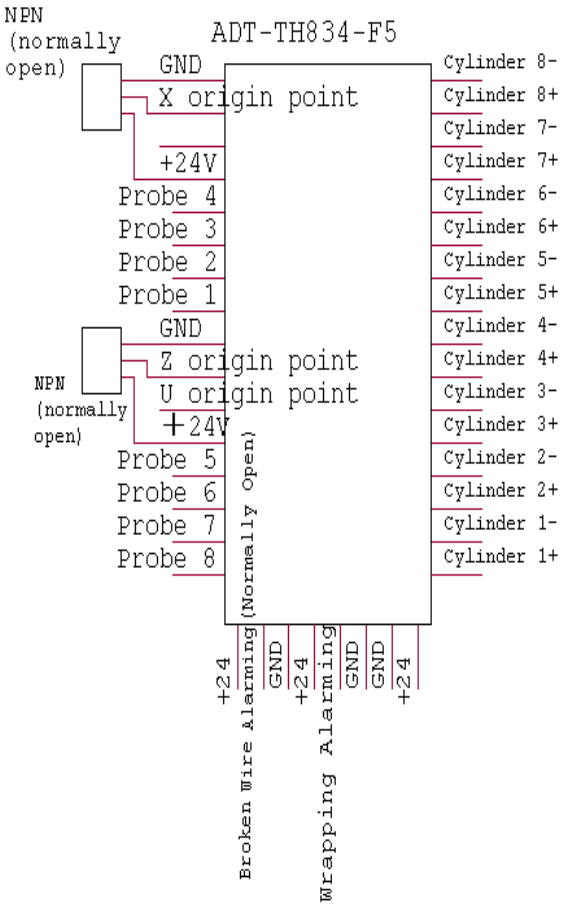
Axis X Servo Wiring



Axis Y Servo Wiring

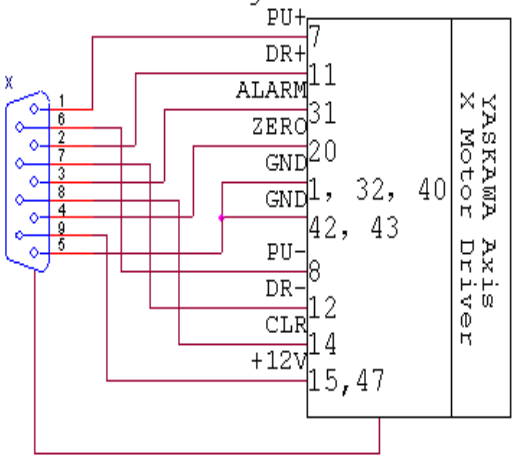


Axis Z Servo Wiring

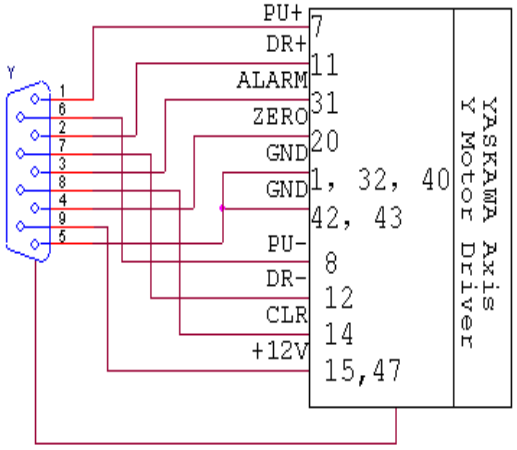


Client	Adtech				
Drawing	CNC 502 Spring Machine				
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Drawn by	Fan Zhizhou	Verified by		Approved by	B
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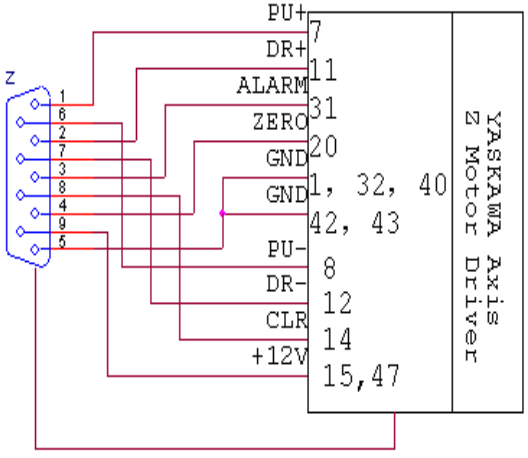
YASKAWA Servo Control Wiring



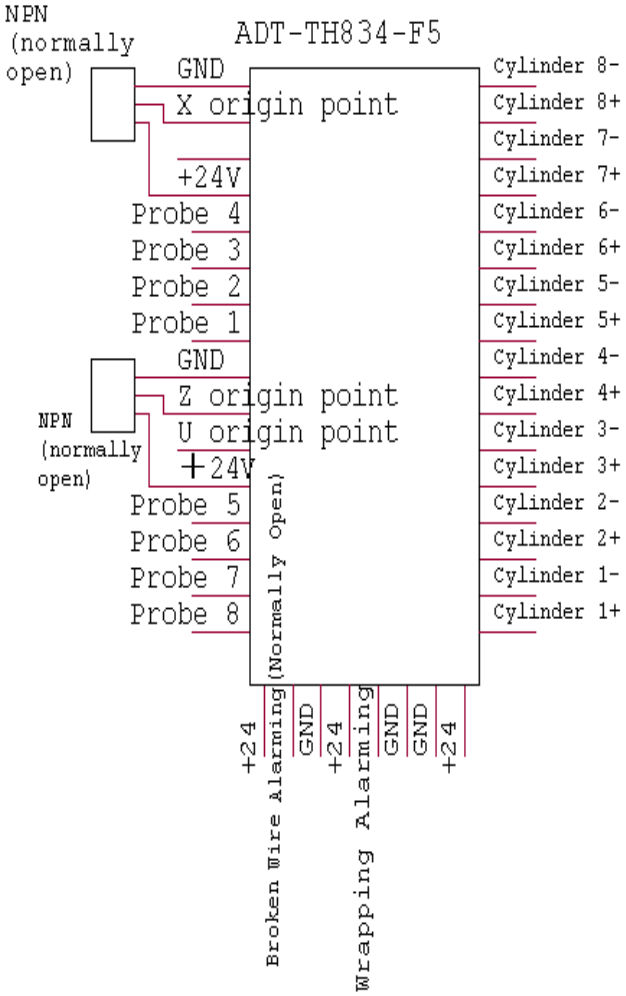
Axis X Servo Wiring



Axis Y Servo Wiring



Axis Z Servo Wiring



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