CONTENT

I Preface

Thank you for your using of CAM888 cam controller, here after is called controller, which is produced by DUCH automatic technology CO., Ltd. The controller adopts the newest technology. And our company has the completely independent intellectual property. Besides, it is the national invention patent product. The characteristics are as following:

- **Leading technology**

  ☆ It uses the high speed microprocessor, the large-scale field programmable chip and the entire digital high accuracy high speed control.

  ☆ Gear change system: Intelligent calculate of stopping at top dead end.

  ☆ It is dynamic indicating for cam angle setting, which is more human nature.

- **High performance**

  ☆ The displayed precision of angle measurement may amount to ±0.1°.

  ☆ braking test has 2 channels outputs . programmable scissors cam has 6 channels outputs. Production value has 1channel output.system normal indication has 1 channel output. Totally 16 channels output.

Before using the controller please read the manual carefully Make sure it is used correctly and then it will display its high performance. Moreover, this manual is an appendix which is sent with the controller. Please take care of it after you have used it. So that it will work when you repair and maintain the controller.

1.1 Notices when open the cases

When open the case, please confirm the following items carefully.

◇If there is any damage during the delivery.

◇Check if the rating value on name plate is the same with your requirement. Make sure the accessories are whole.

◇Any question please contact us or the supplier.

1.2 Install environment

◇The height is no more than1000m；When it is over1000m, it will reduce the capability of the controller because of the thin air.

◇Environment temperature：-10℃～+40℃ Environment humidity：No more than 50% at 40℃. No more than 90% below 20℃.

◇When the installation base allowable vibration is 10～150HZ, its maximum vibration acceleration should be no more than 5m/s².

◇Power supply：DC24V1A.

1.3 Warning of installment

◇Never install it on combustible devices. Never put the combustible things beside it. Never install it in the surrounding which has volatile gas, dust, point-blank sunshine, high temperature or humidity. Never drop any metal into the controller.

◇Do not disassemble or install the present control by yourself, please reach for the professional engineer.

◇Please make sure the power line in well condition. If it is damaged or pressed by heavier goods, it might cause electricity leakage or fire accident.

◇Install a circuit breaker or protecting instrument in the exterior circuit. For safety, the controller should be fixedly mounted, and the cable should be put in the pipe.

◇Please make sure the controller is fixedly mounted in the assembly hole to prevent damage.

◇Keep the control a suitable distance from other instrument.

◇Install a masking means to isolate static electricity, noise signals, magnetic field or radiation to prevent operation failure.

1.4 Attention of connection design

◇We suggest that you use the DC24V/1A power source. Separate the input & output power supply from system power supply.

◇Do not put the controller to earth at the same point with motor and transducer. You should put it in another line. Please ensure that the controller and the press are well earthed.

◇Please install filters at heavy load terminal and inductive terminal to avoid the controller from being jammed. Please add resistance and capacitance devices to AC contactor and solenoid valve. The resistance takes 22Ω/2W, the capacitance takes 0.1μF/3KV. Install the absorb equipment at the side near the contactor coil or the valve coil.

◇The controller cable should as short as possible. Do not put it together with the high pressure electricity. If it is difficult for you please use metal hose to separate them and put the AC and DC to earth dividually.

Attention: Putting the sensor wire to earth is extremely important. Please ensure that the shielded wire of sensor connect wire is well earthed.

II Function And Specification

2.1 Function list

- ✧ SPM/Angle Display: Continuous mode, showing the value of SPM when SPM>8, otherwise showing the angle. Other mode, showing the angle.
- ✧ Production value display: 6 digits. The max. is 999999.
- ✧ ★ Brake signal：2 ways redundancy output.
- ✧ Top point locate：Automatically compensate the warp when positioning the Top dead end Point.
- ✧ Cam Setting：Programmable cam output 6 channels; Programmable cam output 6 channels.
- ✧ Production value has 1 channel output.
- ✧ Bottom Dead Point(180°) Setting.
- ✧ Forwards/Backwards running of the Angle Sensor Setting.
- ✧ ★ Protection Function：locked protection，power off protection.
- ✧ Software lock protection for system parameter
- ✧ System unusual alarm.
- ✧ Communication: Standard RS-485 bus communication connection

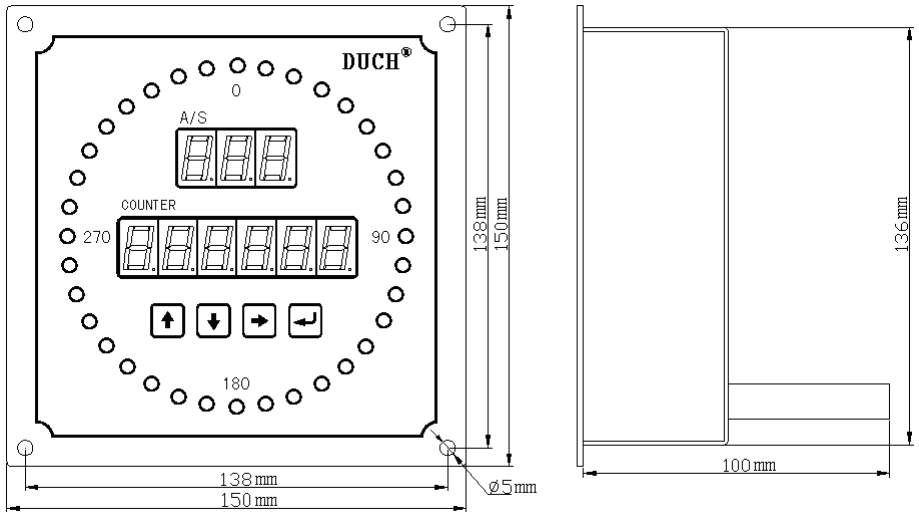
2.2Specification Table

Item	Specification
Power Supply	DC: 10~30V, 1A
OperationTemperature	0~40℃
Keeping Temperature	-20~70℃ 30~85%
Angle Display	0~359º
Angle Setting	0~359º
Stroke	0~800 stroke/minute (360P/R)
Angle Sensor	1°
Indicating lamp	Angle position indicating lamp 36
Display	Angle/Speed(*1channel with 3 orders) Counter(*1 channel with 6 orders)
Setting Key	4 micro switch keys(up, down, put in, enter)
Cam Output	0~359º, programmable scissors cam outputs are 6 channels, programmable cam outputs are 9 channels.
Cam input	4 channels，DC24V±10%, ,Max. input current 5mA or dry connect point input.
Output	16channels, collector through way output, max. fill current is 100mA

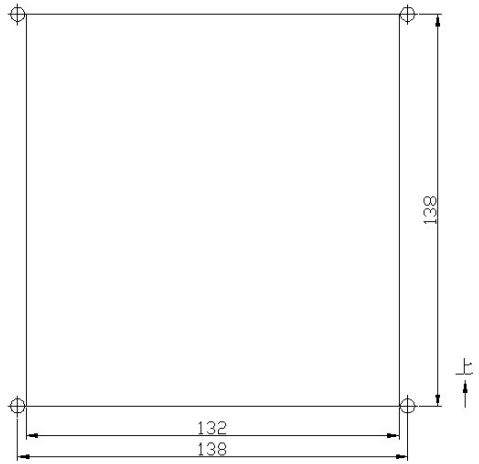
III Installation and connection

3.1 Installation dimensions

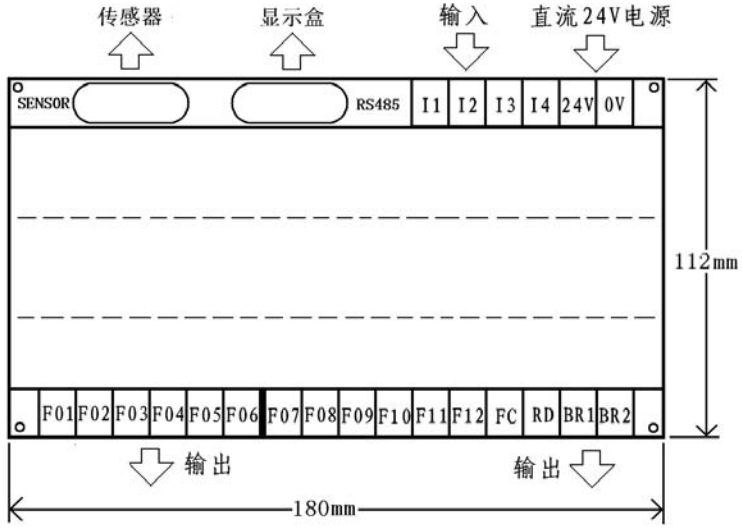
Outline dimension ：



Hole dimension：



3.2 Parts connection diagram



Caution：

1. Make sure the voltage and the poles.

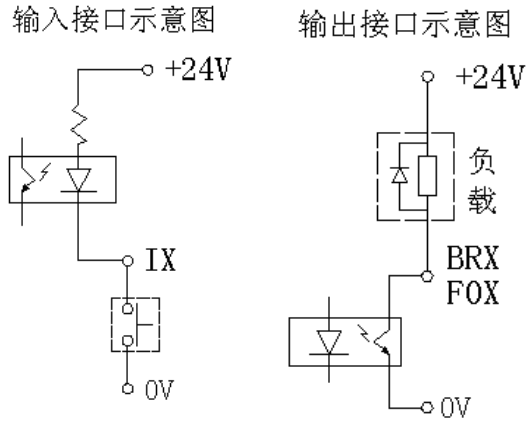
2. Make sure the plug inserted into the socket totally and in correct way. Leave the wire a suitable length for disassembly.

3. To avoid the controller being interfered, please eliminate the noise at heavy load and the inductance loading terminal.

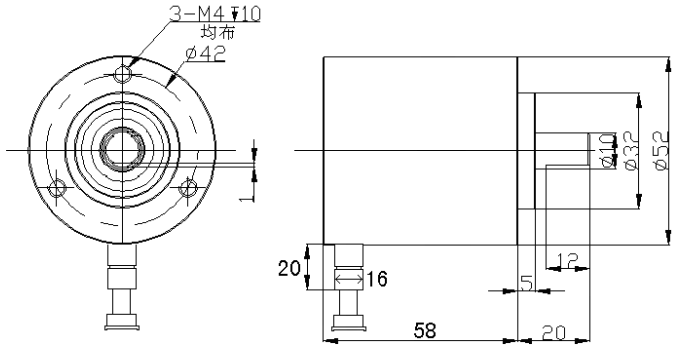
3.3 Terminal board description:

NO	Name	Index
F01	Cutting cam output	1
F02	Cutting cam output	2
F03	Cutting cam output	3
F04	Cutting cam output	4
F05	Cutting cam output	5
F06	Cutting cam output (production count reaches output)	6
F07	Cam output	7
F08	Cam output	8
F09	Cam output	9
F10	Cam output	10
F11	Cam output	11
F12	Cam output	12
FC	Production value output	13
RD	Normal Indication Signal System	14
BR1	Brake signal 1	15
BR2	Brake signal 2	16
24V	＋24V power supply terminal	18
0V	0V power supply terminal	19
I1	System reset	20
I2	ATP	21
I3	Running	22

3.4 Interface circuit

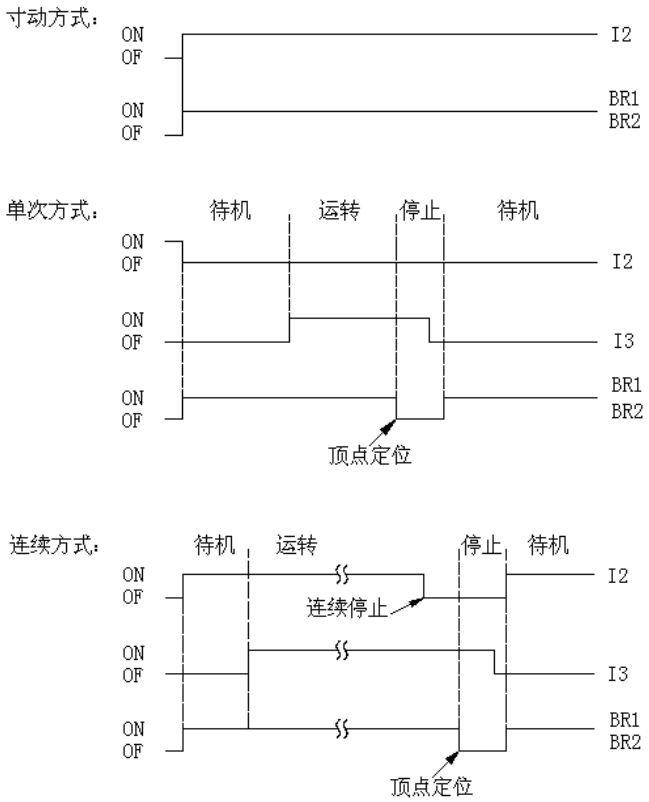


3.5 Sensor dimension

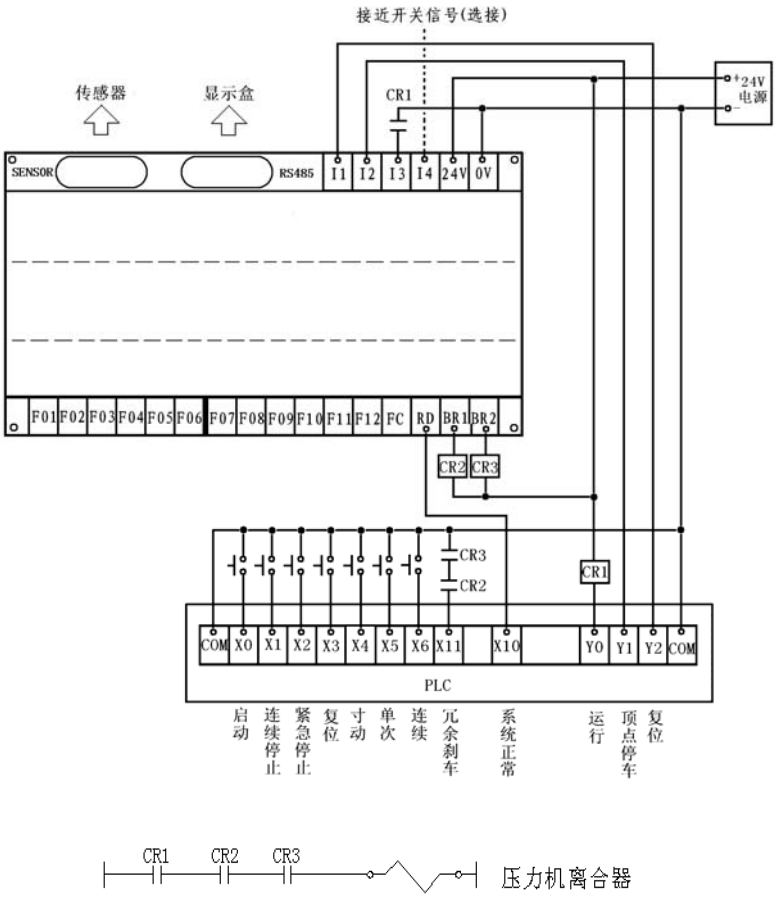


IV System Interface

4.1ATP(Automatic positioning the Top dead end Point) Action Timing Diagram



4.2ATP(Automatic positioning the Top dead end point) Wiring example:



4.3 ATP (Automatic positioning the Top dead end Point)

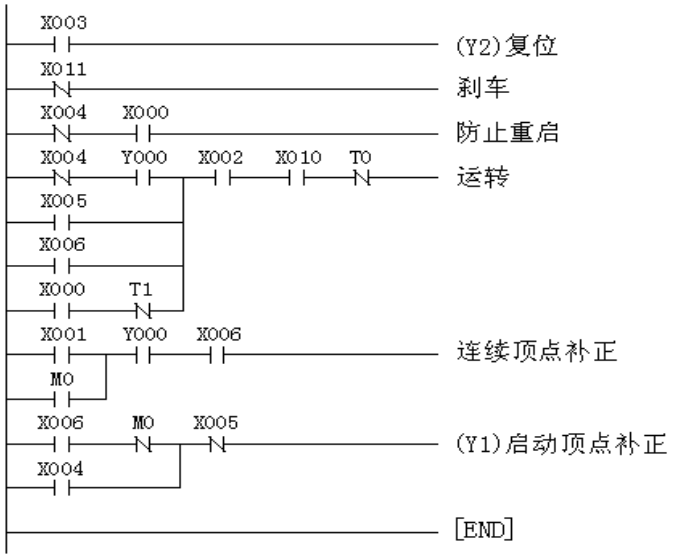
ATP Function Guide

a. IN2 ON(Inch----ATP Function Disable（OUT2 ON）

b. IN2 OFF IN3 ON (Single Mode)

c. IN2 ON=>OFF, IN3 ON(Continues Mode)------

ATP Function Enable（ATP CAM arrive，OUT2 ON=>OFF ,Wait for IN3 OFF，OUT2 OFF=>ON



4.3.3 PLC program list

LD	X003		LD	X001	
OUT	Y002		OR	MO	
LDI	X001		AND	Y000	
OUT	TO	K3	AND	X006	
LDI	X004		OUT	MO	
AND	X000		LD	X006	
OUT	T1	K3	ANI	MO	
LDI	X004		OR	X004	
OR	X005		ANI	X005	
OR	X006		OUT	Y001	
AND	Y006		END		
LD	X000				
ANI	T1				
ORB					
AND	X002				
AND	X010				
ANI	TO				
OUT	YO				

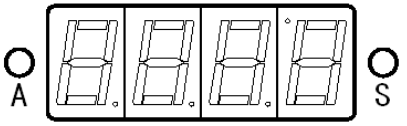
V Parameter Setting

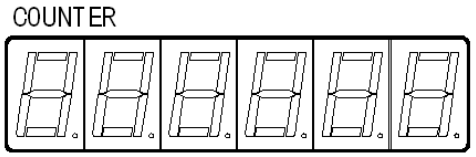
5.1 Key specification

Operation panel function table

Item	Name	Function
▲	Increase/Up	Menu up or numerical value increase. When adjust the numerical value, keep pressing it to make the value increase quickly.
▼	Reduce/Down	Menu down or numerical value reduce. When adjust the numerical value, keep pressing it to make the value reduce quickly.
▶	Enter/Shift	Press this key to enter the menu. When adjust the content，press it to shift.
↵	Confirm/Exit	Exit the setting or exit the submenu. Keep pressing the key for more than 4 seconds to reset the counter.

5.2 Digital display





The quaternion illuminant digital monitor upside is used to display the stroke/angle value: In continuous mode, it displays stroke when the stroke is more than 20 times/minute, otherwise it displays angle value. In other working modes it displays angle value. When it displays angle value, the left indicating lamp A turns on and the right indicating lamp S extinguishes. When it display stroke, the left indicating lamp A extinguishes and the right indicating lamp S turns on. The hexad illuminant digital monitor downside is used to display the work count.

When braking test is over, the quaternion illuminant digital monitor upside displays braking angle. The hexad illuminant digital monitor downside displays braking time.

In setting state the illuminant digital monitor displays multiple information the user needs. The flashing point is the parameter focus. It indicates the position which cursor located.

5.3 Enter setting

When the device is free (equipment in idle condition)， press ▲ and ▼ together for

more than 3 seconds to make the controller enters into setting status. Here, the digital monitor will flash. Then press ▲ or ▼ to select the menu. Press ▶ to enter into the submenu.

5.4 Cam parameter setting

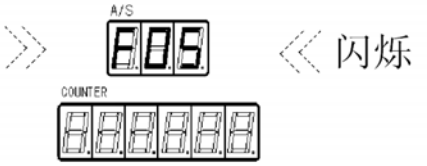
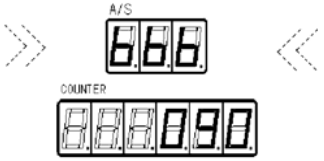
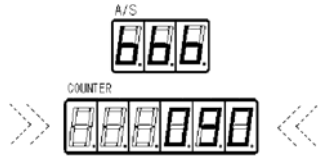
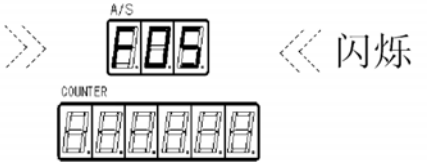
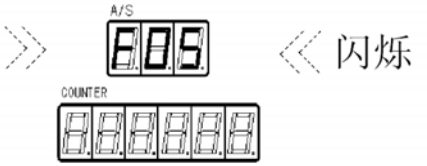
Cutting Cam parameter setting:

Code	Description	Unit	Range	Default
F01	On Angle	Degree	0~359	0
	Off Angle	Degree	0~359	135
	Scissors Counter	Times	2-6000	0
…	On Angle	Degree	0~359	0
	Off Angle	Degree	0~359	135
	Scissors Counter	Times	2-6000	0
F06	On Angle	Degree	0~359	0
	Off Angle	Degree	0~359	135
	Scissors Counter	Times	------	0

F07-F12 Cam parameter setting:

Code	Description	Unit	Range	Default
F07	On Angle	Degree	0~359	0
	Off Angle	Degree	0~359	135
…	On Angle	Degree	0~359	0
	Off Angle	Degree	0~359	135
F12	On Angle	Degree	0~359	0
	Off Angle	Degree	0~359	135
FC	Production value	Times	0-999999	0

Cam parameter setting steps：：

1		Enter setting status. Press ▲ or ▼ to select the cam code which will be set.
2		Press ▶ to enter the submenu. Here item name in submenu flashing, press ▲ or ▼ to select the item which will be adjusted.
3		Press ▶ to enter the adjustment. Here item content in submenu flashing, press ▲ or ▼ to select the parameter which will be adjusted.
4		Press ↵ to exit the parameter adjustment. Back to submenu and repress ↵ to back to main menu. Select other cam. Repeat step2、3.
5		Parameter setting finished. Press ↵ to exit the setting. System saves the data automatically.

or setting steps take the scissors cam F05 as example. F05 parameter：Start Angle ＝ 270°

End Angle ＝ 90°

Scissors Count＝ 15

a. When the device is free (equipment in idle condition)，press ▲ and ▼ together for more than 3 seconds to make the controller enters into setting status. Here, the digital monitor will flash. Than press ▲ to select F05. Press ▶ to enter into the submenu.

b. Now the submenu starting angle value at right side will flash. Press ▲ or ▼ to adjust the parameter. Keep pressing it for a long time the value will change quickly. When it gets to 270, press ↵ to back to submenu.

c. By now the starting angle(oN) in submenu start to flash. Press ▲ or ▼ to select the item. Adjust it until the end angle(oF) flashes. Press ▶ to enter the adjustment. Now the starting angle value at right side will flash. Press ▲ or ▼ to adjust the parameter. Keep pressing it for a long time the value will change quickly. When it gets to 90, press ↵ to back to submenu.

d. At this time the submenu flashes. Press ▲ or ▼ to enter the item. Adjust it until the scissors count (N) flashes. Then press ▶ to enter the adjustment. Now the starting angle value at right side will flash. Press ▲ or ▼ to adjust the parameter. Keep pressing it for a long time the value will change quickly. When it gets to 15, press ↵ to back to submenu.

e. Under the submenu, press ↵ to back to the main menu. Press the key once more it will exit the setting process. At last the system will save the data automatically. The setting is over.

Remind: When you adjust the starting angle the circumferential 36 indicating lamp will display the cam range which you want to adjust. It is more intuitionistic.

5.4.2 Production count reaches prarameter setting

a. In the system menu FC is production count item .

b. Input the FC setting menu, press ▶ change the value ,and then press▲and ▼ regulation of the value. After setting ,press ↵ to exit the setting. System saves the data automatically.

5.5 System parameter setting

The system parameter is important for controller work. Do not change it unless the system needs to be debugged. The system parameter is equipped with the password protection.

5.5.1 System menu entrance

a. When the device is in idle condition， press ▲ and ▼ together for more than 3

seconds to make the controller enters into setting status.

b. Now the quaternion digital monitor upside will flash. Press ▲ or ▼ to select the menu. Choose P01 and press ▶ to enter it.

c. Input the system password by ▲ or ▼. Press ↵ to return to the main menu.

d. Press ▲ or ▼ to select the menu. Item P02-P12 will appear.

Caution： password = 777.

5.5.2 System parameter setting table is as following:

Code	Description	Unit	Range	Default
P02	Rotary direction setting		0~1	0
P03	180°calibration		0~359	
P11	Electricity times on controller		Read-only	
P12	Controller software edition number		Read-only	

5.5.3 Description of system menus：

In the system menu P02-P03 is modifiable parameter item while P11-P12 is read-only item. The settable parameter item is used to set the parameter or system state. The read-only item is merely used to observe the related parameter of the controller.

5.5.4 Rotary direction setting

When install the controller, if you find that the crank rotary direction is inconsistent from the controller indicating direction please reset the direction value in menu P02.

The method is as following:

a. Use the same steps as 5.5.1 to enter the system menu

b. Now the quaternion digital monitor upside will flash. Press ▲ or ▼ to select the menu. Choose P02 and press ▶ to enter it.

c. Use ▲ or ▼ to select 0 or 1.Attention: if you find that the crank rotary direction is inconsistent from the controller indicating direction please select 0 while the original value is 1 and select 1 while it is 0.

d. Press ↵ to back to the main menu. Press the key once more it will exit the setting process. At last the system will save the data automatically. The setting is over.

5.5.5 Controller 180°calibrate

It adopts absolute value rotary transducer. Because the mounting position of transducer does not correspond to crank shaft position completely, they need to be calibrated. The angle is 180°.

The method is as following:

a. Put the press in inch mode, then adjust the slide to the lowest point(180°).
b. Use the same steps as 5.5.1 to enter the system menu.
c. Now the quaternion digital monitor upside will flash. Press ▲ or ▼ to select the menu. Choose P03 and press ▶ to enter it.
d. It displays 180 and flashes. Press ▶ to stop it from flashing.
e. Press ↵ to back to the main menu. Press the key once more it will exit the setting process. At last the system will save the data automatically. The setting is over.

5.5.6 Counts setting

Count the work of counter-point perspective, the system is set to 135 degrees (can be customized)

5.5.7 Other parameter of controller

P11-P12 is read-only. Adjust it to the corresponding menu. It displays the data. You can not change it.

P11------- Electricity times on controller, which used to estimate the time controller has worked.

P12------- Controller software edition number

The method is as following:

a. Use the same steps as 5.5.1 to enter the system menu
b. Now the quaternion digital monitor upside will flash. Press ▲ or ▼ to select the menu. Choose P11 to P12 the digital displayer will display the corresponding data.
c. Press ↵ to exit the setting.

5.5.8 The production count arriving function

1. The system menu of the F06 function for the production of the second count of options to reach a maximum count value is 999999;

2. When the count reaches the production of F06 to set a value of "0" when the count reaches the production is turned off; F06 setting does not affect the way that the output is "cutting the output cam."

3. When the set count reaches the value of the production of F06 is not "0" when the count reaches the production function of opening, F06 channel into a count to reach the output.

4. F06 to set the menu items into the system, with key switch counts the number of bits, and then adjust the count, or key, set up, press to confirm and exit automatically saved.

5. Count arrived, in the last ending point (0 degrees), the output signal, F06 channel, a long bright light, blinking count, the system stops working, press reset button cleared and re-start work; work halfway through the count is cleared , its function will be back to work.

VI Protection and alarm

6.1 Protection And Alarm Instruction

The controller will shut off system 'Ready' signal and output 'Stop' signal when it inspects the unusual. System will display the corresponding unusual code.

6.2Protection and trouble codes：

Code	Description	Unusual Reason	Eliminate Method
E01	Main Memory Unusual	Power、Chip	Replace controller
E02	Sub Memory Unusual	Power、Chip	Replace controller
E03	CPU Unusual	CPU Chip	Replace
E05	Brake Out Put Unusual	Brake Circuit, Redundancy Protection	Replace controller
E06	Sensor Unusual	Wiring Unusual or Damaged	Check rotary transducer
E08	RS485	Wiring Unusual	Check
E09	RS485	Wiring Unusual	

Caution：When it alarms, please eliminate the troubles at first and then eliminate the alarm.

Press enter key or input the alarm reset signal to eliminate the alarm.