Installation Manual for HPA 1500 Electronic Cam Controller

Version V1.00

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Chapter 1 General Information

As a kind of electronic cam controller, PAC15 has powerful function. With 24 LEDs to indicate current angle basically, PAC15 can communicate with users through LCD, and show a lot of different warnings. In general, PAC15 is provided to cooperate with PLCs to control mechanical pressure machine.

With more IO points, PAC15 can control inverter to regulate the machine spm through RS485, and supervise the machine tonnage by connecting a tonnage instrument. The PAC15 controller features as follows:

1. Diagnose the feedback element real-time

PAC15 can check the feedback element real-time automatically, and brake the machine if the break-off between feedback element and machine is detected. Besides, PAC15 can check whether the installation of feedback element is good by fixing a switch outside.

2. Electronic cam and cut function

PAC15 can provide 16 electronic cam or 4 cut most.

3. Provide the function of monitoring warnings outside

8 channels are provided to users to define alarm information and type of input signals personally.

4. Provide the function of TDC compensating automatically

Under the foundation of last brake angle error, PAC15 can correct current stop angle automatically, and guarantee the position of crank in scope of TDC when the machine is stopped. Also, Users can set PAC15 to stop machine at some fixed angle.

5. Count function

PAC15 can take count of every stroke. Current count value which is up to 999999 can be shown and set.

6. Hardware self diagnose function

Hardware and parameters can be checked up at the beginning of power up. If there is any abnormity, PAC15 can show the corresponding warning to users and forbid further operating.

7. Code locking function

PAC15 can prevent the parameters from being modified accidentally by code locking.

8. Show current angle and spm of crank

Usually, PAC15 displays current angle of crank. Once the spm of crank exceeds 10 RPM, it will be shown through PAC15.

9. Give an alarm about brake angle

If the brake angle exceeds the parameter value set by users, PAC15 will give an alarm named "Brake Error".

10. Give an alarm about brake time

If the brake time exceeds the parameter value set by users, PAC15 will give an alarm named "Brake Error".

11. Give an alarm about SPM

If the velocity calculated by PAC15 exceeds the maximum or less than the minimum value set by users, an immediate halt to the operation and an alarm will be given.

12. RS485 communication function

PAC15 can control inverter including Delta and ABB550 to regulate the machine's spm through built-in RS485 communication interface.

13. Tonnage monitoring function

The PAC15 controller can monitor PTM tonnage instrument's analog output signal real time, and convert it into the corresponding tonnage. PAC15 can give five alarm information associated with tonnage.

14. Save and load multiple sets of cam parameters

15. Save and load machine parameters

16. RS232 communication function

Users can set and check parameters through RS232 communication interface.

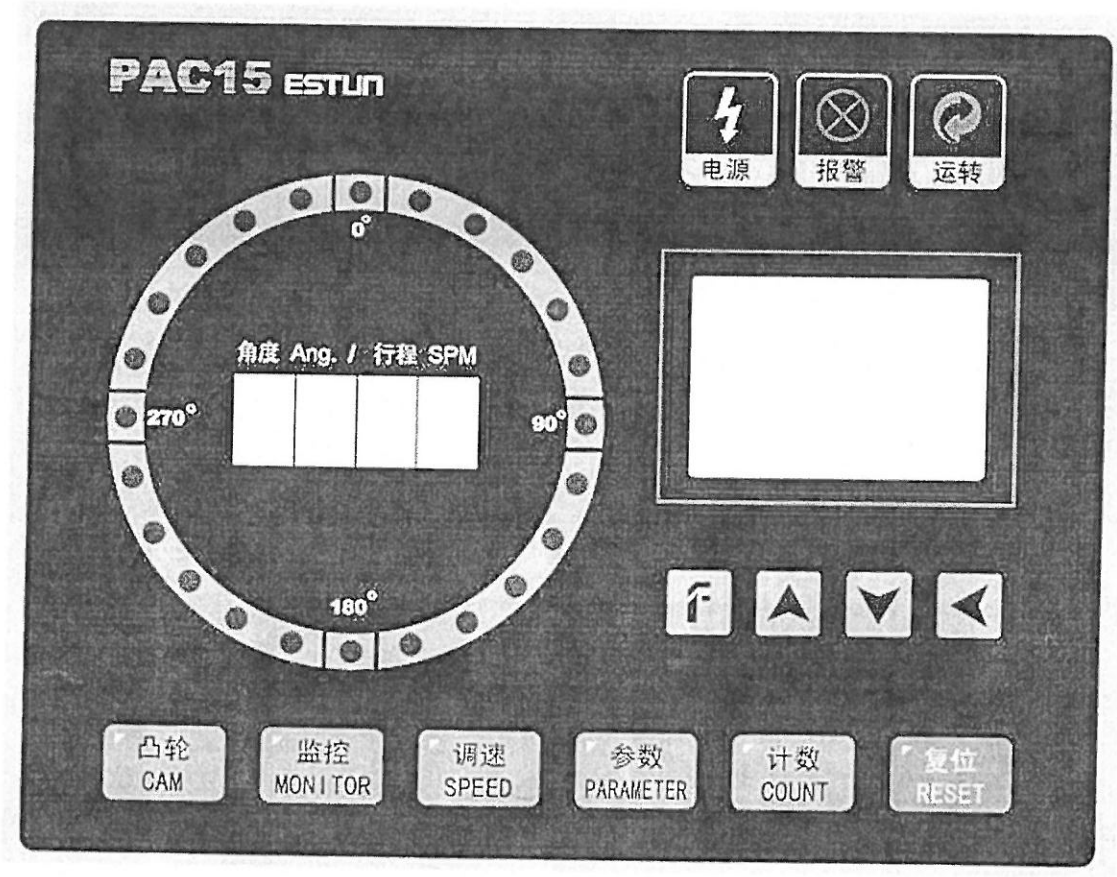
17. Adjust cam angle automatically

Chapter 2 Specifications

Item	Specifications
Power	DC24V ± 10%，2A
EMC	In line with the GB/T17626, GB/T18268 standards
Shock and Vibration	In line with the JB/T8832-2001 standards
Temperature	In line with the GB/T2423.3-93standards
Operating Temperature	0 ~ 40℃
Storage Temperature	−20 ~ 70℃
Humidity	30 ~ 85 %RH
Angle Display	0 ~ 359°
Angle Setting	0 ~ 359°
Speed	<2000 SPM
Angle Sensor	Resolver
Angle Resolution	1°
Indicator	24 crank position indicator, 3 external status indicator
Display	Angle / speed (LED display) / LCD display
Keyboard	10 micro-open key
Cam Output	0 ~ 359 ° / maximum of 16
Shear Output	0 ~ 359°/ maximum of 4
Input	16 channels(Opt coupler isolation)DC24V ± 10%，Maximum input current 20mA
Output	18 channels(Opt coupler isolation)DC24V ± 10%，Maximum output current 50mA

Chapter 3 Operation Mode and Description

3.1 Panel Description



24 LED lights are used to indicate angle of crank. If the machine speed is over 150 SPM, the angle indicated by them does not reflect actual position.

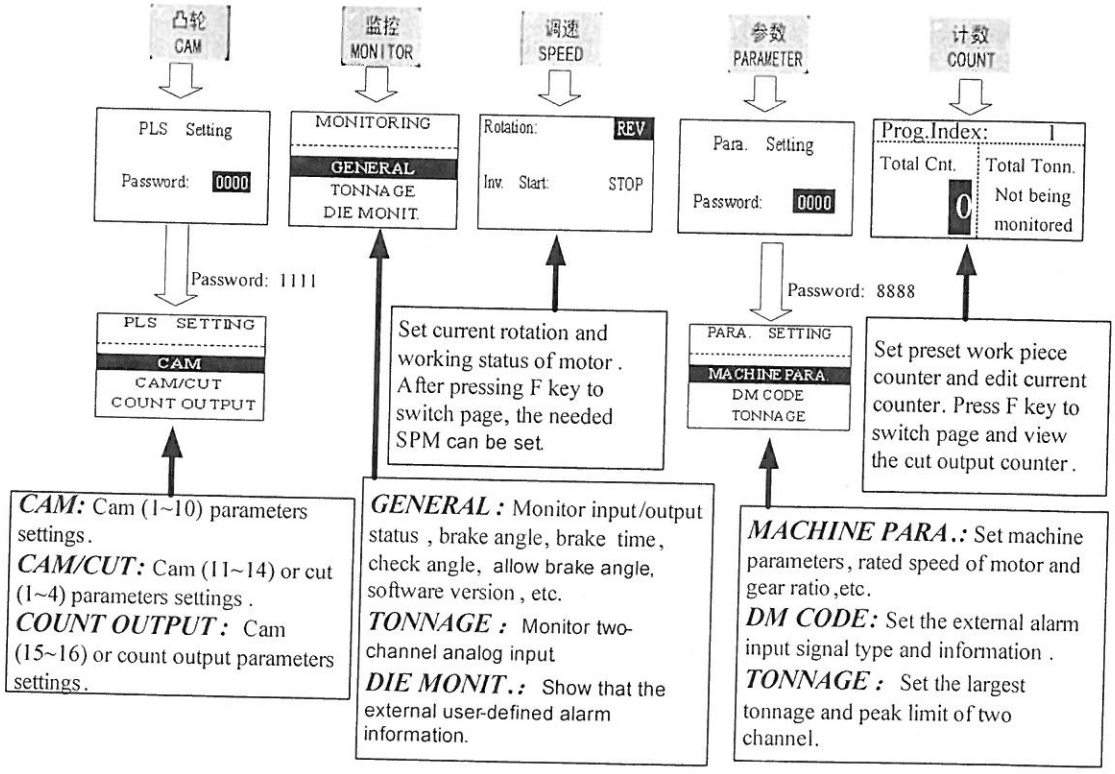
Through the button panel，parameters and work piece counter can be set. Besides, the angle and the speed can be shown through LEDs.

Icon	Name	Function
	F	In the confirmed mode, as a key to switch pages. In the edit mode, as a key to exit this mode.
	Add	In the confirmed mode, as a key to move cursor. In the edit mode, as add key.
	Subtract	In the confirmed mode, as a key to shift cursor. In the edit mode, as subtract key.
	Enter	In the confirmed mode, short press to enter the edit mode. In the edit mode, short press to shift cursor. In the edit mode, long press to enter the confirmation mode.

凸轮 CAM	Cam	Into the cam/cut/count output password page. After inputting the correct password, can view and edit parameters.
监控 MONITOR	Monitor	Into the Monitoring page。
调速 SPEED	Speed	Into the page to set the parameters of inverter.
参数 PARAMETER	Parameter	Into the parameter password page,. After inputting the correct password, can view and edit parameters.
计数 COUNT	Count	Into the page of preset amount and work piece amount to set and view these parameter. Press F key to switch the page to monitor the cut amount.
复位 RESET	Reset	Reset alarm。

3.2 Function Switch

As follows:

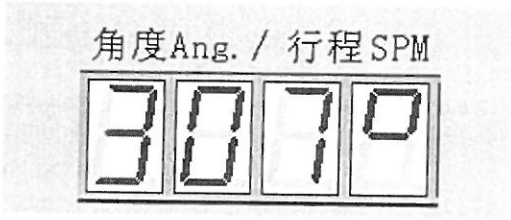


3.3 Display

3.3.1 LED Display

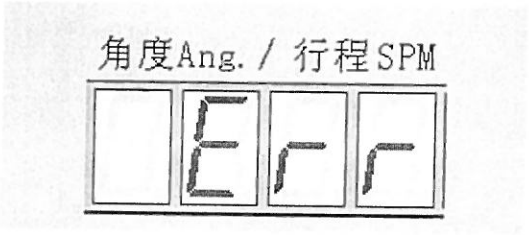
In the process of running, if SPM is less than 10, the crank's current angle or

position is shown through 4 LEDs.



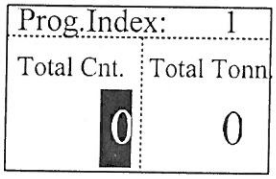
If SPM is bigger than 10, PAC15 shows it.

When an alarm occurs, PAC15 shows an alarm character and keeps blinking:

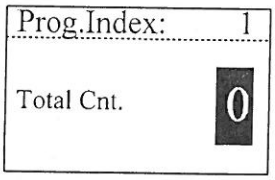


3.3.2 LCD

In the process of running, the total tonnage and current values of the workpiece are shown through LCD screen if tonnage instrument is enabled.



If tonnage instrument is disabled, only current values of the workpiece is shown.



Chapter 4 Cam Mode

4.1 Login

The password is 1111.

Step	Interface	Description
1	PLS Setting Password: 0000	Press 凸轮 CAM to enter cam setting interface。
2	PLS Setting Password: 000**0**	Press ◀ to enter edit mode。
3	PLS Setting Password: 000**1**	In the edit mode, if press ▲, the value will increase by 1.
4	PLS Setting Password: 000**0**	In the edit mode, if press ▼, the value will decrease by 1.
5	PLS Setting Password: 00**0**0	In the edit mode, short press ◀ to shift the cursor (circle shifted to right).

Finally, long press enter key to confirm inputted password. If the password is error, you will go into the cam setting interface again to re-enter the password.

4.2 Cam(1～16) Parameters Setting

Name And Function		Unit	Scope	Default
On/Off	opening & closing angle of electronic cam 1	Degrees	0~359	0
° ° °				
° ° °				
On/Off	opening & closing angle of electronic cam 10	Degrees	0~359	0

Note:

If both on and off angle of cam x are set to 0, its output has been switched off. X is

from 1 to 14. When cam 15 and 16 are used to be cams, if their on and off angle are set to be 0, their output have been switched off.

If both on and off angle of electronic cam 1~10 are set to θ (θ is not equal to 0), PAC15 will keep their output open. When cam 11~16 are used to be cams, if their on and off angle are set to be θ (θ is not equal to 0), PAC15 will keep their output open.

Method of setting opening angle of electronic cam 4 to 10 degrees as follows:

Step	Interface	Description
1	Cam Setting 01: On/Off 0/ 0° 02: On/Off 0/ 0° 03: On/Off 0/ 0°	After entering the correct password, enter the cam setting interface.
2	Cam Setting 04: On/Off 0/ 0° 05: On/Off 0/ 0° 06: On/Off 0/ 0°	Press  to switch pages.
3	Cam Setting 04: On/Off 00/ 0° 05: On/Off 0/ 0° 06: On/Off 0/ 0°	Press  to enter edit mode.
4	Cam Setting 04: On/Off 00/ 0° 05: On/Off 0/ 0° 06: On/Off 0/ 0°	In the edit mode, press  to shift the cursor (circle shifted to right).
5	Cam Setting 04: On/Off 01/ 0° 05: On/Off 0/ 0° 06: On/Off 0/ 0°	In the edit mode, if press  , the value increases by 1.
6	Cam Setting 04: On/Off 10/ 0° 05: On/Off 0/ 0° 06: On/Off 0/ 0°	In the edit mode, long press enter key to go into the confirmed mode, and the cursor is shifted to the next content.

4.3 Cut and Count Output Parameters Setting

4.3.1 Methods

It is the same as the method of cam setting.

4.3.2 Description of Cut Parameters

Name	Parameter	Description	Scope	Default
Cut 1	Mat. Ena./Sn1	synchronous mode change-over enable	0～1	0
	Cycle/Sn2	cycle of counter	0~9999	0
	Multi/Sn3	preset value of counting	0~999999	0
	Processed/Sn 4	current count within the cycle	0~9999	0
	Mat. Start/Sn5	count of opening the output in the synchronous mode	0~9999	0
	Mat. End/Sn6	count of closing the output in the synchronous mode	0~9999	0
Cam11/Cut1	Enable	cam and cut change-over switch	0～1	0
	On/Off	opening &closing angle of cam or cut	0~359	0

Note:

a) Cam 11 and cut 1 share with CA11.

b) Cam 12 and cut 2 share with CA12.

c) Cam 13 and cut 3 share with CA13.

d) Cam 14 and cut 4 share with CA14.

e) The parameters and their modifying method of cut 4 are all the same.

f) In the synchronous count mode, it is important to set enable to 1, Sn1 to 1, Sn5 and Sn6 not to 0.

g) In the synchronous count mode, when Sn5 and Sn6 are equal but not 0 and Sn4 is equal to Sn5 or Sn6, cut 1 opens its output at the opening angle, and closes its output at the closing angle.

h) Output times can be monitored in the count mode. When modify Sn3, the corresponding output times is cleared automatically.

i) When modify Sn2, Sn4, Sn5 and Sn6 are cleared automatically.

Description:

a) Mat. Ena. description: When set to 0, cut counts independently; when set to 1, cut matches to others.

b) Cycle description: When enable is set to 1, Sn2 expresses punching times after that cut will open its output one time.

c) Multi is the preset value of counting. If the cut enable is set to be 1, when the cut output time is equal to Sn3, count arrived signal will output to a second. When Sn3 is 0, the number has been found to accumulate to the maximum and count arrived signal will be kept off.

d) Sn4 is the current count within the cycle. It can be used to real-time display the current counting value, and also be changed to modify the current count.

e) Mat. Start is the count of opening the output in the synchronous mode. When Sn4

is equal to Sn5 and the crank angle is equal to the opening angle, cut starts to output.

f) Mat. End is the count of closing the output in the synchronous mode. When Sn4 is equal to Sn6 and the crank angle is equal to the closing angle, cut closes its output.

g) When Enable is 1, the output is selected to be cam; others, to be cut.

4.3.3 Description Of Count Output Parameters

Name	Parameter	Description	Scope	Default
Cam 15/Multi.	enable	Cut count arrived signal is enabled or disabled. 1: enabled; 0, disabled	0～1	0
	On/Off	opening & closing angle of cam 15	0～359	0
Cam 16/Total count	enable	Workpiece count arrived signal is enabled or disabled. 1: enabled; 0: disabled	0～1	0
	On/Off	opening & closing angle of cam 16	0～359	0

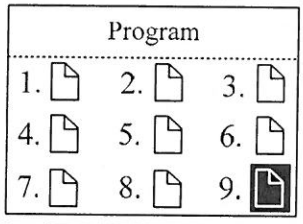
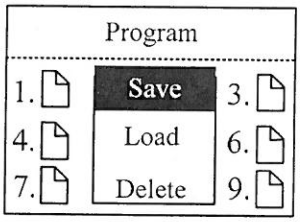
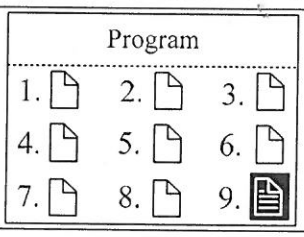
Chapter 5. Save and load cam parameters

5.1 Login

It is the same as the method of cam login, and the password is 1122 in cam mode.

5.2 Save

Method of saving current cam parameters as 9th program as follows:

Step	Interface	Description
1		After entering the correct password, go into the program setting interface. Press  or  to shift the cursor to 9th program.
2		Short press  , and a drop-down menu will be shown. Press  or  to shift the cursor to item of Save.
3		Long press  to confirm saving.

5.3 Load

It is the same as the method of saving current cam parameters.

5.4 Delete

It is the same as the method of saving current cam parameters.

Chapter 6 Monitor Mode

See 3.2. General, tonnage and Die monitoring are included in monitor mode.

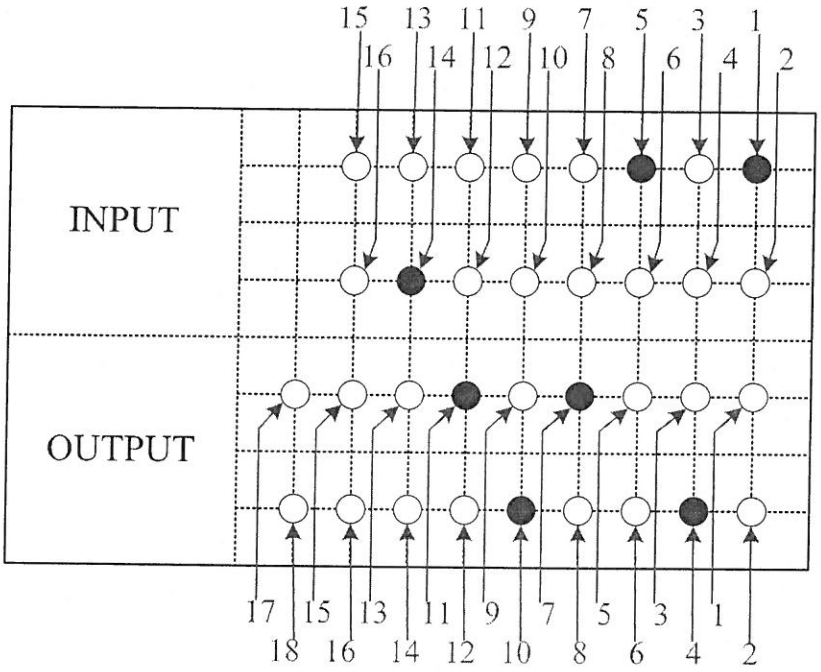
6.1 General

IO monitoring is described in table 1. Besides, the information about brake time, brake angle, allow brake angle and soft version can be see in general monitor.

Table 1

Input	Content	Description
1	X1	check angle
2	X2	run
3	X3	peak compensate
4	X4	count enable
5	X5	alarm reset
6	X6	power indicator
7	X7	alarm indicator
8	X8	running indicator
9	X9	DM1
10	X10	DM2
11	X11	DM3
12	X12	DM4
13	X13	DM5
14	X14	DM6
15	X15	DM7
16	X16	DM8
Output	**Content**	**Description**
1	CA1	cam 1
2	CA2	cam 2
3	CA3	cam 3
4	CA4	cam 4
5	CA5	cam 5
6	CA6	cam 6
7	CA7	cam 7
8	CA8	cam 8
9	CA9	cam 9
10	CA10	cam 10/Tonnage Alarm Out
11	CA11	cam 11/cut 1
12	CA12	cam 12/ cut 2
13	CA13	cam 13/ cut 3
14	CA14	cam 14/ cut 4

15	CA15	cam 15/ multi.
16	CA16	cam 16/total count
17	Y1	stop 1
18	Y2	stop 2
19	Y3	system ready



Note: Y3 and Y2 output at the same time, and the system monitoring does not deal with Y3.

6.2 Tonnage

Two-channel and total tonnage can be shown in this page.

6.3 Die Monitor

Eight external user-defined alarm information can be shown in this page.

Chapter 7 Speed Mode

7.1 Working Status Setting

You can set current rotation and working status of motor in this page. After pressing F key to switch page, the needed spm can be set.

Step	Interface	Description
1	Rotation: FWD Inv. Start: STOP	Press 调速 SPEED to enter communication interface.
2	Rotation: FWD REV Inv. Start: STOP	Press ◀ to enter the edit mode.
3	Rotation: FWD REV Inv. Start: STOP	Press ▼ to move down the cursor.
4	Rotation: REV Inv. Start: STOP	Press ◀ to enter the confirmed mode and the cursor is shifted to the next content.

Note: Please be sure to stop the main motor before switching the motor's direction.

7.2 Set SPM

It is the same as the method of cam parameters setting.

Parameter Name	Description	Scope	Default
Set SPM	set the current needed SPM	0～9999	0

Recommended:

Address: 01;

Transmission Speed: 01: 9600;

Transmission Fault Treatment: 01: Warn and ramp to stop;

Communication Protocol: 04: 8, E, 1 (Modbus, RTU);

Chapter 8 Parameter Mode

8.1 Login

It is the same as the method of cam login, and the password is 8888 or 8899. If 8899 is accepted, the item of "Para backup" in last machine parameters page will be shown to users. Otherwise, if 8888 is accepted, this item will be hidden. The operation method of "Para backup" is the same as cam parameters'.

8.2 Machine Parameters Setting

Name	Description	Unit	Scope	Default
Pn01	to set BDC	—	—	—
Pn02	the minimum allow spm	SPM	0~2000	0
Pn03	the maximum allow spm	SPM	0~2000	2000
Pn04	resolver direction [0] Clockwise to increase [1] Anti-clockwise to increase	—	0~1	0
Pn05	the allow brake angle of the clutch / SPM. The allow brake angle is equal to Pn05 * SPM If current brake angle is more than the allow brake angle, it will be reported 'Brake Error'.	Degrees /SPM	0.01~9.99	9.99
Pn06	Check angle detecting is enabled or disabled [0] disabled [1] enabled	—	0~1	0
Pn07	to set check angle	—	—	—
Pn08	Top stopping at fixed angle is enabled or disabled [0] disabled [1] enabled	—	0~1	0
Pn09	the fixed angle to top stop at	Degrees	0~359	0
Pn10	the limit number of top stopping [=0] Without limit number of top stopping [>0] the limit number of top stopping	—	0~999,000	999,000
Pn11	the scope of non-compensation of top stopping	Degrees	0~20	5
Pn12	The limit to brake angle is enabled or disabled in single mode. [0] disabled [1] enabled	—	0~1	1
Pn13	to restore the factory default values	—	—	—
Pn14	the maximum allow brake time of the clutch	msec	0~50000	40000

Pn15	filtering time of check angle	msec	0~100	2
Pn16	Chinese and English switch [0] English [1] Chinese	—	0~1	1
Rated Speed	to set rated speed of motor	—	0~9999	5000
Gear Ratio	to set gear ratio	—	0~999	0
Tonn. Adjust	to enable the page of tonnage adjusting [0] disabled [1] enabled	—	0~1	0
X4 function	to select the function of X4 [0] counter enable [1] counter reset	—	0~1	0
overrun enable	to enable the function of overrun [0] disabled [1] enabled	—	0~1	0
Dec. P. Ena.	to enable the function of decimal point [0] enabled [1] disabled	—	0~1	0
Tonn. Ins. Ena.	to enable tonnage instrument [0] disabled [1] enabled	—	0~1	0
Tonn.A. O.Ena.	to enable tonnage alarm out [0] disabled [1] enabled	—	0~1	0
Delay Time	to set delay time of cam out	ms	0~500	0
Inv. type	to set Inverter type	—	Delta ABB550	Delta
Para . Bkp	[Save] Save current machine parameters. [Load] Load the saved machine parameters. [Delete] Delete the saved machine parameters.	—	—	—

Note:

1) Pn05 setting: Pn05 is slightly larger than the result of brake angle divided by braking speed.

2) Pn10 setting: Generally reflects the number of clutch action; PAC15 detects this function only when power-up.

3) Pn11 setting: If the stopping point is in the scope of from -Pn11 to + Pn11, the controller does not compensate for the stop angle next time.

BDC setting as follows:

Step	Interface	Description

1	Pn01: 0 Pn02: 0 Pn03: 2000 Pn04: 1	Enter the first page of machine parameters setting.
2	Pn01: 180 Pn02: 0 Pn03: 2000 Pn04: 1	Press  to start setting BDC.
3	Pn01: 180 Pn02: 0 Pn03: 2000 Pn04: 1	Long press  to finish setting.

The setting of restoring the factory default values as follows:

Step	Interface	Description
1	Pn01: 0 Pn02: 0 Pn03: 2000 Pn04: 1	Enter the first page of machine parameters setting.
2	Pn13: Default Pn14: 40000 Pn15: 2 Pn16: 1	Press  repeatedly until to the last page.
4	Pn13: End Pn14: 40000 Pn15: 2 Pn16: 1	Press  to enter the confirmed mode, and the cursor is shifted to the next content.

Other parameters' setting are the same as the method of cam setting.

8.3 DM Code Setting

It is the same as the method of cam setting.

Name	Description	Unit	Scope	Default
DM1	channel 1 setting	—	1~19，101~119	6
DM2	channel 2 setting	—	1~19，101~119	9
DM3	channel 3 setting	—	1~19，101~119	10
DM4	channel 4 setting	—	1~19，101~119	11
DM5	channel 5 setting	—	1~19，101~119	12
DM6	channel 6 setting	—	1~19，101~119	15
DM7	channel 7 setting	—	1~19，101~119	16
DM8	channel 8 setting	—	1~19，101~119	18

Note:

1) If the highest bit is 0, it means the input signal is NO; otherwise, if the highest bit is 1, it means the input signal is NC.

2) Please refer to Table 2 to define alarm information.

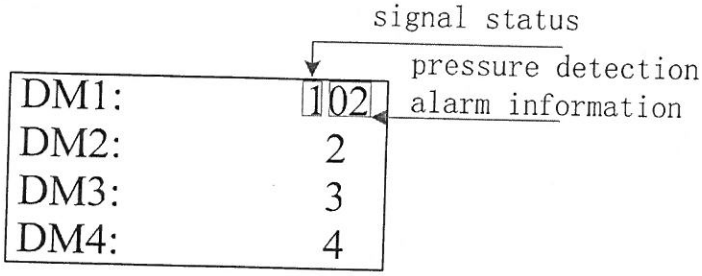


Table 2

Index	Content
01	light curtain error
02	low air pressure
03	feeding error
04	slide lock error
05	lubricating error
06	double valve error
07	overrun
08	no material
09	overload
10	TDC error
11	emergency stop
12	over shut height
13	brake error
14	motor startup error
15	inverter error
16	over speed
17	over tonnage
18	PLC battery error
19	no motor running

8.4 Tonnage Parameters Setting

It is the same as the method of cam setting. Cam 10 and tonnage alarm out signal share with CA10.

Channel	Name	Description	Unit	Scope	Default
Left	Meter Scale	the largest left tonnage	Ton	0~9999	0
	Mul.Scale	multiple scale	—	0~9999	0
	Div.Scale	division scale	—	0~9999	0
Right	Meter Scale	the largest right tonnage	Ton	0~9999	0
	Mul.Scale	multiple scale	—	0~9999	0
	Div.Scale	division scale	—	0~9999	0
Alarm Para.	Up. Per.	upper limit of quality alarm	%	0~999	0
	Lo. Per.	lower limit of quality alarm	%	0~999	0
	Deviation	percent of deviation	%	0~999	0
	Devi.Alarm Ena.	to enable deviation alarm	—	0~1	0
	Bypass Enable	to enable bypass mode	—	0~1	0
	Bypass Times	bypass times	—	0~999	0

Chapter 9 Count Parameter

It is the same as the method of cam setting.

Name	Description	Unit	Scope	Default
preset count	0: PAC15 does not count. ≥1: PAC15 will count and output workpiece count arrived signal if total count enable is set to 1.	Pieces	0~999,999	0
total count	current count	Pieces	0~999,999	0

Note:

1) Cam 16 and workpiece count arrived signal share with CA16.

2) When total count enable is set to 0, CA16 is used as Cam16; otherwise, as output of workpiece count arrived.

Chapter 10 RS232 Communication

Users can set and check parameters through RS232 communication interface.

Recommended:

Address: 01;

Transmission Speed: 9600;

Communication Protocol: 8, E, 1 (Modbus, RTU);

10.1 Parameters' Address and Attribute

Name	Description	Address/Hex	Bytes	Attribute
preset count	preset count	0x0100	4	R/W
Cam1	on: opening angle	0x0104	2	R/W
	off: closing angle	0x0106	2	R/W
Cam2	on: opening angle	0x0108	2	R/W
	off: closing angle	0x010a	2	R/W
Cam3	on: opening angle	0x010c	2	R/W
	off: closing angle	0x010e	2	R/W
Cam4	on: opening angle	0x0110	2	R/W
	off: closing angle	0x0112	2	R/W
Cam5	on: opening angle	0x0114	2	R/W
	off: closing angle	0x0116	2	R/W
Cam6	on: opening angle	0x0118	2	R/W
	off: closing angle	0x011a	2	R/W
Cam7	on: opening angle	0x011c	2	R/W
	off: closing angle	0x011e	2	R/W
Cam8	on: opening angle	0x0120	2	R/W
	off: closing angle	0x0122	2	R/W
Cam9	on: opening angle	0x0124	2	R/W
	off: closing angle	0x0126	2	R/W
Cam10	on: opening angle	0x0128	2	R/W
	off: closing angle	0x012a	2	R/W
Cam11	on: opening angle	0x012c	2	R/W
	off: closing angle	0x012e	2	R/W
Cam12	on: opening angle	0x0130	2	R/W
	off: closing angle	0x0132	2	R/W
Cam13	on: opening angle	0x0134	2	R/W
	off: closing angle	0x0136	2	R/W
Cam14	on: opening angle	0x0138	2	R/W
	off: closing angle	0x013a	2	R/W
Cam15	on: opening angle	0x013c	2	R/W
	off: closing angle	0x013e	2	R/W
Cam16	on: opening angle	0x0140	2	R/W

		off: closing angle	0x0142	2	R/W
Cut1		Mat. Ena./Sn1	0x015e	4	R/W
		Cycle/Sn2	0x0162	4	R/W
		Multi/Sn3	0x0166	4	R/W
		Processed/Sn4	0x016a	4	R/W
		Mat. Start/Sn5	0x016e	4	R/W
		Mat. End/Sn6	0x0172	4	R/W
Cut2		Mat. Ena./Sn1	0x0176	4	R/W
		Cycle/Sn2	0x017a	4	R/W
		Multi/Sn3	0x017e	4	R/W
		Processed/Sn4	0x0182	4	R/W
		Mat. Start/Sn5	0x0186	4	R/W
		Mat. End/Sn6	0x018a	4	R/W
Cut3		Mat. Ena./Sn1	0x018e	4	R/W
		Cycle/Sn2	0x0192	4	R/W
		Multi/Sn3	0x0196	4	R/W
		Processed/Sn4	0x019a	4	R/W
		Mat. Start/Sn5	0x019e	4	R/W
		Mat. End/Sn6	0x01a2	4	R/W
Cut4		Mat. Ena./Sn1	0x01a6	4	R/W
		Cycle/Sn2	0x01aa	4	R/W
		Multi/Sn3	0x01ae	4	R/W
		Processed/Sn4	0x01b2	4	R/W
		Mat. Start/Sn5	0x01b6	4	R/W
		Mat. End/Sn6	0x01ba	4	R/W
Tonnage	Left	Meter Scale	0x01c6	2	R/W
		Mul.Scale	0x0474	2	R/W
		Div.Scale	0x0476	2	R/W
	Right	Meter Scale	0x01c8	2	R/W
		Mul.Scale	0x0478	2	R/W
		Div.Scale	0x047a	2	R/W
	Alarm Para.	Up. Per.	0x047c	2	R/W
		Lo. Per.	0x047e	2	R/W
		Deviation	0x0480	2	R/W
		Devi.Alarm Ena.	0x0482	2	R/W
		Bypass Enable	0x0484	2	R/W
		Bypass Times	0x0486	2	R/W
Cut is enabled or disabled		Cut1	0x01ca	2	R/W
		Cut2	0x01cc	2	R/W
		Cut3	0x01ce	2	R/W
		Cut4	0x01d0	2	R/W
Count arrived out is enabled or disabled		Multi.: Cut count arrived	0x01d2	2	R/W
		Total: Total count arrived	0x01d4	2	R/W

Pn01	to set BDC	0x01d6	2	R
Pn02	the minimum allow spm	0x01d8	2	R/W
Pn03	the maximum allow spm	0x01da	2	R/W
Pn04	resolver direction	0x01dc	2	R/W
Pn05	the allow brake angle of the clutch / SPM.	0x01de	2	R/W
Pn06	Check angle detecting is enabled or disabled	0x01e0	2	R/W
Pn07	to set check angle	0x01e2	2	R
Pn08	Top stopping at fixed angle is enabled or disabled	0x01e4	2	R/W
Pn09	the fixed angle to top stop at	0x01e6	2	R/W
Pn10	the limit number of top stopping	0x01e8	2	R/W
Pn11	the scope of non-compensation of top stopping	0x01ea	2	R/W
Pn12	The limit to brake angle is enabled or disabled in single mode.	0x01ec	2	R/W
Pn13	to restore the factory default values	0x01ee	2	R
Pn14	the maximum allow brake time of the clutch	0x01f0	2	R/W
Pn15	filtering time of check angle	0x01f2	2	R/W
Pn16	Chinese and English switch	0x01f4	2	R/W
Rated Speed	to set rated speed of motor	0x0206	2	R/W
Gear Ratio	to set gear ratio	0x0208	2	R/W
	to set gear ratio	0x020a	2	R/W
Tonn. Adjust	to enable the page of tonnage adjusting	0x020c	2	R/W
X4 function	to select the function of X4	0x020e	2	R/W
overrun enable	to enable the function of overrun	0x0210	2	R/W
Dec. P. Ena.	to enable the function of decimal point	0x0212	2	R/W
Tonn.Ins. Ena.	to enable tonnage instrument	0x0214	2	R/W
Tonn. A. O. Ena.	to enable tonnage alarm out	0x0216	2	R/W
Delay Time	to set delay time of cam out	0x0218	2	R/W
Inv. type	to set Inverter type	0x021a	2	R/W
Para . Bkp	to save. load or delete current machine parameters.	0x021c	2	R
DM	DM1	0x01f6	2	R/W

	DM2	0x01f8	2	R/W
	DM3	0x01fa	2	R/W
	DM4	0x01fc	2	R/W
	DM5	0x01fe	2	R/W
	DM6	0x0200	2	R/W
	DM7	0x0202	2	R/W
	DM8	0x0204	2	R/W
Alarm Status	0: normal 1: parameter error 2: resolver failure 3: check angle error 4: under min. SPM 5: over max. SPM 6: brake error 7: power down 8: brake angle error in single mode 9: BDC error 10: power unstable 11: transmission error 12 : communication error 13: DM error 14: overrun error 15: Over Total Peak 16: Over Left Peak 17: Over Right Peak 18: Over Deviation 19: Quality Alarm	0x0000	4	R
Current Angle	Current angle	0x0004	2	R
Total Count	Total count	0x0006	4	R/W
Processed Count of Cut1	to read processed count of cut1 within current cycle	0x001a	4	R
Processed Count of Cut2	to read processed count of cut2 within current cycle	0x001e	4	R
Processed Count of Cut3	to read processed count of cut3 within current cycle	0x0022	4	R
Processed Count of Cut4	to read processed count of cut4 within current cycle	0x0026	4	R
Cut1 Count	to read counter of cut1	0x000a	4	R
Cut2 Count	to read counter of cut2	0x000e	4	R

Cut3 Count		to read counter of cut3	0x0012	4	R
Cut4 Count		to read counter of cut4	0x0016	4	R
Instruction	Set BDC	to set BDC	0x002a	2	W
	Count Reset	to reset total count	0x002c	2	W
	Cut1 Count Reset	to reset cut1 count	0x002e	2	W
	Cut2 Count Reset	to reset cut2 count	0x0030	2	W
	Cut3Count Reset	to reset cut3 count	0x0032	2	W
	Cut4 Count Reset	to reset cut4count	0x0034	2	W
	Alarm Reset	to reset alarm	0x0036	2	W

10.2 Communication Frame Introdution

10.2.1 Frame of Reading Opening angle of CAM1

Master		Slave	
ADR	01H	ADR	01H
Function	03H	Function	03H
Data address	01H(High)	Number of data (Count by byte)	02H
	04H(Low)		
Number of data (Count by word)	00H(High)	Content	xxH(High)
	01H(Low)		xxH(Low)
CRC CHK Low	xxH	CRC CHK Low	xxH
CRC CHK High	xxH	CRC CHK High	xxH

10.2.2 Frame of Setting Cycle/Sn2 of CUT1 to 100

Master		Slave	
ADR	01H	ADR	01H
Function	10H	Function	10H
Data address	01H(High)	Data address	01H
	62H(Low)		62H
Number of data (words)	00H(High)	Number of data (words)	00H(High)
	02H(Low)		02H(Low)
Number of data (bytes)	04H	CRC CHK Low	xxH
Content (Low 16 bits)	00H(High)	CRC CHK High	xxH
	00H(Low)		
Content (High 16 bits)	00H(High)		
	64H(Low)		
CRC CHK Low	xxH		
CRC CHK High	xxH		

10.2.3 Frame of Reading Alarm Status

Master		Slave	
ADR	01H	ADR	01H
Function	03H	Function	03H
Data address	00H(High)	Number of data (bytes)	04H
	00H(Low)		
Number of data (words)	00H(High)	Content (Low 16 bits)	xxH(High)
	02H(Low)		xxH(Low)
CRC CHK Low	xxH	Content (High 16 bits)	xxH(High)
CRC CHK High	xxH		xxH(Low)
		CRC CHK Low	xxH
		CRC CHK High	xxH

10.2.4 Frame of Setting BDC

Master		Slave	
ADR	01H	ADR	01H
Function	05H	Function	05H
Data address	00H(High)	Data address	00H
	2aH(Low)		2aH
Content (16 bits)	00H(High)	Content (16 bits)	00H(High)
	00H(Low)		00H(Low)
CRC CHK Low	xxH	CRC CHK Low	xxH
CRC CHK High	xxH	CRC CHK High	xxH

Chapter 11 Debug

11.1 Preparation and Examination

Check the power cord, grounding line, input / output signal wires and resolver's connection plug.

Check whether the machine DC power supply is proper.

Supply power to machine after the completion of the above examinations.

Enter the parameters, speed, cam interface separately, and then set the parameters.

A simple method used to check the related wiring is provided through IO interface in the monitor mode.

Warning

Please be sure to check carefully in accordance with the instructions provided by machine manufacturers.

11.2 Resolver Direction Setting

When the rotation direction of angle displayed through PAC15 is different from the actual crank direction, it can be adjusted by changing Pn04.

11.3 BDC Setting

See 7.2.

11.4 The Allow Brake Time Setting

As follows:

1) Press parameter key to enter parameter setting interface. After inputting correct code, parameter setting interface will be shown. Then select the machine parameter setting and enter.

2) Adjust the page and the cursor position by add key, subtract key, or F key, and select Pn14.

3) Press enter key to go into the edit mode.

4) Click enter key and move the cursor to the desired position. If press add key, the value will increase by 1. And if press subtract key, the value will decrease by 1.

5) After getting desired values, long press enter key to confirm the changes and save. But if press F key, the changes will be cancelled.

11.5 Check Angle Setting

As follows:

1) Run the pressure machine more than 1 lap in inch or single mode.

2) Press parameter key to enter parameter setting interface. After inputting correct code, parameter setting interface will be shown. Then select the machine parameter setting and enter.

3) Adjust the page and the cursor position by add key, subtract key, or F key, and select Pn07.

4) Press the enter key to detect check angle, and the cursor does not move.

5) Long press the enter key to confirm the detected angle, and the cursor is shifted to the next parameter.

Note: BDC setting must be prior to check angle setting.

11.6 The Filtering Time of Check angle Setting

If the system uses check angle function, the filtering time is needed to be set to ensure the smooth operation of machine.

1) Press parameter key to enter parameter setting interface. After inputting correct code, parameter setting interface will be shown. Then select the machine parameter setting and enter.

2) Adjust the page and the cursor position by add key, subtract key, or F key, and select Pn15.

3) Set Pn15 in accordance with the actual machine rev. Usually, the faster speed, Pn15 smaller.

11.7 Suggestions

1) In the course of actual use, CA1 is used to determine whether to reach 135 degrees usually. Recommend that its opening angle be set to 0 degrees, and its closing angle be set to 130 degrees.

2) In the course of actual use, CA2 is used to judge whether to reach top dead centre usually. Recommend that its opening angle be set to 350 degrees, and its closing angle be set to 10 degrees.

3) In order to make the controller to adapt to a machine quickly, recommend that user should run the machine once about every 100SPM, and stop normally in continuous or single mode. For example, users can set the machine spm to be 100spm, 200spm, until to the maximum allow spm.

Note:

1) When debugging, it is necessary to observe the running of the crank closely. If necessary, the machine power supply should be quickly cut off to avoid an accident.

2) The monitoring page provided by the controller can be used to determine whether every IO point is normal.

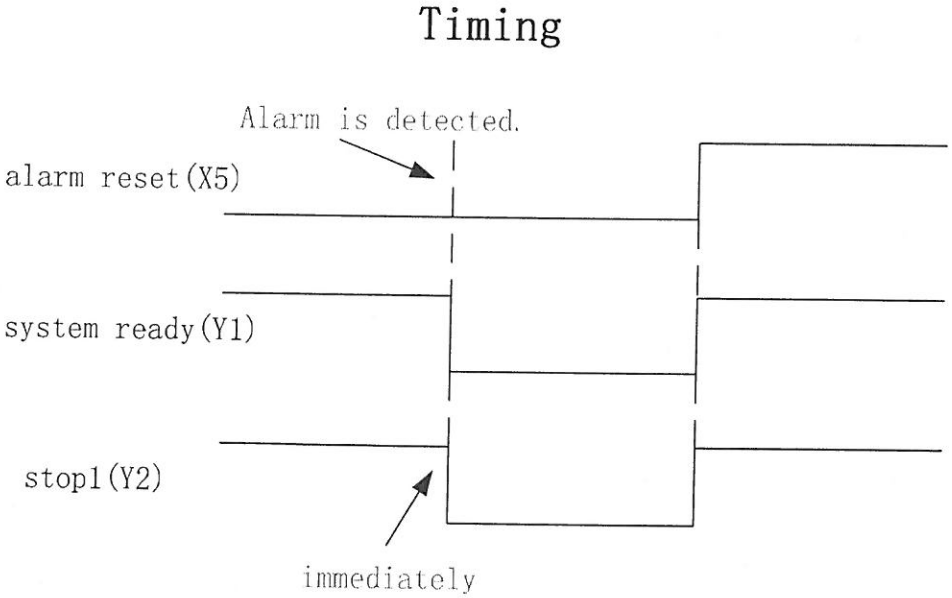
3) In order to use the function of overrun, recommend that overrun switch should be fixed in the range of 10~90.

Chapter 12 Alarm Processing

12.1 Alarm Timing

If the controller detects an abnormity in the process of running, it will shut down system ready signal and output top stop signal immediately.

Alarm timing as follows:



When an alarm is displayed, it can be cleared through reset key or alarm reset input signal.

Note:

When an alarm occurs, please clear the reasons for alarm and then clear the alarm.

After clearing the alarm and its reasons, it is necessary to go back to the inch model, and then switch to the single or continuous mode.

Table 3

Alarm information	Reasons	Method to clear the alarm
parameter error	memory or power-down detection circuit error, etc.	After clearing the alarm, go back to the inch model and run the machine over 1 lap. After that , cut off the power and then power to the controller. Or load default values.
resolver failure	resolver failure	Change resolver, set BDC again, or check connecting wires.
check angle error	resolver sleek	Check whether the joint slack loose and set BDC and overrun.
under min. SPM	under min. SPM	Increase the motor speed or decrease Pn03.
over max. SPM	over max. SPM	Decrease the motor speed or increase Pn02.
brake error	brake error	Change Pn05 and Pn14, or replace clutch.
power down	power down	After clearing the alarm, go back to the inch model and run the machine over 1 lap.
brake angle error in single mode	The angle of starting braking is less than 195 degrees in single mode.	Decrease the machine speed in single mode.
BDC error	BDC has not been provided.	Set BDC and overrun.
power unstable	Switching power supply abnormity, etc.	Replace the switching power supply.
transmission error	joint slack loose, etc.	Check running circuit, and check whether the joint slack loose.
communication error	communication wire loose or inverter parameters are wrong	Check communication wire and inverter parameters.
overrun error	SPM is too fast in single mode.	Decrease the value of SPM in single mode.
Over Total Peak	machine tonnage over the sum of meter scale	Increase the value of two channel meter scale, or adjust machine tonnage again.
Over Left Peak	left tonnage over meter scale	Increase the value of left meter scale, or adjust machine tonnage again.
Over Right Peak	right tonnage over meter scale	Increase the value of right meter scale, or adjust machine tonnage again.
Over Deviation	deviation between two channel over limit	Increase the value of deviation, or adjust machine tonnage again.

Quality Alarm	machine tonnage deviate average tonnage	Adjust the value of Up. /Lo. Per., or adjust machine tonnage again.