# AH27 User Manual



# Preface

CAUTION: Please read this manual carefully, also with related manual for the machinery before use the controller. For installing and operating the controller properly and safely, qualified personnel are required.

This product is designed for specified sewing machines and must not be used for other purposes.

If you have any problem or any comment, please feel free to contact us.

#### **Safety Instruction**

- 1) All the instruction marked with sign <u>.</u> must be absolutely observed or executed; otherwise, personal injuries or risk to the machine might occur.
- 2) This product should be installed and operated by persons with appropriate training only.
- Before connecting power supply cords to power sources, it's necessary to make sure that the power voltage is in the range indicated on the product name plate.
- 4) Make sure to move your feet away from the pedals while power on.
- 5)  $\angle !$  Turn off the power and remove plug prior to the following operations:
  - Connecting or disconnecting any connectors on the control box;
  - Repairing or doing any mechanical adjustment;
  - Threading needle or raising the machine arm;
  - Machine is out of work.
- 6) Make sure to fasten all the fasteners firmly in the control boxes prior to the operation of the system.
- 7) Allow an interval of at least 30 seconds before repapering the system after power off.

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- Repairs and maintenance work may be carried out by special trained electronic technicians.
- 9) All the replacement parts for repairing must be provided or approved by the manufacturer.
- 10) The controller must be firmly connected to a properly grounded outlet.



## **1**、**Product Introduction**

#### 1.1 Overview

These Series Digital AC Servo System consist of motor and controller which are separately mounted on the same bracket, providing a very flexible mounting solution for customers. The system can execute needle-down (or needle-up) position with external-synchronizer. And it can be easily configured with different motors to match with various sewing machines, such as lockstitch, dual-needle lockstitch, heavy duty, over lock stitch, interlock stitch and direct-driven sewing machines. Employing a switch-mode power supply for the sensitive control circuitry, the system can operate over a much wider voltage range. It has the following advantages installed easy, large torque, small size, low-noise, high-efficiency, small shake and high-precision speed control. Side-mount connectors make the connection more reliable and reduce the malfunction caused by oil leakage.

#### 1.2 Specification

Controller Type	AH27-55	AS27-	70/-75	
Max. Sewing Speed	5000	2500	3000	
(r/min)	3000	3500		
Voltage Range		AC (220±44 )V 50/60	)HZ	
Output Power	550W	700W	750W	
Max. Torque	3Nm	5.5Nm	6.8 Nm	
Environment		$0^\circ C \sim 40^\circ C$		
The motor way of	Belt drive/	Delt dei e		
transmission	Direct drive	Beit	drive	

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# 2. Installation Instructions

## 2.1 Motor Installation

Step 1: Mount lifting bracket. When motor installed under the machine table, as needed, to drill

holes in the following diagrams (see Fig. 2-1 the example for USA base table) for the

installation, mount lifting bracket.



Step 2: Install the motor (see Fig.2-2) and then tighten the lifting bracket.





Fig.2-2

## 2.2 Controller Installation





Fig.2-3

## 2.3 Controller shape dimension



Fig.2-4

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# 3. Power Connection and Grounding

Ground wire (Green/yellow) must be grounded. Use the correct connector and extension wire when connecting ground wire to Earth and secure it tightly (see Fig.3-1).







Ensure all power cord, signal wire and grounding wire not be pressed by other matter or over-twisted ,and not be too close to belt and belt wheel, keep 3cm-distance for safety.

A 1Φ/220V power from a 3Φ/380V Power source Connection (See Fig.3-2):





# 4. Definition of controller interface

Connections between control box and other accessories are illustrated in Fig.4-1.

Plug these connectors into the corresponding sockets in control box.

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Fig. 4-1 controller link

# AH27 Operation Panel (HMI) Instruction 1、Operation Panel (HMI) Instruction

## 1.1 Panel Instruction:

AH27 operation Panel is divided into (See Fig1-1) digital tube area and key operation area. The digital tube area is positioned in the middle of the operation panel. It consists of 3 digital tubes, used to display function setting and parameters. There are 2 keys at the top of the digital tube area, they are "P" and" S". There are 3 keys at the bottom of the digital tube area and two LED lights are located above the lower right two keys, showing the corresponding function are open or closed.



Fig.1Panel Instruction

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Table 1: Function of Key

No	Appearance	Description
1	P	<b>Function key:</b> Combines with other keys to set a higher level of the parameter; the password interface confirmation and other interface cancel function. "P" key pressed one time to return to the initial interaction in the parameter modification interface, not to save the current parameters.
2	S	<b>Save</b> : Confirm the operating (except the password interface), the system saves the current parameters in the parameter modification interface.
3		Hundred keys: Adjustable speed.Increase the highest bit. In the technician parameter interface, it could increase the higher bit of the parameter. Combined with the P key, it enters into the technician index interface.
4		<b>Stop position key</b> : Select up/down stop position. It is also used to increase the middle bit of the digital value, each effective pressing once increase a numerical.
5	$\mathbf{T}$	<b>Soft start key:</b> Select soft start function. It is also used to increase the lowest bit of the digital value, each effective pressing once increase a numerical.

## 1.2 Digital interface instruction

Digital interface is divided with three state: The idle state, the indexing status and data display state.

1.2.1 Idle state: When power on, it is the default display state.



Fig.1.2.1 idle state

1.2.2 The indexing status has three cases:







Fig.1.2.2 technician index

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Fig.1.2.4 error playback index

1.2.3 Data display state :

It shows diffident data according to the selected index - technician parameters, control

parameters and error code.



Fig.1.2.5 data display state

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## 2、Shortcut set

In the idle state interface, it can be used to set the soft start and stop position function directly.

#### 2.1 Soft start set

In the idle state (Fig.1.2.1), press (5 key) , the soft start function will be toggle between

enable and disable. If enable the lamp above this key will be lightened ( $\overbrace{}$ ), otherwise the lamp

will be off (「/)).

## 2.2 Stop position

In the idle state (Fig.1.2.1), press (11) (4key), toggle between up and down stop position. The

lamp lightened  $(\overset{(\mu)}{\mu})$  shows that the needle will stop in the down position ,otherwise  $(\overset{(\mu)}{\mu})$  the needle will stopped in the up position.

3、Technical Mode

In the application, to make the controller works in a better condition or to satisfy our own demand, we can adjust the technician parameters as the following steps.

Step 1: Under idle state, first press 😕 (1key) and hold on, then press 🗐 (3key) .Two keys are pressed at the same time, digital tube display see figure 3.1, required to enter the password.

The default password is DDD.

Fig.3.1 password interface

Step 2: Press (1) (3key), (4key), (5key), Modify the digital tube display to the correct

password, and then press  $\bigcirc$  (1key ). If the password is correct, enter the parameters modified index, see figure 3.2, or remain in the password input state, see figure 3.1.

Fig.3.2 technical index

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Step 3: Under parameters index, press (4key), (5key) to modify digital tube display to the needs of the technology parameters. Technical parameters see table 1. Index number is determined, press (2key) ,enter to parameters of interface, see figure 3.3.

		8
ig.3.3 tech	nical pa	rameter

Step 4: Press (3key), (4key), (5key) to modification of digital tube display to the needs of the technology parameters.

Step 5: After parameter modified, press (2key) , confirm the parameter modification and

return to the index interface, If you don't want to save the changes by 😕 (1 key), it will return to

the idle interface. Any time can press P (1 key) is returned to the free interface.

## 4、R&D parameter modification

First press P (1key) and hold on, then turn the power switch, you can enter the R & D parameters; Other methods of operation with the technical parameters of operation.

# 5、Monitor mode

Step 1: Under idle state mode, first press 😕 (1key) and hold on, press 🛄 (4key). Two keys

pressed at the same time, digital tube display see figure 4.1, monitor index interface.

Step 2: Under parameters index, press (4key), (5key) to modification of digital tube display to the needs of monitoring index number . Monitor index see table 2. Index number is determined, press (2key) ,enter to monitor parameters of interface, see figure 4.2.

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Fig 4.2 monitor parameters

Step 3: In the monitoring parameter interface, in addition to press  $[\mathcal{P}]$  (1key) of any key,

returns to the monitoring parameter index interface. Press  $\mathcal{P}$  (1key), returned to the idle state of interface.

Step 4: Repeat step 2 for other monitoring parameters or step 3 exits to monitor mode.

#### 6、Error playback

The controller could save the recent 8 error occurrence. Index 0 shows the most recent fault code. Index 1 stores the error code occurred before index 0's error. Fault code and fault relation, see table 3.

Step 1: In idle state , first press  $\bigcirc$  (1key) and hold on, then press  $\bigcirc$  (5key) ,Two keys are pressed at the same time, digital tube display see figure 5.1



Fig 5.1 error playback index

Step 2: Under error playback index, press (4key), (5key) to modify digital tube display to the needs of error playback index number (0-7). Error index number display correctly, press (2key)entered the error recording interface, view the index number of the recorded fault code, see figure 5.2.

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Fig 5.2 fault code display

playback index interface. Press  $[\mathcal{P}]$  (1key) returned to the idle state of interface.

# 7、Automatic test

In the idle state interface, The first press  $\mathcal{P}$  (1key) and  $\mathcal{S}$  (2key)combination, then step on

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the pedal controller immediately enter into the automatic test status. The controller will run according to setting about test mode and test time operation, until the end of test.Press

(1key) and (2key) combination again the controller will exit the test mode until the run

time exhausted.

## 8、Transmission ratio and the initial angle test

Under idle state, press (P)(1key) and (3key) combination. You can enter the technical parameter:

The initial angle test: P18 parameters adjusted to 2 (test the initial angle), the pedal is pressed to start the test, the test after the parameter back to 0 to (normal operation mode).

Transmission ratio test: P18 parameter adjustment 3 (test drive), depressing the pedal to start the test, the test after the parameter back to 0 (normal operation mode).

## 9、Operation note

To make the system running at peak performance, the customers for the first time using the recommended test again the initial angle and transmission ratio. R & D parameters so as not to be freely modified, and you incorrectly modify the normal use.

	Index No.	Default	Rang	Comment
Speed		20	10~80	Minimum sewing speed (display value*10)
	I	350	20~100	Maximum sewing speed (display value*10)
	5	5	~9	Soft start stitch number
	Э	IB	10~80	Soft start maximum sewing speed (display value*10)
	ч	EI	I~20	System accelerate sensitivity (Direct drive transmission can be set up to a large value; belt transmission don't set large value or too much noise and vibration. This parameter do not affect the electrical)
	5	20	1~80	System decelerate sensitivity ( Direct drive transmission can be set up to a large value ; belt transmission don't set large value or too much noise and vibration. This parameter do not affect the electrical )

Table 1: Technician mode parameter:

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	_ m	חרו חר	Measurement of transmission ratio speed numerical ( RPM )	
				( display value * 10 )
	٦	Б	2~200	The needle stop speed down limit .( display value * 10 )
Pedal		2	/ I / O E / S	Pedal Curve mode setup: 0: Auto Calculated liner Curve (According to the highest speed automatic computation) Speed Pedal forward angle 1: Two segment liner Curve. Speed Pedal forward angle 2: Arithmetic Curve Speed Speed Pedal forward angle Pedal forward angle Pedal forward angle
	9	300	20~400	Two segment controls the speed slope : mid turning point speed RPM (two segment of turning point speed), the parameter[8] set to 1 effective. Mid turning point speed Pedal forward angle

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				Two segment controls the speed slope :
	Ю	800	0~999	mid turning point of pedal Simulated value, the parameter[8]
				set to 1 effective, the value is between[15]and[16].
				Speed Mid turning point of pedal Simulated Pedal forward angle
				Arithmetic Curve supplementary parameter:
				the parameter[8] set to 2 effective,
				1: Square (the low speed control is very well, slow start after
			fast) ;	
Pedal		1	1/2	Speed Pedal forward angle 2 : Square root(Responding speed is fast, fast start after slow); Speed Pedal forward angle
	12	190	0~999	Up stop needle position after pedal (set value shall not be
				higher than 【13】)
	EI	460	0~999	Pedal back mid position (set value between [12] and [14])
	14	480	0~999	Pedal step upon running position (set value between [13] and
				【15】)
	15	680	0~999	Pedal low speed running position (upper) (set value between
				[14] and [16] )
				Pedal simulation the largest of value (set value shall not be less
	Ь	940	0~999	than 【15】)

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13 Pedal back to the middle position 14 Before the step of running position 15 Low-speed running position				
16 Pedal si	imulate the am	ount of maximum		0 13 Pedal back to the middle position
			Peo	lai
			1	12 Up the lifting of the needle position
	רו	I	0/1	Run to up needle position after Power on: 0: no action 1: action
				Special Running Mode setup:
				0:free sewing mode;1:simple sewing mode;(without stopping
				operation mode in the synchronous sensor fault cases using);
	18	0		2:calculate initial angle of motor (do not uninstall strap);
custom			2/3/9	3: calculate motor/machine head run rate mode ;(synchronizer,
setup 1				do not uninstall strap)4: The control system only in the current
Joiup 1				loop control running, speed open-loop.
		19 0	0~31	Torque boost up at low speed :
	19			0: normal function
				1~31: 31 levels Torque boost up
				Stop pin mode:
	20	I	0/1	0: Constant speed tackle mode (in the belt transmission,
				Parking is not precision) 1: back pull mode (PMX)
	21	ЧО	10~80	On the needle lifting speed
	25	0	0/1	Electric steering: 1: reversal; 0 : forward
				motor/machine head run rate: 0.001
	ᅳ	100		(if automatic calculation of motor/machine head run rate has
Maabiaa		IUU	10~500	done, the Parameter value in control box maybe different with
bead				that in HMI) ( display value * 10 )
narameter	27	0	0~359	Up needle position mechanical angle
parameter	28	175	0~359	Down needle position mechanical angle
	29	9	0~359	Thick material afterburner start angle
	30	57	0~359	Thick material afterburner end angle
Start/Stop	ΞI	Stop position	on (	): up needle position ; 1: down needle position

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mode	35	Soft start	Soft start 0: Off; 1: On.		
	33	0		Automatic test mode select : 0: needle NO.; 1: time	
Automatic	H	30	0~999	Automatic test total time setting (10 minute)	
test	ĥ	90	1~999	Running time (0.1second) / needle NO.	
	ĥ	10	1~999	Stop time (0.1second)	
Parameter saves recovery	ЭT	D	0~	Parameter reload(0:Lockstitch straight drive;1:lockstitch belt; 2: stitch straight drive; 3: thick material; 4: overclock sewing machine 5: Integrated controller; 6: 360 Lockstitch straight drive; 7: 360 lockstitch belt; 8: 360 stitch straight drive 9: 360 overclock sewing machine; 10: Nested package stretch sewing; 11: roller	
	38	D- I		Parameter transfer: 1:read data; 0:write data	
	72	٥	0/ 1	Automatic test transmission ratio	
	ЪЭ	280	0~999	Foot lifter position	
	74	10	0~999	Pedal foot lifter confirm time (10ms)	
	75	10	0~999	Pedal foot down confirm time (10ms)	
	76	I	0~999	Electromagnet 1 chopping open time	
	רר	I	0~999	Electromagnet 1 chopping close time	
	פר	80	0~600	Electromagnet 1 solenoid protect time(100ms)	
R&D	פר	800	0~999	Electromagnet 1 full output time	
parameter	80	I	0~3	Electromagnet 1 function 0:off; 1: foot lifter; 2:sunction: 3:+24V output	
	81	I	0~999	Electromagnet 2 chopping open time	
	82	I	0~999	Electromagnet 2 chopping close time	
	83	80	0~600	Electromagnet 2 solenoid protect time(100ms)	
	84	800	0~999	Electromagnet 2 full output time	
	85	5	0~3	Electromagnet 2 function 0:off; 1: foot lifter; 2:sunction: 3:+24V output	

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86	20	20~300	Plus stitch speed
BJ	150	1~999	Plus half stitch delay time
88	150	1~999	Plus a stitch delay time
89	٥	0~2	Input 1 function 0:off; 1: safe SW.; 2:plus stitch:
90	٥	□~	Input 1 effective level
91	30	0~999	Input 1 filtering time

Table 2: Monitor mode parameter (show only the highest of 3 bit)

Index NO.	Comment	until
0	Bus voltage	V
1	Mechanical speed	10r/m
2	Q axis current	0.01A
3	Initial angle	degree
4	Mechanical angle	degree
5	Pedal analog sampling value	
6	Transmission ratio	0.001
7	Version number	

Table 3: error code

error code	Error Definition	Solution
01	Hardware overload	Shut down the controller, Re-power it after 30s interval, if the controller still works
02	Software overload	abnormally, replace it and inform manufacturer.
03		Shut down the controller, check input power voltage, if the voltage is lower than
		190V, please restart the controller after the voltage is normal, if the controller still
	Low voltage	work abnormally after the voltage is recovered to the normal level, please replace
		it and inform manufacturer.
04	Voltage is too	
	high while	Shut down the controller, check the input voltage is high (above 245V). If the
	stopping	power supply voltage is high, Restart controller after recovery, if the controller still
05	Voltage is too	
	high during	cannot work normally please replace it and inform manufacturer.
	Operation	
07	Current detection	Shut down the controller, Re-start it 30s interval, if the controller still can not work
	loop circuit fault	normally replace it and inform manufacturer.

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		Shut down the controller, check the motor power cord whether it is broken off,
08	Motor stallad	loosen, damaged, or be tangled on the machinery by other stuffs. Restart
	Motor stalled	controller after recovery, if the controller still cannot work normally please replace
		it and inform manufacturer.
09	Dynamic Braking failure	Shut down the controller, check the motor power cord whether it is loosen, which
		is tightly inserted after restart controller , if the controller still cannot work
		normally please replace it and inform manufacturer.
11 f	Synchronizor	Shut down controller power, check if the connection wire between synchronizer
	Synchronizer	and controller is loosened; if the controller still work abnormally after restart
	laiure	please replace it and inform manufacturer.
12	Initial motor angle detection failure	Restart for 2~3 times, if the controller still work abnormally, Please inform
		manufacturer.
13		Shut down the controller, check the motor power cord whether it is loosen, return
	HALL failure	normal after restart controller , if the controller still cannot work normally please
		replace it and inform manufacturer.
14	DSP access failure	Shut down the controller, Re-start it1 attempts, if the controller still work
	EEPROM	abnormally, Please inform manufacturer.
15	Motor over speed protection	Shut down the controller, Re-start it 30s interval, if the controller still work
		abnormally, Please inform manufacturer.
16	Irregular motor operation	Shut down the controller, Re-start it 30s interval, if the controller still work
		abnormally, Please inform manufacturer.
18	Motor overload	Shut down the controller, Re-start it 30s interval, if the controller still work
		abnormally, Please inform manufacturer.

386P0007E

2015-01-07

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