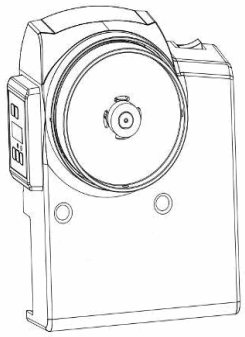
AHE27 User Manual



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 ⚠ 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.**
3) **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) ⚠**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.**
8) **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.**

CAUTION： **Be sure to connect the controller to a properly grounded outlet. If the grounding connection is not secured, you may run a high risk of receiving a serious electric shock, and the controller may operate abnormally.**

1、Product Introduction

1.1 Overview

These Series Digital AC Servo System consist of motor and controller which are mounted on the same bracket. The system can execute needle-down (or needle-up) position with external-synchronizer. 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	AHE27-55
Max. Sewing Speed（r/min）	5000
Voltage Range	AC （220±44） V 50/60HZ
Output Power	550W
Max. Torque	3Nm

Environment	0℃ ～ 40℃
The motor way of transmission	Direct drive

2. Installation Instructions

2.1 Controller Installation

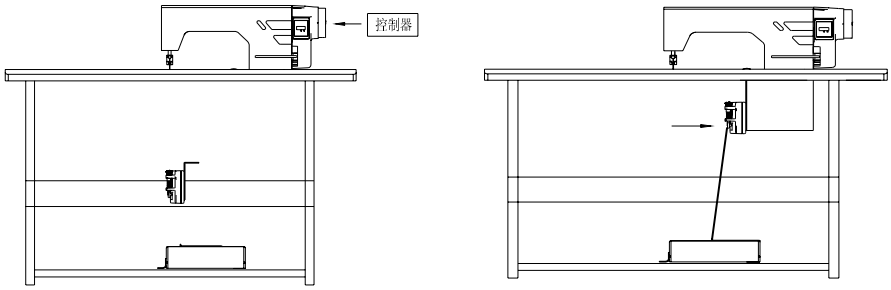


Fig.2-3

2.2Controller shape dimension

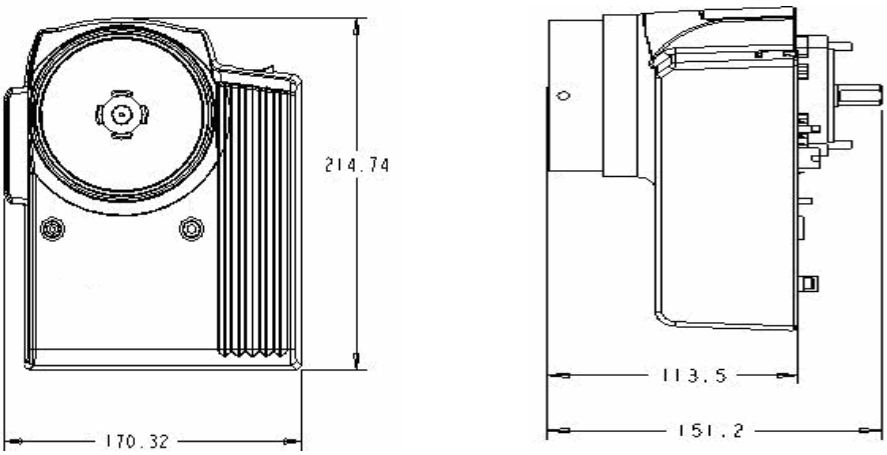


Fig.2-4

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).

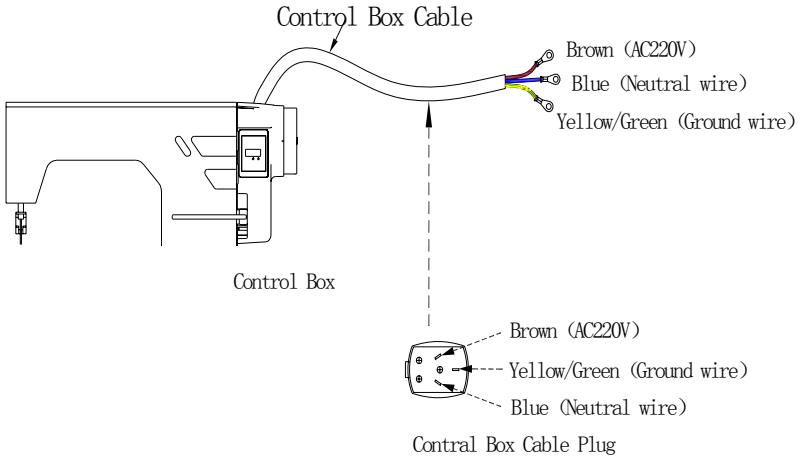


Fig. 3-1

CAUTION	**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):

CAUTION	**If the system have no Neutral point, then this servo motor is not suitable for this connection.**

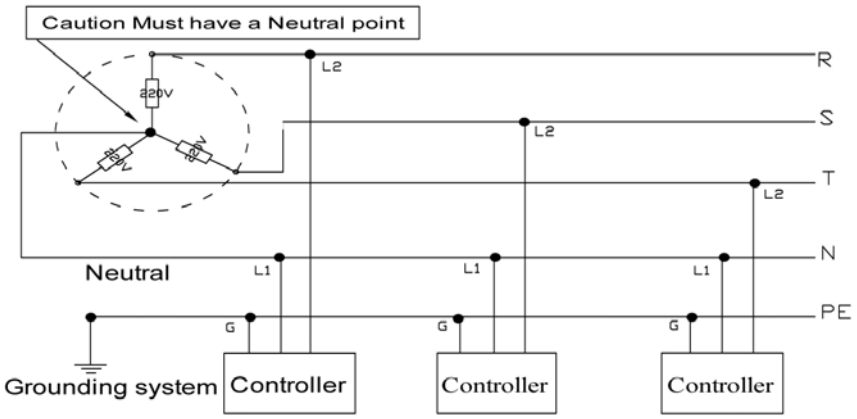


Fig. 3-2

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.

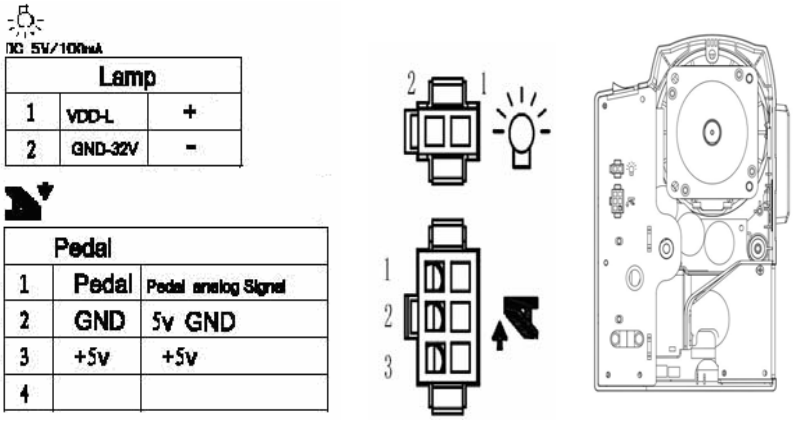


Fig. 4-1 controller link

AHE27 Operation Panel (HMI) Instruction

1、Operation Panel (HMI) Instruction

1.1 Panel Instruction:

The 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.

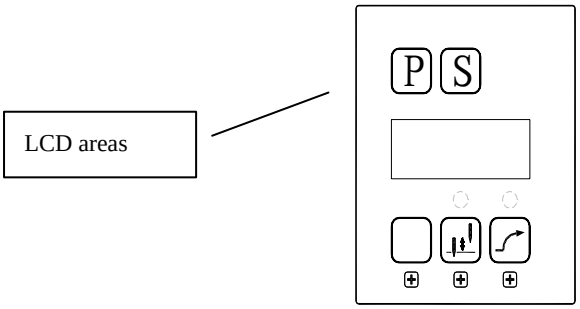


Fig.1Panel Instruction

Table 1: Function of Key

No	Appearance	Description
1	P	**Function key**：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	**Save**: Confirm the operating (except the password interface), the system saves the current parameters in the parameter modification interface.
3		**Hundred keys**：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		**Stop position key**：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		**Soft start key:** 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

Fig.1.2.3 monitor index

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

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 lit ( ), otherwise the lamp will be off ( ) .

2.2 Stop position

In the idle state（Fig.1.2.1），press（4key），toggle between up and down stop position(The set takes effect immediately). The lamp lit ( ) shows that the needle will stop in the down position ,otherwise ( ) the needle will stopped in the up position.

3、Administrator 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 000.

Fig.3.1 password interface

Step 2: Press（3key）、（4key）、（5key）,Modify the digital tube display to the correct password, and then press （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

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。

Fig.3.3 technical parameters

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 (1 key) is returned to the free interface.

4、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.

Fig 4.1 monitor index

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.

Fig 4.2 monitor parameters

Step 3：In the monitoring parameter interface, in addition to press (1key) of any key, returns to the monitoring parameter index interface. Press (1key), returned to the idle state of interface.

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

5、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 （1key）and hold on，then press （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.

Fig 5.2 fault code display 

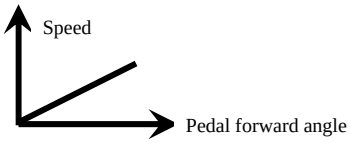
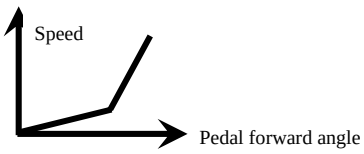
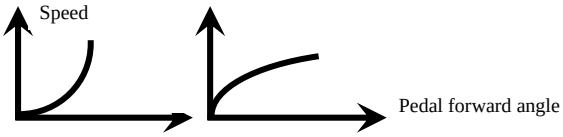
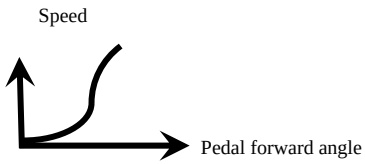
Step 3: In the failure code display interface, press any key except (1key), return to error playback index interface. Press (1key) returned to the idle state of interface.

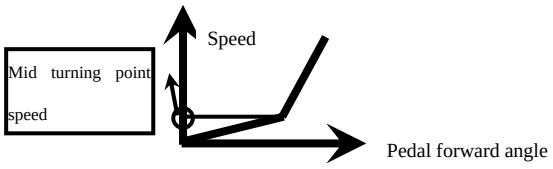
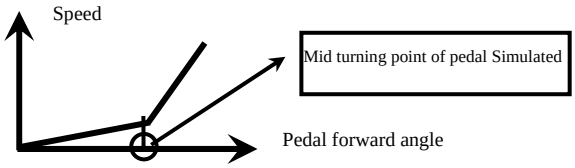
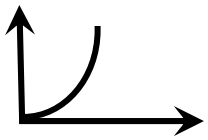
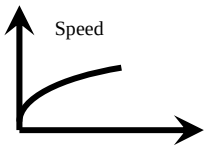
6、Automatic test

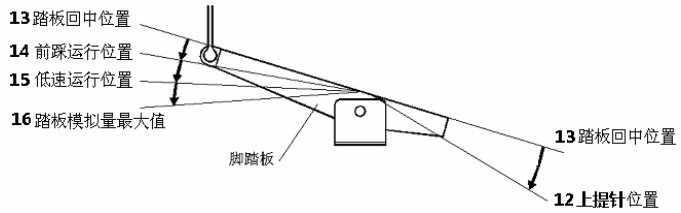
In the idle state interface, press (1key) and (2key)combination, the controller enter into the automatic test status. The controller will run according to setting about test mode and test time operation, until the end of test.Press (1key) and (2key) combination again the controller will exit the test mode until the run time exhausted.

Table 1: Technician mode parameter:

	Index No.	Default	Rang	Comment
Speed	**0**	**20**	10~80	Minimum sewing speed (display value*10)
	1	**350**	20~500	Maximum sewing speed (display value*10)
	2	**2**	1~9	Soft start stitch number
	3	**13**	10~80	Soft start maximum sewing speed (display value*10)
	4	**13**	1~20	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	**80**	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 ）
	6	**80**	20~120	Measurement of transmission ratio speed numerical (RPM)
	7	**18**	2~200	The needle stop speed down limit .(display value * 10)
Pedal	**8**	**2**	0／1／2／3	Pedal Curve mode setup: 0：Auto Calculated liner Curve（According to the highest speed automatic computation）  1：Two segment liner Curve.  2：Arithmetic Curve  3: Scurve 

	9	**300**	20~40 0	Two segment controls the speed slope：mid turning point speed RPM（two segment of turning point speed），the parameter[8] set to 1 effective。 
	10	**800**	0~999	Two segment controls the speed slope： mid turning point of pedal Simulated value，the parameter[8] set to 1 effective, the value is between[15]and[16]. 
	11	**1**	1／2	Arithmetic Curve supplementary parameter： the parameter[8] set to 2 effective, 1：Square（the low speed control is very well, slow start after fast） Speed  2：Square root（Responding speed is fast, fast start after slow）； 
	12	**190**	0~999	Up stop needle position after pedal （set value shall not be higher than【13】）
	13	**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】）
	16	**960**	0~999	Pedal simulation the largest of value（set value shall not be less than【15】）
				
custom setup 1	**17**	**1**	0／1	Run to up needle position after Power on： 0: no action 1: action
	18	**0**	0／1／2／3/4	Special Running Mode setup： 0：free sewing mode；1：simple sewing mode；（without stopping operation mode in the synchronous sensor fault cases using）； 2:calculate initial angle of motor (do not uninstall strap); 3：calculate motor/machine head run rate mode ;(synchronizer, do not uninstall strap)4：The control system only in the current loop control running, speed open-loop.
	19	**0**	0~31	Torque boost up at low speed : 0：normal function 1~31：31 levels Torque boost up
	20	**1**	0／1	Stop pin mode： 0：Constant speed tackle mode (in the belt transmission, Parking is not precision) 1：back pull mode（PMX）
	21	**30**	10~80	On the needle lifting speed
	22	**0**	0/1/2	safety switch 0：Normally open 1：Normal Close 2：Safety detection of closed
	25	**0**	0／1	Electric steering： 1: reversal; 0 : forward

Machine head parameter	**26**	**100**	10~500	motor/machine head run rate: 0.001 (if automatic calculation of motor/machine head run rate has done, the Parameter value in control box maybe different with that in HMI) (display value * 10)
	27	**0**	0~359	Up needle position mechanical angle
	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 mode	**31**	Stop position 0：up needle position ；1：down needle position		
	32	Soft start 0：Off；1：On.		
Automatic test	**33**	**0**	1	Automatic test mode select ：0：needle NO.；1：time
	34	**30**	0~999	Automatic test total time setting （10 minute）
	35	**90**	1~600	Running time （0.1second）／needle NO.
	36	**10**	1~999	Stop time （0.1second）
Parameter saves recovery	**37**	**5**	0~5	Parameter reload（0：Lockstitch straight drive；1：lockstitch belt；2：stitch straight drive；3：thick material；4：overclock sewing machine;5:direct drive machine of the whole）
	38	0-1		Parameter transfer：1:read data；0:write data

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 abnormally, replace it and inform manufacturer.
02	Power off	Shut down the controller, check input power voltage ,if the voltage is normal, the controller still cannot work ,please replace it and inform manufacturer.
03	Low voltage	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 work abnormally after the voltage is recovered to the normal level, please replace it and inform manufacturer.
04	Voltage is too high while stopping	Shut down the controller, check input power voltage, if it is higher than 245V, please restart the controller after the voltage is normal, if the controller still work abnormally after the voltage recovered to the normal level, please replace it and inform manufacturer.
05	Voltage is too high during Operation	
06	(Reserved)	(Reserved)
07	Current detection loop circuit fault	Shut down the controller, Re-start it 30s interval, if the controller still can not work normally replace it and inform manufacturer.
08	Motor stalled	Shut down the controller, check the motor power cord whether it is broken off, loosen, damaged, or be tangled on the machinery by other stuffs. Restart controller after recovery, if the controller still cannot work normally please replace it and inform manufacturer.
09	Dynamic Braking failure	
10	Reserved)	(Reserved)
11	Synchronizer failure	Shut down controller power, check if the connection wire between synchronizer and controller is loosened; if the controller still work abnormally after restart please replace it and inform manufacturer.
12	Initial motor angle detection failure	Restart for 2~3 times, if the controller can not work normally, Please inform manufacturer.
13	HALL failure	Shut down the controller, check the motor power cord whether it is loosen，return normal after restart controller , if the controller still cannot work normally please replace it and inform manufacturer.
14	DSP access failure EEPROM	
15	Motor over speed protection	Shut down the controller, Re-start it 30s interval, if the controller still work

16	Irregular motor operation	abnormally, Please inform manufacturer.
17	(Reserved)	(Reserved)
18	Motor overload	Shut down the controller, Re-start it 30s interval, if the controller still work abnormally, Please inform manufacturer.

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