Contents

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 repowering 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

AHD50 Series Digital AC Servo System, the motor and the controller are separately mounted on the same bracket, providing a very flexible mounting solution for customers. The system can be easily configured with different motors to match with various sewing machines, such as lockstitch, duel-needle lockstitch, heavy duty, and direct-driven sewing machines. The solenoid outputs are over current protected, preventing damage of the controller in case of mis-wiring of external accessories. Employing a switch-mode power supply for the sensitive control circuitry, the system can operate over a much wider voltage range. Side-mount connectors make the connection more reliable and reduce the malfunction caused by oil leakage.

1.2 Components & Accessories

The system contains main body and accessories. Main body of the system composes of control box (Fig.1):

Fig.1 Control Box

AHD50 Series controller provides the follow type of operation panel (see Fig.2).

Fig.2 Panel

Please check whether the components listed on the packing list are all included. Please contact supplier for compensation in case of missing parts. (Packing list is inside the package box).

1.3 Functions & Specification

Function and specification of AHD50 series Digital AC Servo System (see table 1).

Table1:

Controller Type	AHD50
Motor Type	Special Motor
Voltage Range	AC 220±20% V 50/60HZ
Output Power	550W
Max. Sewing Speed	5000rpm
Max. Auto-Back tacking Speed	2200rpm
Max. Torque	3Nm
Nimble Positioning	★
Needle up/Correction	★
Slow Start	★
Presser Foot Lift	★
Thread Trimming, Thread Wiping, Back tacking	★ / ★ / ★
Tension release	★
Thread clamp	option
Overload Protection	★
Weight	5Kg
Dimension	385X295X210mm

(★It indicates the function.**)**

2 Installation Instructions

2.1 Installation

⚠ **CAUTION: Power off and remove the pulley while implementation.**

2.1.1 Installation of Motor & Synchronizer

1. Open the cover board of the machine as shown in Fig.3:

Fig.3

2. Install the motor (the motor as shown in Fig.4-1).Put the motor to the motor installation hole (SeeFig.4-2):

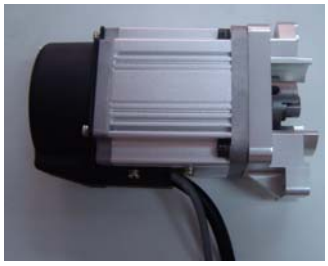

Fig.4-1

Fig.4-2

3. Fix the motor by screw (See Fig.5-1):

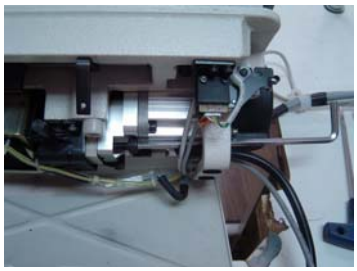

Fig.5-1

Fig.5-2

4. cover the cover board and fix it as shown in Fig.5-2(The synchronizer is installed at the back of motor).

2.1.2 Installation of Panel(HMI)

Firstly mount the operation Panel on the bracket, and then set onto the machine via tightening the one screws (see Fig.6).

Fig.6

2.1.3 Control Box Installation

Drill holes as shown in Fig.7. Mounting the control box under the machine table then tighten the wood screws (as shown in Fig.8).

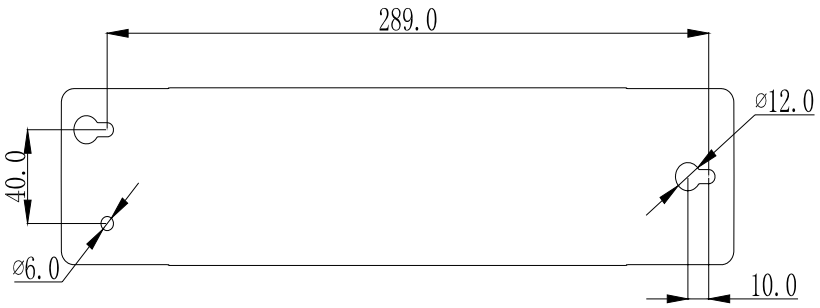

Fig.7

Fig.8

2.1.4 Foot Pedal Installation

As shown in Fig.9, mount nut ② in the pedal pin ① and then insert the pin into position B of the lever ③. Tighten the mechanism with the spring washer ④ and nut ⑤.

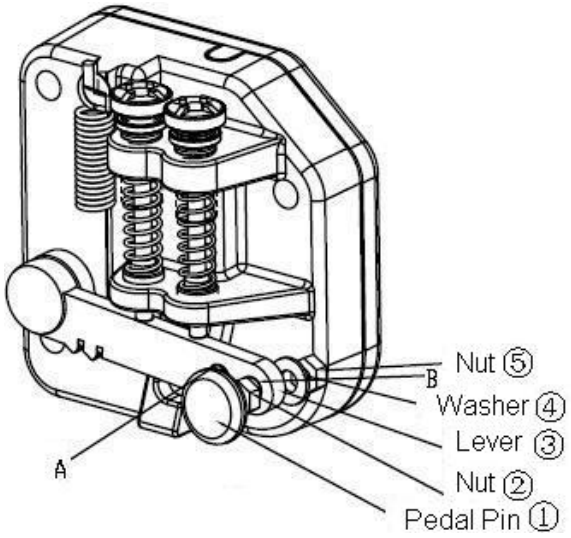

Fig.9

● Foot Pedal Adjustment

Adjust the pedal connecting pole to obtain the optimised pedal angle according the practical level. If the pedal pressure is too weak, move the pedal pin from position B to A (see Fig.9).

● Foot Pedal Operation

⚠ **Caution:** Take your foot off the pedal before power on**.**

Pedal operation is shown in Fig.10:

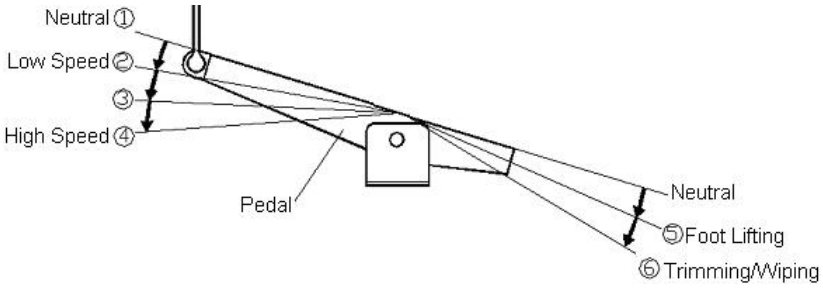

Fig.10

When the pedal is gently depressed from the neutral position ① to position ②, low-speed sewing is carried out. If it is then depressed as far as ③, high speed sewing is carried out.

If the pedal is gently depressed backward from the neutral position ① to position ⑤, the presser foot lift is raised automatically (Assuming this feature is installed and enabled).

If the pedal is depressed backward fully from the neutral position ① to position ⑥, the thread trimmer/wiper operates. The machine will stop at the needle-up position.

2.1.5 Power Connection

- Signal Wire Connection

Connections between control box and other accessories are illustrated in Fig.11. Plug these connectors into the corresponding sockets in control box.

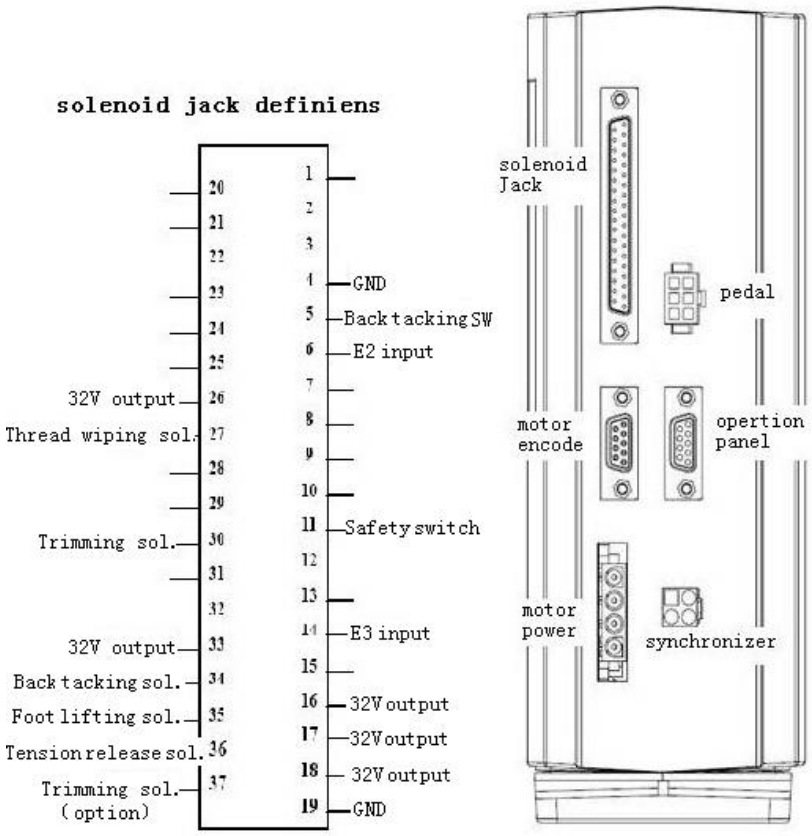

Fig.11

Caution: **Please check if all connectors match or not, pins are found right definition or not.**

● Grounding

Ground wire must be grounded. Use the correct connector and extension wire when connecting ground wire to Earth and secure it tightly.

Caution: Ensure all power cord, signal wire and grounding wire not be pressed by other matter or over-twisted.

2.2 Adjustment

System power on after it is steadily grounded (permanent fixed grounding) ensure the voltage range and technical requirements complied with the indication on nameplate.

- Up position adjustment: adjust the parameter P50 to target position needle up.
- Down position adjustment: adjust the parameter P51 to target position needle down.

● Restore Default Setting

Ensure that each parameter is consistent with the default setting after power on.

AHD50 series servo system's default setting:

- Normal sewing mode selected
- Needle Down at machine stop as default
- Slow start sewing disabled

- Double Start/End Back Tacking
- Automatically thread trimming & auto foot lift after trimming enabled

The installation and adjustment of the system is finished as shown in Fig.12:

Fig.12

3 Operation Instructions

3.1 Operation Panel Instruction

● Panel Display Instruction

AHD50 series digital AC servo system, implement its various functions and technical parameters via operation panel (also called HMI shown in Fig.13). HMI has two areas, LCD area and keys operation area. In the functions selection area, 13 keys stand for different functions, 13 visualized icons is chosen to distinguish them from each other. For example denotes free sewing mode, means constant-stitch sewing mode with optional stitch numbers, denotes auto presser foot lift function etc..

Fig.13

LCD area, located at upper half of the left side, indicates the

current status of the system (Fig.14), including sewing mode, stitches, start/end back tacking settings, presser foot lifting, needle stop position, thread trimming, thread wiping and soft start etc.. The system will do self test after power on, during self test, all icons of display area will lighten then display the current setting of the system, and other icons without optional function will not lighten. For example, auto thread trimming is selected then the icon will lighten, otherwise it is dark.

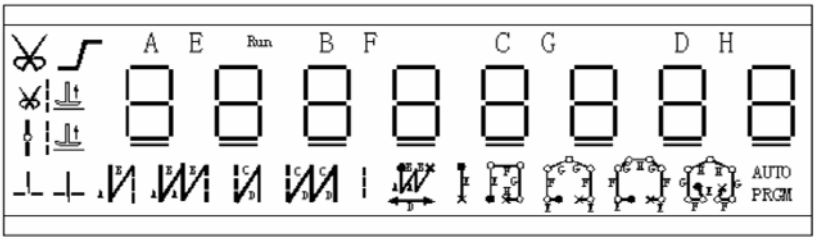

Fig.14

● Panel Keys Definition

Table 2 shows definition of each key.

Table 2: Keys definition

NO.	Key	Function	Display Icon
1	P	Select to enter technician parameters	
2	+	Increase parameter value	None
3	−	Decrease parameter value	None
4		Double start back tacking key: set single, double start back tacking	
5		Four start back tacking key: set four start back tacking	

6		Four end back tacking key: set four end back tacking	
7		Four end back tacking key: set four end back tacking	
8		Select free sewing mode	
9		W type sewing key	
10		One-segment sewing key	
11		Four-segment sewing key	
12		Select constant-stitch(six-segment, seven-segment, eight-segment) sewing and auto-sewing mode	AUTO TEST
13		Set up automatic press foot lifting	
14		Set up automatic trimming	
15		One-Shot-Sewing selection	
16		Select Up/Down position/ Stitch compensation	
17		Acceleration key	None
18		Deceleration key	None

3.1.1 Optional User Mode

● Operator Mode

In this mode, various sewing modes are available after technical parameters settings.

As the default setting, the system enters this mode when it starts. Under this mode, such basic functions as normal sewing work and modes change can be realized but no inside parameters and setting can be changed (details are shown in function operation section).

● Technician Mode

In this mode, technical parameters corresponding to various functions can be adjusted or reset according to practical needs so that the system may run in the best condition. Parameters setting under technician mode:

Step 1: Under operator mode, press key and key, the LCD will display psd-0000, and then set the password by administrator.

Step 2: Use the last four keys and keys to input the password, and then press key. If the password is correct then enter technician mode, otherwise, it will return to operator mode.

Step 3: Change technician parameters by the second and the third key and keys. The parameters are shown in table 3.

Step 4: Parameters values can be changed by the last four keys and keys.

Step 5: Under technician mode, press key, the panel will return to operator mode.

Table 3: Technician parameters

Display	Parameters definition	Range	Default	Remarks
P01	Start speed	100~800	180	spm
P02	Maximum sewing speed	100~5000	4000	spm
P03	Pedal speed curve slope	1~100	6040	%
P04	Maximum constant sewing speed	100~4000	3000	spm
P05	Start/ Constant back tacking speed	200~2200	1200	spm
P06	End back tacking speed	200~2200	1200	spm
P07	Input E2,E3 Function setting	0011~0055	0013	Entries bit is for E3 Tens bit is for E2 1=needle raised without trimming 2=needle position change -over 3=single stitch 4=backtacking inversion 5=backtacking suppression
P08	Maximum manual back tacking speed	200~4000	3000	spm
P09	Stitch compensation speed	100~300	180	spm
P10	Trimming speed	100~300	180	spm
P11	Bobbin stitch setting	0~9999	0	Stitch(s)
P12	Slow start stitches	0~9	0	0=no softstart 1-9=1-9stitch(s)
P13	Slow start speed	100~300	200	spm
P14	Start/ Continuous back tacking stitch compensation 1	0~50	18	ms

P15	Start/ Continuous back tacking stitch compensation 2	0~50	28	ms
P16	End back tracking stitch compensation 1	0~50	18	ms
P17	End back tracking stitch compensation 2	0~50	28	ms
P18	Thread clamp start position	0-359	122	Degree(s)
P19	Thread clamp end position	0-359	318	Degree(s)
P20	Step of speed adjustment (It is only available for the Panel.)	0~200	50	spm
P21	Restoring to factory setup		0	
P22	Mult-function setting	0-1111	0111	Entries Bit:: thread clamp on/off Ten bit: Auto needle up positioning after power on Hundred bit: Back stitch button setting Kilo bit: safety switch on/off setting

Recovery of default parameters:

Enter technician parameters mode and replace the last two numbers of P21 with 88, then press P key, the default (factory) parameters can be recovered. (After the recovery of Default setting the value of P21 will recover to initial value).

Slow start setting:

Enter technician mode, set the last number of the parameter

P12 as 1to9 and then slow start setting is ok.

● Administrator Mode

In this mode, various solenoid parameters set can be regulated according to the practical need so that the servo system can normally run on every sewing machine. Parameters setting under technician mode:

Step 1: Under operator mode, press P and keys to enter administrator mode.

Step 2: Change administrator parameters index by the second and the third key and key under administrator mode. The details of technician parameters are shown in table 4.

Step 3: Parameters values can be changed by the last four keys and keys.

Step 4: Under administrator mode, press key, the panel will return to operator mode.

Table 4:

Display	Parameters definition	Range	Default value	Remarks
P31	Trimming angle 1	100~300	220	degree
P32	Trimming angle 2	10~90	50	degree
P33	Trimming angle 3	50~250	90	degree
P34	Thread wiping delay	5~80	30	ms

P35	Lifting presser foot start time	50~300	150	ms
P36	Pulsing of foot lifting ON time	1~20	5	ms
P37	Pulsing of foot lifting OFF time	1~20	6	ms
P38	Maximum time of foot lifting	2~60	20	s
P39	Maximum time of backstitch	2~60	20	s
P40	Start delay after switching off the foot lifting signal	0~800	200	ms
P41	Foot lifting confirming time	0~800	300	ms
P42	Time of Compensating stitches	0~800	150	ms
P43	Auto test interval time	1~100	10	100ms
P44	Thread wiping/ clamp selection	0～1	0	0:thread wiping 1:thread clamp
P45	Back tacking angle	120-240	165	Degree(s)
P46	Special run mode selection	0~2	0	0:operator select 1:simple sewing mode 2:test motor initial angle
P47	motor/machine head run rate	800~1200	1000	0.001
P48	Password	0~9999	****	Password can get from product supplier.
P49	Pulsing of back tack solenoid ON time	70~500	100	ms
P50	Needle up position	0-359	0	Degree(s)
P51	Needle down position	0-359	155	Degree(s)

P52	Thread tension release start angle	0-359	260	Degree(s)

Password modification:

Administrator parameter P48 is the password to enter the technician and administrator parameter. When restore the factory setup, the password also restore to the default value.

Test motor initial angle:

Under administrator mode, change the value of the parameter P46 to 2. It means changing the operator mode to testing motor initial angle mode (suggest to detect the angle without load); the motor initial angle can be monitored by parameter index SP4. Please change this parameter to original value after testing the initial angle.

Auto-test function

After trimming, Press key, and select to Auto-test. LCD will display auto-test at this moment. then Press key and key together. The machine will run. There are two segments which can be set stitches. Press ,or ,or ,or ,or key. Auto-test will be stop.

3.1.2 Function and Operation

- Normal Sewing

Press key, normal sewing mode icon in display area is

lightened, other icons are not, which indicates normal sewing mode has been selected, it is ready just step the pedal for operation.

● Simple Sewing

Under administrator mode, set P46=1, it means to change the operator mode to simple sewing mode.

Under simple sewing mode, the controller only controls the sewing speed. It is ready for operation just by stepping the pedal. If stop stepping the pedal, the operation will also stop and the needle stop position setting auto trimming is disabled.

When error of the machine synchronizer occurs, you can select to use simple sewing mode to instead of the free sewing mode.

● Constant-Stitch Sewing

1. Back tacking

Step 1: Press key, back tacking icon in display area is lightened, other icons are not, which indicates back tacking mode has been selected.

Step 2: Change the corresponding parameters (A, B and D values) by using and keys, the value range is 1-9 stitches.

Step 3: Tread pedal to start sewing after finish setting.

2. One-segment stitch

Step 1: Press key, back tacking icon in display area

lightens, other icons is not displayed, which indicates one-segment stitch mode has been selected.

Step 2: Change the corresponding parameters (E value) by using + and − keys, the value range is 0-99 stitches.

Step 3: It is ready just step the pedal for operation.

3. Four-segment stitch

Step 1: Press key, back tacking icon in display area is lightened, other icons are not, which indicates four-segment stitch mode has been selected.

Step 2: Change corresponding parameters E, F, G and H values by using + and − keys, the value range is 0-99 stitches.

Step 3: It is ready just step the pedal for operation.

4. Other sewing modes

Step 1: Continuously press MODE key, select the required mode among AUTO TEST, stop pressing the key and the stitch mode has been selected.

Step 2: Change the corresponding parameters (E, F, G and H values) by using + and − keys, the value range is 0-99 stitches.

Step 3: It is ready just step the pedal for operation.

- Back Tacking Sewing

Step 1: Press key or key to change the setting of back tacking.

Start back tacking has following four modes:

- None start back tacking
- Single start back tacking
- Double start back tacking
- Four start back tacking

Step 2: Stop pressing to confirm, then this back tacking mode has been selected.

Step 3: Change the corresponding parameters (A and B values) by using and keys, the value range is 0-9 stitches.

Step 4: The start back tacking setting implemented after finishing the stitches setting.

Note: End back tacking setting method is similar with start back tacking setting method basically, except the key.

● Thread Trimming

Press key to enter thread trimming setting, it can be set as two modes: trimming or non-trimming. Repeatedly press key, the icon in display area will lighten or darken, respectively standing for trimming and non-trimming.

● Presser Foot Lift

Press key to enter presser foot lift setting, it has four setting modes: non-auto foot lift, auto foot lift after thread trimming , auto foot lift in sewing stopping and auto foot lift both after thread trimming and in sewing stopping.

Press key to select the desired mode, stop pressing to confirm, then foot lift setting has been finished.

● Needle Stop Positioning

Press key to set needle stop position; it can be set as two modes: needle up mode and needle down mode. Repeatedly press key, the cursor will switchover between (needle down) and (needle up). Select the desired mode and stop pressing to confirm, then needle stop position setting has been finished.

● Back Tacking and Compensating Stitch

The back tacking button on the machinery can be set to do compensating-stitch function. The back tacking speed and compensating stitch can be adjusted. The button corresponds to following conditions in different stitch modes:

Normal sewing mode: Press the button to get back tacking in running; when machinery stops, press the button to compensate stitch. Compensating stitch depends on the condition of button trigger: trigger the button to compensate half a stitch, press the button gently and release to compensate one stitch; Keep pressing the button can get continuous compensating stitch

according to needs.

Constant-stitch sewing mode: Under this mode, the button is only available for compensating stitch. Stop before one-segment sewing is finished, it can be adjusted to needle up position (if the needle is up, the system will not response), by pressing back tacking button. Stop after one-segment sewing is finished, compensate stitch carries out, compensate stitch depends on the condition of button trigger: trigger the button to compensating half a stitch, press the button gently and release to compensating one stitch; press the button not release can realize continuous compensating stitch according to needs.

Remarks: Under whatever sewing mode, it is unavailable to press the button when the sewing machine is standstill after thread trimming.

● Stitch Corrections

Below is an example for stitches correction. (Double Start back tacking, A=B=4 stitches)

If the stitch loci are appeared abnormally, please correct it as below:

○ The first stitch of B becomes shorter or lost, as shown in Fig. a. Correction: Add the value of P14 (Double End back tacking: Add the value of P16).

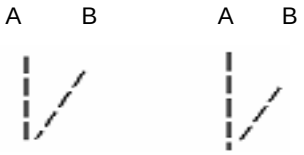

Fig. a

- The last stitch of A becomes shorter or lost, as shown in Fig. b. Correction: Reduce the value of P14 (Double End back tacking: Reduce the value of P16).

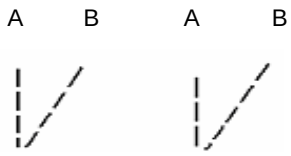

Fig.b

- The first stitch of free sewing becomes shorter or lost, as shown in Fig.c. Correction: Increase the value of P15 (Double End back tacking: Increase P17).

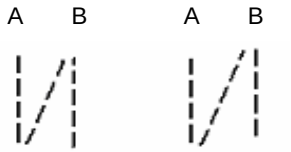

Fig.c

- The last stitch of B becomes shorter or lost, as shown in Fig.d. Correction: Reduce the value of P15 (Double End back tacking: Reduce the value of P17).

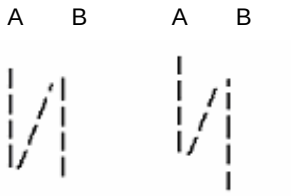

Fig.d

If the stitch loci are appeared abnormally in end back tacking sewing, please correct the parameter value of P16 and P17. If the

stitch loci are appeared abnormally in W type sewing, please correct the parameter value of P14 and P15.

- Parameter Monitoring

Under operator mode, press key and key to enter monitor mode. Change the monitoring parameters by the third and keys. The parameters details are shown in table 5.

Table 5: Monitoring parameters

Parameter Display	Parameter Instruction	Normal Value Range	Unit
SP01	DC Bus Voltage	270~350	V
SP02	Motor Current	xxxx	0.01 A
SP03	Motor rotate speed	xxxx	rpm
SP04	Motor initial angle	xxxx	Degree
SP05	Software Version		Fact Value

※Operator, Technician and administrator all can enter this mode.

4 Work Environment

1. Electromagnetic Interference:

   To avoid the false, please keep the product away from the high electromagnetic machinery or electro pulse generator.

2. Temperature:

   a. Please don't operate the controller in room temperature is above 40℃ or under 0℃.
   b. Avoid operating it directly in sun light or outdoors.
   c. Avoid operating near the heater.
   d. Avoid operating in the area which humidity is less than 30% or higher than 95%; also stay away from dew area.

3. Atmosphere:

   a. Please don't operate in dusty area, and stay away from corrosive material.
   b. Avoid operating in evaporate or combustible gas area.

4. Aeration

   a. Put the control box near the aeration opening.
   b. Clear dust, paper scrap and cloth scrap deposited on machine box periodically to avoid motor overheat.

5 Troubleshooting

- The system can automatic test itself after power on, and provides a failure alarm function. The controller will stop and automatically initiate its protection program to prevent accidents.
- If a failure occurs during system running, it also will display a failure alarm (Error code) on the control panel (HMI).
- If a failure occurs, the HMI will buzz and the corresponding error code will glitter on the display (see Fig.15):

Fig.15

- The following table 6 shows the Error codes, possible causes and solutions for failures.

Table 6:

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	Software overloaded	
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 can not work normally 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 can not work normally after the voltage recovered to the normal level, please replace it and inform manufacturer.
05	Voltage is too high during Operation	
06	Malfunction in solenoid loops	Control box is burned down because of short-circuit of magnets loops, please check magnets loops and inform manufacturer as well as recovery and replace the controller.
07	Malfunction in current control loops	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	Please replace the controller and inform manufacturer.

10	HMI Communication failure	Shut down controller power, check if the connection between HMI and controller is broken or loosen; if the controller still can not work normally after restart, please replace it and inform manufacturer.
11	Synchronizer failure	Shut down controller power, check if the connection wire between synchronizer and controller is loosened; if the controller still can not work normally after restart please replace it and inform manufacturer.
12	Initial motor angle detection failure	Restart for 2~3 times, if the controller still can not work normally, Please inform manufacturer.
13	HALL failure	Please replace the controller and inform manufacturer.
14	DSP access failure EEPROM	Shut down the controller, Re-start it after 30s interval, if the controller still cannot work normally replace it and inform manufacturer.
15	Motor over speed protection	
16	Irregular motor operation	
17	HMI access EEPROM failure	Shut down the controller, check all connection wire; if the controller still can not work normally after restart, please replace it and inform manufacturer.
18	Motor overload	Shut down the controller, Re-start it after 30s interval, if the controller still cannot work normally replace it and inform manufacturer.

Special Remind: If the follow abnormalities happen to the system, it is possible that there is no buzz or error code displayed. Please check as following instruction and feedback to manufacture in time.

Faults	Checking methods	Measures
Both controller and HMI work normally, pedal does not work and no error alarm.	Check if the back tacking button switches on, the solenoid socket is steady connected; the plug of pedal sensor is steady connected.	
Controller indicating light is dark after power on and there is no display on HMI. The motor does not run.	Open front cover of controller and check fuse.	Replace the damaged fuse wire (it is better to do this job by authorized or specially trained personnel from manufacturer).
Thread trimming does not work.	Check if the trimming setting is canceled, the grounding is connected, the plug of pedal sensor is steadily, and the trimming solenoid is damaged or not.	
Thread cannot be trimmed.	Check if P31 parameter setting is correct, and if the trimmer is damaged.	Properly adjust P31 parameter after eliminating the mechanical problems of sewing machine (i.e. the trimmer of sewing machine is abnormal).

	**Caution:**	■ **Turning off the power before installing or removing HMI.** ■ **Do not change HMI settings while sewing.** ■ **Don’t start sewing after setting HMI until HMI returns to the ready status signaled by a BEEP.** ■ **Keep daily cleaning well to avoid those errors caused by dust deposition or other poor operation environment.**

— End —

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Note:

The specification and/or appearances of the equipment described in this user manual are subject to change because of modification without notice.