Industrial Sewing Machine Digital AC Servo System

BFS User Manual

Security instructions

1. The user should carefully read this operation manual before installing and using this product.
2. This product should be installed or operated by personnel receiving proper training.
3. All power supply should be turned off when installation is implemented and do not operate with electricity.
4. Implement according to the instruction book for all instructions marked with ⚠ to avoid unnecessary damage.
5. Before connecting the power line, the voltage should be determined to be less than AC250V and conform to the rated voltage value stipulated by this operation.
6. When firstly switch on this machine after installation, firstly cut off tangent function, operate the sewing machine by lightly pedaling and in low speed, and check whether the rotation direction is correct and rotation is steady or not.
7. Please turn off system power supply before implementing the following operations:
   - ◆ Insert or extract any attachment plug on the controller.
   - ◆ Lift up the head of the sewing machine.
   - ◆ The machine sits idle.
   - ◆ Thread a needle.
   - ◆ Repair the machine or make any adjustment of this machine.
8. Repair or maintenance of high level should be implemented only by trained mechanical and electrical technicians.
   All elements for repair could not be used until being provided or approved by our company.
9. Please stay away from HF electromagnetic wave and radio transmitter etc. when using this product to avoid generated electromagnetic wave disturbing the servo driver and causing malfunction.
10. Requirements of production application environmental temperature and humidity:
    - ◆ Do not operate it in the room temperature of over 45℃ or less than 5℃.
    - ◆ Do not operate it beside the heating installation (electric heater).
    - ◆ Do not operate it in the place of direct sunlight or outside.

1. Product specification

1.1 Use environment requirement

Normal operating environmental temperature:5℃~45℃
Normal operating environmental humidity: 10%~90% (no condensation)
Rated voltage: 220V±10% 50(60) HZ
Working environment: the working environment of this control system should not contain flammable, explosive, toxic, spray or corrosive medium
Instant power failure: less than 20ms at rated voltage
System grounding: less than 4Ω

1.2 Product specification

Motor output power: 550W, 750W
Sewing speed: 100r/min~4500r/min settable
Speed regulation method: infinitely variable speed, or automatically fix speed to operate
Solenoid signal output port: 4 signals, including tangent, sweeping line,foot lifter solenoid and suction solenoid
Error protection: judgment time of blocking protection of over current, shortcut and blocking etc.: 3sec

2. Installation and debugging

2.1 Installation

⚠ Note: Firstly turn off the power when installing or dismantling any subassembly.

2.1.1 Installation of the control cabinet

First step: fasten the control cabinet with self-tapping screw according to the size in figure 2-1. The control cabinet has been installed as shown in figure 2-2.

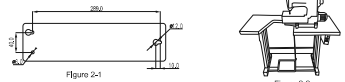


Figure 2-1

Figure 2-2

2.1.2 System wiring

■ Connection of signal line

Refer to figure 2-3 for the connection of the control cabinet with motor synchronization sensor components, operation panel and power line etc. Insert the plugs of various lines into corresponding sockets on the control cabinet. Check whether plugs are plugged or not after installation.

HEAD ELECTROMAGNET			
1	Cut-line	8	Cut-line
2	Sweep-line	9	Sweep-line
3	Power	10	GND
4	LED Lnght+	11	LED Lnght-
5		12	
6	Suction(Optional)	13	Suction(Optional)
7	Hall signal	14	GND

PEDAL			
1	Signal into	4	Switch signal-1
2	5V Gnd	5	Switch signal-2
3	+5V	6	*

PROTECTS			
1	+	2	Signal into
3	+	4	Gnd

MOTOR POWER	
1	Earth
2	Motor -A
3	Motor -B
4	Motor -C

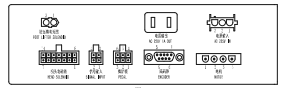
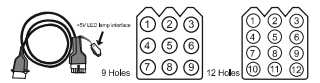


图2-3

2.1.3 连接线束

Figure 2-3



9 Holes		12 Holes	
1 2 feet	Cut-line	1 3 feet	Cut-line
3 4 feet	Sweep-line	4 6 feet	Sweep-line
9 feet	GND	10 12 feet	Cur-line protection

⚠ Note: Please check whether plugs match sockets and whether insert direction or needle is correct when failing to insert plugs with normal strength.

■ Installation of ground connection

The earth terminal of controller power plug needs reliable grounding.

⚠ Note: All power lines, signal lines and grounding lines should not be pressed down by other objects or excessively distort when grounding in order to ensure safety.

2.2 Installation notes

2.2.1 When the footplate connecting rod is installed, the end of the connecting rod connecting to the controller is generally fixed on the outside fixed orifice of footplate sensor rocker. If the footplate is too light, fix the connecting rod to the middle or innermost fixed orifice on the rocker. The length of the connecting rod is adjustable. Generally, the adjusted length of the connecting rod should make a 30-degree angle between the footplate and the ground.

2.2.2 The operation panel is fixed to the support which is fixed to the hand piece. Positions of two mounting screws are customized by the sewing machine factory.

2.2.3 See clearly the label text beside the controller socket when connecting to avoid mistake. Please pay attention: 1. Insert plugs in the right direction. 2. please do not use this controller and immediately contact the supplier when plugs do not match sockets or they are not consistent with each other; 3. all signal lines should be away from sewing hand wheel to avoid failures out of signal lines abrasion. Bundling up signal lines is recommended

3. Function introduction

Figure 1 Operation panel

3.1 Sewing pattern selection

功能	按键	车缝动作说明
USER PARAMETER SETTING KEY	P	Users enter the parameters, select the parameters of the button
ENTER PARAMETER CONFIRMATION KEY	S	After selecting the parameters, enter and determine the key to save
Add keys	▲	User select parameter increment key
Cut keys	▼	User selection parameter decreasing key
Free sewing/fixed needle sewing		Shift key of free sewing and fixed needle sewing(Lamp opening free sewing,Lamp off fixed needle sewing)
Cut-line		Open or close the cut line is the function
Trigger automatic		Under the condition of the fixed needle, the automatic trigger is turned on or off.
Stopping-needle setting		Up and down position selection
start sewing with slow speed		Open or close to start sewing at a slow speed
semi-automatic foot lifter		Open or close semi-automatic foot lifter function
automatic foot lifter		Open or close automatic foot lifter function

3.2 Restore factory settings

1) Firstly shut down power switch
2) Long press (P) and turn on power switch, the interface of "030.MAC" appears
3) Press (S), the interface of "MAC. 0" appears. Press ((⟲)) key wait for all the indicator lights put out after 5 seconds

3.3 Common parameters setting

3.3.1 How to enter into parameter pattern area of various sections

Parameter pattern		Operation mode	Appearing interface	Selectable parameter range
Section 1	Parameter pattern A	In general pattern, directly press (P) and hold 2sec.	U. 1	Selectable range 001~029
Section 2	Parameter pattern B	Long press (P)+ turn on power supply	U. 1	Selectable range=030

Appendix 1

Fault phenomenon and processing countermeasures

Serial number	Fault phenomenon	Processing method and steps
1	Processing before repair	1. When the controller fails, first of all, to restore the factory settings
2	Not trim thread	1. Does the trim switch on the operation panel start or not? Please start it if it is off. 2. Please pedal backward the footplate sensor to confirm whether motor hand wheel is rotating or not. If not, please check whether footplate sensor contact point is in good contact. If yes, please change footplate. If not, please adjust it with a pincet. 3. If motor hand wheel could rotate, please check whether there is pull-in sound of trim thread electromagnet. If yes, there is mechanical fault of trimming device. 4. If there is no sound, check whether electromagnet plug (1) and (8) contact pin are in good contact or not. Please adjust them if not. 5. If in good contact, the trim thread electromagnet is broken and please change it. 6. If the electric cabinet is not broken, the trim thread electromagnet damages and please change it.
3	Not sweep thread	1. Does the trim switch on the operation panel start or not? Please start it if it is off. 2. Please check whether sweep switch on the sewing machine head turns on or not ? Please start it if it is off. 3. Please check whether electromagnet plug (2) and (9) contact pin are in good contact or not.Please adjust them if not. 4. If in good contact, change the electric cabinet with alternation method. Please change the electric cabinet if it is broken. 5. If the electric cabinet is not broken, the sweep thread electromagnet damages and please change it.
4	Pedal not work	1. The operation panel display is normal while pedal does not work, which may result from unconnected footplate sensor connector or broken footplate sensor.
5	Pedal unstable	1. Are the footplate sensor and electric cabinet contact point sometimes in bad contact? If in bad contact, please adjust it. 2. Check whether the lifting-up switch is in bad contact or not. If in bad contact, please adjust it with a pincet. 3. If in good contact, please change the footplate sensor. 4. If there is no fault of the footplate sensor, the electric cabinet is broken, please change it.

6	The hand wheel of the sewing machine is reversed, then " 08 " error appears	1. Check whether the motor coding disc connector is in good contact. If not, please adjust contact point. 2. If in good contact, press "P" to start the machine, press "P" again to adjust parameter to item 65, press "S" to enter into item 65, press "+" under "0", the value "1" is displayed and the motor starts electrical degree test (the motor will interruptedly rotate) and automatically update the electrical degree. After the motor stops rotating, press "P" to adjust parameter to item 61, press "S" to enter into item 61, check the value which is within the range (85-105) and the motor will be broken if it is out of range. Please change the motor if it is broken. 3. If there is no fault of the motor, the electric cabinet is broken, please change it. 4. Connection between the motor and the electric cabinet of different brand and model cause mismatch
7	Report " 08 " error	1. Rotate the machine head to check whether the motor hand wheel gets stuck or not. If yes, firstly rule out mechanical failure of the machine head. 2. If the rotation is easy, please check whether the motor coding disc connector and motor power connection become flexible. Motor power supply is inserted in the opposite direction,please adjust them. 3. If in good contact, check whether the network voltage is too low or the rotate speed is too fast. If yes, please adjust them. 4. If in normal condition, please change the electric cabinet.
8	Report " FF.FE " error	1. If in good contact, please change the operation panel. 2. If there is no fault of the operation panel, the electric cabinet is broken, please change it. 3. In addition, connection between operation panel and electric cabinet of different version number will cause " FF " error.
9	Report " 09 " error	1. Check whether the motor coding disc connector is in good contact or not. If not, please adjust the contact point. 2. If in good contact, change the motor with alteration method. Please change the motor if it is broken. 3. If there is no fault of the motor, the electric cabinet is broken, please change it.
10	Report " 08 " error	1. Do the motor coding disc connector and motor power connection become flexible? If not, please adjust the contact point. 2. Motor fault appears, please change it. 3. Check voltage fluctuation. Frequent voltage fluctuation will cause this error. 4. The electric cabinet is broken, please change it.
11	Report " 10 " error	1. The network voltage is low, adjust the parameter to item 55, enter the parameter to check busbar voltage, and give an alarm if the value is less than 230. Please stabilize mains voltage. 2.The parameter P63 should be replaced by" on"
12	Report " 19 " error	1. The network voltage is high, adjust the parameter to item 55, enter the parameter to check busbar voltage, and give an alarm if the value is less than 380. Please stabilize mains voltage. 2.The parameter P63 should be replaced by" on"
13	Report " 14 " error	1. Electromagnet current protection, electromagnet connection are broken or electromagnet damages, Please change them. 2. Machine is bad, replace.
14	Report " 15 " error	1, The shear line protection device did not return or change P85 item parameter to "0"
15	Report " 18 " error	1. Instant voltage is too high, turn off the controller and start it again. 2. The discharge resistance inside the electric cabinet is broken, please change the electric cabinet. 3. The parameter P63 should be replaced by" on"
16	Report " 11 " error	1. Turn off system power supply. Check whether the motor sensor connector becomes flexible or falls off. Restart the system after fixing it. If it still can not work normally, please change the controller and inform the factory.
17	Report " 21 " error	1. Electrical resistance is big, check the mechanical parts of the motor is stuck
18	Report " 24 " error	1. Motor moment reversal or no-load rotation, shutdown retry or replace the motor

Note:

- **Turn off the power supply before dismantling and installing any components of the controller.**
- **Do not modify button during sewing process.**
- **After setting parameters, sewing could not be done until the data on display screen get back to initial state.**
- **Do well daily cleaning work to avoid system fault out of dust accumulation or other unfavorable working environment.**

Appendix 2

[Parameter pattern A] technician parameter list

Parameter code	Content instruction	Range	Default value	Content value designation instruction and label
【001. H】	Maximum rotate speed (spm)	100~9999	3500	Maximum speed adjustment of sewing
【002. SLM】	Pattern selection of starting sewing at a low speed	A/T	T	A: lightly pedal the footplate forwards, i.e. automatically starting sewing at a low speed T: automatically start sewing at a low speed the time after finishing trim action
【007. S】	Speed of starting sewing at a low speed (spm)	100~2000	1200	Speed adjustment of starting sewing at a low speed
【008.SLS】	Pin times of starting sewing at a low speed	0~99	2	Pin times setting of starting sewing at a low speed
【009. A】	Automatic pin sewing speed (spm)	100~8000	2200	Pin sewing speed adjustment in the case of auto starting
【010.ACD】	Pin sewing final continuous pattern selection	ON/OFF	ON	After finishing final E, For G, H pin time,automatically finish terminate back sewing or trim thread and sweep thread etc. when it is ON.
【010.ACD】	Stirring thread and blowing selection		OFF	OFF means stirring thread,ON means blowing
【026.UD】	Blowing time(special for blowing)		500	The larger the value, the longer the time
【028. SP】	Sewing speed display			Speed value of current actual sewing is displayed

Appendix 3

[Parameter pattern B] system operator parameter list

Parameter code	Content instruction	Range	Default value	Content value designation instruction and label
【030.MAC】	Restore default value	0~1	0	Default value is 0, after which is switched to 1, restore factory setting.
【031.SPD】	Automatically test running time (s)	1~250	5	It is effective when parameter 048.DD is set ON
【032.TST】	Automatic test Interval (s)	1~250	3	It is effective when parameter 048.DD is set ON
【033. L】	Low speed (spm)	100~500	200	Adjustment of low speed
【035. FO】	Action time of presser full initial efforts (ms)	0~990	150	Full effort action time in the case of presser action
【036. FC】	Periodic signal of presser effort action (%)	10~90	35	At the moment of presser, periodically electricity -saving output to avoid presser heating
【037. FD】	Delay starting motor and ensure presser put down time	0~990	200	Delay starting time at the moment of pedaling to confirm presser
【038.HHC】	Cancel lifting presser function in the case of semi-pedaling	ON/OFF	OFF	ON: semi-pedaling cause impossible lifting presser action OFF: semi-pedaling cause possible lifting presser action
【040. T1】	Delay time before trim action (ms)	0~990	0	Interval of starting trimming action after finding up position
【041. T2】	Trim action time (ms)	0~990	100	Trim action time
【042.LI】	Delay of air blowing after presser foot lifting (special for air blowing)		300	The larger the value, the longer the pause time
【044. W1】	Delay time before stirring/sweeping thread action (ms)	0~980	10	Interval of starting stirring/sweeping thread action after finding up position
【045. W2】	Stirring/sweeping thread action time (ms)	0~990	40	Stirring/sweeping thread action time
【046. WF】	Action time before presser action (ms)	0~990	50	Interval of starting lifting up presser action after finishing stirring/sweeping thread action
【047.UEG】	Adjustment of needle position	0~359	5	Finely adjust needle position
【048. DD】	Automatic test selection	ON/OFF	OFF	ON: start automatic test OFF: close automatic test
【049.ANU】	Automatically find up needle position after starting the machine	ON/OFF	ON	ON: automatically find out up needle position signal after turning on the power supply OFF: inaction
【050. HL】	Maximum speed limit of the head	100~9999	3800	Maximum speed total limit in the case of sewing
【051. PDU】	High-speed range adjustment	0~100	20	Adjust corresponding sensitivity of high speed, applicable to high-speed and continuous sewing.
【052. PDD】	Low-speed range adjustment	0~100	10	Adjust corresponding sensitivity of low speed, applicable to low-speed and single-needle sewing.
【053.VER】	Version number of controller software			Display software version of current controller
【054. ASL】	Soft start selection	ON/OFF	OFF	ON: start soft start OFF: close soft start
【055. VOL】	Current main board voltage displaying			Display current main board voltage
【057. DEG】	Down needle position adjustment	0~200	75	Down needle position adjustment
【061. ANG】	Motor deviation angle	0~359	96	Motor deviation angle
【063. EVO】	Voltage error does not report error	ON/OFF	OFF	ON: voltage error does not report error OFF: voltage error reports error
【065. ANT】	Voltage deviation angle test	0~1	0	Voltage deviation angle test
【066. P】	Stop motor parameters 1	1000-5000	3000	Different types of machines can be appropriate to adjust this parameter
【082. CO】	Full effort time of scissors electromagnet (ms)	0~999	150	Full effort action time at the moment of scissors action
【083. CC】	Periodic signal of scissors effort action (%)	0~99	25	At the moment of scissors action, periodically electricity-saving output to avoid scissors electromagnet heating
【066. P】	Stop motor parameters 1	1000-5000	3000	Different types of machines can be appropriate to adjust this parameter
【082. CO】	Full effort time of scissors electromagnet (ms)	0~999	150	Full effort action time at the moment of scissors action
【083. CC】	Periodic signal of scissors effort action (%)	0~99	25	At the moment of scissors action, periodically electricity-saving output to avoid scissors electromagnet heating
【101. CP】	Stop motor parameters 2	1000-5000	3000	Different types of machines can be appropriate to adjust this parameter
【103.UMT】	Biggest presser foot allows time (S)	1-30	10	Prevent the presser foot off for long, hot
【109.COC】	Intensity of scissors maximum output time (%)	1-100	100	Adjust the size scissors income dynamics
【110.COT】	The magnitude of the scissors back when (ms)	1-100	40	Adjust the scissors to let go of the strength
【111.FOC】	The force when presser foot lifting in full processing time(%)		100	The greater the value, the greater the force
【112.FOT】	The force when lifting presser foot and releasing(ms)		20	The larger the value, the faster the release
【127.N】	The force when stopping needle locking		300	Too large or too small value will cause inaccurate needle stop

Appendix 4

Table of comparisons between seven-segment display and actual value

Value font:

Actual value	0	1	2	3	4	5	6	7	8	9
Display character	0		2	3	4	5	6	7	8	9

English font:

Actual letter	A	B	C	D	E	F	G	H	I	J
Display letter	A	b	C	d	E	F	G	H	I	J
Actual letter	K	L	M	N	O	P	Q	R	S	T
Display letter	k	L	n	n	o	P	q	r	S	T
Actual letter	U	V	W	X	Y	Z				
Display letter	U	v	W	H	y	Z				