

工业缝纫机数控交流伺服系统

Industrial Sewing Machine Digital AC Servo System

BFM 用户手册

User Manual

安全说明 Safety instructions

1. 在安装与使用本产品前，使用者须仔细阅读本用户手册。
 2. 本产品须由受过正确训练的人员来安装或操作。
 3. 安装作业时必须关闭所有电源，切记不可带电操作。
 4. 在连接电源线前，必须确定此电压低于 AC 250V，且符合本操作中的规定的额定电压值。
 5. 在电机电控连接电源时（开机状态）请不要把脚放在脚踏板上。
 6. 使用本产品请远离高频电磁波和电波发射器等，以免所产生的电磁波干扰伺服驱动器而发生错误动作。
1. Users should read the operation manual carefully before installation and use.
 2. The product should be installed and operated by trained professionals.
 3. Installation and operation should be performed without power being on and please note that electric operation should be avoided.
 4. Voltage should be lower than AC250V before power line connection and conform to rated voltage specified by operation.
 5. Do not put your feet on the pedals when the control box and motor is switched on(boot status).
 6. The product should be away from high frequency electromagnetic wave and electric wave transmitter to avoid electromagnetic wave interference to servo device,resulting in malfunction.

保修期限 Guarantee Time

本产品保修期限为购买日起一年内或出厂月份起两年内。

Warranty period of this product is 1year dated from purchasing,or within 2year from ex-factory date.

郑重声明 Solemnly Declare

1. 不遵守安全使用说明操作规章，发生意外后果自负。
 2. 未经本公司授权，请勿擅自改动产品，由此而引发的后果本公司不负任何责任。
1. Do not comply with the manual book operating regulations and the safety requirements,all accidental occurrence should be taken by yourself.
 2. Without our authorization ,please do not alter our products,our company is not liable for any consequences arising therefrom.

1.产品规格 1.Product specification

1.1 使用环境要求 1.1Environmental requirement

正常工作环境温度：5℃~45℃ Normal ambient temperature: below 45℃

正常工作环境湿度：10%~90% Normal ambient temperature :10%~90%

额定电压：220V±10% 50（60）HZ Rated voltage:220V±10% 50（60）HZ

工作环境：本控制系统工作环境应不含有易爆、易燃、有毒、水雾或有腐蚀性的介质

Working environment:The control system should be free from inflammable,explosive,poisonous,spray or corrosive substances.

瞬间断电：在额定电压下，小于 20ms Power interruption:less than 20ms based on rated voltage.

系统接地：小于 4Ω System grounding:less than 4Ω.

1.2 产品规格 1.2Product specification

电机输出功率（Power）：550W Output power of motor :550W

缝制速度（Sewing Speed）：100~5000r/min 可设 Sewing speed:100~5000r/min

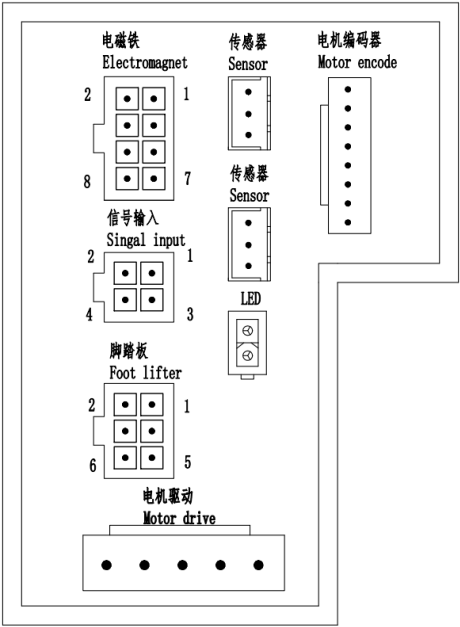
调速方法：无极变速，也可自动定速运行 Method of speed adjustment:infinitely variable speed and automatic constant speed.

电磁铁输出信号（Solenoid Signal Output Port）：4 路，包括抬压脚、剪线、拨线、吸风电磁铁。Electromagnet output signal: 4 channels, including presser foot lifting, thread trimming, thread shifting and air suction electromagnets.

故障保护：过流、短路、堵转等堵转保护判断时间为 3 秒。Failure protection:over-current,short circuit and blocked rotor,etc.Protection time of blocked rotor:3 seconds.

2.电控箱端口说明 Description of Electric Cabinet Port

电控箱背面插座详见下图与表所示：Refer to the following figure and table for details of the socket on the back of the electric cabinet:



图一 电控背面板

Fig. 1 electronic control back panel

电磁铁 electromagnet	
端口号 Port number	功能 Function
1,2	剪线 Cut the thread
3,4	拨线 Top trimming
5,6	抬压脚 Foot lifter
7,8	吸风 Suction

信号输入 signal input	
端口号 Port number	功能 Function
1	GND
2	5V
3	信号 signal

3.功能介绍 Function introduction

3.1 显示屏常用操作介绍

3.1 Introduction to Common Operation of Display Screen



图二 操作面板

Fig. 2 operation panel

功能 Function	按键 Key	动作说明 Action description
用户参数设定 User parameter setting		用户进入参数，选择参数的按键 The user enters the parameter and selects the key of the parameter.
进入参数及确定键 Enter parameters and confirm key		用户选择参数后，进入及确定保存的按键 After the user selects the parameters, enter and confirm the saved key
递增 Increment		用户选择参数递增按键 The user selects the parameter increment key
递减 decrease		用户选择参数递减按键 The user selects the parameter decrement key
模式选择 Mode selection		自由缝、定针缝切换缝 Free sewing and fixed sewing switching sewing
上下停针位 Up and down needle stop position		上下停针位置的选择按键 Select button for needle stop position up and down
剪线 cut-line		开启或关闭自动剪线按键 Turn on or off the automatic thread cutting button
触发自动 Trigger automatic		在定针缝状态下，开启或关闭自动触发按键 In the fixed stitch state, turn on or off the automatic trigger button
慢速起缝 Slow sewing		开启或关闭慢速起缝功能 Turn on or off the slow sewing function
中途抬压脚 semi-automatic foot lifter		开启或关闭中途抬压脚功能 Open or close the presser foot lifting function in the middle
剪线后抬压脚 Automatic foot lifter after cut-line		开启或关闭剪线后抬压脚功能 Turn on or off the presser foot lifting function after thread trimming

3.2 初次安装快捷调试步骤 3.2 Quick Debugging Steps for Initial Installation

电控正常开机后，按  2 秒以上，出现 reset 界面，按  确认进入调试模式。按一下 ，电机机会自动进行电机角度匹配。等电机角度匹配成功后，用手轮转到所需的上针位，按  键就可确认所需的上针位，按任意键退出即可完成初次安装调试步骤。

After the electric control is turned on normally, press  for more than 2 seconds, the reset interface will appear, and press  to enter the debugging mode. press , the motor will automatically match the motor angle. After the motor angle matching is successful, rotate to the required upper pin position by hand, press  to confirm the required upper pin position, and press any key to exit to complete the initial installation and debugging steps.

3.3 恢复出厂设置 3.3 Restore Factory Settings

按 S 键系统语音提示“请输入密码”，输入密码“2012”，再按 S 键系统语音提示“恢复出厂设置”，屏幕显示 P30，再按 S 键出现“MAC.0”界面，按两下+号键，自动跳转并有进度条显示，则恢复出厂成功。

Press S-key system voice prompt "Please enter password", enter password "2012", press S-key system voice

prompt "Restore Factory Settings", P30 will be displayed on the screen, press S-key again to display "MAC.0" interface, press+key twice, automatic jump will be made and progress bar will be displayed, then factory restoration will be successful.

4.系统参数说明表

4. System Parameter Description Table

参数代码 Parameter code	内容说明 Description of content	范围 Range	默认值 Default value	内容值名称说明与标注 Content Value Name Description and Labeling
001	最高转速(rpm) Maximum speed (rpm)	100~9999	3500	车缝时的最高速度调整 Maximum speed adjustment during sewing
007	慢速起缝速度(rpm) Slow sewing speed (rpm)	100~2000	1200	慢速起缝的速度调整 Speed adjustment for slow sewing
008	慢速起缝针数 Number of slow start stitches	0~99	2	慢速起缝的针数设定 Setting of Needles for Slow Start
009	定针缝速度设定(rpm) Automatic Stitch Setting Speed (rpm)	100~8000	2200	Auto 开启下的定针缝速度调整 Adjustment of Stitch Speed under Auto Opening
010	拨线与吹气选择 Wire drawing and blowing selection	0~1	0	0 拨线, 1 吹气 0 dial, 1 blow
011	步进电机检测 Stepping motor detection	0~1	1	0 不检测, 1 检测 0 not detected, 1 detected
023	步进电机剪线自适应模式 Adaptive mode of thread trimming of stepping motor	0~1	0	将参数 0 改成 1 时, 步进电机完成一次剪线自适应动作 When the parameter 0 is changed to 1, a thread trimming adaptive action is completed step by step
028	车缝速度显示 Sewing speed display			显示当前实际车缝时的速度值 Displays the current actual sewing speed value
030	恢复出厂设置 Restore default value	0~1	0	默认 0, 切换到 1 恢复出厂设置 Default 0, switch to 1 to restore factory settings
031	自动测试运行时间(s) Automatic test run time(s)	1~250	5	须在参数 048 设定 ON 状态下有效 Must be valid when parameter 048 is set to ON state
032	自动测试间隔时间(s) Automatic test interval (s)	1~250	3	须在参数 048 设定 ON 状态下有效 Must be valid when parameter 048 is set to ON state
033	最低速度设定(rpm) Low speed (rpm)	100~500	200	低速速度的调整 Adjustment of low speed
035	抬压脚全额初始出力的动作时间(ms) Action Time of Full Initial Output of Presser Foot (ms)	0~990	150	压脚开始动作时, 全额出力的动作时间 When the presser foot starts to operate, the operating time of full output is required.

036	抬压脚出力动作的周期信号 (%) Periodic signal of presser foot output action	10~90	35	压脚动作时，以周期性省电，避免压脚发烫 When the presser foot moves, electricity is saved periodically to prevent the presser foot from burning.
037	延迟马达启动，保证抬压脚放下时间 Delay motor start to ensure presser foot lowering time	0~990	200	踩下时延迟启动时间 Delay start-up time when pressing
038	半踏时，抬压脚功能选择 When half stepping, the presser foot function is cancelled	ON/OFF	OFF	ON:半踏时，将无法作抬压脚动作 OFF:半踏时，可做抬压脚动作 ON: When half stepping, the presser foot cannot be lifted. OFF: When half stepping, the presser foot can be lifted.
040	剪线动作前延迟时间 Delay time before tangent action	0~990	0	找到上针位后进入切线动作前的间隔时间 The interval between finding the upper needle position and entering the tangent action
041	剪线动作时间(ms) Tangent action time (ms)	0~990	100	切线的动作时间 Action Time of Tangent
044	拨/扫线动作前延迟时间(ms) Delay time before dialing/sweeping action (ms)	0~990	10	找到上针位后进入拨/扫线动作前的间隔时间 After finding the upper needle position, the interval before entering the thread shifting/sweeping action
045	拨/扫线动作时间(ms) Dial/sweep action time (ms)	0~990	40	拨/扫线的动作时间 Time for dialing/sweeping lines
046	抬压脚动作前延迟时间 Delay time before presser foot action	0~990	50	拨/扫线动作结束后进入到抬压脚前的间隔时间 The interval between the end of thread shifting/sweeping and the end of presser foot lifting.
047	上停针位置的调整 Adjustment of needle stop position	0~359	5	微调修正停针位置 Fine adjustment and correction of needle stop position
048	自动测试选择 Automatic test selection	ON/OFF	OFF	ON:开始自动测试 OFF: 关闭自动测试 ON: Start Automatic Test OFF: turn off automatic test
049	开机后自动找上针位 Automatically find the needle position after starting the machine.	ON/OFF	ON	ON:开启电源后，自动找到上针位信号 OFF: 无作用 ON: After the power is turned on, the upper needle position signal is automatically found. OFF: no effect
050	车头最高速度限制 Top speed limit of the head	100~5000	4000	车缝时的最高速度限制 Maximum speed total limit in the case of sewing

051	踏板高速度范围调整 Pedal high speed range adjustment	0~100	20	数值越大越容易达到高速 The higher the value, the easier it is to achieve high speed
052	踏板低速度范围调整 Pedal low speed range adjustment	0~100	10	数值越大越容易控制低速 The higher the value, the easier it is to control the low speed
053	控制器软件版本号 Version number of controller software			显示当前控制器的软件版本 Displays the software version of the current controller
055	当前主板电压显示 Current main board voltage displaying			显示当前主板电压 Display current main board voltage
057	下针位位置调整 Down needle position adjustment	0~200	75	下针位位置调整 Down needle position adjustment
061	电机偏差角度值 Motor deviation angle	0~359	96	电机偏差角度值 Motor deviation angle
063	电压错误报错选择 Voltage error does not report error	ON/OFF	OFF	ON:电压错误不报错 ON:voltage error does not report error OFF:电压错误报错 OFF:voltage error reports error
065	电机偏差角度测试 Voltage deviation angle test	0/1	0	电机偏差角度测试 Voltage deviation angle test
066	电机停止参数 1 Motor Stop Parameter 1	1000-5000	2000	不同类型机头可适当调整此参数 Different types of heads can adjust this parameter appropriately.
082	剪线全额出力的动作时间(ms) Full effort time of scissors electromagnet(ms)	0~999	150	剪刀开始动作时间, 全额出力的动作时间 Full effort action time at the moment of scissors action
083	剪线出力动作的周期信号(%) Periodic signal of scissors effort action(%)	0~99	25	剪刀动作时, 以周期性省电输出, 避免剪刀电磁铁发烫 At the moment of scissors action, periodically electricity-saving output to avoid scissors electromagnet
084	轻后踏响应时间(ms) Light back stepping time (ms)	0~200	200	轻后踏持续时间大于 PLD 时间后, 才起效果 The effect comes into effect only after the duration of light back stepping is longer than PLD time.
085	剪线保护选择 Selection of Scissors Signal Detection Function	0/1	1	选择“0”不检测, “1”检测 Select "0" not to detect and "1" to detect
100	电机转向 Motor steering	0-1	0	0 正转, 1 反转 (关机正转) 0 forward rotation, 1 reverse rotation (shutdown forward rotation)
101	电机停止参数 2 Motor Stop Parameter 2	1000~5000	3000	不同类型机头可适当调整此参数 Different types of heads can adjust this parameter appropriately.

103	最大抬压脚允许时间(s) Maximum allowable presser foot lifting time (s)	1~30	10	防止抬压脚长时间吸合，发烫 Prevent the presser foot from being sucked and scalded for a long time.
109	剪线全额出力时间内力度(%) Maximum output time strength of scissors (%)	0~100	100	调整剪刀收入力度大小 Adjust the income of scissors
110	剪线放回时的力度(ms) Strength of Scissors in Return (ms)	0~100	40	调整剪刀放开力度大小 Adjust the opening force of scissors.
115	步进剪线位置 Step thread trimming position	0-3600	470	数值越大，剪线位置越大 The larger the value, the larger the thread trimming position
116	步进抬压脚位置 Stepping presser foot lifting position	0-3600	1000	数值越大，抬压脚位置越大 The higher the value, the greater the presser foot lifting position
117	步进零点位置 Step zero position	0-3600	100	步进零点位置初始位置值 Step zero position initial position value
118	步进抬压脚回位速度 Return speed of stepping presser foot	0-500	300	数值越大，速度越快 The higher the value, the faster the speed
119	步进抬压脚抬起速度 Lifting speed of stepping presser foot	0-500	300	数值越大，速度越快 The higher the value, the faster the speed
120	步进剪线前进速度 Forward speed of step thread cutting	0-500	150	数值越大，速度越快 The higher the value, the faster the speed
121	步进剪线回位速度 Return speed of step thread cutting	0-500	150	数值越大，速度越快 The higher the value, the faster the speed
127	电机停止参数 3 Motor Stop Parameter 3	100-1000	1000	不同类型机头可适当调整此参数 Different types of heads can adjust this
136	语音音量调整 Voice volume adjustment	0~31	25	数值越大，声音越响 The higher the value, the louder the sound.
137	语言选择 Language selection	0/1	0	0: 中文, 1: 英文 0: Chinese, 1: English
138	显示屏亮度调整 Display brightness adjustment	0~9	9	数值越大，亮度越亮 The higher the value, the brighter the brightness.
139	LED 亮度调整 LED brightness adjustment	0~10	10	数值越大，亮度越亮 The higher the value, the brighter the brightness.

5.错误代码解析 5. Error Code Analysis

序号 Serial number	错误代码 Error code	处理方法 processing method
1	报“0A”错误 Report "0A" error	1. 转动机头电机手轮看是否卡住？如卡住则先排除机头机械故障； 2. 如转动轻松，请检查电机编码器盘接头和电机电源接头是否松动？电机电源插头是否有插反如有不好，请修正； 3. 如接触良好，检查电网电压是否过低或转速设置的过高？如有请调整；

		4. 如正常请更换电控箱。 1. Turn the handwheel of the head motor to see if it is stuck? If stuck, remove the mechanical failure of the machine head first; 2. If the rotation is easy, please check whether the motor encoder disk connector and motor power supply connector are loose. Whether the motor power plug is inserted reversely; if not, please correct it. 3. If the contact is good, check whether the grid voltage is too low or the speed setting is too high. If yes, please make adjustments. 4. If normal, please replace the electric cabinet.
2	报“1A”错误 Report "1A" error	1. 电网电压低，将参数调到 55 项，进入参数检查母线电压，电压值低于 230V 时电控箱报警，请稳定市电电压； 2. 将 P63 项参数改为“ON”。 1. The power grid voltage is low. Adjust the parameters to item 55. Enter the parameters to check the bus voltage. When the voltage value is lower than 230V, the electric cabinet will give an alarm. Please stabilize the power grid voltage. 2. Change P63 parameter to "ON".
3	报“FF.FE”错误 Report "FF.FE" error	1. 如接触良好，请更换操作面板； 2. 如不是操作面板故障，则为电控箱损坏请更换。 1. If contact is good, please replace the operation panel; 2. If the operation panel is not faulty, replace the electric cabinet if it is damaged.
4	报“08”错误 Report "08" error	1. 电机编码盘接头和电机电源接头是否松动？如未接触好，请修正触点； 2. 检查电压波动情况，电压波动频繁也会出现此错误； 3. 电机故障，请更换。 1. Are the motor code plate connector and motor power supply connector loose? If contact is not good, please correct the contact. 2. Check the voltage fluctuation. This error will also occur if the voltage fluctuates frequently. 3. Motor failure, please replace.
5	报“09”错误 Report "09" error	1. 检查电机编码盘接头是否插好？如未接触好，请修正触点； 2. 如接触良好，用替换法更换电机，如电机坏请更换； 3. 如不是电机故障，则为电控箱损坏请更换。 1. Check whether the motor coding plate connector is plugged in properly. If contact is not good, please correct the contact. 2. If the contact is good, replace the motor with a replacement method. If the motor is broken, please replace it. 3. If it is not a motor fault, replace the electric cabinet if it is damaged.
6	报“11”错误 Report "11" error	关闭系统电源，检查电机传感器接头是否松动或脱落，将其恢复正常后重启系统。若仍不能正常工作，请更换控制器并通知厂方。 Turn off the power supply of the system, check whether the motor sensor connector is loose or falls off, and restart the system after it returns to normal. If it still fails to work properly, please replace the controller and notify the manufacturer.
7	报“14”错误 Report "14" error	1. 电磁铁电流保护，电磁铁连接线破损或电磁铁坏，请更换； 2. 电控坏，更换电控箱。 1. Electromagnet current protection. Electromagnet connection wire is damaged or electromagnet is damaged. Please replace it. 2. If the electric control is broken, replace the electric control box.
8	报“15”错误 Report "15" error	剪线保护装置未回位或应急可将 P85 项参数改为“0” The P85 parameters can be changed to "0" if the thread cutting protection device is not returned or in case of emergency.

9	报“18”错误 Report “18” error	1. 瞬间电压过高，关闭控制器再开机； 2. 电控箱内放电电阻坏，请更换电控箱； 3. 将 P63 项参数改为“ON”。 1. If the instantaneous voltage is too high, turn off the controller and turn it on again; 2. The resistance of the electric control box is bad, please replace the electric control box; 3. Change P63 parameter to “ON”.
10	报“19”错误 Report “19” error	1. 电网电压高，将参数调到 55 项，进入参数检查母线电压，电压值高于 380V 时电控箱报警，请稳定市电电压； 2. 将 P63 项参数改为“ON”。 1. The power grid voltage is high. Adjust the parameters to item 55. Enter the parameters to check the bus voltage. When the voltage value is higher than 380V, the electric cabinet will give an alarm. Please stabilize the power grid voltage. 2. Change P63 parameter to “ON”.
11	报“21”错误 Report “21” error	1. 电机阻力大，检查电机机械部分是否卡住； 2. 电机损坏，更换电机。 1. Motor resistance is large, check whether the mechanical part of the motor is stuck; 2. The motor is damaged, replace the motor.
12	报“24”错误 Report “24” error	1. 电机停止时有反转情况，检查电机连接处是否有松动； 2. 电机光栅片移位，或电机信号故障，请更换电机； 3. 电控参数设定异常，请进行电机角度检测。 1. When the motor stops, there is reverse rotation. Check whether the motor joint is loose; 2. Replace the motor if the grating plate of the motor shifts or the motor signal fails; 3. The setting of electric control parameters is abnormal, please check the electrical angle of the motor.
13	报“26”错误 Report “26” error	1、电控放电电阻未插、脱落、损坏。 2、市电电压过高、转速设置过高。 1. The electric control discharge resistor is not inserted, dropped or damaged. 2. The mains voltage is too high and the speed is set too high.
14	报“31-40”错误 (步进电机专用错误代码) Report “31-40” error (special error code for stepper motor)	1、步进电机未插好。 2、硬件机构卡住、不顺畅。 3、步进电机信号线脱落。 4、电控箱步进小板损坏。 1. Stepping motor is not plugged in properly. 2. The hardware mechanism is stuck and not smooth. 3. The signal line of stepping motor falls off. 4. The stepping board of the electric control box is damaged.
15	报“55, 99”错误 Report “55, 99” error	1. 脚踏板控制器插头未插好； 2. 脚踏板控制器插头金属顶针被顶出； 3. 电控箱损坏。 1. The plug of pedal controller is not plugged in properly; 2. The metal thimble of the pedal controller plug is pushed out; 3. The electric cabinet is damaged.