AS61

工 业 缝 纫 机 伺 服 控 制 器

Industrial Sewing Machine Servo controller

使用说明

User manual

目 录

前言

 注意	使用前请详细阅读本用户手册及所搭配的缝制设备说明书，配合正确使用，并须由接受过专业培训的人员来安装或操作。

本产品仅适用于指定范围的缝制设备，请勿移做其他用途。

本公司拥有对此用户手册的最终解释权。

使用中若存有任何疑问或对我们的产品及服务有任何意见或建议，请随时与我们联系。

安全说明

1） 安装和调试前，请仔细认真地阅读本手册。

2） 本手册中标有  符号之处为安全注意点，必须特别注意并严格遵守，以免造成不必要的损害。

3） 本产品须由受过专业培训的人员来安装或操作。

4） 确保电源安全接地并符合产品铭牌上标示的电压范围及技术要求。

5） 接通电源开关时，请把脚离开脚踏板。

6) ⚠在进行以下操作时，必须先断开系统电源:

- ■ 安装机器时;
- ■ 在控制箱上插拔任何连接插头时;
- ■ 穿针线，换机针及翻抬机头时;
- ■ 机器休息不用及修理或调整时。

7) 拧紧所有紧固件，以防止缝制作业时产生振动或停针位置错位等异常现象。

8) 每次关闭控制系统后再次启动，应相隔 30 秒以上。

9) 设置系统控制参数或进行保养修理工作应由受过相关培训的专业人员来完成。

10) 维修所用的所有零部件，必须由本公司提供或认可，方能使用。

11) 接地线的安装（特别注意)。

 注意	**安装控制器时必须正确接地，否则将导致控制器无法正常工作，更严重的可能会被电击（详见安装章节)。**

1　产品介绍

1.1　概述

- 使用 TI 最新的 DSP 控制平台；
- 配套最新款的 HMI 50 操作面板；
- 采用新的 HMI 通讯协议，具有丰富的参数、功能扩展能力；
- 可以配套下挂皮带电机和各种直驱电机，采用 550W、750W 电机皮带轮可更换设计；
- 带有 16 路外部信号输入及 16 路电磁铁输出接口；
- 输入、输出功能可通过 HMI 参数自由设定；
- 可配套机型：各种驱动形式全自动的包缝\绷缝\平缝；各种特种缝制设备，目前已能与全功能综合送料机配套；可陆续扩充。

全新一代控制系统

- **硬件**
  - 采用新一代高速 DSP；
  - 创新设计的电磁铁驱动电路设计；
- **软件**
  - 集多年业内经验，重写全部代码；
  - 全新的速度控制算法，响应更快，更平稳；
  - 全新的针迹补偿算法；
  - 全新的电磁铁控制算法，输出重定向功能；
  - 灵活多样的踏板-速度曲线；
  - 强大的功能扩展能力；

1.2 组成

系统分为主件和附件两部分。系统主件如图 1-1 所示：

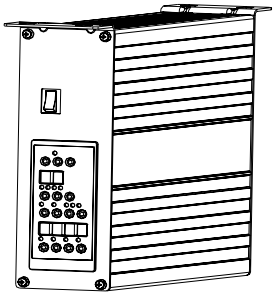


图 1-1 控制箱

控制器配的操作面板，如图 1-2 所示

图 1-2 操作面板

注：请仔细检查包装箱中是否包含装箱单所列的全部元件，如不全，请尽快向供货方说明并补全。

1.3 基本参数

此系列数控交流伺服系统的基本参数详见表 1。

控制器型号	ASD61-55	ASU61-55	ASU61-75	ASU61-75
控制器描述	直驱	皮带	直驱（厚料）	皮带（厚料）
马达类型	PMSM			
电源电压	AC (220±44)V/(110±22)V 50/60HZ			
输出功率	550W	550W	750W	750W

电机转速	5000rpm	5000rpm	3000rpm	3000rpm
最大扭矩	3Nm	3Nm	7Nm	7Nm
工作气候条件 温度/湿度	0℃ ～ 40℃/40% ～ 80%（不凝露）			
储存运输条件 温度/湿度	-40℃～ 55℃/≤93%（55℃）			

2 安装图

2.1 下挂电机的安装

第一步：安装吊装螺栓，若缝纫机台板上无预留定位孔时则需按图 2-1 所示尺寸钻孔，置入定位吊装螺栓。

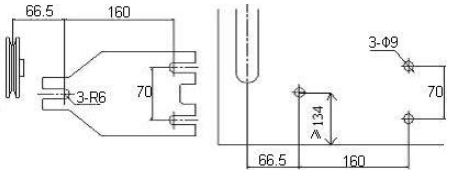


图 2-1 螺栓钻孔尺寸图

第二步：安装电机（见图 2-2）。将电机吊上吊装螺栓后紧固。

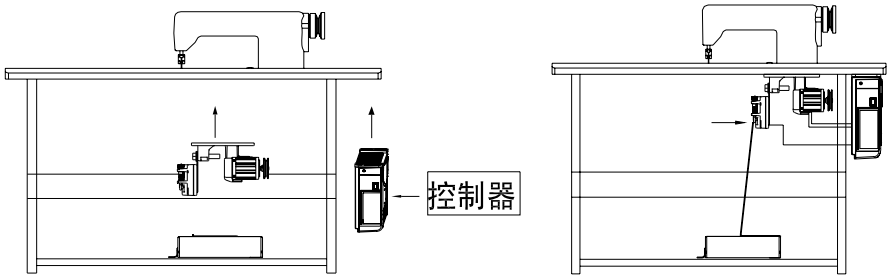


图 2-2 电机安装示意图

2.2 直驱控制器的安装

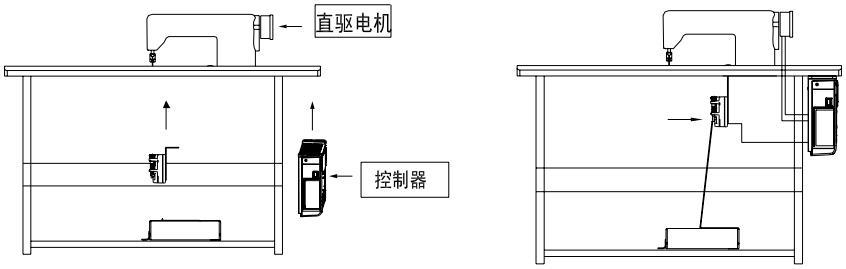


图 2-3 控制器安装示意图

2.3 控制器外形尺寸

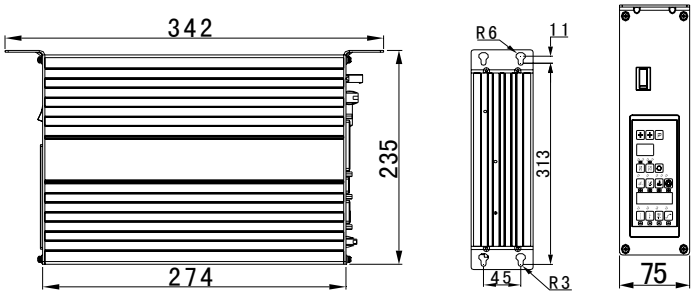


图 2-4 控制器尺寸图

2.4 接线与接地

系统上电及投入使用前，必须确保 AC 输入端已安全可靠的接地（如图 2-5 所示)。系统的接地线为黄绿线，该地线请务必可靠连接至机头上（如连接到机头的螺丝上)，以保证安全使用，并可防止出现异常情况。

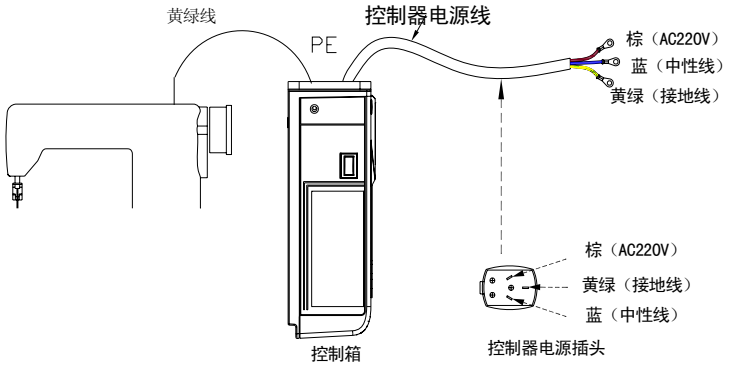


图 2-5

注意	所有电源线、信号线、接地线等接线时不要被其它物体压到或过度扭曲，以确保使用安全！

当电源系统配置为三相四线式／三相五线式 380V 时，欲使用单相 220V 供应本电机的接线方式如图 2-6 所示：

注意	如果此配置系统没有【中性（点）线】时，本伺服电机不适合在此场所使用。

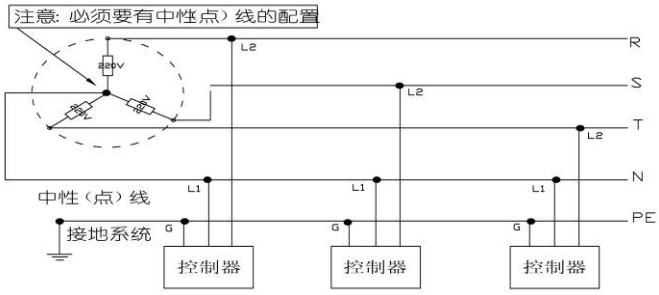


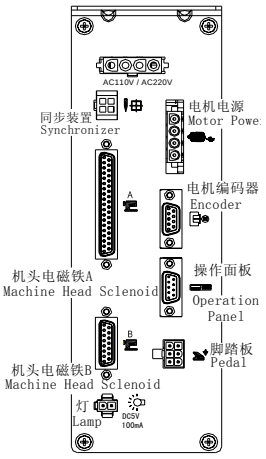
图 2-6 控制器接线图

2.5 控制器接口定义

控制箱与电机同步传感器组件、操作面板和电源线等的连接如图 2-7 所示，将各个连线的插头插入控制箱上对应的插座即可。 装好后，检查一下插头是否插牢。

机头电磁铁A		
1	–	–
2	+5V	+5V
3	in 9-AD1	交互量速度电阻
4	0	0
5	in 0	倒逢开关
6	in 7	提针开关
7	in 4	交互量开关
8	in 2	针距开关
9	in 5	DB2000
10	in 14	DB3000
11	in 1	安全开关
12	in 6	底线检测开关
13	in 3	断线/布边检测
14	in 12	倒逢取消开关
15	out 8	滚轮送料磁阀(罗拉)
16	24V	24V
17	24V	24V
18	out 13	夹线磁阀
19	0	0

20	out 9	线张力磁阀
21	out 10	中压脚磁阀
22	12V	12V针位输出
23	out 7	底线检测左
24	out 14	倒逢/取消开关
25	out 7	底线检测右
26	24V	24V
27	out 11	拨线磁阀
28	out 12	机针冷却磁阀
29	out 6	针距
30	out 15	针距磁阀
31	out 5	HP LED
32	out 13	压脚提升量
33	24V	24V
34	out 1	倒逢磁阀
35	out 2	压脚磁阀
36	out 11	松线线磁阀
37	out 0	剪线磁阀



机头电磁铁B		
1	in 7	提针开关
2	In 2	针距开关
3	in 10	FSPR/VRU SW
4	IN 11	NFD/WALZ SW
5	In 13	DB3000/ZVR SW
6	In 15	HP/FSPR SW
7	——	———
8	GND	GND
9	——	———
10	OUT 6	针距
11	OUT 7	FSPR LED
12	OUT 7	NFD中压脚LED
13	OUT 1	ZVR LED
14	OUT 5	HP LED
15	24V	24V

电机电源		
1	Earth	大地
2	Motor-A	电机A相
3	Motor-B	电机B相
4	Motor-C	电机C相

电机编码器		
1	VCC	＋5V
2	ECNA+	正交编码A
3	ECNB+	正交编码B
4	UP+	上停针信号
5	GND	5V数字地
6	HALLC	霍尔C
7	HALLA	霍尔A
8	HALLB	霍尔B
9	DN+	下停针信号

脚踏板		
1	Signal	踏板信号
2	GND	5V数字地
3	VCC	＋5V
4	Din 6	输入信号6
5	Din 5	输入信号5
6	–	–

操作面板		
1	＋5V HMI	+5V
2	DIR-CTRL	方向控制
3	SCIRXD	信号接受
4	SCITXD	信号发送
5	GND-HMI	+5V HMI地线
6	–	–
7	–	–
8	–	–
9	–	–

图 2-7 控制器对外接口示意图

***注：机头 LED 灯接口的驱动能力：**

额定电压为 5V，12V 可调，额定输出电流为 100mA。

推荐的 LED 发光二极管参数：

VF：Min. = 3.0V，Max. = 3.6V (test condition IF = 20mA);Peak Forward Current：Max. = 80mA;

Continuous Forward Current ：Max. = 35mA

3　操作面板概述

3.1 面板显示说明

操作面板（如图 3-1 所示），正面分为两大区域：液晶显示区域及按键操作区。

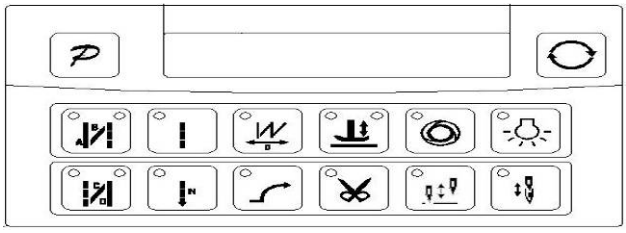


图 3-1

在整个操作面板正面的中间偏上位置，为数码管显示区域。主要由 6 个数码管构成显示功能参数的显示。在操作面板数码管显示区域两边，各有一个按键，分别为“功能键”、“循环建”。在数码管显示区下方，有 12 个按键，在每一个按键的左上角或右上角有 LED 显示灯，来显示按键功能是否开启。

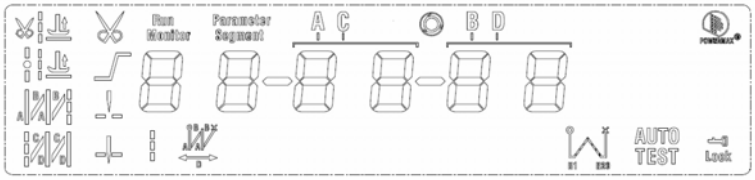


图 3-2 操作面板数码显示图

3.2 操作面板按键说明

操作面板每个按键的说明详见表 1。

表 1 ：操作面板按键说明

序号	外观	描述
1		功能键：主要起确定操作作用，还可以与其它按键组成组合按键；
2		循环键：在修改参数等工作时起切换参数位置等作用；

3		前固缝选择键：在前单固缝、前双固缝、在前四固缝、无前固缝之间循环选择。选择后左上角及右上角灯组合显示出当前的状态；
4		后固缝选择键：在后单固缝、后双固缝、在后四固、无后固缝之间循环选择。选择后左上角及右上角灯组合显示出当前的状态；
5		自由缝纫模式键：选择自由缝纫模式。选择后左上角灯会亮；
6		多段缝选择键：多段缝选择按键。选择后左上角灯会亮；
7		W 缝键：选择进入 W 缝键功能。选择后左上角灯会亮；
8		软启动键：选择进入软启动状态。选择后左上角灯会亮；
9		抬压脚键：自动抬压脚设置。选择压脚和中间抬压脚功能。选择后左上角及右上角灯组合显示出当前的状态；
10		剪线键：选择/不选择自动剪线。选择后左上角灯会亮；
11		触发键：选择/不选择触发方式。选择后左上角灯会亮；
12		停针位键：选择上/下停针。选择上停针后左上角灯会亮；
13		机头灯键：选择点亮/熄灭机头照明灯。选择点亮机头照明灯后左上角灯会亮；
14		补针键：按下时启动补针功能，松开按键时关闭补针功能。选择补针功能后左上角灯会亮.

4 用户模式定义

4.1 操作员模式

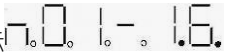
此模式为操作面板的默认模式，操作面板上电后自动进入此模式。进入此模式，6 个数码管上的小数点位会两个相连的数码管小数点移动显示（屏幕显示 8.8.8.8.8.8.），表示 HMI 处于空闲状态。

在执行任何操作的时候，如果长时间不按按键或者拨动拨轮的话，HMI 会自动切换到空闲状态，前面执行的操作将不会被执行！

4.1.1 缝纫模式功能设置

自由缝模式：按  键，数码管显示□。－。－。－。－。－。，此时如果按  键，确定操作，数码管显示恢复到空闲状态，并且点亮  键左上角的 LED 灯。

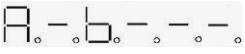
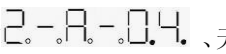
多段缝模式：按  键，数码管显示  。为多段缝操作界面。

可以使用拨轮来确定所需要的 N 段缝，然后按  键，确定参数设置并且退出多段缝设置界面，或则按  键，数码管显示  ，进入多段缝每段针数设置界面。在多段缝每段针数设置界面里面，可以用  键来选择所需要修改的段数，用拨轮来修改针数，当操作完成后按  键确定参数设置并且退出多段缝设置。，确定操作，数码管显示恢复到空闲状态。只要开启了多段缝模式，  键左上角的 LED 灯会被点亮。

W 缝模式：按  键，选择进入 W 缝键功能，数码管显示  为 W 缝界面。可用  键来切换 A、B、D 段，以使用 HMI 上的拨轮来选择每一段的针数。在确定选择后，此时如果按  键确定操作，数码管显示恢复到空闲状态并且点  键左上角的 LED 灯。

4.1.2 前/后加固缝功能设置

当按  键或  键，数码管显示进入前固缝或后固缝设置模式。

当按  键，界面在前单固缝界面  、前双固缝界面  、前四固缝界面  、无前固缝界面  之间循环选择。当按  键，在后单固缝、后双固缝、在后四固、无后固缝之间循环选择（图略）。可以用  键来切换 A、B 或则 C、D 段，以使用 HMI 上的拨轮来选择每一段的针数。在确定选择后，此时如果按  键，确定操作，数码管显示恢复到空闲状态。并且点亮前固缝选择键或则后固缝选择键上角的两个 LED 灯，来显示相应的固缝状态。

- 当  按键上面两个 LED 灯都不点亮的时候，表示没有固缝；
- 当  按键左上方 LED 灯点亮，右上方不亮的时候，表示单固缝；
- 当  按键左上方 LED 灯不亮，右上方点亮的时候，表示双固缝；
- 当  按键左上方、右上方 LED 灯都点亮的时候，表示四固缝。

注：此处只提供了前固缝按键灯图示

4.1.3 软（慢速）启动功能设置

按键后，选择软启动功能，选择后键左上角 LED 灯会亮。再按一下可以退出软启动状态，按键左上角 LED 灯熄灭。

4.1.4 抬压脚功能设置

使用键选择抬压脚设置，有四种抬压脚设置：键灯都不亮为不自动抬压脚、键右灯亮为剪线后自动抬压脚、键左灯亮为缝纫中停车自动抬压脚、键灯全亮剪线后和停车时都自动抬压脚。使用键在四种设置之间循环选择，选择后会在按键上方显示相应的 LED 灯。

4.1.5 剪线功能设置

使用键：选择/不选择自动剪线。选择自动剪线后，键左上角 LED 灯会亮；不选择自动剪线，键左上角 LED 灯自动熄灭。

4.1.6 触发功能设置

使用键：选择/不选择触发方式。选择触发方式后，键左上角 LED 灯会亮；不选择触发方式，键左上角 LED 灯自动熄灭。

4.1.7 停针位控制功能设置

使用键：选择上/下停针。选择下停针后，键左上角 LED 灯会亮；选择上停针后，键左上角 LED 灯自动熄灭。

4.1.8 机头灯设置

使用键：选择点亮/熄灭机头照明灯。选择点亮机头照明灯后，在键左上角 LED 灯会亮；选择下停针后，键左上角 LED 灯自动熄灭。

4.1.9 补针功能设置

使用键：当按下时候启动补针功能，松开按键时候关闭补针功能。选择补针功能后键左上角 LED 灯会亮；关闭补针功能后键左上角 LED 灯自动熄灭。

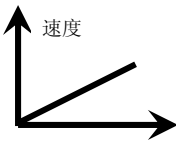
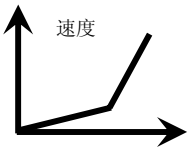
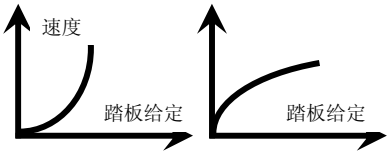
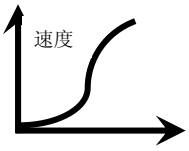
4.2 技术员操作模式

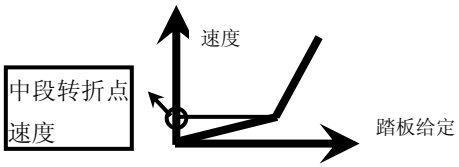
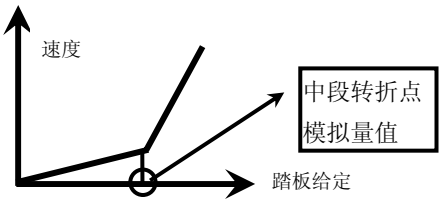
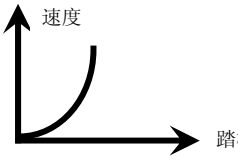
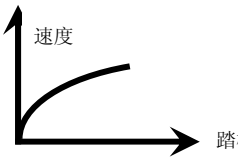
在 HMI 空闲状态下，先按住键，再按键，进入技术员参数修改界面，数码管显示。这个时候可以使用拨轮直接修改小数点位闪烁位置的数值，可使用键来循环切换小数点闪烁位置，达到切换参数位置的作用。在确定修改参数后可以切换到下个参数或者按键来确定修改。如果在规定时间内不按按键、不拨动拨轮，自动退出到 HMI 空闲状态。

表 2：技术员模式参数表

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
速度参数	0	0	200	100~800	起始缝纫速度
		1	2500	200~3000	自由缝最高速度（全局最高限速值）
		2	2500	200~3000	定长缝最高速度
		3	2500	200~3000	手动倒缝最高限速值
		4	200	100~800	补针速度
		5	250	100~500	剪线速度
		6	0	0 / 1	慢速启动模式：0：仅剪线后有慢速启动，1：剪线后、中间停止都有慢速启动
		7	2	1~9	慢速起缝针数
		8	200	100~800	慢速起缝速度
		9	20	1~20	系统加速灵敏度（对于直驱传动可设置为较大的值；对于皮带传动不要设置太大，否则振动、噪声较大。此参数不影响电机出力）
		A	20	1~20	系统减速灵敏度（对于直驱机头可设置为较大的值；对于皮带传动不要设置太大，否则振动、噪声较大。此参数不影响电机出力）
		b	800	200~1200	中速数值（RPM）
		C	50	25~200	低速数值（RPM）
加固缝参数	1	0	800	200~2200	前加固缝速度
		1	800	200~2200	后加固缝速度
		2	800	200~2200	连续回缝（W 缝）速度
		3	26	0~70	前加固缝针迹补偿 1
		4	37	0~70	前加固缝针迹补偿 2
		5	26	0~70	后加固缝针迹补偿 1
		6	37	0~70	后加固缝针迹补偿 2

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
		7	26	1~70	连续回缝针迹补偿 1
		8	20	1~70	连续回缝针迹补偿 2
		9	200	1~999	自动回缝段落停止时间 CT 设定（ms）
		A	180	10~359	针迹补偿参考角度（倒缝电磁铁最佳吸合角度）
加固缝模式	2	0	3	0/1/2/3	前加固工作模式。 0：轻促踏板，即自动执行起始回缝。 1：受踏板控制，可任意停止。 2：针停上定位后，受[CT]时间控制动作 3：针停下定位后，受[CT]时间控制动作
		1	0	0/1/2	前固缝结束后操作模式选择： 0：前固缝后，继续缝纫 1：前固缝后，自动停止 2：前固缝后，自动剪线
		2	0	0/1	定长缝结束后操作模式选择： 0：后固缝 1：停车待命（可补针）
		3	3	0/1/2/3	后加固工作模式。 0：轻促踏板，即自动执行起始回缝。 1：无效 2：针停上定位后，受[CT]时间控制动作 3：针停下定位后，受[CT]时间控制动作
		4	0	0/1/2/3	W 加固工作模式。 0：轻促踏板，即自动执行起始回缝。 1：受踏板控制，可任意停止。 2：针停上定位后，受[CT]时间控制动作 3：针停下定位后，受[CT]时间控制动作

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
		5	0	0~99	后固缝最后一个 C 段增加的针数
		6	0	0~99	前固缝之前插入的针数
		7	0	0~99	后固缝之后插入的针数
踏板参数	3	0	2	0/1/2/3	脚踏板控速曲线模式: 0：自动线性斜率（根据最高速自动计算） 
					1：两段斜率（可自由设定为先缓后快或先快后缓，需配合参数【31】和【32】使用） 
					2：幂次曲线（需配合参数【33】使用） 
					3：S 型曲线（先缓后快，低速操控性好） 

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
踏板参数		1	1500	200~4000	两段控速斜率辅助参数：中段转折点速度 RPM（两段斜率的转折点速度），在参数【30】设置为 1 时有效。 
		2	800	0~1024	两段控速斜率辅助参数： 中段转折点踏板模拟量值，当参数【30】设置为 1 时有效，参数设定值需在参数【38】到【39】的值之间。 
		3	1	1/2	幂次控速曲线辅助参数： 在参数【30】设置为 2 时有效。 1：平方（先缓后快，低速操控性好）；  2：开方（先快后缓，响应速度快）； 

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
		4	150	0~1024	踏板剪线位置设定，如图 2-1 所示。 （设定值不得高于参数【35】）
		5	300	0~1024	踏板抬压脚位置，如图 2-1 所示。 （设定值介于参数【34】和【36】之间）
		6	460	0~1024	踏板回中位置，如图 2-1 所示。 （设定值介于参数【35】和【37】之间）
		7	480	0~1024	踏板前踩运行位置，如图 2-1 所示。 （设定值介于参数【36】和【38】之间）
		8	680	0~1024	踏板低速运行位置（上限），如图 2-1 所示。 （设定值介于参数【37】和【39】之间）
		9	960	0~1024	踏板模拟量最大值，如图 2-1 所示。 （设定值不得低于参数【38】）
		A	200	0~800	踏板抬压脚确认时间
		b	0	0/1	踏板回中立刻剪线选择： 0：off　　1：on
		C	1	0/1	抬压脚位置抬压脚功能选择： 0：不抬　　1：抬
		d	1	0/1	剪线位置抬压脚功能选择： 0：不抬　　1：抬
		E	0	0/1/2/3/4	全后踏操作模式选择： 0：全后踏有切线及抬压脚 1：全后踏只有提针功能 2：全后踏无抬压脚功能 3：全后踏抬压脚及提针 4：全后踏抬压脚并走慢速

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
习惯设定	4	0	0	0/1	上电自动找上针位: 0: 不找; 1: 找
		1	1	0/1	自动加固功能选择: (无自动加固功能的机头，最好禁止) 0: 禁止固缝; 1: 允许固缝。
		2	0	0/1	手按回缝时功能模式选择 0: Juki 模式。在缝纫中途或中途停止时均有动作。 1: Brother 模式。仅在缝纫中途有动作。
		3	0	0/1/2/3	特殊运行模式: 0: 操作工选择 1: 简易缝模式 2: 测电机初始角(不需要取下皮带) 3: 计算传动比模式(需要有停针传感器，且不能取下皮带)
		4	0	0—31	电机低速加力功能开关: 0: 正常功能 1-31: 低速加力过厚能力档位
		5	1	0/1	停针模式: 0: 匀速滑车模式(皮带传动方式下，停车精度不高) 1: 回拉模式(PMX 模式)
		6	100	0~800	按钮补半针命令时间
		7	150	0~800	按钮补一针命令时间
		0	1	1~100	stitch 计数器功能比例值设定
		1	1	1~9999	stitch 计数值设定

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
计数模式	5	2	0	0~4	stitch 计数器模式选择: 0: 不计数 1: 依针数往上计数，数完设定值后自动重新计数 2: 依针数往下计数，数完设定值后自动重新计数 3: 依针数往上计数，数完设定值后，马达自动停止，须由 S4［152.INI］=CRS 设定或面板上的 A 键来启动重新计数。 4: 依针数往下计数，数完设定值后，马达自动停止，须由 S4［152.INI］=CRS 设定或面板上的 A 键来启动重新计数。
		3	1	1~100	Trimming 计数器功能比例值设定
		4	1	1~9999	Trimming 计数值设定
		5	0	0~4	Trimming 计数器模式选择: 0: 不计数 1: 依针数往上计数，数完设定值后自动重新计数 2: 依针数往下计数，数完设定值后自动重新计数 3: 依针数往上计数，数完设定值后，马达自动停止，须由 S4［152.INI］=CRS 设定或面板上的 A 键来启动重新计数。 4: 依针数往下计数，数完设定值后，马达自动停止，须由 S4［152.INI］=CRS 设定或面板上的 A 键来启动重新计数。
		0	0	0	运行时间复位

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
操作类	6	1	0	0/1/2	参数传输方式: 0：无动作； 1：下传参数（自操作面板向控制器传参数）； 2：上传参数（自控制器向操作面板传参数）。
		2	2000	1,2,88	恢复出厂参数（
		3	0	1,2	保存当前参数为 User 自定义机修参数（可恢复）
		注：以上【6X】操作类参数不保存。			

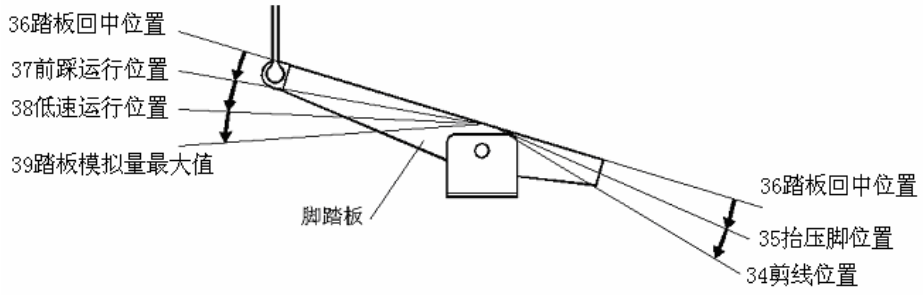


图 4-1 踏板动作参数各位置示意图

4.3 系统员操作模式

在 HMI 空闲状态下，先按住键，再按键，进入系统员参数修改界面，数码管显示3。1。0。1。8。8。。这个时候可以使用拨轮直接修改小数点位闪烁位置的数值，可使用键来循环切换小数点闪烁位置，达到切换参数位置的作用。在确定修改参数后可以切换到下个参数或者按键来确定修改。如果在规定时间内不按按键、不拨动拨轮，自动退出到 HMI 空闲状态。

表 3：系统员模式参数表

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
剪线模式	0	0	0	0/1/2/3/4	剪线电机运行模式选择: 0: 平车式 1: 绷缝式 A（普通绷缝剪线: 停到上针位后剪线） 2: 绷缝式 B:(Reserved) 3: 绷缝式 C:(Reserved) 4: 反转剪线(找到下定位后，再以反方向转至所设定之角度（设定此项时，将自动关闭切线、扫线、倒退等功能）):(Reserved)
		1	0	0~359	剪线结束时机械角度
		2	1	0/1/2/3/4/5/6	剪线时序选择: 0: [TS] 设定角度进行切线，直至上停针后延时[T2]设定时间为止。 1: [TS] 设定角度进行切线，直至[TE]设定角度为止。 2: [TS] 设定角度进行切线，延时[T2]设定时间为止。 3: 下针位信号后延迟[T1]设定时间进行切线，延时[T2]设定时间为止。 4: 找到上针位信号后延迟[T1]设定时间进行切线,延时[T2] 设定时间为止，大部分应用于绷缝机。 5: 找到下针位信號後即開始進行切線動作至上停针止。然后延遲 T1 設定時間後再作 T2 所設定的切線時間。（大部分使用於一般平車機型，而 T1 與 T2 設定值大部分均設為 0）

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
					6:[TS] 设定角度进行切線動作至上停针止。然后延遲 T1 設定時間後再作 T2 所設定的切線時間。
		3	5	5-359	剪线开始角度 TS（相对于下针位角度）
		4	300	10-359	剪线结束角度 TE（相对于下针位角度，需大于 TS）
		5	10	1-999	剪线开始延时 T1（ms）
		6	60	1-999	剪线结束延时 T2（ms）
		7	30	1~999	下停针剪线延迟时间 D1
		8	90	1~9999	下停针剪线持续时间 D2
		9	120	1~999	下停针剪线复原时间 D3
		A	20	10~70	剪线加力角度(Reserved)
松线扫线夹线模式	1	0	0	0/1/2/3/4/5/6	松线电磁铁时序选择: 0:[LS]设定角度后进行松线动作,直至上针位再延迟[L2]所设定时间为止。 1:[LS]设定角度后进行松线动作,直至[LE]设定角度为止。 2:[LS]设定角度后进行松线动作,延迟[L2]所设定时间为止。 3:下针位信号后延迟[L1]设定时间进行松线动作,延迟[L2]所设定时间为止。 4:上针位信号后延迟[L1]设定时间进行松线动作,延迟[L2]所设定时间为止。

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
					5:下针位信號後即開始进行松线动作至上停针止。然后延遲[L1]設定時間後再作[L2]所設定的松线時間。 6:[LS]设定角度后进行松线动作,至上停针止。然后延遲[L1]設定時間後再作[L2]所設定的松线時間。
		1	50	5~359	松线电磁铁启动角度 LS(相对于下针位角度)
		2	300	10~359	松线电磁铁结束角度 LE(相对于下针位角度,需大于 LS)
		3	1	1~999	松线电磁铁启动延迟时间 T1 (ms)
		4	10	1~999	松线电磁铁上针位后延迟时间 T2 (ms)
		5	0	0 / 1	扫线功能选择 0: 关闭 1: 打开
		6	10	1~999	拨线/扫线延迟时间 ms
		7	30	1~9999	拨线/扫线持续时间 ms
		8	50	1~999	拨线/扫线复原时间 ms
		9	1	0 / 1	钳线功能选择 0: 关闭 1: 打开
		A	70	10~359	钳线开始角度
		b	140	11~359	钳线结束角度
		C	0	0~9999	吹风开始延时 ms
		d	50	1~9999	吹风持续时间 ms
停止模式	2	0	320	200~360	剪线后停止位置 (可实现剪线回拉功能)
		1	0	0~240	缝纫前反转角度 (提高过厚料能力)
		2	0	0 / 1	停针后 D 轴电流锁定选择

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
		3	300	1~3000	停针后 D 轴电流锁定时间（ms）
		4	0	0/1/2/3	紧急停车模式： 0：关闭紧急停车功能 1：紧急停于任何位置 2：紧急停于上针位 3：紧急停于下针位
		5	0	0~999	紧急停车前继续缝纫的针数（根据速度与针数设定不同，实际可能大于此数量）
		6	0	0/1	紧急停车后再启动： 0：不可再启动，需重新上电 1：信号撤销后可再次开始缝纫
		7	360	200~360	中间停上针位位置调整
模式选择	3	0	0	0/1	压脚提升的控制模式 0：按钮点动切换； 1：按钮始终按下才有效；
		1	0	0/1	自动测试模式选择： 0：定针数，1：定时间。
		2	300	0~1000	安全开关报警确认时间 ms（不区分直驱翻台开关和绷缝剪刀保护开关，统一处理方式）
		3	50	0~1000	安全开关恢复确认时间 ms
		4	0	0/1	电机转向：1：反转，0：正转。
		5	0	0~2	压脚交互量速度控制功能： 0：关闭 1：开启模拟量控制模式 2：开启开关量控制模式
		6	0	0~1023	交互量下限

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
		7	710	0~1023	交互量上限
		8	200	200~800	交互量速度限幅值下限
		9	400	200~2500	交互量速度限幅值上限
		A	0	0/1/2/3	布边检测器工作模式: 0：不使用布边检测器 1：布边检测器工作于人工启动模式 2：布边检测器工作于自动启动模式 3：布边检测器工作于双切线人工控速模式
		b	50	10~3000	自动模式启动确认时间 ms
		C	3	0~999	启动后不响应的针数
		d	3	0~999	双切线第一次切线的针数
		E	3	0~999	信号无效后继续缝纫的针数（根据速度与针数设定不同，实际可能大于此数量）
		F	0	0/1	自动倒缝时的密缝模式 0：自动倒缝时保持当前密缝状态； 1：自动倒缝时强制关闭密缝；
机头相关参数	4	0	870	0~9999	电机/机头传动比：单位 0.001 （如果自动计算过传动比，控制器内的该参数可能与操作面板上的参数不同）
		1	3500	0~95000	机头最高速度上限
		2	0	0~359	上停针位调整角度 （相对于上针位传感器的位置偏移）
		3	85	0~359	下针位机械角度
		4	100	0~800	放压脚延迟时间（ms）
		5	9	0~359	厚料加力开始角度

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
		6	57	0~359	厚料加力结束角度
		7	0	0~2000	加油提醒时间（小时。0：关闭此功能）
		8	0	0~4000	加油报警、禁止运行时间（小时。0：关闭此功能）
		9	1000	200~2500	机头交互量 B2 speed
		A	1500	200~2500	机头交互量 B3 speed
		b	800	0~1023	模拟信号输入 1 开关阈值
		C	800	0~1023	模拟信号输入 2 开关阈值
输入功能定义	5	0	1	0：禁止； 1：手动倒缝； 2：安全开关； 3：紧急停针； 4：布边检测； 5：踏板剪线输入； 6：踏板压脚输入； 7：补针； 8：前后加固逆转； 9：压脚交互量抬起； 10:密缝； 11:计数器复位； 12:oP 输入	1 号输入功能定义
		1	1		1 号输入有效电平 0/1
		2	0		2 号输入功能定义
		3	0		2 号输入有效电平 0/1
		4	10		3 号输入功能定义
		5	1		3 号输入有效电平 0/1
		6	0		4 号输入功能定义
		7	0		4 号输入有效电平 0/1
		8	9		5 号输入功能定义
		9	1		5 号输入有效电平 0/1
		A	0		6 号输入功能定义

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
		6	0	13：压脚交替量输入 1；14：压脚交替量输入 2；15:提针锁定；16：拼缝压脚控制输入	6 号输入有效电平 0/1
		C	11		7 号输入功能定义
		d	1		7 号输入有效电平 0/1
		E	7		8 号输入功能定义
		F	1		8 号输入有效电平 0/1
输出功能定义	6	0	1	0：输出禁止 1：剪线；2：拨线；3:倒缝；4：抬压脚；5:松线；6:夹线；7：吸风；8:吹风；9：针冷却；10：压脚交互量抬起；11:密缝；12:加固逆转悬挂状态；13：交互量抬起状态；14：密缝状态；15:oP 输出；16:底线计数满状态:17:剪线短头输出；18:拼缝压脚输出	1 号电磁铁输出功能定义
		1	3		2 号电磁铁输出功能定义
		2	4		3 号电磁铁输出功能定义
		3	0		4 号电磁铁输出功能定义
		4	0		5 号电磁铁输出功能定义
		5	13		6 号电磁铁输出功能定义
		6	14		7 号电磁铁输出功能定义

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
		7	16		8 号电磁铁输出功能定义
电磁铁组 1	7	0	60	1~500	1 号电磁铁全出力时间 ms
		1	1	1~10	1 号电磁铁 Chopping 开通时间 ms(Reserved)
		2	2	1~10	1 号电磁铁 Chopping 关闭时间 ms(Reserved)
		3	0	0~600	1 号电磁铁保护时间 100ms
		4	60	1~500	2 号电磁铁全出力时间 ms
		5	1	1~10	2 号电磁铁 Chopping 开通时间 ms(Reserved)
		6	1	1~10	2 号电磁铁 Chopping 关闭时间 ms(Reserved)
		7	150	0~600	2 号电磁铁保护时间 100ms
		8	100	1~500	3 号电磁铁全出力时间 ms
		9	5	1~10	3 号电磁铁 Chopping 开通时间 ms(Reserved)
		A	6	1~10	3 号电磁铁 Chopping 关闭时间 ms(Reserved)
		b	250	0~600	3 号电磁铁保护时间 100ms
		C	100	1~500	4 号电磁铁全出力时间 ms
		d	5	1~10	4 号电磁铁 Chopping 开通时间 ms(Reserved)
		E	6	1~10	4 号电磁铁 Chopping 关闭时间 ms(Reserved)
		F	0	0~600	4 号电磁铁保护时间 100ms
电磁铁组 2	8	0	100	1~500	5 号电磁铁全出力时间 ms
		1	1	1~10	5 号电磁铁 Chopping 开通时间 ms(Reserved)
		2	1	1~10	5 号电磁铁 Chopping 关闭时间 ms(Reserved)
		3	0	0~600	5 号电磁铁保护时间 100ms
		4	100	1~500	6 号电磁铁全出力时间 ms
		5	1	1~10	6 号电磁铁 Chopping 开通时间 ms(Reserved)
		6	1	1~10	6 号电磁铁 Chopping 关闭时间 ms(Reserved)

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
		7	0	0~600	6 号电磁铁保护时间 100ms
		8	100	1~500	7 号电磁铁全出力时间 ms
		9	1	1~ 10	7 号电磁铁 Chopping 开通时间 ms(Reserved)
		A	1	1~ 10	7 号电磁铁 Chopping 关闭时间 ms(Reserved)
		b	0	0~600	7 号电磁铁保护时间 100ms
		C	100	1~500	8 号电磁铁全出力时间 ms
		d	1	1~ 10	8 号电磁铁 Chopping 开通时间 ms(Reserved)
		E	1	1~ 10	8 号电磁铁 Chopping 关闭时间 ms(Reserved)
		F	0	0~600	8 号电磁铁保护时间 100ms
输入功能定义	9	0	0	0: 禁止； 1: 手动倒缝；2: 安全开关；3: 紧急停针；4: 布边检测；5: 踏板剪线输入；6: 踏板压脚输入；7: 补针；8: 前后加固逆转；9: 压脚交互量抬起；10: 密缝；11:计数器复位；12: oP 输入 13: 压脚交替量输入 1；14: 压脚交替	9 号模拟输入功能定义
		1	0		9 号模拟输入有效电平 0/1
		2	0		10 号模拟输入功能定义
		3	0		10 号模拟输入有效电平 0/1
		4	0		11 号输入功能定义
		5	0		11 号输入有效电平 0/1
		6	0		12 号输入功能定义
		7	0		12 号输入有效电平 0/1
		8	8		13 号输入功能定义
		9	1		13 号输入有效电平 0/1
		A	0		14 号输入功能定义
		b	0		14 号输入有效电平 0/1

参数分类	参数号高位	参数号低位	默认值	参数范围	注释
		C	0	量输入 2；15:提针锁定；16：拼缝压脚控制输入	15 号输入功能定义
		d	0		15 号输入有效电平 0/1
		E	0		16 号输入功能定义
		F	0		16 号输入有效电平 0/1
输出功能定义	A	0	0	0：输出禁止 1：剪线；2：拨线；3:倒缝；4：抬压脚；5:松线；6:夹线；7：吸风；8:吹风；9:针冷却；10：压脚交互量抬起；11:密缝；12:加固逆转悬挂状态；13：交互量抬起状态；14：密缝状态；15:aP 输出；16:底线计数满状态 17：剪线短头输出；18：拼缝压脚输出	1 号电磁铁输出功能定义
		1	0		2 号电磁铁输出功能定义
		2	0		3 号电磁铁输出功能定义
		3	5		4 号电磁铁输出功能定义
		4	0		5 号电磁铁输出功能定义
		5	10		6 号电磁铁输出功能定义
		6	12		7 号电磁铁输出功能定义
		7	11		8 号电磁铁输出功能定义

4.4 监控模式

在操作面板空闲状态时，先按住  键，再按  键，即可进入监控模式。用拨轮可以切换需要观看的监控参数。

监控参数的具体内容如下表的表 4 所示，如果在规定时间内没有按键操作，操作面板会自动退回到空闲状态。

表 4：监控模式参数表

	参数号 高位	参数号 低位	参数单位	注释
监控 状态	1	0	次	针数计数
		1	次	剪线计数
	2	0	V	母线电压
		1	RPM	机头速度
		2	0.01A	相电流
		3	degree	初始角度
		4	degree	机械角度
		5	——	踏板电压采样值
		6	0.001	传动比
		7	小时	电机累计运行时间
		8	——	机头交互速度信号采样值
	3	0-7	——	8 个历史故障代码

4.5 错误报警模式

当系统检测出错误时候，操作面板会自动跳转到错误报警模式，液晶显示 E.r.r.-.0.0. 。在错误报警模式内，操作面板仍可以跳转去做技术员参数、系统员参数和其他操作面板参数的修改，并且监控模式仍有效，退出这些模式后，操作不返回空闲状态，还是跳转回错误报警模式，系统在修正错误后，需要断电再上电才可以正常运行工作，常用的错误代码及处置方法可参考控制器用户手册。

4.6 安全开关报警模式

当伺服控制系统检测出安全开关（常用于例如机头翻抬开关等）动作时，操作面板会自动跳转到安全开关报警模式，数码管显示A.r.N.-.U.P.。在安全开关报警模式内，仍可以跳转去进行技术员参数、系统员参数和操作面板自身参数的修改，以及进入监控模式。退出这些模式后不返回空闲状态，还是返回安全开关报警模式。

（统一处理安全开关输入，不区分翻台开关、剪刀保护开关）

5 控制系统安装后操作：

1、控制系统安装后，使用前应当做一次“自动计算传动比”操作（由于加工精度的原因，不同厂家的机头手轮有效半径各不相同，即使是直驱系统也不一定是 1:1 的传动比)。进入技术员【43】参数，设置该参数值为 3。轻点踏板启动，系统以中速旋转大约 10 圈后停止，计算出的结果直接保存在机内。然后将【43】参数恢复为 0。

如果能确认传动比的值，可以直接设定系统员【40】参数。控制器内保存的实际传动比可以通过监控参数【26】得到。

2、此版本及以上控制系统的下停针，不再依靠下停针信号确定。而是由系统员【43】参数确定，该参数确定下针位相对于上针位的机械角度。当前的机械角度可以通过监控【24】参数显示给用户，上针位的机械角度为 0。

（上电后，控制系统需要至少一次运行经过上针位校正机械角度，如：找上针位。传动比的值会影响机械角度的计算，建议先确定正确的传动比后，再调整下针位位置)。

3、此版本及以上控制系统带有 16 个电磁铁驱动输出，并采用了全新的软件设计。其中第 2、3 号输出有斩波调节电流能力(默认为倒缝、抬压脚电磁铁的驱动)，其它输出不能斩波。使用前请确认系统员【6x】参数中设定的各个驱动输出的功能设定与电磁铁接口的连接是否一致；还需确认系统员【7x】、【8x】参数，否则可能出现电磁铁出力不足。(默认参数按照大多数厂家的电磁铁连接定义设定)

6 控制系统恢复出厂参数设置：

6.1 恢复电控厂家出厂参数

第一步：在操作员模式下，先按下  键不放，再按  键，液晶会显示 Pd 0000，要求键入技术员设置的密码。

第二步：使用拨轮直接修改小数点位闪烁位置的数值，可使用  键来循环切换小数点位置，到技术员参数索引至【62】。

第三步：使用拨轮直接修改小数点位闪烁位置的数值，可使用  键来循环切换小数点位置，到要恢复的参数数值。

第四步：确认参数输入无误后，按住  键不动，直至操作面板 LED 开始闪烁后，松开  键，操作面板和整个系统即恢复到出厂设置状态。

6.2 恢复用户自定义出厂参数

使用操作面板参数【63】可将当前用户设置的个性化参数作为自定义参数，操作方法如下：

第一步：在操作员模式下，先按下  键不放，再按  键，液晶会显示 Pd 0000，要求键入技术员设置的密码。

第二步：使用拨轮直接修改小数点位闪烁位置的数值，可使用  键来循环切换小数点位置，到索引值【63】，参数数值为 1 或 2。

第三步：使用拨轮直接修改小数点位闪烁位置的数值，可使用  键来循环切换小数点位置，到要恢复的参数数值。

第四步：确认参数输入无误后，按住  键不动，直至操作面板 LED 开始闪烁后，松开  键，操作面板和整个系统即恢复到出厂设置状态。

当系统因参数设置导致控制系统出错时，用户可以使用自定义的恢复出厂参数调整过来，操作方法同“**恢复电控厂家出厂参数**”说明一样，将系统员参数【63】更改为 1 或 2，长按  键 5 秒钟以后，系统会恢复至用户自定义的参数设置。

注意事项：

1、 上电后操作面板仅下传操作员模式的参数，不会主动下传技术员与系统员的参数。如果确定要下传一次全套参数，可以通过技术员参数【61】主动下传操作面板中的全部当前活动参数。

2、 如果要恢复操作面板中保存的其他参数，需通过技术员参数【62】激活为当前活动参数，并主动下传。

3、 单个参数修改完后，操作面板确认该参数修改后的值与修改前不同时，才下传该参数。

4、 恢复出厂参数之后，系统最好重新上电复位一次。

7 故障处理及维护

故障代码	代码含义	解决措施
01	硬件过流	关闭系统电源， 30 秒后重新接通电源，控制器若仍不能正常工作，请更换控制器并通知厂方。
02	软件过流	
03	系统欠压	断开控制器电源，检查输入电源电压是否偏低（低于176V)。若电源电压偏低，请在电压恢复正常后重新启动控制器。若电压恢复正常后，启动控制器仍不能正常工作，请更换控制器并通知厂方。
04	停机时过压	断开控制器电源，检查输入电源电压是否偏高（高于264V）。若电源电压偏高，请在电压恢复正常后重新启动控制器。若电压恢复正常后，启动控制器仍不能正常工作，请更换控制器并通知厂方。
05	运行时过压	
06	电磁铁回路故障	关闭系统电源，检查电磁铁连线是否正确，是否有松动、破损等现象。若有则及时更换。确认无误后重启系统，若仍不能工作，可寻求技术支援。
07	电流检测回路故障	关闭系统电源， 30 秒后重新接通电源观察是否能正常工作。不行的话重试几次，若该故障频繁出现，需请求技术支援。
08	电机堵转	断开控制器电源，检查电机电源输入插头是否脱落、松动、破损，是否有异物缠绕在机头上。排除后重启系统仍不能正常工作，请更换控制器并通知厂方。
09	制动回路故障	关闭系统电源，检查电源板上白色的制动电阻接头是否松动或脱落，将其插紧后重启系统。若仍不能正常工作，请更换控制器并通知厂方。
10	HMI 通讯故障	检查控制面板与控制器的连线是否脱落、松动、断裂，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。
11	机头停针信号故障	检查机头同步信号装置与控制器的连线是否松动，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。

12	电机初始角度检测故障	请断电后再尝试 2￣3 次，若仍报故障，请更换控制器并通知厂方。
13	电机 HALL 故障	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。
14	DSP 读写 EEPROM 故障	请断电后再尝试 1 次，若仍报故障，请更换控制器并通知厂方。
15	电机超速保护	关闭系统电源， 30 秒后重新接通电源观察是否能正常工作。不行的话重试几次，若该故障频繁出现，请更换控制器并通知厂方。
16	电机反转	关闭系统电源， 30 秒后重启系统，若仍不能正常工作，请更换控制器并通知厂方。
17	HMI 读写 EEPROM 故障	关闭系统电源， 30 秒后重启系统，若仍不能正常工作，请更换控制器并通知厂方。

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2013-5-2

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

12) All the instruction marked with sign ⚠ must be absolutely observed or executed; otherwise, personal injuries or risk to the machine might occur.

13) This product should be installed and operated by persons with appropriate training only.

14) 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.

15) Make sure to move your feet away from the pedals while power on.

16) ⚠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.**

17) Make sure to fasten all the fasteners firmly in the control boxes prior to the operation of the system.

18) Allow an interval of at least 30 seconds before repapering the system after power off.

19) Repairs and maintenance work may be carried out by special trained electronic technicians.

20) All the replacement parts for repairing must be provided or approved by the manufacturer.

21) 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

1.1Overview

- It is using to TI of the latest new DSP control platform；
- It is supporting the latest new HMI 50 operation surface；
- It is the new HMI protocol, with abundant parameter, Extended function；
- It is supporting hanging belt motor and direct drive motor, using 550W, 700W motor belt wheel replaceable design；
- 6 external signal input and 8 electromagnet output interface；
- The HMI parameter free set input and output function；
- supporting models: kinds of drive way automatic over lock\interlock\ lockstitch; various special sewing equipment, currently has with full function comprehensive feeding machine; be gradually extended。

New generation control system

- Hardware
  - The adoption of a new generation of high speed DSP；
  - Innovative design of electromagnet drive circuit design；
- Software
  - Many years of industry experience, rewrite all the code；

- **New rate control algorithm, response to faster, more stable;**
- **New stitches compensation algorithm;**
- **New electromagnet control algorithm, and output redirection function;**
- **Flexible pedal velocity curve;**
- **Extended function;**

1.2 Components& Accessories

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

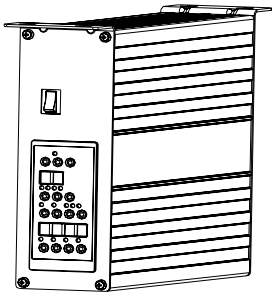


Fig.1-1 Control Box

controller provides the follow type of operation panel (see Fig.1-2)

Fig.1-2 Panel

Note: Please check whether the components listed on the packing list are all included.

Please contact supplier for compensation in case of missing parts.

■ 1.3 Basic parameters

Table 1

Item	ASD61-55	ASU61-55	ASU61-70	ASU61-75
Adaptation	Direct-driven	Belt	Belt（heavy-duty）	Belt（heavy-duty）
Motor Type	PMSM			
Voltage Range	AC (220±44)V 50/60HZ			
Output Power	550W	550W	750W	750W
Max. Speed	5000rpm	5000rpm	3000rpm	3000rpm
Max. Torque	3Nm	3Nm	7Nm	7Nm
Work Environmen Temperature ℃ / humidity t %	0℃ ～ 40℃/40% ～ 80%			
Storage Environmen Temperature ℃ / humidity t %	-40℃～ 55℃/≤93%（55℃）			

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.

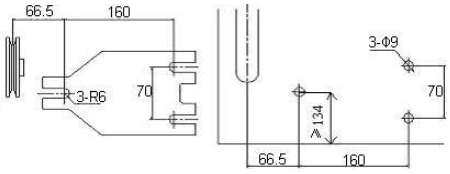


Fig.2-1

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

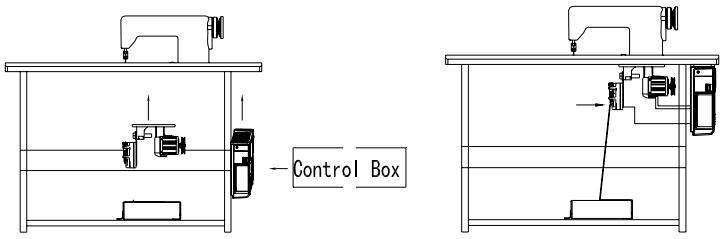


Fig.2-2

2.2 Controller Installation

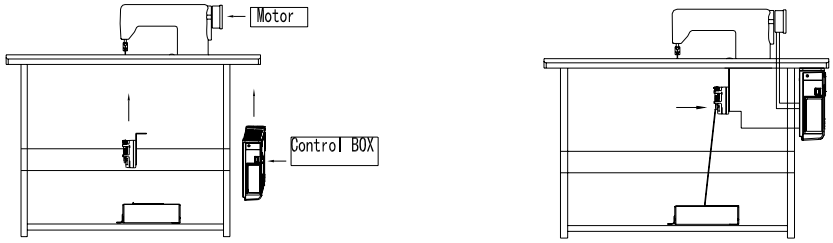


Fig.2-3

2.3 Controller shape dimension

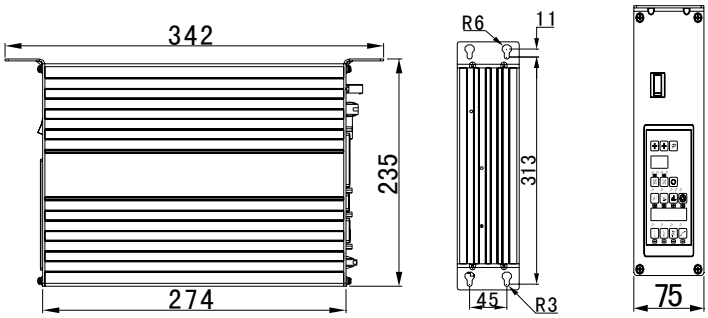


Fig.2-4

2.4 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.2-5).

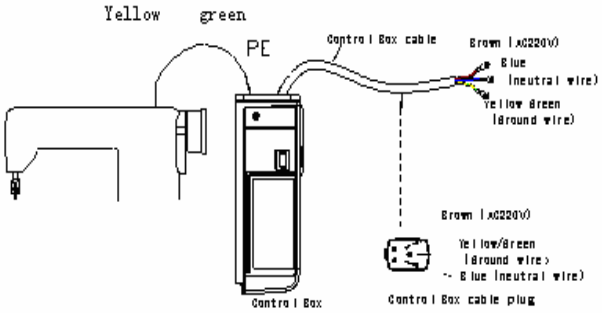


Fig.2-5

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.2-6):

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

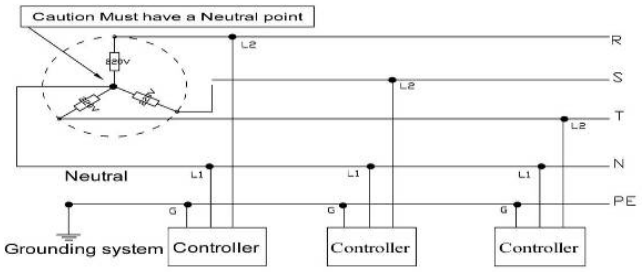


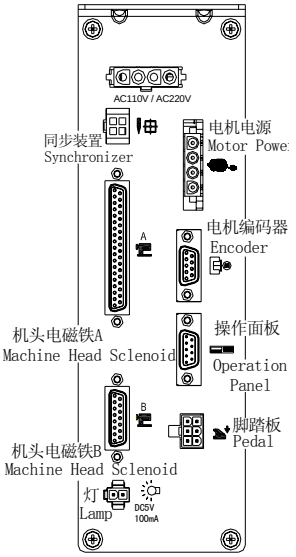
Fig.2-6

2.5 Defintion of controller interface

Connections between control box and other accessories are illustrated in Fig.2-7. Plug these connectors into the corresponding sockets in control box.

Machine head soleniod A		
1	–	–
2	+5V	+5V
3	In 9-AD1	R-N-HP
4	0	0
5	in 0	ZVR . SW
6	in 7	NHT. SW
7	in 4	HP. SW
8	in 2	STK. SW
9	in 5	DB2000
10	in 14	DB3000
11	in 1	LSP
12	in 6	FAWU
13	in 3	LS
14	in 12	VRU LED
15	out 8	WALZ
16	24V	24V
17	24V	24V
18	out 3	FK
19	0	0

20	out 9	FSPR
21	out 10	NFD
22	12V	12V OUTPUT
23	OUT7	FAWU-L
24	OUT14	VRU LED
25	OUT 7	FAWU-R
26	24V	24V
27	out 4	FW
28	out 12	NK/US
29	out 6	STK LED
30	out 15	STK
31	out 5	HP LED
32	out 13	HP
33	24V	24V
34	out 1	VR
35	out 2	FL
36	out11	FSPL
37	out 0	FA



Machine head soleniod B		
1	in 7	NHT. SW
2	In 2	STK. SW
3	in 10	FSPR/VRU SW
4	IN 11	NFD/WALZ SW
5	In 13	DB3000/ZVR SW
6	In 15	HP/FSPR SW
7	—	———
8	GND	GND
9	—	———
10	OUT 6	STK LED
11	OUT 7	FSPR LED
12	OUT 7	NFD LED
13	OUT 1	ZVR LED
14	OUT 5	HP LED
15	24V	24V

Motor Power		
1	Earth	Earth
2	Motor-A	Motor-A
3	Motor-B	Motor-B
4	Motor-C	Motor-C

ENCODER		
1	VCC	＋5V
2	ECNA+	ECN-A
3	ECNB+	ECN-B
4	UP+	Up stop signal
5	GND	5V GND
6	HALLC	HALL-C
7	HALLA	HALL-A
8	HALLB	HALL-B
9	DN+	Down stop signal

Pedal		
1	Signal	Pedal signal
2	GND	5V GND
3	VCC	＋5V
4	Din 6	Input signal 6
5	Din 5	Input signal 5
6	–	–

Operation Panel		
1	+ 5V HMI	+5V
2	DIR-CTRL	DIR-CTRL
3	SCIRXD	receive
4	SCITXD	send
5	GND-HMI	+5V HMI GND
6	–	–
7	–	–
8	–	–
9	–	–

Fig.2-7

The drive ability of the LED：

which the rated current is 100mA and the rated voltage is 5V and 12V.
Recommendatory LED diode parameter as follows:
VF：Min. = 3.0V，Max. = 3.6V (test condition IF = 20mA);
Peak Forward Current：Max. = 80mA;
Continuous Forward Current ：Max. = 35mA

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

3 Operation Instructions

3.1 Operation Panel Instruction

Operation panel (as shown in fig. 3-1), the front surface is divided into two parts: LED Display Area and Push-button Area. And on upper right of operation panel, there is a thumb wheel which is available to be turned C.W and C.C.W.

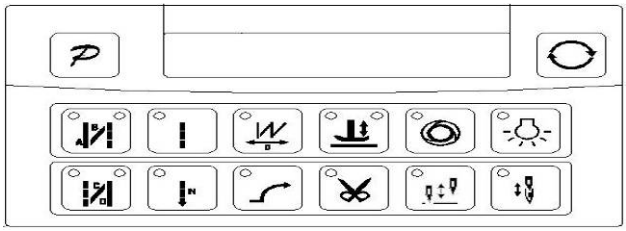


Fig. 3-1

The LED Display Area is on upper-center of the operation panel. The functional parameter display is made up for 6 LEDs. There is a push-button on each side of display area; they are the “Function Key”, “Cycle Key”. Under the display area, there are 12 push-buttons, with LED on upper right or left to show whether the function is on or off.

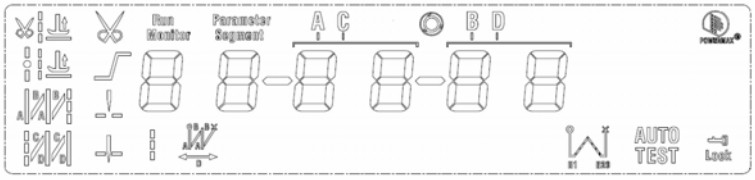


Fig. 3-2

3.2 Panel Keys Definition

Operator panel for each key explanation see the table 1.

Table 1: Following form is the instruction of each key:

No.	Sign	Description
1		Function Key: Main function is to confirm operation and also can be used with other buttons for key-combinations;
2		Cycle Key: Change parameter position when configuration;
3		Front-end Back tacking Key: Cycle selection among the single, double, quadruple and none front-end back tacking. After selection, different combinations of upper left and right LEDs will show the current status;
4		Rear-end Back tacking Key: Cycle selection among the single, double, quadruple and none rear-end back tacking. After selection, different combinations of upper left and right LEDs will show the current status;
5		Free-sewing Mode Key: After this mode is selected, LED on upper left will be lighted;
6		Multi-section Sewing key: After this mode is selected, LED on upper left will be lighted;
7		W-type Sewing Key: Select W-type sewing mode. After selection, the upper left LED will be lighted;
8		Soft-start Key: Select soft-start mode. After selection, the upper left LED will be lighted;
9		Foot Lifting Key: Automatic foot lifting setting. Select foot lifting and mid-foot lifting functions. After selection, upper left and upper right LED combination will show the current status;
10		Trimming Key: Select/not select auto trimming. After selection, the upper left LED will be lighted;

11		Trigger Key: Select/not select trigger mode. After selection, the upper left LED will be lighted;
12		Needle Stop Position Key: Select up/down needle position. After the up needle position is selected, the upper left LED will be lighted;
13		Sewing Lamp Key: Select on/off the illumination lamp. After lamp on is selected, the upper left LED will be lighted;
14		Stitch Compensation Key: Compensation function is on when you press the key, the function will be off when you release it. After compensation function is selected, the upper left LED will be lighted;

4. User Mode Definition

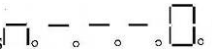
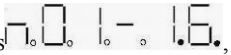
4.1 Operator Mode

This mode is the default mode of operation panel; operation panel will enter this mode automatically after switched on. After entering this mode, the 6 decimal points of LED will move in couples (display likes), this means HMI is in idle condition.

When doing any operation, if you don't press any button or turn thumb wheel for a long time, HMI will switch to idle mode automatically and the previous operation will not be executed!

4.1.1 Sewing Mode Set Up

Free Sewing Mode: Press  , LED displays  , then if you press  to confirm operation, LED display will recover to idle condition and upper left LED of  will be lighted.

Multi-section Sewing Mode: Press  , LED displays  , this is the operation interface of multi-section sewing. You can use the thumb wheel to confirm N sewing sections according to your need, then press  , to confirm parameters and quit the interface, or press  , LED displays  , entering the interface of stitch number set-up for each section. In this interface, you can use  to choose the section

which should be changed, then use thumb wheel to change stitch number, after operation is done, press to confirm the parameters and quit the interface, then LED display will recover to idle condition. So long as the multi-section sewing mode is on, upper left LED of will be lighted.

W-type Sewing Mode: Press , enter W-type sewing function, LED displays , this is W-type sewing interface. You can use to switch over A, B, D section, and use thumb wheel to change stitch number of each section. After confirmation, press, then LED display will recover to idle condition, and upper left LED of will be lighted.

4.1.2 Front-end/Rear-end Back tacking Setting:

When press or, LED enters front-end or rear-end back tacking setup mode.

When press , LED cycles among the single , double , quadruple , and none front-end back tacking interfaces. When press , LED cycles among the single, double, quadruple and none rear-end back tacking (fig. omitted). You can press to switch section A, B or C, D, and use thumb wheel to change stitch number of each section. After changing, press to confirm operation, LED display will recover to idle condition. The two LEDs on front-end or rear-end back tacking key will be lighted to show corresponding conditions.

- When 2 LEDs on are both off, means none back tacking;
- When upper left LED on is on, upper right is off, means single back tacking;
- When upper left LED on is off, upper right is on, means double back tacking;
- When 2 LEDS on are both on, means quadruple back tacking.

Note: above instruction we provide pictures of front-end back tacking

4.1.3 Soft-start Set Up:

press to select soft-start function, after selection, LED on upper left of will be

lighted. Press again can quit soft-start condition; LED on upper left of will be off.

4.1.4 Foot lifting Set Up:

Use to choose foot lifting mode, there are four different modes: , means no auto-foot-lifting; , means auto-foot-lifting after trimming; , means auto-foot-lifting when stop during sewing; , means auto-foot-lifting after trimming and stop during sewing. Use to cycle select among these four modes, after selection the LEDs will also show in corresponding conditions.

4.1.5 Trimming Set Up:

Use to choose auto-trimming mode. When it's auto-trimming, upper left LED of will be lighted; when auto-trimming is off, upper left LED of will be off.

4.1.6 Trigger Set Up:

Use to choose trigger mode. When it's in trigger mode, upper left LED of will be lighted; when trigger mode is off, upper left LED of will be off.

4.1.7 Needle Position Position Set Up:

Use to choose up/down needle position. When down position is selected, upper left LED of will be lighted; when up position is selected, upper left LED of will be off.

4.1.8 Sewing Lamp Set Up:

Use to turn on/off sewing lamp. When turn on the lamp, upper left LED of is on; when turn off the lamp, upper left LED of will be off.

4.1.9 Stitch Compensation Set Up:

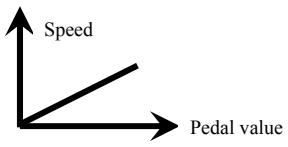
Use to activate stitch compensation function, when you release the button, the function will be deactivated. When the function is selected, upper left LED of will be lighted, otherwise the LED of will be off.

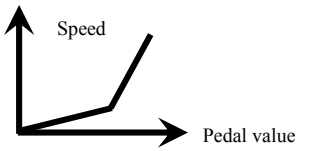
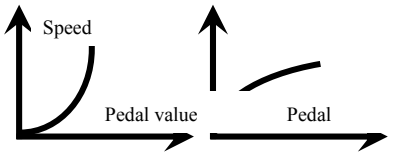
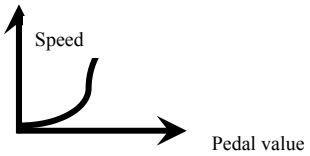
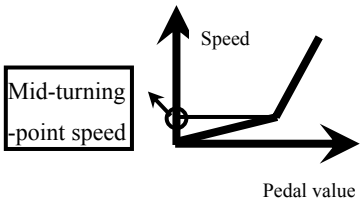
4.2 Technician Mode

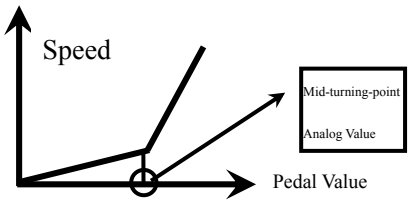
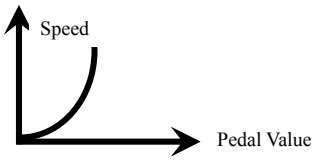
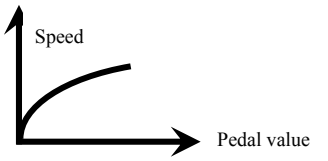
When HMI is in idle condition, press first, then press to enter technician interface, LED displays 0. 1.0.2.0.0. Then use thumb wheel to change value directly in the digit position with the flashing decimal point, you can use to change position of the flashing decimal point. After confirmation, press . If you don't press any button or turn thumb wheel within the certain time, HMI will recover to idle condition automatically.

Table 2： Parameter List of Technician Mode

Para. Type	Para. max	Para. min	Default Value	Value Range	Remark
Speed Para.	0	0	200	100 ~800	Start sewing speed
		1	2500	200 ~3000	Max. speed of free sewing mode(Max. speed limitation of overall situation)
		2	2500	200 ~3000	Max. speed of fixed-length sewing
		3	2500	200 ~3000	Max. speed limitation of manual backstitch
		4	200	100 ~800	Stitch compensation speed
		5	250	100 ~500	Trimming speed
		6	0	0 / 1	Slow-start mode:0; slow-start only after trimming,1:after trimming, sewing stop, both has slow-start
		7	2	1~9	Slow-start stitch number
		8	200	100 ~800	Slow-start speed
		9	20	1~20	System acceleration sensitivity(for direct drive, the value can be bigger; for belt drive, don't use big value, which will make more vibration and noise. This Para. Will not affect motor torque)
		A	20	1~20	System deceleration sensitivity (for direct drive, the value can be bigger; for belt drive, don't use big value, which will make more vibration and noise. This Para. Will not affect motor torque)

Para. Type	Para. max	Para. min	Default Value	Value Range	Remark
		6	800	200~1200	Medium speed value(RPM)
		C	50	25~200	Low speed value(RPM)
Back tacking Para.	1	0	800	200 ~2200	Front-end back tacking speed
		1	800	200 ~2200	Rear-end back tacking speed
		2	800	200 ~2200	W-type sewing speed
		3	26	0~70	Front-end back tacking, No.1 stitch compensation profile
		4	37	0~70	Front-end back tacking, No.2 stitch compensation profile
		5	26	0~70	Rear-end back tacking, No.1 stitch compensation profile
		6	37	0~70	Rear-end back tacking, No.2 stitch compensation profile
		7	26	1~70	W-type sewing, No.1 stitch compensation profile
		8	20	1~70	W-type sewing, No.2 stitch compensation profile
		9	200	1～999	Auto back tacking section stop time CT(ms)
		A	180	10~359	Stitch compensation reference angle(optimum actuation angle of backstitch electromagnet)
Pedal Para.	3	0	2	0/1/2/3	Pedal speed-control profile mode: 0：Auto linear ramp(auto calculation according to max. speed) 

Para. Type	Para. max	Para. min	Default Value	Value Range	Remark
					1：Two-stage ramp (can be set up freely, use Para. No.31 and No.32) 
					2：Power law curve(use No.33) 
					3：S-type curve(first slow then quick, better operation in low speed) 
Pedal Para.	3	1	3000	200 ~4000	Sub-para. Of two-stage speed control: mid-turning-point speed RPM (two-stage ramp turning point speed), only valid when para. No.30's value is 1. 

Para. Type	Para. max	Para. min	Default Value	Value Range	Remark
Pedal Para.	3	2	800	0 ~ 1024	Sub-para. Of two-stage speed control ramp: Pedal analog value of mid-turning-point, valid when Para. No.30 is set to 1, the para. Value should be in the range from para. No.38 to para. No.39. 
		3	2	1/2	Sub-para. Of power speed control curve: Valid when para. No.30 is 2. 1: Square(slow first, faster later, easy to control in low speed);  2: Radication(fast first, slower later, response fast); 
		4	150	0 ~ 1024	Trimming pedal-position set up, see fig. 2-1 (setting value should no bigger than Para. No.35)
		5	300	0 ~ 1024	Foot lifting pedal-position set up, see fig.2-1 (Setting value should be in the range of para.No.34 and para. No.36)

Para. Type	Para. max	Para. min	Default Value	Value Range	Remark
		6	460	0 ~ 1024	Pedal mid-homing position, see fig. 2-1. (Setting value should be in the range of para. No.35 and para. No.37)
		7	480	0 ~ 1024	Pedal forward running position, see fig. 2-1. (Setting value should be in the range of para.No.36 and para. No.38)
		8	680	0 ~ 1024	Pedal low speed running position (upper limitation), see fig. 2-1. (Setting value should be in the range of para.No.37 and para. No.39)
		9	960	0 ~ 1024	Pedal max. Analog value, see fig. 2-1. (Setting value should be no less than para.No.38)
		A	0	0 ~800	Pedal foot lifting confirming time
		b	0	0 / 1	After pedal back to homing position then trimming selection start: 0: off 1: on
		C	1	0 / 1	Foot lifting position, foot lifting function selection: 0: without 1:with
		d	1	0 / 1	Trimming position, foot lifting function selection: 0: without 1:with
Customize Set up	4	0	1	0 / 1	Auto upper needle stop position search after switch on: 0: function on 1: function off
		1	1	0 / 1	Auto back tacking function selection: (for machines without this function, we suggest to deactivated this function 0: function off 1:function on

Para. Type	Para. max	Para. min	Default Value	Value Range	Remark
		2	0	0 / 1	Function mode selection when manually push back tacking 0: Juki mode. During sewing or stop sewing both have this action. 1: Brother mode. Only acts during sewing.
		3	0	0 / 1 / 2 / 3	Special operation mode: 0: Operator selection 1: Simply sewing mode 2: Motor initial angle measurement (not necessary to remove the belt) 3: Ratio mode calculation (synchronize encoder is necessary and belt can not be removed)
		4	0	0—31	Motor torque increase function in low speed on & off: 0: Normal functions 1-31: low speed torque increase level
		5	1	0 / 1	Needle stop mode: 0: Constant speed idle mode (in belt drive mode, stop accuracy is not high) 1: Pull-back mode (PMX mode)
		6	100	0~800	Instruction execution time of half stitch compensation
		7	150	0~800	Instruction execution time of one stitch compensation
Count Mode	5	0	1	1 ~ 100	Stitch counting proportion set up
		1	1	1~ 9999	Stitch counting value set up

Para. Type	Para. max	Para. min	Default Value	Value Range	Remark
		2	0	0~4	Stitch counting mode selection: 0: no counting 1: Counting up according to stitch number, after reaching set value then restart. 2: Counting down according to stitch number, after reaching set value then restart. 3: Counting up according to stitch number, after reaching set value, then motor should stop automatically, recounting should be restart by S4 [152.INI] =CRS or the button A on operation panel. 4: Counting down according to stitch number, after reaching set value, motor should stop automatically, recounting should be restart by S4 [152.INI] =CRS or the button A on operation panel.
		3	1	1~100	Trimming counting proportion set up
		4	1	1~9999	Trimming counting value set up
		5	0	0~4	Trimming counting mode selection: 0: no counting 1: Counting up according to stitch number, after reaching set value then restart. 2: Counting down according to stitch number, after reaching set value then restart.

Para. Type	Para. max	Para. min	Default Value	Value Range	Remark
					3: Counting up according to stitch number, after reaching set value, then motor should stop automatically, recounting should be restart by S4 [152.INI] =CRS or the button A on operation panel. 4: Counting down according to stitch number, after reaching set value, motor should stop automatically, recounting should be restart by S4 [152.INI] =CRS or the button A on operation panel.
Operation	6	0	0	0	Running time reset
		1	0	0/ 1/ 2	Para. transmission method: 0: no action; 1: Para. Download (from operation panel to controller); 2: Para. Upload (from controller to operation panel).
		2	2000	1, 2, 88	Recover to default para.
		3	0	1, 2	Save current para. As User custom para.(recoverable)
		Note: operation para. Of (6X) will not be save.			

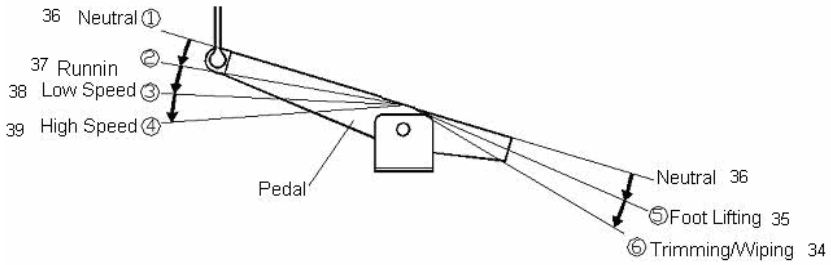


Fig4-1 Pedal action parameter the position of the diagram

4.3 Administrator Mode

When HMI in idle mode, first press  , then press  , to enter administrator interface, LED displays 3. 1.0. 1.8.8. use thumb wheel to change value with the flashing radix point, and  can be used to change flashing point position. After the value is confirmed, you can switch to next para. Or press  to confirm modification. If you don't press any button or turn thumb wheel in a certain time, system will automatically switch to HMI idle condition.

Table 3: Para. List of Administrator mode

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
Trimming Mode	0	1	0	0～359	Mech. Angle when trimming finished
		2	1	0 / 1 / 2 / 3 / 4 / 5 / 6	Trimming time sequence selection: 0: [TS] set angle start trimming, until upper needle stop position is reached, then time delay to [T2] set value. 1: [TS] set angle start trimming, until [TE] set angle. 2: [TS] set angle start trimming, time delay to [T2] set value. 3: After lower needle stop position is reached, time delay to [T1] set value then start trimming, time delay to [T2] set value. 4: After upper needle stop position is reached, time delay to [T1] set value then start trimming, time delay to [T2] set value, most applications are for interlock machines.

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
					5: After lower needle stop position is reached then start trimming until to the upper position. Time delay to T1 set value then start T2 set trimming time. (Most applications are for flat sewing machines, and set value for T1 and T2 are mostly 0) 6: [TS] set angle start trimming until upper needle stop position. Time delay to T1 set value then start T2 set trimming time.
		3	10	5-359	Trimming start angle TS (relate to lower needle stop position angle)
		4	300	10-359	Trimming finish angle TE (relate to lower needle stop position angle, the value should be bigger than TS)
		5	10	1-999	Trimming start time delay T1（ms）
		6	60	1-999	Trimming finish time delay T2（ms）
		7	30	1～999	Lower needle stop position trimming time delay D1
		8	90	1～9999	Lower needle stop position trimming duration time D2
		9	120	1～999	Lower needle stop position trimming recover time D3
		A	20	10-70	Trimming torque increase angle (Reserved)

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
Thread slack/Thread sweeping/ String nipping Mode	1	0	0	0 / 1 / 2 / 3 / 4 / 5 / 6	Thread slack electromagnet time sequence select: 0: [LS] set angle is reached start thread slack, until upper needle stop position then time delay to [L2] set value. 1: [LS] set angle is reached start thread slack, until [LE] set angle. 2: [LS] set angle is reached start thread slack, time delay to [L2] set time. 3: Lower needle stop position is reached, time delay [L1] set time then start thread slack, until [L2] set time. 4: Upper needle stop position is reached, time delay [L1] set time then start thread slack, until [L2] set time. 5: Lower needle stop position is reached then start thread slack until upper needle stop position. Time delay [L1] set time then start [L2] set thread lack time. 6: [LS] set angle is reached then start thread slack until upper needle stop position. And then time delay [L1] set time, then [L2] set thread lack time.
		1	30	5-359	Thread slack electromagnet start angle LS (relate to lower needle stop position angle)

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
		2	300	10-359	Thread slack electromagnet finish angle LE (relate to lower needle stop position, the value should bigger than LS)
		3	1	1-999	Thread slack electromagnet start time delay T1 （ms）
		4	10	1～999	Thread slack electromagnet time delay T2（ms）after upper needle stop position is reached
		5	1	0 / 1	String sweeping function selection 0: off 1:on
		6	10	1～999	Thread wiping/Thread sweeping time delay ms
		7	30	1～9999	Thread wiping/Thread sweeping time delay ms
		8	50	1～999	Thread wiping/Thread sweeping recover time ms
		9	1	0 / 1	Thread nipping function selection 0: off 1: on
		A	100	10-359	Thread nipping initial angle
		b	190	11-359	Thread nipping finish angle
		C	0	0～9999	Air blow start time delay ms
		d	50	1～9999	Air blow duration time ms
		E	160	11-359	Lower angle after foot lifting when thread nipping

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
Stop Mode	2	0	360	200～360	Stop position after trimming(can implement pull back function after trimming)
		1	0	0～240	Reverse angle before sewing start(enhance the ability over thick material)
		2	0	0 / 1	D axis current lock selection after stop
		3	300	1～3000	D axis current lock duration after stop (ms)
		4	0	0/ 1/2/3	Emergency Stop Mode: 0: Turn off the emergency stop function 1: Emergency stop at any position 2: Emergency stop at upper needle stop position 3: Emergency stop at lower needle stop position
		5	0	0～999	Continue stitch No. before emergency stop (according to different set speed and stitch No., the actual value might be bigger)
		6	0	0/ 1	Restart after emergency stop: 0: Can not be restart, it's necessary to restart the power. 1: When the alarm is canceled, can be restarted.

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
		7	360	200～360	Upper needle stop position adjustment when machine stop
		8	0	0/ 1/2	Needle cooling output power set up
		9	2500	1 - 2550 ms	Needle cooling time delay
		A	200	200 - 6000 rpm	Needle cooling start speed
Mode Selection	3	0	0	0 / 1	Foot lifting control mode 0: Push button jog switch: 1: Valid when button is pushed;
		1	0	0 / 1	Auto test mode selection: 0: With certain stitch number 1: With certain time
		2	300	0～1000	Safety alarm confirming time ms (for flat sewing machine safety tilting switch and overlock sewing machine safety knife protection switch are same, use the same solution)
		3	50	0～1000	Safety switch recover confirm time ms
		4	0	0 / 1	Motor resolving direction: 1: C.C.W 0: C.W.
		5	0	0 / 1/2	Foot lifting signal speed control function: 0: off 1: analog signal 2: digital signal
		6	0	0～1023	Signal min.

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
		7	710	0～1023	Signal max.
		8	200	200～800	Signal speed control min.
		9	400	200～2500	Signal speed control max.
		A	0	0/1/2/3	Single side detector operation mode: 0: no use of detector 1: detector on when manual start mode 2: detector on when auto start mode 3: detector on when double trimming manual speed control mode
		b	50	10～3000	Auto start mode confirming time ms
		C	3	0～999	Stitch No. without response after start
		d	3	0～999	Stitch No. for first double trimming
		E	3	0～999	Continue stitch No. after signal invalid (according to different speed and stitch No., the actual value might be bigger)
		F	0	0 / 1	Air-tight joint mode of auto back tacking 0: Hold current air-tight joint condition when auto back tacking; 1: Forced close air-tight joint when auto back tacking;
Machine Para.	4	0	1000	0～9999	Motor/machine ratio:0.001 (If ratio has been calculated automatically, the para. In the controller might be different with HMI)

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
		1	3500	0～5000	Max. speed limitation of machine
		2	0	0～359	Adjustment angle of upper needle stop position (relate to angle difference of upper needle stop position encoder)
		3	175	0～359	Mech. Angle of lower needle stop position
		4	200	0~800	Foot lifting release time delay (ms)
		5	9	0～359	Torque increase initial angle of over thick material
		6	57	0～359	Torque increase finish angle of over thick material
		7	0	0～2000	Oil refill time alarm (hour. 0: function deactivated)
		8	0	0～4000	Oil alarm, stop operation time (hour. 0: function deactivated)
		9	1000	200～2500	Machine signal B2 speed
		A	1500	200～2500	Machine signal B3 speed
		b	800	0～ 1023	No.1 Analog signal input threshold value
		C	800	0～ 1023	No.2 Analog signal input threshold value
Input Definition	5	0	1	0:Disable 1:Manual back tacking 2:Safety switch 3:Emergency stop	No.1 input definition
		1	1		No.1 active input level 0/1
		2	0		No.2 input definition
		3	0		No.2 active input level 0/1

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
		4	10	4:Material side detection 5:Pedal trimming input 6:Pedal foot lifting input 7:Stitch compensation 8:Front-end/rear-end back tacking reverse 9:Presser foot alternation lifting 10:Air-tight joint 11:Counter reset 12:OP input 13:Presser foot alternation input 1 14:Presser foot alternation input 2 15:Needle lifting lock 16:Edge joint presser foot control input	No.3 input definition
		5	1		No.3 active input level 0/1
		6	0		No.4 input definition
		7	0		No.4 active input level 0/1
		8	9		No.5 input definition
		9	1		No.5 active input level 0/1
		A	0		No.6 input definition
		b	0		No.6 active input level 0/1
		C	11		No.7 input definition
		d	1		No.7 active input level 0/1
		E	7		No.8 input definition
		F	1		No.8 active input level 0/1
Output Definition	6	0	1	0:Output disable 1:Trimming 2:Thread wiping	No.1 electromagnet output definition
		1	3		No.2 electromagnet output definition

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
		2	4	3:Back stitch 4:Foot lifting 5:Thread slack 6:Thread nipping 7:Air sucking 8:Air blowing 9:Needle cooling 10: Presser foot alternation lifting 11: Air-tight joint 12:Back tacking reverse hang mode 13:Alternation lifting mode 14:Air-tight joint mode 15:OP output 16:Bottom thread counter full condition 17:Trimming short thread head output 18: Edge joint presser foot control output	No.3 electromagnet output definition
		3	0		No.4 electromagnet output definition
		4	0		No.5 electromagnet output definition
		5	13		No.6 electromagnet output definition
		6	14		No.7 electromagnet output definition
		7	8		No.8 electromagnet output definition
No.1 Electromagnet	7	0	50	1～500	No.1 electromagnet fully output time ms
		1	1	1～10	No.1 electromagnet chopping on time ms(Reserved)
		2	1	1～10	No.1 electromagnet chopping off time ms(Reserved)

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
		3	0	0～600	No.1 electromagnet protection time 100ms
		4	70	1～500	No.2 electromagnet fully output time ms
		5	1	1～ 10	No.2 electromagnet chopping on time ms(Reserved)
		6	1	1～ 10	No.2 electromagnet chopping off time ms(Reserved)
		7	0	0～600	No.2 electromagnet protection time 100ms
		8	150	1～500	No.3 electromagnet fully output time ms
		9	1	1～ 10	No.3 electromagnet chopping on time ms(Reserved)
		A	1	1～ 10	No.3 electromagnet chopping off time ms(Reserved)
		b	0	0～600	No.3 electromagnet protection time 100ms
		C	100	1～500	No.4 electromagnet fully output time ms
		d	1	1～ 10	No.4 electromagnet chopping on time ms(Reserved)
		E	1	1～ 10	No.4 electromagnet chopping off time ms(Reserved)
		F	0	0～600	No.4 electromagnet protection time 100ms
No.2 Electromagnet	8	0	40	1～500	No.5 electromagnet fully output time ms
		1	0	1～ 10	No.5 electromagnet chopping on time ms(Reserved)

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
		2	0	1～10	No.5 electromagnet chopping off time ms(Reserved)
		3	0	0～600	No.5 electromagnet protection time 100ms
		4	100	1～500	No.6 electromagnet fully output time ms
		5	0	1～10	No.6 electromagnet chopping on time ms(Reserved)
		6	0	1～10	No.6 electromagnet chopping off time ms(Reserved)
		7	0	0～600	No.6 electromagnet protection time 100ms
		8	100	1～500	No.7 electromagnet fully output time ms
		9	0	1～10	No.7 electromagnet chopping on time ms(Reserved)
		A	0	1～10	No.7 electromagnet chopping off time ms(Reserved)
		b	0	0～600	No.7 electromagnet protection time 100ms
		C	100	1～500	No.8 electromagnet fully output time ms
		d	0	1～10	No.8 electromagnet chopping on time ms(Reserved)
		E	0	1～10	No.8 electromagnet chopping off time ms(Reserved)
		F	0	0～600	No.8 electromagnet protection time 100ms

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
Input Definition	9	0	0	0:Disable 1:Manual back tacking 2:Safety switch 3:Emergency stop 4:Material side detection 5:Pedal trimming input 6:Pedal foot lifting input 7:Stitch compensation 8:Front-end/rear-end back tacking reverse 9:Presser foot alternation lifting 10:Air-tight joint 11:Counter reset 12:OP input 13:Presser foot alternation input 1 14:Presser foot alternation input 2 15:Needle lifting lock 16:Edge joint presser foot control input	No.9 analog input definition
		1	0		No.9 analog input active level 0/1
		2	0		No.10 analog input definition
		3	0		No.10 analog input active level 0/1
		4	0		No.11 analog input definition
		5	0		No.11 analog input active level 0/1
		6	8		No.12 analog input definition
		7	1		No.12 analog input active level 0/1
		8	0		No.13 analog input definition
		9	0		No.13 analog input active level 0/1
		A	0		No.14 analog input definition
		b	0		No.14 analog input active level 0/1
		C	0		No.15 analog input definition
		d	0		No.15 analog input active level 0/1
		E	0		No.16 analog input definition
		F	0		No.16 analog input active level 0/1

Para. Type	Para. No. max	Para. No. min	Default Value	Value Range	Remark
Output Definition	A	0	0	0:Output disable 1:Trimming 2:Thread wiping 3:Back stitch 4:Foot lifting 5:Thread slack 6:Thread nipping 7:Air sucking 8:Air blowing 9:Needle cooling 10: Presser foot alternation lifting 11: Air-tight joint 12:Back tacking reverse hanging mode 13:Alternation lifting mode 14:Air-tight joint mode 15:OP output 16:Bottom thread counter full condition 17:Trimming short thread head output 18: Edge joint presser foot control output	No. 1 electromagnet output definition
		1	0		No. 2 electromagnet output definition
		2	0		No. 3 electromagnet output definition
		3	0		No. 4 electromagnet output definition
		4	0		No. 5 electromagnet output definition
		5	0		No. 6 electromagnet output definition
		6	0		No. 7 electromagnet output definition
		7	0		No. 8 electromagnet output definition

4.4 Monitoring Mode

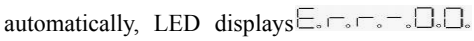
When operation panel is in idle condition, first press  and press  , then enter monitoring mode. Use thumb wheel to choose the para. Which you like to monitor.

Detail monitoring para. See table 4, if you don't push any button, then operation panel will back to idle condition automatically.

Table 4: Monitoring mode para. table

	Para. No. max	Para. No. min	Para. Unit	Remark
Monitoring Status	1	0	Time	Stitch counting
		1	Time	Trimming counting
	2	0	V	Line voltage
		1	RPM	Machine speed
		2	0.01A	Phase current
		3	degree	Initial angle
		4	degree	Mech. Angle
		5	——	Sample value of pedal voltage
		6	0.001	Ratio
		7	Hour	Motor total running time
		8	——	Sample value of machine speed signal
	3	0-7	——	8 history error codes

4.5 False alarm mode

When system detect an error, the operation panel will switch to false alarm mode automatically, LED displays  . In this mode, operation panel is still possible to change Technician para., Administrator para. And other para., and monitoring mode is also valid. When you quit these modes, the operation panel will not return to idle mode, it'll still back to false alarm mode, after correcting system false, it's necessary to reset the main power then the machine can be used normally. For the most error codes and

disposal methods, please check user's manual of controller.

4.6 Safety switch warning mode

When control system detects safety switch action (normally being used for machine tilting safety switch, etc), then operation panel will turn to safety switch alarm mode, LED displays SAFTY. In safety switch alarm mode, it's still possible to change technician para. And operation panel para., and entering monitor mode. After quitting these modes, operation panel will not back to idle condition, it'll still back to safety switch alarm mode.

(Safety switch input will be handled integrally; system will not distinguish machine tilting switch or knife protection switch.)

5. Operation after control system installation:

1. After control system has been installed, before using, it's necessary to have a "Auto ratio calculation" (because the machining accuracy, hand wheel effective radius of different manufactures are different, even for direct drive system, the ratio is not always 1:1). Enter technician No.43 para., value set to 3. Step pedal to start, the system will run about 10 rounds in mid-speed then stop; the calculation result will save in controller directly. After that set para. No.43 to 0.

If the ratio value can be confirmed, then technician para. No.40 can be set directly. The actual ratio which saved in controller can be got by monitoring para. No.26.

2. For this software version and higher version, the down needle position, will no longer confirm by down needle position signal. Instead, the position will be confirmed by technician para. No.43, this parameter will ensure corresponding mech. Angle between down and up needle position. The present mech. Angle can be showed by monitoring parameter No.24 to user, up needle position mech. Angle is 0.

(After power on, control system needs at least one time to go through the up needle position for calibration the mech. Angle. For instance: searching for upper position. Ratio value will influence mech. Angle calculation, we suggested that confirm the correct ratio first,

then adjust lower needle position).

3. For this software version and higher version, all control systems have 5 electromagnet outputs, and use new software design. And No.2 and No.3 has output chopping current adjustment (default output is back stitch and foot lifting electromagnet), the other outputs have no chopping function. Before using, please confirm administrator para. No. 6x, ensure set up of all outputs are same to electromagnet connections; and it's also necessary to confirm administrator para. No.7x and No.8x, if not, the electromagnets may have insufficient power output. (Default para. Is set according to most manufactures' electromagnet connection definition)

6. Control system restores Set up:

6.1 Manufacture parameters recovery

Step 1: In operator mode, press and hold  , then press  , LCD display **PD** 0000, and password which set by technician is required.

Step 2: Use thumb wheel change the value with flashing decimal point, you can use  to change decimal point position, then go to technician para. No.62.

Step 3: Use thumb wheel change the value with flashing decimal point, you can use  to change decimal point position, and then change value to recover one.

Step 4: Confirm the parameters are correct, then press and hold  , until LED on operation panel start flashing, then release  , then operation panel and whole control system is recovered to default settings.

6.2 User's parameters recovery

Use operation panel para. No.63 can turn the current user settings to user-defined settings, operation method as follows:

Step 1: In operator mode, first press and hold  , then press  , LCD will display PD 0000, and password which set by technician is required.

Step 2: Use thumb wheel to change value with flashing decimal point directly, you can use  to change the decimal point position, to index value 63, the parameter value should

be 1 or 2.

Step 3: Use thumb wheel to change value with flashing decimal point directly, you can use  to change the decimal point position, to parameter value which you want to recover.

Step 4: After confirming inputs are correct, press and hold  , until the operation panel LED start flashing, then release  ， then operation panel and whole system is recovered to default condition.

When system get error due to parameter settings, then the user can use user-definition parameter to recover, the operational method is same like "Default parameters recover", set administrator parameter No.63 to 1 or 2, press and hold  for 5 seconds, then system will recover to user-definition parameter settings.

Notes:

1. After power on, operation panel will only download parameters in operator mode, it will not download technician and administrator parameter settings initiatively. If you want to download the whole parameters, you can use technician para. No.61 to download all current active parameters from operation panel to controller.
2. If you want to recover other parameters which saved in operation panel, it's necessary to use technician para. No.62 to activate these parameter settings, then download them.
3. After changing one single para., operation panel need to compare the value difference between current para. And modified one, and then start downloading.
4. After recovering default parameter settings, we strongly recommend that to restart the system.

7. Recovery processing and maintenance

error code	meaning	solution
01	hardware overflow	Turn off the system power, restart after 30 seconds, if the controller still does not work, please replace it and inform the manufacturer.
02	software overflow	

03	system under-voltage	Disconnect the controller power and check if the input voltage is too low (lower than 176V). If yes, please restart the controller when the normal voltage is resumed. If the controller still does not work when the voltage is at normal level, please replace the controller and inform the manufacturer.
04	over-voltage when the machine is off	Disconnect the controller power and check if the input voltage is too high (higher than 264V). If yes, please restart the controller when the normal voltage is resumed. If the controller still does not work when the voltage is at normal level, please replace the controller and inform the manufacturer.
05	over-voltage in operation	
06	solenoid circuit failure	Turn off the system power, check if the solenoid is connected correctly and if it is loose or damaged. If yes, replace it in time. Restart the system upon making sure everything is in good order. If it still does not work, seek technical support.
07	electrical current checking circuit failure	Turn off the system power, restart after 30 seconds to see if it works well. If not, try several more times. If such failure happens frequently, seek technical support.
08	locked motor roller	Disconnect the controller power, check if the motor input plug is off, loose or damaged, or if there is something twined on the machine head. After checking and correction, if the system still does not work, please replace the controller and inform the manufacturer.
09	brake circuit failure	Turn off the system power, check if the white brake resistance plug on the power board is loose or dropped off, fasten it and restart the system. If it still does not work, please replace the controller and inform the manufacturer.
10	HMI communication failure	Check if the connecting line between control panel and controller is off, loose or broken, restore it and restart the system. If it still does not work, please replace the controller and inform the manufacturer.
11	machine head needle positioning failure	Check if the connection line between machine head synchronizer and controller is loose or not, restore it and restart the system. If it still does not work, please replace the controller and inform the manufacturer.
12	motor original angle checking failure	Please try 2 to 3 more times after power down, if it still does not work, please replace the controller and inform the manufacturer.
13	Motor HALL failure	Turn off the system power, check if the motor sensor plug is loose or dropped off, restore it and restart the system. If it still does not work, please replace the controller and inform the manufacturer.
14	DSP Read/Write EEPROM failure	Try another time after power down, if it still does not work, please replace the controller and inform the manufacturer.
15	Motor over-speed protection	Turn off the system power, turn on again in 30 seconds to see if it works. If not, try several more times, if such failure happens frequently, please change the controller and inform the manufacturer.

16	Motor reversion	Turn off the system power, restart the system after 30 seconds, if it still does not work, please replace the controller and inform the manufacturer.
17	HMI Read/Write EEPROM failure	Turn off the system power, restart the system after 30 seconds, if it still does not work, please replace the controller and inform the manufacturer.

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