POWERMAX®

# ASE5A

## 工业缝纫机伺服控制器

Industrial Sewing Machine Servo controller

使用说明书

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设备，请勿移做其他用途。

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

## 安全事项

- 在使用本产品之前，请先阅读《产品说明书》及所搭配的缝纫机机械说明书。
- 本产品必须由接受过专业培训的人员来安装或操作。
- 请尽量远离电弧焊接设备，以免产生的电磁波干扰本控制器而发生误动作。
- 请不要在室温 45°以上或者 0°以下的场所使用。
- 请不要在湿度 30%以下或者 95%以上或者有露水和酸雾的场所使用。
- 安装控制箱及其他部件时，请先关闭电源并拔掉电源插头。
- 为防止干扰或漏电事故，请做好接地工程，电源线的接地线必须牢固的方式与大地有效连接。
- 所有维修用的零部件，须由本公司提供或认可，方可使用。
- 在进行任何保养维修动作前，必须关闭电源并拔掉电源插头。控制箱里有高压危险，必须关闭电源五分钟后方可打开控制箱。
- 本手册中标有 ⚠ 符号之处为安全注意点，必须注意并严格遵守，以免造成不必要的损害。

# 1 产品安装

## 1.1 产品规格

| | | | |
|---|---|---|---|
| 产品型号 | AHE5A | 电源电压 | AC 220±20% V |
| 电源频率 | 50Hz/60Hz | 最大输出功率 | 550W |

## 1.2 接口插头的连接

将脚踏板及机头的各连接插头安插到控制器后面对应的插座上，各插座名称如图 1-2 所示。连接好，请检查插头是否插牢。

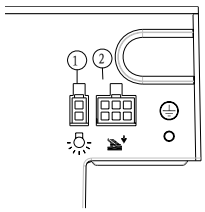
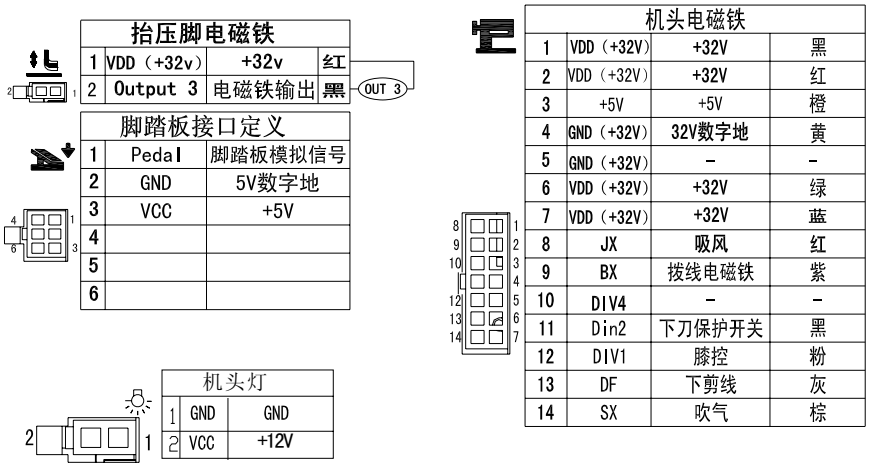


图 1-1 AS 系列控制器图

①机头灯；② 脚踏板；



抬压脚电磁铁

| | | | |
|---|---|---|---|
| 1 | VDD（+32v） | +32v | 红 |
| 2 | Output 3 | 电磁铁输出 | 黑 |

OUT 3

脚踏板接口定义

| | | |
|---|---|---|
| 1 | Pedal | 脚踏板模拟信号 |
| 2 | GND | 5V数字地 |
| 3 | VCC | +5V |
| 4 | | |
| 5 | | |
| 6 | | |

机头灯

| | | |
|---|---|---|
| 1 | GND | GND |
| 2 | VCC | +12V |

机头电磁铁

| | | | |
|---|---|---|---|
| 1 | VDD（+32V） | +32V | 黑 |
| 2 | VDD（+32V） | +32V | 红 |
| 3 | +5V | +5V | 橙 |
| 4 | GND（+32V） | 32V数字地 | 黄 |
| 5 | GND（+32V） | - | - |
| 6 | VDD（+32V） | +32V | 绿 |
| 7 | VDD（+32V） | +32V | 蓝 |
| 8 | JX | 吸风 | 红 |
| 9 | BX | 拨线电磁铁 | 紫 |
| 10 | DIV4 | - | - |
| 11 | Din2 | 下刀保护开关 | 黑 |
| 12 | DIV1 | 膝控 | 粉 |
| 13 | DF | 下剪线 | 灰 |
| 14 | SX | 吹气 | 棕 |

图 1-2 控制器接口定义

## 1.3 连线与接地

必须要做好系统的接地工程，请合格的电气工程人员予以施工。产品通电及投入使用前，必须确保电源插座 AC 输入端已安全可靠的接地。系统的接地线为黄绿线，该地线请务必可靠连接至电网安全保护接地上，以保证安全使用，并可防止出现异常情况。

⚠：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！

# 2 操作面板使用说明

## 2.1 操作面板的显示说明

根据系统工作状态，操作面板的液晶屏模块将显示当前的缝纫模式、各种参数、前/后固缝设置，以及抬压脚、停针位、剪线、慢速起缝等液晶字符。操作面板液晶屏功能图标显示说明如图 2-2 所示。

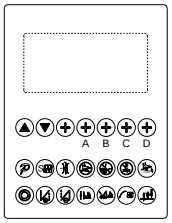



图 2-1 操作面板外观界面

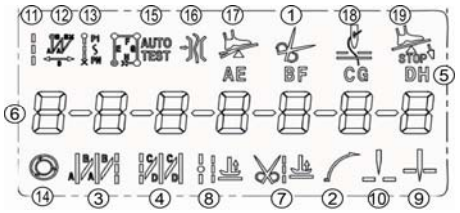



图 2-2 操作面板液晶显示屏图示

表 2-1 操作面板液晶功能图标显示说明

| 索引 | 图标 | 描述 |
|---|---|---|
| ① | | 自动剪线功能 |
| ② | | 软启动功能 |
| ③ | | 前加固缝 |
| ④ | | 后加固缝 |
| ⑤ | AE BF CG DH | 缝纫段数标记 |
| ⑥ | | 计数/参数值显示 |
| ⑦ | | 剪线后抬压脚 |
| ⑧ | | 中间停针抬压脚 |
| ⑨ | | 中间停针下停针 |
| ⑩ | | 中间停针上停针 |
| ⑪ | | 自由缝 |
| ⑫ | | W 缝 |
| ⑬ | | 多段缝 |
| ⑭ | | 多段缝触发功能 |
| ⑮ | AUTO TEST | 自动测试 |
| ⑯ | | 夹线功能 |
| ⑰ | | 后半踏功能 |
| ⑱ | | 扫线功能 |
| ⑲ | | 起始定针缝 |

## 2.2 操作面板各按键功能说明

表 2-2 每个按键功能介绍

| 序号 | 外观 | 名称 | 功能描述 |
|---|---|---|---|
| 1 |  | 参数进入及返回键 | 一般模式下，按此键进入参数模式。参数模式下，按此键不保存修改，返回一般模式。此外，还可与其它按键同时按下实现组合功能。 |
| 2 |  | 模式切换及修改保存键 | 一般模式界面下按下此按键，循环切换自由缝、W 缝、多段缝。参数模式下，修改参数后，按此键，保存参数，再按一次，返回一般模式。 |
| 3 |  | 前加固缝键 | 系统为平缝参数时，作为起始倒针功能选择键，每按动一次，系统前固缝工作模式将按照 11B 号参数设置在无前固缝与前单固缝、前双固缝、前四固缝之间循环选择，对应液晶屏图标点亮。同时显示即为前固缝界面，选择对应的键和+键可增减设置 A、B 段的针数，默认针数范围 0~F 对应 0~15 针。绷缝模式下此按键不能设置起始倒针功能。参数界面，按动一次，参数号加 1。 |
| 4 |  | 后加固缝键 | 系统为平缝参数时，作为结束倒针功能选择键，每按动一次，系统后固缝工作模式将按照 11B 号参数设置在无后固缝与后单固缝、后双固缝、后四固缝之间循环选择，对应液晶屏图标点亮。同时显示即为后固缝界面，选择对应的键和+键可增减设置 C、D 段的针数，默认针数范围 0~F 对应 0~15 针。绷缝模式下此按键不能设置结束倒针功能功能。参数界面，按动一次，参数号减 1。 |
| 5 |  | 夹线键 | 按下该键，液晶屏图标 亮，表明夹线功能有效，再按一下该图标熄灭，表明关闭夹线功能。 |
| 6 |  | 多段缝触发键 | 在多段缝模式下，按下该键，液晶屏图标点亮，表明选择触发模式有效，此时点动脚踏板一次即可完成当前段的设定针数缝制；再按一下该图标熄灭，表明多段缝下触发功能关闭。 |
| 7 |  | 中间抬压脚键 | 按下该键，液晶图标点亮，表明缝纫中停车自动抬压脚有效，再按一下该图标熄灭，表明关闭缝纫中停车自动抬压脚功能。 |

| 序号 | 外观 | 名称 | 功能描述 |
|---|---|---|---|
| 8 |  | 剪线抬压脚键 | 按下该键，液晶图标  点亮，表明剪线后自动抬压脚有效，再按一下该图标熄灭，表明关闭剪线后自动抬压脚功能。 |
| 9 |  | 软启动键/LED 灯 | 按下该键，液晶屏图标  点亮，表明软启动有效，再按一下该图标熄灭，表明关闭软启动功能。长按此键，可调 LED 灯三档亮度。 |
| 10 |  | 停针位键 | 用于缝纫中途停车时系统的上/下停针位置选择，按下该键，  点亮，表明为上停针，再按下该键，  点亮，表明为下停针。但缝纫完成剪线之后，系统将停车在上针位。 |
| 11 |  | 速度增减键 | 可快捷设置临时调速。在多段缝模式下。此外，在参数设置时，单按此按键，对应参数号的加。  +此按键，作为对应参数号的减。 |
| 12 |  | 参数增加键 | 调整对应数值的增加键。  +此按键作为对应数值的减小键。 |
| 13 |  | 自动剪线键 | 按下该键，液晶屏图标  熄灭，表明自动剪线功能无效，再按一下该图标被点亮，表明开启剪线功能。 |
| 14 |  | 半后踏键 | 按下该键，液晶图标  熄灭，表明半后踏功能无效，再按一下该图标被点亮，表明开启半后踏功能。 |
| 15 |  | 扫线键 | 按下该键，液晶图标  熄灭，表明扫线功能无效，再按一下该图标被点亮，表明开启扫线功能。 |
| 16 |  | 起始定针缝 | 按下该键，液晶图标  点亮，表明起始定针缝功能有效，再按一下该图标熄灭，表明关闭起始定针缝功能。 |

# 3 系统参数设置说明

## 3.1 参数模式

1、 待机状态，按P键即可进入参数模式；
2、 按对应▲▼键和+键，可增加参数号及增加参数值。按P+▲▼和P++键，可减小参数号及减小参数值；
3、 按前加固缝键和后加固缝键可加减本段参数索引号；
4、 当参数值有加减，参数界面闪烁。此时，按 S 键，保存修改，界面不再闪烁。再按 S 键退出参数界面，返回一般模式；
5、 参数模式下，按P键，修改值不保存，待机状态。

| 参数编号 | 参数范围 | 典型值 | 参数描述 | 备注 |
|---|---|---|---|---|
| 100 | 100~8000 | 2000 | 起缝速度 | 速度 |
| 101 | 200~5000 | 3500 | 自由缝最高速（全局最高限速） | |
| 102 | 200~5000 | 3000 | 定长缝最高速 | |
| 103 | 200~5000 | 3000 | 手动倒缝最高限速 | |
| 104 | 100~8000 | 2000 | 补针速度 | |
| 105 | 100~5000 | 2500 | 剪线速度 | |
| 106 | 0/1 | 0 | 慢速启动模式<br>0：仅剪线后有慢速启动；<br>1：剪线后、中间停止都有慢速启动 | |
| 107 | 1~9 | 2 | 慢速起缝针数 | |
| 108 | 100~8000 | 2000 | 慢速起缝速度 | |
| 115 | 1~70 | 24 | 后固缝针迹补偿 1（吸合补偿，数值增大表示加快吸合） | 加固缝参数 |
| 116 | 1~70 | 20 | 后固缝针迹补偿 2（释放补偿，数值增大表示释放加快） | |
| 130 | 0/1/2/3 | 2 | 脚踏板曲线模式：<br>0：自动线性斜率（根据最高速自动计算）<br>1：两段斜率；<br>2：幂次曲线；<br>3：S 型曲线 | 踏板参数 |
| 131 | 200~4000 | 3000 | 两段斜率：中段速度 RPM（两段斜率的转折点速度） | |
| 132 | 0~1024 | 800 | 两段斜率：中段踏板模拟量（需在 138 到 139 参数之间） | |

| | | | | | |
|---|---|---|---|---|---|
| 133 | 1/2 | 1 | 幂次曲线:<br>1：平方曲线；<br>2：开方曲线； | | |
| 134 | 0~1024 | 90 | 踏板剪线位置 | 具体设置方法见图 4-1 所示。 | |
| 135 | 0~1024 | 300 | 踏板抬压脚位置 | | |
| 136 | 0~1024 | 460 | 踏板回中位置 | | |
| 137 | 0~1024 | 480 | 踏板前踩运行位置 | | |
| 138 | 0~1024 | 580 | 踏板低速运行位置（上限） | | |
| 139 | 0~1024 | 962 | 踏板模拟量最大值 | | |
| 13E | 1~800 | 100 | 剪线后抬压脚延迟时间（拨线） | | |
| 140 | 0/1 | 1 | 上电自动找上针位:<br>0 不找；1 找 | | 习惯设定 |
| 143 | 0/1/2/3 | 0 | 特殊运行模式:<br>0：操作工选择（正常）<br>1：简易缝模式<br>2：测电机初始角（不需要取下皮带）<br>3：计算传动比模式（需要有停针传感器，且不能取下皮带） | | |
| 144 | 0~31 | 0 | 电机低速加力功能开关:<br>0 正常功能；<br>1~31：低速加力过厚能力档位 | | |
| 149 | 0~10 | 0 | 缓放压脚斩波开通时间(100us 单位) | | |
| 150 | 1～100 | 1 | 计针数功能比例值设定 | | 计数模式 |
| 151 | 1～9999 | 1 | 计针数上限设定值 | | |
| 152 | 0～6 | 0 | 计针数模式选择:<br>0：不计数<br>1：依针数递增计数，计数满后自动重新计数<br>2：依针数递减计数，计数满后自动重新计数<br>3：依针数递增计数，计数满后马达自动停止，须由复位按钮设定或面板上的 P 键来启动重新计数。<br>4：依针数递减计数，计数满后马达自动停止，须由复位按钮设定或面板上的 P 键来启动重新计数。<br>5：依针数递增计数，计数满后发出报警，剪线后马达锁住<br>6：依针数递减计数，计数满后发出报警，剪线后马达锁住 | | |

| | | | | |
|---|---|---|---|---|
| 153 | 1～100 | 1 | 计件数功能比例值设定 | 计数模式 |
| 154 | 1～9999 | 1 | 计件数上限设定值 | |
| 155 | 0～4 | 0 | 计件数模式选择:<br>0：不计数<br>1：计件数递增计数，计数满后自动重新计数<br>2：计件数递减计数，计数满后自动重新计数<br>3：计件数递增计数，计数满后马达自动停止，须由复位按钮设定或面板上的 P 键来启动重新计数。<br>4：计件数递减计数，计数满后马达自动停止，须由复位按钮设定或面板上的 P 键来启动重新计数。 | |
| 156 | 0～9999 | 0 | 对应 1/2/3/4 号电磁铁斩波占空比时间选择(0 以 ms 为单位，1 以 0.1ms 为单位) | |
| 157 | 0～9999 | 0 | 对应 5/6/7/8 号电磁铁斩波占空比时间选择(0 以 ms 为单位，1 以 0.1ms 为单位) | |
| 158 | 0～1 | 0 | 计数可调开关（计针数和计件数）<br>（0 可调，1 不可调） | |
| 160 | | 0 | 运行时间复位 | 操作类（不保存） |
| 161 | 0/1/2 | | 参数传输:<br>0：无动作；<br>1：下传参数；<br>2：上传参数 | |
| 165 | - | | 恢复控制器出厂参数，并覆盖机头厂参数或用户自定义机修参数，原有参数不可恢复。 | |
| 200 | 0/1/2 | 0 | 剪线电机运行模式选择:<br>0：平车式；<br>1：绷缝式（普通绷缝剪线：停到上针位后剪线）； | |

| | | | | |
|---|---|---|---|---|
| 202 | 0/1/2/3/4/5/6 | 1 | 剪线时序选择:<br>0: 203 号参数所设定角度[TS]处进行切线，直至上停针后延时 206 参数所设定时间[T2]为止。<br>1:203 号参数所设定角度[TS]处进行切线，直至 204 号参数所设定角度[TE]为止。<br>2: 203 号参数所设定角度[TS]处进行切线，延时 206 参数所设定时间[T2]为止。<br>3: 下针位信号后延迟 205 号参数所设定时间[T1]进行切线，延时 206 参数所设定时间[T2]设定时间为止。<br>4: 找到上针位信号后延迟 205 号参数所设定时间[T1]进行切线,延时 206 参数所设定时间[T2]设定时间为止，大部分应用于绷缝机。<br>5: 找到下针位信号后即开始进行切线动作至上停针止。然后延迟 205 号参数所设定时间[T1]后再作 206 参数所设定的切线时间[T2]。(大部分用于一般平车机型，而 T1 与 T2 設定值大部分均设为 **0** ）<br>6: 203 号参数所设定角度[TS]处进行切线东芝至上停针止。然后延迟 205 号参数所设定时间[T1]后再作 206 参数所设定的切线时间[T2]。 | 剪线模式 |
| 203 | 5-359 | 10 | 剪线开始角度 TS（相对于下针位角度）（平车） | |
| 204 | 10-359 | 120 | 剪线结束角度 TE（相对于下针位角度，需大于 TS）（平车） | |
| 205 | 1-999 | 10 | 剪线开始延时 T1（ms）（绷缝） | |
| 206 | 1-999 | 120 | 剪线结束延时 T2（ms）（绷缝） | |
| 211 | 5-359 | 25 | 松线电磁铁启动角度 LS（相对于下针位角度） | 松线，扫线，夹线模式 |
| 212 | 10-359 | 350 | 松线电磁铁结束角度 LE（相对于下针位角度，需大于 LS） | |
| 213 | 1-999 | 1 | 松线电磁铁启动延迟时间 L1（ms） | |
| 214 | 1～999 | 10 | 松线电磁铁上针位后延迟时间 L2（ms） | |
| 216 | 1～999 | 10 | 拨线／扫线延迟时间 ms | |
| 217 | 1～9999 | 70 | 拨线／扫线持续时间 ms | |
| 218 | 1～999 | 50 | 拨线／扫线复原时间 ms | |

| | | | | |
|---|---|---|---|---|
| 21C | 0～9999 | 0 | 吹风开始延时 ms | |
| 21d | 1～9999 | 50 | 吹风持续时间 ms | |
| 21E | 11-359 | 160 | 夹线时压脚抬起后的下放角度 | |
| 220 | 200～360 | 360 | 剪线后停止位置（可实现剪线回拉功能） | 停止模式 |
| 221 | 0～240 | 0 | 缝纫前反转角度（提高过厚料能力） | |
| 224 | 0/1/2/3 | 0 | 紧急停车模式：<br>0：关闭紧急停车功能<br>1：紧急停于任何位置<br>2：紧急停于上针位<br>3：紧急停于下针位 | |
| 225 | 0～999 | 0 | 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) | |
| 226 | 0/1 | 0 | 紧急停车后再启动：<br>0：不可再启动，需重新上电；<br>1：信号撤销后可再次开始缝纫 | |
| 227 | 200～360 | 360 | 中间停上针位位置调整 | |
| 231 | 0 / 1 | 0 | 自动测试模式选择：（前面两位数模式设置）<br>0：定针数；<br>1：定时间（×100ms） | 模式选择 |
| 232 | 0～1000 | 300 | 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） | |
| 233 | 0～1000 | 50 | 安全开关恢复确认时间 ms | |
| 234 | 0 / 1 | 0 | 电机转向：<br>0：正转；<br>1：反转 | |
| 240 | 0～9999 | 1000 | 电机/机头传动比：X0.001<br>（如果自动计算过传动比，控制器内的该参数可能与 HMI 上的不同） | 机头相关参数 |
| 242 | 0～359 | 0 | 上停针位调整角度（相对于上针位传感器的位置偏移） | |
| 243 | 0～359 | 175 | 下停针位机械角度 | |
| 244 | 0~800 | 200 | 放压脚延迟时间（ms） | |

| | | | | |
|---|---|---|---|---|
| 247 | 0～2000 | 0 | 加油提醒时间（小时）0：关闭此功能 | |
| 248 | 0～4000 | 0 | 加油报警、禁止运行时间（小时）<br>0：关闭此功能 | |

### 3.2 监控参数表

| 参数编号 | 参数描述 | 参数编号 | 参数描述 |
|---|---|---|---|
| 010 | 针数计数 | 026 | 机头传动比实际值 |
| 011 | 计件数 | 027 | 电机累计运行时间（Hour） |
| 012 | 机头真实速度 | 028 | 机头交互量电压采样值 |
| 013 | 霍尔状态 | 029 | DSP 软件版本号 |
| 020 | 母线电压 | 02A | 模拟输入 1 采样值 |
| 021 | 机头速度 | 02b | 模拟输入 2 采样值 |
| 022 | 相电流 | 02C | 错误计数器 |
| 023 | 初始角度 | 02d | QP 超状态 |
| 024 | 机械角度 | 030-037 | 历史故障代码 |
| 025 | 踏板电压采样值 | | |

### 3.3 安全报警

| 报警代码 | 代码含义 | 解决措施 |
|---|---|---|
| ALA-1 | 加油提醒 | 按 P 键可暂时取消报警。请及时加油 |
| ALA-2 | 计针数报警 | 表示计针数已达所设上限，按 P 键可取消报警并重新计数 |
| ALA-3 | 计件数报警 | 表示计件数已达所设上限，按 P 键可取消报警并重新计数 |
| ALA-4 | 紧急停车 | 再按下紧急停车按钮，可消除紧急停车状态 |
| ALA-5 | 提针锁定 | 再按下提针锁定按钮，可消除提针锁定状态 |
| PoWoFF | 断电提醒 | 请等候 30 秒再重新打开电源开关 |
| ArN UP | 翻台开关报警 | 摆正机头，确保翻台开关复原 |

### 3.4 故障代码表

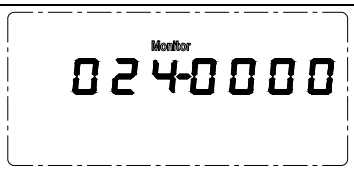
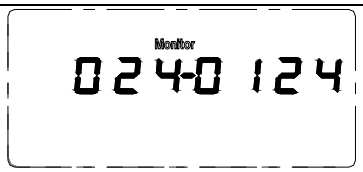
若系统出现报错或报警，请首先检查如下项：

1、先确认机器的连接线是否连接完好；2、确认电控和机头是否匹配；3、确认恢复出厂是否准确。

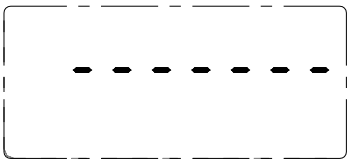
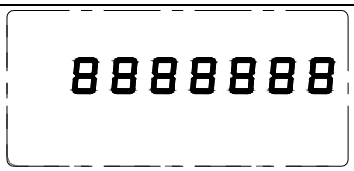
| 故障代码 | 代码含义 | 解决措施 |
|---|---|---|
| Err-01 | 硬件过流 | 关闭系统电源，30 秒后重新接通电源，控制器若仍不能正常工作，请更换控制器并通知厂方。 |
| Err-02 | 软件过流 | |
| Err-03 | 系统欠压 | 断开控制器电源，检查输入电源电压是否偏低（低于 176V）。若电源电压偏低，请在电压恢复正常后重新启动控制器。若电压恢复正常后，启动控制器仍不能正常工作，请更换控制器并通知厂方。 |
| Err-04 | 停机时过压 | 断开控制器电源，检查输入电源电压是否偏高（高于 264V）。若电源电压偏高，请在电压恢复正常后重新启动控制器。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。 |
| Err-05 | 运行时过压 | |
| Err-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，请更换控制器并通知厂方。 |
| Err-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。重试几次，若该故障频繁出现，请更换控制器并通知厂方。 |
| Err-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。 |
| Err-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。 |
| Err-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。 |
| Err-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。 |
| Err-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。 |
| Err-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。 |
| Err-14 | DSP 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。 |
| Err-15 | 电机超速保护 | |
| Err-16 | 电机反转 | |
| Err-17 | HMI 读写 EEPROM 故障 | |
| Err-18 | 电机过载 | |

# 4 特殊功能操作说明

## 4.1 上停针位调整

| | | |
|---|---|---|
| 1 |  | 控制系统在恢复出厂后，可根据需要重新设置上针位！<br>第一步：先按住P键，显示 100-0000 参数，按▲键，调整到 024 号监控参数，液晶屏显示当前角度，如为 0°表明此位置为系统当前默认的上停针位置。 |
| 2 |  | 第二步：转动手轮，让挑线杆到上停针位置或希望调整到的合适位置，此时液晶屏显示调整后的上停针位，如 024-0124. |
| 3 |  | 第三步：先按住P键，再按◎键，使机械偏转角度归零，上停针位设置完成。最后按P键退出。 |

## 4.2 一键恢复机头厂家参数值

| | | |
|---|---|---|
| 1 |  | 如果希望恢复机头厂家的出厂参数，可按照如下步骤：<br>第一步：先按住P键，显示 100-0000 参数，按▲键，调整到 024 号监控参数。 |
| 2 |  | 第二步：长按停针位键 3 秒钟以上，开始一键恢复机头厂家参数，液晶屏显示横杠，表明正在恢复参数，此时控制器切勿断电或拔出操作面板插头。 |
| 3 |  | 待数码管显示全 8，表明机头厂家参数恢复完成。 |

### 4.3 脚踏板灵敏度调整

脚踏板动作由初始位置①（136 号参数）开始，缓慢向前踩至②（137 号参数）开始低速缝纫，继续前踩至③（138 号参数）开始加速，再深踩至④（139 号参数）达到最高速度。②③段之间维持起缝速度，③④段之间为无级调速过程；

1、当脚踏板由初始位置①（136 号参数）开始，缓慢后踩至⑤（135 号参数）时抬压脚自动抬起；

2、当脚踏板由初始位置①（136 号参数）开始，缓慢后踩至⑥（134 号参数）时自动完成剪线动作。

3、各参数数值设置需保证

（134 号参数）＜（135 号参数）＜（136 号参数）＜（137 号参数）＜（138 号参数）＜（139 号参数）

4、可通过监控模式下 025 号参数实时监测不同位置下的踏板采样数值作为各参数的参考值。调整对应参数，抬压脚和前踩或后踩的动作位置也随之改变。如前踩很大距离机器还没有运转，可适当减小 137 参数（不能小于回中位置参数 136），即可提高前踩的灵敏度；若机器过于灵敏，轻触踏板机器就开始运行，可适当加大 137 参数；若不容易补针，稍微前踩，速度就迅速提高造成前冲多针，可适当增大 138 参数或减小 137 参数（即增大脚踏板低速范围），也可以适当降低初始起缝速度（100）。

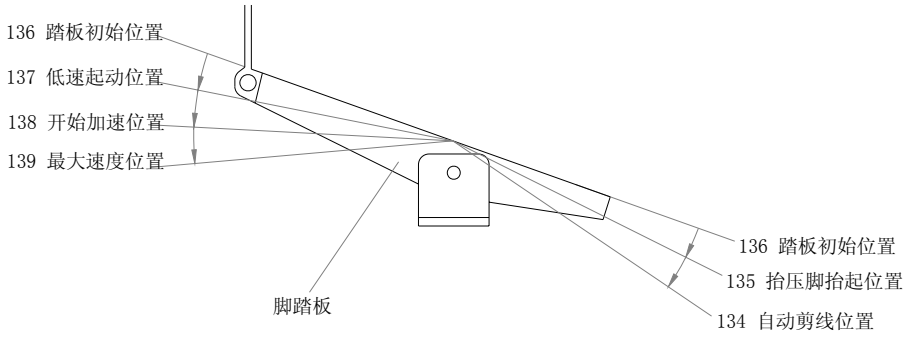



图 4-1 踏板动作各位置参数示意图

386P0271B
2016-04-29

# Contents

## Safety Instruction

- **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 engineers are required.**
- **Please stay away from arc welding equipment, in order to avoid electromagnetic interference and malfunction of the controller.**
- **Keep room temperature bellow 45°c and above 0°c**
- **Do not use in humidity below 30% or above 95% or dew and mist places.**
- **Please turn off the power and unplug the power cord, before install the control box and other components,**
- **To prevent interference or electric leakage accidents, please make the ground work; the power cord ground wire must be securely connected to earth by an effective way.**
- **All parts for the repair provided by the Company or approved before use.**
- **Please turn off the power and unplug the power cord before any maintenance action. There is dangerous high voltage control box, you must turn the power off after one minute before opening the control box.**
- **The symbol ⚠ in this manual means Safety Precautions, please pay attention to it and strictly follow it, to avoid any unnecessary damage.**

# 1. Installation Introduction

## 1.1Product specifications

| | | | |
|---|---|---|---|
| Product Type | AHE5A | Supply Voltage | AC 220 ± 44 V |
| Power frequency | 50Hz/60Hz | Maximum output power | 550W |

## 1.2 Interface connection

Connecting the plugs of pedaland machine head to the corresponding sockets at the back of controller, as Figure 1-2. Please check and confirm the plug is inserted firmly.

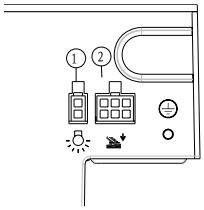
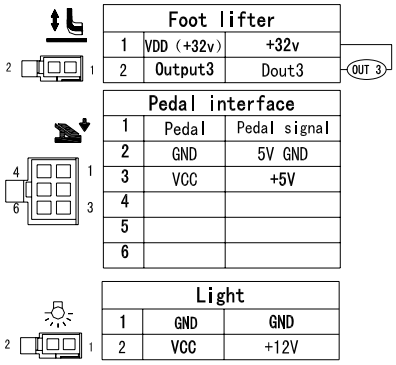



Fig.1-1 Controller Socket Diagram

① Light; ② Pedal socket .



| Foot lifter | | |
|---|---|---|
| 1 | VDD (+32v) | +32v |
| 2 | Output3 | Dout3 |

OUT 3

| Pedal interface | | |
|---|---|---|
| 1 | Pedal | Pedal signal |
| 2 | GND | 5V GND |
| 3 | VCC | +5V |
| 4 | | |
| 5 | | |
| 6 | | |

| Light | | |
|---|---|---|
| 1 | GND | GND |
| 2 | VCC | +12V |

| Machine head electromagnet | | | |
|---|---|---|---|
| 1 | VDD (+32V) | +32V | Black |
| 2 | VDD (+32V) | +32V | Red |
| 3 | +5V | +5V | Orange |
| 4 | GND (+32V) | GND(+32V) | Yellow |
| 5 | GND (+32V) | - | - |
| 6 | VDD (+32V) | +32V | Green |
| 7 | VDD (+32V) | +32V | Blue |
| 8 | JX | suction wind | Red |
| 9 | BX | Dial thread | Purple |
| 10 | Din 4 | - | - |
| 11 | Din 2 | protection switch | Black |
| 12 | Din 1 | Knee control | Pink |
| 13 | DF | Under trimming | Gray |
| 14 | SX | Induced draft | Brown |

## ■1.3 Wiring and Gounding

We must prepare the system grounding project;a qualified electrical engineer is requested for the construction. Product is energized and ready for use; you must ensure that the power outlet the AC input is securely grounded. The grounding wire is yellow and green lines, it must be connected to the grid and reliable security protection on the ground to ensure safe use, and prevent abnormal situation.

⚠: All the power line, signal line, ground wire connection not by other objects or excessive pressure to distort, in order to ensure the safe use!

# 2 Operation Panel Instruction

## 2.1 Operation panel display instruction

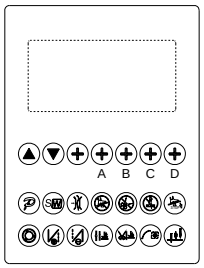



Fig.2-1 Operation Panel

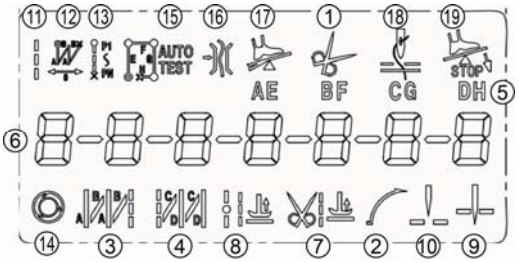



Fig.2-2 LCD Display

Table 2-1LCD Icon Display Description

| Index | Icon | Description |
|---|---|---|
| ① | | Automatic Trimming |
| ② | | Soft start |
| ③ | | Start back tacking |
| ④ | | End back tacking |
| ⑤ | AE BF CG DH | Sewing segments index |
| ⑥ | 8 8 8 8 8 8 | Number Display |
| ⑦ | | Presser Foot Lifting after trimming |
| ⑧ | | Presser Foot Lifting at Seam End |
| ⑨ | | Position Down |
| ⑩ | | Position up |
| ⑪ | | Free Sewing |
| ⑫ | | W Sewing |
| ⑬ | | Multi-section Constant-Stitch Sewing |
| ⑭ | | One-shot Sewing |
| ⑮ | AUTO TEST | Automatic Test |
| ⑯ | | Thread clamp |
| ⑰ | | Back half pedal function |
| ⑱ | | Thread sweeping function |
| ⑲ | | Start sewing |

## 2.2 The operation panel keys of description

Table 2-2 Each key function introduction

| Key | Name | Description |
|---|---|---|
|  | **Enter parameters and return key** | Use the key to switch to the parameter mode.The key is parameters confirm key, and back to the previous menu until the operator sewing mode state. In addition, work with other key to achieve a combination of function. |
|  | **Mode SW. and save changes key** | Under normal mode interface, press the key to SW. the cycle freely seam, W seam, multi-seam. Under the parameter mode, the modified parameters, press the key to save the parameters, and then a return to normal mode. |
|  | **Start back tacking setting key** | Switch during all start tacking type when pressing. (No tacking, Once tacking, double tacking, 4 repeat tacking ). Tacking stitches A、B can be set using the⊕key and the Ⓟ+⊕key. Interlock mode press this key can not set the start function. Parameters of interface, press once, the parameter NO. plus 1 |
|  | **End back tacking setting key** | Switch during all end tacking type when pressing. (No tacking, Once tacking, double tacking,4 repeat tacking). Tacking stitches C、D can be set using the⊕key and the Ⓟ+⊕key. Interlock mode press this key can not set the start function. Parameters of interface, press once, the parameter NO. minus 1 |
|  | **Clamp setting key** | Clamp function is enabled (icon on) or disabled. |
|  | **One-Shot-Sewing Selection** | In Constant-stitch sewing：a. One shot to the pedal, automatic performed number of stitches of every section.<br>b. Toe down the pedal again and again to finish rest the sections until it finish pattern. |
|  | **Intermediate presser foot lifting mode** | a. Press the key, indicating that the automatic presser foot valid parking during sewing.<br>b. Click the icon off, show off sewing stop automatic presser foot lift function. |
|  | **Trimmer presser foot lifting mode** | a. Press the key, indicating that automatic presser foot lift after thread trimming effectively.<br>b. Click the icon off,show off thread trimming stop automatic presser foot lift function. |

| Key | Name | Description |
|---|---|---|
| | **Soft start setting key/ LED lamp** | Soft start at the first seam is enabled (icon on) or disabled.<br>Long press key, adjustable LED lamp the third gear of brightness |
| | **Needle position key** | The sewing halfway function is stop that the system of up/down needle stop position selection |
| | **Increasing and decreasing motor speed** | Under the multi-slit mode, It can be quickly set up temporary speed governor. Furthermore, when the parameter settings, a single press the key, the corresponding parameter number increases. key+ the key, the corresponding parameters number decreasing. |
| | **parameters Increase key** | Adjust the corresponding increase in the value of the key. key+ the key, the corresponding value decreases |
| | **Automatic trimming** | Automatic trimming mode is enabled (icon on) or disabled. |
| | **After a half step key** | After a half step function is enabled (icon on) or disabled. |
| | **Thread sweeping key** | Thread sweeping function is enabled (icon on) or disabled. |
| | **Start sewing** | Start sewing function is enabled (icon on) or disabled. |

# 3 System parameter setting

## 3.1 Parameter mode

1, In the normal mode, press P key to enter parameter mode A;
2, press the corresponding ▲▼key and + key can be increased to the parameter number and the parameter value. Press the P +▲ ▼ and P ++ keys can be reduced to the parameter number and parameter values;
3, press 14 and 14 keys can add and subtract this paragraph parameter index number
4, when the parameter values are addition and subtraction, the parameter interface flashes. In this case, press S to save the changes, the interface is no longer flashing. Press the S key to exit the parameter interface, return to normal mode;
5, In parameter mode, press the P key, change the value is not saved, return to the normal mode.

| NO. | Range | Default | Description |
|---|---|---|---|
| 100 | 100~800 | 200 | Minimum speed |
| 101 | 200~5000 | 3500 | Maximum speed |
| 102 | 200~5000 | 3000 | Constant-stitch sewing speed |
| 103 | 200-5000 | 3000 | Manually backstitch maximum speed limit |
| 104 | 100-800 | 200 | Complement Needle speed |
| 105 | 100~500 | 250 | Trimming speed |
| 106 | 0 / 1 | 0 | Soft start mode:<br>0：Soft start only after trimming<br>1：Soft start after both trimming and stop |
| 107 | 1~9 | 2 | Stitch numbers for soft start |
| 108 | 100~800 | 200 | Soft start speed |
| 130 | 0 / 1 / 2 / 3 | 2 | Speed curve adjustments:<br>0：ramp curve<br>1：polygonal curve<br>2：quadric curve<br>3：S-type curve |
| 131 | 200~4000 | 3000 | The turning point speed of two segment curve. |
| 132 | 0~1024 | 800 | The turning point sampling voltage of the pedal when two segment curve (Between parameter 138 and 139) |
| 133 | 1 / 2 | 1 | The type of polygonal curve:<br>1: square<br>2：rooting |

| | | | | |
|---|---|---|---|---|
| 134 | 0~1024 | 90 | Trimming point of pedal | Figure 4-1 shows the specific setting method |
| 135 | 0~1024 | 300 | Footer lifting point of pedal | |
| 136 | 0~1024 | 460 | Neutral point of pedal | |
| 137 | 0~1024 | 480 | Motor running point of pedal in low speed. | |
| 138 | 0~1024 | 580 | Accelerated point of pedal | |
| 139 | 0~1024 | 962 | Max speed point of pedal | |
| 13E | 1~800 | 100 | After trimmer the press lifter delay time (dial line) | |
| 140 | 0/1 | 1 | Soft start at the first cycle of power ON. 0: Disable 1: Enable | |
| 143 | 0/1/2/3 | 0 | Special mode:<br>0: Normal Mode<br>1: Simply sewing mode<br>2: Motor initial angle measurement (Do not remove the belt)<br>3: Automatically setting the pulley ratio by the CPU. (synchronizer is necessary and the belt not removed) | |
| 144 | 0~31 | 0 | Feedforward torque of motor:<br>0: Normal functions<br>1-31: Feedforward torque level | |
| 149 | 0~10 | 0 | The time of chopping on for the presser foot slow down (uint is 100us) | |
| 150 | 1～100 | 1 | The proportion coefficient of the stitches counter | |
| 151 | 1～9999 | 1 | Maximum stitches of the counter | |
| 152 | 0～6 | 0 | Count mode selection (For Bobbin Thread)<br>0: The counter is invalid<br>1: Count up by stitches. When count over, counter will be auto-reset.<br>2: Count down by stitches. When count over, counter will be auto-reset.<br>3: Count up by stitches. When count over, motor stops and the counter must be reset by the external switch or the P key on the panel.<br>4: Count down by stitches. When count over, motor stops and the counter must be reset by the external switch or the P key on the panel.<br>5: Count up by trimming. When count over, panel alarms and motor stops after trimming.<br>6: Count down by trimming. When count over, panel alarms and motor stops after trimming. | |

| | | | |
|---|---|---|---|
| 153 | 1～100 | 1 | The proportion coefficient of the pieces counter |
| 154 | 1～9999 | 1 | Maximum pieces of the counter |
| 155 | 0～4 | 0 | Count mode selection (For Sewing Piece)<br>0: The counter is invalid<br>1: Count up by pieces. When count over, counter will be auto- reset.<br>2: Count down by pieces. When count over, counter will be auto-reset.<br>3: Count up by pieces. When count over, motor stops and the counter must be reset by the external switch or the P key on the panel.<br>4: Count down by pieces. When count over, motor stops and the counter must be reset by the external switch or the P key on the panel. |
| 156 | 0～9999 | 0 | The output chopping duty cycle of No. 1/2/3/4 solenoid in each bit. |
| 157 | 0～9999 | 0 | The output chopping duty cycle of No. 5/6/7/8 solenoid in each bit. |
| 158 | 0～1 | 0 | Counter adjustable:<br>0:adjustable, 1:not adjustabled |
| 160 | | 0 | Running time reset |
| 161 | 0/1/2 | | Direction of parameter transfer:<br>0: no action<br>1: from operation panel to controller<br>2: from controller to operation panel. |
| 165 | - | | Restore the default factory setting, and cover the user defined para setting,. |
| 200 | 0/1/2 | 0 | Trimming mode selection:<br>0: lockstitch machine<br>1: interlock machine: Needle stops at the up position and trim.<br>2: overlock machine: manual trimming |
| 202 | 0/1/2/3/4/5/6 | 1 | trimming timing options:<br>0: 203 parameter setting angle [TS] Department to conduct a tangent, until up needle stop after the delay time set by 206 parameter [T2] so far.<br>1: 203 parameter setting angle [TS] Department to conduct a tangent, until No. 204 parameter setting angle [TE] so far.<br>2: 203 Number parameter setting angle [TS] Department to conduct a tangent, set the delay time parameter 206 [T2] so far.<br>3: After the needle position signal delay time set by parameter No. 205 [T1] be the tangent, the delay time set by parameter 206 [T2] to set the time so far. |

| | | | |
|---|---|---|---|
| | | | 4: find the needle position signal delay time set by parameter No. 205 [T1] be the tangent, the delay time set by parameter 206 [T2] to set the time until the majority applied stretch sewing machine.<br>5: find the next needle position signal after start tangent action-oriented stop needle stop. Then set the delay time parameter No. 205 [T1] and then set the parameters for the 206 tangent time [T2]. (Mostly used for general flat car models, and most of the T1 and T2 set values are set to 0)<br>Toshiba tangentially oriented needle stop only 203 parameters set by the angle [TS] Office:<br>6. Then set the delay time parameter No. 205 [T1] and then set the parameters for the 206 tangent time [T2]. |
| 203 | 5-359 | 10 | Trimming output start angle TS (down needle position angle as the reference point) (flat sewing) |
| 204 | 10-359 | 120 | Trimming output end angle TE (Down needle position angle is the reference and this value should be bigger than TS) (flat sewing) |
| 205 | 1-999 | 10 | Trimmer start delay T1 (ms) (interlock) |
| 206 | 1-999 | 120 | Trimmer end delay T2 (ms) (interlock) |
| 211 | 5-359 | 25 | Thread release output start angle LS (down needle position angle as the reference point) |
| 212 | 10-359 | 350 | Thread release output end angle LE (Down needle position angle is the reference and this value should be bigger than LS) |
| 213 | 1-999 | 1 | Thread release output start delay time T1 (ms) |
| 214 | 1～999 | 10 | Thread release output end delay time T2 (ms) after up needle position |
| 216 | 1～999 | 10 | Wiper output delay time (ms) |
| 217 | 1～9999 | 70 | Wiper duration time (ms) |
| 218 | 1～999 | 50 | Wiper recovery time (ms) |
| 219 | 0 / 1 | 0 | Thread clamp function<br>0: disable<br>1: enable |
| 21E | 11-359 | 160 | The angle of presser foot solenoid off during thread clamping |
| 220 | 200～360 | 360 | Stop position after trimming (motor can stop with a reverse angle) |
| 231 | 0 / 1 | 0 | Auto test mode:<br>0: stitches mode<br>1: time mode |
| 232 | 0～ 1000 | 300 | Safe switch filtering time (ms) |

| | | | |
|---|---|---|---|
| 234 | 0 / 1 | 0 | Motor direction:<br>0: CW<br>1: CCW |
| 240 | 0～9999 | 1000 | The ratio between motor and machine (1000 stands for 1:1) |
| 242 | 0～359 | 0 | Up needle stop angle (After detecting the synchronizer signal) |
| 243 | 0～359 | 175 | Down needle stop angle |
| 244 | 0-800 | 200 | Running delay time when presser footer comes down (ms) |
| 247 | 0～2000 | 0 | The alarm time for adding oil (hours), disabled when setting 0 |
| 248 | 0～4000 | 0 | Gas alarm, prohibit running time (hour) 0: close this feature |

### 3.2 Monitoring Mode

| No. | Description | No. | Description |
|---|---|---|---|
| 010 | Counter for stitches | 026 | The ratio between motor and machine |
| 011 | Counter for sewing pieces | 027 | The total used time(hours) of motor |
| 013 | State of encoder | 028 | The sampling voltage of interaction |
| 020 | DC voltage | 029 | Software version |
| 021 | Machine speed | 02A | analog input 1 sample value |
| 022 | The phase current | 02b | analog input 2 sample value |
| 023 | Initial electrical angle | 02C | Error Counter |
| 024 | Machine angle | 02d | QP Ultra-state |
| 025 | The sampling voltage of pedal | 030-037 | The history record of error codes |

### 3.3 Safety switch warning mode

| Alarm code | Description | Corrective |
|---|---|---|
| ALA-1 | Fuel filling warning | Fuel filling. Press P key to clear. |
| ALA-2 | Count over for stitches | The counter reaches the limit. Press P key to reset the counter. |
| ALA-3 | Count over for sewing pieces | The counter reaches the limit. Press P key to reset the counter. |
| ALA-4 | Emergency stop | Press the key of emergency stop to clear. |
| ALA-5 | Lift needle locking | Then press the needle lifting locking button, can eliminate the needle lifting locking state |
| PoWoFF | Power is off | Please wait for 30 seconds, then turn on the power switch |
| ArN UP | Safety switch alarm | Adjust the machine to the correct position. |

### 3.4 False alarm mode

If the system error or warning, please first check the following items:

1, to confirm the connection machine is connected properly;

2, confirm the control and head matches;

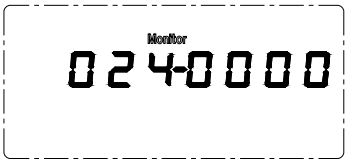
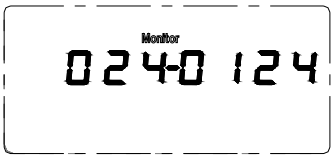
3, confirm restore factory is accurate.

| error code | meaning | solution |
|---|---|---|
| Err-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. |
| Err-02 | software overflow | |
| Err-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. |
| Err-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. |
| Err-05 | over-voltage in operation | |
| Err-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. |
| Err-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. |
| Err-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. |
| Err-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. |
| Err-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. |
| Err-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. |
| Err-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. |

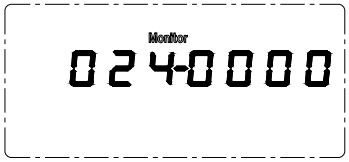
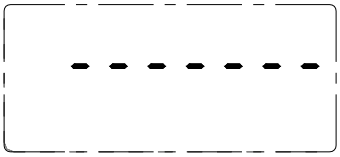
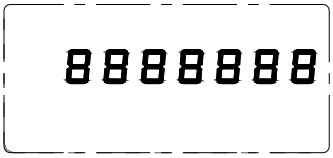
| | | |
|---|---|---|
| Err-13 | Motor HALL failure | Turn off the system power, check if the motor sensor plug is loose or dropped off, restore it and restart the system. If it still does not work, please replace the controller and inform the manufacturer. |
| Err-14 | DSP Read/Write EEPROM failure | 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. |
| Err-15 | Motor over-speed protection | |
| Err-16 | Motor reversion | |
| Err-17 | HMI Read/Write EEPROM failure | |
| Err-18 | Motor overload | |
| Err-19 | Lack of oil alarm | Add oil to the needle rod, and set the P22 parameter at 4000, resume the working time after the last oil adding; or you can press button P to close the alarm and continue to use. |

# 4 Special function operating instructions

## 4.1 Upper stop position adjust

| | | |
|---|---|---|
| 1 |  | Step 1: Press Ⓟkey,.Parameter 100 is shown,press ▲key, Adjust to 024 monitoring parameters,as for 0°,which means the default up needle stop position in angle. |
| 2 |  | Step 2: Turn the hand wheel and adjust to the right position as up needle stop, and the needle position angle is shown simultaneously. |
| 3 |  | Step 3: Press Ⓟ+ ◎ key, the new up needle position is preserved and the parameter is set to zero. |

### 4.2 A key recovery machine manufacturers parameter value

| | | |
|---|---|---|
| 1 |  | Step 1: Press ⓟ key,.Parameter 100 is shown,press ▲ key, Adjust to 024 monitoring parameters. |
| 2 |  | Step 2: Press stop needle key for about 3seconds, then Default Factory Setting is recovered displaying as left LCD. |
| 3 |  | When the LCD is displayed as 8888888, the recovery is accomplished. The machine is recovered back to the initial state in delivery. |

### 4.3 Pedal sensitivity adjustment

Pedal movement by the initial position of the (parameter 136) began, slowly forward step to the (parameter 137) began to low-speed sewing, before continuing on to the (parameter 138) began to accelerate, and then on to the deep (parameter 139) reach maximum speed. In the period of maintenance of sewing speed, stepless speed regulation process between the segment;

1、n the pedal from the initial position to the (parameter 136) began to slow, after stepping on to the (parameter 135) when the presser foot lift automatically;

2、hen the pedal from the initial position to the (parameter 136) began to slow, after stepping on to ⑥ (parameter 134) automatically complete shear line.

A value of

3、the parameter settings are required to ensure that

(parameter 134) < (parameter 135) < (parameter 136) < (parameter 137) < (parameter 138) < (parameter 139)

4、an be used as the parameter's value through the pedal real-time monitoring of 025 parameters at different positions of the monitoring mode sampling numerical. Adjusting the corresponding parameters, presser foot and step on or after step action position change. As on the great distance machine is not running, may be appropriate to reduce the 137 parameters (not less than to the location parameters in 136), can improve the sensitivity of feet; if the machine is too sensitive, touch the pedal machines began to work, it may be appropriate to increase the 137 parameters; if it is not easy to fill needle, a little feet, speed quickly improve the cause forward multi needle, may be appropriate to increase or decrease the 138 parameters of 137 parameters (i.e. adding feet pedal speed range), can also be appropriate to reduce the initial seam speed (100).

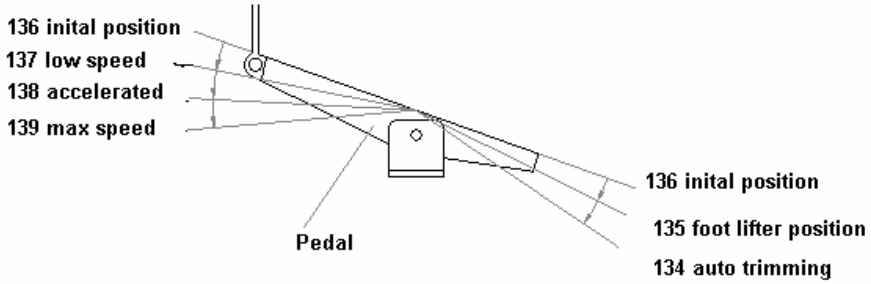



Fig. 4-1 pedal movement of each position parameter

386P0271B
2016-04-29