

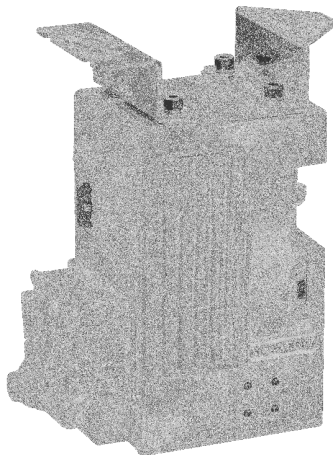
# MD 系列 使用說明書

## 目次

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### EC 指令自我宣言書:

本公司在此宣言以下產品系列:  
AC 伺服馬達-MA、MB、MD、ME、MH、MF 系列

皆符合以下 EC 指令的規定:  
- EC 低電壓指令 (73/23/EEC)  
- EC 電磁兼容指令 (89/336/EEC)  
- EC 機械指令 (98/37/EC)

及配合相關安全標準如下:  
EN 60204-31: 機械之電機設備之安全。  
EN 292-2: 機械安全-基本概念、設計的一般原則。  
EN 292-2: 機械安全-技術指導及規格設計原則。  
EN 61000-6-2: EMS 電磁耐受力防護-工業區。  
EN 61000-6-3: EMI 電磁干擾防護-住宅區。

### 有毒物質限量指令自我宣言書:

本公司在此宣言以下產品系列:  
AC 伺服馬達-MA、MB、MD、ME、MH、MF 系列

皆符合以下指令的規定:  
1. 歐盟 RoHS 指令 (2002/95/EC)  
2. 中華人民共和國電子行業標準: 電子信息產品中有毒有害物質的限量要求 (SJ/T 11363-2006)

本公司產品本身(馬達、控制箱)或其包裝材料及附件(紙箱、螺絲、零件包、說明書、吊瓶、標籤、印刷品...等等)或其元件與原材料供應商皆依照歐盟 RoHS 指令及中華人民共和國電子行業標準的限額規定而符合以下所列之六種有毒物質的限額要求:

有毒物質	限量要求
鉛 (Pb)	低於 240 ppm
汞 (Hg)	低於 800 ppm
鎘 (Cd)	低於 80 ppm
六價鉻 (Cr VI)	低於 800 ppm
多環芳烴 (PBB)	低於 800 ppm
多環二噁英 (PBDE)	低於 800 ppm

\* 基板無鉛製程: 總鉛含有濃度基準量 800 ppm 以下。  
\* 包裝材料: Pb+Hg+Cd+Cr VI 含有濃度基準總共合計 80 ppm 以下。

賀欣機械廠股份有限公司

廠長  
李春長先生

## 1. 安全注意事項:

使用前請詳閱本手冊與所搭配的縫紉機說明書, 並請注意下列事項

- 安裝及操作須由受過正確訓練的人員來執行。拆卸安裝動作前請先關閉電源拔掉插頭並等待 5 分鐘。
- 本驅動裝置僅適用於指定範圍的縫紉機械, 請勿移作其他用途。
- 電源電壓請遵照 MD 控制箱銘牌所標示之規格  $\pm 10\%$  範圍內操作。

**※注意:** 控制箱電壓規格如為 AC 220V 時, 請勿插接到 AC 380V 的電源插座上, 否則將出現異常且面板指示燈會持續閃爍警示, 此時請立即關閉電源開關, 重新檢查電源。持續供應 380V 超過五分鐘以上, 將可能燒損電源入力 EMI 板上的保險絲 (F1, F2) 及電源板上的電解電容 (C4, C5) 而危及人身安全。

- 請遠離高週波磁場或電波發射器等, 以免所產生的電磁波干擾本驅動裝置而發生誤動作。
- 請不要在日光直接照射的場所、室外及室溫 45°C 以上或 5°C 以下的場所操作。
- 請不要在暖氣(電熱器)旁、有露水的場所及在相對濕度 30% 以下或 95% 以上的場所操作。
- 請不要在灰塵多的場所、具有腐蝕性物質的場所及有揮發性氣體的場所操作。
- 請注意不要被外物壓住或過度扭曲電線。
- 裝釘電線時請不要靠近會轉動的皮帶輪及三角皮帶, 最少要離開 3 公分以上。
- 為防止雜訊干擾或漏電事故, 請做好接地工程。
- 在第一次開機後, 請先以低速操作縫紉機並檢查轉動方向是否正確。
- 縫紉機運轉時, 請不要去觸摸皮帶輪、三角皮帶、天秤、針等會動作的部位。
- 所有可動作的部份, 必須以所提供的防護裝置加以隔離, 防止身體接觸並請勿在裝置內塞入其他物品。
- 修理及保養須由經過訓練的技術人員執行, 而所有維修用的零件須由本公司提供或認可, 方可使用。
- 請不要以不適當物體來攻擊或撞擊本產品裝置。

### 危險標示、注意事項

這個標示符號表示機器安裝時, 如有錯誤恐會傷害到人體或機器會受到損壞, 所以機器方面有危險性的地方會有此標示。

這個標示符號表示有高压電, 電氣方面有危險性的地方會有此標示。

### 保固期限

本產品保固期限為購買日期起一年內或出廠月份起 18 個月內。

### 保固內容

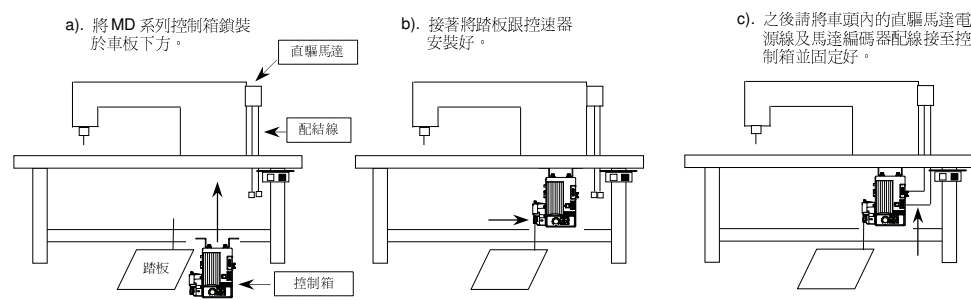
本產品在正常情況且無人為失誤的操作下, 於保固期間無償的為客戶維修使能正常操作。但以下情況於保固期間將得以收取維修費用:

1. 不當使用包括誤接高壓電源、將產品移做其它用途、自行拆卸、維修、更改、或不依規格範圍使用、進水進油及插入異物於本產品。
2. 火災、地震、閃電、風災、水災、鹽蝕、潮濕、異常電壓及其它天災或不當場所造成之損害。
3. 客戶購買後摔落本產品, 或客戶自行運輸(或託付之運輸公司)所造成之損害。

\*本產品於生產及測試上皆盡最大努力和嚴格控管使其達到高品質及高穩定的標準, 但外部之電磁或靜電干擾或不穩定的供應電源, 仍可能對本產品造成影響或損害, 因此操作場所的接地系統一定要確實做好, 並建議客戶安裝故障安全防護裝置如漏電電鈴。

## 2. 安裝說明:

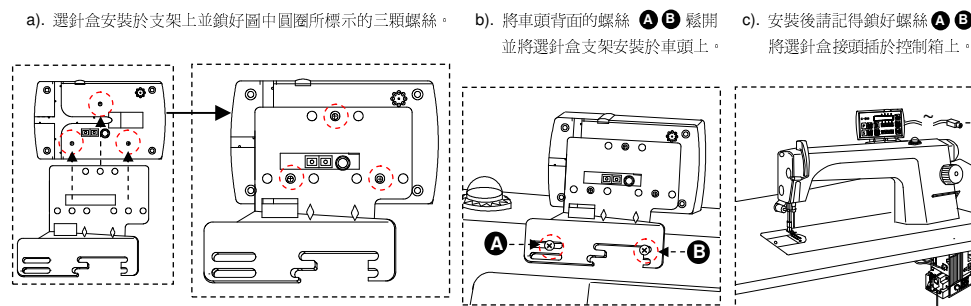
### MD 系列的安裝方式



註: MD 系列適用於賀欣直驅迷你馬達, 請勿使用於其它類型或廠牌之馬達。  
(直驅馬達於出廠時皆已安裝好於車頭上, 如有必要重新安裝或拆卸, 請依據車頭說明書中指示。)

### C-200 選針盒的安裝

注意:  
安裝及調整前請確定已關閉電源開關及拔掉插頭以利人身安全。

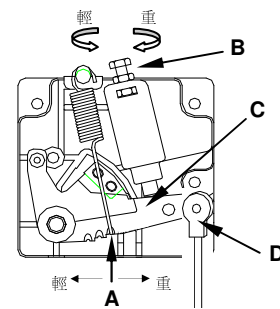


註: 選針盒的安裝方式及位置會因支架種類及車頭型號而有所不同。

### 控速器的調整

注意:  
調整前請確定已關閉電源開關及拔掉插頭以利人身安全。

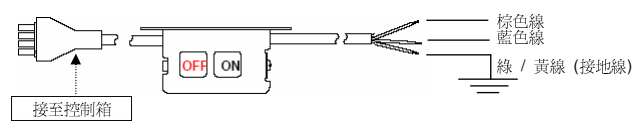
控速器各部位名稱: 如圖示  
A: 前路力量彈簧。  
B: 後路力量的調整螺絲。  
C: 踏板旋臂。  
D: 腳踏吊桿。



調整需求	調整結果
1 踏板前路力量的調整	當彈簧 A 愈向右側勾時, 表示力量的愈重。 當彈簧 A 愈向左側勾時, 表示力量的愈輕。
2 踏板後路力量的調整	當螺絲 B 愈向上時, 則後路力量愈輕。 當螺絲 B 愈向下時, 則後路力量愈重。
3 踏板行程長短的調整	當吊桿 D 向右側孔鎖裝時, 表示行程較長。 當吊桿 D 向左側孔鎖裝時, 表示行程較短。

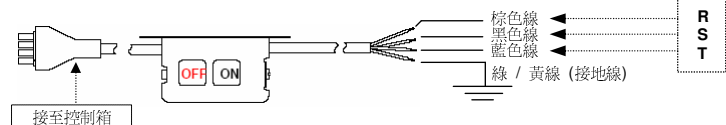
## 3. 配結線與接地說明:

### 單相接線 (AC220V)

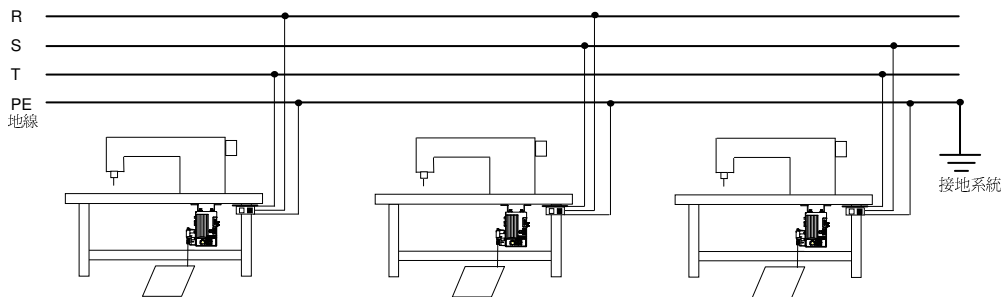


注意:  
1. 綠/黃色電線為接地線, 一定要做好系統的接地工程。

### 三相接線 (AC380V)

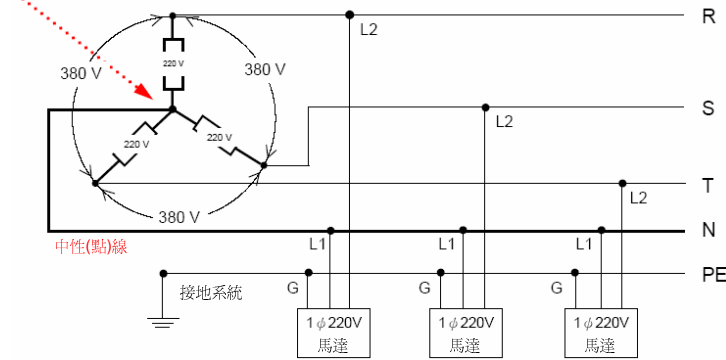


當有多台單相 220 V 伺服馬達欲同時安裝在三相 220V 的供電線路上時, 須注意 R, S, T 各相負載平衡, 如下圖所示:



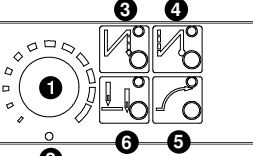
當電源系統配置為三相四線式 380V 時, 欲使用單相 220 V 供應本電機的接線方式

注意: 必須要有中性(點)線的配置



注意: 如果此配置系統沒有【中性(點)線】時, 則單相 220V 的伺服馬達不適合在此場所使用, 請向原供應商改訂購本廠牌之三相 380V 的伺服馬達機型。

## 4. 控制面板操作說明:



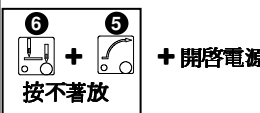
開啓電源後, 1, 2, 3, 4, 5, 6 LED 指示燈會先以順時鐘或逆時鐘方向旋轉 2 次, 再閃爍 2 次後停止, 以確認指示燈是否正確及代表馬達運轉方向。

### 面板按鍵功能:

1. 車縫速度調整旋鈕: 旋鈕逆時針調, 速度減慢。/ 旋鈕順時針調, 速度加快。
2. 電源指示燈: 開啓電源後, LED 燈亮。/ 關閉電源後, LED 燈熄。
3. 啓始回鍵: 燈亮功能開啓, 按下 LED 燈熄功能關閉。
4. 終止回鍵: 燈亮功能開啓, 按下 LED 燈熄功能關閉。
5. 慢速啓動: 燈亮功能開啓, 按下 LED 燈熄功能關閉。
6. 馬達停止時的針停(上/下)位置: 燈亮: 馬達停止時針停於上定位。燈熄: 馬達停止時針停於下定位。

### 回復出廠設定值的功能:

當控制箱需回到出廠預設值時, 請參照以下步驟:



回復出廠設定值後, 1, 2, 3, 4 個功能鍵的 LED 指示燈會同時閃爍四次來表示動作完成。

### 變更馬達運轉方向:

切換順時鐘或逆時鐘的運轉方向後, 請確認 1, 2, 3, 4 個 LED 指示燈的旋轉方向是否正確。

## 5. 故障碼表:

### 故障碼及排除對策:

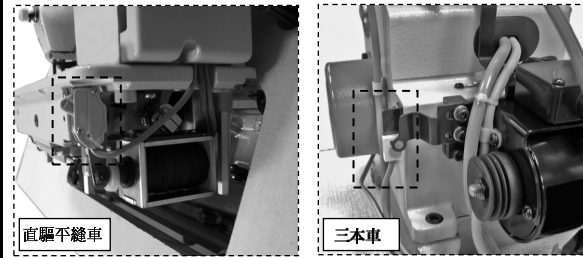
1. 當 MD 系列控制箱若有故障或錯誤異常狀況發生時, 故障訊息將由控制面板上的 1, 2, 3, 4 個功能 LED 指示燈做閃爍警示。(如下圖)
2. 故障排除修理及保養須由經過訓練的技術人員執行。

面板 LED 指示燈閃爍顯示	故障碼警示	出現時機	狀態與對策
	ER0.1	1. 智慧型電力模組(Power Module)自行檢知到異常信息。 2. 不正常過電流發生。	馬達與車頭出力將全部關閉或無動作狀態。請檢查智慧型電力模組是否異常。請仔細檢查電源板過電流保護回路功能是否異常發生。
	ER0.4	1. 電源 ON 時, 檢知到電源電壓過高。 2. 插錯使用之供應電源。 3. 煞車用鋁殼電阻或電源板上的 F1 保險絲發生異常。	馬達與車頭出力將全部關閉或無動作狀態。請檢查馬達本身或馬達插頭配線等信號是否異常。 *如控制箱為 AC 220V 系統, 請勿使用 AC 380V 的電源, 否則面板 LED 指示燈將於送電 2 秒後出現持續閃爍以警示異常, 如果持續送入 380V 電源, 則電源板上的電解電容 (C4, C5) 會在一段時間內爆裂, 並造成電源入力 EMI 板上的保險絲 (F1 - F2) 熔斷, 請仔細檢查電源板。 請檢查控制箱內鋁殼水泥電阻及電源板上的 F1 保險絲是否正常。
	ER0.7	1. 馬達插頭配線接觸不良導致不轉。 2. 定位器信號異常。 3. 車頭機構鎖住或馬達皮帶輪異物捲入卡住。 4. 加工物過厚, 馬達扭力不足無法貫穿。	馬達與車頭出力將全部關閉或無動作狀態。請檢查馬達本身或馬達插頭配線等信號是否異常。請檢查定位器信號是否異常。請檢查車頭是否卡住或干澀轉動困難。
	ER0.16	1. 安全開關故障或接觸不良。 2. 參數【075.SFM】設定值與使用之車頭機型不符合。	馬達暫時停止運轉。請檢查車頭上之安全開關或信號是否異常。請核對參數【075.SFM】的設定值是否符合車頭上的安全開關裝置。

### 安全開關注意事項:

當車頭上的安全開關發生故障或與 MD 控制箱的連接信號異常, 馬達將停止運轉, 並顯示故障碼 ER0.16。(如接選針盒時, 旋轉符號將會停止不動)

### 安全開關範例圖:



### 安全開關接線圖:

安全開關	SAFETY SW.
1 +12V	+12V
2 INL	SAFETY SW.
3 INB	PSD
4 0V	0V

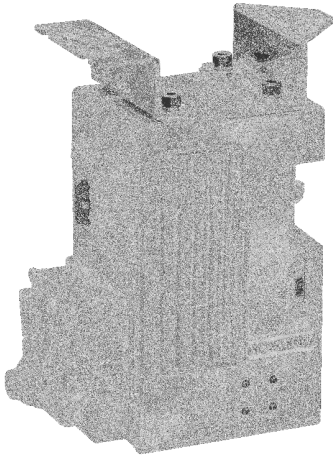
如果您有任何其它技術上的問題, 請連絡經銷商的服務人員或瀏覽本公司網頁 <http://www.hohsing.com> 尋求技術支援。



# MD SERIES USER MANUAL

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1. Safety Precaution
2. Installation
3. Wiring and Grounding
4. Control Panel
5. Error Code List



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HSPMDU01-1 2009.03

## EC Declaration of Conformity

We hereby declare that the following products: AC servo motor--MA-MB-MD-ME-MH-MF series are in conformity with the provision of the EC directives as following:

- EC Low Voltage Directive (73/23/EEC)
- EC Electromagnetic Compatibility Directive (89/336/EEC)
- EC Machinery Directive (98/37/EC)

Applied harmonized standards:  
 EN 60204-31 : Electrical equipment of industrial machines. Particular requirements for sewing machines, sewing units and sewing system.  
 EN 292-1 : Safety of machines.  
 EN 292-2 : Safety of machines, technical guidelines and specifications.  
 EN 61000-6-2 : EMS for industrial environment.  
 EN 61000-6-3 : EMI for residential environment.

## Declaration of Conformity for Concentration Limits for Certain Hazardous Substances

We hereby declare that the following products: AC servo motor--MA-MB-MD-ME-MH-MF series are in conformity with the provision of the European Union RoHS Directive and People's Republic of China Electronic Business Standard : Requirements for concentration limits for certain hazardous substances in electronic information products (SJ/T 11363-2006)

Our product itself (motor, control box) or its packing materials and accessories (box, screws, package, user manual, sticker, label, print...etc.) or the suppliers of parts and raw materials are all in conformity with the provision of the European Union RoHS Directive and People's Republic of China Electronic Business Standard to conform the following concentration limits for the six hazardous substances:

Hazardous Substance	Permissible Values
Lead (Pb)	Less than 240 ppm
Mercury (Hg)	Less than 800 ppm
Cadmium (Cd)	Less than 80 ppm
Hexavalent chromium (Cr VI)	Less than 800 ppm
Polybrominated Biphenyl (PBB)	Less than 800 ppm
Polybrominated Diphenyl ether (PBDE)	Less than 800 ppm

\* The concentration of lead in the lead-free process for PCB shall be less than 800 ppm.  
 \* For packing materials shipped with our products or parts, the hazardous substances shall be 80 ppm or less in sum of Pb+Hg+Cd+Cr VI.

H. S. Machinery Co., Ltd.

Mr. C. C. Lee  
 Plant Manager

## 1. Safety Precaution :

Please read this manual with sewing machine manual thoroughly and pay attention for the following safety precaution.

- Installation and operation must be done by the trained personnel, also turn off the power switch and remove the plug from outlet and wait for 5 minutes before any installation.
- This product is designed for the specific sewing machines and must not be used for other purposes.
- Only use the power voltage as described on the name plate of the MD control box in  $\pm 10\%$  ranges.

**⚠ Attention :** If the control box is AC 220V system, please don't connect to the AC 380V power outlet, otherwise the error will occur and panel LED will blink continually. If that happened, please turn off the power switch immediately and check the power voltage. Continue supply the 380V power over 5 minutes might damage the fuses (F1,F2) of EMI board and burst the electrolytic capacitors (C4,C5) of power board and even might endanger the person safety.

- In order to prevent abnormal operation, keep the product away from the high frequency machines.
- Don't operate in direct sun light - outdoors area and the room temperature is 45°C above or 5°C under.
- Don't operate near the heater - dew area and the humidity is 30% less or 95% more.
- Don't operate in dusty - evaporate - combustible gas area, and stay away from corrosive material.
- Don't apply heavy objects or excessive force on the power cord, also don't bend or pull the power cord.
- Power cord must keep 3 cm or above distance away from the V-belt and the pulley.
- In order to prevent the static interference and current leakage, all grounding works must be done properly.
- After power on the machine for the first time, use low speed to operate and check the correct rotation direction.
- During machine operation, don't touch any moving parts.
- All moving parts must have protective device to avoid the body contact and objects insertion.
- Maintenance and repair must be done by the properly trained technician, also all the spare parts for repair must be approved or supplied by the manufacturer.
- Don't use any objects or force to hit or ram the product.

## Danger and caution signs

- Risks that may cause personal injury or risk to the machine are marked with this symbol in the instruction manual.
- This symbol indicates electrical risks and warnings.

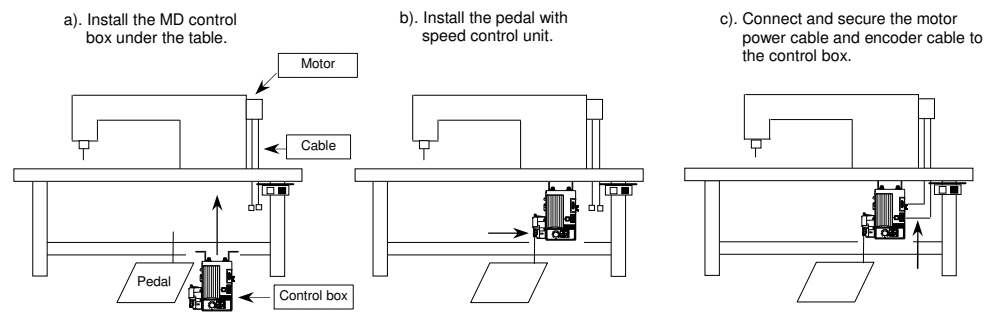
**Limited Warranty**  
**Warranty period of this product is 1 year from purchasing, or 18 months from our manufacturing date.**

Any trouble found within warranty period under normal use condition in conformance with this manual, it will be repaired free of charge. Repair will be chargeable in the following cases even if within warranty period :

1. Inappropriate use include: wrong connecting high voltage, wrong application, disassemble, repair, modification by incompetent personnel, or operate the product without the precaution, or operate the products out of its specification range. Insert odd objects or liquids into the product.
  2. Damage by fire, earth quake, lightning, wind, flood, salt corrosive, moisture, abnormal power voltage and any other damage caused by the natural disaster or by the inappropriate environments.
  3. Dropping after purchase, or damage in transportation by customer himself. (or by customer's shipping agency)
- Note : We put our best effort and mind in testing and manufacturing for assuring the quality and reliable of this product. But it is possible this product can still be damaged due to external magnetic interference and electronic static or noise or unstable power source more than expected; therefore the grounding system of operate area must be well-connected to this product and it's also recommended to install a failsafe device. (such as residual current breaker).

## 2. Installation :

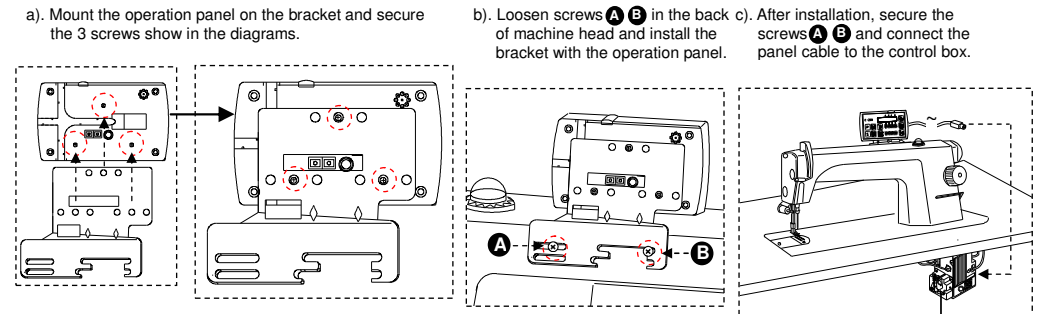
### MD installation



**Note:** MD series is designed for the H. S. direct-drive mini motor, don't use with other type or other brand of motor. (direct-drive motor is pre-installed on the machine head, if reinstall or disassembly is necessary, please refer to the sewing machine user manual.)

### Operation panel installation

**⚠ Caution :**  
 For person safety, turn off the power switch and remove the power plug from outlet before any adjustment.



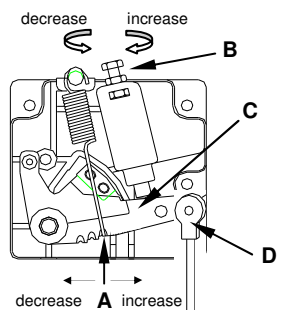
**Note:** Operation panel install location might be varied depend by the bracket type and sewing machine model.

### Speed control unit adjustment

**⚠ Caution :**  
 For person safety, turn off the power switch and remove the power plug from outlet before any adjustment.

Components of speed control unit : see figure

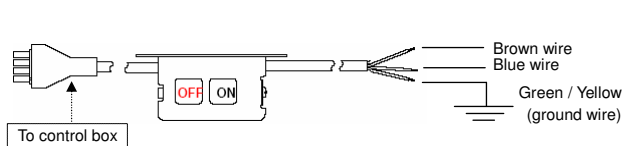
- A : Spring for toeing forward force adjustment
- B : Bolt for heeling backward force adjustment
- C : Pedal arm
- D : Pitman rod for pedal



	Term of adjustment	Adjustment result
1	Toeing forward force adjustment	Spring A move to right = force increased Spring A move to left = force decreased
	Heeling backward force adjustment	Bolt B turn  = force decreased Bolt B turn  = force increased
3	Pedal stroke adjustment	Rod D secure at right = stroke is longer Rod D secure at left = stroke is shorter

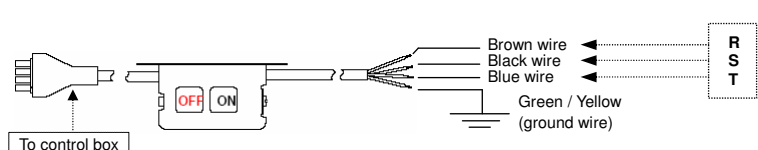
## 3. Wiring and Grounding :

### Single phase ( AC220V )

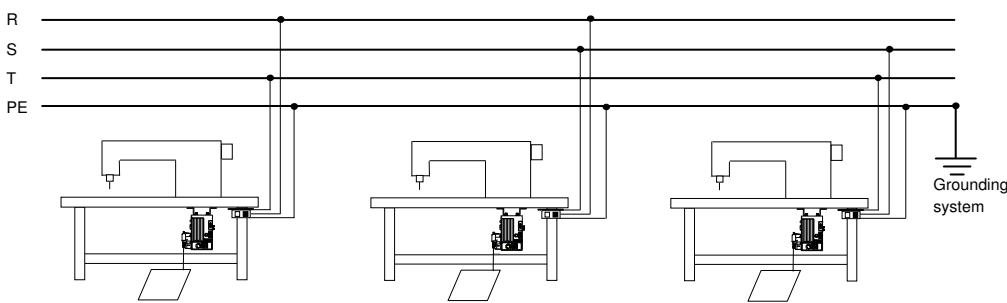


**⚠ Caution :**  
 1. Green / Yellow wire is for grounding, and all grounding works must be done properly.

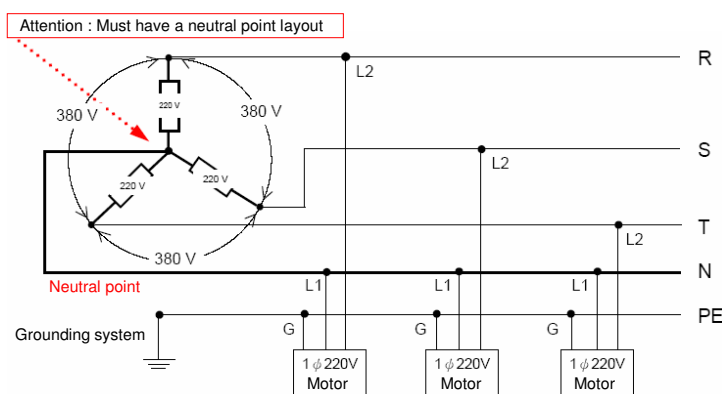
### Three phase ( AC380V )



When multiple 1Φ / 220 V motors are connected to a 3 Φ / 220 V power source, take caution for the load balance of each R, S, T phase, see the following diagram :

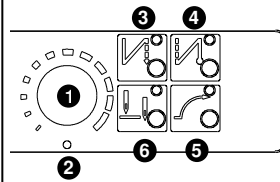


### How to connect a 1Φ / 220 V power from a 3 Φ / 380 V power source



**⚠ Caution :** If the power source does not have the neutral point, then this 1Φ / 220 V servo motor is not suitable for this connection. Please ask supplier to offer our 3Φ / 380 V servo motor.

## 4. Control Panel :

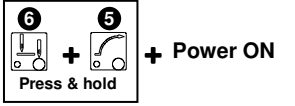


After power ON, the ①, ④, ⑤, ⑥ 4 LEDs will blink and run in a clockwise or counterclockwise direction 2 times which indicate the motor rotate direction, then 4 LED blink together 2 times and stop which confirm the LEDs are in good condition.

### Control panel key functions :

- 1 Sewing speed adjust knob  
 Knob turn counterclockwise : speed down.  
 Knob turn clockwise : speed up.
- 2 Power ON LED  
 Power ON, LED ON.  
 Power OFF, LED OFF.
- 3 Start back tacking  
 LED ON=function ON. / LED OFF=function OFF.
- 4 End back tacking  
 LED ON=function ON. / LED OFF=function OFF.
- 5 Slow start  
 Press the key, LED ON=function ON.  
 Press the key, LED OFF=function OFF.
- 6 Needle stop (up/down) position when motor stop  
 Press the key, LED ON : Stop at UP.  
 Press the key, LED OFF : Stop at DOWN.

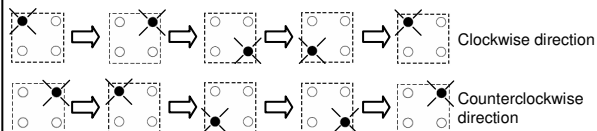
**RESET to the factory setting :**  
 When control box need to recover the factory default setting, see the following instruction :



After RESET, the ①, ④, ⑤, ⑥ 4 LEDs will blink together 4 times to indicate the setting has completed.

### Change motor rotate direction :

After counterclockwise or clockwise direction changed, confirm the correct running direction of the ①, ④, ⑤, ⑥ 4 LEDs.



## 5. Error Code List :

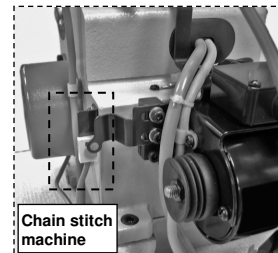
**Panel LED for error code :**  
 1. When MD control box is malfunction or abnormal, the error message will be warned by the blinking of ①, ④, ⑤, ⑥ 4 LED on the control panel. (See the following list)  
 2. Repair and maintenance must be performed by the properly trained technician.

Panel LED blinking	Error code	Cause of the problem	Condition and solution
	ER0. 1	1. Power module detected error. 2. Abnormal over current occurred.	Motor and machine will be shutting down. Please check the power module. Please check the power board over current protection circuit.
	ER0. 4	1. When power on, higher power voltage has been detected. 2. Connected to a wrong AC power source. 3. Aluminum casing resistor for the brake circuit is defective or power board F1 fuse burst.	Motor and machine will be shutting down. Please check the AC power source. * If control box is AC 220V system, don't use the AC 380V power voltage, otherwise the panel LED will blink continually after 2 second of power ON. If continue supply the 380V power, the electrolytic capacitors (C4,C5) of power board will burst open over a period of time and cause the fuses (F1,F2) of EMI board open circuit. Please check the power board. Please check the aluminum casing resistor and power board F1 fuse.
	ER0. 7	1. Bad connection to the motor connector. 2. Synchronizer (sensor) signal error. 3. Machine locked or object stuck in the motor pulley. 4. Sewing material is too thick.	Motor and machine will be shutting down. Please check the motor or motor connectors' connection. Please check the synchronizer (sensor) and its signal. Please check machine head to see if any objects stuck in the motor pulley, or machine does not rotate smoothly.
	ER0.16	1. Safety switch is detected or bad connection. 2. Parameter [075. SFM] setting not match the machine head model.	Motor stopped Please check the safety switch. Please check parameter [075. SFM] setting, make sure it match machine head's safety switch.

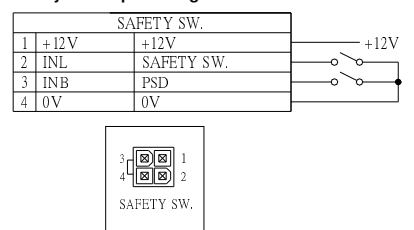
### Safety switch precaution :

When machine head's safety switch malfunction or the connection signal to the MD control box is abnormal, the motor will stop and display error code 16. (if operation panel is connected, the motor rotation icon on the panel will stop running.)

### Safety switch example :



### Safety switch pins assignment :



If you need the technical support, please contact your distributor or browse our website at <http://www.hohsing.com>