

# NICHIBO 馬達功能承認書

## NICHIBO MOTOR SPECIFICATION APPROVE SHEET

|                   |                              |                |             |                        |
|-------------------|------------------------------|----------------|-------------|------------------------|
| 公司名稱 Customer     | JAMES ELECTRONICS LTD.       |                |             |                        |
| 馬達型號 Part No.     | DC-280ST-20150-NR/45 (D-819) |                |             |                        |
| 客戶編號 Customer No. | 2310199                      | 規格書號 Spec. No. | DC-280S-240 | 日期 Date August 03 2020 |

(1)此承認書將提供你關於 Nichibo DC-280ST-20150-NR/45 馬達規範，本承認書任何關於关键性能的修改均應經由雙方共同討論與同意。

This approval sheet provides you with the specification of Nichibo Motor DC-280ST-20150-NR/45, Any revision especially related to performance on this specification shall be approved through mutual discussion and agreement.

(2)為防止馬達性能和/或壽命出現問題，所有測試和判定必須根據此承認書進行；任何關於使用方式及用途變更皆不在此保證書範圍內。

To avoid the issues on the motor performance and/or lifetime, all tests and judgments shall be conducted based on this approval sheet. Besides, any change for customer operation and application are beyond the scope of approval sheet.

(3) 當發生任何預期外事件時，雙方均應依據本承認書所載事項來討論事件的本質與解決之道。本廠所擔負之責任範圍僅限於馬達本體。

When any unexpected event occurs, both parties shall discuss and solve the event according to items written in this approval sheet. Meanwhile, Nichibo takes responsibility only for the part of motor.

(3)請注意你們有責任來保證你們的使用要求符合馬達規範。

Please note that clients/ customers must assure their operations are under the specification of Nichibo motor.

(5)在此承認書性能規格內，為便於 Nichibo 持續生產、改善質量、性能、生產效率，材料來源在沒有作另行通知的情況下可能會稍作更改。

Within the specification this acknowledgement defined, in view of Nichibo's production continuity and improvements in quality, performance and efficiency, Nichibo may change the source of some materials under without notice to customer.

(6) 請客戶在確認收到此承認書後，一周內簽署並回傳給我司。如果客戶未在指定期限內回傳給我司，我司將視為客戶已經認可了此份承認書。

Please return the copy of approval sheet with your signature in one week after the date of issuance. If you failed to return to us within the term hereinabove, we will regard it as the acceptance of this specification.

賣方簽章：

Prepared by:



買方簽章：

Approved by:

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| 項目 ITEM  | 規 格 SPEC  | 測 定 條 件 CONDITION   |
|--|---|---|
| <b>1 · 定格 Rating</b>   |   |   |
| 定格電壓<br>Rated Voltage  | 12.0 VDC  | 馬達端子間電壓<br>Between Motor Terminals  |
| 定格負荷<br>Rated Load   | 50.0 g-cm   | 滑輪式<br>Pulley   |
| 回轉方向<br>Direction of Rotation  | 逆時針<br>CCW  | 從出力軸邊看<br>Viewed from Output Shaft Side   |
| 使用溫度/濕度範圍<br>Operating temp/humid range  | -20°C~60°C<br>30%RH~85%RH   |   |
| 保存溫度/濕度範圍<br>Storage temp/humid range  | -10°C~60°C<br>30%RH~85%RH   |   |
| <b>2 · 測定條件 Measuring Condition</b>  |   |   |
| 馬達姿勢<br>Motor Position   | 出力軸與水平平行<br>Motor to be held, with shaft horizontally                   |   |
| 溫度,濕度<br>Environmental Temperature and Humidity                                | 常溫常濕<br>Normal  | 溫度 $25 \pm 5^\circ\text{C}$ 相對濕度 $65\% \pm 15\%$<br>TEMP: $25 \pm 5^\circ\text{C}$<br>HUMID: $65 \pm 15\%$  |
| 電源<br>Power Supply   | 定電壓安定化電源<br>Regulated   |   |
| <b>3 · 電氣特性 Electrical Characteristics</b>                                     |   |   |
| 無負荷電流<br>No-Load Current   | 140 mA MAX  | 定格電壓測試 30 秒讀取<br>Rated Voltage Test for 30 seconds to read  |
| 無負荷回轉數<br>No-Load Speed  | $12500 \pm 15\%$ RPM  | 定格電壓<br>Rated Voltage   |
| 定格負荷電流<br>Rated-Load Current   | $600 \pm 120$ mA  | 定格電壓<br>Rated Voltage   |
| 定格負荷回轉數<br>Rated-Load Speed  | $10500 \pm 15\%$ RPM  | 定格電壓<br>Rated Voltage   |
| 絕緣耐壓<br>Dielectric Strength  | AC660V 10mA/S   | 馬達端子和鐵殼間<br>Between Motor Terminal and Motor Metal Housing  |
| 截止扭力<br>Stall Torque   | 260g-cm MIN   | 定格電壓<br>Rated Voltage   |
| PTC 斷開<br>PTC switch off   | $\geq 4\text{sec}$  | $25^\circ\text{C}$  |
|  | $\geq 2\text{sec}$  | $80^\circ\text{C}$  |
|  | $\geq 6\text{sec}$  | - $30^\circ\text{C}$  |
| <b>4 · 機械特性 Mechanical Characteristics</b>                                     |   |   |
| 外觀<br>External Appearance  | 馬達外觀圖<br>As per motor Drawing   | 目視判斷<br>Optical   |
| 外型尺寸<br>External Dimension   | 馬達外觀圖<br>As per motor Drawing   | 游標尺, 分厘卡<br>Dial Caliper  |
| 間隙尺寸<br>Shaft End Play   | 0.05 ~ 0.60 mm  | 分厘表<br>Micrometer   |
| 軸振幅<br>Shaft Bending   | 0.05 mm MAX   | 分厘表<br>Micrometer   |
| <b>5 . 馬達上激光刻印標示三列<br/>3 rows information laser<br/>engraving on the Motor</b> | 2310199 → 客戶編號 Customer Numbers<br>D-8I9 → 規範代碼 Standard code<br>XXXXXX | <p>1<sup>st</sup> digit 年 year<br/> 2<sup>nd</sup> digit 月 month (1 ~ 9 rep. Jan. ~ Sep.<br/> A ~ C rep Oct. ~ Dec.)<br/> 3 ~ 6 digits 製造管制碼 Manufacturing control code</p> |

中貿有限公司  
友貿電機(深圳)有限公司  
NICHIBO DC MOTOR

客戶名稱 (Customer) : JAMES

資料檔名 (Filename) : 樣品DC280机种

馬達型號 (Motor No.) : DC-280ST-20150-NR/45

額定電壓 (Voltage) : 12.0V

額定輸出 (Pout Rated) : 4.92W

實驗室溫度 (Ambient Temperature) : 25

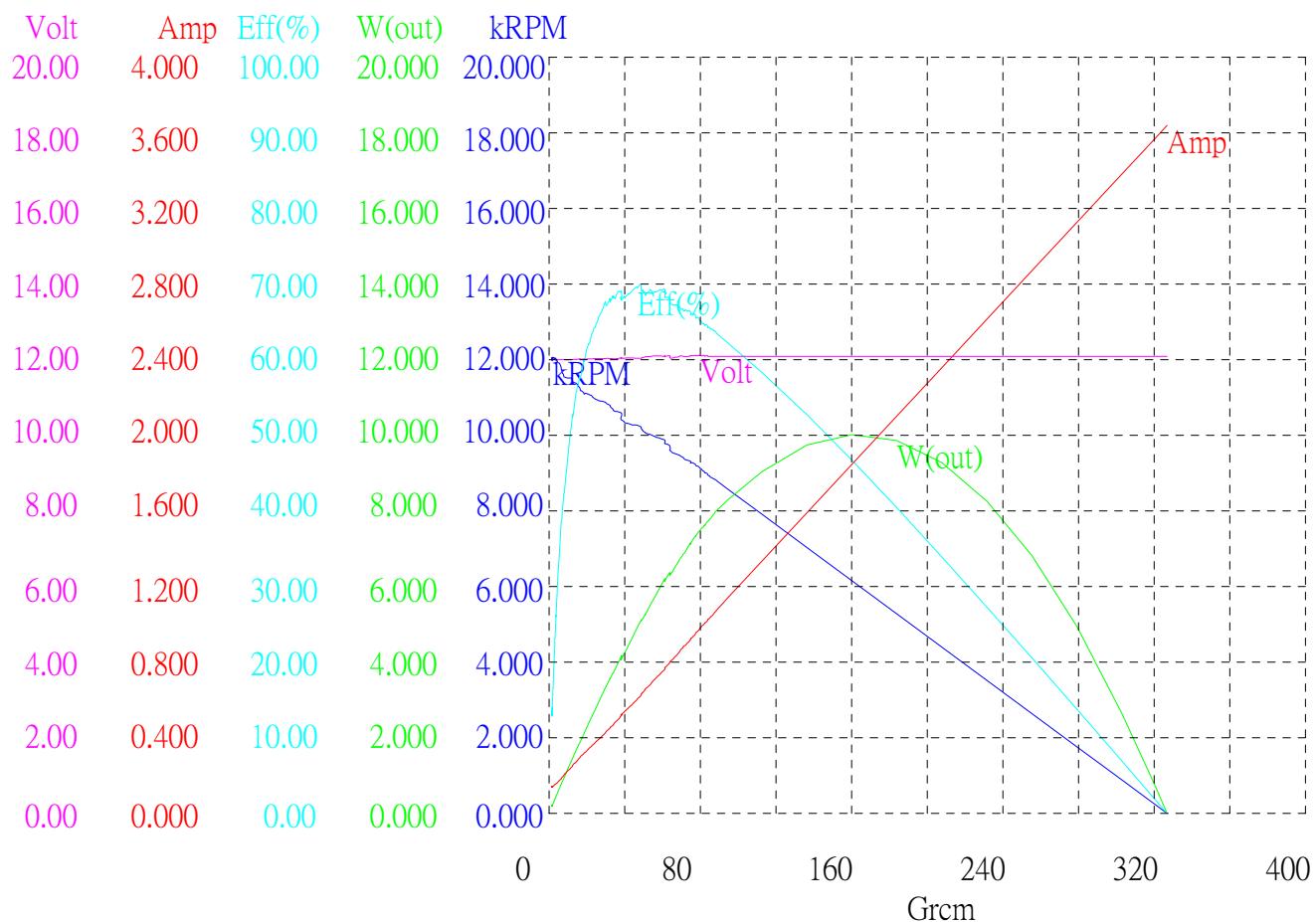
無載轉速 (No-Load R.P.M) : 12500

無載電流 (No-Load Current) : 140mA

啓動轉矩 (Started Torque) : 326g-cm

測試日期 (Test Date) : 2020.08.03

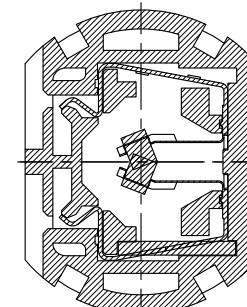
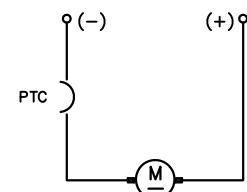
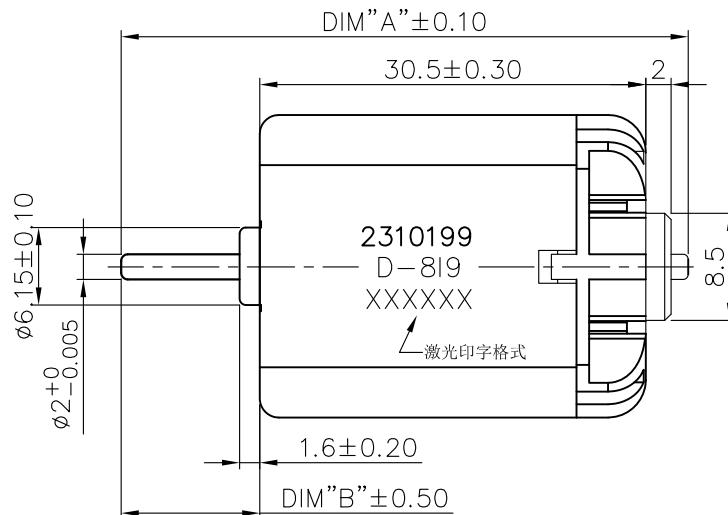
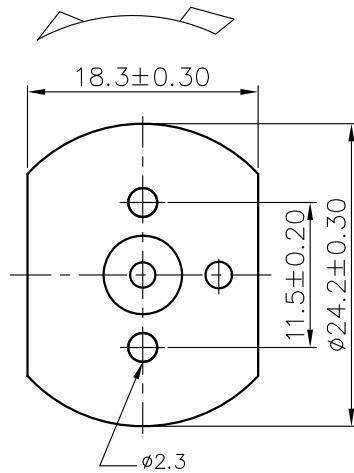
|                       | 轉速<br>R.P.M. | 電流<br>Amps | 轉矩<br>Grcm | 效率<br>Eff(%) | 輸出功率<br>W(out) | 輸入功率<br>W(in) |
|-----------------------|--------------|------------|------------|--------------|----------------|---------------|
| 堵住狀態 (Locked Rotor)   | 0            | 3.640      | 326.890    | 0.00         | 0.0000         | 42.647        |
| 最大扭力 (Max-Torque)     | 0            | 3.640      | 326.890    | 0.00         | 0.0000         | 42.647        |
| 最大效率 (Max-Efficiency) | 10277        | 0.600      | 46.680     | 70.15        | 4.9266         | 7.023         |
| 最大輸出功率 (Max-W(out))   | 6157         | 1.847      | 160.143    | 46.80        | 10.1250        | 21.636        |



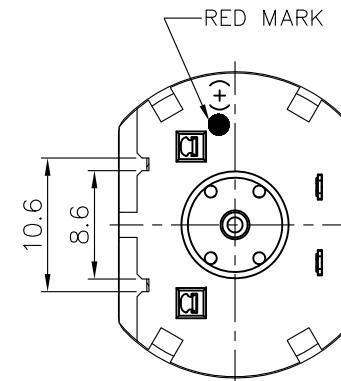
扭力常數(Torque Constant): 91.0228

馬達常數(Motor Constant): 42.8476

|     |    |
|-----|----|
| REV | AO |
|-----|----|

DIRECTION OF ROTATION


端子構造剖面圖



## NOTE :

- 1.LENGTH OF SHAFT DIM "A" 45.0 mm.
- 2.FRONT EXTENSION DIM "B" 11.0 mm.WHILE THE SHAFT AT EXTREMELY RIGHT POSITION.
- 3.END PLAY : 0.05–0.60mm.



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| 未注公差 |       | 名稱<br>NAME           |
|------|-------|----------------------|
| 0    | ±0.3  | 型號<br>MODEL          |
| 0.0  | ±0.1  | DC-280ST-20150-NR/45 |
| 0.00 | ±0.05 | 單位<br>UNIT           |
| 角度   | ±5°   | mm                   |
| 比例   | FREE  | 日期<br>DATE           |

JAMES

2020/08/03

## 1 重要注意事項：

### Important Notes :

1.1 請勿使馬達受撞擊、摔落或任何的變形，這樣會造成馬達無法正常運作。

Avoid any crash, broken and deformation, or motor would be stopped abnormally.

1.2 請勿讓外來物品，如金屬碎屑、細小零件等進入馬達內部。

Necessary protections to ensure no foreign materials such as metal scraps or tiny parts get inside the motor.

1.3 請勿損壞馬達端子，以避免馬達特性上的變化。

Keep the motor terminal intact to avoid changes of motor performance.

1.4 軸向衝擊力會對馬達壽命有負面影響，請務必於實際裝機測試時考量可能的影響並評估整體產品的預期壽命。用於重衝擊負載的使用方式時，請考慮加裝可支撐或保護馬達出力軸的機械裝置。

Axial thrust on the output shaft could have an adverse effect on the motor life. Please check the expected service life under the actual operating conditions by testing the motors installed in your application products. For heavy thrust loads, consider using some mechanical measure to retain the shaft end.

1.5 較重的側向負載如偏心裝置和外部機構的震動都會對馬達壽命造成負面影響。請務必於產品整機測試時做相關事項的確認。

Motor life may be affected adversely by heavy radial load such as produced by rotating eccentric cams, and also by vibration given from external devices. Confirmation on the actual set is needed.

1.6 當需要在馬達出力軸上加裝皮帶輪、齒輪、風葉等配件時，請務必於軸的另一端做適當且正確的支撐。

When press fitting a pulley, gear, fan, etc., onto the motor output shaft, always support the shaft at the other end or its retaining metal pad in a proper and correct way.

1.7 馬達軸承的含浸油可能會造成塑膠零件破裂。因此，請務必確認軸承油對貴廠產品中塑膠零件的影響。

Motor bearing oil may cause plastic part cracked. Please confirm bearing oil influence on plastic material of set.

1.8 於馬達上串接電阻時，馬達的原本特性的可靠度將會有所影響。請儘量避免加裝電阻。如果無法避免使用，請儘量減小電阻值，且重新確認在安裝電阻後馬達功能的可靠度。

When impedance is connected serially to the motor, reliability of motor may be affected. Please avoid using impedance. If necessary, minimize the impedance value and confirm reliability of the motor under such condition.

1.9 馬達出力軸在無或低側向壓力的狀況下運轉時，因軸與軸承間的空隙可能產生間隙噪音。請於整機裝配時確認此現象。

In case of low or no side pressure to the motor shaft, clearance noise between shaft and bearing may occur. Confirmation on actual set is needed.

1.10 對於如 UL、CSA 等安全標準，客戶應自行申請與取得相關認證。

For safety standard, e.g. UL, CSA, customer should apply and acquire certification.

1.11 請將馬達的存放時間控制在六個月以下，請勿將馬達存放於異常低溫及高溫，或放置於高濕度的環境中。此外，請避免在空氣中有霧氣凝結的情形下使用馬達或開啓馬達包裝。

Make arrangement to limit the storage period to 6 months or less. Do not store motors in abnormal low or high temperature or high humidity environment. In addition, condensation of atmosphere should be avoided in motor usage or opening the package of the motor.

## 2 保護迴路：

### Protection Circuit :

為提供安全的保障，請考量於產品中加裝保護迴路如保險絲、溫度開關、保護線圈或其他保護裝置。在考量下列可能發生的情形時，應實施安全確認試驗並加裝保護迴路。

In order to acquire safety assurance, please consider adding protection devices such as a fuse, a protection circuit or other devices to the motor. Safety confirmation test shall be conducted on the following conditions.

2.1 馬達接近其壽命終止或不預期的馬達損壞時，換向器短路或電刷與馬達外殼間短路等現象均有可能發生。

Toward the end of motor life or unexpected failure in motor, commutator slit short or short between brush and motor housing (cell) might occur.

2.2 如馬達工作方式為鎖死或持續超負荷使用時，所產生過多的熱量會燒毀馬達的零組件或引發火苗。

When motor shaft is locked or continuous over-load while power is applied, excessive heat might generate to burn motor parts or cause ignition.

2.3 馬達控制電路或半導體零件會因輸入過高電壓、電路接觸不良或短路而損壞

Motor control circuit or semiconductor may be damaged by supplied voltage exceeded rated limit, supplied voltage in reverse polarity or electrical contact partial open or short circuit.

### 3 有害氣體：

#### Detrimental gases :

3.1 馬達保存、作業的環境中不應有侵蝕性氣體如硫化氫、二氧化硫、二氧化氮、氯氣、二氧化矽、碳化矽等。

For proper operation, storage and operating environment should not contain corrosive gases such as H<sub>2</sub>S, SO<sub>2</sub>, NO<sub>2</sub>, CL<sub>2</sub>, SiO<sub>2</sub>, SiC and etc.

3.2 馬達存放環境中不應有會揮發腐蝕性氣體的材料，尤奇是矽、含氰福馬林和酚醛。如果在機械結構或整組的產品中有類似的腐蝕性氣體存在，可能會馬達無法轉動。

Storage environment should not have materials that emit corrosive gases especially from silicon, cyanic formalin and phenol group. In a mechanism or a set, existence of corrosive gases may cause no rotation in a motor.

3.3 請評估所選用的黏著劑或封填材料是否會產生有害氣體。

Please evaluate the selection of binding agents or sealing materials that could generate detrimental gases.

### 4 周圍環境：

#### Surrounding Atmosphere :

4.1 環境及作業溫度多少會對馬達性能和壽命有所影響。請特別留意炎熱和潮濕的環境。建議在裝配地點使用適當的環境控制設備。

Ambient and operating temperatures exert an affect more or less on motor performance and life. Do pay particular attention to the surroundings when it is hot and damp. A proper climate control is recommend in production site.

4.2 馬達應遠離極端溫度所造成的水氣凝結。因為所凝結的水氣會導致短路或漏電。建議在客戶的產品中加裝安全裝置如冷凝感應器來切斷電源作為保護。

A motor should be protected from temperature extremes that could cause condensation. This might lead to short circuit or current leakage. A safety device, such as condensation censor, is recommended to add on client's end product to cut off power supply.

### 5 放電現象：

#### Electrification :

5.1 皮帶電磁：皮帶與皮帶輪間的磨擦會產生靜電力。當釋放出的靜電累積起來達到定量時，會在馬達內部產生電氣噪音。這種現象可能會對客戶產品中的半導體零組件或馬達本身的損壞。

Belt Electrification : Static electricity may be generated by friction between pulley and belt. When electrostatic discharged from the belt accumulates, electrical noise is generated in a motor. This may cause motor or semiconductor failure in a client's end product.

5.2 接地靜電保護：放電現象與漏電會造成馬達迴路或半導體零件故障。在進行馬達或導電焊接與客戶產品或配件間的焊接時，正確的對焊槍及輸送帶做接地保護是絕對必要的。

Earth-Electrostatic Protection : Electrification and leakage can cause motor circuit or semiconductor failure. Proper grounding is required for soldering iron and conveyer belt during the motor terminal or lead wire is soldered to a mechanism or client's end product.

## 6 電源供應與電力傳導：

### Power Supply & Electric Conduction :

6.1 馬達供電不穩定會對馬達壽命造成影響。例如低供電壓會增加內部電迴路的壓降而在短時間內使馬達功率下降。相反的，高供電壓會使內電阻減小而使馬達壽命縮短。

The fluctuation of the motor driving power source can influence the life span of the motor. In instances where there is low input of voltage to the motor, the internal resistance of the power source is large which may well result in an inferior motor after a short time ; conversely in instances where high cyclic voltages are applied, this internal resistance is small and the motor life span is shortened.

6.2 如使用接插件做為導電迴路的聯結方式，請務必將接頭完全插入。於通電後，如接插件接觸不完全或斷電，均可能造成控制迴路或半導體零件的損壞。

To use connector for interface, please ensure complete pin insert. When power supply is on, connector contacts that do not insert or disconnect might cause damage to control circuit or semiconductor in the motor or circuit components.

## 7 馬達安裝作業：

### Operation of Motor Mounting :

7.1 在裝配螺絲超過本廠建議長度時，當馬達運轉螺絲很可能會碰觸並損壞馬達轉子。如此馬達將無法運轉。請使用適當的裝配用螺絲（請參照附錄 B 中的相關解說）。此外，安裝時亦須確保馬達裝配面的平整。如果無法保證平整的安裝時，可能會造成馬卡住。

In case, a mounting screw is longer than our recommended length, the screw may touch and damage the rotor. Motor will not be able to perform. Suitable screw length should be used for mounting motor to the mounting face. ( the recommended screw length is indicated in the appendix B Note. ) In addition, well flat matching between a mounting face and a motor should be used. In case a screw-tightening surface is not flat, motor jam might occur.

7.2 超音波鉚接所產生的震動波有可能會損壞馬達及其控制迴路。

Ultrasonic welding for motor mounting may damage motor and control circuit due to its vibration

### 7.3 端子焊接作業：

#### Terminal soldering operation:

7.3.1 請使用適當的烙鐵及焊接溫度。建議使用溫度為 400°C (烙鐵頭錫溫)；持續接觸工作時間請勿超過 2 秒。

Suitable soldering iron and temperature are required. Suggested soldering head temperature is 400°C, and soldering time must not exceed 2 seconds.

7.3.2 避免殘餘的錫及助焊劑落入馬達中。因此建議在焊接時，將馬達水平放置。

Please keep the motor horizontal while soldering, in order to avoid remaining tin or flux get inside the motor.

7.3.3 操作時，應避免接觸任何的塑膠部件造成變形。

No contact with any plastic parts during soldering, in case the plastic parts deform.

#### 7.4 安裝方式：

Mounting Application :

7.4.1 螺絲固定方式：請勿使用尺寸不合的螺絲。如此會導致馬達轉動不平衡，進而使馬達震動增加且造成馬達損壞。

Screw Type : Do not use a oversized screw so that will cause unbalance to a motor. Motor vibration may be enlarged by unbalanced motor rotation and cause motor failure.

7.4.2 黏著劑固定方式：請勿過量使用黏著劑。如果黏著劑溢流到馬達軸承上會造成馬達卡住和震動。

Adhesive Type : Do not apply excessive adhesive material overflowing to motor bearing. Overflowed adhesive may cause locked rotor and motor vibration.

7.4.3 緊密配合方式：請勿使用過大的力量擠壓馬達。過大的力量可能會導致軸變形或轉子支撐零件的損壞。這都會造成馬達無法正常運轉。

Forced Insert Type : Do not exert over load to the motor. Overload may cause a shaft deformed or a shaft support broken and result in no rotation of a motor.