

SERIES

效率更高

More efficient

體積更小

Smaller

控制範圍更寬廣

Wider control range

維護零件更少

Fewer maintenance parts

漢鐘 螺旋式

AM 系列

永磁變頻空壓機

HANBELL

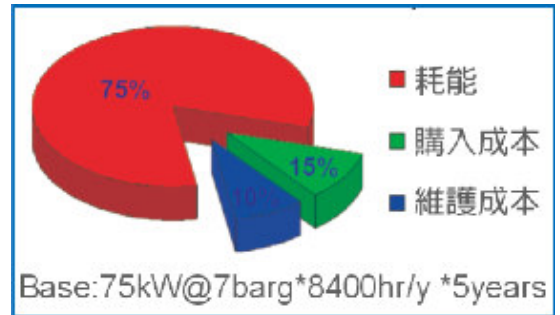
AM SERIES SCREW AIR COMPRESSOR
PERMANENT MAGNET MOTOR



『空氣是免費的，壓縮空氣卻是極為昂貴的』空壓機的能源成本約佔總運轉成本75%（如圖右），其中有近40%是屬於空車或容調運轉之無效損耗。

2000年漢鐘為了有效地降低空壓機的無效損耗，開發第一代HFC系列感應式變頻空壓機，以控制馬達的轉速取代了傳統高耗能的容調穩壓控制。

2009年漢鐘配合節能減碳國家政策積極創新，成功將永磁無刷馬達 (Brushless PM Motor) 技術應用於空壓機，領先全台各界，開發出第二代『AM系列永磁式變頻空壓機』，期盼藉由高效率永磁無刷馬達以及優越的全變頻 Sensorless 控制技術，大幅削減空壓機的運轉成本，能提供更穩壓、更寬域、更經濟的負載調控氣源，真正達成以最低運轉成本創造最大穩定氣源的終極目標。



"Air is free, but compressing air is expensive". Air compressor energy costs about 75% of the total operating costs, around 40% is invalid loss of idle running or adjustable operation.

In 2000, to avoid the invalid loss of air compressor, Hanbell developing the first generation of HFC series induction variable frequency air compressor, by controlling the rotating speed of motor to replace the traditional high energy consumption of adjustable voltage regulation.

In 2009, with national energy saving program, Hanbell has applications Brushless PM motor technology in air compressor and developing the second generation AM series permanent magnet air compressor. With high efficiency permanent magnet motor and superior sensorless controlling technology, AM series air compressor has reducing the operating cost drastically and provide you more stable, wider and More economical loading regulated air supply.

● 第一代感應式變頻空壓機的特點

Features of induction variable frequency air compressor

1. 控制馬達轉速達到節能效益

依據現場空氣需求量改變空壓機馬達轉速，需求量低時馬達降低轉速，消耗電力亦同步降低。空氣量的供給符合需求，減少浪費。

1. Energy saving by controlling the motor rotating speeds

Change the motor rotating speed according to air demand, reducing motor speed when the demand is low and reducing the power input accordingly. Supply the air match to demand to reduce the waste.

2. 部份負載運轉效率高

一般定頻空壓機在空車運轉時無壓縮空氣產生，但耗能約為重車20%~50%。使用變頻控制可以使空壓機的運轉符合在理想壓縮空氣-耗能曲線。

2. High efficiency in partial load

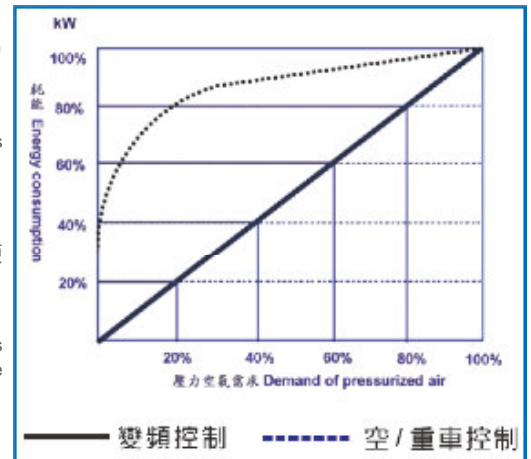
Normally the fixed frequency air compressor won't compress air during idling consumption, but takes 20%~50% power consumption. Using variable frequency can control the air compressor match to the curve of compressing-energy consumption in a calculated ideal value.

3. 線性變化排氣量、供氣壓力穩定

可以減少空壓機低負載運轉時虛功之浪費，輸出風量等於現場需求，系統壓力穩定輸出，解決空重車交替運轉對馬達和系統產生內應力並減少壽命的問題，以及進氣閥容調用氣量低但耗能沒有等比例降低的缺點。

3. Linear variation discharge, stable pressure of air supply

Reducing the waste energy consumption in partial loading, and supply the air as demand. Stable power output of system pressure can avoid the problem of internal stress to motor and system will reduce life expectancy, also solve the disadvantage of intake valve not equally reduced than energy consumption when low air demand.



● 第二代AM系列永磁式變頻空壓機嶄新特點

Features of permanent magnet air compressor

1. 馬達效率更高

與一般感應 (變頻) 馬達相比，永磁無刷馬達的轉子鐵損、電樞銅損等固定損失減少了30%，效率當然更高。

1. Higher efficiency of motor

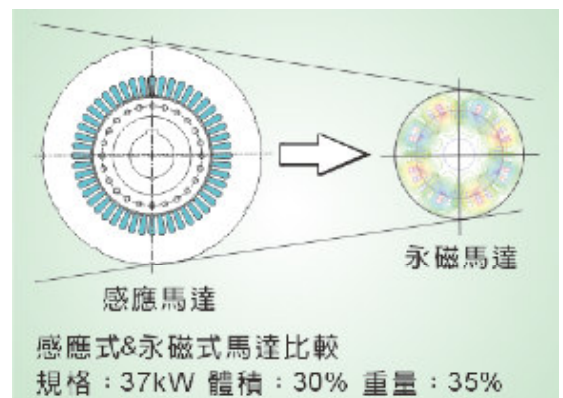
Comparing to induction variable frequency air compressor, the iron loss and armature copper loss of brushless PM motor reduce 30%, higher efficiency.

2. 馬達與空壓機體積更小

馬達使用永磁型轉子，不需通過電流製造電磁場，除耗能更低外，電機內部產生的廢熱也減低許多，散熱需求面積減少，馬達的體積可縮小30%、重量減輕35%，緊湊設計、不佔空間。

2. Smaller of motor and air compressor

The motor was used permanent magnetic rotor no need to create electromagnetic fields by current. Not only lower energy consumption, also decreasing the internal motor waste heat. With smaller cooling area, the volume of motor reduces 30% and weight reduces 35%.



3.實現低轉速高轉矩運轉理想曲線

永磁馬達之輸出轉矩和輸入電流成線性關係，最適合成轉矩負載需求之轉動設備應用場合（空壓機為典型定轉矩負載設備），在低轉速運轉時較容易克服靜摩擦力，具有可頻繁啟停、急加減速、快速起步、電流不易過載等優點，最適用於連續低負載的工况。

3. Achieve to low rotating high torque ideal running curve

The output torque and input current of PM motor is linear, suitable for application of fixed torque equipment (air compressor is typical torque load equipment). In the low speed operation is easy to overcome the friction, and with advantages of frequent start and stop, rapid acceleration and deceleration, quick start, not easy overload. Most suitable for low operating conditions.

4.變頻控制範圍更寬廣

由於永磁變頻空壓機具備低轉速高輸出轉矩的優勢，故其變頻控制模式相較感應式變頻空壓機範圍更寬廣、操作更穩定、反應更快速。

4. Wider VFD control range

The advantage of permanent magnet air compressor is high output in low rotating speed, the VFD control range is wider than variable frequency air compressor, stabilizer and faster.

5.免傳動損失、維護零件更少

永磁馬達與空壓機機體採同軸直結式設計，不需使用皮帶（輪）、齒輪、聯軸器等傳動元件，完全無傳動損失。更大幅削減馬達軸承數量，零件少檢修維護更容易，真正有效縮短日常保養工時以及降低定期維護成本。

5. No transmission loss, fewer maintain parts

PM motor and air compressor use coaxial direct structure design, no need to use transmission parts belt, gear and coupling, no transmission loss. Drastically reduced the quantities bearing, easy to maintain and service. In this way, reducing the service time and cost of spare parts.



6.全新高效率轉子

高轉速工况專用齒型設計、提高效率

6. New high efficiency rotor

Special design of rotor for high speed condition, increasing efficiency.



7.簡易符號訊息顯示

7. Symbol message display

自動重啟動 (可選擇功能)
Auto reboot (Option)

遙控壓力 (遙控壓力調整工作)
Remote pressure (Remote adjust pressure)

遙控啟動 (允許遙控啟動)
Remote start (Allow remote start)

運轉
Operating

馬達故障
Motor failure

加載
Loading

洩放 (可選擇功能)
Unloading (Option)

時間 (計時總時間)
Time (Timing total time)

壓力-設定值指示
(顯示低於或高於設定值)
Pressure setting (Display pressure value)



一般故障
Error



電源故障 (電源被中斷後重新恢復時顯示)
Power Error (Displayed when the power is interrupted and resumed)



排氣溫度高 (高於溫度設定)
Discharge Temp. High (Higher than setting)



緊急停機
Emergency stop



添加潤滑油
Add lubricant



排氣壓力過高警告 (超過設定壓力)
Warning of Dis. Pressure too high (Higher than setting)



油氣分離器維護
Oil Separator Maintain



鎖定頁 (功能調整抑制)
Locked (Function adjustment)



檢修到期，維修
Maintenance



永磁馬達變頻空壓機與感應馬達頻空壓機比較

PM motor and induction motor variable frequency air compressor comparison chart

空壓機型式 Comp. type	使用永磁馬達變頻空壓機 PM motor	一般用感應馬達變頻空壓機 Induction motor
馬達型式 Motor type	永磁同步馬達與油電車同型式專為節能設計 The same with Hybrid special for energy saving	一般效率感應式馬達 Normal induction motor
馬達效率 Motor efficient	永磁馬達效率與IE3同等級以上 IE3 or higher	一般效率或IE2效率馬達，且需加裝排熱風扇，耗電增加 le2 and need cooling fan, more power consumption
傳動能耗 Transmission efficient	直接傳動，不經由聯軸器或齒輪傳動，能耗節省3~5% Directly transmission without gear or coupling, energy saving 3%-5%.	使用聯軸器或齒輪傳動，有傳動損耗 Transmitting with gear or coupling, have transmission loss.
低振動 Vibration	直接傳動，有效減少振動產生 Directly transmission with low vibration	使用聯軸器或齒輪傳動，校正度不好，容易有傳動振動產生 Transmitting with gear or coupling, have vibration if undercorrection.
傳動零件更換 Transmission part replace	無傳動耗材更換成本 No cost of transmission parts replacement	聯軸器或齒輪傳動耗材，定期更換費用高達上萬元 High cost of gear and coupling
體積 Volume	體積較一般變頻空壓機小約10%以上 10% smaller	體積較大、佔空間 Big size need more space
馬達排熱量 Motor heat rejection	排熱量較一般變頻空壓機小5~10%，減少空壓機吸氣熱短循環 Less 5~10%, less inspiratory heat cycle	馬達排熱量較大，機組內部溫度較高 Higher heat rejection, higher temp. inside the compressor

AM系列永磁變頻空壓機技術規範

Air-cooled Specification

機 型 Models		AM-15A	AM-22A	AM-37A	AM-55A	AM-75A	AM-90A
壓縮機 COMPRESSOR	排氣量 (m³/min) 8kg/cm²G	0.76~2.3	1.19~3.6	2.05~6.2	3.23~9.8	4.32~13.1	5.15~15.6
	空氣出口溫度 (°C) DISCHARGE AIR TEMP	環境溫度+15°C (當環境溫度低於30°C時) AMBIENT TEMPERATURE+15°C (While ambient temperature lower than 30°C)					
	潤滑油量 (L) LUBRICANT OIL VOLUME	9	18	24	68	71	85
	環境溫度 (°C) HIGHEST AMBIENT TEMP	2-40°C					
電機 MOTOR	額定輸出 (HP/kW) RATED OUTPUT	20/15	30/22	50/37	75/55	100/75	125/90
	適用輸入電壓 (V) VOLTAGE	220、380、440					380、440
	型式 TYPE	Permanent Magnet Motor(永磁無刷電機)					
	絕緣等級 INSULATION GRADE	F級絕緣 F CLASS					
	啟動方式 STARTING TYPE	變頻器緩衝啟動 INV START					
冷卻器 COOLER	冷卻方式 COOLING MEDIUM	氣冷式 AIR					
	風扇功率 (kW) FAN POWER	0.37	0.37	1.8	1.5	0.37*2	0.75*2
	冷卻風量 (m³/min) COOLING VOLUME-AIR	75	75	125	183	150	250
長/寬/高 (mm) L×W×H	氣冷式 AIR	1200	1120	1250	1400	1500	1600
		X	X	X	X	X	X
		700	1200	1200	1400	1400	1800
		X	X	X	X	X	X
		1070	1360	1700	1500	1720	1720
重量 (kg) NET WEIGHT	氣冷式 AIR	400	650	700	1500	1800	2000
空氣出口管徑 AIR OUTLET SIZE		1 1/4"	1 1/4"	1 1/4"	2"	2"	2"

- 註：1. 上列各機型排氣量最佳運轉區間33%~100%。
2. 以上尺寸規格僅供參考，依實品尺寸為主。
3. AM-37A機組所標示為220V電壓尺寸。
4. 本公司保有所有規範之設計修改權利，不另行通知。
5. 水冷式及其他機型為特殊規格。

- Note:
1. Best operating range in 33%~100% for above models.
2. All the dimensions and weights mentioned above are described for your reference only. The actual measurement is subject to final confirmation.
3. The dimension of AM-37A is for 220V.
4. Hanbell reserves the right to modify specifications and design without notice.
5. Water-Cooled and others type are special model.

