

# 馬達扭力測試設備

## Torque testing equipment

### 一、前言

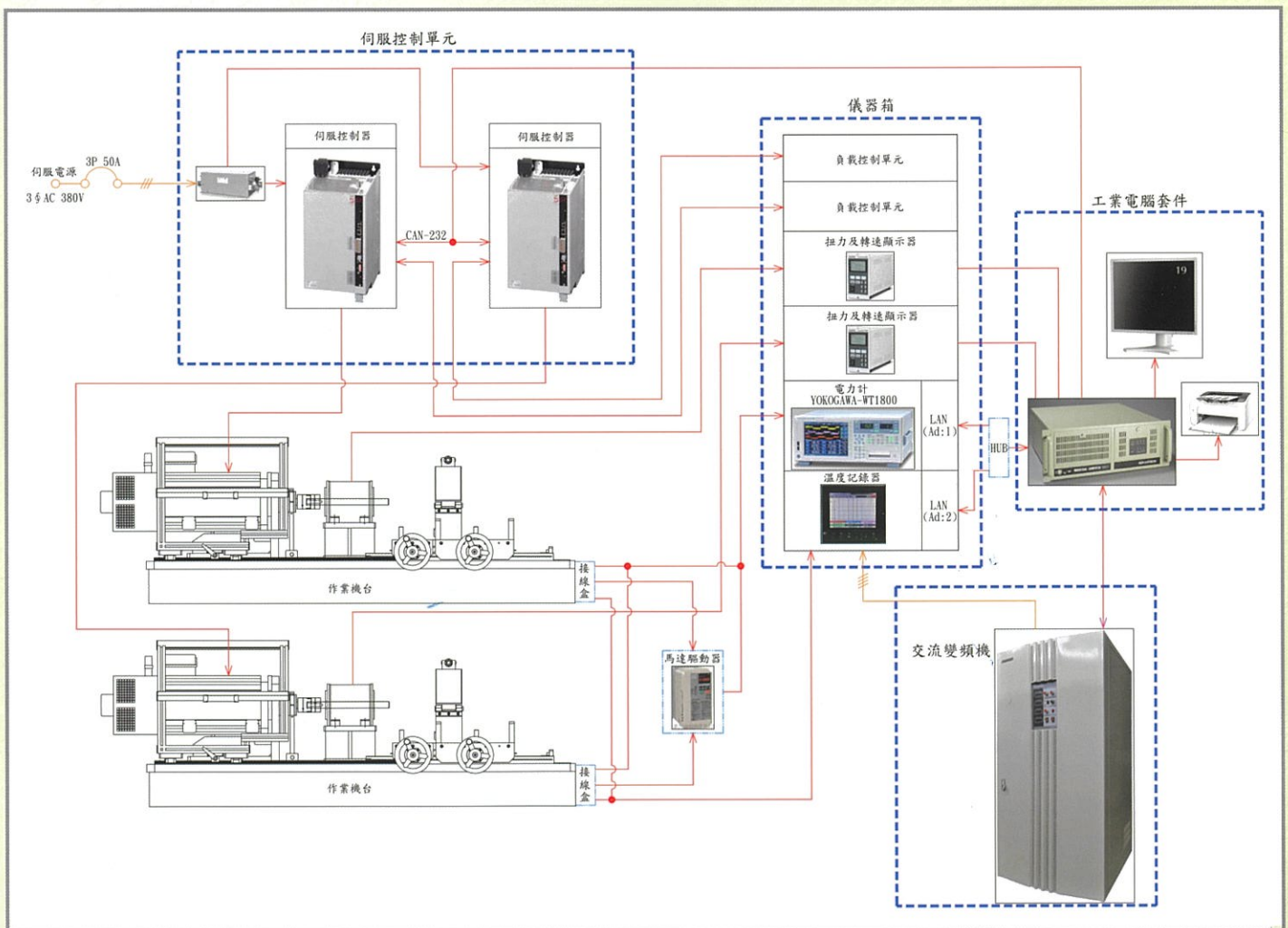
本系統是藉由控制馬達負載或轉速快速地擷取電壓、電流、輸入功率及輸出扭力、馬達轉速，再經由電腦快速演算出馬達效率，並且將所有資料儲存於電腦之中，列印出數據及繪製相關曲線，以作為開發馬達時研判之重要依據。另外，本系統符合 IEC60034、IEEE-112 及 CNS14400 規範。

### ◆ Introduction

This is automatic test equipment, controlling the load or speed of motor, then gathers all data of each point at the same time to calculate and save to hard-disk as important information for motor production, which could also print out and plot curves related. Those data includes voltage, current, input wattage, output torque and out speed. This equipment is applicable for the development of motor. Otherwise, it is comply with standard IEC60034, IEEE-112 and CNS14400.

### 二、系統方塊圖 (範例)

#### ◆ System diagram (For reference)

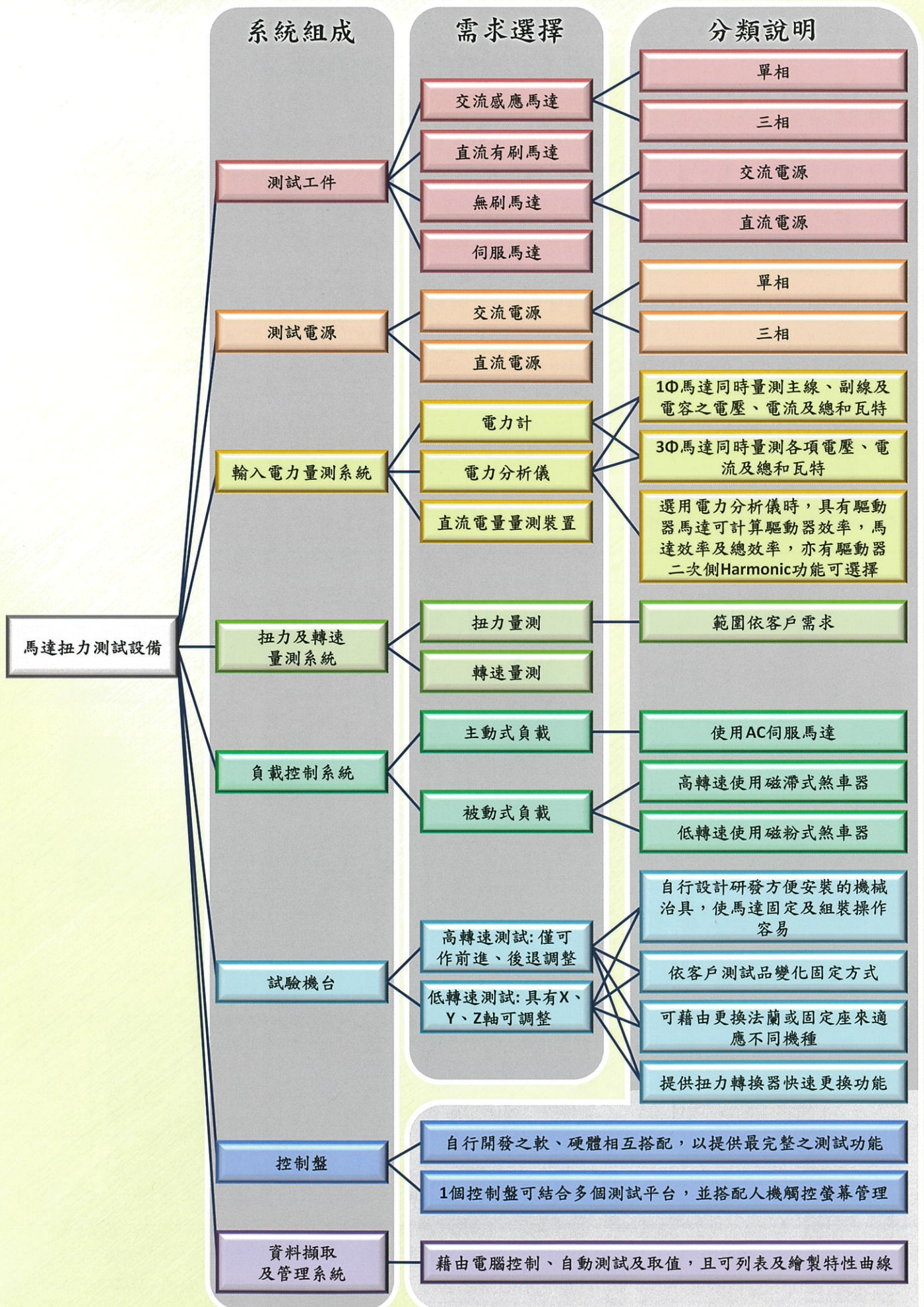


本系統採用高精度電力計，可測量電壓、電流、輸入功率、輸出扭力、馬達轉速及 Harmonic。

This system adopting power meter with high-precision, which could measure voltage, current, input wattage, output torque and harmonic.

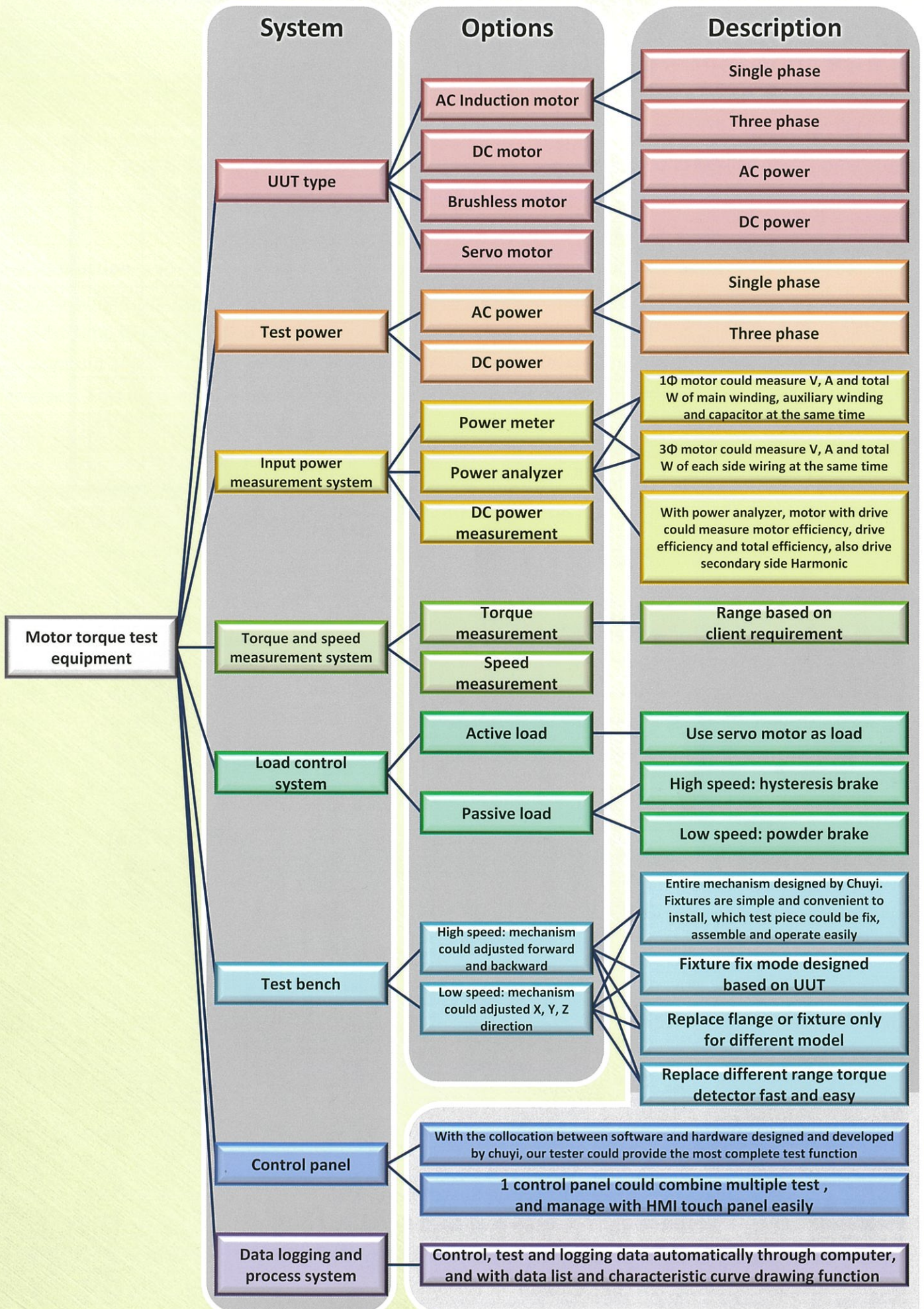


### 三、主要組成 (依客戶需求組合)





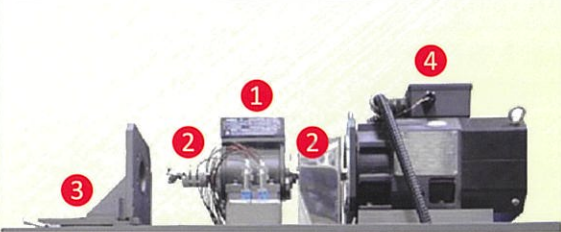
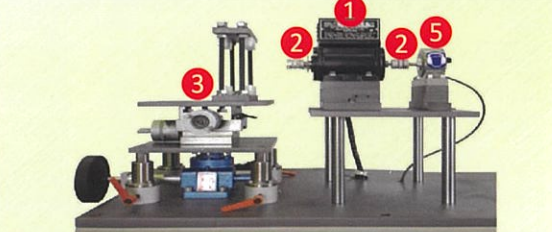
◆ Components (Customized based on client requirement)





#### 四、負載方式比較

##### ◆ Loading type comparison

	主動式負載 Active load	被動式負載 Passive load
圖示※ Illustration		
特色 characteristic	使用伺服馬達作為負載 Using servo motor as load	使用剎車器作為負載 Using brake as load
控制方式 Control type	定轉速或定扭力 Constant speed or constant torque	定扭力 Constant torque
適用最高轉速 Max. speed available	12000 rpm (依不同需求設計機台轉速上限) Max. limit could be designed based on different UUT requirement	30000 rpm (依不同需求設計機台轉速上限) Max. limit could be designed based on different UUT requirement
反電動勢量測 Back EMF measurement	適用 Applicable	不適用 Not applicable
電氣式 Ld/Lq Electric Ld/Lq	適用 Applicable	不適用 Not applicable

※圖示編號: ① 扭力檢出器 ② 聯軸器 ③ 測試平台 ④ 交流伺服馬達 ⑤ 磁滯式剎車器

※Illustration no.: ① Torque detector ② Coupling ③ Test platform ④ AC servo motor ⑤ Hysteresis brake

#### 五、不同類型馬達適用測試項目

##### ◆ Applicable test item for different type motor

	感應式馬達 Induction motor	直流有刷馬達 DC motor	無刷馬達 Brushless motor	伺服馬達 Servo motor
馬達分項效率 Motor sub-efficiency			✓	✓
驅動器二次側 Harmonic Drive secondary side Harmonic			✓	✓
T-N 特性曲線(自動掃描) T-N curve (Auto scan)	✓	✓	✓	✓
定點負載測試 Fix-point load test	✓	✓	✓	✓
馬達溫昇測試 Motor temp. rise test	✓	✓	✓	✓
損失分離測試 Losses separation test	✓			
反電動勢測試 Back EMF test			✓	✓
電氣式 Ld/Lq Electric Ld/Lq			✓	
機械式 Ld/Lq Mechanical Ld/Lq			✓	
Hall Sensor 量測 Hall Sensor measurement		✓	✓	

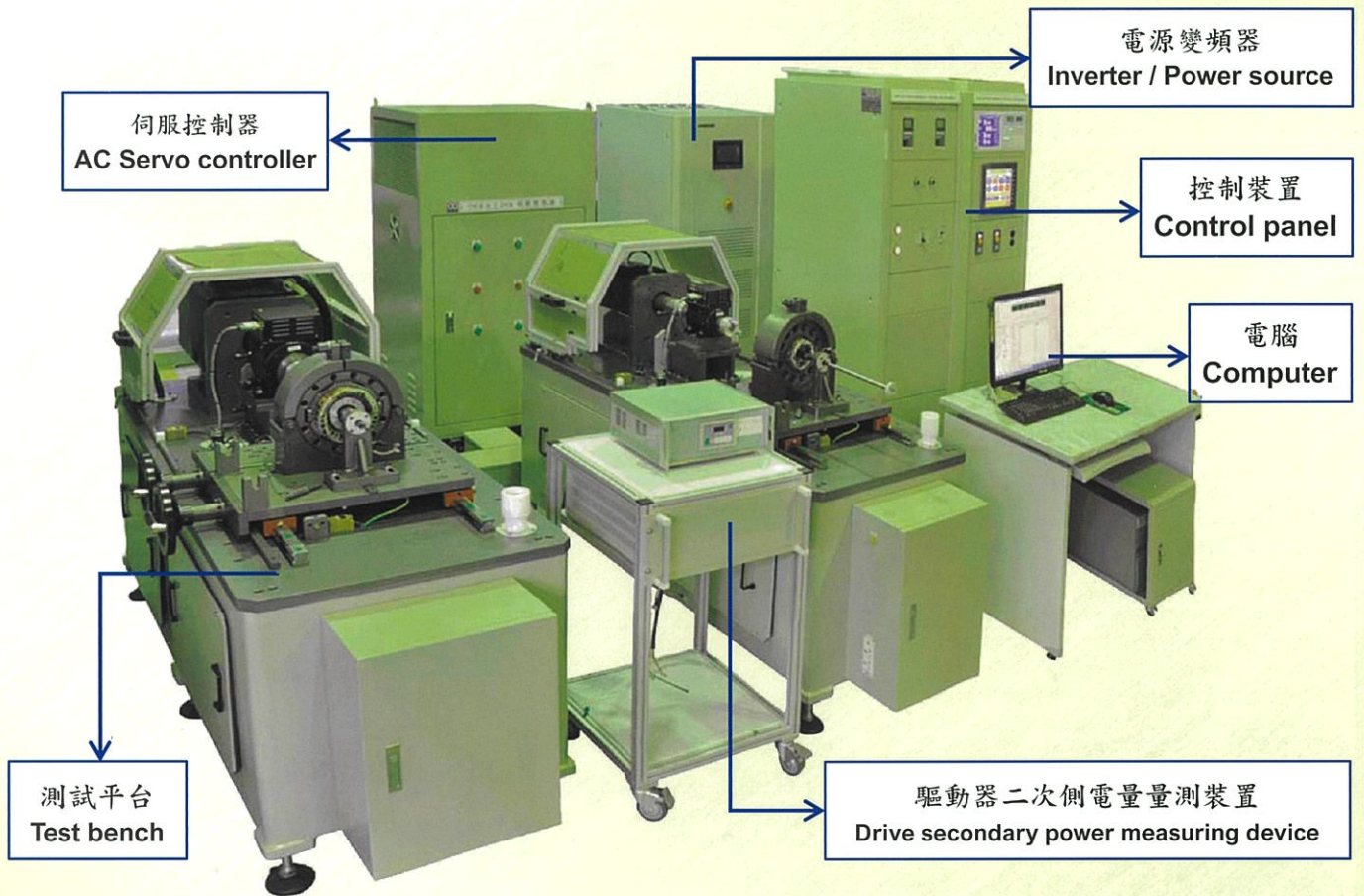


六、外型參考

◆ Outline reference

<無外殼馬達扭力測試設備>

Compressor motor torque testing equipment (without outer case) (For reference)



<馬達扭力測試設備>

Motor torque test equipment (For reference)

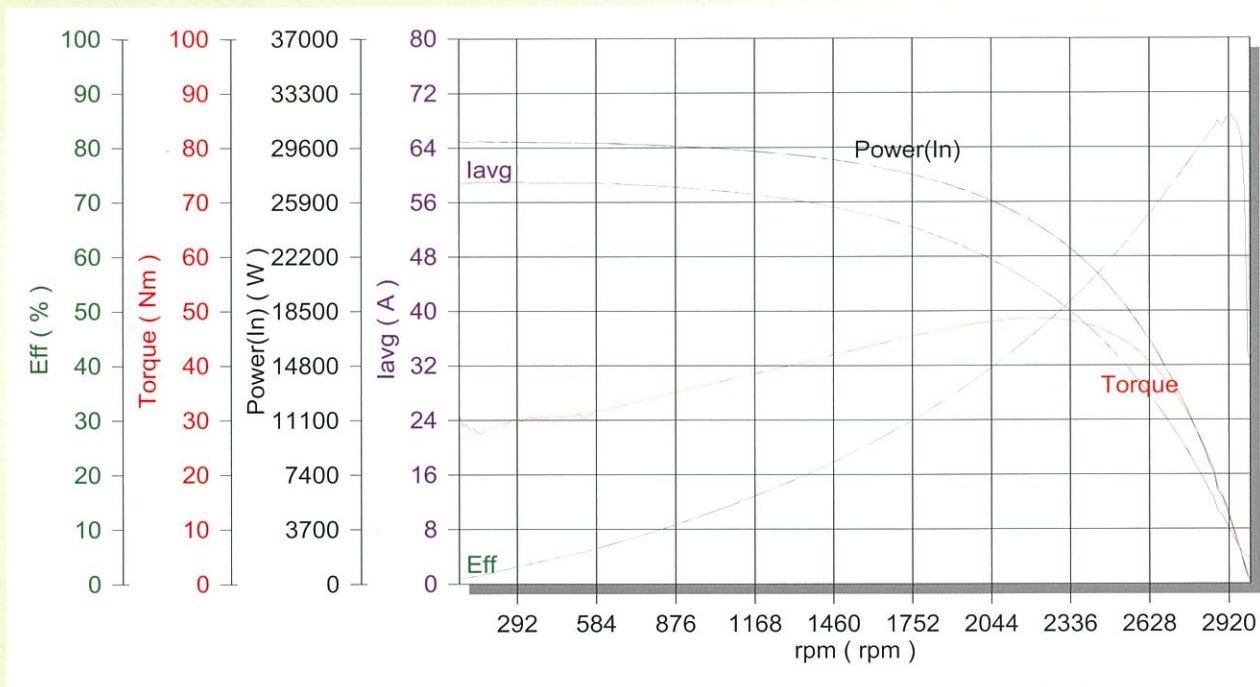




七、測試數據表及曲線圖：以電腦自動進行掃描並加載（無載→負載→堵住）

◆ Performance data and graph: Scanning and loading from no load, load to lock automatically.

◎TN 曲線圖 (TN curve) (For reference)



◎測試報表 (Test report) (For reference)

快速測試報表

馬達型號	M-001	馬達編號	M-001	試驗機台	37KW
轉子型號	R-001	轉子編號	R-001	扭力計	100 N.m
馬達種類	交流感應	壓縮機型號	COM-001	備註	
相數	3.0 Φ	極數	2		
電壓	380.0 V	轉向	CCW 一次側		
頻率	50.0 Hz	電容	uF 二次側		
電阻UV(t)		電阻VW(a)		電阻UW(m)	

項目	三相電壓				三相電流				輸入	輸出	轉速	扭力	功因	總效率	周溫	線圈
	V1	V2	V3	Vav	I1	I2	I3	Iav	Pi	Po	rpm	TQ	PF	Eff.	°C	°C
序號	(V)	(V)	(V)	(V)	(A)	(A)	(A)	(A)	(W)	(W)	(rpm)	N.m	(%)	(%)	°C	°C
1	380.7	381.1	380.7	380.8	3.90	3.90	3.80	3.90	222.0	90.9	2998	0.29	8.7	41.0		
4	377.8	377.9	377.7	377.8	4.60	4.70	4.60	4.60	1908.0	1542.2	2967	4.97	63.0	80.8		
5	377.9	378.0	377.8	377.9	5.40	5.50	5.40	5.50	2656.0	2233.7	2954	7.23	74.3	84.1		
6	378.3	378.4	378.2	378.3	7.50	7.70	7.60	7.60	4241.0	3638.6	2926	11.89	85.4	85.8		
9	378.6	378.7	378.6	378.6	10.50	10.90	10.70	10.70	6338.0	5374.0	2877	17.86	90.3	84.8		
10	378.4	378.5	378.4	378.5	12.30	12.70	12.40	12.40	7462.0	6211.6	2865	20.73	91.4	83.2		
11	378.5	378.5	378.4	378.5	13.40	13.90	13.50	13.60	8194.0	6749.6	2848	22.66	92.0	82.4		
14	378.3	378.2	378.1	378.2	17.90	18.70	18.10	18.30	11094.0	8653.6	2784	29.72	92.7	78.0		
15	378.3	378.1	378.0	378.1	19.00	19.90	19.20	19.40	11737.0	9026.5	2768	31.18	92.6	76.9		
16	378.2	378.1	377.9	378.0	20.00	20.90	20.20	20.40	12351.0	9368.1	2751	32.56	92.6	75.9		
17	378.1	378.0	377.8	377.9	21.00	22.00	21.30	21.40	12973.0	9685.5	2735	33.86	92.4	74.7		
20	377.9	377.7	377.6	377.8	23.80	24.90	24.10	24.30	14593.0	10458.0	2688	37.2	92.0	71.7		
21	377.9	377.6	377.6	377.7	24.70	25.90	25.00	25.20	15149.0	10687.6	2673	38.23	91.8	70.6		
22	377.7	377.5	377.4	377.6	26.40	27.70	26.70	26.90	16090.0	11039.0	2642	39.95	91.4	68.6		
23	377.7	377.4	377.4	377.5	27.10	28.50	27.50	27.70	16544.0	11189.1	2626	40.74	91.3	67.6		
80	375.6	375.6	375.4	375.6	52.20	55.10	53.20	53.50	28181.0	7572.8	1643	44.07	81.0	26.9		
123	375.6	375.4	375.3	375.4	56.80	59.60	57.90	58.10	29682.0	3366.5	908	35.45	78.6	11.3		
156	375.4	375.4	375.2	375.4	57.60	60.20	58.70	58.80	29971.0	1197.9	372	30.79	78.4	4.0		
169	375.5	375.4	375.2	375.4	57.70	60.20	58.80	58.90	30030.0	413.5	142	27.84	78.5	1.4		
175	375.5	375.6	375.2	375.4	57.60	60.20	57.90	58.60	29932.0	207.5	71	27.95	78.6	0.7		
Max TQ49	376.4	376.2	376.0	376.2	43.20	45.60	44.00	44.30	24655.0	11106.2	2185	48.6	85.5	45.1		



制宜電測股份有限公司 Chuyi System Co., Ltd.

地址：24158 新北市三重區光復路二段 88 巷 38 號

ADD : No. 38, Lane 88, Sec. 2, Guangfu Rd., Sanchong Dist.,

New Taipei City 24158, Taiwan

Tel : +886-2-2995-3173

Fax : +886-2-2995-6436

E-mail : taipei@chuyi.com.tw

Web : www.chuyi.com.tw



V1.0 2020.06