

# Test Report



## 測試報告

號碼(No.): AWAN240911

日期(Date): 11-Sep-2024

頁數(Page): 1 of 10

連騰科技股份有限公司 (ADVANCED WIRELESS & ANTENNA INC.)

樣品名稱 (Sample Name) 連騰科技股份有限公司(AWAN)

樣品類型 (Sample type) 姿態航向參考系統(AHRS)

樣品型號 (Style/Item No.) AGM-610

測試期間 (Testing Period) 02- Sep -2024 to 05- Sep -2024

測試需求 (Testing Request) 對AGM-610模組進行性能測試，包括一小時靜態及動態90度來回旋轉條件下的量測。測試將評估模組在不同操作環境中的精度與穩定性，並驗證其是否符合資料手冊中所列的姿態角度偏移規範。

(Conduct performance testing on the AGM-610 module, including measurements under one hour of static and dynamic 90-degree back-and-forth rotations. The test will evaluate the module's accuracy and stability in different operating environments and verify its compliance with the attitude angle drift specifications listed in the datasheet.)

測試結果 (Test Results) 請參閱下一頁(Please refer to following pages.)

結 論 (Conclusion) AGM-610模組在靜態與動態測試條件下的性能評估結果顯示，其在姿態角度偏移、精度與穩定性方面表現良好，並完全符合資料手冊中所列的技術規範。  
(The performance evaluation of the AGM-610 module under static and dynamic test conditions shows that it performs well in terms of attitude angle drift, accuracy, and stability, fully complying with the technical specifications listed in the datasheet.)

   
Signed for and on behalf  
of ADVANCED WIRELESS &  
ANTENNA INC.

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號碼(No.): AWAN240911      日期(Date): 11-Sep-2024      頁數(Page): 2 of 10

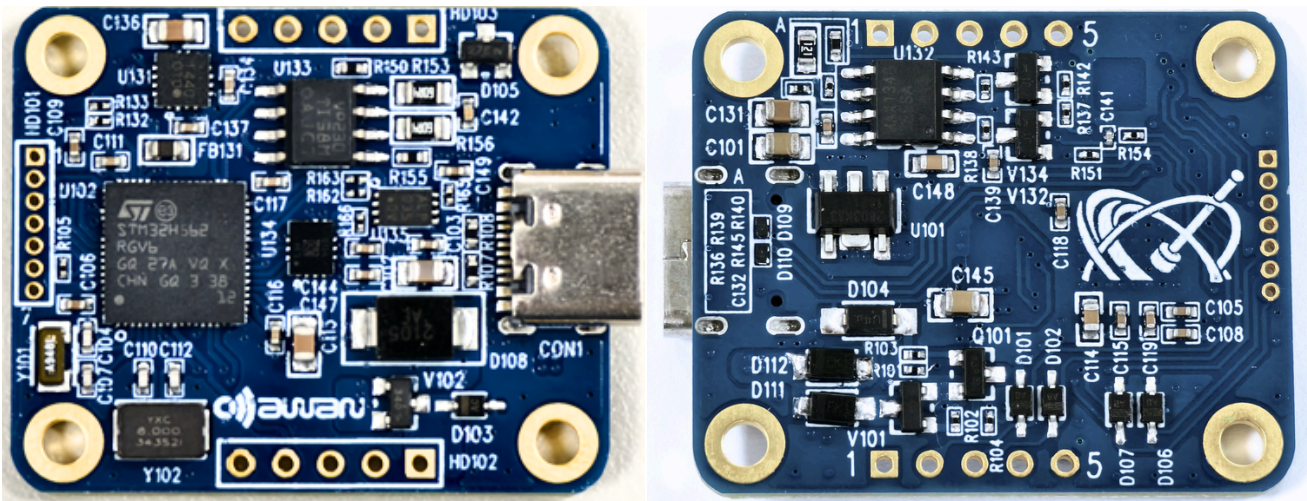
### 測試環境與條件(Test Environment and Conditions)

項目 (Item)	條件 (Condition)
溫度 (Temperature)	25°C
電壓 (Voltage)	5V
通訊 (Communication)	UART
輸出資料率 (ODR - Output Data Rate)	200Hz

### 測試標的 (Test Objects)

模組型態 (Module Type)	樣品廠商 (Sample brand)	樣品型號 ( Sample Model)	數量 (Quantity)
九軸 (陀螺儀、加速度、磁力計) 9-Axis(Gyroscope,Accelerometer, Magnetometer)	awan	AGM-610	5

### 樣品圖片 (Sample Image)



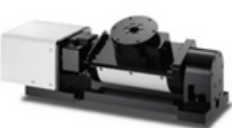
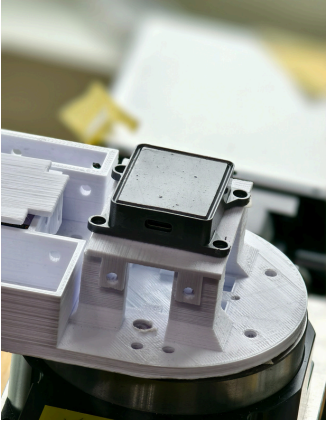
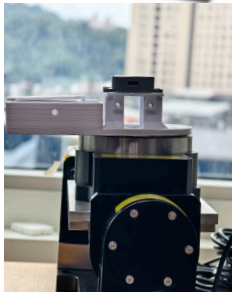
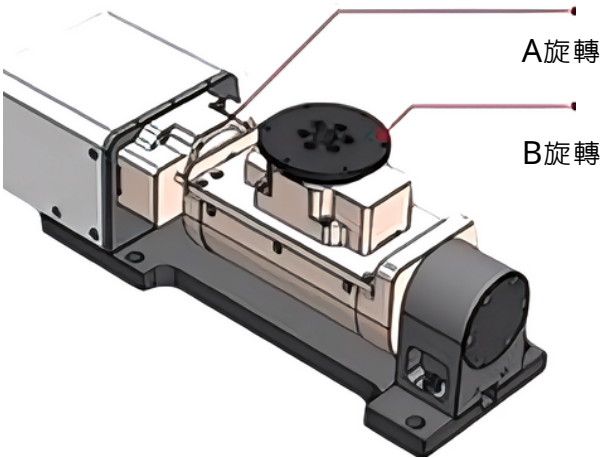
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測試設備(Test Equipment)

項目	圖片
<p>雙軸旋轉台</p> <p>雙軸可獨立旋轉，也可同時旋轉，分別應用於後續的測試項目。</p> <p>(Dual-Axis Rotary Table The dual-axis can rotate independently or simultaneously, and is applied to subsequent test items accordingly.)</p>	<div>上治具前</div>  <div>上治具後</div>  
<p>B軸旋轉主要影響航向角的變化。A軸旋轉主要影響翻滾角，但當A軸和B軸同時旋轉時，翻滾角和俯仰角都會受到影響。</p> <p>(The rotation of Axis B primarily affects the yaw angle. The rotation of Axis A primarily affects the roll angle, but when both Axis A and B rotate, it influences both the roll and pitch angles.)</p>	 <div>A旋轉</div> <div>B旋轉</div>

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號碼(No.) : AWAN240911      日期(Date) : 11-Sep-2024      頁數(Page) : 4 of 10

### 測試結果(Test Results)

#### 功能測試(Functional Testing)

項目 (Item)	檢測內容 (Test Description)	檢測結果 (Test Results)
功能完整性檢查 (Functionality Verification)	確保所有設計功能正常運行，包括數據傳輸和資料抓取。 (All designed functions operate normally, including data transmission and acquisition.)	基本測試正常 (Basic test passed)
燒錄測試 (Programming Test)	確保MCU可正常燒錄與使用 (MCU is programmable and functional).	燒錄成功 (Programming Successful)
通訊檢查 (Communication Check)	檢測UART、RS485及CAN通訊是否正常運作，數據傳輸穩定 (Check UART, RS485, and CAN communication for stable operation and data transmission)	全部通訊都正常 (All communications are functioning normally)
校正測試 (Calibration Test)	在測試環境中，使用LM方法和橢球擬合技術對加速度計、陀螺儀和磁力計進行校正。 (Perform calibration of the accelerometer, gyroscope, and magnetometer using the LM method and ellipsoid fitting technique in the test environment.)	數據經校正後穩定且準確。 ( Data is stable and accurate after calibration.)

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### 測試結果(Test Results) 電性測試(Electrical Testing)

項目 (Item)	檢測內容 (Test Description)	檢測結果 (Test Results)
功耗測試 (Power Consumption Test)	在正常功能下測量模組功耗。 (Measure module power consumption under normal operation).	約0.29W。 (Approximately 0.29W.)
逆偏保護測試 (Reverse Polarity Protection Test)	測試逆偏保護功能，確保在電源極性接反的情況下，模組不受損害，並在恢復正確極性後能正常運作。 (Test reverse polarity protection to ensure the module is not damaged when the power polarity is reversed and functions normally after restoring correct polarity).	逆接5V後恢復正接，模組正常運作。 (After applying 5V reverse polarity and restoring correct connection, the module operated normally.)
MCU 測試 (MCU Test)	針對MCU進行全面測試，包括Flash檢測、GPIO檢查及程式運行，確保其性能和穩定性符合要求。 (Comprehensive testing of the MCU, including flash testing, GPIO checks, and program execution, to ensure performance and stability meet requirements.)	MCU測試皆正常。 (MCU tests all passed.)
RS485 晶片測試 (RS485 Chip Test)	針對 RS485 晶片進行最高波特率下的傳輸穩定性測試。 (Test the RS485 chip for transmission stability at the highest baud rate.)	RS485晶片傳輸測試正常。 (The RS485 chip transmission test passed.)
CAN 晶片測試 (CAN Chip Test)	針對 CAN 晶片進行最高波特率下的傳輸穩定性測試。 (Test the CAN chip for transmission stability at the highest baud rate.)	CAN晶片傳輸測試正常。 (The CAN chip transmission test passed.)
綜合測試 (Integration Test)	在實際應用場景中進行綜合測試，檢查整個系統的協同工作性能。 (Conduct a comprehensive test in real-world scenarios to verify the overall system's coordinated performance.)	基本測試正常。 (Basic test passed.)
壽命測試 (Endurance Test)	長時間運行測試，檢查系統的可靠性和穩定性。 (Long-term operation test to assess system reliability and stability.)	連續執行六天測試，期間功能皆正常。 (Test ran continuously for six days with all functions operating normally.)

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姿態角性能測試結果 (Attitude Angle Performance Test Result)

測試項目 (Test Item)	測試方法 (Method)	結果 (Result)			
		翻滾角 (Roll)	俯仰角 (Pitch)	航向角 (Yaw)	航向角實驗結果圖 (Yaw Angle Test Result Diagram)
靜態測試 (Static Performance Test)	進行一小時靜態測試，觀察並記錄三軸姿態角的偏差。 (Conduct a one-hour static test to observe and record drift in the three-axis attitude angles).	0.024°	0.034°	0.005°	
資料表規格 (Datasheet Specifications)		0.5°	0.5°	0.5°	

測試項目 (Test Item)	測試方法 (Method)	B軸轉速 (Axis B Rotation Speed)	結果 (Result)			
			翻滾角 (Roll)	俯仰角 (Pitch)	航向角 (Yaw)	航向角實驗結果圖 (Yaw Angle Test Result Diagram)
單軸動態測試 (Single-Axis Dynamic Test)	使用電動旋轉平台旋轉B軸15分鐘，改變AGM-610的航向角，記錄三軸姿態角的偏差。 ( Using an electric rotary platform, rotate Axis B for 15 minutes to change the yaw angle of the AGM-610, and record the drift in the three-axis attitude angles.)	27°/s	0.169°	0.264°	0.278°	
		81°/s	0.068°	0.259°	0.24°	
資料表規格 (Datasheet Specifications)		-	1.0°	1.0°	1.0°	-

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姿態角性能測試結果 (Attitude Angle Performance Test Result)

測試項目 (Test Item)	測試方法 (Method)	A軸轉速 (Axis A Rotation Speed)	B軸轉速 (Axis B Rotation Speed)	結果 (Result)			
				翻滾角 (Roll)	俯仰角 (Pitch)	航向角 (Yaw)	航向角實驗結果圖 (Yaw Angle Test Result Diagram)
雙軸動態測試 (Dual-Axis Dynamic Test)	使用電動旋轉平台 旋轉A、B軸15分 鐘，改變AGM- 610的三軸姿態 角，記錄三軸姿態 角的偏差。 (Using an electric rotary platform, rotate Axis A and B for 15 minutes to change the three-axis attitude angles of the AGM-610, and record the drift in the three-axis attitude angles)	14.4°/s	27°/s	0.032°	0.146°	0.299°	
		43.2°/s	81°/s	0.141°	0.091°	0.259°	
資料表規格 (Datasheet Specifications)		-	-	1.0°	1.0°	1.0°	-

備註(Note):

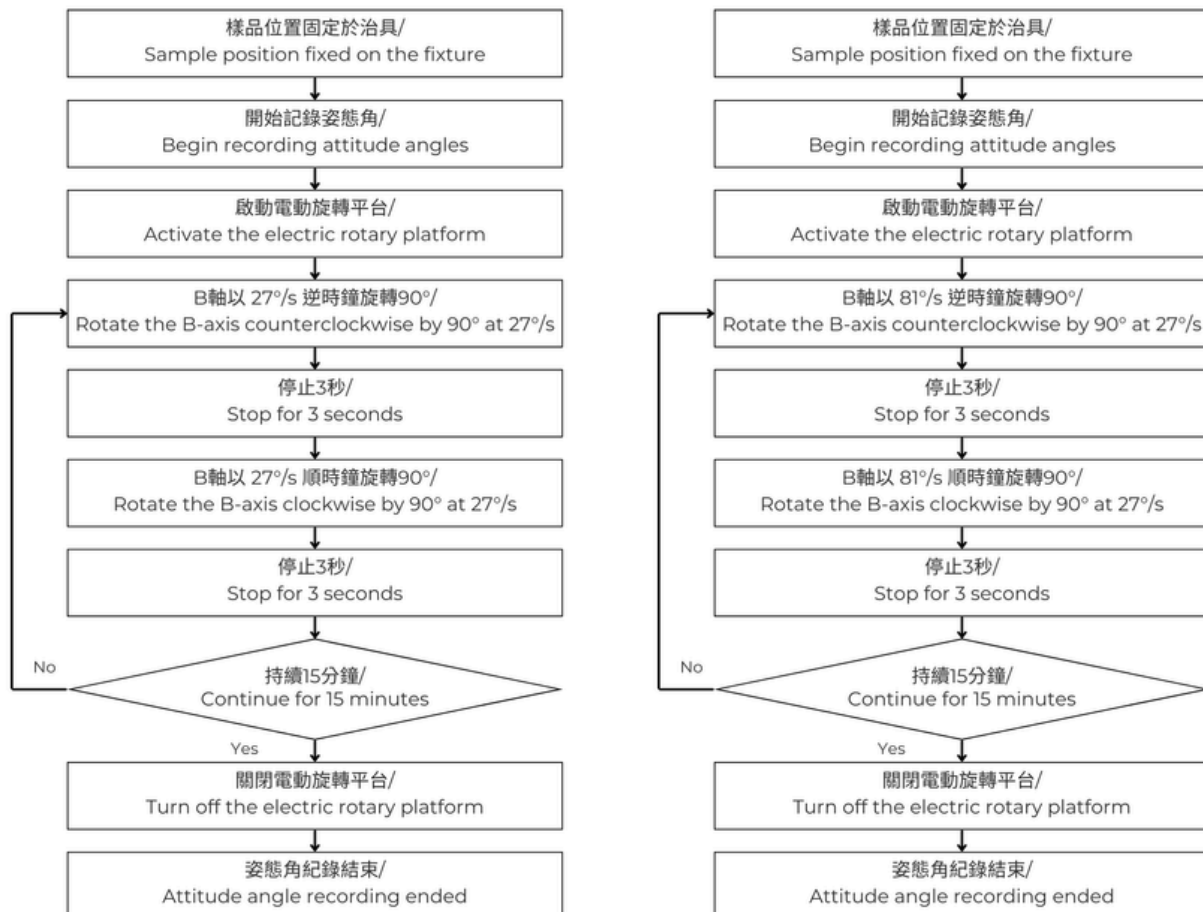
1.“-” = Not Regulated(無規格值)

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### 靜態測試流程圖 / Static Performance Test Flowchart

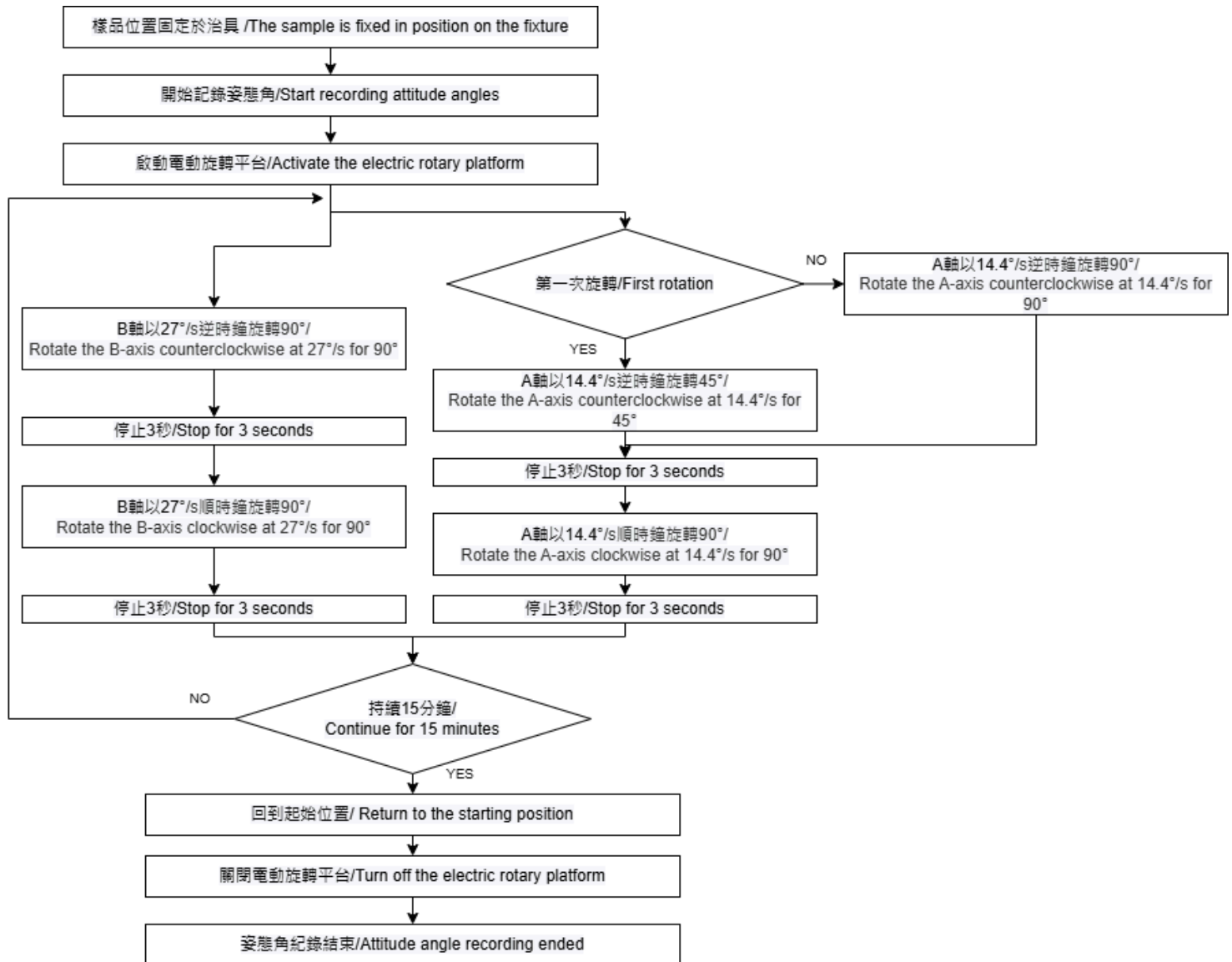


### 單軸動態不同速度測試流程圖 / Single-Axis Dynamic Test Flowchart for Different Speeds



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### 雙軸慢速動態測試流程圖 (Dual-Axis Slow Dynamic Test Flowchart)



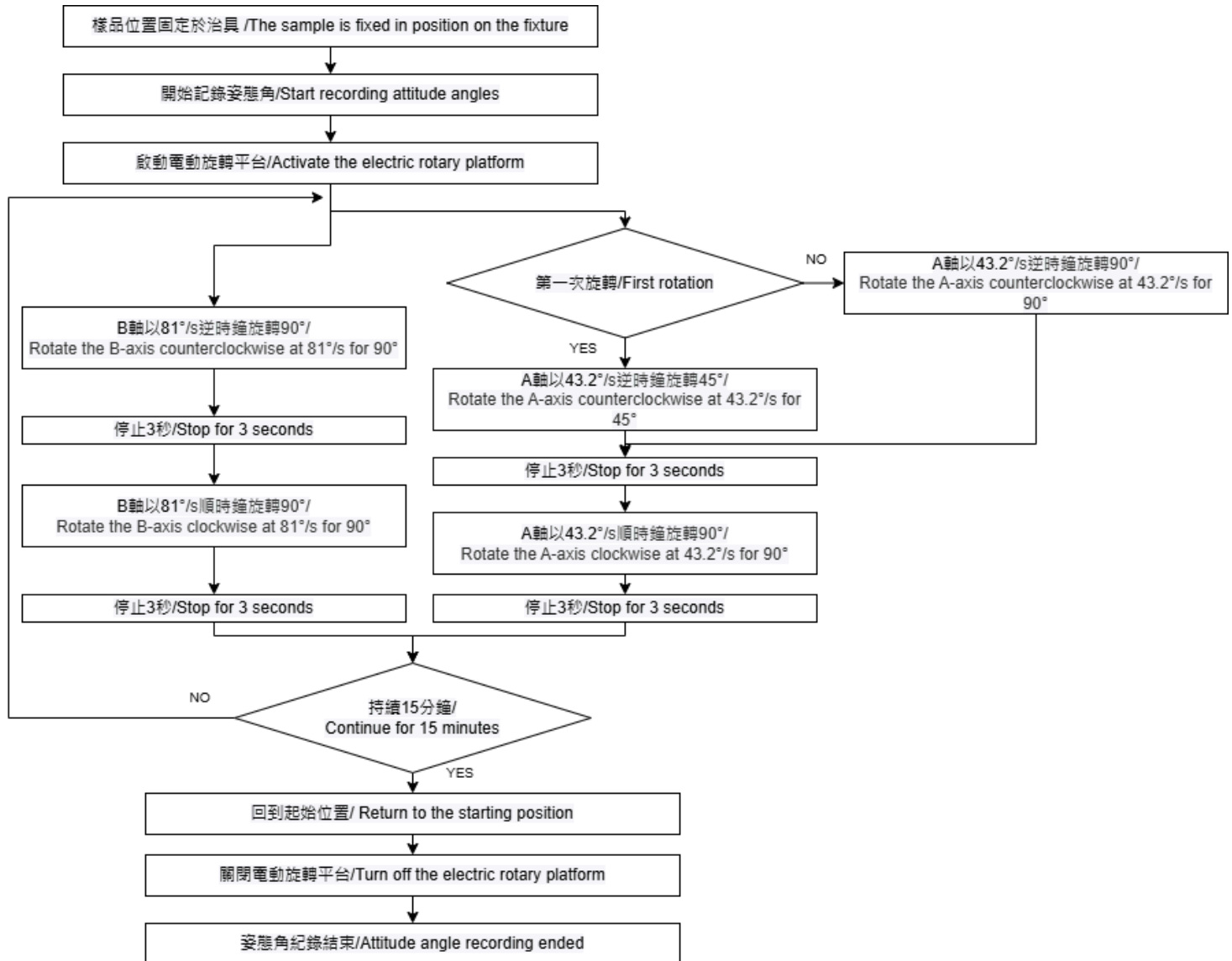
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### 雙軸快速動態測試流程圖 (Dual-Axis Fast Dynamic Test Flowchart)



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