

# **MONTRONOL** 敏石系統有限公司

## TSM教育訓練



# 大綱

- ◆ 接線前準備工作
- ◆ 基本接線
- ◆ 軟體介面介紹
- ◆ 基本指令操作
- ◆ 使用程式控制(以VB6為例)

# 接線前準備工作

- ◆ 確認電源供應器是否調整到適當範圍

TSM11            15~30VDC (24VDC 推薦)

TSM17            12~48VDC

**TSM23            12~70VDC**

- ◆ 直/交流電的腳位選定

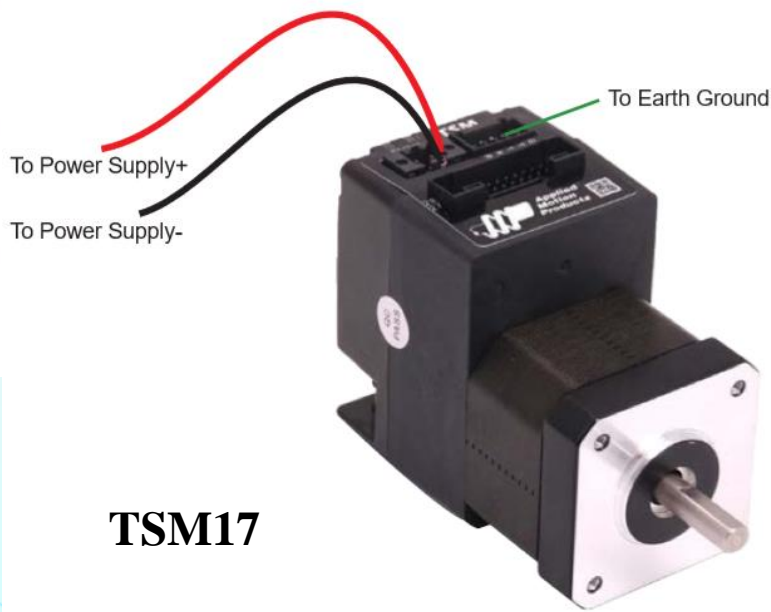
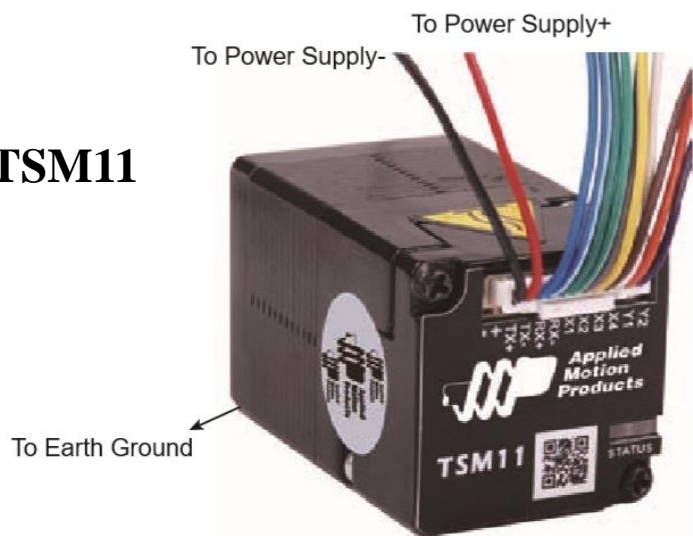


# 基本接線-電源

**注意+-位置避免接錯!!**

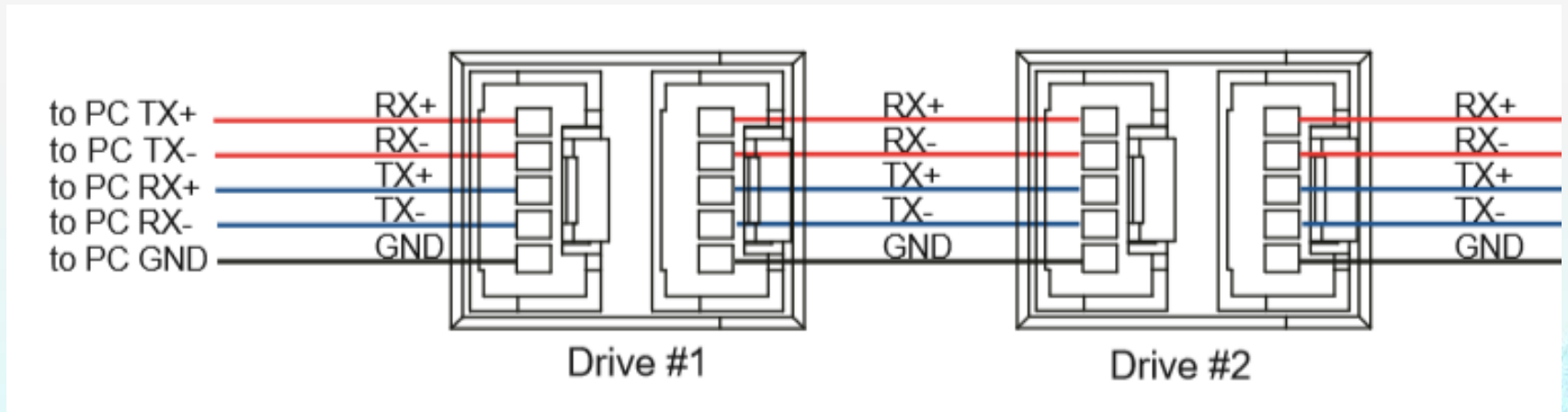
- ◆ 馬達+-插孔位置確認
- ※不同型號+-位置不同

**TSM11**



# 基本接線-通訊

※PC端TX+連接第一個馬達RX+ 連接第二個馬達RX+  
↑ ↑ ↑  
相反 相同

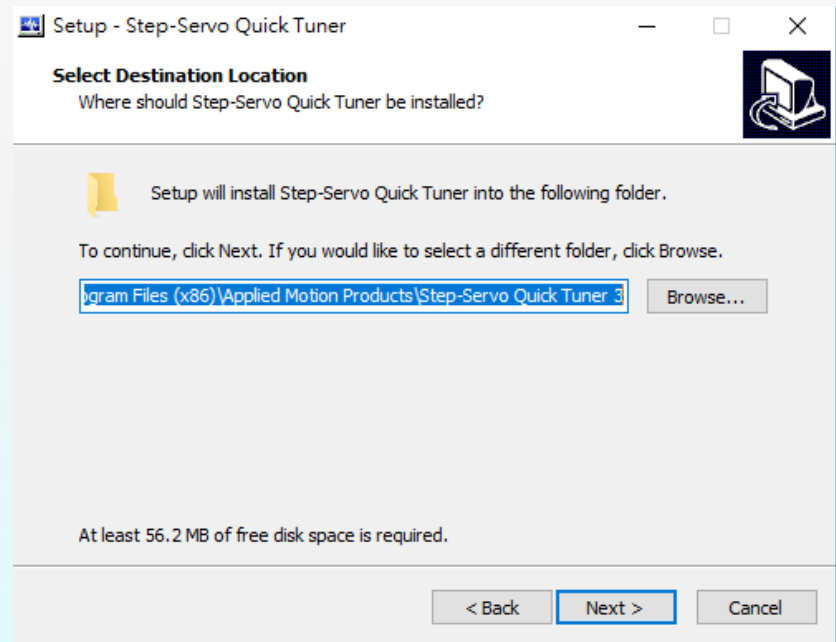
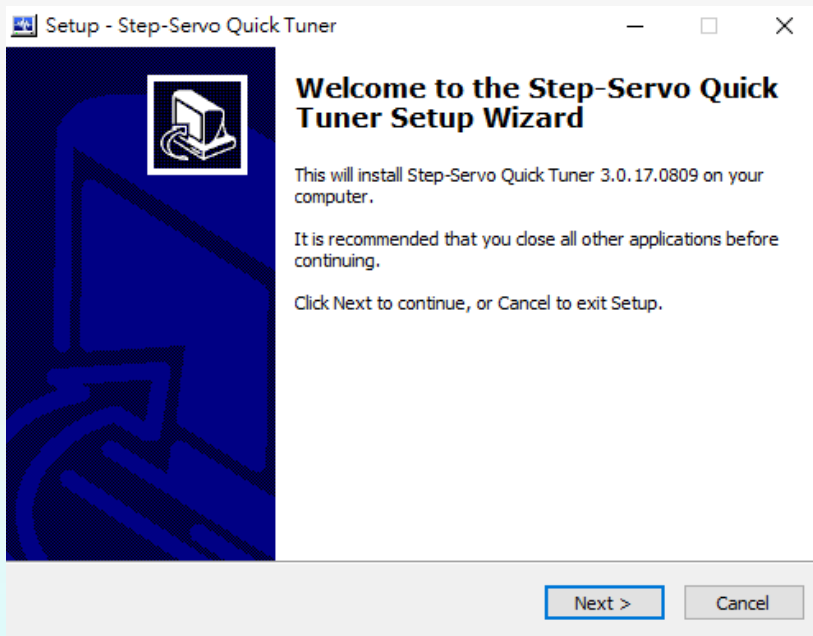


# SSQT基本介紹

## 安裝程式



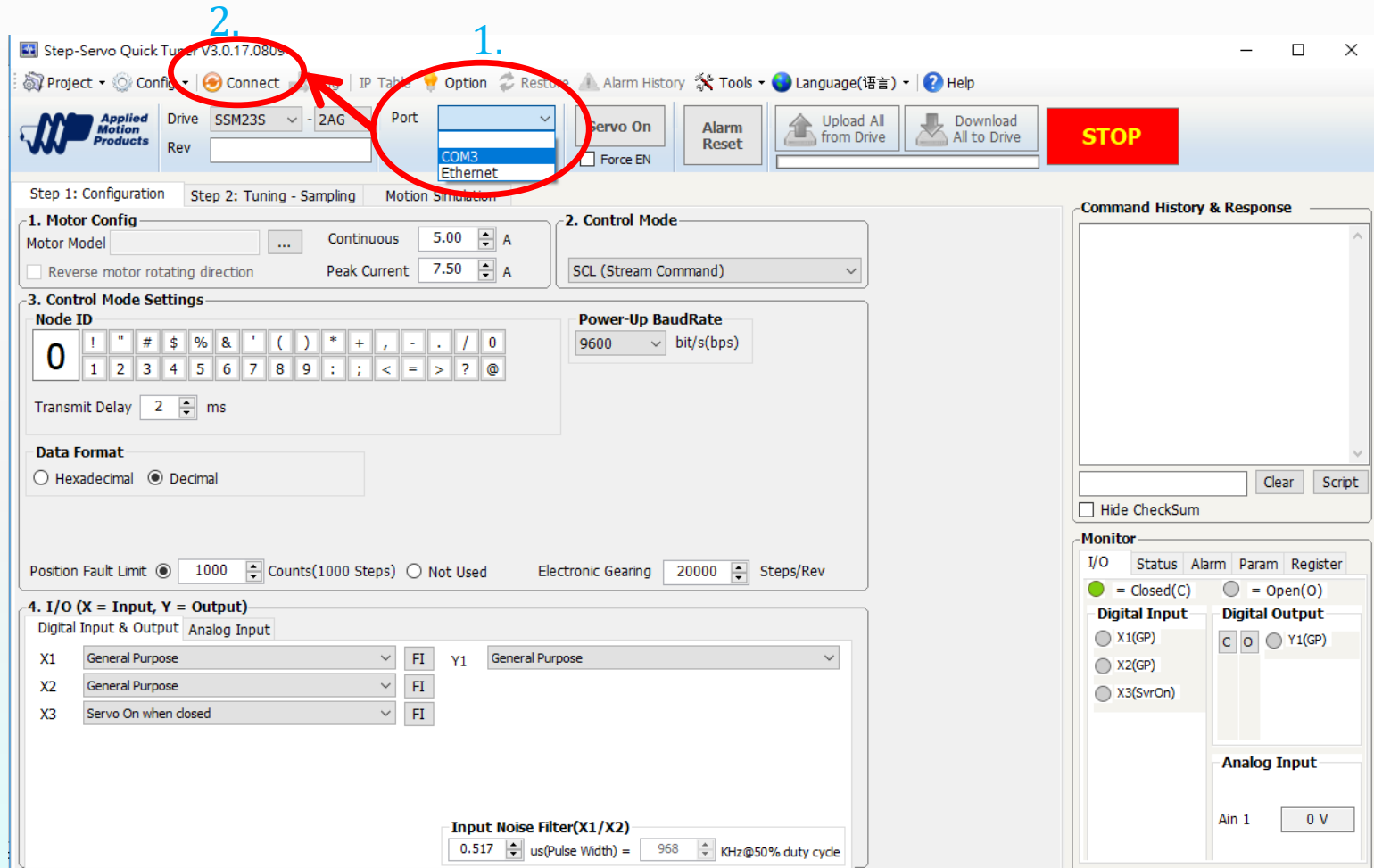
- ◆ 請執行SSQT安裝檔並依照選單依序執行下一步即可完成安裝
- ◆ ※SSQT安裝檔可於AMP官網下載



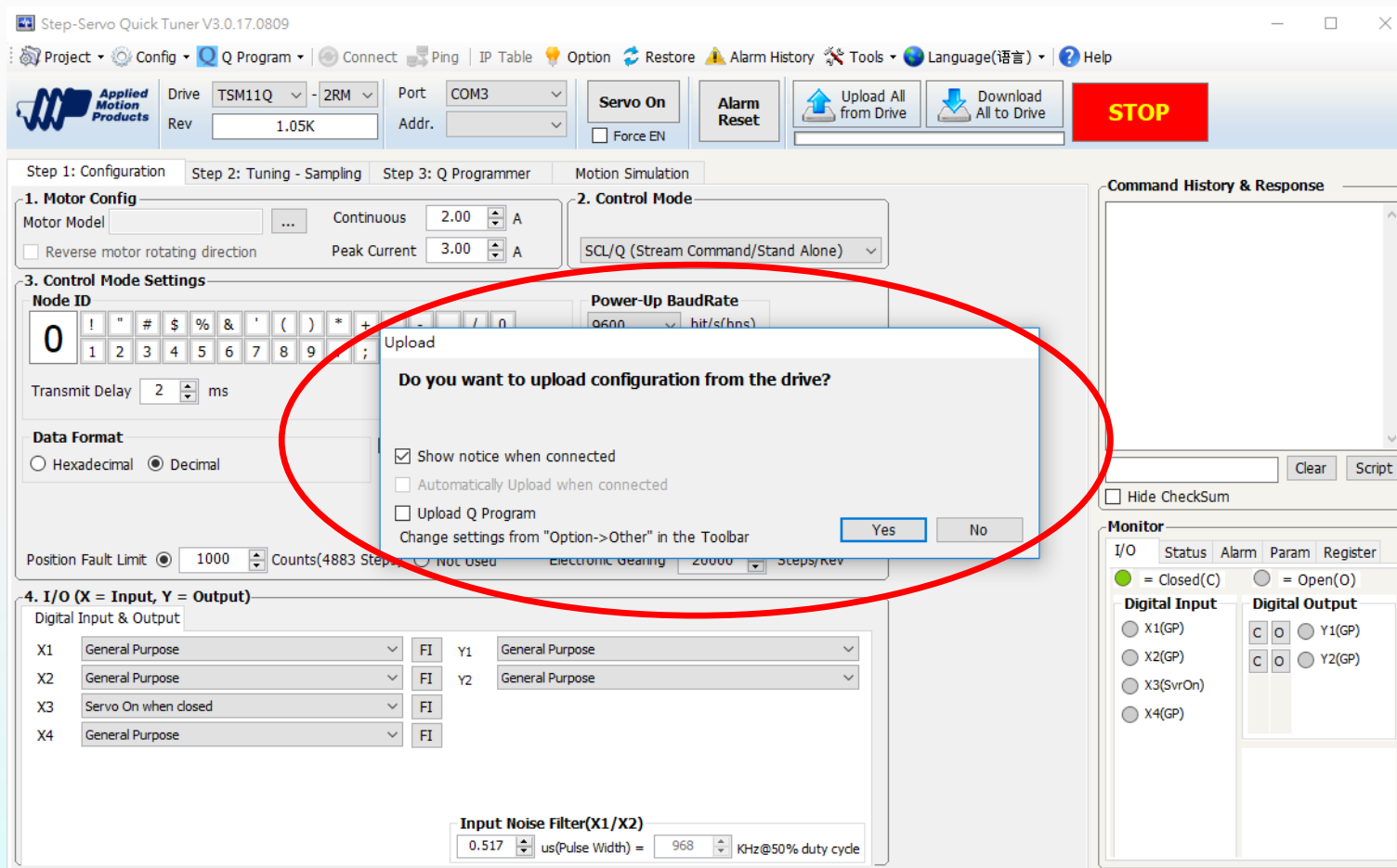
SSQT : Step-Servo Quick-Tuner

# 建立通訊

◆ 建立PC與TSM Step Servo通訊為使用SSQT軟體的第一步驟



- ◆ 若通訊成功將出現Upload視窗，此時表示硬體接線及軟體安裝皆為正確





- ◆ 介面將顯示出TSM Step Servo主要資訊，包括型號、韌體版本及電流

Step-Servo Quick Tuner V3.0.17.0809

Project Config Q Program Connect Ping IP Table Option Restore Alarm History Tools Language(语言) Help

Applied Motion Products Drive TSM11Q -2RM Port COM3 Servo On Alarm Reset Upload All from Drive Download All to Drive STOP

Step 1: Configuration Step 2: Tuning - Sampling Step 3: Q Programmer Motion Simulation

**1. Motor Config**  
Motor Model Continuous 1.50 A  
Reverse motor rotating direction Peak Current 2.25 A

**2. Control Mode**  
Velocity (I/O Controlled)

**3. Control Mode Settings**  
Velocity Control Type  
 Speed only  Position over time  
Velocity Control  
 Fix speed at 5.000 rps Note: The speed will be limited by maximum speed  
Accel 100.000 rps/s  
Decel 100.000 rps/s  
Position Fault Limit 1000 Counts(1000 Steps)  Not Used Electronic Gearing 4096 Steps/Rev

**4. I/O (X = Input, Y = Output)**  
Digital Input & Output  
X1 Not used, Motor runs continuously FI Y1 Closed on fault  
X2 Direction FI Y2 Open when dynamic pos. err < 20 Counts  
X3 Servo On when open FI  
X4 Change motor speed to 50.000 rps FI  
Input Noise Filter(X1/X2)  
0.517 us(Pulse Width) = 968 KHz@50% duty cycle

Command History & Response

Monitor  
I/O Status Alarm Param Register  
● = Closed(C) ○ = Open(O)  
Digital Input Digital Output  
X1(GP) X2(Dir) X3(SvrOn) X4(Speed2)  
Y1(Fault) Y2(DynPE)

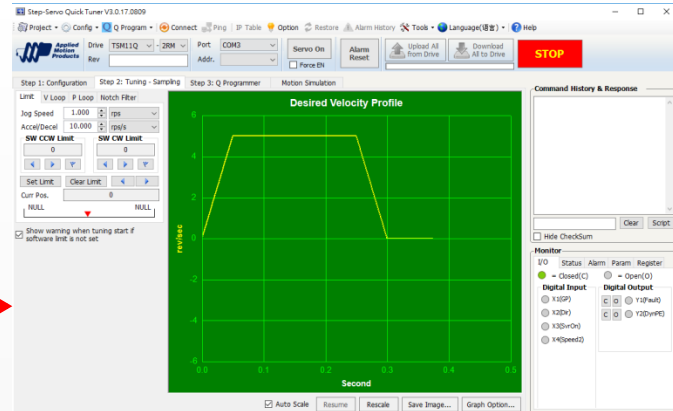
# SSQT標準控制介面

The screenshot shows the Step-Servo Quick Tuner V3.0.17.0809 software interface. The interface is divided into several sections:

- 1. Motor Config:** Includes Motor Model, Reverse motor rotating direction, and a red annotation "狀態區" (Status Area).
- 2. Control Mode:** Includes Velocity (I/O Controlled) and a red annotation "控制區" (Control Area).
- 3. Control Mode Settings:** Includes Velocity Control Type (Speed only, Position over time), Velocity Control (Fix speed at 5.000 rps), Accel (100.000 rps/s), Decel (100.000 rps/s), Position Fault Limit (1000 Counts), and Electronic Gearing (4096 Steps/Rev).
- 4. I/O (X = Input, Y = Output):** Includes Digital Input & Output settings for X1, X2, X3, and X4, and a red annotation "I/O區" (I/O Area).
- Command History & Response:** Includes a text area for commands and responses, a red annotation "指令區" (Command Area), and buttons for Clear and Script.
- Monitor:** Includes a table for I/O status and a red annotation "監控區" (Monitoring Area).

The interface also features a top menu bar with options like Project, Config, Q Program, Connect, Ping, IP Table, Option, Restore, Alarm History, Tools, Language, and Help. A toolbar includes buttons for Servo On, Alarm Reset, Upload All from Drive, Download All to Drive, and a prominent red STOP button.

SSQT具有多樣及實用功能  
 使用者可依需求應用  
 進階操作說明請參考  
 SSQT HELP...



Step 1: Configuration Step 2: Tuning - Sampling Step 3: Q Programmer Motion Simulation

1. Motor Config  
 Motor Model: Continuous 1.50 A  
 Reverse motor rotating direction  
 Peak Current: 2.25 A

2. Control Mode  
 SCL/Q (Stream Command/Stand Alone)  
 Position (I/O Controlled)  
 Velocity (I/O Controlled)  
 SCL/Q (Stream Command/Stand Alone)  
 Modbus  
 Torque

3. Control Mode Settings  
 Node ID: 0

Step 1: Configuration Step 2: Tuning - Sampling Step 3: Q Programmer Motion Simulation

Current Segment

| Segment   | Line | Label | Cmd | Param1 | Param2 | Comment |
|-----------|------|-------|-----|--------|--------|---------|
| Segment 1 | 1    |       |     |        |        |         |
| Segment 1 | 2    |       |     |        |        |         |
| Segment 1 | 3    |       |     |        |        |         |
| Segment 1 | 4    |       |     |        |        |         |
| Segment 1 | 5    |       |     |        |        |         |
| Segment 1 | 6    |       |     |        |        |         |
| Segment 1 | 7    |       |     |        |        |         |
| Segment 1 | 8    |       |     |        |        |         |
| Segment 1 | 9    |       |     |        |        |         |
| Segment 1 | 10   |       |     |        |        |         |
| Segment 1 | 11   |       |     |        |        |         |
| Segment 1 | 12   |       |     |        |        |         |
| Segment 1 | 13   |       |     |        |        |         |
| Segment 1 | 14   |       |     |        |        |         |
| Segment 1 | 15   |       |     |        |        |         |
| Segment 1 | 16   |       |     |        |        |         |
| Segment 1 | 17   |       |     |        |        |         |
| Segment 1 | 18   |       |     |        |        |         |
| Segment 1 | 19   |       |     |        |        |         |

Step 1: Configuration Step 2: Tuning - Sampling Step 3: Q Programmer Motion Simulation

3. Control Mode Settings  
 Velocity Control Type: Speed only  
 Fix speed at: 5.000 rpm  
 Note: The speed will be limited by maximum speed

Accel: 100.000 rpm/s  
 Decel: 100.000 rpm/s

Position Fault Limit: 1000 (Count/1000 Steps) Not Used Electronic Gearing: 4096 Steep/Rcv

4. I/O (X = Input, Y = Output)  
 Digital Input & Output

| I/O | Status              | Alarm | Param | Register |
|-----|---------------------|-------|-------|----------|
| R#  | Data Register       |       |       | Value    |
| A   | Acceleration (A)    |       |       |          |
| B   | Deceleration (B)    |       |       |          |
| C   | Change Distance (C) |       |       |          |
| D   | Distance (D)        |       |       |          |
| E   | Position Offset (E) |       |       |          |
| F   | Accumulator (F)     |       |       |          |
| 1   | User-defined (1)    |       |       |          |
| 2   | User-defined (2)    |       |       |          |

Step 1: Configuration Step 2: Tuning - Sampling Step 3: Q Programmer Motion Simulation

Initialize Parameters  
 Velocity: 10.000 rpm Acceleration: 100.000 rpm/s Deceleration: 100.000 rpm/s

Point to Point Move  
 Command Distance: 20000 (Steps) Jog Speed: 10.000 rpm Accel/Decel: 100.000 rpm/s

Move to Sensor  
 Move to: X1 Direction: CW Stop When: Low

Homing  
 X1 CW LMT X2 CCW LMT X3 HOME Sensor State: Low Active High Active Start Stop

Search Speed & Accel/Decel  
 Search Speed: 10.000 rpm Accel/Decel: 100.000 rpm/s

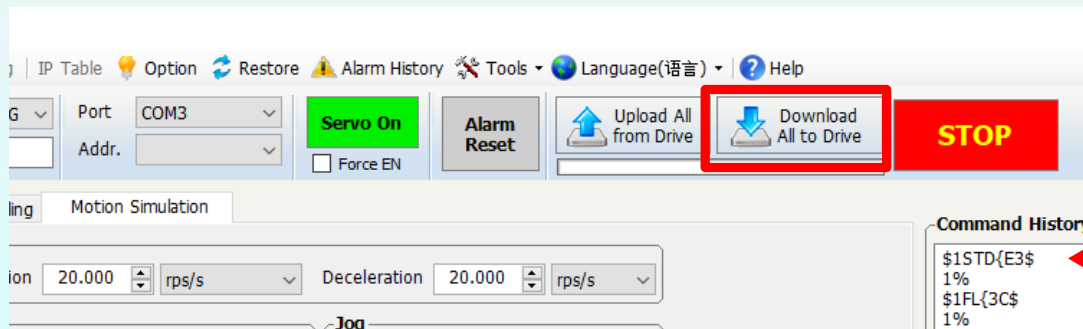
# 基本指令操作

## 將指令傳送至馬達

--請於Command History & Response執行--

- ◆ AC10
- ◆ DE10
- ◆ VE1
- ◆ DI20000
- ◆ FL
- ◆ 設定加速度為10 rps/s
- ◆ 設定減速度為10 rps/s
- ◆ 設定速度為1 rps
- ◆ 設定相對位置20000步
- ◆ 執行相對位置運動

## 亦可將程式下載至馬達(僅適用Q-programmer)



傳送至馬達後，可於指令欄依程式執行

# 常用指令

(請下載[Host-Command-Reference](#))

## 速度模式

- ◆ AC: 加速度
- ◆ DE: 減速度
- ◆ VE: 速度

## 位置模式

- ◆ SH: 回原點
- ◆ SP: 設定馬達的絕對位置
- ◆ DI: 設定方向或移動位置
- ◆ FP: 絕對位置運動
- ◆ FL: 相對位置運動
- ◆ EP: 回傳現在位置
- ◆ ST: 運動停止

## 其他

- ◆ WT: 延遲時間
- ◆ DL: 設定極限開關的模式
- ◆ QR: 重複迴圈
- ◆ QG: 跳至指令的指令行
- ◆ GC: 輸出電流(單位:0.01A)
- ◆ AR: 消除警報
- ◆ MD: 解除激磁
- ◆ ME: 激磁

# PID指令

([StepSERVO Tuning Guide](#))

## 速度環

- ◆ VP: 速度模式比例增益
- ◆ VI: 速度模式積分增益
- ◆ KK: 前饋增益
- ◆ KC: 濾波因子

## 位置環

- ◆ KP: 比例增益(0~32767)
- ◆ KD: 微分增益(0~32767)
- ◆ KE: 濾波因子

詳情請參考

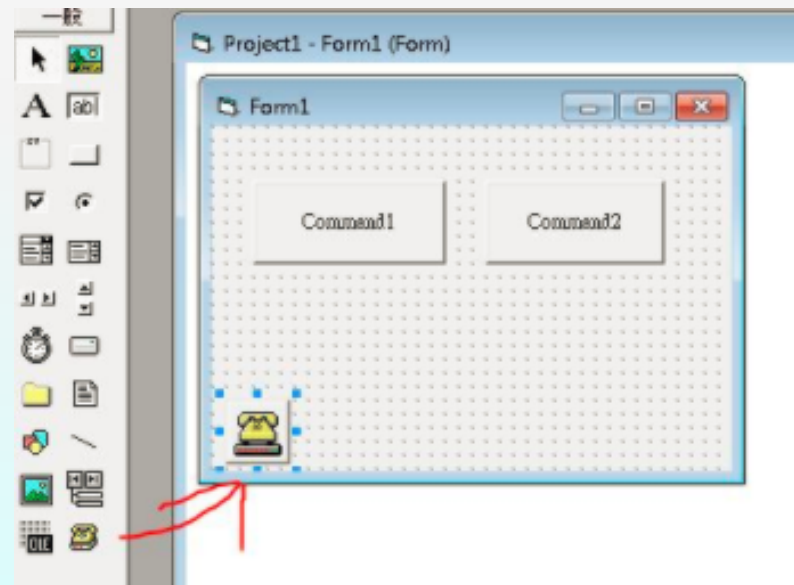
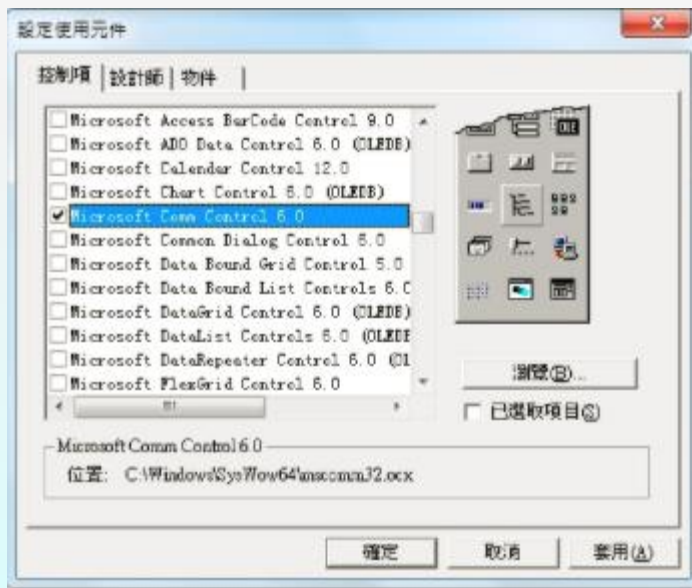
敏石官網-技術支援

[TSM一體型步進伺服馬達PID調整](#) 文章

# TSM系列使用程式控制(以VB6為例)

## 1. 建立通訊

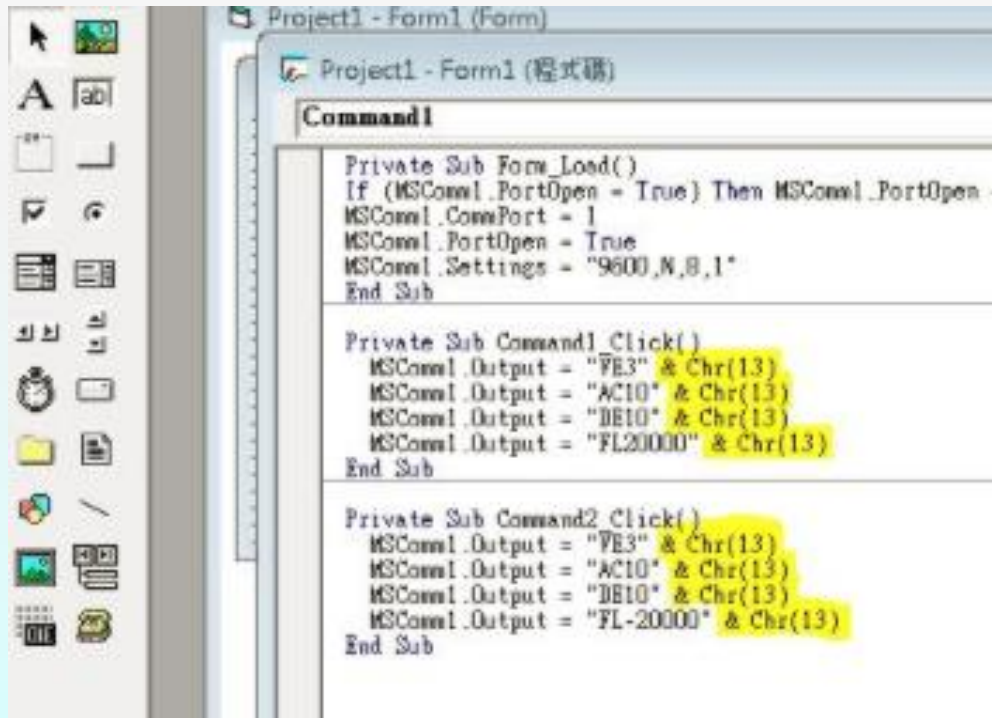
- ◆ A. 專案 > 設定使用元件 > 勾選"Microsoft Comm Control 6.0 "
- ◆ B. 建立一個MS Comm物件，並設定所使用"通訊連接Port"(其餘設定預設即可)



# TSM系列使用程式控制(以VB6為例)

## 2.傳送字串

- ◆ 在使用的物件傳送字串，並在字串之後加上 &Chr(13)，就可控制TSM了
- ◆ EX. MSComm1.Output = "FL200000" & Chr(13)



The screenshot shows the Visual Basic 6.0 IDE with the Project Explorer on the left and the Code Window on the right. The Code Window displays the code for a form named 'Form1'. The code is organized into three subroutines: Form\_Load, Command1\_Click, and Command2\_Click. The Command1\_Click and Command2\_Click subroutines are highlighted in yellow. The Command1\_Click subroutine sends the string 'FE3' followed by a carriage return, 'AC10' followed by a carriage return, 'DE10' followed by a carriage return, and 'FL20000' followed by a carriage return. The Command2\_Click subroutine sends 'FE3' followed by a carriage return, 'AC10' followed by a carriage return, 'DE10' followed by a carriage return, and 'FL-20000' followed by a carriage return.

```
Project1 - Form1 (Form)
Project1 - Form1 (程式碼)
Command1
Private Sub Form_Load()
If (MSComm1.PortOpen = True) Then MSComm1.PortOpen =
MSComm1.CommPort = 1
MSComm1.PortOpen = True
MSComm1.Settings = "9600,N,8,1"
End Sub

Private Sub Command1_Click()
MSComm1.Output = "FE3" & Chr(13)
MSComm1.Output = "AC10" & Chr(13)
MSComm1.Output = "DE10" & Chr(13)
MSComm1.Output = "FL20000" & Chr(13)
End Sub

Private Sub Command2_Click()
MSComm1.Output = "FE3" & Chr(13)
MSComm1.Output = "AC10" & Chr(13)
MSComm1.Output = "DE10" & Chr(13)
MSComm1.Output = "FL-20000" & Chr(13)
End Sub
```