

**iO-GRID** 

**EtherNet/IP**

**連線操作手冊**

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## 1. 範例遠端 I/O 模組配套清單

料號	規格	備註
GF2-C003T	EtherNet/IP 耦合器	
GF2-DI01T	16 通道數位輸入模組, Sink, 24VDC	
GF2-DQ01T	16 通道數位輸出模組, Sink, 24VDC	
GF2-AI01T	4 通道類比輸入模組, -10...10VDC、0...10VDC、0...5VDC、	
GF2-AQ01T	4 通道類比輸出模組, -10...10VDC、0...10VDC、0...5VDC、	
GFPS-0202	Power 24V / 48W	

### 1.1 產品描述

- I. 耦合器用於外部與 EtherNet/IP 設備通訊接口。
- II. 耦合器負責管理並組態配置 I/O 參數...等。
- III. 電源模組為遠端 I/O 標準品，使用者可自行選配。

## 2. 耦合器參數設定

本章節主要說明耦合器如何與EtherNet/IP設備連接，[iO-GRID](#) 詳細說明請參考 [i-Designer 使用手冊](#)

### 2.1 軟體設定前置作業

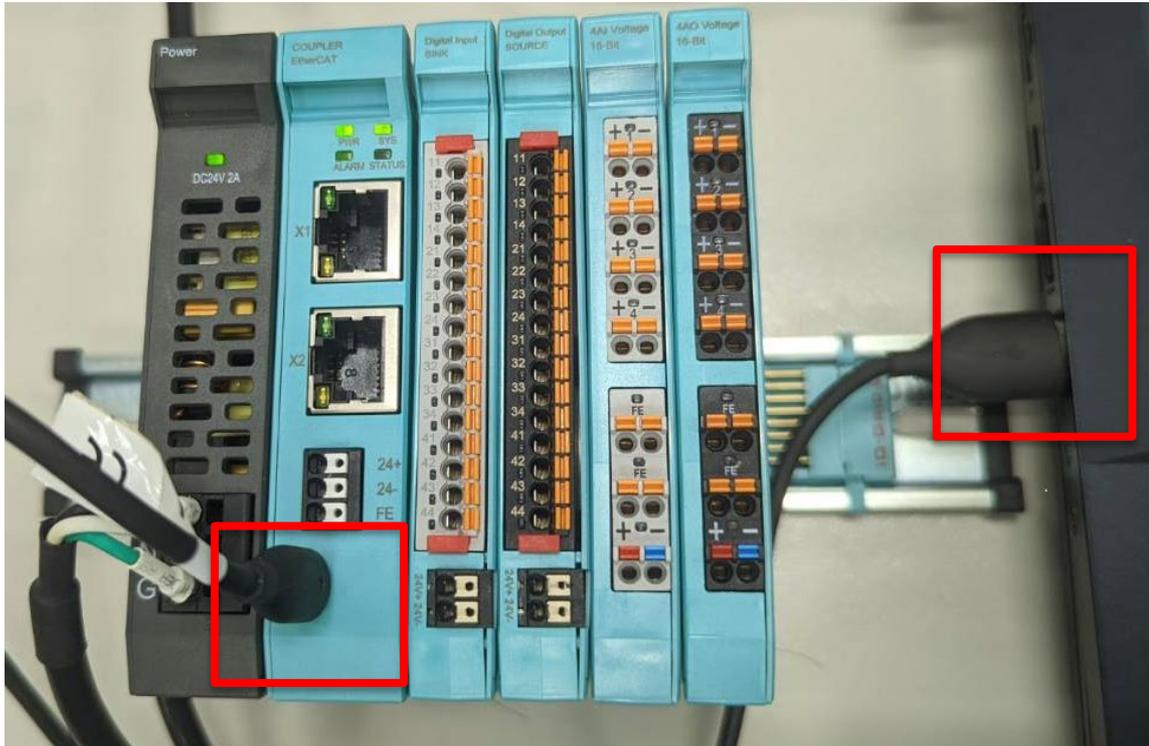
透過Micro USB與耦合器模組接線方式  
將Micro USB接頭與耦合器模組上的Micro USB接口相連。  
確認總線板上處於通電狀態，打開*i-Designer*設定軟體  
設定耦合器模組相關參數。

耦合器模組接線示意圖：



※耦合器模組設定前請先確認總線板上I/O模組**靠攏**

耦合器模組接線實體圖：



## 2.2 耦合器軟體設定

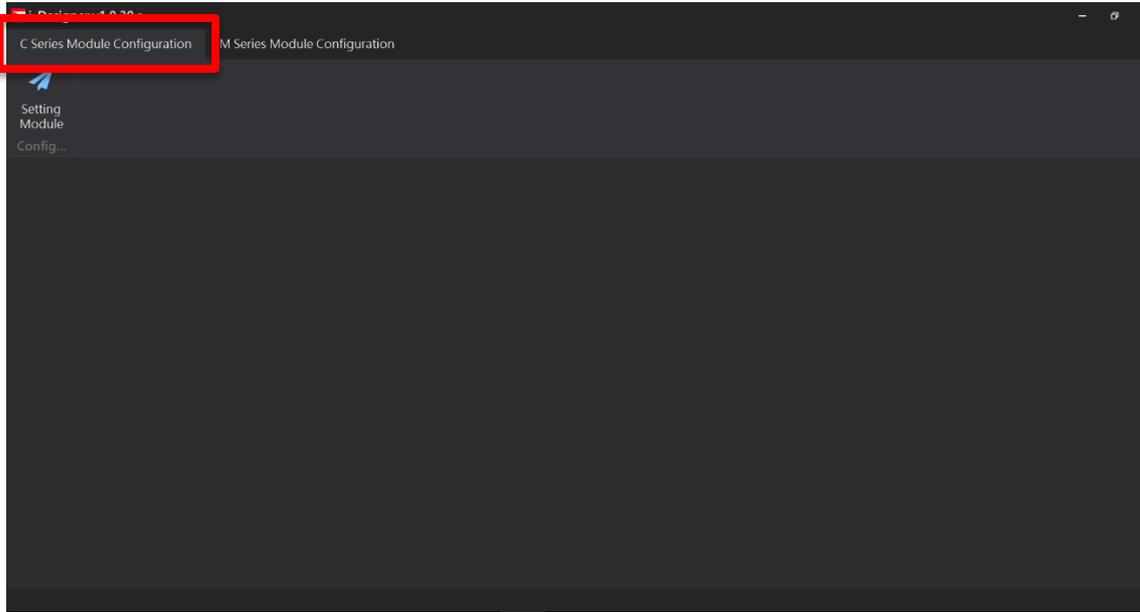
### I. 確認模組上電以及連接上 USB 接口



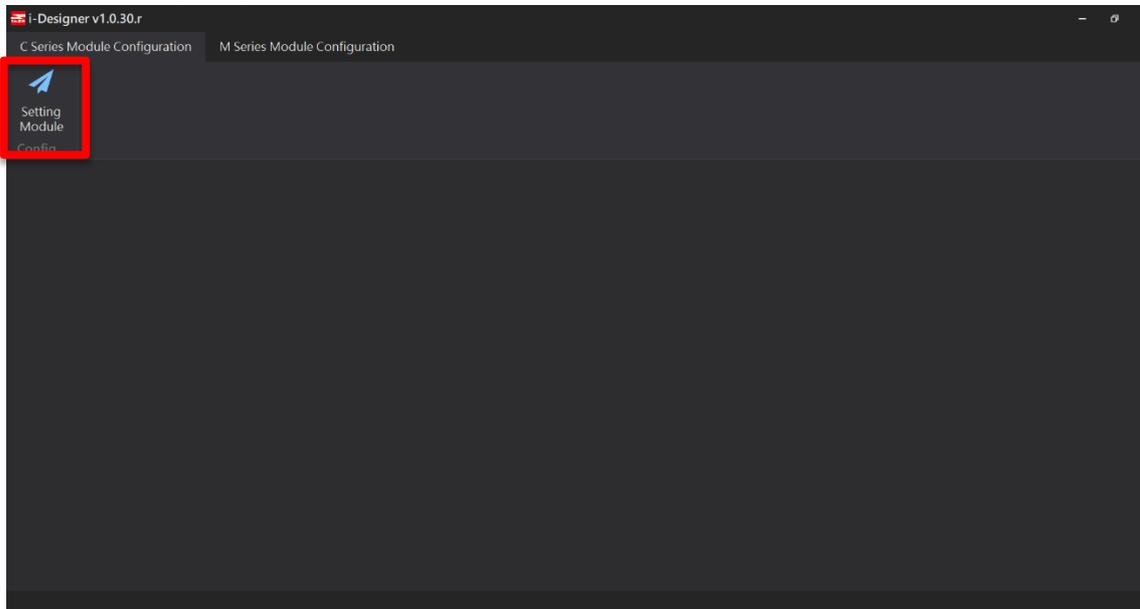
### II. 點擊並開啟軟體



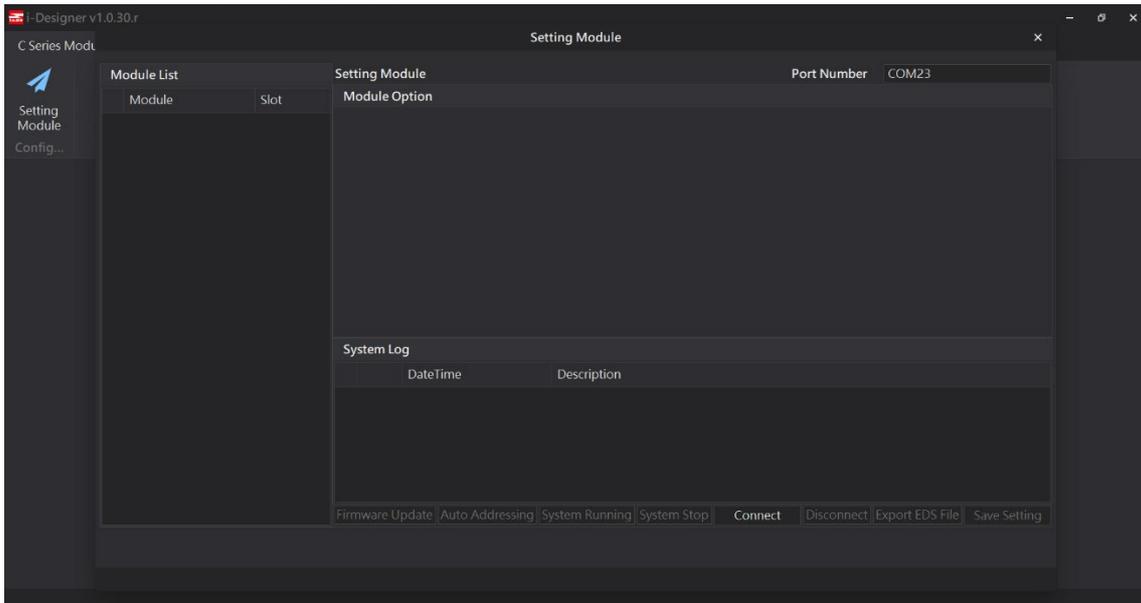
### III. 選擇 C 系列頁籤



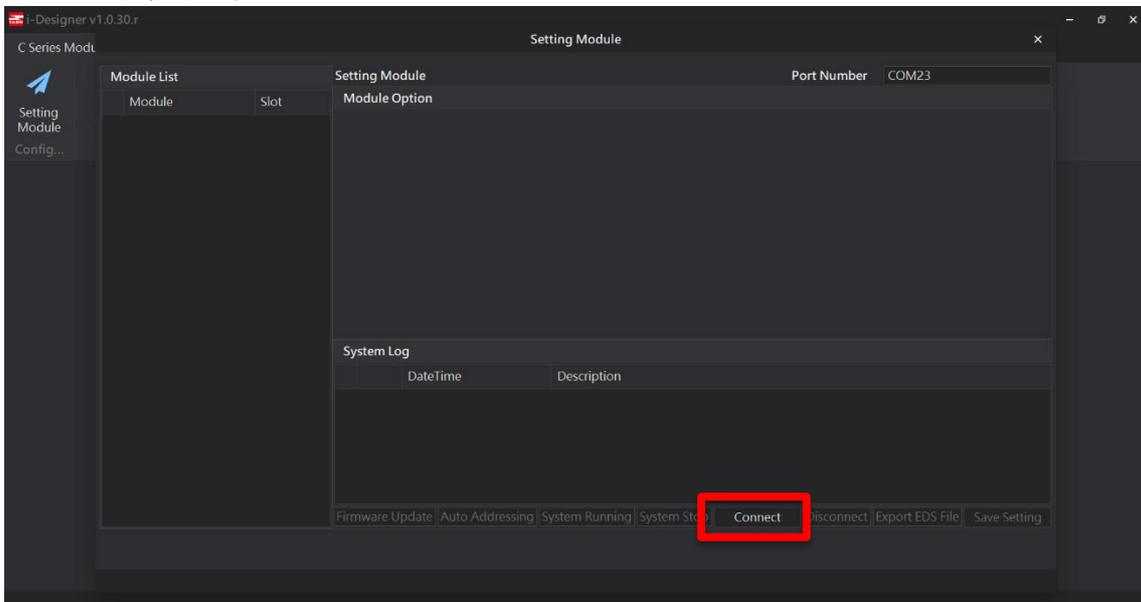
### IV. 點擊設定模組圖示



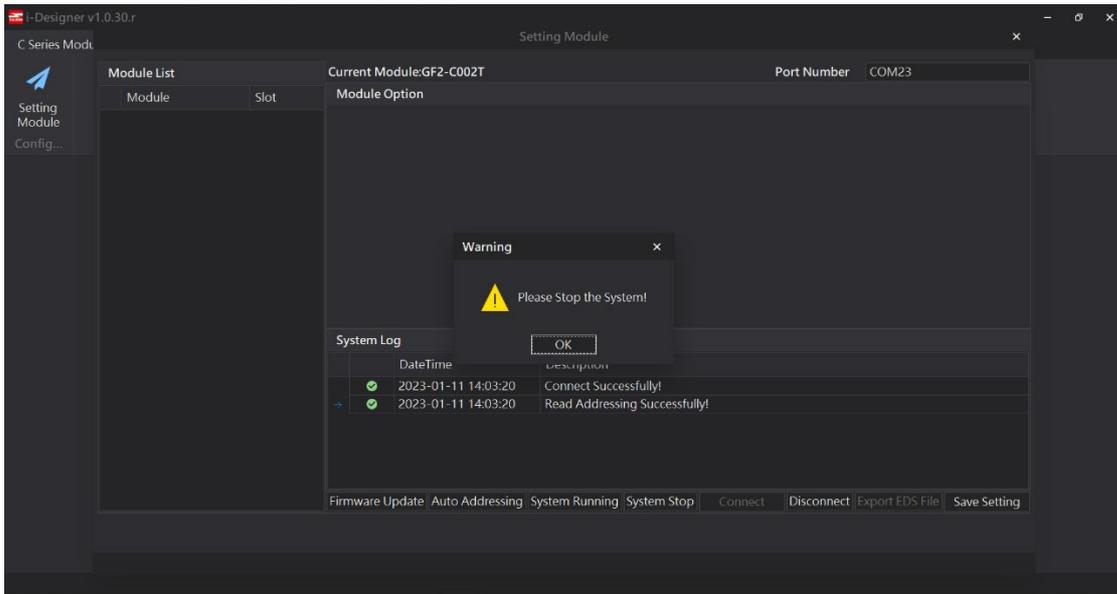
## V. 進入 C 系列設定頁面



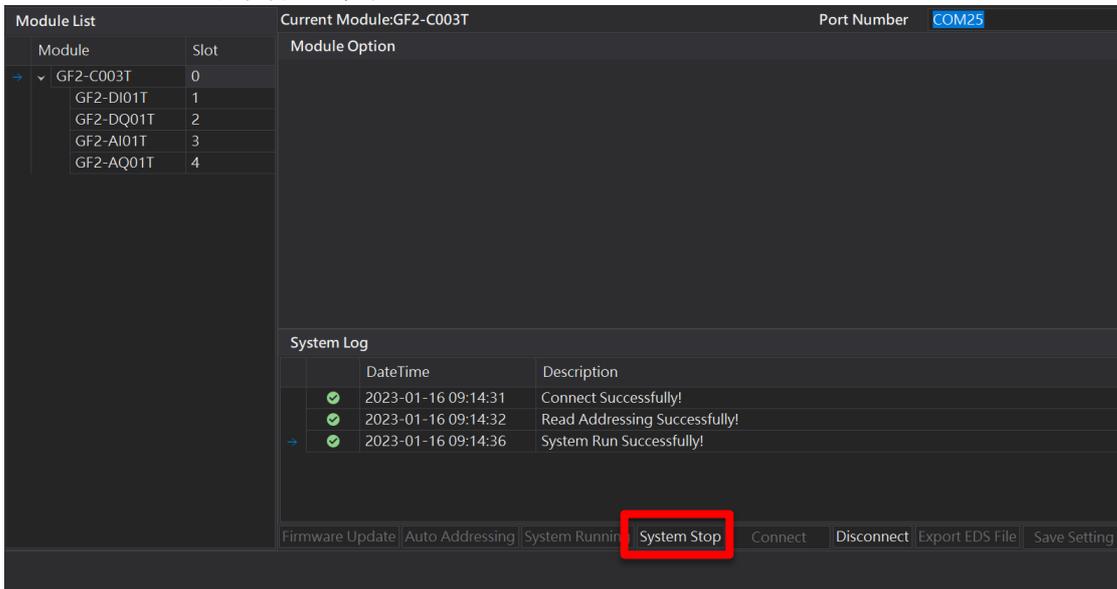
## VI. 點擊“連線”



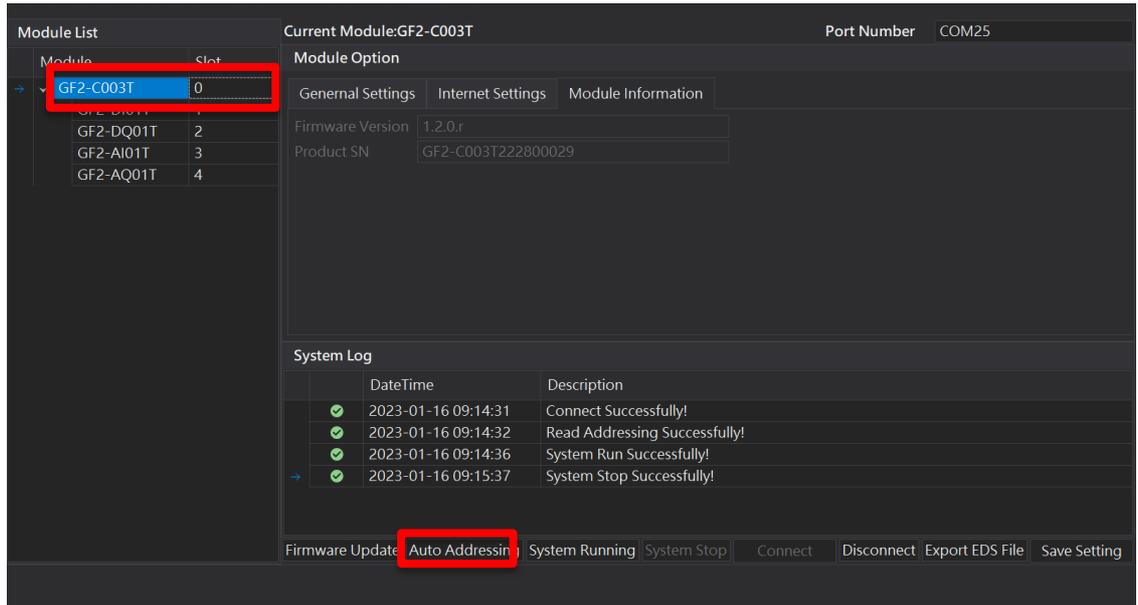
## VII. 顯示連線後先停止系統通知



## VIII. 點擊停止系統



### IX. 點擊耦合器模組後，選擇自動配站

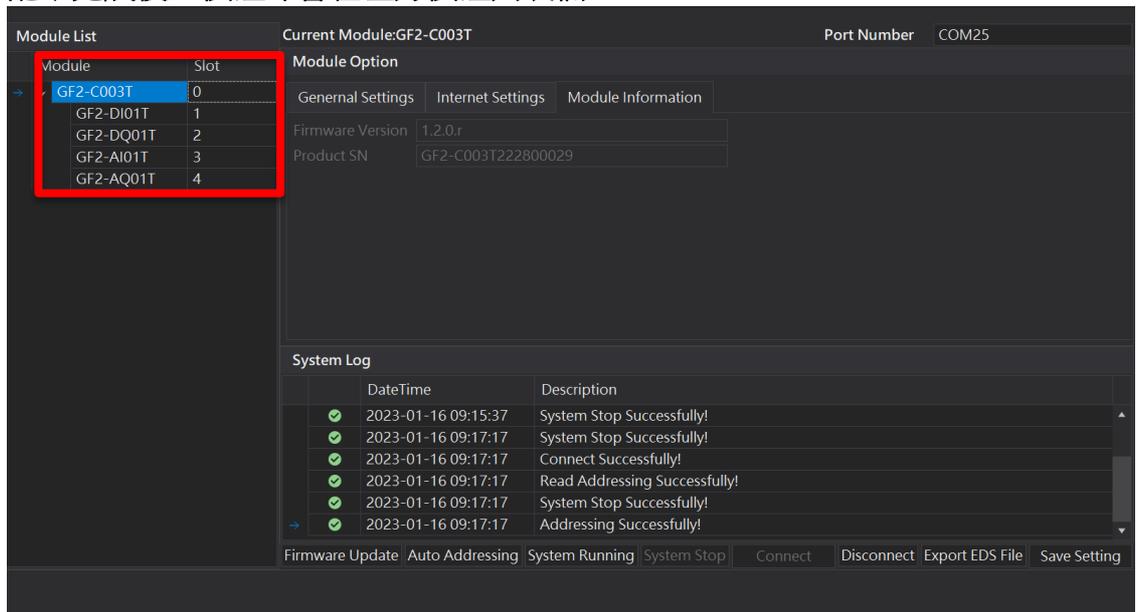


The screenshot shows the software interface for configuring a module. The 'Module List' on the left shows 'GF2-C003T' in slot 0, which is highlighted with a red box. The 'Current Module' is 'GF2-C003T' and the 'Port Number' is 'COM25'. The 'Module Option' section includes tabs for 'General Settings', 'Internet Settings', and 'Module Information'. The 'System Log' shows a sequence of successful operations: 'Connect Successfully!', 'Read Addressing Successfully!', 'System Run Successfully!', and 'System Stop Successfully!'. At the bottom, the 'Auto Addressing' button is highlighted with a red box.

Module	Slot
GF2-C003T	0
GF2-DQ01T	2
GF2-AI01T	3
GF2-AQ01T	4

DateTime	Description
2023-01-16 09:14:31	Connect Successfully!
2023-01-16 09:14:32	Read Addressing Successfully!
2023-01-16 09:14:36	System Run Successfully!
2023-01-16 09:15:37	System Stop Successfully!

### X. 配站完成後，模組即會在左方模組列表欄



The screenshot shows the software interface after the configuration is complete. The 'Module List' on the left shows 'GF2-C003T' in slot 0, which is highlighted with a red box. The 'Current Module' is 'GF2-C003T' and the 'Port Number' is 'COM25'. The 'Module Option' section includes tabs for 'General Settings', 'Internet Settings', and 'Module Information'. The 'System Log' shows a sequence of successful operations: 'System Stop Successfully!', 'System Stop Successfully!', 'Connect Successfully!', 'Read Addressing Successfully!', 'System Stop Successfully!', and 'Addressing Successfully!'. At the bottom, the 'Auto Addressing' button is highlighted with a red box.

Module	Slot
GF2-C003T	0
GF2-DI01T	1
GF2-DQ01T	2
GF2-AI01T	3
GF2-AQ01T	4

DateTime	Description
2023-01-16 09:15:37	System Stop Successfully!
2023-01-16 09:17:17	System Stop Successfully!
2023-01-16 09:17:17	Connect Successfully!
2023-01-16 09:17:17	Read Addressing Successfully!
2023-01-16 09:17:17	System Stop Successfully!
2023-01-16 09:17:17	Addressing Successfully!

## XI. 點擊耦合器模組開啟設定畫面

The screenshot displays the software interface for configuring a module. On the left, the 'Module List' shows a table with columns 'Module' and 'Slot'. The 'GF2-C003T' module in slot 0 is selected and highlighted with a red box. The main area shows 'Current Module: GF2-C003T' and 'Port Number: COM25'. Below this, the 'Module Option' section has tabs for 'General Settings', 'Internet Settings', and 'Module Information'. The 'General Settings' tab is active, showing 'Coupler Slot' set to 0 and 'TimeLock' set to 0 ms. At the bottom, a 'System Log' table lists several successful operations. The 'Save Setting' button in the bottom right corner is highlighted with a red box.

Module	Slot
GF2-C003T	0
GF2-DI01T	1
GF2-DQ01T	2
GF2-AI01T	3
GF2-AQ01T	4

DateTime	Description
2023-01-16 09:15:37	System Stop Successfully!
2023-01-16 09:17:17	System Stop Successfully!
2023-01-16 09:17:17	Connect Successfully!
2023-01-16 09:17:17	Read Addressing Successfully!
2023-01-16 09:17:17	System Stop Successfully!
2023-01-16 09:17:17	Addressing Successfully!

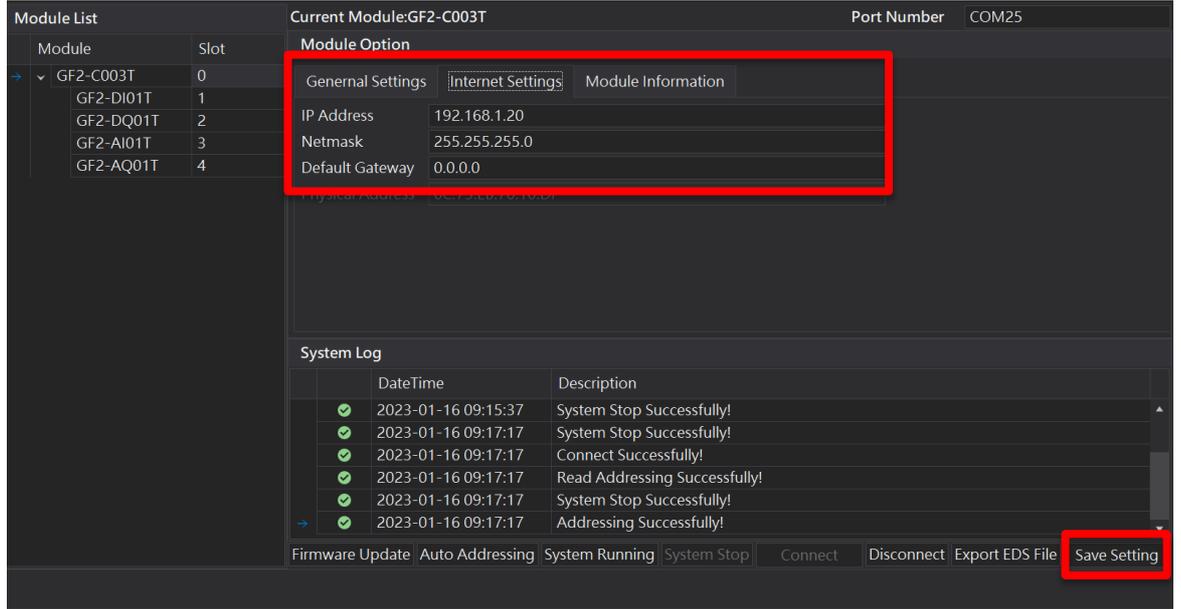
## XII. 設定設備名稱以及斷線是否復歸(斷線保持設定 0)

This screenshot is similar to the previous one, showing the software interface for configuring a module. The 'Module List' on the left shows 'GF2-C003T' in slot 0 selected. The 'Module Option' section shows the 'General Settings' tab active. The 'Save Setting' button in the bottom right corner is highlighted with a red box.

Module	Slot
GF2-C003T	0
GF2-DI01T	1
GF2-DQ01T	2
GF2-AI01T	3
GF2-AQ01T	4

DateTime	Description
2023-01-16 09:15:37	System Stop Successfully!
2023-01-16 09:17:17	System Stop Successfully!
2023-01-16 09:17:17	Connect Successfully!
2023-01-16 09:17:17	Read Addressing Successfully!
2023-01-16 09:17:17	System Stop Successfully!
2023-01-16 09:17:17	Addressing Successfully!

### XIII. 設定設備 IP 位置(需與控制設備相同網域)



The screenshot displays the DAUDIN control interface. On the left, a 'Module List' table shows the selected module GF2-C003T in slot 0. The main area shows 'Current Module: GF2-C003T' and 'Port Number: COM25'. The 'Module Option' section is highlighted with a red box, showing the 'Internet Settings' tab with the following values:

Setting	Value
IP Address	192.168.1.20
Netmask	255.255.255.0
Default Gateway	0.0.0.0

Below the settings is a 'System Log' table with columns for DateTime and Description. The log shows several successful operations:

DateTime	Description
2023-01-16 09:15:37	System Stop Successfully!
2023-01-16 09:17:17	System Stop Successfully!
2023-01-16 09:17:17	Connect Successfully!
2023-01-16 09:17:17	Read Addressing Successfully!
2023-01-16 09:17:17	System Stop Successfully!
2023-01-16 09:17:17	Addressing Successfully!

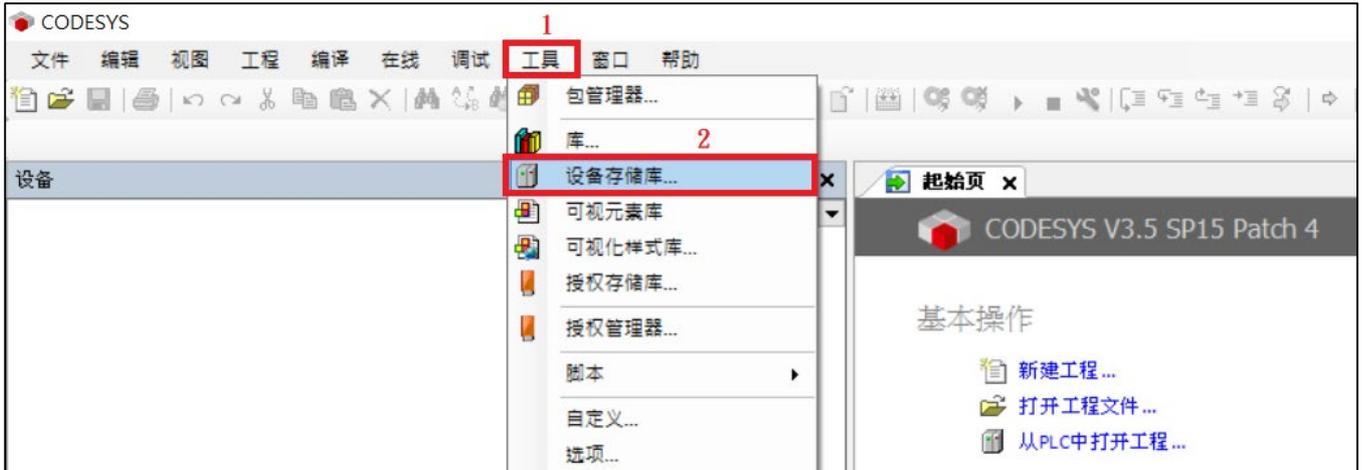
At the bottom, a row of buttons includes 'Firmware Update', 'Auto Addressing', 'System Running', 'System Stop', 'Connect', 'Disconnect', 'Export EDS File', and 'Save Setting', which is highlighted with a red box.

## 3. 各廠牌軟體使用入門指導

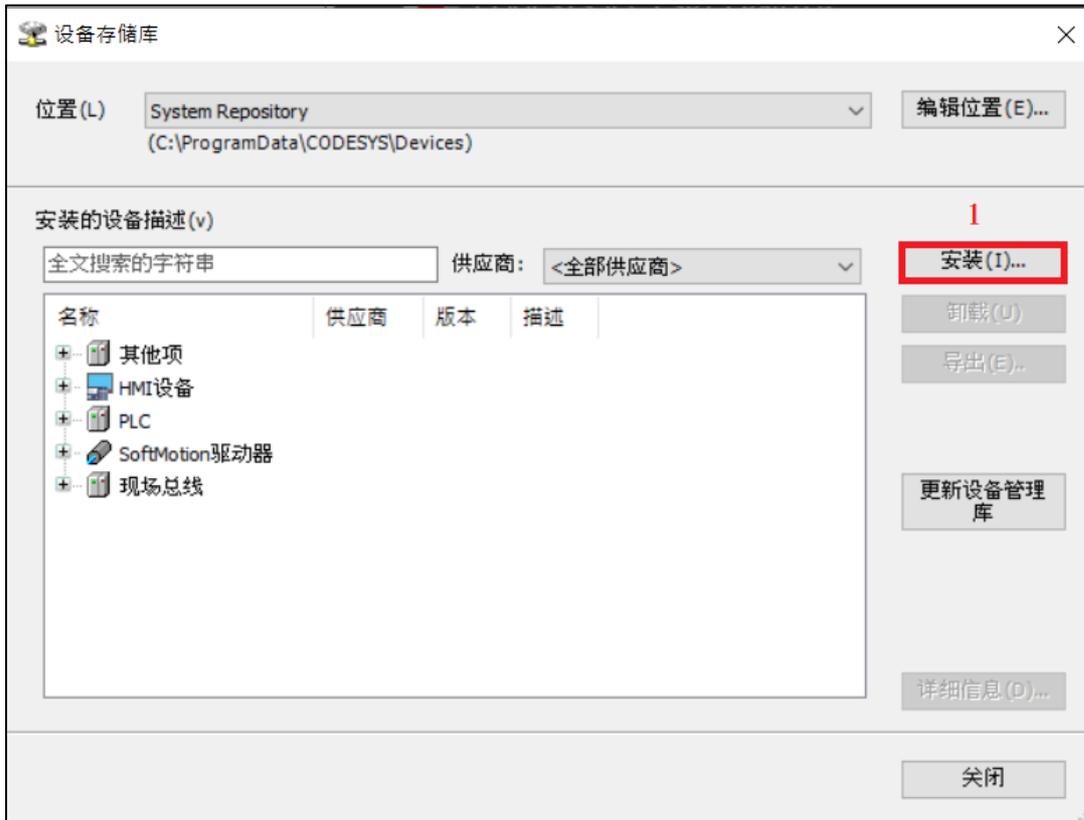
### 3.1 iO-GRID 基於 Codesys 軟體使用入門指導

#### I. 安裝EDS

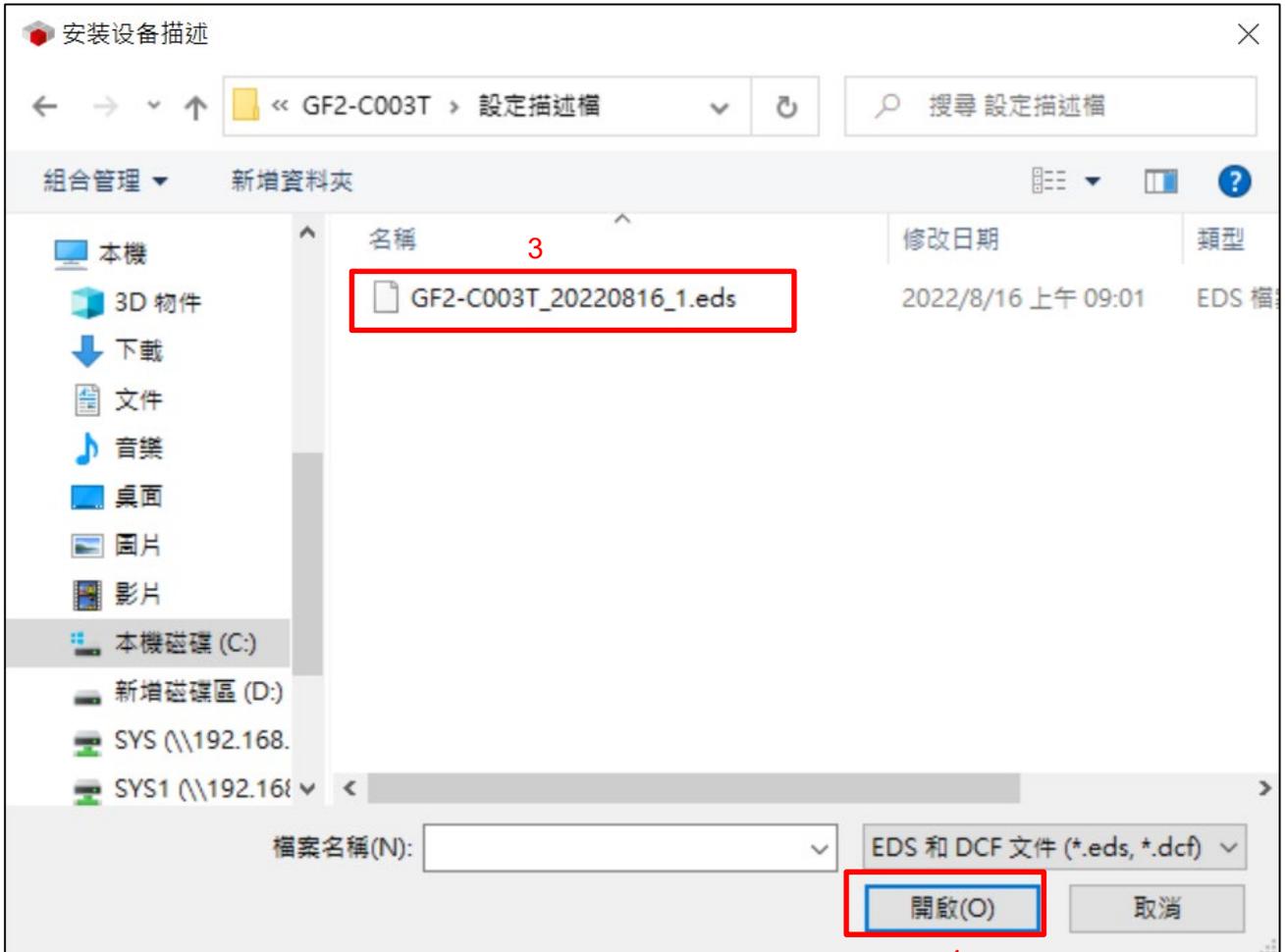
打開Codesys軟體，在工具中選擇設備庫



點擊安裝，選擇XML的放置路徑，文件類型選擇” EtherCAT XML設備描述配置文件”並點擊開啟



點擊後，如果提示設備已成功安裝，則表明XML安裝成功

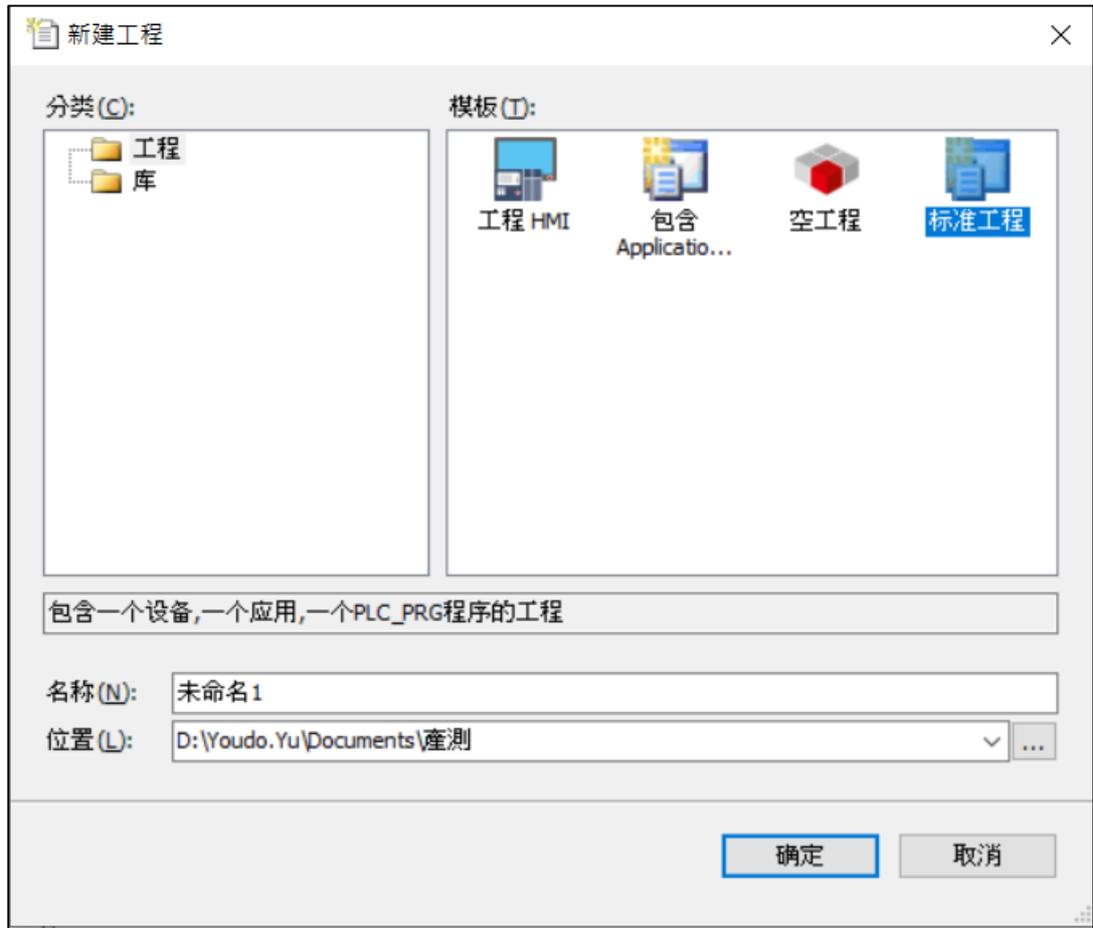


## II. 創建新工程

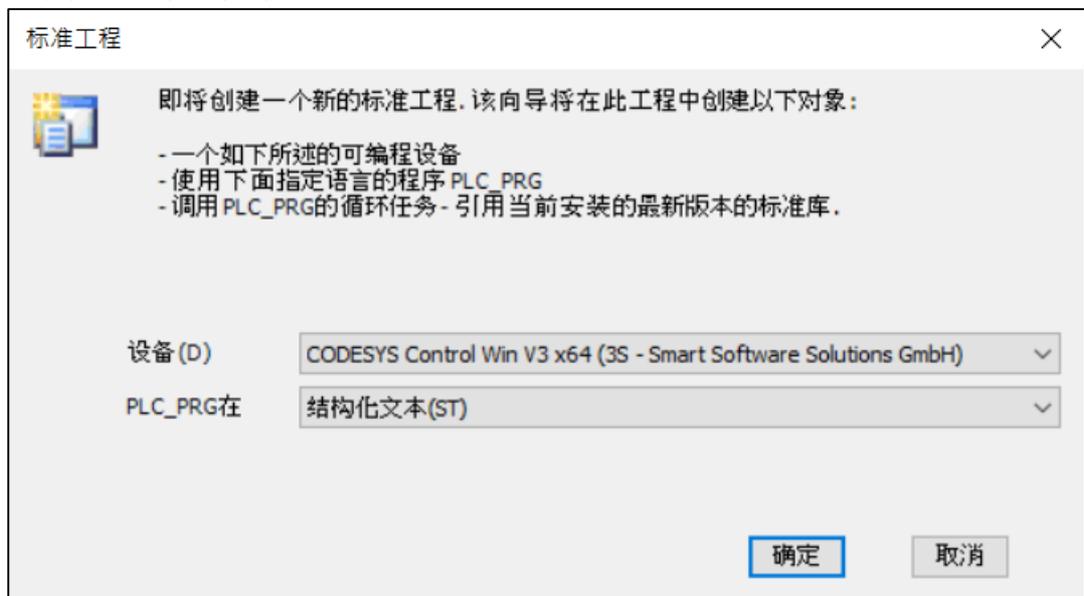
點擊新建工程



選擇標準工程(standard project)，選擇名稱以及路徑



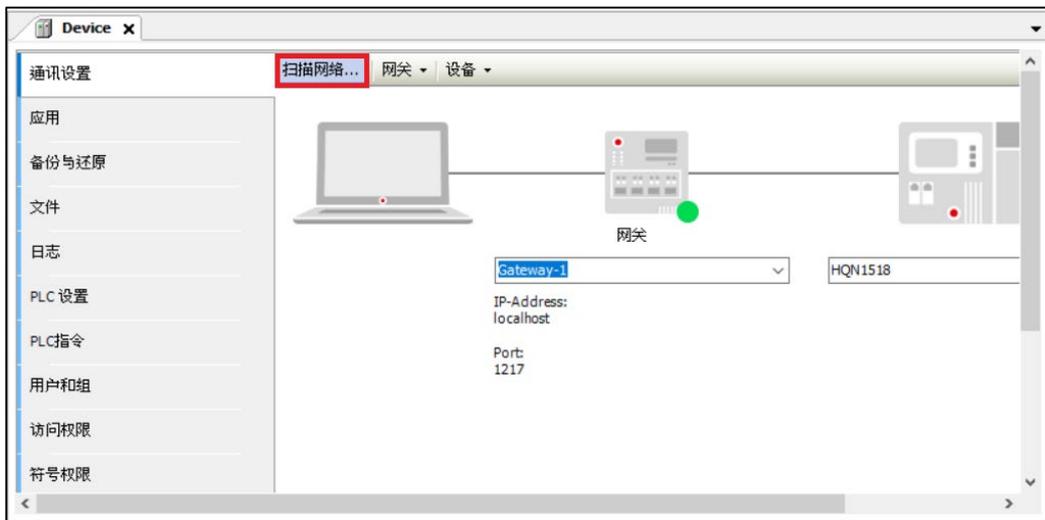
選擇依照客戶使用設備以及程式語言



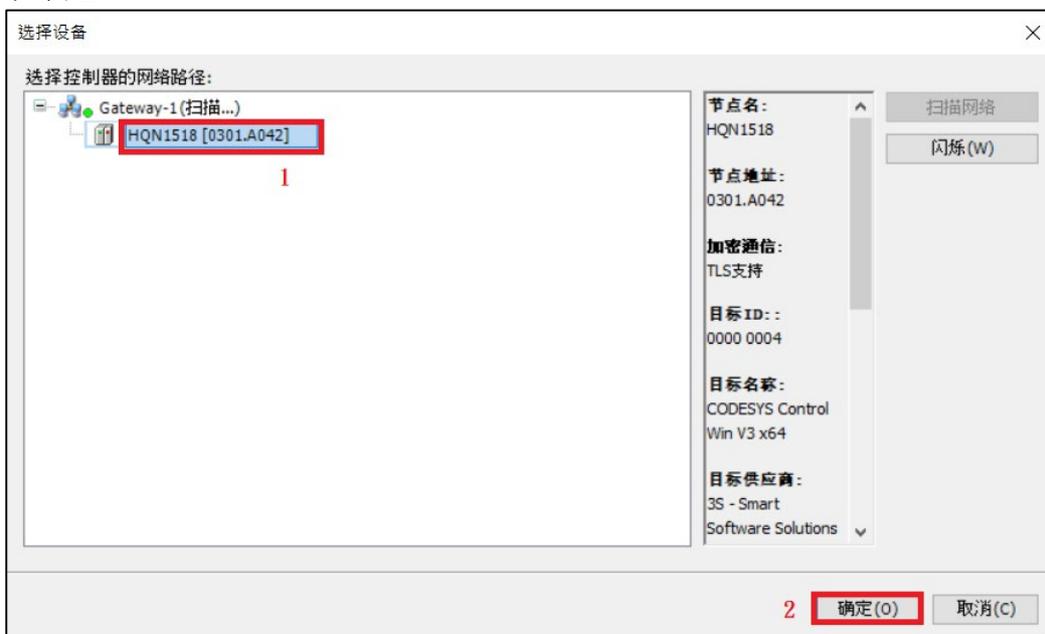
### 雙擊Device



選擇”通訊設置→掃描網路”

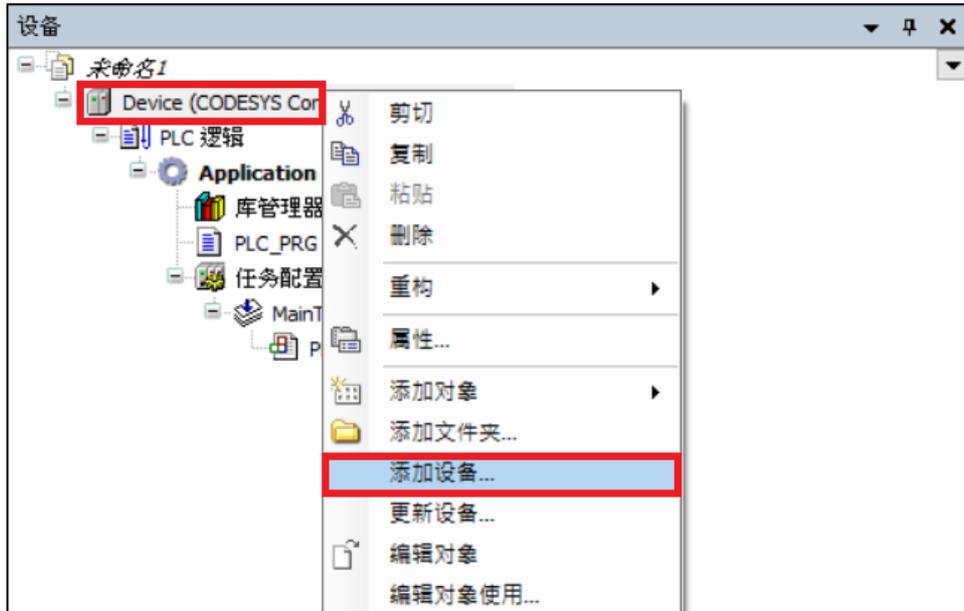


選擇設備後並點擊確定

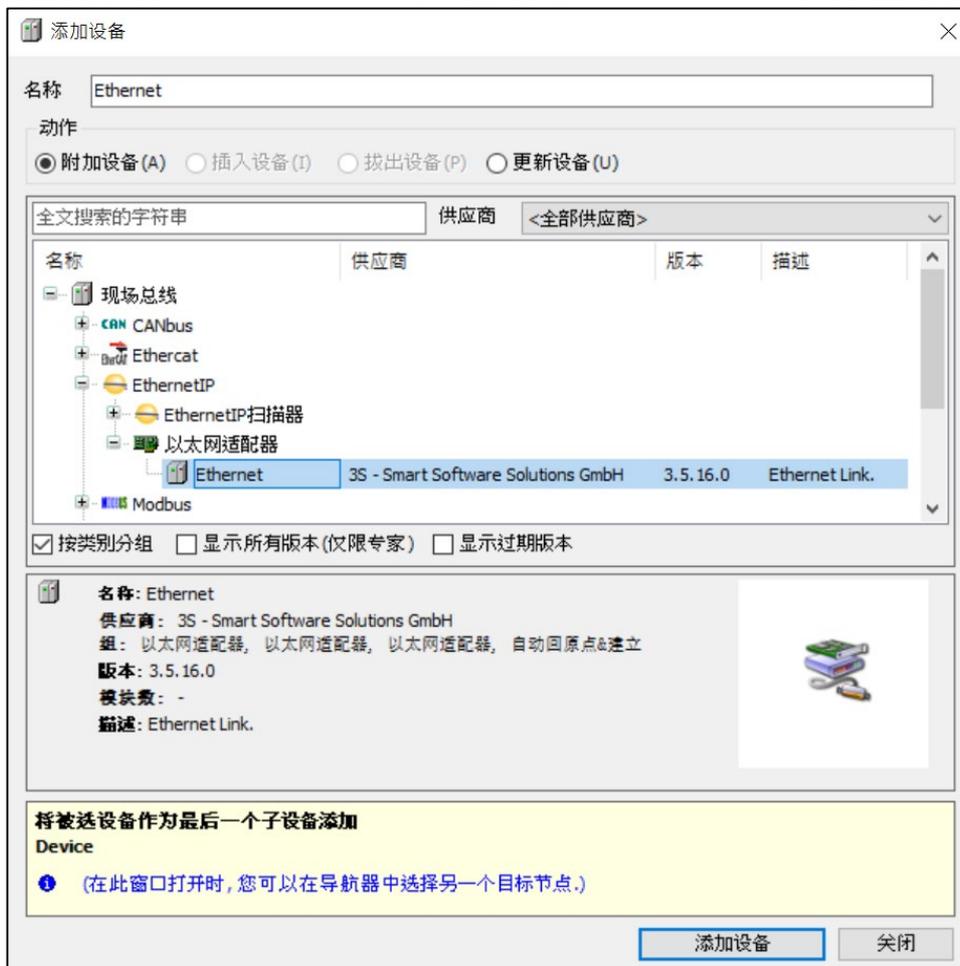


### III. 添加EtherNet/IP設備

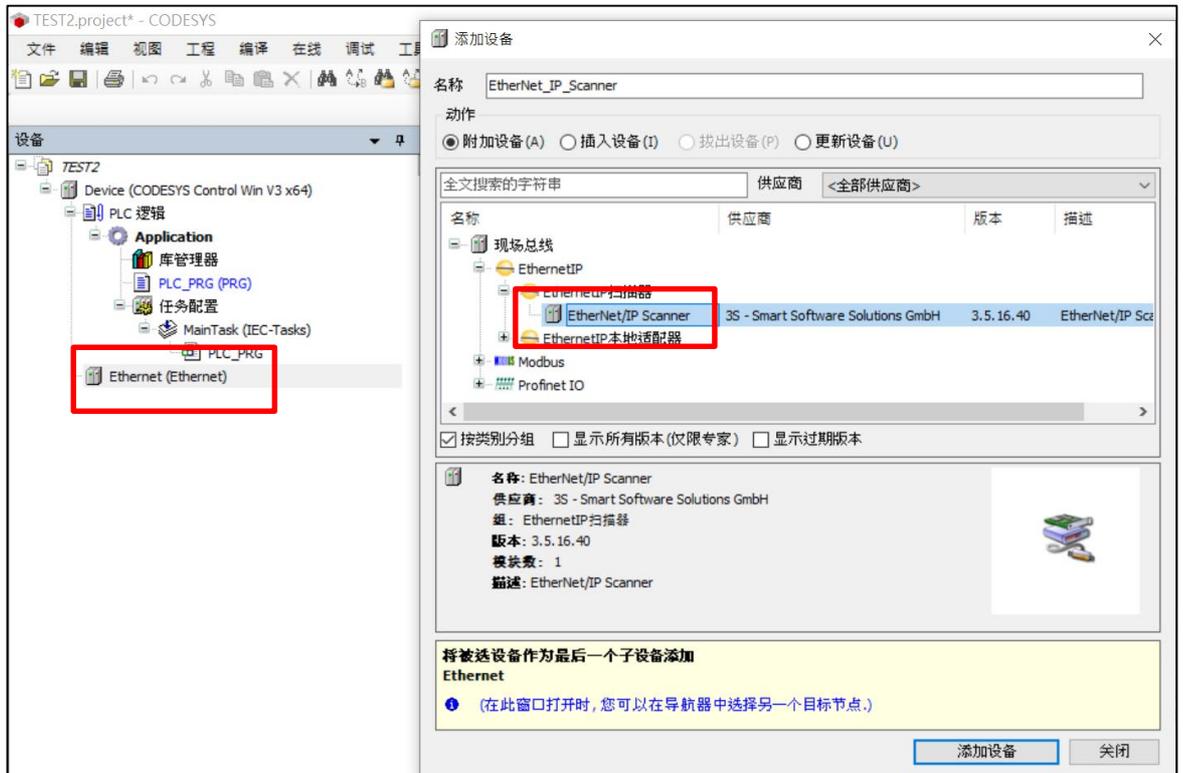
右鍵點擊”Device”並選擇”添加設備”



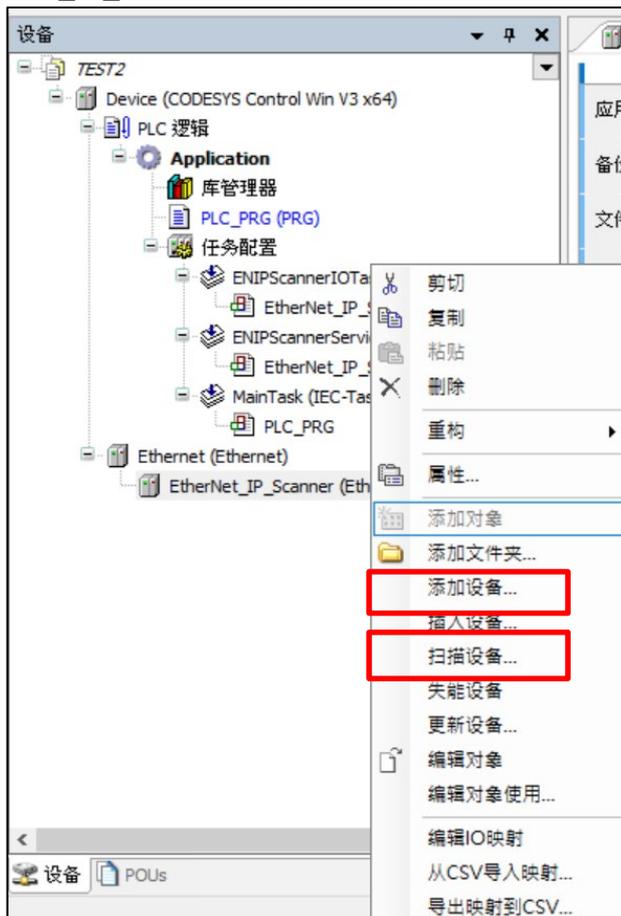
在添加設備選項欄中選擇Ethernnet/IP——乙太網適配器——Ethernet並點擊間加設備



右鍵點擊Ethernet，選擇添加設備，新增EtherNet/IP Scanner

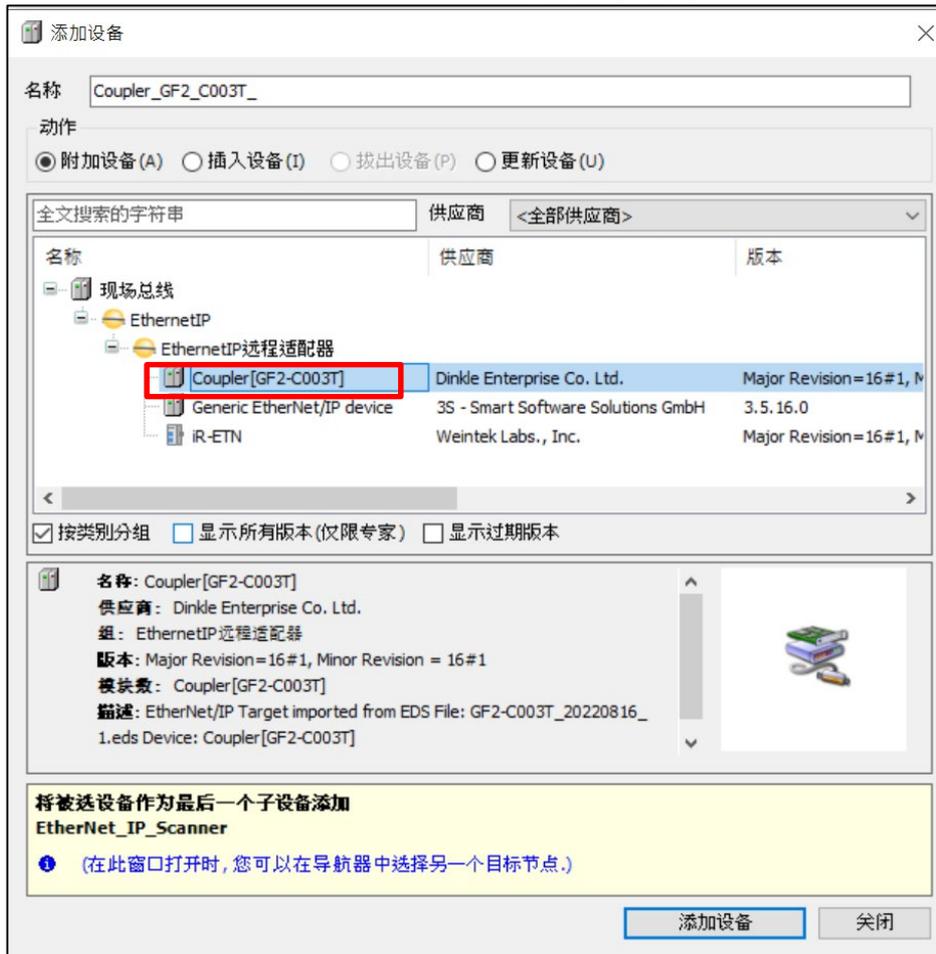


右鍵點擊EtherNet\_IP\_Scanner，選擇添加設備或掃描設備，以便進行設備組態



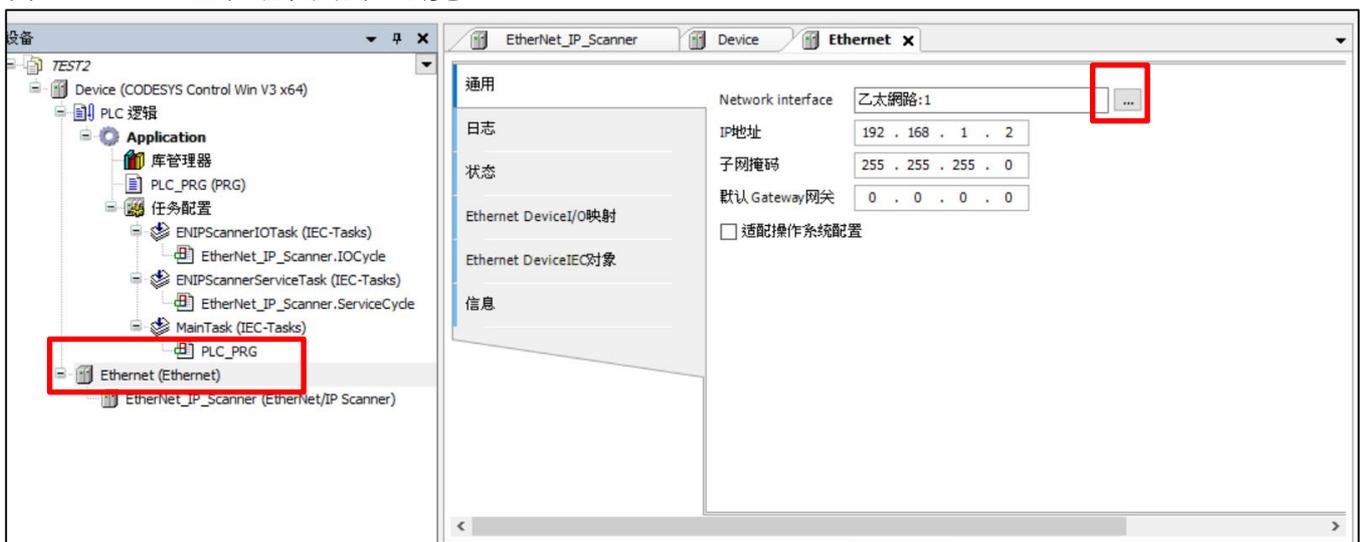
#### IV. 手動添加模組方式

點擊添加設備後，在添加設備視窗內選擇需添加的 **iO-GRID C** 模組，並點擊添加設備

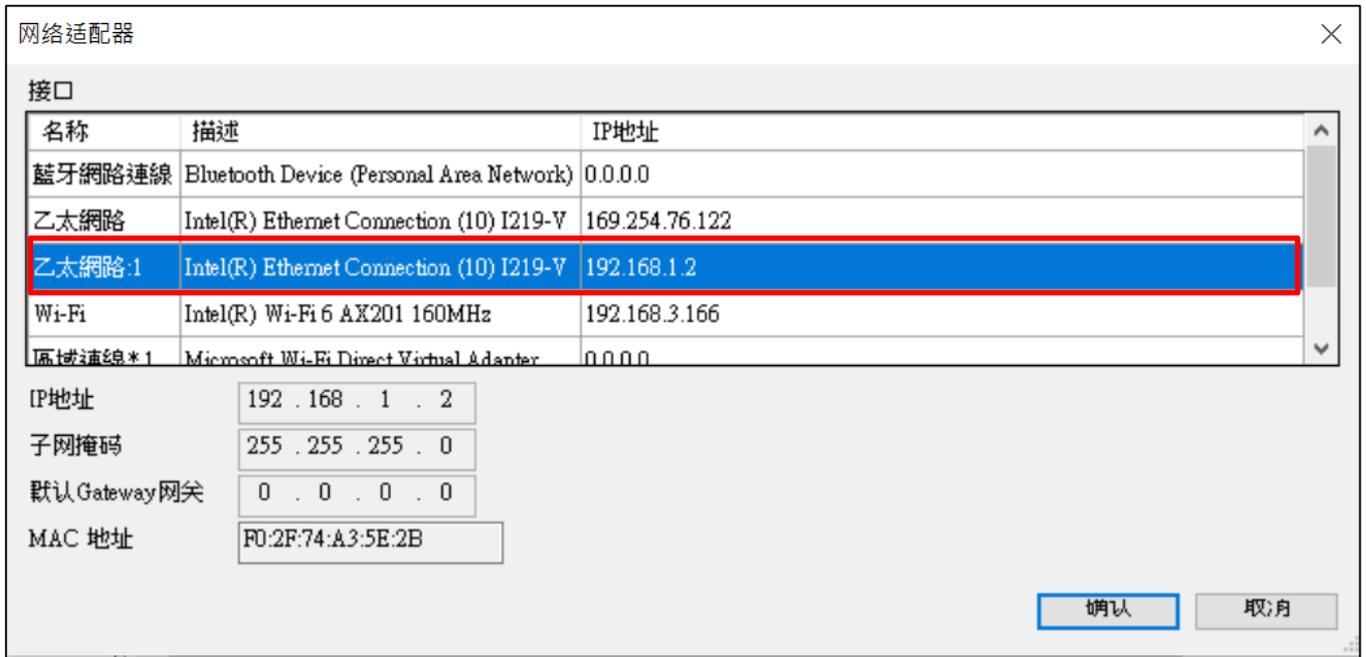


#### V. 掃描添加模組方式

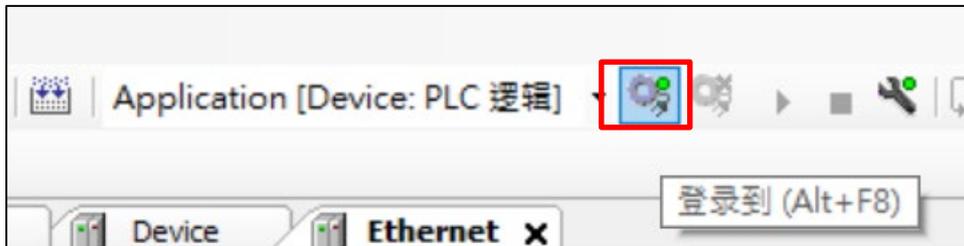
雙擊Ethernet，並在右側點擊”瀏覽”



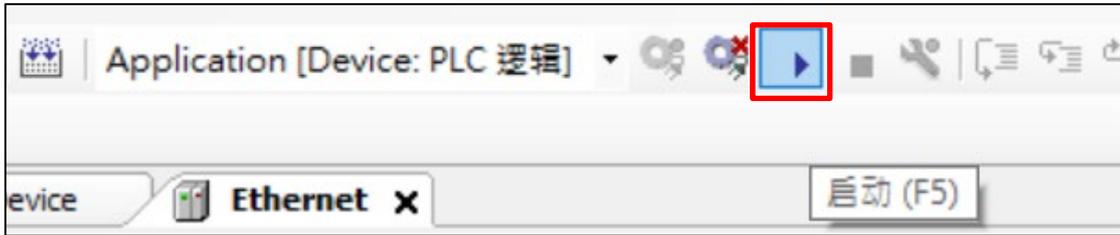
選擇連接的網路適配器



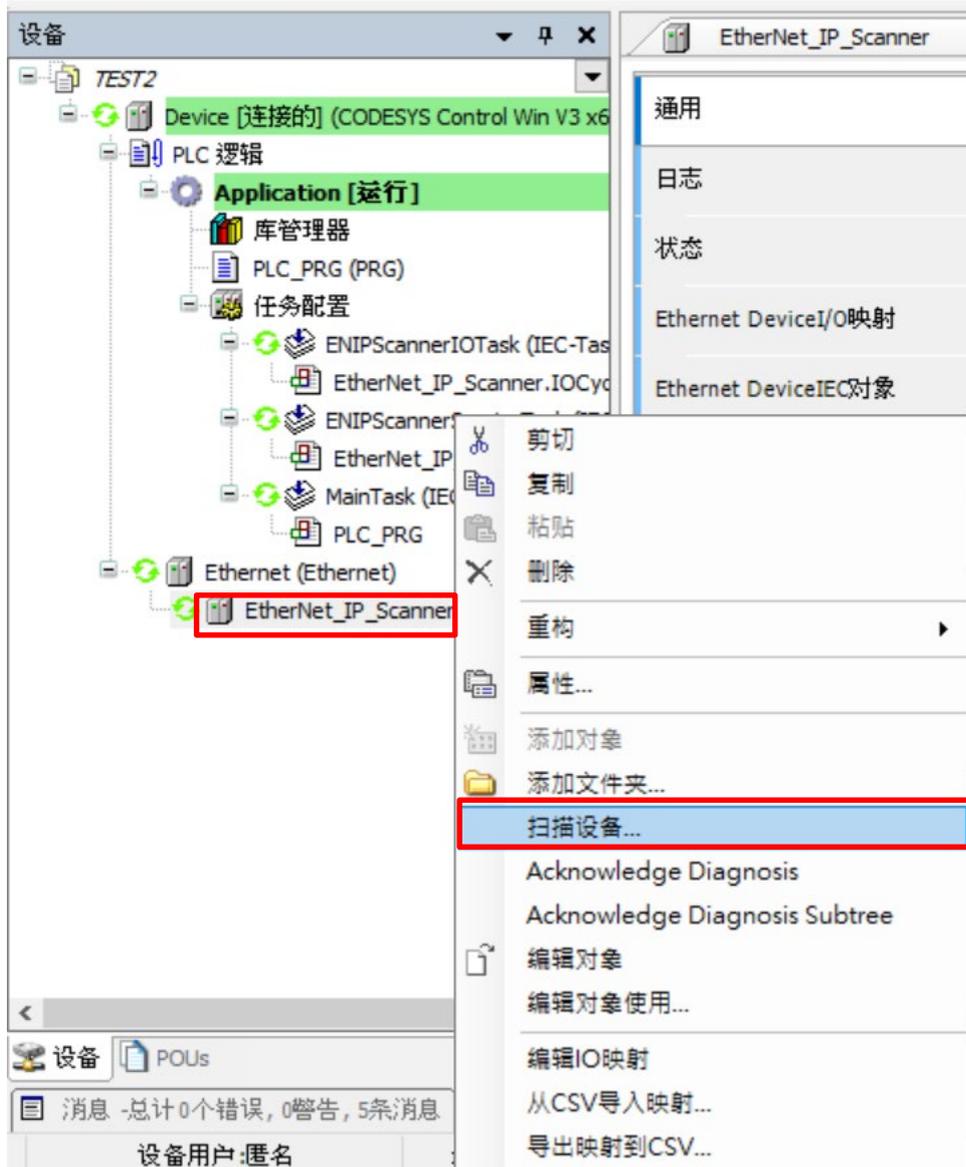
點擊上方工具列”登錄到(Alt+F8)”



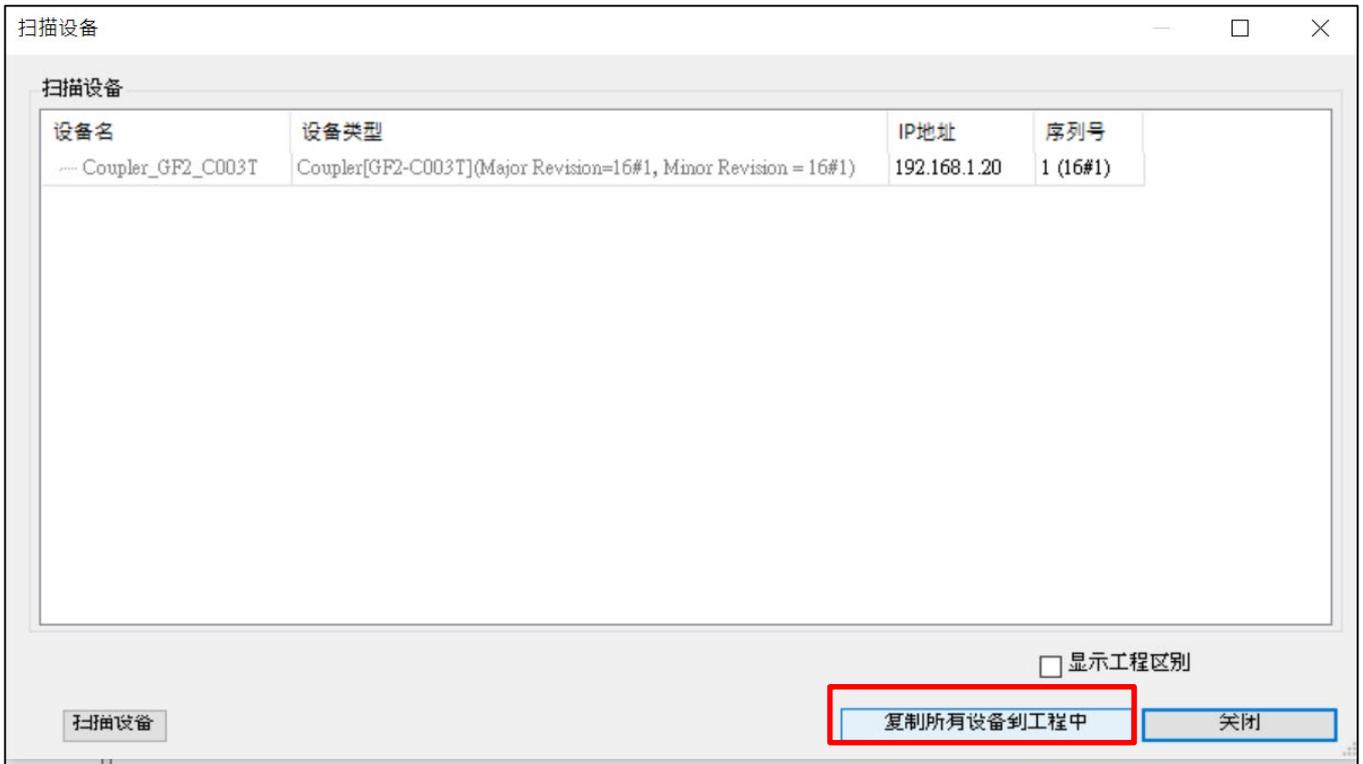
啟動設備



右鍵點擊EtherNet\_IP\_Scanner，並點擊”掃描設備”

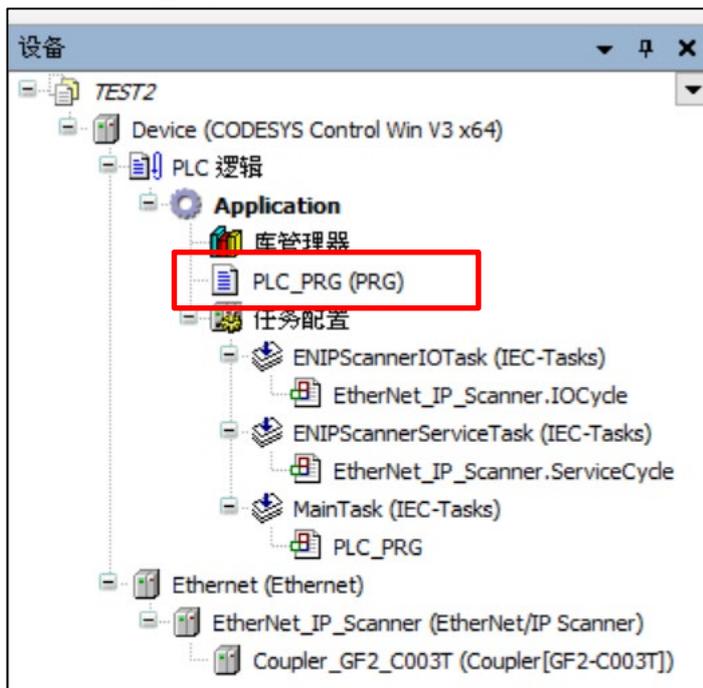


依照掃描設備確認無誤後，點擊”複製所有設備到工程中”



## VI. 簡易I/O映射方式

點擊PLC\_PRG開啟編輯程序頁面



創建變數以及簡易對應程序

```

1  PROGRAM PLC_PRG
2  VAR
3      Input1 : BOOL;
4      Output1 : BOOL;
5  END_VAR

1  Output1 := Input1;
    
```

點擊上方工具列編譯程序



左側雙擊要對應的I/O模組，選擇”EtherCAT I/O映射”頁面

变量	映射	通道	地址	类型
Exclusive Owner				
+		Input Assembly_Param0	%IB0	BYTE
+		Input Assembly_Param1	%IB1	BYTE
+		Input Assembly_Param2	%IB2	BYTE
+		Input Assembly_Param3	%IB3	BYTE
+		Input Assembly_Param4	%IB4	BYTE
+		Input Assembly_Param5	%IB5	BYTE
+		Input Assembly_Param6	%IB6	BYTE
+		Input Assembly_Param7	%IB7	BYTE
+		Input Assembly_Param8	%IB8	BYTE
+		Input Assembly_Param9	%IB9	BYTE
+		Input Assembly_Param10	%IB10	BYTE

對要映射的通道點擊...

变量	映射	通道	地址	类型
Exclusive Owner				
		Input Assembly_Param0	%IB0	BYTE
		Bit0	%IX0.0	BOOL
		Bit1	%IX0.1	BOOL
		Bit2	%IX0.2	BOOL
		Bit3	%IX0.3	BOOL
		Bit4	%IX0.4	BOOL
		Bit5	%IX0.5	BOOL
		Bit6	%IX0.6	BOOL
		Bit7	%IX0.7	BOOL
		Input Assembly_Param1	%IB1	BYTE
		Input Assembly_Param2	%IB2	BYTE

選擇對應變數

输入助手

文本搜索 类别

变量	名称	类型	地址	初始
	Application	应用		
	PLC_PRG	PROGRAM		
	<b>Input1</b>	<b>BOOL</b>		
	Output1	BOOL		
	IoConfig_Globals	VAR_GLOBAL		
	IoDrvEthercatLib	库		IODrvEtherCAT, 3.5...

结构视图(S) 过滤器(F) 无

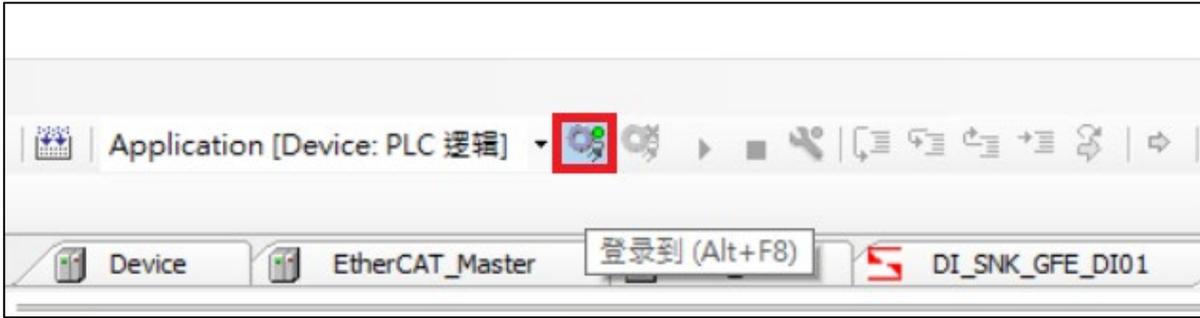
插入变量(w)  以命名空间前缀插入(n)

文档(D)

```
Input1: BOOL;
(VAR)
```

确定 取消

對映完成後點擊上方工具列登錄PLC

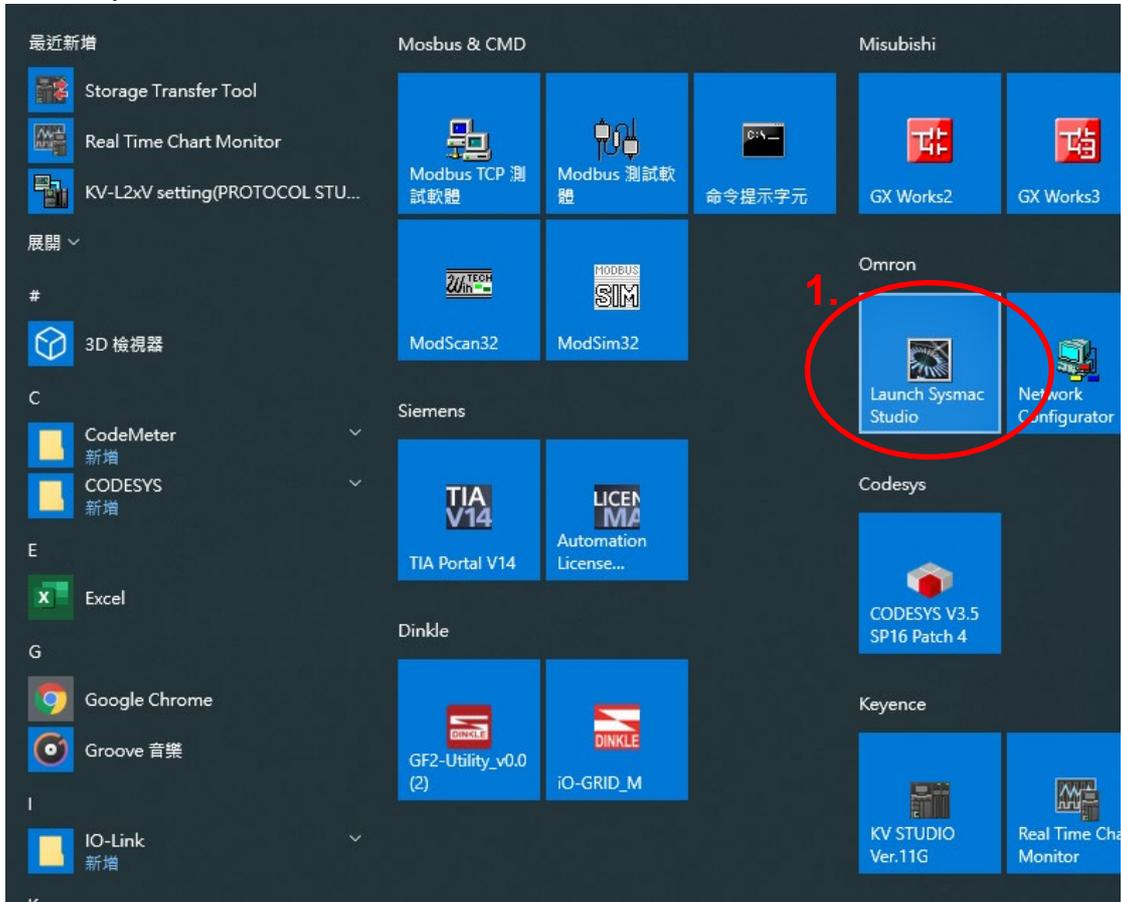


可以於在線模式下查看I/O對映狀態

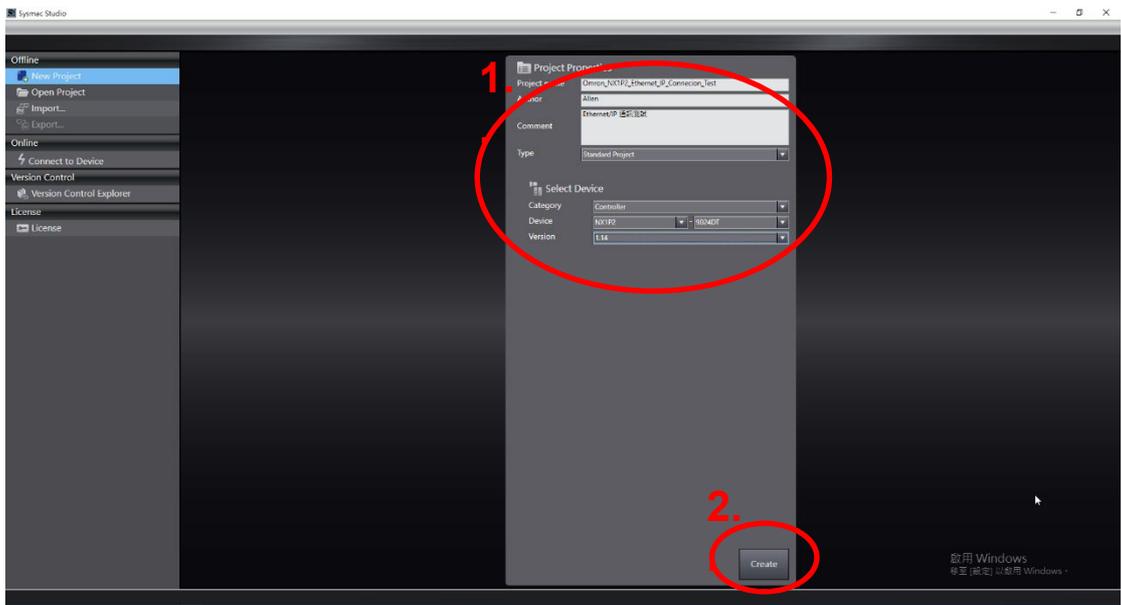
### 3.2 iO-GRID 基於 Sysmac Studio 軟體使用入門指導

#### I. 啟動 Sysmac Studio 並設定 Ethernet/IP 接口：

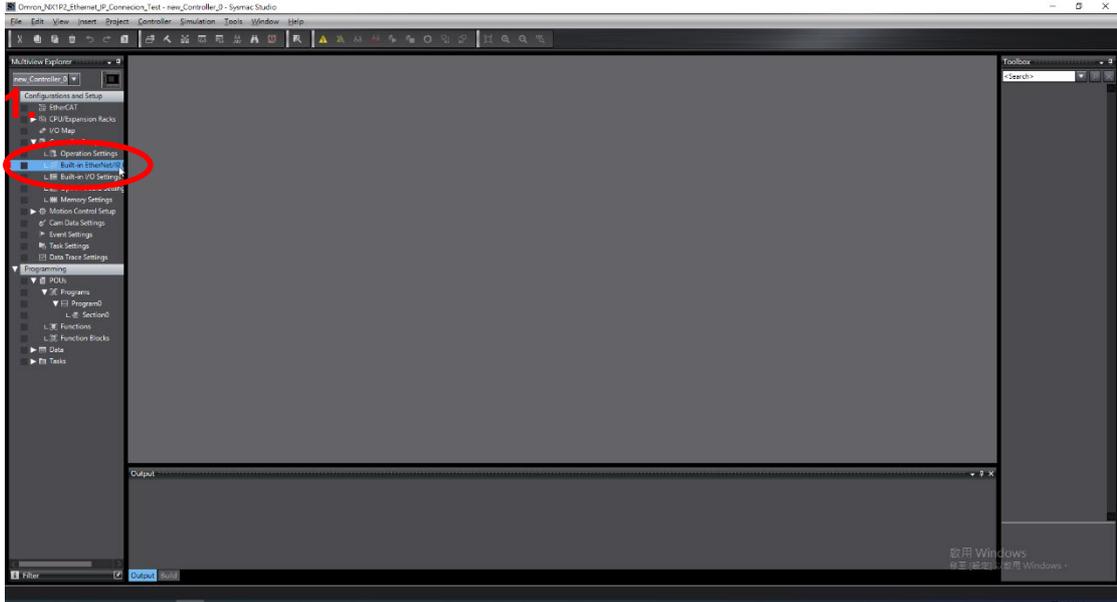
滑鼠左鍵開啟 Sysmac Studio：



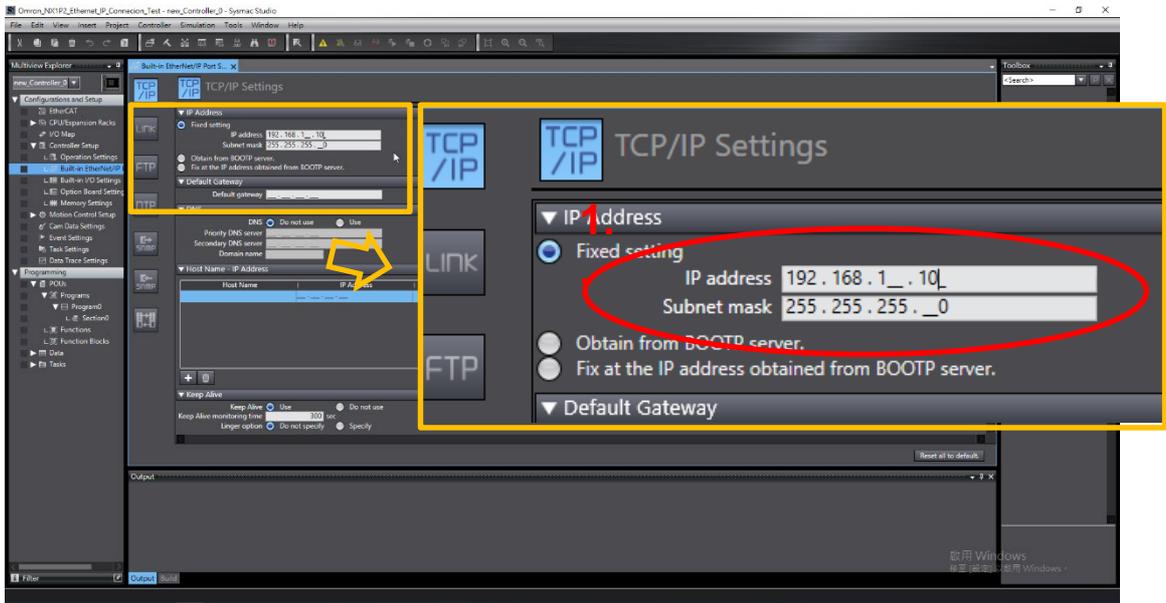
滑鼠左鍵點選 New Project，建立新的專案並填寫專案名稱、資訊、PLC 型號及版本，完成後按下 Create：



選擇 Built-in Ethernet/IP Port Settings 用滑鼠左鍵點擊兩下，開啟編輯畫面：

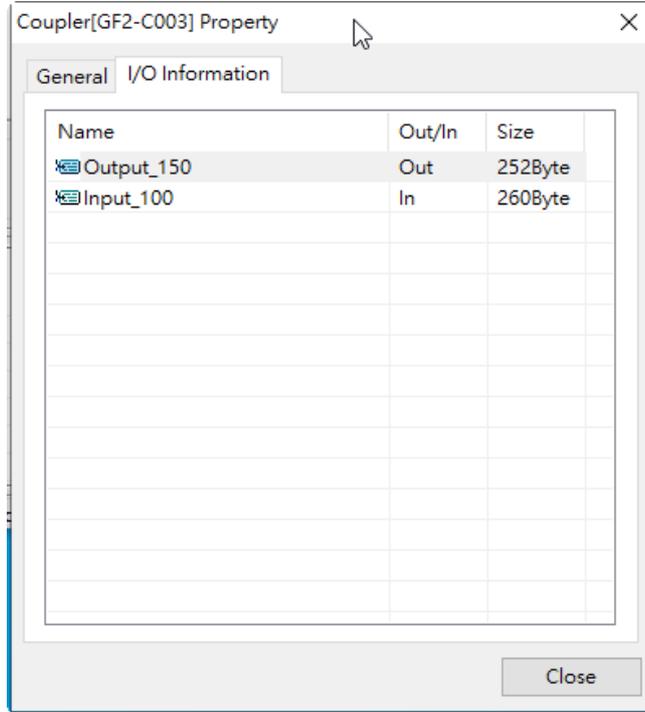


在 IP Address 的欄位中輸入 PLC 的 IP 位址，在 Mask 的欄位中輸入 Class C( 255.255.255.0 )：

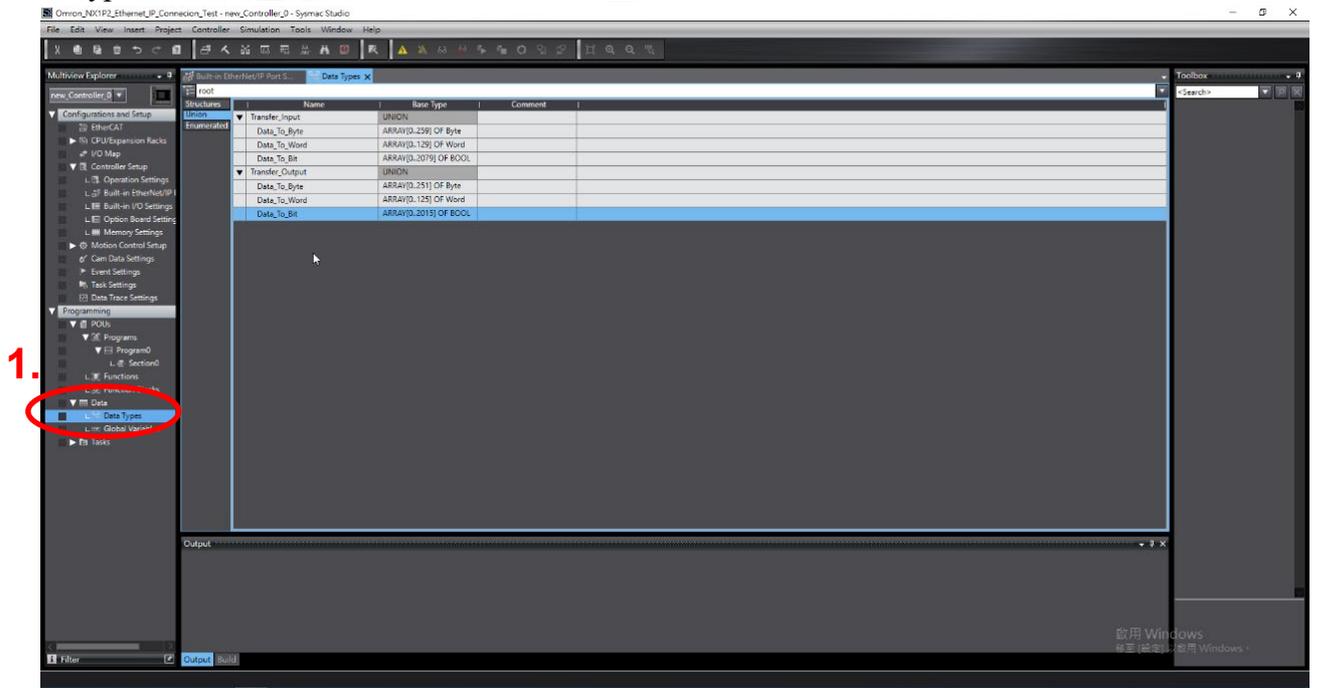


## II. 建立 Data Types( 自定義資料類型 ) 及 Global Variables( 全域變數 ) :

關於 Ethernet/IP 的資料格式，請參考下圖：



選擇 Data Types 用滑鼠左鍵點擊兩下，開啟編輯畫面：



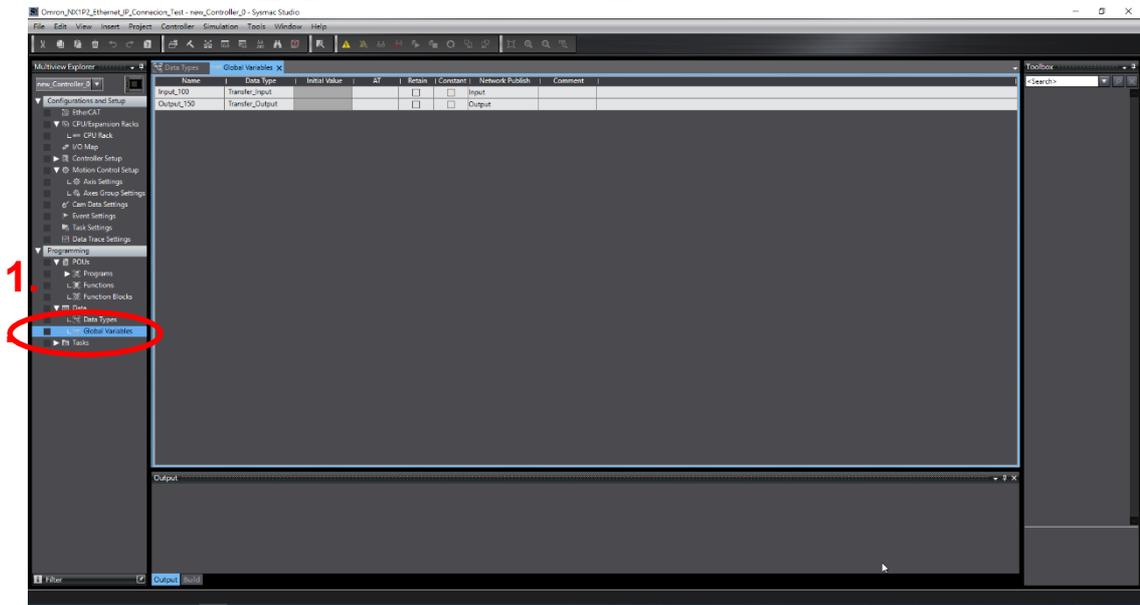
在欄位中建立分別兩個資料類型 Transfer\_Input、Transfer\_Output :

Name	Base Type	Name	Base Type
Transfer_Input	Union	Transfer_Output	Union
Data_To_Byte	ARRAY[0...259] of Byte	Data_To_Byte	ARRAY[0...252] of Byte
Data_To_Word	ARRAY[0...129] of Word	Data_To_Word	ARRAY[0...125] of Word
Data_To_Bit	ARRAY[0...2079] of BOOL	Data_To_Bit	ARRAY[0...2015] of BOOL

▼ Transfer_Input	UNION
Data_To_Byte	ARRAY[0..259] OF Byte
Data_To_Word	ARRAY[0..129] OF Word
Data_To_Bit	ARRAY[0..2079] OF BOOL
▼ Transfer_Output	UNION
Data_To_Byte	ARRAY[0..251] OF Byte
Data_To_Word	ARRAY[0..125] OF Word
Data_To_Bit	ARRAY[0..2015] OF BOOL

選擇 Global Variables 用滑鼠左鍵點擊兩下，開啟編輯畫面：



在欄位中建立分別兩個全域變數：

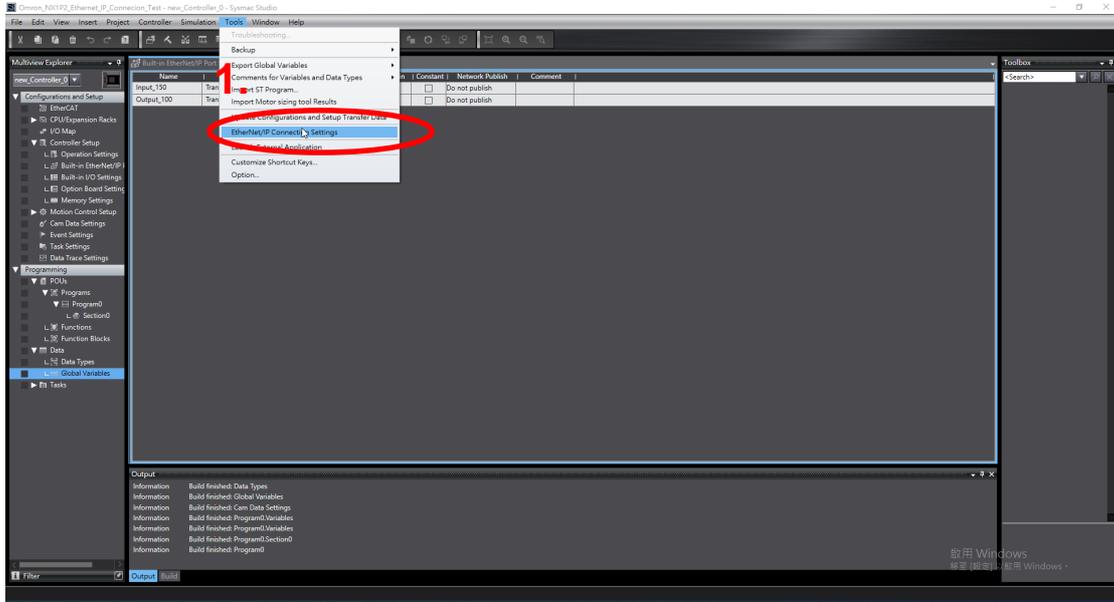
Name	Data Type	Network Publish
Input_100	Transfer_Input	Input
Output_150	Transfer_Output	Output

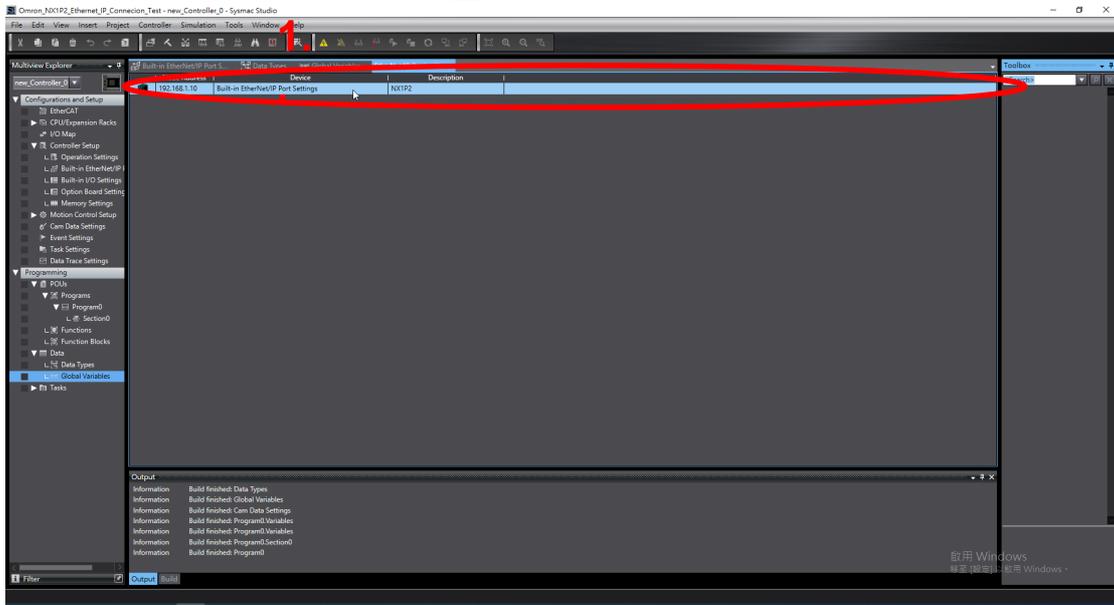
Name	Data Type	Initial Value	AT	Retain	Constant	Network Publish	Comment
Input_100	Transfer_Input			<input type="checkbox"/>	<input type="checkbox"/>	Input	
Output_150	Transfer_Output			<input type="checkbox"/>	<input type="checkbox"/>	Output	

### III. Ethernet/IP 連線設定：

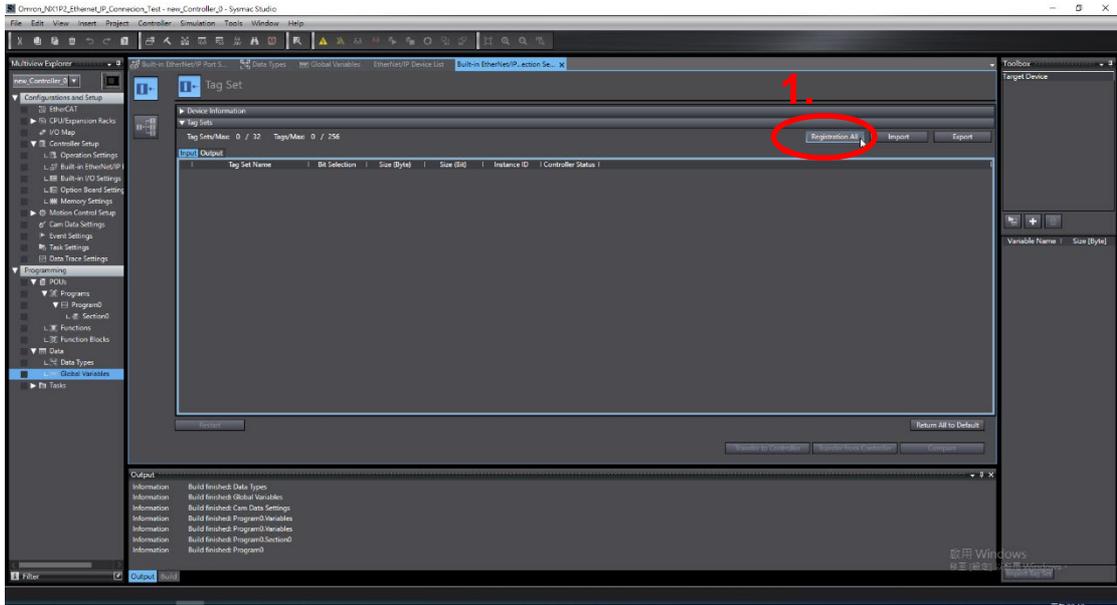
滑鼠左鍵點選 Tool → Ethernet/IP Connection Settings，開啟編輯畫面：



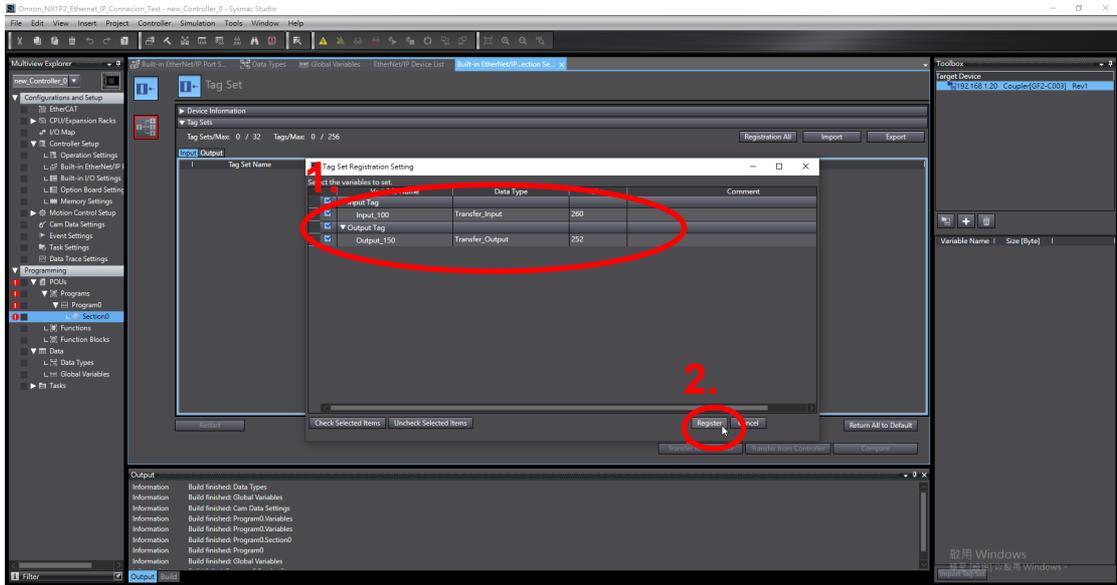
對 Device 點擊滑鼠左鍵兩下，開啟編輯畫面：



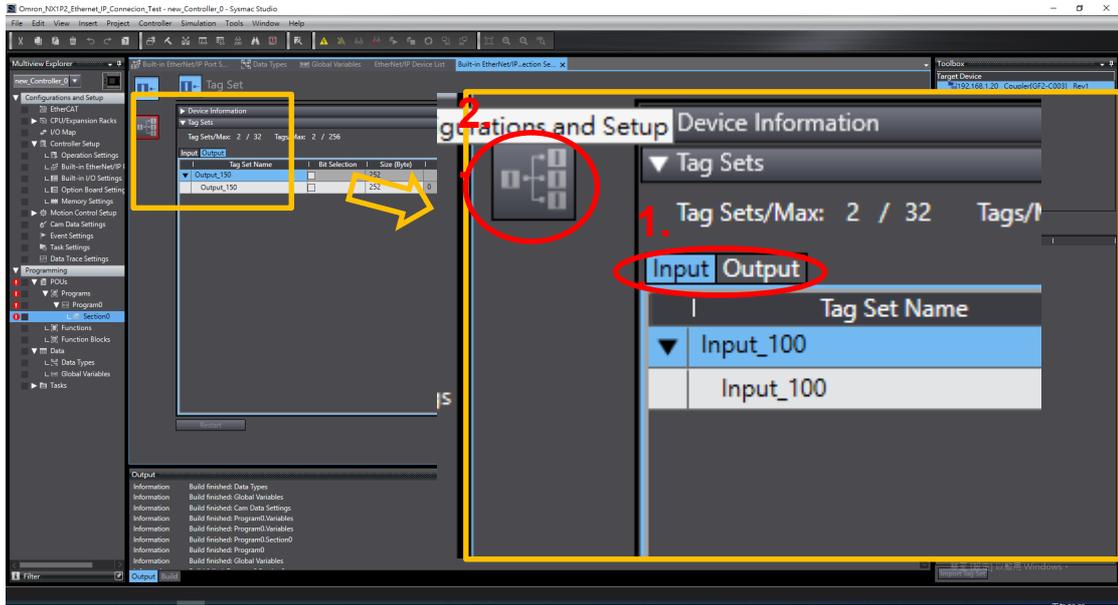
用滑鼠左鍵點擊 Registration All，來匯入 Global Variables：



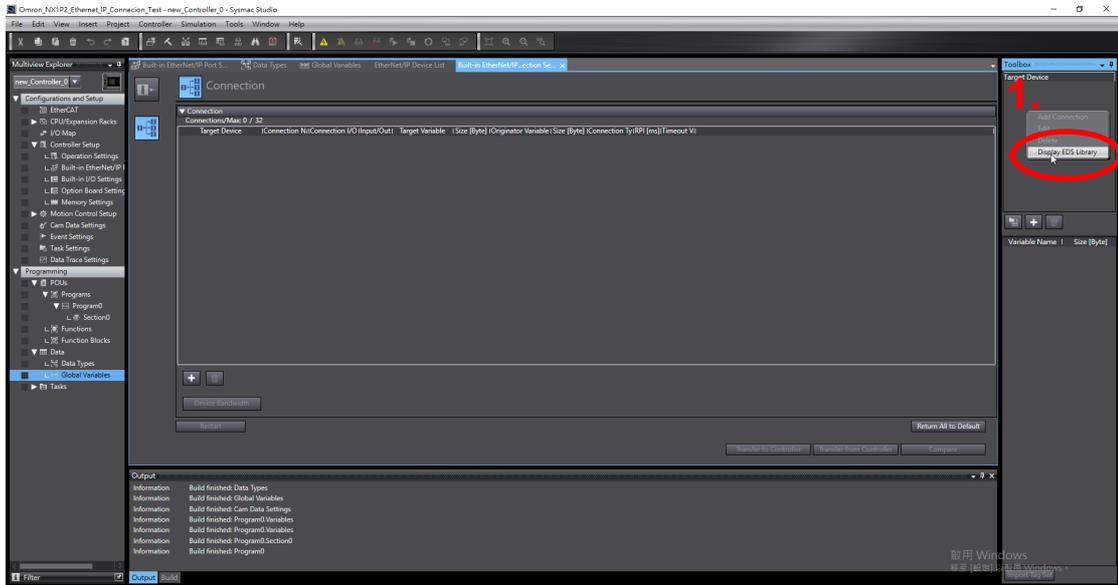
彈跳出匯入視窗，確認匯入的 Tag 無誤，請按下 Register：



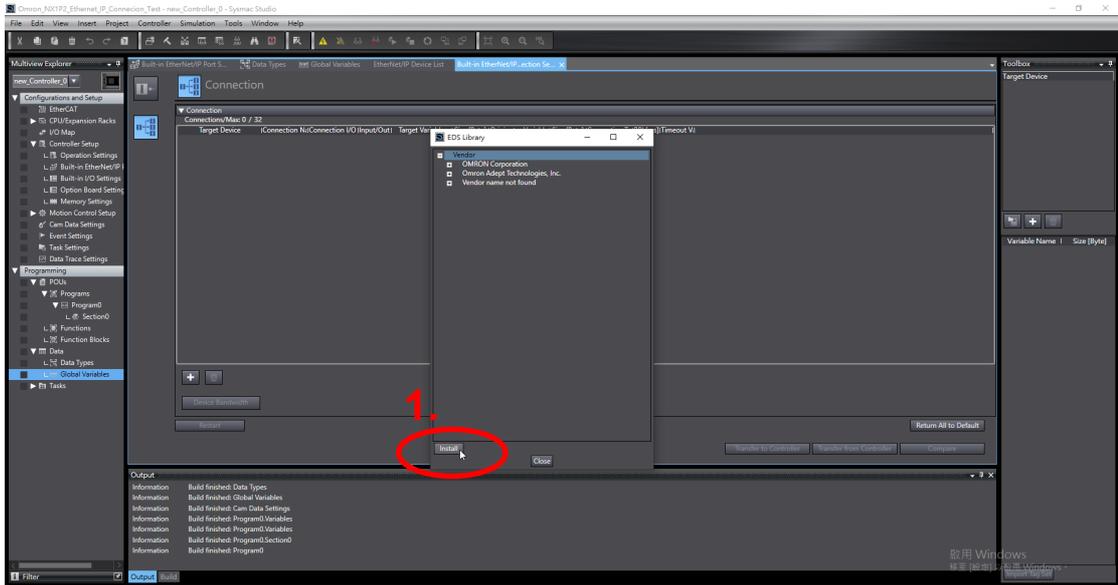
利用 Input、Output 的分頁籤來確認匯入狀況，確認無誤後用滑鼠左鍵點選 Connection 的圖示：



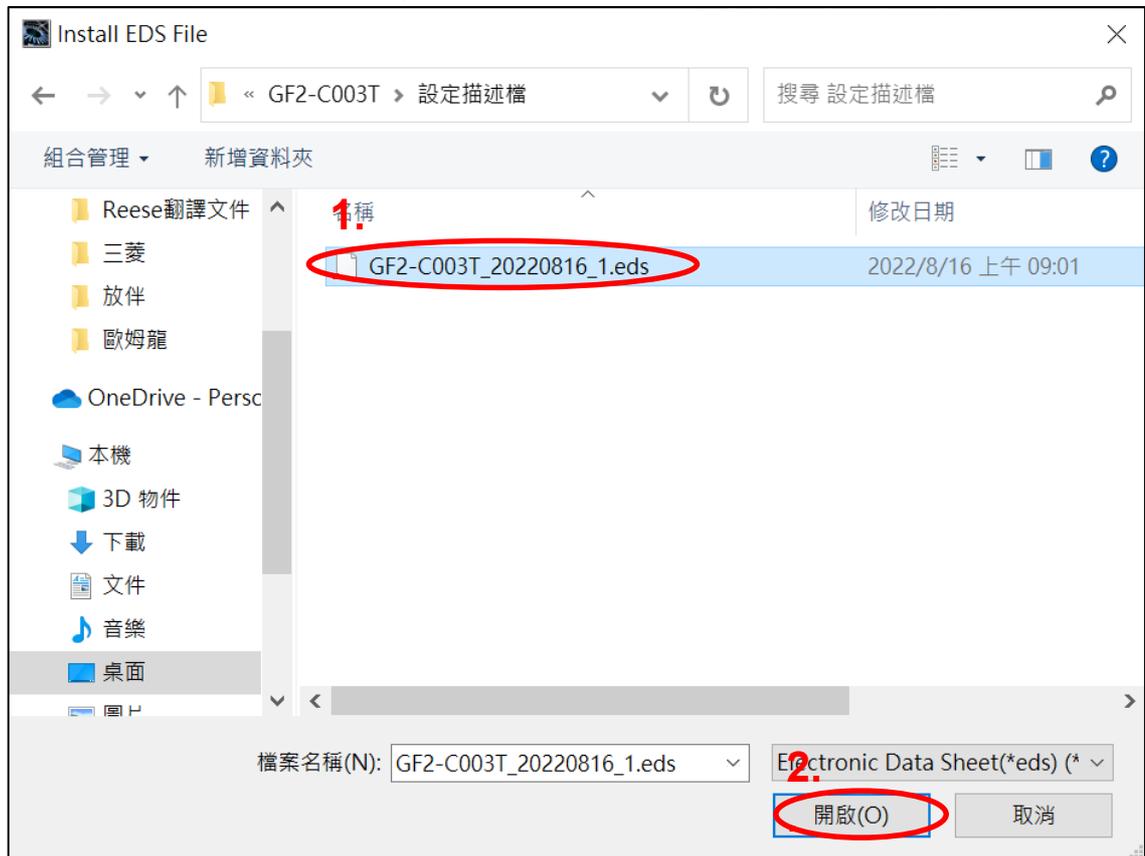
開啟 Connection 畫面，對著右上角的 Target Device 按滑鼠右鍵開啟選單，選擇 Display EDS Library：



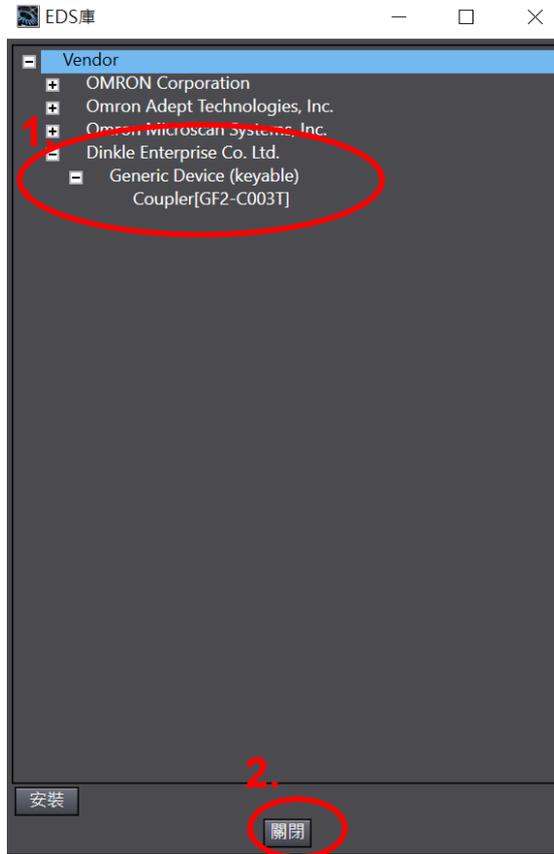
跳出 EDS Library 彈跳視窗，選擇 install :



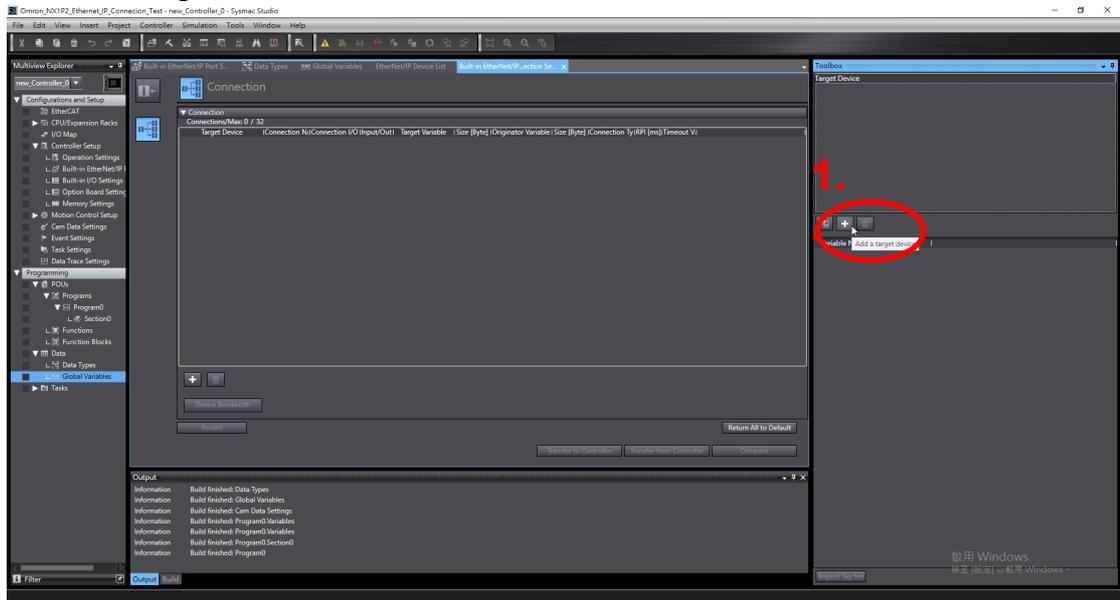
將我們提供的 EDS 檔案( 附檔名為 .eds )放入路徑內，滑鼠左鍵按下”開啟”:



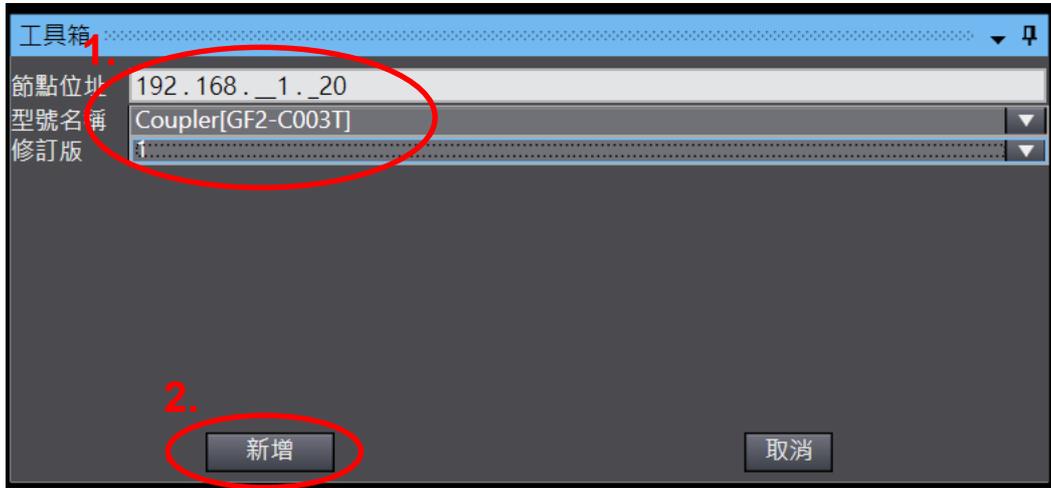
從 EDS Library 選單中會看到新增的 Coupler[ GF2-C003 ]，表示成功新增，滑鼠左鍵按 Close 關閉彈跳視窗：



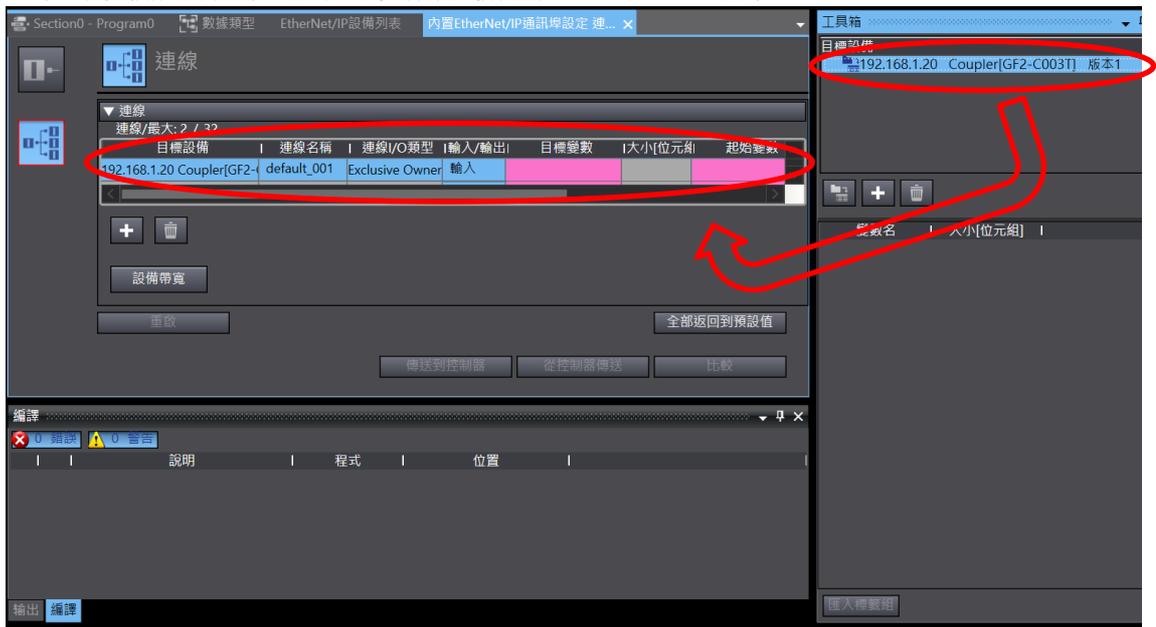
滑鼠左鍵按下 Add a target device :



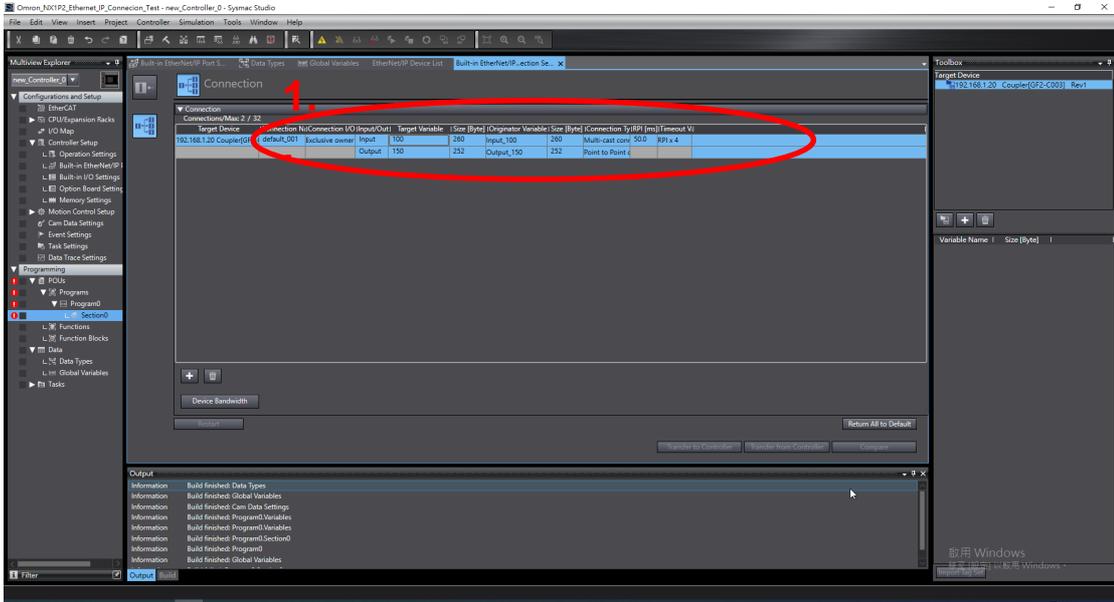
在 Toolbox 輸入 Coupler 的 IP( 預設為 192.168.1.20 )、Model name( Coupler[ GF2-C003T ] )、Revision( 1 )，滑鼠左鍵按下 Add 鍵：



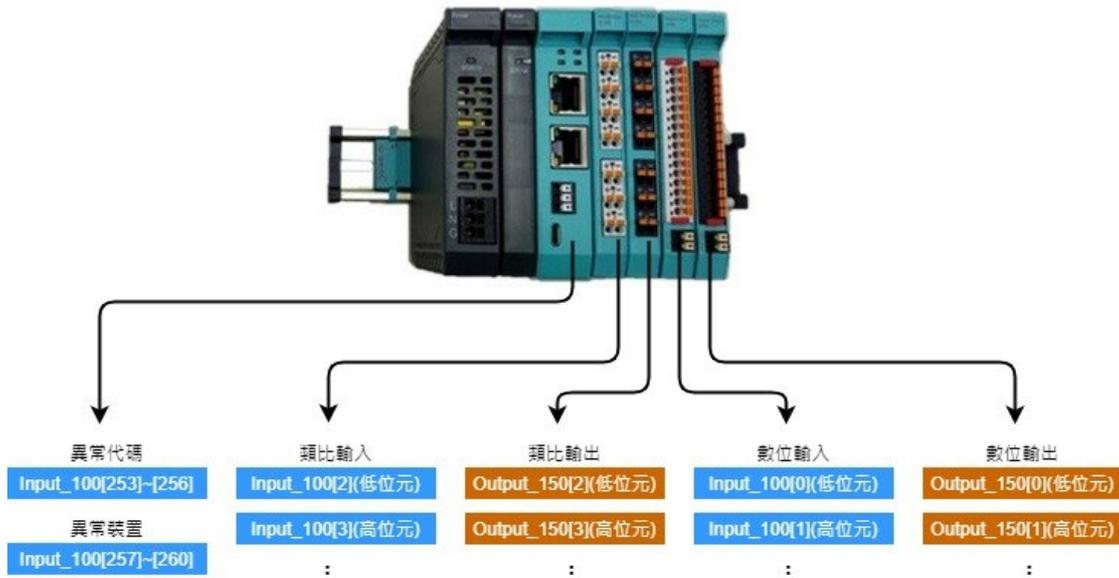
將 Toolbox 中的設備用滑鼠左鍵拖曳的方式加到 Connection 之中：



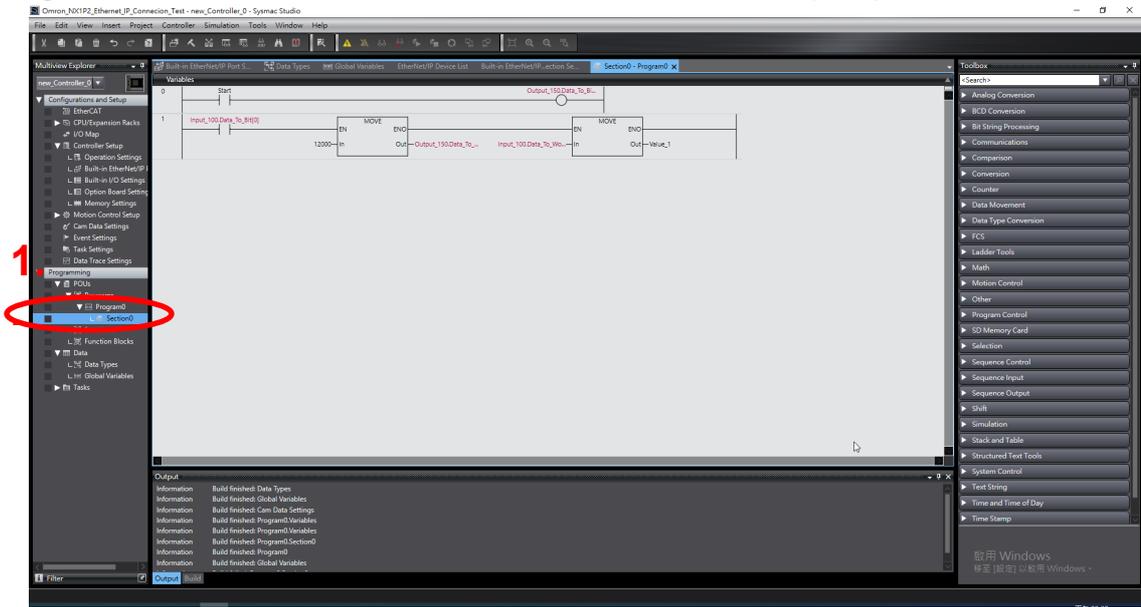
選擇 Originator Variables 的下拉式選單，將剛才的全域變數加進來，並在 Target Variables Input 輸入100、Output 輸入150：



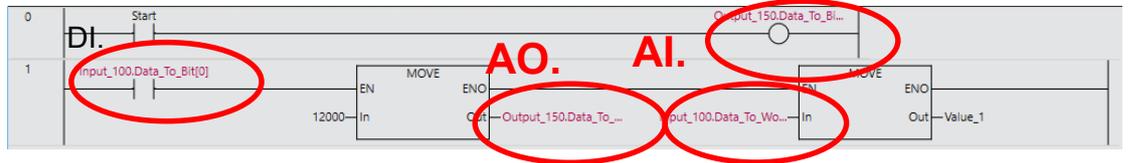
**IV. 設定 IO 位址並建立簡單的測試程式：**  
關於 **iO-GRID** Coupler 暫存器位址說明：



將 Programming 展開，用滑鼠左鍵點擊兩下選擇 Section0 開啟階梯圖( LD )編輯畫面：



輸入下圖的測試程式，此測試程式用來驗證 Remote I/O 有沒有正確的進行連線：  
**DO.**



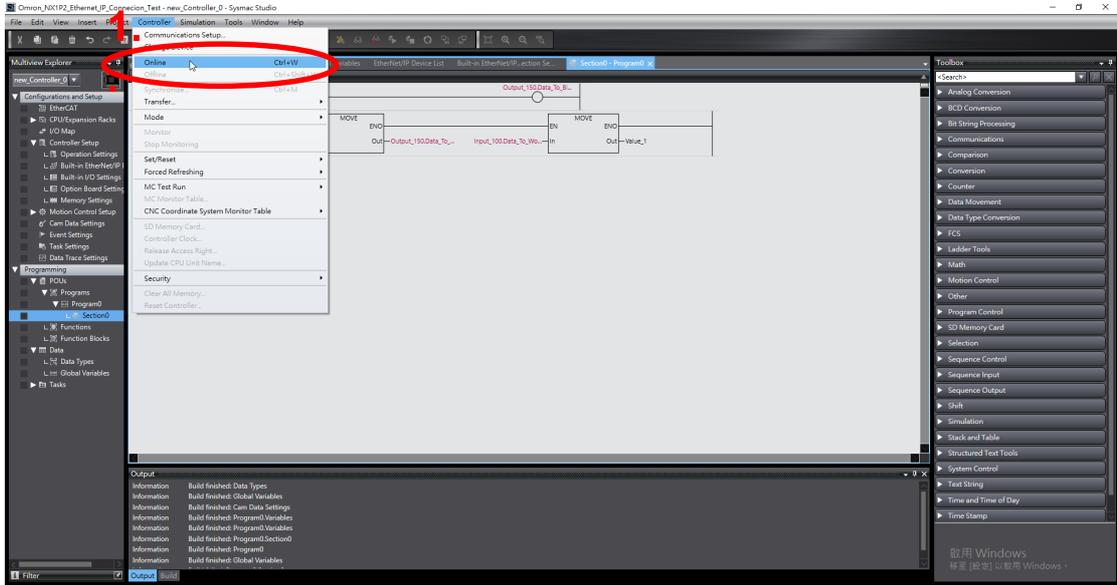
DO : 用暫存位置 Start 來進行條件觸發。

DI : 將 DI 放在 a 接點的位置上，當硬線有訊號回傳時，可以觸發後面的 MOVE 指令。

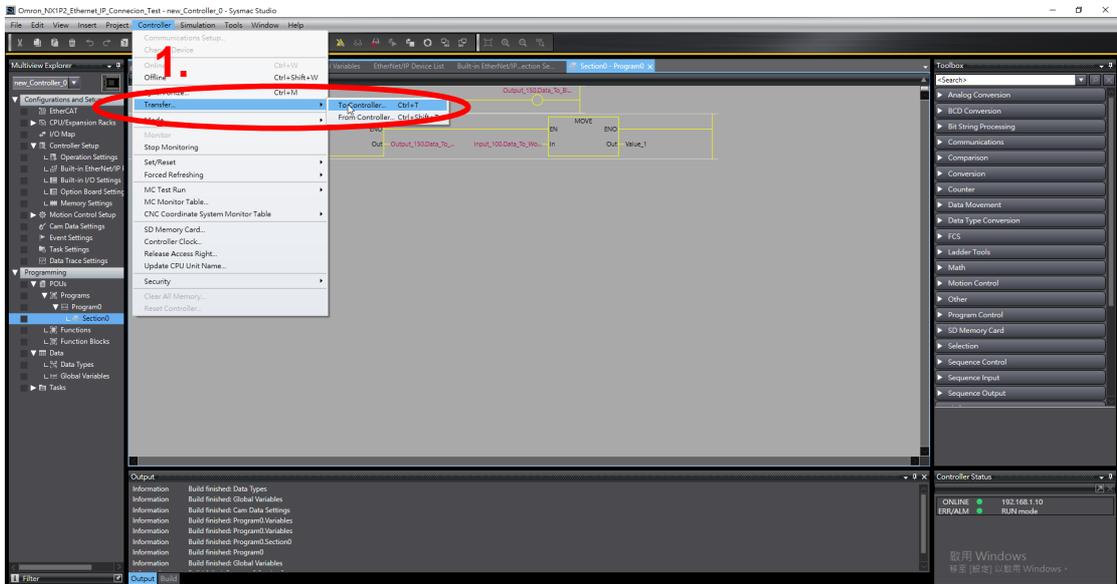
AO : 用 MOVE 指令將 12000 的數值搬移至 AO 中。

AI : 用 MOVE 指令將 AI 的數值搬移至 Value\_1 暫存位置中，AI 數值可由訊號產生器或 AO 來提供。

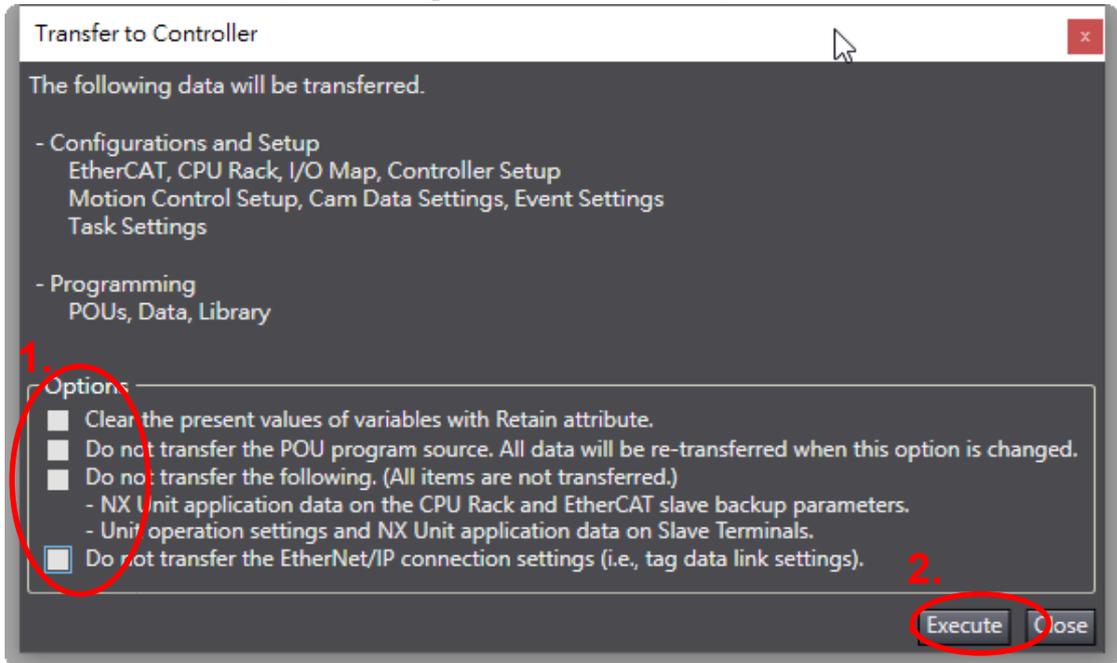
**V. 程式下載至 PLC 並進行線上測試：**  
滑鼠左鍵點選 Controller → Online，確認有連線至 PLC：



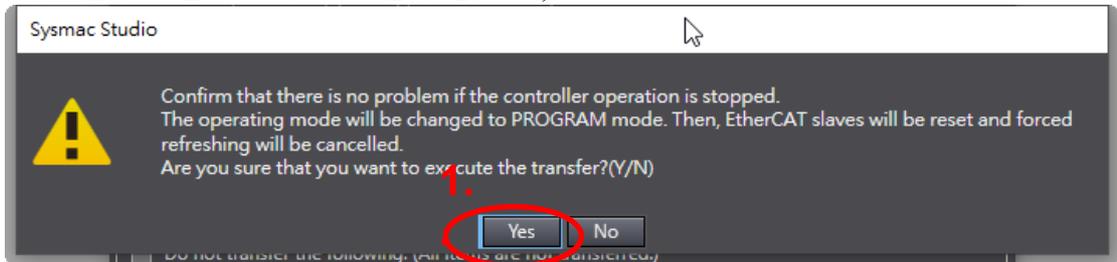
滑鼠左鍵點選 Controller → Transfer → To Controller：



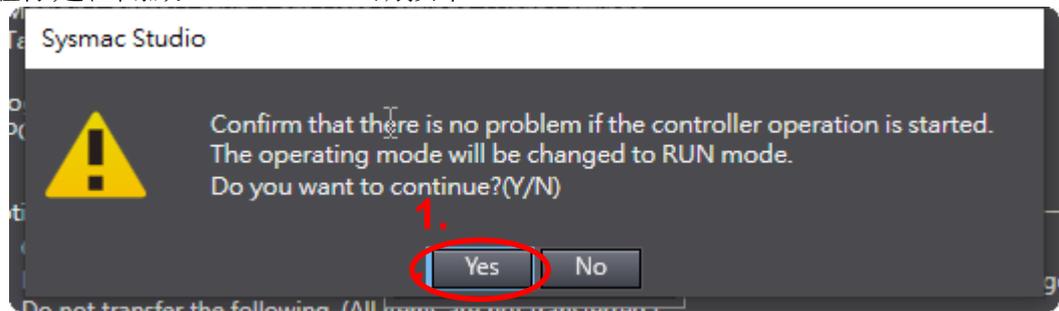
跳出 Transfer To Controller 彈跳視窗，將 Options 的選項都取消後按下 Execute :



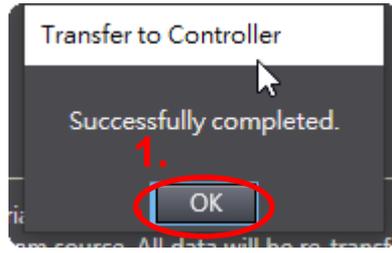
跳出警告視窗提醒你傳輸過程會導致 PLC 進入 Program Mode，請按下 Yes( PS : 此時 PLC 會中斷程式運行，請勿在線上運作中的 PLC 進行此操作 ) :



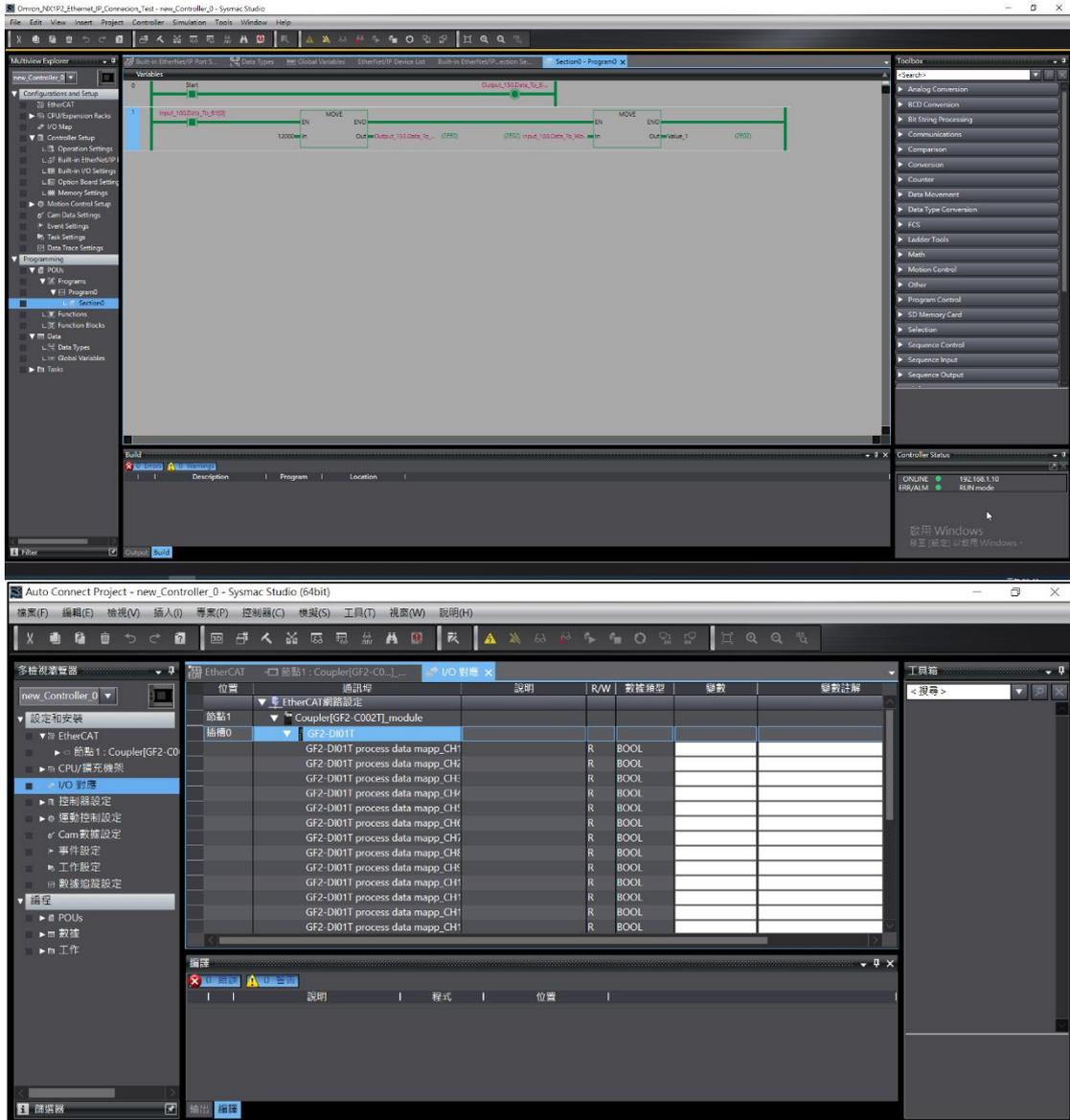
跳出警告視窗提醒你是否開啟 RUN Mode，請按下 Yes :



設定完後跳出完成視窗，請按下 OK：



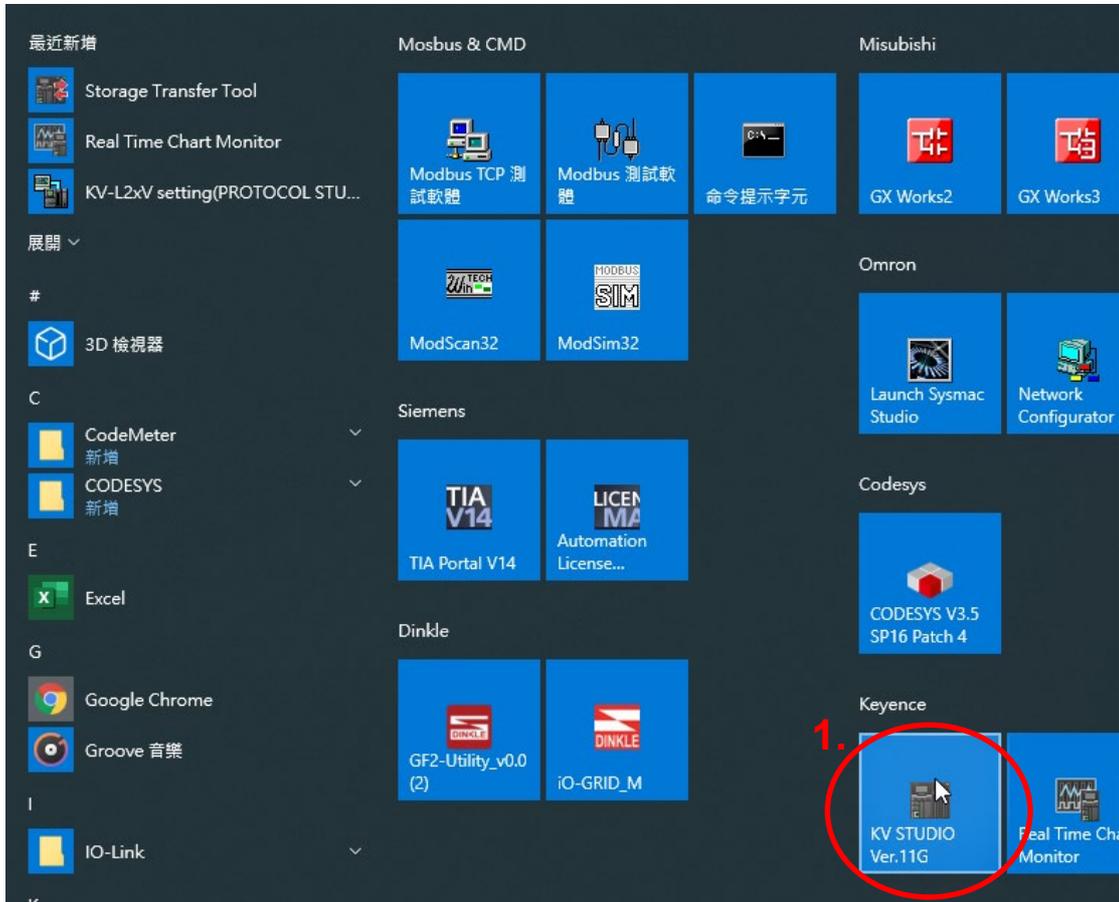
請使用線上監視模式來進行測試：



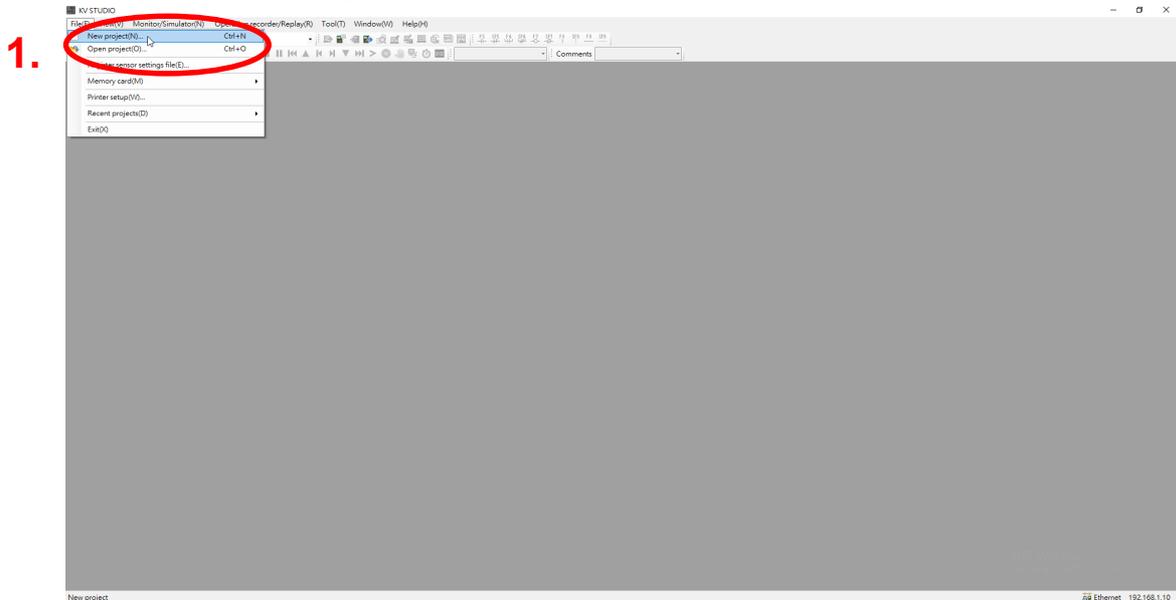
### 3.3 iO-GRID 基於 KV Studio 軟體使用入門指導

#### I. 啟動 KV Studio 並設定 Ethernet/IP 接口：

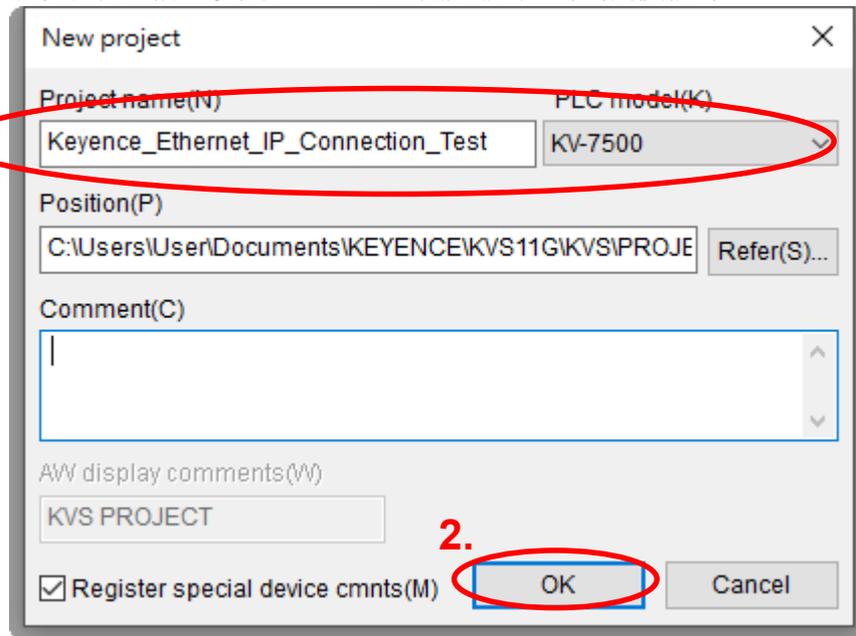
滑鼠左鍵開啟 KV Studio：



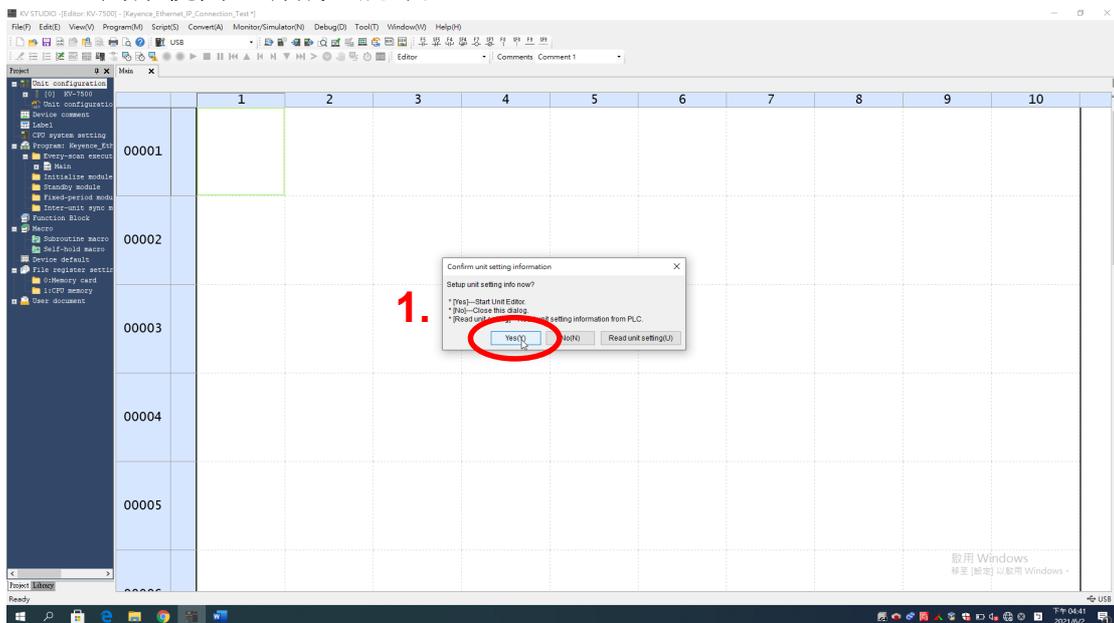
滑鼠左鍵點選 File → New Project。



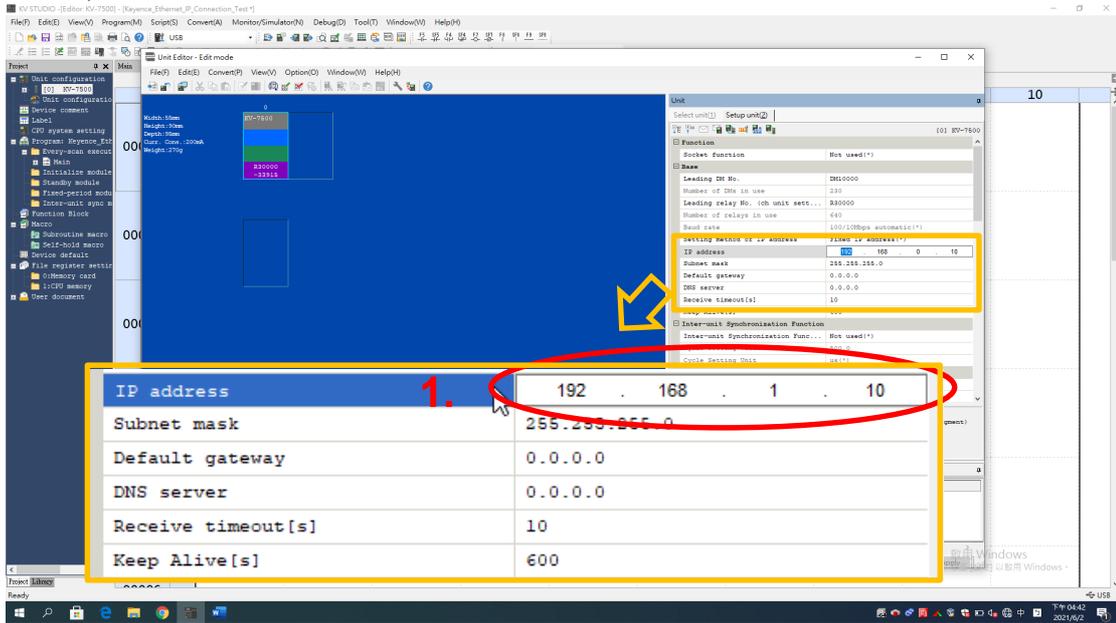
建立新的專案並填寫專案名稱、資訊、PLC 型號及版本，完成後按下 OK：



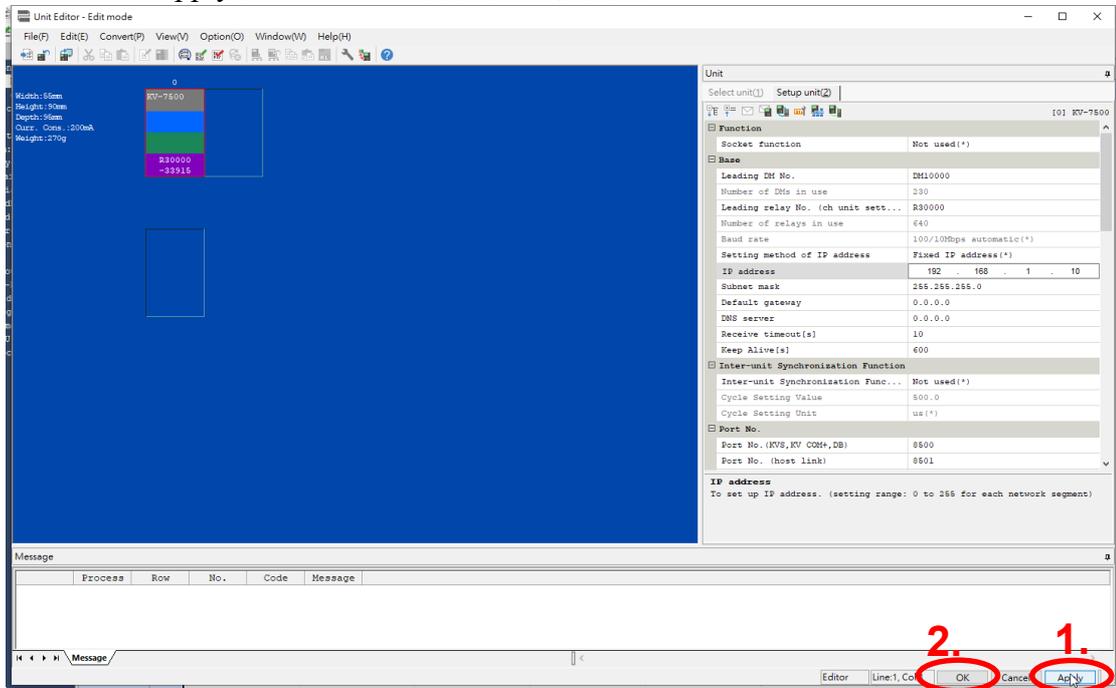
彈出 Unit Editor 對話視窗，滑鼠左鍵點選 YES：



在 IP Address 的欄位中輸入 PLC 的 IP 位址( 192.168.1.10 )，在 Mask 的欄位中輸入 Class C ( 255.255.255.0 )：

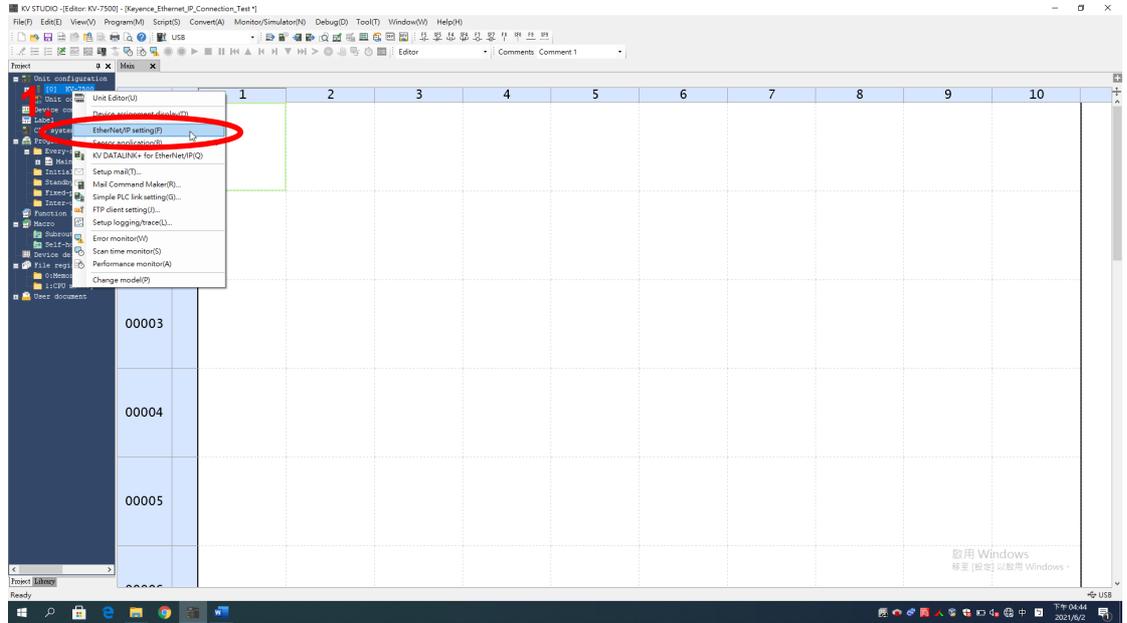


完成後滑鼠左鍵點選 Apply 再點選 OK，離開對話視窗：

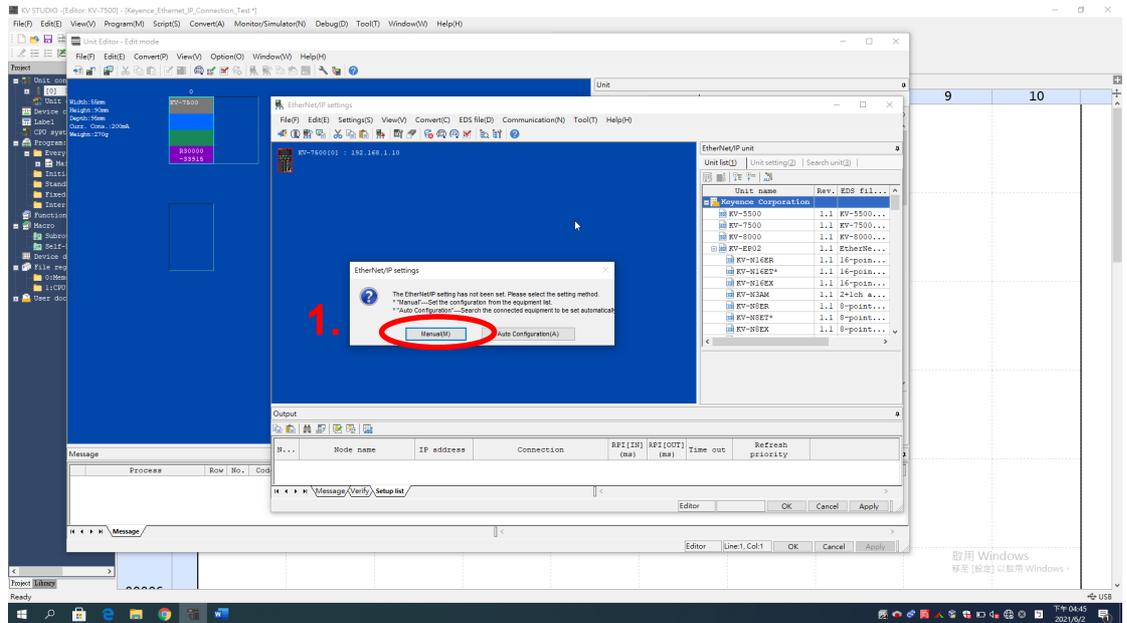


## II. Ethernet/IP 連線設定( Slave )並註冊 EDS 檔：

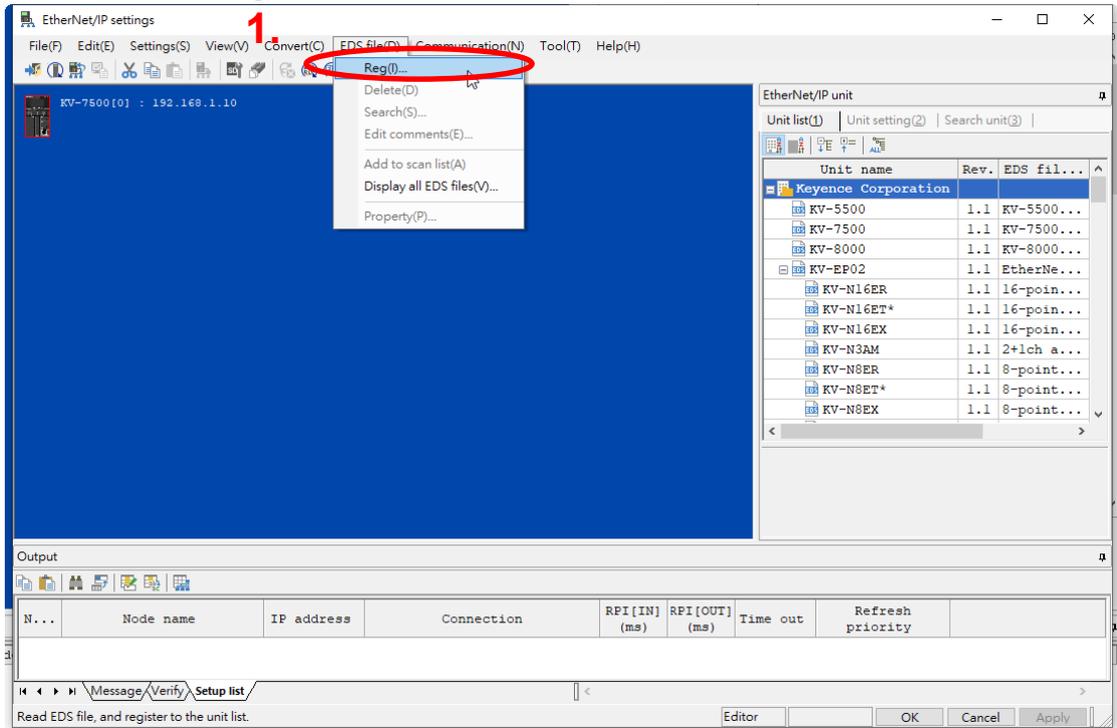
對 “[0] KV7500” 用滑鼠右鍵叫出選單，滑鼠左鍵點選 Ethernet/IP Setting，開啟編輯畫面：



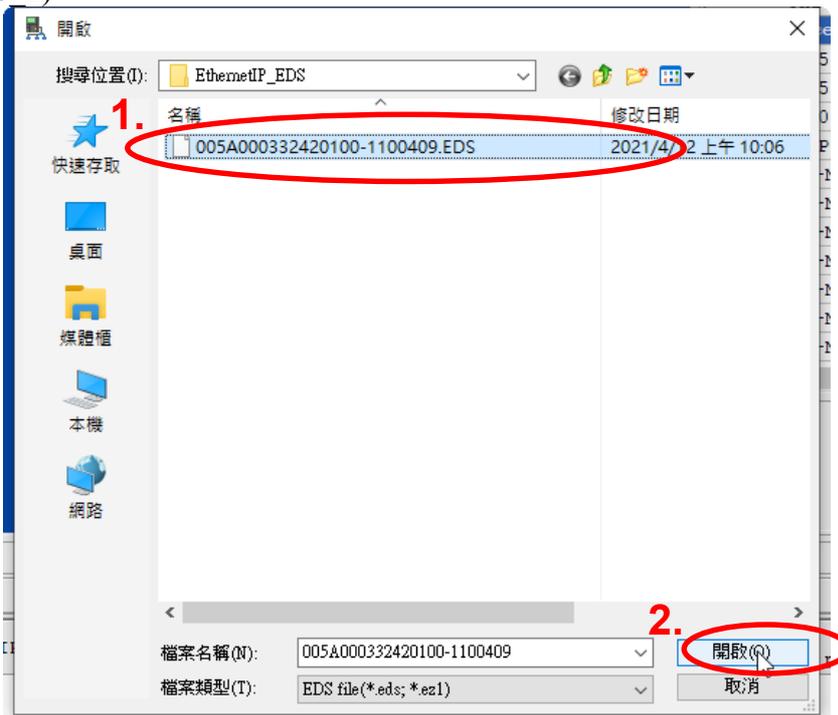
彈跳出對話視窗用滑鼠左鍵選擇 Manual：



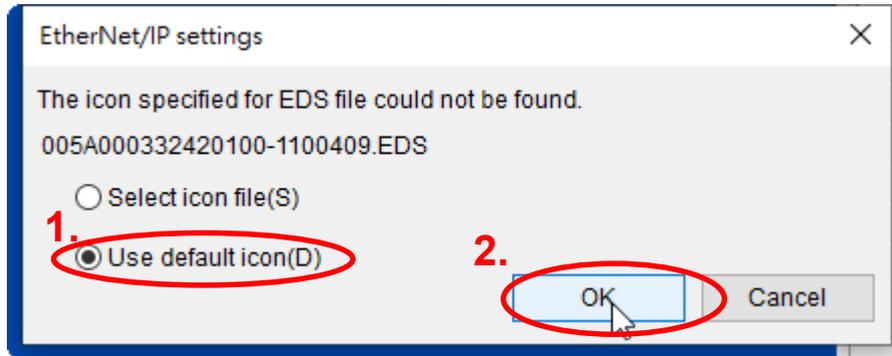
用滑鼠左鍵點擊 EDS File → Reg，來開啟註冊視窗：



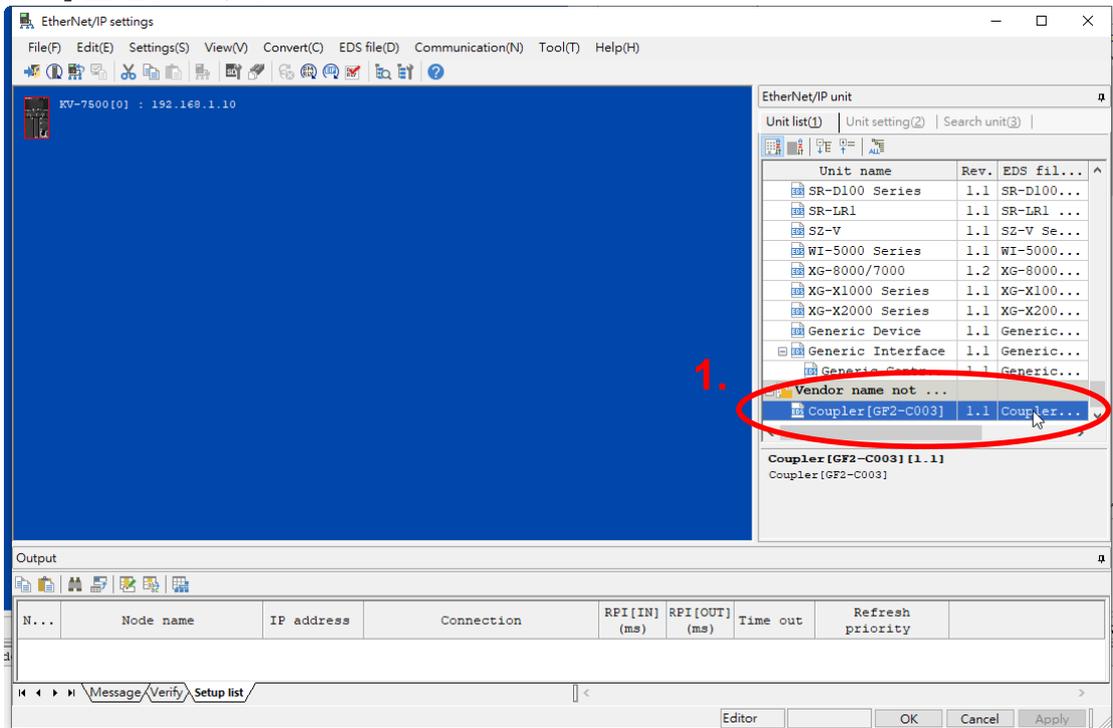
將我們提供的 EDS 檔案( 附檔名為 .eds )放入路徑內，滑鼠左鍵按下”開啟”：(目前版本為: GF2-C003T\_20220816\_1)



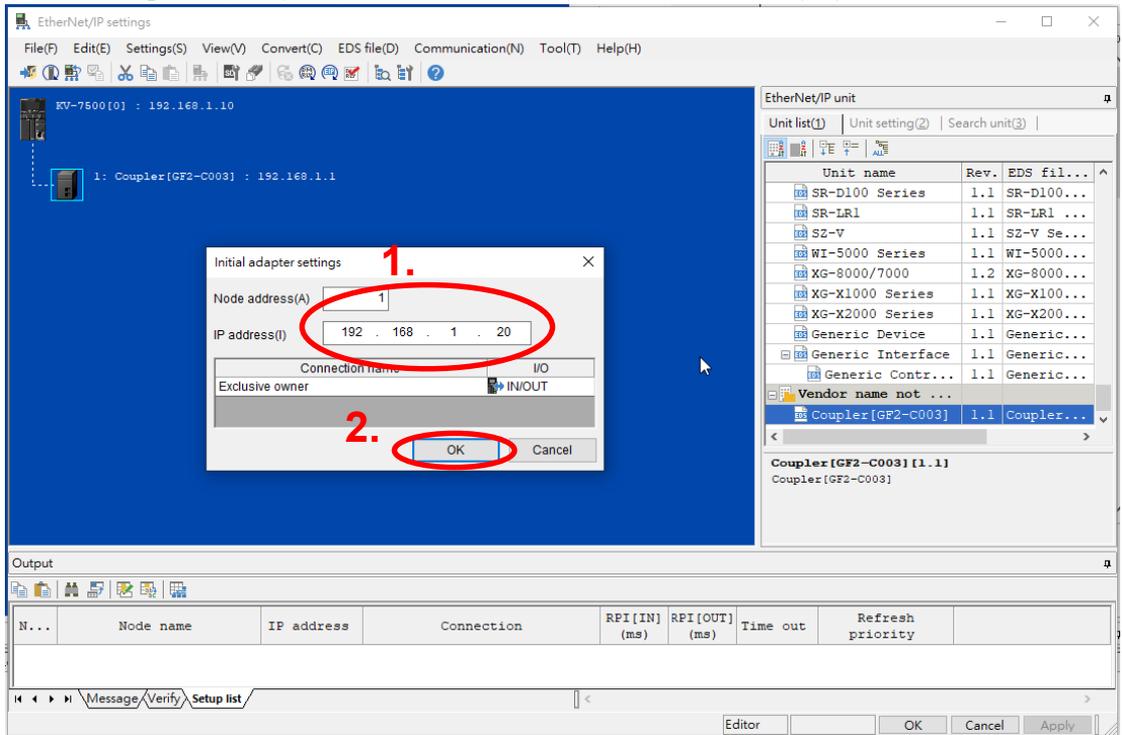
彈跳出對話視窗選擇 Use Default Icon，用滑鼠左鍵點選 OK：



從 EDS Library 選單中會看到新增的 Coupler[ GF2-C003 ]，滑鼠左鍵點擊兩下，新增 Coupler[ GF2-C003 ] 至連接清單中：

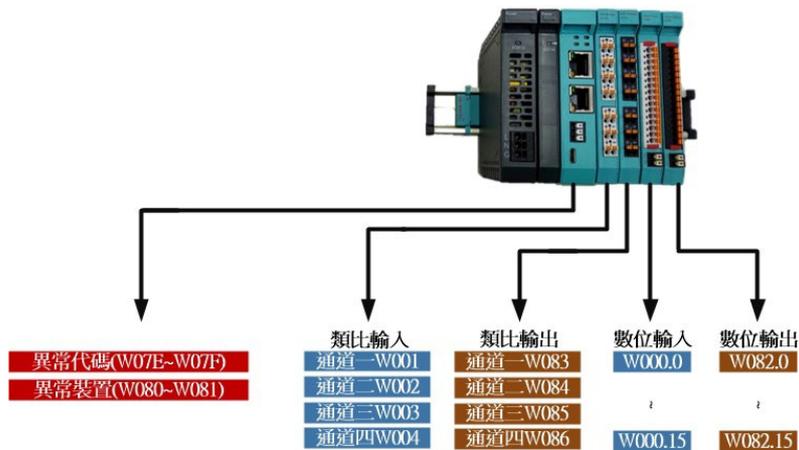


彈跳出對話視窗輸入 Coupler 的 IP( 預設為192.168.1.20 )、Node Address( 1 )，滑鼠左鍵點選 OK :

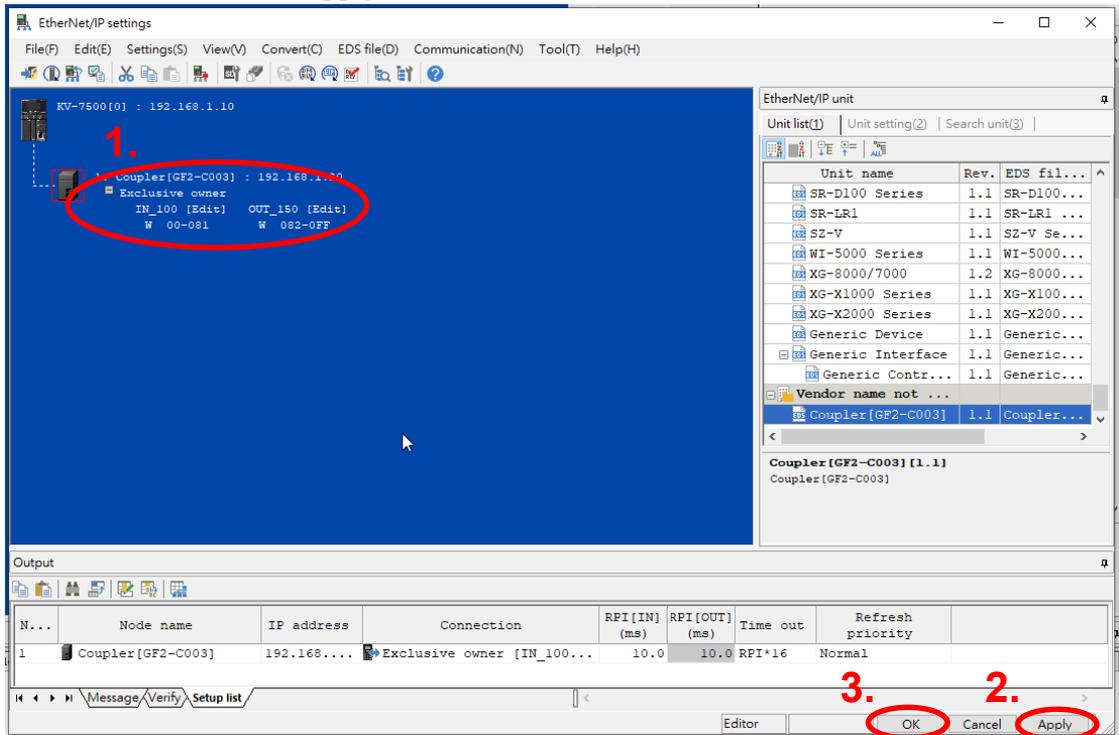


### III. 確認 IO 位址並建立簡單的測試程式：

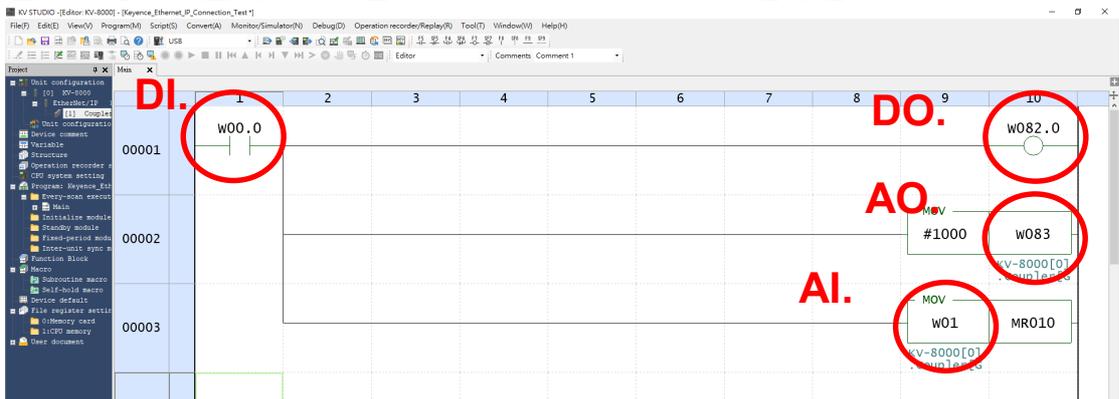
關於 **IO-GRID** Coupler 暫存器位址說明：



確認設備位址無誤後，滑鼠左鍵點選 Apply 再點選 OK，離開對話視窗：



輸入下圖的測試程式，此測試程式用來驗證 Remote I/O 有沒有正確的進行連線：



DO : 用 DI 進行條件觸發。

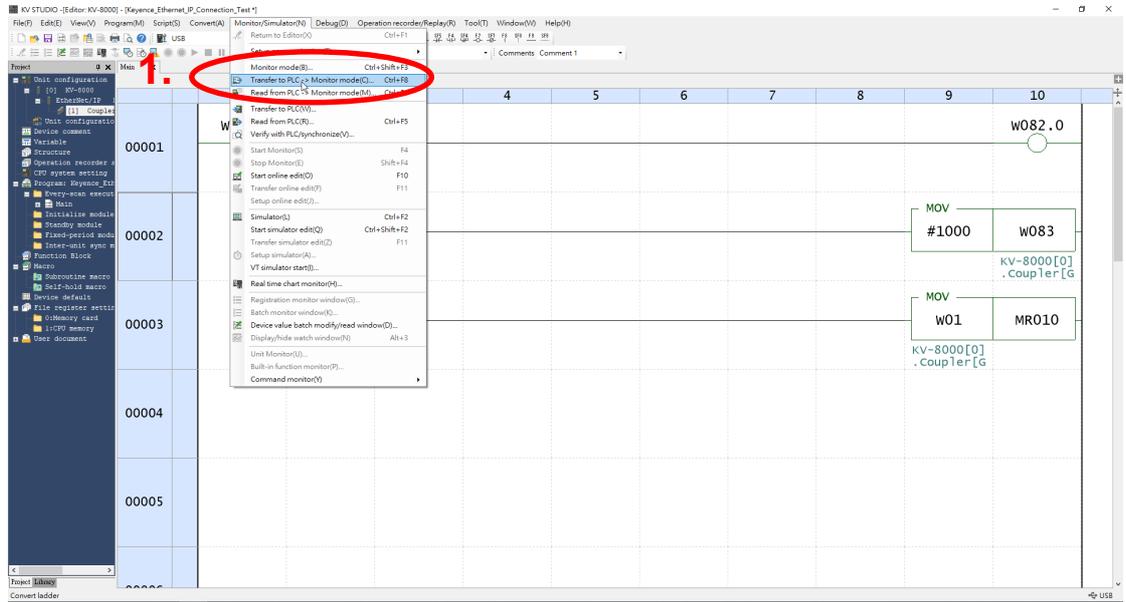
DI : 將 DI 放在 a 接點的位置上，當硬線有訊號回傳時，可以觸發後面的 MOVE 指令與 DO。

AO : 用 MOVE 指令將 1000 的數值搬移至 AO 中。

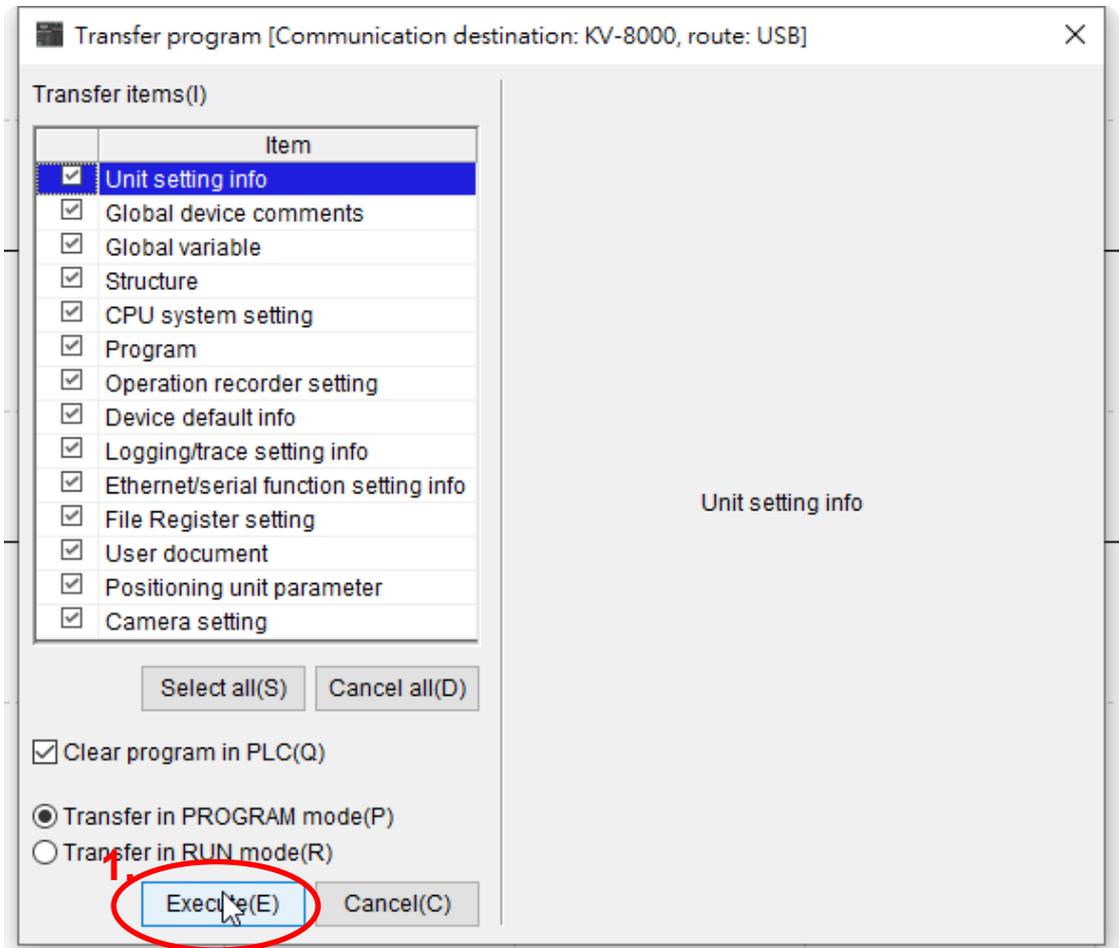
AI : 用 MOVE 指令將 AI 的數值搬移至 MR010 暫存位置中，AI 數值可由訊號產生器或 AO 來提供。

#### IV. 程式下載至 PLC 並進行線上測試：

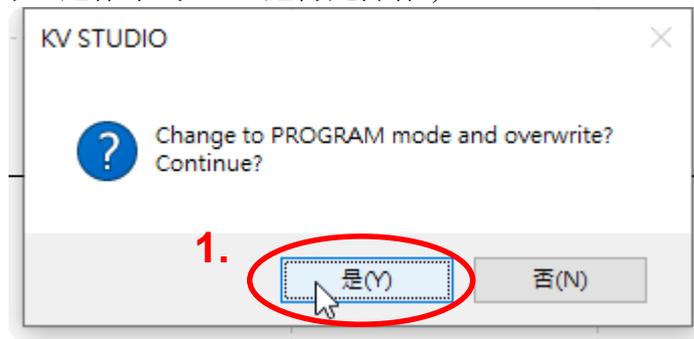
滑鼠左鍵點選 Monitor/Simulator → ( Transfer To PLC → Monitor Mode) ，將程式下載至 PLC ：



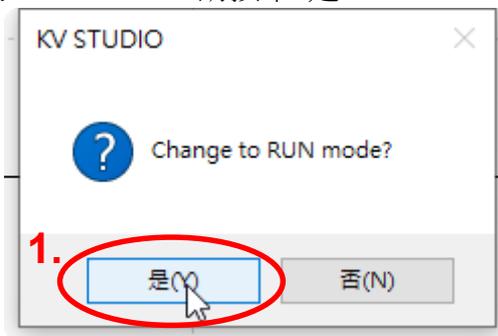
滑鼠左鍵點選 Execute :



跳出警告視窗提醒你傳輸過程會導致 PLC 進入 Program Mode，請按下“是”(PS：此時 PLC 會中斷程式運行，請勿在線上運作中的 PLC 進行此操作)：



跳出警告視窗提醒你是否開啟 RUN Mode，請按下“是”：



請使用線上監視模式來進行測試：

