




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

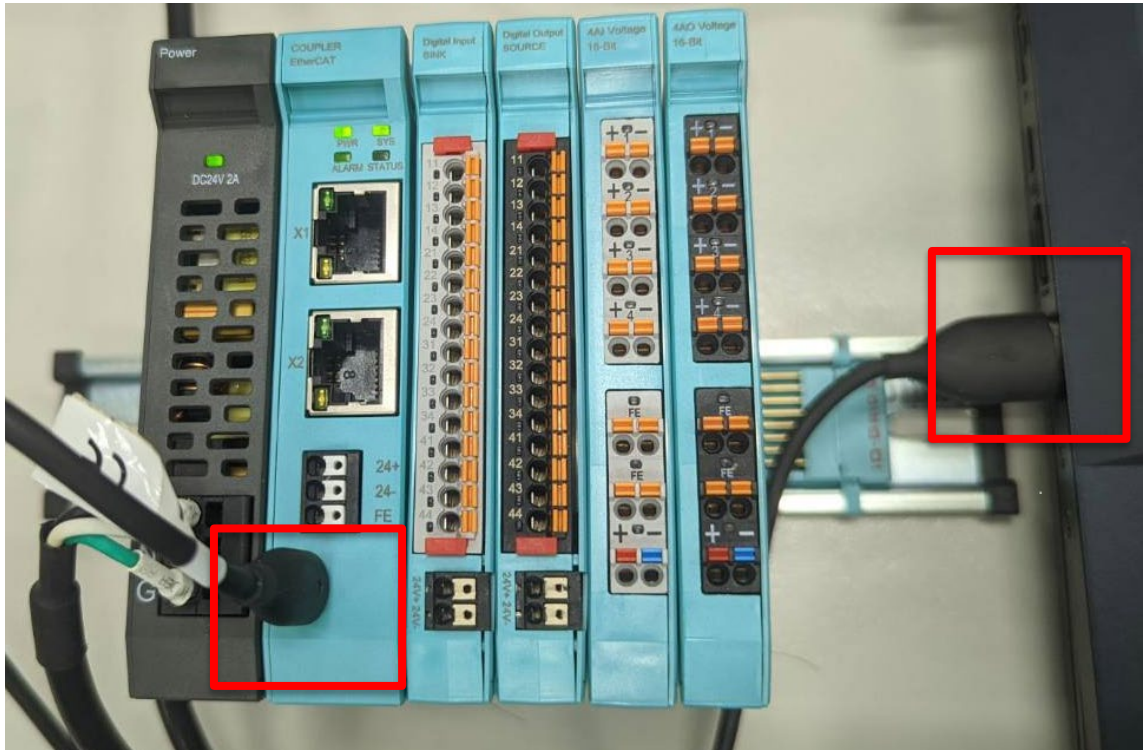
透過Micro USB與耦合器模組接線方式
將Micro USB接頭與耦合器模組上的Micro USB接口相連。
確認總線板上處於通電狀態，打開i-Designer設定軟體
設定耦合器模組相關參數。

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

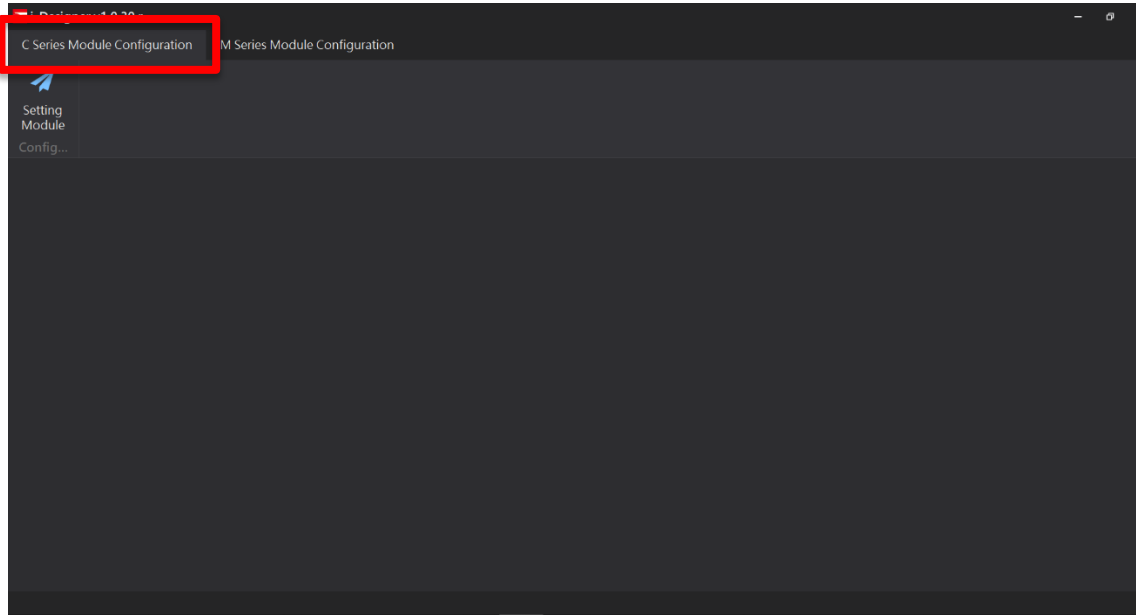
I. 確認模組上電以及連接上 USB 接口



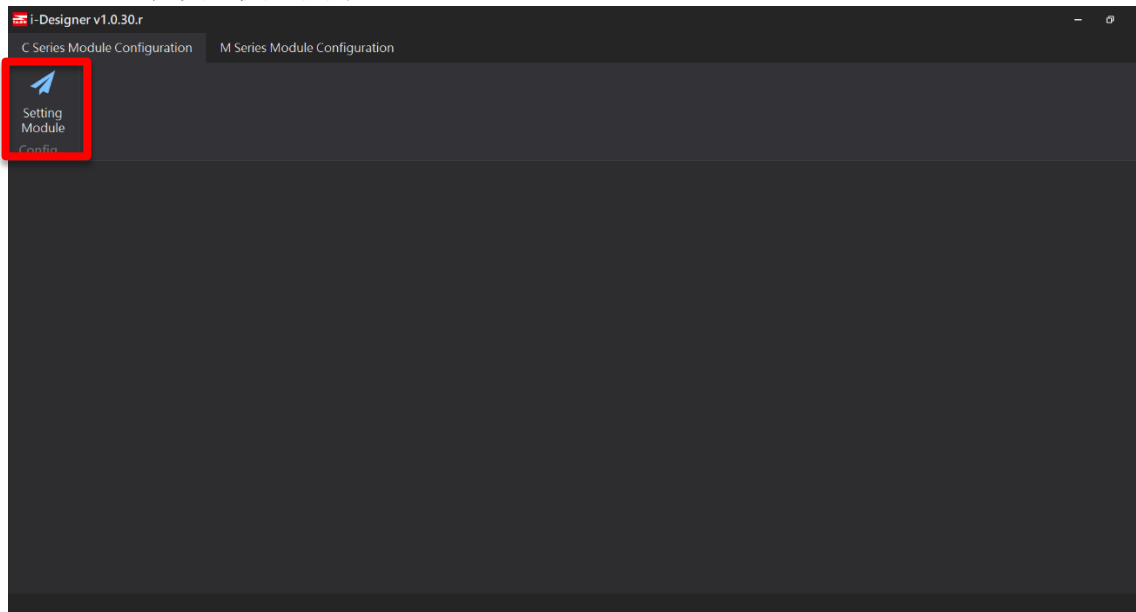
II. 點擊並開啟軟體



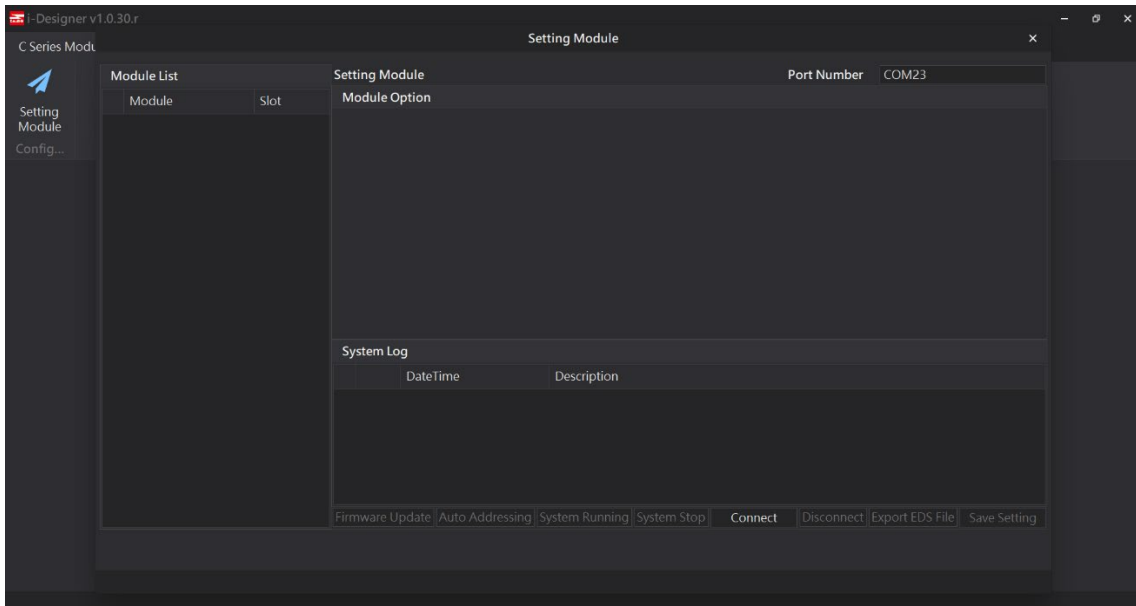
III. 選擇 C 系列頁籤



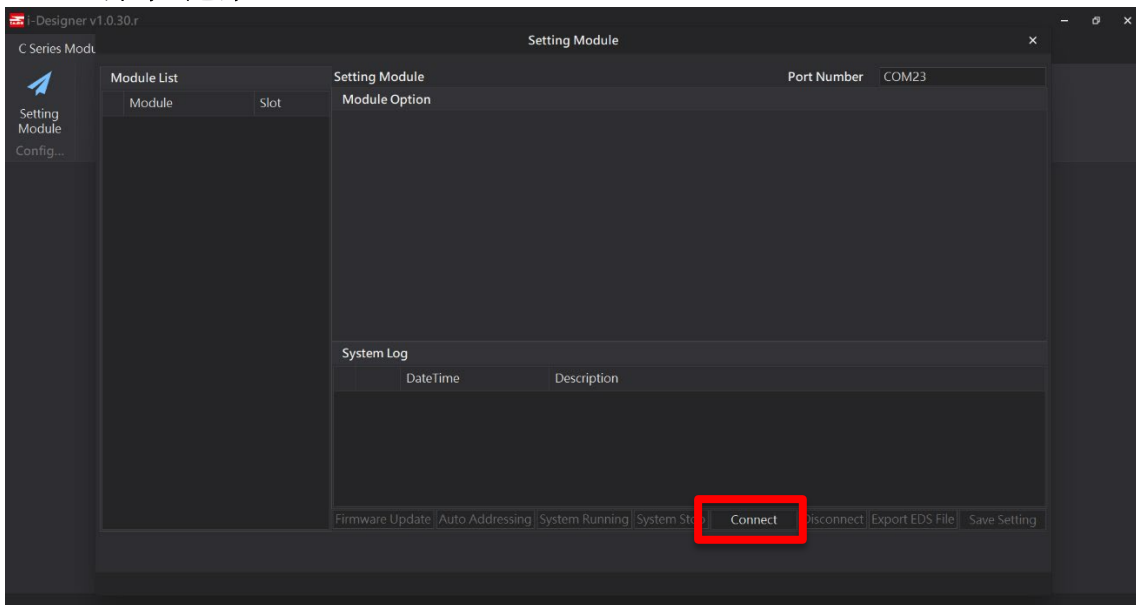
IV. 點擊設定模組圖示



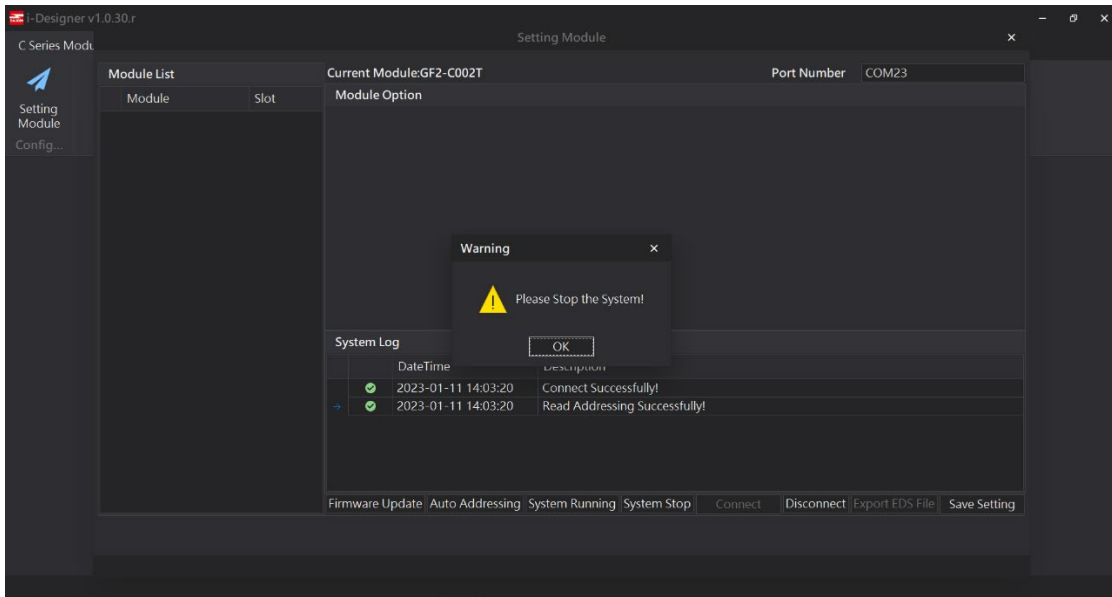
V. 進入 C 系列設定頁面



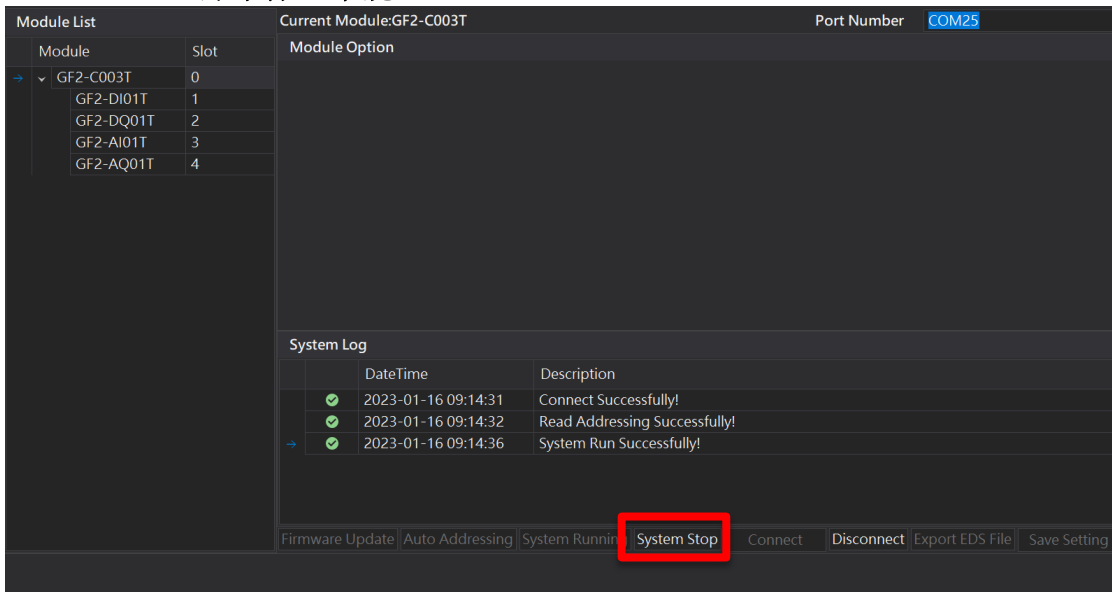
VI. 點擊“連線”



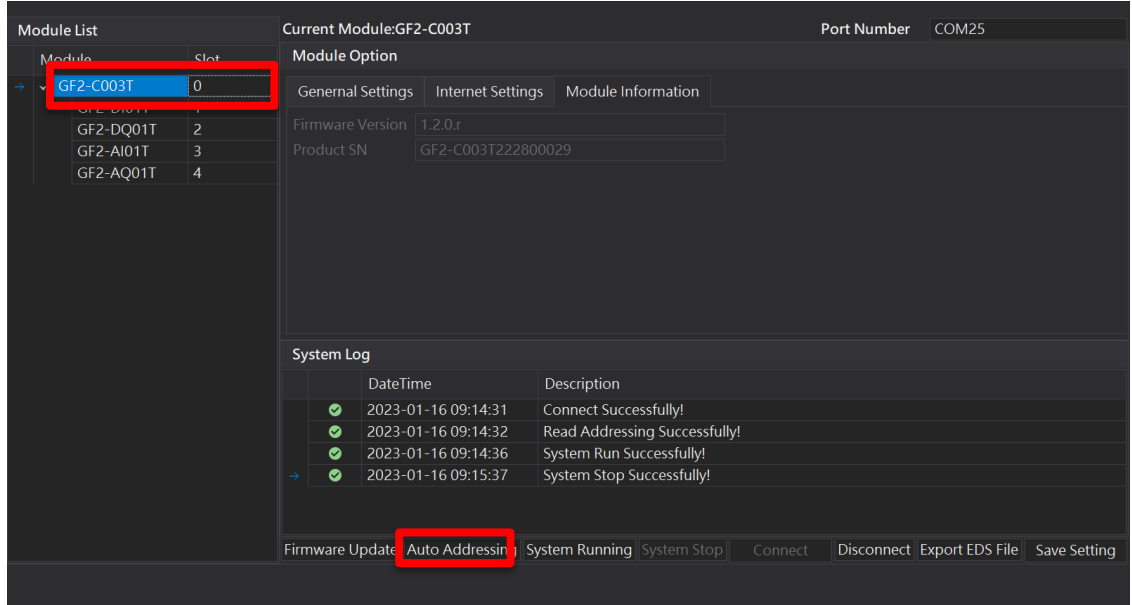
VII. 顯示連線後先停止系統通知



VIII. 點擊停止系統



IX. 點擊耦合器模組後，選擇自動配站

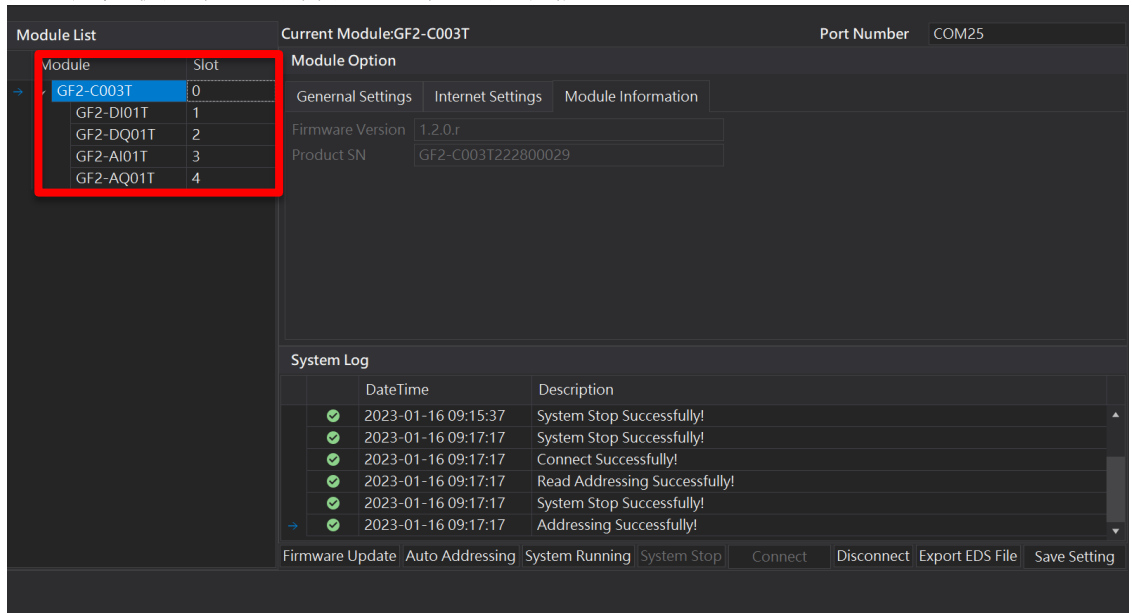


The screenshot shows the software interface for configuring a module. The 'Module List' on the left shows 'GF2-C003T' selected in slot 0. The 'Current Module' is 'GF2-C003T' and the 'Port Number' is 'COM25'. The 'Module Option' section includes 'General Settings', 'Internet Settings', and 'Module Information'. 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-DI01T	1
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' selected in slot 0. The 'Current Module' is 'GF2-C003T' and the 'Port Number' is 'COM25'. The 'Module Option' section includes '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' table shows the following data:

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

The 'Current Module: GF2-C003T' is selected, and the 'Port Number' is set to 'COM25'. The 'Module Option' section is active, showing 'General Settings' with 'Coupler Slot' set to 0 and 'TimeLock' set to 0 ms. The 'System Log' table at the bottom shows several successful events:

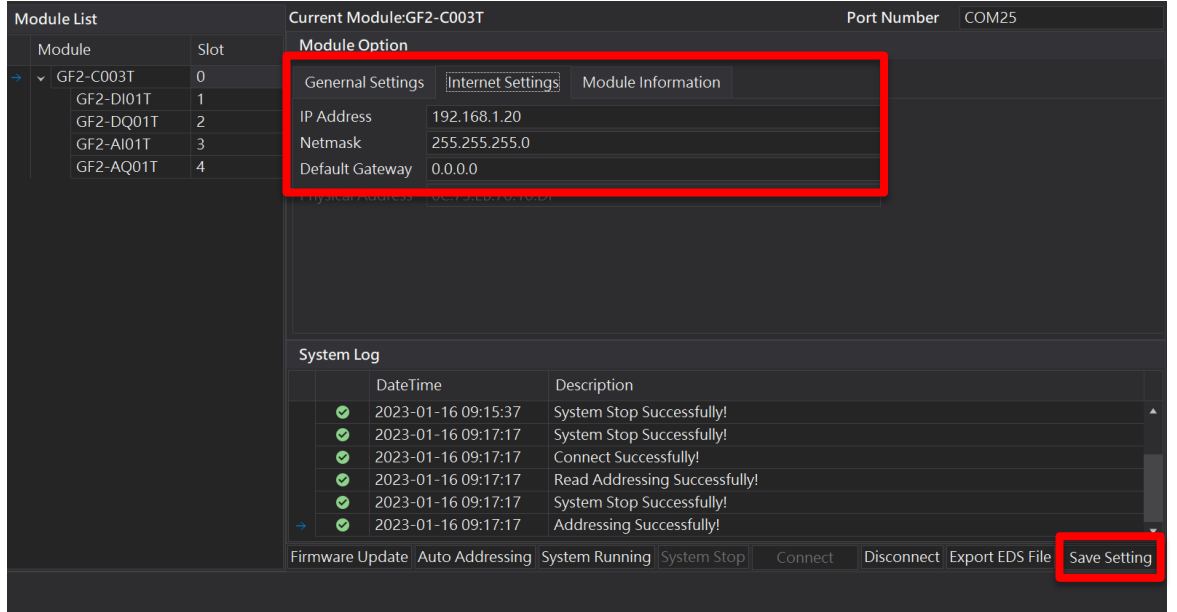
DateTime	Description
2023-01-16 09:15:37	System Stop Successfully!
2023-01-16 09:17:17	System Stop Successfully!
2023-01-16 09:17:17	Connect Successfully!
2023-01-16 09:17:17	Read Addressing Successfully!
2023-01-16 09:17:17	System Stop Successfully!
2023-01-16 09:17:17	Addressing Successfully!

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

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 identical to the one above, showing the same software interface. The 'Module List' table, 'Current Module: GF2-C003T', 'Port Number: COM25', and 'Module Option' settings (Coupler Slot: 0, TimeLock: 0 ms) are all the same. The 'System Log' table and the 'Save Setting' button are also highlighted.

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, the 'Module List' shows the selected module 'GF2-C003T' in slot 0. The main area is titled 'Current Module:GF2-C003T' and 'Port Number COM25'. Under 'Module Option', the 'Internet Settings' tab is active, showing the following configuration:

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':

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!

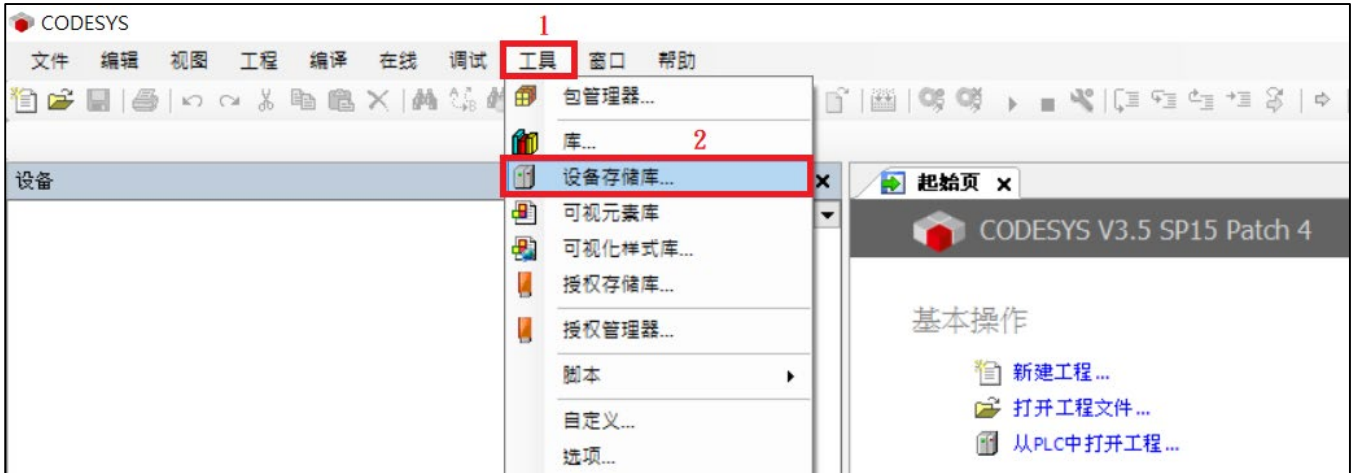
At the bottom, a row of buttons includes 'Firmware Update', 'Auto Addressing', 'System Running', 'System Stop', 'Connect', 'Disconnect', 'Export EDS File', and 'Save Setting'.

3. 各廠牌軟體使用入門指導

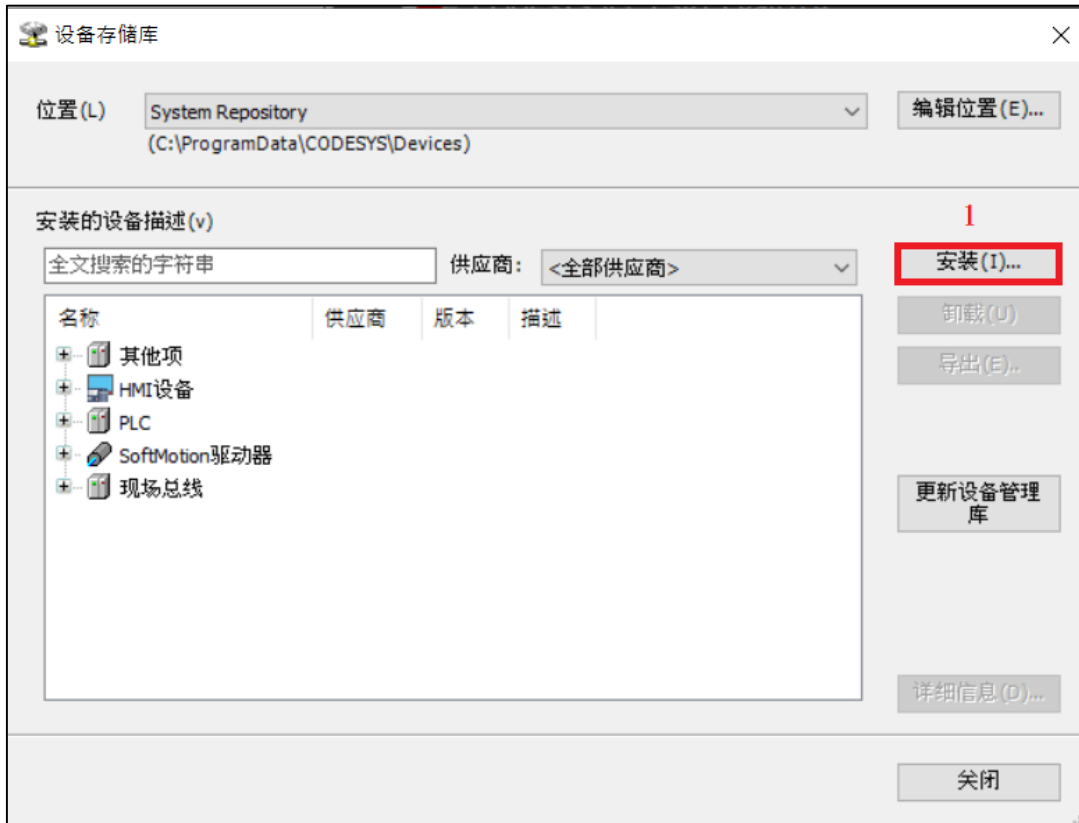
3.1 iO-GRID 基於 Codesys 軟體使用入門指導

I. 安裝EDS

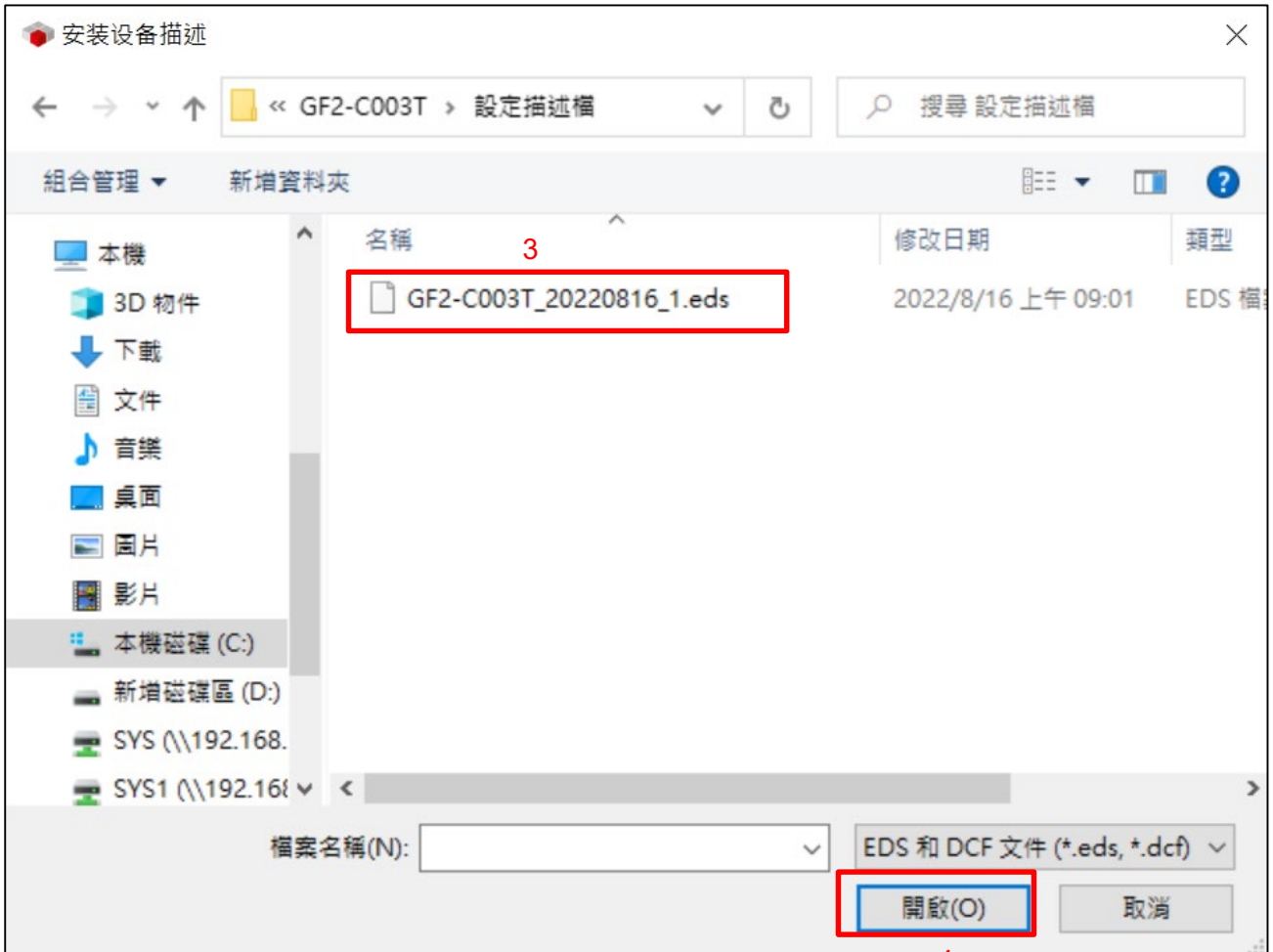
打開Codesys軟體，在工具中選擇設備庫



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

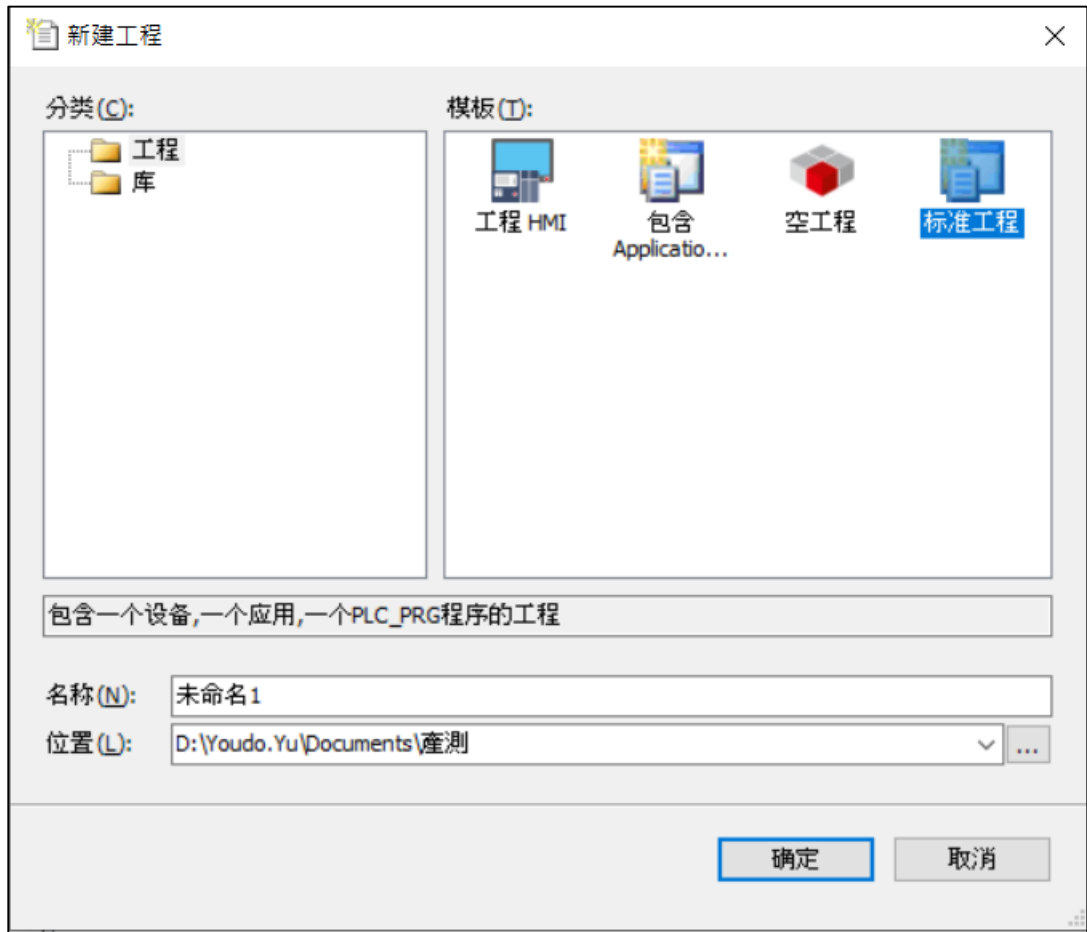


II. 創建新工程

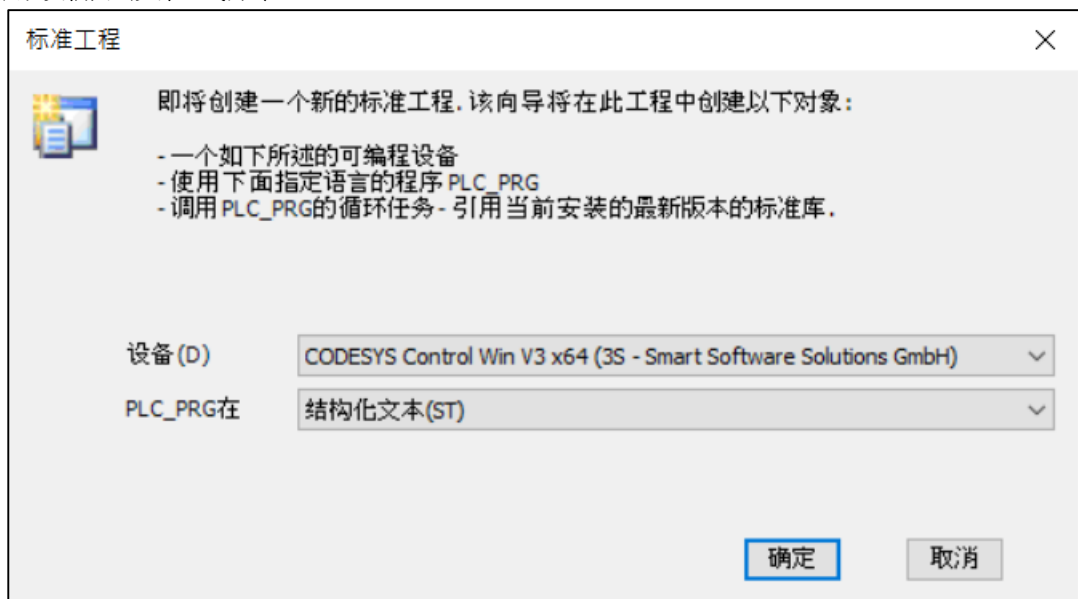
點擊新建工程



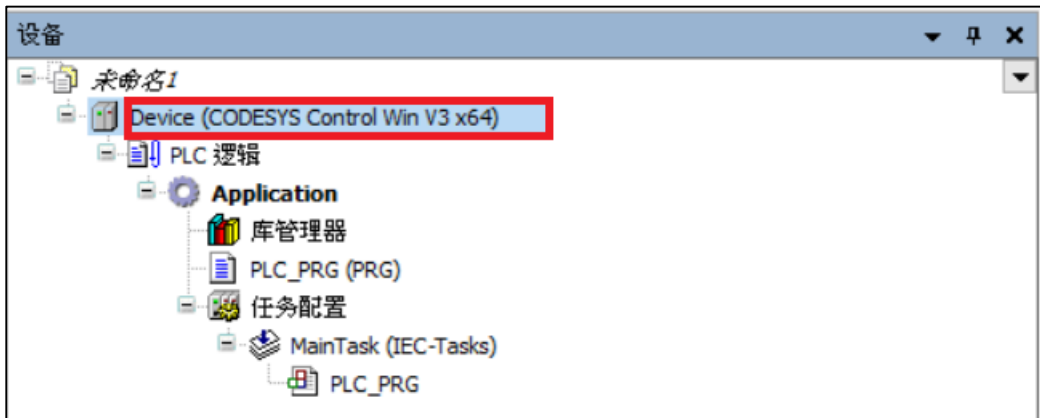
選擇標準工程(standard project)，選擇名稱以及路徑



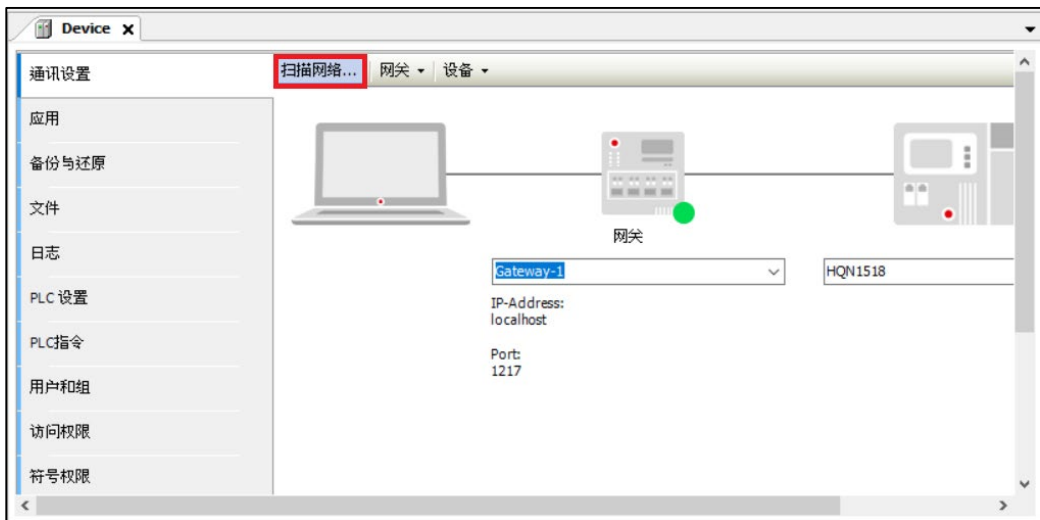
選擇依照客戶使用設備以及程式語言



雙擊Device



選擇”通訊設置→掃描網路”

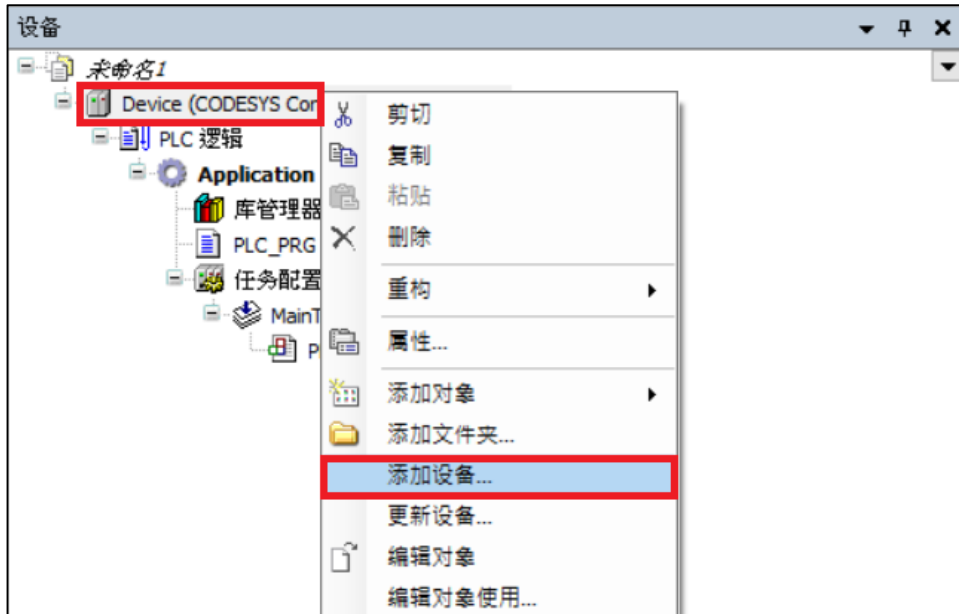


選擇設備後並點擊確定

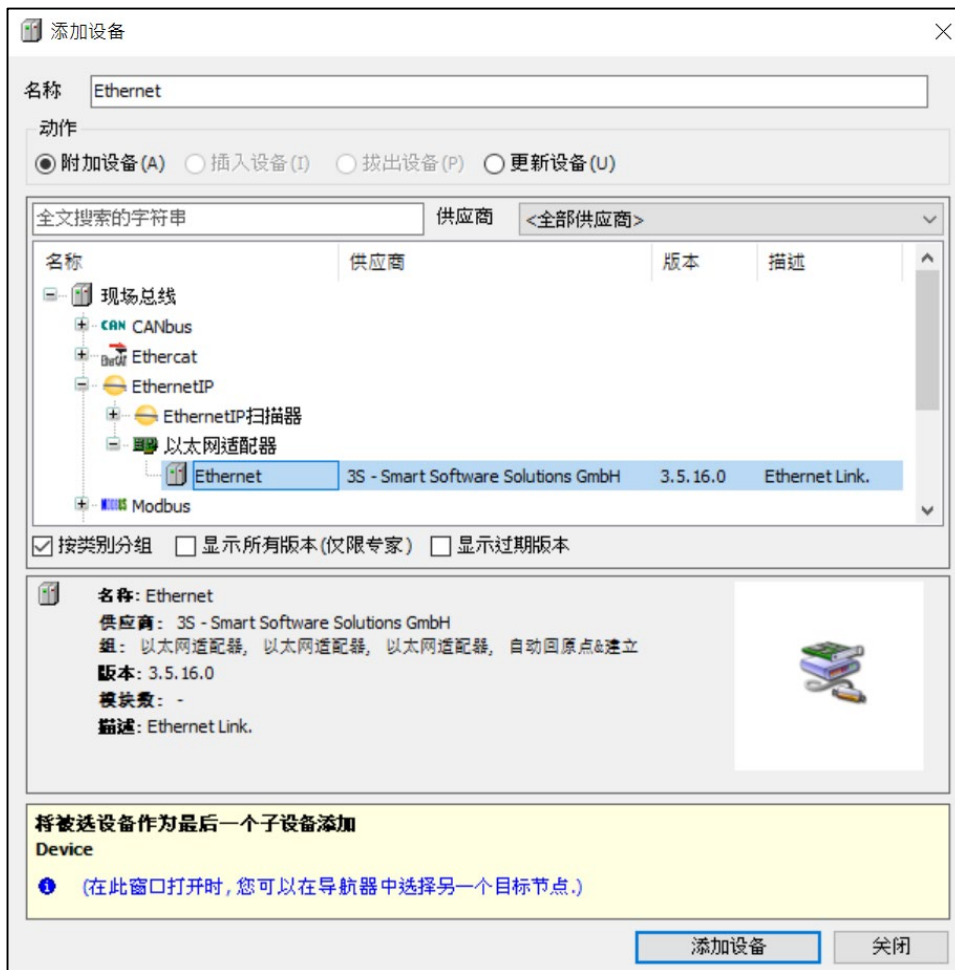


III. 添加EtherNet/IP設備

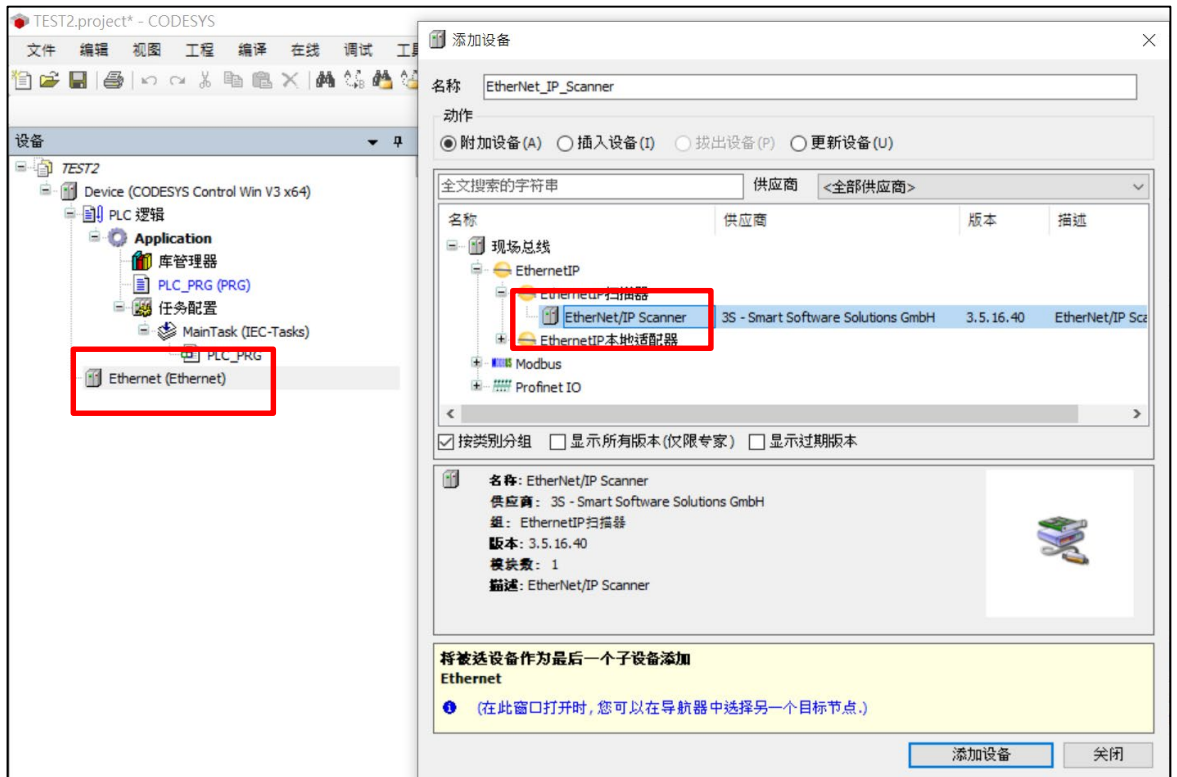
右鍵點擊”Device”並選擇”添加設備”



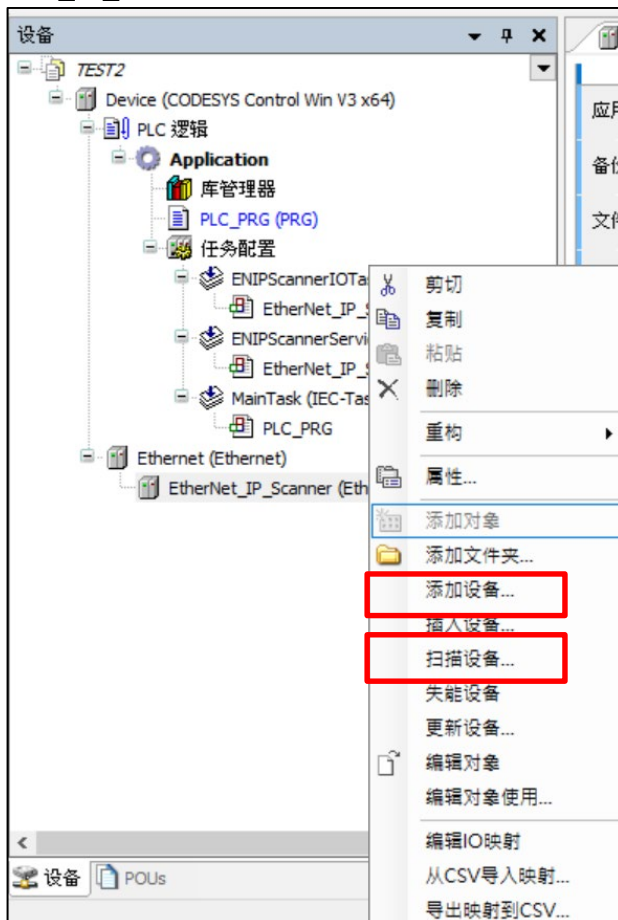
在添加設備選項欄中選擇Ethernnet/IP——乙太網適配器——Ethernet並點擊間加設備



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

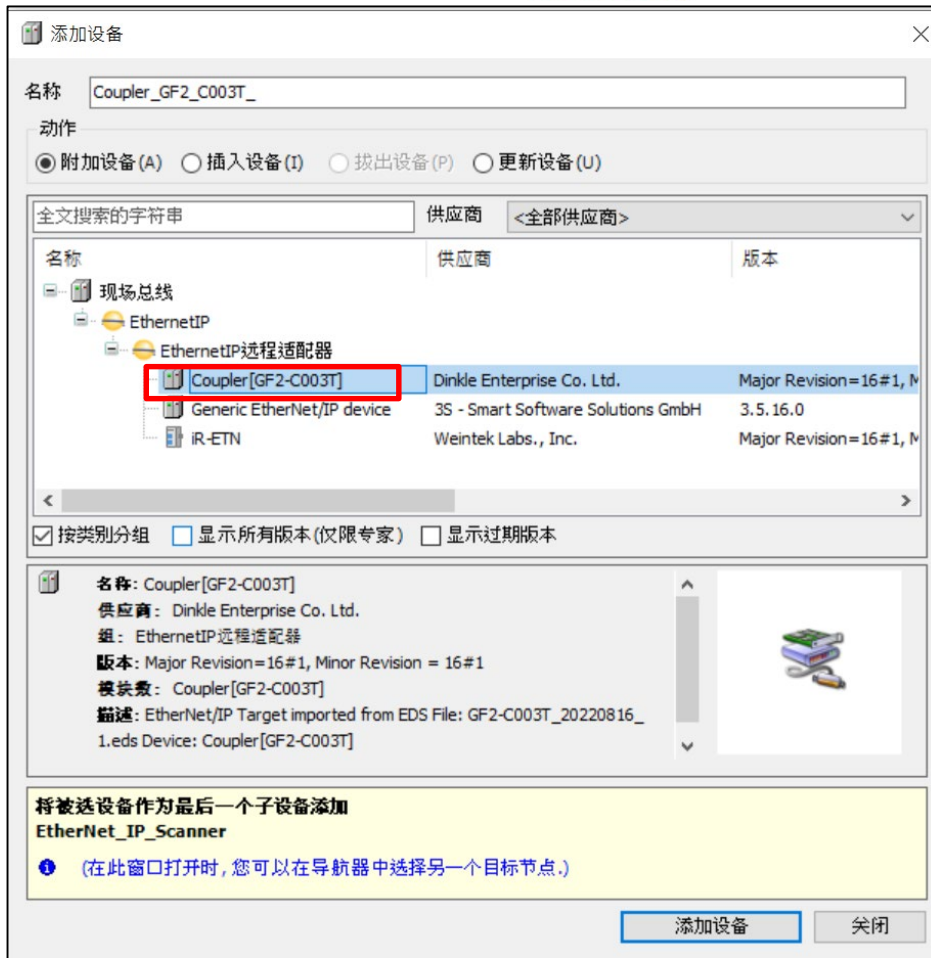


右鍵點擊EtherNet_IP_Scanner，選擇添加設備或掃描設備，以便進行設備組態



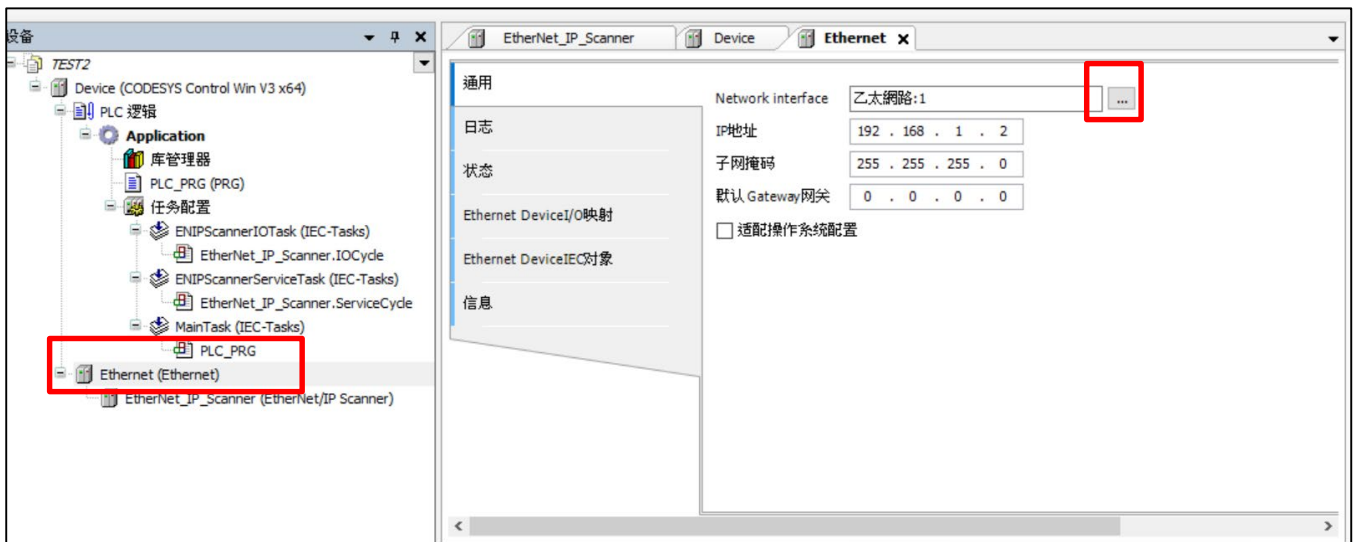
IV. 手動添加模組方式

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

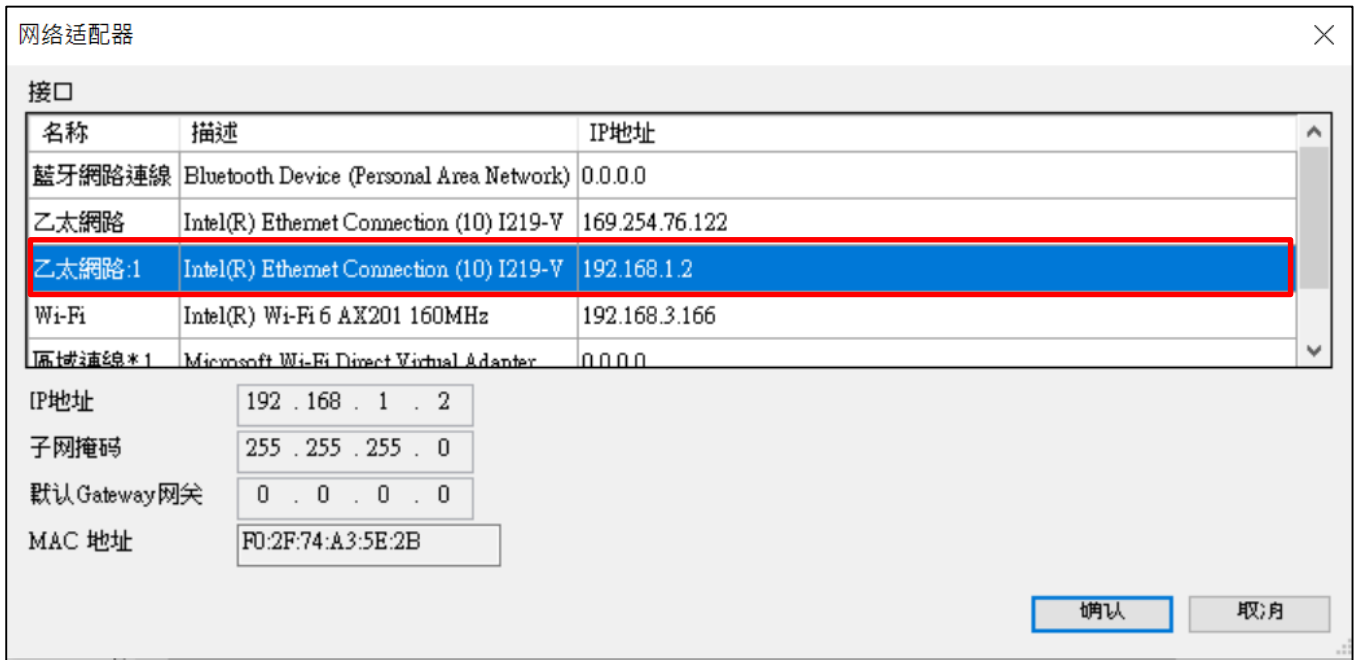


V. 掃描添加模組方式

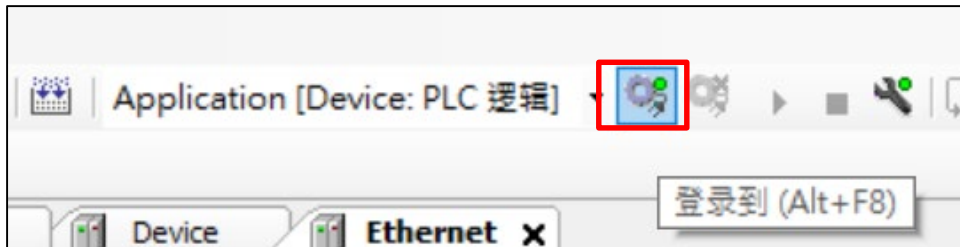
雙擊Ethernet，並在右側點擊”瀏覽”



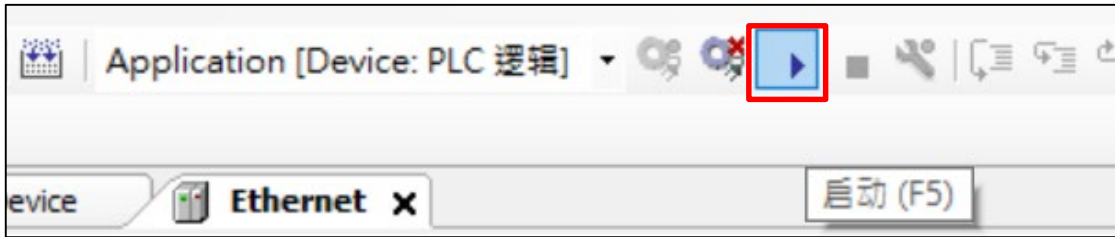
選擇連接的網路適配器



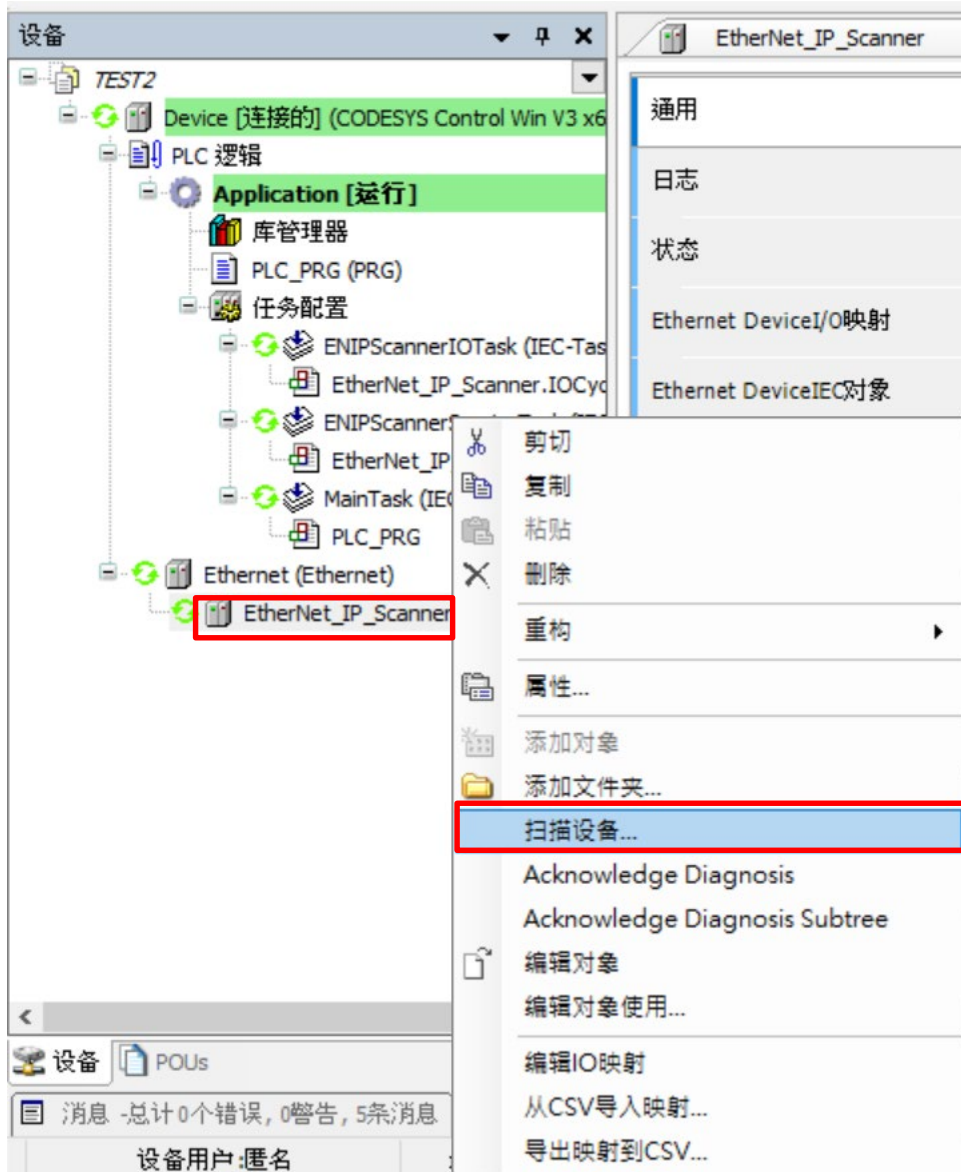
點擊上方工具列”登錄到(Alt+F8)”



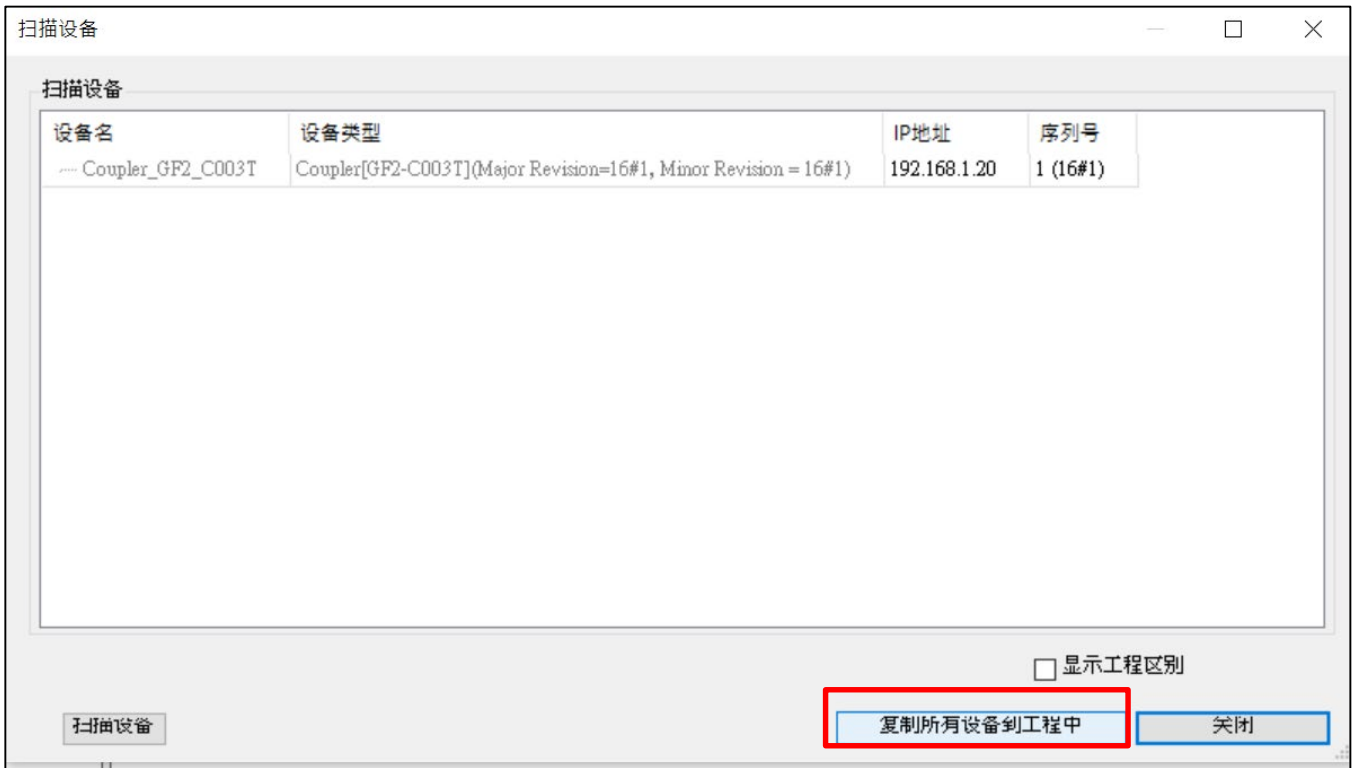
啟動設備



右鍵點擊EtherNet_IP_Scanner，並點擊”掃描設備”

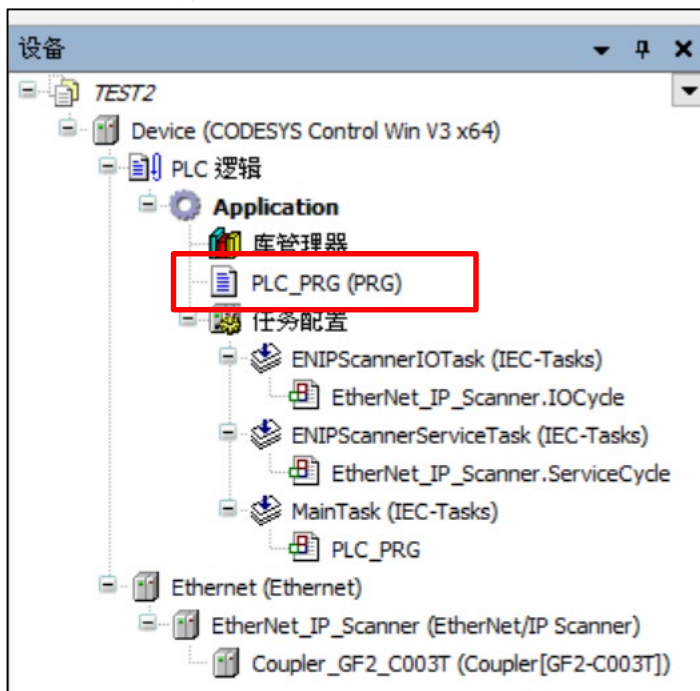


依照掃描設備確認無誤後，點擊”複製所有設備到工程中”



VI. 簡易I/O映射方式

點擊PLC_PRG開啟編輯程序頁面



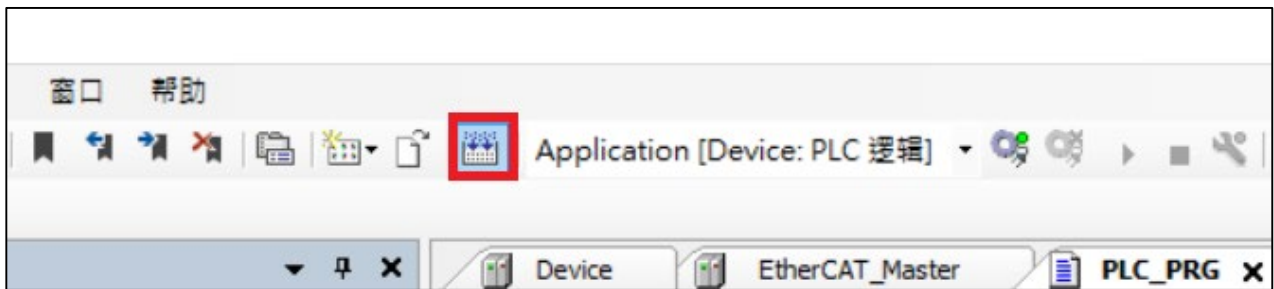
創建變數以及簡易對應程序

```

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		
	Input1	BOOL		
	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)

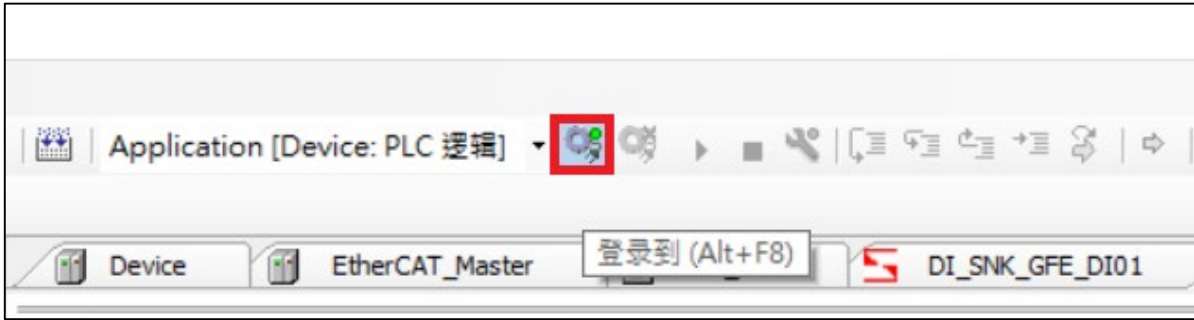
```

Input1: BOOL;
(VAR)

```

确定 取消

對映完成後點擊上方工具列登錄PLC

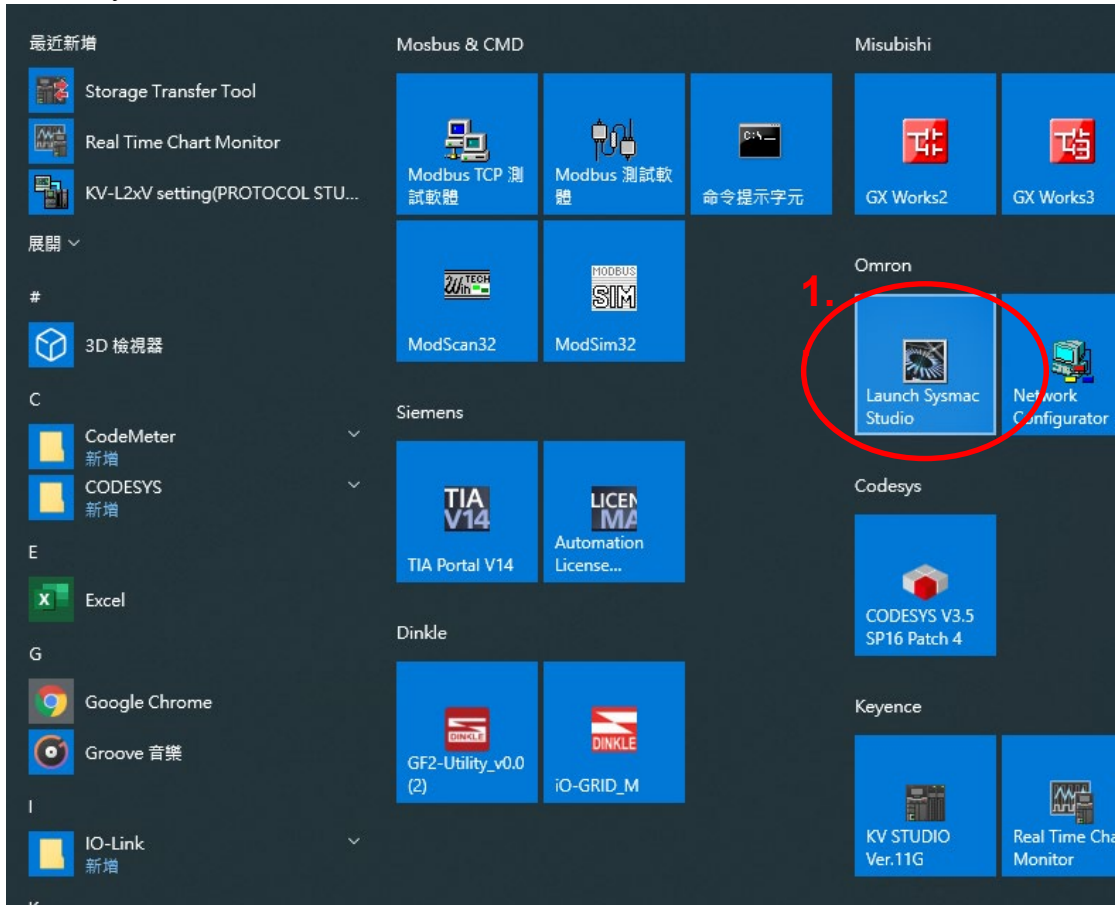


可以於在線模式下查看I/O對映狀態

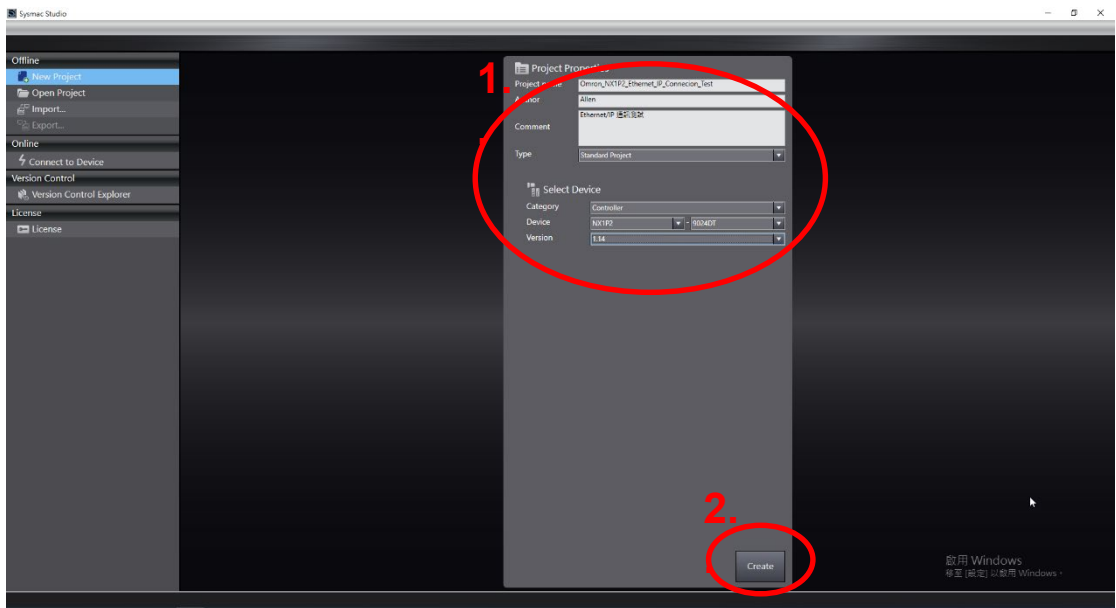
3.2 iO-GRID 基於 Sysmac Studio 軟體使用入門指導

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

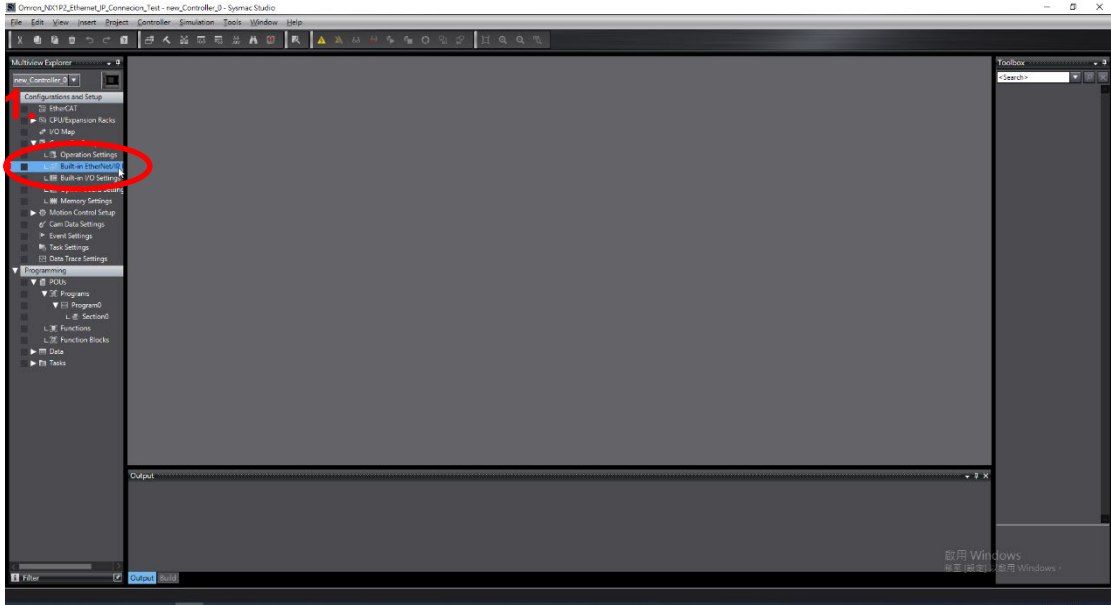
滑鼠左鍵開啟 Sysmac Studio：



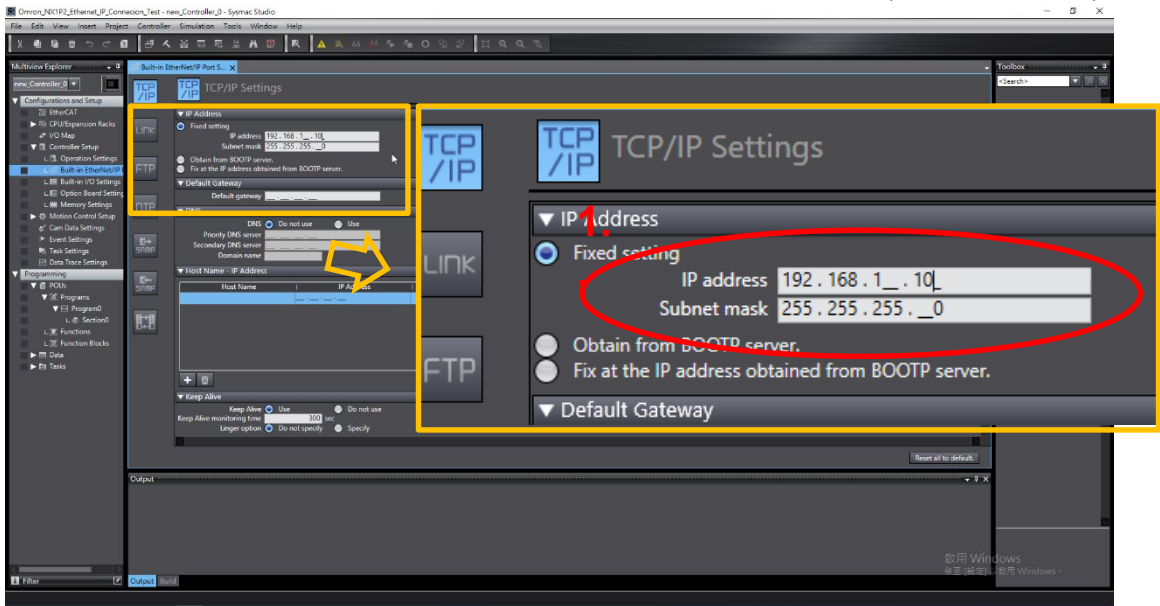
滑鼠左鍵點選 New Project，建立新的專案並填寫專案名稱、資訊、PLC 型號及版本，完成後按下 Create：



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

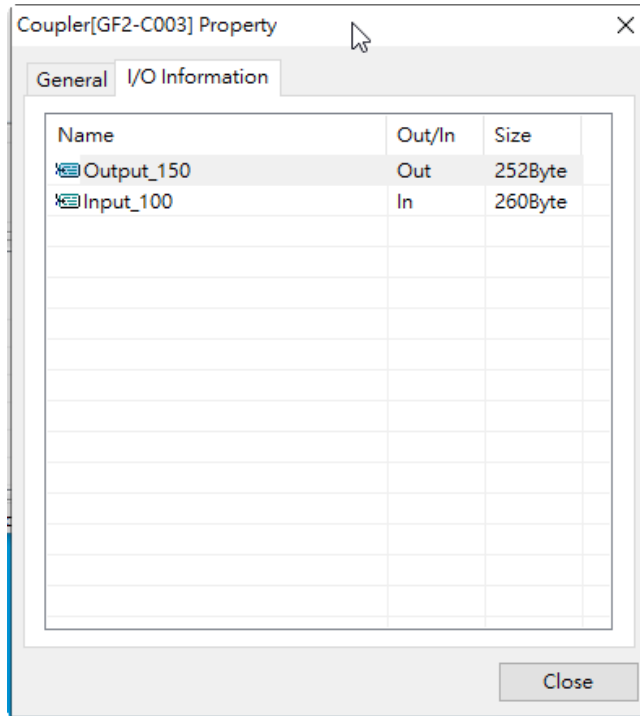


在 IP Address 的欄位中輸入 PLC 的 IP 位址，在 Mask 的欄位中輸入 Class C(255.255.255.0)：

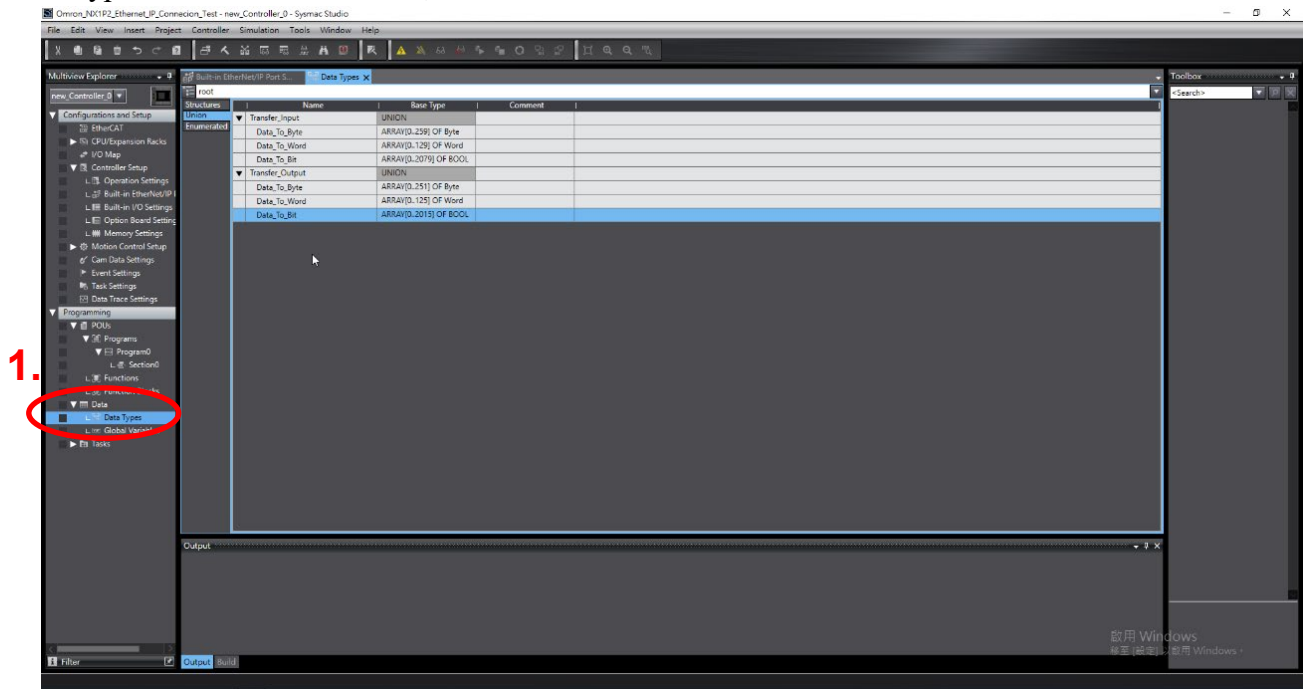


II. 建立 Data Types(自定義資料類型) 及 Global Variables(全域變數) :

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：

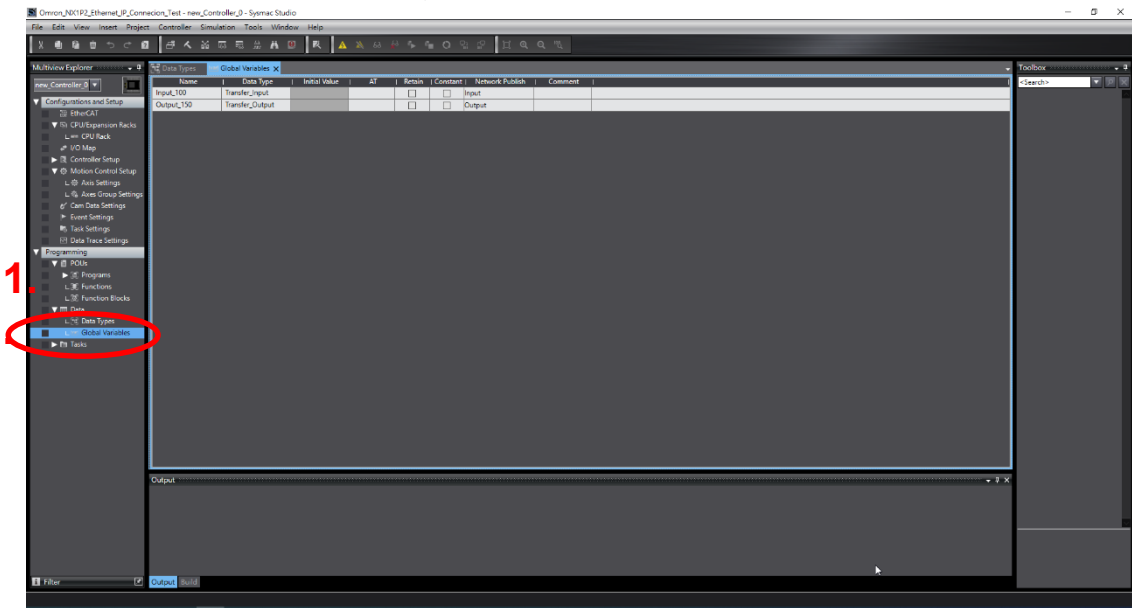


在欄位中建立分別兩個資料類型 Transfer_Input、Transfer_Output :

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：



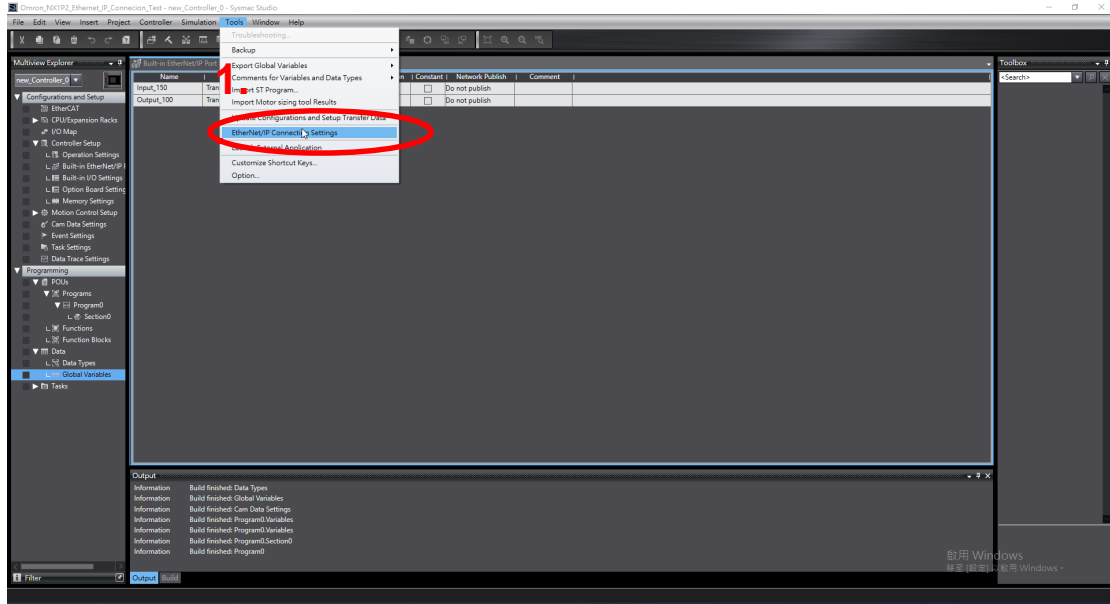
在欄位中建立分別兩個全域變數：

Name	Data Type	Network Publish
Input_100	Transfer_Input	Input
Output_150	Transfer_Output	Output

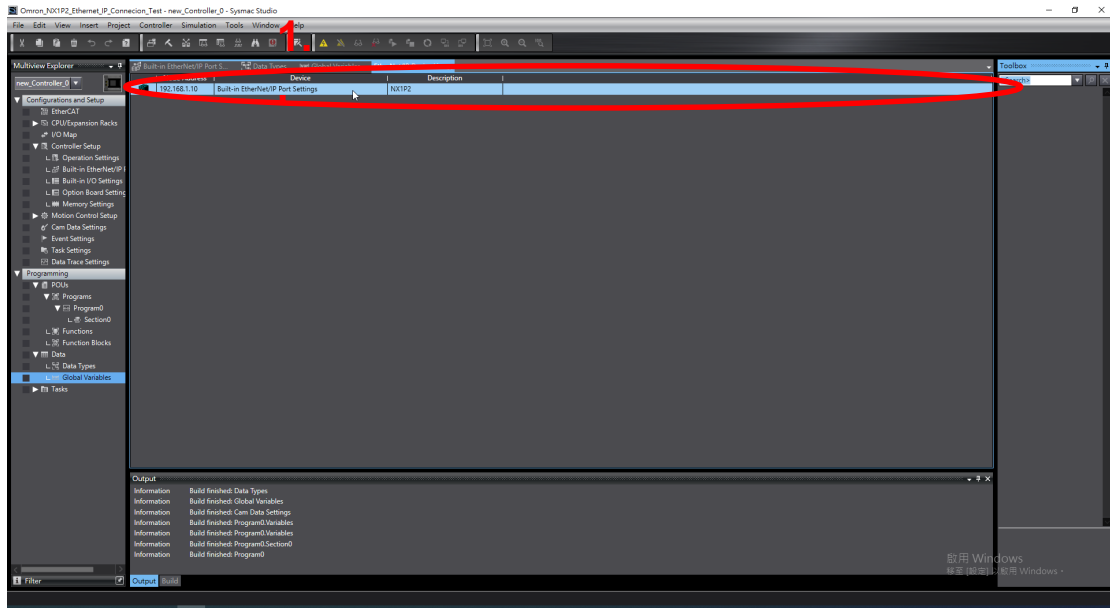
Name	Data Type	Initial Value	AT	Retain	Constant	Network Publish	Comment
Input_100	Transfer_Input			<input type="checkbox"/>	<input type="checkbox"/>	Input	
Output_150	Transfer_Output			<input type="checkbox"/>	<input type="checkbox"/>	Output	

III. Ethernet/IP 連線設定：

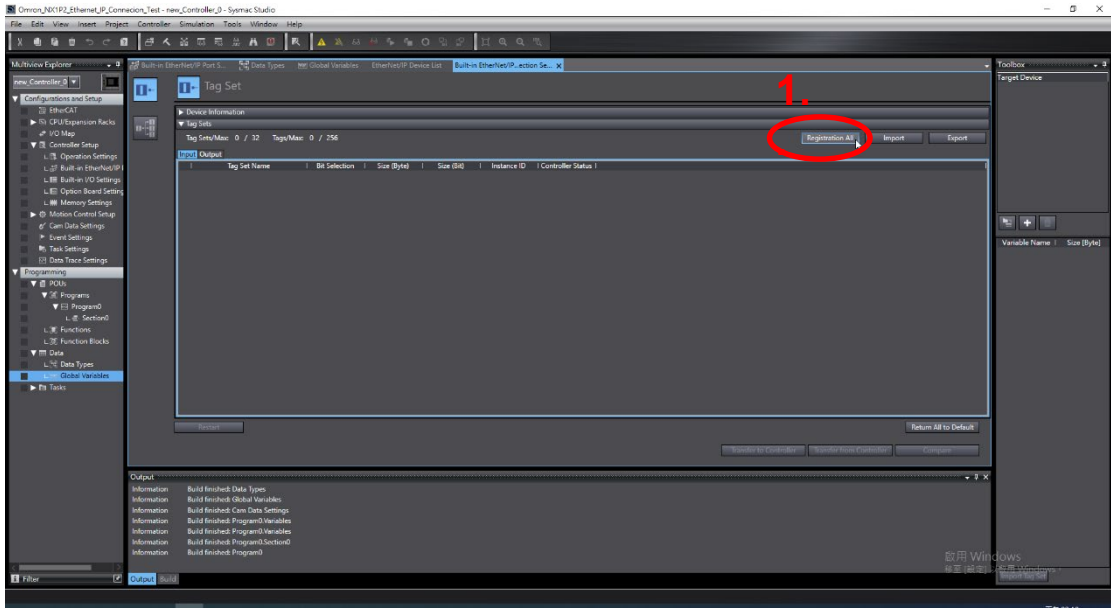
滑鼠左鍵點選 Tool → Ethernet/IP Connection Settings，開啟編輯畫面：



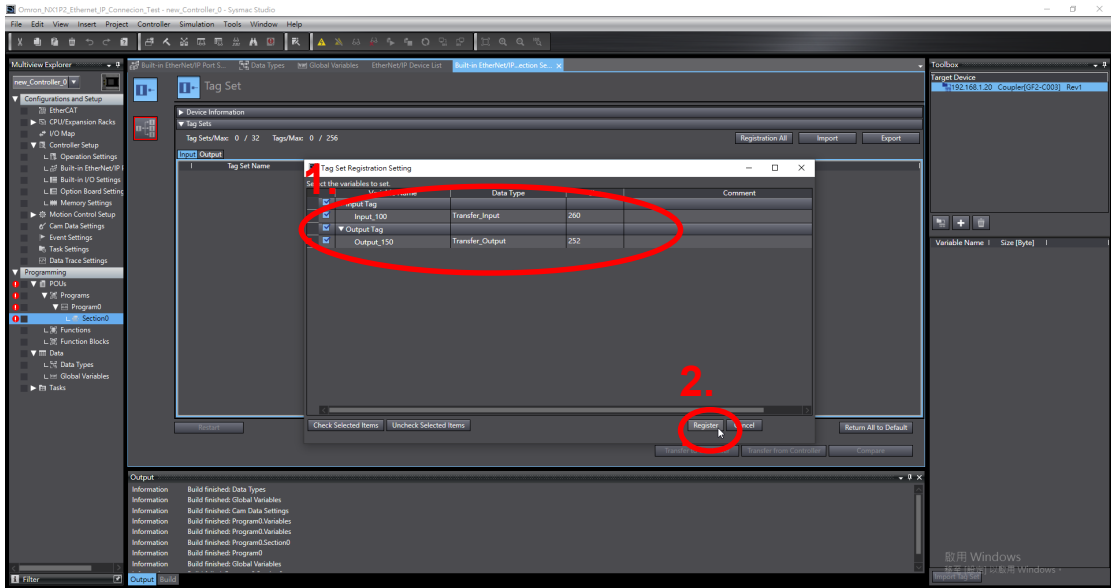
對 Device 點擊滑鼠左鍵兩下，開啟編輯畫面：



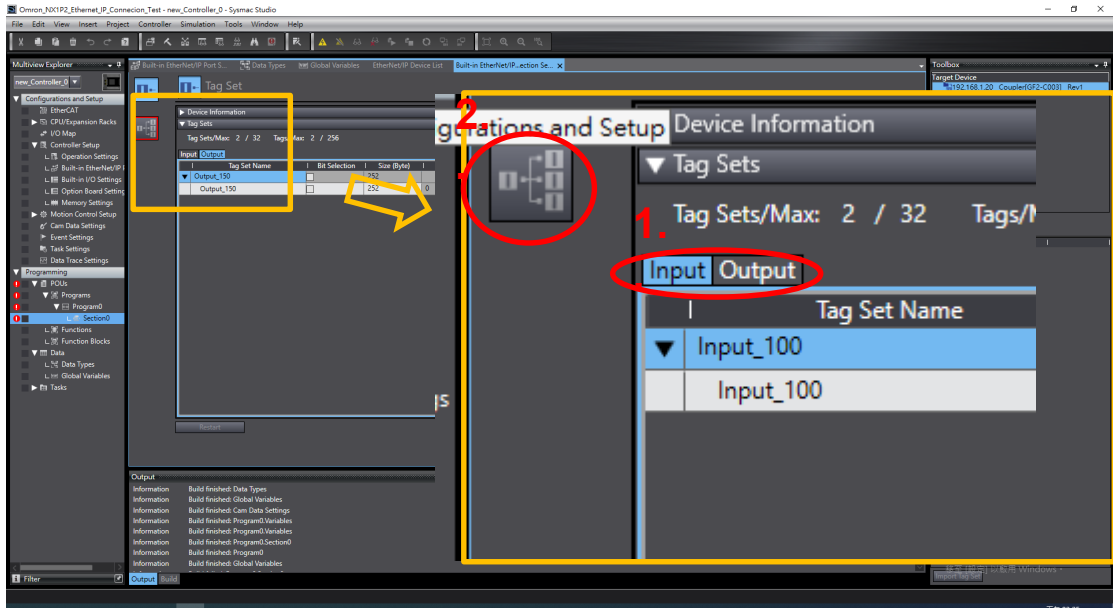
用滑鼠左鍵點擊 Registration All，來匯入 Global Variables：



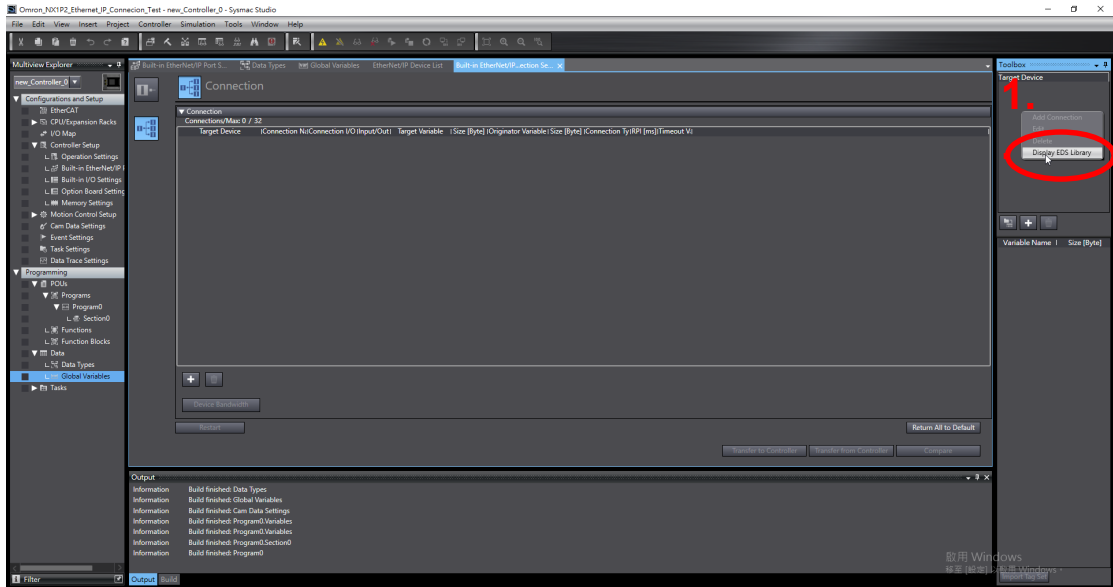
彈跳出匯入視窗，確認匯入的 Tag 無誤，請按下 Register：



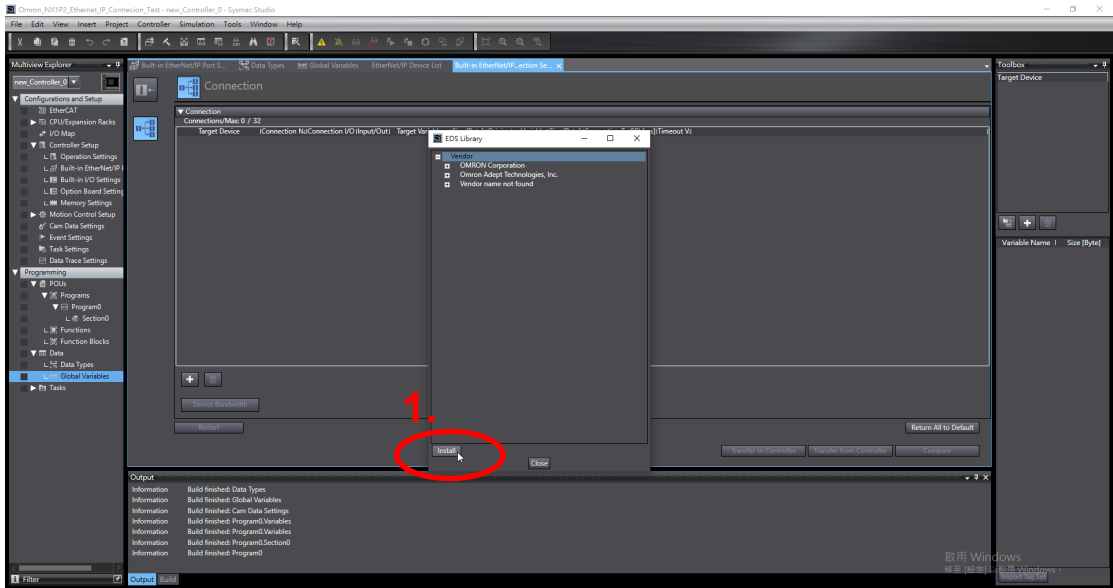
利用 Input、Output 的分頁籤來確認匯入狀況，確認無誤後用滑鼠左鍵點選 Connection 的圖示：



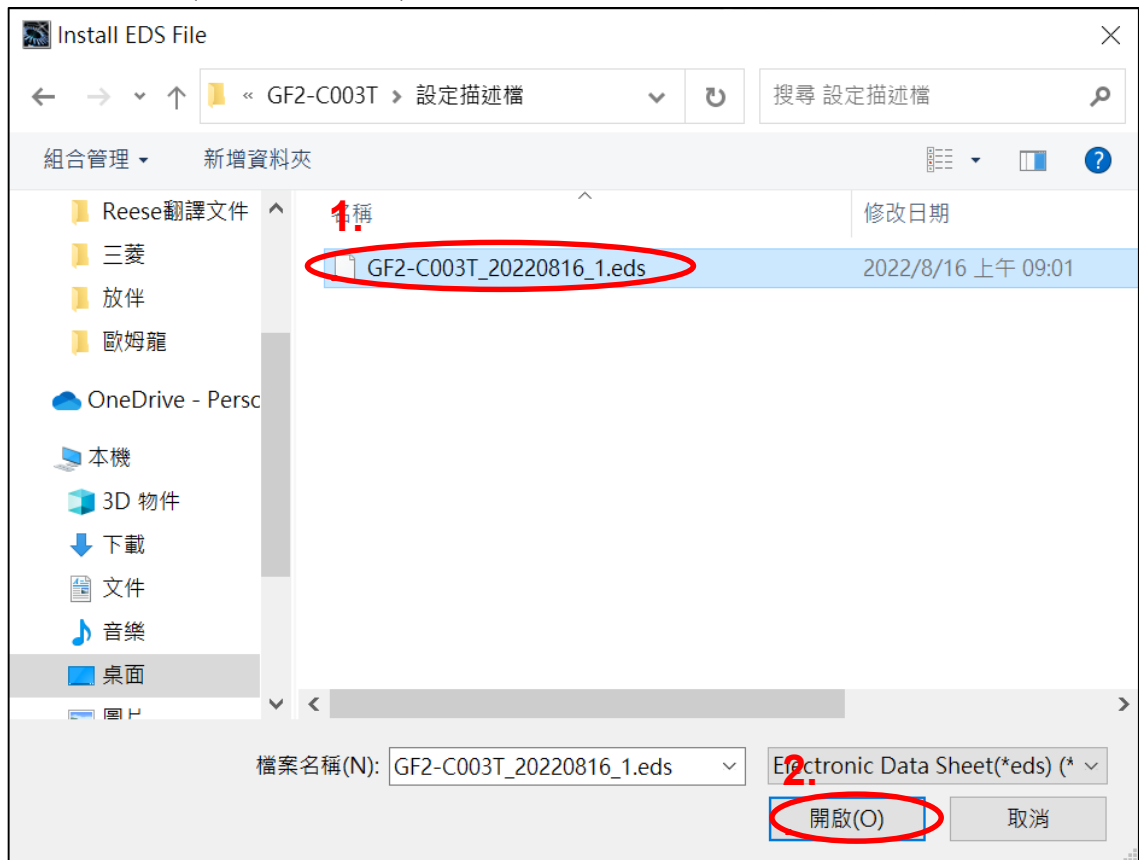
開啟 Connection 畫面，對著右上角的 Target Device 按滑鼠右鍵開啟選單，選擇 Display EDS Library：



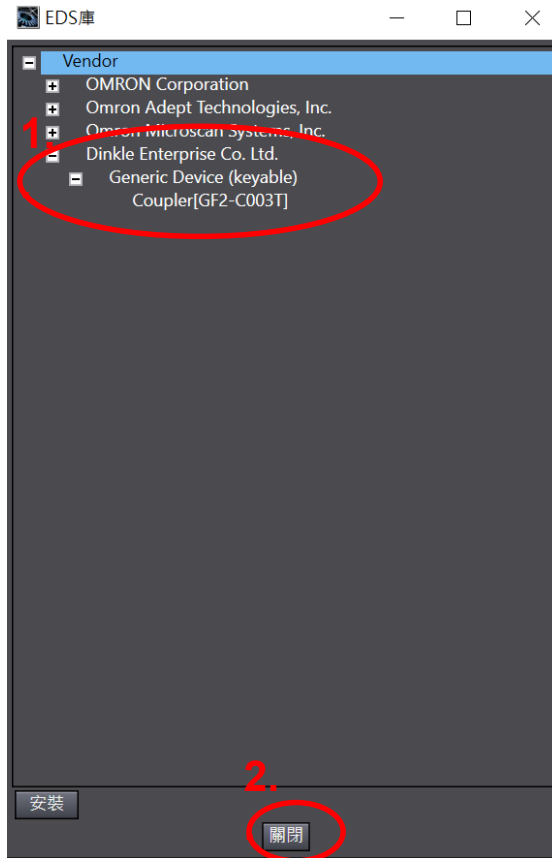
跳出 EDS Library 彈跳視窗，選擇 install :



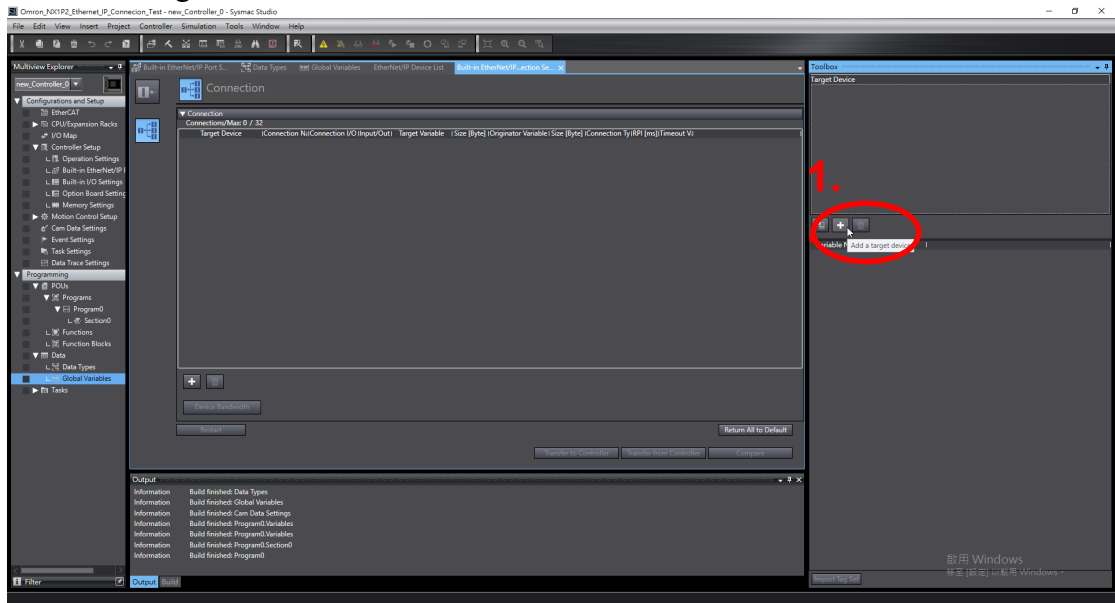
將我們提供的 EDS 檔案(附檔名為 .eds)放入路徑內，滑鼠左鍵按下”開啟”:



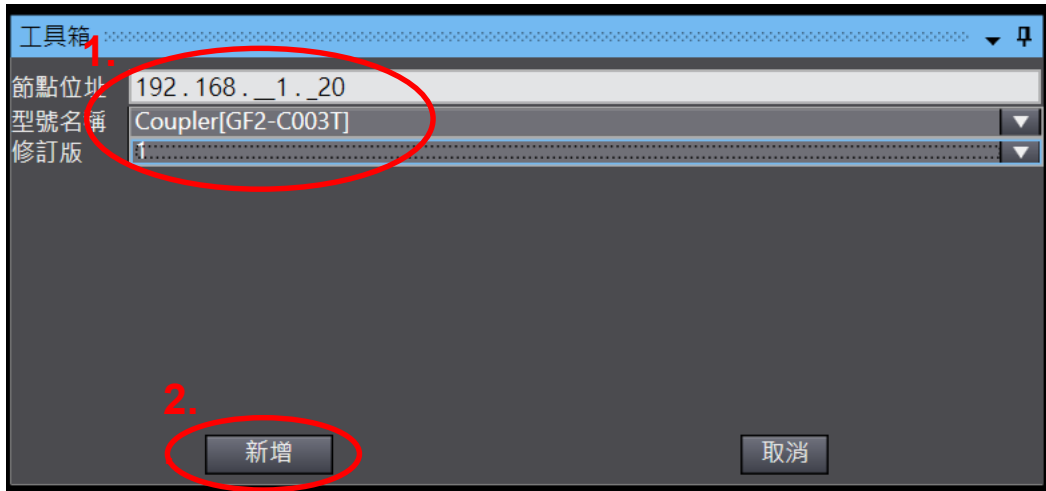
從 EDS Library 選單中會看到新增的 Coupler[GF2-C003]，表示成功新增，滑鼠左鍵按 Close 關閉彈跳視窗：



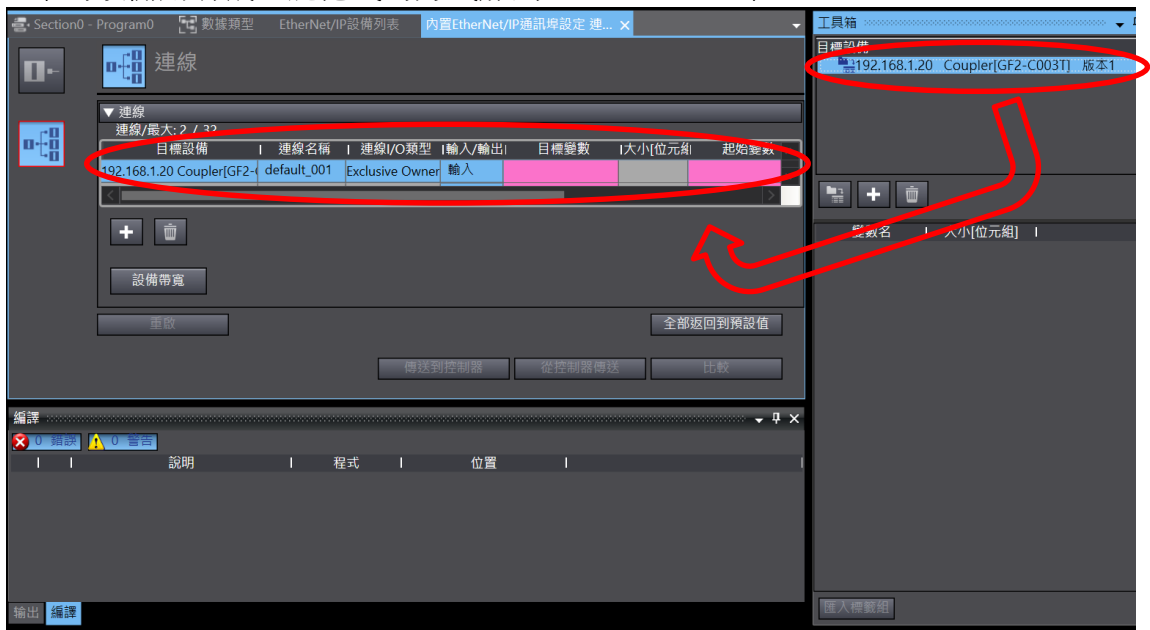
滑鼠左鍵按下 Add a target device :



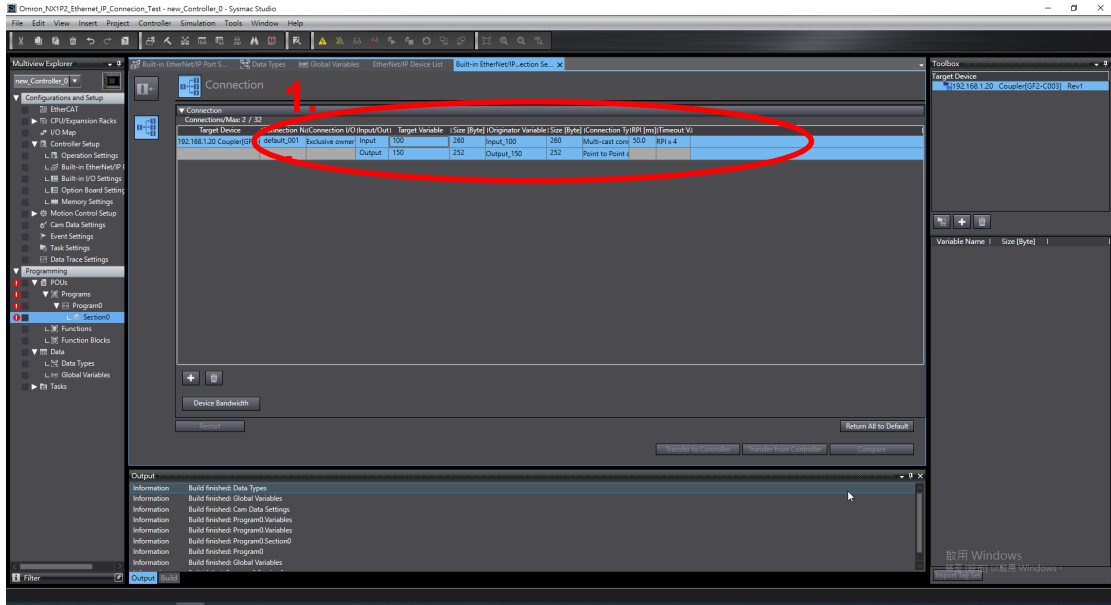
在 Toolbox 輸入 Coupler 的 IP(預設為 192.168.1.20)、Model name(Coupler[GF2-C003T])、Revision(1)，滑鼠左鍵按下 Add 鍵：



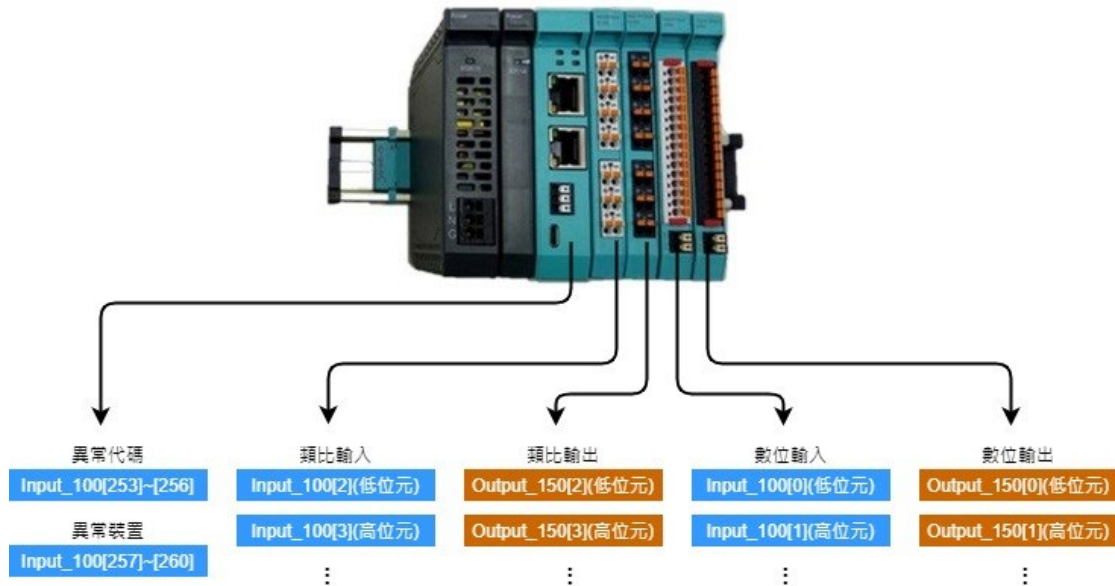
將 Toolbox 中的設備用滑鼠左鍵拖曳的方式加到 Connection 之中：



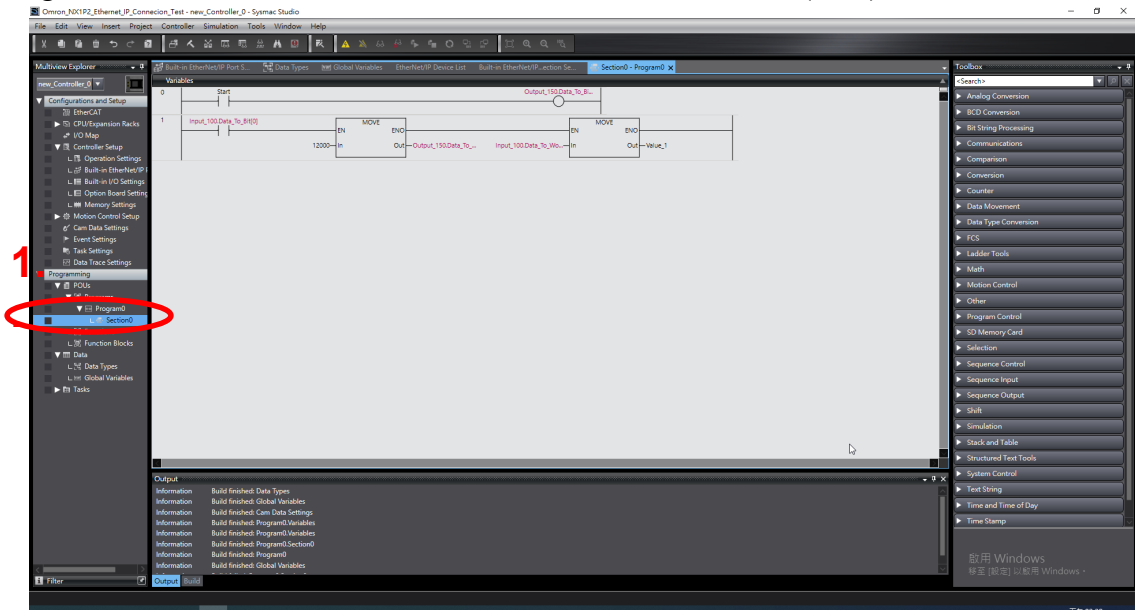
選擇 Originator Variables 的下拉式選單，將剛才的全域變數加進來，並在 Target Variables Input 輸入100、Output 輸入150：



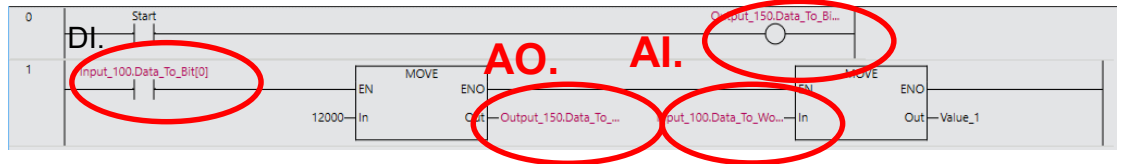
IV. 設定 IO 位址並建立簡單的測試程式：
關於 **iO-GRID** Coupler 暫存器位址說明：



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.



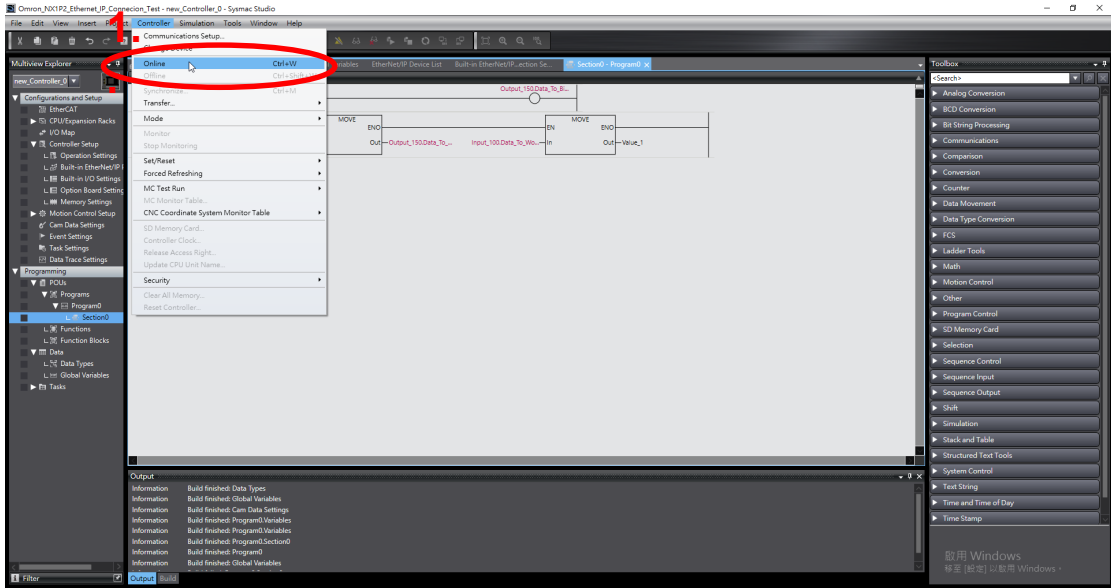
DO : 用暫存位置 Start 來進行條件觸發。

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。

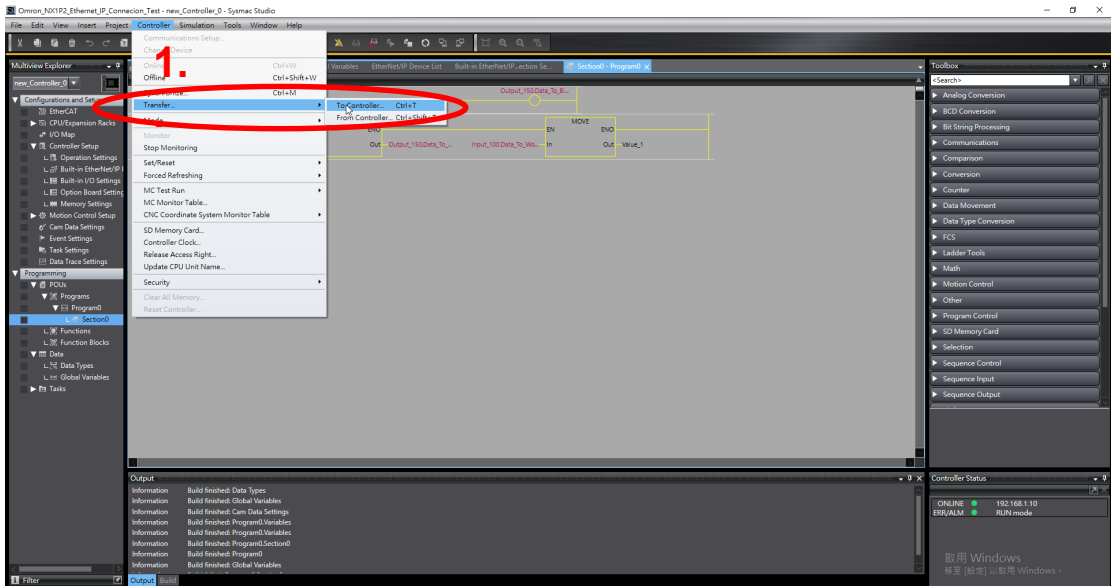
AO : 用 MOVE 指令將 12000 的數值搬移至 AO 中。

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。

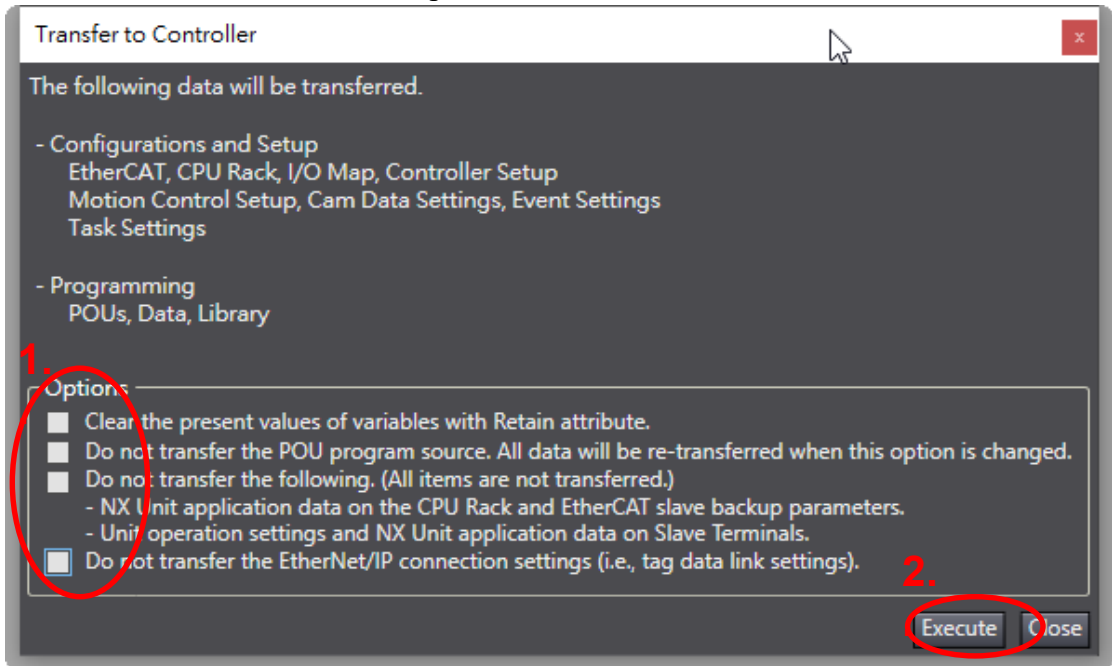
V. 程式下載至 PLC 並進行線上測試：
滑鼠左鍵點選 Controller → Online，確認有連線至 PLC：



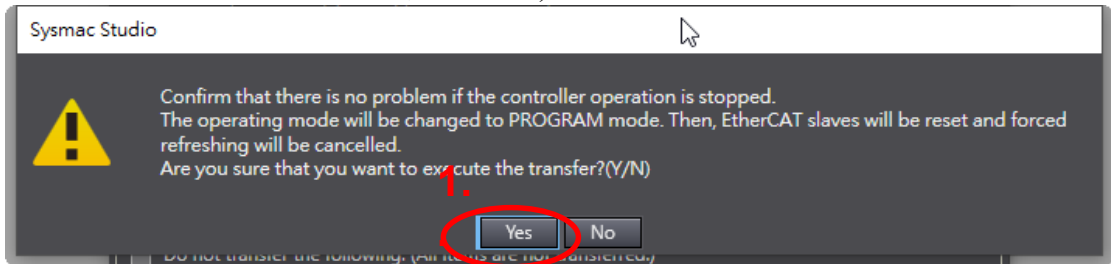
滑鼠左鍵點選 Controller → Transfer → To Controller：



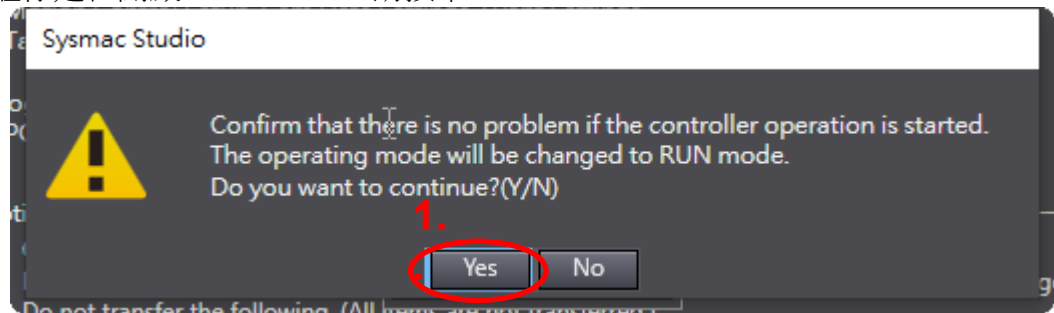
跳出 Transfer To Controller 彈跳視窗，將 Options 的選項都取消後按下 Execute :



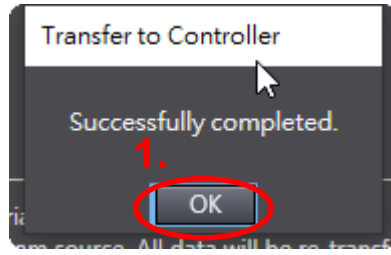
跳出警告視窗提醒你傳輸過程會導致 PLC 進入 Program Mode，請按下 Yes(PS : 此時 PLC 會中斷程式運行，請勿在線上運作中的 PLC 進行此操作) :



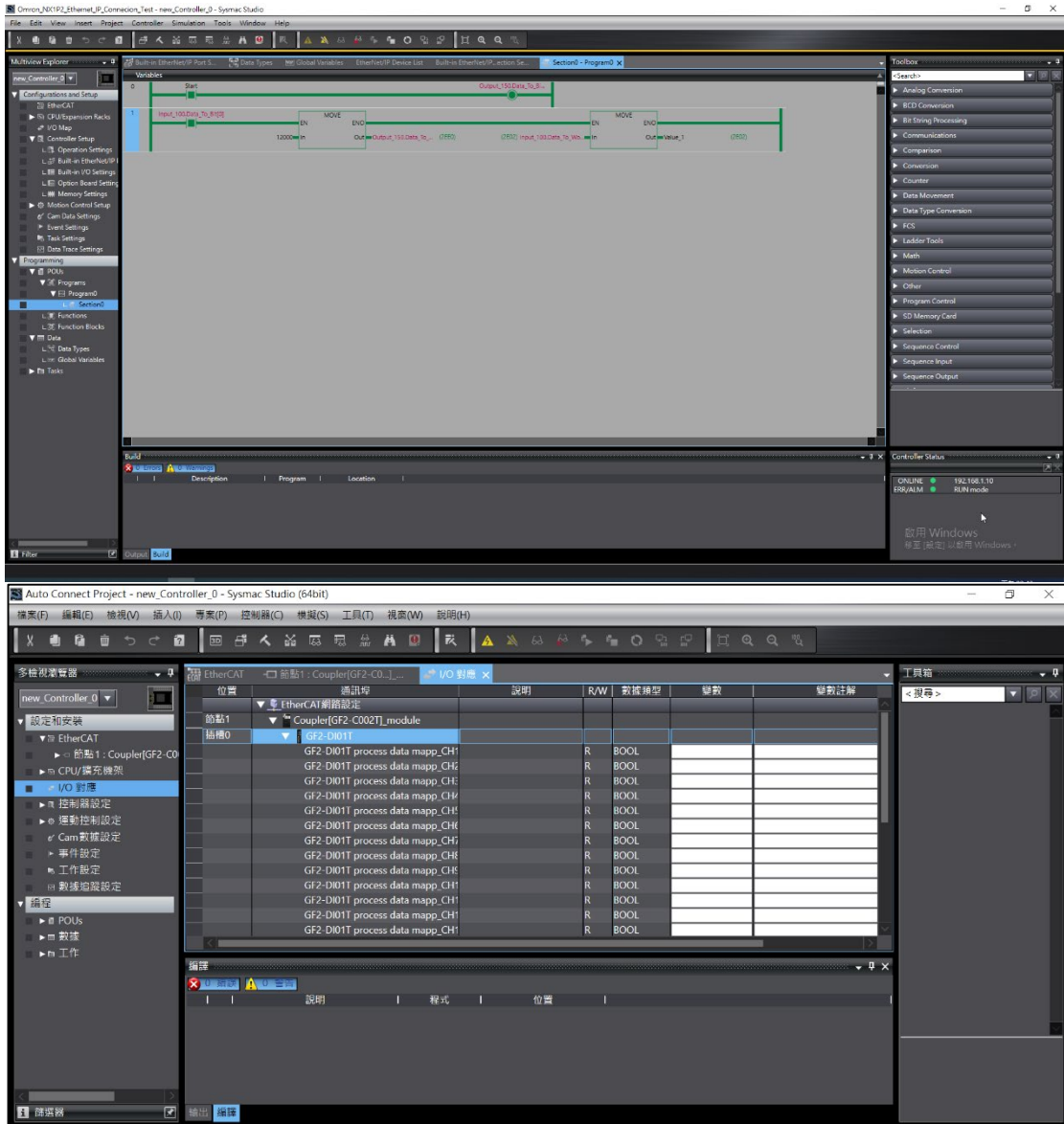
跳出警告視窗提醒你是否開啟 RUN Mode，請按下 Yes :



設定完後跳出完成視窗，請按下 OK：



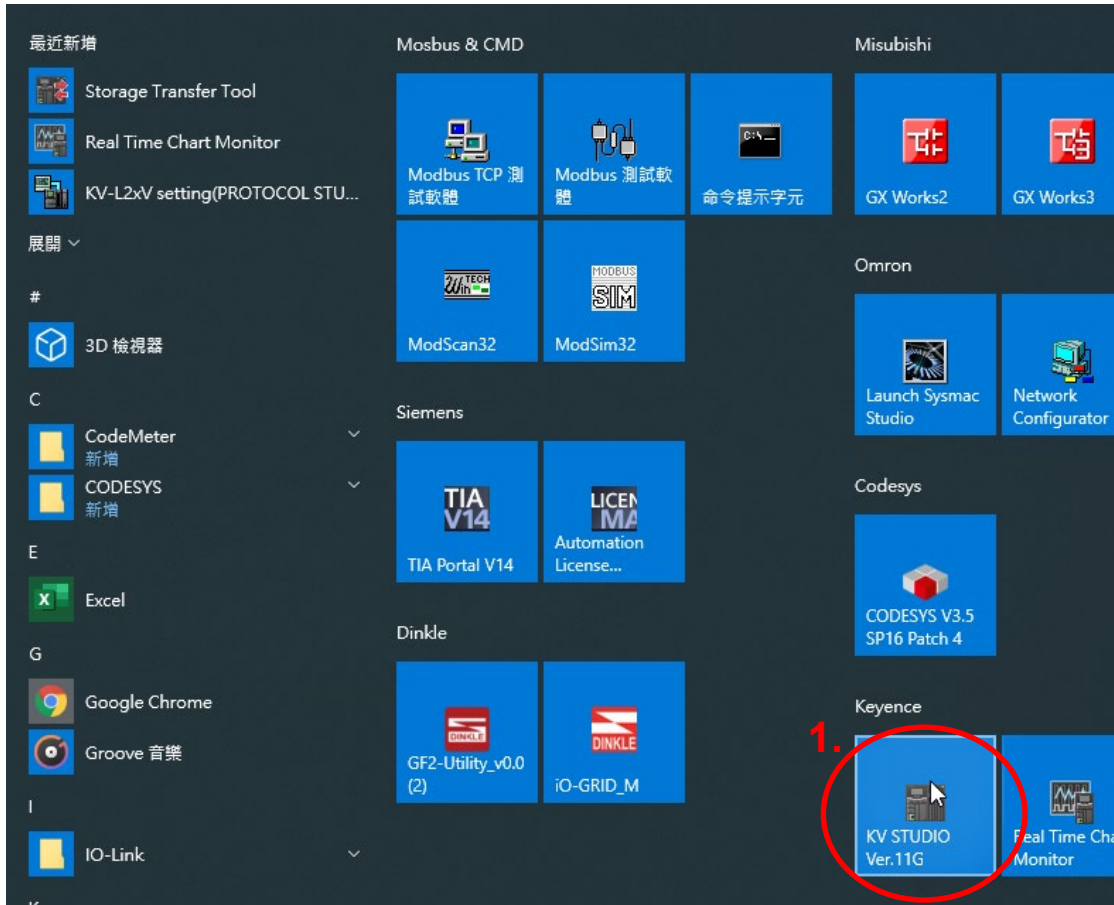
請使用線上監視模式來進行測試：



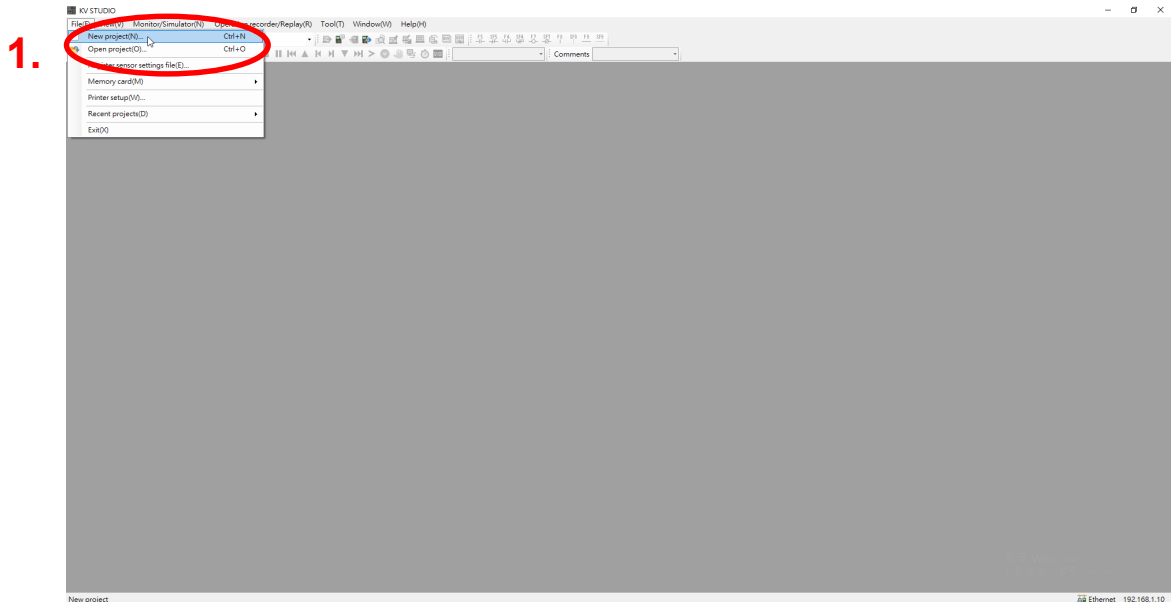
3.3 iO-GRID 基於 KV Studio 軟體使用入門指導

I. 啟動 KV Studio 並設定 Ethernet/IP 接口：

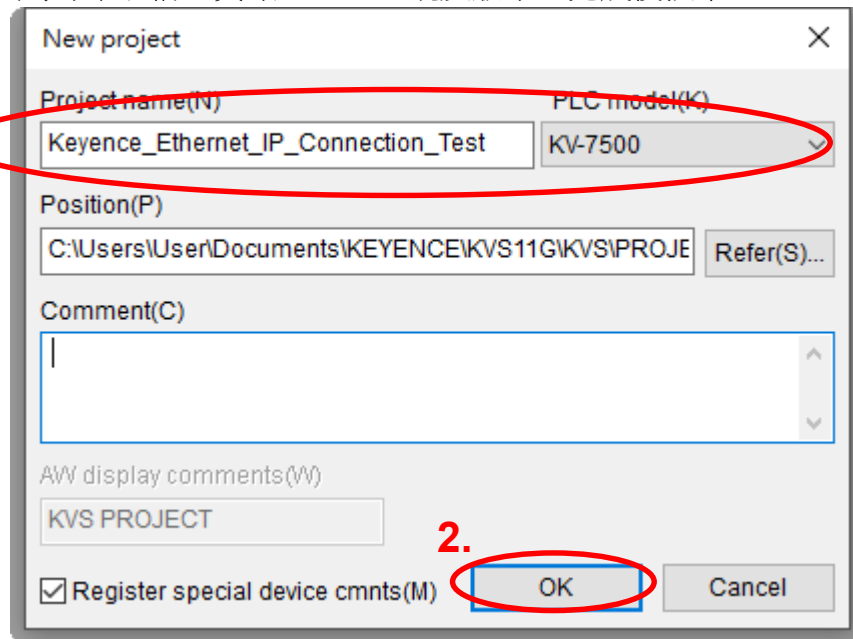
滑鼠左鍵開啟 KV Studio：



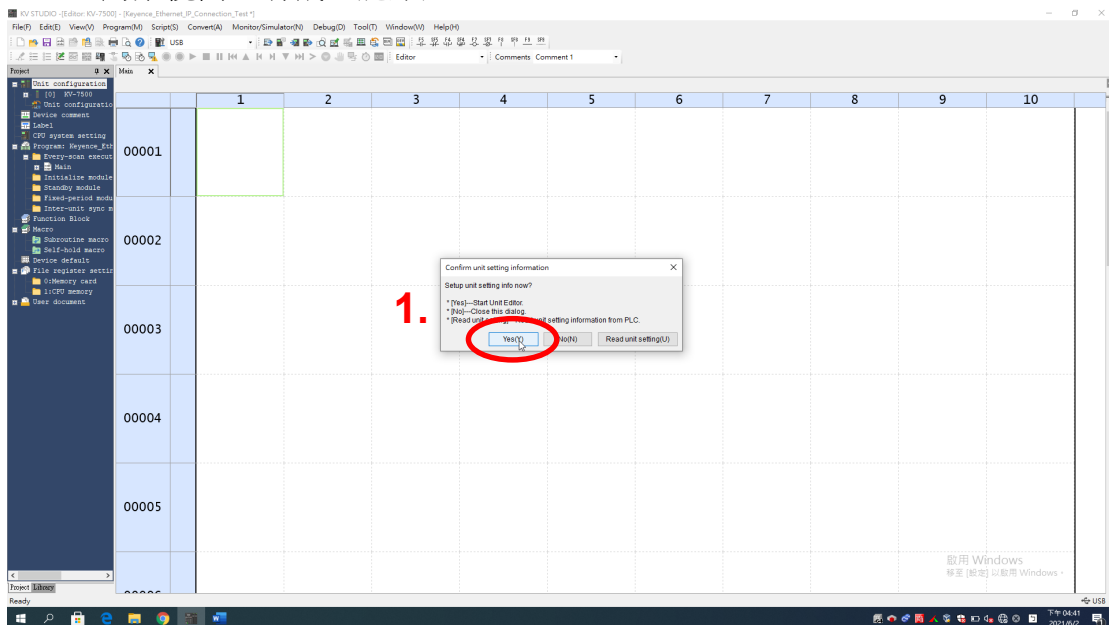
滑鼠左鍵點選 File → New Project。



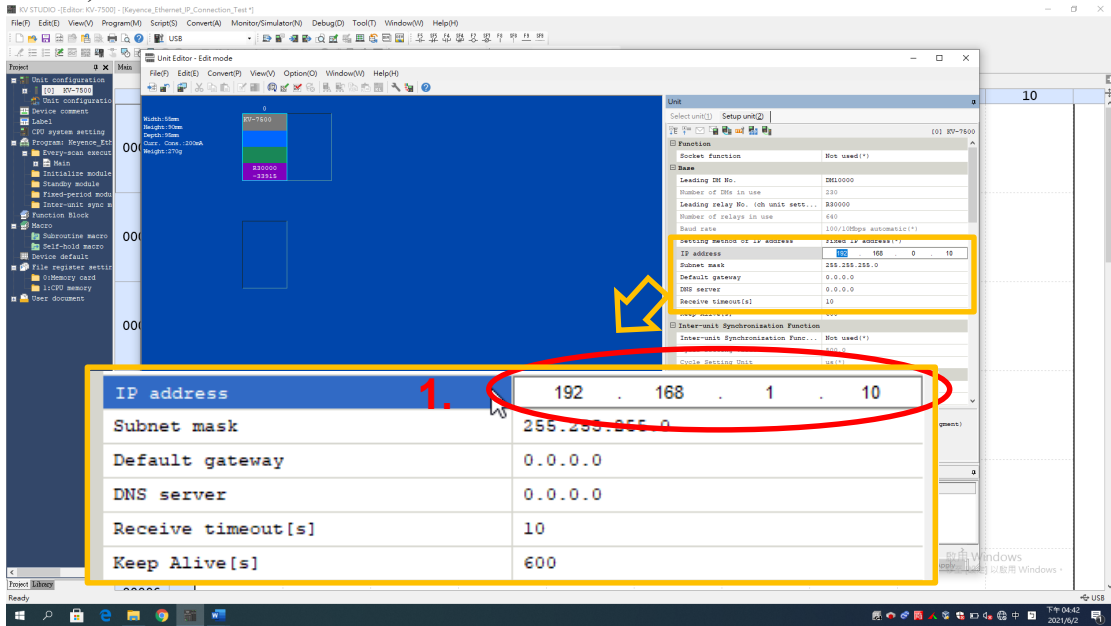
建立新的專案並填寫專案名稱、資訊、PLC 型號及版本，完成後按下 OK：



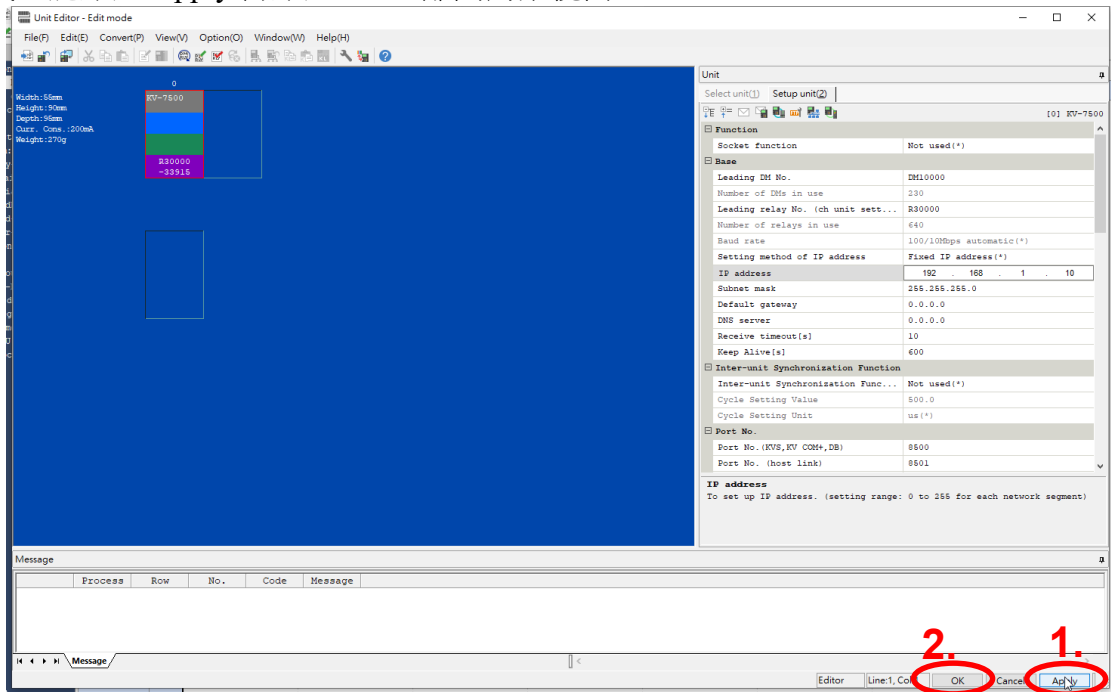
彈出 Unit Editor 對話視窗，滑鼠左鍵點選 YES：



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)：

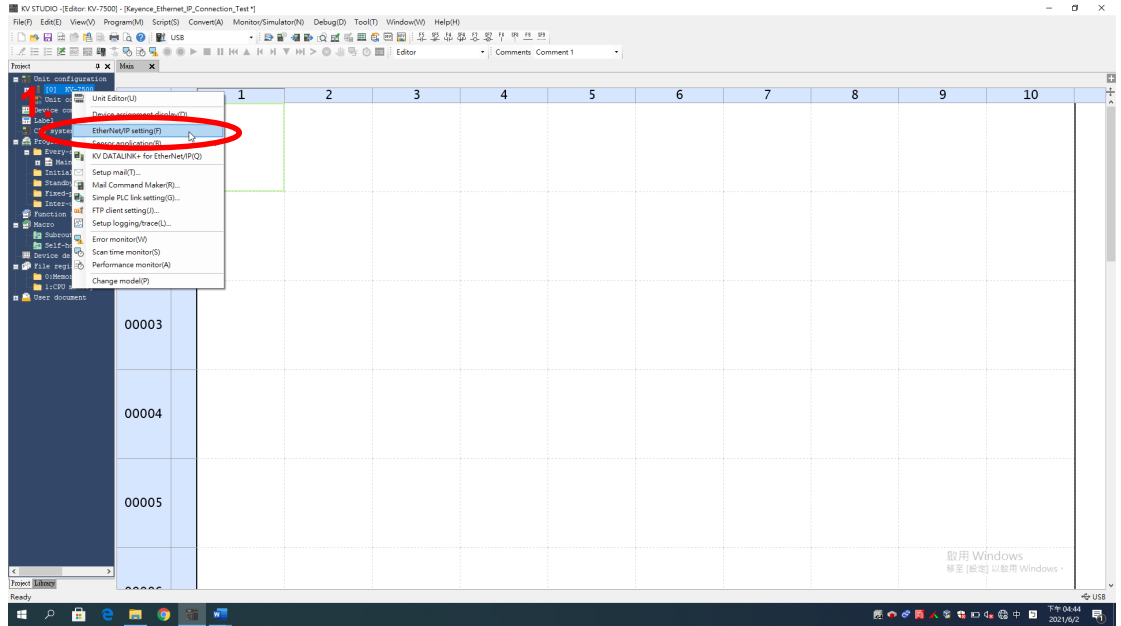


完成後滑鼠左鍵點選 Apply 再點選 OK，離開對話視窗：

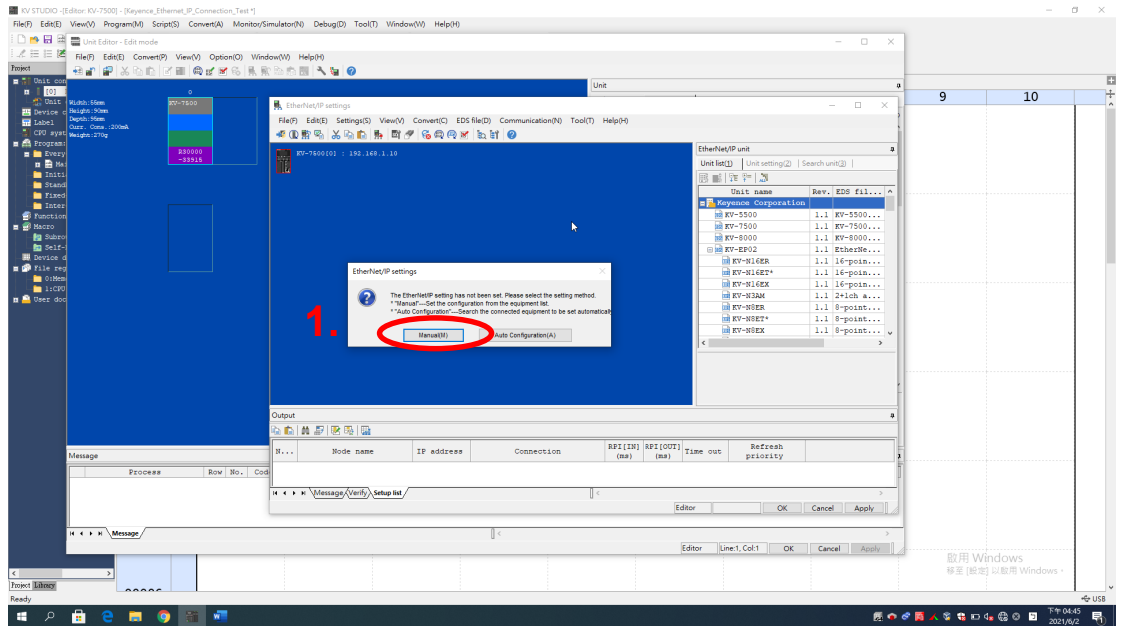


II. Ethernet/IP 連線設定(Slave)並註冊 EDS 檔：

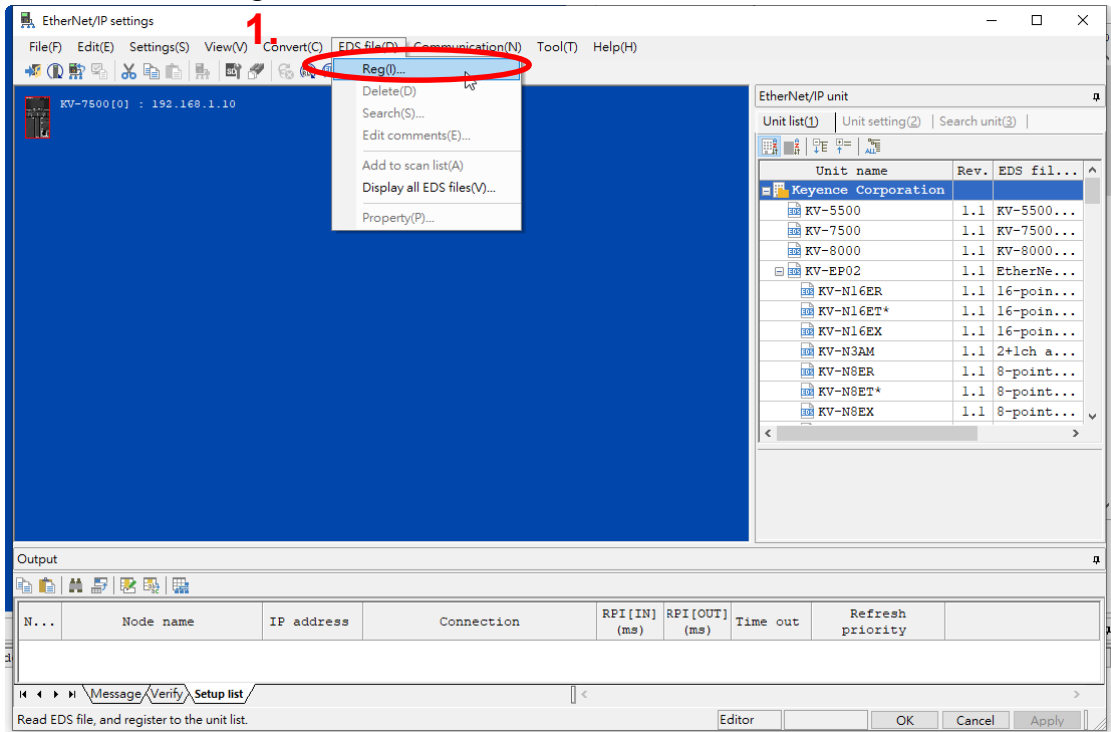
對 “[0] KV7500” 用滑鼠右鍵叫出選單，滑鼠左鍵點選 Ethernet/IP Setting，開啟編輯畫面：



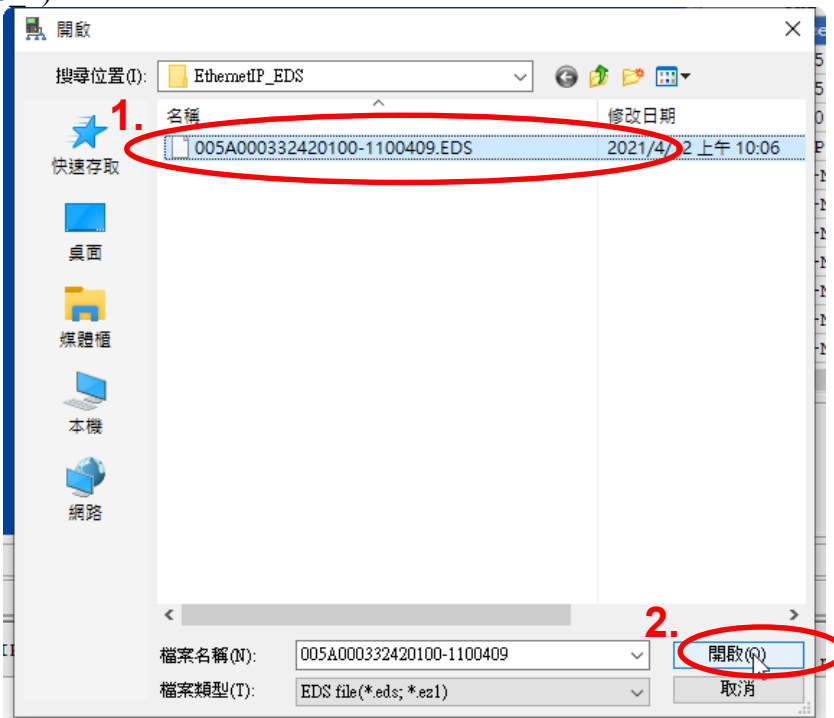
彈跳出對話視窗用滑鼠左鍵選擇 Manual：



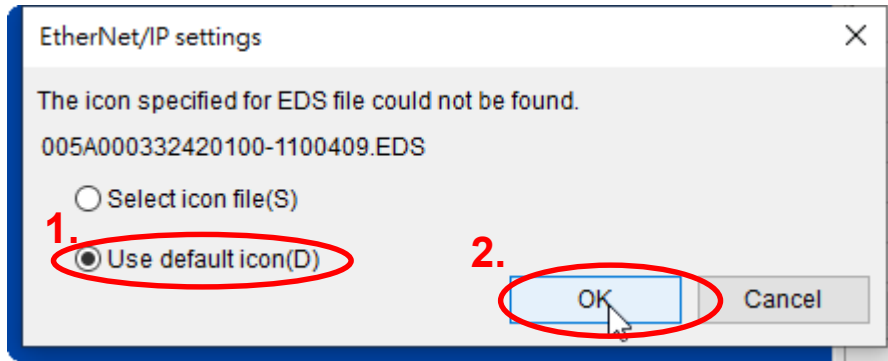
用滑鼠左鍵點擊 EDS File → Reg，來開啟註冊視窗：



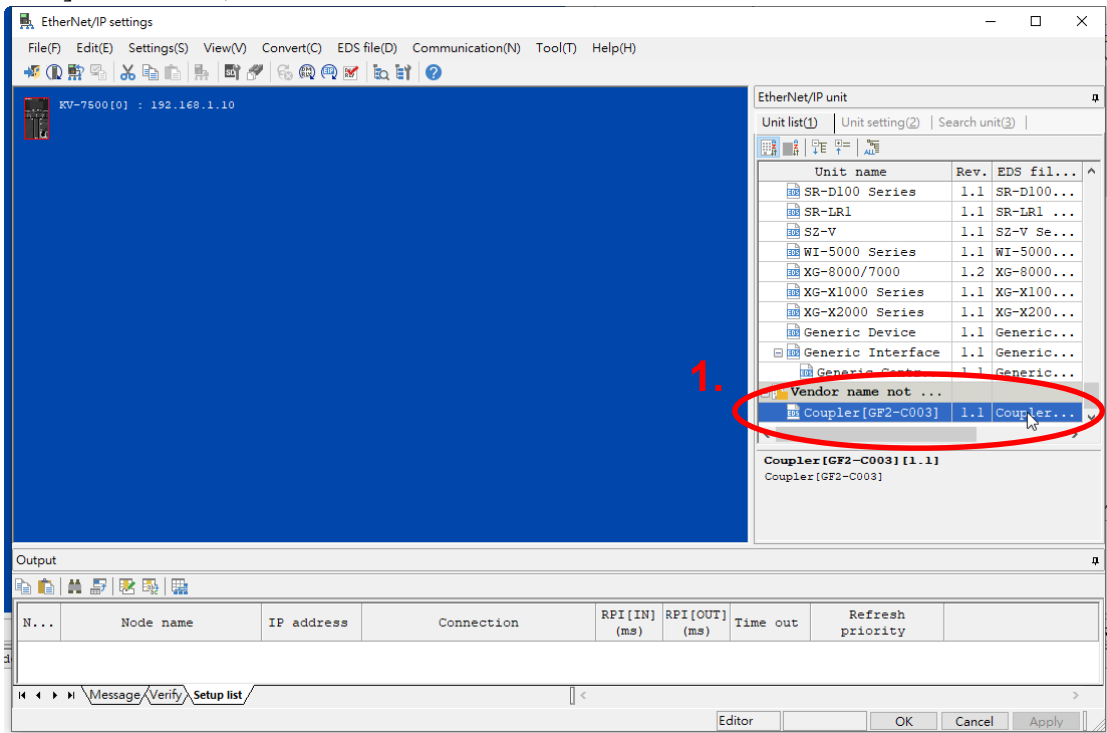
將我們提供的 EDS 檔案(附檔名為 .eds)放入路徑內，滑鼠左鍵按下”開啟”：(目前版本為: GF2-C003T_20220816_1)



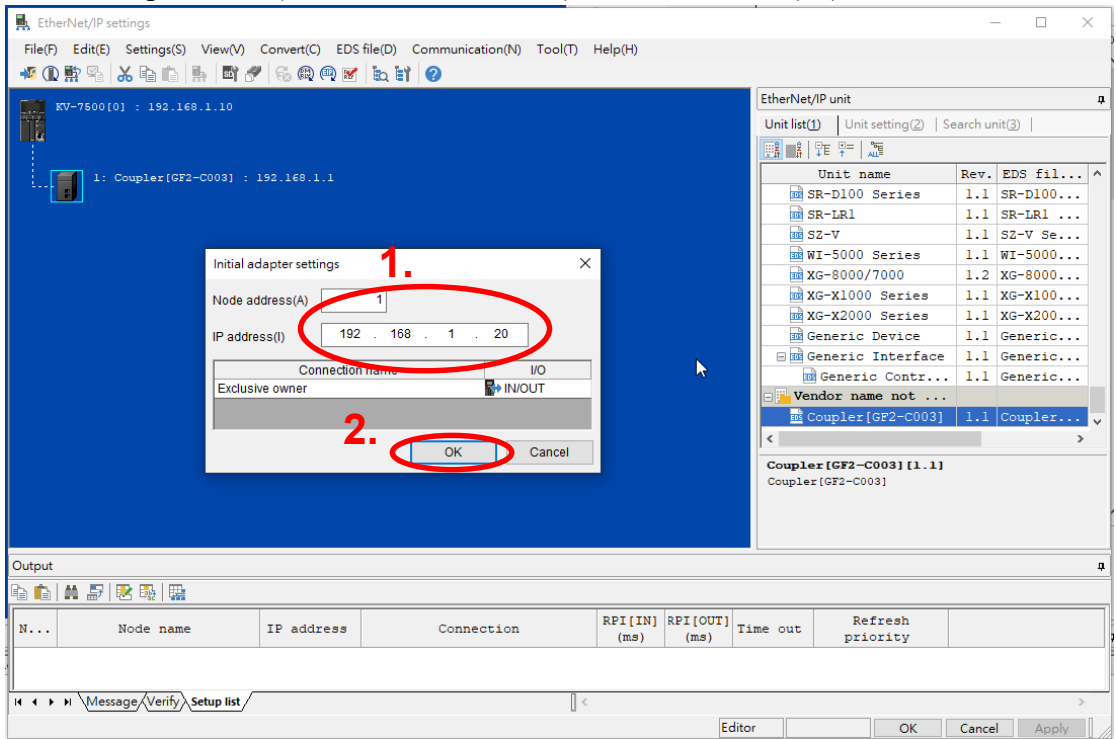
彈跳出對話視窗選擇 Use Default Icon，用滑鼠左鍵點選 OK：



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：

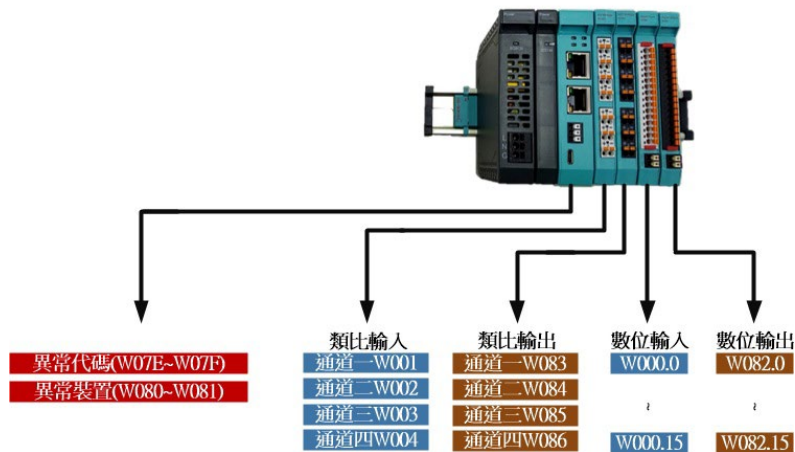


彈跳出對話視窗輸入 Coupler 的 IP(預設為192.168.1.20)、Node Address(1)，滑鼠左鍵點選 OK :

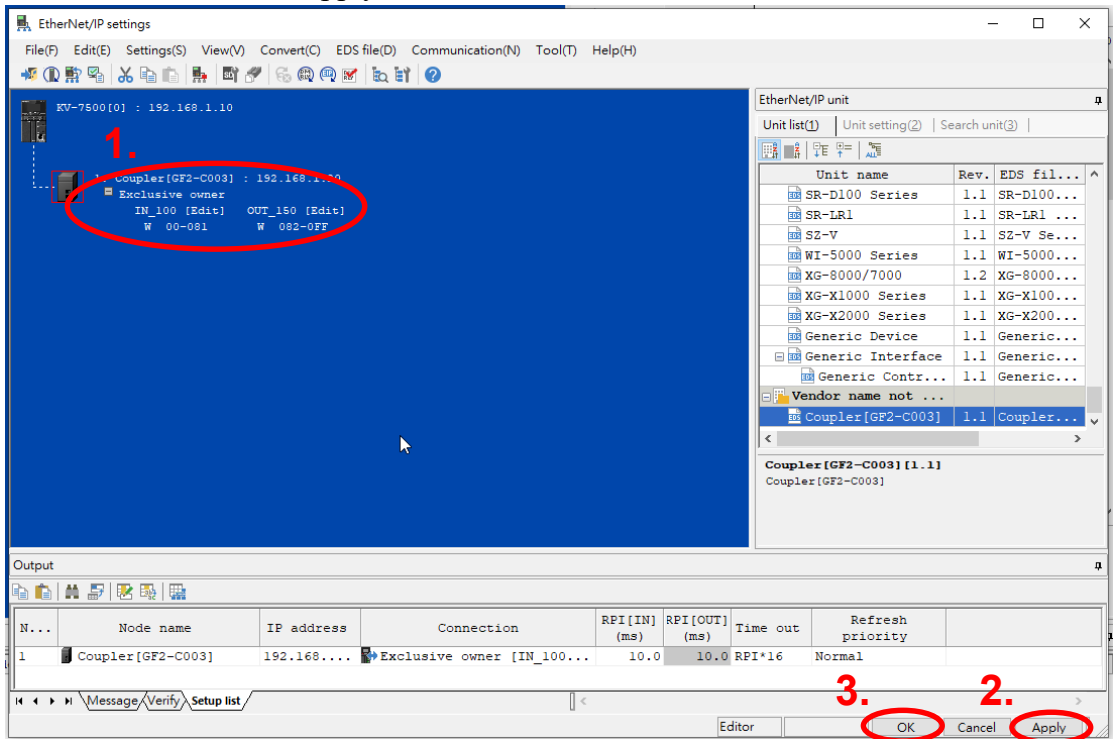


III. 確認 IO 位址並建立簡單的測試程式：

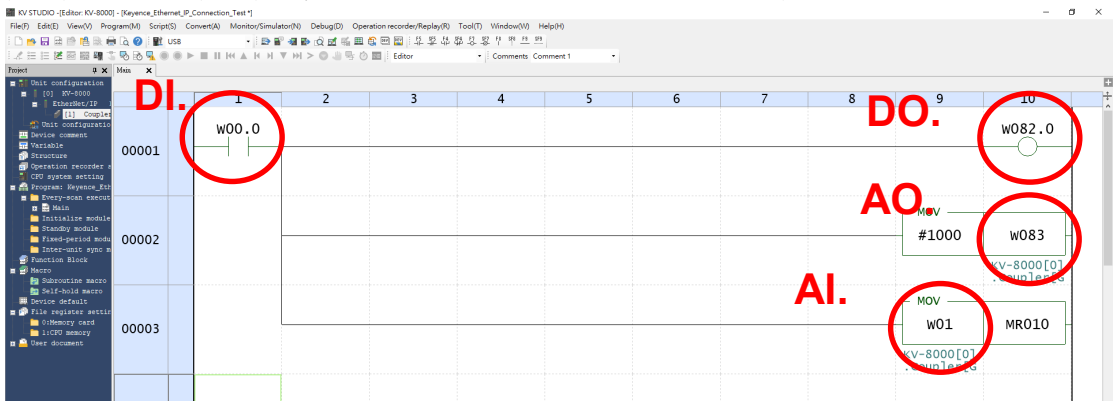
關於 **IO-GRID** Coupler 暫存器位址說明：



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。

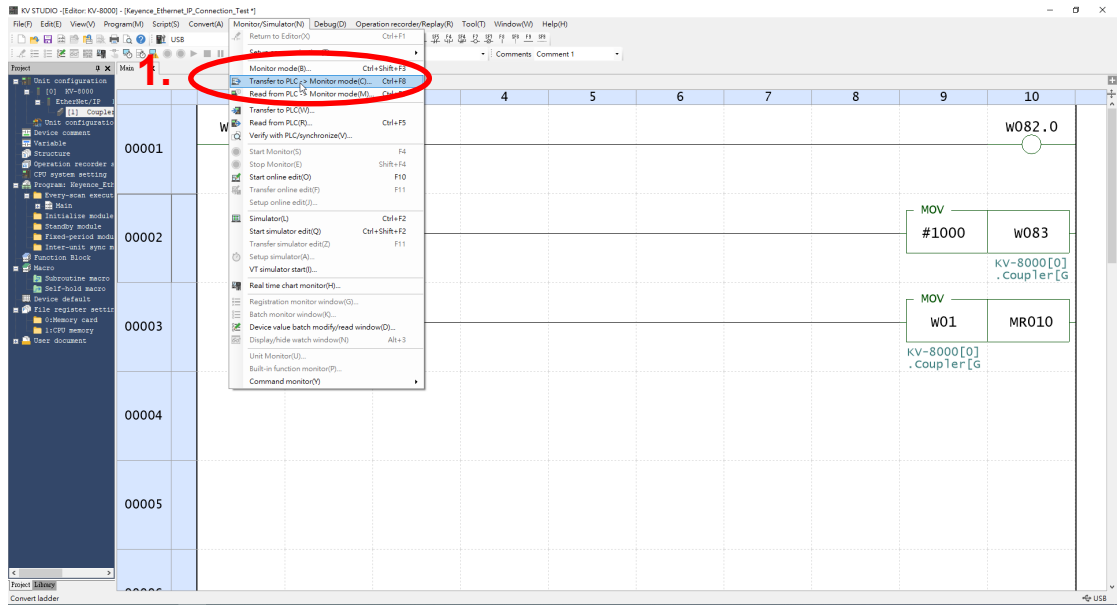
DI : 將 DI 放在 a 接點的位置上，當硬線有訊號回傳時，可以觸發後面的 MOVE 指令與 DO。

AO : 用 MOVE 指令將 1000 的數值搬移至 AO 中。

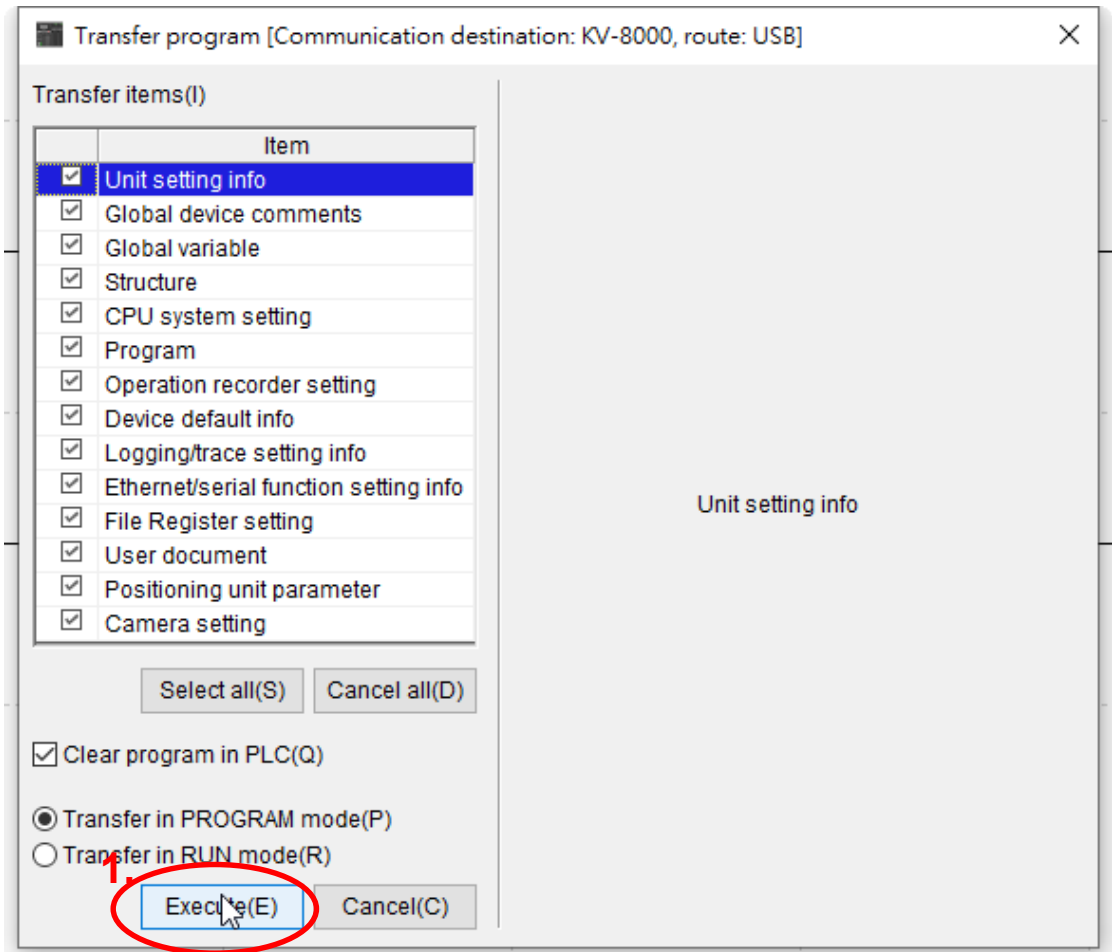
AI : 用 MOVE 指令將 AI 的數值搬移至 MR010 暫存位置中，AI 數值可由訊號產生器或 AO 來提供。

IV. 程式下載至 PLC 並進行線上測試：

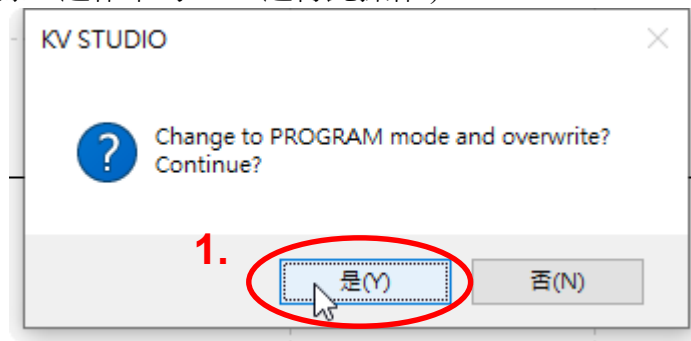
滑鼠左鍵點選 Monitor/Simulator → (Transfer To PLC → Monitor Mode) ，將程式下載至 PLC ：



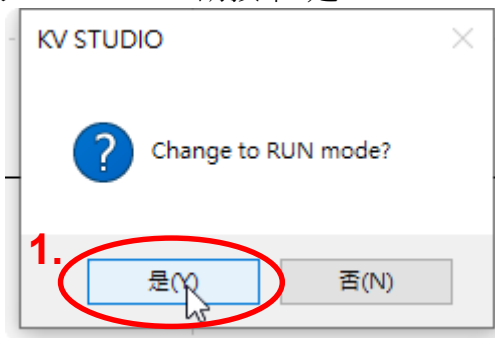
滑鼠左鍵點選 Execute :



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：

