

WEINTEK LABS., INC.

# EtherCAT Master

使用 EtherCAT Master 新增  
iR-ECAT

工程檔案範例

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## 1. 簡介

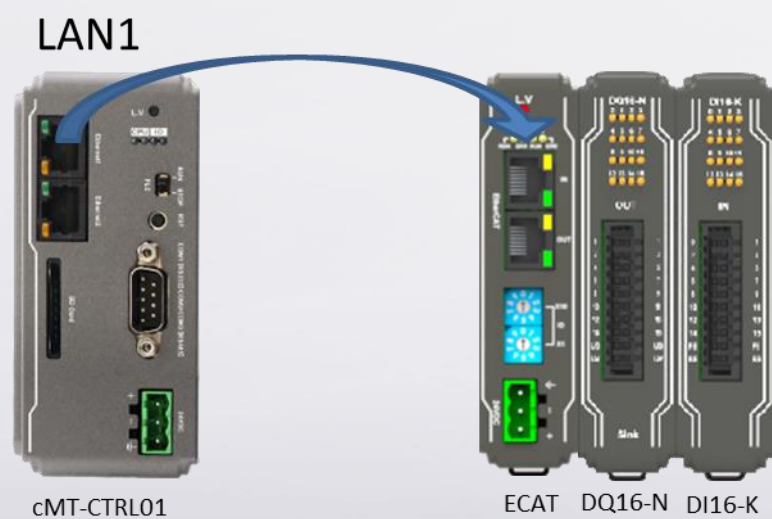
### 簡介

以下範例介紹如何使用 CODESYS EtherCAT Master 新增 iR 模組。

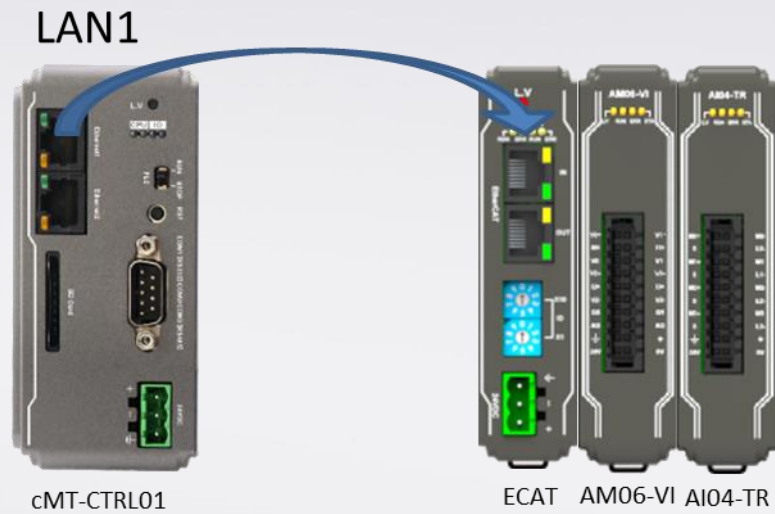
分別介紹新增數位模組、類比模組、運動控制模組等三種 iR 模組的方式，以及 EtherCAT Master 搭配 Weintek CODESYS Library 進行網路型運動控制的設定範例。

### 系統環境

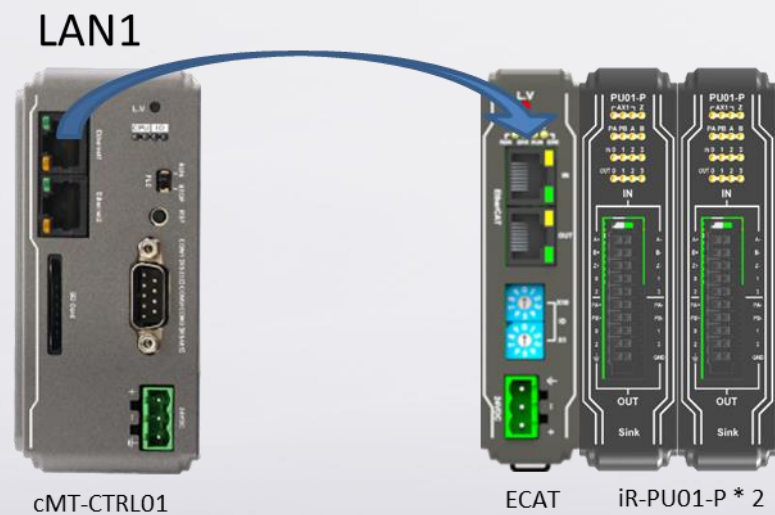
#### 1. 新增數位模組：



## 2. 新增類比模組：

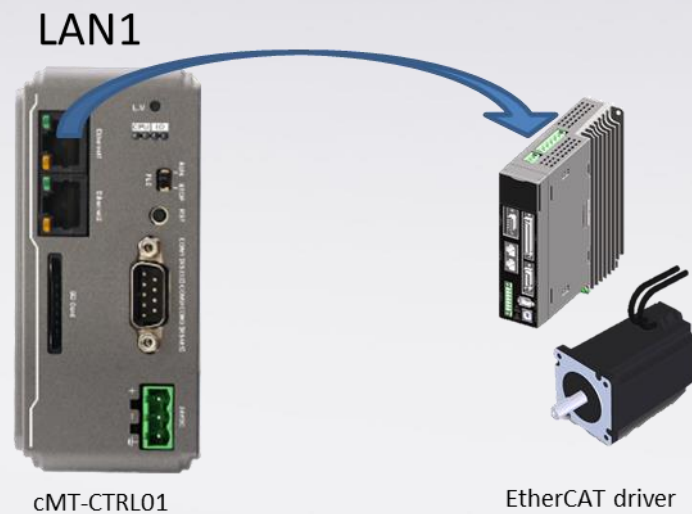


## 3. 新增運動控制模組：



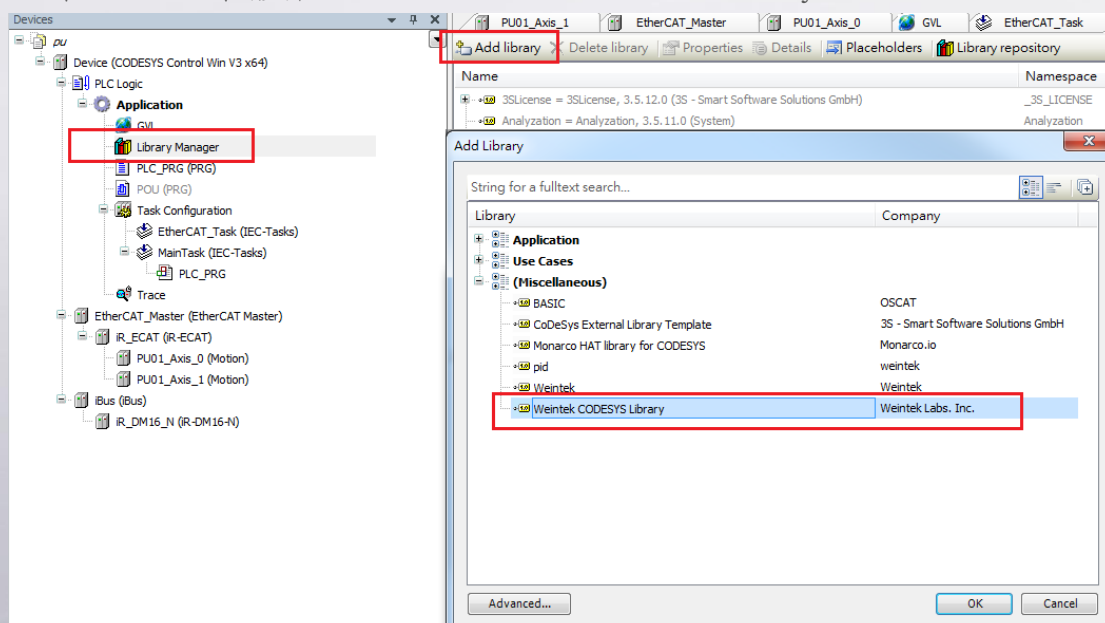
## 4. 網路型運動控制：

支援 EtherCAT 網路型的驅動器，網路線可直接連上驅動器的 RJ-45 接口。



## 2. 安裝 Weintek Library

1. 開啟威綸官網下載頁面，搜尋 [cMT+CODESYS Package] 下載並安裝。  
<https://www.weintek.com/globalw/Download/Download.aspx>  
 (此包括 iR-PU01-P 的裝置描述檔安裝)
2. 在 CODESYS 軟體介面上加入 Weintek CODESYS Library。

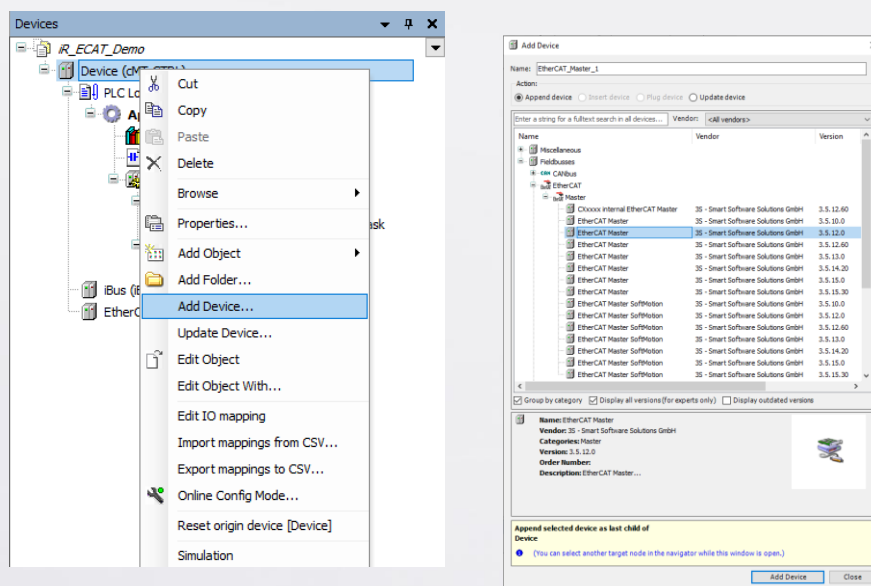


3. 完成安裝，即可使用 Motion Function Block。

## 3. 新增數位模組

- 加入 EtherCAT\_Master 裝置(V3.5.12.0)：

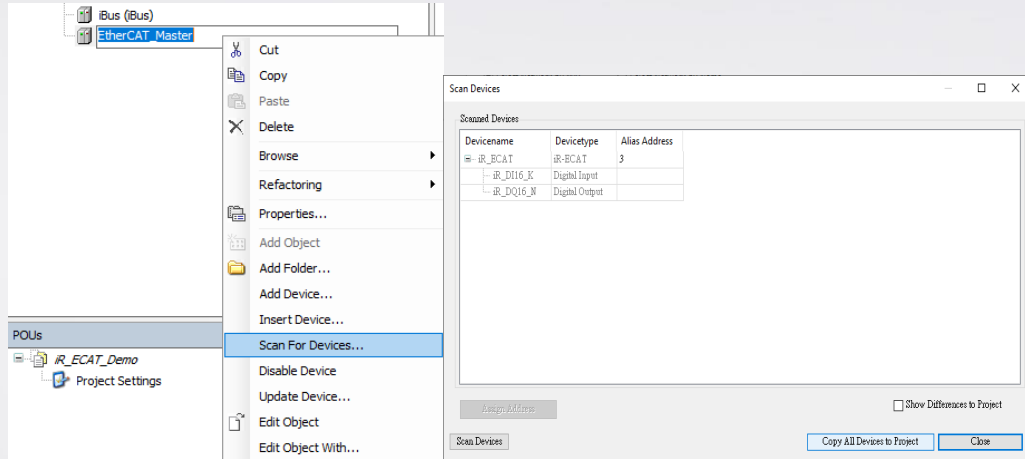
[Device]->[Add Device]->[Fieldbusses]->[EtherCAT] ->[Master]  
->[EtherCAT Master]



- 加入 iR-ECAT 裝置：

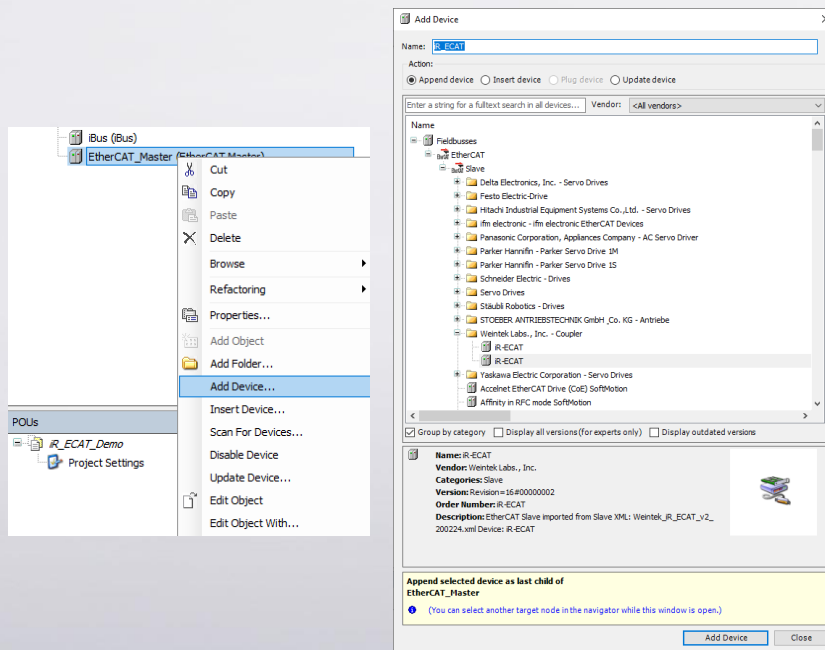
### 方法 1. 搜尋網路上的 iR-ECAT 裝置

[EtherCAT\_Master]->[Scan for devices]->[Copy All Devices to Project]



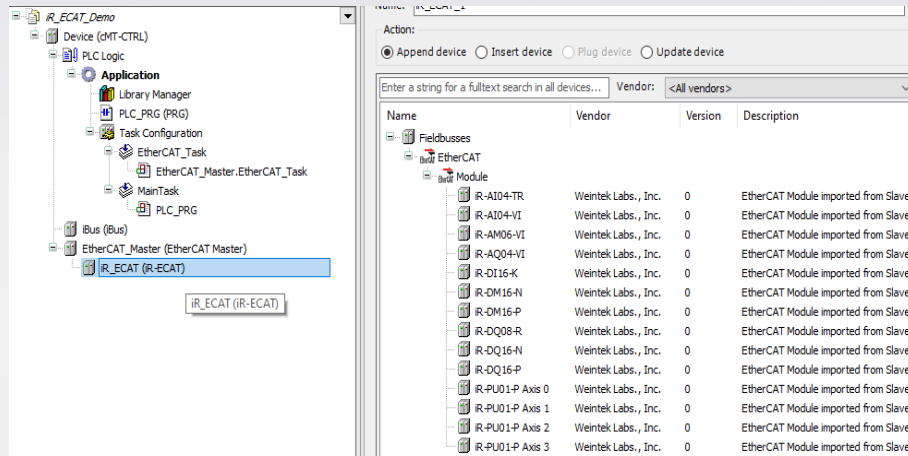
方法 2. 手動加入 iR-ECAT 裝置。

[EtherCAT\_Master] -> [Add Device] -> [Slave] -> [iR-ECAT]

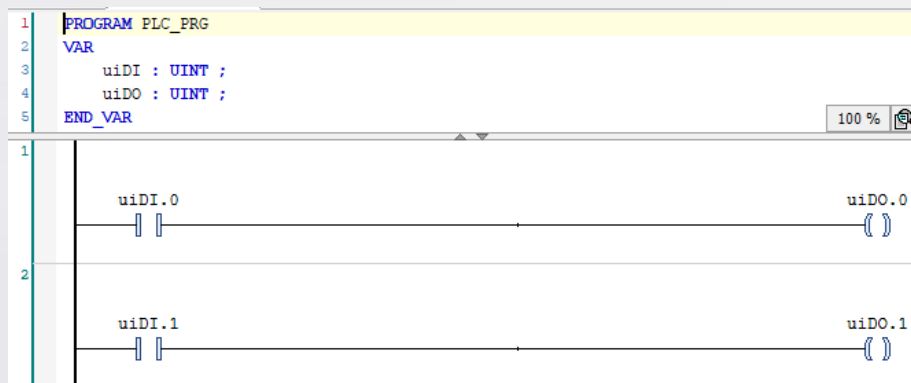


● 加入 iR-ECAT 模組：

[iR-ECAT] -> [Add Device] -> [EtherCAT] -> [Module]



## ● 宣告&程式編輯：



## ● 變數映射：

[iR-ECAT] ->[EtherCAT I/O Mapping]

General	Find	Filter	Show all
Process Data	Variable	Mapping	Channel
Startup Parameters	Application.PLC_PRG.uiDO		IR_DQ16_N Digital Output
EtherCAT I/O Mapping	Application.PLC_PRG.uiDI		IR_DI16_K Digital Input
Status			
Information			

## ● 登入執行程式

※新增 iR-ECAT 數位模組，使用 cMT-CTRL01 參考專案

EtherCAT\_Master\_Demo\_CTRL01\_DIO；使用 cMT 系列 HMI 參考

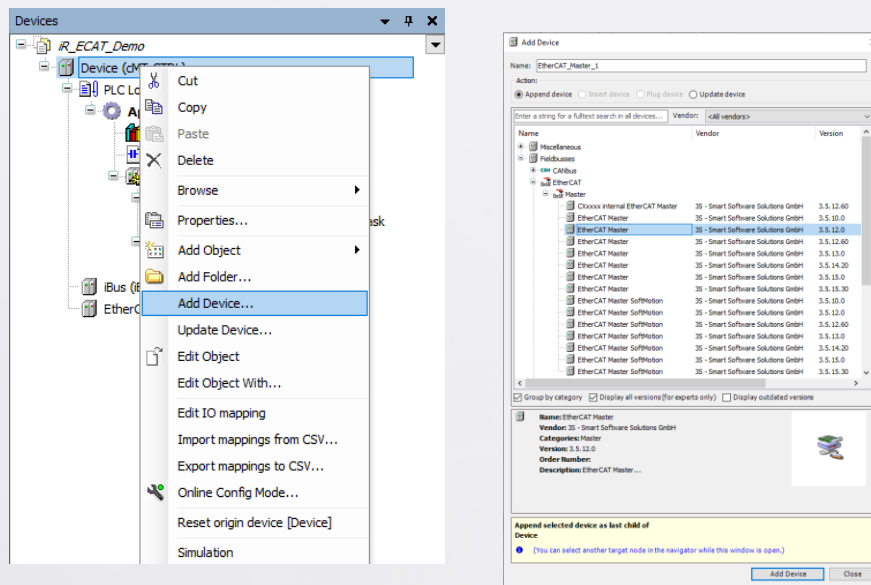
EtherCAT\_Master\_Demo\_HMI\_DIO。



## 4. 新增類比模組

- 加入 EtherCAT\_Master 裝置(V3.5.12.0)：

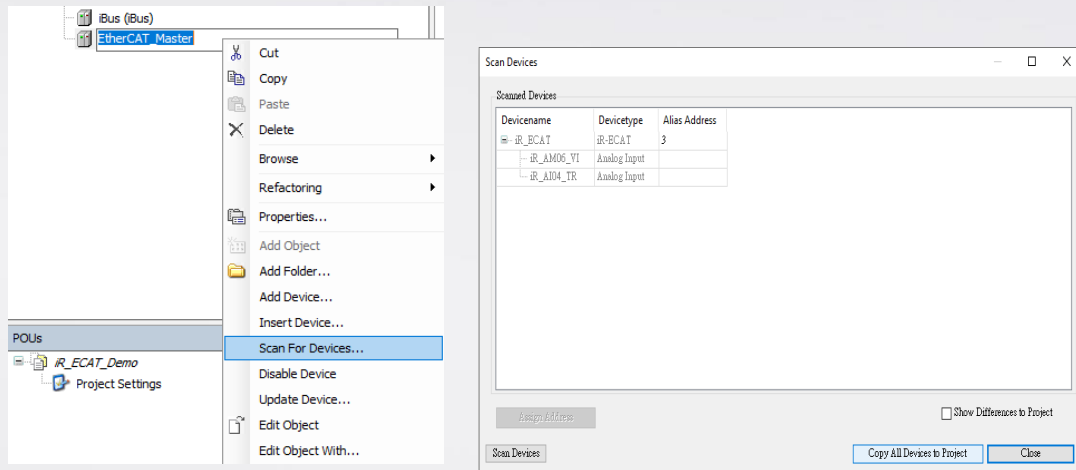
[Device]->[Add Device]->[Fieldbusses]->[EtherCAT] ->[Master]  
->[EtherCAT Master]



- 加入 iR-ECAT 裝置：

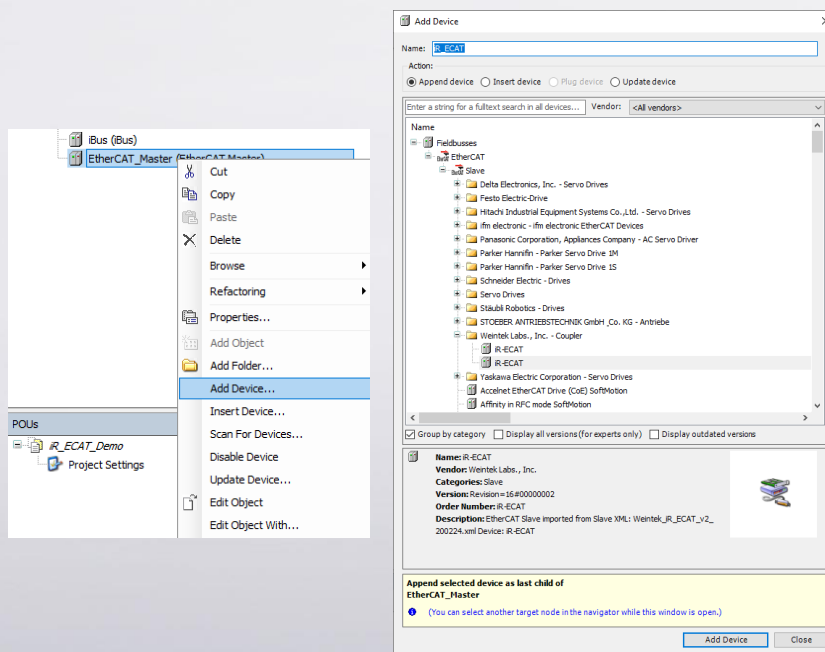
方法 1. 搜尋網路上的 iR-ECAT 裝置。

[EtherCAT\_Master]->[Scan for devices]->[Copy All Devices to Project]



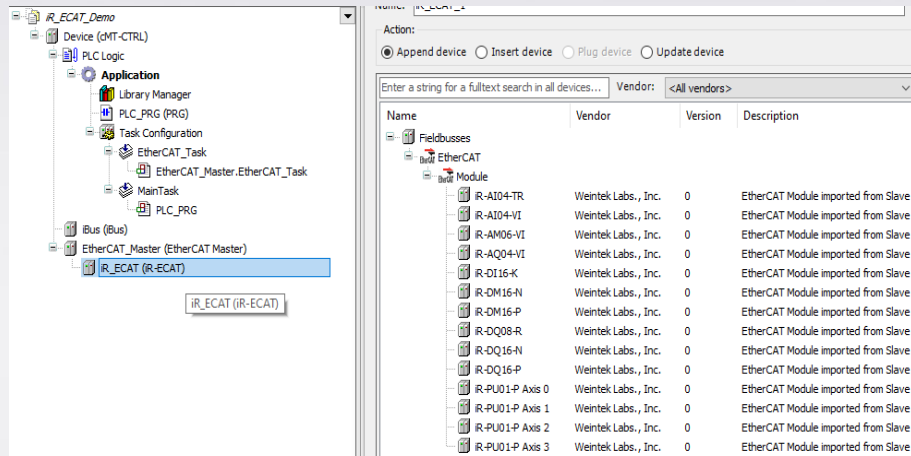
方法 2. 手動加入 iR-ECAT 裝置。

[EtherCAT\_Master] -> [Add Device] -> [Slave] -> [iR-ECAT]



● 加入 iR-ECAT 模組：

[iR-ECAT] -> [Add Device] -> [EtherCAT] -> [Module]



## ● 類比通道設定：

[iR-ECAT] ->[Startup Parameters] ->[Add]

Select Item from Object Directory

Index:Subindex	Name	Flags	Type	Default
16#8000:16#00	iR-AM06-VI Parameter			
16#800F:16#00	output value Parameter On error			
16#8010:16#00	iR-AI04-TR Parameter			
16#01	Channel 0 Mode	RW	UINT	16#0001
16#02	Channel 1 Mode	RW	UINT	16#0001
16#03	Channel 2 Mode	RW	UINT	16#0001
16#04	Channel 3 Mode	RW	UINT	16#0001
16#05	Channel 0 Scale Range Upper Limit	RW	INT	16#7d00
16#06	Channel 1 Scale Range Upper Limit	RW	INT	16#7d00
16#07	Channel 2 Scale Range Upper Limit	RW	INT	16#7d00
16#08	Channel 3 Scale Range Upper Limit	RW	INT	16#7d00
16#09	Channel 0 Scale Range Lower Limit	RW	INT	16#8300
16#0A	Channel 1 Scale Range Lower Limit	RW	INT	16#8300
16#0B	Channel 2 Scale Range Lower Limit	RW	INT	16#8300
16#0C	Channel 3 Scale Range Lower Limit	RW	INT	16#8300
16#0D	Channel 0 Filter Frame Size	RW	UINT	16#000a

Name:

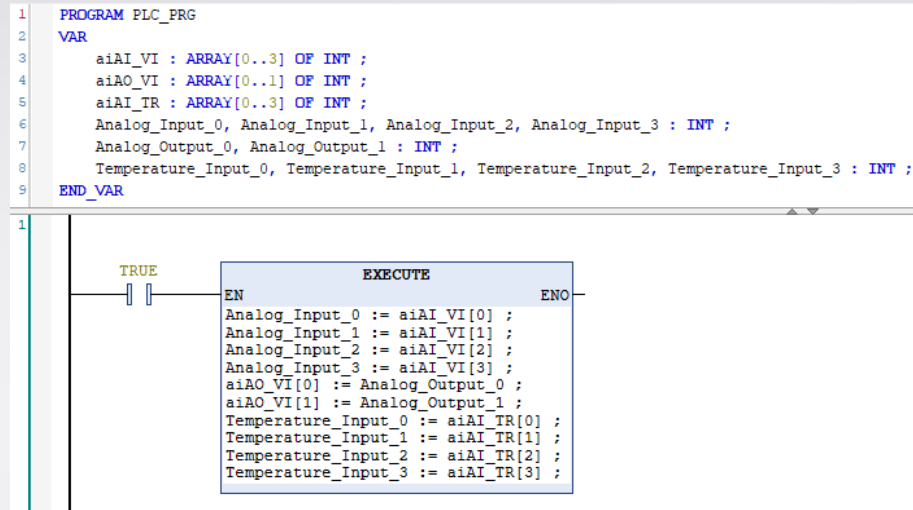
Index: 16#  Bitlength:

SubIndex: 16#  Value:

☐ Complete Access ☐ Byte Array

OK Cancel

## ● 宣告&程式編輯：



## ● 變數映射：

[iR-ECAT] ->[EtherCAT I/O Mapping]

General	Find	Filter	Show all
Process Data	Variable	Mapping	Channel
Startup Parameters	Application.PLC_PRG.aiAO_VI[0]		IR_AM06_VI AO1
EtherCAT I/O Mapping	Application.PLC_PRG.aiAO_VI[1]		IR_AM06_VI AO2
Status	Application.PLC_PRG.aiAI_VI[0]		IR_AM06_VI AI1
Information	Application.PLC_PRG.aiAI_VI[1]		IR_AM06_VI AI2
	Application.PLC_PRG.aiAI_VI[2]		IR_AM06_VI AI3
	Application.PLC_PRG.aiAI_VI[3]		IR_AM06_VI AI4
	Application.PLC_PRG.aiAI_TR[0]		IR_AI04_TR AI1
	Application.PLC_PRG.aiAI_TR[1]		IR_AI04_TR AI2
	Application.PLC_PRG.aiAI_TR[2]		IR_AI04_TR AI3
	Application.PLC_PRG.aiAI_TR[3]		IR_AI04_TR AI4

## ● 登入執行程式

※新增 iR-ECAT 類比模組，使用 cMT-CTRL01 參考專案

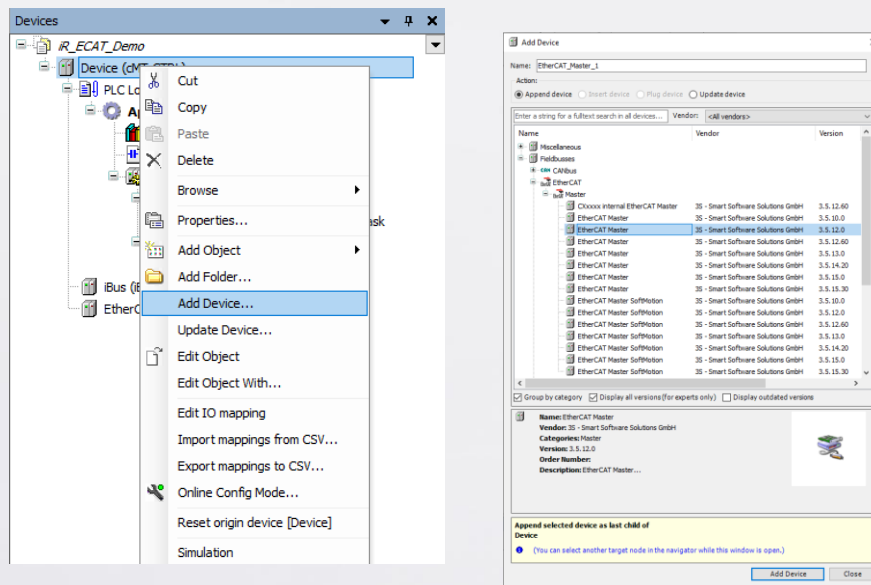
EtherCAT\_Master\_Demo\_CTRL01\_AIO；使用 cMT 系列 HMI 參考

EtherCAT\_Master\_Demo\_HMI\_AIO。

## 5. 新增運動控制模組

- 加入 EtherCAT\_Master 裝置(V3.5.12.0)：

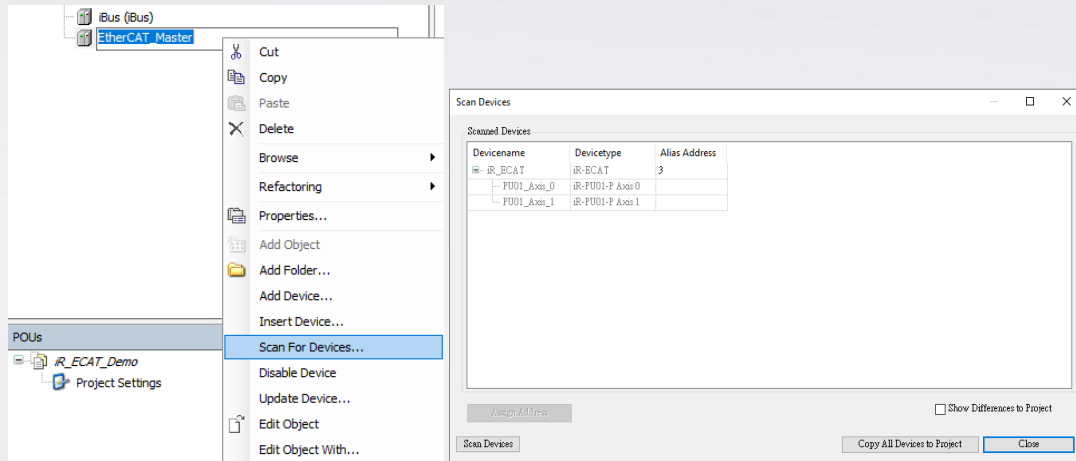
[Device]->[Add Device]->[Fieldbusses]->[EtherCAT] ->[Master]  
->[EtherCAT Master]



- 加入 iR-ECAT 裝置：

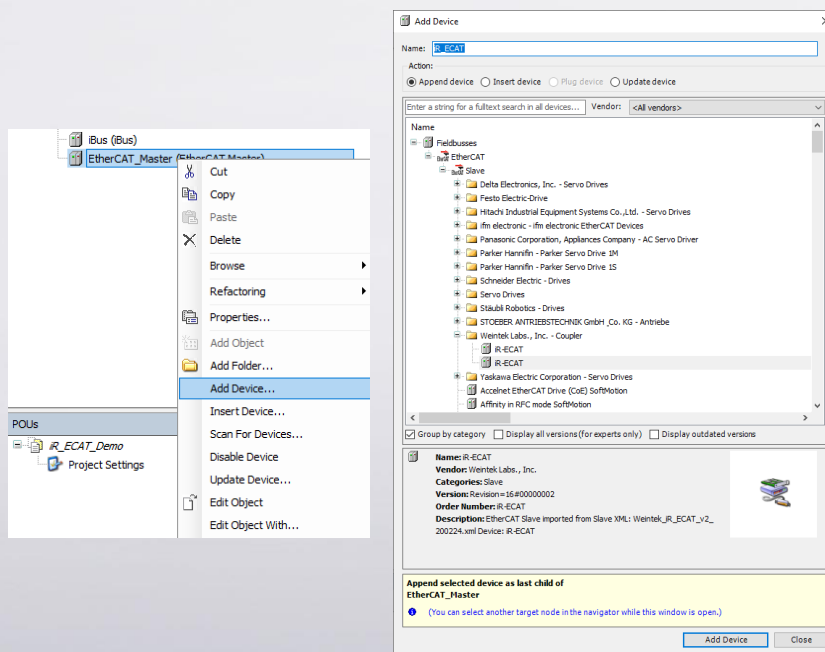
方法 1. 搜尋網路上的 iR-ECAT 裝置。

[EtherCAT\_Master]->[Scan for devices]->[Copy All Devices to Project]



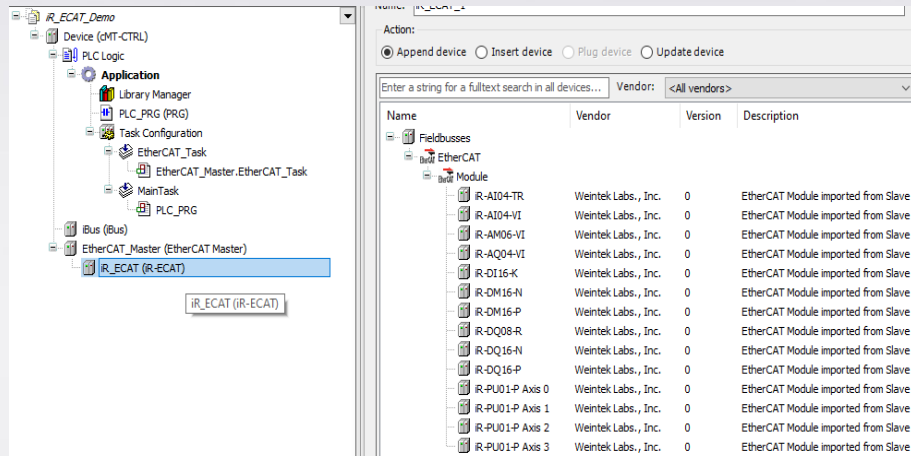
方法 2. 手動加入 iR-ECAT 裝置。

[EtherCAT\_Master] -> [Add Device] -> [Slave] -> [iR-ECAT]



- 加入 iR-ECAT 模組：

[iR-ECAT] -> [Add Device] -> [EtherCAT] -> [Module]



- 運動模組參數設定：

[iR-ECAT] ->[Startup Parameters] ->[Add]

Select Item from Object Directory

Index:Subindex	Name	Flags	Type	Def ^
16#2007:16#00	Axis 0 Abort connection option code	RW	UINT	
16#2040:16#00	Axis 0 Controlword	RW	UINT	
16#205E:16#00	Axis 0 Fault reaction option code	RW	UINT	
16#2060:16#00	Axis 0 Mode of operation	RW	USINT	
16#207A:16#00	Axis 0 Target Position	RW	UDINT	
16#207B:16#00	Axis 0 Position range limit*			
16#207C:16#00	Axis 0 Home offset	RW	UDINT	
16#207D:16#00	Axis 0 Software position limit*			
16#207F:16#00	Axis 0 Max Profile velocity*	RW	UDINT	
16#2080:16#00	Axis 0 Max motor speed*	RW	UDINT	
16#2081:16#00	Axis 0 Profile velocity	RW	UDINT	
16#2083:16#00	Axis 0 Profile acceleration	RW	UDINT	
16#2084:16#00	Axis 0 Profile deceleration	RW	UDINT	
16#2085:16#00	Axis 0 Quick stop deceleration*	RW	UDINT	
16#208F:16#00	Axis 0 Position Encoder Resolution*			

Name:

Index: 16#  Bitlength:

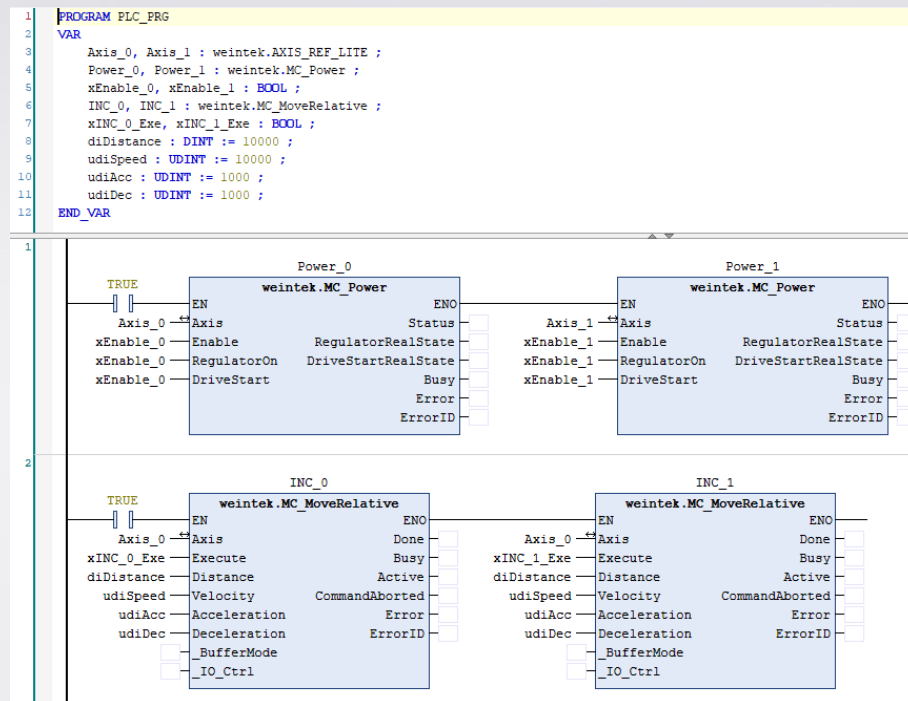
SubIndex: 16#  Value:

☐ Complete Access ☐ Byte Array

OK Cancel

- 宣告&程式編輯：





## ● 變數映射：

[iR-ECAT] ->[EtherCAT I/O Mapping]

General	Find	Filter	Show all
Process Data	Variable	Mapping	Channel
Startup Parameters	Application.PLC_PRG.aiAO_VI[0]	IR_AM06_VI AO1	%QW0
EtherCAT I/O Mapping	Application.PLC_PRG.aiAO_VI[1]	IR_AM06_VI AO2	%QW1
Status	Application.PLC_PRG.aiAI_VI[0]	IR_AM06_VI AI1	%IW1
Information	Application.PLC_PRG.aiAI_VI[1]	IR_AM06_VI AI2	%IW2
	Application.PLC_PRG.aiAI_VI[2]	IR_AM06_VI AI3	%IW3
	Application.PLC_PRG.aiAI_VI[3]	IR_AM06_VI AI4	%IW4
	Application.PLC_PRG.aiAI_TR[0]	IR_AIO4_TR AI1	%IW5
	Application.PLC_PRG.aiAI_TR[1]	IR_AIO4_TR AI2	%IW6
	Application.PLC_PRG.aiAI_TR[2]	IR_AIO4_TR AI3	%IW7
	Application.PLC_PRG.aiAI_TR[3]	IR_AIO4_TR AI4	%IW8

## ● 登入執行程式

※新增 iR-ECAT 運動控制模組，使用 cMT-CTRL01 參考專案

EtherCAT\_Master\_Demo\_CTRL01\_PU；使用 cMT 系列 HMI 參考

EtherCAT\_Master\_Demo\_HMI\_PU。



## 6. EtherCAT 網路型驅動器設定

- 下載 ESI 裝置描述檔：

在該品牌驅動器官網下載 ESI 檔案。

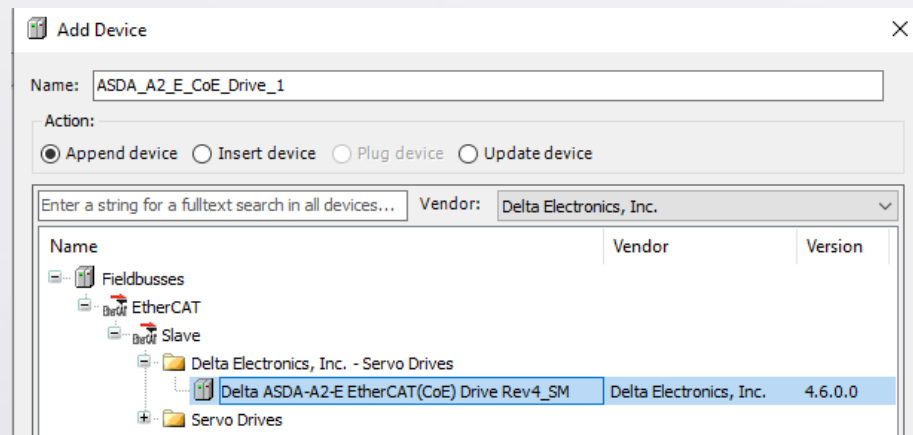
- CODESYS 操作：

1. 安裝 ESI 檔案。

[Tools] -> [Device Repository] -> [Install]

2. 加入 EtherCAT Master 裝置(V3.5.12.0)。

3. 加入驅動器。



4. 設定驅動器參數。

[Startup Parameters] -> [Add]

依照驅動器規格加入保護參數。

Select Item from Object Directory

Index:Subindex	Name	Flags	Type	Default
16#1600:16#00	1st Receive PDO Mapping	RW	USINT	
16#1601:16#00	2nd Receive PDO Mapping	RW	USINT	
16#1602:16#00	3rd Receive PDO Mapping	RW	USINT	
16#1603:16#00	4th Receive PDO Mapping	RW	USINT	
16#1A00:16#00	1st Transmit PDO Mapping	RW	USINT	
16#1A01:16#00	2nd Transmit PDO Mapping	RW	USINT	
16#1A02:16#00	3rd Transmit PDO Mapping	RW	USINT	
16#1A03:16#00	4th Transmit PDO Mapping	RW	USINT	
16#1C12:16#00	RxPDO assign	RW	USINT	
16#1C13:16#00	TxPDO assign	RW	USINT	
16#1C32:16#00	SM output parameter	RO	USINT	
16#1C33:16#00	SM input parameter	RO	USINT	
16#2001:16#00	DRV's Parameter P0-01	RW	UINT	
16#2002:16#00	DRV's Parameter P0-02	RW	UINT	
16#2003:16#00	DRV's Parameter P0-03	RW	UINT	
16#2004:16#00	DRV's Parameter P0-04	RW	UDINT	

Name:

Index: 16#  Bitlength:

SubIndex: 16#  Value:

☐ Byte Array

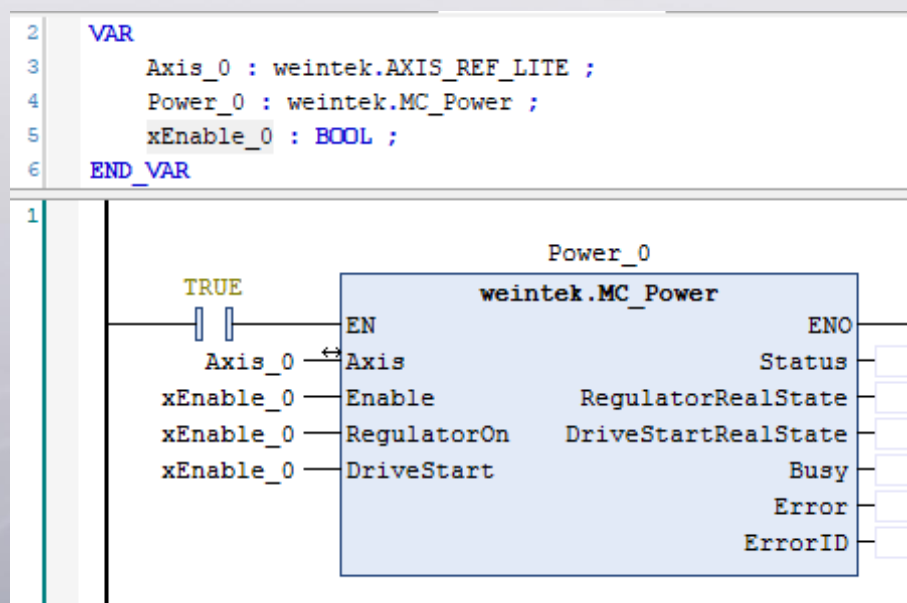
OK Cancel

## 5. 程式編輯 & 軸變數實例映射。

在[Process Data]勾選驅動器的控制方式。

General	Select the Outputs	Select the Inputs																																				
Process Data	<table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Index</th> </tr> </thead> <tbody> <tr><td>16#1600 1st RxPDO Mapping</td><td>UNT</td><td>16#6040:00</td></tr> <tr><td>Control Word</td><td>DINT</td><td>16#607A:00</td></tr> <tr><td>TargetPosition</td><td>DINT</td><td>16#60FF:00</td></tr> <tr><td>TargetVelocity</td><td>INT</td><td>16#6071:00</td></tr> <tr><td>ModeOfOperation</td><td>SINT</td><td>16#6060:00</td></tr> </tbody> </table>	Name	Type	Index	16#1600 1st RxPDO Mapping	UNT	16#6040:00	Control Word	DINT	16#607A:00	TargetPosition	DINT	16#60FF:00	TargetVelocity	INT	16#6071:00	ModeOfOperation	SINT	16#6060:00	<table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Index</th> </tr> </thead> <tbody> <tr><td>16#1A00 1st TxPDO Mapping</td><td>UNT</td><td>16#6041:00</td></tr> <tr><td>Status Word</td><td>DINT</td><td>16#6064:00</td></tr> <tr><td>ActualPosition</td><td>DINT</td><td>16#606C:00</td></tr> <tr><td>Velocity actual value</td><td>INT</td><td>16#6077:00</td></tr> <tr><td>ActualTorque</td><td>SINT</td><td>16#6066:00</td></tr> </tbody> </table>	Name	Type	Index	16#1A00 1st TxPDO Mapping	UNT	16#6041:00	Status Word	DINT	16#6064:00	ActualPosition	DINT	16#606C:00	Velocity actual value	INT	16#6077:00	ActualTorque	SINT	16#6066:00
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Velocity actual value	INT	16#6077:00																																				
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Startup Parameters	<table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Index</th> </tr> </thead> <tbody> <tr><td>16#1601 2nd RxPDO Mapping (excluded by 1)</td><td>UNT</td><td>16#6040:00</td></tr> <tr><td>Control Word</td><td>DINT</td><td>16#607A:00</td></tr> <tr><td>TargetPosition</td><td>DINT</td><td>16#60FF:00</td></tr> <tr><td>TargetVelocity</td><td>INT</td><td>16#6071:00</td></tr> </tbody> </table>	Name	Type	Index	16#1601 2nd RxPDO Mapping (excluded by 1)	UNT	16#6040:00	Control Word	DINT	16#607A:00	TargetPosition	DINT	16#60FF:00	TargetVelocity	INT	16#6071:00	<table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Index</th> </tr> </thead> <tbody> <tr><td>16#1A01 2nd TxPDO Mapping (e)</td><td>UNT</td><td>16#6041:00</td></tr> <tr><td>Status Word</td><td>DINT</td><td>16#6064:00</td></tr> <tr><td>ActualPosition</td><td>DINT</td><td>16#606C:00</td></tr> <tr><td>Velocity actual value</td><td>INT</td><td>16#6077:00</td></tr> </tbody> </table>	Name	Type	Index	16#1A01 2nd TxPDO Mapping (e)	UNT	16#6041:00	Status Word	DINT	16#6064:00	ActualPosition	DINT	16#606C:00	Velocity actual value	INT	16#6077:00						
Name	Type	Index																																				
16#1601 2nd RxPDO Mapping (excluded by 1)	UNT	16#6040:00																																				
Control Word	DINT	16#607A:00																																				
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Velocity actual value	INT	16#6077:00																																				
EtherCAT I/O Mapping	<table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Index</th> </tr> </thead> <tbody> <tr><td>16#1602 3rd RxPDO Mapping (excluded by 1)</td><td>UNT</td><td>16#6040:00</td></tr> <tr><td>Control Word</td><td>DINT</td><td>16#607A:00</td></tr> <tr><td>TargetPosition</td><td>DINT</td><td>16#60FF:00</td></tr> <tr><td>TargetVelocity</td><td>INT</td><td>16#6071:00</td></tr> </tbody> </table>	Name	Type	Index	16#1602 3rd RxPDO Mapping (excluded by 1)	UNT	16#6040:00	Control Word	DINT	16#607A:00	TargetPosition	DINT	16#60FF:00	TargetVelocity	INT	16#6071:00	<table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Index</th> </tr> </thead> <tbody> <tr><td>16#1A02 3rd TxPDO Mapping (e)</td><td>UNT</td><td>16#6041:00</td></tr> <tr><td>Status Word</td><td>DINT</td><td>16#6064:00</td></tr> <tr><td>ActualPosition</td><td>DINT</td><td>16#606C:00</td></tr> <tr><td>Velocity actual value</td><td>INT</td><td>16#6077:00</td></tr> </tbody> </table>	Name	Type	Index	16#1A02 3rd TxPDO Mapping (e)	UNT	16#6041:00	Status Word	DINT	16#6064:00	ActualPosition	DINT	16#606C:00	Velocity actual value	INT	16#6077:00						
Name	Type	Index																																				
16#1602 3rd RxPDO Mapping (excluded by 1)	UNT	16#6040:00																																				
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ActualPosition	DINT	16#606C:00																																				
Velocity actual value	INT	16#6077:00																																				
Status	<table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Index</th> </tr> </thead> <tbody> <tr><td>16#1603 4th RxPDO Mapping (excluded by 1)</td><td>UNT</td><td>16#6040:00</td></tr> <tr><td>Control Word</td><td>DINT</td><td>16#607A:00</td></tr> <tr><td>TargetPosition</td><td>DINT</td><td>16#60FF:00</td></tr> <tr><td>TargetVelocity</td><td>INT</td><td>16#6071:00</td></tr> </tbody> </table>	Name	Type	Index	16#1603 4th RxPDO Mapping (excluded by 1)	UNT	16#6040:00	Control Word	DINT	16#607A:00	TargetPosition	DINT	16#60FF:00	TargetVelocity	INT	16#6071:00	<table border="1"> <thead> <tr> <th>Name</th> <th>Type</th> <th>Index</th> </tr> </thead> <tbody> <tr><td>16#1A03 4th TxPDO Mapping (e)</td><td>UNT</td><td>16#6041:00</td></tr> <tr><td>Status Word</td><td>DINT</td><td>16#6064:00</td></tr> <tr><td>ActualPosition</td><td>DINT</td><td>16#606C:00</td></tr> <tr><td>Velocity actual value</td><td>INT</td><td>16#6077:00</td></tr> </tbody> </table>	Name	Type	Index	16#1A03 4th TxPDO Mapping (e)	UNT	16#6041:00	Status Word	DINT	16#6064:00	ActualPosition	DINT	16#606C:00	Velocity actual value	INT	16#6077:00						
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Information																																						

使用 Weintek\_CODESYS\_Library 的運動控制功能塊編輯程式。

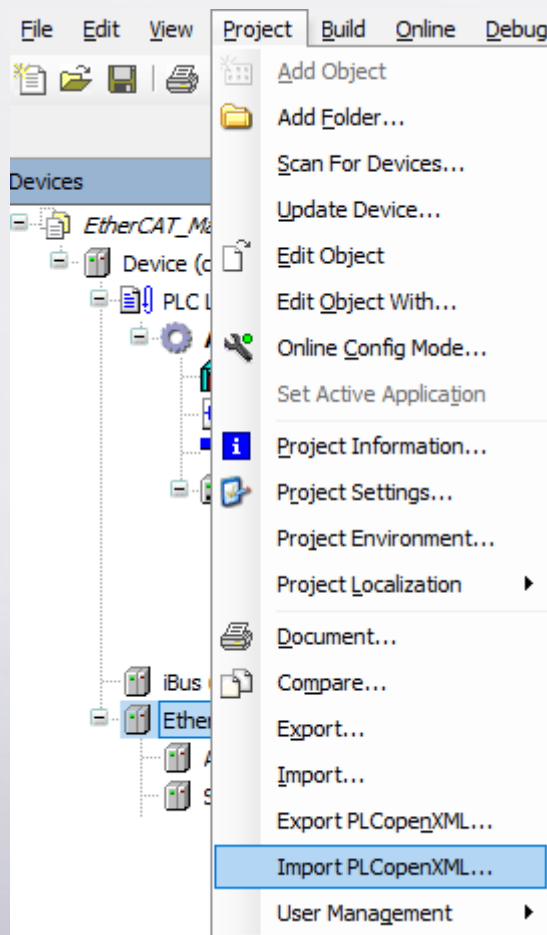


將軸變數實例的 I/O 填入[EtherCAT I/O Mapping]。

General	Find	Filter	Show all				
Process Data	Variable	Mapping	Channel	Address	Type	Unit	Description
Startup Parameters	Application.PLC_PRG.Axis_0.Mapping_Q.Obj.ControlWord		Control Word	%QW6	UDINT		Control Word
EtherCAT I/O Mapping	Application.PLC_PRG.Axis_0.Mapping_Q.Obj.TargetPosition		TargetPosition	%QD1	DINT		TargetPosition
Status	Application.PLC_PRG.Axis_0.Mapping_Q.Obj.TargetVelocity		TargetVelocity	%QD2	DINT		TargetVelocity
Information	Application.PLC_PRG.Axis_0.Mapping_Q.Obj.TargetTorque		TargetTorque	%QW6	DINT		TargetTorque
	Application.PLC_PRG.Axis_0.Mapping_Q.Obj.ModeOp		ModeOfOperation	%QD4	SINT		ModeOfOperation
	Application.PLC_PRG.Axis_0.Mapping_I.Obj.Statusword		Status Word	%IWD2	UDINT		Status Word
	Application.PLC_PRG.Axis_0.Mapping_I.Obj.PositionActual		ActualPosition	%ID2	DINT		ActualPosition
	Application.PLC_PRG.Axis_0.Mapping_I.Obj.VelocityActual		Velocity actual value	%ID3	DINT		Velocity actual value
	Application.PLC_PRG.Axis_0.Mapping_I.Obj.TorqueActual		ActualTorque	%IWD8	DINT		ActualTorque
	Application.PLC_PRG.Axis_0.Mapping_I.Obj.ModeOpDisp		ModeOfOperationDisplay	%ID18	SINT		ModeOfOperationDisplay

## 6. 登入測試。

※威綸提供 PLCopenXML 檔方便使用者快速使用網路型驅動器。在 [EtherCAT\_Master] 裝置上點選 [Project]->[Import PLCopenXML] 選擇 Weintek\_Axis\_Template.XML (檔案可在 iR Resource 文件中下載)



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