

ECAT-2000 系列 EtherCAT 從站 I/O 模組使用手冊

繁體中文

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支援

ECAT-2024/2028/2028C

ECAT-2045/2045-32

ECAT-2050/2051/2051-32

ECAT-2052/2052-NPN

ECAT-2053/2055/2055-32

ECAT-2057/2057-NPN/2057-8P8N/2057-32

ECAT-2060

ECAT-2061

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1. 簡介

ECAT-2000 系列是工業 EtherCAT SubDevice 模組且支援了 EtherCAT 協定，還能夠建構 Daisy Chain 網路拓撲 (如，星形、線形或環形)，可簡化線路配置與維護的複雜度，降低佈線成本與交換器的需求，使安裝更具靈活性。ECAT-2000 系列還具有隔離型的輸入和輸出設計，能夠防止有害的環境干擾。

ECAT-2000 系列通過一系列合格測試驗證且符合 RoHS 環保規範，使用合格的 EtherCAT MainDevice 及配置工具就可輕易的操控它，並完成您的各種應用。圖1.1 顯示了典型的 ECAT-2000 應用。

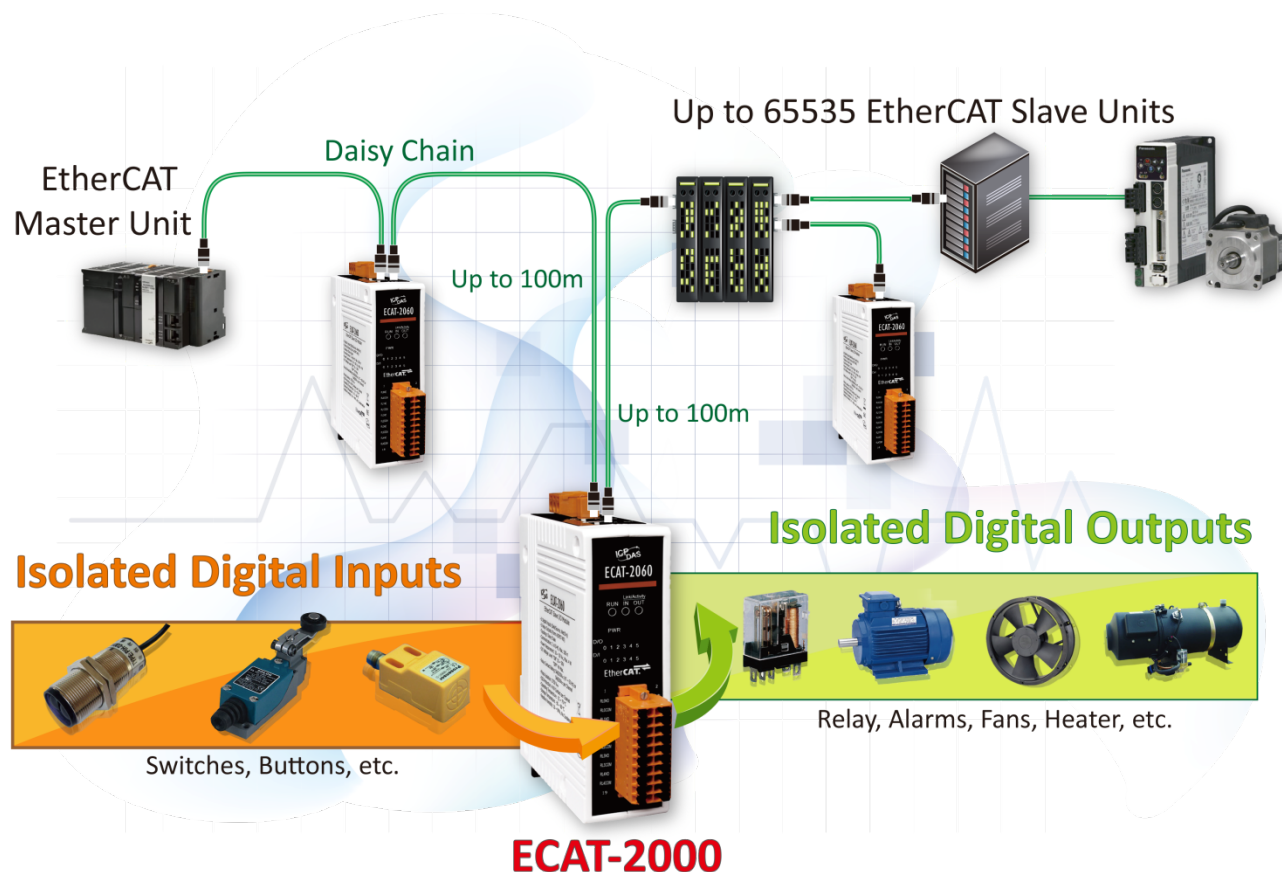


圖 1.1 ECAT-2000 典型應用

1.1 配件清單

產品包裝內應包含下列配件：



ECAT-2000



快速入門指南



注意

如發現產品包裝內的配件有任何損壞或遺失，請保留完整包裝盒及配件，盡快聯繫我們，我們將有專人快速為您服務。

更多資訊：

- 使用手冊/快速入門指南/產品型錄：

https://www.icpdas.com/tw/product/guide+Industrial_Communication+EtherCAT+IO

- XML 設備明說 (ESI)：

<https://www.icpdas.com/tw/download/show.php?num=7788&model=ECAT-2055>

<https://www.icpdas.com/tw/download/show.php?num=7790&model=ECAT-2024>

1.2 產品資訊

ECAT-2000 系列 EtherCAT 從站 I/O 模組支援了多種輸出入類型，如：光隔離輸入

(Photo-Isolated DI)、繼電器觸點 (Relay Contact)、光繼電器 (PhotoMOS Relay) 及

Open-Collector 輸出等。其各系列模組詳細介紹如下：

數位輸出入模組

模組	說明
ECAT-2045	16 個隔離型數位輸出(Sink)通道模組
ECAT-2045-32	32 個隔離型數位輸出(Sink)通道模組
ECAT-2050	4 個隔離型數位輸出(Sink/Source)通道及 13 個隔離型數位輸入通道模組
ECAT-2051	16 個隔離型數位輸入(Wet/Dry)通道模組
ECAT-2051-32	32 個隔離型數位輸入(Wet/Dry)通道模組
ECAT-2052	8 個隔離型數位輸入(Wet)通道及 8 個隔離型數位輸出(Source)通道模組
ECAT-2052-NPN	8 個隔離型數位輸入(Wet)通道及 8 個隔離型數位輸出(Sink)通道模組
ECAT-2053	16 個隔離型數位輸入(Wet)通道模組
ECAT-2055	8 個隔離型數位輸入(Wet/Dry)通道及 8 個隔離型數位輸出(Sink)通道模組
ECAT-2055-32	16 個隔離型數位輸入(Wet/Dry)通道及 16 個隔離型數位輸出(Sink)通道模組
ECAT-2057	16 個隔離型數位輸出(Source)通道模組
ECAT-2057-32	32 個隔離型數位輸出(Source)通道模組
ECAT-2057-NPN	16 個隔離型數位輸出(Sink)通道模組
ECAT-2057-8P8N	8 個隔離型 Source 數位輸出通道及 8 個隔離型 Sink 數位輸出通道模組
ECAT-2060	6 個隔離型數位輸入(Wet/Dry)通道及 6 個隔離型 Relay 輸出通道模組
ECAT-2061	16 個隔離型 Relay 輸出通道模組

類比輸出模組

模組	說明
ECAT-2024	4 個 12-bit 類比電壓輸出通道模組
ECAT-2028	8 個 12-bit 類比電壓輸出通道模組
ECAT-2028C	8 個 12-bit 類比電壓電流輸出通道模組

1.3 選型指南

DC 數位輸出入					
模組	數位輸出		數位輸出		
	通道	類型	通道	類型	最大負載電流
ECAT-2057	-	-	16	Open Emitter(Source)	100 mA/ch
ECAT-2057-32	-	-	32	Open Emitter(Source)	500 mA/ch
ECAT-2057-NPN	-	-	16	Open Collector(Sink)	100 mA/ch
ECAT-2057-8P8N	-	-	8	Open Collector(Sink)	100 mA/ch
			8	Open Emitter(Source)	100 mA/ch
ECAT-2045	-	-	16	Open Collector(Sink)	700 mA/ch
ECAT-2045-32	-	-	32	Open Collector(Sink)	500 mA/ch
ECAT-2051	16	Dry (Source), Wet (Sink/Source)	-	-	-
ECAT-2051-32	32	Dry (Source), Wet (Sink/Source)	-	-	-
ECAT-2050	13	Dry (Source), Wet (Sink/Source)	4	Open Collector/Emitter (Jumper Selectable)	100 mA/ch
ECAT-2052	8	Wet (Sink/Source)	8	Open Emitter(Source)	100 mA/ch
ECAT-2052-NPN	8	Wet (Sink/Source)	8	Open Collector(Sink)	100 mA/ch
ECAT-2053	16	Wet (Sink/Source)	-	-	-
ECAT-2055	8	Dry (Source), Wet (Sink/Source)	8	Open Collector(Sink)	700 mA/ch
ECAT-2055-32	16	Dry (Source), Wet (Sink/Source)	16	Open Collector(Sink)	700 mA/ch
ECAT-2060	6	Dry (Source), Wet (Sink/Source)	6	Relay, Form A (SPST-NO)	5A/ch
ECAT-2061	-	-	16	Relay, Form A (SPST-NO)	5A/ch

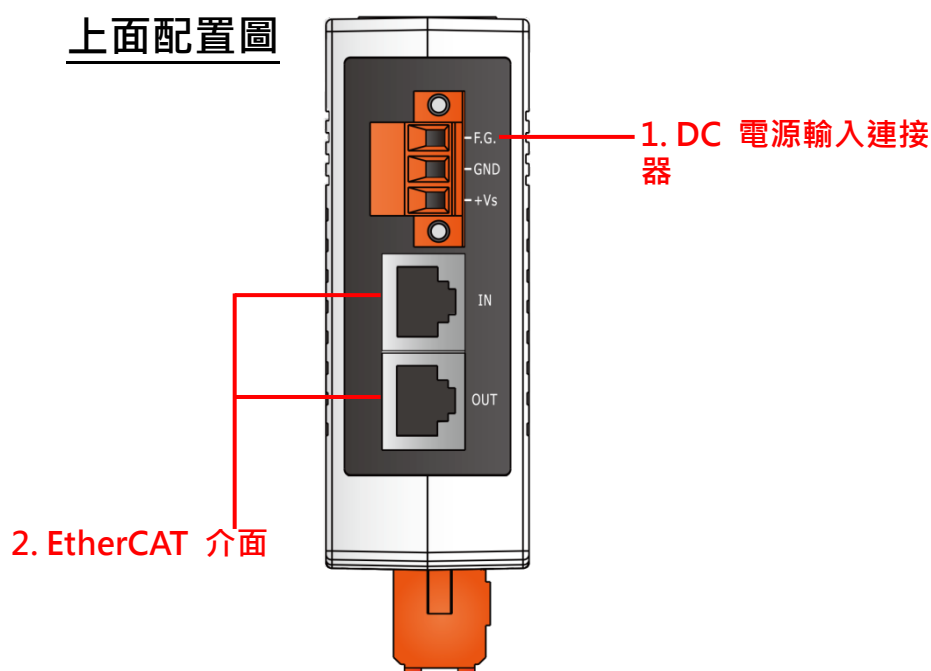
類比輸出						
模組	類比輸出					
	解析度	通道	電壓輸出	電流輸出	精準度	輸出能力
ECAT-2024	12-bit	4	0 ~ 5 V, +/- 5 V, 0 ~ 10 V, +/- 10 V	-	±2 LSB	10V @ 5mA
ECAT-2028	12-bit	8	0 ~ 5 V, +/- 5 V, 0 ~ 10 V, +/- 10 V	-	±2 LSB	10V @ 5mA
ECAT-2028C	12-bit	8	0 ~ 5 V, +/- 5 V, 0 ~ 10 V, +/- 10 V 0-10mA, 0-20mA	-	±2 LSB	10V @ 5mA

2. 硬體資訊

2.1 配置圖

下面包含 ECAT-2000 系列模組前面及上面的配置圖，包含 I/O 接線端子連接器、LED 指示燈、Ethernet Port、運作模式開關及電源輸入連接器...等。

上面配置圖



1. DC 電源輸入連接器

電源接線端子連接器上的 “+Vs” 及 “GND” 適用於 ECAT-2000 系列模組，用於直流供電方式開機。有效的電源輸入範圍: +10 ~ +30 V_{DC}。

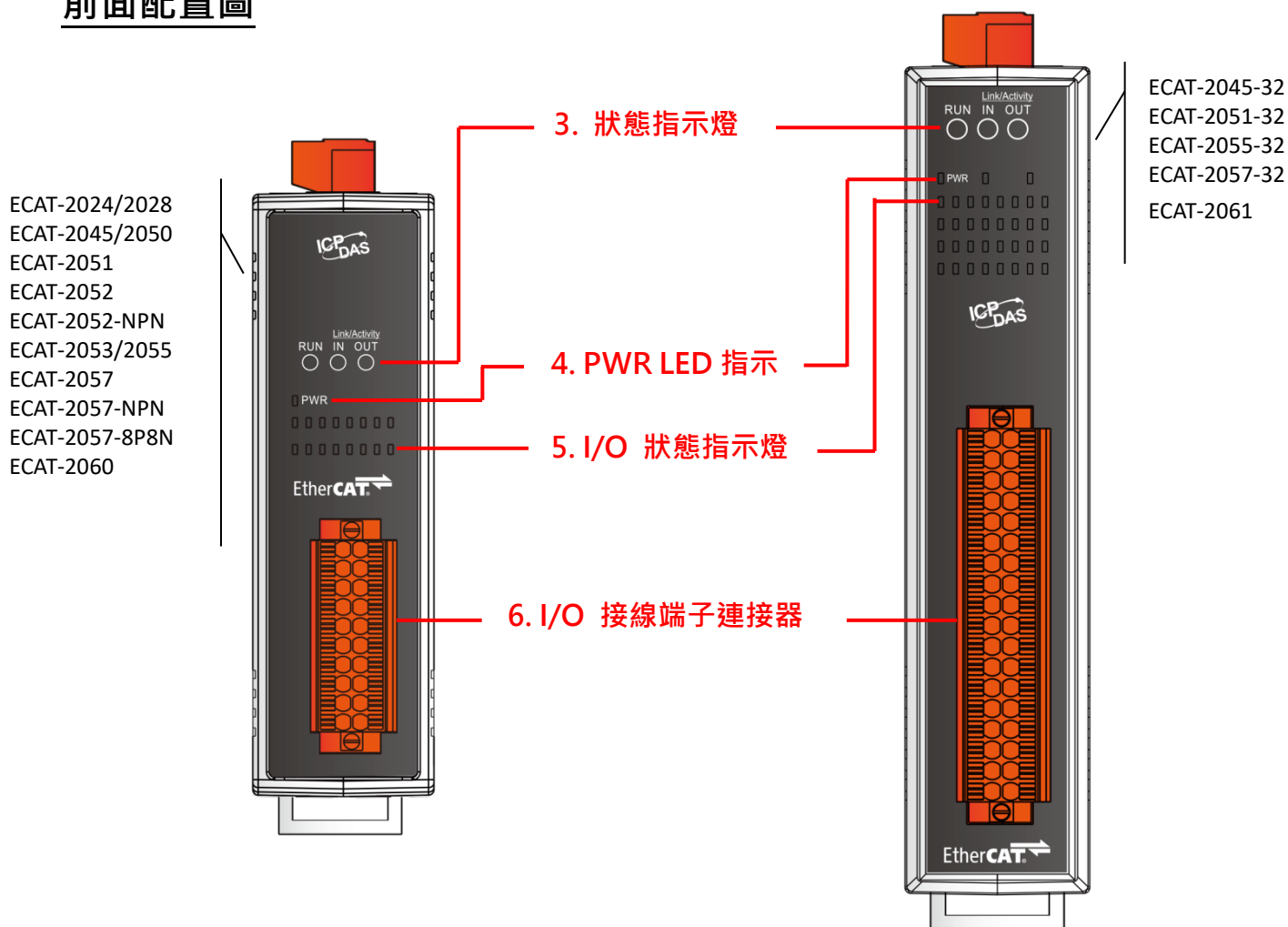
“F.G.” (Frame Ground):

在大陸性氣候區裡，電子電路不斷受到靜電 (ESD) 影響，ECAT-2000 系列模組設計有 Frame Ground (F.G.)，提供靜電依接地路徑釋放 (ESD)，因此能夠增強靜電 (ESD) 保護，確保模組更穩定可靠。

2. EtherCAT 介面

ECAT-2000 系列模組包含二個 RJ-45 插座為 EtherCAT 標準介面 IN 埠為 EtherCAT 信號輸入端用來與 EtherCAT Master 或上一個 EtherCAT Slave 的 EtherCAT 介面 OUT 埠作連結，OUT 埠為 EtherCAT 信號輸出端用來與下一個 EtherCAT Slave 的 EtherCAT 介面 IN 埠作連結。

前面配置圖



3. 狀態指示燈

項目	顏色	狀態	說明
RUN	綠色	OFF	設備處於 INIT 狀態
		閃爍	燈號顯示將以 2.5 Hz 頻率來分辨開啟或關閉， 閃爍 200 ms, 接著停止 200 ms
		閃一次	燈號將亮起 200 ms，接著停止 1000 ms
		ON	設備處於 OPERARIONAL 狀態
Link Activity IN/OUT	綠色	OFF	沒有偵測到網路連線
		閃爍	網路封包收送中
		ON	偵測到網路連線

4. PWR LED 指示燈

一旦 ECAT-2000 系列模組通電開機後，模組上的 PWR LED 指示燈將亮起。

5. I/O 狀態指示燈

I/O 狀態指示燈是依據各 ECAT-2000 系列模組將會有不同設計與功能。

項目	顏色	狀態	說明
DI	綠色	OFF	輸入電壓低於開關閾值(Switching Threshold)下限電壓
		ON	輸入電壓高於開關閾值(Switching Threshold)上限電壓
DO	綠色	OFF	數位輸出狀態為 "OFF"
		ON	數位輸出狀態為 "ON"

6. I/O 接線端子連接器

可拆卸式的 I/O 接線端子連接器，是依據各 ECAT-2000 系列模組將會有不同的腳位配置。各系列模組詳細的腳位定義，請參考至 [第 2.3 節 “腳位定義”](#)。

2.2 規格

2.2.1 系統規格

項目	規格
Communication	
Ethernet Port	2 x RJ-45, 100 BASE-TX
Protocol	EtherCAT
Distance between Station	Max. 100 m (100 BASE-TX)
Data Transfer Medium	Ethernet/EtherCAT Cable (Min. CAT 5), Shielded
LED Indicators	
PWR	1
L/A IN (Link/Activity IN)	1
L/A OUT (Link/Activity OUT)	1
RUN	1
EMS Protection	
ESD (IEC 61000-4-2)	4 KV Contact for Each Channel
EFT (IEC 61000-4-4)	Power: 1 KV Class A; Signal: 1 KV Class A
Surge (IEC 61000-4-5)	1 KV Class A
Hi-Pot	1KV Class A
Power	
Powered from Terminal Block	+10 ~ +30 V _{DC}
Power Consumption	4 W (Max.)
Mechanical	
Installation	DIN-Rail Mounting
Environment	
Operating Temperature	-25 ~ +75°C
Storage Temperature	-30 ~ +80°C
Relative Humidity	10 ~ 90% RH, Non-condensing

模組	ECAT-2024/2028/2028C ECAT-2045/2050/2051 ECAT-2052/2052-NPN ECAT-2053/2055 ECAT-2057/2057-NPN/2057-8P8N ECAT-2060	ECAT-2045-32 ECAT-2051-32 ECAT-2055-32 ECAT-2057-32 ECAT-2061
Dimensions (L x W x H)	110 mm x 90 mm x 33 mm	140 mm x 112.2 mm x 31 mm

2.2.2 I/O 規格

ECAT-2024/2028

模組	ECT-2024	ECAT-2028	ECAT-2028C
Analog Output			
Channels	4	8	
Range	$\pm 5\text{ V}$, $\pm 10\text{ V}$, $0\sim 5\text{ V}$, $0\sim 10\text{ V}$		$\pm 5\text{ V}$, $\pm 10\text{ V}$, $0\sim 5\text{ V}$, $0\sim 10\text{ V}$, $0\sim 10\text{ mA}$, $0\sim 20\text{ mA}$
Resolution	12-bit		
Accuracy	$\pm 0.1\%$ of FSR		
Zero Drift	$\pm 30\text{ }\mu\text{V}/^{\circ}\text{C}$		
Span Drift	$\pm 25\text{ ppm}/^{\circ}\text{C}$		

ECAT-2045/2045-32

模組	ECT-2045	ECAT-2045-32
Digital Output		
Channels	16	32
Type	Open collector	
Sink/Source (NPN/PNP)	Sink	
Load Voltage	$+3.5\text{ V} \sim +50\text{ V}$	
Max. Load Current	700 mA/Channel	500 mA/Channel
Isolation Voltage	3750 Vrms	

ECAT-2051/2051-32

模組	ECAT-2051	ECAT-2051-32
Digital Input		
Channels	16	32
Contact	Dry/Wet	
Sink/Source (NPN/PNP)	Dry:Sink, Wet:Sink/Source	
On Voltage Level	Dry:Close to GND, Wet: $+10\text{ V}_{\text{DC}} \sim +50\text{ V}_{\text{DC}}$	
Off Voltage Level	Dry:Open, Wet: $+4\text{ V}_{\text{DC}}$ Max.	
Isolation Voltage	3750 V _{DC}	

ECAT-2052/2052-NPN

模組	ECAT-2052		ECAT-2052-NPN
Digital Input			
Channels	8		
Contact	Wet		
Sink/Source (NPN/PNP)	Sink/Source		
On Voltage Level	+3.5 V _{DC} ~ +50 V _{DC}		
Off Voltage Level	+2 V _{DC} Max.		
Isolation Voltage	3750 V _{DC}		
Digital Output			
Channels	8		
Type	Open emitter	Open collector	
Sink/Source (NPN/PNP)	Source	Sink	
Load Voltage	+3.5 V ~ +50 V		
Max. Load Current	700 mA/Channel		
Isolation Voltage	3750 Vrms		

ECAT-2053

模組	ECAT-2053
Digital Input	
Channels	16
Contact	Wet
Sink/Source (NPN/PNP)	Sink/Source
On Voltage Level	Wet: $+3.5 V_{DC} \sim +50 V_{DC}$
Off Voltage Level	Wet: $+2 V_{DC} \text{ Max.}$
Isolation Voltage	$3750 V_{DC}$

ECAT-2055/2055-32

模組	ECAT-2055	ECAT-2055-32
Digital Input		
Channels	8	16
Contact	Dry/Wet	
Sink/Source (NPN/PNP)	Dry:Sink Wet:Sink/Source	
On Voltage Level	Dry:Close to GND Wet:+10 V _{DC} ~ +50 V _{DC}	
Off Voltage Level	Dry:Open Wet:+4 V _{DC} Max.	
Isolation Voltage	3750 V _{DC}	
Digital Output		
Channels	8	16
Type	Open collector	
Sink/Source (NPN/PNP)	Sink	
Load Voltage	+3.5 V ~ +50 V	
Max. Load Current	700 mA/Channel	
Isolation Voltage	3750 Vrms	

ECAT-2057/2057-NPN/2057-8P8N

模組	ECT-2057	ECAT-2057-NPN	ECAT-2057-8P8N
Digital Output			
Channels	16	16	16(8 NPN,8 PNP)
Type	Open emitter	Open collector	Open collector/emitter
Sink/Source (NPN/PNP)	Source	Sink	Sink/Source
Load Voltage	+3.5 V ~ +50 V		
Max. Load Current	100 mA/Channel		
Isolation Voltage	3750 Vrms		

ECAT-2057-32

模組	ECAT-2057-32
Digital Output	
Channels	32
Type	Open emitter
Sink/Source (NPN/PNP)	Source
Load Voltage	+10 V _{DC} ~ +40 V _{DC}
Max. Load Current	500 mA/Channel
Isolation Voltage	2500 V _{DC}

ECAT-2050

模組	ECAT-2050
Digital Input	
Channels	13
Contact	Wet(Sink/Source)
Sink/Source (NPN/PNP)	Sink/Source
On Voltage Level	+3.5 V _{DC} ~ +50 V _{DC}
Off Voltage Level	:+2 V _{DC} Max.
Isolation Voltage	3750 V _{DC}
Digital Output	
Channels	4
Type	Open collector/emitter
Sink/Source (NPN/PNP)	Sink/Source
Load Voltage	+3.5 V ~ +50 V
Max. Load Current	100 mA/Channel
Isolation Voltage	3750 Vrms

ECAT-2060/2061

模組	ECAT-2060	ECAT-2061
Digital Input		
Channels	6	-
Contact	Dry/Wet	
Sink/Source (NPN/PNP)	Dry:Sink Wet:Sink/Source	
On Voltage Level	Dry:Close to GND Wet:+10 V _{DC} ~ +50 V _{DC}	
Off Voltage Level	Dry:Open Wet:+4 V _{DC} Max.	
Isolation Voltage	3750 V _{DC}	
Digital Output		
Channels	6	16
Type	Form A (SPST-NO)	
Contact Rating (Resistive Load)	5 A @30 V _{DC} 5 A @ 125/250 V _{AC} (47 ~ 63 Hz)	3 A @30 V _{DC} 3 A @ 125/250 V _{AC} (47 ~ 63 Hz)
Operate Time	10 ms Max.	
Release Time	5 ms Max.	
Mechanical Endurance	2 x 10 ⁷ Ops.	
Electrical Endurance	1x 10 ⁵ Ops.	

2.3 腳位定義

EtherCAT 介面

Terminal No.	Pin Assignment
PWR	F.G.
	GND
	+ Vs
IN	
OUT	

ECAT-2024

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	VOUT0		VOUT1	2
3	GND		GND	4
5	VOUT2		VOUT3	6
7	GND		GND	8
9	N/A		N/A	10
11	N/A		N/A	12
13	N/A		N/A	14
15	N/A		N/A	16
17	F.G.		F.G.	18
19	F.G.		F.G.	20

ECAT-2028

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	VOUT0		VOUT1	2
3	GND		GND	4
5	VOUT2		VOUT3	6
7	GND		GND	8
9	VOUT4		VOUT5	10
11	GND		GND	12
13	VOUT6		VOUT7	14
15	GND		GND	16
17	F.G.		F.G.	18
19	F.G.		F.G.	20

ECAT-2028C

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	VOUT0		IOUT0	2
3	VOUT1		IOUT1	4
5	VOUT2		IOUT2	6
7	VOUT3		IOUT3	8
9	VOUT4		IOUT4	10
11	VOUT5		IOUT5	12
13	VOUT6		IOUT6	14
15	VOUT7		IOUT7	16
17	GND.		GND.	18
19	GND		GND	20

ECAT-2045/2057/2057-NPN/2057-8P8N

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	EXT.GND		EXT.GND	2
3	DO0		DO8	4
5	DO1		DO9	6
7	DO2		DO10	8
9	DO3		DO11	10
11	DO4		DO12	12
13	DO5		DO13	14
15	DO6		DO14	16
17	DO7		DO15	18
19	EXT.PWR		EXT.PWR	20

ECAT-2051

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	GND		GND	2
3	DI0		DI8	4
5	DI1		DI9	6
7	DI2		DI10	8
9	DI3		DI11	10
11	DI4		DI12	12
13	DI5		DI13	14
15	DI6		DI14	16
17	DI7		DI15	18
19	DI.COM		DI.COM	20

ECAT-2052/2052-NPN

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	EXT.GND		N.C.	2
3	DO0		DI0	4
5	DO1		DI1	6
7	DO2		DI2	8
9	DO3		DI3	10
11	DO4		DI4	12
13	DO5		DI5	14
15	DO6		DI6	16
17	DO7		DI7	18
19	EXT.PWR		DI.COM	20

ECAT-2053

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	N.C.		N.C.	2
3	DI0		DI8	4
5	DI1		DI9	6
7	DI2		DI10	8
9	DI3		DI11	10
11	DI4		DI12	12
13	DI5		DI13	14
15	DI6		DI14	16
17	DI7		DI15	18
19	DI.COM		DI.COM	20

ECAT-2055

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	EXT.GND		GND	2
3	DO0		DI0	4
5	DO1		DI1	6
7	DO2		DI2	8
9	DO3		DI3	10
11	DO4		DI4	12
13	DO5		DI5	14
15	DO6		DI6	16
17	DO7		DI7	18
19	EXT.PWR		DI.COM	20

ECAT-2060

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	NO0		GND	2
3	COM0		DI0	4
5	NO1		DI1	6
7	COM1		DI2	8
9	NO2		DI3	10
11	COM2		DI4	12
13	NO3		DI5	14
15	COM3		DI.COM	16
17	NO4		NO5	18
19	COM4		COM5	20

ECAT-2050

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	DI.COM		DI0	2
3	DI1		DI2	4
5	DI3		DI4	6
7	DI5		DI6	8
9	DI7		DI8	10
11	DI9		DI10	12
13	DI11		DI12	14
15	DO3		DO2	16
17	DO1		DO0	18
19	EXT.PWR		EXT.GND	20

ECAT-2045-32/2057-32

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	EXT.PWR		EXT.PWR	19
2	DO16		DO0	20
3	DO17		DO1	21
4	DO18		DO2	22
5	DO19		DO3	23
6	DO20		DO4	24
7	DO21		DO5	25
8	DO22		DO6	26
9	DO23		DO7	27
10	DO24		DO8	28
11	DO25		DO9	29
12	DO26		DO10	30
13	DO27		DO11	31
14	DO28		DO12	32
15	DO29		DO13	33
16	DO30		DO14	34
17	DO31		DO15	35
18	EXT.GND		EXT.GND	36

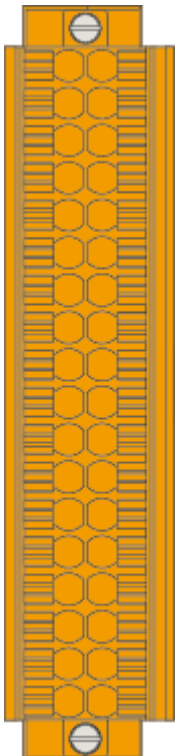
ECAT-2051-32

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	GND		GND	19
2	DI16		DI0	20
3	DI17		DI1	21
4	DI18		DI2	22
5	DI19		DI3	23
6	DI20		DI4	24
7	DI21		DI5	25
8	DI22		DI6	26
9	DI23		DI7	27
10	DI24		DI8	28
11	DI25		DI9	29
12	DI26		DI10	30
13	DI27		DI11	31
14	DI28		DI12	32
15	DI29		DI13	33
16	DI30		DI14	34
17	DI31		DI15	35
18	DI.COM		DI.COM	36

ECAT-2055-32

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	EXT.GND		GND	19
2	DO0		DI0	20
3	DO1		DI1	21
4	DO2		DI2	22
5	DO3		DI3	23
6	DO4		DI4	24
7	DO5		DI5	25
8	DO6		DI6	26
9	DO7		DI7	27
10	DO8		DI8	28
11	DO9		DI9	29
12	DO10		DI10	30
13	DO11		DI11	31
14	DO12		DI12	32
15	DO13		DI13	33
16	DO14		DI14	34
17	DO15		DI15	35
18	EXT.PWR		DI.COM	36

ECAT-2061

Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	NO0		COM0	19
2	NO1		COM1	20
3	NO2		COM2	21
4	NO3		COM3	22
5	NO4		COM4	23
6	NO5		COM5	24
7	NO6		COM6	25
8	NO7		COM7	26
9	N/A		N/A	27
10	N/A		N/A	28
11	NO8		COM8	29
12	NO9		COM9	30
13	NO10		COM10	31
14	NO11		COM11	32
15	NO12		COM12	33
16	NO13		COM13	34
17	NO14		COM14	35
18	NO15		COM15	36

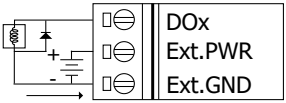
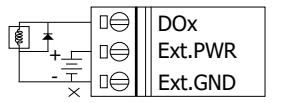
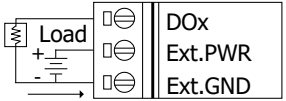
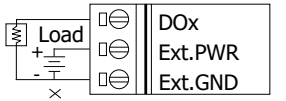
2.4 接線圖

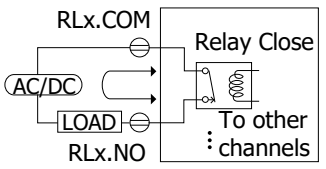
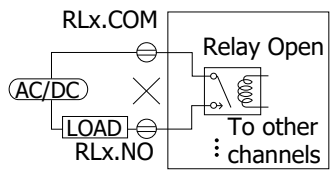
數位輸入接線

模組	Digital Input/Counter	Readback as 1	Readback as 0
ECAT-2051 ECAT-2051-32 ECAT-2055 ECAT-2055-32 ECAT-2060	Dry Contact	Close to GND	Open
ECAT-2051 ECAT-2051-32 ECAT-2052 ECAT-2052-NPN ECAT-2055 ECAT-2055-32 ECAT-2060 ECAT-2053	Sink	+10 ~ +50 VDC	OPEN or <4 VDC
	Source	+10 ~ +50 VDC	OPEN or <4 VDC

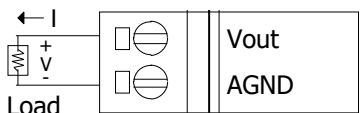
數位輸出接線

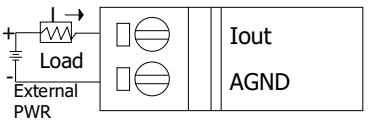
模組	Output Type	ON State Readback as 1	OFF State Readback as 0
ECAT-2052-NPN ECAT-2055 ECAT-2055-32 ECAT-2045 ECAT-2045-32 ECAT-2057-NPN ECAT-2057-8P8N(DO8-15)	Driver Relay		
	Resistance Load		

模組	Output Type	ON State Readback as 1	OFF State Readback as 0
ECAT-2052 ECAT-2057 ECAT-2057-8P8N(DO0-7) ECAT-2057-32	Inductive Load		
	Resistance Load		

模組	Output Type	ON State Readback as 1	OFF State Readback as 0
ECAT-2060 ECAT-2061	Relay Output		

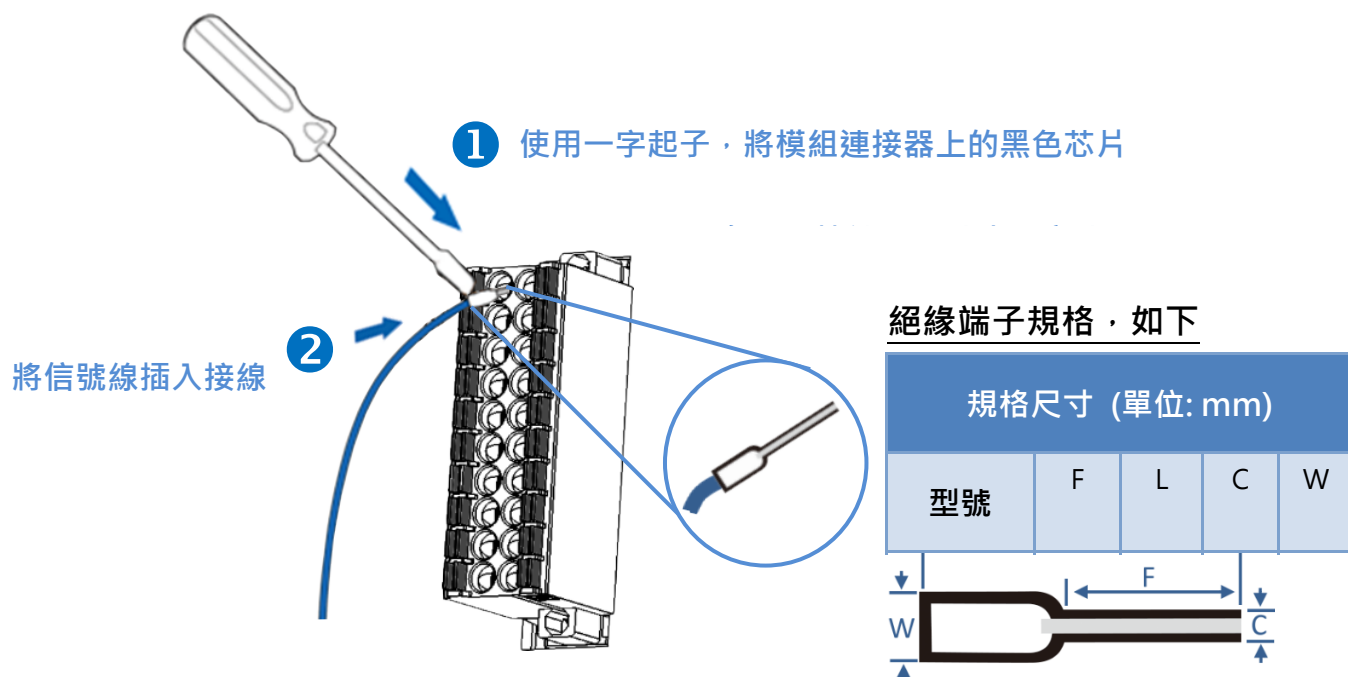
類比輸出接線

模組	Output Type	Voltage Output
ECAT-2024 ECAT-2028	Analog Output	

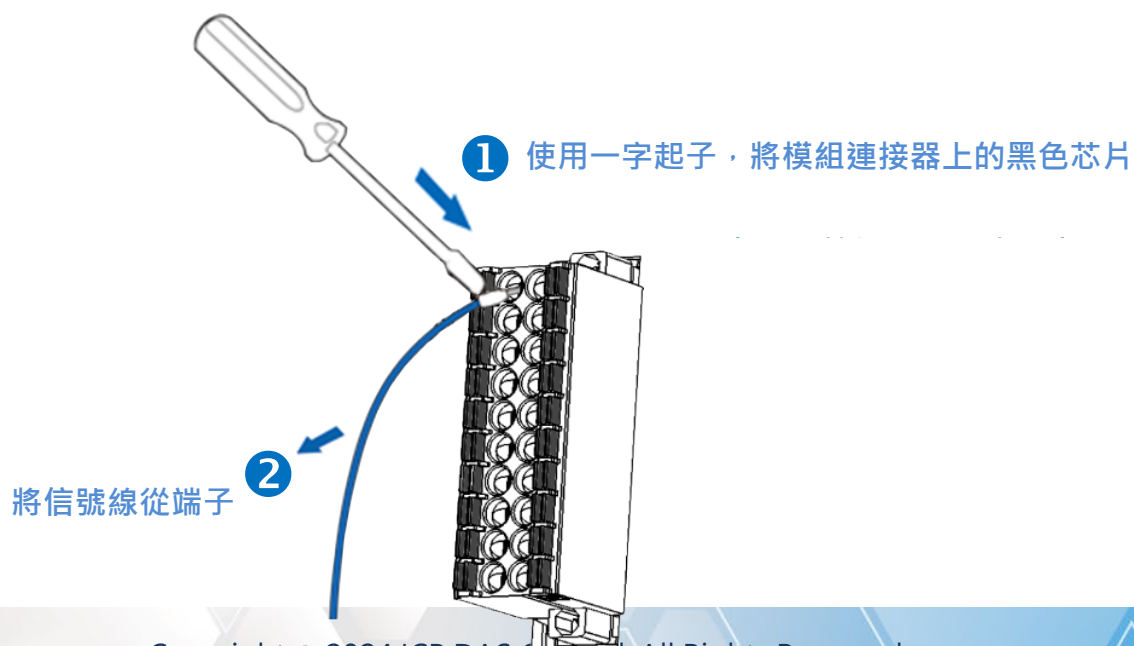
模組	Output Type	Current Output
ECAT-2024 ECAT-2028	Analog Output	

2.5 信號線連接至模組連接器

將信號線連接至模組連接器上，步驟如下圖所示：



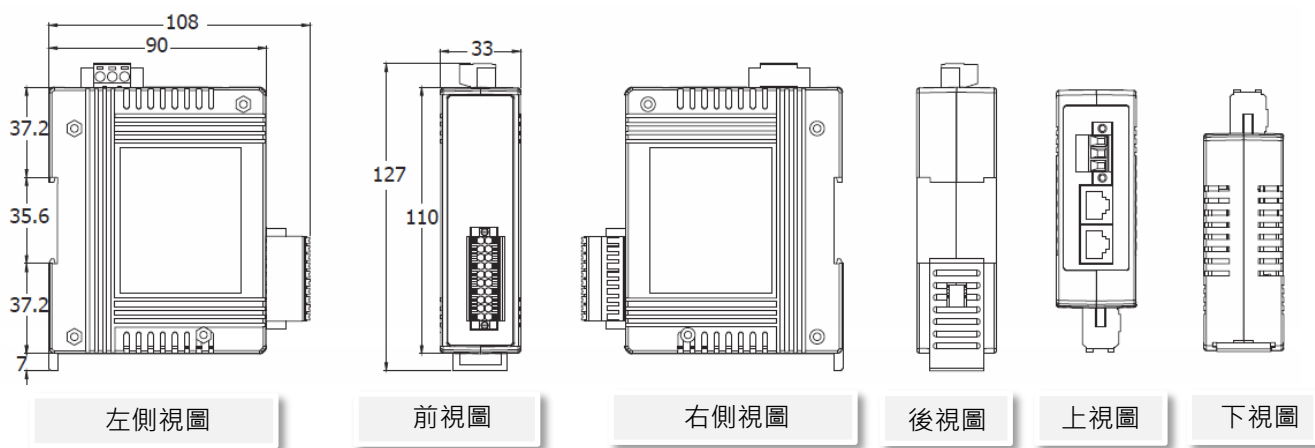
從模組上的連接器來移除信號線，步驟如下圖所示：



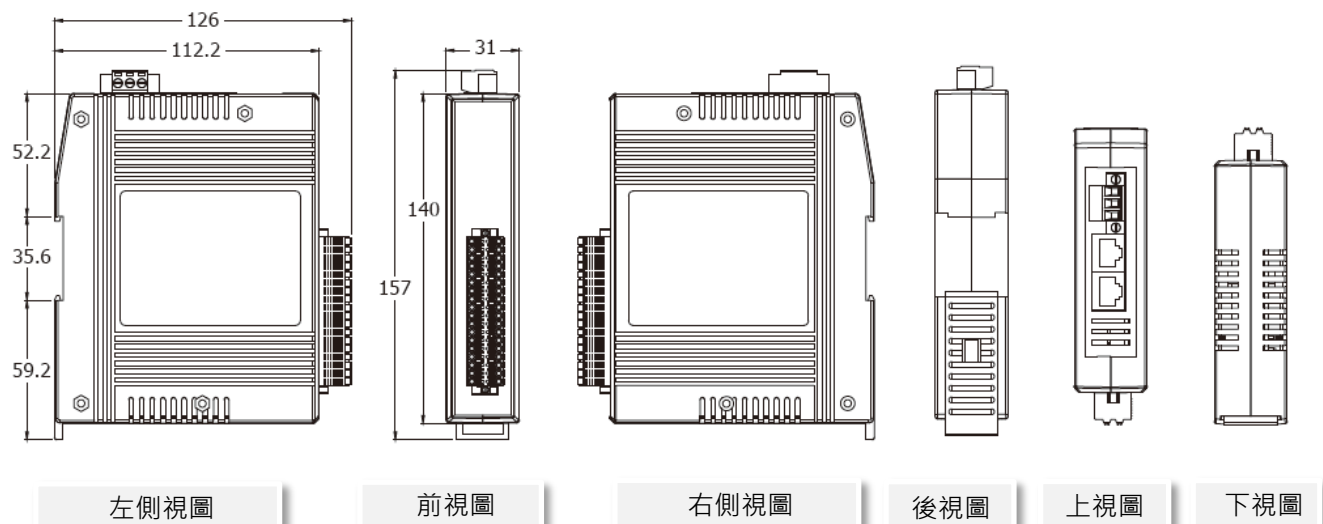
2.6 機構圖

下圖為 ECAT-2000 系列模組的機構圖，單位為 mm (millimeters)。

ECAT-2024/2028/2028C/2045/2050/2051/2052/2053/2055/2057/2060 系列



ECAT-2045-32/2051-32/2055-32/2057-32/2061 系列



3. 啟用 ECAT-2000 模組

此章節將介紹 ECAT-2000 系列模組如何啟動、線接、配置網路設定....等。

3.1 連接主站與電源

步驟 1

確認您電腦的網路設定正確且可運作，將網路線一端連至 ECAT-2000 的 EtherCAT 介面 IN 端另一邊接至電腦的 RJ-45 乙太網路埠口上。

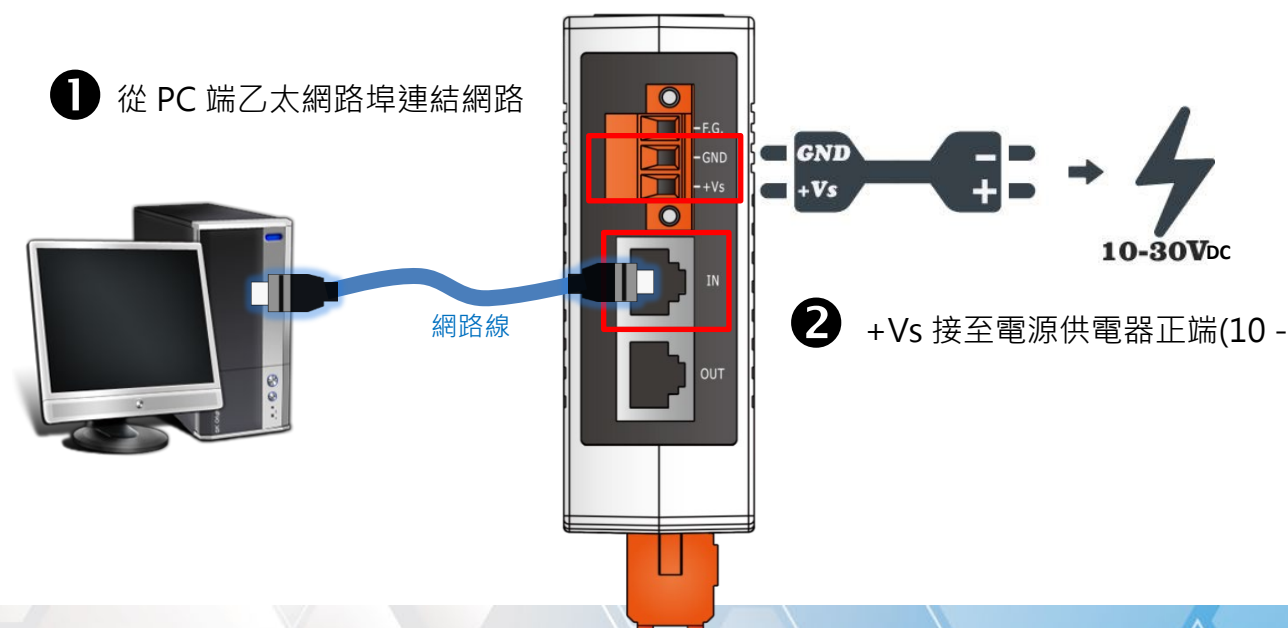
確認您電腦的 Windows 防火牆以及 Anti-virus 防火牆都已關閉，或已正確的設定。



注意: 建議使用獨立網卡，請勿連接至外部網路上以免造成網路風暴。

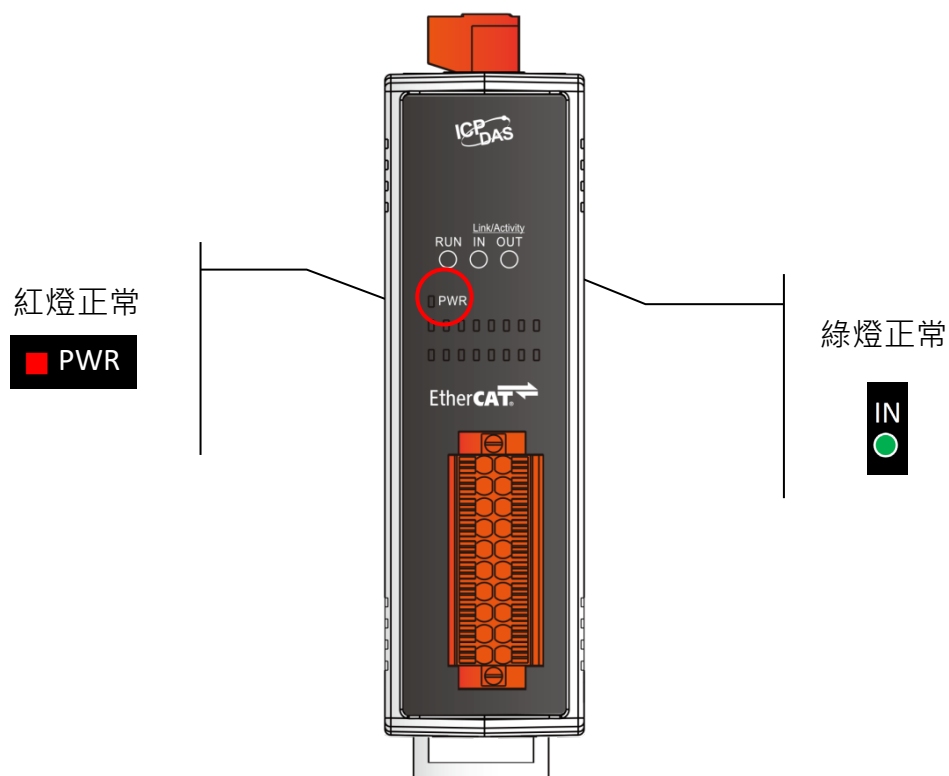
步驟 2

提供電源 (使用 +10 ~ +30 V_{DC} 電源) 到 ECAT-2000。



步驟 3

確認 ECAT-2000 模組上的電源 LED 顯示燈 (PWR) 是否為紅色，IN 顯示燈是否為綠燈。



3.2 配置運作模式

透過市面上最常使用的 EtherCAT Master 軟體-**Beckhoff TwinCAT 2.X** 來連結控制 ECAT-2000 系列模組。

進入至 EtherCAT 網路



注意

安裝最新版本的 XML 裝置描述檔案(ESI)

請確保安裝最新版本的 XML 裝置描述檔案至 TwinCAT 上，最新版本的 XML 裝置

描述檔案可以至泓格科技公司網站下載

(<https://www.icpdas.com/tw/download/show.php?num=7788&model=ECAT-2055>

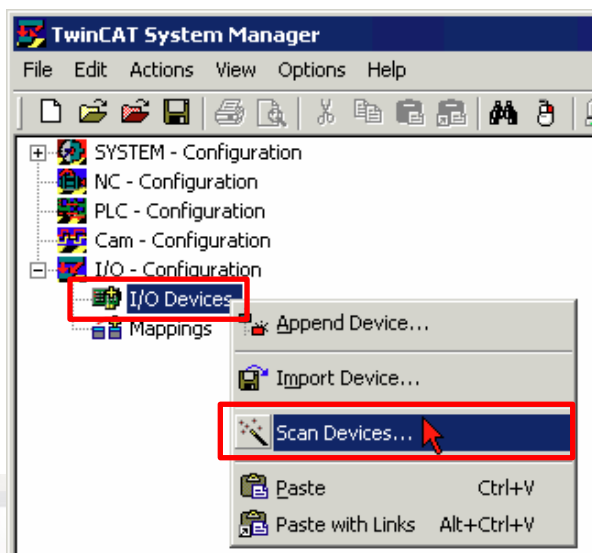
<https://www.icpdas.com/tw/download/show.php?num=7790&model=ECAT-2024>)，

並按照安裝說明依序進行安裝。

步驟 1

自動掃描

- 連結 ECAT-2000 模組至 EtherCAT，連接時系統必需在安全、斷電的狀態。
- 開啟模組電源並打開 TwinCAT System Manager(Config mode)，開始掃描裝置後(如下圖)，之後所有的對話框皆為 “OK”，使模式設定值在 FreeRun 模式。



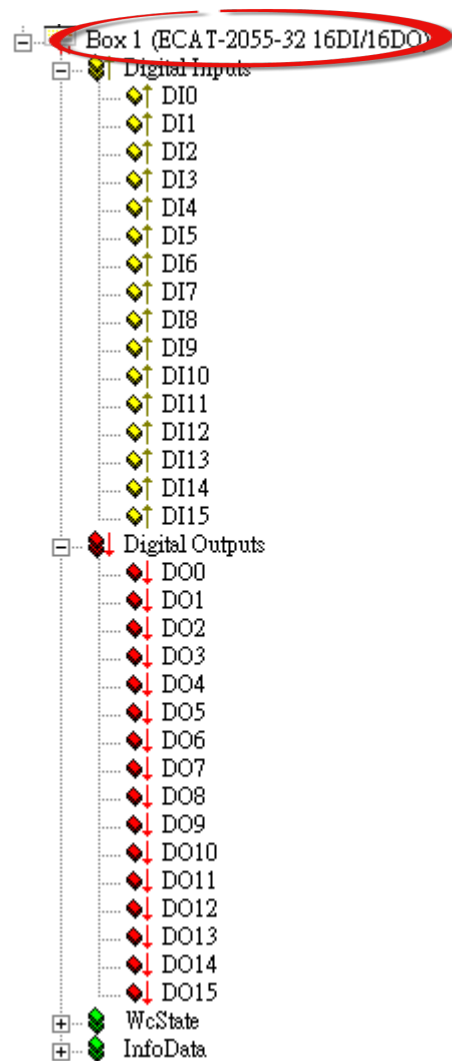
掃描設備(I/O Devices-> 按右鍵->

Scan Devices...)

步驟 2

透過 TwinCAT 設置每個模組

在 TwinCAT System Manager 左邊欄位的視窗，單擊您想要設定的 EtherCAT BOX 後開啟樹狀分支(如下圖)後單擊 DIx 或 DOx 作設定(以 ECAT-2055-32 為例)。



4. Object 說明及參數設定

4.1 標準 Object(0x1000-0x1FFF)

[ALL]Index 1000 Device Type

Index	項目	說明	類型	標誌	預設
1000:00	Device type	EtherCAT 從站設備類型: Lo-Word 包含使用的 CoE 配置件文 (5001)° Hi-Word 包含依據模組化設備配置文件的模組配置文件。	UINT32	RO	0x00000192 (402dec)

[ALL]Index 1008 Device Name

Index	項目	說明	類型	標誌	預設
1008:00	Device name	EtherCAT 從站裝置名稱	String	RO	參考下表

表 4-1: Device Name

模組	Device Name	模組	Device Name
ECAT-2024	ECAT-2024 4AO	ECAT-2053	ECAT-2053 16DI
ECAT-2028	ECAT-2028 8AO	ECAT-2055	ECAT-2055 8DI/8DO
ECAT-2028C	ECAT-2028C 8AO	ECAT-2055-32	ECAT-2055-32 16DI/16DO
ECAT-2045	ECAT-2045 16DO	ECAT-2057	ECAT-2057 16DO
ECAT-2045-32	ECAT-2045-32 32DO	ECAT-2057-32	ECAT-2057-32 32DO
ECAT-2050	ECAT-2050 13DI/4DO	ECAT-2057-NPN	ECAT-2057-NPN 16DO
ECAT-2051	ECAT-2051 16DI	ECAT-2057-8P8N	ECAT-2057-8P8N 16DO
ECAT-2051-32	ECAT-2051-32 32DI	ECAT-2060	ECAT-2060 6DO
ECAT-2052	ECAT-2052 8DI/8DO	ECAT-2061	ECAT-2061 16DO
ECAT-2052-NPN	ECAT-2052-NPN 8DI/8DO	ECAT-2092	ECAT-2092 2ENC
		ECAT-2093	ECAT-2093 3ENC

[ALL]Index 1009 Hardware Version

Index	項目	說明	類型	標誌	預設
1009:00	Hardware version	硬體版本	String	RO	0.7

[ALL]Index 100A Software Version

Index	項目	說明	類型	標誌	預設
100A:00	Software version	軟體版本	String	RO	1.4

[ALL]Index 1018 Identity

Index	項目	說明	類型	標誌	預設
1018:00	Identity	裝置識別資訊	INT8	RO	0x04(4dec)
1018:01	Vendor ID	製造商識別碼	UINT32	RO	0x00494350 (4801360dec)
1018:02	Product code	產品識別碼	UINT32	RO	參考下表
1018:03	Revision	版本號	UINT32	RO	每個裝置自行定義
1018:04	Serial number	序列號	UINT32	RO	每個裝置自行定義

表 4-2: Product Code

模組	Product Code	模組	Product Code
ECAT-2024	0x7E8(2024dec)	ECAT-2053	0x805(2053dec)
ECAT-2028	0x7EC(2028dec)	ECAT-2055	0x807(2055dec)
ECAT-2028C	0x7EC(2028dec)	ECAT-2055-32	0x807(2055dec)
ECAT-2045	0x7EC(2045dec)	ECAT-2057	0x809(2057dec)
ECAT-2045-32	0x7EC(2045dec)	ECAT-2057-32	0x809(2057dec)
ECAT-2050	0x802(2050dec)	ECAT-2057-NPN	0x809(2057dec)
ECAT-2051	0x803(2051dec)	ECAT-2057-8P8N	0x809(2057dec)
ECAT-2051-32	0x803(2051dec)	ECAT-2060	0x80C(2060dec)
ECAT-2052	0x804(2052dec)	ECAT-2061	0x80D(2061dec)
ECAT-2052-NPN	0x804(2052dec)	ECAT-2092	0x82C(2092dec)
		ECAT-2093	0x82D(2093dec)

[ECAT-2050]Index 160n(0≤n≤3) DO Outputs Process Data

Mapping

Index	項目	說明	類型	標誌	預設
160n:00	DO Output process data mapping	PDO Mapping RxPDO n+1	UINT8	RO	0x02(2dec)
160n:01	SubIndex 001	PDO Mapping entry (object 0x70n0,entry 0x01)	UINT32	RO	0x70n0:01,1
160n:02	SubIndex 002	PDO Mapping entry (object 0x70n0,entry 0x02)	UINT32	RO	0x70n0:02,31

[ECAT-2055-32]Index 1600 DO Outputs Process Data Mapping

Index	項目	說明	類型	標誌	預設
1600:00	DO Output process data mapping	PDO Mapping RxPDO 1	UINT8	RO	0x11(17dec)
1600:01	SubIndex 001	PDO Mapping entry (object 0x7000,entry 0x01)	UINT32	RO	0x7000:01,1
1600:02	SubIndex 002	PDO Mapping entry (object 0x7000,entry 0x02)	UINT32	RO	0x7000:02,1
1600:03	SubIndex 003	PDO Mapping entry (object 0x7000,entry 0x03)	UINT32	RO	0x7000:03,3
1600:04	SubIndex 004	PDO Mapping entry (object 0x7000,entry 0x04)	UINT32	RO	0x7000:04,1
1600:05	SubIndex 005	PDO Mapping entry (object 0x7000,entry 0x05)	UINT32	RO	0x7000:05,1
1600:06	SubIndex 006	PDO Mapping entry (object 0x7000,entry 0x06)	UINT32	RO	0x7000:06,1
1600:07	SubIndex 007	PDO Mapping entry (object 0x7000,entry 0x07)	UINT32	RO	0x7000:07,1
1600:08	SubIndex 008	PDO Mapping entry (object 0x7000,entry 0x08)	UINT32	RO	0x7000:08,1
1600:09	SubIndex 009	PDO Mapping entry (object 0x7000,entry 0x09)	UINT32	RO	0x7000:09,1
1600:0A	SubIndex 010	PDO Mapping entry (object 0x7000,entry 0x0A)	UINT32	RO	0x7000:0A,1
1600:0B	SubIndex 011	PDO Mapping entry (object 0x7000,entry 0x0B)	UINT32	RO	0x7000:0B,1
1600:0C	SubIndex 012	PDO Mapping entry (object 0x7000,entry 0x0C)	UINT32	RO	0x7000:0C,1
1600:0D	SubIndex 013	PDO Mapping entry (object 0x7000,entry 0x0D)	UINT32	RO	0x7000:0D,1
1600:0E	SubIndex 014	PDO Mapping entry (object 0x7000,entry 0x0E)	UINT32	RO	0x7000:0E,1
1600:0F	SubIndex 015	PDO Mapping entry (object 0x7000,entry 0x0F)	UINT32	RO	0x7000:0F,1
1600:10	SubIndex 016	PDO Mapping entry (object 0x7000,entry 0x10)	UINT32	RO	0x7000:10,1

[ECAT-2045-32/2057-32]Index 1600 DO Outputs Process Data

Mapping

Index	項目	說明	類型	標誌	預設
1600:00	DO Output process data mapping	PDO Mapping RxPDO 1	UINT8	RO	0x21(33dec)
1600:01	SubIndex 001	PDO Mapping entry (object 0x7000,entry 0x01)	UINT32	RO	0x7000:01,1
1600:02	SubIndex 002	PDO Mapping entry (object 0x7000,entry 0x02)	UINT32	RO	0x7000:02,1
1600:03	SubIndex 003	PDO Mapping entry (object 0x7000,entry 0x03)	UINT32	RO	0x7000:03,3
1600:04	SubIndex 004	PDO Mapping entry (object 0x7000,entry 0x04)	UINT32	RO	0x7000:04,1
1600:05	SubIndex 005	PDO Mapping entry (object 0x7000,entry 0x05)	UINT32	RO	0x7000:05,1
1600:06	SubIndex 006	PDO Mapping entry (object 0x7000,entry 0x06)	UINT32	RO	0x7000:06,1
1600:07	SubIndex 007	PDO Mapping entry (object 0x7000,entry 0x07)	UINT32	RO	0x7000:07,1
1600:08	SubIndex 008	PDO Mapping entry (object 0x7000,entry 0x08)	UINT32	RO	0x7000:08,1
1600:09	SubIndex 009	PDO Mapping entry (object 0x7000,entry 0x09)	UINT32	RO	0x7000:09,1
1600:0A	SubIndex 010	PDO Mapping entry (object 0x7000,entry 0x0A)	UINT32	RO	0x7000:0A,1
1600:0B	SubIndex 011	PDO Mapping entry (object 0x7000,entry 0x0B)	UINT32	RO	0x7000:0B,1
1600:0C	SubIndex 012	PDO Mapping entry (object 0x7000,entry 0x0C)	UINT32	RO	0x7000:0C,1
1600:0D	SubIndex 013	PDO Mapping entry (object 0x7000,entry 0x0D)	UINT32	RO	0x7000:0D,1
1600:0E	SubIndex 014	PDO Mapping entry (object 0x7000,entry 0x0E)	UINT32	RO	0x7000:0E,1
1600:0F	SubIndex 015	PDO Mapping entry (object 0x7000,entry 0x0F)	UINT32	RO	0x7000:0F,1
1600:10	SubIndex 016	PDO Mapping entry (object 0x7000,entry 0x10)	UINT32	RO	0x7000:10,1
1600:11	SubIndex 017	PDO Mapping entry (object 0x7000,entry 0x11)	UINT32	RO	0x7000:11,1
1600:12	SubIndex 018	PDO Mapping entry (object 0x7000,entry 0x12)	UINT32	RO	0x7000:12,1
1600:13	SubIndex 019	PDO Mapping entry (object 0x7000,entry 0x13)	UINT32	RO	0x7000:13,3
1600:14	SubIndex 020	PDO Mapping entry (object 0x7000,entry 0x14)	UINT32	RO	0x7000:14,1
1600:15	SubIndex 021	PDO Mapping entry (object 0x7000,entry 0x15)	UINT32	RO	0x7000:15,1
1600:16	SubIndex 022	PDO Mapping entry (object 0x7000,entry 0x16)	UINT32	RO	0x7000:16,1
1600:17	SubIndex 023	PDO Mapping entry (object 0x7000,entry 0x17)	UINT32	RO	0x7000:17,1
1600:18	SubIndex 024	PDO Mapping entry (object 0x7000,entry 0x18)	UINT32	RO	0x7000:18,1
1600:19	SubIndex 025	PDO Mapping entry (object 0x7000,entry 0x19)	UINT32	RO	0x7000:19,1
1600:1A	SubIndex 026	PDO Mapping entry (object 0x7000,entry 0x1A)	UINT32	RO	0x7000:1A,1
1600:1B	SubIndex 027	PDO Mapping entry (object 0x7000,entry 0x1B)	UINT32	RO	0x7000:1B,1
1600:1C	SubIndex 028	PDO Mapping entry (object 0x7000,entry 0x1C)	UINT32	RO	0x7000:1C,1
1600:1D	SubIndex 029	PDO Mapping entry (object 0x7000,entry 0x1D)	UINT32	RO	0x7000:1D,1
1600:1E	SubIndex 030	PDO Mapping entry (object 0x7000,entry 0x1E)	UINT32	RO	0x7000:1E,1
1600:1F	SubIndex 031	PDO Mapping entry (object 0x7000,entry 0x1F)	UINT32	RO	0x7000:1F,1
1600:20	SubIndex 032	PDO Mapping entry (object 0x7000,entry 0x20)	UINT32	RO	0x7000:20,1

[ECAT-202x]Index 160n AO Outputs Process Data Mapping

 注意: ECAT-2024: $0 \leq n \leq 3$; ECAT-2028/2028C: $0 \leq n \leq 7$

Index	項目	說明	類型	標誌	預設
160n:00	AO Output process data mapping	PDO Mapping RxPDO n+1	UINT8	RO	0x01(1dec)
160n:01	SubIndex 001	PDO Mapping entry (object 0x70n0 (AO outputs Ch n+1),entry 0x01(Analog output))	UINT32	RO	0x70n0:01,16

[ECAT-2050]Index 1A0n($0 \leq n \leq C$) DI Outputs Process Data

Mapping

Index	項目	說明	類型	標誌	預設
16An:00	DI Output process data mapping	PDO Mapping TxPDO n+1	UINT8	RO	0x02(2dec)
1A0n:01	SubIndex 001	PDO Mapping entry (object 0x60n0,entry 0x01)	UINT32	RO	0x60n0:01,1
1A0n:02	SubIndex 002	PDO Mapping entry (object 0x60n0,entry 0x02)	UINT32	RO	0x60n0:02,31

[ECAT-2055-32]Index 1A00 DI Outputs Process Data Mapping

Index	項目	說明	類型	標誌	預設
1A00:00	DI Output process data mapping	PDO Mapping TxPDO 1	UINT8	RO	0x11(17dec)
1A00:01	SubIndex 001	PDO Mapping entry (object 0x6000,entry 0x01)	UINT32	RO	0x6000:01,1
1A00:02	SubIndex 002	PDO Mapping entry (object 0x6000,entry 0x02)	UINT32	RO	0x6000:02,1
1A00:03	SubIndex 003	PDO Mapping entry (object 0x6000,entry 0x03)	UINT32	RO	0x6000:03,3
1A00:04	SubIndex 004	PDO Mapping entry (object 0x6000,entry 0x04)	UINT32	RO	0x6000:04,1
1A00:05	SubIndex 005	PDO Mapping entry (object 0x6000,entry 0x05)	UINT32	RO	0x6000:05,1
1A00:06	SubIndex 006	PDO Mapping entry (object 0x6000,entry 0x06)	UINT32	RO	0x6000:06,1
1A00:07	SubIndex 007	PDO Mapping entry (object 0x6000,entry 0x07)	UINT32	RO	0x6000:07,1
1A00:08	SubIndex 008	PDO Mapping entry (object 0x6000,entry 0x08)	UINT32	RO	0x6000:08,1
1A00:09	SubIndex 009	PDO Mapping entry (object 0x6000,entry 0x09)	UINT32	RO	0x6000:09,1
1A00:0A	SubIndex 010	PDO Mapping entry (object 0x6000,entry 0x0A)	UINT32	RO	0x6000:0A,1
1A00:0B	SubIndex 011	PDO Mapping entry (object 0x6000,entry 0x0B)	UINT32	RO	0x6000:0B,1
1A00:0C	SubIndex 012	PDO Mapping entry (object 0x6000,entry 0x0C)	UINT32	RO	0x6000:0C,1
1A00:0D	SubIndex 013	PDO Mapping entry (object 0x6000,entry 0x0D)	UINT32	RO	0x6000:0D,1
1A00:0E	SubIndex 014	PDO Mapping entry (object 0x6000,entry 0x0E)	UINT32	RO	0x6000:0E,1
1A00:0F	SubIndex 015	PDO Mapping entry (object 0x6000,entry 0x0F)	UINT32	RO	0x6000:0F,1
1A00:10	SubIndex 016	PDO Mapping entry (object 0x6000,entry 0x10)	UINT32	RO	0x6000:10,1

[ECAT-2051-32]Index 1A00 DI Outputs Process Data Mapping

Index	項目	說明	類型	標誌	預設
1A00:00	DI Output process data mapping	PDO Mapping TxPDO 1	UINT8	RO	0x21(33dec)
1A00:01	SubIndex 001	PDO Mapping entry (object 0x6000,entry 0x01)	UINT32	RO	0x6000:01,1
1A00:02	SubIndex 002	PDO Mapping entry (object 0x6000,entry 0x02)	UINT32	RO	0x6000:02,1
1A00:03	SubIndex 003	PDO Mapping entry (object 0x6000,entry 0x03)	UINT32	RO	0x6000:03,3
1A00:04	SubIndex 004	PDO Mapping entry (object 0x6000,entry 0x04)	UINT32	RO	0x6000:04,1
1A00:05	SubIndex 005	PDO Mapping entry (object 0x6000,entry 0x05)	UINT32	RO	0x6000:05,1
1A00:06	SubIndex 006	PDO Mapping entry (object 0x6000,entry 0x06)	UINT32	RO	0x6000:06,1
1A00:07	SubIndex 007	PDO Mapping entry (object 0x6000,entry 0x07)	UINT32	RO	0x6000:07,1
1A00:08	SubIndex 008	PDO Mapping entry (object 0x6000,entry 0x08)	UINT32	RO	0x6000:08,1
1A00:09	SubIndex 009	PDO Mapping entry (object 0x6000,entry 0x09)	UINT32	RO	0x6000:09,1
1A00:0A	SubIndex 010	PDO Mapping entry (object 0x6000,entry 0x0A)	UINT32	RO	0x6000:0A,1
1A00:0B	SubIndex 011	PDO Mapping entry (object 0x6000,entry 0x0B)	UINT32	RO	0x6000:0B,1
1A00:0C	SubIndex 012	PDO Mapping entry (object 0x6000,entry 0x0C)	UINT32	RO	0x6000:0C,1
1A00:0D	SubIndex 013	PDO Mapping entry (object 0x6000,entry 0x0D)	UINT32	RO	0x6000:0D,1
1A00:0E	SubIndex 014	PDO Mapping entry (object 0x6000,entry 0x0E)	UINT32	RO	0x6000:0E,1
1A00:0F	SubIndex 015	PDO Mapping entry (object 0x6000,entry 0x0F)	UINT32	RO	0x6000:0F,1
1A00:10	SubIndex 016	PDO Mapping entry (object 0x6000,entry 0x10)	UINT32	RO	0x6000:10,1
1A00:11	SubIndex 017	PDO Mapping entry (object 0x6000,entry 0x11)	UINT32	RO	0x6000:11,1
1A00:12	SubIndex 018	PDO Mapping entry (object 0x6000,entry 0x12)	UINT32	RO	0x6000:12,1
1A00:13	SubIndex 019	PDO Mapping entry (object 0x6000,entry 0x13)	UINT32	RO	0x6000:13,3
1A00:14	SubIndex 020	PDO Mapping entry (object 0x6000,entry 0x14)	UINT32	RO	0x6000:14,1
1A00:15	SubIndex 021	PDO Mapping entry (object 0x6000,entry 0x15)	UINT32	RO	0x6000:15,1
1A00:16	SubIndex 022	PDO Mapping entry (object 0x6000,entry 0x16)	UINT32	RO	0x6000:16,1
1A00:17	SubIndex 023	PDO Mapping entry (object 0x6000,entry 0x17)	UINT32	RO	0x6000:17,1
1A00:18	SubIndex 024	PDO Mapping entry (object 0x6000,entry 0x18)	UINT32	RO	0x6000:18,1
1A00:19	SubIndex 025	PDO Mapping entry (object 0x6000,entry 0x19)	UINT32	RO	0x6000:19,1
1A00:1A	SubIndex 026	PDO Mapping entry (object 0x6000,entry 0x1A)	UINT32	RO	0x6000:1A,1
1A00:1B	SubIndex 027	PDO Mapping entry (object 0x6000,entry 0x1B)	UINT32	RO	0x6000:1B,1
1A00:1C	SubIndex 028	PDO Mapping entry (object 0x6000,entry 0x1C)	UINT32	RO	0x6000:1C,1
1A00:1D	SubIndex 029	PDO Mapping entry (object 0x6000,entry 0x1D)	UINT32	RO	0x6000:1D,1
1A00:1E	SubIndex 030	PDO Mapping entry (object 0x6000,entry 0x1E)	UINT32	RO	0x6000:1E,1
1A00:1F	SubIndex 031	PDO Mapping entry (object 0x6000,entry 0x1F)	UINT32	RO	0x6000:1F,1
1A00:20	SubIndex 032	PDO Mapping entry (object 0x6000,entry 0x20)	UINT32	RO	0x6000:20,1

[ALL]Index 1C00 Sync Manager Type

Index	項目	說明	類型	標誌	預設
1C00:00	Sync manager type	Using the sync managers	UINT8	RO	0x04(4dec)
1C00:01	SubIndex 001	Sync-Manager Channel 1:Mailbox write	UINT8	RO	0x01(1dec)
1C00:02	SubIndex 002	Sync-Manager Channel 2:Mailbox read	UINT8	RO	0x02(2dec)
1C00:03	SubIndex 003	Sync-Manager Channel 3:Process data write	UINT8	RO	0x03(3dec)
1C00:04	SubIndex 004	Sync-Manager Channel 4:Process data read	UINT8	RO	0x04(4dec)

[ECAT-2050]Index 1C12 SyncManager 2 Assignment

Index	項目	說明	類型	標誌	預設
1C12:00	Sync-Manager 2 assignment	Sync manager assign outputs	UINT8	RO	0x04(4dec)
1C12:01	SubIndex 001	1st allocated RxPDO	UINT16	RO	0x1600(5632dec)
1C12:02	SubIndex 002	2nd allocated RxPDO	UINT16	RO	0x1601(5633dec)
1C12:03	SubIndex 003	3rd allocated RxPDO	UINT16	RO	0x1602(5634dec)
1C12:04	SubIndex 004	4th allocated RxPDO	UINT16	RO	0x1603(5635dec)

[ECAT-2055-32/2045-32/2057-32]Index 1C12 SyncManager 2**Assignment**

Index	項目	說明	類型	標誌	預設
1C12:00	Sync-Manager 2 assignment	Sync manager assign outputs	UINT8	RO	0x01(1dec)
1C12:01	SubIndex 001	1st allocated RxPDO	UINT16	RO	0x1600(5632dec)

[ECAT-202x]Index 1C12 SyncManager 2 Assignment

Index	項目	說明	類型	標誌	預設
1C12:00	Sync-Manager 2 assignment	PDO Assign Outputs	UINT8	RO	0x04(4dec)
1C12:01	SubIndex 001	1st allocated RxPDO	UINT16	RO	0x1600(5632dec)
1C12:02	SubIndex 002	2nd allocated RxPDO	UINT16	RO	0x1601(5633dec)
1C12:03	SubIndex 003	3rd allocated RxPDO	UINT16	RO	0x1602(5634dec)
1C12:04	SubIndex 004	4th allocated RxPDO	UINT16	RO	0x1603(5635dec)
1C12:05 (ECAT-2028 only)	SubIndex 005	5th allocated RxPDO	UINT16	RO	0x1604(5636dec)
1C12:06 (ECAT-2028 only)	SubIndex 006	6th allocated RxPDO	UINT16	RO	0x1605(5637dec)
1C12:07 (ECAT-2028 only)	SubIndex 007	7th allocated RxPDO	UINT16	RO	0x1606(5638dec)
1C12:08 (ECAT-2028 only)	SubIndex 008	8th allocated RxPDO	UINT16	RO	0x1607(5639dec)

[ECAT-2055-32/2051-32]Index 1C13 SyncManager 3 Assignment

Index	項目	說明	類型	標誌	預設
1C13:00	Sync-Manager 3 assignment	Sync manager assign outputs	UINT8	RO	0x01(1dec)
1C13:01	SubIndex 001	1st allocated TxPDO	UINT16	RO	0x1A00(6656dec)

[ECAT-2050]Index 1C13 SyncManager 3 Assignment

Index	項目	說明	類型	標誌	預設
1C13:00	Sync-Manager 3 assignment	Sync manager assign outputs	UINT8	RO	0x01(1dec)
1C13:01	SubIndex 001	1st allocated TxPDO	UINT16	RO	0x1A00(6656dec)
1C13:02	SubIndex 002	2nd allocated TxPDO	UINT16	RO	0x1A01(6657dec)
1C13:03	SubIndex 003	3rd allocated TxPDO	UINT16	RO	0x1A02(6658dec)
1C13:04	SubIndex 004	4th allocated TxPDO	UINT16	RO	0x1A03(6659dec)
1C13:05	SubIndex 005	5th allocated TxPDO	UINT16	RO	0x1A04(6660dec)
1C13:06	SubIndex 006	6th allocated TxPDO	UINT16	RO	0x1A05(6661dec)
1C13:07	SubIndex 007	7th allocated TxPDO	UINT16	RO	0x1A06(6662dec)
1C13:08	SubIndex 008	8th allocated TxPDO	UINT16	RO	0x1A07(6663dec)
1C13:09	SubIndex 009	9th allocated TxPDO	UINT16	RO	0x1A08(6664dec)
1C13:0A	SubIndex 010	10th allocated TxPDO	UINT16	RO	0x1A09(6665dec)
1C13:0B	SubIndex 011	11th allocated TxPDO	UINT16	RO	0x1A0A(6666dec)
1C13:0C	SubIndex 012	12th allocated TxPDO	UINT16	RO	0x1A0B(6667dec)
1C13:0D	SubIndex 013	13th allocated TxPDO	UINT16	RO	0x1A0C(6668dec)

4.2 特定 Objects(0x6000-0x7FFF)

[ECAT-2050]Index 60n0(0<=n<=C) Digital Inputs

Index	項目	說明	類型	標誌	預設
60n0:00	DIn		UINT8	RO	0x2(2dec)
60n0:01	Inputs		BOOLEAN	RO	0x00(0dec)

[ECAT-2055-32]Index 6000 Digital Inputs

Index	項目	說明	類型	標誌	預設
6000:00	Digital Inputs		UINT8	RO	0x11(17dec)
6000:01	DI0		BOOLEAN	RO	0x00(0dec)
6000:02	DI1		BOOLEAN	RO	0x00(0dec)
6000:03	DI2		BOOLEAN	RO	0x00(0dec)
6000:04	DI3		BOOLEAN	RO	0x00(0dec)
6000:05	DI4		BOOLEAN	RO	0x00(0dec)
6000:06	DI5		BOOLEAN	RO	0x00(0dec)
6000:07	DI6		BOOLEAN	RO	0x00(0dec)
6000:08	DI7		BOOLEAN	RO	0x00(0dec)
6000:09	DI8		BOOLEAN	RO	0x00(0dec)
6000:0A	DI9		BOOLEAN	RO	0x00(0dec)
6000:0B	DI10		BOOLEAN	RO	0x00(0dec)
6000:0C	DI11		BOOLEAN	RO	0x00(0dec)
6000:0D	DI12		BOOLEAN	RO	0x00(0dec)
6000:0E	DI13		BOOLEAN	RO	0x00(0dec)
6000:0F	DI14		BOOLEAN	RO	0x00(0dec)
6000:10	DI15		BOOLEAN	RO	0x00(0dec)

[ECAT-2051-32]Index 6000 Digital Inputs

Index	項目	說明	類型	標誌	預設
6000:00	Digital Inputs		UINT8	RO	0x21(33dec)
6000:01	DI0		BOOLEAN	RO	0x00(0dec)
6000:02	DI1		BOOLEAN	RO	0x00(0dec)
6000:03	DI2		BOOLEAN	RO	0x00(0dec)
6000:04	DI3		BOOLEAN	RO	0x00(0dec)
6000:05	DI4		BOOLEAN	RO	0x00(0dec)
6000:06	DI5		BOOLEAN	RO	0x00(0dec)
6000:07	DI6		BOOLEAN	RO	0x00(0dec)
6000:08	DI7		BOOLEAN	RO	0x00(0dec)
6000:09	DI8		BOOLEAN	RO	0x00(0dec)
6000:0A	DI9		BOOLEAN	RO	0x00(0dec)
6000:0B	DI10		BOOLEAN	RO	0x00(0dec)
6000:0C	DI11		BOOLEAN	RO	0x00(0dec)
6000:0D	DI12		BOOLEAN	RO	0x00(0dec)
6000:0E	DI13		BOOLEAN	RO	0x00(0dec)
6000:0F	DI14		BOOLEAN	RO	0x00(0dec)
6000:10	DI15		BOOLEAN	RO	0x00(0dec)
6000:11	DI16		BOOLEAN	RO	0x00(0dec)
6000:12	DI17		BOOLEAN	RO	0x00(0dec)
6000:13	DI18		BOOLEAN	RO	0x00(0dec)
6000:14	DI19		BOOLEAN	RO	0x00(0dec)
6000:15	DI20		BOOLEAN	RO	0x00(0dec)
6000:16	DI21		BOOLEAN	RO	0x00(0dec)
6000:17	DI22		BOOLEAN	RO	0x00(0dec)
6000:18	DI23		BOOLEAN	RO	0x00(0dec)
6000:19	DI24		BOOLEAN	RO	0x00(0dec)
6000:1A	DI25		BOOLEAN	RO	0x00(0dec)
6000:1B	DI26		BOOLEAN	RO	0x00(0dec)
6000:1C	DI27		BOOLEAN	RO	0x00(0dec)
6000:1D	DI28		BOOLEAN	RO	0x00(0dec)
6000:1E	DI29		BOOLEAN	RO	0x00(0dec)
6000:1F	DI30		BOOLEAN	RO	0x00(0dec)
6000:20	DI31		BOOLEAN	RO	0x00(0dec)

[ECAT-2050]Index 70n0(0<=n<=C) Digital Outputs

Index	項目	說明	類型	標誌	預設
70n0:00	DO _n		UINT8	RO	0x2(2dec)
70n0:01	Outputs		BOOLEAN	RO	0x00(0dec)

[ECAT-2055-32]Index 7000 Digital Outputs

Index	項目	說明	類型	標誌	預設
7000:00	Digital Outputs		UINT8	RO	0x11(17dec)
7000:01	DO0		BOOLEAN	RW	0x00(0dec)
7000:02	DO1		BOOLEAN	RW	0x00(0dec)
7000:03	DO2		BOOLEAN	RW	0x00(0dec)
7000:04	DO3		BOOLEAN	RW	0x00(0dec)
7000:05	DO4		BOOLEAN	RW	0x00(0dec)
7000:06	DO5		BOOLEAN	RW	0x00(0dec)
7000:07	DO6		BOOLEAN	RW	0x00(0dec)
7000:08	DO7		BOOLEAN	RW	0x00(0dec)
7000:09	DO8		BOOLEAN	RW	0x00(0dec)
7000:0A	DO9		BOOLEAN	RW	0x00(0dec)
7000:0B	DO10		BOOLEAN	RW	0x00(0dec)
7000:0C	DO11		BOOLEAN	RW	0x00(0dec)
7000:0D	DO12		BOOLEAN	RW	0x00(0dec)
7000:0E	DO13		BOOLEAN	RW	0x00(0dec)
7000:0F	DO14		BOOLEAN	RW	0x00(0dec)
7000:10	DO15		BOOLEAN	RW	0x00(0dec)

[ECAT-2045-32/2057-32]Index 7000 Digital Outputs

Index	項目	說明	類型	標誌	預設
7000:00	Digital Outputs		UINT8	RO	0x21(33dec)
7000:01	DO0		BOOLEAN	RW	0x00(0dec)
7000:02	DO1		BOOLEAN	RW	0x00(0dec)
7000:03	DO2		BOOLEAN	RW	0x00(0dec)
7000:04	DO3		BOOLEAN	RW	0x00(0dec)
7000:05	DO4		BOOLEAN	RW	0x00(0dec)
7000:06	DO5		BOOLEAN	RW	0x00(0dec)
7000:07	DO6		BOOLEAN	RW	0x00(0dec)
7000:08	DO7		BOOLEAN	RW	0x00(0dec)
7000:09	DO8		BOOLEAN	RW	0x00(0dec)
7000:0A	DO9		BOOLEAN	RW	0x00(0dec)
7000:0B	DO10		BOOLEAN	RW	0x00(0dec)
7000:0C	DO11		BOOLEAN	RW	0x00(0dec)
7000:0D	DO12		BOOLEAN	RW	0x00(0dec)
7000:0E	DO13		BOOLEAN	RW	0x00(0dec)
7000:0F	DO14		BOOLEAN	RW	0x00(0dec)
7000:10	DO15		BOOLEAN	RW	0x00(0dec)
7000:11	DO16		BOOLEAN	RW	0x00(0dec)
7000:12	DO17		BOOLEAN	RW	0x00(0dec)
7000:13	DO18		BOOLEAN	RW	0x00(0dec)
7000:14	DO19		BOOLEAN	RW	0x00(0dec)
7000:15	DO20		BOOLEAN	RW	0x00(0dec)
7000:16	DO21		BOOLEAN	RW	0x00(0dec)
7000:17	DO22		BOOLEAN	RW	0x00(0dec)
7000:18	DO23		BOOLEAN	RW	0x00(0dec)
7000:19	DO24		BOOLEAN	RW	0x00(0dec)
7000:1A	DO25		BOOLEAN	RW	0x00(0dec)
7000:1B	DO26		BOOLEAN	RW	0x00(0dec)
7000:1C	DO27		BOOLEAN	RW	0x00(0dec)
7000:1D	DO28		BOOLEAN	RW	0x00(0dec)
7000:1E	DO29		BOOLEAN	RW	0x00(0dec)
7000:1F	DO30		BOOLEAN	RW	0x00(0dec)
7000:20	DO31		BOOLEAN	RW	0x00(0dec)

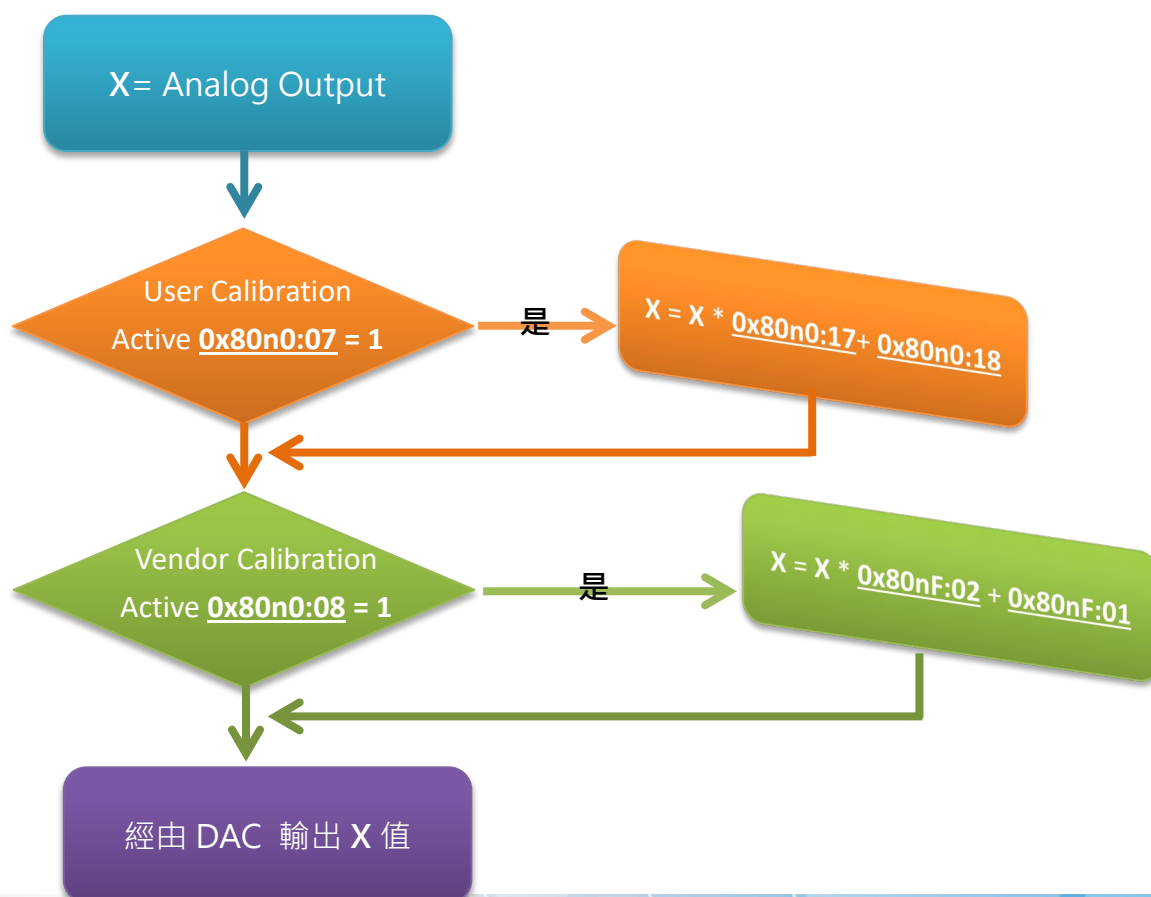
[ECAT-202x]Index 70n0 AO Outputs Channel

注意: ECAT-2024: $0 \leq n \leq 3$; ECAT-2028/2028C: $0 \leq n \leq 7$

Index	項目	說明	類型	標誌	預設
70n0:00	ECAT-2024: AO Outputs Ch. 1-4 ECAT-2028: AO Outputs Ch. 1-8		UINT8	RWP	0x02(2dec)
70n0:01	Output	Analog output data	INT16	RWP	0x0000(0dec)

4.3 特定 Objects(0x8000-0x8FFF)

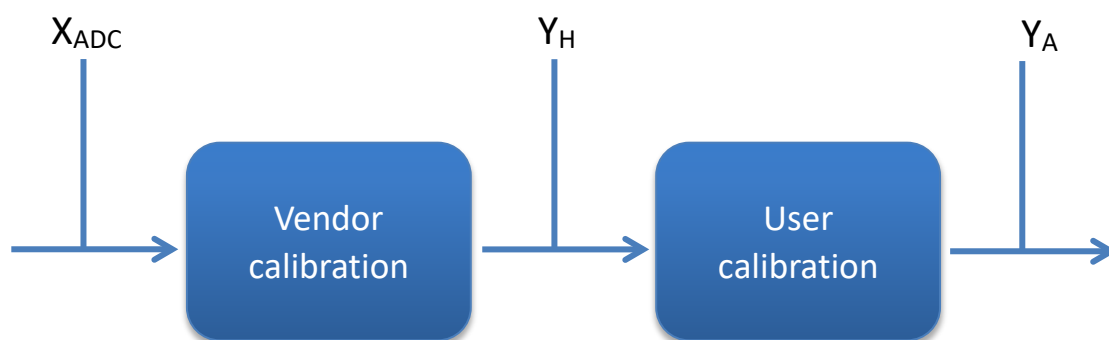
ECAT-2024/2028/2028C 處理資料流程圖



校正計算

校正 “Calibration” 是將設備 “校調至準確”，在操作期間由使用設備的 Vendor 或 User 來校正/調整數據，以便保持量測的精度得以準確。

在 DAC 原始值 Object 0x80nE:01 中，Terminal 不斷記錄測量值，並從 DA 轉換器中保存原始值。每次記錄類比信號後，當下圖參數被啟用時，校正計算的數值將與 Vendor calibration 和 User calibration 校正出的數值相互一致。



計算式	說明
X_{DAC}	DA 轉換器輸出
$Y_H = (X_{DAC} - B_H) \times A_H \times 2^{-14}$	Vendor calibration 後的量測值
$Y_A = (Y_H - B_A) \times A_A \times 2^{-14}$	Vendor 和 User calibration 後的量測值

參數名稱	說明	Index
X_{DAC}	DA 轉換器輸出	<u>0x80nE:01</u>

B _H	Vendor calibration offset (不可更改)	<u>0x80nF:01</u>
A _H	Vendor calibration gain (不可更改)	<u>0x80nF:02</u>
B _A	User calibration offset (可以經由 index <u>0x80n0:07</u> 來啟用)	<u>0x80n0:17</u>
A _A	User calibration gain (可以經由 index <u>0x80n0:07</u> 來啟用)	<u>0x80n0:18</u>

[ECAT-202x]Index 80n0 AO Channel Settings

 注意: ECAT-2024: $0 \leq n \leq 3$; ECAT-2028/2028C: $0 \leq n \leq 7$

Index	項目	說明	類型	標誌	預設
80n0:00	ECAT-2024: AO Settings Ch. 1-4 ECAT-2028: AO Settings Ch. 1-8		UINT8	RO	0x25(37dec)
		0: Default watchdog value The default value (80n0:13) is active.			
80n0:05	Watchdog	1: Watchdog ramp The ramp (80n0:14) for moving to the default value is active. 2: Last output value In the event of a watchdog drop the last process data is issued.	BIT2	RW	0x00(0dec)
80n0:07	Enable User Calibration	0: FALSE 1: TRUE	BOOLEAN	RW	0x00(0dec)
80n0:08	Enable Vendor Calibration	0: FALSE 1: TRUE	BOOLEAN	RW	0x01(1dec)
80n0:09	AO Range	0: Unipolar 5V (0-5V) 1: Bipolar 5V ($\pm 5V$) 2: Unipolar 10V (0-10V) 3: Bipolar 10V ($\pm 10V$) 4: Unipolar 10mA (0-10mA) 5: N/A 6: Unipolar 20mA (0-20mA) Note:4 &6 only for ECAT-2028C	BIT4	RW	0x03(3dec)
80n0:13	Default output	Default output value	INT16	RW	0x0000(0dec)
80n0:14	Default output ramp	Ramp for ramping down to the default value. Value in digits/ms.	UINT16	RW	0xFFFF(4095dec)
80n0:17	User Calibration Offset	User calibration offset	INT16	RW	0x0000(0dec)
80n0:18	User Calibration Gain	User calibration gain	UINT16	RW	0x7FFF(32767dec)

[ECAT-202x]Index 80nE AO Channel Internal Data

 注意: ECAT-2024: $0 \leq n \leq 3$; ECAT-2028/2028C: $0 \leq n \leq 7$

Index	項目	說明	類型	標誌	預設
80nE:0	ECAT-2024: AO internal data Ch. 1-4 ECAT-2028: AO internal data Ch. 1-8		UINT8	RO	0x01(1dec)
80nE:01	DAC raw value	DAC raw value	UINT16	RO	0x800(2048dec)

[ECAT-202x]Index 80nF AO Channel Internal Data

 注意: ECAT-2024: $0 \leq n \leq 3$; ECAT-2028/2028C: $0 \leq n \leq 7$

Index	項目	說明	類型	標誌	預設
80nF:0	ECAT-2024: AO internal data Ch. 1-4 ECAT-2028: AO internal data Ch. 1-8		UINT8	RO	0x02(2dec)
80nF:01	Calibration Offset	Vendor calibration offset	INT16	RW	0x0000(0dec)
80nF:02	Calibration Gain	Vendor calibration gain	UINT16	RW	0x7E9F (32415dec)

附錄：手冊修訂記錄

本章提供此使用手冊的修訂記錄。

下表提供此文件每次修訂的日期與說明。

版本	發行日	說明
1.1	2013 年	首次發行
1.2	2015 年	1. 增加 ECAT-2050 產品相關資訊。 2. 增加 ECAT-2052 產品相關資訊。 3. 增加 ECAT-2052-NPN 產品相關資訊。 4. 增加 ECAT-2053 產品相關資訊。 5. 增加 ECAT-2057 產品相關資訊。 6. 增加 ECAT-2057-NPN 產品相關資訊。
1.4	2016 年 7 月	1. 增加 ECAT-2045-32 產品相關資訊。 2. 增加 ECAT-2051-32 產品相關資訊。 3. 增加 ECAT-2055-32 產品相關資訊。 4. 增加 ECAT-2057-8P8N 產品相關資訊。 5. 增加 ECAT-2061 產品相關資訊。
1.5	2016 年 12 月	1. 增加 ECAT-2024 產品相關資訊。 2. 增加 ECAT-2028 產品相關資訊。
1.6	2017 年 6 月	1. 增加 ECAT-2024/2028 Object 說明及參數設定資訊。 2. 新增章節 附錄 手冊修訂錄。
1.6.1	2017 年 11 月	修正 ECAT-2045-32 腳位定義。
1.7	2018 年 8 月	增加 ECAT-2057-32 產品相關資訊。
1.8	2018 年 10 月	刪除 ECAT-2011H 產品相關資訊。
1.9	2019 年 9 月	修正 ECAT-2045-32 及 ECAT-2057-32 腳位定義。
2.0	2024 年 9 月	修正部分連結 增加 ECAT-2028C 產品相關資訊