ECAT-2000 Series EtherCAT SubDevice I/O User Manual

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SUPPORT

ECAT-2024/2028/2028C
ECAT-2045/2045-32/2050/2051/2051-32
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. Introduction

The ECAT-2000 series are industrial EtherCAT Subdevice I/O modules supporting EtherCAT protocol and installed by daisy chain connection which permits the flexibility in devices installation and reduces infrastructure and operation costs. All the modules can be deployed in the network topologies such as star, line or ring. The isolated input and output design protects the ECAT-2000 against the harmful interference and environment.

The ECAT-2000 has passed and verified by the conformance test tool, therefore eligible EtherCAT MainDevice or configurator can manipulate it simply and implement your various applications easily. Fig 1.1 is shown a typical EtherCAT application.

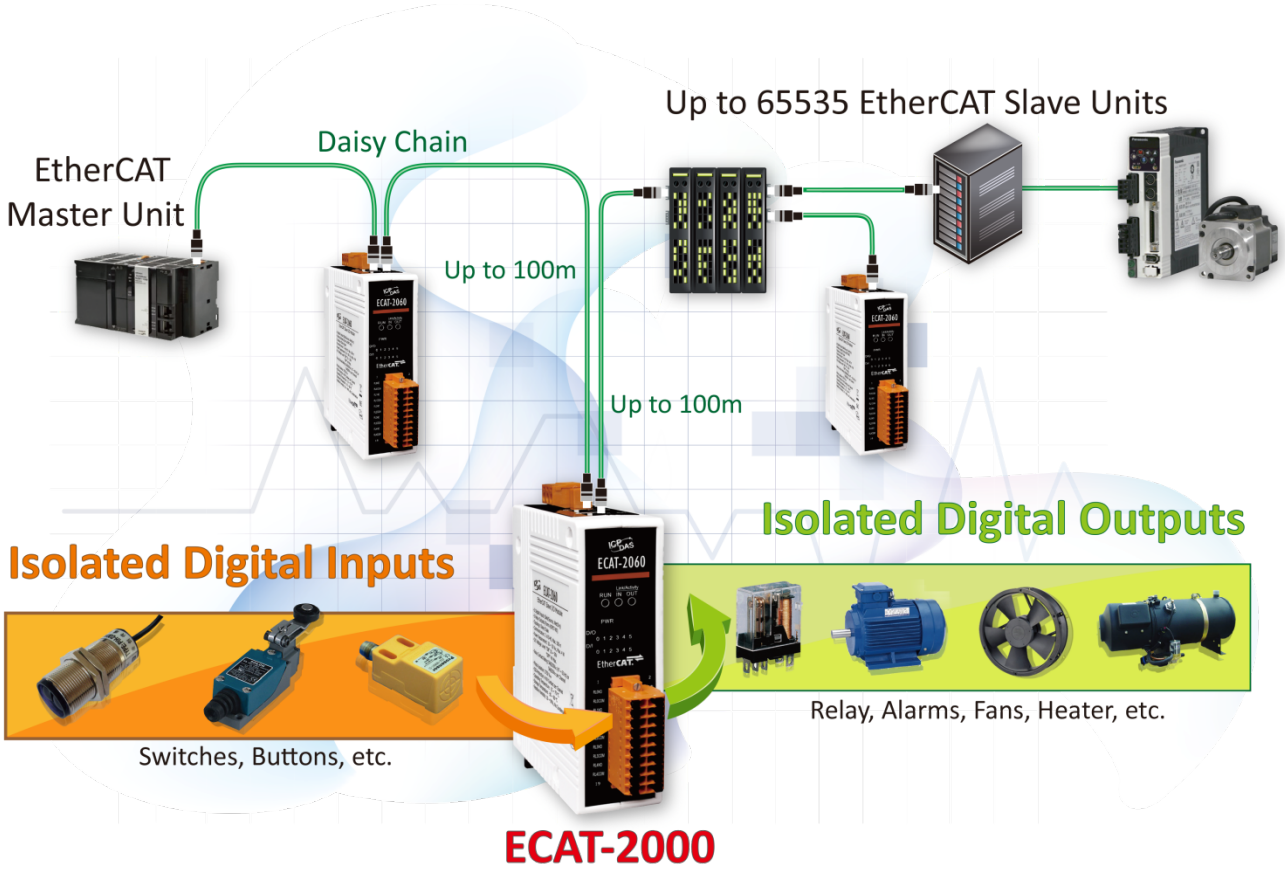


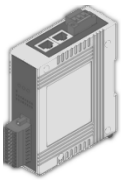
Figure 1.1 Typical Application of ECAT-2000

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1.1 Package List

The shipping package includes the following items:



ECAT-2000



Quick Start

NOTE	If any of these items is missing or damaged, please contact your local distributor for more information. Keep the shipping materials and overall package in case you want to ship the module back in the future.

More Information

- Manual/QuickStart/Datasheet:

  https://www.icpdas.com/en/product/guide+Industrial__Communication+EtherCAT+IO

- XML Device Description(ESI):

  https://www.icpdas.com/en/download/show.php?num=2190&model=ECAT-2055

  https://www.icpdas.com/en/download/show.php?num=2189&model=ECAT-2024

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1.2 Product Information

The ECAT-2000 series of EtherCAT subdevice modules support a range of I/O formats, such as photo-isolated digital input, relay contact ,and open-collector output, etc. The table below provides a description of each model.

Digital I/O

Model	Description
ECAT-2045	Isolated 16-ch Digital Outputs (Sink)
ECAT-2045-32	Isolated 32-ch Digital Outputs (Sink)
ECAT-2050	Isolated 4-ch Digital Outputs (Sink/Source) and Isolated 13-ch Digital Inputs
ECAT-2051	Isolated 16-ch Digital Inputs (Wet/Dry)
ECAT-2051-32	Isolated 32-ch Digital Inputs (Wet/Dry)
ECAT-2052	Isolated 8-ch Digital Outputs (Source) and Isolated 8-ch Digital Inputs (Wet)
ECAT-2052-NPN	Isolated 8-ch Digital Outputs (Sink) and Isolated 8-ch Digital Inputs (Wet)
ECAT-2053	Isolated 16-ch Digital Inputs (Wet)
ECAT-2055	Isolated 8-ch Digital Outputs (Sink) and Isolated 8-ch Digital Inputs (Wet/Dry)
ECAT-2055-32	Isolated 16-ch Digital Outputs (Sink) and Isolated 16-ch Digital Inputs (Wet/Dry)
ECAT-2057	Isolated 16-ch Digital Outputs (Source)
ECAT-2057-32	Isolated 32-ch Digital Outputs (Source)
ECAT-2057-NPN	Isolated 16-ch Digital Outputs (Sink)
ECAT-2057-8P8N	Isolated 8-ch Source Digital Outputs and 8-ch Sink Digital Outputs
ECAT-2060	Isolated 6-ch Relay Outputs and Isolated 6-ch Digital Inputs (Wet/Dry)
ECAT-2061	Isolated 16-ch Relay Outputs

Analog Output

Model	Description
ECAT-2024	4-ch, 12-bit, Voltage Outputs
ECAT-2028	8-ch, 12-bit, Voltage Outputs
ECAT-2028C	8-ch, 12-bit, Voltage&Current Outputs

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1.3 Selection Guide

DC Digital I/O					
Model	Digital Input		Digital Output		
	Channel	Type	Channel	Type	Max. Load Current
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

Analog Output						
Model	AO					
	Resolution	Channel	Voltage Output	Current Output	Accuracy	Output Capability
ECAT-2024	12-bit	4	0 ~ 5 V, +/- 5 V, 0 ~ 10 V, +/- 10 V	-	±2 LSB	10 V @ 5 mA
ECAT-2028	12-bit	8	0 ~ 5 V, +/- 5 V, 0 ~ 10 V, +/- 10 V	-	±2 LSB	10 V @ 5 mA
ECAT-2028C	12-bit	8	0 ~ 5 V, +/- 5 V, 0 ~ 10 V, +/- 10 V 0-10mA, 0-20mA	-	±2 LSB	10 V @ 5 mA

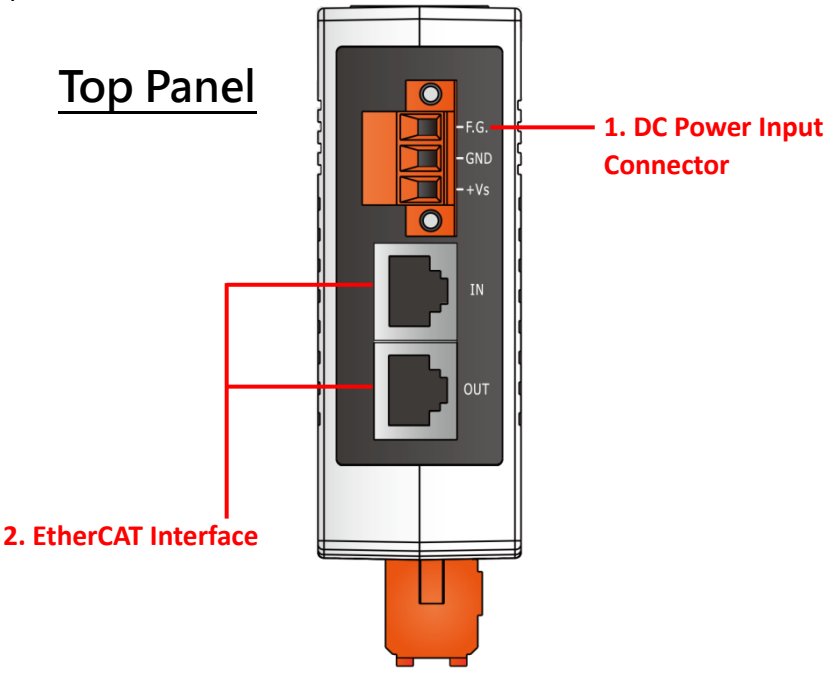
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2. Hardware Information

2.1 Appearance

The front panel and top panel of the ECAT-2000 series module contain the I/O connector, LEDs, Ethernet Port and power connector.



1. DC Power Input Connector

The **"+Vs"** and **"GND"** pins are used for the power supply applies to all types of ECAT-2000 series module. The valid power voltage range is from **+10 to +30 V_{DC}**.

The definition of **"F.G." (Frame Ground)**: Electronic circuits are constantly vulnerable to Electrostatic Discharge (ESD), which becomes worse in a continental climate area. ECAT-2000 series module feature a new design for the frame ground, which provides a path that bypasses ESD, resulting in an enhanced ESD protection capability and ensuring that the module is more reliable.

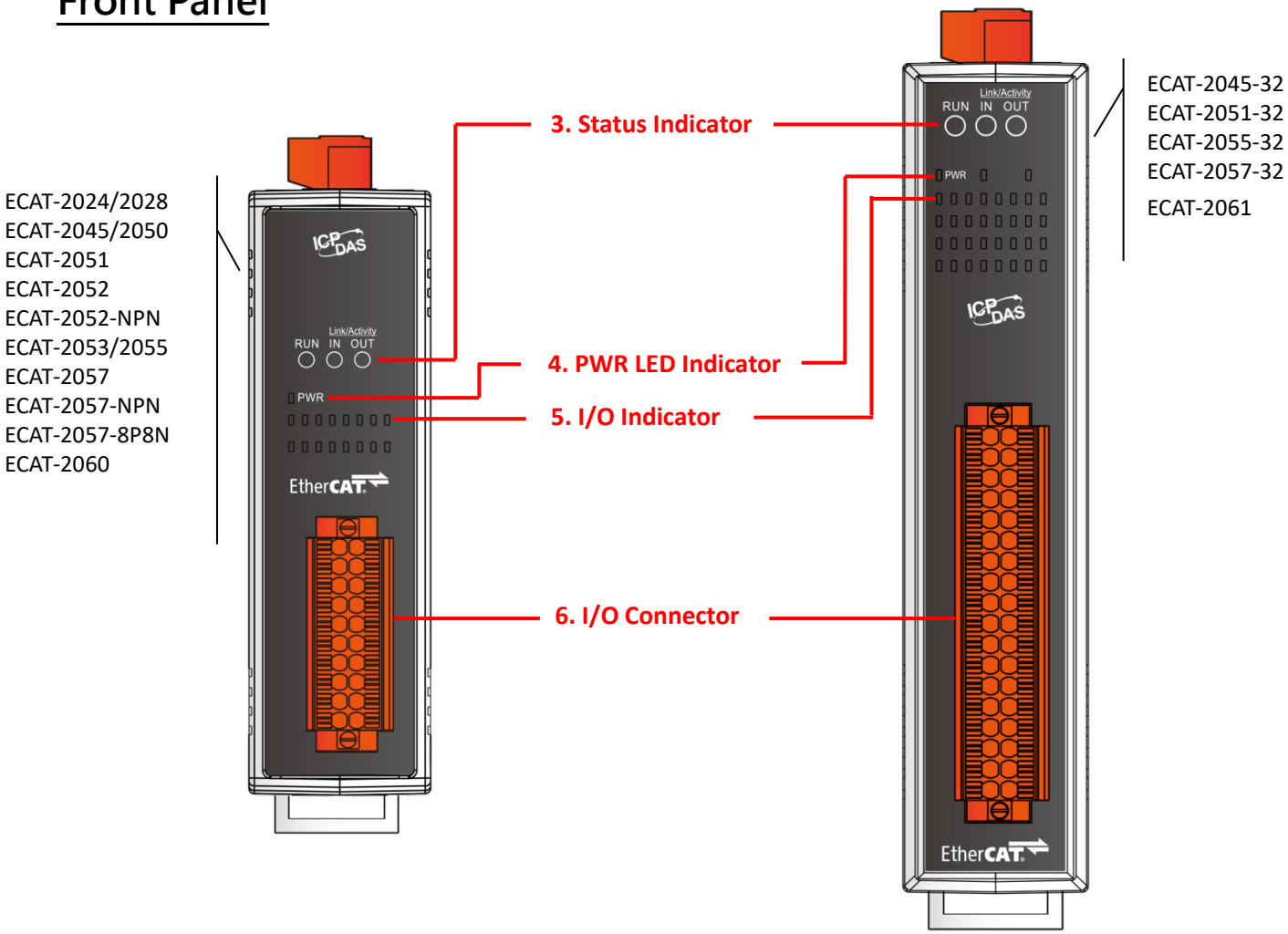
2. EtherCAT Interface

ECAT-2000 series modules are equipped with two RJ-45 EtherCAT Interface ports. **IN** is EtherCAT signal input port that connect EtherCAT Master or EtherCAT signal output of previous EtherCAT slave module · **OUT** is EtherCAT signal output that connect the next EtherCAT signal input of EtherCAT slave module.

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Front Panel



3. Status Indicator

Notation	Color	States	Description
RUN	Green	Off	The device is in state INIT
		Blinking	The device is in state PRE-OPERARIONAL
		Single Flash	The device is in state SAFE-OPERARIONAL
		On	The device is in state OPERARIONAL
Link Activity IN/OUT	Green	Off	No link
		Blinking	Link and activity
		On	Link without activity

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4. PWR LED Indicator

Once power is supplied to the ECAT-2000 series module, the system LED indicator will illuminate.

5. I/O Indicator

The exact design and functionality depends on the module type which indicates the I/O status.

Notation	Color	States	Description
DI	Green	Off	Input voltage is below the lower switching threshold voltage
		On	Input voltage is higher than the upper switching threshold voltage
DO	Green	Off	Digital output status is “Off”
		On	Digital output status is “On”

6. I/O Connector

For more detailed information regarding the pin assignments for the I/O connector, refer to Section 2.3 “Pin Assignments”.

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2.2 Specification

2.2.1 System Specification

Item	Specification
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

Model	ECAT-2024/2028 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

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2.2.2 I/O Specification

ECAT-2024/2028/2028C

Model	ECT-2024	ECAT-2028	ECAT-2028C
Analog Output			
Channels	4	8	
Range	±5 V, ±10 V, 0~5V, 0~10V		±5 V, ±10 V, 0~5V, 0~10V, 0-10mA, 0-20mA
Resolution	12-bit		
Accuracy	+/- 0.1% of FSR		
Zero Drift	+/- 30 µV/°C		
Span Drift	+/- 25 ppm/°C		

ECAT-2045/2045-32

Model	ECT-2045	ECAT-2045-32
Digital Output		
Channels	16	32
Type	Open collector	
Sink/Source (NPN/PNP)	Sink	
Load Voltage	+3.5 V ~ +50 V	
Max. Load Current	700 mA/Channel	500 mA/Channel
Isolation Voltage	3750 Vrms	

ECAT-2051/2051-32

Model	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 V_{DC} ~ +50 V_{DC}	
Off Voltage Level	Dry: Open, Wet: +4 V_{DC} Max.	
Isolation Voltage	3750 V_{DC}	

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ECAT-2052/2052-NPN

Model	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

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

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ECAT-2055/2055-32

Model	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

Model	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		

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ECAT-2057-32

Model	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

Model	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

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ECAT-2060/2061

Model	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	10^5 Ops.	

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2.3 Pin Assignments

EtherCAT Interface

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

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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

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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

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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

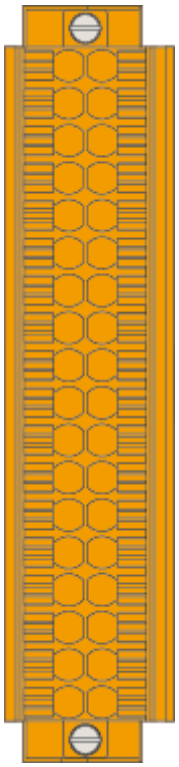
ECAT-2050

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

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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

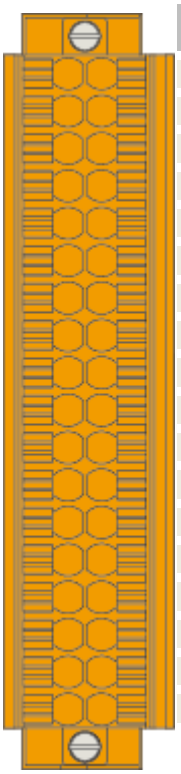
ECAT-2051-32

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

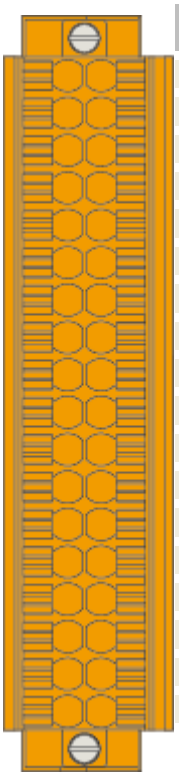
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ECAT-2055-32

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

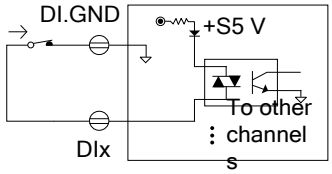
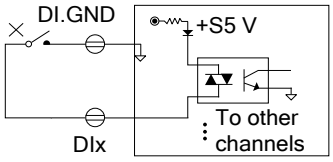
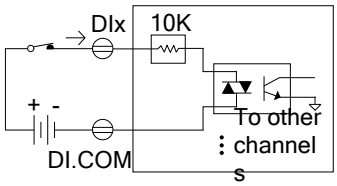
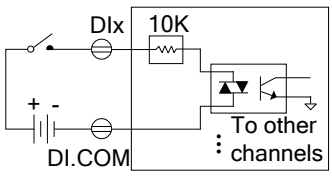
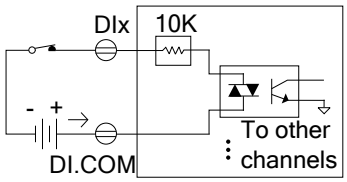
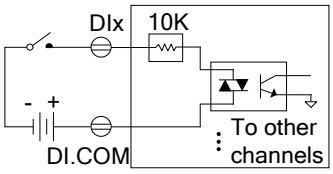
Terminal No.	Pin Assignment		Pin Assignment	Terminal No.
1	NO0		COM0	19
2	NO1		COM1	20
3	NO2		COM2	21
4	NO3		COM3	22
5	NO4		COM4	23
6	NO5		COM5	24
7	NO6		COM6	25
8	NO7		COM7	26
9	N/A		N/A	27
10	N/A		N/A	28
11	NO8		COM8	29
12	NO9		COM9	30
13	NO10		COM10	31
14	NO11		COM11	32
15	NO12		COM12	33
16	NO13	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

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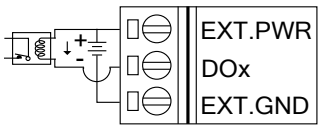
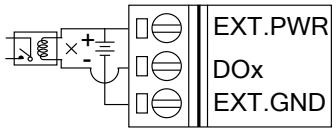
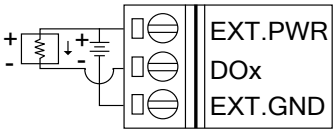
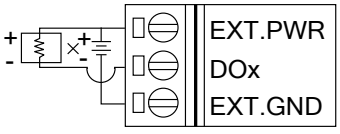
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2.4 Wiring Connections

Digital Input Wiring

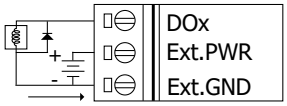
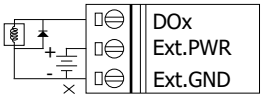
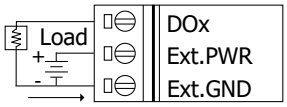
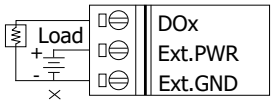
Model	Digital Input/Counter	Readback as 1	Readback as 0
ECAT-2051 ECAT-2051-32 ECAT-2055 ECAT-2055-32 ECAT-2060	Dry Contact	Close to GND 	Open 
ECAT-2051 ECAT-2051-32 ECAT-2052 ECAT-2052-NPN ECAT-2055 ECAT-2055-32 ECAT-2060 ECAT-2053	Sink	+10 ~ +50 VDC 	OPEN or <4 VDC 
	Source	+10 ~ +50 VDC 	OPEN or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

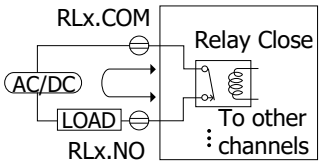
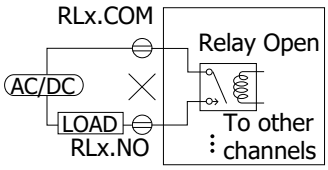
Digital Output Wiring

Model	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		

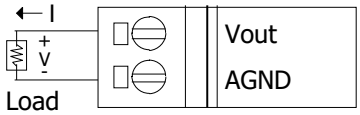
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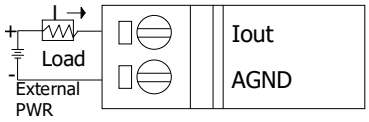
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Model	Output Type	ON State Readback as 1	OFF State Readback as 0
ECAT-2052 ECAT-2057 ECAT-2057-8P8N(DO0-7) ECAT-2057-32	Inductive Load		
	Resistance Load		

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

Analog Output Wiring

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

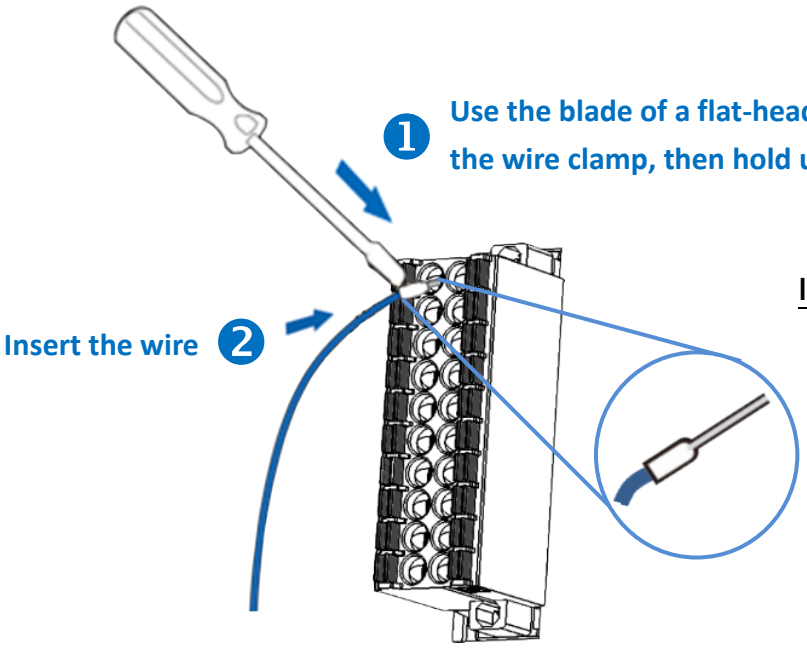
Model	Output Type	Current Output
ECAT-2024 ECAT-2028	**Analog Output**	

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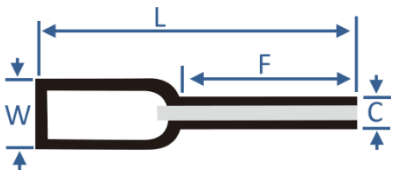
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2.5 Wiring to the Connector

A tip for connection the wire to the connector

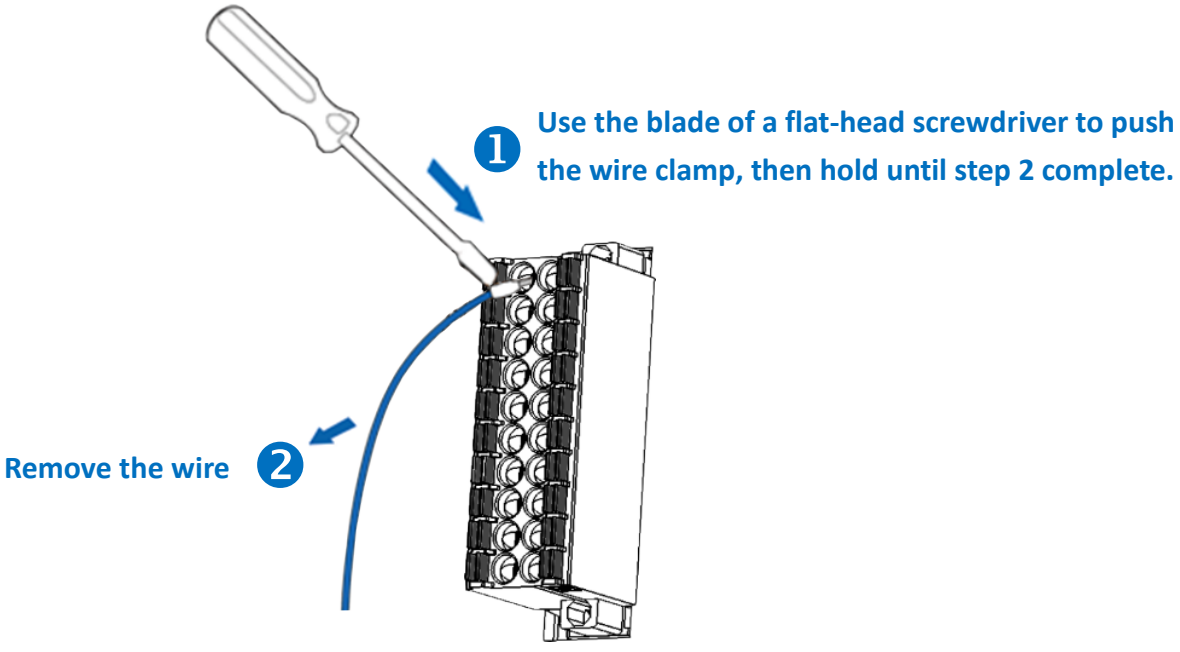


Insulated Terminals Dimensions



Dimensions (Unit: mm)				
Item NO.	F	L	C	W
CE007512	12.0	18.0	1.2	2.8

A tip for removing the wire from the connector



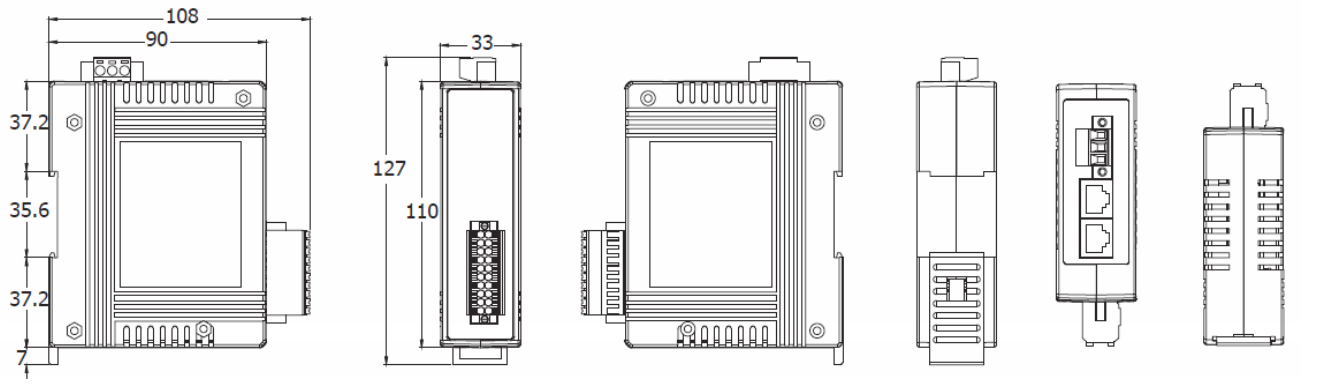
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2.6 Dimensions

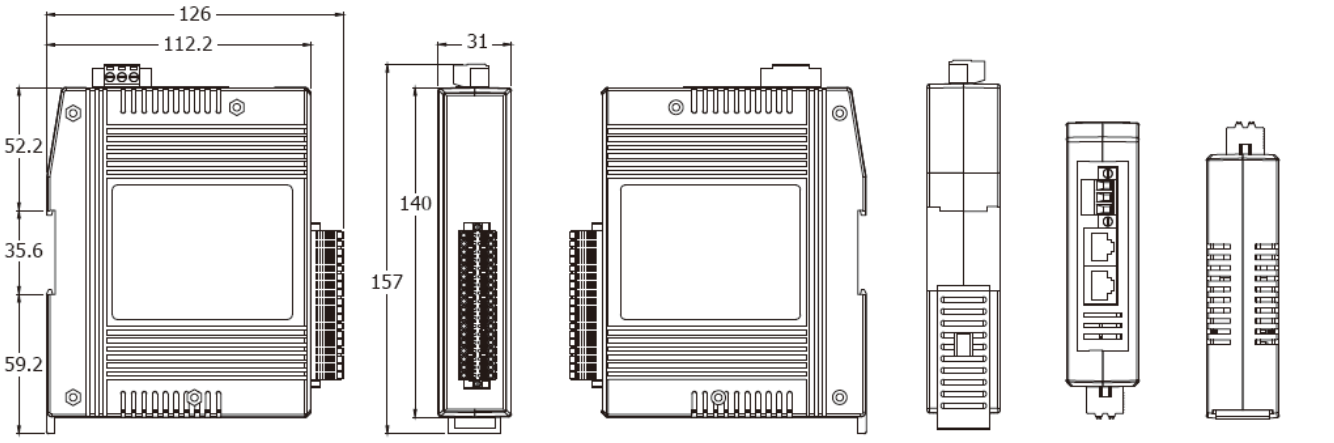
The following diagrams provide the dimensions of the ECAT-2000 series module and can be used as a reference when defining the specifications for any custom enclosures. All dimensions are in millimeters.

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



Left Side | Front | Right Side | Rear | Top | Bottom

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



Left Side | Front | Right Side | Rear | Top | Bottom

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3. Getting Started

This chapter provides a basic overview of how to configure and operate your ECAT-2000 series module.

3.1 Connecting the Power and the Host PC

Step 1

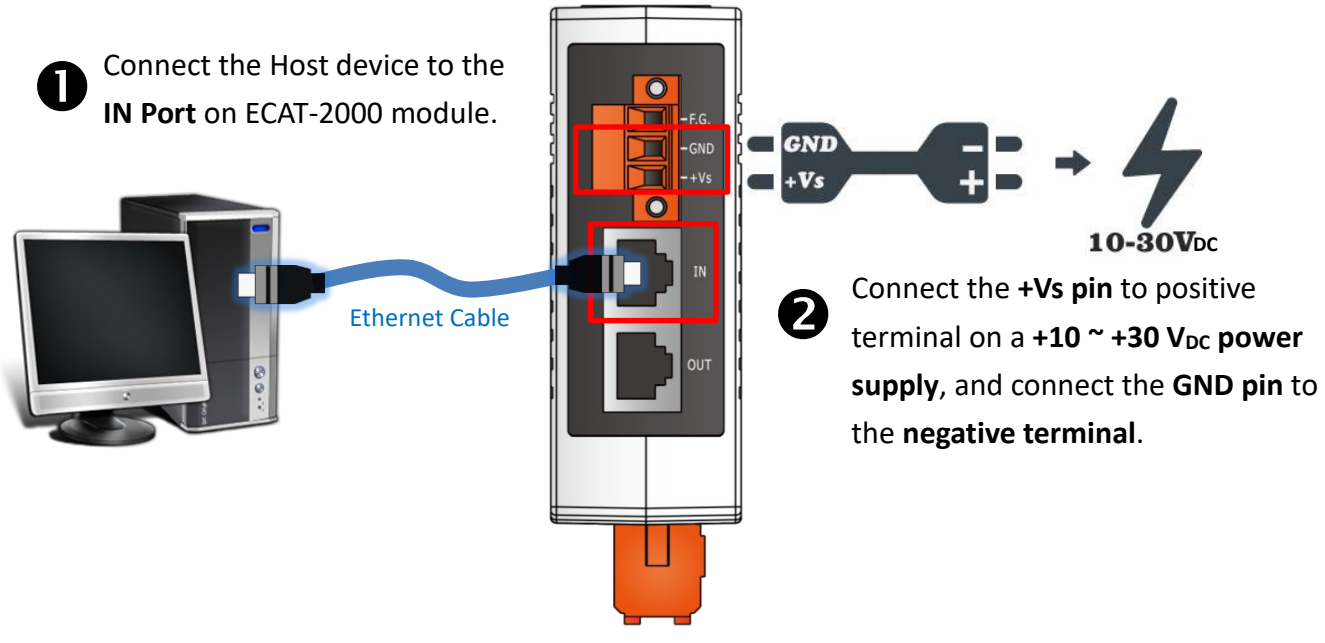
Connect both the IN port of ECAT-2000 module and RJ-45 Ethernet port of Host PC.

Ensure that the network settings on the Host PC have been correctly configured and are functioning normally. Ensure that the Windows firewall or any Anti-Virus firewall is properly configured to allow incoming connections, or temporarily disable these functions.

NOTE: Attaching an ESC (EtherCAT Slave Controller) directly to an office network will result in network flooding, since the ESC will reflect any frame – especially broadcast frames – back into the network (broadcast storm).

Step 2

Apply power to the ECAT-2000 module.

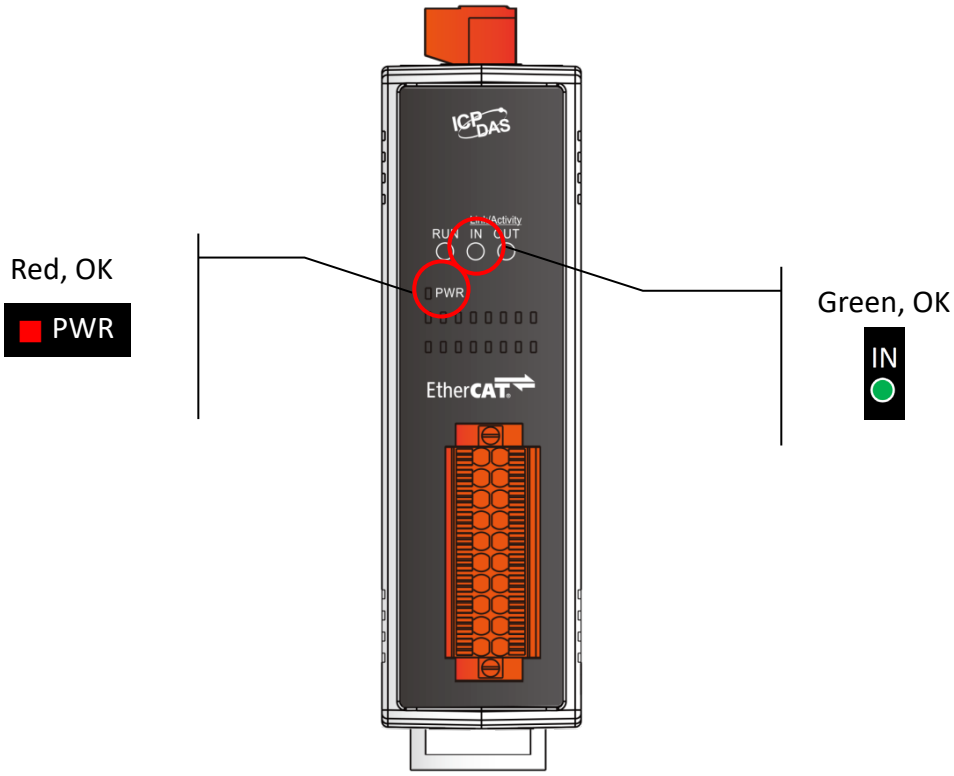


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Step 3

Verify the "PWR" LED indicator on the ECAT-2000 module is Red, "IN" LED indicator is Green.



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3.2 Configuration and Operation

Beckhoff TwinCAT 2.X is most commonly used EtherCAT Master software to operate ECAT-2000 module.

Inserting into the EtherCAT network

NOTE

Installation of the latest XML device description(ESI)

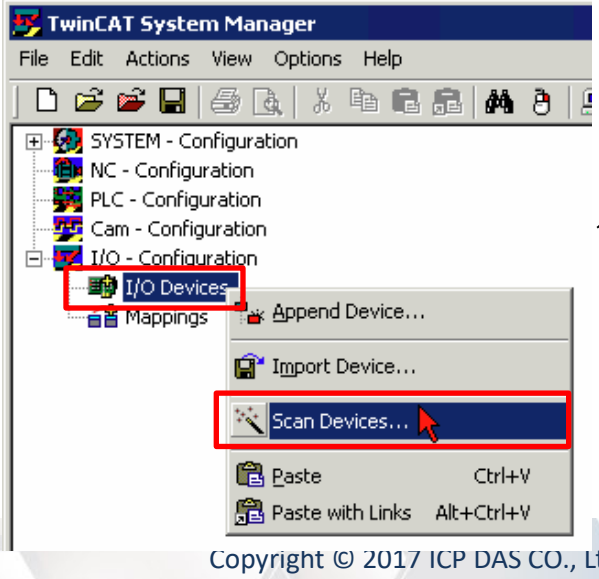
Please ensure that you have installed the latest XML device description in TwinCAT. This can be downloaded from the ICP DAS website (https://www.icpdas.com/en/download/show.php?num=2190&model=ECAT-2055

https://www.icpdas.com/en/download/show.php?num=2189&model=ECAT-2024) and installed according to the installation instructions.

Step 1

Automatic Scanning

- The EtherCAT system must be in a safe, de-energized state before the ECAT-2000 module connected to EtherCAT network!
- Switch on the operating voltage, open the TwinCAT System Manager (Config mode), and scan in the devices (below the picture). Acknowledge all dialogs with **"OK"**, so that the configuration is in **"FreeRun"** mode.



Scanning in the configuration
(I/O Devices-> right-click-> Scan Devices...)

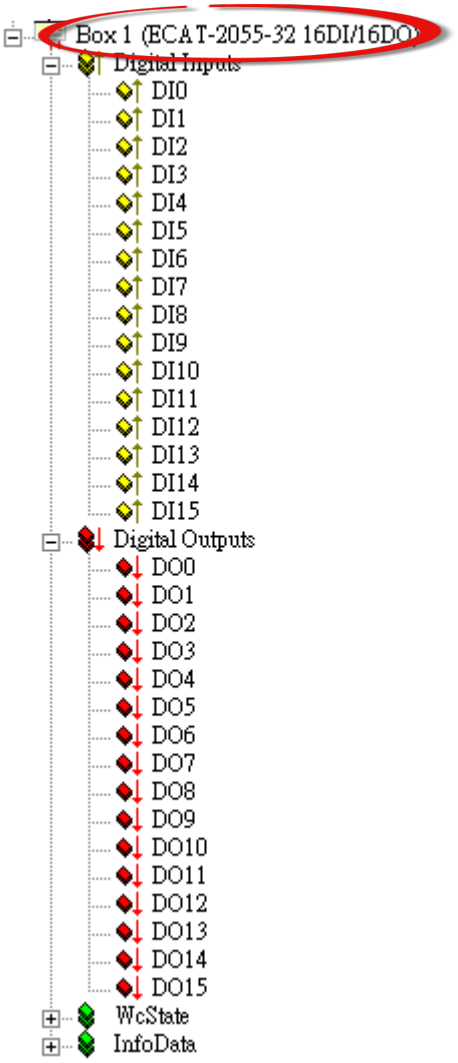
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Step 2

Configuration via TwinCAT

In the left-hand of the TwinCAT System Manager, click on the branch of the EtherCAT Box you wish to configure (ECAT-2055-32 in this example). Click DIx or DOx to get and configure state.



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4. Object Description and Parameterization

4.1 Standard Object(0x1000-0x1FFF)

[ALL]Index 1000 Device Type

Index	Name	Meaning	Data type	Flags	Default
1000:00	Device type	Device type of the EtherCAT slave: the Lo-Word contains the CoE profile used (5001). The Hi-Word contains the module profile according to the modular device profile.	UINT32	RO	0x00000192 (402dec)

[ALL]Index 1008 Device Name

Index	Name	Meaning	Data type	Flags	Default
1008:00	Device name	EtherCAT Slave Device Name	String	RO	Refer to following table

Table 4-1: Device Name

Model	Device Name	Model	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

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[ALL]Index 1009 Hardware Version

Index	Name	Meaning	Data type	Flags	Default
1009:00	Hardware version	Hardware version of the EtherCAT slave	String	RO	0.7

[ALL]Index 100A Software Version

Index	Name	Meaning	Data type	Flags	Default
100A:00	Software version	Firmware version for EtherCAT slave	String	RO	1.4

[ALL]Index 1018 Identity

Index	Name	Meaning	Data type	Flags	Default
1018:00	Identity	Information for identifying the slave	INT8	RO	0x04(4dec)
1018:01	Vendor ID	Vendor ID of the EtherCAT slave	UINT32	RO	0x00494350 (4801360dec)
1018:02	Product code	Product code of the EtherCAT slave	UINT32	RO	Refer to following table
1018:03	Revision	Revision number of the EtherCAT slave;	UINT32	RO	Depend on device
1018:04	Serial number	Serial number of the EtherCAT slave	UINT32	RO	Depend on device

Table 4-2: Product Code

Model	Product Code	Model	Product Code
ECAT-2024	0x7E8(2024dec)	*ECAT-2053*	0x805(2053dec)
ECAT-2028	0x7EC(2028dec)	*ECAT-2055*	0x807(2055dec)
ECAT-2028	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)

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

Index	Name	Meaning	Data type	Flags	Default
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	Name	Meaning	Data type	Flags	Default
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

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

Index	Name	Meaning	Data type	Flags	Default
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

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

NOTE: ECAT-2024: 0<= **n** <=3; ECAT-2028/2028C: 0<= **n** <=7.

Index	Name	Meaning	Data type	Flags	Default
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<=n<=C) DI Outputs Process Data Mapping

Index	Name	Meaning	Data type	Flags	Default
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	Name	Meaning	Data type	Flags	Default
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

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

Index	Name	Meaning	Data type	Flags	Default
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

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[ALL]Index 1C00 Sync Manager Type

Index	Name	Meaning	Data type	Flags	Default
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	Name	Meaning	Data type	Flags	Default
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	Name	Meaning	Data type	Flags	Default
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	Name	Meaning	Data type	Flags	Default
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)

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

Index	Name	Meaning	Data type	Flags	Default
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	Name	Meaning	Data type	Flags	Default
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)

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4.2 Profile Specific Objects(0x6000-0x7FFF)

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

Index	Name	Meaning	Data type	Flags	Default
60n0:00	DIn		UINT8	RO	0x2(2dec)
60n0:01	Inputs		BOOLEAN	RO	0x00(0dec)

[ECAT-2055-32]Index 6000 Digital Inputs

Index	Name	Meaning	Data type	Flags	Default
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)

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[ECAT-2051-32]Index 6000 Digital Inputs

Index	Name	Meaning	Data type	Flags	Default
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)

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

Index	Name	Meaning	Data type	Flags	Default
70n0:00	DOn		UINT8	RO	0x2(2dec)
70n0:01	Outputs		BOOLEAN	RO	0x00(0dec)

[ECAT-2055-32]Index 7000 Digital Outputs

Index	Name	Meaning	Data type	Flags	Default
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)

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

Index	Name	Meaning	Data type	Flags	Default
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)

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[ECAT-2024/2028]Index 70n0 AO Outputs Channel

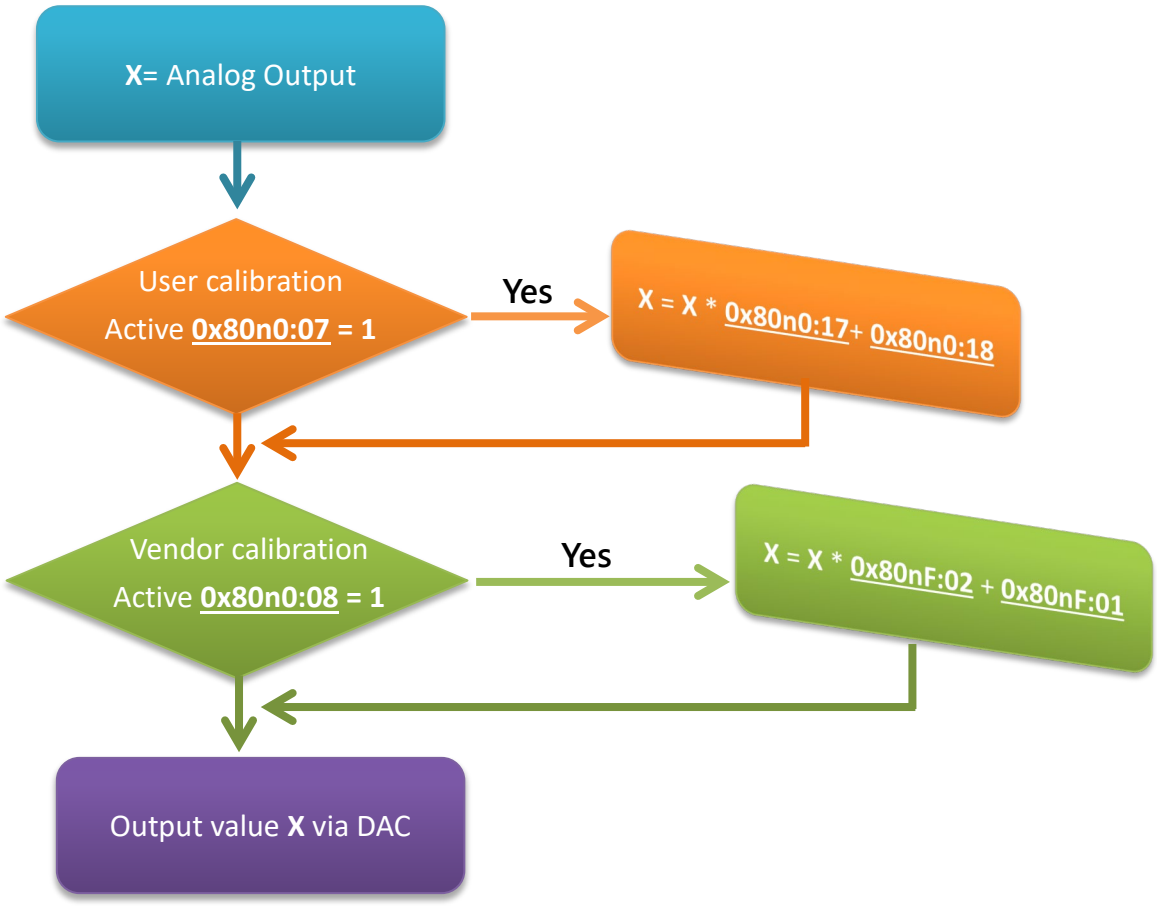
NOTE: ECAT-2024: 0<= **n** <=3; ECAT-2028/2028C: 0<= **n** <=7.

Index	Name	Meaning	Data type	Flags	Default
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 Profile Specific Objects(0x8000-0x8FFF)

Process Data Flow

The data stream of the ECAT-2024/208 (raw data processing) is graphically shown in the flow chart below.



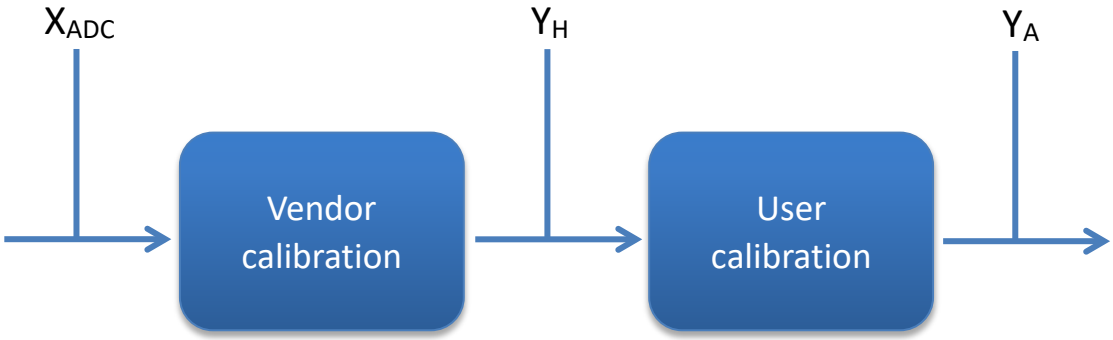
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Calculation of process data

The concept “calibration”, this is a description of the vendor or customer calibration data/adjustment data used by the device during operation in order to maintain the assured measuring accuracy.

The terminal constantly records measured values and saves the raw values from its DA converter in the DAC raw value object 0x80nE:01. After each recording of the analog signal, the correction calculation takes place with the vendor and user calibration data as well as the user scaling, if these are activated (see following picture).



Calculation	Designation
X_{DAC}	Output of the DA converter
$Y_H = (X_{DAC} – B_H) \times A_H \times 2^{-14}$	Measured value after vendor calibration
$Y_A = (Y_H – B_A) \times A_A \times 2^{-14}$	Measured value after vendor and user calibration

Name	Designation	Index
X_{DAC}	Output value of the DA converter	0x80nE:01
B_H	Vendor calibration offset (not changeable)	0x80nF:01
A_H	Vendor calibration gain (not changeable)	0x80nF:02
B_A	User calibration offset (can be activated via index 0x80n0:07)	0x80n0:17
A_A	User calibration gain (can be activated via index 0x80n0:07)	0x80n0:18

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[ECAT-2024/2028]Index 80n0 AO Channel Settings

NOTE: ECAT-2024: 0<= **n** <=3; ECAT-2028/2028C: 0<= **n** <=7.

Index	Name	Meaning	Data type	Flags	Default
80n0:00	ECAT-2024: AO Settings Ch. 1-4 ECAT-2028: AO Settings Ch. 1-8		UINT8	RO	0x25(37dec)
80n0:05	Watchdog	**0: Default watchdog value** The default value (80n0:13) is active. **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 (±5V) **2:** Unipolar 10V (0-10V) **3:** Bipolar 10V (±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	0xFFF(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)

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[ECAT-2024/2028]Index 80nE AO Channel Internal Data

NOTE: ECAT-2024: 0<= **n** <=3; ECAT-2028/2028C: 0<= **n** <=7.

Index	Name	Meaning	Data type	Flags	Default
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-2024/2028]Index 80nF AO Channel Internal Data

NOTE: ECAT-2024: 0<= **n** <=3; ECAT-2028/2028C: 0<= **n** <=7.

Index	Name	Meaning	Data type	Flags	Default
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)

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Appendix: Revision History

This chapter provides revision history information to this document.

The table below shows the revision history.

Revision	Date	Description
1.1	2013	Initial issue
1.2	2015	1. Added the information about the ECAT-2050 specification, I/O connector (Pin assignment), I/O status LEDs, and wire connection in Section 2.3 ECAT-2050. 2. Added the information about the ECAT-2052 specification, I/O connector (Pin assignment), I/O status LEDs, and wire connection in Section 2.5 ECAT-2052. 3. Added the information about the ECAT-2052-NPN specification, I/O connector (Pin assignment), I/O status LEDs, and wire connection in Section 2.6 ECAT-2052-NPN. 4. Added the information about the ECAT-2053 specification, I/O connector (Pin assignment), I/O status LEDs, and wire connection in Section 2.7 ECAT-2053. 5. Added the information about the ECAT-2057 specification, I/O connector (Pin assignment), I/O status LEDs, and wire connection in Section 2.9 ECAT-2057. 6. Added the information about the ECAT-2057-NPN specification, I/O connector (Pin assignment), I/O status LEDs, and wire connection in Section 2.9 ECAT-2057-NPN.
1.4	Jul. 2016	1. Added the information about the ECAT-2045-32/2051-32/2055-32/2057-8P8N/2061 specification in Section 2.2 I/O Specifications. 2. Added the information about the ECAT-2045-32/2051-32/2055-32/2057-8P8N/2061 pin assignments in Section 2.3 Pin Assignments. 3. Added the Section 2.5 Wiring to the connector. 4. Added the Section 2.6 Dimensions. 5. Added the Section 3.1 Connecting the Power and the Host PC. 6. Added the Section 3.2 Configuration and Operation and Inserting

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		into the EtherCAT network. 7. Added the Chapter 4 Object Description and Parameterization. 8. Added the Section 4.1 Standard Object (0x1000-0x1FFF). 9. Added the Section 4.2 Profile Standard Object (0x6000-0x7FFF).
1.5	Dec. 2016	1. Added the information about the ECAT-2024/2028 specification in Section 2.2 I/O Specifications. 2. Added the information about the ECAT-2024/2028 pin assignments in Section 2.3 Pin Assignments. 3. Added the information about the ECAT-2024/2028 input/output wiring Section 2.4 Wiring connector. 4. Added the information about the ECAT-2024/2028 dimensions Section 2.6 Dimensions.
1.6	Jun. 2017	1. Added the information about the ECAT-2024/2028 index 160n AO outputs process data and index 1c12 syncManager 2 assignment in Section 4.1 Standard Object (0x1000-0x1FFF). 2. Added the information about the ECAT-2024/2028 index 70n0 AO analog outputs channel in Section 4.3 Standard Object (0x6000-0x7FFF). 3. Added the Section 4.3 Profile Standard Object (0x8000-0x8FFF).
1.6.1	Nov. 2017	Update the information about the ECAT-2045-32 pin assignments in Section 2.3 Pin Assignments.
1.7	Aug. 2018	Added the information about the ECAT-2057-32 specification, Pin assignment, and wire connection, ect.
1.8	Oct. 2018	Deleted the information about the ECAT-2011H.
1.9	Sep. 2019	Fix pin assignmets about ECAT-2045-32 and ECAT-2057-32
2.0	Sep. 2024	Fix several link Add the ECAT-2028C detail information

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