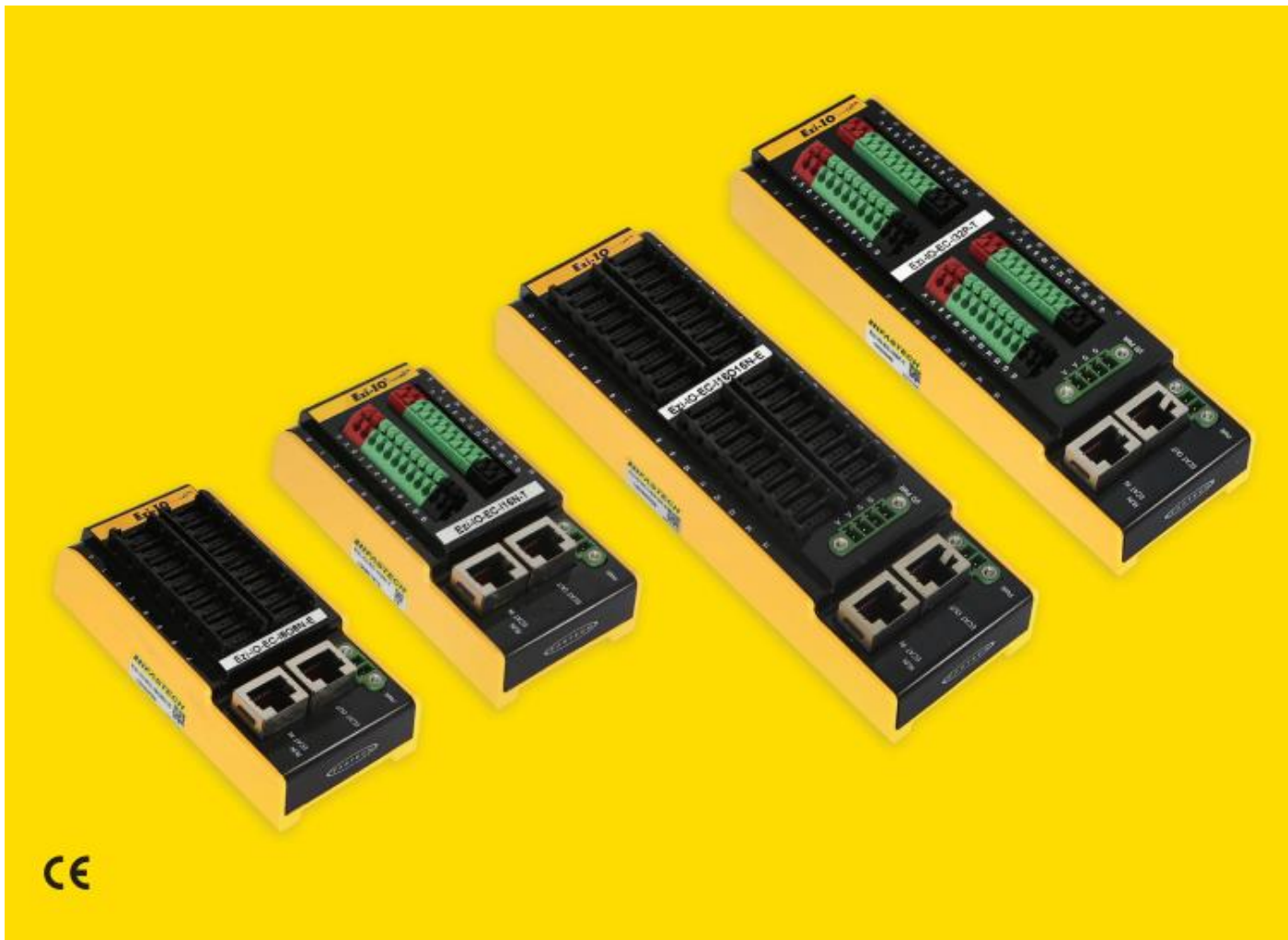


# Ezi-IO<sup>®</sup> EtherCAT<sup>®</sup>

## Input/Output Module



*Fast, Accurate, Smooth Motion*



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**Manual Version : [ver1.0]**

Apply GUI version : None

# 1. Safety Pre-caution and Note on Installation

## Safety and Installation Precautions

### ※ Before Operation

- Thank you for purchasing our Ezi-IO EtherCAT products.
- Ezi-IO EtherCAT is Full Digital I/O control Unit mounted EtherCAT Slave Controller chip.
- This manual describes the handling, maintenance, repair, diagnosis and troubleshooting of Ezi-IO EtherCAT.
- Before starting operation of Ezi-IO EtherCAT, thoroughly read this manual.
- After reading this manual, keep the manual near Ezi-IO EtherCAT, so that any user can read this manual whenever needed.

### ※ Precautions

#### • General Precautions



- Contents of this manual are subject to change without prior notice for functional improvements, change of specifications or user's better understanding. Thoroughly read the manual which is provided with purchased Ezi-IO EtherCAT.
- In case of manual is damaged or lost, please contact with FASTECH's agent or our company at the address on the last page of this manual.
- FASTECH is not responsible for a product breakdown due to user's dismantling for the product, and such a breakdown is not guaranteed by the warranty.


#### • Safety Precautions

- Before installation, operation, repairing the products, thoroughly read the manual and fully understand the contents. Before operating the products, please understand the mechanical characteristics of these products and related safety information and precautions.




- This manual divides safety precautions into **Attention** and **Warning**.



 <b>Attention</b>	If a user does not properly handle the products, the user may seriously or slightly injured damages may occur in the machine.
 <b>Warning</b>	If a user does not properly handle the products, a dangerous situation (such as an electric shock) may occur resulting in deaths or serious injuries.

- Although precaution is only a  , the serious result could be caused depending on the situation. Follow safety precaution.



• Product Status

 <b>Attention</b>	<p><b>Check the Product is damaged or parts are missing.</b>          Otherwise, the machine may get damaged or the user may get injured.</p>
---	---


• Installation

 <b>Attention</b>	<p><b>Please carry the Ezi-IO EtherCAT carefully.</b>          Otherwise, the product may get damaged or user's foot may get injured by dropping the product.</p> <p><b>Use non-flammable materials such as metal in the place where the Ezi-IO EtherCAT is to be installed.</b>          Otherwise, a fire may occur.</p> <p><b>When installing several Ezi-IO EtherCAT in a sealed place, install a cooling fan to keep the ambient temperature of the product as 50°C or lower.</b>          Otherwise, a fire or other kinds of accidents may occur due to overheating.</p>
 <b>Warning</b>	<p><b>The process of installation, Connection, Operation, Checking and Repairing should be done by qualified person.</b>          Otherwise, a fire or other kinds of accidents may occur.</p>

• Connect Cables


 <b>Attention</b>	<p><b>Keep the rated range of input Voltage for drive.</b>          Otherwise, a fire or other kinds of accidents may occur.</p> <p><b>Cable connection should be following the wiring diagram.</b>          Otherwise, a fire or malfunction of machine may occur.</p>
 <b>Warning</b>	<p><b>Before connecting cables, check if input power is off.</b>          Otherwise, an electric shock or a fire may occur.</p> <p><b>The case of this Ezi-IO EtherCAT is isolated from the ground of the internal circuit by the condenser, Please Ground the Ezi-IO EtherCAT.</b>          Otherwise, an electric shock or a fire may occur and a cause of malfunction of machine.</p>

• Operation & Setting change

 <b>Attention</b>	<p><b>If a protection function (Alarm) occurs, firstly remove its cause and then release (Alarm reset) the protection function.</b>          If you operate continuously without removing its cause, the machine may get damaged or the user may get injured.</p>
---	---

	<p><b>Make all input signals to OFF before supply input voltage to Ezi-IO EtherCAT drive.</b></p> <p>The machine may get damaged or the user may get injured by motor operation.</p>
--	--

• **Check and Repair**

 <p><b>Warning</b></p>	<p><b>Stop to supply power to the main circuit and wait sufficient time before checking or repairing this Ezi-IO EtherCAT.</b></p> <p>Electricity remaining in the condenser may cause of electric shock.</p> <p><b>Do not change cabling while power is being supplied.</b></p> <p>Otherwise, the user may get injured or the product and machine may get damaged.</p> <p><b>Do not reconstruct the Ezi-IO-EtherCAT</b></p> <p>Otherwise, an electric shock may occur or the product and machine get damaged. And the reconstructed product cannot get after service.</p>
---	--

※ **Notes on Installation**

- 1) This product has been designed for indoor uses. The ambient temperature of the room should be 0°~ 50°C.
- 2) Do not install this product under direct rays or near magnetic or radioactive objects.

Only qualified and trained personnel should use this product.  
 Be sure to use the product properly after reading “Precautions”  
 The products described in this manual are designed and manufactured to be integrated.  
 Do not use for nay purpose other than general industry.  
 Fastech Co., Ltd. Is not responsible for damage caused by failure to observe this warning.

## 2. Specifications and Size

### 2.1 Module specifications

- Ezi-IO-EtherCAT IN16-□

Module Type		Ezi-IO-EC-I16N-□	Ezi-IO-EC-I16P-□
Input Voltage		24VDC±10%	
Current Consumption		Max 150mA(Excluding I/O current)	
Operating Condition	Ambient Temperature	In Use : 0~50°C In Storage : -20~70°C	
	Humidity	In Use : 35 ~ 85%RH (Non-condensation) In Storage : 10 ~ 90%RH (Non-condensation)	
	Vib. Resist	0.5g	
Function	Input Signal	<ul style="list-style-type: none"> <li>• 16CH Input(Photocoupler Input, NPN type / PNP type)</li> <li>• 24VDC</li> <li>• Max. 15mA/CH</li> </ul>	
	Signal Isolation	None	
LED Display		<ul style="list-style-type: none"> <li>• Power status(PWR)</li> <li>• EtherCAT communication status(RUN)</li> <li>• EtherCAT communication connection(ECAT IN, ECAT OUT)</li> <li>• I/O Status(0 ~ 15)</li> </ul>	
EtherCAT	Synchronization	Free RUN, SM Event	
	Bus Interface	2 X RJ45 connector	
	Cable	STP (Shielded Twisted Pair) Cable, Above Category 5e / Max 100m	

□ : Connector type

- Ezi-IO-EtherCAT OUT16-□

Module Type		Ezi-IO-EC-O16N-□	Ezi-IO-EC-O16P-□
Input Voltage		24VDC±10%	
Current Consumption		Max 150mA(Excluding I/O current)	
Operating Condition	Ambient Temperature	In Use : 0~50°C In Storage : -20~70°C	
	Humidity	In Use : 35 ~ 85%RH (Non-condensation) In Storage : 10 ~ 90%RH (Non-condensation)	
	Vib. Resist	0.5g	
Function	Input Signal	<ul style="list-style-type: none"> <li>• 16CH Output(FET Output, NPN type / PNP type)</li> <li>• 24VDC</li> <li>• Max. 200mA/CH</li> </ul>	
	Signal Isolation	None	
LED Display		<ul style="list-style-type: none"> <li>• Power status(PWR)</li> <li>• EtherCAT communication status(RUN)</li> <li>• EtherCAT communication connection(ECAT IN, ECAT OUT)</li> <li>• I/O Status(0 ~ 15)</li> </ul>	
EtherCAT	Synchronization	Free RUN, SM Event	
	Bus Interface	2 X RJ45 connector	
	Cable	STP (Shielded Twisted Pair) Cable, Above Category 5e / Max 100m	

□ : Connector type



- Ezi-IO-EtherCAT IN8OUT8-□

Module Type		Ezi-IO-EC-I808N-□	Ezi-IO-EC-I808P-□
Input Voltage		24VDC±10%	
Current Consumption		Max 150mA(Excluding I/O current)	
Operating Condition	Ambient Temperature	In Use : 0~50°C In Storage : -20~70°C	
	Humidity	In Use : 35 ~ 85%RH (Non-condensation) In Storage : 10 ~ 90%RH (Non-condensation)	
	Vib. Resist	0.5g	
Function	Input Signal	<ul style="list-style-type: none"> <li>• 8CH Input(Photocoupler input, NPN type / PNP type)</li> <li>• 24VDC</li> <li>• Max. 15mA/CH</li> </ul>	
	Output Signal	<ul style="list-style-type: none"> <li>• 8CH Output(FET output, NPN type / PNP type)</li> <li>• 24VDC</li> <li>• Max. 200mA/CH</li> </ul>	
	Signal Isolation	None	
LED Display		<ul style="list-style-type: none"> <li>• Power status(PWR)</li> <li>• EtherCAT communication status(RUN)</li> <li>• EtherCAT communication connection(ECAT IN, ECAT OUT)</li> <li>• I/O Status(0 ~ 7 / 0 ~ 7)</li> </ul>	
EtherCAT	Synchronization	Free RUN, SM Event	
	Bus Interface	2 X RJ45 connector	
	Cable	STP (Shielded Twisted Pair) Cable, Above Category 5e / Max 100m	

□ : Connector type

- Ezi-IO-EtherCAT IN32-□

Module Type		Ezi-IO-EC-I32N-□	Ezi-IO-EC-I32P-□
Input Voltage		24VDC±10%	
Current Consumption		Max 300mA(Excluding I/O current)	
Operating Condition	Ambient Temperature	In Use : 0~50°C In Storage : -20~70°C	
	Humidity	In Use : 35 ~ 85%RH (Non-condensation) In Storage : 10 ~ 90%RH (Non-condensation)	
	Vib. Resist	0.5g	
Function	Input Signal	<ul style="list-style-type: none"> <li>• 32CH Input(Photocoupler input, NPN type / PNP type)</li> <li>• 24VDC</li> <li>• Max. 15mA/CH</li> </ul>	
	Signal Isolation	Photocoupler Isolation	
LED Display		<ul style="list-style-type: none"> <li>• Control Power status(PWR)</li> <li>• EtherCAT communication status(RUN)</li> <li>• EtherCAT communication connection(ECAT IN, ECAT OUT)</li> <li>• I/O Status(0 ~ 31)</li> </ul>	
EtherCAT	Synchronization	Free RUN, SM Event	
	Bus Interface	2 X RJ45 connector	
	Cable	STP(Shielded Twisted Pair) Cable, Above Category 5e / Max 100m	

□ : Connector type

• Ezi-IO-EtherCAT OUT32-□

Module Type		Ezi-IO-EC-O32N-□	Ezi-IO-EC-O32P-□
Input Voltage		24VDC±10%	
Current Consumption		Max 300mA(Excluding I/O current)	
Operating Condition	Ambient Temperature	In Use : 0~50°C In Storage : -20~70°C	
	Humidity	In Use : 35 ~ 85%RH (Non-condensation) In Storage : 10 ~ 90%RH (Non-condensation)	
	Vib. Resist	0.5g	
Function	Input Signal	<ul style="list-style-type: none"> <li>• 32CH Output(FET output, NPN type / PNP type)</li> <li>• 24VDC</li> <li>• Max. 200mA/CH</li> </ul>	
	Signal Isolation	Photocoupler Isolation	
LED Display		<ul style="list-style-type: none"> <li>• Control Power status(PWR)</li> <li>• EtherCAT communication status(RUN)</li> <li>• EtherCAT communication connection(ECAT IN, ECAT OUT)</li> <li>• I/O Status(0 ~ 31)</li> </ul>	
EtherCAT	Synchronization	Free RUN, SM Event	
	Bus Interface	2 X RJ45 connector	
	Cable	STP(Shielded Twisted Pair) Cable, Above Category 5e / Max 100m	

□ : Connector type

• Ezi-IO-EtherCAT IN16OUT16-□

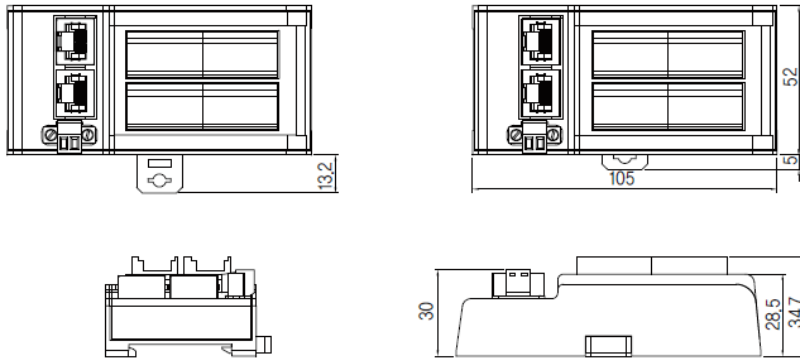
Module Type		Ezi-IO-EC-I16O16N-□	Ezi-IO-EC-I16O16P-□
Input Voltage		24VDC±10%	
Current Consumption		Max 300mA(Excluding I/O current)	
Operating Condition	Ambient Temperature	In Use : 0~50°C In Storage : -20~70°C	
	Humidity	In Use : 35 ~ 85%RH (Non-condensation) In Storage : 10 ~ 90%RH (Non-condensation)	
	Vib. Resist	0.5g	
Function	Input Signal	<ul style="list-style-type: none"> <li>• 16CH Input(Photocoupler input, NPN type / PNP type)</li> <li>• 24VDC</li> <li>• Max. 15mA/CH</li> </ul>	
	Output Signal	<ul style="list-style-type: none"> <li>• 16CH Output(FET output, NPN type / PNP type)</li> <li>• 24VDC</li> <li>• Max. 200mA/CH</li> </ul>	
	Signal Isolation	Photocoupler Isolation	
LED Display		<ul style="list-style-type: none"> <li>• Control Power status(PWR)</li> <li>• EtherCAT communication status(RUN)</li> <li>• EtherCAT communication connection(ECAT IN, ECAT OUT)</li> <li>• I/O Status(0 ~ 15 / 0 ~ 15)</li> </ul>	
EtherCAT	Synchronization	Free RUN, SM Event	
	Bus Interface	2 X RJ45 connector	
	Cable	STP (Shielded Twisted Pair) Cable, Above Category 5e / Max 100m	

□ : Connector type

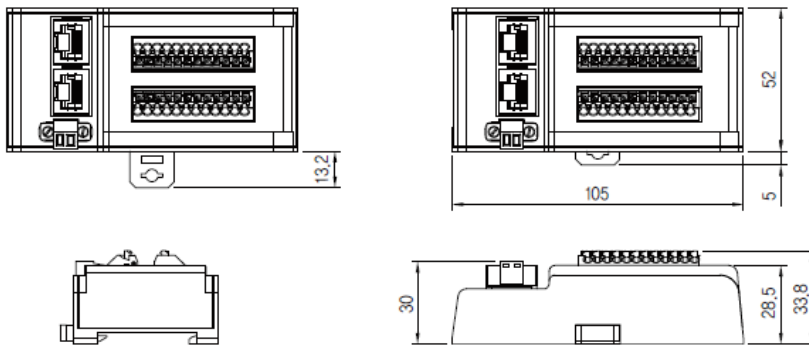
## 2.2 Module size

[Unit : mm]

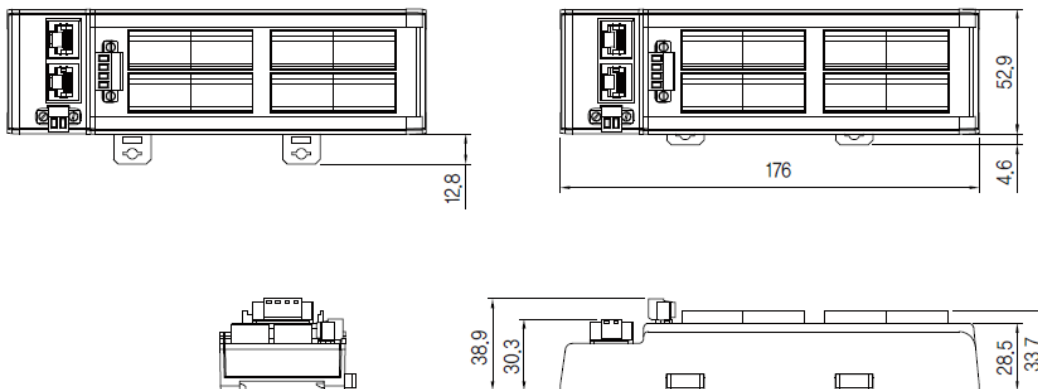
- Ezi-IO-EC-16□-E / Ezi-IO-EC-I8O8□-E Series



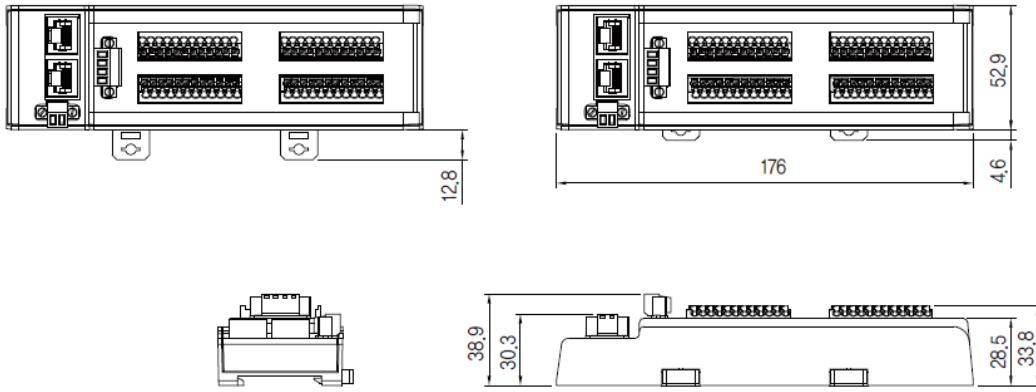
- Ezi-IO-EC-16□-T / Ezi-IO-EC-I8O8□-T Series



- Ezi-IO-EC-32□-E / Ezi-IO-EC-I16O16□-E Series



- Ezi-IO-EC-■32-□-T / Ezi-IO-EC-I16O16□-T Series



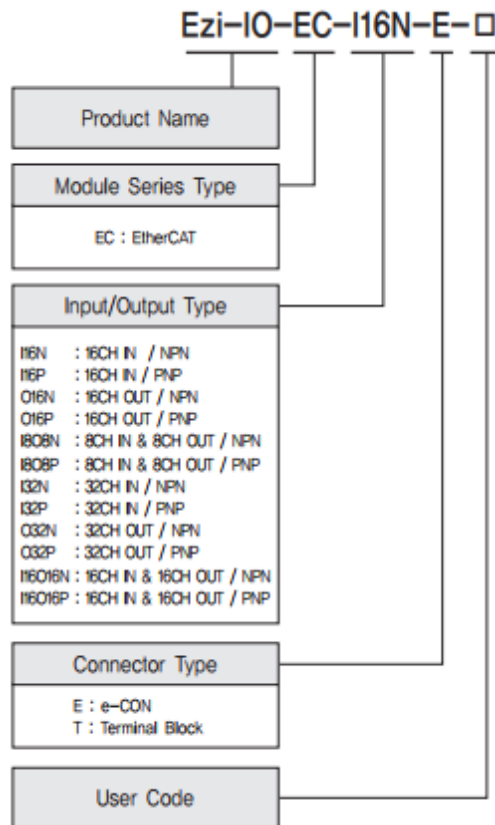
※ ■ : Input / Output Type

□ : NPN / PNP Type

※ It is possible to install at 35mm DIN Rail.

### 3. Configuration

#### 3.1 Ezi-IO EtherCAT Part Numbering



#### 3.2 Ezi-IO EtherCAT Part Number

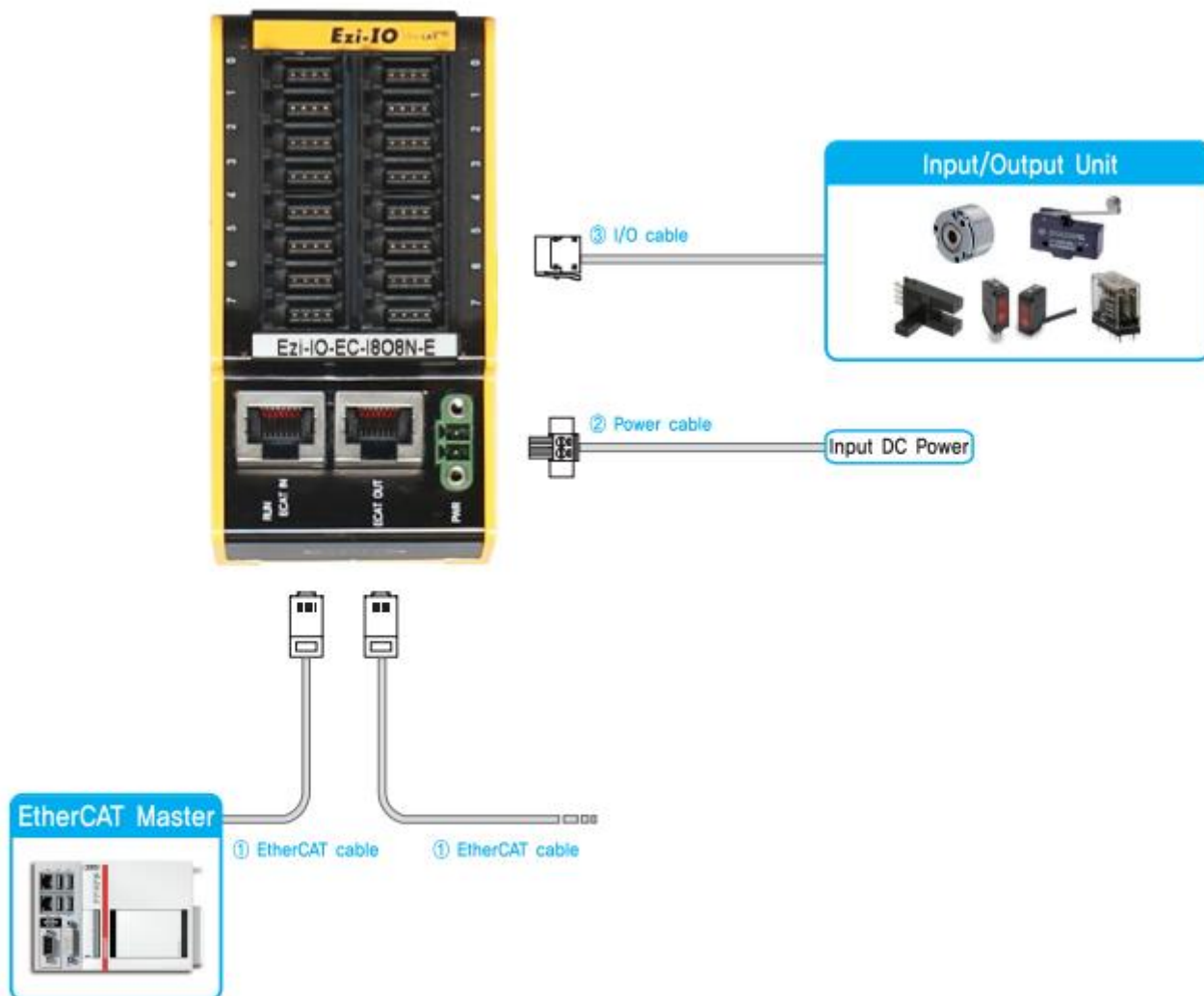
Part Number	Series
Ezi-IO-EC-I16N-E	Ezi-IO-EC-■16□-E
Ezi-IO-EC-I16P-E	
Ezi-IO-EC-O16N-E	
Ezi-IO-EC-O16P-E	
Ezi-IO-EC-I808N-E	Ezi-IO-EC-I808□-E
Ezi-IO-EC-I808P-E	
Ezi-IO-EC-I16N-T	Ezi-IO-EC-■16□-T
Ezi-IO-EC-I16P-T	
Ezi-IO-EC-O16N-T	
Ezi-IO-EC-O16P-T	
Ezi-IO-EC-I808N-T	Ezi-IO-EC-I808□-T
Ezi-IO-EC-I808P-T	
Ezi-IO-EC-I32N-E	Ezi-IO-EC-■32□-E
Ezi-IO-EC-I32P-E	
Ezi-IO-EC-O32N-E	
Ezi-IO-EC-O32P-E	Ezi-IO-EC-I16O16□-E
Ezi-IO-EC-I16O16N-E	
Ezi-IO-EC-I16O16P-E	Ezi-IO-EC-■32□-T
Ezi-IO-EC-I32N-T	
Ezi-IO-EC-I32P-T	
Ezi-IO-EC-O32N-T	
Ezi-IO-EC-O32P-T	Ezi-IO-EC-I16O16□-T
Ezi-IO-EC-I16O16N-T	
Ezi-IO-EC-I16O16P-T	

\* ■ : Input / Output Type

□ : NPN / PNP Type

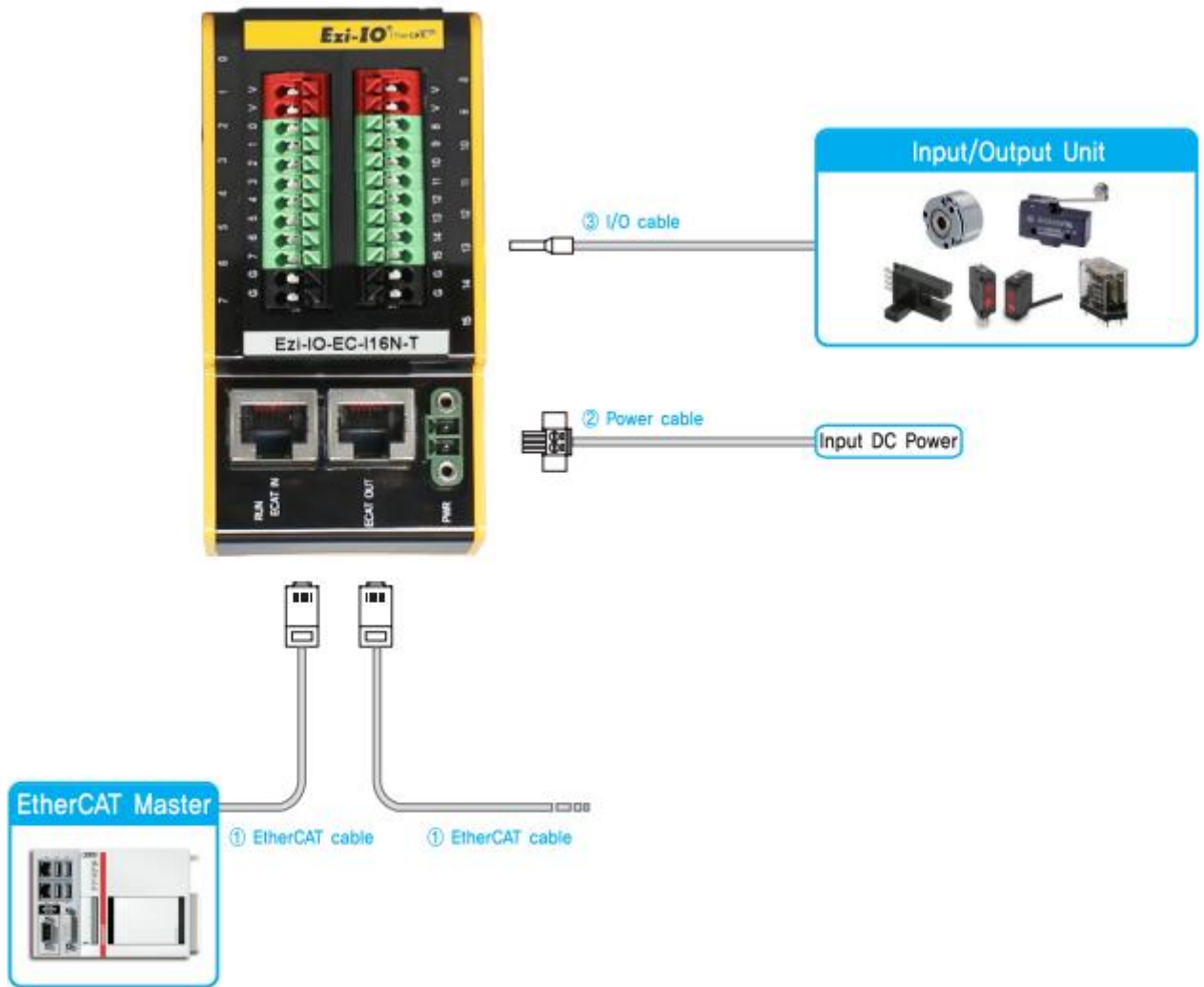
### 3.3 System Configuration

#### 3.3.1 Ezi-IO-EC-16□-E / Ezi-IO-EC-I808□-E Series



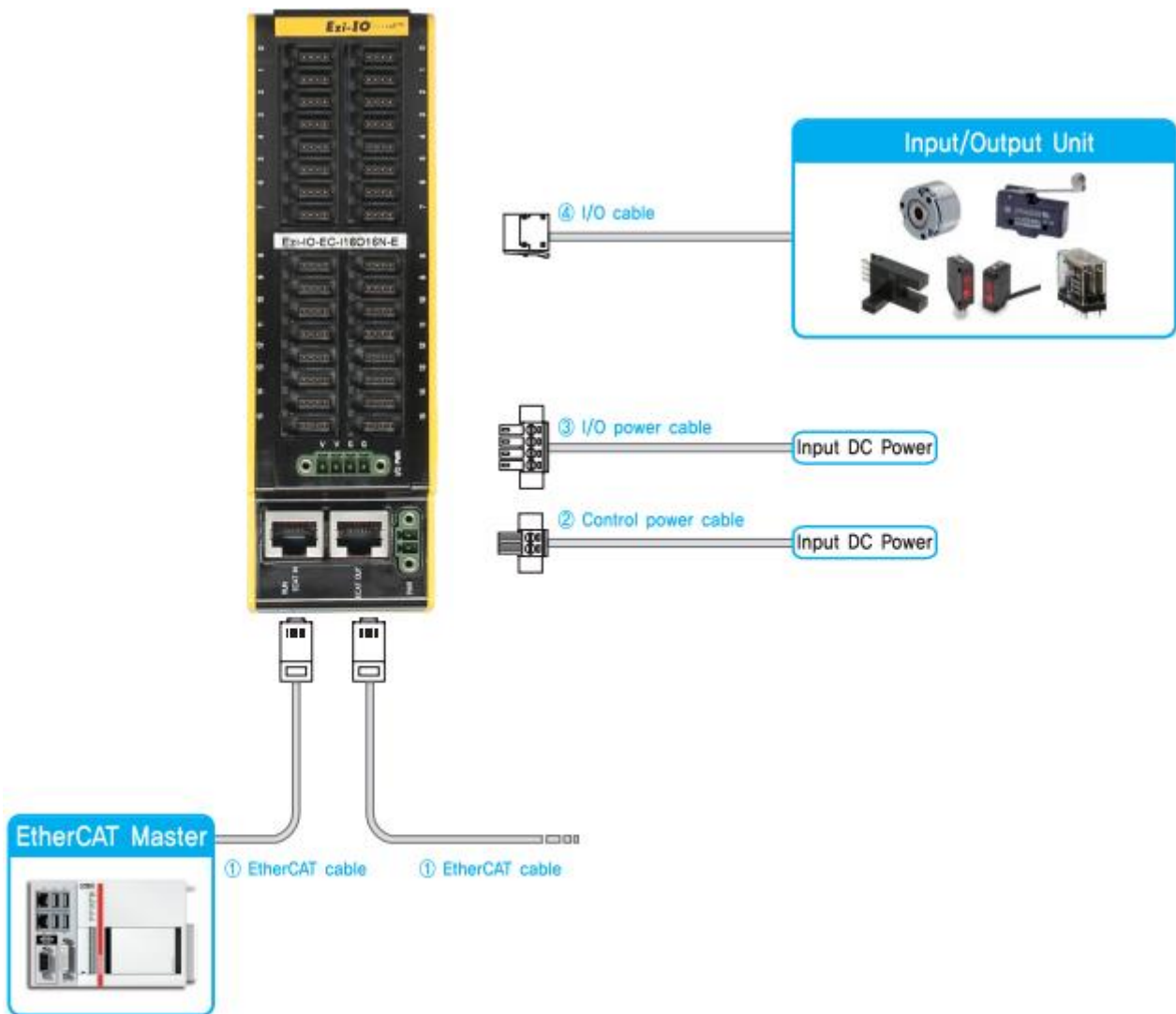
Type	I/O Cable	Power Cable	EtherCAT Cable
Length supplied	-	-	-
Max. Length	20m	2m	100m

### 3.3.2 Ezi-IO-EC-16-T / Ezi-IO-EC-I808-T Series



Type	I/O Cable	Power Cable	EtherCAT Cable
Length supplied	-	-	-
Max. Length	20m	2m	100m

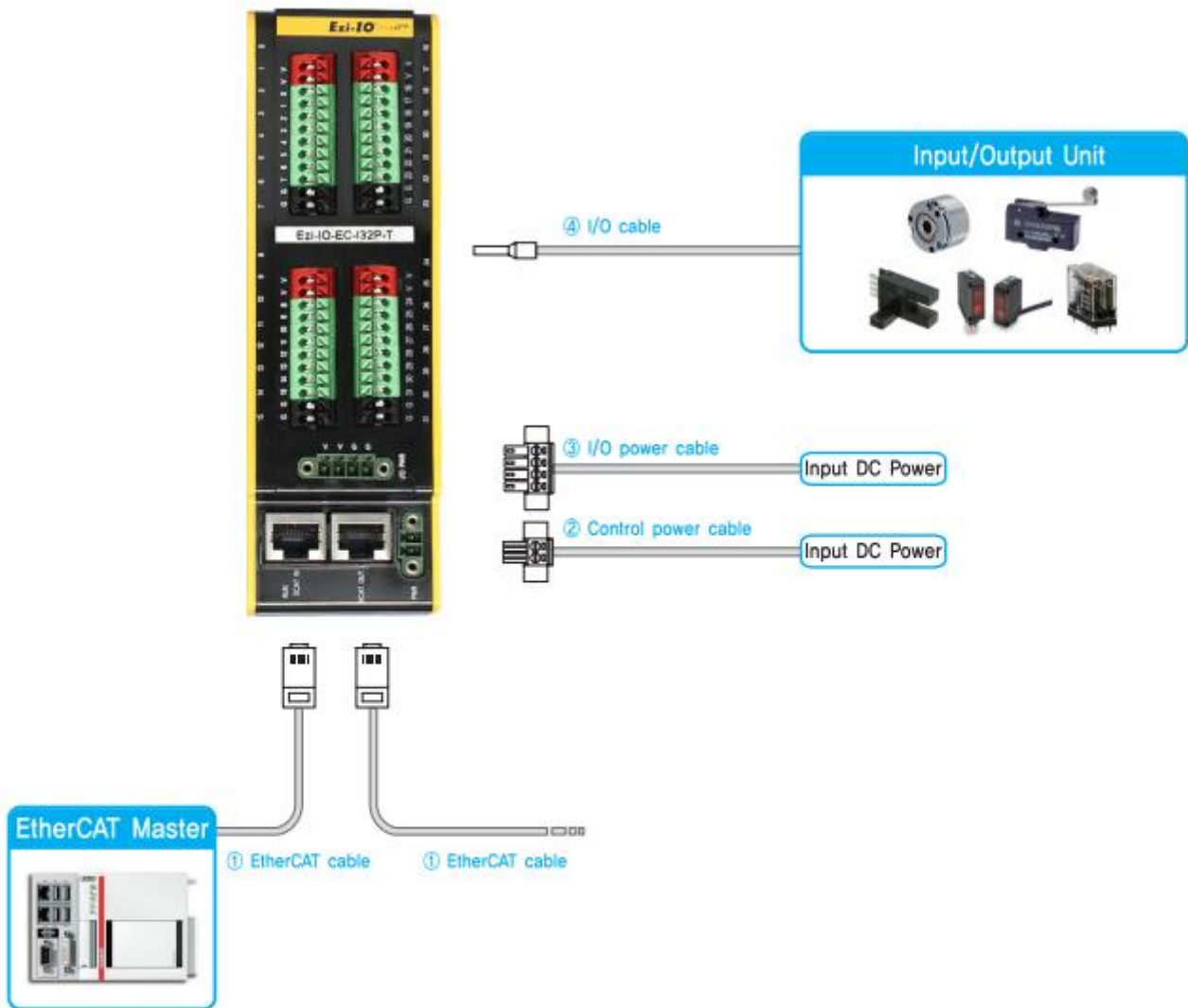
### 3.3.3 Ezi-IO-EC-32-E / Ezi-IO-EC-I16O16-E Series



Type	I/O Cable	Control Power Cable	I/O Power Cable	EtherCAT Cable
Length supplied	-	-	-	-
Max. Length	20m	2m	2m	100m



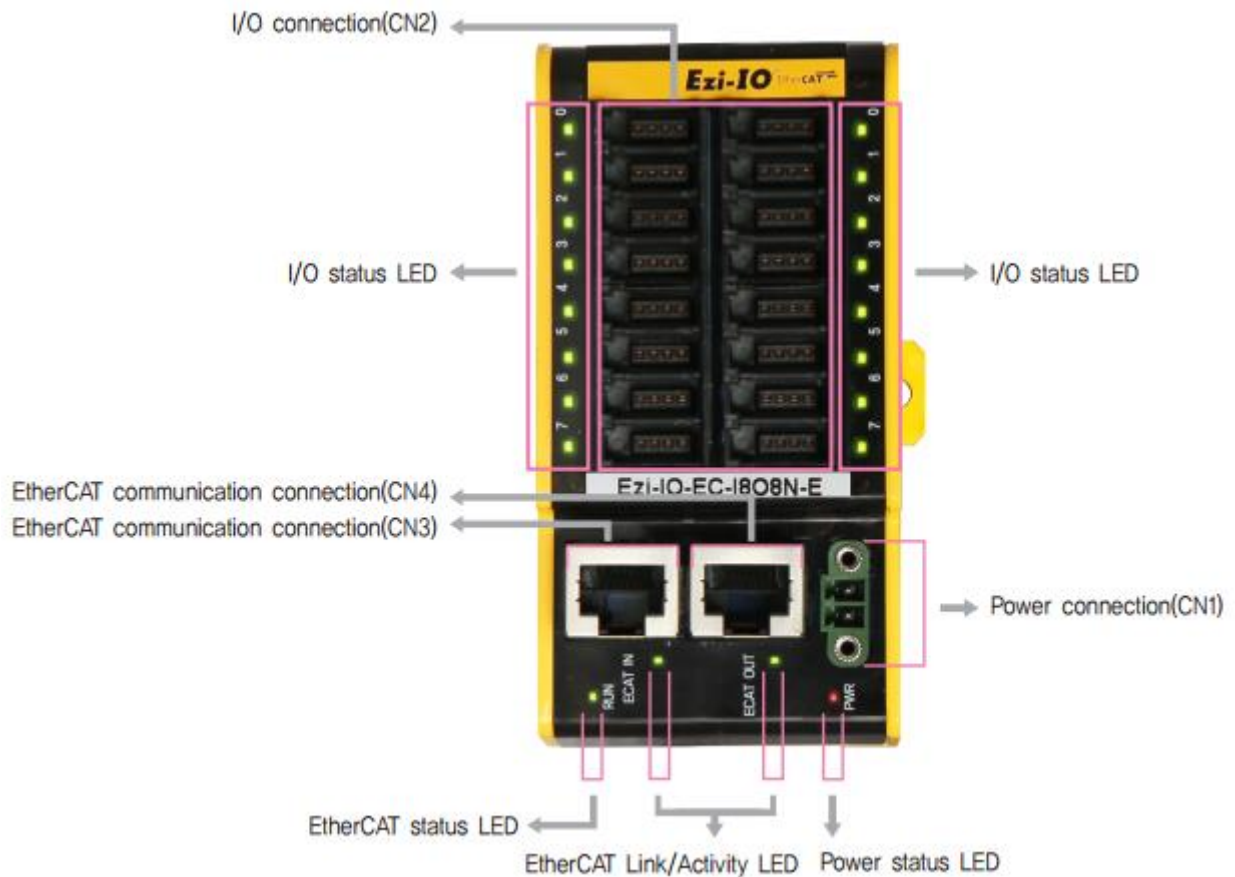
### 3.3.4 Ezi-IO-EC-32-T / Ezi-IO-EC-I16O16-T Series



Type	I/O Cable	Control Power Cable	I/O Power Cable	EtherCAT Cable
Length supplied	-	-	-	-
Max. Length	20m	2m	2m	100m

## 4. External Name and Function, Connector

### 4.1 Name and Function(Ezi-IO-EC-16-E / Ezi-IO-EC-I8O8-E Series)

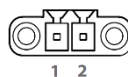


#### 4.1.1 Status LED

Indication	Color	Function	ON/OFF Condition
PWR	Red	Power status indication	Turn on when powr is applied
RUN	Green	EtherCAT communication status indication	Turn on when EtherCAT Communication status is active (Refer to 6.1.2 RUN LED status)
ECAT IN	Green	EtherCAT Link/Activity indication	Flashing when EtherCAT IN Link active
ECAT OUT	Green	EtherCAT Link/Activity indication	Flashing when EtherCAT OUT Link active
0 ~ 15 0~7/0~7	Green	I/O status indication	Input Module : Turn on when input signal is ON Output Module : Turn on when output signal is ON

### 4.1.2 Power Connector(CN1)

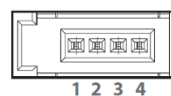
No.	Function	I/O
1	24VDC	Input
2	GND	Input



※ Be sure to supply power which is suitable for the load of I/O and control.

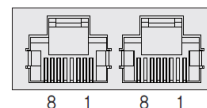
### 4.1.3 I/O Connector(CN2)

No.	Function	I/O
1	24VDC	Output
2	NC	-
3	GND	Output
4	SIGNAL	Input/Output



### 4.1.4 EtherCAT Communication Connector(CN3, CN4)

No.	Function	No.	Function
1	TD+	6	RD-
2	TD-	7	----
3	RD+	8	----
4	----	Connector Hood	F.GND
5	----		



### 4.1.5 EtherCAT Cable

STP(Shielded Twisted Pair) cable.(Above Category 5e)

Item	Length[m]	Remark
CGNR-EC-□□□F	□□□	Normal cable

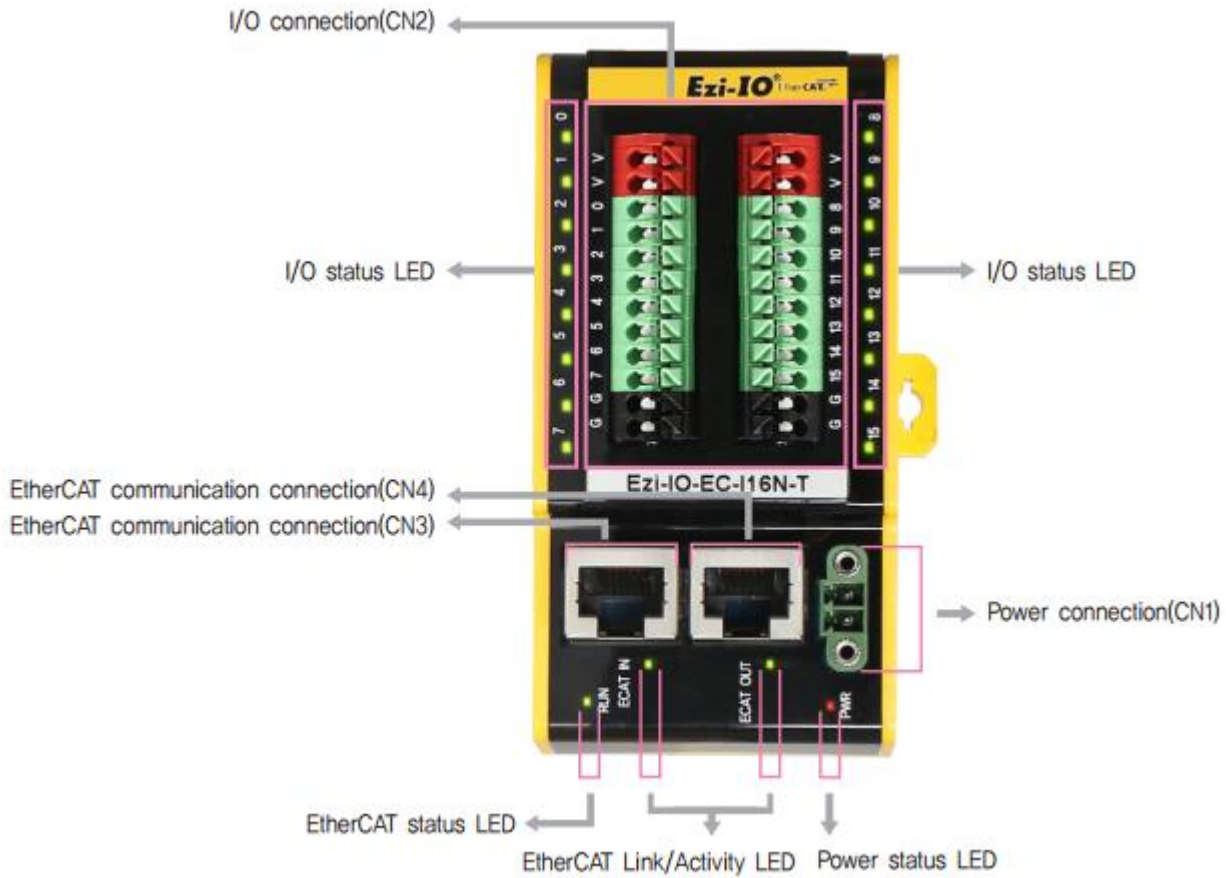
※ □□□ is for Cable Length. The unit is 1[m] and Max. 100[m] length.

### 4.1.6 Connector Specifications

Purpose	Item	Part Number	Manufacturer
Power connector(CN1)	Terminal Block	MC421-38102	DECA
I/O connector(CN2)	e-CON Plug Connector	XN2A-1470	OMRON

※ Above connector is the most suitable product for Ezi-IO-EtherCAT. Another equivalent connector can be used.

## 4.2 Name and Function(Ezi-IO-EC-16-T / Ezi-IO-EC-I8O8-T Series)

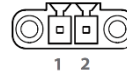


### 4.2.1 Status LED

Indication	Color	Function	ON/OFF Condition
PWR	Red	Power Input Indication	Turn on when power is applied
RUN	Green	EtherCAT communication status indication	Turn on when EtherCAT Communication status is active <a href="#">(Refer to 6.1.2 RUN LED status)</a>
ECAT IN	Green	EtherCAT Link/Activity LED indication	Flashing when EtherCAT IN Link active
ECAT OUT	Green	EtherCAT Link/Activity LED indication	Flashing when EtherCAT OUT Link active
0 ~ 15 0~7/0~7	Green	I/O status indication	Input Module : Turn on when input signal is ON Output Module : Turn on when output signal is ON

### 4.2.2 Power Connector(CN1)

No.	Function	I/O
1	24VDC	Input
2	GND	Input

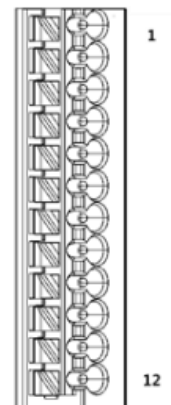
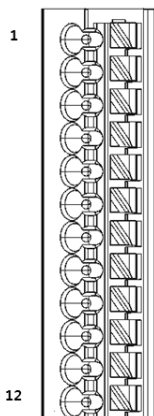
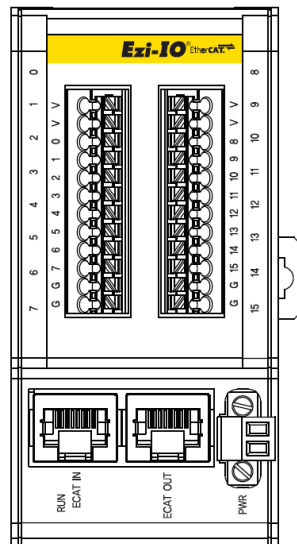


※ Be sure to supply power which is suitable for the load of I/O and control.

### 4.2.3 I/O Connector(CN2)

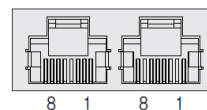
No.	Function	I/O
1	24VDC	Output
2	24VDC	Output
3	SIGNAL	I/O
4	SIGNAL	I/O
5	SIGNAL	I/O
6	SIGNAL	I/O
7	SIGNAL	I/O
8	SIGNAL	I/O
9	SIGNAL	I/O
10	SIGNAL	I/O
11	GND	Output
12	GND	Output

No.	Function	I/O
1	24VDC	Output
2	24VDC	Output
3	SIGNAL	I/O
4	SIGNAL	I/O
5	SIGNAL	I/O
6	SIGNAL	I/O
7	SIGNAL	I/O
8	SIGNAL	I/O
9	SIGNAL	I/O
10	SIGNAL	I/O
11	GND	Output
12	GND	Output



#### 4.2.4 EtherCAT Communication Connector(CN3, CN4)

No.	Function	No.	Function
1	TD+	6	RD-
2	TD-	7	----
3	RD+	8	----
4	----	Connector Hood	F.GND
5	----		



#### 4.2.5 EtherCAT Cable

STP(Shielded Twisted Pair) cable. (Above Category 5e)

Item	Length[m]	Remark
CGNR-EC-□□□F	□□□	Normal cable

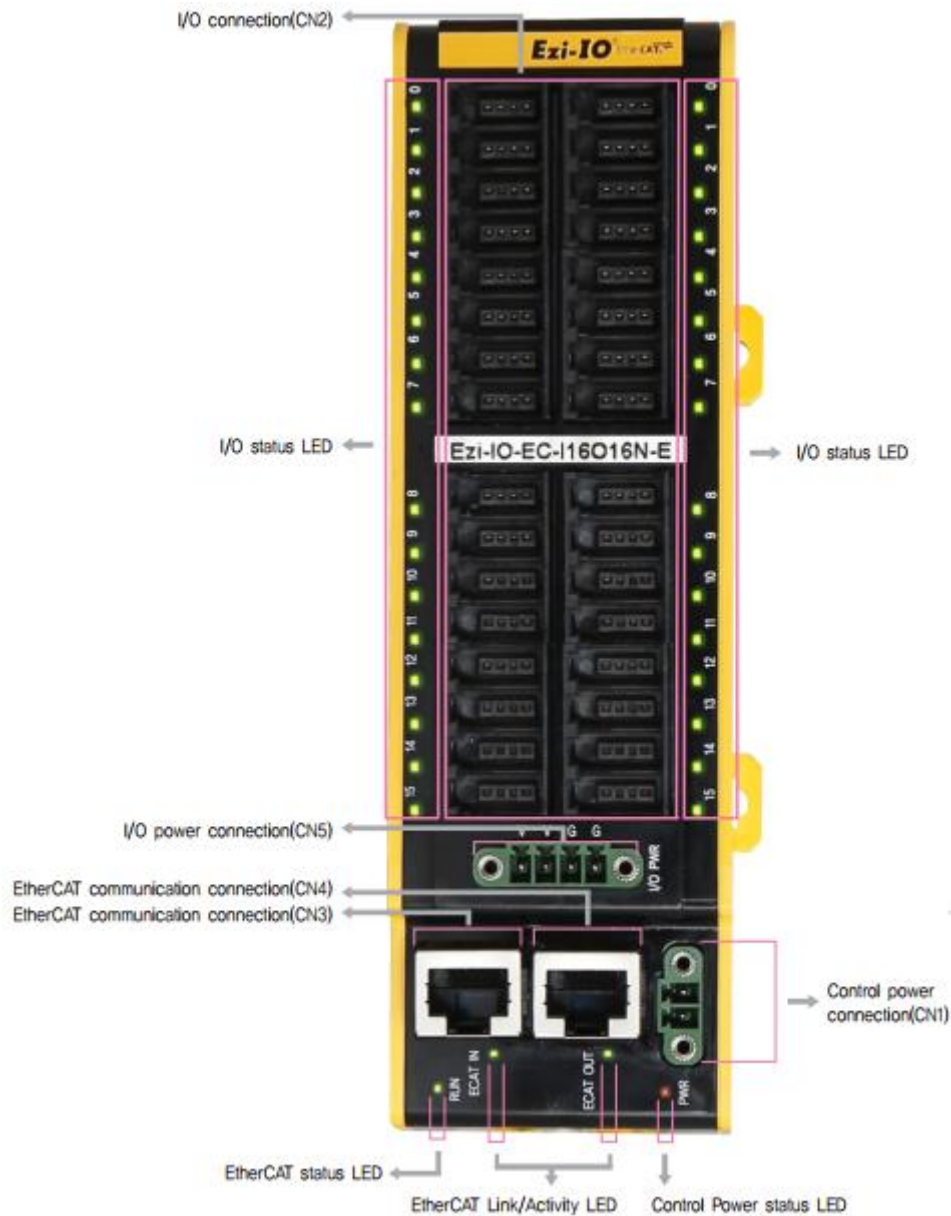
※ □□□ is for Cable Length. The unit is 1[m] and Max. 100[m] length.

#### 4.2.6 Connector Specifications

Purpose	Item	Part Number	Manufacturer
Power(CN1)	Terminal Block	MC421-38102	DECA

※ Above connector is the most suitable product for Ezi-IO-EtherCAT. Another equivalent connector can be used.

### 4.3 Name and Function(Ezi-IO-EC-32-E / Ezi-IO-EC-I16O16-E Series)

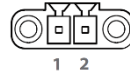


#### 4.3.1 Status LED

Indication	Color	Function	ON/OFF Condition
PWR	Red	Control power status indication	Turn on when control power is applied
RUN	Green	EtherCAT communication status indication	Turn on when EtherCAT Communication status is active <a href="#">(Refer to 6.1.2 RUN LED status)</a>
ECAT IN	Green	EtherCAT Link/Activity LED indication	Flashing when EtherCAT IN Link active
ECAT OUT	Green	EtherCAT Link/Activity LED indication	Flashing EtherCAT OUT Link active
0 ~ 31 0~15/0~15	Green	I/O status indication	Input Module : Turn on when input signal is ON Output Module : Turn on when output signal is ON

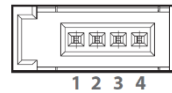
### 4.3.2 Control Power Connector(CN1)

No.	Function	I/O
1	24VDC	Input
2	GND	Input



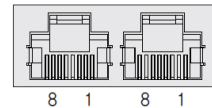
### 4.3.3 I/O Connector(CN2)

No.	Function	I/O
1	24VDC	Output
2	NC	-
3	GND	Output
4	SIGNAL	I/O



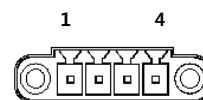
### 4.3.4 EtherCAT Communication Connector(CN3, CN4)

No.	Function	No.	Function
1	TD+	6	RD-
2	TD-	7	----
3	RD+	8	----
4	----	Connector Hood	F.GND
5	----		



### 4.3.5 I/O Power Connector(CN5)

No.	Function	I/O
1	24VDC	Input
2	24VDC	Input
3	GND	Input
4	GDN	Input



※ Be sure to supply a power source which is suitable for the load of I/O.



### 4.3.6 EtherCAT Cable

STP(Shielded Twisted Pair) cable.(Above Category 5e)

Item	Length[m]	Remark
CGNR-EC-□□□F	□□□	Normal cable

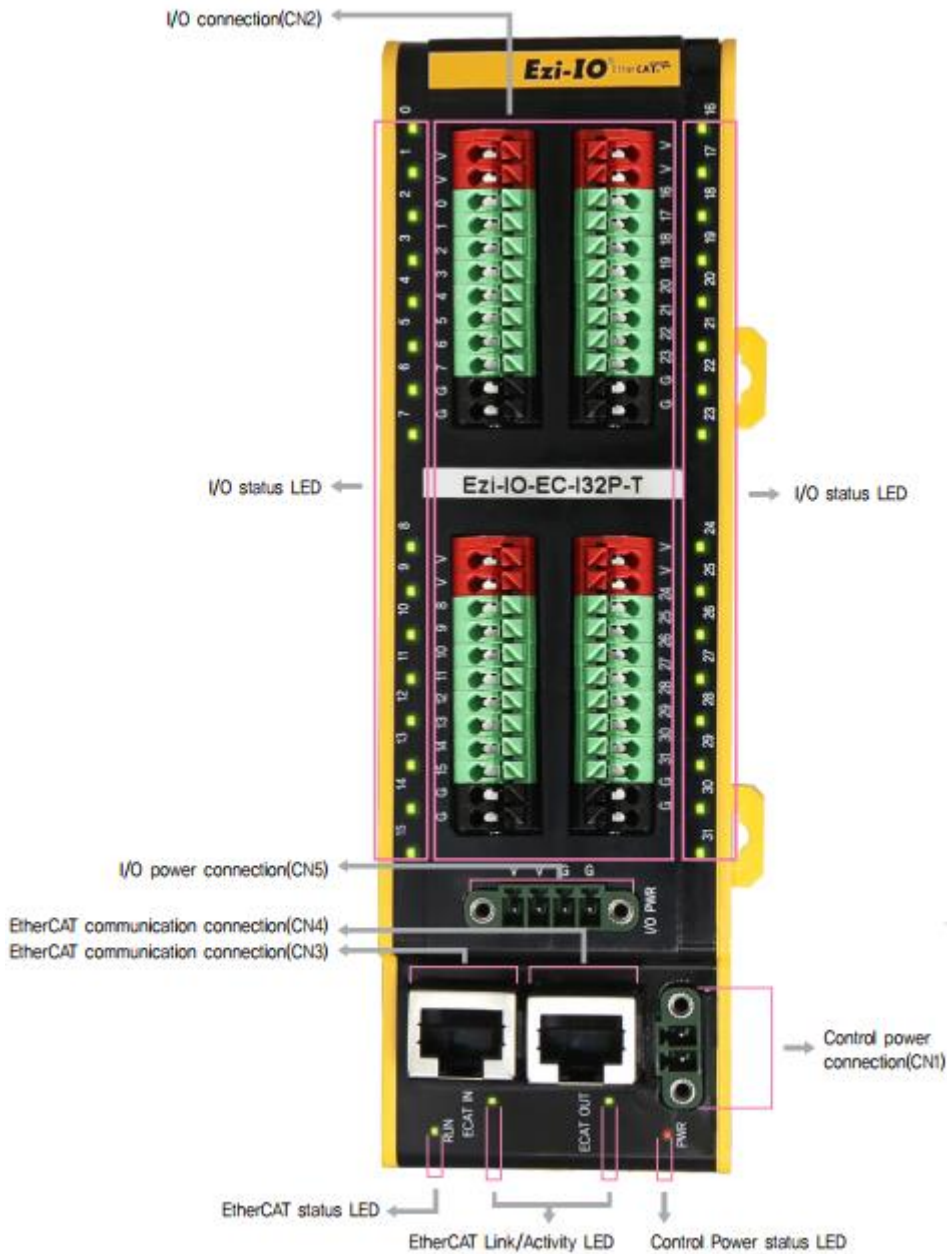
※ □□□ is for Cable Length. The unit is 1[m] and Max. 100[m] length.

### 4.3.7 Connector Specifications

Purpose	Item	Part Number	Manufacturer
Control Power (CN1)	Terminal Block	MC421-38102	DECA
I/O Power (CN5)	Terminal Block	MC421-38104	DECA
i/O (CN2)	e-CON Plug Connector	XN2A-1470	OMRON

※ Above connector is the most suitable product for Ezi-IO-EtherCAT. Another equivalent connector can be used.

## 4.4 Name and Function(Ezi-IO-EC-■32□-T / Ezi-IO-EC-I16O16□-T Series)

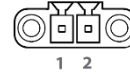


### 4.4.1 Status LED

Indication	Color	Function	ON/OFF Condition
PWR	Red	Control power status indication	Turn on when control power is applied
RUN	Green	EtherCAT communication status indication	Turn on when EtherCAT Communication status is active <a href="#">(Refer to 6.1.2 RUN LED status)</a>
ECAT IN	Green	EtherCAT Link/Activity LED indication	Flashing when EtherCAT IN Link active
ECAT OUT	Green	EtherCAT Link/Activity LED indication	Flashing when EtherCAT OUT Link active
0 ~ 31 0~15/0~15	Green	I/O status indication	Input Module : Turn on when input signal is ON Output Module : Turn on when output signal is ON

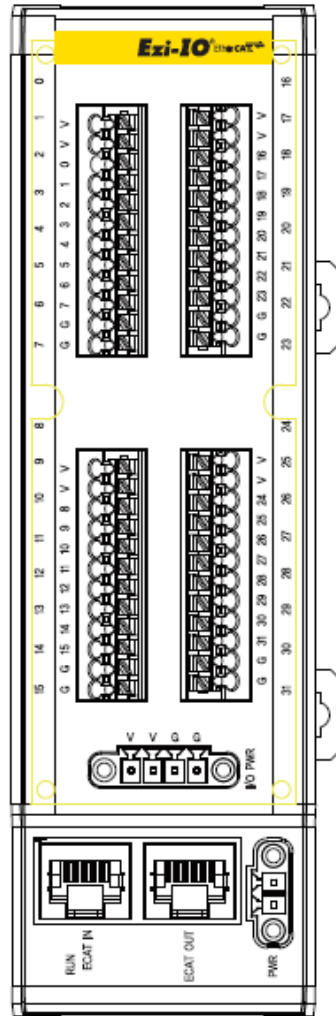
#### 4.4.2 Control Power Connector(CN1)

No.	Function	I/O
1	24VDC	Input
2	GND	Input

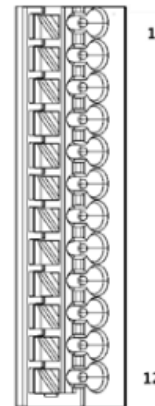
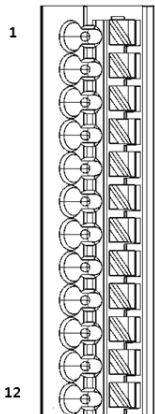


#### 4.4.3 I/O Connector(CN2)

No.	Function	I/O
1	24VDC	Output
2	24VDC	Output
3	SIGNAL	I/O
4	SIGNAL	I/O
5	SIGNAL	I/O
6	SIGNAL	I/O
7	SIGNAL	I/O
8	SIGNAL	I/O
9	SIGNAL	I/O
10	SIGNAL	I/O
11	GND	Output
12	GND	Output

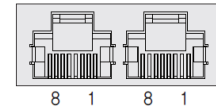


No.	Function	I/O
1	24VDC	Output
2	24VDC	Output
3	SIGNAL	I/O
4	SIGNAL	I/O
5	SIGNAL	I/O
6	SIGNAL	I/O
7	SIGNAL	I/O
8	SIGNAL	I/O
9	SIGNAL	I/O
10	SIGNAL	I/O
11	GND	Output
12	GND	Output



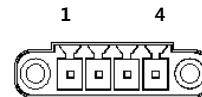
#### 4.4.4 EtherCAT Communication Connector(CN3, CN4)

No.	Function	No.	Function
1	TD+	6	RD-
2	TD-	7	----
3	RD+	8	----
4	----	Connector Hood	F.GND
5	----		



#### 4.4.5 I/O Power Connector(CN4)

No.	Function	I/O
1	24VDC	Input
2	24VDC	Input
3	GND	Input
4	GDN	Input



※ Be sure to supply a power source which is suitable for the load of I/O.

#### 4.4.6 EtherCAT Cable

STP(Shielded Twisted Pair) cable.(Above Category 5e)

Item	Length [m]	Remark
CGNR-EC-□□□F	□□□	Normal Cable

※ □□□ is for Cable Length. The unit is 1[m] and Max. 100[m] length.

#### 4.4.7 Connector Specifications

Purpose	Item	Part Number	Manufacturer
Power (CN1)	Terminal Block	MC421-38102	DECA
I/O Power(CN4)	Terminal Block	MC421-38104	DECA

※ Above connector is the most suitable product for Ezi-IO-EtherCAT. Another equivalent connector can be used.

## 5. IO Connector Wiring

For connecting between peripheral and connector, Ezi-IO-EtherCAT product use e-CON connector which is an industry-standard connector and Terminal Block. As used this, can easily connect with peripheral. As occasion demands can control and compose peripheral using EtherCAT network.

### 5.1 Signal Wiring (Ezi-IO-EC IN16-E)

16CH e-CON I/O module is composed of 4 I/O connectors, there are 16 contacts. All connector's signals apply as input equally. A total of 16 peripherals can be configured according to the user's needs and used to check the input data.

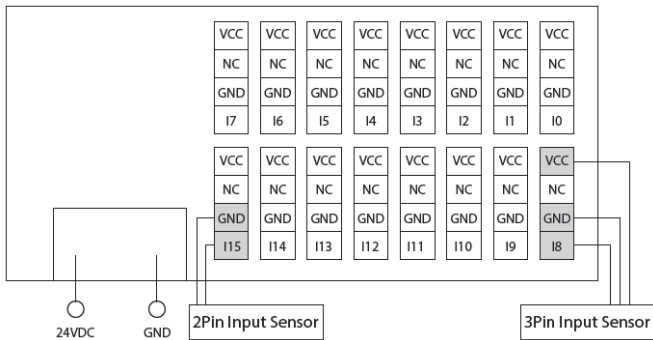


Fig. 5-1-1. Ezi-IO-EC-I16N-E

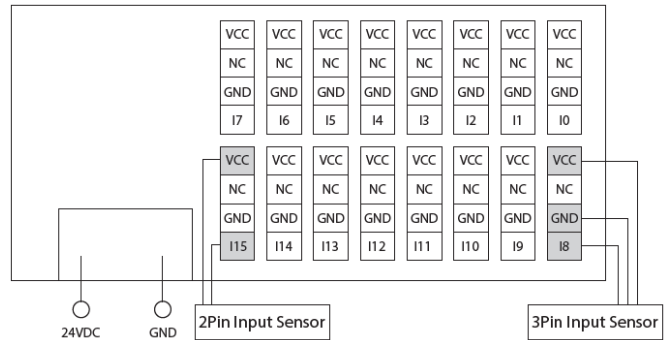


Fig. 5-1-2. Ezi-IO-EC-I16P-E

### 5.2 Signal Wiring (Ezi-IO-EC OUT16-E)

16CH e-CON I/O module is composed of 4 I/O connectors, there are 16 contacts. All connector's signals apply as output equally. According to the user's needs, a total of 16 output data can be used to configure the peripheral devices.

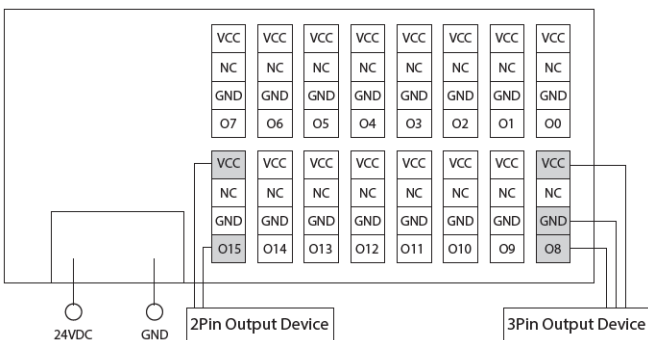


Fig. 5-2-1. Ezi-IO-EC-O16N-E

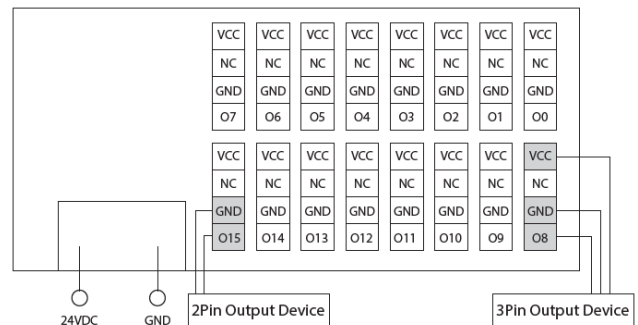


Fig. 5-2-2. Ezi-IO-EC-O16P-E

※ VCC is 24VDC standard.

※ Ex) · 2Pin Input Sensor : Limit Sensor, etc.

· 3Pin Input Sensor : Position Sensor, Photo Sensor, Proximity Sensor, etc.

· 2Pin Output Device : Brake, Solenoid, Photocoupler, etc.

### 5.3 Signal Wiring (Ezi-IO-EC IN8OUT8-E)

16C6CH e-CON I/O module is composed of 4 I/O connector, there are 16 contacts. Signal apply as 8 input and 8 output. According to the user's needs, a total of 8 peripherals can be configured and used to check the input data and a total of 8 output data can be used to configure the peripheral devices.

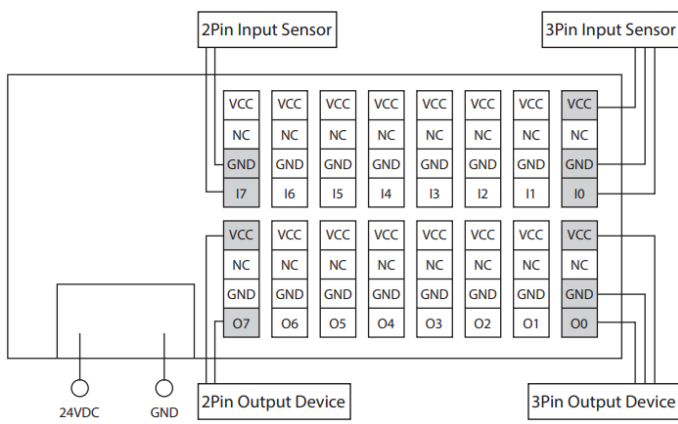


Fig. 5-3-1. Ezi-IO-EC-I808N-E

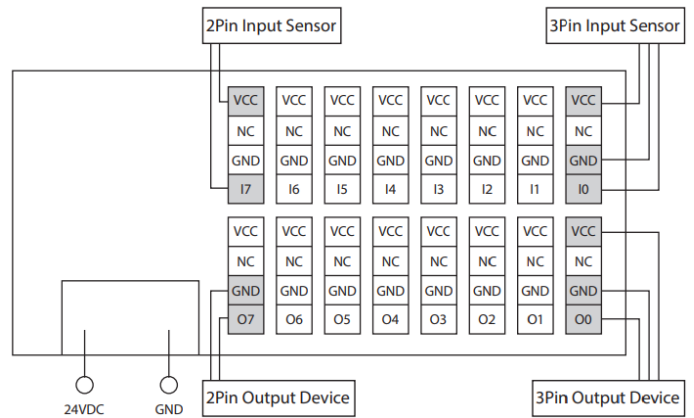


Fig. 5-3-2. Ezi-IO-EC-I808P-E

### 5.4 Signal Wiring (Ezi-IO-EC IN16-T)

16CH Terminal Block I/O module is composed of 2 I/O Terminal Block connector, there are 16 contacts. All connector's signal applies as input equally. A total of 16 peripherals can be configured according to the user's needs and used to check input data.

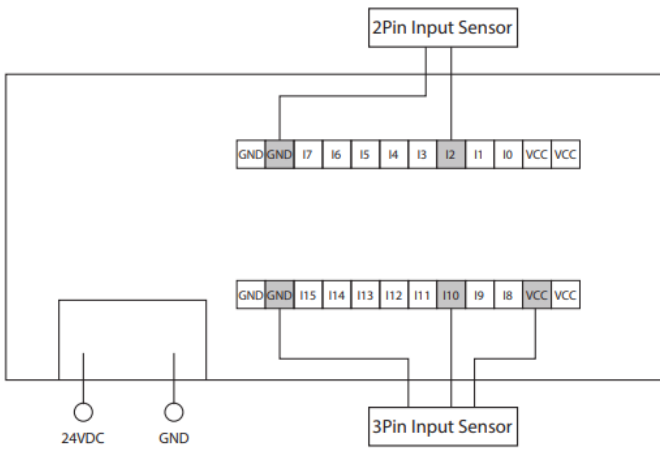


Fig. 5-4-1. Ezi-IO-EC-I16N-T

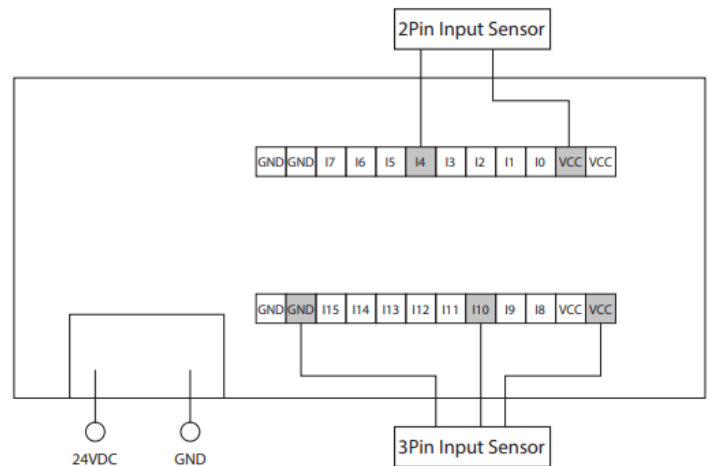


Fig. 5-4-2. Ezi-IO-EC-I16P-T

※ VCC is 24VDC standard.

※ Ex) · 2Pin Input Sensor : Limit Sensor, etc.

· 3Pin Input Sensor : Position Sensor, Photo Sensor, Proximity Sensor, etc.

· 2Pin Output Device : Brake, Solenoid, Photocoupler, etc.

## 5.5 Signal Wiring (Ezi-IO-EC OUT16-T)

16CH Terminal Block I/O module is composed of 2 I/O Terminal Block connector, there are 16 contacts. All connector's signals apply as output equally. According to the user's needs, a total of 16 output data can be used to configure the peripheral devices.

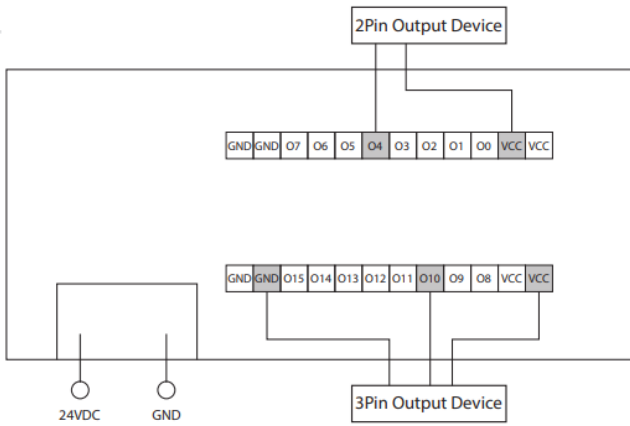


Fig. 5-5-1. Ezi-IO-EC-O16N-T

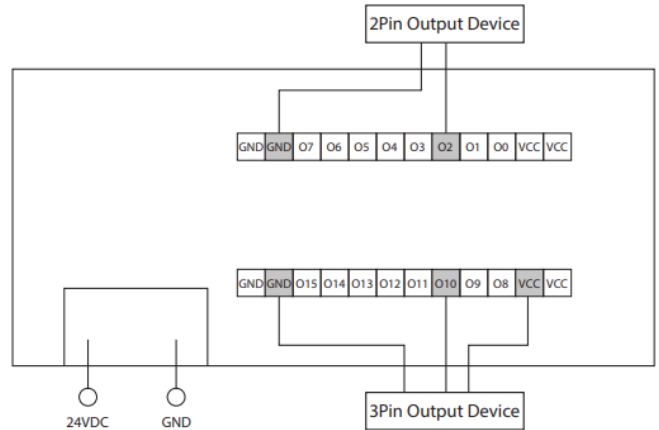


Fig. 5-5-2. Ezi-IO-EC-O16P-T

## 5.6 Signal Wiring (Ezi-IO-EC IN8OUT8-T)

16CH Terminal Block I/O module is composed of 2 I/O Terminal Block connector, there are 16 contacts. Signal apply as 8 input and 8 output. According to the user's needs, a total of 8 peripherals can be configured and used to check the input data and a total of 8 output data can be used to configure the peripheral devices.

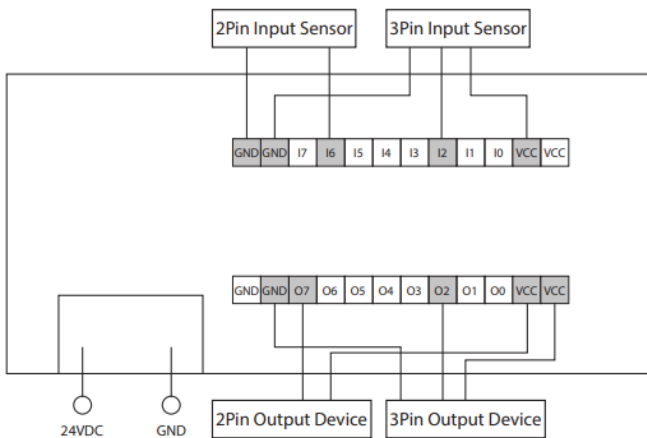


Fig. 5-6-1. Ezi-IO-EC-I8O8N-T

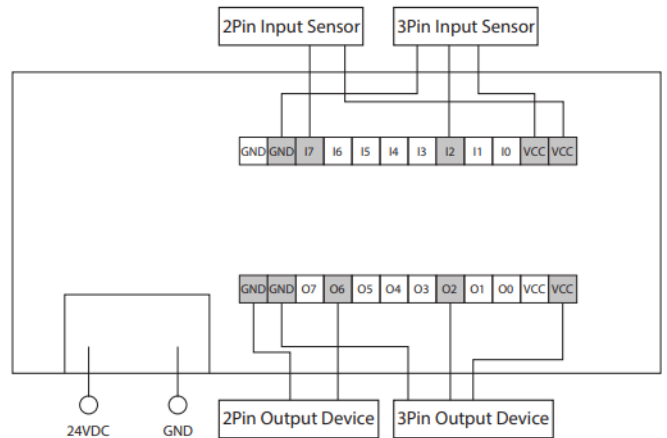


Fig. 5-6-2. Ezi-IO-EC-I8O8P-T

※ VCC is 24VDC standard.

※ Ex) · 2Pin Input Sensor : Limit Sensor, etc.

· 3Pin Input Sensor : Position Sensor, Photo Sensor, Proximity Sensor, etc.

· 2Pin Output Device : Brake, Solenoid, Photocoupler, etc.

## 5.7 Signal Wiring (Ezi-IO-EC IN32-E)

32CH e-CON I/O module is composed of 8 I/O connectors, there are 32 contacts. All connector's signals apply as input equally. A total of 32 peripherals can be configured according to the user's needs and used to check the input data.

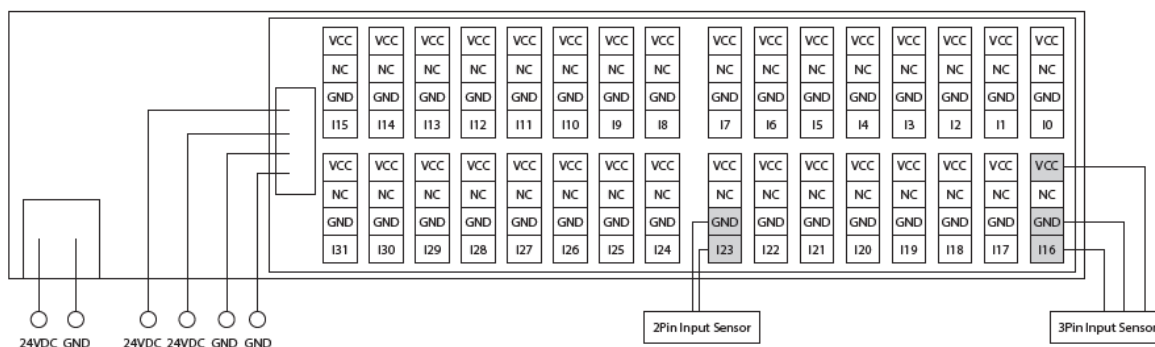


Fig. 5-7-1. Ezi-IO-EC-IN32N-E

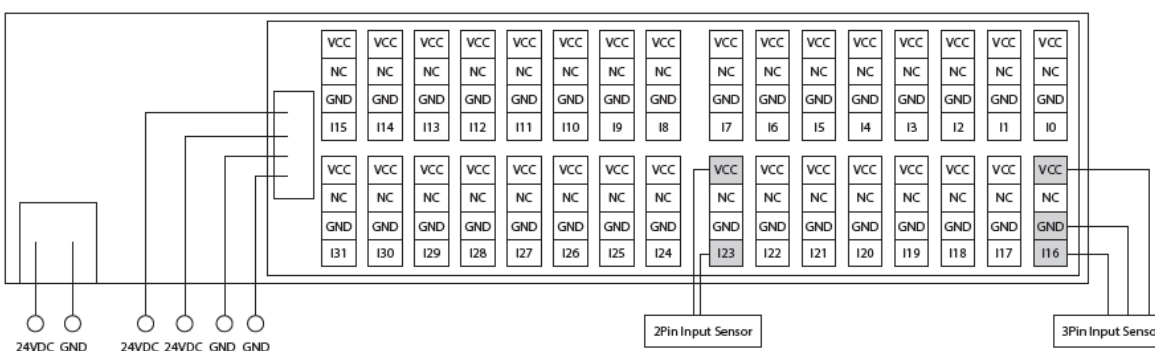


Fig. 5-7-2. Ezi-IO-EC-IN32P-E

※ VCC is supplied from I/O Power Connector(CN5).

※ Be sure to supply power to I/O Power Connector(CN5) which is suitable for the load of I/O.

※ Ex) · 2Pin Input Sensor : Limit Sensor, etc.

· 3Pin Input Sensor : Position Sensor, Photo Sensor, Proximity Sensor, etc.

· 2Pin Output Device : Brake, Solenoid, Photocoupler, etc.



## 5.8 Signal Wiring (Ezi-IO-EC OUT32-E)

32CH e-CON I/O module is composed of 8 I/O connectors, there are 32 contacts. All connector's signals apply as output equally. According to the user's needs, a total of 32 output data can be used to configure the peripheral devices.

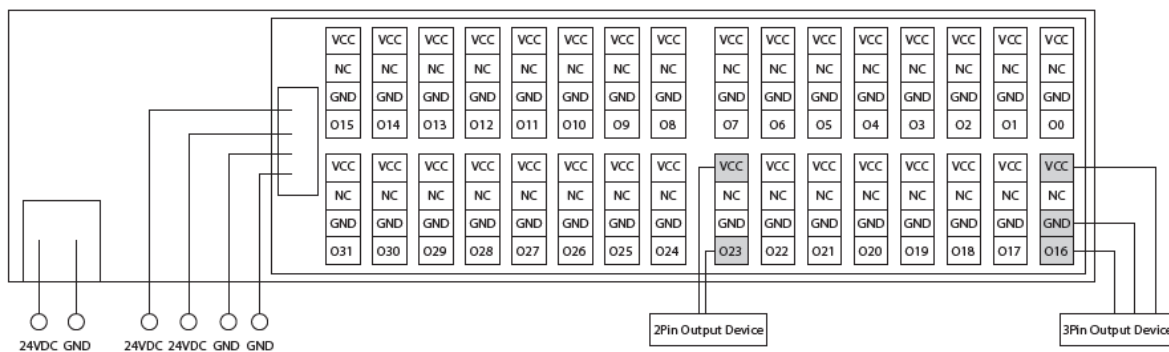


Fig. 5-8-1. Ezi-IO-EC-OUT32N-E

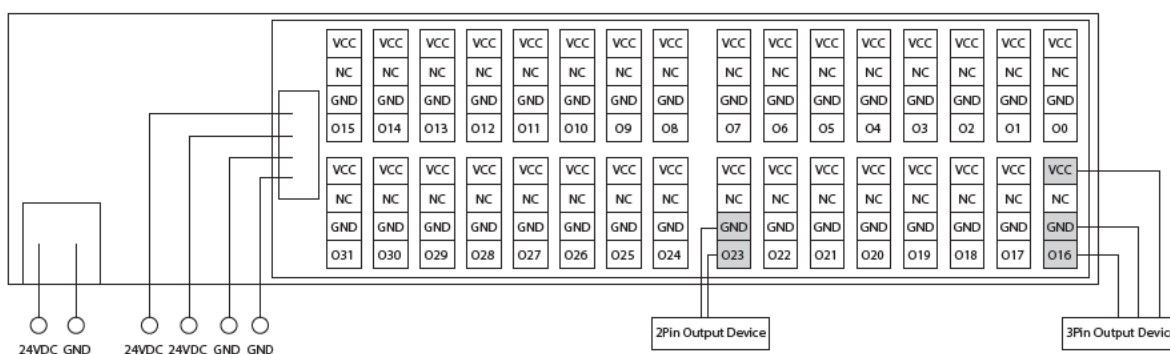


Fig. 5-8-2. Ezi-IO-EC-OUT32P-E

※ VCC is supplied from I/O Power Connector(CN5).

※ Be sure to supply power to I/O Power Connector(CN5) which is suitable for the load of I/O.

※ Ex) · 2Pin Input Sensor : Limit Sensor, etc.

· 3Pin Input Sensor : Position Sensor, Photo Sensor, Proximity Sensor, etc.

· 2Pin Output Device : Brake, Solenoid, Photocoupler, etc.

## 5.9 Signal Wiring (Ezi-IO-EC IN16OUT16-E)

32CH e-CON I/O module is composed of 8 I/O connectors, there are 32 contacts. Signals apply as 16 inputs and 16 outputs. According to the user's needs, a total of 16 peripherals can be configured and used to check the input data and a total of 16 output data can be used to configure the peripheral devices.

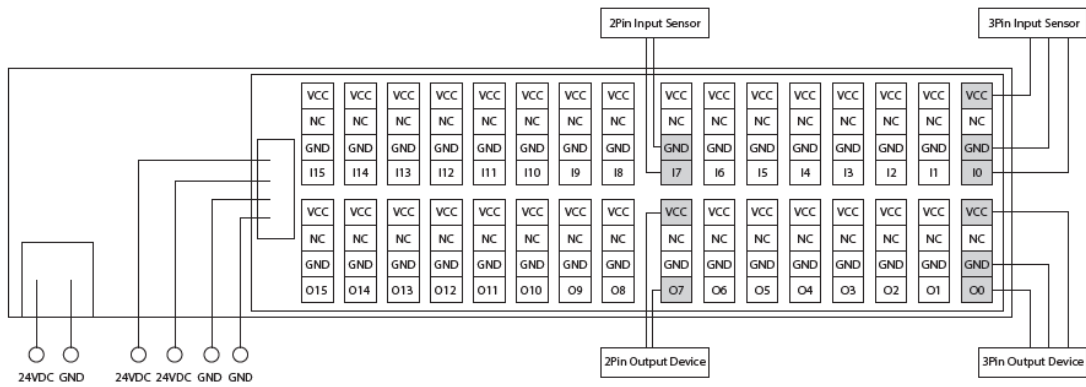


Fig. 5-9-1. Ezi-IO-EC-IN16OUT16N-E

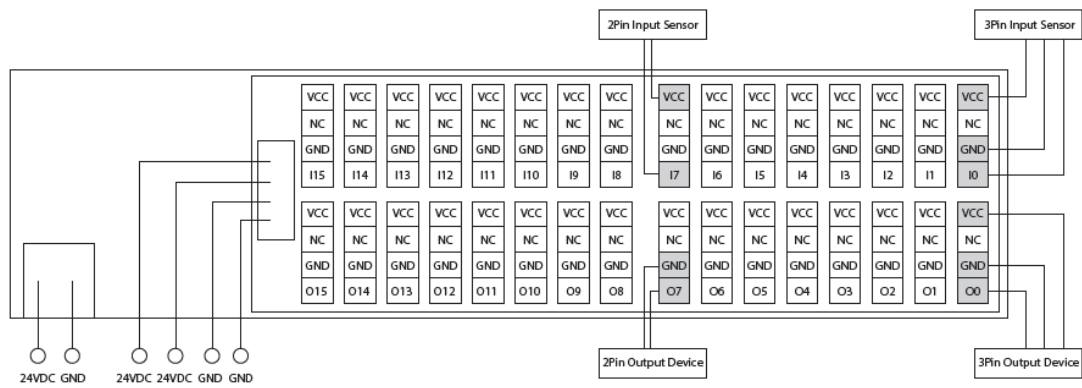


Fig. 5-9-2. Ezi-IO-EC-IN16OUT16P-E

※ VCC is supplied from I/O Power Connector(CN5).

※ Be sure to supply power to I/O Power Connector(CN5) which is suitable for the load of I/O.

※ Ex) · 2Pin Input Sensor : Limit Sensor, etc.

· 3Pin Input Sensor : Position Sensor, Photo Sensor, Proximity Sensor, etc.

· 2Pin Output Device : Brake, Solenoid, Photocoupler, etc.

## 5.10 Signal Wiring (Ezi-IO-EC IN32-T)

32CH Terminal Block I/O module is composed of 4 I/O Terminal Block connector, there are 32 contacts. All connector's signal applies as input equally. A total of 32 peripherals can be configured according to the user's needs and used to check input data.

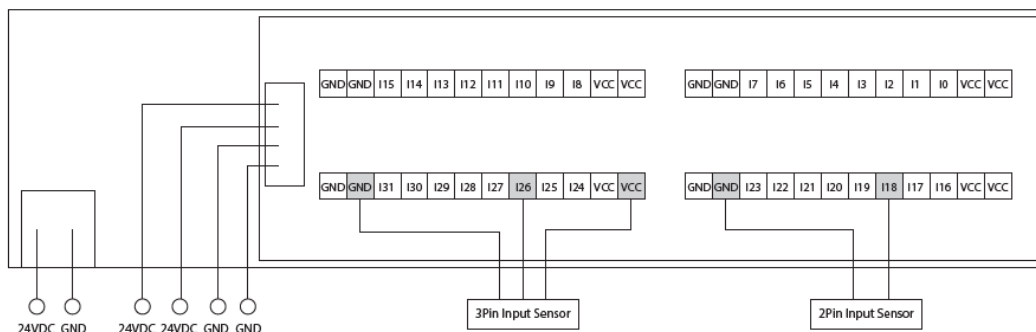


Fig. 5-10-1. Ezi-IO-EC-IN32N-T

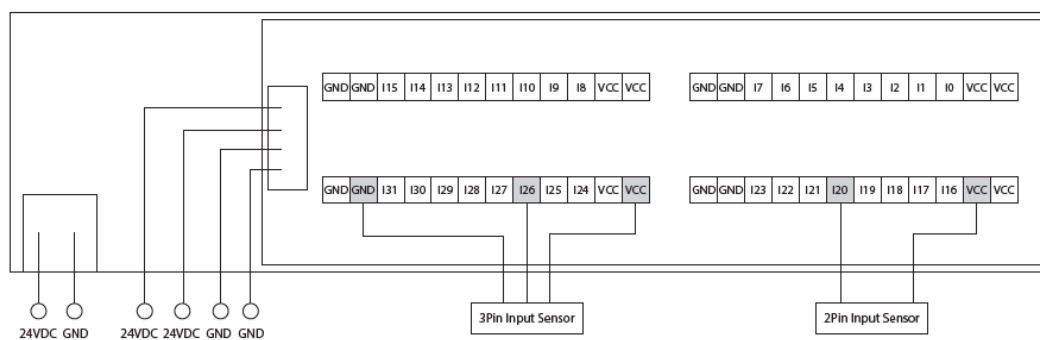


Fig. 5-10-2. Ezi-IO-EC-IN32P-T

※ VCC is supplied from I/O Power Connector(CN5).

※ Be sure to supply power to I/O Power Connector(CN5) which is suitable for the load of I/O.

※ Ex) · 2Pin Input Sensor : Limit Sensor, etc.

· 3Pin Input Sensor : Position Sensor, Photo Sensor, Proximity Sensor, etc.

· 2Pin Output Device : Brake, Solenoid, Photocoupler, etc.

## 5.11 Signal Wiring (Ezi-IO-EC OUT32-T)

32CH Terminal Block I/O module is composed of 4 I/O Terminal Block connector, there are 32 contacts. All connector's signals apply as output equally. According to the user's needs, a total of 32 output data can be used to configure the peripheral devices.

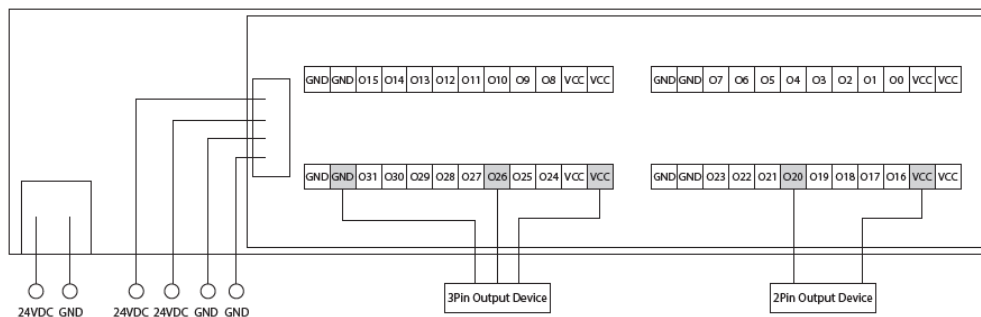


Fig. 5-11-1. Ezi-IO-EC-OUT32N-T

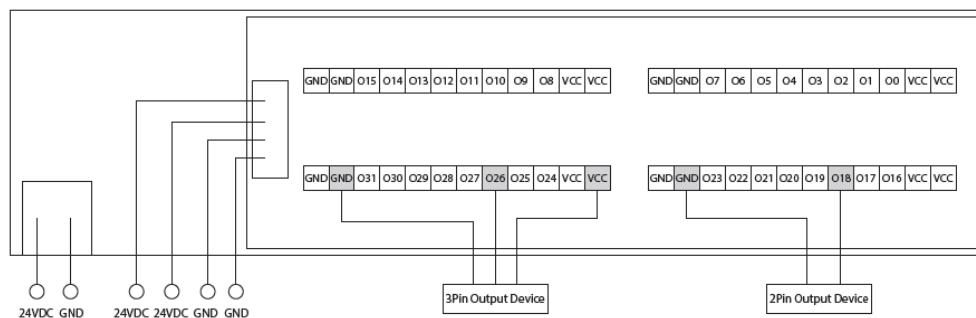


Fig. 5-11-2. Ezi-IO-EC-OUT32P-T

※ VCC is supplied from I/O Power Connector(CN5).

※ Be sure to supply power to I/O Power Connector(CN5) which is suitable for the load of I/O.

※ Ex) · 2Pin Input Sensor : Limit Sensor, etc.

· 3Pin Input Sensor : Position Sensor, Photo Sensor, Proximity Sensor, etc.

· 2Pin Output Device : Brake, Solenoid, Photocoupler, etc.

## 5.12 Signal Wiring (Ezi-IO-EC IN16OUT16-T)

32CH Terminal Block I/O module is composed of 4 I/O Terminal Block connector, there are 32 contacts. Signal apply as 16 input and 16 output. According to the user's needs, a total of 16 peripherals can be configured and used to check the input data and a total of 16 output data can be used to configure the peripheral devices.

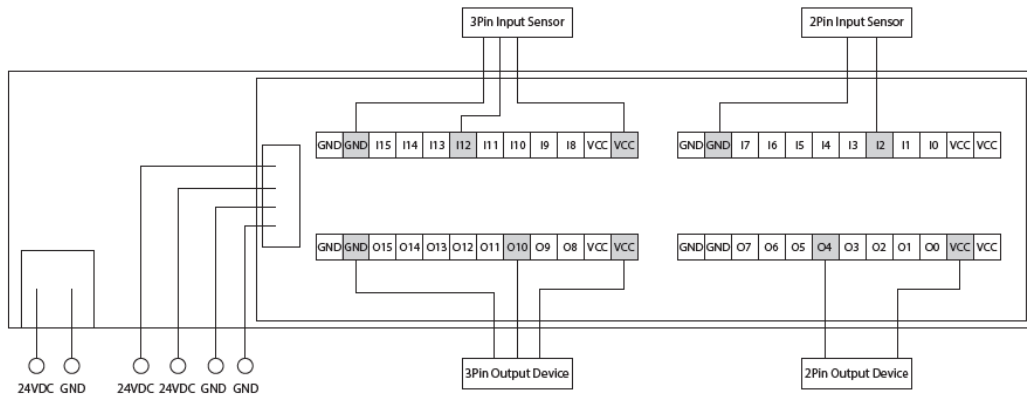


Fig. 5-12-1. Ezi-IO-EC-IN16OUT16N-T

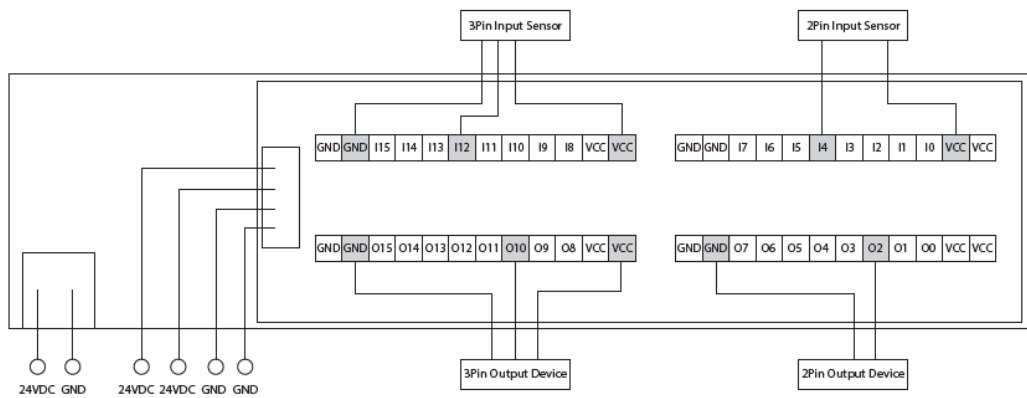


Fig. 5-12-2. Ezi-IO-EC-IN16OUT16P-T

※ VCC is supplied from I/O Power Connector(CN5).

※ Be sure to supply power to I/O Power Connector(CN5) which is suitable for the load of I/O.

※ Ex) · 2Pin Input Sensor : Limit Sensor, etc.

· 3Pin Input Sensor : Position Sensor, Photo Sensor, Proximity Sensor, etc.

· 2Pin Output Device : Brake, Solenoid, Photocoupler, etc.

## 5.13 Peripheral Wiring

Ezi-IO-EtherCAT can connect peripheral easily with simple wiring using e-CON connector. Information of various peripheral wiring is as follows.

Sensor		e-CON		Enable Ezi-IO Model
Pin No.	Line Color	Pin No.	Function	
Sensor Pin No.	Sensor Line Color	e-CON Pin No.	e-CON Pin Function	Enable Ezi-IO Model Name

### 5.13.1 Photo Sensor

#### ① EE-SX672A(NPN) Dark-ON Operation

EE-SX672A		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
+	Black	1	24V	Ezi-IO-EC-I16N Ezi-IO-EC-I8O8N Ezi-IO-EC-I32N Ezi-IO-EC-I16O16N
-	Black	3	GND	
OUT	Black	4	IN	

#### ② EE-SX672A(NPN) Light-ON Operation

EE-SX672A		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
+	Black	1	24V	Ezi-IO-EC-I16N Ezi-IO-EC-I8O8N Ezi-IO-EC-I32N Ezi-IO-EC-I16O16N
L	Black	In case of Light-On, connect with +		
-	Black	3	GND	
OUT	Black	4	IN	

#### ③ EE-SX672R(PNP) Dark-ON Operation

EE-SX672R		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
+	Black	1	24V	Ezi-IO-EC-I16P Ezi-IO-EC-I8O8P Ezi-IO-EC-I32P Ezi-IO-EC-I16O16P
-	Black	3	GND	
OUT	Black	4	IN	

#### ④ EE-SX672R(PNP) Light-ON Operation

EE-SX672R		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
+	Black	1	24V	Ezi-IO-EC-I16P Ezi-IO-EC-I8O8P Ezi-IO-EC-I32P Ezi-IO-EC-I16O16P
L	In case of Light-On, connect with +			
-	Black	3	GND	
OUT	Black	4	IN	

**⑤ PN-K65(NPN) Light-ON Operation**

PM-K65		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16N Ezi-IO-EC-I8O8N Ezi-IO-EC-I32N Ezi-IO-EC-I16O16N
2	Black	4	IN	
4	Blue	3	OUT	

**⑥ PN-K65(NPN) Dark-ON Operation**

PM-K65		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16N Ezi-IO-EC-I8O8N Ezi-IO-EC-I32N Ezi-IO-EC-I16O16N
3	White	4	IN	
4	Blue	3	OUT	

**⑦ PN-K65-P(PNP) Light-ON Operation**

PM-K65-P		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16P Ezi-IO-EC-I8O8P Ezi-IO-EC-I32P Ezi-IO-EC-I16O16P
2	Black	4	IN	
4	Blue	3	OUT	

**⑧ PN-K65-P(PNP) Dark-ON Operation**

PM-K65-P		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16P Ezi-IO-EC-I8O8P Ezi-IO-EC-I32P Ezi-IO-EC-I16O16P
2	White	4	IN	
4	Blue	3	OUT	

• Dark-ON Operation : This operation mode is the mode in which the Through-Beam sensor generates the output when the light entering the receiver side of the Photo Sensor stops or decreases.

• Light-ON Operation : This operation mode is the mode in which the Diffuse-Reflective sensor generates the output when the light entering the receiver side of the Photo Sensor increases.

### 5.13.2 Position Sensor

#### ① SMAT-8T(NPN)

SMAT-8T		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16N Ezi-IO-EC-I8O8N Ezi-IO-EC-I32N Ezi-IO-EC-I16O16N
2	White	3	GND	
3	Blue			
4	Black	4	IN	

#### ② SMAT-8T(PNP)

SMAT-8T		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16P Ezi-IO-EC-I8O8P Ezi-IO-EC-I32P Ezi-IO-EC-I16O16P
2	White	3	GND	
3	Blue			
4	Black	4	IN	

### 5.13.3 Limit Switch

#### ① SS-5GL2T(NPN)

SS-5GL2T		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
Common	Black	3	GND	Ezi-IO-EC-I16N Ezi-IO-EC-I8O8N Ezi-IO-EC-I32N Ezi-IO-EC-I16O16N
NO	-	-	-	
NC	Black	4	IN(24V)	

#### ② SS-5GL2T(PNP)

SS-5GL2T		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
Common	Black	1	24V	Ezi-IO-EC-I16P Ezi-IO-EC-I8O8P Ezi-IO-EC-I32P Ezi-IO-EC-I16O16P
NO	-	-	-	
NC	Black	4	IN(GND)	

#### ③ MS0850506F035P1A(NPN)

MS0850506F035P1A		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
Common	Black	3	GND	Ezi-IO-EC-I16N Ezi-IO-EC-I8O8N Ezi-IO-EC-I32N Ezi-IO-EC-I16O16N
NO	-	-	-	
NC	Black	4	IN(24V)	



④ MS0850506F035P1A(PNP)

MS0850506F035P1A		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
Common	Black	1	24V	Ezi-IO-EC-I16P Ezi-IO-EC-I8O8P Ezi-IO-EC-I32P Ezi-IO-EC-I16O16P
NO	-	-	-	
NC	Black	4	IN(GND)	

### 5.13.4 Proximity Sensor

① E2B-M12KN08-WP-C1 2M(NPN) NO Operation

E2B-M12KN08-WP-C1 2M		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16N Ezi-IO-EC-I8O8N Ezi-IO-EC-I32N Ezi-IO-EC-I16O16N
3	Blue	3	GND	
4	Black	4	IN	

② E2B-M12KN08-WP-C1 2M(NPN) NC Operation

E2B-M12KN08-WP-C1 2M		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16N Ezi-IO-EC-I8O8N Ezi-IO-EC-I32N Ezi-IO-EC-I16O16N
3	Blue	3	GND	
2	Black	4	IN	

③ E2B-M12KN08-WP-B1 2M(PNP) NC Operation

E2B-M12KN08-WP-B1 2M		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16P Ezi-IO-EC-I8O8P Ezi-IO-EC-I32P Ezi-IO-EC-I16O16P
3	Blue	3	GND	
4	Black	4	IN	

④ E2B-M12KN08-WP-B1 2M(PNP) NO Operation

E2B-M12KN08-WP-B1 2M		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16P Ezi-IO-EC-I8O8P Ezi-IO-EC-I32P Ezi-IO-EC-I16O16P
3	Blue	3	GND	
2	Black	4	IN	

⑤ GX-F12A(NPN)

GX-F12A		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16N Ezi-IO-EC-I8O8N Ezi-IO-EC-I32N Ezi-IO-EC-I16O16N
2	Blue	3	GND	
3	Black	4	IN	

⑥ GX-F12A(PNP)

GX-12A-P		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
1	Brown	1	24V	Ezi-IO-EC-I16P Ezi-IO-EC-I8O8P Ezi-IO-EC-I32P Ezi-IO-EC-I16O16P
2	Blue	3	GND	
3	Black	4	IN	

### 5.13.5 Brake

① BXW-03-10R(NPN)

BXW-03-10R		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
+	Black	1	24V	Ezi-IO-EC-O16N Ezi-IO-EC-I8O8N Ezi-IO-EC-O32N Ezi-IO-EC-I16O16N
-	Black	4	OUT(GND)	

② BXW-03-10R(PNP)

BXW-03-10R		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
-	Black	3	GND	Ezi-IO-EC-O16P Ezi-IO-EC-I8O8P Ezi-IO-EC-O32P Ezi-IO-EC-I16O16P
+	Black	4	OUT(24V)	

### 5.13.6 Lamp

※ Attach Fuse at GND.

#### ① S125TL-1-24-R(NPN)

S125TL-1-24-R		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
2	Black	1	24V	Ezi-IO-EC-O16N Ezi-IO-EC-I8O8N Ezi-IO-EC-O32N Ezi-IO-EC-I16O16N
1	Red	4	OUT(GND)	

#### ② S125TL-1-24-R(PNP)

S125TL-1-24-R		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
2	Black	3	GND	Ezi-IO-EC-O16P Ezi-IO-EC-I8O8P Ezi-IO-EC-O32P Ezi-IO-EC-I16O16P
1	Red	4	OUT(24V)	

### 5.13.7 Solenoid Valve

#### ① HD-F6F6-B4(NPN)

HD-F6F6-B4		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
IN	Black	1	24V	Ezi-IO-EC-O16N Ezi-IO-EC-I8O8N Ezi-IO-EC-O32N Ezi-IO-EC-I16O16N
OUT	Black	4	OUT(GND)	

#### ② HD-F6F6-B4(PNP)

HD-F6F6-B4		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
OUT	Black	3	GND	Ezi-IO-EC-O16P Ezi-IO-EC-I8O8P Ezi-IO-EC-O32P Ezi-IO-EC-I16O16P
IN	Black	4	OUT(24V)	

#### ③ VXE2110-01(NPN)

VXE2110-01		e-CON		Enable Ezi-IO Model(NPN)
Pin No.	Line Color	Pin No.	Function	
1	Red	1	24V	Ezi-IO-EC-O16N Ezi-IO-EC-I8O8N Ezi-IO-EC-O32N Ezi-IO-EC-I16O16N
2	Black	4	OUT(GND)	

④ VXE2110-01(PNP)

VXE2110-01		e-CON		Enable Ezi-IO Model(PNP)
Pin No.	Line Color	Pin No.	Function	
1	Red	3	GND	Ezi-IO-EC-O16P Ezi-IO-EC-I8O8P
2	Black	4	OUT(24V)	Ezi-IO-EC-O32P Ezi-IO-EC-I16O16P

## 6. Communication Functions

### 6.1 EtherCAT Communications status

#### 6.1.1 EtherCAT State Machine

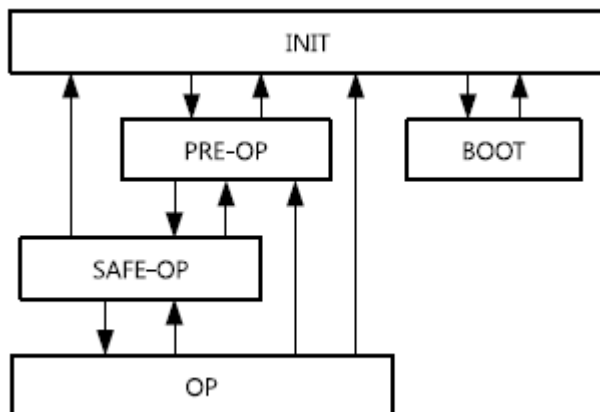


Fig. 6-1. EtherCAT State Machine

The state behavior of the EtherCAT controller is controlled by the EtherCAT master.

Status	Rx PDO	Tx PDO	Description
INIT	Unable	Unable	EtherCAT communication is initialized. Communication is impossible.
PRE-OP	Unable	Unable	After communication is initialized, enter to this step. This step initializes the network settings. At this stage, only mailbox communication is possible.
SAFE-OP	Unable	Enable	Tx PDO communication is possible
OP	Enable	Enable	All communication is possible.
BOOT	Unable	Unable	FoE is possible. (This product does not support FoE.)

※ Ezi-IO-EtherCAT INPUT can check the input in SAFE OP state, and Ezi-IO-EtherCAT OUTPUT operates in OP state.

※ FoE is an EtherCAT Slave node that can update the firmware with File over EtherCAT.

## 6.1.2 EtherCAT Communication Status Display

It is the LED that informs the communication status of EtherCAT.

Indication	Color	State	Description
RUN	Green	OFF	INIT state or Power OFF
		Blinking	PRE-OP(PRE-OPERATIONAL) state
		Single Flash	SAFE-OPERATIONAL state
		ON	OPERATIONAL state
		Flickering	BOOTSTRAP state

The status display of the RUN LED is shown in the figure below for visual confirmation.

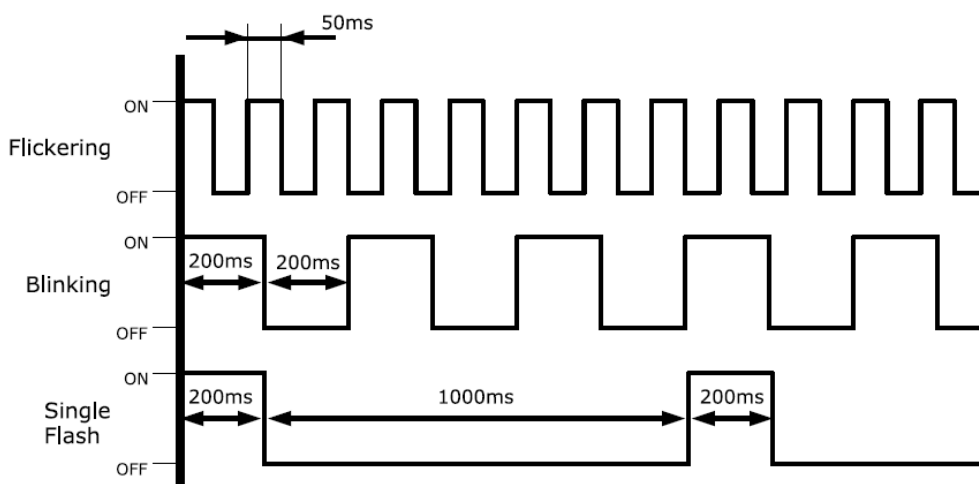


Fig. 6-2. EtherCAT LED

## 6.2 Process Data Communication

Process Data communication (PDO communication) exchanges Process Data Objects (PDO) with the master every cycle. The data to be exchanged is predetermined by PDO Mapping in the communication initialization step. PDO communication is classified into a transmission PDO (Tx PDO) which conveys the status information of the controller and a reception PDO (Rx PDO) which transmits a command of the master.

This communication can be used when the status of the controller is Operational and only Tx PDO is available in Safe-Operational.

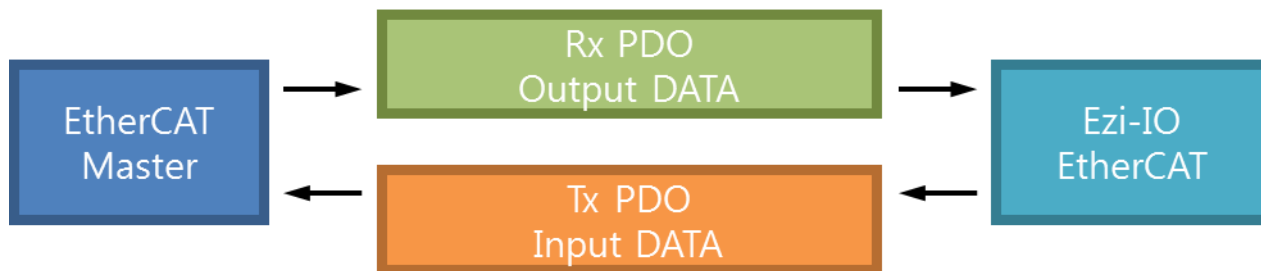


Fig. 6-3. EtherCAT PDO Communication

## 6.3 Synchronization

The controller provides the following synchronization modes:

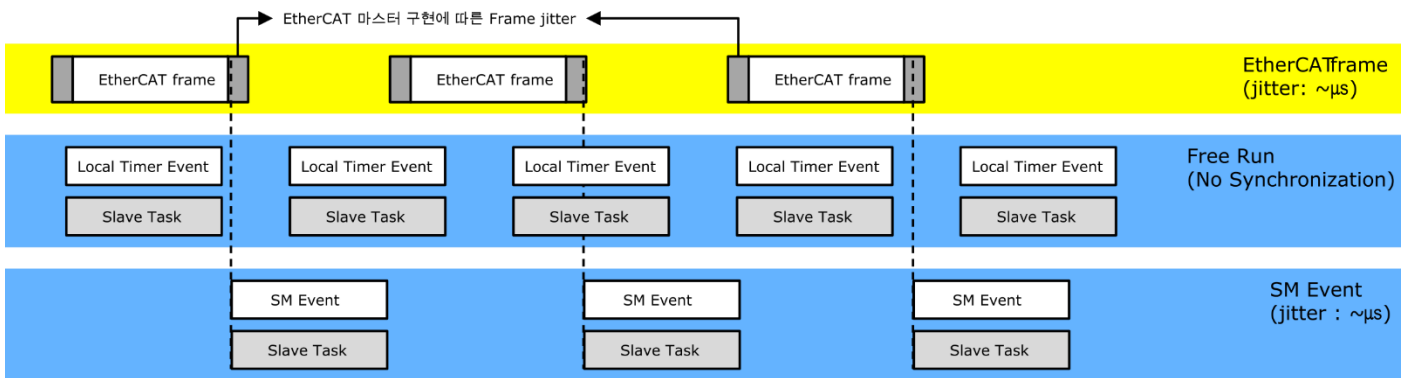


Fig. 6-4. Types of EtherCAT Synchronization

### 6.3.1 Free Run

The controller operates without being synchronized with the master. In Free Run mode, the master and controller have their own independent cycles.

### 6.3.2 SM Event

The controller operates synchronously with SyncManager Event (hereinafter referred to as SM Event) of EtherCAT communication. SM Event is an event that occurs when an EtherCAT Frame is received on the controller. When synchronized to the SM Event, each controller has a jitter in the number of us.

## 6.4 EtherCAT Slave Information

An EtherCAT Slave Information file (XML file) is required to connect the controller to the master of EtherCAT. The file contains the device information of the slave device developed in accordance with the EtherCAT specification in XML format. Slave device can be easily performed by writing XML file to EtherCAT master device through EtherCAT setting device.

- ※ The XML file can be downloaded from the archive on the product homepage.
- ※ The XML file is named FASTECH\_Ezi-IO EtherCAT.

## 6.5 Ezi-IO-EtherCAT Address

To use EtherCAT Network, you must configure Master and all slaves. The Master must set the Address to identify the Slave and specify the node address for sending the message. In general, the address can be set using the rotary switch and Master function installed in the H/W, but this product, Ezi-IO-EtherCAT, can be set only by using the Master function.

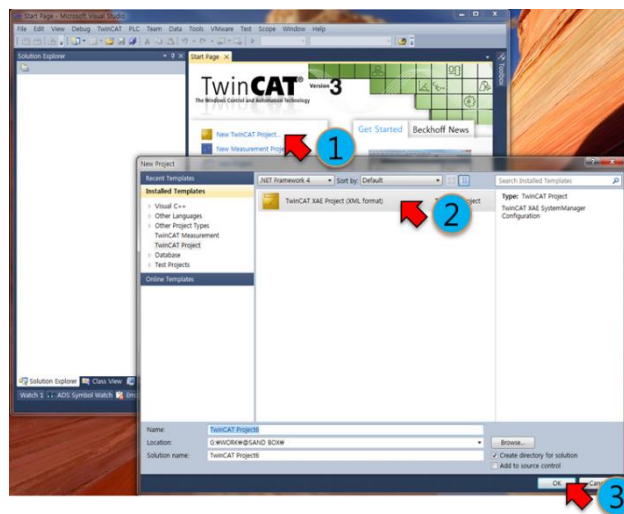
The address can be divided into Physical Address (EtherCAT Address) and Configured Station Alias. The Physical Address (EtherCAT Address) is automatically assigned by the Master according to the connected Slave sequence. The Configured Station Alias can be used flexibly by changing the user's choice, only by Master.



## 7. Settings and Operation

The procedure to operate the controller is as follows.

1. Install the controller according to the installation conditions. First, make sure that there is no abnormality in the controller after applying power. It is then recommended to connect the load. Refer to the Installation Precautions.
2. Make sure that the power cable, I/O connection connector, EtherCAT communication cable, etc. are connected properly. Refer to the System Configuration.
3. Power on the controller. Then check the following:
  - Check the power status LED (PWR) turns red.
  - After connecting the communication, check whether the LED of the EtherCAT communication connection indicator (ECAT IN, ECAT OUT) is green.
  - Enable EtherCAT communication.
  - Check the EtherCAT communication status LED (RUN) lights green.
4. After confirming this, run the software for EtherCAT. (In this manual, TwinCAT is taken as an example.)
5. When TwinCAT is executed, select 'New TwinCAT Project'. In the 'New Project' window, select 'TwinCAT XAE Project', select the project name / path, and select 'OK'.



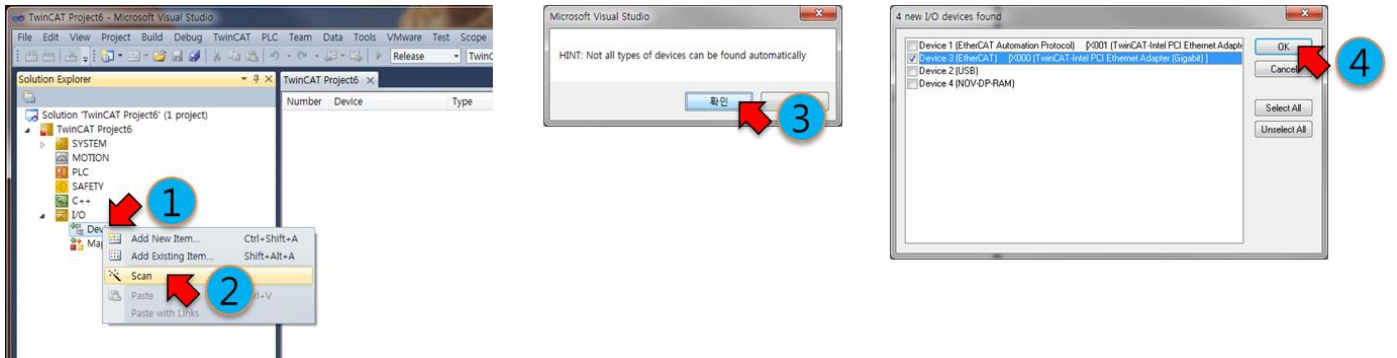
6. If TwinCAT is currently in 'Run Mode', new connections and settings may not be possible. Set TwinCAT to 'Config Mode'.

- Stop Mode : Icon is red
- Config Mode : Icon is blue
- Run Mode : Icon is green (Connection unable)



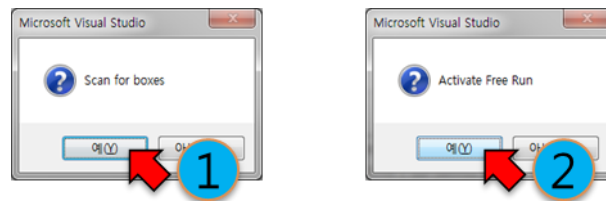
7. After creating the project, select 'Device' in 'I/O' of Solution Explorer and right-click to display the menu. Select 'Scan' from the menu, and when the Hint message pops up, select 'OK'. After checking 'new I / O devices found' window, select 'OK' button.

(If the checkbox is not checked in 'new I / O devices found', check the product's power and cables and try again.)



8. When the 'Scan for boxes' window appears, select 'Yes'.

9. Make sure that 'Drive' or 'Box' is added under 'Device'. When 'Activate Free Run' window appears, select 'Yes'.

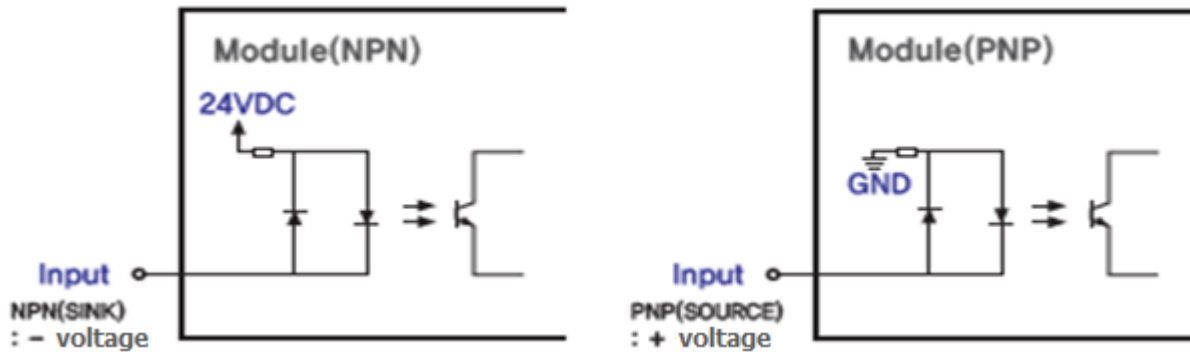


10. Then, You can use the EtherCAT network to configure and control peripherals with settings and programs that match your preferences.

## 7.1 Control I / O settings

### 7.1.1 Input signal

The Ezi-IO EtherCAT module has a photo-coupler input. The signal status operates as [ON: energized] and [OFF: non-energized] of the photo-coupler, not the voltage level of the signal. Depending on the output method of peripheral devices, there are NPN(SINK) type or PNP(SOURCE) type module products. The input circuit for this is designed based on 24V, and the input current is maximum 15mA per channel.



- **NPN type**

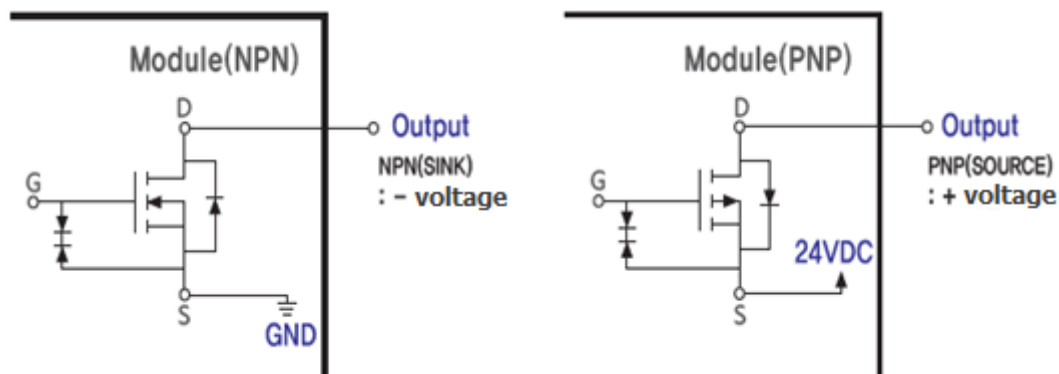
If the I / O module is NPN type and the peripheral device is 3Pin, connect it according to VCC, GND, Signal of the e-CON connector and peripheral devices. If the peripheral device is 2Pin, it should be connected to GND and Input of e-CON connector. Please check the module's method before use.

- **PNP type**

If the I / O module is PNP type and the peripheral device is 3Pin, connect it according to VCC, GND, Signal of the e-CON connector and peripheral devices. If the peripheral device is 2Pin, it should be connected with VCC and Input of e-CON connector. Please check the module's method before use.

## 7.1.2 Output signal

The outputs of the Ezi-IO EtherCAT module are all transistors. Depending on the input method of peripheral devices, there are NPN(SINK) type or PNP(SOURCE) type module products. The output circuit for this is based on 24V, and the output current is 200mA maximum per channel.



- **NPN type**

If the I / O module is NPN type and the peripheral device is 3Pin, connect it according to VCC, GND, Signal of the e-CON connector and peripheral devices. If the peripheral device is 2Pin, it should be connected with VCC and Output of e-CON connector. Please check the module's method before use.

- **PNP type**

If the I / O module is PNP type and the peripheral device is 3Pin, connect it according to VCC, GND, Signal of the e-CON connector and peripheral devices. If the peripheral device is 2Pin, it should be connected with GND and Output of e-CON connector. Please check the module's method before use.

## 7.2 Reference (NPN / PNP / SINK / SOURCE)

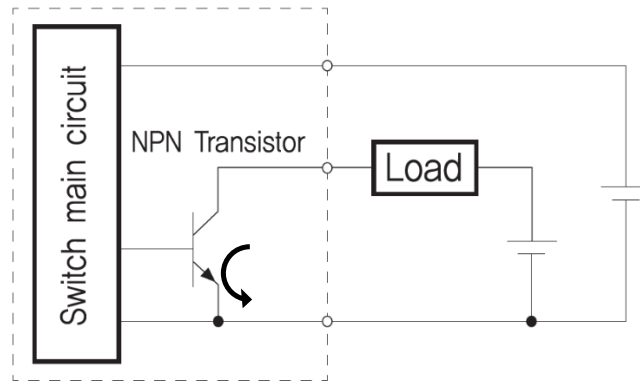


Fig. 7-1. NPN Output type connection example

Figure 7-1 shows an example of NPN output connection. Switches that use NPN transistors for these output transistors are called NPN open collector type. NPN output transistor's direction of the arrow is pointing outward.

When the transistor turns ON, the load current flows into the switch and is called SINK type. Therefore, the other side of the load accessing the output must be connected to the positive side of the power supply.

In the figure, two power supplies are provided, but there is no problem if the other side of the load is shared with the power supply of the switch, and the power of the load is set to one. NPN open collector type is easy to understand when it thinks that it is type which absorbs current when it is ON state.

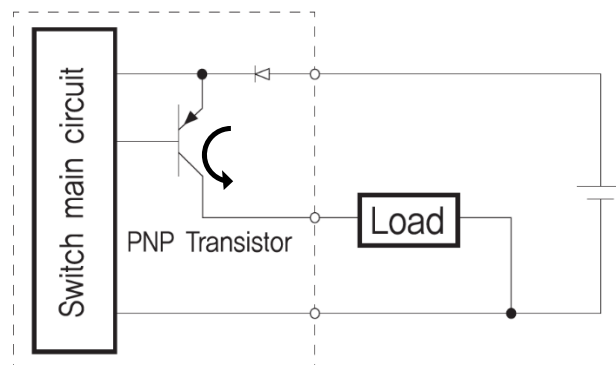


Fig. 7-2. PNP Output type connection example

Figure 7-2 shows a connection example of the PNP output. A switch that uses a PNP transistor for this output transistor is called a PNP open collector type. PNP output transistor's direction of the arrow is pointing inward.

When the transistor is turned ON, the load current flows in the switch. It is also called the SOURCE type. Therefore, the other side of the load accessing the output must be connected to the negative side of the power supply. The PNP output type is easy to understand when it is considered to be a type that outputs current when it is ON.



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