

# **Ezi-IO<sup>®</sup>** **Ethernet** **Input/Output Module** **DA**

User Manual

Text

( Rev.01)



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# 1 . Safety Pre-caution and Note on Installation

## ※ Before Operation

- Thank you for purchasing our Ezi-IO Ethernet DA products.
- Ezi-IO Ethernet DA is a high-performance 32bit ARM chip embedded Digital to Analog conversion module.
- This manual describe the handling, maintenance, repair diagnosis and troubleshooting of Ezi-IO Ethernet DA.
- Before start operation of Ezi-IO Ethernet DA, thoroughly read this.
- After reading this manual, keep the manual near Ezi-IO Ethernet DA, so that any user can read this manual whenever needed.



## 1 - 1 . 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 the purchased product.
- In case of manual is damaged or lost, please contact FASTECH or our agents. You can find our contact information on the last page of this manual.
- FASTECH is not responsible for a product breakdown due to the user's dismantling of the product, and such a breakdown is not guaranteed by the warranty.


### ◆ Safety Precautions

- Before installation, operation, or repairing of the products, thoroughly read the manual and fully understand the contents. Before operating the products, please understand the mechanical characteristics of the products and related safety information and precautions.
- Safety precautions are indicated by **Attention** and **Warning**.



 <b>Attention</b>	If a user does not properly handle the products, the user may be seriously or lightly injured, and damages may occur to 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 **Attention**, a serious result could be caused depending on the situation. Follow safety precaution.



## ◆ Check the Product

 <b>Attention</b>	<p><b>Check if there is any damage on the product and if any part is missing.</b> Otherwise, the machine may get damaged or the user may get injured.</p>
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## ◆ Installation

 <b>Attention</b>	<p><b>Carry the product 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 product is to be installed.</b> Otherwise, a fire may occur.</p> <p><b>When installing multiple products in an enclosed place, use a cooling fan to keep the ambient temperature of the product at or below 50°C.</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>


## ◆ Cable Connection

 <b>Attention</b>	<p><b>Keep the rated range of input voltage for the drive.</b> Otherwise, a fire or other kinds of accidents may occur.</p> <p><b>Connect cables according to the wiring diagram in this manual.</b> Otherwise, a fire or malfunction of the machine may occur.</p>
 <b>Warning</b>	<p><b>Before connecting cables, make sure the input power is off.</b> Otherwise, an electric shock or a fire may occur.</p> <p><b>The case of this Ezi-IO Ethernet DA is installed from the ground of the internal circuit by the condenser. Ground the Ezi-IO Ethernet DA properly.</b> Otherwise, an electric shock, a fire or a malfunction of the machine may occur.</p>

### ◆ Operating & Setting

 <p><b>Attention</b></p>	<p><b>If a protection function (Alarm) occurs, remove the cause and then release (Alarm reset) the protection function.</b></p> <p>If you operate continuously without removing the cause, the machine may get damaged or the user may get injured.</p> <p><b>Change all input signals to "OFF", before supplying input voltage to Ezi-IO Ethernet DA drive.</b></p> <p>The machine may get damaged or the user may get injured by motor operation.</p> <p><b>All parameter values are set by default factory setting value. Before changing the values, read this manual thoroughly.</b></p> <p>Otherwise, the machine may get damaged or other kinds of accidents may occur.</p>
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### ◆ Repairing & Maintenance

 <p><b>Warning</b></p>	<p><b>Stop supplying power to the main circuit and wait for sufficient time before checking or repairing the product.</b></p> <p>Electricity remained in the condenser may cause an 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 product.</b></p> <p>Otherwise, an electric shock may occur or the product and machine get damaged. Reconstructed product cannot get after service.</p>
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## 1 - 2 . Notes on Installation

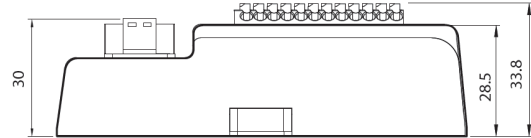
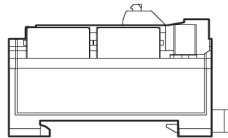
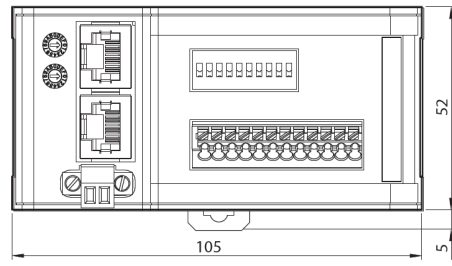
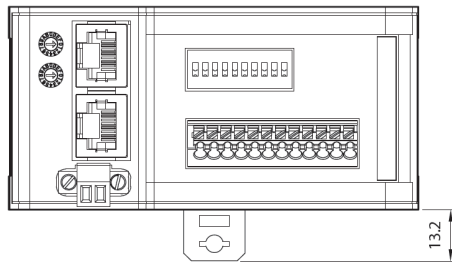
- 1) This product has been designed for indoor use. Use the product in the ambient temperature 0°~ 50°C.
- 2) If the temperature of the case is 50°C or higher, heat shall be radiated.
- 3) Do not install the product under direct rays, near magnetic or radioactive objects.

## 2 . Specifications and Dimensions

### 2 - 1 . Specifications

Model		Ezi-IO-EN-DA04-T	
Input Mode		Voltage Input	Current Input
Input Voltage		DC24V $\pm$ 10%	
Current Consumption		Max. 180mA	
Operating Condition	Ambient Temperature	In Use : 0~50°C In Storage : -20~70°C	
	Humidity	In Use : 35~85%RH (Non-Condensing) In Storage : 10~90%RH (Non-Condensing)	
	Vib. Resist.	0.5G	
Function	Number of Channels		4CH
	Output Range		· 0~5V · 1~5V · 0~10V · -10~10V <div>· 0~20mA</div> <div>· 4~20mA</div>
	Output Range Setting Method		· Parameter (Separate setting for each channel) · DIP Switch (Separate setting for each channel)
	Load Impedance		Min. 1k $\Omega$ Max. 400 $\Omega$
	Resolution		Max. 1/50,000(Full Scale)
	Accuracy	25°C	$\pm$ 0.3%(Full Scale)
		0~50°C	$\pm$ 0.4%(Full Scale)
	Analog Conversion Cycle		500us/4CH
	D/A Converted Data		· -25,000~25,000 (for -10~10V voltage output) · 0~25,000 (for all voltage output except -10~10V) <div>0~25,000</div>
	Signal Isolation Method		Digital isolation between analog input and communication connections
LED Indication		· Power Status(PWR) · Run Status(RUN) · Ethernet Status(Link, Activity)	
Communication Interface		· Ethernet UDP/TCP Communication · Ethernet standard: 10BASE-T, 100BASE-TX · Full-duplex	
GUI		User Interface Program for within Windows	
Library		Motion Library (DLL) for Windows 7/8/10	

## 2 - 2 . Dimensions

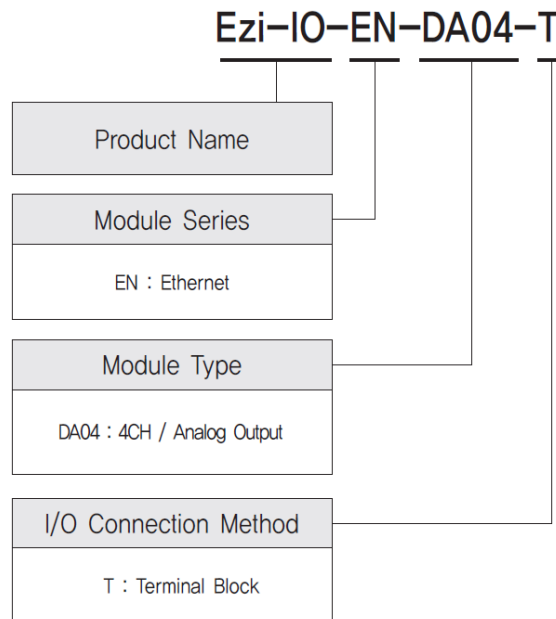


- Install the product on a din rail with a width of 35 mm.

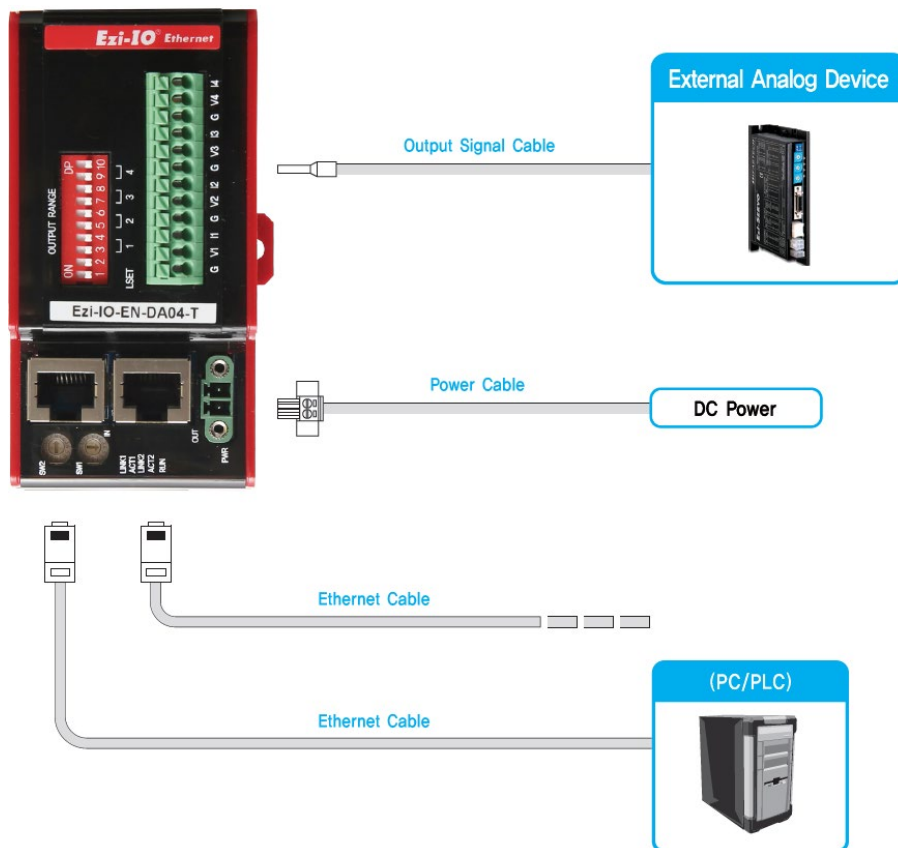
## 3 . Configuration

### 3 - 1 . Part Numbering

#### 1) Ezi-IO Ethernet DA Part Numbering

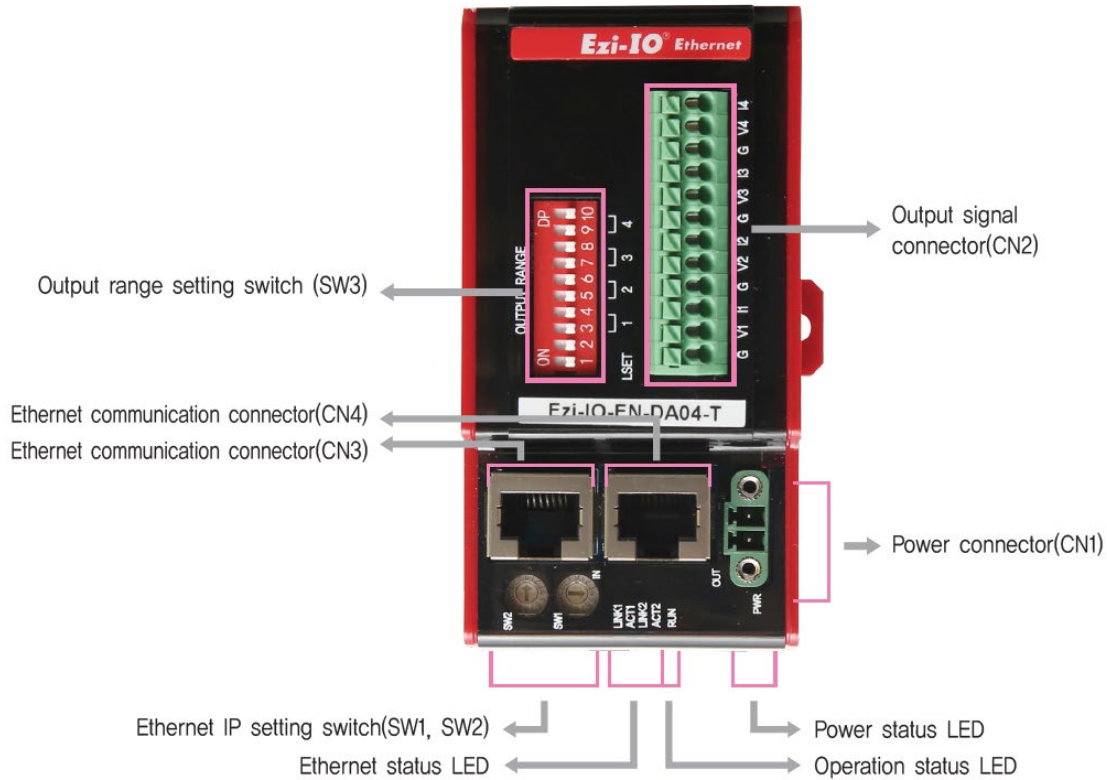


### 3 - 2 . System Configuration





## 4 . Names and Functions



### 1) LED Indications

#### ① Power Status LED

LED	Color	Status	Description
PWR	RED	OFF	Power OFF
		ON	Power ON

#### ② Run Status LED

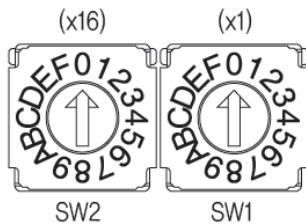
LED	Color	Status	Description
RUN	GREEN	OFF	Abnormal Operation
		Blinking	Normal Operation

#### ③ Ethernet Connection LED

LED	Color	Status	Description
LINK1,2	GREEN	OFF	Link not Established
		ON	Link Established
ACT1,2	YELLOW	OFF	Stand-by
		Blinking	In Operation

## 2) IP Address Selection Switch (SW1:x1, SW2:x16)

- ① It can be set "from 1 to 254". Make sure to avoid IP address overlapping.
  - "0" and "255" cannot be used for IP setting. Be sure to set it "from 1 to 254".
  - The default Gateway is 192.168.0.1. When the switch is set to "1", change the Gateway. Refer to the [Manual – User Program 2-4] section for change method. If IP Address and Gateway are same, Alarm(201 or 202) occurs.
  - It is recommended to use "2~254" for IP setting.  
(Default: SW1 : 2, SW2 : 0)
- ② Basic setting is "192.168.0.xxx", and xxx can be set by switch.



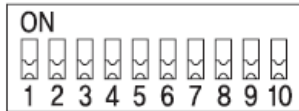
Ex) In case of SW2 : 6, SW1 : 9,

$$6 * 16 + 9 * 1 = 105$$

- ① If the switches are set to 255(FF), IP Address is automatically set.  
Because DHCP is used, IP Address is set automatically when using router.  
(Connect the Ethernet to Ethernet IN connector.)

- Be sure to set the IP address with switches, when connecting directly to the controller (PC/PLC).
- Set the IP address automatically only when the default IP address is not used. When the IP Address is automatically set, connect the user program (GUI) and save the IP address. Then, turn off the power and set the last number of IP with the switch.
- When the switch is set to 0, the IP setting becomes the initial (default) value.  
In the initial state, communication is not connected.
- Basic IP Address : 192.168.0.xxx, Subnet Mask : 255.255.255.0, Gateway : 192.168.0.1

### 3) Output Range Setting Switch(SW3)



SW3 is switch for output range setting. Output range can be set by the combination of each switch.

SW3.2 is not used.

#### ① Selection Setting Method

Select the setting method with LSET(SW3.1) referring to the chart.

Setting Method \ Switch	LSET	Description
	SW3.1	
DIP Switch	ON	Setting voltage output range with DIP switches (SW3.3~SW3.10)
Parameter	OFF	Setting voltage/current input range with parameters through Ethernet

#### ① Selecting Voltage Input Range

When DIP Switch is used for the output setting method (SW3.1 = ON), voltage output range can be set referring to the chart.

	CH1		CH2		CH3		CH4	
	SW3.3	SW3.4	SW3.5	SW3.6	SW3.7	SW3.8	SW3.9	SW3.10
0~10V	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
-10~10V	OFF	ON	OFF	ON	OFF	ON	OFF	ON
0~20mA	ON	OFF	ON	OFF	ON	OFF	ON	OFF
4~20mA	ON	ON	ON	ON	ON	ON	ON	ON

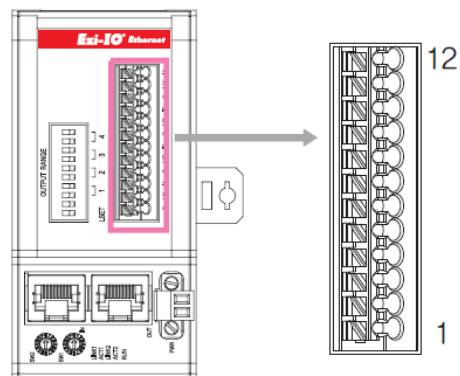
- Voltage output mode for 1~5V, 0~10V can be set with parameter through Ethernet communication.

### 4) Power Connector (CN1)

NO.	Function	I/O
1	DC24V	Input
2	GND	Input

## 5) Output Connector(CN2)

NO.	Indication	Function	I/O
1	G	Analog GND	Output
2	V1	Voltage Out1	Output
3	I1	Current Out1	Output
4	G	Analog GND	Output
5	V2	Voltage Out2	Output
6	I2	Current Out2	Output
7	G	Analog GND	Output
8	V3	Voltage Out3	Output
9	I3	Current Out3	Output
10	G	Analog GND	Output
11	V4	Voltage Out4	Output
12	I4	Current Out4	Output



## 6) Ethernet Connectors (CN3, CN4)

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

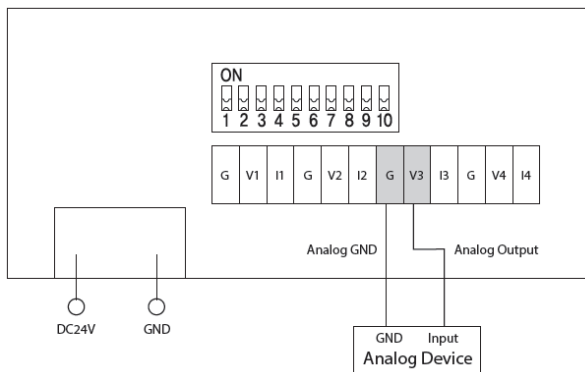
## 5 . Signal Cabling

Ezi-IO Ethernet DA is supplied with push-in spring type terminal blocks. Push-in spring type terminal blocks make the wiring easy by using ferrule connectors, so the product can be simply connected to analog devices.

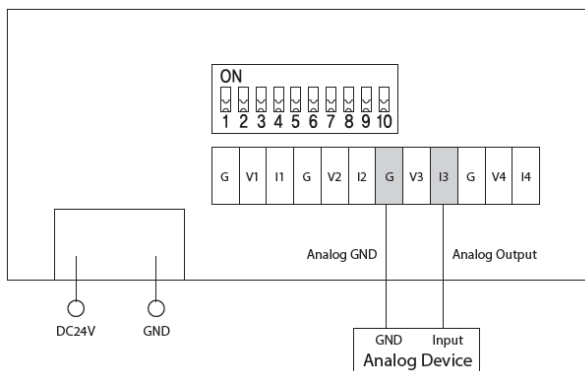
### 5 - 1 . Signal Cabling

Each output channel of Ezi-IO Ethernet DA has separate voltage output and current output pins. Refer to the below figure for wire connections of your applications.

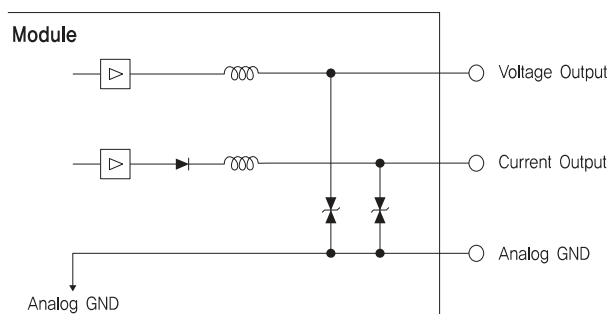
#### 1) Wiring of Voltage Outputs



#### 2) Wiring of Current Outputs



### 5 - 2 . Internal Circuit Diagram



## 6 . Setting Output Range

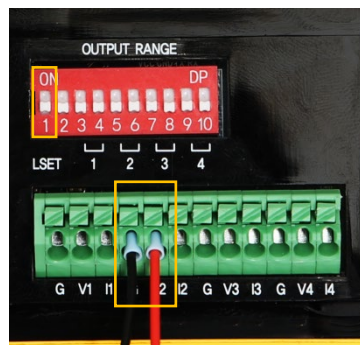
To set voltage range, use either communication parameter setting or DIP switch setting method. The setting methods are following.

### 6 - 1 . Setting Voltage Output Range

#### 6 - 1 - 1 . Setting Voltage Output Range through Communication Parameter

##### (Example) Setting Channel 2

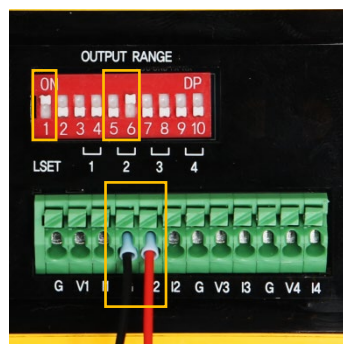
- ① Set LSET switch (SW3.1) of Output Range Setting Switch (SW3) to OFF before supplying power.
- ② On the Output Connector (CN2), wire GND pin (G) and voltage output pin (V2) of Channel 2 to the analogue device. Then, supply power to the module.
- ③ Set the Voltage Output Range Parameter through Ethernet communication.



#### 6 - 1 - 2 . Setting Voltage Output Range with DIP Switches

##### (Example) Setting Channel 2 to -10~10V Output Range

- ① Set LSET switch (SW3.1) of Output Range Setting Switch (SW3) to ON before supplying power to the module. Set the voltage output range of Channel 2 with SW3.5~SW3.6 switches (SW3.5=OFF, SW3.6=ON).
- ② On the Output Connector (CN2), wire GND pin (G) and voltage output pin (V2) of Channel 2 to the analogue device. Then, supply power to the module.

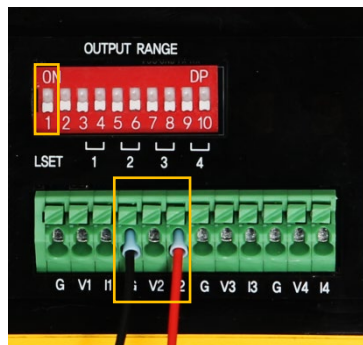


## 6 - 2 . Setting Current Output Range

### 6 - 2 - 1 . Setting Current Output Range through Communication Parameter

#### (Example) Setting Channel 2

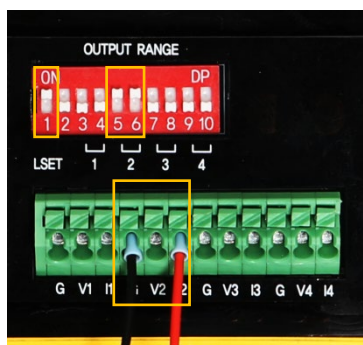
- ① Set LSET switch (SW3.1) of Output Range Setting Switch (SW3) to OFF before supplying power to the module.
- ② On the Output Connector (CN2), wire GND pin (G) and current output pin (I2) of Channel 2 to the analogue device. Then, supply power to the module.
- ③ Set the Current Output Range Parameter through Ethernet communication.



### 6 - 2 - 2 . Setting Current Output Range with DIP Switches

#### (Example) Setting Channel 2 to 4~20[mA] Output Range

- ① Set LSET switch (SW3.1) of Output Range Setting Switch (SW3) to ON before supplying power to the module. Set the current output range of Channel 2 with SW3.5~SW3.6 switches (SW3.5=ON, SW3.6=ON).
- ② On the Output Connector (CN2), wire GND pin (G) and current output pin (I2) of Channel 2 to the analogue device. Then, supply power to the module.



## 7 . Communication Function

- 1) 2 Port Ethernet switching Hub is embedded in the product for daisy-chain connection.
- 2) TCP and UDP Protocol are used.
- 3) When using TCP Protocol, GUI(Graphical User Interface) and user program can be connected to the drive at the same time.
- 4) When using UDP Protocol, GUI(Graphical User Interface) and one or more user program can be connected to the drive at the same time. However, connection delay may occur when 2 or more user programs are connected.
- 5) Refer to 「[3-2 System Configuration](#)」 for PC connection example.
- 6) The signal contents of the RJ45 connector of the drive are as follows.

(Same as general Ethernet 10/100 Base-T)

RJ45 Pin No.	Function
1	TD+
2	TD-
3	RD+
4	----
5	----
6	RD-
7	----
8	----
case	Frame GND

- 7) **Basic IP Address : 192.168.0.xxx**  
**Basic Gateway : 192.168.0.1**  
**Basic Subnet Mask : 255.255.255.0**



## 8 . Functions of Ezi-IO Ethernet DA

Ezi-IO Ethernet DA converts digital voltage and current inputs to analog signal through Ethernet network. Also, function of calibrating output deviation is provided.

### 8 - 1 . Channel Activation Function

You can select the channels of Ezi-IO Ethernet DA to use and activate them.

Deactivated channels output 0 [V] through the voltage output pins and 0 [mA] through the current output pins.

To activate a channel to use, function must be delivered through Ethernet communication.

Refer to [User Manual – Communication Function] for detailed information.

### 8 - 2 . Output Range Setting

Ezi-IO Ethernet DA supports 4 different ranges of voltage output (0~5 [V], 1~5 [V], 0~10 [V], and -10~10 [V]) and two different ranges of current output (0~20 [mA] and 4~20 [mA]). For each output range, you can use max. 5% extended range of output with the user calibration function.

If the digital data is out of range, it is converted to the minimum or maximum analog signal.

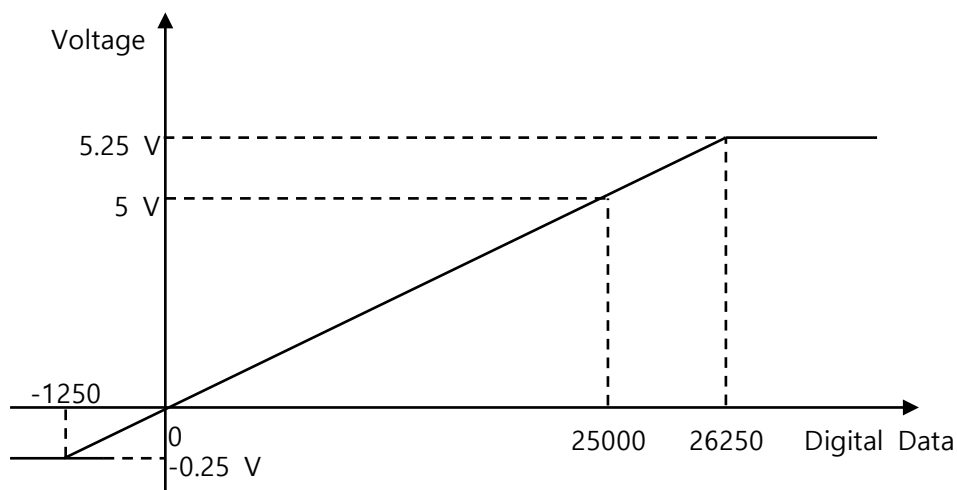
#### 8 - 2 - 1 . 0 ~ 5 [V] Voltage Output

In the voltage output range, the digital data 0~25,000 is converted to 0~5 [V] output. Actually, the digital data -1,250~26,250 is converted to -0.25~5.25 [V].

If the digital data is greater than 26,250, it outputs 5.25 [V]. Or if the digital data is less than -1,250, it outputs -0.25 [V].

The following formula is used when converting digital data to analogue signals.

$$\text{Analog Output[V]} = \frac{5}{25000} \times \text{Digital Data}$$



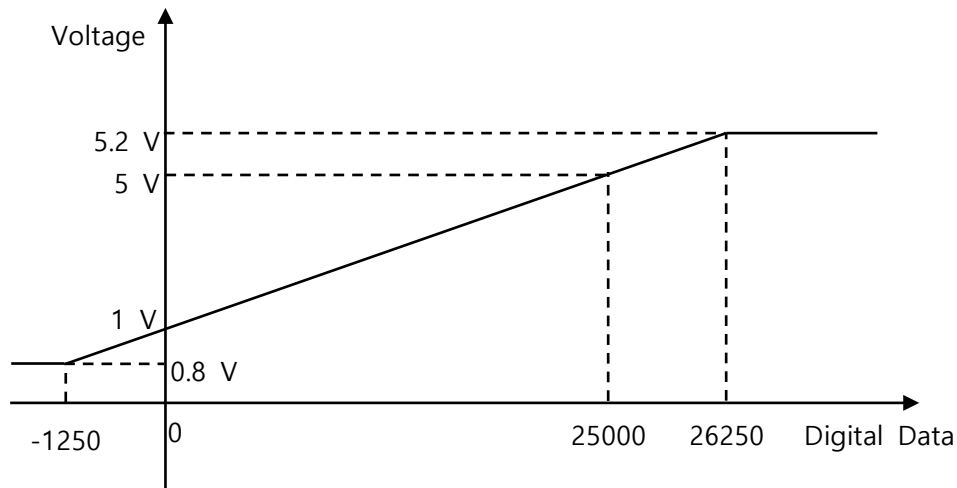
### 8 - 2 - 2 . 1~5 [V] Voltage Output

In the voltage output range, the digital data 0~25,000 is converted to 1~5 [V] output. Actually, the digital data -1,250~26,250 is converted to 0.8~5.2 [V].

If the digital data is greater than 26,250, it outputs 5.2 [V]. Or if the digital data is less than -1,250, it outputs 0.8 [V].

The following formula is used when converting digital data to analogue signals.

$$\text{Analog Output[V]} = \frac{4}{25000} \times \text{Digital Data} + 1$$

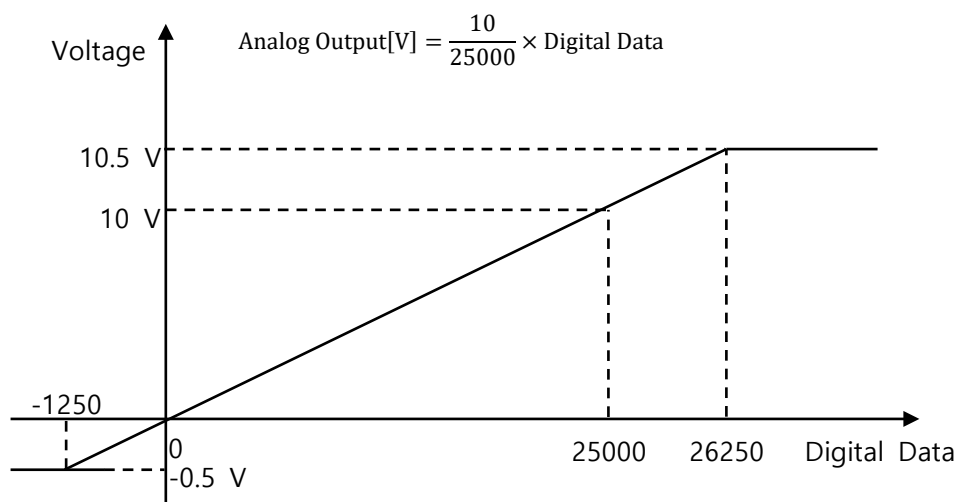


### 8 - 2 - 3 . 0~10 [V] Voltage Output

In the voltage output range, the digital data 0~25,000 is converted to 0~10 [V] output. Actually, the digital data -1,250~26,250 is converted to -0.5~10.5 [V].

If the digital data is greater than 26,250, it outputs 10.5 [V]. Or if the digital data is less than -1,250, it outputs -0.5 [V].

The following formula is used when converting digital data to analogue signals.



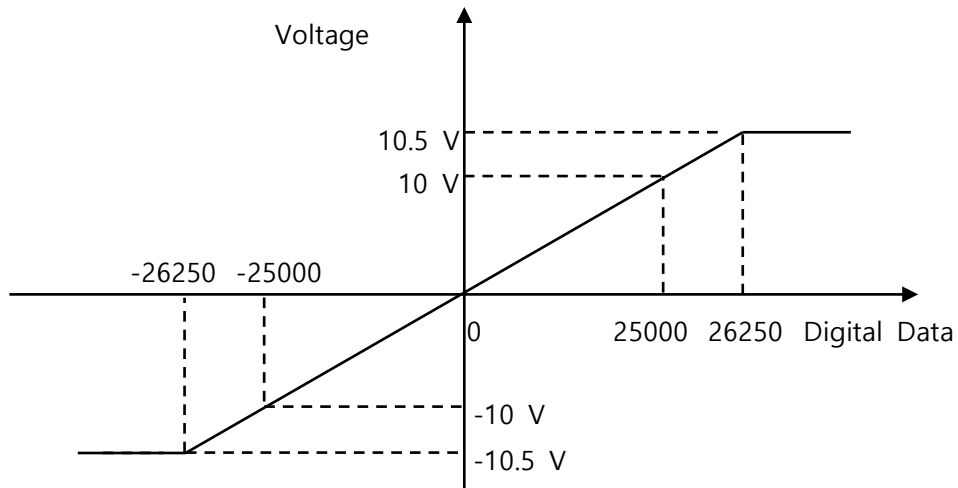
### 8 - 2 - 4 . -10~10 [V] Voltage Output

In the voltage output range, the digital data -25,000~25,000 is converted to -10~10 [V]. Actually, the digital data -26,250~26,250 is converted to -10.5~10.5 [V].

If the digital data is greater than 26,250, it outputs 10.5 [V]. Or if the digital data is less than -26,250, it outputs -10.5 [V].

The following formula is used when converting digital data to analogue signals.

$$\text{Analog Output[V]} = \frac{20}{50000} \times \text{Digital Data}$$



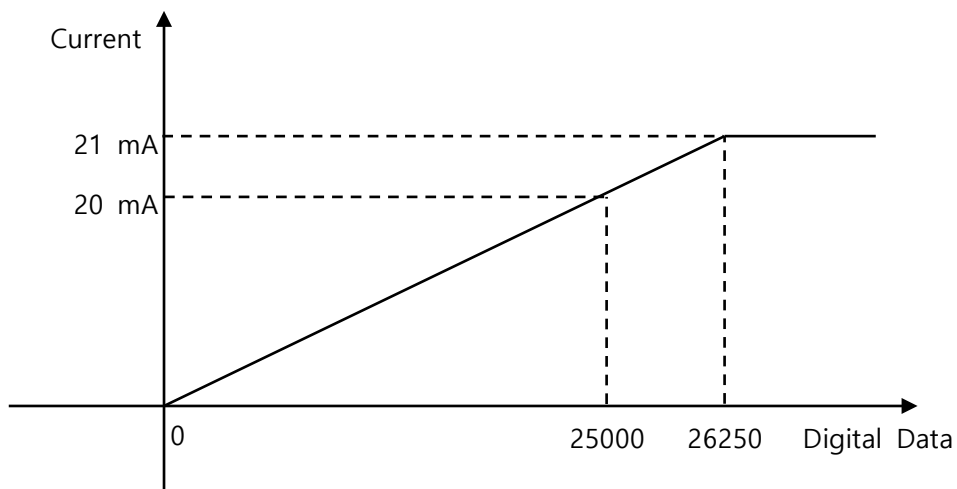
### 8 - 2 - 5 . 0 ~ 20 [mA] Current Output

In the voltage output range, the digital data 0~25,000 is converted to 0~20 [mA] output. Actually, the digital data 0~26,250 is converted to 0~21 [mA].

If the digital data is greater than 26,250, it outputs 21 [mA]. Or if the digital data is less than 0, it outputs 0 [mA].

The following formula is used when converting digital data to analogue signals.

$$\text{Analog Output[mA]} = \frac{20}{25000} \times \text{Digital Data}$$



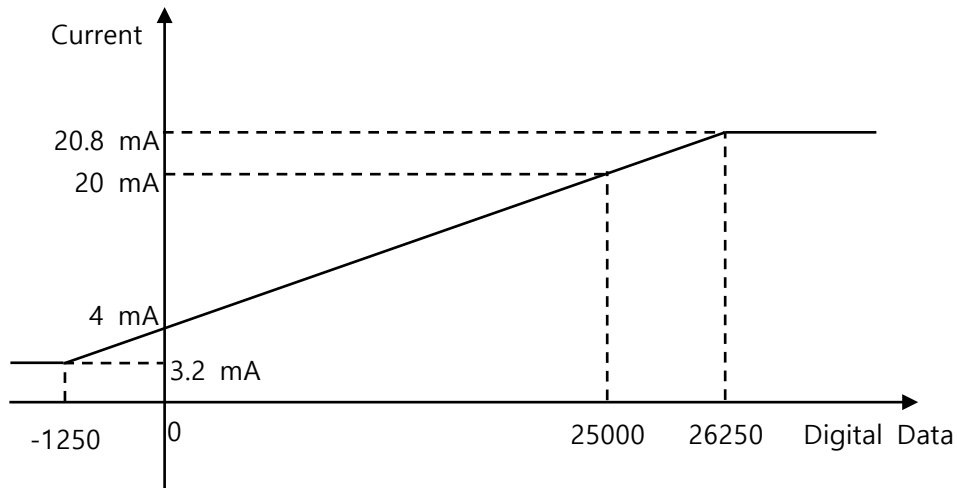
### 8 - 2 - 6 . 4 ~ 20 [mA] Current Output

In the voltage output range, the digital data 0~25,000 is converted to 4~20 [mA] output. Actually, the digital data -1,250~26,250 is converted to 3.2~20.8 [mA].

If the digital data is greater than 26,250, it outputs 20.8 [mA]. Or if the digital data is less than -1,250, it outputs 3.2 [mA].

The following formula is used when converting digital data to analogue signals.

$$\text{Analog Output[mA]} = \frac{16}{25000} \times \text{Digital Data} + 4$$



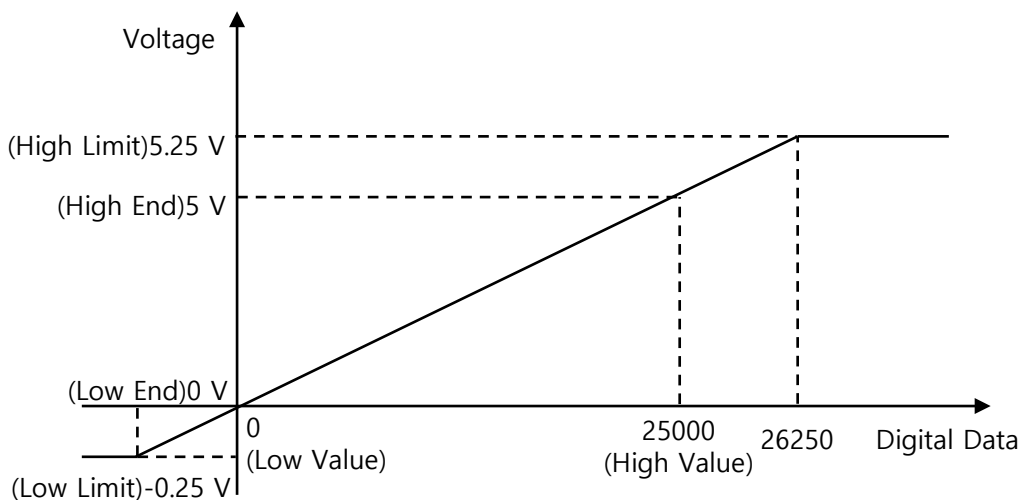
## 8 - 3 . User Calibration for Output Deviation

Deviation in output signals can be occurred due to the various conditions such as connected devices, cables and connection methods. Users can calibrate the deviation values of output signals.

### 8 - 3 - 1 . Terms Used

- Low End and High End: Minimum and maximum values of the selected output range.
- Low Limit and High Limit: Minimum and maximum values of output signal which the specific channel can output in selected output range.
- Low Value and High Value: Digital data when it outputs the Low End and High End values.

#### (Example) With 0~5 [V] Output Range



### 8 - 3 - 2 . Example of Using User Calibration

#### (Example) Output Deviations and User Calibration Function when output range is 0~5 [V]

In the Figure below, it does not output 0~5 [V] exactly for 0~25,000 digital data, and there is output deviations.

Digital data                      0    ⇒    0.2 [V] Output

Digital data                      25,000    ⇒    5.2 [V] Output

First, to use the user calibration function, reset the Low Value and High Value for Low End (0 V) and High End (5 V). Refer to the Figure 9-8 for the reset.

#### (Example)

For Low End (0 V): Reset the Low Value to -1,000.

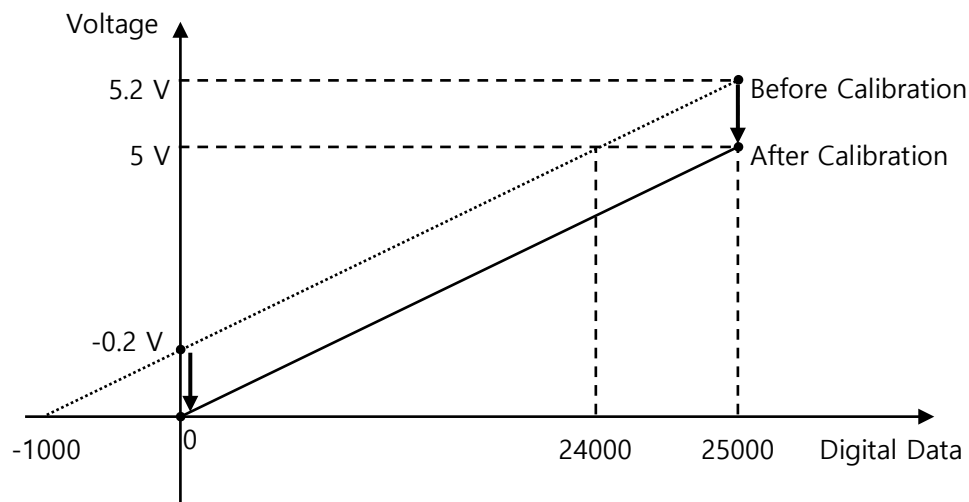
For High End (5 V): Reset the Low Value to 24,000.High End(5 V)

Then, the reset values are used for the user calibration converting the digital data. Finally, it outputs correct analogue output signals corresponding to the digital data.

Digital Data                      0    ⇒    (Converted to -1,000 by the user calibration)    ⇒    0 [V] Output

Digital Data                      10,000    ⇒    (Converted to 9,000 by the user calibration)    ⇒    2 [V] Output

Digital Data                      25,000    ⇒    (Converted to 24,000 by the user calibration)    ⇒    5 [V] Output



Low and High Values for each output range are listed in the table.

Output Range	Low Value	High Value
0~5 [V]	-1,250~1,250	23,750~26,250
1~5 [V]	-1,250~1,250	23,750~26,250
0~10 [V]	-1,250~1,250	23,750~26,250
-10~10 [V]	-26,250~-23,750	23,750~26,250
0~20 [mA]	0~1,250	23,750~26,250
4~20 [mA]	-1,250~1,250	23,750~26,250

### 8 - 3 - 3 . Setting Method

- 1) Setting by GUI(Graphical User Interface)
- 2) Setting by Network Command

## 9 . Appendix

### 9 - 1 . Connector

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

### 9 - 2 . Options

#### 1) Ethernet Cable

Purpose	Part Number	Length[m]	Remarks
Ethernet Connection	CGNR-EC-001F	1	·STP(Shielded Twisted Pair) cable
	CGNR-EC-002F	2	·Category 5e or higher
	CGNR-EC-003F	3	·Max. length: 100m
	CGNR-EC-005F	5	·Normal cable

- If you need cables with length(in units of 1m) not listed on the table or robot cables, please contact FASTECH for more information.



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