

FnIO M – Series :

M5112

M5112 (2Ch, High Speed Counter, Encoder Input, 5~24Vdc)

Date: 2019.08.28

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History

REV.	PAGES	REMARKS	DATE	Editor
1.00	11	Preliminary	Sep 06, 2018	Soyeong, Park
1.01		Image, Torque, Hotswap Function	2020/04/21	Soyeong, Park
1.02		Vibration specification, Product certification changed	2020/04/27	Soyeong, Park
1.03		5V Specification, Counter Mode changed	Jun 29, 2020	Soyeong, Park

1. Environment Specification

Environmental specification	
Operating Temperature	-25°C~60°C
UL Temperature	-20°C~60°C
Storage Temperature	-40°C~85°C
Relative Humidity	5% ~ 90% non-condensing
Mounting	DIN rail
General specification	
Shock Operating	IEC 60068-2-27
Vibration Resistance	Based on IEC 60068-2-6 DNVGL-CG-0039 : Vibration Class B, 4g
Industrial Emissions	EN 61000-6-4/A11 : 2011
Industrial Immunity	EN 61000-6-2 : 2005
Installation Position	Vertical and horizontal installation is available.
Product Certifications	CE, UL, FCC, ATEX (TBD)

2. M5112 (2 Channels High Speed Counter / Encoder)

2.1. M5112 Specification

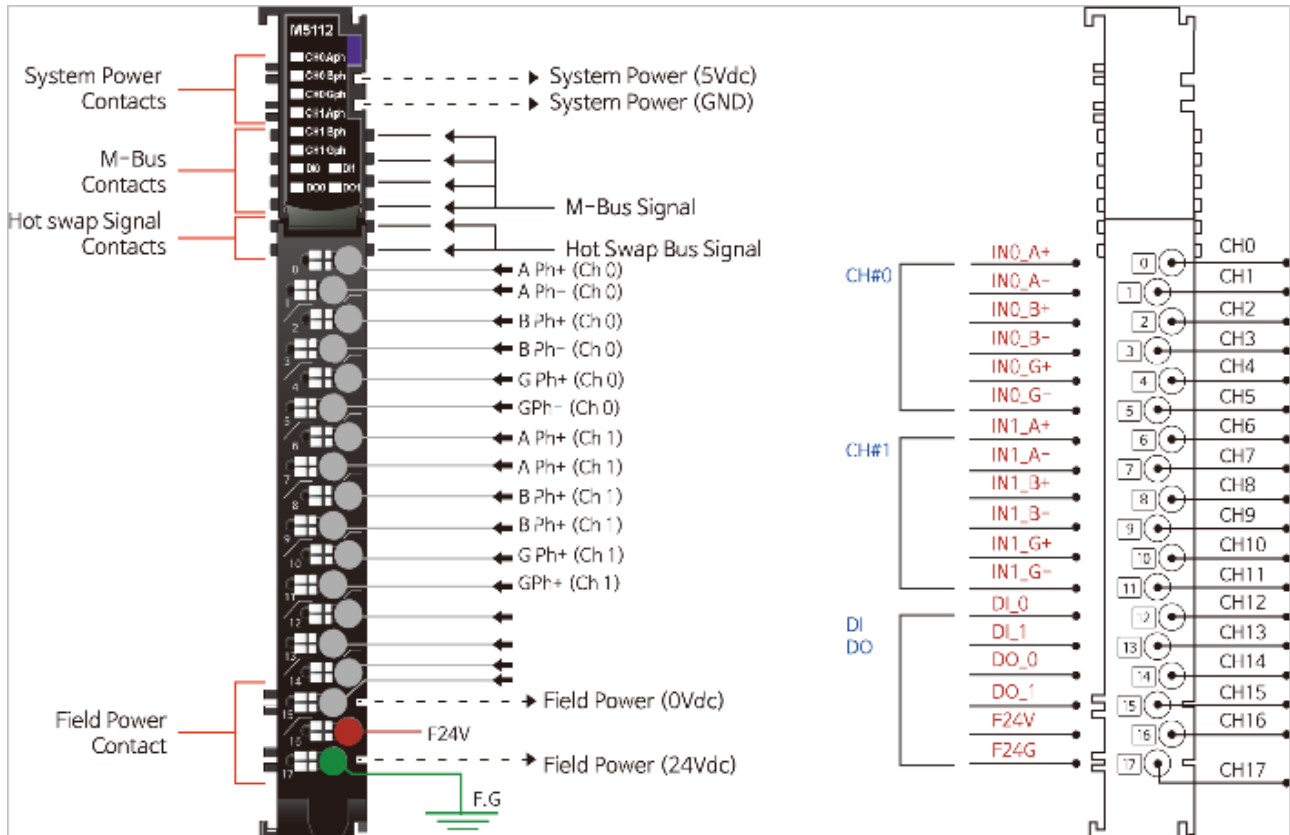
Items	Specifications
Encoder Input Specification	
Number of Channel	2 Channel - Encoder with G-Signal, High Speed Counter, Frequency measurement, Pulse width & Period measurement
Indicators	10 Green LEDs - Phase Input: 6 Green LEDs - Terminal Input: 2 Green LED - Terminal Output: 2 Green LED
Input Voltage	5~24Vdc nominal
Input Current	5mA@ 5Vdc 12mA @ 24Vdc
Min On-State Voltage	≥ 3.5Vdc
Input Frequency	0~750KHz Encoder Mode 0~500KHz Counting Mode @5Vdc 0~750KHz Encoder Mode 0~500KHz Counting Mode @24Vdc
Counting Mode	1-Input Mode : Up, Down, Frequency Measurement Pulse Width & Period measurement 2-Input Mode : Encoder 4x, Encoder 2x, Up/Inhibit, Up/Reset Down/Inhibit, Down/Reset, UP/Down, Clock/Direction
Counter Size	32Bit-wide/Channel
Input Filter Delay	OFF to On : Max . 0.1us @ 24Vdc On to OFF : Max . 2.0us @ 24Vdc
Digital Input Specification	
Input Per Module	2 Point Sink Type
Indicators	2 Green Terminal Input LEDs
Input On-state Voltage	Class 2, 24Vdc nominal Min. 15Vdc to Max. 28.8Vdc
Field power OFF-state Voltage	Max. 5Vdc
On-state Current	Max. 1.3A / point @ 14.2Vdc
Input Signal Delay	OFF to On : 0.3ms Max On to OFF : 0.3ms Max
Nominal Input Impedance	10.63KΩ
Digital Output Specification	
Output Per Module	2 Point Source Type
Indicators	2 Green Terminal Output LEDs
Output Voltage Range	Class2, 24Vdc nominal Min. 15Vdc to Max. 28.8Vdc
On-state Voltage Drop	Max. 0.5Vdc @ 25°C
Field power OFF-state Voltage	Max. 5Vdc
Off-state Leakage Current	Max. 20uA
Output Signal Delay	OFF to On : Max. 0.3ms @ 15Vdc / 0.3A ON to OFF : Max. 0.3ms@ 15Vdc / 0.3A
Output Currnet Rating	Max. 0.3A / channel
Protection	Reverse voltage protection, Short circuit protection
General Specification	
Power Dissipation	Max. 120mA @ 5Vdc
Isolation	I/O to Logic : Photocoupler Isolation I/O to Field Power : Non-Isolation
UL Field Power	Supply voltage : 24Vdc nominal, Class 2

Specification

Field Power	Supply voltage : 24Vdc nominal Voltage range : 15~28.8Vdc
Single Wire	0.205mm ² - 1.3mm ² (24-16 AWG)
Torque	0.8Nm(7 lb-in)
Weight	72g
Module Size	12mm x 110mm x 75mm
Environment Condition	Refer to '1. Environment Specification'

* Class 2, adjacent to voltage rating (30Vmax)

2.2. M5112 Module Diagram



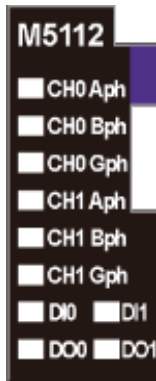
Pin No.	Signal Description
0	Aph Input+ Channel 0
1	/Aph Input - Channel 0
2	Bph Input+ Channel 0
3	/Bph Input - Channel 0
4	Gph Input+ Channel 0
5	/Gph Input - Channel 0
6	Aph Input+ Channel 1
7	/Aph Input - Channel 1
8	Bph Input+ Channel 1
9	/Bph Input - Channel 1
10	Gph Input+ Channel 1
11	/Gph Input - Channel 1
12	Digital Input Channel 0
13	Digital Input Channel 1
14	Digital Output Channel 0
15	Digital Output Channel 1
16	Field Power 0Vdc
17	Field Power 24Vdc

Series No	Through Air	Over Surface	CTI
RTB18C	1.5mm	1.5mm	175≤CTI≤400

Spacings : The following minimum spacing in inches (millimeters) shall be maintained between uninsulated live parts of opposite polarity; and between an uninsulated live part and a grounded Part including any mounting surface or exposed metal part.

2.3. M5112 LED Indicator

2.3.1. LED Indicator



LED No.	LED Function / Description	LED Color
0	Aph Input Ch# 0	Green
1	Bph Input Ch# 0	Green
2	Gph Input Ch# 0	Green
3	Aph Input Ch# 1	Green
4	Bph Input Ch# 1	Green
5	Gph Input Ch# 1	Green
6	Input Channel 0	Green
7	Input Channel 1	Green
8	Output Channel 0	Green
9	Output Channel 1	Green

2.3.2. Channel Status LED

Status	LED is	To indicate
No Signal	Off	Normal Operation
On Signal	Green	Normal Operation

2.4. Hot Swap Function

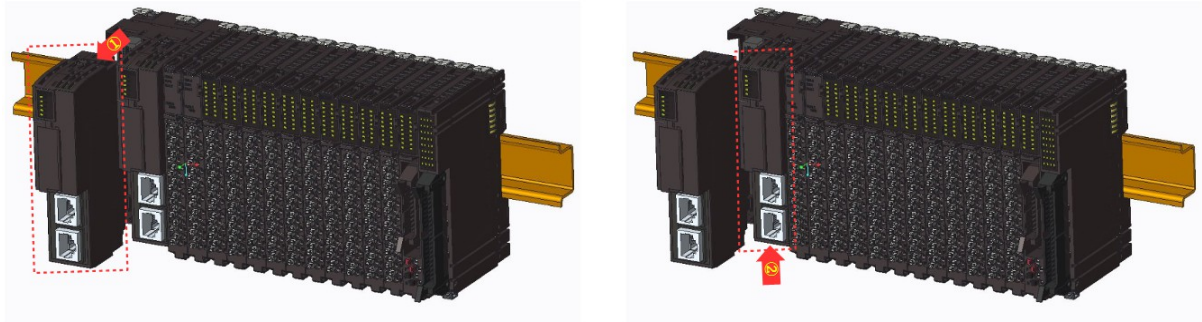
The M-Series has hot-swap capability to protect your system.

※ Caution

If you remove multiple IO modules by mistake, you must connect IO modules one by one, starting with the lower slot number.

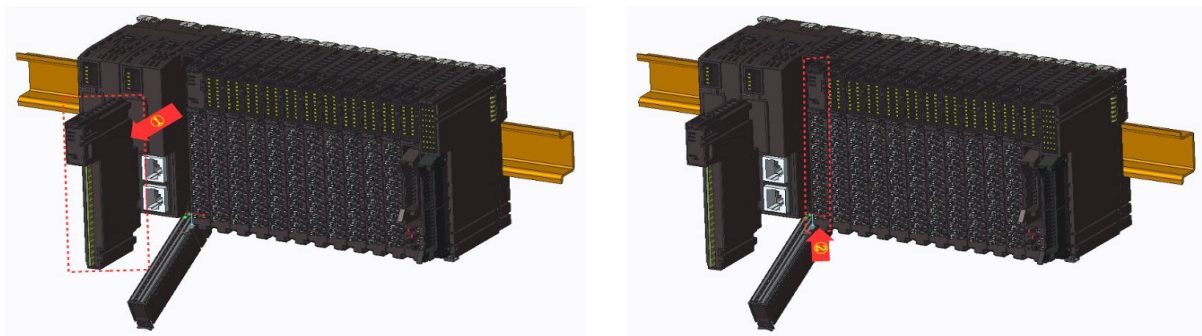
2.4.1. Network Adapter

If one of the network adapters fails(①), the rest of the network adapters(②) function normally to protect the system.



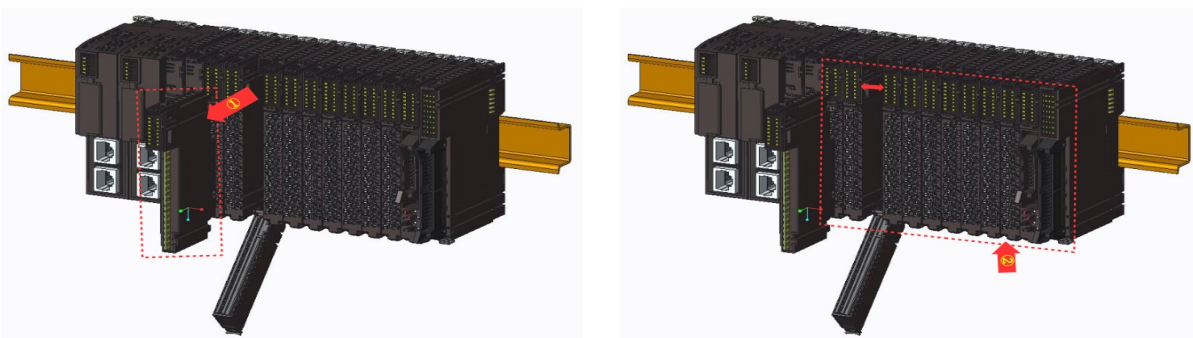
2.4.2. Power Module

If one of the power modules fails(①), the remaining power modules perform normal operation(②). For the hot swap function of the power module, the main and auxiliary power must be set. Refer to Power Module Specifications for related contents.



2.4.3. IO Module

Even if a problem occurs in the IO module(①), the remaining modules except for the problem module can communicate normally(②). If the problematic module is restored, normal communication can be performed again. And each module must be replaced one by one.



2.5. M5112 IO Input Image Data – 14byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Counter Value Ch#0 LL							
1	Counter Value Ch#0 LH							
2	Counter Value Ch#0 HL							
3	Counter Value Ch#0 HH							
4	Counter Value Ch#1 LL							
5	Counter Value Ch#1 LH							
6	Counter Value Ch#1 HL							
7	Counter Value Ch#1 HH							
8	G Value Ch#0 L							
9	G Value Ch#0 H							
10	G Value Ch#1 L							
11	G Value Ch#1 H							
12	-	-	-	-	-	-	Out Status Ch#0	Inp Status Ch#0
13	-	-	-	-	-	-	Out Status Ch#1	Inp Status Ch#1

- Each channel has 7-byte Input Data.
- Counter value represents counter, frequency(Hz), pulse width (0.1usec) or pulse period (0.1usec).
- G Value represents G Signal Counter. G Signal is only available when the function mode is set to Encoder.
- Byte #12, Byte #13 is status byte for Digital Output/Digital Input

2.6. M5112 IO Output Image Data – 2byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	CR 0	CS 0	HP 0	DO 0	Count Mode CH#0			
1	CR 1	CS 1	HP 1	DO 1	Count Mode CH#1			

- CR 0,1 : Counter Reset for Ch#0, Ch#1
- CS 0,1 : Counter Stop (Inhibit Input) for Ch#0, Ch#1
- HP 0,1 : Homing Position Enable/Disable, when this function is enabled, the counter value set to preset value when a pulse is detected on input channel.
- DO 0,1 : General purpose Digital Output
- Count Mode Ch#0,1 : Count Mode for Ch#0, Ch#1 respectively

■ Count Mode Ch#0, Ch#1

Value	Count Mode	Description
B' 0000 (0x0)	Up	Up Counter - Aph Input acts as Up Clock - Bph Input is not used
B' 0001 (0x1)	Down	Down Counter - Aph Input acts as Down Clock - Bph Input is not used
B' 0010 (0x2)	-	-
B' 0011 (0x3)	-	-
B' 0100 (0x4)	Up Clock & Inhibit	Up Counter with Inhibit - Aph Input acts as Up Clock Input - Bph Input acts as Inhibit function for Up Clock Input
B' 0101 (0x5)	Up Clock & Reset	Up Counter with Reset - Aph Input acts as Up Clock Input - Bph Input acts as Reset function to Counter
B' 0110 (0x6)	Down Clock & Inhibit	Down Counter with Inhibit - Aph Input acts as Down Clock Input - Bph Input acts as Inhibit function for Down Clock Input
B' 0111 (0x7)	Down Clock & Reset	Down Counter with Reset - Aph Input acts as Down Clock Input - Bph Input acts as Reset function to Counter
B' 1000 (0x8)	Up Clock & Down Clock	Up & Down Counter - Aph Input acts as Up Clock Input - Bph Input acts as Down Clock Input
B' 1001 (0x9)	Clock & Direction	Up & Down with Direction - Aph Input acts as Clock Input - Bph Input acts as Direction Input (Low = Up Count, High = Down Count)
B' 1010 (0xA)	Encoder 1x	Encoder 1x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1010 (0xB)	Encoder 2x	Encoder 2x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input
B' 1011 (0xC)	Encoder 4x	Encoder 4x - Aph Input acts as Encoder's A phase Input - Bph Input acts as Encoder's B phase Input

B' 1101 (0xD)	Frequency Measurement 1sec Update (*1)	Simple Frequency Measurement, updated by 1sec, Hz Unit - Aph Input acts as Frequency Input - Bph Input is not used
B' 1110 (0xE)	Pulse Width Measurement (*2)	Simple Pulse Width Measurement, 0.1usec Unit - Pulse Width(32bit, if 1234, then Pulse High(On) width is 123.4usec (*3) - Aph Input acts as Pulse Input - Bph Input is not used
B' 1111 (0xF)	Pulse Width & Period Measurement (*3)	Simple Pulse Width & Period Measurement, 0.1usec Unit, - Available in case of Pulse Input $\geq 200\text{Hz}$ ($\leq 2.5\text{msec}$, Pulse On Width) - Pulse Width(16bit, Low Word) + Pulse Period(16bit, High Word) (*4) - Aph Input acts as Pulse Input - Bph Input is not used

- Frequency, B'1101(0xD) can't be used with other channel's Count Mode = 0x0, 0x1, 0x4 ~ 0xA
- Pulse Width, B'1110(0xE) measures Aph Input's High(On) Pulse Width(32bit) in 0.1usec unit.
- Pulse Width & Period, B'1111(0xF) measures Aph's Pulse High(On) Width(16bit) & Period(16bit) in 0.1usec unit.

2.7. M5112 Configuration Parameter Data – 8byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0								Preset Value CH#0 LL
1								Preset Value CH#0 LH
2								Preset Value CH#0 HL
3								Preset Value CH#0 HH
4								Preset Value CH#1 LL
5								Preset Value CH#1 LH
6								Preset Value CH#1 HL
7								Preset Value CH#1 HH

3. FnIO M-Series Caution(Before using the unit)

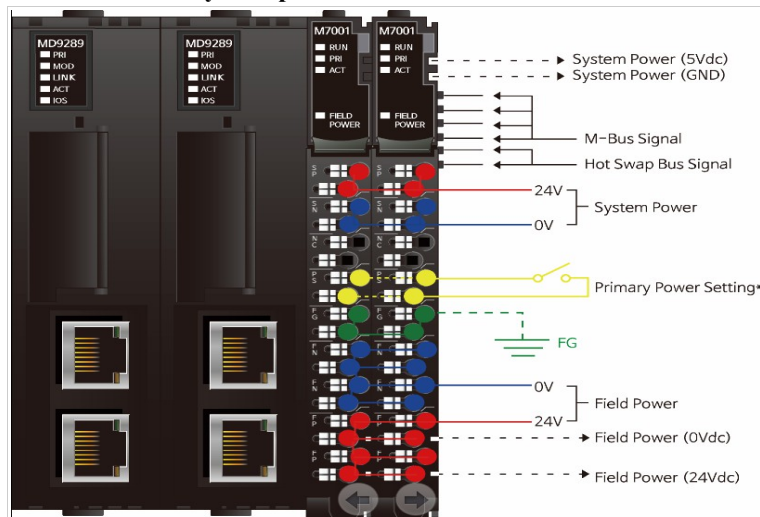
■ We appreciate you for purchasing CREVIS Products. To use the units more effectively, please read this quick guide and refer to the respective user manual for further details.

Cautions for your Safety	
If you don't follow the directions, it could cause a personal injury, damage to the equipment or explosion.	Warning !
Do not assemble the products and wire with power applied to the system. Else it may cause an electric arc, which can result into unexpected and potentially dangerous action by field devices. Arching is explosion risk in hazardous locations. Be sure that the area is non-hazardous or remove system power appropriately before assembling or wiring the modules.	
Do not touch any terminal blocks or IO modules when system is running. Else it may cause the unit to an electric shock or malfunction. Keep away from the strange metallic materials not related tot the unit and wiring works should be controlled by the electric expert engineer. Else it may cause the unit to a fire, electric shock or malfunction.	

If you disobey the instructions, there may be possibility of personal injury, damage to equipment or explosion. Please follow below instructions.	Caution !
Check the rated voltage and terminal array before wiring.	
Do not place Modules near by the inflammable material. Else it may cause a fire.	
Do not permit any vibration approaching it directly.	
Go through module specification carefully, ensure inputs, output connections are made with the specifications. Use standard cables for wiring.	
Use Product under pollution degree 2 environment.	
These devices are open type devices which have to be installed in an enclosure with door or cover which is tool accessible only suitable for use in Class I, Groups A,B,C and D hazardous locations, or non-hazardous location only.	

3.1. How to wire communication & Power

3.1.1. Wiring of communication & System power line for Ethernet.



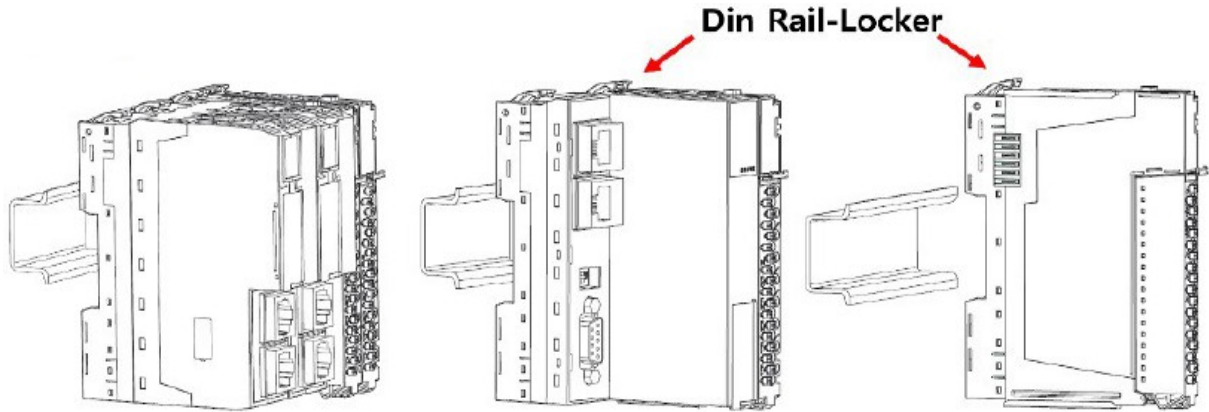
Notice for Wiring of communication and Field power

- The communication power and Field power respectively are supplied to each network adapter.
 - 1) Communication Power : Power for System and MODBUS TCP connection.
 - 2) Field Power : Power for I/O Connection
 - Field power and separated by System power must be used.
 - To avoid a short circuit, tape the un-shield wire.
 - Do not insert any other devices such as converter in to the connector besides products.
- M7001 is used with M9*** (Single Network), MD9*** (Dual type Network) and I/O as power module.

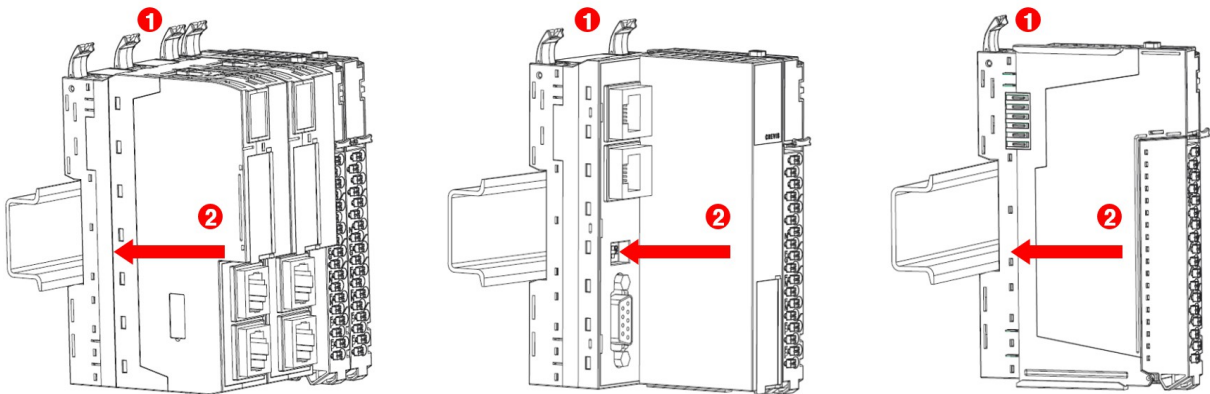
3.2. Module Mounting

3.2.1. How to mount & dismount M-Series Modules on Din-Rail

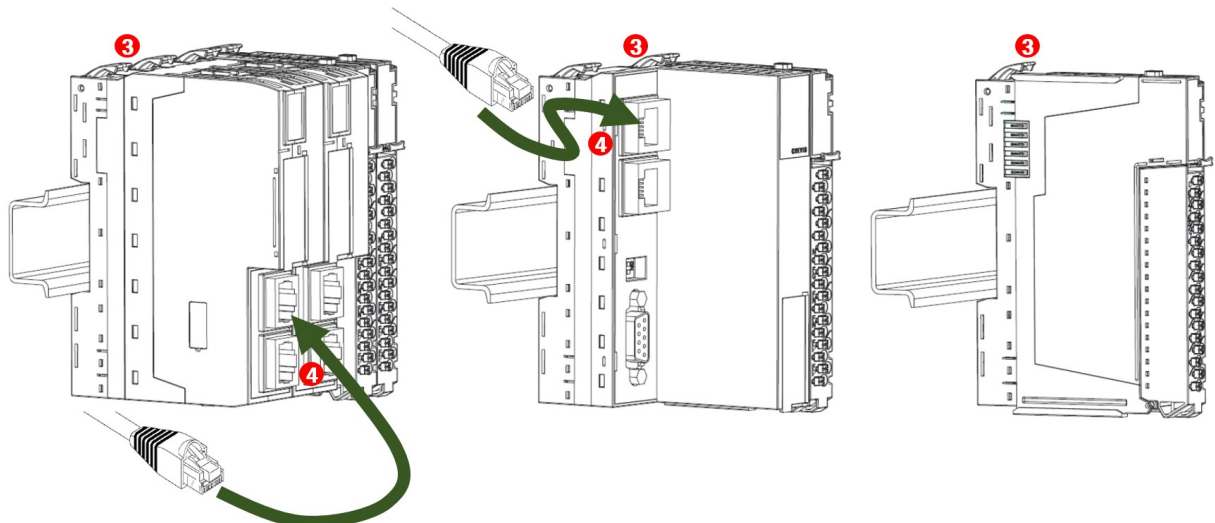
1) Ready



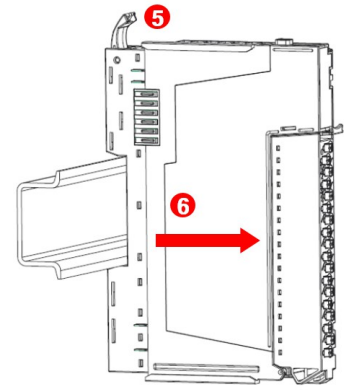
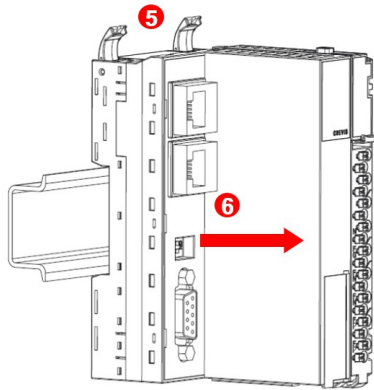
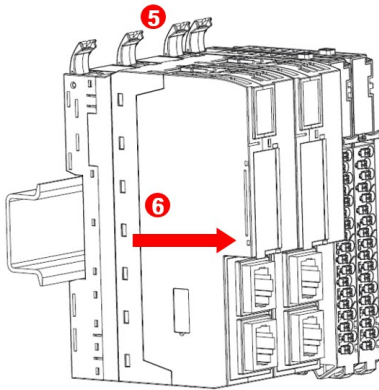
- 2) Unlock the 'Din Rail-Locker' like Number (1).
3) Push the module to the din-rail.



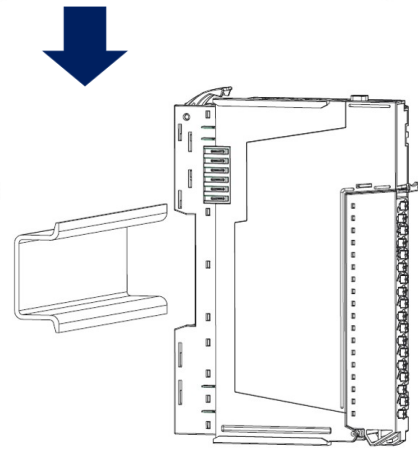
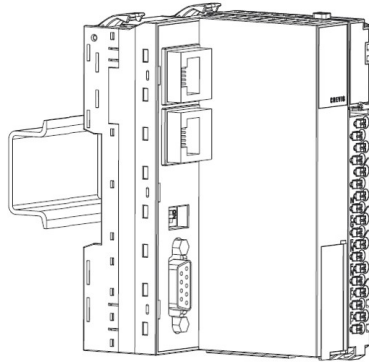
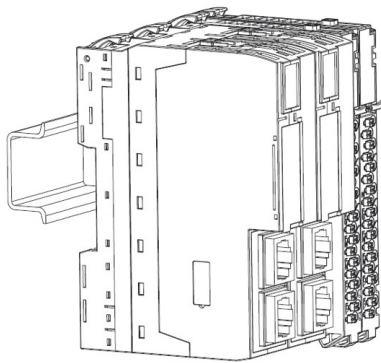
- 4) Lock the 'Din Rail-Locker' like Number (3) to fix the module on the din rail.
5) Connect the communication cable after locking the 'Din Rail-Locker'.



- 6) To remove the module on the din-rail, first unlock the 'Din-Rail Locker' like Number (5).
- 7) Pull the module against the din-rail.



- 8) End



4. Use in Hazardous Environments

ATEX Zone2 Information

1. Certification number : **DEMKO 19 ATEX 2223X**
2. Ambient range (-20°C ≤ Tamb ≤ +60°C)
3. Certification string :



4. Standards covered (EN60079-0 and EN60079-7)
5. The conditions of safe usage :
 - a) The equipment shall be mounted in an enclosure with a minimum ingress protection rating of at least IP54 in accordance with IEC/EN 60079-7 and used in an environment of not more than Pollution Degree 2 (as defined in IEC/EN 60664-1).
 - b) Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 140%.
 - c) The equipment shall be installed in an enclosure with tool removable door or cover.
 - d) Earthing is accomplished through mounting of modules on rail.
 - e) Field wiring conductor temperature rating must be 85°C or higher

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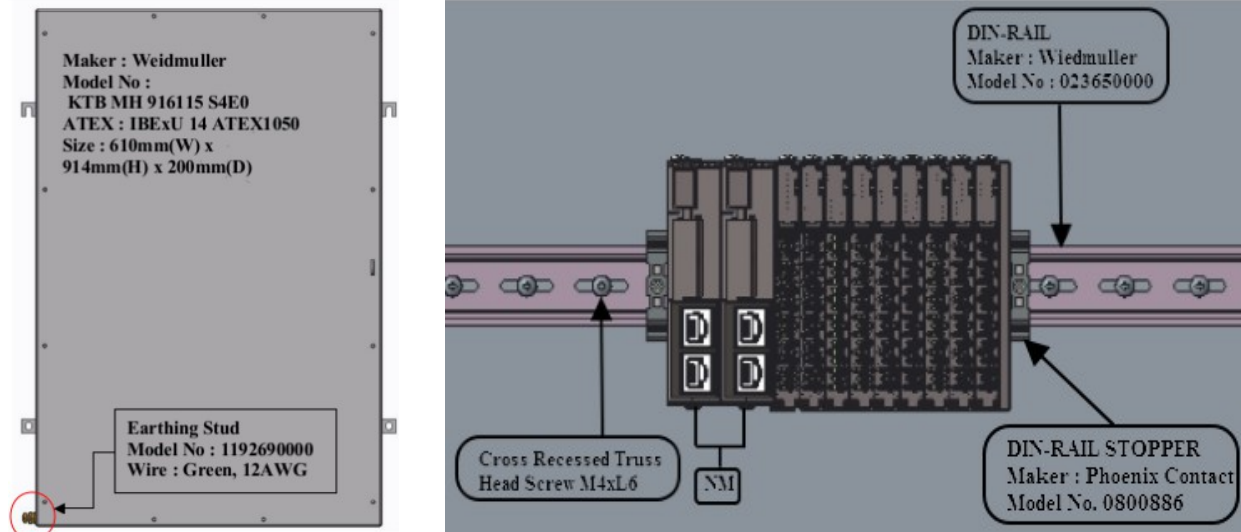
29-4, Gigok-ro, Giheung-gu, Yongin-si,
Gyeonggi-do, Korea 446-930
TEL : +82-31-899-4599 FAX : +82-31-899-4509
Homepage : www.crevis.co.kr



MODBUS TCP/IP
EtherNet IP
MODBUS RTU

*Specifications and designs may be changed without advance Notice.

ATEX Zone22 Information



1. Certification number : DEMKO 20 ATEX 2373
2. Ambient range (-25°C ≤ Tamb ≤ +60°C)
3. Certification string :

Ex II 3 D Ex tc IIIC T80°C Dc
 Ambient temperature range : -25°C to +60°C
 Electrical Ratings : 24Vdc, 300mA / 5Vdc, 2.0A

* Note :

- a) This device can be installed with maximum one network module (MD9 or M9) and six IO modules (M1 to M7). The total output current rating shall not exceed 2A. For suitable use, refer to the electrical rating part in each manual of the modules.
- b) Field wiring conductor temperature rating must be 85°C or higher.
- c) enclosure entry for the field wiring, refer to attached weidmuller's instruction.

Nomenclature :

Programmable controllers FnIO-M Series, model FnIO-M followed by NM, followed by PM, followed by iOM consists of maximum 6 extension modules;

FnIO-M NM – PM – iOM
 I II III

I. NM : MD9 or M9

- A. MD9 – Model MD9***
- B. M9 – Model M9***

II. PM : M7

- A. M7 – Model M7&**

III. iOM : M1, M2, M3, M4, M5 or M7

(Consists of maximum 6 extension modules)

- A. M1 – Model M1#**
- B. M2 – Model M2@**
- C. M3 – Model M3***
- D. M4 – Model M4***
- E. M5 – Model M5***
- F. M7 – Model M7&**

Note :

- “***” may be any alphanumeric code
- “**” may be any alphanumeric code
- “#” may be any numerical number except for 8 and 9
- “@” may be any numerical number except for 7 and 8
- “&” may be any numerical number except for 2

