

FnIO M – Series :

M5112

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

Table of Contents

Table of Contents.....2

History.....2

1.ENVIRONMENT SPECIFICATION.....4

2.M5112 (2 Channels, High Speed Counter / Encoder).....5

 2.1.M5112 Specification.....5

 2.2.M5112 Module Diagram.....7

 2.3.M5112 LED Indicator.....8

 2.3.1.LED Indicator.....8

 2.3.2.Channel Status LED.....8

 2.4.Mapping data from the image table.....9

 2.5.Patameter Data.....11

Specification

History

Rev	Pages	Remarks	Date	Editor
1.00			2018/09/06	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	2020/06/29	Soyeong, Park
1.04	11	Remove Description pages of Hot Swap Function, Use in Hazardous Environments and Caution(Before using the unit)	2021/04/01	SEJIN LIM
1.05	4	Environment Specification Update	2021/11/16	EC KIM
1.06	5,10	Edit Specification/Change Mode Specification	2023/09/01	Soyeong, Park
1.07	7	Edit Signal Description (Field Power)	2024/02/26	Soyeong, Park
1.08	5,11	Add Encoder 1x Data Size Specification	2024/05/21	Soyeong, Park

Specification

1. ENVIRONMENT SPECIFICATION

Environmental specification	
Operating Temperature	-25℃~60℃
UL Temperature	-25℃~60℃
Storage Temperature	-40℃~85℃
Relative Humidity	5% ~ 90% non-condensing
Mounting	DIN rail
General specification	
Shock Operating	IEC 60068-2-27
Vibration Resistance	IEC 60068-2-6, 4g
Industrial Emissions	EN 61000-6-4/A11 : 2011
Industrial Immunity	EN 61000-6-2 : 2019
Installation Position	Vertical and horizontal installation is available.
Product Certifications	UL, ATEX, CE, UKCA

Specification

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

2.1. M5112 Specification

Items	Specifications
Encoder Input Specification	
Number of channel	2 Channel - High Speed Counter, Encoder with G-Signal, Frequency measurement, Pulse width & Period measurement
Indicators	6 Green terminal input
Input voltage	5~24Vdc nominal (Max.28.8Vdc)
Input current	5~12mA @ 5~24Vdc
Min on-state voltage	≥ 4.8Vdc
Input frequency	Counter Mode 0~500KHz
	Encoder Mode 0~350KHz @Encoder 1x 0~750KHz @Encoder 2x, Encoder 4x
Counting mode*	Counter Mode 1-Input Mode : Up,Down, Frequency Measurement, Pulse Width & Period measurement 2-Input Mode : Up/Inhibit, Up/Reset, Down/Inhibit, Down/Reset, UP/Down,Clock/Direction
	Encoder Mode 2-Input Mode : Encoder 1x, Encoder 2x, Encoder 4x
Counter size	Encoder 1x 31Bit-wide/channel
	Others (Mode) 32Bit-wide/channel
Digital Input Specification	
Input per module	2 points sink type
Indicators	2 green input status
Input on-state voltage	24Vdc nominal Min. 15Vdc to Max. 28.8Vdc
On-state current	2.2mA @24Vdc
Off-state voltage	≥ 13Vdc @25°C
Input signal delay	OFF to ON : Max. 0.3ms ON to OFF : Max. 0.3ms
Nominal input impedance	10.2kΩ
Digital Output Specification	
Output per module	2 points source type
Indicators	2 green output status
Output voltage range	24Vdc nominal Min. 15Vdc to Max. 28.8Vdc
On-state voltage drop	Max. 0.5Vdc @ 25°C
Off-state leakage current	Max. 20uA
Output signal delay	OFF to ON : Max. 0.3ms ON to OFF : Max. 0.3ms
Output current rating	Max. 0.3A per 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 **
Field Power	Supply voltage : Class 2, 24Vdc nominal Voltage range : 15~28.8Vdc
	Power Dissipation : 10mA @24Vdc
Single Wire	0.205mm ² - 1.3mm ² (24-16 AWG)
Torque	0.8Nm (7 lb-in)
Weight	72g

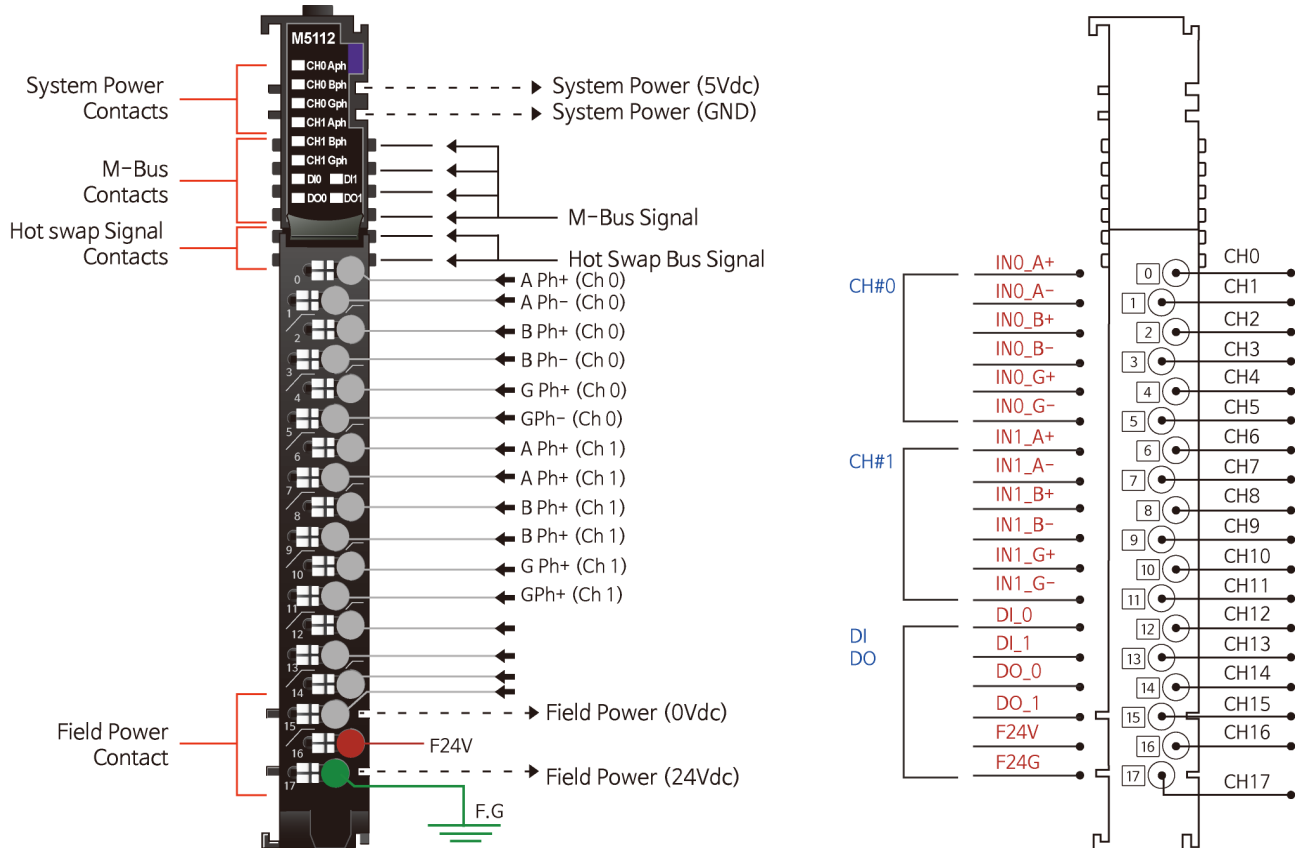
Specification

Module Size	12mm x 110mm x 75mm
Hot Swap	Possible
Environment Condition	Refer to '1. Environment Specification'

* Refer to 2.4. Mapping data from the image table

** 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 24Vdc
17	Field Power 0Vdc (Common)

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.

Specification

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	To indicate
No Signal	Off	No Input / Output Signal
On Signal	Green	Input / Output signal detected

2.4. Mapping data from the image table

● Input Image Value

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Counter Value Ch#0 LL							
Byte1	Counter Value Ch#0 LH							
Byte2	Counter Value Ch#0 HL							
Byte3	Counter Value Ch#0 HH							
Byte4	Counter Value Ch#1 LL							
Byte5	Counter Value Ch#1 LH							
Byte6	Counter Value Ch#1 HL							
Byte7	Counter Value Ch#1 HH							
Byte8	G Value Ch#0 L							
Byte9	G Value Ch#0 H							
Byte10	G Value Ch#1 L							
Byte11	G Value Ch#1 H							
Byte12	-	-	-	-	-	-	Out Status Ch#0	Inp Status Ch#0
Byte13	-	-	-	-	-	-	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

● Output Image Value

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	CR 0	CS 0	HP 0*	DO 0	Count Mode CH#0			
Byte1	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

*When the HP Bit 1 → 0, counter reset is implemented.

If you want to use the HP Function(Homing Position), always keep it at 1.

Specification

■ 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	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 **	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 ***	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 range of the Encoder x1 mode is different from Encoder x2/x4 mode frequency range.

(Encoder 1x : ~350kHz / Encoder 2x/4x : ~750kHz)

** 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.

2.5. Patameter Data

- Valid Parameter length : 8Bytes
- Parameter Data

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Preset Value CH#0 LL*							
Byte1	Preset Value CH#0 LH							
Byte2	Preset Value CH#0 HL							
Byte3	Preset Value CH#0 HH							
Byte4	Preset Value CH#1 LL							
Byte5	Preset Value CH#1 LH							
Byte6	Preset Value CH#1 HL							
Byte7	Preset Value CH#1 HH							

*If the presetvalue exceeds the data size (in Encoder 1x mode), it operates with the value from which the HP function was previously performed.