

FnIO M – Series :

M3708

M3708 (8 Channels, RTD/RESISTANCE INPUT)

Date: 2023.06.22

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History

REV.	PAGES	REMARKS	DATE	Editor
1.00				
1.01		Image, Torque, Hotswap Function	2020/04/21	CW SEO
1.02		Vibration specification, Product certification changed	2020/04/27	CW SEO
1.03	13~17	Added ATEX certificate	2020/05/07	BS HA
1.04	5	Deleted Accuracy PT100, PT1000	2020/07/15	CW SEO
1.05		Remove Description pages of Hot Swap Function, Use in Hazardous Environments and Caution(Before using the unit)	2020/12/08	SJ LIM
1.06	5	Power dissipation changed	2021/04/13	BS HA
1.07	4	Environment Specification Update	2021/11/16	EC KIM
1.08	7	Modify Diagram	2022/04/21	BS HA
1.09	4	Certificate Update	2023/06/05	CW SEO
1.10		Add Software filter, Cu10, Cu100 and PT1000, JPT1000,NI000 expand range, Conversion time changed	2023/07/20	CW SEO

1. ENVIRONMENT SPECIFICATION

Environmental specification	
Operating Temperature	-25 °C ~ 60 °C
UL Temperature	-25 °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	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, ABS, BV, CCS, DNV, KR, LR

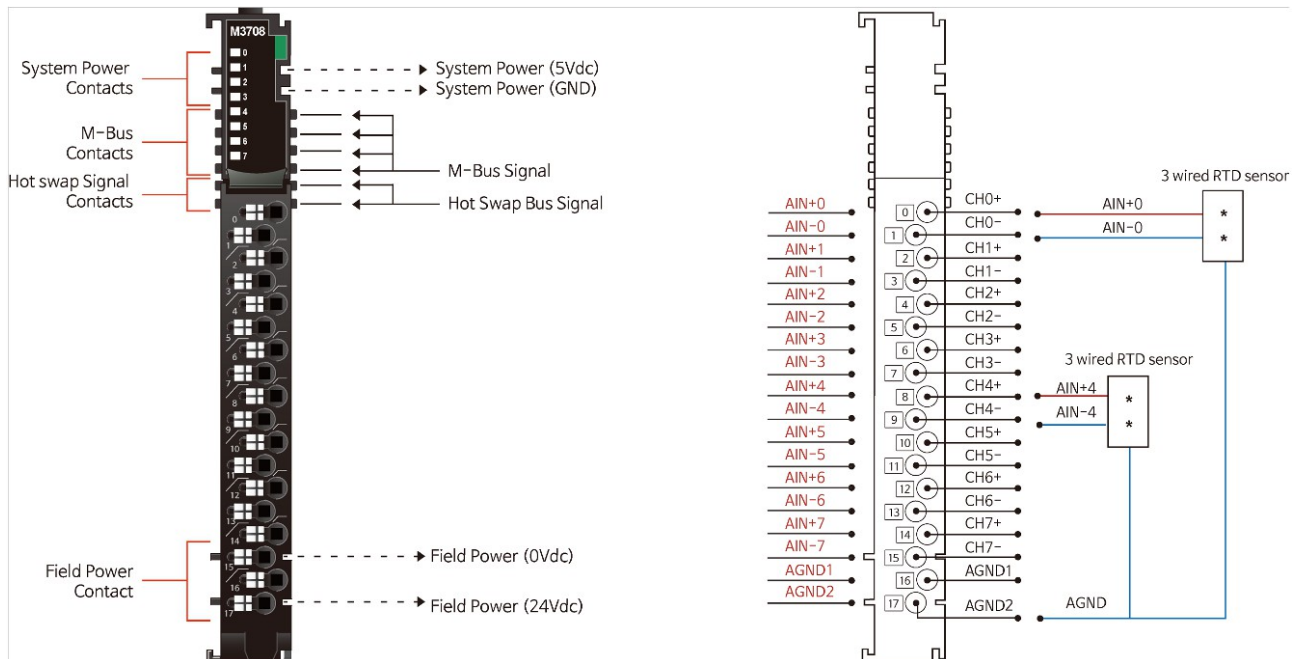
2. M3708 (8 CHANNELS RTD/RESISTANCE INPUT)

2.1. M3708 Specification

Items																											
Input Specification																											
Inputs per module	8 Channels																										
Indicators(Logic side)	8 Green Input status																										
Sensor Types	RTD Input Range <table> <tr> <th>RTD Input</th><th>Input Range</th></tr> <tr> <td>PT1000 ,PT100, PT200, PT500, PT50</td><td>-200~850°C</td></tr> <tr> <td>JPT1000, JPT100, JPT200, JPT500, JPT50</td><td>-200~640°C</td></tr> <tr> <td>NI100, NI200, NI500,NI1000</td><td>-60~250°C</td></tr> <tr> <td>NI120</td><td>-80~260°C</td></tr> <tr> <td>Cu10,Cu100</td><td>-100~260°C</td></tr> <tr> <td>NI1000LG</td><td>-50~120°C</td></tr> <tr> <th>Resistance Input</th><th>Input Range</th></tr> <tr> <td>1Ω/bit</td><td>0~4000Ω</td></tr> <tr> <td>100mΩ/bit</td><td>0~2000Ω</td></tr> <tr> <td>10mΩ/bit</td><td>0~327Ω</td></tr> <tr> <td>20mΩ/bit</td><td>0~620Ω</td></tr> <tr> <td>50mΩ/bit</td><td>0~1200Ω</td></tr> </table>	RTD Input	Input Range	PT1000 ,PT100, PT200, PT500, PT50	-200~850°C	JPT1000, JPT100, JPT200, JPT500, JPT50	-200~640°C	NI100, NI200, NI500,NI1000	-60~250°C	NI120	-80~260°C	Cu10,Cu100	-100~260°C	NI1000LG	-50~120°C	Resistance Input	Input Range	1Ω/bit	0~4000Ω	100mΩ/bit	0~2000Ω	10mΩ/bit	0~327Ω	20mΩ/bit	0~620Ω	50mΩ/bit	0~1200Ω
RTD Input	Input Range																										
PT1000 ,PT100, PT200, PT500, PT50	-200~850°C																										
JPT1000, JPT100, JPT200, JPT500, JPT50	-200~640°C																										
NI100, NI200, NI500,NI1000	-60~250°C																										
NI120	-80~260°C																										
Cu10,Cu100	-100~260°C																										
NI1000LG	-50~120°C																										
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1Ω/bit	0~4000Ω																										
100mΩ/bit	0~2000Ω																										
10mΩ/bit	0~327Ω																										
20mΩ/bit	0~620Ω																										
50mΩ/bit	0~1200Ω																										
Excitation Current	About 0.5mA																										
Connection Method	3-Wire																										
Conversion Time	< 110ms, All Channel																										
Data Format	16bits signed Integer (2' complement)																										
Module Accuracy	PT1000 : ±0.3°C at 50~150°C @ 25°C ambient PT1000 : ±0.5°C at 50~150°C @ -25,60°C ambient PT1000 : ±0.5°C at -200~250°C @ 25°C ambient PT1000 : ±1°C at 250~850°C @ 25°C ambient Cu10 : ±2% Full Scale @ 25°C ambient Cu10 : ±4% Full Scale @ -25,60°C ambient Cu100 : ±0.3% Full Scale @ 25°C ambient Cu100 : ±0.5% Full Scale @ -25,60°C ambient All type Input Range ±0.1% Full Scale @ 25°C ambient ±0.3% Full Scale @ -25°C~60°C																										

Resolution of Data	RTD Type : $\pm 0.1^{\circ}\text{C}$ / F , Resistance Type : 1Ω , $100\text{m}\Omega$, $10\text{m}\Omega$, $20\text{m}\Omega$, $50\text{m}\Omega$
Calibration	Not Required
Diagnostic	Sensor open or range over, then conversion data = $0\text{x}8000(-32768)$
General specification	
Power dissipation	Max. 130mA @ 5.0Vdc
Isolation	I/O to Logic : Isolation Field power : Not Connected
Field Power	Not used, Field power bypass to next expansion module
Single Wiring	0.205mm^2 - 1.3mm^2 (24-16 AWG)
Torque	0.8Nm (7 lb-in)
Weight	72g
Module Size	$12\text{mm} \times 110\text{mm} \times 75\text{mm}$
Environment Condition	Refer to '1. Environment Specification'

2.2. M3708 Wiring Diagram



Pin No.	Signal Description
0	RTD Channel 0+
1	RTD Channel 0-
2	RTD Channel 1+
3	RTD Channel 1-
4	RTD Channel 2+
5	RTD Channel 2-
6	RTD Channel 3+
7	RTD Channel 3-
8	RTD Channel 4+
9	RTD Channel 4-
10	RTD Channel 5+
11	RTD Channel 5-
12	RTD Channel 6+
13	RTD Channel 6-
14	RTD Channel 7+
15	RTD Channel 7-
16	AGND1
17	AGND2

Series No	Through Air	Over Surface	CTI
RTB18C	1.5mm	1.5mm	$175 \leq CTI \leq 400$

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. M3708 LED Indicator

2.3.1. LED Indicator



LED No.	LED Function / Description	LED Color
0	INPUT Channel 0	Green
1	INPUT Channel 1	Green
2	INPUT Channel 2	Green
3	INPUT Channel 3	Green
4	INPUT Channel 4	Green
5	INPUT Channel 5	Green
6	INPUT Channel 6	Green
7	INPUT Channel 7	Green

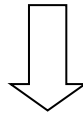
2.3.2. Channel Status LED

Status	LED	To indicate
Not Signal, Normal Operation	Off	Input Sensor Open or Input Range Over Normal Operation
On Signal Normal Operation	Green	Sensor Connected and Input Range Valid Normal Operation

2.4. Mapping data into the image table

● Input Module Data

	Analog Input Ch0
	Analog Input Ch1
	Analog Input Ch2
	Analog Input Ch3
	Analog Input Ch4
	Analog Input Ch5
	Analog Input Ch6
	Analog Input Ch7



● Input Image Value

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	Analog Input Ch0 Low byte							
Byte 1	Analog Input Ch0 High byte							
Byte 2	Analog Input Ch1 Low byte							
Byte 3	Analog Input Ch1 High byte							
Byte 4	Analog Input Ch2 Low byte							
Byte 5	Analog Input Ch2 High byte							
Byte 6	Analog Input Ch3 Low byte							
Byte 7	Analog Input Ch3 High byte							
Byte 8	Analog Input Ch4 Low byte							
Byte 9	Analog Input Ch4 High byte							
Byte 10	Analog Input Ch5 Low byte							
Byte 11	Analog Input Ch5 High byte							
Byte 12	Analog Input Ch6 Low byte							
Byte 13	Analog Input Ch6 High byte							
Byte 14	Analog Input Ch7 Low byte							
Byte 15	Analog Input Ch7 High byte							

- If the input of channel is open or over-ranged, its conversion data will be 0x8000(-32678)

2.5. Configuration Parameter – 18 byte

Byte	Decimal Bit	Description	Default Value
0	00-07	The selection Sensor Type =00h:PT100, 0.00385, -200~850°C, 0.1°C/count =01h:PT200, 0.00385, -200~850°C, 0.1°C/count =02h:PT500, 0.00385, -200~850°C, 0.1°C/count =03h:PT1000, 0.00385, -200~850°C, 0.1°C/count =04h:PT50, 0.00385, -200~850°C, 0.1°C/count =10h:JPT100, 0.003916, -200~640°C, 0.1°C/count =11h:JPT200, 0.003916, -200~640°C, 0.1°C/count =12h:JPT500, 0.003916, -200~640°C, 0.1°C/count =13h:JPT1000, 0.003916, -200~640°C, 0.1°C/count =14h:JPT50, 0.003916, -200~640°C, 0.1°C/count =20h:NI100, 0.00618, -60~250°C, 0.1°C/count =21h:NI200, 0.00618, -60~250°C, 0.1°C/count =22h:NI500, 0.00618, -60~250°C, 0.1°C/count =23h:NI1000, 0.00618, -60~250°C, 0.1°C/count =30h:NI120, 0.00672, -80~250°C, 0.1°C/count =40h:Cu10, 0.00427, -100~260°C, 0.1°C/count =41h:Cu100, 0.00427, -100~260°C, 0.1°C/count =53h:NI1000LG, 0.00500, -50~120°C, 0.1°C/count =80h:Resistance Input, 1~2000Ω, 100mΩ /1count =81h:Resistance Input, 1~327Ω, 10mΩ /1count =82h:Resistance Input, 1~620Ω, 20mΩ /1count =83h: Resistance Input, 1~1200Ω, 50mΩ/1count =84h:Resistance Input, 1~4000Ω, 1Ω /1count =Others: Reserved	0: PT100
1	00	Temperature Type 0: Celsius(°C), 1: Fahrenheit(°F)	0: Celsius(°C)
	01	Reserved	0
	02-03	Data Resolution 00: 0.1°C, °F/bit, 01: 1°C, °F/bit 10: *0.01°C, °F/bit 11: Reserved	0
	03	Reserved	0
	04	Filter Type 0: Normal Filter, 1: Enhanced Filter	0: Normal Filter
	05-06	SW Filter 0: Normal Filter(Filter Time = 20) 1: **Fast Filter(Filter Time = 3) 2: Enhanced Filter(Filter Time = 40) 3: More Enhanced Filter(Filter Time = 80)	0
	07	Reserved	0
2~3		CH0 Offset value	0
4~5		CH1 Offset value	0
6~7		CH2 Offset value	0
8~9		CH3 Offset value	0
10~11		CH4 Offset value	0
12~13		CH5 Offset value	0
14~15		CH6 Offset value	0
16~17		CH7 Offset value	0

* Data exceeding 32767 cannot be displayed.

** If you set a fast filter, the specification accuracy may not be met.

2.6. Data Value

Resistance Temperature Detector Input Range	
Type	Input Range
PT100	-200 ~ 850 °C
PT200	-200 ~ 850 °C
PT500	-200 ~ 850 °C
PT1000	-200 ~ 850 °C
PT50	-200 ~ 850 °C
JPT100	-200 ~ 640 °C
JPT200	-200 ~ 640 °C
JPT500	-200 ~ 640 °C
JPT1000	-200 ~ 640 °C
JPT50	-200 ~ 640 °C
NI100	-60 ~ 250 °C
NI200	-60 ~ 250 °C
NI500	-60 ~ 250 °C
NI1000	-60 ~ 250 °C
NI120	-80 ~ 260 °C
Cu10	-100 ~ 260 °C
Cu100	-100 ~ 260 °C
NI1000LG	-50 ~ 120 °C
Resistance Input Range	
Type	Input Range
1Ω/bit	0~4000Ω
100mΩ/bit	0~2000Ω
10mΩ/bit	0~327Ω
20mΩ/bit	0~620Ω
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