

User Manual – Analog Input Module

EH-RIO2 Series

**RIO2-AX4I, -AX8I, -AX4V, -AX8V, -AX4H, -RTD2, -RTD4,
RTD8, -TC2, -TC4**

Version 1.09



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1. Important Notes

Solid state equipment has operational characteristics differing from those of electromechanical equipment.

Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls describes some important differences between solid state equipment and hard-wired electromechanical devices.

Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Hitachi be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Hitachi cannot assume responsibility or liability for actual use based on the examples and diagrams.

Warning!

- ✓ **If you don't follow the directions, it could cause a personal injury, damage to the equipment or explosion**
- 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 to 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.

Caution!

- ✓ **If you disobey the instructions, there may be possibility of personal injury, damage to equipment or explosion. Please follow below Instructions.**
- Check the rated voltage and terminal array before wiring. Avoid the circumstances over 55°C of temperature. Avoid placing it directly in the sunlight.
- Avoid the place under circumstances over 85% of humidity.
- 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.

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1.1. Safety Instruction

1.1.1. Symbols

DANGER 	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death property damage, or economic loss
IMPORTANT	Identifies information that is critical for successful application and understanding of the product
ATTENTION 	Identifies information about practices or circumstances that can lead to personal Injury, property damage, or economic loss. Attentions help you to identity a hazard, avoid a hazard, and recognize the consequences

1.1.2. Safety Notes

DANGER 	The modules are equipped with electronic components that may be destroyed by electrostatic discharge. When handling the modules, ensure that the environment (persons, workplace and packing) is well grounded. Avoid touching conductive components, e.g. FnBUS Pin.
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1.1.3. Certification

CE Certificate

EN 61000-6-2; Industrial Immunity

EN 61000-6-4; Industrial Emissions

RoHS (EU, CHINA)

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2. ANALOG INPUT MODULE LIST

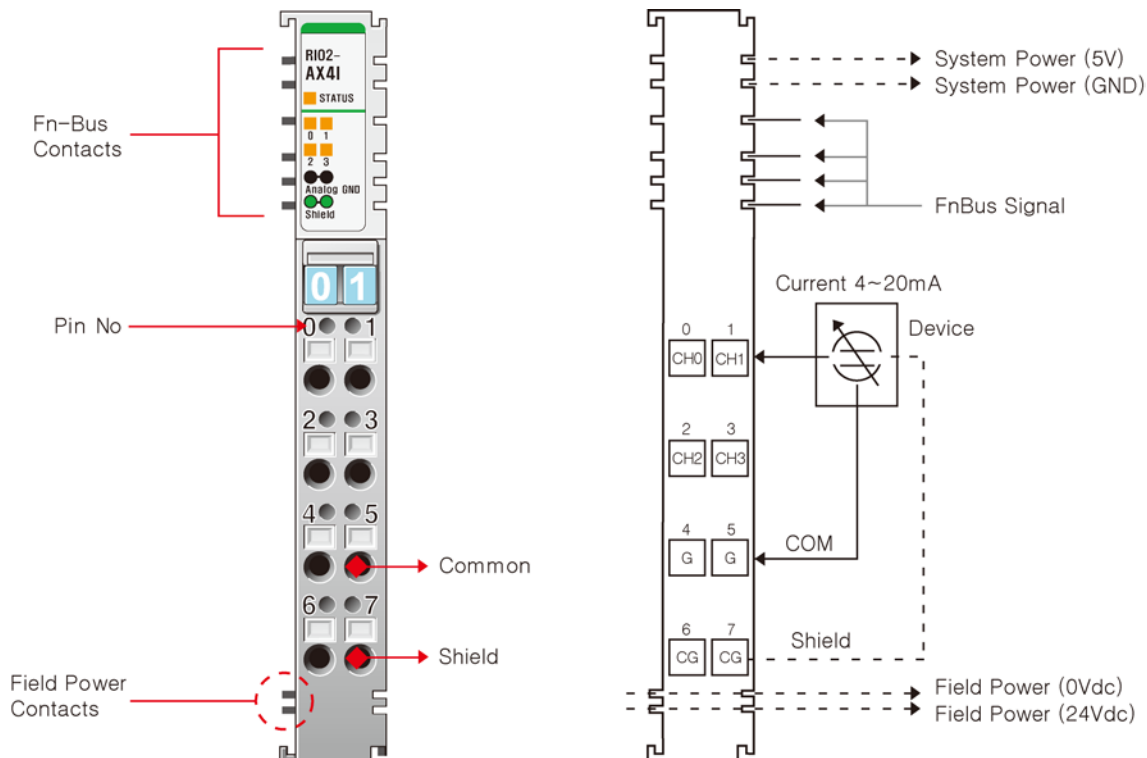
Number	Description	Production Status
RIO2-AX4I	4 Channels, Current, 4~20mA, 12bit	Active
RIO2-AX8I	8 Channels, Current, 4~20mA, 12bit	Active
RIO2-AX4V	4 Channels, Voltage, 0~10Vdc, 12bit	Active
RIO2-AX8V	8 Channels, Voltage, 0~10Vdc, 12bit	Active
RIO2-AX4H	4 Channels, Voltage, -10Vdc~10Vdc, 12bit	Active
RIO2-RTD2	2 Channels, RTD, Status	Active
RIO2-RTD4	4 Channels, RTD, Status	Active
RIO2-RTD8	8 Channels, RTD, Status	Active
RIO2-TC2	2 Channels, TC	Active
RIO2-TC4	4 Channels, TC	Active

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3. Specification

3.1. The Interface and data

3.1.1. RIO2-AX4I

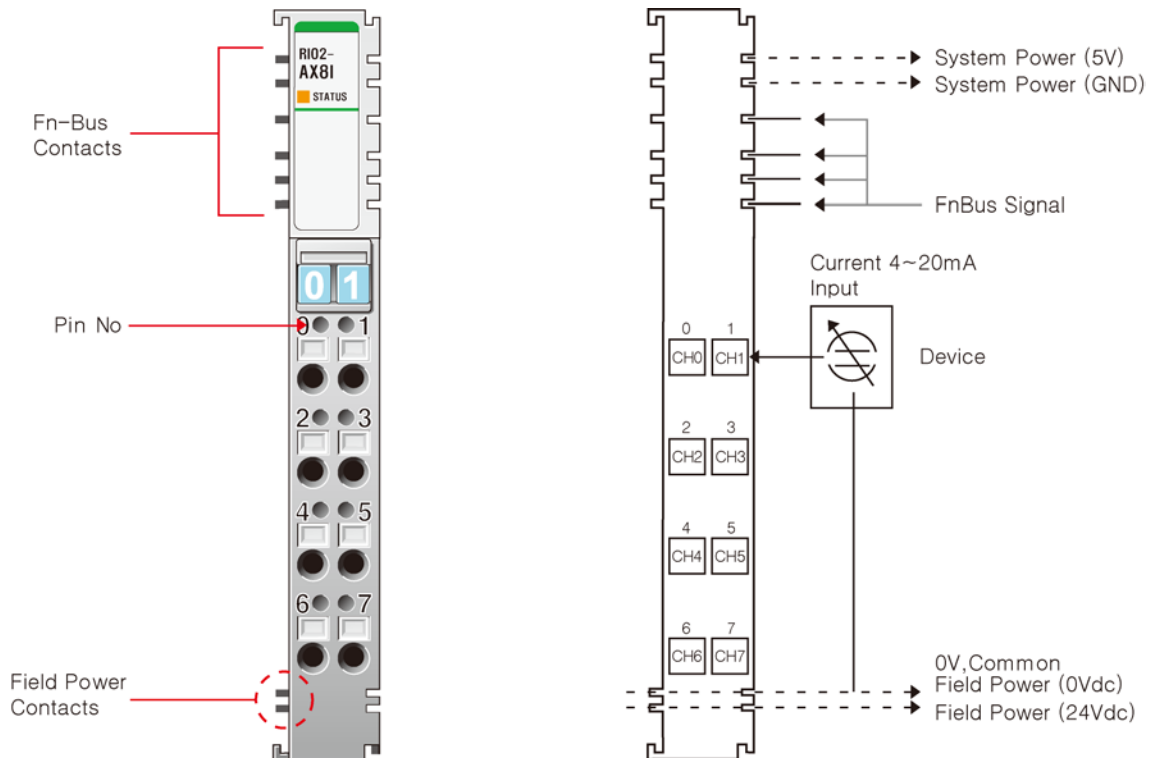


Pin No.	Description	Pin No.	Description
0	Input Channel 0	1	Input Channel 1
2	Input Channel 2	3	Input Channel 3
4	Input Channel Common (0V)	5	Input Channel Common (0V)
6	Chassis Ground / Shield	7	Chassis Ground / Shield

Current	3.0mA	4.0mA	5.0mA	10.0mA	20.0mA
Data(Hex)	H 8000	H 0000	H 00FF	H 05FF	H 0FFF

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3.1.2. RIO2-AX8I

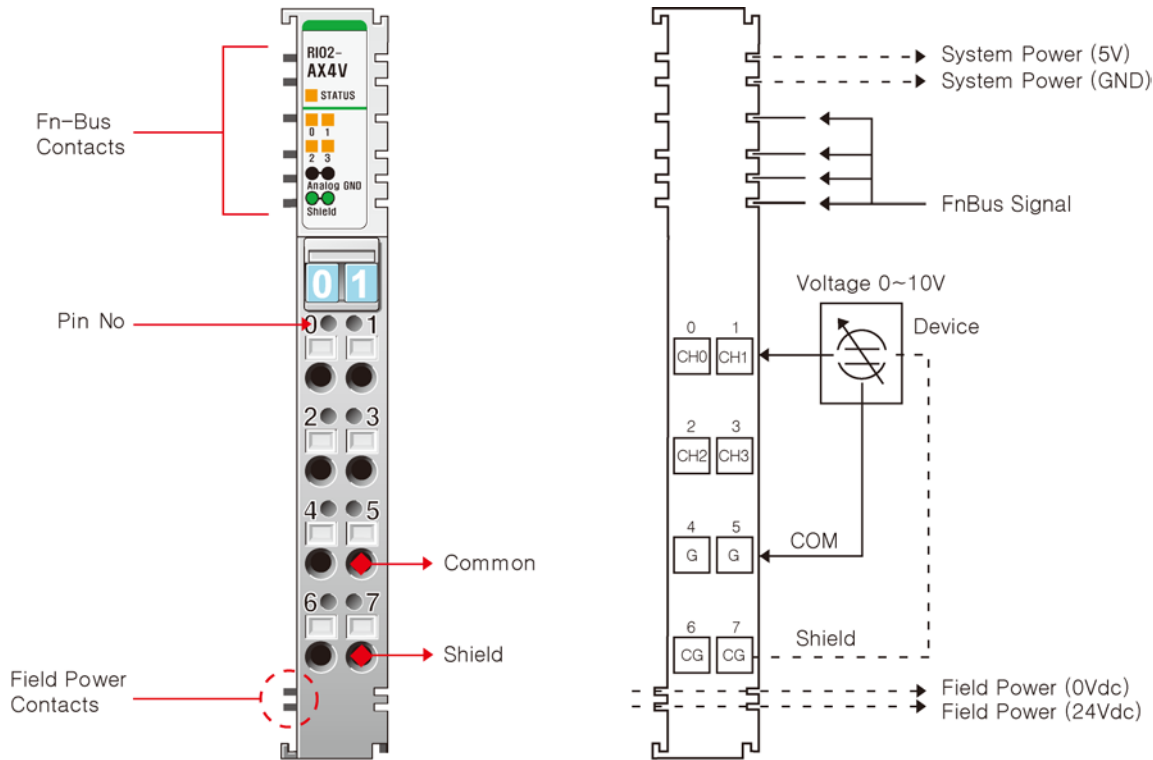


Pin No.	Description	Pin No.	Description
0	Input Channel 0	1	Input Channel 1
2	Input Channel 2	3	Input Channel 3
4	Input Channel 4	5	Input Channel 5
6	Input Channel 6	7	Input Channel 7

Current	3.0mA	4.0mA	12.0mA	20.0mA
Data(Hex)	H 8000	H 0000	H 07FF	H 0FFF

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3.1.3. RIO2-AX4V

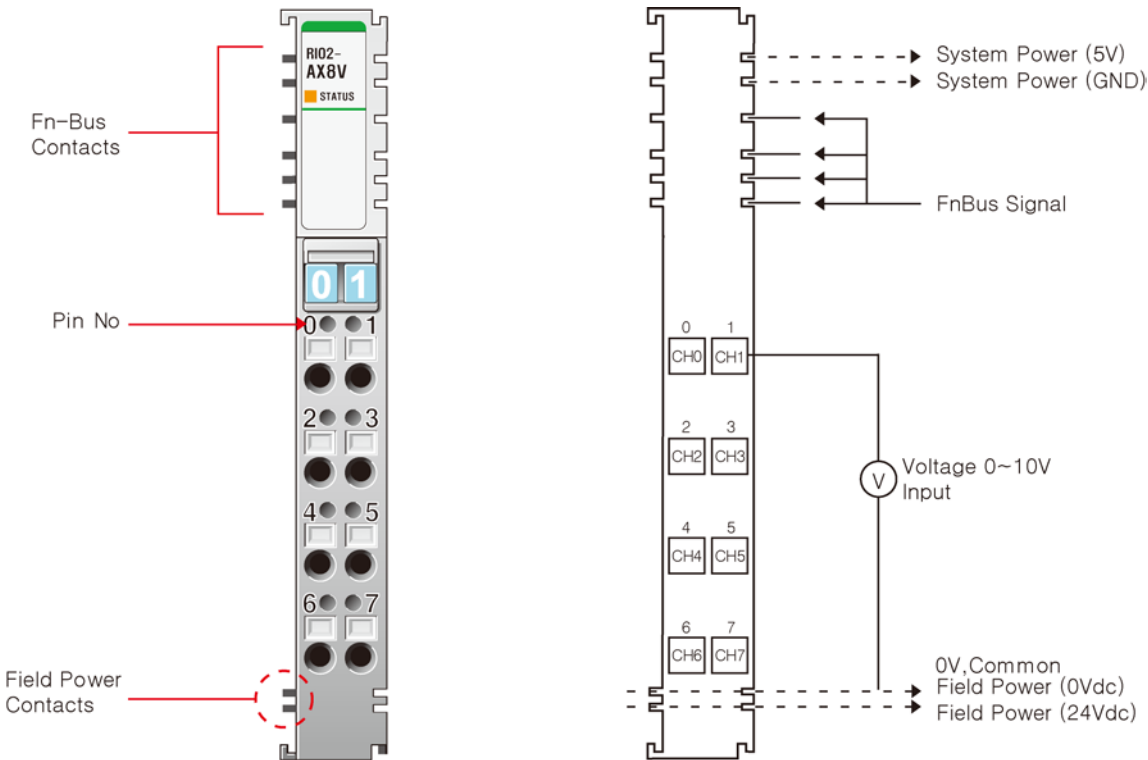


Pin No.	Description	Pin No.	Description
0	Input Channel 0	1	Input Channel 1
2	Input Channel 2	3	Input Channel 3
4	Input Channel Common (0V)	5	Input Channel Common (0V)
6	Chassis Ground / Shield	7	Chassis Ground / Shield

Voltage	0V	2.5V	5V	10V
Data(Hex)	H 0000	H 03FF	H 07FF	H 0FFF

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3.1.4. RIO2-AX8V

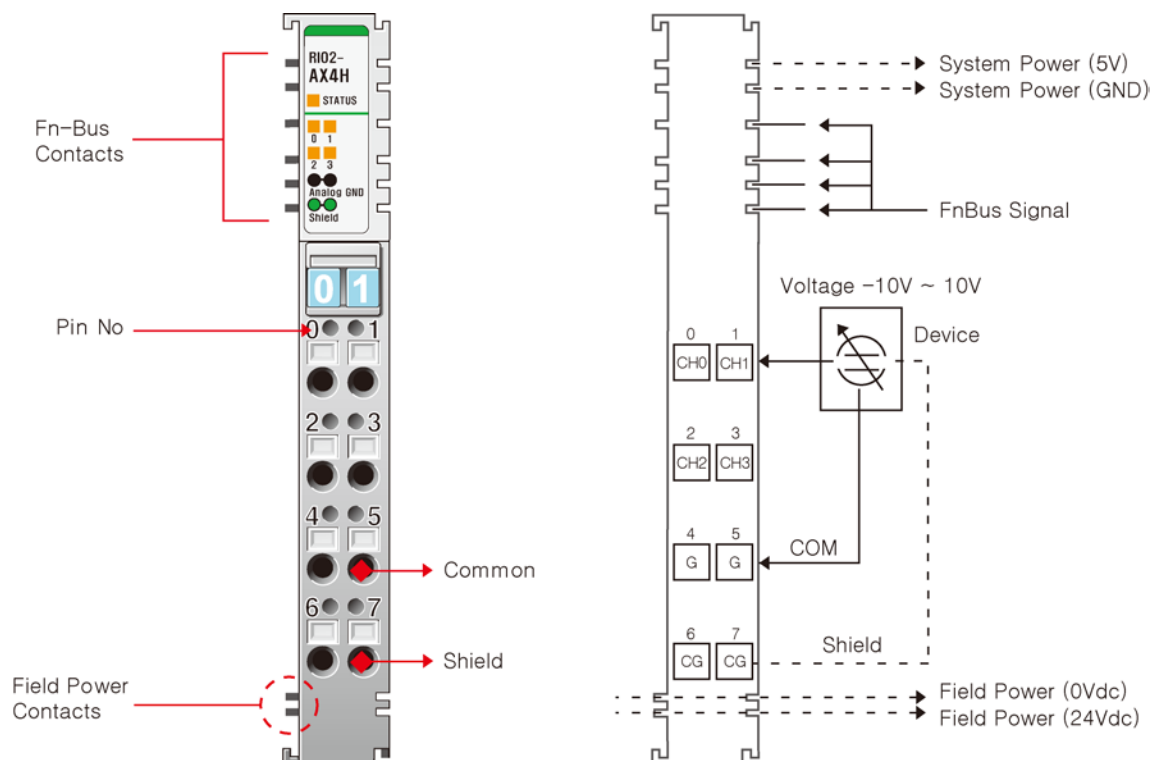


Pin No.	Description	Pin No.	Description
0	Input Channel 0	1	Input Channel 1
2	Input Channel 2	3	Input Channel 3
4	Input Channel 4	5	Input Channel 5
6	Input Channel 6	7	Input Channel 7

Voltage	0V	2.5V	5V	10V
Data(Hex)	H 0000	H 03FF	H 07FF	H 0FFF

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3.1.5. RIO2-AX4H

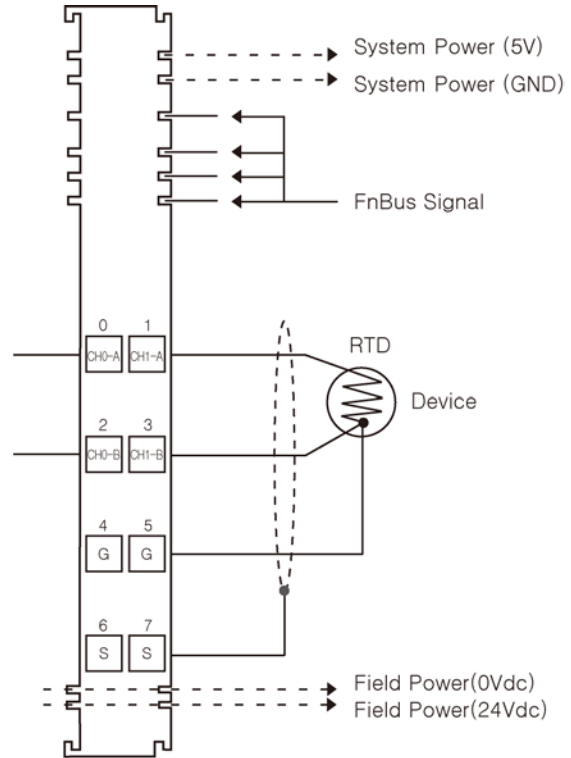
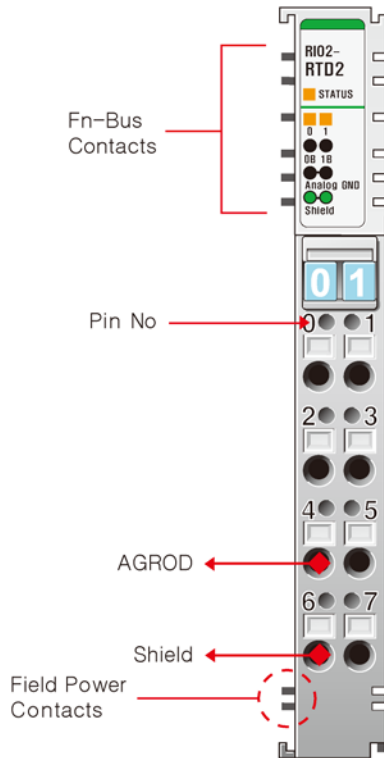


Pin No.	Description	Pin No.	Description
0	Input Channel 0	1	Input Channel 1
2	Input Channel 2	3	Input Channel 3
4	Input Channel Common (0V)	5	Input Channel Common (0V)
6	Chassis Ground / Shield	7	Chassis Ground / Shield

Voltage	-10V	-5V	0V	5V	10V
Data(Hex)	H F800	H FC00	H 0000	H 03FF	H 07FF

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3.1.6. RIO2-RTD2



Pin No.	Description	Pin No.	Description
0	Input Channel 0_A	1	Input Channel 1_A
2	Input Channel 0_B	3	Input Channel 1_B
4	Analog Ground	5	Analog Ground
6	Shield	7	Shield

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Resistance 100mΩ	0Ω	500Ω	1000Ω	1500Ω	2000Ω
Data(Hex)	H 0000	H 1388	H 2710	H 3A98	H 4E20

Sensor PT100	-200°C	-100°C	0°C	200°C	400°C	600°C	850°C
Data(Hex)	H F830	H FC18	H 0000	H 07D0	H 0FA0	H 1770	H 2134

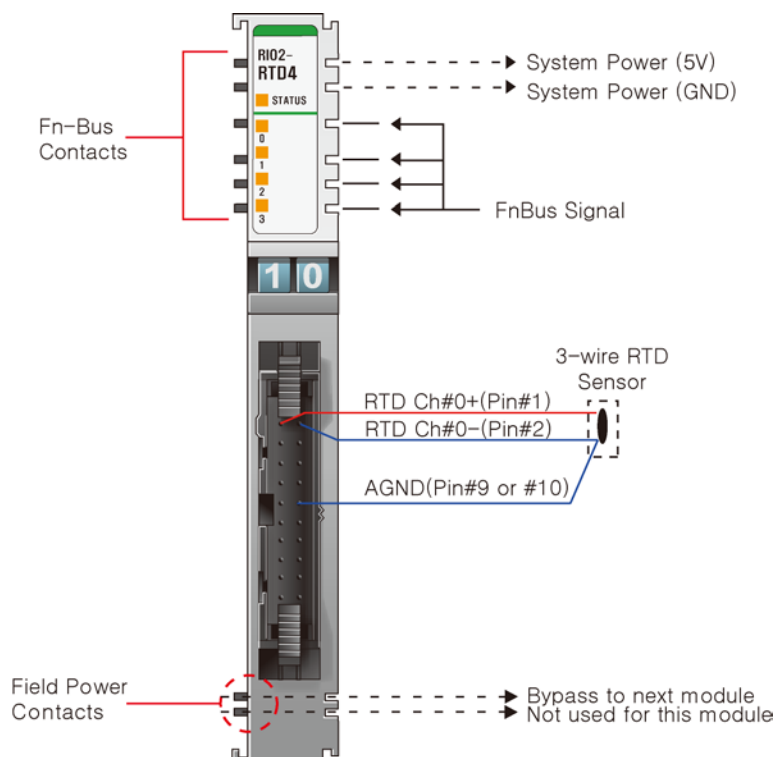
Sensor JPT100	-200°C	-100°C	0°C	200°C	400°C	640°C
Data(Hex)	H F830	H FC18	H 0000	H 07D0	H 0FA0	H 1900

Sensor Type Data

Sensor Type	Degree	Counts	Resolution
Resistance 100mΩ	1~2000Ω	10~20000	100mΩ / 1count
Resistance 10mΩ	1~327Ω	10~3270	10mΩ / 1count
Resistance 20mΩ	1~620Ω	10~6200	20mΩ / 1count
PT50, 0.00385	200~850°C	-2000~8500	0.1°C or 0.1°F / count
PT100, 0.00385	-200~850°C	-2000~8500	0.1°C or 0.1°F / count
PT200, 0.00385	-200~850°C	-2000~8500	0.1°C or 0.1°F / count
PT500, 0.00385	-200~850°C	-2000~8500	0.1°C or 0.1°F / count
PT1000, 0.00385	-200~350°C	-2000~3500	0.1°C or 0.1°F / count
JPT100, 0.003916	-200~640°C	-2000~6400	0.1°C or 0.1°F / count
JPT200, 0.003916	-200~640°C	-2000~6400	0.1°C or 0.1°F / count
JPT500, 0.003916	-200~640°C	-2000~6400	0.1°C or 0.1°F / count
JPT1000, 0.003916	-200~350°C	-2000~3500	0.1°C or 0.1°F / count
NI100, 0.00618	-60~250°C	-600~2500	0.1°C or 0.1°F / count
NI120, 0.00672	-80~250°C	-800~2500	0.1°C or 0.1°F / count
NI200, 0.00618	-60~250°C	-600~2500	0.1°C or 0.1°F / count
NI500, 0.00618	-60~250°C	-600~2500	0.1°C or 0.1°F / count
NI1000, 0.00618	-60~180°C	-600~1800	0.1°C or 0.1°F / count
CU10, 0.00427	-200~260°C	-2000~2600	0.1°C or 0.1°F / count

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3.1.7. RIO2-RTD4



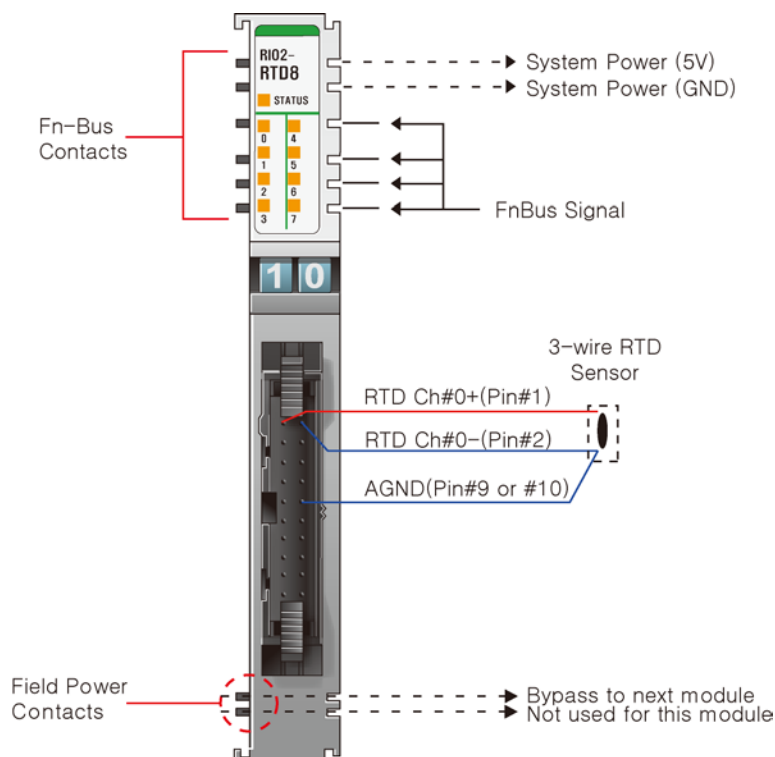
Pin No.	Description	Pin No.	Description
1	RTD Ch#0+	2	RTD Ch#0-
3	RTD Ch#1+	4	RTD Ch#1-
5	RTD Ch#2+	6	RTD Ch#2-
7	RTD Ch#3+	8	RTD Ch#3-
9	AGND	10	AGND
11	-	12	-
13	-	14	-
15	-	16	-
17	-	18	-
19	AGND	20	AGND

PT100

Sensor PT100	-200°C	-100°C	0°C	200°C	400°C	600°C	850°C
Data(Hex)	H F830	H FC18	H 0000	H 07D0	H 0FA0	H 1770	H 2134

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3.1.8. RIO2-RTD8



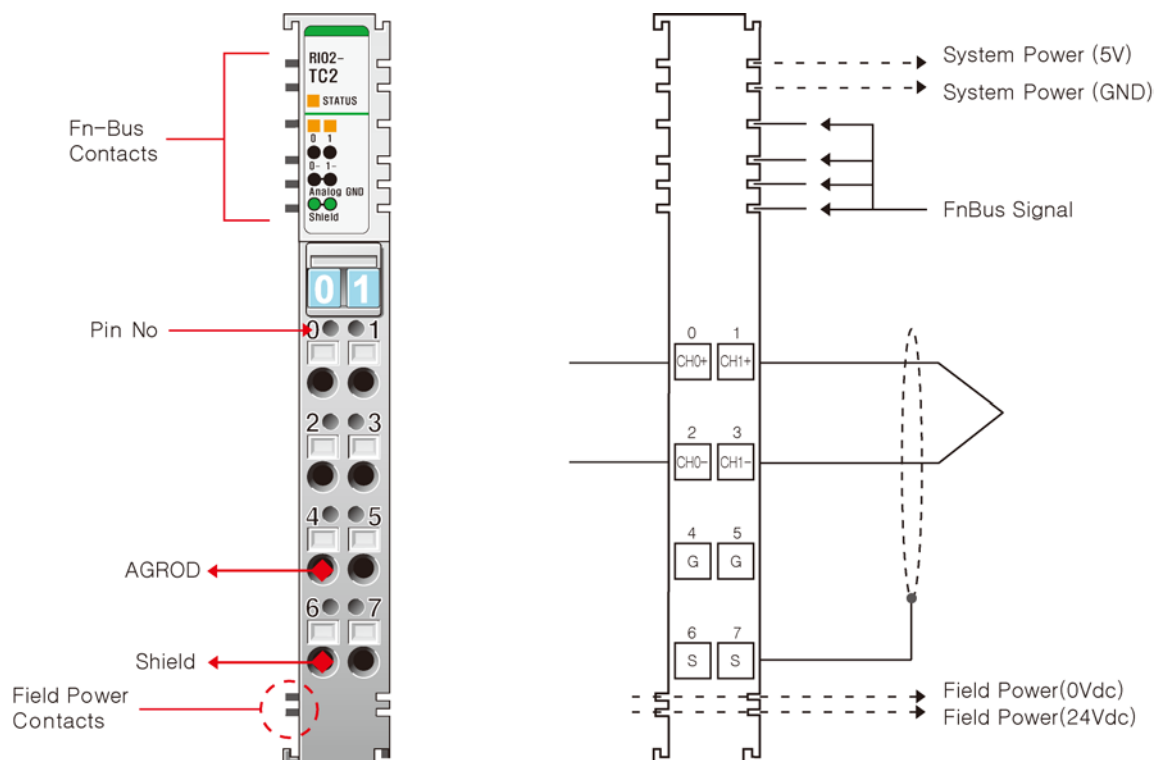
Pin No.	Description	Pin No.	Description
1	RTD Ch#0+	2	RTD Ch#0-
3	RTD Ch#1+	4	RTD Ch#1-
5	RTD Ch#2+	6	RTD Ch#2-
7	RTD Ch#3+	8	RTD Ch#3-
9	AGND	10	AGND
11	RTD Ch#4+	2	RTD Ch#4-
13	RTD Ch#5+	4	RTD Ch#5-
15	RTD Ch#6+	6	RTD Ch#6-
17	RTD Ch#7+	8	RTD Ch#7-
19	AGND	20	AGND

PT100

Sensor PT100	-200°C	-100°C	0°C	200°C	400°C	600°C	850°C
Data(Hex)	H F830	H FC18	H 0000	H 07D0	H 0FA0	H 1770	H 2134

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3.1.9. RIO2-TC2



Pin No.	Description	Pin No.	Description
0	Input Channel 0+	1	Input Channel 1+
2	Input Channel 0-	3	Input Channel 1-
4	Analog Ground	5	Analog Ground
6	Shield	7	Shield

Type B

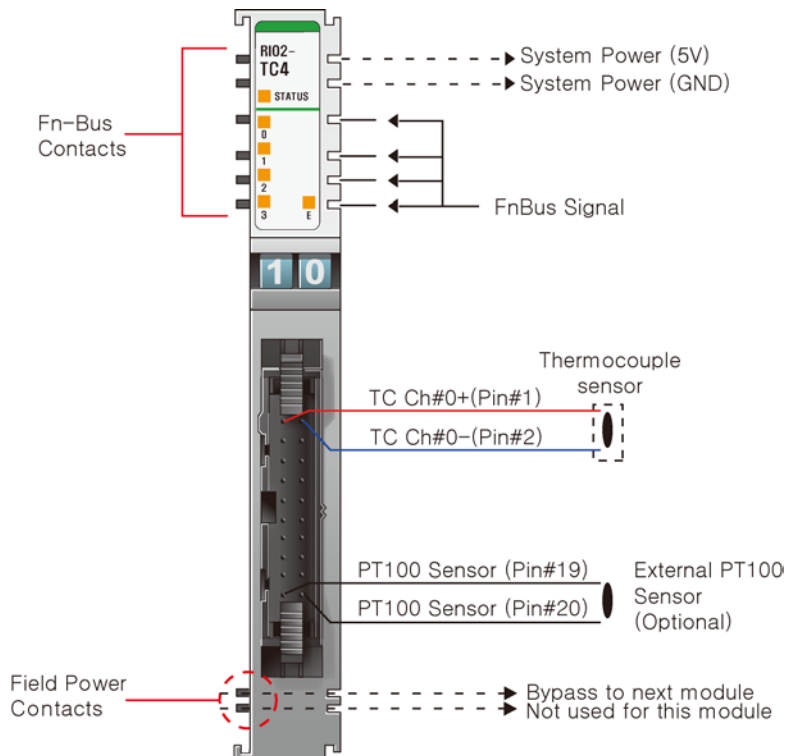
temperature°C	0°C	300°C	900°C	1800°C
Data(Hex)	H 0000	H 0BB8	H 2328	H 4650

Thermocouple Input Range		
Type	Maximum Input Range	Recommended Input Range
Type K	-270 ~ 1372 °C	-100 ~ 1200 °C
Type J	-210 ~ 1200 °C	-100 ~ 1100 °C
Type T	-270 ~ 400 °C	-200 ~ 350 °C
Type B	30 ~ 1820 °C	500 ~ 1700 °C
Type R	-50 ~ 1768 °C	0 ~ 1600 °C
Type S	-50 ~ 1768 °C	0 ~ 1600 °C
Type E	-270 ~ 1000 °C	-200 ~ 800 °C
Type N	-270 ~ 1300 °C	-200 ~ 1250 °C
Type L	-200 ~ 900 °C	-100 ~ 850 °C
Type U	-200 ~ 600 °C	-100 ~ 550 °C
Type C	0 ~ 2310 °C	100 ~ 2100 °C
Type D	0 ~ 2490 °C	100 ~ 2200 °C

- °F = 1.8°C+32

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3.1.10. RIO2-TC4



Pin No.	Description	Pin No.	Description
1	TC Ch#0+	2	TC Ch#0-
3	TC Ch#1+	4	TC Ch#1-
5	TC Ch#2+	6	TC Ch#2-
7	TC Ch#3+	8	TC Ch#3-
9	AGND	10	AGND
11	-	2	-
13	-	4	-
15	-	6	-
17	-	8	-
19	External PT100	20	External PT100

Type B

temperature°C	0°C	300°C	900°C	1800°C
Data(Hex)	H 0000	H 0BB8	H 2328	H 4650

LED : External PT100 Sensor status for Cold Junction Compensation (E)

Status	LED is	To indicate
Normal Operation	Off	External PT100 Sensor Not Found
Normal Operation	Green	External PT100 Sensor Found

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3.2. Environment Specification

Environmental Specifications

Operating Temperature	-20 to 55°C (Discrete I/O) 0 to 55°C (Analog I/O)
Non-Operating Temperature	-40°C to 85°C
Relative Humidity	5%~90% non-condensing
Operating Altitude	2000m
Mounting	DIN rail

General Specifications

Shock Operating	10g
Shock Non-Operating	30g
Vibration/Shock resistance	Displacement : 0.012Inch p-p from 10~57Hz Acceleration : 2G's from 57~500Hz Sweep Rate : 1 octave Per Minute Axes to test : x, y, z Frequency Sweeps Per Axis : 10
EMC resistance burst/ESD	Confirms to EN-61000-6-2
EMI	Confirms to EN-61000-6-4
Installation Pos. /Protect. Class	Variable / IP20
Product Certification	CE
Network Conformance	RIO2-PBA : PTO Conformance Test Completion
Isolation	DC Module (Included Analog Module) : Terminal Block to F.G 500Vac/1min AC Module : Terminal Block to F.G 1500Vac/1min Relay Module : Terminal Block to F.G 2500Vac/1min

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3.3. Specification

3.3.1. RIO2-AX4I

Items	Specification
Input Specification	
Number of Inputs	4 Channels Single Ended, Non-isolated Between Channels
Indicators	4 Green/Red States, 1 Green/Red FnBus State
Resolution in Ranges	12Bits : 3.9uA/Bit
Input current Range	4 ~ 20mA
Data Format	16bits Integer (2's compliment)
Module Error	±0.1% Full Scale @25°C ±0.3% Full Scale @0°C, 60°C
Input Impedance	120Ω
Conversion Time	4msec / All channel
Calibration	Not Required
Diagnostic	Channel Open (if < 3mA, Data=0x8000)
Common Type	4 Channels / 2COM (Single Common)
General Specification	
Power Supply	From System Power DC/DC
Power Dissipation	Max. 165mA @ 5.0Vdc
Isolation	I/O to Logic : Photocoupler isolation Field power : Not Connected
Wiring	I/O Cable Max. 2.0 mm ²
Weight	70g
Module Size	12mm x 99mm x 70mm
Environment Condition	Refer to " Environment Specification"(page : 15)

3.3.2. RIO2-AX8I

Items	Specification
Input Specification	
Number of Inputs	8 Channels Single Ended
Indicators	1 Green/Red FnBus State
Resolution in Ranges	12Bits : 3.9uA/Bit
Input current Range	4 ~ 20mA
Data Format	16bits Integer (2's compliment)
Module Error	±0.1% Full Scale @25°C ±0.3% Full Scale @0°C, 60°C
Input Impedance	120Ω
Conversion Time	4msec / All channel
Calibration	Not Required
Diagnostic	No
Common Type	Nothing in the module terminal Field Power 0V is Common(AGND)
General Specification	
Power Dissipation	Max. 80mA @ 5.0Vdc
Isolation	I/O to Logic : Photocoupler isolation I/O to Logic : Non-Isolation
Field Power	Supply Voltage : 24Vdc nominal Voltage Range : 18~28.8Vdc Power Dissipation: Max. 40mA@24Vdc
Wiring	I/O Cable Max. 2.0 mm ²
Weight	70g
Module Size	12mm x 99mm x 70mm
Environment Condition	Refer to " Environment Specification"(page : 15)

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3.3.3. RIO2-AX4V

Items	Specification
Input Specification	
Number of Inputs	4 Channels Single Ended, Non-isolated Between Channels
Indicators	4 Green/Red States, 1 Green/Red FnBus State
Resolution in Ranges	12Bits : 2.44mV/Bit
Input current Range	0~10Vdc
Data Format	16bits Integer (2's compliment)
Module Error	±0.1% Full Scale @25°C ±0.3% Full Scale @0°C, 60°C
Input Impedance	500KΩ
Conversion Time	4msec / All channel
Calibration	Not Required
Diagnostic	No
Common Type	4 Channels / 2COM (Single Common)
General Specification	
Power Supply	From System Power DC/DC
Power Dissipation	Max. 165mA @ 5.0Vdc
Isolation	I/O to Logic : Photocoupler isolation Field power : Not Connected
Wiring	I/O Cable Max. 2.0 mm ²
Weight	70g
Module Size	12mm x 99mm x 70mm
Environment Condition	Refer to " Environment Specification"(page : 15)

3.3.4. RIO2-AX8V

Items	Specification
Input Specification	
Number of Inputs	8 Channels Single Ended
Indicators	1 Green/Red FnBus State
Resolution in Ranges	12Bits : 2.44mV/Bit
Input current Range	0~10Vdc
Data Format	16bits Integer (2's compliment)
Module Error	±0.1% Full Scale @25°C ±0.3% Full Scale @0°C, 60°C
Input Impedance	500KΩ
Conversion Time	4msec / All channel
Calibration	Not Required
Diagnostic	No
Common Type	Nothing in the module terminal Field Power 0V is Common(AGND)
General Specification	
Power Dissipation	Max. 80mA @ 5.0Vdc
Isolation	I/O to Logic : Photocoupler isolation Field power : Non-Isolation
Field Power	Supply Voltage : 24Vdc nominal Voltage Range : 18~28.8Vdc Power Dissipation: Max. 40mA@24Vdc
Wiring	I/O Cable Max. 2.0 mm ²
Weight	70g
Module Size	12mm x 99mm x 70mm
Environment Condition	Refer to " Environment Specification"(page : 15)

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3.3.5. RIO2-AX4H

Items	Specification
Input Specification	
Number of Inputs	4 Channels Single Ended, Non-isolated Between Channels
Indicators	4 Green/Red States, 1 Green/Red FnBus State
Resolution in Ranges	12Bits : 4.8mV/Bit
Input current Range	-10~10Vdc
Data Format	16bits Integer (2's compliment)
Module Error	±0.1% Full Scale @25°C ±0.3% Full Scale @0°C, 60°C
Input Impedance	500KΩ
Conversion Time	4msec / All channel
Calibration	Not Required
Diagnostic	No
Common Type	4 Channels / 2COM (Single Common)
General Specification	
Power Supply	From System Power DC/DC
Power Dissipation	Max. 170mA @ 5.0Vdc
Isolation	I/O to Logic : Photocoupler isolation Field power : Not Connected
Wiring	I/O Cable Max. 2.0 mm ²
Weight	70g
Module Size	12mm x 99mm x 70mm
Environment Condition	Refer to " Environment Specification"(page : 15)

3.3.6. RIO2-RTD2

Items	Specification
Input Specification	
Number of Inputs	2 Channels Single Ended, Non-isolated Between Channels
Indicators	2 Green/Red States, 1 Green/Red FnBus State
Sensor Types	PT50, PT100, PT200, PT500, PT1000, JPT100, JPT200, JPT500, JPT1000, NI100, NI200, NI500, NI1000, NI120, CU10, Resistance 100mΩ/Bit, Resistance 10mΩ/Bit, Resistance 20mΩ/Bit
Conversion Time	200msec / All Channel
Data Format	16bits Integer (2's compliment)
Dissolution ability	0.1°C / 10mΩ
Module Error	±0.1% Full Scale @25°C ±0.3% Full Scale @0°C, 60°C
Calibration	Not Required
Diagnostic	Channel Open (if it is not Connected, Data=0x8000)
Common Type	2 Channels / 2COM (Single Common)
General Specification	
Power Supply	From System Power DC/DC
Power Dissipation	Max. 70mA @ 5.0Vdc
Isolation	I/O to Logic : Photocoupler isolation Field power : Not Connected
Wiring	I/O Cable Max. 2.0 mm ²
Weight	70g
Module Size	12mm x 99mm x 70mm
Environment Condition	Refer to " Environment Specification"(page : 15)

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3.3.7. RIO2-RTD4

Items	Specification
Input Specification	
Number of Inputs	4 Channels
Indicators	1 Green/Red Status, 4 Green States
Sensor Types	RTD Input - PT 100, PT200, PT500, PT1000, PT50 - JPT100, JPT200, JPT500, JPT1000, JPT50 - NI100, NI200, NI500, NI000 - NI120, NI1000LG Resistance Input - 100mΩ/bit, 10mΩ/bit, 20mΩ/bit, 50mΩ/bit
Excitation Current	About 1mA
Conversion Method	3-Wire or 2-Wire
Conversion Time	30msec/1Channel when Normal Conversion
Data Format	16bits signed Integer(2's compliment)
Resolution of Data	±0.1°C/ F, 10mΩ
Module Accuracy	±0.1% Full Scale @25°C ±0.3% Full Scale @0°C, 60°C
Calibration	Not Required
Diagnostic	Sensor Open or Range Over, then Conversion Data=0x8000(-32768) Except Resistance Input Mode
Common Type	4 Common/Module
General Specification	
Power Dissipation	Max. 100mA @5.0Vdc
Isolation	I/O to Control Logic : Photocoupler Isolation
Field power	Not used, Field Power by pass to next expansion module
Wiring	Connector Type, up to AWG22 Module Connector : HIF3BA-20D-2.54DSA
Weight	70g
Module Size	12mm x 99mm x 70mm
Environment Condition	Refer to " Environment Specification"(page : 15)

User Manual – Analog Input Module

3.3.8. RIO2-RTD8

Items	Specification
Input Specification	
Number of Inputs	8 Channels
Indicators	1 Green/Red LED, Module Status, 8Green LED, Input State
Sensor Types	RTD Input - PT 100, PT200, PT500, PT1000, PT50 - JPT100, JPT200, JPT500, JPT1000, JPT50 - NI100, NI200, NI500, NI000 - NI120, NI1000LG Resistance Input - 100mΩ/bit, 10mΩ/bit, 20mΩ/bit, 50mΩ/bit
Excitation Current	About 1mA
Conversion Method	3-Wire or 2-Wire
Conversion Time	30msec/1Channel when Normal Conversion
Data Format	16bits signed Integer(2's compliment)
Resolution of Data	±0.1°C/ F, 10mΩ
Module Accuracy	±0.1% Full Scale @25°C ±0.3% Full Scale @0°C, 60°C
Calibration	Not Required
Diagnostic	Sensor Open or Range Over, then Conversion Data=0x8000(-32768) Except Resistance Input Mode
Common Type	4 Common/Module
General Specification	
Power Dissipation	Max. 110mA @5.0Vdc
Isolation	I/O to Control Logic : Photocoupler Isolation
Field power	Not used, Field Power by pass to next expansion module
Wiring	Connector Type, up to AWG22 Module Connector : HIF3BA-20D-2.54DSA
Weight	70g
Module Size	12mm x 99mm x 70mm
Environment Condition	Refer to " Environment Specification"(page : 15)

User Manual – Analog Input Module

3.3.9. RIO2-TC2

Items	Specification
Input Specification	
Number of Inputs	2 Channels Single Ended, Non-isolated Between Channels
Indicators	2 Green/Red States, 1 Green/Red FnBus State
Sensor Types	Type K/J/T/B/R/S/E/N/L/U/C/D mV Input 10uV/Bit, 1uV/Bit, 2uV/Bit
Conversion Time	200msec / All Channel
Data Format	16bits Integer (2's compliment)
Dissolution ability	0.1°C / 10mΩ
Module Error	±0.1% Full Scale @25°C ±0.3% Full Scale @0°C, 60°C
Calibration	Not Required
Diagnostic	Channel Open (if it is not Connected, Data=0x8000)
Common Type	2 Channels / 2COM (Single Common)
General Specification	
Power Supply	From System Power DC/DC
Power Dissipation	Max. 70mA @ 5.0Vdc
Isolation	I/O to Logic : Photocoupler isolation Field power : Not Connected
Connection	2 or 3-Wire
Wiring	I/O Cable Max. 2.0 mm ²
Weight	70g
Module Size	12mm x 99mm x 70mm
Environment Condition	Refer to " Environment Specification"(page : 15)

User Manual – Analog Input Module

3.3.10. RIO2-TC4

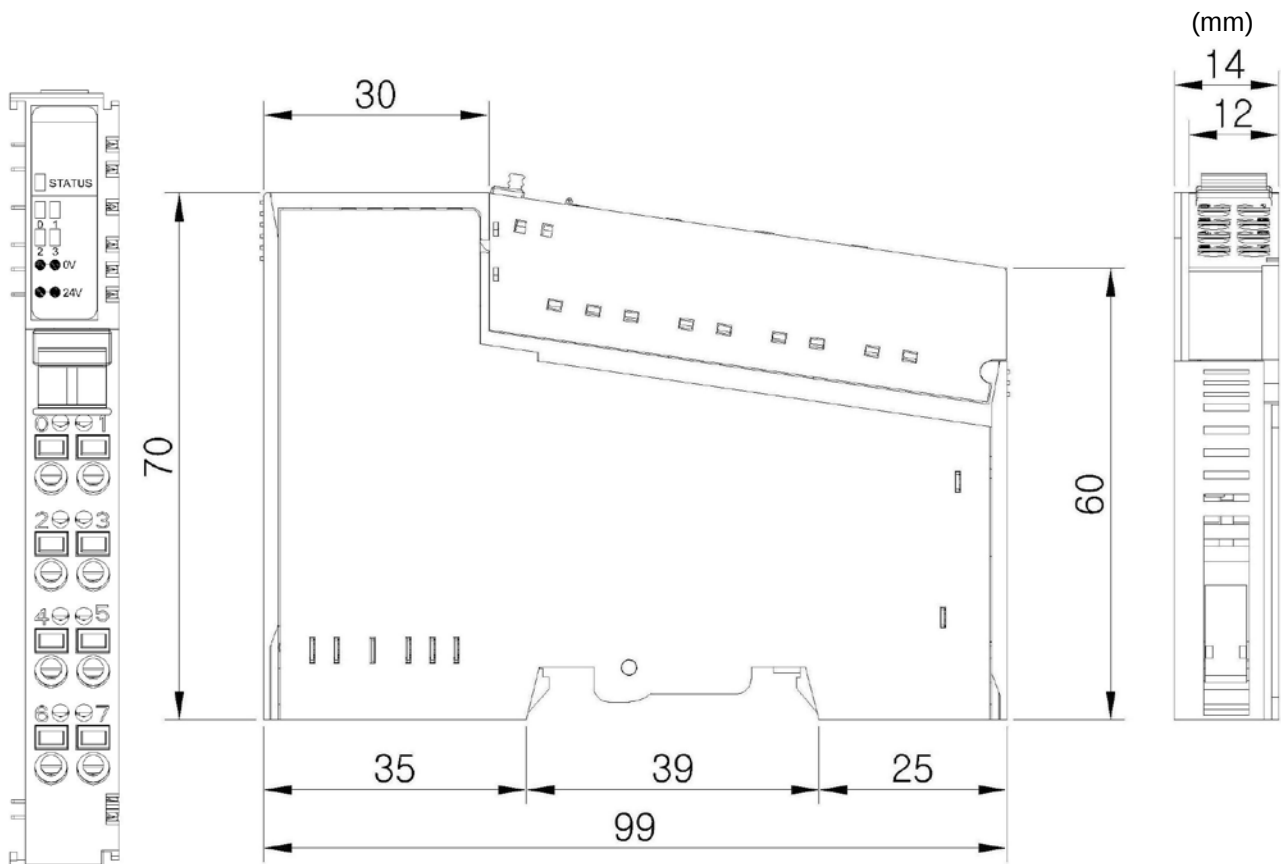
Items	Specification
Input Specification	
Number of Inputs	4 Channels
Indicators	1 Green/Red LED, Module Status 4 Green LED, Input State 1 Green LED, E, Cold Junction
Sensor Types	Thermocouple Input - Type K/J/T/B/R/S/E/N/L/U/C/D mV Input -10uV/bit, 1uV/bit, 2uV/bit
Cold Junction Temperature	-20~70°C
Cold Junction Compensation Method	External "PT100 Sensor (recommended) or Internal Temperature Sensor *Auto Detection if External PT100 (high priority) is Connected
Conversion Time	30msec/1Channel when Normal Conversion
Data Format	16bits Integer (2's compliment)
Resolution of Data	±0.1°C/ F, 10mΩ
Module Accuracy	±0.1% Full Scale @25°C (K/J/mV) ±0.3% Full Scale @0°C, 60°C(K/J/mV) ±0.5% Full Scale @25°C (The others) ±1.0% Full Scale @0°C, 60°C(The others)
Calibration	Not Required
Diagnostic	Sensor Open or Range Over, then Conversion Data=0x8000(-32768)
Common Type	1 Common / 1 Input
General Specification	
System Power Dissipation	Max. 120mA @ 5.0Vdc
Isolation	I/O to Control Logic : Photocoupler Isolation
Field Power	Not used, Field Power by pass to next expansion module
Wiring	Connector Type, up to AWG22 Module Connector : HIF3BA-20D-2.54DSA
Weight	70g
Module Size	12mm x 99mm x 70mm
Environment Condition	Refer to " Environment Specification"(page : 15)

- For more Accuracy, strongly recommend to use Extern PT100 Sensor for Cold Junction Compensation.
- If External PT100 Sensor is found, RIO2-TC4/3808 uses PT100 Temperature as Cold Junction Compensation.

User Manual – Analog Input Module

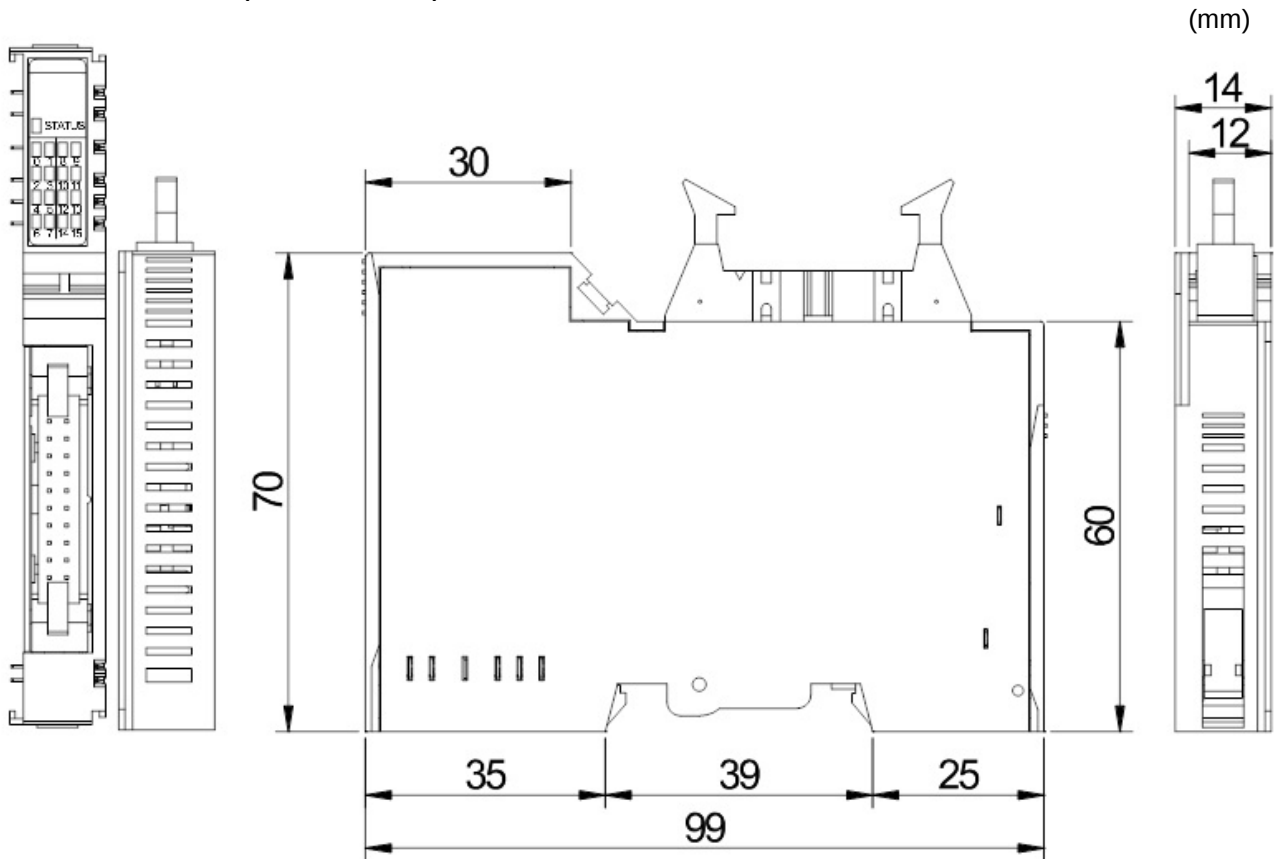
4. Dimensions

4.1. RIO2-RTD2, RIO2-TC2, RIO2-AX4I, RIO2-AX4V, RIO2-AX4H, RIO2-AX8I, RIO2-AX8V



User Manual – Analog Input Module

4.2. RIO2-RTD4, RIO2-RTD8, RIO2-TC4



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5. Mapping Data into the image Table

5.1. RIO2-RTD2, RIO2-TC2

Input Module Date

Analog Input Ch 0
Analog Input Ch 1



Input Image Value

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	Analog Input Ch 0 Low byte							
Byte 1	Analog Input Ch 0 High byte							
Byte 2	Analog Input Ch 1 Low byte							
Byte 3	Analog Input Ch 1 High byte							

5.2. RIO2-AX4I, RIO2-AX4V, RIO2-AX4H, RIO2-RTD4, RIO2-TC4

Input Module Date

Analog Input Ch 0
Analog Input Ch 1
Analog Input Ch 2
Analog Input Ch 3



Input Image Value

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	Analog Input Ch 0 Low byte							
Byte 1	Analog Input Ch 0 High byte							
Byte 2	Analog Input Ch 1 Low byte							
Byte 3	Analog Input Ch 1 High byte							
Byte 4	Analog Input Ch 2 Low byte							
Byte 5	Analog Input Ch 2 High byte							
Byte 6	Analog Input Ch 3 Low byte							
Byte 7	Analog Input Ch 3 High byte							

User Manual – Analog Input Module

5.3. RIO2-AX8I, RIO2-AX8V, RIO2-RTD8

Input Module Data

- 16byte Input Data

Analog Input Ch 0
Analog Input Ch 1
Analog Input Ch 2
Analog Input Ch 3
Analog Input Ch 4
Analog Input Ch 5
Analog Input Ch 6
Analog Input Ch 7



Input Image Value

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	Analog Input Ch 0 Low byte							
Byte 1	Analog Input Ch 0 High byte							
Byte 2	Analog Input Ch 1 Low byte							
Byte 3	Analog Input Ch 1 High byte							
Byte 4	Analog Input Ch 2 Low byte							
Byte 5	Analog Input Ch 2 High byte							
Byte 6	Analog Input Ch 3 Low byte							
Byte 7	Analog Input Ch 3 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							

User Manual – Analog Input Module

6. Trouble Shooting

ATTENTION


In this manual, it couldn't be described all variety case with Network Adapter of several protocols. So if you couldn't find any fault after investigating all below cases, refer to NA user manual.

6.1. Normal Module

LED Status	Cause	Action
EXPANSION MODULE STATUS LED		Device has no expansion Module or may not be powered
Off	Not Power No Initialized	The Parameter is not initialized yet.
Green	Fn-Bus Connection	FnBus normal Operation
Flashing Green	Fn-Bus Ready	FnBus ready
Flashing Red	Fn-Bus Fault	FnBus Time Out, FnBus Failed Communication
Red	Device Fault	Device fault
CHANNEL STATUS LED		
Off	Not Signal	Normal Operation
Green	On Signal	Normal Operation

6.2. RIO2-RTD4, RIO2-RTD8, RIO2-TC4

LED Status	Cause	Action
EXPANSION MODULE STATUS LED		
Off	Not Power No Initialized	Not powered Not Initialized yet.
Green	Module Connection	Normal Operation, IO Exchange
Flashing Green	Module Ready	Module ready
Flashing Red	Module Fault	Module failed in Communication
Red	Module Fault	Module fault

User Manual – Analog Input Module

CHANNEL STATUS LED		
Off	Normal Operation	Input Sensor Open or Input Range Over
Green	Normal Operation	Sensor Connected and Input Range Valid
Red	Channel Fault	Channel Open

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