PROFINET Network Adapter Light

RIO3-PNAL
User manual

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DOCUMENT CHANGE SUMMARY				
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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℃ 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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1.1.1. 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. G-BUS Pin.

1.1.3. Certification

2. Environment Specification

Environment Specification	
Operating Temperature	-40℃ ~ 60℃ : 1.0A full load is allowed
UL Temperature	-20℃~60℃
Storage Temperature	-40℃~85℃
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
Industrial Emissions	EN 61000-6-4/ALL : 2011
Industrial Immunity	EN 61000-6-2 : 2005
Installation Position	Vertical and horizontal installation is available.
Product Certifications	CE, UL, EAC

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3. RIO3-PNAL

3.1. RIO3-PNAL Specification

Items	Specification
Communication Specification	
Adapter Type	Slave node (PROFINET)
Protocol	PROFINET
Max. Expansion Module	10 Slots
Max. Data Size	Max. Input 128bytes / Output 128bytes
Max. Length Bus Line	Up to 100m from Ethernet Hub/Switch with twisted CATS UTP/STP
Max. Nodes	Limited by PROFINET Specification
Baud Rate	100Mbps, Auto-negotiation, Full duplex
Interface Connector	RJ-45 socket * 2pcs
IP-Address Setup	Via Master Device Software
IAP Mode	When DIP Switch 1 to 8 setting is 254 or 255 (Using only Internet Explorer / recommended version 11)

Indicator	4 LEDs
	    1 Green/Red, Module Status (MOD)
	    1 Green/Red, Network Status (NET)
	    1 Green/Red, Network Error (ERROR)
	    1 Green/Red, Expansion I/O Module Status (IOS)
	2 LEDs (each RJ45 Connector)
	    1 Yellow, Link/Active
	    1 Green, Not used

Module Location	Starter module left side of RIO3 Series System
General Specification	
UL System Power	Supply voltage : 24Vdc nominal, Class 2
System Power	Supply voltage : 24Vdc nominal Supply voltage range : 15~28.8Vdc Protection : Reverse polarity protection
Power Dissipation	55mA typical @24Vdc
Current for I/O Module	1.0A @5Vdc
Isolation	System power to internal logic : Non-Isolation System power I/O driver : Isolation
UL Field Power	Supply voltage : 24Vdc nominal, Class 2
Field Power	Supply voltage : 24Vdc typical (Max.28.8Vdc) * Field Power range is different depending on IO Module series. Refer to IO Module's specification.

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Max. Current Field Power Contact	DC 8A Max.
Wiring	I/O Cable Max. 2.0mm² (AWG 14)
Torque	0.8Nm(7 lb-in)
Weight	76g
Module Size	22mm x 109mm x 70mm
Environment Condition	**Refer to 'Environment Specification'**

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3.2. RIO3-PNAL Wiring Diagram
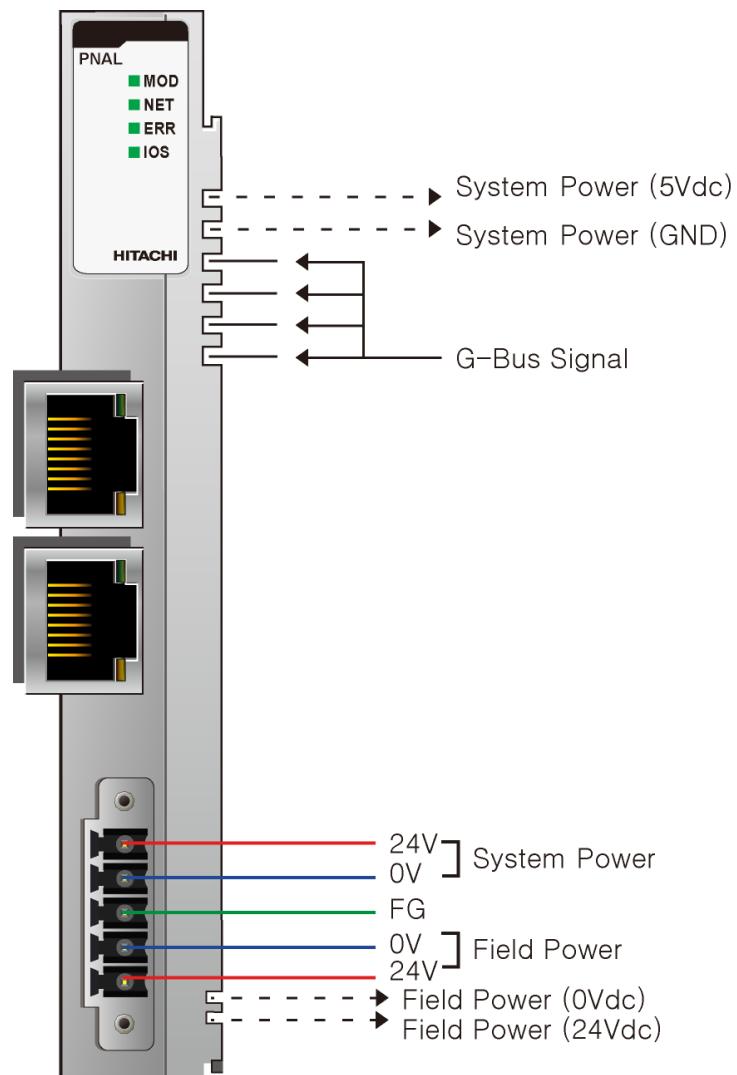
Pin No.	Signal Description
1	System Power, 24V
2	System Power, Ground
3	Frame Ground
4	Field Power, Ground
5	Field Power, 24V

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3.3. RIO3-PNAL LED Indicator

3.3.1. LED Indicator
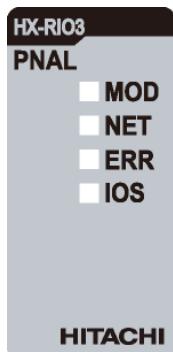
LED	LED Function / Description	LED Color
MOD	Module Status	Green/Red
NET	Current Communication Status	Green/Red
ERR	Error Status (PROFINET)	Red
IOS	Extension Module Status	Green/Red

3.3.2. MOD(Module Status LED)

Status	LED	To indicate
Not Powered	OFF	No power is supplied to the unit.
Device Operational	Green	The unit is operating in normal condition.
Unrecoverable Fault	Red	The device has an unrecoverable fault. - Memory error or CPU watchdog error.

3.3.3. NET(Network Status LED)

State	LED	To indicate
Not Powered	OFF	No power is supplied to the unit.
Communication	Green	Normal communication.
Communication Ready	Flashing Green	Communication identification.
Invalid Configuration	Flashing Red	DCP Communication error(Invalid Configuration).

3.3.4. ERR (Error Status LED)

Status	LED	To indicate :
No Error	OFF	No Error.
Connection error	Red	Communication connection error.

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3.3.5. IOS LED (Expansion Module Status LED)

State	LED	To indicate
Not Powered	OFF	Device may not be powered.
No Expansion Module	Flashing Red	Adapter has no expansion module
Internal Bus Connection, Run Exchanging I/O	Green	Exchanging I/O data.
Expansion Configuration Failed	Red	One or more expansion module occurred in fault state. - Detected invalid expansion module ID. - Overflowed Input/Output Size - Too many expansion moduel - Initialization failure - Communication failure - Changed expansion module configuration - Mismatch vendor code between adapter and expansion module

3.4. RIO3-PNAL Electrical Interface
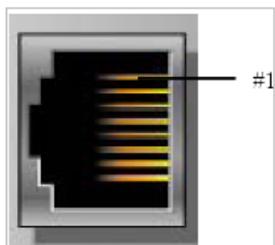
3.4.1. RJ45 Socket

RJ-45	Singal Name	Description
1	TD+	Transmit +
2	TD-	Transmit -
3	RD+	Receive +
4	-	
5	-	
6	RD-	Receive -
7	-	
8	-	
Case	Shield	Shield RJ-45 Socket

Shielded RJ-45 Socket

3.4.2. Dip Switch
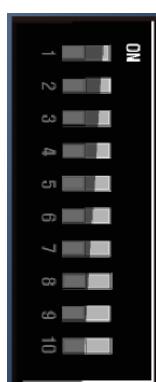
DIP Pole#	Description	
1	IP DIP bit#0	
2	IP DIP bit#1	
3	IP DIP bit#2	Device Name (GN9587-XX)
4	IP DIP bit#3	-XX must a value between 1~99
5	IP DIP bit#4	
6	IP DIP bit#5	
7	IP DIP bit#6	
8	Reserve	
9	Reserve	
10	Node ID : Flash Memory Value	

• **When the dip switch is not set to non-zero (1~99) :**
If the decimal value of the dip switch is not zero (0), the name of device will be fixed as

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"RIO3-PNAL-xx" (xx: 1~99). You must put the fixed device name.

• When the dip switch "10 pole" is set to switch ON :
RIO3-PNAL Devices on a PROFINET subnet must have unique names. The device names must satisfy DNS naming
conventions. This means that the following rules must be observed:
− Names are limited to a total of 127 characters (letters, numbers, dashes or dots)

− Any component part (that is, a character string between two dots) of the device name may only be up to 10 characters long.

− Names cannot contain any special characters such as umlauts, parentheses, underscores, forward or backward slashes, empty spaces, etc. The dash is the only special character allowed.

− Names must not begin or end with the "-" or "." characters.

− Names must not have the format n.n.n.n (where n = 0...999).

− The device name must not start with numbers.
Device names are assigned to PROFINET IO device when the device is being set up and placed in operation for the first time ("commissioned").

The default name is "RIO3-PNAL-address".

4. I/O Process Image Map

An expansion module may have 3 types of data as I/O data, configuration parameter and memory register. The data exchange between network adapter and expansion modules is done via an I/O process image data by RIO3 Series   Internal Bus protocol. The following figure shows the data flow of process image between network adapter and expansion modules.
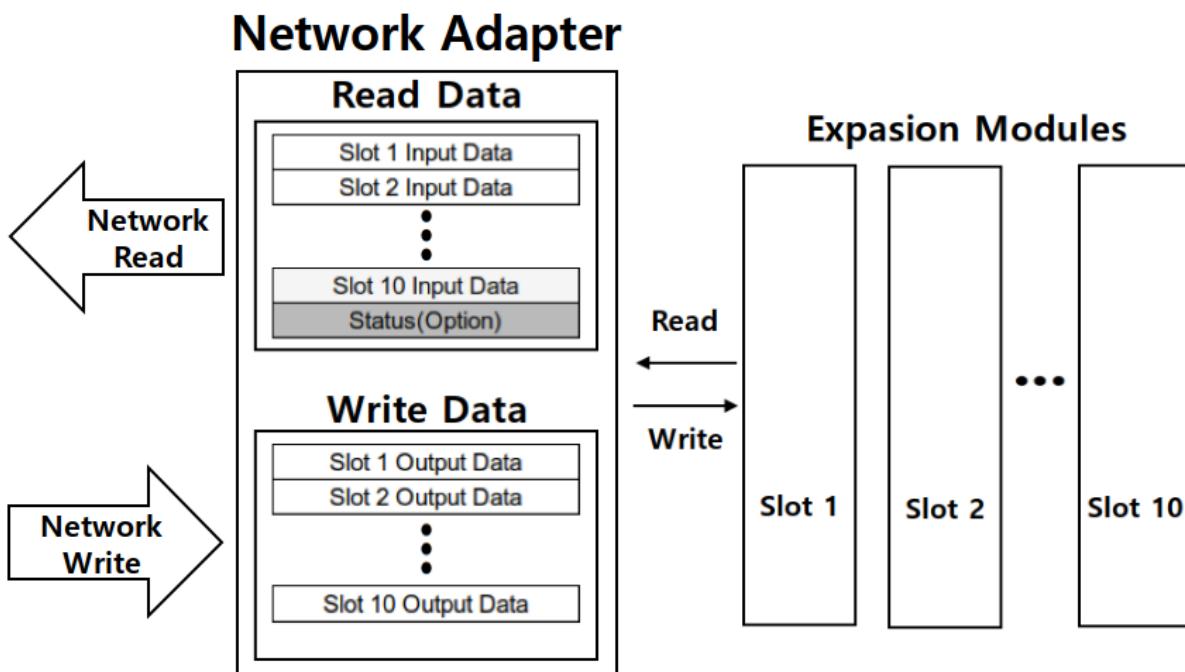
4.1. Mapping Data into Image Table

4.1.1. Discrete Input Module

-. 4 Point Input Module

Input Module Data					D3	D2	D1	D0
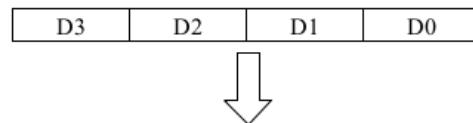
Input Image Value	Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	Byte 0	Reserved				D3	D2	D1	D0

-. 8 Point Input Module
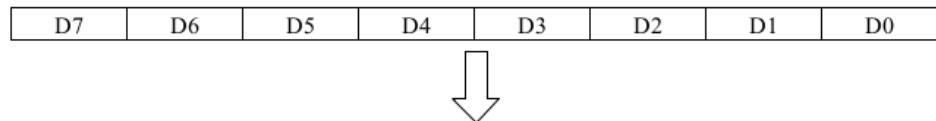
Input Module Data	D7	D6	D5	D4	D3	D2	D1	D0

Input Image Value	Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	Byte 0	D7	D6	D5	D4	D3	D2	D1	D0

-. 16 Point Input Module

Input Image Value	Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	Byte 0	D7	D6	D5	D4	D3	D2	D1	D0

Input Module Data	D7	D6	D5	D4	D3	D2	D1	D0
	D15	D14	D13	D12	D11	D10	D9	D8
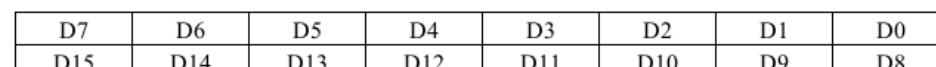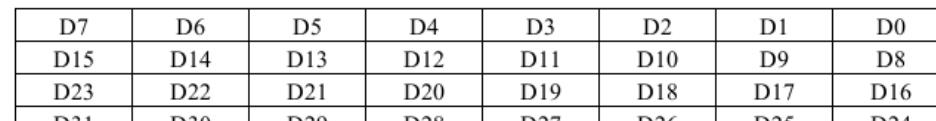
-. 32 Point Input Module

Input Module Data	D7	D6	D5	D4	D3	D2	D1	D0
	D15	D14	D13	D12	D11	D10	D9	D8
	D23	D22	D21	D20	D19	D18	D17	D16
	D31	D30	D29	D28	D27	D26	D25	D24

Input Image Value	Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
	Byte 1	D15	D14	D13	D12	D11	D10	D9	D8
	Byte 2	D23	D22	D21	D20	D19	D18	D17	D16
	Byte 3	D31	D30	D29	D28	D27	D26	D25	D24

4.1.2. Discrete Output Module

-. 4 Point Output Module

Output Image Value	Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	Byte 0	Reserved				D3	D2	D1	D0

Output Module Data	D3	D2	D1	D0

-. 8 Point Output Module

Output Image Value	Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	Byte 0	D7	D6	D5	D4	D3	D2	D1	D0

Output Module Data	D7	D6	D5	D4	D3	D2	D1	D0

-. 16 Point Output Module

Output Image Value	Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
	Byte 1	D15	D14	D13	D12	D11	D10	D9	D8

Output Module Data	D7	D6	D5	D4	D3	D2	D1	D0
	D15	D14	D13	D12	D11	D10	D9	D8

-. 32 Point Output Module

Output Image Value	Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	Byte 0	D7	D6	D5	D4	D3	D2	D1	D0
	Byte 1	D15	D14	D13	D12	D11	D10	D9	D8
	Byte 2	D23	D22	D21	D20	D19	D18	D17	D16
	Byte 3	D31	D30	D29	D28	D27	D26	D25	D24

| Output Module Data	D7	D6	D5	D4	D3	D2	D1	D0
	D15	D14	D13	D12	D11	D10	D9	D8
	D23	D22	D21	D20	D19	D18	D17	D16
	D31	D30	D29	D28	D27	D26	D25	D24

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4.1.3. Analog Input Module

-. 4 Channel Analog Input Module

Input Module Data	
	Analog Input Ch0
	Analog Input Ch1
	Analog Input Ch2
	Analog Input Ch3

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				

-. 8 Channel Analog Input Module

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 Ch0 low byte				
	Byte 9				Analog Input Ch0 high byte				
	Byte 10				Analog Input Ch1 low byte				
	Byte 11				Analog Input Ch1 high byte				
	Byte 12				Analog Input Ch2 low byte				
	Byte 13				Analog Input Ch2 high byte				
	Byte 14				Analog Input Ch3 low byte				
	Byte 15				Analog Input Ch3 high byte				

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4.1.4. Analog Output Module

-. 4 Channel Analog Output Module

| Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	Analog Output Ch0 low byte						
Byte 1	Analog Output Ch0 high byte						
Byte 2	Analog Output Ch1 low byte						
Byte 3	Analog Output Ch1 high byte						
Byte 4	Analog Output Ch2 low byte						
Byte 5	Analog Output Ch2 high byte						
Byte 6	Analog Output Ch3 low byte						
Byte 7	Analog Output Ch3 high byte						

Output Image Value

Output Module Data

Analog Output Ch0
Analog Output Ch1
Analog Output Ch2
Analog Output Ch3

-. 8 Channel Analog Output Module

Output Image Value

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

Output Module Data

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

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4.2. Example of Input Process Image (Input Register) Map

Input image data depends on slot position and expansion slot data type. Input process image data is only ordered by expansion slot position.

• **Example slot configuration**
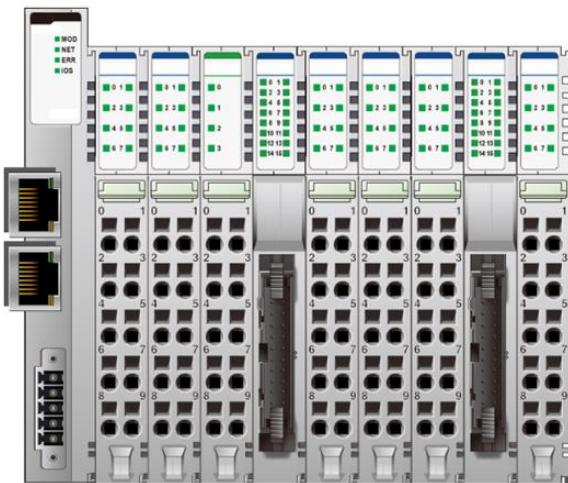
| Solt Address	Module Description
#0	PROFINET Adapter
#1	8-discrete input
#2	8-discrete input
#3	4-analog input
#4	16-discrete input
#5	8-discrete input
#6	8-discrete input
#7	8-discrete input
#8	16-discrete input
#9	8-discrete input

• **Input Process Image**

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0x0001	Discrete Input 8 pts (Slot#2)								Discrete Input 8 pts (Slot#1)							
0x0002	Analog Input Ch0 high byte (Slot#3)								Analog Input Ch0 Low byte (Slot#3)							
0x0003	Analog Input Ch1 high byte (Slot#3)								Analog Input Ch1 Low byte (Slot#3)							
0x0004	Analog Input Ch2 high byte (Slot#3)								Analog Input Ch2 Low byte (Slot#3)							
0x0005	Analog Input Ch3 high byte (Slot#3)								Analog Input Ch3 Low byte (Slot#3)							
0x0006	Discrete Input 8 pts (Slot#4)								Discrete Input 8 pts (Slot#4)							
0x0007	Discrete Input 8 pts (Slot#6)								Discrete Input 8 pts (Slot#5)							
0x0008	Discrete Input 8 pts (Slot#8)								Discrete Input 8 pts (Slot#7)							
0x0009	Discrete Input 8 pts (Slot#9)								Discrete Input 8 pts (Slot#8)							

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4.3. Example of Output Process Image (Output Register) Map

Output image data depends on slot position and expansion slot data type. Output process image data is only ordered by expansion slot position.

• **Example slot configuration**
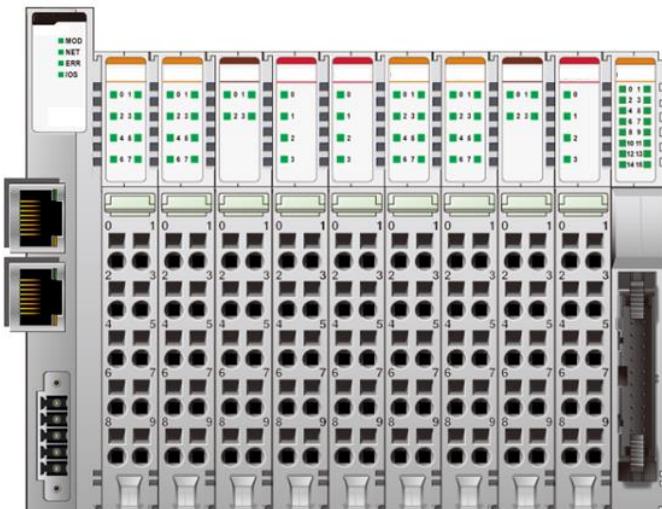
Solt Address	Module Description
#0	PROFINET Adapter
#1	8-discrete output
#2	8-discrete output
#3	4-analog output
#4	4-relay output
#5	4-relay output
#6	8-discrete output
#7	8-discrete output
#8	4-analog output
#9	4-relay output
#10	16-discrete output

• **Output Process Image**

Address	b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0x0800	Discrete Output 8 pts (Slot#2)								Discrete Output 8 pts (Slot#1)							
0x0801	Analog Output Ch0 high byte (Slot#3)								Analog Output Ch0 low byte (Slot#3)							
0x0802	Analog Output Ch1 high byte (Slot#3)								Analog Output Ch1 low byte (Slot#3)							
0x0803	Analog Output Ch2 high byte (Slot#3)								Analog Output Ch2 low byte (Slot#3)							
0x0804	Analog Output Ch3 high byte (Slot#3)								Analog Output Ch3 low byte (Slot#3)							
0x0805	Empty, Don't Care				Discrete Out 4 pts (Slot#5)				Empty, Don't Care				Discrete Out 4 pts (Slot#4)			
0x0806	Discrete Output low 8 pts (Slot#7)								Discrete Output low 8 pts (Slot#6)							
0x0807	Analog Output Ch0 high byte (Slot#8)								Analog Output Ch0 low byte (Slot#8)							
0x0808	Analog Output Ch1 high byte (Slot#8)								Analog Output Ch1 low byte (Slot#8)							
0x0809	Analog Output Ch2 high byte (Slot#8)								Analog Output Ch2 low byte (Slot#8)							
0x080A	Analog Output Ch3 high byte (Slot#8)								Analog Output Ch3 low byte (Slot#8)							
0x080B	Discrete Output low 8 pts (Slot#10)								Empty, Don't Care				Discrete Out 4 pts (Slot#9)			
0x080C	Empty, Don't Care								Discrete Output high 8 pts (Slot#10)							

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5. Parameter

5.1. RIO3-PNAL Parameter

Parameter	Setting	Description
Word data type	All type	Little Endian format(LSB-MSB)
Stop action	Clear output image to 0 *	All outputs are set to 0.
	Hold last valid output image	All outputs are remaining the last value.
Stop action Mode	General Mode	For SIEMENS PLC
	Special Mode	For Soft PLC(ex-CODESYS)

* : Default setting

5.2. RIO3-PNAL PROFINET IO Characteristics

5.2.1. Device Identity

Item	Value
Vendor	HITACHI
Vendor ID	0x0140
Product family	HITACHI RIO3 System
Device ID	0x9087
Details	RIO3-PNAL PROFINET IO Device

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5.2.2. Device Access Point

Item	Value
Module Ident Number	0x00009087
Details	RIO3-PNAL PROFINET IO Device
Vendor Name	HITACHI
Order Number	RIO3-PNAL
Category	HITACHI PROFINET I/O
Software Version	V1.0
Hardware Version	V1.0
Maximal Input Length	1440 Bytes
Maximal Output Length	1440 Bytes
Physical Slots	0..32
Minimal Device Interval	4msec
Based on	portStack
DNS Compliant Name	GLRIO3-PNAL-xx
Supports Extended Assignment of IP Address	No
Fixed in Slots	0
Instance Field of the Object UUID	1
Supports Multiple Write	Yes
Requires IOPS/IOCS	Yes
Requires Engineering tool which supports at least GSDML Version	V2.32

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5.2.3. Sub-slot of RIO3-PNAL

Item	Value						
Sub-slot Number	**Sub-slot Label**						
32768 (0x8000)	X1						
32769 (0x8001)	P1						

Sub-module							
Sub-module Ident Number	0x00000001						
RIO3-PNAL Parameters (Index : 1, Length : 2Bytes, Transfer sequence : 0)							
Byte Offset	Data						
0	0x00, 0x00						
Name of Parameter	Data Type	Byte Offset	Bit Offset	Bit Length	Default value	Value Range	Changeable	Visible
Word data format	Bit Area	0	0	1	MOTOROLA	0..1	Yes	Yes
Stop action	Bit Area	1	0	1	Clear output Images to 0	0..1	Yes	Yes

Interface : RIO3-PNAL	
Sub-module Ident Number	0x0002
Sub-slot Number	32768 (0x8000)
Supports Real time Class	Class 1
Supports Isochronous Mode	No
Number of Additional Input CRs	0
Number of Additional Output CRs	0
Number of Additional Multicast Provider CRs	0
Number of Multicast Consumer CRs	0
Supported Send-clock Factors (Base 31.25us)	32 64 128
Supported Reduction Ratios	1 2 4 8 16 32 64 128 256 512

Port 1 : Port 1	
Sub-module Ident Number	0x0003
Sub-slot Number	32769 (0x8001)
MAU Type	100BASETXFD

6. Dimension

6.1. RIO3-PNAL

(mm)
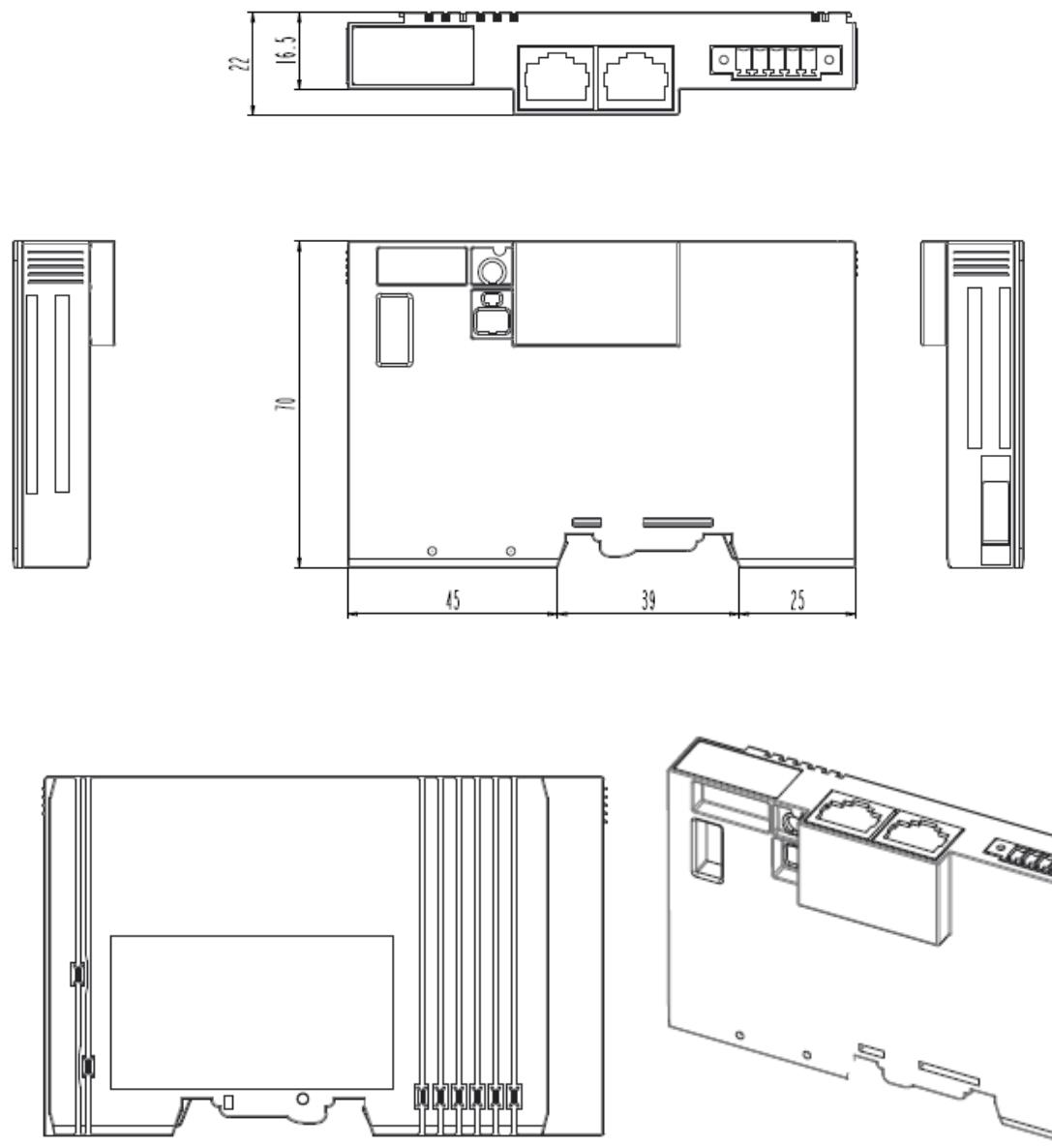
7. **Mechanical Set Up**

7.1. **Total Expansion**

The number of the module assembly that can be connected is 10. So the maximum length is 426mm
Exception.

7.2. **Plugging and Removal of the Components.**

| DANGER ⚠	Before work is done on the components, the voltage supply must be turned off.

As above figure in order to safeguard the RIO3 module from jamming, it should be fixed onto the DIN
rail with locking level. To do so, fold on the upper of the locking lever.
To pull out the RIO3 module, unfold the locking lever as below figure.

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7.3. Internal G-Bus/Field Power Contacts

Communication between the NA series and the expansion module as well as system / field power supply of the bus modules is carried out via the internal bus. It is comprised of 6 data pin and 2 field power pin.

Field Power Pins

Data Pins
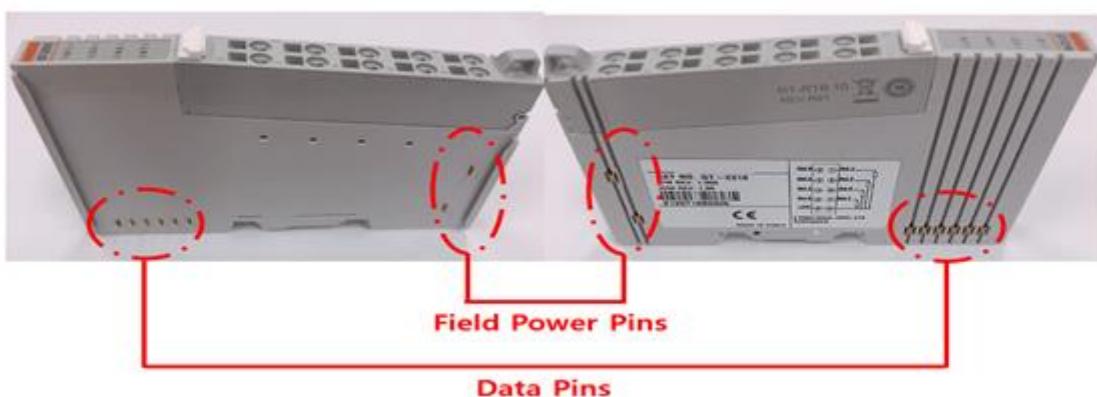
DANGER	Do not touch data and field power pins to avoid soiling and damage by ESD noise.
⚠	

8. Troubleshooting

How to diagnose by LED indicator

LED Status	Cause	Action
All LED turns off	- No power	- Check main power Cable
MOD LED is red	- Occurrence critical error in firmware	- Contact Sales team and send module for repair.
ERR LED Blanking red	-Invalid Configuration	-Check I/O size configuration
IOS LED turns off	- Device may not be powered.	- Check main power Cable
IOS LED flashes red	- Adapter has no expansion module	- Add one or more expansion modules.
IOS LED is red	One or more expansion module occurred in fault state. - Detected invalid expansion module ID. - Overflowed Input/Output Size - Too many expansion module - Initialization failure - Communication failure. - Changed expansion module configuration. - Mismatch vendor code between adapter and expansion module.	- Use expansion slot up to 10. - Compose that IO total size is not excess. - Check status of expansion IO connection. - Check the vendor code of module.

How to diagnose when device couldn't communicate network

Inspection of wrong or omission cable connection.
- Check status of cable connection for each node.
- Check that all colour matches between connector and cable.
- Check wire.

Terminator resistor

- If terminator resistor is not installed, install terminator resistor
- Check location of terminator resistor

Configuration of Node address

- Check duplication node address.

Configuration of Master

- Check configuration of master
- Check whether to do download or don't
- Check composition is right
    - o Configuration of communication baud rate
    - o I/O size
    - o Configuration of each nodes

Ground and environment

- Check ground is contacted
- Check environment factor(temperature, humidity, etc) is in less than regular limit

APPENDIX A

A.1 Product List

No.	RIO3-Number	Description	ID (hex)
		Digital Input Module	
01	RIO3-XDP8	8 Points, Universal, 24Vdc, 10RTB	1238
02	RIO3-XDP16C	16 Points, Universal, 24Vdc, 20P connector	123F
03	RIO3-XDP16T	16 Points, Universal, 24Vdc, 18RTB	12DF
04	RIO3-XDP32C	32 Points, Universal, 24Vdc, 40P connector	12FA
05	RIO3-XY16T	8 Sink Input / 8 Source Output with Diagnostic, 24Vdc	1428
06	RIO3-XAH4	4 Points, 240Vac, 10RTB	1904
		Digital Output Module	
07	RIO3-YTP8	8 Points, Source, 24Vdc/0.5A, 10RTB	2328
08	RIO3-YTP16C	16 Points, Source, 24Vdc/0.3A, 20P connector	222F
09	RIO3-YTP16T	16 Points, Source, 24Vdc/0.3A, 18RTB	226F
10	RIO3-YTP32C	32 Points, Source, 24Vdc/0.3A, 40P connector	22CA
11	RIO3-YS4	4 Points, MOS Relay, 240Vdc/ac, 0.5A, 10RTB	2734
12	RIO3-YS8	8 Points, MOS Relay Output Terminal, 240Vdc, 0.5A	2738
13	RIO3-YR4	4 Points, Relay, 24Vdc/2A, 240Vac/2A, 10RTB	2744
		Analog Input Module	
14	RIO3-LDC2	2ch load cell input unit, strain gauge	3002
15	RIO3-AX4I	4 Channels, 0~20, 4~20mA, 12bits, 10RTB	3114
16	RIO3-AXH4I	4 Channels, 0~20, 4~20mA, 16bits, 10RTB	3154
17	RIO3-AX8I	8 Channels, 0~20, 4~20mA, 12bits, 10RTB	3118
18	RIO3-AXH8I	8 Channels, 0~20, 4~20mA, 16bits, 10RTB	3158
19	RIO3-AX16IC	16 Channels, 0~20, 4~20mA, 12bits, 20P connector	311F
20	RIO3-AX16IT	16 Channels, 0~20, 4~20mA, 12bits, 18RTB	317F
21	RIO3-AX4V	4 Channels, 0~10, 0~5, 1~5Vdc, 12bits, 10RTB	3424
22	RIO3-AXH4V	4 Channels, 0~10, 0~5, 1~5Vdc, 16bits, 10RTB	3464
23	RIO3-AX8V	8 Channels, 0~10, 0~5, 1~5Vdc, 12bits, 10RTB	3428
24	RIO3-AXH8V	8 Channels, 0~10, 0~5, 1~5Vdc, 16bits, 10RTB	3468
25	RIO3-AX16VC	16 Channels, 0~10, 0~5, 1~5Vdc, 12bits, 20P connector	342F
26	RIO3-AX16VT	16 Channels, 0~10, 0~5, 1~5Vdc, 12bits, 18RTB	347F
27	RIO3-RTD4T	4 Channels, RTD, 10RTB	3704
28	RIO3-RTD8C	8 Channels, RTD, 20P connector	3708
29	RIO3-TC4T	4 Channels, Thermocouple, 10RTB	3804
30	RIO3-E3AC	AC Measurement	3901
		Analog Output Module	
31	RIO3-AY4I	4 Channels, Current Output, 4~20mA, 12bits	4214
32	RIO3-AYH4I	4 Channels, Current Output, 4~20mA, 16bits	4254
33	RIO3-AY8I	8 CHANNELS CURRENT OUTPUT, 4~20mA, 12BIT	4218
34	RIO3-AY4V	4CH, 0~10Vdc, 12Bits, 10RTB	4424

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35	RIO3-AYH4V	4CH, 0~10Vdc, 16Bits, 10RTB	4464
36	RIO3-AY8V	8CH, 0~10Vdc, 12Bits, 10RTB	4428
37	RIO3-AY16VC	16CH, 0~10Vdc, 12Bits, 20P Connector	442F
38	RIO3-AY16VT	16CH, 0~10Vdc, 12Bits, 18RTB	447F
Special Module			
39	RIO3-CU24L	High Speed Counter, 2CHs, 24Vdc, Encoder Input, 10RTB	
40	RIO3-RS232	1CH, RS 232, RTS/CTS, Full Duplex Type, 10RTB	5211
41	RIO3-RS485	1CH, RS 485, Half Full Duplex Type, 10RTB	5231
42	RIO3-PWM2	PWM Output, 2CHs, 0.5A/24Vdc, Source, 18RTB	5442
43	RIO3-PO2	Pulse Output, 2CHs, 0.5A/24Vdc, Source, 18RTB	5642
Power Module			
44	RIO3-SHD	Shield Module	7408
45	RIO3-0VDC	Common for 0Vdc	7508
46	RIO3-PSD	Power Expansion, In 24Vdc, Out 1A/5Vdc	7511
47	RIO3-24VDC	Common for 24Vdc	7518
48	RIO3-VDC	Common for 0Vdc, 24Vdc	7588
49	RIO3-PS	Field Power, 5/24/48 Vdc, 110/220 Vac	7641

A.2. Glossary

- System Power : The power for starting up CPU.
- Field Power : The power for input and output line.
- Terminator Resistor : Resistor for prevention reflected wave.
- EDS : Electronic Data Sheet.
- Sink : The method of in/output power supply if a device has no power source.
- Source : The method of in/output power supply if a device has the power source.