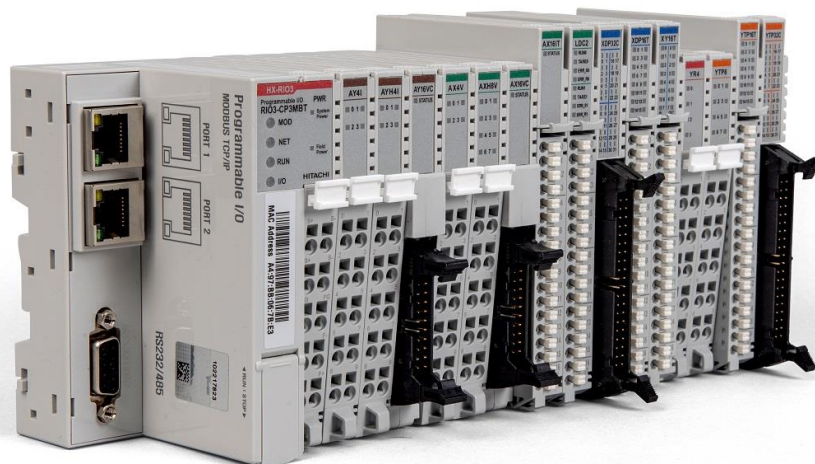


# Digital Output Module

## RIO3-Y... User Manual



Version 1.011

REVISION HISTORY				
REV	PAGE	REMARKS	DATE	EDITOR
1.01		New Document	Nov 2020	(OPR), (PF)
1.01	50	Remove product list table and add a reference	Aug 2021	Faber
1.011		RIO3-YTP8L. RIO3-YTP16L added	Aug 2022	Faber

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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 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 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 50°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.

## 1.1 Safety Instructions

### 1.1.1 Symbols

<p><b>DANGER</b></p> 	<p>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.</p>
<p><b>IMPORTANT</b></p>	<p>Identifies information that is critical for successful application and understanding of the product</p>
<p><b>ATTENTION</b></p> 	<p>Identifies information about practices or circumstances that can lead to personal injury, property damage, or economic loss.</p> <p>Attentions help you to identify a hazard, avoid a hazard, and recognize the consequences</p>

### 1.1.2 Safety Notes

<p><b>DANGER</b></p> 	<p>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, GBUS Pin.</p>
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### 1.1.3 Certification

UL Listed Industrial Control Equipment, certified for U.S.

See UL File E196687

CE Certificate

EN 61000-6-2; Industrial Immunity

EN 61000-6-4; Industrial Emissions

Reach, RoHS (EU, CHINA), EAC

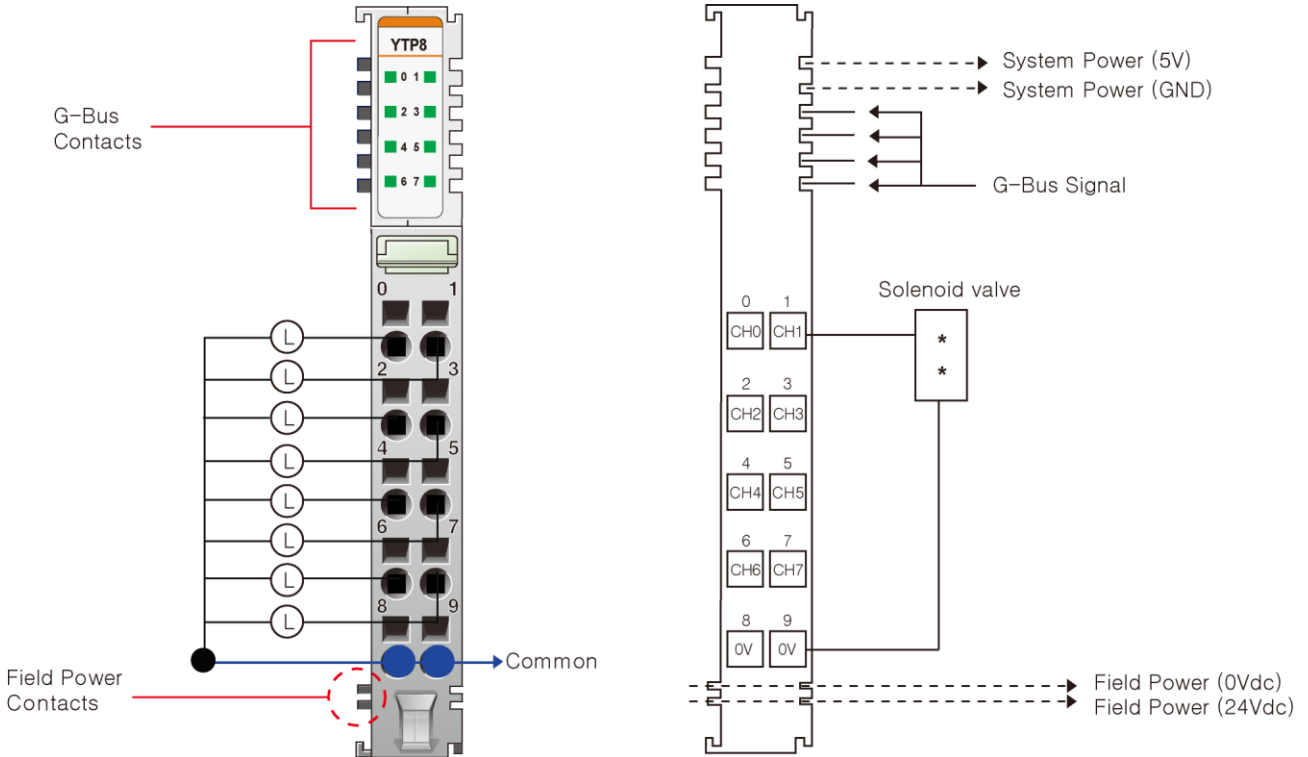
## 2 Digital Output Module List

RIO3-Number	Description	ID (hex)
RIO3-YTP8	Digital Output, 8 Points, Source 24VDC, 0.5A, 10 RTB	2328
RIO3-YTP16C	Digital Output, 16 Points, Source 24VDC, 0.3A, 20P Connector	222F
RIO3-YTP16T	Digital Output 16 Points, Source, 18RTB	226F
RIO3-YTP32C	Digital Output, 32 Points, Source 24VDC, 0.3A, 40P Connector	22CA
RIO3-YS4	Digital Output, 4 Points, MOS Relay (Solid State Relay), 240V (AC/ DC), 0.5A, 10 RTB	2734
RIO3-YR4	Digital Output, 4 Points, Relay, 24VDC / 220VAC, 2.0A, 10 RTB	2744
RIO3-YS8	Digital Output, 8 Points, Relay Output Terminal, 240Vdc/ac, 0.5A	2738
RIO3-YTP8L	Digital Output, 8 Points, Source 24VDC, 2A, 10 RTB	2348
RIO3-YTP16L	Digital Output 16 Points, Source, 2A, 18RTB	228F

### 3 Specification

#### 3.1 RIO3-YTP8

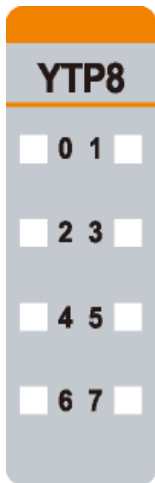
##### 3.1.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Common (Field Power 0V)	Common (Field Power 0V)	9



### 3.1.2 LED Indicator



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

### 3.1.3 Channel Status LED

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

### 3.1.4 Environment Specification

Environmental specification	
Operating Temperature	-40°C ~ 70°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: 2008 / 15g, 11ms
Vibration Resistance	Based on IEC 60068-2-6 DNVGL-CG-0039: 2016/6 Vibration Class B, 4g
Industrial Emissions	EN 61000-6-4: 2007 +A1: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is possible.
Product Certifications	CE, UL, EAC

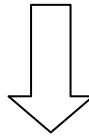
### 3.1.5 Specification

Items	Specification
<b>Output Specification</b>	
Output per module	8 Points Source type
Indicators (Logic side)	8 Green Output state
Output Voltage Range	24Vdc Nominal Min. 15Vdc to Max. 30Vdc
ON-state voltage drop	0.3Vdc @ 25°C 0.5Vdc @ 70°C
ON-State Min. Current	Min. 1mA
OFF-State Leakage current	Max. 5uA
Output Signal Delay	OFF to ON: 0.3ms maximum ON to OFF: 0.3ms maximum
Output Current Rating	Max. 0.5A per channel / Max. 4A per unit
Protection	Over-Current Limit: Min 6.5A @ 25°C per each channel Thermal Shutdown: Min 4A @ 25°C per each channel Short circuit protection
COMMON Type	8 points / 2 COM
<b>General specification</b>	
Power dissipation	40mA maximum @ 5.0Vdc
Isolation	I/O to Logic: photocoupler isolation Field Power: Non-isolation
UL field power	Supply voltage: 24Vdc nominal, Class 2
Field Power	Supply voltage: 24Vdc nominal Voltage range: 15 to 30Vdc Power dissipation: 10mA @ 24Vdc
Wiring	I/O Cable Max. 2.0mm <sup>2</sup> (AWG 14)
Weight	60g
Module Size	12mm x 99mm x 70mm

### 3.1.6 Mapping Data into the Image Table

#### Output Image Value

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	D7	D6	D5	D4	D3	D2	D1	D0



#### Output Module Data

D7	D6	D5	D4	D3	D2	D1	D0
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### 3.1.7 Parameter Data

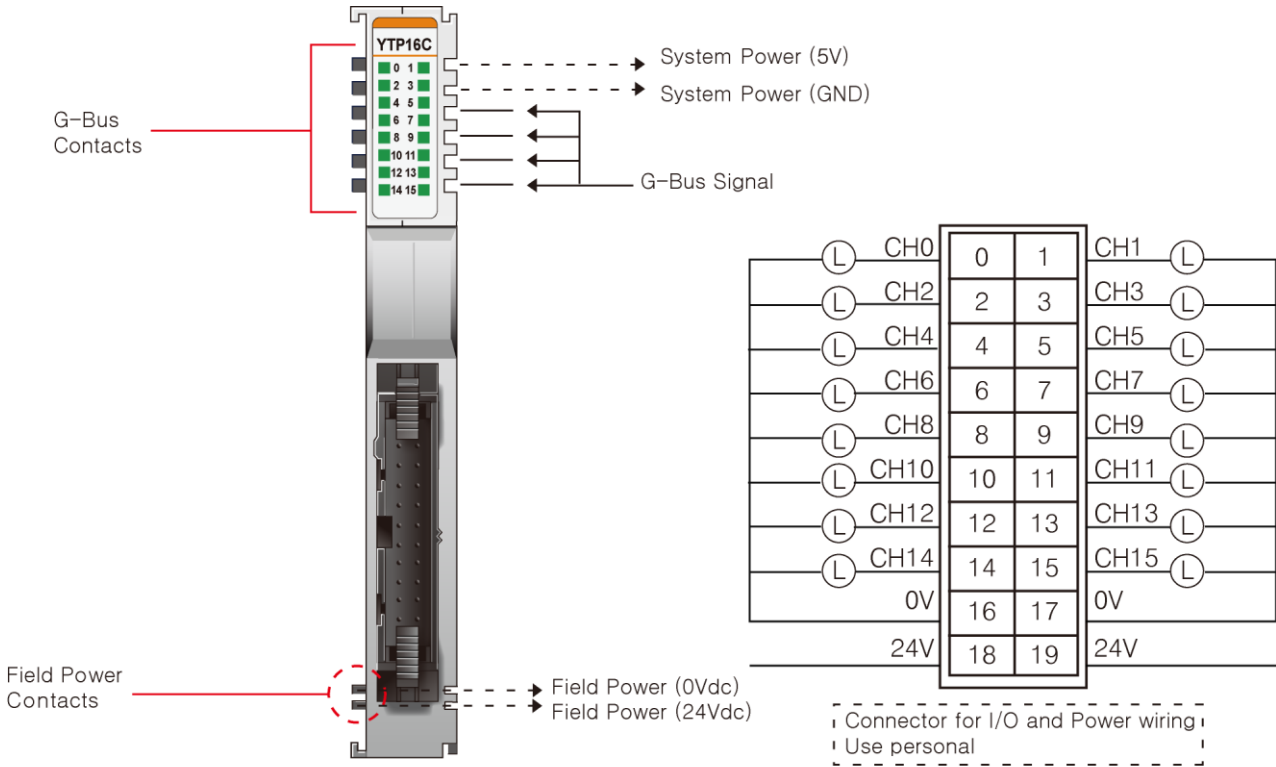
Valid Parameter Length: 2 Bytes

#### Parameter Data

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Fault Action (ch0 ~ ch7) 0: Fault value, 1: Hold last state							
Byte1	Fault value (ch0 ~ ch7) 0: Off, 1: On							

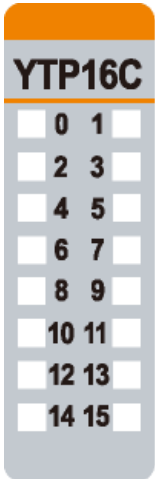
### 3.2 RIO3-YTP16C

#### 3.2.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Output Channel 8	Output Channel 9	9
10	Output Channel 10	Output Channel 11	11
12	Output Channel 12	Output Channel 13	13
14	Output Channel 14	Output Channel 15	15
16	Common (Field Power 0V)	Common (Field Power 0V)	17
18	Common (Field Power 24V)	Common (Field Power 24V)	19

### 3.2.2 LED Indicator



LED No.	LED Function / Description	LED Color
0	Output Channel 0	Green
1	Output Channel 1	Green
2	Output Channel 2	Green
3	Output Channel 3	Green
4	Output Channel 4	Green
5	Output Channel 5	Green
6	Output Channel 6	Green
7	Output Channel 7	Green
8	Output Channel 8	Green
9	Output Channel 9	Green
10	Output Channel 10	Green
11	Output Channel 11	Green
12	Output Channel 12	Green
13	Output Channel 13	Green
14	Output Channel 14	Green
15	Output Channel 15	Green

### 3.2.3 Channel Status LED

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

### 3.2.4 Environment Specification

Environmental Specification	
Operation Temperature	-40°C ~ 70°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: 2007 +A1: 2011
Industrial Immunity	EN 61000-6-2: 2005
Protection Class	Variable / IP20
Installation Position	Vertical and horizontal installation is possible
Product Certifications	CE, UL, EAC

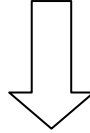
### 3.2.5 Specification

Items	Specification
<b>Output Specification</b>	
Output Per Module	16 Points Source Type
Indicators	16 Green Output Status
Output Voltage Range	Nominal 24Vdc 15Vdc ~ 30Vdc @ 70°C
ON-state Voltage Drop	0.3Vdc @ 25°C 0.5Vdc @ 70°C
ON-State Min. Current	Min. 1mA
OFF-State Leakage Current	Max. 5uA
Output Signal Delay	OFF to ON: Max. 0.3ms ON to OFF: Max. 0.3ms
Output Current Rating	Max. 0.3A / Channel, Max. 3.6A Per Unit
Protection	Over-Current Limit: Min. 6.5A @ 25°C / Channel Thermal Shutdown: Min. 4A @ 25°C / Channel Short Circuit Protection
Common Type	16 points / 2 Common
<b>General Specification</b>	
Power Dissipation	Max. 50mA @ 5Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
UL field power	Supply voltage: 24Vdc nominal, Class 2
Field Power	Supply Voltage: 24Vdc nominal Voltage Range: 15 ~ 30Vdc Power Dissipation: 20mA @ 24Vdc
Wiring	Module connector: HIF3BA-20D-2.54R
Weight	52g
Module Size	12mm x 99mm x 70mm

### 3.2.6 Mapping Data into the Image Table

#### Output Image Value

Bit No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	D7	D6	D5	D4	D3	D2	D1	D0
Byte1	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

### 3.2.7 Parameter Data

Valid Parameter length: 4 Bytes

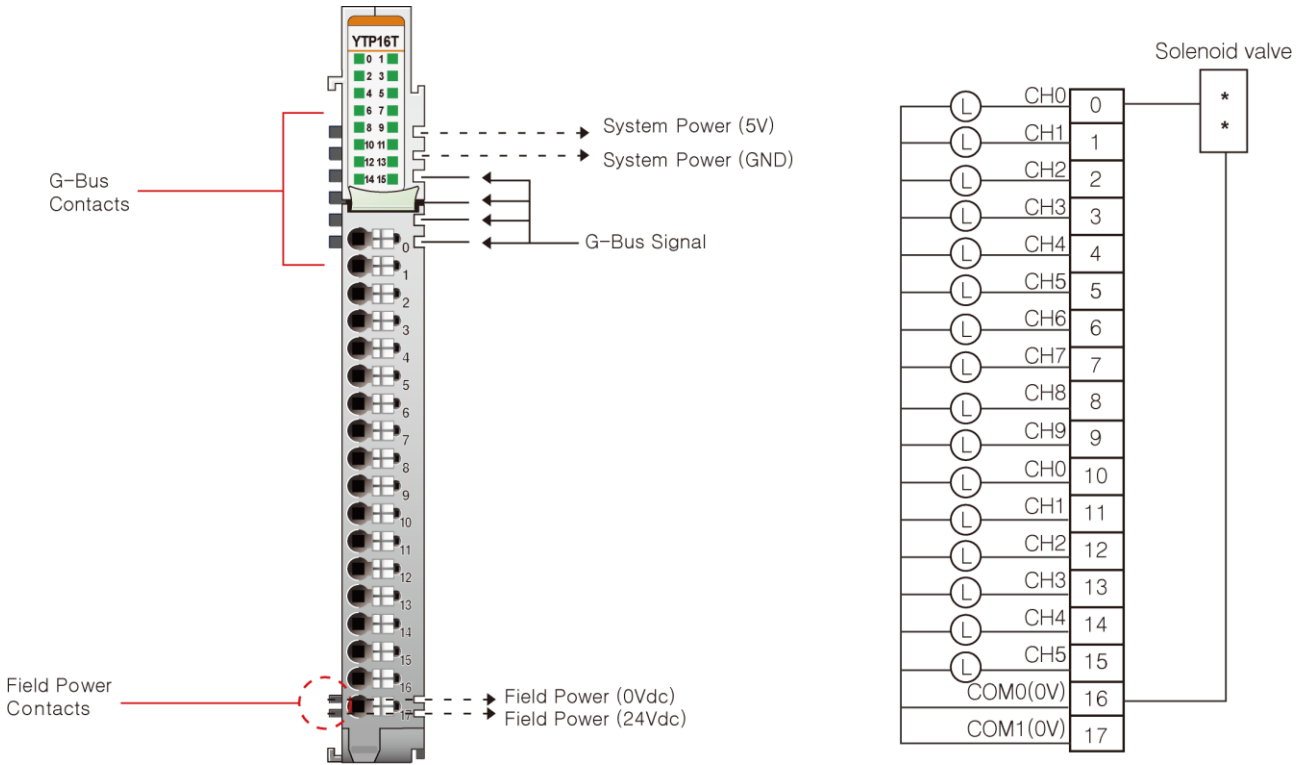
#### Parameter Data

Bit No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Fault Action (ch0 ~ ch7) 0: Fault value, 1: Hold last state							
Byte1	Fault Action (ch8 ~ ch15) 0: Fault value, 1: Hold last state							
Byte2	Fault Value (ch0 ~ ch7) 0: Off, 1: On							
Byte3	Fault Value (ch8 ~ ch15) 0: Off, 1: On							



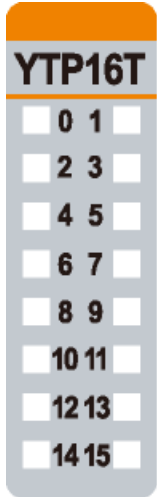
### 3.3 RIO3-YTP16T

#### 3.3.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Output Channel 8	Output Channel 9	9
10	Output Channel 10	Output Channel 11	11
12	Output Channel 12	Output Channel 13	13
14	Output Channel 14	Output Channel 15	15
16	Common (Field Power 0V)	Common (Field Power 0V)	17

### 3.3.2 LED Indicator



LED No.	LED Function / Description	LED Color
0	Output Channel 0	Green
1	Output Channel 1	Green
2	Output Channel 2	Green
3	Output Channel 3	Green
4	Output Channel 4	Green
5	Output Channel 5	Green
6	Output Channel 6	Green
7	Output Channel 7	Green
8	Output Channel 8	Green
9	Output Channel 9	Green
10	Output Channel 10	Green
11	Output Channel 11	Green
12	Output Channel 12	Green
13	Output Channel 13	Green
14	Output Channel 14	Green
15	Output Channel 15	Green

### 3.3.3 Channel Status LED

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

### 3.3.4 Environment Specification

<b>Environmental specification</b>	
Operation Temperature	-40°C ~ 70°C
UL Temperature	-20°C ~ 60°C
Non-Operating Temperature	-40°C ~ 85°C
Relative Humidity	5% to 95% non-condensing
Mounting	DIN Rail
<b>General specification</b>	
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: 2007 +A1: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is possible.
Product Certifications	CE, UL, EAC

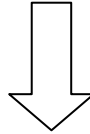
### 3.3.5 Specification

Items	Specification
<b>Output Specification</b>	
Output per module	16 Points Source type
Indicators	16 Green Output state
Output Voltage Range	24Vdc Nominal Min. 15Vdc ~ Max. 32Vdc
ON-State Voltage Drop	0.3Vdc @ 25°C 0.5Vdc @ 70°C
ON-State Min. Current	Min. 1mA
OFF-State Leakage current	Max. 5uA
Output Signal Delay	OFF to ON: 0.3ms maximum ON to OFF: 0.3ms maximum
Output Current Rating	Max. 0.3A per channel / Max. 4.8A per unit
Protection	Over Current Limit: Min 6.5A @ 25°C per channel Thermal Shutdown: Min 4A @ 25°C per channel Short Circuit Protection
COMMON Type	16 points / 2 COM
<b>General specification</b>	
Power dissipation	Max. 50mA @ 5Vdc
Isolation	I/O to Logic: Photocoupler isolation Field power: non-isolation
UL field power	Supply voltage: 24Vdc nominal, Class 2
Field Power	Supply voltage: 24Vdc nominal Voltage range: 15 ~ 30Vdc Power dissipation: 40mA @ 24Vdc
Wiring	I/O Cable Max. 0.75mm <sup>2</sup> (AWG 18)
Weight	63g
Module Size	12mm x 109mm x 70mm

### 3.3.6 Mapping Data into the Image Table

#### Output Image Value

Bit No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	D7	D6	D5	D4	D3	D2	D1	D0
Byte1	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

### 3.3.7 Parameter Data

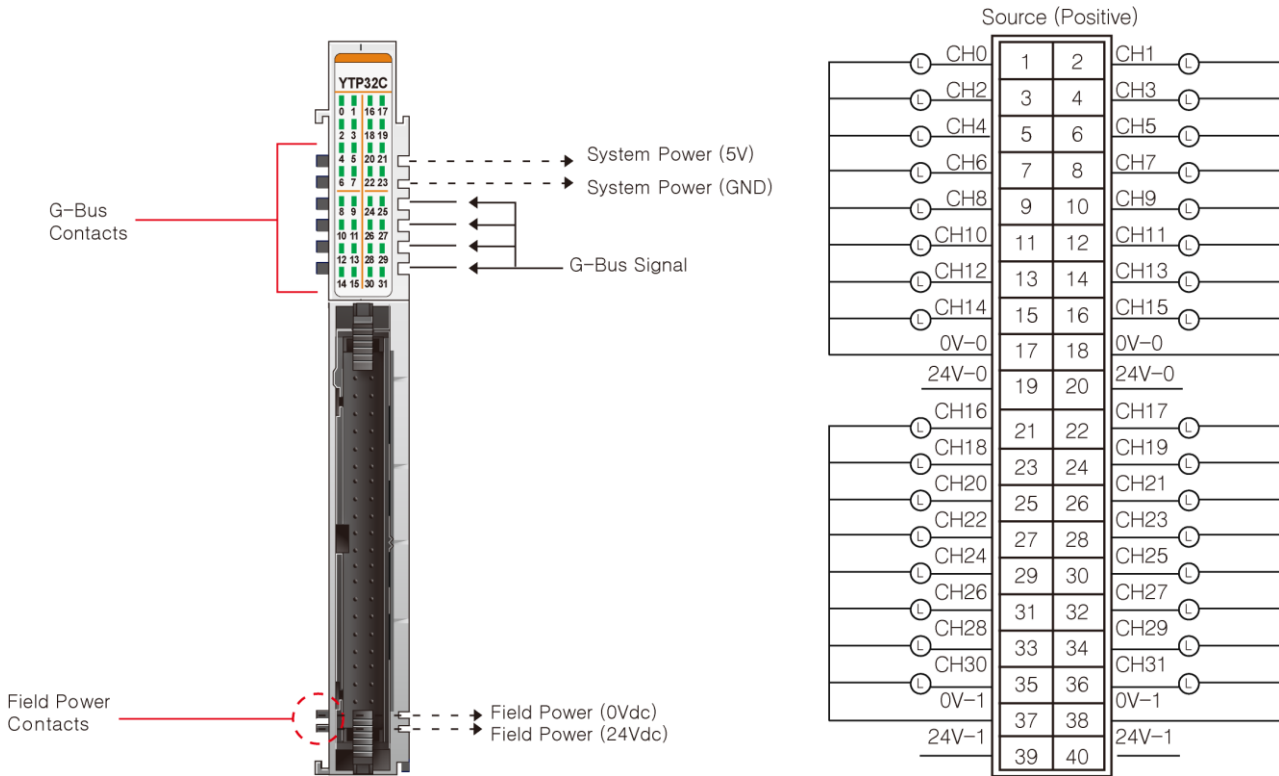
Valid Parameter length: 4 Bytes

#### Parameter Data

Bit No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Fault Action (ch0 ~ ch7) 0: Fault value, 1: Hold last state							
Byte1	Fault Action (ch8 ~ ch15) 0: Fault value, 1: Hold last state							
Byte2	Fault Value (ch0 ~ ch7) 0: Off, 1: On							
Byte3	Fault Value (ch8 ~ ch15) 0: Off, 1: On							

### 3.4 RIO3-YTP32C

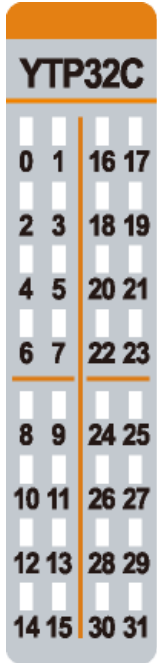
#### 3.4.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Output Channel 8	Output Channel 9	9
10	Output Channel 10	Output Channel 11	11
12	Output Channel 12	Output Channel 13	13
14	Output Channel 14	Output Channel 15	15
16	Common (Field Power 0V)	Common (Field Power 0V)	17
18	Common (Field Power 24V)	Common (Field Power 24V)	19
20	Output Channel 16	Output Channel 17	21
22	Output Channel 18	Output Channel 19	23
24	Output Channel 20	Output Channel 21	25
26	Output Channel 22	Output Channel 23	27
28	Output Channel 24	Output Channel 25	29
30	Output Channel 26	Output Channel 27	31
32	Output Channel 28	Output Channel 29	33

34	Output Channel 30	Output Channel 31	35
36	Common (Field Power 0V)	Common (Field Power 0V)	37
38	Common (Field Power 24V)	Common (Field Power 24V)	39

### 3.4.2 LED Indicator



LED No.	LED Function / Description	LED Color
0	Output Channel 0	Green
1	Output Channel 1	Green
2	Output Channel 2	Green
...	...	...
31	Output Channel 31	Green

### 3.4.3 Channel Status LED

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

### 3.4.4 Environment Specification

Environmental Specification	
Operation Temperature	-40°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	EN61000-6-4: 2007 +A1: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is possible
Product Certifications	CE, UL, EAC



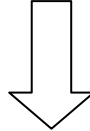
### 3.4.5 Specification

Items	Specification
<b>Output Specification</b>	
Output Per Module	32 Points Source type
Indicators	32 Green Output Status
Output Voltage Range	24Vdc nominal 15Vdc ~ 30Vdc @ 60°C
ON-state Voltage Drop	0.3Vdc @ 25°C 0.5Vdc @ 60°C
ON-State Min. Current	Min. 1mA
OFF-State Leakage Current	Max. 5uA
Output Signal Delay	OFF to ON: Max. 0.3ms ON to OFF: Max. 0.5ms
Output Current Rating	Max. 0.3A / Channel, Max. 6.0A Per Unit
Protection	Over Current Limit: Min. 6.5A @ 25°C per channel Thermal Shutdown: Min. 4A @ 25°C per channel Short Circuit Protection
Common Type	32 points / 8 Common
<b>General Specification</b>	
Power Dissipation	Max. 65mA @ 5Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
UL field power	Supply voltage: 24Vdc nominal, Class 2
Field Power	Supply Voltage: 24Vdc nominal Voltage Range: 15 ~ 30Vdc Power Dissipation: 30mA @ 24Vdc
Wiring	Module Connector: HIF3BA-40D-2.54R
Weight	63g
Module Size	12mm x 109mm x 70mm

### 3.4.6 Mapping Data into the Image Table

#### Output Image Value

Bit No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	D7	D6	D5	D4	D3	D2	D1	D0
Byte1	D15	D14	D13	D12	D11	D10	D9	D8
Byte2	D23	D22	D21	D20	D19	D18	D17	D16
Byte3	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

### 3.4.7 Parameter Data

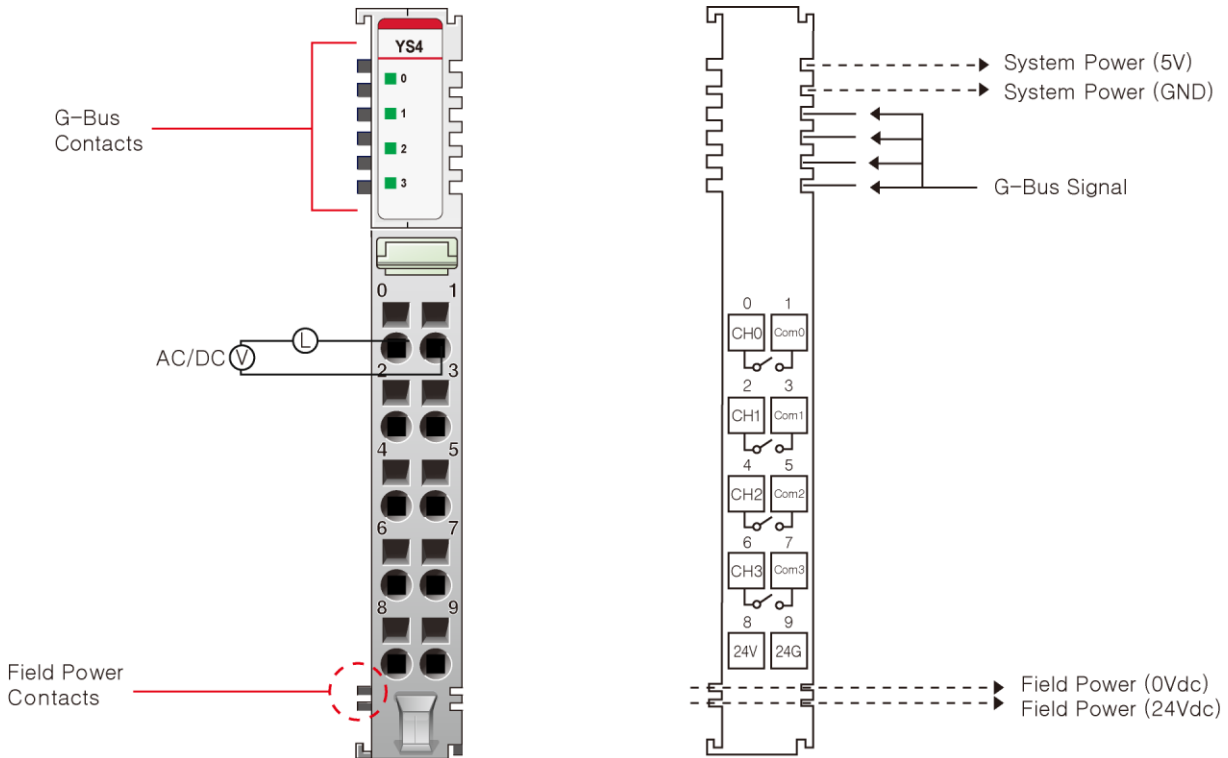
Valid Parameter Length: 8 Bytes

#### Parameter Data

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Fault Action (ch0 ~ ch7)				0: Fault value, 1: Hold last state			
Byte1	Fault Action (ch8 ~ ch15)				0: Fault value, 1: Hold last state			
Byte2	Fault Action (ch16 ~ ch23)				0: Fault value, 1: Hold last state			
Byte3	Fault Action (ch24 ~ ch31)				0: Fault value, 1: Hold last state			
Byte4	Fault Value (ch0 ~ ch7)				0: Off, 1: On			
Byte5	Fault Value (ch8 ~ ch15)				0: Off, 1: On			
Byte6	Fault Value (ch16 ~ ch23)				0: Off, 1: On			
Byte7	Fault Value (ch24 ~ ch31)				0: Off, 1: On			

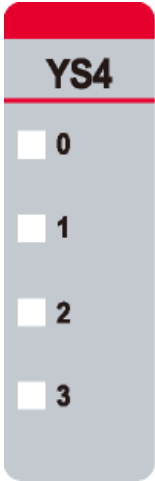
### 3.5 RIO3-YS4

#### 3.5.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Output Channel 0	COM 0	1
2	Output Channel 1	COM 1	3
4	Output Channel 2	COM 2	5
6	Output Channel 3	COM 3	7
8	Common (Field Power 24V)	Common (Field Power 0V)	9

### 3.5.2 LED Indicator



LED No.	LED Function / Description	LED Color
0	Output Channel 0	Green
1	Output Channel 1	Green
2	Output Channel 2	Green
3	Output Channel 3	Green

### 3.5.3 Channel Status LED

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

### 3.5.4 Environment Specification

Environmental Specification	
Operation Temperature	-40°C ~ 70°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	EN61000-6-4: 2007 +A1: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is possible
Product Certifications	CE, UL, EAC

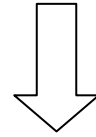
### 3.5.5 Specification

Items	Specification
<b>Output Specification</b>	
Output Per Module	4 Points Bi-directional
Indicators	4 Green Output Status LEDs
Relay Type	MOS Relay (Solid State Relay)
Output Voltage Range (Load Dependent)	Max. 240Vac @ 0.5A resistive Max. 240Vdc @ 0.5A resistive
Output Delay Time (Resistive Load)	Max. 240Vac / 240Vdc OFF to ON: Max. 0.6ms ON to OFF: Max. 3ms
Output Current Rating	Max. 0.5A / Channel
Frequency Range (Vac)	47 ~ 63Hz
Common Type	4 points / 2 Common
<b>General Specification</b>	
Power Dissipation	80mA @ 5Vdc
Isolation	I/O to Logic: Photocoupler Isolation
UL field power	Supply Voltage: 24Vdc nominal, Class 2
Field Power	Supply Voltage: 24Vdc nominal Voltage Range: 15 ~ 30Vdc (AC Power not used)
Wiring	I/O Cable Max. 2.0mm <sup>2</sup> (AWG 14)
Torque	0.8Nm (7 lb-in)
Weight	58g
Module Size	12mm x 99mm x 70mm

### 3.5.6 Mapping Data into the Image Table

#### Output Image Value

Bit No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Reserved				D3	D2	D1	D0



#### Output Module data

D3	D2	D1	D0
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### 3.5.7 Parameter Data

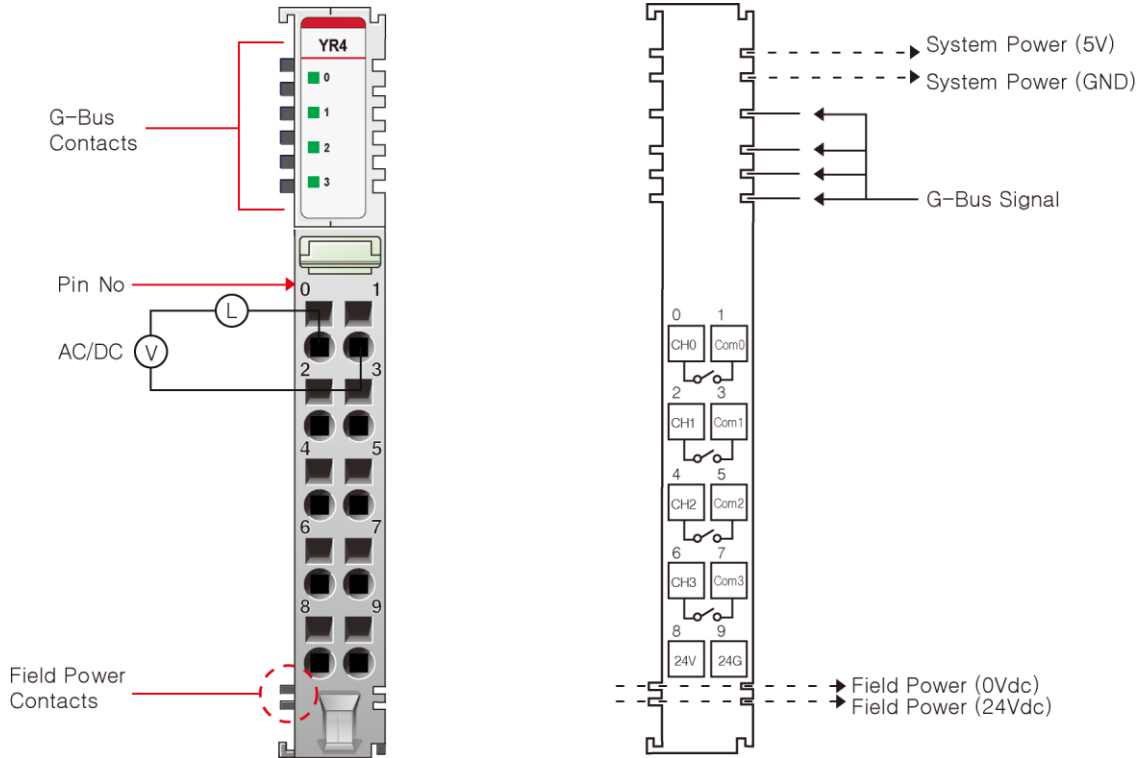
Valid Parameter Length: 2 Bytes

#### Parameter Data

Offset	Decimal Bit	Description	Default Value
Byte0	00-03	Fault Action (0~3) 0: Fault value, 1: Hold last state	0 (Fault value)
Byte1	00-03	Fault value (0~3) 0: Off, 1: On	0 (Off)

### 3.6 RIO3-YR4

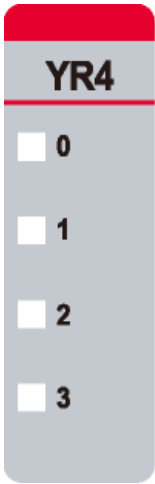
#### 3.6.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Output Channel 0	COM 0	1
2	Output Channel 1	COM 1	3
4	Output Channel 2	COM 2	5
6	Output Channel 3	COM 3	7
8	Common (Field Power 24V)	Common (Field Power 0V)	9



### 3.6.2 LED Indicator



LED No.	LED Function / Description	LED Color
0	Output Channel 0	Green
1	Output Channel 1	Green
2	Output Channel 2	Green
3	Output Channel 3	Green

### 3.6.3 Channel Status LED

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

### 3.6.4 Environment Specification

<b>Environmental Specification</b>	
Operation Temperature	-40°C ~ 60°C
UL Temperature	-20°C ~ 60°C
Storage Temperature	-40°C ~ 85°C
Relative Humidity	5% ~ 90% non-condensing
Mounting	DIN Rail
<b>General Specification</b>	
Shock Operating	IEC 60068-2-27
Vibration Resistance	Based on IEC 60068-2-6 DNVGL-CG-0039: 2016/6 Vibration Class B, 4g
Industrial Emissions	EN 61000-6-4: 2007 +A1: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is possible
Product Certifications	CE, UL, EAC

### 3.6.5 Specification

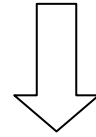
Items	Specification
<b>Output Specification</b>	
Output Per Module	4 Points Bi-directional
Indicators	4 Green Output Status LEDs
Relay Type	Form A, Single Pole Single Throw (SPST)
Output Voltage Range (Load Dependent)	0~32Vdc @ 2A resistive 48Vdc @ 0.8A resistive 110Vdc @ 0.5A resistive Max. 240Vac @ 2A resistive
Output Delay Time (Resistive Load)	OFF to ON: Max. 5ms @ 24Vdc ON to OFF: Max. 8ms @ 24Vdc OFF to ON: Max. 5ms @ 220Vac ON to OFF: Max. 15ms @ 220Vac
Output Current Rating (At Rated Power)	2.0A @ 0~32Vdc 0.8A @ 48Vdc 0.5A @ 110Vdc 2.0A @ 240Vac  -40°C ~ 70°C (2A Load 2ch) -40°C ~ 60°C (2A Load 4ch)
Expected Contact Life	20M Cycles (Resistive)
Max. On-State Voltage Drop	0.5V @ 2A, Resistive Load, 24Vdc
Frequency Range (Vac)	47 ~ 63Hz
Common Type	4 points / 2 COM
<b>General Specification</b>	
Power Dissipation	Max. 35mA @ 5Vdc
Isolation	I/O to Logic: Photocoupler Isolation Field Power: Non-Isolation
Field Power	Supply Voltage: 24Vdc nominal Voltage Range: 22 ~ 26Vdc Power dissipation: 30mA @ 24Vdc (AC Power not used)
Wiring	I/O Cable Max. 2.0mm <sup>2</sup> (AWG 14)
Weight	58g
Module Size	12mm x 99mm x 70mm

\* Voltage Drop specification is dependent on the cable length due to the high load.

### 3.6.6 Mapping Data into the Image Table

Output Image Value

Bit No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Reserved				D3	D2	D1	D0



Output Module data

D3	D2	D1	D0
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### 3.6.7 Parameter Data

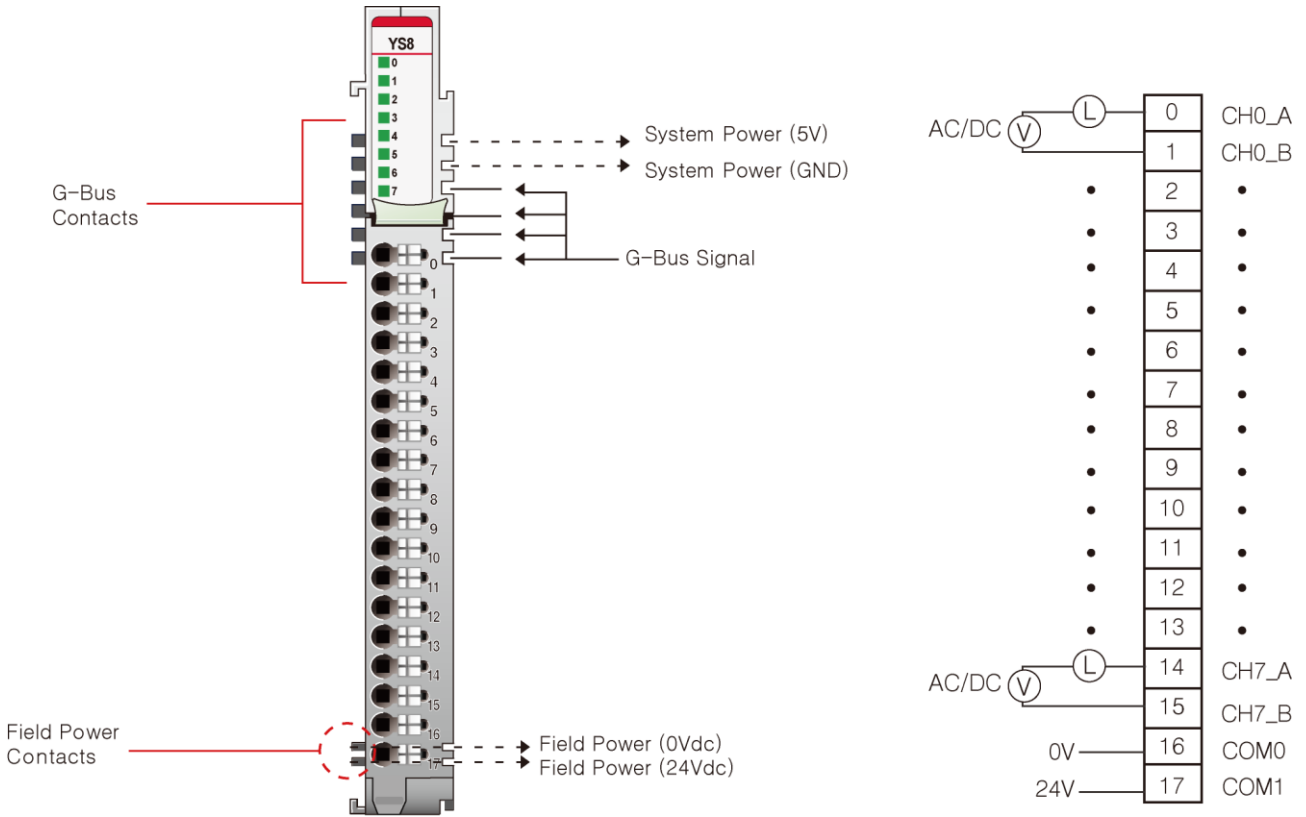
Valid Parameter Length: 2 Bytes

Parameter Data

Offset	Decimal Bit	Description	Default Value
Byte0	00-03	Fault Action (0 ~ 3) 0: Fault value, 1: Hold last state	0 (Fault value)
Byte1	00-03	Fault value (0~3) 0: Off, 1: On	0 (Off)

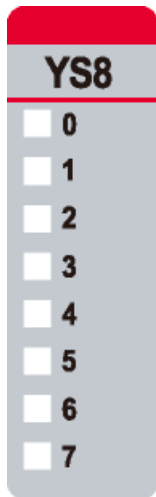
### 3.7 RIO3-YS8

#### 3.7.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Output Channel 0_A	Output Channel 0_B	1
2	Output Channel 1_A	Output Channel 1_B	3
4	Output Channel 2_A	Output Channel 2_B	5
6	Output Channel 3_A	Output Channel 3_B	7
8	Output Channel 4_A	Output Channel 4_B	9
10	Output Channel 5_A	Output Channel 5_B	11
12	Output Channel 6_A	Output Channel 6_B	13
14	Output Channel 7_A	Output Channel 7_B	15
16	Common (Field Power 0V)	Common (Field Power 24V)	17

### 3.7.2 LED Indicator



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

### 3.7.3 Channel Status LED

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

### 3.7.4 Environment Specification

Environmental Specification	
Operation Temperature	-40°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: 2008/15g, 11ms
Vibration Resistance	Based on IEC 60068-2-6 DNVGL-CG-0039: 2016/6 Vibration Class B, 4g
Industrial Emissions	EN61000-6-4: 2007 +A1: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is possible
Product Certifications	CE, UL, EAC

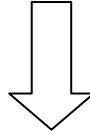
### 3.7.5 Specification

Items	Specification
<b>Output Specification</b>	
Output Per Module	8 points bi-directional
Indicators	8 Green Output State
Relay type	MOS Relay (solid state relay)
Output Voltage Range (Load dependent)	240Vac @ 0.5A resistive 240Vdc @ 0.5A resistive
Output delay time (Resistive load)	Max. AC/DC: 240V OFF to ON: Max. 0.5ms ON to OFF: Max. 2.5ms
Output current rating	Max. 0.5A per channel
Frequency range (Vac)	47 ~ 63Hz
Open-state leakage current	Max. 40uA
Common Type	8 points / 2 COM
<b>General Specification</b>	
Power Dissipation	Max. 130mA @ 5Vdc
Isolation	I/O to Logic: Photocoupler Isolation
UL field power	Supply voltage: 24Vdc nominal, Class 2
Field Power	Supply Voltage: 24Vdc nominal Voltage Range: 15 ~ 30Vdc (AC Power Not Used)
Wiring	I/O Cable Max. 0.75mm <sup>2</sup> (AWG 18)
Weight	63g
Module Size	12mm x 109mm x 70mm

### 3.7.6 Mapping Data into the Image Table

#### Output Image Value

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	D7	D6	D5	D4	D3	D2	D1	D0



#### Output Module data

D7	D6	D5	D4	D3	D2	D1	D0
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### 3.7.7 Parameter Data

Valid Parameter Length: 2 Bytes

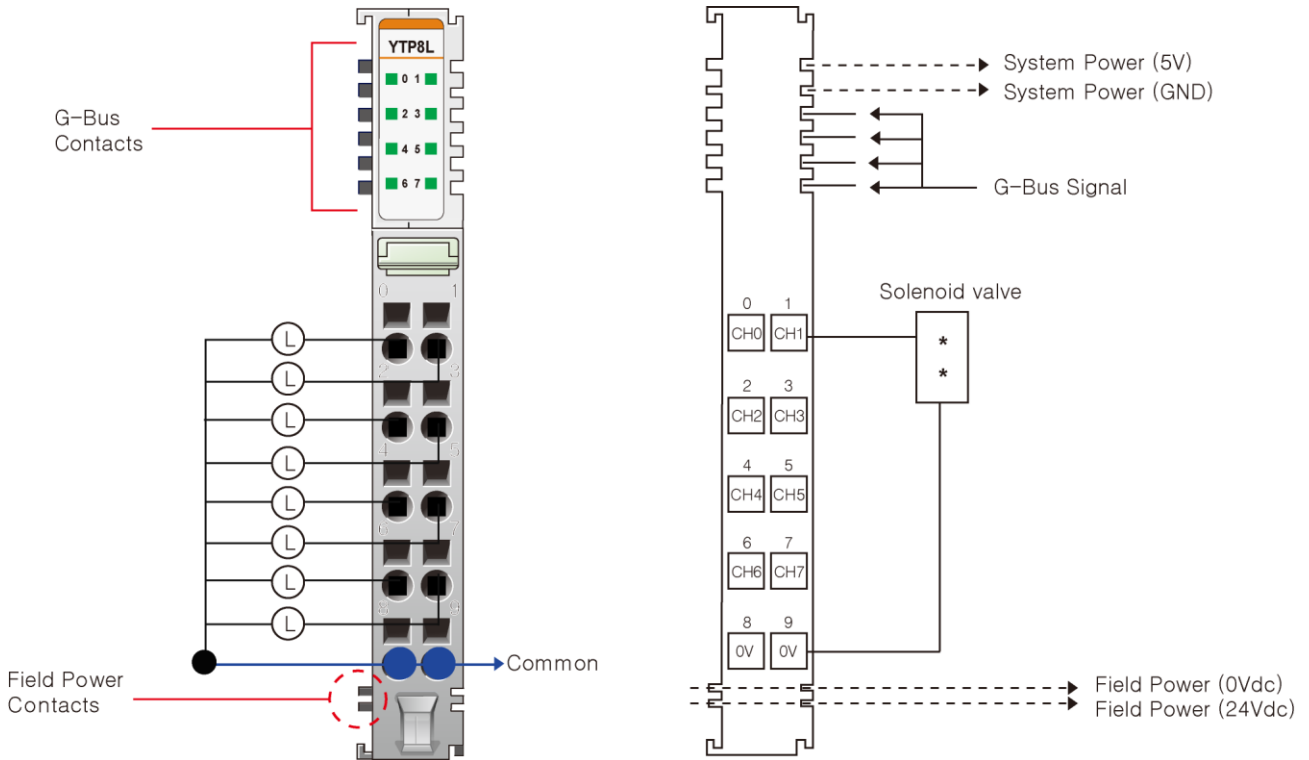
#### Parameter Data

Offset	Decimal Bit	Description	Default Value
0	00-07	Fault Action (0~7)	0 (Fault Value)
1	00-07	0: Fault Value, 1: Hold last state Fault Value (0~7): off, 1: on	0 (off)



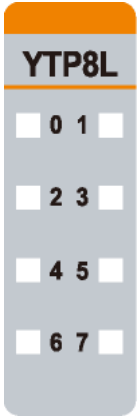
### 3.8 RIO3-YTP8L

#### 3.8.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Common (Field Power 0V)	Common (Field Power 0V)	9

### 3.8.2 LED Indicator



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

### 3.8.3 Channel Status LED

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

### 3.8.4 Environment Specification

Environmental Specification	
Operation Temperature	-40°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: 2008/15g, 11ms
Vibration Resistance	Based on IEC 60068-2-6 DNVGL-CG-0039: 2016/6 Vibration Class B, 4g
Industrial Emissions	EN61000-6-4: 2007 +A1: 2011
Industrial Immunity	EN 61000-6-2: 2005
Installation Position	Vertical and horizontal installation is possible
Product Certifications	CE, UL, EAC

### 3.8.5 Specification

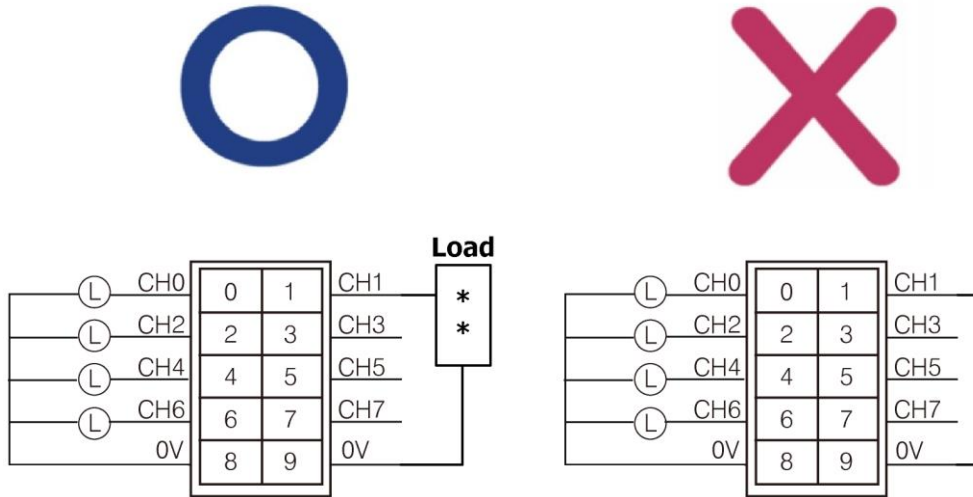
Items	Specification
<b>Output Specification</b>	
Output per module	8 points source type
Indicators	8 green Output status
Output voltage range	24Vdc nominal Min. 15Vdc ~ Max. 30Vdc
On-state voltage drop	3.0Vdc @ 2A
On-state min. current	Min. 1mA
Off-state leakage current	Max. 3uA
Output signal delay	OFF to ON: Max. 0.9ms ON to OFF: Max. 0.9ms
Output current rating	Max. 2A per channel
Protection*	None
Common type	8 points / 2 COM
<b>General Specification</b>	
Power Dissipation	Max. 40mA @ 5Vdc
Isolation	I/O to Logic: photocoupler isolation Field power: non-isolation
UL field power	Supply voltage: 24Vdc nominal, Class 2
Field Power	Supply Voltage: 24Vdc nominal Voltage Range: 15 ~ 30Vdc
Wiring	I/O Cable Max. 2.0mm <sup>2</sup> (AWG 14)
Weight	60g
Module Size	12mm x 99mm x 70mm

\* Check the 3.8.6 Wiring information

### 3.8.6 Wiring information

Observe the following instructions for wiring

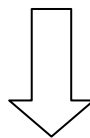
- Observe the maximum Output current of the I/O Module. Parts may be damaged.
- Do not connect the input and GND pins without any load. Parts may be damaged.



### 3.8.7 Mapping Data into the Image Table

Output Image Value

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	D7	D6	D5	D4	D3	D2	D1	D0



Output Module data

D7	D6	D5	D4	D3	D2	D1	D0
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### 3.8.8 Parameter Data

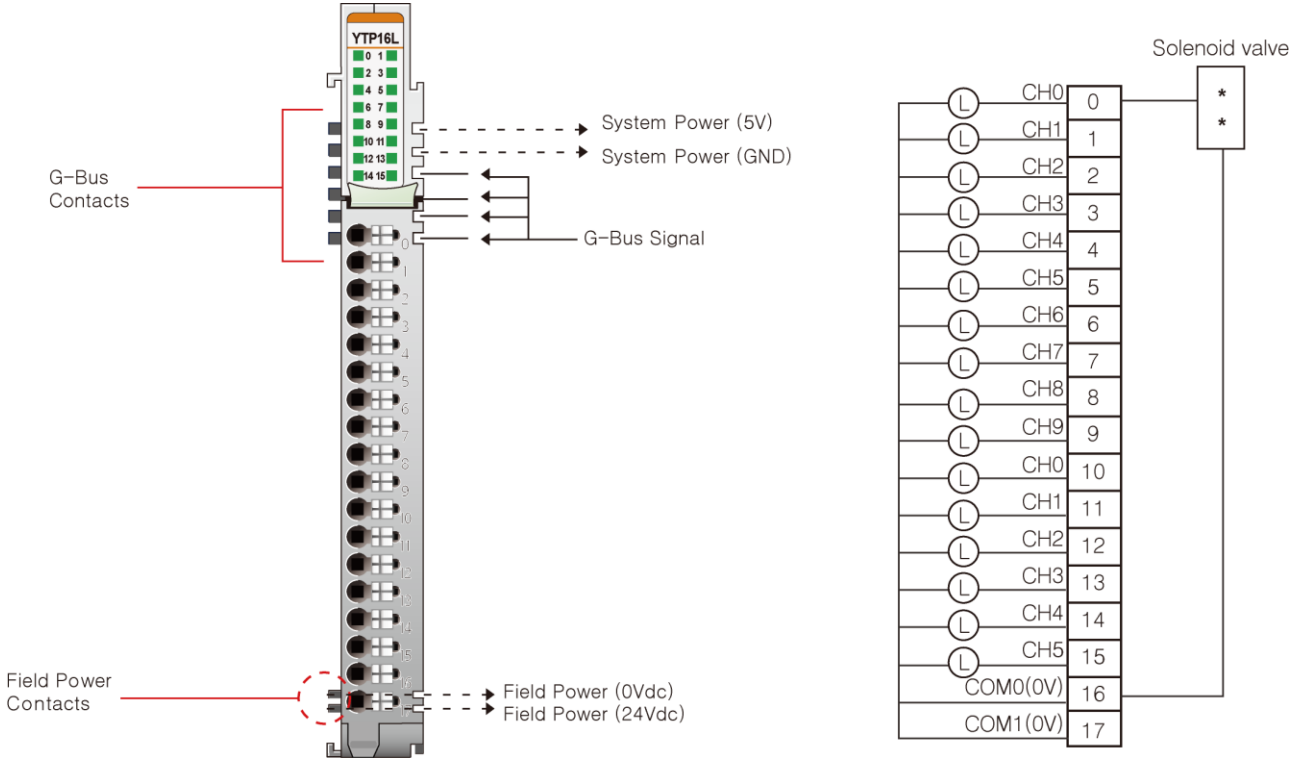
Valid Parameter Length: 2 Bytes

Parameter Data

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Fault Action (ch0 ~ ch7) 0: Fault value, 1: Hold last state							
Byte1	Fault value (ch0 ~ ch7) 0: Off, 1: On							

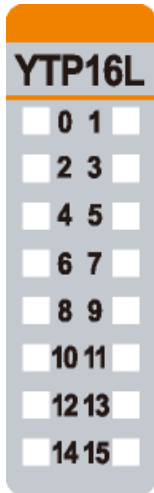
### 3.9 RIO3-YTP16L

#### 3.9.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Output Channel 0	Output Channel 1	1
2	Output Channel 2	Output Channel 3	3
4	Output Channel 4	Output Channel 5	5
6	Output Channel 6	Output Channel 7	7
8	Output Channel 8	Output Channel 9	9
10	Output Channel 10	Output Channel 11	11
12	Output Channel 12	Output Channel 13	13
14	Output Channel 14	Output Channel 15	15
16	Common (Field Power 0V)	Common (Field Power 0V)	17

### 3.9.2 LED Indicator



LED No.	LED Function / Description	LED Color
0	Output Channel 0	Green
1	Output Channel 1	Green
2	Output Channel 2	Green
3	Output Channel 3	Green
4	Output Channel 4	Green
5	Output Channel 5	Green
6	Output Channel 6	Green
7	Output Channel 7	Green
8	Output Channel 8	Green
9	Output Channel 9	Green
10	Output Channel 10	Green
11	Output Channel 11	Green
12	Output Channel 12	Green
13	Output Channel 13	Green
14	Output Channel 14	Green
15	Output Channel 15	Green

### 3.9.3 Channel Status LED

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

### 3.9.4 Environment Specification

Environmental Specification	
Operation Temperature	-40°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: 2008/15g, 11ms
Vibration Resistance	Based on IEC 60068-2-6 DNVGL-CG-0039: 2016/6 Vibration Class B, 4g
Industrial Emissions	EN61000-6-4: 2007 +A1: 2011
Industrial Immunity	EN 61000-6-2: 2005

Installation Position	Vertical and horizontal installation is possible
Product Certifications	CE, UL, EAC

### 3.9.5 Specification

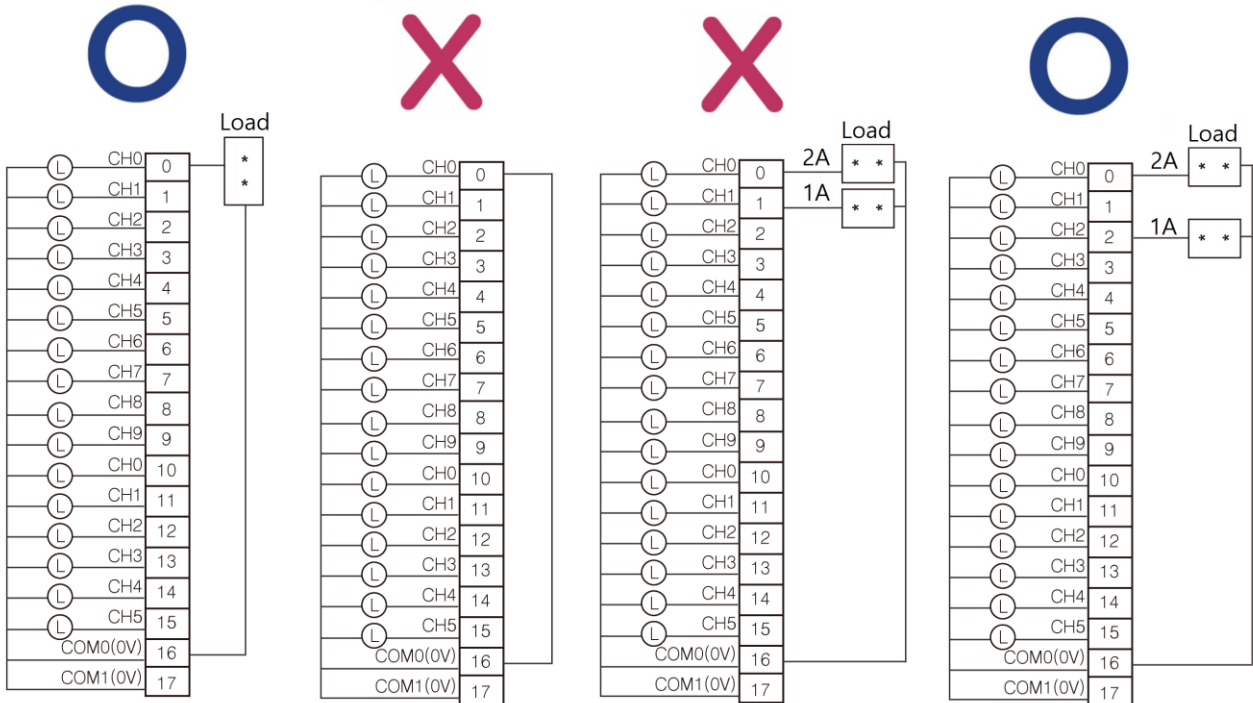
Items	Specification
<b>Output Specification</b>	
Output per module	16 points source type
Indicators	16 green Output status
Output voltage range	24Vdc nominal Min. 15Vdc ~ Max. 30Vdc
On-state voltage drop	3.00Vdc @ 2A
On-state min. current	Min. 1mA
Off-state leakage current	Max. 3uA
Output signal delay	OFF to ON: Max. 0.9ms ON to OFF: Max. 0.9ms
Output current rating(1)	Max. 2A per channel
Protection*	None
Common type	16 points / 2 COM
<b>General Specification</b>	
Power Dissipation	Max. 50mA @ 5Vdc
Isolation	I/O to Logic: photocoupler isolation Field power: non-isolation
UL field power	Supply voltage: 24Vdc nominal, Class 2
Field Power	Supply Voltage: 24Vdc nominal Voltage Range: 15 ~ 30Vdc
Wiring	I/O Cable Max. 0.75mm <sup>2</sup> (AWG 18)
Weight	63g
Module Size	12mm x 109mm x 70mm

\* Check the 3.9.6 Wiring information

### 3.9.6 Wiring information

Observe the following instructions for wiring

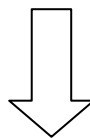
- Observe the maximum Output current of the I/O Module. Parts may be damaged.
- Do not connect the input and GND pins without any load. Parts may be damaged.



### 3.9.7 Mapping Data into the Image Table

Output Image Value

Bit No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	D7	D6	D5	D4	D3	D2	D1	D0
Byte1	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



### 3.9.8 Parameter Data

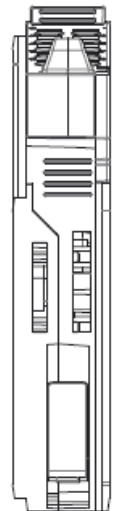
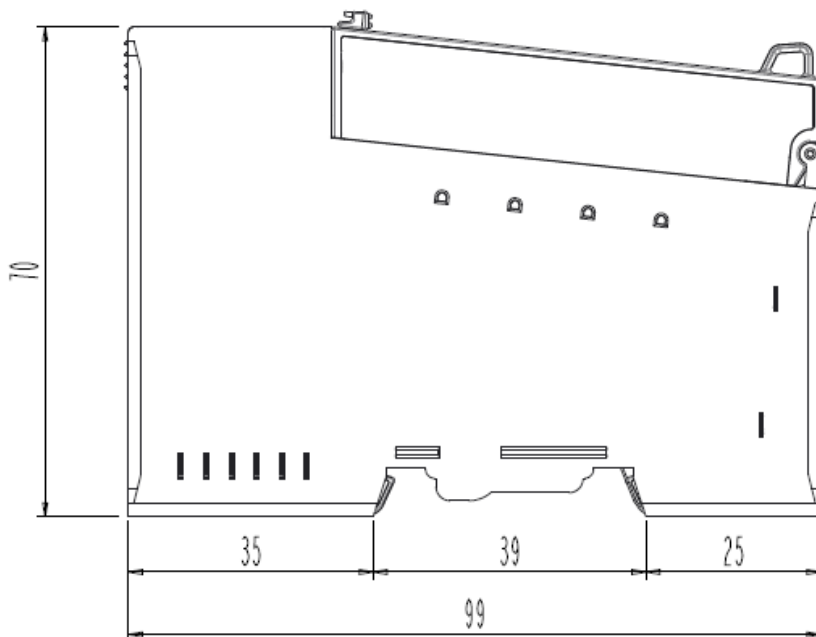
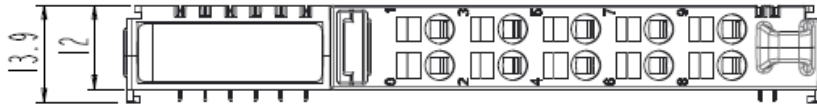
Valid Parameter Length: 4 Bytes

Parameter Data

Bit No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
<b>Byte0</b>	Fault Action (ch0 ~ ch7)				0: Fault value, 1: Hold last state			
<b>Byte1</b>	Fault Action (ch8 ~ ch15)				0: Fault value, 1: Hold last state			
<b>Byte2</b>	Fault Value (ch0 ~ ch7)				0: Off, 1: On			
<b>Byte3</b>	Fault Value (ch8 ~ ch15)				0: Off, 1: On			

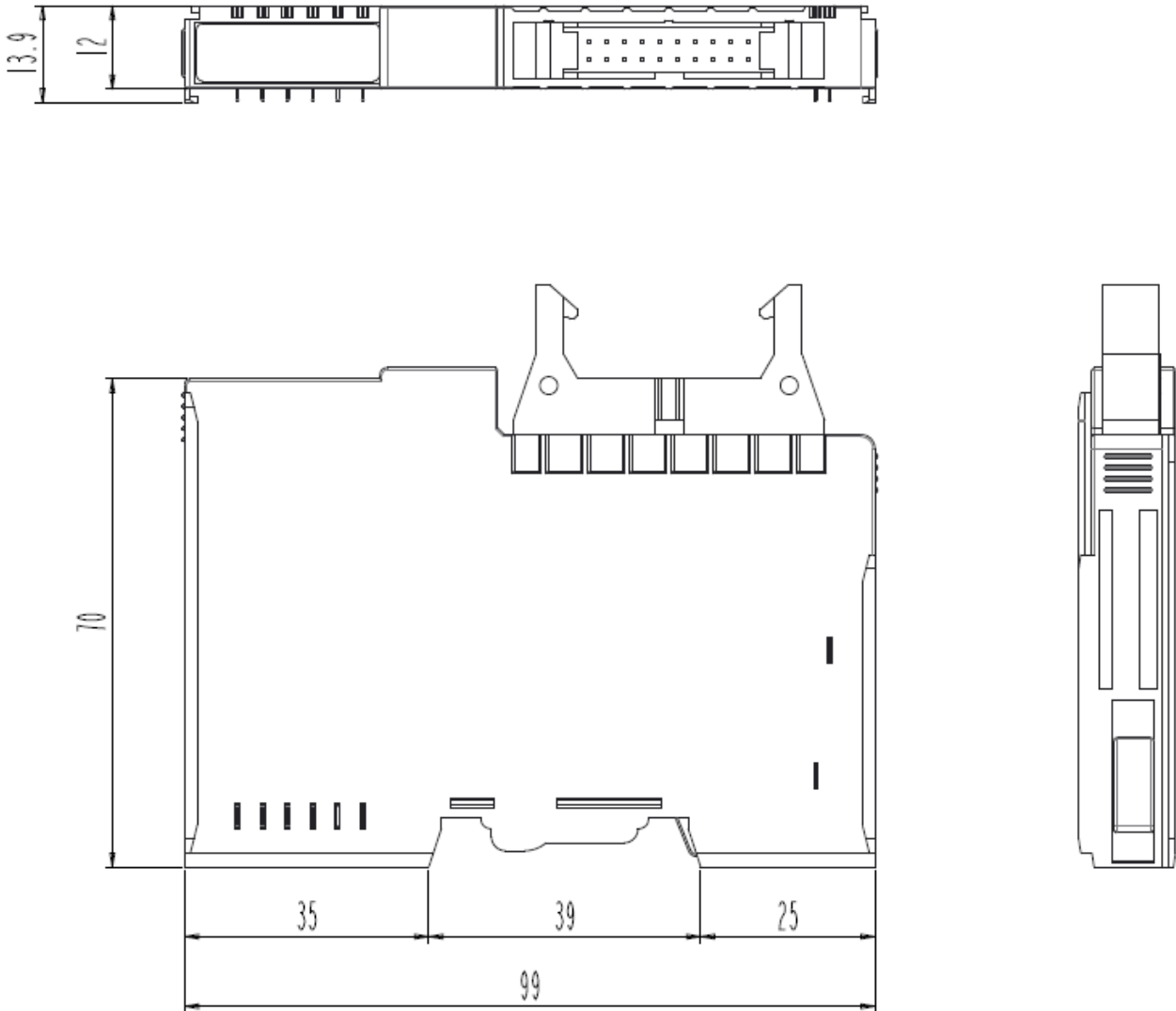
## 4 Dimension

### 4.1 10-Pts. Spring Type



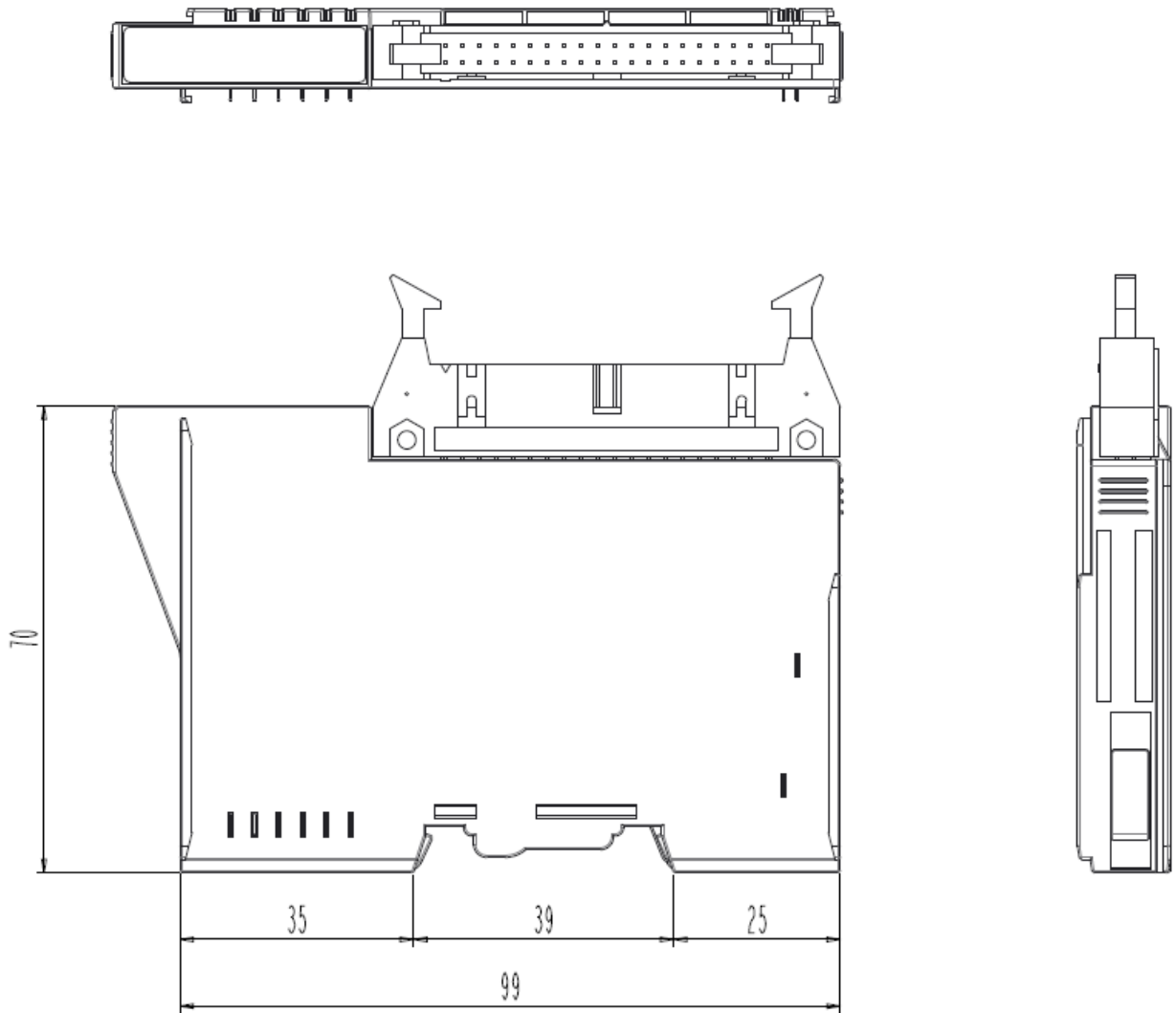
*Dimensions in mm*

## 4.2 20-Pin Connector Type



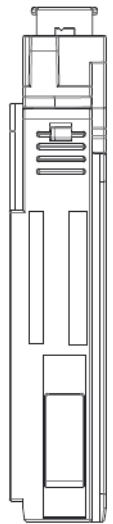
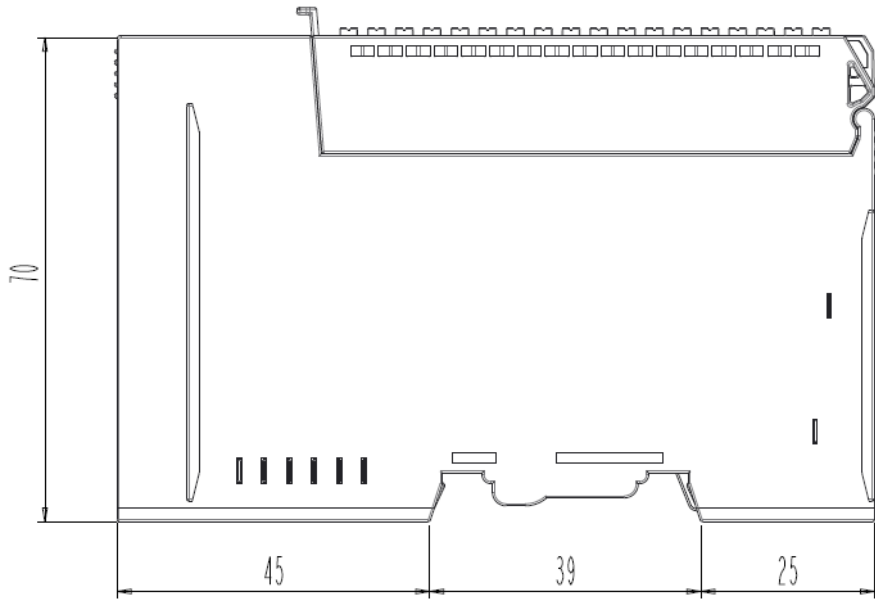
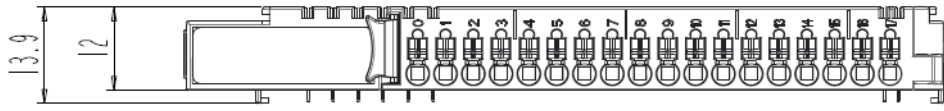
*Dimensions in mm*

### 4.3 40-Pin Connector Type



*Dimensions in mm*

### 4.4 18-Pts. Spring Type



*Dimensions in mm*

## 5 Mounting

### Caution!

#### Hot surface!

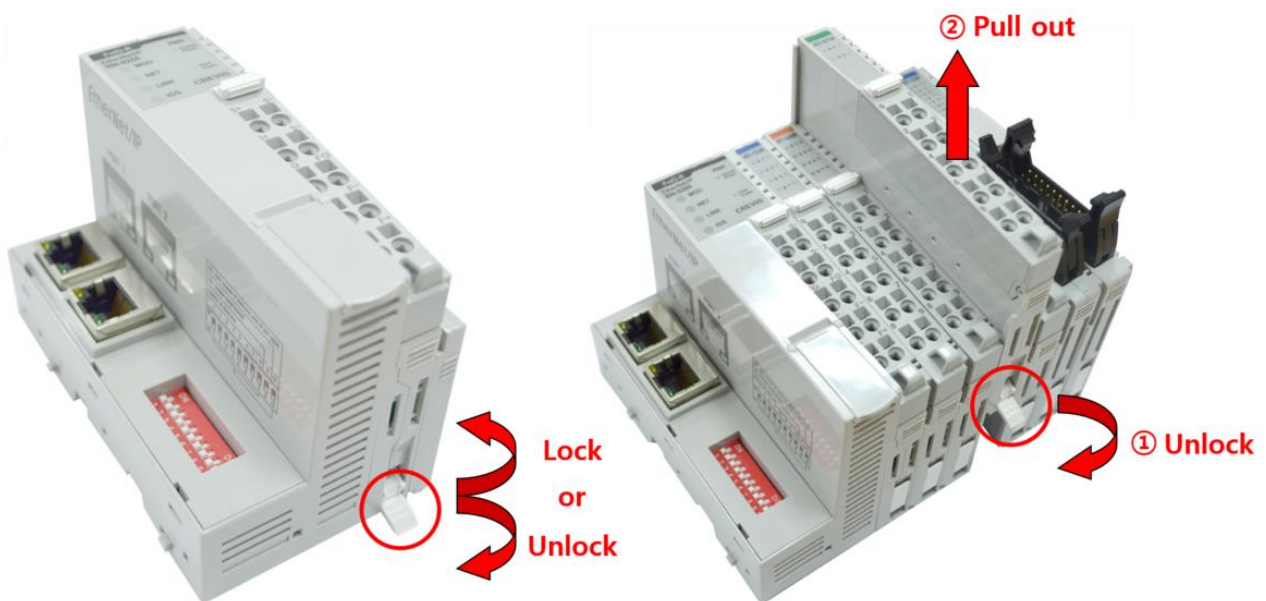
The surface of the housing can become hot during operation. If the device was operated at high ambient temperatures, allow it to be cool before touching it.

### Notice!

#### Perform work on devices only if they are de-energized!

Working on energized devices can damage them. Therefore, turn off the power supply before working on the devices.

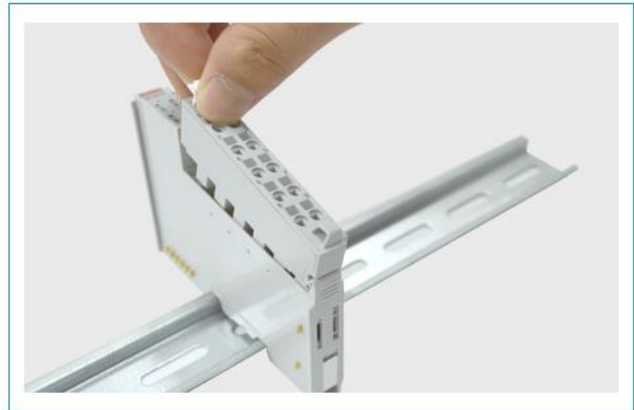
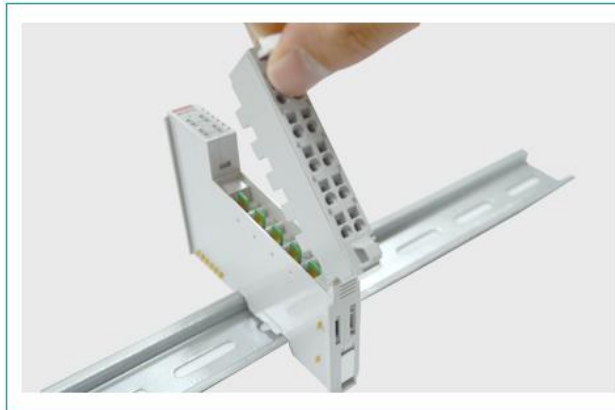
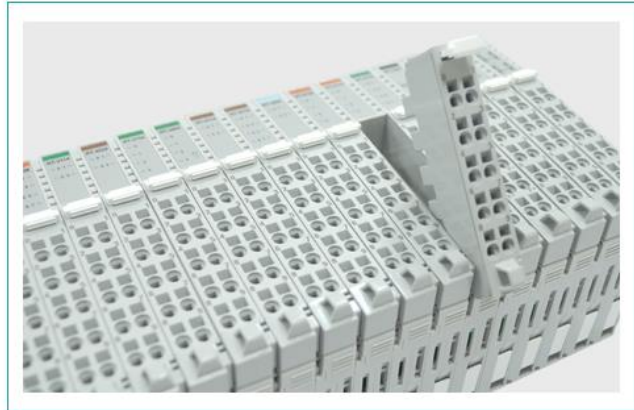
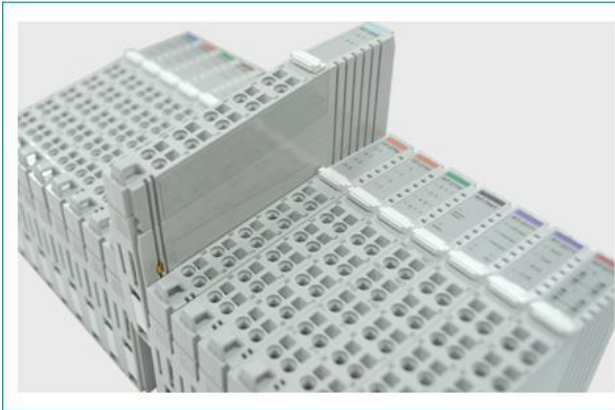
### 5.1 I/O Inserting and Removing Devices



As above figure in order to safeguard the RIO3-Series module from jamming, it should be fixed onto the DIN rail with locking lever. To do so, fold on the upper of the locking lever.

To pull out the HX-RIO3-Series module, unfold the locking lever as below figure.

## 5.2 RTB (Removable Terminal Block)



Whole terminal block can be combined and removed for the convenience.  
There is a locking switch on the RTB for the easy combination and easy removal.  
Easy combination and easy removal for I/O modules on the DIN rail through One Touch Locking Switch.

## 6 G-Bus Pin Description

Communication between the Network Adapter 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.



\*Please refer to the table below regarding the pin description from P1 to P8.

No.	Description
P1	Field Power (VCC)
P2	Field Power (GND)
P3	GBUS CLK
P4	GBUS MISO
P5	GBUS MOSI
P6	GBUS Token
P7	System Power (GND)
P8	System Power (VCC)

### DANGER



Do not touch data and field power pins in order to avoid soiling and damage by ESD noise.



## 7 APPENDIX A

### 7.1 Product List

Please refer the separate HX-RIO3 product list document

### 7.2 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.