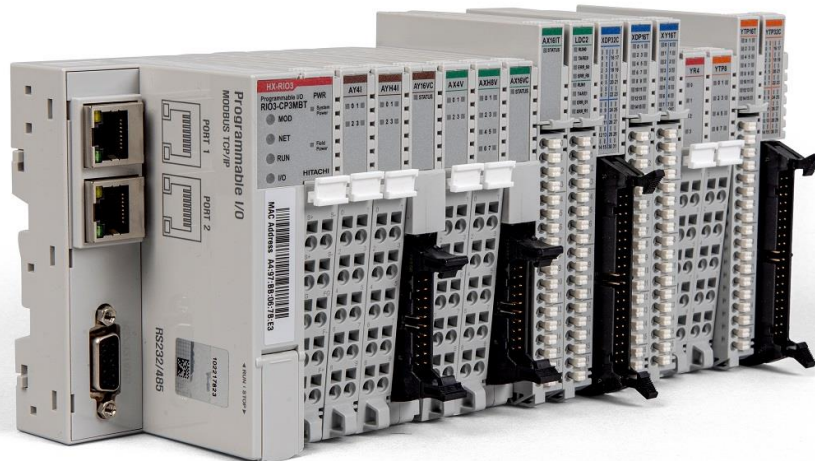


Digital Input Module

RIO3-X... User Manual



Version 1.02

REVISION HISTORY				
REV	PAGE	REMARKS	DATE	EDITOR
1.01		New Document	Nov 2020	(OPR), (PF)
1.02		RIO3-XY16TF added	Aug 2021	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 nearby 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 Instruction

1.1.1 Symbols

<p>DANGER</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>IMPORTANT</p>	<p>Identifies information that is critical for successful application and understanding of the product.</p>
<p>ATTENTION</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>DANGER</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, such as the G-BUS 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

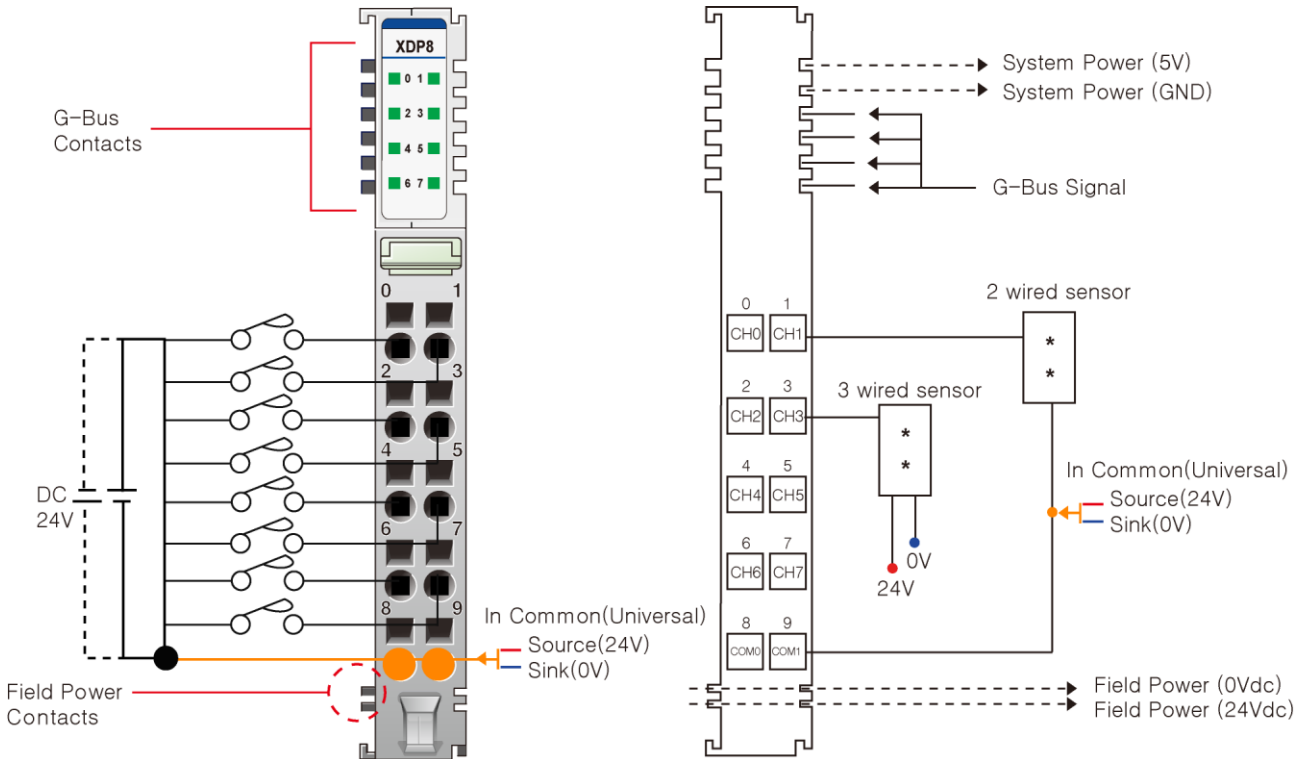
2 Digital Input Module List

RIO3-Number	Description	ID (hex)
RIO3-XDP8	Digital Input, 8 Points, Universal (Sink or Source), 24VDC, 10RTB	1238
RIO3-XDP16C	Digital Input, 16 Points, Universal (Sink or Source), 24VDC, 20P Connector	123F
RIO3-XDP16T	Digital Input, 16Points, Universal (Sink or Source), 24VDC, 18RTB	12DF
RIO3-XDP32C	Digital Input, 32 Points, Universal (Sink or Source), 24VDC, 40P Connector	12FA
RIO3-XAH4	Digital Input, 4 Points, AC Type, 220VAC, 10 RTB	1904
RIO3-XY16T	8 Ch Sink Input / 8 Ch Source Output with Diagnostic, 24Vdc	1428
RIO3-XY16TF	16 Ch. Flexible Sink Input / Source Output with Diagnostic, 24Vdc	1B7F

3 Specification

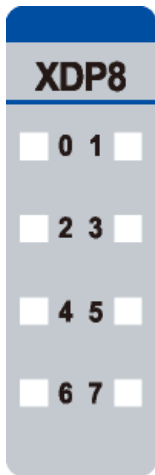
3.1 RIO3-XDP8

3.1.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Common (Sink: 0V / Source: 24V)	Common (Sink: 0V / Source: 24V)	9

3.1.2 LED Indicator



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

3.1.3 Channel Status LED

Status	LED	To indicate
No signal	Off	No Input Signal
On Signal	Green	Input signal received

3.1.4 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	EN61000-6-2: 2005
Installation Position	Vertical and horizontal installation is possible
Product Certifications	CE, UL, EAC

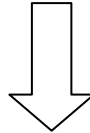
3.1.5 Specification

Items	Specification
Input Specification	
Inputs Per Module	8 Points Universal Type
Indicators	8 Green Input Status
ON-state Voltage	24Vdc 15 ~ 26.4Vdc @ 70°C 15 ~ 28.8Vdc @ 60°C
ON-state Current	4mA @ 24Vdc 5mA @ 30Vdc
Off-state Voltage	12.5Vdc @ 25°C
Input Signal Delay	OFF to ON: Max. 0.3ms ON to OFF: Max. 0.3ms
Input Filter	Adjustable, up to 10ms
Nominal Input Impedance	5.4 kΩ Typical
Common Type	8 Points / 2 Common (Universal)
General Specification	
Power Dissipation	Max. 35mA @ 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 Power Dissipation: 0mA @ 24Vdc
Wiring	I/O Cable Max. 2.0mm ² (AWG 14)
Torque	0.8Nm (7lb-in)
Weight	59g
Module Size	12mm x 99mm x 70mm

3.1.6 Mapping Data into the Image Table.

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

3.1.7 Parameter Data

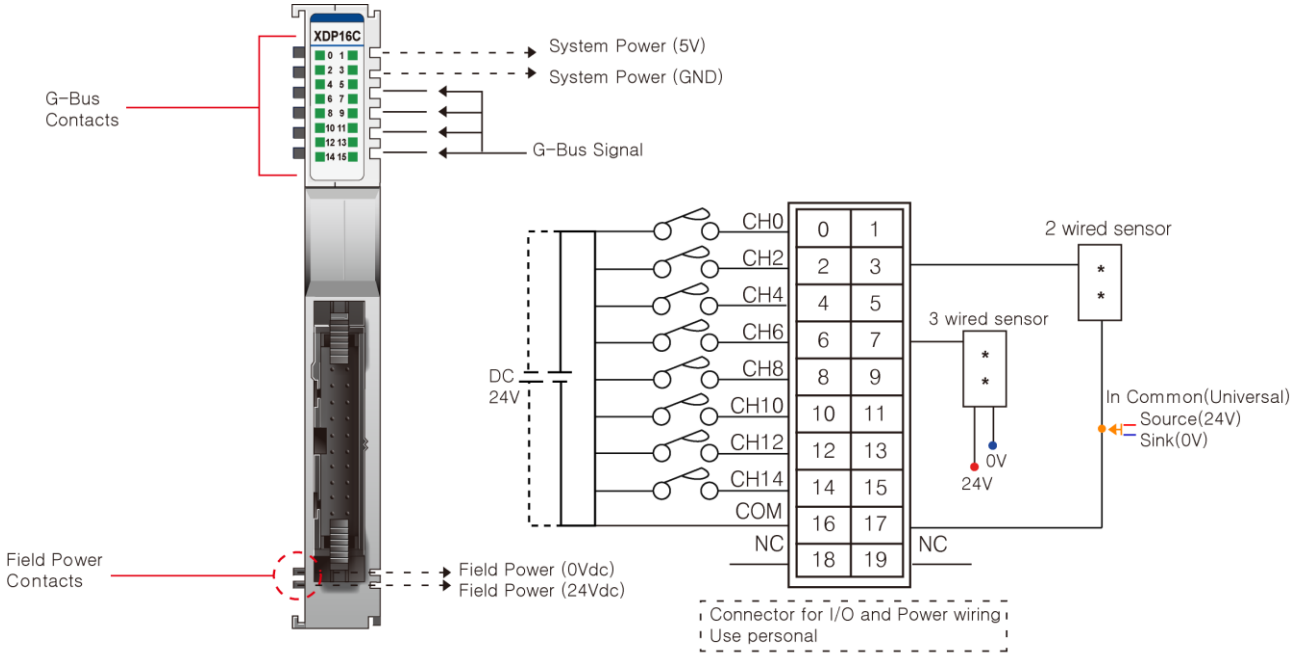
Valid Parameter length: 2 Bytes

Parameter Data

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	Input Filter Value: 0 ~ 10 (unit: ms)							
Byte 1	Reserved							

3.2 RIO3-XDP16C

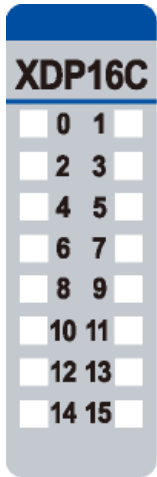
3.2.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Input Channel 8	Input Channel 9	9
10	Input Channel 10	Input Channel 11	11
12	Input Channel 12	Input Channel 13	13
14	Input Channel 14	Input Channel 15	15
16	Common (Sink: 0V / Source: 24V)	Common (Sink: 0V / Source: 24V)	17
18	NC	NC	19

* Although the image above is RIO3-(Universal input module), it does not matter to refer to wiring diagram. Refer to the Sink (0V).

3.2.2 LED Indicator



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

3.2.3 Channel Status LED

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

3.2.4 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	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

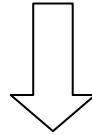
3.2.5 Specification

Items	Specification
Input Specification	
Inputs Per Module	16 Points Universal Type
Indicators	16 Green Input Status
ON-state Voltage	24Vdc nominal 15 ~ 30Vdc @ 60°C
ON-state Current	2.25mA @ 24Vdc 3mA @ 30Vdc
OFF-state voltage	9.3Vdc @ 25°C
Input Signal Delay	OFF to ON: Max. 0.3ms ON to OFF: Max. 0.3ms
Input Filter	Adjustable, up to 10ms
Nominal Input Impedance	10.2 kΩ Typical
Common Type	16 Points / 2 COM
General Specification	
Power Dissipation	Max. 50mA @ 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 Power Dissipation: 0mA @ 24Vdc
Wiring	Connector Type, up to AWG22 Module Connector: HIF3BA-20D-2.54DSA
Weight	52g
Module Size	12mm x 99mm x 70mm

3.2.6 Mapping Data into the Image Table

Input Module Data

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



Input 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

3.2.7 Parameter Data

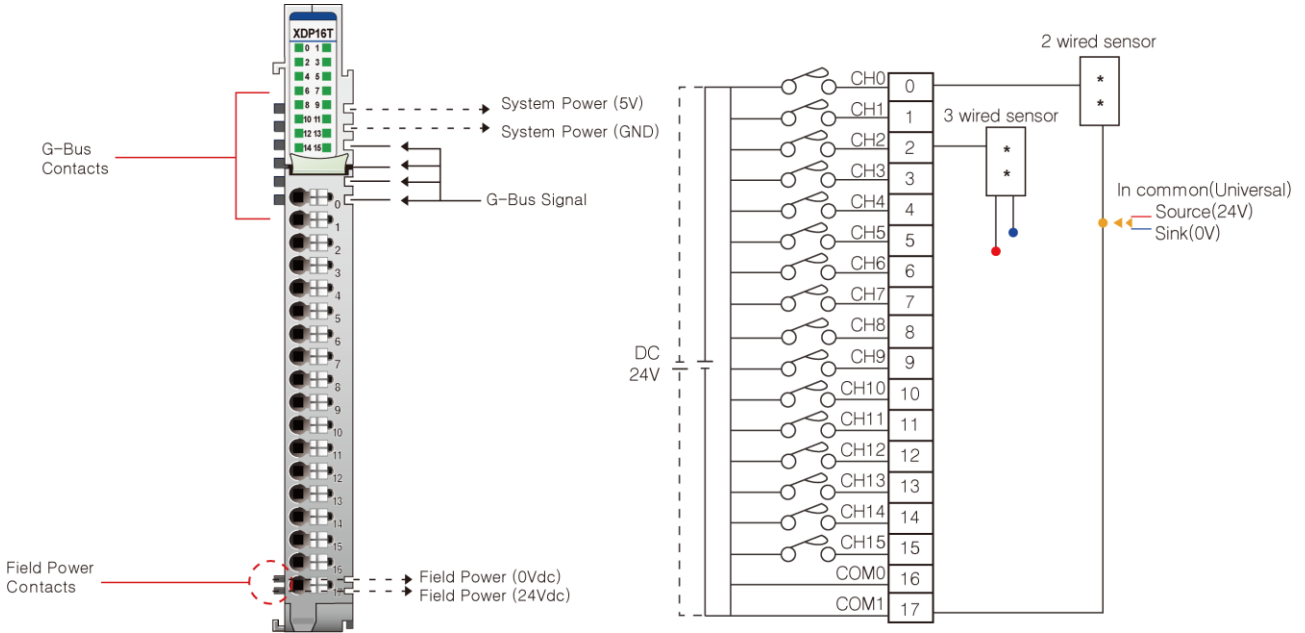
Valid Parameter length: 2 Bytes

Parameter Data

Bit No.	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	Input Filter Value: 0 ~ 10 (unit: ms)							
Byte 1	Reserved							

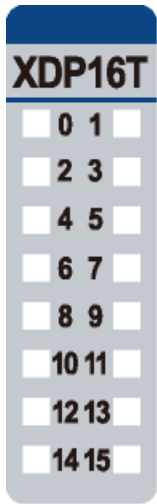
3.3 RIO3-XDP16T

3.3.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Input Channel 8	Input Channel 9	9
10	Input Channel 10	Input Channel 11	11
12	Input Channel 12	Input Channel 13	13
14	Input Channel 14	Input Channel 15	15
16	Common (Sink 0V / Source 24V)	Common (Sink 0V / Source 24V)	17

3.3.2 LED Indicator



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

3.3.3 Channel Status LED

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

3.3.4 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	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

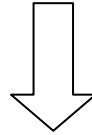
3.3.5 Specification

Items	Specification
Input Specification	
Inputs per module	16 Points Universal Digital Type
Indicators	16 Green input state
ON-state Voltage	24Vdc nominal 15 ~ 26.4Vdc @ 60°C
ON-state current	4mA @ 24Vdc 5mA @ 30Vdc
OFF-state voltage	12.5Vdc @ 25°C
Input Signal Delay	OFF to ON: 0.3ms Max ON to OFF: 0.3ms Max
Input filter	Adjustable, up to 10ms
Nominal Input Impedance	5.6 kΩ typical
COMMON Type	16 points / 2 COM
General specification	
Power dissipation	Max. 50mA @ 5.0Vdc
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 Power dissipation: 0mA @ 24Vdc
Single Wiring	I/O Cable Max. 0.75mm ² (AWG 18)
Weight	63g
Module Size	12mm x 109mm x 70mm

3.3.6 Mapping Data into the Image Table

Input Module Data

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



Input 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

3.3.7 Parameter Data

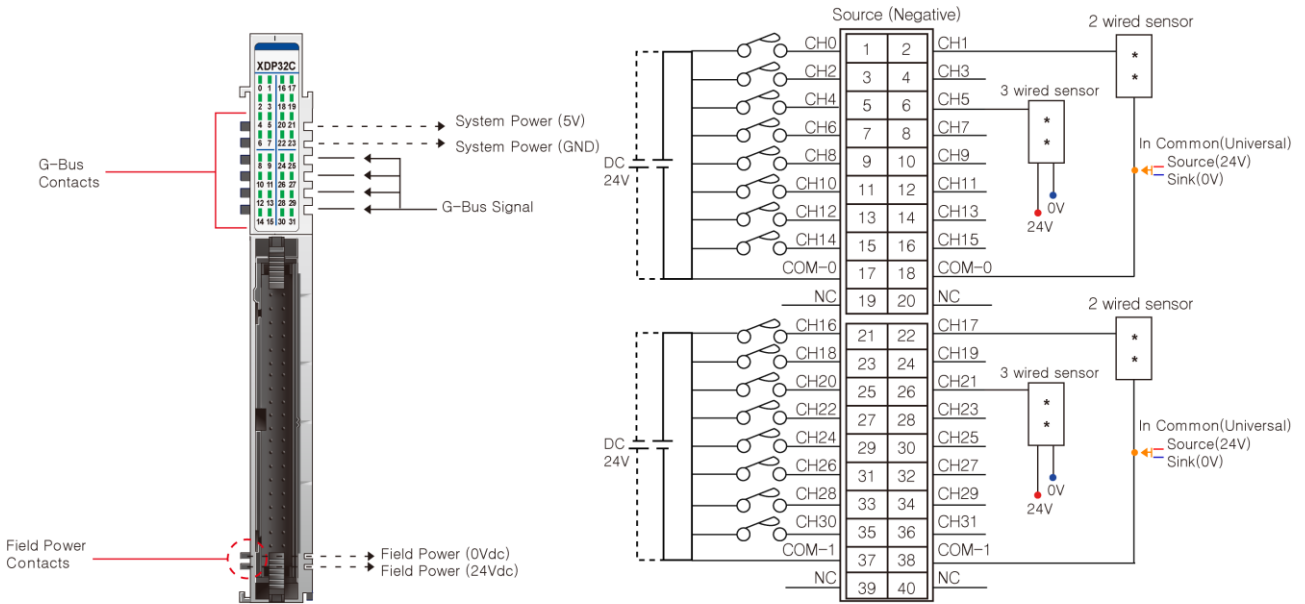
Valid Parameter length: 2 Bytes

Parameter Data

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte0	Input Filter value: 0 ~ 10 (unit: ms)							
Byte1	Reserved							

3.4 RIO3-XDP32C

3.4.1 Wiring Diagram

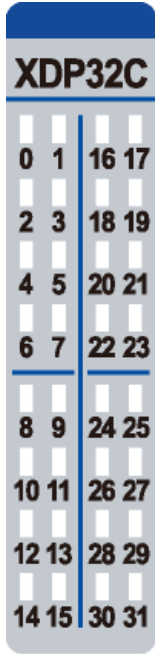


Pin No.	Signal Description	Signal Description	Pin No.
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel 4	Input Channel 5	5
6	Input Channel 6	Input Channel 7	7
8	Input Channel 8	Input Channel 9	9
10	Input Channel 10	Input Channel 11	11
12	Input Channel 12	Input Channel 13	13
14	Input Channel 14	Input Channel 15	15
16	Common (Sink 0V / Source 24V)	Common Sink 0V / Source 24V)	17
18	NC	NC	19
20	Input Channel 16	Input Channel 17	21
22	Input Channel 18	Input Channel 19	23
24	Input Channel 20	Input Channel 21	25
26	Input Channel 22	Input Channel 23	27
28	Input Channel 24	Input Channel 25	29
30	Input Channel 26	Input Channel 27	31
32	Input Channel 28	Input Channel 29	33
34	Input Channel 30	Input Channel 31	35

36	Common (Sink 0V / Source 24V)	Common (Sink 0V / Source 24V)	37
38	NC	NC	39

* Although the image above is RIO3-(Universal input module), it does not matter to refer to wiring diagram. Refer to the Sink (0V).

3.4.2 LED Indicator



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

3.4.3 Channel Status LED

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

3.4.4 Environment Specification

Environmental specification	
Operating 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	EN61000-6-2: 2005
Installation Position	Vertical and horizontal installation is possible
Product Certifications	CE, UL, EAC

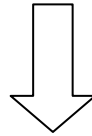
3.4.5 Specification

Items	Specification
Input Specification	
Inputs per module	32 Points Universal Type
Indicators	32 Green Input Status
ON-state Voltage	24Vdc nominal 15 ~ 30Vdc @ 60°C
ON-state Current	2.25mA @ 24Vdc 3mA @ 30Vdc
OFF-state Voltage	9.1V @ 25°C
Input Signal Delay	OFF to ON: Max. 0.2ms ON to OFF: Max. 0.2ms
Input filter	Adjustable, up to 10ms
Nominal Input Impedance	10.2 kΩ Typical
Common Type	32 Point / 4 COM
General Specification	
Power Dissipation	Max. 55mA @ 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 ~ 30 Vdc Power dissipation: 0mA @ 24Vdc
Wiring	Connector Type, up to AWG22 Module connector: HIF3BA-20D-2.54DSA
Weight	59g
Module Size	12mm x 109mm x 70mm

3.4.6 Mapping Data into the Image Table

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
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

3.4.7 Parameter Data

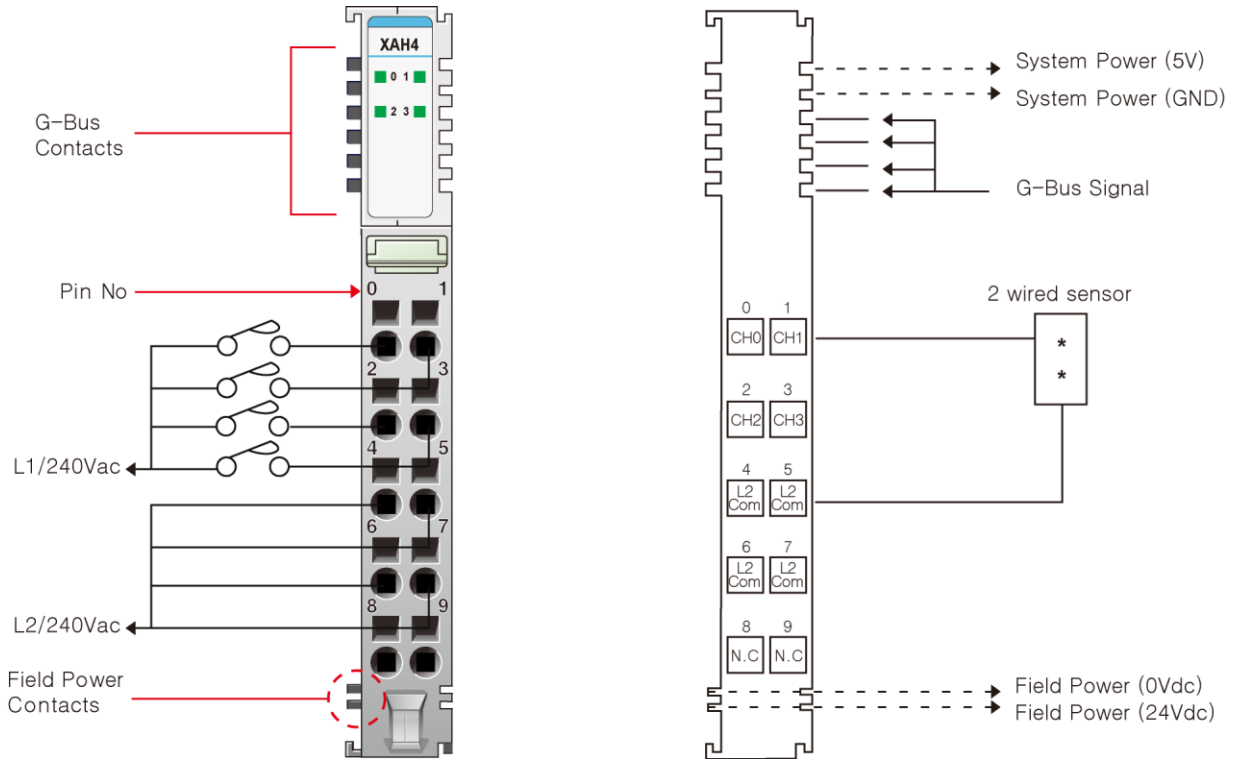
Valid Parameter length: 2 Bytes

Parameter Data

Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	Input Filter Value: 0 ~ 10 (unit: ms)							
Byte 1	Reserved							

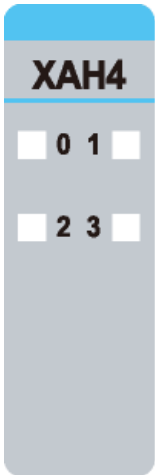
3.5 RIO3-XAH4

3.5.1 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	Input Channel 0	Input Channel 1	1
2	Input Channel 2	Input Channel 3	3
4	Input Channel Common (L2/N)	Input Channel Common (L2/N)	5
6	Input Channel Common (L2/N)	Input Channel Common (L2/N)	7
8	N.C	N.C	9

3.5.2 LED Indicator



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

3.5.3 Channel Status LED

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

3.5.4 Environment Specification

Environmental specification	
Operating 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	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

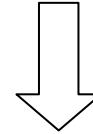
3.5.5 Specification

Items	Specification
Input Specification	
Inputs Per Module	4 Points
Indicators	4 Green input state
ON-state Voltage	240Vac nominal 170Vac ~ 264Vac @ 60°C
ON-state Current	10mA @ 240Vac
OFF-state Voltage	115Vac @ 25°C
Input Signal Delay	OFF to ON: 30ms Max ON to OFF: 140ms Max
Nominal Input Impedance	26.5 kΩ Typical
Frequency Range	60Hz
Common Type	4 Points / 4 Common (L2/N)
General Specification	
Power Dissipation	Max. 30mA @ 5Vdc
Isolation	I/O to Logic: Photocoupler Isolation
UL field power	Supply voltage: 24Vdc nominal, Class 2
Field Power	Field Power passes through to the next module. Supply Voltage: 24Vdc Voltage Range: 15 ~ 30Vdc (AC Power Not Used)
Wiring	I/O Cable Max. 2.0mm ² (AWG 14)
Torque	0.8Nm (7lb-in)
Weight	57g
Module Size	12mm x 99mm x 70mm

3.5.6 Mapping Data into the Image Table

Input Module Data

D3	D2	D1	D0
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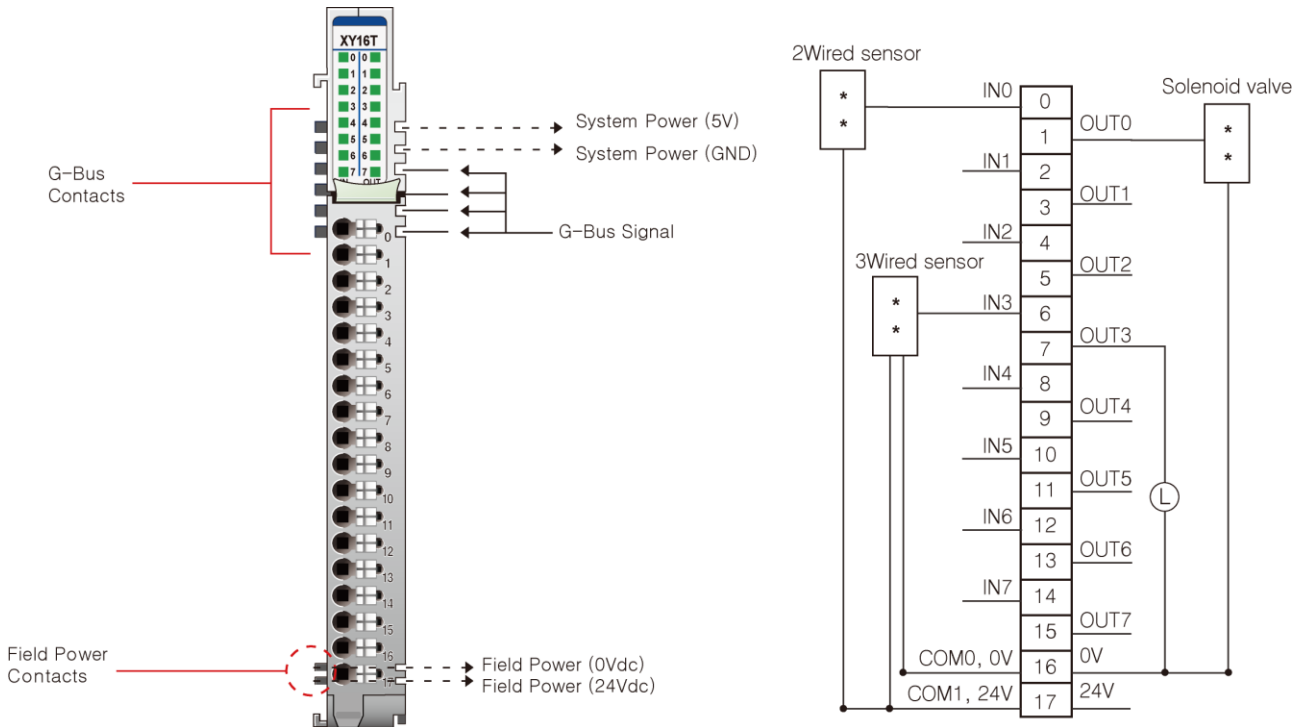


Input Image Value

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

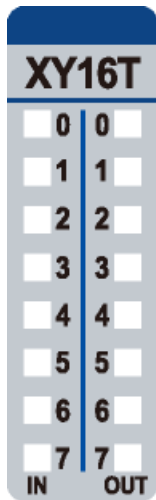
3.6 RIO3-XY16T

3.6.1 Wiring Diagram



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

3.6.2 LED Indicator



LED No.	LED Function / Description	LED Color
0 (Left side)	INPUT Channel 0	Green
1	INPUT Channel 1	Green
2	INPUT Channel 2	Green
3	INPUT Channel 3	Green
4	INPUT Channel 4	Green
5	INPUT Channel 5	Green
6	INPUT Channel 6	Green
7	INPUT Channel 7	Green
0 (Right side)	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

3.6.3 Channel Status LED

LED No. 0 ~ 7 (Left side)

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

LED No. 0 ~ 7 (Right side)

Status	LED	To indicate
No Signal	Off	Normal Operation
On Signal	Green	Normal Operation
Channel Fault	Flash	Short to GND
		Short to VCC (OFF State)
		Over-Current
		Over-Temperature

3.6.4 Environment Specification

Environmental specification	
Operating 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	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

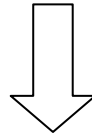
3.6.5 Specification

Items	Specification
Input Specification	
Inputs Per Module	8 Points Sink type
Indicators	8 Green input state
ON-state Voltage	240Vac nominal 15 ~ 30Vdc @ 60°C
OFF-state Voltage	8Vdc @ 25 °C
ON-state Current	2.25mA @ 24Vdc 3mA @ 30Vdc
Input signal delay	OFF to ON: 0.3ms Max ON to OFF: 0.3ms Max
Input filter	Adjustable, up to 10ms
Nominal Input Impedance	10.2 kΩ Typical
Output Specification	
Output per module	8 Points Source type
Indicators	8 Green output state
Output Voltage Range	24Vdc Nominal 15Vdc ~ 30 Vdc @ 60°C
ON-state voltage drop	0.3Vdc @ 25°C 0.6Vdc @ 60°C
ON-State Min. Current	Min. 1mA
OFF-State Leakage current	Max. 10uA
Output Signal Delay	OFF to ON: 0.1ms maximum ON to OFF: 0.35ms maximum
Output Current Rating	Max. 0.5A per channel / Max. 4A per unit
Protection	Over Current limit: 2.2A @ 25°C per channel Thermal Shutdown: 175°C Short circuit protection
General Specification	
Power Dissipation	Max. 55mA @ 5.0Vdc
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 Power dissipation: 40mA @ 24Vdc
Wiring	I/O Cable Max. 0.75mm ² (AWG 18)
Weight	63g
Module Size	12mm x 109mm x 70mm

3.6.6 Mapping Data into the Image Table

Input Module Data

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

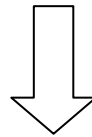


Input Image Value

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 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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3.6.7 Parameter Data

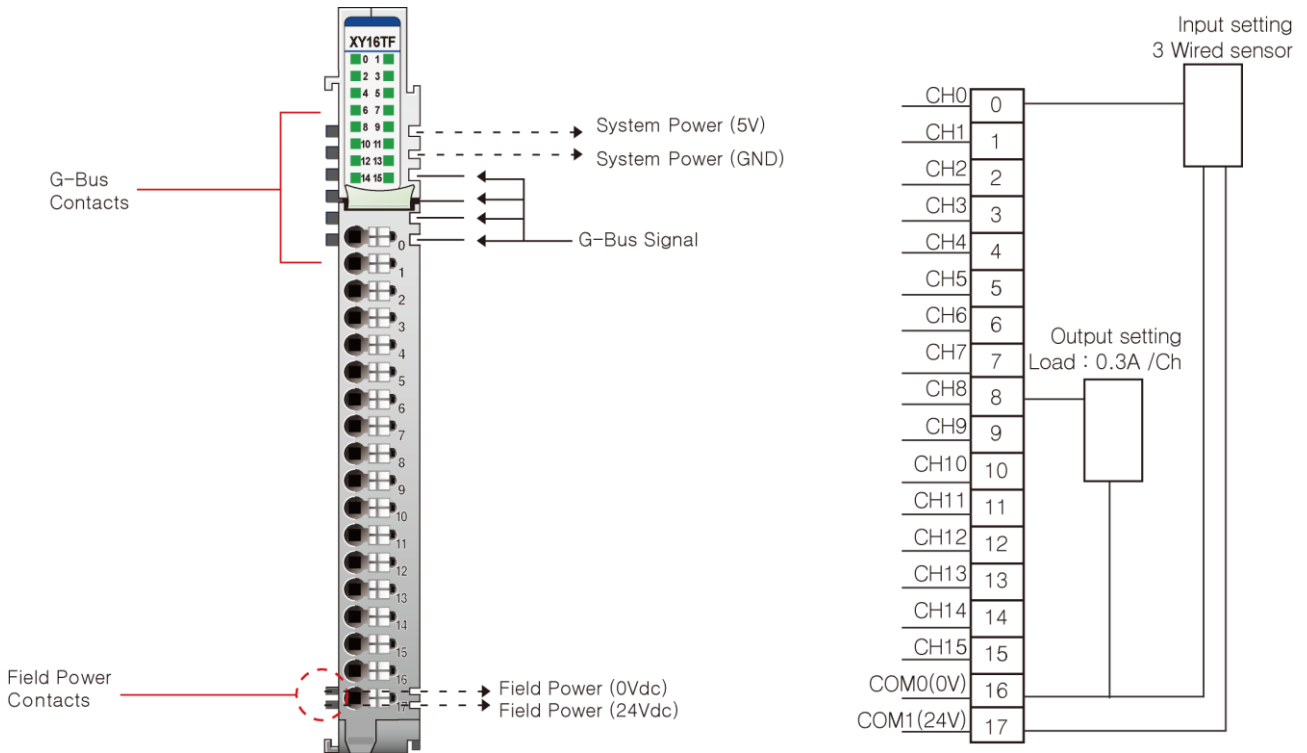
Valid Parameter Length: 4 Bytes

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 value (ch0 ~ ch7) 0: Off, 1: On							
Byte2	Input Filter value: 0 ~ 10 (unit: ms)							
Byte3	Reserved							

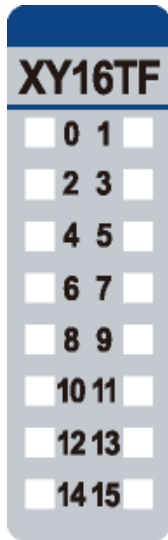
3.7 RIO3-XY16TF

3.7.1 Wiring Diagram



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

3.7.2 LED Indicator



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

3.7.3 Channel Status LED

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

3.7.4 Environment Specification

Environmental specification	
Operating 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	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

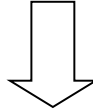
3.7.5 Specification

Items	Specification
Input Specification	
Input per module	16 points sink type
Indicators	16 green input status
On-state voltage	24Vdc nominal *(≤Field Power) 15 ~ 28.8Vdc @ 60°C
On-state current	3.2mA @ 24Vdc 3.8mA @ 30Vdc
Off-state voltage	12.5Vdc @ 25°C
Input signal delay	OFF to ON : 0.4ms Max ON to OFF : 0.5ms Max
Input filter	Adjustable, up to 10ms
Nominal input impedance	10.58K ohm typical
Common type	16 points / 2 COM(Sink)
Output Specification	
Output per module	16 points source type
Indicators	16 Green output status
Output voltage range	24Vdc nominal 15Vdc ~ 28.8Vdc @ 60°C
On-state voltage drop	0.3Vdc @ 25°C 0.3Vdc @ 60°C
On-state min. current	Min. 1mA
Off-state leakage current	Max. 10uA
Output signal delay	OFF to ON : 0.3ms maximum ON to OFF : 0.5ms maximum
Output current rating	Max. 0.3A per channel / Max. 4.8A per unit
Protection	Over current limit : 12A @ 25°C per each channels Thermal shutdown : Typical. 175°C @ 25°C per each channels Short circuit protection
Common type	16 points / 2 COM(Source)
General specification	
Power dissipation	Max. 60mA @ 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 ~ 28.8Vdc Power dissipation : 55mA @ 24Vdc
Wiring	I/O Cable Max. 0.75mm ² (AWG 18)
Weight	63g
Module size	12mm x 109mm x 70mm
Environment condition	Refer to 'Environment Specification'

3.7.6 Mapping Data into the Image Table

● Input Module Data

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

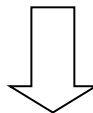


● Input Image Value

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 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

3.7.7 Parameter Data

- Valid Parameter length: 8 Bytes
- Parameter Data

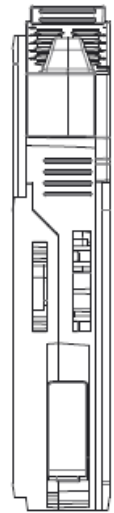
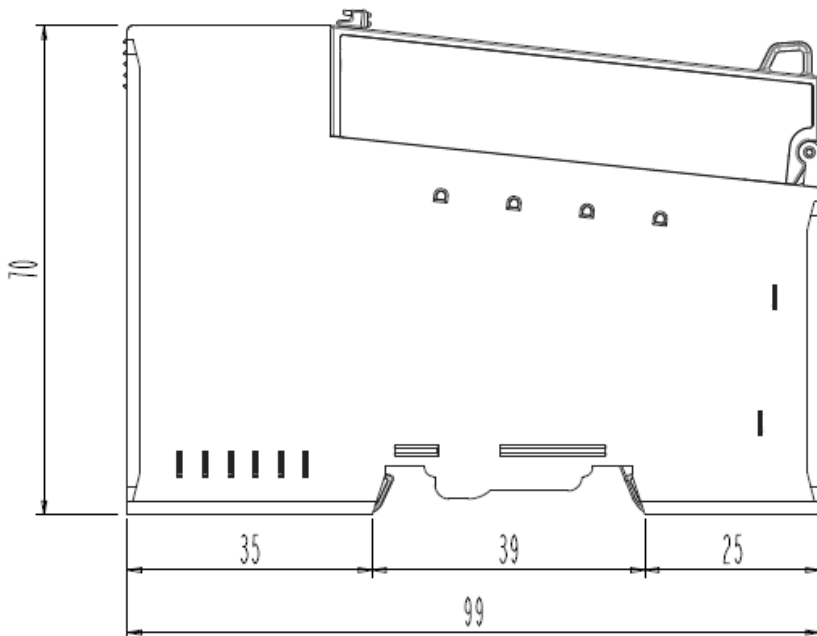
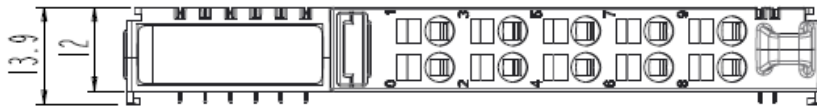
Bit No	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Byte 0	*Operation Selection (ch0~ch7) 0: Input, 1: Output							
Byte 1	* Operation Selection (ch8~ch15) 0: Input, 1: Output							
Byte 2	Fault Action (ch0~ch7) 0: Fault value, 1: Hold last state							
Byte 3	Fault Action (ch8~ch15) 0: Fault value, 1: Hold last state							
Byte 4	Fault value(ch0~ch7) 0: Off, 1: On							
Byte 5	Fault value(ch8~ch15) 0: Off, 1: On							
Byte 6	Input Filter value : 0 ~ 10 (unit : ms)							
Byte 7	Reserved							

* You can check the status of Operation Selection through LED.

* Precautions for use : if you changed Operation Selection, you must reset Module.

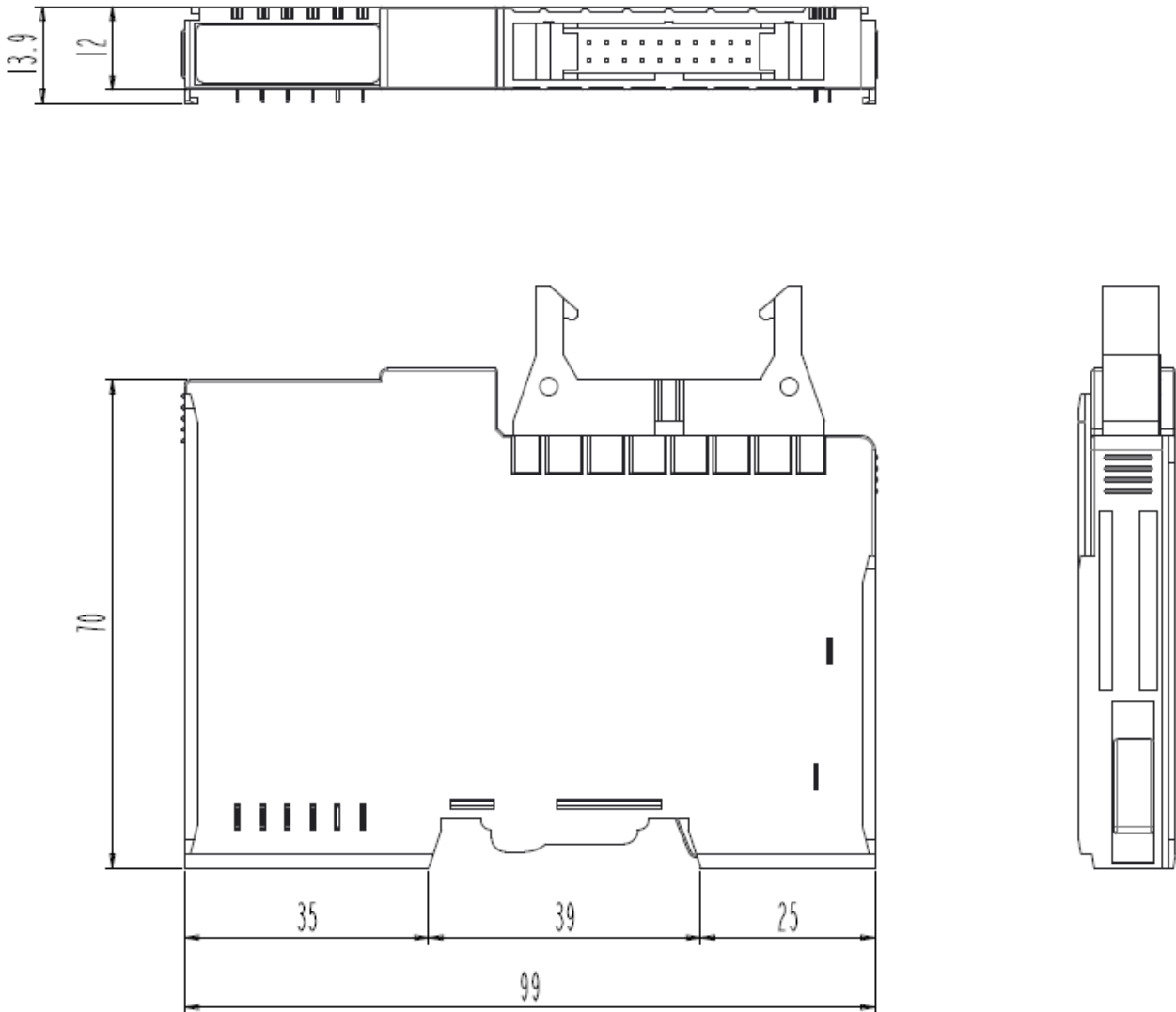
4 Dimension

4.1 10-Pts. Spring Type



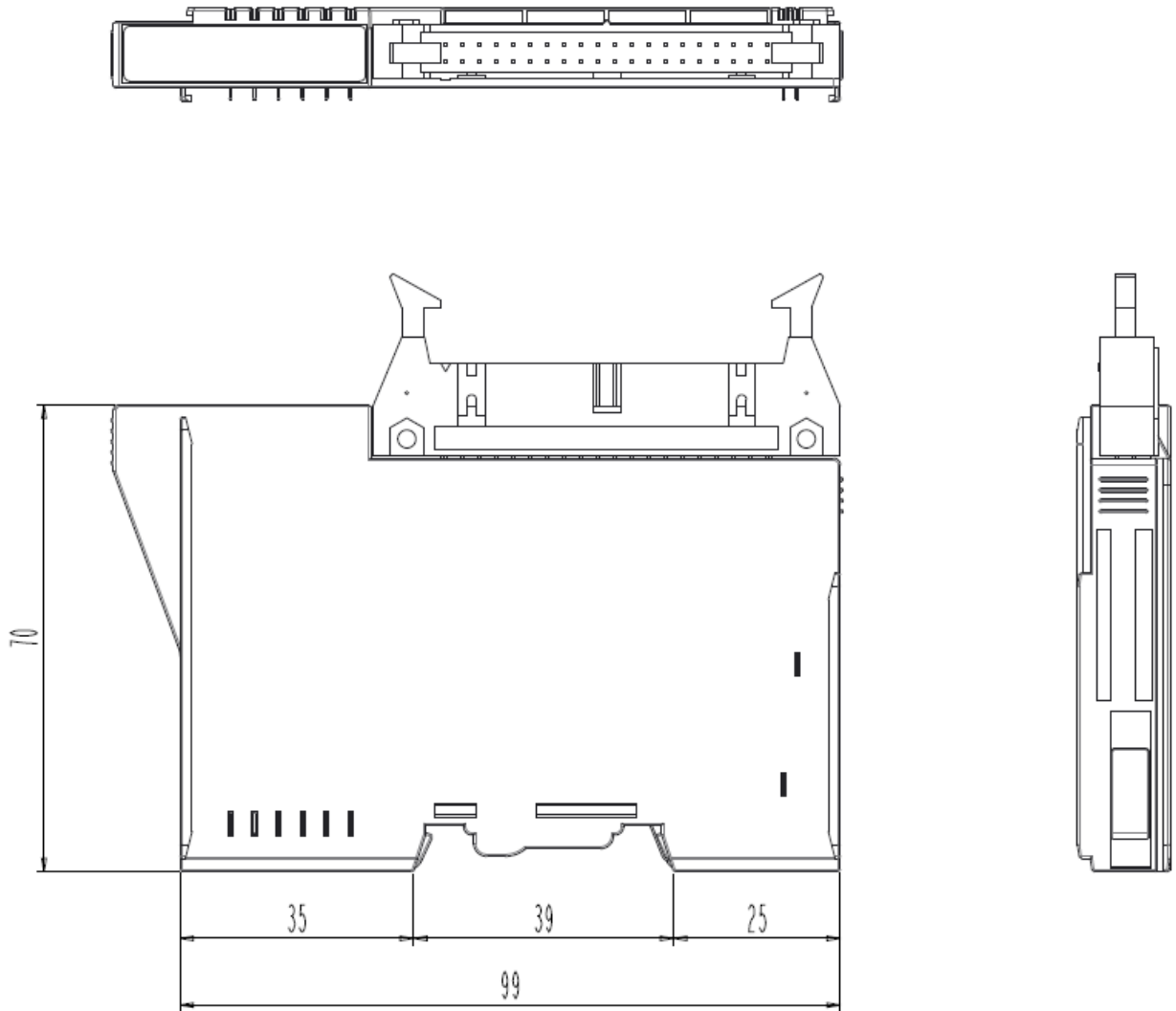
Dimensions in mm

4.2 20-Pin Connector Type



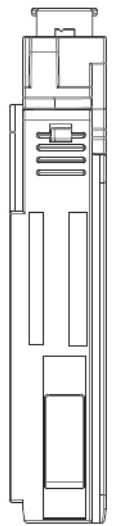
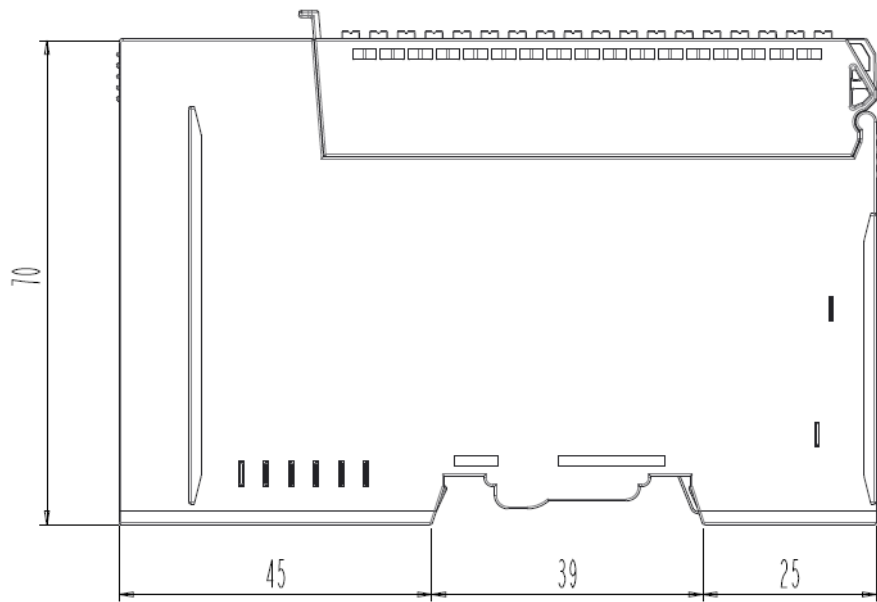
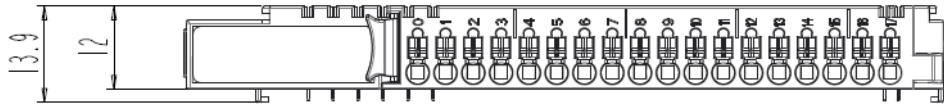
Dimensions in mm

4.3 40-Pin Connector Type



Dimensions in mm

4.4 18-Pts. Spring Type



Dimensions in mm

5 Mounting

Caution!

Hot surface!

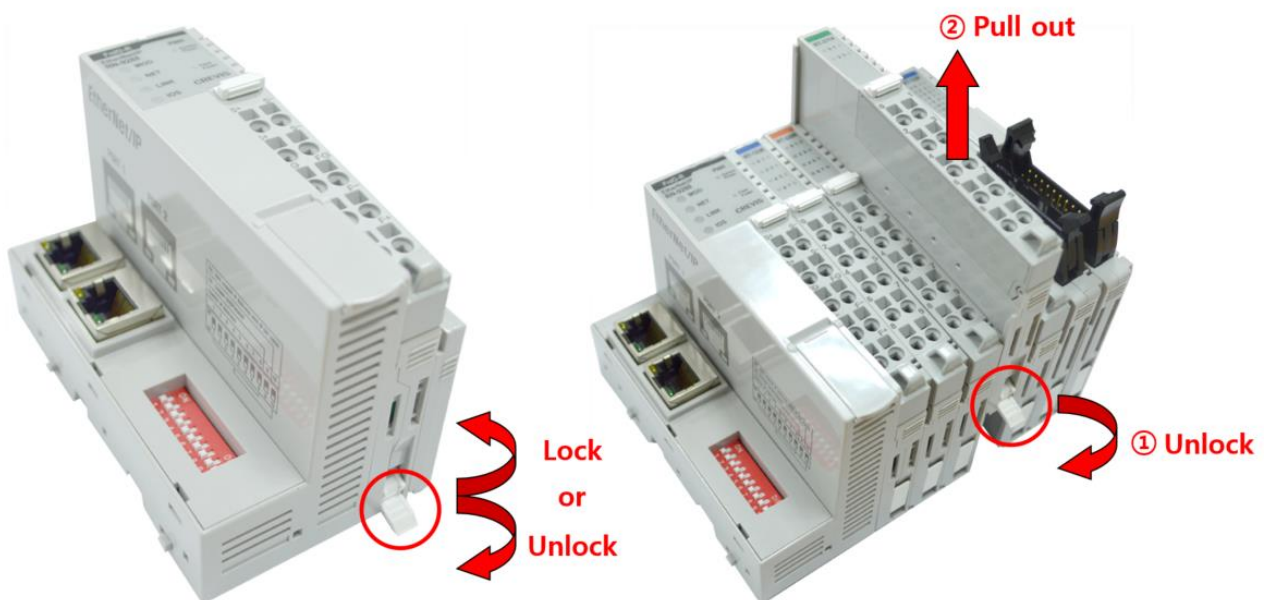
The surface of the housing can become hot during operation. If the device was operated at high ambient temperatures, allow it to be cool before touching it.

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.

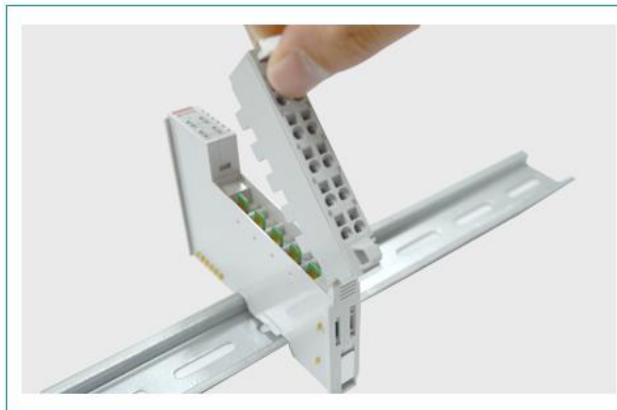
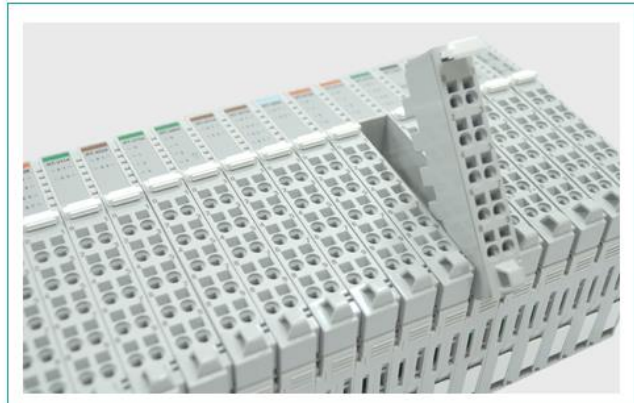
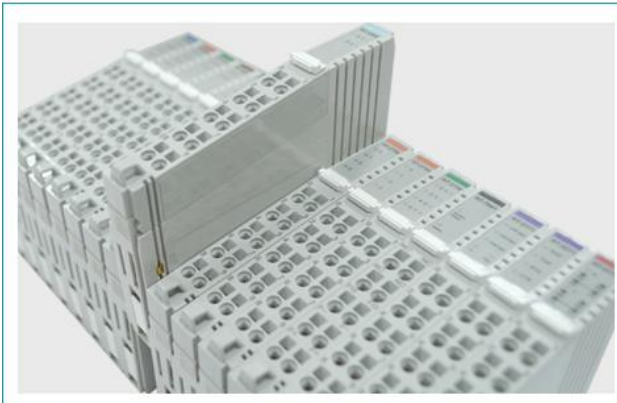
5.1 I/O Inserting and Removing Devices



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 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	G-BUS CLK
P4	G-BUS MISO
P5	G-BUS MOSI
P6	G-BUS 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

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.