

# DeviceNet Network Adapter AT2-Series

## AT2-R1xx User Manual



Version 1.06

**2013 CREVIS Co.,Ltd**

DOCUMENT CHANGE SUMMARY				
REV	PAGE	REMARKS	DATE	EDITOR
1.0	New Document		2011/11/4	JE KANG
1.01		Add product AT2-R38, AT2-R139(NEW)	2011/11/11	JE KANG
1.02	6	Add your experience	2012/1/13	JE KANG
1.03	All	Modify to wrong letters	2012/2/10	JE KANG
		Add the Certificate RoHS	2012/3/21	JE KANG
1.04	50	Modify to baudrate setting	2012/7/19	JE KANG
1.05		Changed Crevis TEL	2013/4/4	JE KANG
1.06		Environment Spec. 50°C→55°C (UL Temp) Delete AT2-R138, AT2-R139	2013/7/3	JE KANG

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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 CREVIS 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, CREVIS cannot assume responsibility or liability for actual use based on the examples and diagrams.

### Warning!



- ✓ **If you don't follow the directions, it could cause a personal injury, damage to the equipment or explosion**
- Do not assemble the products and wire with power applied to the system. Else it may cause an electric arc, which can result into unexpected and potentially dangerous action by field devices. Arching is explosion risk in hazardous locations. Be sure that the area is non-hazardous or remove system power appropriately before assembling or wiring the modules.
- Do not touch any terminal blocks or IO modules when system is running. Else it may cause the unit to an electric shock or malfunction.
- Keep away from the strange metallic materials not related to the unit and wiring works should be controlled by the electric expert engineer. Else it may cause the unit to a fire, electric shock or malfunction.

### Caution!


- ✓ **If you disobey the instructions, there may be possibility of personal injury, damage to equipment or explosion. Please follow below Instructions.**
- Check the rated voltage and terminal array before wiring. Avoid the circumstances over 55°C of temperature. Avoid placing it directly in the sunlight.
- Avoid the place under circumstances over 85% of humidity.
- Do not place Modules near by the inflammable material. Else it may cause a fire.
- Do not permit any vibration approaching it directly.
- Go through module specification carefully, ensure inputs, output connections are made with the specifications. Use standard cables for wiring.
- Use Product under pollution degree 2 environment.

## 1.1. Safety Instruction

### 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 identity 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, e.g. FnBUS Pin.</p>
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### 1.1.3. Certification

c-UL-us UL Listed Industrial Control Equipment, certified for U.S. and Canada

See UL File E235505

CE Certificate

EN 61000-6-2; Industrial Immunity

EN 61000-6-4; Industrial Emissions

FCC

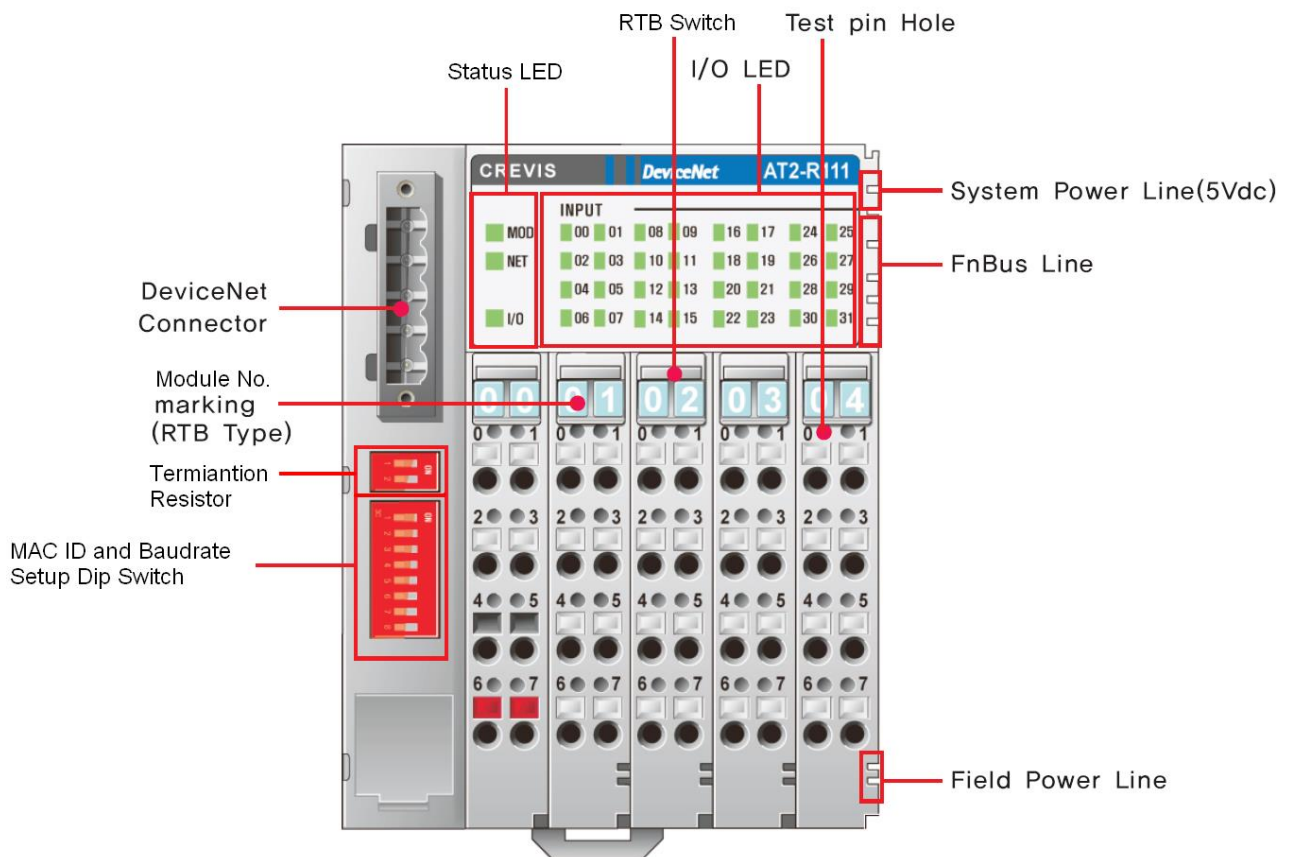
RoHS (EU, CHINA)



## 2. AT2 DEVICENET MODULE LIST

[illegible]

### 3. Specification of DeviceNet AT2-Series



### 3.1. LED Indicator

#### 3.1.1. Module Status LED (MOD)

State	LED is :	To indicate :
No Power	Off	No power is supplied to the unit.
Device Operational	Green	The unit is operating in normal condition.
Device in Standby	Flashing Green	The EEPROM parameter is not initialized yet. Serial Number is zero value (0x00000000)
Minor Fault	Flashing Red	The unit has occurred recoverable fault in self-testing. - EEPROM checksum fault
Unrecoverable Fault	Red	The unit has occurred unrecoverable fault in self-testing. - Firmware fault

#### 3.1.2. Network Status LED (NET)

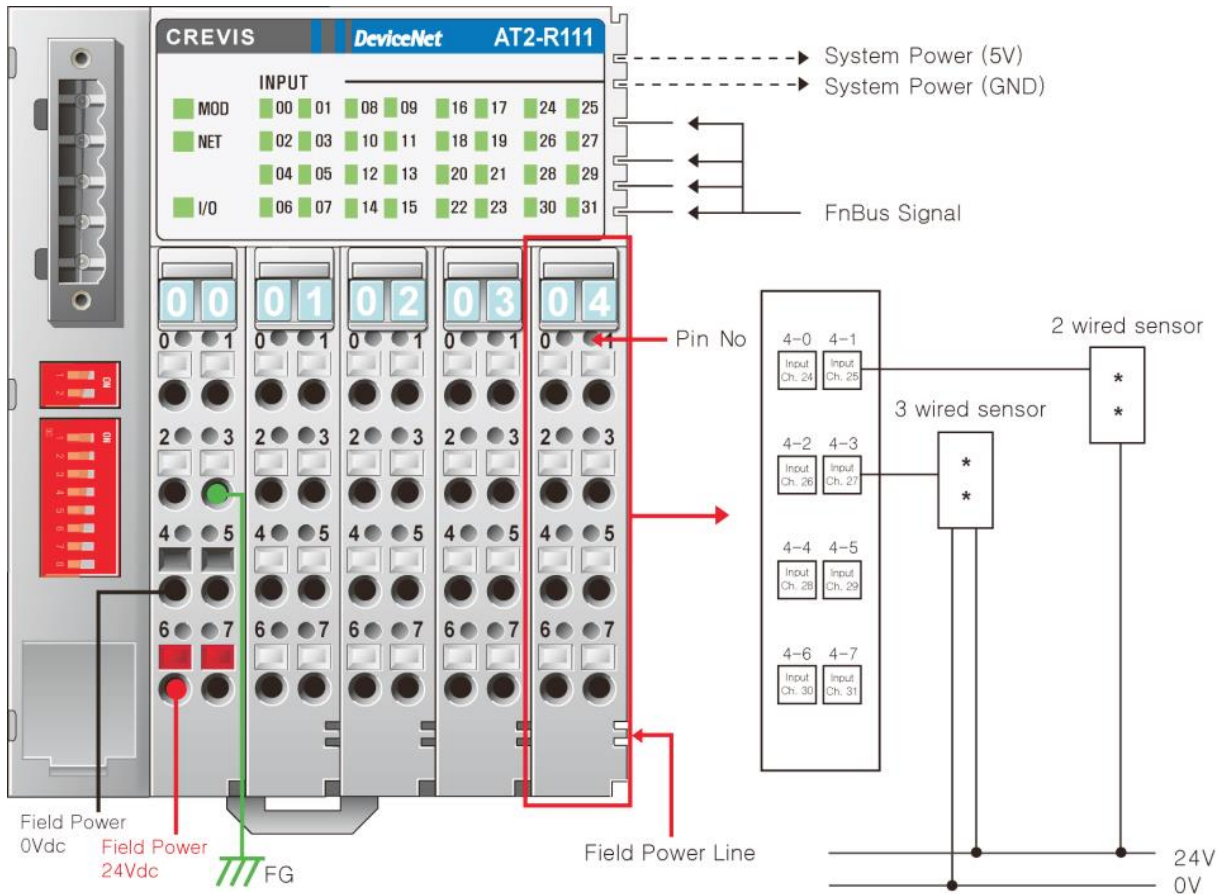
State	LED is :	To indicate :
Not Powered Not On-line	Off	Device is not on-line or may not be powered - Not completed the Dup-MAC_ID test yet
On-line, Not connected	Flashing Green	Device is on-line but has no connections in the established state. - Passed the Dup-MAC_ID test - Not allocated to a master
On-line, Connected	Green	Device is on-line and allocated to a master
Connection Time-out	Flashing Red	One or more I/O connections are in the time-out state.
Critical Communication Failure	Red	Failed communication - Duplicate MAC ID - Bus-off

### 3.1.3. Expansion I/O Module Status LED (I/O)

State	LED is :	To indicate :
Not Powered No Expansion Module	Off	Device has no expansion module or may not be powered.
FnBus On-line, Do not Exchanging I/O	Flashing Green	FnBus is normal but does not exchanging I/O data (Passed the expansion module configuration).
FnBus Connection, Run Exchanging IO	Green	Exchanging I/O data
FnBus connection fault during exchanging IO	Red	One or more expansion module occurred in fault state. - Changed expansion module configuration. - FnBus communication failure.
Expansion Configuration Failed	Flashing Red	Failed to initialize expansion module - Detected invalid expansion module ID. - Overflowed Input / Output Size - Too many expansion module - Initial protocol failure - Mismatch vendor code between adapter and expansion module.

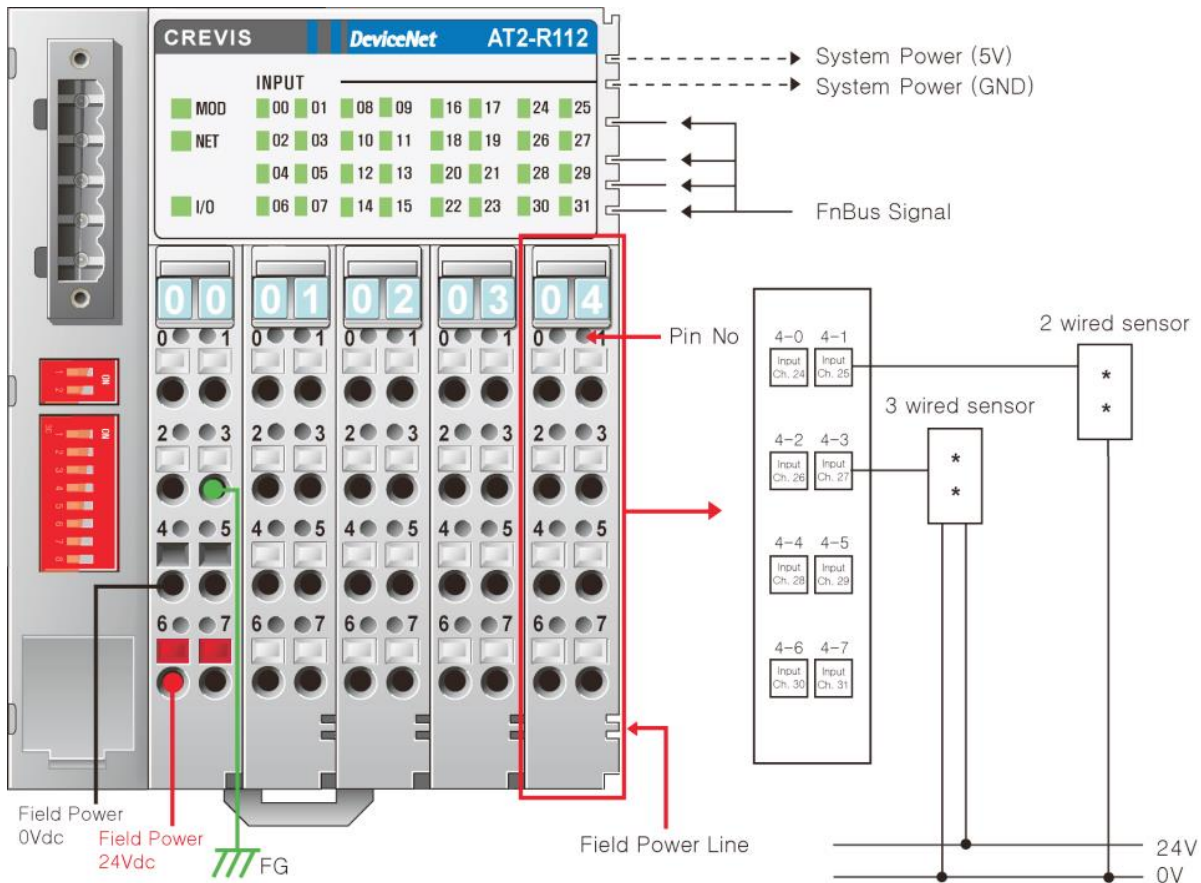
## 3.2. The Interface

### 3.2.1. AT2-R111



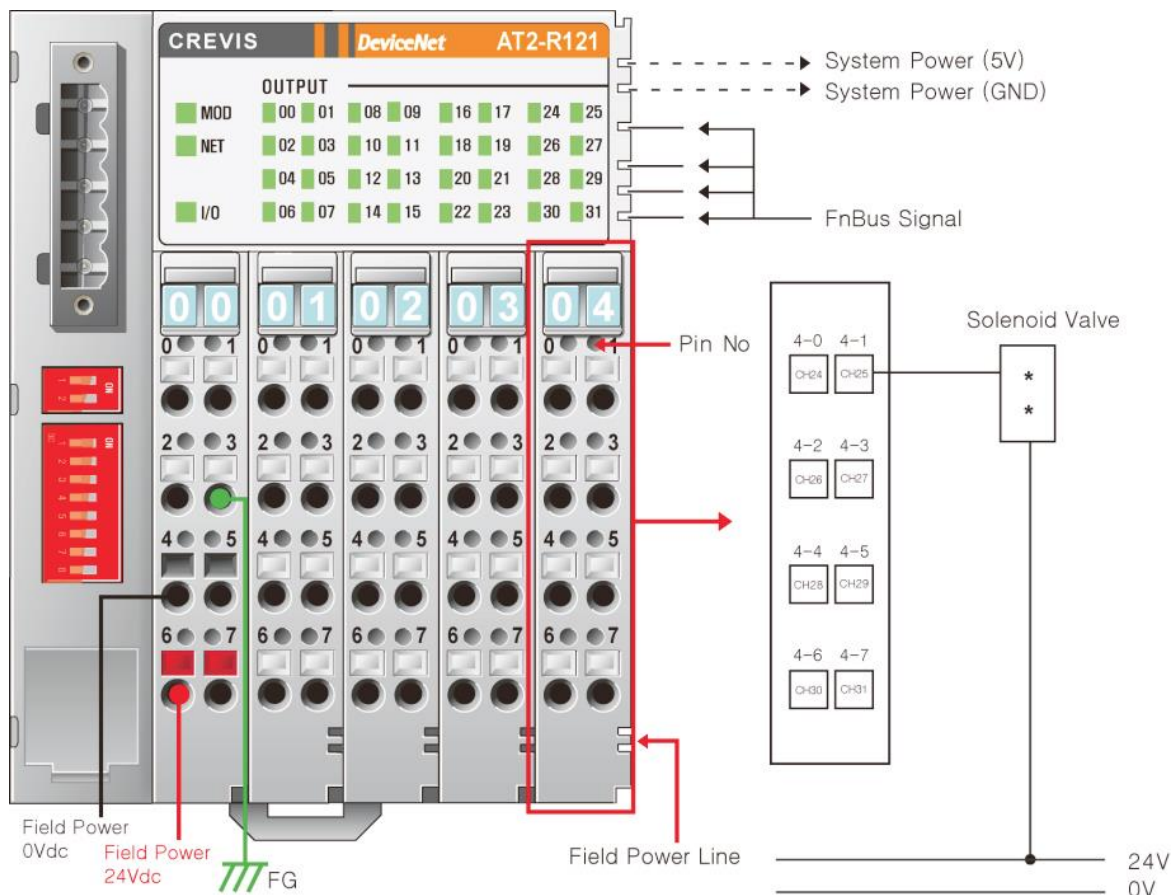
Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Input Channel 0	2-0	Input Channel 8	3-0	Input Channel 16	4-0	Input Channel 24
1-1	Input Channel 1	2-1	Input Channel 9	3-1	Input Channel 17	4-1	Input Channel 25
1-2	Input Channel 2	2-2	Input Channel 10	3-2	Input Channel 18	4-2	Input Channel 26
1-3	Input Channel 3	2-3	Input Channel 11	3-3	Input Channel 19	4-3	Input Channel 27
1-4	Input Channel 4	2-4	Input Channel 12	3-4	Input Channel 20	4-4	Input Channel 28
1-5	Input Channel 5	2-5	Input Channel 13	3-5	Input Channel 21	4-5	Input Channel 29
1-6	Input Channel 6	2-6	Input Channel 14	3-6	Input Channel 22	4-6	Input Channel 30
1-7	Input Channel 7	2-7	Input Channel 15	3-7	Input Channel 23	4-7	Input Channel 31

### 3.2.2. AT2-R112



Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Input Channel 0	2-0	Input Channel 8	3-0	Input Channel 16	4-0	Input Channel 24
1-1	Input Channel 1	2-1	Input Channel 9	3-1	Input Channel 17	4-1	Input Channel 25
1-2	Input Channel 2	2-2	Input Channel 10	3-2	Input Channel 18	4-2	Input Channel 26
1-3	Input Channel 3	2-3	Input Channel 11	3-3	Input Channel 19	4-3	Input Channel 27
1-4	Input Channel 4	2-4	Input Channel 12	3-4	Input Channel 20	4-4	Input Channel 28
1-5	Input Channel 5	2-5	Input Channel 13	3-5	Input Channel 21	4-5	Input Channel 29
1-6	Input Channel 6	2-6	Input Channel 14	3-6	Input Channel 22	4-6	Input Channel 30
1-7	Input Channel 7	2-7	Input Channel 15	3-7	Input Channel 23	4-7	Input Channel 31

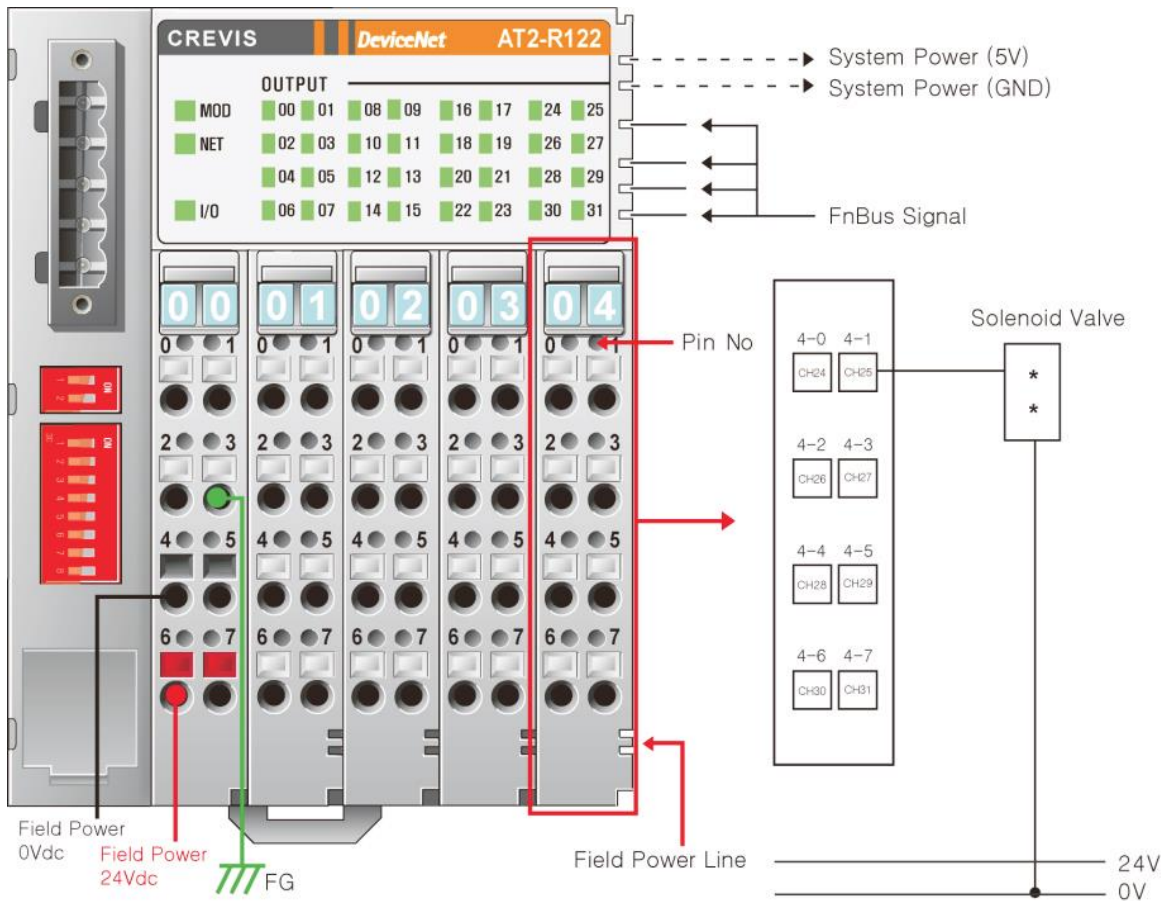
### 3.2.3. AT2-R121



Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Output Channel 0	2-0	Output Channel 8	3-0	Output Channel 16	4-0	Output Channel 24
1-1	Output Channel 1	2-1	Output Channel 9	3-1	Output Channel 17	4-1	Output Channel 25
1-2	Output Channel 2	2-2	Output Channel 10	3-2	Output Channel 18	4-2	Output Channel 26
1-3	Output Channel 3	2-3	Output Channel 11	3-3	Output Channel 19	4-3	Output Channel 27
1-4	Output Channel 4	2-4	Output Channel 12	3-4	Output Channel 20	4-4	Output Channel 28
1-5	Output Channel 5	2-5	Output Channel 13	3-5	Output Channel 21	4-5	Output Channel 29
1-6	Output Channel 6	2-6	Output Channel 14	3-6	Output Channel 22	4-6	Output Channel 30
1-7	Output Channel 7	2-7	Output Channel 15	3-7	Output Channel 23	4-7	Output Channel 31



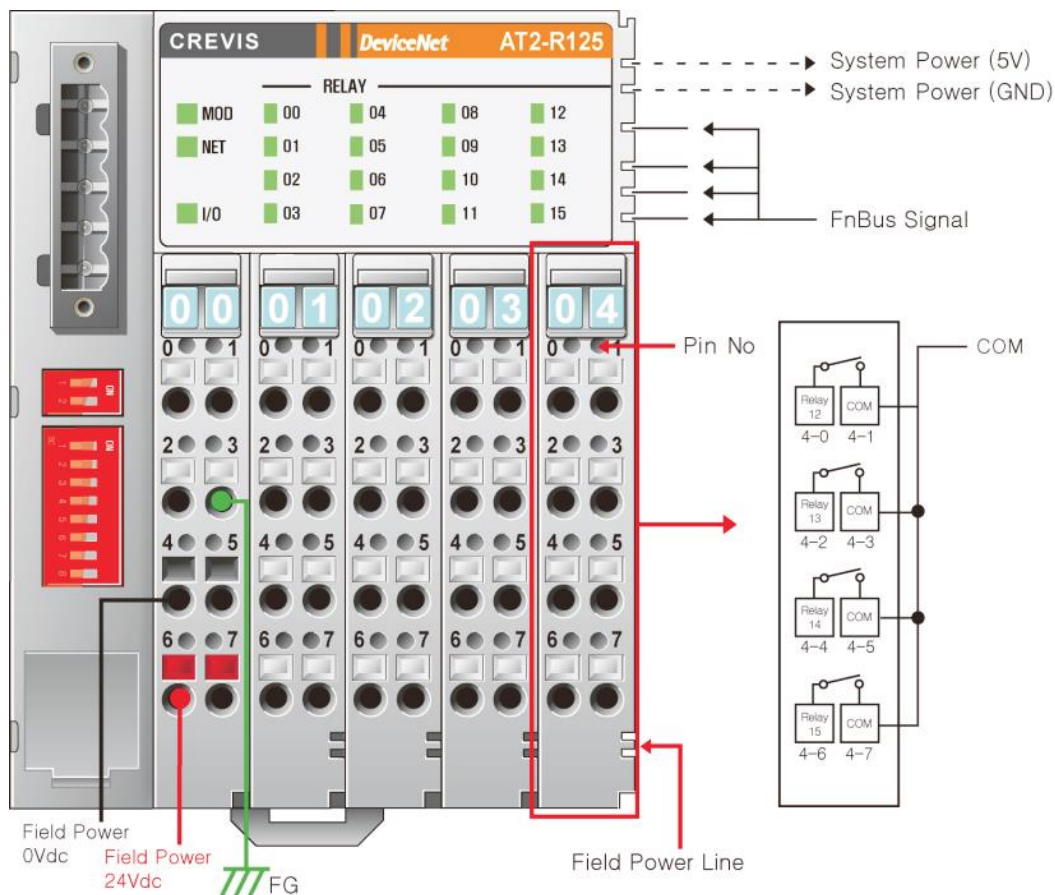
### 3.2.4. AT2-R122



Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Output Channel 0	2-0	Output Channel 8	3-0	Output Channel 16	4-0	Output Channel 24
1-1	Output Channel 1	2-1	Output Channel 9	3-1	Output Channel 17	4-1	Output Channel 25
1-2	Output Channel 2	2-2	Output Channel 10	3-2	Output Channel 18	4-2	Output Channel 26
1-3	Output Channel 3	2-3	Output Channel 11	3-3	Output Channel 19	4-3	Output Channel 27
1-4	Output Channel 4	2-4	Output Channel 12	3-4	Output Channel 20	4-4	Output Channel 28
1-5	Output Channel 5	2-5	Output Channel 13	3-5	Output Channel 21	4-5	Output Channel 29
1-6	Output Channel 6	2-6	Output Channel 14	3-6	Output Channel 22	4-6	Output Channel 30
1-7	Output Channel 7	2-7	Output Channel 15	3-7	Output Channel 23	4-7	Output Channel 31

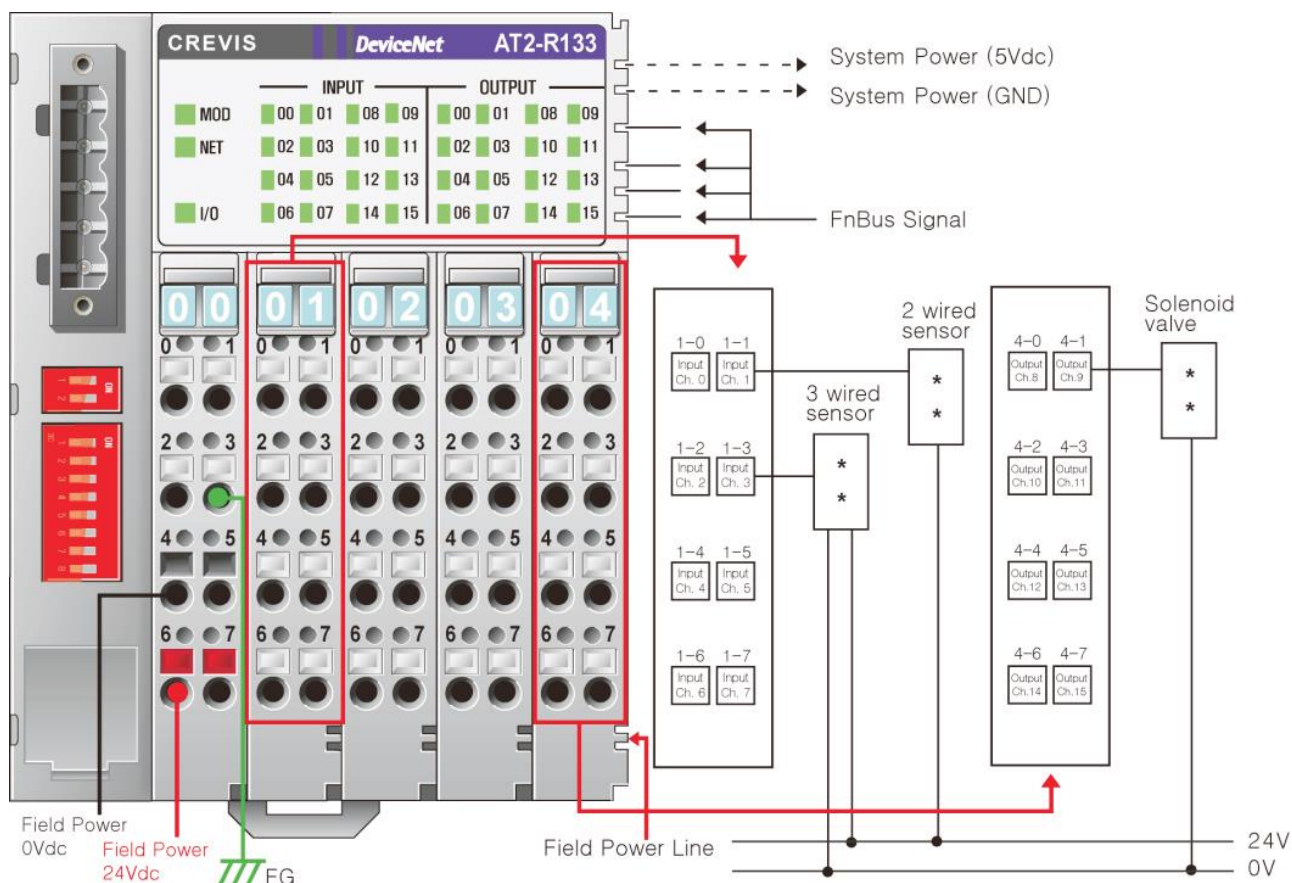


### 3.2.5. AT2-R125



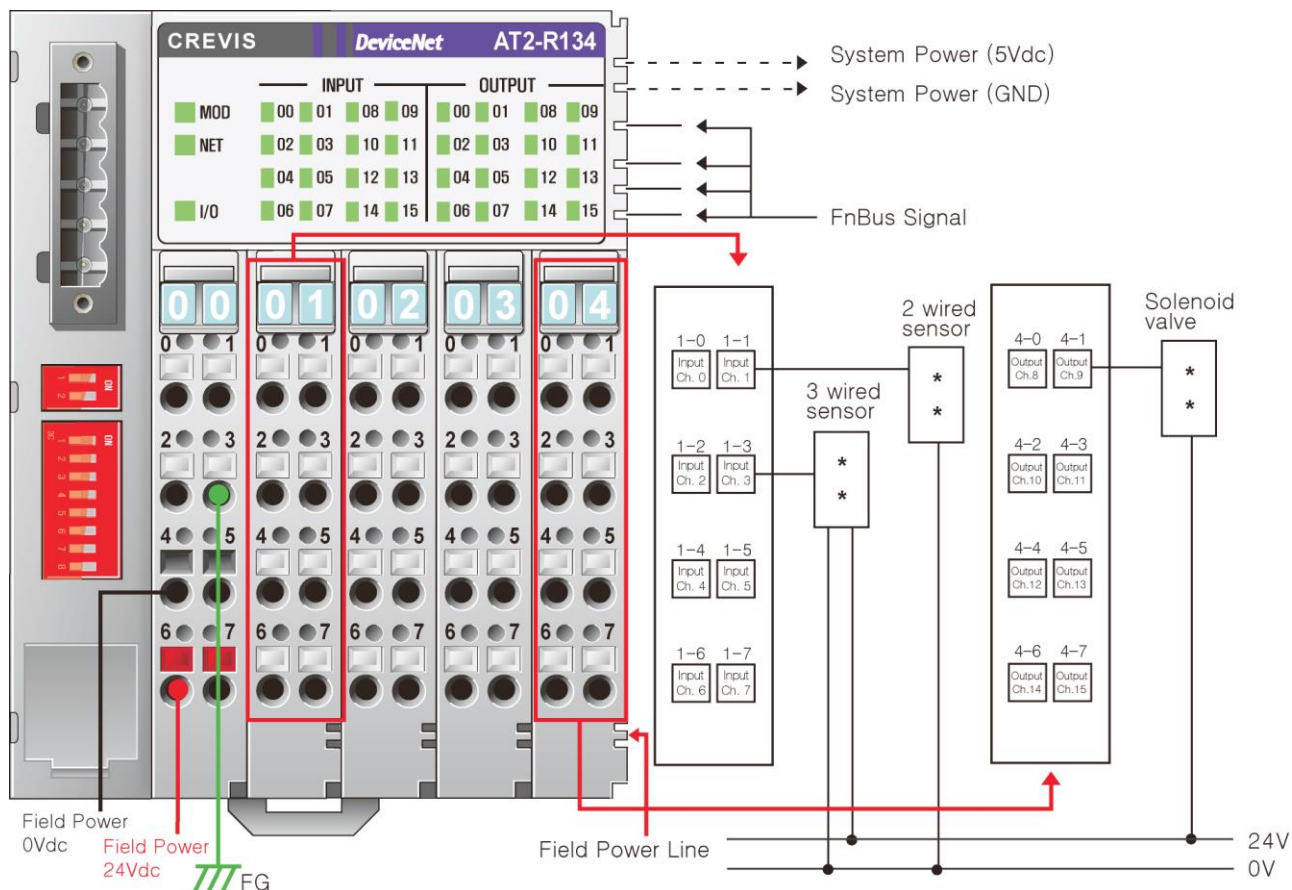
Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Relay Output 0	2-0	Relay Output 4	3-0	Relay Output 8	4-0	Relay Output 12
1-1	COM 0	2-1	COM 1	3-1	COM 2	4-1	COM 3
1-2	Relay Output 1	2-2	Relay Output 5	3-2	Relay Output 9	4-2	Relay Output 13
1-3	COM 0	2-3	COM 1	3-3	COM 2	4-3	COM 3
1-4	Relay Output 2	2-4	Relay Output 6	3-4	Relay Output 10	4-4	Relay Output 14
1-5	COM 0	2-5	COM 1	3-5	COM 2	4-5	COM 3
1-6	Relay Output 3	2-6	Relay Output 7	3-6	Relay Output 11	4-6	Relay Output 15
1-7	COM 0	2-7	COM 1	3-7	COM 2	4-7	COM 3

### 3.2.6. AT2-R133



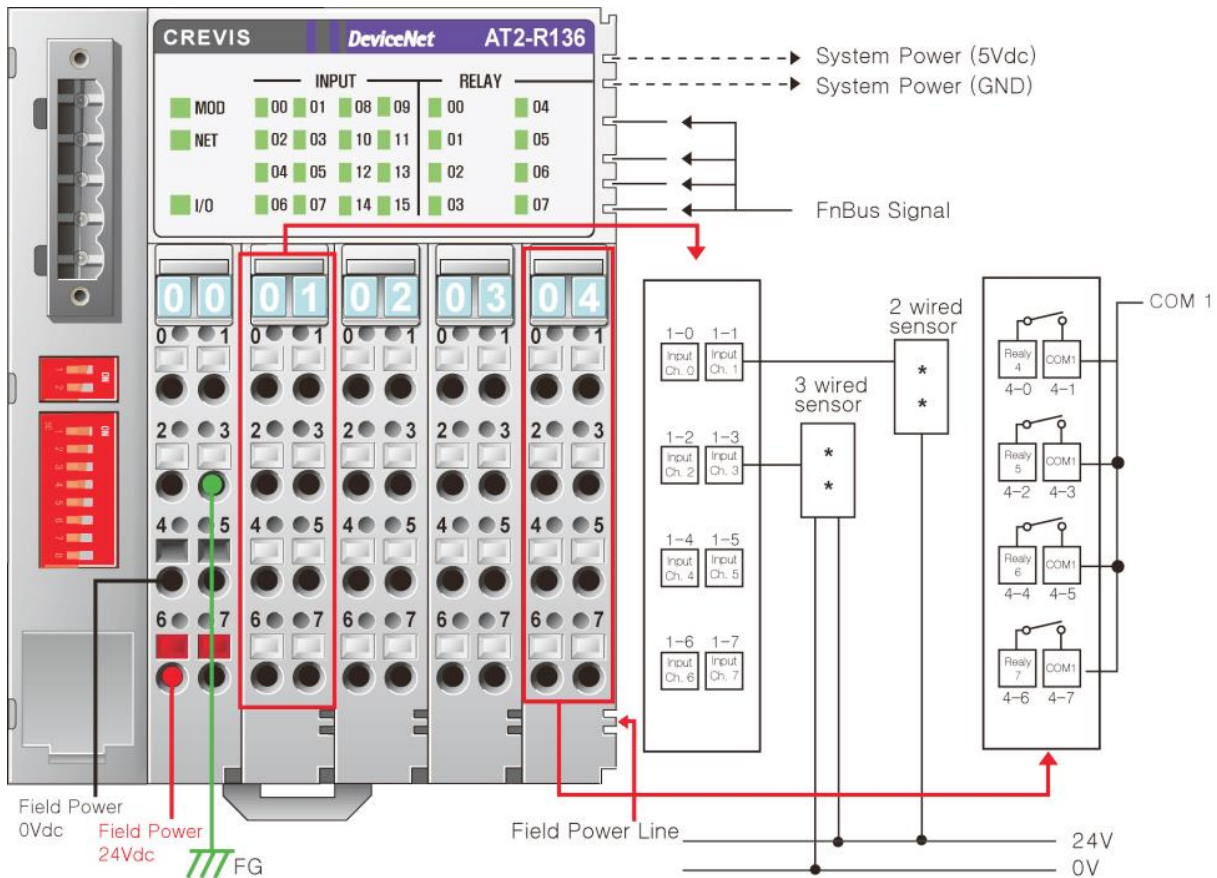
Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Input Channel 0	2-0	Input Channel 8	3-0	Output Channel 0	4-0	Output Channel 8
1-1	Input Channel 1	2-1	Input Channel 9	3-1	Output Channel 1	4-1	Output Channel 9
1-2	Input Channel 2	2-2	Input Channel 10	3-2	Output Channel 2	4-2	Output Channel 10
1-3	Input Channel 3	2-3	Input Channel 11	3-3	Output Channel 3	4-3	Output Channel 11
1-4	Input Channel 4	2-4	Input Channel 12	3-4	Output Channel 4	4-4	Output Channel 12
1-5	Input Channel 5	2-5	Input Channel 13	3-5	Output Channel 5	4-5	Output Channel 13
1-6	Input Channel 6	2-6	Input Channel 14	3-6	Output Channel 6	4-6	Output Channel 14
1-7	Input Channel 7	2-7	Input Channel 15	3-7	Output Channel 7	4-7	Output Channel 15

### 3.2.7. AT2-R134



Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Input Channel 0	2-0	Input Channel 8	3-0	Output Channel 0	4-0	Output Channel 8
1-1	Input Channel 1	2-1	Input Channel 9	3-1	Output Channel 1	4-1	Output Channel 9
1-2	Input Channel 2	2-2	Input Channel 10	3-2	Output Channel 2	4-2	Output Channel 10
1-3	Input Channel 3	2-3	Input Channel 11	3-3	Output Channel 3	4-3	Output Channel 11
1-4	Input Channel 4	2-4	Input Channel 12	3-4	Output Channel 4	4-4	Output Channel 12
1-5	Input Channel 5	2-5	Input Channel 13	3-5	Output Channel 5	4-5	Output Channel 13
1-6	Input Channel 6	2-6	Input Channel 14	3-6	Output Channel 6	4-6	Output Channel 14
1-7	Input Channel 7	2-7	Input Channel 15	3-7	Output Channel 7	4-7	Output Channel 15

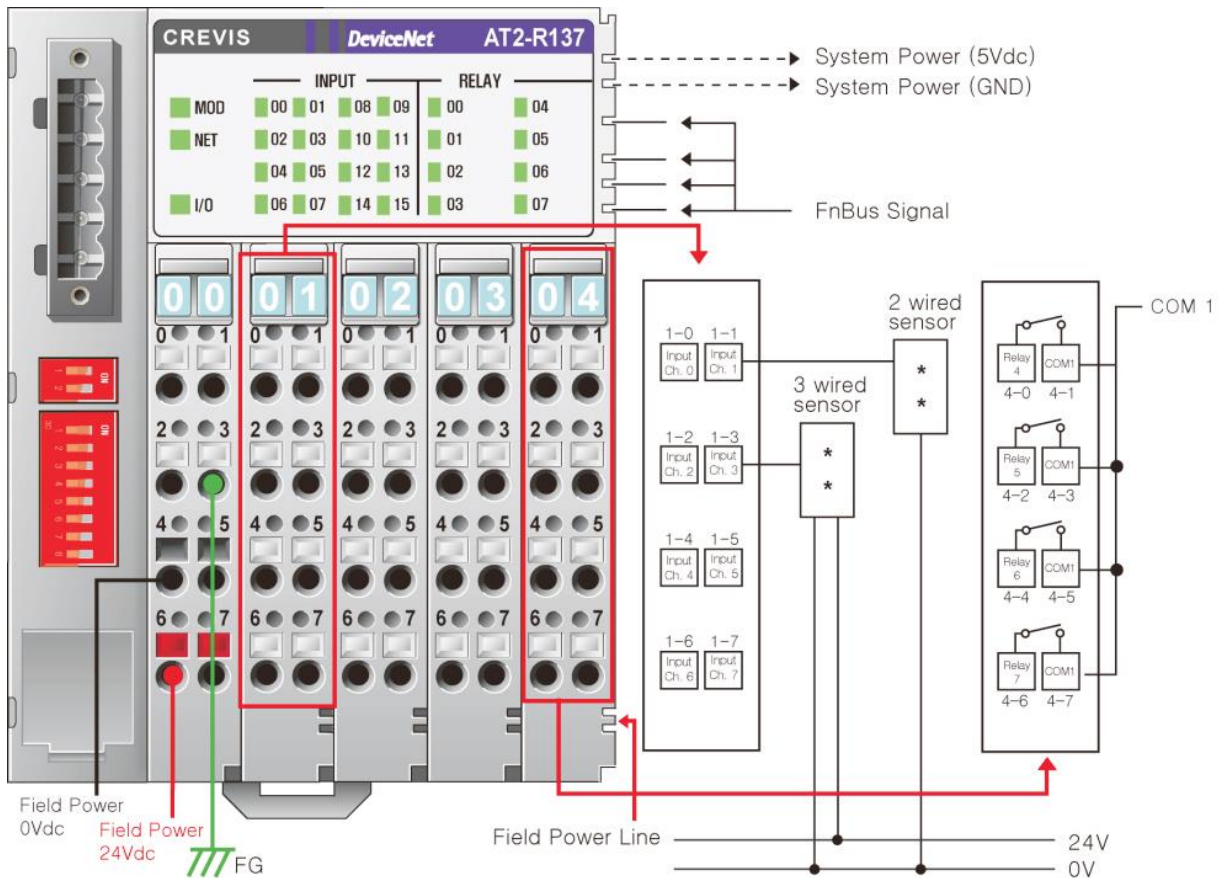
### 3.2.8. AT2-R136



Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Input Channel 0	2-0	Input Channel 8	3-0	Relay Output 0	4-0	Relay Output 4
1-1	Input Channel 1	2-1	Input Channel 9	3-1	COM 0	4-1	COM 1
1-2	Input Channel 2	2-2	Input Channel 10	3-2	Relay Output 1	4-2	Relay Output 5
1-3	Input Channel 3	2-3	Input Channel 11	3-3	COM 0	4-3	COM 1
1-4	Input Channel 4	2-4	Input Channel 12	3-4	Relay Output 2	4-4	Relay Output 6
1-5	Input Channel 5	2-5	Input Channel 13	3-5	COM 0	4-5	COM 1
1-6	Input Channel 6	2-6	Input Channel 14	3-6	Relay Output 3	4-6	Relay Output 7
1-7	Input Channel 7	2-7	Input Channel 15	3-7	COM 0	4-7	COM 1

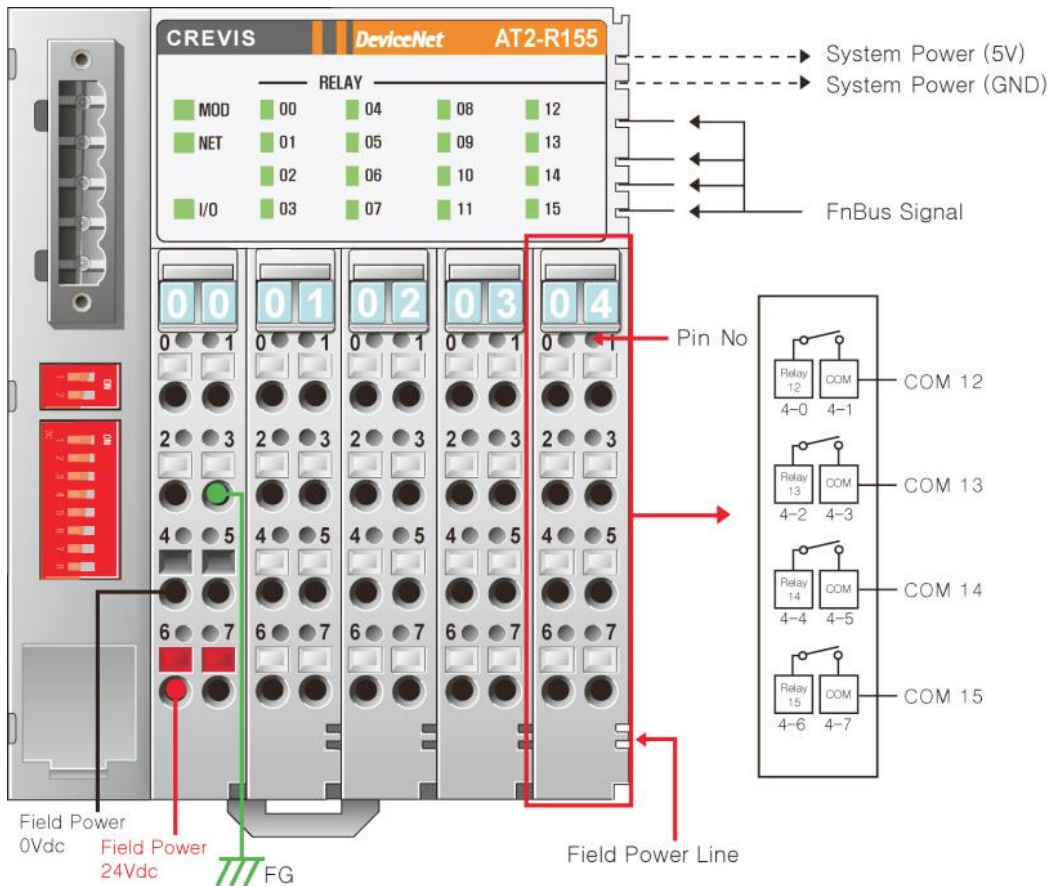


### 3.2.9. AT2-R137



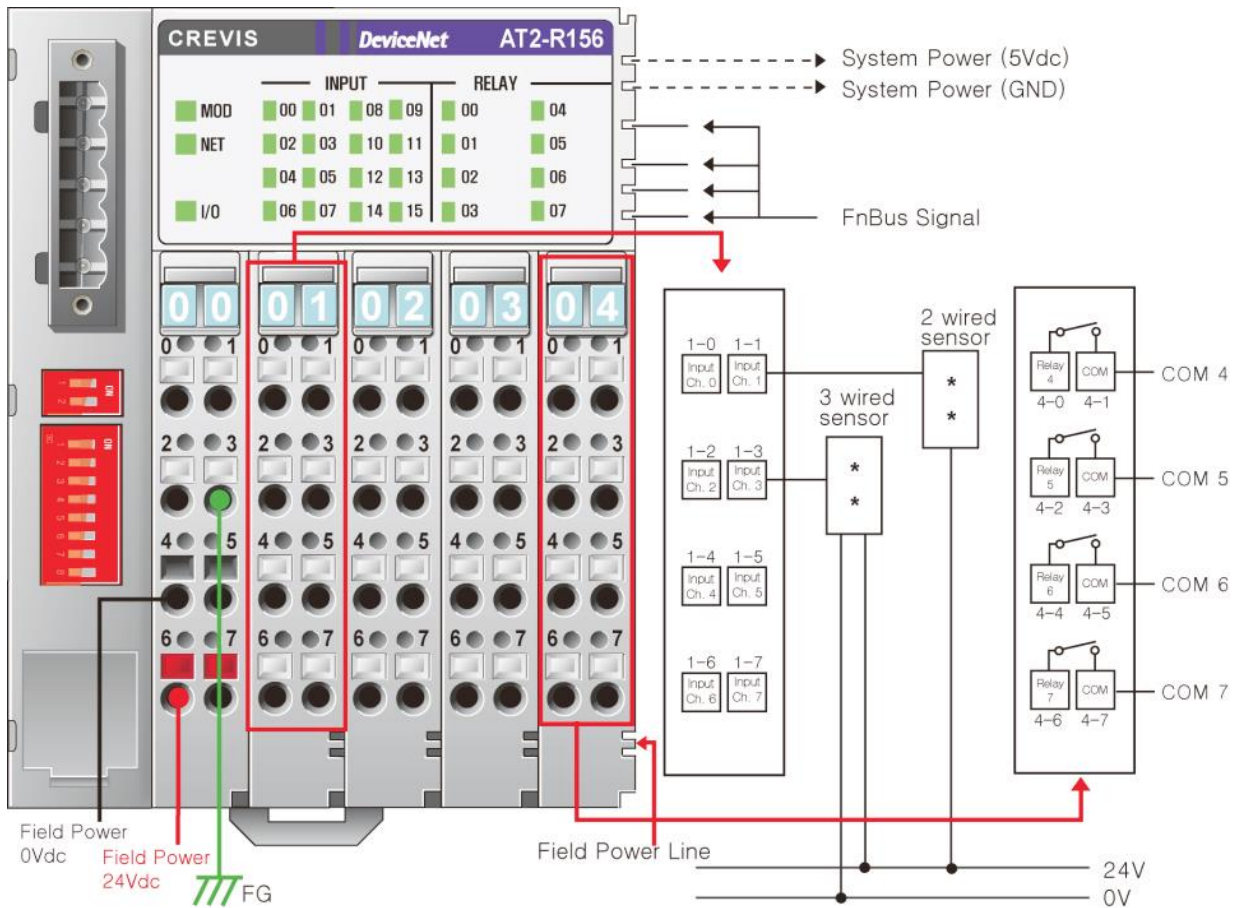
Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Input Channel 0	2-0	Input Channel 8	3-0	Relay Output 0	4-0	Relay Output 4
1-1	Input Channel 1	2-1	Input Channel 9	3-1	COM 0	4-1	COM 1
1-2	Input Channel 2	2-2	Input Channel 10	3-2	Relay Output 1	4-2	Relay Output 5
1-3	Input Channel 3	2-3	Input Channel 11	3-3	COM 0	4-3	COM 1
1-4	Input Channel 4	2-4	Input Channel 12	3-4	Relay Output 2	4-4	Relay Output 6
1-5	Input Channel 5	2-5	Input Channel 13	3-5	COM 0	4-5	COM 1
1-6	Input Channel 6	2-6	Input Channel 14	3-6	Relay Output 3	4-6	Relay Output 7
1-7	Input Channel 7	2-7	Input Channel 15	3-7	COM 0	4-7	COM 1

### 3.2.10. AT2-R155



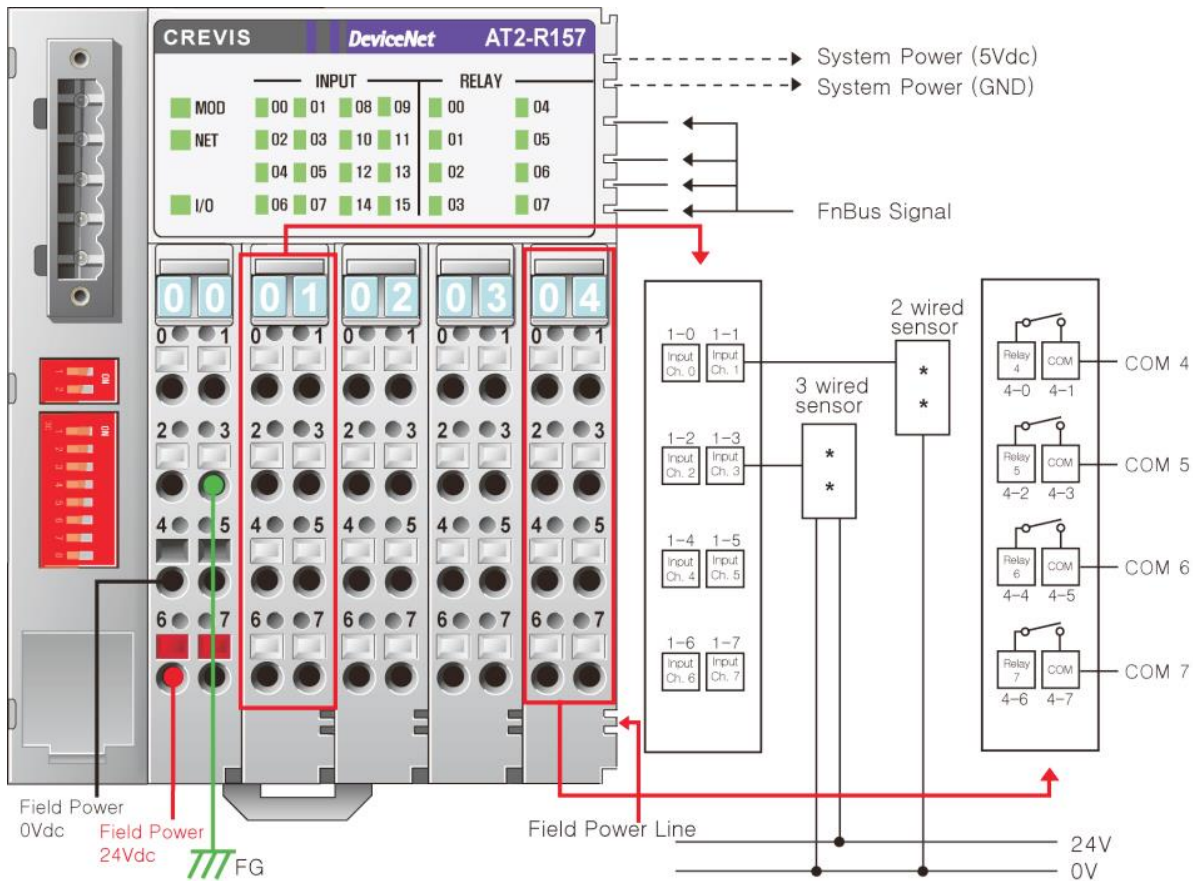
Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Relay Output 0	2-0	Relay Output 4	3-0	Relay Output 8	4-0	Relay Output 12
1-1	COM 0	2-1	COM 4	3-1	COM 8	4-1	COM 12
1-2	Relay Output 1	2-2	Relay Output 5	3-2	Relay Output 9	4-2	Relay Output 13
1-3	COM 1	2-3	COM 5	3-3	COM 9	4-3	COM 13
1-4	Relay Output 2	2-4	Relay Output 6	3-4	Relay Output 10	4-4	Relay Output 14
1-5	COM 2	2-5	COM 6	3-5	COM 10	4-5	COM 14
1-6	Relay Output 3	2-6	Relay Output 7	3-6	Relay Output 11	4-6	Relay Output 15
1-7	COM 3	2-7	COM 7	3-7	COM 11	4-7	COM 15

### 3.2.11. AT2-R156



Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Input Channel 0	2-0	Input Channel 8	3-0	Relay Output 0	4-0	Relay Output 4
1-1	Input Channel 1	2-1	Input Channel 9	3-1	COM 0	4-1	COM 4
1-2	Input Channel 2	2-2	Input Channel 10	3-2	Relay Output 1	4-2	Relay Output 5
1-3	Input Channel 3	2-3	Input Channel 11	3-3	COM 1	4-3	COM 5
1-4	Input Channel 4	2-4	Input Channel 12	3-4	Relay Output 2	4-4	Relay Output 6
1-5	Input Channel 5	2-5	Input Channel 13	3-5	COM 2	4-5	COM 6
1-6	Input Channel 6	2-6	Input Channel 14	3-6	Relay Output 3	4-6	Relay Output 7
1-7	Input Channel 7	2-7	Input Channel 15	3-7	COM 3	4-7	COM 7

### 3.2.12. AT2-R157



Pin No.	Description	Pin No.	Description	Pin No.	Description	Pin No.	Description
1-0	Input Channel 0	2-0	Input Channel 8	3-0	Relay Output 0	4-0	Relay Output 4
1-1	Input Channel 1	2-1	Input Channel 9	3-1	COM 0	4-1	COM 4
1-2	Input Channel 2	2-2	Input Channel 10	3-2	Relay Output 1	4-2	Relay Output 5
1-3	Input Channel 3	2-3	Input Channel 11	3-3	COM 1	4-3	COM 5
1-4	Input Channel 4	2-4	Input Channel 12	3-4	Relay Output 2	4-4	Relay Output 6
1-5	Input Channel 5	2-5	Input Channel 13	3-5	COM 2	4-5	COM 6
1-6	Input Channel 6	2-6	Input Channel 14	3-6	Relay Output 3	4-6	Relay Output 7
1-7	Input Channel 7	2-7	Input Channel 15	3-7	COM 3	4-7	COM 7



### 3.3. Environment & Communication Interface Specification

Environmental Specifications	
Operating Temperature	-20 to 55 °C
Non-Operating Temperature	-40 °C to 85 °C
Relative Humidity	5%~90% non-condensing
Operating Altitude	2000m
Mounting	DIN rail
General Specifications	
Vibration/Shock resistance	Displacement : 0.012Inch p-p from 10~57Hz Acceleration : 2G's from 57~500Hz Sweep Rate : 1 octave Per Minute Axes to test : x, y, z Frequency Sweeps Per Axis : 10
System Power	Supply voltage : 24Vdc nominal Supply voltage range : 19.2~28.8Vdc Protection : Current limit, Reverse polarity protection
System Power Dissipation	Max. 110mA@24Vdc
System Power Current for Expansion Module	Max. 600mA@5Vdc
EMC resistance burst/ESD	Confirms to EN-61000-6-2
EMI	Confirms to EN-61000-6-4
Installation Pos. /Protect. Class	Variable / IP20
Product Certification	UL / cUL, CE, FCC
Network Conformance	AT2-R1xx : ODVA Conformance Test Completion AT2-R3xx : CLPA Conformance Test Completion AT2-R5xx : PTO Conformance Test Completion
Isolation	DC Module (Included Analog Module) : Terminal Block to F.G 500Vac/1min AC Module : Terminal Block to F.G 1500Vac/1min Relay Module : Terminal Block to F.G 2500Vac/1min
Communication Interface Specifications	
Adapter Type	Group 2 Only Slave
Max. Expansion Module	10 Expansion Slots
Max. Input Size	Base IO (max 4byte) + Expansion IO (max 32byte), max 36byte
Max. Output Size	Base IO (max 4byte) + Expansion IO (max 30byte), max 34byte
Max. Length Bus Line	Max. 100m@500Kbps, Max. 250m@250Kbps, Max. 500m@125Kbps
Communication Speed	125Kbps, 250Kbps, 500Kbps, auto baud supported, DIP Switch
Network Protocol	Poll, Bit-Strobe, Cyclic, COS
Interface Connector	5pin Open male connector
Max. Nodes	64 nodes
Node MAC ID setup	DIP Switch
Indicators	3 LEDs 1 Green/Red, Module Status ( MOD ) 1 Green, Network Status ( NET ) 1 Green/Red Expansion I/O Module Status (I/O)
Module Location	Starter module - left side of FnIO system

### 3.4. Specification

#### 3.4.1. AT2-R111

Items	Specification
<b>Interface Specification</b>	
Number of Input	32 Points, Sink Type (GND Common internally shorted)
Indicates	1 LED/1Point
Input Voltage	Nominal 24Vdc, 11~28.8Vdc
Max. Off-State Voltage	5Vdc
Min. On-State Voltage	9Vdc
Input Signal Delay	< 0.5msec
Input Impedance	About 5.4K $\Omega$
<b>General Specification</b>	
Power Dissipation	Max. 110mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A @ 24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"

### 3.4.2. AT2-R112

Items	Specification
<b>Interface Specification</b>	
Number of Input	32 Points, Source Type (24V Power internally shorted)
Indicates	1 LED/1Point
Input Voltage	Nominal 0Vdc, 11~28.8Vdc
Max. Off-State Voltage	5Vdc
Min. On-State Voltage	9Vdc
Input Signal Delay	< 0.5msec
Input Impedance	About 5.4KΩ
<b>General Specification</b>	
Power Dissipation	Max. 110mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A@24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"

### 3.4.3. AT2-R121

Items	Specification
<b>Interface Specification</b>	
Number of Output	32 Points, Sink Type (GND Common internally shorted, like to TR's NPN)
Indicates	1 LED/1Point
Output Load Current	Max. 0.5A/1pt, 8A/All
Output Voltage	Nominal 0Vdc, 11~28.8Vdc available
Drop Voltage(ON-state)	Max. 0.3Vdc
Leakage Current(OFF-state)	Max. 50uA
Output Signal Delay	< 0.3msec
Protection	Short protection, Over Temperature protection, Over Current Limit
<b>General Specification</b>	
Power Dissipation	Max. 110mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A@24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"

### 3.4.4. AT2-R122

Items	Specification
<b>Interface Specification</b>	
Number of Output	32 Points, Source Type (24V Power internally shorted, like to TR's PNP)
Indicates	1 LED/1Point
Output Load Current	Max. 0.5A/1pt, 8A/All
Output Voltage	Nominal 24Vdc, 11~28.8Vdc available
Drop Voltage(ON-state)	Max. 0.3Vdc
Leakage Current(OFF-state)	Max. 50uA
Output Signal Delay	< 0.3msec
Protection	Short protection, Over Temperature protection, Over Current Limit
<b>General Specification</b>	
Power Dissipation	Max. 110mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A@24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"

### 3.4.5. AT2-R125

Items	Specification
<b>Interface Specification</b>	
Number of Output	16 Points
Indicates	1 LED/1Point
Relay Type	Form Am Normally Open Single Pole, Single Throw
Output Rating	2A@5~28.8Vdc 0.8A@48Vdc 0.5A@110Vdc 2A@250Vac
Min. Load	100uA, 100mVdc/Point
Max. On-State Voltage Drop	0.5V@2.0A, Resistive Load, 24Vdc
Output Delay Time	On to Off: Max. 10ms Off to On: Max. 10ms
Initial Contact Resistance	30mΩ
Expected Contact Life	300K Cycle Resistive, 100K Cycle Inductive
Common Type	4 Point / 1 COM (Single Common)
Isolation	I/O to Logic : Relay Coil/Contact Isolation 1250Vrms tested
<b>General Specification</b>	
Power Dissipation	Max. 110mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A@24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"

### 3.4.6. AT2-R133

Items	Specification
<b>Interface Specification</b>	
Number of Input	16 Points, Sink Type (GND Common internally shorted)
Indicates	1 LED/1Point
Input Voltage	Nominal 24Vdc, 11~28.8Vdc
Max. Off-State Voltage	5Vdc
Min. On-State Voltage	9Vdc
Input Signal Delay	< 0.5msec
Input Impedance	About 5.4K $\Omega$
<b>Interface Specification</b>	
Number of Output	16 Points, Source Type (24V Power internally shorted, like to TR's PNP)
Indicates	1 LED/1Point
Output Load Current	Max. 0.5A/1pt, 8A/All
Output Voltage	Nominal 24Vdc, 11~28.8Vdc available
Drop Voltage(ON-state)	Max. 0.3Vdc
Leakage Current(OFF-state)	Max. 50uA
Output Signal Delay	< 0.3msec
Protection	Short protection, Over Temperature protection, Over Current Limit
<b>General Specification</b>	
Power Dissipation	Max. 110mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A@24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"

### 3.4.7. AT2-R134

Items	Specification
<b>Interface Specification</b>	
Number of Input	16 Points, Source Type (24V Power internally shorted)
Indicates	1 LED/1Point
Input Voltage	Nominal 0Vdc, 11~28.8Vdc
Max. Off-State Voltage	5Vdc
Min. On-State Voltage	9Vdc
Input Signal Delay	< 0.5msec
Input Impedance	About 5.4KΩ
<b>Interface Specification</b>	
Number of Output	16 Points, Sink Type (GND Common internally shorted)
Indicates	1 LED/1Point
Output Load Current	Max. 0.5A/1pt, 8A/All
Output Voltage	Nominal 0Vdc, 11~28.8Vdc available
Drop Voltage(ON-state)	Max. 0.3Vdc
Leakage Current(OFF-state)	Max. 50uA
Output Signal Delay	< 0.3msec
Protection	Short protection, Over Temperature protection, Over Current Limit
<b>General Specification</b>	
Power Dissipation	Max. 110mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A@24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"



### 3.4.8. AT2-R136

Items	Specification
<b>Interface Specification</b>	
Number of Input	16 Points, Sink Type (GND Common internally shorted)
Indicates	1 LED/1Point
Input Voltage	Nominal 24Vdc, 11~28.8Vdc
Max. Off-State Voltage	5Vdc
Min. On-State Voltage	9Vdc
Input Signal Delay	< 0.5msec
Input Impedance	About 5.4K $\Omega$
<b>Interface Specification</b>	
Number of Output	8 Points
Indicates	1 LED/1Point
Relay Type	Form Am Normally Open Single Pole, Single Throw
Output Rating	2A@5~28.8Vdc 0.8A@48Vdc 0.5A@110Vdc 2A@250Vac
Min. Load	100uA, 100mVdc/Point
Max. On-State Voltage Drop	0.5V@2.0A, Resistive Load, 24Vdc
Output Delay Time	On to Off: Max. 10ms Off to On: Max. 10ms
Initial Contact Resistance	30m $\Omega$
Expected Contact Life	300K Cycle Resistive, 100K Cycle Inductive
Common Type	4 Point / 1 COM (Single Common)
Isolation	I/O to Logic : Relay Coil/Contact Isolation 1250Vrms tested
<b>General Specification</b>	
Power Dissipation	Max. 50mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A@24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"

### 3.4.9. AT2-R137

Items	Specification
<b>Interface Specification</b>	
Number of Input	16 Points, Source Type (24V Power internally shorted)
Indicates	1 LED/1Point
Input Voltage	Nominal 0Vdc, 11~28.8Vdc
Max. Off-State Voltage	5Vdc
Min. On-State Voltage	9Vdc
Input Signal Delay	< 0.5msec
Input Impedance	About 5.4K $\Omega$
<b>Interface Specification</b>	
Number of Output	8 Points
Indicates	1 LED/1Point
Relay Type	Form Am Normally Open Single Pole, Single Throw
Output Rating	2A@5~28.8Vdc 0.8A@48Vdc 0.5A@110Vdc 2A@250Vac
Min. Load	100uA, 100mVdc/Point
Max. On-State Voltage Drop	0.5V@2.0A, Resistive Load, 24Vdc
Output Delay Time	On to Off: Max. 10ms Off to On: Max. 10ms
Initial Contact Resistance	30m $\Omega$
Expected Contact Life	300K Cycle Resistive, 100K Cycle Inductive
Common Type	4 Point / 1 COM (Single Common)
Isolation	I/O to Logic : Relay Coil/Contact Isolation 1250Vrms tested
<b>General Specification</b>	
Power Dissipation	Max. 50mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A@24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"

**3.4.10. AT2-R155**

Items	Specification
<b>Interface Specification</b>	
Number of Output	16 Points
Indicates	1 LED/1Point
Relay Type	Form Am Normally Open Single Pole, Single Throw
Output Rating	2A@5~28.8Vdc 0.8A@48Vdc 0.5A@110Vdc 2A@250Vac
Min. Load	100uA, 100mVdc/Point
Max. On-State Voltage Drop	0.5V@2.0A
Output Delay Time	On to Off: Max. 10ms Off to On: Max. 10ms
Initial Contact Resistance	30mΩ
Expected Contact Life	300K Cycle Resistive, 100K Cycle Inductive
Common Type	1 Point / 1 COM (Single Common)
Isolation	I/O to Logic : Relay Coil/Contact Isolation 1250Vrms tested
<b>General Specification</b>	
Power Dissipation	Max. 110mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A@24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"

### 3.4.11. AT2-R156

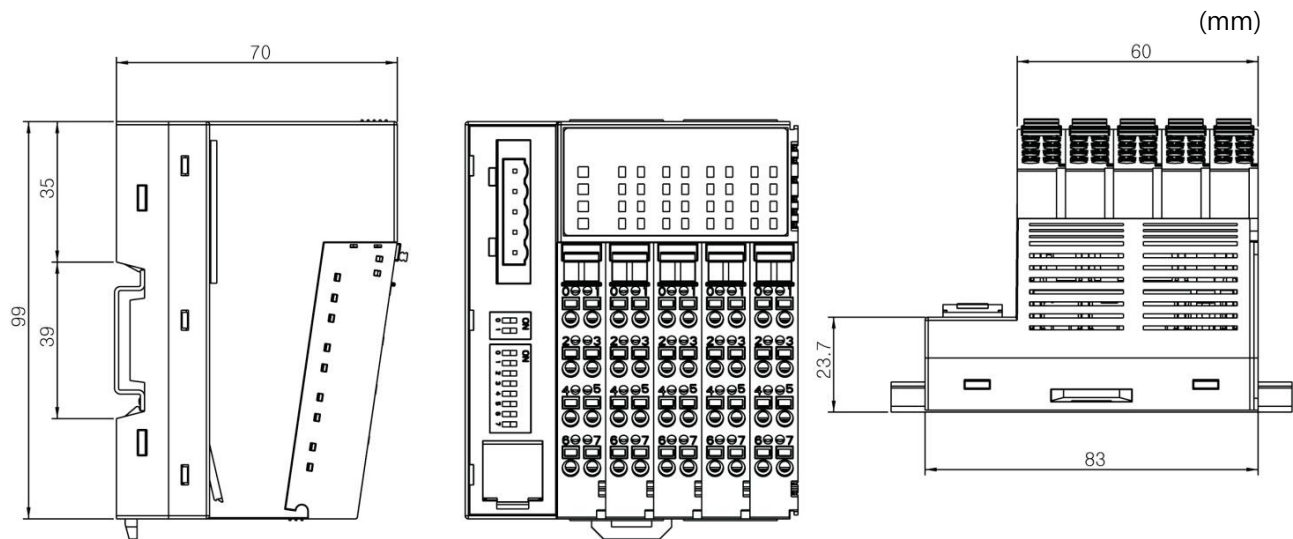
Items	Specification
<b>Interface Specification</b>	
Number of Input	16 Points, Sink Type (GND Common internally shorted)
Indicates	1 LED/1Point
Input Voltage	Nominal 24Vdc, 11~28.8Vdc
Max. Off-State Voltage	5Vdc
Min. On-State Voltage	9Vdc
Input Signal Delay	< 0.5msec
Input Impedance	About 5.4K $\Omega$
<b>Interface Specification</b>	
Number of Output	8 Points
Indicates	1 LED/1Point
Relay Type	Form Am Normally Open Single Pole, Single Throw
Output Rating	2A@5~28.8Vdc 0.8A@48Vdc 0.5A@110Vdc 2A@250Vac
Min. Load	100uA, 100mVdc/Point
Max. On-State Voltage Drop	0.5V@2.0A, Resistive Load, 24Vdc
Output Delay Time	On to Off: Max. 10ms Off to On: Max. 10ms
Initial Contact Resistance	30m $\Omega$
Expected Contact Life	300K Cycle Resistive, 100K Cycle Inductive
Common Type	1 Point / 1 COM (Single Common)
Isolation	I/O to Logic : Relay Coil/Contact Isolation 1250Vrms tested
<b>General Specification</b>	
Power Dissipation	Max. 50mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A@24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"

### 3.4.12. AT2-R157

Items	Specification
<b>Interface Specification</b>	
Number of Input	16 Points, Source Type (24V Power internally shorted)
Indicates	1 LED/1Point
Input Voltage	Nominal 0Vdc, 11~28.8Vdc
Max. Off-State Voltage	5Vdc
Min. On-State Voltage	9Vdc
Input Signal Delay	< 0.5msec
Input Impedance	About 5.4K $\Omega$
<b>Interface Specification</b>	
Number of Output	8 Points
Indicates	1 LED/1Point
Relay Type	Form Am Normally Open Single Pole, Single Throw
Output Rating	2A@5~28.8Vdc 0.8A@48Vdc 0.5A@110Vdc 2A@250Vac
Min. Load	100uA, 100mVdc/Point
Max. On-State Voltage Drop	0.5V@2.0A, Resistive Load, 24Vdc
Output Delay Time	On to Off: Max. 10ms Off to On: Max. 10ms
Initial Contact Resistance	30m $\Omega$
Expected Contact Life	300K Cycle Resistive, 100K Cycle Inductive
Common Type	1 Point / 1 COM (Single Common)
Isolation	I/O to Logic : Relay Coil/Contact Isolation 1250Vrms tested
<b>General Specification</b>	
Power Dissipation	Max. 50mA @ 5.0Vdc
Isolation	DeviceNet to internal logic : Non-isolation Internal logic to I/O driver : Isolation
Field Power	Supply Voltage : 24Vdc nominal Supply Voltage range : 11~28.8Vdc
Field Power Current	Max. 6A@24Vdc
Weight	Max. 340g
Module Size	83mm × 99mm × 70mm
Environment Condition	Refer to " 3.3. Environment & Communication Interface Specification"

## 4. Dimension

### 4.1. AT2-R1xx




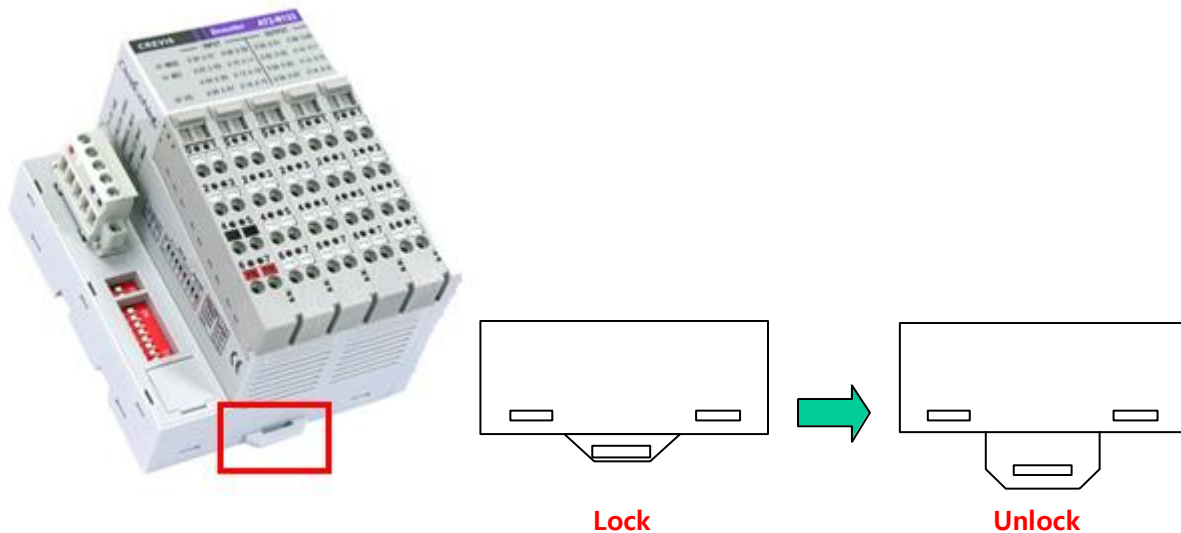
## 5. Mechanical Set Up

### 5.1. Total Expansion

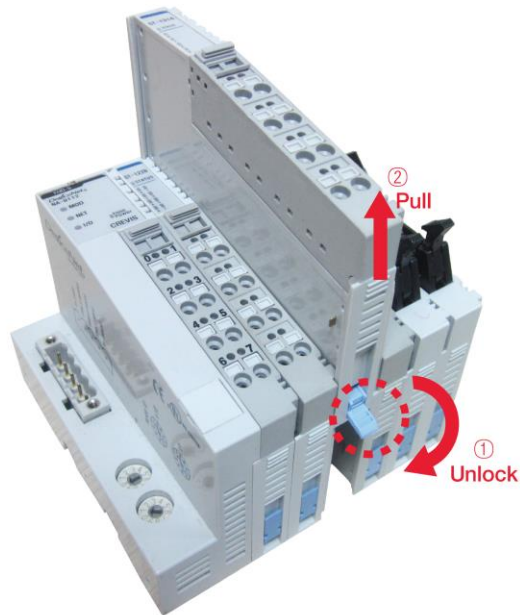
The number of the module assembly that can be connected is 10. So the maximum length is 203mm Exception ST-2748 is excepted to calculate maximum length because that is double width module.

### 5.2. Plugging and Removal of the Components.

<p><b>DANGER</b></p> 	<p>Before work is done on the components, the voltage supply must be turned off.</p> <p>Make sure pull up the locker first as the picture above and then pull down after install the module on DIN rail.</p>
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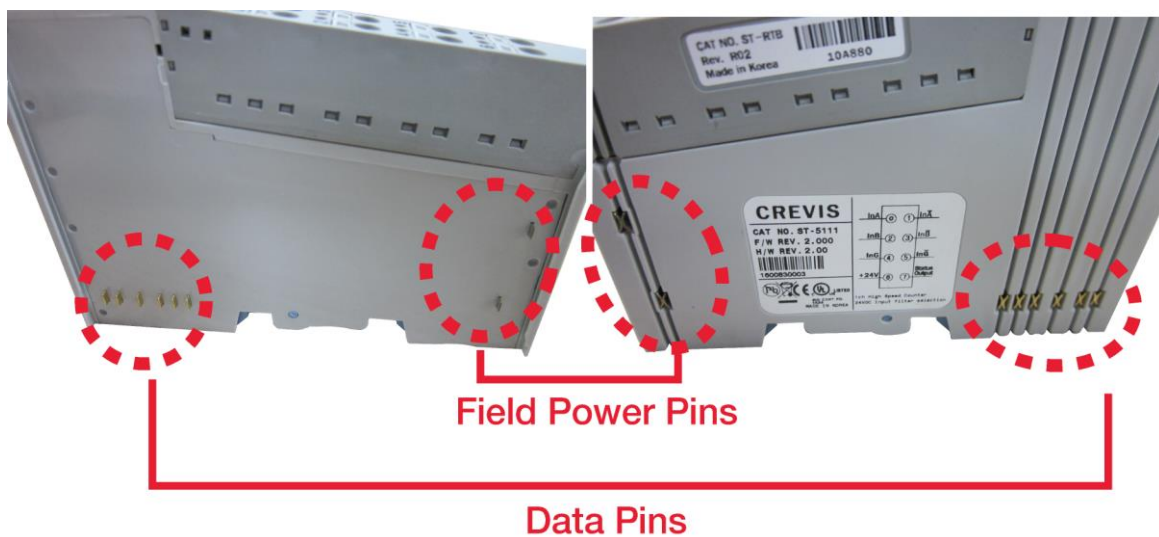


Use a small-bladed screwdriver to lift up Locker. Install the Module on Din rail firmly. Lift down locker to lock. To remove the modules please repeat it in opposite sequence.



### 5.3. Internal FnBUS/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.



**DANGER**



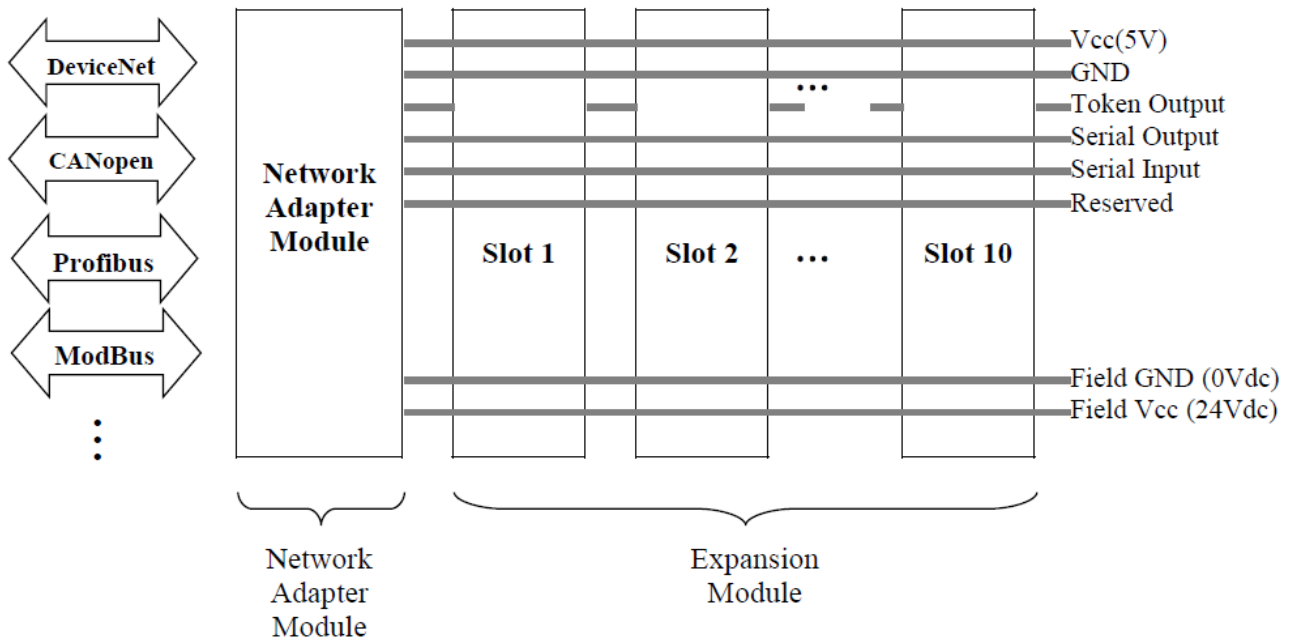
Do not touch data and field power pins in order to avoid soiling and damage by ESD noise.



## 6. Configuration and Operation

### 6.1. FnBus Specification

#### 6.1.1. FnBus System



#### • Network Adapter Module

The Network Adapter Module forms the link between the field bus and the field devices with the Expansion Modules.

The connection to different field bus systems can be established by each of the corresponding Network Adapter Module, e.g. for SyncNet, PROFIBUS, CANopen, DeviceNet, Ethernet/IP, CC-Link, MODBUS/Serial, MODBUS/TCP etc.

#### • Expansion Module

The Expansion Modules are supported a variety of input and output field devices.

There are digital and analog input/output modules and special function modules.

#### • Two types of FnBus Message

- Service Messaging
- I/O Messaging

### 6.1.2. FnBus Pin Description

No.	Name	Description
1	Vcc	System supply voltage (5V dc).
2	GND	System Ground.
3	Token Output	Token output port of Processor module.
4	Serial Output	Transmitter output port of Processor module.
5	Serial Input	Receiver input port of Processor module.
6	Reserved	Reserved for bypass Token.
7	Field GND	Field Ground.
8	Field Vcc	Field supply voltage (24Vdc).

### 6.1.3. Object Models

A DeviceNet node is modeled as a collection of Objects. An Object provides an abstract representation of a particular component within a product. The realization of this abstract object model within a product is implementation dependent. In other words, a product internally maps this object model in a fashion specific to its implementation.

The objects and their components are addressed by a uniform addressing scheme consisting of:

Media Access Control Identifier (MAC ID), an integer identification value assigned to each node on a DeviceNet network.

Class Identifier (Class ID), an integer identification value assigned to each Object Class accessible from the network.

Instance Identifier (Instance ID), an integer identification value assigned to an Object Instance that identifies it among all Instances of the same Class.

Attribute Identifier (Attribute ID), an integer identification value assigned to a Class and/or Instance Attribute.

Service Code, an integer identification value which denotes a particular Object Instance and/or Object Class function.

Supported Objects

- Device Type Number: 0C<sub>HEX</sub> (Communications Adapter)

Name of Object	Type	Number of Instances	Class Code
Identity	Required	1	01 <sub>HEX</sub>
Message Router	Required	1	02 <sub>HEX</sub>
DeviceNet	Required	1	03 <sub>HEX</sub>
Assembly	Required	2	04 <sub>HEX</sub>
Connection	Required	4	05 <sub>HEX</sub>
Acknowledge Handler	Required	1	2B <sub>HEX</sub>
FnBus Manager	Vendor-specific	1	70 <sub>HEX</sub>
Expansion Slot	Vendor-specific	1~32	71 <sub>HEX</sub>

## 6.2. DeviceNet Composition

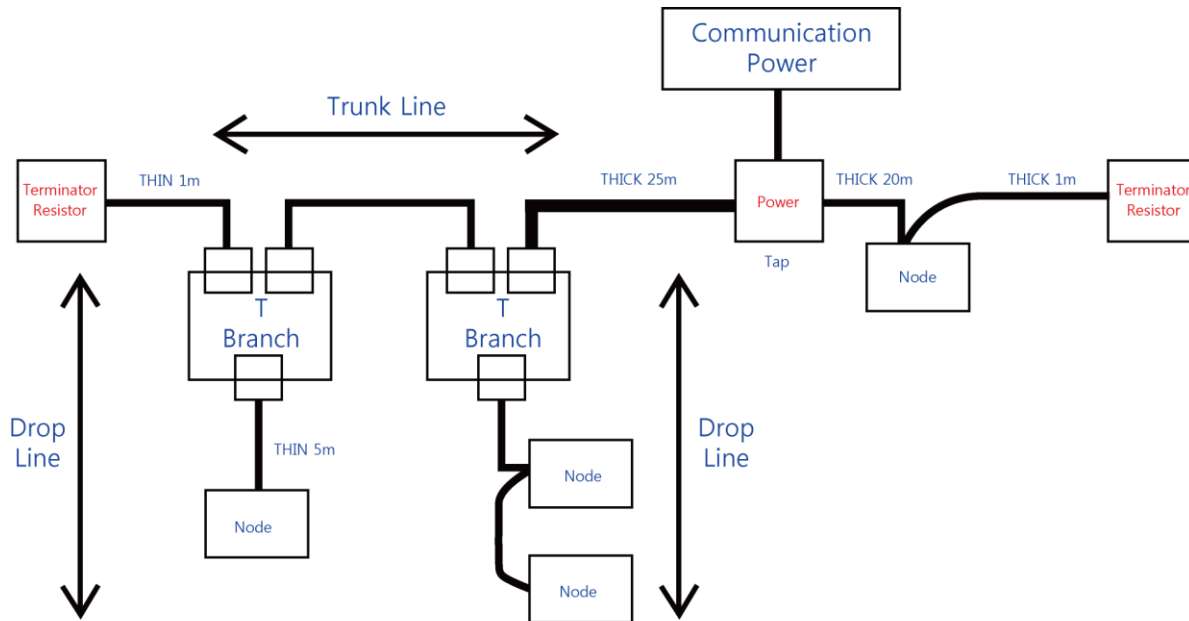


Figure 2. DeviceNet Network Example.

### ● Network Composition

Name	Description
Node	Node is Slave that is charged each address number. DeviceNet is comprised of Master and Slave. Master manages DeviceNet and organizes external I/O in Slave. Slave contacts external I/O.
Trunk / Drop Line	Trunk line is cable that is installed terminator resistor. Drop line is cable that branch from trunk line In the DeviceNet, both trunk and drop line is used.
Connection Mode	Number of Connection mode for DeviceNet is 2 modes. First is T-branch and Second is multi-drop. T-branch is method that branches off drop-line by T-branch tap Multi drop is method what trunk and drop line contacts with node directly.
Terminator Resistor	Terminator resistor is that is installed for reduction a reflected wave in both ends trunk line.
Communication Power	For using DeviceNet, user must supply communication power to each node connector through the DeviceNet cable.

## 6.3. DeviceNet Module(AT2-R1xx) Installation

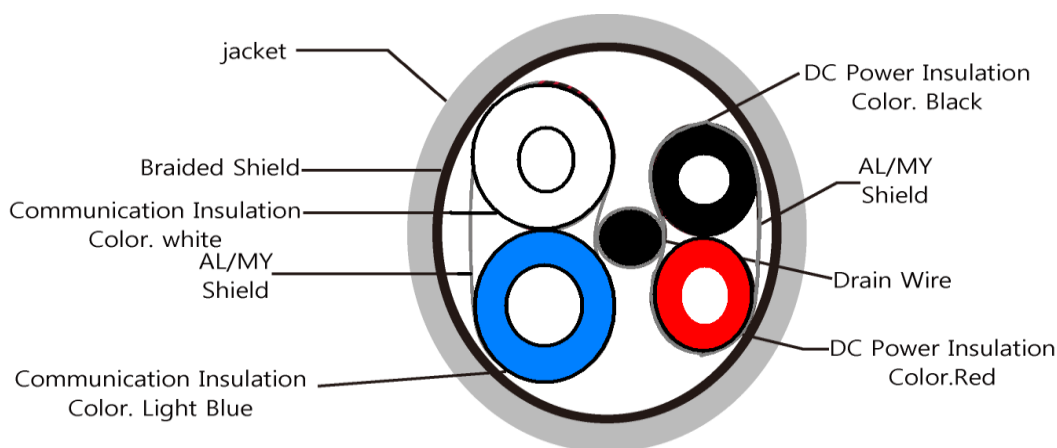
### 6.3.1. DeviceNet Cable Specification

- **Communication Cable Specification**

DeviceNet Cable Specification

In the DeviceNet Specification There is the exclusive cable below

(DeviceNet Specification Volume Release2.0 Errate2, FnIO\_Configuration\_Parameter\_....pdf)



Physical Characteristics	Thick Cable Spec	Thin Cable Spec
<b>Communication cable</b>		
Conductor pair size	#18 Copper (minimum) : 19 strand min (individually tinned)	#24 Copper (minimum) : 19 strand min (individually tinned)
Insulation diameter	0.150 inches	0.077 inches
Colors	Light blue White	Light blue White
Pair twist/ft	3 (approx.)	5 (approx.)
Impedance	120Ω ± 10% (at 1MHz)	
<b>Power pair</b>		
Conductor pair size	#15 Copper (minimum) : 19 strand min (individually tinned)	#22 Copper (minimum) : 19 strand min (individually tinned)
Insulation diameter	0.098 inches	0.055 inches
Color	Red Black	Red Black
Tape shield over pair	1.0mil/1mil,Al/Mylar Al side out w/shorting fold (pull-on applied)	1.0mil/1mil,Al/Mylar Al side out w/shorting fold (pull-on applied)
Drain wire	#18 Copper (minimum) : 19 strand min	#22 Copper (minimum) : 19 strand min
Roundness	Radius delta to be within 15% of 0.5 O.D	
Agency certification	NEC(UL) type CL2(min.)	
Jacket marker	Vender name & part#, and additional	

The maximum length of network for each cable type is as follows.

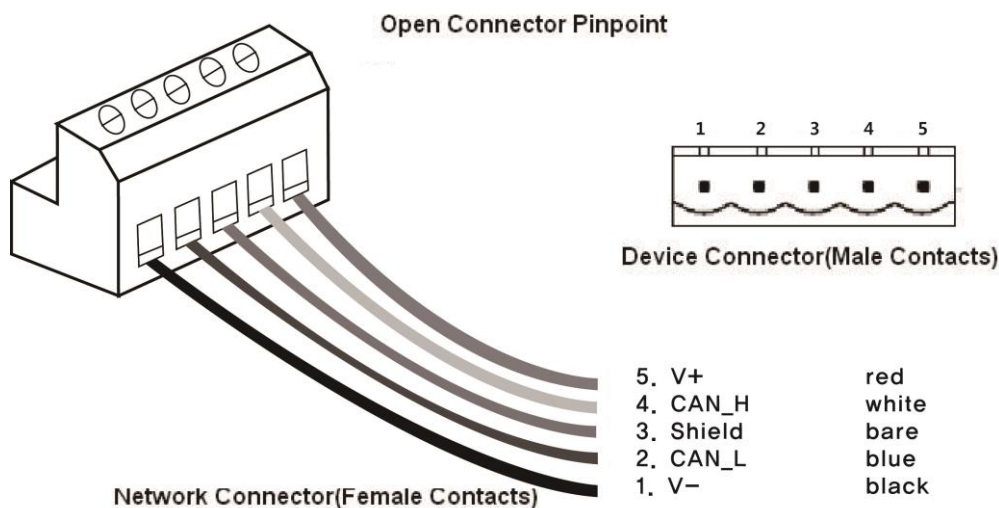
✓ **Thick Cable**

Communication rate	Trunk Length	Trunk Exchange (Thick Cable)	Cumulative drop	Maximum drop
<b>125Kbps</b>	500m(1640ft)	1.0	156m(512ft)	6m(20ft)
<b>250Kbps</b>	250m(820ft)	1.0	76m(256ft)	6m(20ft)
<b>500Kbps</b>	100m(328ft)	1.0	38m(128ft)	6m(20ft)

✓ **Thin Cable**

Communication rate	Trunk Length	Trunk Exchange (Thick Cable)	Cumulative drop	Maximum drop
<b>125Kbps</b>	100m(328ft)	5.0	156m(512ft)	6m(20ft)
<b>250Kbps</b>	100m(328ft)	2.5	76m(256ft)	6m(20ft)
<b>500Kbps</b>	100m(328ft)	1.0	38m(128ft)	6m(20ft)

● **Open Connector Pinpoint**



Device network power is 24V. Network and I/O field power must be separated. One power is provided per network

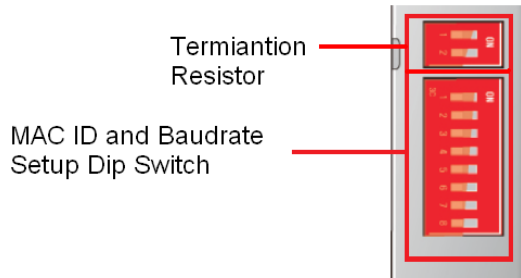
**ATTENTION**



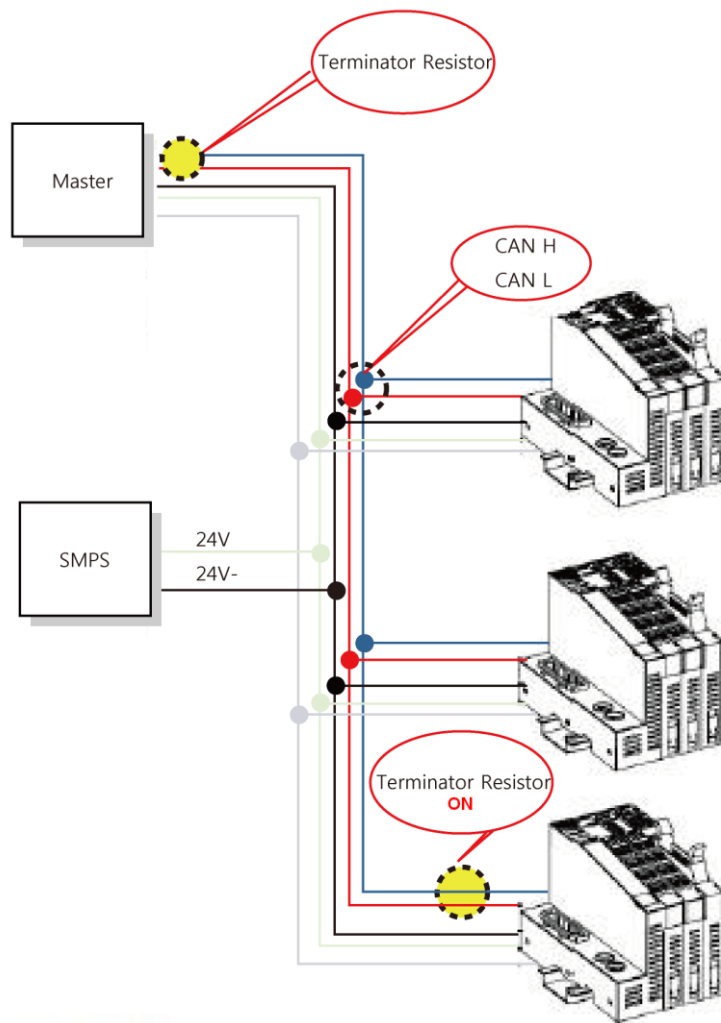
The use of an incorrect supply voltage or frequency can cause severe damage to the component.

## 6.4. DeviceNet Module(AT2-R1xx)Configuration

### 6.4.1. Terminator Resistor Specification



Termination Resistor setting	Dip SW #1	Dip SW #2
ON	on	on
OFF	off	off

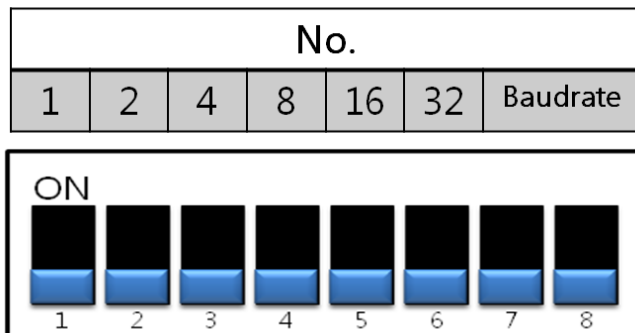


## 6.4.2. MAC ID and Baudrate Setup

### ● MAC ID Setup

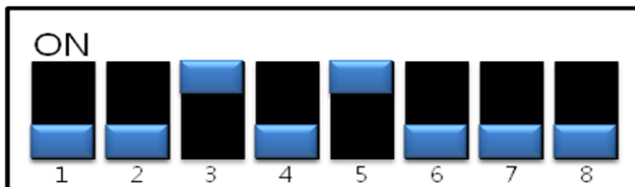
Each DeviceNet Adapter must have an unique MAC ID (from 0 to 63) so that it can be addressed independently from other nodes.

Dip Switch #1~6 setting.



### ✓ MAC ID Setting Example

When setting MAC ID to No.20 (Bin.10100) No.3 & 5 Dip S/W On.



### ● Baudrate Setup

DIP #7	DIP #8	Baudrate
OFF	OFF	125Kbps
ON	OFF	250Kbps
OFF	ON	500Kbps
ON	ON	Auto Baudrate

### ATTENTION



#### \* Directions for setting Node No(Station No)

1. Please set it within the range of contactable Station number (Station no. 00~63)
2. Station number setting out of the range will cause Communication Error.
3. When double setting Station No., communication error occurred

## 7. Object Setting

### 7.1. Identity Object

Class Code: 01<sub>HEX</sub>

#### Common Services

Service Code	Implemented for		Service Name	Value
	Class	Instance		
0x05	No	Yes	Reset	0: Reset Only 1: Reset and Factory Default
0x0E	No	Yes	Get_Attribute_Single	

#### Class Attributes

None

#### Instance Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1	1	Get	Vendor ID	UINT	741 (Crevis Co., Ltd)
	2	Get	Device Type	UINT	0C <sub>HEX</sub> (Communications Adapter)
	3	Get	Product Code	UINT	
	4	Get	Revision - Major - Minor	Structure of: USINT USINT	1 ~ 9 1 ~ 255
	5	Get	Status	WORD	Defined in Spec.
	6	Get	Serial Number	UDINT	Unique Number
	7	Get	Product Name - String Length - ASCII String	Structure of: USINT STRING	ex) (29)“AT2-R137,Source In 16/Relay 8”
	9	Get	CRC	UINT	EEPROM Checksum Code *0x11B8
	100(64h)	Get	Device Fault Code	USINT	00 <sub>HEX</sub> : Normal Operation Bit 0: No expansion slot Bit 1: Too many expansion slot Bit 2: Overflow I/O size Bit 3: I/O Configuration failure Bit 4: EEPROM Checksum fault Bit 6: Invalid Module ID Bit 7: Firmware fault
	Vendor-specific				
	102(66h)	Get	Firmware Code	USINT	113 : A-series
	103(67h)	Get	ODVA Conformance Test Revision	UINT	0x0A17 → “A-17”
	104(68h)	Get	Firmware Release Date	UDINT	0xYYYYMMDD ex) 0x20030417 → 2003/04/17
	107(6Bh)	Get	Inspection Date	UDINT	0xYYYYMMDD



7.2. Message Router Object

Class Code: 02<sub>HEX</sub>

Common Services  
None

Class Attributes  
None

Instance Attributes  
None

### 7.3. DeviceNet Object

Class Code: 03<sub>HEX</sub>

#### Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single
0x4B	No	Yes	Allocate_Master/Slave_Connection_Set
0x4C	No	Yes	Release_Master/Slave_Connection_Set

#### Class Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
0	1	Get	Revision	UINT	02, 00

#### Instance Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1	1	Get/Set*	MAC ID	USINT	0 ~ 63
	2	Get/Set**	Baud Rate	USINT	0=125K, 1=250K, 2=500K
	3	Get/Set	Bus off Interrupt	BOOL	faulted node recovery
	4	Get	Bus-Off Counter	USINT	0 ~ 255
	5	Get	Allocation Information - Allocation Choice - Master's MAC ID	Structure of: BYTE USINT	0~63: Master MAC ID, 255: unallocated
	Vendor-specific				
	101(65h)	Get/Set	Quick Start, TBD	BOOL	0:Normal Start-up 1:Quick Start-up
	111(6Fh)	Get/Set	DIP Switch value	USINT	Actual value of DIP Switch

\*The MAC ID Rotary Switch value = 0~63: Not allowed to set the MAC ID from Network.

The MAC ID Rotary Switch value = 64~99: Allowed to set the MAC ID from Network.

Behavior: Changed new MAC ID → Device will be restarted.

\*\*The Auto-Baud Action (attribute #100) value = 0: Not allowed to set the Baud Rate form Network

The Auto-Baud Action (attribute #100) value = 1: Allowed to set the Baud Rate form Network

Behavior: Changed new Baudrate → Device won't be restarted. (Waiting for reset service or power reset)

## 7.4. Assembly Object

Class Code: 04<sub>HEX</sub>

### Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

### Class Attributes

None

### Input Instance Attributes

Input/output Instance ID

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
100(64h)	3	Get	Input (Produced) Process Image Data	Array n BYTE	Input process current image data
150(96h)	3	Set/Get	Output (Consumed) Process Image Data	Array n BYTE	Output process current image data

## 7.5. Connection Object

Class Code: 05<sub>HEX</sub>

### Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	No	Set_Attribute_Single

### Class Attributes

None

### Instance Attributes for Explicit Messaging Connection

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1	1	Get	state	USINT	Defined in Spec * 0x03 : The connection has been validly/fully configured and the configuration has been successfully applied.
	2	Get	instance_type	USINT	0: Explicit Message
	3	Get	transportClass_trigger	BYTE	83 <sub>HEX</sub>
	4	Get	produced_connection_id	UINT	*0x040B : MAC ID=01, Message group 2, Message ID 3
	5	Get	consumed_connection_id	UINT	*0x040C : MAC ID=01, Message ID 4
	6	Get	initial_comm_characteristics	BYTE	21 <sub>HEX</sub>
	7	Get	produced_connection_size	UINT	44
	8	Get	consumed_connection_size	UINT	44
	9	Get/Set	expacted_packet_rate	UINT	2504 (default) Timer Resolution of 8msec
	12	Get/Set	watchdog_timeout_action	USINT	3 : Deferred Delete (default)
	13	Get	produced_connection_path_length	UINT	00, 00
	14	Get	produced_connection_path	Array of USINT	Empty
	15	Get	consumed_connection_path_length	UINT	00, 00
	16	Get	consumed_connection_path	Array of USINT	Empty

- ✓ attribute 3 transport Class trigger = 0x83 → Direction=Server,  
Production Trigger=IGNORED,  
Transport Class = 3.

This is the value assigned to this attribute within the server end-point of an Explicit Messaging Connection

## Instance Attributes for Poll I/O Connection

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
2	1	Get	State	USINT	Defined in Spec
	2	Get	instance_type	USINT	1: I/O Message
	3	Get	transportClass_trigger	BYTE	82 <sub>HEX</sub>
	4	Get	produced_connection_id	UINT	* 0x03C1 : MAC ID=01, Message ID=6, Unconnected Explicit Request Message
	5	Get	consumed_connection_id	UINT	* 0x040D : MAC ID=01, Message ID=5, Group 2 message Identifier
	6	Get	initial_comm_characteristics	BYTE	01 <sub>HEX</sub>
	7	Get	produced_connection_size	UINT	9111 : 0 to 33, 9112 : 0 to 252
	8	Get	consumed_connection_size	UINT	9111 : 0 to 32, 9112 : 0 to 252
	9	Get/Set	expacted_packet_rate	UINT	Timer Resolution of 8msec * 200(decimal)
	12	Get	watchdog_timeout_action	USINT	0: Time Out (default)
	13	Get	produced_connection_path_length	UINT	0 or 6
	14	Get	produced_connection_path	Array of USINT	
	15	Get	consumed_connection_path_length	UINT	0 or 6
	16	Get	consumed_connection_path	Array of USINT	

## Instance Attributes for Bit-Strobe I/O Connection

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
3	1	Get	state	USINT	Defined in Spec
	2	Get	instance_type	USINT	1: I/O Message
	3	Get	transportClass_trigger	BYTE	82 <sub>HEX</sub>
	4	Get	produced_connection_id	UINT	*0x0381 : MAC ID=01, Message ID=14, Message group 1
	5	Get	consumed_connection_id	UINT	*0X0400 : MAC ID = 00, Message ID = 0, Message group 2
	6	Get	initial_comm_characteristics	BYTE	02 <sub>HEX</sub>
	7	Get	produced_connection_size	UINT	0 to 8
	8	Get	consumed_connection_size	UINT	8
	9	Get/Set	expacted_packet_rate	UINT	Timer Resolution of 8msec * 200
	12	Get	watchdog_timeout_action	USINT	0: Time Out (default)
	13	Get	produced_connection_path_length	UINT	0 or 6
	14	Get	produced_connection_path	Array of USINT	
	15	Get	consumed_connection_path_length	UINT	0 or 6
	16	Get	consumed_connection_path	Array of USINT	

## Instance Attributes for COS I/O Connection (Acknowledged)

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
4	1	Get	State	USINT	Defined in Spec
	2	Get	instance_type	USINT	1: I/O Message
	3	Get	transportClass_trigger	BYTE	12 <sub>HEX</sub>
	4	Get	produced_connection_id	UINT	
	5	Get	consumed_connection_id	UINT	
	6	Get	initial_comm_characteristics	BYTE	1
	7	Get	produced_connection_size	UINT	0 to 36
	8	Get	consumed_connection_size	UINT	0
	9	Get/Set	expacted_packet_rate	UINT	Timer Resolution of 8msec
	12	Get/Set	watchdog_timeout_action	USINT	0: Time Out (default)
	13	Get	produced_connection_path_length	UINT	0 or 6
	14	Get	produced_connection_path	Array of USINT	
	15	Get	consumed_connection_path_length	UINT	4
	16	Get	consumed_connection_path	Array of USINT	20 2B 24 01
	17	Get/Set	production_inhibit_time	UINT	00, 00

## Instance Attributes for COS I/O Connection (Unacknowledged)

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
4	1	Get	State	USINT	Defined in Spec * 0x01 : Configuring
	2	Get	instance_type	USINT	1: I/O Message
	3	Get	transportClass_trigger	BYTE	10 <sub>HEX</sub>
	4	Get	produced_connection_id	UINT	* 0x0341 MAC ID : 01, Message ID=13, Message Group 1
	5	Get	consumed_connection_id	UINT	0FFFF <sub>HEX</sub>
	6	Get	initial_comm_characteristics	BYTE	0F <sub>HEX</sub>
	7	Get	produced_connection_size	UINT	9111 : 0 to 33, 9112 : 0 to 252
	8	Get	consumed_connection_size	UINT	0
	9	Get/Set	expacted_packet_rate	UINT	Timer Resolution of 8msec * 0x00
	12	Get/Set	watchdog_timeout_action	USINT	0: Time Out (default)
	13	Get	produced_connection_path_length	UINT	0 or 6
	14	Get	produced_connection_path	Array of USINT	
	15	Get	consumed_connection_path_length	UINT	0
	16	Get	consumed_connection_path	Array of USINT	Empty
	17	Get/Set	production_inhibit_time	UINT	00, 00

## 7.6. Acknowledge Handler Object

Class Code: 2B<sub>HEX</sub>

### Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single

### Class Attributes

None

### Instance Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1	1	Set	Acknowledge Timer	UNIT	Default: 16
	2	Get	Retry Limit	USINT	1
	3	Get	COS Producing Connection Instance	UINT	4

## 7.7. FnBus Manager Object

Class Code: 70<sub>HEX</sub>

### Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

### Class Attributes

None

### Instance Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1	1	Get	Number of Slot	USINT	(include deactivated slot)
	2	Get	Num of Activated Slot	USINT	
	3	Get	Num of Deactivated Slot	USINT	
	4	Get	External IDs	Array of 33 BYTE	See Table 5.6. See Appendix A.1.
	5	Get/Set*	Selection of Produced Connection Type	USINT	See Table 5.1. Valid value range is 0,1,2,3 (default 2)
	6	Get/Set*	Selection of Consumed Connection Type	USINT	See Table 5.2. Valid value range is 0,1 (default 0)
	7	Get/Set*	Slot Active Flag	DWORD	See Table 5.3
	8	Get	Slot Live List	DWORD	See Table 5.4.
	9	Get	Slot Alarm List	DWORD	See Table 5.5.
	10	Get	Fn-Bus Status	USINT	0: Normal Operation 1: Fn-Bus Standby 2: Fn-Bus Connection Fault 3: Expansion Configuration Fault 4: No Expansion Module
	11	Get	Input (Produced) Byte Size	UINT	IO input byte size
	12	Get	Output (Consumed) Byte Size	UINT	IO output byte size

\*After the system is reset, the new “Set Value” action is applied.  
If changed slot location, set default value automatically.

**Table 5.1. Selection of Input (Produced) Process Image Mode**

Selection Input Image Mode	Description	
0	Status(1byte) + Uncompressed Input Processing Data	
1	Status(1byte) + Compressed Input Processing Data	
2	Uncompressed Input Processing Data	Default
3	Compressed Input Processing Data	



**Table 5.2. Selection of Output (Consumed) Process Image Mode**

Selection Image Mode	Output	Description	
0		Uncompressed Output Processing Data	default
1		Compressed Output Processing Data	

**Table 5.3. Slot Active Flag**

DWORD(32bits)	Decimal Bit	Description
Get/Set	Bit 00	Activate/Deactivate flag for slot position #1 (0:Active, 1:Deactive)
	Bit 01	Activate/Deactivate flag for slot position #2 (0:Active, 1:Deactive)
	Bit 02	Activate/Deactivate flag for slot position #3 (0:Active, 1:Deactive)
	.	.
	.	.
	.	.
	Bit 30	Activate/Deactivate flag for slot position #31 (0:Active, 1:Deactive)
	Bit 31	Activate/Deactivate flag for slot position #32 (0:Active, 1:Deactive)

**Table 5.4. Slot Live List**

DWORD(32bits)	Decimal Bit	Description
Get/Set	Bit 00	This bit is set (1) when slot position #1 is available to exchange IO
	Bit 01	This bit is set (1) when slot position #2 is available to exchange IO
	Bit 02	This bit is set (1) when slot position #3 is available to exchange IO
	.	.
	.	.
	.	.
	Bit 30	This bit is set (1) when slot position #31 is available to exchange IO
	Bit 31	This bit is set (1) when slot position #32 is available to exchange IO

**Table 5.5. Slot Alarm List**

DWORD(32bits)	Decimal Bit	Description
Get/Set	Bit 00	This bit is set (1) when an error is detected in slot position #1
	Bit 01	This bit is set (1) when an error is detected in slot position #2
	Bit 02	This bit is set (1) when an error is detected in slot position #3
	.	.
	.	.
	.	.
	Bit 30	This bit is set (1) when an error is detected in slot position #31
	Bit 31	This bit is set (1) when an error is detected in slot position #32

## 7.8. Expansion Slot Object

Class Code: 71<sub>HEX</sub>

### Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

### Class Attributes

None

### Instance Attributes

Instance ID	Attribute ID	Access Rule	Name	Data Type	Value
1~32 (Slot Address)	1	Get	Module External ID	USINT	See Appendix A.1.
	2	Get	I/O Data Code - Input Data Code - Output Data Code	Structure of: USINT USINT	See Table 5.7.
	3	Get	Input Offset Table - Byte Offset - Bit Offset	Structure of: USINT USINT	Byte offset in the Input Assembly Corresponding bit offset in the byte (If Input data length is zero, then return Empty.)
	4	Get	Output Offset Table - Byte Offset - Bit Offset	Structure of: USINT USINT	Byte offset in the Output Assembly Corresponding bit offset in the byte (If Output data length is zero, then return Empty.)
	5	Get	Input Data	Array of BYTE	Read Input data size defined by attributes 2. If Input data length is zero, then return Empty.
	6	Get/Set	Output Data	Array of BYTE	Read/Write Output data size defined by attributes 2. If Output data length is zero, then return Empty.
	7	Get/Set*	Active Flag	BOOL	0: This slot is activated 1: This slot is deactivated
	8	Get	Configuration Parameter Data length	USINT	Refer to Configuration Parameter document
	9	Get/Set	R/W Configuration Data	n Byte	Data array size defined by attributes 8.
	10	Get	Register Data Length	USINT	Refer to Configuration Parameter document
	11	Get/Set	R/W Register Data - Offset Low - Offset High - R/W Length - Write Data	Structure of: USINT USINT USINT n Byte	Read data array size defined by attribute 10. . R/W Length ≤ 32byte . Offset Length ≤ attribute 9
	100	Get	Product Code	4 Byte	See Table 5.8. And Appendix A.1.

	101	Get	Catalog Number	4 Byte	See Appendix A.1.
	102	Get	Firmware Revision	Structure of: USINT USINT	Expansion Module Firmware Revision

\*After the system is reset, the new “Set Value” action is applied.

If changed slot location, set default value automatically.

**Table 5.7. I/O Data Code Format**

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Input Data Type		Input Data Length					
+1	Output Data Type		Output Data Length					

**Input/output Type:**

0 0: No I/O Data

0 1: Byte Data

1 0: Word Data

1 1: Bit Data

**Input/output Data Length:**

0 0 0 0 0 0: 0 Bit/Byte/Word

0 0 0 0 0 1: 1 Bit/Byte/Word

0 0 0 0 1 0: 2 Bit/Byte/Word

0 0 0 0 1 1: 3 Bit/Byte/Word

...

1 1 1 1 1 1: 63 Bit/Byte/Word

**Table 5.8. Product Code Format**

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	<i>Connection Type</i>							
+1	<i>Assembly Type</i>							
+2	<i>Output Information</i>							
+3	<i>Input Information</i>							

**Connection Type**

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+0	Reserved						<b>Mem</b>	<b>IO</b>

**IO (Input/output Connection):**

IO = 0: does not support Input/output Connection

IO = 1: support Input/output Connection

**MEM (Memory Register Service):**

MEM = 0: does not support Memory Register Service Connection

MEM = 1: support Memory Register Service Connection

**Assembly Type**

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
+1	<b>Unit_Type</b>		<b>Priority</b>		<b>S</b>	Reserved		

**Unit\_Type:**

0 0: Not Used  
 0 1: Input Module  
 1 0: Output Module  
 1 1: I/O Both Modules

**Priority (Input/output Data Priority for assembly):**

0 0: Priority 0 (low) - usually it is used by Byte/Bit Type Discrete module.  
 0 1: Priority 1  
 1 0: Priority 2 - usually it is used by Analog I/O module.  
 1 1: Priority 3 (high)

**S (Status for Profibus Slot Diagnostic) :**

0: No Status  
 1: Support Word Input Diagnostic(0x8000 = -32678)

for example: ST-3234(current analog input 4~20mA, 14bit)

Status	Input Data
Normal	0x0000 (4mA) ~ 0x3FFF (20mA)
Open Wire or Underrange (0~3mA)	0x8000 (-32678)

**Input/ Output Information**

Byte#	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
+2	<b>Data_Type</b>		<b>Data_Length</b>						Output Information
+3	<b>Data_Type</b>		<b>Data_Length</b>						Input Information

**Data\_Type :**

0 0 : Byte Data  
 0 1 : Word Data  
 1 0 : Bit Data  
 1 1 : have no Input or Output Data

**Data\_Length :**

0 0 0 0 0 0 : 1 Bit/Byte/Word  
 0 0 0 0 0 1 : 2 Bit/Byte/Word  
 0 0 0 0 1 0 : 3 Bit/Byte/Word  
 0 0 0 0 1 1 : 4 Bit/Byte/Word  
 0 0 0 1 0 0 : 5 Bit/Byte/Word  
 0 0 0 1 0 1 : 6 Bit/Byte/Word  
 0 0 0 1 1 0 : 7 Bit/Byte/Word  
 0 0 0 1 1 1 : 8 Byte/Word  
 0 0 1 0 0 0 : 9 Byte/Word  
 ...  
 1 1 1 1 1 0 : 63 Byte/Word  
 1 1 1 1 1 1 : 64 Byte/Word

## 8. I/O Format Setting

### DeviceNet I/O Data Format Setting

I/O Data Format of AT2-R1xx can be changed by DeviceNet Configuration Software

Data format is set by change FnBUS Manager Object value in Configuration Software.

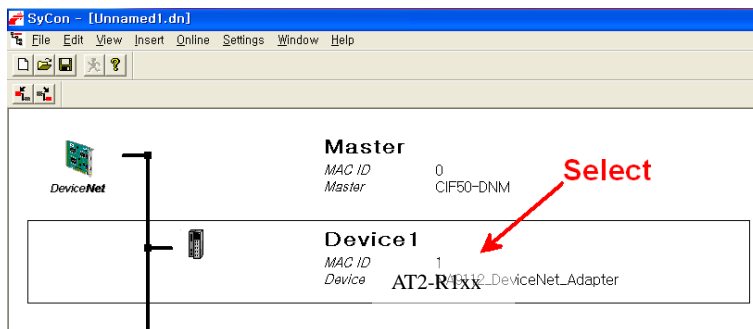
Refer FnBUS Manager Object for detail values.

### 8.1. Example

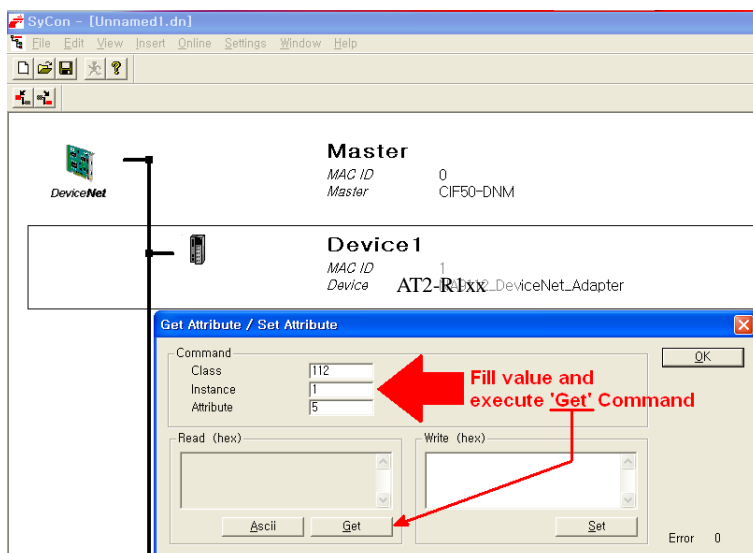
Example what Produced Connection Type of AT2-R1xx is changed from “Status(1byte) +Exp. Uncompressed Input Processing Data” to Exp. “Uncompressed Input Processing Data” with Sycon

#### Sycon

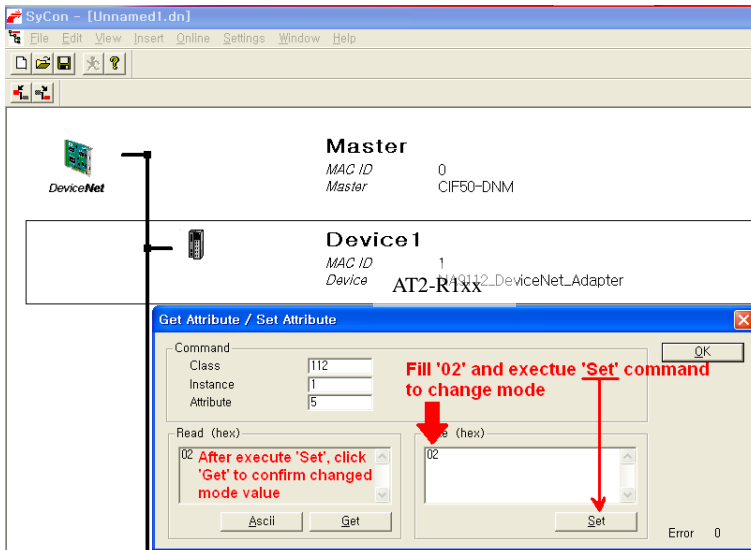
- After setting up AT2-R1xx and configuration system with Sycon, select AT2-R1xx as follows



- After Execution “Get Device Attribute / Set Device Attribute” menu in Online Menu, set 70hex(112dec) to Class Code, 1 to Instance ID, 5 to Attribute ID for ‘Change Produced Connection Type’ and execute “Get” command for confirming current value.

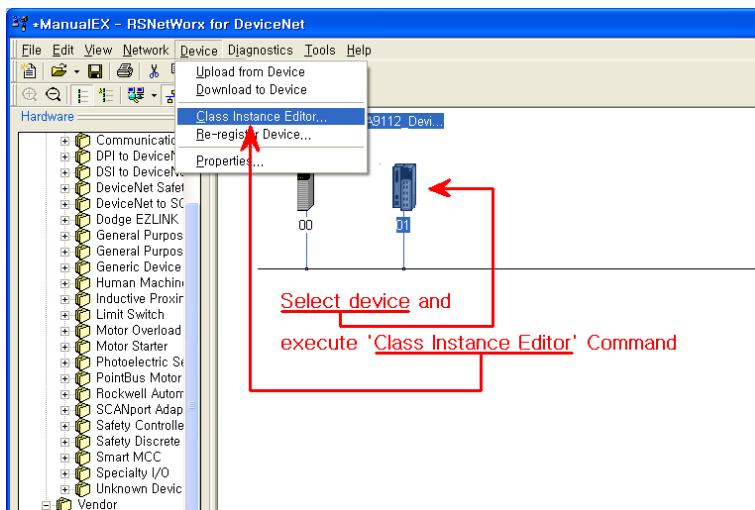


- Fill 02(refer to table 1) in setting value and execute “Set” command and then confirm what current value is 02 by executing “Get” command.

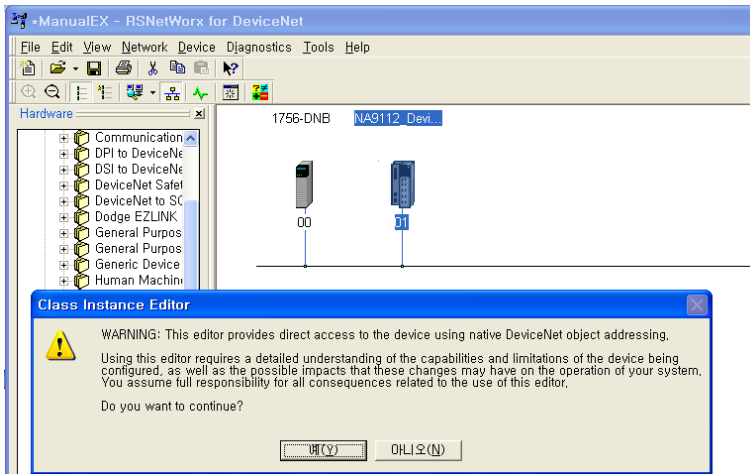


## DeviceNet RSNetworkx

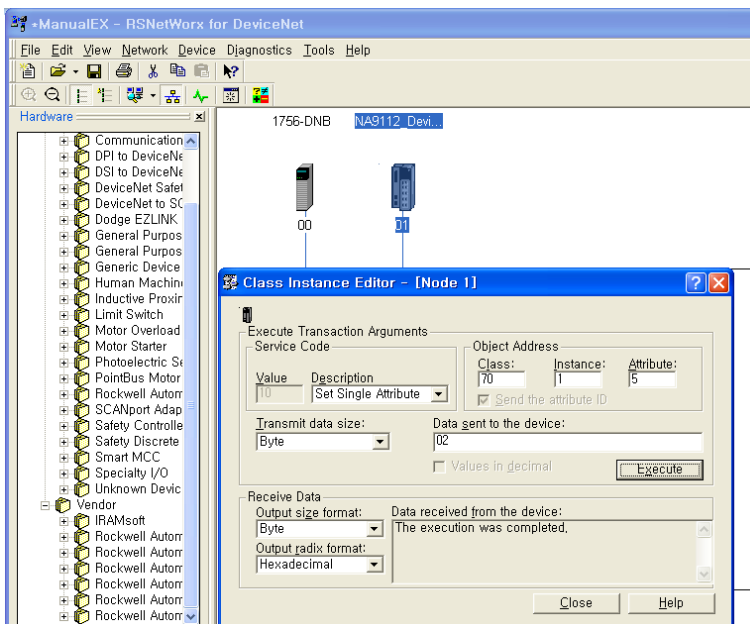
- After setting up AT2-R1xx and configuration system with DeviceNet RSNetworkx then select AT2-R1xx and execute ‘Class Instance Editor’ command as follows



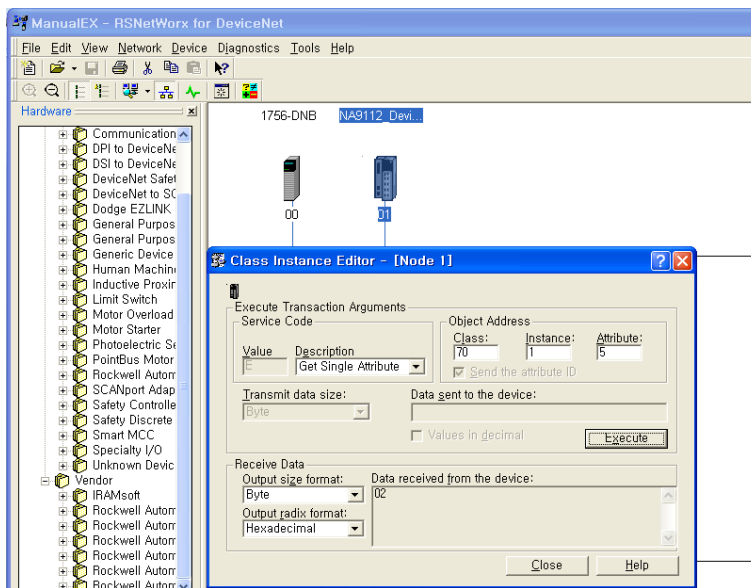
- This message is only that you have to understand its command in details. Click 'Yes'.



- After setting below, click 'execute'. The 'Transmit data size', 'Output size format' and 'Output radix format' is only format to show value. So that is not important. After execution if you can see 'The execution was completed' in region of 'Data received from the device', 'Set' command is completed.



- For confirming changed mode value, click 'execute' after setting below.



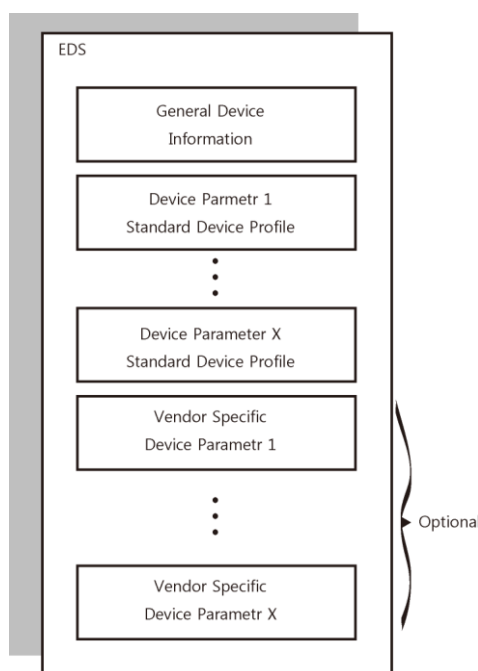


## 8.2. EDS Setting

An Electronic Data Sheet(EDS) Provides information necessary to access and alter the configuration parameter of a device.

EDS is an external file that contains information about configurable attributes for the device, including object addresses of each parameter

the application objects in a device represent the destination addresses for configuration data. These addresses are encoded in EDS



General block diagram of an EDS file

When Configuration tool is started, it automatically retrieves all the EDS files stored in the EDS directory. The device names are placed into an internal list.

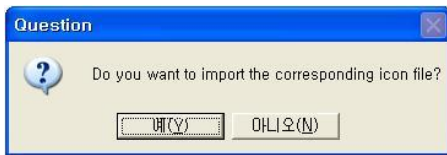
During the configuration, the device- specific data is retrieved directly from EDS files.

If a DeviceNet device does not appear in the selection list, a corresponding EDS file can be copied in to the EDS directory with File > Copy EDS.

The EDS files of some vendors are available on the DeviceNet homepage <http://www.odva.org> or visit the homepage of the manufacturer.



- Click Yes.

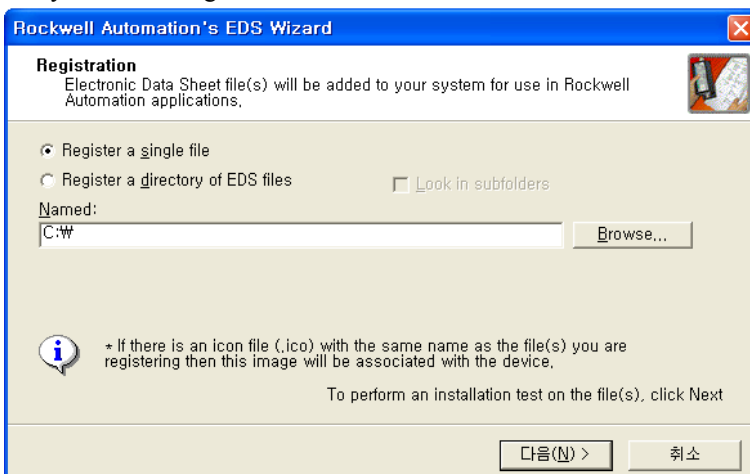


### 8.2.2. Example for addition EDS file with Hardware Installation Tool in RS Linx

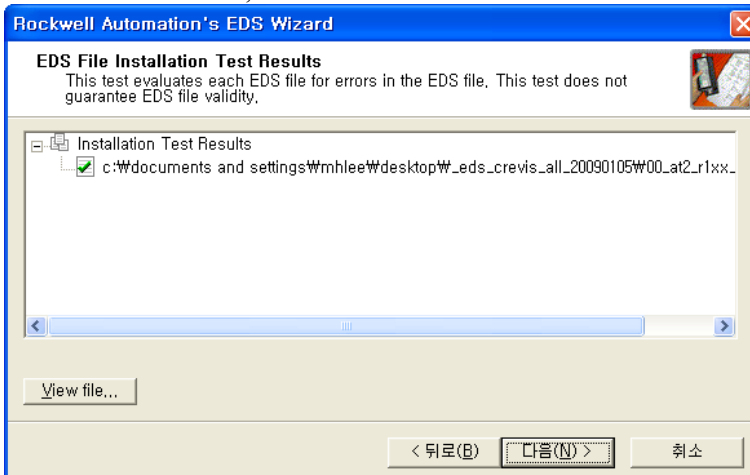
- Execute 'Add' command.



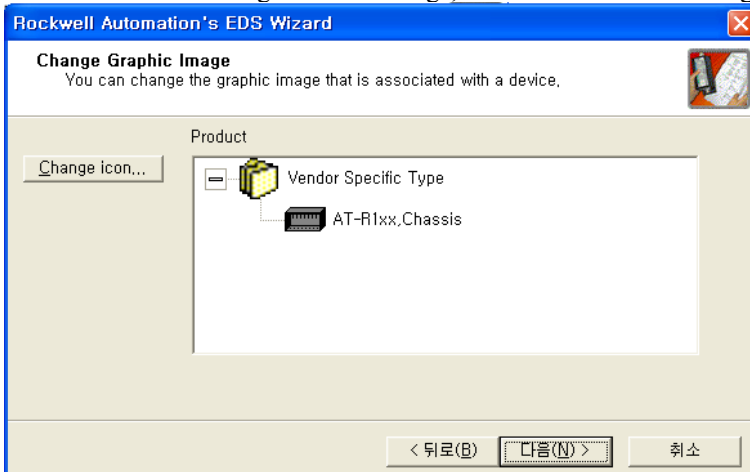
- 'Register a single file' is that registers one EDS file and 'Register a directory of EDS files' is that registers all EDS files in selected directory. In this example, it chooses 'Register a single file'. Check 'Register a single file' and find out that you want to register EDS file to execute 'Browser' command. Click 'Next'.



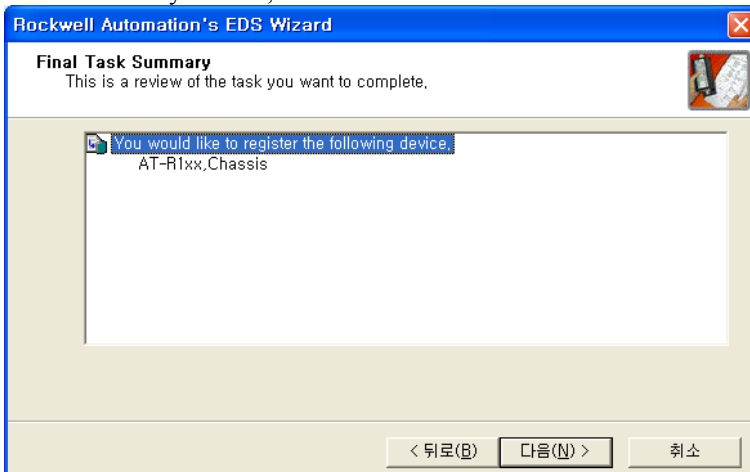
- If error doesn't occur, Click 'Next'.



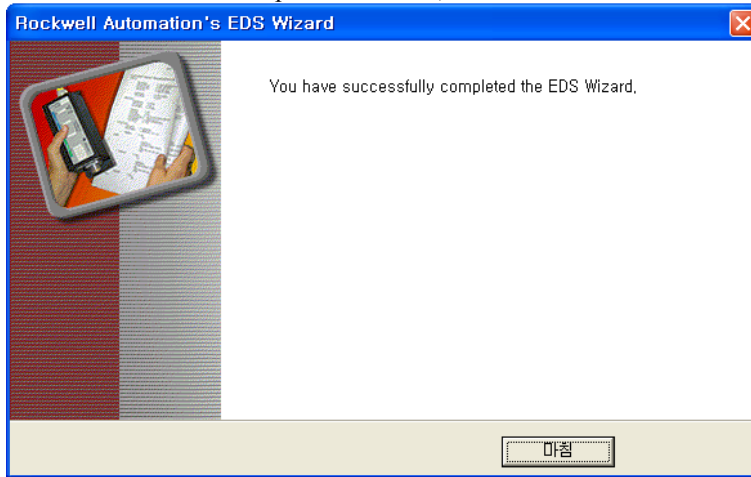
- This window is that registers icon image, Click 'Next' after selecting image.



- If the summary is valid, Click 'Next'.



- This window means all process is done, Click 'Finish'.



## 9. Trouble Shooting

### ● How to diagnose by LED indicator

LED Status	Cause	Action
All LED turns off	-No power	-Check main power Cable
	-System power is not supplied.	-Contact Sales team and send module for repair.
MOD LED flashes green	-Failure of initialization EEPROM parameter.	-Contact Sales team and send module for repair.
MOD LED flashes red	-Excess of expansion slot - Excess of IO size - Wrong IO composition -Occurrence of EEPROM checksum error	-Use expansion slot up to 32. -Compose that IO total size is not excess. -Check composition I/O Module
MOD LED is red	-Wrong address ID -Occurrence critical error in firmware	-Contact Sales team and send module for repair.
I/O LED turns off	-Failure of realization expansion Module -None expansion Module	-Check connector status both NA series and expansion module.
I/O LED flashes red	Failure of configuration baud rate	-Check communication cable with Master -Check power for master.
	Failure of initialization I/O	-Use expansion slot up to 32. -Compose that IO total size is not excess. NA series notice unidentified expansion module ID. Check status of expansion module.
I/O LED is red	Failure of exchanging I/O data	Check status of expansion IO connection.
NET LED turns off	Failure of communication with Master	Check main power for master and communication cable.
NET LED flashed green	Failure of exchanging data with master	Check status in software for Master configuration.
NET LED is red	Communication connecting lost	Check BUS line cable for connection with master.
		Check duplication address.

## ● 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 color matches between connector and cable.
- Check wire omission.

### **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
- Check composition is right
  - Configuration of communication baud rate
  - I/O size
  - Configuration of each node

### **Ground and environment**

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