

# PROFIBUS Network Adapter AT2-Series

## AT2-R5xx User Manual



Version 1.05

**2013 CREVIS Co.,Ltd**

| DOCUMENT CHANGE SUMMARY |              |  |            |         |
|-------------------------|--------------|--|------------|---------|
| REV                     | PAGE         | REMARKS  | DATE       | EDITOR  |
| 1.0                     | New Document |  | 2011/11/4  | JE KANG |
| 1.01                    |              | New product AT2-R538, AT2-R539                                     | 2011/11/11 | JE KANG |
| 1.02                    | 6            | Add your experience  | 2012/1/13  | JE KANG |
| 1.03                    | 50-56        | AT2-R5xx DPV1 Service Specification                                | 2012/2/10  | JE KANG |
|                         |              | Add the Certificate RoHS   | 2012/3/21  | JE KANG |
| 1.04                    |              | Changed Crevis TEL   | 2013/4/4   | JE KANG |
| 1.05                    |              | Environment Spec. 50°C→55°C (UL Temp)<br>Delete AT2-R538, AT2-R539 | 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> |
|--|--|

### 1.1.3. Certification

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

See UL File E235505

FCC

CE Certificate

EN 61000-6-2; Industrial Immunity

EN 61000-6-4; Industrial Emissions

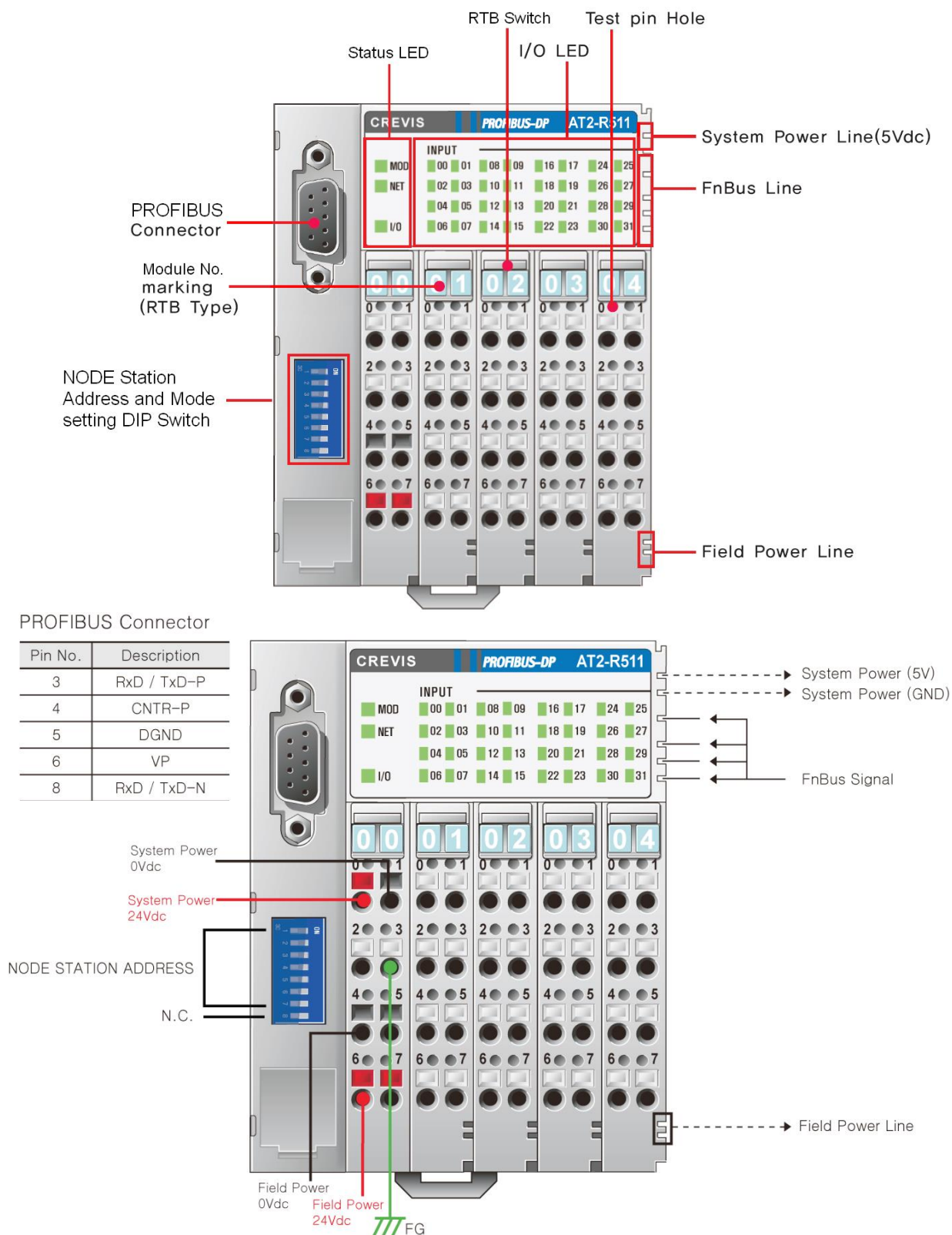
RoHS (EU, CHINA)



## 2. AT2 PROFIBUS-DP MODULE LIST

| AT2-R5xx | Description   | ID (HEX)    | Input/output Size (Byte) |
|----------|---|-------------|--------------------------|
| AT2-R511 | Input, 32 points, Sink, 24Vdc, RTB  | 41 03 E0    | In : 4                   |
| AT2-R512 | Input, 32 points, Source, 24Vdc, RTB  | 41 03 E1    | In : 4                   |
| AT2-R521 | Output, 32 points, Sink, 24Vdc/0.5A, RTB  | 81 03 E2    | Out : 4                  |
| AT2-R522 | Output, 32 points, Source, 24Vdc/0.5A, RTB  | 81 03 E3    | Out : 4                  |
| AT2-R525 | Output, 16 points, Relay, 250Vac/2A, 24Vdc/2A, RTB<br>(4Pt/1Com)                                | 81 01 E6    | Out : 2                  |
| AT2-R533 | Input, 16 points, Sink, 24Vdc, RTB<br>Output, 16 points, Source, 24Vdc/0.5A, RTB                | C1 01 01 E4 | In : 2<br>Out : 2        |
| AT2-R534 | Input, 16 points, Source, 24Vdc, RTB<br>Output, 16 points, Sink, 24Vdc/0.5A, RTB                | C1 01 01 E5 | In : 2<br>Out : 2        |
| AT2-R536 | Input, 16 points, Sink, 24Vdc, RTB (4Pt/1Com)<br>Output, 8 points, Relay, 250Vac/2A, 24Vdc/2A   | C1 00 01 E7 | In : 2<br>Out : 1        |
| AT2-R537 | Input, 16 points, Source, 24Vdc, RTB (4Pt/1Com)<br>Output, 8 points, Relay, 250Vac/2A, 24Vdc/2A | C1 00 01 E8 | In : 2<br>Out : 1        |
| AT2-R555 | Output, 16 points, Relay, 250Vac/2A, 24Vdc/2A, RTB<br>(1Pt/1Com)                                | 81 01 ED    | Out : 2                  |
| AT2-R556 | Input, 16 points, Sink, 24Vdc, RTB (1Pt/1Com)<br>Output, 8 points, Relay, 250Vac/2A, 24Vdc/2A   | C1 00 01 EE | In : 2<br>Out : 1        |
| AT2-R557 | Input, 16 points, Source, 24Vdc, RTB (1Pt/1Com)<br>Output, 8 points, Relay, 250Vac/2A, 24Vdc/2A | C1 00 01 EF | In : 2<br>Out : 1        |
|          |   |             |                          |
|          |   |             |                          |
|          |   |             |                          |
|          |   |             |                          |
|          |   |             |                          |
|          |   |             |                          |
|          |   |             |                          |
|          |   |             |                          |
|          |   |             |                          |
|          |   |             |                          |

### 3. Specification of PROFIBUS-DP 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. |

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

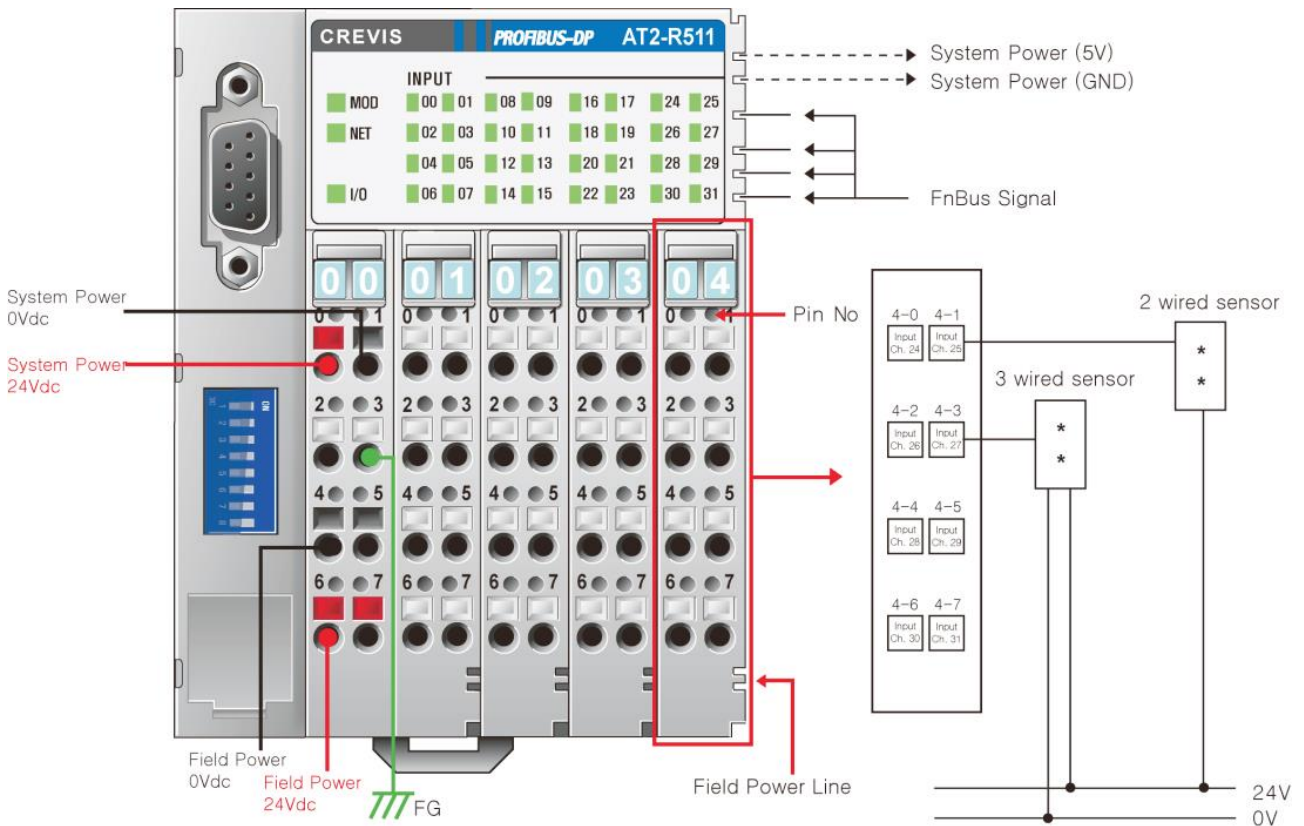
| State                      | LED is :          | To indicate :   |
|----------------------------|-------------------|---|
| Not Powered<br>Not On-line | Off               | Device is not on-line or may not be powered   |
| On-line,<br>Not connected  | Flashing<br>Green | Device is on-line but has no connections in the established state.<br>- Not allocated to a master |
| On-line,<br>Connected      | Green             | Device is on-line and allocated to a master   |
| Connection Time-out        | Flashing<br>Red   | One or more I/O connections are in the time-out state.  |

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

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

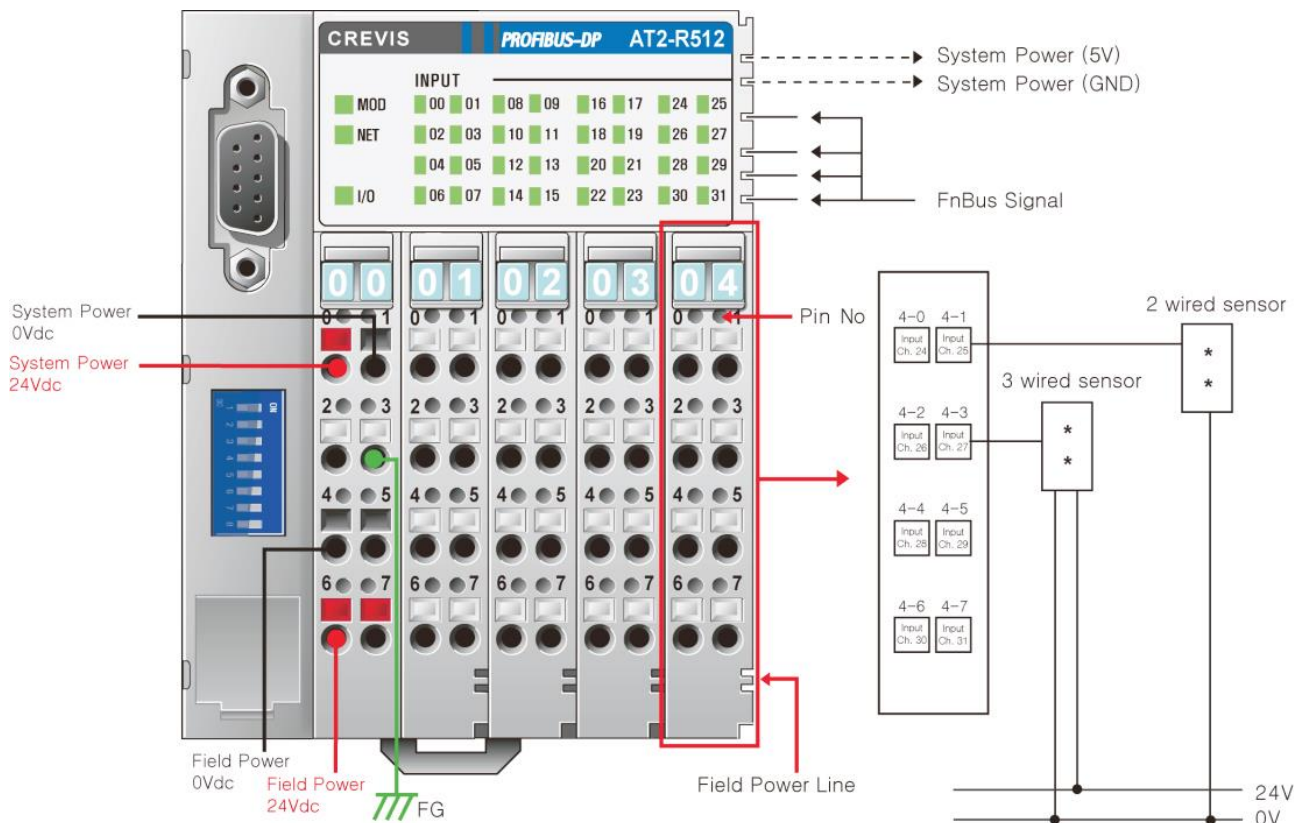
## 3.2. The Interface

### 3.2.1. AT2-R511



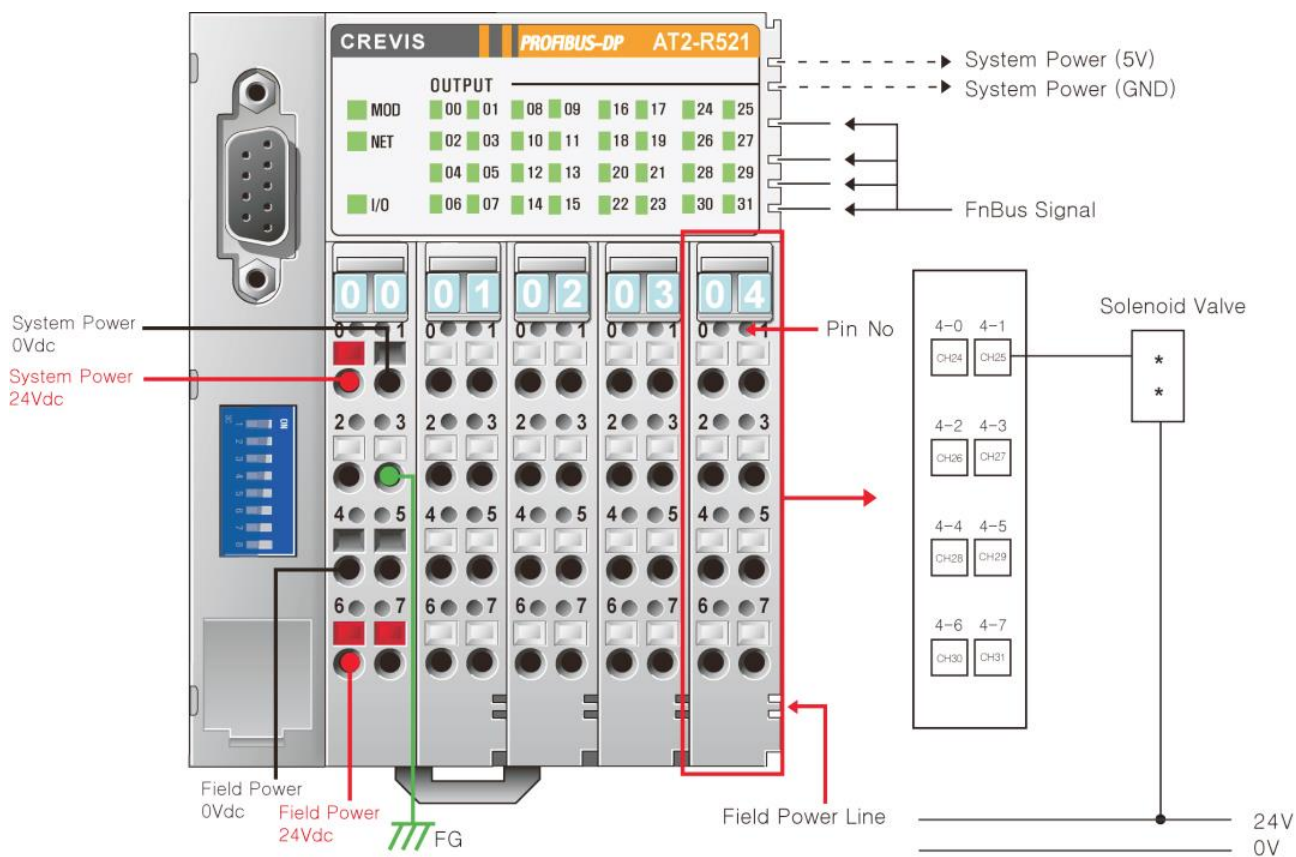
| Pin No. | Description     | Pin No. | Description      | Pin No. | Description      | Pin No. | Description      |
|---------|-----------------|---------|------------------|---------|------------------|---------|------------------|
| 1-0     | Input Channel 0 | 2-0     | Input Channel 8  | 3-0     | 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-R512



| 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 |

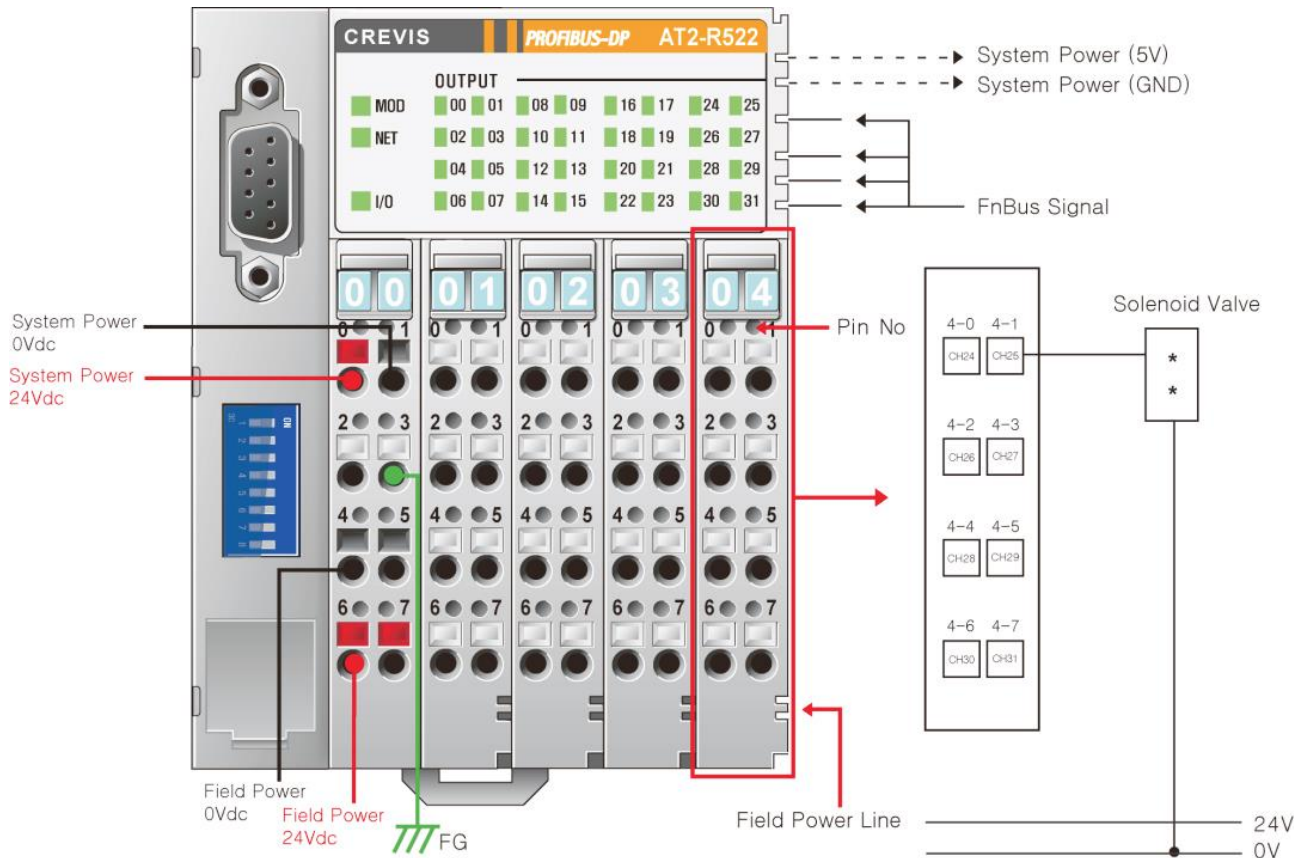
### 3.2.3. AT2-R521



| 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 |

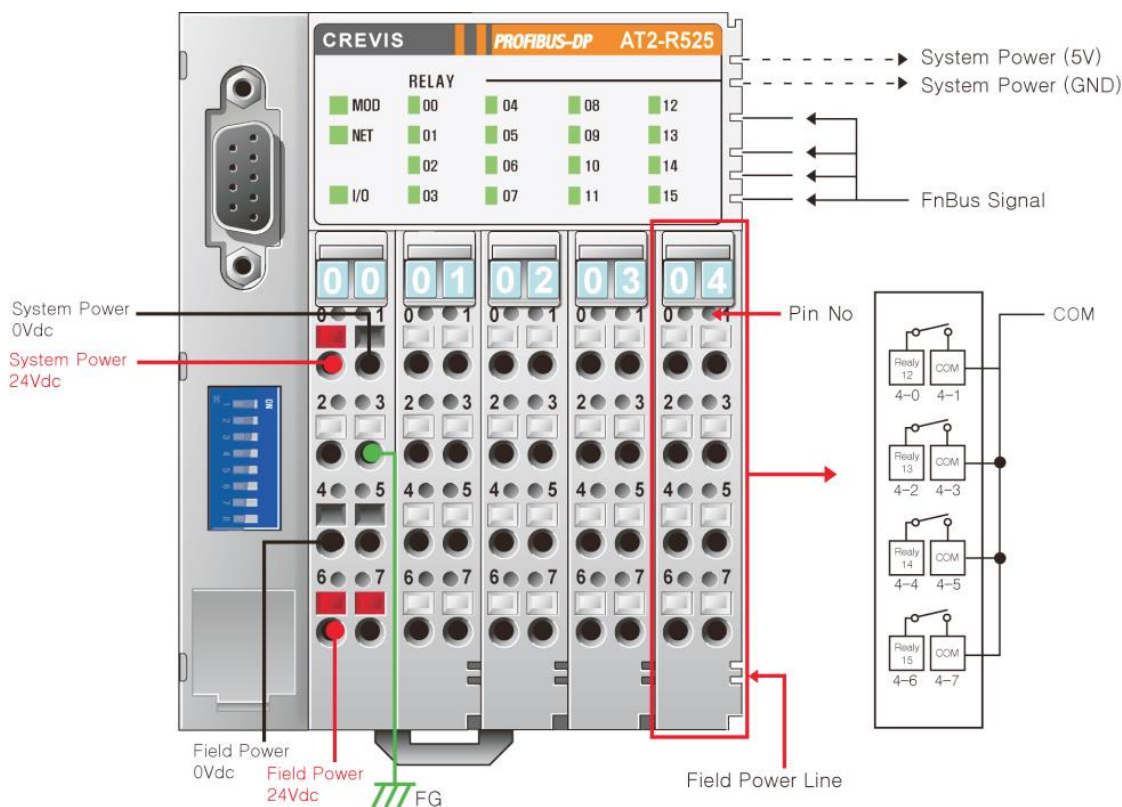


### 3.2.4. AT2-R522



| 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 |

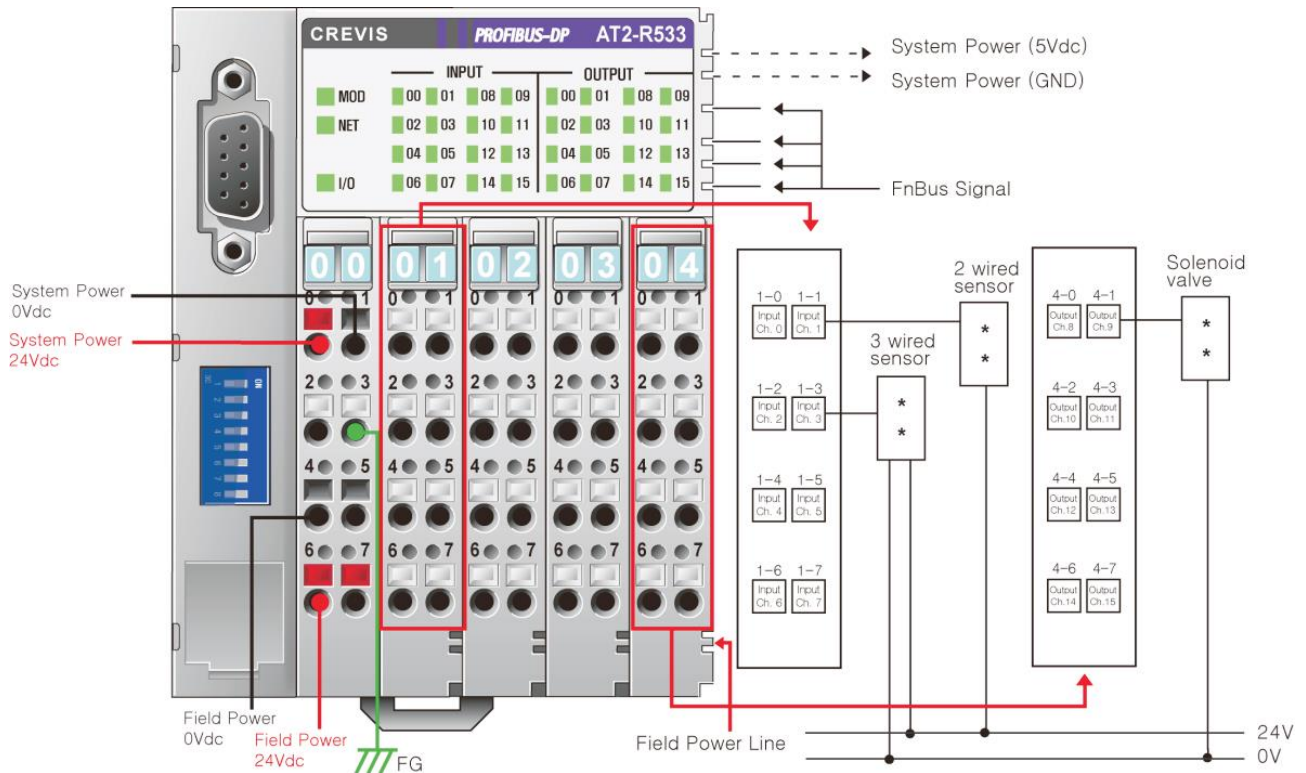
### 3.2.5. AT2-R525



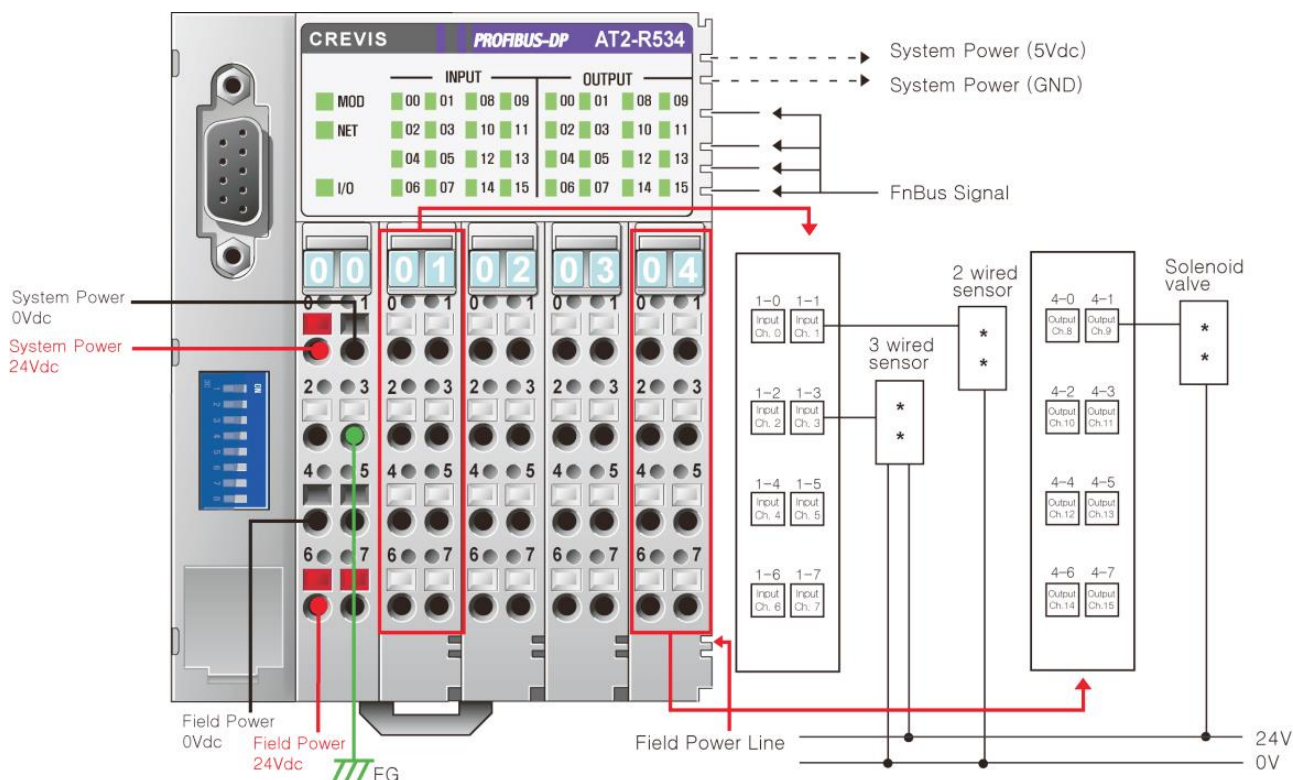
| Pin No. | Description    | Pin No. | Description    | Pin No. | Description     | Pin No. | Description     |
|---------|----------------|---------|----------------|---------|-----------------|---------|-----------------|
| 1-0     | Relay Output 0 | 2-0     | Relay Output 4 | 3-0     | Relay Output 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-R533

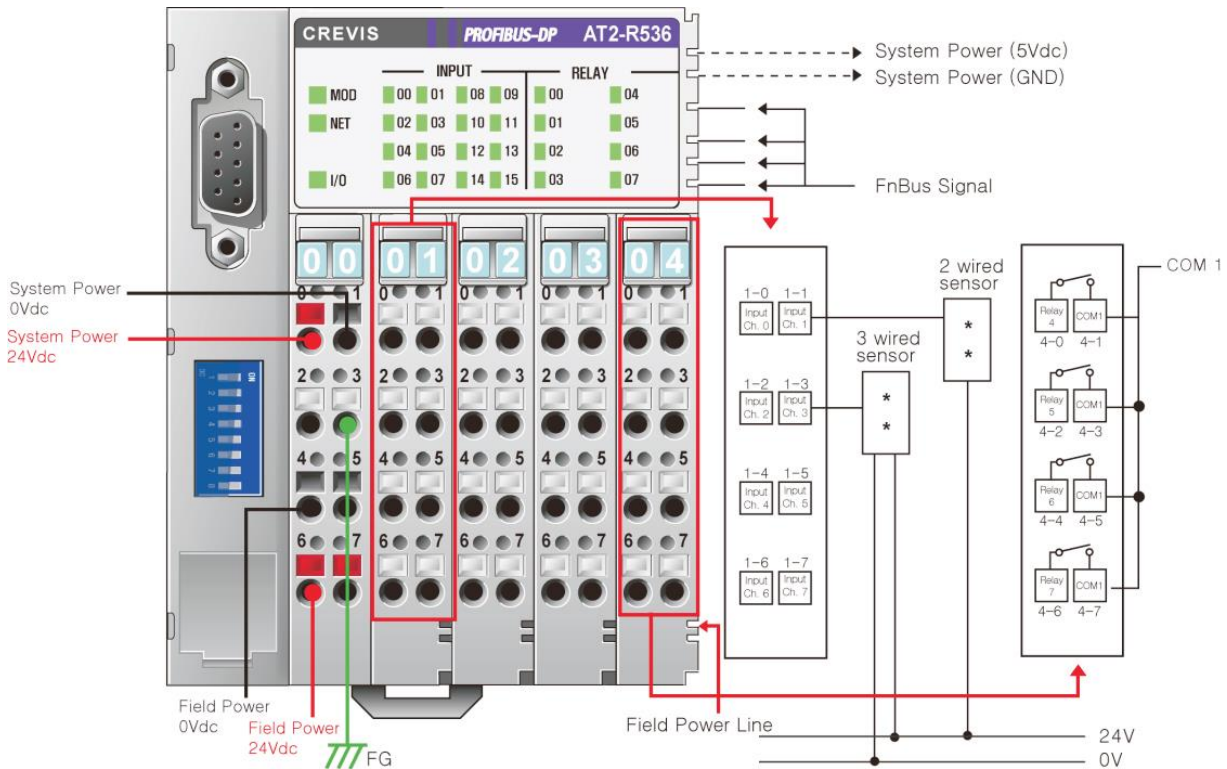


### 3.2.7. AT2-R534



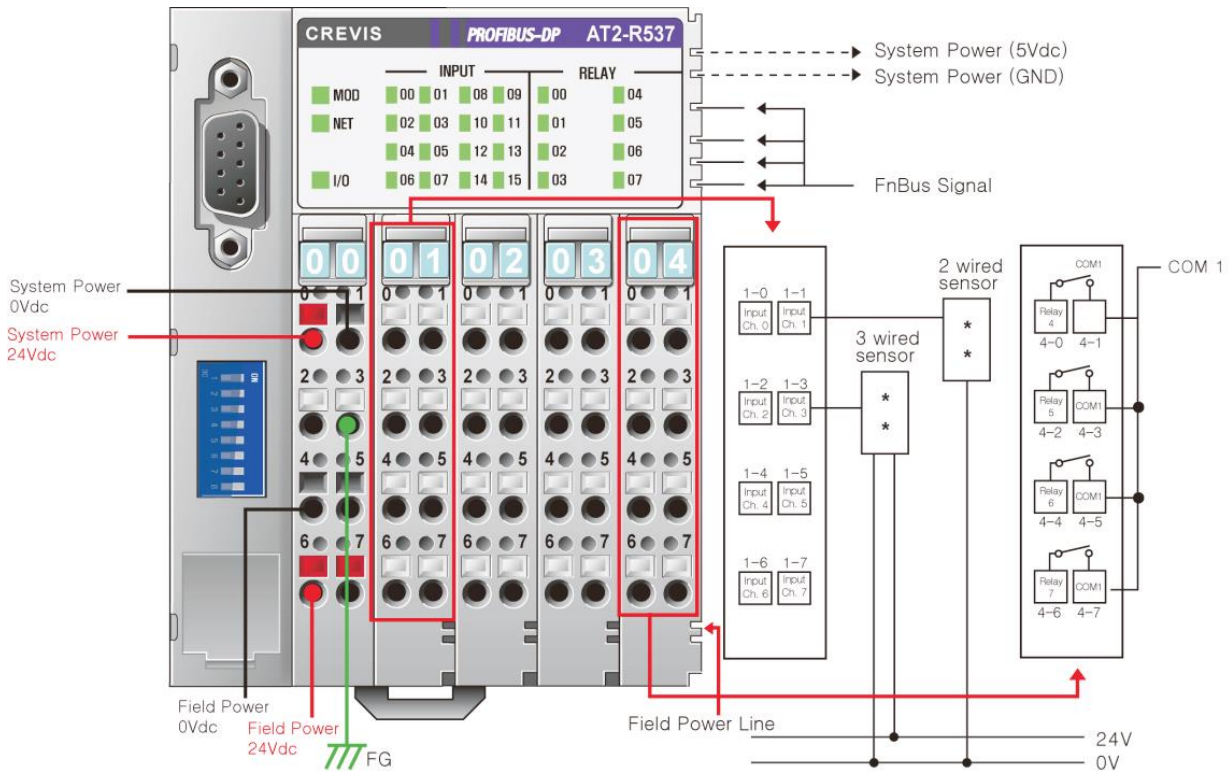
| Pin No. | Description     | Pin No. | Description      | Pin No. | Description      | Pin No. | Description       |
|---------|-----------------|---------|------------------|---------|------------------|---------|-------------------|
| 1-0     | Input Channel 0 | 2-0     | Input Channel 8  | 3-0     | 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-R536



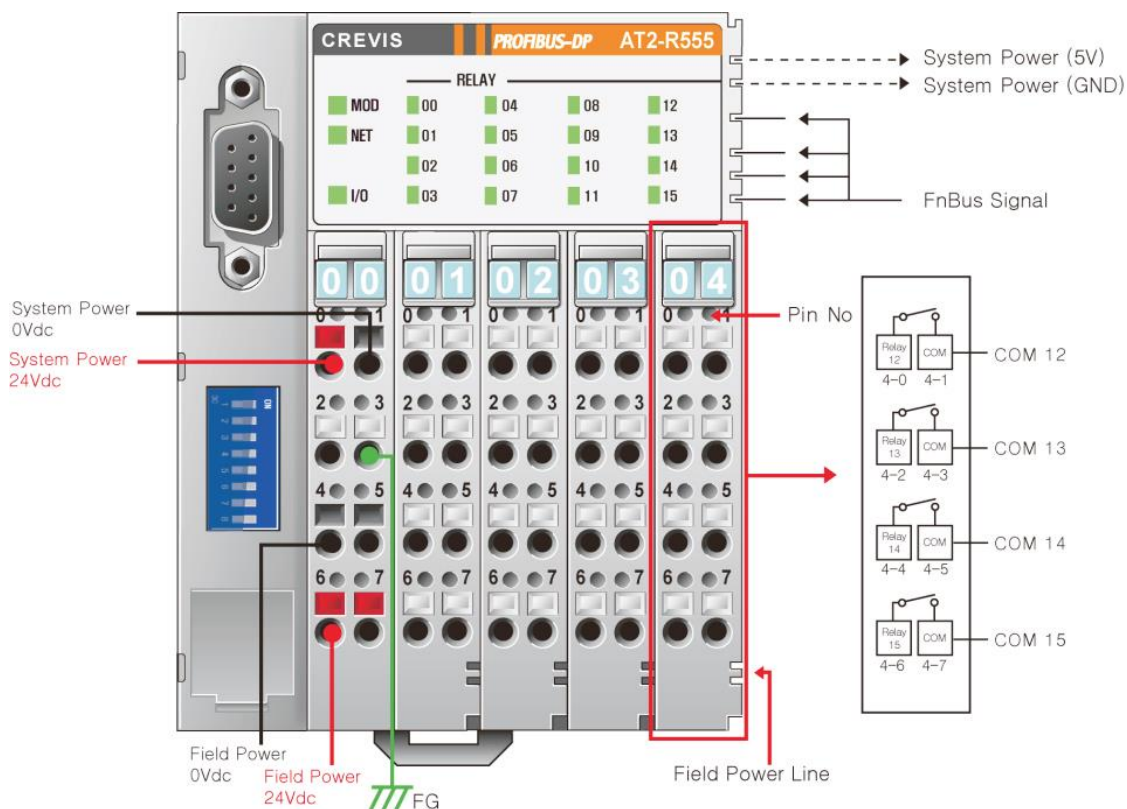
| Pin No. | Description     | Pin No. | Description      | Pin No. | Description    | Pin No. | Description    |
|---------|-----------------|---------|------------------|---------|----------------|---------|----------------|
| 1-0     | Input Channel 0 | 2-0     | Input Channel 8  | 3-0     | Relay 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-R537



| 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          |

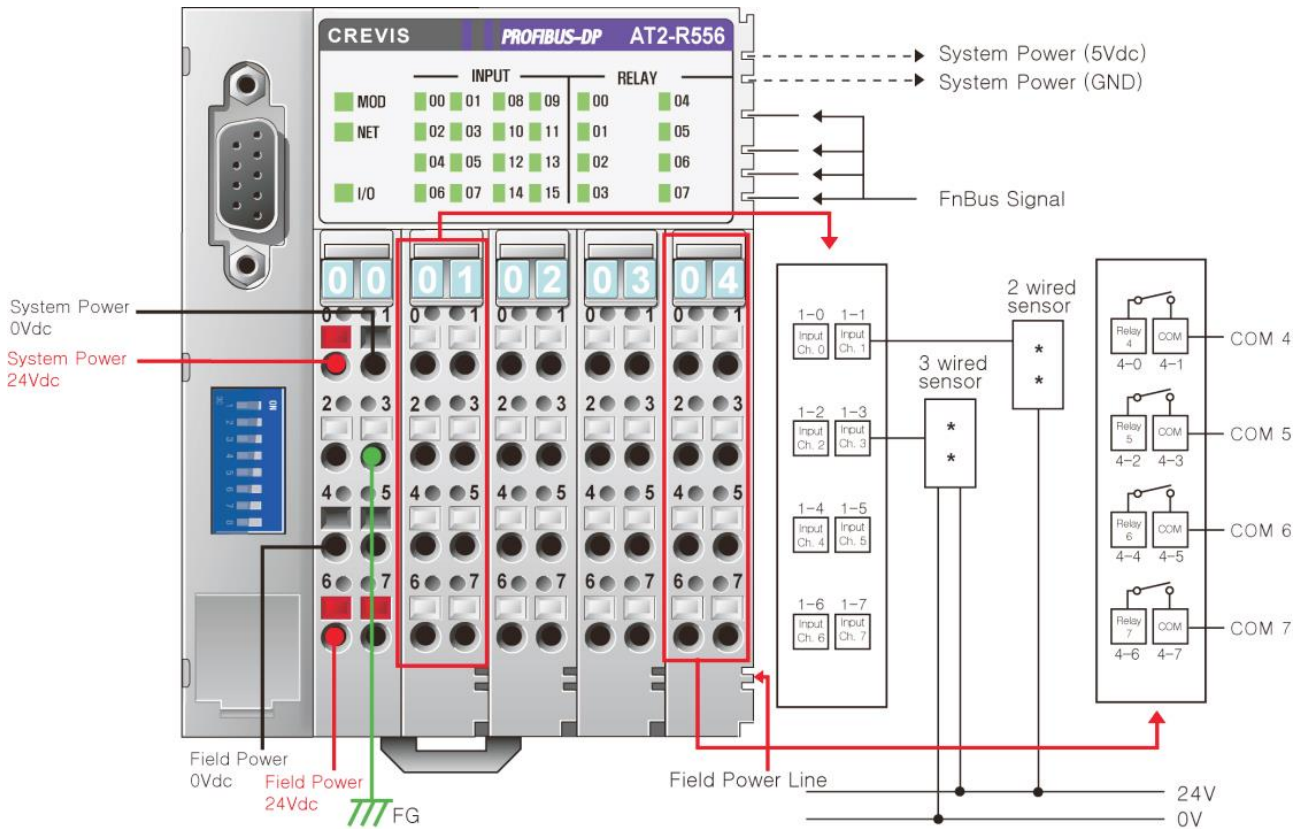
### 3.2.10. AT2-R555



| 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          |

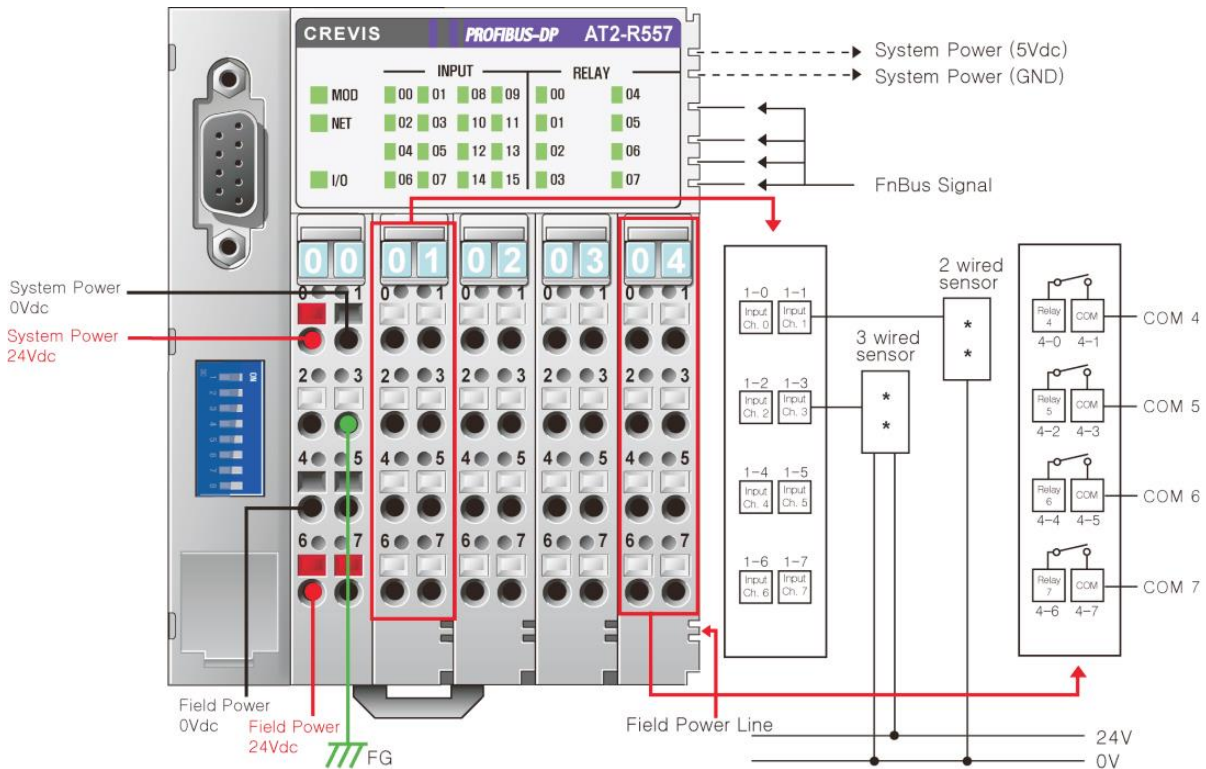


### 3.2.11. AT2-R556



| 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-R557



| 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<br>Acceleration : 2G's from 57~500Hz<br>Sweep Rate : 1 octave Per Minute<br>Axes to test : x, y, z<br>Frequency Sweeps Per Axis : 10   |
| System Power                              | Supply voltage : 24Vdc nominal<br>Supply voltage range : 19.2~28.8Vdc<br>Protection : Current limit, Reverse polarity protection   |
| System Power Dissipation                  | Max. 50mA @ 24Vdc  |
| System Power Current for Expansion Module | Max. 400mA @ 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   |
| Network Conformance                       | AT2-R1xx : ODVA Conformance Test Completion<br>AT2-R3xx : CLPA Conformance Test Completion<br>AT2-R5xx : PTO Conformance Test Completion   |
| Isolation                                 | DC Module (Included Analog Module) : Terminal Block to F.G 500Vac/1min<br>AC Module : Terminal Block to F.G 1500Vac/1min<br>Relay Module : Terminal Block to F.G 2500Vac/1min  |
| Communication Interface Specifications    |  |
| Repeater Control Signal                   | TTL  |
| Freeze Mode                               | Support  |
| Sync Mode                                 | Support  |
| Auto Baudrate                             | Support  |
| Fail Safe Mode                            | Support  |
| Station Type                              | Slave  |
| Max. Nodes                                | 100 Node / Max (Dip Switch #0~99)  |
| Max. Expansion Module                     | 8 Expansion Slots  |
| I/O Data Size                             | Total : Input 36 bytes / Output 36bytes<br>- Input 4 bytes / Output 4 bytes for Base Module<br>- Input 32 bytes / Output 32 bytes for Expansion Module<br>Max. Discrete I/O : Input 256 Points / Output 256 Points<br>Max. Analog I/O : Input 16 channels / Output 16 Channels |
| Indicators                                | 3 LEDs<br>MOD : 1 Green / Red, Module Status (MOD)<br>NET : 1 Green, Network Status (NET)<br>I/O : 1 Green / Red, Expansion I/O Module Status (I/O)  |
| Communication Rate                        | 9.6K ~ 12M (1.2Km ~ 100m)  |
| Communication Speed                       | 9.6K ~ 12Mbps (Auto baudrate Selection)  |
| Module Location                           | Starter Module - Left Side of FnIO System  |



### 3.4. Specification

#### 3.4.1. AT2-R511

| 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. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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-R512

| 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. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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-R521

| 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. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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-R522

| 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. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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-R525

| Items                          | Specification   |
|--------------------------------|---|
| <b>Interface Specification</b> |   |
| Number of Output               | 16 Points   |
| Indicates                      | 1 LED/1Point  |
| Relay Type                     | Form Am Normally Open<br>Single Pole, Single Throw                                      |
| Output Rating                  | 2A@5~28.8Vdc<br>0.8A@48Vdc<br>0.5A@110Vdc<br>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<br>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<br>1250Vrms tested                          |
| <b>General Specification</b>   |   |
| Power Dissipation              | Max. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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-R533

| 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. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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-R534

| 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               | 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. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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-R536

| 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<br>Single Pole, Single Throw                                      |
| Output Rating                  | 2A@5~28.8Vdc<br>0.8A@48Vdc<br>0.5A@110Vdc<br>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<br>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<br>1250Vrms tested                          |
| <b>General Specification</b>   |   |
| Power Dissipation              | Max. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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-R537

| 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<br>Single Pole, Single Throw                                      |
| Output Rating                  | 2A@5~28.8Vdc<br>0.8A@48Vdc<br>0.5A@110Vdc<br>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<br>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<br>1250Vrms tested                          |
| <b>General Specification</b>   |   |
| Power Dissipation              | Max. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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-R555

| Items                          | Specification   |
|--------------------------------|---|
| <b>Interface Specification</b> |   |
| Number of Output               | 16 Points   |
| Indicates                      | 1 LED/1Point  |
| Relay Type                     | Form Am Normally Open<br>Single Pole, Single Throw                                      |
| Output Rating                  | 2A@5~28.8Vdc<br>0.8A@48Vdc<br>0.5A@110Vdc<br>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<br>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<br>1250Vrms tested                          |
| <b>General Specification</b>   |   |
| Power Dissipation              | Max. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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-R556

| 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<br>Single Pole, Single Throw                                      |
| Output Rating                  | 2A@5~28.8Vdc<br>0.8A@48Vdc<br>0.5A@110Vdc<br>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<br>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<br>1250Vrms tested                          |
| <b>General Specification</b>   |   |
| Power Dissipation              | Max. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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"                    |

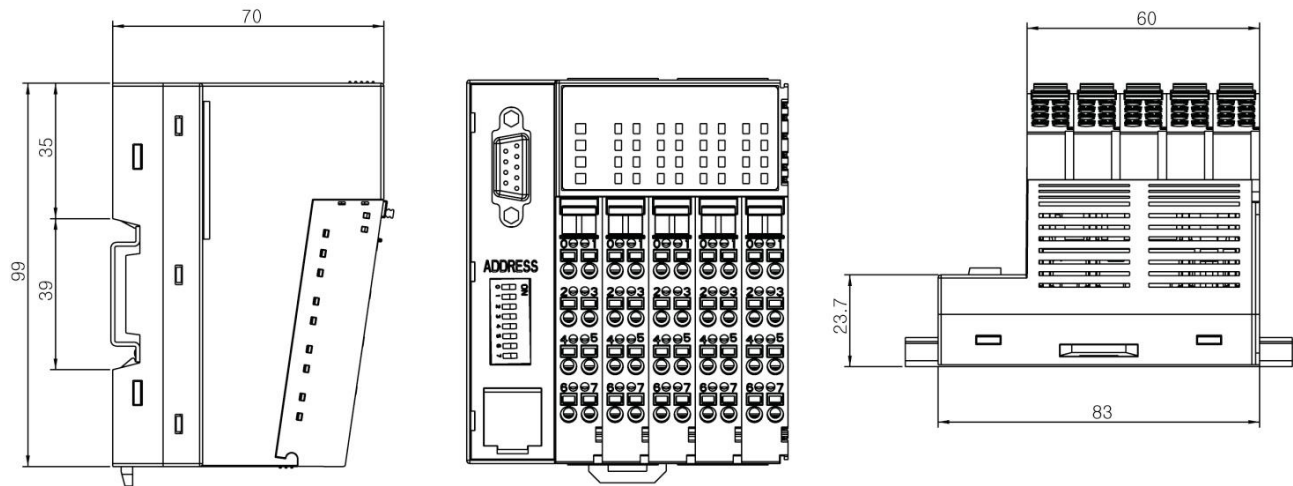
### 3.4.12. AT2-R557

| 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<br>Single Pole, Single Throw                                      |
| Output Rating                  | 2A@5~28.8Vdc<br>0.8A@48Vdc<br>0.5A@110Vdc<br>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<br>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<br>1250Vrms tested                          |
| <b>General Specification</b>   |   |
| Power Dissipation              | Max. 50mA @ 5.0Vdc  |
| Isolation                      | DeviceNet to internal logic : Non-isolation<br>Internal logic to I/O driver : Isolation |
| Field Power                    | Supply Voltage : 24Vdc nominal<br>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-R5xx

(mm)




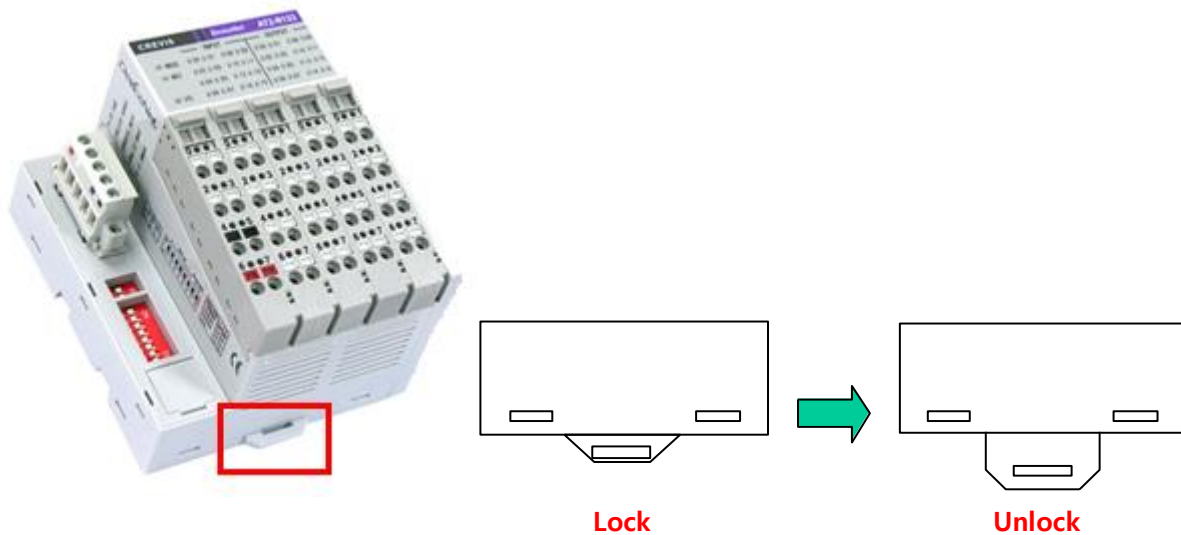
## 5. Mechanical Set Up

### 5.1. Total Expansion

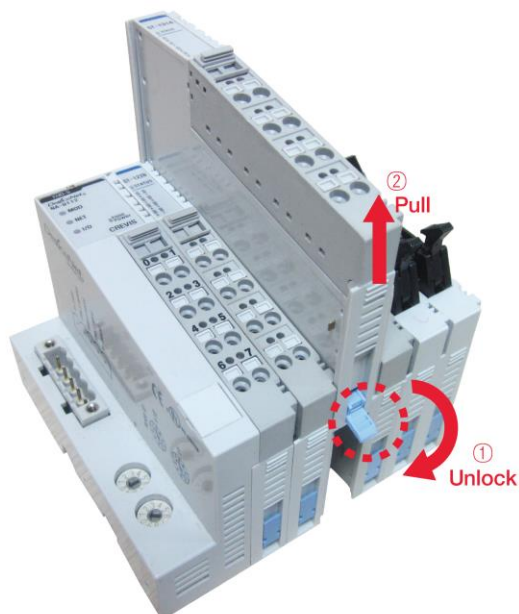
The number of the module assembly that can be connected is 8. So the maximum length is 179mm Exception ST-2748 is excepted to calculate maximum length because that is double width module.

### 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> |
|--|--|

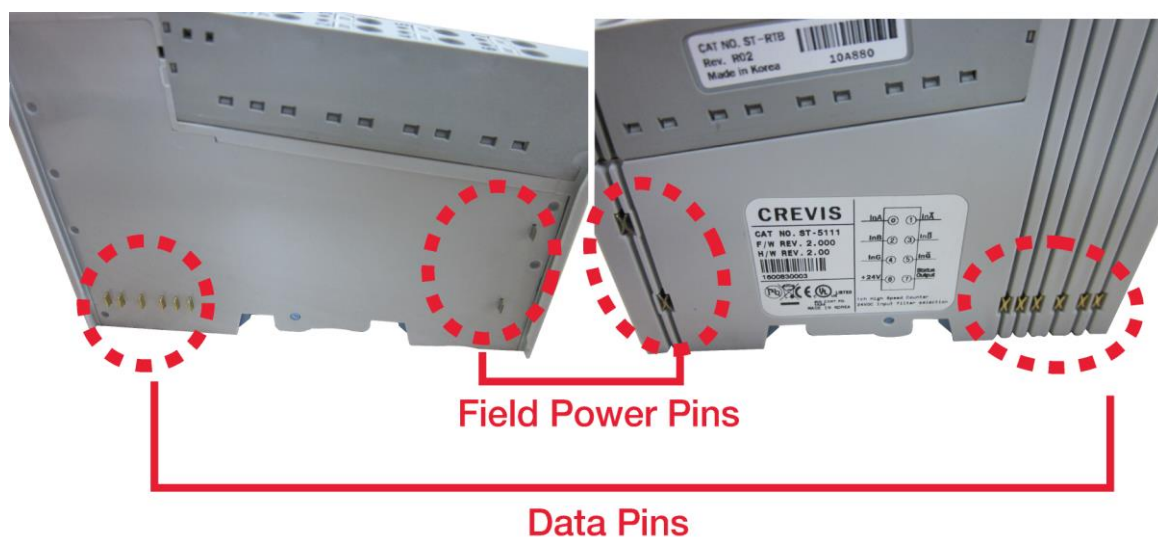


Use a small-bladed screwdriver to lift up Locker. Install the Module on Din rail firmly. Lift down locker to lock. To remove the modules please repeat it in opposite sequence.



### 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**

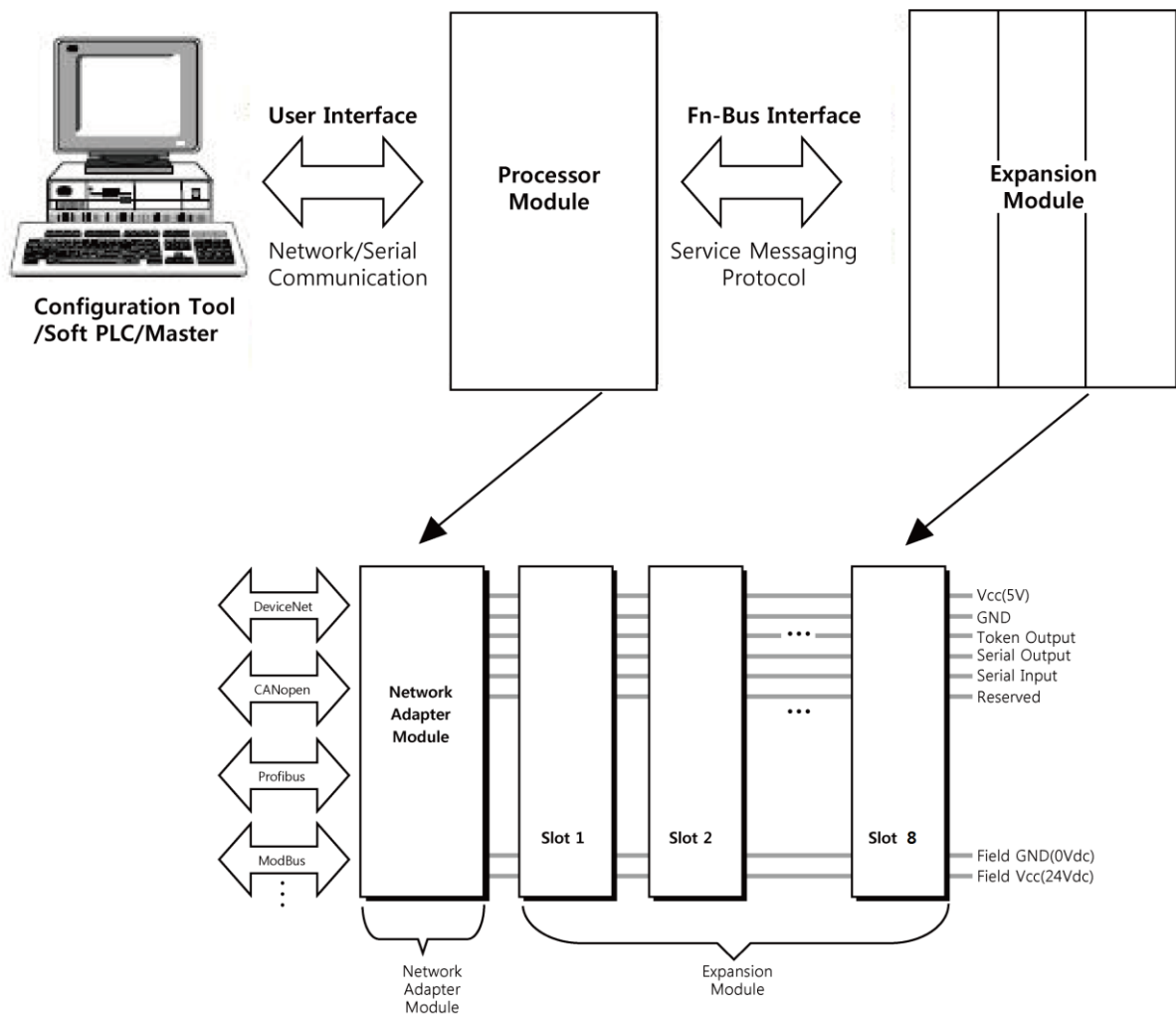


Do not touch data and field power pins in order to avoid soiling and damage by GDS noise.

## 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

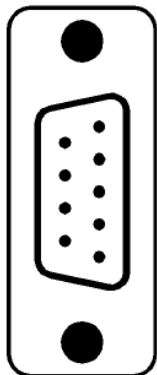
- Service Messaging
- I/O Messaging

## 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).                |

## 6.2. PROFIBUS Electrical Interface

### 6.2.1. AT2-R5xx



| Dsub 9<br>(Female) | Signal<br>Name | Description   |
|--------------------|----------------|---|
| 1                  | -              |   |
| 2                  |                |   |
| 3                  | RXD/TXD-P      | Receive/Transmit data-plus(B wire)                        |
| 4                  | CNTR-P         | Repeater control signal(direction control),<br>RTS signal |
| 5                  | DGND           | Data ground(reference potential for VP)                   |
| 6                  | VP             | Supply voltage-Plus(P5V)                                  |
| 7                  | -              |   |
| 8                  | RXD/TXD-N      | Receive/Transmit data-minus(A-wire)                       |

All Fieldbus devices which use a standard 9-pin Sub-D connector should provide the VP and DGND signals on the bus connector in addition to the receive and transmit signals. With all other connector types, only the receive and transmit signals need to be connected.

Make sure that the connector type used is suitable for the selected baud rate.

If optional signal are provided, they must also comply with EN50170 Volume 2 and they must be correctly described in the respective GSD file.

To prevent EMC interface from entering the device, the cable shield should be connected to the functional ground of the device (generally the electrically conductive case). This is done by connecting the cable shield to the metal case of the Sub-D connector and the functional ground over a larger area. The bus connector must have a low-impedance connection to the cable shield.

The data transfer technology of the serial bus system, which uses a shielded twisted pair data cable, is described in the specification of the interface-immune RS 485 interface standard. To allow correct bus termination, each station must connect the signals DGND and VP (5V) to pins 5 and 6 of the connector, respectively. The 5V supply for the terminating resistors (VP) should have a minimum current rating of 10mA (the current load can increase to 12mA if a NULL signal is sent through the bus). The current rating should be increased to app.

90mA if you need to be able to supply other types of devices on the bus such as bus terminals and optical fiber cable drivers. Due to the capacitive load of the station and the resulting cable reflections, bus connectors should be provided with built-in series inductors as shown below.

#### ATTENTION



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

### 6.2.2. Choice of PROFIBUS data transfer cable type

- ✓ Depending on the application, the user can choose between electrical and optical fiber data transfer cables. The following types of electrical data cables can be used:
  - **Standard bus cable**
  - **Standard bus cable with halogen-free sheath (type FRNC)**
  - **Cable with PE Sheath** for use in the food and manufacturing industries. (It differs from the standard bus cable solely in the cable sheath).
  - **Direct buried cable** with additional protective sheath for laying in the ground.
  - **Trailing cable** ( this is a special cable type which is used where parts of the machine move occasionally or continuously).
  - **Festooned cable.** Compared to a trailing cable, a festooned cable has an additional strain relief element.
- ✓ The bus cable is specified in EN 50170 part 8-2 as " Cable Type A", and should comply with the parameters in the following table. Cable Type B, which is also described in EN 50170, is outdated and should no longer be used.

✓ **Table 1. show the parameters for standard type A bus cables.**

| Parameter                            | Cable type A                          |
|--------------------------------------|---------------------------------------|
| Characteristic impedance in $\Omega$ | 135..165 at a frequency of (3..20MHz) |
| Operating capacity(pF/m)             | < 30                                  |
| Loop resistance ( $\Omega$ /km )     | <=110                                 |
| Core diameter (mm)                   | >0.64*                                |
| Cora cross-section (mm)              | >0.34*                                |

\* The cable cross-sections used should be compatible with the mechanical specifications of the bus interface connector

The cable parameters specified for standard Type A bus cables result in the maximum length of each bus segment for the respective data transfer rate shown in Table 2.

✓ **Table 2 : Maximum cable lengths per segment**

| Baudrate                       | 9.6  | 19.2 | 45.45 | 93.75 | 187.5 | 500 | 1500 | 3000 | 6000 | 12000 |
|--------------------------------|------|------|-------|-------|-------|-----|------|------|------|-------|
| Max. segment Length in 'm' (m) | 1200 | 1200 | 1200  | 1200  | 1000  | 400 | 200  | 100  | 100  | 100   |

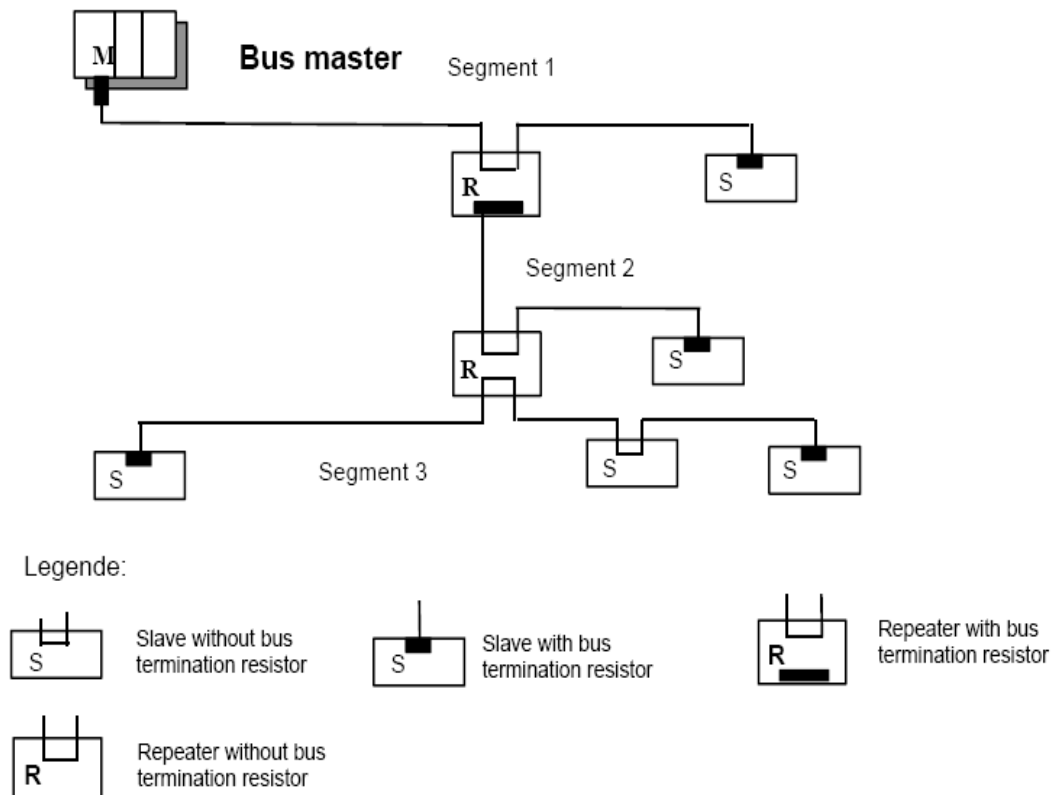
- ✓ **Important :** In a PROFIBUS-DP/FMS installation, you must choose a data transfer rate which is supported by all devices connected to the bus. The chosen data transfer rate then determines the maximum segment lengths as shown above.

The maximum admissible distance between two bus stations in each PROFIBUS network can be calculated as follows:

- ✓ **(NO\_REP+1)\*Segment length**  
NO\_REP=The maximum number of repeaters connected in series(depends on repeater type).
- ✓ **Example :** The repeater manufacture specifications allow nine repeaters to be connected in series. The maximum distance between two bus stations at a data transfer rate of 1500 Kbit/s is then as follow:  
 $(9+1)*200m=2000\text{ m}$

### 6.3. PROFIBUS Module(AT2-R5xx)Configuration

#### 6.3.1. Terminator Resistor Specification



In order to minimize cable reflections and ensure a defined noise level on the data lines, the data transfer cable must be terminated at both ends with a terminating resistor combination as follows.

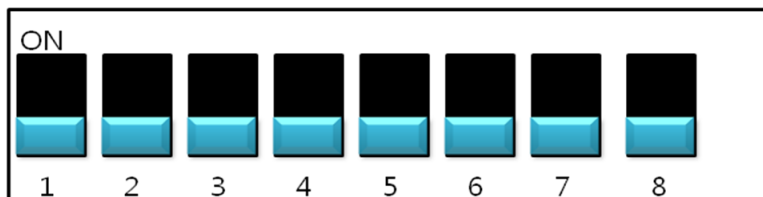
### 6.3.2. Station Address and Quick Start Mode Setup

- **Station Address Setup**

Each PROFIBUS Adapter must have a unique Node Station Address (from 0 to 99) so that it can be addressed independently from other nodes.

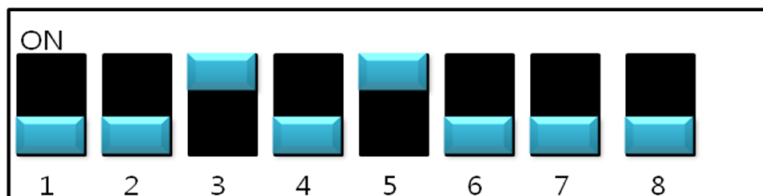
Dip Switch #1~7 setting.

| DIP Switch (Relevant Value) |   |   |   |    |    |    |                  |
|-----------------------------|---|---|---|----|----|----|------------------|
| 1                           | 2 | 4 | 8 | 16 | 32 | 64 | Quick Start Mode |



- ✓ **Node Station Address Setting Example**

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



- **Mode Setting**

| DIP #8 | Start Mode     |
|--------|----------------|
| OFF    | Normal Booting |
| ON     | Quick Booting  |

#### ATTENTION

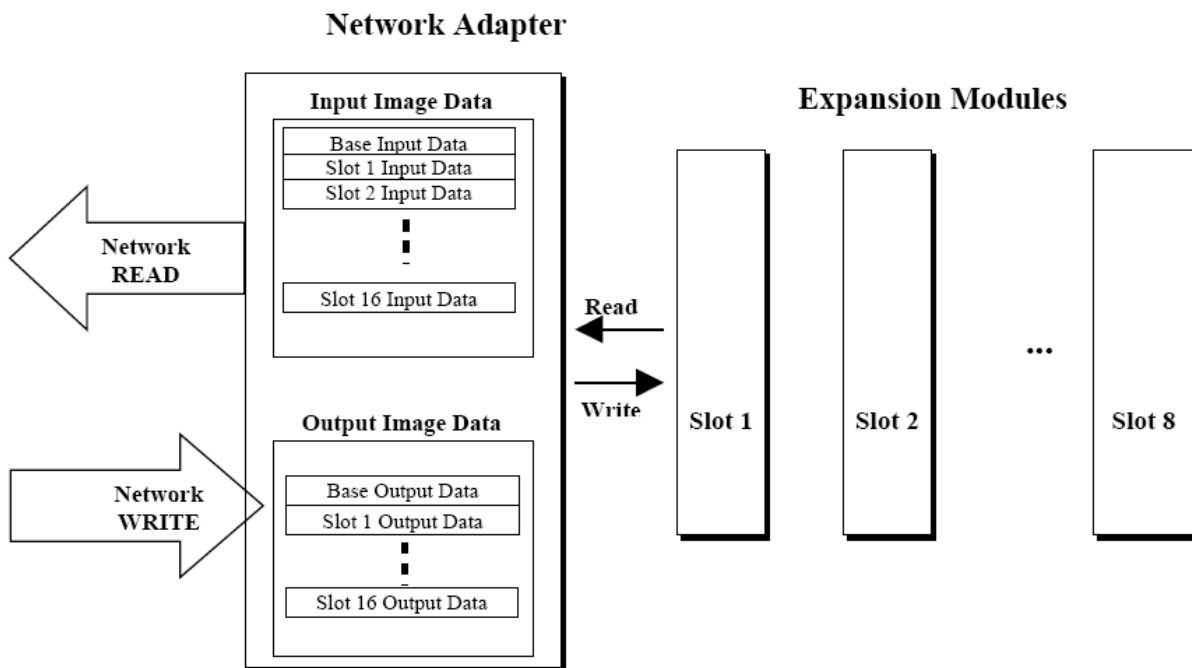


#### \* Directions for setting Node No(Station No)

1. Please set it within the range of contactable Station number (Station no. 00~99)
2. Station number setting out of the range will cause Communication Error.
3. When double setting Station No., communication error occurred

### 6.3.3. I/O Process Image Map

An expansion module may have 3 types of data as I/O data, configuration parameter and memory register. The data exchange between network adapter and expansion modules is done via an I/O process image data by FnBus protocol. The following figure shows the data flow of process image between network adapter and expansion modules.



### 6.3.4. GSD Setting

GSD (Electronic data sheet of a device) files contain and describe the functions and characteristics of PROFIBUS devices. The abbreviation GSD means Generic Station Description (Device Base Files). All the available GSD files together form the device database.

When the program is started, the System Configuration automatically retrieves all the GSD files stored in the GSD directory.

The device names are placed into an internal into a list. During the configuration, the device-specific data is retrieved directly from the GSD files.

If a DP Slave device does not appear in the selection list, a corresponding GSD file can be copied into the GSD directory **File > Copy GSD**.

Another possibility is to copy the GSD file into GSD directory with the Windows Explore and then retrieve the GSD files into the GSD directory with **Setting > Path** and **OK**.

The GSD files can be viewed with the **Tools > GSD Viewer** menu.



- Hilscher Devices: The GSD files for Hilscher devices are already included and installed.
- Other Devices: The respective device manufacturer provides the GSD files for other devices. The GSD files of many vendors are available on the PROFIBUS user organization home page.

The GSD directory is adjustable. In order to alter the directory from a previous setting in another directory, use the **Setting > Path** menu.

All GSD files must be placed in this directory.

No GSD files are used for PROFIBUS-FMS. Hilscher PROFIBUS-FMS devices as well as Other FMS Devices for all vendors are available in the selection list of the Master.

The GSD Files for PROFIBUS-FMS specified by the PNO (PROFIBUS User Organization) are not supported by the System Configurator.

## 6.4. AT2-R5xx DPV1 Service Specification

### 6.4.1. Supported service

#### ✓ MSAC1 Read

##### ● MSAC1 Read confirm(+)

| Parameter      | Description         |
|----------------|---------------------|
| Remote Address | Slave Address(0~99) |
| Length         | 1~32                |
| Data           | User Data           |

##### ● MSAC1 Read confirm(-)

| Parameter      | Description         |
|----------------|---------------------|
| Remote Address | Slave Address(0~99) |
| Error Decode   | -                   |
| Error_code 1   | -                   |
| Error_code 2   | Reserved            |

#### ✓ MSAC1 Write

##### ● MSAC1 Write Response(+)

| Parameter      | Description         |
|----------------|---------------------|
| Remote Address | Slave Address(0~99) |
| Length         | 1~128               |

##### ● MSAC1 Write Response(-)

| Parameter      | Description         |
|----------------|---------------------|
| Remote Address | Slave Address(0~99) |
| Error Decode   | -                   |
| Error_code 1   | -                   |
| Error_code 2   | Reserved            |



### 6.4.2. MSAC1 Read (PROFIBUS-DP Extensions to EN50170)

#### ✓ MSAC1 Read Request

| Parameter            | Description  |
|----------------------|--|
| Remote Address       | Slave Address (0~99)   |
| Slot Number          | Slot Number (0~8)<br>0 : AT2-R5xx<br>1 ~ 8 : I/O   |
| Index                | 1 : Parameter<br>2 : Memory (for expansion IOs, only)<br>252 : Dip Switch Status<br>253 : FW revision (Data length = 4 fixed)<br>254 : Vendor Code |
| Length of data block | 1~32   |

#### ✓ NA Parameter

| Byte address | Description             | Value                          |
|--------------|-------------------------|--------------------------------|
| [4]          | Reaction to FnBus fault | Profibus communication stops   |
|              |                         | Clear input data               |
|              |                         | Stay with the last input value |

#### ✓ Command message for Function Read

| Command Message         |      |         |                                 |
|-------------------------|------|---------|---------------------------------|
| Variable                | Type | Value   | Signification                   |
| Message Header          |      |         |                                 |
| RX                      | Byte | 3       | Receiver                        |
| TX                      | Byte | 16      | Transmitter                     |
| LN                      | Auto |         | Length of message               |
| NR                      | Byte | 0       | Number of the message           |
| A                       | Byte | 0       | No answer                       |
| F                       | Byte | 0       | Error, state                    |
| B                       | Byte | 0x11    | Command = MSAC1_Read_Write      |
| E                       | Byte | 0       | Extension                       |
| Extended Message Header |      |         |                                 |
| Device Adr.             | Byte | 0 ~ 99  | Remote address(slave station)   |
| Data Area               | Byte | 0       | Data area, unused               |
| Data Adr.               | Word | 0 ~ 254 | Slot number                     |
| Data Idx.               | Byte | 1, 2    | Index                           |
| Data count              | Byte | 0 ~ 128 | Length of data block to be read |
| Data type               | Byte | 0 or 10 | Data type, byte string          |
| Function                | Byte | 1       | Function MSAC1_Read             |

### 6.4.3. MSAC1 Write (PROFIBUS-DP Extensions to EN50170)

#### ✓ MSAC1 Write Request

| Parameter      | Description   |
|----------------|---|
| Remote Address | Slave Address (0~99)  |
| Slot Number    | Slot Number (0~8)<br>0 : AT2-R5xx<br>1 ~ 8 : I/O  |
| Index          | 1 : Parameter<br>2 : Memory (for expansion IOs, only)   |
| Length         | 1~32  |
| Data           | 1. Parameter (Refer to 'FnIO configuration parameter')<br>2. Memory (Refer to 'FnIO configuration parameter') |

#### ✓ Command message for Function Write

| Command Message         |      |         |                                 |
|-------------------------|------|---------|---------------------------------|
| Variable                | Type | Value   | Signification                   |
| Message Header          |      |         |                                 |
| RX                      | Byte | 3       | Receiver                        |
| TX                      | Byte | 16      | Transmitter                     |
| LN                      | Auto |         | Length of message               |
| NR                      | Byte | 0       | Number of the message           |
| A                       | Byte | 0       | No answer                       |
| F                       | Byte | 0       | Error, state                    |
| B                       | Byte | 0x11    | Command = MSAC1_Read_Write      |
| E                       | Byte | 0       | Extension                       |
| Extended Message Header |      |         |                                 |
| Device Adr.             | Byte | 0 ~ 99  | Remote address(slave station)   |
| Data Area               | Byte | 0       | Data area, unused               |
| Data Adr.               | Word | 0 ~ 254 | Slot number                     |
| Data Idx.               | Byte | 1, 2    | Index                           |
| Data count              | Byte | 0 ~ 128 | Length of data block to be read |
| Data type               | Byte | 0 or 10 | Data type, byte string          |
| Function                | Byte | 2       | Function MSAC1_Write            |

#### 6.4.4. Error\_Decode(PROFIBUS-DP Extensions to EN50170)

- ✓ 0~127 : Reserved
- ✓ 128 : DPV1
- ✓ 129~253 : Reserved
- ✓ 254 : FMS
- ✓ 255 : HART

#### 6.4.5. Error Code\_1(PROFIBUS-DP Extensions to EN50170)

| Bit | 7  | 6 | 5 | 4 | 3  | 2 | 1 | 0 |
|-----|--|---|---|---|--|---|---|---|
|     | <ul style="list-style-type: none"> <li>Error Class</li> <li>0xA : Application class</li> </ul>   |   |   |   | <ul style="list-style-type: none"> <li>Error code</li> <li>0 : Read Error</li> <li>1 : Write Error</li> <li>2 : Module Failure</li> <li>3 ~7 : Reserved</li> <li>8 : Version conflict</li> <li>9 : Feature not supported</li> <li>10~15 : User specific</li> </ul>   |   |   |   |
|     | <ul style="list-style-type: none"> <li>Error Class               <ul style="list-style-type: none"> <li>➤ 0xB : Access class</li> </ul> </li> </ul>            |   |   |   | <ul style="list-style-type: none"> <li>Error code               <ul style="list-style-type: none"> <li>➤ 0 : Invalid index</li> <li>➤ 1 : Write length error</li> <li>➤ 2 : Invalid slot</li> <li>➤ 3 : Type conflict</li> <li>➤ 4 : Invalid area</li> <li>➤ 5 : state conflict</li> <li>➤ 6 : access denied</li> <li>➤ 7 : invalid range</li> <li>➤ 8 : invalid parameter</li> <li>➤ 9 : invalid type</li> <li>➤ 10~15 : User specific</li> </ul> </li> </ul> |   |   |   |
|     | <ul style="list-style-type: none"> <li>Error Class               <ul style="list-style-type: none"> <li>➤ 0xC : Resource class</li> </ul> </li> </ul>          |   |   |   | <ul style="list-style-type: none"> <li>Error code               <ul style="list-style-type: none"> <li>➤ 0 : read constrain conflict</li> <li>➤ 1 : Write constrain conflict</li> <li>➤ 2 : Resource busy</li> <li>➤ 3 : Resource unavailable</li> <li>➤ 4 ~7 : Reserved</li> <li>➤ 8~15 : User specific</li> </ul> </li> </ul>  |   |   |   |
|     | <ul style="list-style-type: none"> <li>Error Class               <ul style="list-style-type: none"> <li>➤ 0xD : AT2-R5xx Specific Class</li> </ul> </li> </ul> |   |   |   | <ul style="list-style-type: none"> <li>Error code               <ul style="list-style-type: none"> <li>➤ 1 : Slot Parameter write error</li> <li>➤ 2 : Read memory error</li> <li>➤ 3 : Write memory error</li> </ul> </li> </ul>  |   |   |   |

## 6.5. Diagnostics

### 6.5.1. Command message for Diagnostics

| Command Message         |      |          |   |
|-------------------------|------|----------|---|
| Variable                | Type | Value    | Signification   |
| Message Header          |      |          |   |
| RX                      | Byte | 3        | Receiver  |
| TX                      | Byte | 16       | Transmitter   |
| LN                      | Auto | 8        | Length of message   |
| NR                      | Byte | 0        | Number of the message   |
| A                       | Byte | 0        | No answer   |
| F                       | Byte | 0        | Error, state  |
| B                       | Byte | 66(0x42) | Command = MSAC1_Read_Write  |
| E                       | Byte | 0        | Extension   |
| Extended Message Header |      |          |   |
| Device Adr.             | Byte | 0 ~ 99   | Remote address(slave station)   |
| Data Area               | Byte | 0        | Data area, unused   |
| Data Adr.               | Word | 0        | Data address, unused  |
| Data Idx.               | Byte | 0        | Index   |
| Data count              | Byte | 0        | Length of data block to be read   |
| Data type               | Byte | 0 or 10  | Data type, byte string  |
| Function                | Byte | 1, 3     | 1. Function read from internal Buffer<br>3. Function read directly from slave |

### 6.5.2. Diagnostics answer message

| Byte | Item   | Description                                 |
|------|--|---|
| 0    | Station status 1                             | PROFIBUS Standard Diagnostic                |
| 1    | Station status 2                             |   |
| 2    | Station status 3                             |   |
| 3    | Master Address                               |   |
| 4    | PNO Ident Number High                        |   |
| 5    | PNO Ident Number Low                         |   |
| 6    | ID Diagnostic Header                         | Extended Diagnostic (ID Related Diagnostic) |
| 7    | Diagnostic allocation(Slot0~7)               |   |
| 8    | Diagnostic allocation(Slot8~15)              |   |
| 9    | Diagnostic allocation(Slot16~23)             |   |
| 10   | Diagnostic allocation(Slot24~31)             |   |
| 11   | Diagnostic allocation(Slot32~39)             |   |
| 12   | Reserved                                     |   |
| 13   |  |   |
| 14   |  |   |
| 15   | Device Status Diagnostic Header              | Extended Diagnostic (Device Status)         |
| 16   | Status Type(0xA0:Manufacture-specific)       |   |
| 17   | Slot Number                                  |   |
| 18   | Status differentiation(0:No differentiation) |   |
| 19   | Status message                               |   |
| 20   | Reserved                                     |   |

### 6.5.3. Station Status 1~3

| Station status |         |                 |   |
|----------------|---------|-----------------|---|
| 1              | Bit 7   | Master_Lock     | Slave is parameterized by another master                      |
|                | Bit 6   | Prm_Fault       | Last parameter telegram faulty                                |
|                | Bit 5   | Inv_Sl_Res.     | Inplausible response of the slave                             |
|                | Bit 4   | Not_Supp.       | Unknown command detected by the slave                         |
|                | Bit 3   | Ext_Diag        | The area Ext_Diag is used for extended diagnostic             |
|                | Bit 2   | Cfg_Fault       | Slave is wrong parameterized                                  |
|                | Bit 1   | Sta._Not_Rdy    | Slave not ready   |
|                | Bit 0   | Sta._Non_Exist. | Slave not responding  |
| 2              | Bit 7   | Deactivated     | Slave not projected   |
|                | Bit 6   | Reserved        | Reserved  |
|                | Bit 5   | Sync_Mode       | Sync-command active   |
|                | Bit 4   | Freeze_Mode     | Freeze-command active   |
|                | Bit 3   | WD_On           | Watchdog activated  |
|                | Bit 2   | 1               |   |
|                | Bit 1   | Stat_Diag       | Get diagnostic from slave, till bit is released               |
|                | Bit 0   | Prm_            | Slave must be parameterized                                   |
| 3              | Bit 7   | Ext_Diag_Ovfl.  | The slave has more diagnostic data available than it can send |
|                | Bit 6~0 | Reserved        | Reserved  |

### 6.5.4. ID Related Diagnostic

| Byte | Bit7                        | Bit 6  | Bit 5  | Bit 4  | Bit 3  | Bit 2  | Bit 1  | Bit 0    |
|------|-----------------------------|--------|--------|--------|--------|--------|--------|----------|
| 6    | ID Diagnostic Header (0x45) |        |        |        |        |        |        |          |
| 7    | Slot 7                      | Slot 6 | Slot 5 | Slot 4 | Slot 3 | Slot 2 | Slot 1 | AT2-R5xx |
| 8    | Reserved                    |        |        |        |        |        |        | Slot 8   |
| 9    | Reserved                    |        |        |        |        |        |        |          |
| 10   | Reserved                    |        |        |        |        |        |        |          |
| 11   | Reserved                    |        |        |        |        |        |        |          |

### 6.5.5. Device Related Diagnostic(Status message byte)

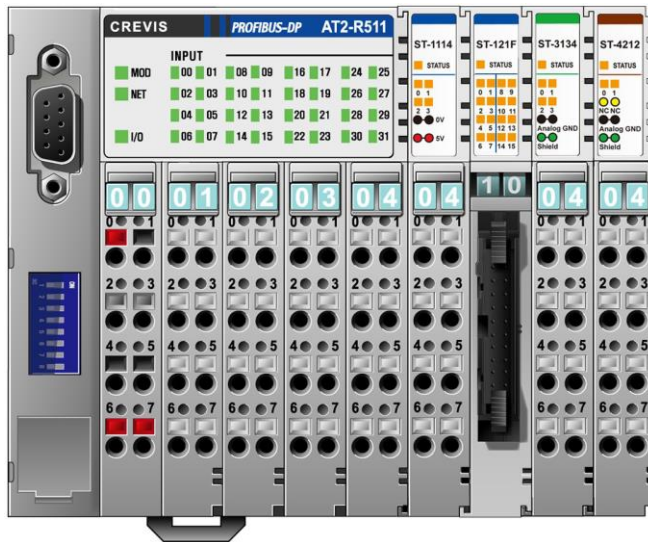
- 0x21 : No response from expansion slot
- 0x22 : Response error(Type)
- 0x23 : Response error(Slot Number)
- 0x24 : Response error(Length)
- 0x25 : Response error(Protocol)
- 0x26 : Response error(ID)
- 0x27 : Response error(Function code)
- 0x28 : Response error(CRC)
- 0x29 : Response error(Data)
- 0x2A : Response error(Sequence)
- 0x2B : NA9122 Request error
- 0x2C : NA9122 Broadcasting error
- 0x41 : FnBus Rx Timeout
- 0x42 : Faulty input data(Type)
- 0x43 : Faulty input data(Slot number)
- 0x44 : Faulty input data(Length)
- 0x45 : Faulty input data(CRC)
- 0x46 : Faulty input data (Slot diag.)
- 0x47 : Input update timeout
- 0x48 : FnBus token fault
- 0xC1 : Resource error of slot
- 0xC2 : Not supported service from slot
- 0xC3 : Attribute error from slot
- 0xC4 : Slot is already in this mode
- 0xC5 : Object conflict from slot
- 0xC6 : Attribute not settable
- 0xC7 : Insufficient data
- 0xC8 : Not supported attribute
- 0xC9 : Too much data
- 0xCA : Object not exist
- 0xCB : Invalid slot parameter
- 0xCC : Store fail
- 0xCD : Access denied
- 0xCE : FnBus token error
- 0xCF : Object not exist
- 0xD0 : Slot memory size over
- 0xE1 : No expansion slot
- 0xE2 : Too many slots
- 0xE3 : Input data size overflow
- 0xE4 : Output data size overflow
- 0xE5 : Invalid product code
- 0xE6 : Set output-offset error
- 0xE7 : Set slot active-flag error
- 0xE8 : Set slot parameter error
- 0xE9 : Set FnBus parameter error
- 0xEA : Slot warm-start error
- 0xEB : Get slot catalog number error
- 0xEC : Invalid slot request
- 0xED : Firmware fault
- 0xEE : Set word-type error
- 0xF0 : Vendor code fault
- 0xFF : Not ready

## 6.6. Example

### 6.6.1. Example of Input Process Image Map

Input image data depends on slot position and expansion slot data type.

- For example slot configuration



| Slot Address | Module Description                    |
|--------------|---------------------------------------|
| Base IO      | AT2-R511<br>32-discrete input (4byte) |
|              | ST-7241, field power distribution     |
| #1           | 4-discrete Input (4bit)               |
| #2           | 16-discrete Input (2byte)             |
| #3           | 4-analog Input (4word)                |
| #4           | 2-analog Output (2word)               |
|              |                                       |
|              |                                       |
|              |                                       |
|              |                                       |
|              |                                       |
|              |                                       |
|              |                                       |
|              |                                       |

- Input Process Image Mode#0 (Uncompressed Input Processing Data)

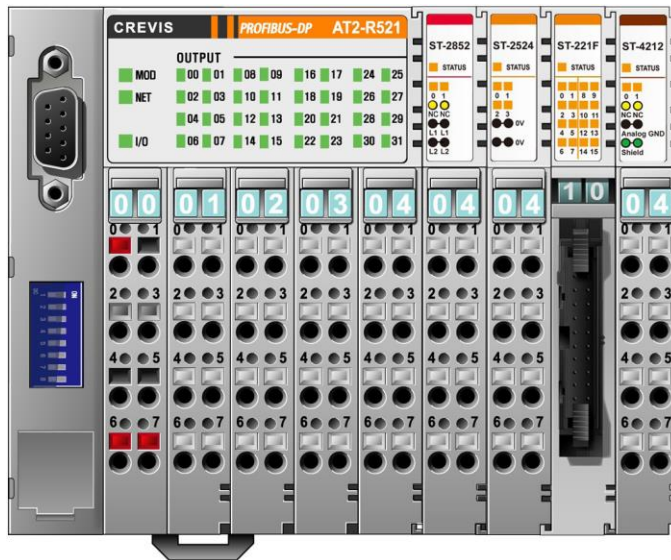
| Byte    | Slot #     | Bit 7                               | Bit 6 | Bit 5 | Bit 4 | Bit 3                         | Bit 2 | Bit 1 | Bit 0 |
|---------|------------|-------------------------------------|-------|-------|-------|-------------------------------|-------|-------|-------|
| Byte 0  | 0<br>(AT2) | 1st input byte (Base IO)            |       |       |       |                               |       |       |       |
| Byte 1  |            | 2nd input byte (Base IO)            |       |       |       |                               |       |       |       |
| Byte 2  |            | 3rd input byte (Base IO)            |       |       |       |                               |       |       |       |
| Byte 3  |            | 4th input byte (Base IO)            |       |       |       |                               |       |       |       |
| Byte 4  | 1          | Empty, Always 0                     |       |       |       | Discrete Input 4 pts (Slot#1) |       |       |       |
| Byte 5  | 2          | Discrete Input low 8 pts (Slot#2)   |       |       |       |                               |       |       |       |
| Byte 6  |            | Discrete Input high 8 pts (Slot#2)  |       |       |       |                               |       |       |       |
| Byte 7  | 3          | Analog Input Ch0 low byte (Slot#3)  |       |       |       |                               |       |       |       |
| Byte 8  |            | Analog Input Ch0 high byte (Slot#3) |       |       |       |                               |       |       |       |
| Byte 9  |            | Analog Input Ch1 low byte (Slot#3)  |       |       |       |                               |       |       |       |
| Byte 10 |            | Analog Input Ch1 high byte (Slot#3) |       |       |       |                               |       |       |       |
| Byte 11 |            | Analog Input Ch2 low byte (Slot#3)  |       |       |       |                               |       |       |       |
| Byte 12 |            | Analog Input Ch2 high byte (Slot#3) |       |       |       |                               |       |       |       |
| Byte 13 |            | Analog Input Ch3 low byte (Slot#3)  |       |       |       |                               |       |       |       |
| Byte 14 |            | Analog Input Ch3 high byte (Slot#3) |       |       |       |                               |       |       |       |



## 6.6.2. Example of Output Process Image Map

Input image data depends on slot position and expansion slot data type.

- For example slot configuration



| Slot Address | Module Description                |
|--------------|-----------------------------------|
| Base IO      | AT2-R521                          |
|              | 32-discrete Output (4byte)        |
|              | ST-7241, field power distribution |
| #1           | 2-discrete Input (2bit)           |
| #2           | 4-discrete Input (4bit)           |
| #3           | 16-discrete Output (2byte)        |
| #4           | 2-analog Output (2word)           |
|              |                                   |
|              |                                   |
|              |                                   |
|              |                                   |
|              |                                   |
|              |                                   |
|              |                                   |

- Output Process Image Mode#0 (Uncompressed Output Processing Data)

| Byte    | Slot #     | Bit 7                                | Bit 6 | Bit 5 | Bit 4 | Bit 3                          | Bit 2 | Bit 1                             | Bit 0 |
|---------|------------|--------------------------------------|-------|-------|-------|--------------------------------|-------|-----------------------------------|-------|
| Byte 0  | 0<br>(AT2) | 1st Output byte (Base IO)            |       |       |       |                                |       |                                   |       |
| Byte 1  |            | 2nd Output byte (Base IO)            |       |       |       |                                |       |                                   |       |
| Byte 2  |            | 3rd Output byte (Base IO)            |       |       |       |                                |       |                                   |       |
| Byte 3  |            | 4th Output byte (Base IO)            |       |       |       |                                |       |                                   |       |
| Byte 4  | 1          | Empty, Don't care                    |       |       |       |                                |       | Discrete Output 2<br>pts (Slot#1) |       |
| Byte 5  | 2          | Empty, Don't care                    |       |       |       | Discrete Output 4 pts (Slot#2) |       |                                   |       |
| Byte 6  | 3          | Discrete Output low 8 pts (Slot#3)   |       |       |       |                                |       |                                   |       |
| Byte 7  |            | Discrete Output high 8 pts (Slot#3)  |       |       |       |                                |       |                                   |       |
| Byte 8  | 4          | Analog Output Ch0 low byte (Slot#4)  |       |       |       |                                |       |                                   |       |
| Byte 9  |            | Analog Output Ch0 high byte (Slot#4) |       |       |       |                                |       |                                   |       |
| Byte 10 |            | Analog Output Ch1 low byte (Slot#4)  |       |       |       |                                |       |                                   |       |
| Byte 11 |            | Analog Output Ch1 high byte (Slot#4) |       |       |       |                                |       |                                   |       |

## 7. 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.                                      |
| I/O LED turns off     | -Failure of realization expansion Module<br>-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<br>-Check power for master.                   |
|                       | Failure of initialization I/O                                      | -Use expansion slot up to 32.<br>-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.                                   |

## ● 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