

POWER/NETWORK MODULE

(DeviceNet®, Automatic area size optimization)

MODEL **R8-ND2**

BEFORE USE

Thank you for choosing us. Before use, please check contents of the package you received as outlined below.

If you have any problems or questions with the product, please contact our sales office or representatives.

■ PACKAGE INCLUDES:

Power/network module(1)
Protective cover(1)

■ MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

■ INSTRUCTION MANUAL

This manual describes necessary points of caution when you use this product, including installation, connection and basic maintenance procedures.

POINTS OF CAUTION

■ CONFORMITY WITH EU DIRECTIVES

- The equipment must be mounted inside a panel.
- The actual installation environments such as panel configurations, connected devices, connected wires, may affect the protection level of this unit when it is integrated in a panel system. The user may have to review the CE requirements in regard to the whole system and employ additional protective measures* to ensure the CE conformity.
* For example, installation of noise filters and clamp filters for the power source, input and output connected to the unit, etc.

■ GENERAL PRECAUTIONS

- Before you remove or mount the unit, turn off the power supply.
- Switches on the side of the module can be set for maintenance only while the power supply is off. Do not access them while the power is supplied.

■ POWER INPUT RATING & OPERATIONAL RANGE

- Locate the power input rating marked on the product and confirm its operational range as indicated below:
DC Power supply: 24V DC rating
24V DC \pm 10%, approx. 12W
(@ internal power max. current 1.6A)
Excitation supply (excitation for I/O module):
24V DC \pm 10%, operational current 10A
(From power supply (excitation supply) connector, via connector for internal bus, supplied to each I/O module. Power output current consumption must be under operational current.)

■ ENVIRONMENT

- Indoor use.
- When heavy dust or metal particles are present in the air, install the unit inside proper housing with sufficient ventilation.

- Do not install the unit where it is subjected to continuous vibration. Do not subject the unit to physical impact.
- Environmental temperature must be within -10 to +55°C (14 to 131°F) with relative humidity within 30 to 90% RH in order to ensure adequate life span and operation.

■ WIRING

- Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

■ AND

- The unit is designed to function as soon as power is supplied, however for analog module, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

INSTALLATION

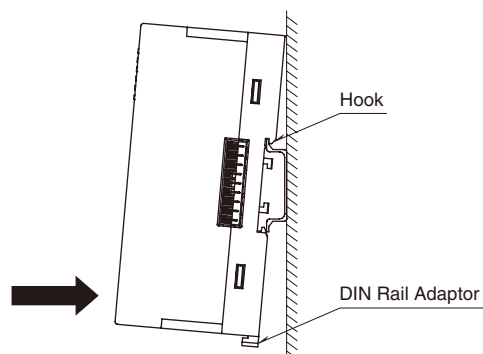
Internal power supply/communication is connected via each module's connector, therefore no backplane base is required, however, hot-swapping of modules is not possible.

■ NODE ADDRESS & NETWORK SETTING

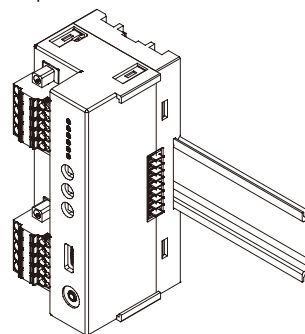
Settings of node address and baud rate must be completed before mounting the module.

■ HOW TO MOUNT THE MODULE ON DIN RAIL

- Power/Network Module



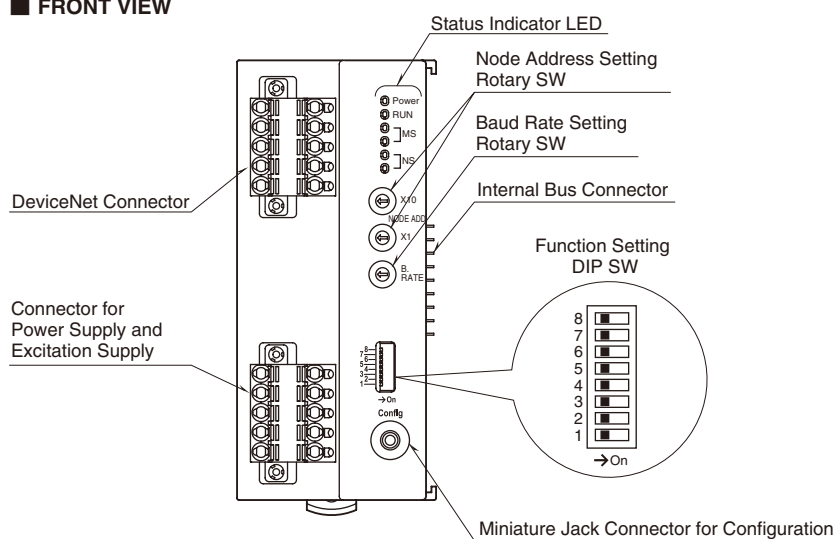
Hang the upper hook at the rear on the DIN rail and push in the lower. When removing the module, push down the DIN rail adaptor utilizing a minus screwdriver and pull.



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COMPONENT IDENTIFICATION

■ FRONT VIEW

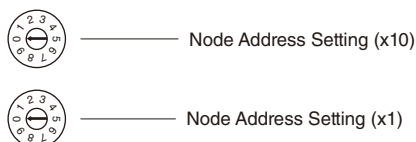


■ FRONT SWITCHES

• Node Address

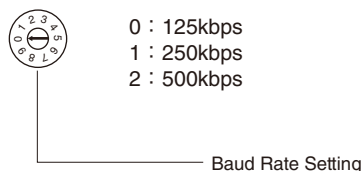
Node Address is selected from 0 to 63 in decimal. The upper switch determines the tens' place digit, while the lower switch does the ones' place digit of the address.

(Factory setting: 00)



• Baud Rate

Baud Rate is selected with the rotary switch. Positions 3 through 9 are unused. Be sure to select from 0 to 2.



■ STATUS INDICATOR LED

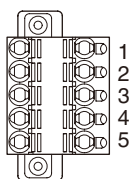
| ID | STATE | COLOR | TO INDICATE |
|-------|------------|-------|--|
| Power | ON | Green | Power supplied |
| RUN | ON / Blink | Green | Turns on or blinks depending on the status |
| MS | ON | Green | Normal operation |
| | ON | Red | Critical failure |
| | Blink | | Minor failure |
| NS | ON | Green | Connections are established |
| | Blink | | Connections are not established |
| | ON | Red | Critical Link failure |
| | Blink | | Minor Link failure |

■ POWER SUPPLY, EXCITATION SUPPLY CONNECTOR ASSIGNMENT

Printed-circuit board connector (Phoenix Contact)

Unit side connector: MSTBV2,5/5-GF-5,08AU

Cable side connector: TFKC2,5/5-STF-5,08AU



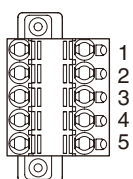
| PIN No. | ID | FUNCTION |
|---------|-----|--------------------------|
| 1 | 24V | Power supply 24V DC |
| 2 | 0V | Power supply 0V DC |
| 3 | + | Excitation supply 24V DC |
| 4 | – | Excitation supply 0V DC |
| 5 | FE1 | Grounding |

■ NETWORK CONNECTOR ASSIGNMENT

Printed-circuit board connector (Phoenix Contact)

Unit side connector: MSTBV2,5/5-GF-5,08AU

Cable side connector: TFKC2,5/5-STF-5,08AU M



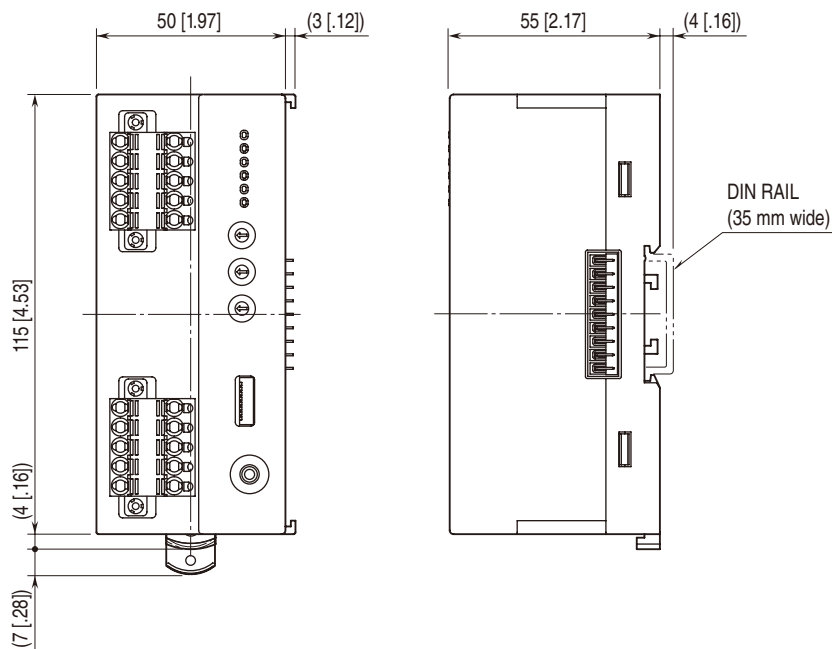
| PIN No. | ID | FUNCTION |
|---------|-------|-------------|
| 1 | V– | Power (–) |
| 2 | CAN_L | Signal Low |
| 3 | Drain | Shield |
| 4 | CAN_H | Signal High |
| 5 | V+ | Power (+) |

TERMINAL CONNECTIONS

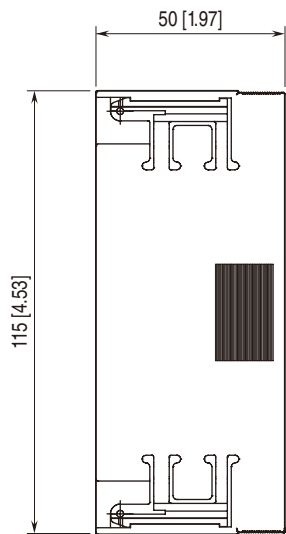
Connect the unit as in the diagram below.

■ EXTERNAL DIMENSIONS unit: mm [inch]

• Unit



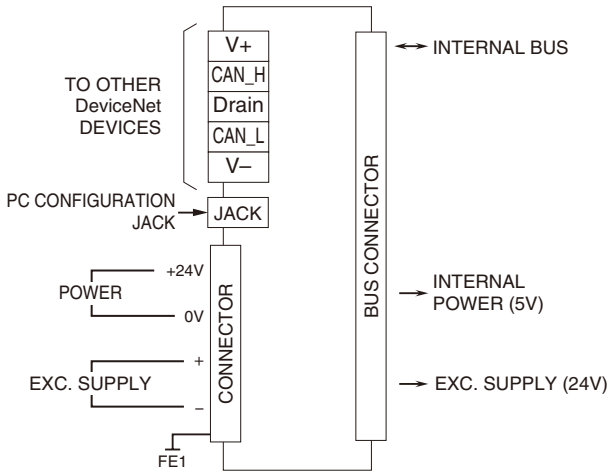
• PROTECTIVE COVER



CONNECTION DIAGRAM

Note: In order to improve EMC performance, bond the FE1 terminal to ground.

Caution: FE1 terminal is NOT a protective conductor terminal.



WIRING INSTRUCTIONS

TENSION CLAMP TERMINAL BLOCK

Power input, excitation supply

Applicable wire size: 0.2 – 2.5 mm²

Stripped length: 10 mm

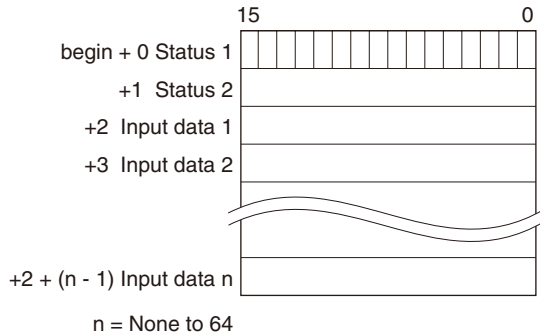
DeviceNet

Transmission cable: Approved for DeviceNet

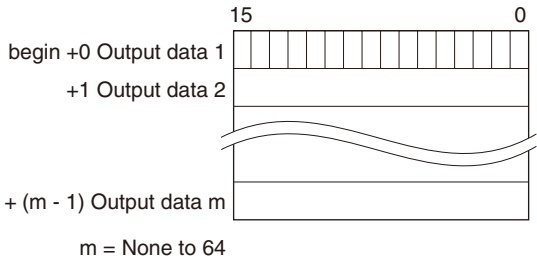
Stripped length: 10 mm

DeviceNet I/O ASSIGNMENTS

IN AREA (R8-ND2 to Master device)



OUT AREA (Master device to R8-ND2)



R8-ND2 automatically determines IN/OUT area size of DeviceNet when the power is turned on according to the configuration of the connected I/O module.

If the I/O module is an input type, input data is assigned in order from the 3rd word of IN area (R8-ND2 to master device). If the I/O module is an output type, output data is assigned in order from the beginning of OUT area (master device to R8-ND2). Temperature control module are allocated to both IN area and OUT area.

Assign the addresses in ascending order of the module address setting.

The data size of each I/O module is determined by the “Data Allocation Mode” × “Addresses in Use” unique to each I/O card. For the details of Data Allocation Mode and Address in Use, refer to “General specifications” in R8 series common specifications (ES-9721).

Status data is assigned to the first two words of IN area regardless of the configuration of the I/O module.

■ DeviceNet DATA EXAMPLE

As an example, the data size of DeviceNet data for the following I/O module configuration are described.

• I/O module configuration example

Network module + nine I/O modules

- DeviceNet data size (word) = Data Allocation Mode × Address in Use
- Module addresses for I/O modules are set in order from top, by leaving space for the address in use.

| I/O MODULE CONFIGURATION | MODULE TYPE | I/O TYPE | DATA ALLOCATION MODE | ADDRESS IN USE | DeviceNet DATA SIZE (word) | | MODULE ADDRESS SETTING |
|--------------------------|-------------------------------------|----------------|----------------------|----------------|----------------------------|-----|------------------------|
| | | | | | IN | OUT | |
| R8-ND2 | Power/network module | - | - | - | - | - | - |
| R8-DA4A | Discrete input module (4 points) | Input | 1 | 1 | 1 | - | 0 |
| R8-DAM16A | Discrete input module (16 points) | Input | 1 | 1 | 1 | - | 1 |
| R8-DC4A | Discrete output module (4 points) | Output | 1 | 1 | - | 1 | 2 |
| R8-DCM16A | Discrete output module (16 points) | Output | 1 | 1 | - | 1 | 3 |
| R8-SV2 | DC voltage input module (2 points) | Input | 2 | 1 | 2 | - | 4 |
| R8-SST8 | DC current input module (8 points) | Input | 2 | 4 | 8 | - | 5 |
| R8-YS2 | DC current output module (2 points) | Output | 2 | 1 | - | 2 | 9 |
| R8-YV4N | DC voltage output module (4 points) | Output | 2 | 2 | - | 4 | 10 |
| R8-TC2 | Temperature control module | Input / Output | 2 | 8 | 16 | 16 | 12 |



• DeviceNet Data

IN AREA (R8-ND2 to master device)

| | |
|-----------|------------------------|
| Begin + 0 | Status 1 |
| +1 | Status 2 |
| +2 | R8 -DA4A (ch1 to 4) |
| +3 | R8 -DAM16A (ch1 to 16) |
| +4 | R8 -SV2 (ch1) |
| +5 | R8 -SV2 (ch2) |
| +6 | R8 -SST8 (ch1) |
| +7 | R8 -SST8 (ch2) |
| +8 | R8 -SST8 (ch3) |
| +9 | R8 -SST8 (ch4) |
| +10 | R8 -SST8 (ch5) |
| +11 | R8 -SST8 (ch6) |
| +12 | R8 -SST8 (ch7) |
| +13 | R8 -SST8 (ch8) |
| +14 | R8 -TC2 (Data 1) |
| +15 | R8 -TC2 (Data 2) |
| +16 | R8 -TC2 (Data 3) |
| : | : |
| +29 | R8 -TC2 (Data 16) |

IN size = 30-word (60-byte)

OUT AREA (Master device to R8-ND2)

| | |
|-----------|------------------------|
| Begin + 0 | R8 -DC4A (ch1 to 4) |
| +1 | R8 -DCM16A (ch1 to 16) |
| +2 | R8 -YS2 (ch1) |
| +3 | R8 -YS2 (ch2) |
| +4 | R8 -YV4N (ch1) |
| +5 | R8 -YV4N (ch2) |
| +6 | R8 -YV4N (ch3) |
| +7 | R8 -YV4N (ch4) |
| +8 | R8 -TC2 (Data 1) |
| +9 | R8 -TC2 (Data 2) |
| +10 | R8 -TC2 (Data 3) |
| : | : |
| +23 | R8 -TC2 (Data 16) |

OUT size = 24-word (48-byte)

■ EDS FILE

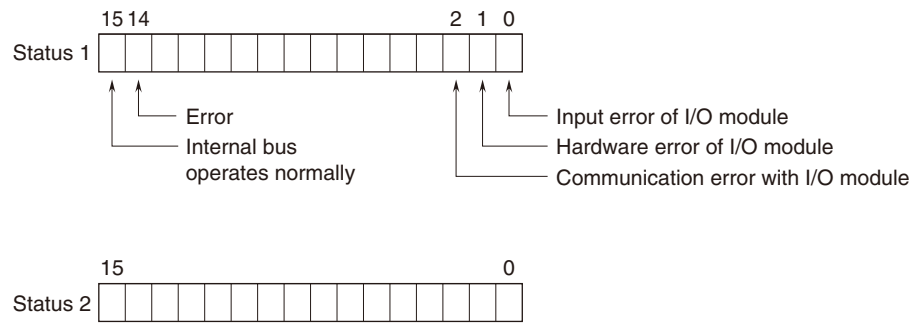
EDS files are downloadable at our web site.

R8-ND2 automatically determines IN/OUT area size of DeviceNet when the power is turned on according to the configuration of the connected I/O module.

Only the largest data size is registered on the EDS files. When registering to the master device, set the data size according to the configuration of I/O modules.

STATUS

■ STATUS



| | | |
|------------------------|------------|---|
| Status 1 | bit15 | Internal bus operates normally 1: Normal 0: Error |
| | bit14 | Error 1: One of bit0 to 2 turns to 1 0: All of bit0 to 2 is 0 |
| | bit3 to 13 | 0 |
| | bit2 | Communication error with I/O module 1: Some I/O modules cannot communicate 0: Communication with all I/O modules is normal |
| | bit1 | Hardware error of I/O modules 1: Some I/O modules are in hardware error. 0: Hardware of all I/O modules are normal |
| | bit0 | Input error of I/O modules 1: Some I/O modules are out of input range, or in burnout 0: Input of all I/O modules are normal |
| Status 2 (reserved) | bit0 to 15 | 0 |

I/O DATA DESCRIPTIONS

■ ANALOG DATA

0 to 100% of the selected I/O range is converted into 0 to 10000 (binary).
Negative values are represented in 2's complements.



■ PULSE DATA (16-bit data)

Negative value is not available, the data is shown with the range 0 to 65535.
16-bit binary data is used for pulse data (16-bit data).



■ PULSE DATA (32-bit data)

32-bit binary data is used for pulse data (32-bit data).
Lower 16 bits are allocated a lower address and higher 16 bits are allocated a higher address.



■ ANALOG DATA (Temperature data)

16-bit binary data is used for temperature data.
With °C, K temperature unit, raw data is multiplied by 10. For example, 25.5°C is converted into 255.
With °F temperature unit, the integer section of raw data is directly converted into the data.
For example, 135.4°F is converted into 135.
Minus temperature is converted into negative values, represented in 2's complements.



■ ANALOG DATA (CT data)

16-bit binary data is used for CT data.
Conversion data is shown by the engineering unit value multiplied by 100 or 1000. For example, for 520.35 A when 0 to 600 A range, the data is 52035 as the conversion data is the engineering value multiplied by 100.
Negative value is not available, the data is shown with the range 0 to 65535.



■ DISCRETE DATA

