

**POWER/NETWORK MODULE  
(Modbus)**

MODEL **R8-NM1**

**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.

**■ GENERAL PRECAUTIONS**

- Before you remove or mount the unit, turn off the power supply.

**■ 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 ± 10%, approx. 12W

(@ internal power max. current 1.6A)

Excitation supply (excitation for I/O module):

24V DC ± 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**

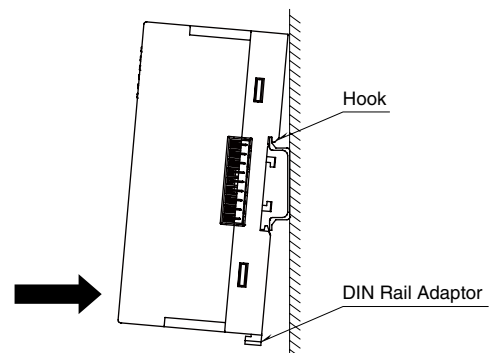
Internal power supply/communication is connected via each module's connector, therefore no backplane base is required, however, hot-swapping of modules is not possible.

**■ NODE ADDRESS & NETWORK SETTING**

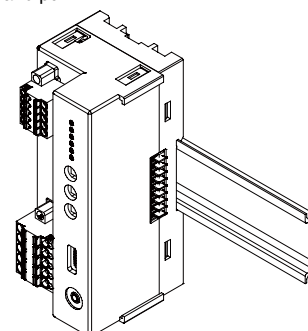
Node address, baud rate, parity and data format setting must be completed before mounting the module.

**■ HOW TO MOUNT THE MODULE ON DIN RAIL**

- Power/Network Module

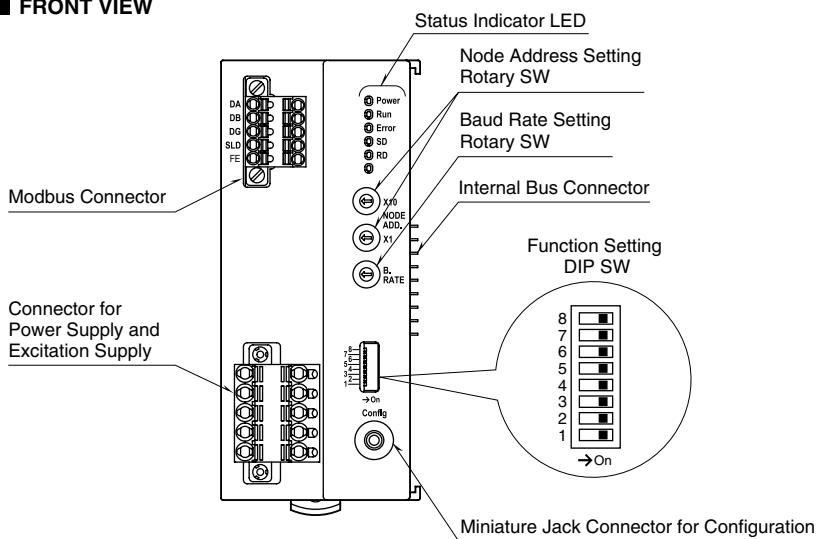


Position the upper hook at the rear on the DIN rail and push in the lower. When removing the module, push down the DIN rail adaptor utilizing a minus screwdriver and pull.

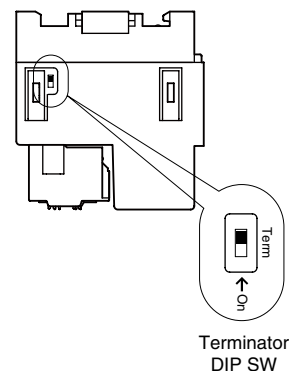


## COMPONENT IDENTIFICATION

### FRONT VIEW



### TOP VIEW



### FRONT SWITCHES

(\*) Factory setting

#### Node Address

Node Address is selected between 1 and 99 in decimal. The left switch determines the tenth place digit, while the right switch does the ones place digit of the address.

(Factory setting: 00)



Node Address Setting (x10)



Node Address Setting (x1)

#### Baud Rate

Baud Rate is selected with the rotary switch. Positions 4 through 9 are unused. Be sure to select between 0 to 3.



0 : 38.4 kbps (factory setting)  
1 : 19.2 kbps  
2 : 9600 bps  
3 : 4800 bps

Baud Rate Setting

#### Data Allocation Mode: SW1

SW	DATA ALLOCATION MODE	
	2	1
SW1	OFF (*)	ON

#### Parity: SW6, 7

SW	PARITY			
	None	Odd	Even	N/A
SW6	OFF (*)	ON	OFF	ON
SW7	OFF (*)	OFF	ON	ON

#### Data Format: SW8

SW	DATA FORMAT	
	RTU (Binary)	ASCII
SW8	OFF (*)	ON

1 byte data consists with the following bit configuration depending on the parity and the data format setting.

	Start Bit	Data Bit Length	Parity Bit	Stop Bit
RTU	1	8	1	1
	1	8	None	2
ASCII	1	7	1	1
	1	7	None	2

Note: Be sure to set unused SW2 through 5 to OFF.

#### TERMINATOR DIP SW

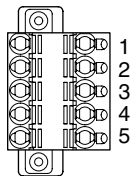
The termination resistor is connected to the network when it is turned on.

### ■ 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



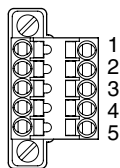
PIN No.	ID	FUNCTION
1	24V	Power supply 24V DC
2	0V	Power supply 0V DC
3	+	Excitation supply 24V DC
4	-	Excitation supply 0V DC
5	FE1	Grounding

### ■ NETWORK CONNECTOR ASSIGNMENT

Printed-circuit board connector (Phoenix Contact)

Unit side connector: MC1,5/5-GF-3,5

Cable side connector: TFMC1,5/5-STF-3,5



PIN No.	ID	FUNCTION
1	DA	DA
2	DB	DB
3	DG	DG
4	SLD	Shield
5	FE	FE

### ■ STATUS INDICATOR LED

ID	COLOR	FUNCTION
Power	Green	ON when the internal 5V power is in normal status.
Run	Green	ON with normal communication *1
Error	Red	ON when abnormal data is received.
SD	Green	ON with data transmitting
RD	Green	ON with data receiving

\*1. Run LED turns off when no command is received from the master device.

### ■ PC CONFIGURATOR

The following parameters can be set with using PC Configurator Software (model: R8CFG):

- Host communication loss detection time: 0.2 to 3200.0 sec. (Factory setting: 3.0 sec.)
- Scan map: 0 to 31 (factory setting: 0 to 31)

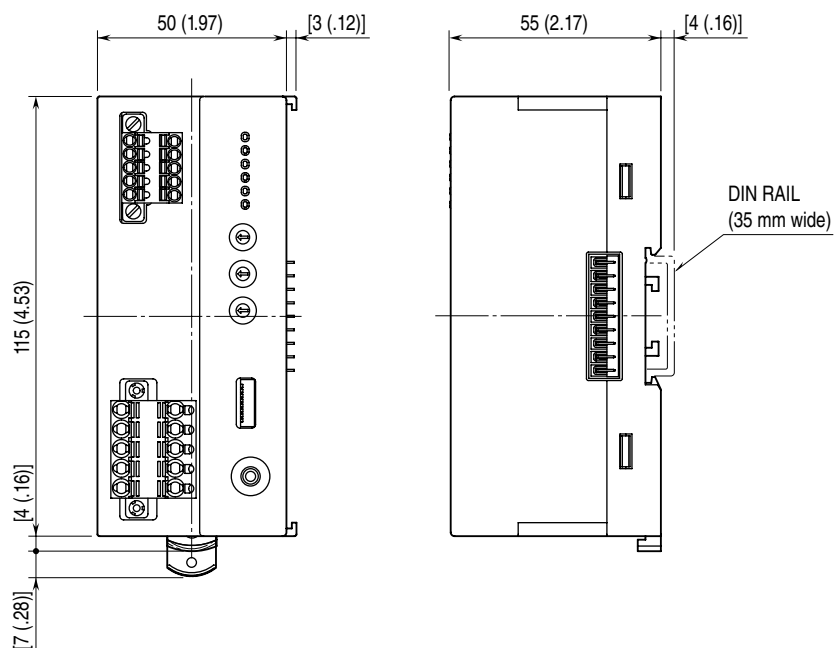
Refer to the users manual for the R8CFG for detailed operation of the software program.

## TERMINAL CONNECTIONS

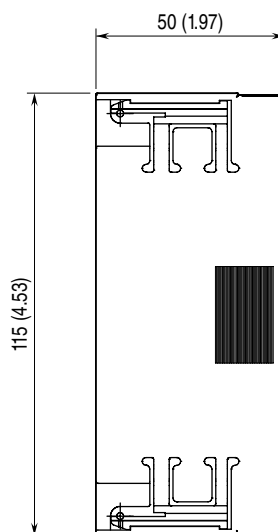
Connect the unit as in the diagram below.

### EXTERNAL DIMENSIONS unit: mm (inch)

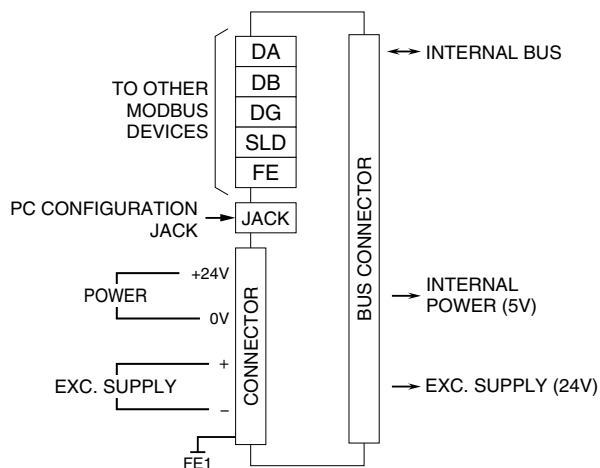
#### • Unit



#### • 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 mm<sup>2</sup>

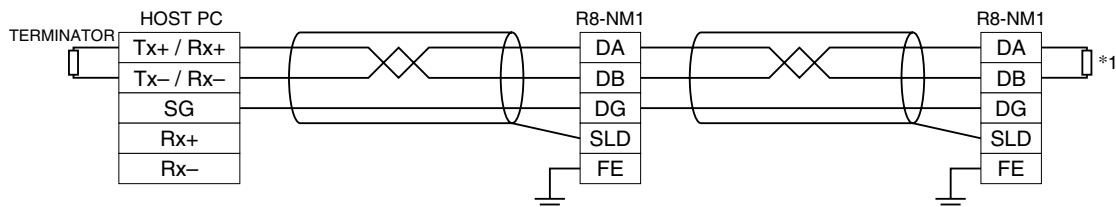
Stripped length: 10 mm

- Modbus

Transmission cable: Approved for Modbus

Stripped length: 10 mm

## COMMUNICATION CABLE CONNECTION



\*1. Turn on the terminator DIP switch to activate the internal terminating resistor.

## MODBUS FUNCTION CODES & SUPPORTED CODES

### ■ Data and Control Functions

CODE	NAME		
01	Read Coil Status	X	Digital output from the slave
02	Read Input Status	X	Status of digital inputs to the slave
03	Read Holding Registers	X	General purpose register within the slave
04	Read Input Registers	X	Collected data from the field by the slave
05	Force Single Coil	X	Digital output from the slave
06	Preset Single Registers	X	General purpose register within the slave
07	Read Exception Status		
08	Diagnostics	X	
09	Program 484		
10	Poll 484		
11	Fetch Comm. Event Counter		Fetch a status word and an event counter
12	Fetch Comm. Event Log		A status word, an event counter, a message count and a field of event bytes
13	Program Controller		
14	Poll Controller		
15	Force Multiple Coils	X	Digital output from the slave
16	Preset Multiple Registers	X	General purpose register within the slave
17	Report Slave ID		Slave type / 'RUN' status
18	Program 884 / M84		
19	Reset Comm. Link		
20	Read General Reference		
21	Write General Reference		
22	Mask Write 4X Register		
23	Read / Write 4X Registers		
24	Read FIFO Queue		

### ■ Exception Codes

CODE	NAME		
01	Illegal Function	X	Function code is not allowable for the slave
02	Illegal Data Address	X	Address is not available within the slave
03	Illegal Data Value	X	Data is not valid for the function
04	Slave Device Failure		
05	Acknowledge		
06	Slave Device Busy		
07	Negative Acknowledge		
08	Memory Parity Error		

### ■ Diagnostic Subfunctions

CODE	NAME		
00	Return Query Data	X	Loop back test
01	Restart Comm. Option	X	Reset the slave and clear all counters
02	Return Diagnostic Register	X	Contents of the diagnostic data (2 bytes)
03	Change ASCII Input Delimiter	X	Delimiter character of ASCII message
04	Force Listen Only Mode	X	Force the slave into Listen Only Mode

## MODBUS I/O ASSIGNMENTS

The DIP SW located at the side of the module switches the unit's data allocation mode.

In the Data Allocation Mode 1, one (1) word is assigned per module. The second channel of analog I/O modules cannot be used. When I/O module of 32-bit data is used, set the Data Allocation Mode to 2.

In the Data Allocation Mode 2, two (2) words are assigned per module regardless of whether the second word area is required or not.

For discrete I/O, 16-channel area is automatically assigned to each module. With a 4-channel module, the bits assigned to ch. 5 through 16 remain "0."

A 4-point analog I/O module takes two addresses per module. For example with the model R8-SV4N located at the module address 5, the inputs 1 and 2 are assigned to the address 5, and the inputs 3 and 4 are to the address 6. Do not assign another module to the address 6. All 4 inputs (input 1 through 4) can be used with Data Allocation Mode 2, while only the inputs 1 and 3 can be used with Data Allocation Mode 1. R8-NM1 Version 1.04 or later can deal with I/O mixed modules. The version of R8-NM1 is confirmed with configurator software (model: R8CFG).

Note: DO NOT access addresses other than mentioned below. Such access may cause problems such as inadequate operation.

Coil (0X)	1 – 16	Module address 0	Do 1 – 16
	17 – 32	Module address 1	Do 1 – 16
	33 – 48	Module address 2	Do 1 – 16
	49 – 64	Module address 3	Do 1 – 16
	:	:	:
Inputs (1X)	497 – 512	Module address 31	Do 1 – 16
	1 – 16	Module address 0	Di 1 – 16
	17 – 32	Module address 1	Di 1 – 16
	33 – 48	Module address 2	Di 1 – 16
	49 – 64	Module address 3	Di 1 – 16
	:	:	:
	497 – 512	Module address 31	Di 1 – 16
513 – 544	Active module map		
545 – 560	Status		

### ■ Data Allocation Mode 1

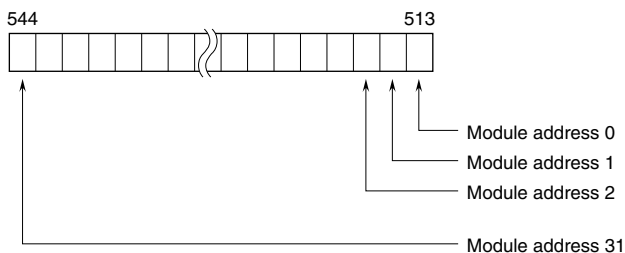
Input Registers (3X)	1	Module address 0	Ai 1 (INT)
	2	Module address 1	Ai 1 (INT)
	3	Module address 2	Ai 1 (INT)
	4	Module address 3	Ai 1 (INT)
	:	:	:
	32	Module address 31	Ai 1 (INT)
	33, 34	Module address 0	Ai 1 (Float)
	35, 36	Module address 1	Ai 1 (Float)
	37, 38	Module address 2	Ai 1 (Float)
	39, 40	Module address 3	Ai 1 (Float)
Holding Registers (4X)	:	:	:
	95, 96	Module address 31	Ai 1 (Float)
	1	Module address 0	Ao 1 (INT)
	2	Module address 1	Ao 1 (INT)
	3	Module address 2	Ao 1 (INT)
	4	Module address 3	Ao 1 (INT)
	:	:	:
	32	Module address 31	Ao 1 (INT)
	33, 34	Module address 0	Ao 1 (Float)
	35, 36	Module address 1	Ao 1 (Float)
37, 38	Module address 2	Ao 1 (Float)	
39, 40	Module address 3	Ao 1 (Float)	
:	:	:	
95, 96	Module address 31	Ao 1 (Float)	

### ■ Data Allocation Mode 2

Input Registers (3X)	1	Module address 0	Ai 1 (INT)
	2	Module address 0	Ai 2 (INT)
	3	Module address 1	Ai 1 (INT)
	4	Module address 1	Ai 2 (INT)
	:	:	:
	63	Module address 31	Ai 1 (INT)
	64	Module address 31	Ai 2 (INT)
	65, 66	Module address 0	Ai 1 (Float)
	67, 68	Module address 0	Ai 2 (Float)
	69, 70	Module address 1	Ai 1 (Float)
Holding Registers (4X)	71, 72	Module address 1	Ai 2 (Float)
	:	:	:
	189, 190	Module address 31	Ai 1 (Float)
	191, 192	Module address 31	Ai 2 (Float)
	1	Module address 0	Ao 1 (INT)
	2	Module address 0	Ao 2 (INT)
	3	Module address 1	Ao 1 (INT)
	4	Module address 1	Ao 2 (INT)
	:	:	:
	63	Module address 31	Ao 1 (INT)
64	Module address 31	Ao 2 (INT)	
65, 66	Module address 0	Ao 1 (Float)	
67, 68	Module address 0	Ao 2 (Float)	
69, 70	Module address 1	Ao 1 (Float)	
71, 72	Module address 1	Ao 2 (Float)	
:	:	:	
189, 190	Module address 31	Ao 1 (Float)	
191, 192	Module address 31	Ao 2 (Float)	

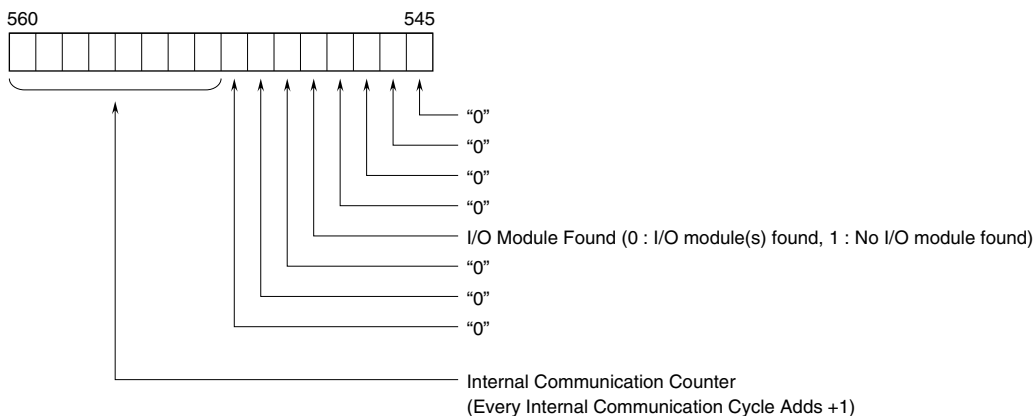
■ ACTIVE MODULE MAP

Indicates where I/O modules are located. When a module is mounted, the corresponding bit turns to “1.”



■ STATUS

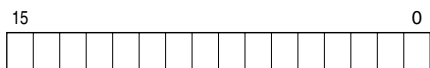
Communication status data. When one or more I/O modules are mounted, the corresponding bit turns to “0.”



**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)

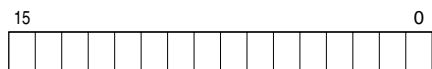
16-bit binary data is used for temperature data.

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)

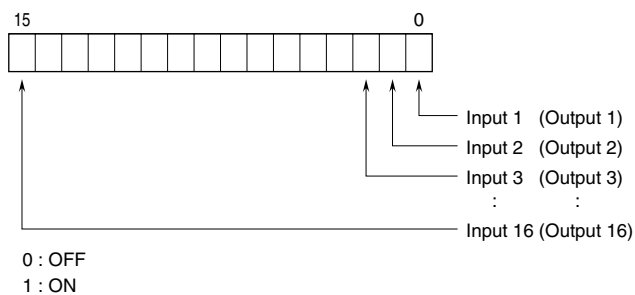
16-bit binary data is used for CT data.

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



For I/O mixed modules shown below, interlock status is assigned to input 1 (to 3) in addition to output 1 to 16 (Available with R8-NM1 Version 1.04 or later).

R8-DCM16ALZ	Input 1	Full interlock
R8-DCM16ALK	Input 1	Full interlock
	Input 2	Individual interlock 1
	Input 3	Individual interlock 2
R8-DCM16ALH	Input 1	Full interlock
	Input 2	Partial interlock 1
	Input 3	Partial interlock 2