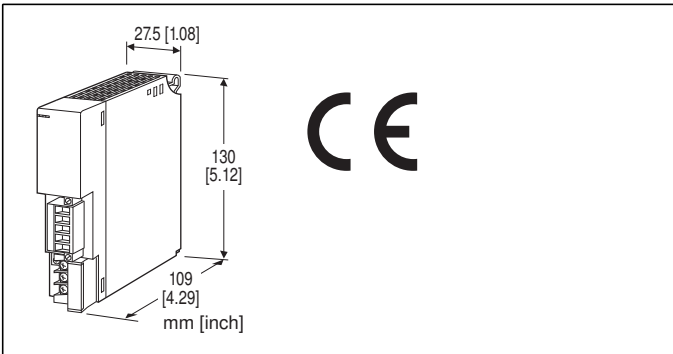


Remote I/O R3 Series

MODBUS INTERFACE MODULE

(115.2 kbps, communication distance: 2 km supported)



MODEL: R3-NM5-[1][2]

ORDERING INFORMATION

- Code number: R3-NM5-[1][2]
- Specify a code from below for each of [1] and [2].
(e.g. R3-NM5-R/CE/Q)
- Specify the specification for option code /Q
(e.g. /C01/S01)

[1] POWER INPUT

N: No power supply
(Use with Ver.2.00 or higher versions of Power Supply Module (model: R3-PSx) to conform with CE marking.)

AC Power

M2: 100 – 240 V AC, 50 – 60 Hz
(Operational voltage range 85 – 264 V, 47 – 66 Hz)

DC Power

R: 24 V DC
(Operational voltage range 24 V $\pm$ 10 %, ripple 10 %p-p max.) *
* Not selectable for use with independent power modules or network modules with the internal power input options.

[2] OPTIONS (multiple selections)

Standards & Approvals

blank: Without CE

/CE: CE marking

Other Options

blank: none

/Q: Option other than the above (specify the specification)

SPECIFICATIONS OF OPTION: Q (multiple selections)

COATING (For the detail, refer to our web site.)

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

/C04: Polyolefin coating

TERMINAL SCREW MATERIAL

/S01: Stainless steel

RELATED PRODUCTS

- PC Configurator cable (model: MCN-CON or COP-US)
 - PC configurator software (model: R3CON)
- Downloadable at our web site.

PACKAGE INCLUDES...

- Terminating resistor (110 Ω , 0.25 W)

GENERAL SPECIFICATIONS

Connection

Modbus: Euro type connector terminal
(applicable wire size: 0.2 to 2.5 mm², stripped length 7 mm)

Internal bus: Via the Installation Base
(model: R3-BSx)

Internal power: Via the Installation Base (model: R3-BSx)

Power input, RUN contact output: M3 separable screw terminal (torque 0.5 N·m)

Screw terminal: Nickel-plated steel (standard) or stainless steel

Isolation: Modbus to internal bus or internal power to power input to RUN contact output to FG

Input error data: Input value setting at input module error with side DIP SW

Main/Sub switching control in dual communication mode: Selectable with the side DIP SW (refer to the manual)

Dual communication setting: Set with the side DIP switch

Data allocation setting: Set with the side DIP switch

Analog output data transmission setting: Indication selectable with front DIP SW.

RUN indicator: Bi-color (green/red) LED; Green ON in normal communication; Red ON when receiving data (Function selected with side DIP SW)

ERR indicator: Bi-color (green/red) LED; green ON at data receiving error (blinking with configuration error); Red ON at EEPROM error; Red blinks when transmitting data (Function selected with side DIP SW)

■ RUN CONTACT OUTPUT

RUN contact: Turns ON while the green RUN LED is ON (Ethernet in normal communication).

Rated load: 250 V AC @ 0.5 A (cos ϕ = 1)
30 V DC @ 0.5 A (resistive load)

Maximum switching voltage: 250 V AC or 30 V DC

Maximum switching power: 250 VA or 150 W

Minimum load: 1 V DC @ 1 mA

Mechanical life: 2 $\times$ 10⁷ cycles (300 cycles/min.)

When driving an inductive load, external contact protection

and noise quenching recommended.

MODBUS COMMUNICATION

RS-485

Standard: Conforms to TIA/EIA-485-A

Transmission distance: 2000 meters max.

The maximum transmission distance of 2000m is applied only when used in combination with a gateway module (model: R3-GMM1).

When used in combination with other master devices, the maximum transmission distance of the master device is applied.

Transmission media: Shielded twisted-pair cable (CPEV-S 0.9 dia.)

Supported function codes: 01, 02, 03, 04, 05, 06, 09, 15, 16, 17, 113 (total of 11 types)

Transmission setting: DIP switch (front)

Data: RTU (Binary) or ASCII

Parity: None, even or odd

Baud rate: 4800, 9600, 14.4 k, 19.2 k, 28.8 k, 38.4 k, 57.6k, 115.2 k (bps)

Node address: Rotary switch; 01 – F7

No communication time: With PC configurator software (model: R3CON); 2 to 32000 (0.1 sec.)

Inter-frame interval: With PC configurator software (model: R3CON); 0 - 50 msec.

INSTALLATION

Power consumption

•AC:

Approx. 20 VA at 100 V

Approx. 28 VA at 200 V

Approx. 30 VA at 240 V

•DC: Approx. 13 W

Current consumption (no power supply): 80 mA

Output current (power supply): 270 mA continuous at 20 V DC; 420 mA for 10 minutes

Operating temperature: -10 to +55°C (14 to 131°F)

Operating humidity: 30 to 90 %RH (non-condensing)

Atmosphere: No corrosive gas or heavy dust

Mounting: Installation Base (model: R3-BSx)

Weight: 200 g (0.44 lb)

PERFORMANCE

Insulation resistance: $\geq 100 \text{ M}\Omega$ with 500 V DC

Dielectric strength: 1500 V AC @ 1 minute

(Modbus to internal bus or internal power to RUN contact output to FG)

STANDARDS & APPROVALS

EU conformity:

EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

Low Voltage Directive

EN 61010-1, EN 61010-2-201

Installation Category II (power input)

Pollution Degree 2

Power input or RUN contact output to internal power or internal bus or Modbus:

Reinforced insulation (300 V)

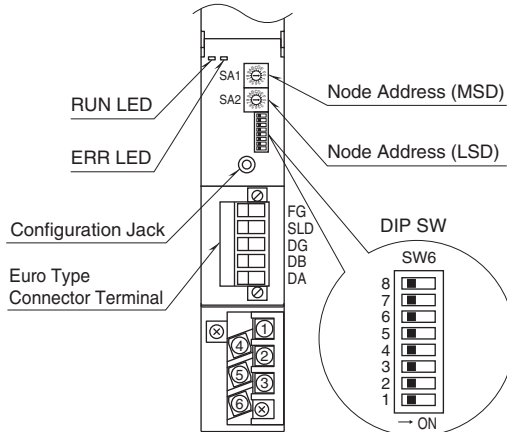
Power input to RUN contact output:

Reinforced insulation (300 V)

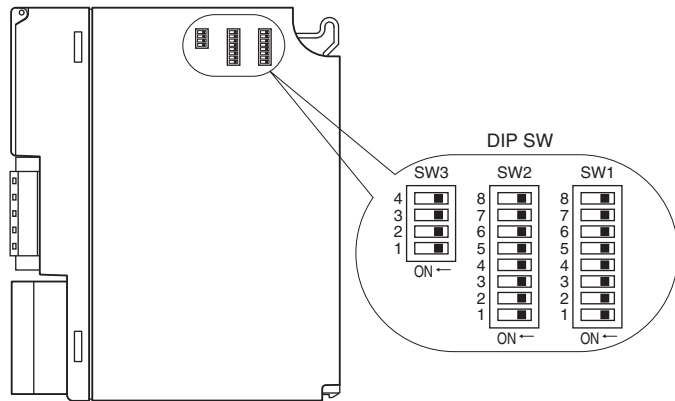
RoHS Directive

EXTERNAL VIEW

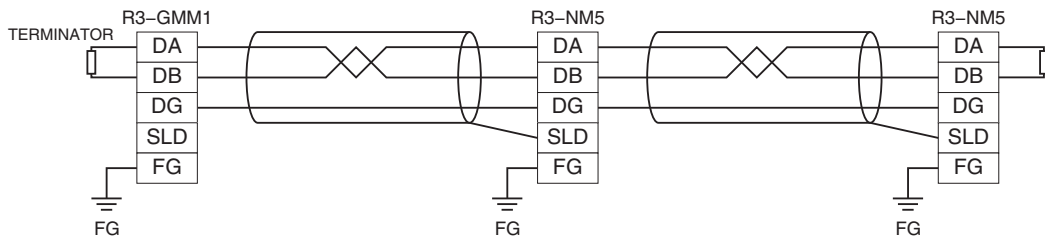
■ FRONT VIEW



■ SIDE VIEW



COMMUNICATION CABLE CONNECTIONS



MODBUS FUNCTION CODES & SUPPORTED CODES

■ Data and Control Functions

CODE	NAME	
01	Read Coil Status	Read digital output data
02	Read Input Status	Read digital input data
03	Read Holding Registers	Read analog output data
04	Read Input Registers	Read analog input data
05	Force Single Coil	Write digital output data
06	Preset Single Register	Write analog output data
09	Slave INFO	Read slave information
15	Force Multiple Coils	Write multiple digital output data
16	Preset Multiple Registers	Write multiple analog output data
17	Report Slave ID	Read slave ID
113	Read Card Name	Read model name (R3-NM5)

■ Exception Code

CODE	NAME	
01	Illegal Function	Unsupported function code
02	Illegal Data Address	Unsupported register address
03	Illegal Data Value	Receiving error

MODBUS I/O ASSIGNMENT

	ADDRESS	DATA FORMAT	NAME
Coil (0X)	1 – 1024		Digital Output (discrete output)
	1025		Main / Sub Switching Command (valid only with SW3-3 set to ON)
Inputs (1X)	1 – 1024		Digital Input (discrete input)
	1025 – 1040		Module Status
	1041 – 1056		Error Status
	1057 – 1072		Data Error Status
Input Registers (3X)	1 – 256	I	Analog Input
	257 – 768	F	Analog Input
Holding Registers (4X)	1 – 256	I	Analog Output
	257 – 768	F	Analog Output

I : Integer, 0 – 10000 (0 – 100%)

F : Floating (32-bit data cannot be accessed using floating addresses.)

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

- Module Status indicates whether individual I/O modules are mounted or not. The bit corresponding to the mounted slot turns to “1,” and the unmounted slot to “0.”

- Error Status indicates error status for each module as described below. The bit corresponding to such module turns to “1.”

R3-TSx, R3-RSx, R3-US4: Input burnout

R3-DA16A: Power input in error or disconnected

R3-YSx: Output current error (e.g. load unconnected)

R3-PC16A: External power supply in error or disconnected

- Data Error Status indicates overrange (R3-US4: out of -10% to +110%; the other types: out of -15% to +115%) status for each module. The bit corresponding to such module turns to “1.”

- Main / Sub Switching Commands given to the network modules result as follows:

MAIN' MODULE	'SUB' MODULE	OUTPUT MODE
1	0	Main bus is used; Red light turns on at RUN LED of the I/O modules.
0	1	Sub bus is used; Green light turns on at RUN LED of the I/O modules.
1	1	Main bus is used; Amber light turns on at RUN LED of the I/O modules.
0	0	Output is invalid; RUN LED of the I/O modules turns off.

TRANSMISSION DATA DESCRIPTIONS

The DIP SW located at the side of the module specifies each I/O module's data allocation (occupied data area).

For example, when the data areas are assigned as shown below:

Module 1	4
Module 2	4
Module 3	4
Module 4	1
Module 5	1
Module 6	1
Module 7	1

Then the I/O data are assigned as in the table below:

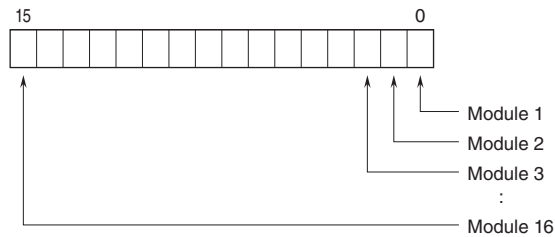
	ADDRESS	POSITION
Input Registers (3X)	1 – 4, 257 – 264	Slot 1
Holding Registers (4X)	5 – 8, 265 – 272	Slot 2
	9 – 12, 273 – 280	Slot 3
	13, 281 – 282	Slot 4
	14, 283 – 284	Slot 5
	15, 285 – 286	Slot 6
	16, 287 – 288	Slot 7

	ADDRESS	POSITION
Coil (0X) Inputs (1X)	1 – 64	Slot 1
	65 – 128	Slot 2
	129 – 192	Slot 3
	193 – 208	Slot 4
	209 – 224	Slot 5
	225 – 240	Slot 6
	241 – 256	Slot 7

For Coil (0X) and Inputs (1X), addresses 16 times assigned data areas (Data Allocation Type) are allotted with the Data Allocation Type '1' and '4.' With '8' and '16,' 64 (4 × 16) are automatically allotted.

MODULE STATUS, ERROR STATUS, DATA ERROR STATUS

Shows each module's availability and error status.



I/O DATA DESCRIPTIONS

The data allocations for typical I/O modules are shown below.

Refer to the manual for each module for detailed data allocations.

■ ANALOG DATA (16-bit data, models: R3-SV4, YV4, DS4, YS4, US4, etc.)

16-bit binary data.

Basically, 0 to 100% of the selected I/O range is converted into 0 to 10000 (binary).

-15 to 0 % is a negative range represented in 2's complement.

In case of R3-US4, -10 to 0% is a negative range represented in 2's complement.



■ TEMPERATURE DATA (16-bit data, models: R3-RS4, TS4, US4, etc.)

16-bit binary data.

With °C 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 (16-bit data, models: R3-CT4A, CT4B, etc.)

16-bit binary data.

Integer obtained by multiplying unit value (A) by 100.

In case of CLSE-R5, integer obtained by multiplying unit value (A) by 1000.

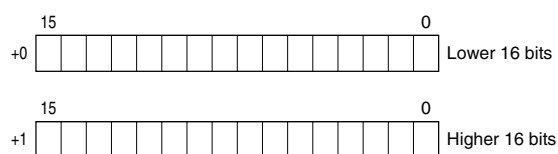


■ ACCUMULATED COUNT DATA (32-bit data, models: R3-PA2, PA4A, WT1, WT4, etc.)

32-bit binary data is used for accumulated counts and encoder positions.

Lower 16 bits are allocated from the lowest address to higher ones, higher 16 bits in turn.

32-bit data cannot be accessed using floating addresses.



■ BCD DATA (32-bit data, models: R3-BA32A, BC32A, etc.)

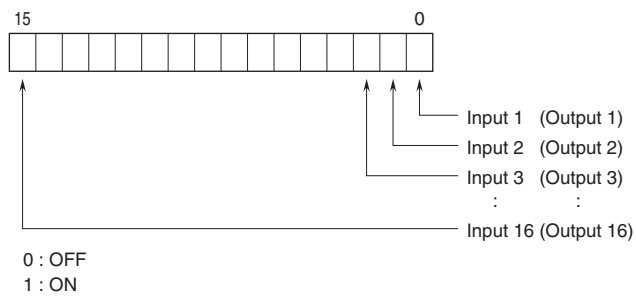
32-bit binary data is used for BCD.

Lower 16 bits are allocated from the lowest address to higher ones, higher 16 bits in turn.

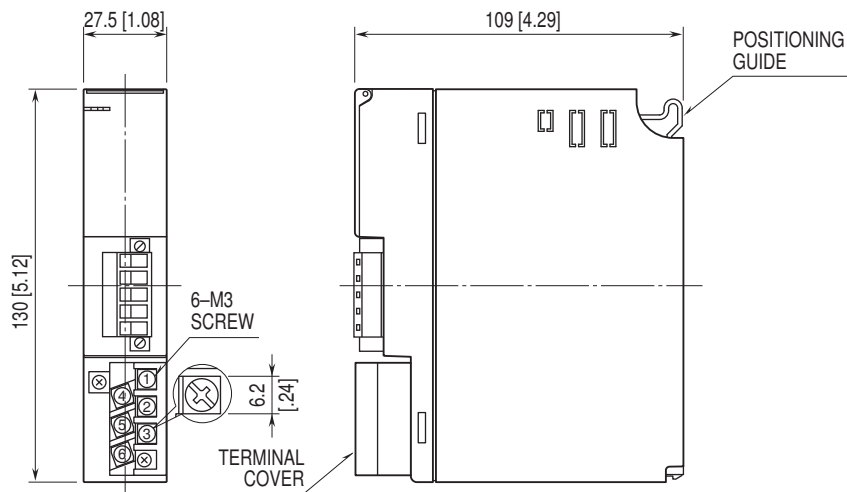
32-bit data cannot be accessed using floating addresses.



■ 16-POINT DISCRETE DATA (models: R3-DA16, DC16, etc.)



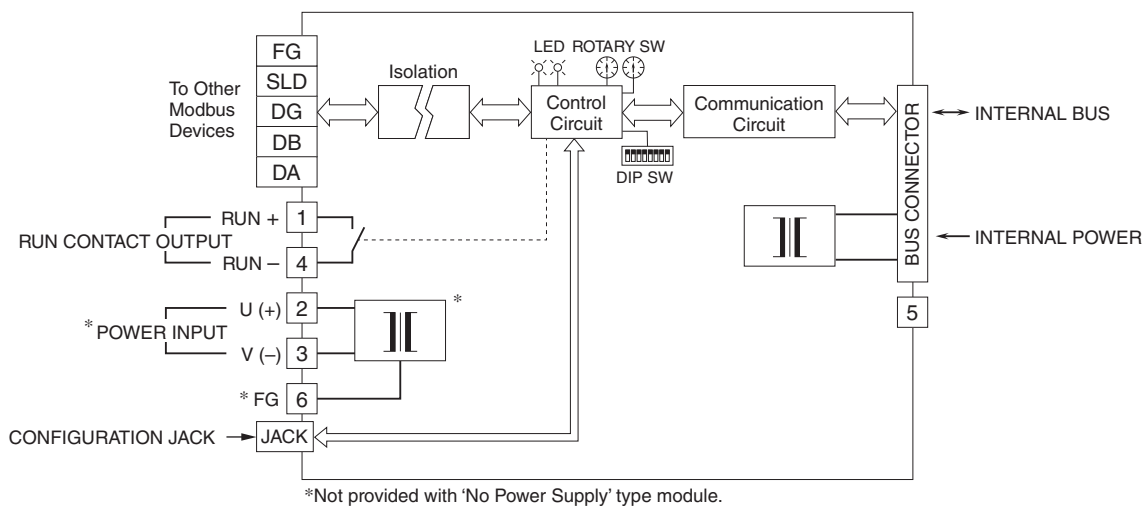
EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



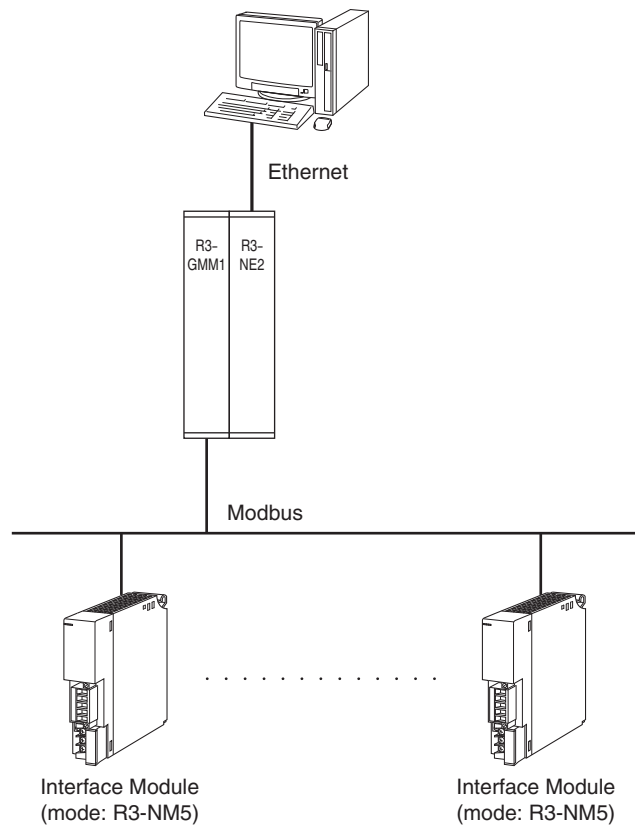
SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

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

Caution: FG terminal is NOT a protective conductor terminal.



SYSTEM DESCRIPTIONS



Specifications are subject to change without notice.