

## Remote I/O R3 Series

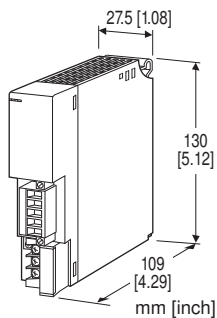
### MODBUS INTERFACE MODULE

#### Functions & Features

- Enables other protocol interface modules to communicate with Modbus data (gateway).
- Recognized as an analog I/O mixed module by other protocol interface modules.
- Used as Modbus slave device like R3-NM1.

#### Typical Applications

- A gateway for CC-Link and Modbus.



## MODEL: R3-GM1S[1]

### ORDERING INFORMATION

- Code number: R3-GM1S[1]
- Specify a code from below for [1].  
(e.g. R3-GM1S/CE/Q)
- Specify the specification for option code /Q  
(e.g. /C01)

### COMMUNICATION MODE

S: Single

### [1] 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

**COATING (For the detail, refer to M-System's web site.)**

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

### CAUTION

- When selecting network modules, note that this unit is not designed to be used with network modules of certain types or versions.
- This unit CANNOT be used with R3-NC2, R3-NEIP1, R3-NFx, and R3-NLx.
- This unit CAN be used with:  
R3-NM3 and R3-NML3 of firmware version V1.00 or higher;  
R3-NC1, R3-NC3, R3-NDx, R3-NE1, R3-NFL1, R3-NM1, R3-NM4, and R3-NP1 of firmware version V2.00 or higher;  
and  
other models of any firmware versions.

### 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 mm<sup>2</sup>, stripped length 7 mm)

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

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

**RUN contact output:** M3 separable screw terminal  
(torque 0.5 N·m)

**Screw terminal:** Nickel-plated steel

**Isolation:** Modbus to internal bus or internal power to RUN contact output

**RUN indicator:** Bi-color (green/red) LED  
Green turns ON when Modbus communication is normal and fieldbus communication on the R3 Network module side is also normal; or

Red turns ON when receiving data.

Indication selectable with DIP SW3-4.

**ERR indicator:** Bi-color (green/red) LED  
Green turns ON/blinks in communication errors (OFF with wire breakdown; Green blinks with setting errors); or  
Red turns ON when transmitting data.

Indication selectable with DIP SW3-4.

**Module allocation:** Set with the side DIP switch.

#### ■ RUN CONTACT OUTPUT

**RUN contact:** Turns on while the green RUN LED is ON (only when Modbus communication and the field bus built-in the interface module are in normal).

**Rated load:** 250 V AC @ 0.5 A (cos φ = 1)

30 V DC @ 0.5 A (resistive load)

(Less than 50 V AC to conform with EU Directive)

**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:**  $2 \times 10^7$  cycles (300 cycles/min.)

When driving an inductive load, external contact protection and noise quenching recommended.

## MODBUS COMMUNICATION

**Standard:** Conforms to TIA/EIA-485-A

**Transmission distance:** 500 meters max.

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

**Transmission setting:** DIP switch (front)

**Data mode:** RTU (Binary) or ASCII

**Parity:** None, even or odd

**Baud rate:** 4800, 9600, 19.2 k, 38.4 k (bps)

**Node address:** Rotary switch; 01 - F7

## INSTALLATION

**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

**Data allocation:**  $16 \times n$  (Module allocation: 1 to 8)

**Current consumption:** 100 mA

**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)

2000 V AC @ 1 minute (power input to FG; isolated on the power supply module)

## STANDARDS & APPROVALS

**EU conformity:**

EMC Directive

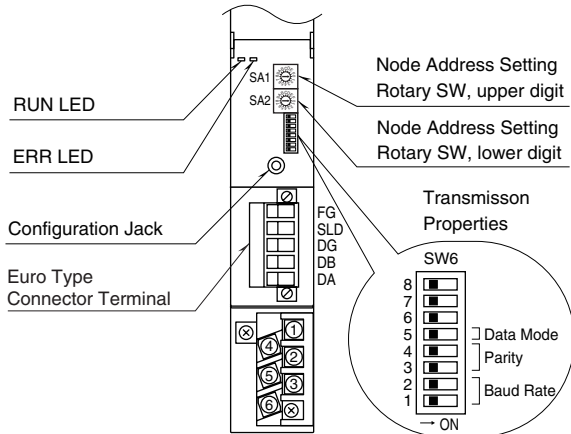
EMI EN 61000-6-4

EMS EN 61000-6-2

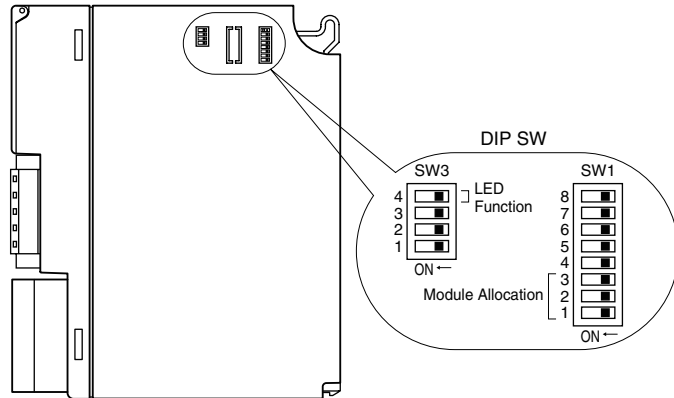
RoHS Directive

## EXTERNAL VIEW

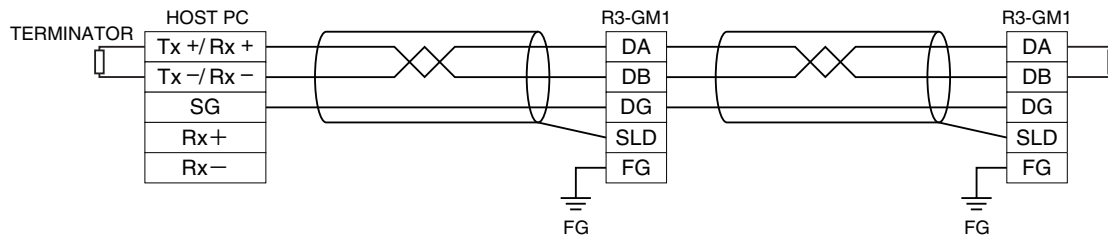
### FRONT VIEW



### SIDE VIEW



## COMMUNICATION CABLE CONNECTIONS



## MODBUS FUNCTION CODES & SUPPORTED CODES

### ■ Data & Control Functions

CODE	NAME		
01	Read Coil Status		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		Digital output from the slave
06	Preset Single Register	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 Register		
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 ASSIGNMENT

	ADDRESS	DATA TYPE	DATA	MODULE POSITION
Input (1X)	1025 – 1032		Module Status	
Input Registers (3X)	1 – 16	I	Analog Input	1
	17 – 32			2
	33 – 48			3
	49 – 64			4
	65 – 80			5
	81 – 96			6
	97 – 112			7
	113 – 128			8
	257 – 288	F	Analog Input	1
	289 – 320			2
	321 – 352			3
	353 – 384			4
	385 – 416			5
	417 – 448			6
	449 – 480			7
	481 – 512			8
Holding Registers (4X)	1 – 16	I	Analog Output	1
	17 – 32			2
	33 – 48			3
	49 – 64			4
	65 – 80			5
	81 – 96			6
	97 – 112			7
	113 – 128			8
	257 – 288	F	Analog Output	1
	289 – 320			2
	321 – 352			3
	353 – 384			4
	385 – 416			5
	417 – 448			6
	449 – 480			7
	481 – 512			8

### ■ DATA TYPE

I: Integer, 0 – 10000 (0 – 100%)

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

Note: DO NOT access addresses other than the ones mentioned above. Such access may cause problems such as malfunction.

### • Module Status

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

## TRANSMISSION DATA DESCRIPTIONS

Use the DIP SW located at the side of the module to specify module allocation.

1 module is equivalent to 1 I/O module with 16 words analog input and 16 words analog output. Max. 8 modules (128 words input, 128 words output) transmission is available. R3-GM1 seems as if max. 8 I/O modules are mounted to 8 slots via Modbus. The input of the module is processed as follows.

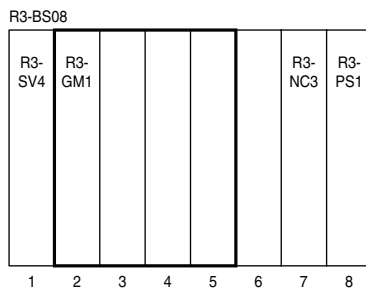
Modbus Communication --> R3-GM1 Module --> R3 Base --> R3 Communication Module

In responding to the input, the output (Holding Register) command becomes valid via Modbus communication, and the input (Input Register) command is valid in the output.

Note: Do not mount any modules in the slots which are occupied by virtual modules. If a real I/O module is mounted in the slot, an internal bus error occurs. Max. 16 real I/O modules and virtual modules are available. The interface module can not read the data for more than 16 modules.

### ■ WHEN R3-GM1 IS MOUNTED ON SLOT NO. 2 (4 modules)

Real I/O modules are mounted on Slots No. 1 and 2, however, the network module (R3-NC3) recognizes that each of Slots No. 1 to 5 is occupied. That is, R3-NC3 recognizes R3-SV4 mounted on Slot No.1 as it is and recognizes R3-GM1 mounted on Slot No.2 as divided into four modules and occupying Slots No. 2 to 5.

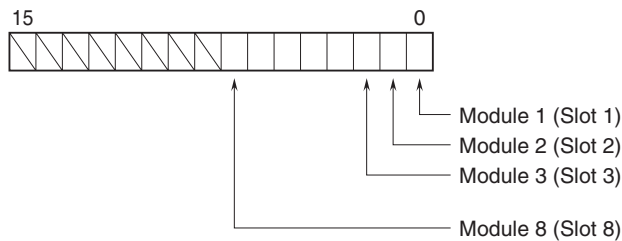


SLOT	REAL MODULE	VERTUAL MODULE	NO. OF WORDS
Slot No.1	R3-SV4	R3-SV4	4 Words
Slot No.2	R3-GM1	R3-GM1 (1/4)	16 Words
Slot No.3	No module	R3-GM1 (2/4)	16 Words
Slot No.4	No module	R3-GM1 (3/4)	16 Words
Slot No.5	No module	R3-GM1 (4/4)	16 Words
Slot No.6	No module	No module	----
Slot No.7	R3-NC3	R3-NC3	----
Slot No.8	R3-PS1	R3-PS1	----

## I/O DATA DESCRIPTIONS

### ■ MODULE STATUS, DATA ERROR STATUS

Shows each module's availability and error status.

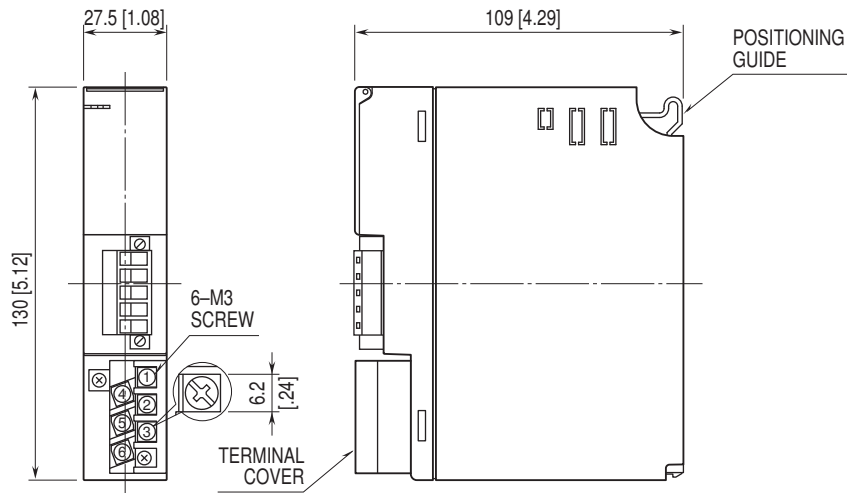


### ■ ANALOG DATA

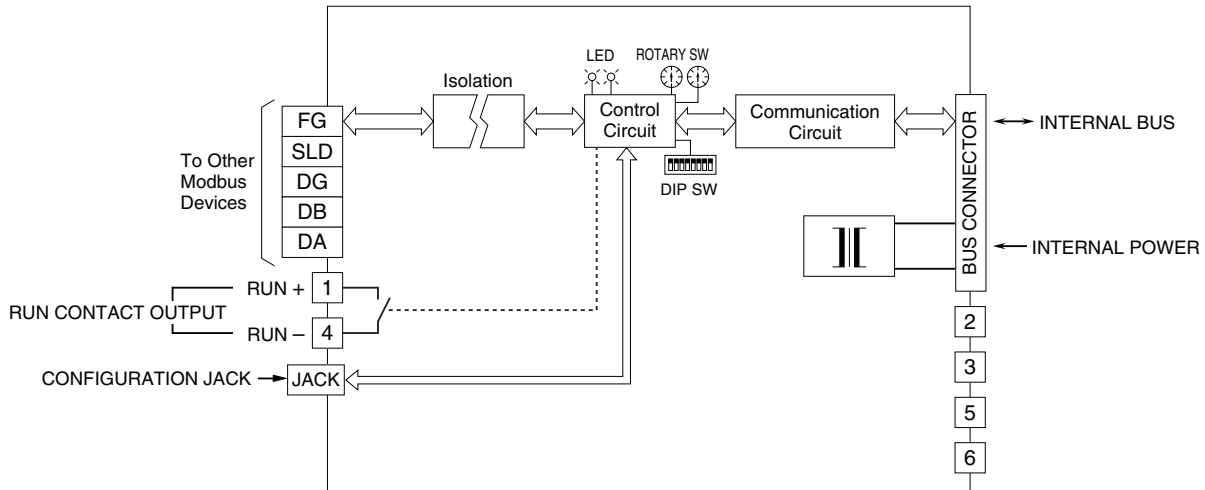
16-bit binary data.



## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]

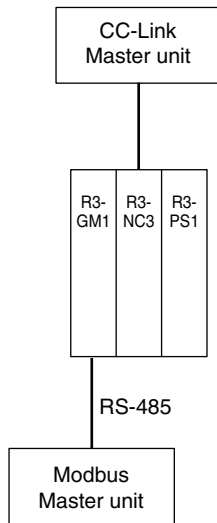


## SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



## SYSTEM CONFIGURATION EXAMPLES

In the following system configuration, Modbus data is converted to CC-Link data via this unit which is used as a gateway.



Specifications are subject to change without notice.