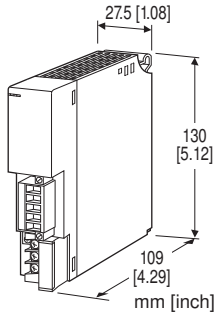
Remote I/O R3 Series

MODBUS GATEWAY MODULE

(master function, communication distance: 2 km supported)



CE

MODEL: R3-GMM1-[1][2]

ORDERING INFORMATION

• Code number: R3-GMM1-[1][2]

Specify a code from below for each of [1] and [2].
(e.g. R3-GMM1-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 ±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

CAUTION

This unit cannot be used in combination with anything other than the Ethernet interface module (model: R3-NE2).
Up to four R3-GMM1 can be installed and used on the same base.
If you install anything other than R3-NE2 or R3-GMM1, the system will not operate normally.
Set node address as the unit uses the node address.
If address 0 is used for broadcast communication in the system where the unit is installed, do not use address 0.
The connected device must be R3-NM5 for communication distance of 2 km.
A communication distance of 2 km has been confirmed for 1 -to-1 communication at baud rate of 57.6 kbps by using CPEV-0.9 transmission media.
If other devices are connected, the communication distance may not reach 2 km.
Depending on the wiring conditions or the connected devices, connection may not be possible unless the baud rate is reduced.

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^2,
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 (standard) or stainless steel

Usable address range

• R3-GMM1[1]: 0 to 63 *
• R3-GMM1[2]: 64 to 127
• R3-GMM1[3]: 128 to 191
• R3-GMM1[4]: 192 to 247

The usable address range for R3-GMM1 is fixed.
By setting R3-GMM1 address within the addresses specified in [1] to [4], the usable address range can be used.
* When the address 0 is used for broadcast communication,

MG CO., LTD.
www.mgco.jp

0 cannot be used.
Use address 1 or higher.
Note that R3-GMM1 cannot connect to addresses outside the usable address range.
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 side DIP SW.
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 side DIP SW.
Output transmission stop signal
Indication selectable with side DIP SW.
Transmission enabling signal setting
Indication selectable with side DIP SW.

■ **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 ø = 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: 2×10^7 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 an interface module (model: R3-NM5).
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, 05, 15
Cache function supported commands: 01, 02, 03, 04
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; 00 – F7
(Address 0 cannot be used when it is used for the broadcast communication.)
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: ≥ 100 MΩ with 500 V DC
Dielectric strength: 1500 V AC @ 1 minute
(Modbus to internal bus or internal power to RUN contact output to FG)

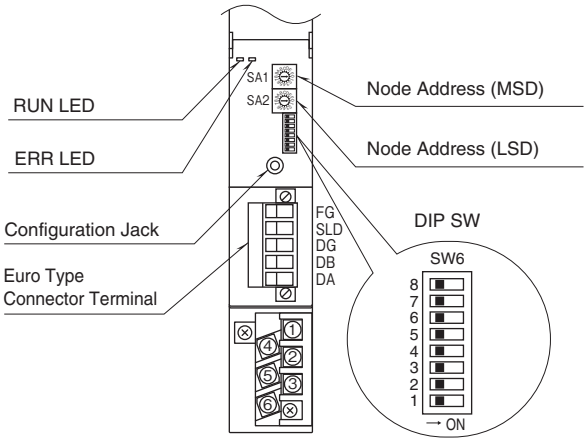
STANDARDS & APPROVALS

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

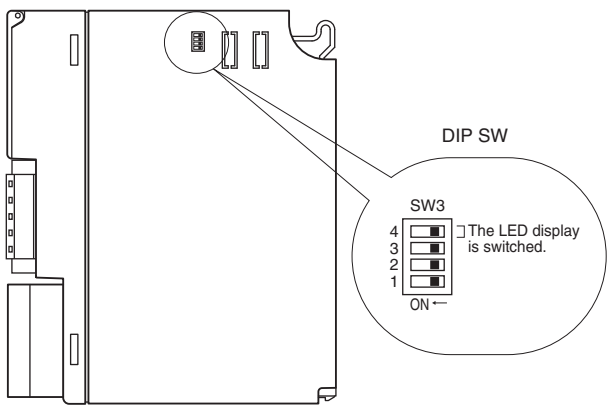
MG CO., LTD.
www.mgco.jp

EXTERNAL VIEW

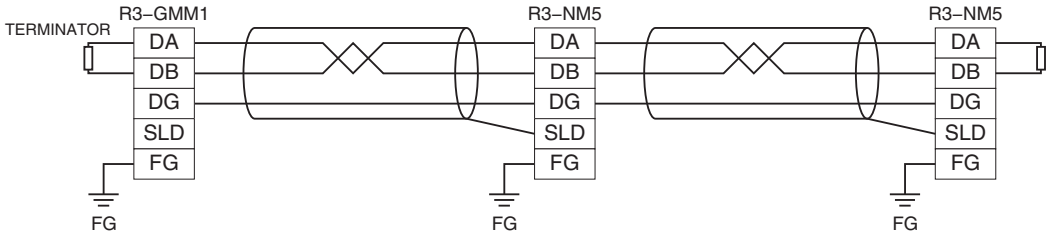
■ **FRONT VIEW**



■ **SIDE VIEW**



COMMUNICATION CABLE CONNECTIONS



MG CO., LTD.
www.mgco.jp

MODBUS FUNCTION CODES & SUPPORTED CODES

■ Data and Control Functions

CODE	NAME	
01	Read Coil Status	Read data with the address 1025
02	Read Input Status	Read the communication status of connected device When address is set to 00H - 3FH: Only data 1 - 64 is valid When address is set to 40H - 7FH: Only data 65 - 128 is valid When address is set to 80H - BFH: Only data 129 - 192 is valid When address is set to C0H - F7H: Only data 193 - 247 is valid
05	Force Single Coil	Write data with the address 1025
15	Force Multiple Coils	Write data with the address 1025

■ Exception Code

CODE	NAME	
01	Illegal Function	Unsupported function code
02	Illegal Data Address	Unsupported register address
03	Illegal Data Value	Receiving error
05	Acknowledge	Input data is not confirmed
07	Negative Acknowledge	Receiving Modbus command is rejected
101	Resource Overflow	Modbus command registration area overflow

■ Cache function

The device periodically communicates with lower-level devices regardless of whether there are requests from the host (Host PC, etc.) and stores data in the cache area. When a request is received from the host, high-speed response is possible by returning data from the cache area.

Cache function supports the following functions:
Read Coil Status（01）
Read Input Status（02）
Read Holding Registers (03)
Read Input Registers (04)

Function codes for writing: 05, 06, 15, 16 are temporarily cached, but the cache is deleted after writing is complete.

MG CO., LTD.
www.mgco.jp

MODBUS I/O ASSIGNMENT

The Modbus I/O assignment of the device is as follows.
For the Modbus I/O assignment of the device to be connected, refer to the operation manual for each device.

		ADDRESS	DATA TYPE	DATA
Coil (0X)		1025	Bit	Transmission enabling signal
Input (1X)	R3–GMM1 (1)	1 – 64	Bit	Slave information connected to R3–GMM1 (1)
	R3–GMM1 (2)	65 – 128	Bit	Slave information connected to R3–GMM1 (2)
	R3–GMM1 (3)	129 – 192	Bit	Slave information connected to R3–GMM1 (3)
	R3–GMM1 (4)	193 – 247	Bit	Slave information connected to R3–GMM1 (4)

R3–GMM1 (1) to (4) are determined by the address set by R3–GMM1.

■ DATA TYPE

Bit: Bit data
Note: Do not access addresses other than the above. Such access may cause problems such as inadequate operation.

1) Transmission Enabling Signal
Set whether to allow/stop the transmission of function codes to the connected device.
When the transmission is stopped, the data communication is not performed.

TRANSMISSION ENABLING SIGNAL	OPERATION
1	Function code transmission is enabled. Green RUN LED turns on. RUN contact is ON.
0	Function code transmission is stopped. RUN LED turns off. RUN contact is OFF.

The transmission enabling signal operates differently depending on the communication section when an error occurs during communication.

COMMUNICATION ERROR SECTION	OPERATION
Host PC to R3-NE2 to R3-GMM1	Becomes 0 after the communication timeout period.
R3-GMM1 to R3-NM5 (slave)	“1” continues.

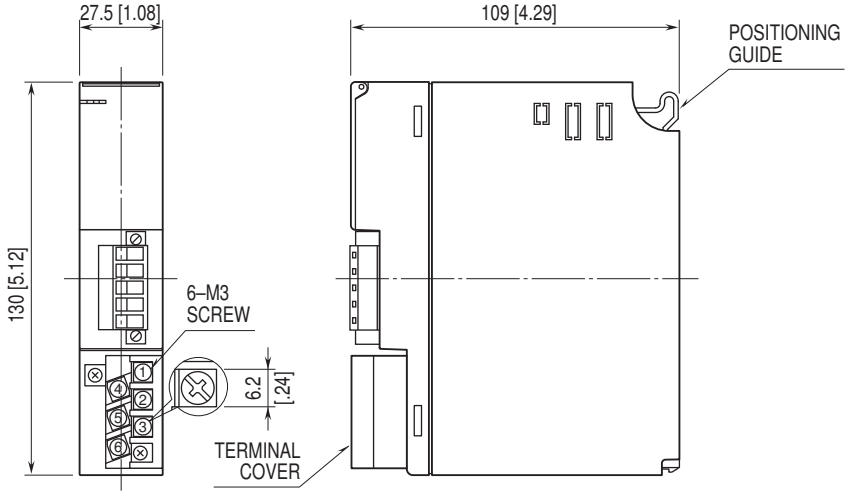
When connecting 2 or more R3-GMM1 on the same network, consider the above operation and be careful to ensure that the commands of each R3-GMM1 do not collide on the network.

2) Device information
The communication status of the connected device is indicated.
Regarding R3–GMM1, data only within the usable address range of its own station can be confirmed.

DEVICE INFORMATION	STATUS
1	Normal communication with the device of the corresponding address
0	No communication with the device of the corresponding address

MG CO., LTD.
www.mgco.jp

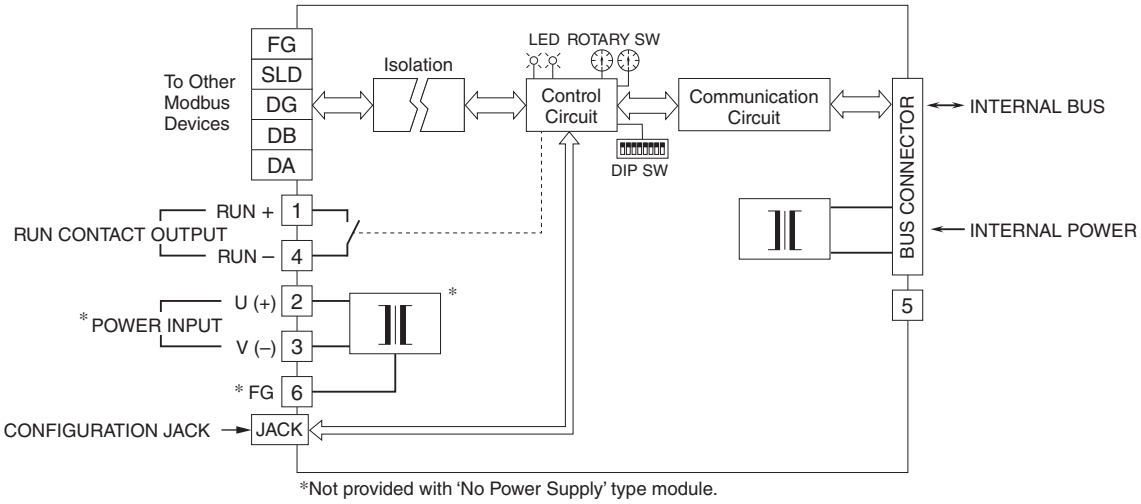
EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm [inch]



SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM

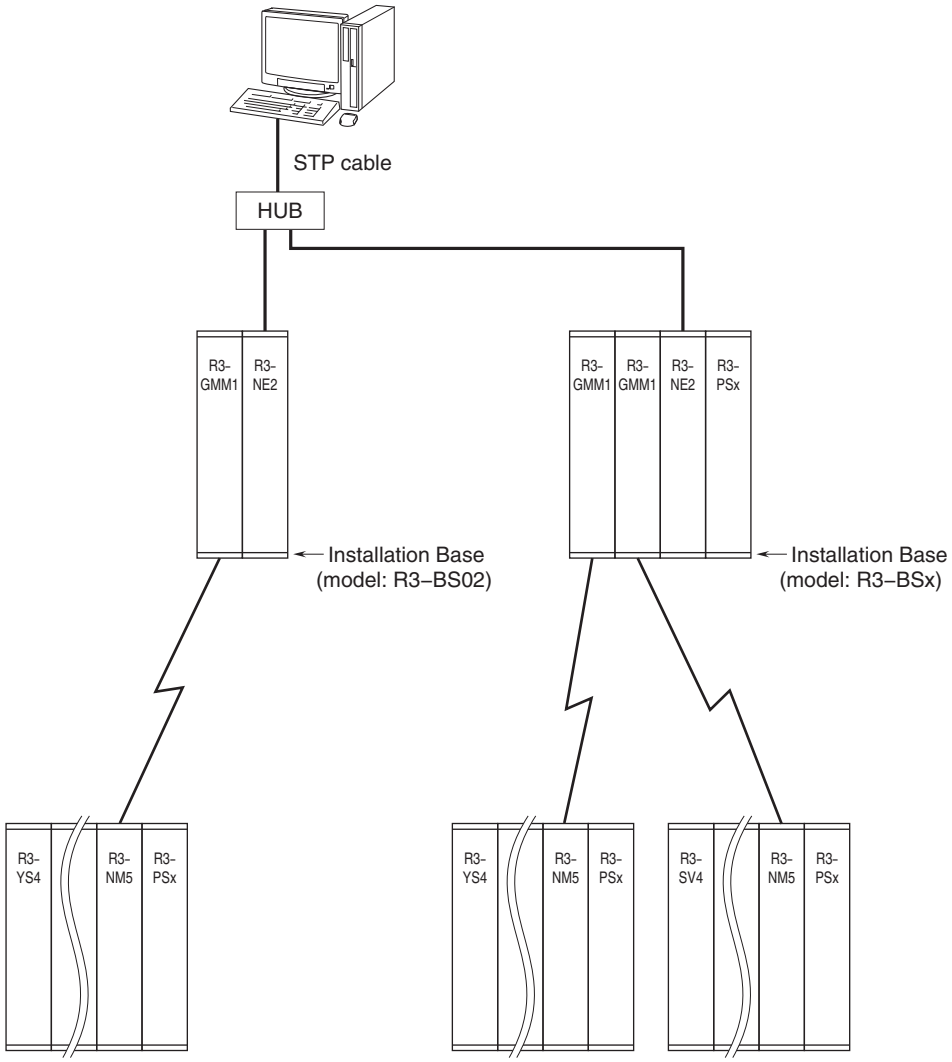
Note: In order to improve EMC performance, bond the FG terminal to ground.

Caution: FG terminal is NOT a protective conductor terminal.



MG CO., LTD.
www.mgco.jp

SYSTEM CONFIGURATION EXAMPLES



In configuration using R3-BS02, use R3-NE2 or R3-GMM1 with power supply.

⚠ Specifications are subject to change without notice.

MG CO., LTD.
www.mgco.jp