

**ETHERNET INTERFACE MODULE
(Modbus/TCP)**

MODEL **R3-GE1**

BEFORE USE

Thank you for choosing M-System. 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 M-System's Sales Office or representatives.

■ PACKAGE INCLUDES:

Network interface module(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 the instrument panel of a metal enclosure.
- 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.

■ HOT SWAPPABLE MODULES

- The module can be replaced while the power is ON. Be sure to replace it when the module is not communicating with a host, as it may affect the system. Replacing multiple modules at once may greatly change line voltage levels. We highly recommend to replace them one by one.

■ GENERAL PRECAUTIONS

- DO NOT set the switches on the module while the power is supplied. The switches are used only for maintenance without the power.

■ 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 apply physical impact to the unit.
- 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, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

INSTALLATION

Use the Installation Base Model: R3-BS, or Model: R3-BSW for free I/O address capability.

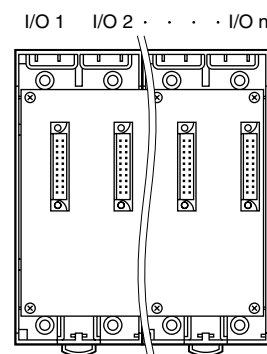
Before mounting the Network Interface Module R3-GE1 onto the base, be sure to configure the module as explained below.

■ MODULE ALLOCATION

Use the side DIP SW1 to set the number of slots which the module is assigned to.

See "TRANSMISSION DATA DESCRIPTIONS."

■ NETWORK SLOTS ON THE BASE



With Model R3-BS base, mount the I/O Modules from the left end (I/O 1) to the right in order that the Network Module assigns data areas from I/O 1.

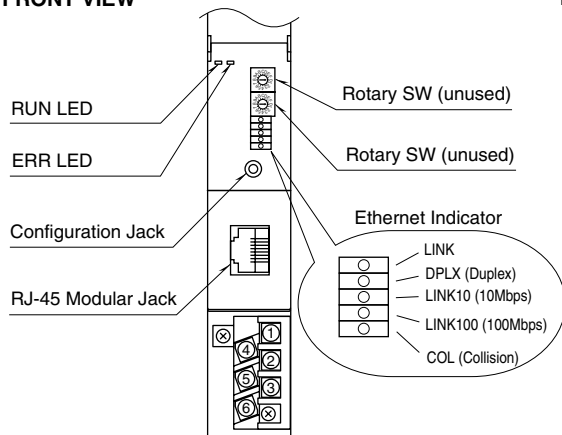
Network Module(s) and Power Module are mounted basically at the right end though technically they could be mounted in any position.

With Model R3-BSW base, there is no limitation in mounting positions as I/O address can be assigned freely to each module using rotary switches equipped on the base.

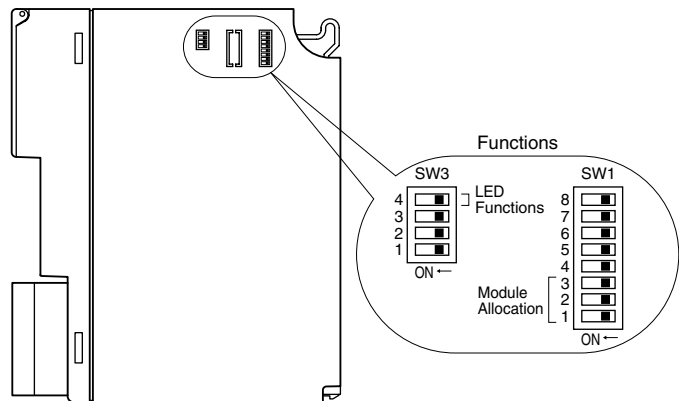
R3-GE1 occupies up to 16 slots. Be careful not to use the slot numbers occupied by this unit for real I/O modules to be mounted on the same base. Also, when mounting this unit, be careful about the slot position and the number of slots to be occupied so that any of the slot numbers will not be greater than 16. The Network module cannot read data for an I/O module assigned to slot No. 17 or later.

COMPONENT IDENTIFICATION

FRONT VIEW



SIDE VIEW



ETHERNET INDICATOR

ID	COLOR	FUNCTION
LINK	Red	ON at LINK
DPLX	Red	ON at full-duplex communication
LINK10	Red	ON at 10 Mbps connection
LINK100	Red	ON at 100 Mbps connection
COL	Red	Blink at collision

SIDE DIP SW

(*) Factory setting

Module Allocation: SW1-1, 1-2, 1-3

MODULE	SW1-1	SW1-2	SW1-3
1	OFF(*)	OFF(*)	OFF(*)
2	ON	OFF	OFF
3	OFF	ON	OFF
4	ON	ON	OFF
5	OFF	OFF	ON
6	ON	OFF	ON
7	OFF	ON	ON
8	ON	ON	ON

LED Function: SW3-4

Functions assigned to the front RUN and ERR LEDs can be selected.

SW3-4	LED FUNCTION	
	RUN	ERR
OFF(*)	Green turns ON when Modbus/TCP communication is normal and fieldbus communication on the R3 Network module side is also normal	Green turns ON/blinks in communication errors (OFF with wire breakdown; Green blinks with setting errors)
ON	Red turns ON when receiving data	Red turns ON when transmitting data

Note: Be sure to set unused SW1-4 through 1-8 and SW3-1 through 3-3 to OFF.

PC CONFIGURATOR

With the configurator software (model: R3CON), parameters shown below are configurable. Refer to the users manual of R3CON for detailed operation.

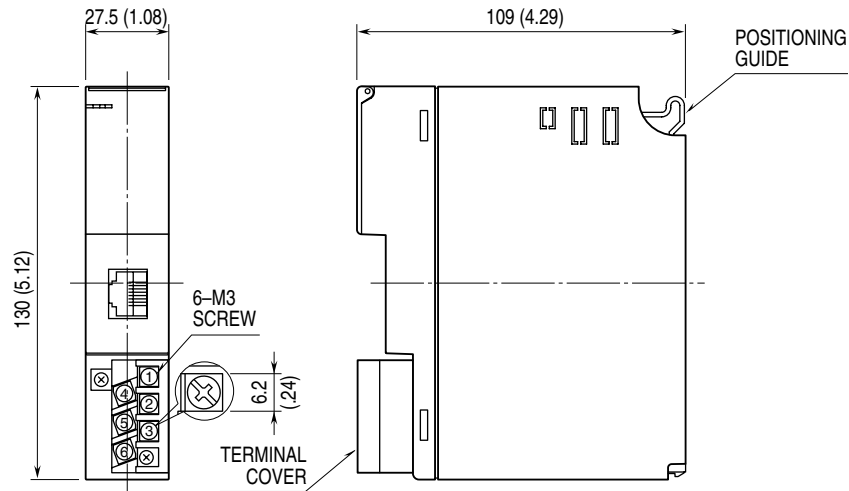
INTERFACE SETTING

PARAMETER	SETTING RANGE	DEFAULT SETTING
Time	0.2 – 3200.0 (sec.)	3.0 (sec.)
IP Address	0.0.0.0 – 255.255.255.255	192.168.0.1
Subnet Mask	0.0.0.0 – 255.255.255.255	255.255.255.0
TCP Socket: Port1 to Port4	0 – 32767	502
Linger: 1 to 4	0.0 – 3276.7 (sec.)	180.0 (sec.)

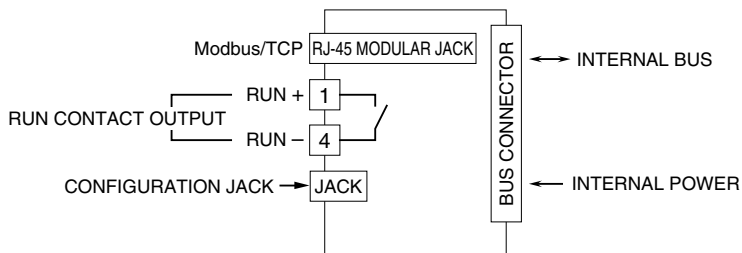
TERMINAL CONNECTIONS

Connect the unit as in the diagram below.

EXTERNAL DIMENSIONS unit: mm (inch)



CONNECTION DIAGRAM



WIRING INSTRUCTIONS

M3 SCREW TERMINAL

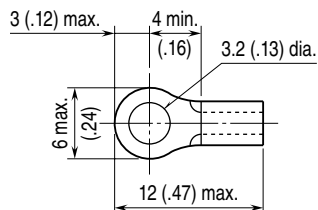
Torque: 0.5 N·m

SOLDERLESS TERMINAL unit: mm (inch)

Refer to the drawing below for recommended ring tongue terminal size. Spade tongue type is also applicable. Solderless terminals with insulation sleeve do not fit.

Applicable wire size: 0.75 – 1.25 mm²

Recommended manufacturer: Japan Solderless Terminal MFG. Co.,Ltd., Nichifu Co.,Ltd.



CHECKING ETHERNET CONNECTION

■ IP ADDRESS

The R3-GE1 does not support BootP Table Software. The IP Address and Subnet Mask can be configured by using the R3CON Configurator Software.

The Modbus/TCP Port No. is fixed to 502.

■ DATA ALLOCATION

Set data allocation by using the side DIP SW1. This setting specifies that how many slots the module is assigned to. Based on the setting, the data areas are allocated to the related slots.

■ WIRING

Connect an Ethernet cable to the front RJ-45 jack.

■ CHECK LED

When wiring is correct, LINK and LINK10, or LINK and LINK100 are turned on.

When the module is receiving or sending data, LINK10 or LINK100 blinks.*

* ON for firmware version V1.00 or later

■ CHECK R3-GE1 CONNECTION

Enter “ping” command on the Windows MS-DOS prompt as follows:

```
C:\WINDOWS>ping ***.***.***.***
(***.***.***.***: Enter IP address in decimal.)

ping ***.***.***.*** with 32 bytes of data:
Reply from ***.***.***.*** : bytes=32 time<10ms TTL=64
Reply from ***.***.***.*** : bytes=32 time<10ms TTL=64
Reply from ***.***.***.*** : bytes=32 time<10ms TTL=64
Reply from ***.***.***.*** : bytes=32 time<10ms TTL=64

Ping statistics for ***.***.***.***
Packets: Sent=4, Received=4, Lost=0(0% loss)
```

When the connection is normal, the replies are as shown above. When the connection fails due to a problem such as a wrong IP address, the reply will be something else, e.g. “time over.”

■ CHECK CONNECTION TO THE APPLICATION SOFTWARE

Check Point 1: LINK LEDs

When a normal connection is established, the front LINK and LINK10 or LINK100 are turned on regardless of data sending/receiving status. Check power supply to the hub in case that these LEDs are not on.

Check Point 2: RUN Indicator LED

When the side DIP SW3-4 is set to OFF, the RUN Indicator LED turns to Green if R3-GE1 and R3 communication interface module send/receive data in normal.

Check Point 3: Sending/Receiving Indicators

When the side DIP SW3-4 is set to ON, the RUN Indicator LED turns to Red in data receiving, and the ERR Indicator LED turns to Red in data sending. In normal operating conditions, these LEDs may seem to blink at once due to the high speed transmission.

MODBUS FUNCTION CODES & SUPPORTED CODES

■ Data and 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 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

	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

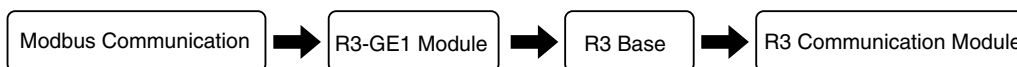
Module Status indicates whether individual I/O module is mounted or not. The bit corresponding to the mounted slot turns to “1,” and the unmounted slot to “0.”

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-GE1 seems as if max. 8 I/O modules are mounted to 8 slots via Modbus/TCP.

The input of the module is processed as follows.



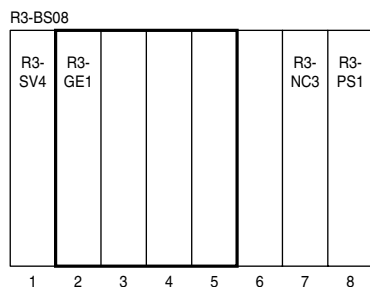
In responding to the input, the output (Holding Register) command becomes valid via Modbus/TCP communication, and the input (Input Register) command is valid in the output.

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 and the ERR LED turns on. 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-GE1 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-GE1 mounted on Slot No.2 as divided into four modules and occupying Slots No. 2 to 5.

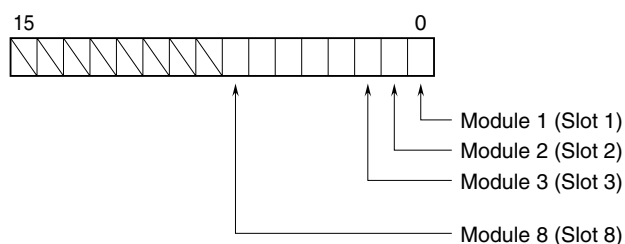


SLOT	REAL MODULE	VIRTUAL MODULE	NO. OF WORDS
Slot No. 1	R3-SV4	R3-SV4	4 Words
Slot No. 2	R3-GE1	R3-GE1 (1/4)	16 Words
Slot No. 3	No module	R3-GE1 (2/4)	16 Words
Slot No. 4	No module	R3-GE1 (3/4)	16 Words
Slot No. 5	No module	R3-GE1 (4/4)	16 Words
Slot No. 6	No module	No module	----
Slot No. 7	R3-NC3	R3-NC3	----
Slot No. 8	R3-PS1	R3-PS1	----

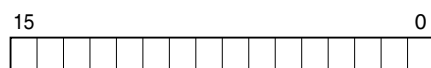
INPUT/OUTPUT DATA

■ MODULE STATUS

Module Status indicates whether individual I/O module is mounted or not, normal or not.



■ ANALOG INPUT/OUTPUT DATA



16 bits binary data