ETHERNET INTERFACE MODULE
(Modbus/TCP, for 64-point analog signals)

MODEL **R6-NE2**

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 a panel.
• Install lightning surge protectors for those wires connected to remote locations.
• Insert a noise filter for the communication line connected to the unit. NEC TOKIN Model ESD-SR-250 or equivalent is recommended.
• 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 INSERTION/REMOVAL OF MODULES

• It is possible to replace the module with the power is supplied. Be sure to replace it when the module is not communicating with a host, as it is possible to affect the system. However, replacing multiple modules at once may greatly change line voltage levels. We recommend that you replace them one by one.

■ GENERAL PRECAUTIONS

• Do not set the DIP switch on the side panel while the power is supplied. The DIP switch is selectable 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 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, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

INSTALLATION

Use the Base Model R6x-BSA or R6x-BSB.

Before mounting the Network Interface Module onto the Base, be sure to configure the module as explained below.

■ DATA ALLOCATION

The setting determines the data area size assigned to each I/O module mounted on the base.
The data sent/received via Modbus is mapped according to this setting.
In order to use the second channel of analog I/O modules, choose the Mode 2. (The 2nd channel cannot be sent/received in the Mode 1.)
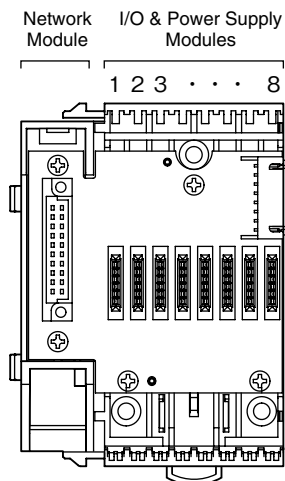See "COMPONENT IDENTIFICATION."

■ NETWORK SLOTS ON THE BASE

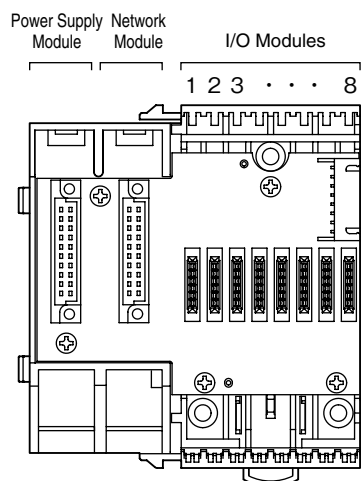Mount the Network Module to the dedicated slot on the base.

• R6x-BSA

The I/O and the power (model: R6x-PF1) modules can be positioned freely on whichever among the slots 1 through 8. Set a module address to each I/O module.

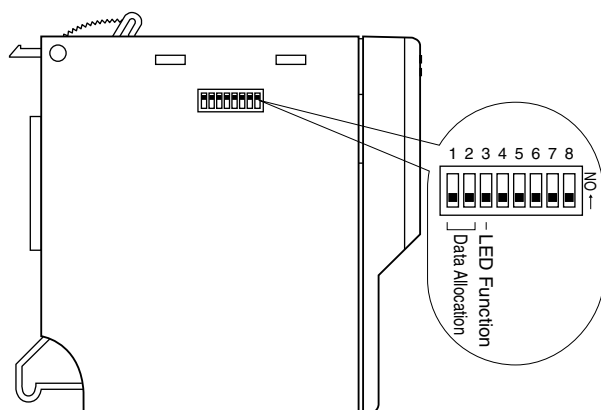

• R6x-BSB

The power module (model: R6-PSM) should be located on the extreme left, the I/O modules can be positioned freely on whichever among the slots 1 through 8. Set a module address to each I/O module.
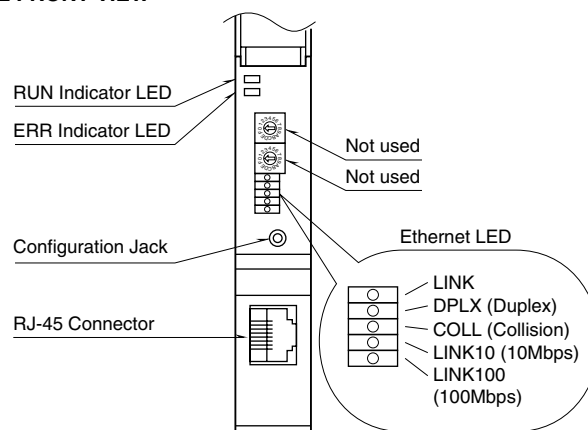
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COMPONENT IDENTIFICATION

■ SIDE VIEW

■ FRONT VIEW

RUN Indicator LED
ERR Indicator LED
Not used
Not used
Configuration Jack
Ethernet LED
RJ-45 Connector
LINK
DPLX (Duplex)
COLL (Collision)
LINK10 (10Mbps)
LINK100 (100Mbps)

■ SIDE DIP SW

(*) Factory setting

• Data Allocation Mode: SW1, SW2

DATA ALLOCATION MODE	SW1	SW2
1	■	
2 (*)		

■ = ON, Blank = OFF

• LED Function: SW3

LED FUNCTION	SW3
RUN: Green ON in normal communications (*) ERR: Green ON/blinks in an abnormality	
RUN: Red ON when receiving ERR: Red ON when transmitting	■

■ = ON, Blank = OFF

Note: Be sure to set unused SW4 through 8 to OFF.

■ ETHERNET INDICATORS

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

PC CONFIGURATOR

With configurator software, settings shown below are available.
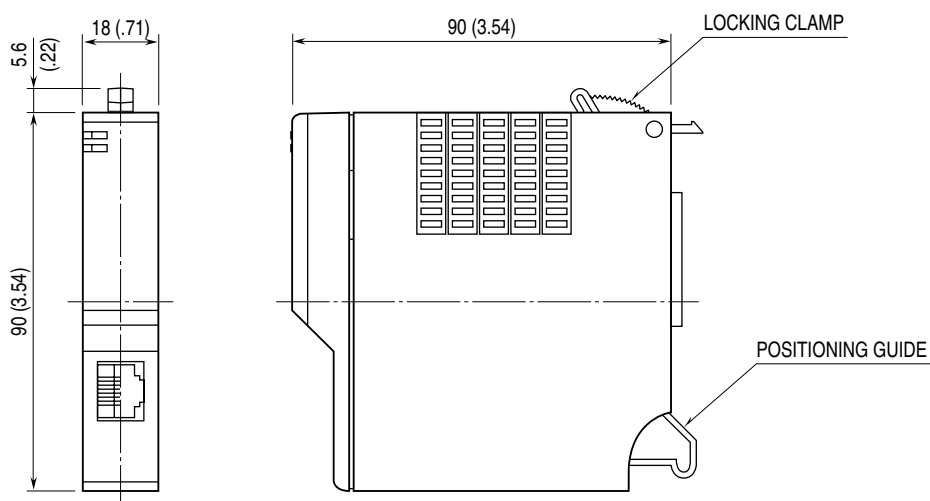Refer to the software manual of R6CON for detailed operation.

■ INTERFACE MODULE SETTING

PARAMETER	AVAILABLE RANGE	DEFAULT SETTING
Communication Failure Detection Time	0.2 – 3200.0 (sec.)	3.0 (sec.)
IP address	255.255.255.255	192.168.0.1
Port 1	0 – 32767	502
Port 2	0 – 32767	502
Port 3	0 – 32767	502
Port 4	0 – 32767	502
TCP connection close time 1	1.0 – 3200.0 (sec.)	180.0 (sec.)
TCP connection close time 2	1.0 – 3200.0 (sec.)	180.0 (sec.)
TCP connection close time 3	1.0 – 3200.0 (sec.)	180.0 (sec.)
TCP connection close time 4	1.0 – 3200.0 (sec.)	180.0 (sec.)
Card map	00000000 to FFFFFFFF	FFFFFFFF

TERMINAL CONNECTIONS

Connect the unit as in the diagram below.

■ EXTERNAL DIMENSIONS unit: mm (inch)

18 (.71)

5.6 (.22)

90 (3.54)

90 (3.54)

LOCKING CLAMP

POSITIONING GUIDE

■ CONNECTION DIAGRAM

Modbus/TCP

RJ-45 CONNECTOR

BUS CONNECTOR

INTERNAL BUS

INTERNAL POWER

CONFIGURATION JACK

JACK

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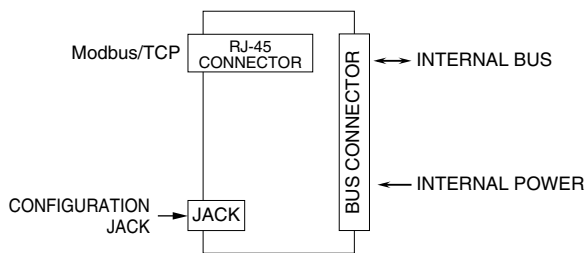
CHECKING ETHERNET CONNECTION

■ IP ADDRESS

The R6-NE2 does not support BootP Table Software. The IP Address and Subnet Mask can be configured using the R6CON Configurator Software.
The Modbus/TCP Port No. is fixed at 502.

■ DATA ALLOCATION MODE

The Data Allocation Mode is usually set to '2' with the side DIP switches. Setting '1' is used only when all the I/O modules on the base are for Data Allocation Mode 1. This setting affects analog I/O data allocations.

■ CHECK WIRING

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

■ 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.*
* LEDs are turned ON for firmware version V2.02 or later.

■ CHECK R6-NE2 CONNECTION

Enter "ping command" on the Windows MS-DOS 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)

Replies in case of normal connection are as shown above. If the connection cannot be established normally due to e.g. wrong IP address, other replies such as 'timeout' will be received.

■ CHECK CONNECTION TO THE APPLICATION SOFTWARE

Check Point 1: LINK LEDs

When 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 switch/hub in case that these LEDs are not on.

Check Point 2: RUN Indicator LED

With the side DIP SW3 is set to OFF, a green LED turns on at the RUN Indicator LED in normal data sending/receiving.

Check Point 3: Sending/Receiving Indicators

With the side DIP SW3 is set to ON, a red LED turns on at the RUN Indicator LED in data receiving, and a red LED turns on at the ERR Indicator LED 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	X	Digital output from the slave (read/write)
02	Read Input Status	X	Status of digital inputs to the slave (read only)
03	Read Holding Registers	X	General purpose register within the slave (read/write)
04	Read Input Registers	X	Collected data from the field by the slave (read only)
05	Force Single Coil	X	Digital output from the slave (read/write)
06	Preset Single Registers	X	General purpose register within the slave (read/write)
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 (read/write)
16	Preset Multiple Registers	X	General purpose register within the slave (read/write)
17	Report Slave ID		
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.
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."

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 – 4
	17 – 32	Module address 1	Do 1 – 4
	33 – 48	Module address 2	Do 1 – 4
	49 – 64	Module address 3	Do 1 – 4
	:	:	:
	497 – 512	Module address 31	Do 1 – 4
Inputs (1X)	1 – 16	Module address 0	Di 1 – 4
	17 – 32	Module address 1	Di 1 – 4
	33 – 48	Module address 2	Di 1 – 4
	49 – 64	Module address 3	Di 1 – 4
	:	:	:
	497 – 512	Module address 31	Di 1 – 4
	513 – 544	Active module map	
	545 – 560	Status	
	561 – 624	Channel 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)
	:	:	:
	95, 96	Module address 31	Ai 1 (Float)
Holding Registers (4X)	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

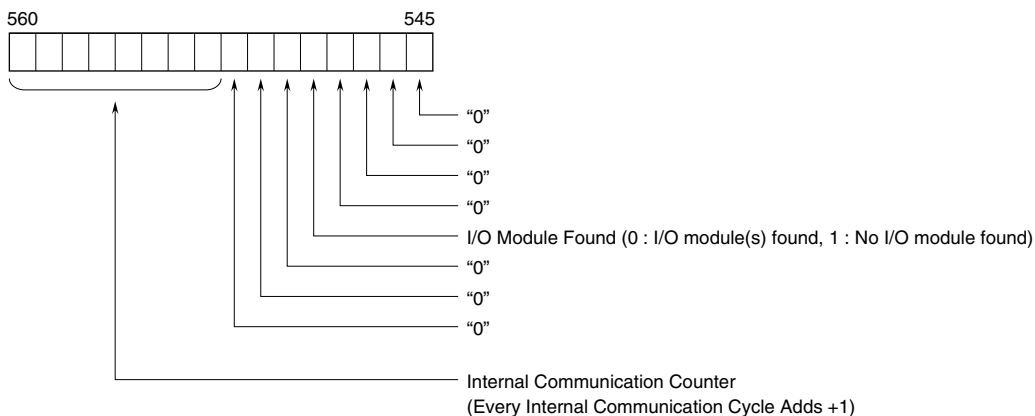| Input Registers (3X)	1	Module address 0	Ai 1 (INT)
	2	Module address 0	Ai 2 (INT)
	3	Module address 1	Ai 1 (INT)
	4	Module address 1	Ai 2 (INT)
	:	:	:
	63	Module address 31	Ai 1 (INT)
	64	Module address 31	Ai 2 (INT)
	65, 66	Module address 0	Ai 1 (Float)
	67, 68	Module address 0	Ai 2 (Float)
	69, 70	Module address 1	Ai 1 (Float)
	71, 72	Module address 1	Ai 2 (Float)
	:	:	:
	189, 190	Module address 31	Ai 1 (Float)
	191, 192	Module address 31	Ai 2 (Float)
Holding Registers (4X)	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 the slots where I/O modules are mounted. When the module is mounted, the corresponding bit turns to "1."

```
544                                    513
┌─┬─┬─┬─┬─┬─┬─┐ ┌─┬─┬─┬─┬─┬─┬─┬─┐
└─┴─┴─┴─┴─┴─┴─┘ └─┴─┴─┴─┴─┴─┴─┴─┘
```

- Module address 0
- Module address 1
- Module address 2
- Module address 31
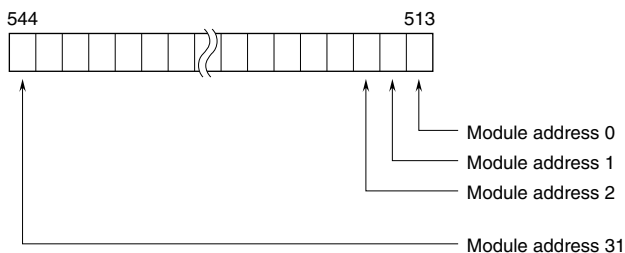
■STATUS

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

```
560                                    545
┌─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┐
└─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┘
```

- "0"
- "0"
- "0"
- "0"
- I/O Module Found (0 : I/O module(s) found, 1 : No I/O module found)
- "0"
- "0"
- "0"
- Internal Communication Counter
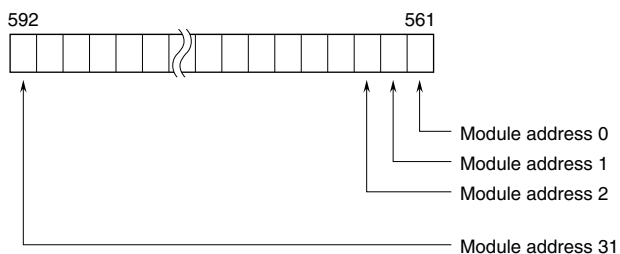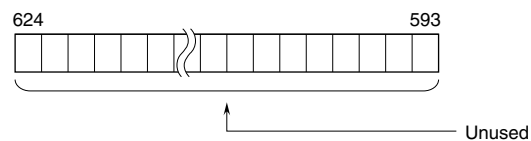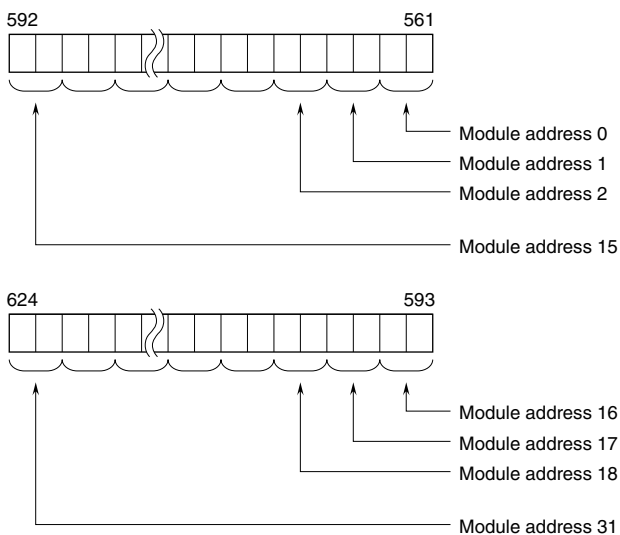 (Every Internal Communication Cycle Adds +1)

■CHANNEL STATUS

Analog input modules check high/low limits and ADC. When there is an error in one or more channels, the bit corresponding to the channels turns to "1."

DC current output modules check output wire breakdown to alert as an error. The bit corresponding to the channels turns to "1."

• Data Allocation Mode 1

```
592                            561
┌─┬─┬─┬─┬─┬─┬─┐ ┌─┬─┬─┬─┬─┬─┬─┬─┐
└─┴─┴─┴─┴─┴─┴─┘ └─┴─┴─┴─┴─┴─┴─┴─┘
```

- Module address 0
- Module address 1
- Module address 2
- Module address 31

```
624                            593
┌─┬─┬─┬─┬─┬─┬─┐ ┌─┬─┬─┬─┬─┬─┬─┬─┐
└─┴─┴─┴─┴─┴─┴─┘ └─┴─┴─┴─┴─┴─┴─┴─┘
```

- Unused

• Data Allocation Mode 2

```
592                            561
┌─┬─┬─┬─┬─┬─┬─┐ ┌─┬─┬─┬─┬─┬─┬─┬─┐
└─┴─┴─┴─┴─┴─┴─┘ └─┴─┴─┴─┴─┴─┴─┴─┘
```

- Module address 0
- Module address 1
- Module address 2
- Module address 15

```
624                            593
┌─┬─┬─┬─┬─┬─┬─┐ ┌─┬─┬─┬─┬─┬─┬─┬─┐
└─┴─┴─┴─┴─┴─┴─┘ └─┴─┴─┴─┴─┴─┴─┴─┘
```

- Module address 16
- Module address 17
- Module address 18
- Module address 31

In the Data Allocation Mode 2, the LSB is used for channel 1, and the MSB for channel 2, of an analog module.

I/O DATA DESCRIPTIONS

• 16-bit Analog Data

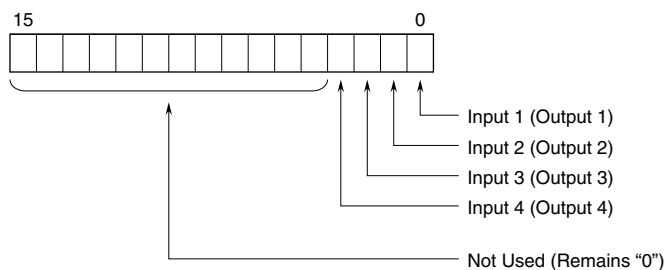0 to 100% of the selected I/O range is converted into 0 to 10000 (binary).

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.

Negative values are represented in 2's complements.

```
15                                    0
┌─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┐
│ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │
└─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┘
```

• Discrete Data

```
15                                    0
┌─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┐
│ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │
└─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┴─┘
```

Input 1 (Output 1)
Input 2 (Output 2)
Input 3 (Output 3)
Input 4 (Output 4)

Not Used (Remains "0")

0 : OFF
1 : ON