

**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:**

Strain gauge input module ..... (1)

**■ MODEL NO.**

Confirm that the model number described on the product is 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 DIRECTIVE**

- Use MECHATROLINK-II network cable with core (Yasukawa Controls Model JEPEC-W6003-x-E) or equivalent for the network.
- Be sure to earth FG terminal.
- The actual installation environments such as panel configurations, connected devices and 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 CE conformity.

**■ POWER INPUT RATING & OPERATIONAL RANGE**

- Locate the power input rating marked on the product and confirm its operational range as indicated below:  
24V DC rating: 24V  $\pm$ 10%, approx. 130mA

**■ GENERAL PRECAUTIONS**

- Before you remove the unit or mount it, turn off the power supply and input signal for safety.

**■ 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 0 to 55°C (32 to 131°F) with relative humidity within 30 to 90% RH in order to ensure adequate life span and operation.

**■ WIRING**

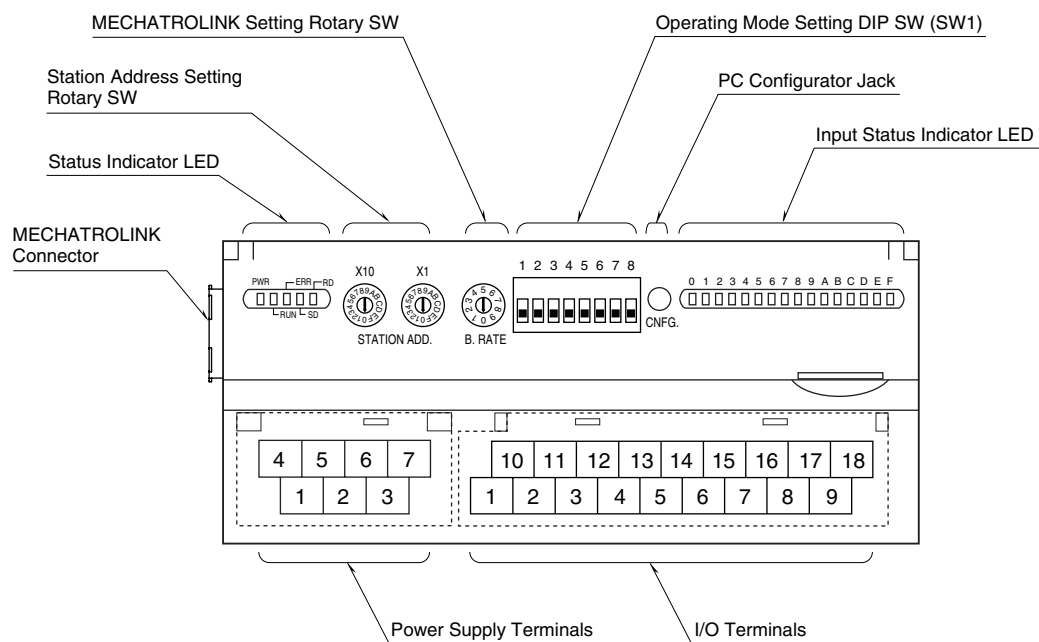
- Do not install cables close to noise sources (relay drive cable, high frequency line, etc.).
- Do not bind these cables together with those in which noises are present. Do not install them in the same duct.

**■ AND ....**

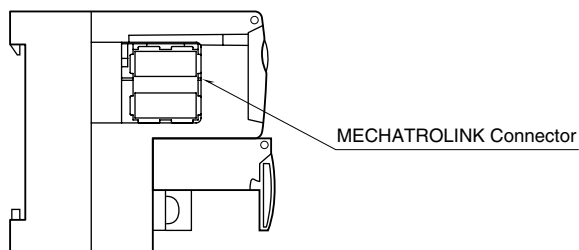
- The unit is designed to function as soon as power is supplied, however, a warm up for 10 minutes is required for satisfying complete performance described in the data sheet.

# COMPONENT IDENTIFICATION

## FRONT VIEW



## LEFT SIDE VIEW

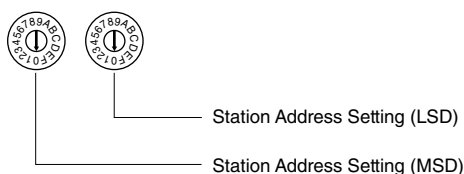


■ STATUS INDICATOR LED

LED	COLOR	EXPLANATION
PWR	Green	Turns on when the internal 5V is supplied normally.
RUN	Green	Turns on in normal communications conditions.
ERR	Red	Turns on in no communication or setting error.
SD	Green	Turns on when the module is transmitting.
RD	Green	Turns on when the module is receiving.

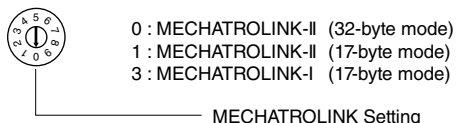
■ STATION ADDRESS

Station Address is selected between 60H and 7FH (Intel-  
ligent I/O) in hexadecimal. (Certain numbers may not be  
selectable depending on the master types. Refer to the  
instruction manual of the master unit.)  
The left switch determines the MSD, while the right switch  
does the LSD of the address.  
(Factory setting: 60H)



■ MECHATROLINK MODE

Choose MECHATROLINK-I or -II, and the data size. Posi-  
tions 2, 4 through 9 are unused.  
(Factory setting: 1)



■ EXTENSION MODULE

Combinations with any extension module is selectable.

■ OPERATING MODE

• Extension (SW1-1, 1-2)

SW1-1	SW1-2	Extension
OFF	OFF	No extension (*)
ON	OFF	Discrete input, 8 or 16 points
OFF	ON	Discrete output, 8 or 16 points

• Lowpass Filter (SW-1.3)

SW1-3	Lowpass filter
OFF	2 kHz (/F2K) / 1 Hz (/F1) (*)
ON	2 Hz

• Averaging (SW1-4, 1-5, 1-6, 1-7)

SW1-4	SW1-5	SW1-6	SW1-7	Averaging
OFF	OFF	OFF	OFF	2 samples (*)
ON	OFF	OFF	OFF	4 samples
OFF	ON	OFF	OFF	8 samples
ON	ON	OFF	OFF	16 samples
OFF	OFF	ON	OFF	32 samples
ON	OFF	ON	OFF	64 samples
OFF	ON	ON	OFF	128 samples
ON	ON	ON	OFF	256 samples
OFF	OFF	OFF	ON	512 samples
ON	OFF	OFF	ON	1024 samples

• Excitation Voltage (SW1-8)

SW1-8	Excitation Voltage
OFF	5 V (*)
ON	2.5 V

■ INPUT STATUS INDICATOR LED

Each input status indicator LED turns ON when:

- 0 : Input 0 automatic zero correction is set
- 1 : Input 0 zero adjustment is set
- 2 : Input 0 span adjustment is set
- 3 : Input 0 monitor output mode is set
- 4 : Input 0 reset offset is set
- 5 : Input 0 underflow is detected
- 6 : Input 0 normal input is received
- 7 : Input 0 overflow is detected
- 8 : Input 1 automatic zero correction is set
- 9 : Input 1 zero adjustment is set
- A : Input 1 span adjustment is set
- B : Input 1 monitor output mode is set
- C : Input 1 reset offset is set
- D : Input 1 underflow is detected
- E : Input 1 normal input is received
- F : Input 1 overflow is detected

■ I/O TERMINAL ASSIGNMENT

10	11	12	13	14	15	16	17	18
NC	+EXC0	+IN0	NC	V0	+EXC1	+IN1	NC	V1
1	2	3	4	5	6	7	8	9
NC	-EXC0	-IN0	SLD0	C0	-EXC1	-IN1	SLD1	C1

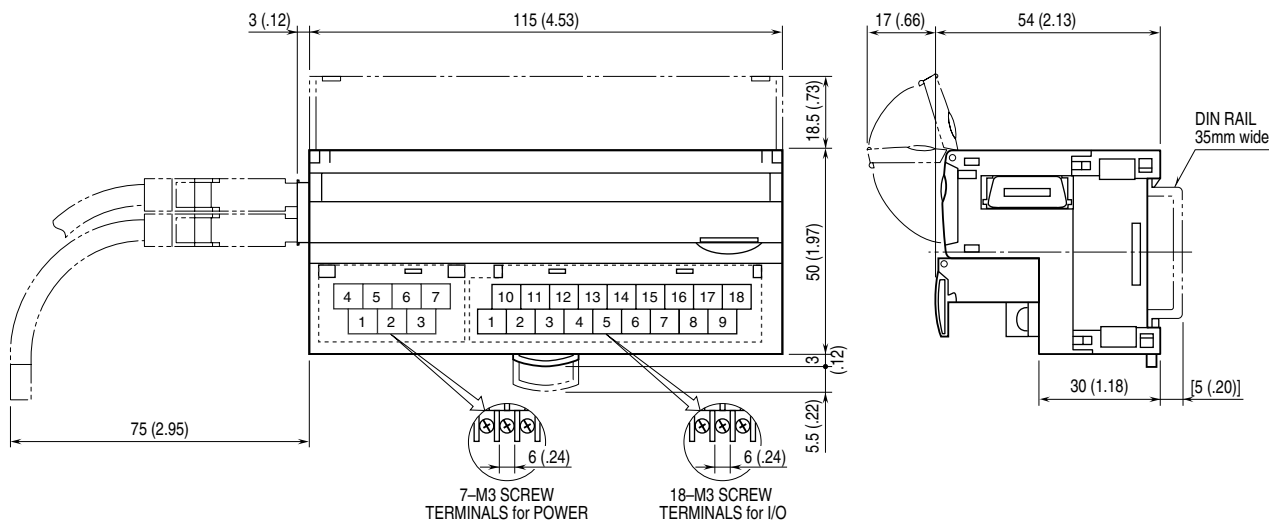
NO.	ID	FUNCTION	NO.	ID	FUNCTION
1	NC	No connection	10	NC	No connection
2	-EXC0	Excitation 0-	11	+EXC0	Excitation 0+
3	-IN0	Input 0-	12	+IN0	Input 0+
4	SLD0	Shield 0	13	NC	No connection
5	C0	Voltage output 0-	14	V0	Voltage output 0+
6	-EXC1	Excitation 1-	15	+EXC1	Excitation 1+
7	-IN1	Input 1-	16	+IN1	Input 1+
8	SLD1	Shield 1	17	NC	No connection
9	C1	Voltage output 1-	18	V1	Voltage output 1+

■ PC CONFIGURATOR

The PC Configurator is used to set the following parameters  
for each channel.

- Auto zero
- Zero adjustment
- Span adjustment
- Monitor output mode setting
- Clear offset

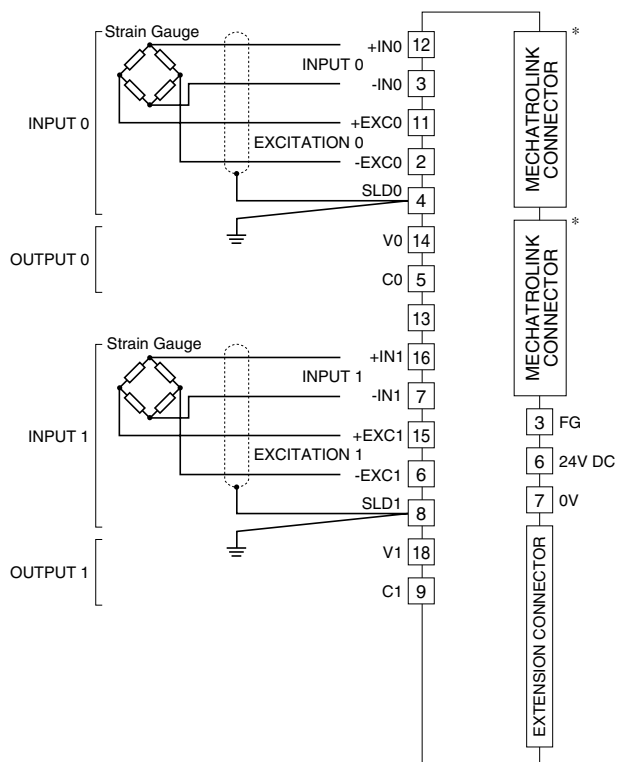
## EXTERNAL DIMENSIONS unit: mm (inch)



## CONNECTION DIAGRAM

Connect the unit as in the diagram below.

Note: In order to improve EMC performance, bond the FG terminal to ground.  
 Caution: FG terminal is NOT a protective conductor terminal.



\* MECHATROLINK connectors are internally connected.  
 The network cable can be connected to either one.

## WIRING INSTRUCTIONS

### ■ SCREW TERMINAL

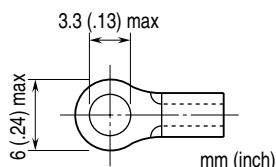
Torque: 0.5 N·m

### ■ SOLDERLESS TERMINAL mm (inch)

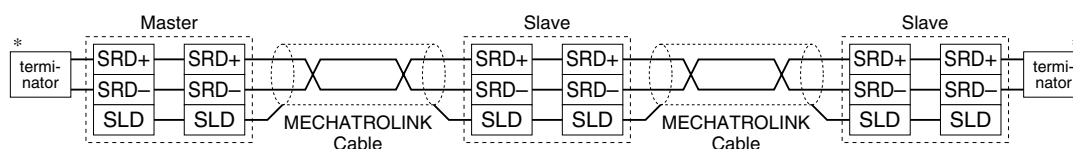
Refer to the drawing below for recommended ring tongue terminal size. Spade tongue type is also applicable. Solderless terminal:

Applicable wire size: 0.25 to 1.65 mm<sup>2</sup> (AWG 22 to 16)

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



## MECHATROLINK CONNECTION



\* Terminator

Be sure to connect the terminating resistors to the unit at both ends of transmission line.

Use the terminating resistor dedicated for MECHATROLINK: Model JEPMC-W6022, Yaskawa Controls Co., Ltd.

Certain types of Master units may have incorporated terminating resistors. Consult the instruction manual for the Master.

## MECHATROLINK COMMUNICATION

### ■ MECHATROLINK-I

**Baud rate:** 4 Mbps

**Transmission distance:** 50 m max.

**Distance between stations:** 30 cm min.

**Transmission media:** MECHATROLINK cable (Model JEPMC-W6003-x-E, Yaskawa Controls Co., Ltd.)

**Max. number of slaves:** 15 (The maximum number of slaves might change depending on the master unit. Refer to the manual of the master unit)

**Transmission cycle:** 2 msec. (fixed)

**Data length:** 17 byte

### ■ MECHATROLINK-II

**Baud rate:** 10 Mbps

**Transmission distance:** 50 m max.

**Distance between stations:** 50 cm min.

**Transmission media:** MECHATROLINK cable (Model JEPMC-W6003-x-E, Yaskawa Controls Co., Ltd.)

**Max. number of slaves:** 30 (The maximum number of slaves might change depending on the master unit. Refer to the manual of the master unit)

**Transmission cycle:** 0.5 msec., 1 msec., 1.5 msec., 2 msec., 4 msec., 8 msec.

**Data length:** 17 bytes / 32 bytes selectable (Must choose identical data size for all stations on one network)

## MECHATROLINK RELATED COMMANDS

Related commands are as follows.

Command of MECHATROLINK has a two-layer structure, which is composed of Data Link Layer (upper layer) and Application Layer (lower layer). All the Application Layer Commands are located in lower layer of Data Link Layer (CDRW).

	COMMAND NAME	COMMAND (hexadecimal)	DESCRIPTION
Data Link Layer Command	MDS	04H	Product type reading
	CDRW	03H	Data transmission
Application Layer Command	NOP	00H	Invalid
	ID_RD	03H	Product information reading
	CONNECT	0EH	Communication start with master
	DISCONNECT	0FH	Communication stop with master
	DATA_RWA	50H	I/O data update

### ■ DATA LINK LAYER COMMAND

#### • MDS (04H) Command Data Format

Reads product type

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
0	04H	90H	Product type reading
1	00H	00H	Reserved
2	00H	80H	Intelligent I/O
3 – 31	00H	00H	3 – 17 bytes at 17 bytes mode

#### • CDRW (03H) Command Data Format

Data transmission command is located in upper layer of Application Layer Command.

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
0	03H	90H	Data transmission
1	CMD	RCMD	CMD : Application Layer command RCMD : Response (Same value as Application Layer Command)
2	00H	ALARM	Error code (Refer to the following table)
3	00H	STATUS1	Transmission status (Refer to the following table)
4	0H	STATUS2	Reserved
5 – 31	XX	YY	Depend upon the Application Layer Command

#### • ALARM

Communication error codes at the slave are sent to the master

ERROR CODE (hexadecimal)	DESCRIPTION	CLASSIFICATION
00H	MECHATROLINK communication is in normal status	----
01H	Unsupported command is received.	Warning
02H	Command execution conditions are not met.	Warning
03H	Data in the command is not correct.	Warning
04H	Synchronization Error	Error

#### • STATUS1

The status of the slave is sent to the master in accordance with the classification of the error codes at ALARM.

Bit	DEFINITION	DESCRIPTION
0	Error Bit	1 : Error, 0 : Normal
1	Warning Bit	1 : Warning, 0 : Normal
2	Command Ready Bit	1 : Command can be accepted (ready), 0 : Command cannot be accepted (busy)
3 – 7	Unused	----

### ■ APPLICATION LAYER COMMAND

Application Layer Command is located in lower layer of Data Link Layer Command (CDRW). Following tables are details on bytes 5 through 31 dependent upon Application Layer Command.

Note : At 17 bytes mode, bytes dependant upon Application Layer Command are to be 5 through 17.

#### • NOP (00H) Command Data Format

0, which indicates invalid command, is sent to the master

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5 – 31	00H	00H	Invalid

#### • ID\_RD (03) Command Data Format

Reads product information. (max. 8 bytes at a time) Repeat reading multiple times in order to read out all the data.

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5	DEVICE_CODE	DEVICE_CODE	DEVICE_CODE : Selection of product information 00 : Product model (data length : 32 bytes) 02 : Product version (data length : 32 bytes) 0F : Vendor code (data length : 48 bytes)
6	OFFSET	OFFSET	OFFSET : Specify read position
7	SIZE	SIZE	SIZE : Specify length of read data (max. 8 bytes)
8 – 15	00H	ID	Product information data
16 – 31	00H	00H	Unused

#### • CONNECT (0EH) Command Data Format

Starts communication with the master

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5	VER	VER	MODE : Selection of MECHATROLINK version 10 : MECHATROLINK - I 21 : MECHATROLINK - II
6	COM_MODE	COM_MODE	COM_MODE : Selection of data length 00 : 17 bytes mode 80 : 32 bytes mode
7	COM_TIME	COM_TIME	COM_TIME : Communication cycle (milliseconds) MECHATROLINK-I: Multiples of two (2) MECHATROLINK-II: Integral multiples of the transmission cycle
8 – 31	00H	00H	Unused

#### • DISCONNECT (0FH) Command Data Format

Stops communication with the master .

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5 – 31	00H	00H	Unused

#### • DATA\_RWA (50H) Command Data Format

Transmits I/O data from/to the master. Data allocation is as follows.

##### • Discrete Input Unit

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5	00H	Discrete input data low 8 bit	
6	00H	Discrete input data high 8 bit	
7 – 12	00H	00H	Unused
13	Discrete output data of extension module low 8 bit	Discrete input data of extension module low 8 bit or echo back of set value at command area	
14	Discrete output data of extension module high 8 bit	Discrete input data of extension module high 8 bit or echo back of set value at command area	"0" for EA8 and EC8x
15 – 31	00H	00H	Unused

## • Discrete Output Unit

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5	Discrete output data low 8 bit	Echo back of set value at command area	
6	Discrete output data high 8 bit	Echo back of set value at command area	
7 – 12	00H	00H	Unused
13	Discrete output data of extension module low 8 bit	Discrete input data of extension module low 8 bit or echo back of set value at command area	
14	Discrete output data of extension module high 8 bit	Discrete input data of extension module high 8 bit or echo back of set value at command area	"0" for EA8 and EC8x
15 – 31	00H	00H	Unused

## • Analog 4-point Input Unit

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5	00H	Input 0 low 8 bit	
6	00H	Input 0 high 8 bit	
7	00H	Input 1 low 8 bit	
8	00H	Input 1 high 8 bit	
9	00H	Input 2 low 8 bit	
10	00H	Input 2 high 8 bit	
11	00H	Input 3 low 8 bit	
12	00H	Input 3 high 8 bit	
13	Discrete output data of extension module low 8 bit	Discrete input data of extension module low 8 bit or echo back of set value at command area	
14	Discrete output data of extension module high 8 bit	Discrete input data of extension module high 8 bit or echo back of set value at command area	"0" for EA8 and EC8x
15	00H	Status low 8 bit	See I/O data status
16	00H	Status high 8 bit	See I/O data status
17 – 31	00H	00H	Unused

## • Analog 2-point Output Unit

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5	Output 0 low 8 bit	Echo back of set value at command area	
6	Output 0 high 8 bit	Echo back of set value at command area	
7	Output 1 low 8 bit	Echo back of set value at command area	
8	Output 1 high 8 bit	Echo back of set value at command area	
9 – 12	00H	00H	Unused
13	Discrete output data of extension module low 8 bit	Discrete input data of extension module low 8 bit or echo back of set value at command area	
14	Discrete output data of extension module high 8 bit	Discrete input data of extension module high 8 bit or echo back of set value at command area	"0" for EA8 and EC8x
15 – 31	00H	00H	Unused



• LC2

Byte	COMMAND (hexadecimal)	RESPONSE (hexadecimal)	REMARKS
5	Input 0 set data low 8 bit	Input 0 low 8 bit or echo back of set value at command area	
6	Input 0 set data high 8 bit	Input 0 high 8 bit or echo back of set value at command area	
7	Input 1 set data low 8 bit	Input 1 low 8 bit or echo back of set value at command area	
8	Input 1 set data high 8 bit	Input 1 high 8 bit or echo back of set value at command area	
9	Command low 8 bit	Command display low 8 bit or echo back of set value at command area	
10	Command high 8 bit	Command display high 8 bit or echo back of set value at command area	
11, 12	00H	00H	Unused
13	Discrete output data of extension module low 8 bit	Discrete input data of extension module low 8 bit or echo back of set value at command area	
14	Discrete output data of extension module high 8 bit	Discrete input data of extension module high 8 bit or echo back of set value at command area	"0" for EA8 and EC8x
15	00H	Status low 8 bit	See I/O data status
16	00H	Status high 8 bit	See I/O data status
17 - 31	00H	00H	Unused

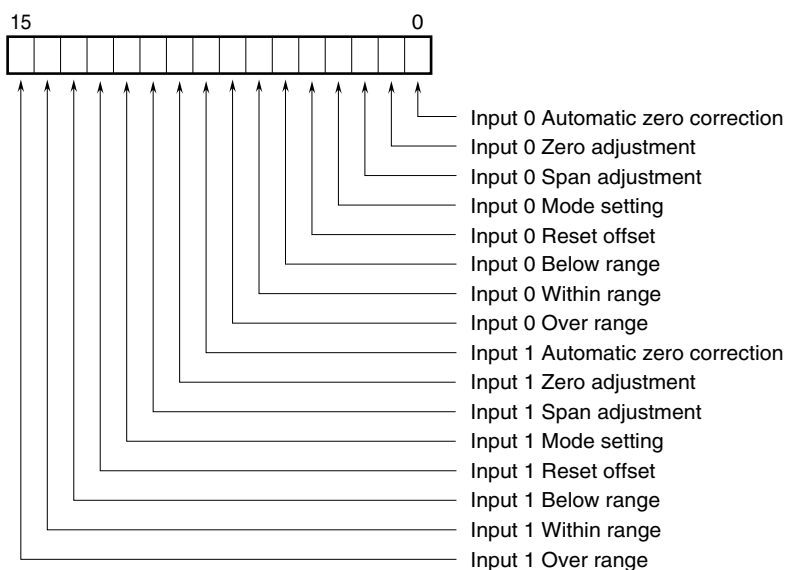
## I/O DATA DESCRIPTION

### ■ ANALOG INPUT



16-bit binary data  
Negative values represented in 2's complements

### ■ LC2 COMMAND DETAILS



**■ AUTOMATIC ZERO CORRECTION**

Set the offset input value. Perform automatic zero correction setting after Zero/Span adjustments.

The procedures are as follows.

- 1) Apply desired offset input value to the sensor.
- 2) Set "1" to Automatic zero correction bit. When the offset is completed, LED0 for Input 0 or LED8 for Input 1 turns on.
- 3) After checking the LED, set "0" to Automatic zero correction bit.

**■ ZERO ADJUSTMENT**

Adjust input zero point. The procedures are as follows.

- 1) Apply 0% load to the sensor.
- 2) Set "1" to Zero adjustment bit. When the adjustment is completed, LED1 for Input 0 or LED9 for Input 1 turns on.
- 3) After checking the LED, set "0" to Zero adjustment bit.

**■ SPAN ADJUSTMENT (with actual load)**

Adjust input span point with the actual load. The procedures are as follows.

- 1) Apply actual 100% load to the sensor.
- 2) Set "1" to Span adjustment bit. When the adjustment is completed, LED2 for Input 0 or LED10 for Input 1 turns on.
- 3) After checking the LED, set "0" to Span adjustment bit.

**■ LOAD COEFFICIENT**

Adjust input Span point by setting load coefficient without applying 100% actual load. The followings are an example of adjustment with 20 % load.

- 1) Apply 20% load of the actual load to the sensor.
- 2) Set 2000 (decimal) to Input set data area.
- 3) Set "1" to Span adjustment bit. When the adjustment is completed, LED2 for Input 0 or LED10 for Input 1 turns on.
- 4) After checking the LED, set "0" to Span adjustment bit.

**■ MODE SETTING**

Select measuring mode or monitor output mode.

- Measuring mode

Set "0" to Mode setting bit to enter measuring mode. In measuring mode, monitor output is linked with input data.

- Monitor output mode

Set "1" to Mode setting bit to enter monitor output mode. In monitor output mode, values at set data area of each input are outputted. Set values at set data area are displayed in Input data area and inputs are disabled. The followings are setting procedures of 20% monitor output for Input 1.

- 1) Set 2000 (decimal) to Input 1 set data area.
- 2) Set "1" to Mode setting bit. When the setting is completed, LED7 turns on and 20% of Input 1 is outputted from monitor output terminal .
- 3) After checking the output, set "0" to Mode setting bit to return to measuring mode.

**■ RESET OFFSET**

Reset the offset value set by Automatic zero correction to zero. The procedures are as follows.

- 1) Set "1" to Reset offset bit. When the reset is completed, LED4 for Input 0 or LED12 for Input 1 turns on.
- 2) After checking the LED, set "0" to Reset offset bit.

**■ INPUT BELOW RANGE (Input only)**

"1" is to be set when input is -1.0% or less.

**■ INPUT WITHIN RANGE (Input only)**

"1" is to be set when input is within the range between -1.0% and 101.0%.

**■ INPUT OVER RANGE (Input only)**

"1" is to be set when input is 101.0% or more.