EEV Driver / Type LNE-C
Proportional Valve Driver / Type LNE-D

Communication Manual

Type: LNE-C*, LNE-D***

SAGInoMIYA

Contents

1. Introduction

This communication manual explains the communication functions of the LNE-C type electronic expansion valve driver and the LNE-D type proportional valve driver.
When using the communication functions, **please read this manual carefully and handle it correctly.**
Also, **be sure to keep this manual** in a place where it can be easily accessed by users at any time.

This manual and various materials can be downloaded from our website.
You can access it using the 2D code below.

Product Information
https://qr.saginomiya.co.jp/u/lne

2. Consent Related to Disclaimers

2.1. Confirmation of Operation

All customers using this Product (hereinafter referred to as "Customers") are requested to, after properly installing this Product, test the operation of this Product to confirm that all the systems in connection with this Product fully function. In order to prevent the occurrence of bodily injury, fire accidents, serious damage, etc., in connection with the Customers' machinery or equipment due to improper installation of this Product, Saginomiya kindly requests the Customers to take the necessary safety measures by preparing safe designs such as a fail-safe design and a fire spread prevention design, as well as to make the proper adjustments for product reliability necessary for fault-tolerance.

2.1.1. Periodic Inspection of this Product

Be sure to confirm the proper operation of this Product and keep records of such operation at least once a year. Saginomiya shall be held harmless and be indemnified by the Customers from any damages incurred due to the Customers failing to conduct the above operational procedures, provided, however, that, this shall not apply if the damages which the Customers incurred due to the defect of this Product caused by Saginomiya.

2.2. Restrictions of Use

This Product is designed and manufactured for the purpose of using them for cooling and heating and refrigerating appliances and air conditioning equipment or various industrial equipment, but is not designed and manufactured for the purpose of using this Product for any instrument or system related to human life or health purposes.
Therefore, the use of this Product in fields related to items (1) through (3) below is not intended whatsoever.
Saginomiya shall be held harmless and be indemnified from any and all damages incurred by use of this Product under item (3).

(1) In any field related to nuclear power and radiation;
(2) In any field related to space or seafloor equipment;
(3) In any equipment or device requiring a high degree of reliance on such equipment or device with respect to which it is reasonably foreseeable that failure or malfunction of the equipment or device would either directly or indirectly cause serious damage to human life, health or property;

Also, when using this Product under the fields related to items (1) through (10), (except for item (3), in relation to which this Product must never be used), please be sure to notify Saginomiya's contact desk in charge of sales and obtain Saginomiya's prior written approval for such use.
Saginomiya shall be held harmless and be indemnified from any and all damages incurred by use of this Product in relation to these fields if the Customers do not notify Saginomiya's contact desk and obtain Saginomiya's prior written approval.

(4) Heating, cooling and air conditioning equipment that uses flammable and/or toxic refrigerants, or various industrial equipment that uses flammable and/or toxic fluids;
(5) Transportation device (railroad, aviation, ship or vessel, vehicle equipment, etc.);
(6) Disaster-prevention or crime-prevention device;
(7) Facility or application directly related to medical equipment, burning appliances, electro thermal equipment, amusement rides and devices, facilities/applications associated directly with billing;
(8) Equipment requiring high reliance on supply systems such as electricity, gas, water, etc., in large-scale communication system, or in transportation or air traffic control system;
(9) Facilities that are to comply with regulations of governmental / public agencies or specific industries or
(10) Other machineries or equipment equivalent to those set forth in the above items (4) to (9) which require for high reliability and safety.

It is recommended to replace this Product within 5 to 10 years of delivery if no other duration of use is provided in the applicable specifications or instruction manual because the conditions and environment of use also have an impact on this Product.

2.3. Scope of Warranty

Saginomiya will provide the customers with replacement or repaired this product delivered, free of cost, only within one year of delivery to the customer, if failure occurs in the customers' equipment using this product due to a defect of this product; provided, however, that in any event the ratio of the amount that Saginomiya bears for the damages incurred by the failure of this product or customers' equipment shall not exceed the price of this product we delivered. In addition, Saginomiya shall be held harmless and be indemnified from any and all damages incurred when the failure of the customers' equipment occurred due to any cause set forth below.

(1) when caused by inappropriate handling or use of this product by the customers (such as not complying with the conditions, environmental specifications or cautions indicated in any applicable catalogue, specifications, instruction manual, etc.);
(2) when failure occurred due to any reason other than this product;
(3) when caused by modification or repair of this product made by anyone other than Saginomiya or designee of Saginomiya;
(4) when caused by the use of this product in violation of the above "restrictions of use" or "confirmation of operation";
(5) when such failure was not reasonably foreseeable at the time of Saginomiya's shipment; or
(6) by any other cause not attributable to Saginomiya, such as an act of God, disaster, or act of any third party.

Please note that the customers will not be entitled to any of the above warranty if the customers purchased this product from internet auction, etc.

3. Precautions

Warning Display

The precautions listed here contain important safety information. Please be sure to follow them.

⚠ **Warning**	If handled incorrectly, there is a risk of "death or serious injury(1) to the user."
⚠ **Caution**	If handled incorrectly, there is a risk of "injury(2) to the user or property damage(3)."

(1) **Serious injury** refers to injuries that result in blindness, injury, burns (high or low temperature), electric shock, fractures, poisoning, etc., that leave aftereffects and require hospitalization or long-term outpatient treatment.
(2) **Injury** refers to injuries, burns, electric shocks, etc., that do not require hospitalization or long-term outpatient treatment.
(3) **Property damage** refers to extensive damage to houses, household goods, livestock, pets, etc.

3.1. Explanation of Symbols

Symbol		Meaning	Type
Prohibition Display		Prohibits certain actions in the handling of the product.	 General Prohibition  Disassembly Prohibition
Caution Display		Alerts to precautions such as electric shock in the handling of the product.	 General Caution  Electric Shock Caution
Instruction Display		Instructs certain actions in the handling of the product.	 General Instruction

3.2. Safety Warnings and Precautions

⚠ **Warning**	
	・Always turn off the power before wiring.
	・Do not install in places with high humidity, or where water or oil may come into contact.
	・Do not disassemble, modify, or repair.
	・Do not use this product for other purposes.

3.3. Handling Precautions

⚠ Caution	
	・When touching this product, take sufficient anti-static measures such as wearing a grounding band or anti-static gloves.
	・Do not touch with wet hands.
	・When installing, do not apply excessive stress that may warp the circuit board.
	・Do not install in the following locations: (1) Places with mechanical vibration or shock (2) Places with a lot of dust or dirt (3) Places where the ambient temperature of this product exceeds the range of −10℃ to +50℃ (4) Places near equipment that generates strong high-frequency noise (5) Places exposed to direct sunlight (6) Places where condensation is likely to occur or where water may come into direct contact (7) Places with corrosive gases
	・Do not drop or apply impact during storage or transportation.

3.4. Wiring Precautions

⚠ Caution	
	・Do not bundle or wire this product together with power lines carrying high current. This may cause malfunction or failure.
	・Do not apply abnormal voltages to the startup input and reset input as they are non-voltage contacts. This may cause failure (including surges, static electricity, noise, etc.).
	・Ensure that the wiring to each terminal block is secure and not loose. ・When wiring stranded wires to the terminal block, insert the wire while pressing the button.
	・Select the size and type of connection wires considering the allowable current.
	・Use twisted pair cables for communication lines. ・Ground the shielded wire at one point at the terminal.
	・Always close the cover after wiring.

4. Overview

4.1. Introduction

The communication function allows the creation of programs on master devices (e.g., PC) to set or monitor data of the EEV driver / type LNE-C and the Proportional Valve Driver / type LNE-D (hereinafter referred to as "this product").

By using the communication function of this product, the following can be performed:

- Operation commands for the electronic expansion valve or electric proportional valve (valve opening control, zero-point setting)
- Reading and writing of setting data
- Reading of driving data

This product adopts a 2-wire RS-485 for the physical layer and Modbus(1) for the communication protocol.
Modbus is a communication protocol developed by Modicon Inc. (now Schneider Electric). It is mainly used for communication between industrial equipment and is designed to exchange data between devices such as PLCs and electronic devices. Modbus has two communication modes: Modbus RTU mode and Modbus ASCII mode, but this product only supports Modbus RTU mode.

(1) Modbus is a registered trademark of Schneider Electric USA Inc.

4.2. Communication Specifications

(Underlined values are initial settings)

Interface	Compliant with RS-485
Connection Method	2-wire half-duplex multi-drop connection
Communication Protocol	Modbus RTU
Synchronization Method	Asynchronous
Maximum Number of Connections	9 units (number of connections to one master device)
Baud Rate	4800bps, 9600bps, **19200bps**, 38400bps
Data Bit Length	8 bits
Parity Bit Length	1 bit (**even**, odd) or 0 bits (no parity)
Stop Bit Length	**1 bit** or 2 bits (Automatically switches to ensure the total of parity bit length and stop bit length is 2 bits)
Supported Function Codes	03H (Read Holding Registers) 06H (Write Single Holding Register) 08H (Loopback) 10H (Write Multiple Holding Registers)
Error Check Method	CRC-16 / Modbus
Response Delay Time	**0ms** ～ 500ms

4.3. Interface

This product communicates with master devices using the RS-485 interface. When using a PC as the master device, a commercially available USB (COM port) to RS-485 serial converter should be used.

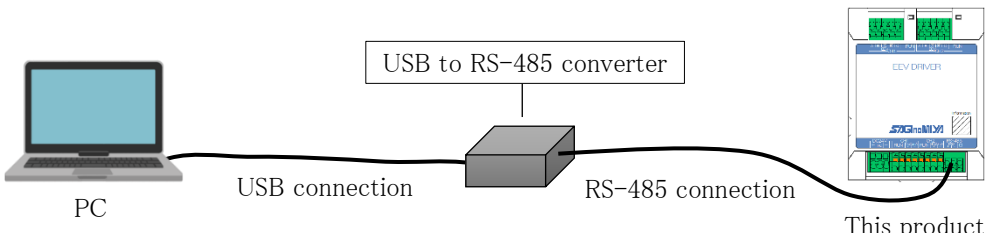


Figure 4-1 Connection with PC

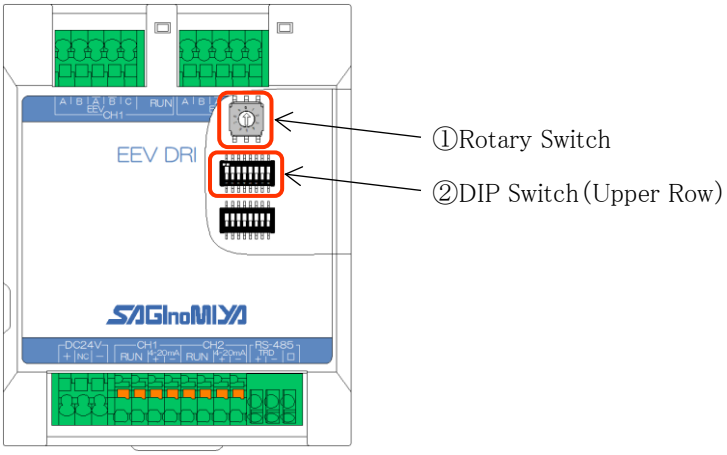
4.4. Communication Settings

4.4.1. Setting Items

(Underlined values are initial settings)

Setting Value	Setting Method	Setting Range	Description
Slave ID	Rotary Switch	**0** to 9	Operates as Slave ID = 1 to 9. "0" is a standalone setting but accepts broadcasts.
Communication Mode	DIP Switch (Upper Row)	**Normal Mode** / Communication Mode	Set when you want to always disable valve opening instructions via current input.
Baud Rate	DIP Switch (Upper Row)	4800bps / 9600bps / **19200bps** / 38400bps	Set the baud rate.
Communication Parity	DIP Switch (Upper Row)	**Even** / Odd / None	Set the communication parity.
Response Delay Time	Writing via Modbus Communication (06H or 10H)	**0ms** to 500ms	The waiting time before this device sends a response after receiving a message. Set this if the master device's reception switching process cannot keep up with the response from this device.

4.4.2. Setting Methods

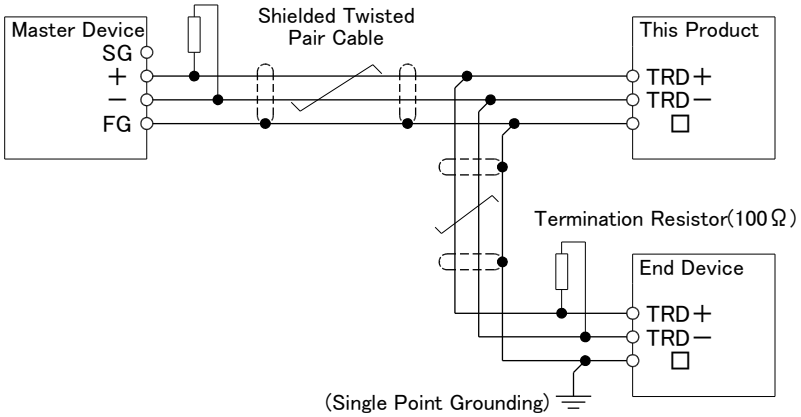


Setting Methods	Configuration Method				
①Rotary Switch	Set by aligning the number on the rotary switch (0 to 9).				
②DIP Switch (Upper Row)	bit1	Communication Mode	OFF: Normal Mode ON : Communication Mode		
	bit2, bit3	Baud Rate	bit2	bit3	Setting Value
			OFF	OFF	19200bps
			ON	OFF	9600bps
			OFF	ON	38400bps
			ON	ON	4800bps
	bit4, bit5	Communication Parity	bit4	bit5	Setting Value
			OFF	OFF	Even
			ON	OFF	Odd
			OFF	ON	None
			ON	ON	Even
	bit6-bit8	Electric Value Drive Setting	Not a communication setting		

5. Wiring

5.1. Wiring Method

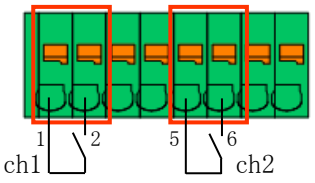
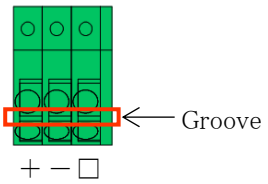
・This product can be set with a Slave ID in the range of 1 to 9, and up to 10 devices, including the master device, can be connected in the communication system.
・The connection configuration can be 1:1 or 1:N. When connecting multiple devices, they should be wired in series (multi-drop connection). Using star or branch wiring may result in improper communication.
・Connect the included termination resistors (100Ω) to the two end devices in the series connection, including the master device.
・Use shielded twisted pair cables for wiring, and ensure the total cable length is within 500 meters.



Shielded Wire Handling

・It is not necessary to connect to the signal ground terminal (SG) of the master device.
・If the master device has a frame ground terminal (FG), connect the shielded wire to it.
・There is no connection from the communication terminal block "□" of this product to the internal circuit. Use it when passing through the shielded wire.
・Connect the FG terminal, including the shielded wire at the terminal, to a single ground point.

5.2. Terminal Blocks and Wires

Type	Startup input Terminal Block	Communication Terminal Block
		
Terminal Block Model	SPTAF(Phoenix Contact)	PTDA(Phoenix Contact)
Recommended Wire	0.2-1.5 ㎟ (equivalent to AWG24-16)	0.2-1.5 ㎟ (equivalent to AWG24-16)
Recommended Stripping Length	8mm	10mm

・Even when driving the electric valve by command from communication, it is necessary to short the startup input terminal.
・The terminal block uses a push-in type. Wiring is done by pushing the wire into the terminal block's insertion port. For stranded wires, insert while pressing the button or groove of the terminal block with a flathead screwdriver, or crimp with a ferrule terminal.
・After inserting the communication cable, be sure to pull the cable near the insertion port of the terminal block to check that the cable does not come out.
・When removing the wire, pull out the wire while pressing the button or groove of the terminal block with a flathead screwdriver.
・Do not insert multiple wires into one insertion port.

6. Modbus Communication

6.1. Communication Procedure

Modbus uses a single master/multiple slave system.
Communication starts when the master device sends a request message, and the slave device responds with a response message to the master's request message. The master device checks this response message and sends the next request message based on its content.
This exchange, where the master device sends a request message and the slave device returns a response message, is repeated.

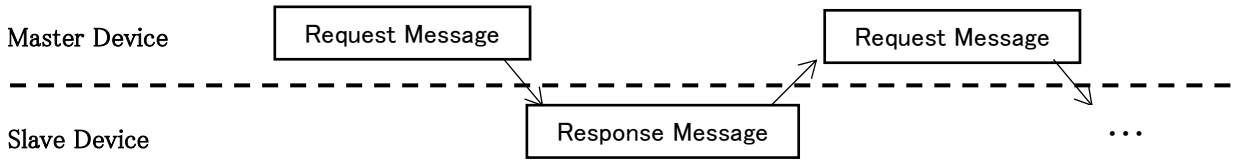


Figure 6-1 Communication Procedure

6.2. Communication Timing

In Modbus RTU mode, communication messages start and end with a silent interval of 3.5-character times(1). This silent interval is used to determine the start and end of communication messages.

(1) The length of one character is fixed at 11 bits (1 character = start bit + data bits + parity bit + stop bit).
The 3.5-character time [ms] = 11 [bits] × 3.5 [characters] ÷ baud rate [bps] × 1000

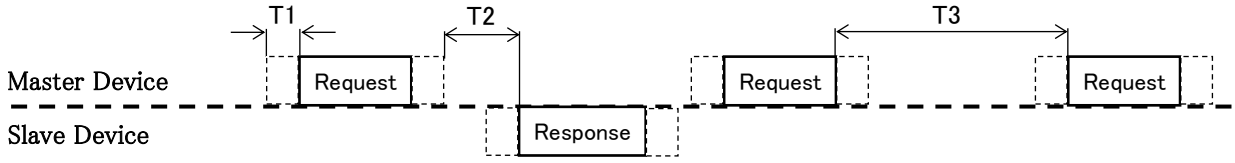


Figure 6-2 Communication Timing

Category	Name	Time
T1	Silent Interval	4800bps :8.02ms 9600bps :4.01ms 19200bps :2.01ms 38400bps :1.75ms
T2	Response Processing Time	Reception processing time ＋Response Delay Time
T3	Timeout Time	(T1 + T2) or more

Transmission and Reception Timing

・After receiving the most recent character, if the silent interval (T1) elapses, it is determined that the message reception is complete, and reception processing is performed.
・Do not leave an interval of more than 1.5 character times between characters in a single request message.
・When a valid request message is received, the slave performs reception processing and then returns a response message (T2). If the master's transmission/reception switching process cannot keep up with the slave's response, set the Response Delay Time (0-500ms).
・Ensure that the interval between sending the next request message is longer than the silent interval.

Timeout Determination

・If a broadcast is received or a communication error occurs, the slave does not return a response. The master device should set a timeout time (T3) and handle it appropriately.

7. Data Format

In the following explanation, when a number is followed by "H" (e.g., "06H"), it indicates that the number is in hexadecimal.

7.1. Message Structure

Both request and response messages are composed of the following format:

Address (1byte)	Function Code (1byte)	Data (Variable length depending on the function code	CRC-16(2bytes)	
			Lower Byte	Upper Byte

Address	Specifies the slave ID of the destination. If 00H is specified, it is a broadcast.
Function Code	Specifies the function code.
Data	Specifies the data corresponding to each function code.
CRC-16	Adds a 2-byte error check code in the order of lower byte → upper byte.

7.1.1. (03H) Reading Holding Registers

・Multiple data from consecutive addresses can be read in bulk starting from the holding register's start address.
・The read data is 2 bytes per register. Data of 4 bytes in one data is treated as two registers, but access that divides these two registers will result in an invalid data address and cannot be read.
・The byte count in the response message contains "Quantity of Registers × 2".

○Format

Request	**H	03H	Upper	Lower	Upper	Lower	Lower	Upper		
	Address	Function Code	Starting Address		Quantity of Registers		CRC-16			
Response	**H	03H	**H	Upper	Lower	Upper	Lower	…	Lower	Upper
	Address	Function Code	Byte Count	Register Value 1		Register Value 2			CRC-16	

○Message Example

Ex) Reading 2 registers from holding register address 000DH for slave ID=2
[Request] 02 03 000D 0002 55 FB
[Response] 02 03 04 03E8 01F4 49 54 (Register Value 1 = 1000, Register Value 2 = 500)

7.1.2. (06H) Writing Single Holding Register

・One data at the target holding register address can be changed.
・The response message, when successfully changed, will be the same as the request message.

○Format

Request	**H	06H	Upper	Lower	Upper	Lower	Lower	Upper
	Address	Function Code	Target Address		Write Data		CRC-16	
Response	**H	06H	Upper	Lower	Upper	Lower	Lower	Upper
	Address	Function Code	Target Address		Write Data		CRC-16	

○Message Example

Ex) Setting the data at holding register address 0006H to 3000 (0BB8H) for slave ID=1

[Request] 01 06 0006 0BB8 6E 89

[Response] 01 06 0006 0BB8 6E 89

7.1.3. (08H) Loopback

・A response message according to the diagnostic sub-code is returned. Only sub-code 00H is supported.

・Any data can be set in the data of sub-code 00H, and the response message will be the same as the request message.

○Format

Request	**H	08H	Upper	Lower	Upper	Lower	Upper	Lower	Lower	Upper
	Address	Function Code	Diagnostic Sub-code		Data		CRC-16			
Response	**H	08H	Upper	Lower	Upper	Lower	Upper	Lower	Lower	Upper
	Address	Function Code	Diagnostic Sub-code		Data		CRC-16			

○Message Example

Ex) Loopback with data 1234H using diagnostic sub-code 00H for slave ID=1

[Request] 01 08 0000 1234 ED 7C

[Response] 01 08 0000 1234 ED 7C

7.1.4. (10H) Writing Multiple Holding Registers

・Multiple data from consecutive addresses can be set in bulk starting from the holding register's start address.

・The write data is 2 bytes per register. The data of 4 bytes in one data is treated as two registers, but access that divides these two registers will result in an error due to an invalid data address.

・The byte count in the request message should contain "Quantity of Registers × 2".

・The response message returns a copy of the request message excluding the byte count, data, and CRC-16.

○Format

Request	**H	10H	Upper	Lower	Upper	Lower	**H	Upper	Lower	…	Lower	Upper
	Address	Function Code	Starting Address		Quantity of Registers		Byte Count	Write Data 1			CRC-16	
Response	**H	10H	Upper	Lower	Upper	Lower	Lower	Upper
	Address	Function Code	Starting Address		Quantity of Registers		CRC-16	

○Message Example

Ex) Changing 2 data from holding register address 0006H for slave ID=1 (Write Data 1 = 1, Write Data 2 = 2)

[Request] 01 10 0006 0002 04 0001 0002 A3 84

[Response] 01 10 0006 0002 A1 C9

7.2. Broadcast

・When the address in the request message is set to 0, it becomes a broadcast. In a broadcast, the request message is sent simultaneously to all slaves connected to the communication system.

・Even if the rotary switch is set to standalone (ID=0), the broadcast will be received if connected to the communication system.

・Slaves do not return a response message to a broadcast request message.

7.3. Exception Responses

・When a request message is received, the slave's response processing can be one of three types: normal response, no response, or exception response.
・In the case of no response, the master device will experience a timeout.

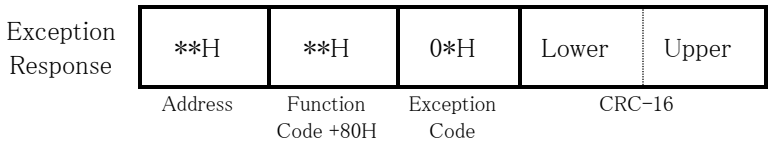
Result of Request Message Analysis	Slave Response
Received a message addressed to itself and processed it successfully	Normal response
Received a message not addressed to itself	No response
Received a broadcast (address = 0)	No response
Received a message addressed to itself but with a CRC-16 error	No response
Could not receive due to communication errors, etc.	No response
There was a problem with the content of the request message	**Exception response**

7.3.1. Exception Codes

・In the event of an exception response, the slave will append an exception code to the response message based on the error encountered. At this point, the function code of the response message will be the function code of the request message plus "80H".

Exception Code	Name	Description
01H	Illegal Function	・Received an unsupported function code
02H	Illegal Data Address	・Specified an unsupported data address ・Specified an address that splits 4-byte data
03H	Illegal Data	・Write data is out of the set range ・The number of bytes in the request message does not match the number of bytes received

○Format



○Message Example

Ex) Setting the data at holding register address 0006H to 3001 (0BB9H) with function code 06H for slave ID=1
[Request] 01 06 0006 0BB9 AF 49
[Response] 01 86 03 02 61
(Function Code:86H = Exception response for 06H, Exception Code:03H = Illegal Data)

7.4. Error Detection

7.4.1. CRC-16 (Cyclic Redundancy Check)

A 2-byte check code calculated from the values from the beginning of the message (address) to the end of the data section (before CRC-16). If the CRC code of the received message does not match the CRC code calculated from the message, the slave will not respond.

7.4.2. Calculation Method

[1] Initialize a 16-bit CRC register (hereafter, X) with the initial value FFFFH.
[2] Calculate the XOR of X and the value of the first byte of the received message, and store the result in X.
[3] Perform the following shift operation. Fill the MSB with "0" after the right shift.
(When the LSB of X is 1) Right shift X by 1 bit, then calculate the XOR with A001H, and store the result in X.
(When the LSB of X is 0) Right shift X by 1 bit. (Proceed to Step 4 without storing the result in X.)
[4] Repeat [3] until 8 shifts are completed.
[5] Calculate the XOR of X and the value of the next byte of the received message, and store the result in X.
[6] Repeat [3] to [5] until the end of the data section of the received message (before CRC-16) is processed.
[7] The final calculated result X is used as CRC-16, and it is added to the message in the order of lower byte to upper byte.

7.4.3. Sample Code for CRC-16 Calculation

```
//*message  : Received message(array)
//length    : Length of the received message excluding CRC

static uint16_t CalculateCrc16(const uint8_t *message, uint16_t length) {
    uint16_t crc  = 0xFFFF;
    uint16_t byte = 0;
    int8_t   bit  = 0;

    for (byte = 0; byte < length; byte++) {
        crc ^= message[byte];

        for (bit = 0; bit < 8; bit++) {
            if (crc & 0x0001) {
                crc >>= 1;
                crc ^= 0xA001;
            } else {
                crc >>= 1;
            }
        }
    }
    return crc;
}
```

8. Address Map

8.1. Holding Registers

・Data classified as “R/W” can be read and written as configuration information.
・Data classified as “R” is read-only operational information. If written, a normal response is returned, but it is not reflected in the operation.
・Supported function codes: [Read] 03H / [Write] 06H (single data) or 10H (multiple data)
・When writing in bulk to holding registers (10H), the instructions with the later addresses take precedence if the same content is specified.

Ex 1) When writing from address 0006H (command valve opening) to address 000FH (command input ratio) with 10H
→ Operates according to the instruction at address 000FH (the ratio command takes precedence, and it does not operate with the pulse count command).
Ex 2) When writing from address 0002H (valve opening reference source = current input) to address 0006H (command valve opening) with 10H
→ Operates according to the instruction at address 0006H.
(the valve opening reference source = communication command takes precedence)

Address	Bytes	Type	Data Content	Data Range	Unit	Remarks
0000H	2	R/W	Response Delay Time	0 – 500	ms	Retained after power on/off
0001H	2	R/W	Auto Return of Reference Valve Opening (Prevention of Forgetting to Return)	0 or 1		Retained after power on/off 0 : Disabled (no auto return) 1 : Enabled (returns to current input 30 minutes after the last command reception)
0002H	1	R/W	Valve Opening Reference Source (ch1)	0 or 1		0 : Operates with the valve opening of current input 1 : Operates with the valve opening of communication command
0003H	1	R/W	Valve Opening Reference Source (ch2)			
0004H	2	R	Current Valve Opening (ch1)	0 – Maximum Valve Opening	Pulses	Maximum Valve Opening = LNE-C: 480, 500, 656 pulses, LNE-D: 3000 pulses
0005H	2	R	Current Valve Opening (ch2)			
0006H	2	R/W	Command Valve Opening (ch1)	0 – Maximum Valve Opening	Pulses	・Same as above ・When written, the valve opening reference source is automatically changed to communication opening (1)
0007H	2	R/W	Command Valve Opening (ch2)			
0008H	1	R/W	Zero Point Adjustment Command/Execution Status (ch1)	0 or 1	—	(Read) 0: Normal, 1: Zero Point Adjustment in Progress (Write) 0: Do nothing, 1:Start Zero Point Adjustment
0009H	1	R/W	Zero Point Adjustment Command/Execution Status (ch2)			
000AH	2	R	DIP Switch Input Information	0 – 65535 (FFFFH)	—	For each DIP switch, the first bit is LSB, and the eighth bit is MSB. response data 2 bytes: bit15-bit8 : DIP Switch 2 status bit7-bit0 : DIP Switch 1 status

Address	Bytes	Type	Data Content	Data Range	Unit	Remarks
000BH	1	R	Startup input Information (ch1)	0 or 1	—	0: Startup input OFF 1: Startup input ON
000CH	1	R	Startup input Information (ch2)			
000DH	2	R	Current Valve Opening Ratio (ch1)	0 – 1000	%	・10 times the actual value (0.1% = 1, 100.0% = 1000) ・Ratio to “Valve Opening” (0%= fully closed, 100%= fully open)
000EH	2	R	Current Valve Opening Ratio (ch2)			
000FH	2	R/W	Command Input Ratio (ch1)	0 – 1000	%	・10 times the actual value (0.1% = 1, 100.0% = 1000) ・Equivalent to “Input Current” (0%= 4mA, 100%= 20mA) ・When written, the valve opening reference source is automatically changed to communication valve opening (1) ・Due to rounding during conversion, the written value may not match the read value
0010H	2	R/W	Command Input Ratio (ch2)			

9. Troubleshooting

Before Considering a Malfunction

If communication is not possible or the electric valve does not operate as intended, check the following points.
If the problem persists, contact the retailer where the product was purchased or our sales office.

[Issue] Unable to communicate (no response from the product or communication error occurs)

Possible Cause	Solution	Ref.
Communication wiring is incorrect	Check the polarity of the wiring.	5.1
Communication wiring is disconnected	Check if the cable is pulled out near the terminal block and insert the cable fully into the terminal block.	5.2
Communication cable is broken	Replace the communication cable.	—
Communication cable is too long	Use a communication cable with a total length of 500m or less.	5.1
Communication cable is inappropriate	Use a shielded twisted pair cable for communication.	—
Termination resistor is not connected	Install the termination resistor in the correct position. Use the included 100Ω (1/2W) resistor.	5.1
Power supply voltage is not applied	Apply power supply voltage to this product and all devices related to communication. Also, allow a delay of more than 3 seconds before starting communication after power is turned on.	—
Communication settings are incorrect	Check if the communication settings of the master and slave match (baud rate, communication parity, data bit length, stop bit).	4.4
Address 0 is specified in the request message	If the address in the request message is 0, it will be a broadcast, and this product will not respond. Consider it as normal completion.	7.2
Address 10 or higher is specified in the request message	Use this product with slave IDs in the range of 1 to 9.	—
Slave ID is duplicated	Check if the slave IDs are duplicated among the devices connected in the communication system.	4.4
Multiple masters are connected	If there are two or more masters in the communication system, reduce it to one.	—
The master received the response from this product before it became ready to receive after sending	Set the Response Delay Time of this product.	4.4
The interval between receiving the response from this product and sending the next message is too short	After receiving the response from this product, wait for the silent interval or longer before sending the next message.	6.2
Communication data is affected by noise from the surroundings	・Try reducing the baud rate. ・Do not bundle or run communication cables parallel to power lines, as induced noise may be superimposed. Also, do not bundle excess communication cables in a loop.	4.4
The slave responded with an exception code	Check the content of the exception code.	7.3

[Issue] The electric valve does not operate or does not reach the intended opening (this product returned a normal response)

Possible Cause	Solution	Ref.
Startup input is not short-circuited	Short-circuit the startup input terminals.	5.2
Electric valve wiring is incorrect	Check the wiring of the electric valve.	—
Ratio value is incorrect	In communication, the actual ratio is handled as 10 times the value. Divide the read value by 10 (read value 50 = opening 5.0%).	8.1
0.1% deviation	Due to rounding during the conversion between ratio value and pulse count, the written value may not match the read value. Consider it as normal operation.	8.1

10. Revision History

Revision Date	Manual Number	Revision Content
January 2025	S-NE-36002	First Edition

The contents of this manual are current as of the date of publication and are subject to change without notice due to product specification changes or improvements.

While every effort has been made to ensure the accuracy of the contents of this manual, we cannot be held responsible for any damage, including indirect damages, resulting from errors, omissions, or the use of the information contained herein.

SAGINOMIYA SEISAKUSHO,INC.

Shinjuku Garden Tower 22F
8-2, Okubo 3-chome, Shinjuku-ku, Tokyo, 169-0072 Japan
Tel : +81 3 6205 9123 Fax : +81 3 6205 9125
E-mail : inter@saginomiya.co.jp
URL : http://www.saginomiya-global.com/en/