Read all instructions thoroughly

INSTRUCTIONS

EEV DRIVER

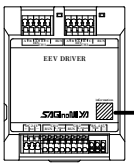
Type — LNE

SAGINOMIYA

1.Introduction

Thank you for purchasing the LNE type electronic expansion Valve driver.
Before using the product, please read this instruction manual carefully and use the product correctly.
After reading, **be sure to store it in a place** where it can be easily accessed by anyone who uses the product.

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



Product Information

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

2.Safety Precautions

⚠ Warning

- ●Always turn off the power before making any connections. There is a risk of electric shock.
- ●Do not install in locations with high humidity, or where water or oil may come into contact with the product. This can cause malfunction or overheating and fire.
- ●Do not modify this product.
- ●Do not use this product for any other purpose.

3.Handling Precautions

⚠ Caution

- ●Handling
  - ・When touching this product, take adequate anti-static measures such as wearing a grounding band or anti-static gloves.
  - ・Do not touch with wet hands.
  - ・Do not apply excessive stress that may warp the circuit board during installation.
- ●Installation Location
  - ・Do not install in locations with mechanical vibration or shock.
  - ・Do not install in locations with a lot of dust or dirt.
  - ・Do not install in locations where the ambient temperature exceeds -10 to +50 °C.
  - ・Do not install near equipment that generates strong high-frequency noise.
  - ・Do not install in locations exposed to direct sunlight.
  - ・Do not install in locations where condensation may occur or where water may directly contact the product.
  - ・Do not install in locations with corrosive gases.
- ●Storage and Transportation
  - ・This product is a precision instrument. Do not drop or subject it to shock during storage or transportation.

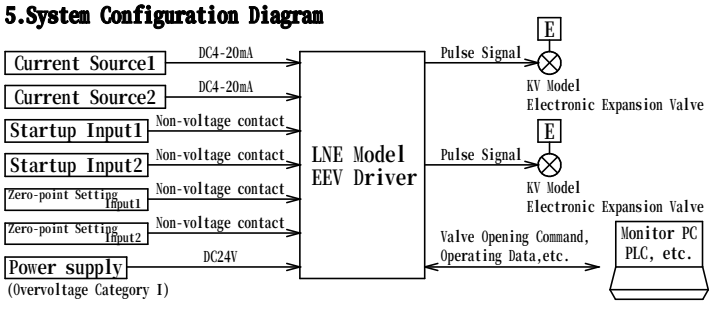
4.Wiring Precautions

This product is intended for use in Overvoltage Category I (CAT I).
For safe use, please observe the following points:

⚠ Caution

- ・Do not bundle or run the wiring of this product parallel to power lines carrying high currents. This can cause malfunction or failure.
- ・The startup input and zero-point setting input are non-voltage contact inputs. Do not apply different voltages (including surges, static electricity, noise, etc.). This can cause failure.
- ・Ensure that the wiring to the terminal block is secure and does not come loose.
- ・When wiring stranded wires to the terminal block, insert them while pressing the button.
- ・Select the type and size of the power cable considering the allowable current of the wire.
- ・Use twisted pair cables for communication lines and ground the shielded wire at one point.
- ・Always close the cover after wiring.

5.System Configuration Diagram



6.Specifications

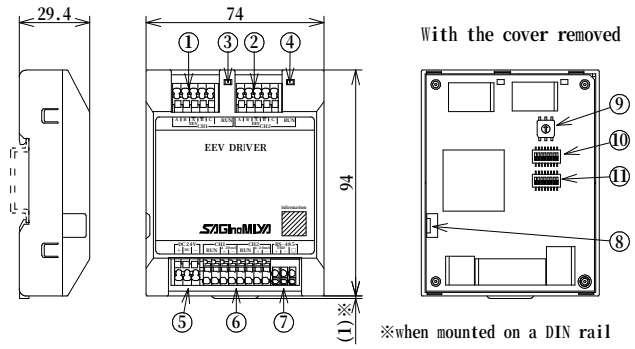
	Item	Specifications
General	Product Model	LNE-CA2C-***
	Power Supply Voltage	DC24V±10%
	Power Consumption	36W or less(With using 2 EEVs) Main Unit:2W or less(Excluding EEV) EEV :17W or less(Per unit)
	Mass	Approx. 105g
	Operating Temperature Range	-10°C to +50°C
	Storage Temperature Range	-20°C to +70°C
	Installation Environment	Pollution Degree 2, Overvoltage Category I
Input, Output	Current Input	Valve Opening input 4-20mA (Maximum rated current:22mA)
	Startup Input	No-voltage contact input ×2 points
	Zero-point Setting Input	(DC 24V 5mA supplied from this product ※1)
	Electronic Expansion Valve Output	For Type KV/ Electronic Expansion Valve(EEV) (Two Independent Drives)
	LED Output for Status Indication	ON : Startup input ON OFF : Startup input OFF Blinking : Zero-point setting in progress (0.5 second cycle blinking)
EEV	Pulse counts	0 to 480 Pulse, 0 to 500 Pulse, 0 to 656 Pulse
	Coil Voltage	DC12V
	Coil Resistance	46Ω,32Ω
	Excitation Speed	31.3pps
	Excitation Method	1-2 Phase Excitation
	Valve Base Position	0 Pulse, A Phase Excitation
	Holding Energization Time	0.5s
Set Value	Maximum Valve Opening Setting	480 Pulse, 500 Pulse, 656 Pulse
	Valve Opening Conversion Direction	DA Action, RA Action (DA:Fully open at 20mA, RA:Fully closed at 20mA)
	Sampling Time	10 seconds, 1 second
	Valve Opening During Stop	Fully Open, Fully Closed
	Current Input Threshold	Disabled, Enabled (Enabled:Output inversion below 3.5mA)
	Communication Mode	Disabled, Enabled (Enabled:Current input disabled)
	Synchronous operation	Disabled/Enabled (Enabled: Synchronize the target opening of ch2 with ch1)
Communication (※2)	Interface	Compliant with RS-485
	Connection Method	2-wire half-duplex multi-drop connection
	Communication Protocol	Modbus RTU
	Synchronization Method	Start/Stop Synchronization (Asynchronous)
	Maximum Number of Connections	9 units (number of connections to one master device)
	Baud Rate	4800bps、9600bps、19200bps、38400bps
	Data Bit Length	8bit
	Parity Bit Length	Even, Odd, No Parity
	Stop Bit Length	Automatic Switching According to Parity Bit (Even, Odd: 1bit No Parity: 2bit)
	Error Check Method	CRC-16/Modbus

※1 Please select a switch with a minimum applicable load of DC 24V, 5mA or less.
※2 For more details, please refer to the RS-485 Communication Manual on our website, or contact the retailer where you purchased the product, or our sales office.

7.Package Contents

- ・Main Unit
- ・Instruction Manual
- ・Terminal Resistor (100Ω)

8.External Dimensions and Part Names

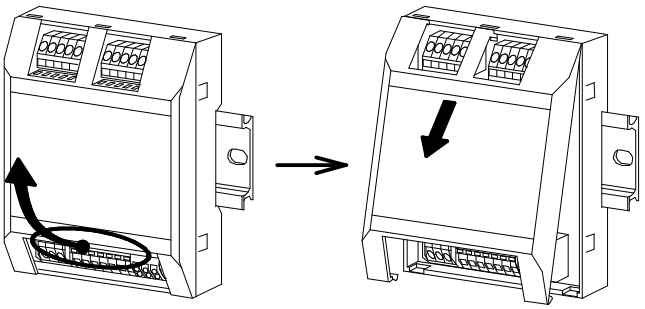


※when mounted on a DIN rail

Name	Function
① EEV Output(ch1) ② EEV Output(ch2)	Connects to the electronic expansion valve. (A:Orange, B:Red, Ā:Yellow, B̄:Black, C:Gray)
③ Status Indicator LED (ch1) ④ Status Indicator LED (ch2)	Indicates the startup input status by lighting up or turning off. Blinks at 0.5-second intervals during the zero-point setting.
⑤ Power Input	Connects the power supply to this product.
⑥ Startup Input & Current Input	Connects the drive start signal and the indicated valve opening signal.
⑦ Communication Terminal Block	Connects the RS-485 communication cable.
⑧ Zero-point Setting Input	Starts the zero-point setting when shorted for 3 seconds.
⑨ Rotary Switch	Sets the slave ID for RS-485 communication.
⑩ DIP Switch 1	Sets communication and electronic expansion valve operation.
⑪ DIP Switch 2	Sets electronic expansion valve operation.

9.How to Open and Close the Case

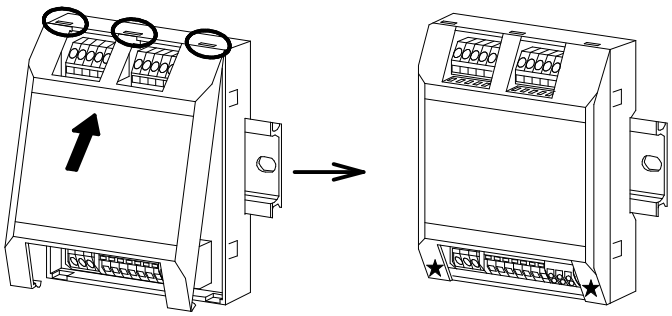
○Opening the Case



①Place your fingers at the bottom of the cover and lift it in the direction of the arrow.

②Pull the cover out in the direction of the arrow.

○Closing the Case

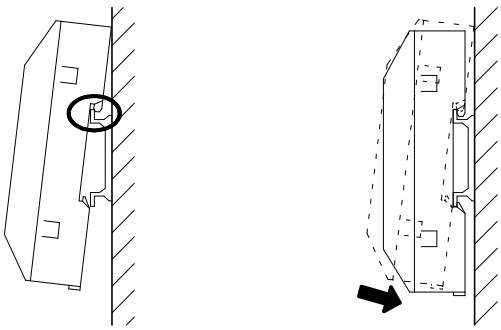


①Insert the claws at the top of the cover into the grooves (3 places) at the top of the main unit.

②Press the ★ part to fit the claws at the bottom.

10.How to Mount the Main Unit

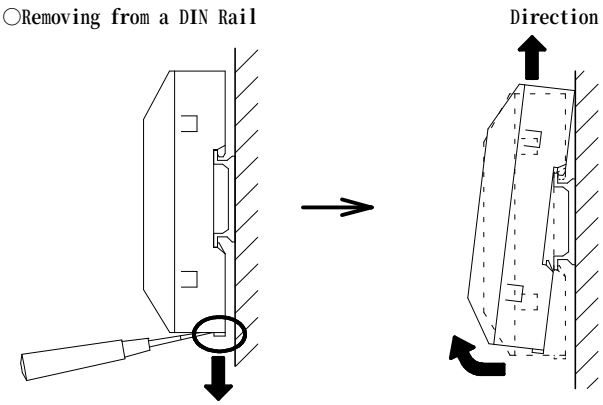
○Mounting on a DIN Rail



①Hook the claws on the upper side of the back of the main unit onto the DIN rail.

②Push it onto the DIN rail until you hear a click.

○Removing from a DIN Rail

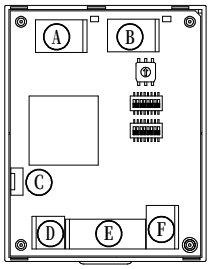


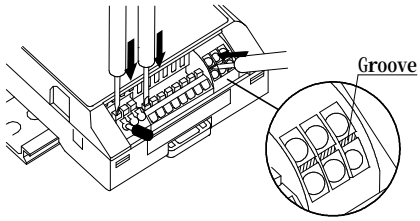
①Insert a flathead screwdriver into into the hole of the fixture at the bottom of the main unit and move the fixture downward.

②Lift the main unit forward and pull it out upward.

11.Wiring

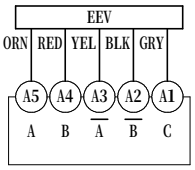
○Wiring to the Terminal Block



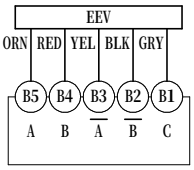


For stranded wires, insert the wire while pressing the button with a flathead screwdriver. For the communication terminal block, press the groove.

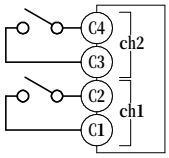
(A)EEV Output(ch1)



(B)EEV Output(ch2)



(C)Zero-point Setting Input



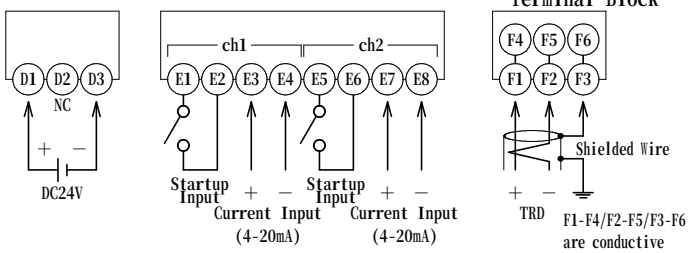
(A)/(B)EEV Output

	Connection Method	PTSA (Phoenix Contact)
Wire Size	Single Wire	0.2㎟～1.5㎟
	Stranded Wire	0.2㎟～1.5㎟
	AWG	24～16
	Stripping Length	9mm

(C)Zero-point Setting Input

Connection Method	B4B-PH(JST)
Pin Conductor	SPH-002T
	SPH-004T
Housing	PHR-4

(D)Power Input (E)Startup Input and Current Input (F)Communication Terminal Block



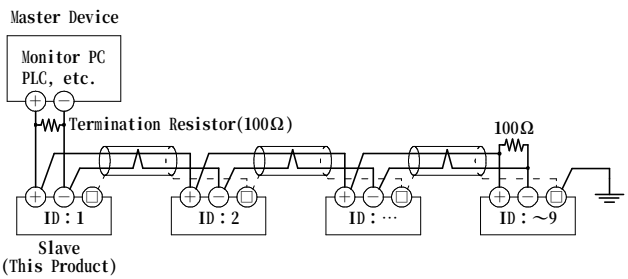
(D)Power Input (E)Startup Input and Current Input (F)Communication Terminal Block

Connection Method		PTSA (Phoenix Contact)	SPTAF (Phoenix Contact)	PTDA (Phoenix Contact)
Wire Size	Single Wire	0.2㎟～1.5㎟	0.2㎟～1.5㎟	0.2㎟～1.5㎟
	Stranded Wires	0.2㎟～1.5㎟	0.2㎟～1.5㎟	0.2㎟～1.5㎟
	AWG	24～16	24～16	24～16
	Stripping Length	9mm	8mm	10mm

⚠ Caution

- Apply the current input after turning on the power. Applying it without turning on the power, reversing the polarity of the current input, or applying a current exceeding the rated 22mA may damage this product.
- For the startup input and zero-point setting input, select switches with a minimum applicable load of DC 24V 5mA or less.
- If the current inputs of ch1 and ch2 are cross-wired, the product will not operate correctly. If you want to drive two electronic expansion valves with one current input, use the synchronization function.

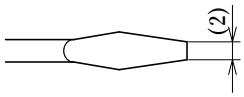
○Shielded Wire Handling



- Use shielded twisted pair cables for communication lines and connect the shield wire to the '□' of the communication terminal block.
- The shielded wire at the termination should be grounded at a single point.
- It is not necessary to connect to the signal ground terminal (SG) of the master device.
- When connecting multiple devices, they should be 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.

12.Setting Method

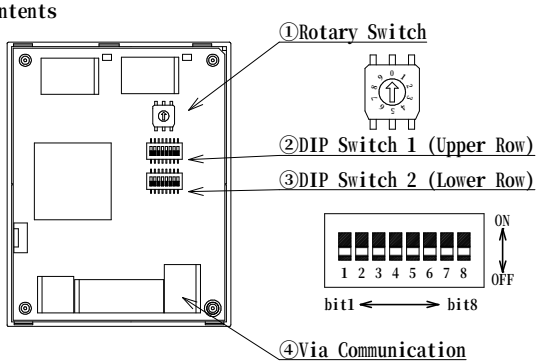
○Switch Operation
- Open the cover of the product and use a small flathead screwdriver to set the rotary switch and DIP switches.
- Use a screwdriver with a tip width of approximately 2mm for wiring.



Screwdriver tip width

⚠ Caution
- Be careful not to short-circuit the components on the circuit board if using a conductive screwdriver.
- Electronic components can be damaged by electrostatic discharge. Take adequate precautions against static electricity.

○Setting Contents



①Rotary Switch

Setting Value	Description
Communication Address	Sets the slave ID for communication use. Do not duplicate IDs 1-9 within the same system. ID=0 : Unused setting (broadcast reception possible) ID=1～9 : Communication operation with the set slave ID.

②DIP Switch 1 (Upper Row)

bit	Setting Value	Description
bit1	Communication Mode	ON :Current input disabled OFF:Current input enabled
bit2 bit3	Communication speed	bit2 \ bit3 / OFF / ON OFF / 19200 bps / 38400 bps ON / 9600 bps / 4800 bps
bit4 bit5	Parity bit	bit4 \ bit5 / OFF / ON OFF / even / no parity ON / odd / even
bit6	Current Input Threshold	ON : With threshold OFF: Without threshold
bit7	Valve Opening During Stop (ch1)	ON :Fully open when Startup Input is OFF OFF:Fully closed when Startup Input is OFF
bit8	Valve Opening During Stop (ch2)	

③DIP Switch 2 (Lower Row)

bit	Setting Value	Description
bit1 bit2	Maximum Valve Opening Setting (ch1)	bit1 \ bit2 / OFF / ON OFF / 480 Pulse / 500 Pulse ON / 656 Pulse / 480 Pulse
bit3	Valve Opening Conversion (ch1)	ON :RA Action OFF:DA Action (DA:Fully open at 20mA, RA:Fully closed at 20mA)
bit4	Sampling Time (ch1)	ON :10 seconds OFF:1 second
bit5 bit6	Maximum Valve Opening Setting (ch2)	bit5 \ bit6 / OFF / ON OFF / 480 Pulse / 500 Pulse ON / 656 Pulse / Synchronous operation
bit7	Valve Opening Conversion (ch2)	ON :RA Action OFF:DA Action (DA:Fully open at 20mA, RA:Fully closed at 20mA)
bit8	Sampling Time (ch2)	ON :10 seconds OFF:1 second

④Via Communication
The following can only be set via communication.
These settings are retained even after power cycling.

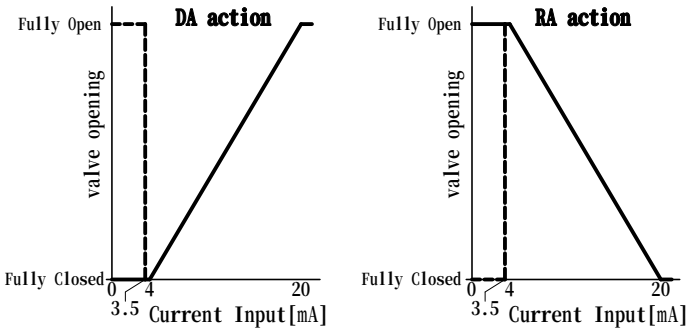
Setting Value	Description
Response Delay Time	Responds after waiting for this set time after receiving the request message.
Auto Return of Reference Valve Opening(Prevention of Forgetting to Return)	Disabled: No auto return Enabled : Returns to current input 30 minutes after the last command reception.

13.Usage Instructions

○Terminology Explanation

Function	Description
Fully Closed	The position of the stepper motor of the electronic expansion valve is at 0 pulses, and the valve is fully closed.
Fully Open	The position of the stepper motor of the electronic expansion valve is at the maximum pulses, and the valve is fully open.
Valve Opening	The number of pulses used for positioning the electronic expansion valve (unit: pulses).
Valve Opening Ratio	The valve opening expressed as a percentage (0% :fully closed, 100%: fully open).
Command Input	The input information used to determine the valve opening of the electronic expansion valve (unit: mA).
Command Input Ratio	The command input expressed as a percentage. The Valve Opening Conversion Direction is applied (0%: equivalent to 4mA, 100%: equivalent to 20mA).
Target Valve Opening	The number of pulses the electronic expansion valve aims for based on the command input or command input ratio (unit: pulses).
Zero-point Setting	The operation to reset the position of the electronic expansion valve to the zero-point position.

○Pulse Output Characteristics (Dashed Line: With Current Input Threshold)

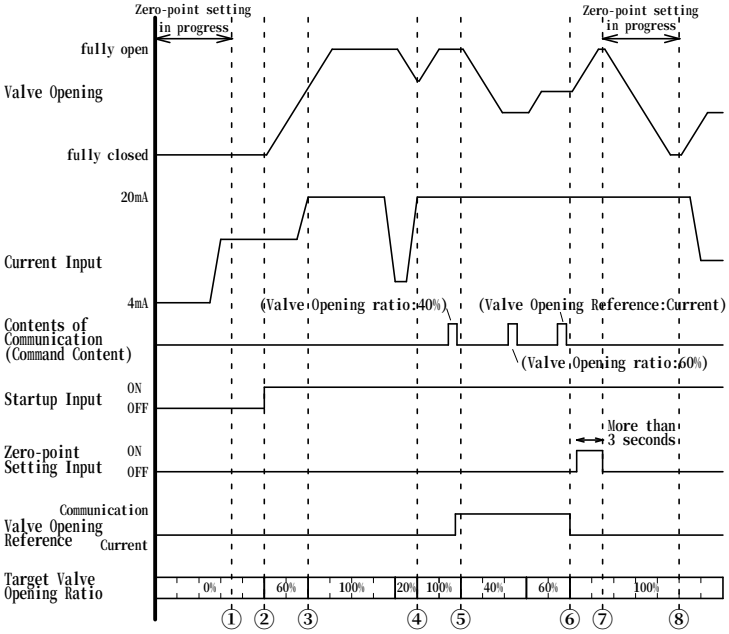


- The electronic expansion valve operates according to the valve opening command from the current input or communication.
- When the Current Input Threshold is set to "with threshold," the fully open/fully closed state reverses at less than 3.5mA.
- For valve opening commands via communication, you can specify the actual pulses from 0 pulses to the maximum valve opening or the equivalent ratio of 4-20mA in the range of 0.0% to 100.0%.

○Function Explanation

Function	Description
Startup Input	Drives the electronic expansion valve with a contact signal to the startup input. ON :Controls the valve opening at the target valve opening. OFF:Stops control at the "Valve Opening During Stop".
Zero-point Setting	Operates the electronic expansion valve until it hits the stopper, resets the valve opening to the zero-point position, and then resumes valve opening control. Executed by turning on the power, shorting the Zero-point setting input for 3 seconds, or via communication command.
Synchronous Operation	When bit5 and bit6 of DIP switch 2 are ON, it enters synchronous operation mode, driving ch1 and ch2 of the electronic expansion valve to the same target valve opening. The valve operation conditions, including the startup input, operate according to the settings of ch1 (Maximum Valve Opening Setting, Valve Opening Conversion Direction, Sampling Time, Valve Opening During Stop). Zero-point setting is not synchronized and is performed independently for ch1 and ch2.
Status Display	Indicates the driving status of the electronic expansion valve with the LED lighting state. Lit : Driving according to the valve opening command (startup input ON). Blinking: Zero-point setting in progress. Off : Stopped at the Valve Opening During Stop (startup input OFF) or main power OFF.
Current Input Threshold	Sets the behavior when the current input is disconnected. With threshold :The valve opening reverses when the input is less than 3.5mA. (DA action: fully open, RA action: fully closed) Without threshold: The valve opening does not reverse when the input is less than 3.5mA. (DA action: fully closed, RA action: fully open)
Communication	Allows the master device to operate the electronic expansion valve with valve opening commands or zero-point setting commands and read the valve driving status and settings. When a valve opening command is received via communication, the valve opening command from the current input is temporarily disabled. When a command to change the valve opening reference to current is received, the valve operates with the valve opening command from the current input. If the Automatic Return of Reference setting is "enabled," the valve opening command from the current input is automatically restored 30 minutes after the last received valve opening command.

14.Basic Operation



No.	Description
—	After powering on, perform the zero-point setting.
①	When the Startup Input is OFF, output a fully closed/fully open pulse signal according to the "Valve Opening During Stop". At this time, if you read the target valve opening via communication, it will return fully closed or fully open regardless of the command content.
②	When the Startup Input is ON, output a pulse signal so that the valve opening of the electronic expansion valve reaches the target valve opening. When moving from a stop state to the open/close direction, during reverse operation from open to close direction, and when stopping upon reaching the target valve opening, hold the output for 0.5 seconds in the same phase.
③	Update the target valve opening at each "Sampling Time" (common for current input and communication command). If the target valve opening is changed in the same direction during the opening/closing operation of the electronic expansion valve, it will continue to move in the same direction.
④	If the target valve opening is updated before reaching the target valve opening, follow the updated target valve opening.
⑤	When a valve opening command is received via communication, automatically switch the "valve opening reference" to communication.
⑥	When a command to change the valve opening reference to current is received via communication, follow the target valve opening of the current input.
⑦	When the Zero-point Setting input is shorted for 3 seconds or more, or a zero-point setting command is received via communication, perform the zero-point setting.
⑧	After completing the zero-point setting, output a pulse signal according to the valve opening reference.

15.Troubleshooting

Issue	Checkpoints
LED does not light up	・Is the DC 24V power input connected? ・Is the polarity of the DC 24V correct? ・Is the Startup Input ON? ・Is the Startup Input disconnected?
LED blinks (repeatedly)	・Zero-point setting is in progress (this is not an error).It takes about 21 seconds when the Maximum Valve Opening is 656 pulses. ・Is the power supply capacity sufficient? Select a power supply that can provide more than the required power consumption.
Electronic expansion valve does not drive	・Is the Startup Input ON? ・Is the wiring of the electronic expansion valve correct? ・Is the current input within the range of 4-20mA? ・Is the polarity of the current input correct? ・Was a Valve Opening command issued via communication? It will not drive with the current input until the Valve Opening reference is switched back to current.
Does not drive at the intended Valve Opening	・Is an unsupported electronic expansion valve connected? ・Are the drive settings of the DIP switch correct? (Maximum Valve Opening Setting, Valve Opening Conversion Direction, Valve Opening During Stop) ・There may be pulse misalignment due to various factors such as debris clogging the electronic expansion valve. Perform the zero-point setting.
No communication (no response)	・Are the communication settings correct? (Duplicate slave IDs,communication speed,parity bit) ・Are the terminal resistors correctly connected at two locations? ・Is the communication line disconnected? ・Is the CRC-16 correct?

16.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.

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.

17.Restrictions of Use

This Product is designed and manufactured for the purpose of using them for coolingand 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 manual because the conditions and environment of use also have an impact on this Product.

18.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 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.

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