CKD

Controller for Electric actuators

ECMG series
System edition

INSTRUCTION MANUAL

SM-A62471/4-A

- Read this Instruction Manual before using the product.
- Read the safety notes carefully.
- Keep this Instruction Manual in a safe and convenient place for future reference.

CKD株式会社

PREFACE

Thank you for purchasing **this CKD “ECMG series” controller for electric actuators**. This Instruction Manual contains basic matters such as installation and usage instructions in order to ensure optimal performance of the product. Please read this Instruction Manual thoroughly and use the product properly.
Keep this Instruction Manual in a safe place and be careful not to lose it.

Product specifications and appearances presented in this Instruction Manual are subject to change without notice.

SAFETY INFORMATION

When designing and manufacturing any device incorporating the product, the manufacturer has an obligation to ensure that the device is safe. To that end, make sure that the safety of the machine mechanism of the device and the electric system that controls such mechanism is ensured.

Ensure to observe organization’s standards, laws and regulations etc. for safety related to design and management of the equipment.

In order to use our products safely, it is important to select, use, handle, and maintain the products properly.

Observe the warnings and precautions described in this Instruction Manual to ensure device safety. Although various safety measures have been adopted in the product, customer's improper handling may lead to an accident. To avoid this:

Thoroughly read and understand this Instruction Manual before using the product.

To explicitly indicate the severity and likelihood of a potential harm or damage, precautions are classified into three categories: “DANGER”, “WARNING”, and “CAUTION”.

⚠ DANGER	Indicates an imminent hazard. Improper handling will cause death or serious injury to people.
⚠ WARNING	Indicates a potential hazard. Improper handling may cause death or serious injury to people.
CAUTION	Indicates a potential hazard. Improper handling may cause injury to people or damage to property.

Precautions classified as “CAUTION” may still lead to serious results depending on the situation.
All precautions are equally important and must be observed.

Other general precautions and tips on using the product are indicated by the following icon.

	Indicates general precautions and tips on using the product.

Precautions on Product Use

⚠ DANGER

Do not use this product for the following applications.

- Medical equipment pertaining to sustainment and management of human life and body
- Mechanism and mechanical device for transferring and transporting people
- Critical parts for securing safety in a mechanical device

⚠ WARNING

The product must be handled by the person who has sufficient knowledge and experience.

This product is designed and manufactured as equipment and parts for general industrial machinery.

Use the product within the specifications.

It cannot be used outside of product-specific specifications. Never modify or additionally process the product.

Since this product is intended for use in general industrial machinery equipment and parts, it is not applicable to be used outdoors or in the following conditions and environments.

(It will be applicable if you consult with our company at the time of its adoption and understand the specifications of our company's product. However, even in such a case, take safety measures to avoid danger in case of failure.)

- Use in equipment and applications that come into direct contact with nuclear power, railways, aviation, ships, vehicles, medical equipment, beverages and food.
- Use in applications requiring safety, such as recreational equipment, emergency shut off circuits, press machines, brake circuits, and safety measures.
- Use in applications that are expected to have a significant impact on people and property and require special safety.

Never handle the product or remove the equipment until safety is confirmed.

- Check and maintain the machinery and equipment only after confirming that all systems related to the product are safe. Turn off the power supply of the equipment and the corresponding equipment to prevent a short circuit.
- Even when the operation is stopped, there may be a high-temperature part or a charging part. Handle the product and remove the equipment carefully.

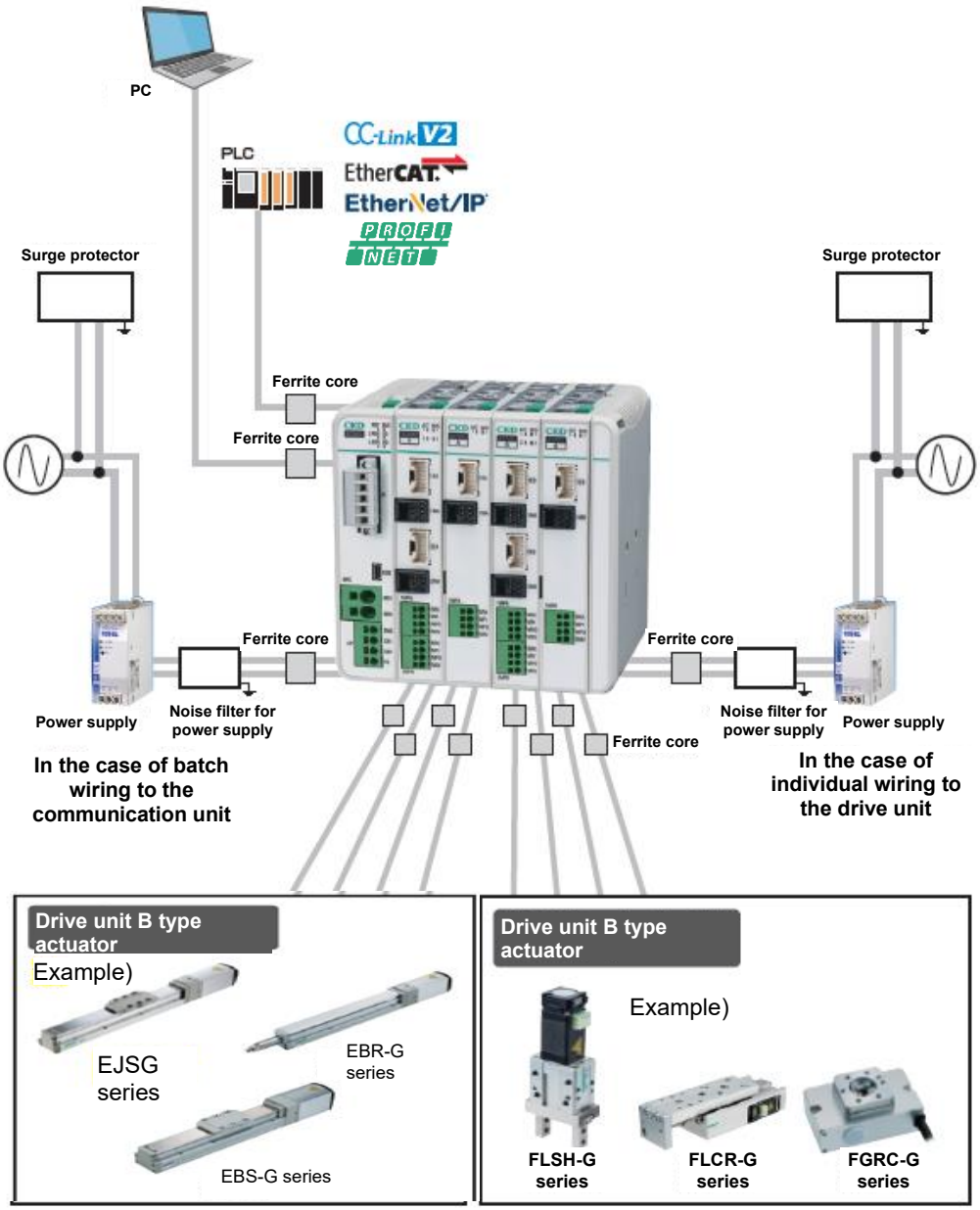
CONTENTS

1. PRODUCT OVERVIEW

1.1 System Overview

- CC-Link is a registered trademark of Mitsubishi Electric Corporation.
- EtherCAT® is the patented technology and registered trademark licensed by German Beckhoff Automation GmbH & Co. KG.
- EtherNet/IP® is a registered trademark of ODVA.
- PROFINET is a standard based on Industrial Ethernet proposed by the Profibus Organization.
- Windows is a registered trademark of Microsoft Corporation in the United States, Japan, and other countries.
- Other company and product names in this document are company's trademarks or registered trademarks.

1.1.1 System structure



Components in the system structure that are available from CKD are listed below.

	Component	Product name/Model no.
This product	Communication unit	ECMG-C series
	Drive unit	ECMG-D series
	End unit	ECMG-P series
Accessories	Communication connector (CC-Link) Note 1	1 port: MSTB 2,5/5-STF-5,08 ABGYAU (PHOENIX CONTACT) 2 ports: TFKC2,5/5-STF-5,08AU (PHOENIX CONTACT)
Sold separately	Actuator	EBS-G/EJSG/EBR-G/FLSH-G/FLCR-G/FGRC-G/ GSSD2/GSTK/GSTG/GSTS/GSTL/GCKW series
	Motor cable	EA-CBLM*-*
	Encoder cable	EA-CBLE*-*
	Motor and encoder relay cable	EA-CBLME*-*
	24 VDC power supply Note 2	EA-PWR-KHNA240F-24
Provided for free	PC setting software	S-Tools

Note 1: Please select a communication connector with either 1 or 2 ports when purchasing a communication units with CC-Link specification.

Note 2: The recommended power supply differs depending on the power supply capacity. Refer to “1.8.5 Power supply selection” for details.

To use this product as a product conforming to the European standards, refer to “6 STANDARD COMPLIANCE” and follow the instructions.

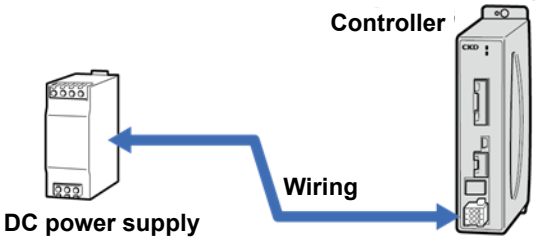
1.1.2 Workflow

Follow the steps below to wire and set the controller so that it can be operated from the PLC.

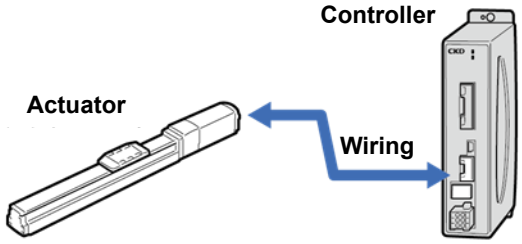
1 Unpack
Take the product out of the box. Refer to “2.2 Unpacking” for details.

2 Assemble the unit
Connect the communication unit, drive unit and end unit. Refer to “2.3 Connection between units” for details.

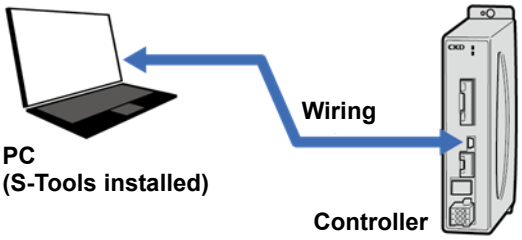
3 Connect the power supply
Connect the controller and the power supply. Refer to “2.4.1 Wiring to the power supply” for details.



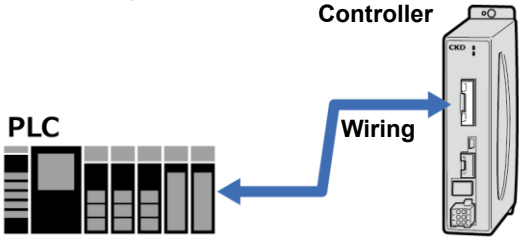
4 Connect the actuator
Connect the controller and the actuator. Refer to Instruction Manual (SM-A62474) for details.



5 Connect S-Tools
Connect the controller and a PC with S-Tools installed. Refer to “2.4.3 Wiring with S-Tools” for details.



6 Connecting a PLC
Connect the controller and the PLC. Refer to “2.4.4 Wiring with upper device (CC-Link specification)” to “2.4.7 Wiring to upper device (PROFINET specifications)” for details.



7 Set the communication settings

Use S-Tools to set the parameters for controller communication. Set the master by following the instruction manual by the manufacturer of the master unit. Refer to “3.3 Communication setting (CC-Link specification)” to “3.6 Communication settings (PROFINET specifications)” for details.

8 Setting actuator information

Set the information of the actuator connected to the controller.
Refer to Instruction Manual (SM-A62474) for details.
*No setting is required for A-type drive units. Note that if multiple actuators are used with one controller, the model information must be overwritten when switching actuators. Refer to Instruction Manual (SM-A62474) for the overwriting method.

9 Set parameters and point data

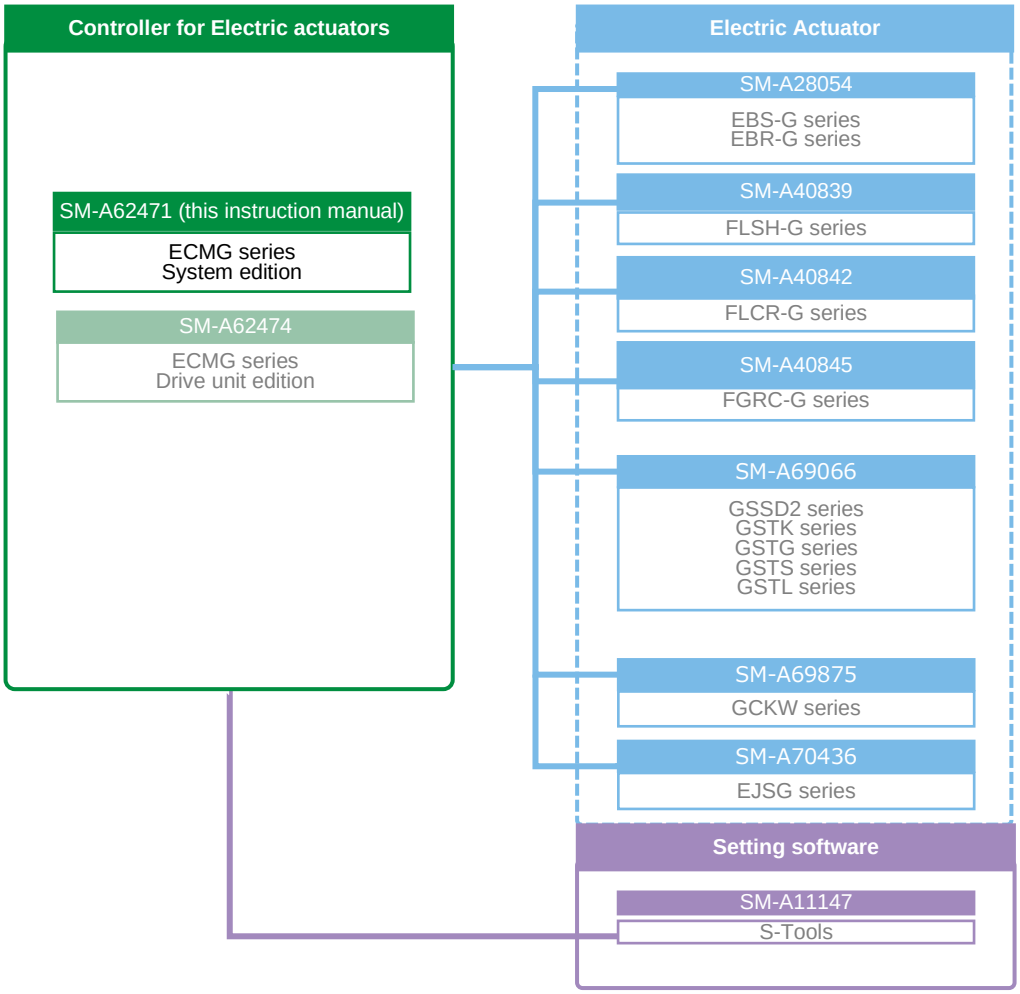
Determine the controller setting. Refer to Instruction Manual (SM-A62474) for details.

10 Start operation

Operate the actuator using the PLC. Refer to Instruction Manual (SM-A62474) for details.

1.2 Instruction Manuals Related to This Product

This Instruction Manual is “SM-A62471”.
The instruction manuals related to this product are as follows.



1.3 Software Version Updates

1.3.1 List of versions

■ Actuator and controller software version

The actuator to be used and the suitable controller software version are listed below.

<Drive unit: A type>

Actuator	Controller software version	
	Communication unit	Drive unit
EBS-G/EBR-G series	Ver.1.00.00 or higher	Ver.1.00.00 or higher
EJSG series	Ver.1.00.00 or higher	Ver.1.01.00 or higher
GSSD2/GSTK/GSTG/GSTS/GSTL series	Ver.1.00.00 or higher	Ver.1.03.00 or higher

<Drive unit: B type>

Actuator	Controller software version	
	Communication unit	Drive unit
FLSH-G/FLCR-G/FGRC-G series	Ver.1.00.00 or higher	Ver.1.00.00 or higher
GCKW series	Ver.1.00.00 or higher	Ver.1.02.00 or higher

■ Additional function and controller software version

The relationship between the function added below and the suitable controller software version is described.

<Drive unit: A type>

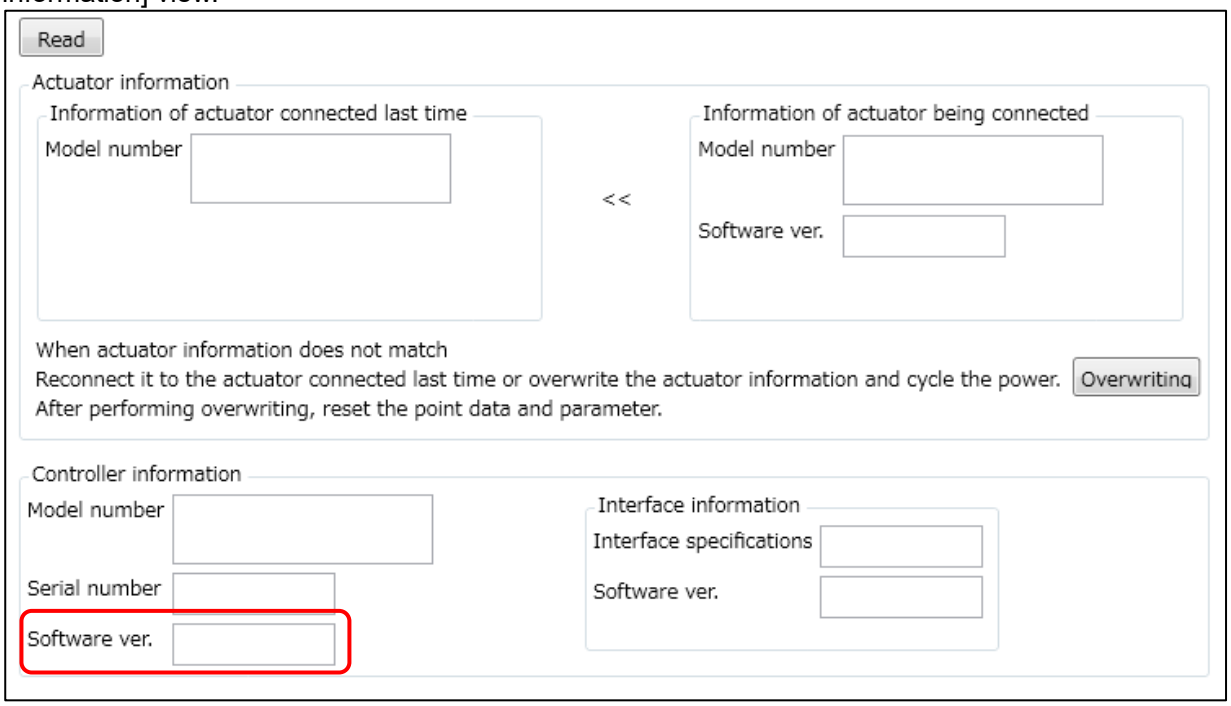
Additional function		Controller software version	
Item	Explanation	Communication unit	Drive unit
Addition of parameter -Point signal output holding -Holding time of traveling signal ON	Instruction Manual (SM-A62474)	Ver.1.00.00 or higher	Ver.1.02.00 or higher
Addition of signal -Outside soft limit -Outside soft limit (-) -Outside soft limit (+)			
Addition of parameter -First servo ON method			Ver.1.04.00 or higher
Addition of parameter options -Home position return direction (coordinate axis)			Ver.1.06.00 or higher

<Drive unit: B type>

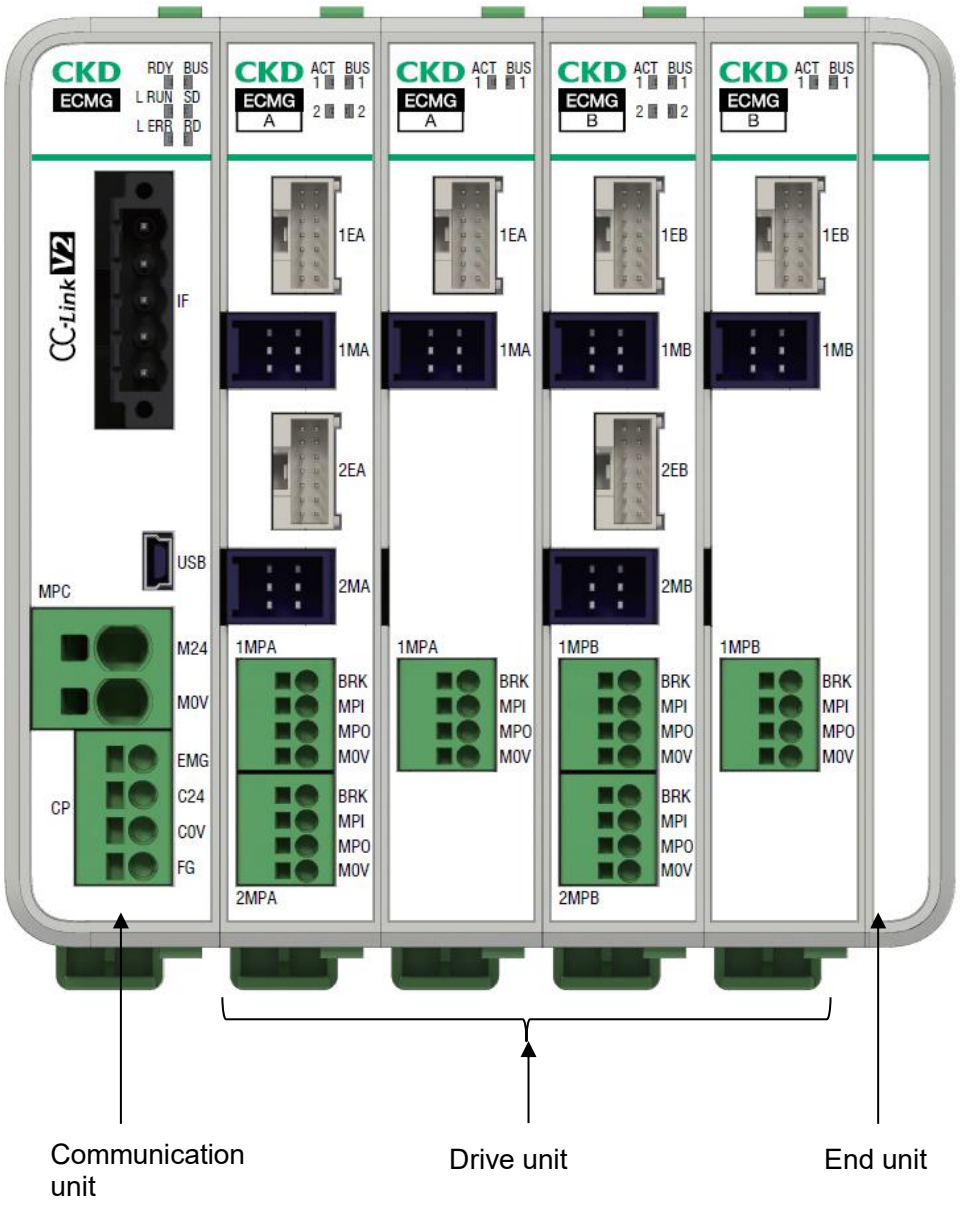
Additional function		Controller software version	
Item	Explanation	Communication unit	Drive unit
Addition of parameter -Point signal output holding -Holding time of traveling signal ON	Instruction Manual (SM-A62474)	Ver.1.00.00 or higher	Ver.1.01.00 or higher
Addition of signal -Outside soft limit -Outside soft limit (-) -Outside soft limit (+)			
Addition of parameter options -Home position return direction (coordinate axis)			Ver.1.04.00 or higher
Addition of parameter -FGRC home position return direction method			

1.3.2 How to check the version

The controller software version can be checked from the controller information in the S-Tools [Model information] view.



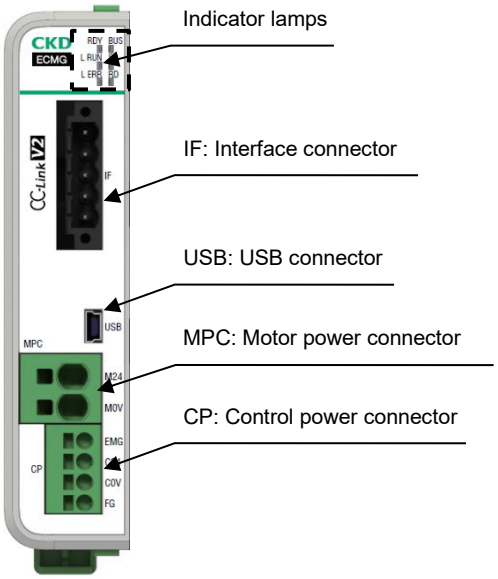
1.4 Unit composition

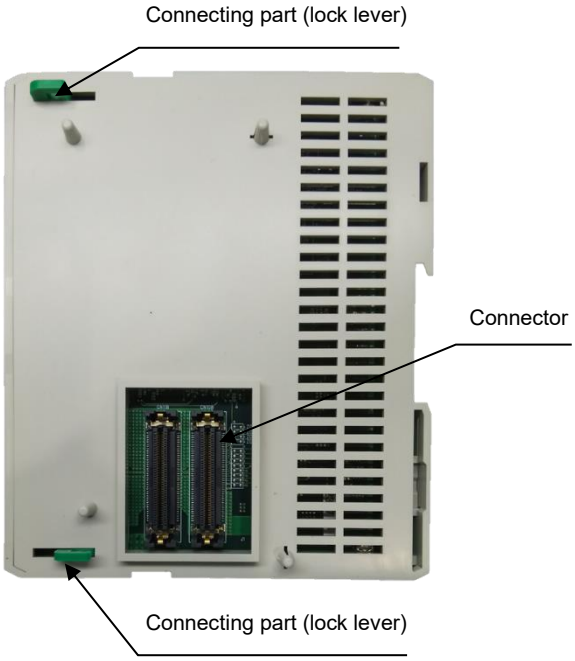


Part name	Explanation	No. of connected units
Communication unit	This unit directly communicates with external devices such as PLCs and PCs.	1 unit
Drive unit	This unit drives the electric actuator. There are units that can be connected with 1 axis and units that can be connected with 2 axes. There are A type and B type, and the connectable actuators are different.	1 to 8 units
End unit	This unit indicates the end of a unit connection.	1 unit

1.5 Name of each part

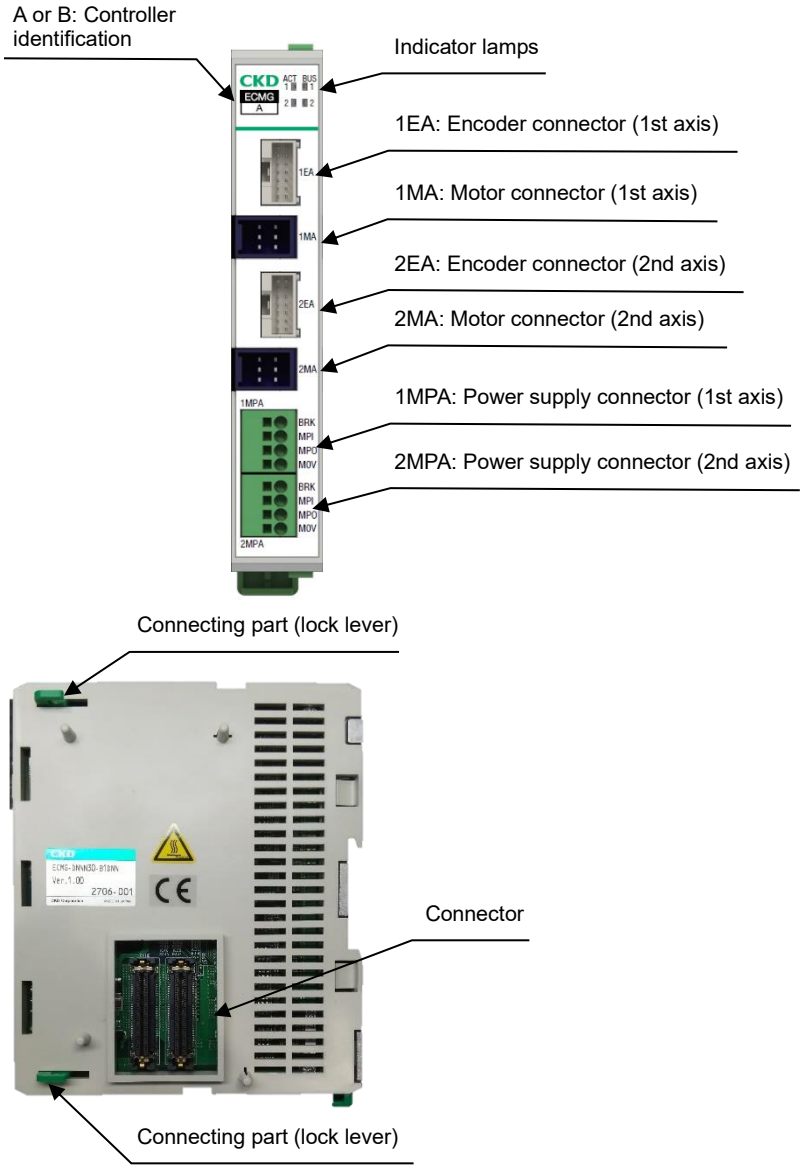
1.5.1 Name of each part of the communication unit





Code	Unit type	Part name	Description
RDY, BUS	Common	Indicator lamps	Displays the operation status of the communication unit. Refer to “1.6.1 LED indication of the communication unit” for information on LED indications.
L RUN, SD, L ERR, RD	CC-Link		
RUN, L/A IN, ERR, L/A OUT	EtherCAT		
MS, NS	EtherNet/IP		
RUN、ERR	PROFINET		
IF	Common	Interface connector	Connector used to connect the upper device Connect a dedicated cable according to each interface specification. Refer to “2.4.4 Wiring with upper device (CC-Link specification)” to "2.4.7 Wiring to upper device (PROFINET specifications)” for wiring information.
USB	Common	USB connector	Connector used to connect the S-Tools Use a commercially available USB cable (mini-B type).
MPC	Common	Power supply connector	This connector is used for supplying power to the drive unit. Refer to “2.4.1 Wiring to the power supply” for information on wiring method.
CP	Common	Control power supply connector	A connector for supplying control power of the communication unit and drive unit. Refer to “2.4.1 Wiring to the power supply” for information on wiring method.

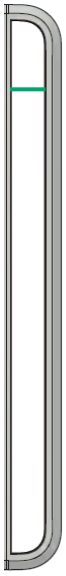
1.5.2 Name of each part of the drive unit

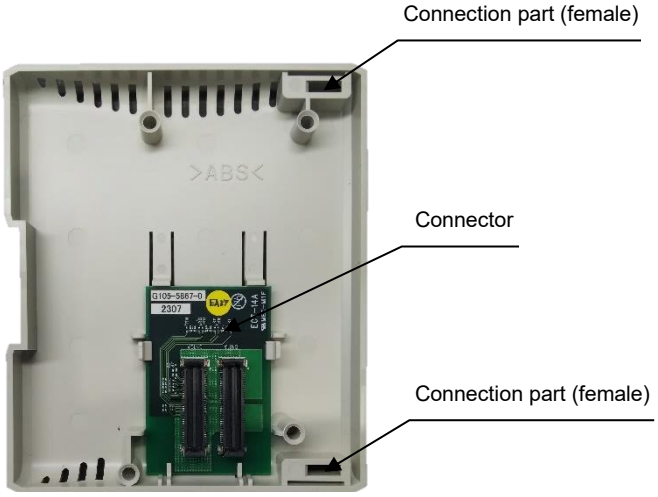


<table>
<tr><th>Code</th><th>Part name</th><th colspan="2">Description</th></tr>
<tr><td rowspan="3">A or B</td><td rowspan="3">Controller identification symbol</td><td>Identification symbol: A</td><td>Identification symbol: B</td></tr>
<tr><td>Unit type: A type</td><td>Unit type: B type</td></tr>
<tr><td>Supported actuators:
E EBS-G series/
EJSG series/
EBR-G series/
GSSD2 series/
GSTK series/
GSTG series/
GSTS series/
GSTL series</td><td>Supported actuators:
FLSH-G series/
FLCR-G series/
FGRC-G series/
GCKW series</td></tr>
<tr><td>ACT (1, 2),
BUS (1, 2)</td><td>Indicator lamps</td><td colspan="2">Indicates the operating status of the drive unit.
Refer to “1.6.2 LED indication of the drive unit ” for information on LED indications.</td></tr>
<tr><td>1EA/2EA*
Note 1</td><td>Encoder connector (n)
(n = 1, 2)</td><td>Connector used to connect the encoder cable
Connection cable model No.: EA - CBLE□ - □□□
Refer to Instruction Manual (SM-A62474) for the connection cable.</td><td rowspan="2">Connector for connecting the motor/encoder relay cable.
Connection cable model No.: EA-CBLME4-□□□
Refer to Instruction Manual (SM-A62474) for the connection cable.</td></tr>
<tr><td>1MA/2MA
Note 1</td><td>Motor connector (n)
(n = 1, 2)</td><td>Connector used to connect the motor cable.
Connection cable model No.: EA - CBLM□ - □□□
Refer to Instruction Manual (SM-A62474) for the connection cable.</td></tr>
<tr><td>1MPA/2MPA
Note 1</td><td>Power supply connector (n)
(n = 1, 2)</td><td colspan="2">Connector used to connect the power supply.
Refer to “2.4.1 Wiring to the power supply” for information on wiring method.</td></tr>
</table>

Note 1: 2MPA, 2MA and 2EA are mounted only on the drive unit for 2-axis, not on the drive unit for 1-axis.

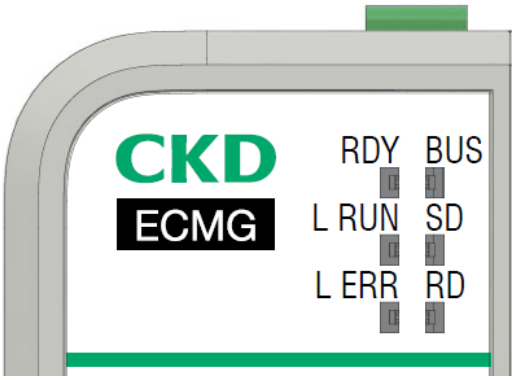
1.5.3 Name of each part of the end unit





1.6 LED indication

1.6.1 LED indication of the communication unit



Part name	Color	Unit type	Explanation
RDY	Green	Common	Displays the operation status of communication unit.
	Red		Displays the occurrence status of communication unit alarm.
BUS	Green		Displays the status of communication with the drive unit.
	Red		Displays the error occurrence status of communication with the drive unit.
L RUN	Green	CC-Link	Lights up when receiving normal data from a PLC. Turns off when time is over.
L ERR	Red		Turns OFF during normal communication. Lights when CRC error occurs. Blinks when station number or communication speed changes from setting when power was turned ON.
SD	Green		Blinks when transmitting data.
RD	Green		Lights when receiving data.
RUN	Green	EtherCAT	Indicates the slave status.
ERR	Red		Indicates the communication status.
L/A IN	Green		Indicates the link status on the IN side.
L/A OUT	Green		Indicates the link status on the OUT side.
MS	Green, red	EtherNet/IP	It indicates the network module status of this product.
NS	Green, red		It indicates the network status.
RUN	Green	PROFINET	Indicates the communication status.
ERR	Red		Indicates the error occurrence status.

■ RDY Lamp

Controller status		RDY
Control power OFF		Off
Normal	During normal operation	Lit green
	During initialization	Blinking green (lit once per second)
At alarm occurrence	At the time of the occurrence of alarm which cannot be released	Lit red
	At the time of the occurrence of alarm which can be released	Blinking red (lit once per second)
At the time of the occurrence of warning		Blinking red (lit once every two seconds)

■ BUS Lamp

Controller status (Inter-unit communication status)		BUS
Control power OFF		Off
Normal	During normal operation	Lit green
	During initialization	Blinking green (lit once per second)
When an internal cyclic communication error occurs	At the time of the occurrence of alarm which cannot be released	Lit red
	At the time of the occurrence of alarm which can be released	Blinking red (lit once per second)

■ Communication status check lamp (CC-Link)

L RUN	L ERR	SD Note 1	RD	Operation
○	◎	◎	○	Communicating normally, but noise is causing periodic CRC errors
○	0.4 s ◎	◎	○	Baud rate or station number setting has changed since power was turned ON
○	◎	●	○	CRC error occurs in received data and response cannot be made
○	●	◎	○	Communication is normal
○	●	●	○	Data to be received by this station was not received
●	◎	◎	○	Polling response sent but refresh communication received contains CRC error
●	◎	●	○	Data received by this station contains CRC error
●	●	◎	○	Link not initiated
●	●	●	○	Data to its own station does not exist or cannot be received
●	●	●	●	Data cannot be received, power is cut off, or hardware is being reset
●	○	●	○	Baud rate and station number setting are incorrect

○: ON, ●: OFF, ◎: Irregular Blink, 0.4 s ◎: Blink every 0.4 seconds

Note 1: SD blinks very fast and may appear to be lit rather than blinking depending on the communication status.

■ Communication status check lamp (EtherCAT)

<RUN>

LED Status	Operation
Off	INIT Status
Blinking	PRE-OPERATIONAL status
Blinking (momentarily)	SAFE-OPERATIONAL status
Blinking (high-speed)	BOOTSTRAP status
ON	OPERATIONAL status

<ERR>

LED Status	Operation
Off	Communication normal
Blinking	Communication error
ON	WDT error

<L/A IN>

LED Status	Operation
Off	NO LINK, NO ACTIVITY
ON	LINK, NO ACTIVITY
Blinking (high-speed)	LINK, ACTIVITY

<L/A OUT>

LED Status	Operation
Off	NO LINK, NO ACTIVITY
ON	LINK, NO ACTIVITY
Blinking (high-speed)	LINK, ACTIVITY

■ Communication status check lamp (EtherNet/IP)

<MS>

LED Status	Operation
Off	Power OFF
Blinking green	Configuring communication
Lit green	Normal operation
Blinking red	A recoverable error has occurred.
Lit red	An irrecoverable error has occurred.

<NS>

LED Status	Operation
Off	Power is OFF or IP address is not set.
Blinking green	Connection not established
Lit green	Normal communication
Blinking red	Error (timeout)
Lit red	Error (duplicate IP address)

■ Communication status check lamp (PROFINET)

<RUN>

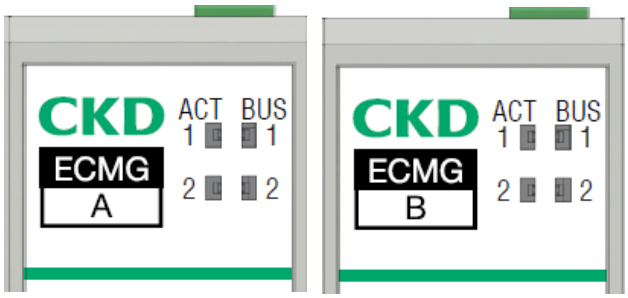
LED Status	Operation
Off	PROFINET not communicated
Blinking	PROFINET initial communication in progress or Flash LED from PLC running
ON	PROFINET cyclic communication in progress

<ERR>

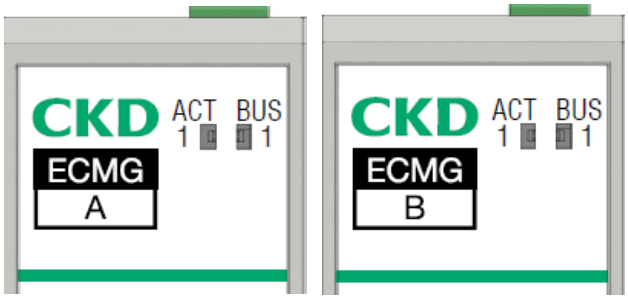
LED Status	Operation
Off	Error not occurred
Blinking	Wiring disconnection detected
ON	Hardware malfunctioning detected

1.6.2 LED indication of the drive unit

<For 2-axis>



<For 1-axis>



Part name	Color	Explanation
ACT	Green	Displays the operating status of the drive unit.
	Red	Displays the alarm occurrence status of the drive unit.
BUS	Green	Displays the communication status between units.
	Red	Displays the alarm occurrence status during communication between units.

■ ACT lamp

Controller status		RDY
Control power OFF		Off
Normal	At servo ON	Lit green
	At servo OFF	Blinking green (lit once per second)
At alarm occurrence	At the time of the occurrence of alarm which cannot be released	Lit red
	At the time of the occurrence of alarm which can be released	Blinking red (lit once per second)
At the time of the occurrence of warning		Blinking red (lit once every two seconds)

■ BUS lamp

Controller status (Inter-unit communication status)		BUS
Control power OFF		Off
Normal	During normal operation	Lit green
	During initialization	Blinking green (lit once per second)
When an internal cyclic communication error occurs	At the time of the occurrence of alarm which cannot be released	Lit red
	At the time of the occurrence of alarm which can be released	Blinking red (lit once per second)

1.7 Model Number Indication

1.7.1 Display of the model number of the communication unit

ECMG-CNN A 30- CL D NN

End unit Note 1	
A	End unit (standard) included
N	Not included

Interface specifications	
CL	CC-Link Specifications
EC	EtherCAT Specifications
EN	EtherNet/IP Specifications
EP	PROFINET specifications

Attachment Note 2	
NN	Not included
1N	Communication connector for CC-Link: 1 port
2N	Communication connector for CC-Link: 2 ports

Note 1: The end unit can be purchased separately. Please refer to “1.7.3 end unit” for details.
Note 2: If you select "EC," "EN" or "EP" as the interface specification, you must select “NN”; if you select “CL”, you can select “1N” or “2N.”

1.7.2 Display of the model number of the drive unit

There are two types of drive unit, A type and B type, and the connectable actuators are different.

Drive unit type	Suitable actuator
A type	EBS-G/EJSG/EBR-G/GSSD2/GSTK/ GSTG/GSTS/GSTL series
B type	FLSH-G/FLCR-G/FGRC-G/ GCKW series

■ A type (suitable actuators: EBS-G/EJSG/EBR-G/GSSD2/GSTK/GSTG/GSTS/GSTL series)

ECMG-DNNR30- A2 DNN

Specifications of drive unit		
A2	A type	For 2-axis connection
A1	A type	For 1-axis connection

■ B type (suitable actuators: FLSH-G/FLCR-G/FGRC-G/GCKW series)

ECMG-DNNN30- B2 DNN

Specifications of drive unit		
B2	B type	For 2-axis connection
B1	B type	For 1-axis connection

1.7.3 Display of the model number of the end unit

ECMG-PNNN30-EACNN

1.8 Specifications

1.8.1 Basic specifications

■ Entire system

Item	Description
Setting tool	Setting software (S-Tools)
Operation mode (PIO) Note 1	64-point mode, simple 7-point mode
Operation mode (CC-Link), Operation mode (EtherCAT), Operation mode (EtherNet/IP), Operating mode (PROFINET)	PIO mode, simple direct value mode, standard direct value mode, and full direct value mode
Power supply voltage	24 VDC ± 10%
Insulation resistance	10 MΩ or more with 500 VDC
Withstand voltage	500 VAC 1 minute
Operating ambient temperature	0 to 40ºC (Non-freezing)
Operating ambient humidity	35 to 80%RH (Non-condensing)
Storage ambient temperature	-10 to 50ºC (Non-freezing)
Storage ambient humidity	35 to 80%RH (Non-condensing)
Operating atmosphere	No corrosive gas, explosive gas, or dust
Degree of protection	IP20
Weight	Depends on the unit composition

Note 1: Valid only when the operation mode (CC-Link, EtherCAT, EtherNet/IP, PROFINET) = PIO mode.

■ Communication unit

Item		Description
Indicator lamps	CC-Link	RDY, BUS, L RUN, L ERR, SD, RD
	EtherCAT	RDY, BUS, RUN, ERR, L/A IN, L/A OUT
	EtherNet/IP	RDY, BUS, MS, NS
	PROFINET	RUN/ERR
Emergency stop release input		24 VDC ± 10%
Weight		About 180 g

■ Drive unit

Item		Description	
Unit type		A type	B type
Applicable actuators		EBS-G/EJSG/EBR-G/GSSD2/GSTK/ GSTG/GSTS/GSTL	FLSH-G/FLCR-G/FGRC-G/GCKW
Indicator lamps	1 axis	ACT 1, BUS 1	
	2 axes	ACT 1, BUS 1, ACT 2, BUS 2	
Brake release input		24 VDC ± 10%	
Weight		About 295 g	

1.8.2 Communication specifications

■ CC-Link Specifications

Item		Details
Communication protocol		CC-Link
CC-Link version		Ver. 2.00 (can also be used with Ver. 1.10 depending on the number of stations occupied.)
Station type		Remote device station
The number of stations occupied	CC-Link Ver.1.10	4 stations
	CC-Link Ver.2.00	Up to 4 stations (extended cyclic setting: 8 times) (Varies depending on the number of connected drive units and operation mode settings.)
Remote input/output	Communication unit	Input 16 bytes/output 16 bytes
	Drive unit (per axis)	Input 0 bytes/output 0 bytes (Only the remote register is occupied.)
Remote register	Communication unit	Input 0 words/output 0 words (Only remote I/O is occupied.)
	Drive unit (per axis)	PIO mode: Input 2 words/output 2 words Simple direct value mode: Input 4 words/output 4 words Standard direct value mode: Input 8 words/output 8 words Full direct value mode: Input 12 words/output 12 words
Communication speed		10 M/5 M/2.5 M/625 k/156 kbps
Extended cyclic setting	CC-Link Ver.1.10	- (cannot be set)
	CC-Link Ver.2.00	1x/2x/4x/8x
Connection cable		CC-Link Ver.1.10-compatible cable (Shielded 3-conductor twisted pair cable)
Transmission format		HDLC compliant
Remote station No.		1 to 64 - Number of stations occupied + 1
No. of connected units		42 max. (remote device stations only)

* For operation modes (PIO mode, simple direct value mode, standard direct value mode, and full direct value mode), refer to “3.8.4 Operation mode”.

■ EtherCAT Specifications

Item	Details
Communication protocol	EtherCAT
Communication speed	100 Mbps (Fast Ethernet, full duplex)
Process data	Variable PDO mapping
Max. PDO data length	RxPDO: 272 bytes/TxPDO: 272 bytes
Station alias	0 to 65535 (set with parameter)
Communication cable	Ethernet cable (CAT5e or above twisted-pair cable (aluminum tape and braided double-shield) recommended)
Node address	Automatically assigned by master

■ EtherNet/IP Specifications

Item	Details
Communication protocol	EtherNet/IP
Communication speed	Automatic setting (100 Mbps/10 Mbps, full duplex/half duplex)
Allocated number of bytes	Input: 272 bytes / Output: 272 bytes
IP address	Setting by parameter (0.0.0.0 to 255.255.255.255) Via DHCP server (arbitrary address)
RPI (packet interval)	4 ms to 10,000 ms
Communication cable	Ethernet cable (CAT5e or above twisted-pair cable (aluminum tape and braided double-shield) recommended)
Vendor ID	201 (decimal)/0x00C9 (hexadecimal)
Product code	119 (decimal)/0x0077 (hexadecimal)

* When the power supply is turned OFF, the IP address obtained from the DHCP server will be deleted.

■ PROFINET specifications

Item	Details
Communication protocol	PROFINET IO
Communication speed	100M bps
Allocated number of bytes	Input: 272 bytes to the maximum / Output: 272 bytes to the maximum
Communication cable	Ethernet cable (CAT5e or above twisted-pair cable (aluminum tape and braided double-shield) recommended)
Conformance Class	CC-B

1.8.3 Limits on the number of connections (limit by unit specifications)

■ Limit by the number of connected units

Up to eight drive units can be connected to one communication unit. Therefore, when only a drive unit for 1-axis connection is used, the actuator can be used for up to 8 axes at maximum.

Example 1) When using the EBS series for 9 axes
9 drive units (A-type for 1-axis connection) are used.
→ “Unavailable” due to a total of 9 units > 8 units
4 drive units (A-type for 2-axis connection) and 1 drive unit (A-type for 1-axis connection) are used.
→ “Available” due to a total of 5 units < 8 units

Example 2) When using 15 axes with the EBS series and 1 axis with the FLSH series
7 drive units (A-type for 2-axis connection), 1 drive unit (A-type for 1-axis connection), and 1 drive unit (B-type for 1-axis connection) are used.
→ “Unavailable” due to a total of 9 units > 8 units
Since a minimum of nine drive units are required, two communication units must be provided.

If 9 or more drive units are connected to one communication unit, an alarm 0x3B43 is generated at the communication unit.

■ Limits on the number of connections due to network

Interface specifications	Data size limit
CC-Link	Up to 272 bytes (When the number of stations occupied is 4 and the extended cyclic setting is 8 times)
EtherCAT, EtherNet/IP, PROFINET	Up to 272 bytes

<Maximum number of connectable axes when using the same operation mode>

Number of connectable axes			
PIO mode	Simple direct value mode	Standard direct value mode	Full direct value mode
16 axes	16 axes	16 axes	10 axes

<Number of connectable axes when using different operation modes for each axis>
Example) Full direct value mode: 10 axes; simple direct value mode: 2 axes

Data size	Judgment
16 bytes + 24 bytes × 10 axes + 8 bytes × 2 axes = 272 bytes = < 272 bytes	Available

If the data size exceeds 272 bytes, an alarm 0x4603 is generated in the communication unit and the actuator cannot be operated from the PLC. Review the operation mode setting.

1.8.4 Limit on number of connections (limited by current consumption)

For the control power supply, it is necessary to supply a current of 0.4 A per unit. For the power supply, it is necessary to supply the required current for each axis. If the current is supplied by the batch method, the current must only flow up to 30 A maximum.

■ Limit on the current value of communication unit and drive unit

Unit	Power supply		
Communication unit	Control power	-	It supports power supplying when using 16 axes (0.4 A x 7 units = 2.8 A), and there are no restrictions on unit specifications.
	Power supply	30.0 A or less	Since the batch power supplying may not meet the capacity, it is necessary to make judgments and supply current by the individual method as necessary.
Drive unit	Power supply (2MPA, 1MPA)	-	Supports the maximum current when using the □56 motor, so there are no restrictions on unit specifications.

■ Current consumption per actuator (one axis)

Current consumption per actuator axis is as follows. If it is equipped with a brake, consider adding the brake current (0.4 A).

<Drive unit: A type>

Model	Current (A)
EBS-04G, EJSG-04, EBR-04G	3.4
EBS-05G, EJSG-05, EBR-05G	4.2
EBS-08G, EJSG-08, EBR-08G	4.5
GSSD2-20, GSTK-20, GSTG-20, GSTS-20, GSTL-20	1.8
GSSD2-32, GSTK-32, GSTG-32, GSTS-32, GSTL-32	2.0
GSSD2-50, GSTK-50, GSTG-50, GSTS-50, GSTL-50	3.1

<Drive unit: B type>

Model	Current (A)
FLSH-16G, FGRC-10G, GCKW-16	0.3
FLSH-20G, FLCR-16G, GCKW-20	0.5
FLSH-25G, GCKW-25	0.6
FGRC-30G	0.7
FLCR-20G	0.9
FGRC-50G	1.1
FLCR-25G	1.6

■ Wiring example

Example 1: Actuator EBS-08 x 16 axes

Wiring method	Power supply (communication unit) power supply current	Judgment
Batch method	4.5 A x 16 axes = 72 A > 30 A	Unavailable
Mixed method (6 axes: batch, 10 axes: individual)	4.5 A x 6 axes = 27 A < 30 A	Available

1.8.5 Power supply selection

When conforming to UL, use a Class 2 power supply unit conforming to UL1310 for the combined DC power supply.

■ Recommended power supply

Manufacturer	CKD model number[*1]	Manufacturer model number	Rated current Note 2	Output peak current Note 2 and 3	Parallel connection	DIN rail compatible
TDK-Lambda Corporation	-	HWS300P-24	12.5 A	42 A	×	×
	-	HWS600P-24	25 A	83 A	o[*6]	×
COSEL CO., LTD.	EA-PWR-KHNA240F-24-N2	KHNA240F-24-N2	10 A	15 A	×	×
	EA-PWR-KHNA240F-24	KHNA240F-24	10 A	15 A	×	o
	-	AEA600F-24-N	17.5 A[*5]	52.5 A[*5]	o	×
	-	AEA1000F-24-N	30.0 A[*5]	100.0 A[*5]	o	×
OMRON Corporation	-	S8VK-S24024	10 A	15 A	o[*6]	o
	-	S8VK-S48024	20 A	30 A	o[*6]	o

Note 1: It can be purchased from CKD. Products marked with "-" (hyphen) cannot be purchased from CKD, please contact the manufacturer.
Note 2: Derating may be required for output power depending on power supply mounting method, ambient temperature, input voltage, etc. Refer to the manufacturer's website for details on power supply usage conditions.
Note 3: Be careful of usage restrictions due to peak current such as DUTY limit, etc. Refer to the manufacturer's website for details.
Note 4: AC200 V, the current at the time of input.
Note 5: AC230V, the current during natural air cooling.
Note 6: Up to two devices can be connected in parallel.

■ Maximum current per actuator (one axis)

The maximum current per actuator axis is as follows. If it is equipped with a brake, consider adding the brake current (0.4 A).

<Drive unit: A type>

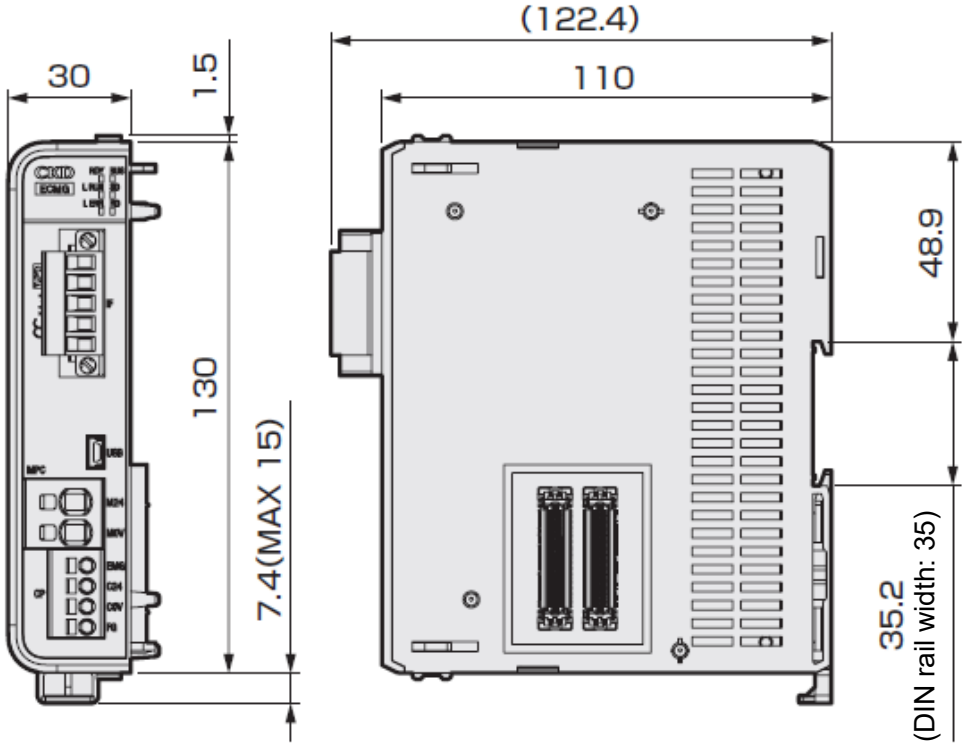
Model	Current (A)
EBS-04G, EJSG-04, EBR-04G	12.4
EBS-05G, EJSG-05, EBR-05G	12.2
EBS-08G, EJSG-08, EBR-08G	12.5
GSSD2-20, GSTK-20, GSTG-20, GSTS-20, GSTL-20	5.7
GSSD2-32, GSTK-32, GSTG-32, GSTS-32, GSTL-32	7.5
GSSD2-50, GSTK-50, GSTG-50, GSTS-50, GSTL-50	4.7

<Drive unit: B type>

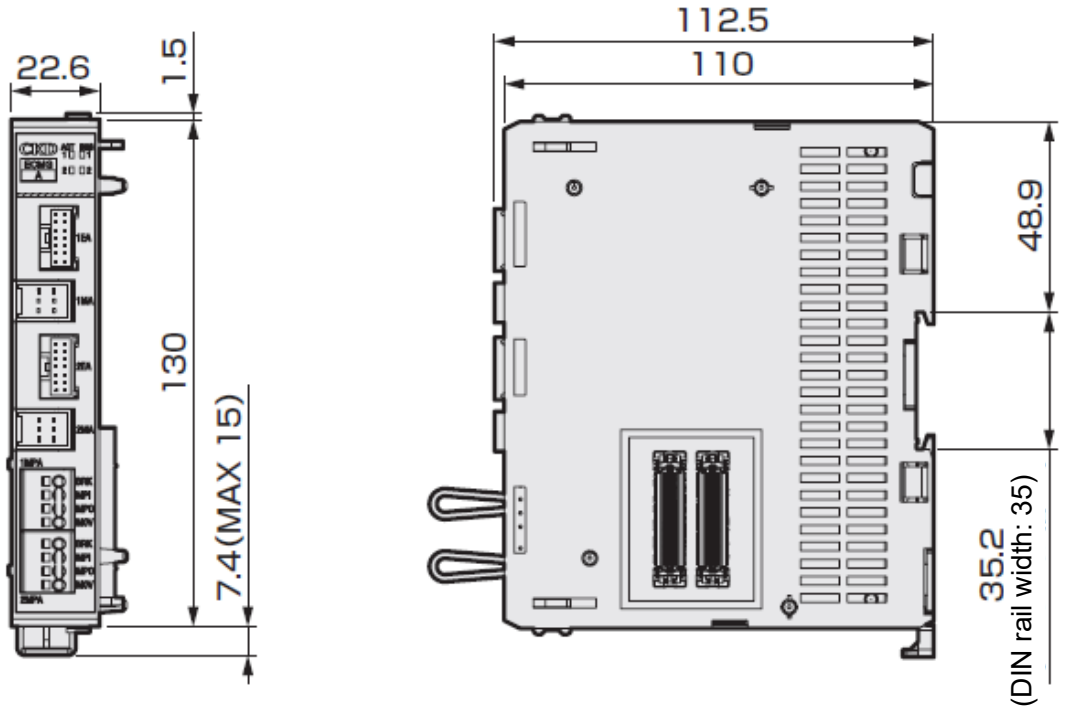
Model	Current (A)
FLSH-16G, GCKW-16	0.4
FLSH-20G, GCKW-20	0.7
FLSH-25G, GCKW-25	0.8
FLCR-10G	1.0
FLCR-20G	1.5
FLCR-25G	2.8
FGRC-10G	0.5
FGRC-30G	0.9
FGRC-50G	1.5

1.9 Dimensions

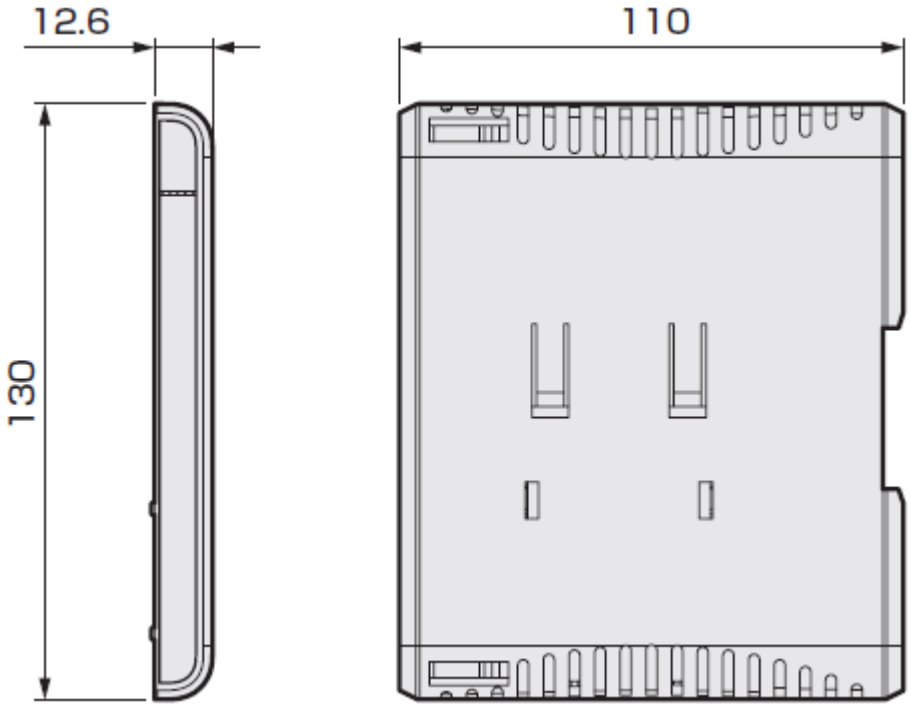
■ Communication unit



■ Drive unit



■ End unit



2. INSTALLATION

⚠DANGER

Do not use in locations with ignitable, flammable, or explosive substances or other such dangerous substances.
This may cause ignition, ignition, or explosion.

Do not work with wet hands.
Doing so may cause electric shock.

Prevent water and oil from splashing onto the product.
A fire, electric leakage, or failure may occur. Even oil drops and oil mists are prohibited.

When connecting a personal computer, prevent frame ground of the computer from being grounded.
If a plus terminal of the product is grounded, connecting the product to a PC with a USB cable may cause short-circuit in the DC power supply.

Make sure to hold and secure a workpiece to install the product.
An injury may occur if the product falls down, falls off, or operates abnormally.

Use a DC stabilized power supply (24 VDC ± 10%) with sufficient capacity as a power supply for the controller and the input/output circuit.
If the product is directly connected to an AC power supply, a fire, burst or damage may occur.

Install overcurrent protective equipment (such as a breaker for wiring and a circuit protector) on the power supply on the primary side when wiring in accordance with "JIS B 9960-1:2019 (IEC 60204-1:2016) Safety of machinery - Electrical equipment of machines - Part 1: General requirements".

Description from "7.2.1 General" of JIS B 9960-1:2019:
Overcurrent protection shall be provided where the current in a circuit can exceed either the rating of any component or the allowable current of the conductors, whichever is the lesser value. The ratings or settings to be selected are detailed in 7.2.10.

⚠WARNING

Do not install the product to a combustible material.
If the product is installed near a combustible material, a fire may result.

Do not place heavy objects on cables or pinch them.
Otherwise, the cover of the cable may tear or excessive stress is applied, causing poor continuity and insulation degradation.

Do not connect the communication connector used for this product to other devices.
A malfunction or damage may occur.

Do not use or store the product in an environment where there is strong electromagnetic waves or radiation.
A malfunction or failure may occur.

Because precision instruments are integrated, do not lay the product sideways or subject the product to vibration or impact during transportation.
Component damage may occur.

Do not perform disassembly or modification of products that are not specified in this manual.
An injury, accident, malfunction, or failure may occur; in addition, the specifications described in this manual may not be satisfied.

Install a safety fence to prevent entry into the actuator operation range.

Insulate unused wires.
A malfunction, failure, or electric shock may occur.

If the system is such that the machine stops in the event of a system failure such as an emergency stop or a power failure, design and implement a safety circuit or a safety device to prevent damages to the devices and injuries to people.

Install the product indoors and in a dry place.
In a place where water can splash onto the product or where humidity is high (80% or more and with condensation), an electric leakage or fire accident may occur.

Perform class D grounding (ground resistance: 100 Ω or less) for the product.
An electric leakage may occur and cause an electric shock or malfunction.

Perform the wiring of the product securely so as not to cause miswiring or loosening of connectors, as confirmed in this instruction manual. Also, check the insulation of the wiring.
Make sure that the wires do not contact other circuits and there is no ground fault and insulation failure between terminals. Otherwise, an overcurrent may flow into the product and cause damage. This may result in an abnormal operation or fire.

Insulate unused wires.
A malfunction, failure, or electric shock may occur.

When restarting after emergency stop or abnormal stop, check that it is safe for the actuator to operate.

Design safety circuits or devices as the entire system including hardware in order to prevent damage to the device or an accident resulting in injury or death in the event that a machine stops due to system abnormality such as an emergency stop or a power failure.

When wiring the product, refer to this Instruction Manual or any other relevant instruction manuals to make sure that the wiring is correct and connectors are firmly connected.
Otherwise, abnormal operation or the flow of an overcurrent may result. Overcurrent may cause abnormal operation, damage, or fire.

Prevent foreign matters such as screws from entering through an opening of a product.
This may result in damage to the product or fire.

If there is heat generation from the equipment in the surroundings, or if heat gets stuck, take measures to keep the ambient temperature at 0 to 40°C, such as installing a fan on the control panel.
There is a risk of burns or fire.

⚠ WARNING

When installing the actuator in a direction other than horizontal, select the type with brake.
If the motor is not equipped with a brake, the movable parts may fall off at servo OFF (including emergency stops and alarms) or power OFF, which may result in injury or damage to the workpiece.

Do not carry or install the product by holding its cable or the movable section.

An injury or cable disconnection may occur.

2.1 Environment

- Confirm the ambient temperature and atmosphere listed in the product specifications when storing or using the product.
- Install the product where it is not subjected to direct sunlight and away from a heating element. Also, avoid dust, corrosive gas, explosive gas, inflammable gas, and combustible material. Chemical resistance has not been considered for the product.
- This product cannot be mounted or used in wet or oily locations.
- Doing so could cause electricity leakage or fires. Oil and oil mist are strictly prohibited.
- Use the product in an operating ambient temperature of 0 to 40°C. Ventilate if heat can become trapped.
- Install the controller so that the exhaust port faces up and down and the power supply connector on the front panel faces down. Allow at least 50 mm of space on both the top and bottom surfaces to allow for natural convection.
- Use the setting tool (S-Tools setting software) to set parameters. Leave a space of at least 70 mm in front of the controller, so that the connector can be attached and removed.
- Provide a safety fence to prevent access to the movable range of the electric actuator. In case of an emergency, install the product in a place where the emergency stop button switch can be easily operated. The emergency stop button switch must not be automatically reset, and the structure and wiring must not allow a person to reset the switch inadvertently.

2.2 Unpacking

CAUTION

Do not carry heavy products alone.

Do not stand on the package.

In order to prevent deforming the package, do not place heavy objects and objects of which their load concentrates.

Do not apply unnecessary force to any part of the product.

When carrying or handling the product, use extreme care not to apply impact to the product (for example, do not drop the product).

When taking the product out of the package, hold the product body.

Place the product horizontally when not in use.

Check that the model number ordered and the model number indicated on the product are the same.
Check the exterior of the product for any damage.

■ Contents of set

<Communication unit (ECMG-CNN*30-D**)>**

No.	Product
1	Communication unit (ECMG-CNN*30-**D**)
2	CC-Link connector (1 or 2 ports) Note 1
3	End unit (ECMG-PNNN30-EAC**) Note 2
4	INSTRUCTION MANUAL

Note 1: A CC-Link connector with either 1 or 2 ports is included only when “CC-Link” is specified as the “Interface specification” of the communication unit. Refer to “1.7.1 Display of the model number of the communication unit” for details.
Note 2: The end unit is included only when selecting the “End unit (standard) included” for the “end unit” of communication unit.

<Drive unit (ECMG-DNN*30-DNN)>**

No.	Product
1	Drive unit (ECMG-DNN*30-**DNN) Note 1
2	INSTRUCTION MANUAL

Note 1: A jumper wire is included to connect the power plugs MPI and MPO. To use individual power supply, remove the jumper wire. Refer to “2.4.1 Wiring to the power supply” for details.

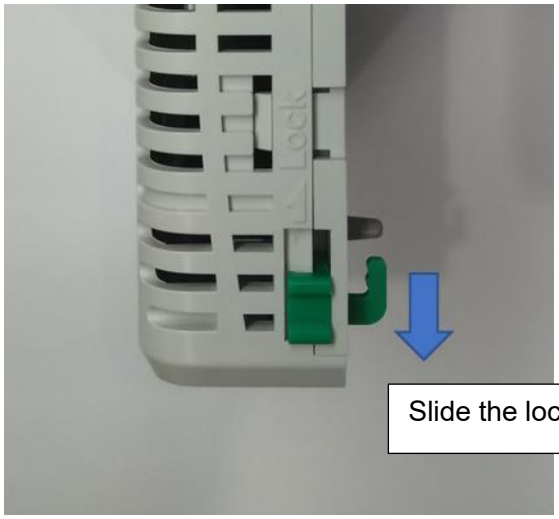
<End unit (ECMG-PNNN30-EACNN)>

No.	Product
1	End unit (ECMG-PNNN30-EACNN)

2.3 Connection between units

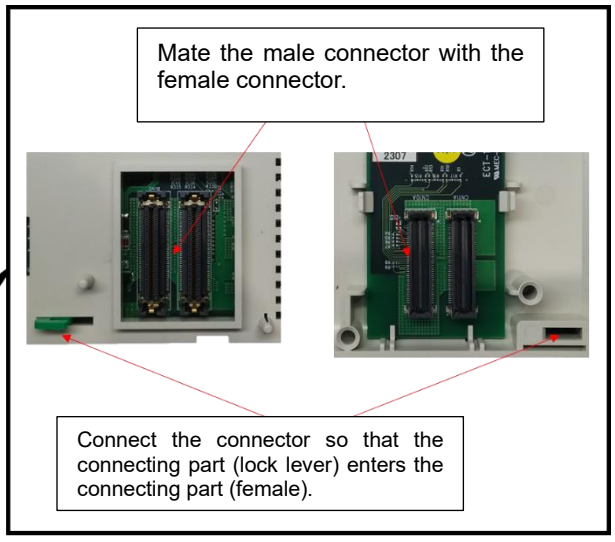
■ Connection method

1 Unlock the lock lever.

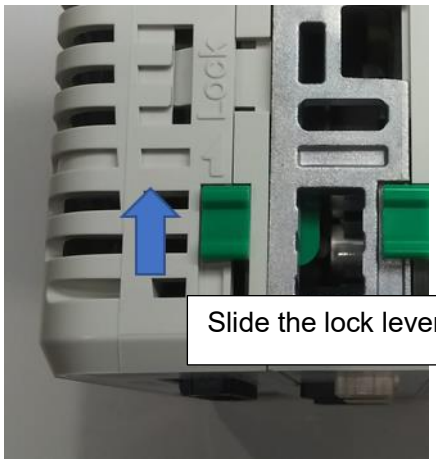


Slide the lock lever toward the front panel.

2 Connect by mating the connector parts.



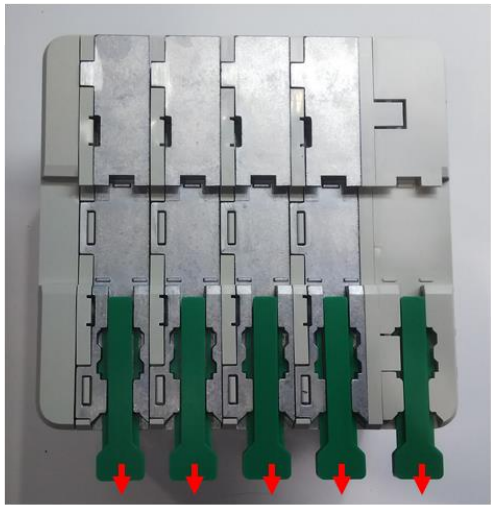
3 Slide the lock lever toward the back and fix it.



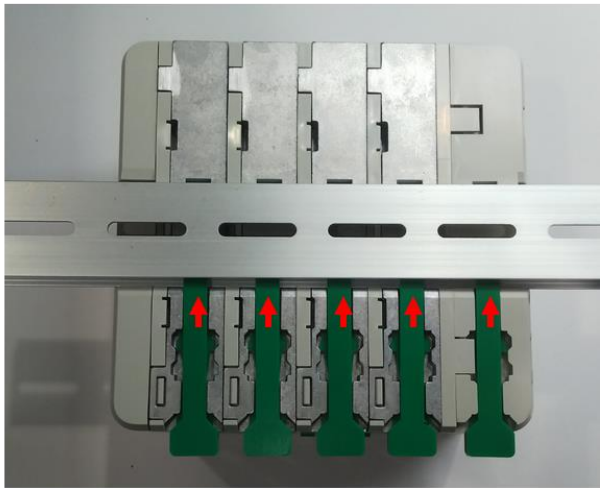
Slide the lock lever toward the back.

4 Attach to the DIN rail.
*DIN rail is not included in this product.

(1)



(2)



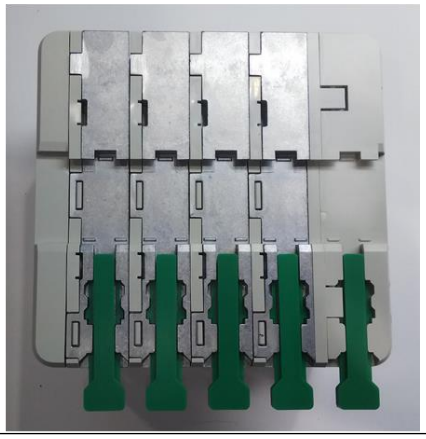
(1) Unlock a DIN rail lock.
(2) After attaching the controller to the DIN rail, secure it with the DIN rail lock.

■ Disassembly method

1 Remove from the DIN rail.

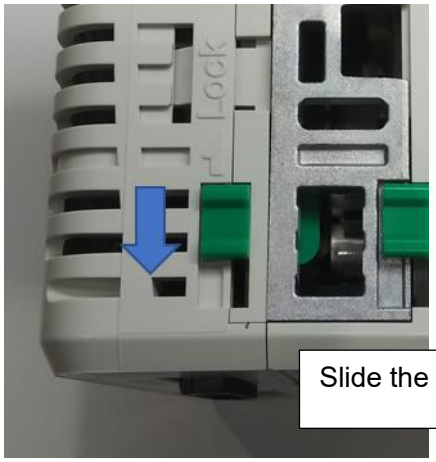
(1)

(2)



(1) Unlock a DIN rail lock.
(2) Remove the controller from the DIN rail.

2 Release the lock between units.



Slide the lock lever toward the front panel.

3 Disconnect units.

2.4 Wiring method

⚠ WARNING

Perform the wiring with the power supply turned OFF.
Touching the electrical wiring connections (bare charging part) may cause electric shock.

Do not touch the charging part with bare hands.
Doing so may cause electric shock.

Read and fully understand this instruction manual before performing the electrical wiring.

CAUTION

Check the working voltage and polarity before wiring and energizing.
A wrong wiring may cause failure.

Take countermeasures against lightning surges in the equipment side.
The product is not resistant to lightning surges.
For an AC voltage, use it in the installation category 2.

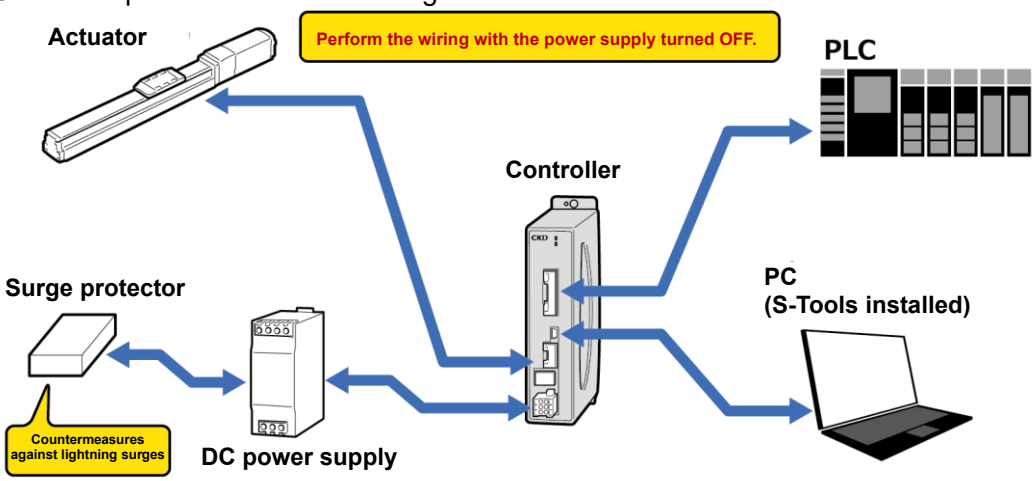
To prevent the wiring connection from loosening or coming off, retighten the screws of the terminal block with a specified torque, and insert the connectors correctly.
This may cause fire, electric shock or malfunction of the equipment.

Use a dedicated communication cable conforming to the specifications of each network

Secure a sufficient bending radius of the communication cable to avoid excessive bending.

Secure distance from the communication cable to the power line and the high voltage line so that it is not affected by noise.

Check the precautions before wiring.



2.4.1 Wiring to the power supply

⚠WARNING

Always set the input for force brake release (BRK) to either 0 VDC or open during normal operation, so that the brake can be applied.
If 24 VDC is applied to force brake release (BRK), the brake will be forcibly released. The movable part of the actuator could fall, causing injury or damaging the workpiece.

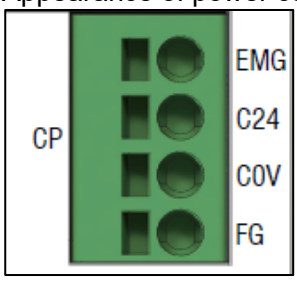
When using in the batch method, wire the power only to the power connector of the communication unit. When using in the individual method, connect the power to the power connector of the communication unit and the power connector of the drive unit. For information on selecting the batch method or individual method, refer to “1.8.4 Limit on number of connections (limited by current consumption)”.

■ Specifications of power connector (communication unit)

<Connector terminal list of CP (control power supply)>

Terminal name	Function name	Description of function
EMG	Emergency stop input	Connects the emergency stop switch for b contact. The servo of the actuator cannot be turned ON during an emergency stop. 24 VDC applied: Emergency stop will be canceled. 0 VDC or open: Emergency stop will be performed.
C24	Control power (+)	Applies 24 VDC of the control power supply.
C0V	Control power (-)	Applies 0 VDC common to the control power supply and emergency stop input.
FG	Frame ground	

Appearance of power connector



Use electrical wiring with the following specifications to connect to the power supply connector.

Single wire connection cross-sectional area	0.2 to 4 mm^2 (AWG24 to AWG12)
Stranded wire connection cross-sectional area	0.2 to 2.5 mm^2 (AWG24 to AWG12)
Lead wire stripping area	10 mm from the tip of the lead wire

Select a wire that allows the current of all connected control power supplies, including drive units.

<Connector terminal list of MPC (power supply)>

Terminal name	Function name	Description of function
M24	Power supply (+)	Applies 24 VDC of the power supply.
M0V	Power supply (-)	Applies 0 VDC of the power supply.

Appearance of power connector

Use electrical wiring with the following specifications to connect to the power supply connector.

Single wire connection cross-sectional area	0.2 to 10 mm^2 (AWG24 to AWG8)
Stranded wire connection cross-sectional area	0.2 to 6 mm^2 (AWG24 to AWG8)
Lead wire stripping area	15 mm from the tip of the lead wire

Select a wire that allows the current of all power supplies other than the drive units that are wired individually.

■ Specifications of power supply connector (drive unit)

<1MPA (1st axis power supply), 2MPA (2nd axis power supply) connector terminal list>

Terminal name	Function name	Description of function
BRK	Force brake release	Forcibly releases brake. The actuator cannot turn the servo ON while the brake is forcibly released. 24 VDC: The brake will be released forcibly. 0 VDC or open: The brake will be applied.
MPI	Power supply (+)	Applies 24 VDC of the power supply.
MPO	Power supply shutoff	The product is shipped with MPI and MPO connected via jumper wire. Power supply is cut off by removing the jumper wire during batch wiring. When wiring individually, remove the jumper wire.
M0V	Power supply (-)	Applies 0 VDC of the power supply.

Appearance of power connector

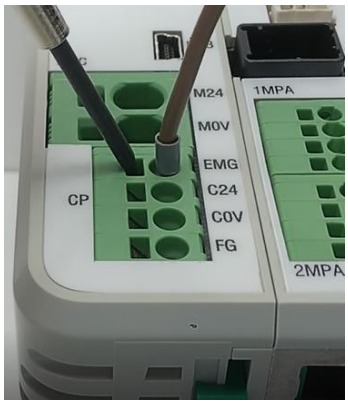
Use electrical wiring with the following specifications to connect to the power supply connector.

Single wire connection cross-sectional area	0.2 to 4 mm^2 (AWG24 to AWG12)
Stranded wire connection cross-sectional area	0.2 to 2.5 mm^2 (AWG24 to AWG12)
Lead wire stripping area	10 mm from the tip of the lead wire

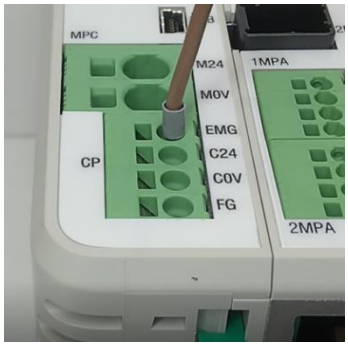
■ Wiring method to power supply connector (communication unit and drive unit)

1 Insert a flat head screwdriver into the insertion slot next to the terminal port to unlock the terminal port (open).

2 Insert a wire into the terminal port.



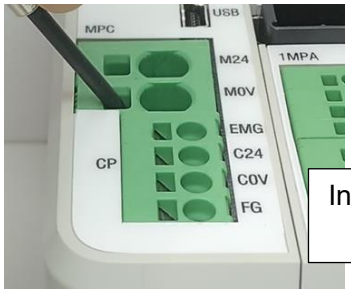
3 Remove the flat head screwdriver from the insertion slot next to the terminal port and lock the terminal port.



Make sure the wire is locked and does not come off.

<For MPC>
The MPC connector has a tight lock, so if you have trouble unlocking it, follow the instructions below.

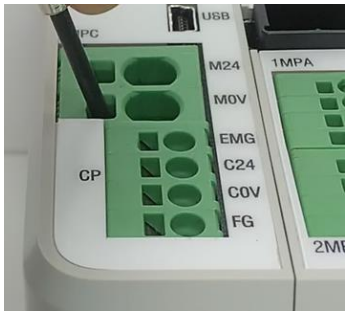
1 Insert a flat head screwdriver diagonally into the insertion slot next to the terminal port.



Insert the tip of the screwdriver into the terminal port side as far as possible.

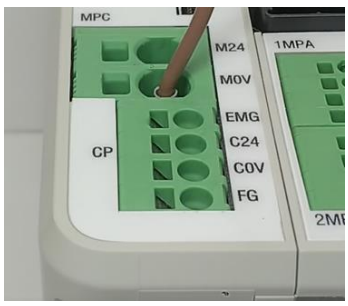
2 Stand the flat head screwdriver perpendicular to the front panel and push the lock to the side opposite to the terminal port to release it.

*If the lock is released in step 1, you can skip step 2.



3 Insert a wire into the terminal port.

4 Remove the flat head screwdriver from the insertion slot next to the terminal port and lock the terminal port.



■ Specifications of power supply circuit

<Drive unit: A type>

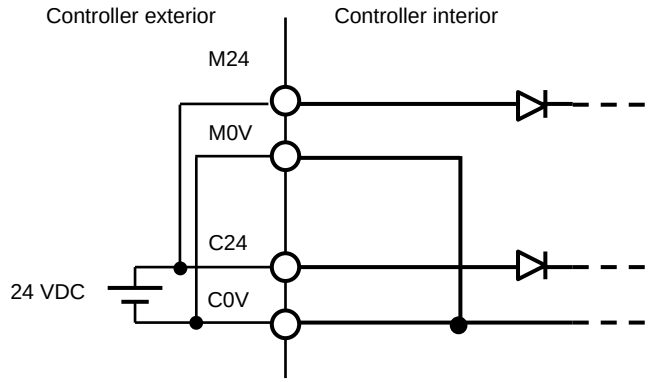
Item		Specifications
Power supply voltage		24 VDC ± 10%
Consumption current (per axis)	EBS-04G, EJSG-04, EBR-04G	3.4 A or less
	EBS-05G, EJSG-05, EBR-05G	4.2 A or less
	EBS-08G, EJSG-08, EBR-08G	4.5 A or less
	GSSD2-20, GSTK-20, GSTG-20, GSTS-20, GSTL-20	1.8 A or less
	GSSD2-32, GSTK-32, GSTG-32, GSTS-32, GSTL-32	2.0 A or less
	GSSD2-50, GSTK-50, GSTG-50, GSTS-50, GSTL-50	3.1A or less
Maximum current (per axis)	EBS-04G, EJSG-04, EBR-04G	12.4 A or less
	EBS-05G, EJSG-05, EBR-05G	12.2 A or less
	EBS-08G, EJSG-08, EBR-08G	12.5 A or less
	GSSD2-20, GSTK-20, GSTG-20, GSTS-20, GSTL-20	5.7 A or less
	GSSD2-32, GSTK-32, GSTG-32, GSTS-32, GSTL-32	7.5 A or less
	GSSD2-50, GSTK-50, GSTG-50, GSTS-50, GSTL-50	4.7 A or less
Brake current (per axis)		0.4 A or less
Control power supply voltage		24 VDC ± 10%
Control unit consumption current (per unit)		0.4 A or less

<Drive unit: B type>

Item		Specifications
Power supply voltage		24 VDC ± 10%
Consumption current (per axis)	FLSH-16G, FGRC-10G, GCKW-16	0.3 A or less
	FLSH-20G, FLCR-16G, GCKW-20	0.5 A or less
	FLSH-25G, GCKW-25	0.6 A or less
	FGRC-30G	0.7 A or less
	FLCR-20G	0.9 A or less
	FGRC-50G	1.1 A or less
	FLCR-25G	1.6 A or less
Maximum current (per axis)	FLSH-16G, GCKW-16	0.4 A or less
	FLSH-20G, GCKW-20	0.7 A or less
	FLSH-25G, GCKW-25	0.8 A or less
	FLCR-10G	1.0 A or less
	FLCR-20G	1.5 A or less
	FLCR-25G	2.8 A or less
	FGRC-10G	0.5 A or less
	FGRC-30G	0.9 A or less
	FGRC-50G	1.5 A or less
Brake current (per axis)		0.4 A or less
Control power supply voltage		24 VDC ± 10%
Control unit consumption current (per unit)		0.4 A or less

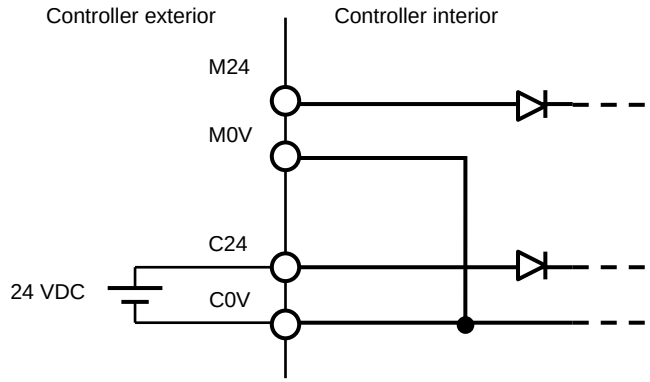
■ Power supply circuit connection diagram (communication unit)

<For the batch method or mixed method (individual wiring only for some axes)>



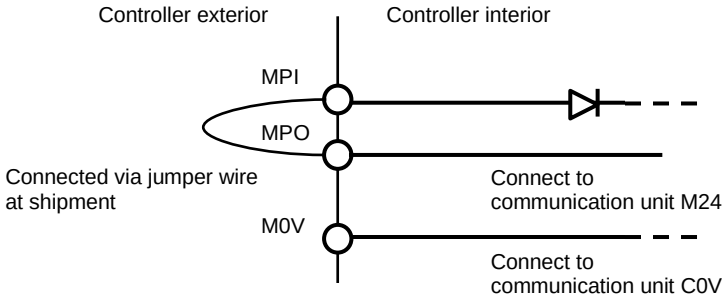
*M0V and C0V are not insulated. M0V and C0V must have the common 0V.

<For the individual method>

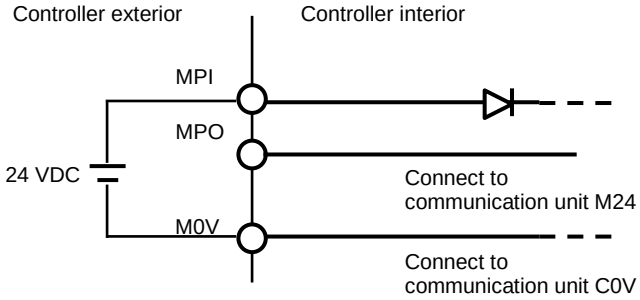


■ Power circuit connection diagram (drive unit)

<For the batch method>



<For the individual method>



* M0V of the drive unit and C0V of the communication unit are not insulated. M0V and C0V must have the common 0V.

■ Electrical circuit and basic composition of power supply

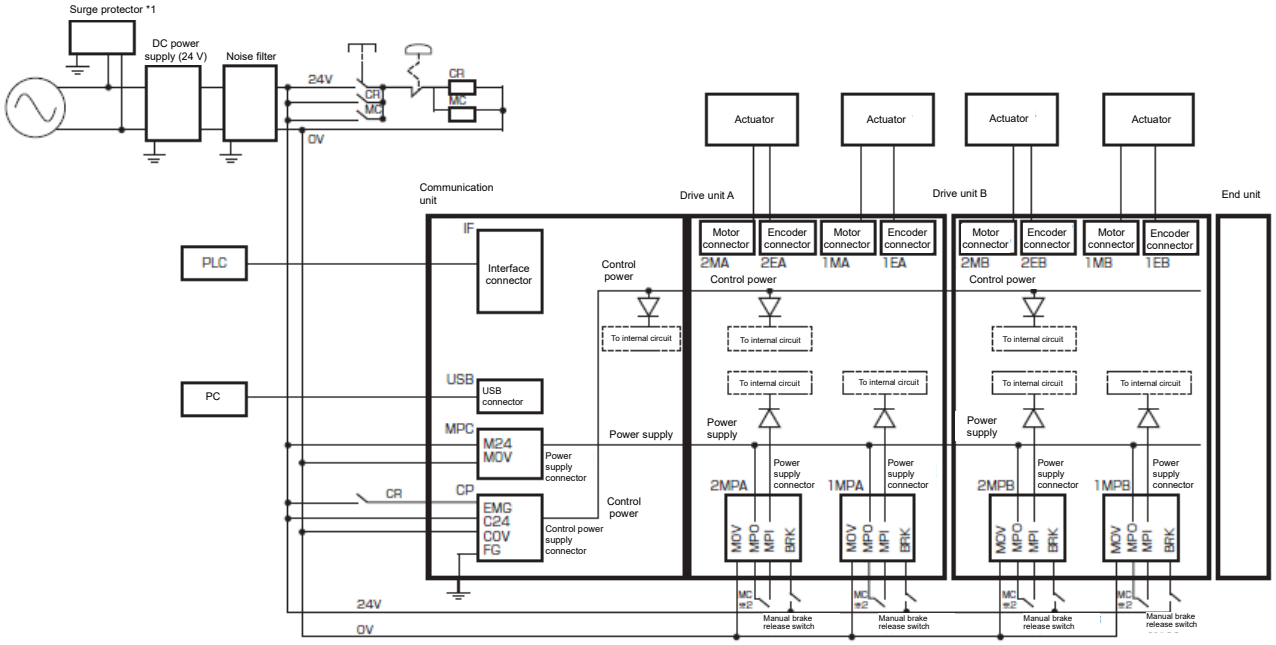
⚠WARNING

Always set the input for force brake release (BRK) to either 0 VDC or open during normal operation, so that the brake can be applied.
If 24 VDC is applied to force brake release (BRK), the brake will be forcibly released. The movable part of the actuator could fall, causing injury or damaging the workpiece.

CAUTION

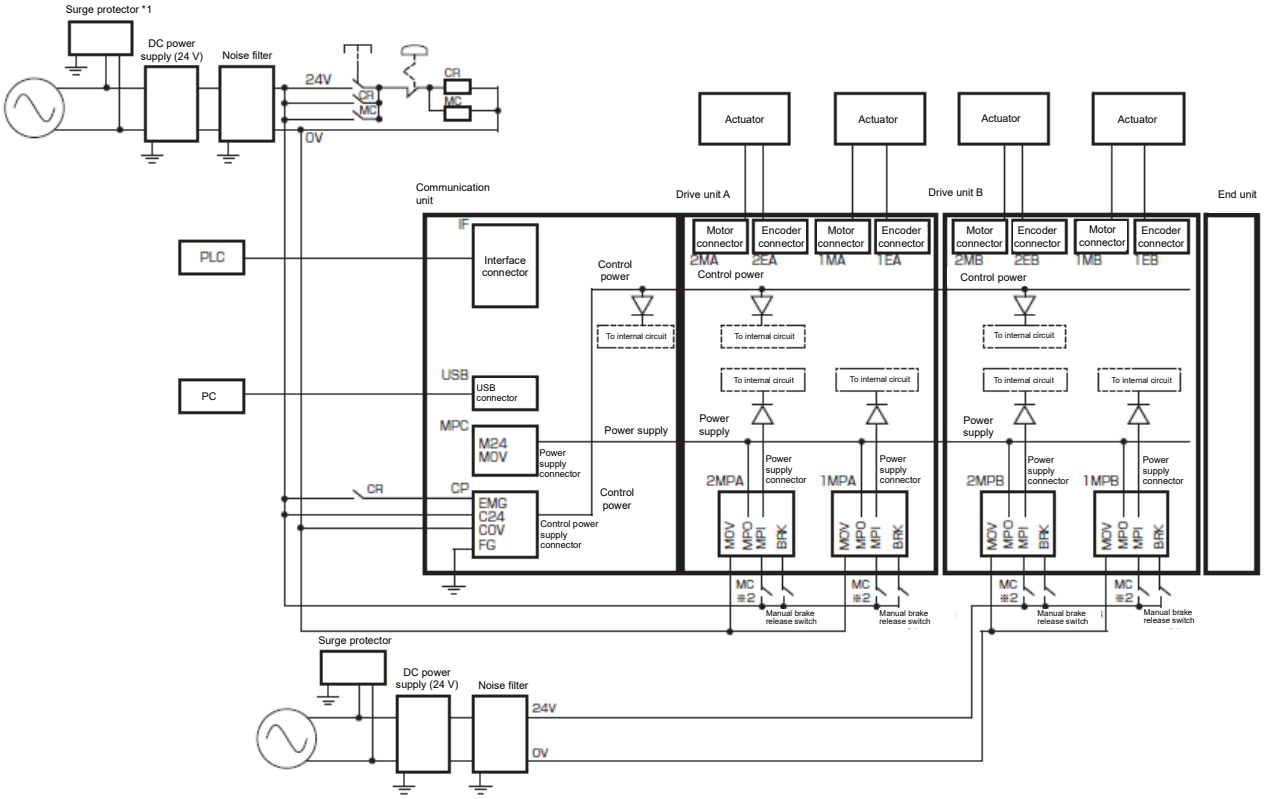
Reconfirm wiring prior to passing current to prevent mis-wiring.
Make sure that wires are not loose and cannot be disconnected.

<Batch method>



Note 1: To externally shut the motor power supply off (such as for supporting safety categories), connect a contact from an electromagnetic switch or other device between the MPI and MPO terminals.
Note 2: A surge protector is required to comply with the CE marking.

<Individual method>



Note 1: To externally shut the motor power supply off (such as for supporting safety categories), connect a contact from an electromagnetic switch or other device between the MPI and MPO terminals.
Note 2: A surge protector is required to comply with the CE marking.

2.4.2 Actuator wiring

Refer to instruction manual (SM-A62474).

2.4.3 Wiring with S-Tools

■ Communication specifications

Item	Specifications
Interface	USB 2.0
Communication speed	Full speed (12 Mbps)

■ Connection method

<Connecting>
Connect the terminal labeled USB on the front of the controller and the USB port of the computer with the USB cable (mini-B type).

<Disconnecting>
Follow the steps below to disconnect the USB cable.

1 Close the software (S-Tools).

2 Disconnect the USB cable from the terminal labeled USB.

- To set the ECMG series, the S-Tools version must be 1.05.00.00 or higher.
- The controller has two modes when S-Tools is connected.
  PLC mode: Control from upper level equipment is valid, and control from S-Tools is invalid (with a few exceptions).
  TOOL mode: Control from S-Tools is valid, and control from upper level equipment is invalid (with a few exceptions)
- If the USB cable is disconnected in the TOOL mode, the controller cannot be controlled from upper level equipment (such as the PLC). Make sure that the controller is in the PLC mode before removing the USB cable.

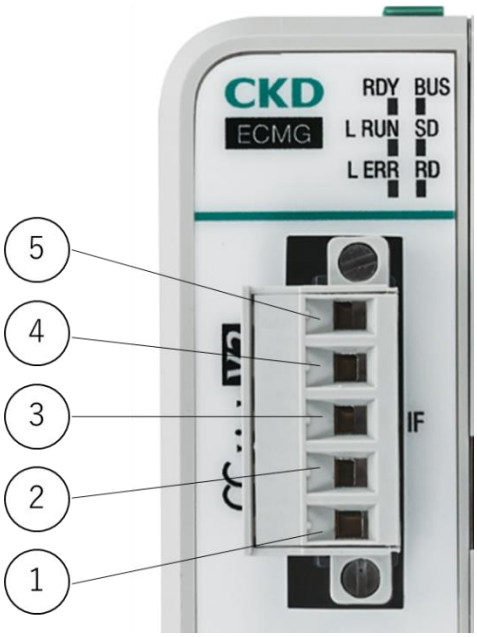
2.4.4 Wiring with upper device (CC-Link specification)

■ Connection method

<Communication cable>
Follow the procedure below to connect the communication cable to IF.

1 After confirming safety, stop communication and turn off the power of peripheral devices.

2 By referring to the figure below, wire a communication cable that conforms to the CC-Link specifications to the accessory communication connector.



Pin number	Signal name	Explanation
(1)	DA	Connect the data A line.
(2)	DB	Connect the data B line.
(3)	DG	Connect the data ground line.
(4)	SLD Note 1	Connect the shield line.
(5)	FG Note 1, 2	Connect the frame ground line.

Note 1: SLD and FG are internally connected.
Note 2: Make sure to ground prior to use. Do not bundle FG wires with protective grounding wires or power wires, because noise may interfere, making communication unstable. Refer to the CC-Link installation manual for details. The CC-Link installation manual is available on the website of the CC-Link Association.

Use a cable with the following specifications to connect to the communication connector.

Item	Specifications
Cable	Cable dedicated to CC-Link
Strip length	7 mm from the tip of the lead wire

When using this product at the terminal of a network, connect a terminating resistor between “DA” and “DB.”

2.4.5 Wiring to an upper device (EtherCAT specifications)

EtherCAT is capable of the use of normal Ethernet cables and flexible wiring methods, but is limited by the type of wiring, equipment, master, or hub to be used. Understand these specifications before performing the wiring. For details, refer to the instruction manual of the master unit manufacturer or ETG (EtherCAT Technology Group).

A communication connector is not attached to this product. Purchase a communication connector that meets the specifications separately.

Example of cable with connector

Manufacturer	Cable	Type
JMACS Japan Co., Ltd.	Industrial Ethernet cable	PNET/B-RJB-RJB/***□
		***: length, □: M = meter, C = centimeter

Example of assembling type connector

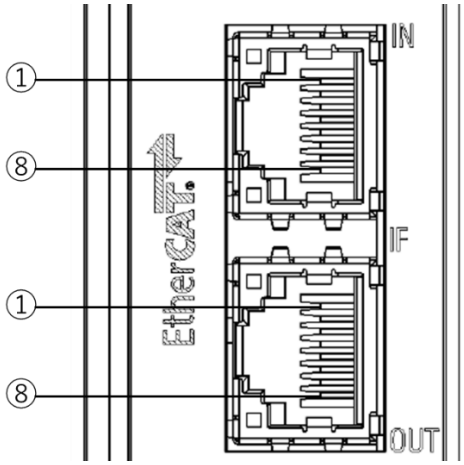
Manufacturer	Connector	Type
3M Japan Limited	RJ45 modular plug for industrial use	3R104-1110-**0 AM
		**: case color / cover color

■ Connection method

<Communication cable>
Follow the procedure below to connect the communication cable to IF.

1 After confirming safety, stop communication and turn off the power of peripheral devices.

2 As shown below, route a communication cable conforming to the EtherCAT specifications to the RJ45 plug (EtherCAT compliant product).



Port	Pin	Signal name	Function
IN/ OUT	1	TD+	Send data, positive
	2	TD-	Send data, negative
	3	RD+	Receive data, positive
	4	Vacant	Vacant
	5	Vacant	Vacant
	6	RD-	Receive data, negative
	7	Vacant	Vacant
	8	Vacant	Vacant

2.4.6 Wiring to upper device (EtherNet/IP specification)

EtherNet/IP is capable of the use of normal Ethernet cables and flexible wiring methods, but is limited by the type of wiring, equipment, master, or hub to be used. Understand these specifications before performing the wiring. For details, refer to the instruction manual of the master unit manufacturer or ODVA.

A communication connector is not attached to this product. Purchase a communication connector that meets the specifications separately.

Example of cable with connector

Manufacturer	Cable	Type
JMACS Japan Co., Ltd.	Industrial Ethernet cable	PNET/B-RJB-RJB/***□
		***: length, □: M = meter, C = centimeter

Example of assembling type connector

Manufacturer	Connector	Type
3M Japan Limited	RJ45 modular plug for industrial use	3R104-1110-**0 AM
		**: case color / cover color

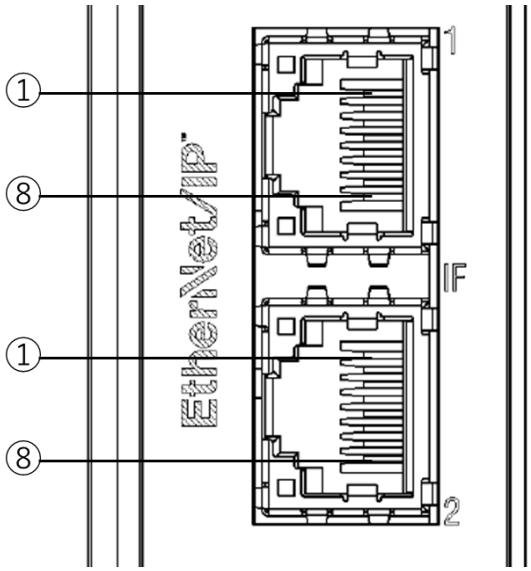
■ Connection method

<Communication cable>
Follow the procedure below to connect the communication cable to IF.

1 After confirming safety, stop communication and turn off the power of peripheral devices.

2 As shown below, route a communication cable conforming to the EtherNet/IP specifications.

Either a straight cable or a cross cable can be used.



Port	Pin	Signal name	Function
IN/ OUT	1	TD+	Send data, positive
	2	TD-	Send data, negative
	3	RD+	Receive data, positive
	4	Vacant	Vacant
	5	Vacant	Vacant
	6	RD-	Receive data, negative
	7	Vacant	Vacant
	8	Vacant	Vacant

2.4.7 Wiring to upper device (PROFINET specifications)

PROFINET is capable of the use of normal Ethernet cables and flexible wiring methods, but is limited by the type of wiring, equipment, master, or hub to be used. Understand these specifications before performing the wiring. For details, refer to the instruction manual of the master unit manufacturer or Profibus Organization.

A communication connector is not attached to this product. Purchase a communication connector that meets the specifications separately.

Example of cable with connector

Manufacturer	Cable	Type
JMACS Japan Co., Ltd.	Industrial Ethernet cable	PNET/B-RJB-RJB/***□
		***: length, □: M = meter, C = centimeter

Example of assembling type connector

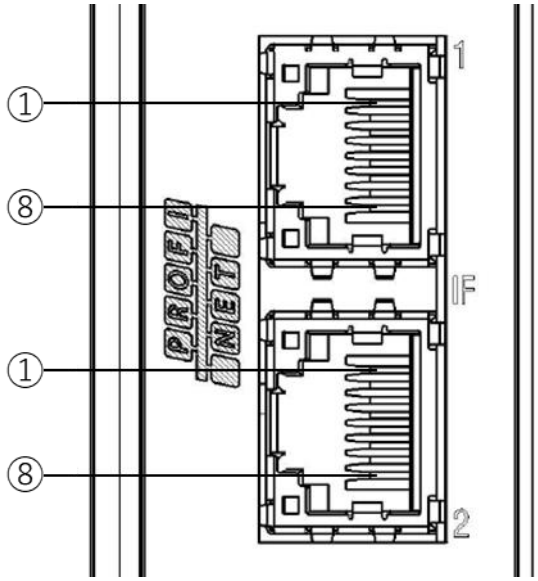
Manufacturer	Connector	Type
3M Japan Limited	RJ45 modular plug for industrial use	3R104-1110-**0 AM
		**: case color / cover color

■ Connection method

<Communication cable>
Follow the procedure below to connect the communication cable to IF.

1 After confirming safety, stop communication and turn off the power of peripheral devices.

2 As shown below, route a communication cable conforming to the PROFINET specifications.



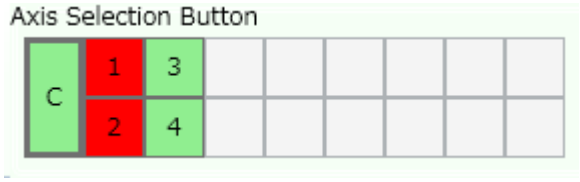
Port	Pin	Signal name	Function
1/ 2	1	TD+	Send data, positive
	2	TD-	Send data, negative
	3	RD+	Receive data, positive
	4	Vacant	Vacant
	5	Vacant	Vacant
	6	RD-	Receive data, negative
	7	Vacant	Vacant
	8	Vacant	Vacant

3. USAGE

3.1 Basic operation of S-Tools

3.1.1 How to monitor axis state and how to select axis to operate

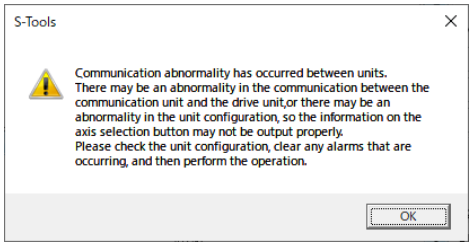
A button for selecting an axis to operate is displayed according to the actual unit configuration, and the number displayed on the button indicates the axis number. “C” indicates the communication unit.

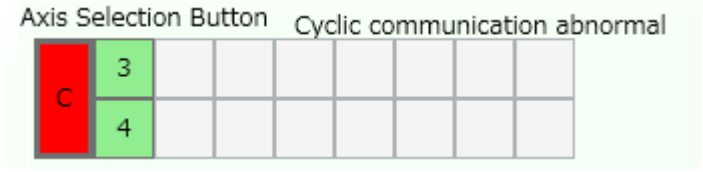


Code	State	Remarks
	Axis: with unit (during operation)	The axis that is in operation becomes a thick frame.
	Axis: with unit (no alarm)	Color: green Text: axis number, C (indicates communication unit)
	Axis: with unit (alarm generated)	Color: red Text: axis number, C (indicates communication unit)
	Axis: with unit (Temperature warning occurred)	Color: Orange Text: axis number, C (indicates communication unit)
	Axis: no unit	Color: gray Text: none

* To change the axis number, you can change it on the [Unit Settings] screen of the [Settings] tab. Refer to “3.7.3 Setting axis numbers” for details.

If there is an error in the internal cyclic communication, the following message is displayed and the text indicating the communication error is displayed on the axis selection screen until the communication error is released. In this state, the axis selection screen is not operating normally, so release the communication error before operating.



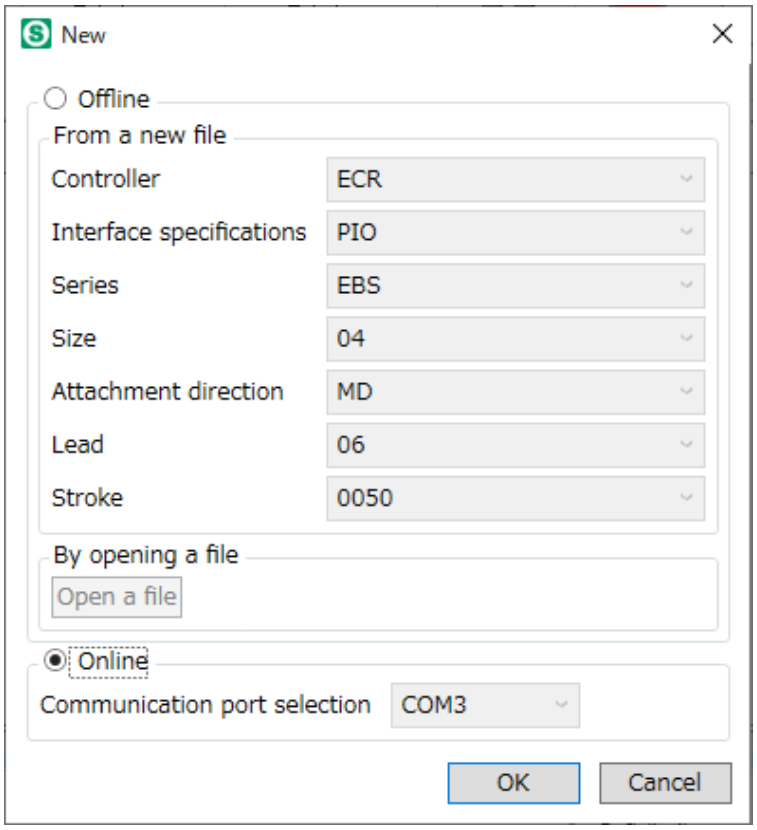


If there is an error in the internal cyclic communication, the existence of an alarm cannot be confirmed from the axis selection screen. Also, an axis with no drive unit may be displayed.

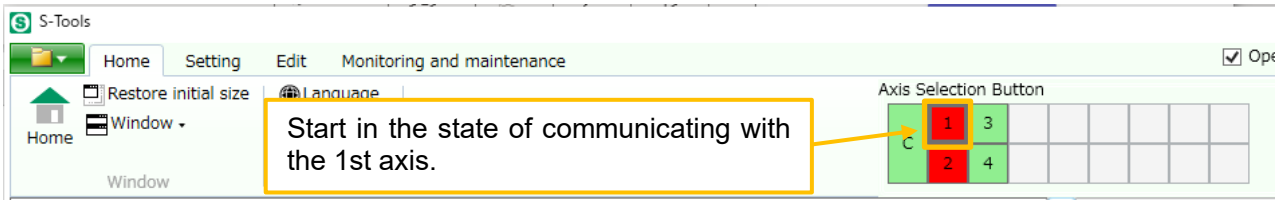
3.1.2 Start S-Tools

■ Run online

Select “Run Online” on the New creation screen.



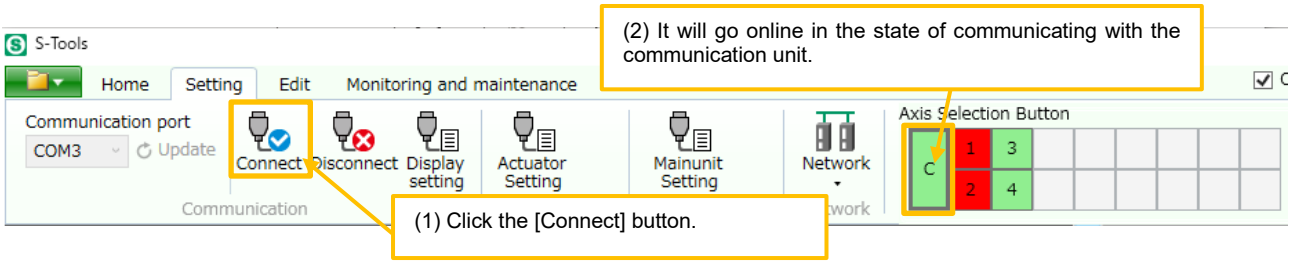
Start in the state of communicating with the 1st axis of the drive unit that is connected next to the communication unit.



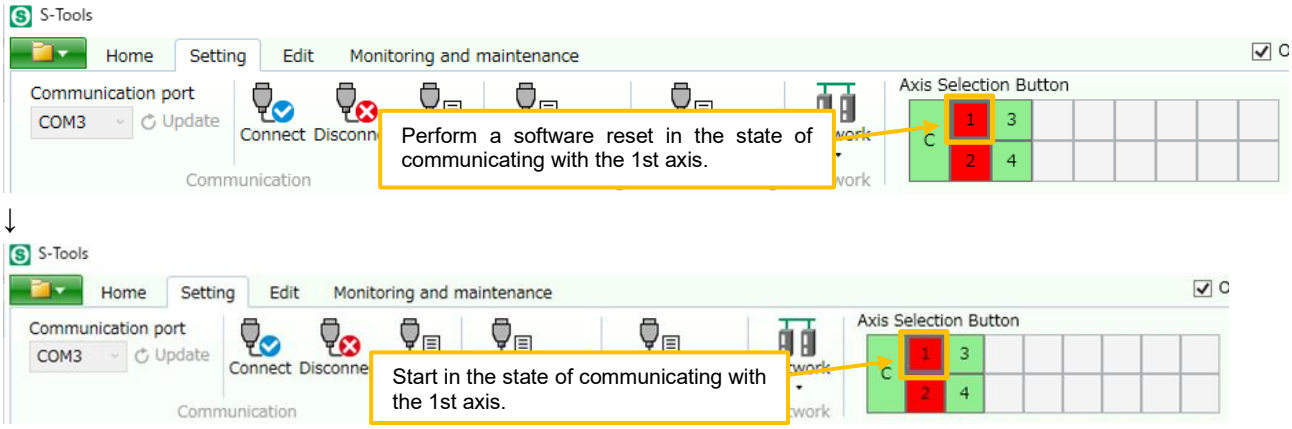
If the drive unit is not connected to the communication unit, start in the state of communicating with the communication unit.

■ Connect from an offline state

When starting communication with the controller by clicking the [Connect] button on the [Settings] tab, it will go online in the state of communicating with the communication unit. When turning on the controller power again or unplugging and plugging the USB cable, it will also go online in the state of communicating with the communication unit.



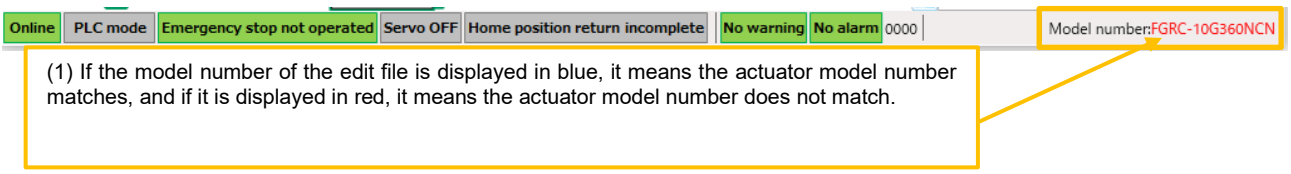
If performing a software reset while an axis is selected, it will go online in the state of communicating with the selected axis. However, if the selected axis does not exist when communication is started after performing a software reset, it will go online in the state of communicating with the communication unit.



3.1.3 Select an axis to operate

Select an axis to operate in the axis selection screen.

Confirm that the actuator model number in the edit file matches the actuator model number to be operated.



If they do not match, operations that can be performed in the main window, such as parameter editing, are limited unless opening a new edit file. Open the new creation screen and select “Run online” to open an edit file.

3.2 Updating and setting actuator information

Products in the EBS-G/EJSG/EBR-G/GSSD2/GSTK/GSTG/GSTS/GSTL series have the function to automatically recognize actuators, but when an actuator of different model number is connected to one controller, the actuator information must be overwritten. Refer to Instruction Manuals of the drive unit (SM-A62474) and S-Tools (SM-A11147) for details.

When using the FLSH-G/FLCR-G/FGRC-G/GCKW series, set the actuator information first.
Refer to Instruction Manuals of the drive unit (SM-A62474) and “Actuator setting” in the S-Tools (SM-A11147) for details.

When setting up the ECMG series, use the latest S-Tools (Ver. 1.05. 00.00 or higher).

3.3 Communication setting (CC-Link specification)

3.3.1 Obtaining CSP+ files

CSP+ (Control & Communication System Profile) files contain information required to launch, operate, and maintain CC-Link components. CSP+ files can be used for easier configuration of components from the PLC development tool. Import these files into the PLC development tool if required.
Refer to the instruction manual of the master unit manufacturer for how to install the CSP+ file. Use the latest CSP+ file to configure an appropriate network.

CSP+ files are available on the website of CKD (https://www.ckd.co.jp/).

<How to obtain>

1 Select “COMPONENT PRODUCTS” from the “PRODUCT INFORMATION” tab or the “PRODUCT INFORMATION” page.

2 Select “Electric actuator” in the product lineup.

3 Select “Stepper motor drive.”

4 Access the detail page of “Controller ECMG” from the product list.

5 Select “Software” and download “ECMG Series CSP+ file (CC-Link).zip”.

Import the CSP+ file as a zip file into the PLC development tool.

Import “ECMG Series CSP+ files (CC-Link).zip” as a zip file into the development tool.

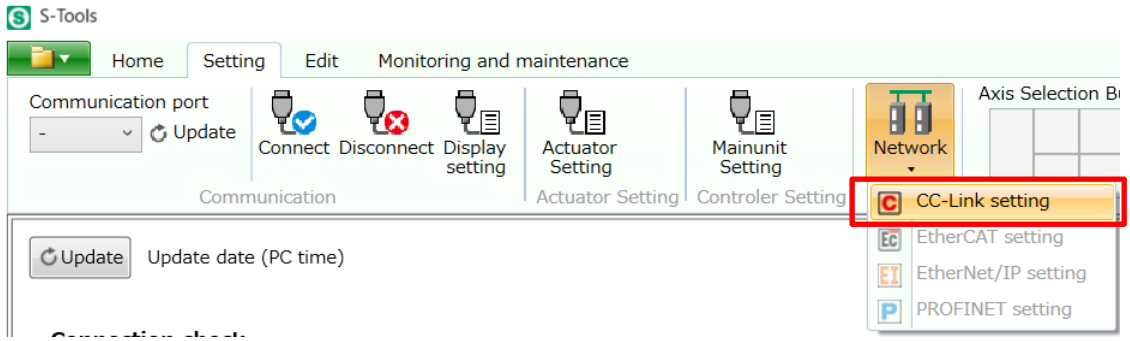
3.3.2 CC-Link device settings

To connect this product as a CC-Link device, it is necessary to set the station number, station type, number of stations occupied, etc. in the PLC using a PLC development tool etc. Refer to the PLC manual for the PLC setting method.

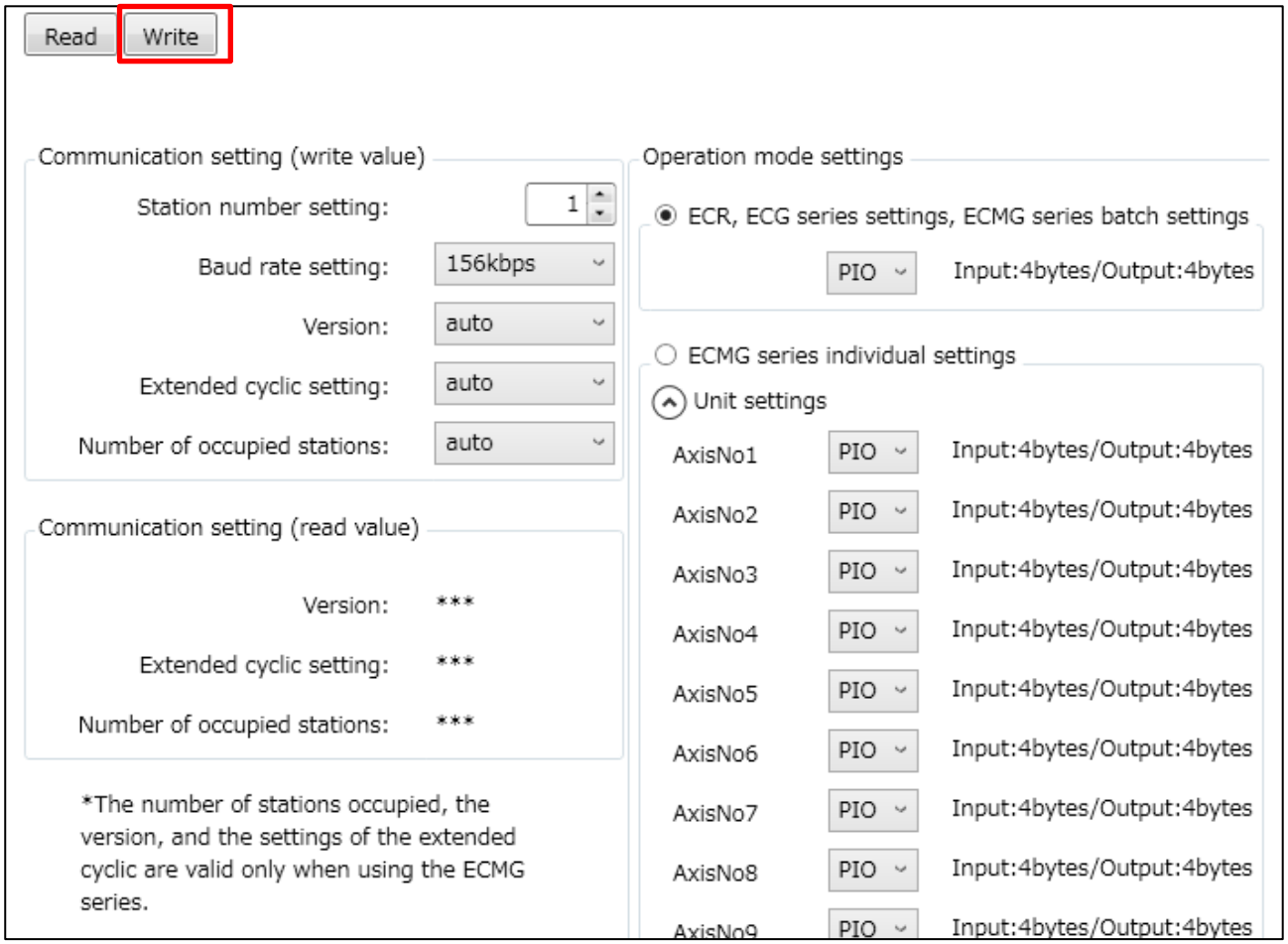
■ Controller CC-Link settings

S-Tools can be used to change the station number and other settings.

1 Select the “Settings” tab of S-Tools and click the [CC-Link Configuration] button in the network submenu.

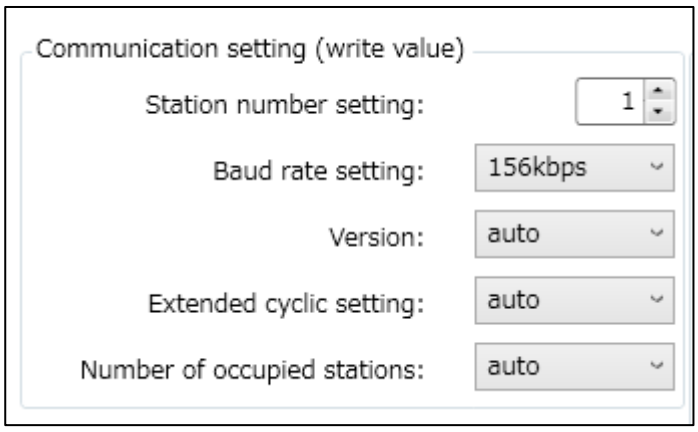


2 Confirm that each set value has been set, and then click [Write].



<Communication setting (write value)>

Set the station number, baud rate, number of stations occupied, version, and extended cyclic communication settings.

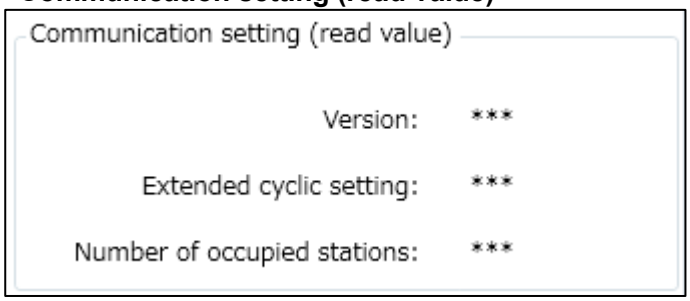


Part Name	Description
Station number setting	Set the station number. The initial value is “1.” However, the setting range varies depending on the operation mode.
Baud rate setting	Set the baud rate. Select from “156 kbps,” “625 kbps,” “2.5 Mbps,” “5 Mbps,” or “10 Mbps.”
Version	Set the CC-Link version. Select from “Automatic”, “1.10”, or “2.00”.
Extended cyclic setting	Set the extended cyclic. Select from “Automatic”, “1 time”, “2 times,” “4 times,” or “8 times.”
The number of stations occupied	Set the number of stations occupied. Select from “Automatic”, “1 station”, “2 stations”, “3 stations” or “4 stations”.

Note 1: Refer to “3.8.4 Operation mode” for the operation mode.

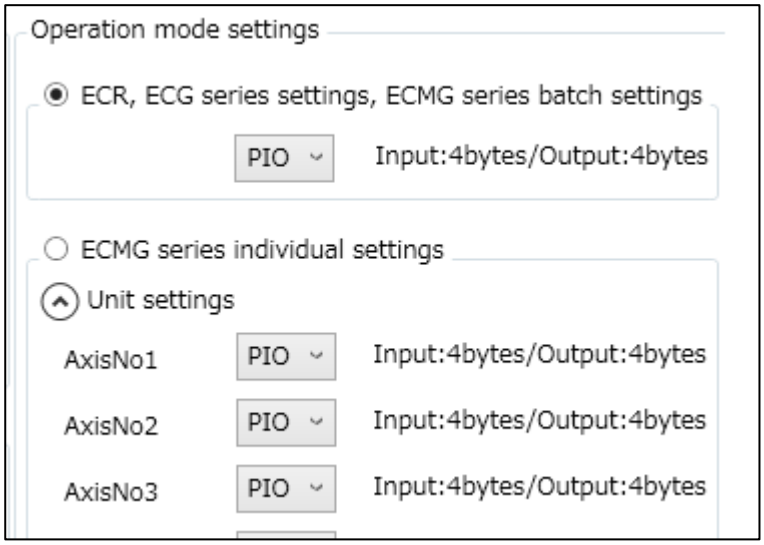
- If the alarm 0x4503 is generated in the communication unit, the CC-Link version of the PLC and the “Version” setting of the ECMG are different. Set the ECMG “version” to match the PLC CC-Link version.
- Make sure that the “Number of stations occupied” and “Extended cyclic communication” settings satisfy the data size required by the operation mode setting. If the required data size is not secured, communication between ECMG and PLC cannot be performed, and an alarm 0x4513 is generated in the communication unit.

<Communication setting (read value)>



Part Name	Description
Version	Read the CC-Link version settings of the controller when the [Read] button is pressed.
Extended cyclic setting	Read the controller’s extended cyclic settings when the [Read] button is pressed.
The number of stations occupied	Read the settings of the number of stations occupied by the controller when the [Read] button is pressed.

<Operation mode settings>
Set the operation mode. To set the same settings for all drive units, select [ECR, ECG series settings, ECMG series batch settings] and set the operation mode. To set the operation mode for each drive unit, select [ECMG series individual setting] and set the operation mode for each axis.



Choices	Description	
	Controller	Explanation
ECR, ECG series settings, ECMG series batch settings	ECR series	Set the operation mode. Select from “PIO,” “SDP,” or “FDP.”
	ECG series	Set the operation mode. Select from “PIO,” “SDP,” “FDP,” “HSDP,” or “HDP”.
	ECMG series	Set the operation mode of the drive unit collectively. Select from “PIO,” “SDP,” “HDP,” or “FDP.”
ECMG series individual settings	ECMG series	Set the operation mode of drive unit for each unit. Select from “PIO,” “SDP,” “HDP,” or “FDP.”

- When clicking the [Read] button to read data from the controller, the drop list is grayed out except for the configurable axes. Operation modes for 16 axes can be set until reading is executed, but the operation modes are written only for the axes connected when writing is executed.
- Set so that the sum of bytes of the size does not exceed 256 bytes (272 bytes including 16 bytes of the communication unit). If the setting exceeds 256 bytes, internal cyclic communication between the communication unit and the drive unit is disabled, and an alarm 0x4603 is generated in the communication unit.

3.4 Communication setting (EtherCAT specification)

■ 3.4.1 Obtaining ESI files

In order for the EtherCAT device to join the network, an ESI (EtherCAT Slave Information) describing the communication specifications of the device must be installed in the configuration tool of the master unit. Refer to the instruction manual of the master unit manufacturer for how to install the ESI file. Use the latest ESI file to configure an appropriate network.

ESI files are available on the website of CKD (https://www.ckd.co.jp/).

<How to obtain>

1 Select “COMPONENT PRODUCTS” from the “PRODUCT INFORMATION” tab or the “PRODUCT INFORMATION” page.

2 Select “Electric actuator” in the product lineup.

3 Select “Stepper motor drive.”

4 Access the detail page of “Controller Model No. ECMG” from the product list.

5 Select “Software” and download “ECMG Series ESI file (EtherCAT).zip”.

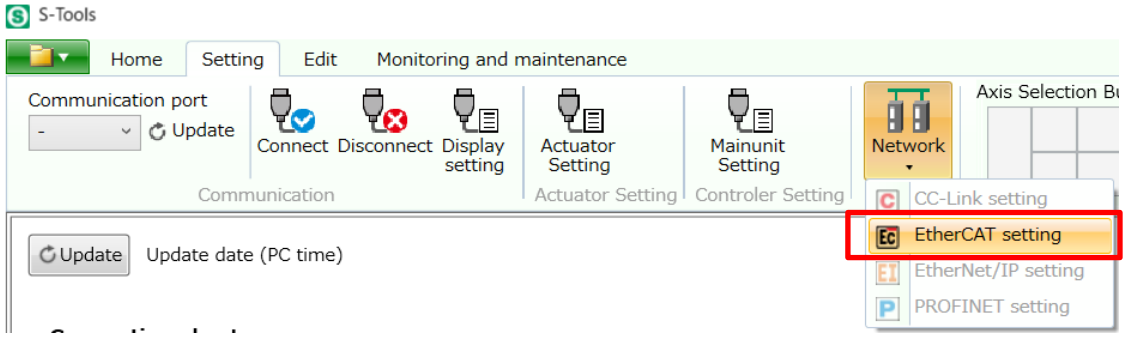
■ 3.4.2 EtherCAT device settings

To connect this product as an EtherCAT device, it is necessary to set the device ID, etc. of this product in the PLC using a PLC development tool, etc. Refer to the PLC manual for the PLC setting method.

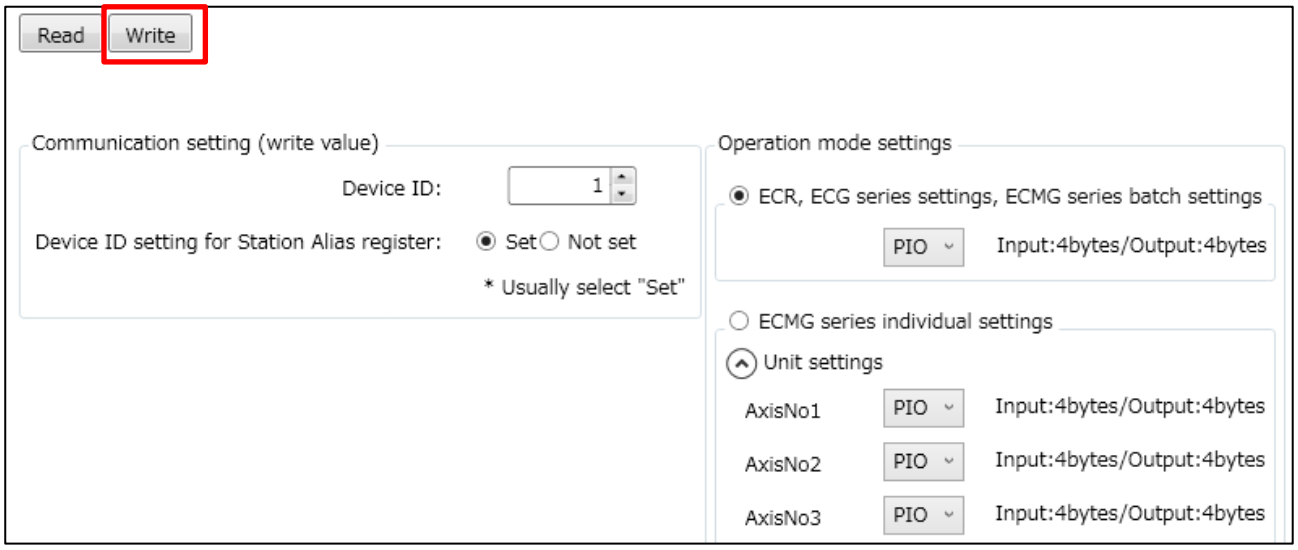
■ Controller EtherCAT settings

S-Tools can be used to change the device ID and other settings.

1 Select the “Settings” tab of S-Tools and click the [EtherCAT setting] button in the network submenu.

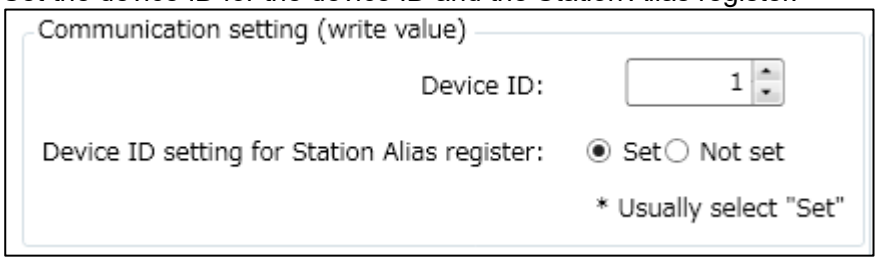


2 Confirm that each set value has been set, and then click [Write].



<Communication setting (write value)>

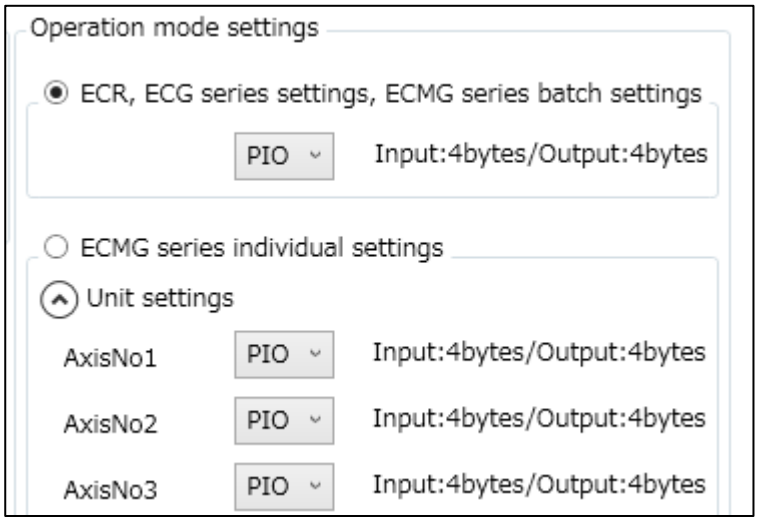
Set the device ID for the device ID and the Station Alias register.



Part Name	Description
Device ID	Set the device ID. The initial value is “1.”
Device ID setting for Station Alias register	Select either “Set” or “Not set.” The default value is “Set.”

<Operation mode settings>

Set the operation mode. To set the same settings for all drive units, select [ECR, ECG series settings, ECMG series batch settings] and set the operation mode. To set the operation mode for each drive unit, select [ECMG series individual setting] and set the operation mode for each axis.



Choices	Description	
	Controller	Explanation
ECR, ECG series settings, ECMG series batch settings	ECR series ECG series	Set the operation mode. Select from “PIO,” “SDP,” “FDP,”
	ECMG series	Set the operation mode of the drive unit collectively. Select from “PIO,” “SDP,” “HDP,” or “FDP.”
ECMG series individual settings	ECMG series	Set the operation mode of drive unit for each unit. Select from “PIO,” “SDP,” “HDP,” or “FDP.”

- When clicking the [Read] button to read data from the controller, the drop list is grayed out except for the configurable axes. Operation modes for 16 axes can be set until reading is executed, but the operation modes are written only for the axes connected when writing is executed.
- Set so that the sum of bytes of the size does not exceed 256 bytes (272 bytes including 16 bytes of the communication unit). If the setting exceeds 256 bytes, internal cyclic communication between the communication unit and the drive unit is disabled, and an alarm 0x4603 is generated in the communication unit.

3.5 Communication settings (EtherNet/IP specification)

3.5.1 Obtaining EDS files

In order for the EtherNet/IP device to join the network, an EDS (Electronic Data Sheet) file describing the communication specifications of the device must be installed in the configuration tool of the master unit. Refer to the instruction manual of the master unit manufacturer for how to install the EDS file. Use the latest EDS file to configure an appropriate network.

EDS files are available on the website of CKD (https://www.ckd.co.jp/).

<How to obtain>

1 Select “COMPONENT PRODUCTS” from the “PRODUCT INFORMATION” tab or the “PRODUCT INFORMATION” page.

2 Select “Electric actuator” in the product lineup.

3 Select “Stepper motor drive.”

4 Access the detail page of “Controller Model No. ECMG” from the product list.

5 Select “Software” and download “ECMG Series EDS file (EtherNet/IP).zip.”

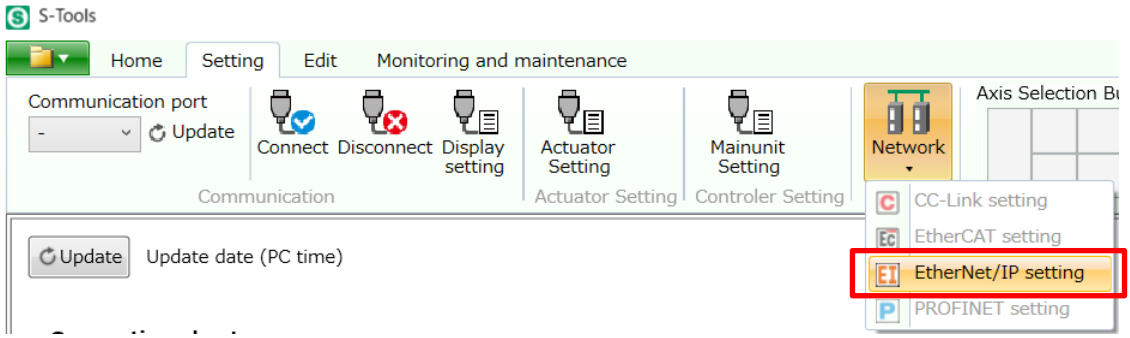
3.5.2 EtherNet/IP device setting

To connect this product as an EtherNet/IP device, it is necessary to set the product's IP address and other items in the PLC using a PLC development tool etc. Refer to the PLC manual for the PLC setting method.

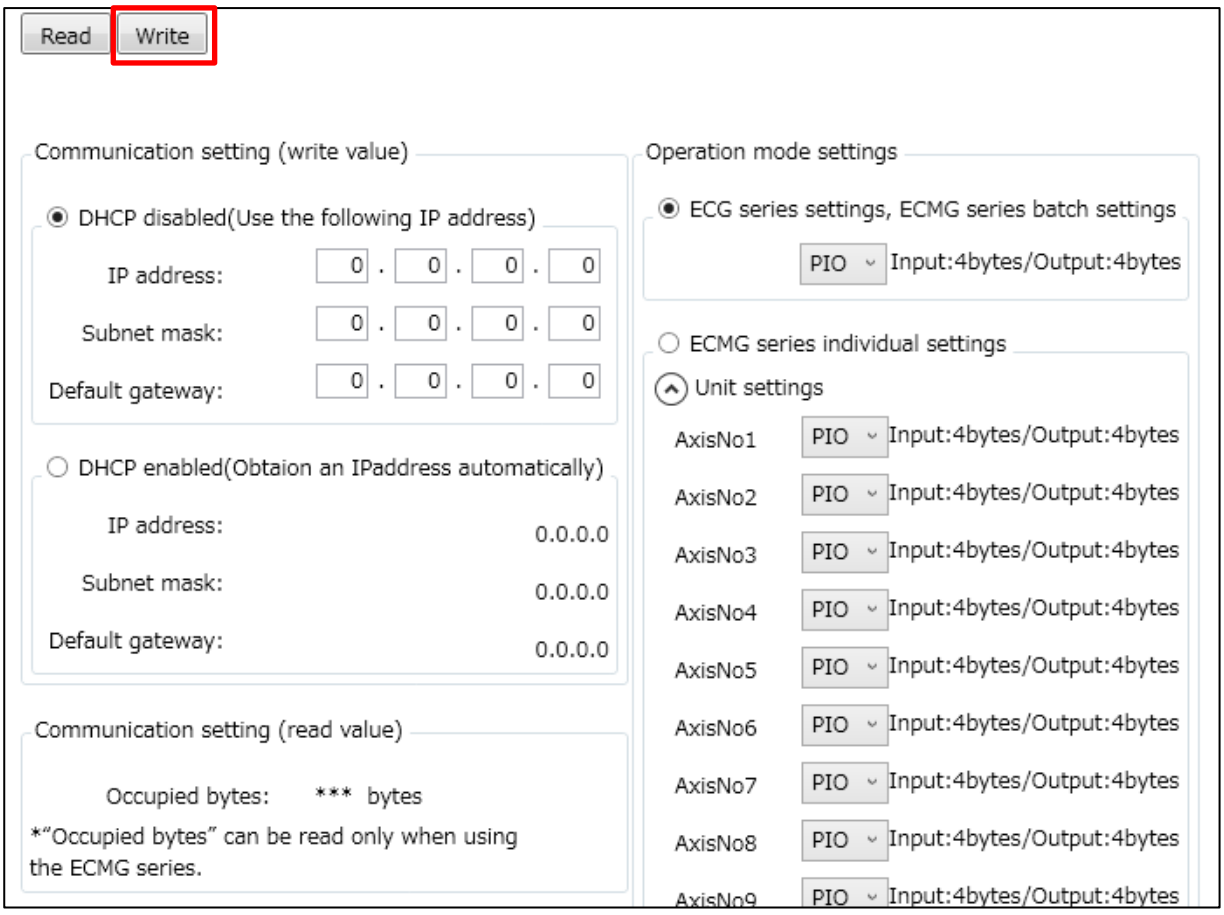
■ Controller EtherNet/IP setting

S-Tools can be used to change the IP address and other settings.

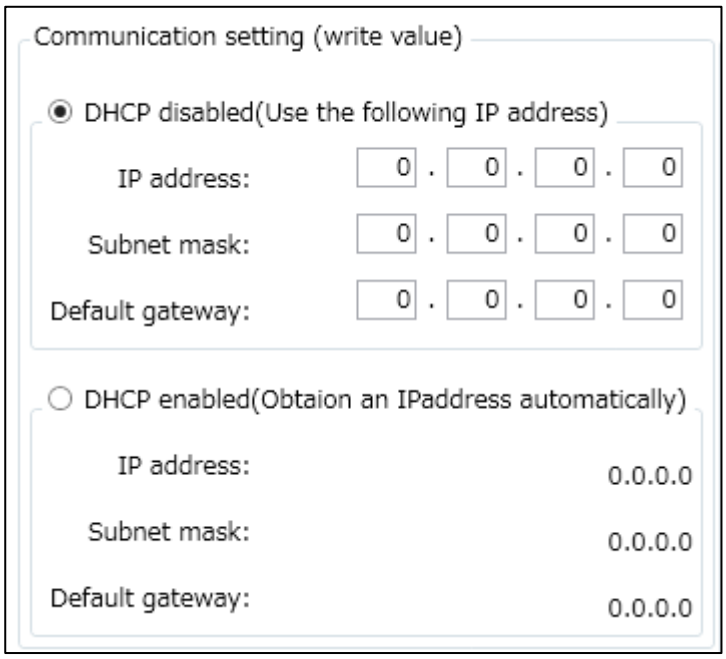
1 Select the "Settings" tab of S-Tools and click the [EtherNet/IP setting] button in the network submenu.



2 Confirm that each set value has been set, and then click [Write].



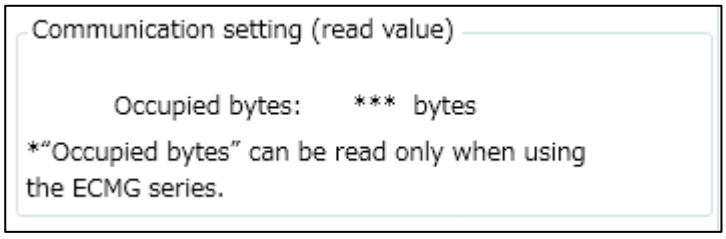
<Communication setting (write value)>
Set the IP address, subnet mask, default gateway, and DHCP enable/disable.



Part name	Description
IP address	Set the IP address. Set the address in the range from 0.0.0.0 to 255.255.255.255.
Subnet mask	Set the subnet mask. Set in the range from 0.0.0.0 to 255.255.255.255.
Default gateway	Set the default gateway. Set in the range from 0.0.0.0 to 255.255.255.255.
DHCP	Select “Disabled” or “Enabled.” When “Enabled” is selected, the IP address, subnet mask, and default gateway are assigned automatically from the DHCP server.

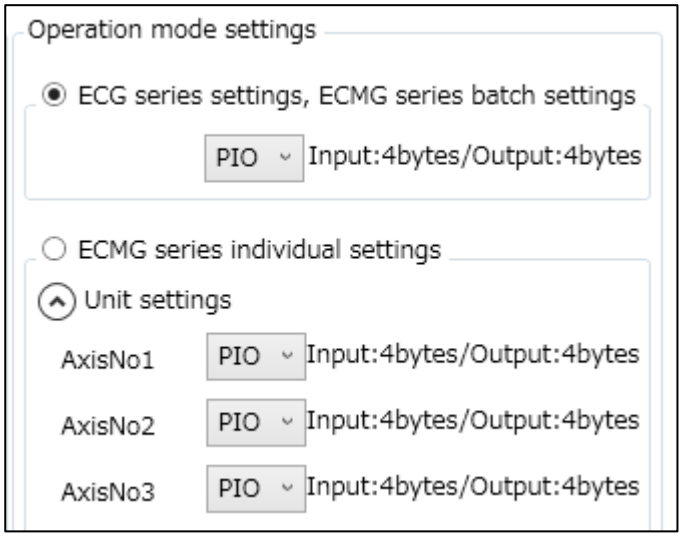
Note 1: Refer to “3.8.4 Operation mode” for the operation mode.

<Communication setting (read value)>
The data size can be read.



Part name	Description
Allocated number of bytes	When the [Read] button is pressed, the data capacity occupied by communication between the upper device and the controller is read from the controller and displayed.

<Operation mode settings>
Set the operation mode. To set the same settings for all drive units, select [ECG series settings, ECMG series batch settings] and set the operation mode. To set the operation mode for each drive unit, select [ECMG series individual setting] and set the operation mode for each axis.



Choices	Description	
	Controller	Explanation
ECG series settings, ECMG series batch settings	ECG series	Set the operation mode. Select from “PIO,” “SDP,” or “FDP.”
	ECMG series	Set the operation mode of the drive unit collectively. Select from “PIO,” “SDP,” “HDP,” or “FDP.”
ECMG series individual settings	ECMG series	Set the operation mode of drive unit for each unit. Select from “PIO,” “SDP,” “HDP,” or “FDP.”

- When clicking the [Read] button to read data from the controller, the drop list is grayed out except for the configurable axes. Operation modes for 16 axes can be set until reading is executed, but the operation modes are written only for the axes connected when writing is executed.
- Set so that the sum of bytes of the size does not exceed 256 bytes (272 bytes including 16 bytes of the communication unit). If the setting exceeds 256 bytes, internal cyclic communication between the communication unit and the drive unit is disabled, and an alarm 0x4603 is generated in the communication unit.

3.6 Communication settings (PROFINET specifications)

3.6.1 Obtaining GSDML files

In order for the PROFINET device to join the network, a GSDML (General Station Description) file describing the communication specifications of the device must be installed in the configuration tool of the master unit. Refer to the instruction manual of the master unit manufacturer for how to install the GSDML file. Use the latest GSDML file to configure an appropriate network.

GSDML files are available on the website of CKD (https://www.ckd.co.jp/).

<How to obtain>

1 Select "COMPONENT PRODUCTS" from the "PRODUCT INFORMATION" tab or the "PRODUCT INFORMATION" page.

2 Select "Electric actuator" in the product lineup.

3 Select "Stepper motor drive."

4 Access the detail page of "Controller Model No. ECMG" from the product list.

5 Select "Software" and download "ECMG Series GSDML file (PROFINET).zip."

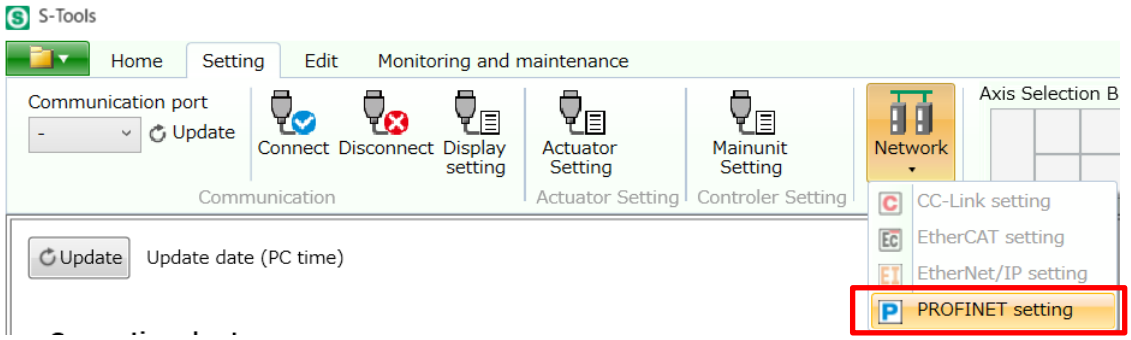
3.6.2 PROFINET device settings

To connect this product as an PROFINET device, it is necessary to set the allocated number of bytes etc. of this product in the PLC using a PLC development tool, etc. Refer to the PLC manual for the PLC setting method.

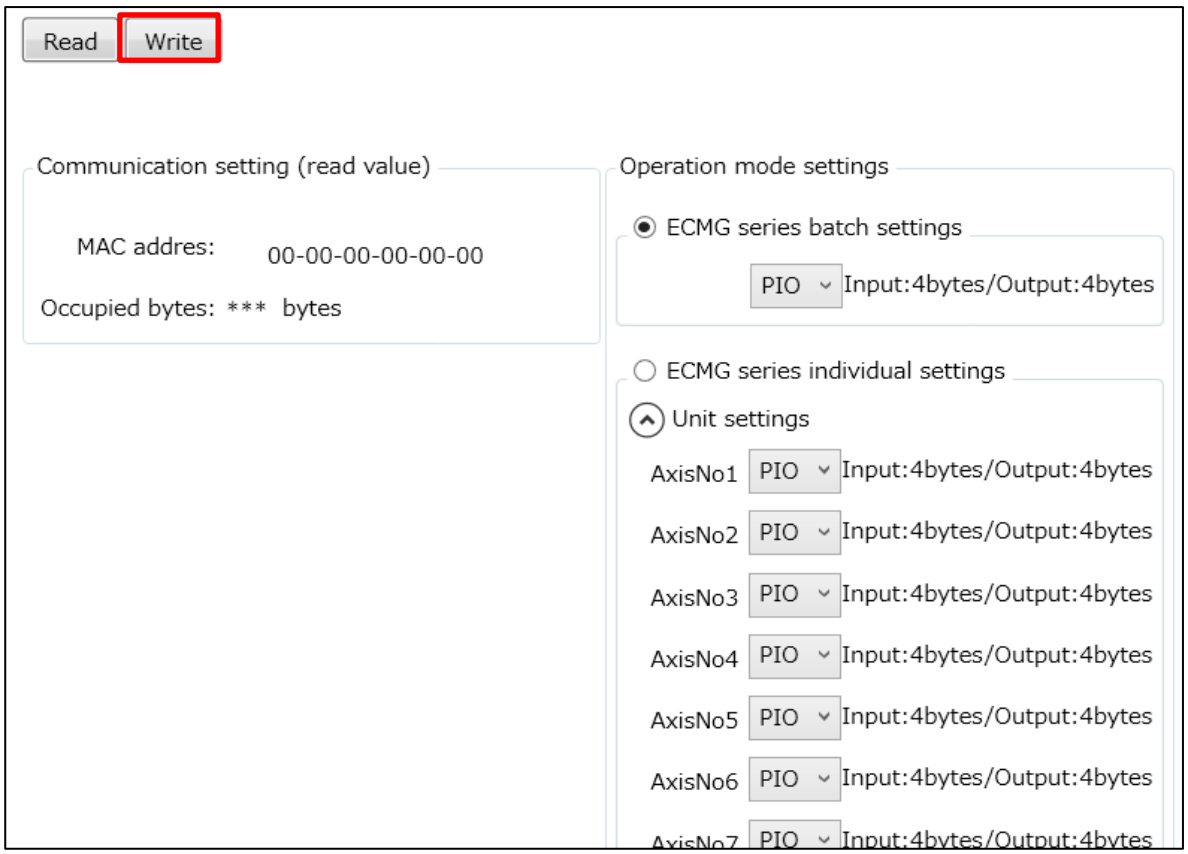
■ Controller PROFINET settings

S-Tools can be used to change the operation mode.

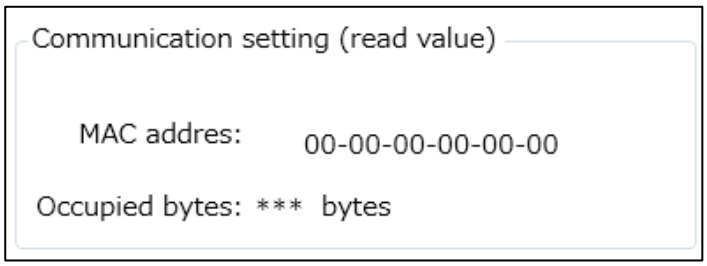
1 Select the "Settings" tab of S-Tools and click the [PROFINET setting] button in the network submenu.



2 Confirm that each set value has been set, and then click [Write].

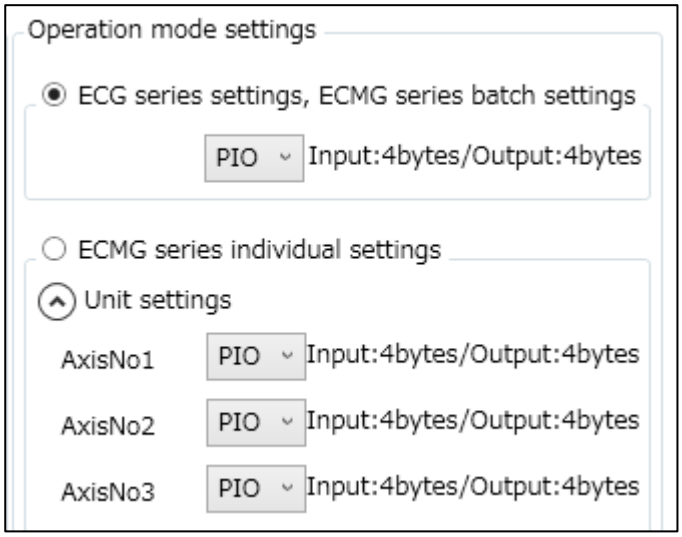


<Communication setting (read value)>
MAC address and the data size can be read.



Name	Description
MAC address	Reads and displays the MAC address of the device.
Allocated number of bytes	When the [Read] button is pressed, the data capacity occupied by communication between the upper device and the controller is read from the controller and displayed.

<Operation mode settings>
Set the operation mode. To set the same settings for all drive units, select [ECG series settings, ECMG series batch settings] and set the operation mode. To set the operation mode for each drive unit, select [ECMG series individual setting] and set the operation mode for each axis.



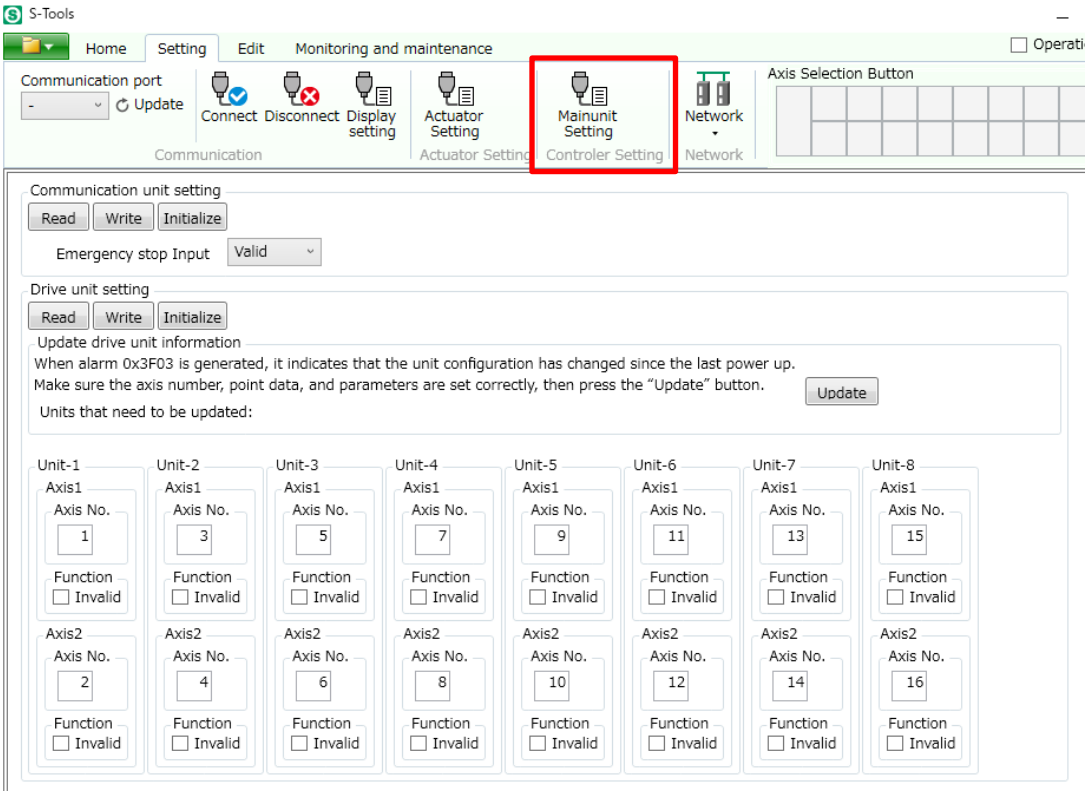
Choices	Description	
	Controller	Explanation
ECG series settings, ECMG series batch settings	ECMG series	Set the operation mode of the drive unit collectively. Select from "PIO," "SDP," "HDP," or "FDP."
ECMG Series individual settings	ECMG series	Set the operation mode of drive unit for each unit. Select from "PIO," "SDP," "HDP," or "FDP."

- When clicking the [Read] button to read data from the controller, the drop list is grayed out except for the configurable axes. Operation modes for 16 axes can be set until reading is executed, but the operation modes are written only for the axes connected when writing is executed.
- Set so that the sum of bytes of the size does not exceed 256 bytes (272 bytes including 16 bytes of the communication unit). If the setting exceeds 256 bytes, internal cyclic communication between the communication unit and the drive unit is disabled, and an alarm 0x4603 is generated in the communication unit.

3.7 Unit Settings

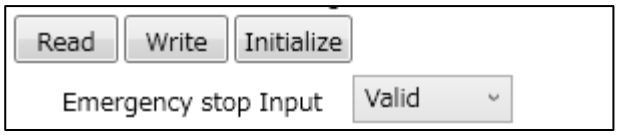
You can disable the emergency stop input, set the axis number, and disable the axis function.

<Unit setting screen>
Select the [Settings] tab in S-Tools and click the [Unit settings] button.



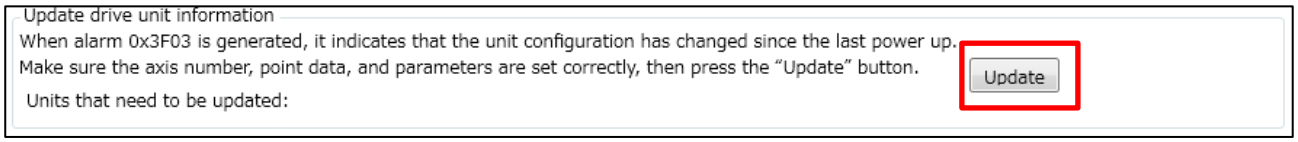
3.7.1 Emergency stop input disable setting

It is possible to enable or disable the emergency stop input. If the emergency stop input is not used, the actuator can be operated without wiring to the EMG by disabling the emergency stop input setting. For controller power wiring, see "2.4.1 Wiring to the power supply".



3.7.2 Update drive unit information

Update of the drive unit information is required only when the alarm “0x3F03” is generated.
Alarm “0x3F03” is generated when the drive unit connected to the communication unit is changed. After confirming that the axis number, parameters, and point data settings for each unit are correct, press the [Update] button and turn the controller power on again.

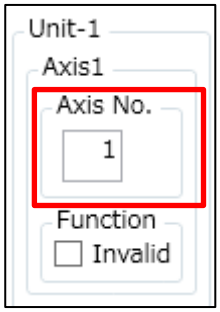


3.7.3 Setting axis numbers

CAUTION

Do not change the axis number setting unless it is necessary, and if the axis number setting is changed, share the changed contents with other workers.
By changing the axis number, the axis operated by the command from the PLC is also changed. If the changed contents are not shared with other workers, the entire equipment may operate unexpectedly.

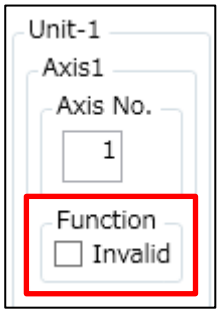
The axis number of each unit can be set. If an alarm related to the axis number (for example, 0x3B23, 0x3B33 or 0x3F03) is generated, reset the axis number on this screen. Enter the axis number to be set in the text box in the red frame below and click the [Write] button to change the setting.



- Axes connected to one communication unit cannot be used by setting the same axis number. If the same axis number is set, the alarm 0x3B23 is generated in the communication unit and the drive unit cannot be operated.
- The changed axis number is stored in the drive unit, and when the drive unit power is turned on again, the changed axis number is activated.
- When rewriting the controller settings with the [Write] button in the drive unit setting group and executing a software reset, it will go online with the communication unit selected.

3.7.4 Axis function disabling setting

By disabling the function of the unused axis, it is possible to prevent the alarm from being output even when the actuator is not connected. When the axis function is disabled, the actuator cannot be operated even if it is connected, but parameters and point data can be rewritten. You can change the setting to disabled by clicking the check box in the red frame below and clicking the [Write] button with the check box selected.



3.8 Communication format

3.8.1 Data communication

Type of data communication	Description
Cyclic transmission	This type of communication is used between the master and slave on a set cycle.
Message transmission	This type of communication is used to transmit data with an irregular period and length. This product does not support message transmission.

3.8.2 Send/receive data (communication unit)

The following data is transmitted and received between the PLC and the controller, and cyclic transmission is used for all data transmission and reception. Refer to “3.8.10 Data access” for communication method.

Part name	Description	Accessible data	Send and receive data
Input/output signals	Monitors the communication status between units.	-	3.8.5 3.8.6
Read data and write data	Set point data and user parameters, and check alarm history.	3.8.9	3.8.5 3.8.6

■ Input/output signals

The items listed in the table below (signal name) are transmitted and received.

Classification	Item (signal name)
Data to be written to the controller by the PLC	Alarm reset (communication unit)
Data to be read from the controller by the PLC	Temperature error (warning),Internal cyclic communication status, internal non-cyclic communication status, communication unit status, alarm status (communication unit) and axis number n link status

<Data to be written to the controller by the PLC>

Signal name	Explanation
Alarm reset (communication unit)	Performs alarm reset of the communication unit when switched from OFF to ON.

<Data to be read from the controller by the PLC>

Signal name	Explanation
Temperature error (warning)	Turns ON when either drive unit has a temperature warning (alarm code: 0x0501).
Internal cyclic communication status	Turns ON if an error occurs in the internal cyclic communication between ECMG units.
Internal non-cyclic communication status	Turns ON if an error occurs in the internal non-cyclic communication between ECMG units.
Communication unit status	Turns ON when the communication unit is ready for communication.
Alarm status (communication unit)	Turns OFF if an alarm occurs in the communication unit, and turns ON while no alarm occurs.
Link status of axis No. n	Turns ON when communication between the communication unit and the nth-axis is established.

■ Write data and read data

Operate the following items.

Classification	Item
Data to be written to the controller by the PLC	Data number, data R/W selection, target unit and axis number selection, data request, write data
Data to be read from the controller by the PLC	Data write status, data complete, data response, read data, data (alarm)

<To read data>
Set the axis number of the axis to be read in the “target unit and axis number selection,” the number of the data to be read in the “data number,” set the “data R/W selection” to 0 (read), then turn the “data request” ON. The data of the number set in the “data number” will be output in the “read data.”

<To write data>
After setting the axis number of the axis to be read in the “target unit and axis number selection,” the number of the data to be written in the “data number,” and the value to be written in the “write data,” set the “data R/W selection” to 1 (write), then turn the “data request” ON.
* Check “data response” and “data completion” to see if the data was read or written correctly.

Setting point data and parameter and reading alarm history can also be performed using PC setting software (S-Tools). For parameters that cannot be set from a PLC, use S-Tools.

3.8.3 Send/Receive data (drive unit)

The following data is transmitted and received between the PLC and the controller, and cyclic transmission is used for all data transmission and reception. Refer to “3.8.10 Data access” for communication method.

Part name	Description	Send and receive data
Input/output signals	Controls the controller from the PLC.	3.8.5 3.8.7 3.8.8
Monitoring	Position, speed, current, and alarm status are monitored.	3.8.5 3.8.7

■ Input/output signals

The items listed in the table below (signal name) are transmitted and received. Refer to Instruction Manual (SM-A62474) for details on each signal.

Classification	Item (signal name)
Data to be written to the controller by the PLC	Point number selection bit n, point travel start, point number n travel start, home position return, servo ON, alarm reset, stop, INCH selection, JOG/INCH (+) travel start, JOG/INCH (-) travel start, direct value travel selection, position, positioning width, speed, acceleration, deceleration, pressing rate, pressing speed, pressing distance, mode, gain magnification
Data to be read from the controller by the PLC	Point number confirmation bit n, point travel complete, point number n travel complete, home position return complete, servo ON state, traveling, zone 1, zone 2, point zone, outside soft limit, outside soft limit (-), outside soft limit (+), alarm, warning, operation preparation complete, alarm confirmation bit n, direct travel status

- Only point operation can be performed when PIO mode is selected.
- When the simple direct value mode, standard direct value mode, or full direct value mode is selected, and the direct value travel is selected in the “direct value travel selection,” it is necessary to set the “position,” “speed,” etc.

■ Monitoring

Operate the following items (signal name).

Classification	Item (signal name)
Data to be written to the controller by the PLC	Monitoring No., monitoring request
Data to be read from the controller by the PLC	Monitoring response, monitoring complete, monitor value, Position, Speed, Current value, Alarm

When the data to be monitored is selected in “monitor No.,” and “monitor request” is turned ON, the current value of the selected data is output in “monitor value.”

3.8.4 Operation mode

There are four modes of operation (CC-Link, EtherCAT, EtherNet/IP, PROFINET): The PIO mode can be changed among the 2 types according to the setting of operation mode (PIO).

<Mode list of operation mode (CC-Link, EtherCAT, EtherNet/IP, PROFINET)>

Part name	Abbreviation	Set value from PLC
PIO mode	PIO	0
Simple direct value mode	SDP	1
Standard direct value mode	FDP	2
Full direct value mode	HDP	3

■ PIO mode

In this mode, direct value travel cannot be selected, and control is performed by point travel.

<Mode list of operation mode (PIO)>

Part name	Abbreviation	Set value from PLC
64-point mode	B064	0
Simple 7-point mode	S007	1

■ Simple direct value mode and standard direct value mode, and full direct value mode

This mode is used to perform control by point travel or direct value travel.

<table>
<tr><th></th><th>Simple direct value mode</th><th>Standard direct value mode and full direct value mode</th></tr>
<tr><td>Point travel</td><td colspan="2">• When direct value travel selection is turned off, it becomes point travel.
• The point data selection method is the same as the 64-point mode of the PIO mode.
• When point travel starts, the direct value travel status is turned OFF.</td></tr>
<tr><td rowspan="2">Direct value travel</td><td colspan="2">• When direct value travel selection is turned on, it becomes direct value travel.
• When the direct value travel is started, the direct value travel status is turned ON.
• The point number confirmation bit is not set when the travel is completed.</td></tr>
<tr><td>• Only the data that are input from the PLC are used as position data; and other data (including speed and acceleration) to be used are from point data.
• The point data selection method is the same as the 64-point mode of the PIO mode.
• It is used to change only the position data based on the set point data.</td><td>• It operates using data (data equivalent to point data such as position and speed) that are input from a PLC.</td></tr>
</table>

3.8.5 Address allocation

■ Communication unit

<Control area (PLC → ECMG)>

CC-Link	EtherCAT		EtherNet/IP, PROFINET	Input byte for communication unit	Assigned data
	Index	Subindex			
RYn0 to RY(n+1)F	0x2001	0x01	0 to 3 bytes	0 to 3 bytes	Communication unit control signal
RY(n+2)0 to RY(n+3)F	0x2001	0x02	4 to 7 bytes	4 to 7 bytes	Write data
RY(n+4)0 to RY(n+5)F	0x2001	0x03	8 to 11 bytes	8 to 11 bytes	Data number
RY(n+6)0 to RY(n+7)F	0x2001	0x04	12 to 15 bytes	12 to 15 bytes	Data R/W control signal

<Status area (ECMG → PLC)>

CC-Link	EtherCAT		EtherNet/IP, PROFINET	Output byte for communication unit	Assigned data
	Index	Subindex			
RXn0 to RX(n+1)F	0x2005	0x01	0 to 3 bytes	0 to 3 bytes	Communication unit status signal
RX(n+2)0 to RX(n+3)F	0x2005	0x02	4 to 7 bytes	4 to 7 bytes	Read data
RX(n+4)0 to RX(n+5)F	0x2005	0x03	8 to 11 bytes	8 to 11 bytes	Data (alarm)
RX(n+6)0 to RX(n+7)F	0x2005	0x04	12 to 15 bytes	12 to 15 bytes	Data R/W status signal

■ Drive unit

Areas of up to 256 bytes are used depending on each axis setting.
* In the case of CC-Link, all send/receive data of the drive unit is assigned to the remote register.

<Control area (PLC → ECMG)>

CC-Link	EtherCAT	EtherNet/IP, PROFINET	Assigned data
RWwn0 to RWw(n+7)F	0x2003	16 to 271 bytes	Depends on the operation mode of each axis

<Status area (ECMG → PLC)>

CC-Link	EtherCAT	EtherNet/IP, PROFINET	Assigned data
RWrn0 to RWr(n+7)F	0x2007	16 to 271 bytes	Depends on the operation mode of each axis

For each axis, the area occupied by each operation mode is as follows:

<PIO mode (4 bytes)>

Allocated number of bytes	Assigned data	
	PLC → ECMG	ECMG → PLC
4 bytes occupied	Control signal	Status signal

<Simple direct value mode (8 bytes)>

Allocated number of bytes	Assigned data	
	PLC → ECMG	ECMG → PLC
2 bytes occupied	Control signal	Status signal
2 bytes occupied	Monitoring No.	Monitoring value
4 bytes occupied	Position	Position

<Standard direct value mode (16 bytes)>

Allocated number of bytes	Assigned data	
	PLC → ECMG	ECMG → PLC
2 bytes occupied	Control signal	Status signal
14 bytes occupied	Direct value data	Monitoring output

<Full direct value mode (24 bytes)>

Allocated number of bytes	Assigned data	
	PLC → ECMG	ECMG → PLC
2 bytes occupied	Control signal	Status signal
14 bytes occupied	Direct value data	Monitoring output
6 bytes occupied		Reserved
2 bytes occupied	Reserved	

■ Configuration example

(1) When using standard direct value mode with 16 axes

<Communication unit: PLC → ECMG>

CC-Link	EtherCAT		EtherNet/IP, PROFINET	Input byte for communication unit	Assigned data
	Index	Subindex			
RYn0 to RY(n+7)F	0x2001	0x01 to 0x04	0 to 15 bytes	0 to 15 bytes	Communication unit control area

<Communication unit: ECMG → PLC>

CC-Link	EtherCAT		EtherNet/IP, PROFINET	Output byte for communication unit	Assigned data
	Index	Subindex			
RXn0 to RX(n+7)F	0x2005	0x01 to 0x04	0 to 15 bytes	0 to 15 bytes	Communication unit status area

<Drive unit: PLC → ECMG>

CC-Link	EtherCAT		EtherNet/IP, PROFINET	Input byte for drive unit	Assigned data
	Index	Subindex			
RWwn0 to RWwn7	0x2003	0x01 to 0x04	16 to 31 bytes	0 to 15 bytes	1st axis: control area
RWwn8 to RWwnF	0x2003	0x05 to 0x08	32 to 47 bytes	0 to 15 bytes	2nd axis: control area
RWw(n+1)0 to RWw(n+1)7	0x2003	0x09 to 0x0C	48 to 63 bytes	0 to 15 bytes	3rd axis: control area
RWw(n+1)8 to RWw(n+1)F	0x2003	0x0D to 0x10	64 to 79 bytes	0 to 15 bytes	4th axis: control area
RWw(n+2)0 to RWw(n+2)7	0x2003	0x11 to 0x14	80 to 95 bytes	0 to 15 bytes	5th axis: control area
(Omitted)					
RWw(n+6)8 to RWw(n+6)F	0x2003	0x35 to 0x38	224 to 239 bytes	0 to 15 bytes	14th axis: control area
RWw(n+7)0 to RWw(n+7)7	0x2003	0x39 to 0x3C	240 to 255 bytes	0 to 15 bytes	15th axis: control area
RWw(n+7)8 to RWw(n+7)F	0x2003	0x3D to 0x40	256 to 271 bytes	0 to 15 bytes	16th axis: control area

<Drive unit: ECMG → PLC>

CC-Link	EtherCAT		EtherNet/IP, PROFINET	Output byte for drive unit	Assigned data
	Index	Subindex			
RWrn0 to RWrn7	0x2007	0x01 to 0x04	16 to 31 bytes	0 to 15 bytes	1st axis: status area
RWrn8 to RWrnF	0x2007	0x05 to 0x08	32 to 47 bytes	0 to 15 bytes	2nd axis: status area
RWr(n+1)0 to RWr(n+1)7	0x2007	0x09 to 0x0C	48 to 63 bytes	0 to 15 bytes	3rd axis: status area
RWr(n+1)8 to RWr(n+1)F	0x2007	0x0D to 0x10	64 to 79 bytes	0 to 15 bytes	4th axis: status area
RWr(n+2)0 to RWr(n+2)7	0x2007	0x11 to 0x14	80 to 95 bytes	0 to 15 bytes	5th axis: status area
(Omitted)					
RWr(n+6)8 to RWr(n+6)F	0x2007	0x35 to 0x38	224 to 239 bytes	0 to 15 bytes	14th axis: status area
RWr(n+7)0 to RWr(n+7)7	0x2007	0x39 to 0x3C	240 to 255 bytes	0 to 15 bytes	15th axis: status area
RWr(n+7)8 to RWr(n+7)F	0x2007	0x3D to 0x40	256 to 271 bytes	0 to 15 bytes	16th axis: status area

(2) 1st axis: PIO mode, 2nd axis: standard direct value mode, 3rd Axis: PIO mode, 4th axis: simple direct value mode

<Communication unit: PLC → ECMG>

CC-Link	EtherCAT		EtherNet/IP, PROFINET	Input byte for communication unit	Assigned data
	Index	Subindex			
RYn0 to RY(n+7)F	0x2001	0x01 to 0x04	0 to 15 bytes	0 to 15 bytes	Communication unit control area

<Communication unit: ECMG → PLC>

CC-Link	EtherCAT		EtherNet/IP, PROFINET	Output byte for communication unit	Assigned data
	Index	Subindex			
RXn0 to RX(n+7)F	0x2005	0x01 to 0x04	0 to 15 bytes	0 to 15 bytes	Communication unit status area

<Drive unit: PLC → ECMG>

CC-Link	EtherCAT		EtherNet/IP, PROFINET	Input byte for drive unit	Assigned data	
	Index	Subindex				
RWwn0 to RWwn1	0x2003	0x01	16 to 19 bytes	0 to 3 bytes	Axis number 1	Control area
RWwn2 to RWwn9	0x2003	0x02 to 0x05	20 to 35 bytes	0 to 15 bytes	Axis number 2	Control area
RWwnA to RWwnB	0x2003	0x06	36 to 39 bytes	0 to 3 bytes	Axis number 3	Control area
RWwnC to RWwnF	0x2003	0x07 to 0x08	40 to 47 bytes	0 to 7 bytes	Axis number 4	Control area

<Drive unit: ECMG → PLC>

CC-Link	EtherCAT		EtherNet/IP, PROFINET	Output byte for drive unit	Assigned data	
	Index	Subindex				
RWrn0 to RWrn1	0x2007	0x01	16 to 19 bytes	0 to 3 bytes	Axis number 1	Status area
RWrn2 to RWrn9	0x2007	0x02 to 0x05	20 to 35 bytes	0 to 15 bytes	Axis number 2	Status area
RWrnA to RWrnB	0x2007	0x06	36 to 39 bytes	0 to 3 bytes	Axis number 3	Status area
RWrnC to RWrnF	0x2007	0x07 to 0x08	40 to 47 bytes	0 to 7 bytes	Axis number 4	Status area

3.8.6 Signal assignment details (communication unit)

The format of the data to be sent and received as cyclic data is described below. Refer to “3.8.5 Address allocation” for address allocation by interface specification. Refer to “3.8.10 Data access” or the PLC manufacturer’s manual for the communication method.

<Control area: communication unit control signal>

Input byte for communication unit		Item	Value (decimal)
Byte	bit		
0	-	-	-
1	0 to 2	-	-
	3	Alarm reset (communication unit)	1: Reset
	4 to 7	-	-
2	-	-	-
3	-	-	-

<Control area: Data R/W control signal, write data, and data number>

Input byte for communication unit		Item	Value (decimal)
Byte	bit		
4 to 7	-	Write data	Data written when executing data write * The byte 4 side indicates the lower byte, and the byte 7 side indicates the higher byte.
8 to 11	-	Data number	Data number of data to read/write * The byte 8 side indicates the lower byte, and the byte 11 side indicates the higher byte.
12	0 to 3	-	-
	4	Data request	0: -, 1: Execute
	5	Data R/W selection	0: Read, 1: Write
	6 to 7	-	-
13	0 to 7	Target unit and axis number selection	1 to 16,238 * If a value other than the above is selected, an axis selection error is output in the data response, and writing or reading cannot be performed.
14 to 15	-	-	-

<Status area: communication unit status signal>

Output byte for communication unit		Item	Value (decimal)
Byte	bit		
0	0	Temperature error (warning) Note 1	0: Normal, 1: Temperature error
	1	Internal cyclic communication status	0: Normal, 1: Error
	2	Internal non-cyclic communication status	0: Normal, 1: Error
	3 to 7	-	-
1	0	Communication unit status	0: Initializing, 1: Initializing completed
	1 to 2	-	-
	3	Alarm status (communication unit) Note 2	0: Alarm occurs, 1: No alarm
	4 to 7	-	-
2	0	Link status of axis No. 1	0: not established, 1: established
	1	Link status of axis No. 2	0: not established, 1: established
	2	Link status of axis No. 3	0: not established, 1: established
	3	Link status of axis No. 4	0: not established, 1: established
	4	Link status of axis No. 5	0: not established, 1: established
	5	Link status of axis No. 6	0: not established, 1: established
	6	Link status of axis No. 7	0: not established, 1: established
	7	Link status of axis No. 8	0: not established, 1: established
3	0	Link status of axis No. 9	0: not established, 1: established
	1	Link status of axis No. 10	0: not established, 1: established
	2	Link status of axis No. 11	0: not established, 1: established
	3	Link status of axis No. 12	0: not established, 1: established
	4	Link status of axis No. 13	0: not established, 1: established
	5	Link status of axis No. 14	0: not established, 1: established
	6	Link status of axis No. 15	0: not established, 1: established
	7	Link status of axis No. 16	0: not established, 1: established

Note 1: If “Temperature error” is output, it indicates that a warning “Temperature error” has occurred in one of the drive units.
Note 2: There are two alarm status signals: “Alarm status (communication unit)” that indicates the alarm status of the communication unit, and “Alarm status” that indicates the alarm status of the drive unit. Check both alarm statuses before operating the actuator.

<Status area: data R/W status signal, read data, and data (alarm)>

Output byte for communication unit		Item	Value (decimal)
Byte	**bit**		
4 to 7	-	Read data	Data written when executing data write * The byte 4 side indicates the lower byte, and the byte 7 side indicates the higher byte.
8 to 11	-	Data (alarm)	Data number of data to read/write * The byte 8 side indicates the lower byte, and the byte 11 side indicates the higher byte.
12	0 to 3	Data response Note 1	Indicates the execution result when reading or writing data. 0 to 9
	4	Data complete	0: Incomplete, 1: Complete
	5	Data write status	0: Read, 1: Write
	6 to 7	-	-
13	0 to 7	-	-
14, 15	-	-	-

Note 1: Refer to "3.10.3 Data read" or "3.10.4 Data write" for details on the execution results of the data response.

3.8.7 Signal assignment details (drive unit)

Set data for the PLC to read from the controller.

■ PIO mode (operation mode (CC-Link, EtherCAT, EtherNet/IP, PROFINET): 0)

The table below shows an example in the 64 point mode (operation mode (PIO): 0). Refer to “3.8.8 Cyclic data details for PIO mode” for details of the operation mode (PIO). Refer to “3.8.5 Address allocation” for address allocation by interface specification.

<Control area: Control signal>

Input byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number selection bit 0	Binary data 0 to 63 * The 0 bit side indicates the lower bit, and the 5 bit side indicates the upper bit.
	1	Point number selection bit 1	
	2	Point number selection bit 2	
	3	Point number selection bit 3	
	4	Point number selection bit 4	
	5	Point number selection bit 5	
	6	Point travel start	1: Start
	7	JOG (-) travel start	1: Start
n+1	0	JOG (+) travel start	1: Start
	1	Home position return start	1: Home position return start
	2	Servo ON	1: Servo ON, 0: Cancel
	3	Alarm reset	1: Reset
	4	Stop	0: Stop, 1: Cancel
	5	-	-
	6	-	-
	7	-	-
n+2 to n+3	-	-	-

- When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status. Similarly, if communication is not established, it will not be sent to the controller even if each bit is ON (“1”).
- Stop is negative logic. Turn ON (“1”) (cancel) bits for both to operate.

<Status area: status signal>

Output byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number confirmation bit 0/ Alarm confirmation bit 0	Port numbers 0 to 63 Alarm 0 to 15 Note 5 * Set the travel complete point number when normal and the alarm when abnormal. * The 0 bit side indicates the lower bit, and the 5 bit side indicates the upper bit.
	1	Point number confirmation bit 1/ Alarm confirmation bit 1	
	2	Point number confirmation bit 2/ Alarm confirmation bit 2	
	3	Point number confirmation bit 3/ Alarm confirmation bit 3	
	4	Point number confirmation bit 4	
	5	Point number confirmation bit 5	
	6	Point travel complete Note 1	0: Incomplete, 1: Complete
	7	Selection output 1 Note 1 and 2 Point zone/Zone 1/Zone 2/ Traveling/Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	Point zone/Zone 1/Zone 2 0: Outside zone, 1: Inside zone Traveling 0: Stopped, 1: Traveling Warning 0: Triggered, 1: Not triggered Outside soft limit 0: Within the soft limit range, 1: Out of soft limit range Outside soft limit (-) 0: Soft limit (-) or greater, 1: Less than the soft limit (-) Outside soft limit (+) 0: Soft limit (+) or less; 1: Excesses the soft limit (+)
n+1	0	Selection output 2 Note 1 and 2 Point zone/Zone 1/Zone 2/ Traveling/Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	
	1	Home position return complete Note 3	0: Incomplete, 1: Complete
	2	Servo ON state Note 3	0: OFF state, 1: ON state
	3	Alarm status Note 3, Note 4	0: Triggered, 1: Not triggered
	4	Operation preparation complete	0: Incomplete, 1: Complete
	5	-	-
	6	-	-
	7	-	-
n+2 to n+3	-	-	-

Note 1: Both point travel complete and traveling may be ON ("1") at the same time depending on the timing.
Note 2: If the software version is old, the outside soft limit, outside soft limit (-), and outside soft limit (+) cannot be selected. Refer to "1.3.1 List of versions" for compatibility of version and controller specifications.
Note 3: Content can be monitored even in TOOL mode when not in forced output mode. Other items are turned OFF (“0”).
Note 4: There are two alarm status signals: “Alarm status (communication unit)” that indicates the alarm status of the communication unit, and “Alarm status” that indicates the alarm status of the drive unit. Check both alarm statuses before operating the actuator.
Note 5: The alarm 0 to 15 indicates the first digit of the alarm code as a hexadecimal number. Refer to "5.2 Alarm Indications and Countermeasures " for the alarm codes.

When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status.

■ Simple direct value mode (operation mode (CC-Link, EtherCAT, EtherNet/IP, PROFINET): 1)

Refer to “3.8.5 Address allocation” for address allocation by interface specification.

<Control area: Control signal>

Input byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number selection bit 0	Binary data 0 to 63 * The 0 bit side indicates the lower bit, and the 5 bit side indicates the upper bit.
	1	Point number selection bit 1	
	2	Point number selection bit 2	
	3	Point number selection bit 3	
	4	Point number selection bit 4	
	5	Point number selection bit 5	
	6	Point travel start	1: Start
	7	JOG/INCH(-) travel start	1: Start
n+1	0	JOG/INCH(+) travel start	1: Start
	1	Home position return start	1: Home position return start
	2	Servo ON	1: Servo ON, 0: Cancel
	3	Alarm reset	1: Reset
	4	Stop	0: Stop, 1: Cancel
	5	Direct value travel selection Note 1	0: Point travel, 1: Direct value travel
	6	INCH selection	0: JOG, 1: INCH
	7	Monitoring request	1: Execute

Note 1: When the direct value travel selection is turned OFF (“0”), the point travel can be performed in the same way as the 64-point mode.

- When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status. Similarly, if communication is not established, it will not be sent to the controller even if each bit is ON (“1”).
- After the monitoring number is switched, there will be some time lag until the data actually switches. If you refer to the data immediately after switching, you may reference unintended data.
- Stop is negative logic. Turn ON (“1”) (cancel) bits for both to operate. (You cannot disable stop in the simple direct value mode, the full direct value mode, or the standard direct value mode.)

<Control area: monitoring number and position>

Input byte for drive unit		Item	Value (decimal)
Byte	bit		
n+2 to n+3	-	Monitoring No.	2: Speed 3: Current value 5: Alarm
n+4 to n+7	-	Position (0.01 mm) (0.01 deg) Note 1	-999999 to 999999 * The n+4 byte side indicates the lower byte, and the n+7 byte side indicates the higher byte.

Note 1: When the PLC is powered on, this item is set to 0. The value of this item does not change unless a new value is written from the PLC.

<Status area: status signal>

Output byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number confirmation bit 0	Port numbers 0 to 63 Note 5 * The 0 bit side indicates the lower bit, and the 5 bit side indicates the upper bit.
	1	Point number confirmation bit 1	
	2	Point number confirmation bit 2	
	3	Point number confirmation bit 3	
	4	Point number confirmation bit 4	
	5	Point number confirmation bit 5	
	6	Point travel complete Note 1	0: Incomplete, 1: Complete
	7	Selection output 1 Note 1 and 2 Point zone/Zone 1/Zone 2/ Traveling/Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	Point zone/Zone 1/Zone 2 0: Outside zone, 1: Inside zone Traveling 0: Stopped, 1: Traveling Warning 0: Triggered, 1: Not triggered Outside soft limit 0: Within the soft limit range, 1: Out of soft limit range Outside soft limit (-) 0: Soft limit (-) or greater, 1: Less than the soft limit (-) Outside soft limit (+) 0: Soft limit (+) or less; 1: Excesses the soft limit (+)
n+1	0	Selection output 2 Note 1 and 2 Point zone/Zone 1/Zone 2/ Traveling/Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	
	1	Home position return complete Note 3	0: Incomplete, 1: Complete
	2	Servo ON state Note 3	0: OFF state, 1: ON state
	3	Alarm status Note 3, Note 4	0: Triggered, 1: Not triggered
	4	Operation preparation complete	0: Incomplete, 1: Complete
	5	Direct value travel status	0: Point travel, 1: Direct value travel
	6	Monitoring response Note 3	0: Normal, 1: Monitoring number error
	7	Monitoring complete Note 3	0: Incomplete, 1: Complete

Note 1: Both point travel complete and traveling may be ON (“1”) at the same time depending on the timing.
Note 2: If the software version is old, the outside soft limit, outside soft limit (-), and outside soft limit (+) cannot be selected. Refer to "1.3.1 List of versions" for compatibility of version and controller specifications.
Note 3: Content can be monitored even in TOOL mode when not in forced output mode. Other items are turned OFF("0").
Note 4: There are two alarm status signals: “Alarm status (communication unit)” that indicates the alarm status of the communication unit, and “Alarm status” that indicates the alarm status of the drive unit. Check both alarm statuses before operating the actuator.
Note 5: The value becomes undefined if the direct value travel selection (RYn6) is turned ON from OFF.

When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status.

<Status areas: monitoring values and position>

Output byte for drive unit		Item	Value (decimal)
Byte	bit		
n+2 to n+3	-	Monitoring value Note 1	The monitoring data that was read is set.
n+4 to n+7	-	Position (0.01 mm) (0.01 deg) Note 1	-999999 to 999999 * The n+4 byte side indicates the lower byte, and the n+7 byte side indicates the higher byte.

Note 1: Content can be monitored even in TOOL mode when not in forced output mode. Other items are turned OFF (“0”).

■ Standard direct value mode (Operation mode (CC-Link, EtherCAT, EtherNet/IP, PROFINET): 2)

Refer to “3.8.5 Address allocation” for address allocation by interface specification.

<Control area: Control signal>

Input byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number selection bit 0	Binary data 0 to 63 * The 0 bit side indicates the lower bit, and the 5 bit side indicates the upper bit.
	1	Point number selection bit 1	
	2	Point number selection bit 2	
	3	Point number selection bit 3	
	4	Point number selection bit 4	
	5	Point number selection bit 5	
	6	Point travel start	1: Start
	7	JOG/INCH(-) travel start	1: Start
n+1	0	JOG/INCH(+) travel start	1: Start
	1	Home position return start	1: Home position return start
	2	Servo ON	1: Servo ON, 0: Cancel
	3	Alarm reset	1: Reset
	4	Stop	0: Stop, 1: Cancel
	5	Direct value travel selection Note 1	0: Point travel, 1: Direct value travel
	6	INCH selection	0: JOG, 1: INCH
	7	-	-

Note 1: When the direct value travel selection is turned OFF (“0”), the point travel can be performed in the same way as the 64-point mode.

- When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status. Similarly, if communication is not established, it will not be sent to the controller even if each bit is ON (“1”).
- Stop is negative logic. Turn ON (“1”) (cancel) bits for both to operate. (You cannot disable stop in the simple direct value mode, the full direct value mode, or the standard direct value mode.)

<Control area: monitoring number and direct value data>

Input byte for drive unit		Item	Value (decimal)
Byte	bit		
n+2	0 to 1	Operation method	0: Positioning operation, 1: Pressing operation 1, 2: Pressing operation 2 * The bit 0 side indicates the lower bit, and the bit 1 side indicates the higher bit.
	2 to 3	Position specification method	0: Absolute, 1: Incremental * The bit 2 side indicates the lower bit, and the bit 3 side indicates the higher bit.
	4 to 7	Rotation direction	0: Common, 1: Shortest rotation, 2: CW, 3: CCW * The bit 4 side indicates the lower bit, and the bit 7 side indicates the higher bit.
n+3	0 to 3	Acceleration/deceleration method	0: Common, 1: Trapezoid * The bit 0 side indicates the lower bit, and the bit 3 side indicates the higher bit.
	4 to 7	Stop method	0: Common 1: Control 2: Fixed excitation 3: Automatic servo OFF 1 4: Automatic servo OFF 2 5: Automatic servo OFF 3 * The bit 4 side indicates the lower bit, and the bit 7 side indicates the higher bit.
n+4 to n+7	-	Position (0.01 mm) (0.01 deg) Note 1	-999999 to 999999 * The n+4 byte side indicates the lower byte, and the n+7 byte side indicates the higher byte.
n+8 to n+9	-	Positioning width (0.01 mm) (0.01 deg) Note 1	0 to 999 (when setting = 0, use common parameter value)
n+10 to n+11	-	Speed (mm/s) (deg/s) Note 1	0 to 9999 (when setting = 0, use common parameter value)
n+12	-	Acceleration (0.01 G) Note 1	0 to 255 (when setting = 0, use common parameter value)
n+13	-	Deceleration (0.01 G) Note 1	0 to 255 (when setting = 0, use common parameter value)
n+14	-	Pressing rate (%) Note 1	0 to 100 (when setting = 0, use common parameter value)
n+15	-	Pressing speed (mm/s) (deg/s) Note 1	0 to 99 (when setting = 0, use common parameter value)

Note 1: When the PLC is powered on, this item is set to 0. The value of this item does not change unless a new value is written from the PLC.

- The pressing distance is applied to the value set to the common pressing distance of the parameter.
- 0 is applied to the gain magnification. (Not to use the gain magnification.)

<Status area: status signal>

Output byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number confirmation bit 0	Port numbers 0 to 63 Note 6 * The 0 bit side indicates the lower bit, and the 5 bit side indicates the upper bit.
	1	Point number confirmation bit 1	
	2	Point number confirmation bit 2	
	3	Point number confirmation bit 3	
	4	Point number confirmation bit 4	
	5	Point number confirmation bit 5	
	6	Point travel complete Note 1	0: Incomplete, 1: Complete
	7	Selection output 1 Note 1, 2 and 3 Point zone/Zone 1/Zone 2/ Traveling/Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	Point zone/Zone 1/Zone 2 0: Outside zone, 1: Inside zone Traveling 0: Stopped, 1: Traveling Warning 0: Triggered, 1: Not triggered Outside soft limit 0: Within the soft limit range, 1: Out of soft limit range Outside soft limit (-) 0: Soft limit (-) or greater, 1: Less than the soft limit (-) Outside soft limit (+) 0: Soft limit (+) or less; 1: Excesses the soft limit (+)
n+1	0	Select output 2 Note 1, 2 and 3 Point zone/Zone 1/Zone 2/ Traveling/Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	
	1	Home position return complete Note 4	0: Incomplete, 1: Complete
	2	Servo ON state Note 4	0: OFF state, 1: ON state
	3	Alarm status Note 4, Note 5	0: Triggered, 1: Not triggered
	4	Operation preparation complete	0: Incomplete, 1: Complete
	5	Direct value travel status	0: Point travel, 1: Direct value travel
	6	-	-
	7	-	-

Note 1: Both point travel complete and traveling may be ON (“1”) at the same time depending on the timing.
Note 2: Point zone is always OFF ("0") in the case of a direct value travel.
Note 3: If the software version is old, the outside soft limit, outside soft limit (-), and outside soft limit (+) cannot be selected. Refer to "1.3.1 List of versions" for compatibility of version and controller specifications.
Note 4: Content can be monitored even in TOOL mode when not in forced output mode. Other items are turned OFF("0").
Note 5: There are two alarm status signals: “Alarm status (communication unit)” that indicates the alarm status of the communication unit, and “Alarm status” that indicates the alarm status of the drive unit. Check both alarm statuses before operating the actuator.
Note 6: The value becomes undefined if the direct value travel selection (RYn6) is turned ON from OFF.

When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status.

<Status area: monitoring output>

Output byte for drive unit		Item	Value (decimal)
Byte	bit		
n+2 to n+3	-	-	-
n+4 to n+5	-	Position (0.01 mm) (0.01 deg) Note 1	-999999 to 999999 * The n+4 byte side indicates the lower byte, and the n+7 byte side indicates the higher byte.
n+6 to n+7	-		
n+8 to n+9		Speed (mm/s) (deg/s) Note 1	0 to 9999
n+10 to n+11		Current (%) Note 1	0 to 100
n+12 to n+13		-	
n+14 to n+15		Alarm Note 1	The alarm code is set.

Note 1: Content can be monitored even in TOOL mode when not in forced output mode. Other items are turned OFF (“0”).

■ Full direct value mode (operation mode (CC-Link, EtherCAT, EtherNet/IP, PROFINET): 3)

Refer to “3.8.5 Address allocation” for address allocation by interface specification.

<Control area: Control signal>

Input byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number selection bit 0	Binary data 0 to 63 * The 0 bit side indicates the lower bit, and the 5 bit side indicates the upper bit.
	1	Point number selection bit 1	
	2	Point number selection bit 2	
	3	Point number selection bit 3	
	4	Point number selection bit 4	
	5	Point number selection bit 5	
	6	Point travel start	1: Start
	7	JOG/INCH(-) travel start	1: Start
n+1	0	JOG/INCH(+) travel start	1: Start
	1	Home position return start	1: Home position return start
	2	Servo ON	1: Servo ON, 0: Cancel
	3	Alarm reset	1: Reset
	4	Stop	0: Stop, 1: Cancel
	5	Direct value travel selection Note 1	0: Point travel, 1: Direct value travel
	6	INCH selection	0: JOG, 1: INCH
	7	-	-

Note 1: When the direct value travel selection is turned OFF (“0”), the point travel can be performed in the same way as the 64-point mode.

- When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status. Similarly, if communication is not established, it will not be sent to the controller even if each bit is ON (“1”).
- Stop is negative logic. Turn ON (“1”) (cancel) bits for both to operate. (You cannot disable stop in the simple direct value mode, the full direct value mode, or the standard direct value mode.)

<Control area: direct value data and reservation>

Input byte for drive unit		Item	Value (decimal)
Byte	bit		
n+2	0 to 1	Operation method	0: Positioning operation, 1: Pressing operation 1, 2: Pressing operation 2 * The bit 0 side indicates the lower bit, and the bit 1 side indicates the higher bit.
	2 to 3	Position specification method	0: Absolute, 1: Incremental * The bit 2 side indicates the lower bit, and the bit 3 side indicates the higher bit.
	4 to 7	Rotation direction	0: Common, 1: Shortest rotation, 2: CW, 3: CCW * The bit 4 side indicates the lower bit, and the bit 7 side indicates the higher bit.
n+3	0 to 3	Acceleration/deceleration method	0: Common, 1: Trapezoid * The bit 0 side indicates the lower bit, and the bit 3 side indicates the higher bit.
	4 to 7	Stop method	0: Common 1: Control 2: Fixed excitation 3: Automatic servo OFF 1 4: Automatic servo OFF 2 5: Automatic servo OFF 3 * The bit 4 side indicates the lower bit, and the bit 7 side indicates the higher bit.
n+4 to n+7	-	Position (0.01 mm) (0.01 deg) Note 1	-999999 to 999999 * The n+4 byte side indicates the lower byte, and the n+7 byte side indicates the higher byte.
n+8 to n+9		Positioning width (0.01 mm) (0.01 deg) Note 1	0 to 999 (when setting = 0, use common parameter value)
n+10 to n+11		Speed (mm/s) (deg/s) Note 1	0 to 9999 (when setting = 0, use common parameter value)
n+12		Acceleration (0.01 G) Note 1	0 to 255 (when setting = 0, use common parameter value)
n+13		Deceleration (0.01 G) Note 1	0 to 255 (when setting = 0, use common parameter value)
n+14		Pressing rate (%) Note 1	0 to 100 (when setting = 0, use common parameter value)
n+15		Pressing speed (mm/s) (deg/s) Note 1	0 to 99 (when setting = 0, use common parameter value)
n+16 to n+19		Pressing distance (0.01 mm) (0.01 deg) Note 1	-999999 to 999999 (when setting = 0, use common parameter value) * The n+16 byte side indicates the lower byte, and the n+19 byte side indicates the higher byte.
n+20 to n+21		Gain magnification (%) Note 1	0 to 9999 (setting = 0 indicates gain magnification not in use.)
n+22 to n+23		-	-

Note 1: When the PLC is powered on, this item is set to 0. The value of this item does not change unless a new value is written from the PLC.

<Status area: status signal>

Output byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number confirmation bit 0	Port numbers 0 to 63 Note 6 * Set the travel complete point number when normal and the alarm when abnormal. * The 0 bit side indicates the lower bit, and the 5 bit side indicates the upper bit.
	1	Point number confirmation bit 1	
	2	Point number confirmation bit 2	
	3	Point number confirmation bit 3	
	4	Point number confirmation bit 4	
	5	Point number confirmation bit 5	
	6	Point travel complete Note 1	0: Incomplete, 1: Complete
	7	Selection output 1 Note 1 , 2 and 3 Point zone/Zone 1/Zone 2/ Traveling/ Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	Point zone/Zone 1/Zone 2 0: Outside zone, 1: Inside zone Traveling 0: Stopped, 1: Traveling Warning 0: Triggered, 1: Not triggered Outside soft limit 0: Within the soft limit range, 1: Out of soft limit range Outside soft limit (-) 0: Soft limit (-) or greater, 1: Less than the soft limit (-) Outside soft limit (+) 0: Soft limit (+) or less; 1: Excesses the soft limit (+)
n+1	0	Select output 2 Note 1, 2 and 3 Point zone/Zone 1/Zone 2/ Traveling/Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	
	1	Home position return complete Note 4	0: Incomplete, 1: Complete
	2	Servo ON state Note 4	0: OFF state, 1: ON state
	3	Alarm status Note 4, Note 5	0: Triggered, 1: Not triggered
	4	Operation preparation complete	0: Incomplete, 1: Complete
	5	Direct value travel status	0: Point travel, 1: Direct value travel
	6	-	-
	7	-	-

Note 1: Both point travel complete and traveling may be ON (“1”) at the same time depending on the timing.
Note 2: Point zone is always OFF ("0") in the case of a direct value travel.
Note 3: If the software version is old, the outside soft limit, outside soft limit (-), and outside soft limit (+) cannot be selected. Refer to "1.3.1 List of versions" for compatibility of version and controller specifications.
Note 4: Content can be monitored even in TOOL mode when not in forced output mode. Other items are turned OFF("0").
Note 5: There are two alarm status signals: “Alarm status (communication unit)” that indicates the alarm status of the communication unit, and “Alarm status” that indicates the alarm status of the drive unit. Check both alarm statuses before operating the actuator.
Note 6: The value becomes undefined if the direct value travel selection (RYn6) is turned ON from OFF.

When starting, first confirm the PLC communication status for the alarm signal, warning signal, and other signals, and then reference the status.

<Status areas: monitoring output, reservation>

Output byte for drive unit		Item	Value (decimal)
Byte	bit		
n+2 to n+3	-	-	-
n+4 to n+7	-	Position (0.01 mm) (0.01 deg) Note 1	-999999 to 999999 * The n+4 byte side indicates the lower byte, and the n+7 byte side indicates the higher byte.
n+8 to n+9	-	Speed (mm/s) (deg/s) Note 1	0 to 9999
n+10 to n+11	-	Current (%) Note 1	0 to 100
n+12 to n+13	-	-	-
n+14 to n+15	-	Alarm Note 1	The alarm code is set.
n+16 to n+23	-	-	-

Note 1: Content can be monitored even in TOOL mode when not in forced output mode. Other items are turned OFF (“0”).

3.8.8 Cyclic data details for PIO mode

■ 64-point mode (B064) (operation mode (PIO): 0)

Refer to “3.8.5 Address allocation” for address allocation by interface specification.

<Control area: Control signal>

Input byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number selection bit 0	Binary data 0 to 63 * The 0 bit side indicates the lower bit, and the 5 bit side indicates the upper bit.
	1	Point number selection bit 1	
	2	Point number selection bit 2	
	3	Point number selection bit 3	
	4	Point number selection bit 4	
	5	Point number selection bit 5	
	6	Point travel start	1: Start
	7	JOG (-) travel start	1: Start
n+1	0	JOG (+) travel start	1: Start
	1	Home position return start	1: Home position return start
	2	Servo ON	1: Servo ON, 0: Cancel
	3	Alarm reset	1: Reset
	4	Stop	0: Stop, 1: Cancel
	5	-	-
	6	-	-
	7	-	-
n+2 to n+3	-	-	-

<Status area: status signal>

Output byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number confirmation bit 0/ Alarm confirmation bit 0	Port numbers 0 to 63 Alarm 0 to 15 * Set the travel complete point number when normal and the alarm when abnormal. * The 0 bit side indicates the lower bit, and the 5 bit side indicates the upper bit.
	1	Point number confirmation bit 1/ Alarm confirmation bit 1	
	2	Point number confirmation bit 2/ Alarm confirmation bit 2	
	3	Point number confirmation bit 3/ Alarm confirmation bit 3	
	4	Point number confirmation bit 4	
	5	Point number confirmation bit 5	
	6	Point travel complete	0: Incomplete, 1: Complete
	7	Selection output 1 Point zone/Zone 1/Zone 2/ Traveling/ Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	Point zone/Zone 1/Zone 2 0: Outside zone, 1: Inside zone Traveling 0: Stopped, 1: Traveling Warning 0: Triggered, 1: Not triggered
n+1	0	Selection output 2 Point zone/Zone 1/Zone 2/ Traveling/ Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	Point zone/Zone 1/Zone 2 0: Outside zone, 1: Inside zone Traveling 0: Stopped, 1: Traveling Warning 0: Triggered, 1: Not triggered
	1	Home position return complete	0: Incomplete, 1: Complete
	2	Servo ON state	0: OFF state, 1: ON state
	3	Alarm status	0: Triggered, 1: Not triggered
	4	Operation preparation complete	0: Incomplete, 1: Complete
	5	-	-
	6	-	-
	7	-	-
n+2 to n+3	-	-	-

Note 1: If the software version is old, the outside soft limit, outside soft limit (-), and outside soft limit (+) cannot be selected. Refer to "1.3.1 List of versions" for compatibility of version and controller specifications.

■ Simple 7-point mode (S007) (operation mode (PIO): 1)

Refer to “3.8.5 Address allocation” for address allocation by interface specification.

<Control area: Control signal>

Input byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number 1 travel start	1: Start
	1	Point number 2 travel start	1: Start
	2	Point number 3 travel start	1: Start
	3	Point number 4 travel start	1: Start
	4	Point number 5 travel start	1: Start
	5	Point number 6 travel start	1: Start
	6	Point number 7 travel start	1: Start
	7	JOG (-) travel start	1: Start
n+1	0	JOG (+) travel start	1: Start
	1	Home position return start	1: Home position return start
	2	Servo ON	1: Servo ON, 0: Cancel
	3	Alarm reset	1: Reset
	4	Stop	0: Stop, 1: Cancel
	5	-	
	6	-	
	7	-	
n+2 to n+3	-	-	-

<Status area: status signal>

Output byte for drive unit		Item	Value (decimal)
Byte	bit		
n+0	0	Point number 1 travel complete	0: Incomplete, 1: Complete
	1	Point number 2 travel complete	0: Incomplete, 1: Complete
	2	Point number 3 travel complete	0: Incomplete, 1: Complete
	3	Point number 4 travel complete	0: Incomplete, 1: Complete
	4	Point number 5 travel complete	0: Incomplete, 1: Complete
	5	Point number 6 travel complete	0: Incomplete, 1: Complete
	6	Point number 7 travel complete	0: Incomplete, 1: Complete
	7	Selection output 1 Point zone/Zone 1/Zone 2/ Traveling/ Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	Point zone/Zone 1/Zone 2 0: Outside zone, 1: Inside zone Traveling 0: Stopped, 1: Traveling Warning 0: Triggered, 1: Not triggered
n+1	0	Selection output 2 Point zone/Zone 1/Zone 2/ Traveling/ Warning/ Outside soft limit/ Outside soft limit (-)/ Outside soft limit (+)	Point zone/Zone 1/Zone 2 0: Outside zone, 1: Inside zone Traveling 0: Stopped, 1: Traveling Warning 0: Triggered, 1: Not triggered
	1	Home position return complete	0: Incomplete, 1: Complete
	2	Servo ON state	0: OFF state, 1: ON state
	3	Alarm status	0: Triggered, 1: Not triggered
	4	Operation preparation complete	0: Incomplete, 1: Complete
	5	-	
	6	-	
	7	-	
n+2 to n+3	-	-	-

Note 1: If the software version is old, the outside soft limit, outside soft limit (-), and outside soft limit (+) cannot be selected. Refer to "1.3.1 List of versions" for compatibility of version and controller specifications.

3.8.9 Data number

Indicates the data number used when executing data read or data write. Refer to “3.8.10 Data access, “3.10.3 Data read”, “3.10.4 Data write” and the manual of the PLC manufacturer for execution of data read and data write.

Data number (hexadecimal)	Item	Value (decimal)	Unit	Access Note 1	Target Note 2	Remarks
0x0505	Data initialization Note 3	0x999n (hexadecimal)	-	W	C/D	n: Set the bit as follows. Bit 0: 1 = Parameter data Initialize all Bit 1: (Not in use) Bit 2: 1 = Point data Initialize all Bit 3: (Not in use)
0x057F	Software reset Note 4	9999	-	W	C/D	9999 = Software reset
0x2810	Stroke length	0 to 9999	Mm (deg)	R	D	-
0x4000	Alarm data details	Alarm code Alarm date and time	-	R	C/D	The latest data in the alarm history is read. Read data [When the calendar function disabled] Bit 15 to 0: Alarm code Bit 31 to 16: 0 Data (alarm) Bit 15 to 0: seconds (upper 16 bits) Bit 31 to 16: seconds (lower 16 bits) [When the calendar function disabled] Bit 15 to 0: Alarm code Bit 23 to 16: Month Bit 31 to 24: Year Data (alarm) Bit 15 to 0: Hour Bit 15 to 0: Day Bit 15 to 0: Second Bit 31 to 16: Minute
0x4800	Integrated running distance	0 to 999999999	m (10^3 deg)	R	D	-
0x4802	Integrated number of travel times	0 to 999999999	times	R	D	-
0x4804	Integrated operating time	0 to 999999999	s	R	D	-
0x5000	Soft limit (+) Note 5	-999999 to 999999	0.01 mm (0.01 deg)	R/W	D	
0x5002	Soft limit (-) Note 5	-999999 to 999999	0.01 mm (0.01 deg)	R/W	D	-
0x5004	Zone 1 (+)	-999999 to 999999	0.01 mm (0.01 deg)	R/W	D	-
0x5006	Zone 1 (-)	-999999 to 999999	0.01 mm (0.01 deg)	R/W	D	-

Data number (hexadecimal)	Item	Value (decimal)	Unit	Access Note 1	Target Note 2	Remarks
0x5008	Zone 2 (+)	-999999 to 999999	0.01 mm (0.01 deg)	R/W	D	-
0x500A	Zone 2 (-)	-999999 to 999999	0.01 mm (0.01 deg)	R/W	D	-
0x500C	Zone hysteresis	0 to 999	0.01 mm (0.01 deg)	R/W	D	-
0x500E	Home position return direction (coordinate axis)	0 to 2	-	R/W	D	0: Normal (normal coordinates), 1: Opposite (normal coordinates), 2: Opposite (inverse coordinates)
0x5010	Home position return speed	1 to 99	mm/s (deg/s)	R/W	D	-
0x5012	Home position offset amount Note 5	-999999 to 999999	0.01 mm (0.01 deg)	R/W	D	-
0x5014	Automatic home position return Note 5	0 to 1	-	R/W	D	0: Disabled, 1: Enabled
0x5018	Emergency stop input Note 5	0 to 1	-	R/W	C	0: Enabled, 1: Disabled
0x5020	Pressing judgment time	0 to 9999	ms	R/W	D	-
0x5022	Fixed current at stop	0 to 100	%	R/W	D	-
0x5024	Automatic servo OFF time 1	0 to 9999	s	R/W	D	-
0x5026	Automatic servo OFF time 2	0 to 9999	s	R/W	D	-
0x5028	Automatic servo OFF time 3	0 to 9999	s	R/W	D	-
0x5030	Threshold value for integrated running distance	0 to 999999999	m 10^3 deg	R/W	D	-
0x5032	Threshold value for integrated number of travel times	0 to 999999999	times	R/W	D	-
0x5034	Threshold value for integrated operating time	0 to 999999999	s	R/W	D	-
0x5040	Common positioning width	1 to 999	0.01 mm 0.01 deg	R/W	D	-
0x5042	Common speed	1 to 9999	m/s deg/s	R/W	D	-
0x5044	Common acceleration	1 to 999	0.01G	R/W	D	-
0x5046	Common deceleration	1 to 999	0.01G	R/W	D	-
0x5048	Common pressing rate	1 to 100	%	R/W	D	-
0x504A	Common pressing speed	1 to 99	mm/s deg/s	R/W	D	-
0x504C	Common pressing distance	-999999 to 999999	0.01 mm 0.01 deg	R/W	D	-
0x504E	Common acceleration/ deceleration method	1	-	R/W	D	1: Trapezoid
0x5050	Common stop method	1 to 5	-	R/W	D	1: Control 2: Fixed excitation

Data number (hexadecimal)	Item	Value (decimal)	Unit	Access Note 1	Target Note 2	Remarks
						3: Automatic servo OFF 1 4: Automatic servo OFF 2 5: Automatic servo OFF 3
0x5054	Common rotation direction	1 to 3	-	R/W	D	1: Shortest rotation 2: CW 3: CCW
0x5080	G1 gain (response)	0 to 15	-	R/W	D	-
0x5082	G2 gain (load magnification)	0 to 15	-	R/W	D	-
0x5100	Operation mode (communication) Note 5	0 to 4	-	R/W	D	0: PIO 1: SDP 2: HDP 3: FDP
0x540C	Axis function Note 5	0 to 1	-	R/W	D	0: Enabled, 1: Disabled
0x5400	Operation mode (PIO) Note 5	0 to 4	-	R/W	D	0: B064 1: S007
0x5404	Output selection 1 Note 5	0 to 4	-	R/W	D	0: Point zone, 1: Zone 1, 2: Zone 2, 3: Traveling, 4: Warning
0x5406	Output selection 2 Note 5	0 to 4	-	R/W	D	0: Point zone, 1: Zone 1, 2: Zone 2, 3: Traveling, 4: Warning
0x540C	Stop input Note 5	0 to 1	-	R/W	D	0: Enabled, 1: Disabled
0x5410	JOG/INCH speed	1 to 100	mm/s deg/s	R/W	D	-
0x5412	INCH distance	1 to 1000	0.01 mm 0.01 deg	R/W	D	-
0x5482	Station number Note 5	1 to 64	-	R/W	C	-
0x5484	Communication speed Note 5	0 to 4	-	R/W	C	0:156 kbps 1: 625 kbps 2: 2.5 Mbps 3: 5 Mbps 4: 10 Mbps
0x5486	CC-Link version Note 5	0 to 2	-	R/W	C	0: Automatic 1: 1.10 2: 2.00
0x5488	Extended cyclic setting Note 5	0 to 4	-	R/W	C	0: Automatic 1: 1x 2: 2x 3: 4x 4: 8x
0x548A	The number of stations occupied Note 5	0 to 4	-	R/W	C	0: Automatic 1: 1 station 2: 2 stations 3: 3 stations 4: 4 stations
0x54C2	Device ID Note 5	0 to 65535	-	R/W	C	-
0x54C4	Register 0x0012 Note 5	0 to 1	-	R/W	C	0: Disabled (Standard) 1: Enabled (OMRON PLC)

Data number (hexadecimal)	Item	Value (decimal)	Unit	Access Note 1	Target Note 2	Remarks
0x5502	IP address Note 5	0.0.0.0 to 255.255.255.255	-	R/W	C	Set every 8 bits from the 1st to 4th octet. Example) 3232235787 (decimal) ↓ C0 A8 01 0B (hexadecimal) ↓ 192.168.1.11 (IP address)
0x5504	Subnet mask Note 5	0.0.0.0 to 255.255.255.255	-	R/W	C	
0x5506	Default gateway Note 5	0.0.0.0 to 255.255.255.255	-	R/W	C	
0x5508	DHCP	0 to 1	-	R/W	C	0: Disabled, 1: Enabled
0x5600	Calendar function	0 to 1	-	R/W	C	0: Enabled, 1: Disabled
0x8000 + 0x0020*n	Position	-999999 to 999999	0.01 mm (0.01 deg)	R/W	D	Point data for point No. n (n=0 to 63)
0x8002 + 0x0020*n	Positioning width	0 to 999	0.0 1 mm (0.01 deg)	R/W	D	Point data for point No. n (n=0 to 63)
0x8004 + 0x0020*n	Speed	0 to 9999	mm/s (deg/s)	R/W	D	Point data for point No. n (n=0 to 63)
0x8006 + 0x0020*n	Acceleration	0 to 999	0.01G	R/W	D	Point data for point No. n (n=0 to 63)
0x8008 + 0x0020*n	Deceleration	0 to 999	0.01G	R/W	D	Point data for point No. n (n=0 to 63)
0x800A + 0x0020*n	Pressing rate	0 to 100	%	R/W	D	Point data for point No. n (n=0 to 63)
0x800C + 0x0020*n	Pressing speed	0 to 99	mm/s (deg/s)	R/W	D	Point data for point No. n (n=0 to 63)
0x800E + 0x0020*n	Pressing distance	-999999 to 999999	0.01 mm (0.01 deg)	R/W	D	Point data for point No. n (n=0 to 63)

Data number (hexadecimal)	Item	Value (decimal)	Unit	Access Note 1	Target Note 2	Remarks
0x8010 + 0x0020*n	Mode	0 to 65535	-	R/W	D	Point data for point No. n (n=0 to 63) Bit 3 to 0: Operation method 0: Positioning operation, 1: Pressing operation 1, 2: Pressing operation 2 Bit 7 to 4: Position specification method 0: Absolute 1: Incremental Bit 11 to 8: Acceleration/deceleration method 0: Common 1: Trapezoid Bit 15 to 12: Stop method 0: Common 1: Control 2: Fixed excitation 3: Automatic servo OFF 1 4: Automatic servo OFF 2 5: Automatic servo OFF 3 Bit 19 to 16: Rotation direction 0: Common 1: Shortest rotation 2: CW 3: CCW
0x8012 + 0x0020*n	Gain magnification	0 to 9999	%	R/W	D	Point data for point No. n (n=0 to 63)
0x8014 + 0x0020*n	Point zone (+)	-999999 to 999999	0.01 mm (0.01 deg)	R/W	D	Point data for point No. n (n=0 to 63)
0x8016 + 0x0020*n	Point zone (-)	-999999 to 999999	0.01 mm (0.01 deg)	R/W	D	Point data for point No. n (n=0 to 63)

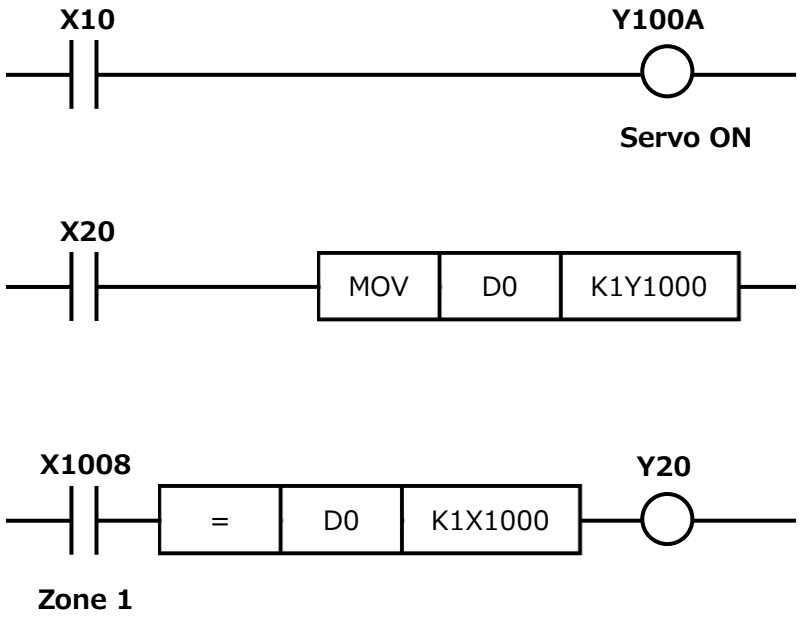
Note 1: R: Read, W: Write
Note 2: Indicates the unit that can be selected in “Target unit / axis number selection”. C: communication unit (value: 238), D: drive unit (value: 1 to 16)
Note 3: When initializing all parameter data, the parameters of the operation mode (CC-Link), Station number, and Communication speed are also initialized. Set these parameters again before turning the power back on or resetting the software.
Note 4: When the data complete turns ON, turn OFF the data request. If the data request remains ON, the software reset will be executed again after the software reset is completed.
Note 5: After changing the data, turn the power OFF/ON.

- Some values may generate errors even if set with the range in this table, depending on the actuator model No. (size, etc.). If a value out of the specification is set, unexpected operation may occur.

3.8.10 Data access

■ Cyclic data (CC-Link specifications)

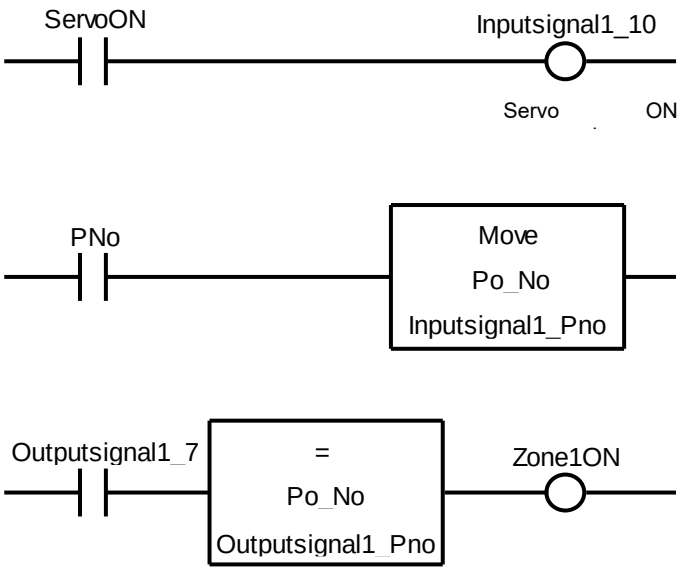
Cyclic data is always exchanged between the master and slave at a set cycle. Set the data length and configuration using a PLC development tool, and assign relays and data memories. Remote output and remote register (output) will be updated when data is set (with coil, bit SET, Move command, etc.). Remote input and remote register (input) can be referenced through means such as contacts, Compare command, or Move command.



For detailed information on settings, updates and references, refer to the manual from the PLC manufacturer.

■ Process data (EtherCAT specifications)

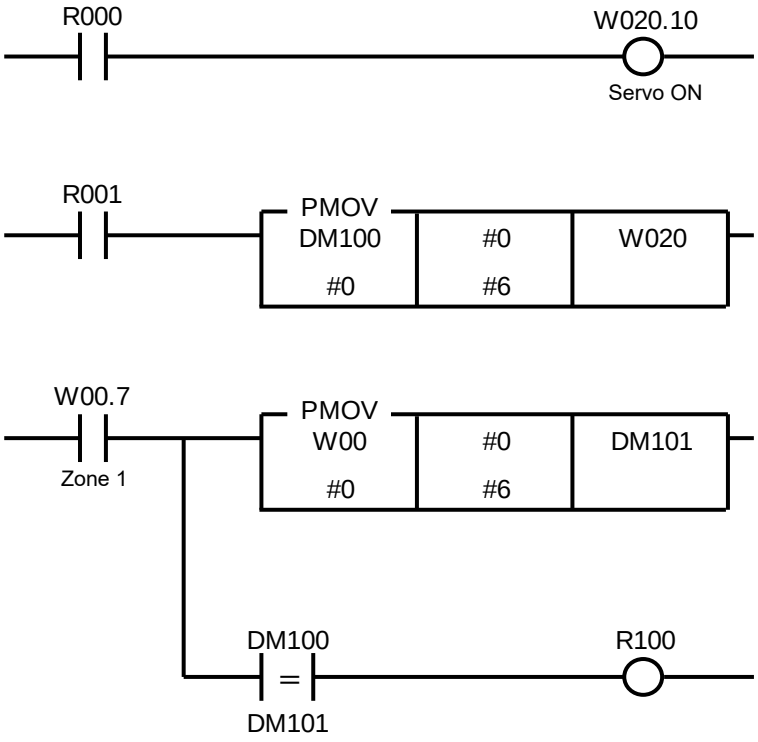
Process data is always exchanged between the master and slave at a set cycle. Set the data length and configuration using a PLC development tool, and assign relays and data memories. Input signals and input data will be updated when data is set (with coil, bit SET, Move command, etc.). Also, output signals and output data can be referenced through means such as contacts, Compare command, or Move command.



For detailed information on settings, updates and references, refer to the manual from the PLC manufacturer.

■ Implicit communication (EtherNet/IP specifications)

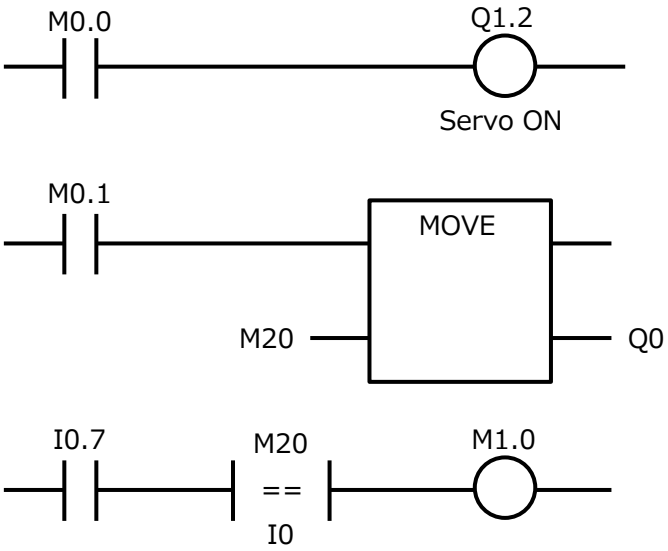
In the Implicit communication, data is always exchanged between the master and slave at a set cycle. Set the data length and configuration using a PLC development tool, and assign relays and data memories. Input data will be updated when data is set (with coil, bit SET, Move command, etc.). Also, the output data can be referred through means such as contacts, Compare command, or Move command.



For detailed information on settings, updates and references, refer to the manual from the PLC manufacturer.

■ IO Data (PROFINET specifications)

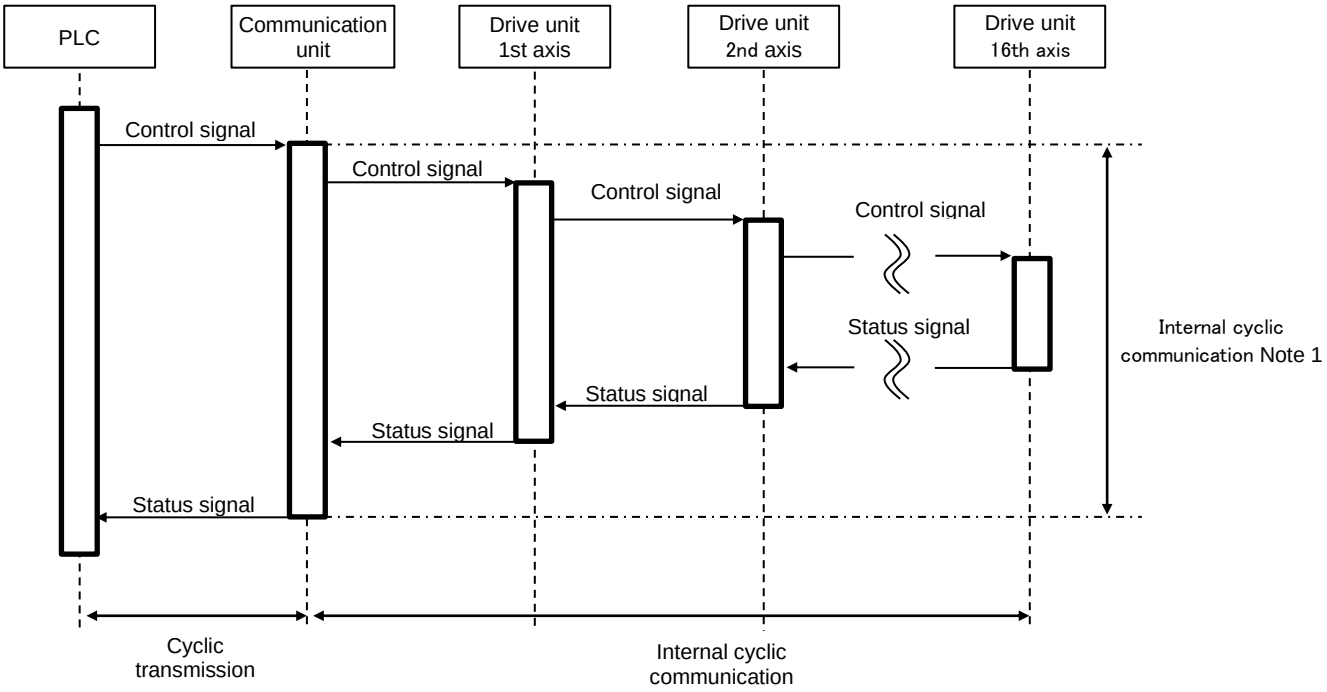
IO Data is always exchanged between the master and slave at a set cycle. Set the data length and configuration using a PLC development tool, and assign relays and data memories. Input data will be updated when data is set (with coil, bit SET, Move command, etc.). Also, the output data can be referred through means such as contacts, Compare command, or Move command.



For detailed information on settings, updates and references, refer to the manual from the PLC manufacturer.

3.8.1 Cyclic transmission sequence diagram

Sequence diagram of cyclic transmission between PLC and communication unit and internal cyclic communication between communication unit and drive unit is shown below.



Note 1: The internal cyclic communication time is determined by the data size and the number of axes. The data size is determined by the sum of the number of bytes of the operation mode for each axis. For example, for PIO mode 1 axis (4 bytes), standard direct value mode 2 axes (16 bytes each), and full direct value mode 1 axis (24 bytes), (4 bytes x 1 axis) + (16 bytes x 2 axes) + (24 bytes x 1 axis) = 60 bytes.

<List of the number of bytes in operation mode>

Operation mode	Number of bytes
PIO mode	4 bytes
Simple direct value mode	8 bytes
Standard direct value mode	16 bytes
Full direct value mode	24 bytes

<List of internal cyclic communication time>

Number of axes / Data size	3 axes or less	4 axes	5 axes	6 axes	7 axes	8 axes	9 axes	10 axes	11 axes	12 axes	13 axes	14 axes	15 axes	16 axes
1 to 16 bytes	1 ms	1 ms	-	-	-	-	-	-	-	-	-	-	-	-
17 to 32 bytes	1 ms	1 ms	1 ms	1 ms	1 ms	1 ms	-	-	-	-	-	-	-	-
33 to 48 bytes	1 ms	1 ms	1 ms	1 ms	1 ms	2 ms	2 ms	2 ms	2 ms	-	-	-	-	-
49 to 64 bytes	1 ms	1 ms	1 ms	2 ms	2 ms	2 ms	2 ms	2 ms	2 ms	3 ms	3 ms	3 ms	3 ms	4 ms
65 to 80 bytes	1 ms	1 ms	2 ms	2 ms	2 ms	2 ms	2 ms	3 ms	3 ms	3 ms	3 ms	3 ms	4 ms	4 ms
81 to 96 bytes	-	2 ms	2 ms	2 ms	2 ms	2 ms	3 ms	3 ms	3 ms	3 ms	4 ms	4 ms	4 ms	4 ms
97 to 112 bytes	-	-	2 ms	2 ms	2 ms	3 ms	3 ms	3 ms	4 ms	4 ms	4 ms	4 ms	5 ms	5 ms
113 to 128 bytes	-	-	2 ms	2 ms	3 ms	3 ms	3 ms	4 ms	4 ms	4 ms	5 ms	5 ms	5 ms	5 ms
129 to 144 bytes	-	-	-	3 ms	3 ms	3 ms	4 ms	4 ms	4 ms	5 ms	5 ms	5 ms	6 ms	6 ms
145 to 160 bytes	-	-	-	-	3 ms	4 ms	4 ms	4 ms	5 ms	5 ms	5 ms	6 ms	6 ms	7 ms
161 to 176 bytes	-	-	-	-	3 ms	4 ms	4 ms	5 ms	5 ms	5 ms	6 ms	6 ms	7 ms	7 ms
177 to 192 bytes	-	-	-	-	-	4 ms	5 ms	5 ms	6 ms	6 ms	6 ms	7 ms	7 ms	8 ms
193 to 208 bytes	-	-	-	-	-	-	5 ms	5 ms	6 ms	6 ms	7 ms	7 ms	8 ms	8 ms
209 to 224 bytes	-	-	-	-	-	-	5 ms	6 ms	6 ms	7 ms	7 ms	8 ms	8 ms	9 ms
225 to 240 bytes	-	-	-	-	-	-	-	6 ms	7 ms	7 ms	8 ms	8 ms	9 ms	9 ms
241 to 256 bytes	-	-	-	-	-	-	-	-	7 ms	8 ms	8 ms	9 ms	9 ms	10 ms

* The above values are for reference only

3.9 Setting parameters and point data

Refer to Instruction Manual (SM-A62474) of the drive unit.

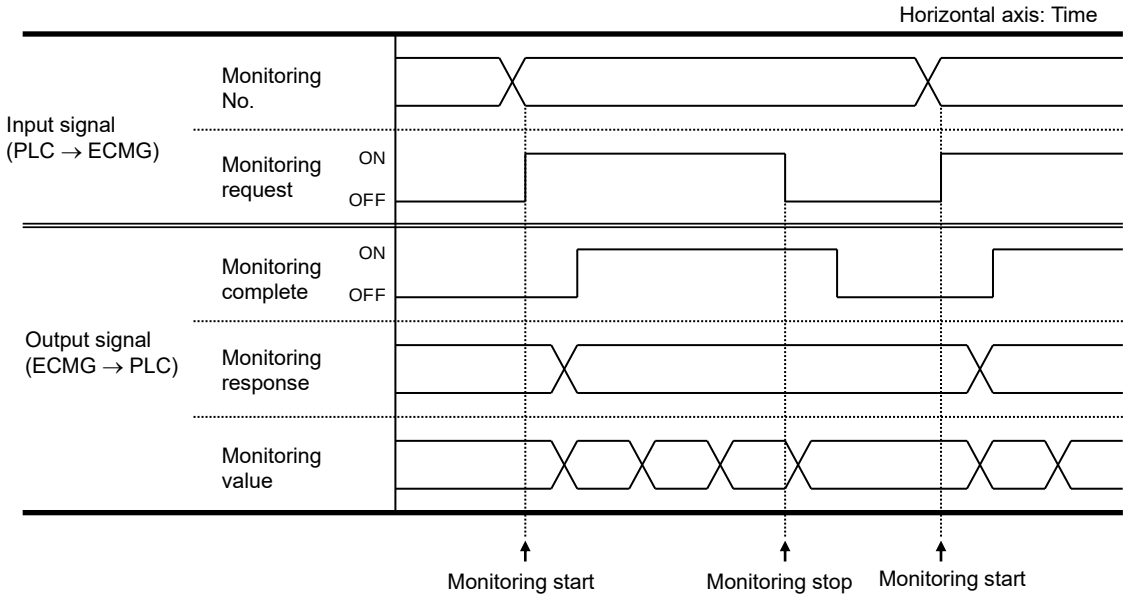
3.10 Operation timing chart

3.10.1 Control of the actuator

Refer to Instruction Manual “SM-A62474” for the timing chart related to the actuator operation.

3.10.2 Monitoring

The monitoring function is executed in the communication area of the drive unit.
After setting the monitoring number, turn monitoring request ON.



Monitoring No. (hexadecimal)	Data output to monitoring value (decimal)
0x0002	Speed (mm/s) (deg/s) 0 to 9999
0x0003	Current (%) 0 to 100
0x0005	Alarm

- The function to change the output of the monitoring value by specifying the monitoring number can be used only in the simple direct value mode.
- In the PIO mode, the monitoring function cannot be used, and in other modes, all outputs of position, speed, current, and alarm can be monitored simultaneously.

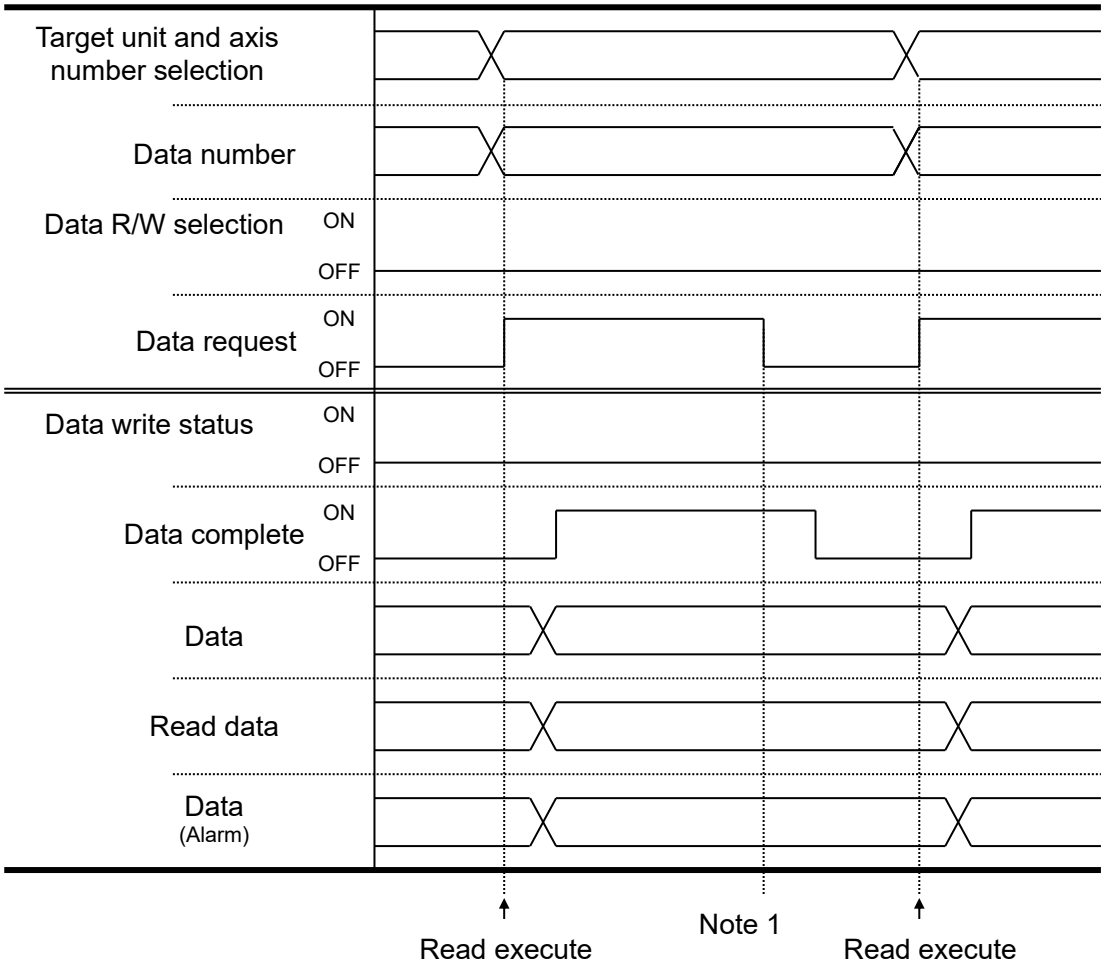
<Output list of monitoring response>

Monitoring response	Description
0	Normal
1	Monitoring number error

3.10.3 Data read

Data read is executed in the communication area of the communication unit.
After setting the axis number, data number and data R/W selection, turn data request ON.

Horizontal axis: Time



Note 1: Confirm that data complete is ON, and then turn data request OFF.

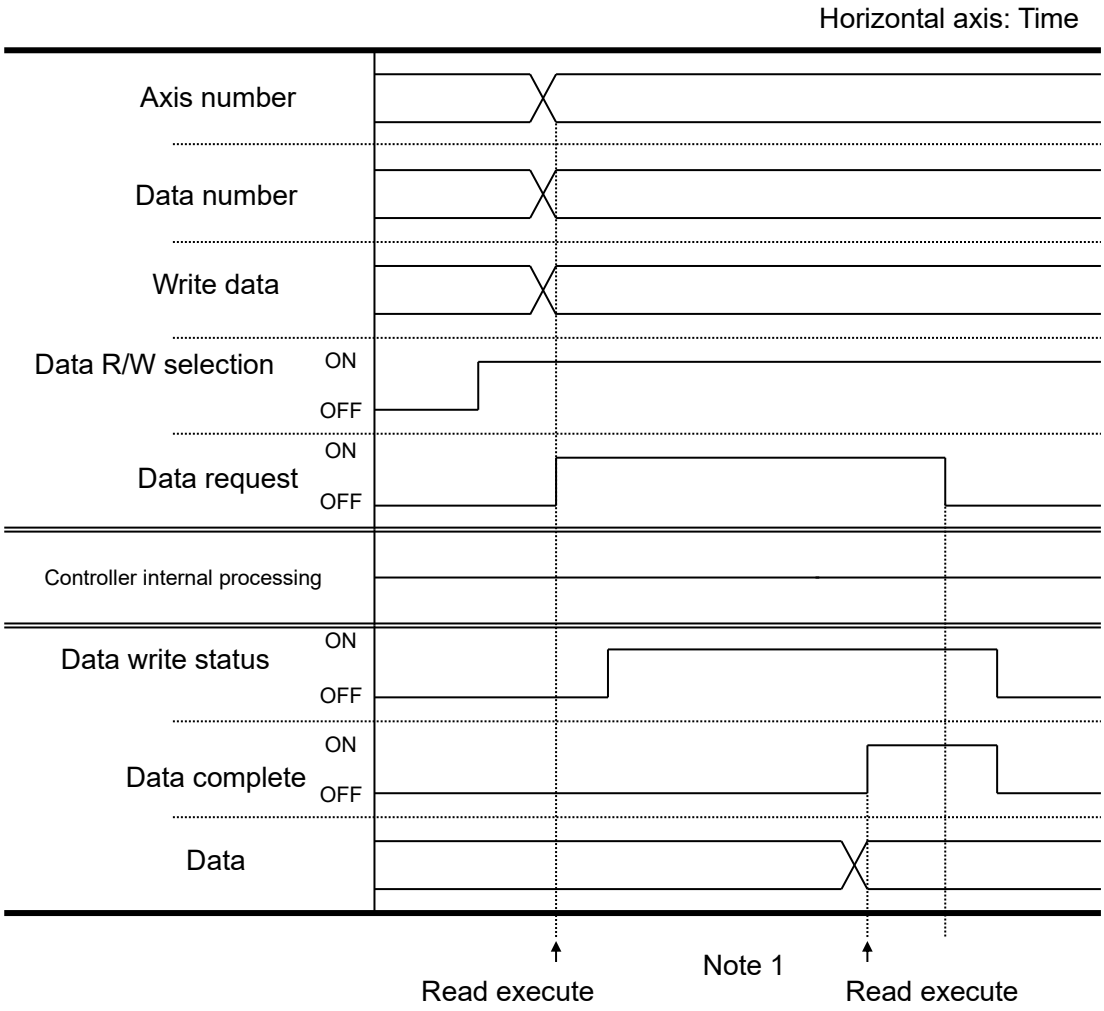
Do not change ON/OFF of the data R/W selection or switch the PLC mode / TOOL mode from S-Tools while the data request is ON. Unintended data reading or writing may be performed.

<List of data response output>

Data response				Description
bit3	bit2	bit1	bit0	
0	0	0	0	Normal
0	0	1	0	Data number error
1	0	0	1	Axis number error

3.10.4 Data write

Data write is executed in the communication area of the communication unit.
After setting an axis number, data number, write data, and data R/W selection, turn data request ON.



Note 1: Confirm that data complete is ON, and then turn data request OFF.

Do not change ON/OFF of the data R/W selection or switch the PLC mode / TOOL mode from S-Tools while the data request is ON. Unintended data reading or writing may be performed.

<List of data response output>

Data response				Description
bit3	bit2	bit1	bit0	
0	0	0	0	Normal
0	0	1	0	Data number error
0	1	1	1	Write data over lower limit
1	0	0	0	Write data over upper limit
1	0	0	1	Axis number error

4. MAINTENANCE AND INSPECTION

⚠WARNING

Do not perform disassembly or modification of products that are not specified in this manual.
An injury, accident, malfunction, or failure may occur; in addition, the specifications described in this manual may not be satisfied.

Do not attach or remove wires and connectors with the power turned on.
A malfunction, failure, or electric shock may occur.

Do not work with wet hands.
Doing so may cause electric shock.

Do not touch the heat sink and cement resistance inside the controller or the motor of an actuator.
Electric shock or burns may result.

Install the product before wiring.
An electric shock may occur.

Before performing inspection, wait five minutes or longer after turning off the power and check the voltage with a tester.
An electric shock may occur.

CAUTION

Take measures to prevent a third person from turning on the power unexpectedly when performing maintenance, inspection, or repair.

Wiring and inspections must be performed by specialists.

Use a power cable with a sufficient capacity that allows the maximum instantaneous current.
A heat generation or damage may occur during operation.

Perform periodic inspections (two to three times a year) to confirm that the product operates properly.

Turn off the power immediately if abnormal heat, smoke, odor, sound, or vibration occurs in the product.
Damage to the product or fire may occur.

4.1 Precautions on Product Disposal

CAUTION

When disposing of the product, comply with “Waste Management and Public Cleansing Act” and have an industrial waste disposal company dispose of the product.

5. TROUBLESHOOTING

5.1 Problems, Causes, and Solutions

If the product does not operate as intended, confirm the table below for a possible solution.

Problem	Cause	Solution
The RUN lamp does not light or flash even when the power supply is turned ON.	Wiring is not correct.	Check the power supply wiring.
	The cable is broken.	Confirm that the wiring is neither pinched nor disconnected. Check the connector and terminal.
	Product is malfunctioning or is damaged.	It will need to be repaired. Check “5.1.1 Items to check when a problem occurs” and then contact us.
	The power supply is malfunctioning.	Repair or replace the power supply.
	Power capacity is insufficient.	Use a power supply with a larger capacity.
The RUN lamp remains lit in red.	Alarm has been issued.	Check the alarm and its cause in “5.2 Alarm Indications and Countermeasures” and then remove it.
	There is an abnormality in system.	It will need to be repaired. Check “5.1.1 Items to check when a problem occurs” and then contact us.
No operation standby completion signal is output.	The emergency stop signal is connected with the a-contact.	Connect emergency stop (EMG) wiring to the b-contact.
	The voltage is applied to the force brake release signal.	Ensure that the voltage is not applied to the force brake release signal during the operation.
	The servo is OFF.	Input the servo ON signal from the PLC.
	The stop signal is OFF.	Turn ON the stop signal.
	Wiring is not correct.	Refer to “2.4 Wiring method” and check the wiring.

Problem	Cause	Solution
Product does not operate as intended with PLC signal.	The input signal is unstable.	The input from the host system may be chattering. Ensure the input signal is at least 20 msec.
	It stops during operation.	The transport load may be too large. Recheck the specifications.
	Setting of position, speed, acceleration, or pressing rate is not correct.	Check the point data details.
	Setting of operation mode is not correct.	Check the “operation mode” details for the parameters.
	Wiring is not correct.	Refer to “2.4 Wiring method” and check the wiring.
	Friction load is too large.	Check the load friction during transport. Confirm that it is not seizing with the workpiece.
	It is colliding with the workpiece.	Check the assembly and setting status.
	Internal resistance of product has increased.	Check the environment conditions and the conditions of use. Check how long the product has been in use (operation distance).
	Actuator body is damaged.	It will need to be repaired. Check “5.1.1 Items to check when a problem occurs” and then contact us.
Product itself vibrates. The actuator makes abnormal sounds.	The actuator fitting is loose.	Retighten the bolts.
	Resonation occurs.	Perform gain adjustment.
Product cannot be operated with PLC.	It is in TOOL mode.	Use the setting tool (S-Tools) to change it to PLC mode.
	Wiring is not correct.	Refer to “2.4 Wiring method” and check the wiring.
	The cable is broken.	Confirm that the wiring is neither pinched nor disconnected. Check the connector and terminal.
	Overload error occurs.	Recheck the transport load and speed.
	Power capacity is insufficient.	Confirm that the power supply capacity satisfies the required voltage and current.

Problem	Cause	Solution	
Workpiece moves due to its own weight during an emergency stop.	The servo turns OFF during emergency stop.	Designed to be brake-less	Use a type with brake.
		Brake is forcibly released	Turn force release OFF for the brake.
	Load exceeding holding force is applied.	Confirm that an external force equal to or higher than the holding force is not being operated. Revise the “current when stopped” setting for the parameters data.	
Positioning completion output does not turn off.	The positioning complete width is too large for the travel distance.	Check the “positioning width” for the point data.	
Pressing operation cannot be performed.	Operation method is not set to pressing operation.	Check the “Operation method” in the point data.	
The maximum speed is not achieved.	The load or speed is excessive.	Confirm that the workpiece weight and operation speed satisfy specification values. Perform gain adjustment.	
Speed is not high enough. (very slow)	Operation method is set to pressing operation instead of positioning operation.	Check the “Operation method” in the point data. Make a gain adjustment	
Overshoot occurs.	Both transfer weight and amount of deceleration are large.	Confirm that the workpiece weight and operation speed satisfy specification values. Use a smaller deceleration value. Perform gain adjustment.	
Product cannot reach target takt time.	The acceleration or speed setting is incorrect.	Check the “acceleration” and “speed” for the point data.	

If you have any other questions or concerns, contact your nearest CKD sales office or distributor.

5.1.1 Items to check when a problem occurs

1	Check the state of the controller LEDs. Refer to “1.6 LED indication” for information on LED indications.
2	Check whether there is an error on the PLC.
3	Check the voltage of the control power supply (24 VDC).
4	Check the alarm details. Alarm details can be checked using the S-Tools setting software.
5	Check the communication status with the PLC using the PLC development tool or S-Tools.
6	Confirm that the cable is neither “disconnected” nor “pinched,” and that it is connected properly. When checking conductivity, turn the power supply OFF and disconnect the wiring to prevent electric shock.
7	Confirm that anti-noise measures (such as connecting a grounding wire or installing a surge suppressor) have been implemented.
8	Check the history leading up to the trouble occurring and the operation condition when the trouble occurred.
9	Check the product’s serial No.

*Check the cause of the problem according to the above items. Also, refer to “5.1.1 Items to check when a problem occurs” or “5.2 Alarm Indications and Countermeasures” as a solution.

5.2 Alarm Indications and Countermeasures

CAUTION

When an alarm occurs, eliminate the cause of the alarm.
Repeated operation under the condition that an alarm is generated may impose a load on the actuator and controller, and may accelerate degradation of the product or cause damage.
Consider the possibility of actuator or controller malfunction.
If an alarm related to the operation of the actuator such as "overload (C)" occurs, the actuator or controller may be malfunctioning. If the alarm recurs after performing the countermeasures listed in the table below and turning the controller power back on, contact CKD.

Alarms generated by the communication unit are not output by the drive unit. If an error occurs on the drive unit side, check whether an alarm has occurred on the communication unit.

■ Alarm

These are output when an error that affects the operation of the actuator is detected in the controller. There are two types of alarms, depending on the degree of error: alarms that can be reset, and alarms that require the power to be turned ON again.

Alarm code	Alarm item	Description	Solution	Alarm reset
0x1000 to 0x1FFF	Memory (Read)	An error has been detected in reading data from memory at power-on.	“0x1300 to 0x13FF” indicates that there is an error in the parameter data. Initialize the parameter data and power cycle. “0x1500 to 0x15FF” indicates that there is an error in the point data. Initialize the point data and power cycle. “0x1700 to 0x170F” indicates that there is an error in the alarm data. Initialize the alarm data and power cycle. “0x1800 to 0x180F” indicates that there is an error in the maintenance data. Initialize the maintenance data and power cycle. “0x1B00 to 0x1B0F” indicates that there is an error in the actuator information in the drive unit (A type). Overwrite the information of the actuator connected last time with the information of the actuator being connected and power cycle. “0x1B10 to 0x1B1F” indicates that there is an error in the actuator information in the drive unit (B type). Initialize or overwrite the actuator information, and turn the power on again. Other codes indicate that there is an error in the data inside. If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x2000 to 0x2FFF	Memory (Write)	An error has been detected in writing data into memory when changing data.	If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x3000 to 0x30FF	Temperature	The temperature in the controller is high.	Check the ambient temperature. If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x3100 to 0x31FF	Current	An overcurrent flowed from the power supply.	If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x3210 to 0x321F	Encoder for other models connected	Indicates that an encoder that is not compatible with the controller is connected.	If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x3220 to 0x322F	Encoder identification abnormality	Indicates that there is an abnormality in the identification of the encoder type (incremental/absolute).	If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No

Alarm code	Alarm item	Description	Solution	Alarm reset
0x3230 to 0x32FF	Encoder not connected	Indicates an abnormality in the connection state between the controller and actuator.	Check the connection between the cable and the connector. If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x3400 to 0x341F	Software reset error	Indicates that internal cyclic communication with the communication unit could not be resumed after performing a software reset of the drive unit.	Turn on the power again.	No
0x3400 to 0x342F	Encoder not connected	Indicates an abnormality in the connection state between the controller and actuator.	Check the connection between the cable and the connector. If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x3800 to 0x38FF	TOOL not connected	There is a problem with the connector connection while using the product in TOOL mode.	Check the connection between the cable and the connector. If the connector is disconnected, connect the connector. After changing the mode to PLC mode, reset the alarm.	Yes
0x3900 to 0x39FF	Interface	Indicates an error in the interface.	If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x3A00 to 0x3A0F	Actuator Model number error	Indicates that the model number of the actuator connected last time and actuator being connected are different when the power is turned ON.	Reconnect to the previously connected actuator. Or, overwrite the information of the actuator connected last time with the information of the actuator being connected and turn the power ON again.	No
0x3A10 to 0x3A1F	Actuator information not set	Indicates that actuator information is not set in the controller when the drive unit (B type) is powered on.	Set the actuator information and turn on the power again.	No
0x3A20 to 0x3A2F	Changing actuator information	Indicates that the drive unit (B type) has not been turned on again after the actuator information was changed.	Turn on the power again.	No
0x3A30 to 0x3A3F	Actuator information error (ECG only)	Indicates that an actuator not compatible with the ECMG series is connected.	Contact your nearest CKD sales office or distributor.	No
0x3B00 to 0x3B0F	Number of axes error (Not connected)	Indicates that an operable axis cannot be detected.	Check that the drive unit is connected to the communication unit, and then turn the power on again. Check the LED indication of the drive unit to see if there is any abnormality with the drive unit.	No
0x3B10 to 0x3B1F	Number of axes error (Excess)	Indicates that the communication unit has detected more than 17 axes.	Check if nine or more drive units are connected to one communication unit.	No
0x3B20 to 0x3B2F	Axis number error (Duplicate)	Indicates a duplicate axis number.	Set the axis number again. For details on how to set axis number, refer to “3.7.3 Setting axis numbers”.	No

Alarm code	Alarm item	Description	Solution	Alarm reset
0x3B30 to 0x3B3F	Axis number error (Out of range)	Indicates that the axis number is out of range.	Set the axis number again. For details on how to set axis number, refer to “3.7.3 Setting axis numbers”.	No
0x3B40 to 0x3B4F	Number of units error (Excess)	Indicates that the communication unit has detected 9 or more drive units.	Check if nine or more drive units are connected to one communication unit.	No
0x3B50 to 0x3B5F	Axis number writing error (At startup)	Indicates failure to set the axis number at power ON.	Turn on the power again.	No
0x3C00 to 0x3C8F	Internal cyclic communication error (At startup)	Indicates an error in internal cyclic communication at power ON.	Check that there is no abnormality with the connection between units and turn the power on again.	No
0x3D00 to 0x3D8F	Internal cyclic communication error	Indicates an error in internal cyclic communication.	If this alarm is generated in both the communication unit and the drive unit, release the alarm in the drive unit before releasing the alarm in the communication unit.	Yes
0x3F00 to 0x3F0F	Drive unit mismatch	Indicates that the drive unit connected to the communication unit has changed since the last startup.	Confirm that the axis number, point data, and user parameters are set correctly, update the drive unit information from S-Tools, and turn the power on again. For information on how to update the drive unit information, refer to "3.2 Updating and setting actuator information".	No
0x4000 to 0x40FF	Parameter data	There is an error in the parameter data.	“0x4010 to 0x401F” indicates that there is an error in the setting of the home position offset amount. “0x4020 to 0x402F” indicates that there is an error in the setting of the home position return speed. Reconfigure the user parameters and perform an alarm reset.	Yes
0x4100 to 0x41FF	Point data (Position)	When a point travel command is input, there is an error in the point data of the point number.	The final target position exceeds the range of the soft limit, or the final target position is 360 deg or more in FGRC series. Reconfigure the following point data and reset the alarm. Point data: position, pressing distance	Yes
0x4200 to 0x42FF	Point data (Speed)	When a point travel command is input, there is an error in the point data of the point number.	The point data setting is outside the setting range. Reconfigure the following point data and reset the alarm. For “0x4202”, review the setting of “Pressing speed” in the point data. For “0x4212”, review the “Speed” setting of the point data. For “0x4222”, review the “Acceleration” setting of the point data. For “0x4232”, review the “Deceleration” setting of the point data.	Yes
0x4300 to 0x43FF	Point data (Pressing)	When a point travel command is input, there is an error in the point data of the point number.	The point data setting is outside the setting range. Reconfigure the following point data and reset the alarm. Point data: pressing rate	Yes
0x4500 to 0x450F	CC-Link data error (Version)	The protocol version of CC-Link differs between the upper device and the communication unit.	Check whether the version information of the upper device matches that of the communication unit, and then turn the power on again.	No
0x4510 to 0x451F	CC-Link data error (The number of stations occupied)	The number of stations occupied is insufficient for the data capacity required from the setting of the operation mode of each drive unit.	Check that there are no problems with the operation mode (CC-Link) and the number of stations occupied, and then turn the power on again.	No

Alarm code	Alarm item	Description	Solution	Alarm reset
0x4600 to 0x460F	Operation mode setting error	The data size of internal cyclic communication exceeds the controller specification.	Review the operation mode setting.	No
0x4700 to 0x470F	Axis number setting error	An axis number other than 1 to 16 is set.	Review the axis number.	No
0x5000 to 0x5FFF	Internal non-cyclic communication error	Indicates an error in the internal non-cyclic communication.	Perform an alarm reset.	Yes
0x6000 to 0x60FF	Servo ON	There is an error in the encoder data signal for motor excitation when the servo is turned on for the first time after power-on.	Check the connection of the cable and the connector connecting the controller and the actuator. Check that the actuator is not restrained and reset the alarm. For a B-type drive unit, check that the actuator information setting matches the connected actuator. Refer to “” for how to set actuator information.	Yes
0x6200 to 0x62FF	Home position return	The home position cannot be detected even after traveling a distance longer than the stroke of the actuator when returning to the home position.	Check the connection of the cable and the connector connecting the controller and the actuator. Confirm that there is no problem, and then reset the alarm.	Yes
0x6400 to 0x64FF	Outside soft limit	The present position is outside the range of the soft limit during point travel.	If the alarm occurs due to an overshoot when positioning close to the soft limit, check the load conditions. The alarm will also occur when a point travel command is input from outside the range of the soft limit. In this case, move the actuator manually so that the present position is within the range of the soft limit. Confirm that there is no problem, and then reset the alarm.	Yes
0x6500 to 0x65FF	Overload (M)	The fingers cannot travel.	It occurs when the actuator cannot operate for a certain period of time or is pushed back in the direction opposite to the direction of operation while the actuator is in operation except during pressing operation. Check the load and operating conditions. Check if there is any object within the movable range that interferes with the operation. Confirm that there is no problem, and then reset the alarm.	Yes
0x6600 to 0x66FF	Overload (P)	The fingers have been pushed back to the pressing start point by external force when pressing.	Check the load and operating conditions. Confirm that there is no problem, and then reset the alarm.	Yes
0x6700 to 0x67FF	Overload (S)	The fingers cannot stop.	Check the load and operating conditions. Confirm that there is no problem, and then reset the alarm.	Yes
0x6800 to 0x68FF	Overload (H)	The fingers have become misaligned when stopping.	Check the load and operating conditions. Check the setting of the “Holding current at stop” in the parameter data. Confirm that there is no problem, and then reset the alarm.	Yes
0x6900 to 0x69FF	Overload (C)	An overcurrent has flown into the motor.	Check the load and operating conditions. Confirm that there is no problem, and then reset the alarm.	Yes
0x6A00 to 0x6AFF	Overload (D)	There is a problem in controlling the position.	Check the load and operating conditions. Confirm that there is no problem, and then reset the alarm.	Yes
0x6B00 to 0x6BFF	Overload (T)	Excessive torque output has continued.	Check the load and operating conditions. Confirm that there is no problem, and then reset the alarm.	Yes
0x6C00 to 0x6CFF	Home position return (C)	Excessive load is detected during home position return in the FGRC.	Check that there are no workpieces to collide with within the homing operation range. Confirm that there is no problem, and then reset the alarm.	Yes

Alarm code	Alarm item	Description	Solution	Alarm reset
0x7000 to 0x7FFF	Memory (Initialize)	An error has been detected in initializing memory data when changing data.	If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No

When an alarm occurs, the actuator is in the servo OFF state. In case of an actuator with a brake, the brake is applied and the holding torque is applied. In case of an actuator without brake, the dynamic brake is applied but the holding torque is not applied.

■ Warning

These are output when a minor error that will not affect the operation of the actuator is detected in the controller. They can be canceled by changing controller settings.

Alarm code	Alarm Item	Phenomenon	Cause/Solution
0x0101	Calendar Initialization	The date setting has been initialized due to an error in the calendar function .	The internal power supply was cut off and the date setting could not be retained. Reset the date of calendar function. The warning is canceled when the resetting is completed.
0x0111	Calendar writing error	Indicates that the date write was not complete.	Reset the date of calendar function. If the error occurs again even after resetting, please contact us.
0x0201	Maintenance data (Running distance)	The integrated running distance has exceeded the threshold.	The integrated running distance has exceeded the threshold set in the user parameter. After performing maintenance, reconfigure the threshold. The warning is cleared when the threshold exceeds the integrated running distance.
0x0211	Maintenance data (Number of travels)	The integrated number of travels has exceeded the threshold.	The integrated number of travels has exceeded the threshold set in the user parameter. After performing maintenance, reconfigure the threshold. The warning is cleared when the threshold exceeds the integrated number of travels.
0x0221	Maintenance data (Operating time)	The integrated operating time has exceeded the threshold.	The integrated operating time has exceeded the threshold set in the user parameter. After performing maintenance, reconfigure the threshold. The warning is cleared when the threshold exceeds the integrated operating time.
0x0401	Power supply voltage drop	The power supply voltage has dropped below a certain value.	The power supply voltage detected by the controller is less than 21.6 V while the power supply is ON. Adjust the power supply voltage. The warning is canceled when the power supply voltage detected by the controller is 21.6 V or more.
0x0501	Temperature error (Drive unit)	Drive unit temperature exceeds the threshold	The drive unit temperature exceeds the threshold set in the user parameter. After checking the operating conditions, reconfigure the threshold. The warning is cleared when the drive unit temperature falls below the threshold.

6. STANDARD COMPLIANCE

■ Compliance with European standards

Products with the CE marking conform to European standards.
This product is intended to be incorporated into the customer equipment and use as a part of equipment. The CE marking affixed to the product itself indicates that CKD has declared conformity to the EMC Directive under our limited conditions. If the customer equipment incorporating this product is to be shipped to or used in the European Economic Area as a final product, it is the responsibility of the customer to confirm compliance with the EU Directives.

■ Compliance with UL Standards

Products with the UL marking conform to UL Standards.
When using the product as a UL/cUL conforming product, please read this chapter carefully and use the product in accordance with the description.
In addition, if the customer equipment incorporating this product is to be shipped to or used in the United States or Canada as a final product, it is the responsibility of the customer to confirm compliance with the UL Standards.

6.1 EU Directives/European standards

EMC Directive: 2014/30/EU
EN 61000-6-2:2019
EN 55011:2016+A1:2017+A11:2020 (Group 1, Class A)

RoHS Directive: 2011/65/EU
ENIEC 63000:2018

This product is classified as Class A, Group 1, being compliant with EN 55011.
Group 1 product is equipment in which radio-frequency energy is not intentionally generated and used in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material, for inspection/analysis purposes, or for transfer of electromagnetic energy.
Class A product is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network that supplies buildings used for domestic purposes.

6.2 Precautions for use in Europe (EU member states)

6.2.1 Suitable actuator

The table below shows the combinations of controller drive units and compatible actuators.

Drive unit	Suitable actuator
A type	EBS-G series, EJSG series, EBR-G series, GSSD2 series, GSTK series, GSTG series, GSTS series, GSTL series
B type	FLSH-G series, FLCR-G series, FGRC-G series, GCKW series

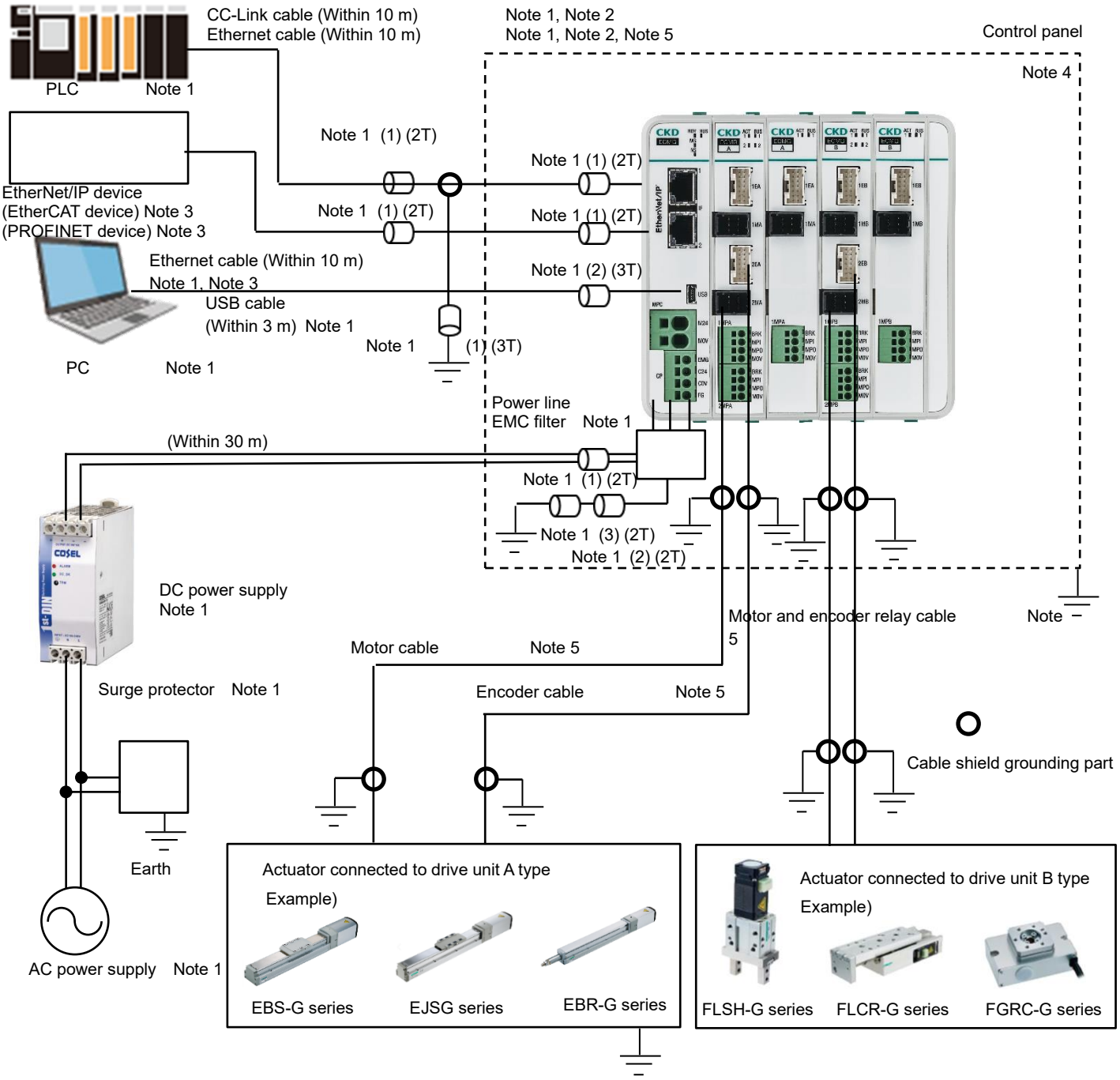
6.2.2 Working environment

Condition	Temperature	Humidity
During use	0 to 40ºC (Non-freezing)	35 to 80%RH (Non-condensing)
During storage	-10 to 50ºC (Non-freezing)	35 to 80%RH (Non-condensing)
During transport	-10 to 50ºC (Non-freezing)	35 to 80%RH (Non-condensing)

6.2.3 System structure

■ EMC measures Installation example

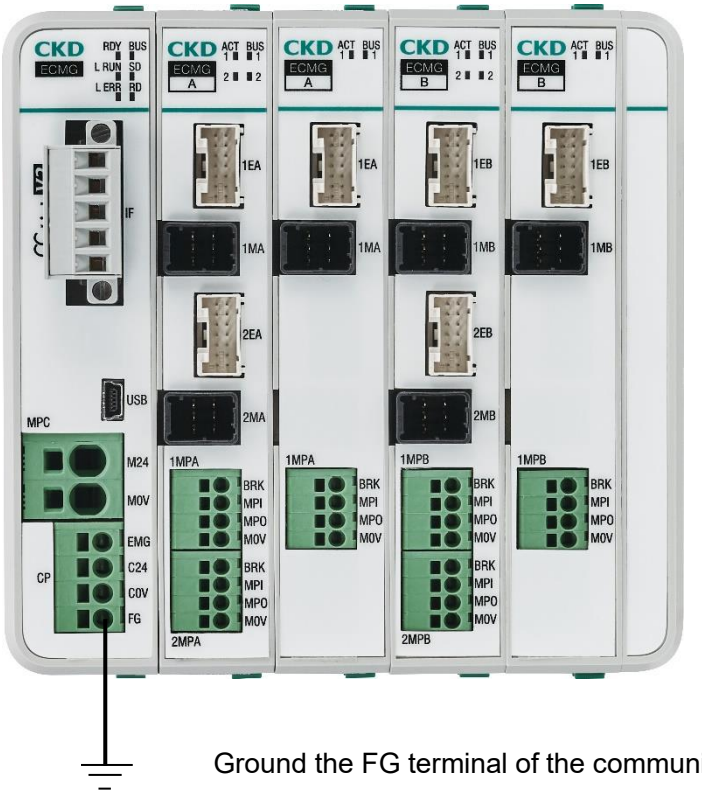
The following figure shows how to install this product (ECMG series) in compliance with European standards. A surge protector, EMI filter for power supply, and ferrite cores are required to comply with European standards.



Note 1: Devices and cables indicated with the note are not supplied with the product. As for motor cables and encoder cables, dedicated cables are attached.
Note 2: The shield of CC-Link cable and Ethernet cable is one-sided ground (controller side only).
Note 3: Ethernet cable indicated with the note is connected only in case of EtherNet/IP, EtherCAT and PROFINET specifications. Please connect the product to suitable network devices.
Note 4: Install the controller in the control panel.
Note 5: The profinet cable, motor cable, encoder cable, and motor/encoder relay cable are grounded on both sides.

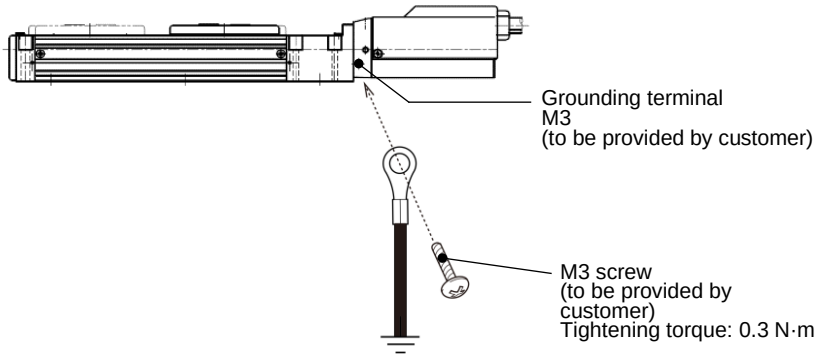
Part used	Model	Manufacturer
Surge protector	RSPD-250-Q4	OKAYA ELECTRIC INDUSTRIES CO., LTD.
	RSPD-250-U4	
	LT-CS32G801WS	SOSHIN ELECTRIC CO., LTD.
	LT-C32G801WS	
Power line EMC filter	RSEN-2050	Made by TDK-Lambda Corporation
Ferrite core (1)	E04SR401938	SEIWA ELECTRIC MFG CO., LTD.
Ferrite core (2)	E04SR301334	
Ferrite core (3)	E04RMX251512	

■ Example of preventive measure against EMC (controller grounded)



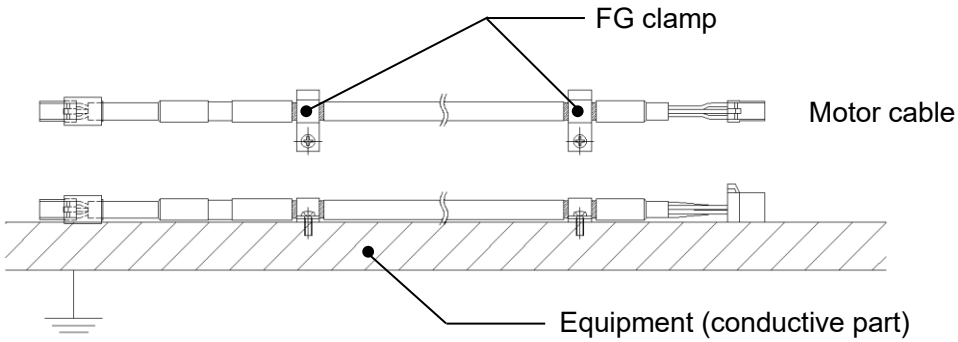
Ground the FG terminal of the communication unit.

■ Example of preventive measure against EMC (actuator grounded)



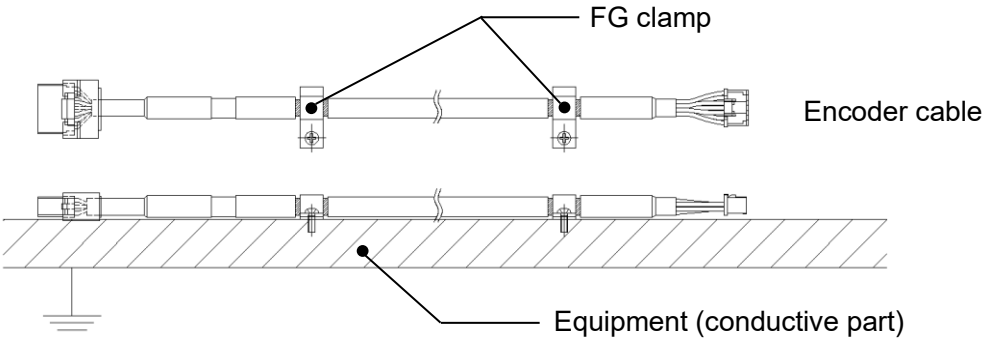
■ Example of preventive measure against EMC (motor cable grounding)

Remove the outer sheath on both ends of the motor cable, and ground the braided shield parts with an FG clamp or the like.



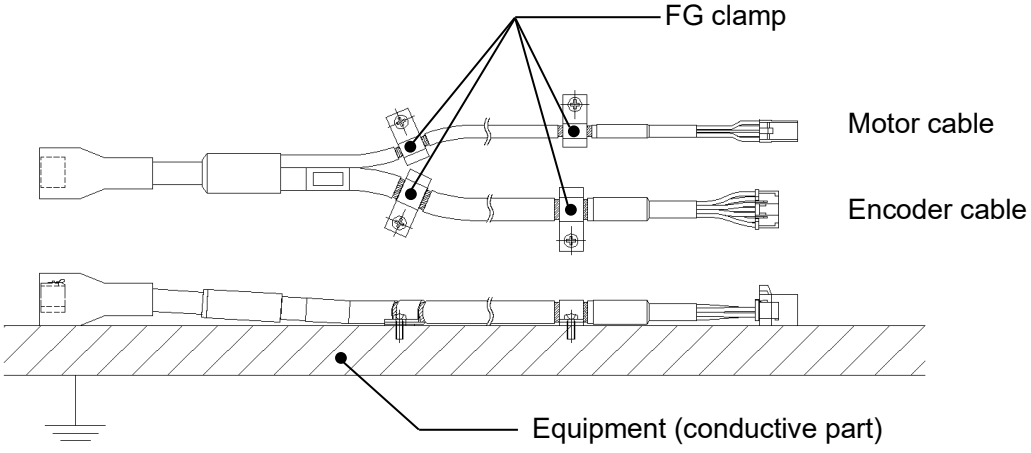
■ Example of preventive measure against EMC (Encoder cable grounding)

Remove the outer sheath on both ends of the encoder cable, and ground the braided shield parts with an FG clamp or the like.



■ Example of preventive measure against EMC (motor and encoder relay cable grounded)

Remove the outer sheath on both ends of the motor and encoder relay cable, and ground the braided shield parts with an FG clamp or the like.



■ Example of preventive measure against EMC (Ethernet cable shield grounded)

In the same way as motor and encoder relay cable grounded, PLC side of Ethernet cable shield is required to be grounded by FG clamp.

EtherNet/IP : 1 port side
EtherCAT : IN port side
PROFINET : 1 port side

■ Example of preventive measure against EMC (CC-Link cable shield grounded)

CC-Link cable shield (PLC side) is required to be connected to SLD terminal of CC-Link PLC.
In addition, FG terminal of CC-Link communication connector is required to be connected to the earth wire.
In detail, please refer to the manual “CC-Link cable wiring manual”, etc.

6.3 UL Standards

Controller model No.	ECMG series
File No.	E325064
Vol No.	Volume3
Sec No.	Section 1
CCN	NMMS2, (Power Conversion Equipment-Component) NMMS8 (Power Conversion Equipment Certified for Canada-Component)
Authentication level	Recognized Component Marking
Safety standards	UL61800-5-1 (Certified by the United States)
	CSA C22.2 No. 274 (Certified by Canada)

* A communication unit with PROFINET specification does not support the UL standards.

6.4 Precautions when conforming to UL Standards

6.4.1 Installing location and environment

When using the product, make sure that the following conditions are met:

Item	Value
Maximum ambient temperature	40ºC
Pollution degree	2
Overvoltage category	II

* Use in pollution degree class 2 or in an environment cleaner than pollution degree class 2. When using in pollution degree class 3, the controller must be placed in a control panel with a structure (IP54) that prevents water, oil, carbon, metal dust, etc. from entering.

6.4.2 Degree of protection

It has a solid-state motor overload protection function. Overload protection operates at up to 150% of FLA.

* FLA (Full Load Ampere): Rated output current

6.4.3 External power supply

This product is intended for use with the power supply listed in the table below when it complies with UL Standards.

Model number	Rating (Output voltage, output current)	Manufacturer
S8VK-S96024	24 V, 40 A	OMRON Corporation
S8VK-S48024	24 V, 20 A	
S8VK-S24024	24 V, 10 A	

6.4.4 Overheating protection

Motor overheating protection function specified in UL61800-5-1 is not provided.
If the motor overheating protection function is required as a whole, take measures such as detecting the motor overheating, etc.

7. WARRANTY PROVISIONS

7.1 Warranty Conditions

■ Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified below, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

- Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or this Instruction Manual.
- Failure caused by incorrect use such as careless handling or improper management.
- Failure not caused by the product.
- Failure caused by use not intended for the product.
- Failure caused by modifications/alterations or repairs not carried out by CKD.
- Failure that could have been avoided if the customer's machinery or device, into which the product is incorporated, had functions and structures generally provided in the industry.
- Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
- Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.

■ Confirmation of product compatibility

It is the responsibility of the customer to confirm compatibility of the product with any system, machinery, or device used by the customer.

■ Others

The terms and conditions of this warranty stipulate basic matters.
When the terms and conditions of the warranty described in individual specification drawings or the Specifications are different from those of this warranty, the specification drawings or the Specifications shall have a higher priority.

7.2 Warranty Period

The product is warranted for one (1) year from the date of delivery to the location specified by the customer.