CKD

ECG Series
Controller for Electric Actuators

IO-Link Specifications

INSTRUCTION MANUAL

Read this Instruction Manual before using the product.
In particular, read the safety notes carefully.
Keep this Instruction Manual safe for use at any time.

PREFACE

Thank you for purchasing CKD controller for electric actuators "ECG Series IO-Link Specifications."

This Instruction Manual describes basic matters related to the operation of this product in order to fully demonstrate its performance. 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 equipment using this product, you are obliged to manufacture safe equipment. 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.

Regarding safety related to the design, management, etc. of the equipment, be sure to comply with group standards, laws and ordinances.

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.

Various safety measures have been taken for the product, but handling that is not described in this Instruction Manual may cause an accident. 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	Mishandling can lead to imminent risk of death or serious injury.
⚠️ WARNING	Mishandling can lead to death or serious injury.
⚠️ CAUTION	Mishandling can lead to personal injury or property damage.

Precautions classified as "CAUTION" may still lead to serious results depending on the situation.

All precautions are equally important and must be observed.

< Warning symbol type >

	A general purpose mark indicating prohibited (not allowed) actions.		A mark that prohibits touching equipment.
	A mark that prohibits the act of putting a finger.		A general purpose mark indicating the danger such as electric shock and burn.
	A mark indicating the danger that occurs when an automatic equipment is started.		A general purpose mark indicating what you must do.
	A mark instructing you to carefully read the Instruction Manual.		A mark instructing the connection of the ground wire.

In addition, the following icons indicate general precautions, usage tips, or technical information or glossary.

	● It contains useful information such as general precautions, supplementary information, and reference information.

	● It contains detailed information and tips on how to use it in a practical way.

	● It contains technical information and glossary that you should know when using the function.

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

🚫 **Never modify or perform additional processing to the product.**
• Modification or additional processing may not only pose a risk of fire or electric shock, but may not satisfy the specifications described in this Instruction Manual.

Never handle the product, install 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. In addition, turn off the power supply of the equipment and the corresponding equipment to prevent an electric shock.
• Even after the operation is stopped, as there may be high-temperature parts or charging parts, carefully handle the product, and install or remove the equipment.

❗ **The product must be handled by the person with sufficient knowledge and experience.**
• This product is designed and manufactured as general industrial machinery equipment and parts, so please handle with care.

Use the product according to the specifications.
• This product cannot be used without following the product-specific specifications.
• Since this product is intended to use in general industrial machinery equipment and parts, it is not applicable when used in the following conditions. 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 under conditions and environments other than those specified, and outdoor use.

◎ 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 that require safety, such as entertainment equipment, emergency cut-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.

CONTENTS

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1. PRODUCT OVERVIEW

1.1. System Structure

> ● 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.

Since the ECG-A Series and ECG-B Series are connected to different actuators, so check each system configuration.

1.1.1. System Structure

■ ECG-A Series

<WHEN CONNECTING EBS/EJSG/EBR SERIES>

Surge protector

Controller: ECG-A Series

Customer-provided
PLC

LAN cable, etc.

Ferrite core

Ferrite core

IO-Link master

For power supply
Noise filter

Communication cable
(IO-Link spesification compliant)

PC

DC power
supply

Ferrite core

USB cable (mini-B)

PC setting software (free of charge)
Download from the CKD website.
(URL:https://www.ckd.co.jp)

Ferrite core

Ferrite core

Motor cable

Encoder cable

Connectable actuator

EBS-G Series   EJSG Series   EBR-G Series

The following items can be purchased from us in the system configuration.

	Component	Product name/Model no.
This product	Controller	ECG-A Series
Accessories	Power supply connector	DFMC1,5/3-STF-3,5 (PHOENIX CONTACT)
	Communication connector (IO-Link)	FMC1,5/4/ST-3,5-RF (PHOENIX CONTACT)
Sold separately	Actuator	EBS-G/EJSG/EBR-G Series
	Motor cable	EA-CBLM□-□□□
	Encoder cable	EA-CBLE□-□□□
	24 VDC power supply	EA-PWR-KHNA240F-24
	Noise filter	AX-NSF-NF2015A-OD
Provided for free	PC setting software	S-Tools

To use the product as a product conforming to the European standards, refer to "6PRODUCT COMPLIANCE" and follow the instructions.

> ● A "ferrite core" is a magnetic material that uses a ferrite material. It is used to attenuate high frequency noise.
> ● A "surge protector" is a device that protects equipment and communication equipment from transient abnormal high voltages such as lightning.
> ● A "noise filter" is an electric or electronic circuit for removing noise and a device that contains it.

<WHEN CONNECTING GSSD2/GSTK/GSTG/GSTS/GSTL SERIES>

Surge protector

Controller: ECG-A Series

Customer-provided

PLC

LAN cable, etc.

Ferrite core

IO-Link master

Ferrite core

DC power supply

For power supply Noise filter

Communication cable (IO-Link spesification compliant)

PC

Ferrite core

USB cable (mini-B)

PC setting software (free of charge)
Download from the CKD website.
(URL:https://www.ckd.co.jp)

Ferrite core   **Ferrite core**

Motor cable   **Encoder cable**

Connectable actuator

GSSD2 Series   **GSTK Series**   **GSTG Series**   **GSTS Series**   **GSTL Series**

System components that can be purchased from CKD are listed below.

	Component	Product name/Model no.
This product	Controller	ECG-A Series
Accessories	Power supply connector	DFMC1,5/3-STF-3,5 (PHOENIX CONTACT)
	Communication connector (IO-Link)	FMC1,5/4/ST-3,5-RF (PHOENIX CONTACT)
Sold separately	Actuator	GSSD2/GSTK/GSTG/GSTS/GSTL Series
	Motor cable	EA-CBLM□-□□□
	Encoder cable	EA-CBLE□-□□□
	24 VDC power supply	EA-PWR-KHNA240F-24
	Noise filter	AX-NSF-NF2015A-OD
Provided for free	PC setting software	S-Tools

To use the product as a product conforming to the European standards, refer to "6PRODUCT COMPLIANCE" and follow the instructions.

	● A "ferrite core" is a magnetic material that uses a ferrite material. It is used to attenuate high frequency noise. ● A "surge protector" is a device that protects equipment and communication equipment from transient abnormal high voltages such as lightning. ● A "noise filter" is an electric or electronic circuit for removing noise and a device that contains it.

■ ECG-B Series
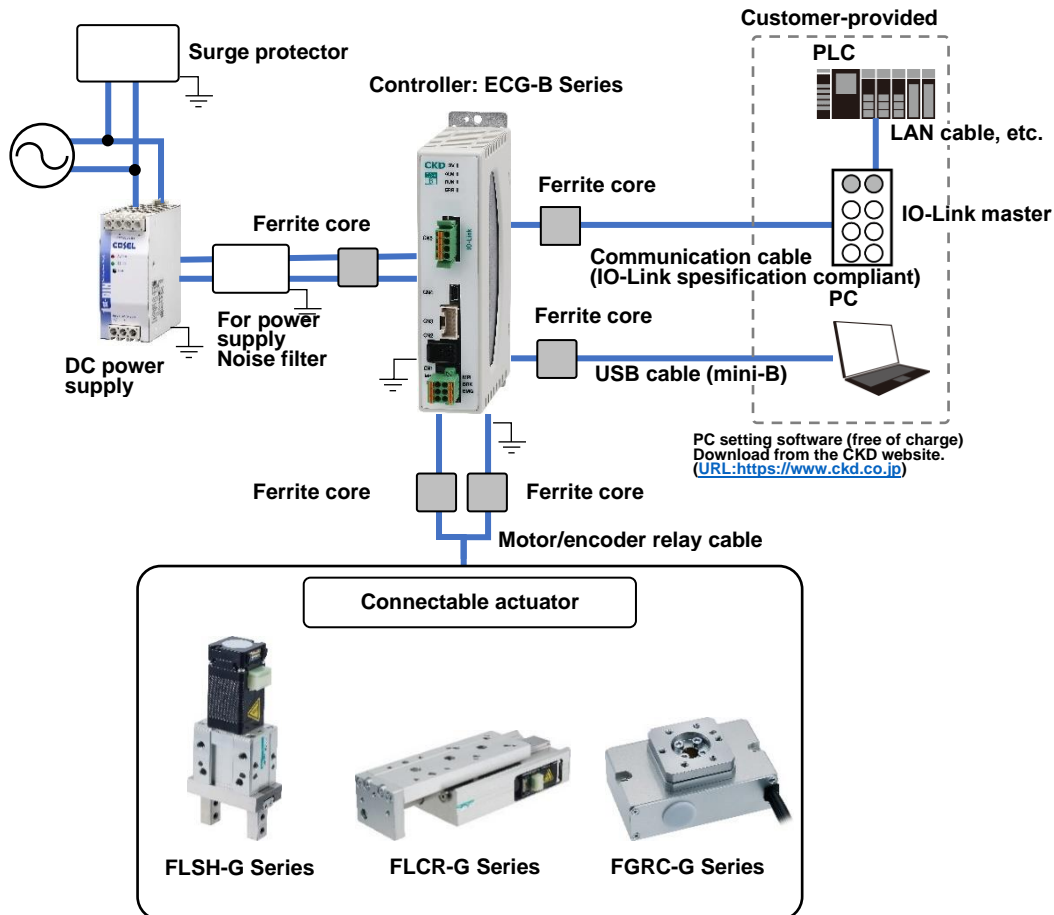
<WHEN CONNECTING FLSH-G/FLCR-G/FGRC-G SERIES>

Surge protector

Controller: ECG-B Series

Customer-provided
PLC

LAN cable, etc.

Ferrite core

IO-Link master

Communication cable
(IO-Link spesification compliant)

PC

Ferrite core

Ferrite core

USB cable (mini-B)

For power supply
Noise filter

DC power supply

PC setting software (free of charge)
Download from the CKD website.
(URL:https://www.ckd.co.jp)

Ferrite core

Ferrite core

Motor/encoder relay cable

Connectable actuator

FLSH-G Series   FLCR-G Series   FGRC-G Series

System components that can be purchased from CKD are listed below.

	Component	Product name/Model no.
This product	Controller	ECG-B Series
Accessories	Power supply connector	DFMC1,5/3-STF-3,5 (PHOENIX CONTACT)
	Communication connector (IO-Link)	FMC1,5/4/ST-3,5-RF (PHOENIX CONTACT)
Sold separately	Actuator	FLSH-G/FLCR-G/FGRC-G Series
	Motor/encoder relay cable	EA-CBLME□-□□□
	24 VDC power supply	EA-PWR-KHNA240F-24
	Noise filter	AX-NSF-NF2015A-OD
Provided for free	PC setting software	S-Tools

To use the product as a product conforming to the European standards, refer to "6PRODUCT COMPLIANCE" and follow the instructions.

- A "ferrite core" is a magnetic material that uses a ferrite material. It is used to attenuate high frequency noise.
- A "surge protector" is a device that protects equipment and communication equipment from transient abnormal high voltages such as lightning.
- A "noise filter" is an electric or electronic circuit for removing noise and a device that contains it.

<WHEN CONNECTING GCKW SERIES>

Surge protector

Controller: ECG-B Series

Customer-provided

PLC

LAN cable, etc.

Ferrite core

Ferrite core

IO-Link master

Communication cable (IO-Link spesification compliant)

For power supply Noise filter

DC power supply

Ferrite core

PC

USB cable (mini-B)

PC setting software (free of charge)
Download from the CKD website.
(URL:https://www.ckd.co.jp)

Ferrite core

Ferrite core

Motor and encoder relay cable

Connectable actuator

GCKW Series

System components that can be purchased from CKD are listed below.

	Component	Product name/Model no.
This product	Controller	ECG-B Series
Accessories	Power supply connector	DFMC1,5/3-STF-3,5 (PHOENIX CONTACT)
	Communication connector (IO-Link)	FMC1,5/4/ST-3,5-RF (PHOENIX CONTACT)
Sold separately	Actuator	GCKW Series
	Motor/encoder relay cable	EA-CBLME□-□□□
	24 VDC power supply	EA-PWR-KHNA240F-24
	Noise filter	AX-NSF-NF2015A-OD
Provided for free	PC setting software	S-Tools

To use the product as a product conforming to the European standards, refer to "6PRODUCT COMPLIANCE" and follow the instructions.

- A "ferrite core" is a magnetic material that uses a ferrite material. It is used to attenuate high frequency noise.
- A "surge protector" is a device that protects equipment and communication equipment from transient abnormal high voltages such as lightning.
- A "noise filter" is an electric or electronic circuit for removing noise and a device that contains it.

1.1.2. Workflow

> ⚠ **CAUTION**
>
> 🛈 **Set information corresponding to the actuator connected to the controller.**
> - Actuating with information not corresponding to the actuator will cause the actuator to operate unexpectedly. It may cause injury to people around it or failure of the actuator.

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

1. Unpacking

Take the product out of the box. Refer to "2.2 Unpacking" for details.

2. Connecting the power supply

Connect the controller and the power supply. Refer to "2.3.1 Wiring To The Power Supply" for details.
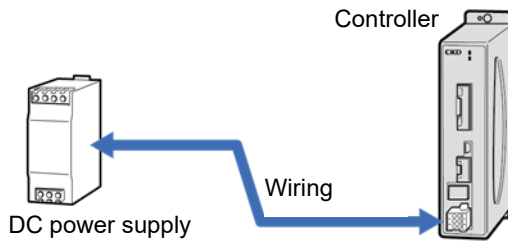
3. Connecting the actuator

Connect the controller and the actuator. Refer to "2.3.2 Wiring To The Actuator" for details.

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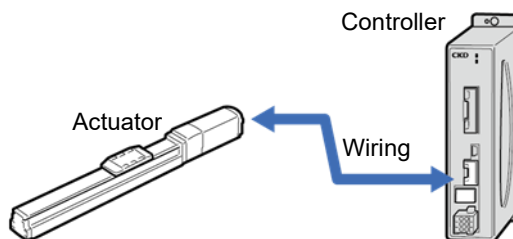
4. Connecting S-Tools

Connect the controller and the PC with S-Tools installed. Refer to "2.3.3 Wiring With S-Tools" for details.

PC
(S-Tools installed)
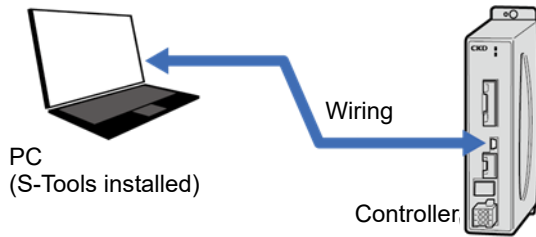
Wiring

Controller

5. Connecting IO-Link master

Connect the controller and the IO-Link master. Refer to "2.3.4 Wiring With The IO-Link Communication Cable" for details. Connect the IO-Link master and PLC with a dedicated cable. For wiring of the master and PLC, refer to the instruction manuals of the master unit manufacturer and PLC manufacturer.

Controller

IO-Link master

Wiring
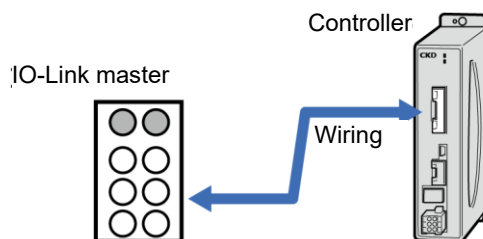
6. Setting communication

Set the IO-Link master. Import IODD file as needed. Refer to "3.2 Obtaining IODD Files" for details.
For the master setting procedure, refer to "3.3 IO-Link Master Settings" and the instruction manuals of the master unit manufacturer and PLC manufacturer.

7. Setting actuator information

Set the information of the actuator connected to the controller.
Refer to "3.1 Setting Actuator Information" for details.
* No setting is required when using ECG-A Series.

8. Setting parameters and point data

Determine the controller setting. Refer to "3.5 Setting Parameters" and "3.6 Point Data Setting" for more information.

9. Start operation

Operate the actuator using the PLC. Refer to "3.7 Operation And Time Chart" for details.

- The work in steps 3 to 8 are in no paticular order. Carry out in the order according to the customer's situation. However, perform the "Set the actuator information" before the "Set the parameter and point data."
- S-Tools are required to set the actuator information.

1.2. Instruction Manuals Related To This Product

This Instruction Manual is "SM-A40831-A".
The instruction manuals related to this product are as follows.

Controller for Electric Actuators	Electric Actuator
SM-A27751 ECG Series Parallel I/O specification	**SM-A28054** EBS-G Series EBR-G Series
SM-A27752 ECG Series CC-Link specifications	**SM-A40839** FLSH-G Series
SM-A40831-A (this Instruction Manual) ECG Series IO-Link Specifications	**SM-A40842** FLCR-G Series
SM-A40832 ECG Series EtherCAT specifications	**SM-A40845** FGRC-G Series
SM-A40833 ECG Series EtherNet/IP Specifications	**SM-A69066** GSSD Series GSTK Series GSTG Series GSTS Series GSTL Series
	SM-A69875 GCKW Series
	SM-A70436 EJSG Series

Setting software
SM-A11147 S-Tools

1.3. Software Ver. Update Information

1.3.1.   Version list

Depending on the controller software version, some actuators cannot be connected or some functions cannot be used.

> • Depending on the interface specification, the software version corresponding to the actuator differs. Refer to "1.2 Instruction Manuals Related To This Product" and check the software version described in the instruction manual of the interface specification of the controller to be used.

■ Software Ver. of actuator and controller

Software versions of actuators and corresponding controllers to be used are listed below.

<ECG-A SERIES>

Actuator		Software Ver. of the controller
Series	Classification	
EBS Series	-	Version 1.00.00 or later
EBR Series	-	
EBS Series	Compatible with secondary batteries Note 1	Version 1.03.00 or later
GSSD2 Series	-	Version 1.06.00 or later
GSTK Series	-	
GSTG Series	-	
GSTS Series	-	
GSTL Series	-	
EJSG Series	-	Version 1.06.00 or later

Note 1: An actuator that supports secondary batteries can be used even if the ECG is the earlier version listed, but the actuator model number displayed is the same as the standard actuator.

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<ECG-B SERIES>

Actuator		Software Ver. of the controller
Series	**Classification**	
FLSH Series	**-**	Version 1.00.00 or later
FLCR Series	**-**	
FGRC Series	**-**	
FLCR Series	**With brake**	Version 1.01.00 or later
FLSH Series:	**Stroke: 12, 18, 22** **Rubber cover: G, F** **Finger: 2, 3, 4**	Version 1.02.00 or later
GCKW Series	**-**	Version 1.03.00 or later

■ Additional function and controller software Ver.

Relationship between additional functions and software versions of actuators and corresponding controllers are listed below.

<ECG-A SERIES>

Additional function		Software Ver. of the controller
Item	**Explanation**	
Adding parameter ・ **Holding point signal output** ・ **Traveling signal ON hold time**	**3.5.1**	Version 1.06.00 or later
Adding signal ・ **Soft limit over** ・ **Soft limit over (-)** ・ **Soft limit over (+)**	**3.5.2**	Version 1.07.00 or later
Data storage target parameter Adding	**3.8.3**	Version 1.08.00 or later
Adding parameter ・ **Initial servo ON method**	**3.5.1**	Version 1.09.00 or later
・ **Adding parameter choices** ・ **Home position return direction (coordinate axis)**	**3.5.1** **3.7.5**	Version 1.04.00 or later

<ECG-B SERIES>

Additional function		Software Ver. of the controller
Item	**Explanation**	
Adding parameter ・ **Holding point signal output** ・ **Traveling signal ON hold time**	**3.5.1**	Version 1.03.00 or later
Initial value change ・ **Pressing speed** **Home position return speed**	**3.5.1** **3.6.16**	
Adding signal ・ **Soft limit over** ・ **Soft limit over (-)** ・ **Soft limit over (+)**	**3.5.2**	Version 1.04.00 or later
Data storage target parameter Adding	**3.8.3**	Version 1.05.00 or later
・ **Adding parameter choices** ・ **Home position return direction (coordinate axis)**	**3.5.1** **3.7.5**	Version 1.07.00 or later
Adding parameter ・ **FGRC home position return method**	**3.5.1** **3.7.5**	

1.3.2. Method To Check Version

Software Ver. of the controller can be checked from the controller information in the Model Information view of S-Tools.

1.4. Name Of Each Part

A or B: Controller identification

Indicator lamp

CN5: Interface connector

CN4: USB connector

CN3: Encoder connector

CN2: Motor connector

CN1: Power supply connector
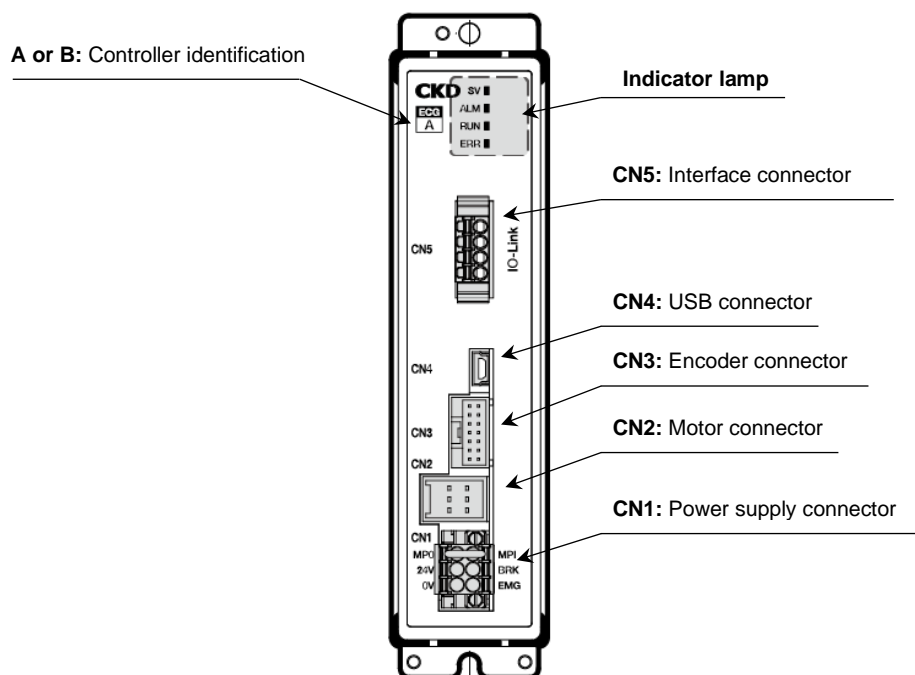
Code	Name	Content		
A or B	**Controller identification code**	Identification code: A		Identification code: B
		Controller: ECG-A Series		Controller: ECG-B sSries
		Supported actuators: EBS-G Series, EJSG Series, EBR-G Series, GSSD2 Series, GSTK Series, GSTG Series, GSTS Series, GSTL Series		Supported actuators: FLSH-G Series, FLCR-G Series, FGRC-G Series, GCKW Series
SV, ALM RUN, ERR	**Indicator lamp**	SV stands for servo lamp and ALM stands for alarm lamp. Refer to "1.4.1 LED Display" for information on LED indications.		
CN1	**Power supply connector**	A connector for connecting power to the controller. Refer to "2.3.1Wiring To The Power Supply" for information on wiring method.		
CN2	**Motor connector**	A connector for connecting the motor cable Connection cable model No.: Refer to "2.3.2Wiring To The Actuator" for the EA-CBLM□-□□□ connection cable.		A connector for connecting the motor/encoder relay cable. Connection cable model No.: EA-CBLME□- □□□ Refer to "2.3.2Wiring To The Actuator" for the connection cable.
CN3	**Encoder connector**	A connector for connecting the encoder cable Connection cable model No.: Refer to "2.3.2Wiring To The Actuator" for the EA-CBLME□-□□□ connection cable.		
CN4	**USB connector**	A connector for connecting with S-Tools. Use a commercially available USB cable (mini-B type) for the connection cable.		
CN5	**Interface connector**	A connector for connecting the host device Connect an IO-Link dedicated cable. Refer to "2.3.4 Wiring With The IO-Link Communication Cable" for wiring.		

1.4.1.　LED Display
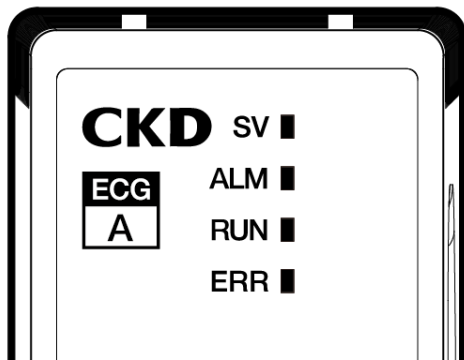
Name	Color	Explanation
SV	Green	Indicates the servo ON/OFF status. Indicates the most significant digit n of the alarm code when an alarm occurs.
ALM	Red	Displays the status of alarm/warning occurrence.
RUN	Green	Blinks when receiving normal data from the host device. Lit on when communication is not established.
ERR	Red	Blinks when an error occurs.

■ Servo lamp and alarm lamp

Controller status		SV	ALM
Control power OFF		Off	Off
At normal operation	At servo ON	Lit green	Off
	At servo OFF	Blinking green (lit once per second)	
At occurrence of alarm	At occurrence of non-cancelable alarm	Blinking green (After lighting off for 2 seconds, light on once every 1 second n times, and then repeat) -> Alarm 0xn□□□ occurs	Lit red
	At occurrence of cancelable alarm		Blinking red (lit once per second)
At occurrence of warning	At servo ON	Lit green	Blinking red (lit once every two seconds)
	At servo OFF	Blinking green (lit once per second)	

※ For the correspondence of the alarm code and alarm description, refer to "5.2Alarm Indications And Countermeasures".

- "Non-cancelable alarm" is an alarm output from the controller when an abnormality affecting the actuator operation is detected. Turn the power off and on again to cancel.
- "Cancelable alarm" is an alarm output from the controller when an abnormality affecting the actuator operation is detected. To cancel, perform an alarm reset using a host device (PLC, etc.) or S-Tools.

■ Communication status check lamp

＜RUN＞

LED Status	Operation
Blinking (ON for 0.9 seconds --> OFF for 0.1 seconds; this cycle is then repeated)	Established IO-Link communication
ON	IO-Link communication not established

＜ERR＞

LED Status	Operation
OFF	Power OFF or no communication error
Blinking (ON for 0.1 seconds --> OFF for 0.1 seconds; this cycle is then repeated)	24 VDC voltage drop on IO-Link line

1.5. Model Number Display

1.5.1. ECG-A Series

ECG-ANNN30- [LK] [A] [00]

Interface specifications	
NP	Parallel I/O specification (Common to NPN and PNP)
LK	IO-Link Specifications
CL	CC-Link Specifications
EC	EtherCAT specifications
En	EtherNet/IP Specifications

Mounting method	
A	Standard mounting
D	DIN rail mounting

I/O cable length	
00	None
02	2 m
03	3 m
05	5 m
10	10 m

※ The "I/O cable length" is available only when the "Interface specifications" are parallel I/O specification.
When the "Interface specifications" are other than the parallel I/O specifications, only "00" can be selected for "I/O cable length".

1.5.2. ECG-B Series

ECG-BNNN30- [LK] [A] [00]

Interface specifications	
NP	Parallel I/O specification (Common to NPN and PNP)
LK	IO-Link Specifications
CL	CC-Link Specifications
EC	EtherCAT specifications
En	EtherNet/IP Specifications

Mounting method	
A	Standard mounting
D	DIN rail mounting

I/O cable length	
00	None
02	2 m
03	3 m
05	5 m
10	10 m

※ The "I/O cable length" is available only when the "Interface specifications" are parallel I/O specification.
When the "Interface specifications" are other than the parallel I/O specifications, only "00" can be selected for "I/O cable length".

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2. INSTALLATION

⚠ DANGER

🚫 **Do not use in locations with ignitable, inflammable, 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 (control power supply and power supply) 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".

Reference: Excerpt from JIS B 9960-1:2019 "7.2.1 General matters".
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 the product to other equipment.** • A failure 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.
⚠	**When restarting after emergency stop or abnormal stop, check that it is safe for the actuator to operate.**

⚠ WARNING

Design a safety circuit or safety device so that if the machine stops due to a system abnormality such as an emergency stop or a power failure, the equipment will not be damaged or personal injury will not occur.

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.

Make sure that the wiring is insulated.
- Otherwise, malfunction or the flowing in of overcurrent may occur. Overcurrent may cause abnormal operation, damage, or fire.

Make sure that the wires do not contact other circuits and there is no ground fault and insulation failure between terminals.
- Otherwise, abnormal operation or the flow of an overcurrent may result. Overcurrent may cause abnormal operation, damage, or fire.

Make sure to install the emergency stop button in a location where operation is easy.
- Make sure that the emergency stop button has a structure that cannot be automatically reset, and that no one can reset it inadvertently.
- It may take several seconds from the emergency stop to the actuator stop, depending on the speed and loading load when the actuator moves.

Consider the possibility of motor or power source failure.
- Even if motor or power source failure occurs, take measures to prevent personal injury or equipment failure.

When there is a need for resetting the actuator to the starting position, design a safe control unit.

Install the product indoors and in a dry place.
- It may cause an electric leakage or a fire accident in a place exposed to water or a place with high humidity (place with humidity of 80% or more, or with condensation).

When using an actuator for other than horizontal mounting, use the actuator with a brake.
- If it is not equipped with a brake, the moving part may drop at the time of servo OFF (including an emergency stop and alarm) or power OFF, resulting in injury or damage to a workpiece.

Perform class D grounding (grounding resistance: 100 Ω or less) for the product.
- Electric leakage may cause a fire, electric shock or malfunction.

⚠ CAUTION

🚫 **Do not use the product in an environment where a strong magnetic field occurs.**
- A malfunction may occur.

Do not perform a withstand voltage test or an insulation resistance test on a device with the product installed.
- Due to the circuit design, the product may be damaged if a withstand voltage test or an insulation resistance test is performed on the device with the product installed. If a withstand voltage test or an insulation resistance test is required as a device, remove the product before performing it.

Do not store or use the product in a place exposed to ultraviolet rays or in an atmosphere where corrosive gas or salt are present.
- It may cause performance deterioration and strength deterioration due to rust.

Do not install the product in a place subjected to strong vibrations or shocks.
- If the product is subjected to strong vibrations or shocks, a malfunction may occur.

Do not use the product in a place where condensation occurs due to a sudden change in the ambient temperature.
- It may cause a malfunction of the product or deteriorate of strength.

Connect only cables designed for the product.
- A failure of the product or unexpected accident may occur.

When transporting or mounting, do not have the moving part or cable part of the product.
- An injury or cable disconnection may occur.

Do not move the lead cable from the actuator.
- Secure the connector using a cable clamper, etc. so as to prevent it from moving. Use the lead cable with a bending radius of 40 mm or more.

Do not bend the relay cable up to 200 mm from the end of the connector.
- Poor continuity may occur.

Do not hold the controller case tightly.

Do not bend the fixed cable repeatedly.
- If repetitive bending is unavoidable, use a movable cable.

⚠ **When performing electric welding to the equipment to which the product is installed, remove all the frame ground connections of the product.**
- If electric welding is performed with the frame ground connected, the product may be damaged due to welding current, excessive high voltage during welding, or surge voltage.

⚠ CAUTION

⊙ When installing an external stopper or a holding mechanism (such as a brake), arrange it so as not to affect the detection of the home position.
- Unintended position may be recognized as the home position due to the influence of external stopper or holding mechanism at the time of home position return.

Install the wiring so that no induction noise is applied.
- Avoid a place where a large current or strong magnetic field occurs.
- Do not use the same piping or wiring (with multi-core cables) as the power line of a large motor other than the product.
- Do not use the same piping or wiring as the power supplies and wires for inverters used for robots. Apply frame ground to the power supply and insert a filter into the output section.

Use a stabilized power supply (24 VDC ± 10%) as the power supply, and select one with sufficient capacity for the number of installed products.
- If the capacity is not sufficient, a malfunction may occur.

Use cables with a bending radius of 51mm or more. In addition, fix the fixed cable so as not to move easily.
- Since the bending radius cannot be applied to the bending of the connector part, it is recommended to fix near the connector.

Secure sufficient space for maintenance and inspection.
- Otherwise, maintenance and inspection cannot be performed, which may cause equipment stop or damage, or injuries.

The customer is responsible for checking the compatibility of the product with the customer's system, machinery, and device.

When holding the product, hold its bottom surface.

When transporting and installing the product, ensure the safety of the workers by securely supporting the product using a lift or supporting gear and by assigning more than one worker.

Install the product in a way that it is not subjected to twisting or bending force.

Before adjusting the gain, firmly fix the actuator body to the rigid equipment.

Separate the power for the output section of the product from the power for inductive loads such as solenoid valves and relays that generate surges.
- If the power supply is shared, surge current may be applied to the output part, causing damage.
  If the power cannot be separated, connect the surge absorption elements in parallel directly to all the inductive loads.

2.1. Installation Environment

- Before storing or using the product, check the ambient temperature and atmosphere specified in the product specifications.
- Use the product at an ambient temperature between 0°C and 40°C. Ventilate if heat is accumulated.
- Use the product at an ambient humidity between 35% and 80% RH. Do not use the product in a place where condensation occurs.
- Store in a place with an ambient temperature of -10 to 50°C and an ambient humidity of 35 to 80% RH, and avoid condensation and freezing.
- 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.
- Install the actuator on a smooth and flat surface.
- Installing the actuator on a smooth surface with dents may cause the actuator to malfunction or be damaged.
- 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.
- Since the controller uses S-Tools, secure a space of 70 mm or more in front of the controller so that the connector of the connection cable to the PC can be attached and detached.

70 mm or more   Heat dissipation space   50 mm or more

Connector attachment/removal space

Heat dissipation space   50 mm or more

2025-03-07   SM-A40831/6-A
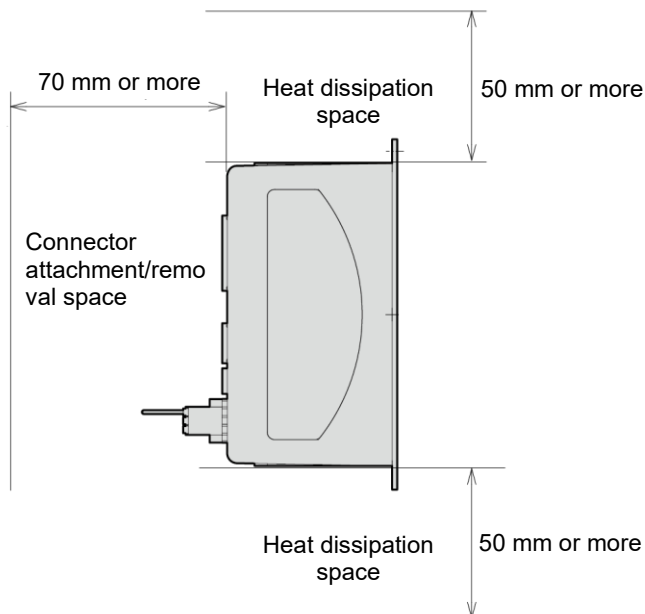
2.2. Unpacking

⚠ CAUTION	
🚫	**Heavy products shall not be carried by a worker alone.** **Do not stand on the package.** **Do not place heavy items or items with concentrated loads that may deform the packaging.** **Do not apply excessive 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 out the product out of the package, hold the product body.** **Keep it level when standing still.**

Make sure that the model number on your order is the same as the model number on the product.
Make sure that there is no external damage to the product.

2.3. Wiring Method

	WARNING
🚫	**Do not touch the charging part with bare hands.** • Doing so may cause electric shock.
⚠️	**Perform the wiring with the power supply turned OFF.** • Touching the electrical wiring connections may result in electric shock.
📖	**Read and fully understand this Instruction Manual before performing the electrical wiring.**

	CAUTION
⚠️	**Secure a sufficient bending radius of the communication cable to avoid excessive bending.** **Take countermeasures against lightning surges in the equipment side.** • The product is not resistant to lightning surges. • Use AC voltage in 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.
❗	**Check the working voltage and polarity before wiring.** • Incorrect wiring may cause a failure. **Secure distance from the communication cable to the power line and the high voltage line so that it is not affected by noise.** **Use a dedicated communication cable conforming to the IO-Link specifications.**

Check the precautions before wiring.

Perform the wiring with the power supply turned OFF.

Actuator

PLC

IO-Link master

Controller

PC
(S-Tools installed)

Surge protector

Countermeasures against lightning surges

DC power supply
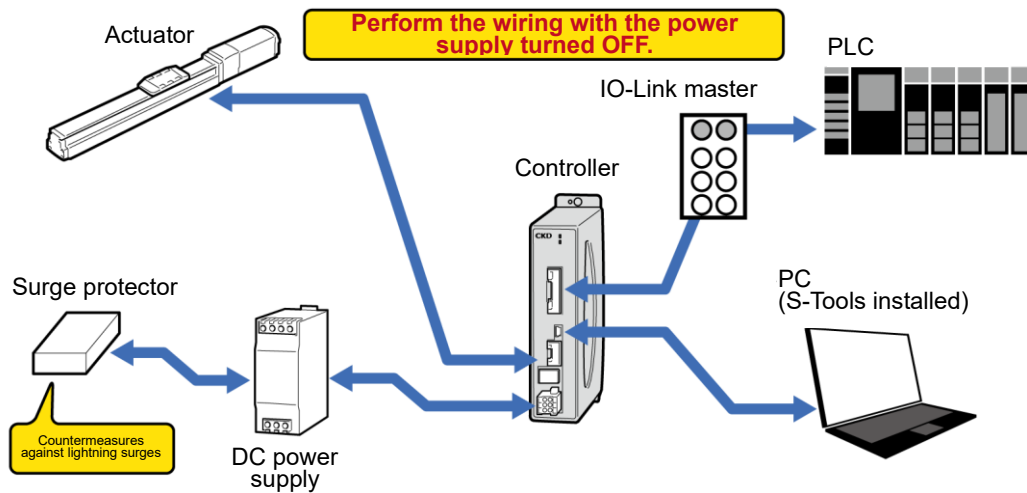
- The "installation category" is a concept that describes how well an electrical device can withstand the application of a transient voltage from an AC power source. The installation category 2 corresponds to "primary side circuit for equipment using a power cord connected to an outlet".

2.3.1.　Wiring To The Power Supply

> ## ⚠ WARNING
>
> ⓘ **During normal operation (other than during maintenance), be sure to set the input to the force brake release (BRK) to 0 VDC or open state so that the brake is applied.**
> • When 24 VDC is applied to the force brake release (BRK), the brake is forcibly released. Therefore, there is a risk of injury or damage to the workpiece due to the moving part of the actuator dropping, etc., except when installed horizontally.

■ Power supply connector specifications

\<List of power supply connector terminals (DFMC1,5/3 STF 3,5 (PHOENIX CONTACT))\>

Terminal name	Function name	Description of function	
MPI	Power supply (+)	The product is shipped with MPI and MPO connected via jumper wire. Power supply is cut off by removing the jumper wire.	
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.	
BRK	Force brake release	Forcibly release the brake. The actuator cannot turn the servo ON while the brake is forcibly released.	
		24 VDC applied	Forcibly release the brake.
		0 VDC or open state	Allows the brake to be applied.
24V	Common power supply (+)	Same 24 VDC applied for control power supply and power supply.	
EMG	Emergency stop input	Connect the emergency stop switch for b contact. The actuator cannot turn the servo ON during emergency stop.	
		24 VDC applied	Emergency stop is released.
		0 VDC or open state	It will be an emergency stop.
0V	Common power supply (-)	Applies 0 VDC common to the control power supply and power supply, brake release and emergency stop input.	

Power supply connector (power supply connector is an accessory)

When pushing the opening/closing lever with a precision screwdriver, etc., the wire insertion port opens and the wire can be inserted.
Releasing the opening/closing lever closes the wire insertion port.
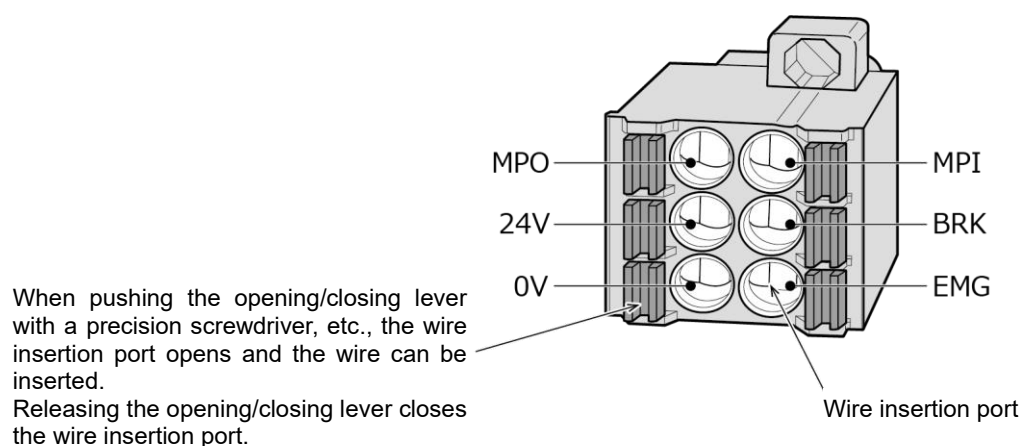
Use the wire with the following specifications to connect to the power supply connector.

Item	Explanation
Core wire	0.5 mm^2 (AWG20) single wire, stranded wire, stranded wire with bar terminal without insulating sleeve
Lead wire stripping area	8 mm from the end of the lead wire

> ● Emergency stop input can be set to "Enabled" or "Disabled" by the parameter "Emergency stop input".

■ Specifications of power supply circuit

Item			Specifications
Power supply voltage			24 VDC ± 10%
Motor section instantaneous maximum current	ECG-A Series	□35 (EBS-04, EJSG-04, EBR-04, GSSD2-20, GSTK-20, GSTG-20, GSTS-20, GSTL-20)	2.4A or less
		□42 (EBS-05, EJSG-05, EBR-05, GSSD2-32, GSTK-32, GSTG-32, GSTS-32, GSTL-32)	2.7A or less
		□56 (EBS-08, EJSG-08, EBR-08, GSSD2-50, GSTK-50, GSTG-50, GSTS-50, GSTL-50)	4.0A or less
	ECG-B Series	□20(FLSH-16, FLCR-16, FGRC-10, GCKW-16)	1.5A or less
		□25(FLSH-20, FLCR-20, FGRC-30, GCKW-20)	3.0 A or less
		□25(FLSH-25,FLCR-25,GCKW-25)	4.5A or less
		□35(FGRC-50)	4.2A or less
Control power supply voltage			24 VDC ± 10%
Control unit current consumption			0.4A or less

■ Electrical circuit and basic configuration of the power supply

> ⚠ **CAUTION**
>
> ⚠ **Reconfirm wiring prior to passing current to prevent mis-wiring.**
>
> **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.

<Electrical schematic of power supply>

Controller exterior   Controller interior

Connected by a jumper wire at the time of shipment

MPI

MPO

DC24V   24V

0V

Power supply connector

MPO	MPI
24V	BRK
0V	EMG

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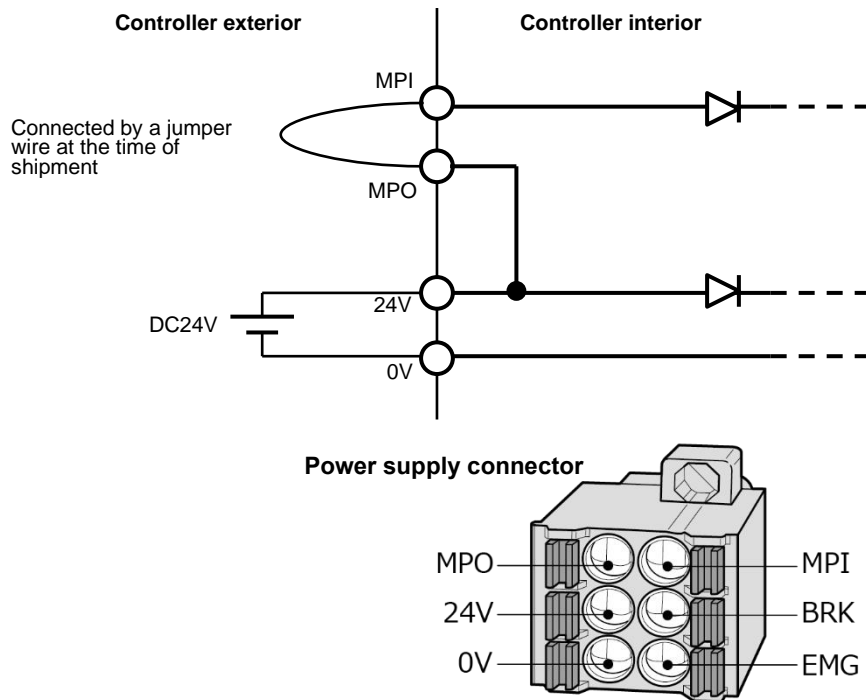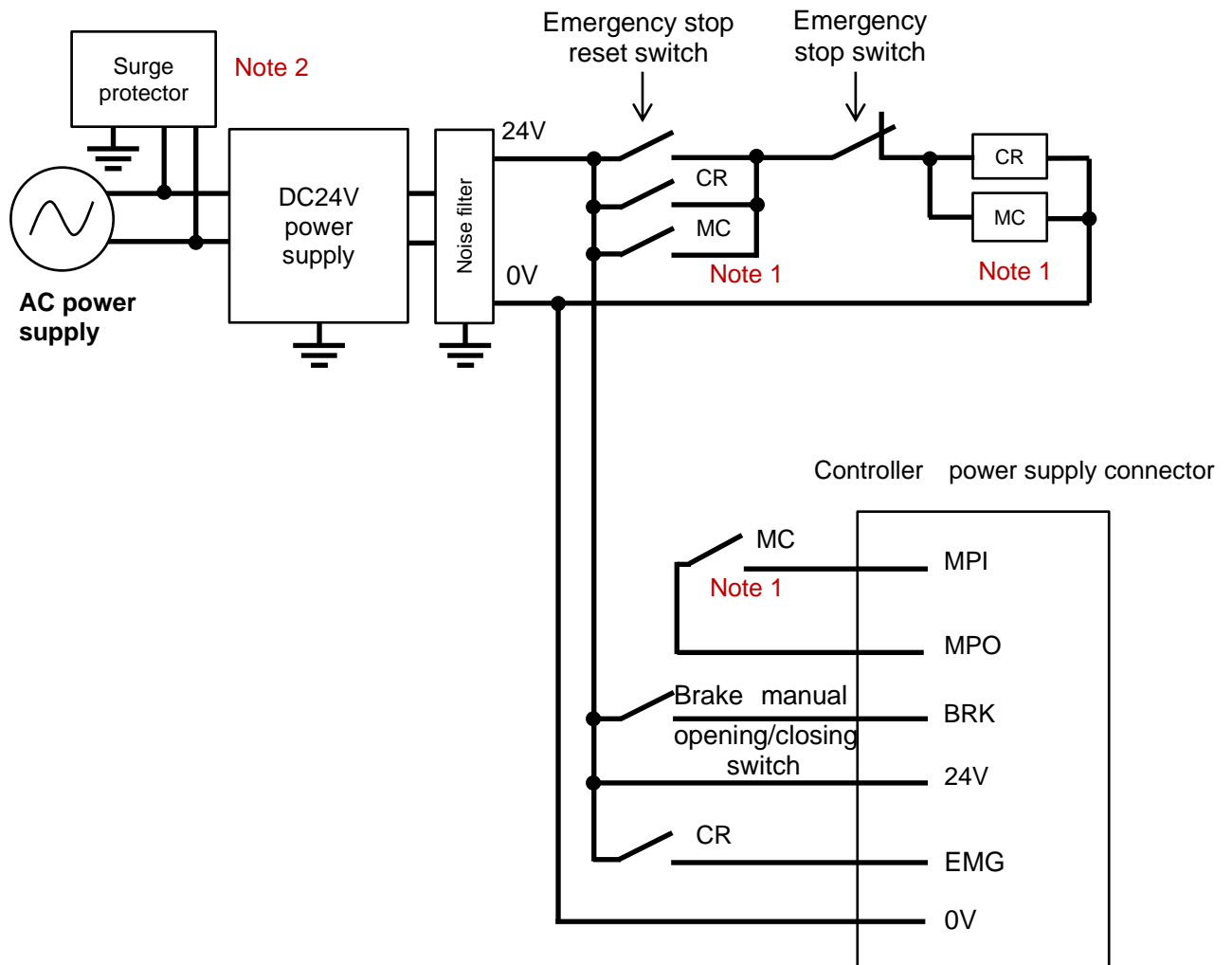
Note 1: To externally shut the motor power supply off (such as for supporting safety categories), connect a contact
such as an electromagnetic switch between the MPI and MPO terminals.
Note 2: A surge protector is required to comply with the CE marking.

2.3.2. Wiring To The Actuator

> ⚠ **CAUTION**
>
> 🛈 **If repetitive bending is unavoidable, use a movable cable.**

Use the dedicated relay cable to wire the controller and actuator. The combinations of controller and relay cable are as follows.
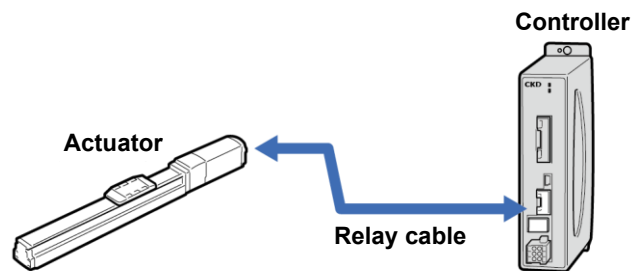
Controller	Relay cable	
ECG-A Series	Motor cable	EA-CBLM□-□□□
	Encoder cable	EA-CBLE□-□□□
ECG-B Series	Motor/encoder relay cable	EA-CBLME□-□□□

■ Motor cable model number system (ECG-A series): Standard series

EA-CBLM4- [S] [01]

Cable type	
S	Fixed cable
R	Movable cable

Cable length	
01	1 m
03	3 m
05	5 m
10	10 m

※ For the EBS-G Series and EBR-G Series, actuators shipped before October 2022 are supplied with a motor cable with the model number "EA-CBLM2-□□□" and an encoder cable with the model number "EA-CBLE2-□□□". Refer to instruction manuals for the actuator of the "1.2 Instruction Manuals Related To This Product" for details.

※ For the GSSD2 Series, GSTK Series, GSTG Series, GSTS Series and GSTL Series, motor cable with model number "EA-CBLM2-□□□" and encoder cable with model number "EA-CBLE2-□□□" are attached to actuators shipped before May 2023. Refer to instruction manuals for the actuator of the "1.2 Instruction Manuals Related To This Product" for details.

■ Motor cable dimensions (ECG-A Series): Standard Series

Fixed: φ6.5
Movable: φ7.6

(12) (17.5) (10.5) (16) L (Cable length is depending on the model number.) (5) (10.5) (16) (9)

Actuator side

Controller side

■ **Motor cable model number explanation (ECG-A Series): P4 Series, G Series (Dust-proof Specifications)**

EA-CBLM5- [S] [01]

Cable type	
S	Fixed cable
R	Movable cable

Cable length	
01	1 m
03	3 m
05	5 m
10	10 m

※ For the P4 Series, actuators shipped before January 2023 are supplied with a motor cable with the model number "EA-CBLM3-□□□" and an encoder cable with the model number "EA-CBLE3-□□□". Refer to instruction manuals for the actuator of the "1.2 Instruction Manuals Related To This Product" for details.

■ **Motor cable dimensions (ECG-A Series): P4 Series, G Series (Dust-proof Specifications)**

Actuator side

Controller side

Fixed φ6.5
Movable: φ7.6

(19) (10) (5) (10.5) (16)

L (Cable length is depending on the model number.)

■ Encoder cable model number system (ECG-A series): Standard series

EA-CBLE4- [S] [01]

Cable type	
S	Fixed cable
R	Movable cable

Cable length	
01	1 m
03	3 m
05	5 m
10	10 m

※ For the EBS-G Series and EBR-G Series, actuators shipped before October 2022 are supplied with a motor cable with the model number "EA-CBLM2-□□□" and an encoder cable with the model number "EA-CBLE2-□□□". Refer to instruction manuals for the actuator of the "1.2 Instruction Manuals Related To This Product" for details.

※ For the GSSD2 Series, GSTK Series, GSTG Series, GSTS Series and GSTL Series, motor cable with model number "EA-CBLM2-□□□" and encoder cable with model number "EA-CBLE2-□□□" are attached to actuators shipped before May 2023. Refer to instruction manuals for the actuator of the "1.2 Instruction Manuals Related To This Product" for details.

■ Encoder cable dimensions (ECG-A Series): Standard Series

Fixed φ8.5
Movable φ8.2

L (Cable length is depending on the model number.)

Actuator side | Controller side

■ Encoder cable model number explanation (ECG-A Series): P4 Series, G Series (Dust-proof Specifications)

EA-CBLE5- [S] [01]

Cable type	
S	Fixed cable
R	Movable cable

Cable length	
01	1 m
03	3 m
05	5 m
10	10 m

※ For the P4 Series, actuators shipped before January 2023 are supplied with a motor cable with the model number "EA-CBLM3-□□□" and an encoder cable with the model number "EA-CBLE3-□□□". Refer to instruction manuals for the actuator of the "1.2 Instruction Manuals Related To This Product" for details.

■ Encoder cable dimensions (ECG-A Series): P4 Series

Actuator side — (23.5) — (19) — (10.5) — (16)

Fixed φ8.5
Movable φ8.2

L (Cable length is depending on the model number.)

(9)

Controller side — (16) — (8.5)

■ Motor and encoder relay cable model number system (ECG-B Series)

EA-CBLME4- [S] [01]

Cable type	
S	Fixed cable
R	Movable cable

Cable length	
01	1 m
03	3 m
05	5 m
10	10 m

※ For the FLSH-G Series, FLCR-G Series, and FGRC Series, actuators shipped before October 22022 are supplied with an encoder cable with the model number "EA-CBLE2-□□□". Refer to instruction manuals for the actuator of the "1.2 Instruction Manuals Related To This Product" for details.

※ For the GCKW Series, actuators shipped before May 2023 are supplied with a relay cable with the model number "EA-CBLME2-□□□". Refer to instruction manuals for the actuator of the "1.2 Instruction Manuals Related To This Product" for details.

■ Motor and encoder relay cable external dimensions (ECG-B Series)

2.3.3. Wiring With S-Tools

⚠ CAUTION
🚫 **Do not connect the USB connector to other equipment.**
⚠ **During normal operation (when operating from a host device such as a PLC), remove the USB cable from the controller.** • During normal operation, set to the PLC mode to allow control from the host device (PLC, etc.).

Setup software S-Tools (free of charge) must be installed on the PC.
Download S-Tools from the website of CKD (URL: https://www.ckd.co.jp).

■ Communication specifications

Item	Specifications
Interface	USB2.0
Communication speed	Full speed(12Mbps)

■ Connection method

<Connect>

1. Connect the controller to a PC

Connect the controller and the PC with S-Tools installed. Connect a USB cable (mini-B type) to CN4 on the front of the controller and a USB port on the PC.

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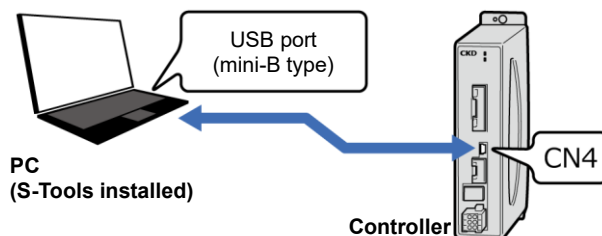
Follow the steps below to disconnect the USB cable.

1. Switch to PLC mode

2. Close S-Tools

Exit S-Tools on the PC.

3. Disconnect the USB cable from the controller

Disconnect the USB cable from CN4 on the front of the controller.

■ Control mode

The controller has the following two modes when S-Tools is connected.

• **PLC mode:** Control from a host device (PLC, etc.) is enabled, and control from S-Tools is disabled except for some cases.

• **TOOL mode:** Control from S-Tools is enabled, and control from a host device (PLC, etc.) is disabled except for some cases.

If the USB cable is disconnected in the TOOL mode, the controller cannot be controlled from the host device (PLC, etc.). Make sure that the controller is in the PLC mode before removing the USB cable.

🖉	● S-Tools are required to set and change parameters and point data. Refer to the S-Tools instruction manual (SM-A11147) for details such as setting method. ● To set the ECG-A Series and ECG-B Series, the S-Tools version must be Ver. 1.04.00.00 or later.

2.3.4. Wiring With The IO-Link Communication Cable

⚠ CAUTION

⚠ **Before wiring, confirm safety, then stop communication, and then turn off the power of peripheral devices.**

■ Connection method

\<Network cable\>

As shown in the figure below, connect a communication cable that conforms to the IO-Link specifications to the communication connector, which is included as an accessory.
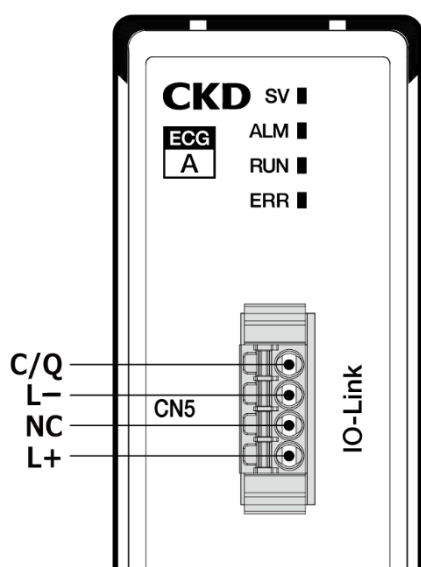
Signal name	Core color	Explanation
L+	Brown	Connect the plus side of the IO-Link communication power supply.
NC	-	None
L-	Blue	Connect the ground side of the IO-Link communication power supply.
C/Q	Black	Connect the IO-Link communication cable.

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

Item	Specifications
Core wire	0.2 to 1.5 mm^2 (AWG 24 to 16) single wire, stranded wire
Strip length	10 mm from the end of the lead wire

3. HOW TO USE

<table>
<tr><td colspan="2" align="center">⚠ DANGER</td></tr>
<tr>
<td>🚫</td>
<td>
Do not enter the operating range while the actuator can operate.
• An injury may occur.

Do not work with wet hands.
• Doing so may cause electric shock.
</td>
</tr>
</table>

<table>
<tr><td colspan="2" align="center">⚠ WARNING</td></tr>
<tr>
<td>🚫</td>
<td>
Do not climb on the product or put things on it.
• A fall accident, injury due to the product falling down or off, etc., or malfunction and runaway due to the product damage may occur.

Do not issue a command with a set value smaller than the positioning repeatability.
• The positioning control may not be performed properly.

Do not apply a load greater than the allowable value to the product.
• Details of the allowable value are provided on the model selection page of the catalog.
</td>
</tr>
<tr>
<td>🚫</td>
<td>
Do not touch the main unit with hands or body during operation or immediately after stopping.
• There is a risk of contact with hot areas and burns.
</td>
</tr>
<tr>
<td>⚠</td>
<td>
Confirm the wiring with peripheral devices and that equipment is safe to operate before supplying electricity to the product.
• If electricity is supplied inadvertently, an electric shock or injury may occur.

If the controller LED does not light or blink when the power is turned on, turn off the power immediately.
</td>
</tr>
<tr>
<td>⚠</td>
<td>
Before controlling the actuator from a position where it cannot be seen, check that it is safe for the actuator to operate.
</td>
</tr>
</table>

⚠ WARNING

When a power failure occurs, turn off the power to the controller.
- The product can suddenly start moving when the power is restored and it can lead to an accident.

Before moving the moving part of the actuator manually, perform after confirming the servo OFF.
- When setting the servo OFF, operate with sufficient safety so that there is no danger of the moving part falling.

Take measures to prevent damage to the human body and the device in case of power failures.
- An unexpected accident may occur.

⚠ CAUTION

🚫
When the controller and actuator are connected with a cable, do not move the actuator moving part by external force except for manual operation.
• A malfunction or damage may occur due to regenerative currents.

Do not apply external force to the actuator during the home position return operation.
• The home position may be misrecognized.

Do not dent or scratch the moving part of the actuator.
• An operation fault may occur.

Do not set the servo OFF while gravity or force of inertia is applied.
• The moving part may continue to move or fall off if the servo OFF is set. For safety reasons, perform the servo OFF operation in a balanced state, or be careful not to drop the workpiece by its own weight in the case of vertical installation.

Do not issue the stop command during acceleration or deceleration.
• There is a risk of danger due to speed change.

Do not turn the power on and off frequently.
• Elements in the controller may become damaged.

Do not hit the piston rod or table against the mechanical stopper, etc., except when returning to the home position or when using as clamping.
• The feed screw may become damaged due to impacts and failure may occur.

🚫
Do not insert fingers or objects into the opening of the product.
• An injury or product damage may occur.

⚠
If it operates with vibration, adjust the speed or gain to prevent vibration.
• Depending on the conditions of use, it may operate with vibration even within the operation speed range.

❗
When changing the combination of the actuator and controller, be sure to check the program and parameters before operating them.
• An accident may occur.

Use the actuator so that no impact is applied to the moving part.

Since the product life varies depending on the transfer load, etc., set it with sufficient margin.

📚
● "Regenerative current" is the current that is generated by the motor operating like a generator when the moving part of the actuator is moved by an external force. Reverse current flows from the motor to the controller, causing malfunction or damage.

3.1. Setting Actuator Information

> ## ⚠ CAUTION
>
> 🚫 **Set information corresponding to the actuator connected to the controller.**
> - Actuating with information not corresponding to the actuator will cause the actuator to operate unexpectedly. It may cause injury to people around it or failure of the actuator.

For the ECG-B series controller, set the actuator information first.
When writing actuator information to the controller, use the latest S-Tools (Ver. 1.04.00.00 or later). For details, refer to "Actuator settings" in the S-Tools instruction manual (SM-A11147).

PC
(S-Tools installed)

Actuator settings

Controller: ECG-B Series
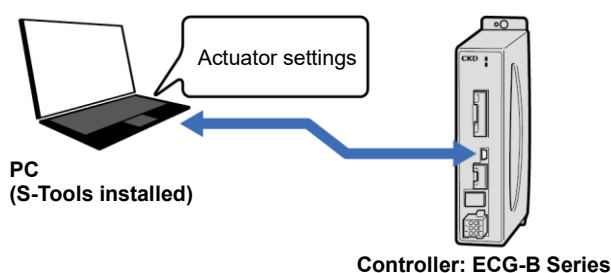
> ✏
> - ECG-A series does not require actuator information settings.
> - Actuator information cannot be set with versions of S-Tools older than Ver. 1.04.00.00.

<Procedure for writing actuator information>
Use S-Tools to select the model number of the actuator to be used and write to the controller.

1. Click [Actuator Settings] in S-Tools

Select the [Setting] tab of S-Tools and click the [Actuator setting] button.
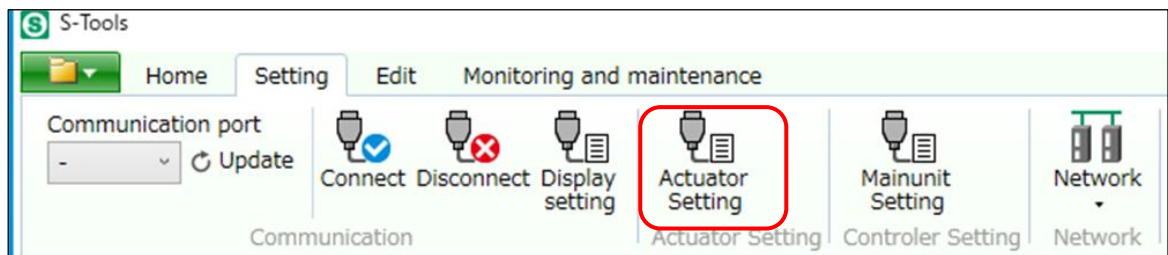
2. Select the actuator to be used and click [Write]

After selecting the model number of the actuator to be use, click the [Write] button.

3.2. Obtaining IODD Files

In order for IO-Link devices to participate in the network, IODD (IO Device Description) files describing the communication specifications of the devices needs to be installed in the PLC development tool of the master unit.
Refer to the instruction manual of the master unit manufacturer for how to install the IODD file.
Use the latest IODD file to configure an appropriate network.
IODD files are available on the website of CKD (https://www.ckd.co.jp/).

\<How to obtain\>

1. Select "Component Products" from the website
Select "Component Products" from the "Products & Support" tab or the "Product Information" page.

2. Select "Electric actuator" in the product lineup

3. Select "Stepping motor drive"

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

5. Select "Software" and download "ECG Series IODD (IO-Link).zip"

IODD file differs depending on Software version.
Refer to the following list

Controller	Software Ver.	Folder name
ECG-A Series	Ver.1.00.00 to Ver1.05.00	Ver1.00.00 to Ver1.05.00
	Ver.1.06.00	Ver1.06.00
	Ver.1.07.00	Ver1.07.00
	Version 1.09.00 or later	Ver1.09.00-
ECG-B Series	Ver.1.00.00 to Ver1.02.00	Ver1.00.00 to Ver1.02.00
	Ver.1.03.00	Ver1.03.00
	Ver.1.04.00	Ver1.04.00
	Version 1.05.00 or later	Ver1.05.00-

※ Refer to "1.3.1Version list" for details.

The product operates in 7 operation modes: PIO mode (5 Types), simple direct value mode and full direct value mode, and each mode uses a different IODD file. Select one according to the operation mode.

<IDDO file for ECG-A>

Mode	File name
Standard 64-point mode	CKD-ECG-A-PIOMODE-B064-yyyymmdd-IODDvvv.xml
Simple 7-point mode	CKD-ECG-A-PIOMODE-S007-yyyymmdd-IODDvvv.xml
Solenoid valve mode, double 2-position type	CKD-ECG-A-PIOMODE-VW2P-yyyymmdd-IODDvvv.xml
Solenoid valve mode, double 3-position type	CKD-ECG-A-PIOMODE-VW3P-yyyymmdd-IODDvvv.xml
Solenoid valve mode, single type	CKD-ECG-A-PIOMODE-VSGL-yyyymmdd-IODDvvv.xml
Simple direct value mode	CKD-ECG-A-SIMPLEMODE-yyyymmdd-IODDvvv.xml
Full direct value mode	CKD-ECG-A-FULLMODE-yyyymmdd-IODDvvv.xml

※ "yyyymmdd" is the date. "vvv" is the version.

<IODD file for ECG-B>

Mode	File name
Standard 64-point mode	CKD-ECG-B-PIOMODE-B064-yyyymmdd-IODDvvv.xml
Simple 7-point mode	CKD-ECG-B-PIOMODE-S007-yyyymmdd-IODDvvv.xml
Solenoid valve mode, double 2-position type	CKD-ECG-B-PIOMODE-VW2P-yyyymmdd-IODDvvv.xml
Solenoid valve mode, double 3-position type	CKD-ECG-B-PIOMODE-VW3P-yyyymmdd-IODDvvv.xml
Solenoid valve mode, single type	CKD-ECG-B-PIOMODE-VSGL-yyyymmdd-IODDvvv.xml
Simple direct value mode	CKD-ECG-B-SIMPLEMODE-yyyymmdd-IODDvvv.xml
Full direct value mode	CKD-ECG-B-FULLMODE-yyyymmdd-IODDvvv.xml

※ "yyyymmdd" is the date. "vvv" is the version.

The following files are also downloaded upon downloading IODD files. Copy them to the designated folder of the PLC development tool used.

File	File name	
Device icon	ECG-A	CKD-ECG-A-icon.png
	ECG-B	CKD-ECG-B-icon.png
Device symbol	ECG-A	CKD-ECG-A-pic.png
	ECG-B	CKD-ECG-B-pic.png
Vendor logo	CKD-logo.png	
Connector symbol	CKD-con-pic.png	

● Depending on the master unit, you may be able to add the controller into the network without installing the IODD file.

3.3. IO-Link Master Settings

In order to connect this product to the relevant port setting of the IO-Link master as an IO-Link device, it is necessary to set the device ID, process data, process data length, etc. using the PLC development tool.

> ● Normally, input/output process data are mapped using the setting table. If there is no corresponding setting table, the data table is generally mapped to be larger than the data length.

In the IO-Link master by OMRON, setting of PD(in) (9 bytes) in simple direct value mode maps five 2-byte PD(in) tables.

Refer to the relevant PLC and IO-Link Master manuals for connection methods.

3.4. Communication Format

3.4.1. Data Communication

Type of data communication	Content
Cyclic communication	Communication that is performed periodically between the IO-Link master and the controller according to the data frame with the size specified by the device. Also referred to as PD (Process Data) communication.
Message communication	Upper devices such as PLC access any data in the controller via the IO-Link master when necessary. Used for accessing OD (On-request data). Used for service data communication.

3.4.2.　Send/Receive Data

The following data are transmitted and received between the PLC and the controller: message communication is used for read data and written data, and cyclic communication is used for other transmitted and received data.
Refer to "3.4.6Data Access" for the communication method.

Name	Description	Send and receive Reference data
Input/output signals	The actuator is operated in the same way as the controller of the parallel I/O specifications.	"3.4.4Process Data" "3.4.5 PIO Mode Process Data Details"
Read data and write data	The point data and user parameters are set, and the alarm history is checked.	"3.4.7Service Data"
Monitor	The position, speed, current, and alarm status are monitored.	"3.4.4Process Data"

■ 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 (Process data output / PD(out))	Point number selection bit n, point travel start, point number n travel start, solenoid valve travel command n, solenoid valve travel command n, home position return start, servo ON, alarm reset, stop, pause, 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 (Process data input / PD(in))	Point number confirmation bit n, point travel complete, point number n travel complete, switch n, home position return complete, servo ON state, traveling, zone 1, zone 2, point zone, alarm, warning, operation preparation complete, alarm confirmation bit n, direct value travel status

	● When the PIO mode is selected, the same items as the controller of the parallel I/O specifications are sent and received. ● When the simple 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.

<Data to be written to the controller by the PLC (PD(out))>

Signal name	Explanation	
Point number selection bit n	Sets the point number (0 to 63) to be selected when the travel starts, in binary (n = 0 to 5).	
Point travel start	Starts the travel with the setting of the selected point number when switched from OFF to ON.	
Point number n travel start	Starts the travel with the setting of the point number n (1 to 7) when switched from OFF to ON.	
Solenoid valve travel command n	Performs the movement with the setting of the point number n (1 to 2). Performs the movement by the edge input in case of a 2 position type, and by the level input in case of a 3 position type.	
Solenoid valve travel command	When OFF	Move with the setting of point number 1.
	When ON	Move with the setting of point number 2.
Home position return start	Starts the home position return when switched from OFF to ON.	
Servo ON	When OFF	Switches the actuator to the servo OFF state.
	When ON	Switches the actuator to the servo ON status.
Alarm reset	Executes the alarm reset when switched from OFF to ON.	
Stop Note 1	When ON	The actuator is ready to move.
	When OFF	The actuator becomes immovable state. If switched OFF while moving, the actuator decelerates and stops and the travel command is canceled Even if it is turned ON, travel does not restart.
Pause Note 1	When ON	The actuator becomes ready to move and resumes moving.
	When OFF	The actuator becomes immovable state. When it is set to OFF while the actuator is traveling, the actuator decelerates to a stop but the travel command is held.
INCH selection	When ON	INCH is selected, and JOG travel is performed by inputting "JOG/INCH (+)/(−) travel start".
	When OFF	JOG is selected, and JOG travel is performed by inputting "JOG/INCH (+) (-) travel start".
JOG/INCH(-) travel start	When it is ON, the actuator moving part moves in the - direction. The speed is the value set in the parameter "JOG/INCH Speed", and the acceleration and deceleration are 0.3 G for the ECG-A series and 0.1 G for the ECG-B series.	
JOG/INCH(+) travel start	When it is ON, the actuator moving part moves in the + direction. The speed is the value set in the parameter "JOG/INCH Speed", and the acceleration and deceleration are 0.3 G for the ECG-A series and 0.1 G for the ECG-B series.	
Direct value travel selection	When OFF	Switched to point travel.
	When ON	Switched to direct value travel.
Position	Refer to "3.6.5Setting The Position" for the setting range, etc.	
Positioning width	Refer to "3.6.6Setting The Positioning Width" for the setting range, etc.	
Speed	Refer to "3.6.7Setting The Speed" for the setting range, etc.	
Acceleration	Refer to "3.6.8Setting The Acceleration" for the setting range, etc.	
Deceleration	Refer to "3.6.9Setting The Deceleration" for the setting range, etc.	
Pressing rate	Refer to "3.6.15Setting The Pressing Rate" for the setting range, etc.	

Note 1: A negative logic signal

Signal name	Explanation
Pressing speed	Refer to "3.6.16Setting The Pressing Speed" for the setting range, etc.
Pressing distance	Refer to "3.6.17Setting The Pressing Distance" for the setting range, etc.
Mode	You can select the operation method, position specification method, acceleration/deceleration method, stop method, or rotation direction. Refer to "3.6.4Selecting The Operation Method" for the choices for the operation method. Refer to "3.6.3Selecting The Position Specification Method" for the choices for the position specification method. Refer to "3.6.10Selecting The Acceleration/Deceleration Method" for the choices for the acceleration/deceleration method. Refer to "3.6.11Selecting The Stop Method" for the choices for the stop method. Refer to "3.6.12Selecting The Rotation Direction" for the choices for the rotation direction.
Gain magnification	Refer to "3.6.13Setting The Gain Magnification" for the setting range, etc.

- The point number (0 to 63) is the decimal number of the 6-digit binary point number selection bit.
- For the "point number selection bit n", the bit with larger n indicates the upper value when the point number is set in binary.
  <Input example>
  When bit 0 = OFF, bit 1 = OFF, bit 2 = ON, bit 3 = OFF, bit 4 = OFF, and bit 5 = OFF are set in the point number selection bit, this indicates that the point 4 is selected.

<Data to be read from the controller by the PLC (PD(in))>

Signal name	Explanation
Point number confirmation bit n	The number (0 to 63) of the point where the travel is completed is output in binary (n=0 to 5).
Point travel completion	Turns ON when movement is within the range to be completed.
Point number n travel completion	Turns ON when the movement to the point number (n = 1 to 7) is within the range to be completed.
Switch n	Turns ON when the current position is within the range of "operation completion position" ± "positioning width" of point n, and turns OFF when it is not within the above range (n = 1, 2).
Home position return complete	Turns ON when the home position return is completed, and turns OFF when it is not completed or during the home position return.
Traveling	Turns ON when the actuator is traveling, and turns OFF when it is stopped.ON when the actuator is traveling, and turns OFF when it is stopped.
Zone n	ON or OFF is output when the current position is within the "zone n (+) (-)" set in the parameter (n = 1, 2). Refer to "3.5.3Zone Settings And Output Signals" for details.
Point zone	Turns ON when the current position is within the range set by the "point zone (+) (-)" of the point number n during or after traveling with the setting of the point number n, and turns OFF when it is not within the above range (n = 0 to 63). Refer to "3.6.14Point Zone Setting And Output Signal" for details.
Servo ON state	Turns ON when the servo ON state, and turns OFF when the servo OFF state.
Alarm Note 1	Turns OFF when an alarm occurs, and turns ON when no alarm occurs.
Warning Note 1	Turns OFF when a warning occurs, and turns ON when no warning occurs.
Operation preparation complete	Turns ON when the movement command from the PLC can be received. Turns OFF when the movement command cannot be received. However, when the input signal for pause is OFF, the actuator cannot move even if the operation preparation complete is ON.
Alarm confirmation bit n	When an alarm occurs, the number of the fourth digit from the bottom of the alarm is output in binary. (n=0 to 3)
Direct value travel status	When direct travel starts, the direct value travel status turns ON, which is OFF at power-on. When point travel starts, the direct value travel status turns OFF.
Soft limit over Note 2	Turns ON when the current position of the actuator is outside the set software limit. Refer to "3.5.2Setting Soft Limit And Soft Limit Over Signal Output" for details.
Soft limit over (+) Note 2	Turns ON when the actuator's current position is larger than the set soft limit (+). Refer to "3.5.2Setting Soft Limit And Soft Limit Over Signal Output" for details.
Soft limit over (-) Note 2	Turns ON when the current position of the actuator is less than the set soft limit (-). Refer to "3.5.2Setting Soft Limit And Soft Limit Over Signal Output" for details.

Note 1: A negative logic signal
Note 2: This signal cannot be used if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

- The point number (0 to 63) is the decimal number of the 6-digit binary point number confirmation bit.
- The upper 1 digit (0 to F) of the alarm code is the hexadecimal number of the 4-digit binary alarm confirmation bit.
- For the "point number confirmation bit n" and "alarm confirmation bit n," the bit with larger n indicates the upper value when the point number or the alarm code is output in binary.
  <Output example>
  When bit 0 = OFF, bit 1 = OFF, bit 2 = ON, and bit 3 = OFF in the alarm confirmation bit, this indicates that alarm 0x4□□□ has occurred. Refer to "5.2Alarm Indications And Countermeasures" for the details of alarms.

■ Write data and read data

The point data and parameters are set, and the alarm history is read. Data is written and read by

transmitting and receiving service data.

<To read data>
Specify Index and Subindex of the data to be read and

execute writing of the data.
For details, refer to "3.4.4Process Data" or the relevant manuals of PLC and IO-Link master.

<To write data>
Specify the Index and Subindex of the data to be written, set the data length and the value to be written, and then execute the writing of the data.
For details, refer to "3.4.4Process Data" or the relevant manuals of PLC and IO-Link master.

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

■ Monitor

Position, speed, current and alarm status are monitored by transmitting and receiving "monitor number" and "monitor value" in the process data. When data to be monitored is selected by specifying the "monitor number," the current value of the selected data is output as "monitor value."

3.4.3.   Operation Mode

There are three operation modes (IO-Link) as follows. The PIO mode can be changed among the 5 types according to the setting of operation mode (PIO).

<Mode list of operation mode (IO-Link)>

Name	Abbreviation	Set value from PLC
PIO mode	PIO	0
Simple direct value mode	SDP	1
Full direct value mode	FDP	2

■ PIO mode

This mode performs control in accordance with conventional signal I/O.

<Mode list of operation mode (PIO)>

Name	Abbreviation	Set value from PLC
64-point mode	B064	0
Simple 7-point mode	S007	1
Solenoid valve mode, double 2-position type	VW2P	2
Solenoid valve mode, double 3-position type	VW3P	3
Solenoid valve mode, single type	VSGL	4

■ Simple direct value mode and full direct value mode

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

	Simple direct value mode	Full direct value mode
Point travel	When the direct value travel selection of PD(out) is OFF, the point travel can be used. The point data selection method is the same as the 64-point mode of the PIO mode. When the point travel is started, the direct travel status of PD(in) turns OFF.	
Direct value travel	When the direct value travel selection of PD(out) is ON, the direct value travel can be used. When the direct value travel is started, the direct travel status of PD(in) turns ON. The point number confirmation bit of PD(in) is not set when the travel is completed.	
	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 uses data (data equivalent to point data such as position and speed) that are input from a PLC.

\<Sending and receiving data in operation mode (IO-Link)\>

Operation mode		PIO mode	Simple direct value mode	Full direct value mode
Abbreviation		PIO	SDP	FDP
Reading/writing of parameters		Yes	Yes	Yes
Direct value travel selection Note 1		Unselectable	1: Direct value travel	1: Direct value travel
Positioning point		64 points	Unlimited	Unlimited
Direct value travel items Note 2	Target position	△	○	○
	Positioning width	△	△	○
	Speed	△	△	○
	Acceleration	△	△	○
	Deceleration	△	△	○
	Pressing rate	△	△	○
	Pressing distance	△	△	○
	Pressing speed	△	△	○
	Position specification method	△	△	○
	Operation method	△	△	○
	Stop method	△	△	○
	Acceleration/ deceleration method	△	△	○
Monitor Note 3	Position	-	◎	◎
	Speed	-	▲	◎
	Current	-	▲	◎
	Alarm	-	▲	◎

Note 1: When the direct value travel selection is "0: Point travel," the point travel can be performed in the same way as the 64-point mode.

Note 2: For the direct value travel items, ○ indicates that it works with the set value from the PLC and △ that it works with the set value of the point data.

Note 3: For the monitor, ◎ indicates that it can be monitored, — indicates that it cannot be monitored, and ▲ indicates that one item from speed, current, and alarm can be selected and monitored.

3.4.4. Process Data

The format of the data to be sent and received as process data is described below. Refer to "3.4.6Data Access" and the PLC manufacturer's manual for the communication method.

■ PIO mode(Operation mode (IO-Link) : 0)

Example : 64 point mode (Operation mode (PIO) : 0)

The table below is for the 64-point mode (Operation mode (PIO): 0). Refer to "3.4.5 PIO Mode Process Data Details" for details on the operation mode (PIO).

<PD(out)> (Data to be written to the controller from the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0 (First byte)	7	-	-	-	-
	6	Stop Note 1	0: Stop, 1: Cancel	8	Boolean
	5	Alarm reset	0: -, 1: Reset	7	Boolean
	4	Servo ON	0: Servo OFF, 1: Servo ON	6	Boolean
	3	Home position return start	0: -, 1: Home position return start	5	Boolean
	2	Point travel start	0: -, 1: Start	4	Boolean
	1	JOG (+) travel start	0: Stop, 1: Start	3	Boolean
	0	JOG (-) travel start	0: Stop, 1: Start	2	Boolean
PD(out)#1 (Second byte)	7 to 6	-	-	-	-
	5	Point number selection bit 5	Binary data 0 to 63 ※ The bit 0 side indicates the low-order bit, and the bit 5 side indicates the high-order bit.	1	UInteger6
	4	Point number selection bit 4			
	3	Point number selection bit 3			
	2	Point number selection bit 2			
	1	Point number selection bit 1			
	0	Point number selection bit 0			

Note 1: Stop is negative logic. Turn ON the bit to "1: Cancel" to operate.

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(Out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

> ● At startup, check that communication with the PLC is established, and then refer to the data of each signal such as an alarm. If communication is not established, the controller cannot be operated even if each bit is "1: ON."

<PD(in)> (Data to be read from the controller by the PLC)

PD(in) Operation mode (IO-Link): 0					
Byte order	**Bit**	**Item**	**Value (decimal)**	**Index 0x0028 Subindex**	**Format**
PD(in)#0 (First byte)	**7**	Operation preparation complete	0: Incomplete, 1: Complete	9	Boolean
	6	-	-	-	-
	5	Alarm Note 1	0: Triggered, 1: Not triggered	8	Boolean
	4	Servo ON state Note 1	0: OFF state, 1: ON state	7	Boolean
	3	Home position return complete Note 1	0: Incomplete, 1: Complete	6	Boolean
	2	Point travel complete Note 2	0: Incomplete, 1: Complete	5	Boolean

	1	Selection output 2 Note 2, Note3
		  Point zone
		  Zone 1
		  Zone 2
		  Traveling
		  Warning
		  Soft limit over
		  Soft limit over (-)
		  Soft limit over (+)
			Point zone/Zone 1/Zone 2
			  0: Inside zone
			  1: Outside zone
			Traveling
			  0: Stopped
			  1: Traveling
			Warning
			  0: Triggered,
			  1: Not triggered
				4	Boolean

	0	Selection output 1 Note 2, Note 3
		  Point zone
		  Zone 1
		  Zone 2
		  Traveling
		  Warning
		  Soft limit over
		  Soft limit over (-)
		  Soft limit over (+)
			Soft limit over
			  0: Inside soft limit range,
			  1:Outside soft limit range
			Soft limit over (-)
			  0: soft limit (-) or more,
			  1: less than soft limit (-)
			Soft limit over (+)
			  0: less than soft limit (+),
			  1: over soft limit (+)
				3	Boolean

Note 1: Content can be monitored even in TOOL mode. However, it is only when the forced output mode is not in effect. Other items will be "0: OFF".

Note 2: Both point travel complete and moving may be ON ("1") at the same time depending on the timing.

Note 3: If the software version is old, soft limit over, soft limit over (-), and soft limit over (+) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(in) Operation mode (IO-Link): 0					
Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#1 (Second byte)	7 to 6	-	-	-	-
	5	Point number confirmation bit 5	Point numbers 0 to 63 Alarms 0 to 15 **Note 1** ※ Set the travel complete point number when normal and the alarm when abnormal. ※ The bit 0 side indicates the low-order bit, and the bit 5 side indicates the high-order bit.	1	UInteger6
	4	Point number confirmation bit 4			
	3	Point number confirmation bit 3/ alarm confirmation bit 3			
	2	Point number confirmation bit 2/ alarm confirmation bit 2			
	1	Point number confirmation bit 1/ alarm confirmation bit 1			
	0	Point number confirmation bit 0/ alarm confirmation bit 0			

Note 1: The alarm 0 to 15 indicates the first digit of the alarm code as a hexadecimal number. For details, refer to "Input/output signals" of "3.4.2Send/Receive Data". Refer to "5.2Alarm Indications And Countermeasures" for the alarm codes.

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

● When starting, confirm that communication with the PLC is established, and then refer to the data of each signal such as an alarm.

■ Simple direct value mode (operation mode (IO-Link): 1)

<PD(out)> (Data to be written to the controller from the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0029 Subindex	Format
PD(out) Operation mode (IO-Link: 1)					
PD(out)#0 (First byte)	7	Pause Note 1	0: Pause, 1: Cancel	13	Boolean
	6	Stop Note 1	0: Stop, 1: Cancel	12	Boolean
	5	Alarm reset	0: -, 1: Reset	11	Boolean
	4	Servo ON	0: Servo OFF, 1: Servo ON	10	Boolean
	3	Home position return start	0: -, 1: Home position return start	9	Boolean
	2	Point travel start	0: -, 1: Start	8	Boolean
	1	JOG/INCH(+) travel start	0: Stop, 1: Start	7	Boolean
	0	JOG/INCH(-) travel start	0: Stop, 1: Start	6	Boolean
PD(out)#1 (Second byte)	7	INCH selection	0: JOG, 1: INCH	5	Boolean
	6	-	-	-	-
	5	Point number selection bit 5	Binary data 0 to 63 ※ The bit 0 side indicates the low-order bit, and the bit 5 side indicates the high-order bit.	4	UInteger6
	4	Point number selection bit 4			
	3	Point number selection bit 3			
	2	Point number selection bit 2			
	1	Point number selection bit 1			
	0	Point number selection bit 0			

Note 1: Stop and pause are negative logics. To enable operation, set the both bits to "1: Cancel". You cannot disable stop and pause in the simple direct value mode or the full direct value mode.

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(out) Operation mode (IO-Link: 1)					
Byte order	Bit	Item	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#2 (Third byte)	7 to 4	-	-	-	-
	3 to 1	Monitor No.	2: Speed 3: Current value 5: Alarm Note 1	3	UInteger3
	0	Direct value travel selection Note 2	0: Point travel, 1: Direct value travel	2	Boolean
PD(out)#3 (Fourth byte) to PD(out)#6 (Seventh byte)	-	Position (0.01 mm) (0.01 deg)	-999999 to 999999 ※ The values on the PD(out)#6 side represent low-order bytes, and the values on the PD(out)#3 side represent high-order bytes.	1	Integer32

Note 1: Designates which information is set to the PD(in) monitor value.
Note 2: When the direct value travel selection is "0: Point travel," the point travel can be performed in the same way as the 64-point mode.

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

- When starting, confirm that communication with the PLC is established, and then refer to the data of each signal such as an alarm. If communication is not established, the controller cannot be operated even if each bit is "1: ON."
- After the monitor number is switched, there will be some time lag until the data actually switches. The time difference may be longer depending on the communication speed, etc., but switching is completed within 2 ms after a signal reaches the controller. If you refer to the data immediately after switching, you may reference unintended data.
- Reset can be executed whether in PLC mode or TOOL mode.

<PD(in)> (Data to be read from the controller by the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in) Operation mode (IO-Link): 1					
PD(in)#0 (First byte)	7	Operation preparation complete	0: Incomplete, 1: Complete	17	Boolean
	6	Warning Note 1	0: Triggered, 1: Not triggered	16	Boolean
	5	Alarm Note 1	0: Triggered, 1: Not triggered	15	Boolean
	4	Servo ON state Note 1	0: OFF state, 1: ON state	14	Boolean
	3	Home position return complete Note 1	0: Incomplete, 1: Complete	13	Boolean
	2	Point travel complete Note 2	0: Incomplete, 1: Complete	12	Boolean
	1 to 0	-	-	-	-
PD(in)#1 (Second byte)	7 to 6	-	-	-	-
	5	Point number confirmation bit 5	Binary data For direct value travel: 0 is set. For point travel: The travel complete point number is set. ※ The bit 0 side indicates the low-order bit, and the bit 5 side indicates the high-order bit. Note 4	11	UInteger6
	4	Point number confirmation bit 4			
	3	Point number confirmation bit 3			
	2	Point number confirmation bit 2			
	1	Point number confirmation bit 2			
	0	Point number confirmation bit 1			
PD(in)#2 (Third byte)	7	Soft limit over (+) Note 3	0: less than soft limit (+) 1: over soft limit (+)	10	Boolean
	6	Soft limit over (-) Note 3	0: soft limit (-) or more 1: less than soft limit (-)	9	Boolean
	5	Soft limit over Note 3	0: Within the range of soft limit 1: Outside the range of software limit	8	Boolean
	4	Zone 2	0: Outside zone, 1: Inside zone	7	Boolean
	3	Zone 1	0: Outside zone, 1: Inside zone	6	Boolean
	2	Traveling Note 2	0: Stopped, 1: Traveling	5	Boolean
	1	Point zone	0: Outside zone, 1: Inside zone	4	Boolean
	0	Direct value travel status	0: Point travel, 1: Direct value travel	3	Boolean

Note 1: Content can be monitored even in TOOL mode. However, it is only when the forced output mode is not in effect. Other items will be "0: OFF".

Note 2: Both point travel complete and moving may be ON ("1") at the same time depending on the timing.

Note 3: This signal is not assigned if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

Note 4: The values of the PD(in)#1 bits 0 to 5 become undefined if the direct value travel selection (PD(out) #2) is turned ON from OFF.

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(in) Operation mode (IO-Link): 1					
Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#3 (Fourth byte) to PD(in)#6 (Seventh byte)	-	Position (0.01 mm) (0.01 deg) Note 1	-999999 to 999999 ※ The values on the PD(in)#6 side represent low-order bytes, and the values on the PD(in)#3 side represent high-order bytes.	2	Integer32
PD(in)#7 (8th byte) to PD(in)#8 (9th byte)	-	Monitor value Note 1	Set the monitor data that was read. ※ The values on the PD(in)#8 side represent low-order bytes, and the values on the PD(in)#7 side represent high-order bytes.	1	UInteger16

Note 1: Content can be monitored even in TOOL mode. However, it is only when the forced output mode is not in effect. Other items will be "0: OFF".

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

- When starting, confirm that communication with the PLC is established, and then refer to the data of each signal such as an alarm.

■ Full direct value mode (operation mode (IO-Link): 2)

\<PD(out)> (Data to be written to the controller from the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0029 Subindex	Format
PD(out) Operation mode (IO-Link): 2					
PD(out)#0 (First byte)	7	Pause Note 1	0: Pause, 1: Cancel	25	Boolean
	6	Stop Note 1	0: Stop, 1: Cancel	24	Boolean
	5	Alarm reset	0: -, 1: Reset	23	Boolean
	4	Servo ON	0: Servo OFF, 1: Servo ON	22	Boolean
	3	Home position return start	0: -, 1: Home position return start	21	Boolean
	2	Point travel start	0: -, 1: Start	20	Boolean
	1	JOG/INCH(+) travel start	0: Stop, 1: Start	19	Boolean
	0	JOG/INCH(+) travel start	0: Stop, 1: Start	18	Boolean
PD(out)#1 (Second byte)	7	INCH selection	0: JOG, 1: INCH	17	Boolean
	6	-	-	-	-
	5	Point number selection bit 5	Binary data 0 to 63 ※ The bit 0 side indicates the low-order bit, and the bit 5 side indicates the high-order bit.	16	UInteger6
	4	Point number selection bit 4			
	3	Point number selection bit 3			
	2	Point number selection bit 2			
	1	Point number selection bit 1			
	0	Point number selection bit 0			

Note 1: Stop and pause are negative logics. To enable operation, set the both bits to "1: Cancel". You cannot disable stop and pause in the simple direct value mode or the full direct value mode.

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(out) Operation mode (IO-Link): 2					
Byte order	Bit	Item	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#2 (Third byte)	**7 to 4**	-	-	-	-
	3 to 1	Rotation direction	0: Common 1: Close rotation 2:CW 3:CCW Note 1 ※ The bit 1 side indicates the low-order bit, and the bit 3 side indicates the high-order bit.	15	UInteger3
	0	Direct value travel selection Note 2	0: Point travel, 1: Direct value travel	14	Boolean
PD(out)#3 (Fourth byte) to PD(out)#6 (Seventh byte)	**-**	Position (0.01 mm) (0.01 deg)	-999999 to 999999 ※ The values on the PD(out)#6 side represent low-order bytes, and the values on the PD(out)#3 side represent high-order bytes.	13	Integer32
PD(out)#7 (8th byte) to PD(out)#8 (9th byte)	**-**	Positioning width (0.01 mm) (0.01 deg)	0 to 999 (when setting = 0, use common parameter value. ※ The values on the PD(out)#8 side represent low-order bytes, and the values on the PD(out)#7 side represent high-order bytes.	12	UInteger16
PD(out)#9 (10th byte) to PD(out)#10 (11th byte)	**-**	Speed (mm/s) (deg/s)	0 to 9999 (when setting = 0, use common parameter value. ※ The values on the PD(out)#10 side represent low-order bytes, and the values on the PD(out)#9 side represent high-order bytes.	11	UInteger16
PD(out)#11 (12th byte)	**-**	Acceleration (0.01 G)	0 to 255 (when setting = 0, use common parameter value.	10	UInteger8

Note 1: The rotation direction setting is enabled only when the connected actuator is FGRC (rotary). Do not use the product by the combination of the pressing operation and the close rotation because the operation will be undefined.

Note 2: When the direct value travel selection is "0: Point travel," the point travel can be performed in the same way as the 64-point mode.

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(out) Operation mode (IO-Link): 2					
Byte order	**Bit**	**Item**	**Value (decimal)**	**Index 0x0029 Subindex**	**Format**
PD(out)#12 (13th byte)	-	Deceleration (0.01 G)	0 to 255 (when setting = 0, use common parameter value.	9	UInteger8
PD(out)#13 (14th byte)	-	Pressing rate (%)	0 to 100 (when setting = 0, use common parameter value.	8	UInteger8
PD(out)#14 (15th byte)	-	Pressing speed (mm/s) (deg/s)	0 to 99 (when setting = 0, use common parameter value.	7	UInteger8
PD(out)#15 (16th byte) to PD(out)#18 (19th byte)	-	Pressing distance (0.01 mm) (0.01 deg)	-999999 to 999999 (when setting = 0, use common parameter value. The values on the PD(out)#18 side represent low-order bytes, and the values on the PD(out)#15 side represent high-order bytes.	6	Integer32
PD(out)#19 (20th byte) to PD(out)#20 (21st byte)	-	Gain magnification (%)	0 to 9999 (when setting = 0, this means that gain magnification is not used ※ The values on the PD(out)#20 side represent low-order bytes, and the values on the PD(out)#19 side represent high-order bytes.	5	UInteger16

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(out) Operation mode (IO-Link): 2					
Byte order	Bit	Item	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#21 (22nd byte)	**7**	Position specification method	0: Absolute, 1: Incremental	4	Boolean
	6 to 5	Operation method	0: Positioning operation 1: Pressing operation 1 2: Pressing operation 2 ※ The bit 5 side indicates the low-order bit, and the bit 6 side indicates the high-order bit.	3	UInteger2
	4 to 3	Acceleration/deceleration method	0: Common, 1: Trapezoid ※ The bit 3 side indicates the low-order bit, and the bit 4 side indicates the high-order bit.	2	UInteger2
	2 to 0	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 0 side indicates the low-order bit, and the bit 3 side indicates the high-order bit.	1	UInteger3

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

- When starting, confirm that communication with the PLC is established, and then refer to the data of each signal such as an alarm. If communication is not established, the controller cannot be operated even if each bit is "1: ON."
- After the monitor number is switched, there will be some time lag until the data actually switches. The time difference may be longer depending on the communication speed, etc., but switching is completed within 2 ms. If you refer to the data immediately after switching, you may reference unintended data.
- Depending on the actuator model number (such as size), some values may cause an alarm even if they are within the settable range shown in this table. If a value out of the specification is set, unexpected operation may occur.
- Reset can be executed whether in PLC mode or TOOL mode.

<PD(in)> (Data to be read from the controller by the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0 (First byte)	7	Operation preparation complete	0: Incomplete, 1: Complete	19	Boolean
	6	Warning Note 1	0: Triggered, 1: Not triggered	18	Boolean
	5	Alarm Note 1	0: Triggered, 1: Not triggered	17	Boolean
	4	Servo ON state Note 1	0: OFF state, 1: ON state	16	Boolean
	3	Home position return complete Note 1	0: Incomplete, 1: Complete	15	Boolean
	2	Point travel complete Note 2	0: Incomplete, 1: Complete	14	Boolean
	1 to 0	-	-	-	-
PD(in)#1 (Second byte)	7 to 6	-	-	-	-
	5	Point number confirmation bit 5	Binary data. For direct value travel: 0 is set. For point travel: The travel complete point number is set. ※ The bit 0 side indicates the low-order bit, and the bit 5 side indicates the high-order bit. Note 3	13	UInteger6
	4	Point number confirmation bit 4			
	3	Point number confirmation bit 3			
	2	Point number confirmation bit 2			
	1	Point number confirmation bit 2			
	0	Point number confirmation bit 1			

Note 1: Content can be monitored even in TOOL mode. However, it is only when the forced output mode is not in effect. Other items will be "0: OFF".
Note 2: Both point travel complete and moving may be "1: ON" at the same time depending on the timing.
Note 3: The values of the PD(in)#1 bits 0 to 5 become undefined if the direct value travel selection (PD(out) #2) is turned ON from OFF.

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

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PD(in) Operation mode (IO-Link): 2					
Byte order	**Bit**	**Item**	**Value (decimal)**	**Index 0x0028 Subindex**	**Format**
PD(in)#2 (Third byte)	**7**	Soft limit over (+) Note 1	0: less than soft limit (+) 1: over soft limit (+)	12	Boolean
	6	Soft limit over (-) Note 1	0: soft limit (-) or more 1: less than soft limit (-)	11	Boolean
	5	Soft limit over Note 1	0: Within the range of soft limit 1: Outside the range of software limit	10	Boolean
	4	Zone 2	0: Outside zone, 1: Inside zone	9	Boolean
	3	Zone 1	0: Outside zone, 1: Inside zone	8	Boolean
	2	Traveling Note 2	0: Stopped, 1: Traveling	7	Boolean
	1	Point zone Note 3	0: Outside zone, 1: Inside zone	6	Boolean
	0	Direct value travel status	0: Point travel, 1: Direct value travel	5	Boolean

Note 1: This signal is not assigned if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".
Note 2: Both point travel complete and moving may be "1: ON" at the same time depending on the timing.
Note 3: For direct value travel, the point zone is always "0: OFF."

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(in) Operation mode (IO-Link): 2					
Byte order	**Bit**	**Item**	**Value (decimal)**	**Index 0x0028 Subindex**	**Format**
PD(in)#3 (Fourth byte) to PD(in)#6 (Seventh byte)	-	Position (0.01 mm) (deg) Note 1	-999999 to 999999 ※ The values on the PD(in)#6 side represent low-order bytes, and the values on the PD(in)#3 side represent high-order bytes.	4	Integer32
PD(in)#7 (8th byte) to PD(in)#8 (9th byte)	-	Speed (mm/s) (deg/s) Note 1	0 to 9999 ※ The values on the PD(in)#8 side represent low-order bytes, and the values on the PD(in)#7 side represent high-order bytes.	3	UInteger16
PD(in)#9 (10th byte)	-	Current (%) Note 1	0 to 100	2	UInteger8
PD(in)#10 (11th byte) to PD(in)#11 (12th byte)	-	Alarm Note 1	The alarm code is set. ※ The values on the PD(in)#11 side represent low-order bytes, and the values on the PD(in)#10 side represent high-order bytes.	1	UInteger8

Note 1: Content can be monitored even in TOOL mode. However, it is only when the forced output mode is not in effect. Other items will be "0: OFF".

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

> ✏ ● When starting, confirm that communication with the PLC is established, and then refer to the data of each signal such as an alarm.

3.4.5. PIO Mode Process Data Details

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

<PD(out)> (Data to be written to the controller from the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	-	-	-	-
	6	Stop Note 1	0: Stop, 1: Cancel	8	Boolean
	5	Alarm reset	0: -, 1: Reset	7	Boolean
	4	Servo ON	0: Servo OFF, 1: Servo ON	6	Boolean
	3	Home position return start	0: -, 1: Home position return start	5	Boolean
	2	Point travel start	0: -, 1: Start	4	Boolean
	1	JOG (+) travel start	0: Stop, 1: Start	3	Boolean
	0	JOG (-) travel start	0: Stop, 1: Start	2	Boolean
PD(out)#1	7	-	-	-	-
	6	-	-	-	-
	5	Point number selection bit 5	Binary data 0 to 63 ※ The bit 0 side indicates the low-order bit, and the bit 5 side indicates the high-order bit.	1	UInteger6
	4	Point number selection bit 4			
	3	Point number selection bit 3			
	2	Point number selection bit 2			
	1	Point number selection bit 1			
	0	Point number selection bit 0			

Note 1: Stop is negative logic. Turn ON the bit to "1: Cancel" to operate.

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

\<PD(in)\> (Data to be read from the controller by the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	Operation preparation complete	0: Incomplete, 1: Complete	8	Boolean
	6	-	-	-	-
	5	Alarm Note 1	0: Triggered, 1: Not triggered	7	Boolean
	4	Servo ON state Note 1	0: OFF state, 1: ON state	6	Boolean
	3	Home position return complete Note 1	0: Incomplete, 1: Complete	5	Boolean
	2	Point travel complete Note 2	0: Incomplete, 1: Complete	4	Boolean

	1	Selection output 2 Note 2, Note 3
		Point zone
		Zone 1
		Zone 2
		Traveling
		Warning
		Soft limit over
		Soft limit over (-)
		Soft limit over (+)
			Point zone/Zone 1/Zone 2
			  0: Inside zone
			  1: Outside zone
			Traveling
			  0: Stopped
			  1: Traveling
			Warning
			  0: Triggered,
			  1: Not triggered
			Soft limit over
			  0: Within the range of soft limit,
			  1: Outside the range of software limit
			Soft limit over (-)
			  0: soft limit (-) or more,
			  1: less than soft limit (-)
			Soft limit over (+)
			  0: less than soft limit (+),
			  1: over soft limit (+)
				3	Boolean

	0	Selection output 1 Note 2, Note 3 Point zone Zone 1 Zone 2 Traveling Warning Soft limit over Soft limit over (-) Soft limit over (+)		2	Boolean

Note 1: Content can be monitored even in TOOL mode. However, it is only when the forced output mode is not in effect. Other items will be "0: OFF".

Note 2: Both point travel complete and moving may be "1: ON" at the same time depending on the timing.

Note 3: If the software version is old, soft limit over, soft limit over (-), and soft limit over (+) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(in) Operation mode (PIO): 0					
Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#1	7	-	-	-	-
	6	-	-	-	-
	5	Point number confirmation bit 5	-	1	UInteger6
	4	Point number confirmation bit 4	-		
	3	Point number confirmation bit 3 /alarm confirmation bit 3	Point numbers 0 to 63 Alarms 0 to 15 Note 1 ※ Set the travel complete point number when normal and the alarm when abnormal. ※ The bit 0 side indicates the low-order bit, and the bit 5 side indicates the high-order bit.		
	2	Point number confirmation bit 2 /alarm confirmation bit 2			
	1	Point number confirmation bit 1 /alarm confirmation bit 1			
	0	Point number confirmation bit 0 /alarm confirmation bit 0			

Note 1: The alarm 0 to 15 indicates the first digit of the alarm code as a hexadecimal number. For details, refer to "Input/output signals" of "3.4.2Send/Receive Data". Refer to "5.2Alarm Indications And Countermeasures" for the alarm codes.

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

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

<PD(out)> (Data to be written to the controller from the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	-	-	-	-
	6	Stop Note 1	0: Stop, 1: Cancel	13	Boolean
	5	Alarm reset	0: -, 1: Reset	12	Boolean
	4	Servo ON	0: Servo OFF, 1: Servo ON	11	Boolean
	3	Home position return start	0: -, 1: Home position return start	10	Boolean
	2	-	-	-	-
	1	JOG (+) travel start	0: Stop, 1: Start	9	Boolean
	0	JOG (-) travel start	0: Stop, 1: Start	8	Boolean
PD(out)#1	7	-	-	-	-
	6	Point number 7 travel start	0: -, 1: Start	7	Boolean
	5	Point number 6 travel start	0: -, 1: Start	6	Boolean
	4	Point number 5 travel start	0: -, 1: Start	5	Boolean
	3	Point number 4 travel start	0: -, 1: Start	4	Boolean
	2	Point number 3 travel start	0: -, 1: Start	3	Boolean
	1	Point number 2 travel start	0: -, 1: Start	2	Boolean
	0	Point number 1 travel start	0: -, 1: Start	1	Boolean

Note 1: Stop is negative logic. Turn ON the bit to "1: Cancel" to operate.

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

\<PD(in)\> (Data to be read from the controller by the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	**7**	Operation preparation complete	0: Incomplete, 1: Complete	13	Boolean
	6	-	-	-	-
	5	Alarm Note 1	0: Triggered, 1: Not triggered	12	Boolean
	4	Servo ON state Note 1	0: OFF state, 1: ON state	11	Boolean
	3	Home position return complete Note 1	0: Incomplete, 1: Complete	10	Boolean
	2	-	-	-	-
	1	Selection output 2 Note 2, Note 3 Point zone Zone 1 Zone 2 Traveling Warning Soft limit over Soft limit over (-) Soft limit over (+)	Point zone/Zone 1/Zone 2 　0: Outside zone, 1: Inside zone Traveling 　0: Stopped 　1: Traveling Warning 　0: Triggered, 　1: Not triggered Soft limit over	9	Boolean
	0	Selection output 1 Note 2, Note 3 Point zone Zone 1 Zone 2 Traveling Warning Soft limit over Soft limit over (-) Soft limit over (+)	0: Within the range of soft limit, 　1: Outside the range of software limit Soft limit over (-) 　0: soft limit (-) or more, 　1: less than soft limit (-) Soft limit over (+) 　0: less than soft limit (+), 　1: over soft limit (+)	8	Boolean

Note 1: Content can be monitored even in TOOL mode. However, it is only when the forced output mode is not in effect. Other items will be "0: OFF".

Note 2: Point number n travel complete and traveling can become "1: ON" at the same time depending on the timing.

Note 3: If the software version is old, soft limit over, soft limit over (-), and soft limit over (+) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(in) Operation mode (PIO): 1					
Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#1	7	-	-	-	-
	6	Point number 7 travel complete Note 1	0: Incomplete, 1: Complete	7	Boolean
	5	Point number 6 travel complete Note 1	0: Incomplete, 1: Complete	6	Boolean
	4	Point number 5 travel complete Note 1	0: Incomplete, 1: Complete	5	Boolean
	3	Point number 4 travel complete Note 1	0: Incomplete, 1: Complete	4	Boolean
	2	Point number 3 travel complete Note 1	0: Incomplete, 1: Complete	3	Boolean
	1	Point number 2 travel complete Note 1	0: Incomplete, 1: Complete	2	Boolean
	0	Point number 1 travel complete Note 1	0: Incomplete, 1: Complete	1	Boolean

Note 1: Point number n travel complete and traveling may become "1: ON" at the same time depending on the timing.

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

■ Solenoid valve mode, double 2-position type (VW2P) (operation mode (PIO): 2)

\<PD(out)> (Data to be written to the controller from the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	-	-	-	-
	6	-	-	-	-
	5	Alarm reset	0: -, 1: Reset	5	Boolean
	4	Servo ON	0: Servo OFF, 1: Servo ON	4	Boolean
	3	Home position return start	0: -, 1: Home position return start	3	Boolean
	2	-	-	-	-
	1	-	-	-	-
	0	-	-	-	-
PD(out)#1	7	-	-	-	-
	6	-	-	-	-
	5	-	-	-	-
	4	-	-	-	-
	3	-	-	-	-
	2	-	-	-	-
	1	Solenoid valve travel command 2	0: -, 1: ON	2	Boolean
	0	Solenoid valve travel command 1	0: -, 1: ON	1	Boolean

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

\<PD(in)\> (Data to be read from the controller by the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in) Operation mode (PIO): 2					
PD(in)#0	7	Operation preparation complete	0: Incomplete, 1: Complete	10	Boolean
	6	-	-	-	-
	5	Alarm Note 1	0: Triggered, 1: Not triggered	9	Boolean
	4	Servo ON state Note 1	0: OFF state, 1: ON state	8	Boolean
	3	Home position return complete Note 1	0: Incomplete, 1: Complete	7	Boolean
	2	-	-	-	-
	1	Selection output 2 Note 2, Note 3 Point zone Zone 1 Zone 2 Traveling Warning Soft limit over Soft limit over (-) Soft limit over (+)	Point zone/Zone 1/Zone 2 0: Inside zone 1: Outside zone Traveling 0: Stopped 1: Traveling Warning 0: Triggered, 1: Not triggered Soft limit over	6	Boolean
	0	Selection output 1 Note 2, Note 3 Point zone Zone 1 Zone 2 Traveling Warning Soft limit over Soft limit over (-) Soft limit over (+)	0: Within the range of soft limit, 1: Outside the range of software limit Soft limit over (-) 0: soft limit (-) or more, 1: less than soft limit (-) Soft limit over (+) 0: less than soft limit (+), 1: over soft limit (+)	5	Boolean

Note 1: Content can be monitored even in TOOL mode. However, it is only when the forced output mode is not in effect. Other items will be "0: OFF".

Note 2: Both point travel complete and moving may be "1: ON" at the same time depending on the timing.

Note 3: If the software version is old, soft limit over, soft limit over (-), and soft limit over (+) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(in) Operation mode (PIO): 2					
Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#1	7	-	-	-	-
	6	-	-	-	-
	5	Switch 2	0: OFF, 1: ON	4	Boolean
	4	Switch 1	0: OFF, 1: ON	3	Boolean
	3	-	-	-	-
	2	-	-	-	-
	1	Point number 2 travel complete Note 1	0: Incomplete, 1: Complete	2	Boolean
	0	Point number 1 travel complete Note 1	0: Incomplete, 1: Complete	1	Boolean

Note 1: Both point travel complete and moving may be "1: ON" at the same time depending on the timing.

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

■ Solenoid valve mode, double 3-position type (VW3P) (operation mode (PIO): 3)

<PD(out)> (Data to be written to the controller from the PLC)

PD(out) Operation mode (PIO): 3					
Byte order	**Bit**	**Item**	**Value (decimal)**	**Index 0x0029 Subindex**	**Format**
PD(out)#0	7	-	-	-	-
	6	-	-	-	-
	5	Alarm reset	0: -, 1: Reset	5	Boolean
	4	Servo ON	0: Servo OFF, 1: Servo ON	4	Boolean
	3	Home position return start	0: -, 1: Home position return start	3	Boolean
	2	-	-	-	-
	1	-	-	-	-
	0	-	-	-	-
PD(out)#1	7	-	-	-	-
	6	-	-	-	-
	5	-	-	-	-
	4	-	-	-	-
	3	-	-	-	-
	2	-	-	-	-
	1	Solenoid valve travel command 2	0: -, 1: ON	2	Boolean
	0	Solenoid valve travel command 1	0: -, 1: ON	1	Boolean

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

<PD(in)> (Data to be read from the controller by the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	Operation preparation complete	0: Incomplete, 1: Complete	10	Boolean
	6	-	-	-	-
	5	Alarm Note 1	0: Triggered, 1: Not triggered	9	Boolean
	4	Servo ON state Note 1	0: OFF state, 1: ON state	8	Boolean
	3	Home position return complete Note 1	0: Incomplete, 1: Complete	7	Boolean
	2	-	-	-	-
	1	Selection output 2 Note 2, Note 3 Point zone Zone 1 Zone 2 Traveling Warning	Point zone/Zone 1/Zone 2 　0: Inside zone 　1: Outside zone Traveling 　0: Stopped 　1: Traveling Warning	6	Boolean
	0	Selection output 1 Note 2, Note 3 Point zone Zone 1 Zone 2 Traveling Warning	0: Triggered, 　1: Not triggered Soft limit over 　0: Within the range of soft limit, 　1: Outside the range of software limit Soft limit over (-) 　0: soft limit (-) or more, 　1: less than soft limit (-) Soft limit over (+) 　0: less than soft limit (+), 　1: over soft limit (+)	5	Boolean

Note 1: Content can be monitored even in TOOL mode. However, it is only when the forced output mode is not in effect. Other items will be "0: OFF".
Note 2: Both point travel complete and moving may be "1: ON" at the same time depending on the timing.
Note 3: If the software version is old, soft limit over, soft limit over (-), and soft limit over (+) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(in) Operation mode (PIO): 3					
Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#1	7	-	-	-	-
	6	-	-	-	-
	5	Switch 2	0: OFF, 1: ON	4	Boolean
	4	Switch 1	0: OFF, 1: ON	3	Boolean
	3	-	-	-	-
	2	-	-	-	-
	1	Point number 2 travel complete Note 1	0: Incomplete, 1: Complete	2	Boolean
	0	Point number 1 travel complete Note 1	0: Incomplete, 1: Complete	1	Boolean

Note 1: Both point travel complete and moving may be "1: ON" at the same time depending on the timing.

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

■ Solenoid valve mode, single type (VSGL) (operation mode (PIO): 4)

<PD(out)> (Data to be written to the controller from the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0029 Subindex	Format
PD(out)#0	7	-	-	-	-
	6	-	-	-	-
	5	Alarm reset	0: -, 1: Reset	4	Boolean
	4	Servo ON	0: Servo OFF, 1: Servo ON	3	Boolean
	3	Home position return start	0: -, 1: Home position return start	2	Boolean
	2	-	-	-	-
	1	-	-	-	-
	0	-	-	-	-
PD(out)#1	7	-	-	-	-
	6	-	-	-	-
	5	-	-	-	-
	4	-	-	-	-
	3	-	-	-	-
	2	-	-	-	-
	1	Solenoid valve travel command	0: Travel to point 1 1: Travel to point 2	1	Boolean
	0	-	-	-	-

※ The value of each item stored in the PLC will not change unless a new value is written. Note that it may change depending on PLC settings. The PLC power-on value is stored as 0 or the last value written at the previous start-up. For the stored value at the power-on, refer to the corresponding manuals for the PLC and IO-Link master.

※ When referencing PD(out) data as service data, Index=0x0029 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

\<PD(in)\> (Data to be read from the controller by the PLC)

Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#0	7	Operation preparation complete	0: Incomplete, 1: Complete	10	Boolean
	6	-	-	-	-
	5	Alarm Note 1	0: Triggered, 1: Not triggered	9	Boolean
	4	Servo ON state Note 1	0: OFF state, 1: ON state	8	Boolean
	3	Home position return complete Note 1	0: Incomplete, 1: Complete	7	Boolean
	2	-	-	-	-
	1	Selection output 2 Note 2, Note 3 Point zone Zone 1 Zone 2 Traveling Warning	Point zone/Zone 1/Zone 2 0: Outside zone, 1: Inside zone Traveling 0: Stopped 1: Traveling Warning 0: Triggered, 1: Not triggered	6	Boolean
	0	Selection output 1 Note 2, Note 3 Point zone Zone 1 Zone 2 Traveling Warning	Soft limit over 0: Within the range of soft limit, 1: Outside the range of software limit Soft limit over (-) 0: soft limit (-) or more, 1: less than soft limit (-) Soft limit over (+) 0: less than soft limit (+), 1: over soft limit (+)	5	Boolean

Note 1: Content can be monitored even in TOOL mode. However, it is only when the forced output mode is not in effect. Other items will be "0: OFF".
Note 2: Both point travel complete and moving may be "1: ON" at the same time depending on the timing.
Note 3: If the software version is old, soft limit over, soft limit over (-), and soft limit over (+) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

PD(in) Operation mode (PIO): 4					
Byte order	Bit	Item	Value (decimal)	Index 0x0028 Subindex	Format
PD(in)#1	7	-	-	-	-
	6	-	-	-	-
	5	Switch 2	0: OFF, 1: ON	4	Boolean
	4	Switch 1	0: OFF, 1: ON	3	Boolean
	3	-	-	-	-
	2	-	-	-	-
	1	Point number 2 travel complete Note 1	0: Incomplete, 1: Complete	2	Boolean
	0	Point number 1 travel complete Note 1	0: Incomplete, 1: Complete	1	Boolean

Note 1: Both point travel complete and moving may be "1: ON" at the same time depending on the timing.

※ When referencing PD(in) data as service data, Index=0x0028 (read only). When referencing everything, Subindex=0, set in order of first byte and then second byte.

3.4.6. Data Access

■ Process data

Process data is data that is communicated periodically between the master and slaves. Set the data length and configuration using a PLC development tool, and assign relays and data memories.

Name	Description
Process data output / PD(out)	It will be updated when data is set (coil, bit SET, Move command, etc.).
Process data input / PD(in)	Can be referenced through means such as contacts, Compare command, or Move command.

The actuator operations such as servo ON, home position return, point number selection, and start travel can be controlled only with process data.

```
  ServoON                                    PD_out_5
  ──┤ ├──────────────────────────────────────( )──────
                                             Servo ON


    PNo                          ┌─────────────────┐
  ──┤ ├─────────────────────────│      Move        │─────
                                 │     Po_No        │
                                 │   PD_out_Pno     │
                                 └─────────────────┘


  PD_in_0      ┌─────────────────┐          Zone1ON
  ──┤ ├────────│        =        │────────────( )──────
   Zone 1      │     Po_No        │
              │    PD_in_Pno     │
               └─────────────────┘
```
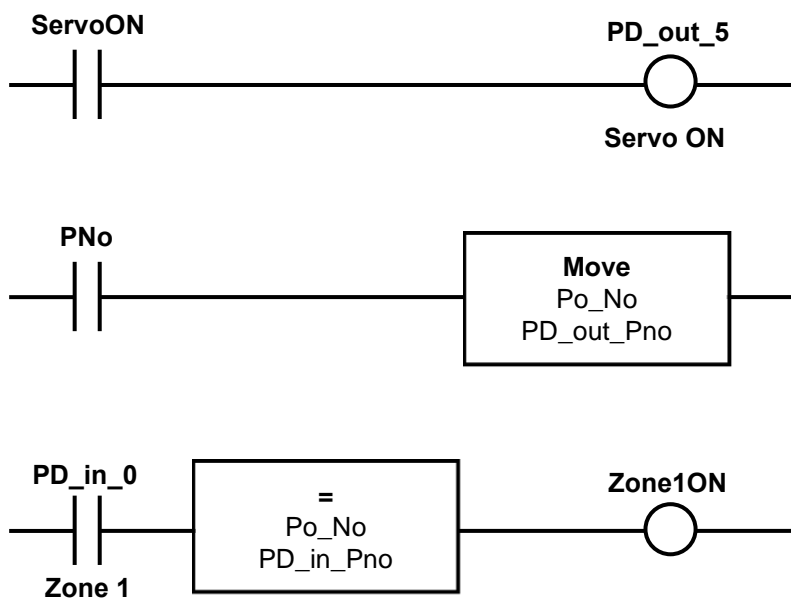
※ For detailed information on settings, updates and references, refer to the manual from the PLC manufacturer.

3.4.7. Service Data

With service data (On-request Data, message communication), the point data and parameters are set, and the alarm history is read. The controller is operated from the PLC by transmitting and receiving service data. Also, process data can be read as service data.

<Index for referring to process data as service data>

Name	Index
Process data output/PD(out)	0x0028
Process data input/PD(in)	0x0029

<Write data and read data>

Item	Content
Reading data	Specify the Index and Subindex of the data to be read and then execute writing of the data.
Writing data	Specify the Index and Subindex of the data to be written, set the data length and the value to be written, and then execute the writing of the data.

Service data uses FBs (function blocks) provided by the PLC manufacturer to perform reading and writing. There are FBs that specify the node number (station alias). Refer to the manuals for the PLC and IO-Link master for details.

Following are access examples.

■ Access example 1: Using the IO-Link access function
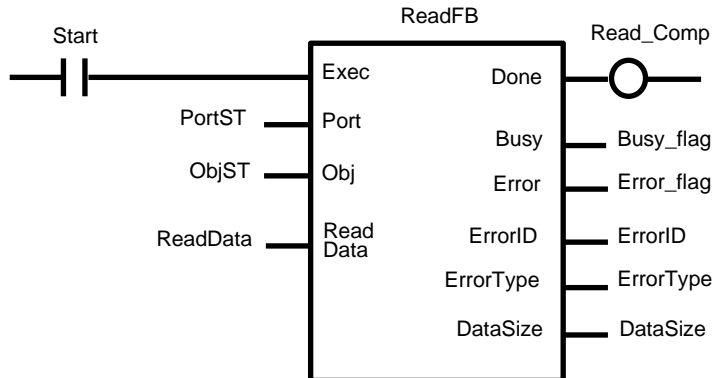
Variable name	Content
Port	Setting information regarding the port to be read
Obj	Index and Subindex information to be read
ReadData	Storage area for the read data
DataSize	Storage area for the read data size

- "Function block (FB)" is a component of a circuit block that is used repeatedly so that it can be reused in a sequence program. By making them into the components, the control that combines multiple functions can be simplified as if it were a single command.

■ Access example 2: Using the CoE object write (read) function
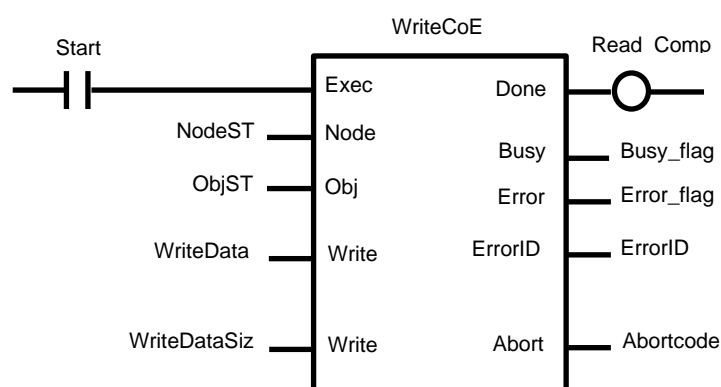
■ Access example 3: Transmitting a message to the controller from the IO-Link master

The object format describes only the information necessary for explaining examples of writing and reading the following data. Since the format differs depending on the object used, refer to the manual for the IO-Link master for details on the object.

<Object format>

Object name	Index	Subindex	Command
Control	0x4000 +0x00n0 Note 1	0x01	0 = None, 2 = Write, 3 = Read
Status		0x02	2 = Successful, 4 = Error
Index		0x03	Index of the data to be operated is set.
Subindex		0x04	Subindex of the data to be operated is set.
Data length		0x05	Data to be written is set when writing.
Data		0x06	Data to be written is set when writing. Read data is stored when reading.

Note 1: n indicates the port number of the IO-Link master.

<Example of writing to the specified service data address>

Execute FBs (1) through (5) below to use Index = 0x4000 for the object (IO-Link master port number = 0) when writing 20 to Home position return speed (Index = 0x310).

① Write 0x310 (Index of the data to be written) to Subindex = 0x03.
② Write 0 (Subindex of the data to be written) to Subindex = 0x04.
③ Write 2 (Data length of the data to be written) to Subindex = 0x05.
④ Write 20 (Data to be written) to Subindex = 0x06.
⑤ Write "2" to Subindex = 0x01 and execute writing to relevant data.

<Example of reading to the specified service data address>

Execute FBs (1) through (5) below to use Index = 0x4000 for the object (IO-Link master port number = 0) when reading the content of Soft limit (+) (Index = 0x302).

① Write 0x302 (Index of the data to be read) to Subindex = 0x03.
② Write 0 (Subindex of the data to be read) to Subindex = 0x04.
③ Write "3" to Subindex = 0x01 and execute reading of relevant data.
④ Monitor until Subindex = 0x02 is "2 (successful)". The read function is used from here on.
⑤ Acquire data with Subindex = 0x06.

- If the entire data composed of multiple elements (data with multiple Subindex data) is accessed with Subindex = 0, some items (such as the point data "Position specification method") will have bit configuration. For details, refer to "3.4.4 Process Data," "3.4.5 PIO Mode Process Data Details," or "Data formats" of "3.4.7 Service Data". If the data of the item that is stored with the DS function is rewritten, data download in the DS function will be executed at the next power-on, and the data may return to its pre-update state. Refer to "3.8 Data Storage Function" for details on the DS function. Refer to "DS Upload/Download target items" of "3.8.3 Download/Upload" for the items supported by the DS function.
- Set so that the high-order values of multiple-byte data come first.
  <Example: 4-byte data>

First byte	Second byte	Third byte	Forth byte
High-order data			Low-order data

  Take note of the data types used in ladders. Depending on the manufacturer, data may not be accessed correctly even if the data types with corresponding size (for example, 4-byte data to data types such as DWORD or UINT and 2-byte data to data types such as WORD or USINT) are specified for the input/output parameters of the FB. Access data using a bite array of the same size (a bite array of 4 bytes in the case of the above example).
- When writing data, there are FBs where a bite array of 232 bytes must be specified with a data length of 232 bytes.

■ Data formats

<table>
<tr><td rowspan="4">✏️</td><td>● Use S-Tools for data that cannot be accessed from IO-Link.</td></tr>
<tr><td>● Depending on the actuator model number (size, etc.), some values may cause an error even if they are within the settable range in this table.</td></tr>
<tr><td>● When the DS target data are changed by S-Tools, execute transfer to the IO-Link master, or turn off then on the power and perform software reset.</td></tr>
</table>

(1) Identification

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format
0x0010	0	Vendor Name	CKD Corporation	R	64byte	String
0x0011	0	Vender Text	https://www.ckd.co.jp/	R	64byte	String
0x0012	0	Product Name	ECG-A:ECG-ANNN30-LK ECG-B:ECG-BNNN30-LK	R	64byte	String
0x0013	0	Product ID	Refer to the table <Product ID and Device ID3>.	R	64byte	String
0x0014	0	Product Text	Electric Controller	R	64byte	String
0x0015	0	Serial-Number	***	R	16byte	String
0x0016	0	Hardware Revision	***	R	64byte	String
0x0017	0	Firmware Revision	***	R	64byte	String
0x0018	0	Application Specific Tag	Factory setting Developed by v33fan/V_STACK	R/W	32byte	String
0x0000	0	Direct Parameters1	Direct parameters Note 1	R	16byte	Record
	1	Reserved	Reserved	R	1byte	UInteger8
	2	Master Cycle Time	Master cycle time	R	1byte	UInteger8
	3	Min Cycle Time	Minimum cycle time	R	1byte	UInteger8
	4	M-Sequence Capability	Sequence capability	R	1byte	UInteger8

Note 1: The value format of each set item conforms to the IO-Link standard.

※ For the item Access, R represents read and W write.

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format
0x0000	5	IO-Link VersionID	IO-Link version ID	R	1byte	UInteger8
	6	Process Data Input Length	Process data PD (in) length	R	1byte	UInteger8
	7	Process Data Output Length	Process data PD (out) length	R	1byte	UInteger8
	8	Vendor ID 1	0x03	R	1byte	UInteger8
	9	Vendor ID 2	0x57	R	1byte	UInteger8
	10	Device ID 1	0x40	R	1byte	UInteger8
	11	Device ID 2	ECG-A:0x20 ECG-B:0x30	R	1byte	UInteger8
	12	Device ID 3	Refer to the table <Product ID and Device ID3>.	R	1byte	UInteger8
	13	Reserved	Reserved	R	1byte	UInteger8
	14	Reserved	Reserved	R	1byte	UInteger8
	15	Reserved	Reserved	R	1byte	UInteger8
	16	Standard Command	Reserved	R/W	1byte	UInteger8

※ For the item Access, R represents read and W write.

<Product ID and Device ID3>

ECG-A Series：Software Ver.1.00.00 to Ver.1.05.00

ECG-B Series：Software Ver.1.00.00 to Ver.1.02.00

Controller	Operation mode		Product ID	Device ID 3
ECG-A Series	PIO mode	Standard 64-point mode	ECG-ANNN30-LK_PIO_MODE(B064)	0x03
		Simple 7-point mode	ECG-ANNN30-LK_PIO_MODE(S007)	0x04
		Solenoid valve mode Double 2-position type	ECG-ANNN30-LK_PIO_MODE(VW2P)	0x05
		Solenoid valve mode Double 3-position type	ECG-ANNN30-LK_PIO_MODE(VW3P)	0x06
		Solenoid valve mode Single type	ECG-ANNN30-LK_PIO_MODE(VSGL)	0x07
	Full direct value mode		ECG-ANNN30-LK_FULL_MODE	0x02
	Simple direct value mode		ECG-ANNN30-LK_SIMPLE_MODE	0x01
ECG-B Series	PIO mode	Standard 64-point mode	ECG-BNNN30-LK_PIO_MODE(B064)	0x03
		Simple 7-point mode	ECG-BNNN30-LK_PIO_MODE(S007)	0x04
		Solenoid valve mode Double 2-position type	ECG-BNNN30-LK_PIO_MODE(VW2P)	0x05
		Solenoid valve mode Double 3-position type	ECG-BNNN30-LK_PIO_MODE(VW3P)	0x06
		Solenoid valve mode Single type	ECG-BNNN30-LK_PIO_MODE(VSGL)	0x07
	Full direct value mode		ECG-BNNN30-LK_FULL_MODE	0x02
	Simple direct value mode		ECG-BNNN30-LK_SIMPLE_MODE	0x01

※ DeviceID3 differs depending on Software version.

ECG-A Series：Software Ver.1.06.00 to Ver.1.07.00

ECG-B Series：Software Ver.1.03.00 to Ver.1.04.00

Controller	Operation mode		Product ID	Device ID 3
ECG-A Series	PIO mode	Standard 64-point mode	ECG-ANNN30-LK_PIO_MODE(B064)	0x0A
		Simple 7-point mode	ECG-ANNN30-LK_PIO_MODE(S007)	0x0B
		Solenoid valve mode Double 2-position type	ECG-ANNN30-LK_PIO_MODE(VW2P)	0x0C
		Solenoid valve mode Double 3-position type	ECG-ANNN30-LK_PIO_MODE(VW3P)	0x0D
		Solenoid valve mode Single type	ECG-ANNN30-LK_PIO_MODE(VSGL)	0x0E
	Full direct value mode		ECG-ANNN30-LK_FULL_MODE	0x09
	Simple direct value mode		ECG-ANNN30-LK_SIMPLE_MODE	0x08
ECG-B Series	PIO mode	Standard 64-point mode	ECG-BNNN30-LK_PIO_MODE(B064)	0x0A
		Simple 7-point mode	ECG-BNNN30-LK_PIO_MODE(S007)	0x0B
		Solenoid valve mode Double 2-position type	ECG-BNNN30-LK_PIO_MODE(VW2P)	0x0C
		Solenoid valve mode Double 3-position type	ECG-BNNN30-LK_PIO_MODE(VW3P)	0x0D
		Solenoid valve mode Single type	ECG-BNNN30-LK_PIO_MODE(VSGL)	0x0E
	Full direct value mode		ECG-BNNN30-LK_FULL_MODE	0x09
	Simple direct value mode		ECG-BNNN30-LK_SIMPLE_MODE	0x08

※ DeviceID3 differs depending on Software version.

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ECG-A Series：Software Ver.1.09.00 or later

ECG-B Series：Software Ver.1.05.00 or later

Controller	Operation mode		Product ID	Device ID 3
ECG-A Series	PIO mode	Standard 64-point mode	ECG-ANNN30-LK_PIO_MODE(B064)	0x18
		Simple 7-point mode	ECG-ANNN30-LK_PIO_MODE(S007)	0x19
		Solenoid valve mode Double 2-position type	ECG-ANNN30-LK_PIO_MODE(VW2P)	0x1A
		Solenoid valve mode Double 3-position type	ECG-ANNN30-LK_PIO_MODE(VW3P)	0x1B
		Solenoid valve mode Single type	ECG-ANNN30-LK_PIO_MODE(VSGL)	0x1C
	Full direct value mode		ECG-ANNN30-LK_FULL_MODE	0x17
	Simple direct value mode		ECG-ANNN30-LK_SIMPLE_MODE	0x16
ECG-B Series	PIO mode	Standard 64-point mode	ECG-BNNN30-LK_PIO_MODE(B064)	0x11
		Simple 7-point mode	ECG-BNNN30-LK_PIO_MODE(S007)	0x12
		Solenoid valve mode Double 2-position type	ECG-BNNN30-LK_PIO_MODE(VW2P)	0x13
		Solenoid valve mode Double 3-position type	ECG-BNNN30-LK_PIO_MODE(VW3P)	0x14
		Solenoid valve mode Single type	ECG-BNNN30-LK_PIO_MODE(VSGL)	0x15
	Full direct value mode		ECG-BNNN30-LK_FULL_MODE	0x10
	Simple direct value mode		ECG-BNNN30-LK_SIMPLE_MODE	0x0F

※ DeviceID3 differs depending on Software version.

(2) Parameter and commands

<Common specifications>

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format	DS
0x0002	0	<System Command>	See the table <System Command>.	W	1byte	UInteger8	-
0x000C	0	Device Access Locks	0x0000: No lock 0x0001: Parameter lock 0x0002: Data storage lock	R/W	2byte	Record	●
0x0020	0	Error Count	Error count (cleared at power-on) Note 1	R	2byte	UInteger16	-
0x0024	0	Device Status	0: Normal 1: Reserved 2: Reserved 3: Reception of process data temporarily disabled 4: Reception of process data disabled due to error	R	1byte	UInteger8	-
0x0025	0	Detailed Device Status	Refer to the table <Event qualifier>. Event code high order Event code low order 3-byte configuration x maximum of 8	R	24byte	Array [8] of 3Octet String	-
0x0030	0	Offset Time	0 (Reserved)	R/W	1byte	Record	-

Note 1: If an error of level 2 or higher occurs when the process data input alarm signal falls, then it is counted as +1. It is only +1 even if multiple errors occur simultaneously.

※ For the item Access, R represents read and W write.

※ For the item DS, "●" indicates that the item is included in data storage.

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Value (hexadecimal)	Command	Content
0x82	Restore Factory Settings	Set the setting value to the default state. Note 1

Note 1: User data other than Identification is initialized. To initialize point data and all user data, use data initialization (Index = 0x505, Subindex = 0).

\<Event Qualifier\>

Bit	Item	Setting
7	MODE	1: Single shot
6		2: Terminated 3: Issued
5	TYPE	1: Notification
4		2: Warning 3: Error
3	SOURCE	0: Device
2	INSTANCE	
1		0: Unknown 4: Application
0		

<Individual specifications 1 (Vendor)>

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format	DS
0x0041	0	Operation mode (IO-Link) Note 1	0: PIO mode 1: Simple direct value mode 2: Full direct value mode	R/W	1byte	UInteger8	-
0x0042	0	Data Storage mode Note 2	1: Forced upload	R/W	1byte	UInteger8	-
0x0043	0	Error event mode Note 3	0: Error event generated/released 1: Error event single shot 2: Do not send error events	R/W	1byte	UInteger8	-
0x0044	0	Data initialization executing Note 4	1: Data initialization executing	R	1byte	UInteger8	-
0x0047	0	Operation mode (PIO) Note 1	0: Standard 64-point mode 1: Simple 7-point mode 2: Solenoid valve mode 2-position type 3: Solenoid valve mode 3-position type 4: Solenoid valve mode, single type	R/W	1byte	UInteger8	-

Note 1: Change operation mode (IO-Link) and operation mode (PIO) from S-Tools. After making changes, turn off then on the power. If the operation mode is changed, it goes back to its original value on start-up according to the IO-Link master settings. Set the Device ID again with a development tool such as for a PLC.

Note 2: This requests a forced data storage upload. After the request is accepted, the written value is cleared. For this request to be executed, the Data Storage function of the master unit must be enabled.

Note 3: After making changes, turn off then on the power.

Note 4: When data initialization (Index = 0x0505) is executed, the completion of the process can be confirmed. If this item is referenced after the process is completed in a short time, "1 (Data initialization executing)" cannot be confirmed at all.

※ For the item Access, R represents read and W write.

※ For the item DS, "●" indicates that the item is included in data storage.

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format	DS
0x0048	0	Output selection 1 Note 1	0: Point zone 1: Zone 1 2: Zone 2 3: Traveling 4: Warning 5: Soft limit over 6: Soft limit over (-) 7: Soft limit over (+)	R/W	1byte	UInteger8	●
0x0049	0	Output selection 2 Note 1, Note 2	0: Point zone 1: Zone 1 2: Zone 2 3: Traveling 4: Warning 5: Soft limit over 6: Soft limit over (-) 7: Soft limit over (+)	R/W	1byte	UInteger8	●
0x0316	0	JOG/INCH speed (mm/s) (deg/s)	1 to 100	R/W	1byte	UInteger8	-
0x0317	0	INCH distance (0.01mm) (0.01deg)	0 to 1000	R/W	2byte	UInteger16	-
0x032F	0	Stop input Note 1	0: Enabled 1: Disabled	R/W	1byte	UInteger8	-
0x0314	0	G1 gain (response)	0 to 15	R/W	1byte	UInteger8	-
0x0315	0	G2 gain (load magnification)	0 to 15	R/W	1byte	UInteger8	-

Note 1: After making changes, turn off then on the power.
Note 2: If the software version is old, soft limit over, soft limit over (-), and soft limit over (+) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".
※ For the item Access, R represents read and W write.
※ For the item DS, "●" indicates that the item is included in data storage.

> ● In the case where the device comparison function of the data storage function is set to "Yes," if the operation mode (IO-Link) or operation mode (PIO) is changed, it goes back to its original mode on start-up according to the Device ID set in the IO-Link master. When changing the operation mode (IO-Link) or operation mode (PIO), set the Device ID again using a development tool such as for a PLC. For the ID of each operation mode, see the table <Product ID and Device ID3>.

<Individual specifications 2>

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format	DS
0x1000	0	Point data number specification	0 to 63	R/W	2byte	UInteger16	-
0x1001	0	Point data	Note 1	R/W	30byte	Record	●
	1	Position (0.01mm) (0.01deg)	− stroke to + stroke	R/W	4byte	Integer32	-
	2	Positioning width (0.01mm) (0.01deg)	0 to 999 (when setting = 0, use common parameter value.)	R/W	2byte	UInteger16	-
	3	Speed (mm/s) (deg/s)	0 to 9999 (when setting = 0, use common parameter value.)	R/W	2byte	UInteger16	-
	4	Acceleration (0.01 G)	0 to 255 (when setting = 0, use common parameter value.)	R/W	1byte	UInteger8	-
	5	Deceleration (0.01 G)	0 to 255 (when setting = 0, use common parameter value.)	R/W	1byte	UInteger8	-
	6	Pressing rate (%)	0 to 100 (when setting = 0, use common parameter value.)	R/W	1byte	UInteger8	-
	7	Pressing speed (mm/s) (deg/s)	0 to 99 (when setting = 0, use common parameter value.)	R/W	1byte	UInteger8	-
	8	Pressing distance (0.01mm) (deg/s)	999999 to 999999 (when setting = 0, use common parameter value.)	R/W	4byte	Integer32	-

Note 1: Use S-Tools to set or change common values for point data. Some situations may generate errors even within the setting range, depending on the actuator model No. (size, etc.).

※ For the item Access, R represents read and W write.

※ For the item DS, "●" indicates that the item is included in data storage.

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format	DS
0x1001	9	Gain magnification (%)	0 to 9999 (when setting = 0, this means that gain magnification is not used.)	R/W	2byte	UInteger16	-
	10 Note 2	Rotation direction	0: Common 1: Close rotation 2:CW 3 : CCW Note 1	R/W	1byte	UInteger4	-
	11 Note 2	Stop method	0: Common 1: Select Control 2: Fixed 3: Automatic Servo OFF 1 4: Automatic Servo OFF 2 5: Automatic Servo OFF 3	R/W	1byte	UInteger4	-
	12 Note 2	Acceleration/ deceleration method	0: Common, 1: Trapezoid	R/W	1byte	UInteger4	-
	13 Note 2	Position specification method	0: Absolute, 1: Incremental	R/W	1byte	UInteger4	-
	14 Note 2	Operation method	0: Positioning operation 1: Pressing operation 1 2: Pressing operation 2	R/W	1byte	UInteger4	-
	15	Point zone (+) (0.01mm) (0.01deg)	-999999 to 999999	R/W	4byte	Integer32	-
	16	Point zone (-) (0.01mm) (0.01deg)	-999999 to 999999	R/W	4byte	Integer32	-

Note 1: The rotation direction setting is enabled only when the connected actuator is FGRC (rotary). Do not use the product by the combination of the pressing operation and the close rotation because the operation will be undefined.

Note 2: Accessing with Subindex = 0 results in the following 4-byte data being output:
　　　　・ Bit 3 to 0: Operation method value
　　　　・ Bit 7 to 4: Position specification method value
　　　　・ Bit 11 to 8: Acceleration/deceleration method value
　　　　・ Bit 15 to 12: Stop method value
　　　　・ Bit 19 to 16: Rotation direction value

※ For the item Access, R represents read and W write.

※ For the item DS, "●" indicates that the item is included in data storage.

- Access the point data after setting Point data number specification (Index = 0x1000) and while that point number is specified. (Initial value at power-on = 1)
- Depending on the PLC development tool, items such as the position may be displayed as a value (unit) with a decimal part.

<Individual specifications 3>

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format	DS
0x0302	0	Soft limit + (0.01mm) (0.01deg) Note 1	-999999 to 999999	R/W	4byte	Integer32	●
0x0304	0	Soft limit - (0.01mm) (0.01deg) Note 1	-999999 to 999999	R/W	4byte	Integer32	●
0x0308	0	Zone 1 + (0.01mm) (0.01deg)	-999999 to 999999	R/W	4byte	Integer32	●
0x030A	0	Zone 1 - (0.01mm) (0.01deg)	-999999 to 999999	R/W	4byte	Integer32	●
0x030C	0	Zone 2 + (0.01mm) (0.01deg)	-999999 to 999999	R/W	4byte	Integer32	●
0x030E	0	Zone 2 - (0.01mm) (0.01deg)	-999999 to 999999	R/W	4byte	Integer32	●
0x0310	0	Home position return speed (mm/s)	1 to 99	R/W	2byte	UInteger16	●
0x0311	0	Zone hysteresis (0.01mm) (0.01deg)	0 to 999	R/W	2byte	UInteger16	●
0x0312	0	Home position offset amount (0.01 mm) (0.01 deg) Note 1	-999999 to 999999	R/W	4byte	Integer32	●
0x0313	0	Home position return direction (coordinate axis) Note 2	0: Normal (Standard coordinates) 1:Opposite (Standard coordinates) 2: Opposite (inverted coordinate)	R/W	1byte	UInteger8	-

Note 1: After making changes, turn off then on the power.
Note 2: If the software version is old, opposite (inverted coordinate) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

※ For the item Access, R represents read and W write.
※ For the item DS, "●" indicates that the item is included in data storage.

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format	DS
0x0318	0	Automatic home position return Note 1	0: Disabled, 1: Enabled	R/W	2byte	UInteger16	●
0x0322	0	Emergency stop input Note 1	0: Enabled, 1: Disabled	R/W	1byte	UInteger8	-
0x0329	0	Fixed current at stop (%)	0 to 100	R/W	2byte	UInteger16	●
0x032B	0	Pressing judgment time (ms)	0 to 9999	R/W	2byte	UInteger16	●
0x032C	0	Automatic servo OFF time 1 (ms)	0 to 9999	R/W	2byte	UInteger16	-
0x032D	0	Automatic servo OFF time 2 (ms)	0 to 9999	R/W	2byte	UInteger16	-
0x032E	0	Automatic servo OFF time 3 (ms)	0 to 9999	R/W	2byte	UInteger16	-
0X0340 Note 2	0	Holding point signal output	0: Disabled, 1: Enabled	R/W	1byte	UInteger8	-
0x0341 Note 2	0	Traveling signal ON hold time	0 to 9999	R/W	2byte	UInteger16	-
0x0342 Note 2, Note 3	0	Initial servo ON method	0: Normal 1: Simple	R/W	1byte	UInteger8	
0x0530	0	Threshold value for integrated running distance (m)(10^3deg)	0 to 999999999	R/W	4byte	UInteger32	-
0x0531	0	Threshold of integrated number of travels (times)	0 to 999999999	R/W	4byte	UInteger32	-
0x0532	0	Threshold value for integrated operating time (s)	0 to 999999999	R/W	4byte	UInteger32	-

Note 1: After making changes, turn off then on the power.
Note 2: This parameter is not available if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".
Note 3: Only ECG-A Series can be set.
※ For the item Access, R represents read and W write.
※ For the item DS, "●" indicates that the item is included in data storage.

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<Individual specifications 4>

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format	DS
0x0319	0	Common positioning width (0.01mm) (0.01deg)	1 to 999	R/W	2byte	UInteger16	-
0x031A	0	Speed (mm/s) (deg/s)	1 to 9999	R/W	2byte	UInteger16	-
0x031B	0	Common acceleration (0.01 G)	1 to 999	R/W	2byte	UInteger16	-
0x031C	0	Common deceleration (0.01 G)	1 to 999	R/W	2byte	UInteger16	-
0x031D	0	Common pressing rate (%)	1 to 100	R/W	1byte	UInteger8	-
0x031E	0	Common pressing speed (mm/s) (deg/s)	1 to 99	R/W	1byte	UInteger8	-
0x031F	0	Common pressing distance (0.01mm) (0.01deg)	-999999 to 999999	R/W	4byte	Integer32	-
0x0320	0	Common acceleration/ deceleration method	1: Trapezoid	R/W	1byte	UInteger8	-
0x0321	0	Common stop method	1: Control 2: Fixed excitation 3: Automatic servo OFF 1 4: Automatic servo OFF 2 5: Automatic servo OFF 3	R/W	1byte	UInteger8	-
0x0324	0	Common rotation direction	1: Close rotation 2:CW 3:CCW	R/W	1byte	UInteger8	-

※ For the item Access, R represents read and W write.

<Individual specifications 5>

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format	DS
0x0386	0	Stroke length	Actuator stroke	R	2byte	UInteger16	-
0x070A	0	Alarm code	Refer to "5.2Alarm Indications And Countermeasures" for details on alarm codes.	R	2byte	UInteger16	-

※ For the item Access, R represents read and W write.

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<Individual specifications 6>

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format	DS
0x0400	0	Controller model number	***	R	40byte	String	-
0x0401	0	Controller serial number	***	R	16byte	String	-
0x0402	0	Actuator model number	***	R	40byte	String	-
0x0403	0	Actuator serial number	***	R	16byte	String	-
0x0450	0	Integrated running distance (m) (10^3 deg)	0 to 999999999	R	4byte	UInteger32	-
0x0451	0	Integrated number of travel times (times)	0 to 999999999	R	4byte	UInteger32	-
0x0452	0	Integrated operating time (sec)	0 to 999999999	R	4byte	UInteger32	-
0x0480	0	Alarm data details	-	R	8byte	Record	-
	1	Alarm code	***	R	2byte	UInteger32	-
	2	Reserved	0x0000	R	2byte	UInteger32	-
	3	Time information (seconds) (high-order 2 bytes)	Count in seconds	R	2byte	UInteger16	-
	4	Time information (seconds) (low-order 2 bytes)	Count in seconds	R	2byte	UInteger16	-
0x0505	0	Data initialization	0x999n: Data initialization n: Set the bits as follows. bit0(LSB): 1 = Parameter data Initialize all Bit1: (Not in use) Bit2: 1 = Point data Initialize all Bit3: (Not in use) 0 if read Note 1	R/W	2byte	UInteger16	-

Note 1: A response indicating successful completion is returned when the acceptation of the process is successfully completed. For the completion of the process, refer to Data Initialization Executing (Index = 0x0044). Common values such as "Common speed" become parameter data. Power cycling or software reset is required after initialization.

※ For the item Access, R represents read and W write.

Index (hexadecimal)	Sub index	Item	Value (decimal)	Access	Data length	Format	DS
0x0520	0	Software reset	9999 = Software reset 0 if read Note 1	R/W	2byte	UInteger16	-

Note 1: A response indicating successful completion is returned when the acceptation of the process is successfully completed. Since initialization of communication and other items is executed with the reset process, determine the completion from the OFF/ON of the IO-Link master port status. To prevent malfunction, do not execute this item while the actuator is operating and do not operate the actuator or write data while resetting.

※ For the item Access, R represents read and W write.

- To read the alarm history, write the alarm history number specification first. Since the system time at the time of the occurrence of the alarm (time elapsed since power-on) is set to the time information, the time information of the latest alarm may not always be a large value.

■ Return error

When reading/writing data, following error codes are set as FB output parameters for the set input parameters. If CoE object is used, the error codes are set to Subindex = 0x07 (Errorcode) of the corresponding Index (such as 0x4000).

Error code	Content	Remarks
0x8000	Application error	-
0x8011	Index not available	-
0x8012	Subindex is outside the range	-
0x8020	Service temporarily not available	-
0x8021	Service temporarily not available	-
0x8022	Service temporarily not available	-
0x8023	Not writeable	-
0x8030	Parameter value out of range	-
0x8031	Parameter value above limit	Either 0x8031 or 0x8131
0x8032	Parameter value below limit	Either 0x8032 or 0x8132
0x8033	Data length overrun	-
0x8034	Data length underrun	-
0x8035	Function not available	-
0x8040	Invalid parameter set	-
0x8041	Inconsistent parameter set	-
0x8101	Unable to accept due to writing from S-Tools.	-
0x8104	Error in internal processing of read/write (retry operation)	-
0x8105	Error in internal processing of read/write (function)	-
0x8106	Error in internal processing of read/write (other 1)	-
0x8107	Error in internal processing of read/write (other 2)	-
0x8108	Device failure	Failure of device inside the unit
0x8109	Waiting to process write	Multiple write commands are executed at short intervals. Lengthen the interval.
0x8131	Parameter value above limit	-
0x8132	Parameter value below limit	-

- The IO-Link master unit does not have an internal processing function for resetting errors. If an error occurs in accessing data, the error may only be cleared by power cycling.

3.5. Setting Parameters

S-Tools can be used to set and change parameters. Refer to the S-Tools instruction manual (SM-A11147) for details such as setting method.

> ✏️ ● When setting parameters, the moving direction of the actuator is as follows. However, if "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)", "- direction" and " + direction" will be inverted.
> The "- direction" indicates the motor direction, finger opening direction, PULL direction and counterclockwise direction.
> The "+ direction" indicates the opposite motor direction, finger closing direction, PUSH direction and clockwise direction.

3.5.1. Parameter List

The parameters that can be set by the user are as follows.

Name	Content		Setting range	Initial value	Unit
Soft limit (+) **Note 1**	Sets the operable range in the + direction (opposite motor side) of the actuator Refer to "3.5.2 Setting Soft Limit And Soft Limit Over Signal Output" for details.	EBS, EJSG, EBR	Soft limit (-) to sum of +stroke and margin	0.00	mm
		GSSD2, GSTK, GSTG, GSTS, GSTL			
		FLSH, GCKW			
		FLCR			
		FGRC	Soft limit (-) - 360		deg
Soft limit (-) **Note 1**	Sets the operable range in the - direction (motor side) of the actuator Refer to "3.5.2 Setting Soft Limit And Soft Limit Over Signal Output" for details.	EBS, EJSG, EBR	-stroke -margin to soft limit (+)	0.00	mm
		GSSD2, GSTK, GSTG, GSTS, GSTL			
		FLSH, GCKW			
		FLCR			
		FGRC	-360 to soft limit (+)		deg

Note 1: Power cycle or software reset is required for the parameter settings to take effect.
Note 2: In FGRC series, setting the values of zone 1 (+), zone 1 (-), zone 2 (+), and zone 2 (-) to 360 or more or to -360 or less is treated as 0.

Name	Content		Setting range	Initial value	Unit
Zone 1 (+)	Sets the + side position of the output signal zone 1. Refer to "3.5.3 Zone Settings And Output Signals" for details.		-9999.99 to 9999.99 Note 1	0.00	mm (deg)
Zone 1 (-)	Sets the - side position of the output signal zone 1. Refer to "3.5.3 Zone Settings And Output Signals" for details.		-9999.99 to 9999.99 Note 1	0.00	mm (deg)
Zone 2 (+)	Sets the + side position of the output signal zone 2. Refer to "3.5.3 Zone Settings And Output Signals" for details.		-9999.99 to 9999.99 Note 1	0.00	mm (deg)
Zone 2 (-)	Sets the - side position of the output signal zone 2. Refer to "3.5.3 Zone Settings And Output Signals" for details.		-9999.99 to 9999.99 Note 1	0.00	mm (deg)
Zone hysteresis	Sets the hystereses of Zone 1 and Zone 2 outputs. Refer to "3.5.3 Zone Settings And Output Signals" for details.		0.00 to 9.99	0.00	mm (deg)
Home position return direction (coordinate axis) **Note 2, Note 3**	Set the direction of the home position return to "normal (standard coordinate)" or opposite (standard coordinate), or opposite (inverted coordinate)". Refer to "3.7.5 Home Position Return Operation" for details.		Normal (standard coordinate), opposite (standard coordinate), and opposite (inverted coordinate)	Normal (standard coordinate)	None
Home position return speed	Sets the speed for home position return	EBS, EJSG, EBR	5 to 20	20	mm/s
		GSSD2, GSTK, GSTG, GSTS, GSTL	20 to 30		
		FLSH, GCKW	5 to 15	15 Note 4	
		FLCR	5 to 20		
		FGRC	20 to 30		deg/s
Home position offset amount **Note 2**	Set the offset amount for the home position. Refer to "3.7.5 Home Position Return Operation" for details.	Home position return direction (coordinate axis) = normal (standard coordinate), opposite (inverted coordinate)	0.00 to + stroke	0.00	mm (deg)
		Home position return direction (coordinate axis)= opposite (standard coordinate)	- stroke to 0.00		

Note 1: In FGRC series, setting the values of zone 1 (+), zone 1 (-), zone 2 (+), and zone 2 (-) to 360 or more or to -360 or less is treated as 0.
Note 2: Power cycle or software reset is required for the parameter settings to take effect.
Note 3: If the software version is old, opposite (inverted coordinate) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".
Note 4: Initial value is 20, if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

Name	Content	Setting range	Initial value	Unit
Automatic home position return **Note 1**	When setting to "enabled", home position return is performed at the first movement command input after the controller is powered on, and the movement starts at the second travel command input. It is not enabled, when the actuator with an absolute encoder is used.	Disabled, enabled	Disabled	None
FGRC home position return method **Note 1, Note 2, Note 3**	This parameter is valid only when FGRC series is connected. In the FGRC series, select whether to reference the position of the internal sensor or to reference the position pushed against the stopper of the external mounting when returning to home. Refer to "3.7.5 Home Position Return Operation" for details.	Sensor, pushing	Sensor	None
Emergency stop input **Note 1**	Set the emergency stop input to "Enabled" or "Disabled". For an emergency stop, see "2.3.1 Wiring To The Power Supply".	Enabled, disabled	Enabled	None
Initial servo ON method **Note 1, Note 2**	Set the excitation method when the servo is turned on for the first time after the power is turned on. When setting to "Simple", the excitation phase detection operation is simplified and can shorten the time to operation preparation complete. Only ECG-A Series can be set.	Normal, simple	Normal	None
Pressing judgment time	Set the time until it is judged that the pressing is complete in the pressing zone of the pressing operation 1. During the pressing judgment time, when the current value reaches the one corresponding to the value set in the pressing rate, it is judged that pressing is complete.	0 to 9999	200	ms
Fixed current at stop	Set the current value to maintain the workpiece when stopped.	0 to 100	65	%
Automatic servo OFF 1	Sets the time until the servo turns OFF after reaching the target position in the positioning operation or pressing operation. It becomes valid if "Automatic servo OFF 1" is selected in "Stop method" of Point Data.	0 to 9999	0	sec
Automatic servo OFF 2	Sets the time until performing servo OFF after reaching the target position in the positioning operation or pressing operation. It becomes valid if "Automatic servo OFF 2" is selected in "Stop method" of Point Data.	0 to 9999	0	sec
Automatic servo OFF 3	Sets the time until performing servo OFF after reaching the target position in the positioning operation or pressing operation. It becomes valid if "Automatic servo OFF 3" is selected in "Stop method" of Point Data.	0 to 9999	0	sec
Threshold value for integrated running distance (Actuator)	A warning is output when the integrated running distance of the actuator exceeds the threshold. If the setting is 0, no warning is output. For warnings, see "5.2.2 Warning".	0 to 999999999	0	M (10^3deg)

Note 1: Power cycle or software reset is required for the parameter settings to take effect.
Note 2: This parameter is not available if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".
Note 3: When selecting the choice "Pushing", it is necessary to calculate the torque at the time of the pushing before selecting the product.

Name	Content		Setting range	Initial value	Unit
Threshold value for integrated number of travel times (Actuator)	A warning is output when the integrated number of travel times of the actuator exceeds the threshold. If the setting is 0, no warning is output. For warnings, see "5.2.2 Warning".		0 to 999999999	0	times
Threshold value for integrated operating time (Motor)	A warning is output when the integrated operating time of the motor exceeds the threshold. If the setting is 0, no warning is output. For warnings, see "5.2.2 Warning".		0 to 999999999	0	sec
Common positioning width	Set the tolerance value for positioning completion output. When 0 is set to the point data, this value applies.		Refer to "3.6.6 Setting The Positioning Width"	0.10	Mm (deg)
Common speed	Set the common speed for the transfer zone. When 0 is set to the point data, this value applies.		Refer to "3.6.7 Setting The Speed"	30	(mm/s) (deg/s)
Common acceleration	Set the common acceleration for the transfer zone. When 0 is set to the point data, this value applies.		Refer to "3.6.8 Setting The Acceleration"	0.10	G
Common deceleration	Set the deceleration for the transfer zone. When 0 is set to the point data, this value applies.		Refer to "3.6.9 Setting The Deceleration"	0.10	G
Common pressing rate	Set the common pressing rate in a pressing interval. When 0 is set to the point data, this value applies.		Refer to "3.6.15 Setting The Pressing Rate"	50	%
Common pressing speed	Set the common pressing speed for the pressing interval. When 0 is set to the point data, this value applies.	EBS, EJSG, EBR	Refer to "3.6.16 Setting The Pressing Speed"	20	(mm/s) (deg/s)
		GSSD2, GSTK, GSTG, GSTS, GSTL			
		FLSH, GCKW			
		FLCR			
		FGRC		15 Note 1	
Common pressing distance	Set the common pressing distance for the pressing interval. When 0 is set to the point data, this value applies.		Refer to "3.6.17 Setting The Pressing Distance"	3.00	mm(deg)
Common acceleration / deceleration method	The value is fixed to trapezoid. When "Common" is set to the point data, this value applies.		Refer to "3.6.10 Selecting The Acceleration/Deceleration Method"	Trapezoid	None
Common stop method	Set the common stop method after positioning completion. When "Common" is set to the point data, this setting applies.		Refer to "3.6.11 Selecting The Stop Method"	Control	None
Common rotation direction	Sets the common rotation direction when connecting FGRC Series. When "Common" is set to the point data, this setting applies.		Refer to "3.6.12 Selecting The Rotation Direction"	Close rotation	None

Note 1: Initial value is 20, if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

Name	Content	Setting range	Initial value	Unit
Operation mode (PIO) **Note 1**	Sets the operation mode (PIO). Refer to "3.6.1 Operation Mode (PIO) And Number Of Positioning Points" for details.	64-point mode, simple 7-point mode, solenoid valve mode double 2 position type, solenoid valve mode double 3 position type, solenoid valve mode single type	64-point mode	None
Output selection 1 **Note 1, Note 2**	Selects the assignment of the signal output by general-purpose output 7 of the PIO signal Refer to "3.7.7 Signal Of Output Selection" for details.	Point zone, Zone 1, Zone 2, Traveling, warning, soft limit over, soft limit over (-), soft limit over (+)	Zone 1	None
Output selection 2 **Note 1, Note 2**	Selects the assignment of the signal output by general-purpose output 8 of the PIO signal Refer to "3.7.7 Signal Of Output Selection" for details.	Point zone, Zone 1, Zone 2, Traveling, warning, soft limit over, soft limit over (-), soft limit over (+)	Zone 2	None
Stop input **Note 1**	When the operation mode (IO-Link) is set to the PIO mode and the operation mode (PIO) is set to the 64-point mode or simple 7-point mode, set the stop signal input by the general-purpose input 12 to "Enabled" or "Disabled". It is not possible set it to "Disabled" in the simple direct value mode or the full direct value mode.	Enabled, disabled	Enabled	None
JOG/INCH speed	When the operation mode (IO-Link) is the PIO mode and the operation mode (PIO) is the 64 point mode or the simple 7 point mode, or when the operation mode (IO-Link) is the simple direct value mode or full direct value mode, set the speed for the JOG (−) travel start signal or the JOG (+) travel start signal.	1 to 100	30	(mm/s) (deg/s)
INCH distance	This is for setting the distance the actuator travels when a JOG/INCH (-) travel start signal or JOG/INCH (+) travel start signal is input with INCH selected (INCH selected is ON).	0.01 to 10.00	0.10	mm(deg)

Note 1: Power cycle or software reset is required for the parameter settings to take effect.
Note 2: If the software version is old, soft limit over, soft limit over (-), and soft limit over (+) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

Name	Content	Setting range	Initial value	Unit
Holding point signal output **Note 1, Note 2**	When setting to "enabled", it no longer clears point number confirmation bit n, point travel completion, point number n travel completion, and point zones when emergency stop and force brake release. Even when setting to "enabled", the above signal is cleared when the stop signal is turned off or when an alarm occurs.	Disabled, enabled	Disabled	None
Traveling signal ON hold time **Note 1, Note 2**	Sets the hold time of the ON state of the traveling signal during the point travel and the direct value travel from the start of the travel. Assume that the travel completion position is reached within the set time, it does not turn OFF, and the ON state of the traveling signal is held for the set time. Even if the time is set, when the stop operation is performed due to an emergency stop, stop signal OFF, at occurrence of alarm, etc., the ON state of the traveling signal is not held.	0 to 9999	0	ms
G1 gain **(Responsiveness)**	This is for adjusting the convergence time of the waveform. Refer to "3.5.4 Adjusting The Gains" for details.	0 to 15	0	None
G2 gain **(Load magnification)**	This is adjusted according to the actuator load. Refer to "3.5.4 Adjusting The Gains" for details.	0 to 15	0	None

Note 1: Power cycle or software reset is required for the parameter settings to take effect.
Note 2: This parameter is not available if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

3.5.2.　Setting Soft Limit And Soft Limit Over Signal Output

This determines operable range of the actuator in transfer and pressing operations.

> ● Exceeding the soft limit range during operation results in an alarm output. In addition, if the operation completion position is outside the soft limit range, an alarm is output when the operation starts.

■ EBS/EJSG/EBR/FLSH/FLCR/GSSD2/GSTK/GSTG/GSTS/GSTL/GCKW

The motor side is the coordinate of -, the opposite motor side is the coordinate of +, and the position coordinates of the home position are 0.
Set the soft limit within the range outside the "travel distance (target position (1), (2))" and inside "the mechanical movable range of the actuator".
If both the soft limit (+) and soft limit (−) settings are 0, the stroke range becomes the operable range.
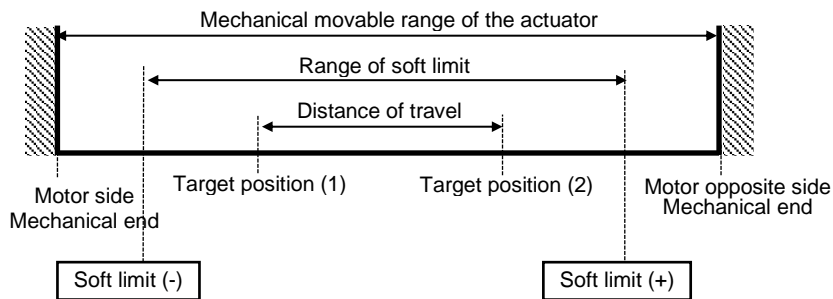
The soft limit over, soft limit over (+) and soft limit over (-) signals can be used to detect that the actuator's current position is outside the soft limit range.
Output examples for each signal are shown below.
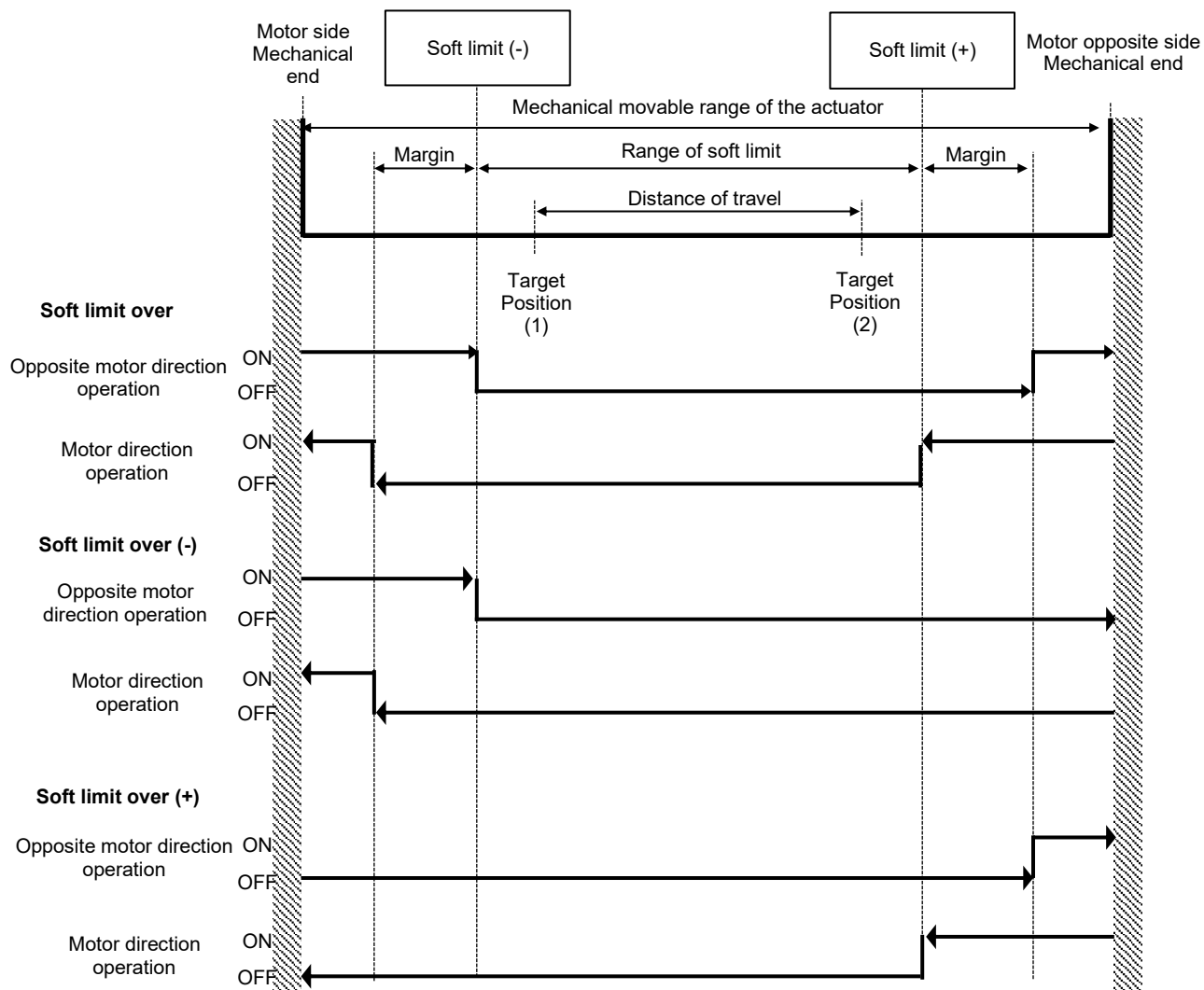
- When zone (−)> (+), each signal of soft limit over is always OFF.
- When soft limit (+) = soft limit (-) = 0, each signal of soft limit over is turned ON outside the range of the stroke.

The value of the margin varies for each actuator. Refer to the following list

Actuator model number	Margin	Unit
Series		
EBS	3	mm
EJSG	3	
EBR	3	
FLSH	0.2	
FLCR	0.5	
GSSD2	0.5	
GSTK	0.5	
GSTG	0.5	
GSTS	0.5	
GSTL	0.5	
GCKW	0.2	

■ FGRC

The position coordinates of the home position are 0.
Set the soft limit (+) value to be the soft limit (-) value or higher.
If both the soft limit (+) and soft limit (-) are 0, there is no limit on the operating range.
The movable range changes as shown in the following figure depending on the setting of the soft limit.

<Setting example 1>
Soft limit (+):   +225 deg
Soft limit (-):   +135 deg
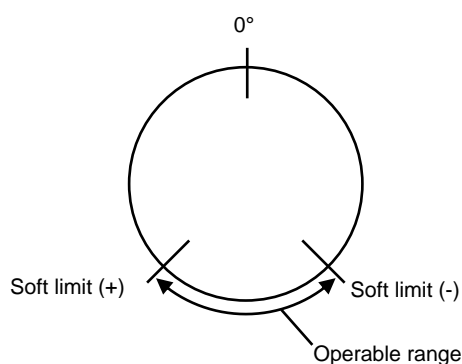
<Setting example 2>
Soft limit (+): +135 deg
Soft limit (-): -135 deg
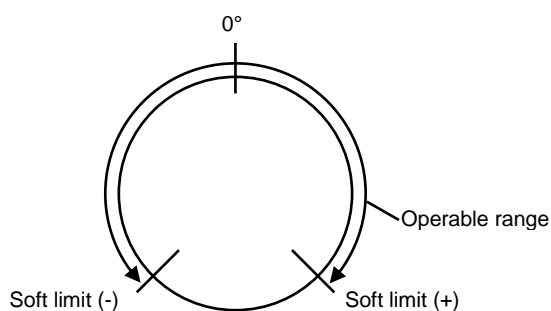
※ This is a figure of FGRC from above.

The signal of soft limit over can be used to detect that the current position of the actuator is outside the software limit range.
For FGRC series, only soft limit over is output, and soft limit over (+) and soft limit over (-) are not output.

Output examples for soft limit over are shown below.

Soft limit over ON ⟶
Soft limit over OFF - - - - ▸
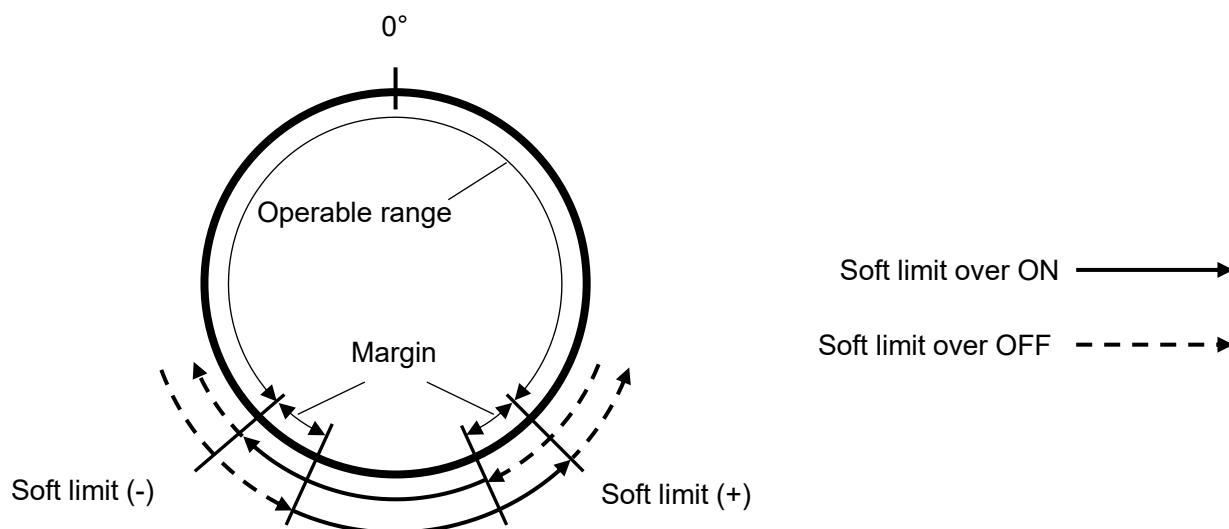
※ This is a figure of FGRC from above.

- When soft limit (−)< soft limit (+), set the values of soft limit (+) and soft limit (−) 1 deg or more apart.
- When soft limit (−)＞ (+), each signal of the soft limit over is always OFF.
- When soft limit (+) = soft limit (-) = 0, the soft limit over signal is always OFF.

The value of the margin varies for each actuator. Refer to the following list

Actuator model number		Margin	Unit
Series	Body size		
FGRC	10	0.3	deg
	30	0.2	
	50		

3.5.3. Zone Settings And Output Signals

When the current position is within the setting range, output signals Zone 1 and Zone 2 can be turned ON or OFF.

■ EBS/EJSG/EBR/FLSH/FLCR/GSSD2/GSTK/GSTG/GSTS/GSTL/GCKW

Example Set Zone 1 (-): 20 mm, Zone 1 (-): 50 mm, Zone hysteresis: 5 mm
Set Zone 2 (-): 50 mm, Zone 2 (+): 20 mm, Zone hysteresis: 5 mm
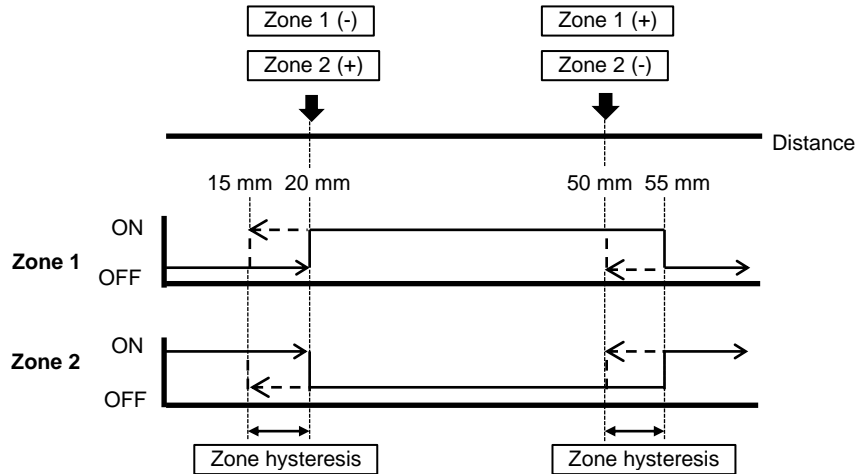
- When zone (−) < zone (+), the output signal of the zone is turned ON in the zone of zone (−) to zone (+) and turned OFF in the other zones.
- When zone (−) > zone (+), the output signal of the zone is turned OFF in the zone of zone (+) to zone (-) and turned ON in the other zones.
- When zone (+) = zone (-), the output signal of the zone is always OFF.

■ FGRC

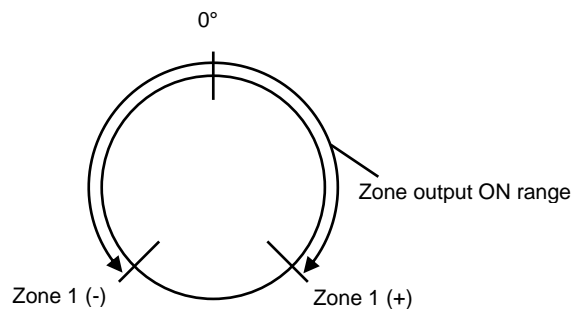The output range changes as shown in the following figure depending on the setting of the zone.

<Setting example 1>
Zone 1 (+): +225 deg
Zone 1 (-): +135 deg
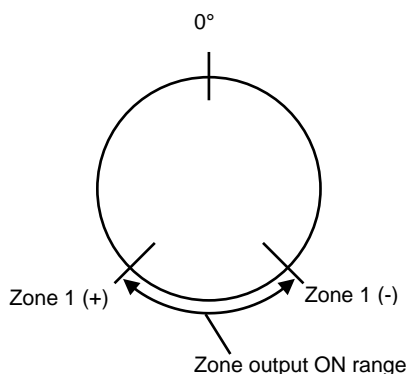
<Setting example 2>
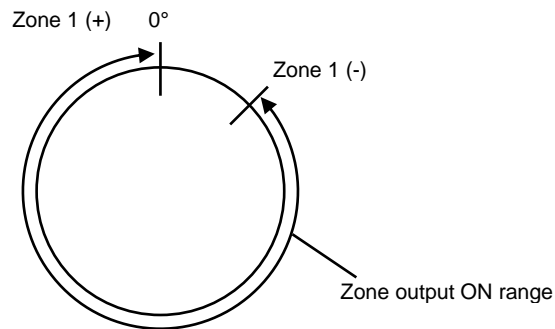Zone 1 ( ): +135 deg
Zone 1 (-): -135 deg

※ This is a figure of FGRC from above.

If the zone setting is greater than or equal to 360 deg, or less than or equal to -360 deg, the setting is treated as 0 deg.

<Setting example 1>
Zone 1 (+): *9999.99 deg(=0deg)
Zone 1 (-):   +45 deg

Zone 1 (+)   0°

Zone 1 (-)

Zone output ON range

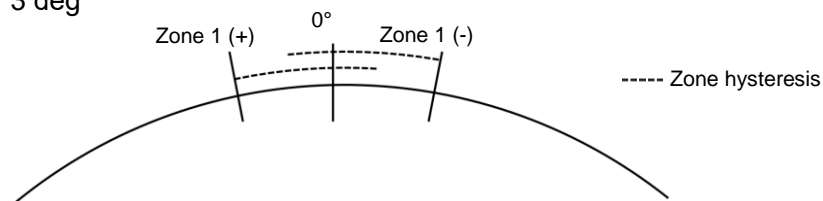※ This is a figure of FGRC from above.

When the zone hysteresis is interfering, the zone output does not change once it is switched.

<Setting example>
Zone 1 (+)): +358 deg
Zone 1 (-):   +2 deg
Zone hysteresis … 3 deg

0°
Zone 1 (+)   Zone 1 (-)

----- Zone hysteresis

※ This is a This is a figure in which FGRC is seen from the above.re of FGRC from above.

After home position return, the zone output is OFF in the range from 358 deg to 2 deg. However, when moving to a position of 2 deg or more or 358 deg or less, the zone output turns ON, and then ON is output in all ranges due to hysteresis.

3.5.4. Adjusting The Gains

Depending on the installation conditions, it may be necessary to reset the parameter "G1 gain (responsiveness)" or "G2 gain (load magnification)". S-Tools are required to change the gain. Refer to the S-Tools instruction manual (SM-A11147) for details such as setting method.

■ **Setting gain by installation method (EBS/ EBR Series: Standard Series)**
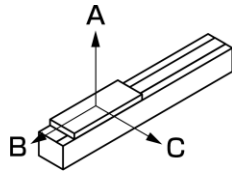
The table below shows the recommended values of "G1 gain (responsiveness)" and "G2 gain (load magnification)" parameters for horizontal and vertical installation of EBS series and EBR series actuators.
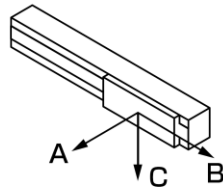
<EBS series (Standard series)>

Actuator model number				24 VDC / horizontal, wall-hanging or ceiling-hanging		24 VDC / Vertical	
Series	Size	Motor Mounting direction	Screw lead	G1	G2	G1	G2
EBS	04	GE	6	3	8	2	9
			12	7	5	8	3
		GR, GD, GL	6	3	10	4	9
			12	3	10	3	9
	05	GE	2	4	4	4	4
			5	6	4	6	2
			10	4	4	4	4
			20	6	5	7	3
		GR, GD, GL	2	5	4	2	6
			5	6	4	6	4
			10	5	5	5	6
			20	4	5	9	2
	08	GE	5	2	8	3	5
			10	2	8	4	6
			20	2	9	2	6
		GR, GD, GL	5	2	7	4	5
			10	2	8	2	4
			20	2	8	3	7

※ In the item "Motor mounting direction", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD indicates bottom mounting.
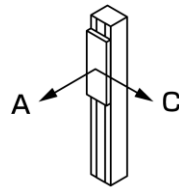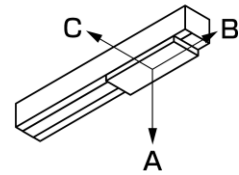
Horizontal installation　　　Wall-hanging installation　　　Vertical installation　　　Ceiling-hanging installation

| | ● "Screw lead" refers to the distance that the workpiece can be moved when the motor rotates once in the electric actuator. |

<EBR series (Standard series)>

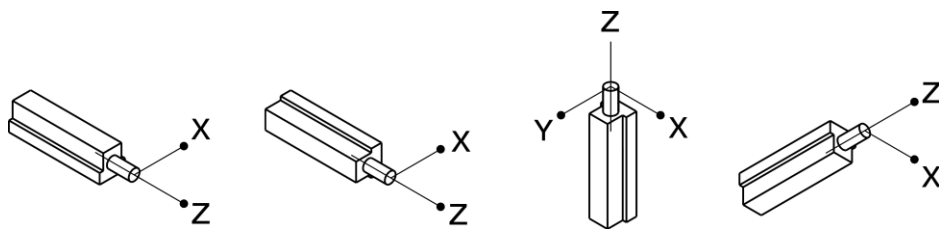| Actuator model number				24 VDC / horizontal, wall-hanging or ceiling-hanging		24 VDC / Vertical	
Series	Size	Motor Mounting direction	Screw lead	G1	G2	G1	G2
EBR	04	GE	6	2	8	2	7
			12	5	8	4	8
		GR, GD, GL	6	3	11	4	11
			12	3	10	7	7
	05	GE	2	4	4	4	4
			5	6	6	5	8
			10	5	8	5	6
			20	8	4	9	2
		GR, GD, GL	2	5	5	5	3
			5	6	6	5	6
			10	3	9	6	7
			20	7	6	6	7
	08	GE	5	3	8	3	7
			10	2	11	3	9
			20	2	9	2	6
		GR, GD, GL	5	2	9	1	8
			10	2	10	2	8
			20	4	8	3	6

※ In the item "Motor mounting direction", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD indicates bottom mounting.

Horizontal installation   Wall-hanging installation   Vertical installation   Ceiling-hanging installation

- "Screw lead" refers to the distance that the workpiece can be moved when the motor rotates once in the electric actuator.

■ Setting gain by installation method (EBS/ EBR Series: P4 Series)

The table below shows the recommended values of "G1 gain (responsiveness)" and "G2 gain (load magnification)" parameters for horizontal and vertical installation of EBS Series and EBR Series actuators (P4 Series).

<EBS series (P4 series)>

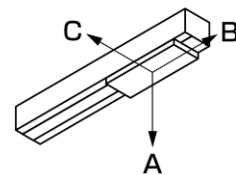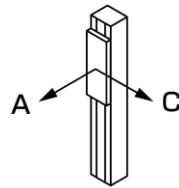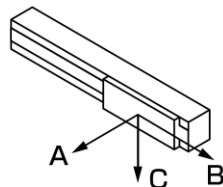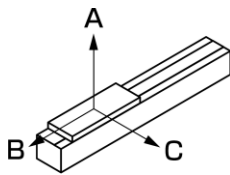| Actuator model number				24 VDC / horizontal, wall-hanging or ceiling-hanging		24 VDC / Vertical	
Series	Size	Motor Mounting direction	Screw lead	G1	G2	G1	G2
EBS	04	GE	6	3	8	2	9
			12	7	5	8	3
		GR, GD, GL	6	3	10	4	9
			12	3	10	3	9
	05	GE	2	4	4	4	4
			5	6	4	6	2
			10	4	4	4	4
			20	6	5	7	3
		GR, GD, GL	2	5	4	2	6
			5	6	4	6	4
			10	5	5	5	6
			20	4	5	9	2
	08	GE	5	2	8	3	5
			10	2	8	4	5
			20	2	9	2	6
		GR, GD, GL	5	2	7	4	5
			10	2	8	2	4
			20	2	8	3	7

※ In the item "Motor mounting direction", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD indicates bottom mounting.

Horizontal installation   Wall-hanging installation   Vertical installation   Ceiling-hanging installation

● "Screw lead" refers to the distance that the workpiece can be moved when the motor rotates once in the electric actuator.

\<EBR Series (P4 Series)\>

Actuator model number				24 VDC / horizontal, wall-hanging or ceiling-hanging		24 VDC / Vertical	
Series	Size	Motor mounting direction	Screw lead	G1	G2	G1	G2
EBR	04	GE	6	2	8	2	7
			12	5	8	4	8
		GR, GD, GL	6	3	10	4	11
			12	3	10	7	7
	05	GE	2	4	4	4	4
			5	6	6	4	7
			10	5	8	5	6
			20	8	4	8	2
		GR, GD, GL	2	5	5	5	3
			5	6	6	5	6
			10	3	9	6	7
			20	7	6	6	6
	08	GE	5	3	8	3	7
			10	2	11	3	6
			20	2	9	2	6
		GR, GD, GL	5	2	9	1	8
			10	2	10	2	6
			20	3	7	3	6

※ In the item "Motor mounting direction", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD indicates bottom mounting.

Horizontal installation   Wall-hanging installation   Vertical installation   Ceiling-hanging installation
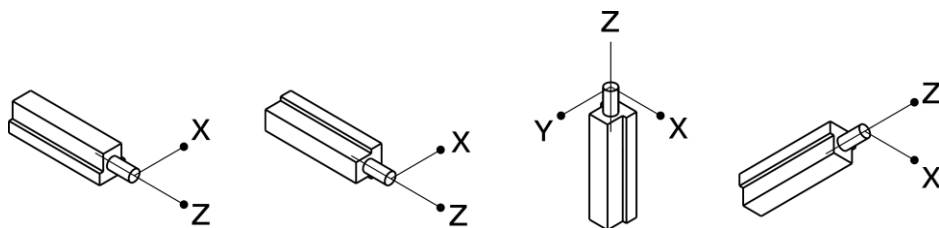

- "Screw lead" refers to the distance that the workpiece can be moved when the motor rotates once in the electric actuator.

■ Setting gain by installation method (EJSG Series)

The table below shows the recommended values of "G1 gain (responsiveness)" and "G2 gain (load magnification)" parameters for horizontal and vertical installation of EBS series and EJSG series actuators.

\<EJSG Series\>

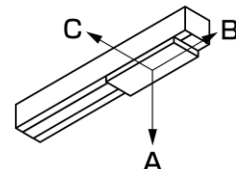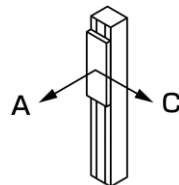| Actuator model number				24 VDC / horizontal, wall-hanging or ceiling-hanging		24 VDC / Vertical	
Series	Size	Motor Mounting direction	Screw lead	G1	G2	G1	G2
EJSG	04	E	6	3	7	4	4
			12	7	4	7	5
		R, D, L.	6	4	11	4	7
			12	3	9	4	8
	05	E	5	6	2	7	2
			10	6	2	6	2
			20	8	3	8	3
		R, D, L.	5	6	5	6	4
			10	6	3	7	3
			20	9	3	6	6
	08	E	5	4	8	2	9
			10	2	9	2	10
			20	2	9	3	8
		R, D, L.	5	2	8	3	7
			10	2	10	2	9
			20	2	9	2	9

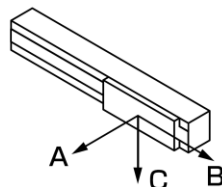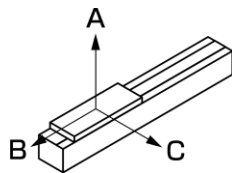※ In the item "Motor mounting direction", E indicates straight mounting, R indicates right-side mounting, L indicates left-side mounting, and D indicates bottom mounting.

Horizontal installation   Wall-hanging installation   Vertical installation   Ceiling-hanging installation

● "Screw lead" refers to the distance that the workpiece can be moved when the motor rotates once in the electric actuator.

■ Setting gain by installation method (GSSD2/GSTK/GSTG/GSTS/GSTL Series)

The table below shows the recommended values of "G1 gain (responsiveness)" and "G2 gain (load magnification)" parameters for horizontal and vertical installation of GSSD2,GSTK,GSTG,GSTS, and GSTL Series actuators.

＜GSSD2/GSTK/GSTG/GSTS/GSTL Series＞

Actuator model number				24 VDC / horizontal, wall-hanging or ceiling-hanging		24 VDC / Vertical	
Series	Size	Motor mounting direction	Screw lead	G1	G2	G1	G2
GSSD2 GSTK GSTG GSTS GSTL	20	GE	6	5	5	6	5
	20	GE	9	4	7	2	9
	32	GE	6	2	8	2	8
	32	GE	12	4	8	4	6
	50	GE	6	5	7	5	7
	50	GE	12	6	4	6	5

Horizontal installation   Wall-hanging installation   Vertical installation   Ceiling-hanging installation
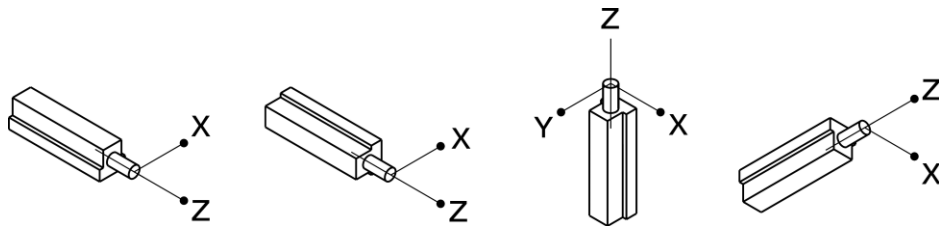
"Screw lead" refers to the distance that the workpiece can be moved when the motor rotates once in the electric actuator.

■ Adjusting the gains

Name	Content	Setting range	Initial value	Unit
G1 gain (response)	This is for adjusting the convergence time of the waveform. Command followability is improved and oscillation is more likely to occur. If set to 0, the internal factory setting will be applied. Use the initial value unless there is a problem.	0 to 15	0	None
G2 gain (load magnification)	This is adjusted according to the actuator load. Increasing the G2 gain reduces speed ripple. If the load is large, increase the set value. If set to 0, the internal factory setting will be applied. Use the initial value unless there is a problem.			

If there is abnormality in the operation of the actuator, adjust the gain by the following methods.

<If abnormal sound is generated when stopped>
If the actuator generates a high-pitched abnormal sound when stopped, decrease the G2 gain. If no effect is found even if the G2 gain has been decreased, decrease also the G1 gain to make an adjustment.

<If abnormal sound is generated during operation>
If abnormal sound is generated during operation at a constant speed other than an acceleration time, decrease the G2 gain. If no effect is found even if the G2 gain has been decreased, decrease also the G1 gain to make an adjustment.

<If the actuator vibrates during operation>
If the actuator vibrates during operation, increase the G2 gain. If no effect is found even if the G2 gain has been increased, increase also the G1 gain to make an adjustment.

<If the actuator does not stop at the set position>
If the actuator does not stop at the set position and misalignment occurs, an overload (S) alarm (alarm code: 6702) is detected. Since the setting of the gain is high, decrease the G1 gain or G2 gain.

<If a workpiece cannot be carried>
If the actuator does not operate at the set speed or stops during traveling, increase the G2 gain. If abnormal sound is generated when stopped or during operation by increasing the G2 gain, decrease the G1 gain.

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3.6. Point Data Setting

S-Tools can be used to set or change point data . Refer to the S-Tools instruction manual (SM-A11147) for details such as setting method.

3.6.1. Operation Mode (PIO) And Number Of Positioning Points

The number of point data that can be set depends on the operation mode. The operation mode can be selected by the parameter.

Operation mode (PIO)	Abbreviation	Number of point data	Signal assignment outline
64-point mode	B064	64 points	JOG travel start input Output selection: 2 point (point zone, zone 1, zone 2, traveling, warning, soft limit over, soft limit over (-), soft limit over(+))
Simple 7-point mode	S007	7 points	JOG travel start input Output selection: 2 point (point zone, zone 1, zone 2, traveling, warning, soft limit over, soft limit over (-), soft limit over(+))
Solenoid valve mode, double 2-position type	VW2P	2 points	SW inputs 1, 2 Output selection: 2 point (point zone, zone 1, zone 2, traveling, warning, soft limit over, soft limit over (-), soft limit over(+))
Solenoid valve mode **Double 3-position type**	VW3P	2 points	SW inputs 1, 2 Output selection: 2 point (point zone, zone 1, zone 2, traveling, warning, soft limit over, soft limit over (-), soft limit over(+))
Solenoid valve mode, single type	VSGL	2 points	SW inputs 1, 2 Output selection: 2 point (point zone, zone 1, zone 2, traveling, warning, soft limit over, soft limit over (-), soft limit over(+))

※ If the software version is old, soft limit over, soft limit over (-), and soft limit over (+) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

3.6.2. Point Data Table

Set the position specification method, operation method, position, speed, pressing rate, etc. for each point.

The number of points that can be set depends on the number of positioning points in the operation mode.

Setting items	Content	Unit
Position specification method	Select either Absolute or Incremental Refer to "3.6.3 Selecting The Position Specification Method" for details.	None
Operation method	Select Positioning operation, Pressing operation 1, or Pressing operation 2. Refer to "3.6.4 Selecting The Operation Method" for details.	None
Position	When the operation method is set to positioning operation, set the operation completion position. When the operation method is set to pressing operation 1 or pressing operation 2, the operation completion position is determined together with the "pressing distance". Set positioning operation, pressing operation 1, or pressing operation 2 with the "operation method". The operation completion position of pressing operation 1 or pressing operation 2 is determined by "Position" and "Pressing distance". Refer to "3.6.5 Setting The Position" for details.	mm (deg)
Positioning width	Set the output range of the point travel complete output signal and switch 1 and 2 output signals with the width (one side) of the operation completion position. Refer to "3.6.6 Setting The Positioning Width" for details.	mm (deg)
Speed	Set the speed for the transfer zone. Refer to "3.6.7 Setting The Speed" for details.	(mm/s) (deg/s)
Acceleration	Set the acceleration for the transfer zone. Refer to "3.6.8 Setting The Acceleration" for details.	G
Deceleration	Set the deceleration for the transfer zone. Refer to "3.6.9 Setting The Deceleration" for details.	G
Acceleration/deceleration method	Only Trapezoid operation can be selected. Refer to "3.6.10 Selecting The Acceleration/Deceleration Method" for details.	None
Stop method	Select Control stop, Fixed excitation, Automatic servo OFF 1, Automatic servo OFF 2, or Automatic servo OFF 3. Refer to "3.6.11 Selecting The Stop Method" for details.	None
Rotation direction	Sets the rotation direction of the FGRC series. Refer to "3.6.12 Selecting The Rotation Direction" for details.	None
Gain magnification	Sets the gain magnification. Refer to "3.6.13 Setting The Gain Magnification" for details.	%
Point zone (+)	Sets the + side position of the point zone. Refer to "3.6.14 Point Zone Setting And Output Signal" for details.	mm (deg)
Point zone (-)	Sets the - side position of the point zone. Refer to "3.6.14 Point Zone Setting And Output Signal" for details.	mm (deg)

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Setting items	Content	Unit
Pressing rate	Set the rate of the upper limit of the pressing force in a pressing interval to the maximum pressing force in percentage [%]. Refer to "3.6.15 Setting The Pressing Rate" for details.	%
Pressing speed	Sets the speed of the pressing zone. Refer to "3.6.16 Setting The Pressing Speed" for details.	(mm/s) (deg/s)
Pressing distance	Sets the travel distance in the pressing zone. Refer to "3.6.17 Setting The Pressing Distance" for details.	mm (deg)

3.6.3.   Selecting The Position Specification Method

You can select a position specification method.

<Choices and initial values (factory default)>

Actuator model number	Choices	Initial value
Series		
EBS/EJSG/EBR/FLSH/FLCR/FGRC/GSSD2/GSTK/GSTG/GSTS/GSTL/GCKW	Absolute, Incremental Note1	Absolute

Note 1: In FGRC series, when selecting "Incremental" and setting the rotation direction to "Close rotation", it rotates in the CW direction.

■ Absolute

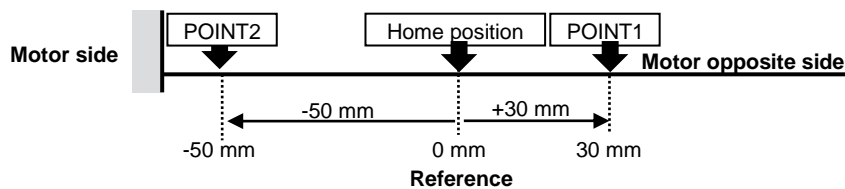Set the distance from the home position, with the home position (0 mm) as the reference.

<Setting example> Reference (home position) -> POINT1 -> POINT2
POINT1   Position "+30 mm" is set
POINT2   Position "-50 mm" is set

The positioning completion position for POINT 1 is the point of 30 mm from the home position.
The positioning completion position for POINT 2 is the point of -50 mm from the home position.

■ Incremental

Set the distance from the current position with the current position as the reference.
The - value input represents a position on the motor side and the + value input represents a position on the opposite motor side.

<Setting example> Reference (current position) -> POINT1 -> POINT2
POINT1   Position "+30 mm" is set
POINT2   Position "-50 mm" is set

The positioning completion position for POINT 1 is the point of 80 mm from the home position.
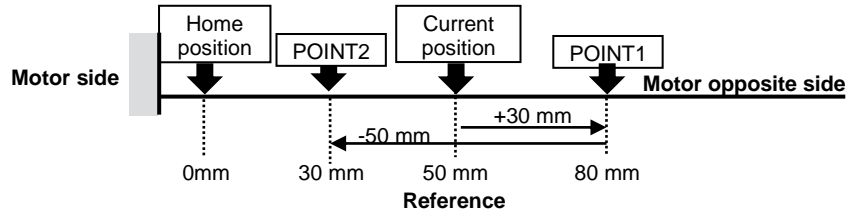The positioning completion position for POINT 2 is the point of 30 mm from the home position.

	● When using the operation mode (PIO) in the solenoid valve mode, set it as "Absolute". Even if it is set to "Incremental", it operates in "Absolute".

3.6.4. Selecting The Operation Method

You can select the operation method.

<Choices and initial values (factory default)>

Actuator model number	Choices	Initial value
Series		
EBS/EJSG/EBR/FLSH/FLCR/FGRC/ GSSD2/GSTK/GSTG/GSTS/GSTL/G CKW	Positioning operation Pressing operation 1 Note 1, Note 2 Pressing operation 2 Note 1, Note 2	Positioning operation

Note 1: When pressing operation 1, or 2 is selected in FGRC series, do not set the rotation direction to "Close rotation." Depending on the settings of "Position" and "Pressing distance", operation may not be predicted.

Note 2: When pressing operation 1, or 2 is selected in FGRC series, and an operation command is issued at a setting where the value of the position + pressing distance is 360 deg or more, an alarm "Point data (position)" occurs, and the command is not received.

<Description of operation>

Operation method	Explanation
Positioning operation	This operation is intended for general transport. When the positioning width is reached, the point travel complete signal is output. When the positioning completion point is reached, the actuator stops. Refer to "3.7.6 Positioning Operation" for details.
Pressing operation 1	Can be used for clamping, etc. In the pressing operation, the workpiece is continuously pressed until the pressing completion point is reached. During this time, the alarm is not detected even if it is stopped halfway due to an external force. When the set pressing rate is reached, the point travel complete signal is output. When the pressing completion point is reached, the pressing operation is terminated and the actuator stops. Refer to "3.7.8 Pressing Operation" for details.
Pressing operation 2	Can be used for press fitting, etc. In the pressing operation, the workpiece is continuously pressed until the pressing completion point is reached. During this time, the alarm is not detected even if it is stopped halfway due to an external force. It operates at the set pressing rate, and when it reaches within the positioning width, the point travel complete signal is output. When the pressing completion point is reached, the pressing operation is terminated and the actuator stops. Refer to "3.7.8 Pressing Operation" for details.

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3.6.5.   Setting The Position

Set the movement position.
The movement position differs depending on the position specification method and operation method.

\<Setting range and initial values (factory default)\>

Actuator model number	Setting range	Initial value	Unit
Series			
EBS/EJSG/EBR/FLSH/FLCR/GSSD2/ GSTK/GSTG/GSTS/GSTL/GCKW	− stroke to + stroke	0.00	mm
FGRC	0.00 to 359.99 Note 1, Note 2, Note 3	0.00	deg

Note 1: For FGRC series, set the operation starting point and the operation ending point 0.05 deg or more apart.
        If the setting is less than 0.05 deg, the actuator may not operate and output a point travel complete signal.
Note 2: When the FGRC series is connected and the position setting is set to 360 deg or more, the remainder of the setting value divided by 360 deg will be the position setting.
Note 3: For reciprocating operation on FGRC series, set the travel distance to 359.90 or less.

3.6.6.　Setting The Positioning Width

Set the output range for the point travel complete output signal and switch 1, 2 output signal.
It is set with the width (one side) (mm) with respect to the operation completion position.

<Setting range and initial values (factory default)>

Actuator model number	Setting range	Initial value	Unit
Series			
EBS/EJSG/EBR/FLSH/FLCR/FGRC/ GSSD2/GSTK/GSTG/GSTS/GSTL/G CKW	0.00 to 9.99 Note 1	0.00	mm(deg)

Note 1: If the point data setting is 0, the parameter's common positioning width is applied.
　　　　The initial value of the common positioning width is 0.10 mm (deg).

■ Positioning operation

<Setting example>

Set POINT 1 position (absolute position): +50 mm, and positioning width: 5 mm
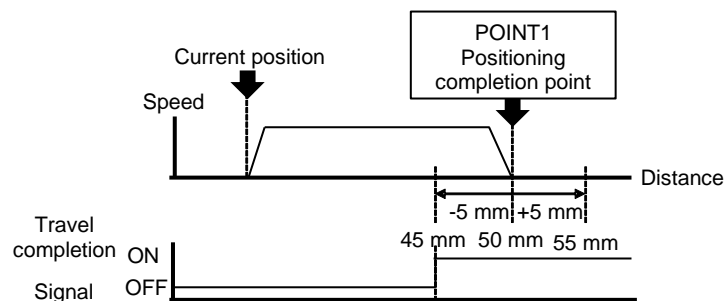
Travel complete signal is output when the actuator moves in the range of 45 mm to 55 mm.
Even if it goes out of the positioning width range due to overshoot, etc., the travel complete signal is kept ON.

> ● If "Hold point signal output" is "Disabled", the travel complete signal is turned OFF when servo is OFF, emergency stop and force brake release is performed. However, if "Hold point signal output" is "Enabled", the travel complete signal does not turn OFF even when servo OFF, emergency stop and force brake release is performed.

■ Pressing operation 1

Since the travel complete signal is determined by the pressing rate, the positioning width setting is not reflected.

■ Pressing operation 2

<Setting example>

Set POINT 1 position (absolute position): +40 mm, pressing distance: +10 mm, and positioning width: 5 mm.
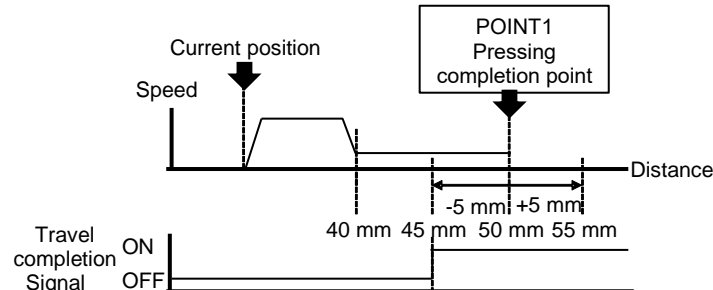
Travel complete signal is output when the actuator moves in the range of 45 mm to 55 mm.

After the travel complete signal is output, the travel complete signal is kept ON even if it goes out of the positioning width due to pushing back, etc.

- The reference of the positioning width is the positioning completion point in the positioning operation and the pressing completion point in the pressing operation.
- If "Hold point signal output" is "Disabled", the travel complete signal is turned OFF when servo is OFF, emergency stop and force brake release is performed. However, if "Hold point signal output" is "Enabled", the travel complete signal does not turn OFF even when servo OFF, emergency stop and force brake release is performed.

3.6.7.　Setting The Speed

You can set the speed of the transfer zone.

■ EBS series (Standard series)

<Setting range and initial values (factory default)>

Actuator model number				Setting range	Initial value	Unit
Series	Body size	Motor mounting direction	Screw lead			
EBS	04	GE	06	7 to 320 Note 1, Note 2	0	mm/s
			12	15 to 500 Note 1, Note 2		
		GR,GD,GL	06	7 to 250 Note 1, Note 2		
			12	15 to 400 Note 1, Note 2		
	05	GE	02	2 to 120 Note 1, Note 2		
			05	6 to 290 Note 1, Note 2		
			10	12 to 500 Note 1, Note 2		
			20	25 to 850 Note 1, Note 2		
		GR,GD,GL	02	2 to 100 Note 1, Note 2		
			05	6 to 250 Note 1, Note 2		
			10	12 to 400 Note 1, Note 2		
			20	25 to 700 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.

Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).

※ In the item "Motor mounting direction", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD indicates bottom mounting.

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Actuator model number				Setting range	Initial value	Unit
Series	Body size	Motor mounting direction	Screw lead			
EBS	08	GE	05	6 to 150 Note 1, Note 2	0	mm/s
			10	12 to 250 Note 1, Note 2		
			20	25 to 500 Note 1, Note 2		
		GR,GD,GL	05	6 to 125 Note 1, Note 2		
			10	12 to 250 Note 1, Note 2		
			20	25 to 400 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.
Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).

※ In the item "Motor mounting direction", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD indicates bottom mounting.

■ EBS series (P4 series)

<Setting range and initial values (factory default)>

Actuator model number				Setting range	Initial value	Unit
Series	Body size	Motor mounting direction	Screw lead			
EBS	04	GE	06	7 to 260 Note 1, Note 2	0	mm/s
			12	15 to 400 Note 1, Note 2		
		GR,GD,GL	06	7 to 200 Note 1, Note 2		
			12	15 to 320 Note 1, Note 2		
	05	GE	02	2 to 100 Note 1, Note 2		
			05	6 to 230 Note 1, Note 2		
			10	12 to 400 Note 1, Note 2		
			20	25 to 680 Note 1, Note 2		
		GR,GD,GL	02	2 to 80 Note 1, Note 2		
			05	6 to 200 Note 1, Note 2		
			10	12 to 320 Note 1, Note 2		
			20	25 to 560 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.

Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).

※ In the item "Motor mounting direction", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD indicates bottom mounting.

Actuator model number				Setting range	Initial value	Unit
Series	Body size	Motor mounting direction	Screw lead			
EBS	08	GE	05	6 to 120 Note 1, Note 2	0	mm/s
			10	12 to 200 Note 1, Note 2		
			20	25 to 400 Note 1, Note 2		
		GR,GD,GL	05	6 to 100 Note 1, Note 2		
			10	12 to 200 Note 1, Note 2		
			20	25 to 320 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.
Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).

※ In the item "Motor mounting direction", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD indicates bottom mounting.

■ EBR series (Standard series)

\<Setting range and initial values (factory default)>

Actuator model number				Setting range	Initial value	Unit
Series	Body size	Motor mounting direction	Screw lead			
EBR	04	GE	06	7 to 200 Note 1, Note 2	0	mm/s
			12	15 to 400 Note 1, Note 2		
		GR,GD,GL	06	7 to 200 Note 1, Note 2		
			12	15 to 350 Note 1, Note 2		
	05	GE	02	2 to 90 Note 1, Note 2		
			05	6 to 300 Note 1, Note 2		
			10	12 to 500 Note 1, Note 2		
			20	25 to 700 Note 1, Note 2		
		GR,GD,GL	02	2 to 90 Note 1, Note 2		
			05	6 to 250 Note 1, Note 2		
			10	12 to 400 Note 1, Note 2		
			20	25 to 600 Note 1, Note 2		
EBR	08	GE	05	6 to 125 Note 1, Note 2	0	mm/s
			10	12 to 300 Note 1, Note 2		
			20	25 to 500 Note 1, Note 2		
		GR,GD,GL	05	6 to 125 Note 1, Note 2		
			10	12 to 250 Note 1, Note 2		
			20	25 to 400 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.
Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).
※ In the item "Motor mounting direction", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD indicates bottom mounting.

■ EBR series (P4 series)

\<Setting range and initial values (factory default)\>

Actuator model number				Setting range	Initial value	Unit
Series	Body size	Motor mounting direction	Screw lead			
EBR	04	GE	06	7 to 160 Note 1, Note 2	0	mm/s
			12	15 to 320 Note 1, Note 2		
		GR,GD,GL	06	7 to 160 Note 1, Note 2		
			12	15 to 280 Note 1, Note 2		
	05	GE	02	2 to 70 Note 1, Note 2		
			05	6 to 240 Note 1, Note 2		
			10	12 to 400 Note 1, Note 2		
			20	25 to 560 Note 1, Note 2		
		GR,GD,GL	02	2 to 70 Note 1, Note 2		
			05	6 to 200 Note 1, Note 2		
			10	12 to 320 Note 1, Note 2		
			20	25 to 480 Note 1, Note 2		
EBR	08	GE	05	6 to 100 Note 1, Note 2	0	mm/s
			10	12 to 240 Note 1, Note 2		
			20	25 to 400 Note 1, Note 2		
		GR,GD,GL	05	6 to 100 Note 1, Note 2		
			10	12 to 200 Note 1, Note 2		
			20	25 to 320 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.
Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).
※ In the item "Motor mounting direction", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD indicates bottom mounting.

■ EJSG Series (Standard Series)

<Setting range and initial values (factory default)>

Actuator model number				Setting range	Initial value	Unit
Series	Body size	Motor mounting direction	Screw lead			
EJSG	04	E	06	7 to 320 Note 1, Note 2	0	mm/s
			12	15 to 500 Note 1, Note 2		
		R, D, L.	06	7 to 250 Note 1, Note 2		
			12	15 to 400 Note 1, Note 2		
	05	E	05	6 to 290 Note 1, Note 2		
			10	12 to 500 Note 1, Note 2		
			20	25 to 850 Note 1, Note 2		
		R, D, L.	05	6 to 250 Note 1, Note 2		
			10	12 to 400 Note 1, Note 2		
			20	25 to 700 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.

Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).

※ In the item "Motor mounting direction", E indicates straight mounting, R indicates right-side mounting, L indicates left-side mounting, and D indicates bottom mounting.

Actuator model number				Setting range	Initial value	Unit
Series	Body size	Motor mounting direction	Screw lead			
EJSG	08	E	05	6 to 150 Note 1, Note 2	0	mm/s
			10	12 to 250 Note 1, Note 2		
			20	25 to 500 Note 1, Note 2		
		R, D, L.	05	6 to 125 Note 1, Note 2		
			10	12 to 250 Note 1, Note 2		
			20	25 to 400 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.

Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).

※ In the item "Motor mounting direction", E indicates straight mounting, R indicates right-side mounting, L indicates left-side mounting, and D indicates bottom mounting.

■ EJSG Series (C Series, P4 Series, FP1 Series)

<Setting range and initial values (factory default)>

Actuator model number				Setting range	Initial value	Unit
Series	**Body size**	**Motor mounting direction**	**Screw lead**			
EJSG	04	E	06	7 to 260 Note 1, Note 2	0	mm/s
			12	15 to 400 Note 1, Note 2		
		R, D, L.	06	7 to 200 Note 1, Note 2		
			12	15 to 320 Note 1, Note 2		
	05	E	05	6 to 230 Note 1, Note 2		
			10	12 to 400 Note 1, Note 2		
			20	25 to 680 Note 1, Note 2		
		R, D, L.	05	6 to 200 Note 1, Note 2		
			10	12 to 320 Note 1, Note 2		
			20	25 to 560 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.

Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).

※ In the item "Motor mounting direction", E indicates straight mounting, R indicates right-side mounting, L indicates left-side mounting, and D indicates bottom mounting.

Actuator model number				Setting range	Initial value	Unit
Series	Body size	Motor mounting direction	Screw lead			
EJSG	08	E	05	6 to 120 Note 1, Note 2	0	mm/s
			10	12 to 200 Note 1, Note 2		
			20	25 to 400 Note 1, Note 2		
		R, D, L.	05	6 to 100 Note 1, Note 2		
			10	12 to 200 Note 1, Note 2		
			20	25 to 320 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.

Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).

※ In the item "Motor mounting direction", E indicates straight mounting, R indicates right-side mounting, L indicates left-side mounting, and D indicates bottom mounting.

■ GSSD2/GSTK/GSTG/GSTS/GSTL Series

\<Setting range and initial values (factory default)\>

Actuator model number				Setting range	Initial value	Unit
Series	**Body size**	**Motor mounting direction**	**Screw lead**			
GSSD2 GSTK GSTG GSTS GSTL	20	GE	06	10 to 300 Note 1, Note 2	0	mm/s
			09	12 to 400 Note 1, Note 2		
	32	GE	06	10 to 250 Note 1, Note 2		
			12	15 to 500 Note 1, Note 2		
	50	GE	06	10 to 250 Note 1, Note 2		
			12	15 to 500 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.
Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).

■ FLSH/FLCR/FGRC/GCKW Series

<Setting range and initial values (factory default)>

Actuator model number			Setting range	Initial value	Unit
Series	**Body size**	**Screw lead**			
FLSH	**16**	**H1**	5 to 50 Note 1, Note 2	0	mm/s
	20	**H1**	5 to 50 Note 1, Note 2		
	25	**H1**	5 to 50 Note 1, Note 2		
FLCR	**16**	**02**	2 to 100 Note 1, Note 2		
		08	10 to 250 Note 1, Note 2		
	20	**02**	2 to 100 Note 1, Note 2		
		08	10 to 300 Note 1, Note 2		
	25	**02**	2 to 75 Note 1, Note 2		
		06	7 to 200 Note 1, Note 2		
FGRC	**10**		20 to 200 Note 1, Note 2	0	deg/s
	30		20 to 200 Note 1, Note 2		
	50		20 to 200 Note 1, Note 2		
GCKW	**16**	**H1**	5 to 50 Note 1, Note 2	0	mm/s
	20	**H1**	5 to 50 Note 1, Note 2		
	25	**H1**	5 to 50 Note 1, Note 2		

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.
Note 2: If the point data setting is 0, the parameter's common speed is applied. The initial value of the common speed is 30 mm/s (deg/s).

3.6.8.   Setting The Acceleration

You can set the acceleration of the transfer zone.

<Setting range and initial values (factory default)>

Actuator model number	Setting range		Initial value	Unit
Series	Horizontal installation Wall-hanging installation	When installed vertically		
EBS/EJSG/EBR	0.10 to 0.70 Note 1, Note 2, Note 3, Note 4	0.10 to 0.50 Note 1, Note 2, Note 3	0.00	G
GSSD2/GSTK/GSTG/GSTS/GSTL	0.10 to 0.70 Note 1, Note 2	0.10 to 0.50 Note 1, Note 2		
FLSH/GCKW	0.10 to 0.30 Note 1, Note 2	0.10 to 0.30 Note 1, Note 2		
FLCR	0.10 to 0.30 Note 1, Note 2	0.10 to 0.30 Note 1, Note 2		
FGRC	0.10 to 0.30 Note 1, Note 2	0.10 to 0.30 Note 1, Note 2		

Note 1: When converting units, assume 1G = 9800 mm/s^2 (deg/s^2) for calculation.
Note 2: If the point data setting is 0, the parameter's common acceleration is applied. The initial value of the common acceleration is 0.10 G.
Note 3: It can be set from 0.01 G to 0.09 G, but the operation may become unstable.
Note 4: For screw lead 2, use in the range of 0.10 G to 0.50 G. It can be set up to the upper limit of 1.00 G, but the operation may become unstable.

3.6.9.   Setting The Deceleration

You can set the deceleration of the transfer zone.

<Setting range and initial values (factory default)>

Actuator model number	Setting range		Initial value	Unit
Series	Horizontal installation Wall-hanging installation	When installed vertically		
EBS/EJSG/EBR	0.10 to 0.70 Note 1, Note 2, Note 3, Note 4	0.10 to 0.50 Note 1, Note 2, Note 3	0.00	G
GSSD2/GSTK/GSTG/GSTS/GSTL	0.10 to 0.70 Note 1, Note 2	0.10 to 0.50 Note 1, Note 2		
FLSH/GCKW	0.10 to 0.30 Note 1, Note 2	0.10 to 0.30 Note 1, Note 2		
FLCR	0.10 to 0.30 Note 1, Note 2	0.10 to 0.30 Note 1, Note 2		
FGRC	0.10 to 0.30 Note 1, Note 2	0.10 to 0.30 Note 1, Note 2		

Note 1: When converting units, assume 1G = 9800 mm/s^2 (deg/s^2) for calculation.
Note 2: If the point data setting is 0, the parameter's common acceleration is applied. The initial value of the common deceleration is 0.10 G.
Note 3: It can be set from 0.01 G to 0.09 G, but the operation may become unstable.
Note 4: For screw lead 2, use in the range of 0.10 G to 0.50 G. It can be set up to the upper limit of 1.00 G, but the operation may become unstable.

3.6.10. Selecting The Acceleration/Deceleration Method

You can select the acceleration/deceleration method for the positioning operation and pressing operation. The acceleration/deceleration method can be selected from common and trapezoidal, but whichever is selected will be the trapezoidal setting.

<Choices and initial values (factory default)>

Choices	Explanation	Initial value
Common	The acceleration/deceleration method set by the common acceleration/deceleration method of the parameters data will be applied.	Common
Trapezoid	This is the acceleration/deceleration method where the speed command changes at a certain rate.	

● The acceleration and deceleration set in the point data are applied to the acceleration and deceleration in the acceleration/deceleration method.

3.6.11. Selecting The Stop Method

For positioning and pressing operations, you can select the stop method after reaching the target position.

<Choices and initial values (factory default)>

| Choices	Explanation	Initial value
Common	The stop method set by the common stop method of the parameters will be applied. The initial data of the common stop method is "Control".	Common
Control	After the positioning or pressing operation is completed, the actuator is controlled by the current that can keep the completion position and stopped and held.	
Fixed excitation	After the positioning or pressing operation is completed, the actuator is stopped and held by the fixed current when stopped set in the parameters.	
Automatic servo OFF 1	The control stops after reaching the target position in positioning or pressing operation. Servo OFF is initiated after the time set in Automatic servo OFF time 1 in the parameters elapses.	
Automatic servo OFF 2	The control stops after reaching the target position in positioning or pressing operation. Servo OFF is initiated after the time set in Automatic servo OFF time 2 in the parameters elapses.	
Automatic servo OFF 3	The control stops after reaching the target position in positioning or pressing operation. Servo OFF is initiated after the time set in Automatic servo OFF time 3 in the parameters elapses.	

3.6.12. Selecting The Rotation Direction

In FGRC series, you can select the rotation direction.

<Choices and initial values (factory default)>

Choices	Explanation	Initial value
Common	The rotation direction set in the common rotation direction of the parameter is applied. The initial value of the common rotation direction is "Close rotation".	**Common**
Close rotation **Note 1, Note 2**	From the current position to the target position, it rotates to a direction in which the operation distance is short.	
CW	It rotates in the CW direction (clockwise).	
CCW	It rotates in the CCW direction (counterclockwise).	

Note 1: Do not set the operation method to "Pressing operation 1, 2" when the point data is set to "Close rotation". Depending on the settings of "Position" and "Pressing distance", operation may not be predicted.
Note 2: If the point data is set to "Close rotation" and the position specification method is set to "Incremental", it will rotate in the CW direction.

Table
Rotates in the CW direction

Table
Rotates in the CCW direction
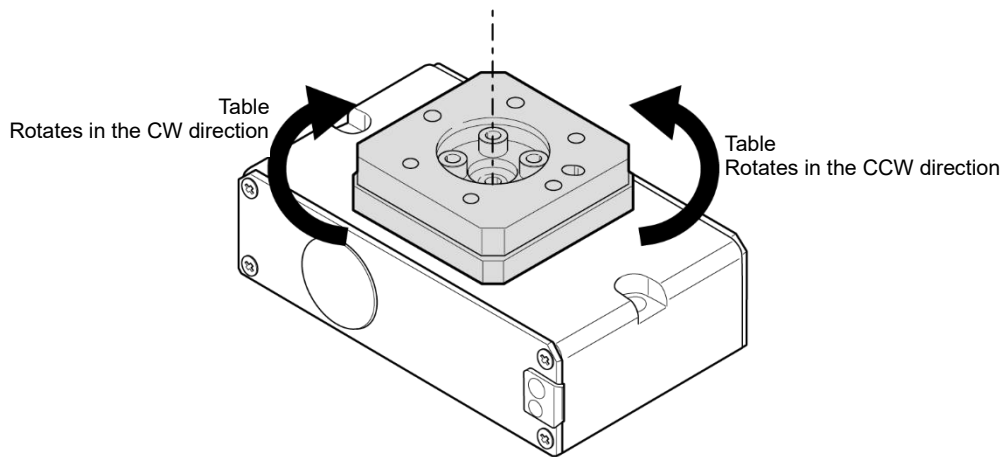
3.6.13. Setting The Gain Magnification

Use this only when gain adjustment is required for each point. This should normally be used with a setting value of 0.

<Setting range and initial values (factory default)>

Actuator model number		Setting range	Initial value	Unit
Series				
EBS/EJSG/EBR/FLSH/FLCR/FGRC/ GSSD2/GSTK/GSTG/GSTS/GSTL/G CKW		0 to 9999 Note 1	0	%

Note 1: If the point data setting is set to 0, the gain magnification will be unused.

✏️ ● Using the wrong setting could result in unstable control. If control is unstable, contact CKD.

3.6.14. Point Zone Setting And Output Signal

The point zone output signal can be set by the distance from the home position, with the boundary value for switching the signal from OFF to ON as the point zone (-), considering the operation in the + direction. Also it can be set by the distance from the home position, with the boundary value for switching from ON to OFF as a point zone (+).
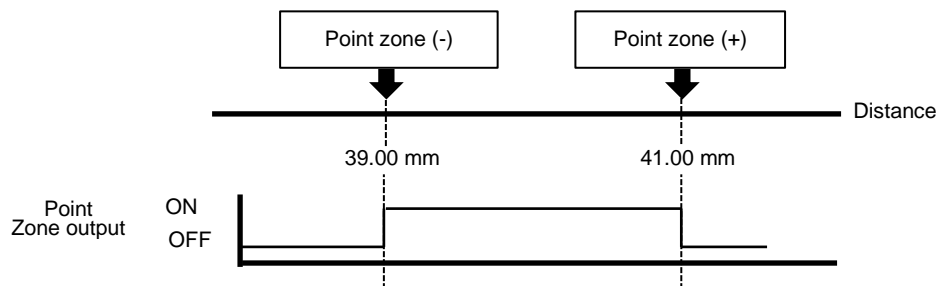
<Setting range and initial values (factory default)>

Actuator model number	Setting range	Initial value	Unit
Series			
EBS/EJSG/EBR/FLSH/FLCR/FGRC/ GSSD2/GSTK/GSTG/GSTS/GSTL/G CKW	-9999.99 to 9999.99	0.00	mm(deg)

<Setting example 1>
Point zone (-) < Point zone (+)
Point zone 1 (-): 39.00 mm
Point zone 1 (+): 41.00 mm
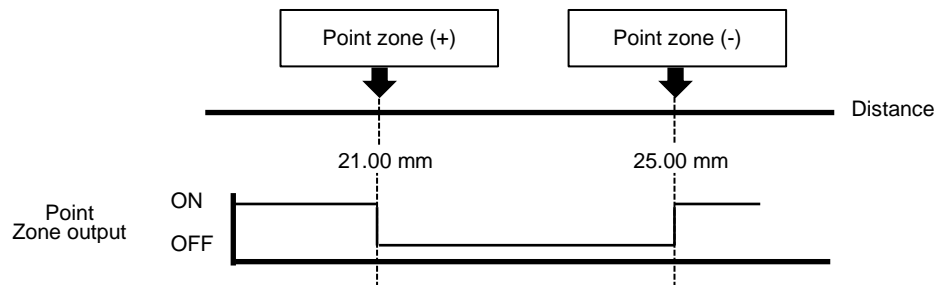

<Setting example 2>
Point zone (-) > Point zone (+)
Point zone 1 (+): 21.00 mm
Point zone 1 (-): 25.00 mm

- Even when the point zone (−) < point zone (+) < 0, the output signal of the point zone turns ON in the interval between the point zone (−) and the point zone (+), and turns OFF in other intervals.
- When the point zone (−) > the point zone (+), the output signal of the point zone is turned OFF in the interval between the point zone (+) and the point zone (−), and turned ON in other intervals.
- When Point zone (+) = Point zone (-), the output signal of the point zone is always OFF.

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3.6.15. Setting The Pressing Rate

Sets the upper limit of the pressing force in a pressing zone as a ratio to the maximum pressing force. For details of the pressing rate, refer to the catalog.

<Setting range and initial values (factory default)>

Actuator model number			Setting range	Initial value	Unit
Series	Body size	Screw lead			
EBS	04	06	20 to 100 Note 1	0	%
		12	20 to 100 Note 1		
	05	02	20 to 80 Note 1		
		05	20 to 80 Note 1		
		10	20 to 80 Note 1		
		20	20 to 80 Note 1		
	08	05	20 to 100 Note 1		
		10	20 to 100 Note 1		
		20	20 to 100 Note 1		
EJSG	04	06	20 to 100 Note 1		
		12	20 to 100 Note 1		
	05	05	20 to 80 Note 1		
		10	20 to 80 Note 1		
		20	20 to 80 Note 1		
	08	05	20 to 100 Note 1		
		10	20 to 100 Note 1		
		20	20 to 100 Note 1		

Note 1: If the point data setting is 0, the parameter's common pressing rate is applied. The initial value of the common pressing rate is 50%.

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Actuator model number			Setting range	Initial value	Unit
Series	Body size	Screw lead			
EBR	04	06	20 to 100 Note 1	0	%
		12	20 to 100 Note 1		
	05	02	20 to 80 Note 1		
		05	20 to 80 Note 1		
		10	20 to 80 Note 1		
		20	20 to 80 Note 1		
	08	05	20 to 100 Note 1		
		10	20 to 100 Note 1		
		20	20 to 100 Note 1		

Note 1: If the point data setting is 0, the parameter's common pressing rate is applied. The initial value of the common pressing rate is 50%.

Actuator model number			Setting range	Initial value	Unit
Series	Body size	Screw lead			
GSSD2 GSTK GSTG GSTS GSTL	20	06	40 to 100 Note 1	0	%
		09	40 to 100 Note 1		
	32	06	30 to 100 Note 1		
		12	30 to 100 Note 1		
	50	06	30 to 100 Note 1		
		12	30 to 100 Note 1		
FLSH	16	H1	30 to 100 Note 1		
	20	H1	30 to 100 Note 1		
	25	H1	30 to 100 Note 1		
FLCR	16	02	30 to 100 Note 1		
		08	30 to 100 Note 1		
	20	02	30 to 100 Note 1		
		08	30 to 100 Note 1		
	25	02	30 to 100 Note 1		
		06	30 to 100 Note 1		
FGRC	10		20 to 100 Note 1		
	30		20 to 100 Note 1		
	50		20 to 100 Note 1		
GCKW	16	H1	30 to 100 Note 1		
	20	H1	30 to 100 Note 1		
	25	H1	30 to 100 Note 1		

Note 1: If the point data setting is 0, the parameter's common pressing rate is applied. The initial value of the common pressing rate is 50%.

3.6.16. Setting The Pressing Speed

You can set the speed of the pressing zone.

<Setting range and initial values (factory default)>

Actuator model number		Setting range	Initial value	Unit
Series				
EBS/EJSG/EBR		5 to 20 Note 1	0	mm/s
GSSD2/GSTK/GSTG/GSTS/GSTL	**6**	10 to 20 Note 1		
	9	12 to 20 Note 1		
	12	15 to 20 Note 1		
FLSH/GCKW		5 to 15 Note 2, Note 3		
FLCR	**2**	2 to 20 Note 2		
	6, 8	5 to 20 Note 2		
FGRC		20 to 30 Note 2	0	deg/s

Note 1: If the point data setting is 0, the parameter's common pressing speed is applied.
The initial value of the common pressing speed is 20 mm/s (deg/s).
Note 2: If the point data setting is 0, the parameter's common pressing speed is applied. The initial value of the common pressing speed is 15mm/s (deg/s). However, depending on the software version of the controller, it is 20mm/s (deg/s). For the correspondence of the version and controller specification, refer to "1.3.1 Version list".
Note 3: If the initial value of the common pressing speed is 20 mm/s, change the pressing speed or the common pressing speed within the setting range when performing pressing operation using FLSH Series.

> ● Set the pressing speed not to exceed the speed of the transfer zone. If the pressing speed is larger, the speed for the transport interval is automatically applied to the pressing speed.

3.6.17. Setting The Pressing Distance

You can set the travel distance of the pressing zone.

<Setting range and initial values (factory default)>

Actuator model number	Setting range	Initial value	Unit
Series			
EBS/EJSG/EBR/FLSH/FLCR/GSSD2/ GSTK/GSTG/GSTS/GSTL/GCKW	-Stroke to + stroke Note 1, Note 2	0.00	mm
FGRC	0 to 359.99 Note 1, Note 2	0.00	deg

Note 1: If the point data setting is 0, the parameter's common pressing distance is applied.
The initial value of the common pressing distance is 3.00 mm (deg).
Note 2: Do not set the common pressing distance to 0.

3.7. Operation And Time Chart

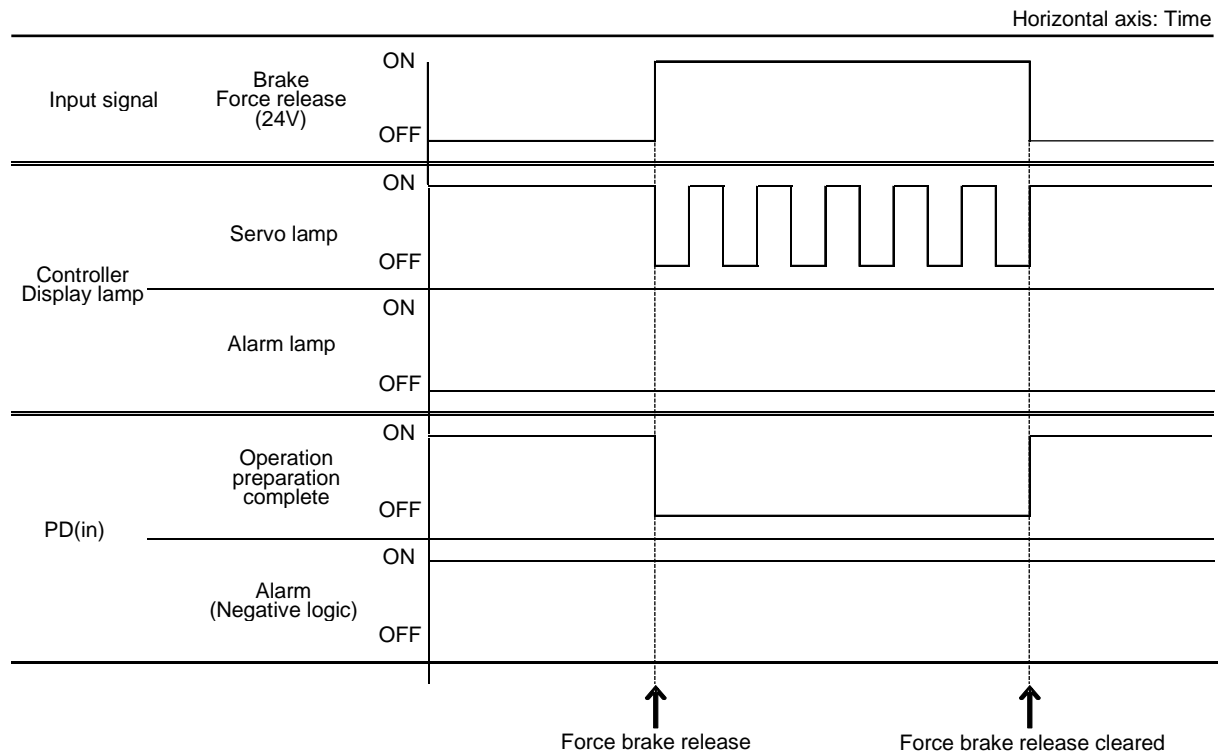## 3.7.1.   Emergency Stop And Release

⚠ **WARNING**
⚠ **When releasing the emergency stop, confirm that the actuator is safe to operate.** • For solenoid valve mode single / double 3 position type, the travel command signal is level input, so it may operate at the same time as emergency stop is released. This may cause injury or damage to the work piece.

⚠ **CAUTION**
⚠ **Be careful of emergency stop wiring disconnection.** • No alarm is detected in the emergency stop state.

When performing an emergency stop, it may take several seconds to stop depending on the travel speed and load.
If an emergency stop is performed during operation, a short is generated between the motor terminals after deceleration and stop, and it enters the dynamic brake status. Operation preparation complete output turns OFF until the emergency stop is released, and the electromagnetic brake is also locked for actuators with bakes. Be sure to check the safety of your surroundings when releasing the emergency stop.

	• "Dynamic brake" is a method of quickly stopping the rotation of the motor by consuming rotational energy as heat energy by short-circuiting the motor terminals via a resistor in the event of a power failure or emergency stop. Since there is no holding torque during stop, it is necessary to use an electromagnetic brake for vertical installation.

	• The emergency stop signal (EMG) can be disabled by the "Emergency stop input" parameter. • For emergency stop wiring, see "2.3.1 Wiring To The Power Supply". • If an emergency stop is performed during operation, it does not stop suddenly, but stops at the set deceleration speed of the operation that was executed until the emergency stop.

<Time-chart>

Input signal	Emergency stop EMG (b contact)	ON / OFF	
Controller Display lamp	Servo lamp	ON / OFF	
	Alarm lamp	ON / OFF	
PD(in)	Operation preparation complete	ON / OFF	
	Alarm (Negative logic)	ON / OFF	

Emergency stop   Emergency stop release
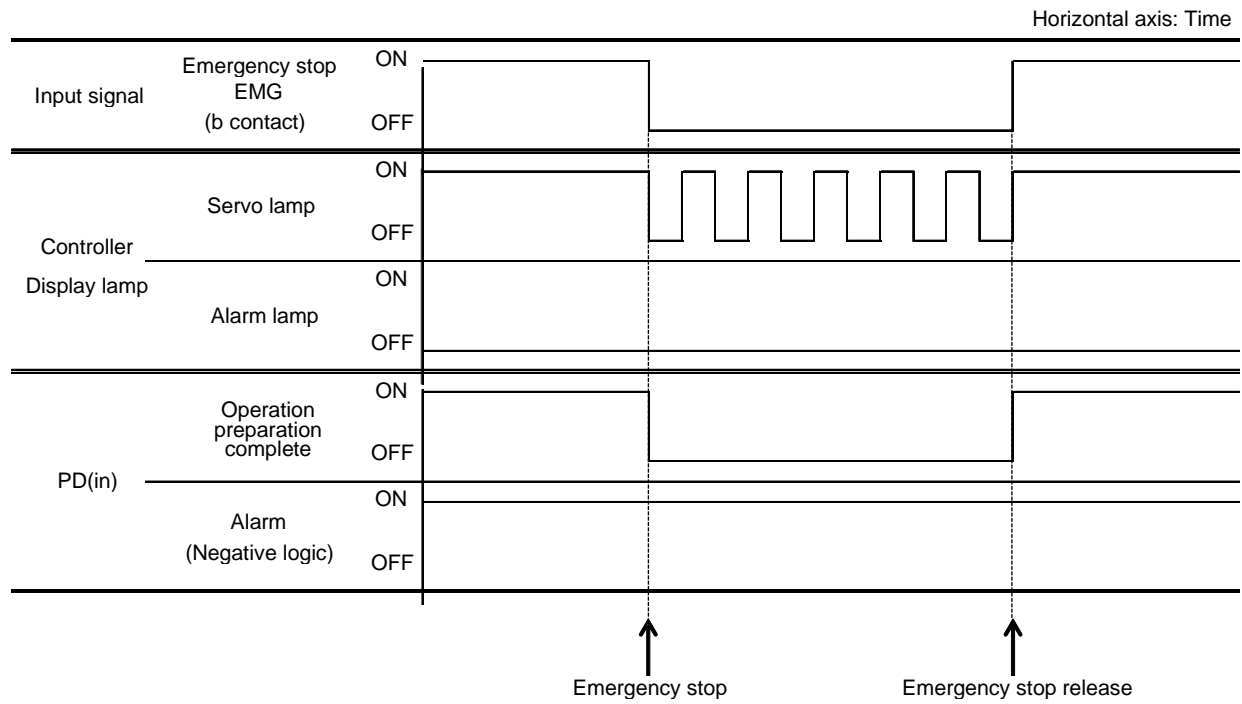
3.7.2. Forced Release Of Brake

> ⚠️ **WARNING**
>
> ❗ **Always set the input for force brake release (BRK) to either 0 VDC or open state during normal operation, so that the brake can be applied.**
> - When 24 VDC is applied to the force brake release (BRK), the brake is forcibly released. The moving part of the actuator may fall, causing injury or damage to the workpiece.

> ⚠️ **CAUTION**
>
> ⚠️ **Be careful of force brake release wiring disconnection.**
>
> ❗ **When clearing the brake force release, check that the actuator is safe to operate.**
> - For solenoid valve mode single / double 3 position type, the travel command signal is level input, so it may operate at the same time as the force brake release is cleared. This may cause injury or damage to the work piece.

When the force brake release signal is input (24 V applied), the electromagnetic brake is forcibly released in the actuators with brakes. If the force brake release is performed during operation, the motor will be deenergized after deceleration and stop. It operates in the same way as an emergency stop, but the electromagnetic brake is released.

<Time-chart>

Force brake release | Force brake release cleared

> 💡 • For the wiring for force brake release, see "2.3.1 Wiring To The Power Supply".

<Difference between emergency stop and force brake release>

Item	Startup method	Servo	Electromagnetic brake	Release method
Emergency stop	0 V applied or open state	OFF	Lock	24 VDC applied
Force brake release	24 VDC applied	OFF	Release	0 V applied or open state
Servo OFF	Input signal "Servo ON" ON -> OFF	OFF	Lock	Input signal "Servo ON" OFF → ON

3.7.3. Operation Of Servo ON/OFF

> ## ⚠ WARNING
>
> ⚠ **When turning the servo OFF, check that it is safe even if the actuator stops.**
> • If the servo is turned OFF during operation, the moving part may fall, causing injury or damage to the workpiece.

> ## ⚠ CAUTION
>
> **When turning the servo ON, check that the actuator operates safely.**
> • The travel command signal is level input for the solenoid valve mode single / double 3-position type, so it may operate simultaneously with servo ON. This may cause injury or damage to the work piece.

If the servo is turned OFF during operation, the motor will be de-energized after deceleration and stop. While the servo is OFF, the output signal of ready for operation is turned off, and in the case of an actuator with a brake, the electromagnetic brake is locked.

<Time-chart>

Horizontal axis: Time
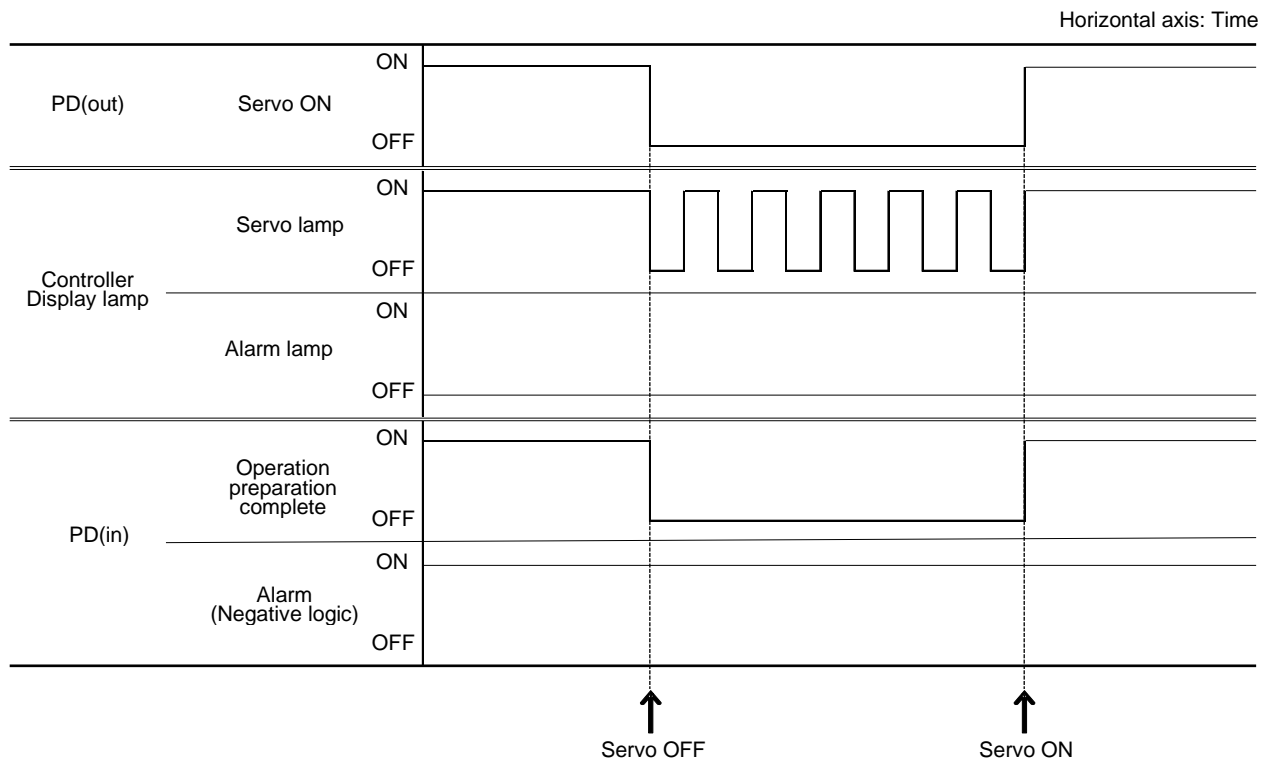
> ● Servo ON / OFF operation by input signal "Servo ON" is not accepted when operation by S-Tools is enabled.

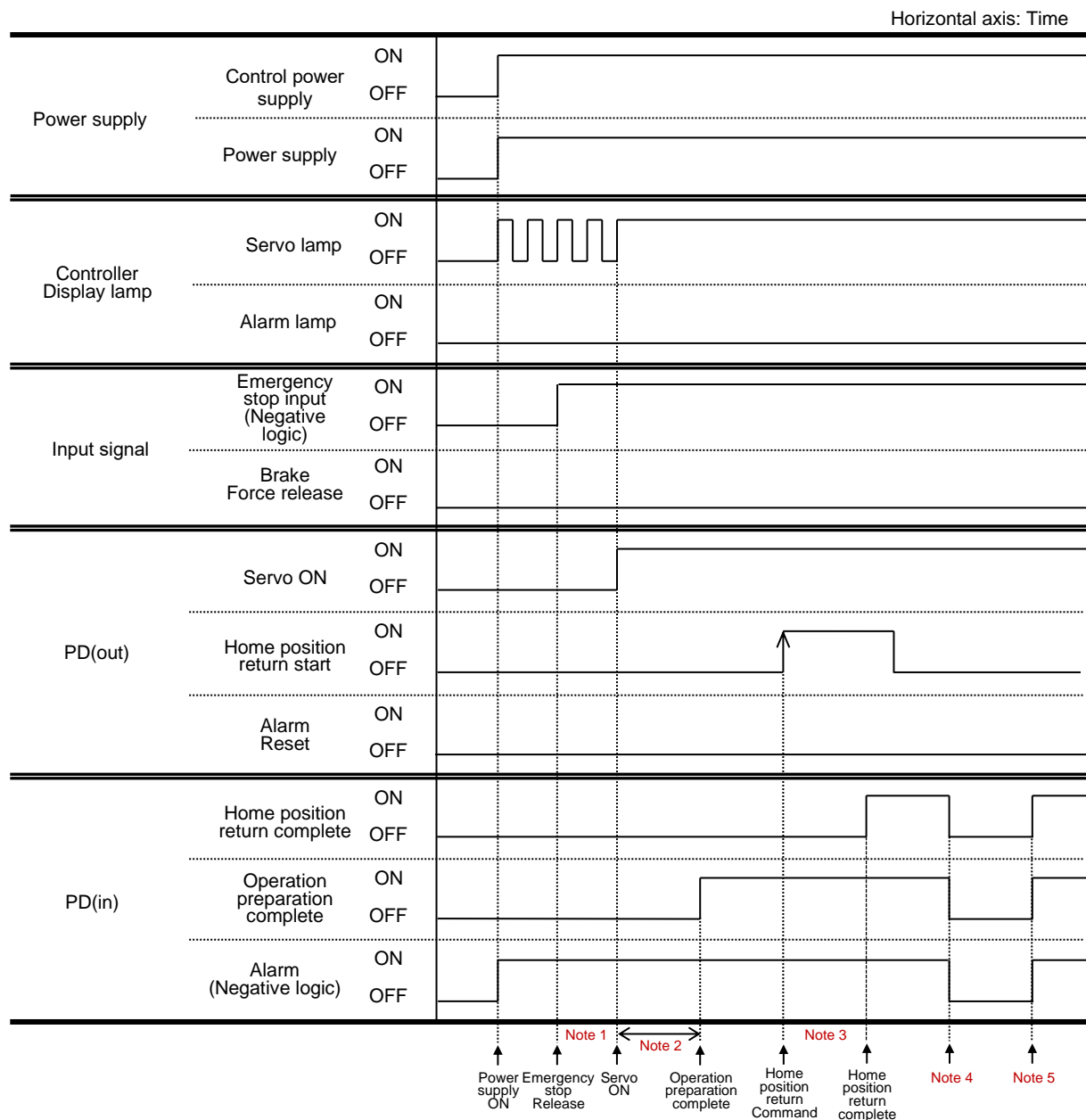## 3.7.4. Power-on Sequence

⚠ **CAUTION**

ⓘ **Do not change the power supply voltage after turning on the power.**
• The actuator may not operate normally when executing the travel.

The diagram on the next page shows the time-chart from when the home position return is started after power on to when the home position return is completed.
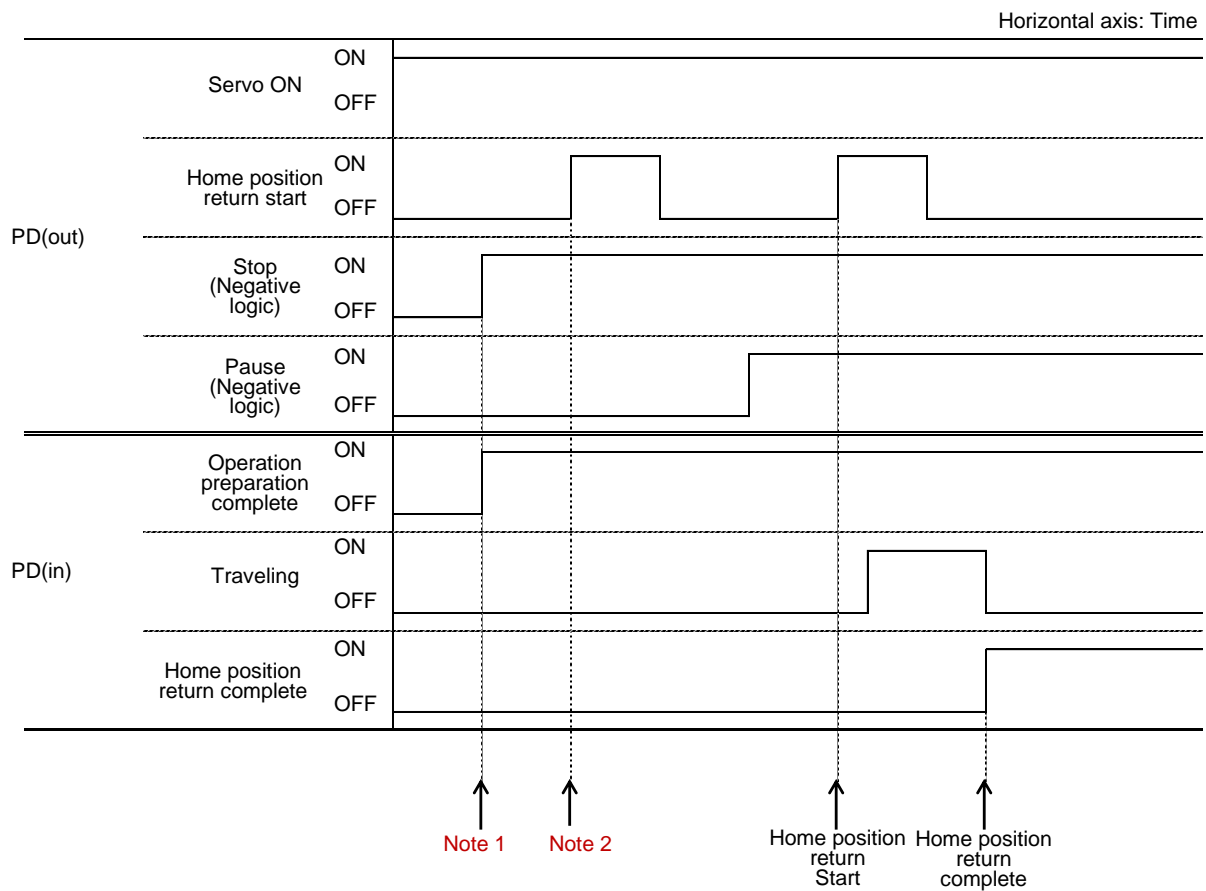
\<Time-chart\>

Horizontal axis: Time

Power supply	Control power supply	ON / OFF
Power supply	Power supply	ON / OFF
Controller Display lamp	Servo lamp	ON / OFF
Controller Display lamp	Alarm lamp	ON / OFF
Input signal	Emergency stop input (Negative logic)	ON / OFF
Input signal	Brake Force release	ON / OFF
PD(out)	Servo ON	ON / OFF
PD(out)	Home position return start	ON / OFF
PD(out)	Alarm Reset	ON / OFF
PD(in)	Home position return complete	ON / OFF
PD(in)	Operation preparation complete	ON / OFF
PD(in)	Alarm (Negative logic)	ON / OFF

Power supply ON — Emergency stop Release — Servo ON — Operation preparation complete — Home position return Command — Home position return complete — Note 4 — Note 5

Note 1 — Note 2 — Note 3

Note 1: The emergency stop is not released automatically. The figure above shows the timing when it is recognized that the emergency stop is ON after the power is turned on.

Note 2: When the servo is turned ON for the first time after the power is turned on, it takes 2s to 10s to complete the operation preparation depending on the position of the stroke.

Note 3: Operation when automatic home position return of parameter is disabled.

Note 4: Operation when S-Tools operation is enabled (TOOL mode).

Note 5: Operation when S-TOOLS operation is disabled (PLC mode).

- Due to the use of a stepping motor, excitation phase detection is performed following the first servo ON after turning the power on.

■ Effect of stop and pause signals on operation

After turning on the power, turn on the stop and pause before turning on a travel command such as the home position return start. Actuator cannot be operated while the stop or pause is OFF.

<Time chart>

Horizontal axis: Time

PD(out)		
Servo ON	ON / OFF	
Home position return start	ON / OFF	
Stop (Negative logic)	ON / OFF	
Pause (Negative logic)	ON / OFF	

PD(in)		
Operation preparation complete	ON / OFF	
Traveling	ON / OFF	
Home position return complete	ON / OFF	

Note 1   Note 2   Home position return Start   Home position return complete

Note 1: While the stop is OFF, the operation preparation complete does not turn ON even when the servo is ON, and actuators do not operate even when a travel command such as the home position return start is turned ON.
Note 2: While the pause is OFF, actuators do not operate even if a travel command such as home position return start is turned ON.

3.7.5. Home Position Return Operation

⚠ **CAUTION**

🛈 **If contacting with the workpiece while returning to the home position, the home position may be displaced.**

💡 ● The acceleration and deceleration when home position return is 0.3G when using ECG-A Series and 0.1G when using ECG-B Series.

■ EBS/EJSG/EBR (incremental encoder)

Home position return operation is performed according to the parameters in the table below.

Setting items	Overview	Setting range		Initial value	Unit
Home position return direction (coordinate axis) **Note 1**	Set the direction of the home position return to "normal (standard coordinate)" or opposite (standard coordinate), or opposite (inverted coordinate)".	Normal (standard coordinate), opposite (standard coordinate), and opposite (inverted coordinate)		Normal (standard coordinate)	None
Home position return speed	Sets the speed for home position return	5 to 20		20	mm/s
Home position offset amount	Set the offset amount for the home position.	Home position return direction (coordinate axis) = normal (standard coordinate), opposite (inverted coordinate)	0.00 to + stroke	0.00	mm
		Home position return direction (coordinate axis)= opposite (standard coordinate)	- stroke to 0.00		
Automatic home position return	When setting to "enabled", home position return is performed at the first movement command input after the controller is powered on, and the movement starts at the second travel command input.	Disabled, enabled		Disabled	None

Note 1: If the software version is old, opposite (inverted coordinate) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

The table below shows the "home position return direction (coordinate axis)" setting when "home position offset amount" = 0 mm and the relationship between the home position and the coordinate axes.

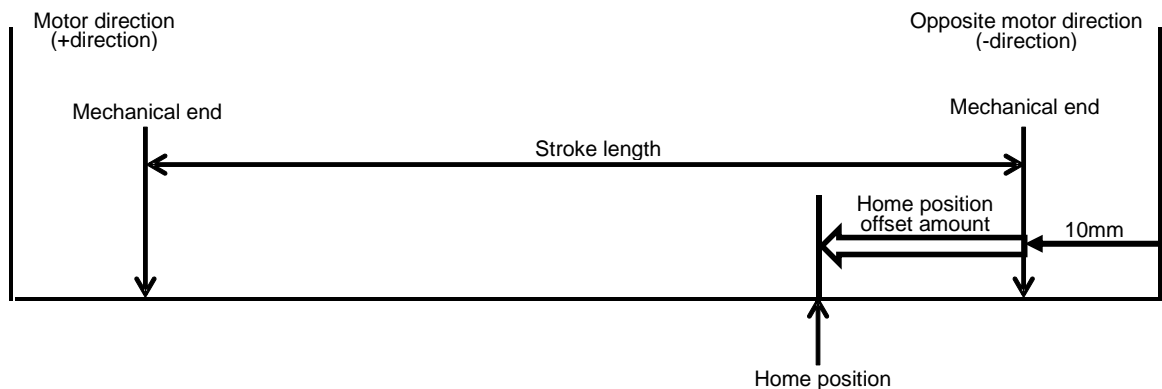| Home position return direction (coordinate axis)	Home position	+ direction	- dorectionD
Normal (standard coordinate)	10 mm from motor side mechanical end to opposite motor direction	Opposite motor direction	Motor direction
Opposite (standard coordinate)	10 mm from opposite motor side mechanical end to motor direction	Opposite motor direction	Motor direction
Opposite (inverted coordinate)	10 mm from opposite motor side mechanical end to motor direction	Motor direction	Opposite motor direction

<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">

Motor direction
(-direction)

Opposite motor direction
(+direction)

Mechanical end

Mechanical end

Stroke length

10 mm

Home position
offset amount

Home position

<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (standard coordinate)">
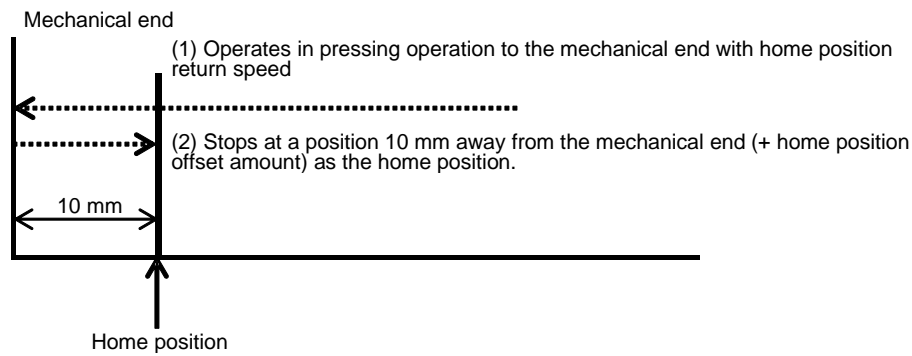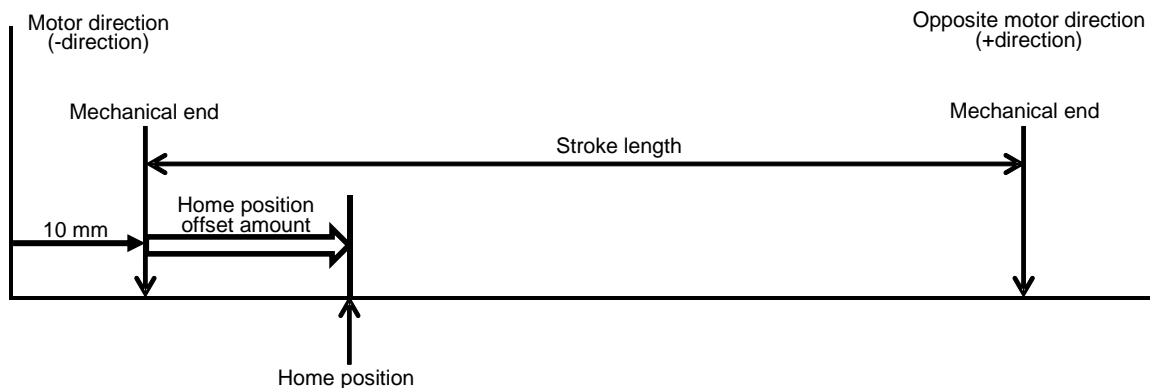
Motor direction
(-direction)

Opposite motor direction
(+direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

10 mm

Home position

<Home position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">

Motor direction
(+direction)

Opposite motor direction
(-direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

10mm

Home position

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< Operation when returning to home position>

When the home position return is performed, it travels to the mechanical end in pressing operation, and after traveled to the mechanical end, it operates with the position 10 mm away from the mechanical end as the home position.

Mechanical end

(1) Operates in pressing operation to the mechanical end with home position return speed

(2) Stops at a position 10 mm away from the mechanical end (+ home position offset amount) as the home position.

10 mm

Home position

<Time-chart>

Horizontal axis: Time

PD(out) — Home position return Start — ON / OFF

Displacement

Home position
Mechanical end

PD(in) — Home position return complete — ON / OFF

Operation preparation complete — ON / OFF

Home position return Start

Home position return complete

■ EBS/EJSG/EBR (Absolute encoder)

Home position return operation is performed according to the parameters in the table below.

Setting items	Overview	Setting range		Initial value	Unit
Home position return direction (coordinate axis) **Note 1**	Set the direction of the home position return to "normal (standard coordinate)" or opposite (standard coordinate), or opposite (inverted coordinate)".	Normal (standard coordinate), opposite (standard coordinate), and opposite (inverted coordinate)		Normal (standard coordinate)	None
Home position return speed	Sets the speed for home position return	5 to 20		20	mm/s
Home position offset amount	Set the offset amount for the home position.	Home position return direction (coordinate axis) = normal (standard coordinate), opposite (inverted coordinate)	0.00 to + stroke	0.00	mm
		Home position return direction (coordinate axis) = opposite (standard coordinate)	- stroke to 0.00		
Automatic home position return	Since the batteryless absolute encoder is used, automatic home position return is disabled.	Disabled, enabled		Disabled	None

Note 1: If the software version is old, opposite (inverted coordinate) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

The table below shows the "home position return direction (coordinate axis)" setting when "home position offset amount" = 0 mm and the relationship between the home position and the coordinate axes.

Home position return direction (coordinate axis)	Home position	+ direction	- direction
Normal (standard coordinate)	10 mm from motor side mechanical end to opposite motor direction	Opposite motor direction	Motor direction
Opposite (standard coordinate)	10 mm from opposite motor side mechanical end to motor direction	Opposite motor direction	Motor direction
Opposite (inverted coordinate)	10 mm from opposite motor side mechanical end to motor direction	Motor direction	Opposite motor direction

<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">

Motor direction
(-direction)

Opposite motor direction
(+direction)

Mechanical end

Mechanical end

Stroke length

10 mm

Home position
offset amount

Home position

<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (standard coordinate)">

Motor direction
(-direction)

Motor direction
(+direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

10 mm

Home position

<Home position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">

Motor direction
(+direction)

Motor direction
(-direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

10 mm

Home position

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< Operation when returning to home position>

When the home position return is performed, it moves 3 mm from the home position to the mechanical end side and then moves to the home position without pushing against the mechanical end. A batteryless absolute encoder is used, so point travel is possible even if home position return operation is not executed. The home position is 10 mm from the mechanical end.
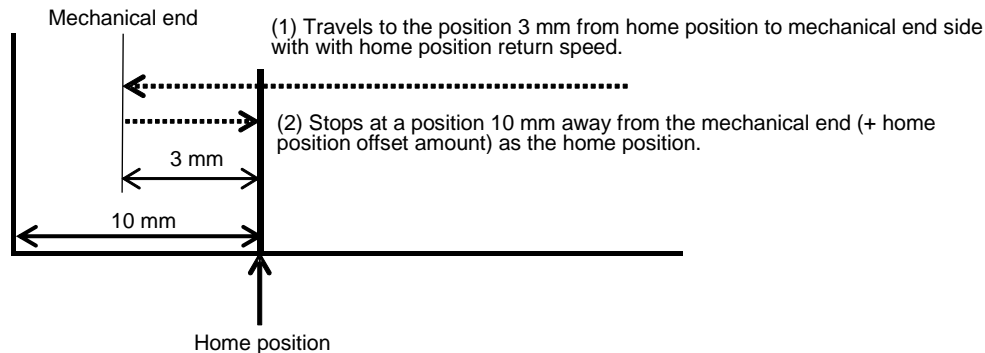
- When the home position return is performed, the operation is completed without pushing against the mechanical end. The reverse operation is not performed depending on the position at the start of the home position return.

- A "batteryless absolute encoder" is an absolute encoder that does not require a battery to store its position.

<Time-chart>
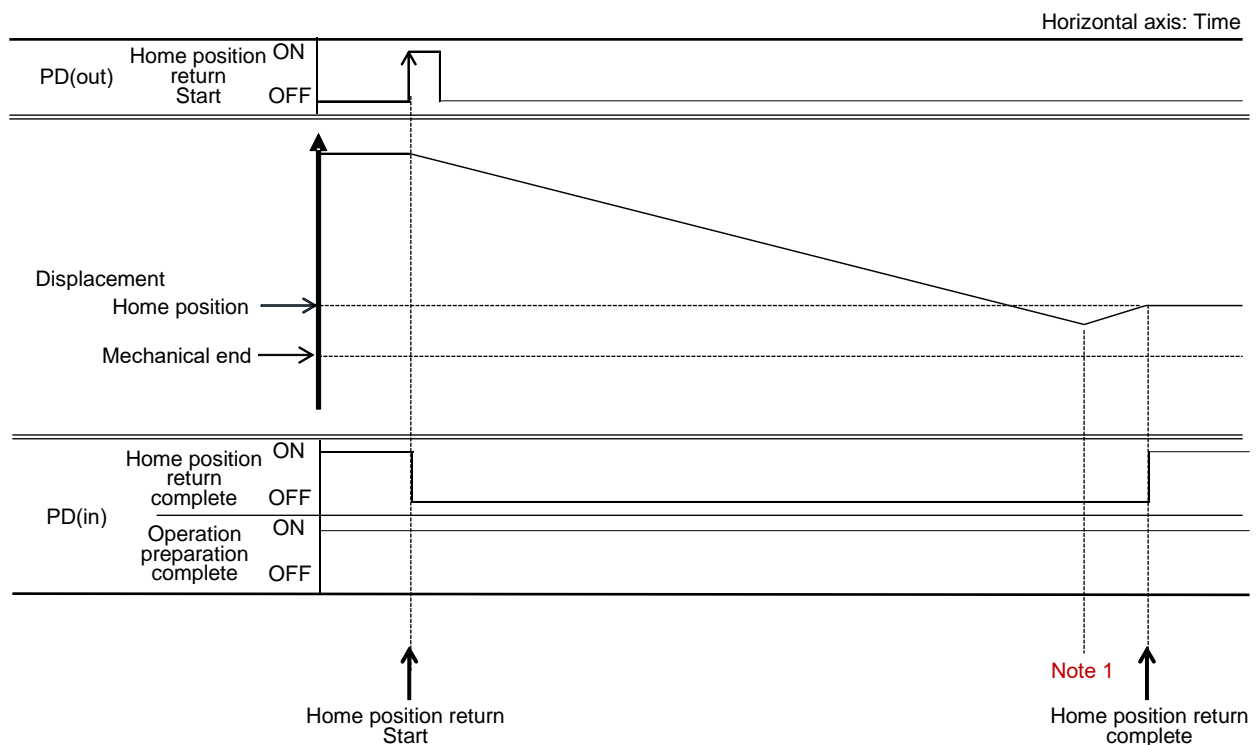
Note 1: When the home position return is performed, it moves to the home position without pushing against the mechanical end.

■ GSSD2/GSTK/GSTG/GSTS/GSTL (Incremental encoder)

Home position return operation is performed according to the parameters in the table below.

Setting items	Overview	Setting range		Initial value	Unit
Home position return direction (coordinate axis) **Note 1**	Set the direction of the home position return to "normal (standard coordinate)" or opposite (standard coordinate), or opposite (inverted coordinate)".	Normal (standard coordinate), opposite (standard coordinate), and opposite (inverted coordinate)		Normal (standard coordinate)	None
Home position return speed	Sets the speed for home position return	20 to 30		20	mm/s
Home position offset amount	Set the offset amount for the home position.	Home position return direction (coordinate axis) = normal (standard coordinate), opposite (inverted coordinate)	0.00 to + stroke	0.00	mm
		Home position return direction (coordinate axis) = opposite (standard coordinate)	- stroke to 0.00		
Automatic home position return	When setting to "enabled", home position return is performed at the first movement command input after the controller is powered on, and the movement starts at the second travel command input.	Disabled, enabled		Disabled	None

Note 1: If the software version is old, opposite (inverted coordinate) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

The table below shows the "home position return direction (coordinate axis)" setting when "home position offset amount" = 0 mm and the relationship between the home position and the coordinate axes. The value entered in A varies for each model.

Home position return direction (coordinate axis)	Home position	+ direction	- direction
Normal (standard coordinate)	A mm from motor side mechanical end to opposite motor direction	Opposite motor direction	Motor direction
Opposite (standard coordinate)	A mm from opposite motor side mechanical end to motor direction	Opposite motor direction	Motor direction
Opposite (inverted coordinate)	A mm from opposite motor side mechanical end to motor direction	Motor direction	Opposite motor direction

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<Value of A (position from mechanical end) for each model >
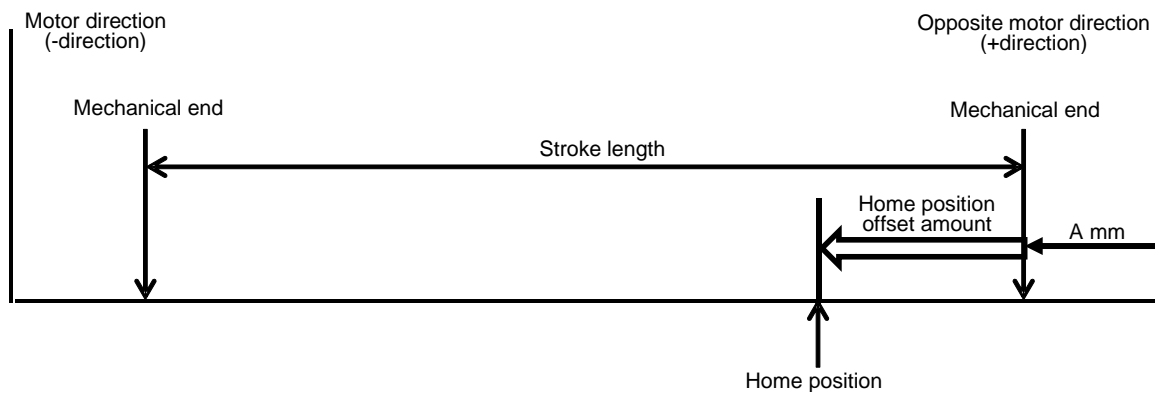
When the parameter "Home position return direction" is "Normal" and the "Home position offset amount" is "0.00", the home position will be the position from the mechanical end in the table below.

Actuator model number			Position from the mechanical end	Unit
Series	Body size	Screw lead		
GSSD2 GSTK	20	06	3.0	mm
		09		
	32	06		
		12		
	50	06		
		12		
GSTG	20	06	4.1	
		09		
	32	06	2.6	
		12		
	50	06	3.3	
		12		
GSTS GSTL	20	06	5.0	
		09		
	32	06	5.6	
		12		
	50	06	2.8	
		12		

<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">

Motor direction
(-direction)

Opposite motor direction
(+direction)

Mechanical end

Mechanical end

Stroke length

A mm

Home position
offset amount

Home position

<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (standard coordinate)">

Motor direction
(-direction)

Opposite motor direction
(+direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

A mm

Home position

<Home position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">

Motor direction
(+direction)

Opposite motor direction
(-direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

Home position

< Operation when returning to home position>

When the home position return is performed, it travels to the mechanical end in pressing operation, and after traveled to the mechanical end, it operates with the position A mm away from the mechanical end as the home position.

Mechanical end

(1) Operates in pressing operation to the mechanical end with home position return speed

(2) It stops at a position away from the mecha end by A mm (offset from the origin).

Amm

Home position

<Time-chart>

Horizontal axis: Time

PD(out)
Home position return Start — ON / OFF

Displacement

Home position
Mechanical end

PD(in)
Home position return complete — ON / OFF

Operation preparation complete — ON / OFF

Home position return Start

Home position return complete

■ GSSD2/GSTK/GSTG/GSTS/GSTL (Absolute encoder)

Home position return operation is performed according to the parameters in the table below.

Setting items	Overview	Setting range		Initial value	Unit
Home position return direction (coordinate axis) **Note 1**	Set the direction of the home position return to "normal (standard coordinate)" or opposite (standard coordinate), or opposite (inverted coordinate)".	Normal (standard coordinate), opposite (standard coordinate), and opposite (inverted coordinate)		Normal (standard coordinate)	None
Home position return speed	Sets the speed for home position return	20 to 30		20	mm/s
Home position offset amount	Set the offset amount for the home position.	Home position return direction (coordinate axis) = normal (standard coordinate), opposite (inverted coordinate)	0.00 to + stroke	0.00	mm
		Home position return direction (coordinate axis) = opposite (standard coordinate)	- stroke to 0.00		
Automatic home position return	Since the batteryless absolute encoder is used, automatic home position return is disabled.	Disabled, enabled		Disabled	None

Note 1: If the software version is old, opposite (inverted coordinate) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

The table below shows the "home position return direction (coordinate axis)" setting when "home position offset amount" = 0 mm and the relationship between the home position and the coordinate axes. The value entered in A varies for each model.

Home position return direction (coordinate axis)	Home position	+ direction	- direction
Normal (standard coordinate)	A mm from motor side mechanical end to opposite motor direction	Opposite motor direction	Motor direction
Opposite (standard coordinate)	A mm from opposite motor side mechanical end to motor direction	Opposite motor direction	Motor direction
Opposite (inverted coordinate)	A mm from opposite motor side mechanical end to motor direction	Motor direction	Opposite motor direction

\<Value of A (position from mechanical end) for each model \>

When the parameter "Home position return direction" is "Normal" and the "Home position offset amount" is "0.00", the home position will be the position from the mechanical end in the table below.

Actuator model number			Position from the mechanical end	Unit
Series	Body size	Screw lead		
GSSD2 GSTK	20	06	3.0	mm
		09		
	32	06		
		12		
	50	06		
		12		
GSTG	20	06	4.1	
		09		
	32	06	2.6	
		12		
	50	06	3.3	
		12		
GSTS GSTL	20	06	5.0	
		09		
	32	06	5.6	
		12		
	50	06	2.8	
		12		

<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">

Motor direction
(-direction)

Opposite motor direction
(+direction)

Mechanical end

Mechanical end

Stroke length

Amm

Home position
offset amount

Home position

<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (standard coordinate)">

Motor direction
(-direction)

Opposite motor direction
(+direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

Amm

Home position

<Home position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">

Motor direction
(+direction)

Opposite motor direction
(-direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

Amm

Home position

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< Operation when returning to home position>

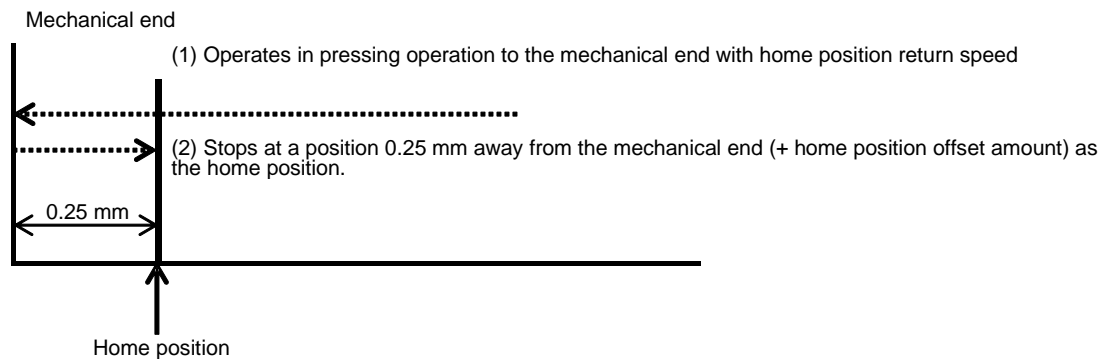When the home position return is performed, it moves 1.0mm from the home position to the mechanical end side and then moves to the home position without pushing against the mechanical end. A batteryless absolute encoder is used, so point travel is possible even if home position return operation is not executed. The home position is A mm from the mechanical end.
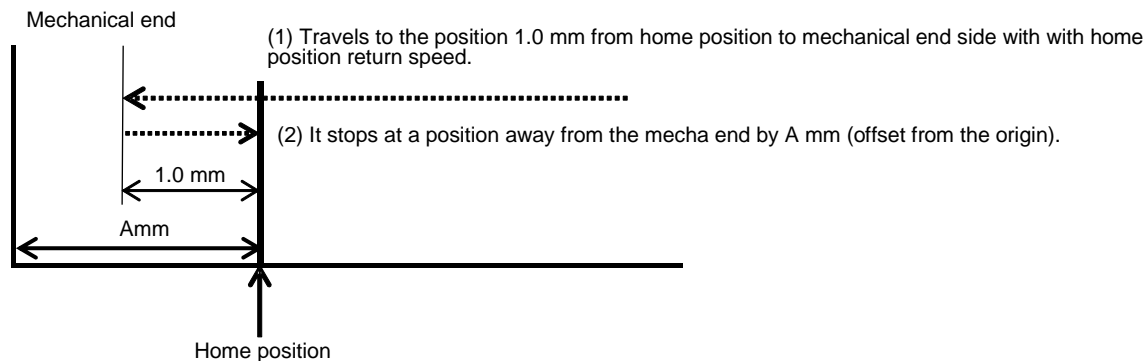
Mechanical end

(1) Travels to the position 1.0 mm from home position to mechanical end side with with home position return speed.

(2) It stops at a position away from the mecha end by A mm (offset from the origin).

1.0 mm

Amm

Home position

- When the home position return is performed, the operation is completed without pushing against the mechanical end. The reverse operation is not performed depending on the position at the start of the home position return.

- A "batteryless absolute encoder" is an absolute encoder that does not require a battery to store its position.

<Time-chart>

Horizontal axis: Time

PD(out) — Home position return Start — ON / OFF

Displacement
Home position
Mechanical end

PD(in) — Home position return complete — ON / OFF
Operation preparation complete — ON / OFF

Home position return Start

Note 1
Home position return complete
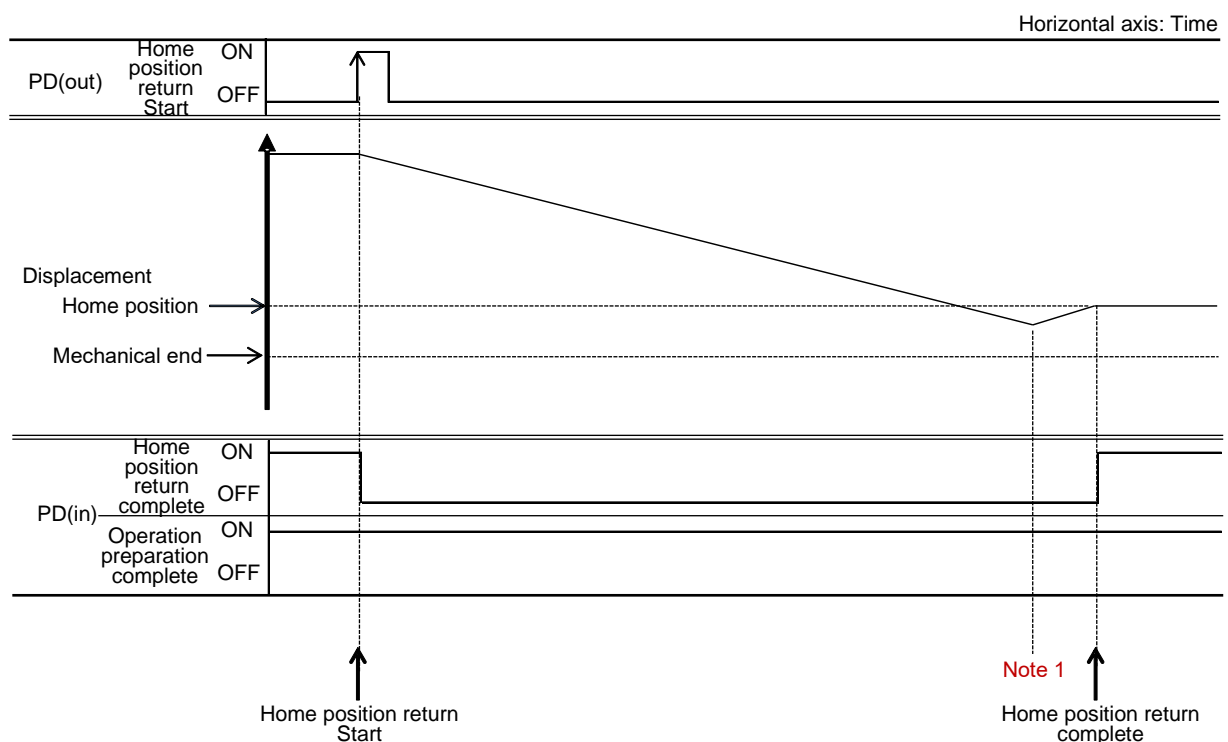
Note 1: When the home position return is performed, it moves to the home position without pushing against the mechanical end.

◾ FLSH/GCKW (incremental encoder)

Home position return operation is performed according to the parameters in the table below.

Setting items	Overview	Setting range		Initial value	Unit
Home position return direction (coordinate axis) **Note 1**	Set the direction of the home position return to "normal (standard coordinate)" or opposite (standard coordinate), or opposite (inverted coordinate)".	Normal (standard coordinate), opposite (standard coordinate), and opposite (inverted coordinate)		Normal (standard coordinate)	None
Home position return speed	Sets the speed for home position return	5 to 15		15 Note 2	mm/s
Home position offset amount	Set the offset amount for the home position.	Home position return direction (coordinate axis) = normal (standard coordinate), opposite (inverted coordinate)	0.00 to + stroke	0.00	mm
		Home position return direction (coordinate axis)= opposite (standard coordinate)	- stroke to 0.00		
Automatic home position return	When setting to "enabled", home position return is performed at the first movement command input after the controller is powered on, and the movement starts at the second travel command input.	Disabled, enabled		Disabled	None

Note 1: If the software version is old, opposite (inverted coordinate) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".
Note 2: Initial value is 20, if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

The table below shows the "home position return direction (coordinate axis)" setting when "home position offset amount" = 0 mm and the relationship between the home position and the coordinate axes.

Home position return direction (coordinate axis)	Home position	+ direction	- direction
Normal (standard coordinate)	0.25mm from the open side mechanical end to the close direction	Close direction	Open direction
Opposite (standard coordinate)	0.25mm from the close side mechanical end to the open direction	Close direction	Open direction
Opposite (inverted coordinate)	0.25mm from the close side mechanical end to the open direction	Open direction	Close direction
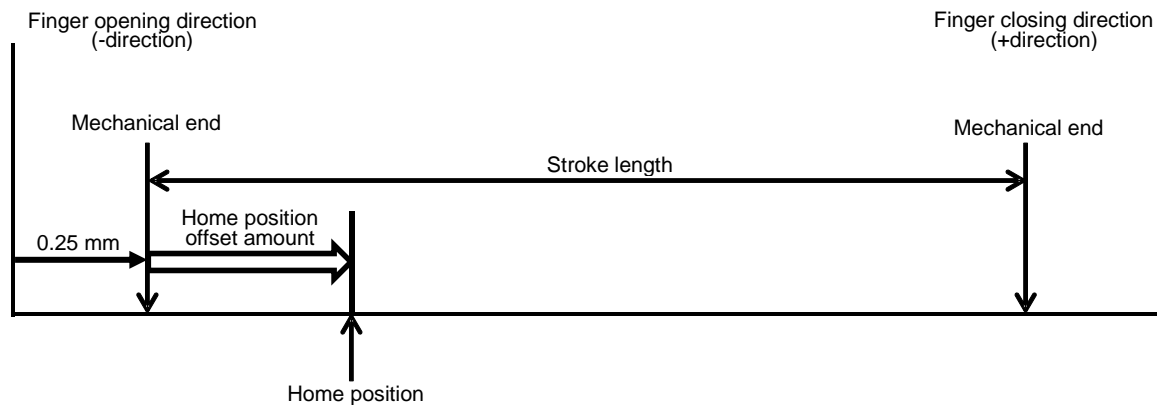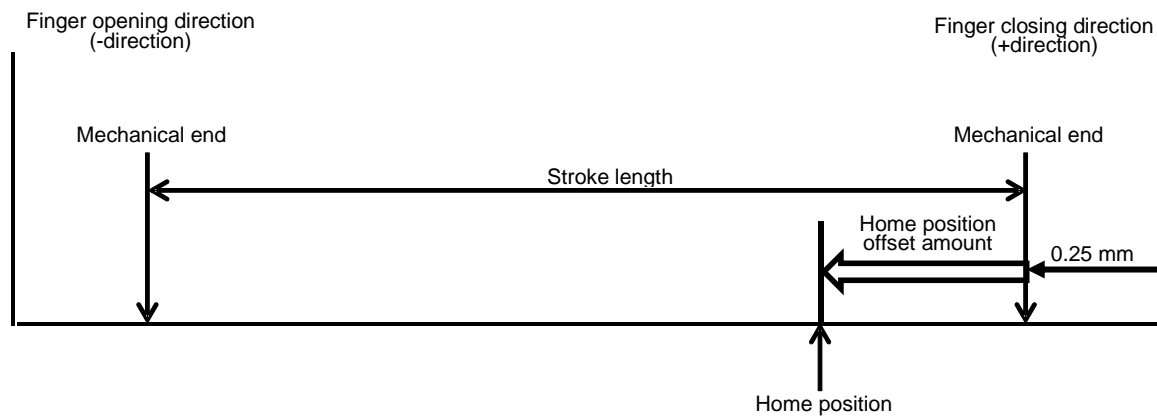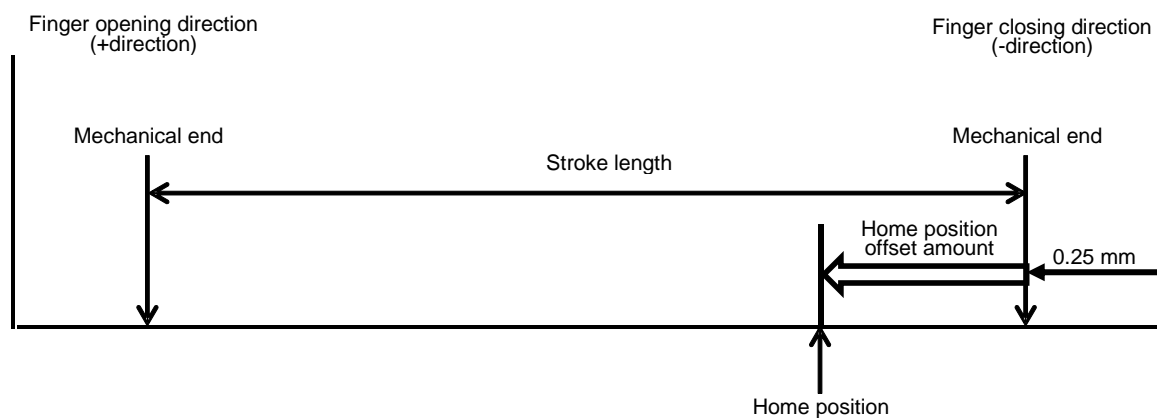
<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">

Finger opening direction
(-direction)

Finger closing direction
(+direction)

Mechanical end

Mechanical end

Stroke length

0.25 mm

Home position
offset amount

Home position

<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (standard coordinate)">
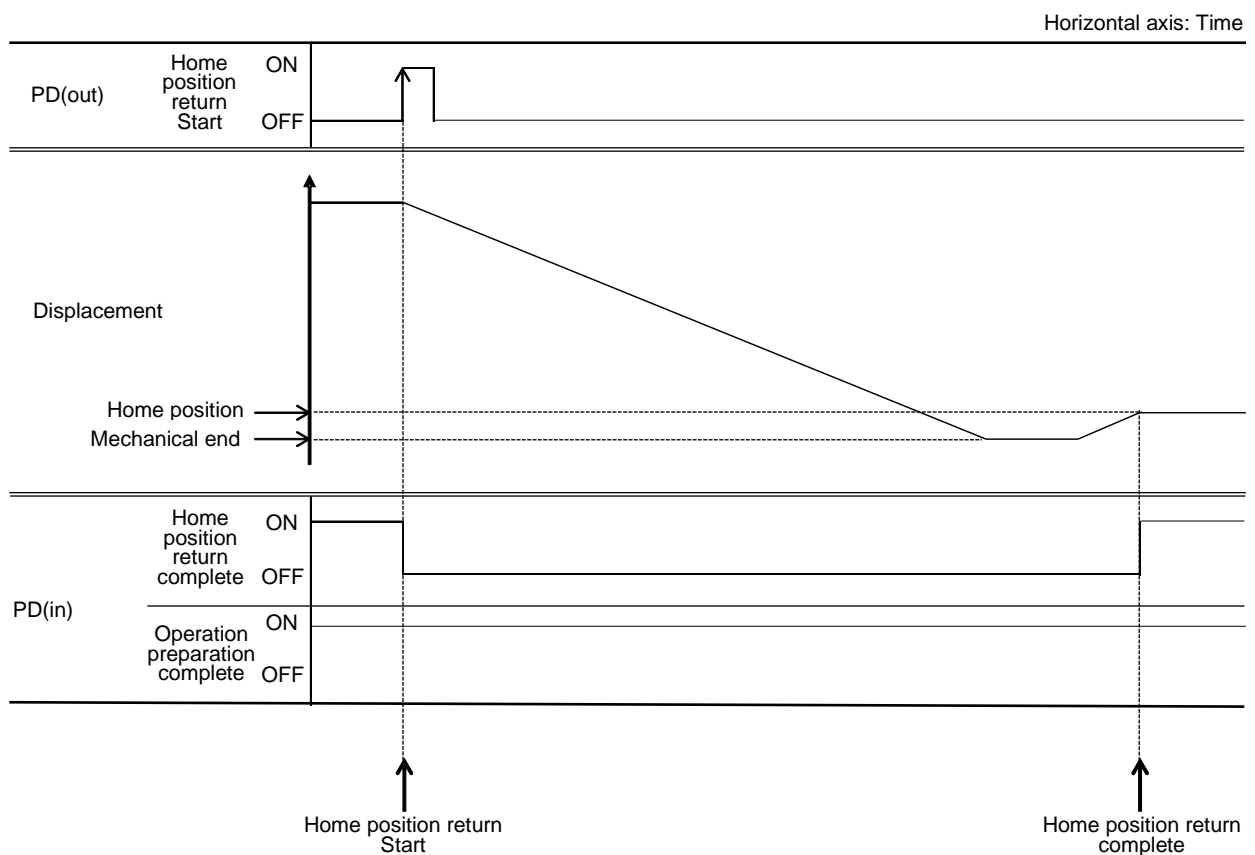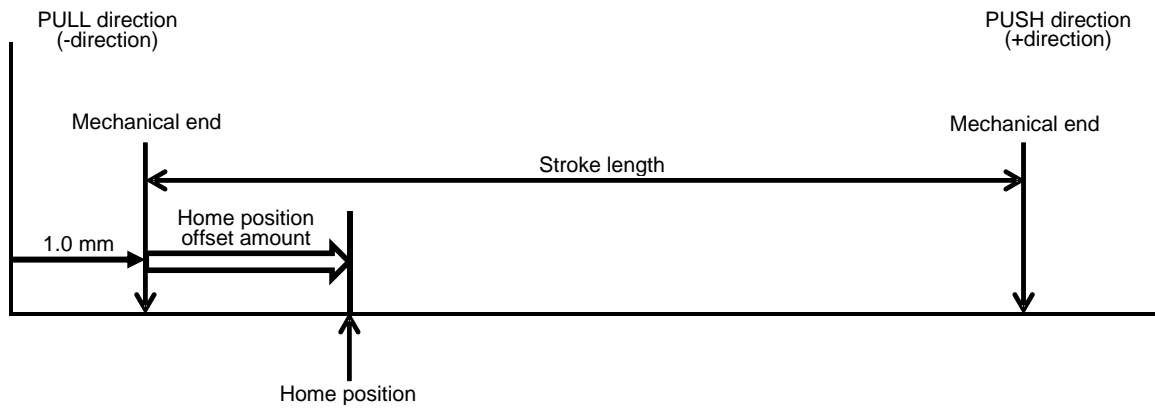
Finger opening direction
(-direction)

Finger closing direction
(+direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

0.25 mm

Home position

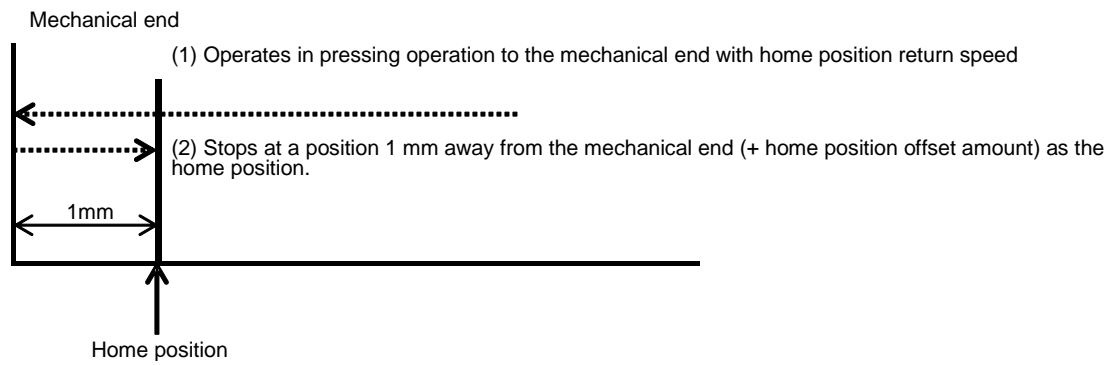**<Home position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">**

Finger opening direction
(+direction)

Finger closing direction
(-direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

0.25 mm

Home position

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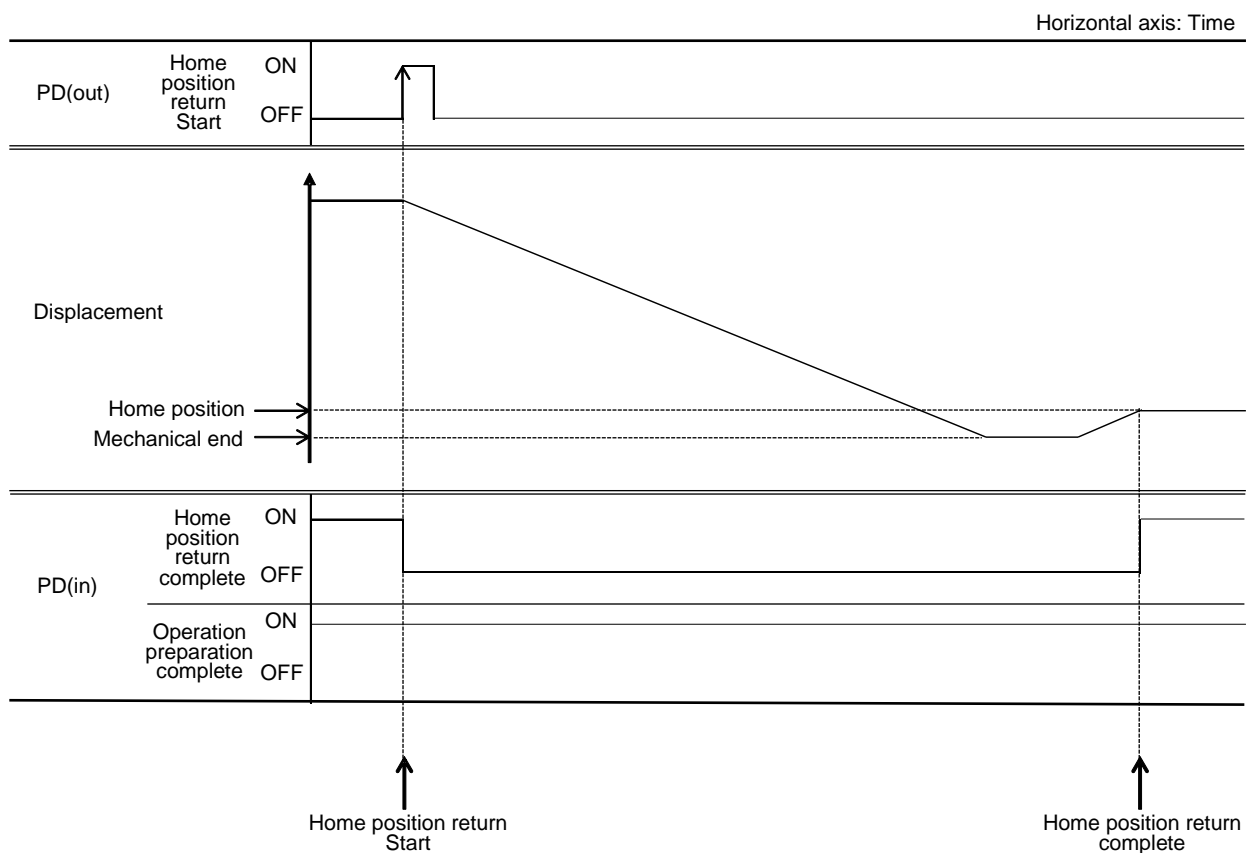
< Operation when returning to home position>

When the home position return is performed, it travels to the mechanical end in pressing operation, and after traveled to the mechanical end, it operates with the position 0.25 mm away from the mechanical end as the home position.

Mechanical end

(1) Operates in pressing operation to the mechanical end with home position return speed

(2) Stops at a position 0.25 mm away from the mechanical end (+ home position offset amount) as the home position.

0.25 mm

Home position

<Time-chart>

Horizontal axis: Time

PD(out)

Home position return Start   ON   OFF

Displacement

Home position
Mechanical end

PD(in)

Home position return complete   ON   OFF

Operation preparation complete   ON   OFF

Home position return Start

Home position return complete

■ FLCR (incremental encoder)

Home position return operation is performed according to the parameters in the table below.

Setting items	Overview	Setting range		Initial value	Unit
Home position return direction (coordinate axis) **Note 1**	Set the direction of the home position return to "normal (standard coordinate)" or opposite (standard coordinate), or opposite (inverted coordinate)".	Normal (standard coordinate), opposite (standard coordinate), and opposite (inverted coordinate)		Normal (standard coordinate)	None
Home position return speed	Sets the speed for home position return	5 to 20		15 Note 2	mm/s
Home position offset amount	Set the offset amount for the home position.	Home position return direction (coordinate axis) = normal (standard coordinate), opposite (inverted coordinate)	0.00 to + stroke	0.00	mm
		Home position return direction (coordinate axis) = opposite (standard coordinate)	- stroke to 0.00		
Automatic home position return	When setting to "enabled", home position return is performed at the first movement command input after the controller is powered on, and the movement starts at the second travel command input.	Disabled, enabled		Disabled	None

Note 1: If the software version is old, opposite (inverted coordinate) cannot be selected. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".
Note 2: Initial value is 20, if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

The table below shows the "home position return direction (coordinate axis)" setting when "home position offset amount" = 0 mm and the relationship between the home position and the coordinate axes.

Home position return direction (coordinate axis)	Home position	+ direction	- direction
Normal (standard coordinate)	1.0 mm from PULL side mechanical end to PUSH direction	PUSH direction	PULL direction
Opposite (standard coordinate)	1.0 mm from PUSH side mechanical end to PULL direction	PUSH direction	PULL direction
Opposite (inverted coordinate)	1.0 mm from PUSH side mechanical end to PULL direction	PULL direction	PUSH direction
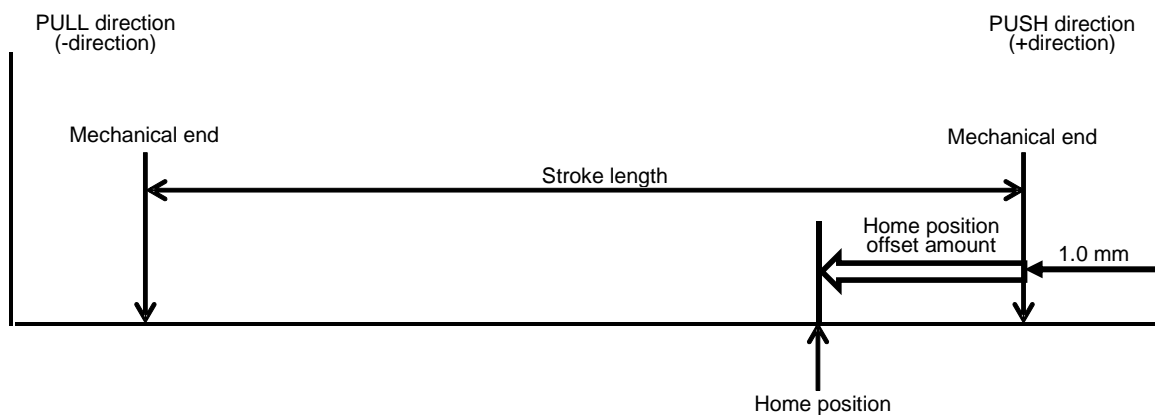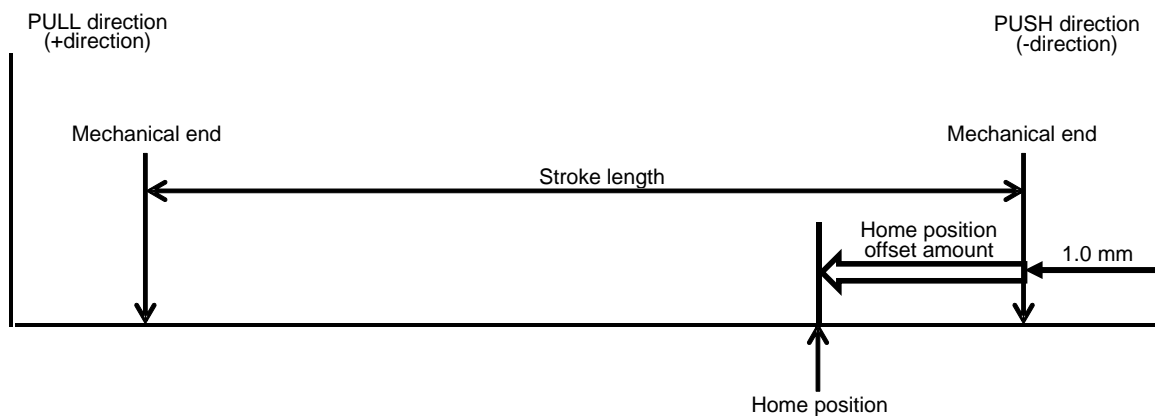
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<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">

PULL direction
(-direction)

PUSH direction
(+direction)

Mechanical end

Mechanical end

Stroke length

1.0 mm

Home position
offset amount

Home position

<Origin position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (standard coordinate)">

PULL direction
(-direction)

PUSH direction
(+direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

1.0 mm

Home position

<Home position and coordinate axis, if "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">

PULL direction
(+direction)

PUSH direction
(-direction)

Mechanical end

Mechanical end

Stroke length

Home position
offset amount

1.0 mm

Home position

< Operation when returning to home position>

When the home position return is performed, it travels to the mechanical end in pressing operation, and after traveled to the mechanical end, it operates with the position 1 mm away from the mechanical end as the home position.

Mechanical end

(1) Operates in pressing operation to the mechanical end with home position return speed

(2) Stops at a position 1 mm away from the mechanical end (+ home position offset amount) as the home position.

1mm

Home position

<Time-chart>

Horizontal axis: Time

PD(out)

Home position return Start

ON

OFF

Displacement

Home position

Mechanical end

PD(in)

Home position return complete

ON

OFF

Operation preparation complete

ON

OFF

Home position return Start

Home position return complete

■ FGRC (incremental encoder)

Home position return operation is performed according to the parameters in the table below.

Setting items	Overview	Setting range		Initial value	Unit
Home position return direction (coordinate axis)	Sets the direction of the home position return to "normal (standard coordinate)" or "opposite (standard coordinate)".	Normal (Normal Coordinates), opposite (Normal Coordinates) Note 1		Normal (standard coordinate)	None
Home position return speed	Sets the speed for home position return	20 to 30 Note 2		15 Note 3	deg/s
Home position offset amount	Set the offset amount for the home position. A positive value indicates the offset amount in the CW direction, and a negative value indicates the offset amount in the CCW direction. The offset amount can be set only in the CW direction when the home position return direction is "Normal", and only in the CCW direction when the home position return direction is "Opposite".	Home position return direction (coordinate axis) = normal (standard coordinate)	0.00 to +360.00	0.00	deg
		Home position return direction (coordinate axis) = opposite (standard coordinate)	-360.00 to 0.00		
Automatic home position return	When setting to "enabled", home position return is performed at the first movement command input after the controller is powered on, and the movement starts at the second travel command input.	Disabled, enabled		Disabled	None
FGRC home position return method Note 4	In the FGRC series, select whether to reference the position of the internal sensor or to reference the position pushed against the stopper of the external mounting when returning to home.	Sensor, pushing		Sensor	None

Note 1: Depending on the software version, opposite (inverted coordinate) can be selected, but in the FGRC Series, the setting is the same as the opposite (standard coordinate). For the correspondence of the version and controller specification, refer to "1.3.1 Version list".
Note 2: For FGRC Series, the initial value is 15 mm/s, so set again within the range of 20 to 30 mm/s.
Note 3: Initial value is 20, if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".
Note 4: This parameter is not available if the software version is old. For the correspondence of the version and controller specification, refer to "1.3.1 Version list".

<Setting/ operating example (when "FGRC home position return method" = "Sensor")>

When the parameter "Home position return direction" is "Normal" and the "Home position offset amount" is "0.00", the position of (8) will be the home position.

Also, if "Home position return direction" of the parameter is "Normal" and the "Home position offset amount" is the travel distance between (8) and (8)', the offset position (8)' will be the home position.
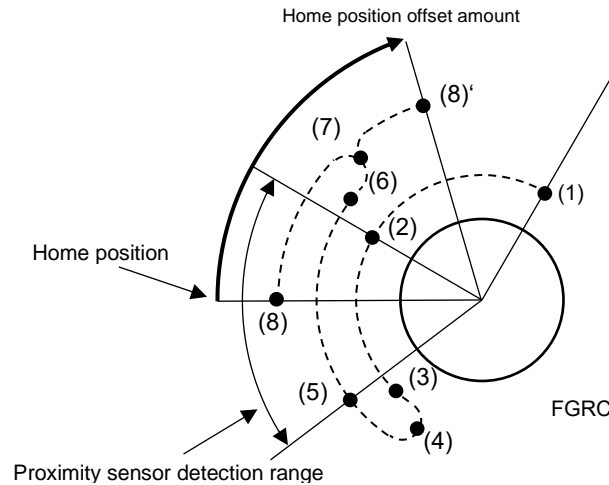
※ This is a figure of FGRC from above.

Point	Content
(1)	When home position return is commanded, home position return operation starts in the specified rotation direction.
(2)	The proximity sensor is turned on.
(3)	The proximity sensor is turned off.
(4)	Reverse movement is performed.
(5)	The proximity sensor is turned on.
(6)	The proximity sensor is turned off. The home position offset reference position is calculated from the results of (2), (3), (5), and (6).
(7)	The actuator stops once and starts the operation to the home position.
(8)	The home position return is completed when the home position offset amount is 0.00.
(8)'	When the home position offset amount is the "travel distance from (8) to (8)'", it travels the home position offset amount, and the home position return is completed at (8)'.

- If the home position return direction is "Normal," an operation is started counterclockwise (in the CCW direction).
- If the home position return direction is "Opposite," an operation is started clockwise (in the CW direction).
- If there is an obstacle within the detection range of the proximity sensor, the home position return will not be completed.
- When traveling the home position offset amount, the rotation direction can not be specified. When the home position return direction is "Normal", it moves clockwise (CW direction). When the home position return direction is "Opposite", it moves counterclockwise.

<Time-chart>

<Setting/ operating example (when "FGRC home position return method" = "Pushing")>
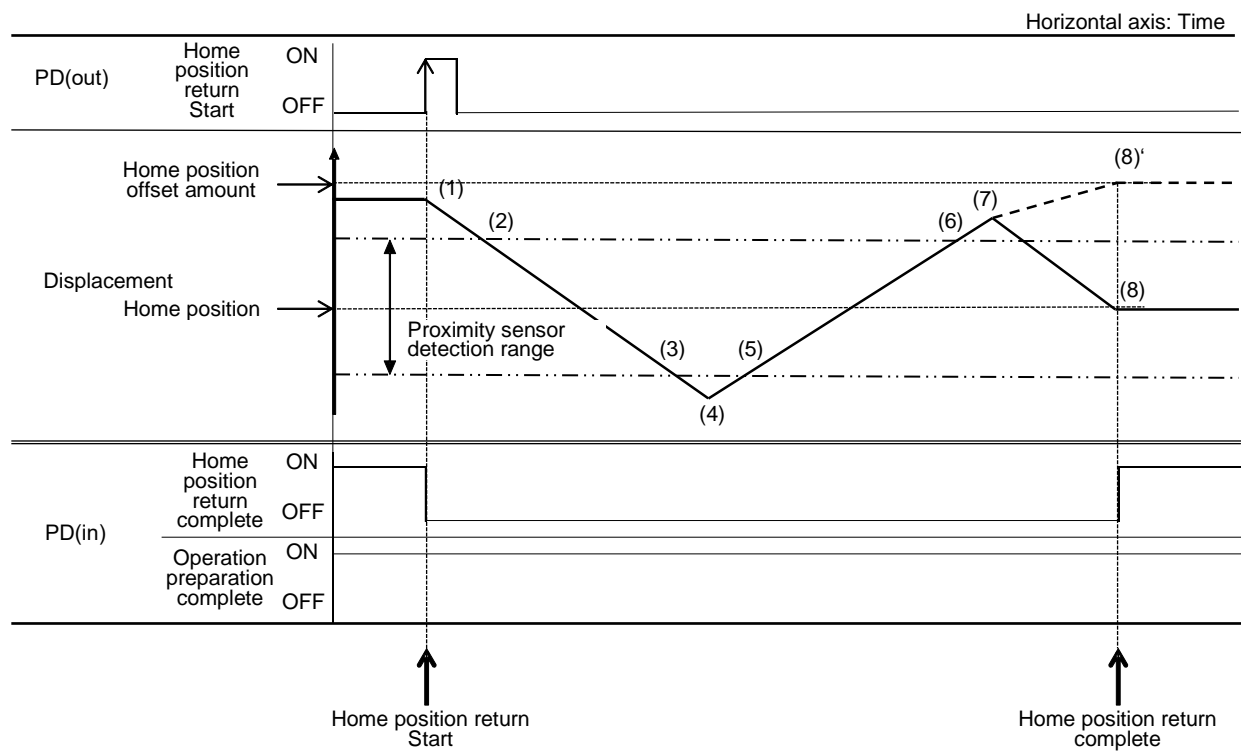
The following example shows the operation when the parameter "Home position return direction (coordinate axis)" is "Normal (standard coordinate)".

1. When home position return start command is input, it will rotates counterclockwise from the "Home position return start position (A)".
2. It will be pushed to the external stopper (B).
3. If the home position offset amount is 0.00, the home position is the position 2 deg inverted from the position of the "external stopper (B)".
4. If the home position offset amount is between 0.01 and 360.00, the home position is the position with the home position offset amount rotated clockwise from the position of the "home position (C)".

Home position (C)

2 deg

External stopper (B)
Note 1

Home position when home position offset amount is set (C')

Home position return start position (A)
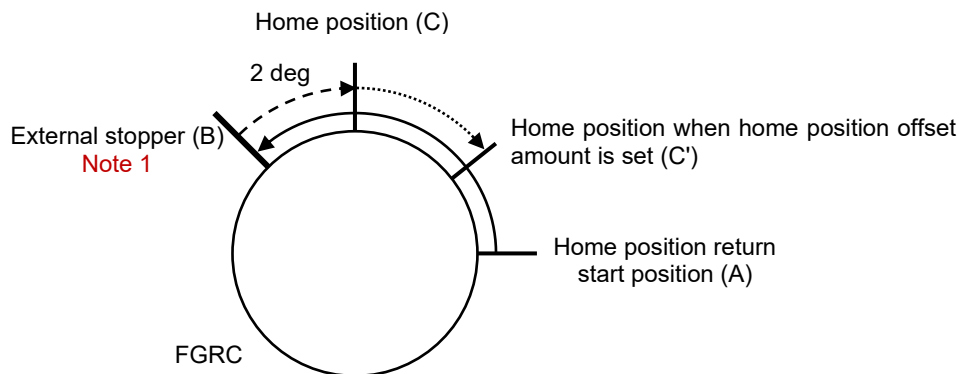
FGRC

Note 1: External stopper and pushing jig are customer-supplied.
※ This is a figure of FGRC from above.

- If the home position return direction is "Normal," an operation is started counterclockwise (in the CCW direction).
- If the home position return direction is "Opposite," an operation is started clockwise (in the CW direction).
- If an obstacle is placed in the range between (B) to (C), it recognizes the position 2 deg inverted from the position where collided with the obstacle as the home position.
- If an obstacle is placed in the range between (B) to (C), the home position return is not completed.
- When traveling the home position offset amount, the rotation direction can not be specified. When the home position return direction is "Normal", it moves clockwise (CW direction). When the home position return direction is "Opposite", it moves counterclockwise.

Time chart(when "FGRC home position return method = "Pushing")>

Horizontal axis: Time

PD(out) — Home position return Start: ON / OFF

Displacement
- Home position
- External stopper

PD(in) — Home position return complete: ON / OFF
Operation preparation complete: ON / OFF

Home position return Start

Home position return complete

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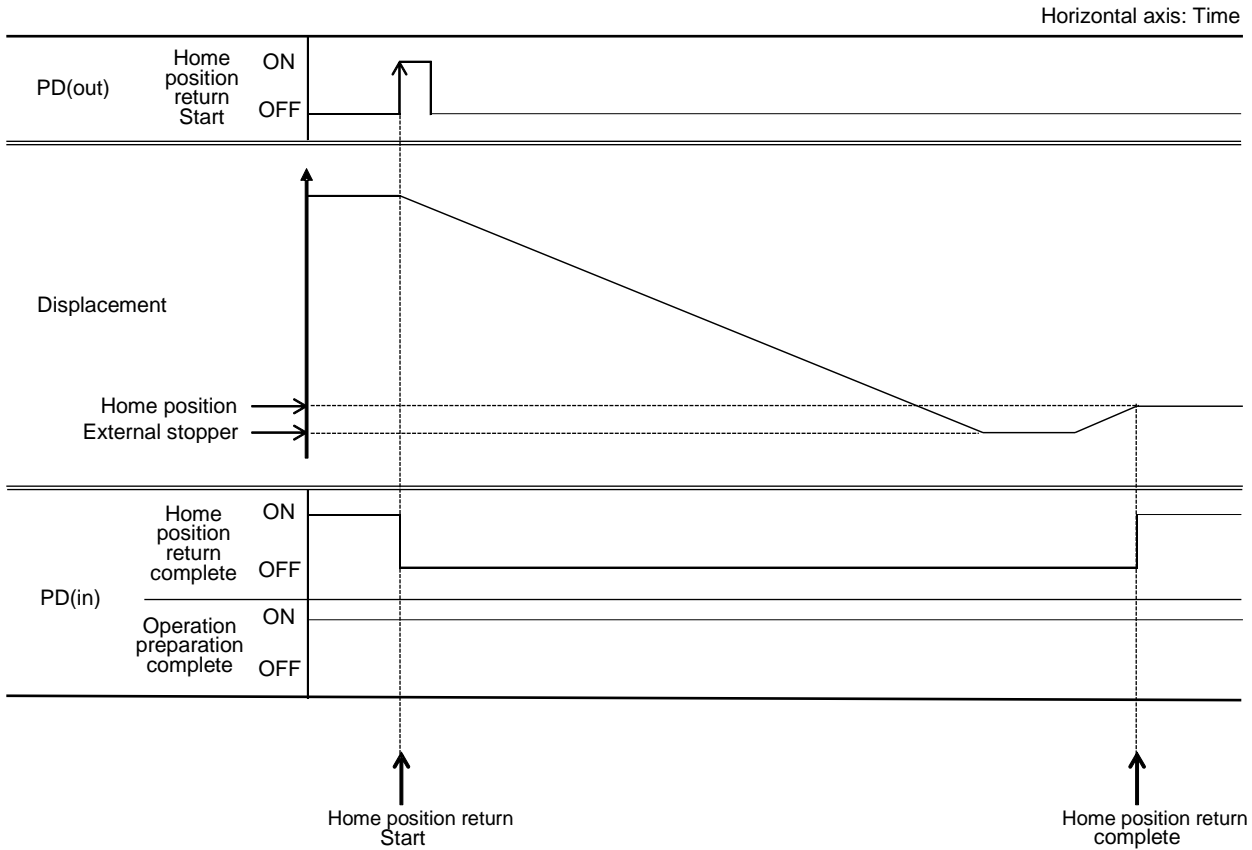
3.7.6. Positioning Operation

■ 64-point mode

<Point operation>

After specifying the point number with the point number selection bit, turn the point travel start signal ON (edge input) to start traveling. Use the following input and output signals for operation.

<Input signal>

General purpose input 0 to 5 / Point number selection bit 0 to 5	Content
-	Sets the point No. in binary.

0: OFF (level input), 1: ON (level input), 1↑: ON (edge input)

General purpose input 6 / Point travel start	Content
1↑	Begins traveling to a point. Operates to the point set by the point number selection bit.

0: OFF (level input), 1: ON (level input), 1↑: ON (edge input)

<Output signal>

General purpose output 0 to 5 / Point number selection bit 0 to 5	Content
-	Outputs the point No. that has been traveled to in binary.

0: OFF, 1: ON

General purpose output 6 / Point travel completion	Content
1	Turns ON when it finishes traveling to the set point.

0: OFF, 1: ON

✎ ● When an alarm occurs, the upper 1 digit of the alarm code is output in binary.

<Setting example>

General purpose input 0	General purpose input 1	General purpose input 2	General purpose input 3	General purpose input 4	General purpose input 5	General purpose input 6	Content
1	0	0	0	0	0	1↑	Travel start to point 1
0	0	0	1	0	0	1↑	Travel start to point 8
1	1	1	1	1	1	1↑	Travel start to point 63

0: OFF (level input), 1: ON (level input), 1↑: ON (edge input)

\<Operation method\>

1. Set the point number

Set the point number with the point number selection bit.

2. Turn ON the point travel start

3. Confirm that the point travel completion is turned ON

The point number check bit outputs the set point number.
Then confirm that the point travel completion is turned on.

<Time-chart>
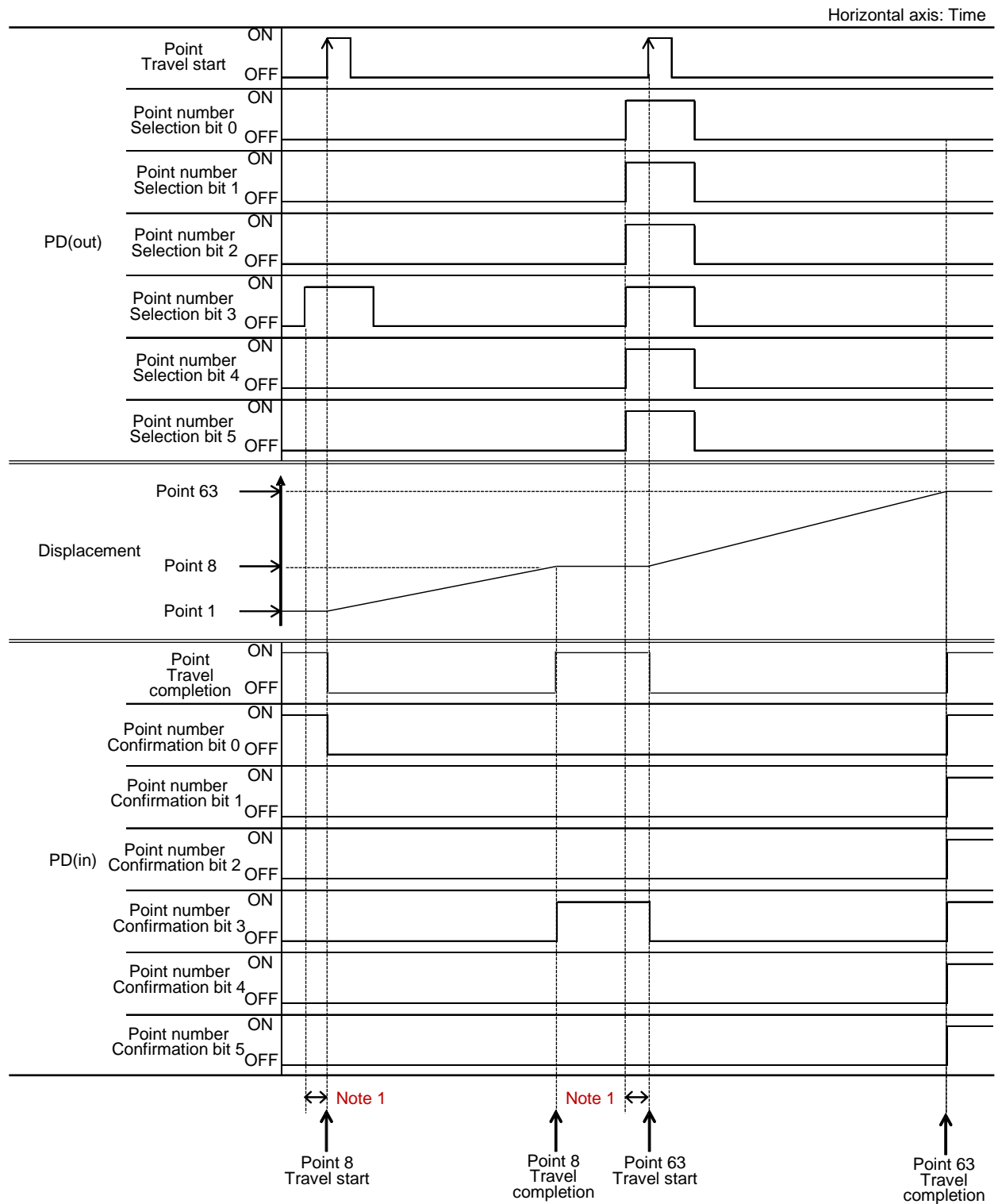
Note 1: Leave an interval of at least 10 ms after setting point number selection and travel start ON.

\<Jog operation\>

Use the following input and output signals for operation.

General purpose input 7	General purpose input 8	Content
JOG (-) travel start	JOG (+) travel start	
0	1↑	Starts JOG operation to the opposite motor side.
X	0	Stops JOG operation to the opposite motor side.
1↑	0	Starts JOG operation to the motor side.
0	X	Stops JOG operation to the motor side.

0: OFF (level input), 1↑: ON (edge input), x: Not specified (regardless of ON/OFF state)

※ The JOG speed can be set by the JOG speed parameter. For details, refer to "JOG/INCH speed" of "3.5.1Parameter List".

\<Operation method\>

1. Set the JOG speed

Set the JOG speed of the parameter arbitrarily.

2. Turn ON JOG travel start

To operate in the + direction, turn ON the JOG (+) travel start.
To operate in the - direction, turn ON the JOG (-) travel start.

3. Turn OFF JOG travel start

When the actuator travels to the target position, turn OFF the JOG (+) travel start or the JOG (−) travel start that was ON.

\<Time-chart\>
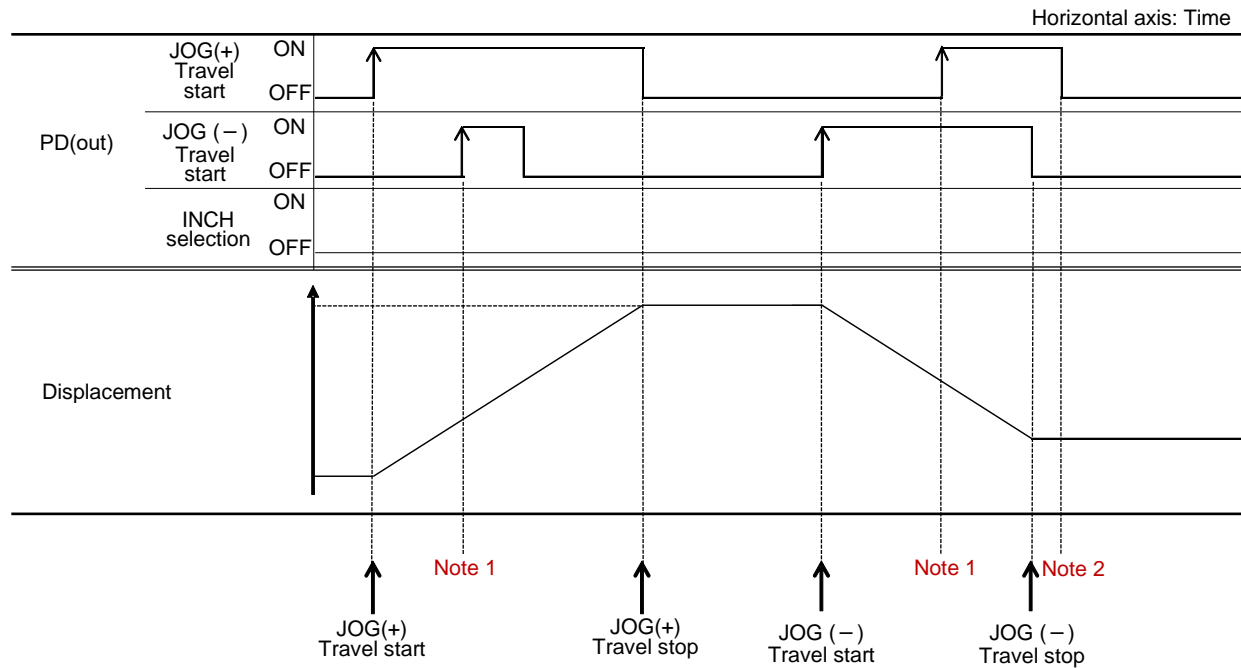
Note 1: When the jog travel start (-) is performed in the - direction, the travel command will not be accepted even if the jog travel start (+) command in the + direction is turned ON.
Note 2: The jog travel start command that is continuously turned on takes precedence, and unless it is turned off once, the jog travel start command in the opposite direction is not accepted.
※ When the operation mode (IO-Link) is other than PIO mode, INCH selection must be OFF.

💡	• Jog operation can be executed even when the home position return is not completed. Even when the automatic home position return is "enabled" and the home position return is not completed, the home position return is not executed before jog operation. • Jog operation is a function to perform teaching, etc. When using FGRC Series, the operation may become unstable if you continue to rotate more than 360 deg in a certain direction.

<Signal assignment in setting each operation mode: PD(out)>

Item	PIO mode	Simple direct value mode	Full direct value mode
Point number selection bit 0	PD(out)#1 bit 0	PD(out)#1 bit 0	PD(out)#1 bit 0
Point number selection bit 1	PD(out)#1 bit 1	PD(out)#1 bit 1	PD(out)#1 bit 1
Point number selection bit 2	PD(out)#1 bit 2	PD(out)#1 bit 2	PD(out)#1 bit 2
Point number selection bit 3	PD(out)#1 bit 3	PD(out)#1 bit 3	PD(out)#1 bit 3
Point number selection bit 4	PD(out)#1 bit 4	PD(out)#1 bit 4	PD(out)#1 bit 4
Point number selection bit 5	PD(out)#1 bit 5	PD(out)#1 bit 5	PD(out)#1 bit 5
Point travel start	PD(out)#0 bit 2	PD(out)#0 bit 2	PD(out)#0 bit 2
JOG (-) travel start	PD(out)#0 bit 0	PD(out)#0 bit 0	PD(out)#0 bit 0
JOG (+) travel start	PD(out)#0 bit 1	PD(out)#0 bit 1	PD(out)#0 bit 1
INCH selection	-	PD(out)#1 bit 7	PD(out)#1 bit 7

<Signal assignment in setting each operation mode: PD(in)>

Item	PIO mode	Simple direct value mode	Full direct value mode
Point number confirmation bit 0	PD(in)#1 bit 0	PD(in)#1 bit 0	PD(in)#1 bit 0
Point number confirmation bit 1	PD(in)#1 bit 1	PD(in)#1 bit 1	PD(in)#1 bit 1
Point number confirmation bit 2	PD(in)#1 bit 2	PD(in)#1 bit 2	PD(in)#1 bit 2
Point number confirmation bit 3	PD(in)#1 bit 3	PD(in)#1 bit 3	PD(in)#1 bit 3
Point number confirmation bit 4	PD(in)#1 bit 4	PD(in)#1 bit 4	PD(in)#1 bit 4
Point number confirmation bit 5	PD(in)#1 bit 5	PD(in)#1 bit 5	PD(in)#1 bit 5
Point travel completion	PD(in)#0 bit 2	PD(in)#0 bit 2	PD(in)#0 bit 2

■ Simple 7-point mode

<Point operation>
Traveling starts when the point travel start signal is turned ON (edge input). Use the following input and output signals.

<Input signal>

General purpose input 0 to 6	Content
Point No. 1 to 7 travel start	
1↑	Starts traveling to corresponding point.

0: OFF (level input), 1: ON (level input), 1↑: ON (edge input)

<Output signal>

General purpose output 0 to 6	Content
Point No. 1 to 7 travel completion	
1	Turns ON when it finishes traveling to the corresponding point.

0: OFF, 1: ON

<Setting example>

General purpose input 0	General purpose input 1	General purpose input 2	General purpose input 3	General purpose input 4	General purpose input 5	General purpose input 6	Content
1↑	**0**	**0**	**0**	**0**	**0**	**0**	Travel start to point 1
0	**0**	**1↑**	**0**	**0**	**0**	**0**	Travel start to point 3
0	**0**	**0**	**0**	**0**	**0**	**1↑**	Travel start to point 7

0: OFF (level input), 1: ON (level input), 1↑: ON (edge input)

<Operation method>

1. Turn ON the point travel start
Turn ON the point travel start corresponding to the point where you want to operate.

2. Turn OFF the point travel start
Turn OFF the point travel start that was ON.

3. Confirm that the point travel completion is turned ON
Confirm that the point travel completion for the corresponding point is turned ON.

<Time-chart>

PD(out)

Point number 1 Travel start — ON / OFF

Point number 2 Travel start — ON / OFF

Point number 3 Travel start — ON / OFF

Point number 4 Travel start — ON / OFF

Point number 5 Travel start — ON / OFF

Point number 6 Travel start — ON / OFF

Point number 7 Travel start — ON / OFF

Displacement

Point 7

Point 3

Point 1

PD(in)

Point number 1 Travel completion — ON / OFF

Point number 2 Travel completion — ON / OFF

Point number 3 Travel completion — ON / OFF

Point number 4 Travel completion — ON / OFF

Point number 5 Travel completion — ON / OFF

Point number 6 Travel completion — ON / OFF

Point number 7 Travel completion — ON / OFF

Point 3 Travel start

Point 3 Travel completion

Point 4 Travel start
Note 1

Point 7 Travel start

Point 7 Travel completion

Note 1: Traveling does not start while another point number travel start input is ON.

\<Jog operation\>

The jog operation is similar to the 64-point mode. For details, refer to "64-point mode" of "3.7.6 Positioning Operation".

\<Signal assignment in setting each operation mode: PD(out)\>

Item	PIO mode
Point number 1 travel start	PD(out)#1 bit 0
Point number 2 travel start	PD(out)#1 bit 1
Point number 3 travel start	PD(out)#1 bit 2
Point number 4 travel start	PD(out)#1 bit 3
Point number 5 travel start	PD(out)#1 bit 4
Point number 6 travel start	PD(out)#1 bit 5
Point number 7 travel start	PD(out)#1 bit 6
JOG/INCH(-) travel start	PD(out)#0 bit 0
JOG/INCH(+) travel start	PD(out)#0 bit 1

\<Signal assignment in setting each operation mode: PD(in)\>

Item	PIO mode
Point number 1 travel complete	PD(in)#1 bit 0
Point number 2 travel complete	PD(in)#1 bit 1
Point number 3 travel complete	PD(in)#1 bit 2
Point number 4 travel complete	PD(in)#1 bit 3
Point number 5 travel complete	PD(in)#1 bit 4
Point number 6 travel complete	PD(in)#1 bit 5
Point number 7 travel complete	PD(in)#1 bit 6

■ Solenoid valve mode, double 2-position type

Travels between two points when turned ON (edge input).

<Input signal>

General purpose input 0	General purpose input 1	Content
Solenoid valve travel command 1	Solenoid valve travel command 2	
1↑	0	Begins traveling to point 1.
0	1↑	Begins traveling to point 2.

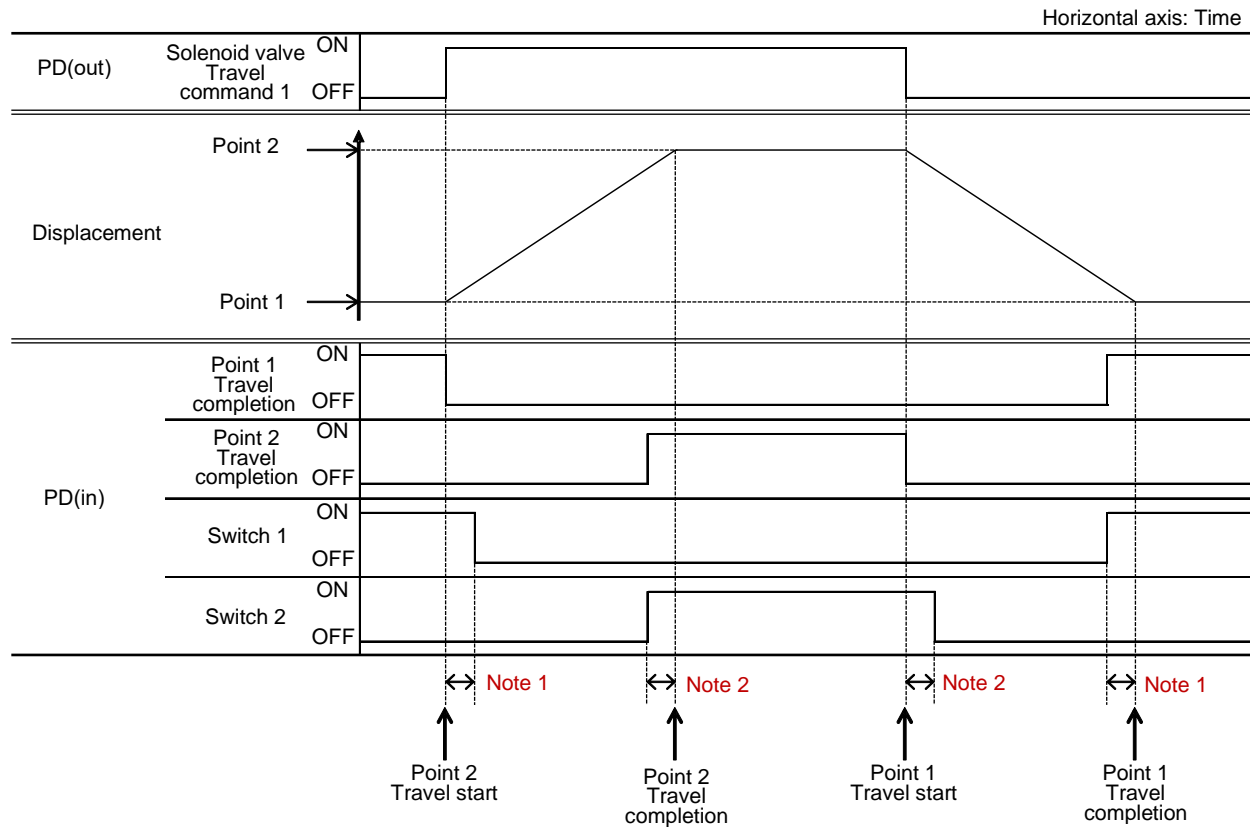0: OFF (level input), 1: ON (level input), 1↑: ON (edge input)

<Output signal>

General purpose output 0	General purpose output 1	Content
Point 1 travel complete	Point 2 travel complete	
1	0	Turns ON when it finishes traveling to point 1.
0	1	Turns ON when it finishes traveling to point 2.

0: OFF, 1: ON

General purpose output 4	General purpose output 5	Content
Switch 1	Switch 2	
1	0	Turns ON when entering the positioning completion width of point 1.
0	1	Turns ON when entering the positioning completion width of point 2.

0: OFF, 1: ON

\<Time-chart\>

Note 1: The output of switch 1 turns ON according to the positioning width set in the point data.
Note 2: The output of switch 2 turns ON according to the positioning width set in the point data.

\<Signal assignment in setting each operation mode: PD(out)\>

Item	PIO mode
Solenoid valve travel command 1	PD(out)#1 bit 0
Solenoid valve travel command 2	PD(out)#1 bit 1

\<Signal assignment in setting each operation mode: PD(in)\>

Item	PIO mode
Point number 1 travel complete	PD(in)#1 bit 0
Point number 2 travel complete	PD(in)#1 bit 1
Switch 1	PD(in)#1 bit 4
Switch 2	PD(in)#1 bit 5

■ Solenoid valve mode, double 3-position type

> ⚠ **CAUTION**
>
> ⊚ **When turning the power on again, confirm that it is safe for the actuator to operate.**
> - When turning the power on again with the automatic home position return set to "Enables", the PLC mode is automatically entered. The actuator may start moving depending on the input state of the host device (PLC, etc.).

Travels between two points when turned ON (level input).

<Input signal>

General purpose input 0	General purpose input 1	Content
Solenoid valve travel command 1	Solenoid valve travel command 2	
1	0	Begins traveling to point 1.
0	1	Begins traveling to point 2.
0	0	Suspends travel operation and stops at that point.

0: OFF (level input), 1: ON (level input), 1↑: ON (edge input)

<Output signal>

General purpose output 0	General purpose output 1	Content
Point 1 travel complete	Point 2 travel complete	
1	0	Turns ON when it finishes traveling to point 1.
0	1	Turns ON when it finishes traveling to point 2.

0: OFF, 1: ON

General purpose output 4	General purpose output 5	Content
Switch 1	Switch 2	
1	0	Turns ON when entering the positioning completion width of point 1.
0	1	Turns ON when entering the positioning completion width of point 2.

0: OFF, 1: ON

<Time-chart>

Note 1: The output of switch 1 turns ON according to the positioning width set in the point data.
Note 2: The output of switch 2 turns ON according to the positioning width set in the point data.
Note 3: When turning the solenoid valve travel command OFF, travel complete output also turns OFF.

<Signal assignment in setting each operation mode: PD(out)>

Item	PIO mode
Solenoid valve travel command 1	PD(out)#1 bit 0
Solenoid valve travel command 2	PD(out)#1 bit 1

<Signal assignment in setting each operation mode: PD(in)>

Item	PIO mode
Point number 1 travel complete	PD(in)#1 bit 0
Point number 2 travel complete	PD(in)#1 bit 1
Switch 1	PD(in)#1 bit 4
Switch 2	PD(in)#1 bit 5

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■ Solenoid valve mode, single type

⚠ **CAUTION**
⚙ **When turning the power on again, confirm that it is safe for the actuator to operate.** • When turning the power on again with the automatic home position return set to "Enables", the PLC mode is automatically entered. The actuator may start moving depending on the input state of the host device (PLC, etc.).

Travels between two points by turning one input signal OFF (level input) or ON (level input).

\<Input signal\>

General purpose input 1	Content
Solenoid valve travel command	
0	Begins traveling to point 1.
1	Begins traveling to point 2.

0: OFF (level input), 1: ON (level input), 1↑: ON (edge input)

\<Output signal\>

General purpose output 0	General purpose output 1	Content
Point 1 travel complete	**Point 2 travel complete**	
1	0	Turns ON when it finishes traveling to point 1.
0	1	Turns ON when it finishes traveling to point 2.

0: OFF, 1: ON

General purpose output 4	General purpose output 5	Content
Switch 1	**Switch 2**	
1	0	Turns ON when entering the positioning completion width of point 1.
0	1	Turns ON when entering the positioning completion width of point 2.

0: OFF, 1: ON

<Time-chart>

Note 1: The output of switch 1 turns ON according to the positioning width set in the point data.
Note 2: The output of switch 2 turns ON according to the positioning width set in the point data.

<Signal assignment in setting each operation mode: PD(out)>

Item	PIO mode
Solenoid valve travel command	PD(out)#1 bit 1

<Signal assignment in setting each operation mode: PD(in)>

Item	PIO mode
Point number 1 travel complete	PD(in)#1 bit 0
Point number 2 travel complete	PD(in)#1 bit 1
Switch 1	PD(in)#1 bit 4
Switch 2	PD(in)#1 bit 5

■ Direct value operation

\<Simple direct value mode\>

1. Check the point data settings

Check that the point data for the point number to be specified by PD (out) is set.

2. Set the position and point number

Set the position and point number in PD (out).

3. Set Direct value travel selection to ON

The order of steps 2 and 3 can be reversed.

4. Turn ON the point travel start bit

The position setting is reflected only in the operation when the point travel start bit is turned ON, and the position of the set point number is not updated.
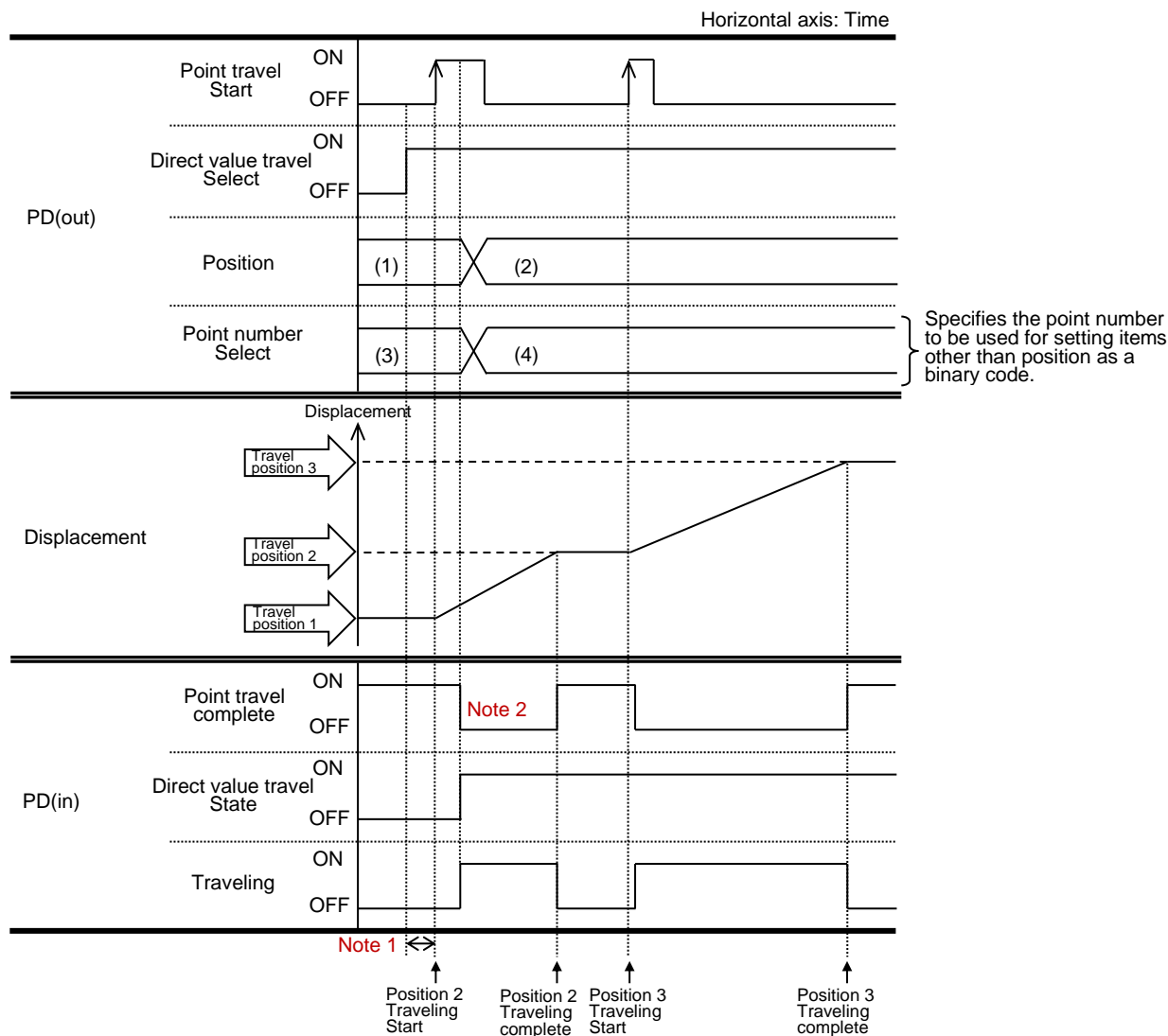
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\<Time-chart\>

Note 1: Leave an interval of at least 10 ms until the point travel start turns ON after setting of point number selection.

Note 2: Even after the point travel start is turned on, the previous point travel completion remains on until the actuator actually starts traveling, so do not make a mistake. Also, both travel complete and traveling may be ON at the same time depending on the timing.

※ (1) indicates that the position data of travel position 2 is set, and (2) indicates that the position data of travel position 3 is set.

※ In the figure above, (3) indicates the point number for which the point data to be used for operation toward travel position 2 is set, and (4) indicates the point number for which the point data to be used for operation toward travel position 3 is set. For (4), the settings of (3) can be left as they are if the point data other than position is the same as (3).

※ When the point travel is completed, point number is not set and all the point number confirmation bits are turned OFF.

※ The stop and pause operations are the same as the point operation. Refer to "3.7.10 Operation When Stop Signal Is Input During Operation" for details.

<Signal assignment in setting each operation mode: PD(out)>

Item	Simple direct value mode
Point number selection bit 0	PD(out)#1 bit 0
Point number selection bit 1	PD(out)#1 bit 1
Point number selection bit 2	PD(out)#1 bit 2
Point number selection bit 3	PD(out)#1 bit 3
Point number selection bit 4	PD(out)#1 bit 4
Point number selection bit 5	PD(out)#1 bit 5
Direct value travel selection	PD(out)#2 bit 0
Point travel start	PD(out)#0 bit 2
Stop	PD(out)#0 bit 6
Pause	PD(out)#0 bit 7
Position (0.01 mm) (0.01 deg)	PD(out)#3 to #6 Note 1

Note 1: The values on the PD(out)#6 side represent low-order bytes, and the values on the PD(out)#3 side represent high-order bytes.

<Signal assignment in setting each operation mode: PD(in)>

Item	Simple direct value mode
Point number confirmation bit 0	PD(in)#1 bit 0
Point number confirmation bit 1	PD(in)#1 bit 1
Point number confirmation bit 2	PD(in)#1 bit 2
Point number confirmation bit 3	PD(in)#1 bit 3
Point number confirmation bit 4	PD(in)#1 bit 4
Point number confirmation bit 5	PD(in)#1 bit 5
Direct value travel status	PD(in)#2 bit 0
Point travel completion	PD(in)#0 bit 2
Traveling	PD(in)#2 bit 2
Position (0.01 mm) (0.01 deg)	PD(in)#3 to #6 Note 1

Note 1: The values on the PD(in)#6 side represent low-order bytes, and the values on the PD(in)#3 side represent high-order bytes.

### \<Full direct value mode\>

After setting point data such as position and speed in PD (out), turn ON the point travel start bit.

\<Time-chart\>

Horizontal axis: Time

PD(out)
- Point travel Start — ON / OFF
- Direct value travel Select — ON / OFF
- Point Data — (1) (2)

Displacement
- Travel position 3
- Travel position 2
- Travel position 1

PD(in)
- Point travel complete — ON / OFF — Note 2
- Direct value travel State — ON / OFF
- Traveling — ON / OFF

Note 1

Position 2 Traveling Start
Position 2 Traveling complete
Position 3 Traveling Start
Position 3 Traveling complete
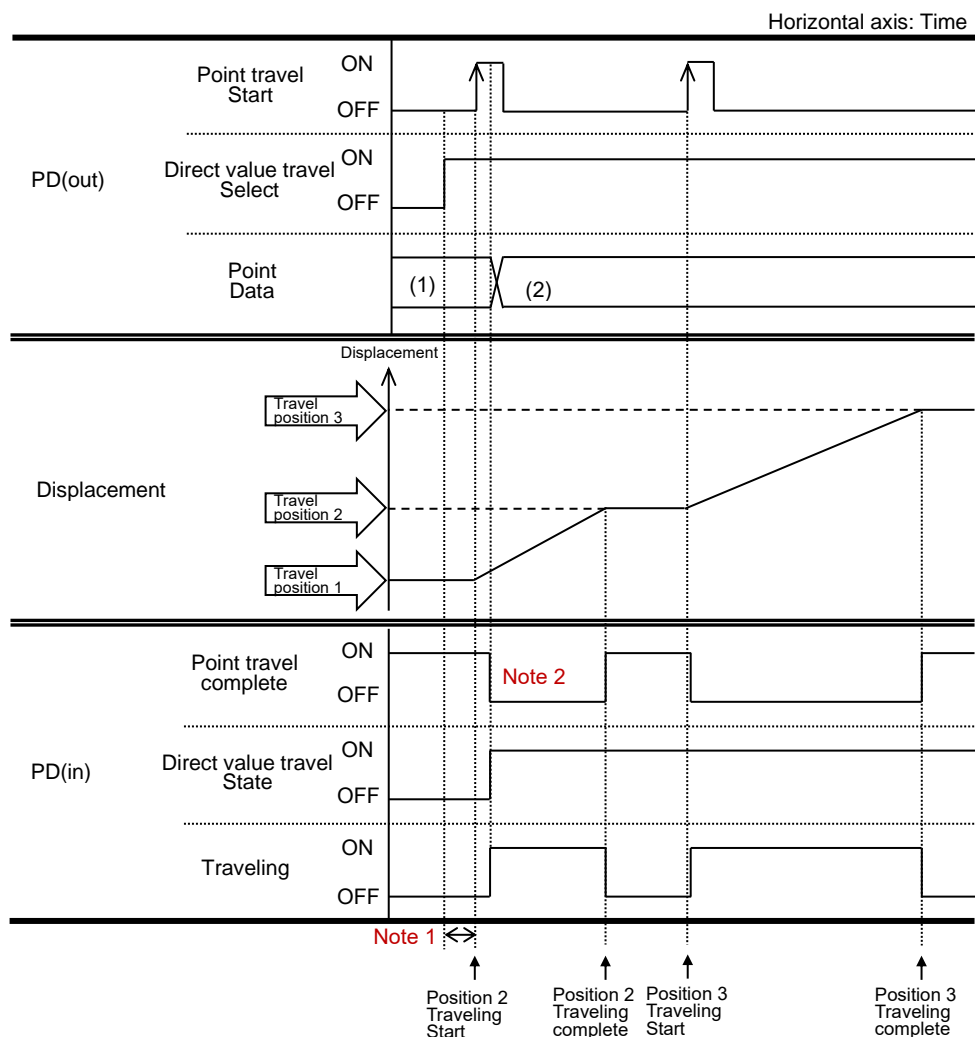
Note 1: Leave an interval of at least 10 ms before turning the point travel start ON after setting the point data.

Note 2: Even after the point travel start is turned on, the previous point travel completion remains on until the actuator actually starts traveling, so do not make a mistake. Also, both travel complete and traveling may be ON at the same time depending on the timing.

※ (1) indicates that the point data of travel position 2 is set, and (2) indicates that the point data of travel position 3 is set.

※ While the direct value travel selection is ON, the point number selection setting does not affect the travel.

※ When the travel is completed, point number is not set and all the point number confirmation bits are turned OFF.

※ The stop and pause operations are the same as the point operation. Refer to "3.7.10 Operation When Stop Signal Is Input During Operation" for details.

<Signal assignment in setting each operation mode: PD(out)>

Item	Full direct value mode
Point number selection bit 0	PD(out)#1 bit 0
Point number selection bit 1	PD(out)#1 bit 1
Point number selection bit 2	PD(out)#1 bit 2
Point number selection bit 3	PD(out)#1 bit 3
Point number selection bit 4	PD(out)#1 bit 4
Point number selection bit 5	PD(out)#1 bit 5
Direct value travel selection	PD(out)#2 bit 0
Point travel start	PD(out)#0 bit 2
Stop	PD(out)#0 bit 6
Pause	PD(out)#0 bit 7
Position (0.01 mm) (deg)	PD(out)#3 to #6 Note 1
Positioning width (0.01 mm) (0.01 deg)	PD(out)#7 to #8 Note 2
Speed (mm/s) (deg/s)	PD(out)#9 to #10 Note 3
Acceleration (0.01 G)	PD(out)#11
Deceleration (0.01 G)	PD(out)#12
Pressing rate (%)	PD(out)#13
Pressing speed (mm/s) (deg/s)	PD(out)#14
Pressing distance (0.01 mm) (0.01 deg)	PD(out)#15 to #18 Note 4
Operation method	PD(out)#21 bit 5 to 6 Note 5
Position specification method	PD(out)#21 bit 7
Rotation direction	PD(out)#2 bit 1 to 3 Note 6
Acceleration/deceleration method	PD(out)#21 bit 3 to 4 Note 7
Stop method	PD(out)#21 bit 0 to 2 Note 8
Gain magnification (%)	PD(out)#19 to #20 Note 9

Note 1: The values on the PD(out)#6 side represent low-order bytes, and the values on the PD(out)#3 side represent high-order bytes.
Note 2: The values on the PD(out)#8 side represent low-order bytes, and the values on the PD(out)#7 side represent high-order bytes.
Note 3: The values on the PD(out)#10 side represent low-order bytes, and the values on the PD(out)#9 side represent high-order bytes.
Note 4: The values on the PD(out)#18 side represent low-order bytes, and the values on the PD(out)#15 side represent high-order bytes.
Note 5: The values on the PD(out)#21 bit 5 side represent low-order bits, and the values on the PD(out)#21 bit 6 side represent high-order bits.
Note 6: The values on the PD(out)#2 bit 1 side represent low-order bits, and the values on the PD(out)#2 bit 3 side represent high-order bits.
Note 7: The values on the PD(out)#21 bit 3 side represent low-order bits, and the values on the PD(out)#21 bit 4 side represent high-order bits.
Note 8: The values on the PD(out)#21 bit 0 side represent low-order bits, and the values on the PD(out)#21 bit 2 side represent high-order bits.
Note 9: The values on the PD(out)#20 side represent low-order bytes, and the values on the PD(out)#19 side represent high-order bytes.

<Signal assignment in setting each operation mode: PD(in)>

Item	Full direct value mode
Point number confirmation bit 0	PD(in)#1 bit 0
Point number confirmation bit 1	PD(in)#1 bit 1
Point number confirmation bit 2	PD(in)#1 bit 2
Point number confirmation bit 3	PD(in)#1 bit 3
Point number confirmation bit 4	PD(in)#1 bit 4
Point number confirmation bit 5	PD(in)#1 bit 5
Direct value travel status	PD(in)#2 bit 0
Point travel completion	PD(in)#0 bit 2
Traveling	PD(in)#2 bit 2
Position (0.01 mm) (0.01 deg)	PD(in)#3 to PD(in)#6 Note 1

Note 1: The values on the PD(in)#6 side represent low-order bytes, and the values on the PD(in)#3 side represent high-order bytes.

<Direct value travel selection and direct travel status>

Turn ON the direct value travel selection. When the direct value travel starts, the direct value travel status is turned ON and stays ON until the point travel starts, as shown below. It remains ON even when the servo OFF.
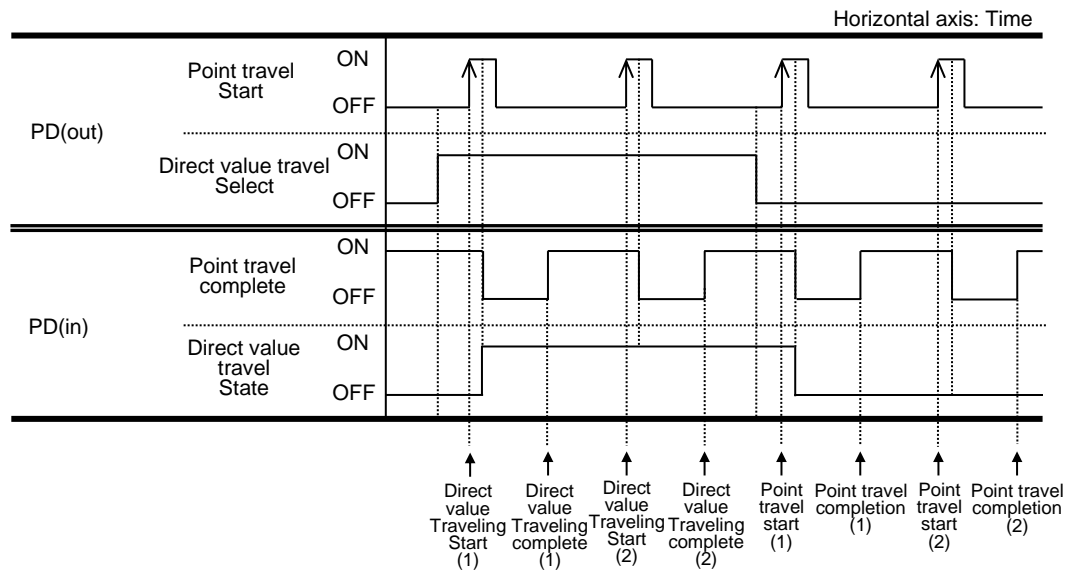
<Time chart>

<Signal assignment in setting each operation mode: PD(out)>

Item	Simple direct value mode	Full direct value mode
Direct value travel selection	PD(out)#2 bit 0	PD(out)#2 bit 0
Point travel start	PD(out)#0 bit 2	PD(out)#0 bit 2

<Signal assignment in setting each operation mode: PD(in)>

Item	Simple direct value mode	Full direct value mode
Direct value travel status	PD(in)#2 bit 0	PD(in)#2 bit 0
Point travel completion	PD(in)#0 bit 2	PD(in)#0 bit 2

3.7.7.　Signal Of Output Selection

The signals of output selection 1 and output selection 2 of the parameter are output according to the signal assignment setting of PIO.
Point zone, zone 1, zone 2, traveling, or warning can be selected for the output selection.

<Output signal>

Output signal name	Content
Point zone	Turns ON when the current position is within the range of the point zone (+) and point zone (-) set in the point data. Refer to "3.6.14 Point Zone Setting And Output Signal" for details.
Traveling	Turns ON while traveling (including during point traveling and traveling at the time of home position return).
Zone 1	Turns ON when the current position is within the range of the zone 1 (+) and zone 1 (-) set in the parameter. Refer to "3.5.3 Zone Settings And Output Signals" for details.
Zone 2	Turns ON when the current position is within the range of the zone 2 (+) and zone 2 (-) set in the parameter. Refer to "3.5.3 Zone Settings And Output Signals" for details.
Warning	Turns OFF when a slight abnormality that does not affect actuator operation is detected. Refer to "5.2.2 Warning" for details.
Soft limit over	Turns ON when the current position is outside the range of soft limit (+) and soft limit (-) set in the parameter. Refer to "3.5.2 Setting Soft Limit And Soft Limit Over Signal Output" for details.
Soft limit over (-)	Turns ON when the current position is smaller than the soft limit (-) set in the parameter. Refer to "3.5.2 Setting Soft Limit And Soft Limit Over Signal Output" for details.
Soft limit over (+)	Turns ON when the current position is larger than the soft limit (+) set in the parameter. Refer to "3.5.2 Setting Soft Limit And Soft Limit Over Signal Output" for details.

\<Time-chart\>

PD(out) — Point 1 Travel command — ON / OFF

Displacement:
- Point 1
- Zone 1 (+)
- Zone 1 (-)
- Zone 2 (+)
- Zone 2 (-)
- Point zone (+)
- Point zone (-)

PD(in):
- Point 1 Travel completion — ON / OFF
- Point zone — ON / OFF
- Traveling — ON / OFF
- Zone 1 — ON / OFF
- Zone 2 — ON / OFF

Point 1 Travel start

Point 1 Travel completion
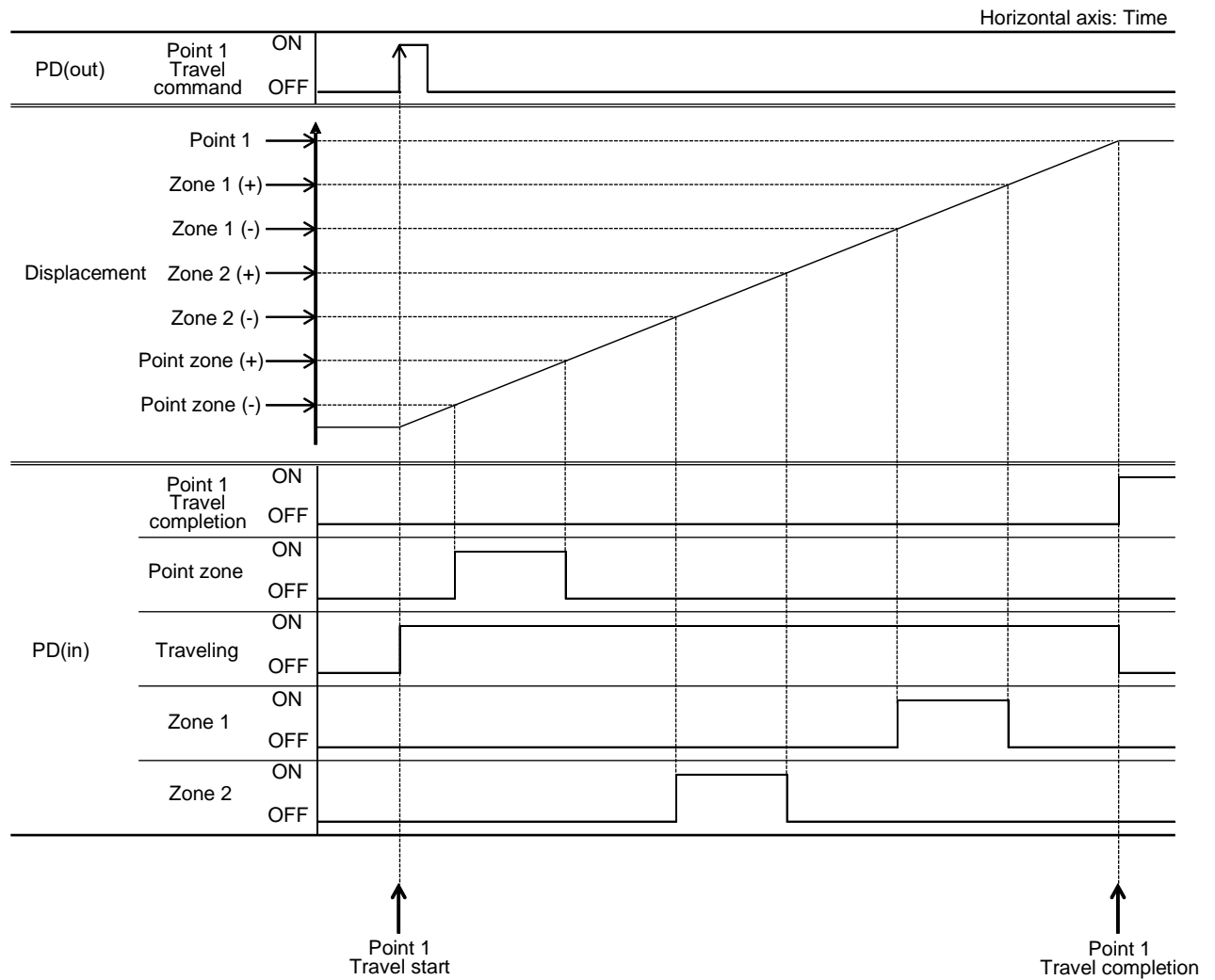
3.7.8. Pressing Operation

You can select "Pressing operation 1" or "Pressing operation 2" as the operation method of the point data. After the transfer operation, the actuator operates at the set "pressing rate" or less in the pressing zone. Alarm is not output even if it stops due to contact with the workpiece in the pressing interval.

> ● The pressing rate may vary depending on load conditions and operating conditions.

<Pressing operation settings>

Setting items	Content
Pressing rate	The upper limit of the pressing force in the pressing zone can be set in percentage to the maximum pressing force. Refer to "3.6.15 Setting The Pressing Rate" for details.
Pressing speed	You can set the speed of the pressing zone. Refer to "3.6.16 Setting The Pressing Speed" for details.
Pressing distance	The pressing zone from the start to the end of pressing can be set. Refer to "3.6.17 Setting The Pressing Distance" for details.
Pressing judgment time	Set by pressing operation 1. The time until determining that pressing is complete in the pressing zone can be set. For details, refer to "Pressing judgment time" of "3.5.1 Parameter List".

■ Pressing operation 1

<Time-chart>

Horizontal axis: Time
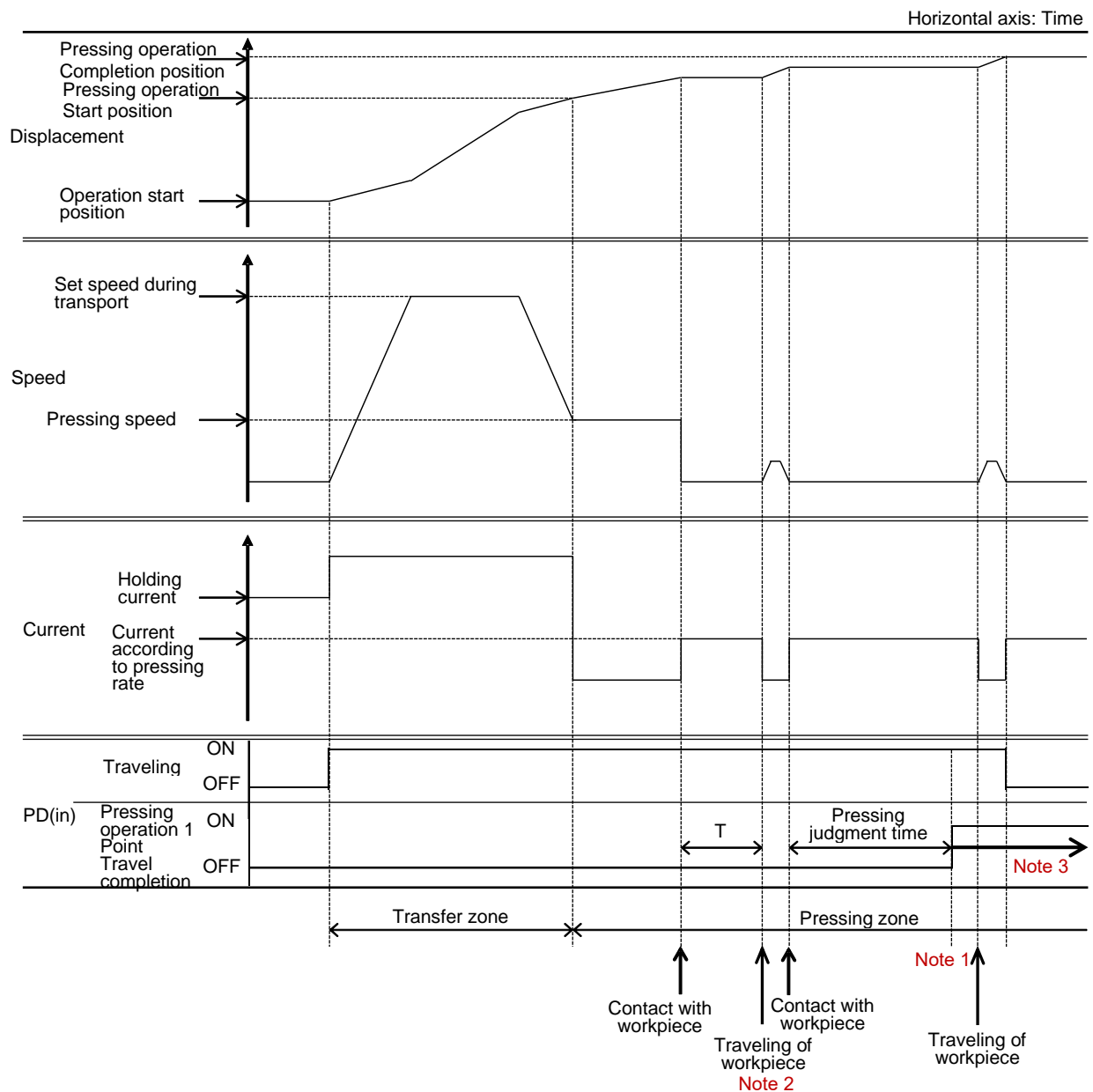
Note 1: If current corresponding to "Pressing judgment time" continues to flow for the "Pressing judgement time" or longer, the point travel completion is output. However, the output during traveling does not turn off until the pressing operation completion position is reached.

Note 2: If a displacement such as the workpiece moving occurs earlier than the pressing judgment time is reached during pressing, the above judgment time will be reset.
(T < Pressing judgment time)

Note 3: Even if the workpiece moves after the travel completion output, the point travel completion output continues to be ON.

■ Pressing operation 2

<Time-chart>

Pressing operation
Completion position

Pressing operation
Start position

Displacement

Operation start
position

Set speed during
transport

Speed

Pressing speed

Holding
current

Current

Current
according
to pressing
rate

Pressing operation 2   ON
Point
PD(in) Travel completion   OFF

Transfer zone   Pressing zone

Contact with workpiece   Pressing operation complete position
Note 1

Note 1: When the pressing operation completion position is reached, the point travel completion is output. If the actuator stops halfway and does not reach the operation completion position, the point travel completion is not output.

3.7.9. Operation When A New Operation Signal Is Input During Operation

⚠	**CAUTION**

> **Be careful of the operation signal input timing.**
> - Depending on settings such as position, speed, acceleration, etc., it may not operate as setting.
> - If a new operation signal is input near the soft limit, an alarm of soft limit over may be output.
> - If a new operation signal is input while acceleration/deceleration, an overload alarm may be output.
>
> **Be careful of the movement at new operation signal input.**
> - If a new operation signal is input, actuator decelerates temporarily.

When a new point operation signal is input during point operation, the following operations are performed.

New point target position	Content
Same as current operation direction	Continues to operate to the target position at the speed set in the new point.
Opposite of current operation direction	After decelerating and stopping, it begins operation in the opposite direction.

3.7.10.   Operation When Stop Signal Is Input During Operation

If a stop signal is input during operation, it will decelerate and then stop during operation. The point travel complete signal is not output.
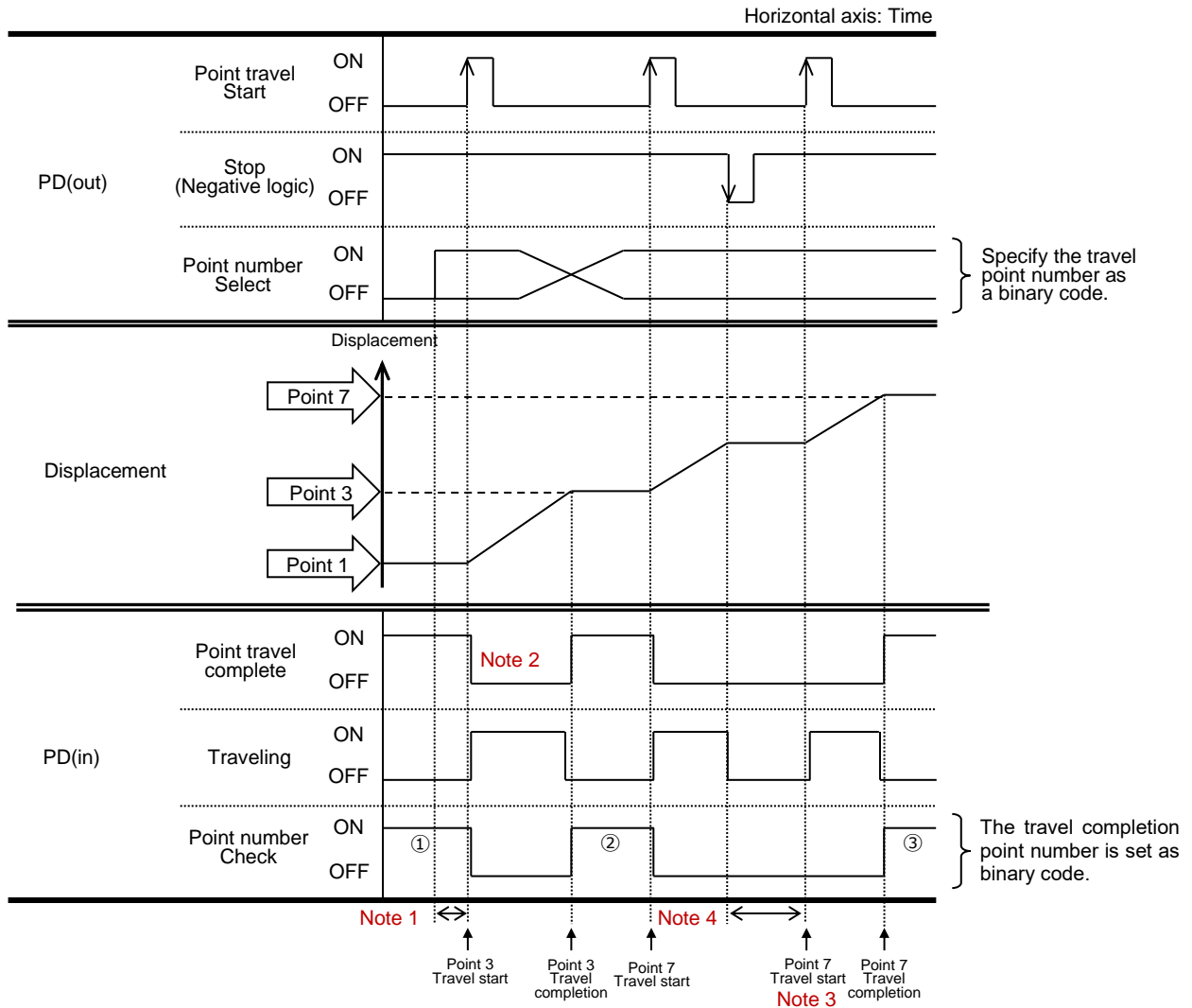
■ <Designating a stop during travel>

<Time-chart>

Note 1: Leave an interval of at least 10 ms until the point travel start turns ON after setting of point number selection.
Note 2: Even after the point travel start is turned on, the previous point travel completion remains on until the actuator actually starts traveling, so do not make a mistake. Also, both travel complete and traveling may be ON at the same time depending on the timing.
Note 3: Since "Stop" works on negative logic, the actuator becomes ready to move when the bit is turned ON. Turning ON the point travel start starts traveling.
Note 4: If it is stopped by "Stop," point travel complete is not turned ON.
※ (1), (2) and (3) indicate that points 1, 3, and 7 are set for point number confirmation, respectively.

◼ Designating a pause during travel

<Time-chart>

Horizontal axis: Time

Note 1: Leave an interval of at least 10 ms until the point travel start turns ON after setting of point number selection.
Note 2: Even after the point travel start is turned on, the previous point travel completion remains on until the actuator actually starts traveling, so do not make a mistake. Also, both travel complete and traveling may be ON at the same time depending on the timing.
Note 3: Since "Pause" works on negative logic, point travel is restarted when the bit is turned ON.
Note 4: If it is paused by "Pause," point travel complete is not turned ON.

※ (1), (2) and (3) indicate that points 1, 3, and 7 are set for point number confirmation, respectively.

3.7.11. Holding Operation After Travel Complete

> ⚠️ **WARNING**
>
> 🛈 **When the actuator is mounted vertically, take measures against falling.**
> • When the workpiece is mounted in the vertical direction, a load larger than the actuator holding force may be applied due to vibration or impact of the device. Be sure to implement fall prevention measures.

If the "Stop method" of the point data is set to "Fixed excitation", it holds at the current value set in the "Fixed current when stopped"of the parameters after travel is complete. An alarm is generated when a load exceeding the holding force (100% of the fixed current when stopped) in the table below is applied during holding.

Actuator model number			Holding force	Unit
Series	Body size	Screw lead	When using power supply	
EBS	04	06	9.2	kg
		12	3.3	
	05	02	18.3	
		05	10.0	
		10	3.3	
		20	0.8	
	08	05	33.3	
		10	18.3	
		20	3.3	
EJSG	04	06	9.2	
		12	3.3	
	05	05	10.0	
		10	3.3	
		20	0.8	
	08	05	33.3	
		10	18.3	
		20	3.3	

Actuator model number			Holding force	Unit
Series	Body size	Screw lead	When using power supply	
EBR	04	06	8.3	kg
		12	2.9	
	05	02	23.3	
		05	14.0	
		10	6.7	
		20	1.7	
	08	05	55.0	
		10	20.0	
		20	8.3	
GSSD2 GSTK GSTG GSTS GSTL	20	06	6.4	
		09	4.0	
	32	06	11.6	
		12	4.8	
	50	06	19.6	
		12	13.2	
FLSH	16	H1		
	20	H1		
	25	H1		
FLCR	16	02	4.0	kg
		08	0.5	
	20	02	6.0	
		08	0.8	
	25	02	8.5	
		06	3.0	
FGRC	10			
	30			
	50			
GCKW	16	H1		
	20	H1		
	25	H1		

3.7.12. Errors And Obtaining Error Codes

Horizontal axis: Time

PD(in)　Alarm (b contact)　ON　　OFF

Error code　　Acquisition　Note 1

Error occurrence　　Error recovery
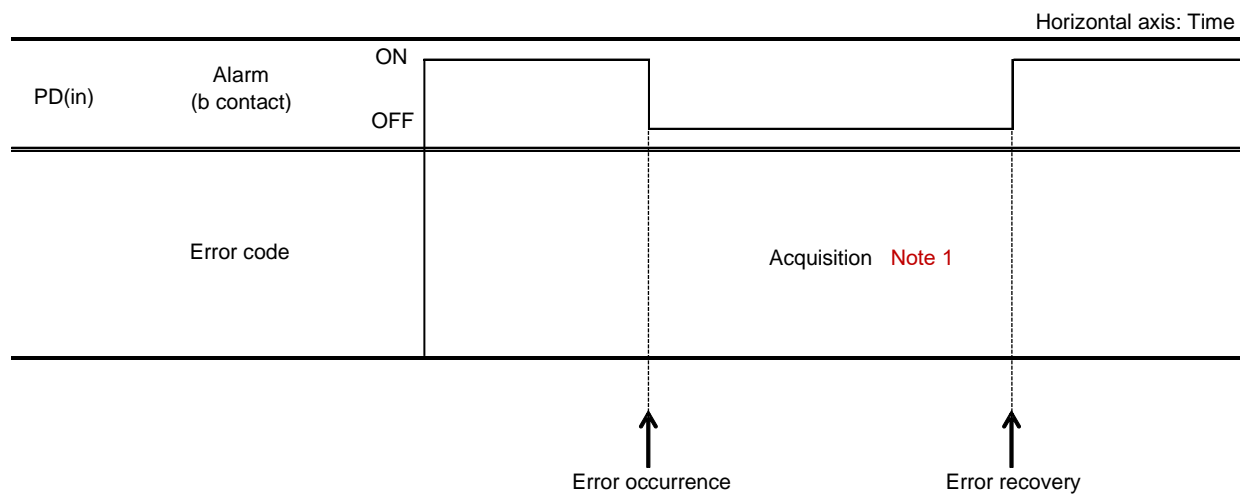
Note 1: Obtain Alarm (Index = 0x70A) or Alarm details (Index = 480) with service data.

3.8. Data Storage Function

Data Storage function is a function that backs up the IO-Link device setting parameter data for each Point of the IO-Link master. With this function, the backup data can be restored as necessary, such as when the IO-Link device is replaced due to a failure, etc.

3.8.1. IO-Link Master Settings

Following items are set for each port of the IO-Link master using the PLC development tool.

Making the settings below allows the IO-Link master to backup data, restore data, and support data backup requested by the IO-Link device. Refer to the manual provided by the PLC manufacturer for details.

Item	Content
Device matching function	Checks whether the connected IO-Link device matches the set Device ID.
Backup function	Backs up the IO-Link device setting parameters.
Restore function	Restores the IO-Link device backup data.
IO-Link device settings	IO-Link device's Vendor ID, Device ID, Revision, Process Data Input/Output Length, etc.

3.8.2. Operation Mode Switching

The operation modes include PIO mode (operation mode (IO-Link): 0), simple direct value mode (operation mode (IO-Link): 1), and full direct value mode (operation mode (IO-Link): 2); and PIO modes include standard mode (operation mode (PIO): 0), simple 7-point mode (operation mode (PIO): 1), and solenoid valve mode (operation mode (PIO): 2 to 4). For each of them, the device ID is set, and the data length and contents of process data and IODD files differ, so normally, the operation mode is set together with initial settings using S-Tools.

If the IO-Link master Supports the device ID rewriting function and a previously used controller is connected when replacing devices, etc., the IO-Link master will rewrite the device ID if the device ID differs. This will result in switching to the operation mode used by the equipment. After switching the operation mode, turn off then on the controller power and perform a software reset.

✎	● If the Data Storage function of the IO-Link master is enabled, the backup data will be restored (downloaded) immediately after power-on if any difference is found in the data being processed. ● When replacing the actuator with a different one, disable the restore function or delete the backup data. ● If the Data Storage target data is changed from S-Tools, disable the restore process unless S-Tools operation "Transfer to IO-Link Master (Forced Upload)" is performed, or delete the backup data before operation.

3.8.3. Download/Upload

■ Download

If the backup data stored in the IO-Link master does not match the parameter data set in the connected IO-Link device at startup, the IO-Link master downloads the stored backup data. Therefore, if the controller is replaced with a backup controller for reasons such as a controller failure, the minimum setting data required for operation can be written to the new controller.

Conditions are checked before upload is processed.
Data download is executed by the IO-Link master when the execution conditions are met. Execution cannot be requested from the controller to the IO-Link master as needed.

🖉	● Do not access the service data while downloading. ● Disable the "Restore function setting" of the IO-Link master before connecting a controller for which downloading is not to be executed. ● If the serial number check is also included in the device comparison settings, an error will occur when the controller is replaced. To download the backup data after replacing the controller, exclude the serial number check from the device comparison settings or change the setting to the serial number of the new unit.

For details on the backup data deletion function and download execution conditions, refer to the manual provided by the PLC manufacturer.

■ Upload

Under the following conditions, the IO-Link device setting parameters are uploaded for use as backup data.
- The IO-Link master does not have backup data stored at startup.
- The backup data was cleared with the controller connected.
- The request was made from the IO-Link device.

	● Do not access the service data while uploading.
	● If upload is not enabled in the PLC settings, upload will not be executed even if forced upload (Index = 0x0042) is instructed.

For details on the backup data deletion function and upload execution conditions, refer to the manual provided by the PLC manufacturer.

■ DS Upload/Download target items

Data storage target parameter differs depending on the software version of the controller. Software version of the controller and data target parameter is shown below.

- ECG-A：Software Ver.1.00.00 to Ver.1.07.00
  ECG-B：Software Ver.1.00.00 to Ver.1.04.00

Item	Data length
Device Access Locks	2byte
Application Specific Tag	32byte
Output selection 1	1byte
Output selection 2	1byte
Home position return speed	2byte
Automatic home position return	2byte
Fixed current at stop	2byte
Pressing judgment time	2byte
Soft limit (+)	4byte
Soft limit (-)	4byte
Zone 1 (+)	4byte
Zone 1 (-)	4byte
Zone 2 (+)	4byte
Zone 2 (-)	4byte
Zone hysteresis	2byte
Home position offset amount	4byte
Point data 0 to 63	30 bytes/point

- ECG-A: Version 1.08.00.00 or later
  ECG-B: Version 1.05.00.00 or later

Item	Data length
Device Access Locks	2byte
Application Specific Tag	32byte
Output selection 1	1byte
Output selection 2	1byte
Home position return speed	2byte
Automatic home position return	2byte
Fixed current at stop	2byte
Pressing judgment time	2byte
Soft limit (+)	4byte
Soft limit (-)	4byte
Zone 1 (+)	4byte
Zone 1 (-)	4byte
Zone 2 (+)	4byte
Zone 2 (-)	4byte
Zone hysteresis	2byte
Home position offset amount	4byte
Common positioning width	2byte
Common speed	2byte
Common acceleration	1byte
Common deceleration	1byte
Common pressing current	1byte
Common pressing speed	1byte
Common pressing distance	4byte
Common stop method	1byte
Common acceleration/deceleration method	1byte
Common rotation direction	1byte
Point data 0 to 63	30 bytes/point

3.9. Error Events

When an error occurs with the controller, an error generation event is sent to the IO-Link Master. When the error is released, an error release event is sent to the IO-Link Master.

Event code	Content
0x18**	For **, the error code type is set. An error event whose TYPE (Level = 2 or more) is in error is sent.
0x5111	Sent when the power supply voltage of the IO-Link line drops.

> ● If error release happens offline, the error release event is not sent, and it may not be possible to clear the error display, etc. To clear the error display, etc., the power of the IO-Link master unit must be turned off then on. The error display and other information when an error event is sent differ depending on the IO-Link master, the PLC, etc. As such, refer to manufacturer's manuals (such as the PLC manufacturer) for details.

■ OMRON Corporation IO-Link Master GX-ILM08C

The A-lamp of the port blinks in red during the period from sending of an error event to sending of an error recovery event. In addition, the IN Data Enable bit and Device Error bit in the corresponding port of the I/O Port Status of the PLC turn OFF and ON, respectively. However, an event log of the controller is not recorded and thus the details cannot be checked.

> ● When an error occurs in the IO-Link Master GX-ILM08C manufactured by OMRON Corporation, the IN Data Enable bit of the corresponding port turns OFF. This can be different from the indication of the I/O LED on the side of the connector of each port.

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 detach wiring or connectors while the power is 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 resistor inside the controller, and the actuator motor.**
- An electric shock or burns may occur.

⚠ **Install the product before wiring.**
- An electric shock may occur.

❗ **After 5 minutes or more have passed since the power was turned off, check the voltage with a tester, etc., and then perform the inspection.**
- An electric shock may occur.

⚠ CAUTION

⚠ **During maintenance, inspection, and repair, call attention to the surroundings so that a third party does not accidentally turn on the power.**

❗ **Wiring and inspections must be performed by specialists.**

Use a power cable that can sufficiently tolerate the instantaneous maximum 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 "laws pertaining to disposal of wastes and cleaning" and have an industrial waste disposal company dispose of the product.

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5. TROUBLESHOOTING

5.1. The Cause Of Trouble And How To Troubleshoot

If the product does not operate as intended, check according to the table below.

Problem	Cause	How to troubleshoot	References
Servo lamp does not light or blink even when the power is turned on.	Wiring is not correct.	Check the power supply wiring.	"2.3.1 Wiring To The Power Supply"
	The cable is disconnected.	Check for cable sheath damage and disconnection. Check the connector and terminal.	
	The product is broken or damaged.	It will need to be repaired.	"5.1.1 Items To Check When Trouble Occurs"
	Power supply has failure.	Repair or replace the power supply.	-
	Power capacity is insufficient.	Use a power supply with large capacity.	"2.3.1 Wiring To The Power Supply"
The alarm lamp remains lit in red.	Alarm has been issued.	Check the alarm code and remove the cause.	"5.2.1 Alarm"
	There is an abnormality in system.	It will need to be repaired.	"5.1.1 Items To Check When Trouble Occurs"
No signal of ready for operation is output.	It is in emergency stop state.	Release the emergency stop.	"3.7.1 Emergency Stop And Release"
	A voltage is applied to the force brake release signal.	Ensure that a 24 V voltage is not applied to the force brake release signal during operation.	"3.7.2 Forced Release Of Brake"
	The servo is OFF.	Input the servo ON signal from the PLC.	"3.4.4 Process Data", "3.4.5 PIO Mode Process Data Details", or "3.7.3 Operation Of Servo ON/OFF"
	The stop signal is OFF.	Turn ON the stop signal.	"3.4.4 Process Data" or "3.4.5 PIO Mode Process Data Details"
	Wiring is not correct.	Check the wiring to the PLC.	-
Product does not operate as intended with PLC signal.	Input signal is unstable.	The input signal from the host equipment may be chattering. Ensure the input signal is at least 20 ms.	-
	It stops during operation.	The transfer load may be too large. Recheck the specifications.	Catalogs and instruction manuals for each actuator

Problem	Cause	How to troubleshoot	References
Product does not operate as intended with PLC signal.	The position setting is incorrect.	Check the "Point" in the point data.	"3.6.5 Setting The Position"
	The speed setting is incorrect.	Check the "Speed" in the point data.	"3.6.7 Setting The Speed"
	The acceleration setting is incorrect.	Check the "Acceleration" in the point data.	"3.6.8 Setting The Acceleration"
	The setting of pressing rate is incorrect.	Check the "Pressing rate" in the point data.	"3.6.15 Setting The Pressing Rate"
	Setting of operation mode is incorrect.	Check the "Operation mode" details in the parameters.	"Operation mode (PIO)" in "3.5.1 Parameter List"
	Wiring is not correct.	Check the wiring.	-
	Friction load is too large.	Check the friction load 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 the usage period (operating distance).	"5.2.2 Warning"
	Actuator body is damaged.	It will need to be repaired.	"5.1.1 Items To Check When Trouble Occurs"
Product itself vibrates.	Connection to actuator is loose.	Tighten the bolts.	Catalogs and instruction manuals for each actuator
		Perform gain adjustment.	"3.5.4 Adjusting The Gains"
The product cannot be operated with PLC.	It is in TOOL mode.	Use S-Tools to change it to PLC mode.	SM-A11147
	Wiring is not correct.	Check the wiring.	-
	The cable is disconnected.	Check for cable sheath damage and disconnection. Check the connector and terminal.	-
	Overload error occurs.	Check the transport load. Check the speed.	Catalogs and instruction manuals for each actuator
	Power capacity is insufficient.	Confirm that the power capacity satisfies the required voltage and current.	"2.3.1 Wiring To The Power Supply"

Problem	Cause	How to troubleshoot		References
Workpiece moves due to its own weight during an emergency stop.	It is servo OFF state at emergency stop.	Designed to be brakeless	Use a type with brake.	Catalogs and instruction manuals for each actuator
		Brake is forcibly released.	Turn off the forced release of the brake.	"3.7.2 Forced Release Of Brake"
	Load exceeding holding force is applied.	Confirm that an external force equal to or higher than the holding force is not being operated.		"3.7.11 Holding Operation After Travel Complete"
		Review the setting of the parameter "Fixed current when stopped".		"Fixed current at stop" of "3.5.1 Parameter List"
Positioning completion output does not turn off.	The positioning width is too large for the travel distance.	Check the "Positioning width" in the point data.		"3.6.6 Setting The Positioning Width"
Pressing operation cannot be performed.	Operation method is not set to pressing operation.	Check the "Operation method" in the point data.		"3.6.4 Selecting The Operation Method"
The maximum speed is not achieved.	The load or speed is excessive.	Confirm that the workpiece weight and operation speed satisfy specification values.		Catalogs and instruction manuals for each actuator
		Perform gain adjustment.		"3.5.4 Adjusting The Gains"
The speed is very slow.	Operation method is set to pressing operation instead of positioning operation.	Check the "Operation method" in the point data.		"3.6.4 Selecting The Operation Method"
		Perform gain adjustment.		"3.5.4 Adjusting The Gains"
The actuator is making abnormal sound.	It is resonating.	Perform gain adjustment.		"3.5.4 Adjusting The Gains"
Overshoot occurs.	Both transfer weight and amount of deceleration are large.	Confirm that the workpiece weight and operation speed satisfy specification values.		Catalogs and instruction manuals for each actuator
		Reduce the "Deceleration" in the point data.		"3.6.9 Setting The Deceleration"
		Perform gain adjustment.		"3.5.4 Adjusting The Gains"
The actuator does not work.	The servo does not turn ON.	Check the MPI and MPO connections on the power connector.		"2.3.1 Wiring To The Power Supply"
		Check the emergency stop release status.		"2.3.1 Wiring To The Power Supply"
		Check whether a voltage is applied to the force brake release.		"2.3.1 Wiring To The Power Supply"
	With FGRC series, the point travel complete signal is output immediately after operation.	In the FGRC series, set "Position" at least 0.05 deg away.		"3.6.5 Setting The Position"
It cannot reach target takt time.	Setting of acceleration or speed is not correct.	Check the "Acceleration" in the point data.		"3.6.8 Setting The Acceleration"
		Check the "Speed" in the point data.		"3.6.7 Setting The Speed"

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

5.1.1. Items To Check When Trouble Occurs

Item	What to check
Controller	Check the light status on the controller.

Communication status		SV	ALM
When the control power is OFF		Off	Off
At normal operation	At servo ON	Lit green	
	At servo OFF	Blinking green (lit once per second)	
At occurrence of alarm	At occurrence of non-cancelable alarm	Blinking green (After lighting off for 2 seconds, light on once every 1 second n times, and then repeat) -> Alarm 0xn□□□ occurs	Lit red
	At occurrence of cancelable alarm		Blinking red (lit once per second)
At occurrence of warning	At servo ON	Lit green	Blinking red (lit once per 2 seconds)
	At servo OFF	Blinking green (lit once per second)	

Item	What to check
PLC	Check whether there is an error on the PLC.
Alarm	Use S-Tools to check the alarm information.
Actuator information	When using the ECG-B series, check that the actuator information written in the controller is identical with the connected actuator.
PLC communication	Use PLC development tools or S-Tools to check the communication status of IO-Link.
Cable connection check	Make sure that the cables are connected properly without "disconnection" or "damaged sheath". Before checking the continuity, be sure to turn off the power and remove the cables to prevent an electric shock.
Control power supply	Check the voltage of the control power supply (24 VDC).
Anti-noise measure	Check that measures (such as connecting ground wire and attaching a surge protector) have been taken against noise.
Situation check	Check the history leading up to the trouble occurring and the operation condition when the trouble occurred.
Serial number	Check the product's serial No. It may be requested for confirmation when you make an inquiry.

※ Examine the cause of the trouble on the basis of the above items. See also "5.1 The Cause Of Trouble And How To Troubleshoot"or "5.2 Alarm Indications And Countermeasures" as a solution.

5.2. Alarm Indications And Countermeasures

5.2.1. Alarm

> ⚠ **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 failure.**
> - If there is an alarm that affects the operation of the actuator, such as "overload (C)", failure of the actuator or controller may have occurred. If the alarm recurs even after performing the preventive measures listed in the table below and turning the controller power cycling, contact your nearest CKD sales office or distributor.

An alarm is output from the controller when an abnormality affecting actuator operation is detected.
Check the alarm code, alarm items, contents, cause, and countermeasures. As a tip for countermeasures, the reference is described.
After taking corrective action, confirm that there is no problem before releasing the alarm.

✏	● There are two alarm release methods depending on the degree of abnormality. **Cancelable alarm**: The alarm can be released by resetting the alarm from the host device (PLC, etc.) or S-Tools operation. **Non-cancelable alarm**: The alarm can be released by turning on the power again.

Alarm code	Alarm item	Problem	Cause/Solution	References	Release method
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 parameters.	SM-A11147	Power on again
			"0x1500 to 0x15FF" indicates that there is an error in the point data. Initialize the point data.		
			"0x1700 to 0x170F" indicates that there is an error in the alarm data. Initialize the alarm data.		
			"0x1800 to 0x180F" indicates that there is an error in the maintenance data. Initialize the maintenance data.		
			"0x1B00 to 0x1B0F" indicates that there is an error in the actuator information of ECG-A. Overwrite the information of the actuator connected last time with the information of the actuator being connected.		
			"0x1B10 to 0x1B1F" indicates that there is an error in the actuator information of ECG-B. Initialize or overwrite the actuator information.		
			Other codes indicate that there is an error in the internal data.	-	
0x2000 to 0x2FFF	Memory (Write)	An error has been detected in writing data into memory when changing data.	-	-	Power on again
0x3000 to 0x30FF	Temperature	The temperature in the controller is high.	Turn off the power and eliminate the cause of high temperature rise.	-	Power on again
0x3100 to 0x31FF	Current	An overcurrent has flown into the motor.	-	-	Power on again
0x3200 to 0x320F	Encoder not connected	There is an error in the connection status between the controller and actuator.	Check the cable connection status. Check the connection status of the connector.	-	Power on again

※ If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.

Alarm code	Alarm item	Problem	Cause/Solution	References	Release method
0x3210 to 0x321F	Encoder for other models connected	An encoder that the controller does not support is connected.	Make sure that it is a supported actuator.	-	Power on again
0x3220 to 0x322F	Encoder identification abnormality	There is an error in the identification of the encoder type (incremental/absolute).	Make sure that it is a supported actuator.	-	Power on again
0x3230 to 0x32FF	Encoder not connected	There is an error in the connection status between the controller and actuator.	Check the cable connection status. Check the connection status of the connector.	-	Power on again
0x3400 to 0x342F	Encoder not connected	There is an error in the connection status between the controller and actuator.	Check the cable connection status. Check the connection status of the connector.	-	Power on again
0x3800 to 0x38FF	TOOL not connected	There is an error in the connector connection status while using in TOOL mode.	Check the USB cable connection status. Check the USB connector connection status. If the connector is disconnected, set to PLC mode after connecting the connector.	"2.3.3 Wiring With S-Tools"	Alarm Reset
0x3900 to 0x39FF	Interface	There is an error with the interface.	-	-	Power on again
0x3A00 to 0x3A0F	Actuator model number error	When the power is turned on, the model number of the actuator that was connected last time and the actuator that is connected are different.	Reconnect the previously connected actuator. Overwrite the information of the actuator connected last time with the information of the actuator being connected.	"Model information" of SM-A11147	Power on again
0x3A10 to 0x3A1F	Actuator information not set	It indicates that actuator information is not set in the controller when the power is turned on in ECG-B series.	Set the actuator information.	"Actuator setting" of "3.1 Setting Actuator Information" or SM-A11147	Power on again

※ If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.

Alarm code	Alarm item	Problem	Cause/Solution	References	Release method
0x3A20 to 0x3A2F	Changing actuator information	The power is not turned on again after the actuator information is changed in ECG-B series.	This alarm occurs when the actuator information is changed and the power is not turned on again.	"Actuator setting" of "3.1 Setting Actuator Information" or SM-A11147	Power on again
0x4000 to 0x40FF	Parameter data	There is an error in the parameter.	Review the setting of the parameter "Home position speed".	"Home position return speed" in "3.5.1 Parameter List"	Alarm Reset
			Review the setting of the parameter "Home position offset amount".	"Home position offset amount" in "3.5.1 Parameter List"	
0x4100 to 0x41FF	Point data (position)	When the point travel command is input, there is an error in the point data of that point number.	The operation completion position exceeds the range of the soft limit, or in FGRC series, the operation completion position is 360 deg or more. Review the "Position" and "Pressing distance" settings of the point data.	"3.6.5 Setting The Position" or "3.6.17 Setting The Pressing Distance"	Alarm Reset
0x4200 to 0x42FF	Point data (Speed)	When the point travel command is input, there is an error in the point data of that point number.	For "0x4212", review the "Speed" setting of the point data.	"3.6.7 Setting The Speed"	Alarm Reset
			For "0x4222", review the "Acceleration" setting of the point data.	"3.6.8 Setting The Acceleration"	
			For "0x4232", review the "Deceleration" setting of the point data.	"3.6.9 Setting The Deceleration"	
			For "0x4202", review the "Pressing speed" setting of the point data.	"3.6.16 Setting The Pressing Speed"	
0x4300 to 0x43FF	Point data (pressing)	When the point travel command is input, there is an error in the point data of that point number.	Review the "Pressing rate" setting of the point data.	"3.6.15 Setting The Pressing Rate"	Alarm Reset
0x4400 to 0x440F	IO-Link data abnormality	There is an error in data setting or IO-Link backup data.	Reconfigure the data.	-	Power on again
			Reconfigure the data storage function.	"3.8 Data Storage Function"	
0x6000 to 0x60FF	Servo ON	There is an error in the encoder data signal for the motor excitation at the time of the servo ON after power-on again.	Check the encoder cable connection status. Check the motor cable connection status. Check the connection status of the connector. Check whether any external force is applied to the actuator.	-	Alarm Reset

※ If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.

Alarm code	Alarm item	Problem	Cause/Solution	References	Release method
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 encoder cable connection status. Check the connection status of the connector.	-	Alarm Reset
0x6400 to 0x64FF	Soft limit over	The current position is outside the range of the soft limit during the point travel.	If it occurs due to an overshoot when positioning close to the soft limit, check the load conditions. If it occurs by inputting a point travel command outside the soft limit range, check the safety and move the actuator within the soft limit range by moving it by hand.	-	Alarm Reset
			Review the "Soft limit" setting of the parameter.	"3.5.2 Setting Soft Limit "	
0x6500 to 0x65FF	Overload (M)	Cannot travel.	Occurs when the actuator cannot move for a certain period of time while it is operating except during the pressing operation, or when it is pushed back in the direction opposite to the operating direction. Check the load and operating conditions. Check that if there are things within the movable range that prevent operation.	-	Alarm Reset
			Review the gain value.	"3.5.4 Adjusting The Gains"	
0x6600 to 0x66FF	Overload (P)	When pressing, it was pushed back to the pressing start point by an external force or the like.	Occurs when the moving part is pushed back to the pressing start position during pressing operation. Check the load and operating conditions.	-	Alarm Reset
			Review the gain value.	"3.5.4 Adjusting The Gains"	
0x6700 to 0x67FF	Overload (S)	Cannot stop.	Occurs when the actuator cannot be stopped within a certain period of time during the stop operation. Check the load and operating conditions.	-	Alarm Reset
0x6800 to 0x68FF	Overload (H)	Misalignment occurred when stopping.	Occurs when the actuator is stopped and the position deviates more than a certain amount. Check the load and operating conditions.	-	Alarm Reset
			Review the setting range of the "Fixed current when stopped" of the parameter.	"Fixed current at stop" of "3.5.1 Parameter List"	

※ If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.

Alarm code	Alarm item	Problem	Cause/Solution	References	Release method
0x6900 to 0x69FF	Overload (C)	An overcurrent has flown into the motor.	Occurs when the motor current more than the standard value flows for a certain period of time or longer. Check the load and operating conditions.	-	Alarm Reset
0x6A00 to 0x6AFF	Overload (D)	There is an error in the position control.	Occurs when the position on the control command deviates from the current position by a certain amount or more during actuator operation other than the pressing operation. Check the load and operating conditions.	-	Alarm Reset
0x6B00 to 0x6BFF	Overload (T)	Excessive torque output has continued.	Occurs when a load exceeding the standard value is applied for a certain period of time or longer during actuator operation other than the pressing operation. Check the load and operating conditions.	-	Alarm Reset
0x6C00 to 0x6CFF	Home position return (C)	Excessive load is detected during home position return in FGRC series.	Check that there are no workpieces to collide with within the range of the home position return operation.	"3.7.5 Home Position Return Operation"	Alarm Reset
0x7000 to 0x7FFF	Memory (Initialize)	An error has been detected during initializing memory data when changing data.	-	-	Power on again

※ If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.

	● When an alarm occurs, the actuator is in the servo OFF state. In the case of an actuator with a brake, the brake is activated and the holding torque is applied. In the case of an actuator without a brake, the actuator is in the dynamic brake state, but in the state without holding torque.

5.2.2. Warning

A warning is output when a slight abnormality that does not affect the actuator operation is detected. It can be cleared by changing the setting such as threshold. Warnings are information that informs the timing of actuator maintenance. It does not directly affect the operation.

Alarm code	Alarm item	Problem	Cause/Solution	References
0×0201	Maintenance data (Running distance)	The integrated running distance of the actuator has exceeded the threshold.	The integrated running distance has exceeded the parameter setting threshold. After performing maintenance, reconfigure the threshold. The warning is cleared when the threshold exceeds the integrated running distance.	Threshold value for integrated running distance (Actuator)" of "3.5.1 Parameter List" or "Maintenance information" of SM-A11147
0×0211	Maintenance data (Number of travels)	The integrated number of actuator travels has exceeded the threshold.	The integrated number of travels has exceeded the parameter setting threshold. After performing maintenance, reconfigure the threshold. The warning is cleared when the threshold exceeds the integrated number of travels.	Threshold value for integrated number of travel times (Actuator)" of "3.5.1 Parameter List" or "Maintenance information" of SM-A11147
0×0221	Maintenance data (Operating time)	The integrated operating time of the actuator has exceeded the threshold.	The integrated operating time has exceeded the parameter setting threshold. After performing maintenance, reconfigure the threshold. The warning is cleared when the threshold exceeds the integrated operating time.	Threshold value for integrated operating time (Motor)" of "3.5.1 Parameter List" or "Maintenance information" of SM-A11147
0×0401	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 cleared when the motor power supply voltage detected by the controller is 21.6 V or more.	"2.3.1 Wiring To The Power Supply"

6. PRODUCT COMPLIANCE

■ **European standards compliance**

Products with the CE mark 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.

■ **UL standards compliance**

Products with the UL mark conform to UL standards.
To use the product as a product conforming to the UL/cUL standards, refer to this chapter and follow the instructions.
  If the customer equipment incorporating this product is to be shipped to or used in the US/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 61000-6-2:2005
                    EN 55011:2016 +A1:2017 +A11:2020
                    (Group1 Class A)
- RoHS Directive: 2011/65/EU and (EU)2015/863
                    EN 50581:2012

	● This product is Group 1, Class A product that complies with EN 55011. Group 1 means that radio frequency energy is not intentionally generated and used in the form of electromagnetic radiation, induction, or capacitive coupling for the purpose of processing, inspecting, or analyzing materials, or for the transmission of electromagnetic energy. Class A means that the product is suitable for use in all locations except facilities that are directly connected to a low-voltage power distribution network that feeds residential environments and residential buildings.

6.2. Precautions For Use In Europe (EU Member States)

6.2.1. Suitable Actuator

Combinations of controller model numbers and suitable actuators are listed below.

Controller model number	Suitable actuator
ECG-A Series	EBS-G Series, EJSG Series, EBR-G Series, GSSD2 Series, GSTK Series, GSTG Series, GSTS Series, GSTL Series
ECG-B Series	FLSH-G Series, FLCR-G Series, FGRC-G Series, GCKW Series

6.2.2. Working Environment

When using, storing or transporting the product, check the following environmental temperature and atmosphere.

Condition	Temperature	Humidity
During use	0 to 40°C (no freezing)	35 to 80% RH (no condensation)
During storage	-10 to 50°C (no freezing)	35 to 80% RH (no condensation)
During transport	-10 to 50°C (no freezing)	35 to 80% RH (no condensation)

6.2.3. System Structure

- This product is not intended for use in residential areas. It may also not be able to provide sufficient protection for wireless receivers in the same environment.
- If this product is used in a residential environment, it may interfere with other equipment.
- Do not use this product in a residential environment unless you take measures to reduce electromagnetic interference so as not to interfere with radio and television reception status.
- Surge protector and noise filters should be installed near the input device and wired at the shortest possible distance.
- The ferrite core must be installed close to the equipment or ground point.

■ Example of EMC measure installation (ECG-A series)

The following figure shows how to install this product (ECG-A Series) in compliance with European standards. A surge protector, EMI filter for power supply, and ferrite cores are required to comply with European standards.
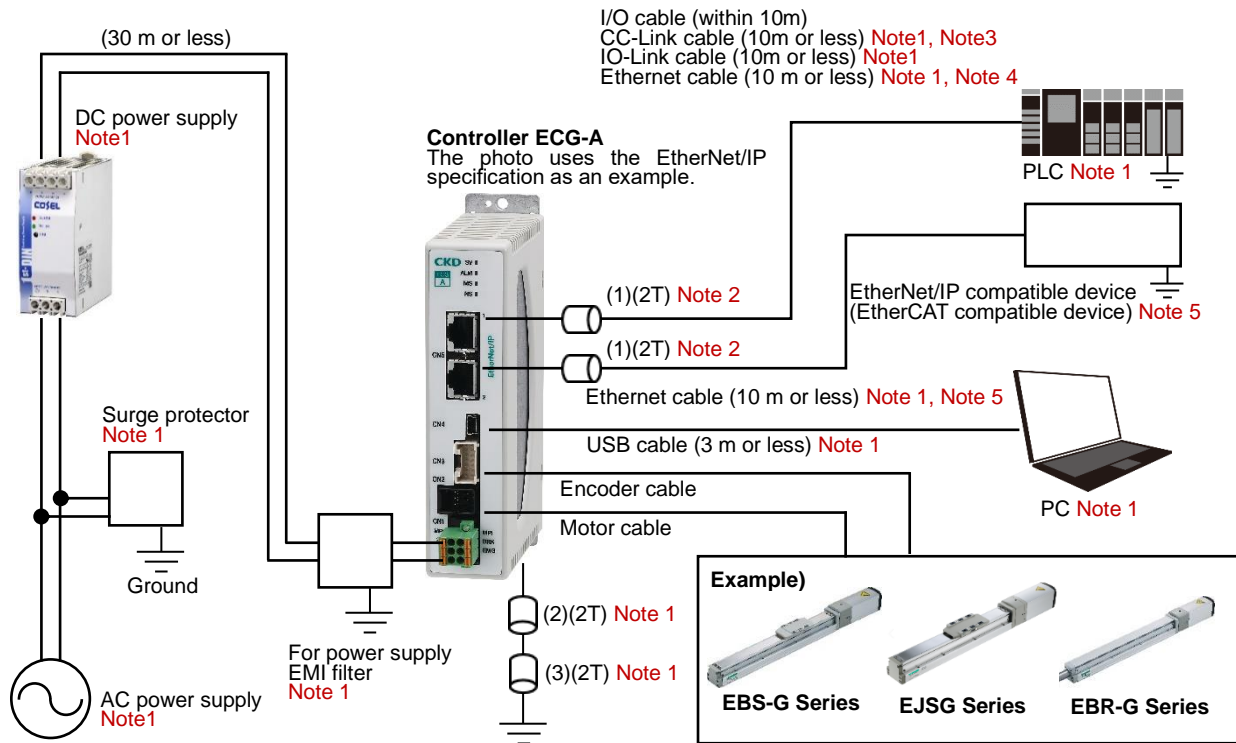
Note 1: Peripheral equipment and cables are customer-supplied. However, the motor cable, encoder cable and I/O cable are dedicated cables. Please buy them from us.
Note 2: The ferrite cores can only be installed for CC-Link specification, EtherCAT specification, and EtherNet/IP specification, and are provided by the customer.
Note 3: The shield of the CC-Link cable is grounded at both ends.
Note 4: The shield of the Ethernet cable is grounded at one end (PLC side only).
Note 5: Connect only for EtherNet/IP and EtherCAT specifications. Connect the relevant network devices.

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	
EMI filter for power supply	AX-NSF-NF2015A-OD	Soshin Electric Co., Ltd.
Ferrite core (1)	E04SR401938	Seiwa Electric MFG Co., Ltd.
Ferrite core (2)	E04SR301334	
Ferrite core (3)	E04RMX251512	

■ Example of EMC measure installation (ECG-B Series)

The following figure shows how to install this product (ECG-B Series) in compliance with European standards. A surge protector, EMI filter for power supply, and ferrite cores are required to comply with European standards.
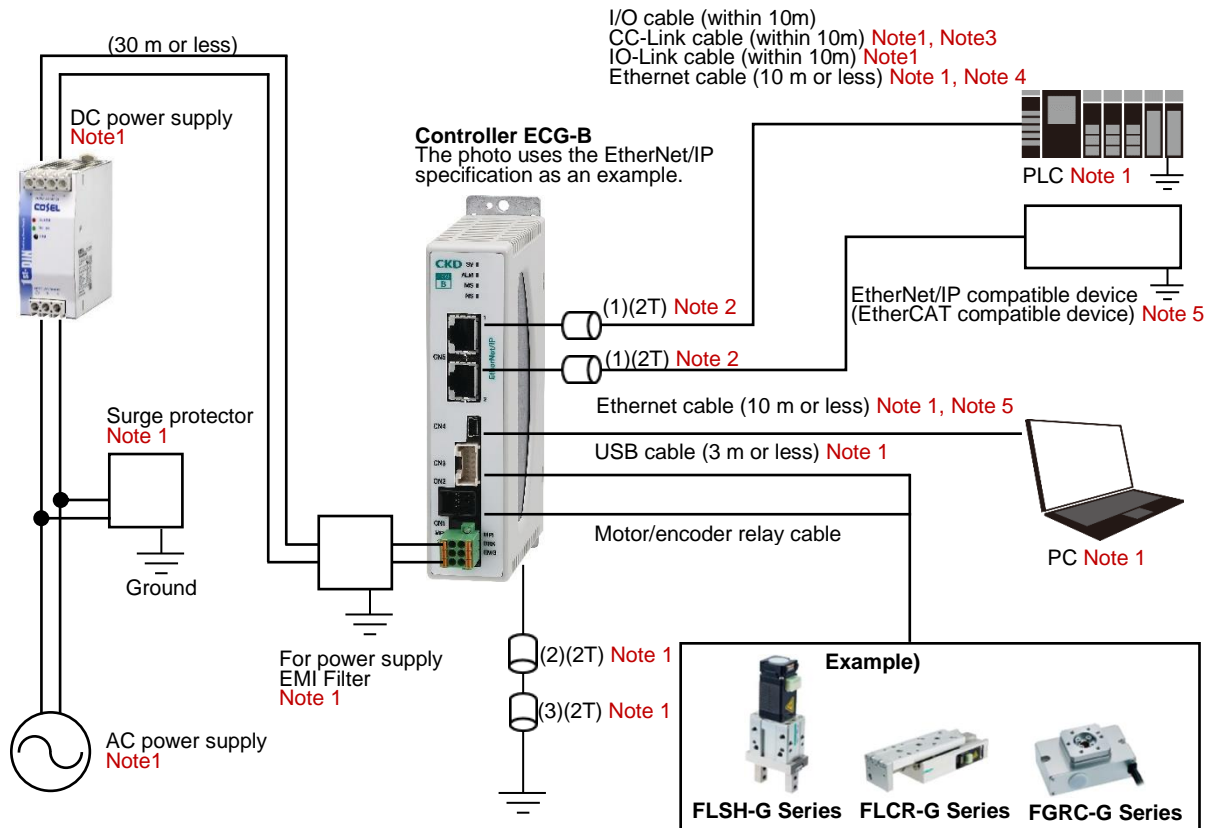
Note 1: Peripheral equipment and cables are customer-supplied. However, the motor and encoder relay cable and I/O cable are dedicated cables. Please buy them from us.
Note 2: The ferrite cores can only be installed for CC-Link specification, EtherCAT specification, and EtherNet/IP specification, and are provided by the customer.
Note 3: The shield of the CC-Link cable is grounded at both ends.
Note 4: The shield of the Ethernet cable is grounded at one end (PLC side only).
Note 5: Connect only for EtherNet/IP and EtherCAT specifications. Connect the relevant network devices.

Part used	Model	Manufacturer
Surge protector	R-A-V-781BXZ-4	Okaya Electric Industries Co., Ltd.
	R-A-V-781BWZ-4	
	RSPD-250-Q4	Soshin Electric Co., Ltd.
	RSPD-250-U4	
EMI filter for power supply	AX-NSF-NF2015A-OD	Soshin Electric Co., Ltd.
Ferrite core (1)	E04SR401938	Seiwa Electric MFG Co., Ltd.
Ferrite core (2)	E04SR301334	
Ferrite core (3)	E04RMX251512	

■ Example of EMC measure (controller grounded)

Standard mount type

CN1
MP0   MPI
24V   BRK
0V   EMG

Tighten the ground wire together with the fixing screw of the main body to connect it.

M5 screw
(Provided by customer)

DIN rail mount type

Ground terminal
Connect the ground wire to the tap hole (M3).

CKD   SV ■
ECG A   ALM ■

M3 screw
(Provided by customer)
Tightening torque
0.3 N·m
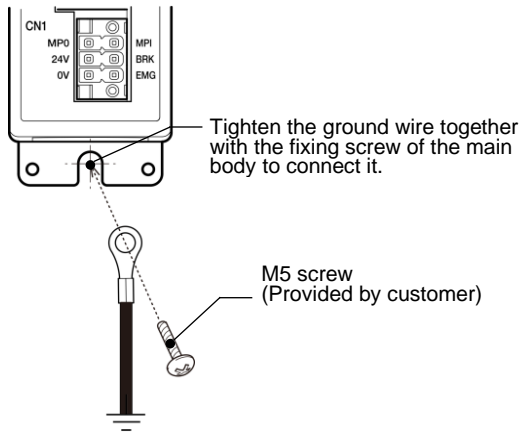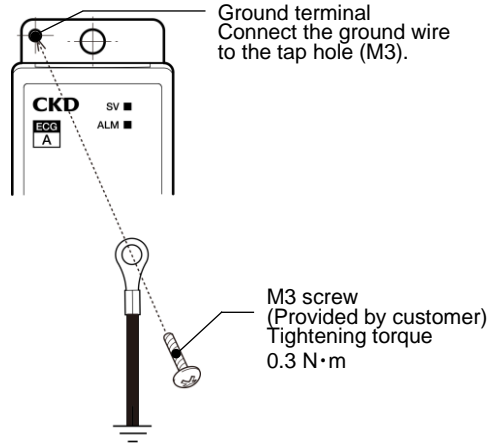
■ Example of preventive measure against EMC (actuator grounded)

Ground terminal
M3
(Provided by customer)

M3 screw
(Provided by customer)
Tightening torque: 0.3 N·m
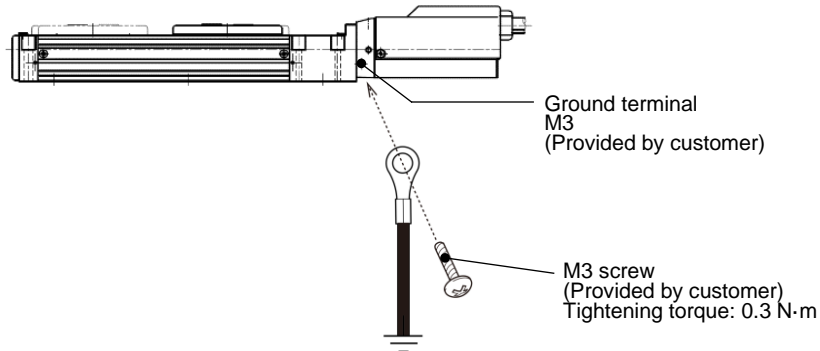
■ Example of preventive measure against EMC (motor and encoder relay cable grounded)

FG clamp

Encoder cable

Equipment (conductive part)
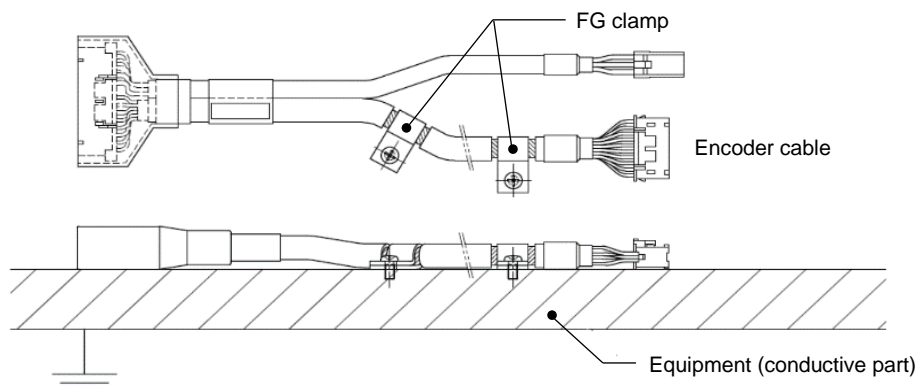
■ Example of preventive measure against EMC (ethernet cable shield grounded)

Clamp the PLC side of the Ethernet cable to the frame ground in the same way as grounding the motor and encoder relay cable.

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

Connect the shield wire of the CC-Link cable (PLC side) to the SLD terminal of PLC.
Connect the ground wire to the frame ground terminal of the CC-Link communication connector.
Refer to the CC-Link installation manual for details.

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6.3. UL Standards

Controller model number	ECG-A Series ECG-B Series
File No.	E325064
Vol No.	Volume3
Sec No.	Section 1
CCN	NMMS2 to (Power Conversion Equipment-Component) NMMS8 (Power Conversion Equipment Certified for Canada-Component)
Authentication level	Recognized Component Marking
Safety standards	UL61800-5-1 (US authentication)
	CSA C22.2 No. 274 (Canada authentication)

6.4. Precautions In Compliance With UL Standards

6.4.1. Installation Location/Installation Environment

When using the product, check that it comply with the following environment.

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

※ Use in an environment that is equal to Class 2 pollution degree or cleaner than Class 2 pollution degree. When using in a pollution degree of Class 3, a controller must be installed in a control panel with a structure (IP54) that prevents water, oil, carbon, metal dust, 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): Rating output current

6.4.3.　External Power Supply

This product is intended for use with the power supply listed in the table below in compliance with UL standards.

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

6.4.4.　Over Temperature Protection

There is no motor over temperature protection function specified in UL61800-5-1.
If the motor overheating protection function is required as the entire equipment, take measures such as detecting the motor over temperature.

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 free of charge or repair the faulty product at one of CKD's facilities free of charge.
However, the following failures are excluded from this warranty:

• Failure caused by handling or use of the product under conditions and in environments that deviate from those stated in the catalog, the Specifications, or this Instruction Manual.

• Failures due to excess durability (number of times, distance, time, etc.) and consumables

• Failure not caused by the product.

• Failure caused by use not intended for the product.

• Failures caused by an alteration or repair that CKD is not involved

• Failure caused by reasons unforeseen at the level of technology available at the time of delivery.

• Failure caused by causes that are not CKD responsibility, such as natural disasters and disasters.

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

These terms and conditions of warranty set out the basics.
In the event that warranty information on an individual specification diagram or document differs from these warranty terms, the specification diagram or document shall prevail.

7.2. Warranty Period

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

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8. REFERENCE INFORMATION

8.1. Specifications

8.1.1. Basic specifications

The basic specifications of ECG-A Series and ECG-B Series (I/O specifications) are as follows.

Item	Content	
Controller	ECG-A Series	ECG-B Series
Applicable actuators	EBS-G Series EJSG Series EBR-G Series GSSD2 Series GSTK Series GSTG Series GSTS Series GSTL Series	FLSH-G Series FLCR-G Series FGRC-G Series GCKW Series
Setting software	S-Tools	
Operation mode (PIO) **Note 1**	64-point mode, simple 7-point mode, solenoid valve mode double 2 position type, solenoid valve mode double 3 position type, solenoid valve mode single type	
Operation mode (IO-Link)	PIO mode, simple direct value mode, or full direct value mode	
Power supply voltage	24 VDC ± 10%	
Indicator lamp	SV: Servo lamp, ALM: Alarm lamp, Communication status check lamp	
Brake release input	24 VDC ± 10%	
Emergency stop release input	24 VDC ± 10%	
Insulation resistance	500 VDC 10 MΩ or more	
Withstand voltage	500 VAC 1 minute	
Operating ambient temperature	0 to 40°C (no freezing)	
Operating ambient humidity	35 to 80% RH (no condensation)	
Storage ambient temperature	-10 to 50°C (no freezing)	
Storage ambient humidity	35 to 80% RH (no condensation)	
Operating atmosphere	No corrosive gas, explosive gas, or dust	
Protective structure	IP20	
Mass	Standard mounting: approx. 310g DIN rail mounting: approx. 340 g	

Note 1: Operative only when the operation mode is PIO mode.

8.1.2. Communication Specifications

The communication specifications of ECG-A Series and ECG-B Series (I/O specifications) are as follows.

Item		Content
Communication protocol		IO-Link
Communication protocol version		V1.1
Communication speed		COM3(230.4kbps)
Port		Class A
Process data PD (in) data length Note 1	PIO mode	2 bytes
	Simple direct value mode	9 bytes
	Full direct value mode	12 bytes
Process data PD (out) data length Note 1	PIO mode	2 bytes
	Simple direct value mode	7 bytes
	Full direct value mode	22 bytes
Minimum cycle time	PIO mode	1 ms
	Simple direct value mode	1.5 ms
	Full direct value mode	2.5 ms
Data storage		2kbyte
SIO mode Support		None
Vendor ID Note 2		855 (Decimal) / 0x357 (Hexadecimal)

Note 1: When setting the data with the IO-Link master (PLC), if the data table cannot be set with the data length shown here, the data table should be generally mapped to be larger than this data length.
Note 2: Indicates CKD Corporation.

※ For operation modes (PIO mode, simple direct value mode, and full direct value mode), refer to "3.4.3 Operation Mode".

ECG-A Series：Software Ver.1.00.00 to Ver.1.05.00

ECG-B Series：Software Ver.1.00.00 to Ver.1.02.00

Item			Content
Device ID Note 1	**Simple direct value mode**	**ECG-A**	0x402001 (hexadecimal)
		ECG-B	0x403001 (hexadecimal)
	Full direct value mode	**ECG-A**	0x402002 (hexadecimal)
		ECG-B	0x403002 (hexadecimal)
	PIO mode **Standard 64-point mode**	**ECG-A**	0x402003 (hexadecimal)
		ECG-B	0x403003 (hexadecimal)
	PIO mode **Simple 7-point mode**	**ECG-A**	0x402004 (hexadecimal)
		ECG-B	0x403004 (hexadecimal)
	PIO mode **Solenoid valve mode** **Double 2-position type**	**ECG-A**	0x402005 (hexadecimal)
		ECG-B	0x403005 (hexadecimal)
	PIO mode **Solenoid valve mode** **Double 3-position type**	**ECG-A**	0x402006 (hexadecimal)
		ECG-B	0x403006 (hexadecimal)
	PIO mode **Solenoid valve mode** **Single type**	**ECG-A**	0x402007 (hexadecimal)
		ECG-B	0x403007 (hexadecimal)

Note 1: Indicates this product.

※ For operation modes (PIO mode, simple direct value mode, and full direct value mode), refer to "3.4.3 Operation Mode".

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ECG-A Series：Software Ver.1.06.00 to Ver.1.07.00

ECG-B Series：Software Ver.1.03.00 to Ver.1.04.00

Item			Content
Device ID Note 1	**Simple direct value mode**	**ECG-A**	0x402008 (hexadecimal)
		ECG-B	0x403008 (hexadecimal)
	Full direct value mode	**ECG-A**	0x402009 (hexadecimal)
		ECG-B	0x403009 (hexadecimal)
	PIO mode **Standard 64-point mode**	**ECG-A**	0x40200A (hexadecimal)
		ECG-B	0x40300A (hexadecimal)
	PIO mode **Simple 7-point mode**	**ECG-A**	0x40200B (hexadecimal)
		ECG-B	0x40300B (hexadecimal)
	PIO mode **Solenoid valve mode** **Double 2-position type**	**ECG-A**	0x40200C (hexadecimal)
		ECG-B	0x40300C (hexadecimal)
	PIO mode **Solenoid valve mode** **Double 3-position type**	**ECG-A**	0x40200D (hexadecimal)
		ECG-B	0x40300D (hexadecimal)
	PIO mode **Solenoid valve mode** **Single type**	**ECG-A**	0x40200E (hexadecimal)
		ECG-B	0x40300E (hexadecimal)

Note 1: Indicates this product.

※ For operation modes (PIO mode, simple direct value mode, and full direct value mode), refer to "3.4.3 Operation Mode".

ECG-A Series：Software Ver.1.09.00 or later

ECG-A Series：Software Ver.1.05.00 or later

Item			Content
Device ID Note 1	**Simple direct value mode**	**ECG-A**	0x402016 (hexadecimal)
		ECG-B	0x40300F (hexadecimal)
	Full direct value mode	**ECG-A**	0x402017 (hexadecimal)
		ECG-B	0x403010 (hexadecimal)
	PIO mode **Standard 64-point mode**	**ECG-A**	0x402018 (hexadecimal)
		ECG-B	0x403011 (hexadecimal)
	PIO mode **Simple 7-point mode**	**ECG-A**	0x402019 (hexadecimal)
		ECG-B	0x403012 (hexadecimal)
	PIO mode **Solenoid valve mode** **Double 2-position type**	**ECG-A**	0x40201A (hexadecimal)
		ECG-B	0x403013 (hexadecimal)
	PIO mode **Solenoid valve mode** **Double 3-position type**	**ECG-A**	0x40201B (hexadecimal)
		ECG-B	0x403014 (hexadecimal)
	PIO mode **Solenoid valve mode** **Single type**	**ECG-A**	0x40201C (hexadecimal)
		ECG-B	0x403015 (hexadecimal)

Note 1: Indicates this product.

※ For operation modes (PIO mode, simple direct value mode, and full direct value mode), refer to "3.4.3 Operation Mode".

8.2. Dimensions

8.2.1. ECG-A Series (IO-Link Specifications)

■ Standard mounting (ECG-ANNN30-LKA□□)
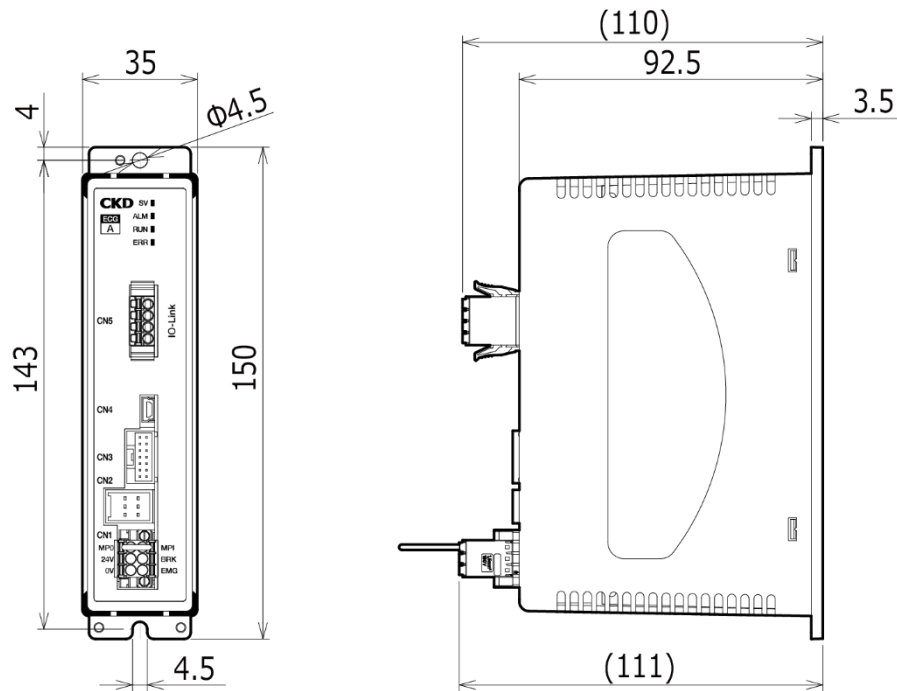
■ DIN rail mounting (ECG-ANNN30-LKD□□)

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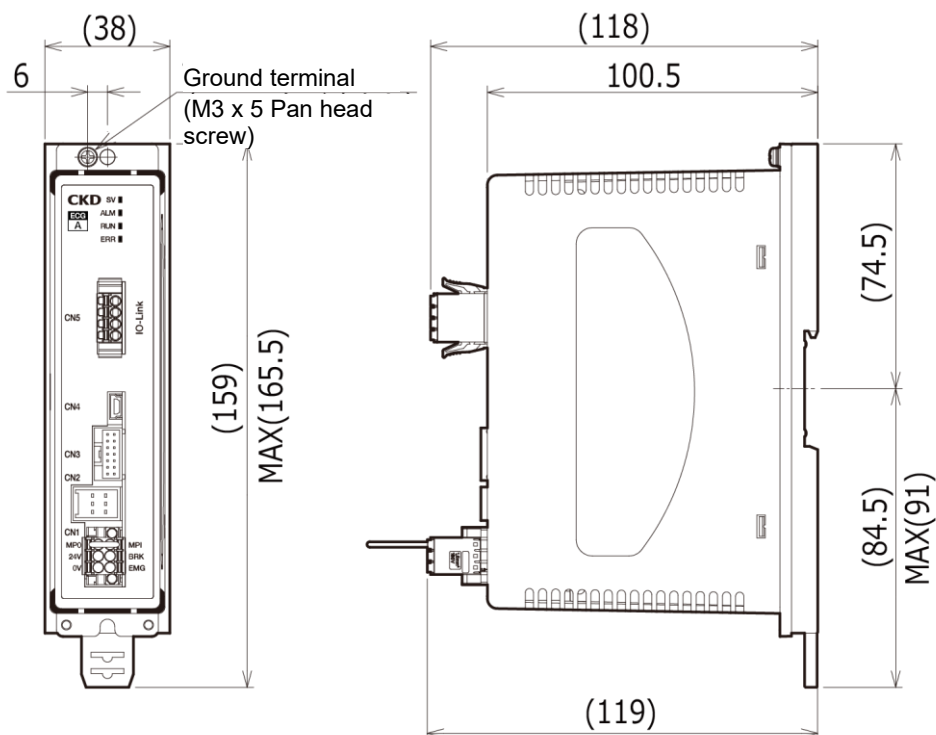
8.2.2. ECG-B Series (IO-Link Specifications)

■ Standard mounting (ECG-BNNN30-LKA□□)

■ DIN rail mounting (ECG-BNNN30-LKD□□)

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Glossary

CAT5e
A standard for network cables, also called category 5e or category 5 enhanced. The communication speed has been improved from the conventional CAT5 standard. This cable is less susceptible to crosstalk caused by noise from other cables.

CCW
Abbreviation for Counter Clockwise Rotation. Counterclockwise when viewed from the output shaft side.
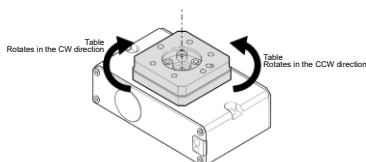
CRC
Abbreviation for Cyclic Redundancy Check. Also referred to as cyclic redundancy checking. A method to check whether data was transmitted, recorded, or replicated accurately.

CSP + file
Abbreviation for the Control & Communication System Profile Plus file. It contains information to help start up, operate, and maintain CC-Link compatible devices. Since the profile specification is fixed, parameters can be easily set for CC-Link products even if they are from different manufacturers.

CW
Abbreviation for Clockwise Rotation. Clockwise when viewed from the output shaft side.
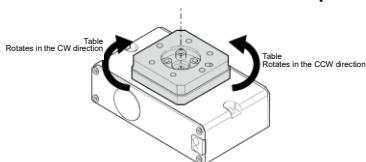
Data Storage function
A function to back up the configuration parameter data of an IO-Link device, such as an ECG controller, to the IO-Link master.

DHCP server
A server that automatically assigns IP addresses and other configuration information to devices connected to a network.

EDS file
Abbreviation for Electronic Data Sheet file. It contains information to help start up, operate, and maintain EtherNet/IP-compatible devices. Since the profile specification is fixed, parameters can be easily set for EtherNet/IP products even if they are from different manufacturers.

ESI file
Abbreviation for EtherCAT Slave Information file. It contains information to help start up, operate, and maintain EtherCAT compatible devices. Since the profile specification is fixed, parameters can be easily set for EtherCAT products even if they are from different manufacturers.

HDLC
Abbreviation for High-level Data Link Control, and a type of protocol of the data link layer. Transmission efficiency is high because continuous transmission can be performed without waiting for the other party's response, and data error detection using CRC enables highly reliable data transmission.

IODD file
An abbreviation for the IO Device Description file. It contains information to help start up, operate, and maintain IO-Link compatible devices. Since the profile specification is fixed, parameters can be easily set for IO-Link products even if they are from different manufacturers.

IO-Link device
Devices such as sensors, actuators, and controllers compatible with IO-Link.

IO-Link master
It can connect multiple IO-Link devices and receive signals of the IO-Link devices. The IO-Link master can be set with IO-Link device setting items such as device verification function, backup function, and restore function using PLC development tools.

Input data
It indicates the 32 bit unit data (2 words) to be written from the host device (PLC, etc.) to the controller in EtherCAT communication.

Input signal

It indicates the bit-wise data to be written from the host device (PLC, etc.) to the controller in EtherCAT communication.

Output data

It indicates the 32 bit unit data (2 words) read from the controller by the host device (PLC, etc.) in EtherCAT communication.

Output signal

It indicates the bit-wise data read from the controller by the host device (PLC, etc.) in EtherCAT communication.

NPN

It indicates that NPN transistors are generally used in the output unit of a PLC in the connection of the parallel I/O specification. Even if the NPN transistor is not used, if the − side of the external power supply is connected to the output COM (output common) and the + side of the external power supply is connected to the input COM (input common), the term NPN is used. Also referred to as negative common type or sink type.

PNP

It indicates that PNP transistors are generally used in the output unit of a PLC in the connection of the parallel I/O specification. Even if the PNP transistor is not used, if the + side of the external power supply is connected to the output COM (output common) and the - side of the external power supply is connected to the input COM (input common), the term PNP is used. Also referred to as positive common type or source type.

PLC

Abbreviation for Programmable Logic Controller. A programmable controller for controlling industrial equipment. Possible to control multiple motors, sensors, robots, and other various devices.

WDT

Abbreviation for watchdog timer. A timer that detects an error in the computation time, monitors the time of one scan of the program, and issues an alarm if processing does not finish within the scheduled time.

Alarm code

When an error is detected, it is output from the controller to inform you of the error. You can check the display lamp of the controller, the output signal to the PLC, and all digits or one upper digit of the alarm code from S-Tools. You can check the details of the alarm in the Instruction Manual or the alarm history screen of S-Tools.

Inch operation

It is used when you want to move by relative position specification by the amount of travel set from the current position.

Encoder

There are a linear encoder that measures and outputs movement on a linear axis, and a rotary encoder that measures and outputs angle (rotational movement). The rotary encoder is referred to as an encoder in this Instruction Manual, the instruction manual described in the "Instruction manual for this product", and the catalog.

- Incremental encoder An encoder that measures and outputs the angle moved from the measurement start position. When using with an electric actuator, the amount of movement from the home position is unknown, so it is necessary to return to the home position before operating the actuator.

- Absolute encoder
  An encoder that measures and outputs the angle moved from the home position. When using with an electric actuator, it is not necessary to return to the home position before operating the actuator because it outputs the amount of movement from the home position.

- A "batteryless absolute encoder" is an absolute Batteryless absolute encoder
  An absolute encoder that does not require a battery to store its position.r that does not require a battery to store its position.

Overhang amount

It indicates the distance from the center of the top surface of the slider to the center of gravity of the object transferred. In the catalog, the amount of overhang that is allowed in the front-back, left-right, and up-down directions is listed for each mass.

Regenerative current

Current that is generated by the motor operating like a generator when the moving part of the actuator is moved by an external force. Reverse current flows from the motor to the controller, causing malfunction or damage.

Portable mass
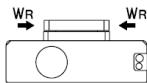It indicates the maximum mass that the actuator can transfer.

Allowable thrust load
Limit value of the load that can be applied in the direction of the actuator rotation axis. WS is used in this Instruction Manual, the instruction manual described in the "Instruction manual for this product", and the catalog.
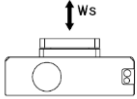
Allowable radial load
Limit value of the load that can be applied perpendicular (laterally) to the actuator rotation axis. WR is used in this Instruction Manual, the instruction manual described in the "Instruction manual for this product", and the catalog.

Allowable moment load
Limit value of the load that can be applied in the direction of tilting the actuator rotation axis. M is used in this Instruction Manual, the instruction manual described in the "Instruction manual for this product", and the catalog.
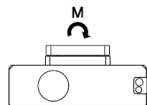
Home position
Position to be the reference (0 mm) for actuator operation.

Positioning repeatability
A term that is used only for grippers. It indicates the difference between the maximum and minimum stop positions when positioning operation is repeated from the same direction to the same position.

Repeatability
It Indicates the difference between the maximum and minimum stop positions when positioning operation is repeated from the same direction to the same position. However, in the case of grippers, it indicates the variation when the same workpiece is repeatedly gripped under the same operating conditions.

Grease
It is applied to bearings, bearings, etc., to reduce friction and smooth the operation of the machine. Because the performance cannot be demonstrated due to deterioration of grease or adhesion of foreign material, periodic maintenance is required.

Surge protector
A device that protects equipment and communication equipment from transient abnormal high voltage such as lightning.

Servo OFF
It indicates that the motor is not energized.

Servo ON
It indicates that the motor is energized.

Cyclic communication (transmission)
It indicates periodic communication between the host device (PLC, etc.) and the controller.

Subnet mask
A value that identifies in the IP address the part indicating which network it belongs to (network range) and the part indicating which device in the network. The subnet mask value tells you how many bits from the beginning of the IP address indicate the network range.

IP address : 192.168.10.1
Subnet mask : 255.255.0.0
Network range : 192.168.□.□

Jog operation
While the travel command is issued, the actuator continues to operate at the set speed.

Slave station
A general term for stations other than the master station.

Static allowable moment
Limit value of the load moment that can be applied to the slider when the actuator is stationary. How to apply each moment in the slider type is as follows.
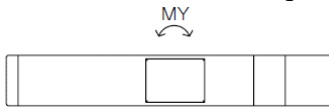
• Pitching moment
A moment acting in the front-rear direction on the slider movement axis. MP is used in this Instruction Manual, the instruction manual described in the "Instruction manual for this product", and the catalog.
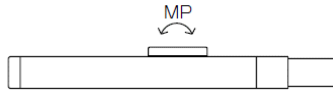
• Yawing moment
A moment that acts in the left-right direction on the slider movement axis. MY is used in this Instruction Manual, the instruction manual described in the "Instruction manual for this product", and the catalog.

• Rolling moment
A moment that acts in the axial rotation direction on the slider movement axis. MR is used in this Instruction Manual, the instruction manual described in the "Instruction manual for this product", and the catalog.

Installation category
A concept that expresses how well an electrical device can withstand the application of a transient voltage from an AC power source. The installation category 2 corresponds to "primary side circuit for equipment using a power cord connected to an outlet".

Full-duplex communication
A communication method that allows simultaneous transmission and reception.

Occupied station number
In the CC-Link specification, a value that indicates how much traffic the controller occupies in the communication in the system. Since the number of stations that can be used by one master station is fixed, the total number of stations occupied by the controller and other units connected to the master station must be less than that value.

Soft limit
It indicates the limit of the operating range set in the controller.

Dynamic brake
A method that quickly stops the rotation of the motor by consuming rotational energy as heat energy by short-circuiting the motor terminals via a resistor in the event of a power failure or emergency stop. Since there is no holding torque during stop, it is necessary to use an electromagnetic brake for vertical installation.

Electromagnetic brake
A mechanism that mechanically fixes the output shaft of the motor to prevent the workpiece from falling off when becoming the servo OFF state due to power failure or an alarm in the vertical installation state. Because it is a brake for holding, it cannot be used for stopping during operation.

Electric Actuator
It is a combination of a motor and mechanical parts, and can control operations such as speed, angle, and force. The rotational force of the motor is transmitted to the drive system and converted into rotational motion or linear motion.

Default gateway
It indicates the IP address of a relay device (such as a router) that connects the inside network to the outside network. When sending or receiving data to or from a device at an address other than the network range set by the subnet mask, the relay device set by the default gateway is always passed through.

Screw lead
It refers to the distance that the workpiece can be moved when the motor rotates once in the electric actuator.

Noise filter
An electrical circuit or electronic circuit that removes noise, or a device that contains it.

Backlash
A mechanical play in gears, etc.. The lower the backlash, the less rattling.

Parameter
Parameters let you set basic items for operating the actuator. In addition to the settings related to the actuator operation, settings related to communication with the PLC and warnings are also set with parameters.

Half-duplex communication
A communication method in which both transmission and reception cannot be performed at the same time (only one of them can be performed).

Fast Ethernet
It is standardized by IEEE802.3u and is a standard that improves the transmission speed of Ethernet to 100 Mbps.

Function block (FB)
It is a component of a circuit block that is used repeatedly so that it can be reused in a sequence program. By making them into the components, the control that combines multiple functions can be simplified as if it were a single command.

Ferrite core
It is magnetic material using ferrite material. It is used to attenuate high frequency noise.

Process data output / PD(out)
It indicates the data to be written from the host device (PLC, etc.) to the controller in IO-Link specification communication.

Process data input / PD(in)
It indicates the data that the host device (PLC, etc.) reads out from the controller in IO-Link specification communication.

Point data
In the point data, the actuator operation pattern such as the target position and speed is set for each point number. In ECG series, the operation pattern for 64 points can be set, and the actuator can be operated by specifying the point number and issuing a travel command.

Polling
If multiple devices communicate separately, processing and signals can conflict and cause problems. Polling is the process in which the main device (master station) checks in order whether there are any requests from other devices (slave station) in order to communicate smoothly.
When polling response is being performed, it means that there is polling from the master station to the slave station, and the slave station is responding to the polling from the master station.
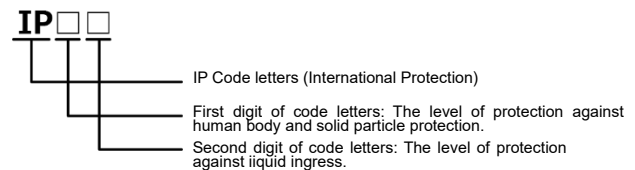
Ball screw
A mechanical element that can convert rotational motion to linear motion. Unlike sliding screws, the ball rolls between the screw shaft and nut, reducing energy loss due to friction. It is used to convert the rotational motion of the motor into the linear motion of the actuator.

Baud rate
It indicates the communication speed. A value that indicates how many times per second digital data can be modulated and demodulated.

Protective class IP20 / IP40
The protective class indicates the degree of protection from solid foreign materials such as dust and water. The first digit of the number indicates the degree of protection against the human body and solid foreign materials, and "2" indicates the it is protected against foreign solid materials with a diameter of 12.5 mm or more and "4" indicates that it is protected against foreign solid substances with a diameter of 1.0 mm or more. The second digit of the number indicates the degree of protection against water intrusion, and "0" indicates no protection. It is specified in JIS C 0920 and IEC 60529.

IP□□

IP Code letters (International Protection)

First digit of code letters: The level of protection against human body and solid particle protection.

Second digit of code letters: The level of protection against liquid ingress.

Master station
A station that controls the entire network. One master station is required for one network.

Mechanical end
A position where the moving part of the actuator stops mechanically.

Message communication (transmission)
It indicates communication that occurs irregularly (when necessary) between the host device (PLC, etc.) and the controller.

Remote device station
A station that cyclically transmits bit-wise input / output signal and word-based input / output data to the master station in the communication of CC-Link specification.

Remote output

It indicates bit-wise data that is written from the host device (PLC, etc.) to the controller in the communication of CC-Link specification.

Remote input

It indicates bit-wise data that the host device (PLC, etc.) reads out from the controller in the communication of CC-Link specification.

Remote register (output)

It indicates 16-bit unit (1 word) data that is written from the host device (PLC, etc.) to the controller in the communication of CC-Link specification.

Remote register (input)

It indicates 16-bit unit (1 word) data that the host device (PLC, etc.) reads out from the controller in the communication of CC-Link specification.

Lost motion

It is the maximum value of the difference between the average values at the stop position after rotating in the forward and reverse directions multiple times. It is affected by the backlash and the rigidity of the mechanism.