CKD

ECG Series
Controller for Electric Actuators

Parallel I/O Specification

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.

2025-03-05 SM-A27751/7-A

PREFACE

Thank you for purchasing our controller for electric actuators “ECG Series parallel I/O specification”.

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.
Ensure to observe organization’s standards, laws and regulations etc. for safety related to design and management of the equipment.
In order to use our products safely, it is important to select, use, handle, and maintain the products properly.
Observe the warnings and precautions described in this Instruction Manual to ensure device safety.
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".

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

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

< 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 implement 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, be careful not to get an electric shock by turning off the power of the device or the power of the corresponding equipment.
- 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 who has 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 within 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.
  - ◎ This product is expected to be used in applications with significant impact on people and property, and where safety is particularly required.

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1. PRODUCT OVERVIEW

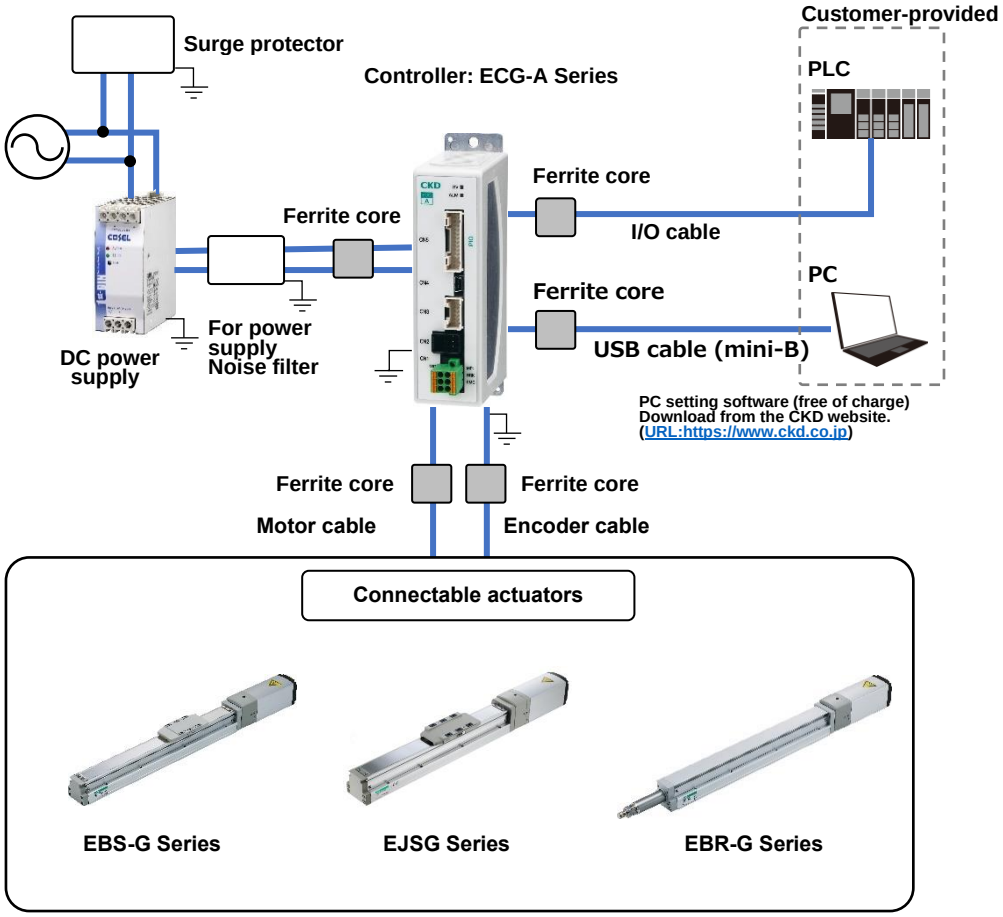
1.1. System Structure

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 >



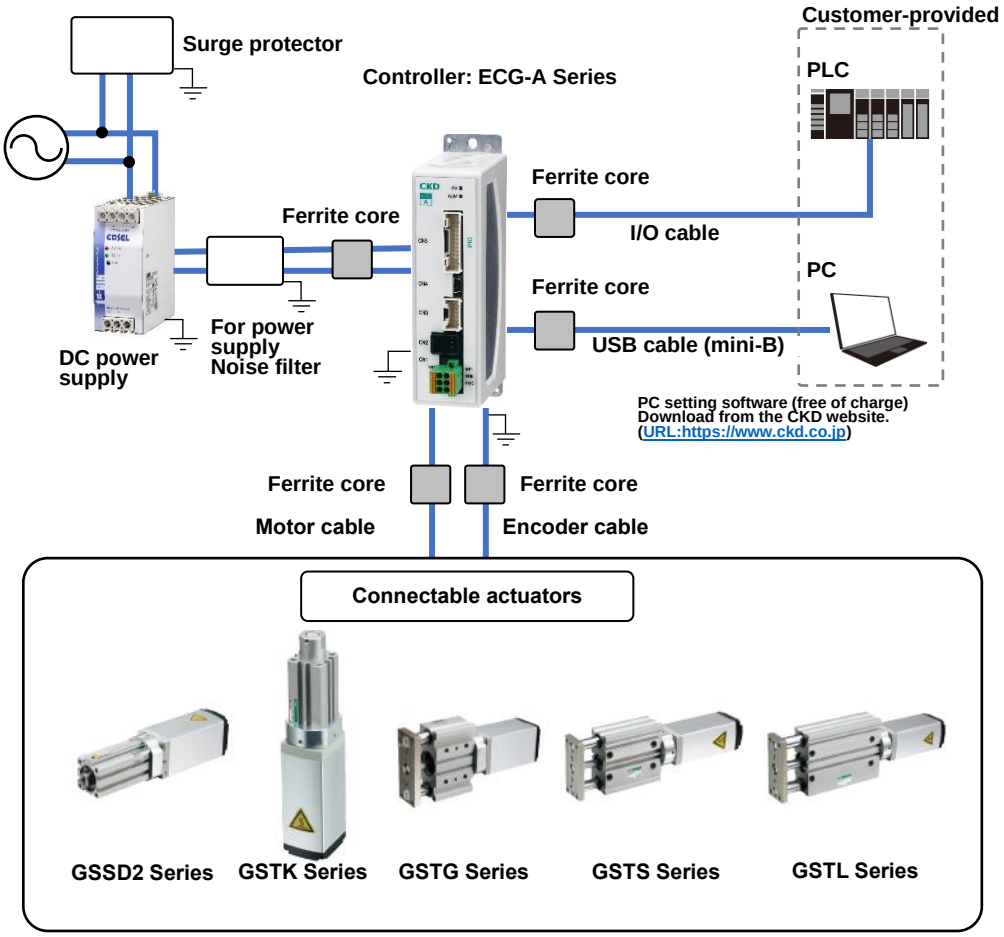
System components that can be purchased from CKD are listed below.

	Component	Product name/Model no.
This product	Controller	ECG-A Series
Accessories	Power supply connector	DFMC1,5/3-STF-3,5 (PHOENIX CONTACT)
	I/O cable	EA-CBLNP2-□□
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>



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

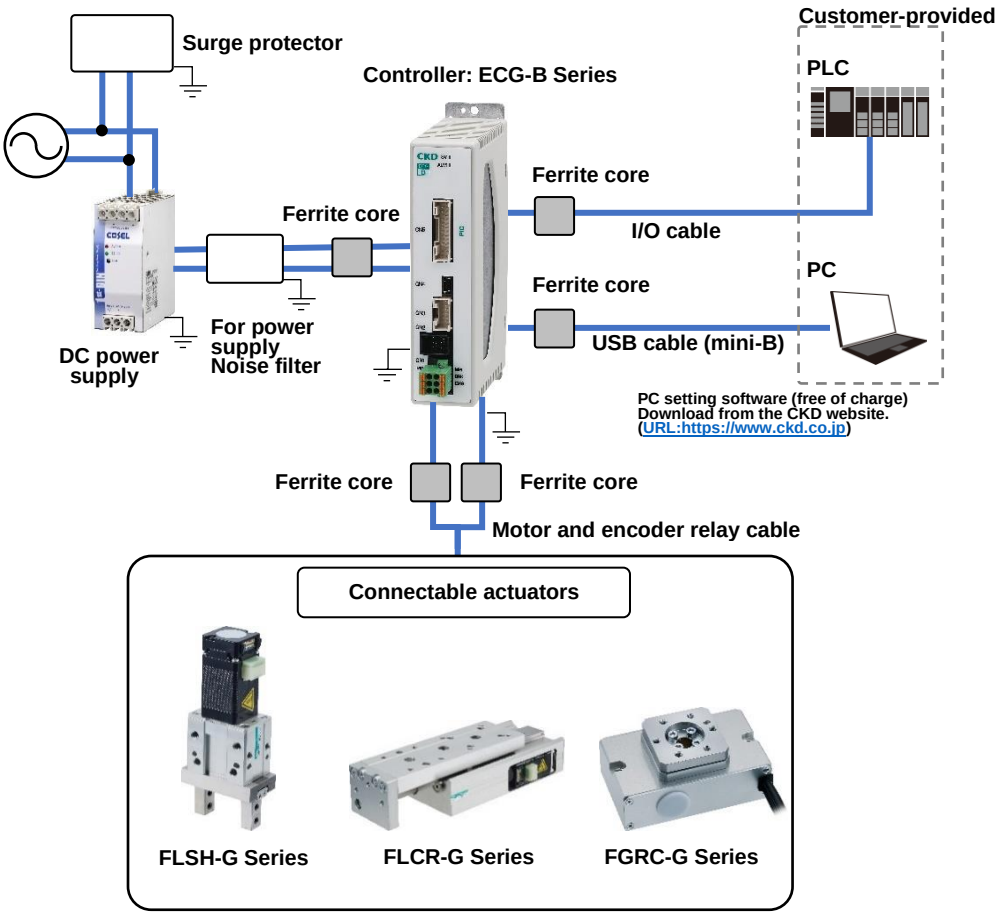
	Component	Product name/Model no.
This product	Controller	ECG-A Series
Accessories	Power supply connector	DFMC1,5/3-STF-3,5 (PHOENIX CONTACT)
	I/O cable	EA-CBLNP2-□□
Sold separately	Actuator	GSSD2/GSTK/GSTG/GSTS/GSTL Series
	Motor cable	EA-CBLM□-□□□
	Encoder cable	EA-CBLE□-□□□
	24 VDC power supply	EA-PWR-KHNA240F-24
	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>



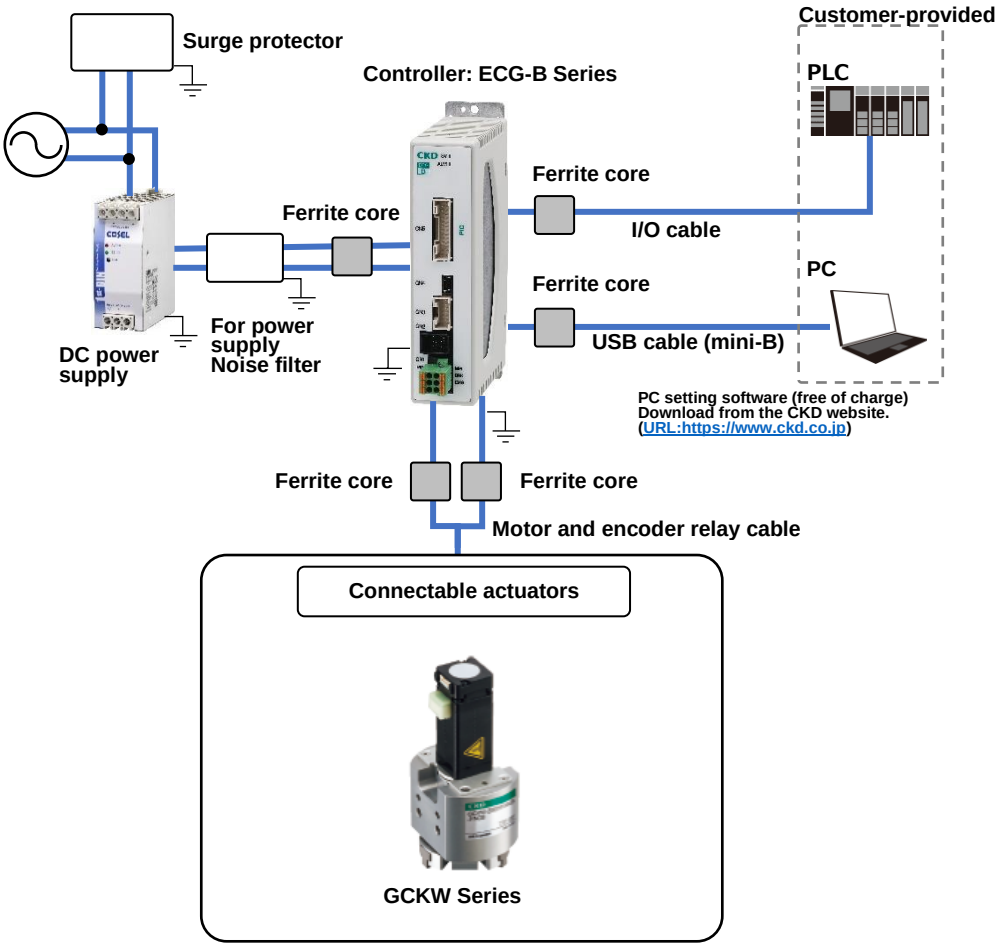
System components that can be purchased from CKD are listed below.

	Component	Product name/Model no.
This product	Controller	ECG-B Series
Accessories	Power supply connector	DFMC1,5/3-STF-3,5 (PHOENIX CONTACT)
	I/O cable	EA-CBLNP2-□□
Sold separately	Actuator	FLSH-G/FLCR-G/FGRC-G Series
	Motor and 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 >



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)
	I/O cable	EA-CBLNP2-□□
Sold separately	Actuator	GCKW Series
	Motor and 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.

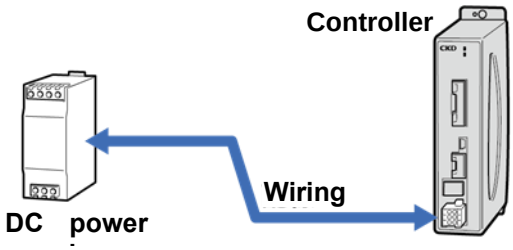
Follow the steps below to wire and set the controller so that it can be operated from the PLC.

1. Unpacking

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

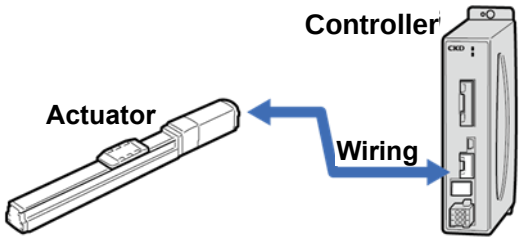
2. Connecting the power supply

Connect the controller and the power supply. Refer to “2.3.1Wiring to the Power Supply” for details.



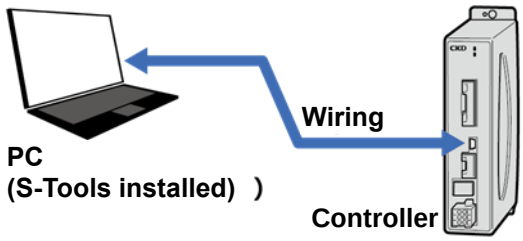
3. Connecting the actuator

Connect the controller and the actuator. Refer to “2.3.2Actuator Wiring” for details.



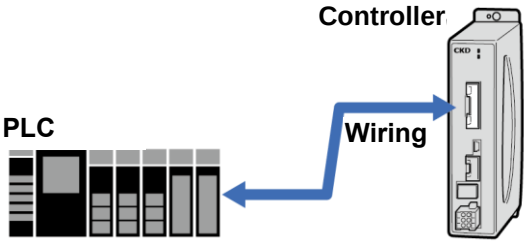
4. Connecting S-Tools

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



5. Connecting PLC

Connect the controller and the PLC. Refer to “2.3.4Wiring with the I/O cable” for details.



6. Setting actuator information

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

7. Setting parameters and point data

Determine the controller setting. Refer to “3.2Setting parameters” and “3.3Point Data Setting” for more information.

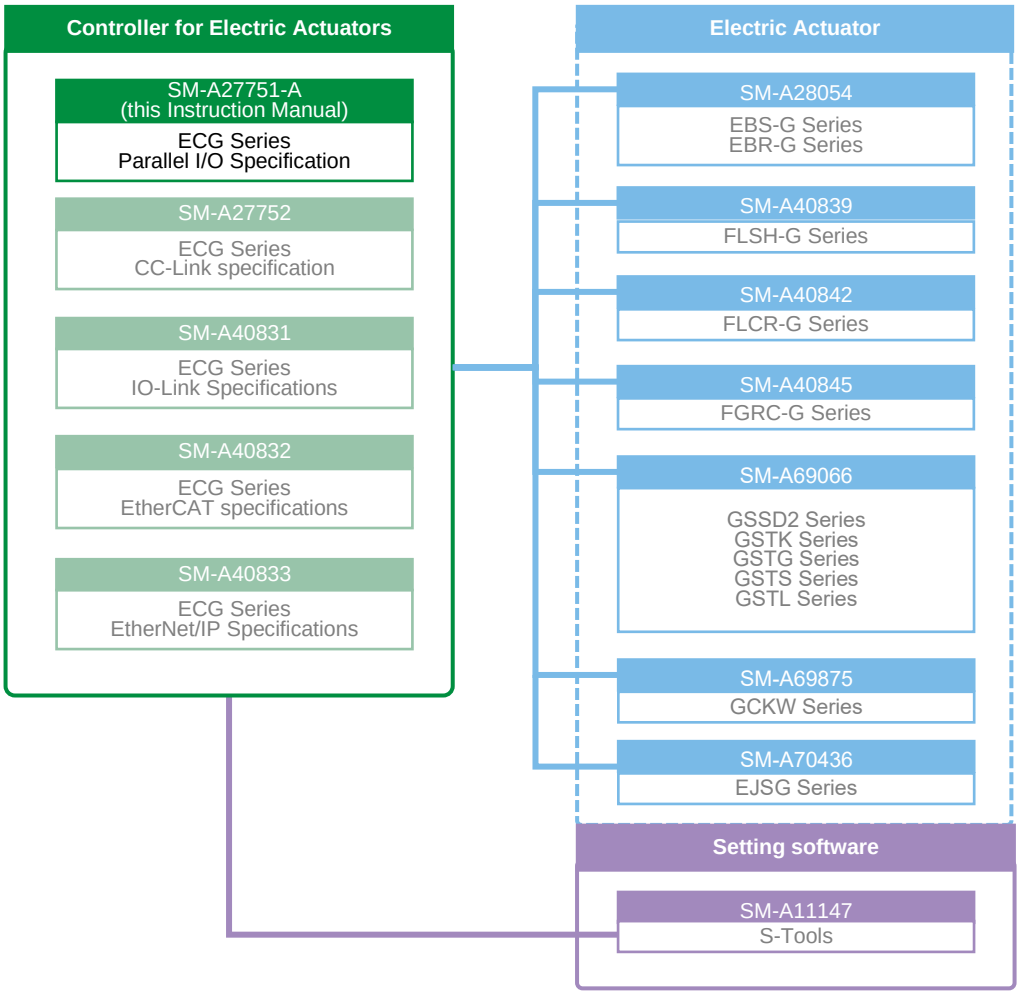
8. Start operation

Operate the actuator using the PLC. Refer to “3.4Operation and Time Chart” for details.

- The steps of step 3 to 7 are in no particular 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.
- When using a controller with parallel I/O specification, parameters and point data cannot be set from the PLC, so use S-Tools to set them.

1.2. Instruction Manuals Related to This Product

This Instruction Manual is "SM-A27751-A".
The instruction manuals related to this product are as follows.



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 Code/No.	
EBS Series	-	Version 1.00.00 or later
EBR Series	-	
EBS Series	Compatible with secondary batteries Note 1	Version 1.02.00 or later
GSSD2 Series	-	Version 1.05.00 or later
GSTK Series	-	
GSTG Series	-	
GSTS Series	-	
GSTL Series	-	
EJSG Series	-	Version 1.05.00 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.

< ECG-B SERIES >

Actuator		Software Ver. of the controller
Series	**Classification Code/No.**	
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 >

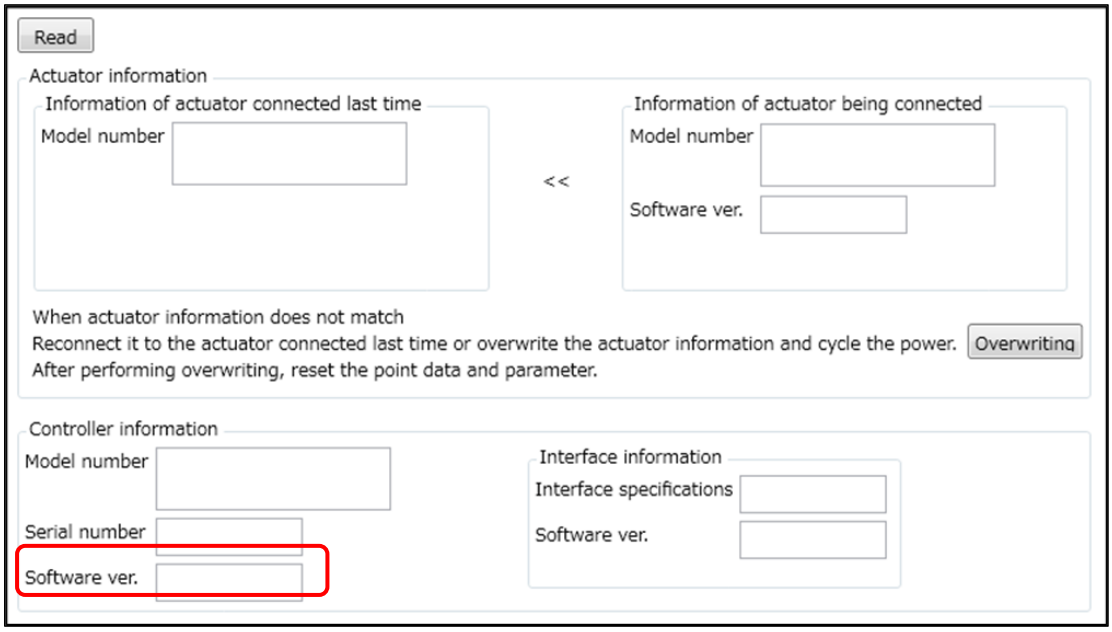
Additional function		Software Ver. of the controller
Item	Explanation	
Adding parameter **・ Holding point signal output** **・ Traveling signal ON hold time**	**3.2.1**	Version 1.05.00 or later
Adding signal **・ Soft limit over** **・ Soft limit over (-)** **・ Soft limit over (+)**	**3.2.2**	Version 1.06.00 or later
Adding parameter **・ Initial servo ON method**	**3.2.1**	Version 1.07.00 or later
・ Adding parameter choices **・ Home position return direction (coordinate axis)**	**3.2.1** **3.4.5**	Version 1.09.00 or later

< ECG-B SERIES >

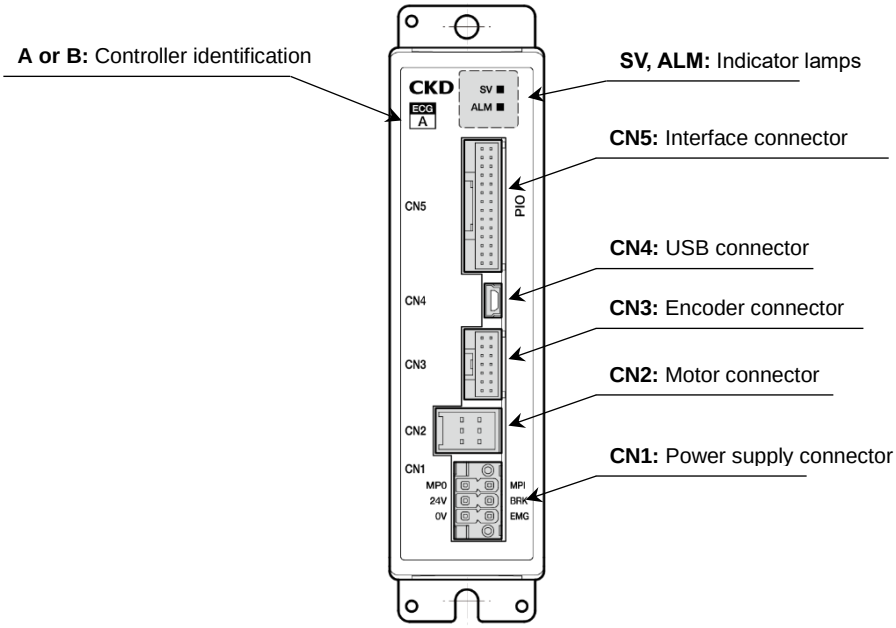
Additional function		Software Ver. of the controller
Item	Explanation	
Adding parameter **・ Holding point signal output** **・ Traveling signal ON hold time**	**3.2.1**	Version 1.03.00 or later
Initial value change **・ Pressing speed** **・ Home position return speed**	**3.2.1** **3.3.16**	
Adding signal **・ Soft limit over** **・ Soft limit over (-)** **・ Soft limit over (+)**	**3.2.2**	Version 1.04.00 or later
Adding parameter choices **・ Home position return direction (coordinate axis)**	**3.2.1** **3.4.5**	Version 1.06.00 or later
Adding parameter **・ FGRC home position return method**	**3.2.1** **3.4.5**	

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. Part Name


A or B: Controller identification
SV, ALM: Indicator lamps
CN5: Interface connector
CN4: USB connector
CN3: Encoder connector
CN2: Motor connector
CN1: Power supply connector
CKD
ECG
A
SV
ALM
CN5
PIO
CN4
CN3
CN2
CN1
MP0
24V
0V
MPI
BRK
EMG

<table>
<tr><th>Code</th><th>Part Name</th><th colspan="2">Description</th></tr>
<tr><td rowspan="3">A or B</td><td rowspan="3">Controller identification code</td><td>Identification code: A</td><td>Identification code: B</td></tr>
<tr><td>Controller: ECG-A Series</td><td>Controller: ECG-B Series</td></tr>
<tr><td>Supported actuators:
EBS-G Series
EJSG Series,
EBR-G Series,
GSSD2 Series,
GSTK Series,
GSTG Series,
GSTS Series,
GSTL Series</td><td>Supported actuators:
FLSH-G Series,
FLCR-G Series,
FGRC-G Series,
GCKW Series,</td></tr>
<tr><td>SV, ALM</td><td>Indicator lamp</td><td colspan="2">SV stands for servo lamp and ALM stands for alarm lamp.
For LED indications, see “1.4.1 LED Display”.</td></tr>
<tr><td>CN1</td><td>Power supply connector</td><td colspan="2">A connector for connecting power to the controller.
See “2.3.1Wiring to the Power Supply” for information on wiring method.</td></tr>
<tr><td>CN2</td><td>Motor connector</td><td>A connector for connecting the motor cable
Connection cable model No.:
Refer to “2.3.2Actuator Wiring” for the EA-CBLM□-□□□ connection cable.</td><td rowspan="2">A connector for connecting the motor and encoder relay cable.
Connection cable model No.:
Refer to “2.3.2Actuator Wiring” for the EA-CBLME□-□□□ connection cable.</td></tr>
<tr><td>CN3</td><td>Encoder connector</td><td>A connector for connecting the encoder cable
Connection cable model No.:
Refer to “2.3.2Actuator Wiring” for the EA-CBLME□-□□□ connection cable.</td></tr>
<tr><td>CN4</td><td>USB connector</td><td colspan="2">A connector for connecting with S-Tools.
Use a commercially available USB cable (mini-B type) for the connection cable.</td></tr>
<tr><td>CN5</td><td>Interface connector</td><td colspan="2">A connector for connecting with the host device.
Refer to “2.3.4Wiring with the I/O cable” for Connection cable model No.: EA-CBLNP2-□□ wiring.</td></tr>
</table>

1.4.1. LED Display

■ Servo lamp and alarm lamp

<table>
<tr><th colspan="2">Controller status</th><th>SV</th><th>ALM</th></tr>
<tr><td colspan="2">Control power OFF</td><td>Off</td><td rowspan="3">Off</td></tr>
<tr><td rowspan="2">At normal operation</td><td>At servo ON</td><td>Lit green</td></tr>
<tr><td>At the time of servo OFF</td><td>Blinking green
(lit once per second)</td></tr>
<tr><td rowspan="2">At occurrence of alarm</td><td>At occurrence of non-cancelable alarm</td><td rowspan="2">Blinking green
(After lighting off for 2 seconds, light on once every 1 second n times, and then repeat) ->
Alarm 0xn□□□ occurs</td><td>Lit red</td></tr>
<tr><td>At occurrence of cancelable alarm</td><td>Blinking red
(lit once per second)</td></tr>
<tr><td rowspan="2">At occurrence of warning</td><td>At servo ON</td><td>Lit green</td><td rowspan="2">Blinking red
(lit once every two seconds)</td></tr>
<tr><td>At servo OFF</td><td>Blinking green
(lit once per second)</td></tr>
</table>

※ 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.

1.5. Model Number Indication

1.5.1. ECG-A Series

ECG-ANNN30- **NP** **A** **00**

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

Installing	
A	Normal mounting
D	DIN rail mounting

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

※ 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”.

※ A single cable can also be purchased. Refer to “2.3.4Wiring with the I/O cable” for details.

1.5.2. ECG-B Series

ECG-BNNN30- **NP** **A** **00**

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

Installing	
A	Normal mounting
D	DIN rail mounting

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

※ 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”.

※ A single cable can also be purchased. Refer to “2.3.4Wiring with the I/O cable” for details.

2. INSTALLATION

DANGER

Do not use the product in a place where dangerous substances such as ignitable, inflammable, or explosive materials are present.
- A fire, ignition, or explosion may occur.

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.

When installing the product, make sure to hold and secure the product and the workpiece when installing the product.
- An injury may occur if the product falls down, falls off, or malfunctions.

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 primary side of the power supply 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 this product to other devices.
- 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 disassemble or modify the product not specified in this Instruction Manual.
- In addition to causing injuries, accidents, malfunctions, or failures, it may not meet the specifications such as this Instruction Manual.

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 irregular stop, make sure that the actuator is safe 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, malfunction or the flowing in of overcurrent may occur. Overcurrent may cause a malfunction, damage, or fire.

Make sure that the wiring is insulated.

- Otherwise, malfunction or the flowing in of overcurrent may occur. Overcurrent may cause a malfunction, 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, malfunction or the flowing in of overcurrent may occur. Overcurrent may cause a malfunction, 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 (ground 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 51 mm 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.

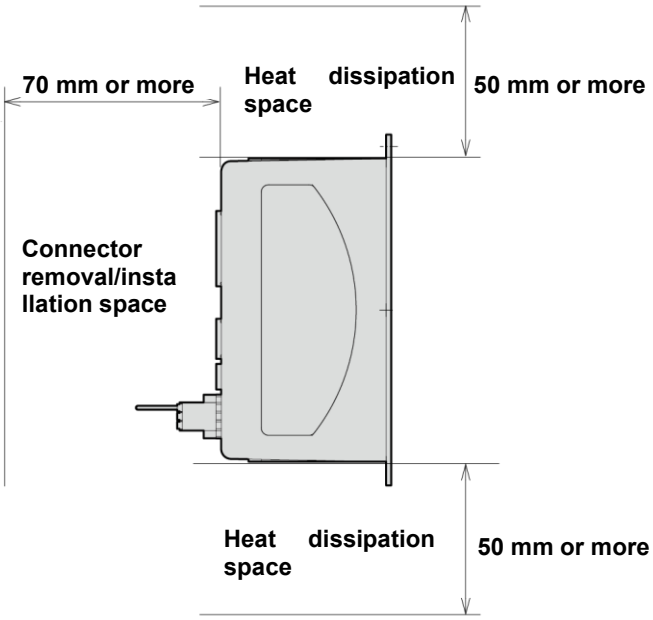
Before adjusting the gain, firmly fix the actuator body to the rigid equipment.

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 builds up.
- 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.
- Avoiding places exposed to direct sunlight or near heating elements, install in a place free from dust, corrosive gas, explosive gas, flammable gas, and flammable materials. 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. Secure a space of 50 mm or more on both the top and bottom surfaces in consideration of natural convection as a heat dissipation space.
- 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.



2.2. Unpacking

CAUTION	
	**Heavy products shall not be carried by a worker alone.** **Never ride on the packaging.** **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.**
	**Pay sufficient attention to avoid an impact such as dropping during transportation and handling.**
	**When taking out the product from the packaging, hold the product body.** **Keep it level when standing still.**

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

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 for the network cable and do not bend it forcibly.

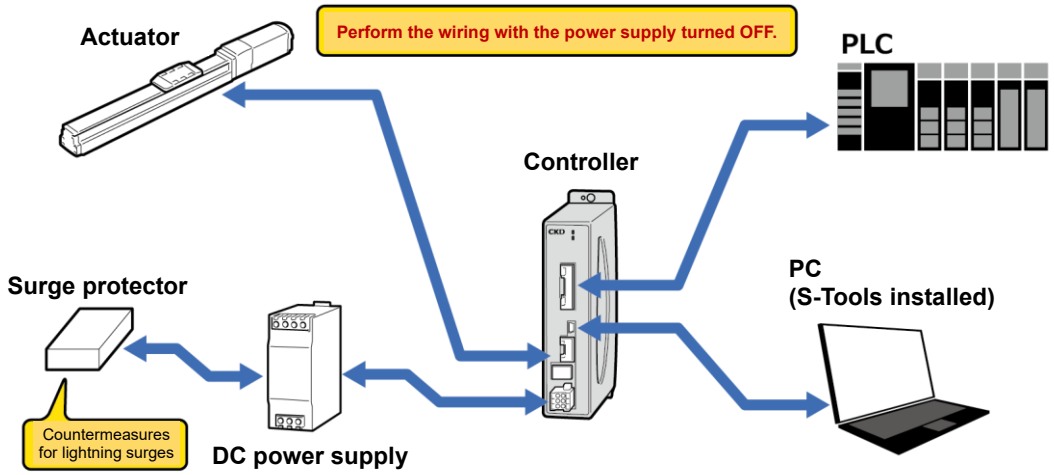
Take countermeasures against lightning surges in the equipment side.
- The product is not resistant to lightning surges.
- Use AC voltage in installation category 2.

Tighten the screws again on the terminal block with the specified torque so that the wiring connections do not come loose or come off, and insert the connectors correctly.
- This may cause fire, electric shock or malfunction of the equipment.

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

Keep the network cable away from power lines and high-voltage lines so that it is not affected by noise.

Check the precautions before wiring.



- 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.

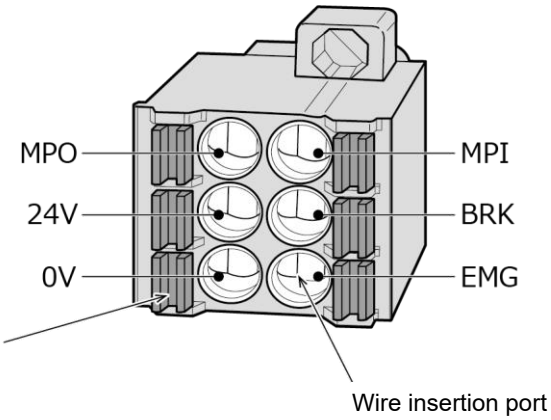
- When 24 VDC is applied to the force brake release (BRK), the brake is forcibly released. Therefore, there is a risk of injury or damage to the workpiece due to the moving part of the actuator dropping, etc., except when installed horizontally.

■ 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 (+)	MPI and MPO are connected by a jumper wire at the time of shipment. Power supply is cut off by removing the jumper wire.	
MPO	Power supply shutoff	MPI and MPO are connected by a jumper wire at the time of shipment. Power supply is cut off by removing the jumper wire.	
BRK	Force brake release	Forcibly releases the brake. The actuator cannot turn the servo ON while the brake is forcibly released.	
		24 VDC applied	Forcibly releases the brake.
		0 VDC or open state	Allows the brake to be applied.
24 V	Common power supply (+)	Same 24 VDC applied for control power supply and power supply.	
EMG	Emergency stop input	Connects 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.
0 V	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 max. current	**ECG-A Series**	**☐35 (EBS-04, EJSG-04, EBR-04, GSSD2-20, GSTK-20, GSTG-20, GSTS-20, GSTL-20)**	2.4 A or less
		☐42 (EBS-05, EJSG-05, EBR-05, GSSD2-32, GSTK-32, GSTG-32, GSTS-32, GSTL-32)	2.7 A or less
		☐56 (EBS-08, EJSG-08, EBR-08, GSSD2-50, GSTK-50, GSTG-50, GSTS-50, GSTL-50)	4.0 A or less
	ECG-B Series	**☐20(FLSH-16, FLCR-16, FGRC-10, GCKW-16)**	1.5 A or less
		☐25(FLSH-20, FLCR-20, FGRC-30, GCKW-20)	3.0 A or less
		☐25L(FLSH-25, FLCR-25, GCKW-25)	4.5 A or less
		☐35(FGRC-50)	4.2 A or less
Control power supply voltage			24 VDC ± 10%
Control unit current consumption			0.4 A or less

■ Electrical circuit and basic configuration of power supply

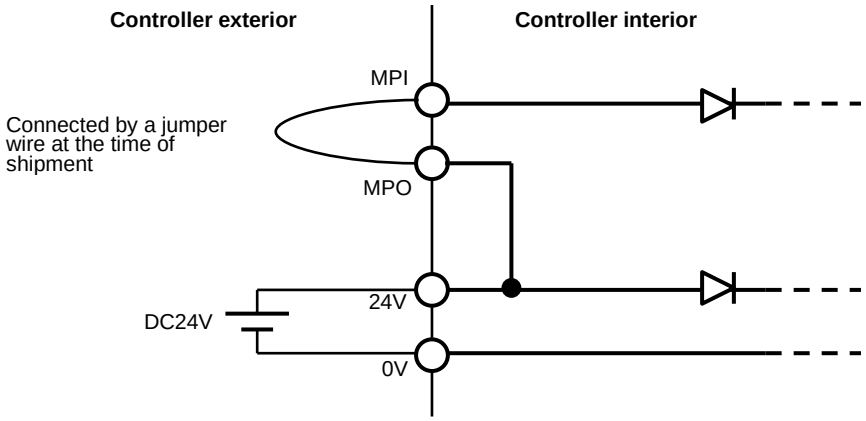
CAUTION

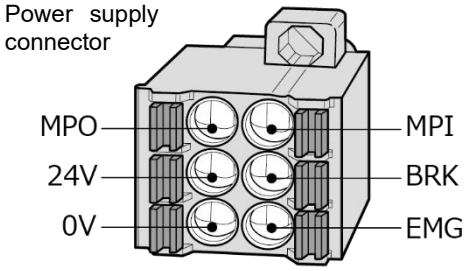
Reconfirm wiring prior to energizing to prevent wiring mistakes

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.

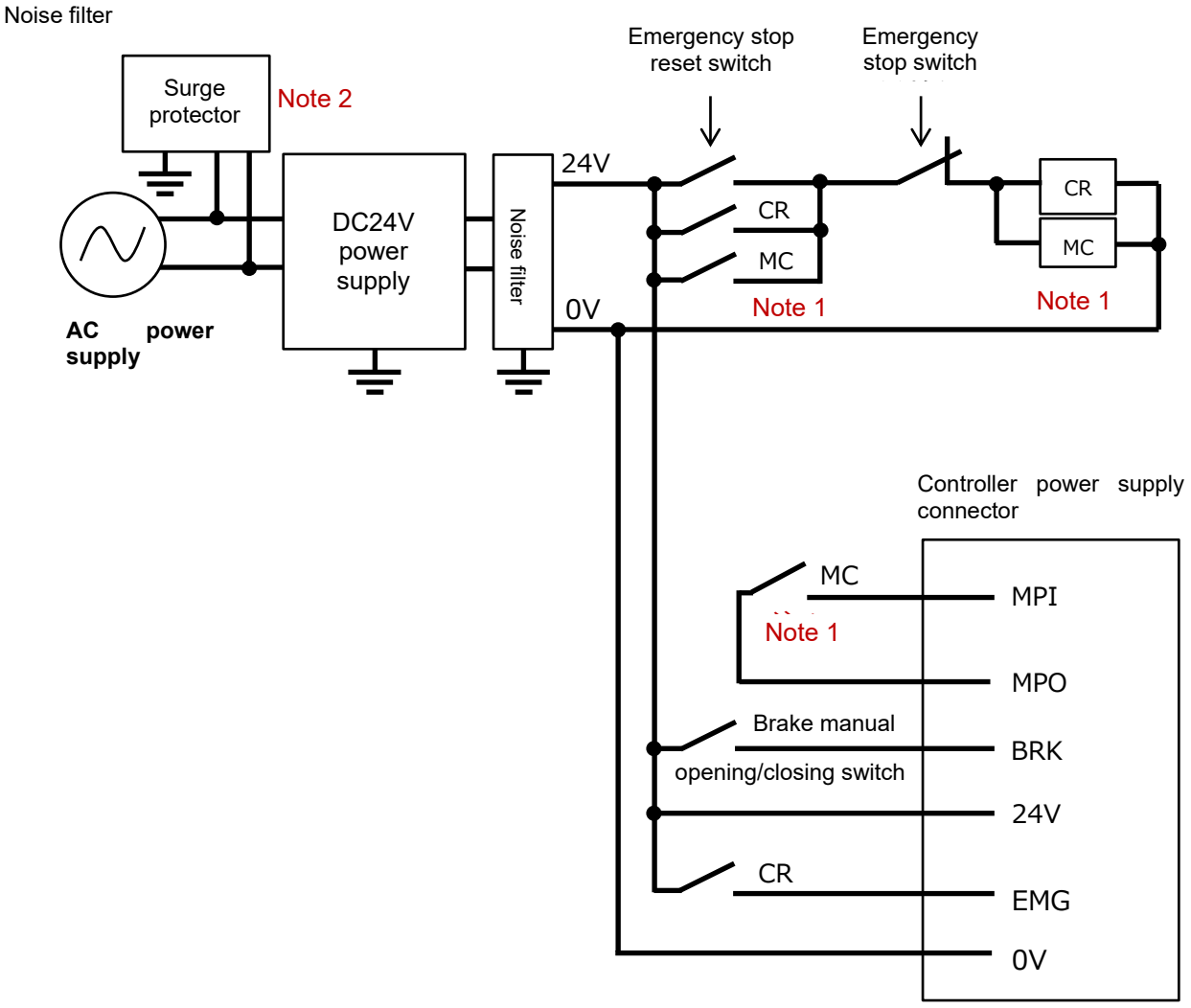
- This may cause fire, electric shock or malfunction of the equipment.

<Electrical schematic of power supply>





<Basic configuration of power supply>



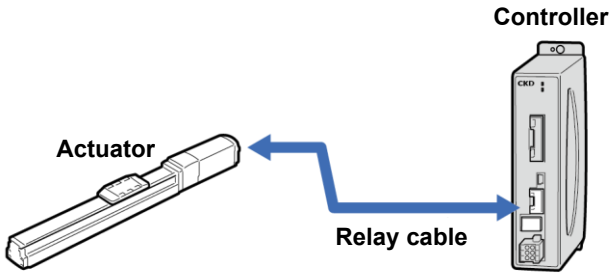
Note 1: To externally shut the power supply off (such as for supporting safety categories), connect a contact such as an electromagnetic switch between the MPI and MPO terminals.
Note 2: A surge protector is required to comply with the CE marking.

2.3.2. Actuator Wiring

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 explanation (ECG-A Series): Standard Series

EA-CBLM4- **S** **01**

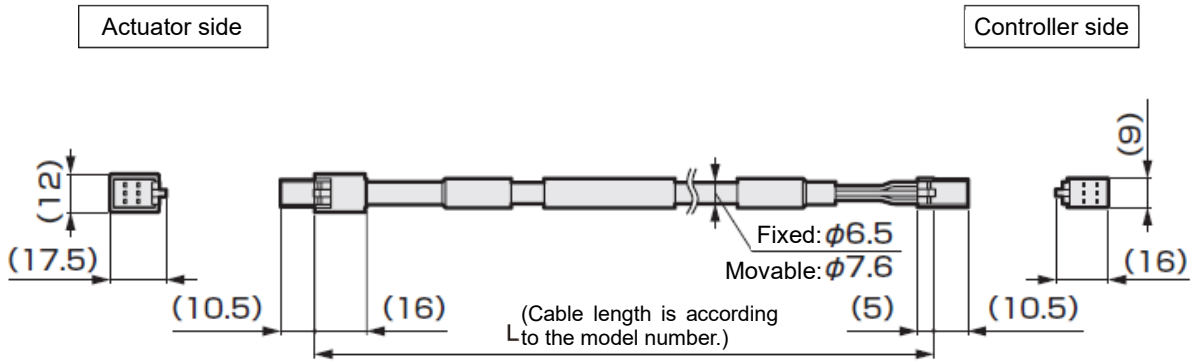
Cable type	
S	Fixed cable
R	Movable cable

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

※ 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



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

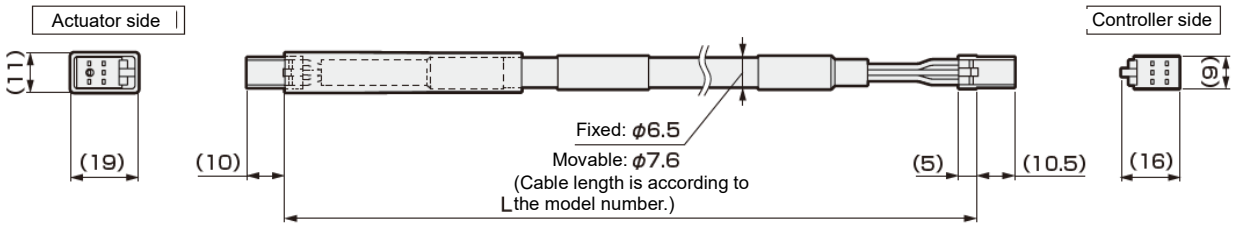
EA-CBLM5- **S** **01**

Cable type	
S	Fixed cable
R	Movable cable

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

※ 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)



■ Encoder cable model number explanations (ECG-A Series): Standard Series

EA-CBLE4- **S** **01**

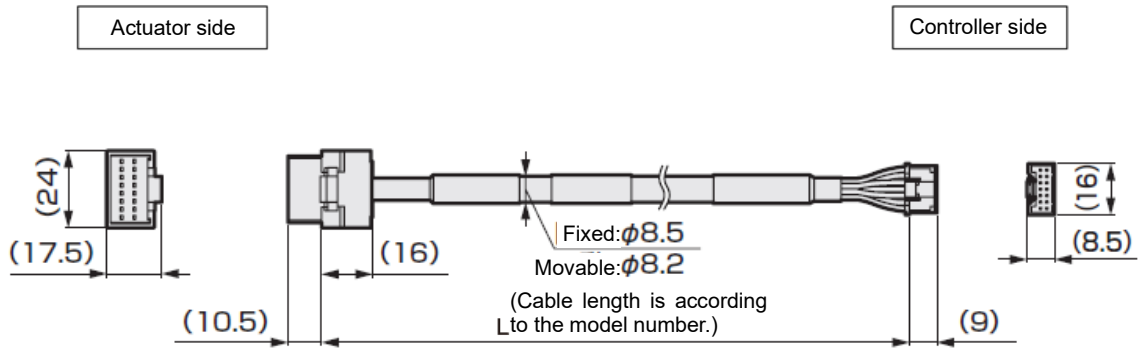
Cable type	
S	Fixed cable
R	Movable cable

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

※ 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



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

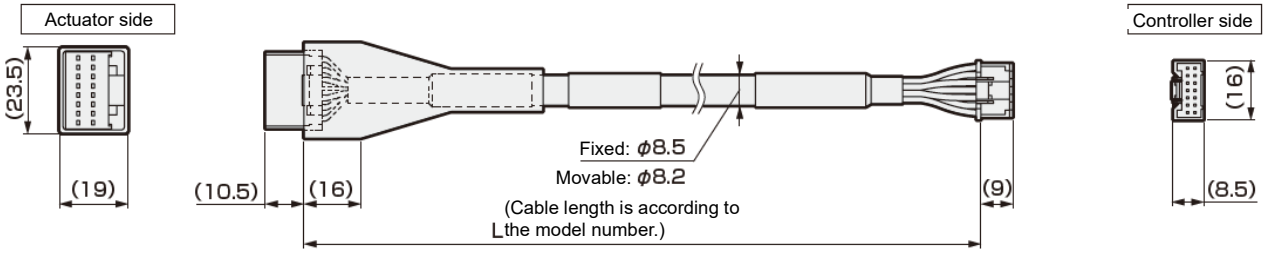
EA-CBLE5- **S** **01**

Cable type	
S	Fixed cable
R	Movable cable

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

※ 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, G Series (Dust-proof Specifications)



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

EA-CBLME4- **S** **01**

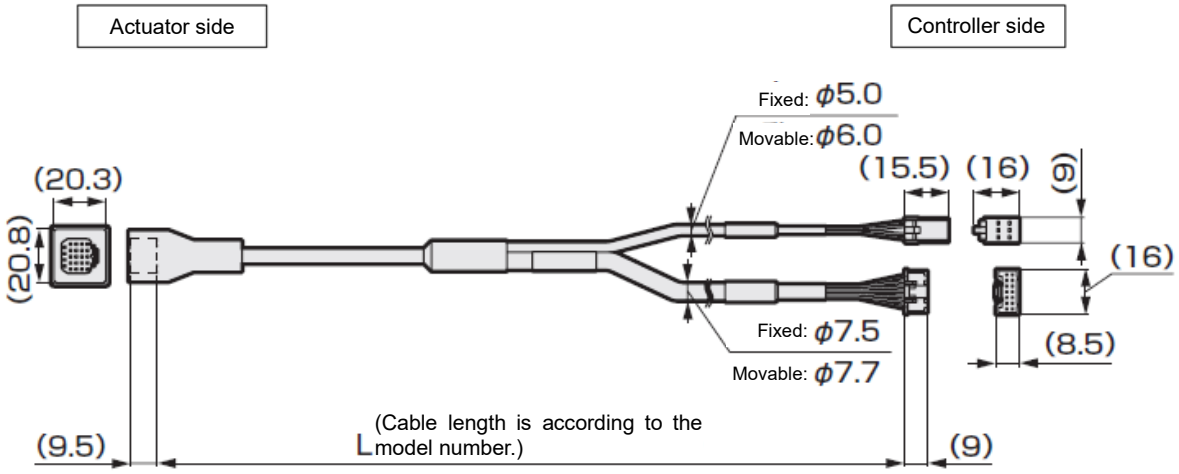
Cable type	
S	Fixed cable
R	Movable cable

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

※ For the FLSH-G Series, FLCR-G Series, and FGRC Series, actuators shipped before October 2022 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 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.).

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

■ Communication specifications

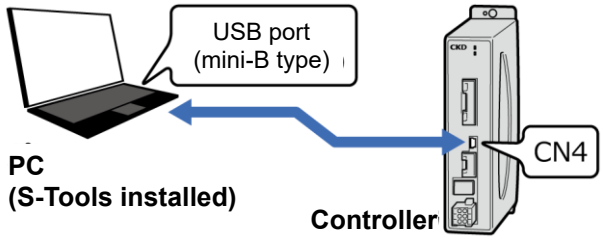
Item	Specifications
Interface	USB2.0
Communication speed	Full speed(12Mbps)

■ 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.



<Disconnect>
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

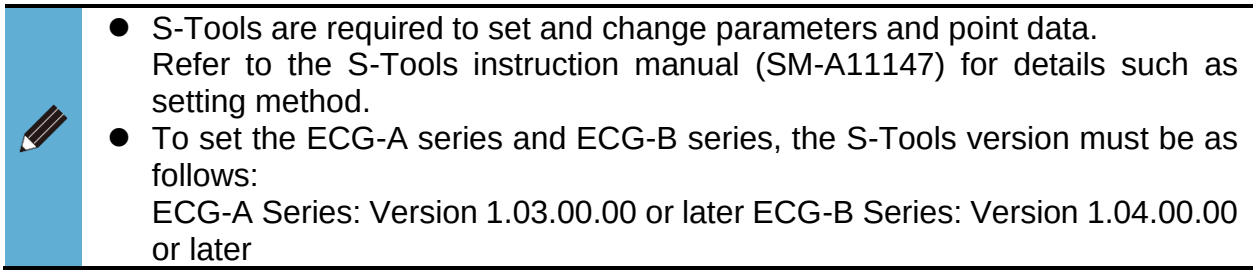
Disconnect the USB cable from CN4 on the front of the controller.

■ 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.

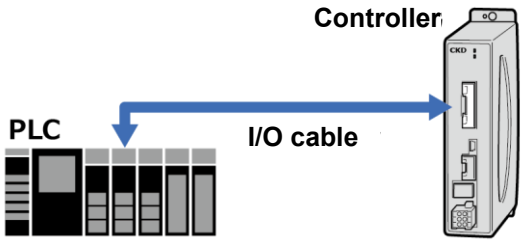
If the USB cable is disconnected in the TOOL mode, the controller cannot be controlled from host device (such as the PLC). Make sure that the controller is in the PLC mode before removing the USB cable.



- 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 as follows:
  ECG-A Series: Version 1.03.00.00 or later ECG-B Series: Version 1.04.00.00 or later

2.3.4. Wiring with the I/O cable

Use the dedicated I/O cable to wire the controller and the host system (PLC).



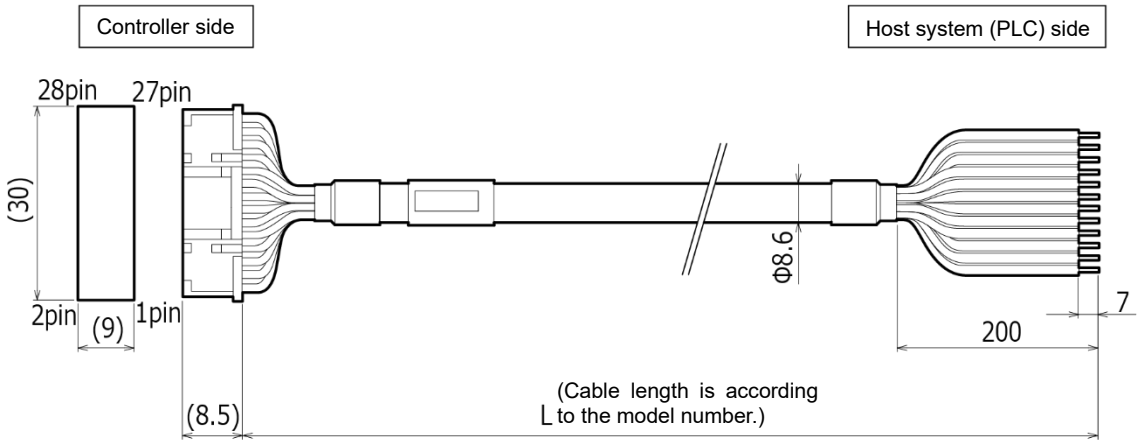
- The I/O cables used and signal assignments are the same for the ECG-A Series and the ECG-B Series.

■ I/O cable model number system

EA-CBLNP2- **02**

Cable length	
02	2m
03	3m
05	5m
10	10m

■ I/O cable dimensions

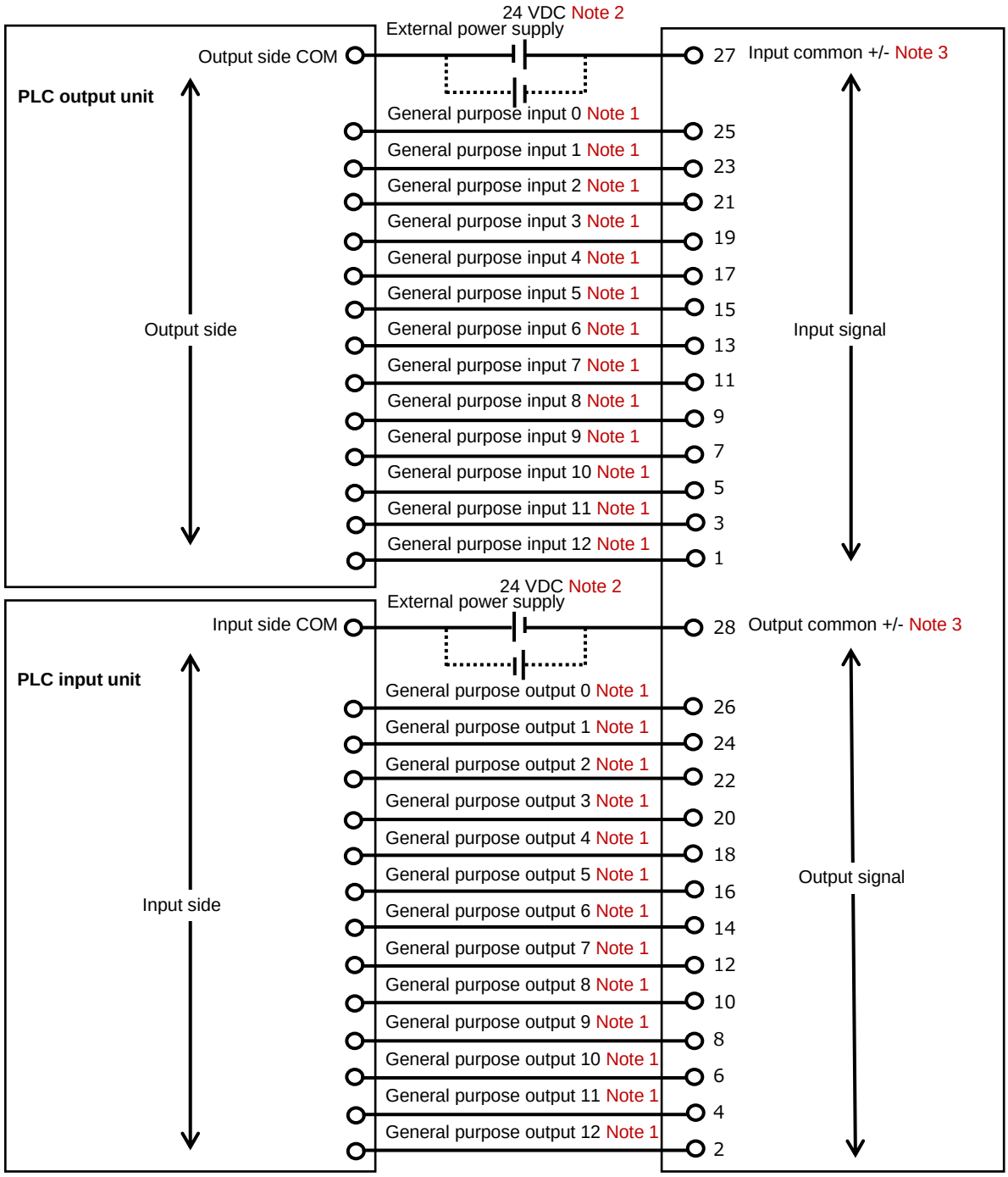


■ I/O cable wiring diagram

CAUTION

Reconfirm wiring prior to energizing to prevent wiring mistakes

Use S-Tools to confirm that the input / output signals are correct after energizing.

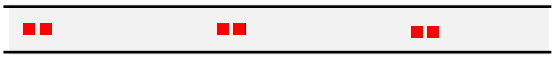


Note 1: Refer to “General purpose input / output signal assignment” for general purpose input / output.
Note 2: External power supply (24 VDC) is required for both input and output. Input and output common can be used on either + side or - side.
Solid lines indicate NPN connections and dotted lines indicate PNP connections.
Note 3: Input common and output common are not connected inside the controller.

- "NPN" indicates that NPN transistors are generally used in the output unit of a PLC in the connection of 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" indicates that PNP transistors are generally used in the output unit of a PLC in the connection of 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.

■ I/O cable assignment

<General purpose input>

Identification (insulator)		General purpose input No.	Pin No.
Mark	Color		
 Red, 1 dot	Orange	12	1
	Gray	11	3
	White	10	5
	Yellow	9	7
	Pink	8	9
 Red, 2 dots	Orange	7	11
	Gray	6	13
	White	5	15
	Yellow	4	17
	Pink	3	19
 Red, 3 dots	Orange	2	21
	Gray	1	23
	White	0	25
	Yellow	Common	27

<General purpose output>

Identification (insulator)		General purpose output No.	Pin No.
Mark	Color		
 Black, 1 dot	Orange	12	2
	Gray	11	4
	White	10	6
	Yellow	9	8
	Pink	8	10
 Black, 2 dots	Orange	7	12
	Gray	6	14
	White	5	16
	Yellow	4	18
	Pink	3	20
 Black, 3 dots	Orange	2	22
	Gray	1	24
	White	0	26
	Yellow	Common	28

■ General purpose input / output signal assignment

<Signal name list >

The table below lists the input and output signals.
For details on the operation, see “3.4.6Positioning Operation”.

<Input signal> (PLC -> controller)

Abbreviation	Signal name	Explanation	
PSBn	**Point number selection bit n**	Sets the point number (0 to 63) to be selected when the travel start, in binary (n = 0 to 5).	
PST	**Point travel start**	Starts the travel with the setting of the selected point number when switched from OFF to ON.	
PnST	**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.	
VnST	**Solenoid valve movement 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.	
VST	**Solenoid valve movement command**	At OFF	Move with the setting of point number 1.
		When ON	Move with the setting of point number 2.
OST	**Home position return start**	Starts the home position return when switched from OFF to ON.	
SVON	**Servo ON**	At OFF	Switches the actuator to the servo OFF state.
		When ON	Switches the actuator to the servo ON status.
ALMRST	**Alarm reset**	Executes the alarm reset when switched from OFF to ON.	
STOP# **Note 1**	**Stop**	When ON	The actuator is ready to move.
		At OFF	The actuator becomes immovable state. If switched OFF while moving, the actuator decelerates and stops and the travel command is canceled. The travel does not resume even when switched ON.
JOGM	**JOG (-) travel start**	The jog travel is performed in the - direction while ON. The speed is the value set in the parameter "JOG Speed", and the acceleration and deceleration are 0.3 G for the ECG-A Series and 0.1 G for the ECG-B Series.	
JOGP	**JOG (+) travel start**	The jog travel is performed in the + direction while ON. The speed is the value set in the parameter "JOG Speed", and the acceleration and deceleration are 0.3 G for the ECG-A Series and 0.1 G for the ECG-B Series.	

Note 1:“#” indicates a negative logic signal.

- 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.

<Output signal> (Controller -> PLC)

Abbreviation	Signal name	Explanation
PCBn	**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).
PEND	**Point travel completion**	Turns ON when movement is within the range to be completed.
PnEND	**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.
SWn	**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).
OEND	**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.
MOVE	**Traveling**	Turns ON when the actuator is traveling, and turns OFF when it is stopped.
ZONEn	**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 “3.2.3Zone Settings and Output Signals” for details.
PZONE	**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 “3.3.14Point Zone Setting and Output Signal” for details.
SONS	**Servo ON state**	Turns ON when the servo ON state, and turns OFF when the servo OFF state.
ALM# **Note 1**	**Alarm**	Turns OFF when an alarm occurs, and turns ON when no alarm occurs.
WARM# **Note 1**	**Warning**	Turns OFF when a warning occurs, and turns ON when no warning occurs.
READY	**Operation preparation complete**	Turns ON when the travel command from the PLC can be received. Turns OFF when the travel command cannot be received.
ACBn	**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)
SLMT	**Soft limit over Note 2**	Turns ON when the current position of the actuator is outside the set software limit. Refer to “3.2.2Setting Soft Limit and Soft Limit Over Signal Output” for details.
SLMTP	**Soft limit (+) Note 2**	Turns ON when the actuator's current position is larger than the set soft limit (+). Refer to “3.2.2Setting Soft Limit and Soft Limit Over Signal Output” for details.
SLMTM	**Soft limit over (-)** **Note 2**	Turns ON when the current position of the actuator is less than the set soft limit (-). Refer to “3.2.2Setting Soft Limit and Soft Limit Over Signal Output” for details.

Note 1: “#” indicates 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.

<General purpose input of operation mode and signal assignments>

General purpose input No.	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
General purpose input 0	PSB0	P1ST	V1ST	V1ST	-
General purpose input 1	PSB1	P2ST	V2ST	V2ST	VST
General purpose input 2	PSB2	P3ST	-	-	-
General purpose input 3	PSB3	P4ST	-	-	-
General purpose input 4	PSB4	P5ST	-	-	-
General purpose input 5	PSB5	P6ST	-	-	-
General purpose input 6	PST	P7ST	-	-	-
General purpose input 7	JOGM	JOGM	-	-	-
General purpose input 8	JOGP	JOGP	-	-	-
General purpose input 9	OST	OST	OST	OST	OST
General purpose input 10	SVON	SVON	SVON	SVON	SVON
General purpose input 11	ALMRST	ALMRST	ALMRST	ALMRST	ALMRST
General purpose input 12	STOP# Note 1	STOP# Note 1	-	-	-

Note 1: “#” indicates a negative logic signal.

<General purpose output of operation mode and signal assignments>

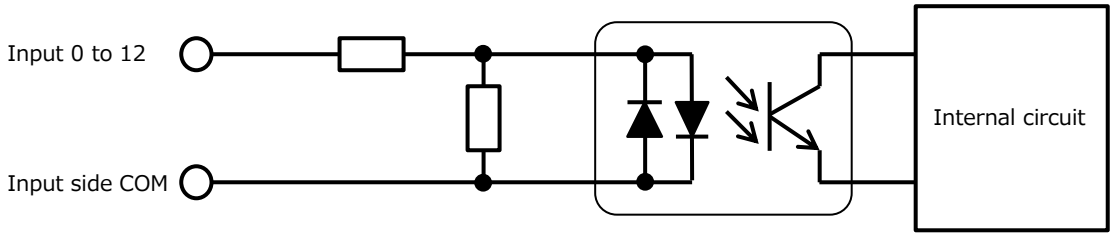
General purpose output No.	64-point mode	Simple 7-point mode	Solenoid valve mode double 2-position type	Solenoid valve mode double 3-position type	Solenoid valve mode single type
General purpose output 0	PCB0/ACB0	P1END	P1END	P1END	P1END
General purpose output 1	PCB1/ACB1	P2END	P2END	P2END	P2END
General purpose output 2	PCB2/ACB2	P3END	-	-	-
General purpose output 3	PCB3/ACB3	P4END	-	-	-
General purpose output 4	PCB4	P5END	SW1	SW1	SW1
General purpose output 5	PCB5	P6END	SW2	SW2	SW2
General purpose output 6	PEND	P7END	-	-	-
General purpose output 7 Note 3	PZONE/ ZONE1/ ZONE2/ MOVE/ WARN#Note 1/ SLMTNote 2/ SLMTMNote 2/ SLMTPNote 2	PZONE/ ZONE1/ ZONE2/ MOVE/ WARN#Note 1/ SLMTNote 2/ SLMTMNote 2/ SLMTPNote 2	PZONE/ ZONE1/ ZONE2/ MOVE/ WARN#Note 1/ SLMTNote 2/ SLMTMNote 2/ SLMTPNote 2	PZONE/ ZONE1/ ZONE2/ MOVE/ WARN#Note 1/ SLMTNote 2/ SLMTMNote 2/ SLMTPNote 2	PZONE/ ZONE1/ ZONE2/ MOVE/ WARN#Note 1/ SLMTNote 2/ SLMTMNote 2/ SLMTPNote 2
General purpose output 8 Note 3	PZONE/ ZONE1/ ZONE2/ MOVE/ WARN#Note 1/ SLMTNote 2/ SLMTMNote 2/ SLMTPNote 2	PZONE/ ZONE1/ ZONE2/ MOVE/ WARN#Note 1/ SLMTNote 2/ SLMTMNote 2/ SLMTPNote 2	PZONE/ ZONE1/ ZONE2/ MOVE/ WARN#Note 1/ SLMTNote 2/ SLMTMNote 2/ SLMTPNote 2	PZONE/ ZONE1/ ZONE2/ MOVE/ WARN#Note 1/ SLMTNote 2/ SLMTMNote 2/ SLMTPNote 2	PZONE/ ZONE1/ ZONE2/ MOVE/ WARN#Note 1/ SLMTNote 2/ SLMTMNote 2/ SLMTPNote 2
General purpose output 9	OEND	OEND	OEND	OEND	OEND
General purpose output 10	SONS	SONS	SONS	SONS	SONS
General purpose output 11	ALM# Note 1	ALM# Note 1	ALM# Note 1	ALM# Note 1	ALM# Note 1
General purpose output 12	READY	READY	READY	READY	READY

Note 1: "#" indicates a negative logic signal.
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".
Note 3: Output selection: Signal assignment is available from (point zone, zone 1, zone 2, warning, soft limit over, soft limit over (-), soft limit over(+)).

■ Input / output circuit

<Input circuit>

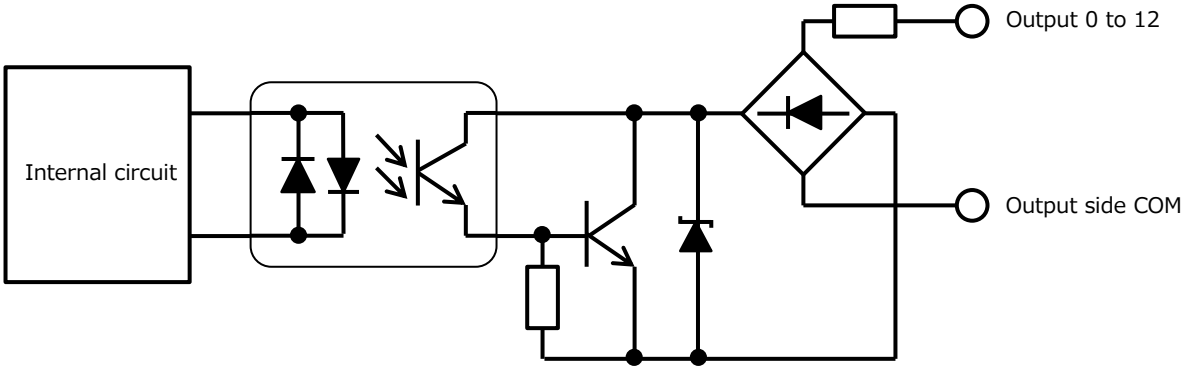
Item	Specifications
Number of inputs	13
Input voltage	24 VDC ± 10%
Input current	4mA
Min. ON input voltage	19 V or more
Max. OFF input current	0.2 mA or less



Input has no polarity, so input side COM can use + or -.

<Output Circuit>

Item	Specifications
Number of outputs	13
Load voltage	24 VDC ± 10%
Load current	20 mA or less
Internal voltage drop when ON	3 V or less
Leakage current when OFF	0.1 mA or less
Output short-circuit protection circuit	Yes
Connecting load	PLC



Output has no polarity, so output side COM can use + or -.

- To prevent malfunction due to noise or chattering in the PIO signal, set the “input filter”. You can set the time that does not respond to the PIO input signal with the parameter "Input filter".

3. USAGE

DANGER

Do not enter the operating area when the actuator is in an operational state.
- An injury may occur.

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

WARNING

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.

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.

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.

Before controlling the actuator from a position where it cannot be seen, check that it is safe for the actuator to operate.

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.

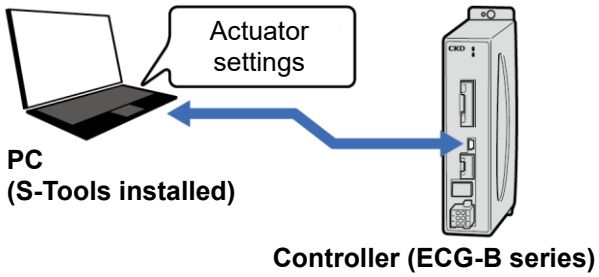
3.1. Setting Actuator Information

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).



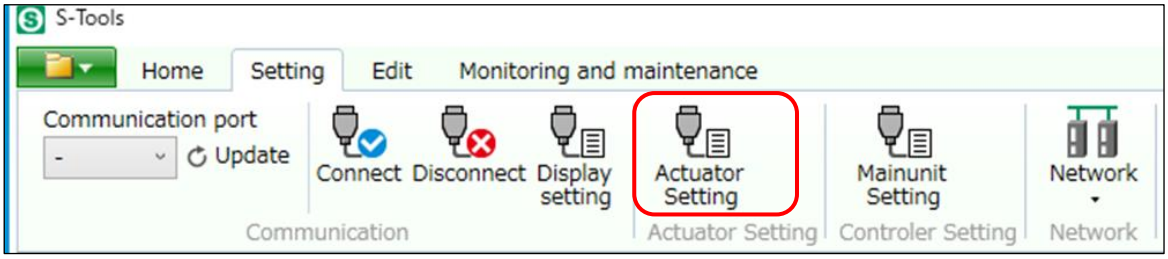
- ECG-A series does not require actuator information settings.
- Actuator information cannot be set with versions of S-Tools older than Ver. 1.04.00.00.

<Procedure for writing actuator information>

Use S-Tools to select the model number of the actuator to be used and write it to the controller.

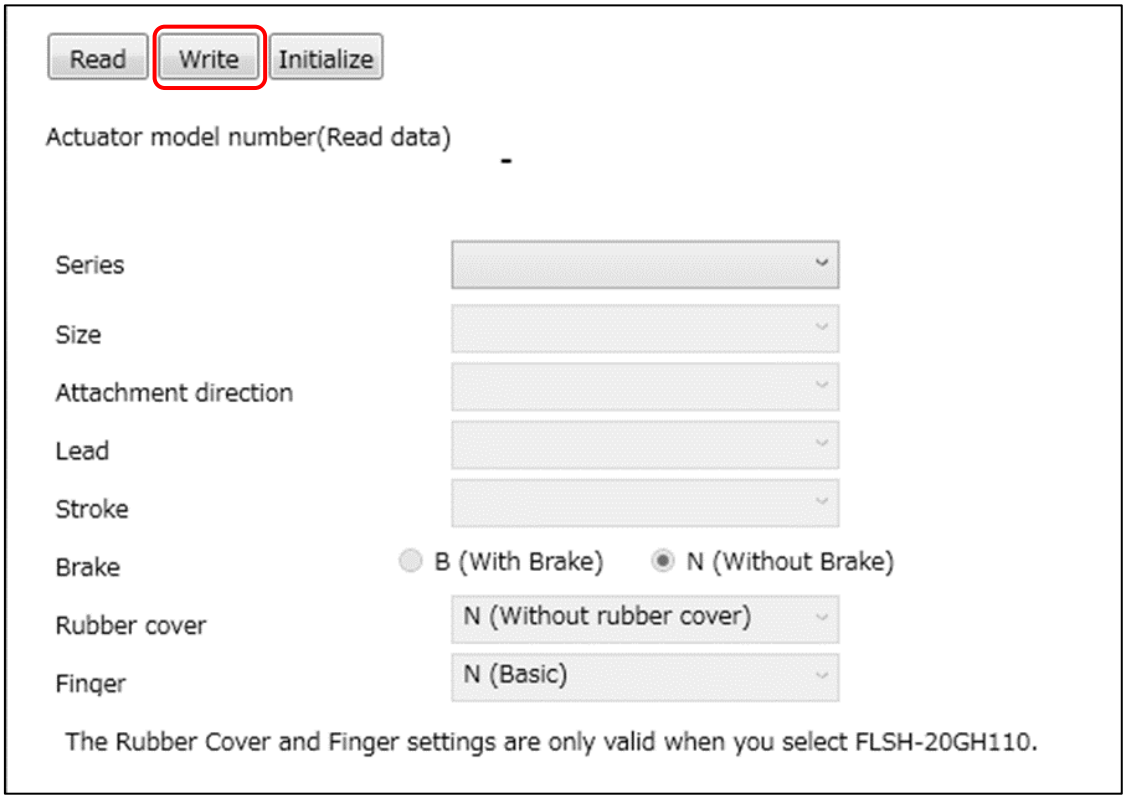
1. Click [Actuator Settings] in S-Tools

Select the [Setting] tab in S-Tool and click the [Actuator Setting] button.



2. Select the actuator to be used and click [Write]

Select the model number of the actuator to be used and click the [Write] button.



3.2. Setting parameters

S-Tools are required 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.

3.2.1. Parameters List

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

Part Name	Description		Setting range	Initial value	Unit
Soft limit (+) **Note 1**	Sets the operable range in the + direction (opposite motor side) of the actuator Refer to “3.2.2Setting Soft Limit ” 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 “3.2.2Setting Soft Limit ” for details.	EBS, EJSG, EBR	Subtraction of - stroke and margin to soft limit (+)	0.00	mm
		GSSD2, GSTK, GSTG, GSTS, GSTL			
		FLSH, GCKW			
		FLCR			
		FGRC	-360 (deg) to the soft limit (+) value		deg

Note 1: Power cycle or software reset is required for the parameter settings to take effect.

Part Name	Description		Setting range	Initial value	Unit
Zone 1 (+)	Sets the + side position of the output signal zone 1. Refer to “3.2.3Zone 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 “3.2.3Zone 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 “3.2.3Zone 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 “3.2.3Zone Settings and Output Signals” for details.		-9999.99 to 9999.99 Note 1	0.00	mm (deg)
Zone hysteresis	Sets the hysteresis of Zone 1 and Zone 2 outputs. Refer to “3.2.3Zone 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**	Sets the direction of the home position return to “normal (standard coordinate)” or opposite (standard coordinate), or opposite (inverted coordinate)”. Refer to “3.4.5Home 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 returning to home position.	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 “3.4.5Home 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 = normal (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“.

Part Name	Description	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 “3.4.5Home 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 “2.3.1Wiring to the Power Supply”.	Enabled, disabled	Enabled	None
Initial servo ON method Note 1, Note 2	Sets 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	Sets the time until it is judged that the pressing is complete in the pressing interval 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 performing servo 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

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 Ver. 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.

Part Name	Description	Setting range	Initial value	Unit
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 “5.2.2Warning”.	0 to 999999999	0	m (10^3deg)
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 “5.2.2Warning”.	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 “5.2.2Warning”.	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 “3.3.6Setting the Positioning Width“	0.10	mm (deg)
Common speed	Sets the common speed for the transport interval. When 0 is set to the point data, this value applies.	Refer to “3.3.7Setting the Speed“	30	mm/s (deg/s)
Common acceleration	Sets the common acceleration for the transport interval. When 0 is set to the point data, this value applies.	Refer to “3.3.8Setting the Acceleration“	0.10	G
Common deceleration	Sets the deceleration for the transport interval. When 0 is set to the point data, this value applies.	Refer to “3.3.9Setting the Deceleration“	0.10	G
Common pressing rate	Sets the common pressing rate in the pressing interval. When 0 is set to the point data, this value applies.	Refer to “3.3.15Setting the Pressing Rate“	50	%

Part Name	Description		Setting range	Initial value	Unit
Common pressing speed	Sets the common pressing speed in the pressing interval. When 0 is set to the point data, this value applies.	EBS, EJSG, EBR	Refer to “3.3.16Setting the Pressing Speed“	20	mm/s
		GSSD2, GSTK, GSTG, GSTS, GSTL			
		FLSH, GCKW		15 Note 1	
		FLCR			
		FGRC			deg/s
Common pressing distance	Sets the common pressing distance for the pressing interval. When 0 is set to the point data, this value applies.		Refer to “3.3.17Setting 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 “3.3.10Selecting 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 “3.3.11Selecting 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 “3.3.12Selecting 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“.

Part Name	Description	Setting range	Initial value	Unit
Operation mode (PIO) Note 1	Sets the operation mode (PIO). Refer to “3.3.1Operation 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
Input signal filter Note 1	Sets the period for not responding to the PIO input signal from the host device (PLC, etc.). It works on all PIO signals and prevents malfunctions caused by noise and chattering.	0 to 19	5	ms
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 “3.4.7Signal 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 “3.4.7Signal 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 (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".	Enabled, disabled	Enabled	None
JOG speed	Sets the speed for the JOG (−) or JOG (+) travel start signal when the operation mode is the 64-point mode or simple 7-point mode.	1 to 100	30	mm/s (deg/s)

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“.

Part Name	Description	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 “3.2.4Adjusting the Gains” for details.	0 to 15	0	None
G2 gain (Load magnification)	This is adjusted according to the actuator load. Refer to “3.2.4Adjusting 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 Ver. is old. For the correspondence of the version and controller specification, refer to “1.3.1 Version List“.

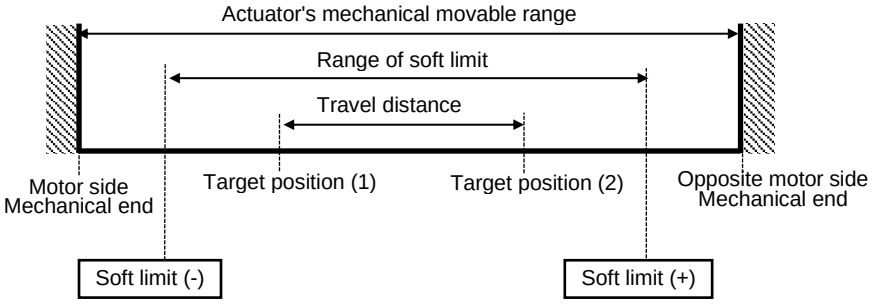
3.2.2. Setting Soft Limit and Soft Limit Over Signal Output

This parameters determines the movable range in transport and pressing operations.

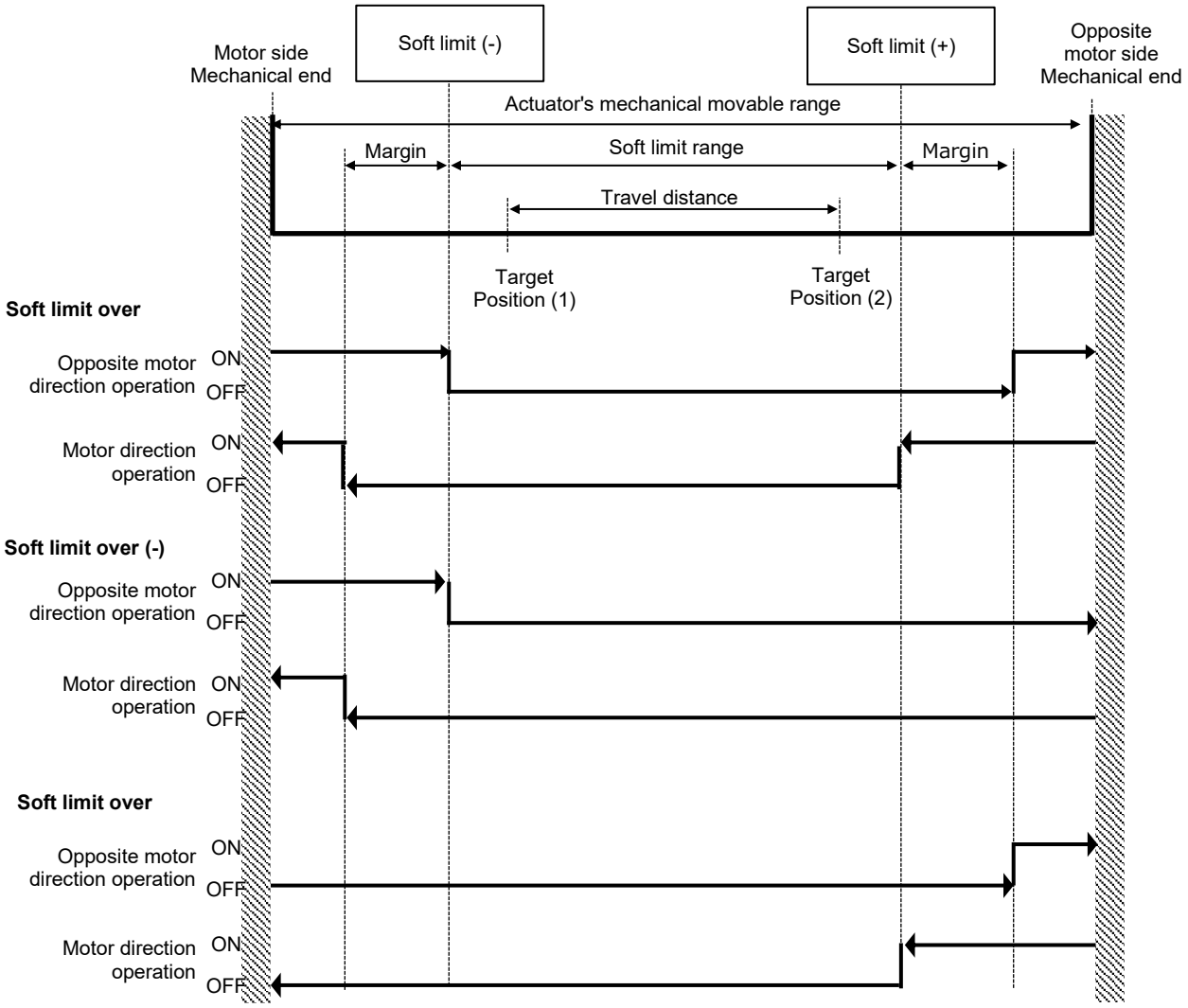
- Exceeding the soft limit range during operation results in an alarm output. In addition, if the operation completion position is outside the soft limit range, an alarm is output when the operation starts.

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

The motor side x-coordinate is negative while the opposite motor side x-coordinate is positive. The home position x-coordinate is 0.
Set the soft limit to a value that is or is outside of “the movement distance (target position (1), (2))” and inside of “the actuator's mechanical movable range.”
If soft limit (+) and soft limit (-) are both set to 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.

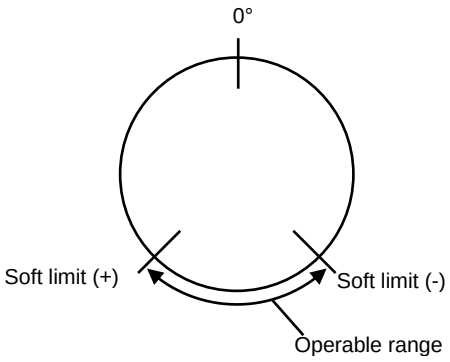
The value of the margin varies for each actuator. Refer to the following list

Actuator model number Series	Margin	Unit
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	

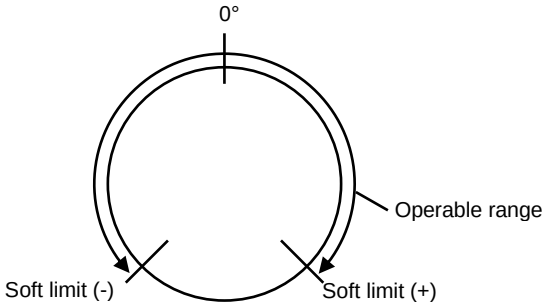
■ FGRC

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 (+): +225deg
Soft limit (-): +135deg



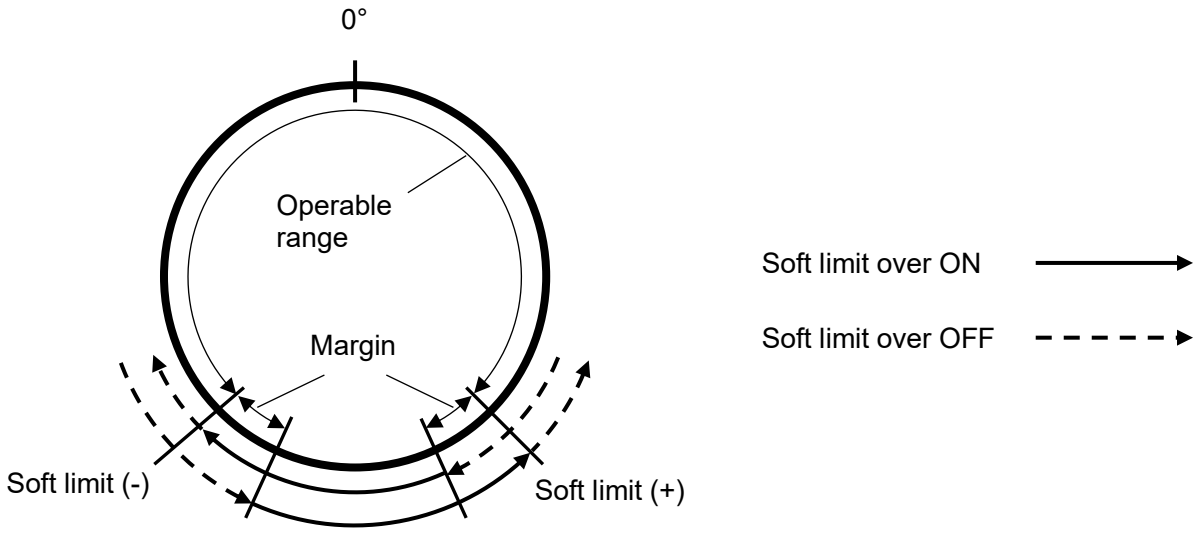
<Setting example 2>
Soft limit (+): +135deg
Soft limit (-): -135deg



※ 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.



※ 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

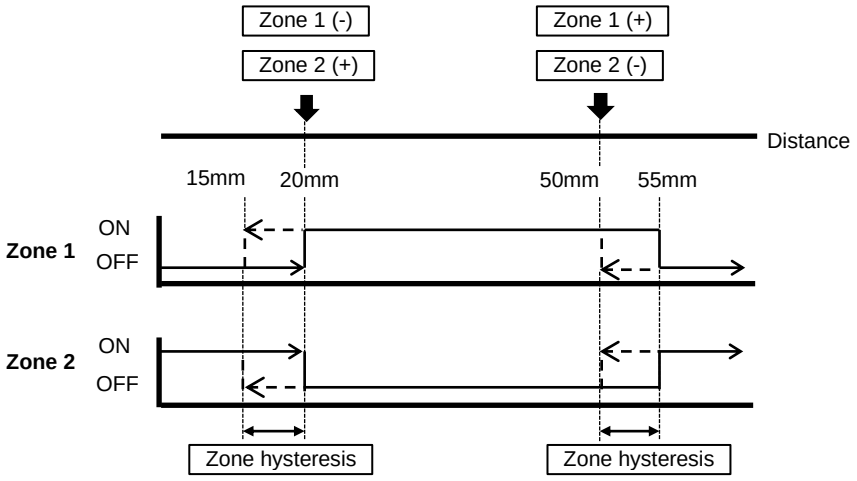
Actuator model number		Margin	Unit
Series	**Body size**		
FGRC	10	0.3	deg
	30	0.2	
	50		

3.2.3. 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

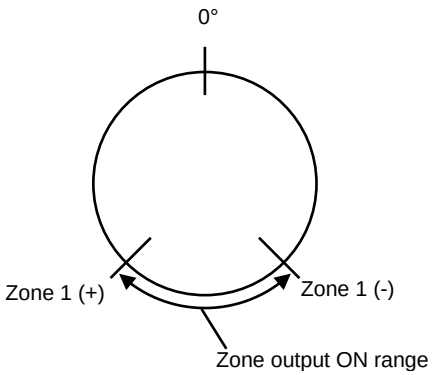


- When zone (−) < zone (+), the output signal of the zone is turned ON in the interval between the zone (−) to zone (+) and turned OFF in the other intervals.
- When zone (−) > zone (+), the output signal of the zone is turned OFF in the interval between zone (+) to zone (-) and turned ON in the other intervals.
- When zone (+) = zone (-), the output signal of the zone is always OFF.

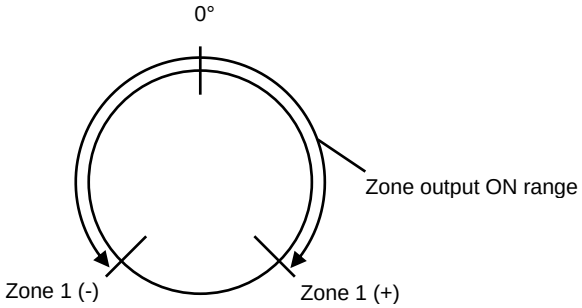
■ FGRC

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

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



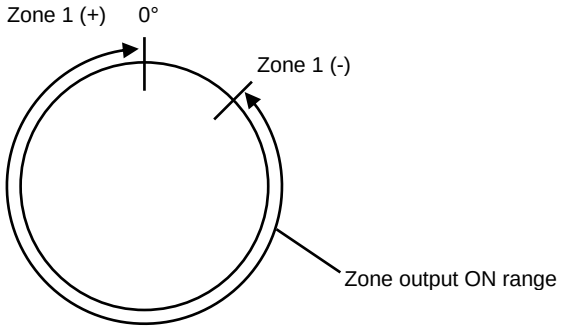
<Setting example 2>
Zone 1 ( ): +135deg
Zone 1 (-): -135deg



※ 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.

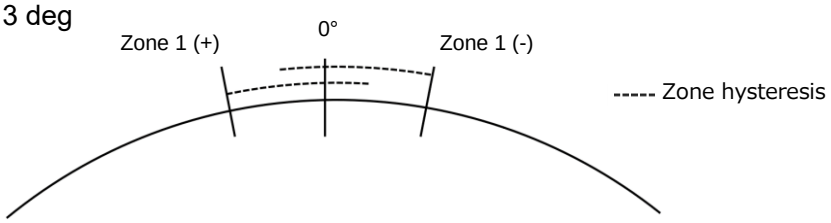
<Setting example 1>
Zone 1 (+): *9999.99deg(=0deg)
Zone 1 (-): +45deg



※ 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 (+)): +358deg
Zone 1 (-): +2deg
Zone hysteresis … 3 deg



※ This is a figure 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.

3.2.4. 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. For more information, including how to set these settings, refer to “Adjustment” in “3.7.2 Control Panel” of S-Tools instruction manual (SM-A11147).

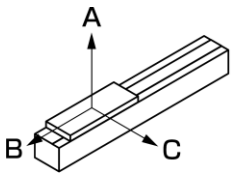
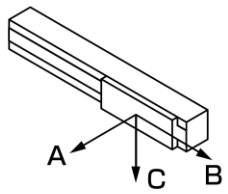
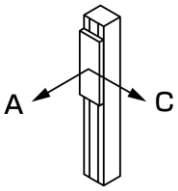
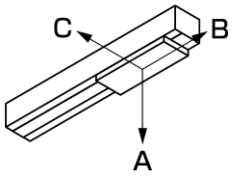
■ Setting gain by installation method (EBS/ EBR Series: Standard Series)

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 (Standard Series).

<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
			

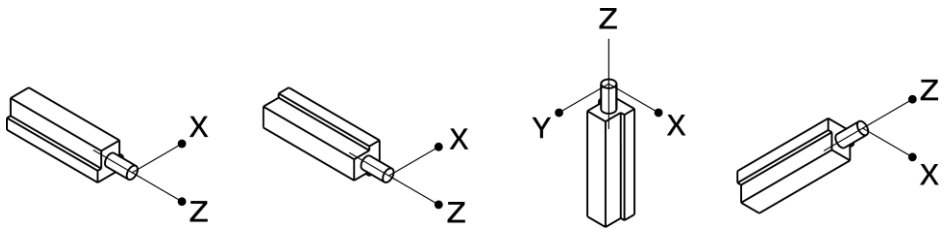
- "Screw lead" refers to the distance that the workpiece can be moved when the motor rotates once in the electric actuator.

<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)

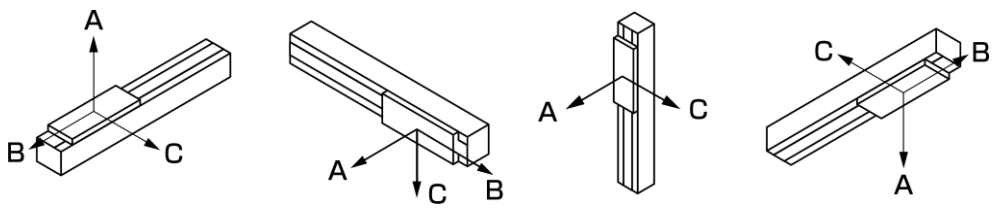
The table below shows the recommended values of "G1 gain (responsiveness)" and "G2 gain (load magnification)" parameters for horizontal and vertical installation of EBS Series and EBR Series actuators (P4 Series).

<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



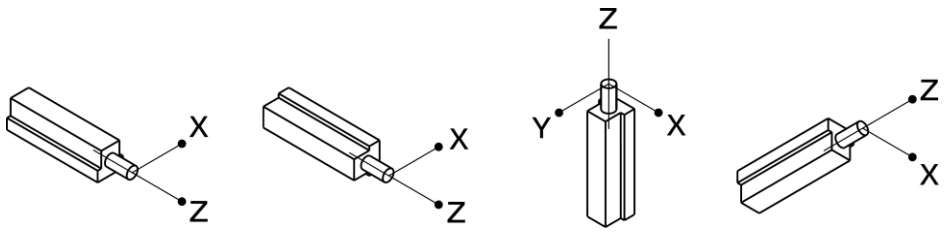
- "Screw lead" refers to the distance that the workpiece can be moved when the motor rotates once in the electric actuator.

<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)

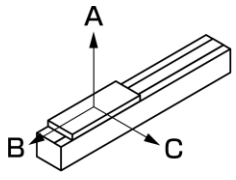
The table below shows the recommended values of "G1 gain (responsiveness)" and "G2 gain (load magnification)" parameters for horizontal and vertical installation of EJSG Series actuators.

<EJSG Series>

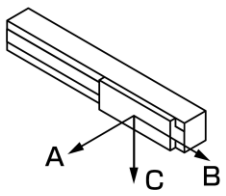
Actuator model number				24 VDC / horizontal, wall-hanging or ceiling-hanging		24 VDC / Vertical	
Series	Size	Motor mounting direction	Screw lead	G1	G2	G1	G2
EJSG	04	E	6	3	7	4	4
			12	7	4	7	5
		R, D, L.	6	4	11	4	7
			12	3	9	4	8
	05	E	5	6	2	7	2
			10	6	2	6	2
			20	8	3	8	3
		R, D, L.	5	6	5	6	4
			10	6	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", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD indicates bottom mounting.

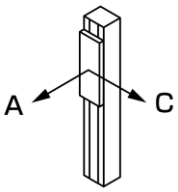
Horizontal installation



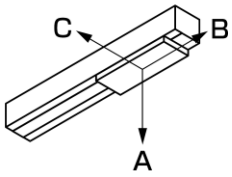
Wall-hanging installation



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.

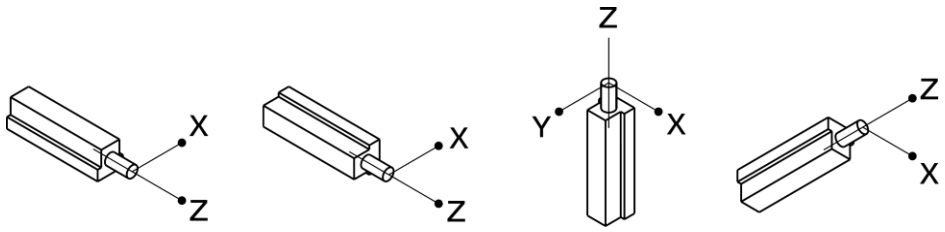
■ Setting gain by installation method (GSSD2/GSTK/GSTG/GSTS/GSTL Series)

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
			9	4	7	2	9
	32	GE	6	2	8	2	8
			12	4	8	4	6
	50	GE	6	5	7	5	7
			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

Part Name	Description	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 during a stop or during an operation by increasing the G2 gain, decrease the G1 gain.

3.3. Point Data Setting

S-Tools are required to set and change the point data. Refer to the S-Tools instruction manual (SM-A11147) for details such as setting method.

3.3.1. 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“.

3.3.2. 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	Description	Unit
Position specification method	Select either Absolute or Incremental Refer to “3.3.3Selecting the Position Specification Method” for details.	None
Operation method	Select Positioning operation, Pressing operation 1, or Pressing operation 2. Refer to “3.3.4Selecting 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 “3.3.5Setting 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 “3.3.6Setting the Positioning Width” for details.	mm (deg)
Speed	Sets the speed for the transport interval. Refer to “3.3.7Setting the Speed” for details.	mm/s (deg/s)
Acceleration	Sets the acceleration for the transport interval. Refer to “3.3.8Setting the Acceleration” for details.	G
Deceleration	Sets the deceleration for the transport interval. Refer to “3.3.9Setting the Deceleration” for details.	G
Acceleration/deceleration method	Only Trapezoid operation can be selected. Refer to “3.3.10Selecting 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 “3.3.11Selecting the Stop Method” for details.	None
Rotation direction	Sets the rotation direction of the FGRC Series. Refer to “3.3.12Selecting the Rotation Direction” for details.	None
Gain magnification	Sets the gain magnification. Refer to “3.3.13Setting the Gain Magnification” for details.	%
Point zone (+)	Sets the + side position of the point zone. Refer to “3.3.14Point Zone Setting and Output Signal” for details.	mm (deg)
Point zone (-)	Sets the - side position of the point zone. Refer to “3.3.14Point Zone Setting and Output Signal” for details.	mm (deg)

Setting items	Description	Unit
Pressing rate	Sets the upper limit of the pressing force in a pressing interval as a ratio to the maximum pressing force. Refer to “3.3.15Setting the Pressing Rate” for details.	%
Pressing speed	Sets the speed of the pressing interval. Refer to “3.3.16Setting the Pressing Speed” for details.	mm/s (deg/s)
Pressing distance	Sets the travel distance in the pressing interval. Refer to “3.3.17Setting the Pressing Distance” for details.	mm (deg)

3.3.3. Selecting the Position Specification Method

You can select a position specification method.

<Choices and initial values (factory default)>

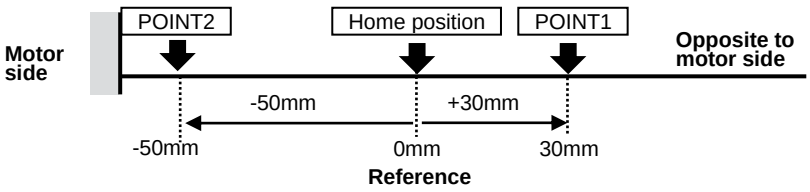
Actuator model number Series	Choices	Initial value
EBS/EJSG/EBR/FLSH/FLCR/FGRC/ GSSD2/GSTK/GSTG/GSTS/GSTL/ GCKW	Absolute Incremental Note 1	Absolute

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 "+30mm" is set
POINT2 Position "-50mm" is set



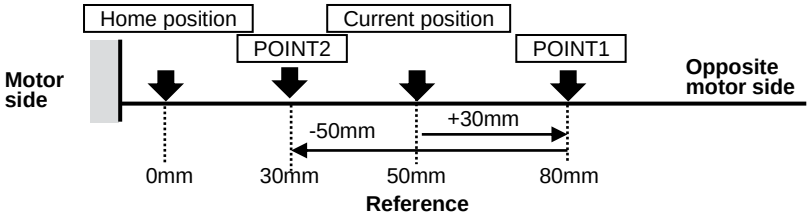
The positioning completion position for POINT 1 is the point of 30 mm from the home position.
The positioning completion position for POINT 2 is the point of -50 mm from the home position.

■ 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 "+30mm" is set
POINT2 Position "-50mm" 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".

3.3.4. Selecting the Operation Method

You can select the operation method.

<Choices and initial values (factory default)>

Actuator model number / Series	Choices	Initial value
EBS/EJSG/EBR/FLSH/FLCR/FGRC/ GSSD2/GSTK/GSTG/GSTS/GSTL/ GCKW	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 “3.4.6Positioning 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 “3.4.8Pressing 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 “3.4.8Pressing Operation” for details.

3.3.5. 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 / Series	Setting range	Initial value	Unit
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	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.

3.3.6. 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)>

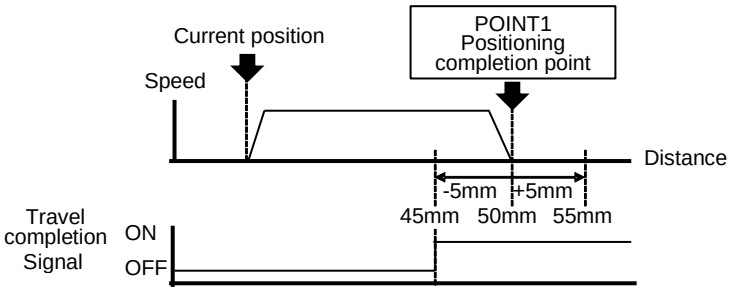
Actuator model number / Series	Setting range	Initial value	Unit
EBS/EJSG/EBR/FLSH/FLCR/FGRC/ GSSD2/GSTK/GSTG/GSTS/GSTL/ GCKW	0.00 to 9.99 Note 1	0.00	mm(deg)

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 to POINT 1 Position (absolute position): +50 mm, 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.

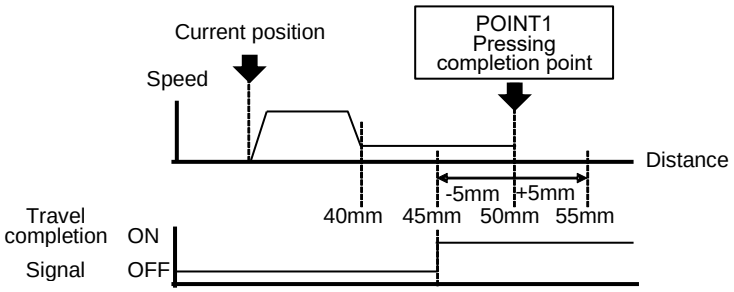
■ Pressing operation 1

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

■ Pressing operation 2

<Setting example>

Set to POINT 1 Position (absolute position): +40 mm, Pressing distance: +10 mm, 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.

3.3.7. Setting the Speed

You can set the speed of the transport interval.

■ 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.

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		
	08	GE	05	6 to 125 Note 1, Note 2		
			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		
	08	GE	05	6 to 100 Note 1, Note 2		
			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", GE indicates straight mounting, GR indicates right-side mounting, GL indicates left-side mounting, and GD 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).

3.3.8. Setting the Acceleration

You can set the acceleration of the transport interval.

<Setting range and initial values (factory default)>

Actuator model number	Setting range		Initial value	Unit
Series	When installed horizontally When installed by wall-hanging	When installed vertically		
EBS/EJSG/EBR	0.01 to 0.70 Note 1, Note 2, Note 3, Note 4	0.01 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.

3.3.9. Setting the Deceleration

You can set the deceleration of the transport interval.

<Setting range and initial values (factory default)>

Actuator model number	Setting range		Initial value	Unit
Series	When installed horizontally When installed by wall-hanging	When installed vertically		
EBS/EJSG/EBR	0.01 to 0.70 Note 1, Note 2, Note 3. Note 4	0.01 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/s2 (deg/s2) 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.

3.3.10. 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 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.

3.3.11. 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.	

3.3.12. Selecting the Rotation Direction

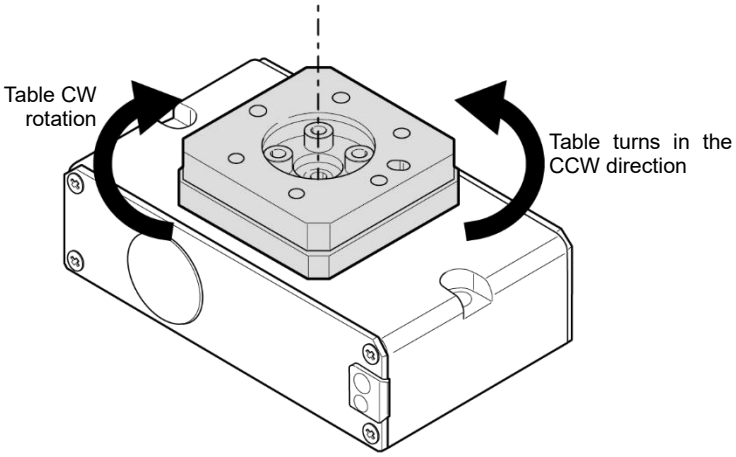
In FGRC Series, you can select the rotation direction.

<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.



3.3.13. 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 / Series	Setting range	Initial value	Unit
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.

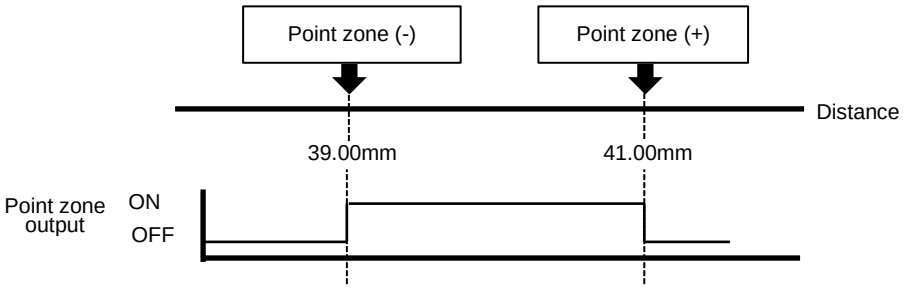
3.3.14. Point Zone Setting and Output Signal

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 (+).

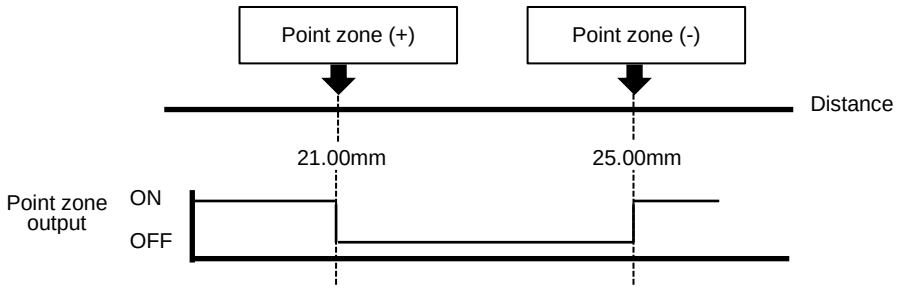
<Setting range and initial values (factory default)>

Actuator model number / Series	Setting range	Initial value	Unit
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.

3.3.15. Setting the Pressing Rate

Set the upper limit of the pressing force in a pressing interval 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%.

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%.

3.3.16. Setting the Pressing Speed

You can set the speed of the pressing interval.

<Setting range and initial values (factory default)>

Actuator model number		Setting range	Initial value	Unit
Series	Screw lead			
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 15 mm/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 transport interval. If the pressing speed is larger, the speed for the transport interval is automatically applied to the pressing speed.

3.3.17. Setting the Pressing Distance

You can set the travel distance of the pressing interval.

<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.

3.4. Operation and Time Chart

- For the controller (ECG) to recognize a general purpose input signal (PIO input signal), it is necessary to continue inputting the signal for a period of time longer than the period set by the “input signal filter” of the parameter.

3.4.1. 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.

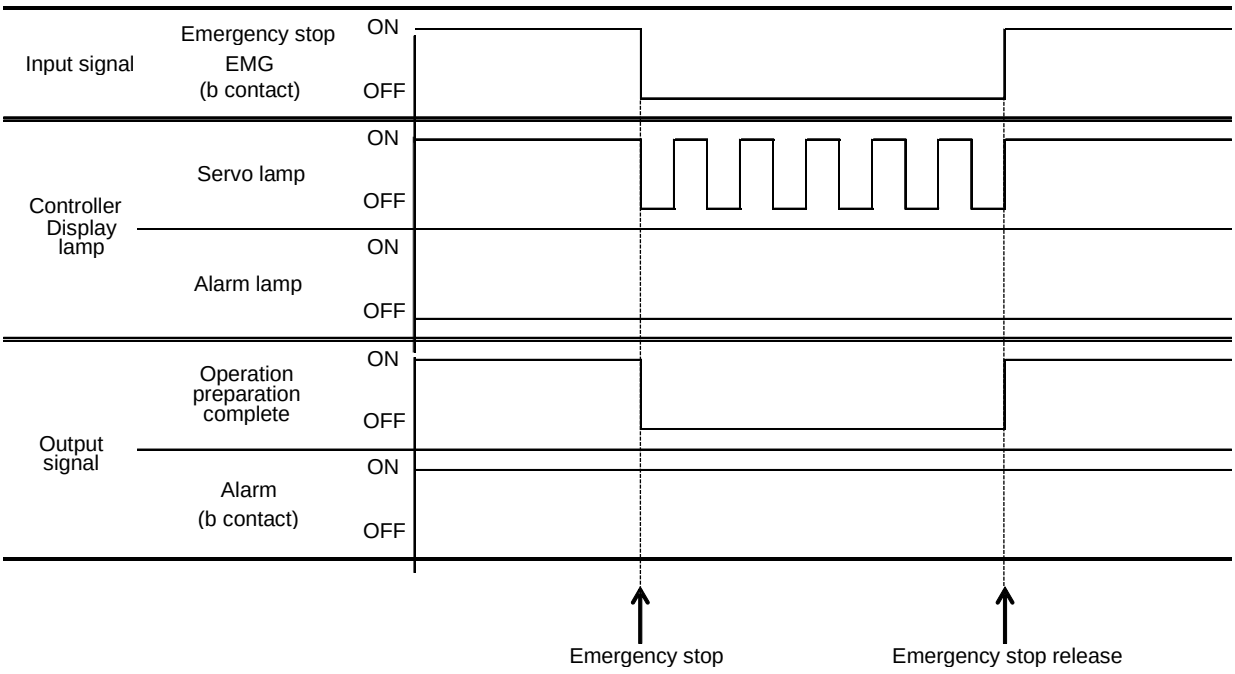
When performing an emergency stop, it may take several seconds to stop depending on the travel speed and load.
If an emergency stop is performed during operation, a short is generated between the motor terminals after deceleration and stop, and it enters the dynamic brake status.
Operation preparation 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 “2.3.1Wiring 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>

Horizontal axis: Time



3.4.2. 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.

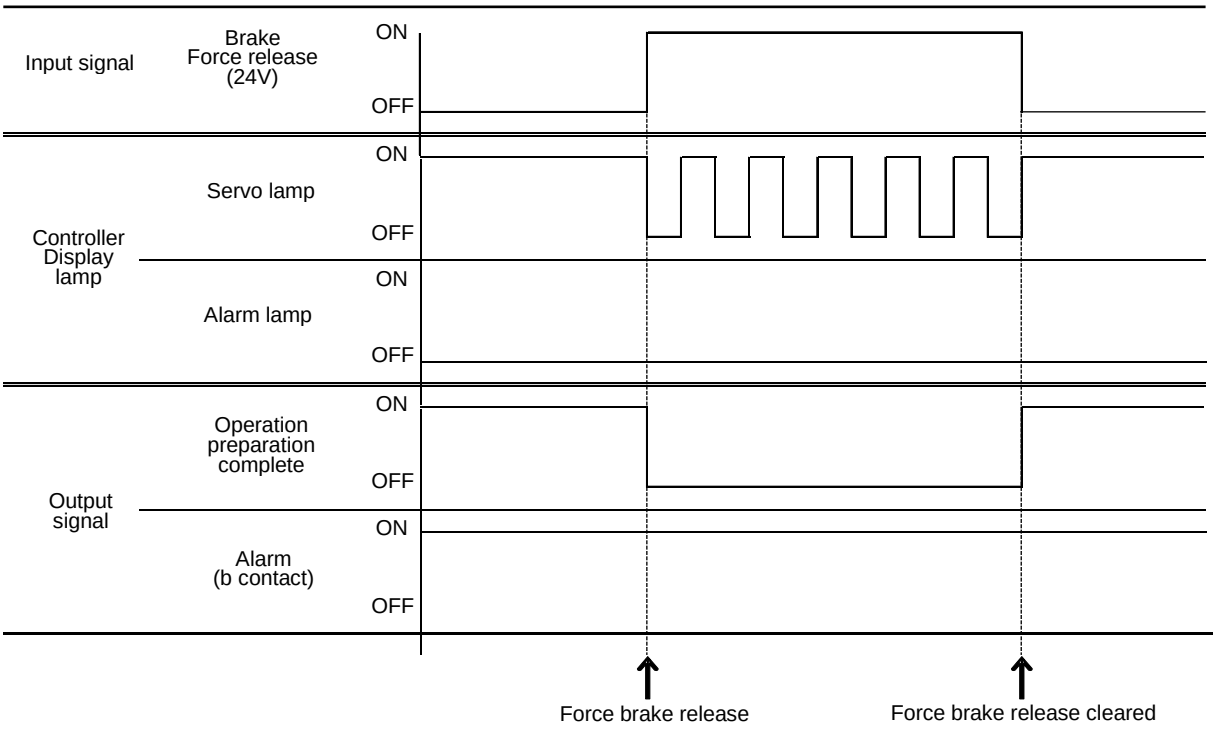
When clearing the force brake release, check that the actuator is safe to operate.

- 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>

Horizontal axis: Time



- For the wiring for force brake release, see “2.3.1Wiring 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

3.4.3. 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

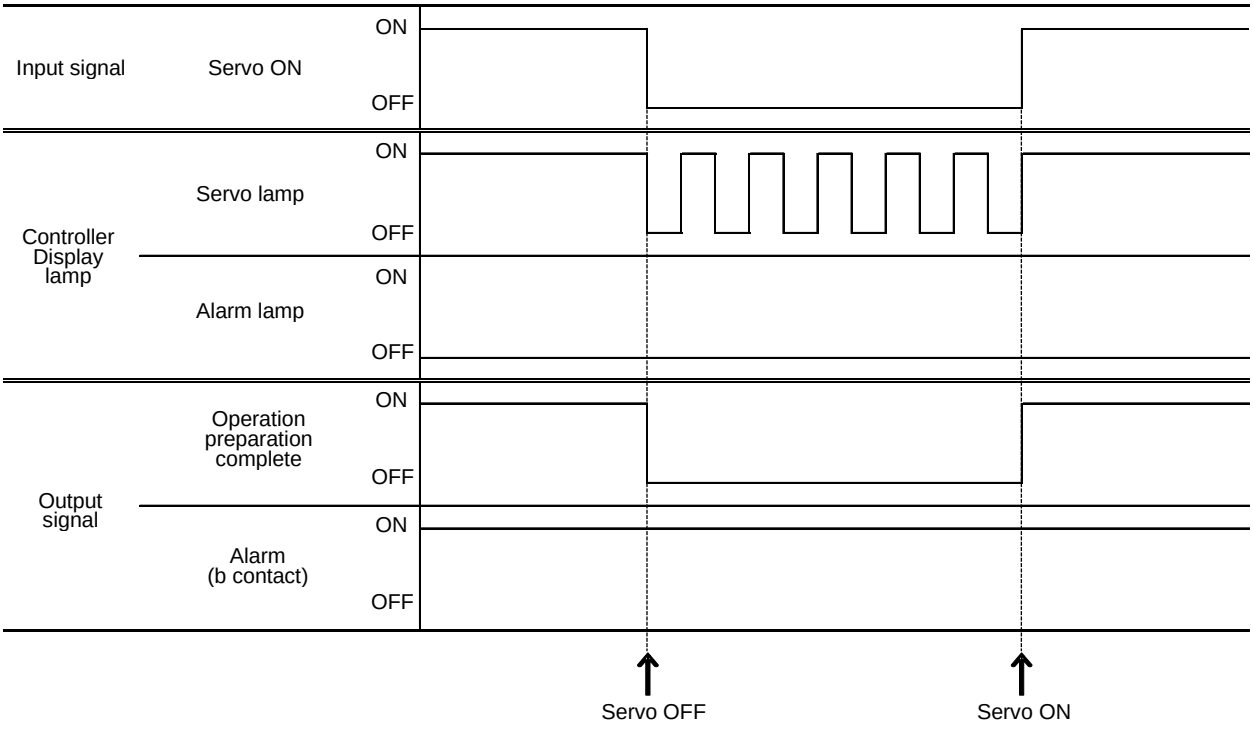
When turning the servo ON, check that the actuator operates safely.

- 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 operation preparation complete 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.

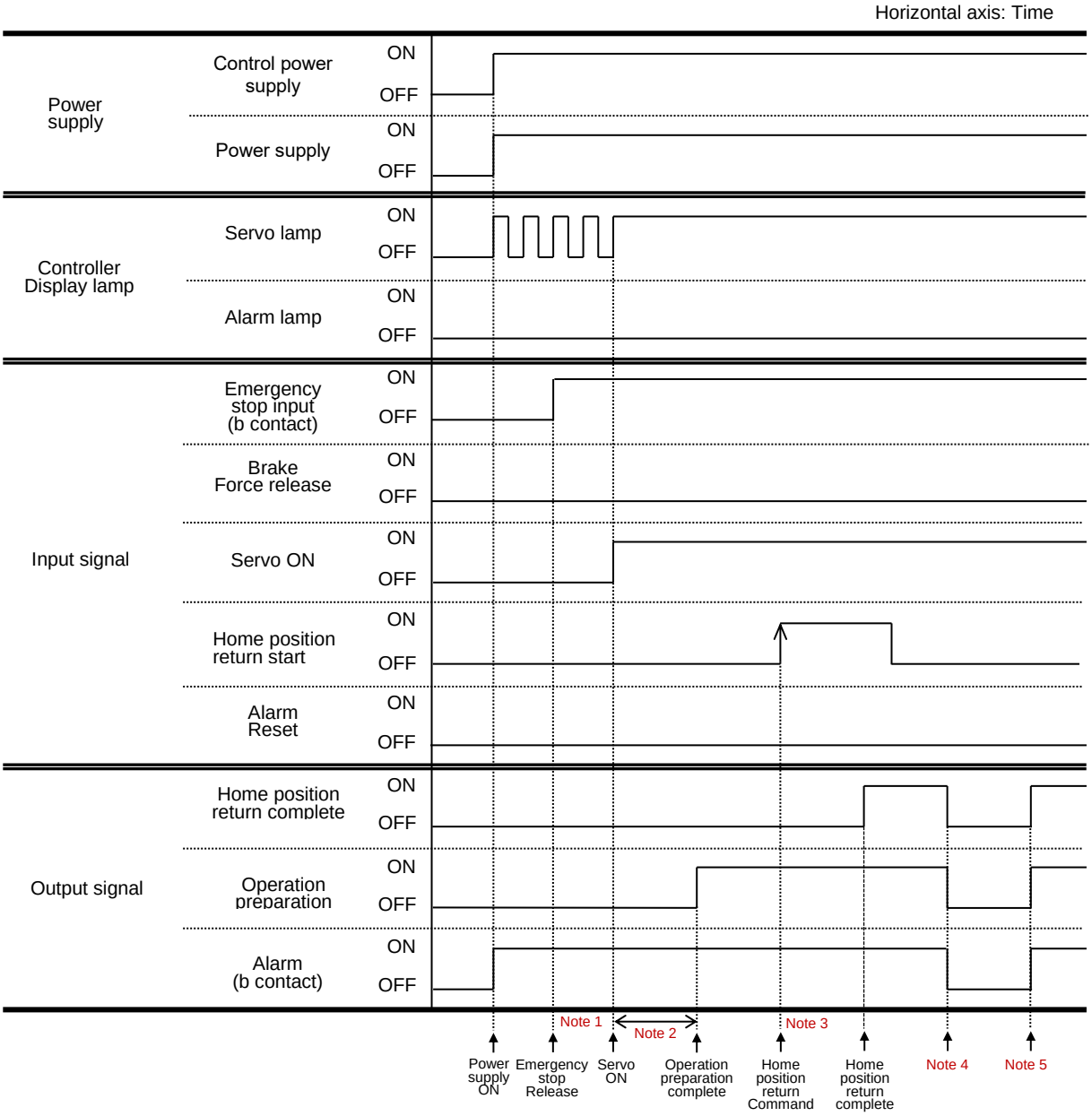
3.4.4. Power-on Sequence

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>



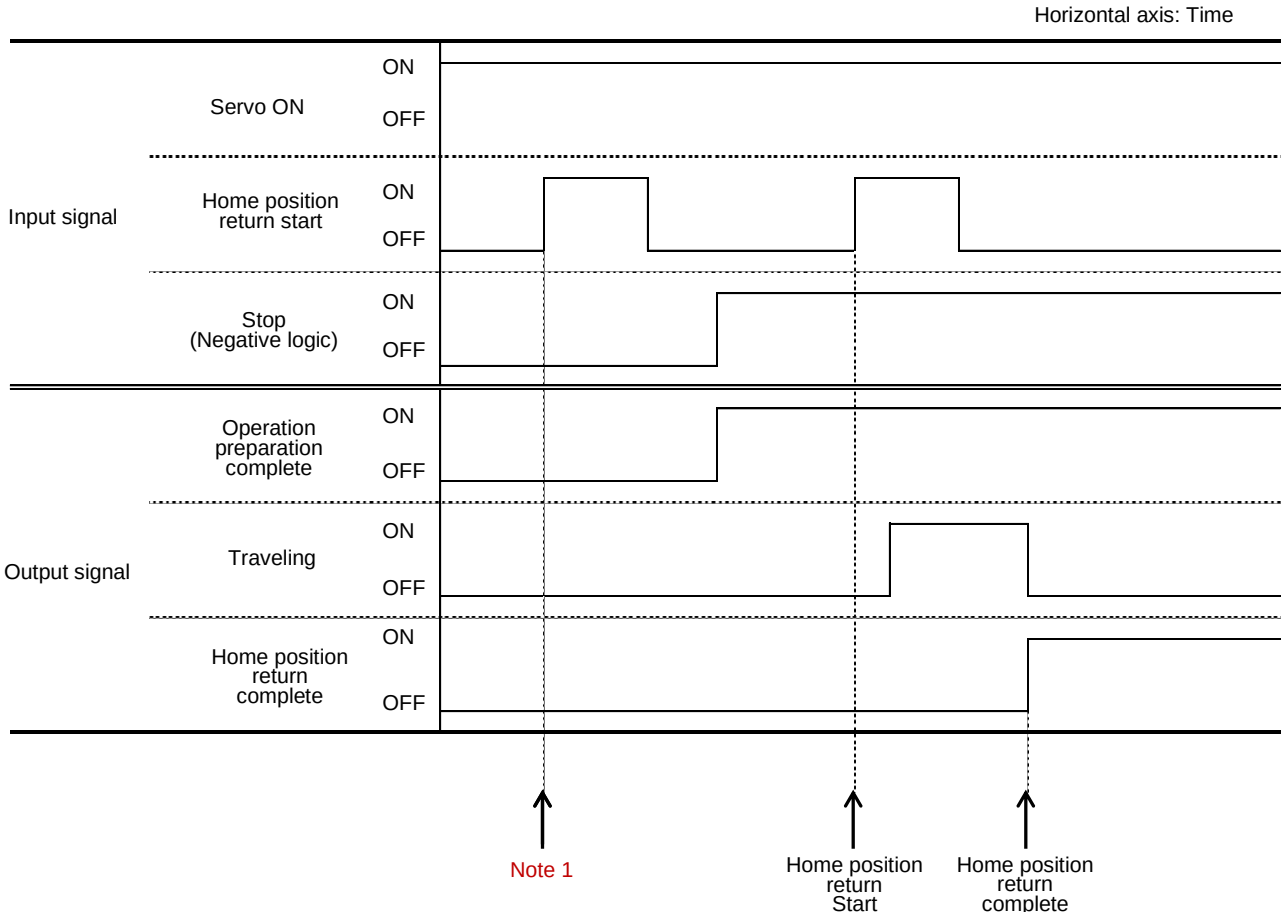
Note 1: The emergency stop is not released automatically. The figure above shows the timing when it is recognized that the emergency stop is ON after the power is turned on.
Note 2: When the servo is turned ON for the first time after the power is turned on, it takes 2s to 10s to complete the operation 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 signal on operation

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

<Time chart>



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.

3.4.5. 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.

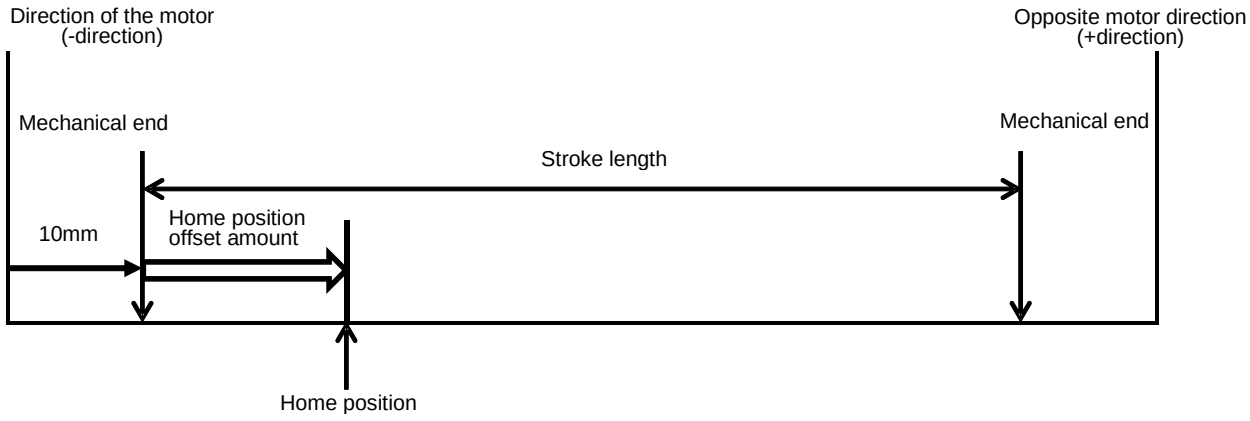
Setting items	Overview	Setting range		Initial value	Unit
Home position return direction (coordinate axis) Note 1	Sets the direction of the home position return to “normal (standard coordinate)” or opposite (standard coordinate), or opposite (inverted coordinate)”.	Normal (standard coordinate), opposite (standard coordinate), and opposite (inverted coordinate)		Normal (standard coordinate)	None
Home position return speed	Sets the speed for returning to home position.	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“.

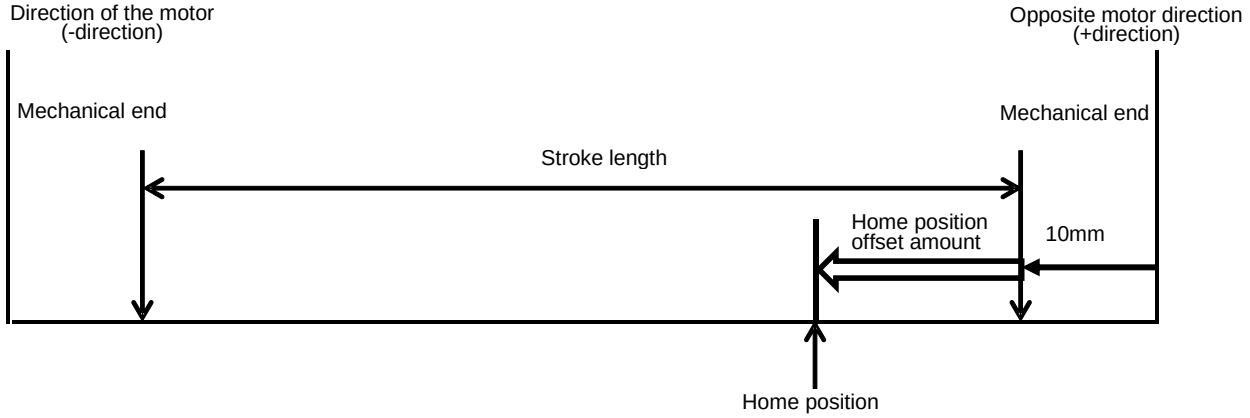
The table below shows the "home position return direction (coordinate axis)" setting when "home position offset amount" = 0 mm and the relationship between the home position and the coordinate axes.

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

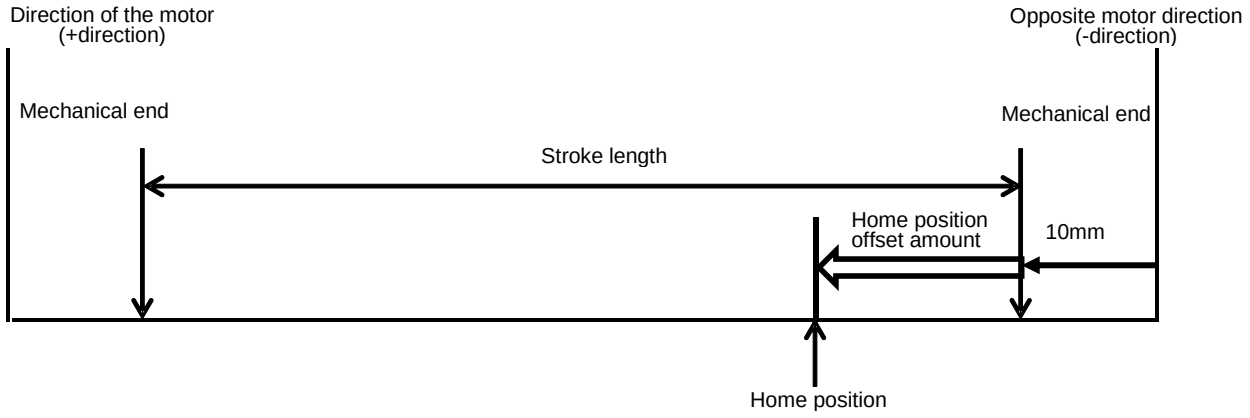
<Origin position and coordinate axis, when "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">



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

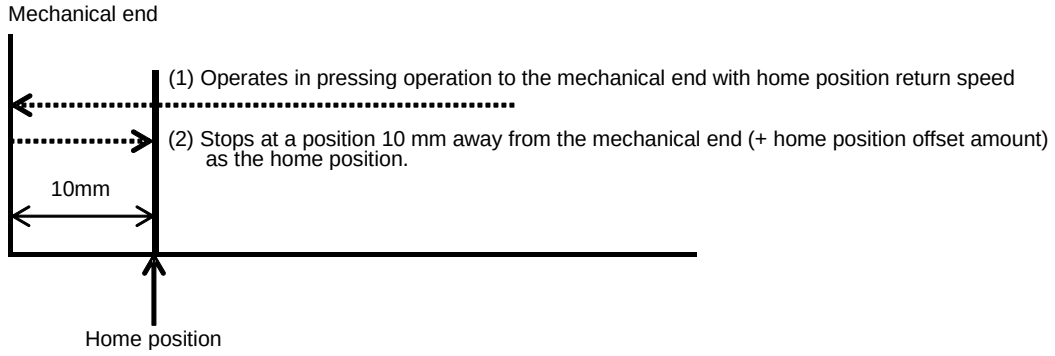


<Home position and coordinate axis, when "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">

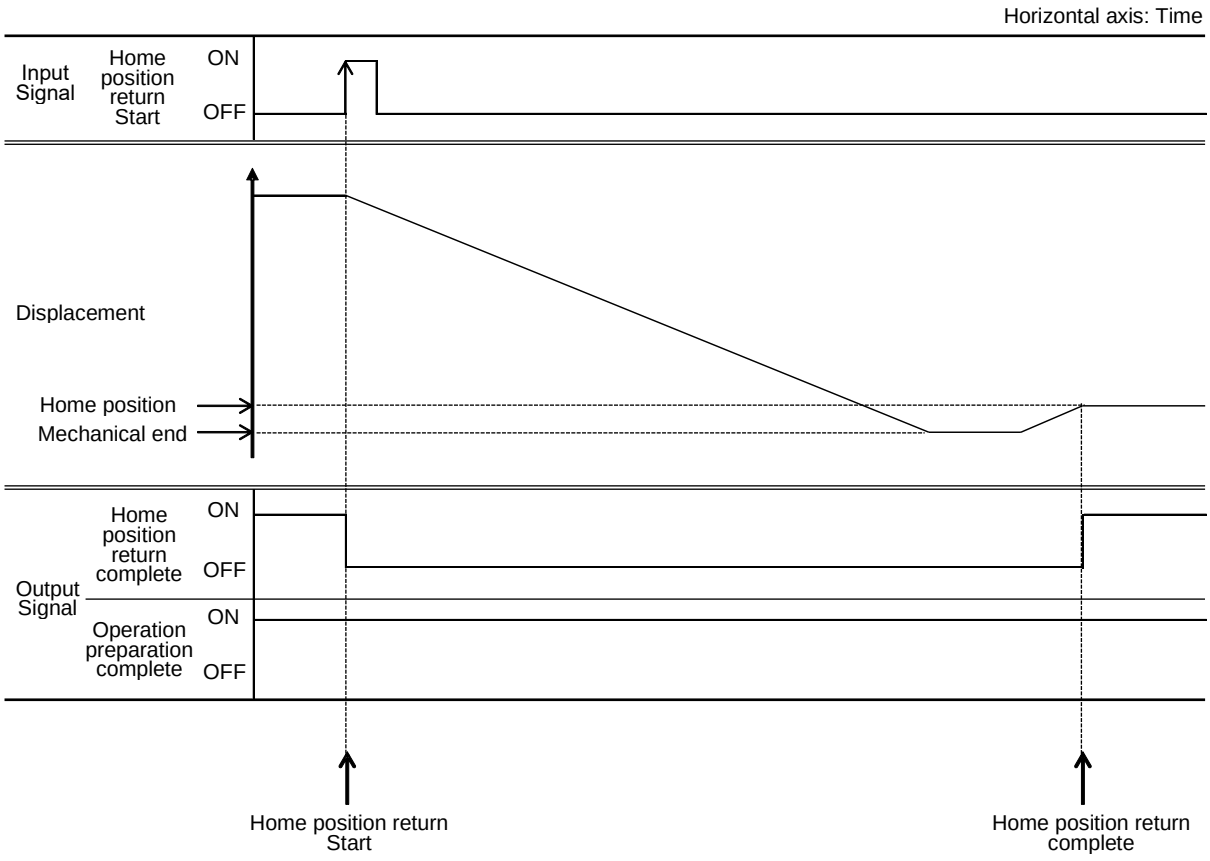


<Operation when returning to home position>

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.



<Time-chart>



■ EBS/EJSG/EBR (Absolute encoder)

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

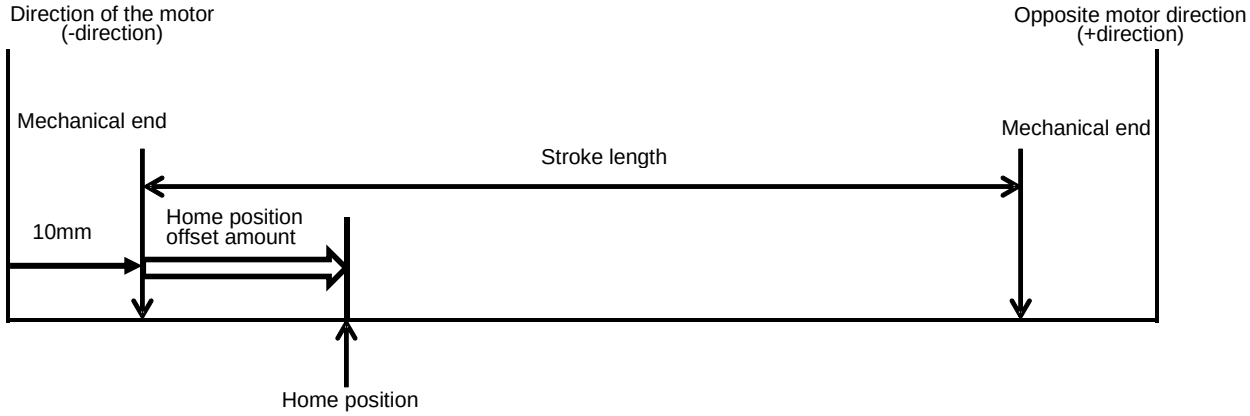
Setting items	Overview	Setting range		Initial value	Unit
Home position return direction (coordinate axis) Note 1	Sets the direction of the home position return to “normal (standard coordinate)” or “opposite (standard coordinate), or opposite (inverted coordinate)”.	Normal (standard coordinate), opposite (standard coordinate), and opposite (inverted coordinate)		Normal (standard coordinate)	None
Home position return speed	Sets the speed for returning to home position.	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“.

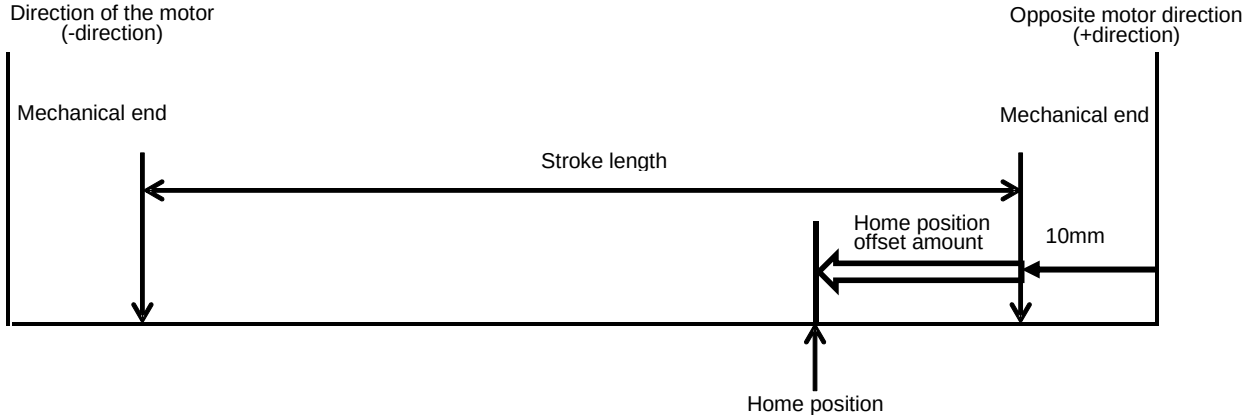
The table below shows the "home position return direction (coordinate axis)" setting when "home position offset amount" = 0 mm and the relationship between the home position and the coordinate axes.

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	Direction of the motor
Opposite (standard coordinate)	10 mm from opposite motor side mechanical end to motor direction	Opposite motor direction	Direction of the motor
Opposite (inverted coordinate)	10 mm from opposite motor side mechanical end to motor direction	Direction of the motor	Opposite motor direction

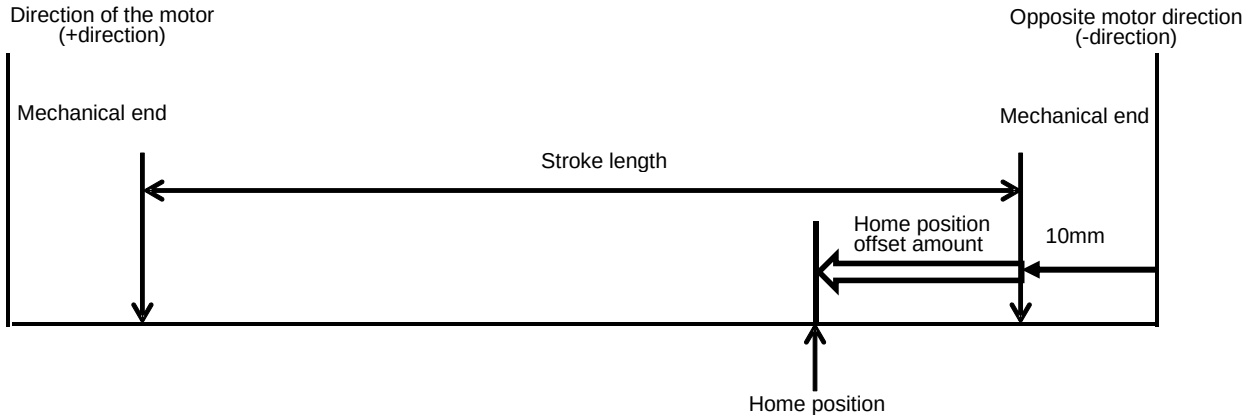
<Origin position and coordinate axis, when "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">



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

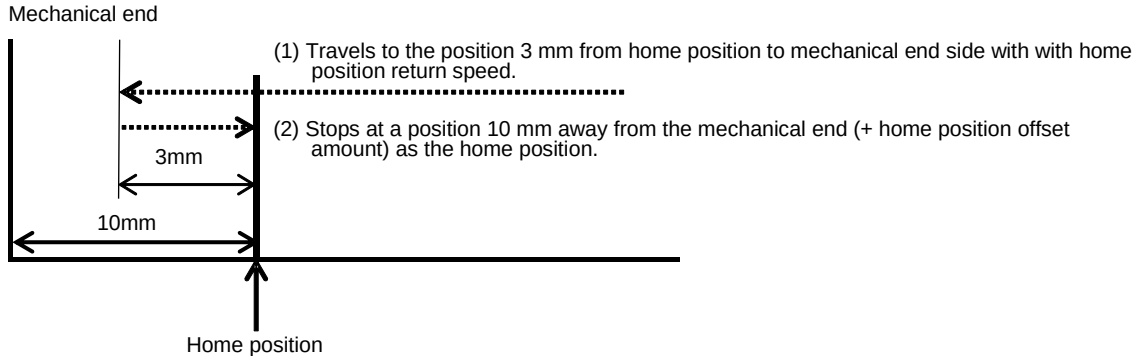


<Home position and coordinate axis, when "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">



<Operation when returning to home position>

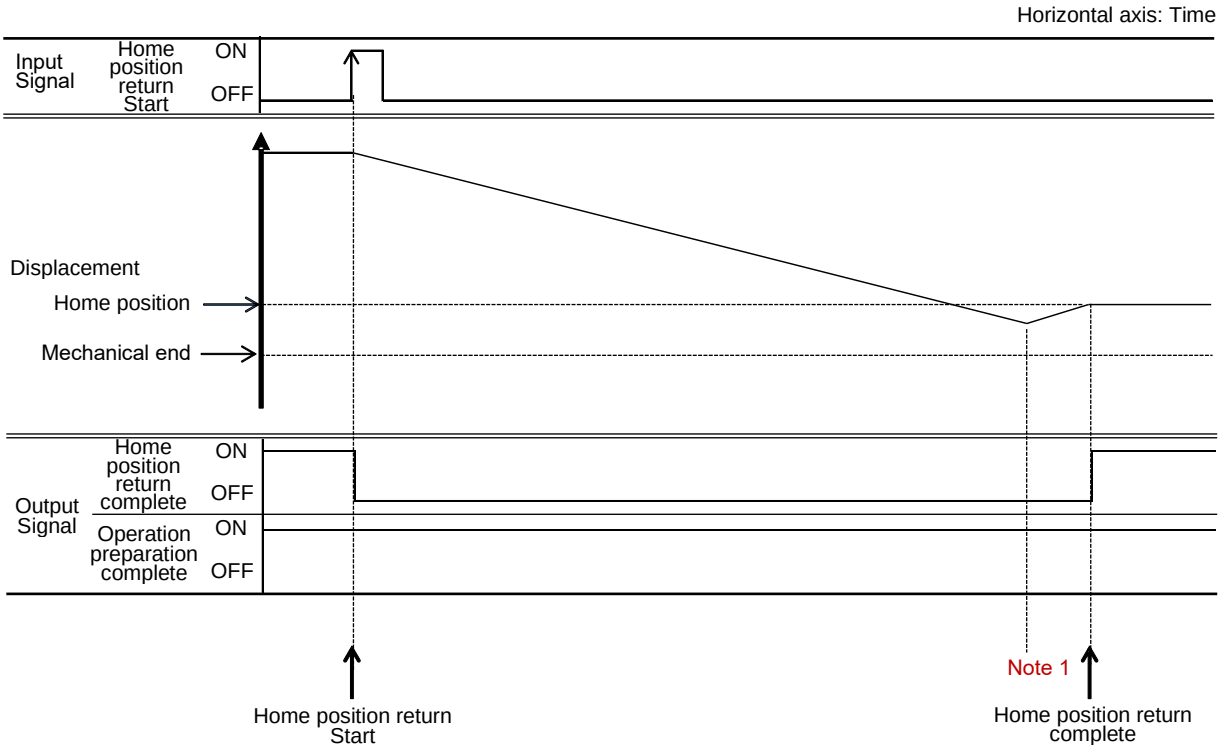
When the home position return is performed, it moves 3 mm from the home position to the mechanical end side and then moves to the home position without pressing against the mechanical end. An absolute encoder without a battery is used, so point travel is possible even if home position return operation 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	Set the speed for returning to home position.	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.

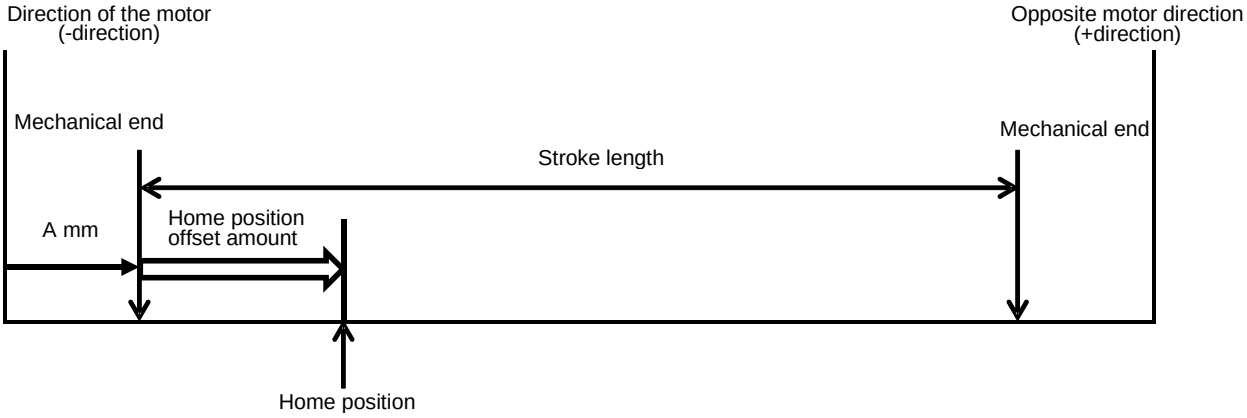
Home position return direction (coordinate axis)	Home position	+direction	-direction
Normal (standard coordinate)	A mm from motor side mechanical end to opposite motor direction	Opposite motor direction	Direction of the motor
Opposite (standard coordinate)	A mm from opposite motor side mechanical end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

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

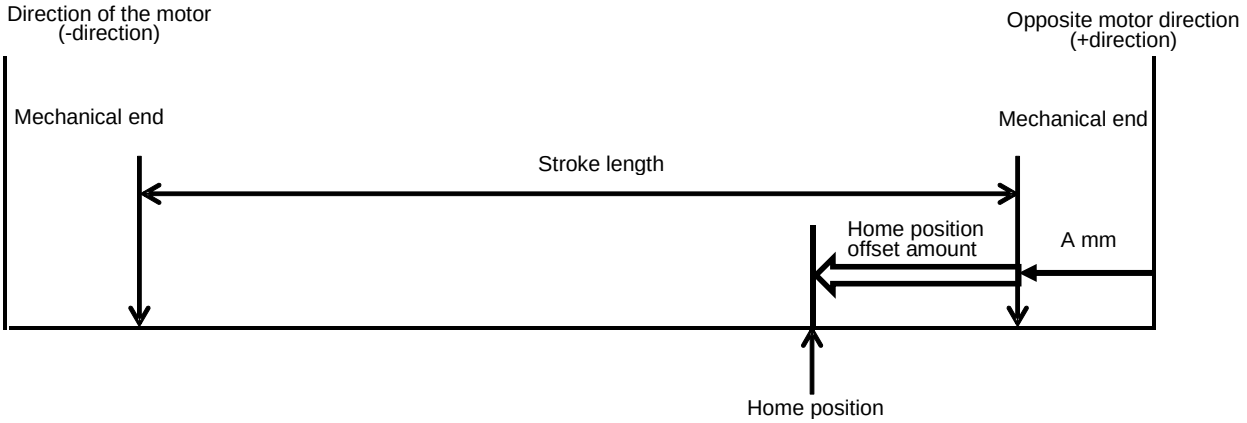
When the parameter “Home position return direction” is “Normal” and the “Home position offset amount” is “0.00”, the home position will be the position from the mechanical end in the table below.

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		

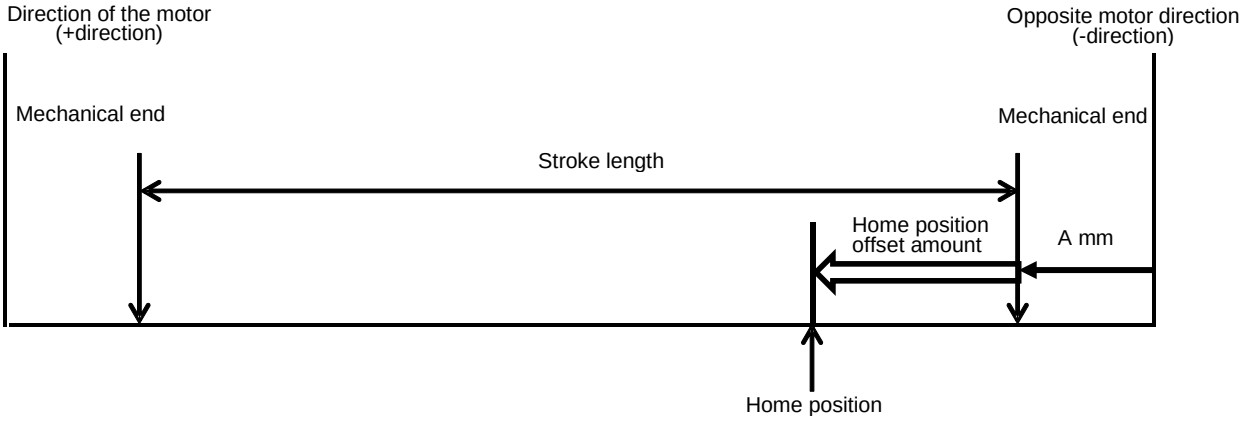
<Origin position and coordinate axis, when "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">



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

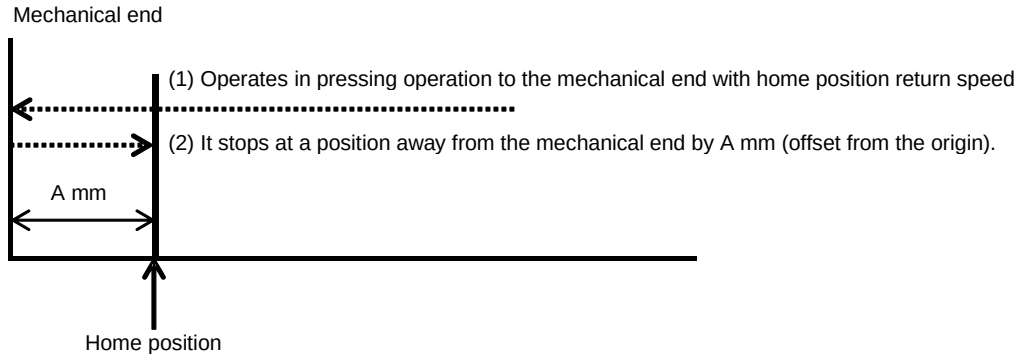


<Home position and coordinate axis, when "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">

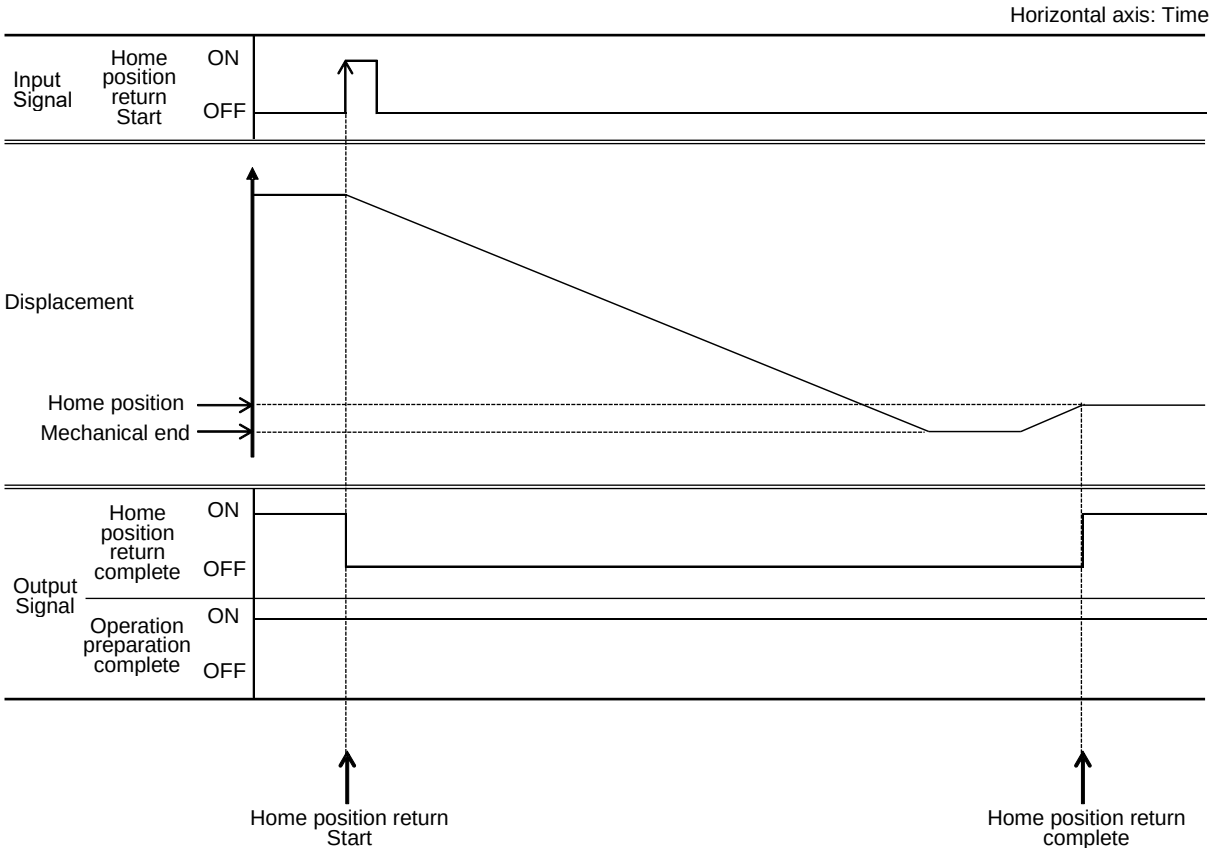


<Operation when returning to home position>

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.



<Time-chart>



■ 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	Sets 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 returning to home position.	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.

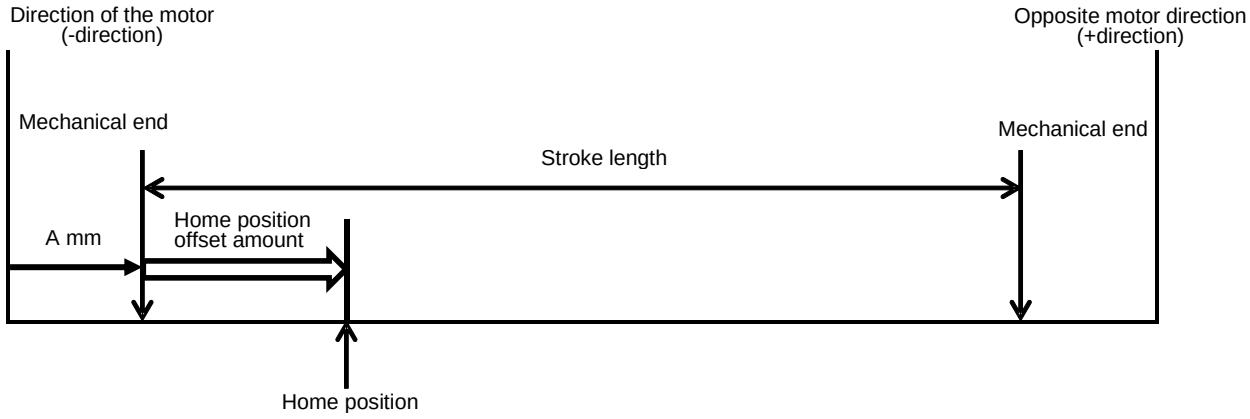
Home position return direction (coordinate axis)	Home position	+direction	-direction
Normal (standard coordinate)	A mm from motor side mechanical end to opposite motor direction	Opposite motor direction	Direction of the motor
Opposite (standard coordinate)	A mm from opposite motor side mechanical end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

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

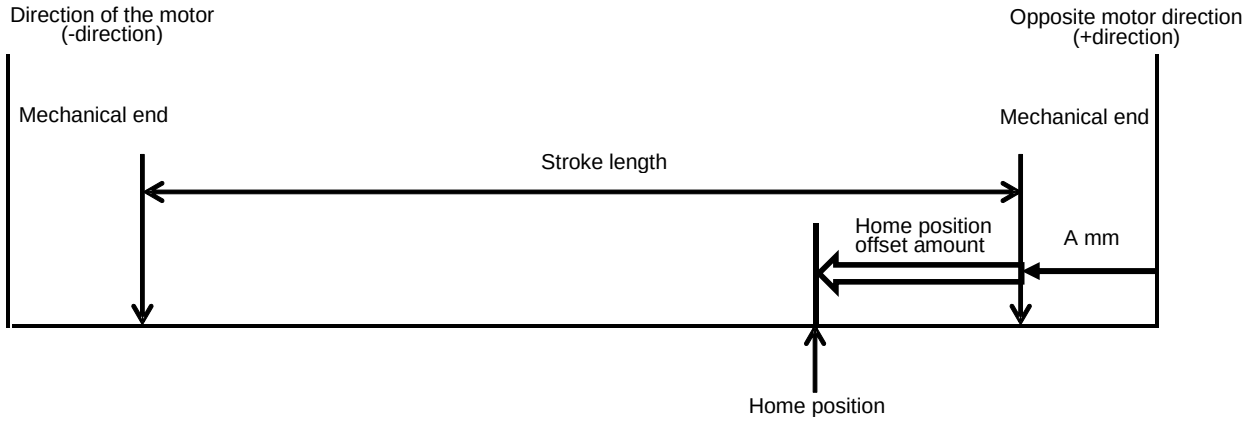
When the parameter “Home position return direction” is “Normal” and the “Home position offset amount” is “0.00”, the home position will be the position from the mechanical end in the table below.

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		

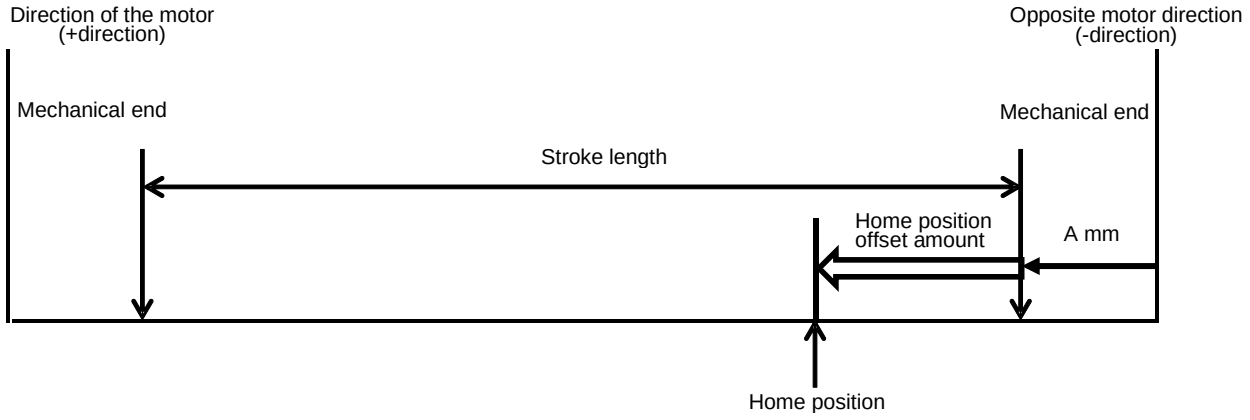
<Origin position and coordinate axis, when "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">



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

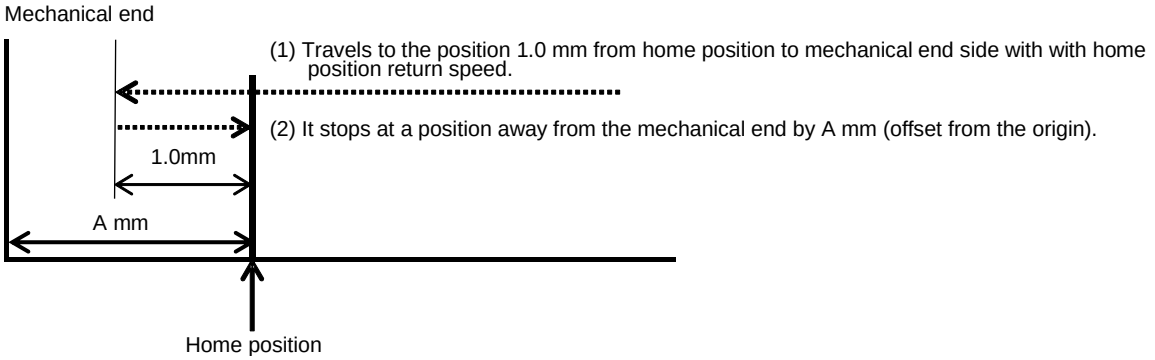


<Home position and coordinate axis, when "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">



<Operation when returning to home position>

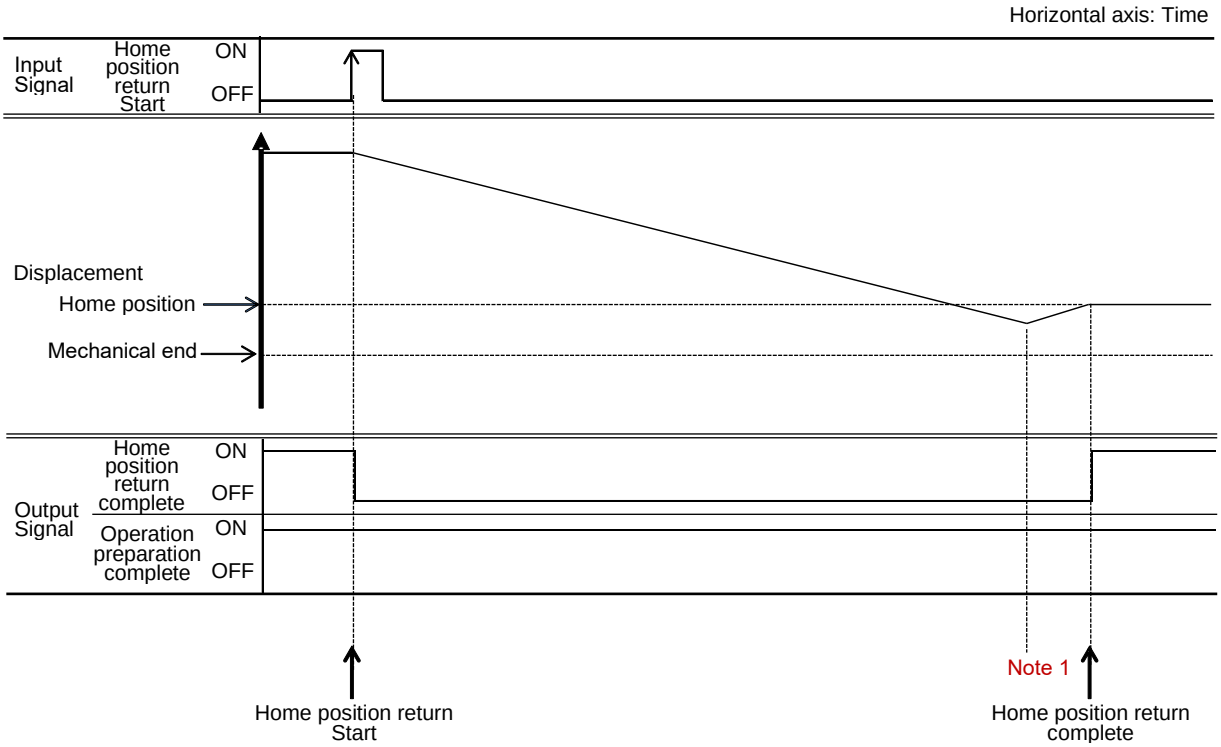
When the home position return is performed, it moves 1.0 mm from the home position to the mechanical end side without pushing against the mechanical end and then moves to the home position. An absolute encoder without a battery is used, so point travel is possible even if home position return operation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



- 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.

■ 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	Sets 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 returning to home position.	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

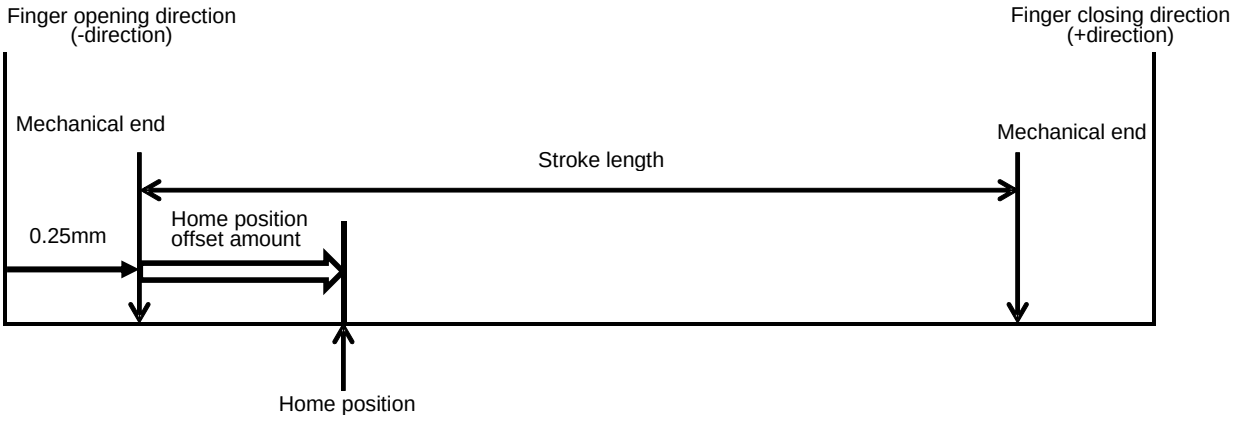
Note 1: If the software version is old, opposite (inverted coordinate) cannot be selected. For the correspondence of the version and controller specification, refer to “1.3.1 Version List“.

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“.

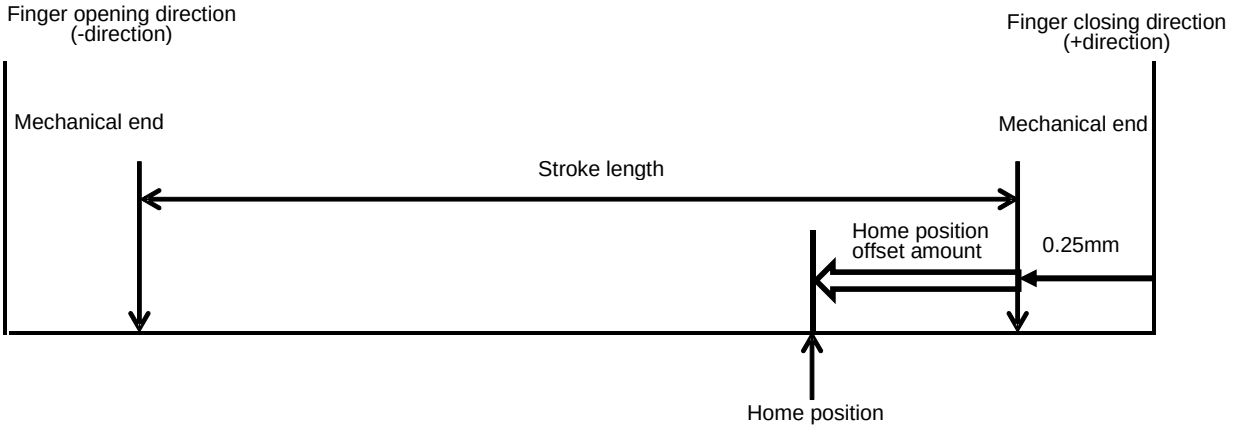
The table below shows the "home position return direction (coordinate axis)" setting when "home position offset amount" = 0 mm and the relationship between the home position and the coordinate axes.

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

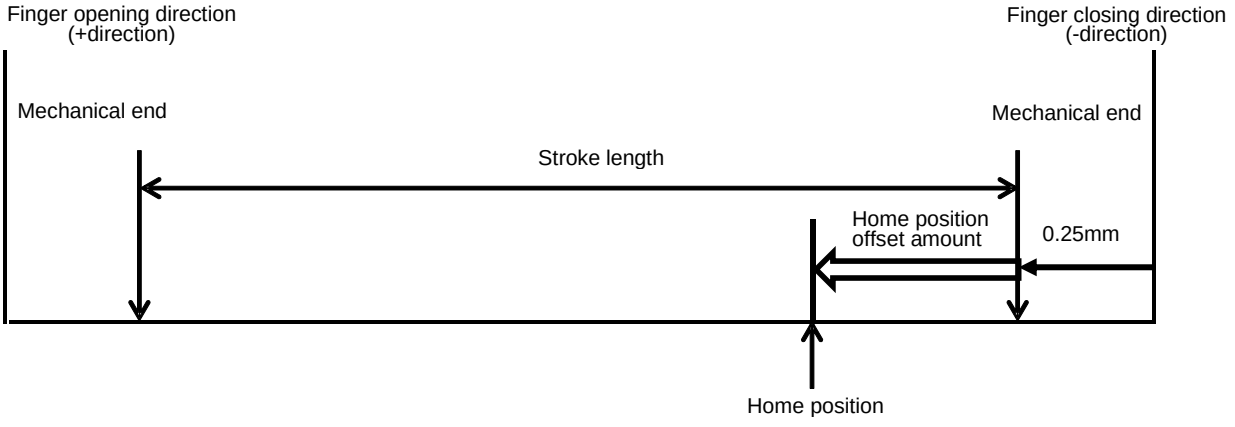
<Origin position and coordinate axis, when "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">



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

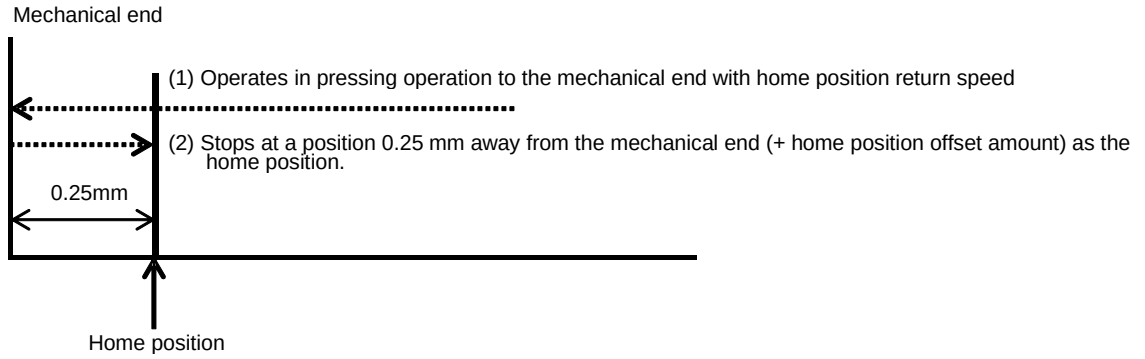


<Home position and coordinate axis, when "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">

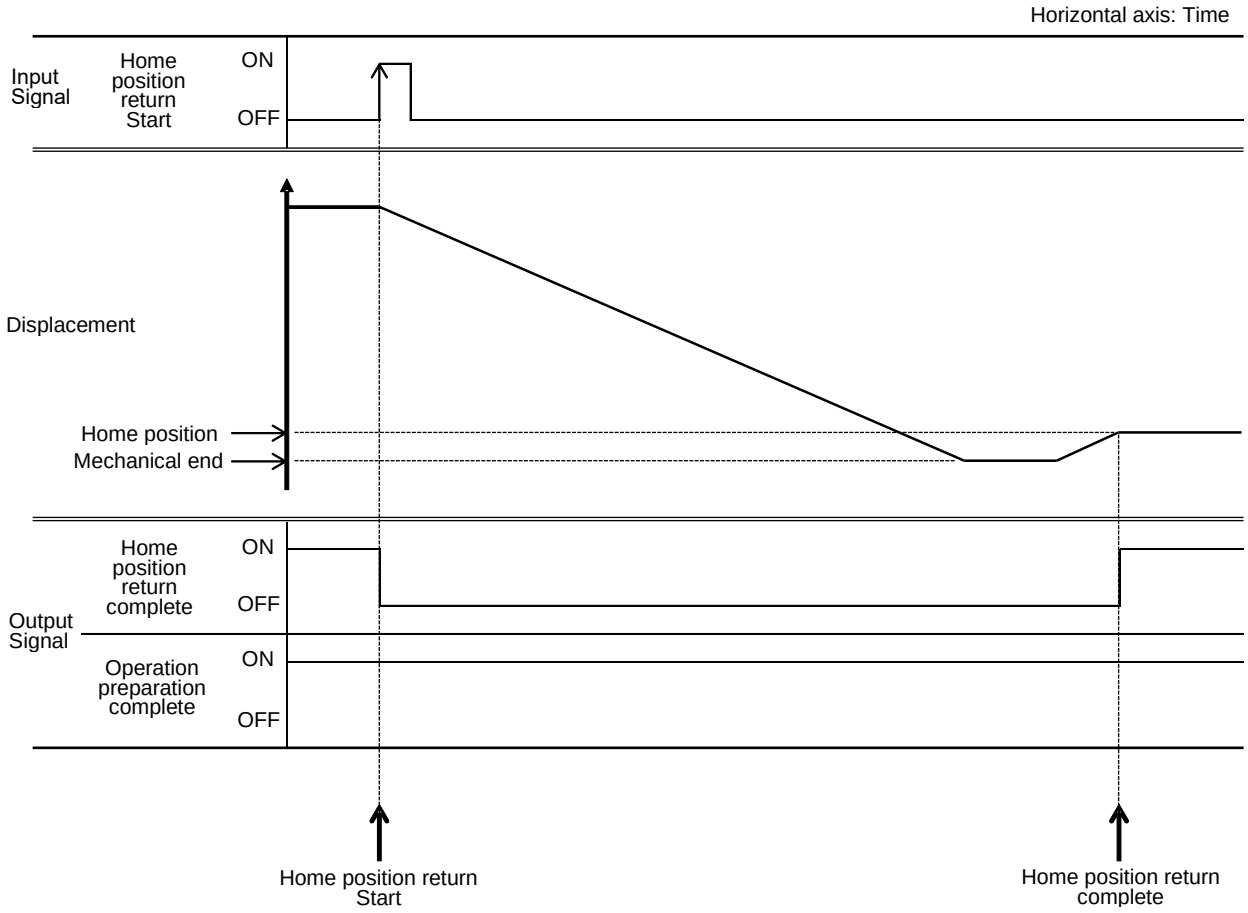


<Operation when returning to home position>

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.



<Time-chart>



■ 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	Sets 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 returning to home position.	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

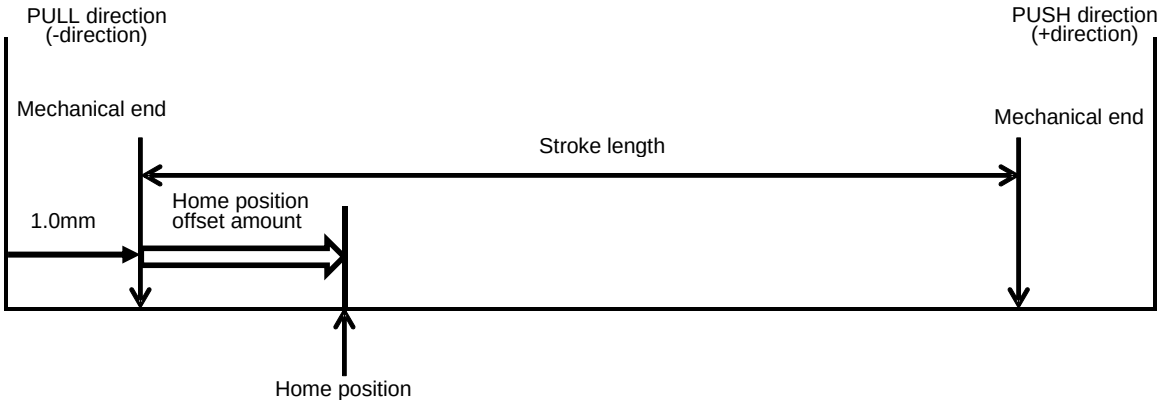
Note 1: If the software version is old, opposite (inverted coordinate) cannot be selected. For the correspondence of the version and controller specification, refer to “1.3.1 Version List“.

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“.

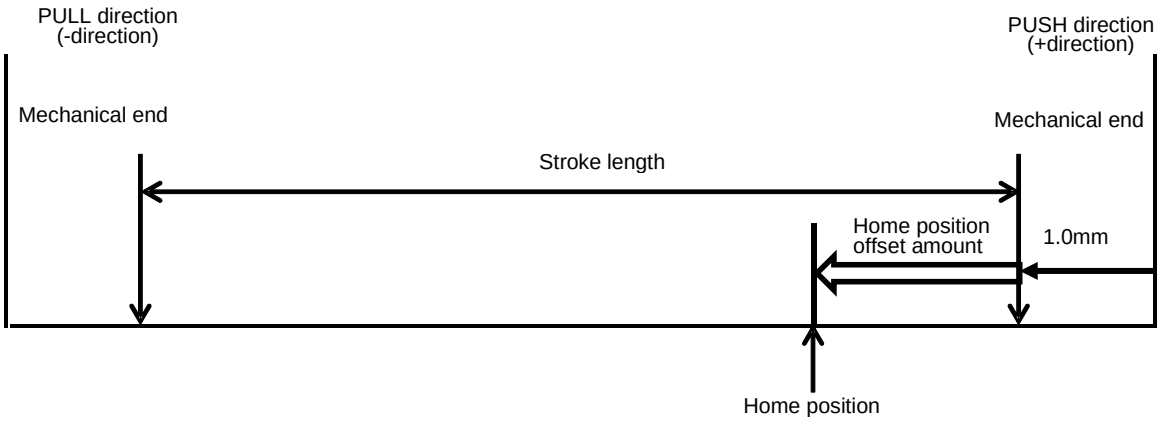
The table below shows the "home position return direction (coordinate axis)" setting when "home position offset amount" = 0 mm and the relationship between the home position and the coordinate axes.

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

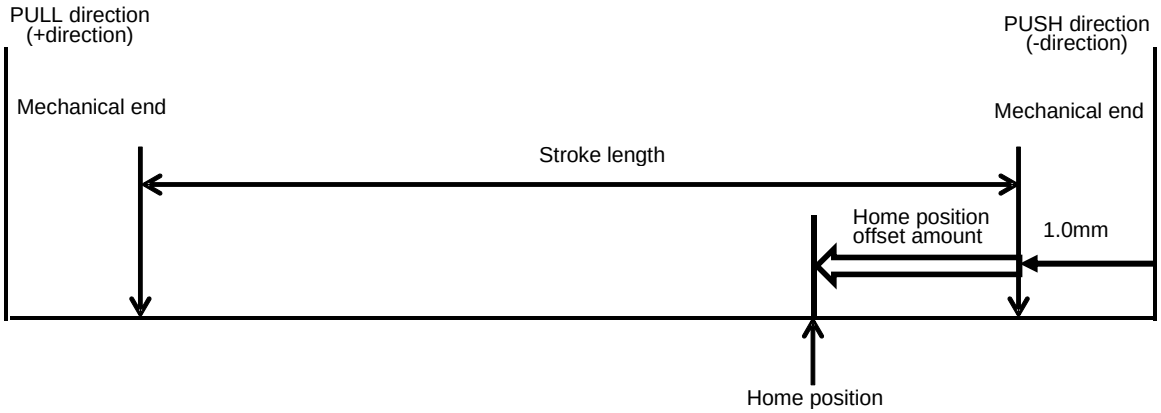
<Origin position and coordinate axis, when "Home position return direction (coordinate axis)" = "Normal (standard coordinate)">



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

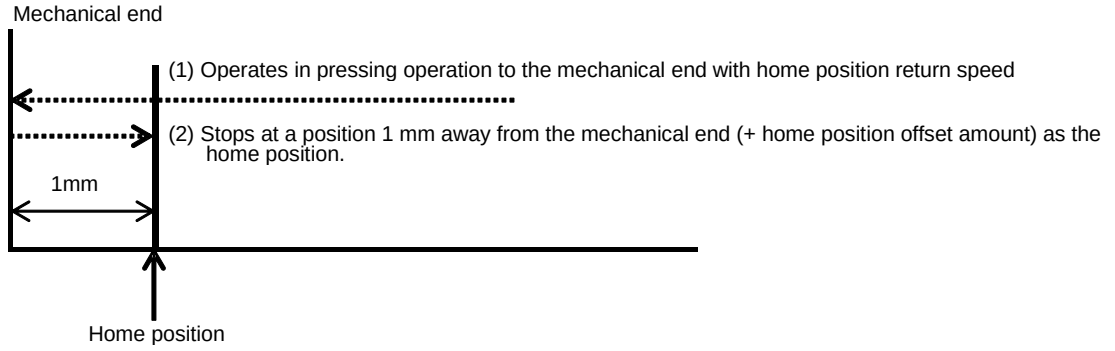


<Home position and coordinate axis, when "Home position return direction (coordinate axis)" = "Opposite (inverted coordinate)">

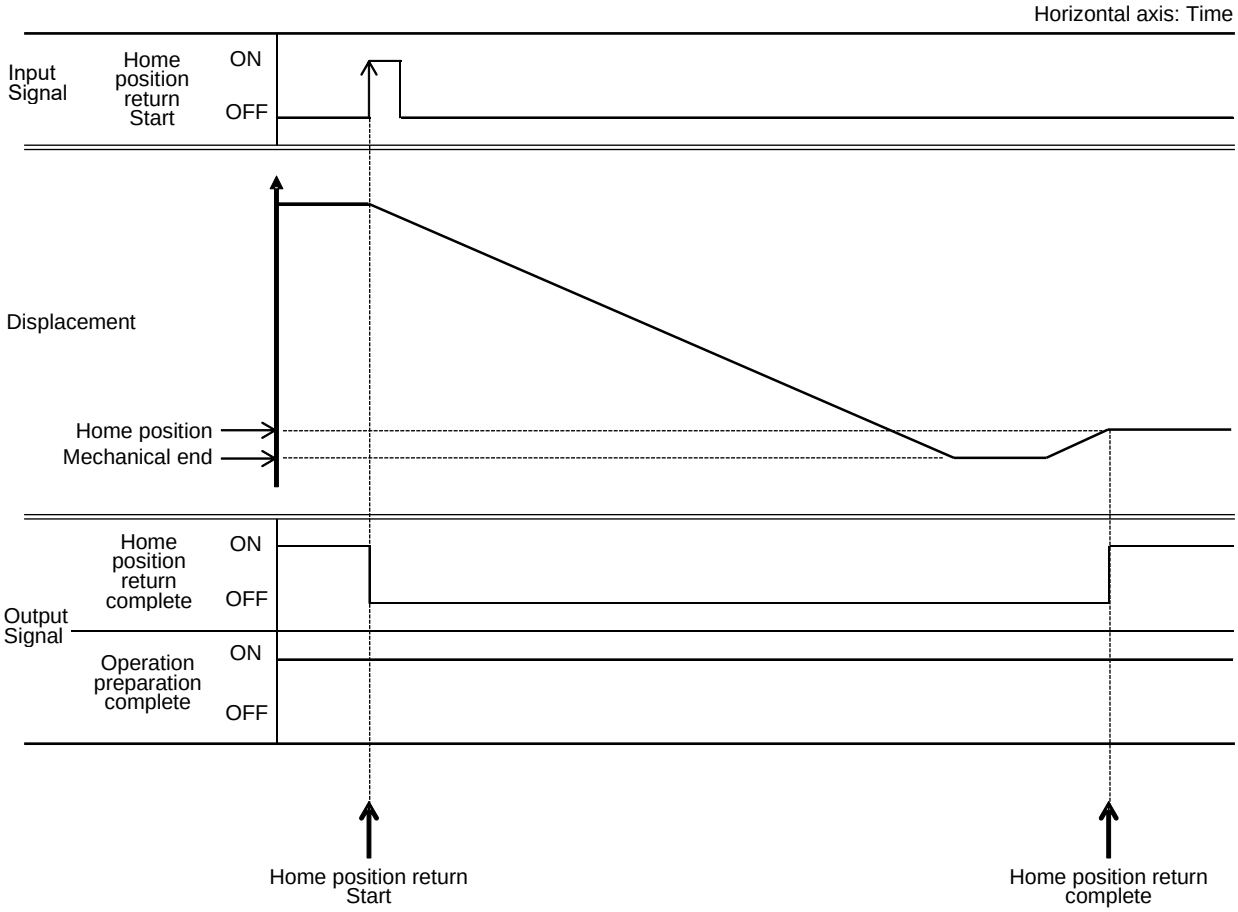


<Operation when returning to home position>

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.



<Time-chart>



■ FGRC (Incremental encoder)

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

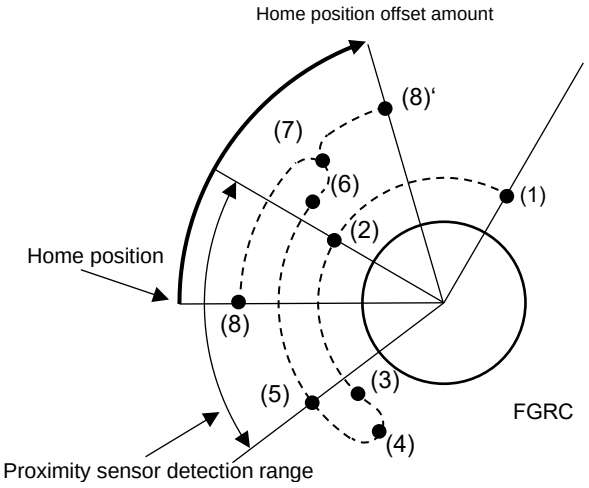
Setting items	Overview	Setting range		Initial value	Unit
Home position return direction (coordinate axis)	Sets the direction of the home position return to “normal (standard coordinate)” or “opposite (standard coordinate)”.	Normal (Normal Coordinates), opposite (Normal Coordinates) Note 1		Normal (standard coordinate)	None
Home position return speed	Sets the speed for returning to home position.	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 Ver. 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 (standard coordinate)” 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 (standard coordinate)” and the “Home position offset amount” is the travel distance between (8) and (8)‘, the offset position (8)‘ will be the home position.



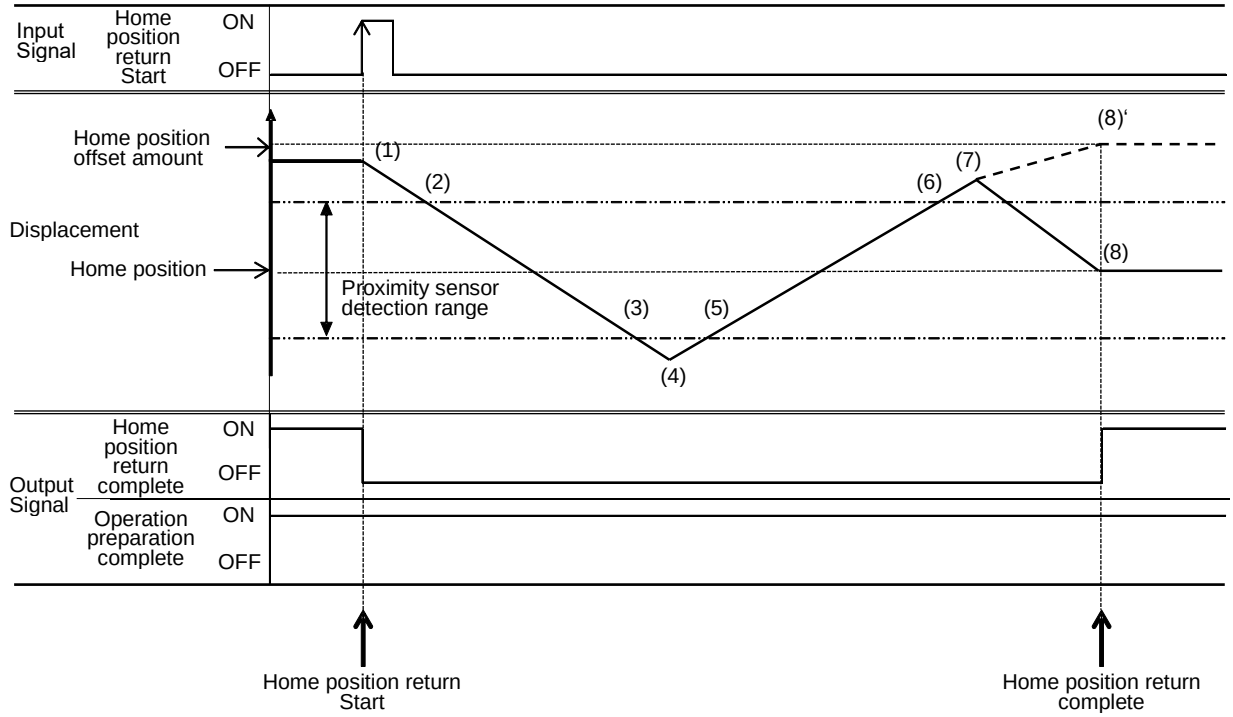
※ This is a figure of FGRC from above.

Point	Description
(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 (when “FGRC home position return method” = "Sensor”) >

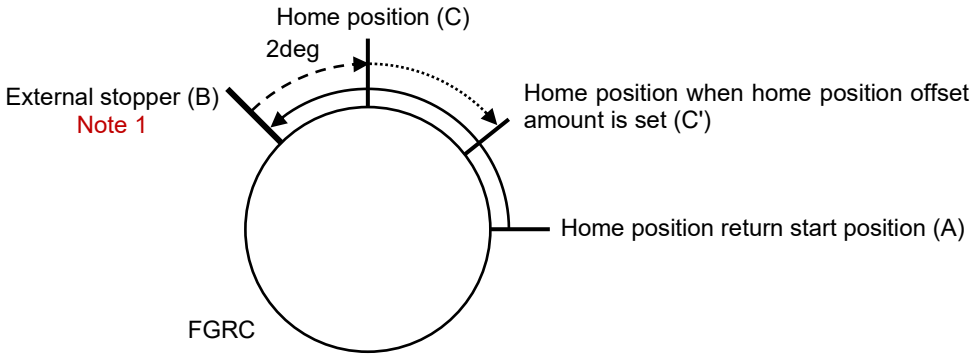
Horizontal axis: Time



<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 rotate 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)".



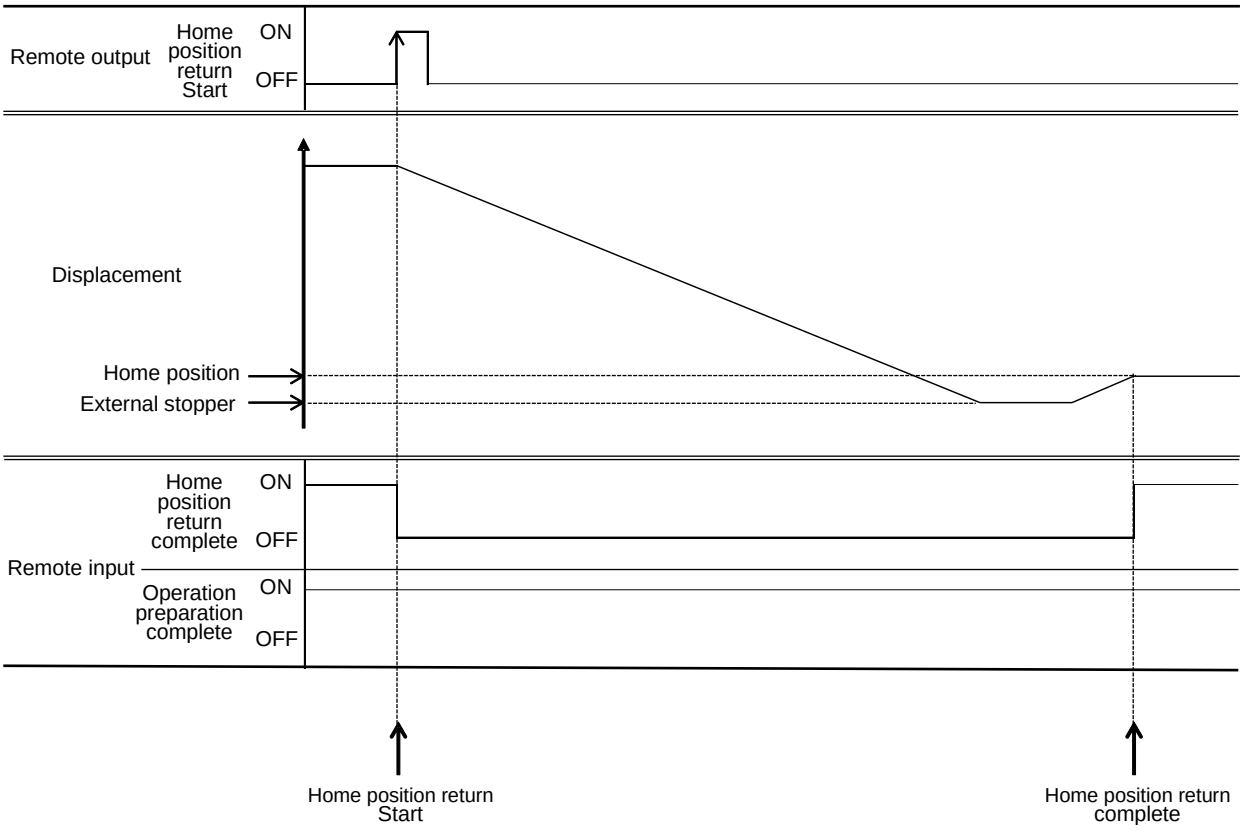
Note 1: External stopper and pushing jig are customer-supplied.

※ 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



3.4.6. 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 inpusst) 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	Description
-	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	Description
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	Description
-	Outputs the point No. in binary after travel is complete.

0: OFF, 1: ON

General purpose output 6 Point travel completion	Description
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	Description
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

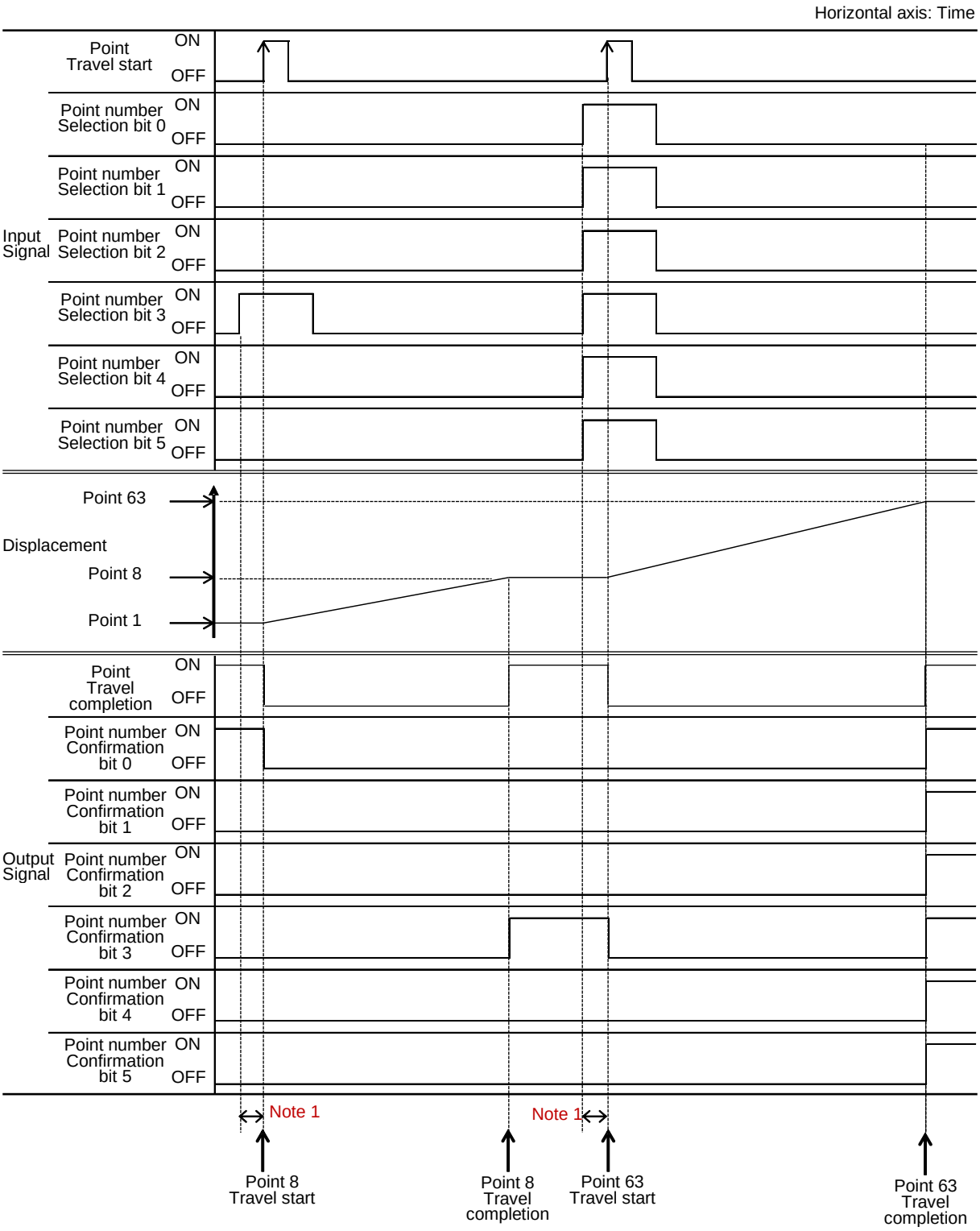
Set the point number with the point number selection bit.

2. Turn on the point travel start

3. Confirm that point travel completion is 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: After setting the point No. selection bit, wait at least for the time set in the parameter “Input signal filter” (initial value = 5 ms) to elapse before inputting the point travel start.

<Jog operation>

Use the following input and output signals for operation.

General purpose input 7	General purpose input 8	Description
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 **speed**“ of “3.2.1Parameters List”.

<Operation method>

1. Set JOG speed

Set the JOG speed of the parameter arbitrarily.

2. Turn ON JOG travel start

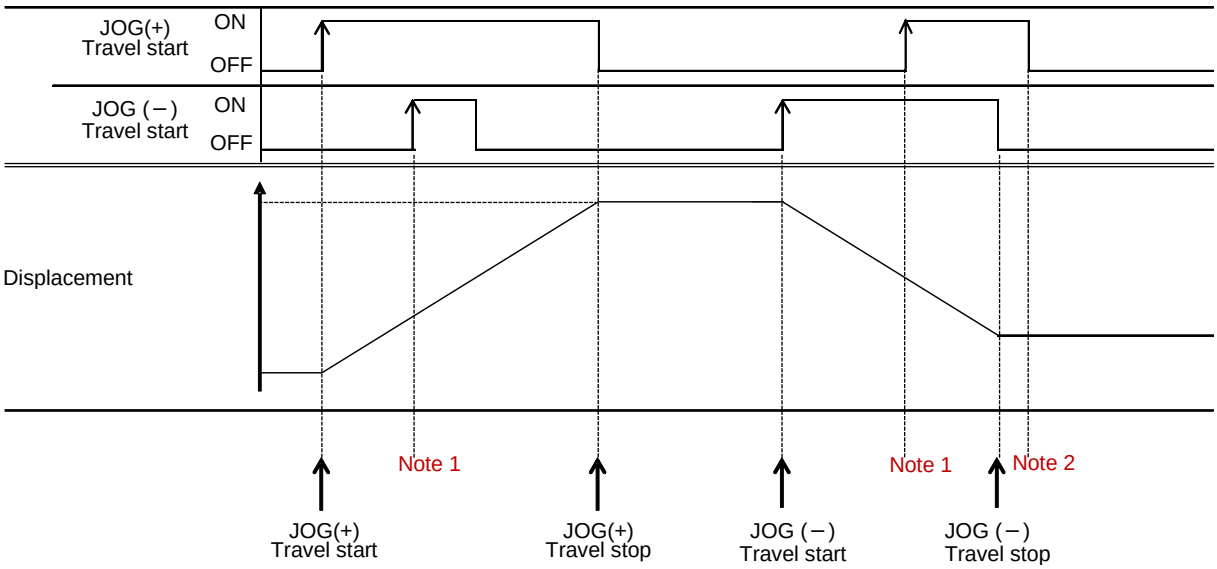
To operate in the + direction, turn ON the JOG (+) travel start.
To operate in the - direction, turn ON the JOG (-) travel start.

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>

Horizontal axis: Time



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.

- 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.

■ 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 Point No. 1 to 7 travel start	Description
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 Point No. 1 to 7 travel completion	Description
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	Description
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.

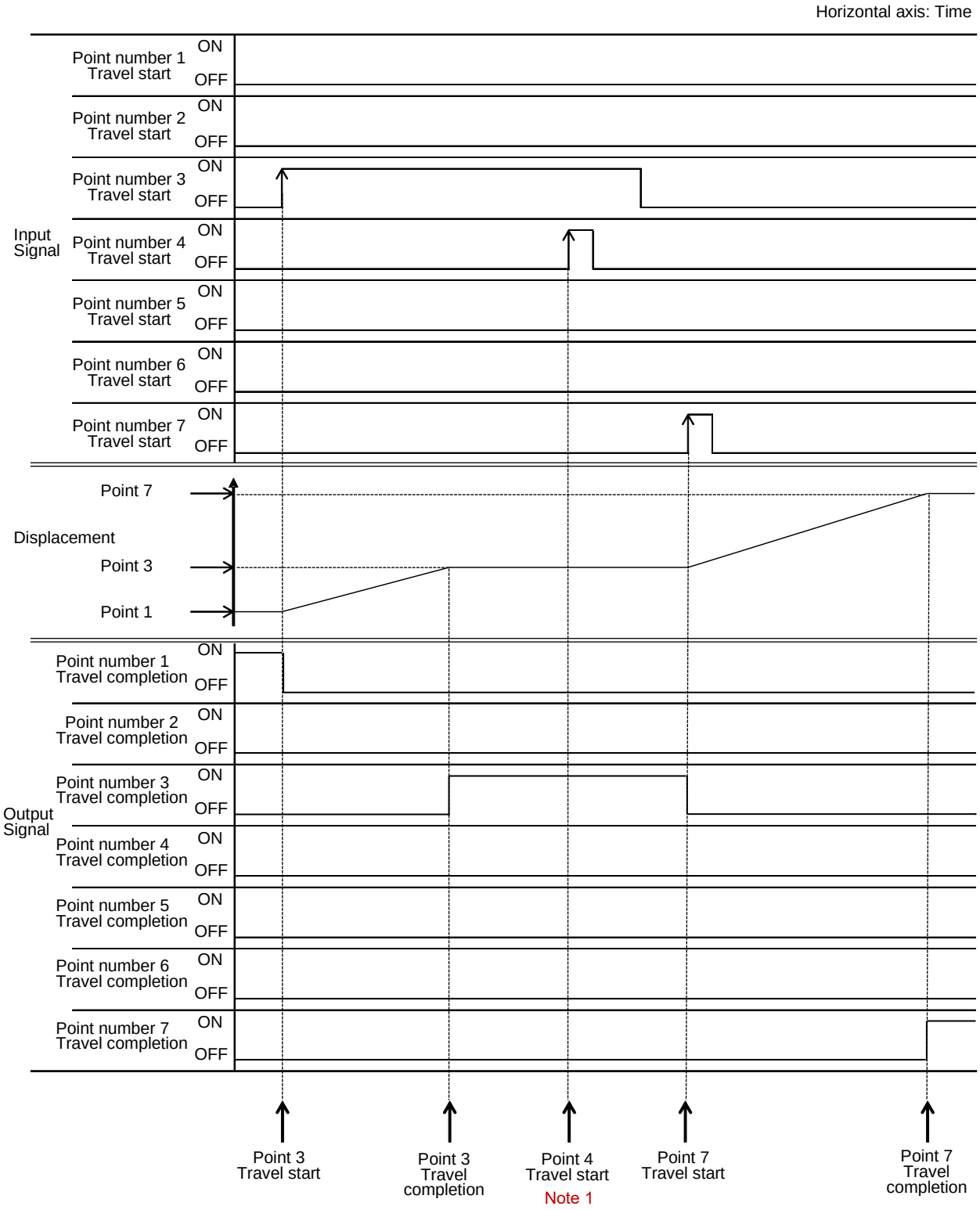
2. Turn OFF the point travel start

Turn OFF the point travel start that was ON.

3. Confirm that point travel completion is ON

Confirm that the point travel completion for the corresponding point is turned ON.

<Time-chart>



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 “3.4.6Positioning Operation”.

■ 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	Description
Solenoid valve movement command 1	Solenoid valve movement 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>

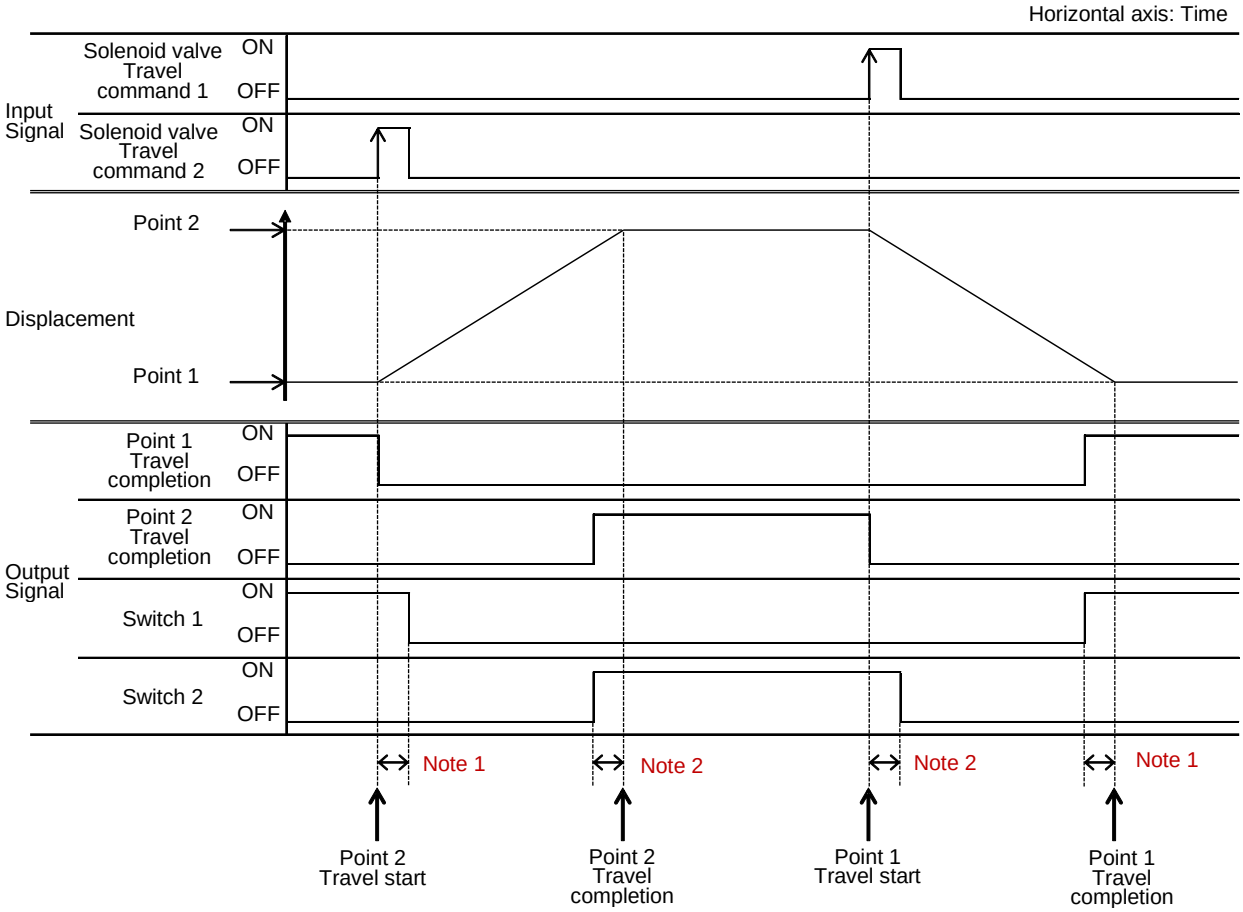
General purpose output 0	General purpose output 1	Description
Point 1 travel complete	Point 2 travel complete	
1	0	Turns ON when it finishes traveling to point 1.
0	1	Turns ON when it finishes traveling to point 2.

0: OFF, 1: ON

General purpose output 4	General purpose output 5	Description
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.

■ 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	Description
Solenoid valve movement command 1	Solenoid valve movement 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>

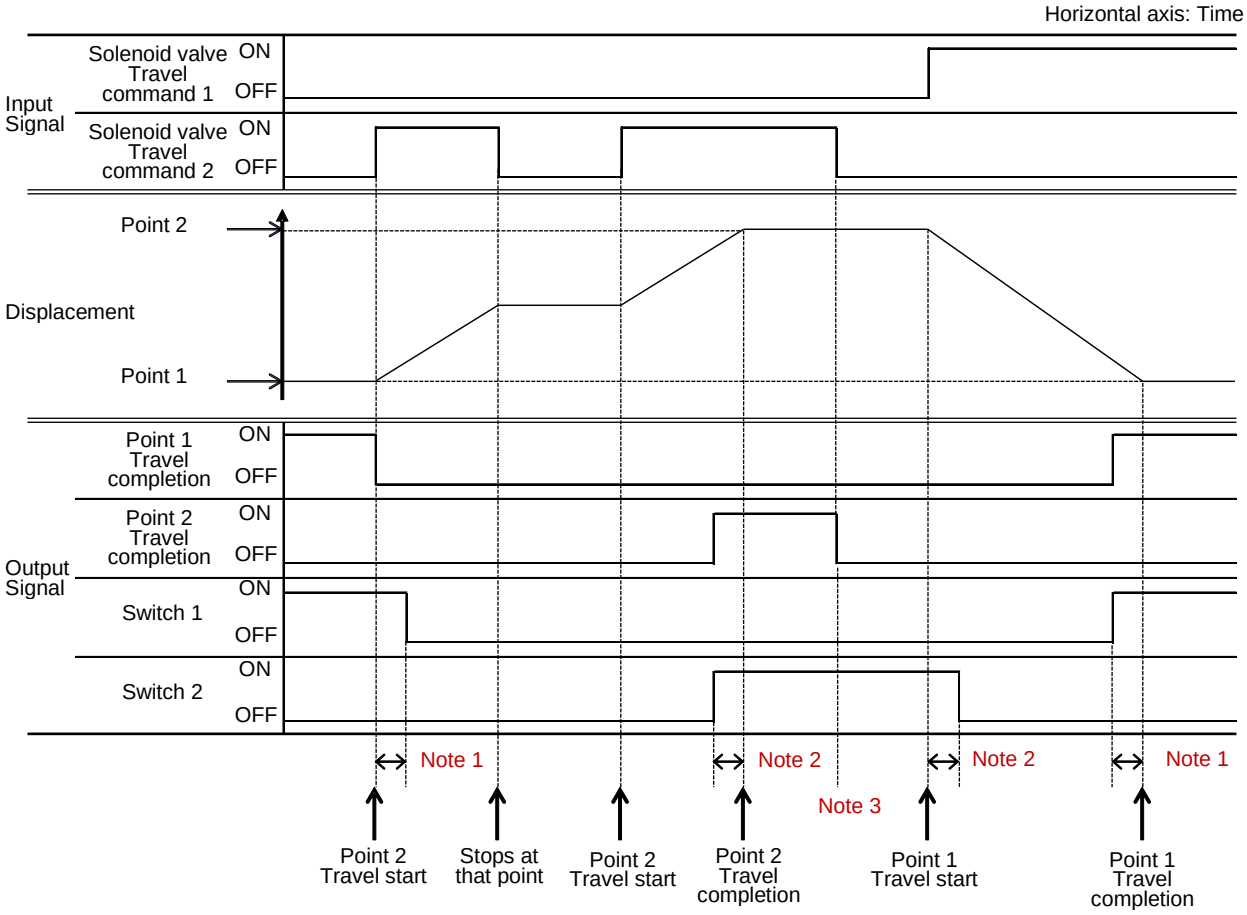
General purpose output 0	General purpose output 1	Description
Point 1 travel complete	Point 2 travel complete	
1	0	Turns ON when it finishes traveling to point 1.
0	1	Turns ON when it finishes traveling to point 2.

0: OFF, 1: ON

General purpose output 4	General purpose output 5	Description
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 movement command OFF, travel complete output also turns OFF.

■ 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	Description
Solenoid valve movement 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	Description
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.

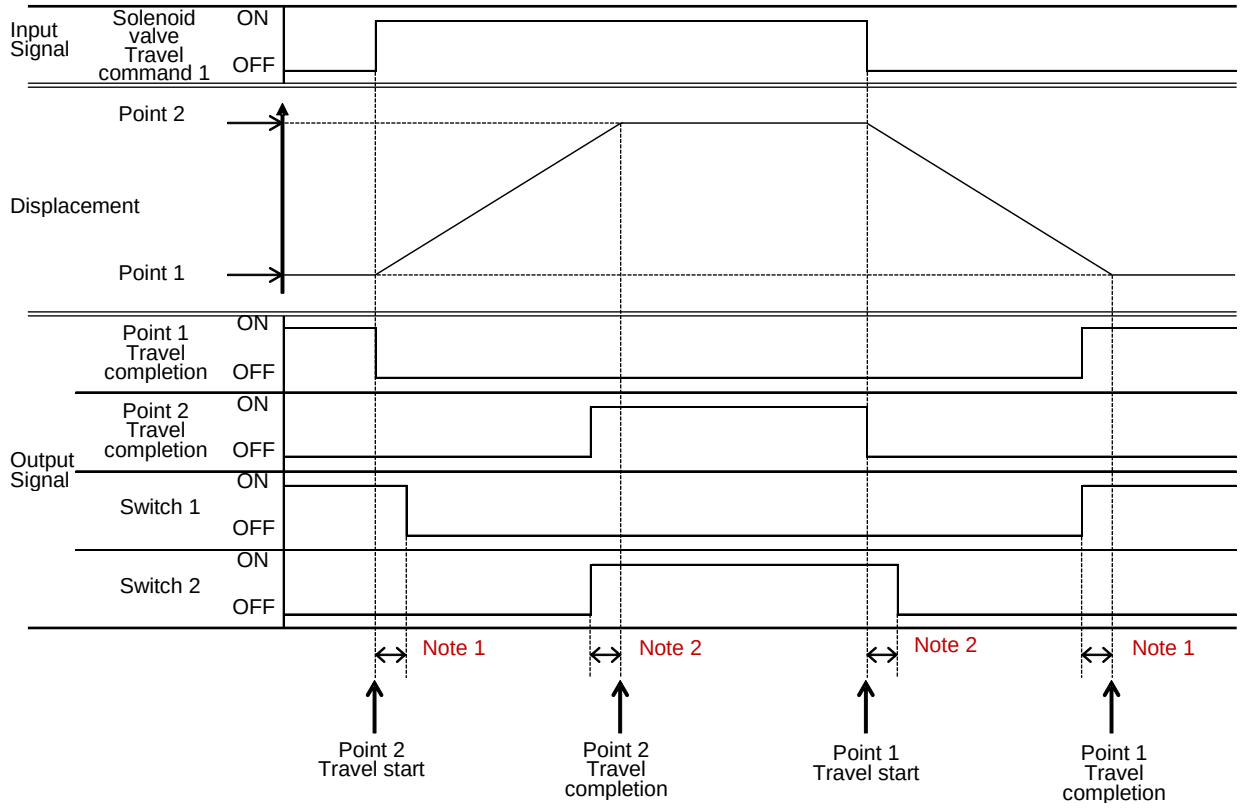
0: OFF, 1: ON

General purpose output 4	General purpose output 5	Description
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>

Horizontal axis: Time



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.

3.4.7. Signal of Output Selection

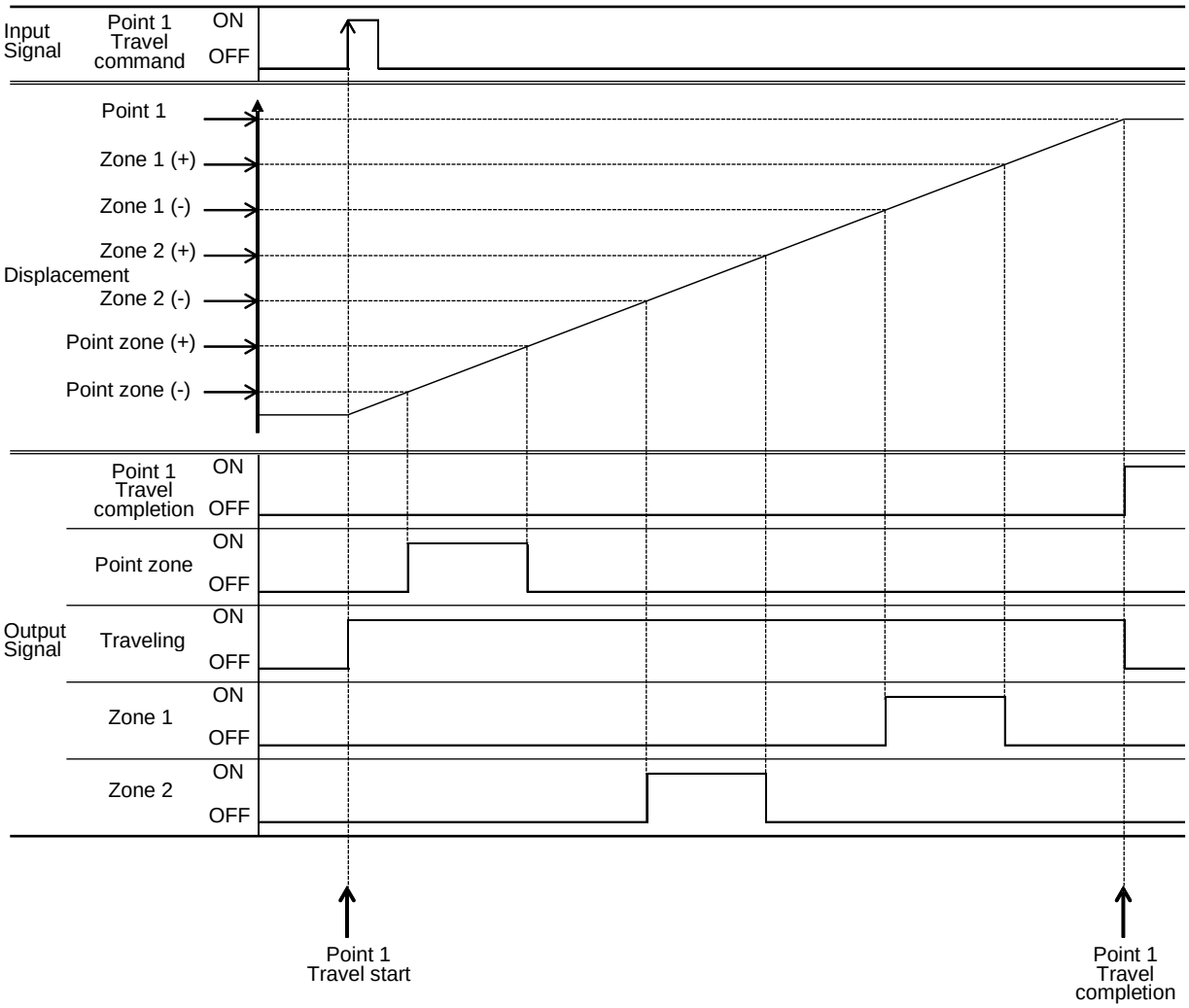
The signals of output selection 1 and output selection 2 of the parameter are output according to the signal assignment setting of PIO.
Point zone, zone 1, zone 2, traveling, or warning can be selected for the output selection.

<Output signal>

Output signal name	Description
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 “3.3.14Point 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 “3.2.3Zone 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 “3.2.3Zone Settings and Output Signals” for details.
Warning	Turns OFF when a slight abnormality that does not affect actuator operation is detected. Refer to “5.2.2Warning” 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 “3.2.2Setting 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 “3.2.2Setting Soft Limit and Soft Limit Over Signal Output” for details.
Soft limit ove r (+)	Turns ON when the current position is larger than the soft limit (+) set in the parameter Refer to “3.2.2Setting Soft Limit and Soft Limit Over Signal Output” for details.

<Time-chart>

Horizontal axis: Time



3.4.8. Pressing Operation

You can select "Pressing operation 1” or "Pressing operation 2" with the operation method of the point data. After the transfer operation, the actuator operates at the set “pressing rate” or less in the pressing interval. Alarm is not output even if it stops due to contact with the workpiece.

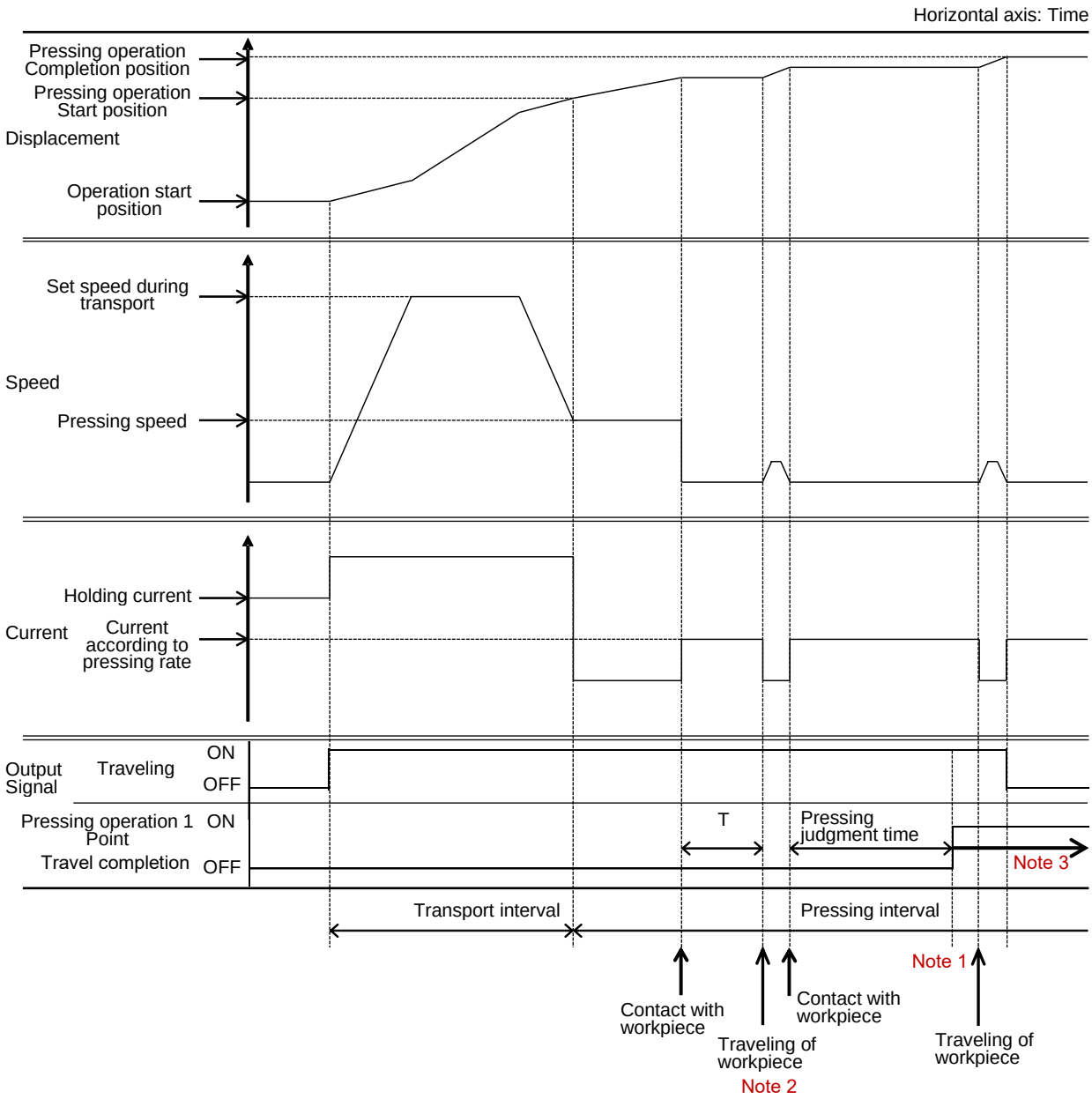
- The pressing rate may vary depending on load conditions and operating conditions.

<Pressing operation settings>

Setting items	Description
Pressing rate	The upper limit of the pressing force in the pressing interval can be set in percentage to the maximum pressing force. Refer to “3.3.15Setting the Pressing Rate” for details.
Pressing speed	You can set the speed of the pressing interval. Refer to “3.3.16Setting the Pressing Speed” for details.
Pressing distance	The pressing interval from the start to the end of pressing can be set. Refer to “3.3.17Setting the Pressing Distance” for details.
Pressing judgment time	Set by pressing operation 1. The time until determining that pressing is complete in the pressing interval can be set. For details, refer to “Pressing judgment time“ of “3.2.1Parameters List”.

■ Pressing operation 1

<Time-chart>



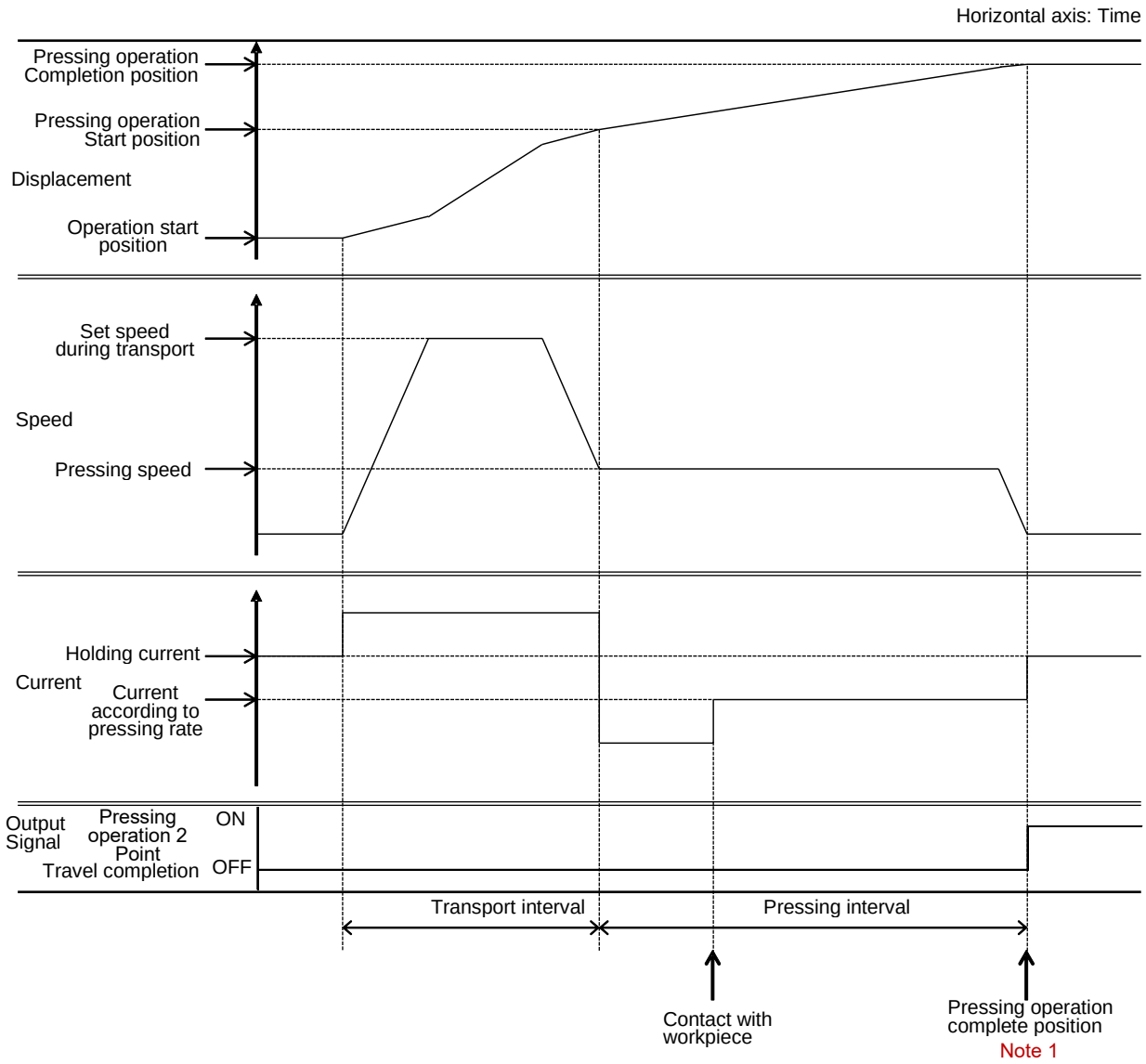
Note 1: If current corresponding to “Pressing judgment time” continues to flow for the “Pressing judgement time” or longer, the point travel completion is output. However, the output during traveling does not turn off until the pressing operation completion position is reached.

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>



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.

3.4.9. 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.

- When a new operation signal is input, actuator decelerates temporarily.

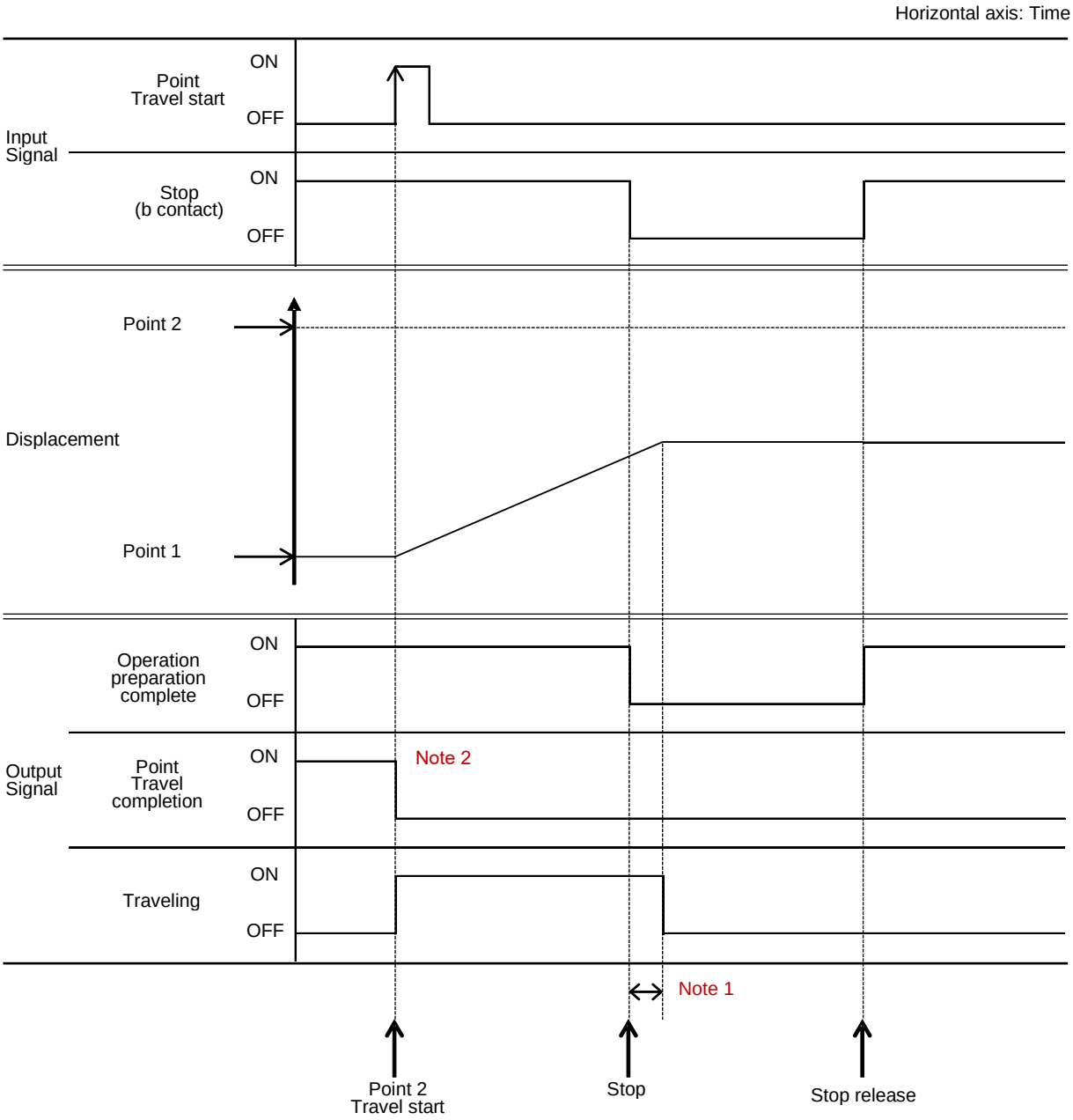
When a new point operation signal is input during point operation, the following operations are performed.

New point target position	Description
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 operating in the opposite direction.

3.4.10. 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.

<Time-chart>



Note 1: Once the stop signal is input, it decelerates then stops. Check that the traveling signal is OFF.
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.

3.4.11. 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. If a load exceeding the holding force (100% of the fixed current at stop) shown in the following table is applied while holding, an alarm may occur.

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		

4. MAINTENANCE AND INSPECTION

WARNING

Do not disassemble or modify the product not specified in this Instruction Manual.
- In addition to causing injuries, accidents, malfunctions, or failures, it may not meet the specifications such as this Instruction Manual.

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

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

Do not touch the heat sink and cement resistor inside the controller or the motor of an actuator.
- An electric shock or burns may occur.

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

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

CAUTION

Alert people around not to let a third party turn on the power inadvertently.

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 “Act on Waste Management and Public Cleaning” and have a specialized waste disposal operator dispose of the product.

5. TROUBLESHOOTING

5.1. The Cause of Trouble and How to Troubleshoot

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

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.	“2.3.1Wiring to the Power Supply”
	The cable is disconnected.	Check for cable sheath damage, disconnection, connectors and terminals.	
	Product has failure or is damaged.	It will need to be repaired.	“5.1.1Items to Check When Trouble Occurs”
	Power supply has failure.	Repair or replace the power supply.	-
	Power capacity is insufficient.	Use a power supply with a large capacity.	“2.3.1Wiring to the Power Supply”
The alarm lamp remains lit in red.	Alarm has been issued.	Check the alarm code and remove the cause.	“5.2.1Alarm”
	There is an abnormality in system.	It will need to be repaired.	“5.1.1Items to Check When Trouble Occurs”
No Ready for operation signal is output.	It is in emergency stop state.	Release the emergency stop.	“3.4.1Emergency 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.	“3.4.2Forced Release of Brake”
	The servo is OFF.	Input the servo ON signal from the PLC.	"2.3.4 Wiring with the I/O cable" or "3.4.3Operation of Servo ON/OFF"
	The stop signal is OFF.	Turn ON the stop signal.	“2.3.4 Wiring with the I/O cable”
	Wiring is not correct.	Check the wiring to the PLC.	“2.3.4 Wiring with the I/O cable”
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.	"Input signal filter” in "3.2.1Parameters List”
	It stops during operation.	The transport 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.	“3.3.5Setting the Position”
	The speed setting is incorrect.	Check the “Speed” in the point data.	“3.3.7Setting the Speed”
	The acceleration setting is incorrect.	Check the “Acceleration” in the point data.	“3.3.8Setting the Acceleration”
	The setting of pressing rate is incorrect.	Check the “Pressing rate” in the point data.	“3.3.15Setting the Pressing Rate”
	Setting of operation mode is incorrect.	Check the “Operation mode” details in the parameters.	"Operation mode (PIO)” in "3.2.1Parameters List”
	Wiring is not correct.	Check the wiring.	“2.3.4 Wiring with the I/O cable”
	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.	Recheck the environment conditions and the conditions of use. Check the usage period (operating distance).	“5.2.2Warning”
	Actuator body is damaged.	It will need to be repaired.	“5.1.1Items 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.	“3.2.4Adjusting 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.	“2.3.4 Wiring with the I/O cable”
	The cable is disconnected.	Check for cable sheath damage, disconnection, connectors and terminals.	“2.3.4 Wiring with the I/O cable”
	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.	“2.3.1Wiring 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.	“3.4.2Forced 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.		“3.4.11Holding Operation After Travel Complete”
		Review the setting of the parameter “Fixed current when stopped”.		”Fixed current at stop” of “3.2.1Parameters 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.		“3.3.6Setting the Positioning Width”
Pressing operation cannot be performed.	Operation method is not set to pressing operation.	Check the "Operation method" in the point data.		“3.3.4Selecting 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.		“3.2.4Adjusting 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.		“3.3.4Selecting the Operation Method”
		Perform gain adjustment.		“3.2.4Adjusting the Gains”
The actuator is making abnormal sound.	It is resonating.	Perform gain adjustment.		“3.2.4Adjusting 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.		“3.3.9Setting the Deceleration”
		Perform gain adjustment.		“3.2.4Adjusting the Gains”

Problem	Cause	How to troubleshoot	References
The actuator does not work.	The servo does not turn ON.	Check the MPI and MPO connections on the power connector.	“2.3.1Wiring to the Power Supply”
		Check the emergency stop release status.	“2.3.1Wiring to the Power Supply”
		Check whether a voltage is applied to the force brake release.	“2.3.1Wiring 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.	“3.3.5Setting the Position”
It cannot reach target takt time.	Setting of acceleration or speed is not correct.	Check the “Acceleration” in the point data.	“3.3.8Setting the Acceleration”
		Check the “Speed” in the point data.	“3.3.7Setting 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

<table>
<tr><th>Item</th><th>What to check</th></tr>
<tr><td>Controller</td><td>Check the light status on the controller.
<table>
<tr><th colspan="2">Communication status</th><th>SV</th><th>ALM</th></tr>
<tr><td colspan="2">When the control power is OFF</td><td>Off</td><td rowspan="3">Off</td></tr>
<tr><td rowspan="2">At normal operation</td><td>At servo ON</td><td>Lit green</td></tr>
<tr><td>At servo OFF</td><td>Blinking green (lit once per second)</td></tr>
<tr><td rowspan="2">At occurrence of alarm</td><td>At occurrence of non-cancelable alarm</td><td rowspan="2">Blinking green
(After lighting off for 2 seconds, light on once every 1 second n times, and then repeat) -> Alarm 0xn□□□ occurs</td><td>Lit red</td></tr>
<tr><td>At occurrence of cancelable alarm</td><td>Blinking red
(lit once per second)</td></tr>
<tr><td rowspan="2">At occurrence of warning</td><td>At servo ON</td><td>Lit green</td><td rowspan="2">Blinking red
(lit once per 2 seconds)</td></tr>
<tr><td>At servo OFF</td><td>Blinking green (lit once per second)</td></tr>
</table></td></tr>
<tr><td>PLC</td><td>Check whether there is an error on the PLC.</td></tr>
<tr><td>Alarm</td><td>Use S-Tools to check the alarm information.</td></tr>
<tr><td>Actuator information</td><td>When using the ECG-B Series, check that the actuator information written in the controller is identical with the connected actuator.</td></tr>
<tr><td>PLC communication</td><td>Use S-Tools to check the I/O status.</td></tr>
<tr><td>Cable connection check</td><td>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.</td></tr>
<tr><td>Control power supply</td><td>Check the voltage of the control power supply (24 VDC).</td></tr>
<tr><td>Anti-noise measure</td><td>Check that measures (such as connecting ground wire and attaching a surge protector) have been taken against noise.</td></tr>
<tr><td>Situation check</td><td>Check the history leading up to the trouble occurring and the operation condition when the trouble occurred.</td></tr>
<tr><td>Serial number</td><td>Check the product's serial No. It may be requested for confirmation when you make an inquiry.</td></tr>
</table>

※ Examine the cause of the trouble on the basis of the above items. See also “5.1The Cause of Trouble and How to Troubleshoot”or “5.2Alarm 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 on again, 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 data inside.	-	
0x2000 to 0x2FFF	Memory (Write)	An error has been detected in writing data into memory when changing data.	Data write may have failed.	-	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

※ If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.

Alarm code	Alarm item	Problem	Cause/Solution	References	Reset method
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
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 “3.1Setting 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	Reset 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 “3.1Setting 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 "3.2.1Parameters List”	Alarm Reset
			Review the setting of the parameter "Home position offset amount".	"Home position offset amount” in "3.2.1Parameters 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.	"3.3.5Setting the Position" or “3.3.17Setting 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.	“3.3.7Setting the Speed”	Alarm Reset
			For "0x4222", review the "Acceleration" setting of the point data.	“3.3.8Setting the Acceleration”	
			For "0x4232", review the "Deceleration" setting of the point data.	[3.3.9Setting the Deceleration]	
			For "0x4202", review the "Pressing speed" setting of the point data.	[3.3.16Setting 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.	“3.3.15Setting 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.	“Data storage function” of SM-A40831	
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	Reset 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.	“3.2.2 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.	“3.2.4Adjusting 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.	“3.2.4Adjusting 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 “3.2.1Parameters List”	
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

※ If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.

Alarm code	Alarm item	Problem	Cause/Solution	References	Reset method
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.	“3.4.5Home 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 "3.2.1Parameters 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 "3.2.1Parameters 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 "3.2.1Parameters List" or "Maintenance information" of SM-A11147
0×0401	Power supply voltage	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 power supply voltage detected by the controller is 21.6 V or more.	“2.3.1Wiring to the Power Supply”

6. PRODUCT COMPLIANCE

■ European standards compliance

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

■ UL standards compliance

Products with the UL marking 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.

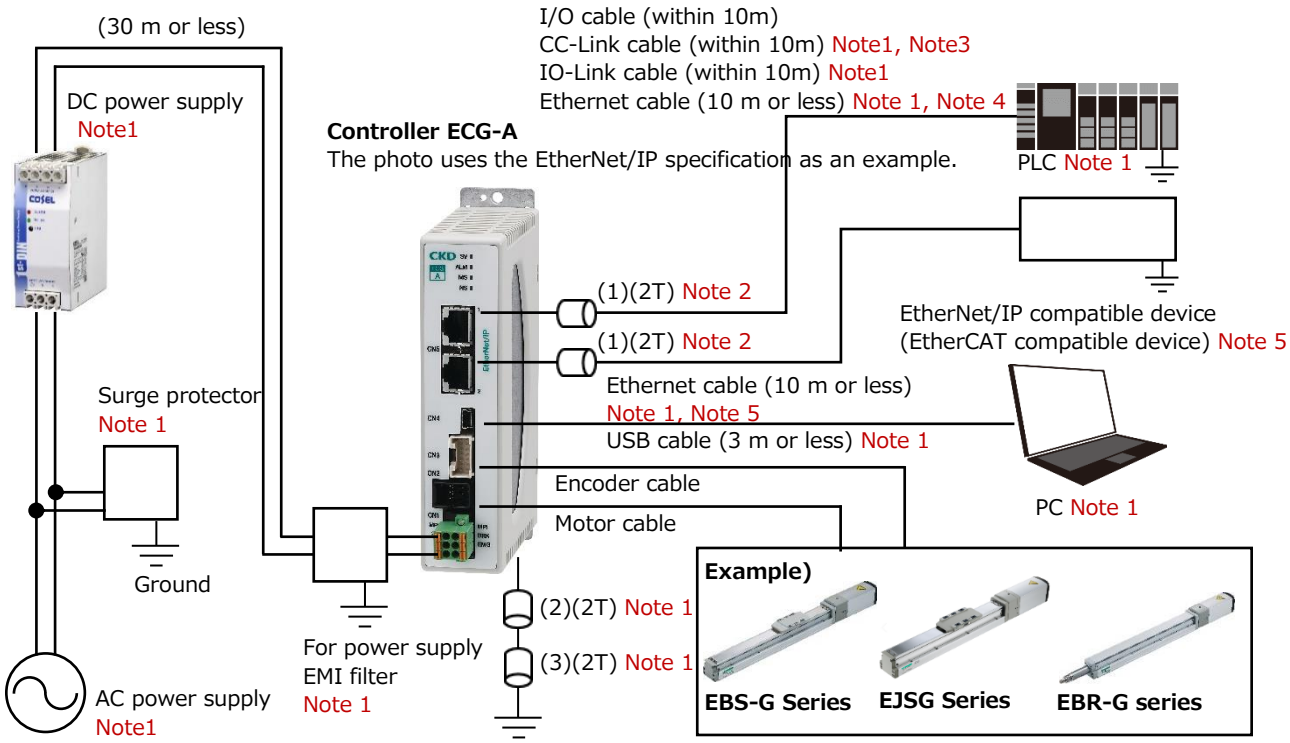
Condition	Temperature	Humidity
During use	0 to 50°C no freezing	35 to 80% RH (no condensation)
During storage	-10 to 50°C no freezing	35 to 80% RH (no condensation)
During transport	-10 to 50°C no freezing	35 to 80% RH (no condensation)

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.

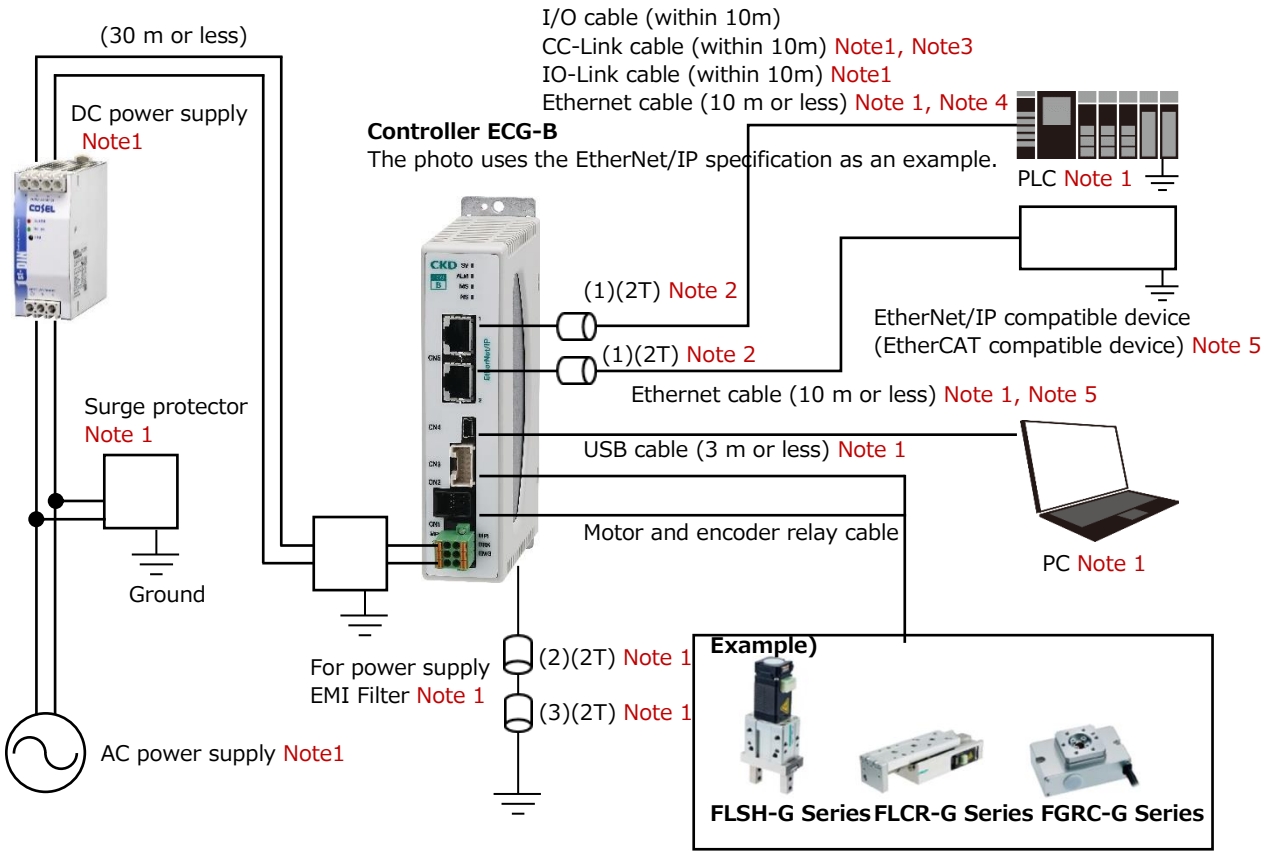


Note 1: Peripheral equipment and cables are customer-supplied. However, the motor cable, encoder cable and I/O cable are dedicated cables. Please buy them from us.
Note 2: The ferrite cores can only be installed for CC-Link specification, EtherCAT specification, and EtherNet/IP specification, and are 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.

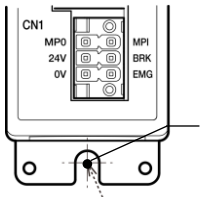


Note 1: Peripheral equipment and cables are customer-supplied. However, the motor and encoder relay cable and I/O cable are dedicated cables. Please buy them from us.
Note 2: The ferrite cores can only be installed for CC-Link specification, EtherCAT specification, and EtherNet/IP specification, and 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.

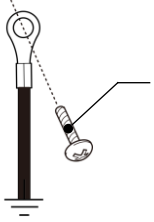
Part used	Model	Manufacturer
Surge protector	RSPD-250-Q4	Okaya Electric Industries Co., Ltd.
	RSPD-250-U4	
	LT-CS32G801WS	Soshin Electric Co., Ltd.
	LT-C32G801WS	
EMI filter for power supply	AX-NSF-NF2015A-OD	Soshin Electric Co., Ltd.
Ferrite core (1)	E04SR401938	Seiwa Electric MFG Co., Ltd.
Ferrite core (2)	E04SR301334	
Ferrite core (3)	E04RMX251512	

■ Example of preventive measure against EMC (controller grounded)

Standard mount type



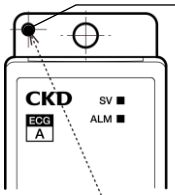
Tighten the ground wire together with the fixing screw of the main body to connect it.

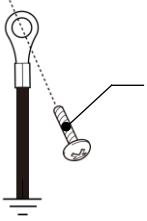


M5 screw
(Provided by customer)

DIN rail mount type

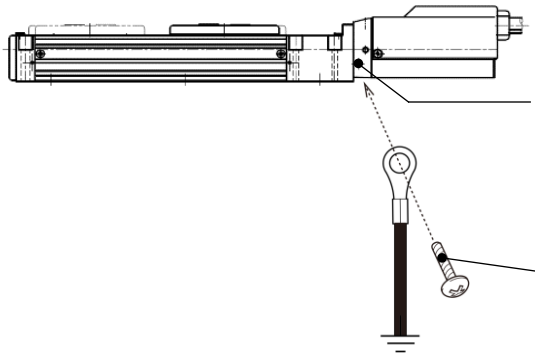
Grounding terminal
Connect the ground wire to the tap hole (M3).





M3 screw
(Provided by customer)
Tightening torque
0.3 N·m

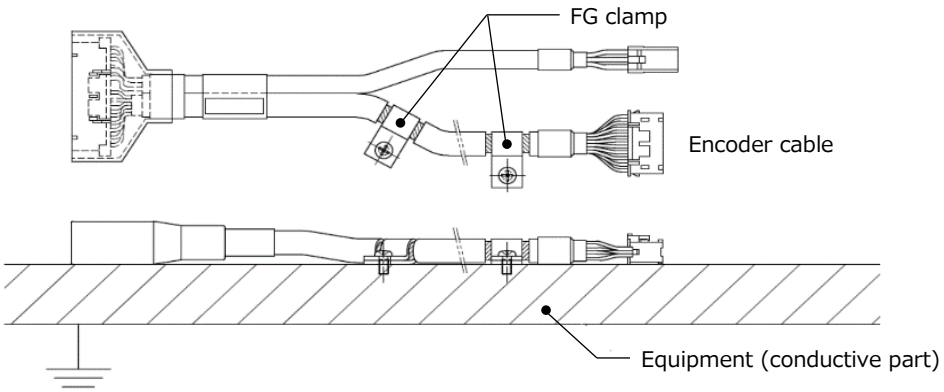
■ Example of preventive measure against EMC (actuator grounded)



Grounding 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.

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 (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. Working 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.

8. Reference Information

8.1. Specifications

8.1.1. Basic specifications

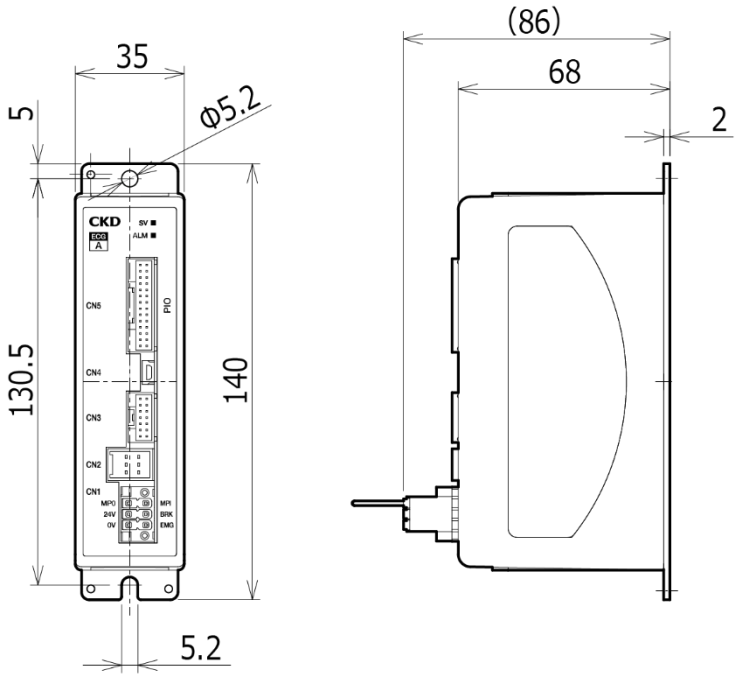
The basic specifications of ECG-A series and ECG-B series (parallel I/O specifications) are as follows.

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)	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	
Number of inputs	13 points	
Number of outputs	13 points	
Power supply voltage	24 VDC ± 10%	
Indicator lamp	SV: Servo lamp, ALM: Alarm 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	
Weight	Standard mounting: approx. 180 g DIN rail mounting: approx. 210 g	Standard mounting: approx. 310g DIN rail mounting: approx. 340g

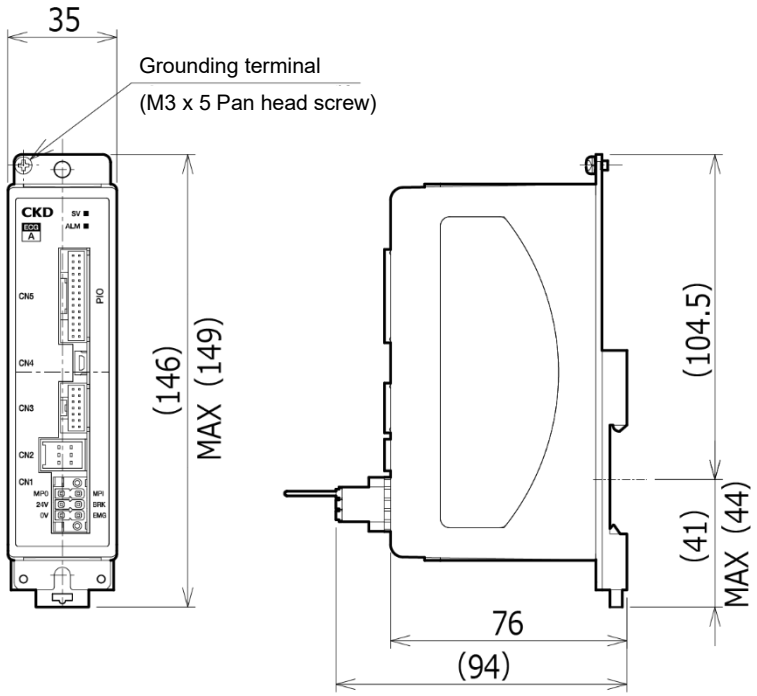
8.2. Dimensions

8.2.1. ECG-A series (parallel I/O specification)

■ Standard mounting (ECG-ANNN30-NPA□□)

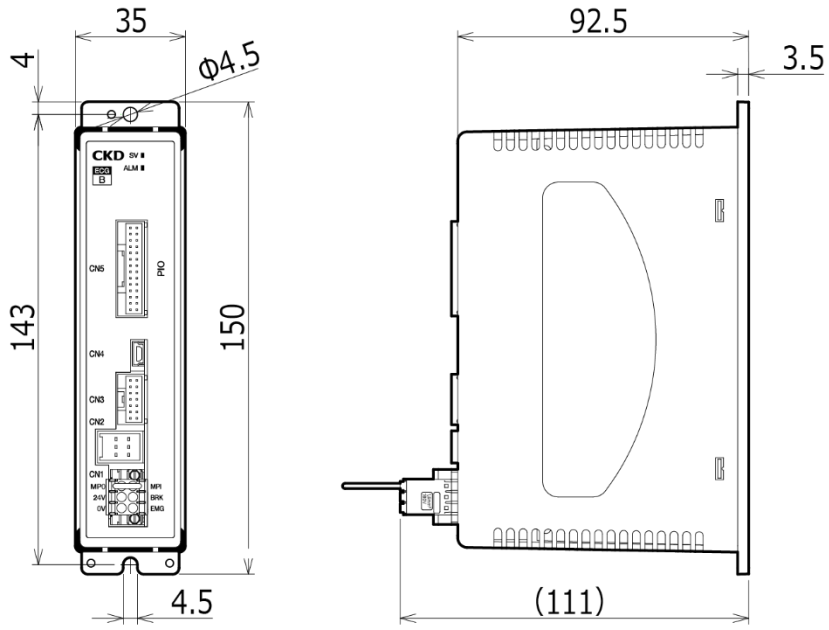


■ DIN rail mounting (ECG-ANNN30-NPD□□)

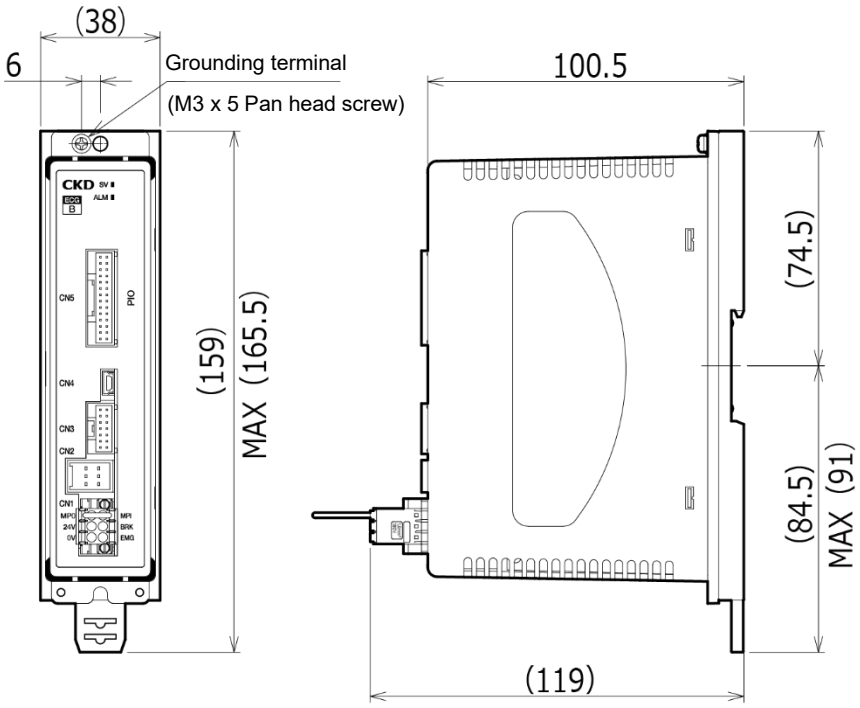


8.2.2. ECG-B series (parallel I/O specification)

■ Standard mounting (ECG-BNNN30-NPA□□)



■ DIN rail mounting (ECG-BNNN30-NPD□□)



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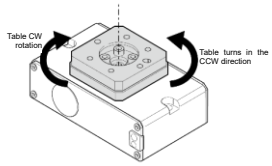
CAT5e
A standard for network cables, also called category 5e or category 5 enhanced. The communication speed has been improved from the conventional CAT5 standard. This cable is less susceptible to crosstalk caused by noise from other cables.

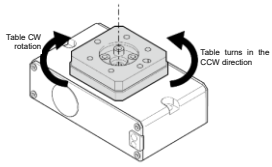
CCW
Abbreviation for Counter Clockwise Rotation. Counterclockwise when viewed from the output shaft side.



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.

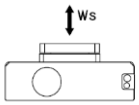
- Incremental encoder An encoder that measures and outputs the angle moved from the measurement start position. When using with an electric actuator, the amount of movement from the home position is unknown, so it is necessary to return to the home position before operating the actuator.
- Absolute encoder
  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.
- Batteryless absolute encoder
  An absolute encoder 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.

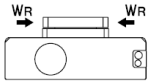
Regenerative current
Current that is generated by the motor operating like a generator when the moving part of the actuator is moved by an external force. Reverse current flows from the motor to the controller, causing malfunction or damage.

Portable mass
It indicates the maximum mass that the actuator can transfer.

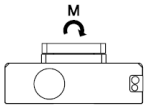
Allowable thrust load
Limit value of the load that can be applied in the direction of the actuator rotation axis. WS is used in this Instruction Manual, the instruction manual described in the ”Instruction manual for this product”, and the catalog.



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.

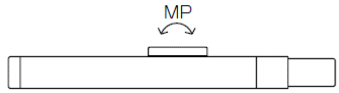
IP address : 192.168.10.1
Subnet mask : 255.255.0.0
⬇
Network range : 192.168.□.□

Jog operation
While the travel command is issued, the actuator continues to operate at the set speed.

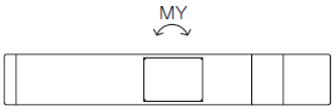
Slave station
A general term for stations other than the master station.

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.

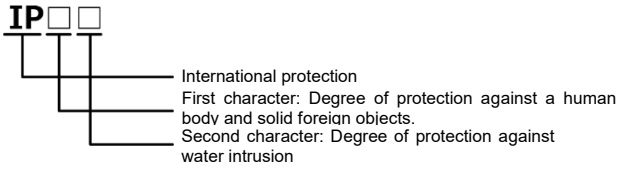
Point data
In the point data, the actuator operation pattern such as the target position and speed is set for each point number. In ECG series, the operation pattern for 64 points can be set, and the actuator can be operated by specifying the point number and issuing a travel command.

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.



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.