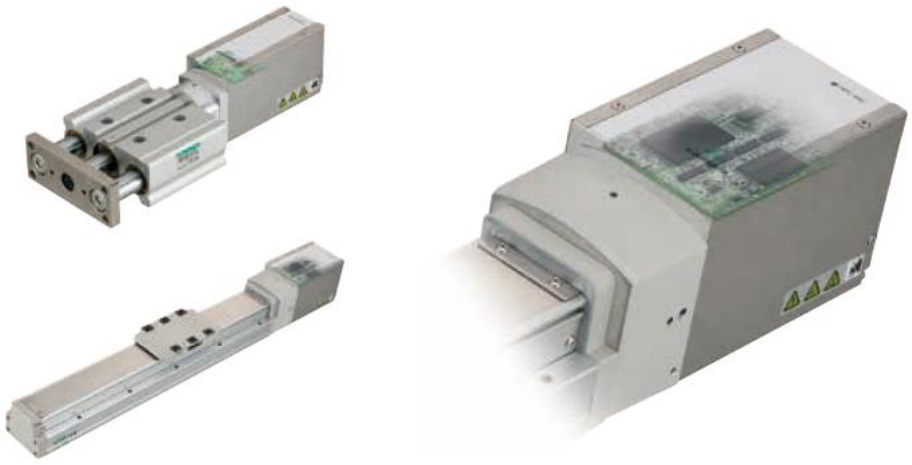
CKD

Electric Actuator

LRXE Series / LRXG Series

INSTRUCTION MANUAL

SM-B07674-A



- Read this Instruction Manual before using the product.
- Read the safety notes carefully.

  Keep this Instruction Manual in a safe and convenient place for future reference.

PREFACE

Thank you for purchasing our **"LRXE Series/LRXG Series" electric actuator**. This Instruction Manual contains basic matters such as installation and usage instructions in order to ensure optimal performance of the product. Please read this Instruction Manual thoroughly and use the product properly.
Keep this Instruction Manual in a safe place and be careful not to lose it.

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

- The product is intended for users who have basic knowledge of materials, wiring, electricity, and mechanisms. CKD shall not be responsible for accidents caused by persons who selected or used the product without knowledge or sufficient training.
- Since there are a wide variety of customer applications, it is impossible for CKD to be aware of all of them. Depending on the application and usage, the product may not be able to exercise its full performance due to fluid, piping, and other conditions, or an accident may occur. It is the responsibility of the customer to check the product specifications and decide how the product shall be used in accordance with the application and usage.

SAFETY INFORMATION

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

In order to use our products safely, it is important to select, use, handle, and maintain the products properly.
Observe the warnings and precautions described in this Instruction Manual to ensure device safety.

Although various safety measures have been adopted in the product, customer's improper handling may lead to an accident. To avoid this:

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

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

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

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

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

	Indicates general precautions and tips on using the product.

Precautions on Product Use

⚠DANGER

Do not use the 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

Use the product within the specifications.

Precautions on Product Disposal

⚠CAUTION

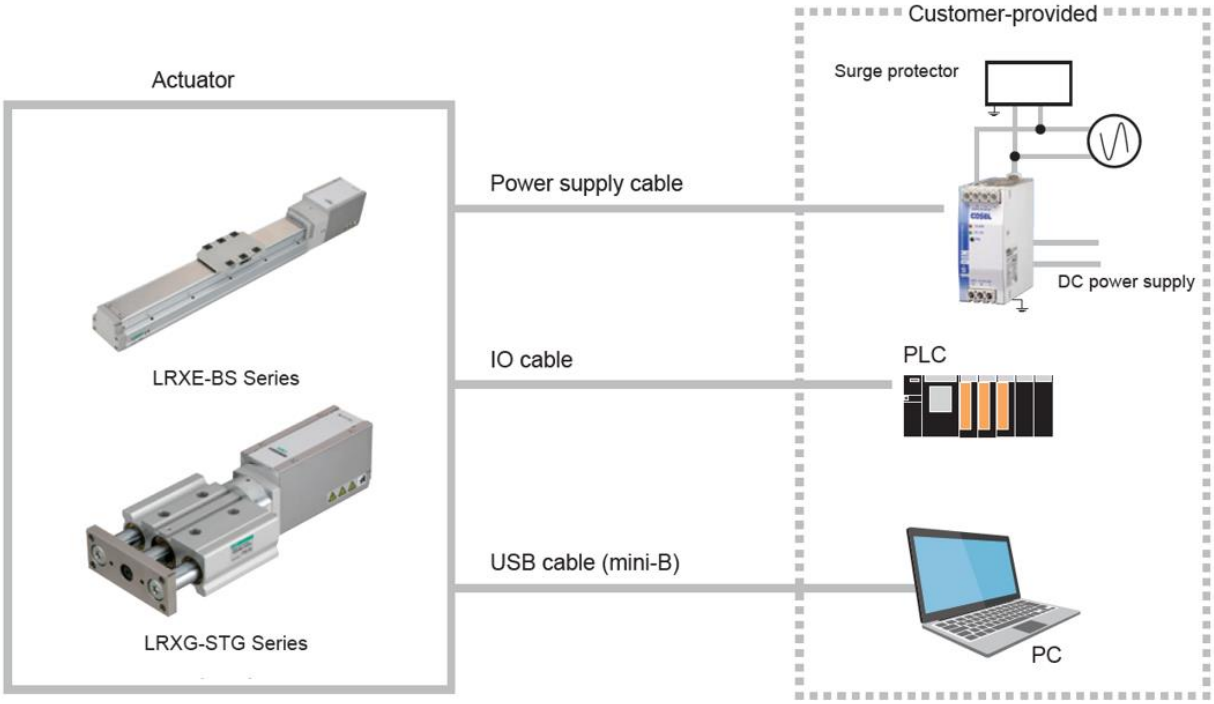
When disposing of the product, comply with laws pertaining to disposal and cleaning of wastes and have an industrial waste disposal company dispose of the product.

CONTENTS

1. PRODUCT OVERVIEW

1.1 System Overview

1.1.1 System structure



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

	Component	Product name/Model no.
This product	Actuator/Controller	LRXE Series / LRXG Series
Accessories	Power cable	EA-CBLP1-*
	IO cable	EA-CBLNP3-*
Sold separately	24 VDC power supply	EA-PWR-KHNA240F-24
Provided for free	PC setting software (provided for free)	S-Tools

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

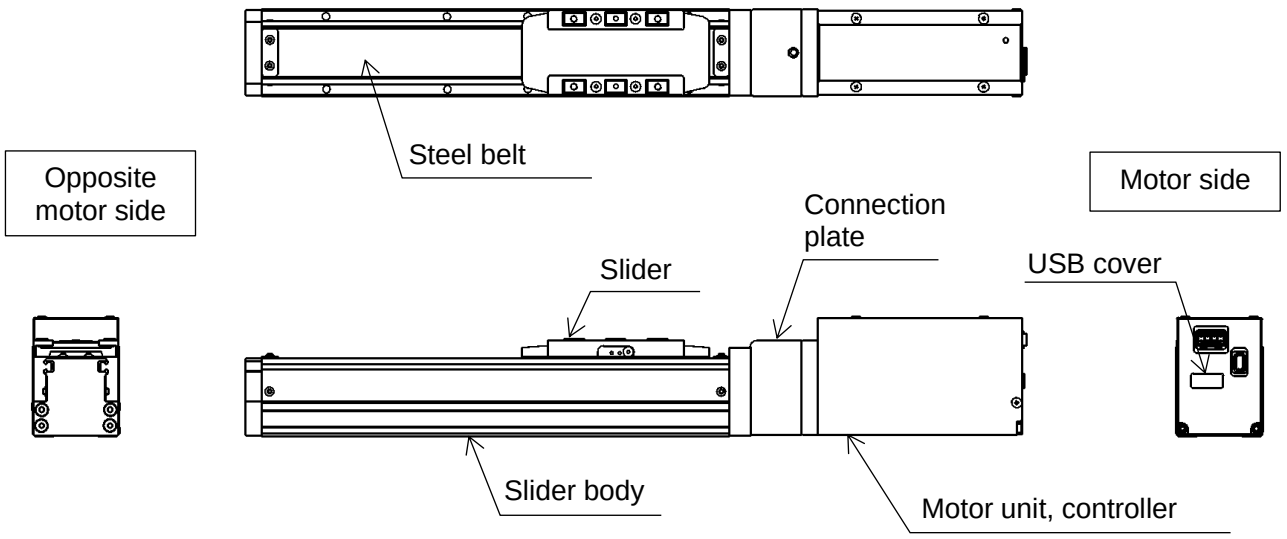
1.2 Instruction Manuals Related to This Product

For the Instruction Manuals for controllers and setting tools related to this product, refer to the following.

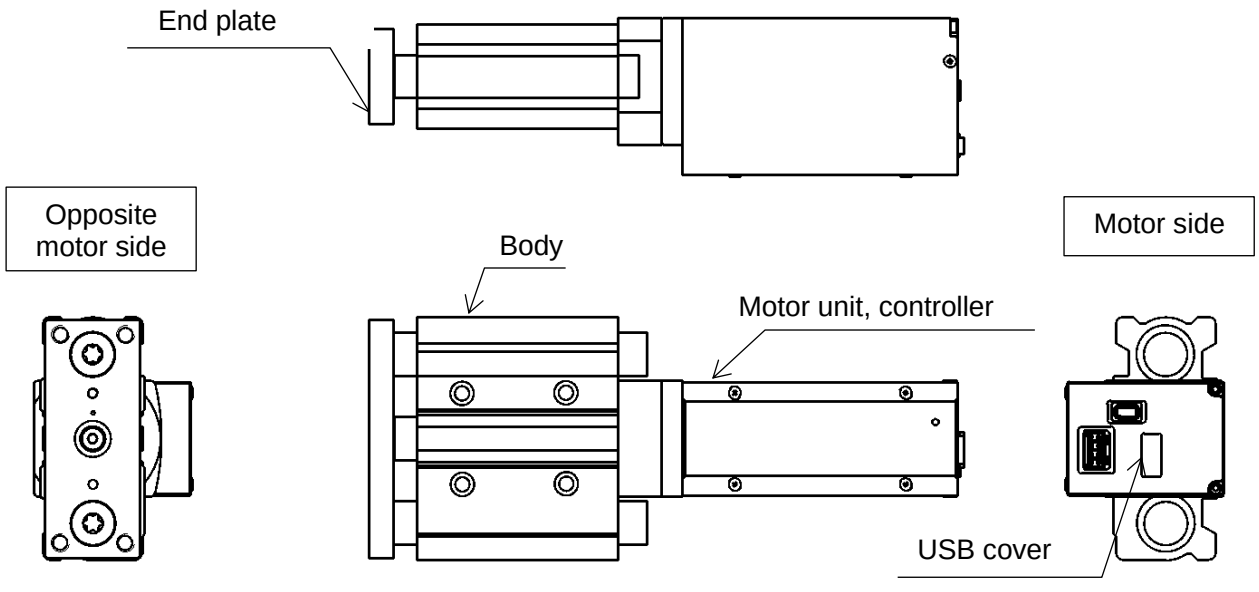
Part name	No.
PC Setting Software for Electric Actuators - S-Tools	SM-A11147-A

1.3 Names of Parts

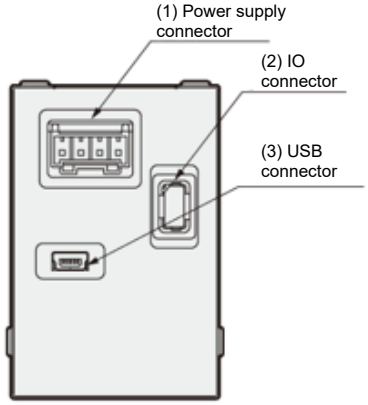
1.3.1 LRXE Series



1.3.2 LRXG Series



1.3.3 Connection (common to LRX* series)



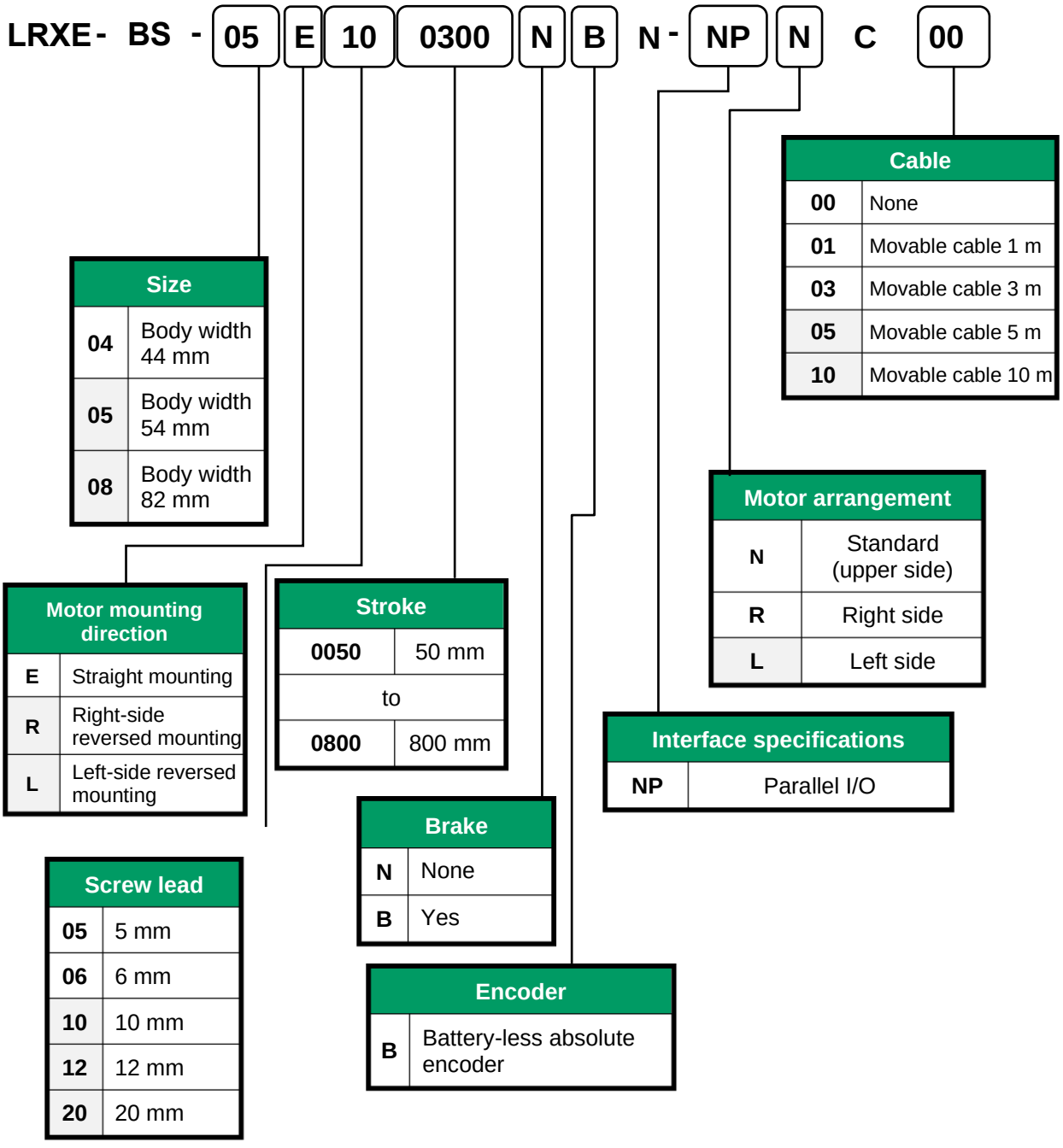
Part name	Description
Power supply connector	Connector to connect to power supply Refer to “2.4.1 Wiring to the power supply” for wiring.
IO connector	Connector for connecting to upper level equipment Refer to “2.4.2 Connection to upper level equipment” for wiring.
USB connector	Connector for connecting to the setting tool (PC setting software) Refer to “2.4.3 Connecting to S-Tools” for wiring. Cable: Commercially available USB cable (mini-B)

1.3.4 LED indication

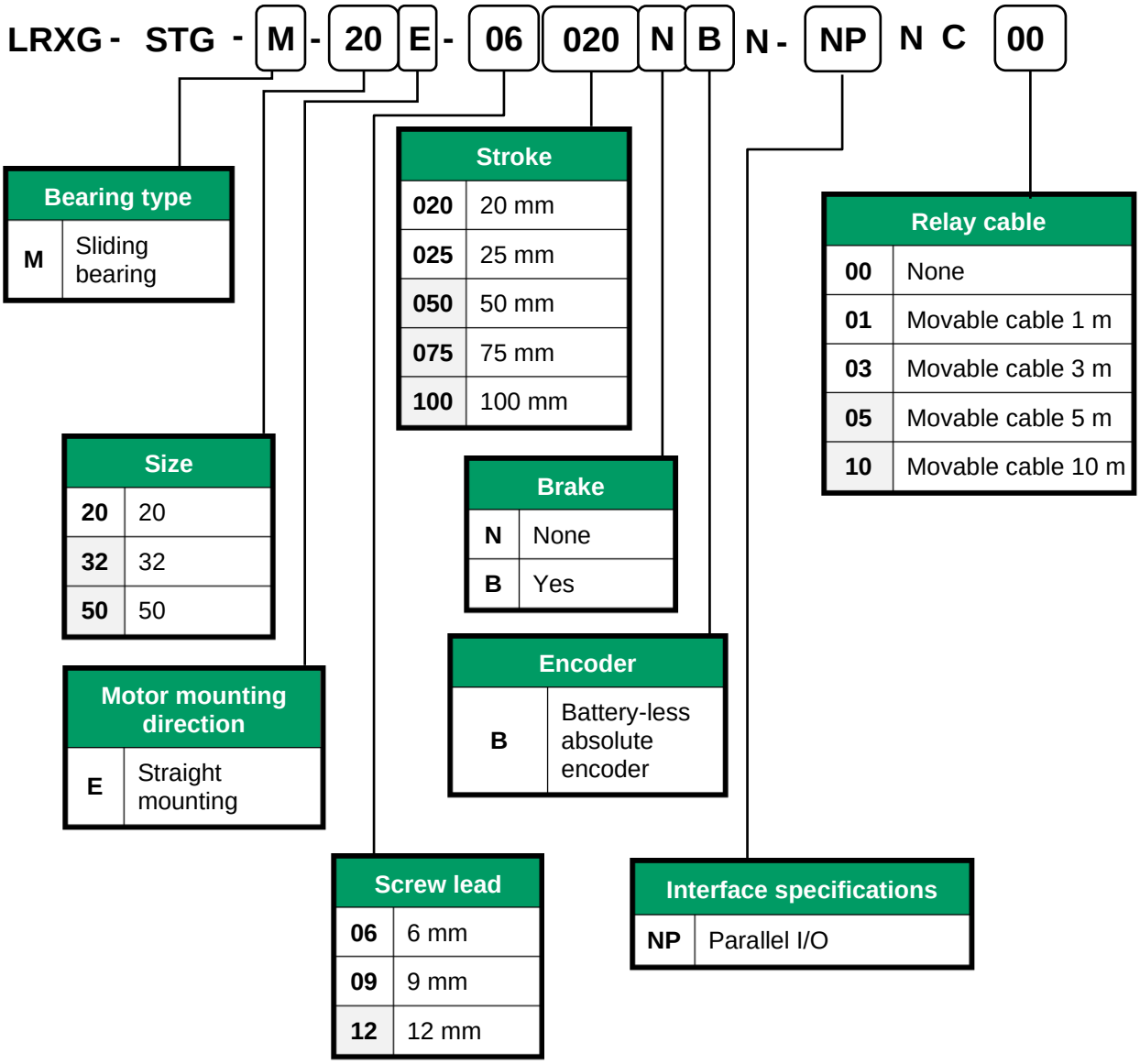
Name		Green light	Red light
Control power OFF		OFF	OFF
Normal operation	Motor energized	ON	OFF
	aaxMotor de-energized	Blinking (Lights up once per second)	
Alarm occurrence	At the time of occurrence of cancelable alarm	OFF	Blinking (Lights up once per second)
	At the time of occurrence of non-cancelable alarm		ON
Warning occurrence	Motor energized	Blinking (Lights off once per 2 seconds)	Blinking (Lights up once per 2 seconds)
	Motor de-energized	Blinking (Lights up once per second)	Blinking (Lights up once per 2 seconds)

1.4 Model Number Indication

1.4.1 LRXE Series



1.4.2 LRXG Series



1.5 Specifications

1.5.1 Actuator specifications

<LRXE-04 Series>

Item			Content			
Motor mounting			Straight mounting type		Reversed mounting type	
Motor type			☐35 stepping motor			
Encoder type			Battery-less absolute encoder			
Drive system			Ball screw φ10			
Controller			Embedded			
Stroke		(mm)	50 to 500			
Screw lead		(mm)	6	12	6	12
Max. load capacity Note 1	Horizontal	(kg)	20.0	15.0	20.0	15.0
	Vertical	(kg)	9.2	3.3	9.2	3.3
Operating speed range		(mm/s)	7 to 450	15 to 900	7 to 375	15 to 500
Max. acceleration / deceleration	Horizontal	(G)	1.0	1.0	1.0	1.0
	Vertical	(G)	0.5	0.5	0.5	0.5
Max. pressing force		(N)	155	77	155	77
Pressing speed range		(mm/s)	5 to 20	5 to 20	5 to 20	5 to 20
Repeatability		(mm)	±0.01			
Lost motion		(mm)	0.1 or less			
Static allowable moment		(N•m)	MP : 62 MY : 62 MR : 92			
Setting tool			Setting software (S-Tools) Connection cable: USB cable (mini-B)			
External interface	Parallel I/O specifications		24 VDC ± 10%, input/output: max. 4 points each, cable length: max. 10 m			
Power supply voltage Note 3			24 VDC ± 10%			
Current consumption	Control	(A)	0.12			
	Motor	(A)	4.0			
Brake	Model power supply voltage	Note 3	Non-excitation operation, 24 VDC ± 10%			
	Power consumption	(W)	6.1			
	Holding force	(N)	140	70	140	70
Insulation resistance			10 MΩ or more at 500 VDC			
Withstand voltage			500 VAC, 1 minute			
Working ambient temperature			-10 to 40°C (no freezing)			
Working 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			
Atmosphere			No corrosive gas, explosive gas, and dust			
Degree of protection			IP20			

Note 1: The load capacity varies depending on the acceleration/deceleration and speed.
Note 2: The maximum speed may decrease depending on the conditions.
Note 3: If the cable length exceeds 5 m, the power supply voltage should be 24 V ± 5%.

<LRXE-05 Series>

Item			Content					
Motor mounting			Straight mounting type			Reversed mounting type		
Motor type			☐42Stepping motor					
Encoder type			Battery-less absolute encoder					
Drive system			Ball screw φ12					
Controller			Embedded					
Stroke		(mm)	50 to 600					
Screw lead		(mm)	5	10	20	5	10	20
Max. load capacity Note 1	Horizontal	(kg)	40	27.5	18.3	40	27.5	18.3
	Vertical	(kg)	14.2	7.1	2.5	14.2	7.1	0.8
Operating speed range		(mm/s)	6 to 375	12 to 750	25~1120	6 to 325	12 to 635	20~1120
Max. acceleration/deceleration	Horizontal	(G)	1.0	1.0	1.0	1.0	1.0	1.0
	Vertical	(G)	0.5	0.5	0.5	0.5	0.5	0.5
Max. pressing force		(N)	20	110	55	220	110	55
Pressing speed range		(mm/s)	5 to 20	5 to 20	5 to 20	5 to 20	5 to 20	5 to 20
Repeatability		(mm)	±0.01					
Lost motion		(mm)	0.1 or less					
Static allowable moment		(N•m)	MP : 103 MY : 103 MR : 144					
Setting tool			Setting software (S-Tools) Connection cable: USB cable (mini-B)					
External interface	Parallel I/O specifications		24 VDC ± 10%, input/output: max. 4 points each, cable length: max. 10 m					
Supply voltage Note 3			24 VDC ± 10%					
Current consumption	Control	(A)	0.12					
	Motor	(A)	4.5					
Brake	Model power supply voltage Note 3		Non-excitation operation, 24 VDC ± 10%					
	Power consumption	(W)	6.1					
	Holding force	(N)	168	84	42	168	84	42
Insulation resistance			10 MΩ or more at 500 VDC					
Withstand voltage			500 VAC, 1 minute					
Working ambient temperature			0 to 40°C no freezing					
Working 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					
Atmosphere			No corrosive gas, explosive gas, and dust					
Degree of protection			IP20					

<LRXE-08 Series>

Item			Content					
Motor mounting			Straight mounting type			Reversed mounting type		
Motor type			□56 Stepping motor					
Encoder type			Battery-less absolute encoder					
Drive system			Ball screw φ15					
Controller			Embedded					
Stroke		(mm)	50 to 800					
Screw lead		(mm)	5	10	20	5	10	20
Max. load capacity Note 1	Horizontal	(kg)	80	70	30	80	70	30
	Vertical	(kg)	43.3	28.3	3.3	33.3	21.7	3.3
Operating speed range		(mm/s)	6 to 230	12 to 430	25 to 650	6 to 200	12 to 430	25 to 650
Max. acceleration/deceleration	Horizontal	(G)	1.0	1.0	1.0	1.0	1.0	1.0
	Vertical	(G)	0.5	0.5	0.5	0.5	0.5	0.5
Max. pressing force		(N)	965	482	241	965	482	241
Pressing speed range		(mm/s)	5 to 20	5 to 20	5 to 20	5 to 20	5 to 20	5 to 20
Repeatability		(mm)	±0.01					
Lost motion		(mm)	0.1 or less					
Static allowable moment		(N•m)	MP : 203 MY : 203 MR : 336					
Setting tool			Setting software (S-Tools) Connection cable: USB cable (mini-B)					
External interface	Parallel I/O specifications		24 VDC ± 10%, input/output: max. 4 points each, cable length: max. 10 m					
Power supply voltage Note 3			24 VDC ± 10%					
Current consumption	Control	(A)	0.12					
	Motor	(A)	4.5					
Brake	Model power supply voltage Note 3		Non-excitation operation, 24 VDC ± 10%					
	Power consumption	(W)	6.1					
	Holding force	(N)	768	384	192	768	384	192
Insulation resistance			10 MΩ or more at 500 VDC					
Withstand voltage			500 VAC, 1 minute					
Working ambient temperature			0 to 40°C no freezing					
Working 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					
Atmosphere			No corrosive gas, explosive gas, and dust					
Degree of protection			IP20					

Note 1: The load capacity varies depending on the acceleration/deceleration and speed.
Note 2: The maximum speed may decrease depending on the conditions.
Note 3: If the cable length exceeds 5 m, the power supply voltage should be 24 V ± 5%.

<LRXG-20 Series>

Item			Content	
Motor type			☐ 35 Stepping motor	
Encoder type			Battery-less absolute encoder	
Drive system			Sliding screw φ6	
Controller			Built-in	
Stroke		(mm)	20 to 100	
Screw lead		(mm)	6	9
Max. load capacity Note 1	Horizontal	(kg)	4.4	3.2
	Vertical	(kg)	6.4	4.0
Operating speed range		(mm/s)	10 to 250	12 to 400
Max. acceleration/deceleration	Horizontal	(G)	0.7	0.7
	Vertical	(G)	0.3	0.3
Max. pressing force		(N)	100	70
Pressing speed range		(mm/s)	10 to 20	12 to 20
Repeatability		(mm)	±0.02	
Lost motion		(mm)	0.3 or less	
Setting tool			Setting software (S-Tools) Connection cable: USB cable (mini-B)	
External interface	Parallel I/O specifications		24 VDC ± 10%, input/output: max. 4 points each, cable length: max. 10 m	
Power supply voltage Note 3			24 VDC ± 10%	
Current consumption	Control	(A)	0.12	
	Motor	(A)	1.8	
Brake	Model power supply voltage	Note 3	Non-excitation operation, 24 VDC ± 10%	
	Power consumption	(W)	6.1	
	Holding force	(N)	140	93
Insulation resistance			10 MΩ or more at 500 VDC	
Withstand voltage			500 VAC, 1 minute	
Working ambient temperature			0 to 40°C no freezing	
Working 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	
Atmosphere			No corrosive gas, explosive gas, and dust	
Degree of protection			IP20	

Note 1: The load capacity varies depending on the acceleration/deceleration and speed.
Note 2: The maximum speed may decrease depending on the conditions.
Note 3: If the cable length exceeds 5 m, the power supply voltage should be 24 V ± 5%.

<LRXG-32 Series>

Item			Content	
Motor			□42 Stepping motor	
Encoder type			Battery-less absolute encoder	
Drive system			Sliding screw φ8	
Controller			Built-in	
Stroke		(mm)	25 to 100	
Screw lead		(mm)	6	12
Max. load capacity Note 1	Horizontal	(kg)	9	4.8
	Vertical	(kg)	11.6	4.8
Operating speed range		(mm/s)	10 to 250	15 to 500
Max. acceleration/deceleration	Horizontal	(G)	0.7	0.7
	Vertical	(G)	0.3	0.3
Max. pressing force		(N)	220	90
Pressing speed range		(mm/s)	10 to 20	15 to 20
Repeatability		(mm)	±0.02	
Lost motion		(mm)	0.3 or less	
Setting tool			Setting software (S-Tools) Connection cable: USB cable (mini-B)	
External interface	Parallel I/O specifications		24 VDC ± 10%, input/output: max. 4 points each, cable length: max. 10 m	
Power supply voltage Note 3			24 VDC ± 10%	
Current consumption	Control	(A)	0.12	
	Motor	(A)	2.0	
Brake	Model power supply voltage	Note 3	Non-excitation operation, 24 VDC ± 10%	
	Power consumption	(W)	6.1	
	Holding force	(N)	140	70
Insulation resistance			10 MΩ or more at 500 VDC	
Withstand voltage			500 VAC, 1 minute	
Working ambient temperature			0 to 40°C no freezing	
Working 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	
Atmosphere			No corrosive gas, explosive gas, and dust	
Degree of protection			IP20	

Note 1: The load capacity varies depending on the acceleration/deceleration and speed.
Note 2: The maximum speed may decrease depending on the conditions.
Note 3: If the cable length exceeds 5 m, the power supply voltage should be 24 V ± 5%.

<LRXG-50 Series>

Item			Content	
Motor			□56 Stepping motor	
Encoder type			Battery-less absolute encoder	
Drive system			Sliding screw φ12	
Controller			Built-in	
Stroke		(mm)	25 to 100	
Screw lead		(mm)	6	12
Max. load capacity Note 1	Horizontal	(kg)	14.8	14.8
	Vertical	(kg)	19.6	13.2
Operating speed range		(mm/s)	20 to 250	20 to 400
Max. acceleration/deceleration	Horizontal	(G)	0.7	0.7
	Vertical	(G)	0.3	0.3
Max. pressing force		(N)	590	425
Pressing speed range		(mm/s)	20	20
Repeatability		(mm)	±0.01	
Lost motion		(mm)	0.3 or less	
Setting tool			Setting software (S-Tools) Connection cable: USB cable (mini-B)	
External interface	Parallel I/O specifications		24 VDC ± 10%, input/output: max. 4 points each, cable length: max. 10 m	
Power supply voltage Note 3			24 VDC ± 10%	
Current consumption	Control	(A)	0.12	
	Motor	(A)	3.1	
Brake	Model power supply voltage	Note 3	Non-excitation operation, 24 VDC ± 10%	
	Power consumption	(W)	7.2	
	Holding force	(N)	640	320
Insulation resistance			10 MΩ or more at 500 VDC	
Withstand voltage			500 VAC, 1 minute	
Working ambient temperature			0 to 40°C no freezing	
Working 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	
Atmosphere			No corrosive gas, explosive gas, and dust	
Degree of protection			IP20	

Note 1: The load capacity varies depending on the acceleration/deceleration and speed.
Note 2: The maximum speed may decrease depending on the conditions.
Note 3: If the cable length exceeds 5 m, the power supply voltage should be 24 V ± 5%.

1.5.2 Basic specifications

Item	Details	
Number of inputs	4 points	
Number of outputs	4 points	
Power supply voltage	When using 1 m, 3 m, or 5 m cable	24 VDC ± 10%
	When using 10 m cable	24 VDC ± 5%
Indicator lamp	Servo lamp, alarm lamp	
Brake release input	24 VDC ± 10%	

2. INSTALLATION

⚠DANGER

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

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.

Make sure to hold and secure the product (including the workpiece) while installing the product.
An injury may occur if the product falls down, falls off, or operates abnormally.

Use a DC stabilized power supply (24 VDC ± 10%) with sufficient capacity as a power supply for the controller and the input/output circuit.

However, if the cable length exceeds 5 m, use a DC stabilized power supply (24 VDC ±5%) for the power source.
If the product is directly connected to an AC power supply, a fire, burst or damage may occur.

Do not work with wet hands.
An electric shock may occur.

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

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 if the circuit current may exceed the rated value of the component or the allowable current of the conductor, whichever is less. The details of the selected rated value or setting value are specified in 7.2.10.

⚠WARNING

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

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

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

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

When wiring the product, refer to this Instruction Manual or any other relevant instruction manuals to make sure that the connectors are firmly connected and the wires are properly insulated.
Make sure that the wires do not contact other circuits and there is no ground fault and insulation failure between terminals. Otherwise, an overcurrent may flow into the product and cause damage. This may result in an abnormal operation or fire.

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

Do not damage or pinch the cables, apply unnecessary stress to the cables, or place heavy objects on the cables.
A conduction failure or electric shock may occur.

The IO connector of the product shall not be connected to any other device.
A malfunction or damage may occur.

Make sure to install the emergency stop button in a location where operation is easy.
Adopt a structure and wiring system that inhibit any automatic resetting of emergency stop button, and that prevent a person from accidentally resetting the emergency stop button. When an emergency stop is executed, it may take several seconds until the machine has actually stopped, depending on the traveling speed and carrying load.

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

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

Consider the possibility of power source failure.
Implement measures so as to prevent injuries to people and damages to devices even if a failure occurs with the power source.

Consider the possibility of motor failure.

Consider the operating state when restarting the product after an emergency stop or an irregular stop.

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

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

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.

⚠CAUTION

Install the wiring so that no induction noise is applied.

- Avoid using the product in a place where a large current or strong magnetic field occurs.
- Do not pipe or wire the product in the same wiring (with multi-conductor cables) as the power lines for other large motors.
- Do not pipe or wire the product in the same wiring as the power supplies and wires for inverters used in robots. Frame ground the power supply and insert a filter into the output section.

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

Separate the power for the output section of the product from the power for inductive loads (such as a solenoid valve and a relay) that generate surge currents.
If the power is shared, a surge current will flow into the output section and cause damage.
If the power cannot be separated, connect the surge absorption elements in parallel directly to all the inductive loads.

Do not perform a withstand voltage test or an insulation resistance test in 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 insulation resistance test is required, remove the product before performing the test.

Remove all the FG (frame ground) connections of the product before performing electric welding on the device to which the product is installed.
If electric welding is performed without removing the FG connections, the product may become damaged due to a welding current or excessive high voltage and surge voltage from welding.

Select a power that has sufficient capacity for the number of products installed.
If the capacity is not sufficient, a malfunction may occur.

When installing an external stopper or a holding mechanism (such as a brake), place it at a position where it does not 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.

Do not use the product in a place exposed to ultraviolet rays or in an atmosphere where corrosive gas and salt are present.
A performance degradation, abnormal operation, or strength deterioration due to rust formation may occur.

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.

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

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

⚠ CAUTION

Do not carry or install the product by holding its cable or the movable section.
An injury or cable disconnection may occur.

Secure sufficient space for maintenance and inspection.
Maintenance and inspection cannot be performed if sufficient space is not provided and this may cause equipment stoppage, failure, or injury.

When holding the product, hold its bottom surface.

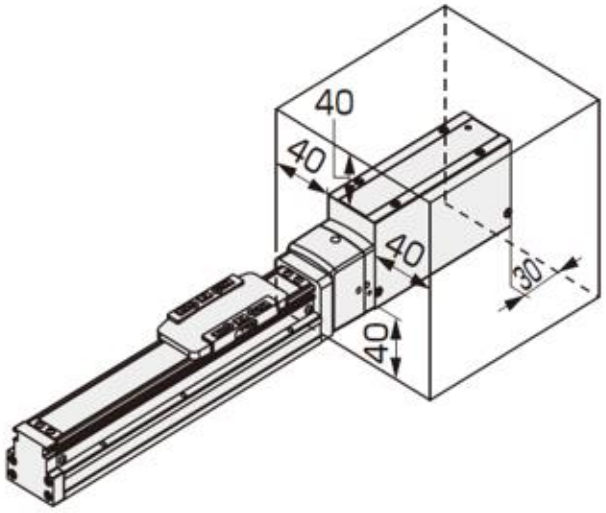
When transporting or installing the product, ensure the safety of the workers by securely supporting the product using a lift or supporting gear and by assigning more than one worker.

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

Before adjusting the gain, firmly secure the actuator body to a rigid device and mount the jigs.

When using positioning holes, make sure to use pins having the size that does not require press-fitting.
If press-fitting sized pins are used, the press-fitting load may cause the guide section to become damaged or distortion may reduce accuracy. The recommended tolerance of the pin is JIS tolerance of 6 µm or less.

When you use multiple actuators, leave a distance from around the motor section in installing them.
Distances more than those shown below should be provided from the motor section in installing an actuator. If the space around the motor is small, malfunction may occur.



2.1 Environment

- Check the environment temperature and atmosphere before using and storing the product.
- Use the LRXE series in an ambient temperature range of 10 to 40°C.
- Use the LRXG series in an ambient temperature range of 0 to 40°C.
- Ventilate if heat is accumulated.
- Use the product at an ambient humidity between 35% and 80%. Do not use the product in a place where condensation occurs.
- Install the product where it is not subjected to direct sunlight and away from a heating element. Also, avoid dust, corrosive gas, explosive gas, inflammable gas, and combustible material. Chemical resistance has not been considered for the product.
- Install the actuator on a smooth and flat surface.
- In order to avoid operation fault and damage, do not install the actuator on a surface with dents.
- The controller is set using a setting software (S-Tools). Provide a space in front of the USB cover so that the connector of the connection cable to the PC can be detached/attached. In addition, provide at least 140 mm of space in front of the cable connection section so that the power and IO cables can be detached/attached.

2.2 Unpacking

- When carrying or handling the product, use extreme care not to apply impact to the product (for example, do not drop the product).
- Do not carry heavy products alone.
- Place the product horizontally when not in use.
- Do not stand on the package.
- In order to prevent deforming the package, do not place heavy objects and objects of which their load concentrates.
- When taking the actuator out of the package, hold the actuator body.
- Do not apply unnecessary force to any part of the actuator.

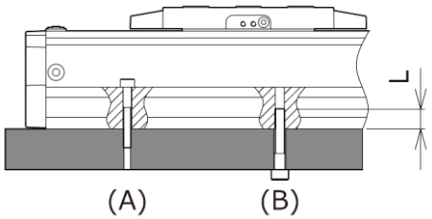
- Check that the model number ordered and the model number indicated on the product are the same.
- Check the exterior of the product for any damage.

2.3 Mounting

2.3.1 Body

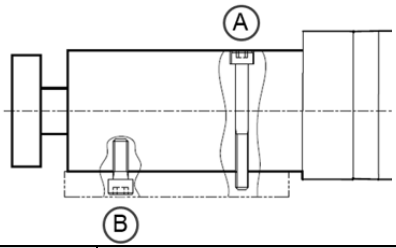
- Do not apply an excessive shock or moment to the slider.
  A malfunction or damage may occur.

The LRXE series has a precision machined finish on the base and table mounting surface to achieve highly accurate linear motion.
The flatness of the mounting surface of a system has been finished highly accurately by grinding processing, so stable high accuracy can be obtained (Recommended flatness: 0.05 mm/200 mm or less).
Do not put dents and scratches interfering with the flatness of a mounting surface.
The flatness of the workpiece side to be mounted on the slider shall be 0.02 mm or less. Do not apply any twisting or bending force to the product.
This may cause product damage or malfunction.
For the length of a screw mounting the body and tightening torque, refer to the following table.



Model	(A) Mounting from the top		(B) Mounting from the bottom		
	Bolt	Tightening torque (N•m)	Bolt	Tightening torque (N•m)	Max. screw-in depth L(mm)
LRXE-BS-04	M3x0.5	0.63	M4x0.7	1.5	6
LRXE-BS-05	M4x0.7	1.5	M5x0.8	3.0	7.5
LRXE-BS-08	M5x0.8	3.0	M6x1	5.2	9

Be careful not to make any dents or scratches on the LRXG series that may impair the flatness of the body (tube) mounting surface or end plate surface.
The flatness of the mating side to be attached to the end plate should be 0.03 mm or less as a guide.
For the length of a screw mounting the body and tightening torque, refer to the following table.



Model	(A) Mounting from the top		(B) Mounting from the bottom	
	Bolt	Tightening torque (N•m)	Bolt	Tightening torque (N•m)
LRXG-20	M5x0.8	3~5.4	M6x1.0	3~5.4
LRXG-32	M6x1.0	5.2~9.2	M8x1.25	5.2~9.2
LRXG-50	M8x1.25	12.5~22	M10x1.5	12.5~22

■ Allowable load

For details, refer to the “Selection guide” page in the catalog.

2.4 Wiring

⚠WARNING

Turn off the power before wiring.
An electric shock may occur by touching the electrical wiring connection (bare live part).

Do not touch live parts with bare hands.
An electric shock may occur.

Thoroughly read and understand this Instruction Manual before working on electrical wiring.

⚠CAUTION

Check the working voltage and polarity before wiring and energizing.

Take measures against lightning surges on the device side.
The product has no resistance to lightning surges.
Use AC voltage models in an installation category II environment.

Connect the wiring securely so that it does not come loose or come off.
A malfunction may occur.

Ensure that the cable has a sufficient bending radius and do not bend it forcibly.

Keep signal lines away from power lines and high voltage lines.

2.4.1 Wiring to the power supply

⚠WARNING

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

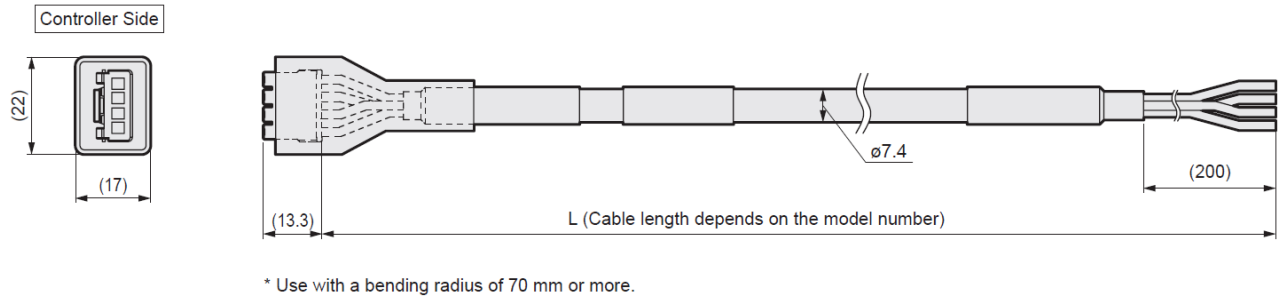
Use the dedicated power cable for wiring between the actuator and power supply.

■ Power cable model code system

EA-CBLP1- **01**

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

■ Power cable dimensions



* Use with a bending radius of 70 mm or more.

■ Power cable pin assignments

Identification (insulator) Color	Function name	Pin No.
White	Control power (+)	Applies 24 VDC of the control power supply.
Red	Motor power supply (+)	Applies 24 VDC of the motor power supply
Black	0 V	Applies common 0 VDC for control power supply, motor power supply, and brake forcing release.
Pink	Brake	Forcibly releases brake. The actuator cannot turn the servo ON while the brake is forcibly released. 24 VDC: The brake will be released forcibly. 0 VDC or open: The brake will be applied.

2.4.2 Connection to upper level equipment

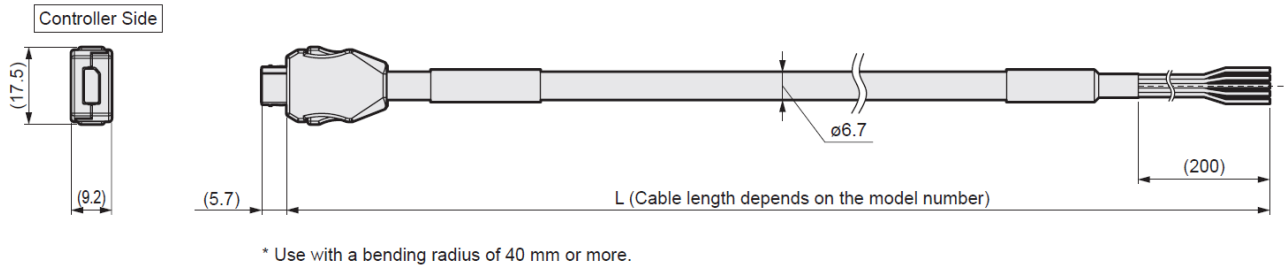
Use the dedicated I/O cable for wiring the actuator and the upper level system (PLC).

■ I/O cable model code system

EA-CBLNP3- **01**

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

■ I/O cable dimensions

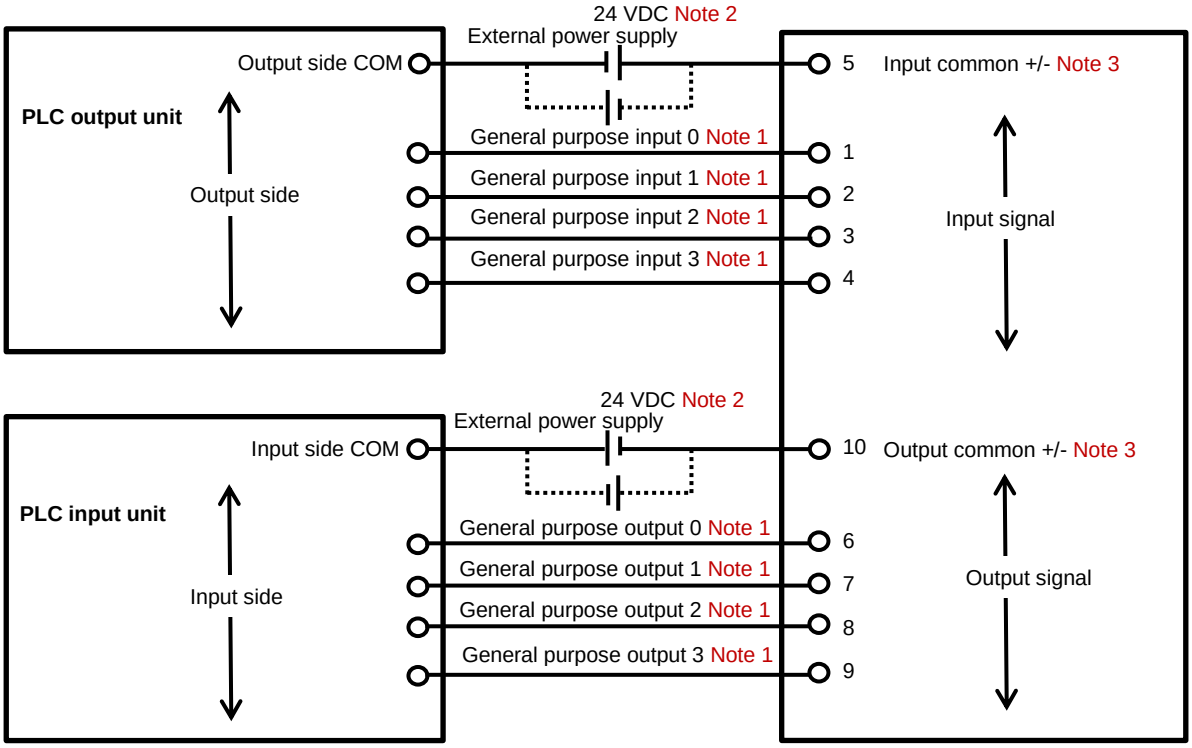


* Use with a bending radius of 40 mm or more.

■ 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 energization.



Note 1: For general purpose I/O, refer to "General purpose I/O signal assignment".
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.

■ I/O cable assignment

<General purpose input>

Identification (insulator)	General purpose input No.	Pin No.
Color		
Black	General purpose input 0	1
White	General purpose input 1	2
Red	General purpose input 2	3
Green	General purpose input 3	4
Yellow	Input common	5

<General purpose output>

Identification (insulator)	General purpose input No.	Pin No.
Color		
Brown	General purpose output 0	6
Blue	General purpose output 1	7
Orange	General purpose output 2	8
Gray	General purpose output 3	9
Purple	Output common	10

■ General purpose input / output signal assignment

<List of signal names>

<Input signal> (PLC -> controller)

Signal name	Abbreviation	Description
Point number selection bit n	PSBn	Sets the point number (0 to 3) to be selected when travel starts, in binary (n = 0, 1).
Point travel start	PST	Starts the travel with the setting of the selected point number when switched from OFF to ON. Also, when switched from ON to OFF, the traveling actuator stops.
Point number n travel start	PnST	When "Travel start input method" is set to "Edge", the travel starts with the point number n (1 to 3) when switched from OFF to ON. Also, when switched from ON to OFF, the traveling actuator stops. When "Travel start input method" is set to "Level", when it is ON, the travel starts with the point number n (1 to 3) setting. Stops when it is OFF. When OFF, the traveling actuator stops.
Solenoid valve travel command	VST	When OFF, it travels with the point number 1 setting. When ON, it travels with the point number 2 setting.
Alarm reset	ALMRST	Executes the alarm reset when switched from OFF to ON.

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 = ON and bit 1 = OFF in the point number selection bits, it indicates that point 1 is selected.

<Output signal> (Controller -> PLC)

Signal name	Abbreviation	Description
Point number confirmation bit n	PCBn	The number (0 to 3) of the point where the travel is completed is output in binary (n=0, 1).
Point travel complete	PEND	Turns ON when the travel is completed.
Point number n travel complete	PnEND	Turns ON when the travel to the point number n (1 to 3) is completed.
Switch n	SWn	Turns ON when the current position is within the range of “Position” ± “Positioning width” of point n, and turns OFF when it is not within the above range (n = 1 to 3).
Alarm	ALM	Turns OFF when an alarm occurs, and turns ON when no alarm occurs.

For the “point number confirmation bit n”, when outputting the point number in binary, the bit with larger n indicates the higher-order value
<Output example>
When bit 0 = OFF and bit 1 = ON in the point number confirmation bit, it indicates that point number 2 travel has been completed.

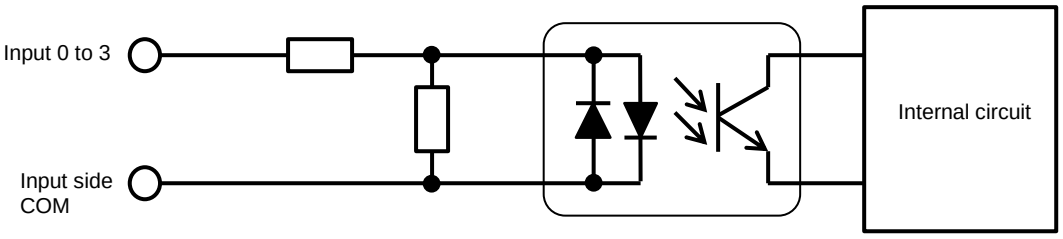
<Operating mode and signal assignment>

	4-point mode	Simple 3-point mode	Solenoid valve mode, single type
General purpose input 0	PSB0	P1ST	-
General purpose input 1	PSB1	P2ST	VST
General purpose input 2	PST	P3ST	-
General purpose input 3	ALMRST	ALMRST	ALMRST
General purpose output 0	PCB0	P1END/SW1	P1END/SW1
General purpose output 1	PCB1	P2END/SW2	P2END/SW2
General purpose output 2	PEND	P3END/SW3	-
General purpose output 3	ALM#	ALM#	ALM#

■ Input / output circuit

<Input circuit>

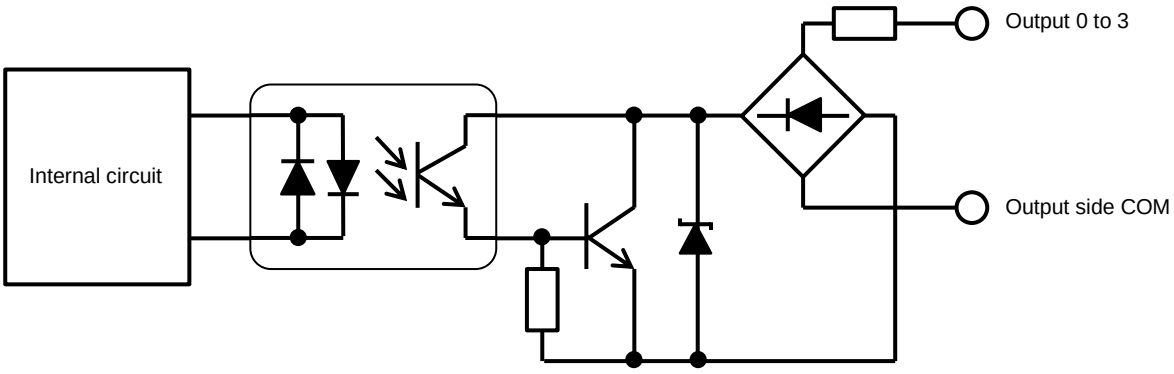
Item	Description of function
Number of inputs	4 points
Input voltage	24 VDC ± 10%
Input current	4 mA / point
Min. input voltage when ON	19 V or more
Max. input current when OFF	0.2 mA or less



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

<Output circuit>

Item	Description of function
Number of outputs	4 points
Load voltage	24 VDC ± 10%
Load current	20 mA or less / point
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, etc.



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

2.4.3 Connecting to S-Tools

⚠CAUTION

During normal operation, remove the USB cable from the controller before use.
The actuator may malfunction.

■ Communication specifications

Item	Specification
Interface	USB 2.0
Baud rate	Full speed (12 Mbps)

■ Connection method

<Connecting>
Follow the steps below to connect the PC.

1 Remove the USB cover.

2 Connect the USB cable (mini-B type) to the USB connector and the USB port on the PC.

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

1 Close the software (S-Tools).

2 Remove the USB cable from the USB connector.

3 Attach the USB cover.

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

3. USAGE

3.1 Safety Instructions

⚠DANGER

Do not enter the operating area of the device when the product is in an operational state.
The product may operate unexpectedly and an injury may occur.

Do not work with wet hands.
An electric shock may occur.

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

⚠WARNING

Before supplying electricity to the product, check that the operation area of the device is safe.
If electricity is supplied without checking safety, an electric shock or injury may occur.

Do not touch the product body during or immediately after operation.
A burn injury may occur.

Do not stand or put an object on the product.
A fall accident, injury due to the product falling down or off, or malfunction and runaway due to the product becoming damaged may occur.

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

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

Do not give commands that are smaller than the positioning repeatability.
The positioning control may not be performed properly.

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 movable section of the product manually, make sure that the servo is turned off.
When the servo is turned off, an unexpected event (such as the movable section falling off) may occur. Before turning off the servo, make sure that the safety measures are implemented to eliminate danger and operate with utmost care to ensure safety

Do not apply a load that exceeds the allowable load specified in the "Selection guide" page in the catalog to the product.
When the actuator is installed vertically, do not shut off the control power while the workpiece is being held by the servo ON state.

⚠ CAUTION

Do not move the movable section of the product with external force and do not use the product in an application that requires the movable section to decelerate suddenly.
A malfunction or damage may occur due to regenerative currents.

Other than in home position return and pressing operations, do not subject the fingers to impact (such as allowing the fingers to hit against the stroke end or the attachments to collide with each other).
The feed screw may become damaged due to impact and an operation fault may occur.

Do not subject the product to external force when returning to the home position.
The home position may not be recognized correctly.

Do not put dents and scratches on the movable section.
An operation fault may occur.

Do not subject the movable section to impact.

Leave a margin for the transfer load since the product life changes depending on the transfer load and the environment.

If vibrations are generated, change the set speed and use the product at a speed that does not generate vibrations.
Depending on the conditions of use, vibrations may be generated during an operation even when the product is used within the operation speed range.

Do not turn off the servo while gravity or force of inertia is applied.
The movable section may continue to move or fall off if the servo is turned off. Turn off the servo in an equilibrium state where no gravity and force of inertia are applied or after safety is ensured.

Do not insert a (human) finger or an object into the opening of the product.
An injury or product damage may occur.

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

Do not use a load that does not fall within the specified range.
If the load falls outside the range, an excessive uneven load applied to the guide section may cause rattling in the guide section, deteriorate accuracy, and adversely affect service life.

3.2 USB configuration

3.2.1 Obtaining the USB driver

Please obtain the USB driver from our website (https://www.ckd.co.jp/).

<How to obtain>

1 Select “Equipment/Products” from the “Products & Support” tab or the “Products & Support” page.

2 Select “Electric actuator” in the product category.

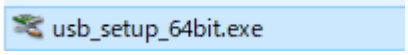
3 Select "Slider/Rod Type."

4 Access the detailed page for "Electric Actuator Slider Type LRXE" from the product list.

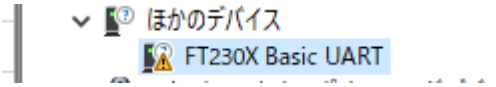
5 Select "Software" and download "USB Driver.zip".

3.2.2 USB driver installation procedure

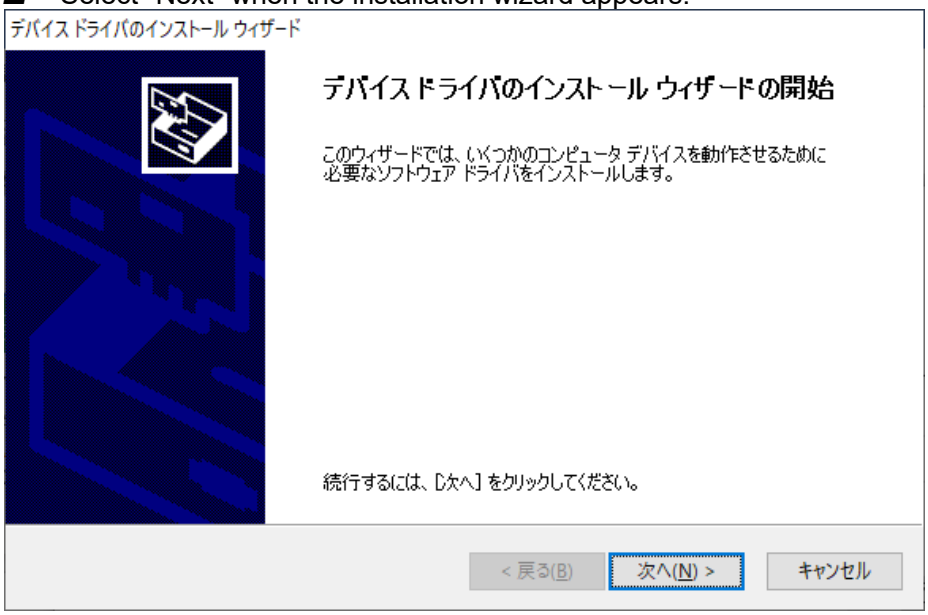
1 Double-click "usb_setup_64bit.exe" to launch the installer.



* When this product is connected to a PC without the USB driver installed, the product will be recognized as "FT230X Basic UART" in the device manager.

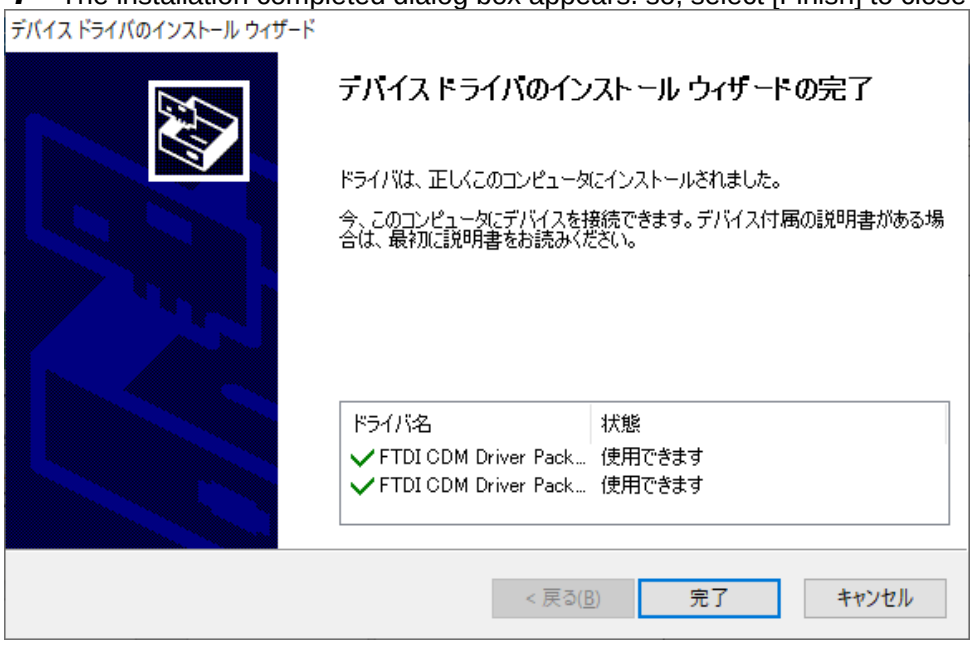


2 Select "Next" when the installation wizard appears.



3 A dialog box will appear asking if you want to install the device software. Select [Install] to begin the installation.

4 The installation completed dialog box appears. so, select [Finish] to close the dialog box.



3.3 Parameters

Parameters can be set and changed using the configuration software (S-Tools). Refer to the Instruction Manual for S-Tools (SM-A11147-A) for details.

3.3.1 List of parameters

Name Note 1	Description	Setting range	Initial value	Unit
☆Soft limit (+)	This is for setting the movable range in the + direction (fingers close). Setting range is soft limit (−) to + stroke + margin. If both the soft limit (+) and soft limit (−) settings are 0, the stroke range becomes the movable range. Refer to “3.3.2 Soft limits” for details.	Soft limit (-) to +stroke + margin	0	0.01 mm
☆Soft limit (−)	This is for setting the movable range in the – direction (fingers open). Setting range is - stroke - margin to soft limit (+). If both the soft limit (+) and soft limit (−) settings are 0, the stroke range becomes the movable range. Refer to “3.3.2 Soft limits” for details.	-Stroke - margin to soft limit (+)	0	0.01 mm
☆Home position return direction (coordinate axis)	This is for setting the direction of home position return to "normal" or "opposite". Refer to “3.3.3 Home position and coordinate axes” for details.	Standard (standard coordinates), opposite (inverted coordinates)	Standard (standard coordinates)	None
☆Home position offset amount	This is for setting the amount of offset of the home position. Refer to “3.3.3 Home position and coordinate axes” for details.	-stroke - margin to +stroke + margin	0	0.01 mm
Pressing judgment time	Set the time until it is judged that the pressing is complete in the pressing zone of the pressing operation 1. During the pressing judgment time, when the current value reaches the one corresponding to the value set in the pressing rate, it is judged that pressing is complete.	0 to 9999	200	ms
Holding current at stop	This is for setting the value of current for holding the workpiece when a stop is made.	0 to 100	65	%
Automatic servo OFF time 1	This is enabled when automatic servo OFF 1 is selected in the point data "Stop method". The servo turns off after the set time has elapsed since the actuator completed traveling.	0 to 9999	0	sec
Threshold value for integrated running distance (Actuator)	A warning is output when the integrated running distance reaches the set threshold. No warning is output when the setting value is 0.	0 to 999999999	0	m
Threshold of integrated number of travels (actuator)	A warning is output if the integrated number of travels of the actuator exceeds the set threshold. If the threshold is 0, no warning is output.	0 to 999999999	0	times
Threshold of integrated operating time (motor)	A warning is output if the integrated operating time of the motor exceeds the set threshold. If the threshold is 0, no warning is output.	0 to 999999999	0	sec
Temperature threshold	A warning is output when the substrate temperature of the controller exceeds the set threshold. No warning is output when the setting value is 0.	0.0 to 255.0	80.0	ºC

Note 1: To reflect the settings of parameters with "☆" in the name, it is necessary to restart the power supply or reset the software.

Name Note 1	Content	Set range	Initial value	Unit
Common positioning width	Set the tolerance value for positioning completion output.	0.01 to 9.99	0.10	mm
Common speed	Set the common speed for the transfer zone. When 0 is set in point data, this value is read.	Refer to “3.4.6 Setting the speed“.	30	mm/s
Common acceleration	Set the acceleration for the transfer zone.	Refer to “3.4.7 Setting the acceleration“.	0.10	G
Common deceleration	Set the deceleration for the transfer zone.	Refer to “3.4.8 Setting the deceleration“.	0.10	G
Common pressing rate	Sets the common pressing rate for the pressing zone. When 0 is set in point data, this value is read.	Refer to “3.4.10 Setting the pressing rate“.	50	%
Common pressing speed	Set the common pressing speed in a pressing zone. When 0 is set in point data, this value is read.	Refer to “3.4.11 Setting the pressing speed“.	15	mm/s
Common pressing distance	Set the common pressing distance for the pressing zone. When 0 is set in point data, this value is read.	-stroke - margin to +stroke + margin	3.00	mm
Common stop method	Set the common stop method after positioning completion. When “Common” is set in point data, this setting is read.	Control, fixed excitation, automatic servo OFF 1	Control	None
☆ Operation mode (PIO)	Set the operation mode.	4-point mode, simple 3-point mode, solenoid valve mode single type	Simple 3-point mode	None
☆Input signal filter	Sets the period for not responding to the PIO input signal from the upper level equipment (PLC, etc.). It works on all PIO signals and prevents malfunctions caused by noise and chattering.	0 to 19	5	ms
☆ Point signal Output retention	By setting this to "Enable", the point number confirmation bit n, point travel complete, point number n travel complete, and point zone will not be cleared when the servo is turned off, an emergency stop is performed, or the brake is forcibly released. Even if set to “Enable”, the above signals are cleared when the stop signal is turned off or an alarm occurs.	Disable, Enable	Disable	None
☆ Travel start input method	Sets the input method for the point travel start signal. Refer to “3.3.6 Travel start input method” for details.	Edge, Level	Edge	None
☆ Travel complete output selection	Sets the output method for the travel complete signal. Refer to “3.3.73.3.7 Travel complete output selection” for details.	Travel complete output, switch output	Travel complete output	None
G1 gain (response)	This is for adjusting the convergence time of the speed waveform. As the set value increases, the position proportional gain, speed proportional gain, and speed integral gain increase. It improves command tracking but 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. As the set value increases, the speed proportional gain and speed integral gain increase. 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.	0 to 15	0	None

Note 1: To reflect the settings of parameters with "☆" in the name, it is necessary to restart the power supply or reset the software.

■ Margin

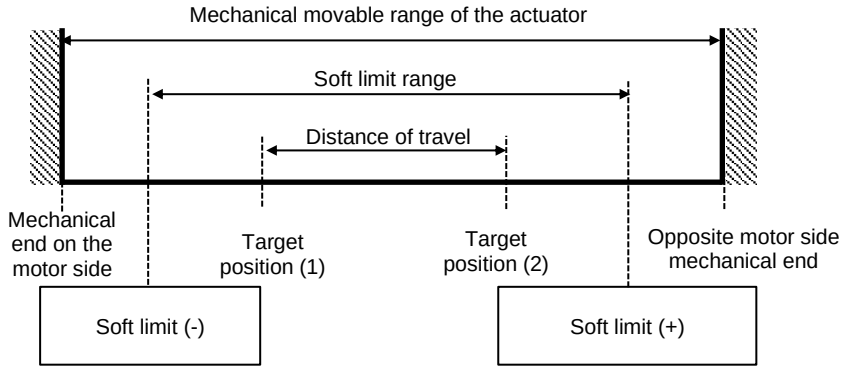
The value of the margin varies for each actuator. Refer to the table below.

Actuator model number / Series	Margin	Unit
LRXE	3	Mm
LRXG	0.5	

3.3.2 Soft limits

The movable range can be set for the transfer operation and the pressing operation.
If the range of the soft limit is exceeded during those operations, an alarm is output.
If the operation completion position is outside the range of the soft limit, an alarm is output at the start of the operation.

The motor side is the negative coordinate and the opposite motor side is positive coordinate, with the home position coordinate being = 0.
Set the soft limit to a value that is or is outside of “the travel distance (target position (1), (2))” and inside of “the actuator's mechanical movable range.”



3.3.3 Home position and coordinate axes

If contacting with the workpiece during a home position return, the home position may be displaced.

■ LRXE Series

Sets the position of the home position according to the parameters in the table below.

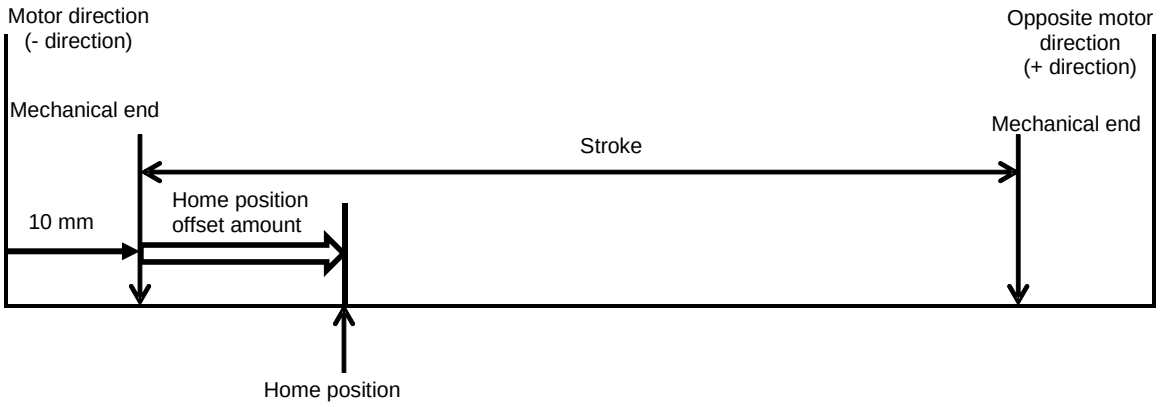
Setting item	Overview
Home position return direction (coordinate axis)	Sets the home position return direction.
Home position offset amount	Sets the offset amount for the home position.

* Refer to “3.3.1 List of parameters“ for the setting range and initial value.

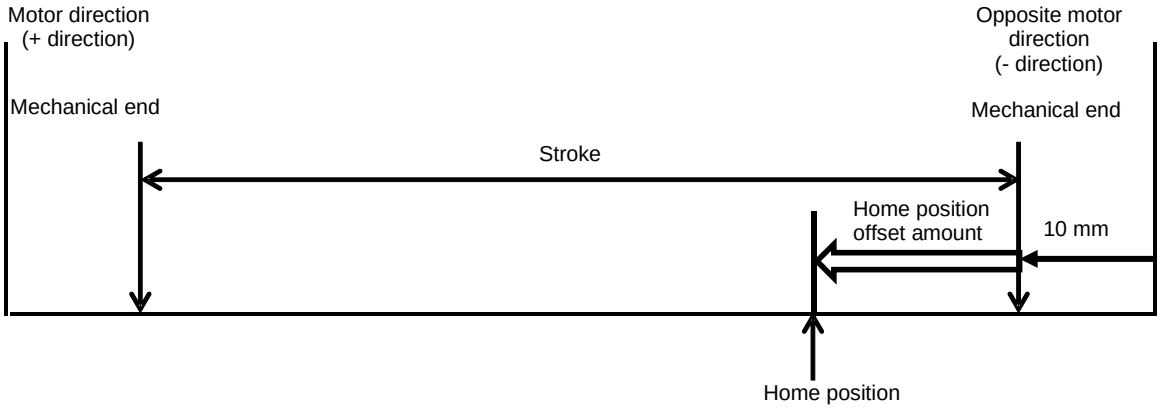
The table below shows the relationship between the "Home position return direction (coordinate axis)" setting, the home position, and the coordinate axis when the "Home position offset amount" = 0 mm.

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

<Home position and coordinate axis when "Home position return direction (coordinate axis)" = "Standard (standard coordinates)”>

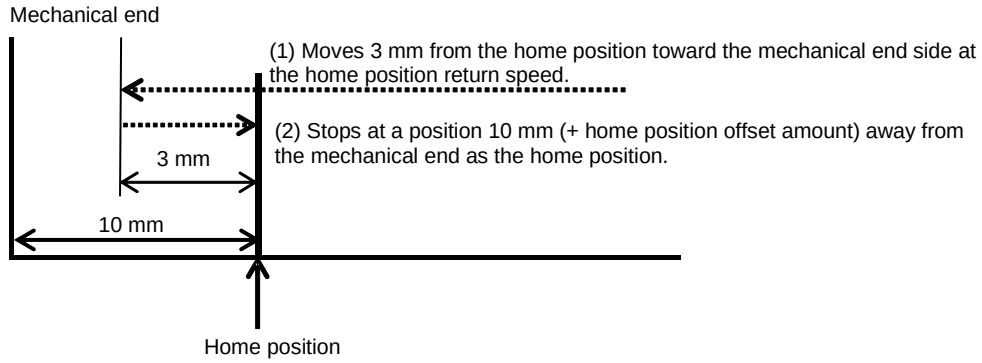


<Home position and coordinate axis when "Home position return direction (coordinate axis)" = "Opposite (inverted coordinates)”>



<Operation when home position return>

When the home position return is performed, it moves 3 mm from the home position to the mechanical end side and then moves to the home position without pushing against the mechanical end. Since a battery-less absolute encoder is used, point travel is possible even if home position return operation is not executed. The home position is 10 mm from the mechanical end.



■ LRXG Series

Sets the position of the home position according to the parameters in the table below.

Setting item	Overview
Home position return direction (coordinate axis)	Sets the home position return direction.
Home position offset amount	Sets the offset amount for the home position.

* Refer to “3.3.1 List of parameters “ for the setting range and initial value.

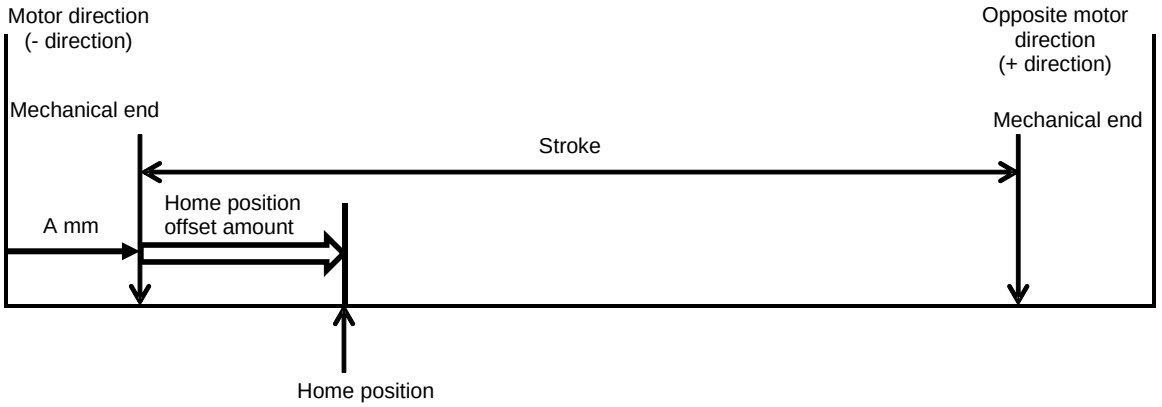
The table below shows the relationship between the "Home position return direction (coordinate axis)" setting, the home position, and the coordinate axis when the "Home position offset amount" = 0 mm. The value in A varies for each model.

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

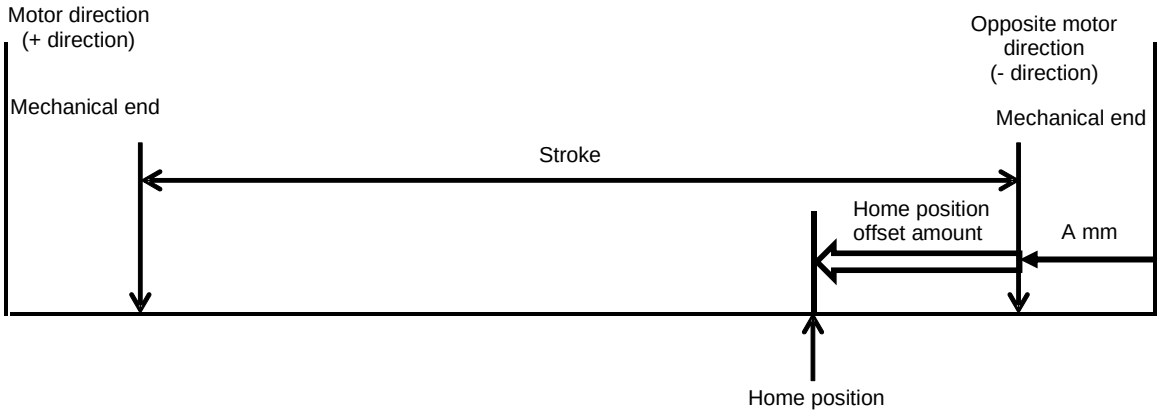
<A (position from mechanical end) value for each model>
When the parameter “Home position return direction” is “Standard” and the “Home position offset amount” is “0.00”, the position from the mechanical end in the table below is the home position.

Actuator model number			Position from mechanical end [mm]
Series	Body size	Screw lead	
LRXG	20	06	4.1
		09	
	32	06	2.6
		12	
	50	06	3.3
		12	

<Home position and coordinate axis when "Home position return direction (coordinate axis)" = "Standard (standard coordinates)”>

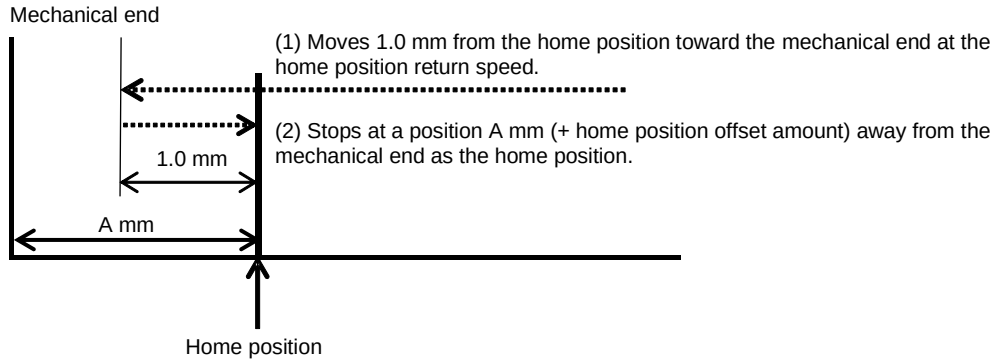


<Home position and coordinate axis when "Home position return direction (coordinate axis)" = "Opposite (inverted coordinates)”>



<Operation when home position return>

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



3.3.4 Adjusting the gains

In the following cases, change the setting of the parameters “G1 gain (responsiveness)” and “G2 gain (load magnification).” For the change of the gains, the setting software S-Tools is required. 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-A).

■ Gain setting by installation method (LRXE series)

When using LRXE series actuators, change the settings of the parameters "G1 gain (responsiveness)" and "G2 gain (load magnification)" according to the table below.

<LRXE Series>

Actuator model number				Horizontal Note 1		Vertical	
Series	Size	Motor Mounting direction	Screw lead	G1	G2	G1	G2
LRXE	04	E	6	5	11	5	9
			12	5	9	5	9
		R,L	6	6	9	6	7
			12	6	11	5	9
	05	E	5	7	7	7	6
			10	3	9	7	6
			20	7	7	8	5
		R,L	5	8	7	5	7
			10	4	8	4	8
			20	6	7	9	5
	08	E	5	5	10	5	8
			10	6	8	6	6
			20	6	8	6	7
		R,L	5	5	10	4	10
			10	6	8	6	6
			20	5	9	6	8

Note 1: "The G1 gain (responsiveness) and G2 gain (load magnification), which are applied by setting "0", are parameters adjusted under the condition of no load and horizontal installation at the time of shipment.

When installing the product on a wall, use the same gain setting as for horizontal installation.

■ Gain setting by installation method (LRXG series)

When using LRXG series actuators, change the settings of the parameters "G1 gain (responsiveness)" and "G2 gain (load magnification)" according to the table below.

<LRXG Series>

Actuator model number				Horizontal Note 1		Vertical	
Series	Size	Motor Mounting direction	Screw lead	G1	G2	G1	G2
LRXG	20	E	6	8	9	8	9
			9	8	9	8	9
	32	E	6	7	10	7	10
			12	8	9	8	9
	50	E	6	10	7	10	7
			12	10	7	10	7

Note 1: "The G1 gain (responsiveness) and G2 gain (load magnification), which are applied by setting "0", are parameters adjusted under the condition of no load and horizontal installation at the time of shipment.

When installing the product on a wall, use the same gain setting as for horizontal installation.

■ Gain adjustment method

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

If abnormal sound is generated during a stop
If high-pitched abnormal sound is generated from the actuator during a stop, the set value of the gain is high, so 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 an operation
If abnormal sound is generated during an operation at a constant speed other than an acceleration time, the set value of the gain is high, so 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 an operation
If the actuator vibrates during an operation, the set value of the gain is low, so 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, the overload (H) alarm (alarm code: 6702) is given. Since the setting of the gain is high, decrease the G1 gain or G2 gain.

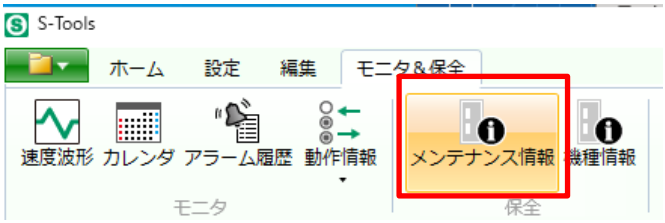
If no workpiece can be carried
If the actuator does not operate at the set speed or stops during movement to the set position during workpiece transfer, the set value of the gain is low, so increase the G2 gain. If abnormal sound is generated during a stop or during an operation by increasing the G2 gain, decrease the G1 gain.

3.3.5 Setting threshold values

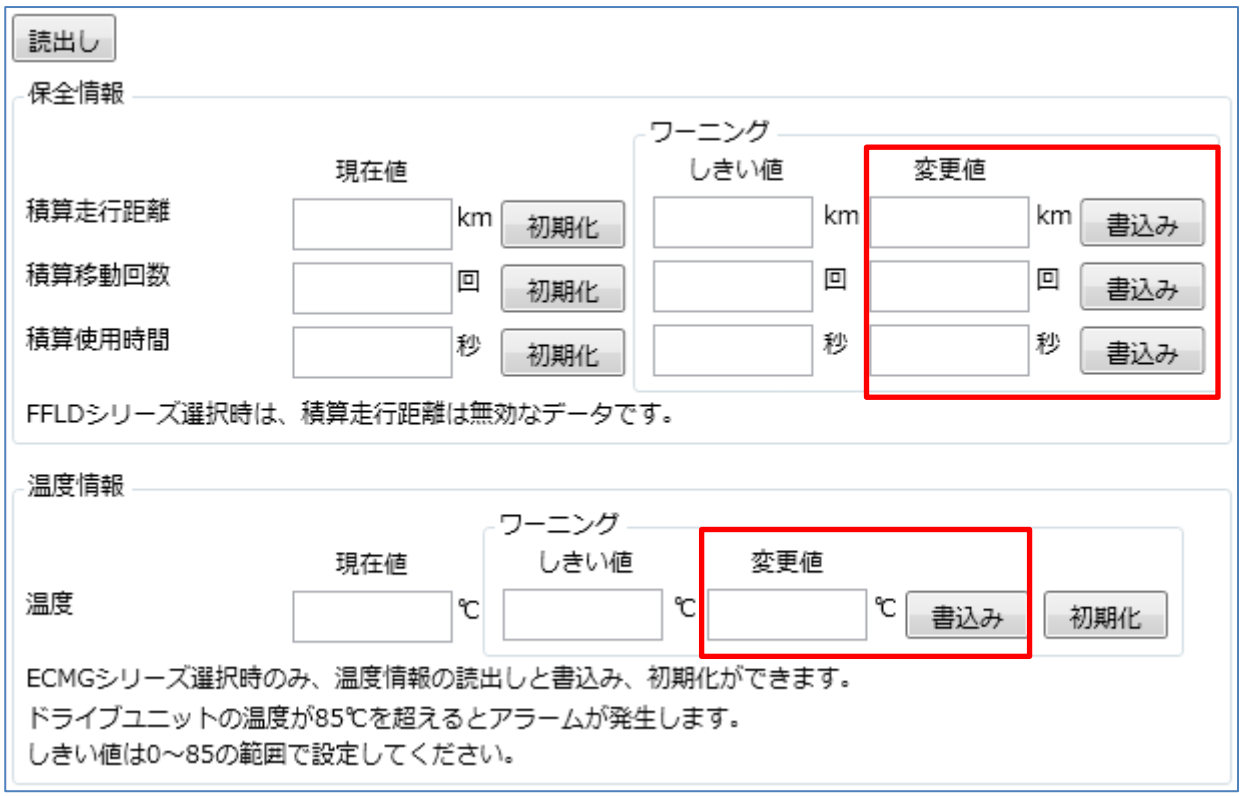
Sets the values of the integrated travel distance threshold, integrated number of travel times threshold, integrated operating time threshold, and temperature rise threshold from the S-Tools.

■ How to set threshold values (using S-Tools)

1 Select the [Monitor and maintenance] tab of S-Tools" and click the [Maintenance information] button.



2 Enter the value to set in the text box in the [Change value] column for the threshold that you want to change and click the [Write] button.



Name	Content
Threshold value for integrated running distance	A warning is output when the integrated running distance reaches the set threshold. No warning is output when the setting value is 0.
Threshold value for integrated number of travel times	A warning is output when the integrated number of actuator travel times reaches the set threshold. No warning is output when the setting value is 0.
Threshold value for integrated operating time	A warning is output when the integrated motor operating time reaches the set threshold. No warning is output when the setting value is 0. The integrated operating time indicates the time while the servo is ON.
Temperature threshold	A warning is output when the substrate temperature of the controller exceeds the set threshold. No warning is output when the setting value is 0.

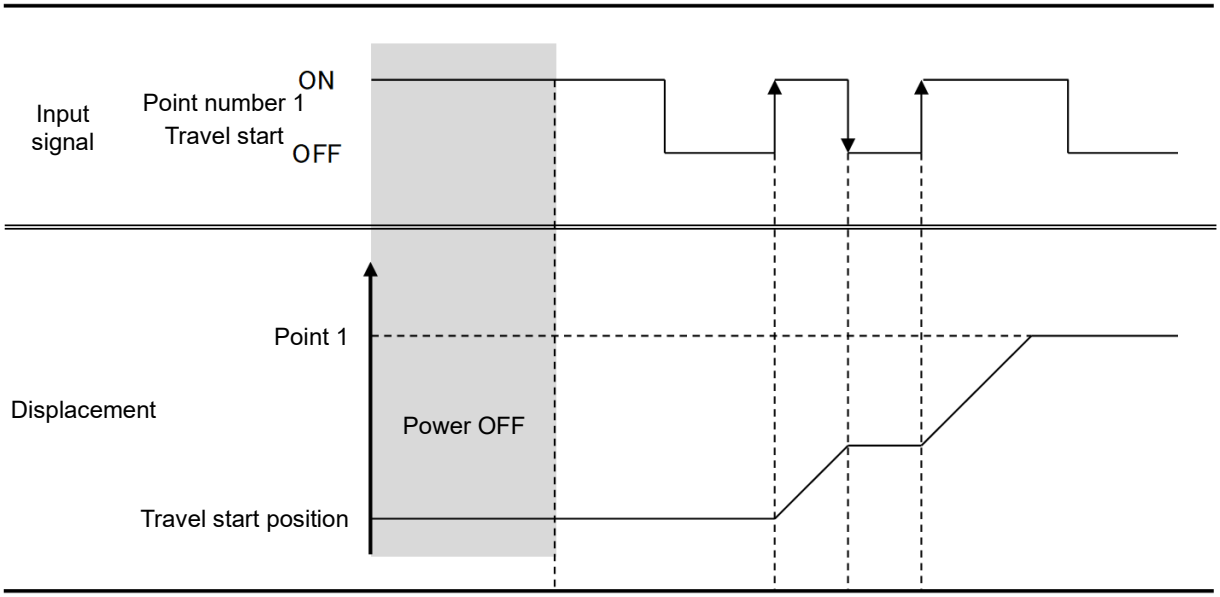
3.3.6 Travel start input method

The input method for the travel start signal can be selected.

■ Edge

The actuator starts moving when the point travel start signal turns from OFF to ON.
The actuator stops when the point travel start signal turns from ON to OFF.
It can prevent unintentional start of movement immediately after power-on or resetting an alarm.

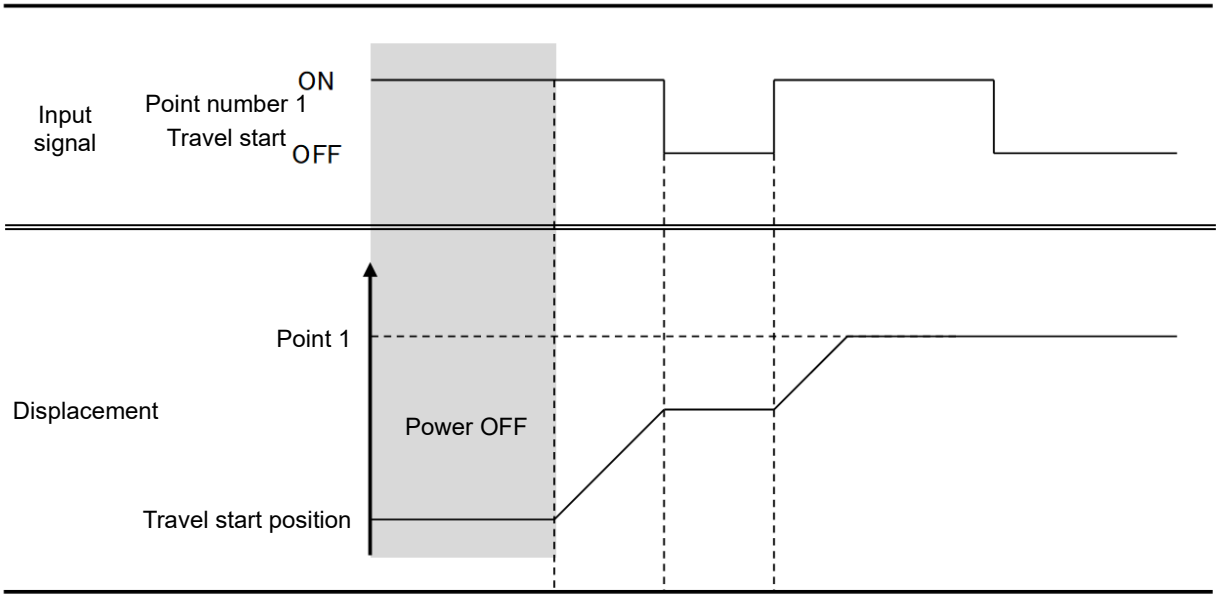
Horizontal axis: Time



■ Level

The actuator starts moving when the point travel start signal is ON.
The actuator stops when the point travel start signal is OFF.

Horizontal axis: Time

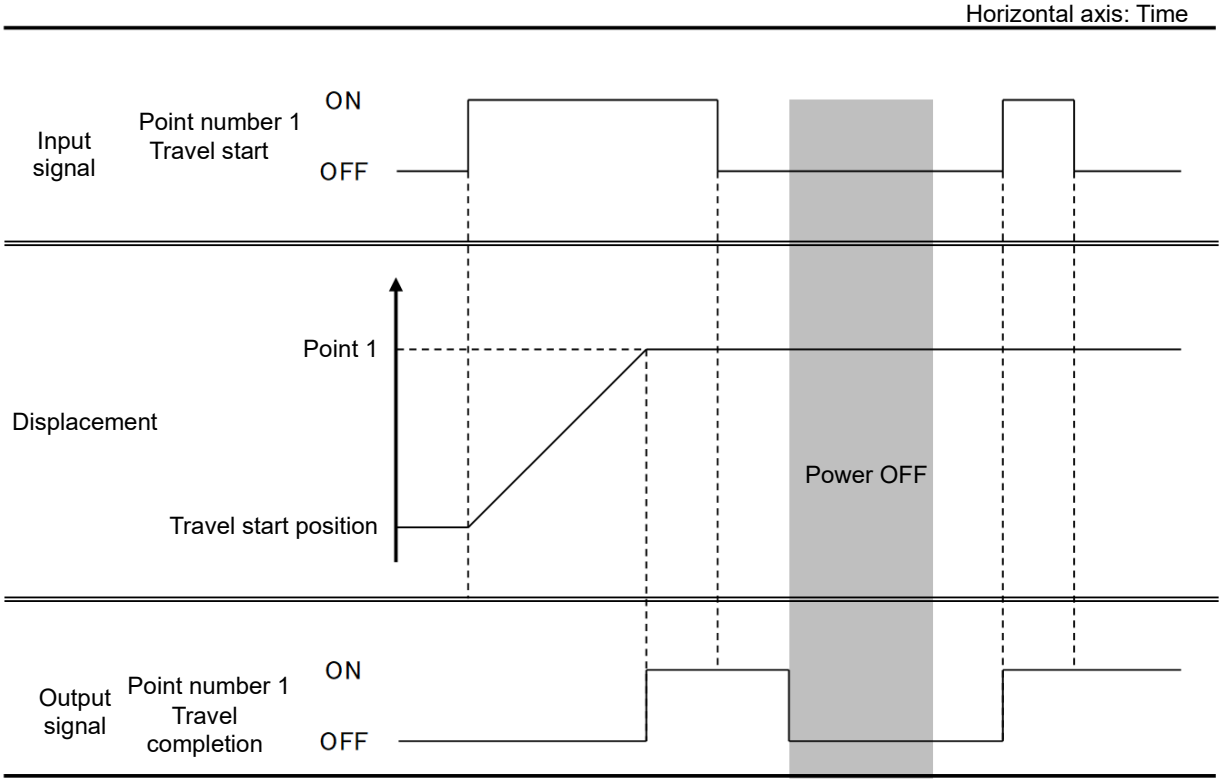


3.3.7 Travel complete output selection

"Travel complete output" or "switch output" can be selected.

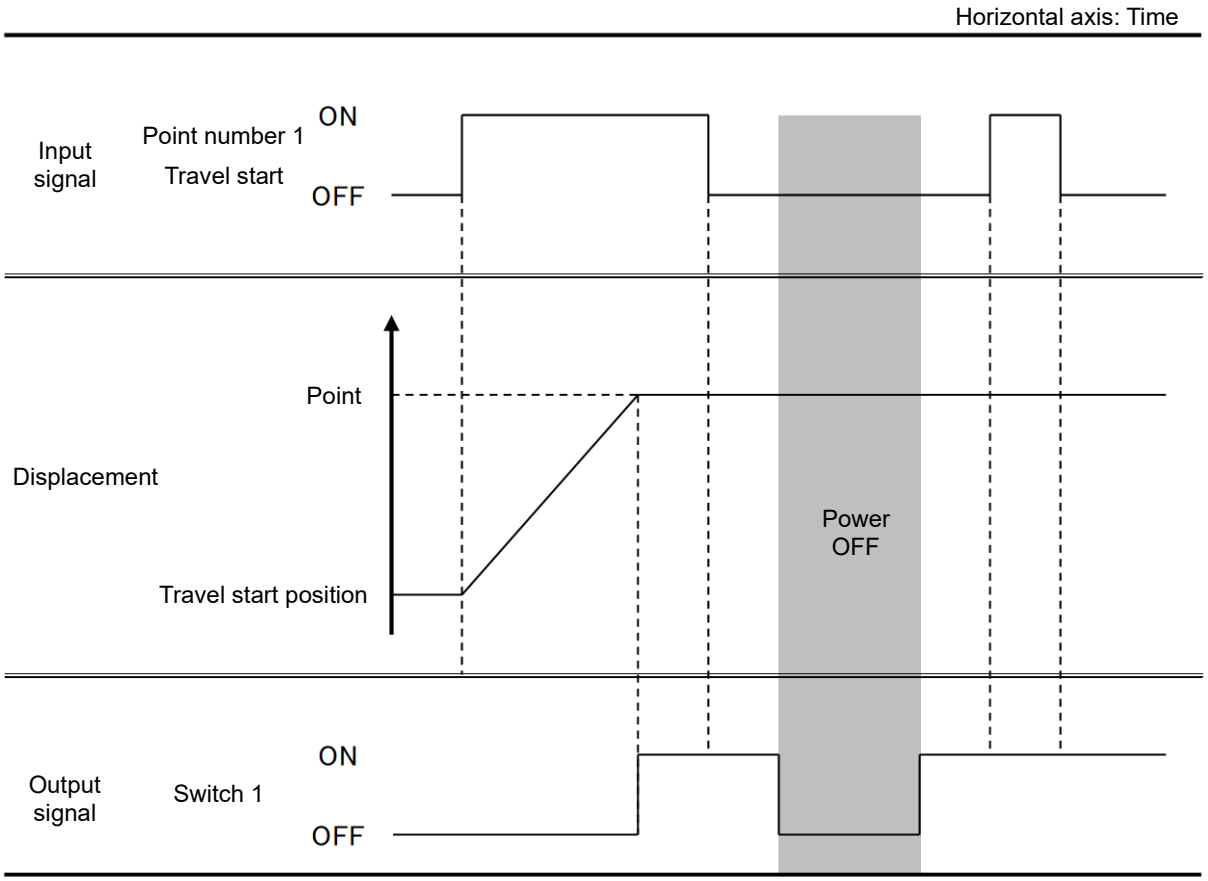
■ Travel complete output

After inputting the point travel start, point number confirmation bit n, point travel complete, and point number n travel complete are output when the actuator operation is completed.
No signal is output even if the actuator stops within the completion width of point n immediately after power-on.
After the point n travel complete, the completion signal continues to be output even if the travel start input is turned off.



■ Switch output

Switch n is output when the actuator position is within the completion width of point n.
If the actuator is stopped within the completion width of point n immediately after power-on or resetting alarm, switch n is output.
After the point n travel complete, the completion signal continues to be output even if the travel start input is turned off.



3.4 Point Data

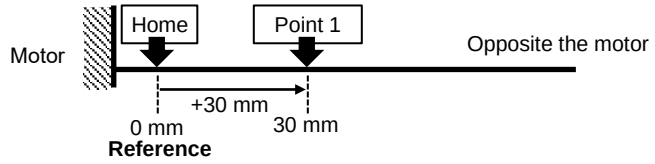
Point data can be set and changed using the configuration software (S-Tools). Refer to the S-Tools instruction manual (SM-A11147-A) for details such as setting method.

3.4.1 List of point data

Setting item	Description	Setting range	Initial value
Position specification method	Only “Absolute” can be selected. Refer to “3.4.2 Position specification method” for details.	Absolute	None
Operation method	This is for selecting among positioning operation, pressing operation 1, and pressing operation 2. Refer to “3.4.3 Operation method” for details.	Positioning operation	None
Position	This is for setting the final target position (mm) when the operation method is set to positioning operation. If the operation method is set to pressing operation 1 or pressing operation 2, the final target position is determined according to the pressing distance. Refer to “3.4.4 Position” for details.	0.00	mm
Positioning width	Sets the output range of the point travel complete output signal as the width (one side) [mm] with respect to the final target position. Refer to “3.4.5 Positioning width” for details.	0 (common)	mm
Speed	Sets the speed (mm/s) of the transfer zone. Refer to “3.4.6 Setting the speed” for details.	0 (common)	mm/s
Acceleration	Set the acceleration for the transfer zone [G]. Refer to “3.4.7 Setting the acceleration” for details.	0 (common)	G
Deceleration	Sets the deceleration [G] of the transfer zone. Refer to “3.4.8 Setting the deceleration” for details.	0 (common)	G
Stop method	Selects control stop, fixed excitation, or automatic servo OFF1. Refer to “3.4.9 Selecting the stop method” for details.	Common	None
Pressing rate	Sets the upper limit of the pressing force in a pressing zone as a ratio to the maximum pressing force. Refer to “3.4.10 Setting the pressing rate“ for details.	0 (common)	%
Pressing speed	This is for setting the speed (mm/s) in the pressing zone. Refer to “3.4.11 Setting the pressing speed“ for details.	0 (common)	mm/s
Pressing distance	This is for setting the pressing zone width (mm). Refer to “3.4.12 Setting the pressing distance“ for details.	0 (common)	mm

3.4.2 Position specification method

The location setting method is as follows. Since there is only one setting value, it is not displayed as a setting item on S-Tools, etc.

Position specification	Description	Setting example
Absolute	Distance from the home position is set using the home position (0 mm) as reference point.	Example) Point 1 position: +30 mm is set  Positioning completion point of Point 1 is 30 mm from the home position.

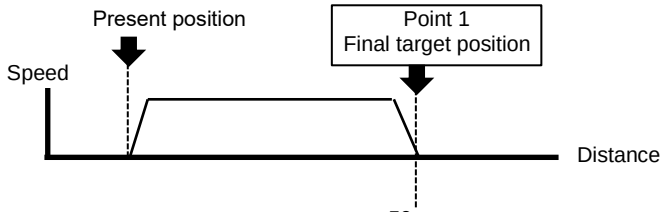
3.4.3 Operation method

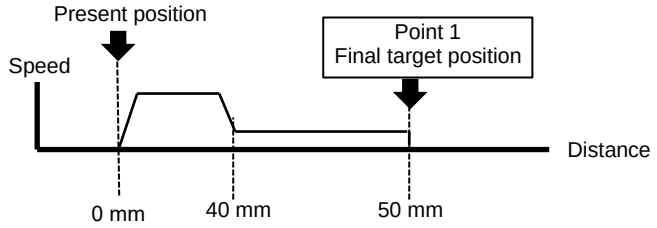
Positioning operation, pressing operation 1, or pressing operation 2 can be selected for the operation method.

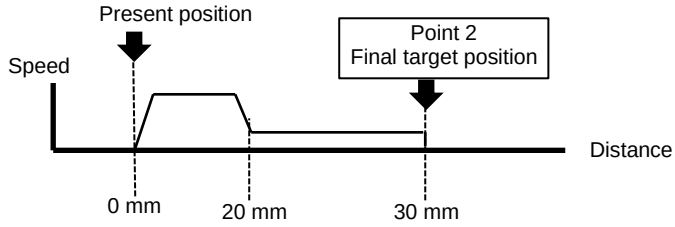
Operation	Description
Positioning operation	This operation is intended for general transport. A completion signal is output when the actuator has come within the positioning width. When the actuator reaches the positioning completion point, it comes to a stop. Refer to “3.5.4 Positioning operation” for details.
Pressing operation 1	This operation keeps pushing the workpiece toward the pressing completion point during the pressing operation. While this operation is ongoing, pausing caused by external force will not be detected as an alarm. This setting can be used when clamping. When the set pressing rate is reached, a completion signal is output. When the actuator reaches the pressing completion point, the pressing operation ends and the actuator comes to a stop. Refer to “3.5.5 Pressing operation” for details.
Pressing operation 2	This operation keeps pushing the workpiece toward the pressing completion point during the pressing operation. While this operation is ongoing, pausing caused by external force will not be detected as an alarm. This setting can be used when press-fitting. While the actuator operates at the set pressing rate and reaches within the positioning width, it outputs a completion signal. When the actuator reaches the pressing completion point, the pressing operation ends and the actuator comes to a stop. Refer to “3.5.5 Pressing operation” for details.

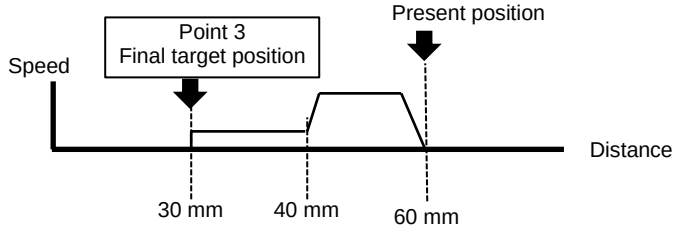
3.4.4 Position

Position of point operation is set.
The travel position varies depending on the operation method setting.

<table>
<tr><th>Operation</th><th>Setting example</th></tr>
<tr><td>Positioning operation</td><td>Example Set to Point 1 Position : +50 mm
 

The set position is the final target position.</td></tr>
<tr><td>Pressing operation 1
Pressing operation 2</td><td>Example Set to Point 1 Position : +40 mm
Pressing distance: +10 mm
 

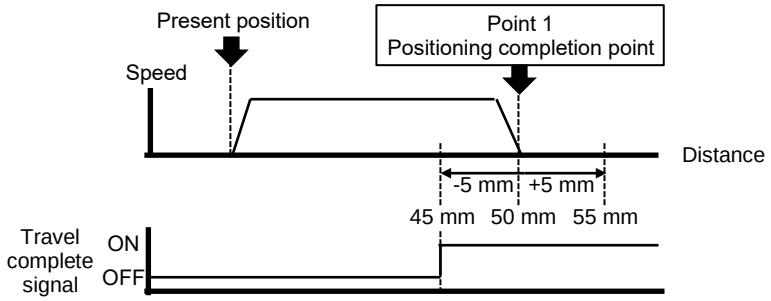
Example Set to Point 2 Position: +40 mm
Pressing distance: -10 mm
 

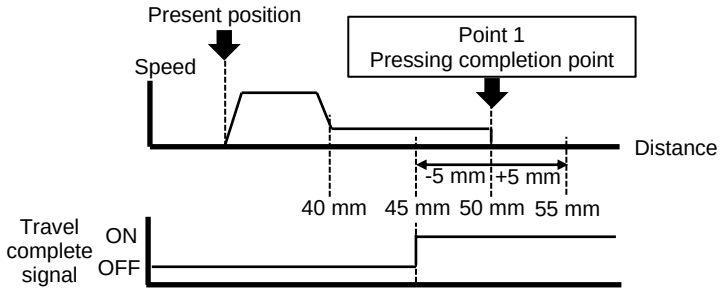
Example Set to Point 3 Position: +40 mm
Pressing distance: -10 mm
 

"Position + Pressing distance" is the final target position.
Pressing operation is performed to the final target position for the pressing distance.</td></tr>
</table>

3.4.5 Positioning width

The output range of Travel complete output signal is set.
It is the width (per finger) (mm) with respect to the operation completion position.
The positioning width can only be changed by the common setting.

<table>
<tr><th>Operation</th><th>Setting example</th></tr>
<tr><td>Positioning operation</td><td>Example Set to Point 1 Position : +50 mm
Positioning width: 5 mm
 

Travel complete signal is output when the actuator is within the range of 45 mm to 55 mm.
Travel complete signal is retained even if the actuator is outside the positioning width due to reasons such as an overshoot.</td></tr>
<tr><td>Pressing operation 1</td><td>Since Travel complete signal is determined from the set pressing rate, the setting made to the positioning width is not reflected.</td></tr>
<tr><td>Pressing operation 2</td><td>Example Set to Point 1 Position: +40 mm
Pressing distance: +10 mm
Positioning width: 5 mm
 

Travel complete signal is output when the actuator is within the range of 45 mm to 55 mm.
After the Travel complete signal is output, the signal is retained even if the actuator is outside the positioning width due to reasons such as being pushed back.</td></tr>
</table>

3.4.6 Setting the speed

The speed for the transfer zone can be set.

・Setting range and initial values (factory default)

<LRXE Series>

Actuator model number				Speed setting range [mm/s] Note 1, Note 2	Initial speed value [mm/s] Note 3
Series	Body size	Motor mounting direction	Screw lead		
LRXE	04	E	06	7 to 450	0
			12	15 to 900	0
		R,L	06	7 to 375	0
			12	15 to 500	0
	05	E	05	6 to 375	0
			10	12 to 750	0
			20	25 to 1120	0
		R,L	05	6 to 325	0
			10	12 to 635	0
			20	25 to 1120	0
	08	E	05	6 to 230	0
			10	12 to 430	0
			20	25 to 650	0
		R,L	05	6 to 200	0
			10	12 to 430	0
			20	25 to 650	0

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.
Note 2: This can be set to 0 in point data. If this is set to 0, the common speed of the parameters data will be applied.
Note 3: The common speed is applied because the initial value (factory-default) is set to 0.

<LRXG Series>

Actuator model number				Speed setting range [mm/s] Note 1, Note 2	Initial speed value [mm/s] Note 3
Series	Body size	Motor mounting direction	Screw lead		
LRXG	20	E	06	10 to 250	0
			09	12 to 400	0
	32	E	06	10 to 250	0
			12	15 to 500	0
	50	E	06	20 to 250	0
			12	20 to 400	0

Note 1: Operation may not be stable even in the setting range, depending on the acceleration, deceleration, or installation method.
Note 2: This can be set to 0 in point data. If this is set to 0, the common speed of the parameters data will be applied.
Note 3: The common speed is applied because the initial value (factory-default) is set to 0.

3.4.7 Setting the acceleration

The acceleration for the transfer zone can be set.

・Setting range and initial values (factory default)

Actuator model number	Setting range of acceleration [G] Note 1 Note 2		Initial acceleration value [G] Note 3
Series	When installed horizontally (wall hanging installation)	When installed vertically	
LRXE	0.10 to 1.00	0.10 to 0.50	0.00
LRXG	0.10 to 0.70	0.10 to 0.50	0.00

Note 1: When converting units, assume 1G = 9800 mm/s^2 for calculation.
Note 2: This can be set to 0 in point data. If this is set to 0, the common acceleration of the parameters data will be applied.
Note 3: The common acceleration is applied because the initial value (factory-default) is set to 0.

3.4.8 Setting the deceleration

The deceleration for the transfer zone can be set.

・Setting range and initial values (factory default)

Actuator model number	Setting range of deceleration [G] Note 1 Note 2		Initial deceleration value [G] Note 3
Series	When installed horizontally (wall hanging installation)	When installed vertically	
LRXE	0.10 to 1.00	0.10 to 0.50	0.00
LRXG	0.10 to 0.70	0.10 to 0.50	0.00

Note 1: When converting units, assume 1G = 9800 mm/s^2 for calculation.
Note 2: This can be set to 0 in point data. If this is set to 0, the common deceleration of the parameters data will be applied.
Note 3: The common deceleration is applied because the initial value (factory-default) is set to 0.

3.4.9 Selecting the stop method

The stop method applied after reaching the target position in positioning operation or pressing operation is set.The stop method can be selected from common, control, fixed excitation, and automatic servo OFF1.

Stop method	Description
Common	The stop method set in the parameter data "Common stop method" is applied.
Control	After completing the positioning or pressing operation, the actuator is controlled with a current that can retain the completion position and held stopped.
Fixed excitation	After completing the positioning or pressing operation, the actuator is held stopped with the user parameter "Holding current at stop".
Automatic servo OFF 1	After completing the positioning or pressing operation, the actuator is controlled to a stop. The servo turns off after the time set in user parameter "Automatic servo OFF time 1" has elapsed.

3.4.10 Setting the pressing rate

The rate to the maximum pressing force in a pressing zone can be set.

・Setting range and initial values (factory default)

Actuator model number			Setting range of the pressing rate [%] Note 1	Initial value of pressing rate [%] Note 2
Series	Body size	Screw lead		
LRXE	04	06	20 to 100	0
		12	20 to 100	0
	05	05	20 to 80	0
		10	20 to 80	0
		20	20 to 80	0
	08	05	20 to 100	0
		10	20 to 100	0
		20	20 to 100	0
LRXG	20	06	40 to 100	0
		09	40 to 100	0
	32	06	30 to 100	0
		12	30 to 100	0
	50	06	30 to 100	0
		12	30 to 100	0

Note 1: The pressing rate can be set to 0 in the point data. When the rate is set to 0, the common pressing rate of parameter data is applied.
Note 2: Since the default value (value upon shipping) is set to 0, the common pressing rate is applied.

3.4.11 Setting the pressing speed

The speed of the pressing zone can be set.

・Setting range and initial values (factory default)

Actuator model number		Pressing speed setting range [mm/s] Note 1	Initial pressing speed value [mm/s] Note 2
Series	Screw lead		
LRXE		5 to 20	0
LRXG	6	10 to 20	0
	9	12 to 20	0
	12	15 to 20	0

Note 1: The pressing speed can be set to 0 in point data. If this is set to 0, the common pressing speed of the parameters data will be applied.
Note 2: The common pressing speed is applied because the initial value (factory default) is set to 0.
* Set the pressing speed to be less than or equal to the speed for the transfer zone. If the pressing speed is higher, the speed for the transfer zone is automatically applied to the pressing speed.

3.4.12 Setting the pressing distance

The pressing zone width can be set.

• Setting range and initial values (factory default)

Actuator model number	Pressing distance setting range [mm] Note 1, Note 2, Note 3	Initial pressing distance value [mm] Note 4
Series		
LRXE/LRXG	-stroke - margin to +stroke + margin	0

Note 1: If the pressing distance is set to 0 in the point data, the common pressing distance of the parameters data will be applied.
Note 2: Do not set the common pressing distance to 0.
Note 3: Refer to "Margin" in "3.3.1 List of parameters" for the margin.
Note 4: The common pressing distance is applied because the initial value (factory-default) is set to 0.

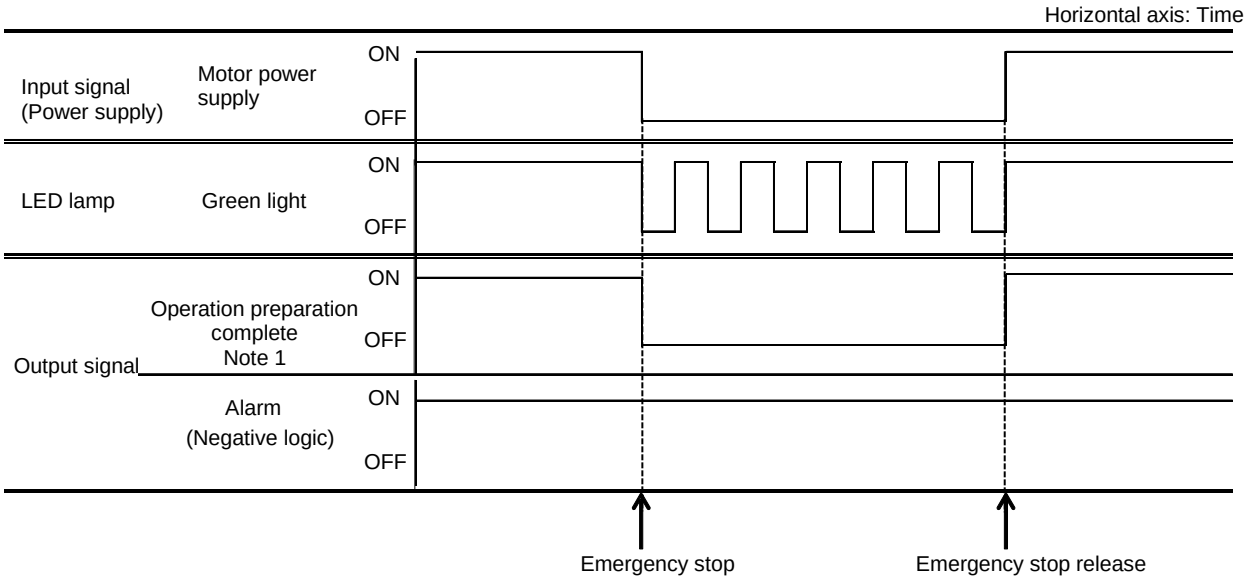
3.5 Operation timing chart

3.5.1 Emergency stop and release

⚠CAUTION

Be careful of emergency stop wiring disconnection.
The motor power supply OFF state is not output as an alarm.

To perform an emergency stop, turn off the motor power supply. Input signals are not accepted when the motor power supply is turned off. After turning the motor power supply ON, a waiting time of about 1 second is required to stabilize the excitation to the motor. After this time has elapsed, the unit is ready for operation. However, input signals are accepted during the waiting period.



Note 1: The output signal "Operation preparation complete" can be checked only on S-Tools and is not assigned as an output signal to upper level equipment such as a PLC.

- For actuators with brakes, the electromagnetic brake locks. Be sure to check the safety of your surroundings when releasing the emergency stop.
- When performing an emergency stop, it may take several seconds to stop depending on the travel speed and load.

3.5.2 Force brake release

⚠WARNING

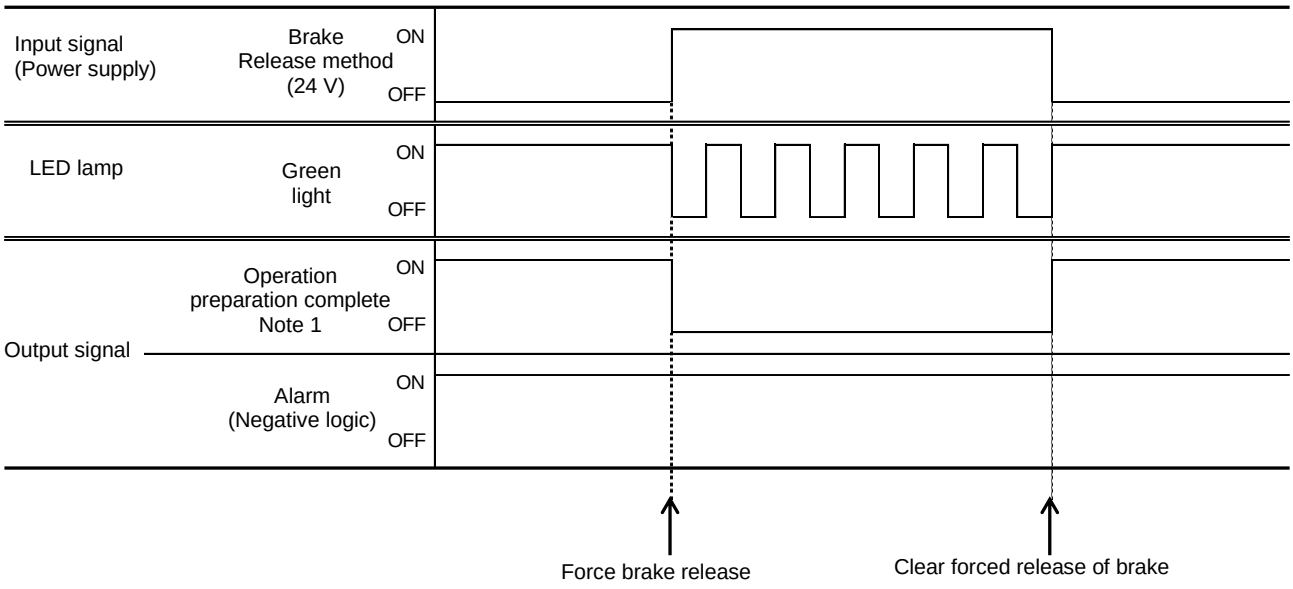
Always set the input for force brake release (BRK) to either 0 VDC or open during normal operation, so that the brake can be applied.
If 24 VDC is applied to force brake release (BRK), the brake will be forcibly released. The movable part of the actuator could fall, causing injury or damaging the workpiece.

⚠CAUTION

Be careful of force brake release wiring disconnection.
Force brake release status is not treated as an alarm, so no alarm signal will be output.

When the force brake release signal is input (24 V applied), the electromagnetic brake is forcibly released (if one is attached). If force brake release is performed during operation, no current is passed to the motor after deceleration stops. This operates the same as emergency stop, but the electromagnetic brake is left released.

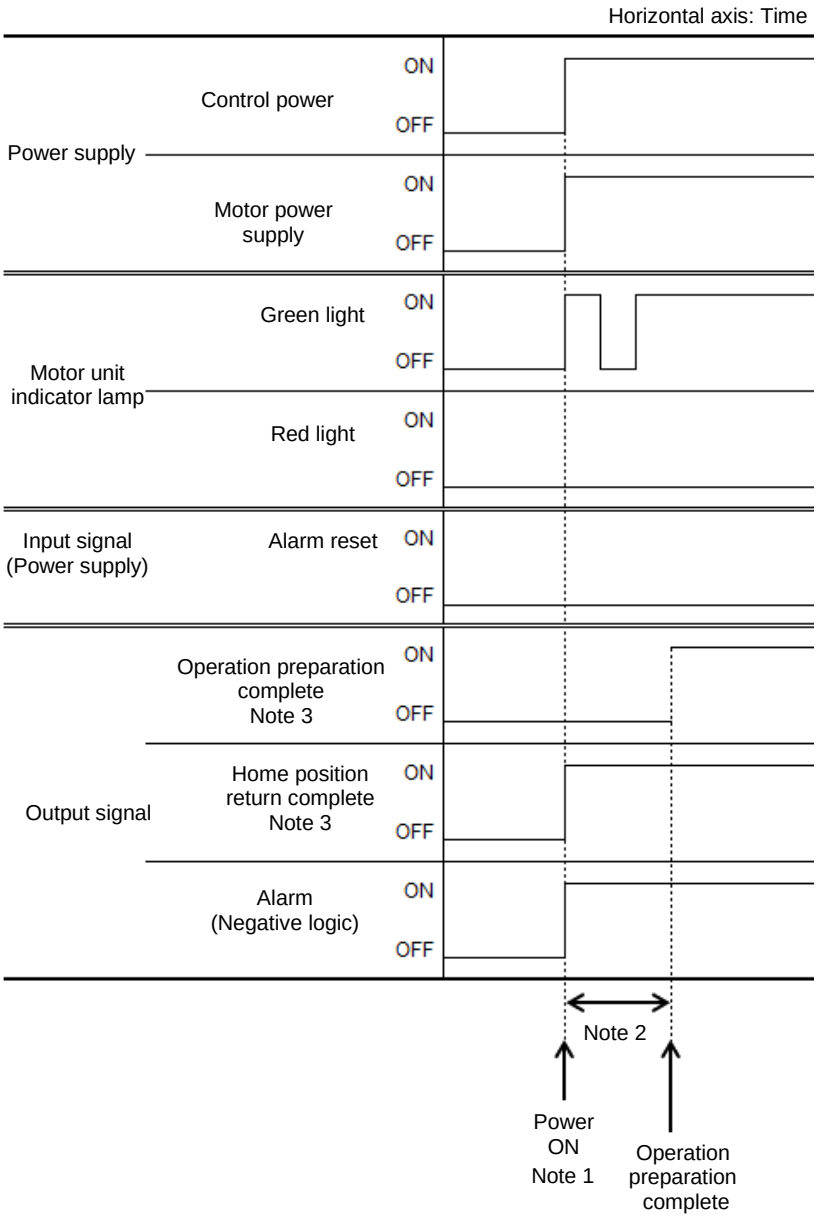
Horizontal axis: Time



Note 1: The output signal "Operation preparation complete" can be checked only on S-Tools and is not assigned as an output signal to upper level equipment such as a PLC.

3.5.3 Power-on sequence

The timing chart below shows the time from power-on to the operation preparation complete.



Note 1: Since a battery-less absolute encoder is used, the Home position return complete turns ON as soon as the control power is turned ON.
Note 2: It takes about 2s to complete the preparation for operation after the power is turned on. Since the output signal "Operation preparation complete" cannot be checked from the PLC, check the time elapsed after power-on and input a travel command.
Note 3: The output signal "Operation preparation complete" and “Home position return complete” can be checked only on S-Tools and are not assigned as output signals to upper level equipment such as a PLC.

3.5.4 Positioning operation

- Depending on the operating environment and conditions, it may take time for the actuator to stop. If the stop time is 1.0 s or less, contact us.
- If a stop command is given during acceleration or deceleration, the operation may become unstable.

■ 4-point mode

Once the point number is specified with the point number selection bit, traveling begins via ON edge input of the point travel start signal. While traveling, the movement stops at the OFF edge input of the point travel start signal. Use the following input and output signals for operation.

・Input signal 0: OFF (level input), 1: ON (level input), 0↓: OFF edge input, 1↑: ON edge input

Point number selection bit 0 to 1	Content
-	Sets the point No. in binary.

Point travel start	Content
1↑	Point travel start Operates to point set with the point No. selection bit.
0↓	Point travel stop If a point travel is in progress, the operation is stopped.

Setting example)

Point number selection bit 0	Point number selection bit 1	Point travel start	Content
0	0	1↑	Begins traveling to point 0.
1	0	1↑	Begins traveling to point 1.
*	*	0↓	If there is an operation running, it will stop.

・Output signal 0: OFF, 1: ON

1	Content
-	Outputs the point No. in binary after travel is complete.

Point travel complete	Content
1	Turns ON when it finishes traveling to the set point.

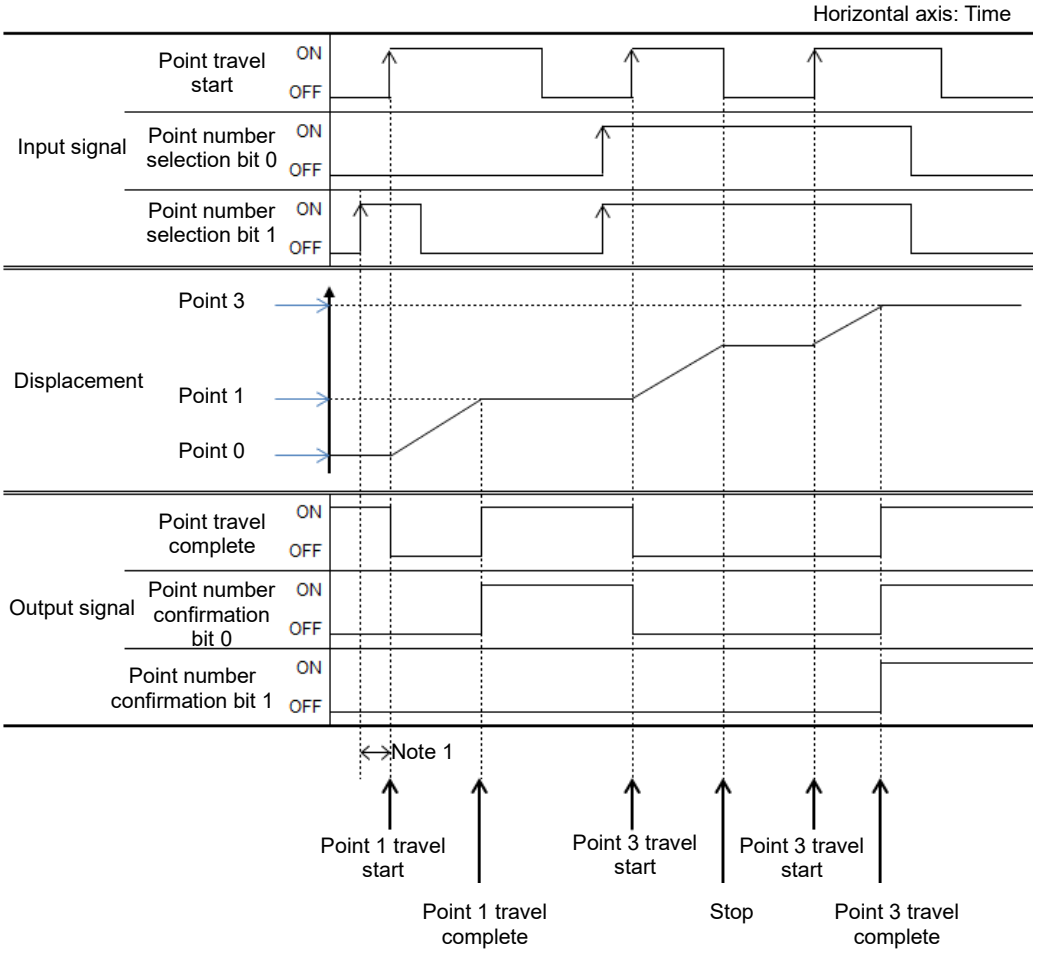
・Operation procedure

1 Set the point number in the point number selection bit.

2 Turn ON the point travel start

3 Output the point number set by the point number confirmation bit and confirm that point travel complete is ON.

・Time chart



*1 After setting the point number selection bit, wait at least the time set in the parameter "Input signal filter" (initial value = 5 ms) before inputting the point travel start

■ Simple 3-point mode

Travel starts at the ON edge input or level input of the point travel start signal. Use the following input and output signals.

・Input signal 0: OFF (level input), 1: ON (level input), 0↓: OFF edge input, 1↑: ON edge input

Travel start input method	Point No. 1 to 3 travel start	Content
Edge	0↓	Stops if it is traveling to the corresponding point.
	1↑	Starts traveling to corresponding point. During ON edge input, if another point number travel start signal switches ON, traveling does not start.
Level	0	Stops if it is traveling to the corresponding point.
	1	Starts traveling to corresponding point. If the other point number travel start signal is ON when switched from OFF to ON, the travel will not start.

Setting example)

Point number 1 travel start	Point number 2 travel start	Point number 3 travel start	Content
1↑	0	0	Begins traveling to point 1.
0↓	0	0	If it is traveling to point 1, the travel is stopped.
1↑	1	0	The travel does not start while another point number travel start input is ON.

・Output signal 0: OFF, 1: ON

Travel complete output selection	Point No. 1 to 3 travel complete/switch output 1 to 3	Content
Travel complete output	1	Turns ON when it finishes traveling to the corresponding point.
Switch output	1	Turns ON when entering the positioning completion width of corresponding point.

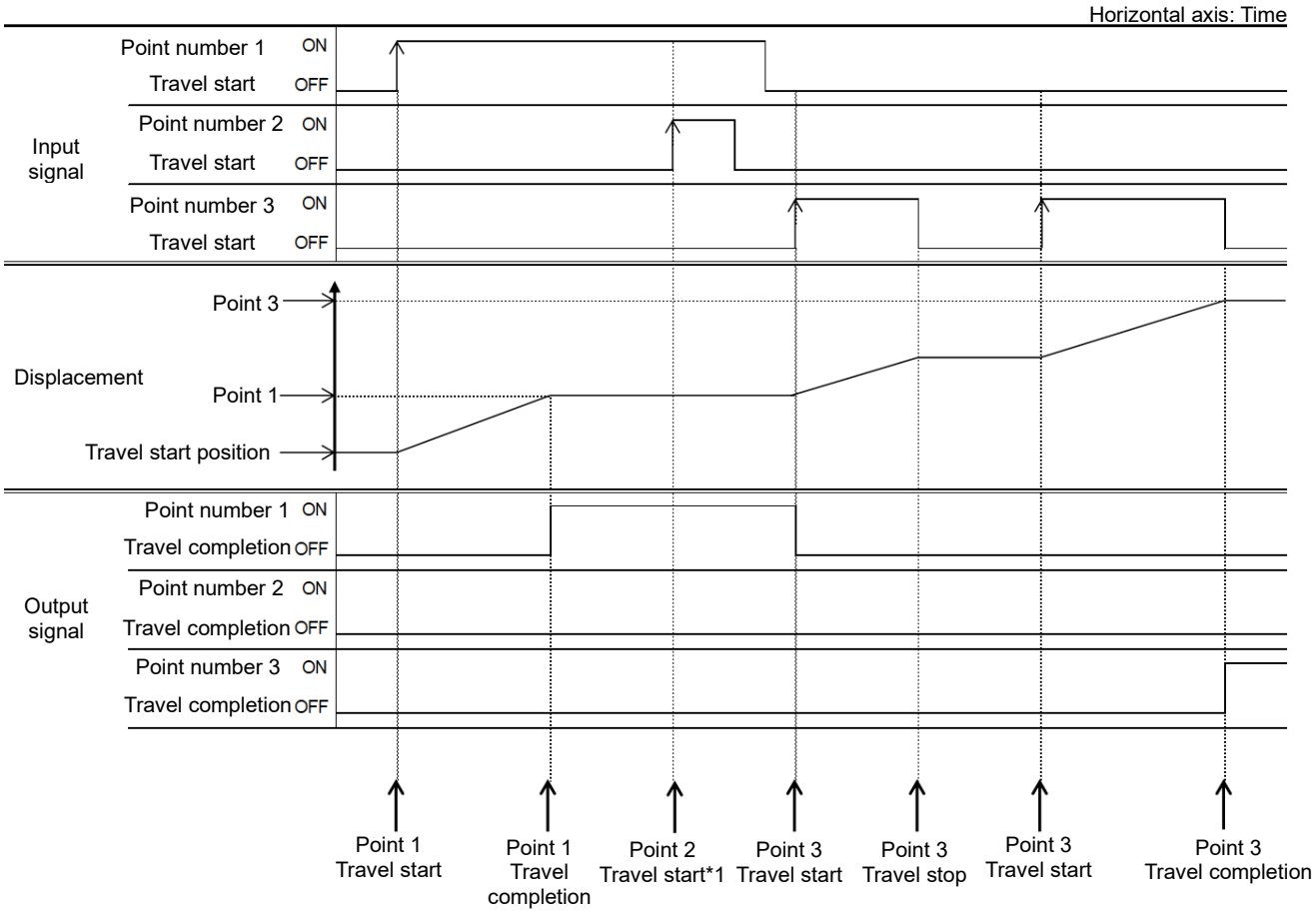
・Operation procedure

1 Turn ON the point travel start corresponding to the point where you want the actuator to operate.

2 Confirm that the point travel complete for the corresponding point is turned ON.

3 Turn OFF the point travel start that was ON.

・Time chart



Note 1: Does not start traveling while another point number travel start input is ON.
Note 2: The parameter "Travel complete output selection" switches point n travel complete and switch n (n=1 to 3).
Note 3: The output of switch 1 turns ON according to the positioning width set in the point data.
Note 4: The output of switch 2 turns ON according to the positioning width set in the point data.
Note 5: The output of switch 3 turns ON according to the positioning width set in the point data.

■ Solenoid valve mode, single type

Travels between two points by turning one input signal OFF (level input) or ON (level input). Use the following input and output signals.

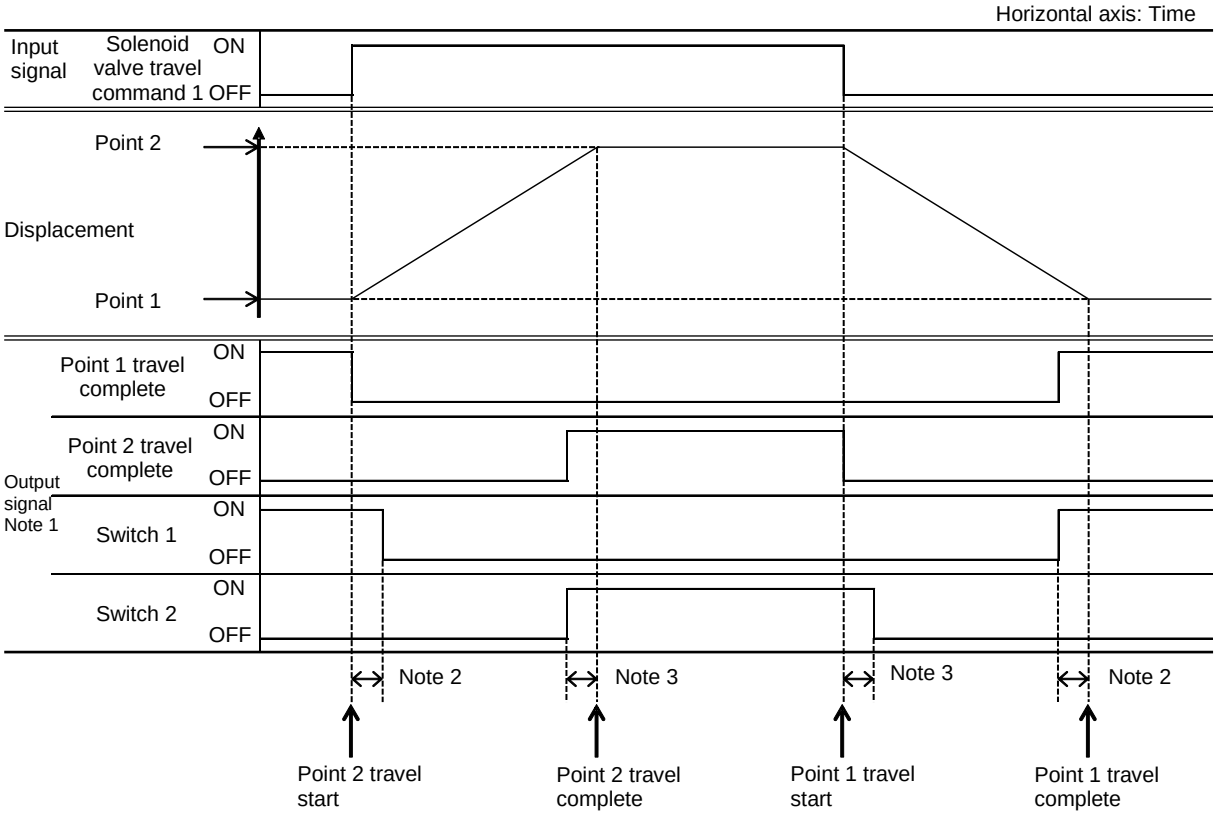
・Input signal 0: OFF (level input), 1: ON (level input), 0↓: OFF edge input, 1↑: ON edge input

Travel start input method	Solenoid valve travel command	Content
Edge	0↓	Begins traveling to point 1.
	1↑	Begins traveling to point 2.
Level	0	Begins traveling to point 1.
	1	Begins traveling to point 2.

・Output signal 0: OFF, 1: ON

Travel complete output selection	Point No. 1 to 2 travel complete/switch output 1 to 2	Content
Travel complete output	1	Turns ON when it finishes traveling to the corresponding point.
Switch output	1	Turns ON when entering the positioning completion width of corresponding point.

・Time chart



Note 1: The parameter "Travel complete output selection" switches point n travel complete and switch n (n=1, 2).
Note 2: The output of switch 1 turns ON according to the positioning width set in the point data.
Note 3: The output of switch 2 turns ON according to the positioning width set in the point data.

3.5.5 Pressing operation

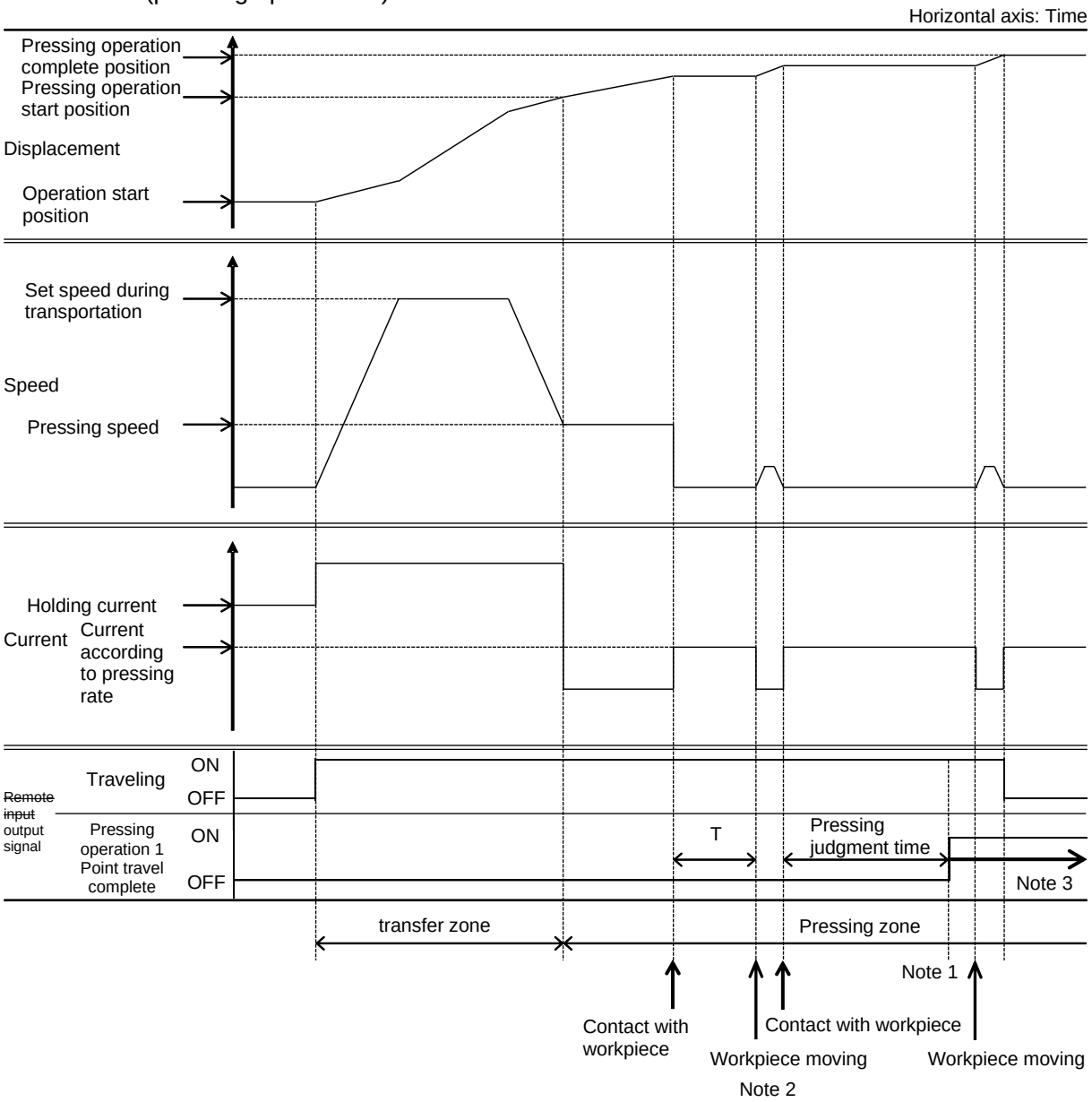
Depending on the operating environment and conditions, it may take time for the actuator to stop. If the stop time is 1.0 s or less, contact us.

Pressing operations can be performed by configuring either “pressing operation 1” or “pressing operation 2” in point data. After the travel operation, the actuator operates in the pressing zone at the set “pressing rate” or less. No alarm is output in the pressing zone even if it stops due to contact with a workpiece.

・Pressing operation settings

Setting item	Content
Pressing rate	The rate of the upper limit of the pressing force in a pressing zone to the maximum pressing force can be set in percentage [%]. Refer to “3.3.1 List of parameters” for details.
Pressing speed	The speed of the pressing zone can be set. Refer to “3.3.1 List of parameters” for details.
Pressing distance	The pressing zone width can be set. Refer to “3.3.1 List of parameters” for details.
Pressing judgment time	When setting pressing operation 1, the time until determining that pressing is complete can be set. Refer to “3.3.1 List of parameters” for details.

・Time chart (pressing operation 1)

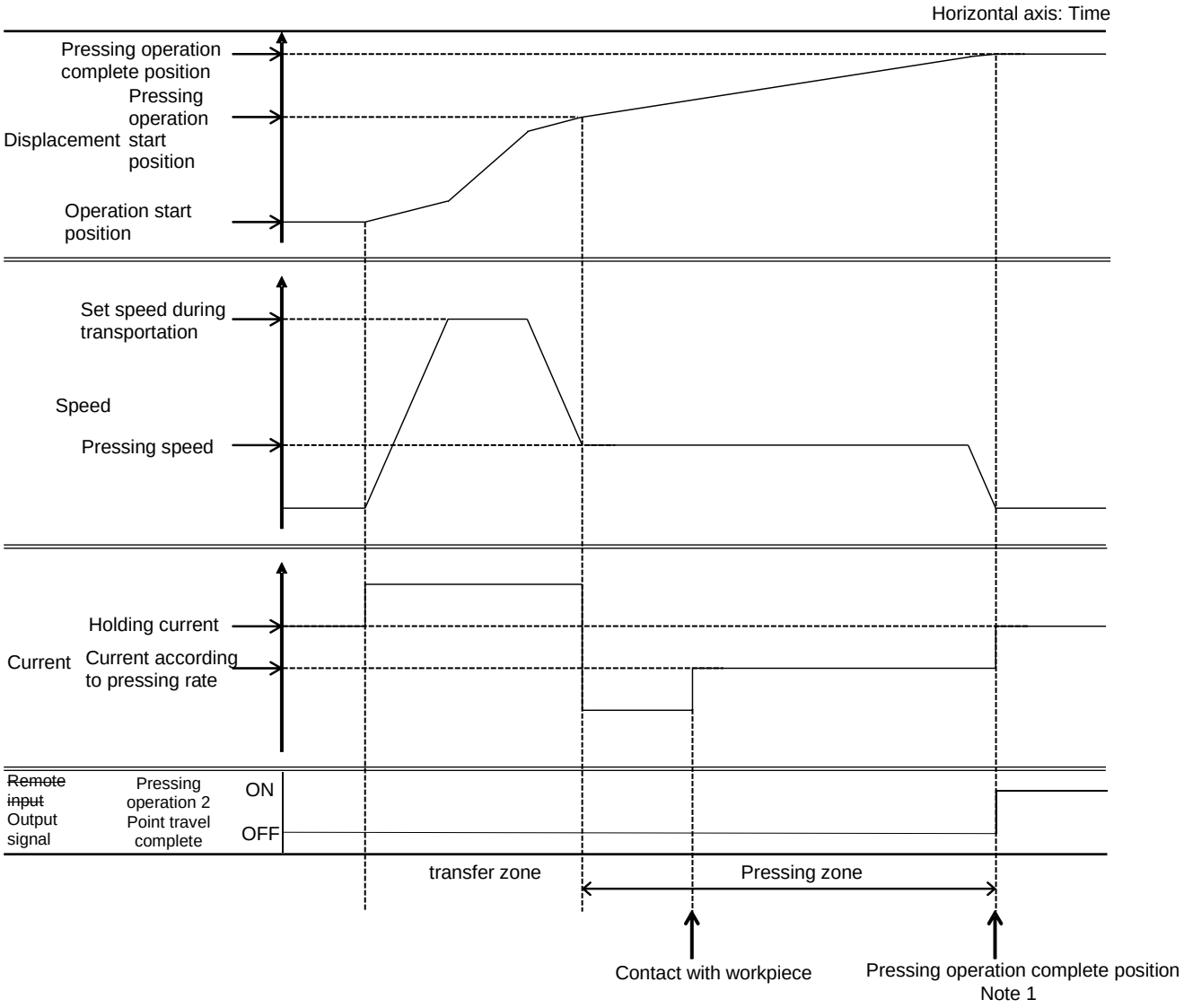


Note 1: If current corresponding to “Pressing judgment time” continues to flow for the “Pressing judgement time” or longer, the point travel complete is output. However, the output during traveling does not turn off until the pressing operation completion position is reached.

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 complete output, the point travel complete output continues to be ON.

・Time chart (Pressing operation 2)



Note 1: When the pressing operation completion position is reached, the point travel complete is output. If the actuator stops halfway and does not reach the operation completion position, the point travel complete is not output.

3.5.6 Operation when a new operation signal is input during operation

⚠CAUTION

Be careful of the operation signal input timing.

- It may be impossible to operate as configured according to settings such as the position, speed and acceleration.
- If a new operation signal is input near the software limit, an alarm for software limit over may be output.
- If a new operation signal is input during acceleration/deceleration, an overload alarm may be output.

Note the movement when a new operation signal is input.

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

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

New point target position	Content
Same as current actuation direction	Continues to operate to the target position at the speed set in the new point.
Opposite of current actuation direction	After decelerating, begins operating in the opposite direction.

Depending on the operating environment and conditions, it may take time for the actuator to stop. If the stop time is 1.0 s or less, contact us.

3.5.7 Holding operation after travel complete

⚠WARNING

Prevent falling during vertical operation.
When a workpiece is placed in the vertical direction, vibration or a sudden impact to the equipment could cause a load exceeding the holding force above to be applied. When placing a workpiece in the vertical direction, be sure to implement safety measures to prevent falling.

If the “stop method” is set to “fixed excitation” for the point data, it is held at the current value set in the “fixed current at stop” of the user parameters once travel is complete. If a load exceeding the holding force shown in the following table is applied while holding, an alarm may occur.

Actuator model number				Holding force [kg]
Series	Body size	Motor Mounting Direction	Screw lead	When using 24 V power supply
LRXE	04	E	06	9.2
			12	3.3
		R,L	06	9.2
			12	3.3
	05	E	05	14.2
			10	7.1
			20	2.5
		R,L	05	10.0
			10	3.3
			20	0.8
	08	E	05	43.3
			10	28.3
			20	3.3
		R,L	05	33.3
			10	28.3
			20	3.3
LRXG	20	E	06	6.4
			09	4.0
	32	E	06	11.6
			12	4.8
	50	E	06	19.6
			12	13.2

4. MAINTENANCE AND INSPECTION

⚠WARNING

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

Do not work with wet hands.
An electric shock may occur.

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

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

Do not disassemble or modify the product.
An injury, accident, malfunction, or failure may occur.

⚠CAUTION

Wiring and inspection must be performed by specialists.

For the lead wires used for the power cable, use wires with a sufficient diameter that can allow the instantaneous maximum current to flow.
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.
The product may become damaged or the continuous flow of currents may cause a fire.

Stop supplying power to the product before performing maintenance, inspection, and repair.

Take measures to prevent a third person from turning on the power unexpectedly.

For the LRXE series, the grease lubrication interval is set at 100 km as a guide.
Since the greasing interval depends on the conditions of use, consider the appropriate interval when performing initial inspection.

Wear protective glasses when greasing.
If spattered grease comes in contact with the eyes, it can cause inflammation.

4.1 Periodic Inspection

In order to use the product under optimum conditions, perform a periodic inspection two to three times a year.

4.1.1 Inspection item

Turn off the power before performing items 1, 2, and 3 below.

No.	Inspection item	Inspection method	Action
1	Check that the mounting bolts on the product and the screws on the terminal block are not loose.	Looseness check	Turn off the power, and then additionally tighten them with the specified torque.
2	Check that connectors are not loose.	Looseness check	Turn off the power, and then insert the connectors correctly.
3	Check that there are no scratches and cracks on the cables.	Visual inspection	Turn off the power and then replace cables.
4	Check that foreign matters are not accumulating or are not stuck in between the movable section.	Visual inspection	Turn off the power, and then perform cleaning. Note 1 After cleaning, apply grease. For the LRXG series, the recommended frequency is once every 3 months or every 100 km. Note 2, Note 3
5	Check that there are no vibrations or abnormal sounds while the product is stopped or operated.	Noise inspection	If there is any abnormality, contact your nearest CKD sales office or distributor.
6	Check that the power supply voltage is normal.	Tester	Check the power system and use the product within the power supply voltage range described in the Specifications. Supply voltage: 24 VDC ±10% (24 VDC ± 5% if cable length exceeds 5 m)

Note 1: Use a clean waste cloth for cleaning and make sure not to leave foreign matters on the movable section.
Note 2: For how to apply grease, refer to “4.1.3 Lubrication procedures“.
Note 3: Apply grease earlier than recommended to low-lead products to use the actuator more safely.

4.1.2 Application of grease

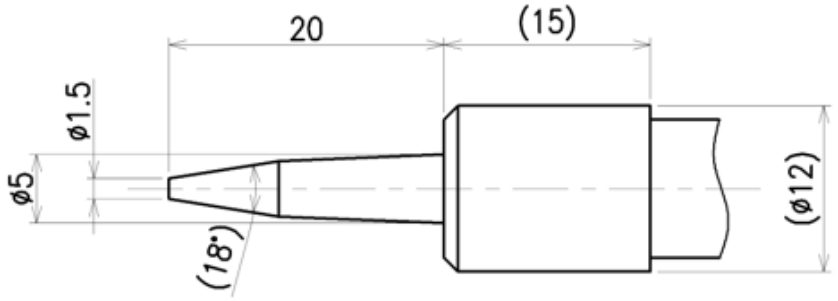
For grease lubrication for the LRXE-BS series, refer to the following.

■ Grease

Model	Manufacturer	Target actuator
AC-D	Kyodo-Yushi Co., Ltd.	LRXE Series

■ Nozzle tip shape

For the recommended tip shape of a nozzle used for grease application, refer to the following figure.
The grease nozzle for EBS/EBR series cannot be used.



Model	Manufacturer	Target actuator
HSP-3	Yamada Corporation Co., Ltd.	LRXE Series

4.1.3 Lubrication procedures

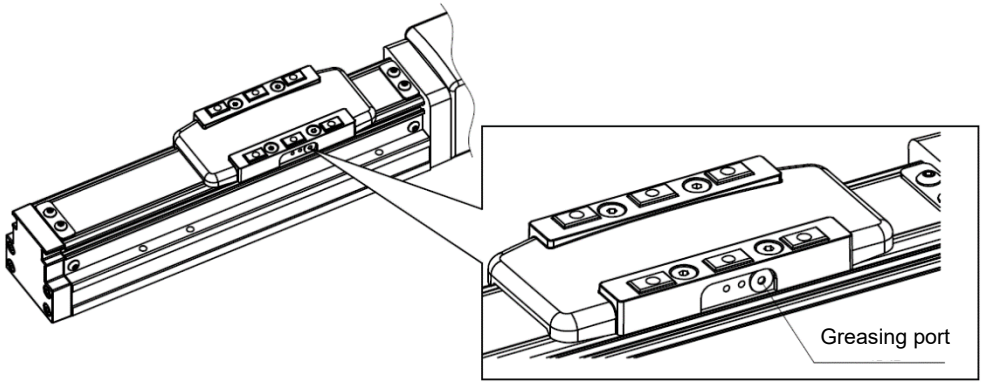
The lubrication procedure for theLRXE-BS series is as follows:

1. Wipe off grease and dirt.

Wipe off old grease and dirt with a clean waste cloth. Use caution to prevent foreign matter from remaining in the moving parts.

2. Inject grease.

While moving the slider slowly, inject grease from the greasing port on the side of the slider. Grease is applied to the guide section and the ball screw part.



3. Perform a break-in operation.

Perform a break-in operation to allow grease to settle in between the parts.

Be careful not to lose the removed parts such as bolts because they will be required again for assembly.

4.1.4 Replacement and adjustment procedures for the steel belt

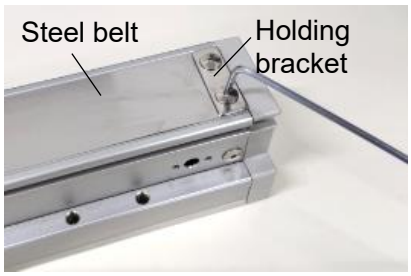
The procedures for replacing and adjusting the steel belt in the LRXE-BS series are as follows:

1. Remove the resin cover.

Loosen the four bolts on the slider section with a hex key for M3 (across flats: 2 mm) and then remove the resin cover.

2. Remove the steel belt.

Remove the two bolts on each end of the steel belt with a hex key for M3 (across flats: 2 mm) and also the two holding brackets and then remove the steel belt.



3. Move the slider to the non-motor side.

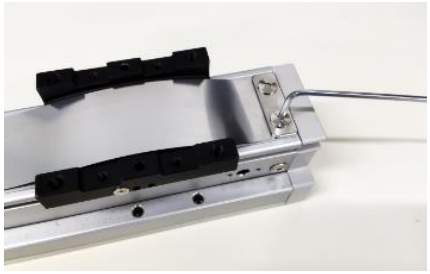
Clean the installation surface of the steel belt, confirm that there is no damage on the installation surface, and then move the slider to the stroke end of the non-motor side.

4. Replace the steel belt.

Place a new steel belt and temporarily fasten the holding brackets and bolts removed in Step 2. Temporarily tighten the bolts to the extent that the steel belt can slide.

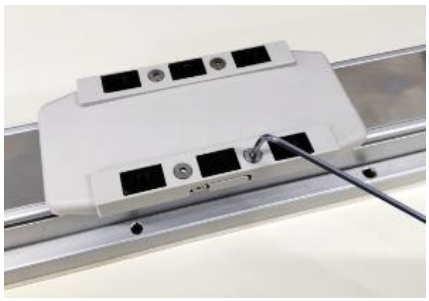
5. Secure the steel belt.

Align the steel belt with the shaft center and tighten the two bolts on the non-motor side with the specified tightening torque (0.4 N·m). Next, while keeping the steel belt along the slider, tighten the two bolts on the motor side with the specified tightening torque (0.4 N·m).



6. Attach the resin cover.

Attach the resin cover and then tighten the bolts on the slider section with the specified tightening torque (0.4 N·m).



7. Make sure that the steel belt is fully seated.

Move the slider back and forth to make sure that the steel belt is fully seated.

- Be careful not to lose the removed parts such as bolts because they will be required again for assembly.
- The steel belt deforms easily, so be careful for handling.

4.1.5 Replacement and adjustment procedures for the timing belt

This section describes the procedures for replacing and adjusting the timing belt when the motor mounting direction is "R: Right mounting," or "L: Left mounting."

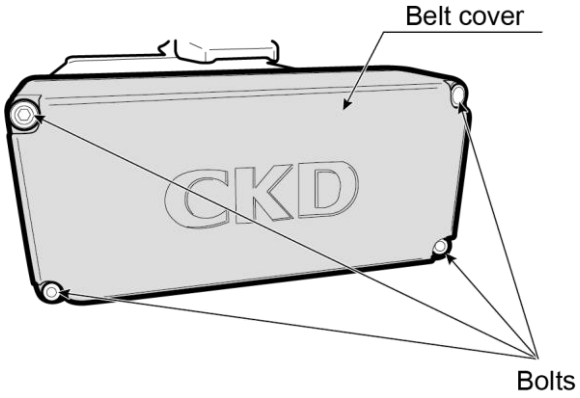
- Be careful not to lose the removed parts such as bolts because they will be required again for assembly.
- Replacing the timing belt misaligns the origin position. Be sure to adjust the origin position before operation.

■ Removing the belt cover

Bolt	Tool
Hexagon socket head bolt (M3 x 30L) x 4 pieces	Hex key for M3 (across flats: 2.5 mm)

1. Remove the belt cover.

Remove four bolts with the hex key and remove the belt cover.



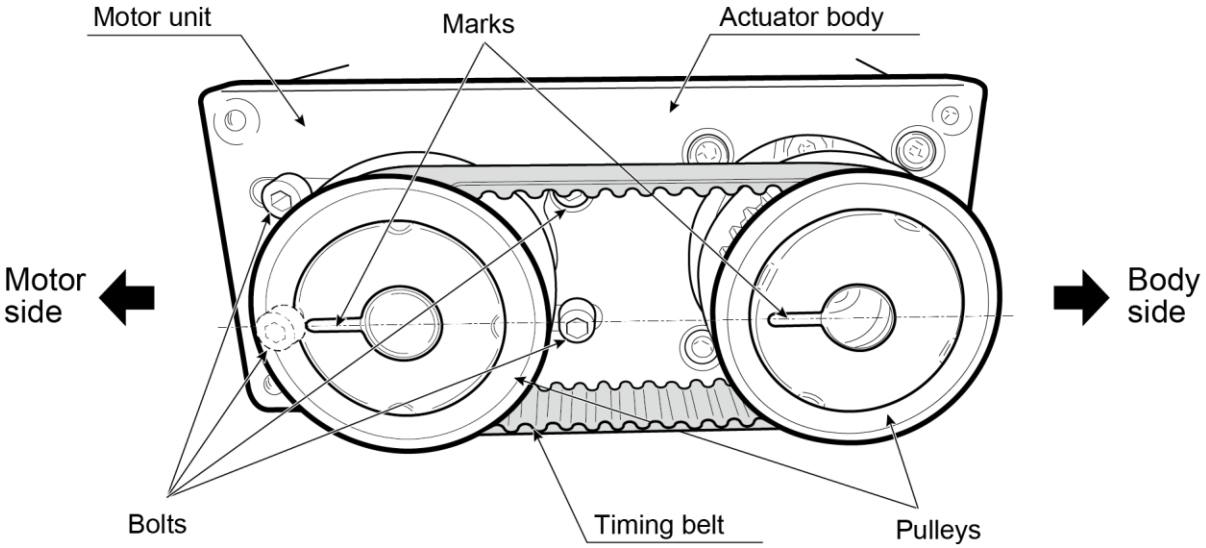
■ Replacing the timing belt

Bolt	Tool	Actuator
Hexagon socket head bolt (M3 x 16L) x 4 pieces	Hex key for M3 (across flats: 2.5 mm)	EJSG-04R/D/L EJSG-05R/D/L
Hexagon socket head bolt (M4 x 18L) x 4 pieces	Hex key for M4 (across flats: 3 mm)	EJSG-08R/D/L

Timing belt model number	Motor mounting direction of Supported actuators
EJSG-04R-BELT	LRXE-BS-04R/L
EJSG-05R-BELT	LRXE-BS-05R/L
EJSG-08R-BELT	LRXE-BS-08R/L

1. Loosen the fixed parts of the motor unit.

Slightly loosen the four bolts with a hex key. Loosen them to the extent that the motor unit can slide without rattling.



2. Remove the timing belt from the pulleys.

Slide the motor unit toward the body side, and remove the timing belt from the pulleys.

3. Replace the timing belt.

Replace the timing belt with a new one and attach it to the pulleys.

4. Align the position of the pulleys.

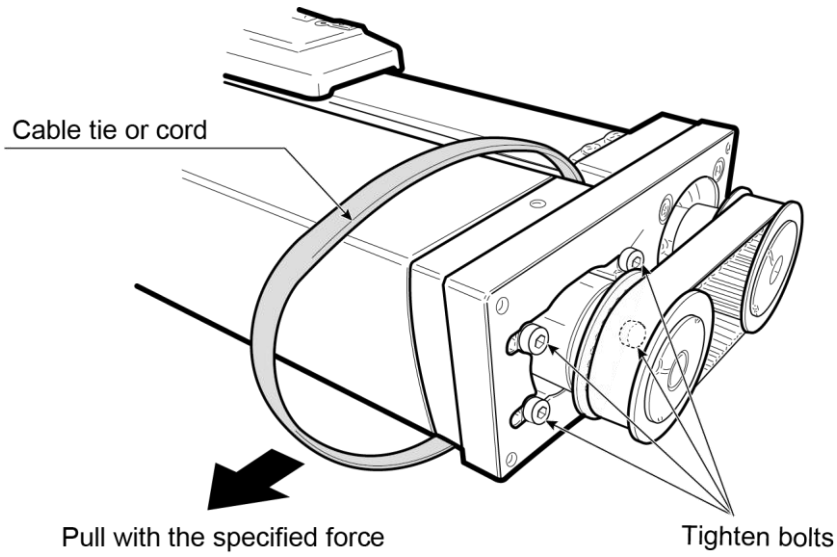
Apply tension to the timing belt and adjust it so that the marks on the pulleys are aligned and facing the motor side.

■ Adjusting the tension on the timing belt

Bolt	Tool	Actuator
Hexagon socket head bolt (M3 x 16L) x 4 pieces	Hex key for M3 (across flats: 2.5 mm)	LRXE-BS-04R/L LRXE-BS-05R/L
Hexagon socket head bolt (M4 x 18L) x 4 pieces	Hex key for M4 (across flats: 3 mm)	LRXE-BS-08R/L

1. Put a cable tie or a cord around the base of the motor section.

Put a cable tie or a cord around the base of the motor section so that the tension of the timing belt can be easily adjusted.



2. Pull the cable tie or cord and tighten bolts.

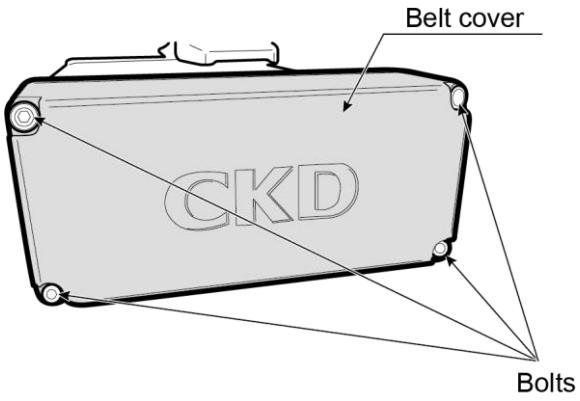
While pulling the cable tie or cord with the specified force (common in all models: 40 N) to adjust the tension of the timing belt, tighten the four bolts with the specified tightening torque (LRXE-BS-04 or LRXE-BE-05: 0.3 N·m, LRXE-BS-08: 0.7 N·m).

■ **Attaching the belt cover**

Bolt	Tool
Hexagon socket head bolt (M3 x 30L) x 4 pieces	Hex key for M3 (across flats: 2.5 mm)

1. Attach the belt cover.

Tighten four bolts with the specified tightening torque (0.3 N·m) and attach the belt cover.



4.1.6 How to adjust the home position

Adjust the home position from the S-Tools operation panel. Refer to Adjustment 2 in the instruction manual (SM-A11147-A) for details.

5. TROUBLESHOOTING

5.1 Items to Check When a Problem Occurs

When a problem occurs, ensure safety and follow the procedure below.

1	Check the state of the controller LEDs. Refer to “” for LED indications.
2	Check if there is a problem with the PLC.
3	Check the voltage of the control power supply and motor power supply (24 VDC).
4	Check the details on the alarm. The details on the alarm can be checked with the setting software (S-Tools).
5	Check the communication status with the PLC using the PLC development tool or S-Tools.
6	Check that there is no disconnection or pinching of the cables and that they are connected correctly. Before checking the continuity, turn off the power and remove the cables to prevent an electric shock.
7	Check that measures (such as connecting the ground wire and attaching the surge suppressor) have been taken against noise.
8	Check the course of events and the operating conditions at the time the problem occurred.
9	Check the serial number of the product.

If the problem persists, refer also to "5.3 Problems, Causes, and Solutions".

5.2 Alarm Code

⚠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 an alarm related to actuator operation such as "Overload (C)" occurs, the actuator or controller may be malfunctioning. If the alarm recurs after implementing the countermeasures listed in the table below and restarting the controller power, contact CKD.

■ Alarms

An alarm is output when an error that affects the operation of the actuator is detected. There are alarms that can be reset and alarms that require power cycling (turning off and then on again), depending on the degree of the error.

Alarm code	Alarm item	Description	Solution	Alarm reset
0x1000 to 0x1FFF	Memory (Read)	An error has been detected in reading data from memory at power-on.	"0x1300 to 0x13FF" indicates that there is an error in the parameter data. Initialize the parameter data and power cycle. "0x1500 to 0x15FF" indicates that there is an error in the point data. Initialize the point data and power cycle. "0x1700 to 0x170F" indicates that there is an error in the alarm data. Input the alarm reset signal and power cycle. "0x1800 to 0x180F" indicates that there is an error in the alarm data. Initialize the alarm data and power cycle. Other codes indicate that there is an error in the data inside. If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x2000 to 0x2FFF	Memory (Write)	An error has been detected in writing data into memory when changing data.	If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x3000 to 0x30FF	Temperature	The temperature in the controller is high.	Check the ambient temperature. If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x3100 to 0x31FF	Current	An overcurrent has flown into the motor.	If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No
0x3800 to 0x38FF	TOOL not connected	There is a problem with the connector connection while using the product in TOOL mode.	Check the connection between the cable and the connector. If the connector is disconnected, connect the connector. After changing the mode to PLC mode, reset the alarm.	Yes
0x4000 to 0x40FF	Parameter data	There is an error in the parameter data.	For the following parameters, reconfigure the parameters and power cycle: Software limit (+), Software limit (−), Home position offset amount	No
			For the following parameters, reset the alarm: Home position return speed, Holding current at stop	Yes
0x4100 to 0x41FF	Point data (Position)	There is an error in the point data when a travel command is input to that point number.	The final target position is outside the range of the soft limit. Reconfigure the following point data and reset the alarm. Point data: Position, Pressing distance	Yes

Alarm code	Alarm item	Description	Solution	Alarm reset
0x4200 to 0x42FF	Point data (Speed)	There is an error in the point data when a travel command is input to that point number.	The point data setting is outside the setting range. Reconfigure the following point data and reset the alarm. Point data: speed, acceleration, deceleration, pressing speed	Yes
0x4300 to 0x43FF	Point data (Pressing)	There is an error in the point data when a travel command is input to that point number.	The point data setting is outside the setting range. Reconfigure the following point data and reset the alarm. Point data: Pressing current	Yes
0x6000 to 0x60FF	Servo ON	There is an error in the encoder data signal for exciting the motor when the servo is turned on for the first time after power-on.	Check the connection of the cable and the connector connecting the controller and the actuator. Check that the actuator is not restrained and reset the alarm.	Yes
0x6200 to 0x62FF	Home position return	The home position cannot be detected even after traveling a distance longer than the stroke of the actuator when returning to the home position.	Check the connection of the cable and the connector connecting the controller and the actuator. Check that there is no problem and reset the alarm.	Yes
0x6400 to 0x64FF	Outside soft limit	The present position is outside the range of the soft limit when traveling from point to point.	If the alarm occurs due to an overshoot when positioning close to the soft limit, check the load conditions. The alarm will also occur when a travel command from point to point is input from outside the range of the soft limit. In this case, move the actuator manually so that the present position is within the range of the soft limit. Check that there is no problem and reset the alarm.	Yes
0x6500 to 0x65FF	Overload (M)	The fingers cannot travel.	Check the load and operating conditions. Check that there is no problem and reset the alarm.	Yes
0x6600 to 0x66FF	Overload (P)	The fingers have been pushed back to the pressing start point by external force when pressing.	Check the load and operating conditions. Check that there is no problem and reset the alarm.	Yes
0x6700 to 0x67FF	Overload (S)	The fingers cannot stop.	Check the load and operating conditions. Check that there is no problem and reset the alarm.	Yes
0x6800 to 0x68FF	Overload (H)	The fingers have become misaligned when stopping.	Check the load and operating conditions. Check the setting of the "Holding current at stop" in the parameter data. Check that there is no problem and reset the alarm.	Yes
0x6900 to 0x69FF	Overload (C)	An overcurrent has flown into the motor.	Check the load and operating conditions. Check that there is no problem and reset the alarm.	Yes
0x6A00 to 0x6AFF	Overload (D)	There is a problem in controlling the position.	Check the load and operating conditions. Check that there is no problem and reset the alarm.	Yes
0x6B00 to 0x6BFF	Overload (T)	Excessive torque output has continued.	Check the load and operating conditions. Check that there is no problem and reset the alarm.	Yes
0x7000 to 0x7FFF	Memory (Initialization)	An error has been detected in initializing memory data when changing data.	If the error reoccurs even after power cycling, contact your nearest CKD sales office or distributor.	No

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

■ Warnings

A warning is output when a slight error that does not affect the operation of the actuator is detected. It can be cleared by changing the controller settings.

Alarm code	Alarm item	Problem	Cause/Solution
0x0201	Maintenance data (Running distance)	The integrated running distance has exceeded the threshold.	The integrated running distance has exceeded the threshold set in the user parameter. After performing maintenance, reconfigure the threshold. The warning is cleared when the threshold exceeds the integrated running distance.
0x0211	Maintenance data (Number of travels)	The integrated number of travels has exceeded the threshold.	The integrated number of travels has exceeded the threshold set in the user parameter. After performing maintenance, reconfigure the threshold. The warning is cleared when the threshold exceeds the integrated number of travels.
0x0221	Maintenance data (Operating time)	The integrated operating time has exceeded the threshold.	The integrated operating time has exceeded the threshold set in the user parameter. After performing maintenance, reconfigure the threshold. The warning is cleared when the threshold exceeds the integrated operating time.
0x0401	Motor power supply voltage drop	The voltage of the motor power supply is below a certain value.	The voltage of the motor power supply detected by the controller is less than 21.6 V while the motor power supply is ON. Adjust the voltage of the motor power supply The warning is canceled when the voltage of the motor power supply detected by the controller is 21.6 V or more.
0x0501	Temperature abnormality	Controller section temperature exceeds threshold.	Controller section temperature exceeds the user parameter setting threshold. After checking the operating conditions, reconfigure the threshold. The warning is cancelled when the temperature of the controller section falls below the threshold.

5.3 Problems, Causes, and Solutions

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

Problem	Cause	Solution
No operation standby completion signal is output.	No voltage is applied to P24 of the communication cable.	Apply voltage to P24 of the communication cable.
	Wiring is not correct.	Refer to "2.4 Wiring" and check the wiring.
Product does not operate as intended with signal from PLC.	Input signal is unstable.	Input from the higher system may be causing chattering. Maintain the input signal for 20 ms or more.
	Home position return cannot be completed or performed.	Transfer load may be too large. Check the Specifications.
	Setting of position, speed, acceleration, or pressing force is not correct.	Check the contents of the point data and user parameters.
	Wiring is not correct.	Refer to "2.4 Wiring" and check the wiring.
	Friction load is too large.	Check the friction load during transfer. Check that there is no jamming with the workpiece.
	Workpiece is in contact with the fingers.	Check how the device is assembled and set up.
	Internal resistance of product has increased.	Check the environment conditions and the conditions of use. Check how long the product has been in use (operation distance).
	Actuator body is damaged.	Repair or replace the product. Refer to "5.1 Items to Check When a Problem Occurs" and contact your nearest CKD sales office or distributor.
Product itself vibrates.	Connection to actuator is loose.	Tighten the bolts.
Product does not operate with PLC.	Mode is set to TOOL mode.	Change the mode to PLC mode using the setting tool (S-Tools).
	Wiring is not correct.	Refer to "2.4 Wiring" and check the wiring.
	Wiring is disconnected.	Check for pinching and disconnection of cables and check the connection of connectors and terminals.
	Overload error has occurred.	Check the transfer load and the speed.
	Power capacity is insufficient.	Check that the power capacity satisfies the required voltage and current.
Workpiece moves due to its own weight during an emergency stop.	Load exceeding holding force is applied.	Check whether an external force greater than the holding force is applied. Check the setting of the "Holding current at stop" in the parameter data.

Problem	Cause	Solution
Travel complete output does not turn off.	Positioning completion output width is too large for distance of travel.	Check the point data "Positioning width".
Pressing operation cannot be performed.	Operation method is not set to pressing operation.	Check the point data "Operation method".
Device is out of step.	Load or speed has exceeded limit.	Check that the workpiece weight and the operation speed satisfy the specified values.
Product cannot achieve desired speed (it is very slow).	Operation method is set to pressing operation instead of positioning operation.	Check the point data "Operation method". Adjust the gain.
Overshoot occurs.	Amount of deceleration is large because transfer weight is large.	Check that the workpiece weight and the operation speed satisfy the specified values. Adjust the gain.

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

6. PRODUCT COMPLIANCE

Products with the CE marking conform to European standards. Products without the CE marking do not 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.

6.1 EU Directives/European Standards

EMC Directive: 2014/30/EU
EN61000-6-2:2005
EN55011:2016+A1:2017+A11:2020
EN55011:2016+A2:2021
(Group 1 Class A)
RoHS Directive: 2011/65/EU and (EU)2015/863
EN 50581:2012

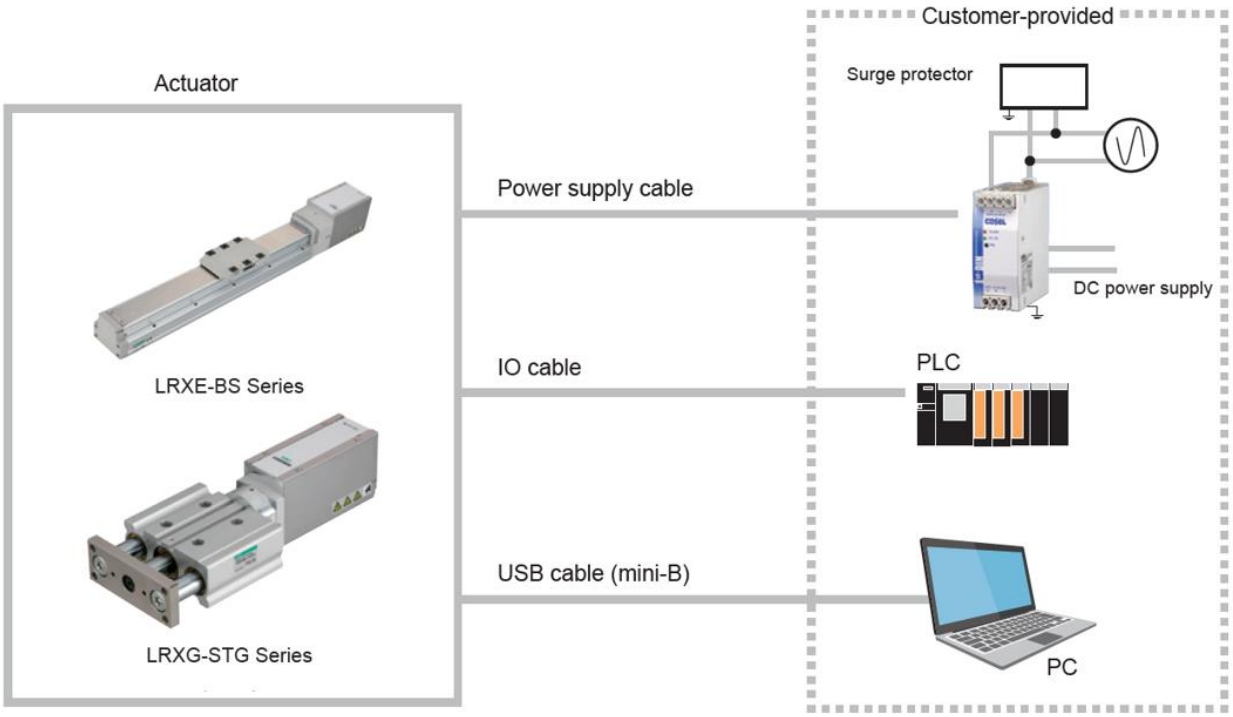
6.1.1 Environment

Condition	Temperature	Humidity
During use	10 to 40°C (no freezing)	35% to 80% RH (no condensation)
During storage	-10 to 50°C (no freezing)	35% to 80% RH (no condensation)
During transport	-10 to 50°C (no freezing)	35% to 80% RH (no condensation)

6.1.2 System structure

The figure below shows an example of a system configuration for this product (LRX series) in conformance with European standards.
A surge protector is required to comply with European standards.

<Example of an EMC Directive-compliant system structure>



Equipment and cables marked with an asterisk (*) must be provided by the customer.

Part required	Model number	Manufacturer
Surge protector	RSPD-250-Q4	Okaya Electric Industries Co., Ltd
	RSPD-250-U4	
	LT-CS32G801WS	Soshin Electric Co., Ltd.
	LT-C32G801WS	

7. WARRANTY PROVISIONS

7.1 Warranty Conditions

■ Warranty coverage

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

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

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

■ Confirmation of product compatibility

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

■ Others

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

7.2 Warranty Period

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