



# ROBO Cylinder RCS2/RCS2W Actuators Rod Type Operation Manual



**Tenth Edition**



Standard Type	Motor Straight Type (Coupling Type):	RA4C, RA5C, RGS4C, RGS5C, RGD4C, RGD5C
Standard Type	Motor Straight Type (Built-in Type):	RA4D, RA7AD, SRA7BD, RA7BD, RGS4D, RGS7AD, SRGS7BD, RGS7BD, RGD4D, RGD7AD, SRGD7BD, RGD7BD
Standard Type	Motor Reversing Type:	RA4R, RA5R, RGD4R
Standard Type	Flat Type:	F5D
Dustproof/Splash-proof Type	Motor Straight Type (Coupling Type):	RA4C
Dustproof/Splash-proof Type	Motor Straight Type (Built-in Type):	RA4D
Dustproof/Splash-proof Type	Motor Reversing Type:	RA4R



## **Please Read Before Use**

Thank you for purchasing our product.

This Operation Manual explains the handling methods, structure and maintenance of this product, among others, providing the information you need to know to use the product safely.

Before using the product, be sure to read this manual and fully understand the contents explained herein to ensure safe use of the product.

The CD or DVD that comes with the product contains Operation Manuals for IAI products.

When using the product, refer to the necessary portions of the applicable Operation manual by printing them out or displaying them on a PC.

After reading the Operation Manual, keep it in a convenient place so that whoever is handling this product can reference it quickly when necessary.

### **[Important]**

- This Operation Manual is original.
- The product cannot be operated in any way unless expressly specified in this Operation Manual. IAI shall assume no responsibility for the outcome of any operation not specified herein.
- Information contained in this Operation Manual is subject to change without notice for the purpose of product improvement.
- If you have any question or comment regarding the content of this manual, please contact the IAI sales office near you.
- Using or copying all or part of this Operation Manual without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

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## Safety Guide

“Safety Guide” has been written to use the machine safely and so prevent personal injury or property damage beforehand. Make sure to read it before the operation of this product.

### Safety Precautions for Our Products

The common safety precautions for the use of any of our robots in each operation.

No.	Operation Description	Description
1	Model Selection	<ul style="list-style-type: none"> <li>● This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications.               <ol style="list-style-type: none"> <li>1) Medical equipment used to maintain, control or otherwise affect human life or physical health.</li> <li>2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility)</li> <li>3) Important safety parts of machinery (Safety device, etc.)</li> </ol> </li> <li>● Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product.</li> <li>● Do not use it in any of the following environments.               <ol style="list-style-type: none"> <li>1) Location where there is any inflammable gas, inflammable object or explosive</li> <li>2) Place with potential exposure to radiation</li> <li>3) Location with the ambient temperature or relative humidity exceeding the specification range</li> <li>4) Location where radiant heat is added from direct sunlight or other large heat source</li> <li>5) Location where condensation occurs due to abrupt temperature changes</li> <li>6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid)</li> <li>7) Location exposed to significant amount of dust, salt or iron powder</li> <li>8) Location subject to direct vibration or impact</li> </ol> </li> <li>● For an actuator used in vertical orientation, select a model which is equipped with a brake. If selecting a model with no brake, the moving part may drop when the power is turned OFF and may cause an accident such as an injury or damage on the work piece.</li> </ul>

No.	Operation Description	Description
2	Transportation	<ul style="list-style-type: none"> <li>● When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane.</li> <li>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>● When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped.</li> <li>● Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the operation manual for each model.</li> <li>● Do not step or sit on the package.</li> <li>● Do not put any heavy thing that can deform the package, on it.</li> <li>● When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work.</li> <li>● When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit.</li> <li>● Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength.</li> <li>● Do not get on the load that is hung on a crane.</li> <li>● Do not leave a load hung up with a crane.</li> <li>● Do not stand under the load that is hung up with a crane.</li> </ul>
3	Storage and Preservation	<ul style="list-style-type: none"> <li>● The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation.</li> <li>● Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.</li> </ul>
4	Installation and Start	<p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> <li>● Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. Also, be equipped for a fall-over or drop due to an act of God such as earthquake.</li> <li>● Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life.</li> <li>● When using the product in any of the places specified below, provide a sufficient shield.             <ol style="list-style-type: none"> <li>1) Location where electric noise is generated</li> <li>2) Location where high electrical or magnetic field is present</li> <li>3) Location with the mains or power lines passing nearby</li> <li>4) Location where the product may come in contact with water, oil or chemical droplets</li> </ol> </li> </ul>

No.	Operation Description	Description
4	Installation and Start	<p>(2) Cable Wiring</p> <ul style="list-style-type: none"> <li>● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool.</li> <li>● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error.</li> <li>● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error.</li> <li>● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction.</li> <li>● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product.</li> <li>● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire.</li> </ul> <p>(3) Grounding</p> <ul style="list-style-type: none"> <li>● The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation.</li> <li>● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure to use a twisted pair cable with wire thickness 0.5mm<sup>2</sup> (AWG20 or equivalent) or more for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards).</li> <li>● Perform Class D Grounding (former Class 3 Grounding with ground resistance 100Ω or below).</li> </ul>

No.	Operation Description	Description
4	Installation and Start	<p>(4) Safety Measures</p> <ul style="list-style-type: none"> <li>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>● When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury.</li> <li>● Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation.</li> <li>● Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product.</li> <li>● Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input.</li> <li>● When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury.</li> <li>● Take the measure so that the work part is not dropped in power failure or emergency stop.</li> <li>● Wear protection gloves, goggle or safety shoes, as necessary, to secure safety.</li> <li>● Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire.</li> <li>● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.</li> </ul>
5	Teaching	<ul style="list-style-type: none"> <li>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>● Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well.</li> <li>● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency.</li> <li>● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly.</li> <li>● Place a sign "Under Operation" at the position easy to see.</li> <li>● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.</li> </ul> <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>

No.	Operation Description	Description
6	Trial Operation	<ul style="list-style-type: none"> <li>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>● After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation.</li> <li>● When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation.</li> <li>● Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc.</li> <li>● Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.</li> </ul>
7	Automatic Operation	<ul style="list-style-type: none"> <li>● Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence.</li> <li>● Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication.</li> <li>● Make sure to operate automatic operation start from outside of the safety protection fence.</li> <li>● In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product.</li> <li>● When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.</li> </ul>

No.	Operation Description	Description
8	Maintenance and Inspection	<ul style="list-style-type: none"> <li>● When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>● Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well.</li> <li>● When the work is to be performed inside the safety protection fence, basically turn OFF the power switch.</li> <li>● When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency.</li> <li>● When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly.</li> <li>● Place a sign “Under Operation” at the position easy to see.</li> <li>● For the grease for the guide or ball screw, use appropriate grease according to the Operation Manual for each model.</li> <li>● Do not perform the dielectric strength test. Failure to do so may result in a damage to the product.</li> <li>● When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.</li> <li>● The slider or rod may get misaligned OFF the stop position if the servo is turned OFF. Be careful not to get injured or damaged due to an unnecessary operation.</li> <li>● Pay attention not to lose the cover or untightened screws, and make sure to put the product back to the original condition after maintenance and inspection works.</li> </ul> <p>Use in incomplete condition may cause damage to the product or an injury.</p> <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>
9	Modification and Dismantle	<ul style="list-style-type: none"> <li>● Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.</li> </ul>
10	Disposal	<ul style="list-style-type: none"> <li>● When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste.</li> <li>● When removing the actuator for disposal, pay attention to drop of components when detaching screws.</li> <li>● Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.</li> </ul>
11	Other	<ul style="list-style-type: none"> <li>● Do not come close to the product or the harnesses if you are a person who requires a support of medical devices such as a pacemaker. Doing so may affect the performance of your medical device.</li> <li>● See Overseas Specifications Compliance Manual to check whether complies if necessary.</li> <li>● For the handling of actuators and controllers, follow the dedicated operation manual of each unit to ensure the safety.</li> </ul>

## Alert Indication

The safety precautions are divided into “Danger”, “Warning”, “Caution” and “Notice” according to the warning level, as follows, and described in the Operation Manual for each model.

Level	Degree of Danger and Damage	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	 Danger
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could result in death or serious injury.	 Warning
Caution	This indicates a potentially hazardous situation which, if the product is not handled correctly, may result in minor injury or property damage.	 Caution
Notice	This indicates lower possibility for the injury, but should be kept to use this product properly.	 Notice

## Precautions

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1. Do not attempt to establish the settings for the speed and acceleration/deceleration above the allowable range.  
An operation with speed and acceleration/deceleration beyond the allowable range may cause an abnormal noise, vibration, malfunction or shortened life.
2. Back and forth operation in short distance may wear out the oil film of the grease.  
If the actuators are moved back and forth continuously over a short distance of 30 mm or less, grease film may run out. As a guide, move the actuators back and forth repeatedly for around 5 cycles over a distance of 50 mm or more after every 5,000 to 10,000 cycles. Keep using the actuators with the grease worn out may cause malfunction. If it is extreme, flaking may occur on the guide.
3. Do not attempt to apply a rotary torque  
Doing so may damage the internal component such as the rod stopper, and may result in an operation failure.
4. The allowable load moment for the flat type should be within the allowable range.  
If the robot is operated under a load equal to or greater than the allowable load moment, abnormal noise or vibration, failure, or shorter life may result. In an extreme case, flaking may occur. If it is extreme, flaking may occur on the guide.
5. For the model equipped with the home-position check sensor (Model: HS), do not attempt to have the home return speed setting faster than the initial setting at the time the product was delivered.  
Because the home-position check sensor switch is stored inside the body on the motor end, it may get damaged if the setting is made faster than the initial.
6. Make sure to attach the actuator properly by following this instruction manual.  
Using the product with the actuator not being certainly retained or affixed may cause abnormal noise, vibration, malfunction or shorten the product life.
7. Ensure use of the product in the specified conditions, environments and ranges.  
An operation out of the guarantee may cause a drop in performance or malfunction of the product.

## International Standards Compliances

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This actuator complies with the following overseas standards.

Refer to Overseas Standard Compliance Manual (ME0287) for more detailed information.

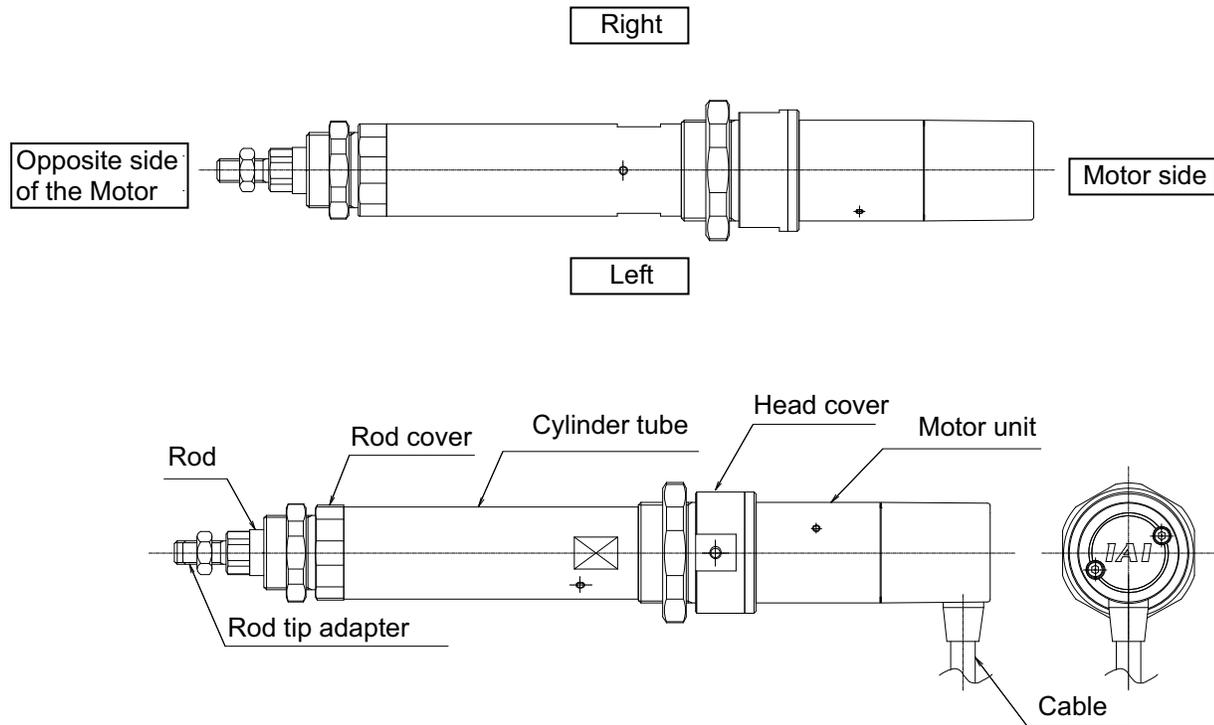
RoHS Directive	CE Marking
○	Optional

## Names of the Parts

In this Operation Manual, the left and right sides are indicated by looking at the actuator from the motor end, with the actuator placed horizontally, as shown in the figure below.

### 1. Motor Straight Type (Coupling Type): No Guide

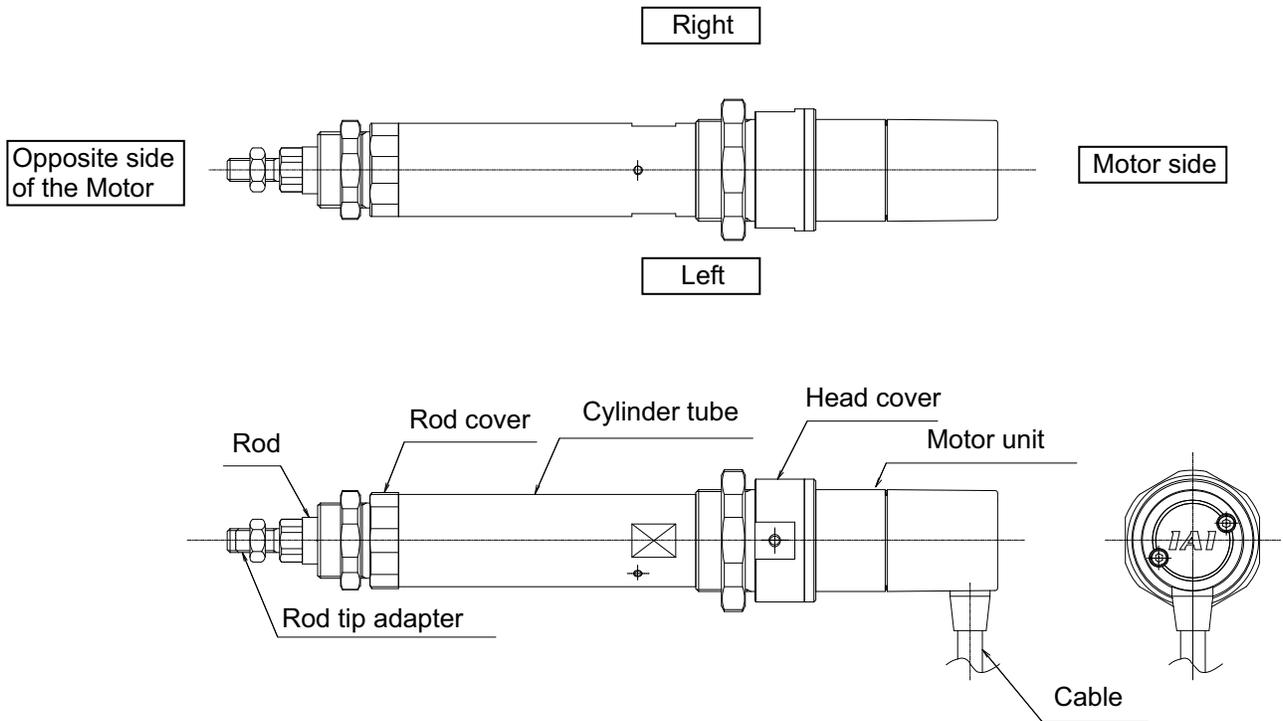
#### ● RCS2-RA4C



**Caution:** The cable directly connected to the actuator is not robot cable even when ordered with robot cable option. When designing, please be sure not to give repeated bending loads to this cable. The robot cable is applicable only to the connecting cables.

## 2. Motor Straight Type (Built-in Type): No Guide

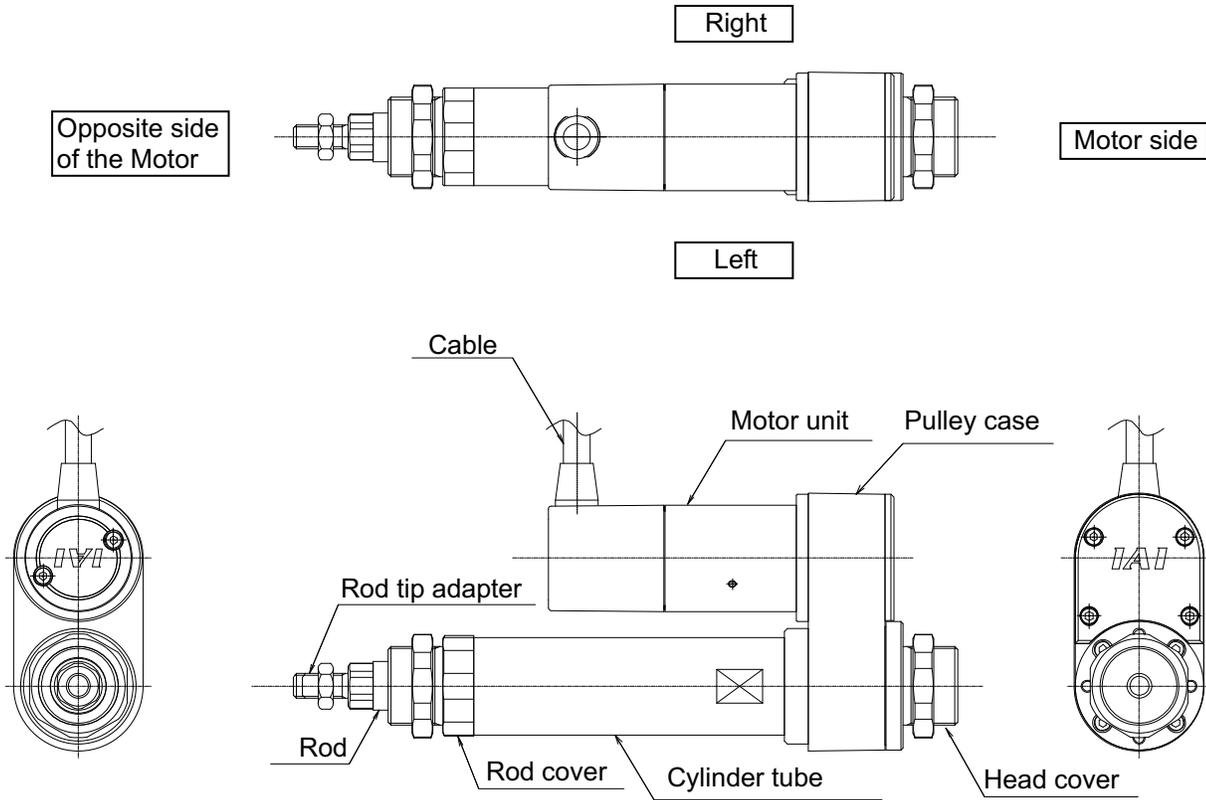
### ● RCS2-RA4D



**Caution:** The cable directly connected to the actuator is not robot cable even when ordered with robot cable option. When designing, please be sure not to give repeated bending loads to this cable. The robot cable is applicable only to the connecting cables.

## 3. Motor Reversing Type: No Guide

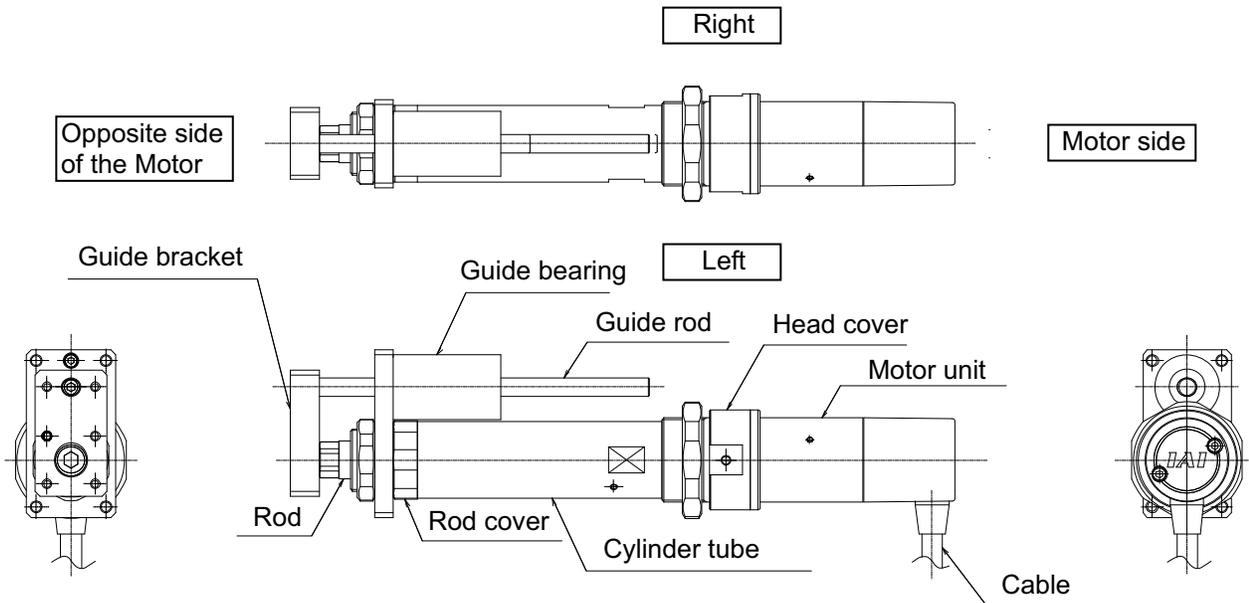
- RCS2-RA4R



**Caution:** The cable directly connected to the actuator is not robot cable even when ordered with robot cable option. When designing, please be sure not to give repeated bending loads to this cable. The robot cable is applicable only to the connecting cables.

## 4. Motor Straight Type (Coupling Type): Single-guide Type

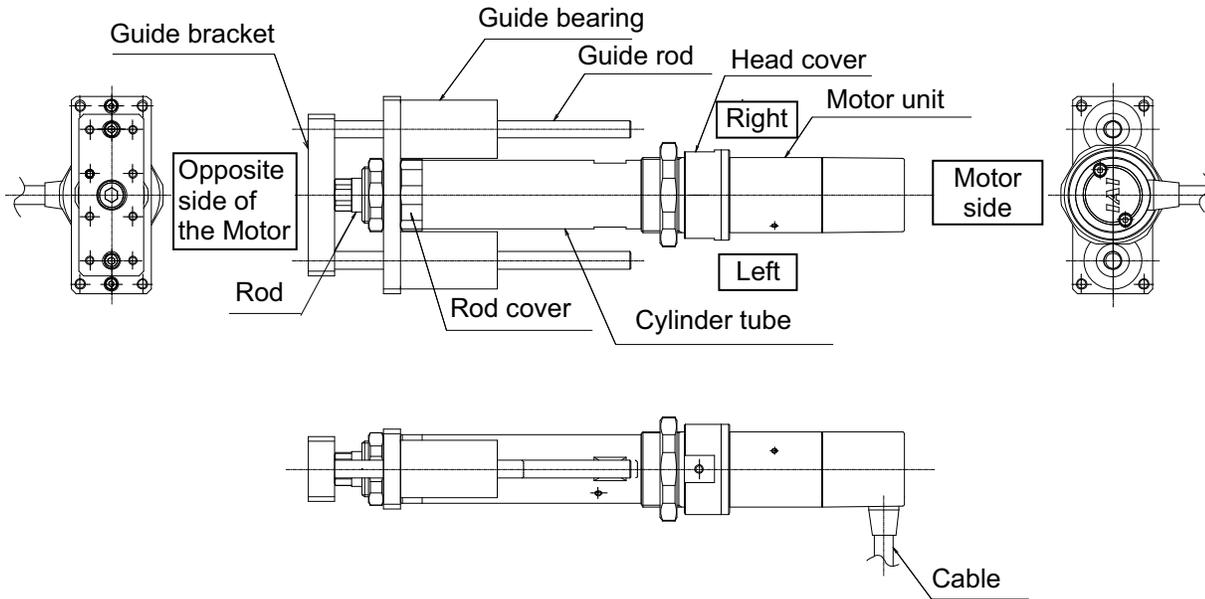
### ● RCS2-RGS4C



**!** Caution: The cable directly connected to the actuator is not robot cable even when ordered with robot cable option. When designing, please be sure not to give repeated bending loads to this cable. The robot cable is applicable only to the connecting cables.

## 5. Motor Straight Type (Coupling Type): Double-guide Type

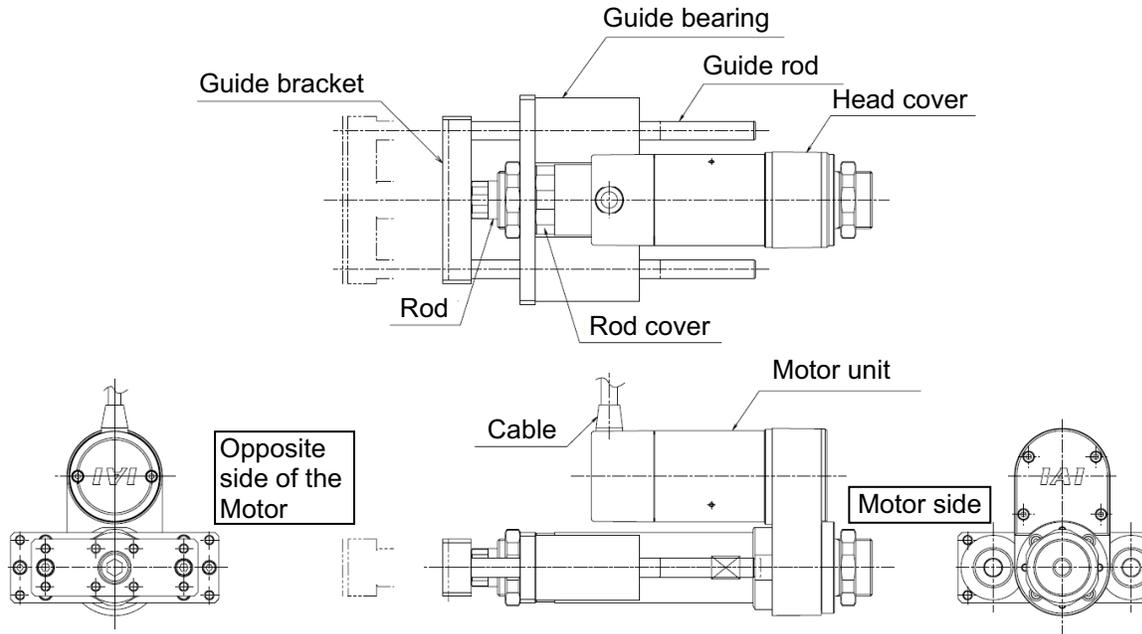
### ● RCS2-RGD4C



**Caution:** The cable directly connected to the actuator is not robot cable even when ordered with robot cable option. When designing, please be sure not to give repeated bending loads to this cable. The robot cable is applicable only to the connecting cables.

## 6. Motor Reversing Type: With Double Guides

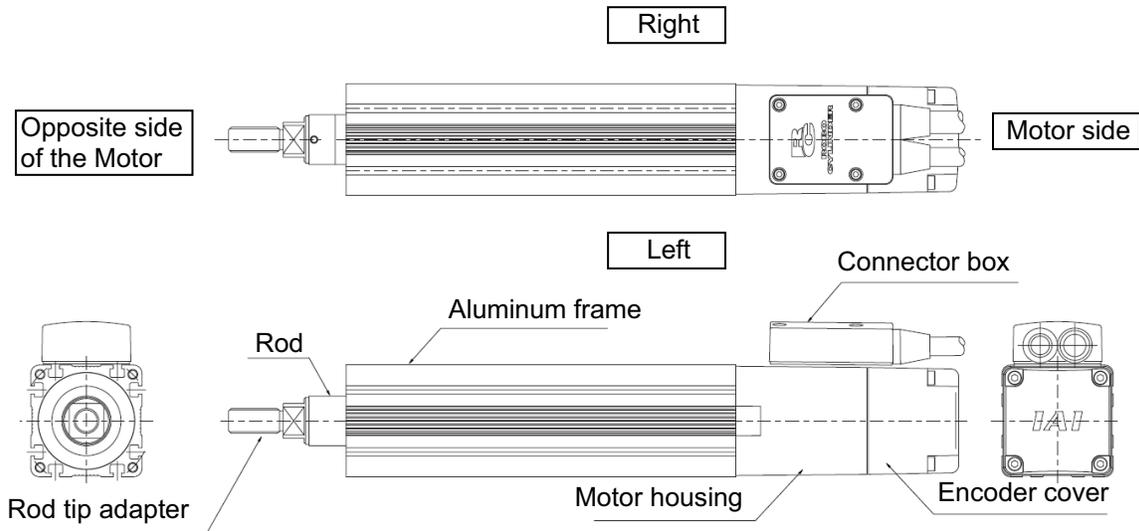
### ● RCS2-RGD4R



**Caution:** The cable directly connected to the actuator is not robot cable even when ordered with robot cable option. When designing, please be sure not to give repeated bending loads to this cable. The robot cable is applicable only to the connecting cables.

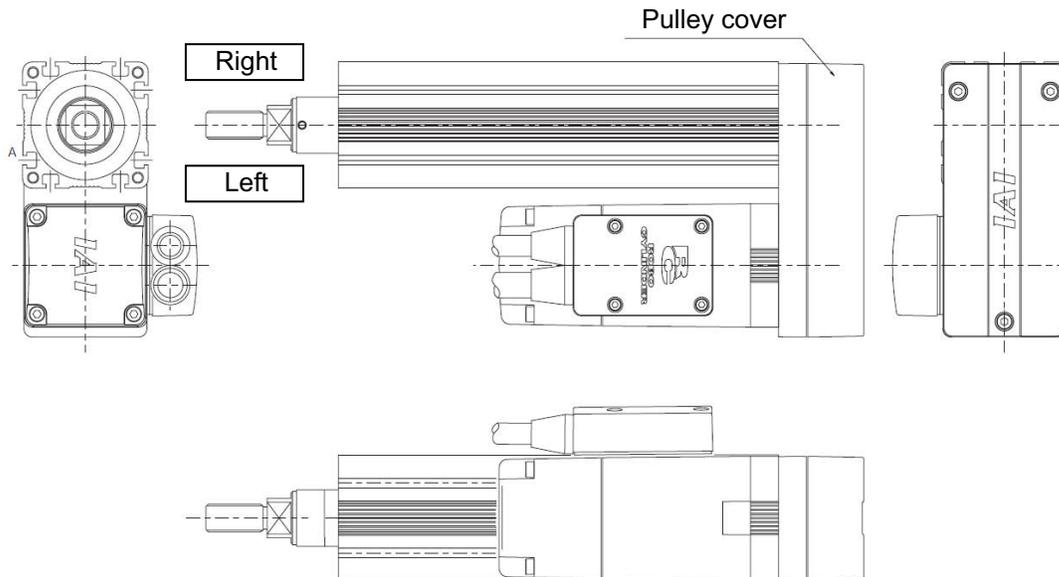
## 7. Motor Straight Type (Coupling Type): No Guide

- RCS2-RA5C



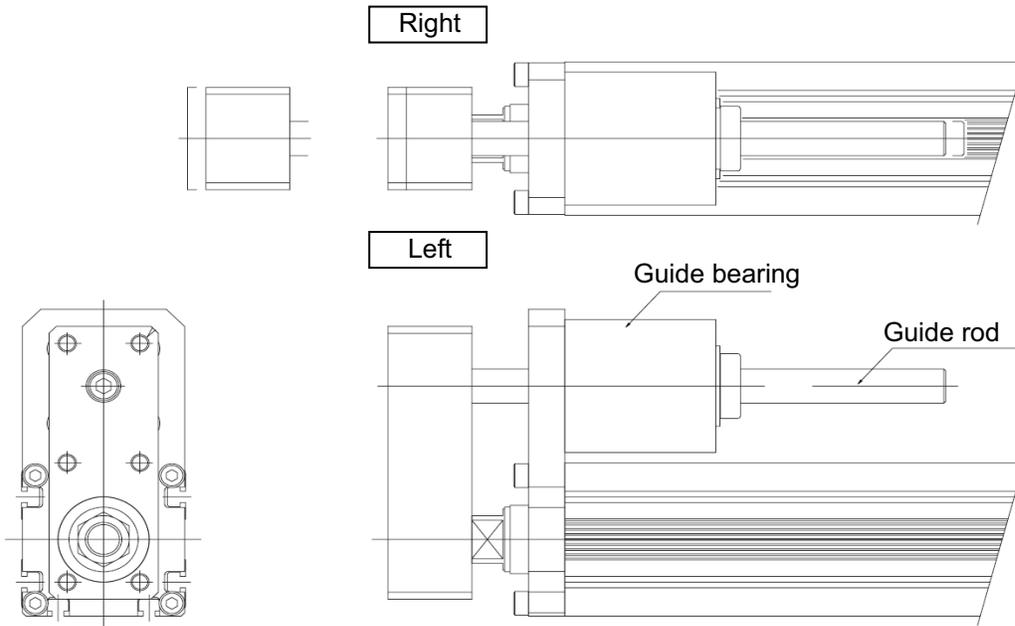
## 8. Motor Reversing Type: No Guide

- RCS2-RA5R



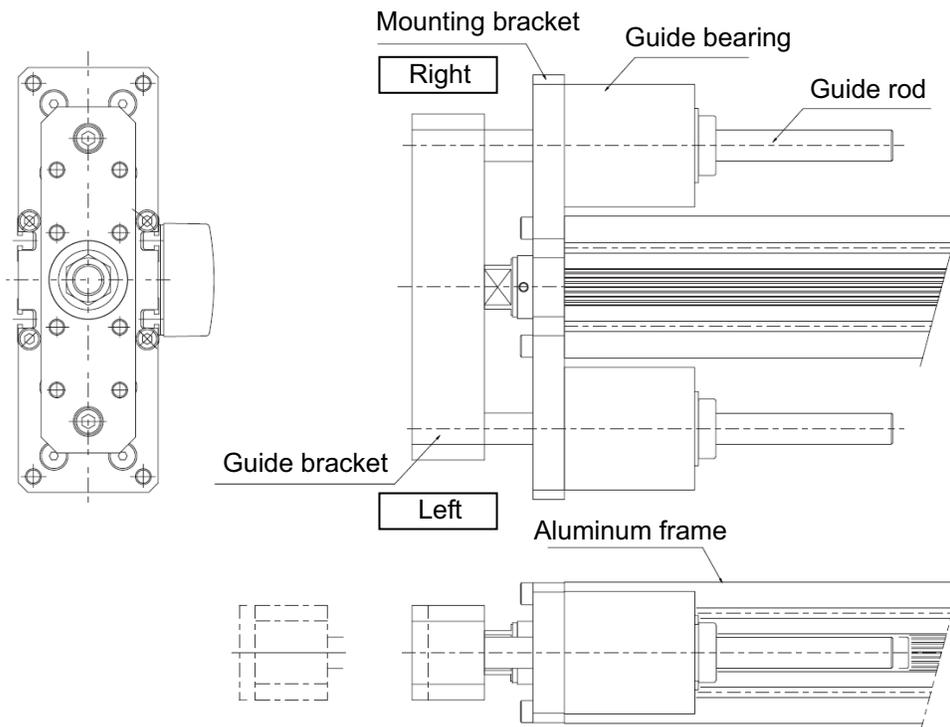
## 9. Motor Straight Type (Coupling Type): Single-guide Type

### ● RCS2-RGS5C



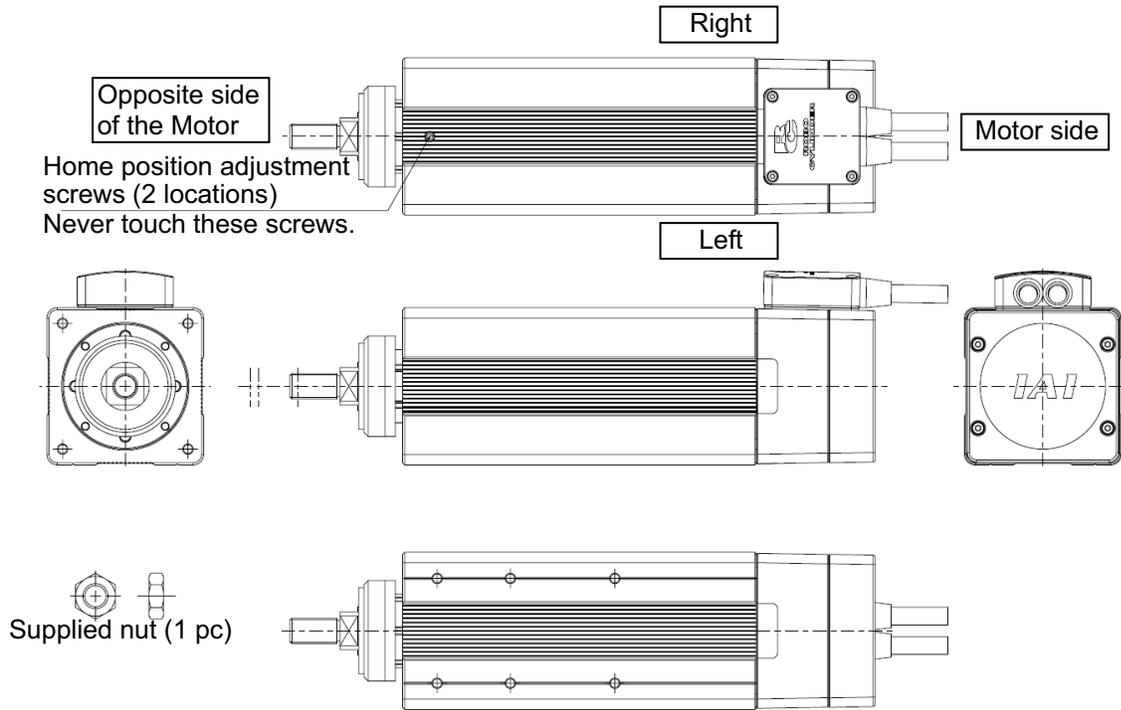
## 10. Motor Straight Type (Coupling Type): Double-guide Type

### ● RCS2-RGD5C



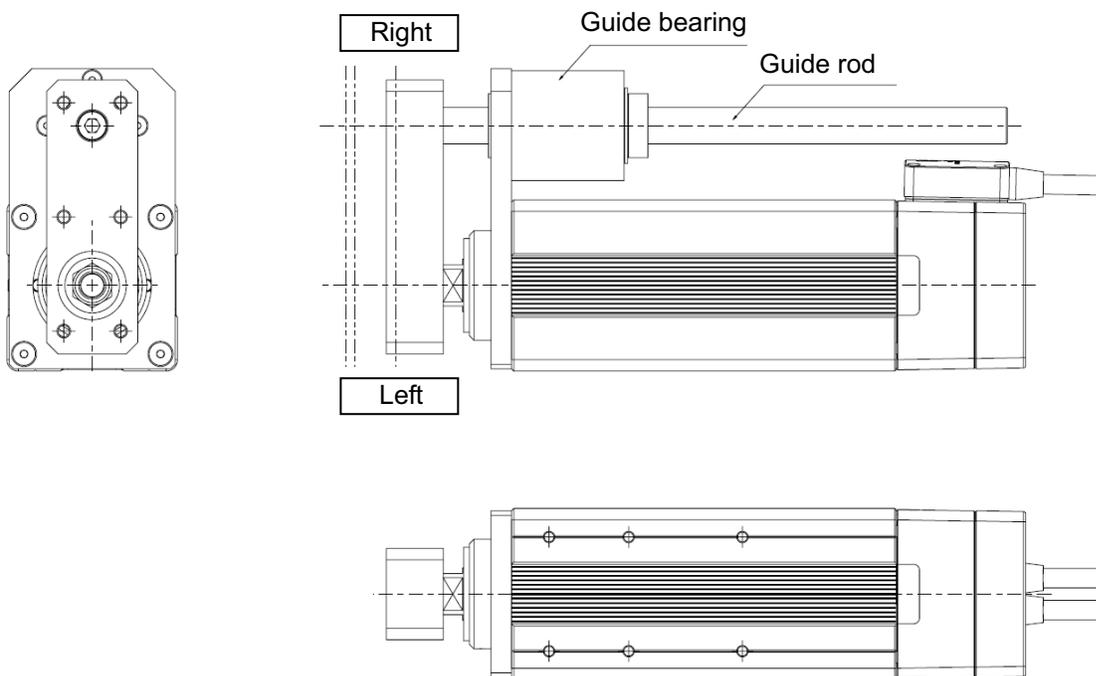
## 11. Short Type (Standard)

- RCS2-SRA7BD



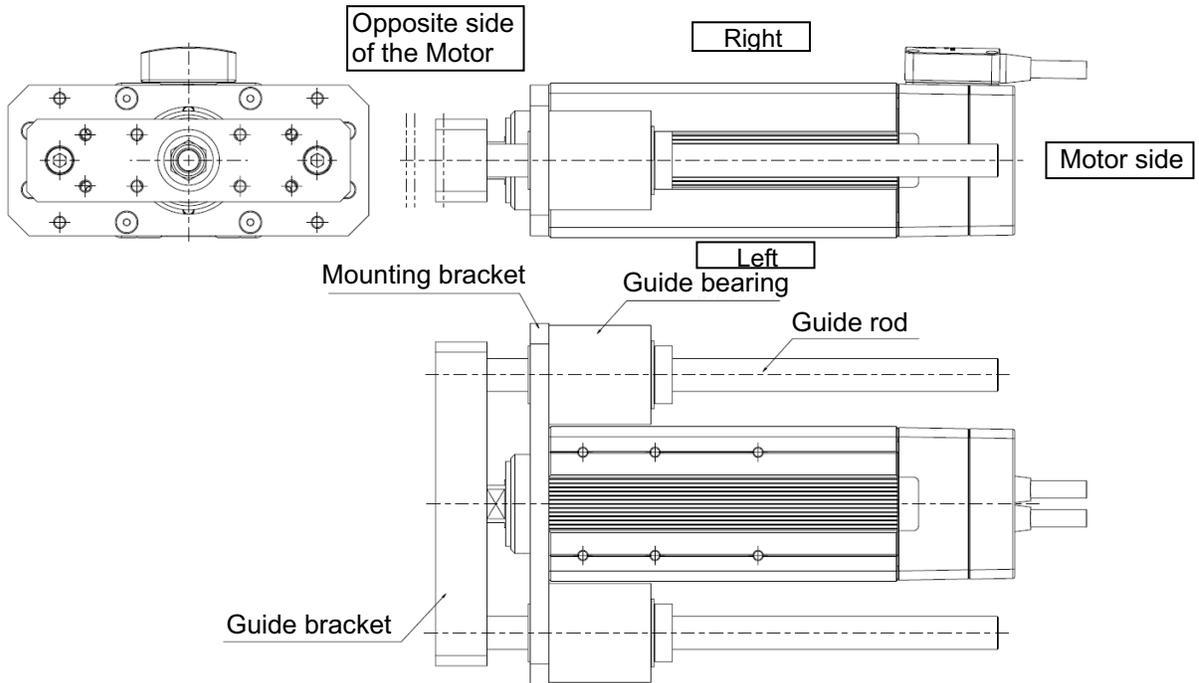
## 12. Short Type: With Single Guide

- RCS2-SRGS7BD



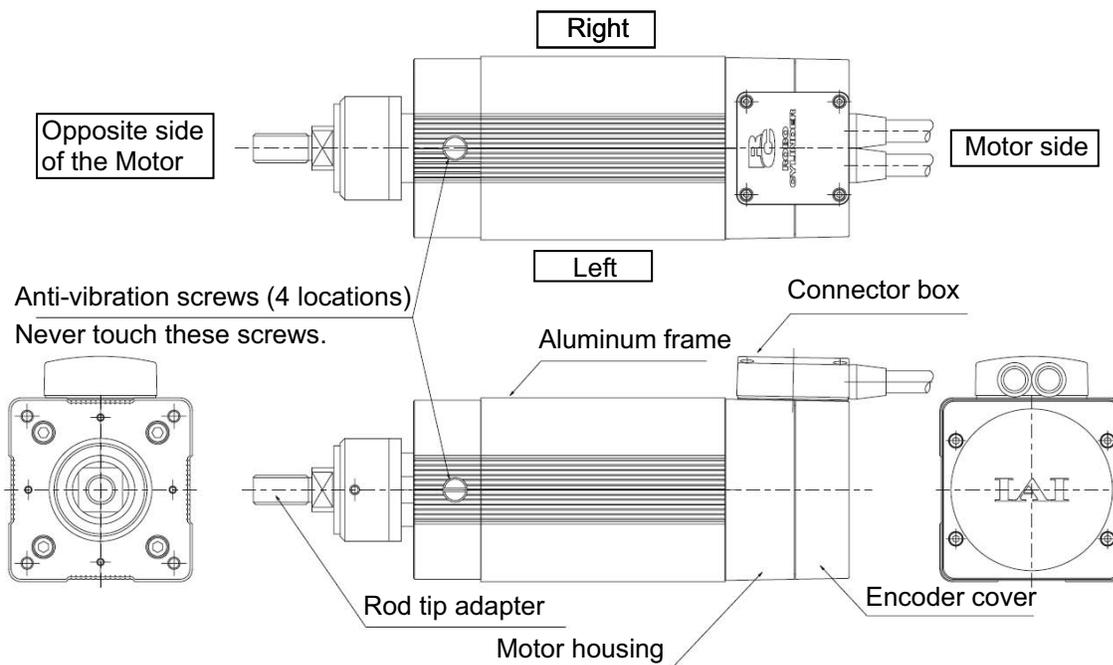
## 13. Short Type: With Double Guides

- RCS2-SRGD7BD



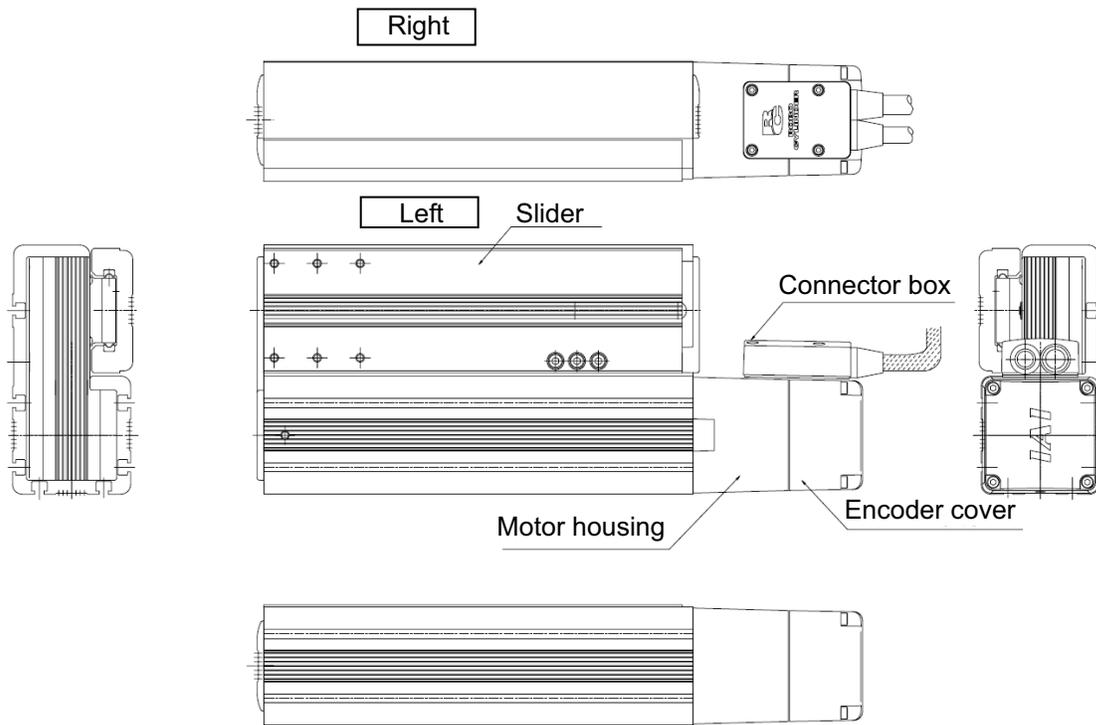
## 14. Short Type

- RCS2-RA7A (B) D



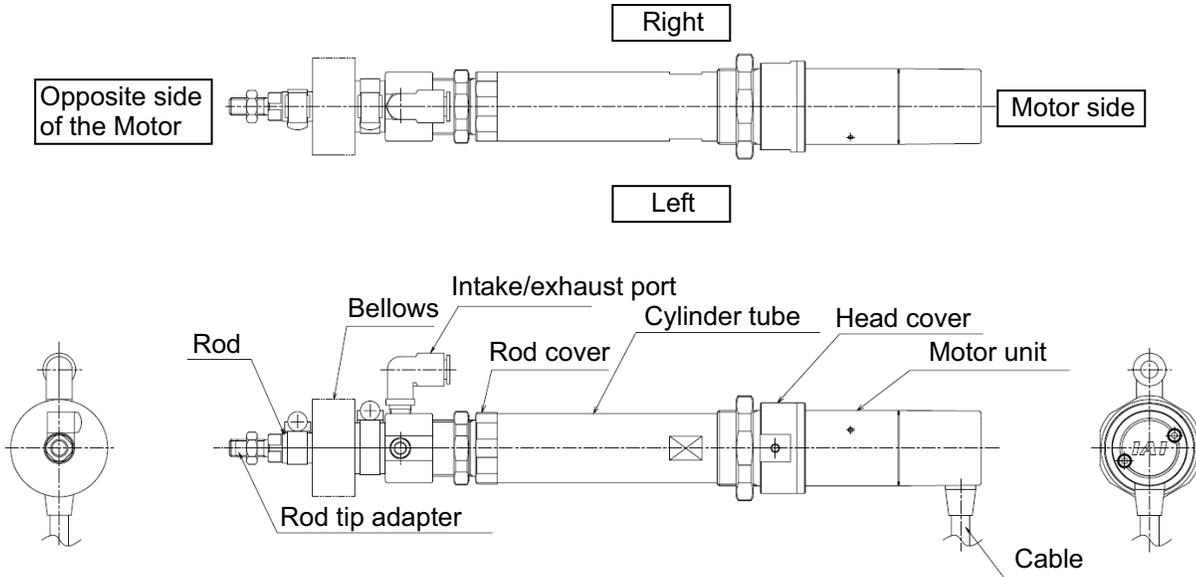
## 15. Flat Type

- RCS2-F5D



## 16. Dustproof/Splash-proof Motor Straight Type (Coupling Type)

- RCS2W-RA4C



**⚠ Caution:** The cable directly connected to the actuator is not robot cable even when ordered with robot cable option. When designing, please be sure not to give repeated bending loads to this cable. The robot cable is applicable only to the connecting cables.

# **RC** ROBO CYLINDER

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## 1. Specifications Check

### 1.1 Checking the Product

The standard configuration of this product is comprised of the following parts.

See the component list for the details of the enclosed components. If you find any fault or missing parts, contact your local IAI distributor.

#### 1.1.1 Parts

No.	Name	Model number	Quantity	Remarks
1	Actuator	Refer to "How to Read the Model Nameplate" and "How to Read the Model Number."	1	
Accessories				
2	Motor • encoder cables <sup>(Note1)</sup>		1 set	
3	Nut			Refer to list below
4	First Step Guide		1	
5	Operation Manual (DVD)		1	
6	Safety Guide		1	

Note1 The motor • encoder cables differ between the standard model and robot cable.  
[Refer to 1.4, Motor • Encoder Cables.]

#### [List of Included Nut Type]

Model No.	Nut M10×1.25	Nut M12×1.25	Nut M14×1.5	Nut M20×1.5	Nut M22×1.5	Square Nut 6×6 M4	Square Nut 7×7 M4	Square Nut 10×10 M6
RCS2-RA7AD		1						
RCS2-RA7BD		1						
RCS2-SRA7BD		1						
RCS2-RA5C							4 or 8*1	
RCS2-RA5R			1				4 or 8*1	
RCS2-RGD5C							4 or 8*1	

\*1 Stroke 100mm or less: 4 pieces, stroke more than 100mm: 8 pieces

Model No.	Nut A M26×1.5	Nut B M35×1.5	Nut C M8×1.5	Nut A M30×1.5	Nut B M40×1.5	Nut C M10×1.5
RCS2-RA4C				1	1	1
RCS2-RA4D				1	1	1
RCS2-RA4R				2		1
RCS2-RGS4C				1	1	
RCS2-RGS4D				1	1	

## 1.1.2 Operation Manuals for the Controllers Related to this Product

## (1) XSEL-J/K Controller

No.	Name	Control No.
1	Operation Manual for XSEL-J/K Controller	ME0116
2	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	ME0154
3	Operation Manual for Teaching Pendant SEL-T/TD/TG	ME0183
4	Operation Manual for Teaching Pendant IA-T-X/XD	ME0160
5	Operation Manual for DeviceNet	ME0124
6	Operation Manual for CC-Link	ME0123
7	Operation Manual for PROFIBUS	ME0153
8	Operation Manual for X-SEL EtherNet	ME0140
9	Operation Manual for Multi-Point I/O Board	ME0138
10	Operation Manual for Multi-Point I/O Board Dedicated Terminal Board	ME0139

## (2) XSEL-P/Q Controller

No.	Name	Control No.
1	Operation Manual for XSEL-P/Q Controller	ME0148
2	Operation Manual for XSEL-P/Q/PX/QX RC Gateway Function	ME0188
3	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	ME0154
4	Operation Manual for Teaching Pendant SEL-T/TD/TG	ME0183
5	Operation Manual for Teaching Pendant IA-T-X/XD	ME0160
6	Operation Manual for DeviceNet	ME0124
7	Operation Manual for CC-Link	ME0123
8	Operation Manual for PROFIBUS	ME0153

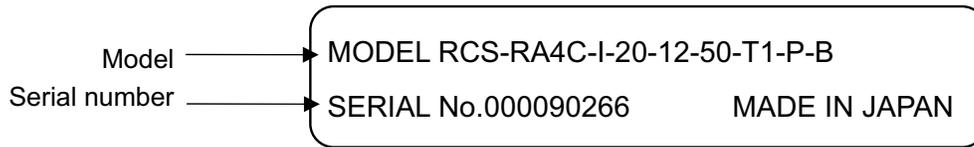
## (3) SSEL Controller

No.	Name	Control No.
1	Operation Manual for SSEL Controller	ME0157
2	Operation Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	ME0154
3	Operation Manual for Teaching Pendant SEL-T/TD/TG	ME0183
4	Operation Manual for Teaching Pendant IA-T-X/XD	ME0160
5	Operation Manual for DeviceNet	ME0124
6	Operation Manual for CC-Link	ME0123
7	Operation Manual for PROFIBUS	ME0153

## (4) SCON Controller and Related

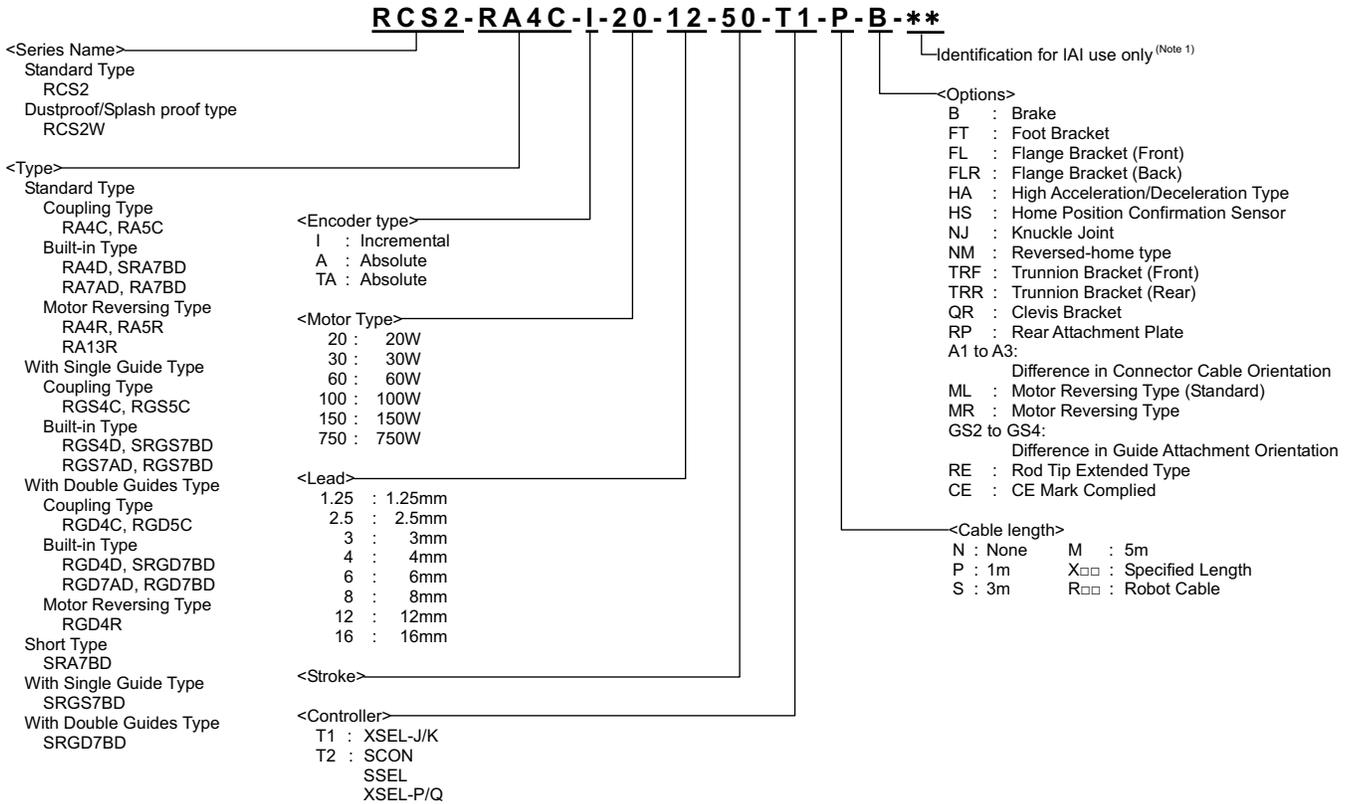
No.	Name	Control No.
1	Operation Manual for SCON Controller	ME0161
2	Operation Manual for SCON-CA Controller SCON-CA	ME0243
3	Operation Manual for PC Software RCM-101-MW/RCM-101-USB	ME0155
4	Operation Manual for Teaching Pendant CON-T/TG	ME0178
5	Operation Manual for Touch Panel Teaching CON-PT/PD/PG	ME0227
6	Operation Manual for Simplified Teaching Pendant RCM-E	ME0174
7	Operation Manual for Data setter RCM-P	ME0175
8	Operation Manual for Touch Panel Display RCM-PM-01	ME0182
9	Operation Manual for DeviceNet	ME0124
10	Operation Manual for CC-Link	ME0123
11	Operation Manual for PROFIBUS	ME0153

## 1.1.3 How to Read the Model Nameplate

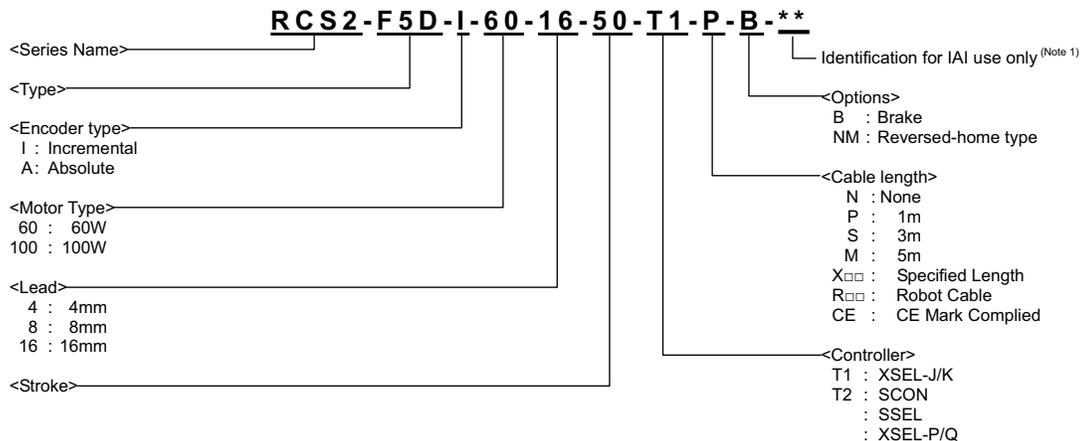


## 1.1.4 How to Read the Model Number

### (1) RCS2 Actuator



### (2) Flat Type



Note1 Identification for IAI use only: It may be displayed for IAI use. It is not a code to show the model type.

## 1.2 Specification

### 1.2.1 Speed

Speed limits [Unit: mm/s]

Type	Motor Type	Lead [mm]	Horizontal/ Vertical	Stroke [mm]	
				50 to 250	300
RCS2-RA4C, RA4D, RA4R, RGS4C, RGS4D, RGD4C, RGD4D RGD4R, RCS2W-RA4C, RA4D, RA4R	20W 30W	3	Horizontal	150	
			Vertical	150	
		6	Horizontal	300	
			Vertical	300	
		12	Horizontal	600	
			Vertical	600	
RCS2-RA5C, RGS5C, RGD5C	60W 100W	4	Horizontal	200	188
			Vertical	200	188
		8	Horizontal	400	377
			Vertical	400	377
		16	Horizontal	800	755
			Vertical	800	755
RCS2-RA5R	60W	4	Horizontal	200	188
			Vertical	200	188
		8	Horizontal	400	377
			Vertical	400	377
		16	Horizontal	800	755
			Vertical	800	755
RCS2-RA7AD, RGS7AD, RGD7AD	60W	3	Horizontal	150	125
			Vertical	150	125
		6	Horizontal	300	250
			Vertical	300	250
	12	Horizontal	600	505	
		Vertical	600	505	
	100W	6	Horizontal	300	250
			Vertical	300	250
12		Horizontal	600	505	
		Vertical	600	505	
RCS2-RA7BD, RGS7BD, RGD7BD	100W	4	Horizontal	200	
			Vertical	200	
		8	Horizontal	400	
			Vertical	400	
	16	Horizontal	800		
		Vertical	800		
	150W	8	Horizontal	400	
			Vertical	400	
16		Horizontal	800		
		Vertical	800		
RCS2-SRA7BD, SRGS7BD, SRGD7BD	60W 100W 150W	4	Horizontal	200	
			Vertical	200	
		8	Horizontal	400	
			Vertical	400	
		16	Horizontal	800	
			Vertical	800	
RCS2-F5D	60W 100W	4	Horizontal	200	
			Vertical	200	
		8	Horizontal	400	
			Vertical	400	
		16	Horizontal	800	
			Vertical	800	

## 1.2.2 Maximum acceleration and transportable weight

Type	Motor Type	Lead [mm]	Horizontal/ Vertical	Maximum acceleration [G]		Transportable Weight [kg]	Rated Thrust [N]
				Standard Type	High Acceleration/ Deceleration Type (Model: HA)		
RCS2-RA4C	20W	3	Horizontal	0.2	–	12.0	75.4
			Vertical	0.2	–	4.0	75.4
		6	Horizontal	0.3	1.0	6.0	37.7
			Vertical	0.3	1.0	2.0	37.7
		12	Horizontal	0.3	1.0	3.0	18.9
			Vertical	0.3	1.0	1.0	18.9
	30W	3	Horizontal	0.2	–	18.0	113.1
			Vertical	0.2	–	6.5	113.1
		6	Horizontal	0.3	1.0	9.0	56.6
			Vertical	0.3	1.0	3.0	56.6
		12	Horizontal	0.3	1.0	4.0	28.3
			Vertical	0.3	1.0	1.5	28.3
RCS2-RGS4C, RGD4C	20W	3	Horizontal	0.2	–	12.0	75.4
			Vertical	0.2	–	3.5	75.4
		6	Horizontal	0.3	1.0	6.0	37.7
			Vertical	0.3	1.0	1.5	37.7
		12	Horizontal	0.3	1.0	3.0	18.9
			Vertical	0.3	1.0	0.5	18.9
	30W	3	Horizontal	0.2	–	18.0	113.1
			Vertical	0.2	–	6.0	113.1
		6	Horizontal	0.3	1.0	9.0	56.6
			Vertical	0.3	1.0	2.5	56.6
		12	Horizontal	0.3	1.0	4.0	28.3
			Vertical	0.3	1.0	1.0	28.3
RCS2-RA4D, RA4R, RCS2W-RA4C, RA4D, RA4R	20W	3	Horizontal	0.2	–	12.0	75.4
			Vertical	0.2	–	4.0	75.4
		6	Horizontal	0.3	–	6.0	37.7
			Vertical	0.3	–	2.0	37.7
		12	Horizontal	0.3	–	3.0	18.9
			Vertical	0.3	–	1.0	18.9
	30W	3	Horizontal	0.2	–	18.0	113.1
			Vertical	0.2	–	6.5	113.1
		6	Horizontal	0.3	–	9.0	56.6
			Vertical	0.3	–	3.0	56.6
		12	Horizontal	0.3	–	4.0	28.3
			Vertical	0.3	–	1.5	28.3
RCS2-RGS4D, RGD4D, RGD4R	20W	3	Horizontal	0.2	–	12.0	75.4
			Vertical	0.2	–	3.5	75.4
		6	Horizontal	0.3	–	6.0	37.7
			Vertical	0.3	–	1.5	37.7
		12	Horizontal	0.3	–	3.0	18.9
			Vertical	0.3	–	0.5	18.9
	30W	3	Horizontal	0.2	–	18.0	113.1
			Vertical	0.2	–	6.0	113.1
		6	Horizontal	0.3	–	9.0	56.6
			Vertical	0.3	–	2.5	56.6
		12	Horizontal	0.3	–	4.0	28.3
			Vertical	0.3	–	1.0	28.3

Type	Motor Type	Lead [mm]	Horizontal/ Vertical	Maximum acceleration [G]		Transportable Weight [kg]	Rated Thrust [N]		
				Standard Type	High Acceleration/ Deceleration Type (Model: HA)				
RCS2-RA5C	60W	4	Horizontal	0.2	–	50.0	255.1		
			Vertical	0.2	–	11.5	255.1		
		8	Horizontal	0.3	1.0	25.0	127.5		
			Vertical	0.3	1.0	5.0	127.5		
		16	Horizontal	0.3	1.0	12.0	68.3		
			Vertical	0.3	1.0	2.0	68.3		
	100W	4	Horizontal	0.2	–	60.0	424.3		
			Vertical	0.2	–	18.0	424.3		
		8	Horizontal	0.3	1.0	30.0	212.7		
			Vertical	0.3	1.0	9.0	212.7		
		16	Horizontal	0.3	1.0	15.0	105.8		
			Vertical	0.3	1.0	3.5	105.8		
RCS2-RA5R	60W	4	Horizontal	0.2	–	50.0	255.1		
			Vertical	0.2	–	11.5	255.1		
		8	Horizontal	0.3	–	25.0	127.5		
			Vertical	0.3	–	5.0	127.5		
		16	Horizontal	0.3	–	12.0	68.3		
			Vertical	0.3	–	2.0	68.3		
		RCS2-RGS5C, RGD5C	60W	4	Horizontal	0.2	–	50.0	255.1
					Vertical	0.2	–	10.8	255.1
8	Horizontal			0.3	1.0	25.0	127.5		
	Vertical			0.3	1.0	4.3	127.5		
16	Horizontal			0.3	1.0	12.0	68.3		
	Vertical			0.3	1.0	1.3	68.3		
100W	4		Horizontal	0.2	–	60.0	424.3		
			Vertical	0.2	–	17.3	424.3		
	8		Horizontal	0.3	1.0	30.0	212.7		
			Vertical	0.3	1.0	8.3	212.7		
	16		Horizontal	0.3	1.0	15.0	105.8		
			Vertical	0.3	1.0	2.8	105.8		
RCS2-RA7AD	60W	3	Horizontal	0.05	–	40.0	340.1		
			Vertical	0.05	–	15.0	340.1		
		6	Horizontal	0.1	–	20.0	169.5		
			Vertical	0.1	–	7.0	169.5		
		12	Horizontal	0.15	–	10.0	85.3		
			Vertical	0.15	–	2.5	85.3		
	100W	6	Horizontal	0.1	–	30.0	283.2		
			Vertical	0.1	–	12.5	283.2		
		12	Horizontal	0.2	–	15.0	141.1		
			Vertical	0.2	–	5.5	141.1		
		RCS2- RGS7AD	60W	3	Horizontal	0.05	–	40.0	340.1
					Vertical	0.05	–	14.5	340.1
6	Horizontal			0.1	–	20.0	169.5		
	Vertical			0.1	–	6.0	169.5		
12	Horizontal			0.15	–	10.0	85.3		
	Vertical			0.15	–	1.5	85.3		
100W	6		Horizontal	0.1	–	30.0	283.2		
			Vertical	0.1	–	11.5	283.2		
	12		Horizontal	0.2	–	15.0	141.1		
			Vertical	0.2	–	4.5	141.1		

Type	Motor Type	Lead [mm]	Horizontal/ Vertical	Maximum acceleration [G]		Transportable Weight [kg]	Rated Thrust [N]
				Standard Type	High Acceleration/ Deceleration Type (Model: HA)		
RCS2-RGD7AD	60W	3	Horizontal	0.05	–	40.0	340.1
			Vertical	0.05	–	13.9	340.1
		6	Horizontal	0.1	–	20.0	169.5
			Vertical	0.1	–	5.4	169.5
	12	Horizontal	0.15	–	10.0	85.3	
			Vertical	0.15	–	0.9	85.3
		6	Horizontal	0.1	–	30.0	283.2
			Vertical	0.1	–	10.9	283.2
12	Horizontal	0.2	–	15.0	141.1		
	Vertical	0.2	–	3.9	141.1		
RCS2-RA7BD	100W	4	Horizontal	0.1	–	40.0	424.3
			Vertical	0.1	–	19.5	424.3
		8	Horizontal	0.17	–	22.0	212.7
			Vertical	0.17	–	9.0	212.7
	16	Horizontal	0.25	–	10.0	105.8	
			Vertical	0.25	–	3.5	105.8
		8	Horizontal	0.2	–	35.0	318.5
			Vertical	0.2	–	14.5	318.5
16	Horizontal	0.3	–	15.0	158.8		
	Vertical	0.3	–	6.5	158.8		
RCS2-RGS7BD	100W	4	Horizontal	0.1	–	40.0	424.3
			Vertical	0.1	–	18.5	424.3
		8	Horizontal	0.17	–	22.0	212.7
			Vertical	0.17	–	8.0	212.7
	16	Horizontal	0.25	–	10.0	105.8	
			Vertical	0.25	–	2.5	105.8
		8	Horizontal	0.2	–	35.0	318.5
			Vertical	0.2	–	13.5	318.5
16	Horizontal	0.3	–	15.0	158.8		
	Vertical	0.3	–	5.5	158.8		
RCS2-RGD7AD	100W	4	Horizontal	0.1	–	40.0	424.3
			Vertical	0.1	–	17.9	424.3
		8	Horizontal	0.17	–	22.0	212.7
			Vertical	0.17	–	7.4	212.7
	16	Horizontal	0.25	–	10.0	105.8	
			Vertical	0.25	–	1.9	105.8
		8	Horizontal	0.2	–	35.0	318.5
			Vertical	0.2	–	12.9	318.5
16	Horizontal	0.3	–	15.0	158.8		
	Vertical	0.3	–	4.9	158.8		

Type	Motor Type	Lead [mm]	Horizontal/ Vertical	Acceleration [G]		Transportable Weight [kg]	Rated Thrust [N]	
				Rated acceleration	Maximum acceleration			
RCS-SRA7BD	60W	4	Horizontal	0.05	–	20.0	254	
			Vertical	0.05	–	10.0	254	
		8	Horizontal	0.15	–	10.0	127	
			Vertical	0.15	–	5.0	127	
		16	Horizontal	0.25	–	5.0	63	
			Vertical	0.25	–	2.0	63	
	100W	4	Horizontal	0.1	–	40.0	414	
			Vertical	0.1	–	19.5	414	
		8	Horizontal	0.2	–	22.0	207	
			Vertical	0.2	–	9.0	207	
		16	Horizontal	0.3	–	10.0	103	
			Vertical	0.3	–	3.5	103	
	150W	4	Horizontal	0.1	–	55.0	628	
			Vertical	0.1	–	22.5	628	
		8	Horizontal	0.2	–	35.0	314	
			Vertical	0.2	–	14.5	314	
		16	Horizontal	0.3	–	15.0	157	
			Vertical	0.3	–	6.5	157	
	60W	60W	4	Horizontal	–	0.15	10.0	254
				Vertical	–	0.15	5.0	254
			8	Horizontal	–	0.25	5.0	127
				Vertical	–	0.25	2.5	127
			16	Horizontal	–	0.35	2.5	63
				Vertical	–	0.35	1.0	63
		100W	4	Horizontal	–	0.2	20.0	414
				Vertical	–	0.2	9.0	414
			8	Horizontal	–	0.3	10.0	207
				Vertical	–	0.3	4.5	207
			16	Horizontal	–	0.4	5.0	103
				Vertical	–	0.4	1.5	103
	150W	4	Horizontal	–	0.2	27.5	628	
			Vertical	–	0.2	11.0	628	
		8	Horizontal	–	0.3	17.5	314	
			Vertical	–	0.3	7	314	
		16	Horizontal	–	0.4	7.5	157	
			Vertical	–	0.4	3.0	157	

Type	Motor Type	Lead [mm]	Horizontal/ Vertical	Acceleration [G]		Transportable Weight [kg]	Rated Thrust [N]	
				Rated acceleration	Maximum acceleration			
RCS-SRGS7BD	60W	4	Horizontal	0.05	–	20.0	254	
			Vertical	0.05	–	9.5	254	
		8	Horizontal	0.15	–	10.0	127	
			Vertical	0.15	–	4.5	127	
		16	Horizontal	0.25	–	5.0	63	
			Vertical	0.25	–	1.5	63	
	100W	4	Horizontal	0.1	–	40.0	414	
			Vertical	0.1	–	19.0	414	
		8	Horizontal	0.2	–	22.0	207	
			Vertical	0.2	–	8.5	207	
		16	Horizontal	0.3	–	10.0	103	
			Vertical	0.3	–	3.0	103	
	150W	4	Horizontal	0.1	–	55.0	628	
			Vertical	0.1	–	22.0	628	
		8	Horizontal	0.2	–	35.0	314	
			Vertical	0.2	–	14.0	314	
		16	Horizontal	0.3	–	15.0	157	
			Vertical	0.3	–	6.0	157	
	60W	4	Horizontal	–	0.15	10.0	254	
			Vertical	–	0.15	4.5	254	
			8	Horizontal	–	0.25	5.0	127
				Vertical	–	0.25	2.0	127
		16	Horizontal	–	0.35	2.5	63	
			Vertical	–	0.35	0.5	63	
			4	Horizontal	–	0.2	20.0	414
				Vertical	–	0.2	8.5	414
		8	Horizontal	–	0.3	10.0	207	
			Vertical	–	0.3	4.0	207	
			16	Horizontal	–	0.4	5.0	103
				Vertical	–	0.4	1.0	103
	150W	4	Horizontal	–	0.2	27.5	628	
			Vertical	–	0.2	10.5	628	
		8	Horizontal	–	0.3	17.5	314	
			Vertical	–	0.3	6.5	314	
		16	Horizontal	–	0.4	7.5	157	
			Vertical	–	0.4	2.5	157	

Type	Motor Type	Lead [mm]	Horizontal/ Vertical	Maximum acceleration [G]		Transportable Weight [kg]	Rated Thrust [N]
				Standard Type	High Acceleration/ Deceleration Type (Model: HA)		
RCS2-F5D	60W	4	Horizontal	0.2	–	See the next page	255.1
			Vertical	0.2	–	11.5	255.1
		8	Horizontal	0.3	–	See the next page	127.5
			Vertical	0.3	–	5.0	127.5
		16	Horizontal	0.3	–	See the next page	63.8
			Vertical	0.3	–	2.0	63.8
	100W	4	Horizontal	0.2	–	See the next page	424.3
			Vertical	0.2	–	18.0	424.3
		8	Horizontal	0.3	–	See the next page	212.7
			Vertical	0.3	–	9.0	212.7
		16	Horizontal	0.3	–	See the next page	105.8
			Vertical	0.3	–	3.5	105.8

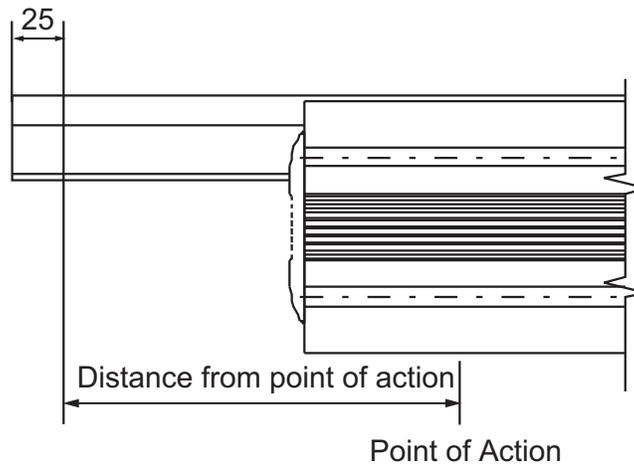


Caution: Do not attempt to establish the settings for the acceleration/deceleration above the allowable range. It may cause vibration, malfunction or shortened life.

[Moment and Transportable Weight of Flat Type (F5D)]

Shown in the table below is the allowable load on the tip calculated from Ma moment of each stroke.

Stroke		50	100	150	200	250	300
F5D Type	Distance from point of action [m]	0.07	0.12	0.17	0.22	0.27	0.32
	[N]	83	48.42	34.18	26.4	21.52	18.16
	(kgf)	8.47	4.94	3.49	2.69	2.2	1.85



## 1.2.3 Driving System • Position Detector

Type	Motor Type	Lead [mm]	No. of Encoder Pulses	Ball Screw Type				
				Type	Diameter	Accuracy		
RCS2-RA4C, A4D, RA4R, RGS4C, RGS4D, GD4C, RGD4, RGD4R, CS2W-RA4C, RA4D, RA4R	20W 30W	3	16384	Ball Screw	φ10mm	C10		
		6						
		12						
RCS2-RA5C, RGS5C, RGD5C	60W 100W	4		16384	Ball Screw	φ12mm	C10	
		8						
		16						
RCS2-RA5R	60W	4		16384	Ball Screw	φ12mm	C10	
		8						
		16						
RCS2-RA7AD, RGS7AD, RGD7AD	60W	3	3072		Ball Screw	φ10mm	C10	
		6						
		12						
RCS2-RA7BD, RGS7BD, RGD7BD	100W	6			3072	Ball Screw	φ12mm	C10
		12						
		4						
RCS2-RA7BD, RGS7BD, RGD7BD	100W	8		3072		Ball Screw	φ12mm	C10
		16						
		8						
RCS2-SRA7BD, SRGS7BD, SRGD7BD	60W 100W 150W	4	16384			Ball Screw	φ12mm	C10
		8						
		16						
RCS2-F5D	60W 100W	4			16384	Ball Screw	φ12mm	C10
		8						
		16						

## 1.2.4 Positioning Precision

Type	Lead [mm]	Item	Tolerance
RCS2-RA4C, RA4D, RA4R, RGS4C, RGS4D, RGD4C, RGD4, D4R, RCS2W-RA4C, RA4D, RA4R	3	Positioning Repeatability	±0.02mm
	6	Lost Motion	0.1mm or less
	12		
RCS2-RA5C, RA5R, RGS5C, RGD5C	4	Positioning Repeatability	±0.02mm
	8	Lost Motion	0.1mm or less
	16		
RCS2-RA7AD, RGS7AD, RGD7AD	3	Positioning Repeatability	±0.02mm
	6	Lost Motion	0.1mm or less
	12		
RCS2-RA7BD, RGS7BD, RGD7BD	4	Positioning Repeatability	±0.02mm
	8	Lost Motion	0.1mm or less
	16		
RCS2-SRA7BD, SRGS7BD, SRGD7BD	4	Positioning Repeatability	±0.02mm
	8	Lost Motion	0.1mm or less
	16		
RCS2-F5D	4	Positioning Repeatability	±0.02mm
	8	Lost Motion	0.05 or less
	16		

The values shown above are the accuracy at the delivery from the factory. It does not include the consideration of time-dependent change as it is used.

### 1.2.5 Rod Non-Rotation Accuracy

Type	Lead [mm]	Tolerance
RCS2-RA4C, RA4D, RA4R, RCS2W-RA4C, RA4D, RA4R	3 6 12	$\pm 1.0^\circ$
RCS2-RGS4C, RGS4D RGD4C, RGD4D	3 6 12	$\pm 0.05^\circ$
RCS2-RA5C, RA5R	4 8 16	$\pm 0.7^\circ$
RCS2-RGS5C	4 8 16	$\pm 0.1^\circ$
RCS2-RGD5C	4 8 16	$\pm 0.08^\circ$
RCS2-RA7AD	3 6 12	$\pm 0.7^\circ$
RCS2-RGS7AD	3 6 12	$\pm 0.1^\circ$
RCS2-RGD7AD	3 6 12	$\pm 0.08^\circ$
RCS2-RA7BD	4 8 16	$\pm 0.7^\circ$
RCS2-RGS7BD	4 8 16	$\pm 0.1^\circ$
RCS2-RGD7BD	4 8 16	$\pm 0.08^\circ$
RCS2-SRA7AD	4 8 16	–
RCS2-SRGS7AD	4 8 16	$\pm 0.1^\circ$
RCS2-SRGD7AD	4 8 16	$\pm 0.08^\circ$

## 1.2.6 Allowable Load Moment of Actuator

### (1) Rod Type

- The actual load should not exceed the value specified in the catalog.
- Be sure to align the shaft center of the rod and the moving direction of the load.

- Lateral load may cause damage or breakdown of the actuator.
- If the rod may receive lateral load, provide a guide or other appropriate mechanism to support the actuator in the moving direction of the load.



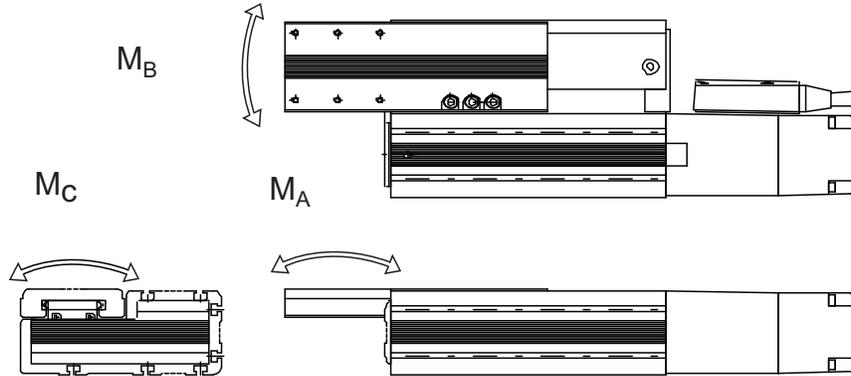
- Do not allow the rod (slide shaft) to receive rotational torque.  
\* Doing so may damage the internal parts.

Tighten the nut at the tip of the rod, while securely holding the rod using a wrench of size 17 (RA4) or 22 (RA5).

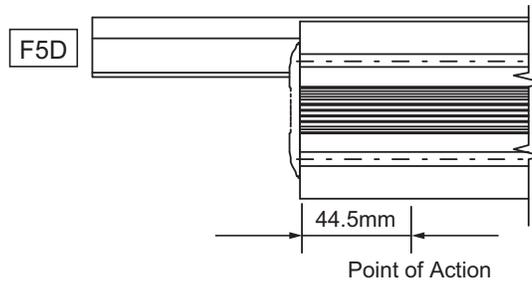
(2) Flat Type

Shown below is the dynamic allowable moment when the driving life is 5000km.

Type	Dynamic allowable moment [N•m]		
	Ma	Mb	Mc
F5D	5.81	8.30	14.8



The point of action for the moment in directions Ma and Mb are as shown below.



1.2.7 Protection class

Type	Performance
RCS2W-RA4C, RA4D, RA4R	IP54

[Refer to 2.4 Connecting the Air Tube of the RCS2W Dustproof/Splash-proof Type for the details.]

## 1.2.8 Duty Ratio in Continuous Operation

Continuous operation is available with the duty ratio 100%.

Duty ratio is the rate of operation expressed in % that presents the time of the actuator being operated in 1 cycle of operation.

**Caution:** If an overload error occurs, extend the stopped time to lower the duty or decrease the acceleration/deceleration speed.

[How to Calculate Duty]

Figure out the load rate and acceleration/deceleration speed time ratio by calculation and read the duty ratio from the graph. When the load rate is less than 50%, an operation with 100% duty ratio (continuous operation) should be available.

### 1) Duty ratio LF

It is described in 2. Specifications regarding the maximum transportable weight at the rated acceleration and rated acceleration/deceleration.

$$\text{Duty ratio: LF} = \frac{M \times \alpha}{M_r \times \alpha_r} \quad [\%]$$

- Maximum transportable weight at the rated acceleration :  $M_r$  [kg]
- Rated acceleration/deceleration :  $\alpha_r$  [G]
- Transferring mass during operation :  $M$  [kg]
- Acceleration/deceleration during operation :  $\alpha$  [kg]

### 2) Acceleration/deceleration time ratio $t_{od}$

$$\text{Acceleration/deceleration time ratio } t_{od} = \frac{\text{Acceleration time during operation} + \text{Deceleration time during operation}}{\text{Operation Time}} \quad [\%]$$

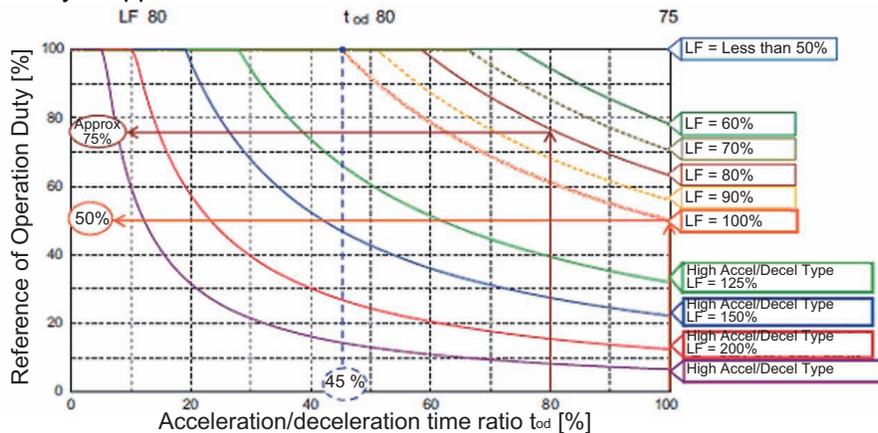
$$\text{Acceleration time} = \frac{\text{Velocity at operation [mm/s]}}{\text{Acceleration during operation [mm/s}^2\text{]}} \quad [\text{sec}] \quad \text{Deceleration time} = \frac{\text{Velocity at operation [mm/s]}}{\text{Deceleration during operation [mm/s}^2\text{]}} \quad [\text{sec}]$$

$$\text{Acceleration [mm/s}^2\text{]} = \text{Acceleration [G]} \times 9,800\text{mm/s}^2$$

$$\text{Deceleration [mm/s}^2\text{]} = \text{Deceleration [G]} \times 9,800\text{mm/s}^2$$

### 3) Read the duty ratio from the load rate LF and the acceleration speed time ratio $t_{od}$ that were used to figure out the duty ratio.

Example) If the load factor LF is 80% and acceleration/deceleration time ratio  $t_{od}$  is 80%, the reference duty is approx. 75%.



## 1.3 Option

### 1.3.1 Brake Type (Model: B)

The brake is a mechanism designed to prevent the rod from dropping on a vertically installed actuator when the power or servo is turned OFF.

Use the brake to prevent the installed load, etc., from being damaged due to the falling rod.

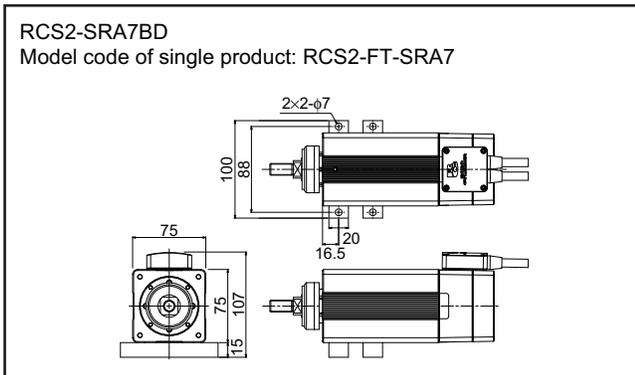
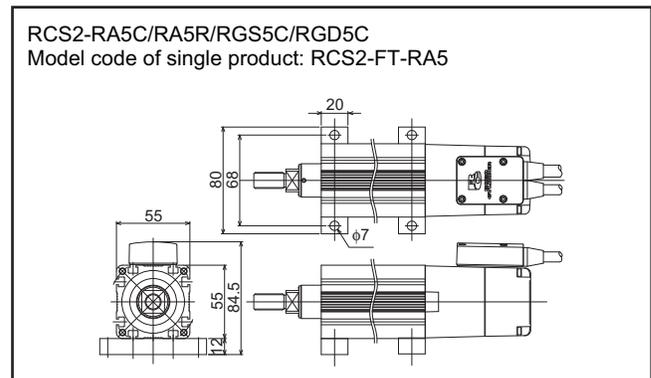
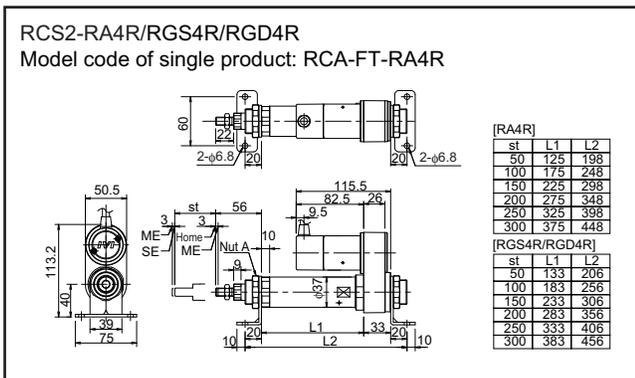
### 1.3.2 Reversed-home Specification (Model: NM)

The standard home position is on the motor side. This is the type to indicate when the operation direction is required to be in the same as the coordinate system of the device that the actuator is mounted on.

**⚠ Caution:** The home position is adjusted at the factory before shipment. If you wish to change the home after the delivery of your actuator, you must return the actuator to IAI for adjustment. Contact our sales office or an agent near you.

### 1.3.3 Foot Bracket (Model: FT)

It is a metal part to be attached on the bottom of the actuator to affix with screws from top side.





### 1.3.6 High Acceleration/Deceleration Type) (Model: HA)

The maximum acceleration (0.2G or 0.3G) for the standard type becomes 1.0G.

At the maximum acceleration 1.0G, operation with the same transportable weight as the standard type can be performed.

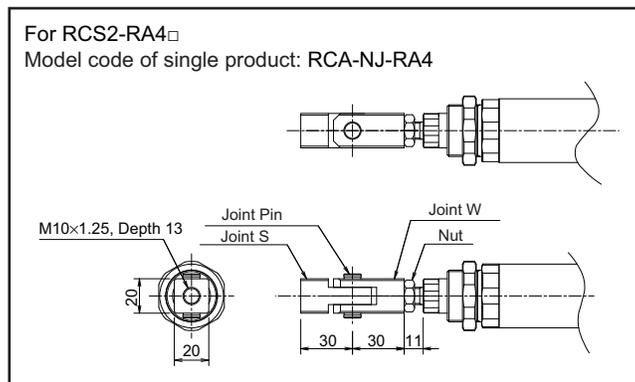
The dedicated controller is required when operating a high acceleration/deceleration type actuator. The controller differs from the standard type.

### 1.3.7 Home Position Confirmation Sensor (Model: HS)

A sensor to monitor the slider to see if it is certainly moved to the home position when a home-return is executed gets attached on the actuator.

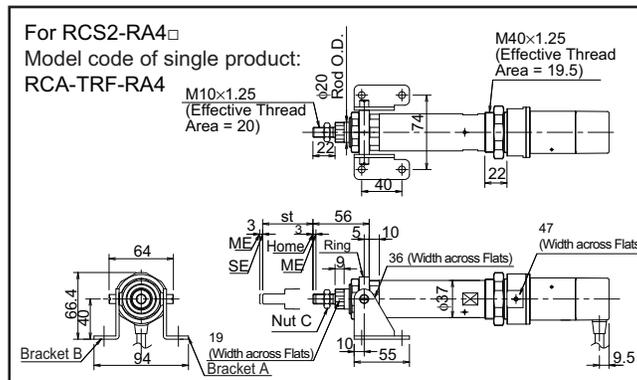
### 1.3.8 Knuckle Joint (Model: NJ)

This is a metal joint to make free movement (rotation) on the tip of the rod for when using a clevis or trunnion bracket.



### 1.3.9 Trunnion Bracket (Front) (Model: TRF)

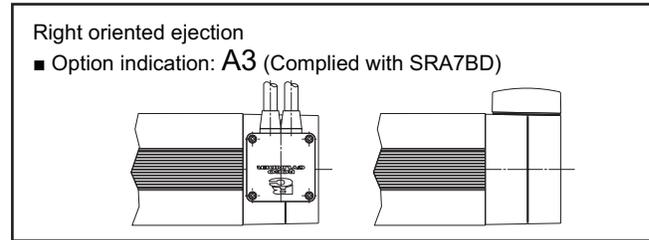
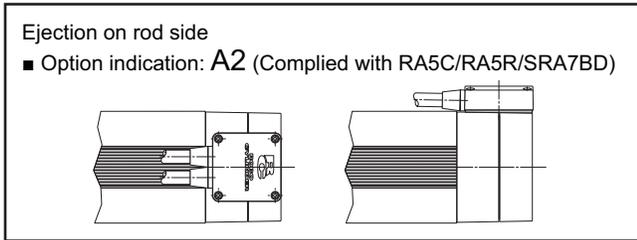
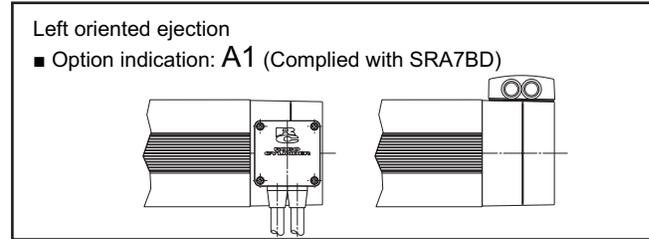
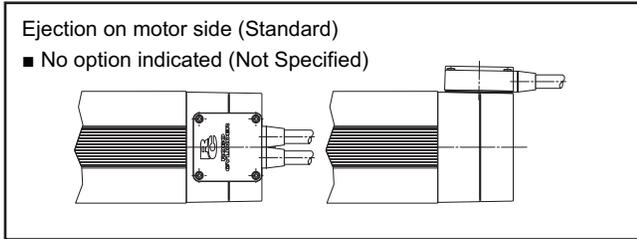
This is a bracket to make the cylinder follow when the movement of an object attached on the tip of the rod is different from the direction of rod movement. Attach on the rod.





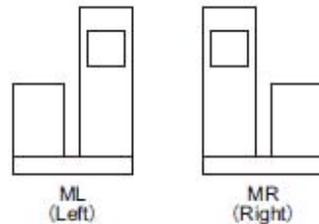
### 1.3.13 Difference in Connector Cable Orientation (Model: A1 to A3)

The direction of cable ejection is different.



### 1.3.14 Motor Reversing Type (Standard) (Model: ML), Motor Reversing Type (Model: MR)

The direction of motor reversing is different. From the view of the motor side, the type with the motor reversed to the left is ML, and the motor reversed to the right is MR



### 1.3.15 Difference in Guide Attachment Orientation (Model: GS2 to GS4)

The position of the rod for the single guided type is different. They are attached on the right (GS2), attached on the bottom (GS3) and attached on the left (GS4).

### 1.3.16 Rod Tip Extended Type (Model: RE)

This is an adopter to extend the rod tip of RCS2-SRA7BD to have the same distance from the attachment hole to the rod tip for RCS2-SRA4BD and RCS2-RA7BD.

### 1.3.17 CE Mark Complied (Model: CE)

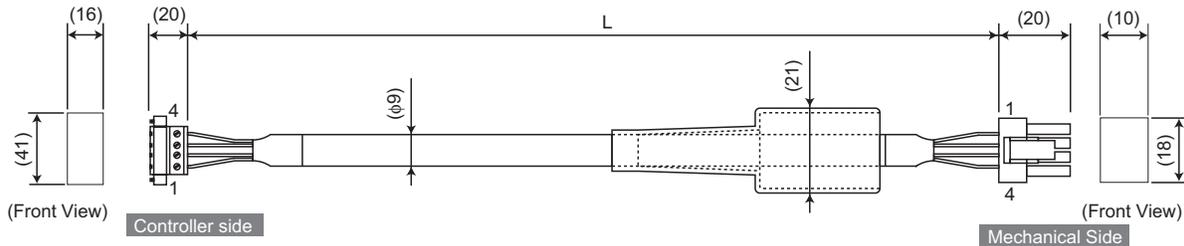
It shows the compliance with CE Mark

## 1.4 Motor • Encoder Cables

### [1] Motor Cables/Motor Robot Cables

Model number: CB-RCC-MA□□□/CB-RCC-MA□□□-RB

□□□ indicates the cable length (L) (Example: 030=3m), Max.20m



Width	Signal Name	No.	No.	Signal Name	Width
0.75sq	PE	1	1	U	0.75sq (Solderless)
	U	2	2	V	
	V	3	3	W	
	W	4	4	PE	

#### [Bending Radius]

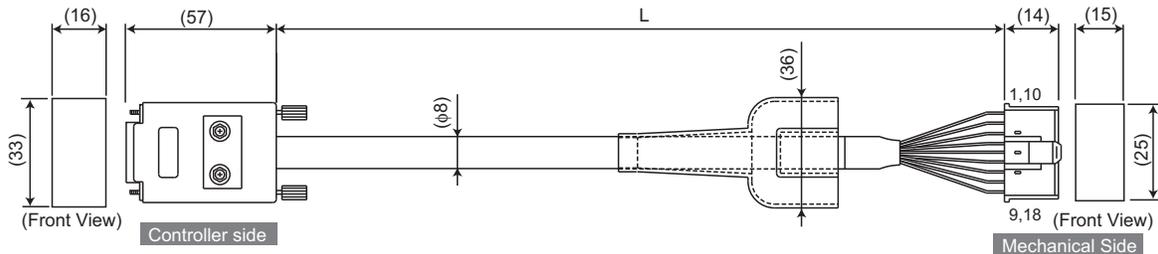
When used under moving condition : 51mm (Robot Cable)

When used in fixed condition : 34mm (Standard Cable)

### [2] Encoder Cables/Encoder Robot Cables (For X-SEL-J/K)

Model number: CB-RCBC-PA□□□/CB-RCBC-PA□□□-RB

□□□ indicates the cable length (L) (Example: 030=3m), Max.20m



Width	Signal Name	No.	No.	Signal Name	Width
0.15sq (Solderless)	A/U	1	1	A/U	0.15sq (Solderless)
	A̅/U	2	2	A̅/U	
	B/V	3	3	B/V	
	B̅/V	4	4	B̅/V	
	Z/W	5	5	Z/W	
	Z̅/W	6	6	Z̅/W	
	SD	7	7	—	
	SD̅	8	8	—	
	BAT+	9	9	FG	
	BAT-	10	10	SD	
	VCC	11	11	SD	
	GND	12	12	BAT+	
	BK-	13	13	BAT-	
	BK+	14	14	VCC	
	—	15	15	GND	
The shield is clamped to the hood Ground wire and braided shield wires			16	—	
			17	BK-	
			18	BK+	

#### [Bending Radius]

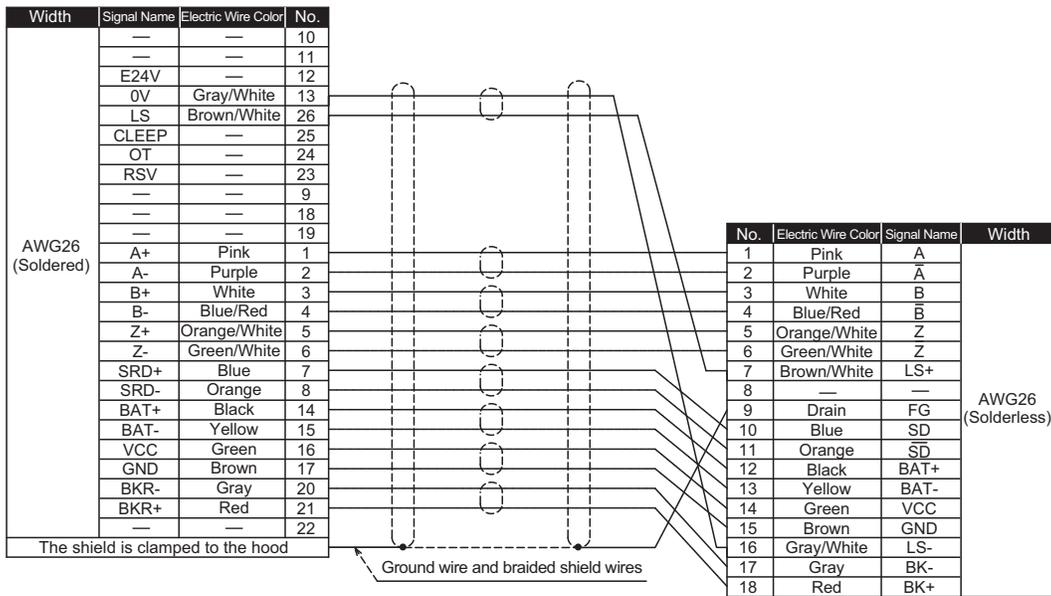
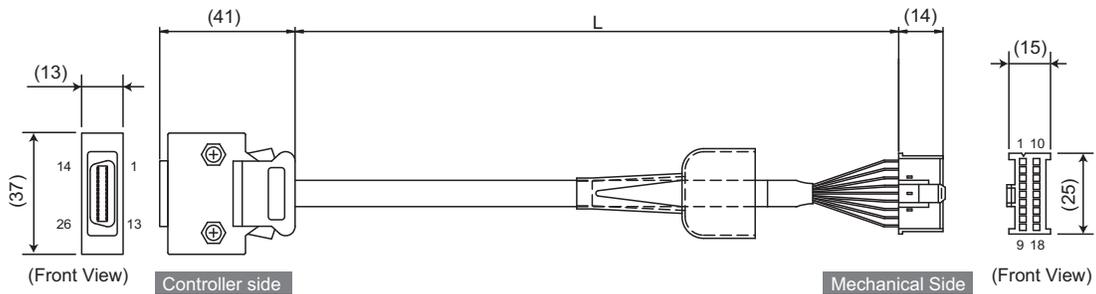
When used under moving condition : 90mm (Robot Cable)

When used in fixed condition : 75mm (Standard Cable)

## [3] Encoder Cables/Encoder Robot Cables (For SCON, SSEL and X-SEL-P/Q)

Model number: CB-RCS2-PA□□□/CB-X3-PA□□□

□□□ indicates the cable length (L) (Example: 030=3m), Max.20m



### [Bending Radius]

When used under moving condition : 58mm (Robot Cable)

When used in fixed condition : 93mm (Standard Cable)

## 2. Installation

### 2.1 Transportation

#### [1] Handling of Robot

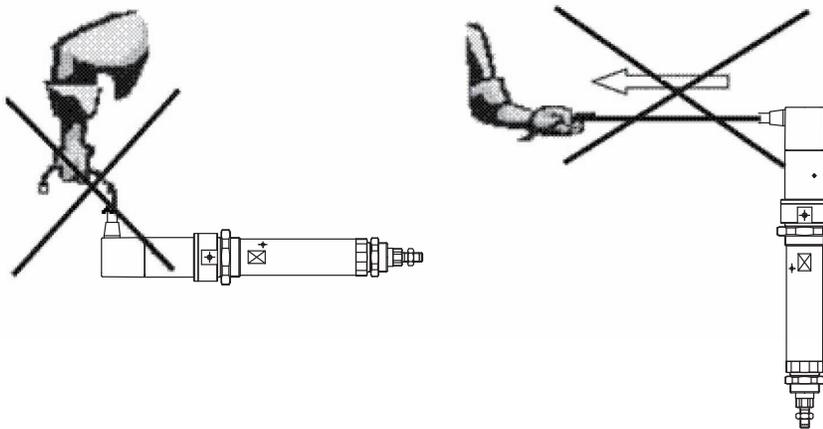
##### (1) Handling the Packed Unit

Unless otherwise specified, the actuator is shipped with each axis packaged separately.

- Do not damage or drop. The package is not applied with any special treatment that enables it to resist an impact caused by a drop or crash.
- Transport a heavy package with at least more than two operators. Consider an appropriate method for transportation.
- Keep the unit in horizontal orientation when placing it on the ground or transporting. Follow the instruction if there is any for the packaging condition.
- Do not step or sit on the package.
- Do not put any load that may cause a deformation or breakage of the package.

##### (2) Handling the Actuator After Unpacking

- Do not carry an actuator by motor unit and a cable or attempt to move it by pulling the cable.



- Hold the body base when transporting the actuator.
- Be careful not to bump the actuator into anything when moving it.
- Do not apply an excessive force to each part of the actuator. In particular, prevent the motor unit and rear bracket from receiving an unnecessary force.

Supplement) For the names of each part of the actuator, refer to “Names of the Parts”

## [2] Handling in Assembled Condition

- When carrying the actuator, exercise caution not to bump it against nearby objects or structures.
- Secure the rods to prevent sudden movement during transport.
- If any end of the actuator is overhanging, secure it properly to avoid significant movement due to external vibration.
- When transporting the assembly without the ends of the actuators fastened, do not subject the assembly to an impact of 0.3 G or more.
- When suspending the mechanical equipment (system) with ropes, avoid applying force to actuator, connector box, etc. Also, avoid the cables being pinched or caused an excessive deformation.

## 2.2 Installation and Storage • Preservation Environment

### [1] Installation Environment

The actuator should be installed in a location other than those specified below.

In general, the installation environment should be one in which an operator can work without protective gear. Also provide sufficient work space required for maintenance inspection.

- Where the actuator receives radiant heat from strong heat sources such as heat treatment furnaces
- Where the ambient temperature exceeds the range of 0 to 40°C
- Where the temperature changes rapidly and condensation occurs
- Where the relative humidity exceeds 85% RH
- Where the actuator receives direct sunlight
- Where the actuator is exposed to corrosive or combustible gases
- Where the ambient air contains a large amount of powder dust, salt or iron (at level exceeding what is normally expected in an assembly plant)
- Where the actuator is subject to splashed water, oil (including oil mist or cutting fluid) or chemical solutions
- Where the actuator receives impact or vibration

If the actuator is used in any of the following locations, provide sufficient shielding measures:

- Where noise generates due to static electricity, etc.
- Where the actuator is subject to a strong electric or magnetic field
- Where the actuator is subject to ultraviolet ray or radiation

### [2] Storage • Preservation Environment

- The storage and preservation environment should comply with the same standards as those for the installation environment. In particular, when the machine is to be stored for a long time, pay close attention to environmental conditions so that no dew condensation forms.
- Unless specially specified, moisture absorbency protection is not included in the package when the machine is delivered. In the case that the machine is to be stored and preserved in an environment where dew condensation is anticipated, take the condensation preventive measures from outside of the entire package, or directly after opening the package.
- For storage and preservation temperature, the machine withstands temperatures up to 60°C for a short time, but in the case of the storage and preservation period of 1 month or more, control the temperature to 50 °C or less.
- Storage and preservation should be performed in the horizontal condition. In the case it is stored in the packaged condition, follow the posture instruction if any displayed on the package.

## 2.3 How to Installation

This chapter explains how to install the actuator on your mechanical system.

### 2.3.1 Installation of Main Unit

The surface to mount the main unit should be a machined surface or a plane that possesses an equivalent accuracy and the flatness should be within 0.05mm. Also, the platform should have a structure stiff enough to install the unit so it would not generate vibration or other abnormality.

Also consider enough space necessary for maintenance work such as actuator replacement and inspection. On the base there is a datum surface prepared for the attachment slotted holes.

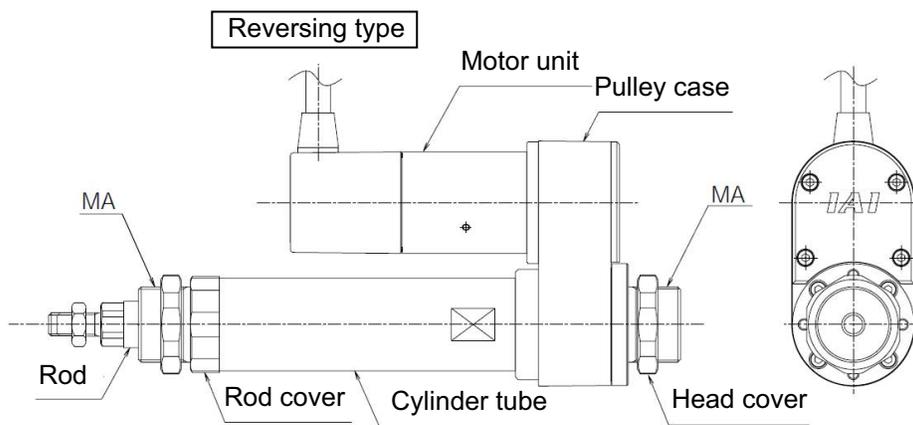
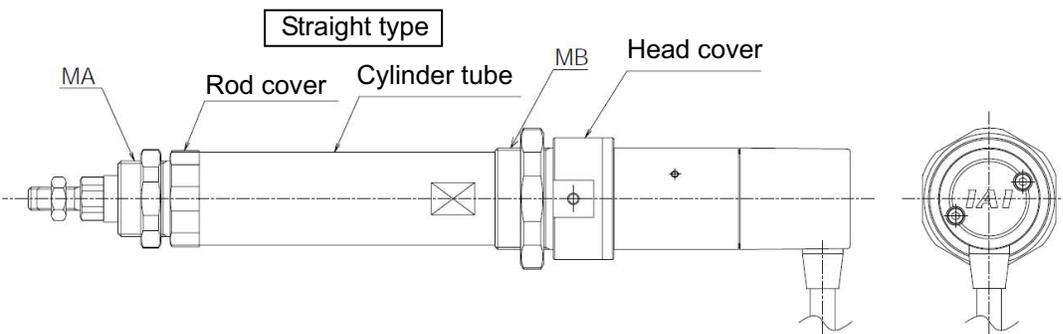
On the back side of the actuator, there are attachment tapped holes, through holes, positioning reamed holes and slotted holes. For the details of the positions and dimensions, check in the appearance drawings. [Refer to 6. External Dimensions.]

When repeatability in re-attaching is required after it is detached, utilize the reamed holes. Please note, however, that a consideration is necessary such as to use only one point on the motor side of the reamed holes when a fine-tuning such as perpendicularity is required.

#### (1) Using screws on the rod or head side

Install the actuator using screws set on the rod or head side of the actuator.

- Applicable model: RCS2-RA4

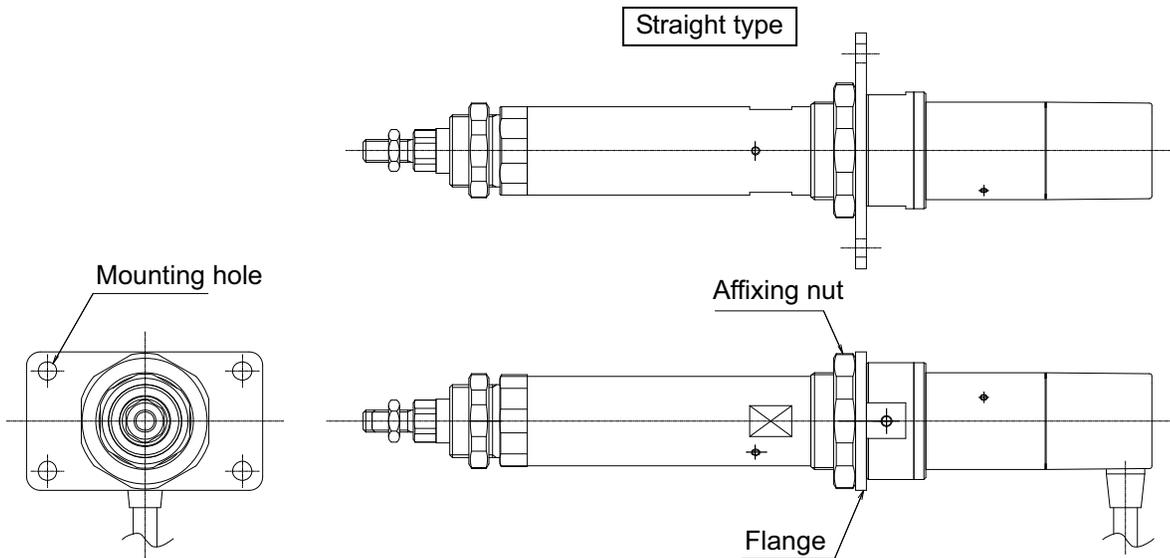
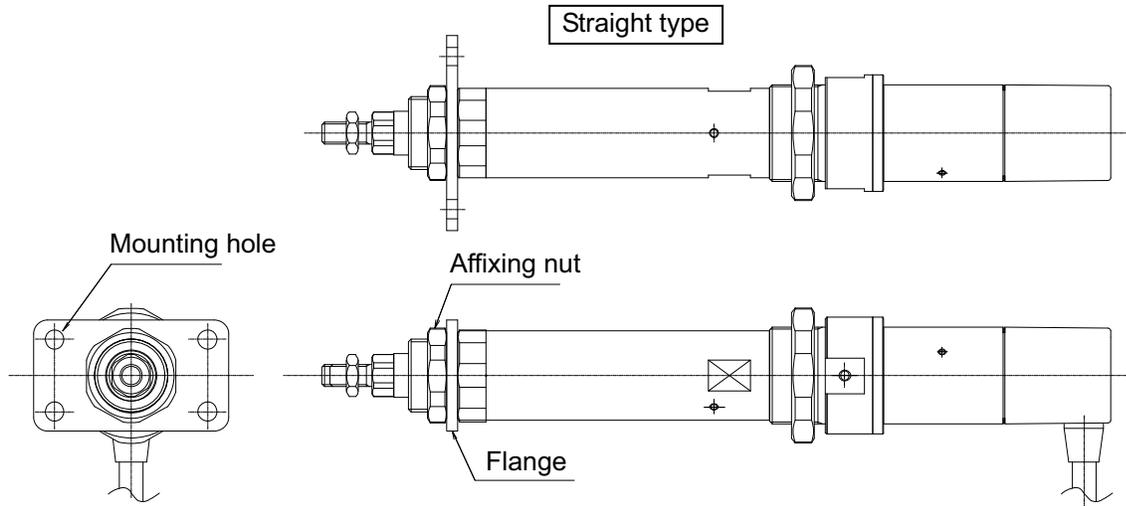


Type	MA	MB
RA4 type	M30 × 1.5	M40 × 1.5

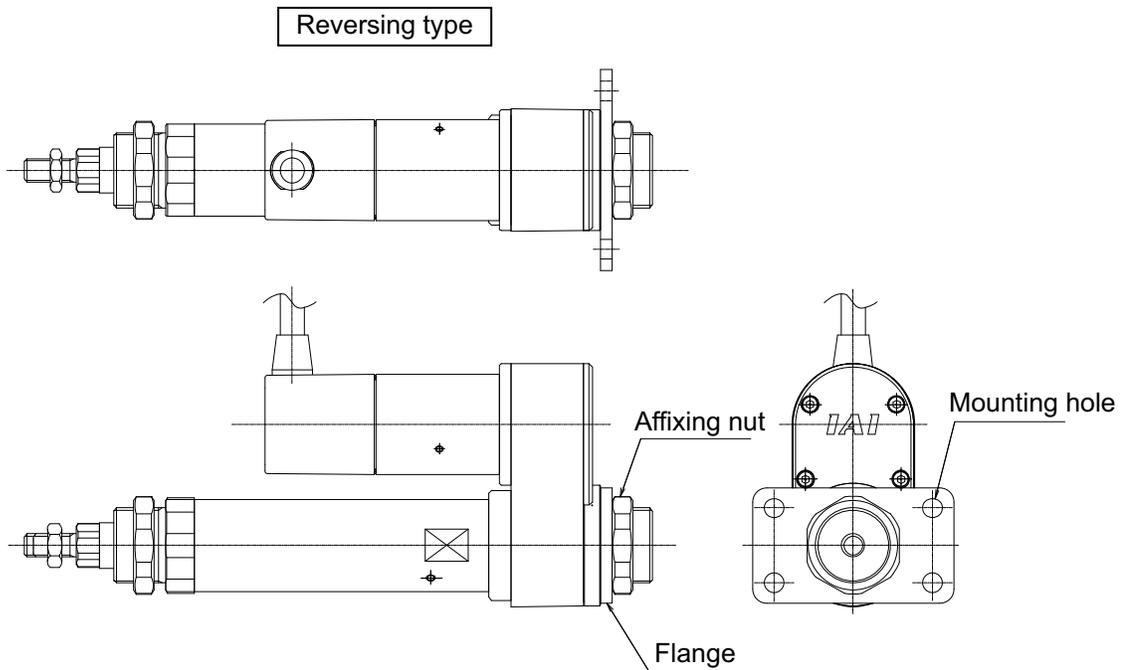
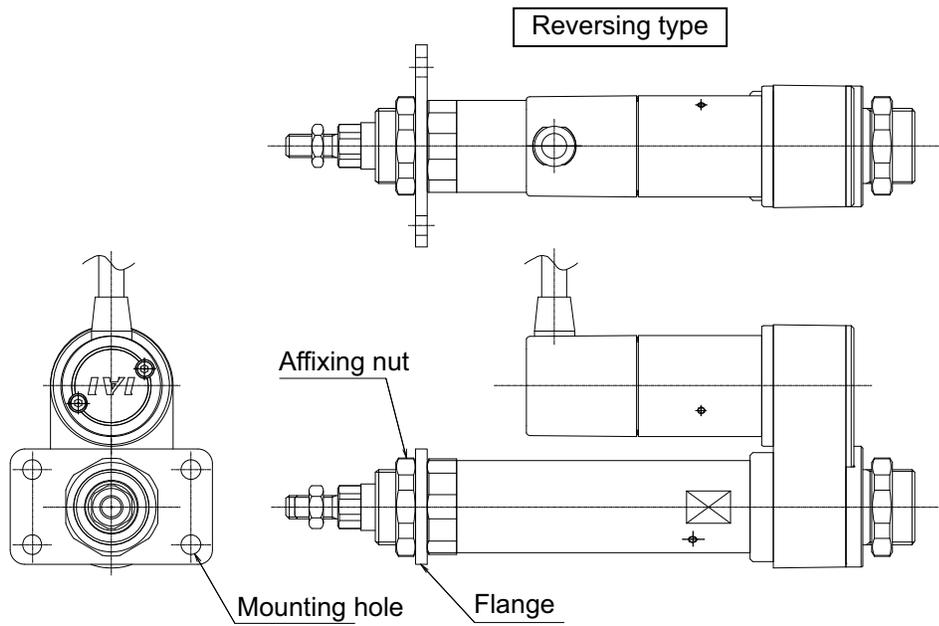
(2) Using screws on a flange (optional)

An optional flange is available for installing the actuator. Use this flange, if necessary.

- Applicable model: RCS2-RA4



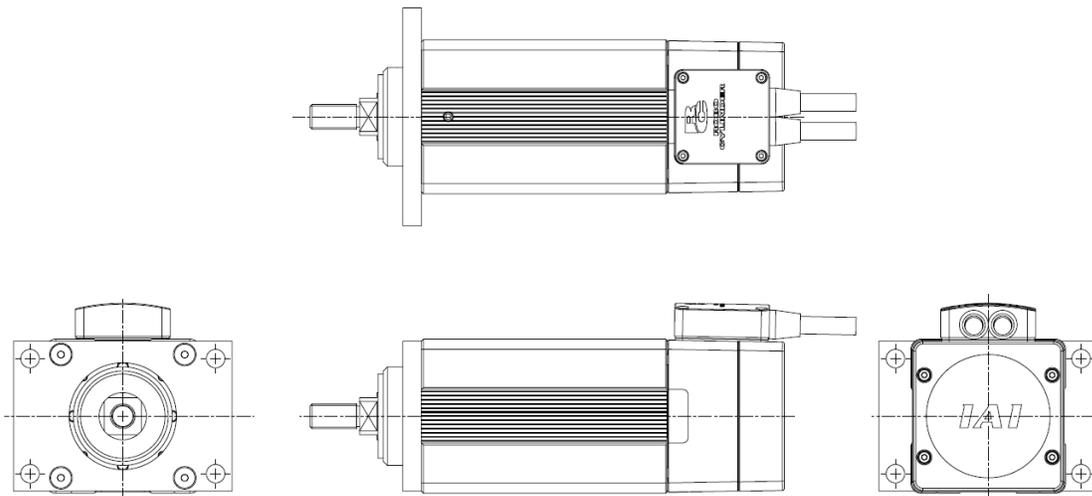
	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m



	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m

- Applicable models: RCS2-SRA7BD

Short type

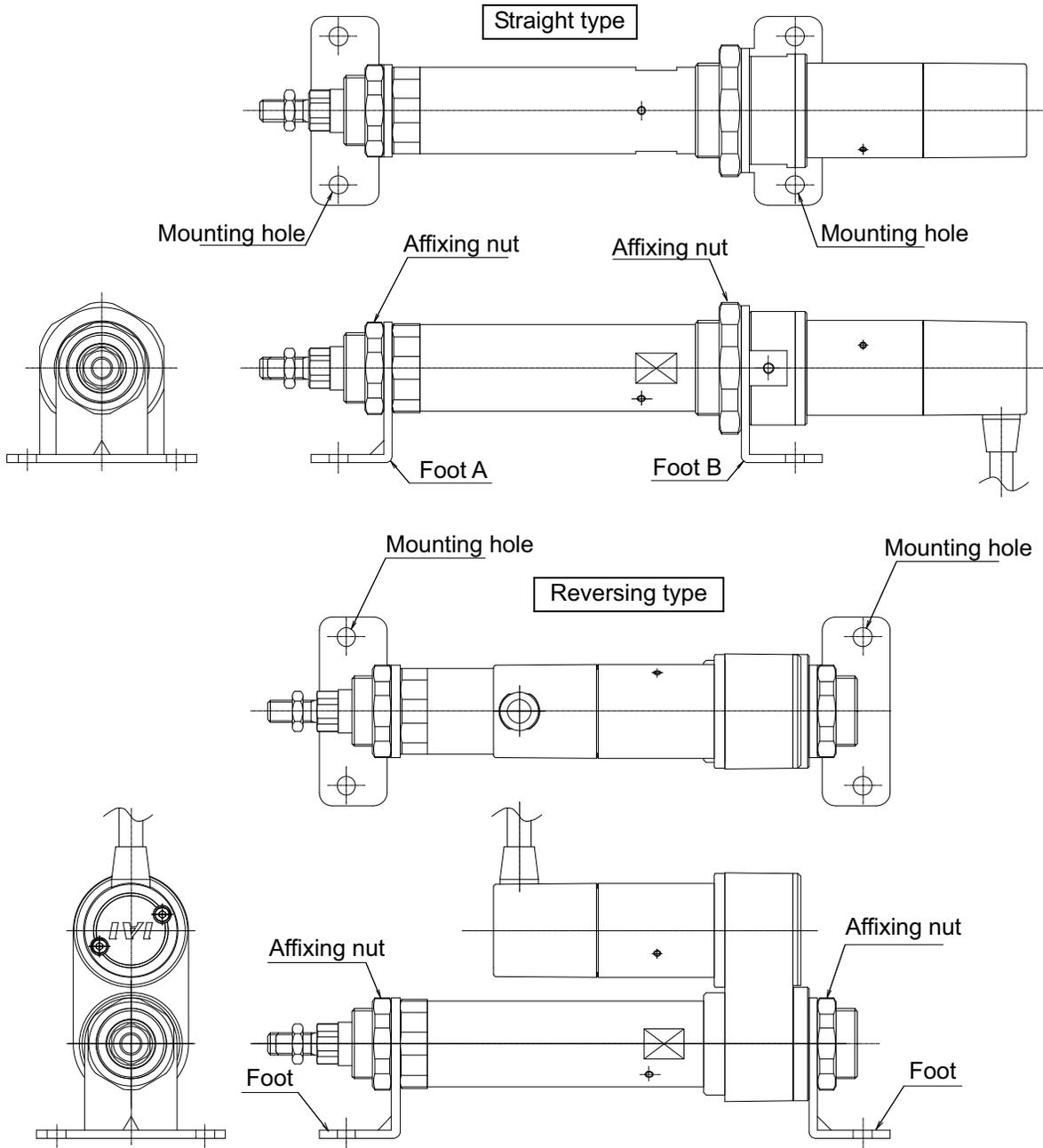


	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m

(3) Using screws on feet (optional)

Optional feet are available for installing the actuator. Use these feet, if necessary.

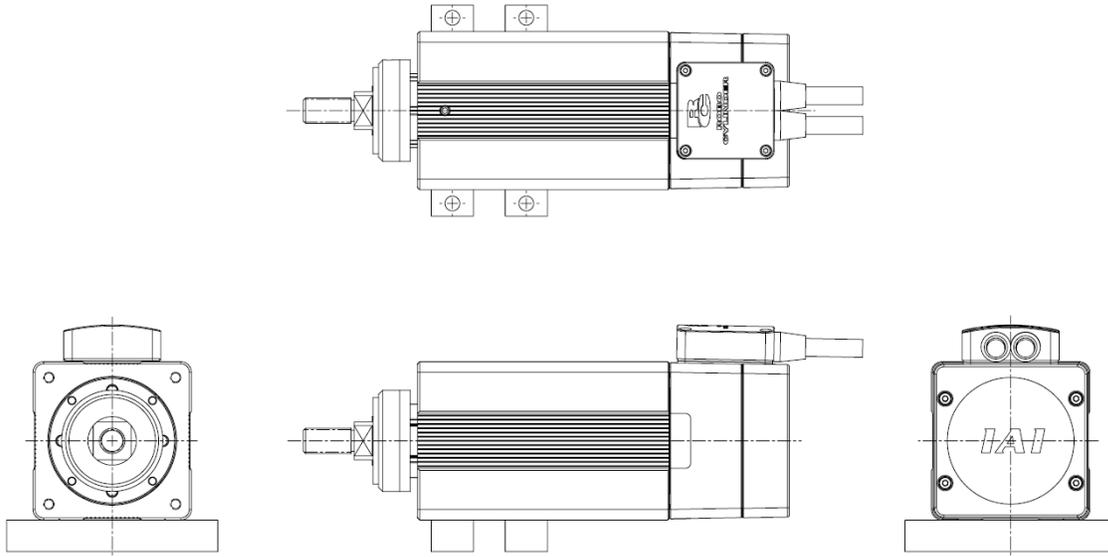
- Applicable model: RCS2-RA4



	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m

- Applicable model: RCS2-SRA7BD

Short type



	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m

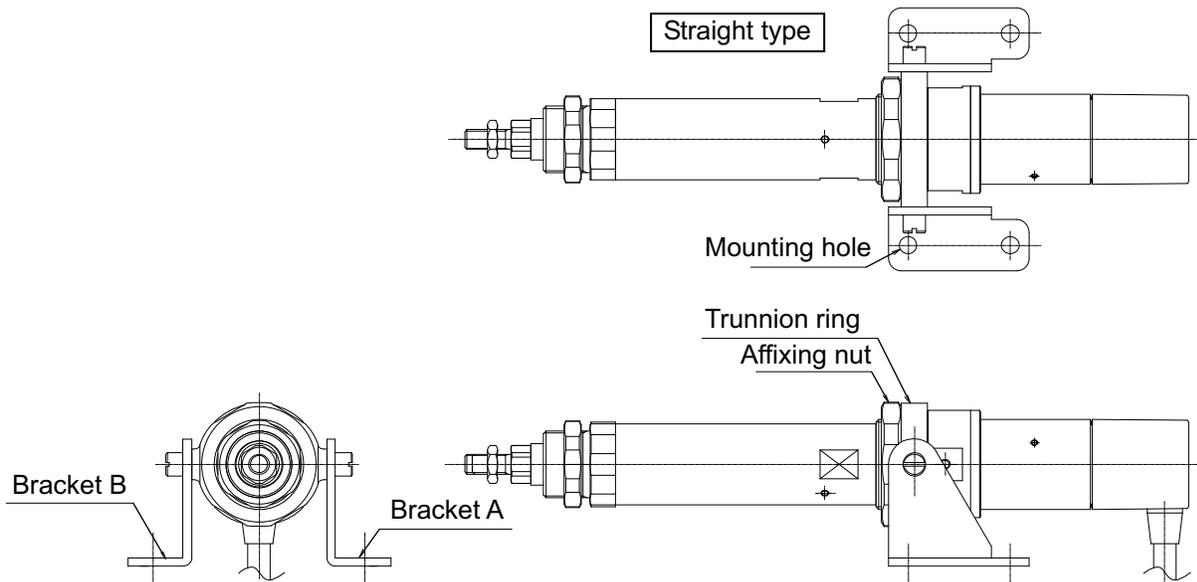
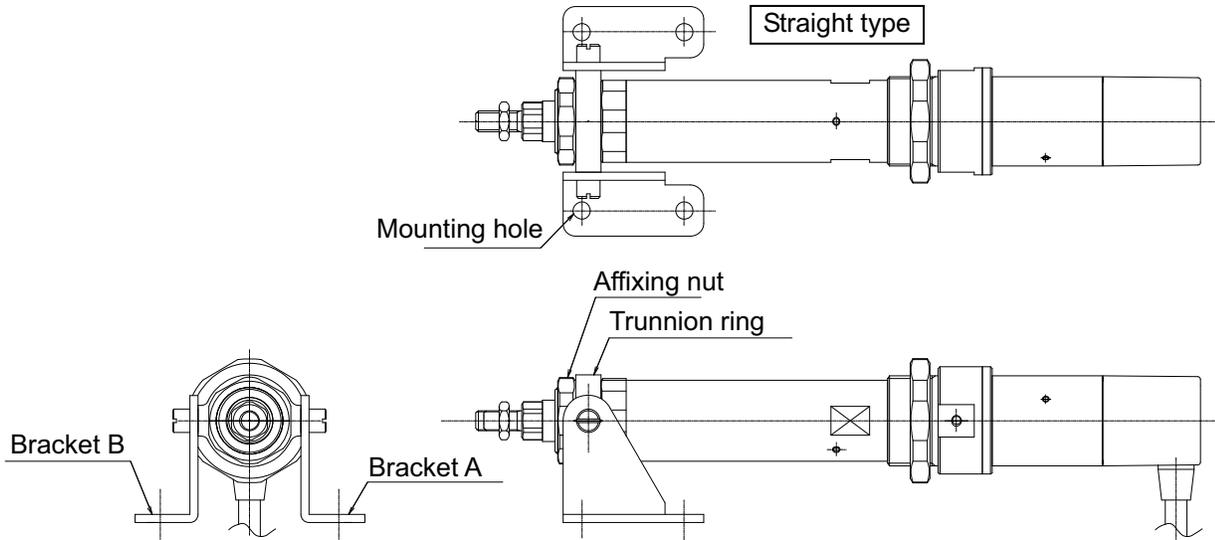


Caution: Affix the actuator using two feet (optional), one in the front and the other in the back.  
If affixed using only one foot in the front or back, the actuator may be negatively affected due to insufficient rigidity.

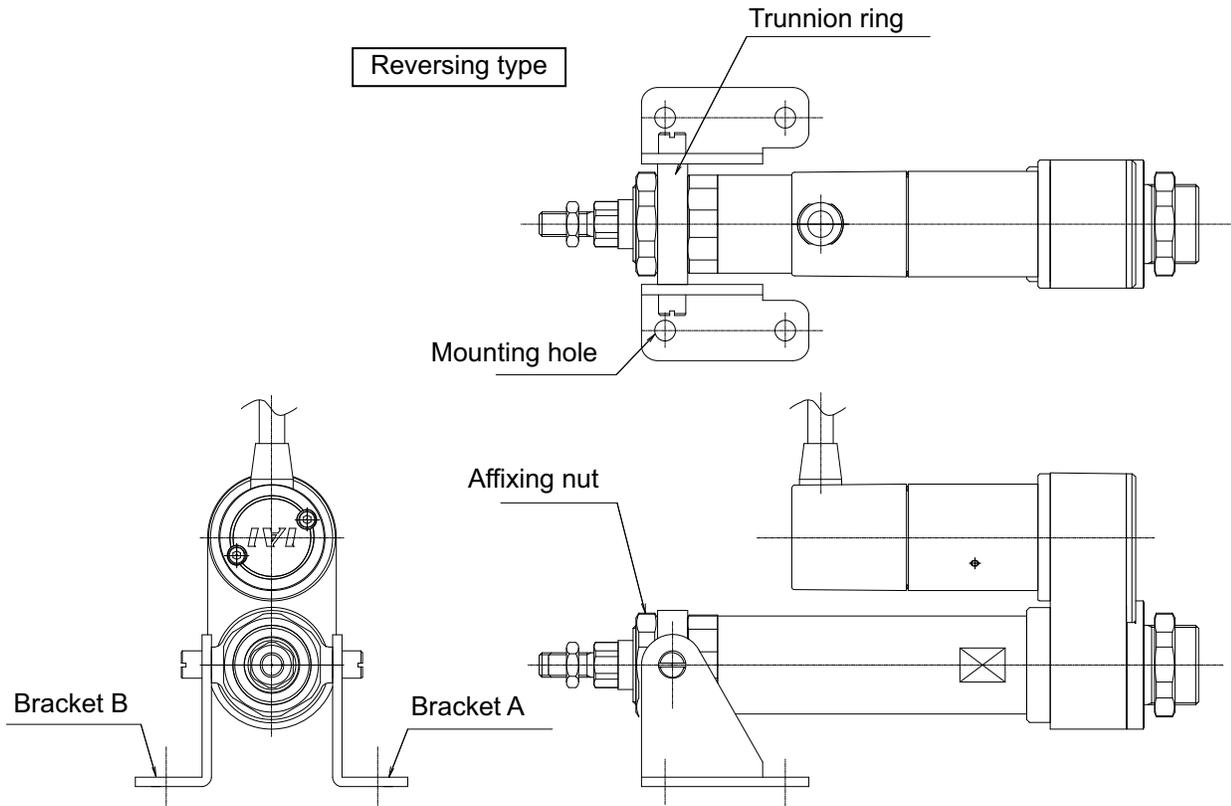
(4) Using screws on a trunnion (optional)

An optional trunnion is available for installing the actuator. Use this trunnion, if necessary.

- Applicable model: RCS2-RA4



	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m



	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N•m	5.4 N•m

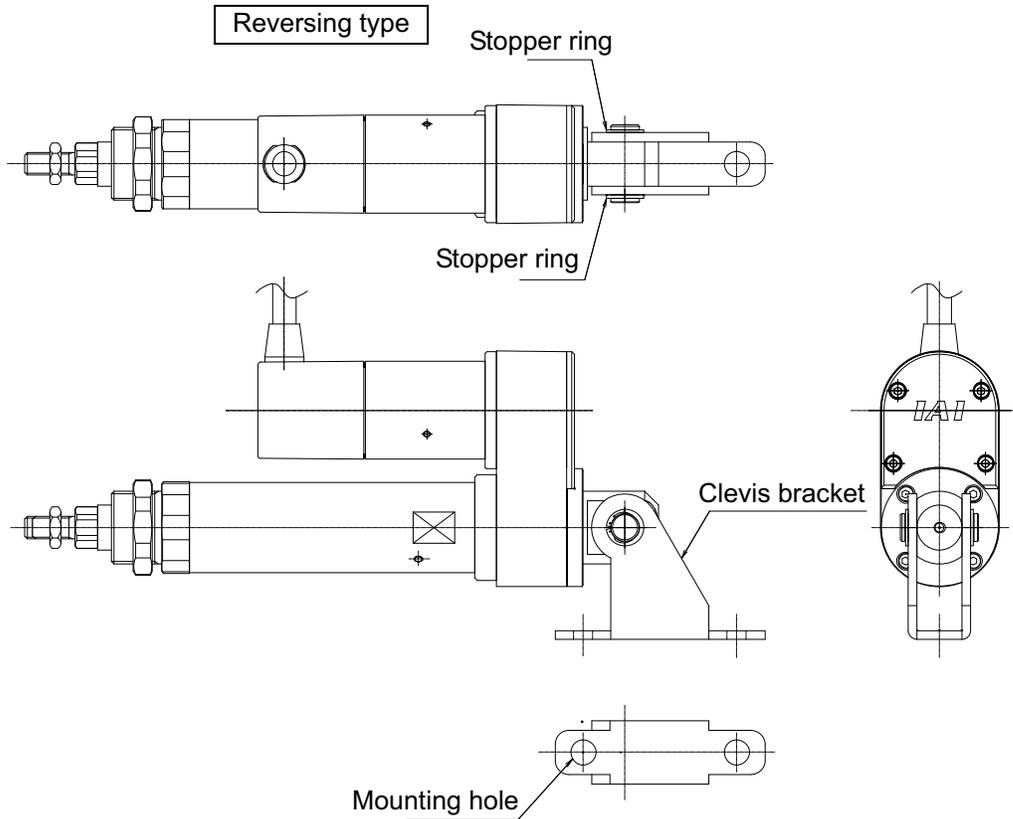


- Caution:**
- Exercise caution when installing the actuator horizontally using the optional clevis or trunnion or any commercially available free joint, because the rod will receive the actuator weight. As a result, the bush may wear quickly or internal mechanical parts may be damaged. If the actuator is installed horizontally using any of the aforementioned means, add a guide or other appropriate mechanism to prevent the rod from receiving the actuator weight.
  - The optional clevis and trunnion are designed so that the fulcrum shaft can only receive radial load. In a condition where play is not permitted or thrust load is received, the customer must design a separate bearing structure.
  - The optional clevis and trunnion provide structures whereby the bearing supports the fulcrum shaft. Apply grease to the fulcrum shaft.

(5) Using screws on a clevis (optional)

An optional clevis is available for installing the actuator. Use this clevis, if necessary.

- Applicable model: Motor reversing type RCS2-RA4R



	Mating material is steel	Mating material is aluminum
Screw size	M8	M8
Tightening torque	30 N•m	12 N•m

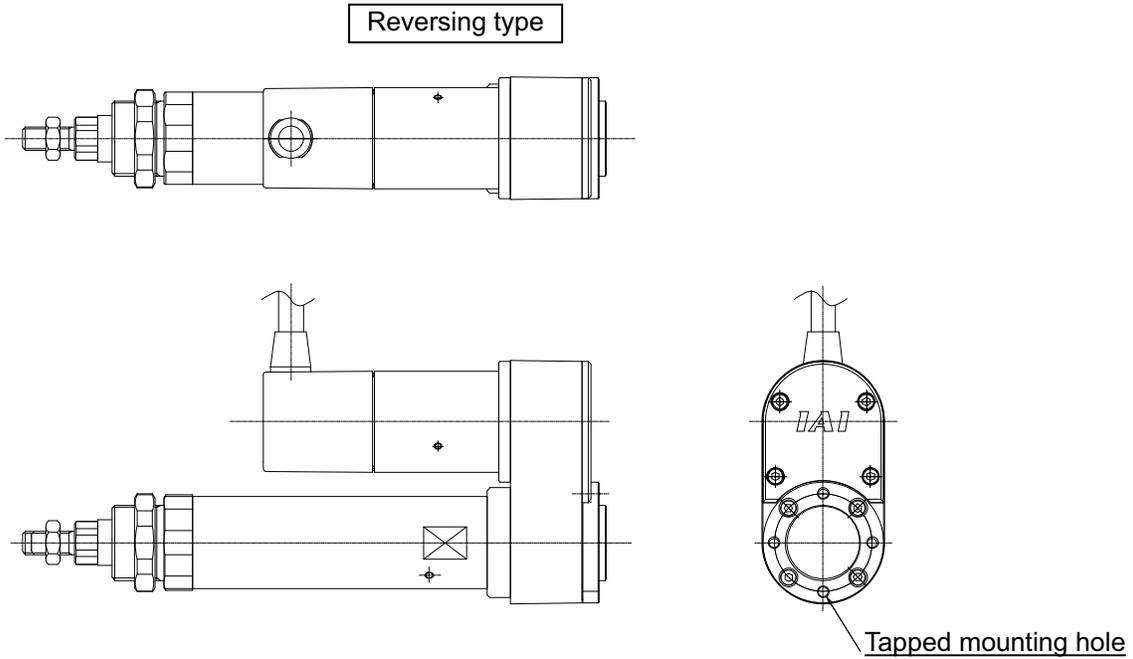
**Caution:**

- Exercise caution when installing the actuator horizontally using the optional clevis or trunnion or any commercially available free joint, because the rod will receive the actuator weight. As a result, the bush may wear quickly or internal mechanical parts may be damaged. If the actuator is installed horizontally using any of the aforementioned means, add a guide or other appropriate mechanism to prevent the rod from receiving the actuator weight.
- The optional clevis and trunnion are designed so that the fulcrum shaft can only receive radial load. In a condition where play is not permitted or thrust load is received, the customer must design a separate bearing structure.
- The optional clevis and trunnion provide structures whereby the bearing supports the fulcrum shaft. Apply grease to the fulcrum shaft.

(6) Using screws on a rear mounting bracket (optional)

An optional rear mounting bracket is available for installing the actuator. Use this rear mounting bracket, if necessary.

- Applicable model: Motor reversing type RA4R

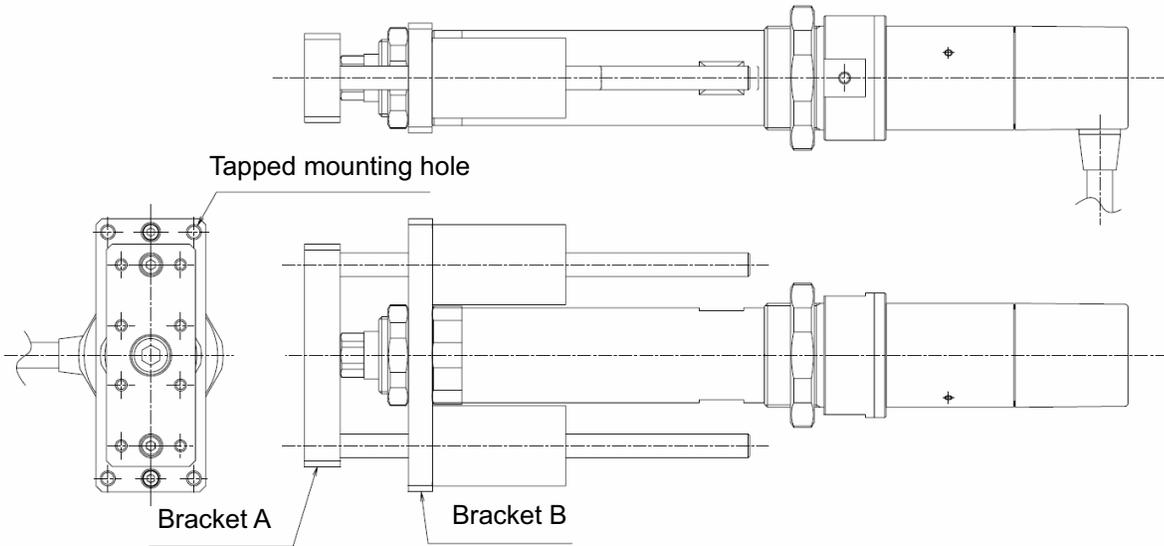


Type	Tapped hole diameter	Tapped depth	Tightening torque
RA4 type	M4	7 mm	1.8 N•m

(7) Double-guide type

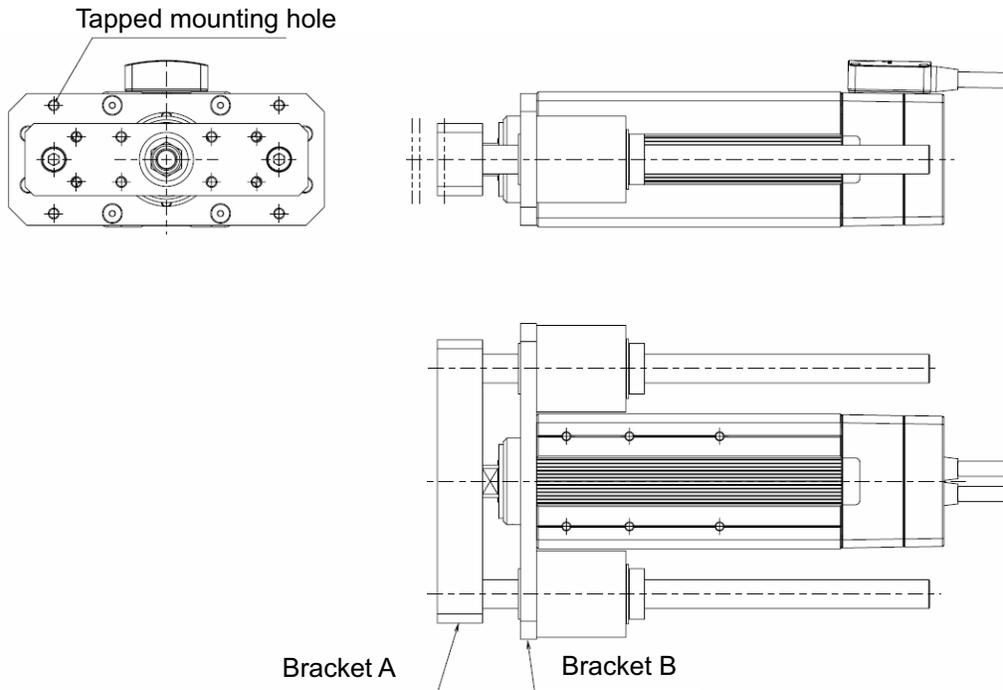
Use the tapped holes in the bracket for installing an actuator of the double-guide type.

- Applicable model: Double-guide type RGD4



Type	Tapped hole diameter	Tapped depth	Tightening torque
RA4 type	M5	8 mm	3.4 N•m

- Applicable model: SRGD7BD

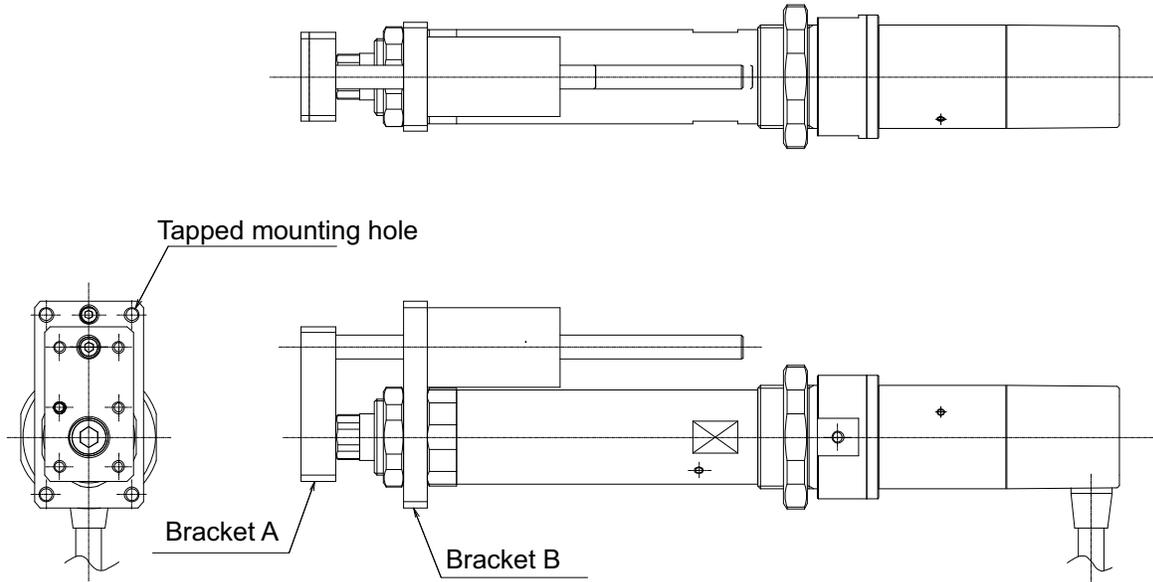


Type	Tapped hole diameter	Tapped depth	Tightening torque
SRGD7BD	M6	9 mm or more	5.36 N•m

(8) Single-guide type

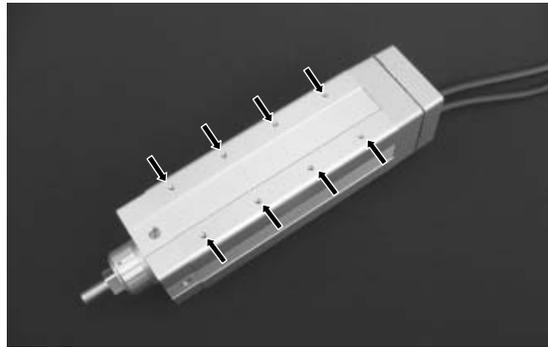
Use the tapped holes in the bracket for installing an actuator of the single-guide type.

- Applicable model: Double-guide type RGD4



Type	Tapped hole diameter	Tapped depth	Tightening torque
RA4 type	M5	8 mm	3.4 N•m

- (9) Using tapped mounting holes at the back  
 Applicable model: RA7 (excluding 50-mm stroke models)  
 The RA7 type has tapped mounting holes at the back.  
 Use these holes to install the actuator.

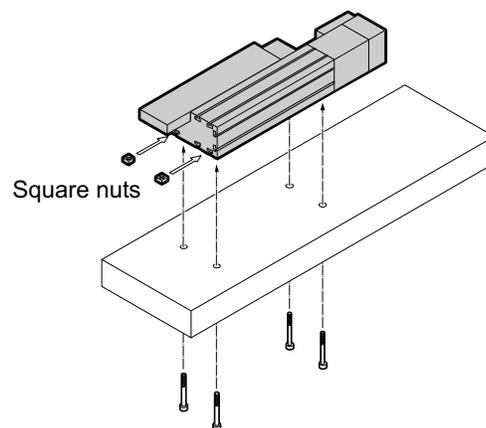


RA7

Shown below is the maximum screw-in depth of the tapping screws used for mounting the base.  
 Be careful not to allow the tip of the bolt to project.

Type	Tapped hole diameter	Maximum screw-in depth
RA7	M5	15 mm
SRA7BD, SRGS7BD, SRGD7BD	M5	12 mm

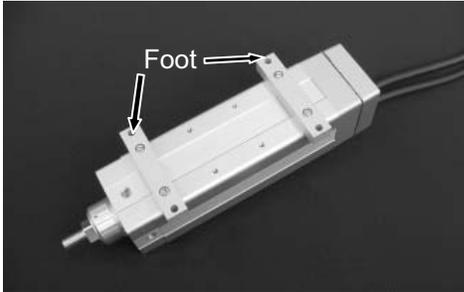
- (10) Using T-grooves and square nuts  
 Applicable models: RA5C, RA5R, F5D  
 The RA5 and F5 types have T-grooves. Insert square nuts in these T-grooves and install the actuator to the frame.



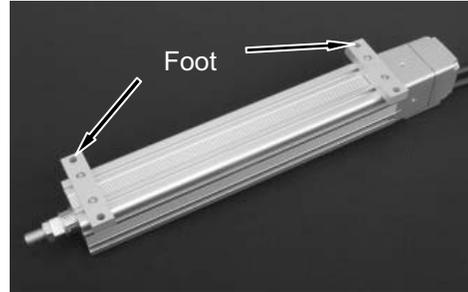
(11) Using feet

Applicable models: RA5, RA5R, RA7, SRA7BD, SRGS7BD, SRGD7BD (excluding flat types)

[1] On the RA7 type, attach feet using the tapped mounting holes at the back.



[2] On the RA5 type, attach feet using square nuts inserted into the T-grooves.

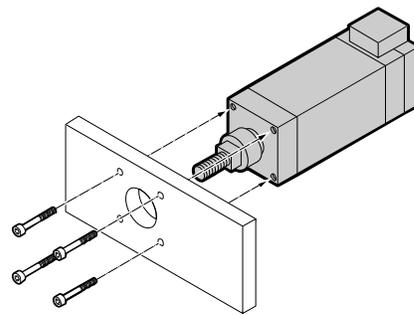
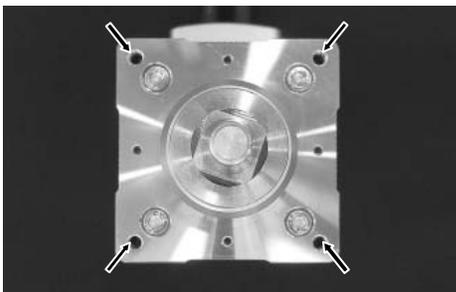


Install the feet to the frame using bolts.



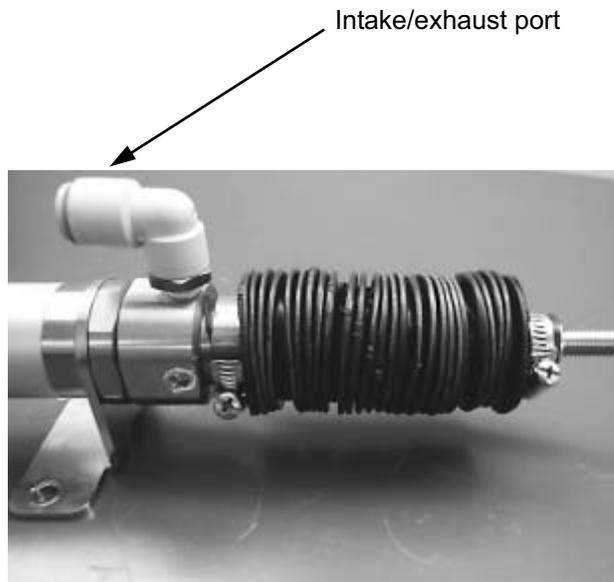
(12) Using tapped holes on the reference surface

Applicable models: RA5, RA5R, RA7 (excluding flat types and guide types)



Type	Tapped hole diameter	Effective thread depth
RA5/RA5R	M6	12 mm
RA7	M5	15 mm
SRA7BD	M5	12 mm

## 2.4 Connecting the Air Tube of the RCS2W Dustproof/Splash-proof Type



Install the air tube (outer diameter: 10 mm, inner diameter: 6.5 mm) on the intake/exhaust port and guide the air tube to a location where the external environment assures the tube will not come in contact with water.

(Applicable tube)

Shown below is a representative model of air tube that can be installed on the RCS2W:

- TU1065: Polyurethane tube (Manufacturer: SMC)



Caution: The air tube should not be more than 3 m long.

## 3. Connecting with Controller

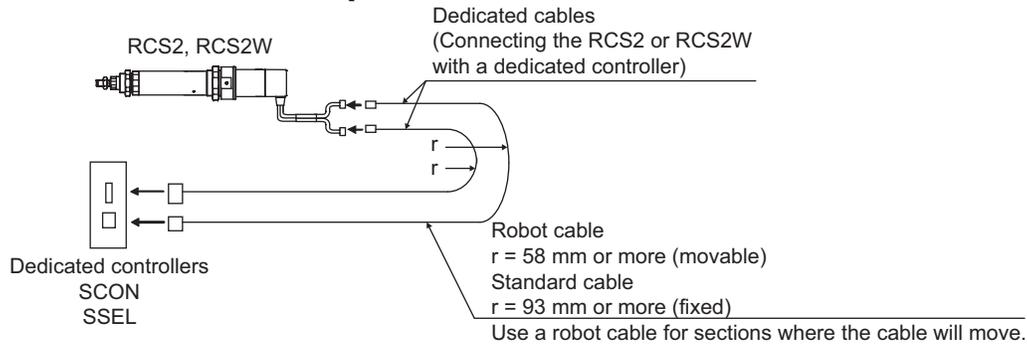
As the connection cable for the controller and RCS2 (this actuator), use the IAI-dedicated controller and dedicated connection cable.

This section explains the wiring method for a single axis.

- If the dedicated connection cable cannot be secured, reduce the load on the cable by allowing it to deflect only by the weight of the cable or wire it in a self-standing cable hose, etc., having a large radius.
- Do not cut and reconnect the dedicated connection cable for extension or shorten the cable.
- Do not pull on the dedicated connection cable or bend it forcibly.
- The actuator cable coming out of the motor unit is not meant to be bent. Fix the cable so it would not be bent repeatedly.

Please consult with IAI if you require a different kind of cable than the one supplied.

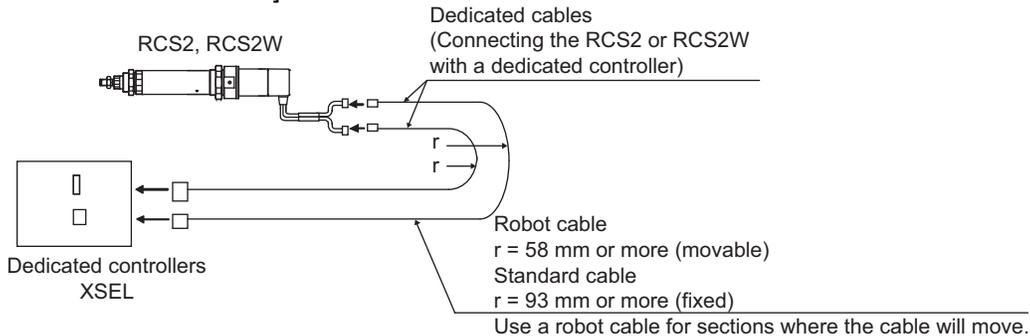
### [Connection with SCON/SSEL Controllers]



#### Dedicated cables

- Motor cable CB-RCC-MA□□□ / Robot motor cable CB-RCC-MA□□□-RB
  - Encoder cable CB-RCS2-PA□□□ / Robot encoder cable CB-X3-PA□□□-RB
- indicates the cable length. A desired length up to 30 m can be specified.  
Example) 080 = 8 m

### [Connection with X-SEL Controllers]



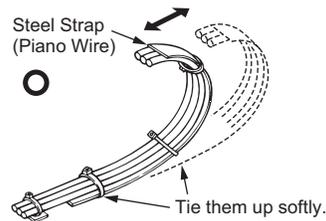
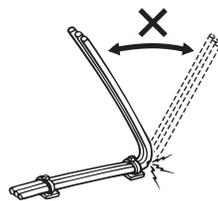
#### Dedicated cables

- Motor cable CB-RCC-MA□□□ / Robot motor cable CB-RCC-MA□□□-RB
  - X-SEL-J/K encoder cable CB-RCBC-PA□□□ / X-SEL-J/K robot encoder cable CB-RCBC-PA□□□-RB
  - X-SEL-P/Q encoder cable CB-RCS2-PA□□□ / X-SEL-P/Q robot encoder cable CB-X3-PA□□□-RB
- indicates the cable length. A desired length up to 15 m can be specified.  
For other cables, a desired length up to 20 m can be specified.  
Example) 080 = 8 m

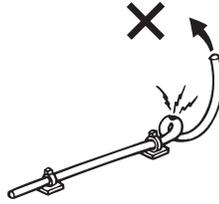


Warning: For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure, or an operation error, but also electric shock or electric leakage, or may even cause a fire.

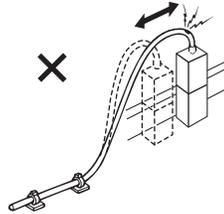
- Use dedicated cables of IAI indicated in this instruction manual. Contact us if you wish to have a change to the specifications of the dedicated cables.
- Make sure to turn the power off in the process of power line or cable connection or disconnection.
- Do not attempt to cut a dedicated cable with connectors on both ends to extend, shorten or re-joint it.
- Hold the dedicated cable to avoid mechanical force being applied to the terminals and connectors.
- Use a cable pipe or duct to have an appropriate protection when there is a possibility of mechanical damage on a dedicated cable.
- In case a dedicated cable is to be used at a moving part, make sure to lay out the cable without applying any force to pull the connector or extreme bend on the cable. Do not attempt to use the cable with a bending radius below the allowable value.
- Make certain that the connectors are plugged properly. Insufficient connection may cause an operation error, thus it is extremely risky.
- Do not lay out the cables to where the machine runs over them.
- Pay attention to the cable layout so it would not hit peripherals during an operation. In case it does, have an appropriate protection such as a cable track.
- When a cable is used hanging on the ceiling, prevent an environment that the cable swings with acceleration or wind velocity.
- Make sure there is not too much friction inside the cable storage equipment.
- Do not apply radiated heat to power line or cables.
- Have a sufficient radius for bending, and avoid a bend concentrating on one point.



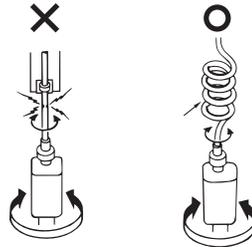
- Do not let the cable bend, kink or twist.



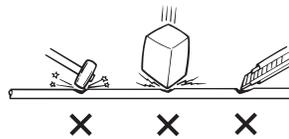
- Do not pull the cable with a strong force.



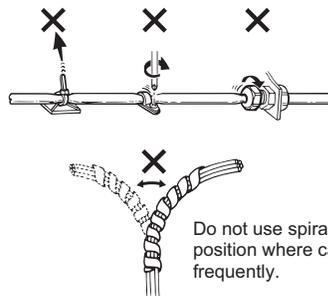
- Pay attention not to concentrate the twisting force to one point on a cable.



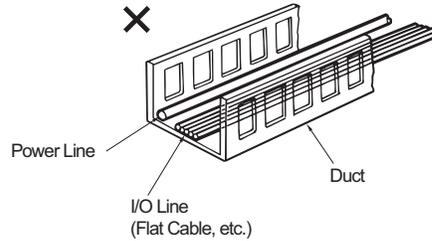
- Do not pinch, drop a heavy object onto or cut the cable.



- When a cable is fastened to affix, make sure to have an appropriate force and do not tighten too much.



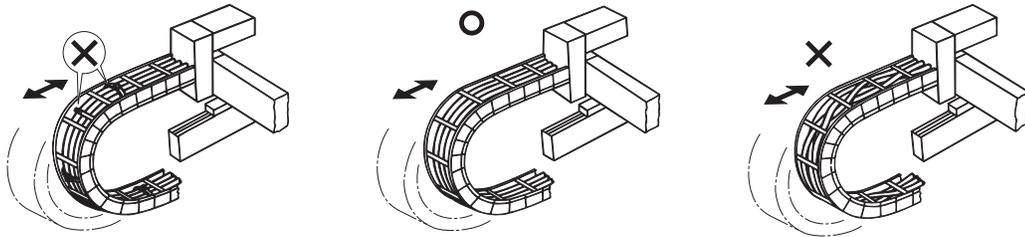
- PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



Follow the instructions below when using a cable track.

- If there is an indication to the cable for the space factor in a cable track, refer to the wiring instruction given by the supplier when storing the cable in the cable track.
- Avoid the cables to get twined or twisted in the cable track, and also to have the cables move freely and do not tie them up. (Avoid tension being applied when the cables are bent.)

Do not pile up cables. It may cause faster abrasion of the sheaths or cable breakage.



## 4. Maintenance Inspection

### 4.1 Inspection Items and Schedule

Follow the maintenance inspection schedule below.

It is assumed that the equipment is operating 8 hours per day.

If the equipment is running continuously night and day or otherwise running at a high operating rate, inspect more often as needed.

	Visual inspection	Grease supply
Start of operation	○	
After 1 month of operation	○	
After 3 months of operation	○	○ (Sliding surface of the rod <sup>(Note 1)</sup> , Ball screw <sup>(Note 2)</sup> )
Every 3 months thereafter	○	○ (Sliding surface of the rod <sup>(Note 1)</sup> , Ball screw <sup>(Note 2)</sup> )
After 3 years of operation, or upon reaching 5,000 km in traveled distance	○	
Every year thereafter	○	

Note 1 Apply grease to the sliding surface of the rod at the startup check if grease has been consumed, or every three months.

For the RCS2W dustproof/splash-proof type, apply grease when the bellows is changed.

Note 2 [Applicable Units: RCS2-RA5C, RA5R, RGS5C, RGD5C, SR7BD, SRGS7BD, SRGD7BD]

### 4.2 External Visual Inspection

An external visual inspection should check the following things.

Main unit	Loose actuator mounting bolts, other loose items
Rod	Lubrication, dust, foreign object on sliding surfaces
Cables	Scratches, proper connections
Overall	Irregular noise, vibration

### 4.3 Cleaning

- Clean exterior surfaces as necessary.
- Use a soft cloth to wipe away dirt and buildup.
- Do not blow too hard with compressed air as it may cause dust to get in through the gaps.
- Do not use oil-based solvents as they can harm lacquered and painted surfaces.
- To remove severe buildup, wipe gently with a soft cloth soaked in a neutral detergent or alcohol.

## 4.4 Grease Supply

### 4.4.1 Grease to be applied on Rod Sliding Surface

IAI uses the following grease in our plant.

Kyodo Yushi	Multitemp LRL 3
-------------	-----------------

 **Warning:** Never use any fluorine-based grease. Mixing lithium-based grease with other grease not only reduces the performance of the grease, it may even cause damage to the actuator.

### 4.4.2 Grease Applied on Ball Screw and Rod Sliding Surface [Applicable Units: RCS2-RA5C, RA5R, RGS5C, RGD5C, SR7BD, SRGS7BD, SRGD7BD]

IAI uses the following grease in our plant.

Kyodo Yushi	Multitemp LRL 3
-------------	-----------------

This product is suitable for ball screws and has excellent properties such as low heat generation. Use a lithium grease spray for maintenance. Keep the spraying time to within 1 second per spray action.

Wako Chemical	Grease spray No.A161 or equivalent
---------------	------------------------------------

 **Warning:**

- Never use any fluorine-based grease. It will cause a chemical reaction when mixed with a lithium-based grease and may cause damage to the actuator.
- Keep the spraying time to within 1 second, and do not spray continuously for more than 1 second or spray more than twice repeatedly. It may create problems.

## 4.4.3 How to apply grease

### [1] Applying the Grease on the Rod Sliding Surface

Apply grease over the entire surface of the rod.



### [2] Grease Supply on Ball Screw and Rod Sliding Surface [Applicable Units: RCS2-RA5C, RA5R, RGS5C, RGD5C]

1) Remove the thin-head screw located at the position shown to below.



- 2) Move the rod by at least one half the stroke.  
Apply grease to the ball screw by spraying grease through the screw hole (by keeping the spraying time to within 1 second).  
Use your finger to apply grease over the rod sliding surface.



- 3) After grease has been applied, move the rod back and forth to let the grease spread evenly.



- 4) Apply silicon to the thread of the screw removed in (1), and then put the screw back into its original place.



**Caution:**

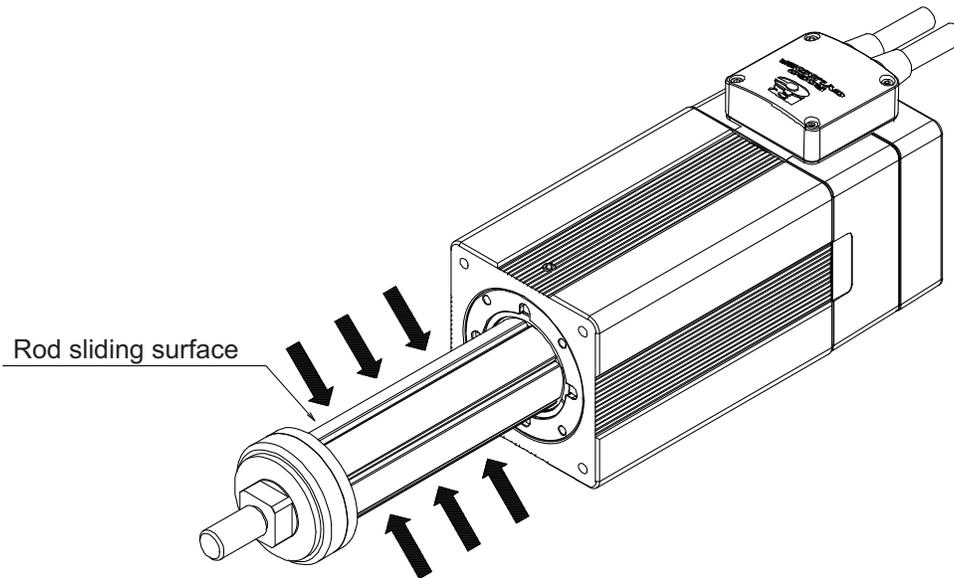
- Do not use spray oil when applying grease. Be sure to use spray grease instead. Keep the spraying time to within 1 second, and do not spray continuously for more than 1 second or spray more than twice repeatedly. Also note that if an excess amount of grease is supplied, oil may flow into the electronic components and cause malfunction.
- In case the grease got into your eye, immediately go see the doctor to get appropriate care. After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease off.

## [3] Grease Supply to Rod Sliding Surface and Ball Screw

[Applicable Units: RCS2-SRA7BD, SRGS7BD, SRGD7BD]

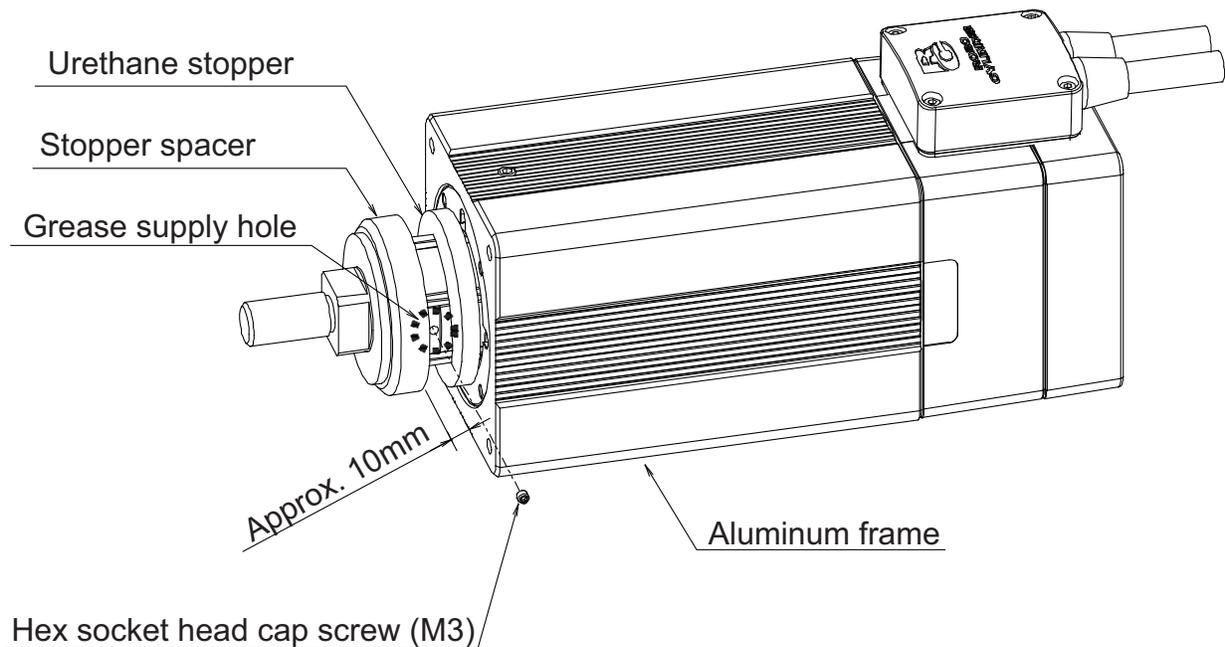
[Rod sliding surface]

- 1) Move the rod to the stroke end with such as JOG operation in advance.
- 2) Turn the power off.
- 3) Apply grease evenly on the rod sliding surface.  
At this time, apply grease with soft cloth so the rod sliding surface would not get damaged with scratches.
- 4) Turn the power on, and run the rod back and forth for several times with such as JOG operation so the grease spreads out to the whole area of the rod sliding surface.



## [Ball Screw]

- 1) Move the rod in advance with such as JOG operation to get it in the position where the distance between the end of the stopper spacer and the end of the aluminum frame is approximately 10mm.
- 2) Turn the power off.
- 3) Move the urethane stopper to the body end. (the urethane stopper can be moved with hand.)
- 4) A hole for grease supply can be seen in the rod.
- 5) Remove the hex socket head cap screw that covers the grease supply hole with a 1.5mm-sized hex wrench.
- 6) Insert the nozzle of the grease spray to the grease supply hole and spray it. The time to spray should be 1 second at maximum.
- 7) Tighten the hex socket head cap screw to the rod with a 1.5mm-sized wrench, and move the urethane stopper to the stopper spacer end.
- 8) Push the rod firmly against the mechanical stopper on the other side of the home position (the side that the rod comes out).
- 9) Move the rod to the stroke range.
- 10) Turn the power on, and run the rod back and forth for several times with such as JOG operation so the grease spreads out to the whole area of the ball screw.



- Caution:**
- Do not use an oil spray when in grease supply. Make sure to use a grease spray. Time to spray should be 1 second at maximum. Do not attempt to spray more than 1 second in one shot, or spray 2 times or more at once. Excessive grease supply may cause the oil flow to the electrical components, which may lead to an unexpected operation.
  - In case the grease got into your eye, immediately go see the doctor to get appropriate care. After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease off.

## 4.5 Procedure for Belt Replacement and Tuning

Applicable Units : RCS2-RA4R, RA5R

### 4.5.1 Inspection of the Belt

For inspection work, detach the cover of a pulley case and carry it out by visual.

The replacement period cannot be determined in general because the durability of the deceleration belt can be greatly influenced by the conditions of operation.

It generally has life of hundreds of times for bending movement.

The timing belt requires replacement regularly under the following conditions as a reference since degradation such as abrasion proceeds as the time passes for usage.

- When remarkable abrasion is confirmed on the teeth or edges of the belt
- When the belt is swelled for such reasons as oil being attached on
- When damage is confirmed such as crack on the tooth or back of the belt

Also, since it is difficult to confirm the degradation of the core wires to retain the strength of the toothed belt by visual or looseness caused by being elongated, it is recommended to set regular replacement periods in advance in case the product is used under such conditions that gives the core wires great fatigue due to high acceleration and deceleration speed.

### 4.5.2 Belts to be used

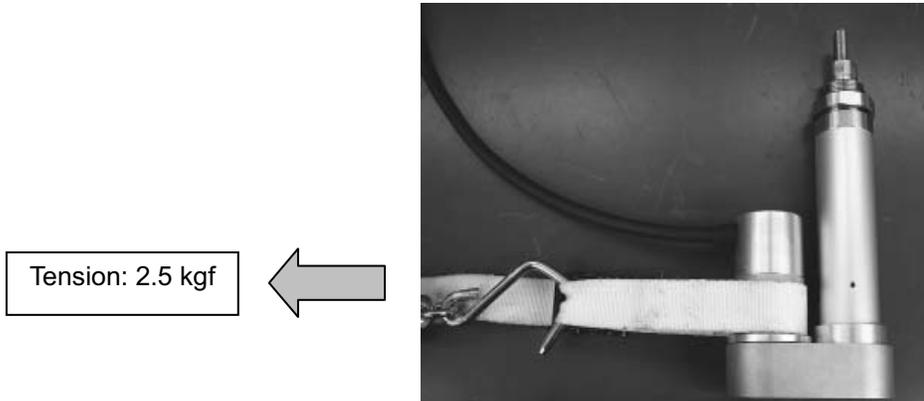
The following belt is applied when the product is shipped out from IAI factory.

- RA4R - 60S2M152R Rubber, cleanroom type (Bando Chemical Industries) 6 mm wide
- RA5R - 100S3M219R Rubber, cleanroom type (Bando Chemical Industries) 10 mm wide

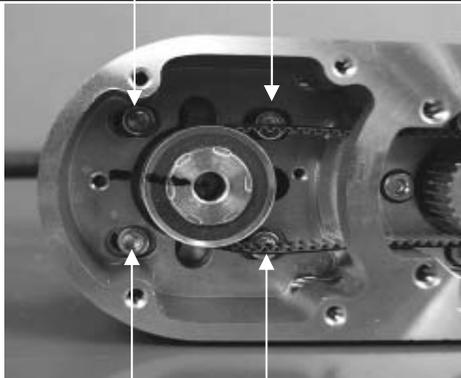
## 4.5.3 Adjusting the Belt Tension (RA4R Type)

Remove the pulley case cover and loosen the four motor-unit affixing bolts. Pass a looped string (or long tie-band) around the motor unit, and pull the string to the specified tension using a tension gauge. In this condition, uniformly tighten the motor-unit affixing bolts.

[Recommended tightening torque of adjustment bolts]  
162 N•cm (16.5 kgf•cm)



Motor-unit affixing bolts  
(Use an Allen wrench of 2.5 mm across flats.)

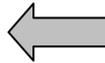


Motor-unit affixing bolts  
(Use an Allen wrench of 2.5 mm across flats.)

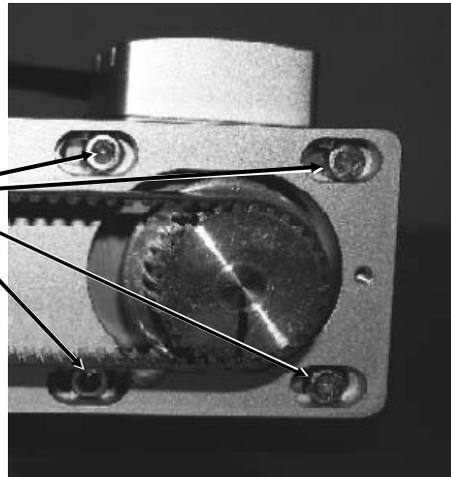
## 4.5.4 Adjusting the Belt Tension (RA5R Type)

Remove the pulley case cover and loosen the four motor-unit affixing bolts. Pass a looped string (or long tie-band) around the motor unit, and pull the string to the specified tension using a tension gauge. In this condition, uniformly tighten the motor-unit affixing bolts. [Recommended tightening torque for adjustment bolts]

Tension:  $6 \pm 0.2$  kgf



Motor-unit affixing bolts  
(Use an Allen wrench of 3 mm across flats.)



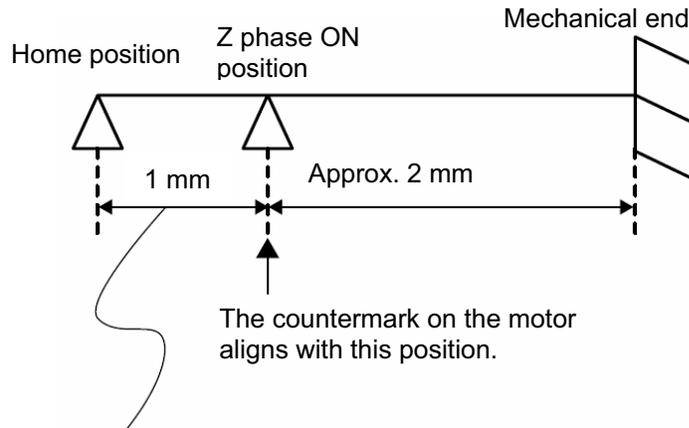
## 4.5.5 Replacing the Belt: RA4R Type

### [Items Required for Replacement]

- Replacement belt  
RA4R ... 60S2M152R Rubber, cleanroom type (Bando Chemical Industries) 6 mm wide
- Allen wrenches
- Tension gauge (capable of tensioning to 7 kgf or greater)
- Strong string, looped (or long tie-band)
- Scale
- Oil-based marker pen
- PC or teaching pendant

### [Overview of Replacement]

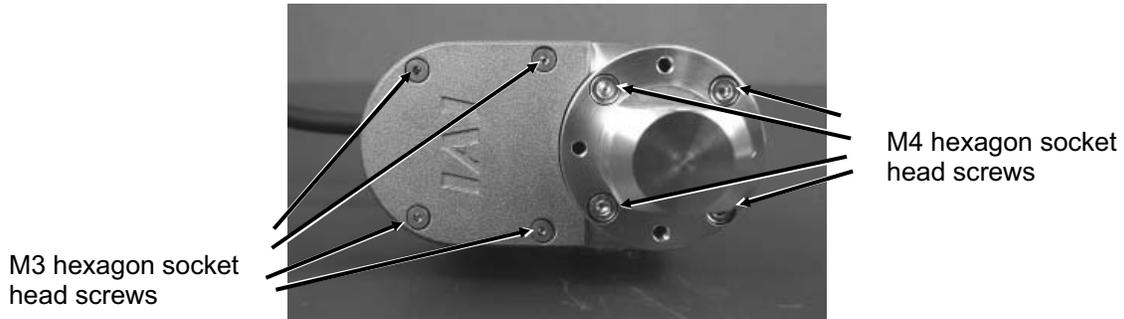
- 1) Move the rod to a position where Z phase turns on (home position) (2 mm from the mechanical end). In this position, loosen the motor-unit affixing bolts and replace the belt.
- 2) Restore the home position.  
Affix the rod at a position 2 mm from the mechanical end on the home side, pass the belt, and adjust the belt to the specified tension.
- 3) Perform homing using a PC or teaching pendant and check for deviation from the initial home position.  
If there is a deviation, adjust the home offset if you are using a SCON controller. If you are using an SSEL or X-SEL controller, adjust the home preset.



Set by the home offset parameter (SCON) or home preset parameter (SSEL, X-SEL).  
(The above value indicates the factory setting.)

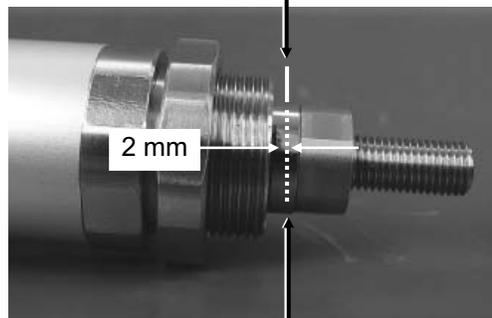
## [Procedure]

- 1) Remove the pulley case cover using two Allen wrenches, one of 2 mm across flats and the other of 3 mm across flats.



- 2) Move the rod to a position where Z phase turns on (home position). This corresponds to a position where the rod projects 2 mm from the mechanical end. Apply countermarks in this position.

Cause the rod to project 2 mm from the mechanical end.

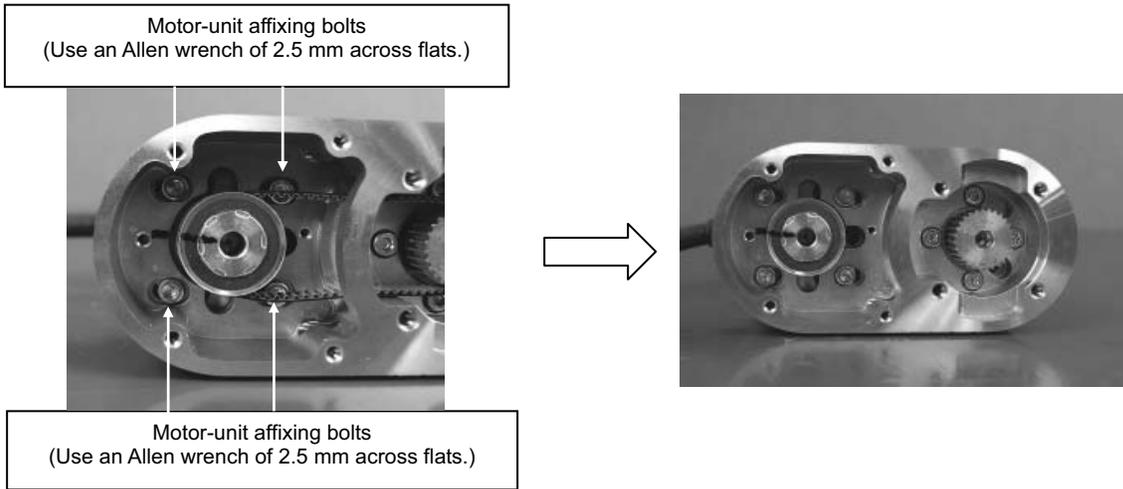


Apply countermarks once the rod has projected 2 mm from the mechanical end.

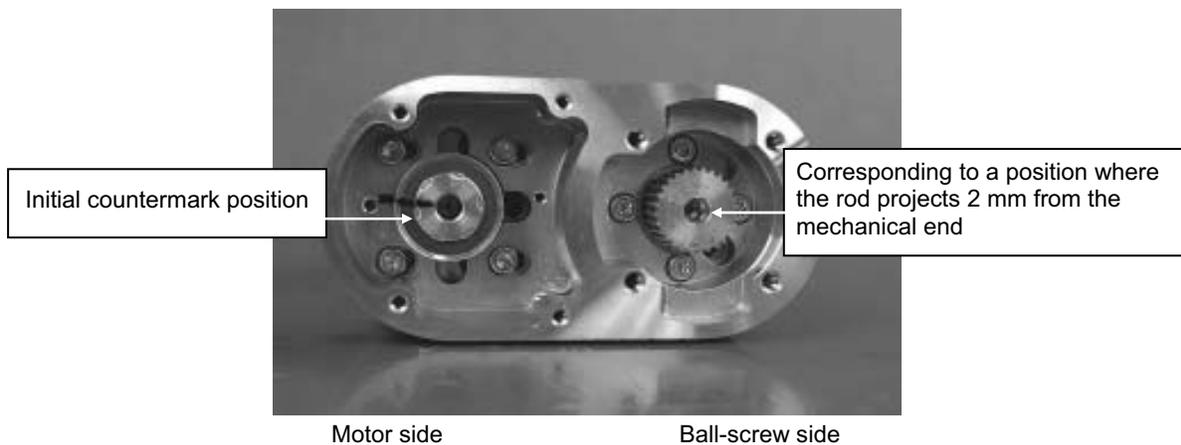


**Warning:** If the actuator is installed vertically, move it after turning on the controller power and forcibly releasing the brake. At this time, beware of danger as the actuator may drop suddenly. Always provide a support to brace the actuator hand to prevent sudden drop, so as not to pinch fingers or damage the load.

- 3) Loosen the motor-unit affixing bolts using an Allen wrench of 2.5 mm across flats. Slide the motor, and loosen and remove the belt.

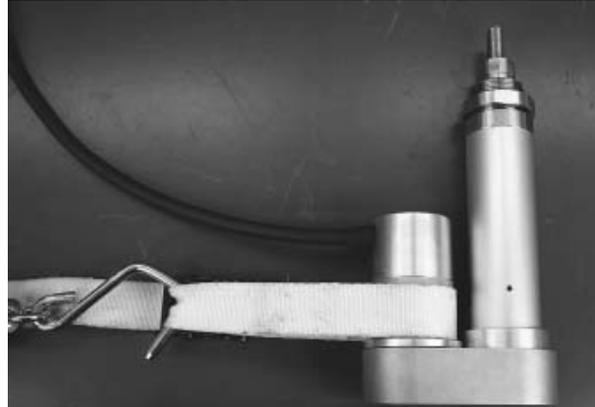
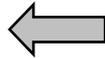


- 4) Check the following points before restoring the home position:
- The motor side should be aligned with the initial countermark. If the position is offset, adjust it to achieve proper alignment.
  - The ball-screw side should be at a position where the rod projects 2 mm from the mechanical end.
- After the check, attach a new belt while holding the pulleys on both sides in position.

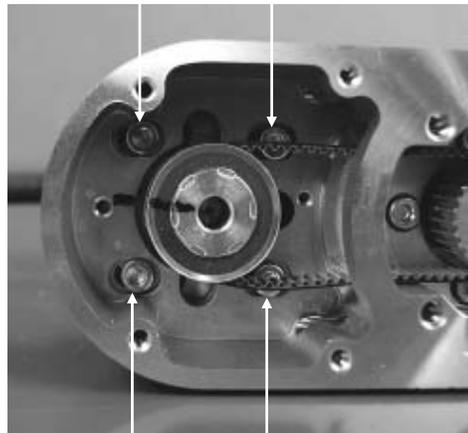


- 5) Adjust the belt tension.  
Pass a looped strong string (or long tie-band) around the motor cover and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the motor-unit affixing bolts.  
[Recommended tightening torque for adjustment bolts]  
162 N•cm (16.5 kgf•cm)

Tension: 2.5 kgf

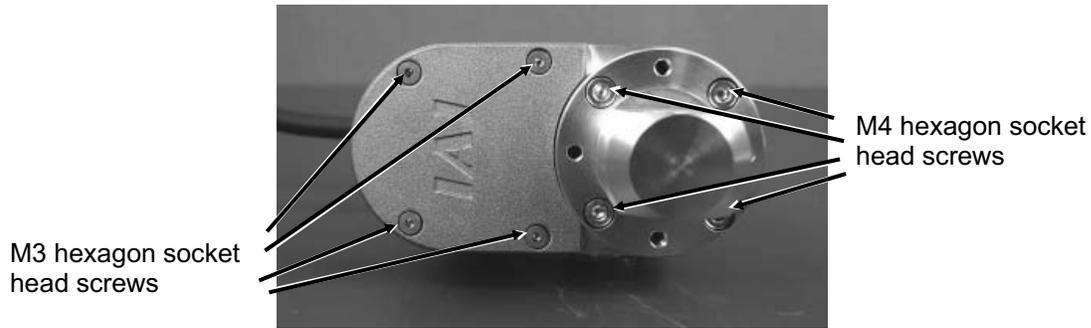


Motor-unit affixing bolts  
(Use an Allen wrench of 2.5 mm across flats.)



Motor-unit affixing bolts  
(Use an Allen wrench of 2.5 mm across flats.)

- 6) Install the pulley case cover using two Allen wrenches, one of 2 mm across flats and the other of 3 mm across flats.



- 7) Connect a PC or teaching pendant to the controller to perform homing. (If the actuator is of absolute encoder specification, an absolute reset must be performed.)  
Check for deviation from the initial home position.  
If there is a deviation, adjust parameter No. 22, "Home offset" if you are using an SCON controller. If you are using an SSEL or X-SEL controller, adjust axis-specific parameter No. 12, "Home preset." If your controller is of absolute encoder specification, perform homing after changing the parameter, and then perform an absolute reset.

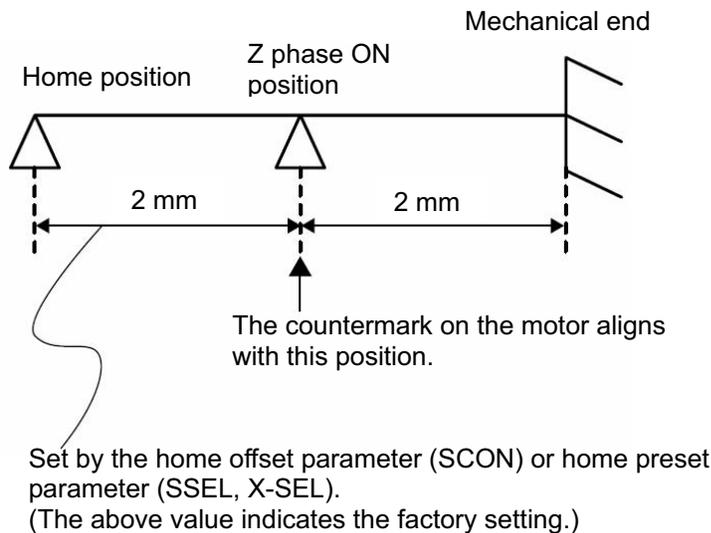
## 4.5.6 Replacing the Belt: RA5R Type

### [Items Required for Replacement]

- Replacement belt  
RA5R ... 100S3M219R Rubber, cleanroom type (Bando Chemical Industries) 10 mm wide
- Allen wrenches
- Tension gauge (capable of tensioning to 8 kgf or greater)
- Strong string, looped (or long tie-band)
- Scale
- Oil-based marker pen
- PC or teaching pendant

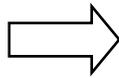
### [Overview of Replacement]

- 1) Move the rod to a position where Z phase turns on (home position) (2 mm from the mechanical end). In this position, loosen the motor-unit affixing bolts and replace the belt.
- 2) Restore the home position.  
Affix the rod at a position 4 mm from the mechanical end on the home side, pass the belt, and adjust the belt to the specified tension.
- 3) Perform homing using a PC or teaching pendant and check for deviation from the initial home position.  
If there is a deviation, adjust the home offset if you are using an SCON controller. If you are using an SSEL or X-SEL controller, adjust the home preset.

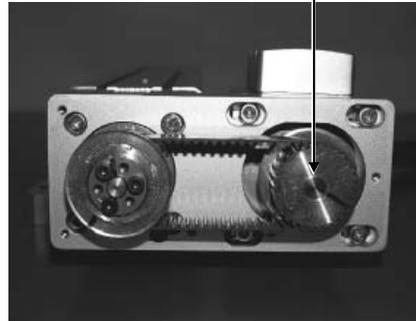


**[Procedure]**

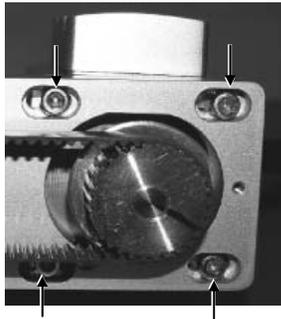
- 1) Move the slider from the home position toward the mechanical end and check the rotating direction of the motor shaft. (If the actuator has its home located on the opposite side to the standard specification, this check is always required because the motor shaft rotates in the different direction.)
  - Remove the pulley case cover. (Remove the three thin-head screws using an Allen wrench of 2.5 mm across flats.)



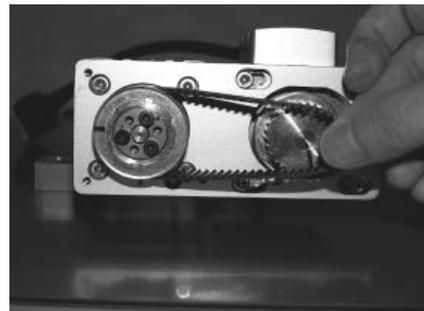
Check the rotating direction of the motor shaft.



- 2) Loosen the four tension adjustment bolts to slacken the belt. (Allen wrench of 3 mm across flats)



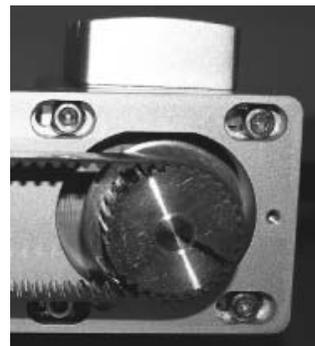
- 3) Remove the belt from the pulleys.



- 4) Make the following adjustment to restore the home position:

- Move the slider to the mechanical end on the home side and keep it in contact with the mechanical end.
- Turn the motor shaft by the specified amount from the countermark position toward the return-to-mechanical-end direction (the direction checked at the beginning).

Type	Amount returned from the countermark position
RA5R-16	67.5°
RA5R-8	135°
RA5R-4	230°



- 5) Adjust the belt tension.  
Pass a looped strong string (or long tie-band) around the motor cover and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the motor-unit affixing bolts.  
Recommended tightening torque for adjustment bolts: (M5) 763 N-cm (78 kgf-cm)



Caution: After tightening the bolts to the above torque, tighten them slightly further by making sure that both pulleys do not move.

Tension:  $6 \pm 0.2$  kgf



- 6) Install the pulley cover.  
Tighten the three hexagon socket head bolts (M3x22) using an Allen wrench of 2.5 mm across flats.
- 7) Perform homing using a PC or teaching pendant.  
(If the actuator is of absolute encoder specification, an absolute reset must be performed). Check for deviation from the initial home position.  
If there is a deviation, adjust parameter No. 22, "Home offset" if you are using an SCON controller. If you are using an SSEL or X-SEL controller, adjust axis-specific parameter No. 12, "Home preset." If your controller is of absolute encoder specification, perform homing after changing the parameter, and then perform an absolute reset.

## 4.6 Replacing the Motor

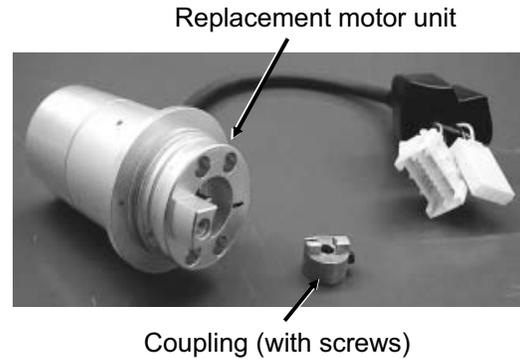
### 4.6.1 Replacing the Motor of the Motor Straight Type (Coupling Type): RA4C Type

#### [Items Required for Replacement]

- Replacement motor unit
- Coupling (with screws)
- Allen wrenches
- Scale
- Oil-based marker pen
- Grease

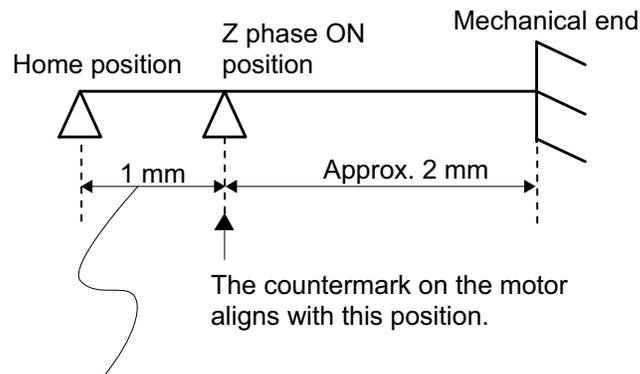
Idemitsu Kosan	Daphne Eponex Grease No.2
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- PC or teaching pendant



#### [Overview of Replacement]

- 1) Move the rod to a position where Z phase turns on (home position) (2 mm from the mechanical end). In this position, replace the motor.
- 2) Perform homing using a PC or teaching pendant and check for deviation from the initial home position. If there is a deviation, adjust the home offset if you are using an SCON controller. If you are using an SSEL or X-SEL controller, adjust the home preset.

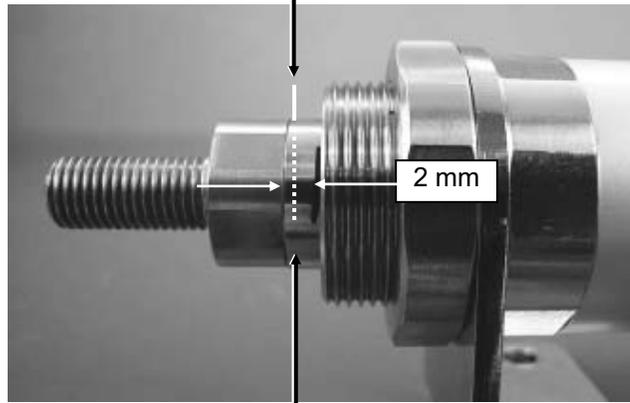


Set by the home offset parameter (SCON) or home preset parameter (SSEL, X-SEL).  
(The above value indicates the factory setting.)

## [Procedure]

- 1) Move the rod to a position where Z phase turns on (home position).  
This corresponds to a position where the rod projects 2 mm from the mechanical end.  
Apply countermarks in this position.

Cause the rod to project 2 mm from the mechanical end.

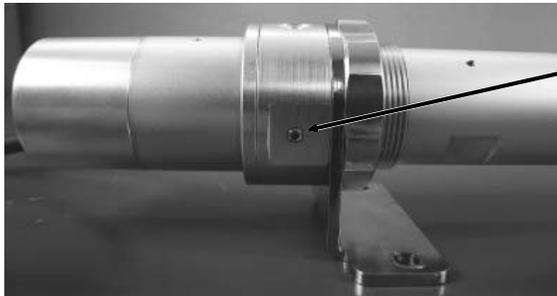


Apply countermarks once the rod has projected 2 mm from the mechanical end.



**Warning:** If the actuator is installed vertically, move it after turning on the controller power and forcibly releasing the brake. At this time, beware of danger as the actuator may drop suddenly.  
Always provide a support to brace the actuator hand to prevent sudden drop, so as not to pinch fingers or damage the load.

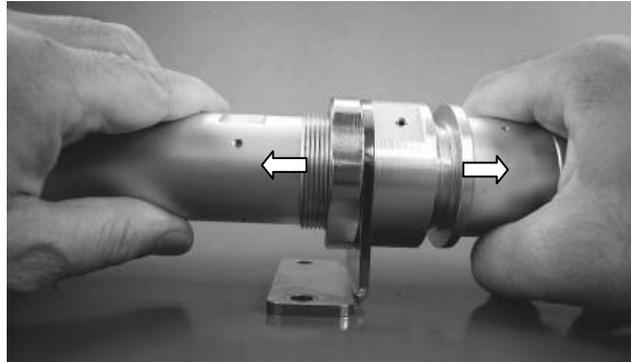
- 2) Using an Allen wrench of 2 mm across flats, remove the two motor-unit affixing bolts on the right and left.



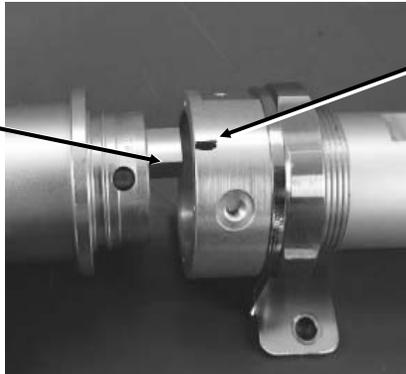
2 affixing bolts on the motor-end cap (right and left) (hexagon socket head setscrews)

3) Pull out the motor unit.

Before pulling out the motor unit, apply a countermark on the cylinder tube at a position corresponding to the tab on the motor unit, so that the motor unit and cylinder can be aligned in the correct position later on.

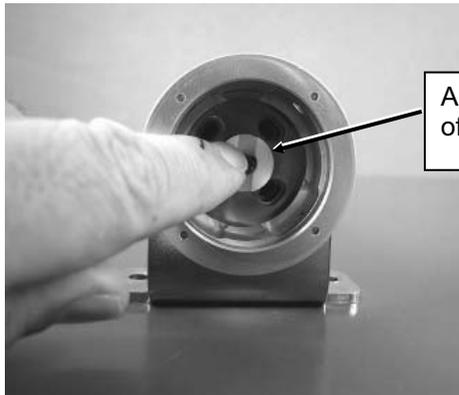


Tab on the motor unit



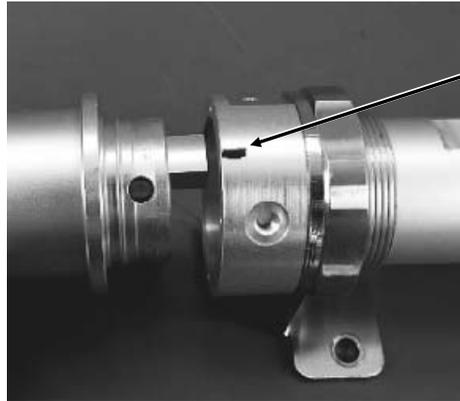
Apply a countermark at a position corresponding to the tab on the motor unit.

4) Apply grease on the actuator coupling.

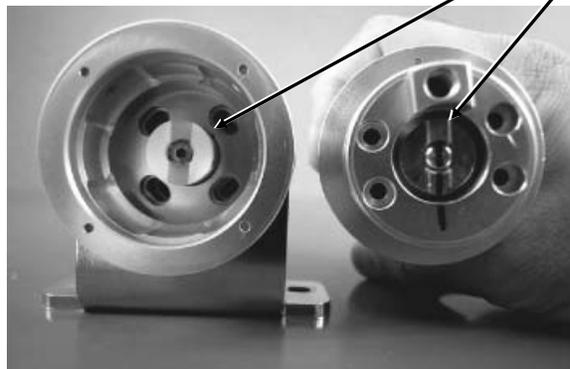


Apply grease on the inside of the coupling.

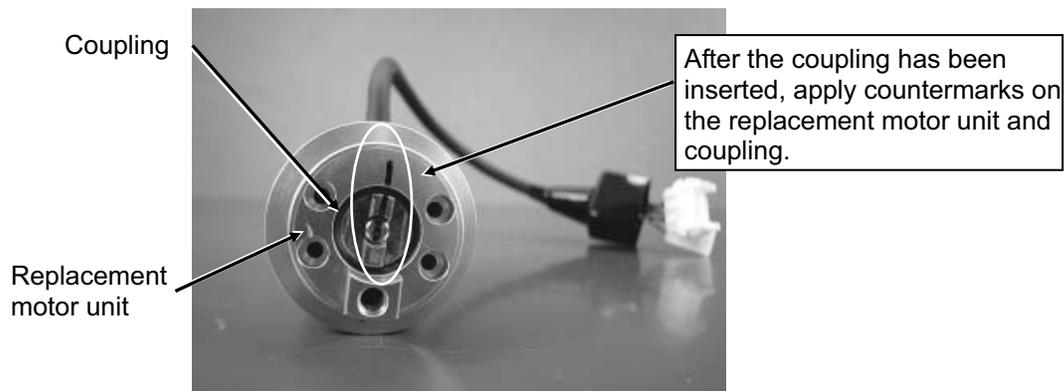
- 5) Align the tab on the replacement motor unit with the countermark on the cylinder.  
With the motor unit and cylinder aligned properly, insert the coupling into the replacement motor unit by aligning the orientation of this coupling with that of the actuator coupling (adjusted to a position corresponding to a rod projection of 2 mm from the mechanical end). Apply countermarks to identify the current motor position (phase Z position) and coupling.



Align the tab on the replacement motor unit with the countermark on the cylinder.



Position the couplings.



Coupling

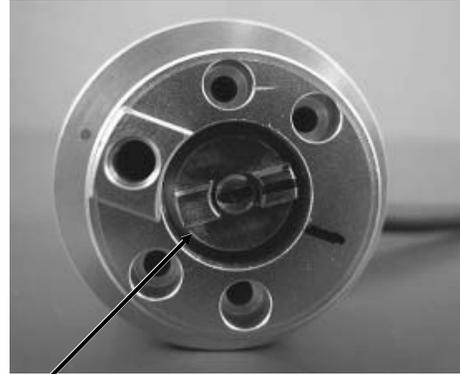
Replacement motor unit

After the coupling has been inserted, apply countermarks on the replacement motor unit and coupling.

- 6) Turn the coupling and motor shaft simultaneously until a setscrew on the coupling is seen through the hole. Thereafter, tighten the hexagon socket head setscrew using an Allen wrench of 2 mm across flats. Similarly, turn the coupling and motor shaft simultaneously until the other screw is seen through the hole, and tighten the setscrew.

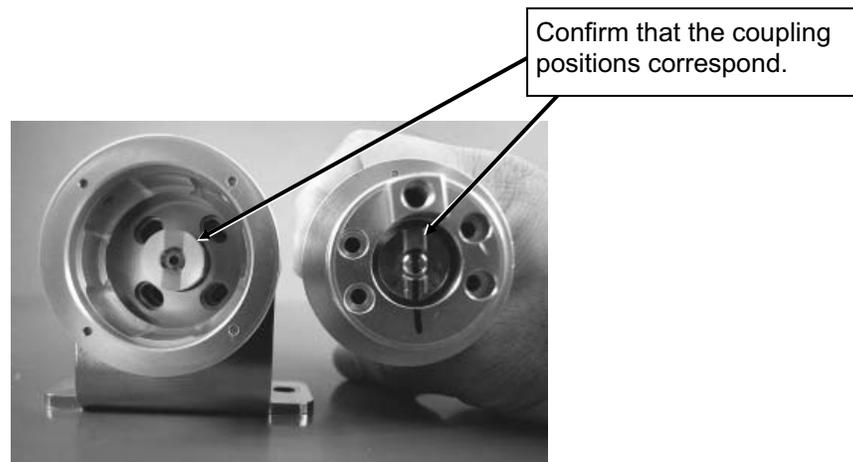
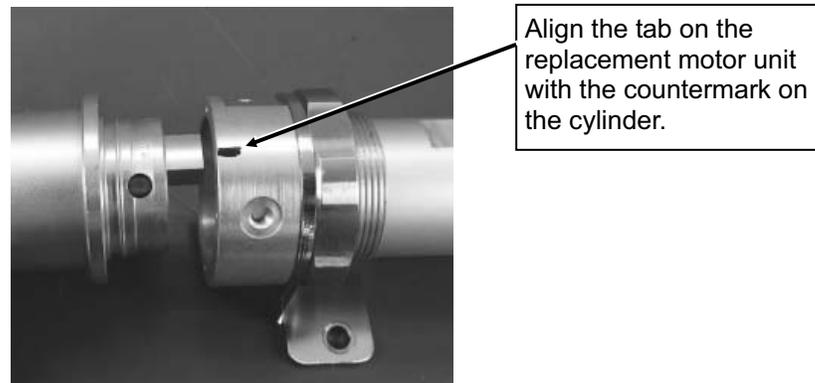
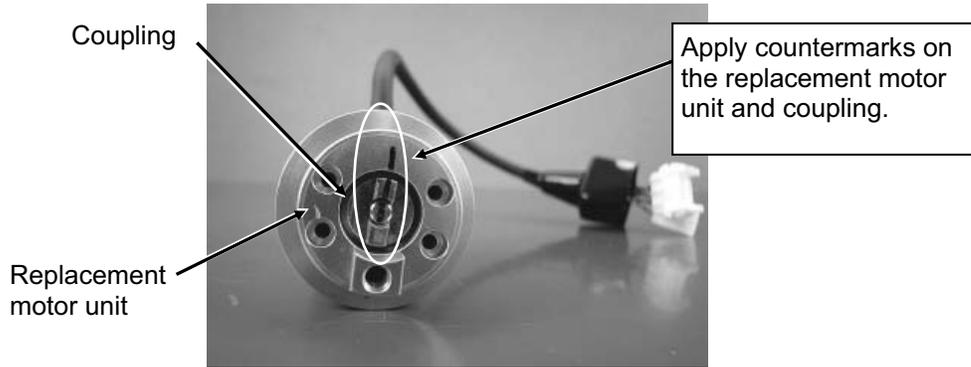


Coupling  
setscrew hole

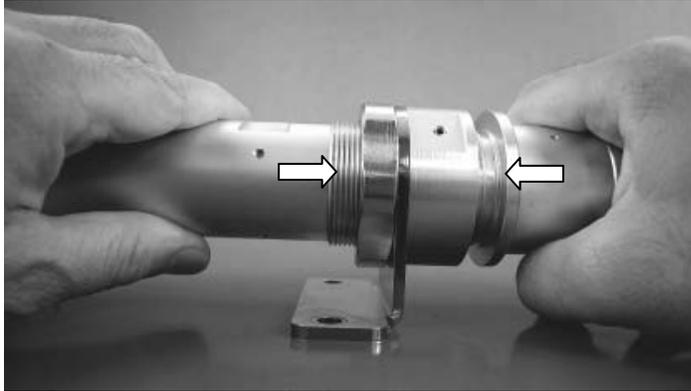


Turn the coupling and motor shaft simultaneously until a setscrew on the coupling is seen through the hole. Thereafter, tighten the hexagon socket head setscrew using an Allen wrench of 2 mm across flats.

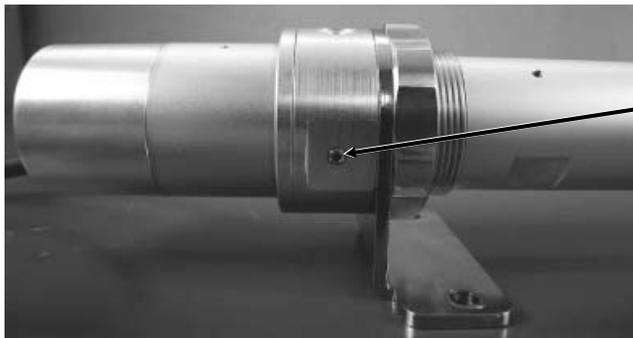
- 7) Return the coupling in the replacement motor unit to the initial motor position (Z phase position). Align the tab on the replacement motor unit with the countermark on the cylinder. With the motor unit and cylinder positioned this way, confirm that the orientation of the actuator coupling (adjusted to a position corresponding to a rod projection of 2 mm from the mechanical end) corresponds to the position of the coupling in the replacement motor unit.



- 8) Carefully insert the replacement motor unit into the cylinder by ensuring that the couplings do not lose their alignment.



- 9) Using an Allen wrench of 2 mm across flats, tighten the two motor-unit affixing bolts on the right and left.



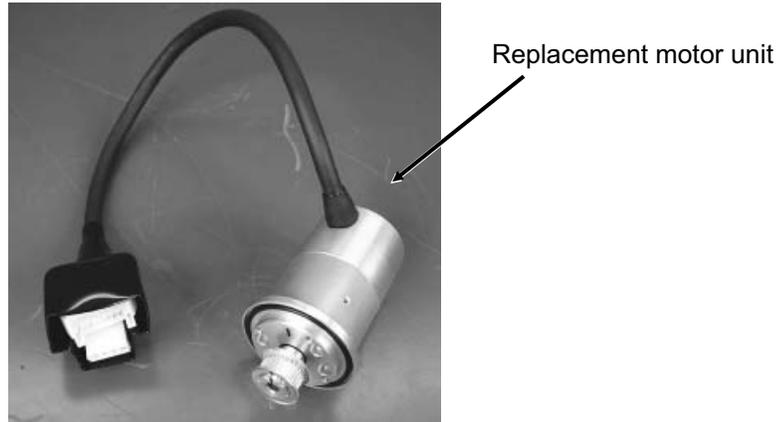
2 affixing bolts on the motor-end cap (right and left) (hexagon socket head setscrews)

- 10) Connect a PC or teaching pendant to the controller to perform homing. (If the actuator is of absolute encoder specification, an absolute reset must be performed).  
Check for deviation from the initial home position.  
If there is a deviation, adjust parameter No. 22, "Home offset" if you are using an SCON controller. If you are using an SSEL or X-SEL controller, adjust axis-specific parameter No. 12, "Home preset." If your controller is of absolute encoder specification, perform homing after changing the parameter, and then perform an absolute reset.

## 4.6.2 Replacing the Motor of the Motor Reversing Type: RA4R Type

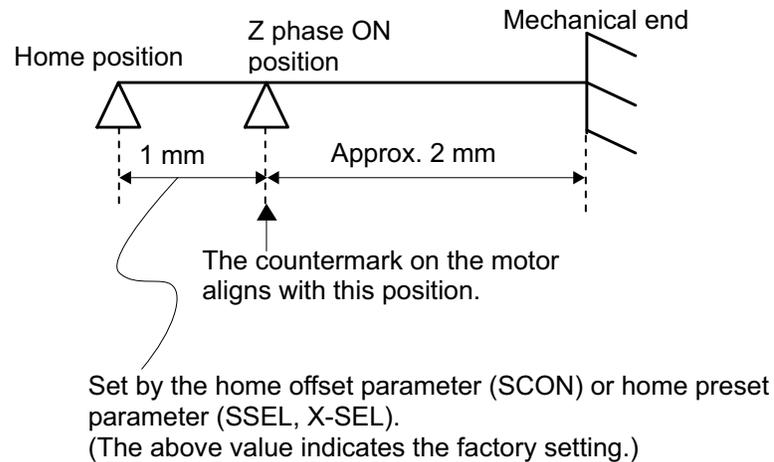
### [Items Required for Replacement]

- Replacement motor unit
- Allen wrenches
- Tension gauge (capable of tensioning to 7 kgf or greater)
- Strong string, looped (or long tie-band)
- Scale
- Oil-based marker pen
- PC or teaching pendant



### [Overview of Replacement]

- 1) Loosen the motor-unit affixing bolts to remove the belt, and replace the motor.
- 2) Restore the home position.  
Affix the rod at a position 2 mm from the mechanical end on the home side, pass the belt, and adjust the belt to the specified tension.
- 3) Perform homing using a PC or teaching pendant and check for deviation from the initial home position.  
If there is a deviation, adjust the home offset if you are using an SCON controller. If you are using an SSEL or X-SEL controller, adjust the home preset.



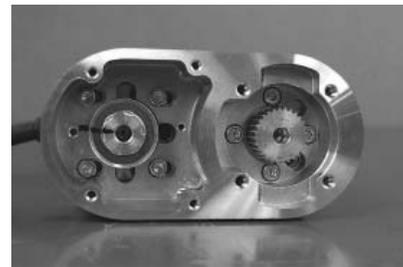
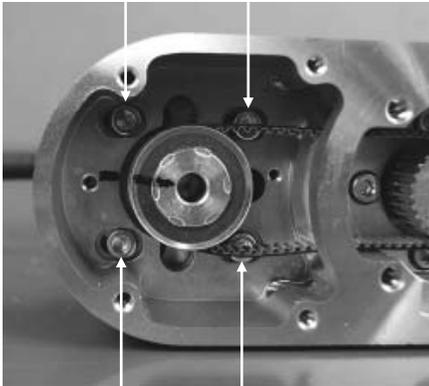
**[Procedure]**

- 1) Remove the pulley case cover using two Allen wrenches, one of 2 mm across flats and the other of 3 mm across flats.



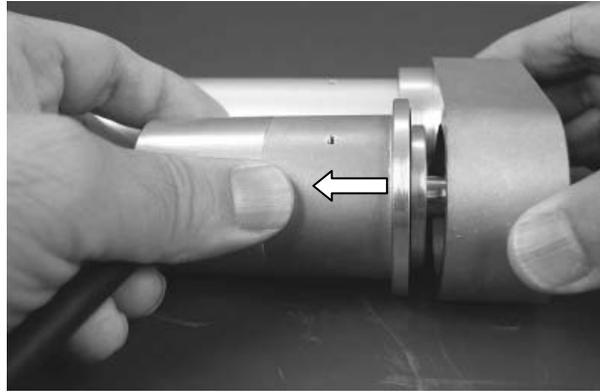
- 2) Loosen the motor-unit affixing bolts using an Allen wrench of 2.5 mm across flats. Slide the motor, and loosen and remove the belt. After the belt has been removed, remove the motor-unit affixing bolts.

Motor-unit affixing bolts  
(Use an Allen wrench of 2.5 mm across flats.)

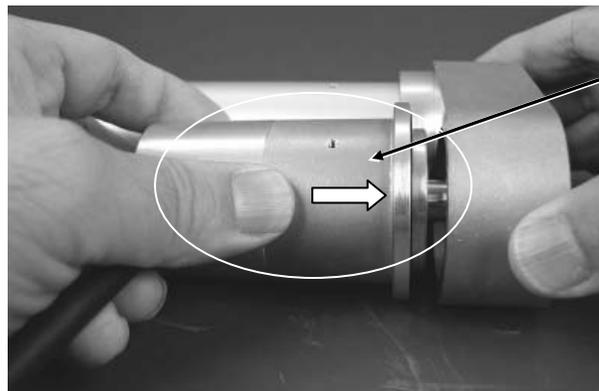


Motor-unit affixing bolts  
(Use an Allen wrench of 2.5 mm across flats.)

3) Take out the motor.

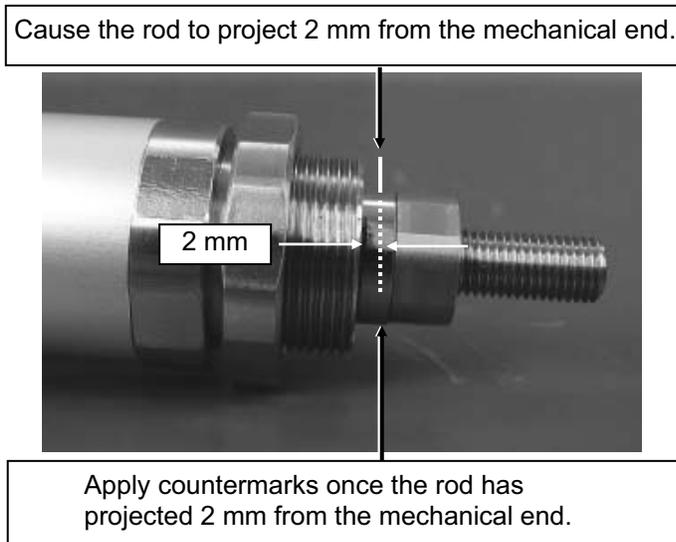


4) Install the replacement motor. Loosely tighten the motor-unit affixing bolts.



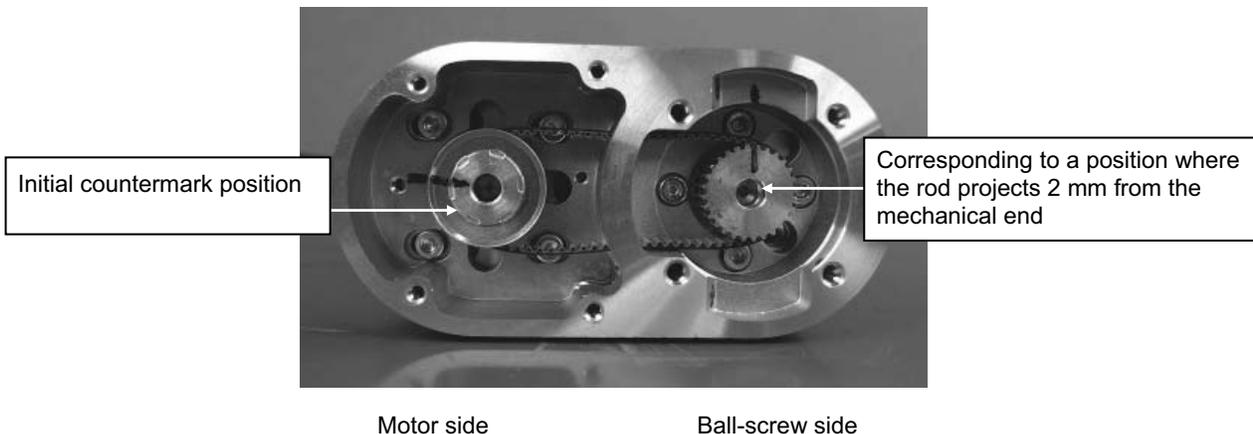
Replacement motor

- 5) Move the rod to a position where Z phase turns on (home position). This corresponds to a position where the rod projects 2 mm from the mechanical end. Apply countermarks in this position.



 **Warning:** If the actuator is installed vertically, move it after turning on the controller power and forcibly releasing the brake. At this time, beware of danger as the actuator may drop suddenly. Always provide a support to brace the actuator hand to prevent sudden drop, so as not to pinch fingers or damage the load.

- 6) Check the following points before restoring the home position:
- The motor side should be aligned with the initial countermark. If the position is offset, adjust it to achieve proper alignment.
  - The ball-screw side should be at a position where the rod projects 2 mm from the mechanical end. After the check, attach a new belt while holding the pulleys on both sides in position.



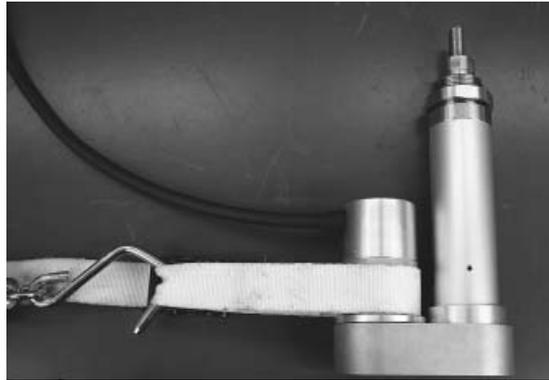
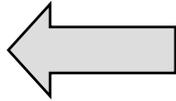
7) Adjust the belt tension.

Pass a looped strong string (or long tie-band) around the motor cover and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the motor-unit affixing bolts.

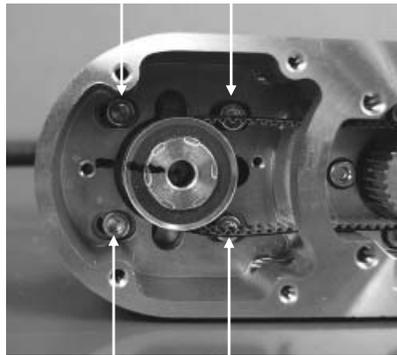
[Recommended tightening torque for adjustment bolts]

162 N•cm (16.5 kgf•cm)

Tension: 2.5 kgf

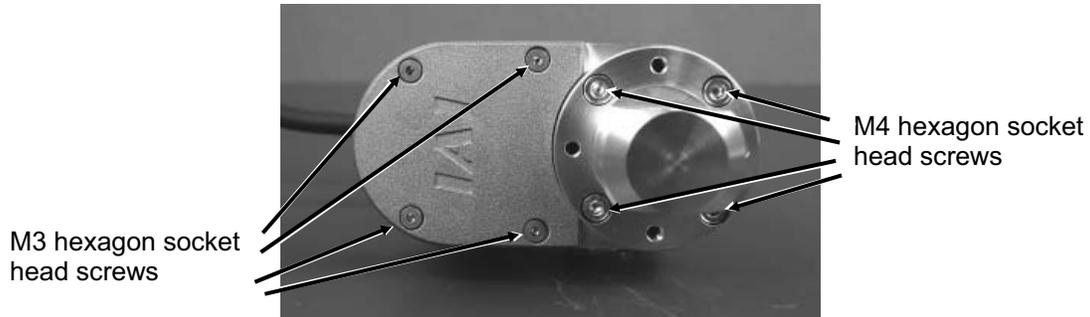


Motor-unit affixing bolts  
(Use an Allen wrench of 2.5 mm across flats.)



Motor-unit affixing bolts  
(Use an Allen wrench of 2.5 mm across flats.)

- 8) Remove the pulley case cover using two Allen wrenches, one of 2 mm across flats and the other of 3 mm across flats.



- 9) Connect a PC or teaching pendant to the controller to perform homing. (If the actuator is of absolute encoder specification, an absolute reset must be performed.)  
Check for deviation from the initial home position.  
If there is a deviation, adjust parameter No. 22, "Home offset" if you are using an SCON controller. If you are using an SSEL or X-SEL controller, adjust axis-specific parameter No. 12, "Home preset." If your controller is of absolute encoder specification, perform homing after changing the parameter, and then perform an absolute reset.

## 4.6.3 Replacing the Motor of the Motor Reversing Type: RA5R Type

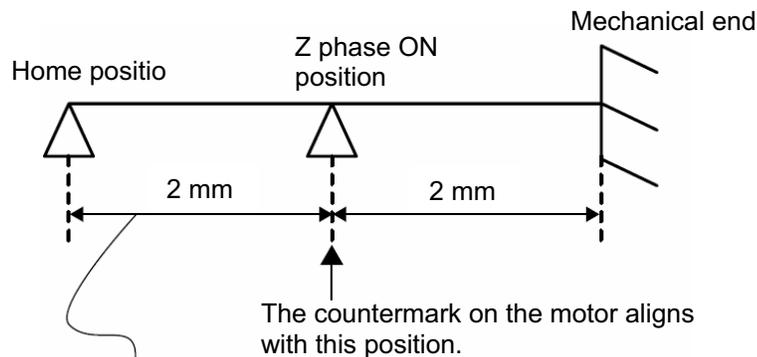
### [Items Required for Replacement]

- Replacement motor with pulleys (See the photograph to the right.) (Confirm that the motor has countermarks.)
- PC or teaching pendant
- Allen wrenches
- Tension gauge (capable of tensioning to 8 kgf or greater)
- Strong string, looped (or long tie-band)
- Scale
- Oil-based marker pen



### [Overview of Replacement]

- 1) Move the rod to a position where Z phase turns on (home position) (2 mm from the mechanical end). In this position, replace the motor.
- 2) Restore the home position.  
Affix the rod at a position 4 mm from the mechanical end on the home side, pass the belt, and adjust the belt to the specified tension.
- 3) Perform homing using a PC or teaching pendant and check for deviation from the initial home position.  
If there is a deviation, adjust the home offset if you are using a SCON controller. If you are using an SSEL or X-SEL controller, adjust the home preset.



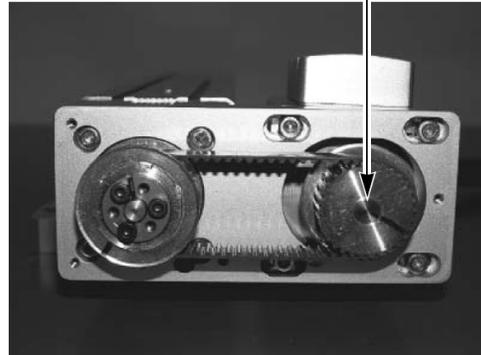
Set by the home offset parameter (SCON) or home preset parameter (SSEL, X-SEL). (The above value indicates the factory setting.)

## [Procedure]

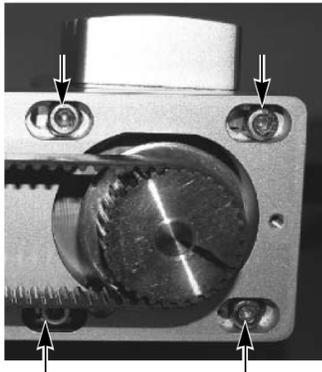
- 1) Move the slider from the home position toward the mechanical end and check the rotating direction of the motor shaft. (If the actuator has its home located on the opposite side to the standard specification, this check is always required because the motor shaft rotates in the different direction.)
  - Remove the pulley case cover.  
(Remove the three thin-head screws using an Allen wrench of 2.5 mm across flats.)



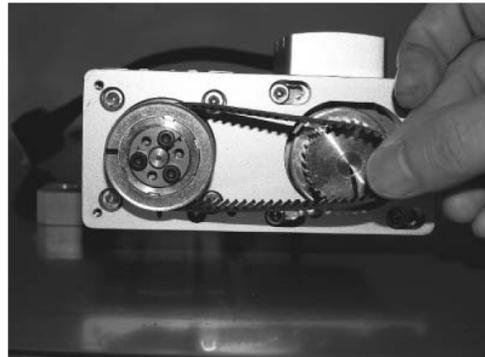
Check the rotating direction of the motor shaft.



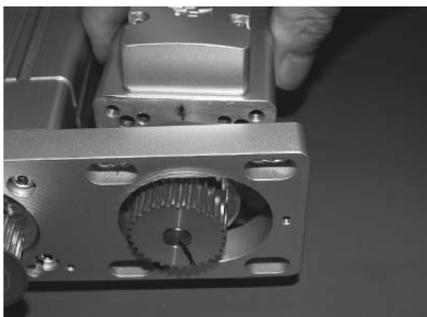
- 2) Loosen the four tension adjustment bolts to slacken the belt.  
(Allen wrench of 3 mm across flats)



- 3) Remove the belt from the pulleys.



- 4) Take out the motor.  
Remove the four hexagon socket head bolts using an Allen wrench of 3 mm across flats.



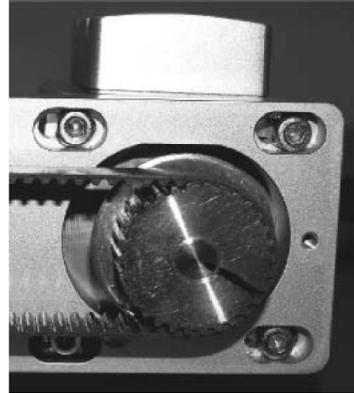
- 5) Install the new motor.  
Uniformly tighten the four hexagon socket head bolts (M4x15) using the Allen wrench of 3 mm across flats.

Recommended tightening torque: 176 N•cm (18 kgf•cm)

6) Make the following adjustment to restore the home position:

- Move the slider to the mechanical end on the home side and keep it in contact with the mechanical end.
- Turn the motor shaft by the specified amount from the countermark position toward the return-to-mechanical-end direction (the direction checked at the beginning).

Type	Amount returned from the countermark position
RA5R-16	67.5°
RA5R-8	135°
RA5R-4	230°



7) Adjust the belt tension.

Pass a looped strong string (or long tie-band) around the motor cover and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the motor-unit affixing bolts.

Recommended tightening torque for adjustment bolts: (M5) 763 N-cm (78 kgf-cm)



Caution: After tightening the bolts to the above torque, tighten them slightly further by making sure that both pulleys do not move.

Tension:  $6 \pm 0.2$  kgf



8) Install the pulley cover.

Tighten the three hexagon socket head bolts (M3x22) using an Allen wrench of 2.5 mm across flats.

9) Perform homing using a PC or teaching pendant.

(If the actuator is of absolute encoder specification, an absolute reset must be performed). Check for deviation from the initial home position.

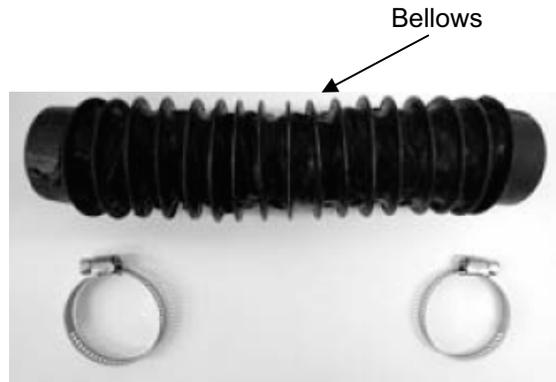
If there is a deviation, adjust parameter No. 22, "Home offset" if you are using an SCON controller. If you are using an SSEL or X-SEL controller, adjust axis-specific parameter No. 12, "Home preset." If your controller is of absolute encoder specification, perform homing after changing the parameter, and then perform an absolute reset.

## 4.7 Replacing the Bellows of the RCS2W Dustproof/Splash-proof Type

### [Items Required for Replacement]

- Replacement bellows unit  
: RA4 --- JB-RA4- (stroke)
- Phillips screwdriver
- Torque driver
- Grease

Kyodo Yushi	Multemp LRL3
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### [Procedure]

- 1) Loosen the front and rear metal fittings affixing the bellows and remove the bellows.



Loosening of front metal fitting



Loosening of rear metal fitting

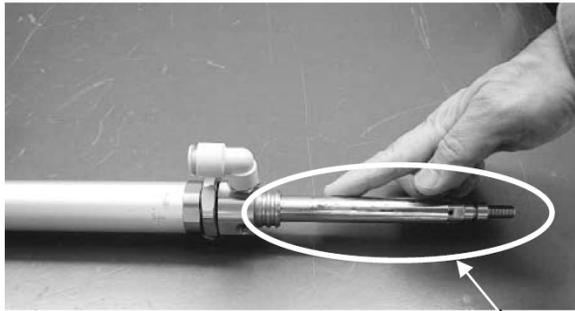


Removal of bellows



Bellows has been removed

2) Apply grease evenly over the entire cylinder surface.



Apply grease evenly over the entire surface.

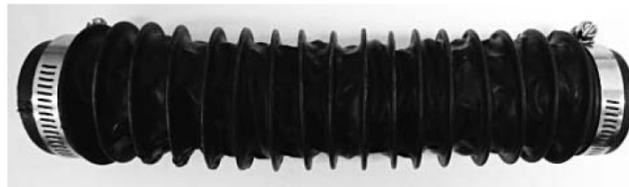
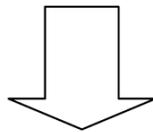
3) Install a metal fitting on the bellows.



Bellows



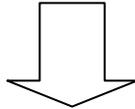
Install a metal fitting on the bellows.



- 4) Install the replacement (new) bellows and tighten the screws of the front and rear metal fittings affixing the bellows. Tighten the screws to the specified torque using a torque driver.



Installation of bellows



Tightening of rear metal fitting

Tightening torque: 2 N•m

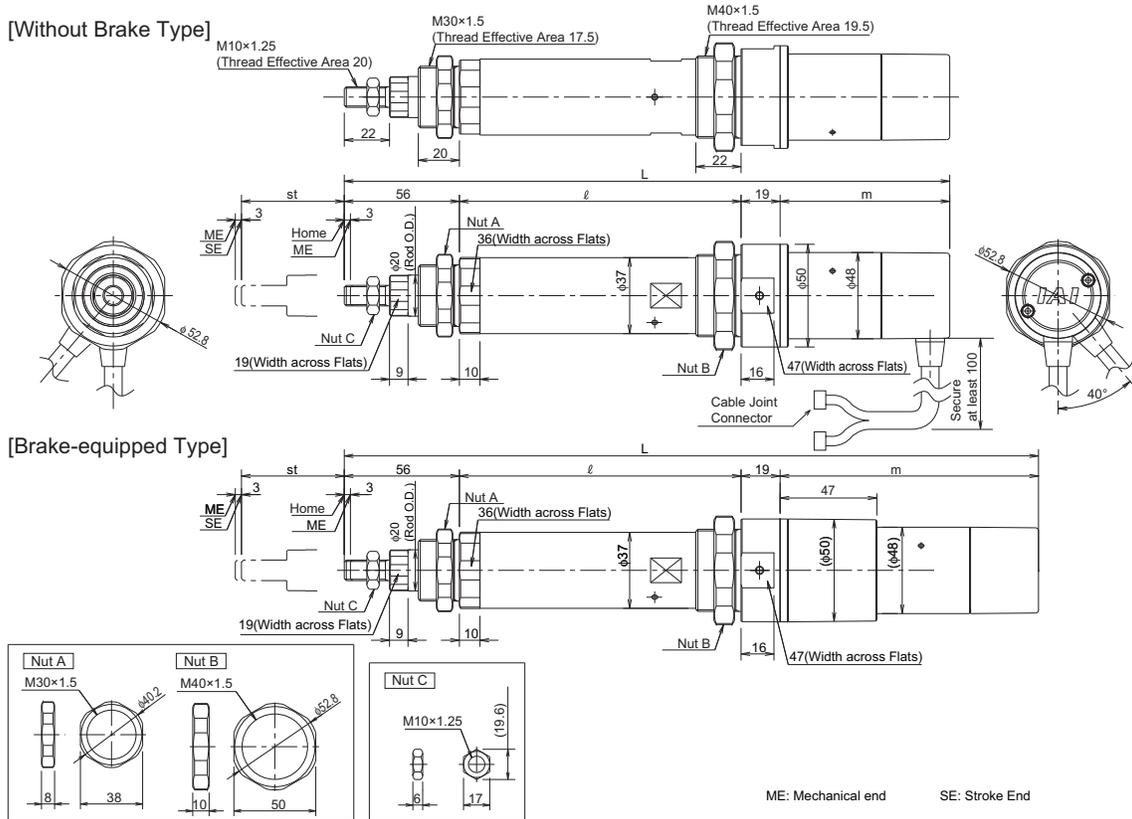


Tightening of front metal fitting

Tightening torque: 2 N•m

## 5. External Dimensions

### 5.1 RCS2-RA4C



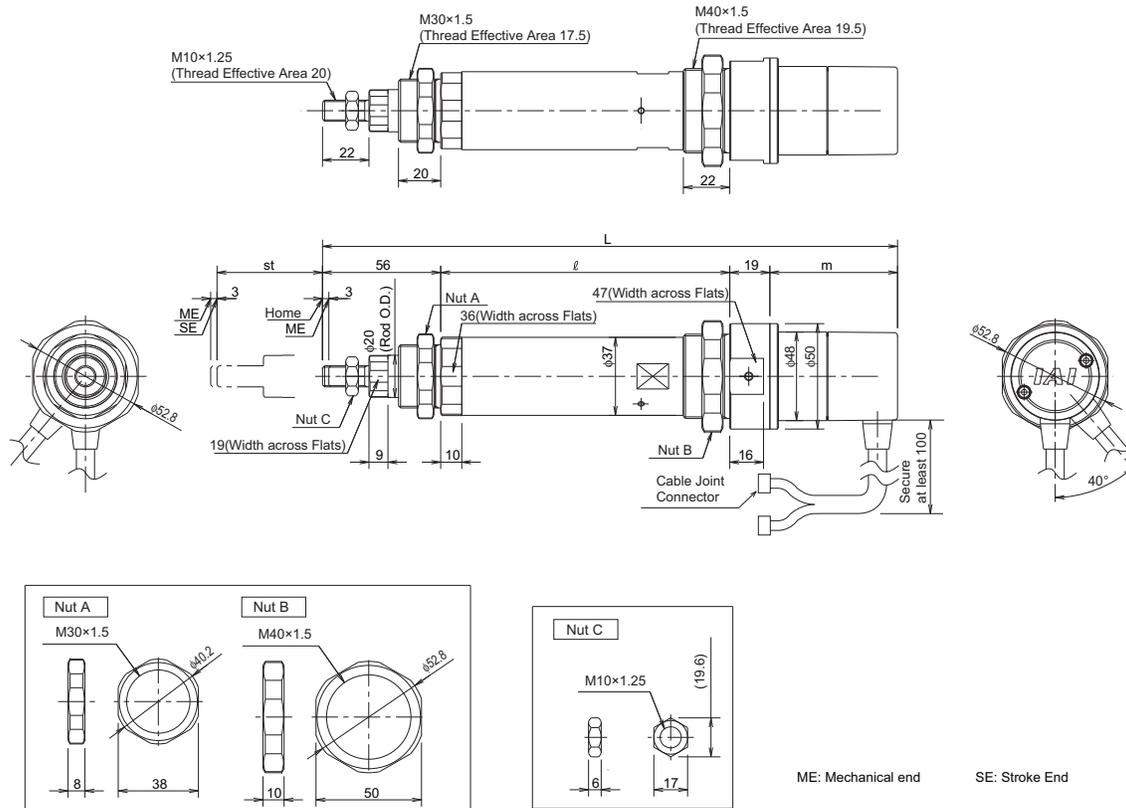
RCS2-RA4C (Without Brake)

Stroke	50	100	150	200	250	300	
L	20W	292.5	342.5	392.5	442.5	492.5	542.5
	30W	307.5	357.5	407.5	457.5	507.5	557.5
$\ell$	137	187	237	287	337	487	
m	20W	80.5					
	30W	95.5					
Weight [kg]	1.1	1.2	1.4	1.5	1.7	1.8	

RCS2-RA4C (Brake-equipped)

Stroke	50	100	150	200	250	300	
L	20W	335.5	385.5	435.5	485.5	535.5	585.5
	30W	350.5	400.5	450.5	500.5	550.5	600.5
$\ell$	137	187	237	287	337	487	
m	20W	123.5					
	30W	138.5					
Weight [kg]	1.3	1.5	1.6	1.7	1.9	2.0	

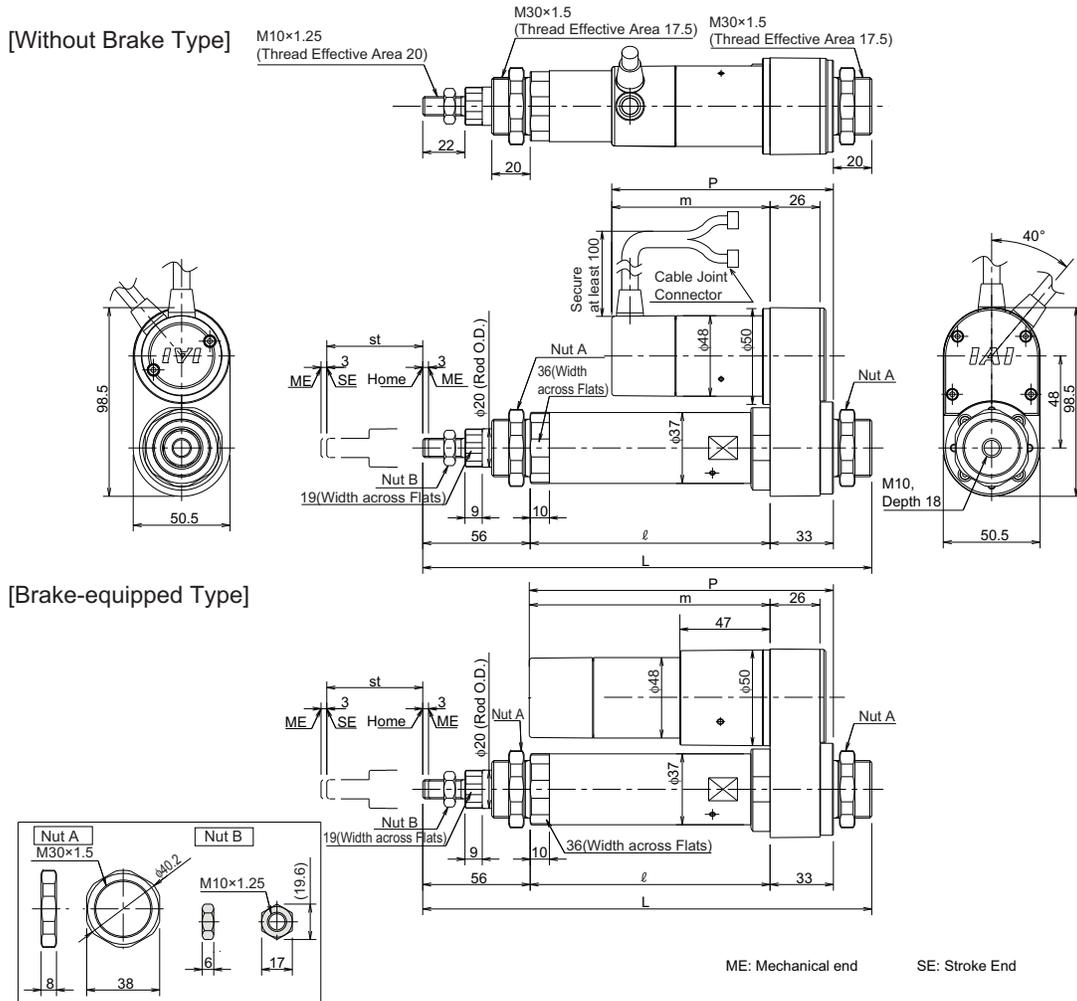
## 5.2 RCS2-RA4D



RCS2-RA4D (Without Brake)

Stroke	50	100	150	200	250	300	
L	20W	270.5	320.5	370.5	420.5	470.5	520.5
	30W	285.5	335.5	385.5	435.5	485.5	535.5
l		137	187	237	287	337	487
	m	20W	58.5				
30W		73.5					
Weight [kg]	1.0	1.2	1.3	1.5	1.6	1.8	

## 5.3 RCS2-RA4R



RCS2-RA4R (Without Brake)

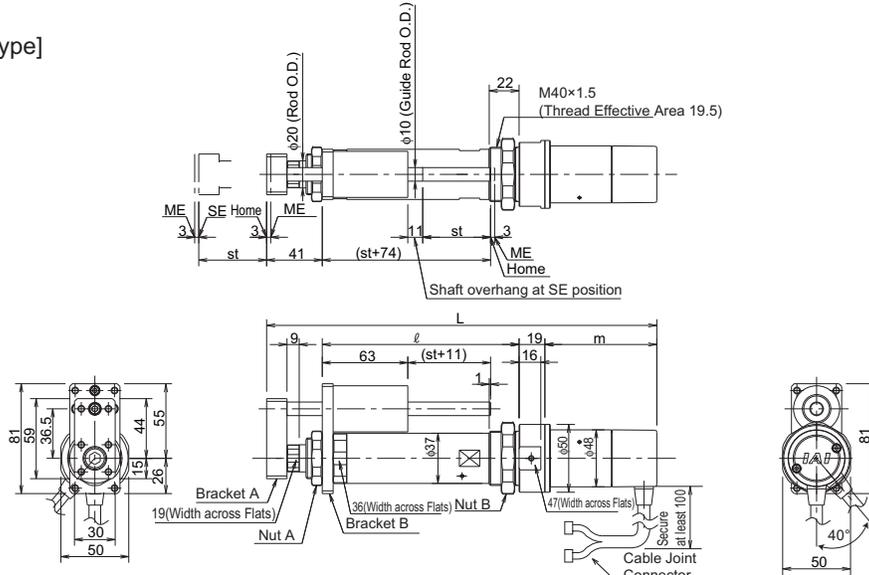
Stroke	50	100	150	200	250	300	
L	20W	234	284	334	384	434	484
	30W	235	284	334	384	434	484
l	125	175	225	275	325	375	
m	20W	80.5					
	30W	95.5					
P	20W	113.5					
	30W	128.5					
Weight [kg]	1.2	1.4	1.5	1.7	1.8	2.0	

RCS2-RA4R (Brake-equipped)

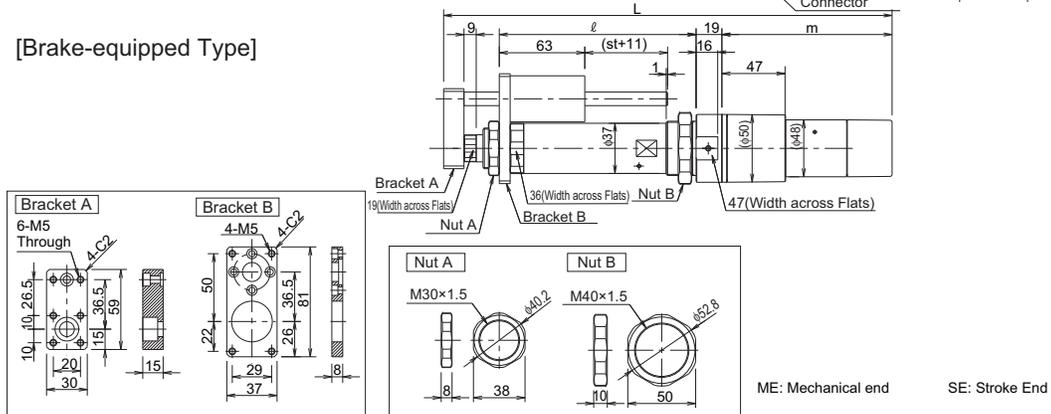
Stroke	50	100	150	200	250	300	
L	20W	234	285	334	384	434	484
	30W	234	284	334	384	434	484
l	125	175	225	275	325	375	
m	20W	123.5					
	30W	138.5					
P	20W	156.5					
	30W	171.5					
Weight [kg]	1.4	1.6	1.7	1.9	2.0	2.2	

## 5.4 RCS2-RGS4C

[Without Brake Type]



[Brake-equipped Type]



RCS2-RGS4C (Without Brake)

Stroke	50	100	150	200	250	300	
L	20W	285.5	335.5	385.5	435.5	485.5	535.5
	30W	300.5	350.5	400.5	450.5	500.5	550.5
ℓ	145	195	245	295	345	395	
m	20W	80.5					
	30W	95.5					
Weight [kg]	1.5	1.6	1.8	2.0	2.2	2.4	

RCS2-RGS4C (Brake-equipped)

Stroke	50	100	150	200	250	300	
L	20W	328.5	378.5	428.5	478.5	528.5	578.5
	30W	343.5	393.5	443.5	493.5	543.5	593.5
ℓ	145	195	245	295	345	395	
m	20W	123.5					
	30W	138.5					
Weight [kg]	1.7	1.8	2.0	2.2	2.4	2.6	

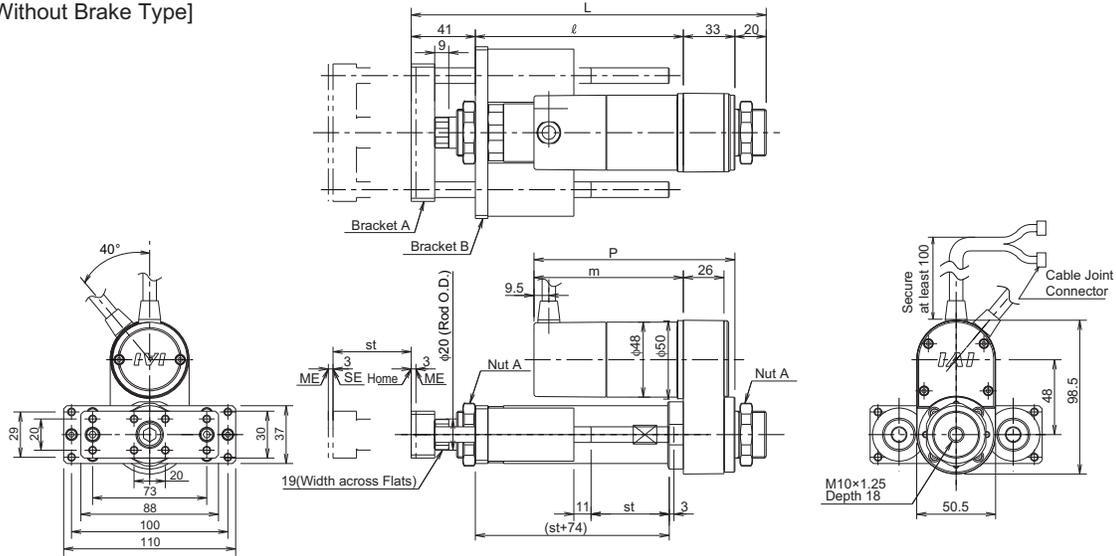




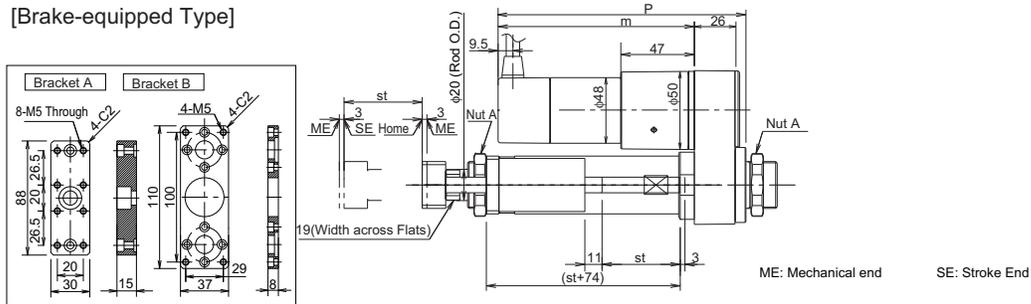


## 5.8 RCS2-RGD4R

[Without Brake Type]



[Brake-equipped Type]



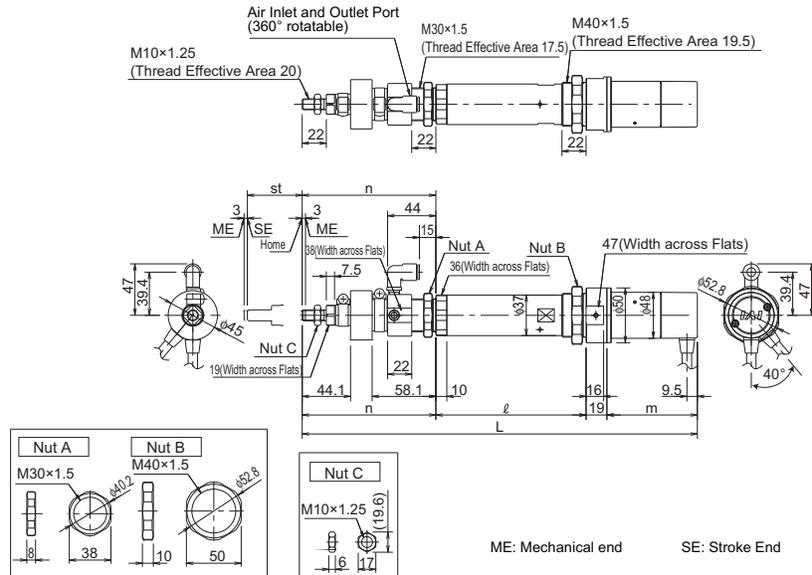
RCS2-RGD4R (Without Brake)

Stroke	50	100	150	200	250	300	
L	20W	227	277	327	377	427	477
	30W	227	277	327	377	427	477
ℓ	133	183	233	283	333	383	
m	20W	80.5					
	30W	95.5					
P	20W	113.5					
	30W	128.5					
Weight [kg]	1.9	2.2	2.3	2.6	2.7	3.0	

RCS2-RGD4R (Brake-equipped)

Stroke	50	100	150	200	250	300	
L	20W	227	277	327	377	427	477
	30W	227	277	327	377	427	477
ℓ	133	183	233	283	333	383	
m	20W	123.5					
	30W	138.5					
P	20W	156.5					
	30W	171.5					
Weight [kg]	2.1	2.4	2.5	2.8	2.9	3.2	

## 5.9 RCS2W-RA4C/RA4D



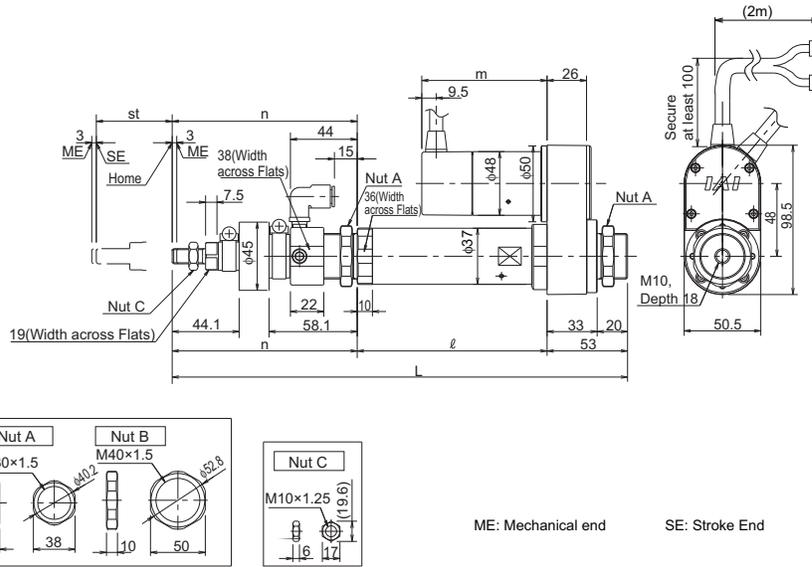
RCS2W-RA4C/RA4D (Without Brake)

Stroke		50	100	150	200	250	300	
L	RA4C	20W	358.4	418.4	478.4	538.4	599.4	660.4
		30W	373.4	433.4	493.4	553.4	614.4	675.4
	RA4D	20W	336.4	396.4	456.4	516.4	577.4	638.4
		30W	351.4	411.4	471.4	531.4	592.4	653.4
ℓ	RA4C	20W	137	187	237	287	337	387
		30W	137	187	237	287	337	387
	RA4D	20W	137	187	237	287	337	387
		30W	137	187	237	287	337	387
m	RA4C	20W	80.5					
		30W	95.5					
	RA4D	20W	58.5					
		30W	73.5					
n	RA4C	20W	121.9	131.9	141.9	151.9	162.9	173.9
		30W	121.9	131.9	141.9	151.9	162.9	173.9
	RA4D	20W	121.9	131.9	141.9	151.9	162.9	173.9
		30W	121.9	131.9	141.9	151.9	162.9	173.9
Weight [kg]	RA4C	20W/30W	1.4	1.5	1.7	1.8	2.0	2.1
	RA4D	20W/30W	1.3	1.5	1.6	1.8	1.9	2.1

RCS2W-RA4C/RA4D (Brake-equipped)

Stroke		50	100	150	200	250	300	
L	RA4C	20W	401.4	461.4	521.4	581.4	642.4	703.4
		30W	416.4	476.4	536.4	596.4	657.4	718.4
	RA4D	20W	There is no brake-equipped type.					
		30W	There is no brake-equipped type.					
ℓ	RA4C	20W	137	187	237	287	337	387
		30W	137	187	237	287	337	387
	RA4D	20W	There is no brake-equipped type.					
		30W	There is no brake-equipped type.					
m	RA4C	20W	123.5					
		30W	138.5					
	RA4D	20W	There is no brake-equipped type.					
		30W	There is no brake-equipped type.					
n	RA4C	20W	121.9	131.9	141.9	151.9	162.9	173.9
		30W	121.9	131.9	141.9	151.9	162.9	173.9
	RA4D	20W	There is no brake-equipped type.					
		30W	There is no brake-equipped type.					
Weight [kg]	RA4C	20W/30W	1.6	1.7	1.9	2.0	2.2	2.3
	RA4D	20W/30W	-					

## 5.10 RCS2W-RA4R



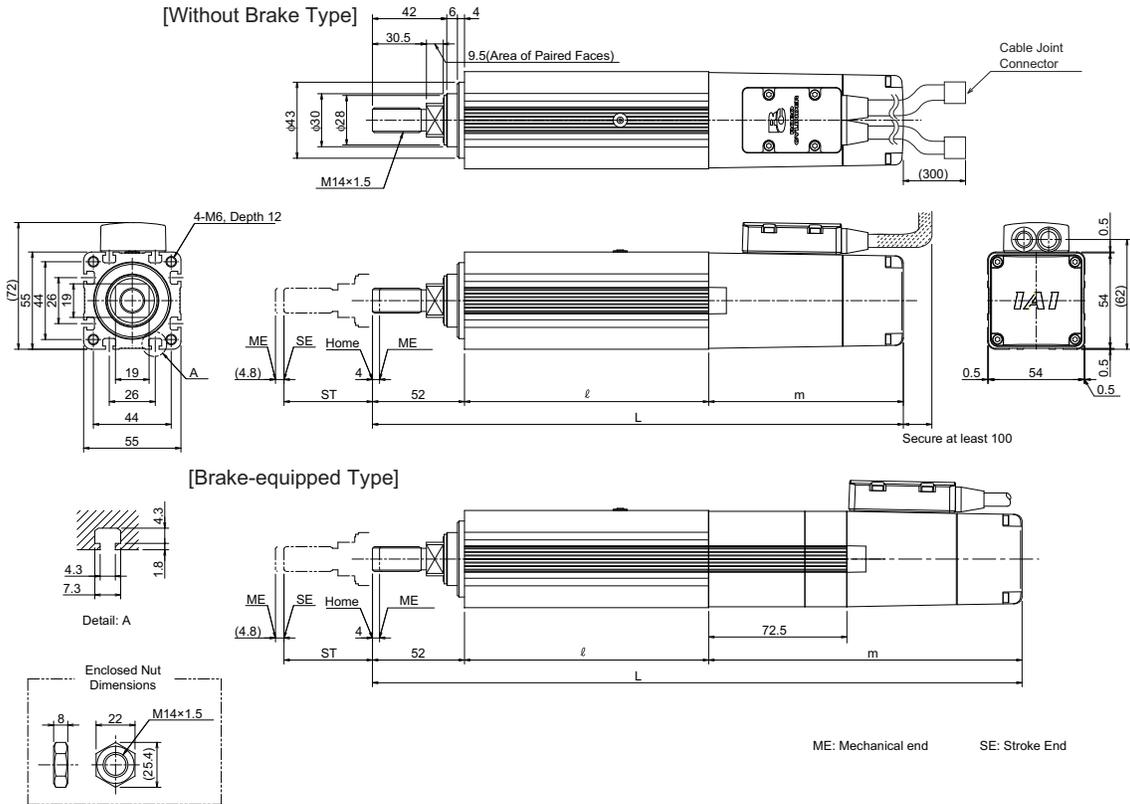
RCS2W-RA4R (Without Brake)

Stroke	50	100	150	200	250	300	
L	20W	299.9	359.9	419.9	479.9	540.9	601.9
	30W	299.9	359.9	419.9	479.9	540.9	601.9
ℓ	20 W	125	175	225	275	325	375
	30 W	125	175	225	275	325	375
m	20W	80.5					
	30W	95.5					
n	20W	121.9	131.9	141.9	151.9	162.9	173.9
	30W	121.9	131.9	141.9	151.9	162.9	173.9
Weight [kg]	1.5	1.7	1.8	2.0	2.1	2.3	

RCS2W-RA4R (Brake-equipped)

Stroke	50	100	150	200	250	300	
L	20W	299.9	359.9	419.9	479.9	540.9	601.9
	30W	299.9	359.9	419.9	479.9	540.9	601.9
ℓ	20W	125	175	225	275	325	375
	30W	125	175	225	275	325	375
m	20W	123.5					
	30W	138.5					
n	20W	121.9	131.9	141.9	151.9	162.9	173.9
	30W	121.9	131.9	141.9	151.9	162.9	173.9
Weight [kg]	1.7	1.9	2.0	2.2	2.3	2.5	

## 5.11 RCS2-RA5C



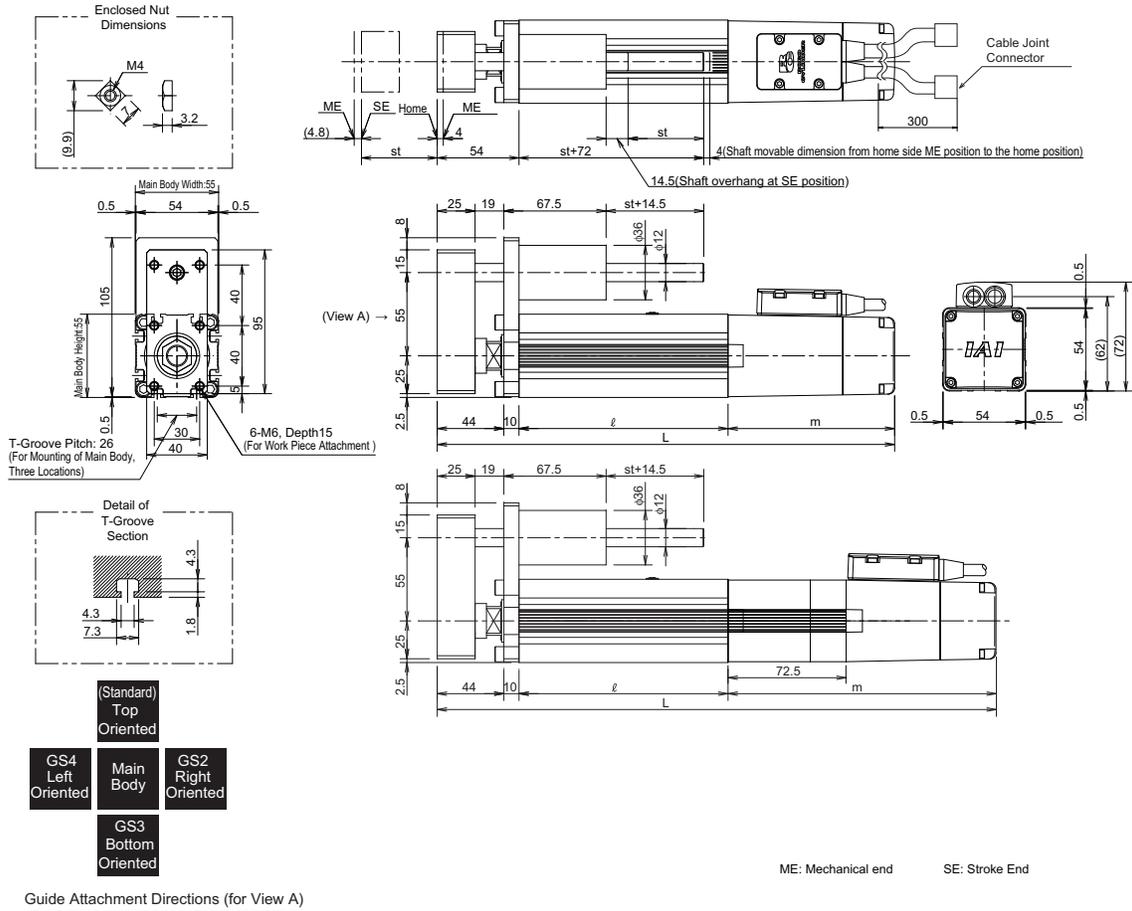
RCS2-RA5C (Without Brake)

Stroke	50	100	150	200	250	300
L	60W	282	332	382	432	482
	100W	300	350	400	450	500
l	138	188	238	288	338	388
m	60W	92				
	100W	110				
Weight [kg]	1.9	2.2	2.5	2.8	3.1	3.4

RCS2-RA5C (Brake-equipped)

Stroke	50	100	150	200	250	300
L	60W	354.5	404.5	454.5	504.5	554.5
	100W	372.5	422.5	472.5	522.5	572.5
l	138	188	238	288	338	388
m	60W	164.5				
	100W	182.5				
Weight [kg]	2.2	2.5	2.8	3.1	3.4	3.7

## 5.12 RCS2-RGS5C



Guide Attachment Directions (for View A)

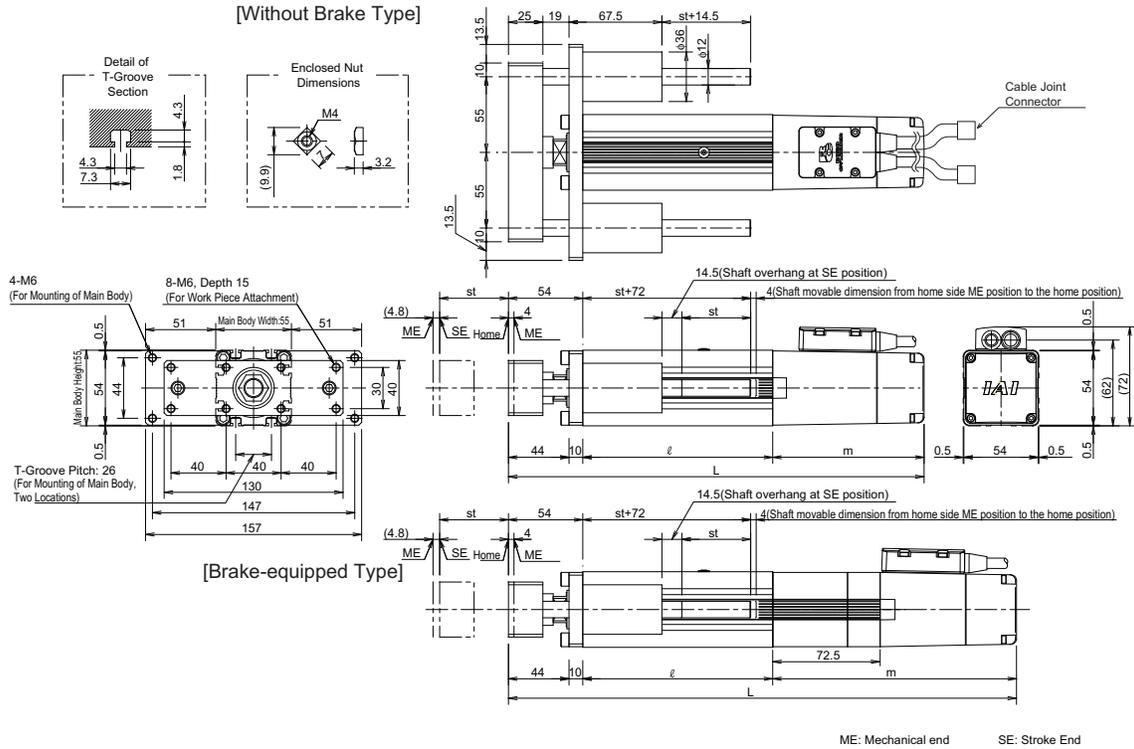
### RCS2-RGS5C (Without Brake)

Stroke	50	100	150	200	250	300	
L	60W	284	334	384	434	484	534
	100W	302	352	402	452	502	552
ℓ	138	188	238	288	338	388	
m	60W	92					
	100W	110					
Weight [kg]	2.5	2.8	3.2	3.6	3.9	4.3	

### RCS2-RGS5C (Brake-equipped)

Stroke	50	100	150	200	250	300	
L	60W	356.5	406.5	456.5	506.5	556.5	606.5
	100W	374.5	424.5	474.5	524.5	574.5	624.5
ℓ	138	188	238	288	338	388	
m	60W	164.5					
	100W	182.5					
Weight [kg]	2.8	3.1	3.5	3.9	4.2	4.6	

## 5.13 RCS2-RGD5C



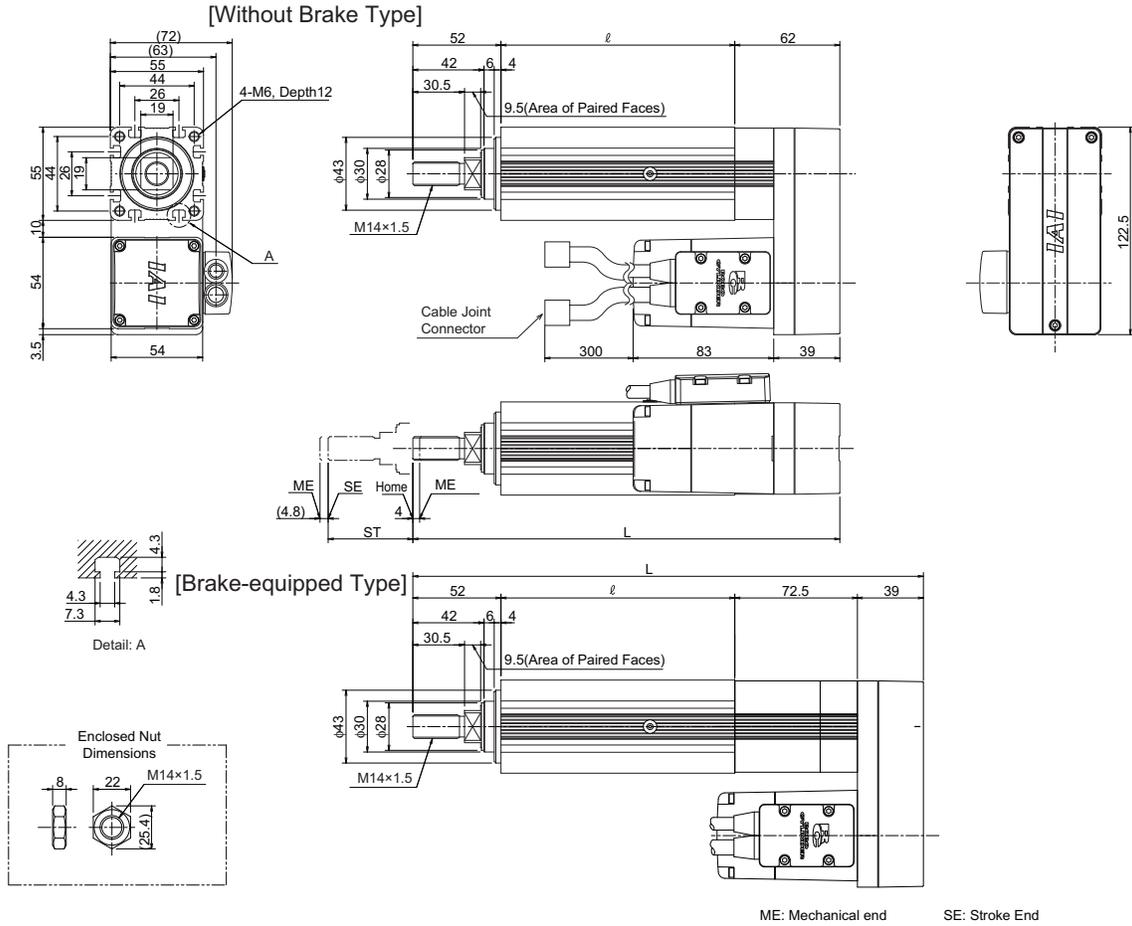
RCS2-RGD5C (Without Brake)

Stroke	50	100	150	200	250	300
L	60W	284	334	384	434	484
	100W	302	352	402	452	502
ℓ	138	188	238	288	338	388
m	60W	92				
	100W	110				
Weight [kg]	2.7	3.0	3.4	3.8	4.2	5.5

RCS2-RGD5C (Brake-equipped)

Stroke	50	100	150	200	250	300
L	60W	356.5	406.5	456.5	506.5	556.5
	100W	374.5	424.5	474.5	524.5	574.5
ℓ	138	188	238	288	338	388
m	60W	164.5				
	100W	182.5				
Weight [kg]	3.0	3.3	3.7	4.1	4.5	5.8

## 5.14 RCS2-RA5R



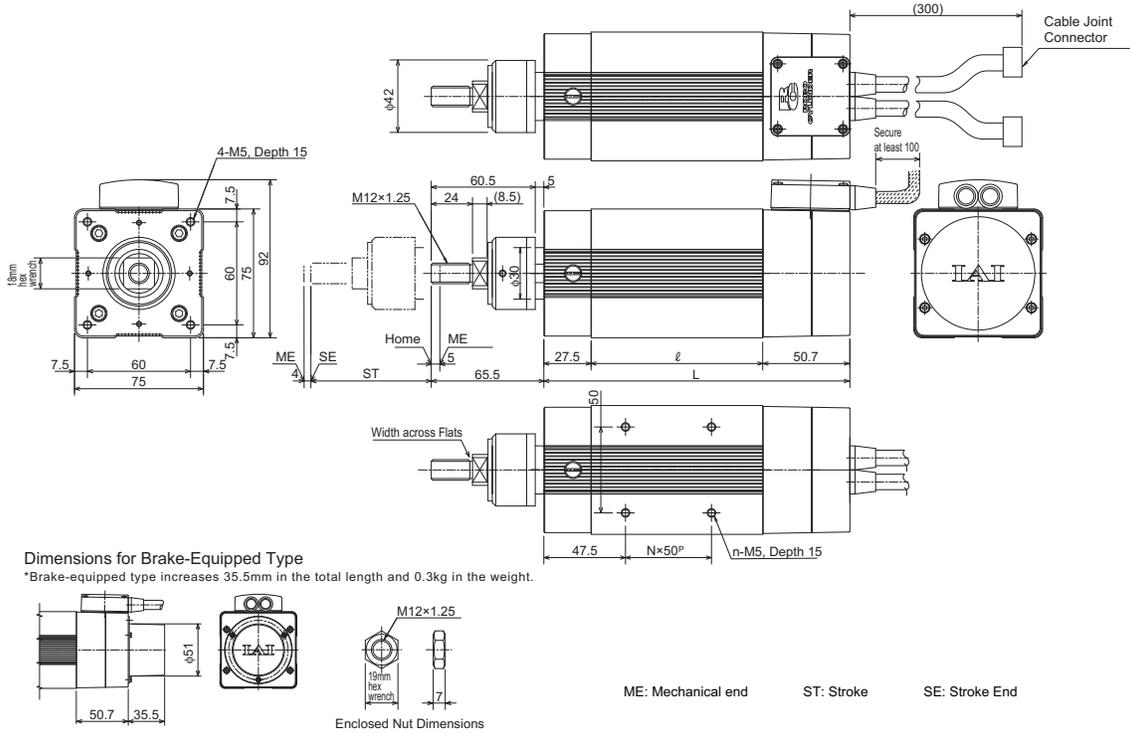
RCS2-RA5R (Without Brake)

Stroke	50	100	150	200	250	300
L	252	302	352	402	452	502
ℓ	138	188	238	288	338	388
Weight [kg]	2.3	2.6	2.9	3.2	3.5	3.8

RCS2-RA5R (Brake-equipped)

Stroke	50	100	150	200	250	300
L	301.5	351.5	401.5	451.5	501.5	551.5
ℓ	138	188	238	288	338	388
Weight [kg]	2.6	2.9	3.2	3.5	3.8	4.1

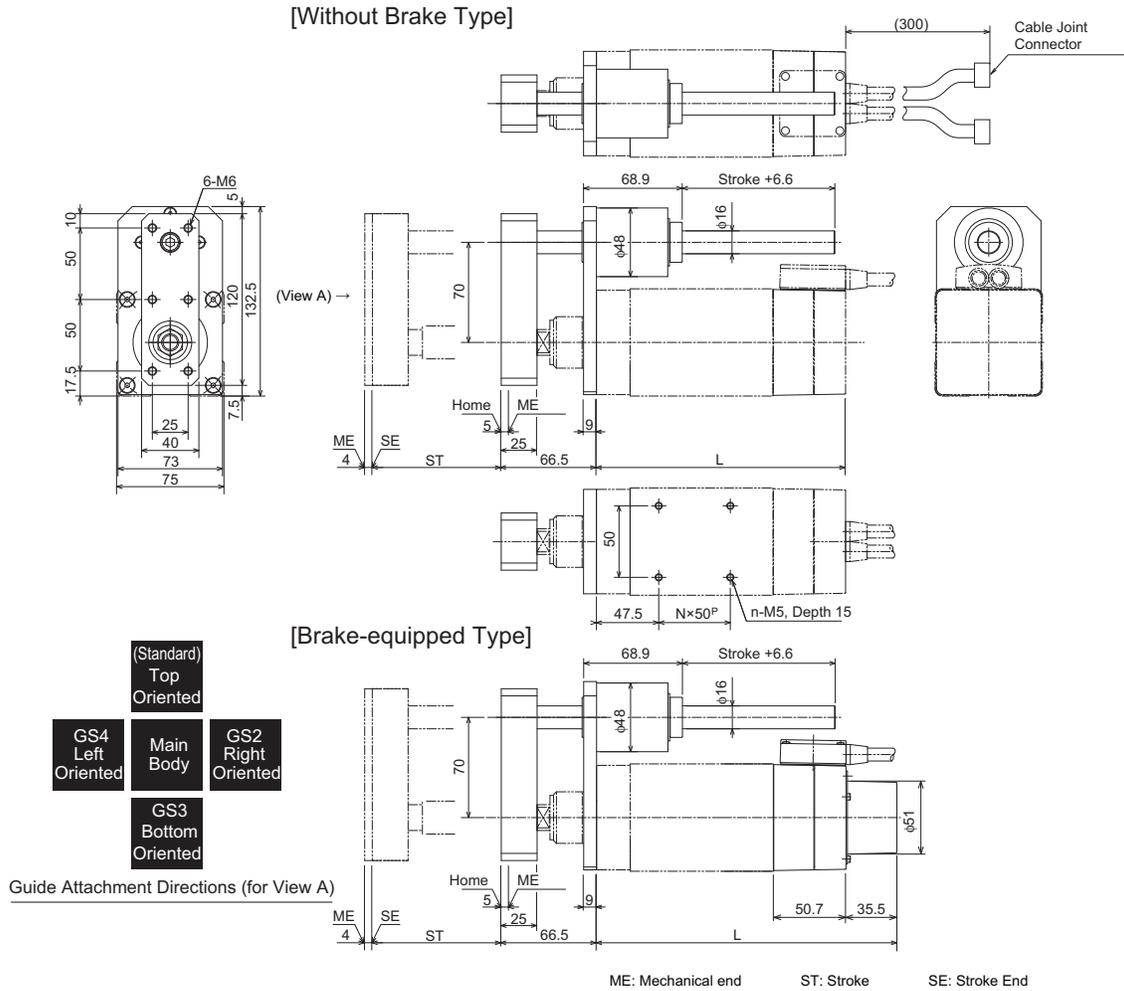
## 5.15 RCS2-RA7AD



RCS2-RA7AD

Stroke	50	100	150	200	250	300
L	128	178	228	278	328	378
ℓ	49.8	99.8	149.8	199.8	249.8	299.8
N	60W	-	1	2	3	4
	100W	-	-	1	2	3
n	60W	2	4	6	8	10
	100W	-	2	4	6	8
Weight [kg]	60W	2.1	2.6	3.0	3.5	3.9
	100W	2.2	2.7	3.1	3.6	4.0

## 5.16 RCS2-RGS7AD



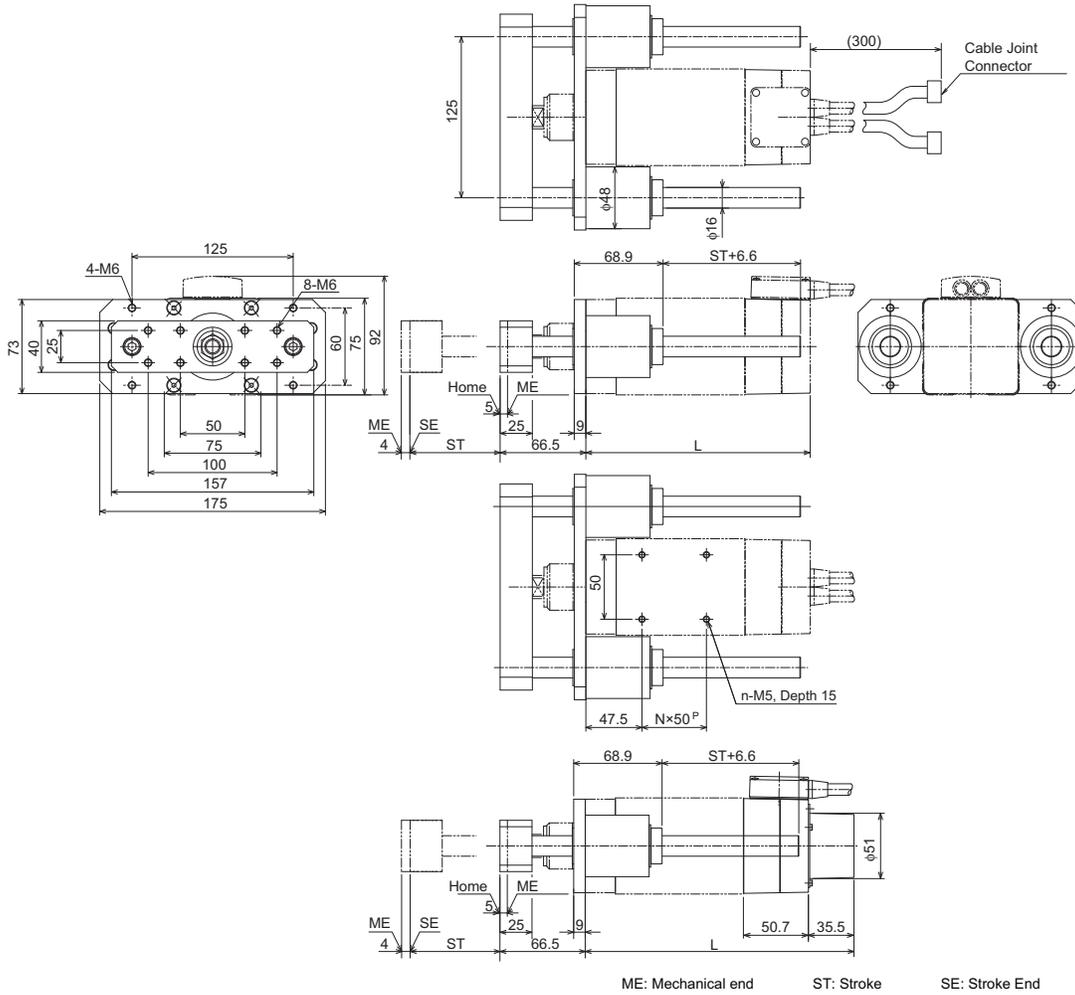
RCS2-RGS7AD (Without Brake)

Stroke	50	100	150	200	250	300	
L	128	178	228	278	328	378	
N	60W	-	1	2	3	4	5
	100W	-	-	1	2	3	4
n	60W	2	4	6	8	10	12
	100W	-	2	4	6	8	10
Weight [kg]	60W	3.2	3.8	4.3	4.8	5.3	5.9
	100W	3.3	3.9	4.4	4.9	5.4	6.0

RCS2-RGS7AD (Brake-equipped)

Stroke	50	100	150	200	250	300	
L	163.5	213.5	263.5	313.5	363.5	413.5	
N	60W	-	1	2	3	4	5
	100W	-	-	1	2	3	4
n	60W	2	4	6	8	10	12
	100W	-	2	4	6	8	10
Weight [kg]	60W	3.5	4.1	4.6	5.1	5.6	6.2
	100W	3.6	4.2	4.7	5.2	5.7	6.3

## 5.17 RCS2-RGD7AD



ME: Mechanical end    ST: Stroke    SE: Stroke End

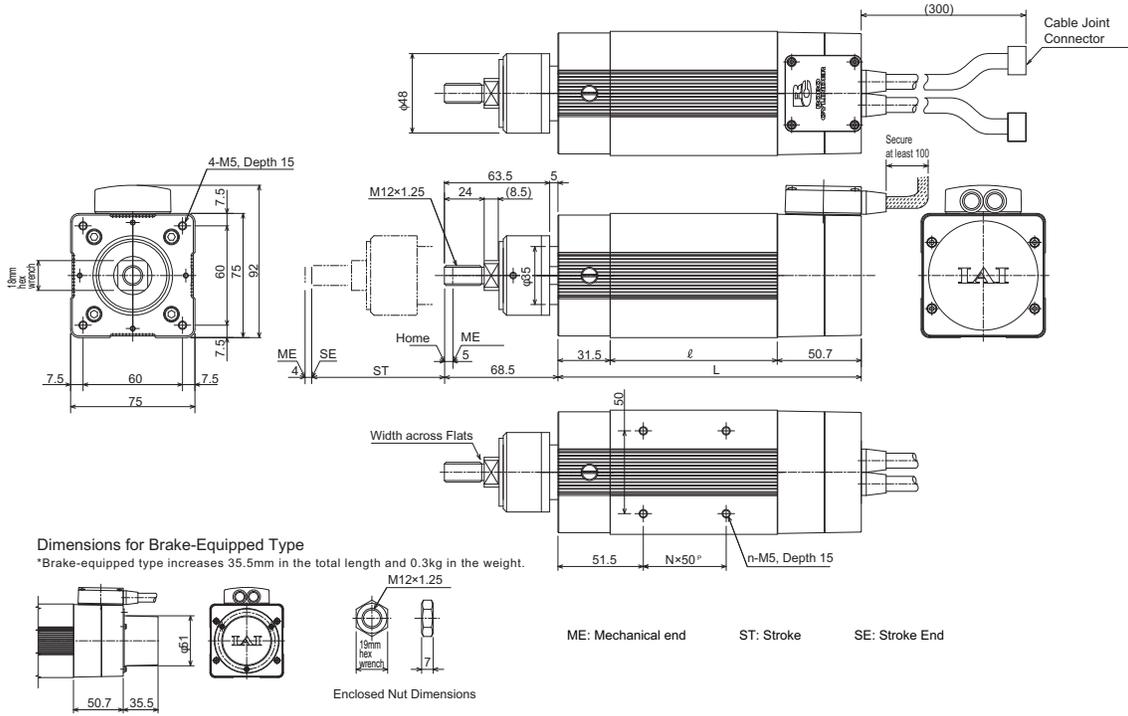
RCS2-RGD7AD (Without Brake)

Stroke	50	100	150	200	250	300
L	128	178	228	278	328	378
N	60W	-	1	2	3	4
	100W	-	-	1	2	3
n	60W	2	4	6	8	10
	100W	-	2	4	6	8
Weight [kg]	60W	3.8	4.5	4.1	5.7	6.3
	100W	3.9	4.6	5.2	5.8	6.4

RCS2-RGD7AD (Brake-equipped)

Stroke	50	100	150	200	250	300
L	163.5	213.5	263.5	313.5	363.5	413.5
N	60W	-	1	2	3	4
	100W	-	-	1	2	3
n	60W	2	4	6	8	10
	100W	-	2	4	6	8
Weight [kg]	60W	4.1	4.8	5.4	6	6.6
	100W	4.2	4.9	5.5	6.1	6.7

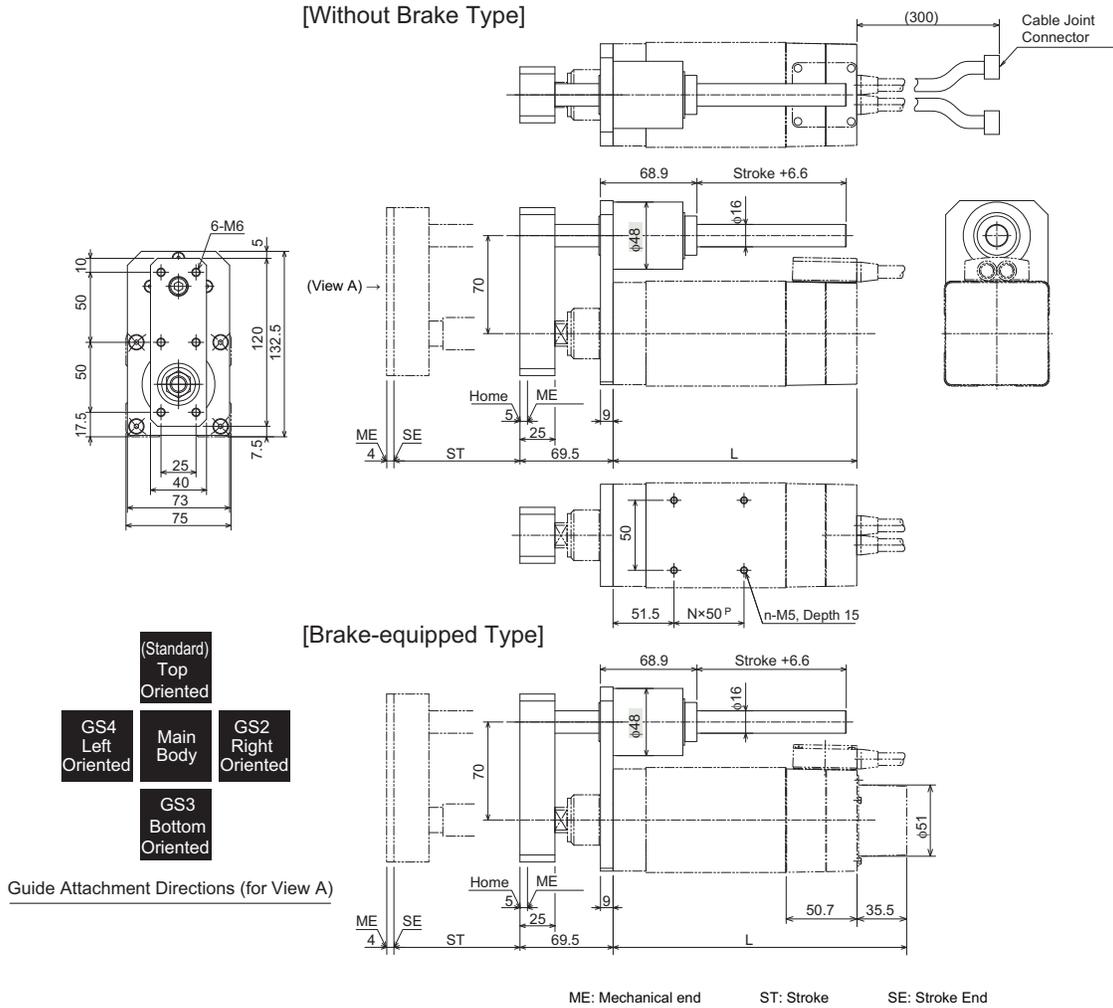
## 5.18 RCS2-RA7BD



RCS2-RA7BD

Stroke	50	100	150	200	250	300	
L	100W	133	183	233	283	333	383
	150W	-	183	233	283	333	383
ℓ	100W	50.8	100.8	150.8	200.8	250.8	300.8
	150W	-	100.8	150.8	200.8	250.8	300.8
N	100W	-	-	1	2	3	4
	150W	-	-	1	2	3	4
n	100W	-	2	4	6	8	10
	150W	-	2	4	6	8	10
Weight [kg]	100W	2.7	3.2	3.6	4.1	4.5	5.0
	150W	-	3.3	3.7	4.2	4.6	5.1

## 5.19 RCS2-RGS7BD



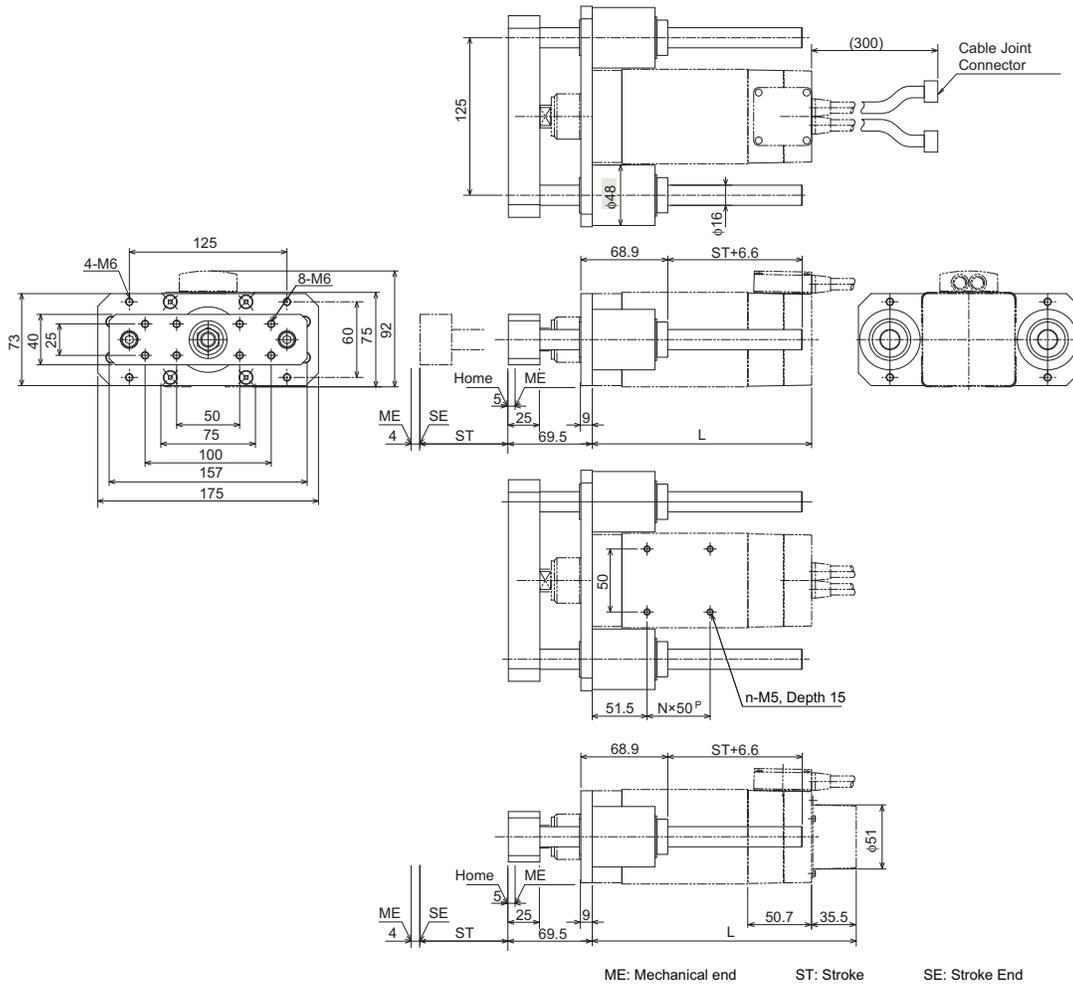
RCS2-RGS7BD (Without Brake)

Stroke	50	100	150	200	250	300	
L	100W	133	183	233	283	333	383
	150W	-	183	233	283	333	383
N	100W	-	-	1	2	3	4
	150W	-	-	1	2	3	4
n	100W	-	2	4	6	8	10
	150W	-	2	4	6	8	10
Weight [kg]	100W	3.8	4.4	4.9	5.4	5.9	6.5
	150W	-	4.5	5.0	5.5	6.0	6.6

RCS2-RGS7BD (Brake-equipped)

Stroke	50	100	150	200	250	300	
L	100W	168.5	218.5	268.5	318.5	368.5	418.5
	150W	-	218.5	268.5	318.5	368.5	418.5
N	100W	-	-	1	2	3	4
	150W	-	-	1	2	3	4
n	100W	-	2	4	6	8	10
	150W	-	2	4	6	8	10
Weight [kg]	100W	4.1	4.7	5.2	5.7	6.2	6.8
	150W	-	4.8	5.3	5.8	6.3	6.9

## 5.20 RCS2-RGD7BD



RCS2-RGD7BD (Without Brake)

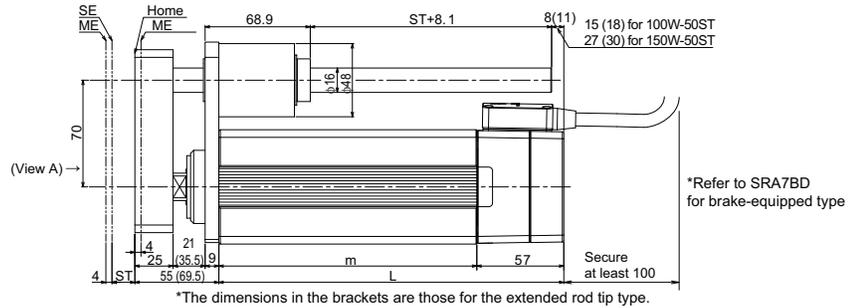
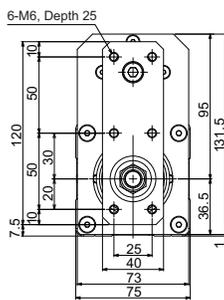
Stroke		50	100	150	200	250	300
L	100W	133	183	233	283	333	383
	150W	-	183	233	283	333	383
N	100W	-	-	1	2	3	4
	150W	-	-	1	2	3	4
n	100W	-	2	4	6	8	10
	150W	-	2	4	6	8	10
Weight [kg]	100W	4.4	5.1	5.7	6.3	6.9	7.5
	150W	-	5.2	5.8	6.4	7.0	7.6

RCS2-RGD7BD (Brake-equipped)

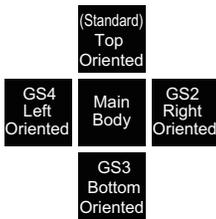
Stroke		50	100	150	200	250	300
L	100W	168.5	218.5	268.5	318.5	368.5	418.5
	150W	-	218.5	268.5	318.5	368.5	418.5
N	100W	-	-	1	2	3	4
	150W	-	-	1	2	3	4
n	100W	-	2	4	6	8	10
	150W	-	2	4	6	8	10
Weight [kg]	100W	4.7	5.4	6	6.6	7.2	7.8
	150W	-	5.5	6.1	6.7	7.3	7.9



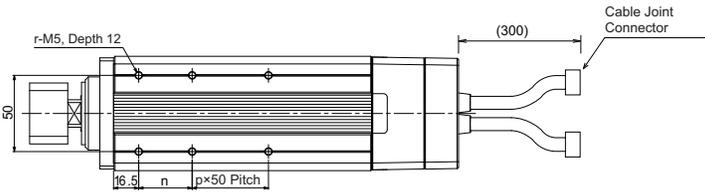
## 5.22 RCS2-SRGS7BD



\*The dimensions in the brackets are those for the extended rod tip type.



Guide Attachment Directions (for View A)

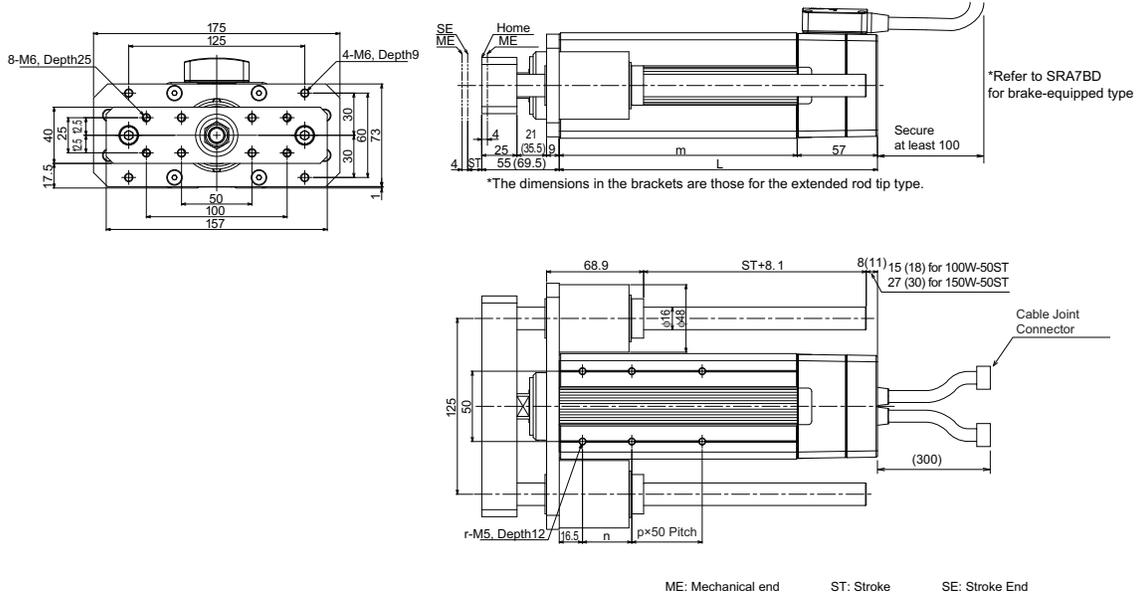


ME: Mechanical end    ST: Stroke    SE: Stroke End

### RCS2-SRGS7BD

Stroke		50	100	150	200	250	300
L	60W	126	176	226	276	326	376
	100W	133	176	226	276	326	376
	150W	145	176	226	276	326	376
m	60W	69	119	169	219	269	319
	100W	76	119	169	219	269	319
	150W	88	119	169	219	269	319
n		25	35	35	35	35	35
p		0	0	1	2	3	4
r		4	4	6	8	10	12
Weight [kg]	60W	3.5	4.1	4.8	5.4	6.1	6.7
	100W	3.7	4.3	4.9	5.6	6.2	6.9
	150W	4	4.5	5.1	5.8	6.4	7.1

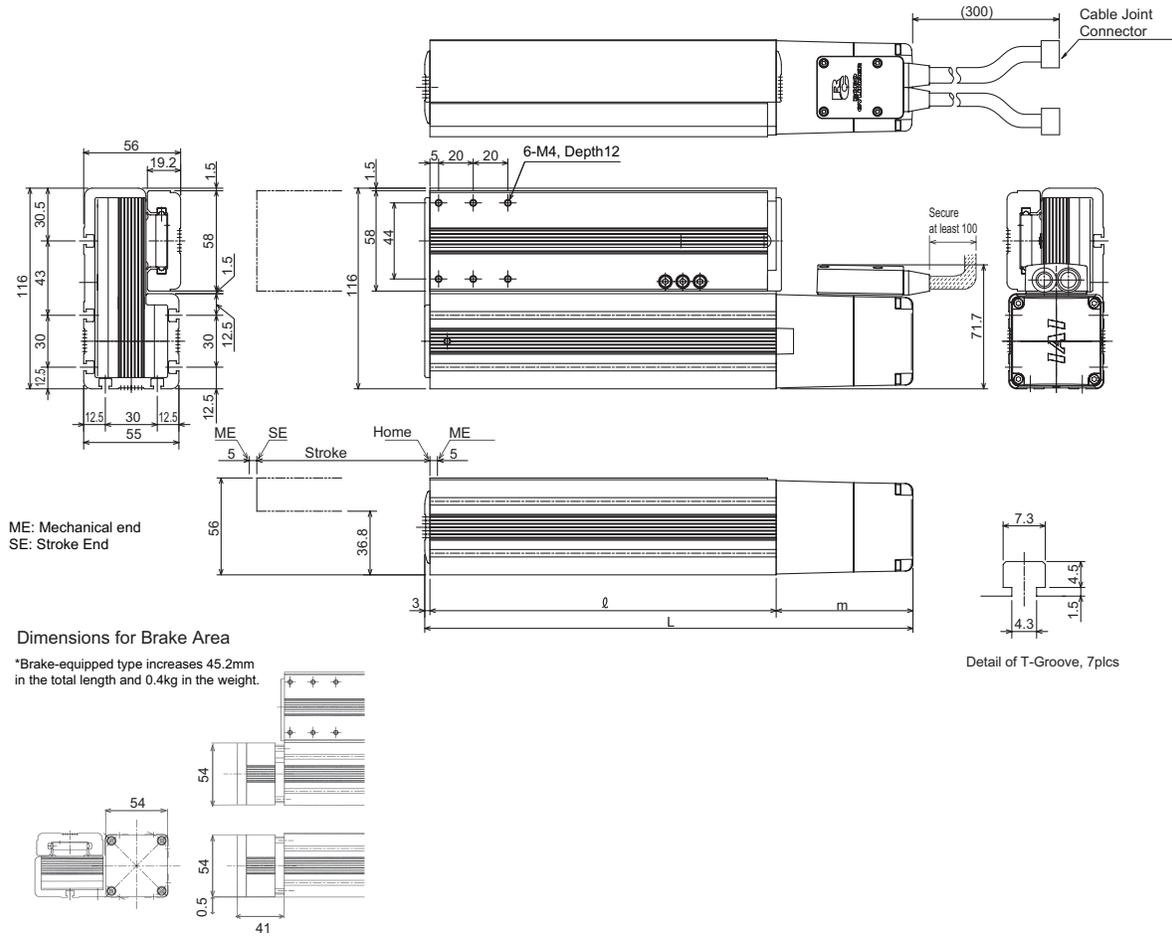
## 5.23 RCS2-SRGD7BD



RCS2-SRGD7BD

Stroke		50	100	150	200	250	300
L	60W	126	176	226	276	326	376
	100W	133	176	226	276	326	376
	150W	145	176	226	276	326	376
m	60W	69	119	169	219	269	319
	100W	76	119	169	219	269	319
	150W	88	119	169	219	269	319
n		25	35	35	35	35	35
p		0	0	1	2	3	4
r		4	4	6	8	10	12
Weight [kg]	60W	4.3	5	5.7	6.4	7.2	7.9
	100W	4.5	5.1	5.9	6.6	7.3	8
	150W	4.8	5.3	6.1	6.8	7.5	8.2

## 5.24 RCS2-F5D



### RCS2-F5D

Stroke		50	100	150	200	250	300
L	60W	232	282	332	382	432	482
	100W	250	300	350	400	450	500
l		150	200	250	300	350	400
m	60W	79					
	100W	97					
Weight [kg]	60W	2.1	2.5	3	3.4	3.9	4.3
	100W	2.3	2.7	3.2	3.6	4.1	4.5

## 6. Life

### 6.1 Rod Type

The product life is assumed to be 5,000km (reference) under the condition that it runs with maximum transportable weight and maximum acceleration/deceleration.

### 6.2 Flat Type

The mechanical life of the actuator is represented by that of the guide receiving the greatest moment load. Operation life of the linear guide is to be determined by the total driving distance which can reach without having 90% flaking (peeling on rail surface). Operation life can be figured out with the calculation method shown below.

#### 6.2.1 How to Calculate Operation Life

For the operation life of the linear guide, use the dynamic allowable moment stated in 1.2 Specifications, and figure out with the formula below.

$$L = \left( \frac{C_M}{M} \right)^3 \cdot 5000\text{km}$$

L : Operation life (km)     $C_M$  : Dynamic allowable moment (N·m)  
M : Moment to work (N·m)    5000km : Standard rated life of ROBO Cylinder

In addition, have a calculation for the drop of life with the formula below if there is a concern that the life could drop due to the condition of vibration or way to be attached.

$$L = \left( \frac{C_M}{M} \cdot \frac{f_{ws}}{f_w} \cdot \frac{1}{f_\alpha} \right)^3 \cdot 5000\text{km}$$

L : Operation life (km)     $C_M$  : Dynamic allowable moment (N·m)  
M : Moment to work (N·m)     $f_{ws}$  : Standard operational coefficient  
 $f_w$  : Load coefficient     $f_\alpha$  : Attachment coefficient  
5000km : Standard rated life of ROBO Cylinder

Explained below is regarding the standard operational coefficient  $f_{ws}$ , load coefficient  $f_w$  and attachment coefficient  $f_\alpha$ .

Refer to the contents below to set them up.

[Standard operational coefficient  $f_{ws}$ ]

For ROBO Cylinders described in this manual,  $f_{ws} = 1.2$ . It is a coefficient defined for each model, some models such as RCS3 high-speed type is 1.35.

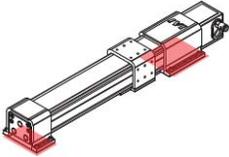
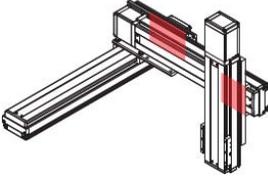
[Load coefficient  $f_w$ ]

It is a coefficient to consider the life drop due to operational conditions.

Load coefficient $f_w$	Operation Condition	Reference for acceleration/deceleration
1.0 to 1.5	Small vibration or impact in slow operation	0.3G or less

[Attachment coefficient  $f_\alpha$ ]

Attachment coefficient  $f_\alpha$  is a coefficient to consider the life drop due to the condition of actuator attachment.

Attachment coefficient $f_\alpha$	1.0	1.2	1.5
	Attachment in whole area	Attachment on both ends	Attachment on spots
Attached condition			

\* As the figures are those in common for each manual, they are not for RCS2 flat type.

Replace to figures for RCS2 flat type and select the attachment coefficient.

\* Even when in attachment in whole area, and the actuator is seated in the whole length of the product, select 1.2 or 1.5 for the attachment coefficient depending on the position of screw fixing.

\* For attachment in whole area, use all of the tapped holes (counterbored holes) on the seat surface to fix.

## 6.2.2 Operation Life

The operation life depends on the moment to work. With light load, it will be longer than 5,000km, the standard rated life. With no consideration of vibration and attachment condition, the operation life is 40,000km according to the calculation with formula in the previous page under assumption that  $0.5 C_M$  (half of dynamic allowable moment) of moment is applied on. It shows that it can be 8 times longer than the standard rated life, which is 5,000km.

## 7. Warranty

### 7.1 Warranty Period

One of the following periods, whichever is shorter:

- 18 months after shipment from our company
- 12 months after delivery to the specified location
- 2,500 hours of operation

### 7.2 Scope of the Warranty

Our products are covered by warranty when all of the following conditions are met. Faulty products covered by warranty will be replaced or repaired free of charge:

- (1) The breakdown or problem in question pertains to our product as delivered by us or our authorized dealer.
- (2) The breakdown or problem in question occurred during the warranty period.
- (3) The breakdown or problem in question occurred while the product was in use for an appropriate purpose under the conditions and environment of use specified in the Operation Manual and catalog.
- (4) The breakdown or problem in question was caused by a specification defect or problem, or by the poor quality of our product.

Note that breakdowns due to any of the following reasons are excluded from the scope of warranty:

- [1] Anything other than our product
- [2] Modification or repair performed by a party other than us (unless we have approved such modification or repair)
- [3] Anything that could not be easily predicted with the level of science and technology available at the time of shipment from our company
- [4] A natural disaster, man-made disaster, incident or accident for which we are not liable
- [5] Natural fading of paint or other symptoms of aging
- [6] Wear, depletion or other expected result of use
- [7] Operation noise, vibration or other subjective sensation not affecting function or maintenance

Note that the warranty only covers our product as delivered and that any secondary loss arising from a breakdown of our product is excluded from the scope of warranty.

### 7.3 Honoring the Warranty

As a rule, the product must be brought to us for repair under warranty.

### 7.4 Limited Liability

- (1) We shall assume no liability for any special damage, consequential loss or passive loss such as a loss of expected profit arising from or in connection with our product.
- (2) We shall not be liable for any program or control method created by the customer to operate our product or for the result of such program or control method.

## 7.5 Conditions of Conformance with Applicable Standards/Regulations, Etc., and Applications

- (1) If our product is combined with another product or any system, device, etc., used by the customer, the customer must first check the applicable standards, regulations and/or rules. The customer is also responsible for confirming that such combination with our product conforms to the applicable standards, etc. In such a case we will not be liable for the conformance of our product with the applicable standards, etc.
- (2) Our product is for general industrial use. It is not intended or designed for the applications specified below, which require a high level of safety. Accordingly, as a rule our product cannot be used in these applications. Contact us if you must use our product for any of these applications:
  - [1] Medical equipment pertaining to maintenance or management of human life or health
  - [2] A mechanism or mechanical equipment intended to move or transport people (such as a vehicle, railway facility or aviation facility)
  - [3] Important safety parts of mechanical equipment (such as safety devices)
  - [4] Equipment used to handle cultural assets, art or other irreplaceable items
- (3) Contact us at the earliest opportunity if our product is to be used in any condition or environment that differs from what is specified in the catalog or Operation Manual.

## 7.6 Other Items Excluded from Warranty

The price of the product delivered to you does not include expenses associated with programming, the dispatch of engineers, etc. Accordingly, a separate fee will be charged in the following cases even during the warranty period:

- [1] Guidance for installation/adjustment and witnessing of test operation
- [2] Maintenance and inspection
- [3] Technical guidance and education on operating/wiring methods, etc.
- [4] Technical guidance and education on programming and other items related to programs

## Change History

Revision Date	Description of Revision	
March 2009	Fourth edition	
April 2009	Fifth edition	Added RCS2-RGD4R.
January 2010	Sixth edition	Added 13.4, "Applying Grease."
August 2012	Seventh edition	Revised overall
March 2013	Eighth edition	How to Supply Grease to SRA7BD, SRGS7BD, SRGD7BD added in 4.4, "Grease Supply".
October 2013	Ninth edition	Pg. 45 Note corrected CB-X2-PA□□□ → CB-X3-PA□□□
April 2015	Tenth edition	Pg. 33, 37 Dynamic allowable moment value changed Pg. 127 Figure for brake part changed Pg. 128 Change made about life





## ***IAI Corporation***

Head Office: 577-1 Obane Shimizu-KU Shizuoka City Shizuoka 424-0103, Japan  
TEL +81-54-364-5105 FAX +81-54-364-2589  
website: [www.iai-robot.co.jp/](http://www.iai-robot.co.jp/)

Technical Support available in USA, Europe and China

## ***IAI America, Inc.***

Head Office: 2690 W. 237th Street, Torrance, CA 90505  
TEL (310) 891-6015 FAX (310) 891-0815  
Chicago Office: 110 East State Parkway, Schaumburg, IL 60173  
TEL (847) 908-1400 FAX (847) 908-1399  
Atlanta Office: 1220 Kennestone Circle, Suite 108, Marietta, GA 30066  
TEL (678) 354-9470 FAX (678) 354-9471  
website: [www.intelligentactuator.com](http://www.intelligentactuator.com)

## ***IAI Industrieroboter GmbH***

Ober der Röth 4, D-65824 Schwalbach am Taunus, Germany  
TEL 06196-88950 FAX 06196-889524

## ***IAI (Shanghai) Co., Ltd.***

SHANGHAI JIAHUA BUSINESS CENTER A8-303, 808, Hongqiao Rd. Shanghai 200030, China  
TEL 021-6448-4753 FAX 021-6448-3992  
website: [www.iai-robot.com](http://www.iai-robot.com)

## ***IAI Robot (Thailand) Co., Ltd.***

825 PhairojKijja Tower 12th Floor, Bangna-Trad RD., Bangna, Bangkok 10260, Thailand  
TEL +66-2-361-4458 FAX +66-2-361-4456