

# ROBO Cylinder®

## Radial Cylinder

RCS4- RRA4C/RRA6C/RRA7C/RRA8C  
RRA4R/RRA6R/RRA7R/RRA8R

Instruction Manual

First Edition

ME3773-1B



Specifications	ch.1
Installation	ch.2
Connecting with the Controller	ch.3
Maintenance and Inspection	ch.4
External Dimensions	ch.5
Life	ch.6
Warranty	ch.7
Appendix	ch.8



## **Please Read Before Use**

Thank you for purchasing our product.

This instruction manual explains the handling methods, structure and maintenance of this product, providing the information you need in order 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 DVD enclosed with the product contains instruction manuals for IAI products.

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

After reading the instruction manual, keep it in a convenient place so that whoever is handling the product can refer to it quickly when necessary.

### **[Important]**

- This instruction manual is an original document dedicated for this product.
- This product cannot be used in ways not shown in this instruction manual. IAI shall not be liable for any result whatsoever arising from the use of the product in any other way than what is noted in the manual.
- The information contained in this instruction manual is subject to change without notice for the purpose of product improvement.
- If any issues arise regarding the information contained in this instruction manual, contact our customer center or the nearest sales office.
- Use or reproduction of this instruction manual in full or in part without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the text are registered trademarks.

## RCS4 Radial Cylinder Type Instruction Manual Configuration

Product name	Instruction manual name	Control number
RCS4	First Step Guide	ME3775
RCS4 Radial Cylinder Type	Instruction Manual (this document)	ME3773
SCON-CB/CGB Controller	SCON-CB/CGB Controller Instruction Manual	ME0340
SCON-CAL/CGAL Controller	SCON-CAL/CGAL Controller Instruction Manual	ME0243
MSCON-C Controller	MSCON-C Controller Instruction Manual	ME0306
SSEL-CS Controller	SSEL-CS Controller Instruction Manual	ME0157
XSEL-P/Q Controller	XSEL-P/Q Controller Instruction Manual	ME0148
XSEL-R/S Controller	XSEL-R/S Controller Instruction Manual	ME0313
XSEL-RA/SA Controller	XSEL-RA/SA Controller Instruction Manual	ME0359
PC Compatible Software for RC/EC	RCM-101-MW/RCM-101-USB Instruction Manual	ME0155
PC Compatible Software for XSEL	IA-101-X-MW/IA-101-X-USBMW Instruction Manual	ME0154
Touch Panel Teaching Pendant	TB-01/01D/01DR Applicable for Position Controller Instruction Manual	ME0324
Touch Panel Teaching Pendant	TB-02/02D Applicable for Position Controller Instruction Manual	ME0355
Data Setter	TB-03 Applicable for Position Controller	ME0376
Touch Panel Teaching Pendant	TB-01/01D/01DR Applicable for Program Controller Instruction Manual	ME0325
Touch Panel Teaching Pendant	TB-02/02D Applicable for Program Controller Instruction Manual	ME0356
Data Setter	TB-03 Applicable for Program Controller	ME0377

# Contents

Safety Guide .....	Intro-1
Precautions for Handling .....	Intro-9
International Standard Compliance .....	Intro-10
Names of the Parts .....	Intro-11

## Chapter 1 Specifications

1.1 Checking the product .....	1-1
Components .....	1-1
How to Read the Model Nameplate .....	1-2
How to Read the Model Number .....	1-2
Product list .....	1-3
1.2 Specifications .....	1-4
Specifications .....	1-4
Duty ratio .....	1-46
1.3 Options .....	1-48
With brake (Model Code: B) .....	1-48
Cable Eject Direction Changed (Model Code: CJT, CJR, CJL, CJB and CJO) .....	1-48
Motor Reversed Direction (Model Code: ML, MR) .....	1-48
Home reverse specification (Model Code: NM) .....	1-48
Rear Attachment Plate (Model Code: RP) .....	1-48
Tip Adapter Flange (Model Code: FFA) .....	1-49
Tip Adapter Internal Thread (Model Code: NFA) .....	1-49
Tip adapter (Keyway) (Model Code: KFA) .....	1-50
Flange (Model Code: FL) .....	1-50
1.4 Accessories .....	1-51
Motor Cable .....	1-51
Encoder Cables .....	1-52

## **Chapter 2 Installation**

2.1 Precautions for transportation .....	2-1
2.2 Installation and storage/preservation environment .....	2-3
Installation Environment .....	2-3
Storage/preservation environment .....	2-4
2.3 How to Install .....	2-5
Installation Orientation Type : RCS4-RRA4/RRA6/RRA7/RRA8 .....	2-5
Installation surface .....	2-6
Installation of the Main Unit .....	2-7
Attachment of Transported Object .....	2-22
Precautions regarding the rod .....	2-23

## **Chapter 3 Connecting with the Controller**

3.1 Connecting with the Controller .....	3-1
--	-----

## **Chapter 4 Maintenance and Inspection**

4.1 Precautions for maintenance and inspection work .....	4-1
4.2 Inspection items and schedule .....	4-3
Radial Cylinder .....	4-3
Grease supply timing (Guideline) .....	4-3
4.3 Visual inspection items .....	4-4
External visual inspection .....	4-4
Internal visual inspection .....	4-5
4.4 Cleaning .....	4-7
External cleaning .....	4-7
Internal cleaning .....	4-7
4.5 Greasing method .....	4-8
Grease used .....	4-8
Greasing method .....	4-9
4.6 How to replace components .....	4-11
Belt replacement/adjustment .....	4-11
Motor replacement .....	4-21

**Chapter 5 External Dimensions**

- 5.1 External Dimensions ..... 5-1
  - RCS4-RRA4C ..... 5-1
  - RCS4-RRA6C ..... 5-2
  - RCS4-RRA7C ..... 5-3
  - RCS4-RRA8C ..... 5-4
  - RCS4-RRA4R ..... 5-5
  - RCS4-RRA6R ..... 5-6
  - RCS4-RRA7R ..... 5-7
  - RCS4-RRA8R ..... 5-8

**Chapter 6 Life**

- 6.1 Concept of life ..... 6-1

**Chapter 7 Warranty**

- 7.1 Warranty period ..... 7-1
- 7.2 Scope of the warranty ..... 7-1
- 7.3 Honoring the warranty ..... 7-1
- 7.4 Limited liability ..... 7-2
- 7.5 Conformance with applicable standards/regulations,etc.,  
and application conditions ..... 7-2
- 7.6 Other Items excluded from warranty ..... 7-2

**Chapter 8 Appendix**

- 8.1 Index ..... 8-1
- 8.2 Revision history ..... 8-3





## **Safety Guide**

The Safety Guide is intended to permit safe use of the product and thus to prevent risks and property damage. Be sure to read it before handling the product.

## Safety Precautions for Our Products

Common safety precautions for the use of robots in various operations are indicated here.

No.	Operation	Precautions
1	Model Selection	<ul style="list-style-type: none"> <li>● This product is not intended or designed for applications where high levels of safety are required, and so cannot guarantee that human lives will be protected. 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 or machinery designed for the purpose of moving or transporting people (vehicles, railway facilities, aviation facilities etc.)</li> <li>(3) Machinery components essential for safety (safety devices etc.)</li> </ol> </li> <li>● Do not use the product outside the range of the specifications. Otherwise, the product life may be drastically shortened, and product damage or facilities stoppage may occur.</li> <li>● Do not use it in any of the following environments.                             <ol style="list-style-type: none"> <li>(1) Locations with flammable gases, ignitable objects or explosives</li> <li>(2) Locations with potential exposure to radiation</li> <li>(3) Locations with ambient temperature or relative humidity exceeding the specifications range</li> <li>(4) Locations where radiant heat is applied by direct sunlight or other large heat source</li> <li>(5) Locations where condensation occurs due to abrupt temperature changes</li> <li>(6) Locations with corrosive gases (sulfuric acid, hydrochloric acid, etc.)</li> <li>(7) Locations exposed to significant amounts of dust, salt or iron powder</li> <li>(8) Locations 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 a model without brake is selected, the moving parts may fall when the power is turned OFF, causing accidents such as injury or workpiece damage.</li> </ul>

No.	Operation	Precautions
2	Transportation	<ul style="list-style-type: none"> <li>● When transporting heavy objects, do the work with two or more persons or utilize equipment such as a crane.</li> <li>● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety.</li> <li>● During transportation, carefully consider the carrying positions, weight, and weight balance, and be careful to avoid collisions or dropping.</li> <li>● Use appropriate transportation measures for transport. The actuators available for transportation with a crane have eyebolts attached or tapped holes to attach bolts. Follow the instructions in the instruction manual for each model.</li> <li>● Do not climb onto the package.</li> <li>● Do not put anything heavy that could deform the package on it.</li> <li>● When using a crane with capacity of 1t or more, have an operator qualified for crane operation and sling work.</li> <li>● When using a crane or equivalent equipment, make sure not to suspend loads exceeding the equipment's rated load.</li> <li>● Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. Also, check to make sure that the hook is free of damage.</li> <li>● Do not climb on loads suspended from cranes.</li> <li>● Do not leave loads suspended from cranes for long periods.</li> <li>● Do not stand under loads suspended from cranes.</li> </ul>
3	Storage and Preservation	<ul style="list-style-type: none"> <li>● For the storage and preservation environment, see the installation environment. However, give especial consideration to the prevention of condensation.</li> <li>● Store the products so as to prevent them from falling over or down in the case of natural disasters such as earthquakes.</li> </ul>

No.	Operation	Precautions
4	Installation and Startup	<p>(1) Installation of robot body and controller, etc.</p> <ul style="list-style-type: none"> <li>● Be sure to securely hold and fix the product (including the workpiece). If the product falls over, is dropped, or operates abnormally, it may lead to damage and injury. Also, be equipped for falls over or down due to natural disasters such as earthquakes.</li> <li>● Do not climb on or put anything on the product. Otherwise, this may lead to accidental falling, injury or damage to the product due to falling objects, product loss of function or performance degradation, or shortening of product life.</li> <li>● When using the product in any of the places specified below, provide sufficient shielding.               <ol style="list-style-type: none"> <li>(1) Locations where electrical noise is generated</li> <li>(2) Locations with strong electrical or magnetic fields</li> <li>(3) Locations with mains or power lines passing nearby</li> <li>(4) Locations where the product may come in contact with water, oil or chemical spray</li> </ol> </li> </ul> <p>(2) Cable wiring</p> <ul style="list-style-type: none"> <li>● Use IAI genuine cables for connecting the actuator and controller, and for the teaching tools.</li> <li>● Do not scratch cables, bend them forcibly, pull them, coil them, snag them, or place heavy objects on them. Otherwise, this may lead to fire, electric shock, or abnormal operation due to leakage or conduction malfunction.</li> <li>● Perform the wiring for the product after turning OFF the power to the unit, and avoid miswiring.</li> <li>● When wiring DC power (+24V), be careful with the positive/negative polarity. Incorrect connections may lead to fire, product breakdown or abnormal operation.</li> <li>● Connect the cable connector securely so that there is no disconnection or looseness. Otherwise, this may lead to fire, electric shock, or abnormal operation of the product.</li> <li>● Never cut or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Otherwise, this may lead to fire or abnormal operation of the product.</li> </ul> <p>(3) Grounding</p> <ul style="list-style-type: none"> <li>● Grounding must be performed, in order to prevent electric shocks or electrostatic charge, enhance noise-resistant performance and control 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, be sure to use a twisted pair cable with wire thickness 0.5mm<sup>2</sup> (AWG20 or equivalent) or more for grounding work. For safeguard grounding, it is necessary to select an appropriate wire diameter 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	Precautions
4	Installation and Startup	<p>(4) Safety measures</p> <ul style="list-style-type: none"> <li>● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety.</li> <li>● When the product is operating or in the ready mode, take safety measures (such as the installation of safety/protection fences) so that nobody can enter the area within the robot's movable range. Contact with an operating robot may lead to death or serious injury.</li> <li>● Be sure to install an emergency stop circuit so that the unit can be stopped immediately in an emergency during operation.</li> <li>● Take safety measures such that turning the power ON alone will not start up the unit. Otherwise, this may cause the product to start unexpectedly, leading to injury or product damage.</li> <li>● Take safety measures such that emergency stop cancel or recovery after power failure alone will not start up the unit. Otherwise, this may lead to injury or equipment damage.</li> <li>● When installation or adjustment operation is to be performed, display signs such as "Operating: No Power ON!" etc. Sudden power input may cause electric shock or injury.</li> <li>● Take measures to prevent workpieces, etc. from falling during power failures or emergency stop.</li> <li>● Wear protection gloves, goggles and safety shoes, as necessary, to secure safety.</li> <li>● Do not insert fingers or objects into the openings in the product. Otherwise, this may lead to injury, electric shock, product damage, or fire.</li> <li>● When releasing the brake on a vertically oriented actuator, be careful that it does not fall under its own weight, catching the operator's hand or damaging workpieces.</li> </ul>
5	Teaching	<ul style="list-style-type: none"> <li>● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety.</li> <li>● Perform teaching operation from outside the safety/protection fence, if possible. If operation must be performed within the safety/protection fence, prepare "Work Regulations" and make sure that all the workers acknowledge and understand them well.</li> <li>● When operation is to be performed inside the safety/protection fence, operators should have emergency stop switches available at hand so that the unit can be stopped at any time if abnormalities occur.</li> <li>● When operation is to be performed inside the safety/protection fence, have a monitor standing by in addition to the operator(s) so that the unit can be stopped at any time if abnormalities occur. Also, keep watch on the operation so that a third party cannot operate the switches carelessly.</li> <li>● Place a sign indicating "Operating" where it can be seen easily.</li> <li>● When releasing the brake on a vertically oriented actuator, be careful that it does not fall under its own weight, catching the operator's hand or damaging workpieces.</li> </ul> <p>* Safety/protection fence: If there is no safety/protection fence, the movable range should be indicated.</p>

No.	Operation	Precautions
6	Trial Operation	<ul style="list-style-type: none"> <li>● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety.</li> <li>● After teaching or programming, carry out trial operation step by step before switching to automatic operation.</li> <li>● When trial operation is to be performed inside the safety/protection fence, use the same work procedure, determined in advance, as teaching operation.</li> <li>● Be sure to confirm program operation at safe speeds. Otherwise, this may lead to accidents due to unexpected motion caused by program error, etc.</li> <li>● Do not touch the terminal block or any of the various setting switches while the equipment is live. Otherwise, this may lead to electric shock or abnormal operation.</li> </ul>
7	Automatic Operation	<ul style="list-style-type: none"> <li>● Check before starting automatic operation or restarting after operation stop that there is nobody within the safety/protection fence.</li> <li>● Before starting automatic operation, make sure that all peripheral equipment is ready for automatic operation and that there is no alarm indication.</li> <li>● Be sure to start automatic operation from outside the safety/protection fence.</li> <li>● If the product produces abnormal heat, smoke, odor, or noise, immediately stop it and turn OFF the power switch. Otherwise, this may lead to fire or damage to the product.</li> <li>● When a power failure occurs, turn OFF the power switch. Otherwise, this may lead to injury or product damage due to unexpected product motion during recovery from the power failure.</li> </ul>
8	Maintenance and Inspection	<ul style="list-style-type: none"> <li>● When working with two or more persons, make it clear who is to be in charge and communicate well with each other to ensure safety.</li> <li>● Perform the work outside the safety/protection fence, if possible. If operation must be performed within the safety/protection fence, prepare "Work Regulations" and make sure that all the workers acknowledge and understand them well.</li> <li>● When work is to be performed inside the safety/protection fence, turn OFF the power switch as a rule.</li> <li>● When operation is to be performed inside the safety/protection fence, operators should have emergency stop switches available at hand so that the unit can be stopped at any time if abnormalities occur.</li> <li>● When operation is to be performed inside the safety/protection fence, have a monitor standing by in addition to the operator(s) so that the unit can be stopped at any time if abnormalities occur. Also, keep watch on the operation so that a third party cannot operate the switches carelessly.</li> <li>● Place a sign indicating "Operating" where it can be seen easily.</li> <li>● For the grease for the guide or ball screw, use appropriate grease according to the Instruction Manual for each model.</li> <li>● Do not perform dielectric strength testing. Otherwise, this may lead to damage to the product.</li> </ul>

No.	Operation	Precautions
8	Maintenance and Inspection	<ul style="list-style-type: none"> <li>● When releasing the brake on a vertically oriented actuator, be careful that it does not fall under its own weight, catching the operator's hand or damaging workpieces.</li> <li>● The slider or rod may be misaligned from the stop position if the servo is turned OFF. Avoid injury or damage due to unnecessary operation.</li> <li>● Be careful not to lose the cover or any removed screws, and be sure to return the product to the original condition after maintenance and inspection work. Otherwise, this may lead to product damage or injury due to incomplete mounting.</li> </ul> <p>* Safety/protection fence: If there is no safety/protection fence, the movable range should be indicated.</p>
9	Modification and Disassembly	<ul style="list-style-type: none"> <li>● Do not modify, disassemble/assemble, or use maintenance parts not specified on your own discretion.</li> </ul>
10	Disposal	<ul style="list-style-type: none"> <li>● When the product exceeds its useful life or is no longer needed, dispose of it properly as industrial waste.</li> <li>● When removing the actuator for disposal, avoid dropping components when detaching screws.</li> <li>● Do not put the product in a fire when disposing of it. The product may rupture or generate toxic gases.</li> </ul>
11	Other	<ul style="list-style-type: none"> <li>● If you are equipped with a medical device such as a pacemaker, do not approach the product or its wiring, as the device may be affected.</li> <li>● See the Overseas Specifications Compliance Manual to check compliance with overseas standards if necessary.</li> <li>● For the handling of actuators and controllers, follow the dedicated instruction manual of each unit to ensure safety.</li> </ul>

## Precaution Indications

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

Level	Degree of risk to persons and property	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	 <span style="font-size: 1.2em; vertical-align: middle;">Danger</span>
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could result in death or serious injury.	 <span style="font-size: 1.2em; vertical-align: middle;">Warning</span>
Caution	This indicates a potentially hazardous situation which, if the product is not handled correctly, may result in minor injury or property damage.	 <span style="font-size: 1.2em; vertical-align: middle;">Caution</span>
Notice	This indicates a situation in which, while injury is not a likely result, the precautions should be observed in order to use the product appropriately.	 <span style="font-size: 1.2em; vertical-align: middle;">Notice</span>



## Precautions for Handling

1. The Safety Guide attached with the product is intended to permit safe use of the product and thus to prevent risks and property damage. Be sure to read it before handling the product.
2. Do not attempt any handling or operation that is not indicated in this instruction manual.
3. Make sure to secure the actuator properly in accordance with this instruction manual.

If the actuator is not securely fixed, this may lead to abnormal noise, vibration, breakdown or shortened product life.

4. Make sure to observe the usage conditions and environment of the product.

Operation outside the warranty could cause decreased performance or product breakdown.

Use within the allowable range for each item.

Item	Cautions for use	Problems or breakdowns which may occur if the allowable range is exceeded
Speed and acceleration/deceleration	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life.
Rod Tip Dynamic Allowable Load	Use within the allowable range	May lead to abnormal noise, vibration, breakdown, or shortened product life. In extreme cases, flaking may occur on the guide or ball screw.
Load offset distance		Mounting a load with an overhang length greater than the allowable values may lead to vibration or abnormal noise.

5. If return operations are continued over a short distance, they may rapidly degrade the film of grease.

Continuous return operation within a distance less than 30mm may cause the grease film to degrade rapidly.

As a guideline, in every 5,000 to 10,000 cycles, have approximately 5 cycles of return operation over a 50mm distance or more to regenerate the oil film. Continued use of the actuator in that state may lead to breakdown.

In extreme cases, flaking may occur on the guide or ball screw.

6. Do not attempt to have rods collide with an obstacle at high speed.

This may damage the coupling or other mechanical parts.

7. Grease has been applied to the outer periphery of the rod for the rod type. Protect the peripheral equipment if grease adhesion negatively affects them.

8. In some conditions of environment of use, postures of installation and conditions of operation, the base oil separated from the grease may come out of ROBO Cylinder.

It is recommended to have a protection in case the peripheral devices could get influence of the base oil.

## International Standard Compliance

The ROBO Cylinder complies with the following overseas standards.

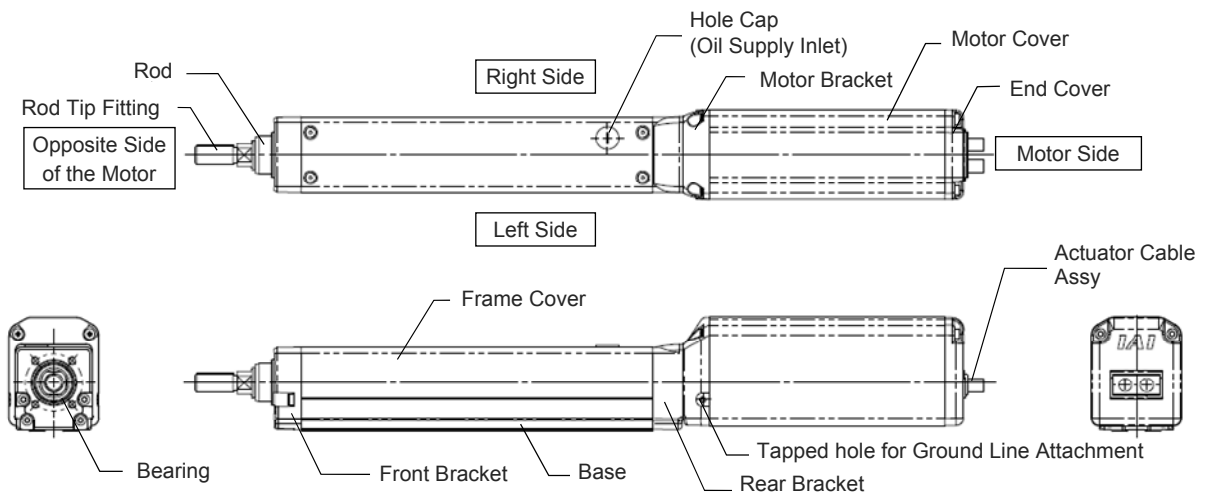
Refer to the Overseas Standard Compliance Manual (ME0287) for more detailed information.

CE Marking	RoHS Directive
○	○

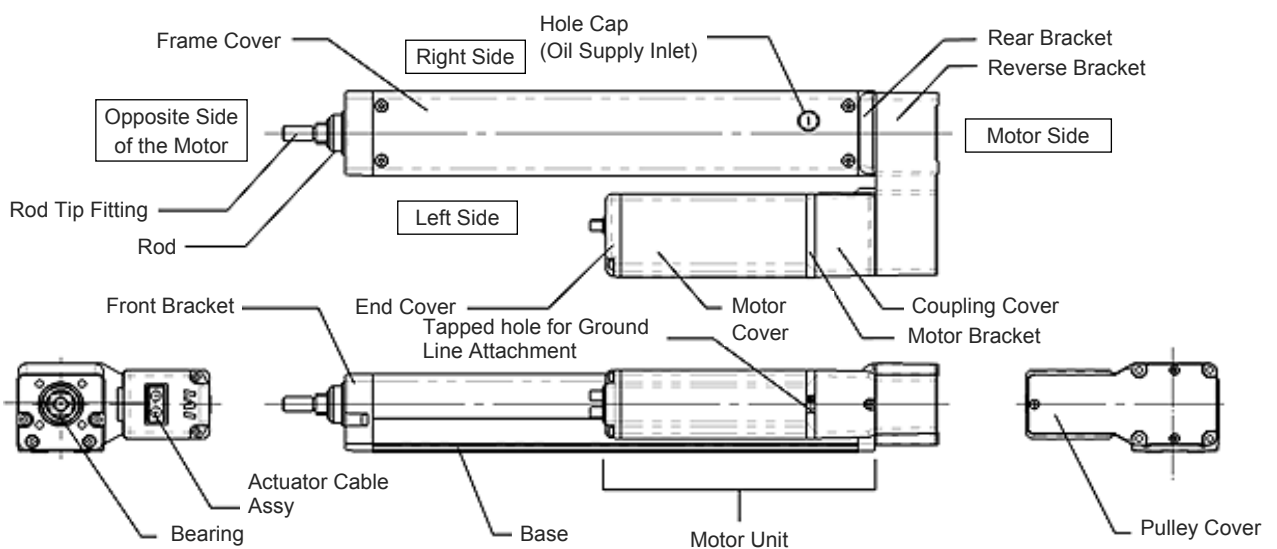
## Names of the Parts

In this manual, the actuator left/right sides and motor/opposite sides are shown as in the figure below.

### Standard Type



### Motor Reversed Type





# ROBO Cylinder

# Chapter 1






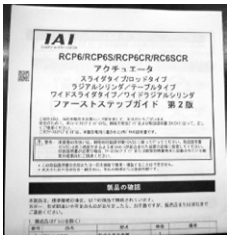


## Specifications

1.1 Checking the product	1-1
Components	1-1
How to Read the Model Nameplate	1-2
How to Read the Model Number	1-2
Product list	1-3
1.2 Specifications	1-4
Specifications	1-4
Duty ratio	1-46
1.3 Options	1-48
With brake (Model Code: B)	1-48
Cable Eject Direction Changed (Model Code: CJT, CJR, CJL, CJB and CJO)	1-48
Motor Reversed Direction (Model Code: ML, MR)	1-48
Home reverse specification (Model Code: NM)	1-48
Rear Attachment Plate (Model Code: RP)	1-48
Tip Adapter Flange (Model Code: FFA)	1-49
Tip Adapter Internal Thread (Model Code: NFA)	1-49
Tip adapter (Keyway) (Model Code: KFA)	1-50
Flange (Model Code: FL)	1-50
1.4 Accessories	1-51
Motor Cable	1-51
Encoder Cables	1-52

# 1.1 Checking the product

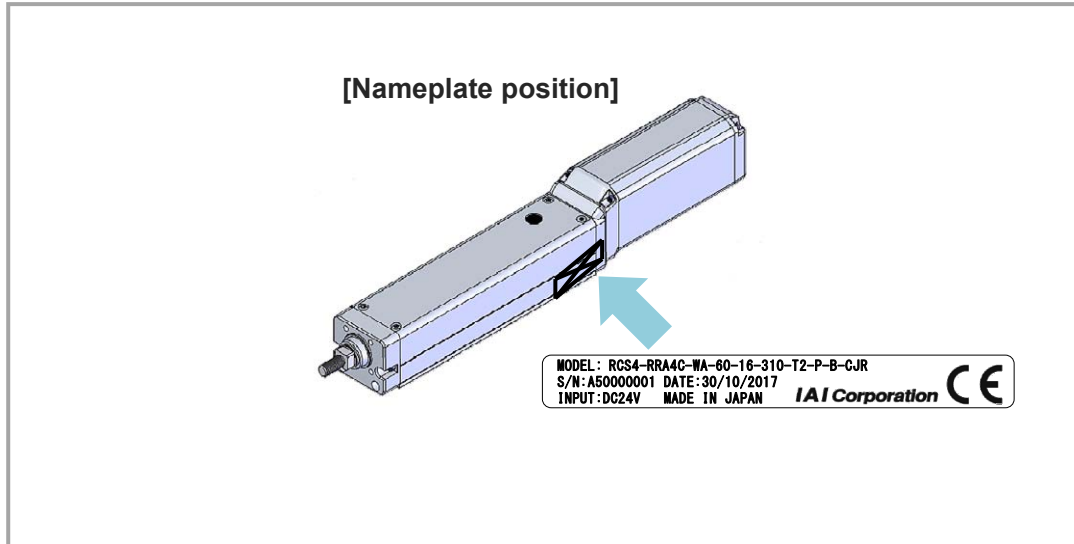
## Components

The following table shows the product configuration for the standard specification. See the packing list for the details of the enclosed components. In the unlikely case that any model number errors or missing parts come to light, contact your local IAI distributor.

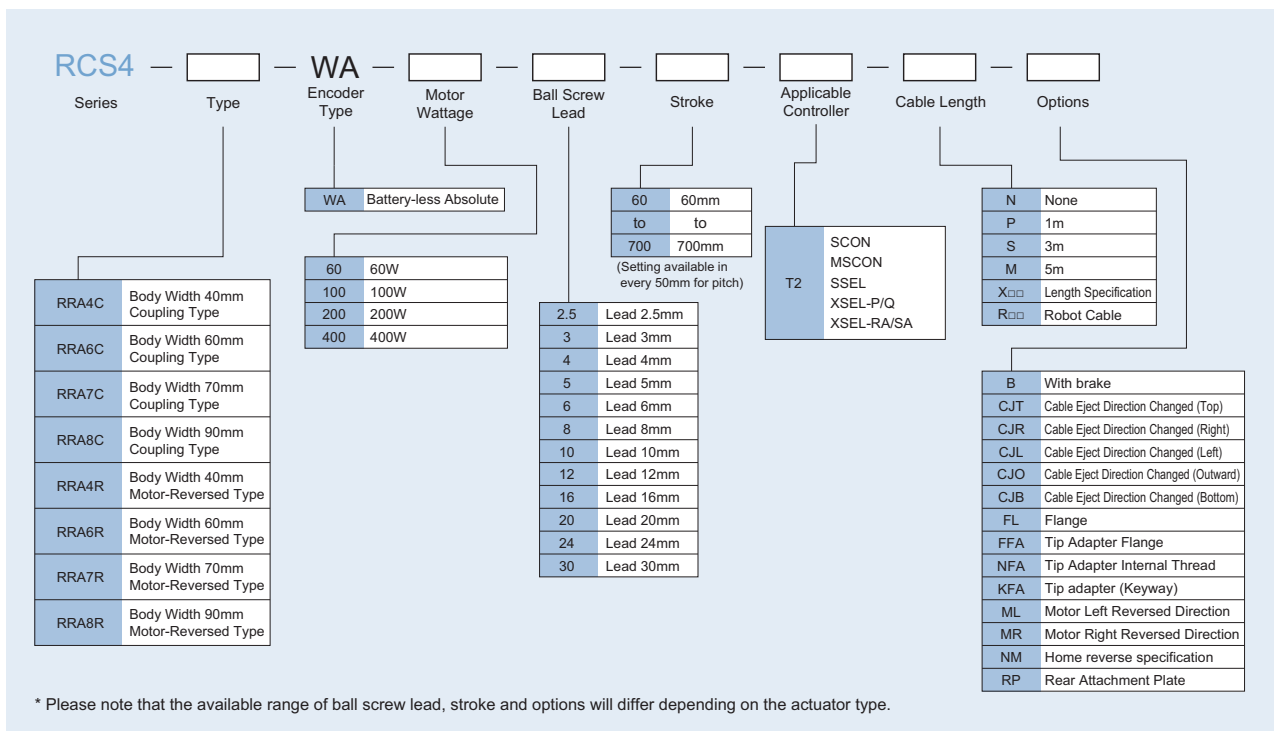
Body	Accessories	
<p><u>Actuator Quantity: 1</u></p> 	<p><u>Motor Cable Quantity: 1</u></p> 	<p><u>Encoder Cable Quantity: 1</u></p> 
Accessories		
<p><u>Cross Recessed Pan Head Screw with Captive Washer M3 x 6 Quantity: 2</u></p> <p>For affixing ground cable</p> 	<p><u>Cable Band Quantity: 2</u></p> <p>For clamping connector cover</p>  <p>* Refer to International Application Manual (ME0287) for how to use it.</p>	
Accessories (Documents/DVD)		
<p><u>First Start Guide Quantity: 1</u></p> 	<p><u>Safety Guide Quantity: 1</u></p> 	<p><u>Instruction Manual DVD Quantity: 1</u></p> 

## How to Read the Model Nameplate

Model → MODEL: RCS4-RRA4C-WA-60-16-310-T2-P-B-CJR  
 Serial number → S/N: A50000001 DATE: 30/10/2017  
 INPUT: DC24V MADE IN JAPAN IAI Corporation CE











## How to Read the Model Number



## 1.1 Checking the product

### Product list

#### 1. Specifications

Category	Type	Appearance	Body Width (mm)	Motor Wattage (W)	Lead (mm)	Positioning Repeatability (mm)	Stroke (mm)	Max. Speed (mm/s)	Rated Thrust (N)	Max. Payload (kg)	
										Horizontal	Vertical
Motor Straight Type	RRA4C		 40mm	60	16	±0.01	60 to 410 (Every 50 st)	960	53	8	2
					10			600	85	18	4
					5			300	170	30	6
					2.5			150	340	40	10
	RRA6C		 60mm	100	20	±0.01	65 to 415 (Every 50 st)	1200	85	15	4
					12			720	142	25	10
					6			360	283	50	20
					3			180	566	60	20
	RRA7C		 70mm	200	24	±0.01	70 to 520 (Every 50 st)	1440	142	20	6
					16			960	214	45	12
					8			480	427	60	25
					4			240	855	80	35
RRA8C		 90mm	400	30	±0.01	50 to 700 (Every 50 st)	1500	226	30	8	
				20			1100	339	60	20	
				10			550	678	80	40	
				5			275	1357	100	72	
Motor Reversing Type	RRA4R		 40mm	60	16	±0.01	60 to 410 (Every 50 st)	960	53	8	2
					10			600	85	18	4
					5			300	170	30	6
					2.5			150	340	40	10
	RRA6R		 60mm	100	20	±0.01	65 to 415 (Every 50 st)	1200	85	15	4
					12			720	142	25	9
					6			360	283	50	19
					3			180	566	60	20
	RRA7R		 70mm	200	24	±0.01	70 to 520 (Every 50 st)	1440	142	20	6
					16			960	214	45	12
					8			480	427	60	25
					4			240	855	80	35
RRA8R		 90mm	400	30	±0.01	50 to 700 (Every 50 st)	1300	226	30	8	
				20			1000	339	60	17	
				10			550	678	80	34	
				5			275	1357	100	72	



## 1.2 Specifications

### Specifications

#### [1] RCS4-RRA4C

##### [Lead and Payload]

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
16	8	2	53
10	18	4	85
5	30	6	170
2.5	40	10	340

##### [Stroke and Max. Speed]

Unit: mm/s

Lead (mm)	60 to 410 (Every 50mm)
16	960
10	600
5	300
2.5	150



#### Caution

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.  

$$\text{Minimum speed [mm/s]} = \text{ball screw lead [mm/r]} \div 16384 \text{ [p/r]} \times 1000 \text{ [1/s]}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

**[Payload by Acceleration]**

At low load capacity, the acceleration/deceleration can be increased.

Lead 16

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
8	8	6	5	4	2	2	2	2	1

Lead 10

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
18	15	12	12	8	4	4	4	4	3

Lead 5

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
30	30	25	20	-	6	6	6	6	-

Lead 2.5

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
40	40	35	-	-	10	10	10	-	-



**Caution**

Do not attempt to configure settings for acceleration/deceleration above the specifications.

This may lead to vibration, breakdown, or shortened product life.

**[Actuator Specifications]**

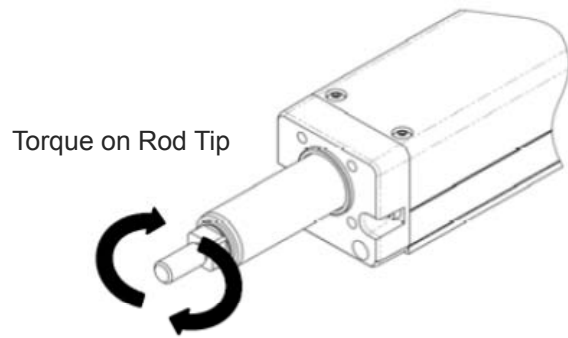
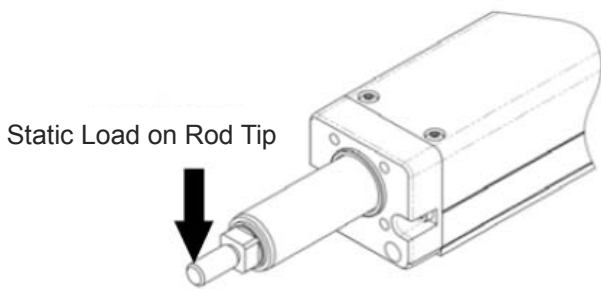
Item	Content
Drive system	Ball screw $\phi 8\text{mm}$ , rolled C10
Positioning repeatability	$\pm 0.01\text{mm}$
Lost motion	0.1mm or less
Rod	$\phi 20\text{mm}$ Aluminum
Rod Non-Rotation Accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip] <sup>(note 1)</sup>
Rod tip overhang distance	100mm or less
No. of Encoder Pulses	16384
Ambient operating temperature/humidity	0 to 40°C, 85%RH or less (Non-condensing)

(\*) It shows the displacement angle in the rod rotational direction at no load.

Note 1 [Rod End Load] is described in graphs for all the types after the performance of each type.

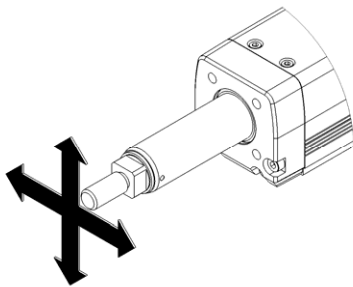
**[Allowable load and torque on rod tip]**

Item		Stroke	60	110	160	210	260	310	360	410
Rod Tip Static Allowable Load	[N]		63.4	50.7	42.1	36.0	31.3	27.6	24.6	22.2
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Load Offset Distance 0mm	28.9	22.2	17.9	14.8	12.6	10.8	9.4	8.2
	[N]	Load Offset Distance 100mm	17.9	15.5	13.4	11.6	10.2	9.0	8.0	7.1
Rod Tip Static Allowable Torque	[N•m]		6.4	5.1	4.3	3.7	3.2	2.9	2.6	2.3
Rod Tip Dynamic Allowable Torque	[N•m]		1.7	1.5	1.3	1.1	1.0	0.9	0.7	0.7

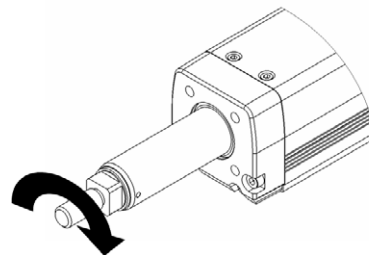


**Caution**

Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.

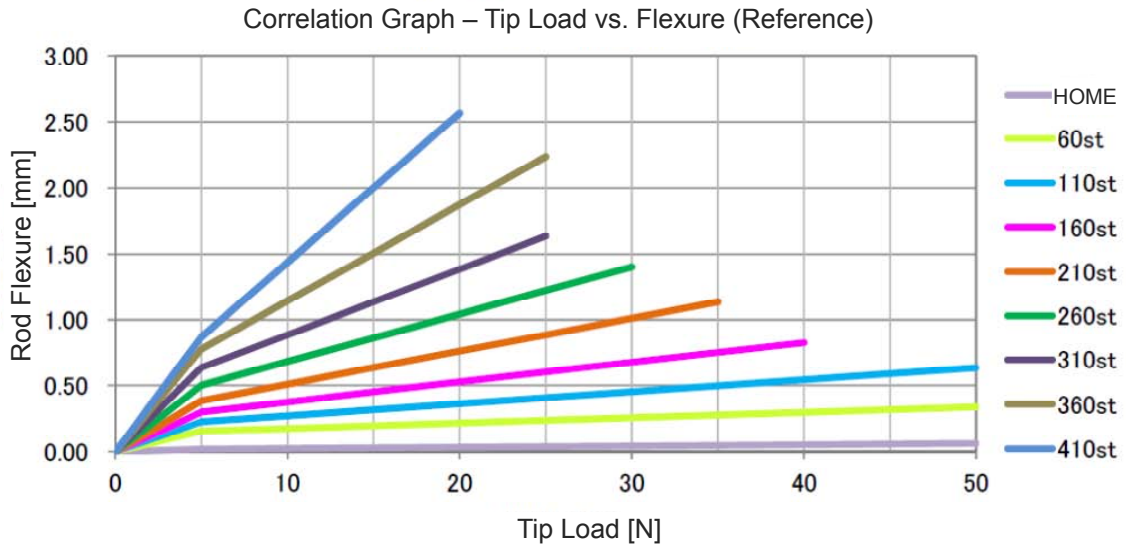


Should be below allowable load  
Do not attempt to apply impact load



Should be below allowable torque

[Rod Flexure (Reference)]



**[2] RCS4-RAA6C****[Lead and Payload]**

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
20	15	4	85
12	25	10	142
6	50	20	283
3	60	20	566

**[Stroke and Max. Speed]**

Unit: mm/s

Lead (mm)	65 to 415 (Every 50mm)
20	1200
12	720
6	360
3	180

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.  

$$\text{Minimum speed [mm/s]} = \text{ball screw lead [mm/r]} \div 16384 \text{ [p/r]} \times 1000 \text{ [1/s]}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

**[Payload by Acceleration]**

At low load capacity, the acceleration/deceleration can be increased.

**Lead 20**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
15	10	8	6	4	4	4	3	3	2

**Lead 12**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
20	20	20	12	12	10	8	8	6	6

**Lead 6**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
50	45	30	25	-	20	15	12	12	-

**Lead 3**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
60	50	40	-	-	20	20	20	-	-

**Caution**

Do not attempt to configure settings for acceleration/deceleration above the specifications.

This may lead to vibration, breakdown, or shortened product life.

**[Actuator Specifications]**

Item	Content
Drive system	Ball screw $\phi$ 10mm, rolled C10
Positioning repeatability	$\pm$ 0.01mm
Lost motion	0.1mm or less
Rod	$\phi$ 25mm Aluminum
Rod Non-Rotation Accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip] <sup>(note 1)</sup>
Rod tip overhang distance	100mm or less
No. of Encoder Pulses	16384
Ambient operating temperature/humidity	0 to 40°C, 85%RH or less (Non-condensing)

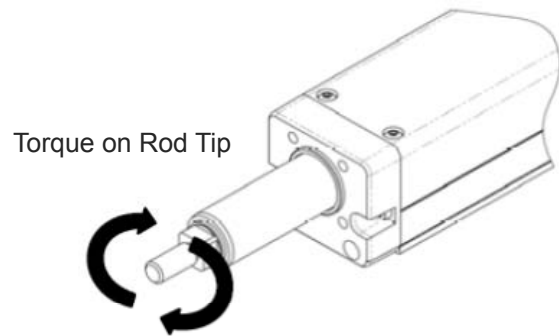
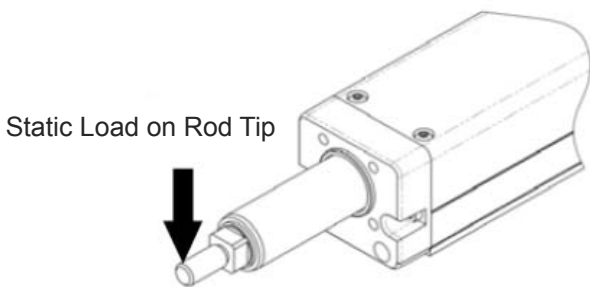
(\*) It shows the displacement angle in the rod rotational direction at no load.

Note 1 [Rod End Load] is described in graphs for all the types after the performance of each type.



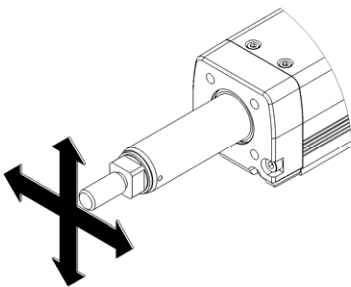
**[Allowable load and torque on rod tip]**

Item		Stroke	65	115	165	215	265	315	365	415
Rod Tip Static Allowable Load	[N]		144	117	99	85.4	75	66.7	59.9	54.3
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Load Offset Distance 0mm	58.1	46.4	38.3	32.4	27.9	24.4	21.5	19.2
	[N]	Load Offset Distance 100mm	38.8	34.0	29.7	26.2	23.2	20.8	18.7	16.8
Rod Tip Static Allowable Torque	[N•m]		14.5	11.8	10.0	8.7	7.6	6.8	6.2	5.6
Rod Tip Dynamic Allowable Torque	[N•m]		3.8	3.3	2.9	2.6	2.3	2.0	1.8	1.6

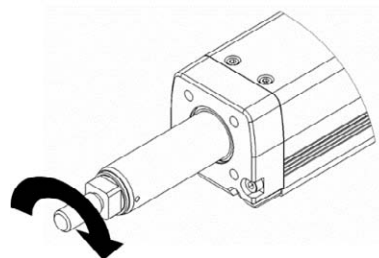


**Caution**

Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.

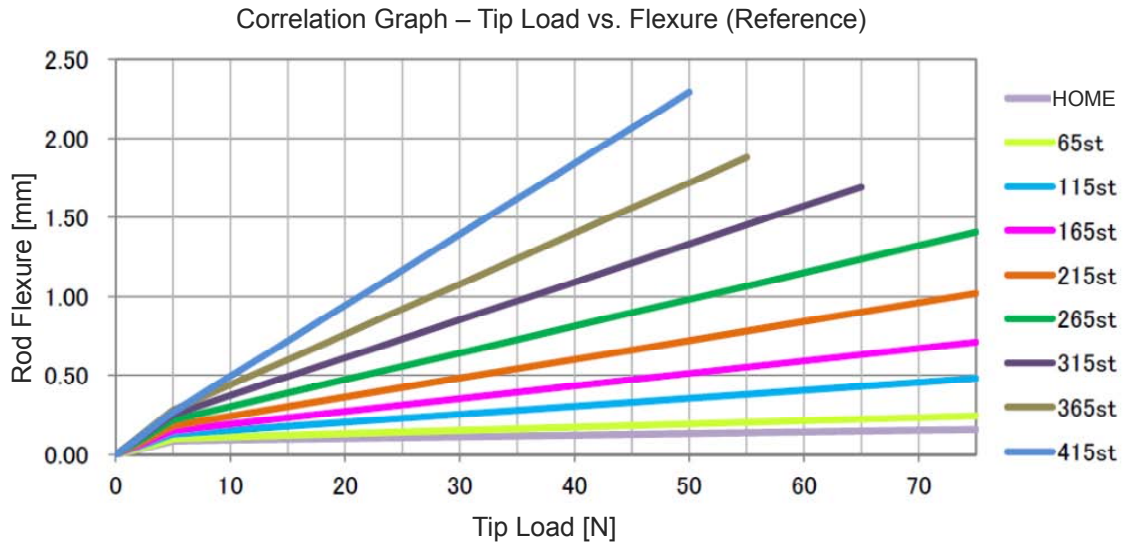


Should be below allowable load  
Do not attempt to apply impact load



Should be below allowable torque

[Rod Flexure (Reference)]



**[3] RCS4-RR47C****[Lead and Payload]**

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
24	20	6	142
16	45	12	214
8	60	25	427
4	80	35	855

**[Stroke and Max. Speed]**

Unit: mm/s

Lead (mm)	70 to 520 (Every 50mm)
24	1440
16	960
8	480
4	240

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.  

$$\text{Minimum speed [mm/s]} = \text{ball screw lead [mm/r]} \div 16384 \text{ [p/r]} \times 1000 \text{ [1/s]}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

**[Payload by Acceleration]**

At low load capacity, the acceleration/deceleration can be increased.

**Lead 24**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
20	15	10	10	8	6	6	6	4	4

**Lead 16**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
45	30	25	20	15	12	12	10	8	8

**Lead 8**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
60	50	40	40	-	25	25	20	20	-

**Lead 4**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
80	70	60	-	-	35	35	30	-	-



**Caution**

Do not attempt to configure settings for acceleration/deceleration above the specifications.

This may lead to vibration, breakdown, or shortened product life.

**[Actuator Specifications]**

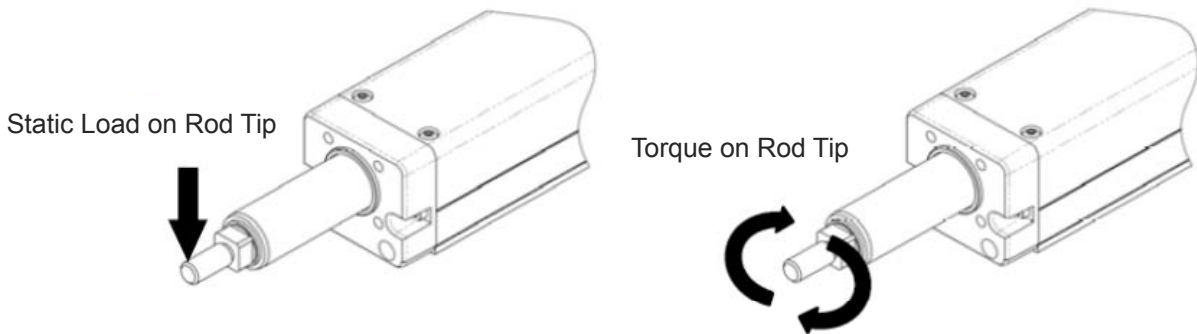
Item	Content
Drive system	Ball screw $\phi$ 12mm, rolled C10
Positioning repeatability	$\pm$ 0.01mm
Lost motion	0.1mm or less
Rod	$\phi$ 30mm Aluminum
Rod Non-Rotation Accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip] <sup>(note 1)</sup>
Rod tip overhang distance	150mm or less
No. of Encoder Pulses	16384
Ambient operating temperature/humidity	0 to 40°C, 85%RH or less (Non-condensing)

(\*) It shows the displacement angle in the rod rotational direction at no load.

Note 1 [Rod End Load] is described in graphs for all the types after the performance of each type.

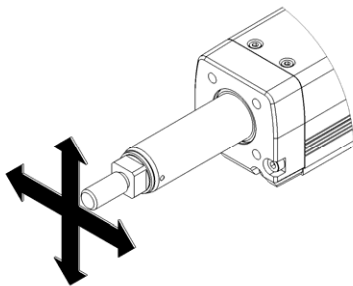
**[Allowable load and torque on rod tip]**

Item		Stroke	70	120	170	220	270	320	370	420	470	520
Rod Tip Static Allowable Load	[N]		175	147	126	111	98.6	88.7	80.6	73.8	68	63
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Load Offset Distance 0mm	75.7	62.6	53.1	46.0	40.5	36.1	32.5	29.4	26.9	24.7
	[N]	Load Offset Distance 100mm	49.8	45.1	40.5	36.5	33.1	30.2	27.7	25.5	23.6	21.9
Rod Tip Static Allowable Torque	[N•m]		17.6	14.7	12.7	11.2	9.9	9.0	8.2	7.5	6.94	6.45
Rod Tip Dynamic Allowable Torque	[N•m]		5.0	4.5	4.0	3.6	3.3	3.0	2.8	2.5	2.32	2.16

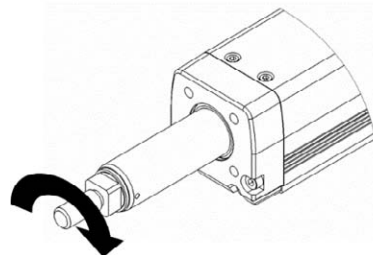


**Caution**

Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.

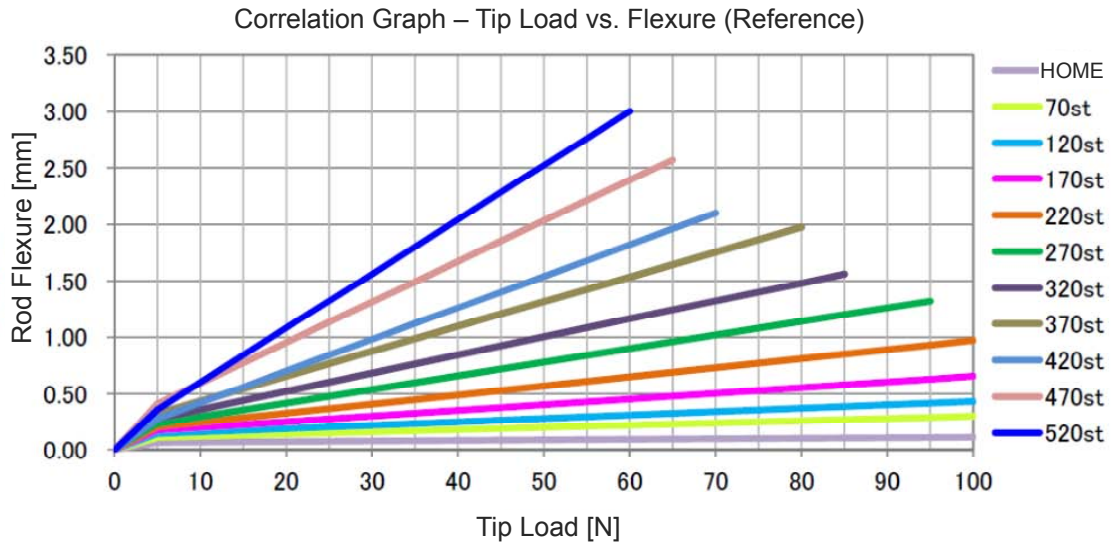


Should be below allowable load  
Do not attempt to apply impact load



Should be below allowable torque

[Rod Flexure (Reference)]



**[4] RCS4-RRA8C****[Lead and Payload]**

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
30	30	8	226
20	60	20	339
10	80	40	678
5	100	72	1357

**[Stroke and Max. Speed]**

Unit: mm/s

Lead (mm)	50 to 250 (Every 50mm)	300 (mm)	350 (mm)	400 (mm)	450 (mm)	500 (mm)	550 (mm)	600 (mm)	650 (mm)	700 (mm)
30	1500		1230	970	790	650	540	460	400	350
20	1100	1070	820	650	520	430	360	310	260	230
10	550	520	400	310	250	210	180	150	130	110
5	275	250	190	150	120	100	80	70	60	55

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.  

$$\text{Minimum speed [mm/s]} = \text{ball screw lead [mm/r]} \div 16384 \text{ [p/r]} \times 1000 \text{ [1/s]}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)



**[Payload by Acceleration]**

At low load capacity, the acceleration/deceleration can be increased.

**Lead 30**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
30	20	15	10	8	8	8	8	6	6

**Lead 20**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
60	40	25	20	15	20	20	15	12	12

**Lead 10**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
80	80	70	60	-	40	30	30	20	-

**Lead 5**

Horizontal					Vertical				
0.2	0.3	0.5	0.7	1.0	0.2	0.3	0.5	0.7	1.0
100	100	80	80	-	72	50	40	25	-

**Caution**

Do not attempt to configure settings for acceleration/deceleration above the specifications.

This may lead to vibration, breakdown, or shortened product life.

**[Actuator Specifications]**

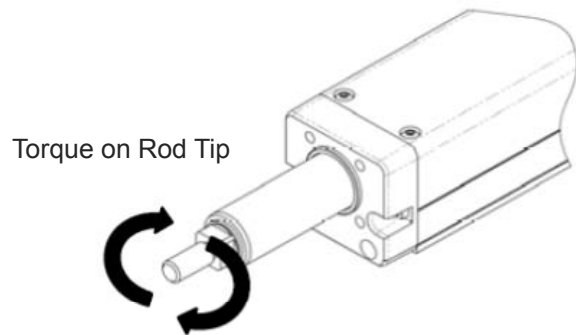
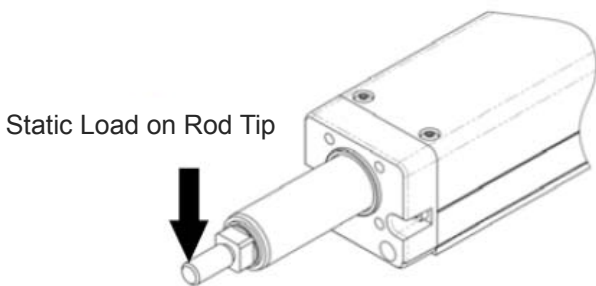
Item	Content
Drive system	Ball screw $\phi$ 16mm, rolled C10
Positioning repeatability	$\pm$ 0.01mm
Lost motion	0.1mm or less
Rod	$\phi$ 40mm Aluminum
Rod Non-Rotation Accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip] <sup>(note 1)</sup>
Rod tip overhang distance	150mm or less
No. of Encoder Pulses	16384
Ambient operating temperature/humidity	0 to 40°C, 85%RH or less (Non-condensing)

(\*) It shows the displacement angle in the rod rotational direction at no load.

Note 1 [Rod End Load] is described in graphs for all the types after the performance of each type.

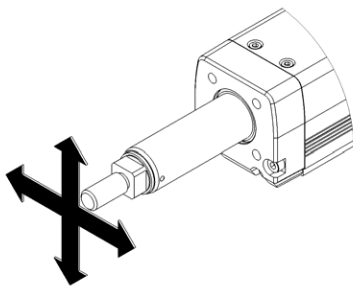
**[Allowable load and torque on rod tip]**

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700
Rod Tip Static Allowable Load	[N]		222	186	159	139	124	111	101	92.1	84.7	78.4	72.8	68.0	63.7	59.8
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Load Offset Distance 0mm	93.0	76.3	64.7	56.0	49.2	43.8	39.3	35.6	32.4	29.7	27.3	25.2	23.3	21.7
	[N]	Load Offset Distance 100mm	72.0	61.6	53.9	48.0	43.0	38.9	35.4	32.3	29.7	27.4	25.3	23.5	21.9	20.4
Rod Tip Static Allowable Torque	[N•m]		22.3	18.7	16.1	14.1	12.6	11.3	10.3	9.4	8.7	8.1	7.6	7.1	6.7	6.3
Rod Tip Dynamic Allowable Torque	[N•m]		7.2	6.2	5.4	4.8	4.3	3.9	3.5	3.2	3.0	2.7	2.5	2.4	2.2	2.0

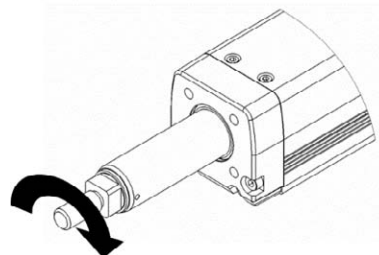


**Caution**

Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.

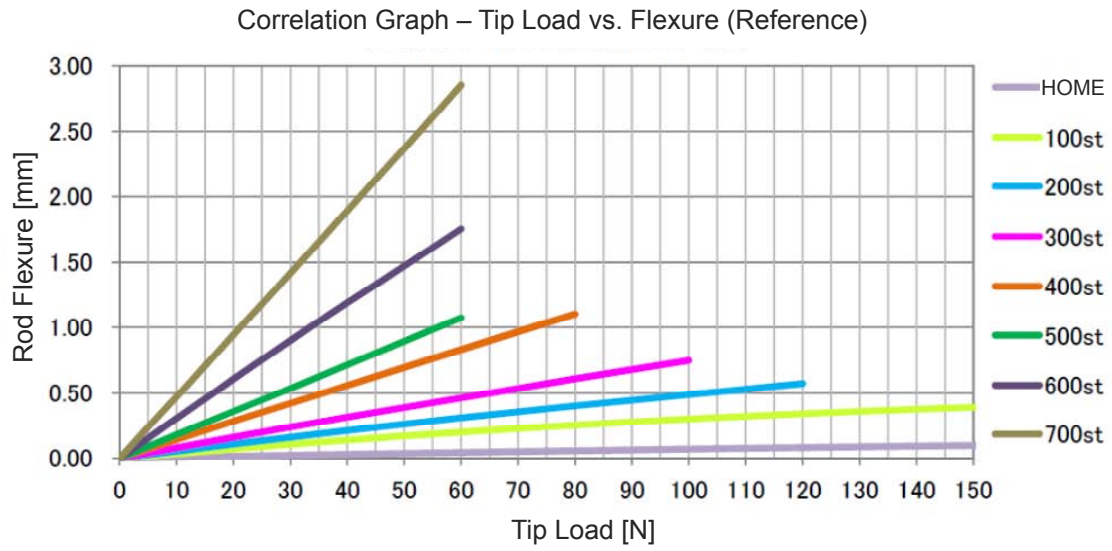


Should be below allowable load  
Do not attempt to apply impact load



Should be below allowable torque

[Rod Flexure (Reference)]



**[5] RCS4-RRA4R****[Lead and Payload]**

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
16	8	2	53
10	18	4	85
5	30	6	170
2.5	40	10	340

**[Stroke and Max. Speed]**

Unit: mm/s

Lead (mm)	60 to 410 (Every 50mm)
16	960
10	600
5	300
2.5	150

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.  

$$\text{Minimum speed [mm/s]} = \text{ball screw lead [mm/r]} \div 16384 \text{ [p/r]} \times 1000 \text{ [1/s]}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

**[Payload by Acceleration]**

At low load capacity, the acceleration/deceleration can be increased.

Lead 16

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
8	8	6	5	-	2	2	2	2	-

Lead 10

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
18	15	12	12	-	4	4	4	4	-

Lead 5

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
30	30	25	20	-	6	6	6	6	-

Lead 2.5

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
40	40	35	-	-	10	10	10	-	-



**Caution**

Do not attempt to configure settings for acceleration/deceleration above the specifications.

This may lead to vibration, breakdown, or shortened product life.

**[Actuator Specifications]**

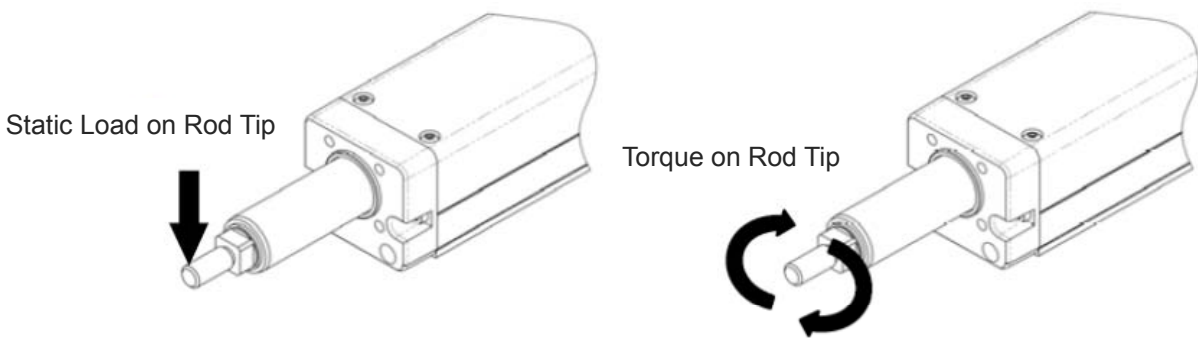
Item	Content
Drive system	Ball screw $\phi 8\text{mm}$ , rolled C10
Positioning repeatability	$\pm 0.01\text{mm}$
Lost motion	0.1mm or less
Rod	$\phi 20\text{mm}$ Aluminum
Rod Non-Rotation Accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip] <sup>(note 1)</sup>
Rod tip overhang distance	100mm or less
No. of Encoder Pulses	16384
Ambient operating temperature/humidity	0 to 40°C, 85%RH or less (Non-condensing)

(\*) It shows the displacement angle in the rod rotational direction at no load.

Note 1 [Rod End Load] is described in graphs for all the types after the performance of each type.

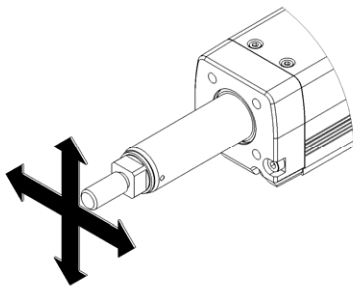
**[Allowable load and torque on rod tip]**

Item		Stroke	60	110	160	210	260	310	360	410
Rod Tip Static Allowable Load	[N]		63.4	50.7	42.1	36.0	31.3	27.6	24.6	22.2
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Load Offset Distance 0mm	28.9	22.2	17.9	14.8	12.6	10.8	9.4	8.2
	[N]	Load Offset Distance 100mm	17.9	15.5	13.4	11.6	10.2	9.0	8.0	7.1
Rod Tip Static Allowable Torque	[N•m]		6.4	5.1	4.3	3.7	3.2	2.9	2.6	2.3
Rod Tip Dynamic Allowable Torque	[N•m]		1.7	1.5	1.3	1.1	1.0	0.9	0.7	0.7

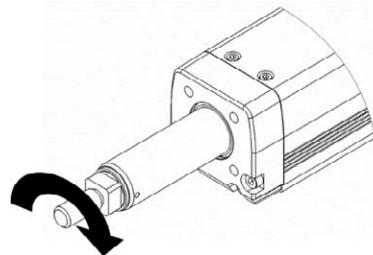


**Caution**

Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.



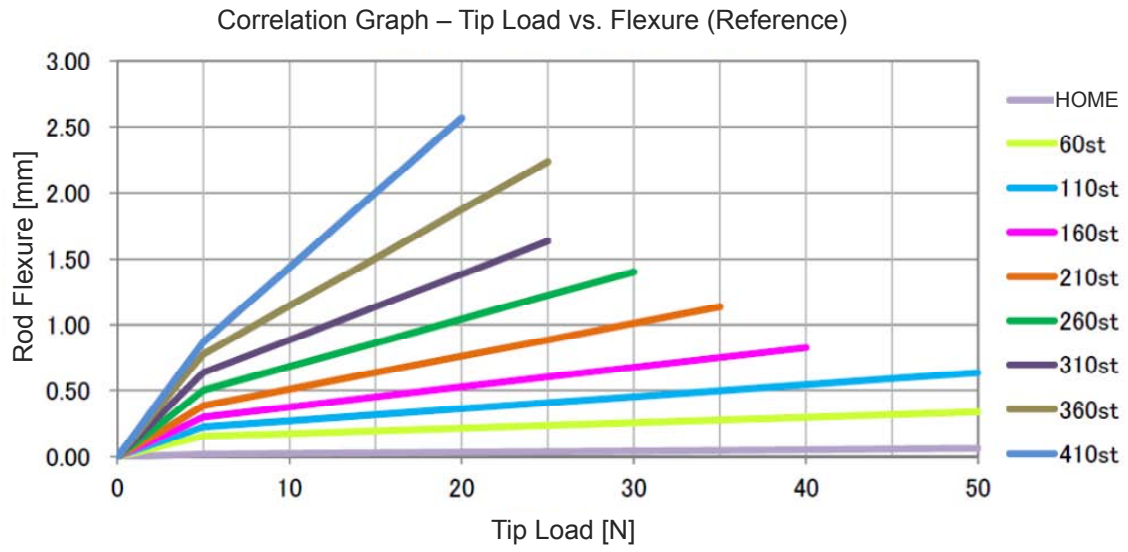
Should be below allowable load  
Do not attempt to apply impact load



Should be below allowable torque



[Rod Flexure (Reference)]



**[6] RCS4-RRA6R****[Lead and Payload]**

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
20	15	4	85
12	25	9	142
6	50	19	283
3	60	20	566

**[Stroke and Max. Speed]**

Unit: mm/s

Lead (mm)	65 to 415 (Every 50mm)
20	1200
12	720
6	360
3	180

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.  

$$\text{Minimum speed [mm/s]} = \text{ball screw lead [mm/r]} \div 16384 \text{ [p/r]} \times 1000 \text{ [1/s]}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

**[Payload by Acceleration]**

At low load capacity, the acceleration/deceleration can be increased.

**Lead 20**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
15	10	8	6	-	4	4	3	3	-

**Lead 12**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
20	20	20	12	-	9	8	8	6	-

**Lead 6**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
50	45	30	25	-	19	15	12	12	-

**Lead 3**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
60	50	40	-	-	20	20	20	-	-

**Caution**

Do not attempt to configure settings for acceleration/deceleration above the specifications.

This may lead to vibration, breakdown, or shortened product life.

**[Actuator Specifications]**

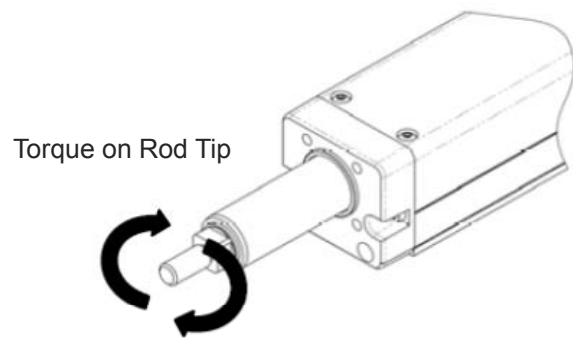
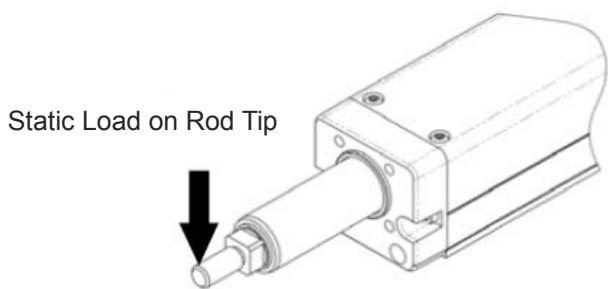
Item	Content
Drive system	Ball screw $\phi$ 10mm, rolled C10
Positioning repeatability	$\pm$ 0.01mm
Lost motion	0.1mm or less
Rod	$\phi$ 25mm Aluminum
Rod Non-Rotation Accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip] <sup>(note 1)</sup>
Rod tip overhang distance	100mm or less
No. of Encoder Pulses	16384
Ambient operating temperature/humidity	0 to 40°C, 85%RH or less (Non-condensing)

(\*) It shows the displacement angle in the rod rotational direction at no load.

Note 1 [Rod End Load] is described in graphs for all the types after the performance of each type.

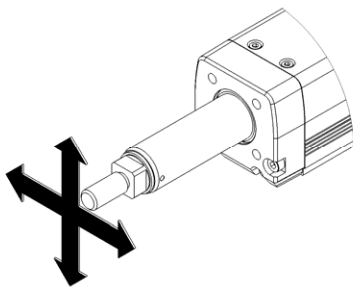
**[Allowable load and torque on rod tip]**

Item		Stroke	65	115	165	215	265	315	365	415
Rod Tip Static Allowable Load	[N]		144	117	99	85.4	75	66.7	59.9	54.3
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Load Offset Distance 0mm	58.1	46.4	38.3	32.4	27.9	24.4	21.5	19.2
	[N]	Load Offset Distance 100mm	38.8	34.0	29.7	26.2	23.2	20.8	18.7	16.8
Rod Tip Static Allowable Torque	[N•m]		14.5	11.8	10.0	8.7	7.6	6.8	6.2	5.6
Rod Tip Dynamic Allowable Torque	[N•m]		3.8	3.3	2.9	2.6	2.3	2.0	1.8	1.6

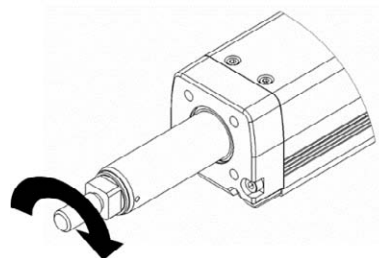


**Caution**

Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.

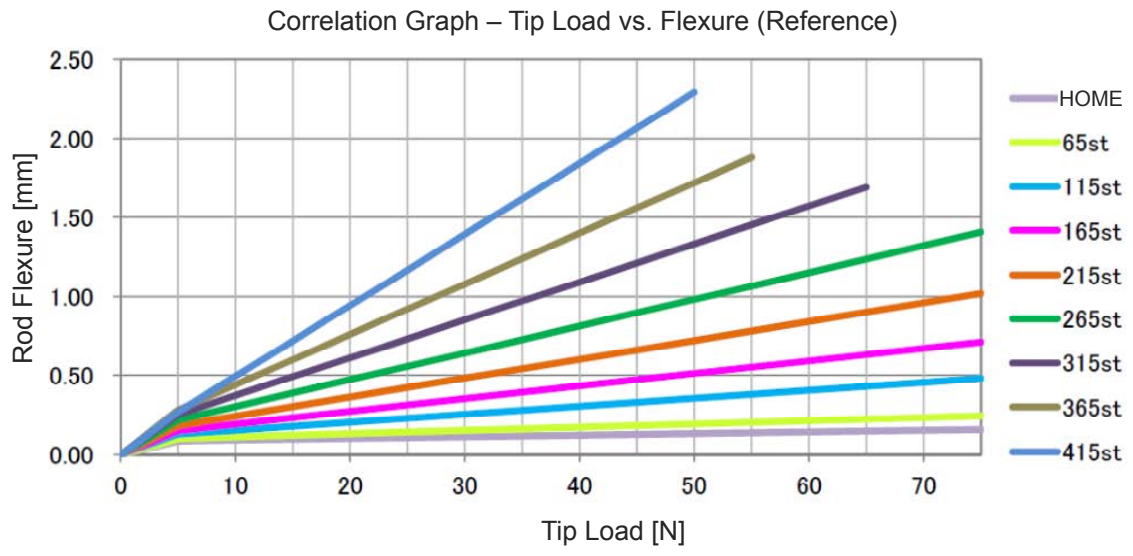


Should be below allowable load  
Do not attempt to apply impact load



Should be below allowable torque

[Rod Flexure (Reference)]



**[7] RCS4-RAA7R****[Lead and Payload]**

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
24	20	6	142
16	45	12	214
8	60	25	427
4	80	35	855

**[Stroke and Max. Speed]**

Unit: mm/s

Lead (mm)	70 to 520 (Every 50mm)
24	1440
16	960
8	480
4	240

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.  

$$\text{Minimum speed [mm/s]} = \text{ball screw lead [mm/r]} \div 16384 \text{ [p/r]} \times 1000 \text{ [1/s]}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

**[Payload by Acceleration]**

At low load capacity, the acceleration/deceleration can be increased.

**Lead 24**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
20	15	10	10	-	6	6	6	4	-

**Lead 16**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
45	30	25	20	-	12	12	10	8	-

**Lead 8**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
60	50	40	40	-	25	25	20	20	-

**Lead 4**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
80	70	60	-	-	35	35	30	-	-



**Caution**

Do not attempt to configure settings for acceleration/deceleration above the specifications.

This may lead to vibration, breakdown, or shortened product life.



**[Actuator Specifications]**

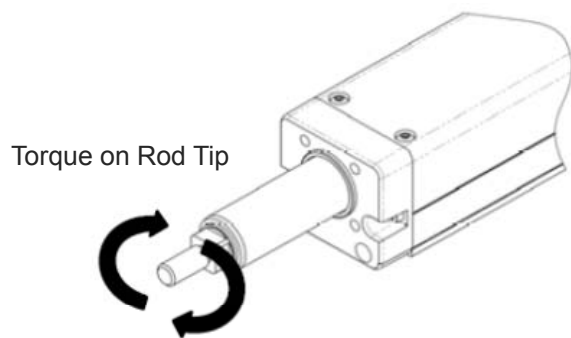
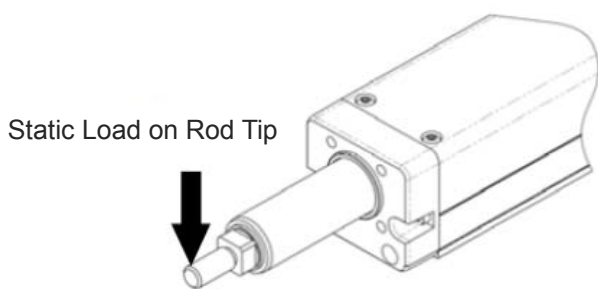
Item	Content
Drive system	Ball screw $\phi$ 12mm, rolled C10
Positioning repeatability	$\pm$ 0.01mm
Lost motion	0.1mm or less
Rod	$\phi$ 30mm Aluminum
Rod Non-Rotation Accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip] <sup>(note 1)</sup>
Rod tip overhang distance	150mm or less
No. of Encoder Pulses	16384
Ambient operating temperature/humidity	0 to 40°C, 85%RH or less (Non-condensing)

(\*) It shows the displacement angle in the rod rotational direction at no load.

Note 1 [Rod End Load] is described in graphs for all the types after the performance of each type.

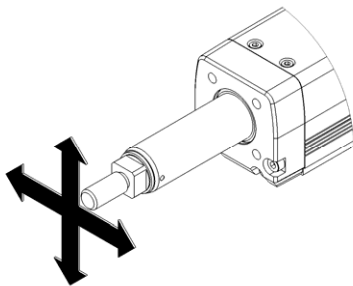
**[Allowable load and torque on rod tip]**

Item		Stroke	70	120	170	220	270	320	370	420	470	520
Rod Tip Static Allowable Load	[N]		175	147	126	111	98.6	88.7	80.6	73.8	68	63
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Load Offset Distance 0mm	75.7	62.6	53.1	46.0	40.5	36.1	32.5	29.4	26.9	24.7
	[N]	Load Offset Distance 100mm	49.8	45.1	40.5	36.5	33.1	30.2	27.7	25.5	23.6	21.9
Rod Tip Static Allowable Torque	[N•m]		17.6	14.7	12.7	11.2	9.9	9.0	8.2	7.5	6.94	6.45
Rod Tip Dynamic Allowable Torque	[N•m]		5.0	4.5	4.0	3.6	3.3	3.0	2.8	2.5	2.32	2.16

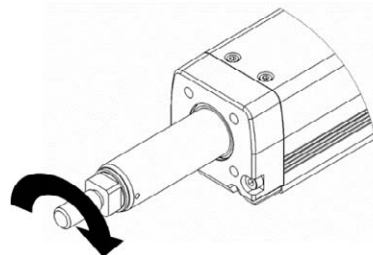


**Caution**

Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.

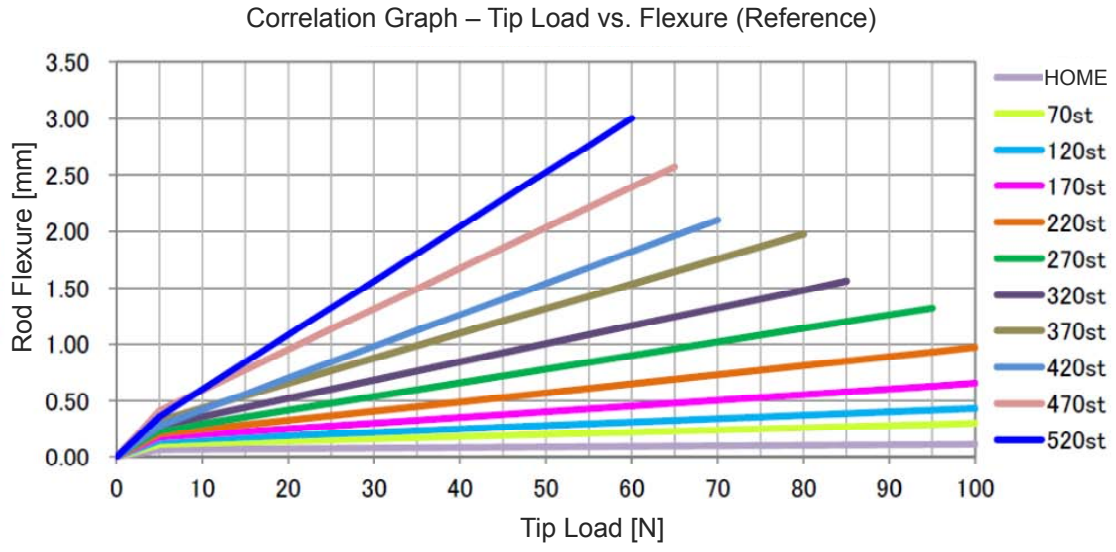


Should be below allowable load  
Do not attempt to apply impact load



Should be below allowable torque

[Rod Flexure (Reference)]



**[8] RCS4-RRA8R****[Lead and Payload]**

Lead (mm)	Max. payload		Rated Thrust (N)
	Horizontal (kg)	Vertical (kg)	
30	30	8	226
20	60	17	339
10	80	34	678
5	100	72	1357

**[Stroke and Max. Speed]**

Unit: mm/s

Lead (mm)	50 to 250 (Every 50mm)	300 (mm)	350 (mm)	400 (mm)	450 (mm)	500 (mm)	550 (mm)	600 (mm)	650 (mm)	700 (mm)
30	1300		1230	970	790	650	540	460	400	350
20	1000		820	650	520	430	360	310	260	230
10	550	520	400	310	250	210	180	150	130	110
5	275	250	190	150	120	100	80	70	60	55

**Caution**

- The maximum speed may not be achieved when the stroke or movement distance is short or when acceleration/deceleration is set low.
- Setting at or below the minimum speed may lead to abnormal noise or unstable speeds. Do not attempt to set below the minimum speed.
- The minimum speed can be calculated with the equation below.  

$$\text{Minimum speed [mm/s]} = \text{ball screw lead [mm/r]} \div 16384 \text{ [p/r]} \times 1000 \text{ [1/s]}$$
 (mm/r: movement per 1 motor revolution, p/r: pulse per 1 motor revolution)

**[Payload by Acceleration]**

At low load capacity, the acceleration/deceleration can be increased.

**Lead 30**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
30	20	15	10	-	8	8	8	6	-

**Lead 20**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
60	40	25	20	-	17	17	15	12	-

**Lead 10**

Horizontal					Vertical				
0.3	0.5	0.7	1.0	1.2	0.3	0.5	0.7	1.0	1.2
80	80	70	60	-	34	30	30	20	-

**Lead 5**

Horizontal					Vertical				
0.2	0.3	0.5	0.7	1.0	0.2	0.3	0.5	0.7	1.0
100	100	80	80	-	72	50	40	25	-

**Caution**

Do not attempt to configure settings for acceleration/deceleration above the specifications.

This may lead to vibration, breakdown, or shortened product life.

**[Actuator Specifications]**

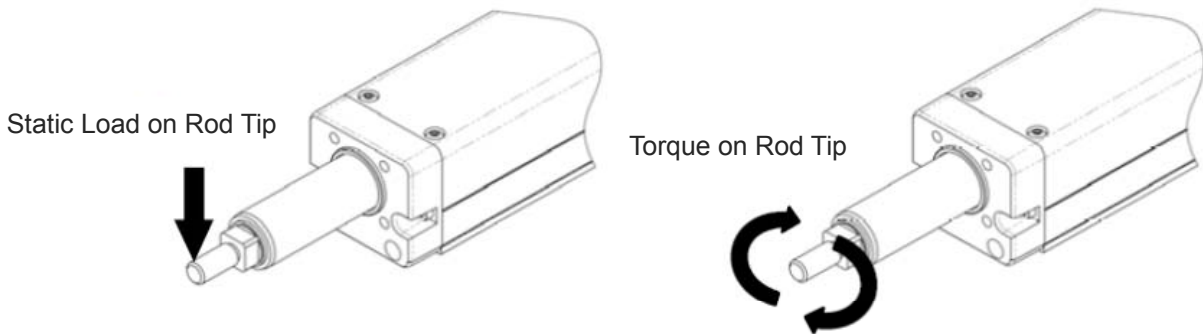
Drive system	Ball screw $\phi$ 16mm, rolled C10
Positioning repeatability	$\pm$ 0.01mm
Lost motion	0.1mm or less
Rod	$\phi$ 40mm Aluminum
Rod Non-Rotation Accuracy (*)	0 degrees
Allowable load and torque on rod tip	Refer to [Allowable Load and Torque on Rod Tip] <sup>(note 1)</sup>
Rod tip overhang distance	150mm or less
No. of Encoder Pulses	16384
Ambient operating temperature/humidity	0 to 40°C, 85%RH or less (Non-condensing)

(\*) It shows the displacement angle in the rod rotational direction at no load.

Note 1 [Rod End Load] is described in graphs for all the types after the performance of each type.

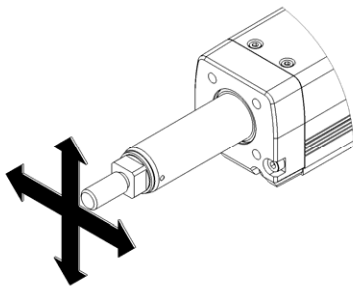
**[Allowable load and torque on rod tip]**

Item		Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700
Rod Tip Static Allowable Load	[N]		222	186	159	139	124	111	101	92.1	84.7	78.4	72.8	68.0	63.7	59.8
Rod Tip Dynamic Allowable Load (Operating life 5,000km Remaining Probability 90%)	[N]	Load Offset Distance 0mm	93.0	76.3	64.7	56.0	49.2	43.8	39.3	35.6	32.4	29.7	27.3	25.2	23.3	21.7
	[N]	Load Offset Distance 100mm	72.0	61.6	53.9	48.0	43.0	38.9	35.4	32.3	29.7	27.4	25.3	23.5	21.9	20.4
Rod Tip Static Allowable Torque	[N•m]		22.3	18.7	16.1	14.1	12.6	11.3	10.3	9.4	8.7	8.1	7.6	7.1	6.7	6.3
Rod Tip Dynamic Allowable Torque	[N•m]		7.2	6.2	5.4	4.8	4.3	3.9	3.5	3.2	3.0	2.7	2.5	2.4	2.2	2.0

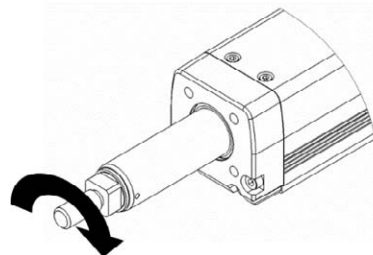


**Caution**

Actuator possesses a built-in guide structure that enables it to apply a side-way load (radial load) and torque. Make sure not to exceed the load indicated in the specification table. Applying excess load may cause an operation failure, parts malfunction and shortened life.

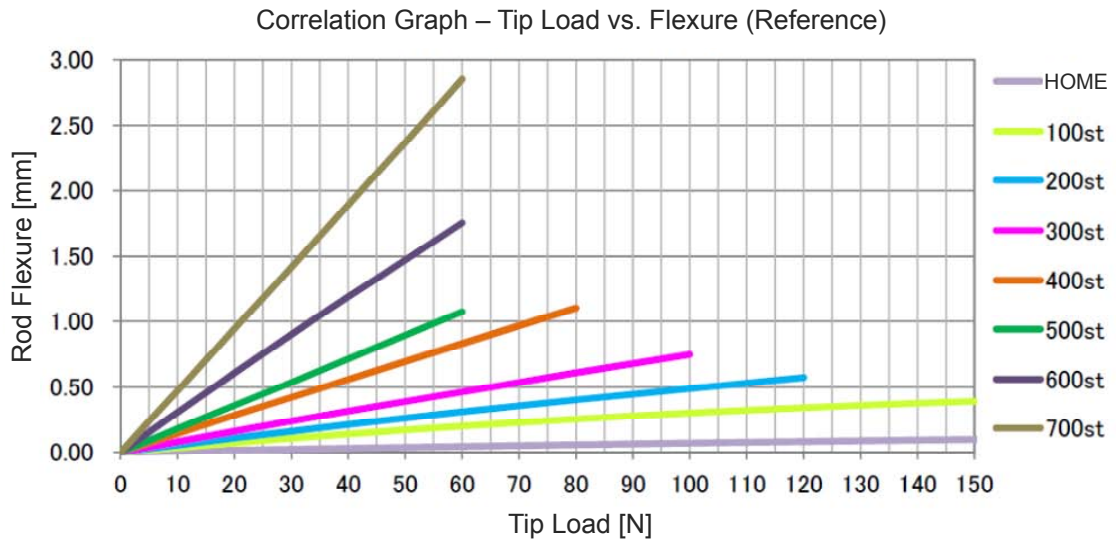


Should be below allowable load  
Do not attempt to apply impact load



Should be below allowable torque

[Rod Flexure (Reference)]





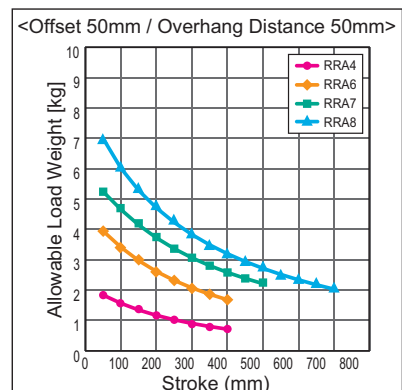
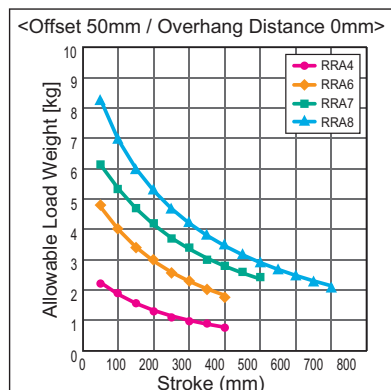
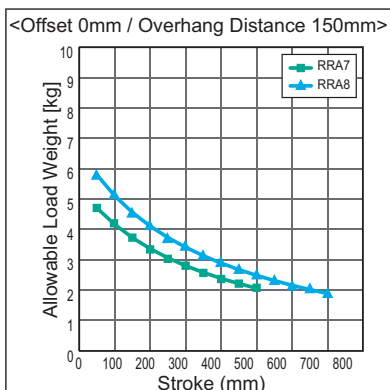
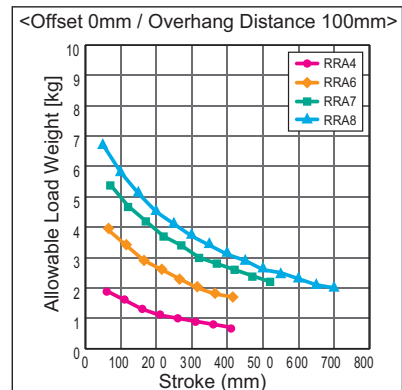
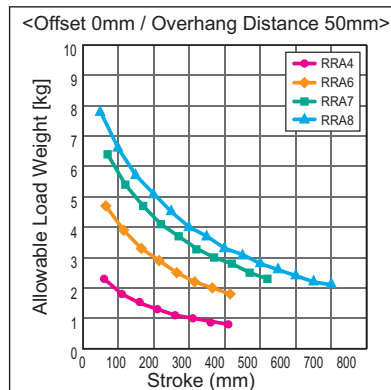
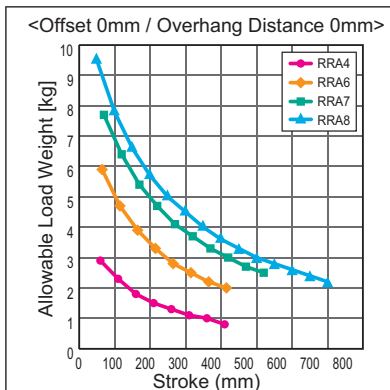
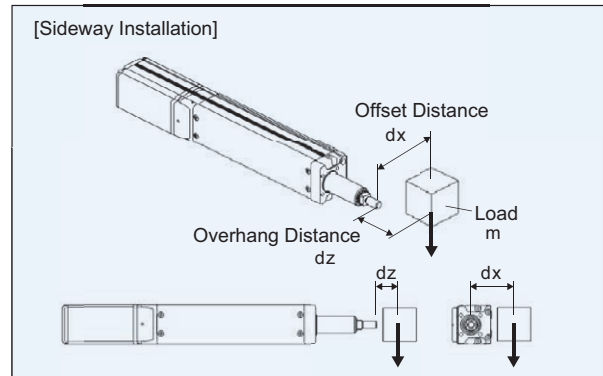
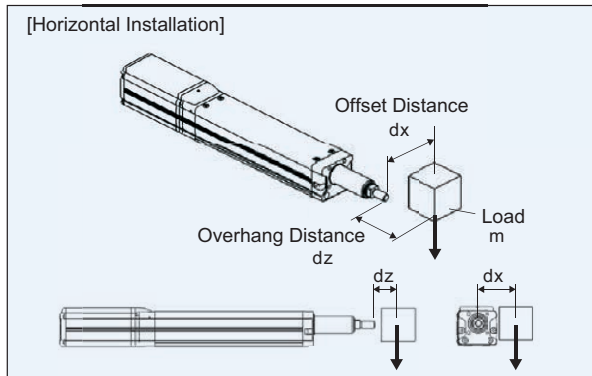
## Rod End Load

As the radial cylinder is equipped with guides, the rod is capable to receive certain amount of load without any guide.

Refer to the following graphs for allowable payload.

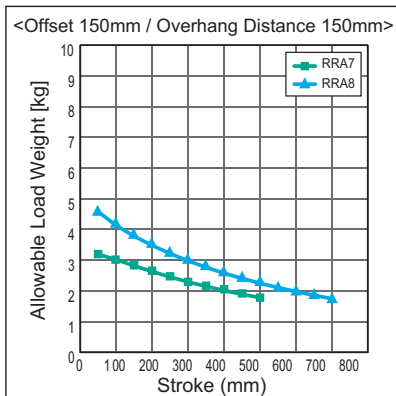
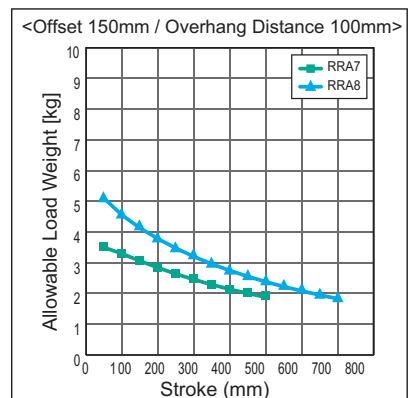
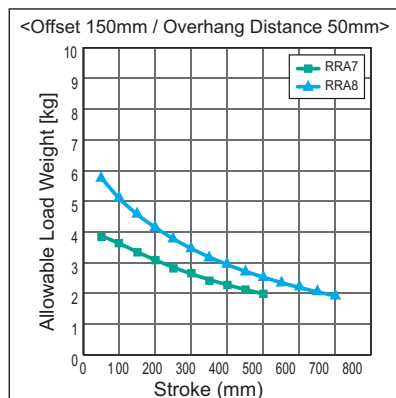
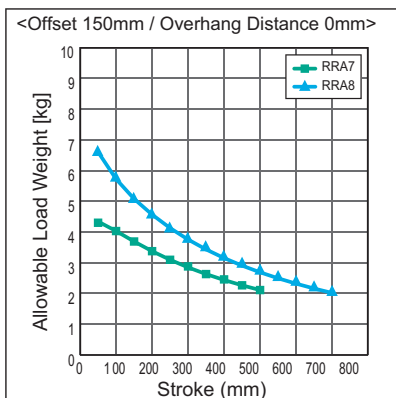
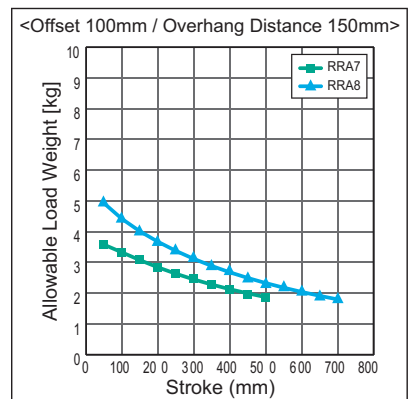
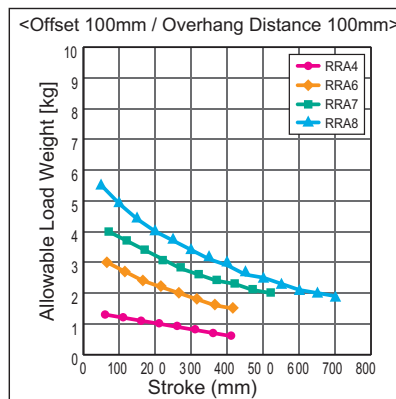
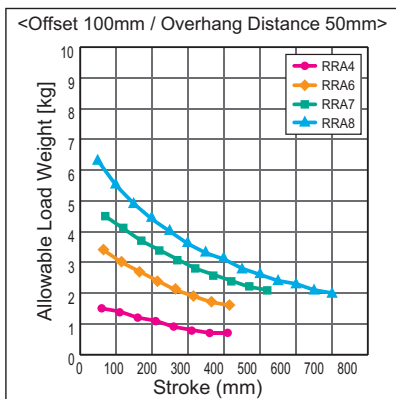
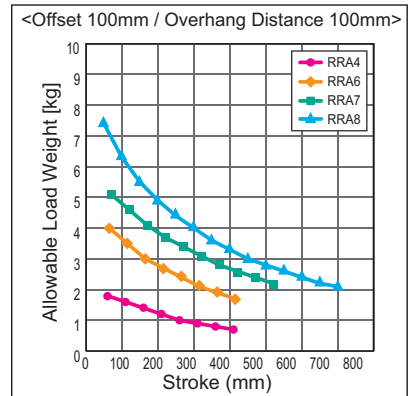
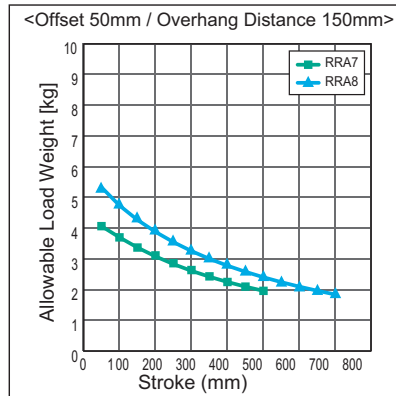
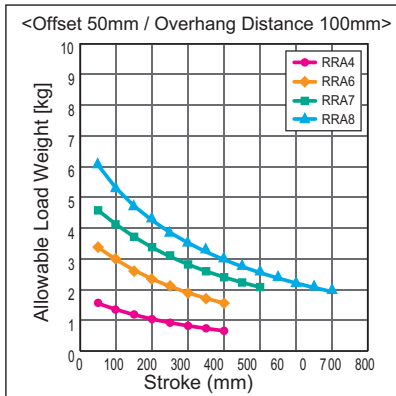
It is necessary to use external guides if it is required to have load above the allowable load.

### [Horizontal Installation allowable Payload]



Conditions to Calculate Allowable Load  
 Payload for guide drive life of 5000km considering moment due to acceleration (Acceleration 1G, 500mm/s)

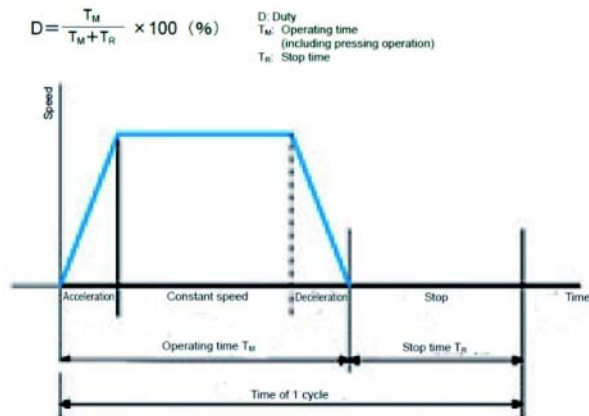
## 1.2 Specifications



Conditions to Calculate Allowable Load  
 Payload for guide drive life of 5000km considering moment due to acceleration (Acceleration 1G, 500mm/s)

## Duty ratio

The duty ratio is the operating rate, shown in %, of the actuator operating time within one cycle.



As the reference for duty available to use may differ depending on the operation conditions (payload, acceleration / deceleration, etc.), it is necessary to figure out the load factor LF and acceleration / deceleration time ratio  $t_{od}$  using the calculation formulae below and find it out from the graph.

### 1) Figure out the load factor LF using the calculation formulae below.

Maximum payload at the acceleration 0.3G is described in 1.2. Specifications.

<p>[When indicated acceleration / deceleration is at acceleration / deceleration 0.3G or below]</p> $\text{Load Factor LF} = \frac{M \times \alpha}{M_r \times 0.3} [\%]$ <p>Max. Payload at Acceleration 0.3G : <math>M_r</math> [kg]                  Acceleration / Deceleration 0.3G : 0.3 [G]                  Payload during Operation : <math>M</math> [kg]                  Acceleration during Operation : <math>\alpha</math> [G]</p>	<p>[When indicated acceleration / deceleration is at acceleration / deceleration 0.3G or above]</p> $\text{Load Factor LF} = \frac{M \times \alpha}{M_d \times \alpha} = \frac{M}{M_d} [\%]$ <p>Payload at Indicated Acceleration : <math>M_d</math> [kg]                  Payload during Operation : <math>M</math> [kg]                  Acceleration during Operation : <math>\alpha</math> [G]</p>
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### 2) Figure out the acceleration / deceleration time ratio $t_{od}$ using the calculation formulae below.

$$\text{Acceleration / Deceleration Time Ratio } t_{od} = \frac{\text{Acceleration Time during Operation} + \text{Deceleration Time during Operation}}{\text{Duration of Operation}} [\%]$$

$$\text{Acceleration Time} = \frac{\text{Velocity during Operation [mm/s]}}{\text{Acceleration during Operation [mm/s}^2]} [\text{sec}]$$

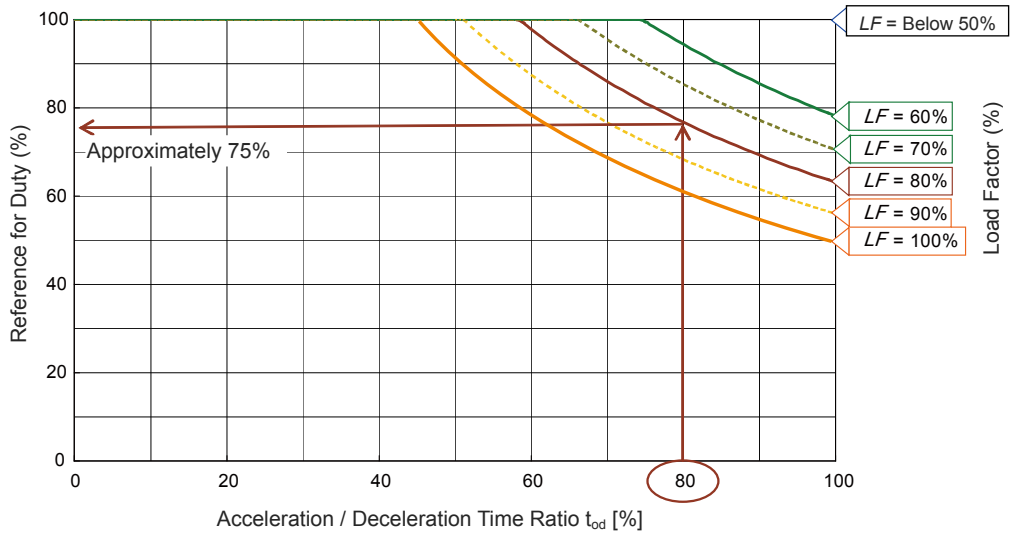
$$\text{Acceleration [mm/s}^2] = \text{Acceleration [G]} \times 9,800\text{mm/s}^2$$

$$\text{Deceleration Time} = \frac{\text{Velocity during Operation [mm/s]}}{\text{Deceleration during Operation [mm/s}^2]} [\text{sec}]$$

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

**3) Read a reference for duty with the figured out “Load Factor” and “Acceleration / Deceleration Time Ratio”.**

e.g.) The reference for duty when the load factor LF is 80% and the acceleration / deceleration time ratio  $t_{od}$  is 80% should be approximately 75%.



## 1.3 Options

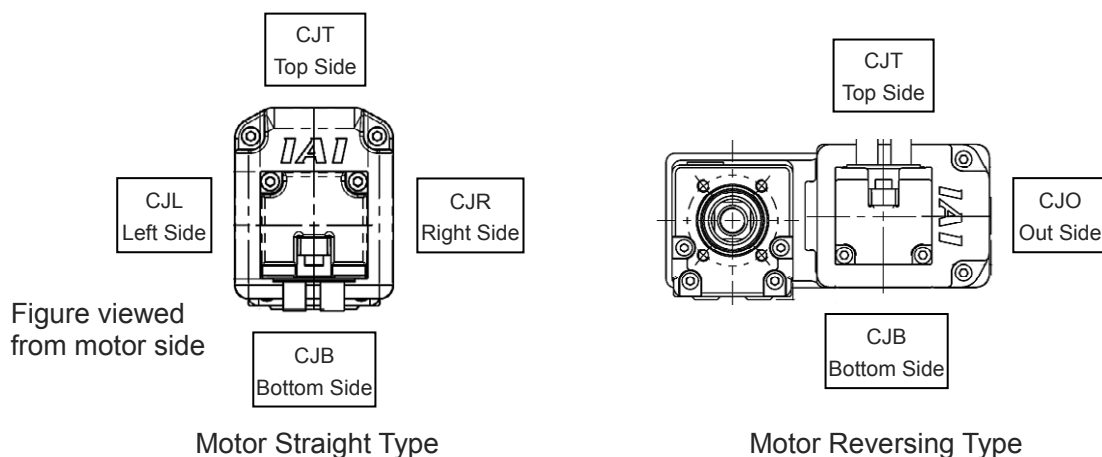
### With brake (Model Code: B)

This is used to prevent the slider or rod from moving during power outages or when the servo is OFF.

It can also be used to prevent the slider or rod from falling when mounted vertically.

### Cable Eject Direction Changed (Model Code: CJT, CJR, CJL, CJB and CJO)

The orientation of the motor / encoder cable to be installed on the actuator unit can be changed to top/bottom/right/left.



### Motor Reversed Direction (Model Code: ML, MR)

It is the code to indicate the direction of motor reversed when selecting the motor reversed type. ML shows reversed to left and MR to right.



### Home reverse specification (Model Code: NM)

The standard home position is on the motor side.

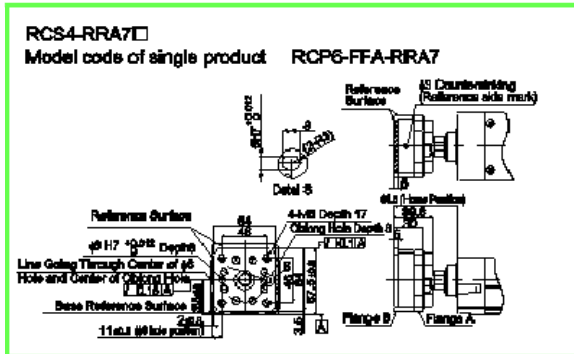
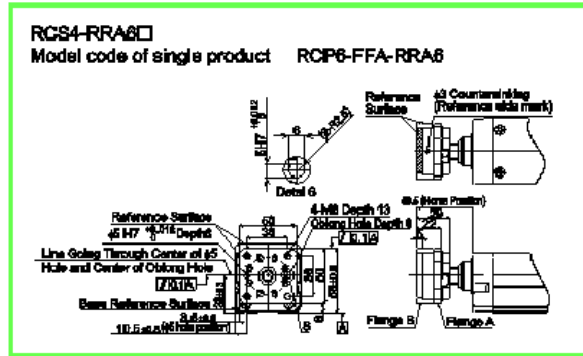
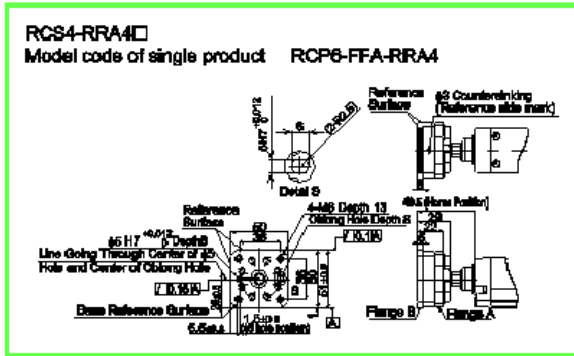
However, the opposite side specification is selected if the home position direction is reversed in accordance with equipment layout or assembly direction.

### Rear Attachment Plate (Model Code: RP)

It is a bracket (plate) to affix the motor reversed type (RRA4R) at the back to a device.

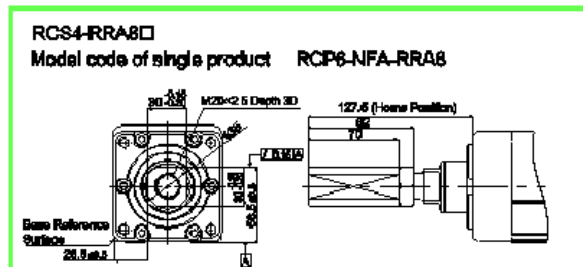
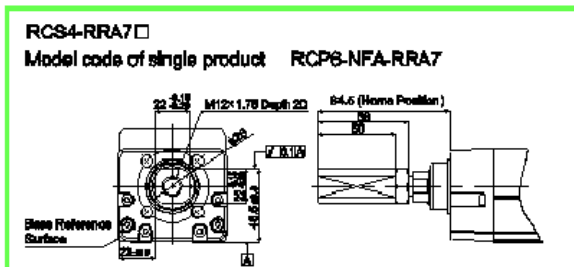
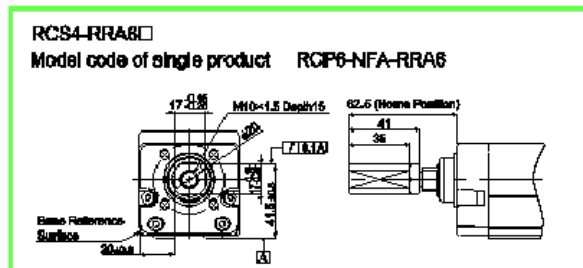
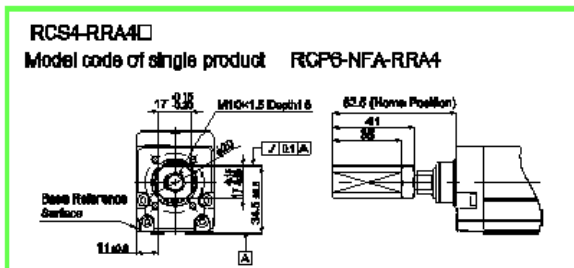
### Tip Adapter Flange (Model Code: FFA)

This is an adapter to attach on the rod tip an object such as a fixture with four screws.



### Tip Adapter Internal Thread (Model Code: NFA)

This is an adapter to attach on the rod tip an object such as a fixture with one screws.

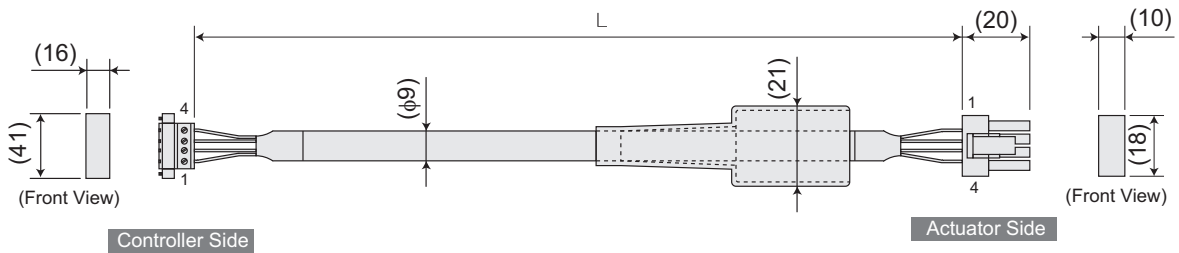




# 1.4 Accessories

## Motor Cable

Model Code: **CB-RCC-MA□□□ / CB-RCC-MA□□□-RB**



Minimum bending radius  $r = 51\text{mm}$  or more (for movable use)

\* It is only robot cable available to use inside the cable track

Wire Size	Color	Signal	No.	No.	Signal	Color	Wire Size
0.75sq	Green	PE	1	1	U	Red	0.75sq (Crimped)
	Red	U	2	2	V	White	
	White	V	3	3	W	Black	
	Black	W	4	4	PE	Green	

- The cable length is available from 1m to 20m.  
Specify the length in increments of 1m.
- The following shows a sample model number.

Cable length **1**m → CB-RCC-MA**010** (-RB)

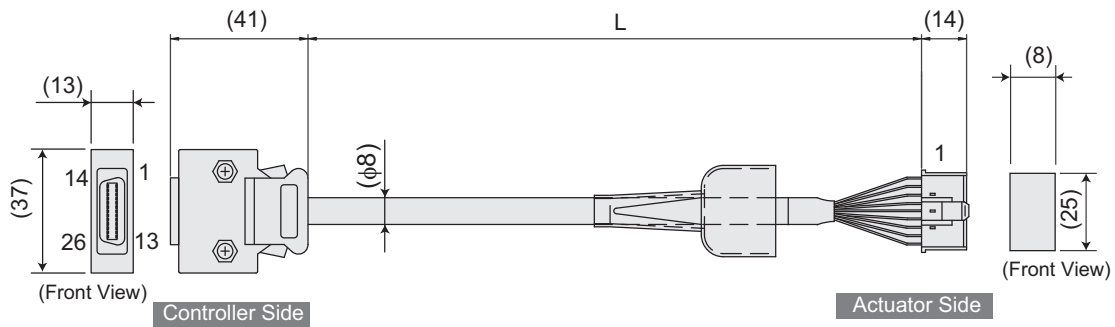
Cable length **3**m → CB-RCC-MA**030** (-RB)

Cable length **10**m → CB-RCC-MA**100** (-RB)



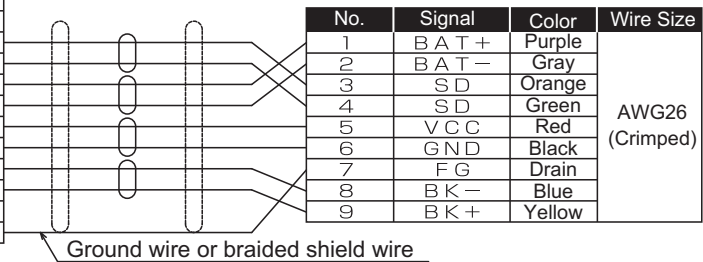
**Encoder Cables**

Model Code: **CB-X1-PA**□□□



Minimum bending radius  $r = 44\text{mm}$  or more (for movable use)  
 \*Robot cable is standard for this model.

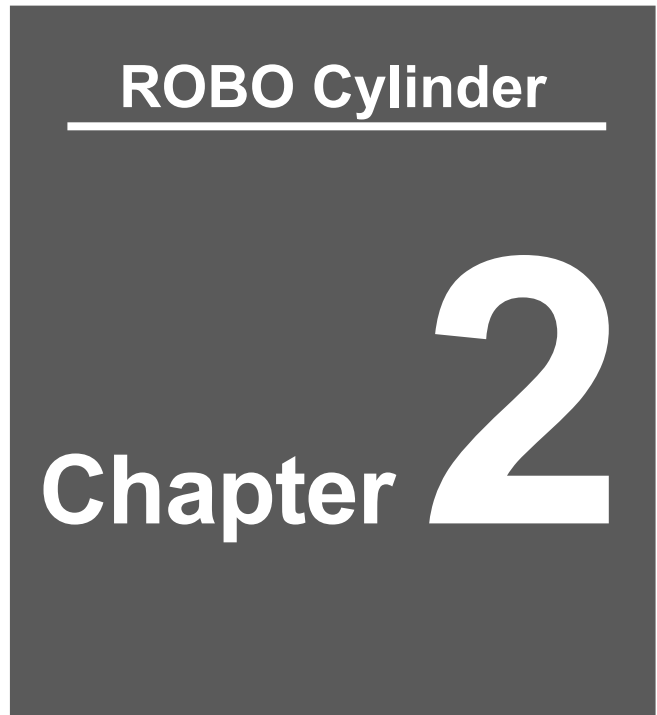
Wire Size	Color	Signal	No.
AWG26 (Soldered)	—	—	10
	—	—	11
	—	E24V	12
	—	OV	13
	—	LS	26
	—	CREEP	25
	—	OT	24
	—	RSV	23
	—	—	9
	—	—	18
	—	—	19
	—	A+	1
	—	A-	2
	—	B+	3
	—	B-	4
	—	Z+	5
	—	Z-	6
	Orange	SRD+	7
	Green	SRD-	8
	Purple	BAT+	14
	Gray	BAT-	15
	Red	VCC	16
Black	GND	17	
Blue	BKR-	20	
Yellow	BKR+	21	
—	—	22	



- The cable length is available from 1m to 20m.  
Specify the length in increments of 1m.
- The following shows a sample model number.

Cable length **1m** → CB-X1-PA**010**  
 Cable length **3m** → CB-X1-PA**030**  
 Cable length **10m** → CB-X1-PA**100**





# Installation

- 2.1 Precautions for transportation ..... 2-1
- 2.2 Installation and storage/preservation environment..... 2-3
  - Installation Environment ..... 2-3
  - Storage/preservation environment ..... 2-4
- 2.3 How to Install ..... 2-5
  - Installation Orientation Type : RCS4-RRA4/RRA6/RRA7/RRA8..... 2-5
  - Installation surface..... 2-6
  - Installation of the Main Unit ..... 2-7
  - Attachment of Transported Object..... 2-22
  - Precautions regarding the rod ..... 2-23

## 2.1 Precautions for transportation

### [Handling the package]

- Do not damage or drop the package.

The package is not specially designed to withstand dropping or shock due to collision.

- Keep the unit in horizontal orientation for stationary positioning or transportation.
- Do not climb onto the package.
- Do not put anything that could deform the package on it.



### [Handling after unpacking]

- Carry the slider type by its base part.
- Do not carry the unit by its motor cover.
- Do not damage or drop the package during transportation.
- Do not apply excessive force to any part.

→ For the names of each part, refer to "Names of the Parts" on page Intro-11.



### [Handling when assembled into machinery (system)]

- Secure rods to prevent sudden movement during transport.
- If the actuator or any moving part is overhanging, fix it appropriately to avoid large wobbles due to external vibration.

When transporting without fixing the tip, do not apply impact of 0.3G or more.

- When suspending machinery (system) with ropes, be careful not to catch the rope on the actuator or cable.

## 2.2 Installation and storage/preservation environment

Usage is possible in environments of pollution degree 2 or equivalent.

Pollution degree 2: Environment in which generally only nonconductive pollution occurs, but temporary conductive pollution may occur due to condensation (IEC 60664-1)

### Installation Environment

Avoid the following locations for installation.

In general, the installation environment should be one in which an operator can work without protective gear.

- 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
- Where the altitude is more than 2,000m

Also, provide sufficient work space for the following maintenance and inspection:

- Space to replenish grease
- Space to replace the motor.

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

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

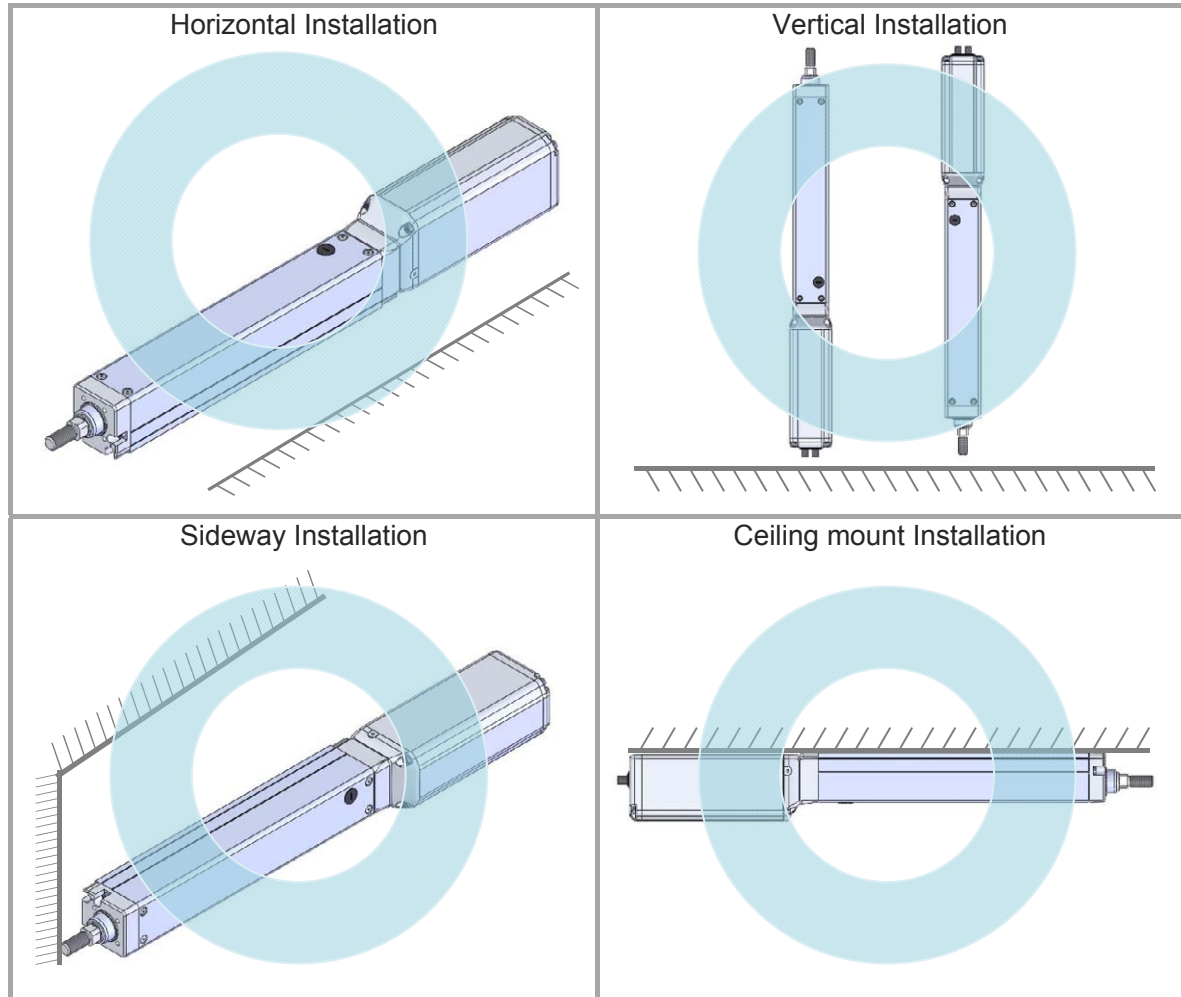
## Storage/preservation environment

---

- For the storage and preservation environment, see the installation environment.  
However, give especial consideration to the prevention of condensation during long-term storage/preservation.
- Unless especially specified, desiccant is not included in the package at shipping.  
If the product is to be stored/preserved in an environment where condensation is anticipated, take condensation preventive measures.
- For short-term storage, it can be stored at 60°C or below.  
For storage of one month or more, make sure that the temperature does not exceed 50°C.
- The product should be placed horizontally for storage and preservation.  
If storing in the packaged condition, observe the conditions, if any, regarding storage orientation.

## 2.3 How to Install

### Installation Orientation Type : RCS4-RAA4/RAA6/RAA7/RAA8



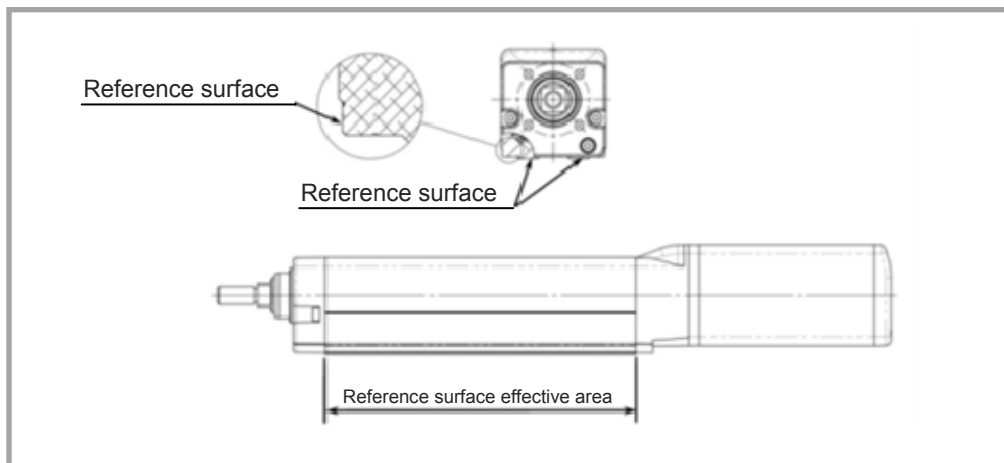
### Caution

- When installing the unit vertically, keep the motor on top to the greatest extent possible.
- If the motor is installed on the bottom, the grease may separate due to long-term disuse, causing the base oil to flow into the motor part. The controller and motor/encoder may break down due to the entry of the base oil.

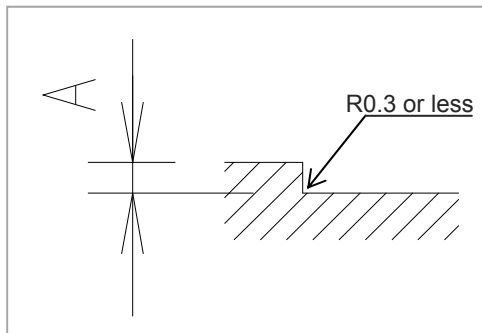


## Installation surface

- The body mounting surface should be a machined surface or a plane with similar accuracy, with flatness within 0.05mm/m.
- The mounting frame should have a structure rigid enough to prevent the generation of vibration, etc.
- Also consider the necessary space for maintenance work such as Actuator replacement and inspection.



When mounting using the side reference surface, machine the installation surface according to the figure below.



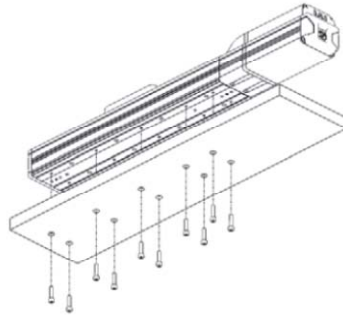
A Dimensions	
RRA4	
RRA6	2 to 4mm
RRA7	
RRA8	3 to 5mm

## Installation of the Main Unit

### [Using the Tapped Holes on the Bottom of the Base]

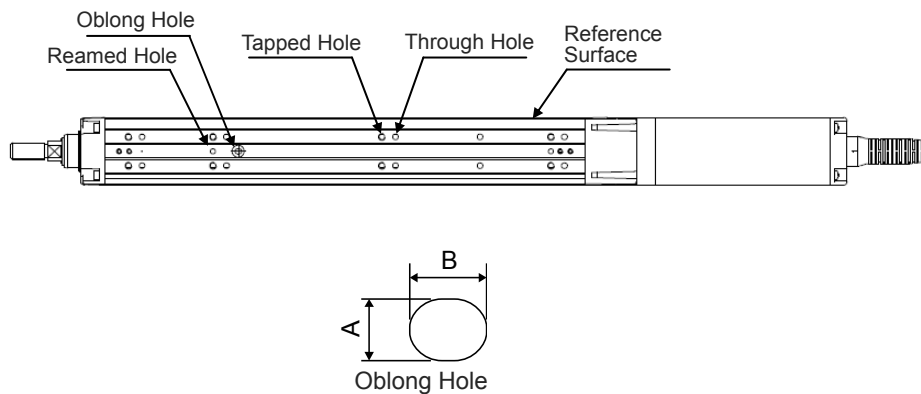
The unit has a tapped holes at the bottom of the base for mounting. It can be affixed at the back using the tapped holes.

→ For details regarding the position and dimensions, refer to "Chapter 5 External Dimensions".

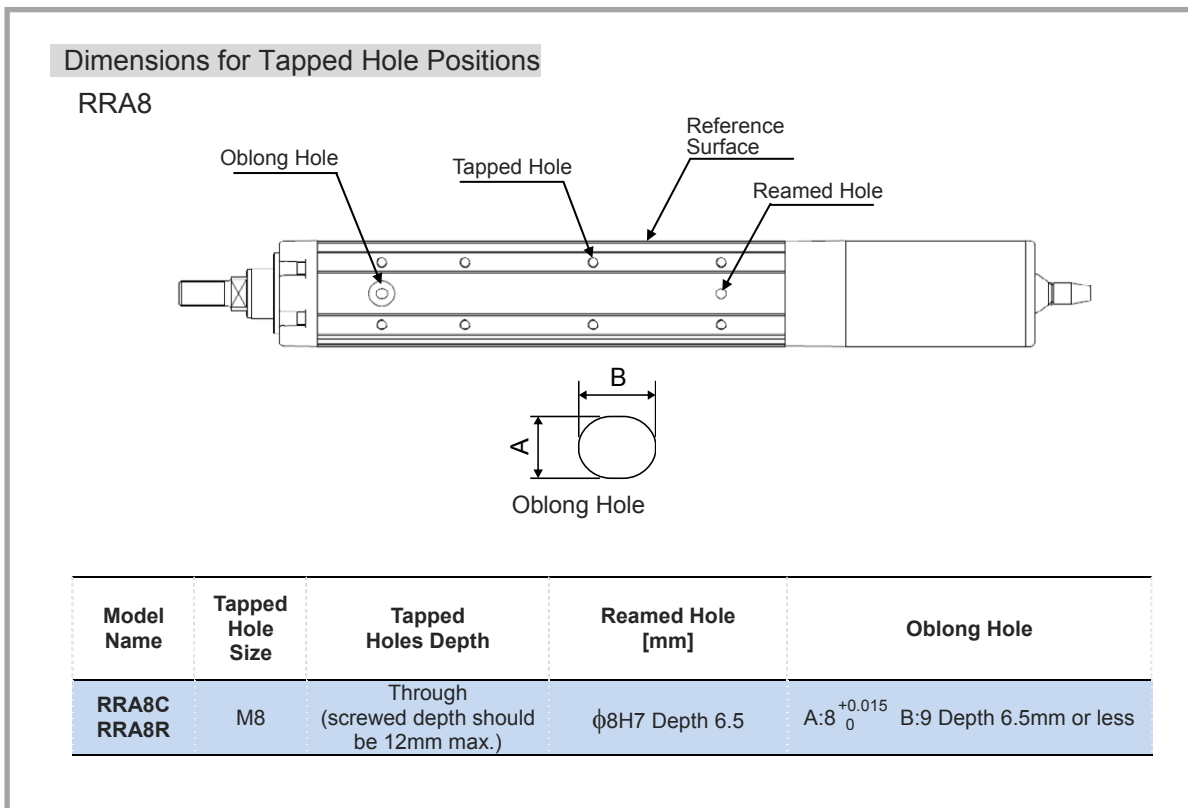


#### Dimensions for Tapped Hole Positions

RRA4, RRA6, RRA7



Model Name	Tapped Hole Size	Tapped Holes Depth	Reamed Hole [mm]	Oblong Hole
RRA4C RRA4R	M4	Through (screwed depth should be 6mm max.)	φ 3H7 Depth 4	A: $3^{+0.010}_0$ B: 4 Depth 4mm or less
RRA6C RRA6R	M5	Through (screwed depth should be 10mm max.)	φ4H7 Depth 5.5	A: $4^{+0.012}_0$ B: 5 Depth 5.5mm or less
RRA7C RRA7R	M5	Through (screwed depth should be 10mm max.)	φ4H7 Depth 6	A: $4^{+0.012}_0$ B: 5 Depth 6mm or less



**[Tightening Torque]**

Model Name	Tapped Hole Size	Tightening Torque	
		In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:
RRA4C RRA4R	M4	3.59N·m (0.37kgf·m)	1.76N·m (0.18kgf·m)
RRA6C RRA6R	M5	7.27N·m (0.74kgf·m)	3.42N·m (0.35kgf·m)
RRA7C RRA7R	M5	7.27N·m (0.74kgf·m)	3.42N·m (0.35kgf·m)
RRA8C RRA8R	M6	30.0N·m (3.06kgf·m)	11.4N·m (1.17kgf·m)

## Notice

- The use of high-strength bolts of ISO-10.9 or higher is recommended.
- Keep the effective length of thread engagement between a screw and a threaded hole at 6mm or below for RRA4C/4R, 1.8 times of the nominal diameter for RRA6C/6R and RRA7C/7R and at 12mm or below for RRA8C/8R so the tip of a screw will not come up inside the actuator.

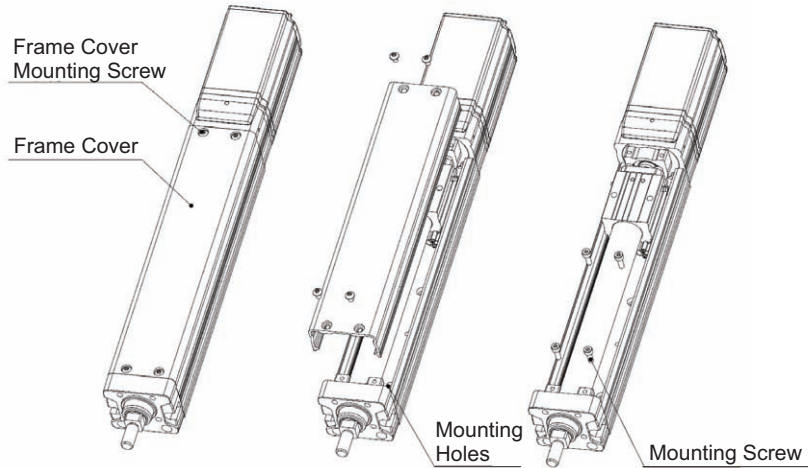
**[Using the Through Holes on the Top of the Base]**

As RRA4, RRA6 and RRA7 are equipped with through holes on the base for purpose of installation from the top, it is available to screw in from the top side.

Detach the side covers on the sides when installing.

(Note) The two attachment holes on RRA4C side cannot be used for attachment.

Pay attention even though there is no problem in use.



Apply the socket head cap screw indicated in the table below suitable for the platform material.

Model Name	Through Holes	Mounting Screw	Tightening Torque
RRA4C RRA4R	φ3.4 drilled hole, φ6.5 counter boring depth 3.5	M3	0.83N•m (0.085kgf•m)
RRA6C RRA6R	φ4.5 drilled hole, φ8 counter boring depth 4.5	M4	1.76N•m (0.18kgf•m)
RRA7C RRA7R	φ6 drilled hole, φ9.5 counter boring depth 5.5	M5	3.42N•m (0.35kgf•m)

**Detaching Frame Cover**

- Loosen the frame cover mounting screws with a 1.5mm-sized (for RRA4C and RRA4R) or 2.5mm-sized (for RRA6C, RRA6R, RRA7C and RRA7R) hex wrench to detach the frame cover. (Remove 4 hex socket head cap screws.)  
For the RRA4C and RRA4R attach the unit with the rod pulled out to avoid interference with the rod.
- The slider cannot be driven only with ROBO Cylinder itself if it is equipped with a brake.  
Connect a controller and have JOG operation to move the rod to perform installation.
- When affixing the frame cover, tighten the screws with the tightening torque described below.

Model Name	Screw Diameter	Tightening Torque
RRA4C, RRA4R	M3	0.62N•m (0.06kgf•m)
RRA6C, RRA6R	M4	1.76N•m (0.18kgf•m)
RRA7C, RRA7R	M4	1.76N•m (0.18kgf•m)

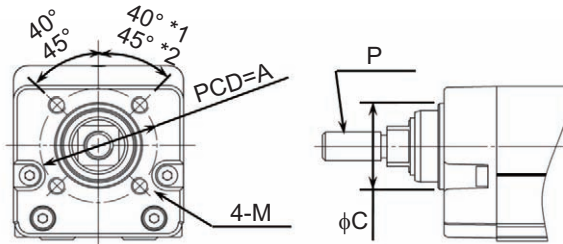
**Notice**

- The use of high-strength bolts of ISO-10.9 or higher is recommended.
- Make sure to ensure the same length as the nominal diameter for the effective length of thread engagement between a screw and a threaded hole when the threaded hole is made of steel and length 1.8 times of the nominal diameter when the threaded hole is made of aluminum.

**[When using Tapped Holes on Front Bracket]**

There are tapped holes equipped on the front bracket.  
Utilize these tapped holes for installation.

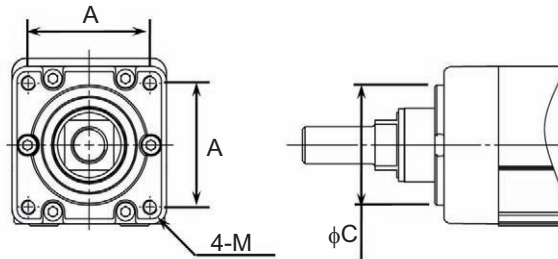
RRA4, RRA6, RRA7



\*1 : RRA4  
\*2 : RRA6, RRA7

Model Name	Tapped Hole Size B	A	Screw Effective Depth	φC
RRA4C RRA4R	M4	30	8	φ24h7
RRA6C RRA6R	M5	40	12	φ30h7
RRA7C RRA7R	M5	46	16	φ35h7

RRA8



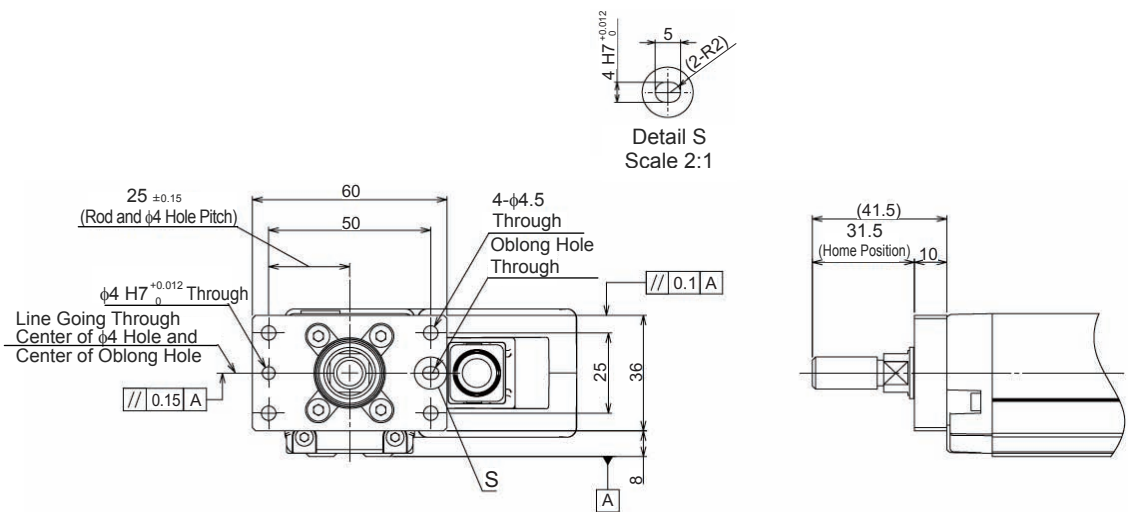
Model Name	Tapped Hole Size B	A	Screw Effective Depth	φC
RRA8C RRA8R	M8	67	16	φ65h7

**[When using Front Flange (Option)]**

There are tapped holes equipped on the front housing (Option).  
Utilize these holes for the installation.

**RRA4C, RRA4R**

- (Note) In the delivery of IAI, the flatness is secured in the way described in the figure.
- (Note) The front flange cannot be used for Stroke 60/110 of RRA4R as the motor unit interferes to it.
- (Note) In some stroke variations, the mounting surface can interfere to the cable. Pay attention to interference to peripherals when a short stroke is selected.

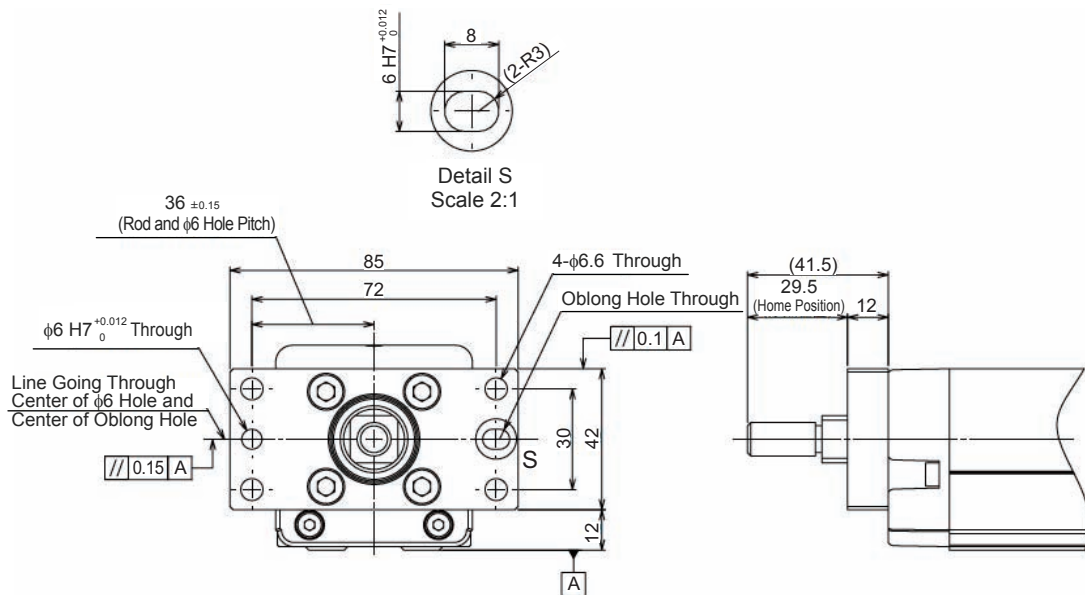


RRA6C, RRA6R

(Note) In the delivery of IAI, the flatness is secured in the way described in the figure.

(Note) The front flange cannot be used for Stroke 65 of RRA6R as the motor unit interferes to it.

(Note) In some stroke variations, the mounting surface can interfere to the cable. Pay attention to interference to peripherals when a short stroke is selected.



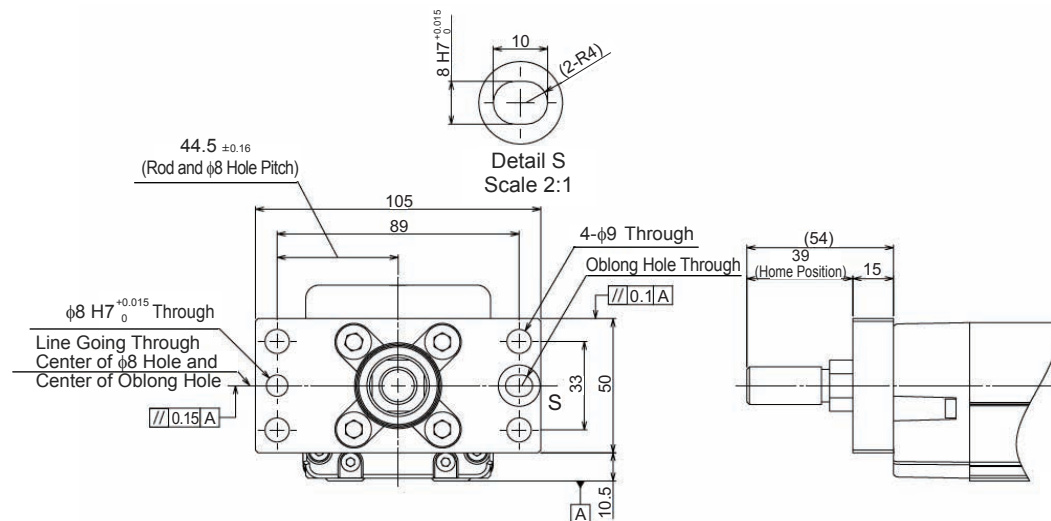


## RRA7C, RRA7R

(Note) In the delivery of IAI, the flatness is secured in the way described in the figure.

(Note) The front flange cannot be used for Stroke 70 of RRA7R as the motor unit interferes to it.

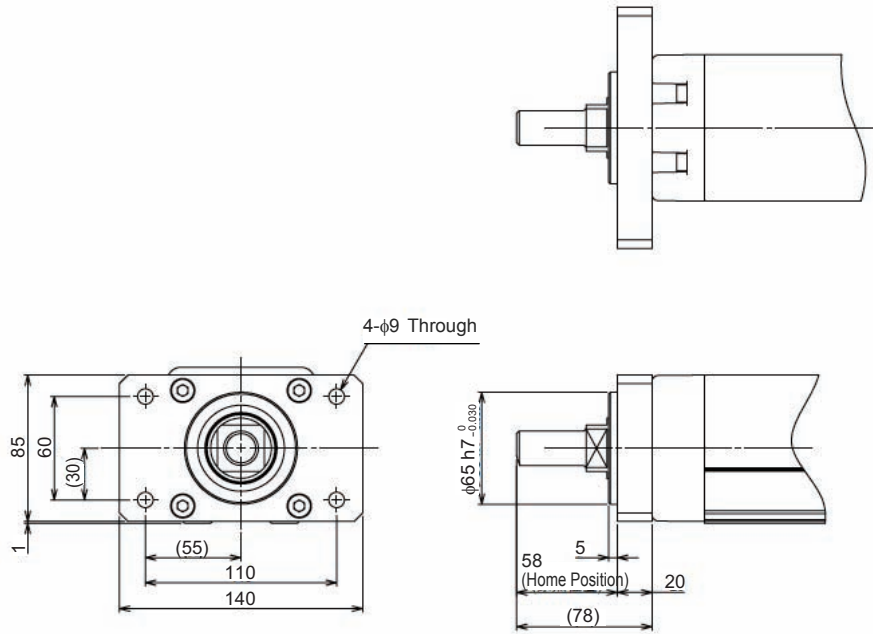
(Note) In some stroke variations, the mounting surface can interfere to the cable. Pay attention to interference to peripherals when a short stroke is selected.



RRA8C, RRA8R

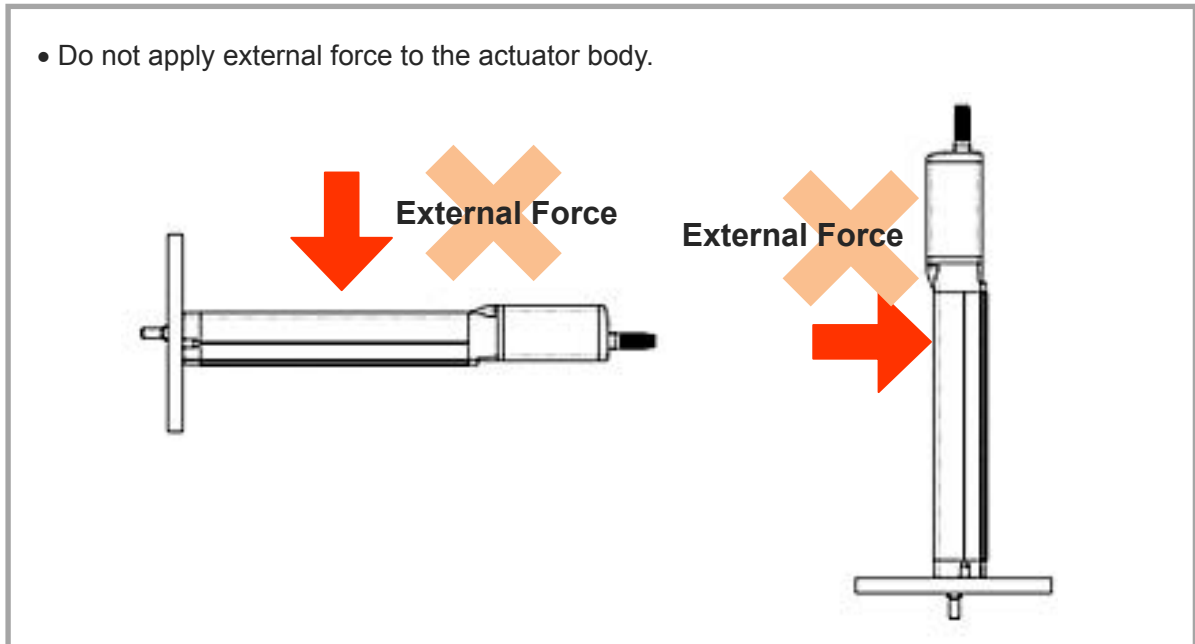
(Note) The front flange cannot be used for Stroke 50 of RRA8R as the motor unit interferes to it.

(Note) Pay attention to interference to peripherals for short strokes.



**[Precautions for Installation using Front Bracket and Flange]**

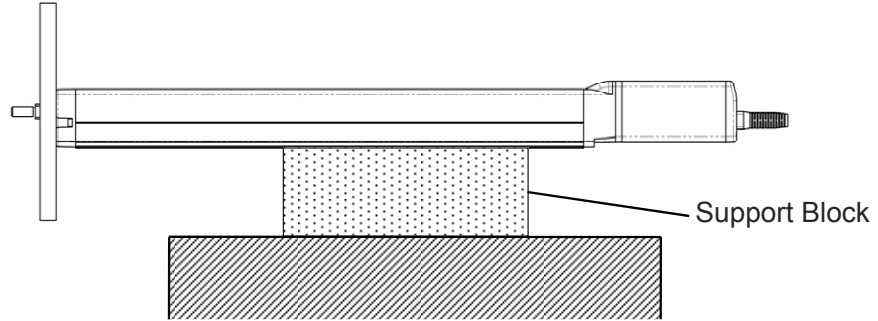
- Do not apply external force to the actuator body.

**Caution**

- Do not apply external force to the actuator body after installation.  
External force may cause malfunctions or damage to parts.

**[Precautions for horizontal mounting using Front Bracket and Flange]**

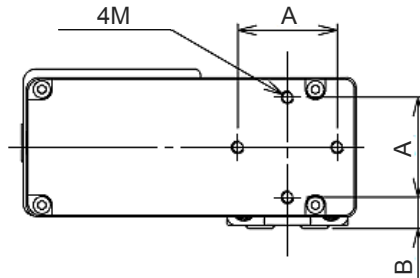
- Prepare a support block for the body, as shown in the figure below.



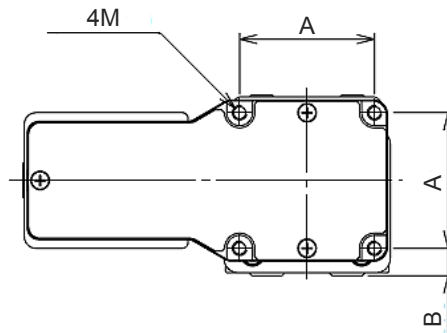
**[When Using Attachment Holes on Bracket in Motor Reversing Type]**

As there are tapped holes on the reversing bracket, it is available to screw in from the back. It should be an option (Model Code: RP) for RRA4R.

- For RRA4R (Option)

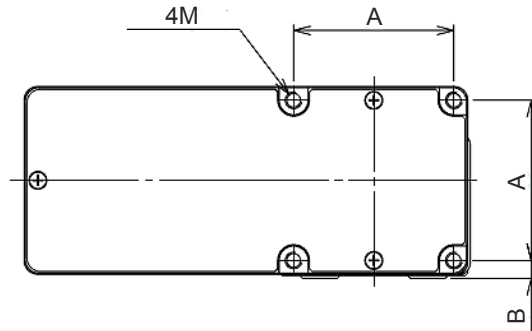


- For RRA6R



Model Name	A	B	Attachment Holes	Attachment Hole Depth	Tightening Torque
RRA4R	32	10	M4	8 mm	1.76N•m (0.18kgf•m)
RRA6R	47	9.5	M5	10 mm	3.42N•m (0.35kgf•m)

- For RRA7R and RRA8R



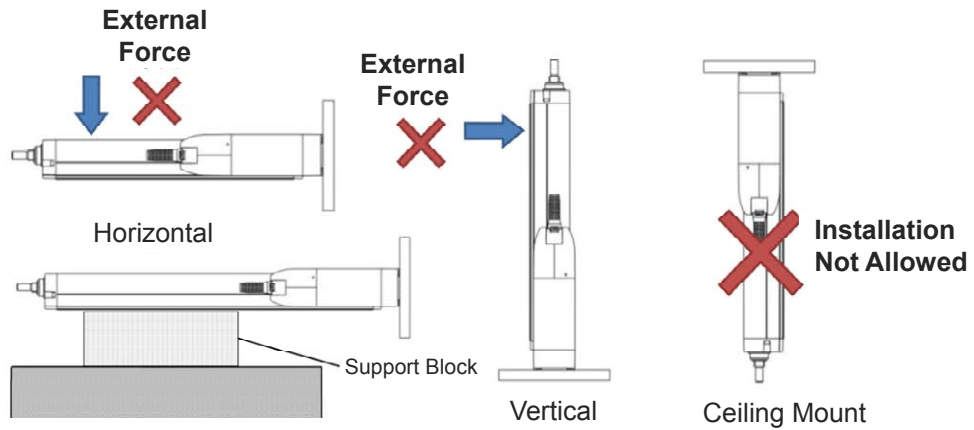
Model Name	A	B	Attachment Holes	Attachment Hole Depth	Tightening Torque
RRA7R	58	6.5	M6	12mm	5.4N•m (0.55kgf•m)
RRA8R	58	8	M6	12mm	5.4N•m (0.55kgf•m)

### Notice

- The use of high-strength bolts of ISO-10.9 or higher is recommended.
- Make sure the internal thread and bolt effective engagement length is approximately 1.8 times the nominal diameter or more.

**[Precautions for Using Attachment Holes on Bracket in Motor Reversing Type]**

- Do not apply external force to the actuator body.



Installation Posture			Supports
Horizontal	Vertical	Ceiling Mount	
×	×	×	No
○	○	×	Yes

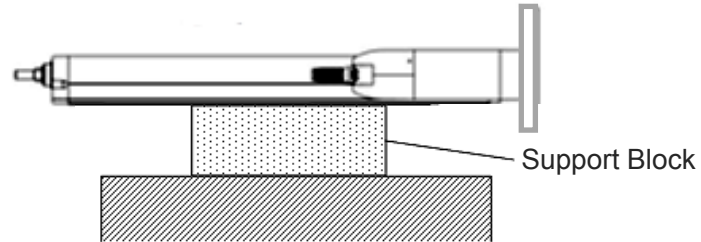


**Caution**

Do not apply external force to the actuator body after installation.  
External force may cause malfunctions or damage to parts.

**[Precautions for horizontal mounting using Attachment Holes on Bracket in Motor Reversing Type]**

- Prepare a support block for the body, as shown in the figure below.

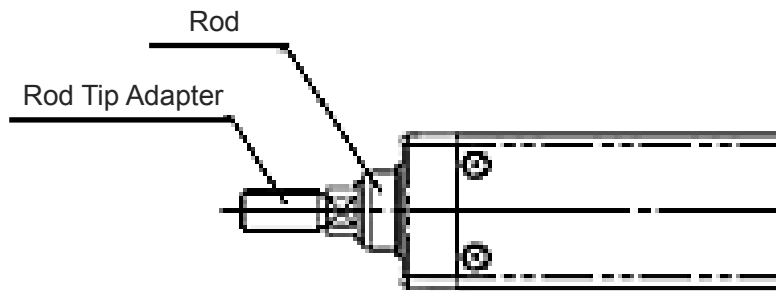




## Attachment of Transported Object

[When using the rod tip adapter male thread]

Transported objects can be secured using the male thread of the rod tip adapter.



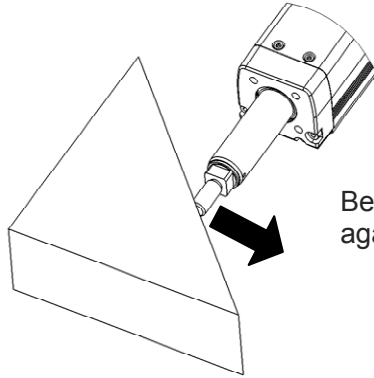
### Caution

When fastening a nut onto the tip bracket thread, make sure that the rod does not rotate. Use a wrench to fix the width across flat of the tip bracket with the rod in the maximum retraction position.



## Precautions regarding the rod

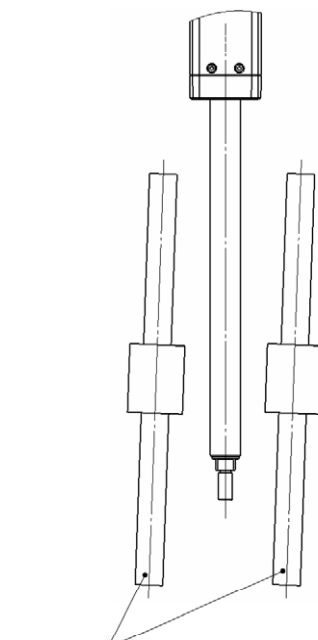
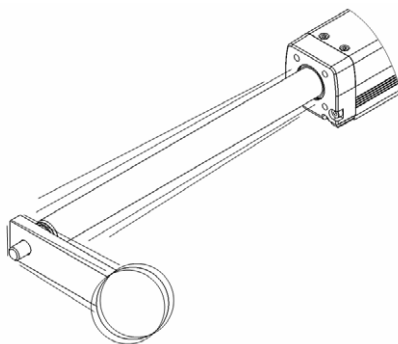
- When the reaction force against the pressing operation is the side-way force, make sure it would not exceed the allowable load.



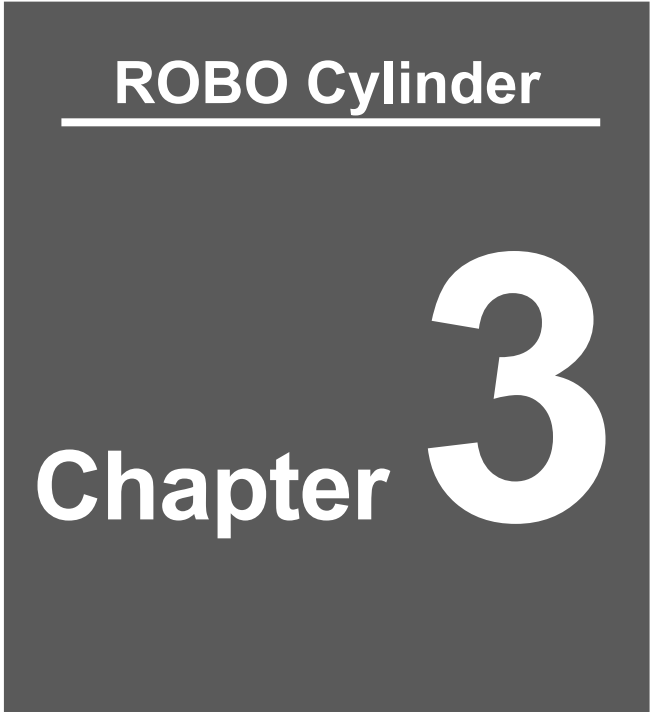
Be careful on the direction of the reaction force against the pressing.

- When connecting the rod to external guides, be careful on the parallelism of the guides to the rod. When connecting and fixing the rod to external guides, be careful not to apply excess side-way load to the rod because of the assembly variation. For the connection of the rod and guides, have a component such as a free joint to accept the assembly variation.

- When using a stroke of more than 200 and the load is eccentric (offset), the rod may generate vibration in some operation conditions. Apply guides to control the vibration.



External Guide



# Connecting with the Controller

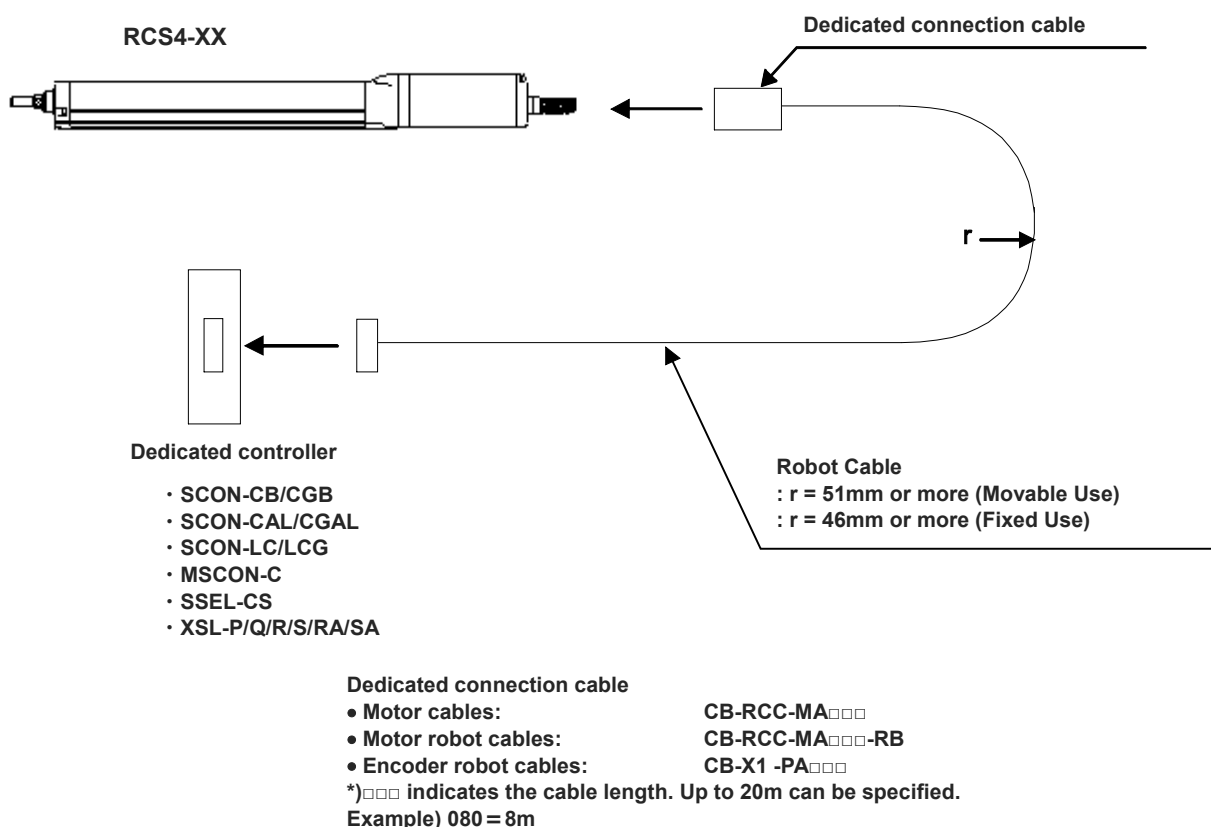
3.1 Connecting with the Controller ..... 3-1

## 3.1 Connecting with the Controller

As the connection cable for the controller and the actuator, use the IAI-dedicated connection cable.

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

- 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





## Caution

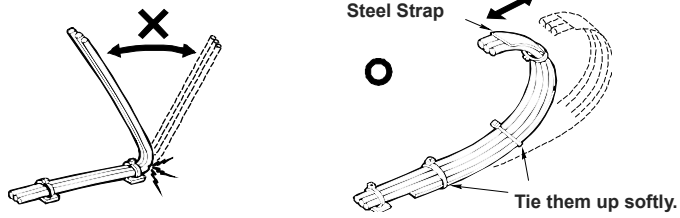
- For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure, or an 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.

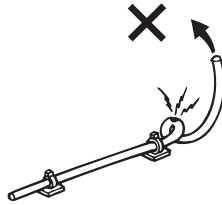
Use a cable pipe or duct to have an appropriate protection when there is a possibility of mechanical damage on a dedicated cable.
- In case a dedicated cable is to be used at a moving part, make sure to lay out the cable without applying any force to pull the connector or extreme bend on the cable. Do 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.

 **Caution**

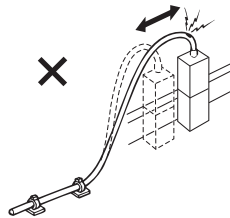
● Have a sufficient radius for bending, and avoid a bend concentrating on one point.



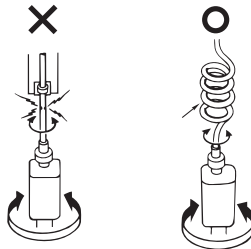
● Do not let the cable bend, kink or twist.



● Do not pull the cable with a strong force.

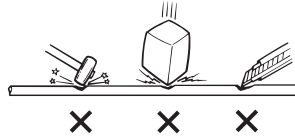


● Pay attention not to concentrate the twisting force to one point on a cable.

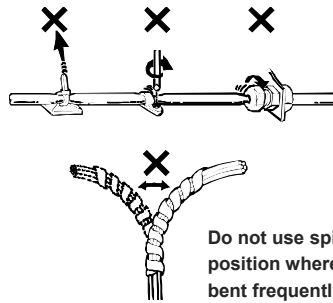


**Caution**

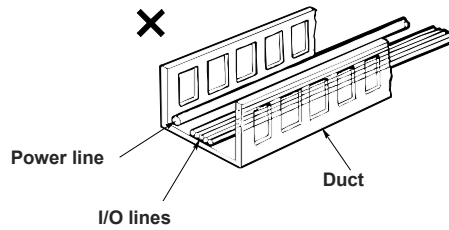
Do not pinch, drop a heavy object onto or cut the cable.



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



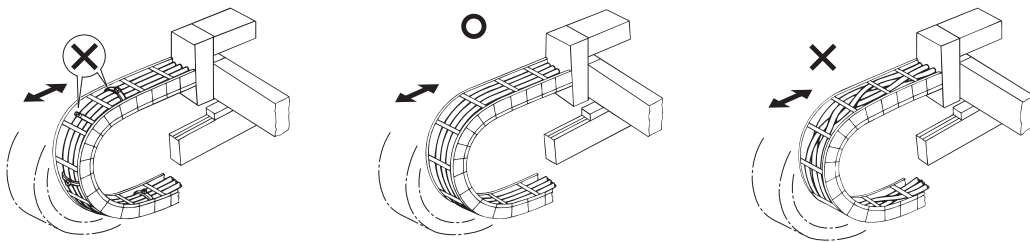
PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



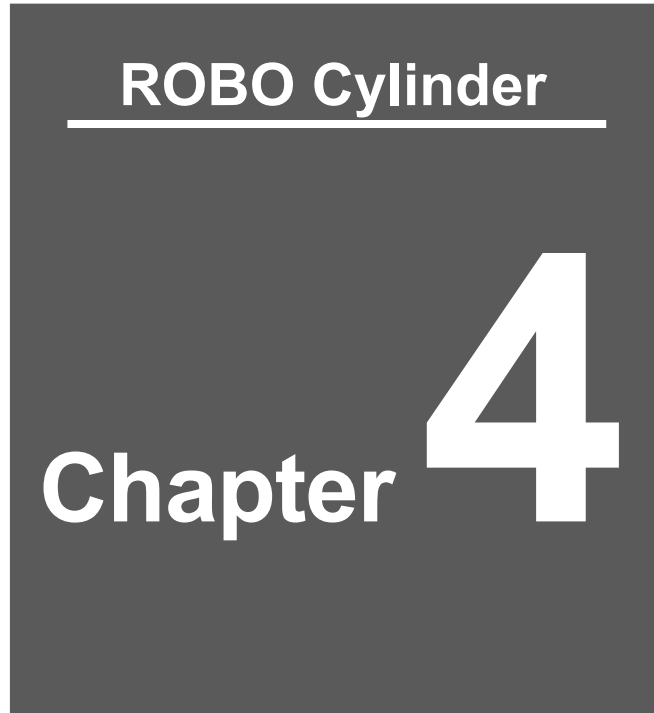
 **Caution**

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.







# Maintenance and Inspection

- 4.1 Precautions for maintenance and inspection work..... 4-1
- 4.2 Inspection items and schedule..... 4-3
  - Radial Cylinder ..... 4-3
  - Grease supply timing (Guideline)..... 4-3
- 4.3 Visual inspection items ..... 4-4
  - External visual inspection ..... 4-4
  - Internal visual inspection..... 4-5
- 4.4 Cleaning..... 4-7
  - External cleaning ..... 4-7
  - Internal cleaning ..... 4-7
- 4.5 Greasing method ..... 4-8
  - Grease used ..... 4-8
  - Greasing method ..... 4-9
- 4.6 How to replace components ..... 4-11
  - Belt replacement/adjustment ..... 4-11
  - Motor replacement..... 4-21

## 4.1 Precautions for maintenance and inspection work

Make sure to read the following precautions before conducting any maintenance or inspection work.



### Caution

- Do not climb on or put anything on the actuator. Otherwise, this may lead to accidental falling, injury or damage to the product due to falling objects, product loss of function or performance degradation, or shortening of product life.
- Before releasing the brake, make sure to check there is nothing that will interfere with moving parts within the operation range.
- The rod may fall, possibly injuring the operator or people nearby and damaging the Actuator, workpiece or equipment.



### Caution

- Check that the power to the Actuator is OFF before conducting any maintenance or inspections.
- Be careful not to lose the cover or any removed screws.  
Be sure to return the product to the original condition after maintenance and inspection work.
- Mounting in an incomplete state may cause injuries or damage to the product.
- Do not modify, disassemble/assemble, or use maintenance parts not specified on your own discretion under any circumstances.



### Caution

The grease film may run out if the actuator performs return operation continuously over a distance of 30mm or less. As a guideline, every 5,000 to 10,000 cycles, have approximately 5 cycles of return operation over a 50mm distance or more to regenerate the oil film.

The ball screw or guide may be damaged if the oil film runs out.

---

### Notice

- First, be sure to wipe off the old grease, and then supply new grease.
- The degradation speed of grease may differ depending on the operating environment (temperature, humidity and ambient atmosphere).

It is recommended to shorten the grease supply period if the actuator is used under poor environmental conditions such as high temperatures, high humidity or dusty atmospheres.

- Also, it is recommended to improve the environmental conditions in case the grease changes color notably due to poor operating conditions.
- Base oil may separate from the grease due to the mounting orientation or operating conditions.

Base oil may also leak from the inside of the Actuator to the exterior through gaps. Check visually for oil drips when supplying grease.

- An actuator stored for 6 months or more may suffer from grease degradation. Supply grease before the start of use.

→ For details, refer to "4.5 Greasing method".

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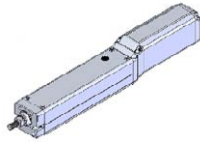
## 4.2 Inspection items and schedule

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.

### Radial Cylinder



Inspection period	External inspection	Internal inspection	Greasing	
			Rod sliding surface	Ball Screw and Guide
Start of work inspection	○	-	-	-
1 month inspection	○	-	-	-
3 month inspection	-	-	○	○
Every 3 months thereafter	○	-	○	-
3 months after starting operation	-	-		
6 month inspection	○	○	-	Grease supply timing (Guideline) dependent
Every 6 months thereafter	○	○		

### Grease supply timing (Guideline)

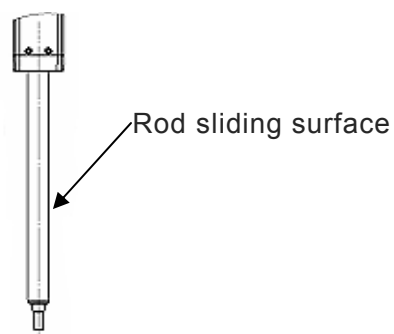
Maximum operating speed [mm/s]	Grease supply timing (Guideline)	
	Operation distance	Months
0 to 750 or less	1,250km	12 months
750 to 1500 or less	2,500km	

## 4.3 Visual inspection items

Refer to "4.6 How to replace components" for detailed information about specific component replacement and adjustment methods.

### External visual inspection

Inspection items	Maintenance work
Is abnormal noise or vibration generated?	Take an action by referring to "Troubleshooting in Controller Instruction Manual".
Are actuator mounting bolts loose?	Tighten them further.
Is the cable scratched?	Replace if the damage is severe.
Is the connector loose?	Re-insert correctly.
Is the rod sliding surface grease not lubricating well? (Even if the grease is brown, lubrication is adequate if the running surface is shiny)	Wipe away the old grease, then replenish with new grease.
Is there foreign matter or dust adhered to the rod sliding surface?	Replenish with new grease after cleaning.
Is grease dripping out? (especially if vertically mounted)	Clean up any drips. Replenish the grease.



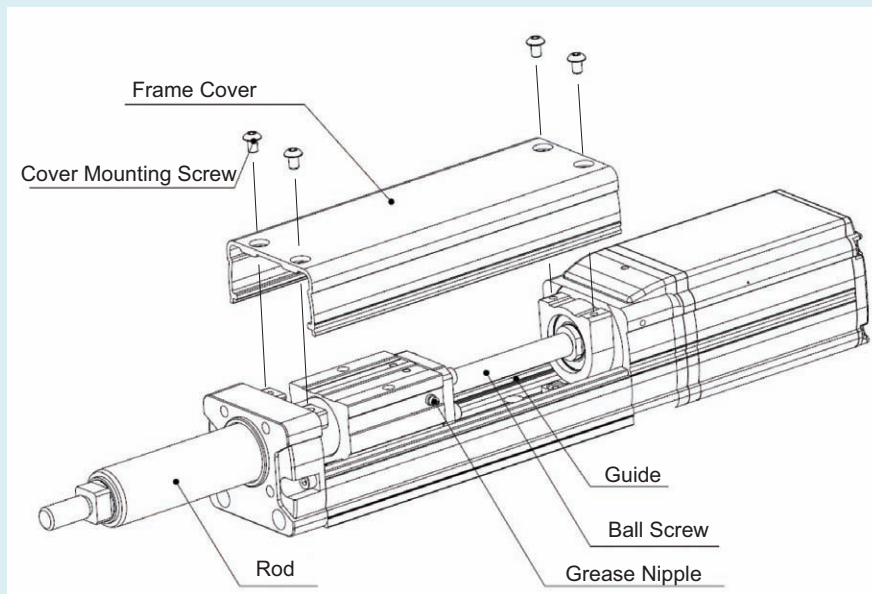
Refer to "4.6 How to replace components" for detailed information about specific component replacement and adjustment methods.

 **Internal visual inspection**

Inspection items	Maintenance work
<b>Are actuator mounting bolts loose?</b>	Tighten them further.
<b>Is the ball screw or guide grease not lubricating well?</b> <b>(Even if the grease is brown, lubrication is adequate if the running surface is shiny )</b>	Wipe away the old grease, then replenish with new grease.
<b>Is dust or foreign matter adhered to the ball screw or guide?</b>	Replenish with new grease after cleaning.

**Internal inspection method**

- 1) With 1.5mm (RRA4C, RRA4R) or with 2.5mm (RRA6C, RRA6R, RRA7C and RRA7R) hex wrench, loosen the screws holding the frame cover, and detach the frame cover.
- 2) Check inside.  
Extend the rod when checking the ball screw. The ball screw will appear. Slide the rod manually with hand or move it with JOG operation of the controller.
- 3) After finishing the inspection, assemble back in the reverse order.



Model Name	Screw Diameter	Tightening Torque
RRA4C, RRA4R	M3	0.62N•cm
RRA6C, RRA6R	M4	1.76N•cm
RRA7C, RRA7R	M4	1.76N•cm

## 4.4 Cleaning

### External cleaning

- Clean exterior surfaces as necessary.
- If grease base oil etc. drips on the rod sliding surface and its periphery, wipe it off with a soft cloth, etc.
- 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 gaps.
- Do not use petroleum-based solvents as they can harm resin and painted surfaces.
- To remove severe buildup, wipe gently with a soft cloth soaked in a neutral detergent or alcohol.

### Internal cleaning

Conduct it only to RRA4, RRA6 and RRA7.

- 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 gaps.
- Do not use petroleum-based solvents, neutral detergent or alcohol.



## 4.5 Greasing method

### [1] Grease used: Use an equivalent product

◎ RRA4, RRA6 and RRA7

Application location	During maintenance (recommended product)	Default (reference)
Ball screw	Kyodo Yushi/ Multemp LRL No. 3	Kyodo Yushi/ Multemp LRL No. 3
Guide		
Rod (sliding surface)		



### Caution

- Do not attempt to apply fluorine grease.  
Mixing lithium grease with other grease not only reduces the performance of the grease, it may even cause damage to the actuator.

◎ RRA8

Application location	During maintenance (recommended product)	Default (reference)
Ball screw	Idemitsu Kosan/ Daphne Eponex Grease No. 2	Idemitsu Kosan/ Daphne Eponex Grease No. 2
Guide		
Rod (sliding surface)		



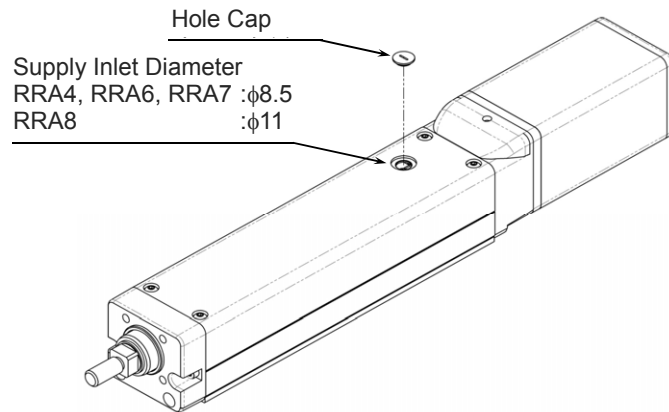
### Caution

- Do not attempt to apply fluorine grease.  
Mixing lithium grease with other grease not only reduces the performance of the grease, it may even cause damage to the actuator.

[2] Greasing method: Ball screw and Guide,

**Greasing method**

1) Take off the cap on the front side.



2) Move the rod to the home position manually or with JOG operation of the controller.

3) Insert a grease gun to the supply hole (RRA4, RRA6 and RRA7: φ8.5, RRA8: φ11) on the top of the frame, hold the gun on the grease nipple and supply grease.

By supplying grease only to this grease nipple, grease can be supplied to both the ball screw and guide.

(Note) Follow the grease nipple diameter shown in the list below when preparing a grease gun.

	Nipple Diameter
RRA4, RRA6, RRA7	φ3.5
RRA8	φ6.0

Grease Gun	Nozzle	Supplier of nozzle
Grease gun of mounting screw R1/8 (Example) GC-57K (Yamada Corporation)	NZ3	NSK

Model	Amount of Grease Supply (Reference)
RRA4	0.5cc to 1.0cc
RRA6	1.5cc to 2.0cc
RRA7	2.0cc to 2.5cc
RRA8	3.5cc to 4.0cc

**Caution**

Supplying too much grease may increase sliding resistance and load to the motor, resulting in a drop of performance.

Also, there is a concern that the excess grease applied to the ball screw may splash around and dirt the peripheral.

- 4) Cleanup the rod (sliding surface) and apply the grease with hands.
- 5) Slide the rod back and forth manually with hand or by the controller with JOG operation to spread out the grease evenly.
- 6) Attach the cap.

**Caution**

If the grease enters your eye, wash it with clean water for 15 minutes and immediately see a specialist physician for appropriate care.

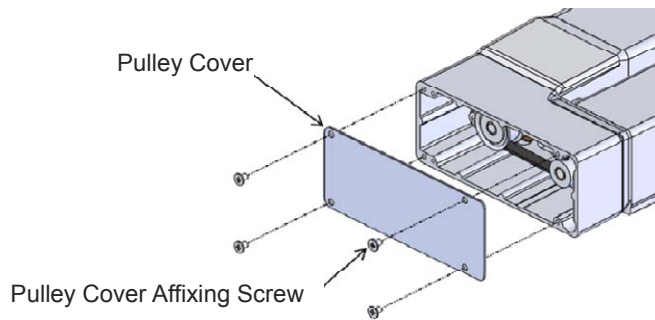
After finishing the grease replenishment, wash your hands carefully with water and soap to rinse the grease off.

## 4.6 How to replace components

### Belt replacement/adjustment

#### [Belt Inspection]

1) Detach the pulley cover affixing screws and take off the pulley cover.



2) Check the condition of the belt visually.

### Judgment

- It generally has life of hundreds of times for bending movement. However, the replacement period cannot be determined in general because the durability of the belt can be greatly influenced by the conditions of operation.
- 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
- 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.

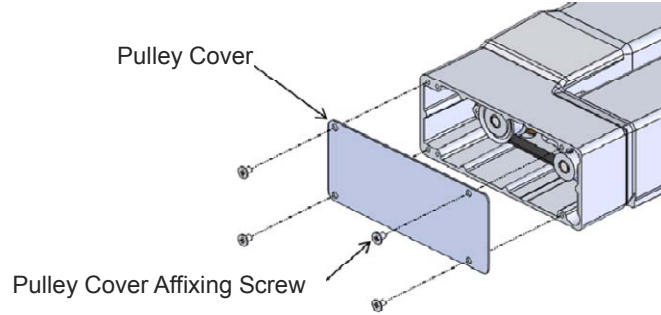
**[Belt to Use]**

IAI uses the following belt in our plant

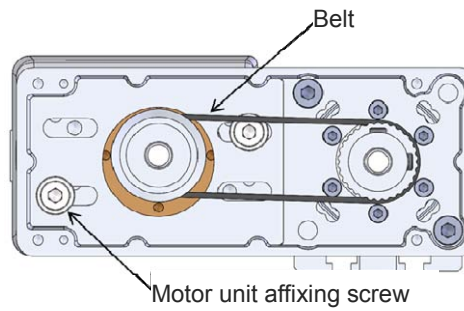
Model	Belt to Use	Manufacture Name
RRA4R	60S2M162R	Bando Chemical Industries, Ltd.
RRA6R	60S3M207GB	Mitsuboshi belting Ltd.
RRA7R	100S3M249R	Bando Chemical Industries, Ltd.
RRA8R	275-EV5GT-15	Gates Unitta Asia, Ltd.

**[Belt Replacement: RRA4R, RRA6R, RRA7R]**

1) Detach the pulley cover affixing screws and take off the pulley cover.

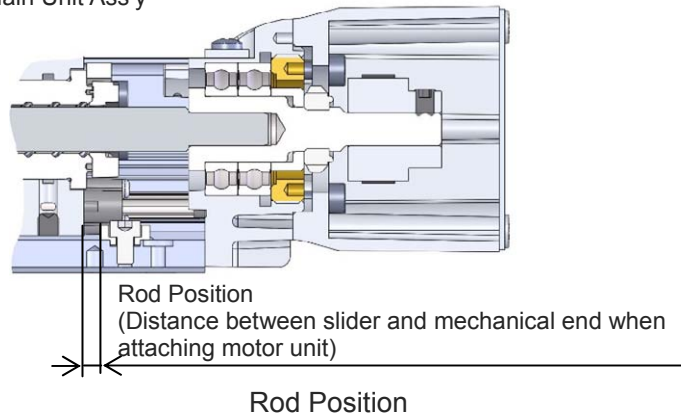


2) Loosen the motor unit affixing screw and take off the belt.



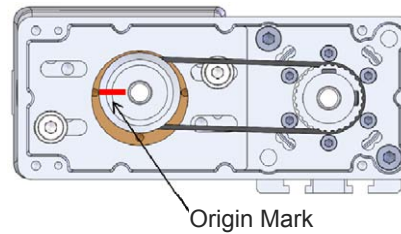
3) Keep the Rod at the distance shown in the table below from the mechanical end.

Section: Main Unit Ass'y

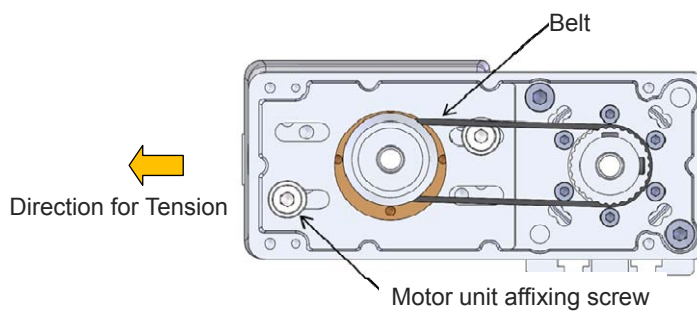


Model	Rod Position [mm]
RRA4R, RRA6R, RRA7R	2

- 4) With the origin mark marked on the motor end pulley facing outwards, hang the belt on the pulleys.



- 5) Apply tension in the force shown in the table below to the motor unit, and tighten the motor unit affixing screw in the tightening torque shown in the table below.



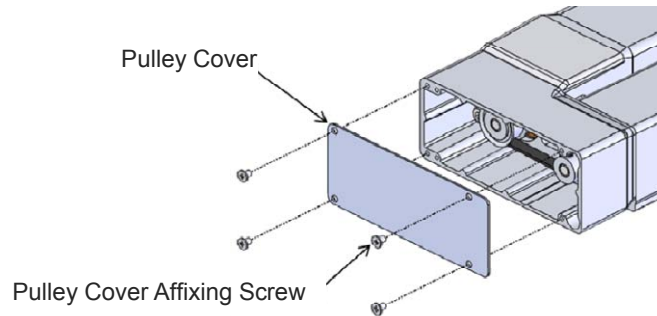
Tensile Force when Attaching Motor Unit

Model	Tensile Force [N]
RRA4R	20 to 25
RRA6R	40 to 45
RRA7R	70 to 80

Motor Unit Affixing Screw Tightening Torque

Model	Tightening Torque [N•m]
RRA4R, RRA6R	2.1
RRA7R	4.1

- 6) Tighten up the pulley cover with the pulley cover affixing screws in the specified torque.



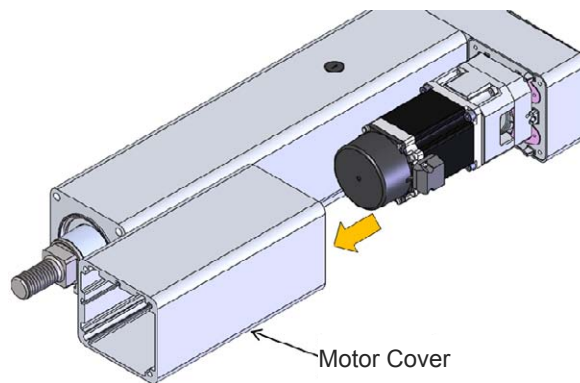
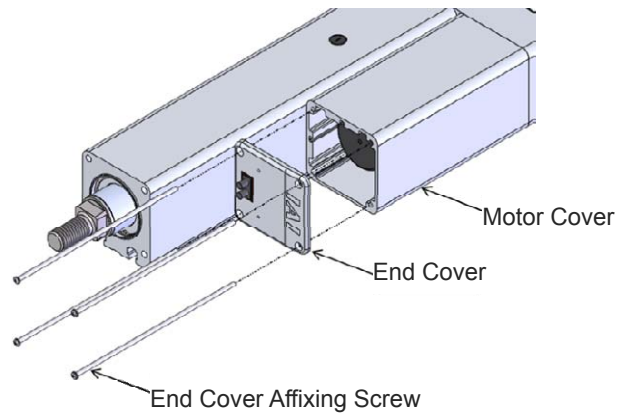
Pulley Cover Affixing Screw Tightening Torque

Model	Type of Screws	Tightening Torque [N·m]
RRA4R	Cross Recessed Slim-Head Screw (SUS) : M3	0.4
RRA6R, RRA7R	Cross Recessed Flat-Head Screw (SUS) : M3	0.4

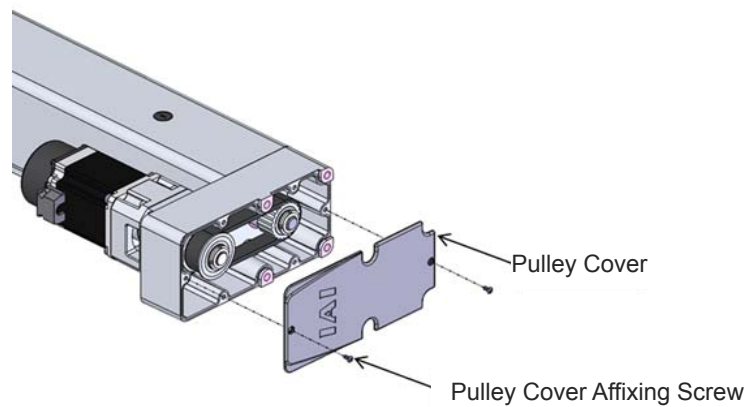


**[Belt Replacement: RRA8R]**

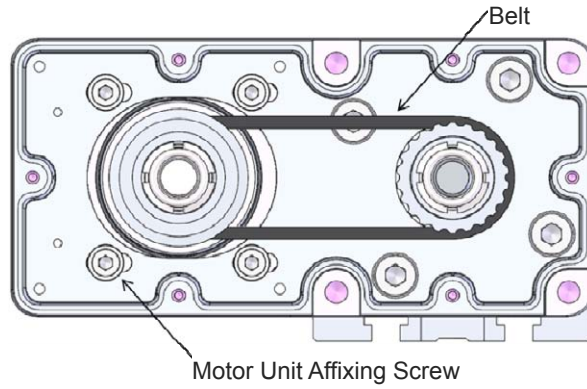
- 1) Detach the end cover affixing screws and take off the end cover and motor cover.



- 2) Detach the pulley cover affixing screw and take off the pulley cover.

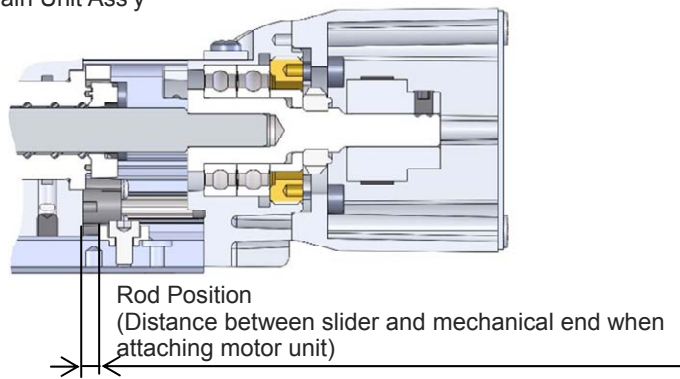


3) Loosen the motor unit affixing screw and take off the belt.



4) Keep the Rod at the distance shown in the table below from the mechanical end.

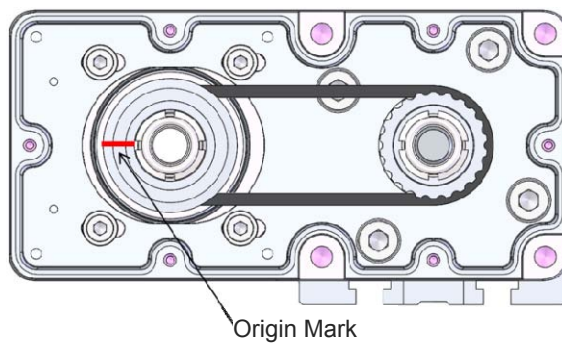
Section: Main Unit Ass'y



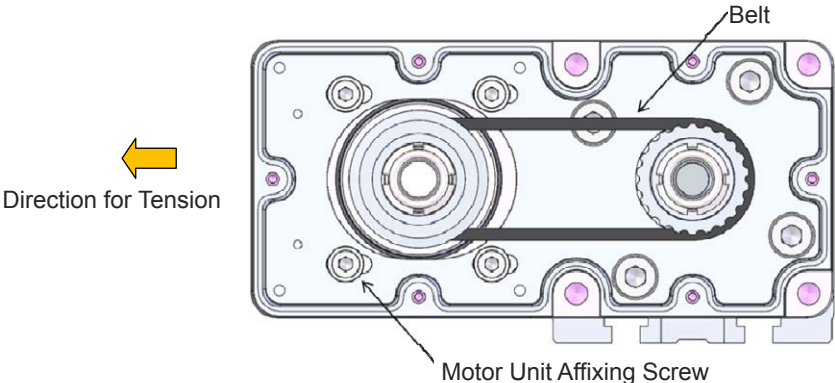
Rod Position

Model	Rod Position [mm]
RRA8R	2

5) With the origin mark marked on the motor end pulley facing outwards, hang the belt on the pulleys.



6) Apply tension in the force shown in the table below to the motor unit, and tighten the motor unit affixing screw in the tightening torque shown in the table below.



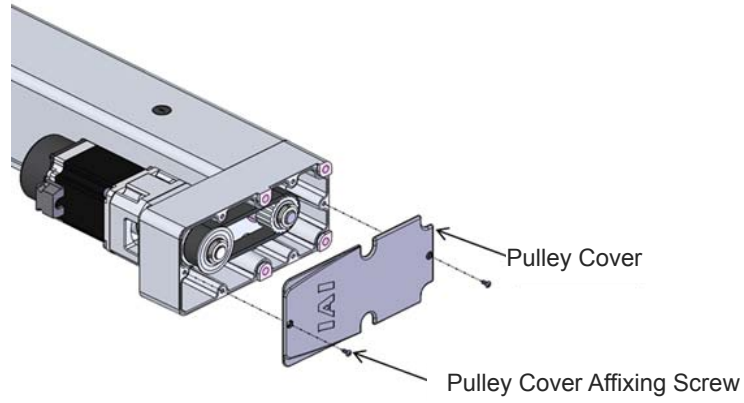
Tensile Force when Attaching Motor Unit

Model	Tensile Force [N]
RRA8R	180 to 200

Motor Unit Affixing Screw Tightening Torque

Model	Tightening Torque [N•m]
RRA8R	4.1

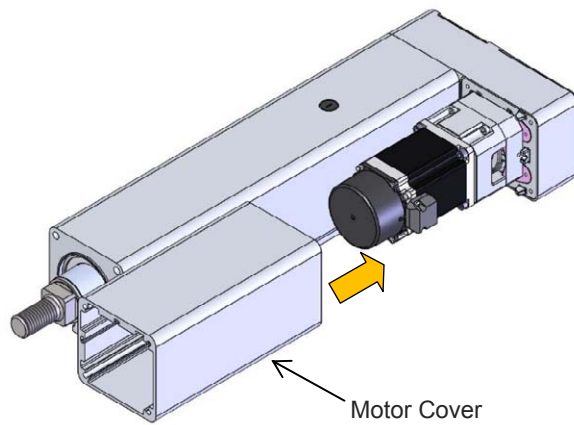
7) Tighten up the pulley cover with the pulley cover affixing screws in the specified torque.

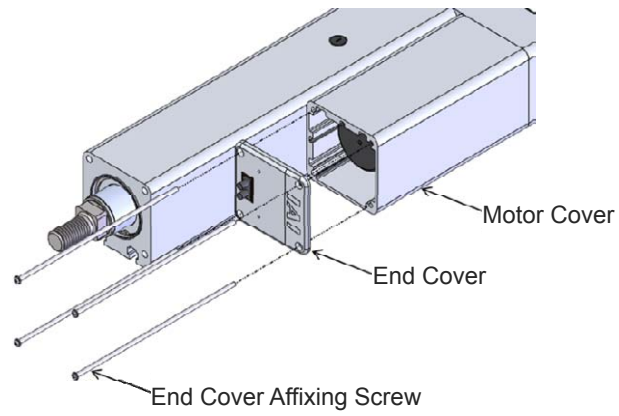


Pulley Cover Affixing Screw Tightening Torque

Model	Type of Screws	Tightening Torque [N•m]
RRA8R	Hex Socket Button Head Screw: M3	0.4

8) Affix the end cover and motor cover with the end cover affixing screws, and tighten them up with the specified tightening torque.





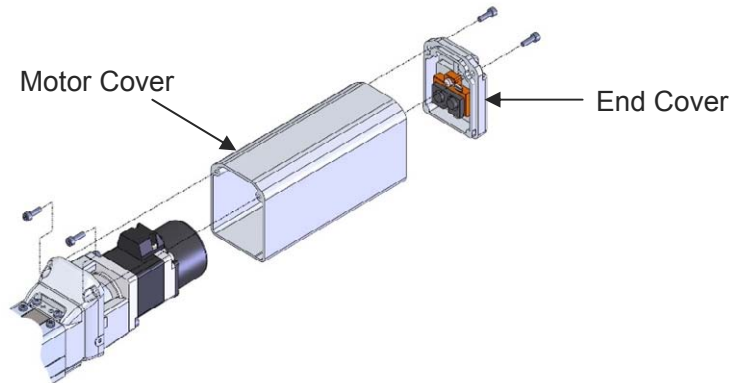
End Cover Affixing Screw Tightening Torque

Model	Type of Screws	Tightening Torque [N•m]
RRA8R	Cross-recessed pan screws: M4	1.0

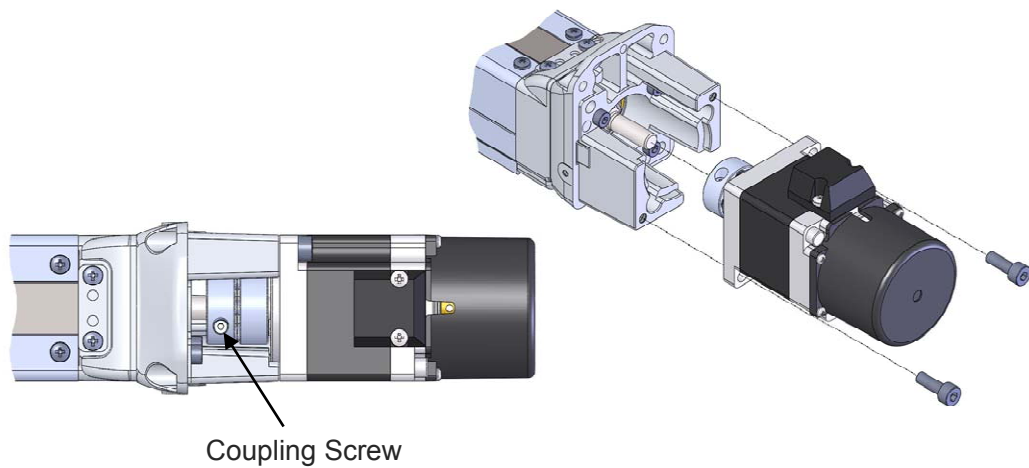
## Motor replacement

### [Motor Straight Type]

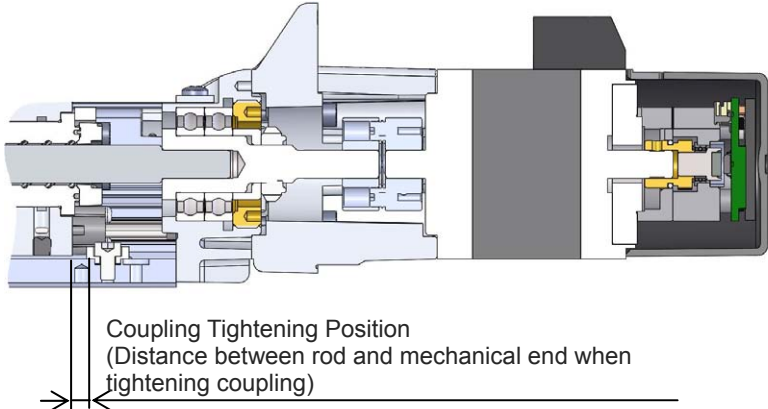
- 1) Detach the motor cover affixing screws.
- 2) Take off the end cover and motor cover.



- 3) Move the slider to the position where the coupling screw on the actuator side can be seen.
- 4) Loosen the coupling screw, detach the motor affixing screws and take off the motor.



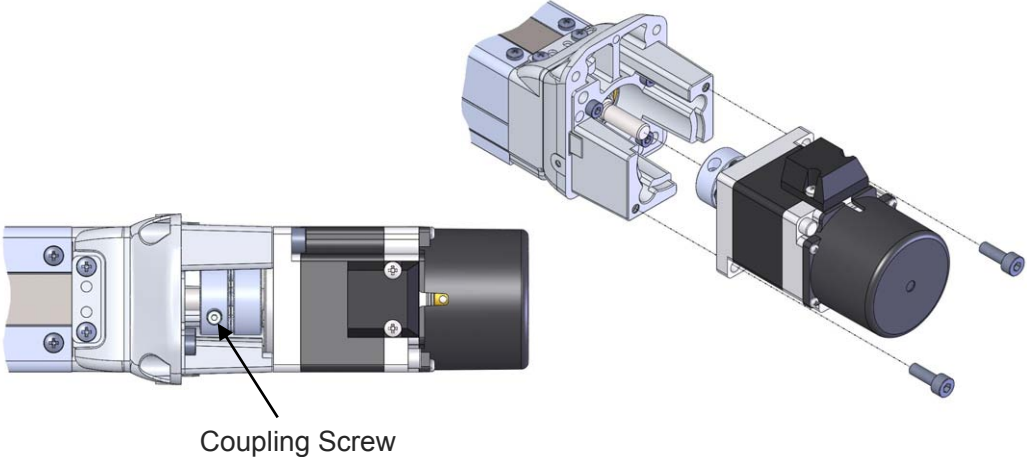
5) Keep the rod at the distance shown in the table from the mechanical end.



Coupling Tightening Position

Model	Coupling Tightening Position [mm] (Distance between rod and Mechanical End)
RRA4C	2
RRA6C	2
RRA7C	2
RRA8C	2

6) Hold the motor for replacement loosely with the motor affixing screws, and then tighten the coupling screw in the tightening torque shown in the table.



Coupling Tightening Torque

Model	Tightening Torque [N•m]
RRA4C	0.4
RRA6C	0.9
RRA7C	1.5
RRA8C	1.5

7) Fully tighten the motor affixing screws in the tightening torque shown in the table.

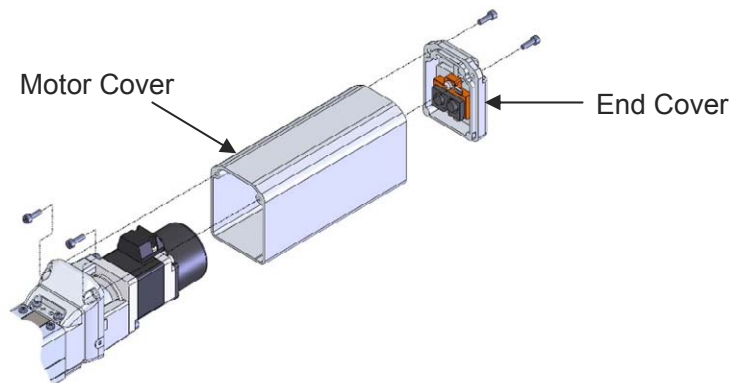
Motor affixing screws Tightening Torque

Model	Tightening Torque [N•m]
RRA4C	2.1
RRA6C	2.1
RRA7C	4.1
RRA8C	4.1

8) Attach the motor cover and end cover.

Tighten the motor cover affixing screws in the tightening torque shown in the table.

Pay attention not to get the cable pinched.



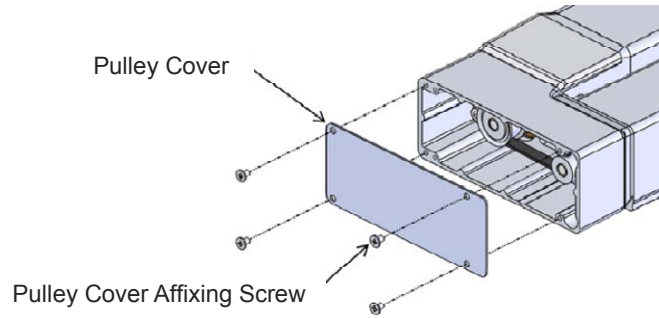
Motor Cover and End Cover Affixing Screw Tightening Torque

Model	Type of Screws	Tightening Torque [N•m]
RRA4C	Hexagonal Socket Head Bolt: M3	0.9
RRA6C	Hexagonal Socket Head Bolt: M3	0.9
RRA7C	Hexagonal Socket Head Bolt: M4	2.1
RRA8C	Cross-recessed pan screws: M4	1.0

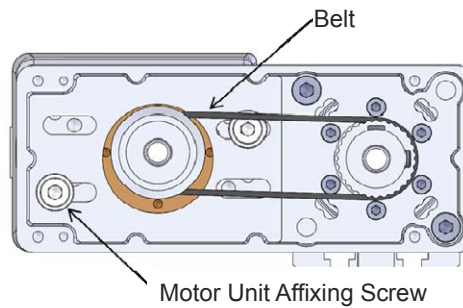


**[Motor-Reversed Type: RRA4R, RRA6R, RRA7R  
When Replacing Motor Unit]**

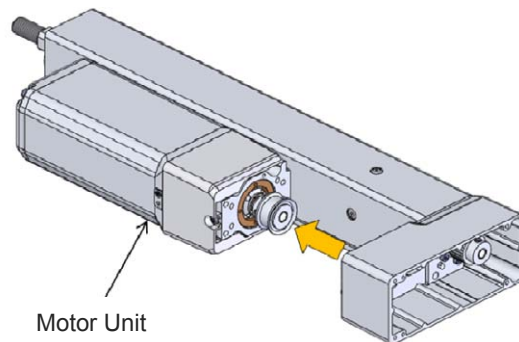
- 1) Detach the pulley cover affixing screws and take off the pulley cover.



- 2) Detach the motor unit affixing screw and take off the belt.

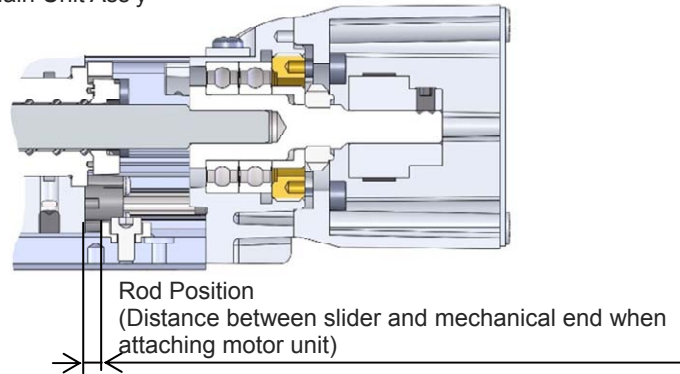


- 3) Detach the motor unit.



- 4) Attach the motor unit for replacement.
- 5) Keep the Rod at the distance shown in the table below from the mechanical end.

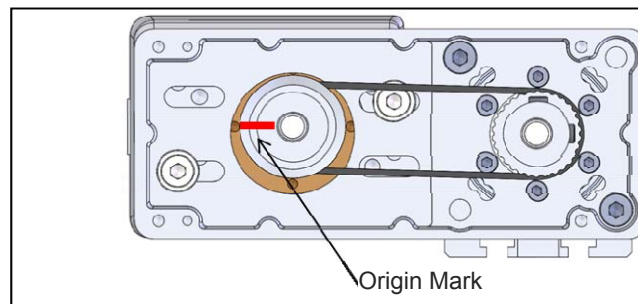
Section: Main Unit Ass'y



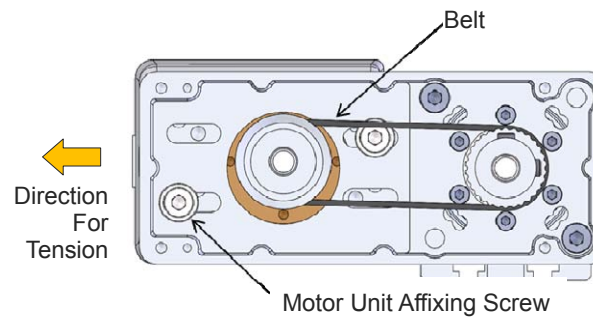
Rod Position

Model	Rod Position [mm]
RRA4R, RRA6R, RRA7R	2

- 6) With the origin mark marked on the motor end pulley facing outwards, hang the belt on the pulleys.



- 7) Apply tension in the force shown in the table below to the motor unit, and tighten the motor unit affixing screw in the tightening torque shown in the table below.



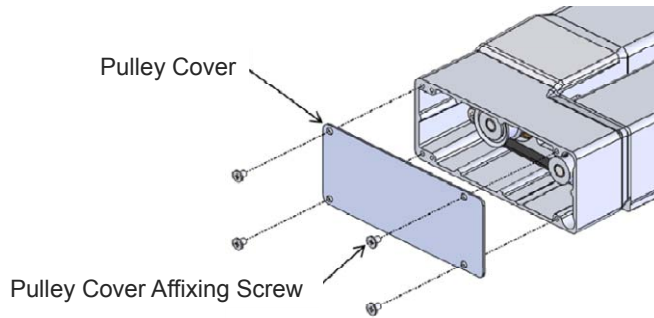
Tensile Force when Attaching Motor Unit

Model	Tensile Force[N]
RRA4R	20 to 25
RRA6R	40 to 45
RRA7R	70 to 80

Motor Unit Affixing Screw Tightening Torque

Model	Tightening Torque [N•m]
RRA4R, RRA6R	2.1
RRA7R	4.1

8) Tighten up the pulley cover with the pulley cover affixing screws in the specified torque.

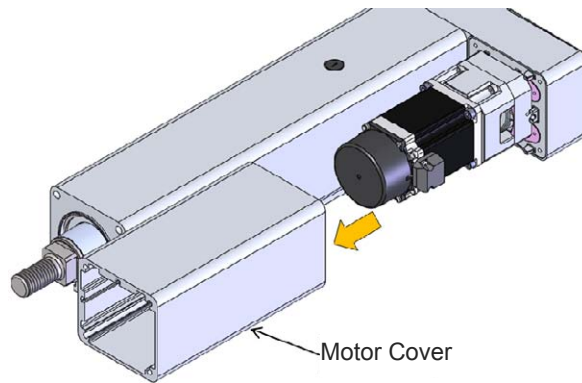
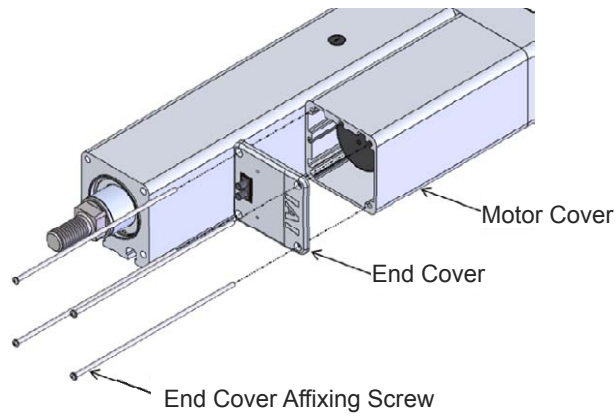


Pulley Cover Affixing Screw Tightening Torque

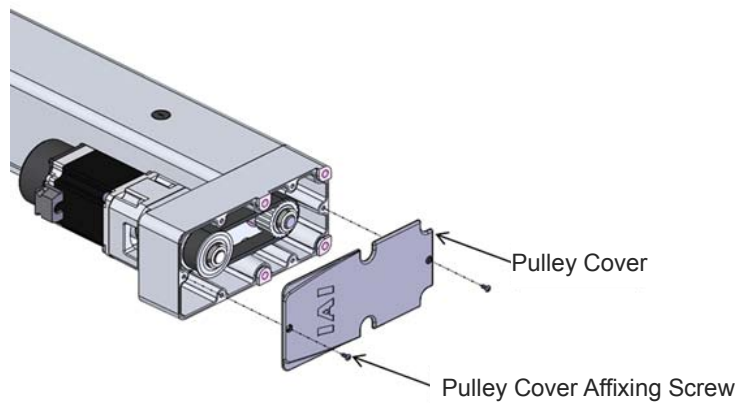
Model	Type of Screws	Tightening Torque [N•m]
RRA4R	Cross Recessed Slim-Head Screw (SUS) : M3	0.4
RRA6R, RRA7R	Cross Recessed Flat-Head Screw (SUS) : M3	0.4

**[Motor Reversing Type: RRA8R****When Replacing Motor Equipped with Pulley]**

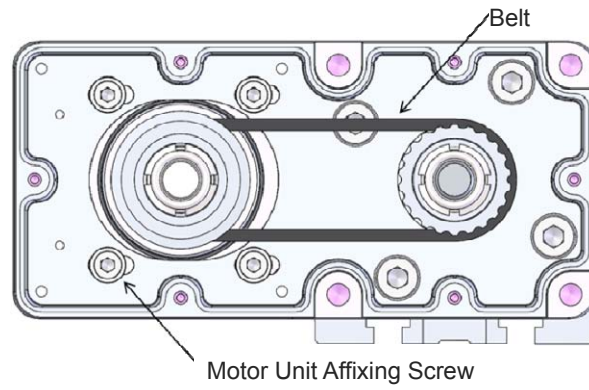
- 1) Detach the end cover affixing screws and take off the end cover and motor cover.



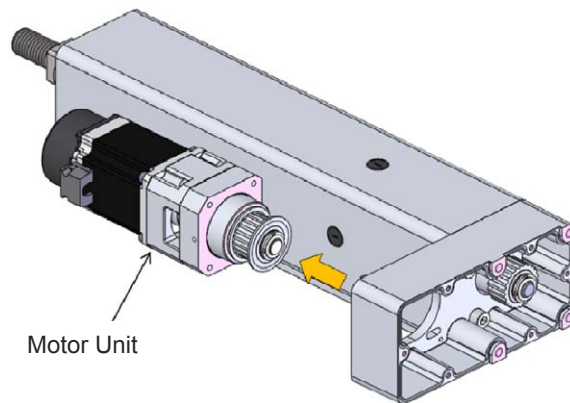
- 2) Detach the pulley cover affixing screws and take off the pulley cover.



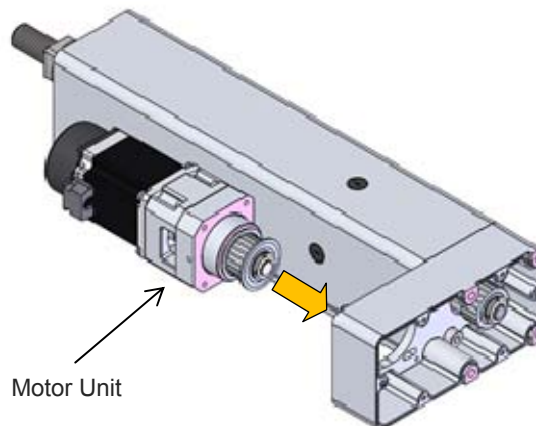
3) Detach the motor unit affixing screw and take off the belt.



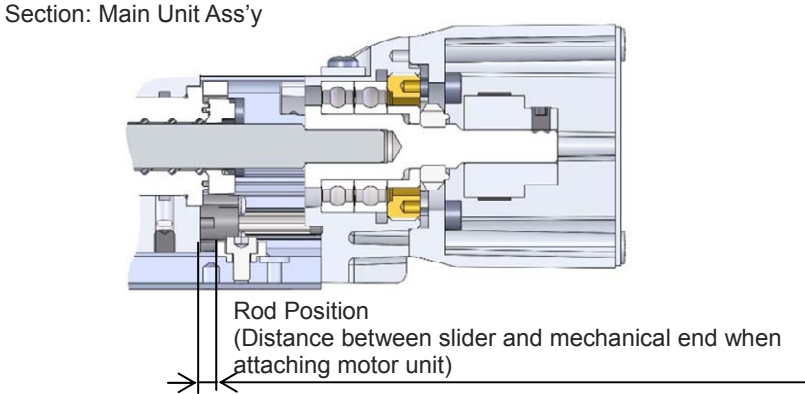
4) Detach the motor unit.



5) Attach the motor unit for replacement and hang the belt.



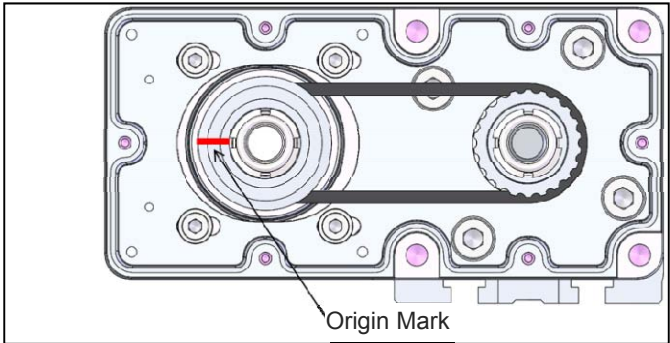
6) Keep the rod at the distance shown in the table below from the mechanical end.



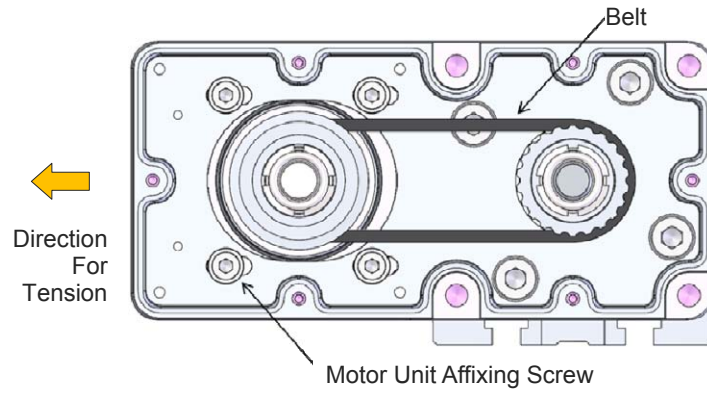
Rod Position

Model	Rod Position [mm]
RRA8R	2

7) With the origin mark marked on the motor end pulley facing outwards, hang the belt on the pulleys.



8) Apply tension in the force shown in the table below to the motor unit, and tighten the motor unit affixing screw in the tightening torque shown in the table below.



Tensile Force when Attaching Motor Unit

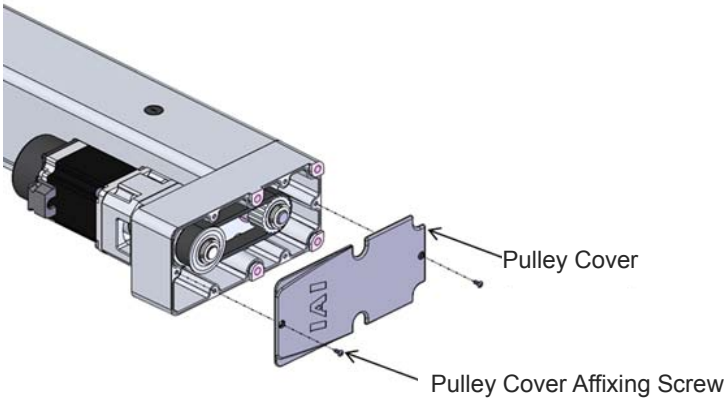
Model	Tensile Force[N]
RRA8R	180 to 200

Motor Unit Affixing Screw Tightening Torque

Model	Tightening Torque [N•m]
RRA8R	4.1



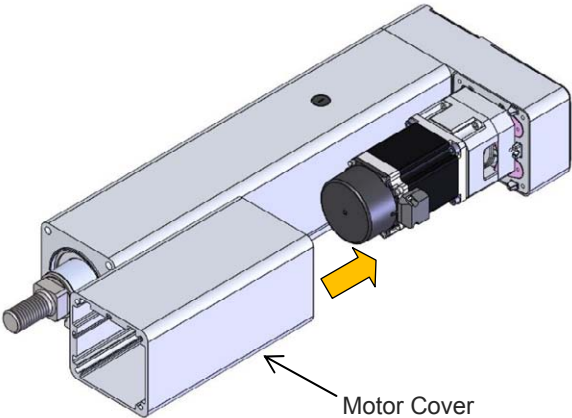
9) Tighten up the pulley cover with the pulley cover affixing screws in the specified torque.

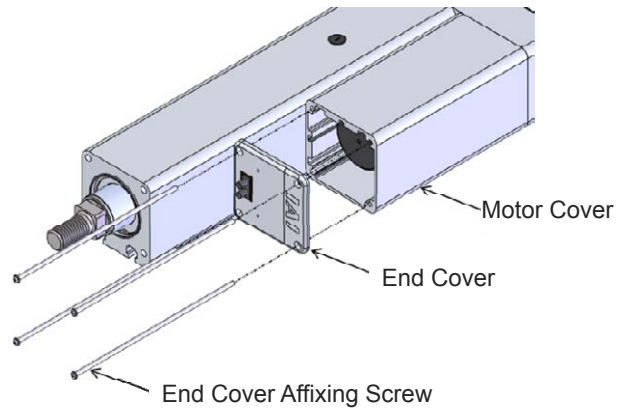


Pulley Cover Affixing Screw Tightening Torque

Model	Type of Screws	Tightening Torque [N·m]
RRA8R	Hex Socket Button Head Screw : M3	0.4

10) Affix the end cover and motor cover with the end cover affixing screws, and tighten them up with the specified tightening torque.





End Cover Affixing Screw Tightening Torque

Model	Type of Screws	Tightening Torque [N•m]
RRA8R	Cross-recessed pan screws: M4	1.0



### Caution

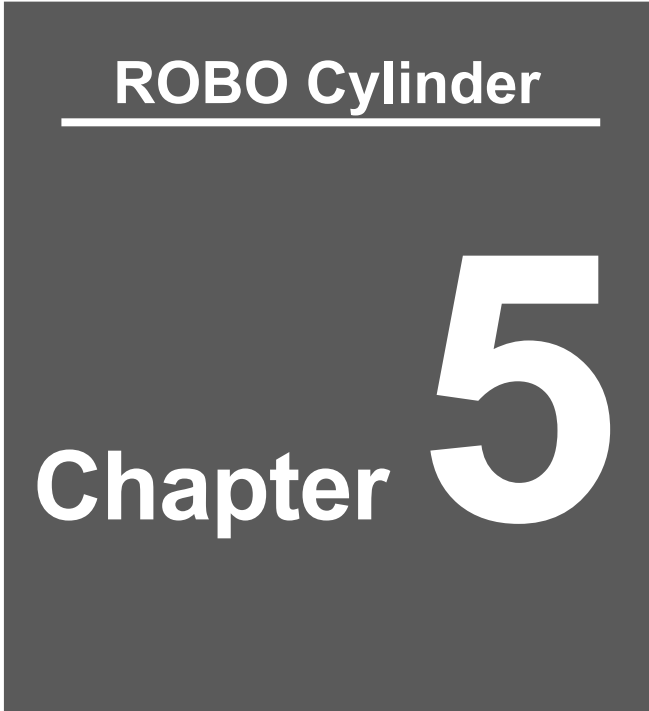
Make sure to hold the slider so it would not move in case of replacing a motor in vertical installation which is not equipped with a brake. It will be dangerous as the slider will be dropped, if it is not held, as soon as the motor gets taken off.

---

### Notice

- Pay attention not to get the cable pinched when attaching the motor cover and end cover.
  - When the actuator is not equipped with a brake, make sure that the motor is magnetized when attaching it so the shaft and the origin point get aligned.
-





# External Dimensions

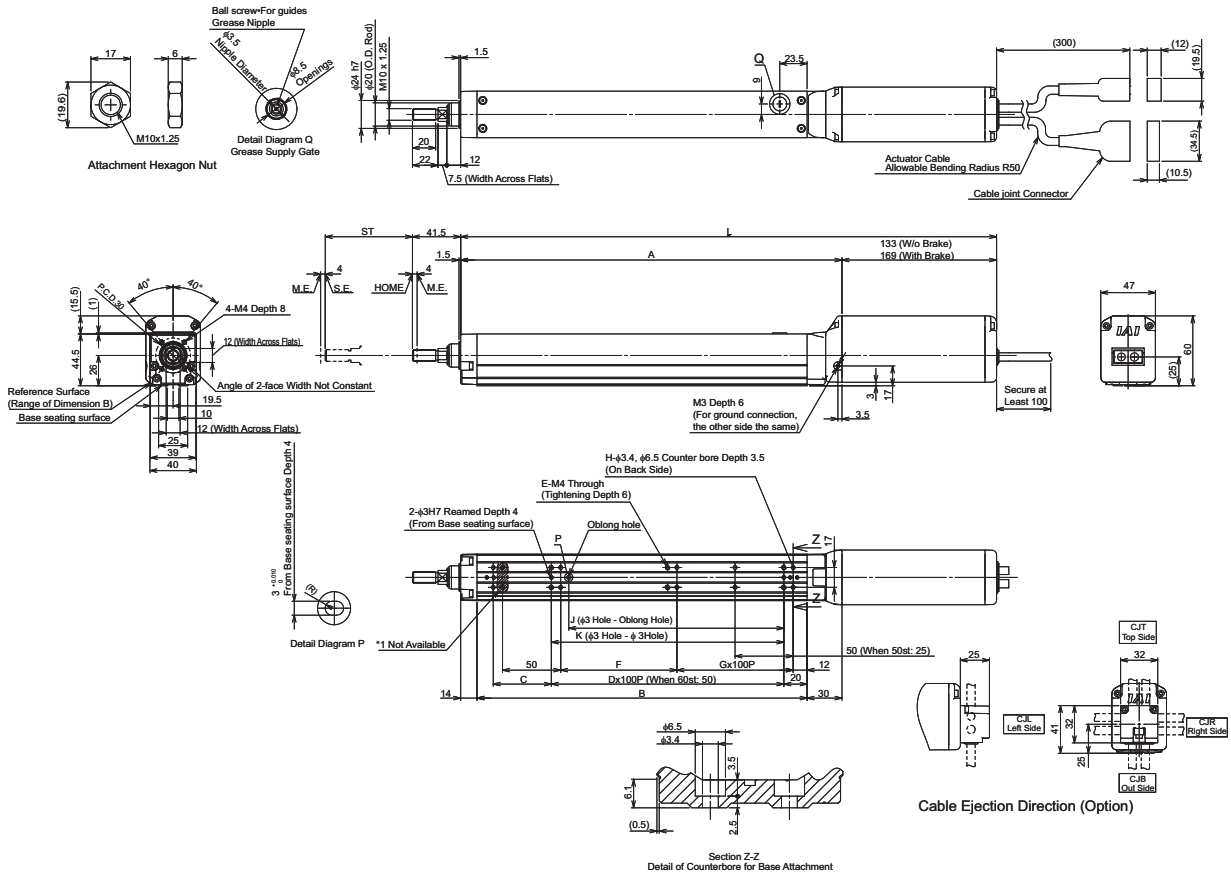
5.1 External Dimensions.....	5-1
RCS4-RRA4C.....	5-1
RCS4-RRA6C.....	5-2
RCS4-RRA7C.....	5-3
RCS4-RRA8C.....	5-4
RCS4-RRA4R.....	5-5
RCS4-RRA6R.....	5-6
RCS4-RRA7R.....	5-7
RCS4-RRA8R.....	5-8

## 5.1 External Dimensions

# 5.1 External Dimensions



ST: Stroke, M.E.: Mechanical End, S.E.: Stroke End



\*1 The two holes on the rod side in attachment holes on the base top (H) cannot be used. Also the number of holes (H) shown in the table excludes those not available to use.

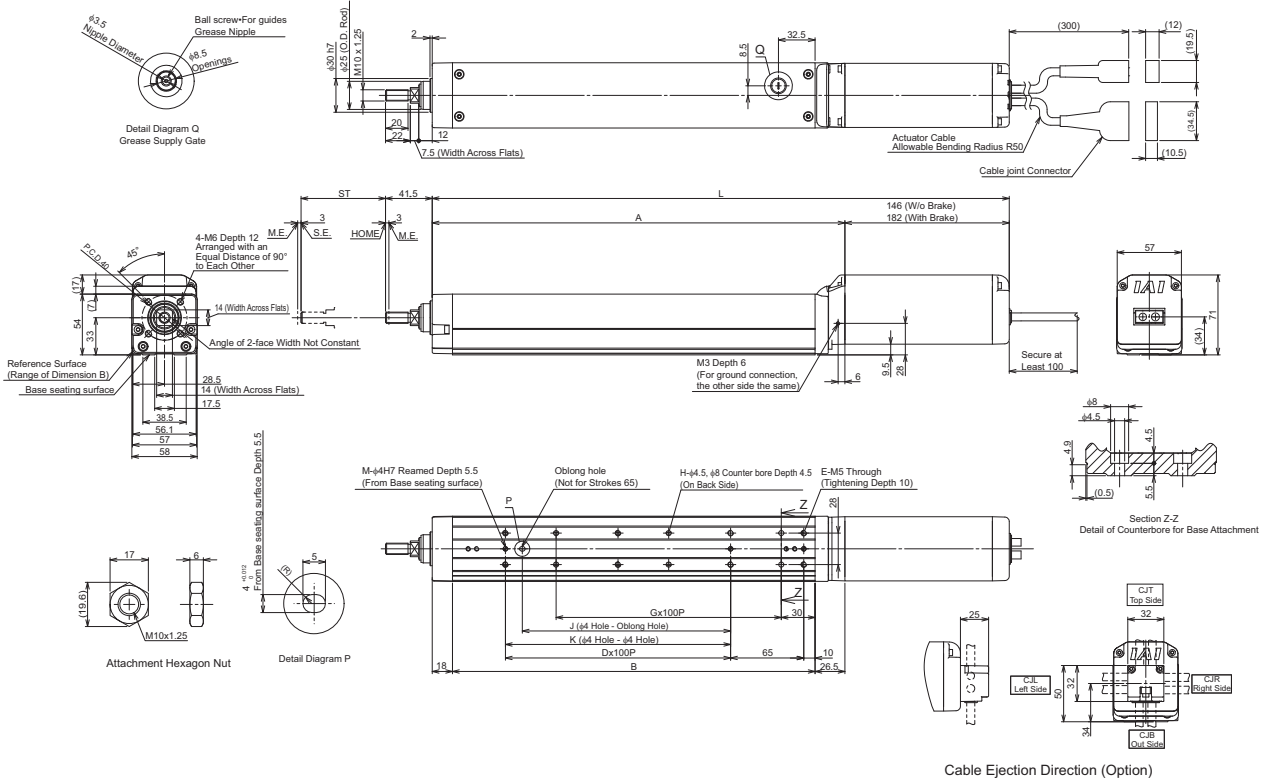
### ■ Dimensions and Mass by Stroke

Unit: mm

Stroke	L		A	B	C	D	E	F	G	H <sup>*1</sup>	J	K	Mass [kg]	
	w/o Brake	With Brake											w/o Brake	With Brake
60	311	347	178	134	50	0	6	50	0	6	35	50	1.3	1.6
110	361	397	228	184	50	1	6	100	0	6	85	100	1.3	1.6
160	411	447	278	234	100	1	6	50	1	8	85	100	1.4	1.7
210	461	497	328	284	50	2	8	100	1	8	185	200	1.5	1.8
260	511	547	378	334	100	2	8	50	2	10	185	200	1.6	1.9
310	561	597	428	384	50	3	10	100	2	10	285	300	1.7	2.0
360	611	647	478	434	100	3	10	50	3	12	285	300	1.8	2.1
410	661	697	528	484	50	4	12	100	3	12	385	400	1.9	2.2



ST: Stroke, M.E.: Mechanical End, S.E.: Stroke End



5. External Dimensions

■ Dimensions and Mass by Stroke

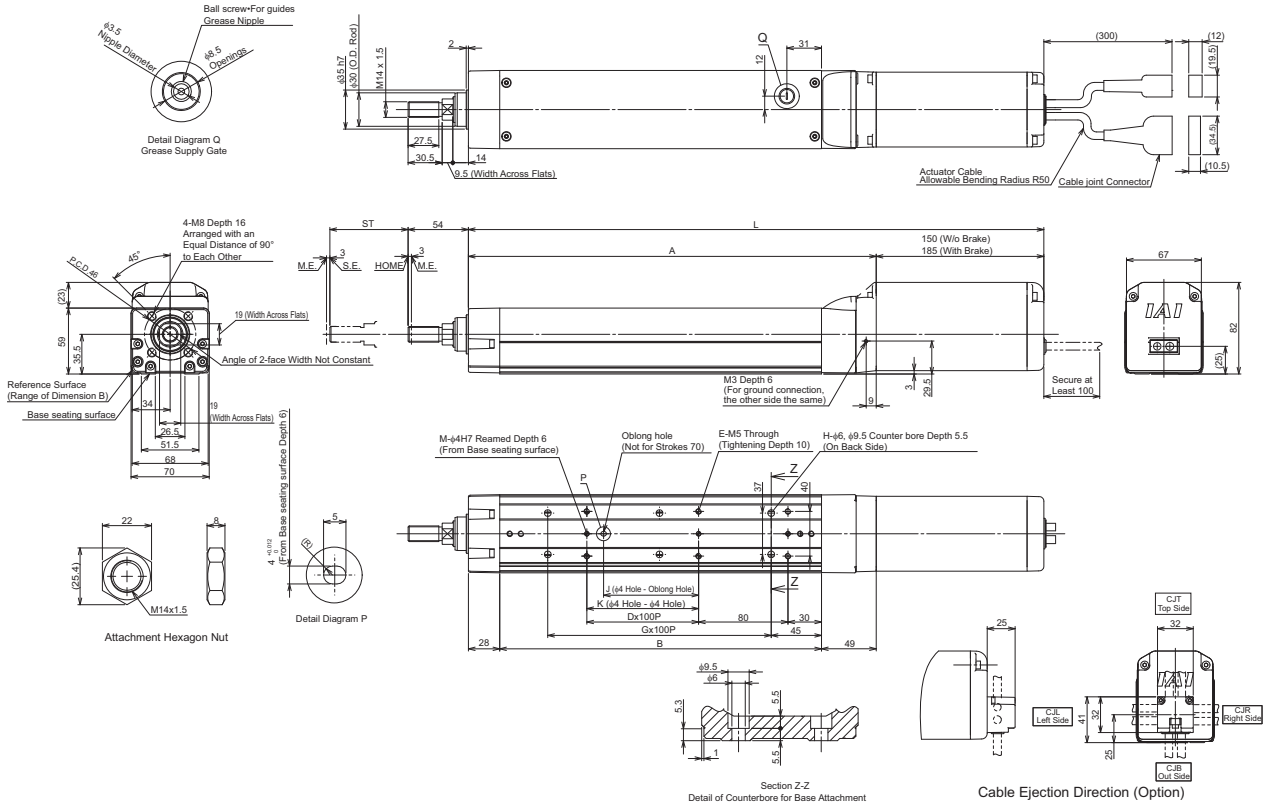
Unit: mm

Stroke	L		A	B	D	E	G	H	J	K	M	Mass [kg]	
	w/o Brake	With Brake										w/o Brake	With Brake
65	362.5	398.5	216.5	172	0	4	1	4	0	0	2	2.1	2.4
115	412.5	448.5	266.5	222	1	6	1	4	85	100	3	2.4	2.7
165	462.5	498.5	316.5	272	1	6	2	6	85	100	3	2.6	2.9
215	512.5	548.5	366.5	322	2	8	2	6	185	200	3	2.8	3.1
265	562.5	598.5	416.5	372	2	8	3	8	185	200	3	3.1	3.4
315	612.5	648.5	466.5	422	3	10	3	8	285	300	3	3.3	3.6
365	662.5	698.5	516.5	472	3	10	4	10	285	300	3	3.5	3.8
415	712.5	748.5	566.5	522	4	12	4	10	385	400	3	3.7	4.0

## 5.1 External Dimensions



ST: Stroke, M.E.: Mechanical End, S.E.: Stroke End



### ■ Dimensions and Mass by Stroke

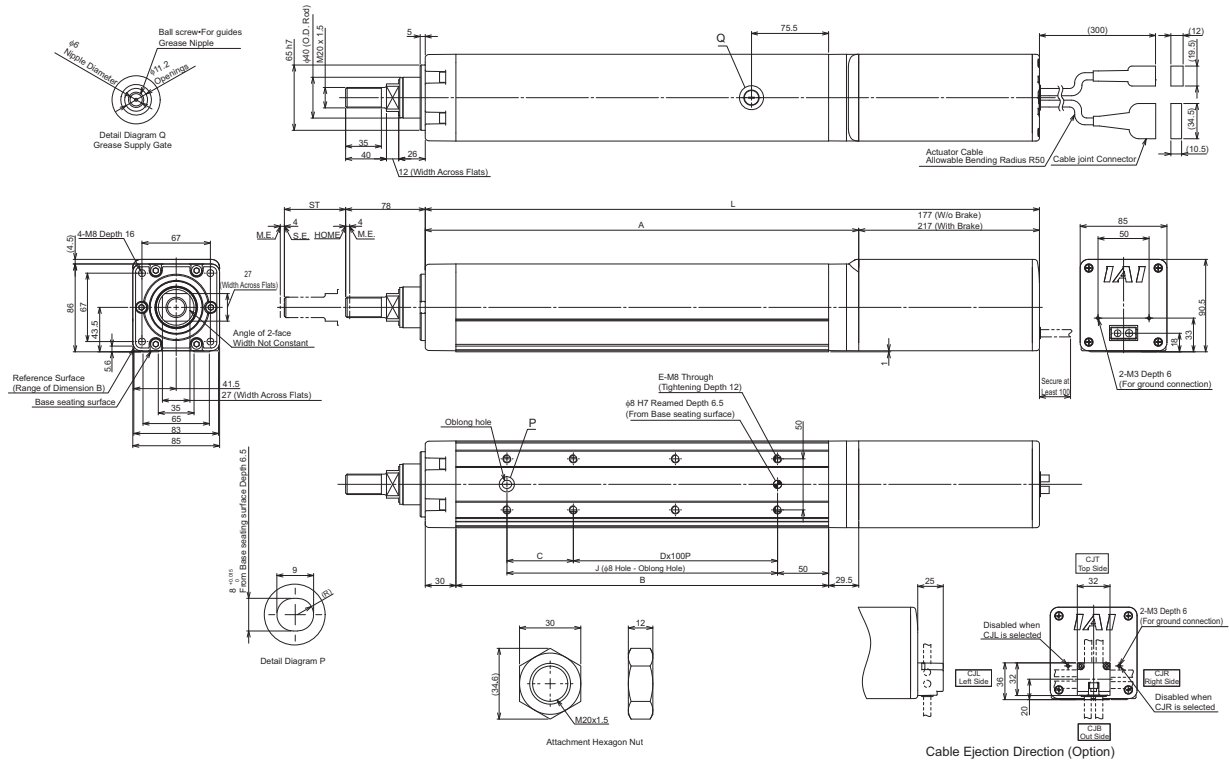
Unit: mm

Stroke	L		A	B	D	E	G	H	J	K	M	Mass [kg]	
	w/o Brake	With Brake										w/o Brake	With Brake
70	415	450	265	188	0	4	1	4	0	0	2	3.7	4.2
120	465	500	315	238	1	6	1	4	85	0	2	4.0	4.5
170	515	550	365	288	1	6	2	6	85	100	3	4.2	4.7
220	565	600	415	338	2	8	2	6	185	200	3	4.5	5.0
270	615	650	465	388	2	8	3	8	185	200	3	4.8	5.3
320	665	700	515	438	3	10	3	8	285	300	3	5.0	5.5
370	715	750	565	488	3	10	4	10	285	300	3	5.3	5.8
420	765	800	615	538	4	12	4	10	385	400	3	5.6	6.1
470	815	850	665	588	4	12	5	12	385	400	3	5.8	6.3
520	865	900	715	638	5	14	5	12	485	500	3	6.1	6.6





ST: Stroke, M.E.: Mechanical End, S.E.: Stroke End



5. External Dimensions

■ Dimensions and Mass by Stroke

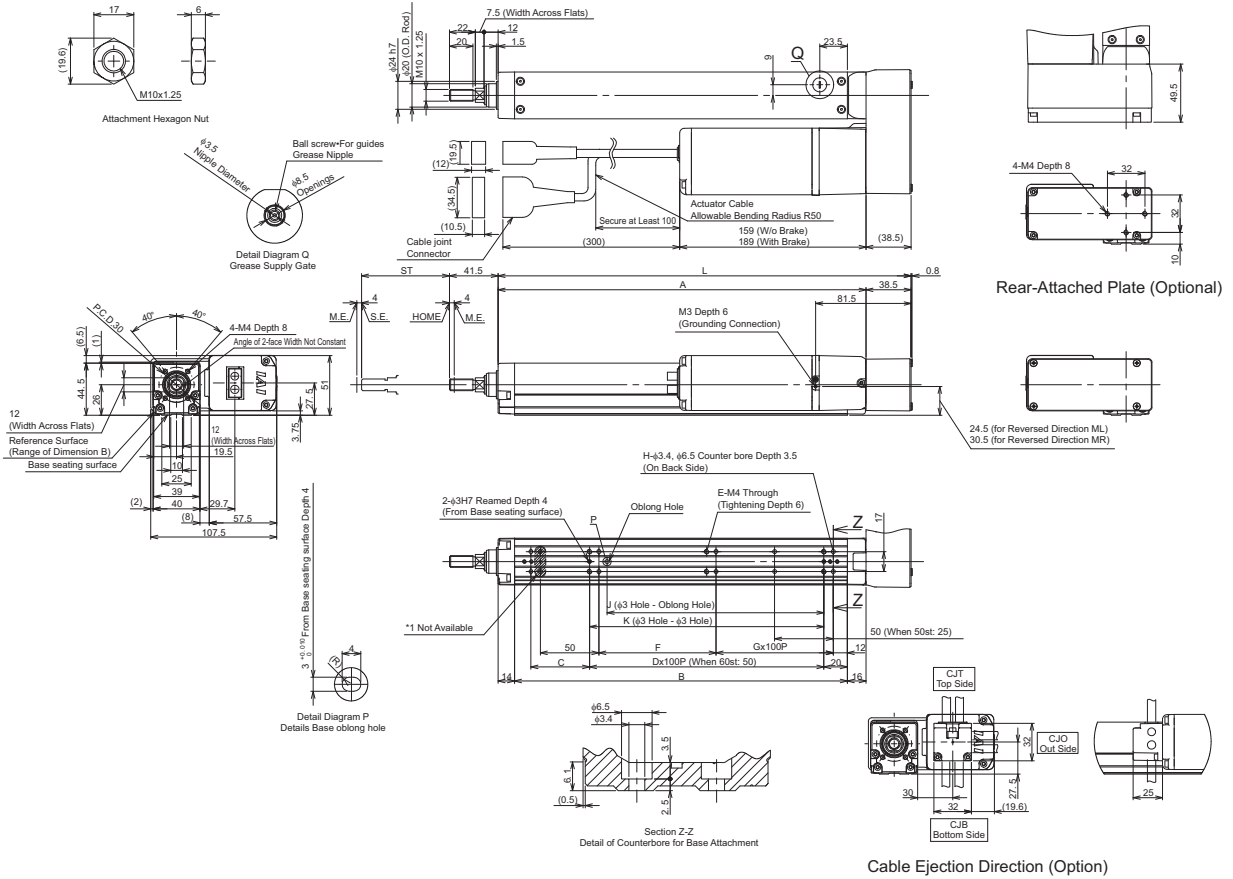
Unit: mm

Stroke	L		A	B	C	D	E	J	Mass [kg]	
	w/o Brake	With Brake							w/o Brake	With Brake
50	451.5	491.5	274.5	215	115	0	4	115	6.6	7.2
100	501.5	541.5	324.5	265	65	1	6	165	7.1	7.7
150	551.5	591.5	374.5	315	115	1	6	215	7.6	8.2
200	601.5	641.5	424.5	365	65	2	8	265	8.1	8.7
250	651.5	691.5	474.5	415	115	2	8	315	8.6	9.2
300	701.5	741.5	524.5	465	65	3	10	365	9.1	9.7
350	751.5	791.5	574.5	515	115	3	10	415	9.5	10.1
400	801.5	841.5	624.5	565	65	4	12	465	10.0	10.6
450	851.5	891.5	674.5	615	115	4	12	515	10.5	11.1
500	901.5	941.5	724.5	665	65	5	14	565	11.0	11.6
550	951.5	991.5	774.5	715	115	5	14	615	11.5	12.1
600	1001.5	1041.5	824.5	765	65	6	16	665	12.0	12.6
650	1051.5	1091.5	874.5	815	115	6	16	715	12.4	13.0
700	1101.5	1141.5	924.5	865	65	7	18	765	12.9	13.5

## 5.1 External Dimensions



ST: Stroke, M.E.: Mechanical End, S.E.: Stroke End



5. External Dimensions

\*1 The two holes on the rod side in attachment holes on the base top (H) cannot be used.  
Also the number of holes (H) shown in the table excludes those not available to use.

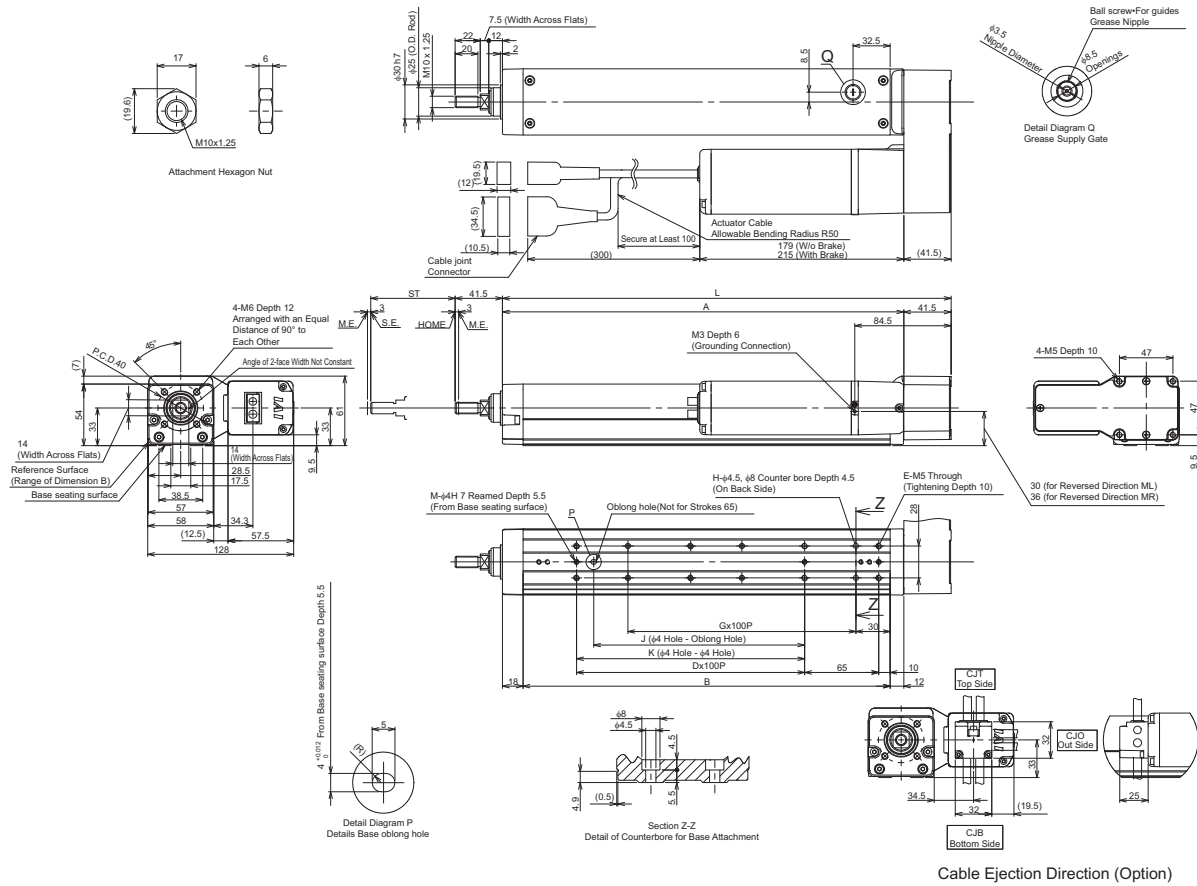
### ■ Dimensions and Mass by Stroke

Unit: mm

Stroke	L	A	B	C	D	E	F	G	H	J	K	Mass [kg]	
												w/o Brake	With Brake
60	202.5	164	134	50	0	6	50	0	6	35	50	1.6	1.9
110	252.5	214	184	50	1	6	100	0	6	85	100	1.7	2.0
160	302.5	264	234	100	1	6	50	1	8	85	100	1.8	2.1
210	352.5	314	284	50	2	8	100	1	8	185	200	2.0	2.3
260	402.5	364	334	100	2	8	50	2	10	185	200	2.1	2.4
310	452.5	414	384	50	3	10	100	2	10	285	300	2.2	2.5
360	502.5	464	434	100	3	10	50	3	12	285	300	2.3	2.6
410	552.5	514	484	50	4	12	100	3	12	385	400	2.5	2.8



ST: Stroke, M.E.: Mechanical End, S.E.: Stroke End



5. External Dimensions

■ Dimensions and Mass by Stroke

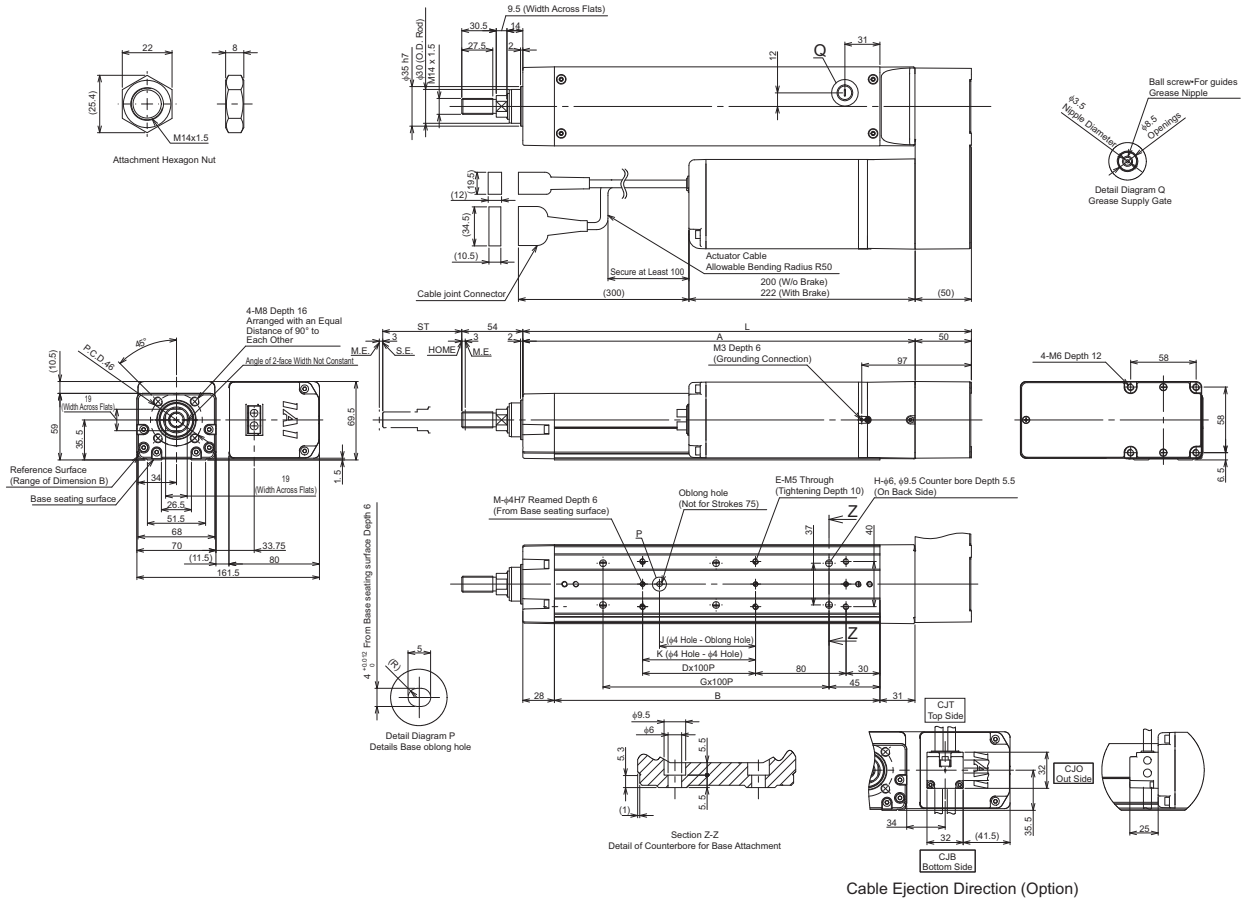
Unit: mm

Stroke	L	A	B	D	E	G	H	J	K	M	Mass [kg]	
											w/o Brake	With Brake
65	243.5	202	172	0	4	1	4	0	0	2	2.5	2.8
115	293.5	252	222	1	6	1	4	85	100	3	2.7	3.0
165	343.5	302	272	1	6	2	6	85	100	3	2.9	3.2
215	393.5	352	322	2	8	2	6	185	200	3	3.2	3.5
265	443.5	402	372	2	8	3	8	185	200	3	3.4	3.7
315	493.5	452	422	3	10	3	8	285	300	3	3.6	3.9
365	543.5	502	472	3	10	4	10	285	300	3	3.9	4.2
415	593.5	552	522	4	12	4	10	385	400	3	4.1	4.4

## 5.1 External Dimensions



ST: Stroke, M.E.: Mechanical End, S.E.: Stroke End



5. External Dimensions

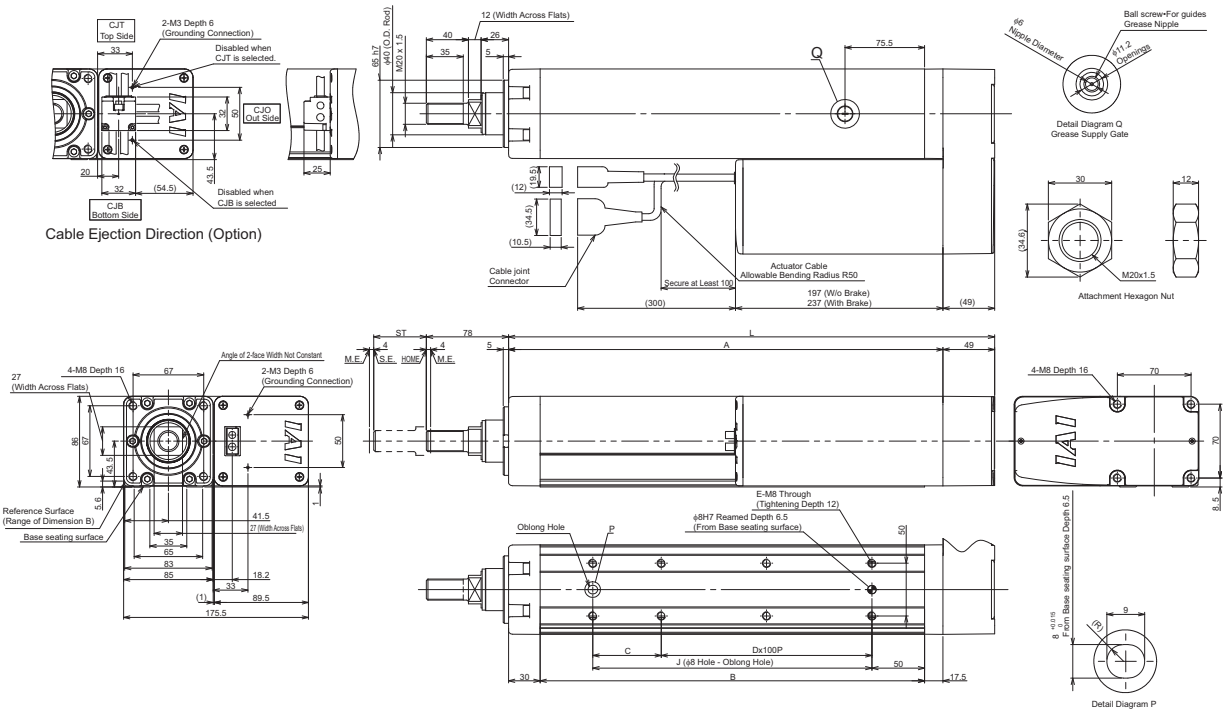
### ■ Dimensions and Mass by Stroke

Unit: mm

Stroke	L	A	B	D	E	G	H	J	K	M	Mass [kg]	
											w/o Brake	With Brake
70	297	247	188	0	4	1	4	0	0	2	4.5	5.0
120	347	297	238	1	6	1	4	85	0	2	4.8	5.3
170	397	347	288	1	6	2	6	85	100	3	5.0	5.5
220	447	397	338	2	8	2	6	185	200	3	5.3	5.8
270	497	447	388	2	8	3	8	185	200	3	5.6	6.1
320	547	497	438	3	10	3	8	285	300	3	5.8	6.3
370	597	547	488	3	10	4	10	285	300	3	6.1	6.6
420	647	597	538	4	12	4	10	385	400	3	6.4	6.9
470	697	647	588	4	12	5	12	385	400	3	6.6	7.1
520	747	697	638	5	14	5	12	485	500	3	6.9	7.4



ST: Stroke, M.E.: Mechanical End, S.E.: Stroke End



■ Dimensions and Mass by Stroke

Unit: mm

Stroke	L	A	B	C	D	E	J	Mass [kg]	
								w/o Brake	With Brake
50	311.5	262.5	215	115	0	4	115	7.9	8.5
100	361.5	312.5	265	65	1	6	165	8.3	8.9
150	411.5	362.5	315	115	1	6	215	8.8	9.4
200	461.5	412.5	365	65	2	8	265	9.3	9.9
250	511.5	462.5	415	115	2	8	315	9.8	10.4
300	561.5	512.5	465	65	3	10	365	10.3	10.9
350	611.5	562.5	515	115	3	10	415	10.8	11.4
400	661.5	612.5	565	65	4	12	465	11.2	11.8
450	711.5	662.5	615	115	4	12	515	11.7	12.3
500	761.5	712.5	665	65	5	14	565	12.2	12.8
550	811.5	762.5	715	115	5	14	615	12.7	13.3
600	861.5	812.5	765	65	6	16	665	13.2	13.8
650	911.5	862.5	815	115	6	16	715	13.7	14.3
700	961.5	912.5	865	65	7	18	765	14.1	14.7



**ROBO Cylinder**

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**Chapter 6**

**Life**

6.1 Concept of life..... 6-1

## 6.1 Concept of life

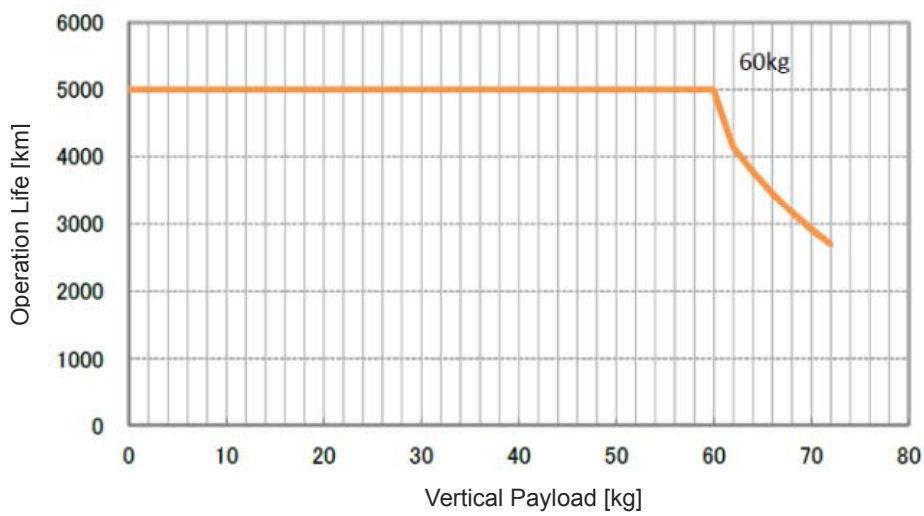
[RRA4C, RRA4R, RRA6C, RRA6R, RRA7C, RRA7R]

The service life is about 5,000 km (guideline) when it is operated under maximum payload and acceleration/deceleration.

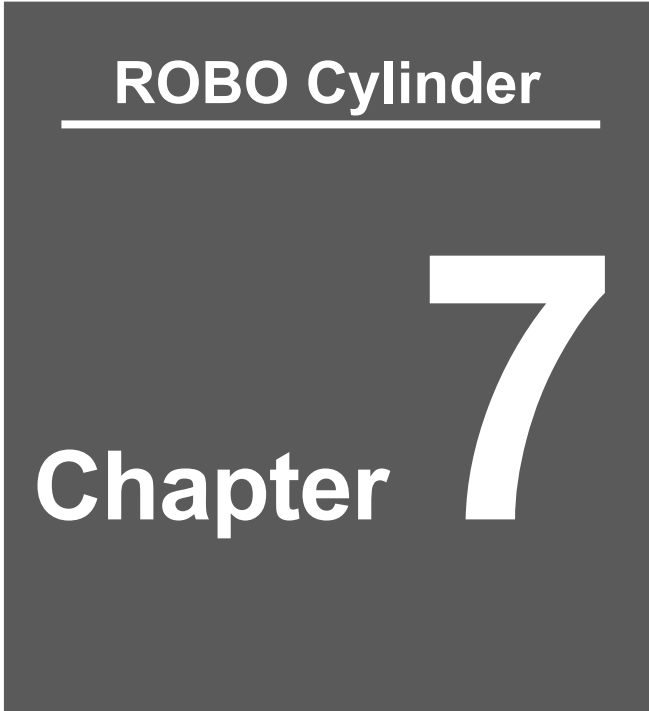
[RRA8C, RRA8R]

The life of Lead 10 and 20 is assumed 5,000km (reference) under the condition of maximum payload, maximum acceleration and deceleration.

The graph below shows the relation of payload and life.







# Warranty

7.1 Warranty period ..... 7-1

7.2 Scope of the warranty..... 7-1

7.3 Honoring the warranty ..... 7-1

7.4 Limited liability ..... 7-2

7.5 Conformance with applicable standards/regulations,etc.,and application conditions ..... 7-2

7.6 Other Items excluded from warranty ..... 7-2

## 7.1 Warranty period

### 7.1 Warranty period

Whichever of the following periods is shorter:

- 18 months after shipment from IAI
- 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 malfunction in question pertains to our product as delivered by IAI or our authorized dealer.
- (2) The breakdown or malfunction in question occurred during the warranty period.
- (3) The breakdown or malfunction in question occurred while the product was in use for an appropriate purpose under the operating conditions and operating environment specified in the instruction manual and catalog.
- (4) The breakdown or malfunction in question was caused by a specification defect, malfunction, or poor product quality.

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

- (a) Anything other than our product
- (b) Modification or repair performed by a party other than IAI (unless approved by IAI)
- (c) Anything that could not be easily predicted with the level of science and technology available at the time of shipment from IAI
- (d) Natural disaster, unnatural disaster, incident or accident for which we are not liable
- (e) Natural fading of paint or other symptoms of aging
- (f) Wear, depletion or other expected result of use
- (g) Operation noise, vibration or other subjective sensations 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 consigned to IAI for repair under warranty.

## 7.4 Limited liability

- (1) We 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 assume no liability for any program or control method created by the customer to operate our product or for the results of any such program or control method.

## 7.5 Conformance with applicable standards/regulations, etc., and application conditions

- (1) If our product is combined with another product or any system, equipment, 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 assume no liability 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 IAI if you must use our product for any of these applications:

- (a) Medical equipment used to maintain, control or otherwise affect human life or physical health
- (b) Mechanisms and machinery designed for the purpose of moving or transporting people (vehicles, railway facilities, aviation facilities etc.)
- (c) Machinery components essential for safety (safety devices etc.)
- (d) Equipment used to handle cultural assets, art or other irreplaceable items
- (3) Contact IAI in advance if our product is to be used in any condition or environment that differs from that specified in the catalog or instruction 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 mounting/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



7. Warranty

# ROBO Cylinder

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# Chapter 8

## Appendix

8.1 Index .....	8-1
8.2 Revision history .....	8-3

**8.1 Index****A**

- Allowable load on rod tip ..... 1-6 to 7,  
1-11 to 12, 1-16 to 17, 1-21 to 22, 1-26 to 27,  
1-31 to 32, 1-36 to 37, 1-41 to 42, 1-44 to 45
- Allowable torque ..... 1-6 to 7,  
1-11 to 12, 1-16 to 17, 1-21 to 22, 1-26 to 27,  
1-31 to 32, 1-36 to 37, 1-41 to 42
- Ambient operating temperature ..... 1-6,  
1-11, 1-16, 1-21, 1-26, 1-31, 1-36, 1-41
- Attachment of Transported Object ..... 2-22

**B**

- Belt replacement/adjustment ..... 4-11 to 20

**C**

- Cable Eject Direction Changed (Model Code:  
CJT, CJR, CJL, CJB and CJO) ..... 1-48
- Cleaning ..... 4-7
- Components ..... 1-1

**D**

- Duty Ratio ..... 1-46 to 47

**E**

- Encoder Cables ..... 1-52
- External Dimensions
  - RCS4-RRA4C ..... 5-1
  - RCS4-RRA6C ..... 5-2
  - RCS4-RRA7C ..... 5-3
  - RCS4-RRA8C ..... 5-4
  - RCS4-RRA4R ..... 5-5
  - RCS4-RRA6R ..... 5-6
  - RCS4-RRA7R ..... 5-7
  - RCS4-RRA8R ..... 5-8
- External visual inspection ..... 4-4

**F**

- Flange (Model Code: FL) ..... 1-50

**G**

- Grease used ..... 4-8
- Greasing Method ..... 4-8 to 10

8-1

**H**

- Home reverse specification  
(Model Code: NM) ..... 1-48
- How to Read the Model Nameplate ..... 1-2
- How to Read the Model Number ..... 1-2

**I**

- Inspection items and schedule ..... 4-3
- Installation Environment ..... 2-3
- Installation of the Main Unit ..... 2-7 to 21
- Installation Orientation ..... 2-5
- Installation surface ..... 2-6
- Internal Cleaning ..... 4-7
- Internal visual inspection ..... 4-5
- International Standard Compliance ..... Intro-10

**L**

- Life ..... 6-1

**M****Mass**

- RCS4-RRA4C ..... 5-1
- RCS4-RRA6C ..... 5-2
- RCS4-RRA7C ..... 5-3
- RCS4-RRA8C ..... 5-4
- RCS4-RRA4R ..... 5-5
- RCS4-RRA6R ..... 5-6
- RCS4-RRA7R ..... 5-7
- RCS4-RRA8R ..... 5-8
- Max. Speed ..... 1-3,  
1-4, 1-9, 1-14, 1-19, 1-24, 1-29, 1-34, 1-39
- Max. payload ..... 1-3,  
1-4, 1-9, 1-14, 1-19, 1-24, 1-29, 1-34, 1-39
- Motor Cable ..... 1-51
- Motor Replacement ..... 4-21 to 34
- Motor Reversed Direction  
(Model Code: ML, MR) ..... 1-48

## N

## Names of the Parts

Standard Type ..... Intro-11

Motor Reversed Type ..... Intro-11

No. of Encoder Pulses ..... 1-6,  
1-11, 1-16, 1-21, 1-26, 1-31, 1-36, 1-41

## P

Payload ..... 1-3,  
1-4 to 5, 1-9 to 10, 1-14 to 15, 1-19 to 20, 1-24  
to 25, 1-29 to 30, 1-34 to 35, 1-39 to 40

Positioning repeatability ..... 1-3,  
1-6, 1-11, 1-16, 1-21, 1-26, 1-31, 1-36, 1-41

Precautions for Handling ..... Intro-9 to 10

Precautions for transportation ..... 2-1 to 2

Product list ..... 1-3

## R

## Rear Attachment Plate

(Model Code: RP) ..... 1-48

Rod Flexure ..... 1-8,  
1-13, 1-18, 1-23, 1-28, 1-33, 1-38, 1-43

Rod Non-Rotation Accuracy ..... 1-6,  
1-11, 1-16, 1-21, 1-26, 1-31, 1-36, 1-41

Rod tip overhang distance ..... 1-6,  
1-11, 1-16, 1-21, 1-26, 1-31, 1-36, 1-41

## S

Speed ..... 1-3,  
1-4, 1-9, 1-14, 1-19, 1-24, 1-29, 1-34, 1-39

Storage/preservation environment ..... 2-4

## T

## Tip adapter (Keyway)

(Model Code: KFA) ..... 1-50

Tip Adapter Flange (Model Code: FFA) ... 1-49

## Tip Adapter Internal Thread

(Model Code: NFA) ..... 1-49

## W

Warranty ..... 7-1 to 2

With brake (Model Code: B) ..... 1-48

**8.2 Revision history**

Revision Date	Revised content
October 2017	First Edition
April 2018	1B Edition Pg. 2-5      Installation posture: Horizontally Oriented Wall Mount and Ceiling Mount $\Delta \rightarrow \circ$







## ***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