



## **ROBO Cylinder Rod Type RCA Actuators**

Motor Straight Type (Coupling Type): RA3C, RGS3C, RGD3C, RA4C, RGS4C and RGD4C  
Motor Straight Type (Built-in Type): RA3D, RGS3D, RGD3D, RA4D, RGS4D and RGD4D  
Motor Reversing Type: RA3R, RGS3R, RGD3R, RA4R, RGS4R and RGD4R

## **RCAW Actuators, Dustproof/Splash-proof Type**

Motor Straight Type (Coupling Type): RA3C and RA4C  
Motor Straight Type (Built-in Type): RA3D and RA4D  
Motor Reversing Type: RA3R and RA4R

## **Operating Manual**

**Sixth Edition**

***IAI America, Inc.***



## **Please Read Before Use**

Thank you for purchasing our product.

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

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

The CD or DVD that come with the product contains operation manuals for IAI products.

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

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

### **[Important]**

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



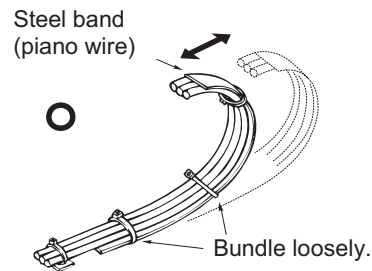
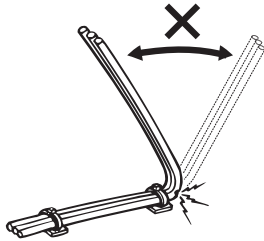
## CE Marking

If a compliance with the CE Marking is required, please follow Overseas Standards Compliance Manual (ME0287) that is provided separately.

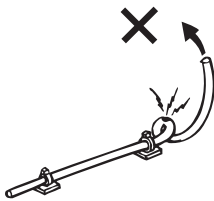
## Prohibited Handling of Cables

When designing an application system using IAI's actuators and controllers, incorrect wiring or connection of each cable may cause unexpected problems such as a disconnected cable or poor contact, or even a runaway system. This section explains prohibited handling of cables. Read the information carefully to connect the cables properly.

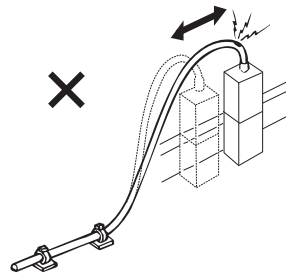
1. Do not let the cable flex at a single point.



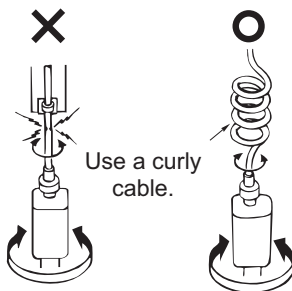
2. Do not let the cable bend, kink or twist.



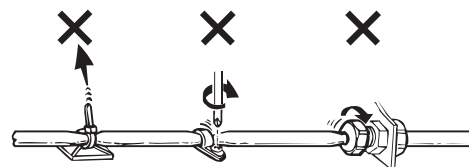
3. Do not pull the cable with a strong force.



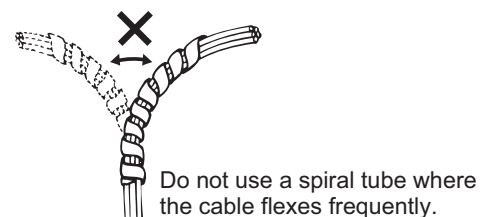
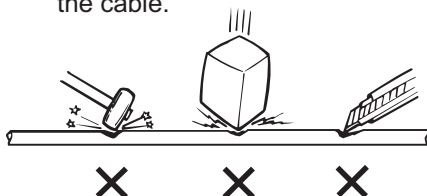
4. Do not let the cable receive a turning force at a single point.



5. When fixing the cable, provide a moderate slack and do not tension it too tight.



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



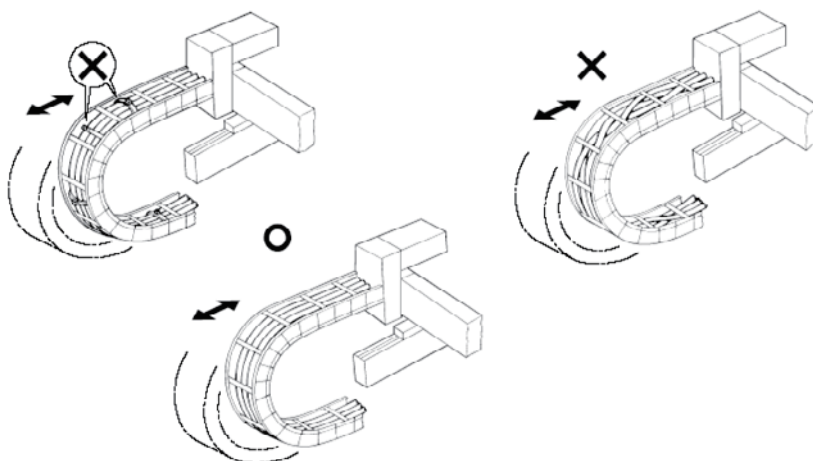
## 7. Notes on using cable bearers

- The supplied cables are not robot cables. Accordingly, never store the cables in a cable bearer.

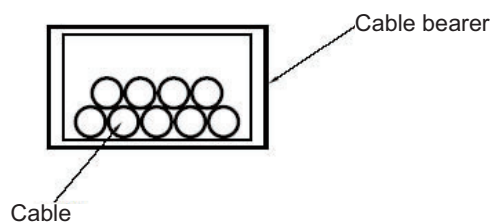
- Always use a robot cable for each relay cable.

- Use a cable bearer with a bending radius ( $r$ ) of 50 mm or greater.

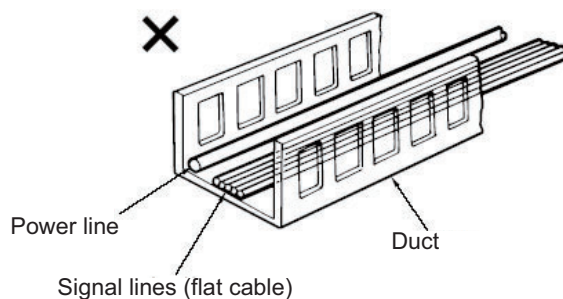
- Do not let the cable get tangled or kinked in a cable bearer or flexible tube. When bundling the cable, keep a certain degree of flexibility (so that the cable will not become too taut when bent).



- Do not cause the cables to occupy more than 60% of the space in the cable bearer.



- Do not lay signal lines together with circuit lines that create a strong electric field.



## Table of Contents

Safety Guide.....	1
Caution in Handling .....	8
1. Foreword.....	9
2. Safety Precautions.....	9
2.1 Basic Operating Instructions.....	9
2.2 Maintenance and Inspection.....	9
3. Warranty.....	10
3.1 Warranty Period .....	10
3.2 Scope of Warranty .....	10
3.3 Honoring the Warranty.....	10
3.4 Limited Liability .....	10
3.5 Conditions of Conformance with Applicable Standards/Regulations, Etc., and Applications .....	11
3.6 Other Items Excluded from Warranty .....	11
4. Names of the Parts .....	12
4.1 Standard, Motor Straight Type (Coupling Type): No Guide .....	12
4.2 Standard, Motor Straight Type (Built-in Type): No Guide .....	13
4.3 Standard, Motor Reversing Type .....	14
4.4 Single-guide Type: Standard, Motor Straight Type (Example of Coupling Type).....	15
4.5 Double-guide Type: Standard, Motor Straight Type (Example of Coupling Type) .....	16
4.6 Dustproof/Splash-proof Type: Motor Straight Type (Example of Coupling Type) .....	17
5. Transporting and Handling.....	18
5.1 Handling the Actuator .....	18
5.1.1 Handling the Packed Unit.....	18
5.1.2 Handling the Actuator After It is Unpacked.....	18
5.2 Handling the Actuator Assembly.....	19
5.2.1 Condition of Shipment from IAI (Assembled) .....	19
5.2.2 Handling after Assembly with Peripheral Equipment.....	19
6. Operating and Storage Environment .....	20
6.1 Operating Environment.....	20
6.2 Storage Environment.....	20
7. Installation.....	21
7.1 Installing the Main Body .....	21
8. Wiring Cable .....	31
9. Connecting the Air Tube of the RCAW Dustproof/Splash-proof Type .....	32
10. Maximum Speed .....	33
11. Load on the Actuator .....	34
12. Actuators with a Switch (Optional).....	34
13. High Acceleration/Deceleration and Power-saving Options.....	35
13.1 Applicable Actuator Models .....	35
13.2 Specifications of High Acceleration/Deceleration Actuators .....	35
13.3 Notes .....	36
13.4 Applicable Controller Models (ACON, ASEL) .....	36

14. Maintenance .....	37
14.1 Maintenance Schedule .....	37
14.2 Visual Inspection of the Machine Exterior.....	37
14.3 Cleaning .....	37
14.4 Applying Grease to the Sliding Surface of the Rod .....	38
14.5 Reduction Belt [Motor Reversing Type] .....	39
14.5.1 Inspecting the Belt.....	39
14.5.2 Applicable Belt.....	39
14.5.3 Adjusting the Belt Tension .....	40
14.5.4 Replacing the Belt of the Motor Reversing Type: RA3R/RA4R Types .....	41
14.6 Replacing the Motor .....	46
14.6.1 Replacing the Motor of the Motor Straight Type (Coupling Type): RA3C/RA4C Types.....	46
14.6.2 Replacing the Motor of the Motor Reversing Type: RA3R/RA4R Types .....	53
14.7 Replacing the Bellows of the RCAW Dustproof/Splash-proof Type.....	59
15. Cable Drawings.....	62
16. Appendix .....	64
16.1 External Dimensions.....	64
16.1.1 RCA-RA3C.....	64
16.1.2 RCA-RA4C.....	65
16.1.3 RCA-RA3D.....	66
16.1.4 RCA-RA4D.....	67
16.1.5 RCA-RA3R.....	68
16.1.6 RCA-RA4R.....	69
16.1.7 RCA-RGS3C .....	70
16.1.8 RCA-RGS4C .....	71
16.1.9 RCA-RGS3D .....	72
16.1.10 RCA-RGS4D .....	73
16.1.11 RCA-RGD3C.....	74
16.1.12 RCA-RGD4C.....	75
16.1.13 RCA-RGD3D.....	76
16.1.14 RCA-RGD4D.....	77
16.1.15 RCA-RGD3R.....	78
16.1.16 RCA-RGD4R.....	79
16.1.17 RCAW-RA3C/RA3D/RA3R.....	80
16.1.18 RCAW-RA4C/RA4D/RA4R.....	81
Change History.....	82



## Safety Guide

---

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

### Safety Precautions for Our Products

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

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

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

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





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

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

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

## Alert Indication

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

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

## Caution in Handling

---

1. Do not set speeds and accelerations/decelerations equal to or greater than the respective ratings.

If the actuator is operated at a speed or acceleration/deceleration exceeding the allowable value, abnormal noise or vibration, failure, or shorter life may result.

In the case of interpolated operation of combined axes, the speed and acceleration/deceleration settings should correspond to the minimum values among all combined axes.

2. Back and forth operation in a short distance may cause wear of grease.

Continuous back and forth operation within a distance less than 30mm may cause wear of grease.

It is recommended to have 5 rounds of back and forth operation in a distance more than 50mm after every 5,000 to 10,000 rounds of the short distance operation. A layer of the grease will recover.

3. Turn the servo ON after putting the actuator or rod away from the mechanical end.

Turning the servo ON near the mechanical end may disturb the magnetic pole phase detection, and may cause the magnetic pole unconfirmed error or the excitation detection error.

Put the slider or rod away from the mechanical end when performing this operation.

4. Make sure to attach the actuator properly by following this operation manual.

Using the product with the actuator not being certainly retained or affixed may cause abnormal noise, vibration, malfunction or shorten the product life.



## 1. Foreword

Thank you for purchasing an IAI product.

This manual explains the structure, correct operation and maintenance of the actuator.

Please read this manual carefully before using the product.

For more complete information on operating the actuator, please also refer to the controller operating manual.

## 2. Safety Precautions

### 2.1 Basic Operating Instructions

- Please do not attempt to use or operate the actuator in any manner not indicated in this manual or the controller manual.
- Please be sure to use only the cable provided by IAI to connect the actuator and controller.
- Please do not allow people within the moving range of the unit when it is in operation or when the power is ON since this is dangerous.

### 2.2 Maintenance and Inspection

- When doing maintenance and inspection work, always shut down the controller power first.
- When doing inspection, make sure that no one can inadvertently turn the power ON.
- Make sure that a sign indicating work in progress is clearly visible.
- If several persons are working, be sure to watch out for each other's safety. In particular, check before turning power ON or OFF and let others know if you are doing work involving axis movement.

(Note)

- The content of this manual is subject to change without notice for the purpose of improvement.
- This manual was created with utmost attention to accuracy. Should you find any error, however, or if you have any question, please contact IAI's Sales Engineering or Technical Service Section.

## 3. Warranty

### 3.1 Warranty Period

One of the following periods, whichever is shorter:

- 18 months after shipment from our factory
- 12 months after delivery to a specified location
- 2500 hours of operation time

### 3.2 Scope of Warranty

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

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

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

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

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

### 3.3 Honoring the Warranty

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

### 3.4 Limited Liability

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

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

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

### 3.6 Other Items Excluded from Warranty

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

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

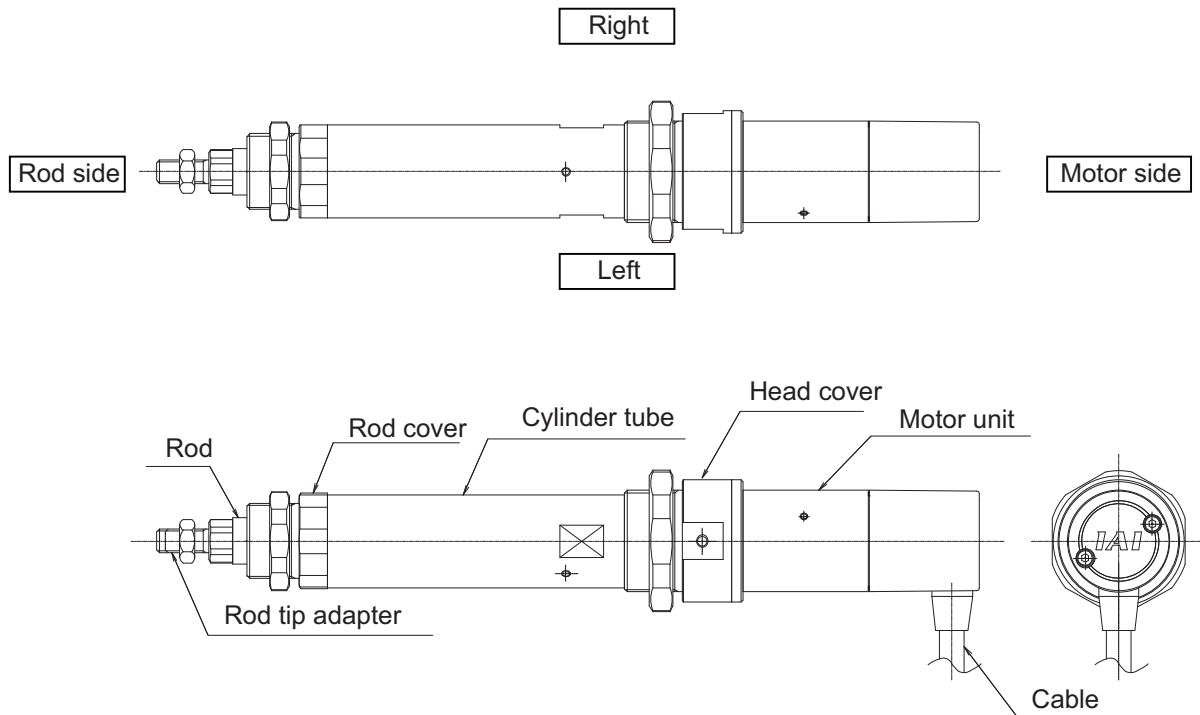
## 4. Names of the Parts

The names of the actuator parts are indicated below.

In this manual, the right and left are determined by viewing the actuator from the top and from the motor side.

### 4.1 Standard, Motor Straight Type (Coupling Type): No Guide

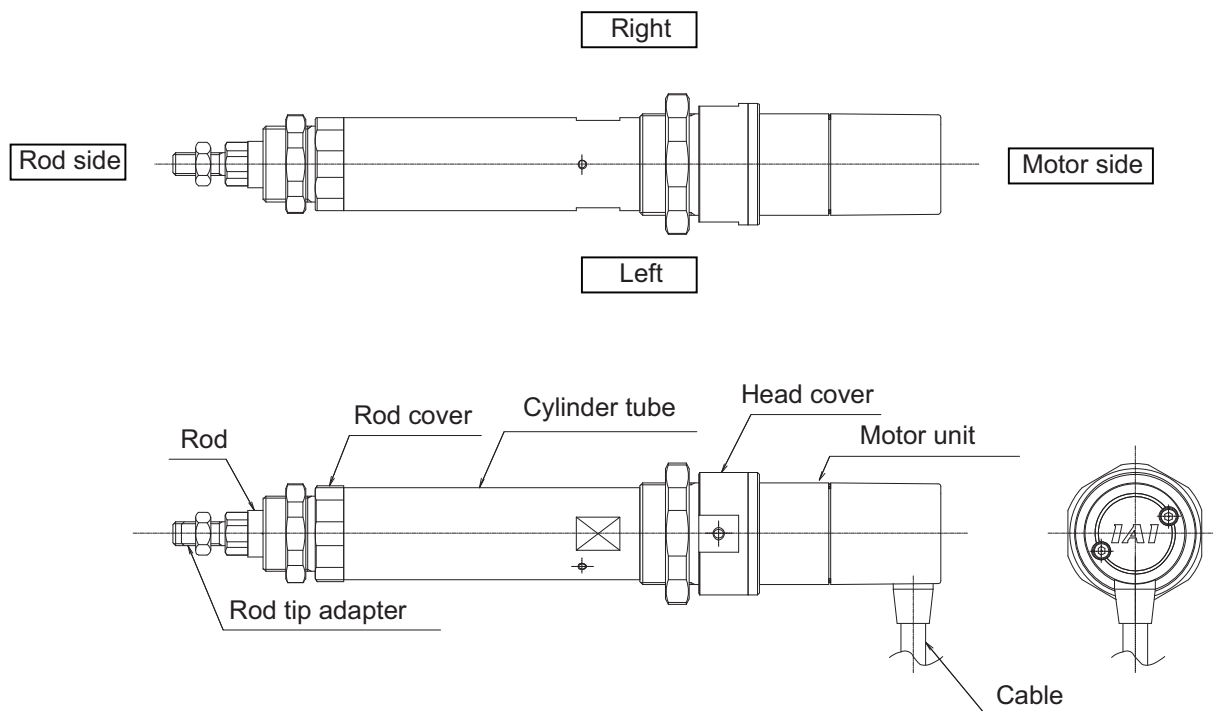
- RCA-RA3C, RCA-RA4C



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

## 4.2 Standard, Motor Straight Type (Built-in Type): No Guide

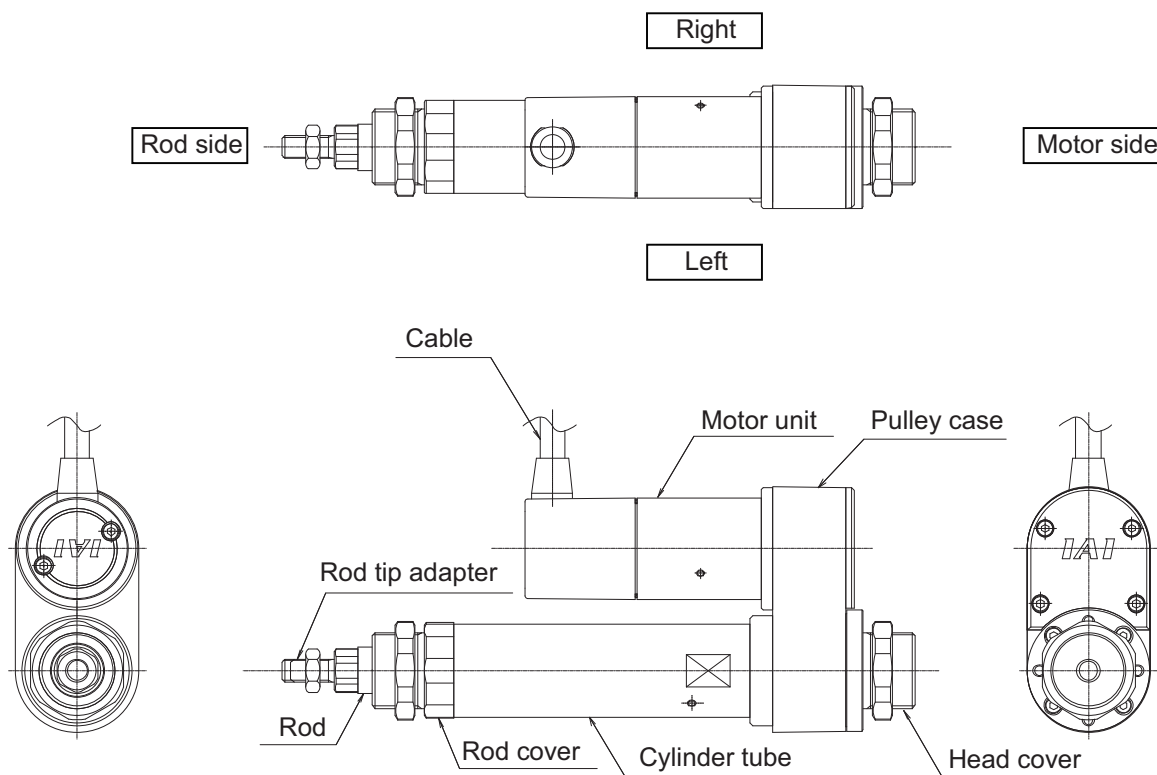
- RCA-RA3D, RCA-RA4D



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

## 4.3 Standard, Motor Reversing Type

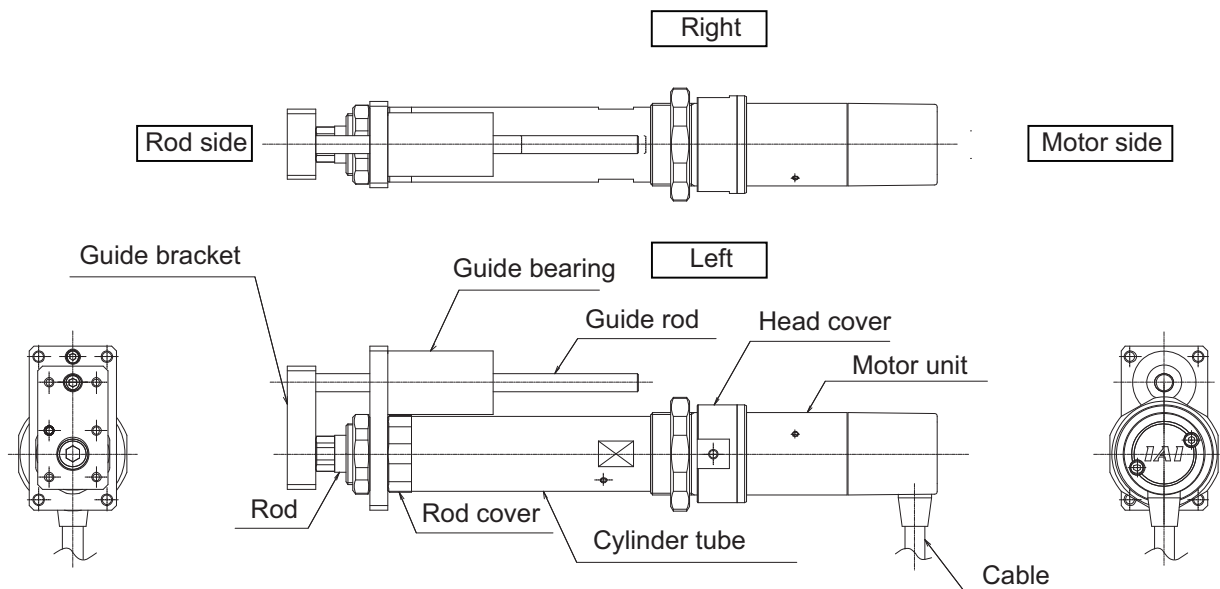
- RCA-RA3R, RCA-RA4R



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

## 4.4 Single-guide Type: Standard, Motor Straight Type (Example of Coupling Type)

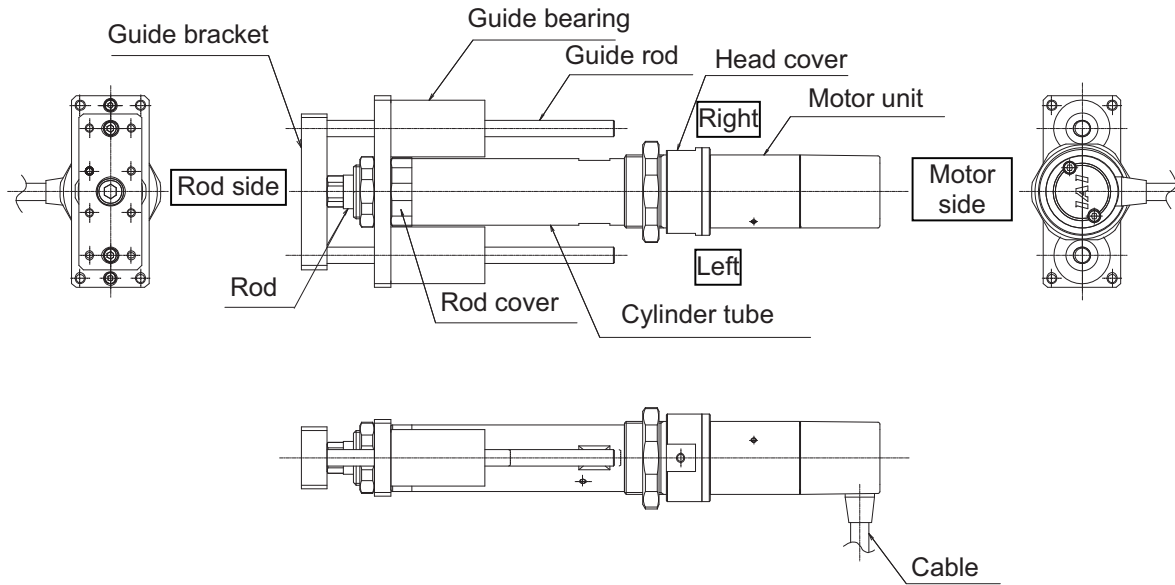
- RCA-RGS3C



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

## 4.5 Double-guide Type: Standard, Motor Straight Type (Example of Coupling Type)

- RCA-RGD3C

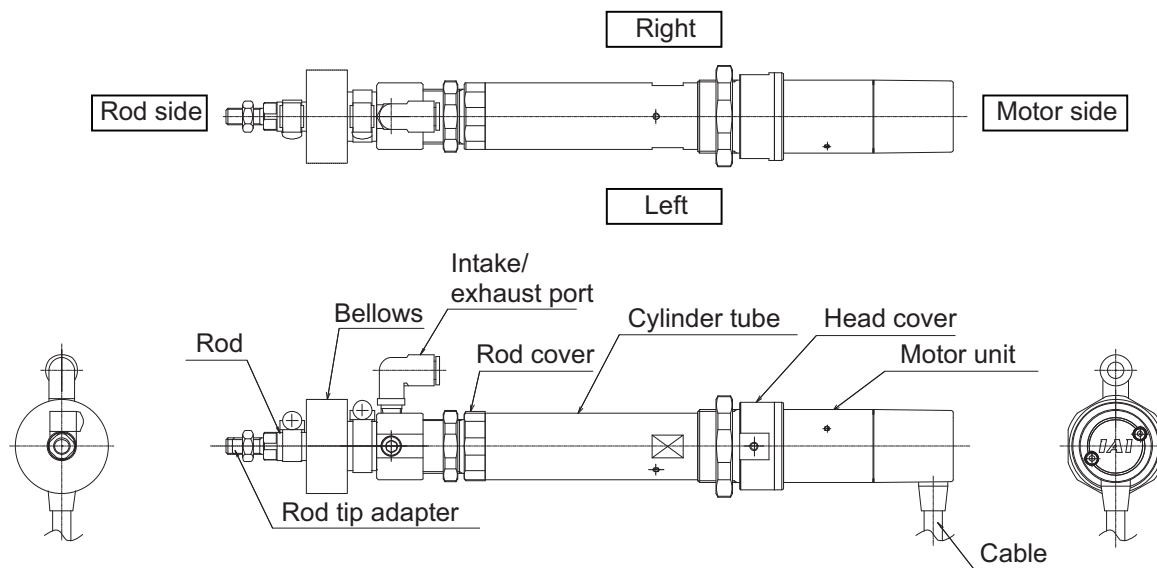


**Caution:** The cable directly connected to the actuator is not robot cable even when ordered with robot cable option. When designing, please be sure not to give repeated bending loads to this cable. The robot cable is applicable only to the connecting cables.



## 4.6 Dustproof/Splash-proof Type: Motor Straight Type (Example of Coupling Type)

- RCAW-RA3C



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

## 5. Transporting and Handling

### 5.1 Handling the Actuator

#### 5.1.1 Handling the Packed Unit

Unless otherwise specified, each actuator (axis) is shipped individually.  
Please take care that the shipping box is not dropped or subjected to strong impact during transport.

- The operator should not carry heavy shipping boxes by themselves.
- If the shipping box is left standing, it should be in a horizontal position.
- Do not climb on top of the shipping box.
- Do not place heavy objects on top of the shipping box.

#### 5.1.2 Handling the Actuator After It is Unpacked

Lift the actuator up by the base to remove it from the packing.

- When transporting the actuator, be careful not to hit it against nearby structures or object. In particular, exercise caution to protect the motor unit and pulley case against impact.
- Do not exert excessive force on any part of the actuator.
- Be careful not to cause the cables to receive a tensile force.

Supplement) Please refer to Section 4 above for the names of the actuator parts.

## 5.2 Handling the Actuator Assembly

Pay attention to the following instructions when transporting an assembly of actuator axes.

### 5.2.1 Condition of Shipment from IAI (Assembled)

The actuators you have ordered are assembled at IAI, after which the assembly receives a shipping inspection and is shipped in an outer frame with skids.

The assembly is packed with the rod securely affixed so that it will not move unexpectedly during transportation. In the case of a combined unit, the actuator ends are secured to prevent swinging due to external vibration.

- The package is not designed with special considerations for protection against impact due to dropping or collision, so please handle the package with care. Also, do not place any heavy object on the outer frame, as it is not strong enough to withstand loads.
- When suspending the package using ropes, etc., pass the ropes from underneath the reinforcement frames at the bottom of the skids. When lifting with a forklift, also place the forks underneath the skids.
- Set down the package carefully so as not to apply impact to the assembly or cause it to bounce.

After unpacking, handle the actuator assembly correctly by observing the instructions given below.

### 5.2.2 Handling after Assembly with Peripheral Equipment

When transporting the actuators that have been assembled with peripheral equipment either at IAI or on your site, observe the instructions given below.

- Secure the rod so that it will not move suddenly while transporting the actuator.
- If any actuator end is protruding, secure it to prevent swinging due to external vibration.
- If the actuator ends are not secured, do not apply any impact force exceeding 0.3 G during transportation.
- When suspending the actuator-assembled peripheral equipment using ropes, etc., make sure the ropes do not contact the actuators directly.
- Pass the ropes over appropriate cushion materials, and make sure the loads from the ropes will be received by the base of each actuator.
- Secure the end of the Y-axis using a separate rope to maintain the axis in a stable horizontal position. At this time, be careful not to apply loads on the screw cover.
- Be careful not to allow the brackets, covers and connector box of each actuator to receive loads. Also protect the cables from pinching or excessive deformation.

## 6. Operating and Storage Environment

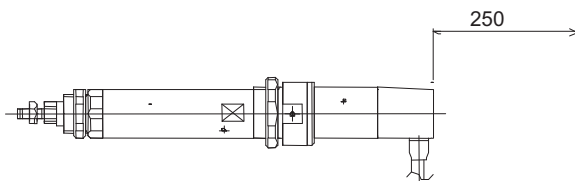
### 6.1 Operating Environment

The actuator should be set up in an environment, which meets the following criteria:

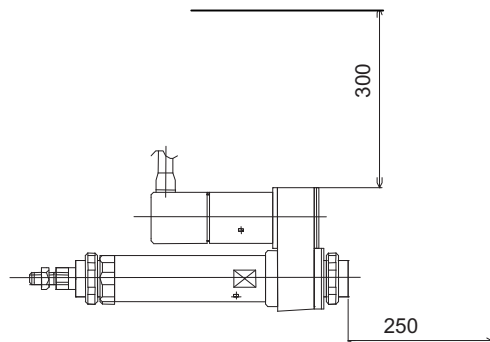
- Avoid direct sunlight.
- Avoid radiant heat from strong heat sources such as a furnace.
- Ambient temperature should be 0 ~ 40°C.
- The humidity should be less than 85% and there should be no condensation.
- Avoid exposure to corrosive or combustible gases.
- The area should have very little dust and be suitable for normal assembly operations. (RCA)
- Avoid exposure to oil mist or fluids used in cutting. (RCA)
- Ambient air should be free from cutting or grinding fluids containing sulfur.
- The unit should not be subject to impact or vibration.
- Avoid extreme electromagnetic waves, ultraviolet rays and radiation.

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

Work space needed for maintenance/inspection  
[Motor straight type]



[Motor reversing type]



- \* If you are using the dustproof/splash-proof type (RCAW type), consult IAI beforehand.  
This product is not designed by considering chemical resistance. Contact IAI for splash-proof resistance to liquids other than water.

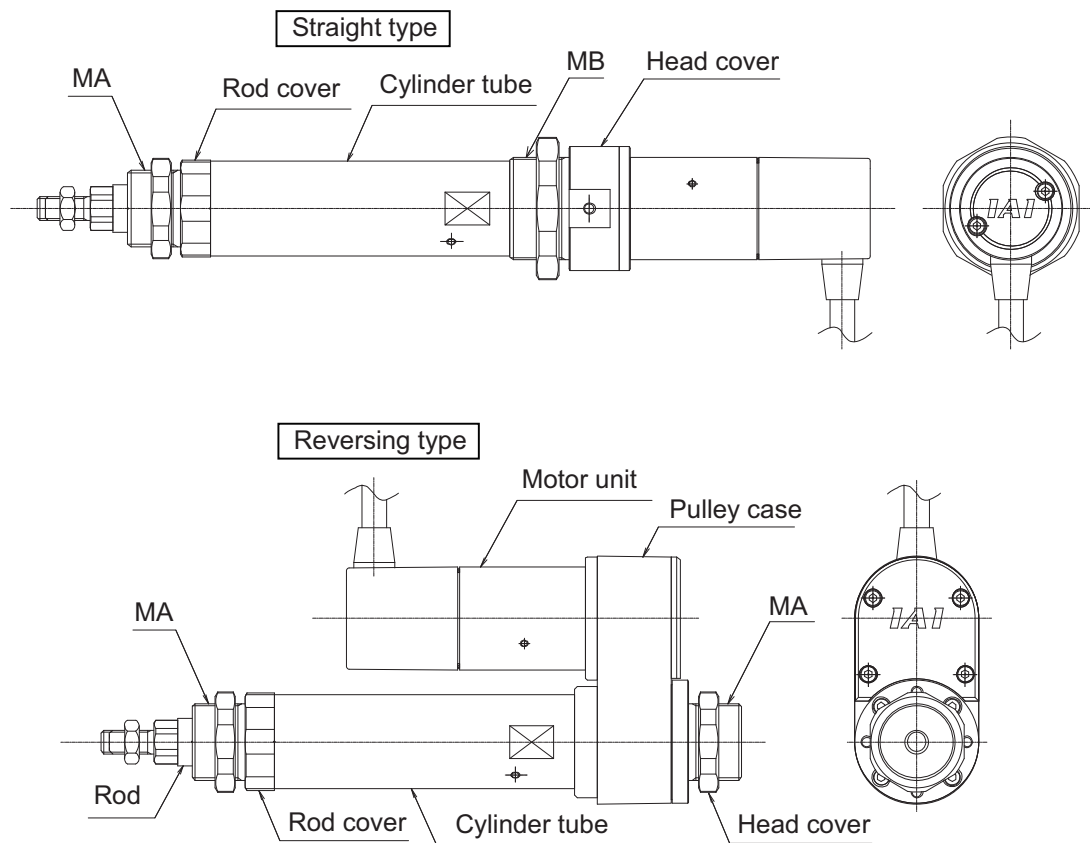
### 6.2 Storage Environment

The storage environment should be similar to the operating environment. In addition, you must take precautions against condensation if the unit is to be stored for a long period of time. Unless there are special instructions, we do not include moisture absorption agents when shipping the unit. If you are storing the unit where condensation might occur, then you must treat the entire package or treat the unit itself after it is unpacked to prevent condensation. The unit can withstand up to 60°C during a short storage interval but only up to 50°C if the storage period is longer than one month.

## 7. Installation

### 7.1 Installing the Main Body

- (1) Using screws on the rod or head side  
Install the actuator using screws set on the rod or head side of the actuator.
- **Applicable models: All models**

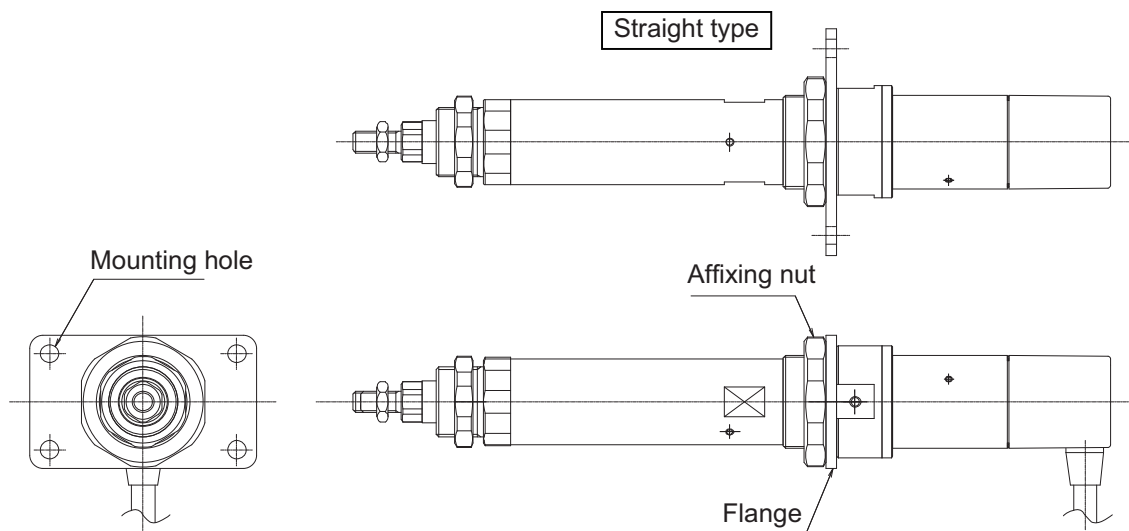
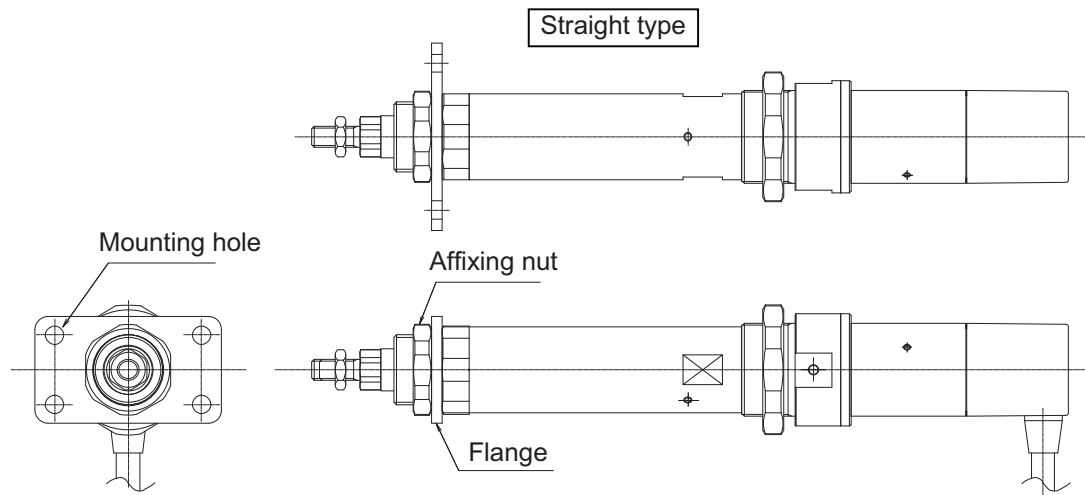


Type	MA	MB
RA3 type	M26 x 1.5	M35 x 1.5
RA4 type	M30 x 1.5	M40 x 1.5

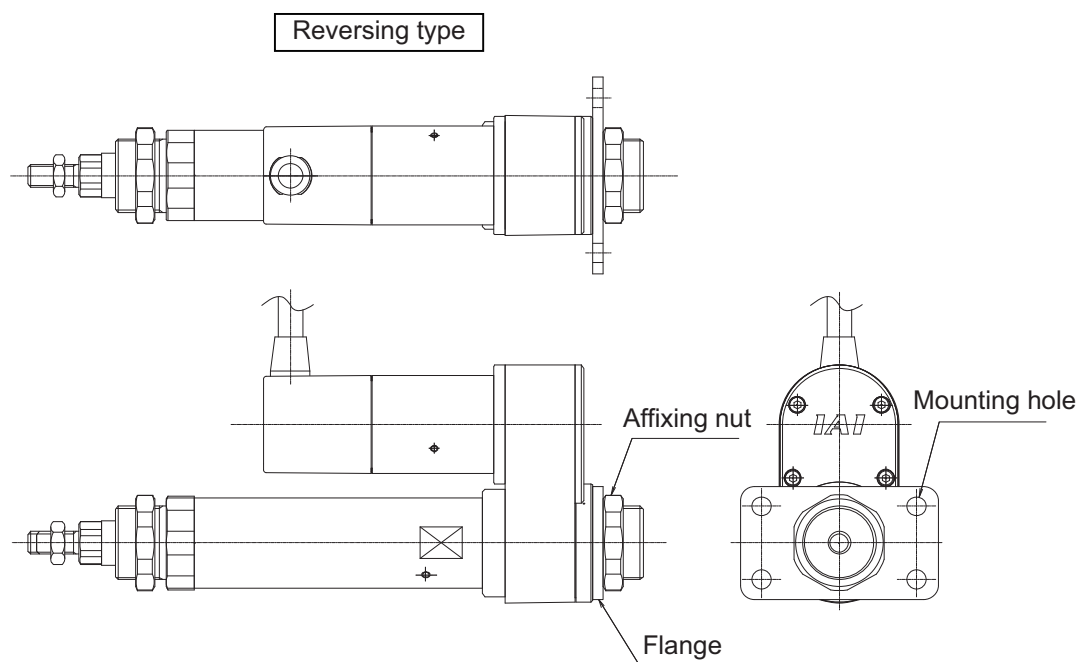
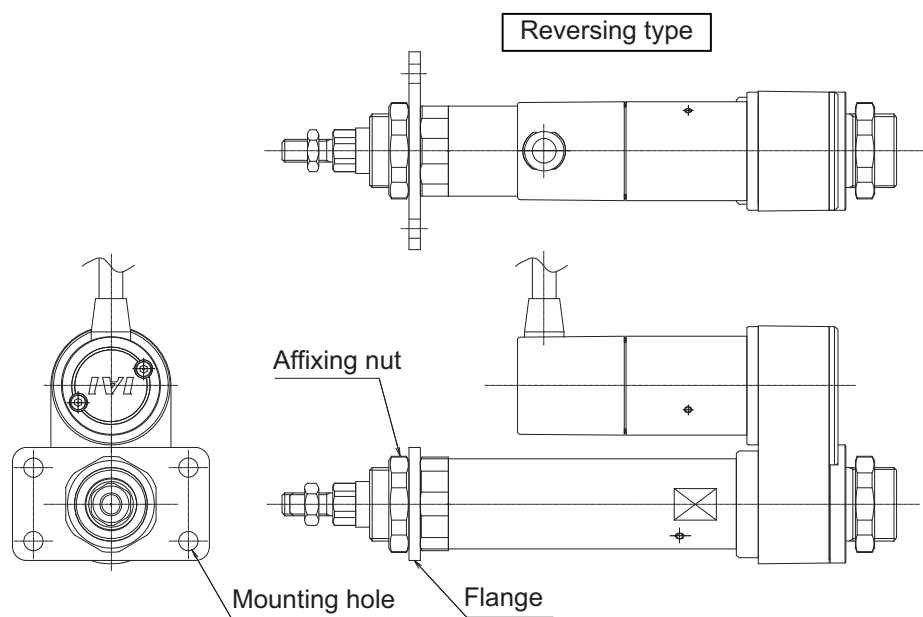
## (2) Using screws on a flange (optional)

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

- Applicable models: All models

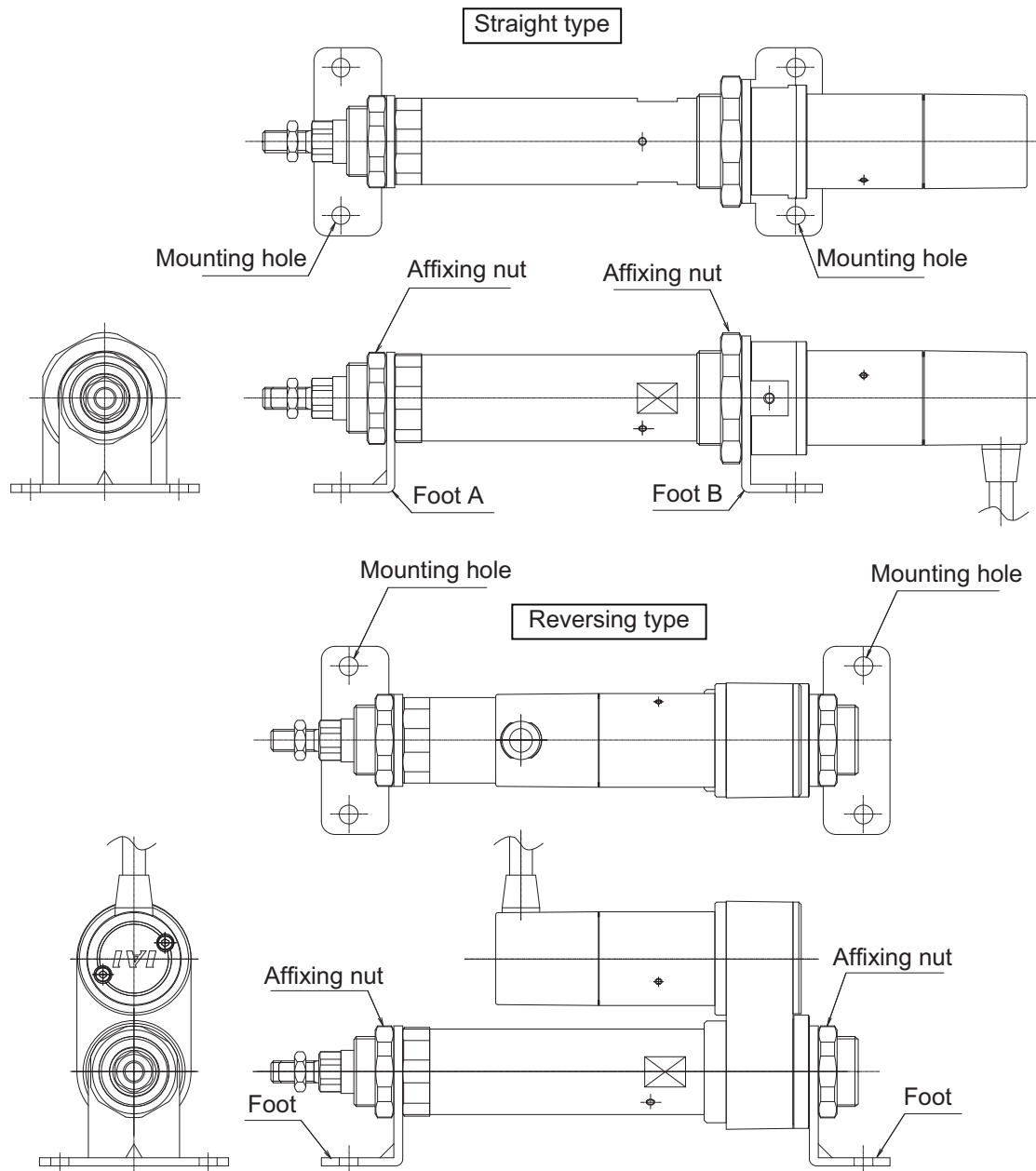


	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N-m	5.4 N-m



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

- (3) Using screws on feet (optional)  
 Optional feet are available for installing the actuator. Use these feet, if necessary.  
 ● Applicable models: All models



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

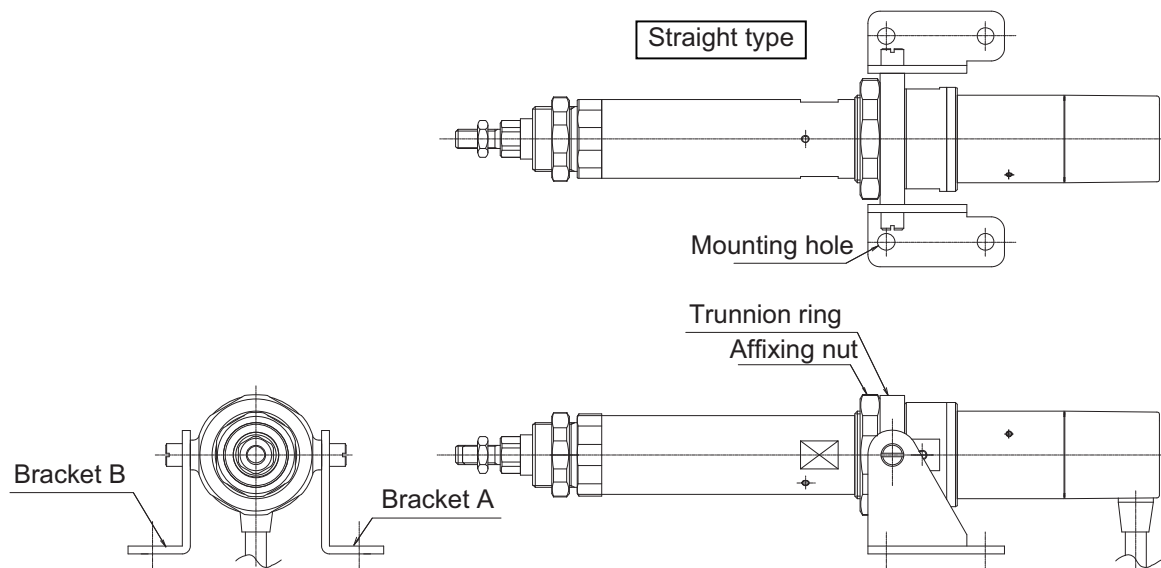
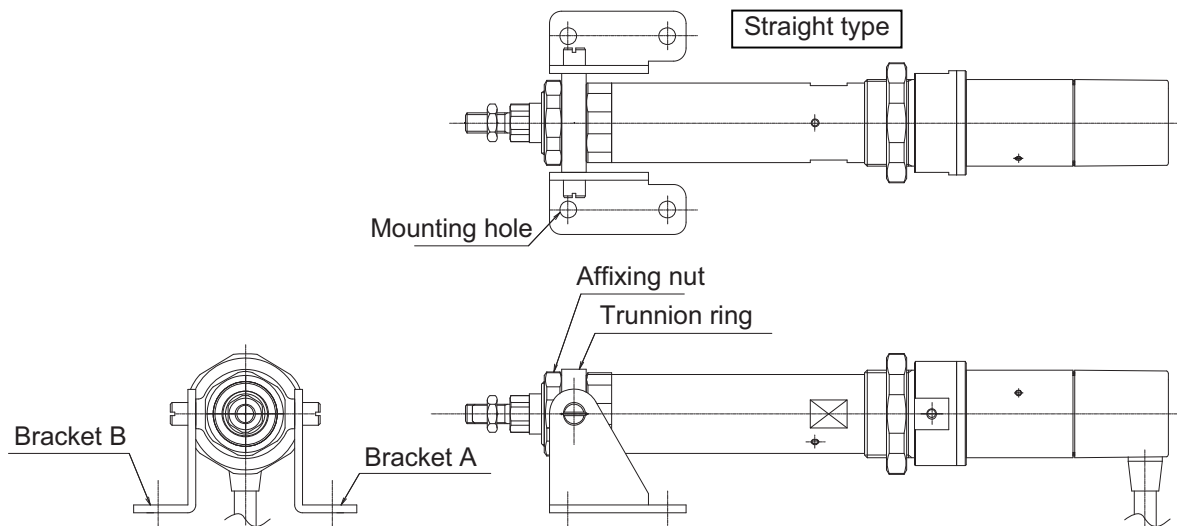
**Caution:** Affix the actuator using two feet (optional), one in the front and the other in the back. If affixed using only one foot in the front or back, the actuator may be negatively affected due to insufficient rigidity.



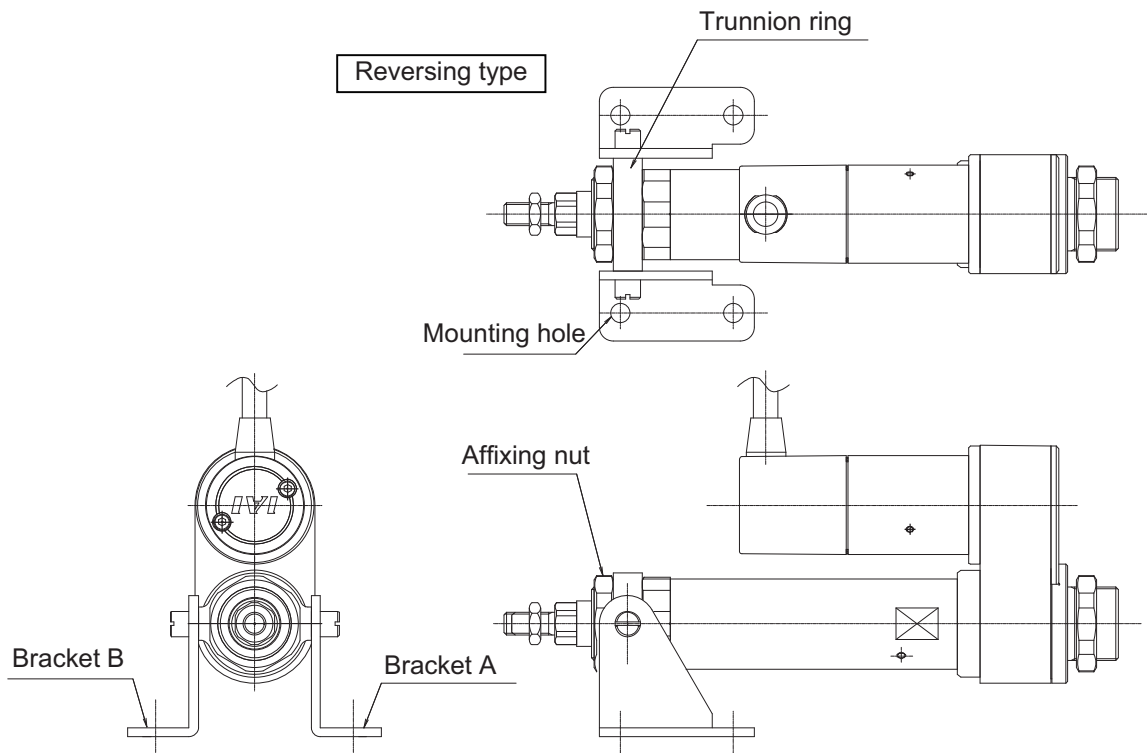
(4) Using screws on a trunnion (optional)

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

- Applicable models: RA3C, RA3D, RA4C, RA4D



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



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

**Caution:** Exercise caution when installing the actuator horizontally using the optional clevis or trunnion or any commercially available free joint, because the rod will receive the actuator weight. As a result, the bush may wear quickly or internal mechanical parts may be damaged.  
If the actuator is installed horizontally using any of the aforementioned means, add a guide or other appropriate mechanism to prevent the rod from receiving the actuator weight.

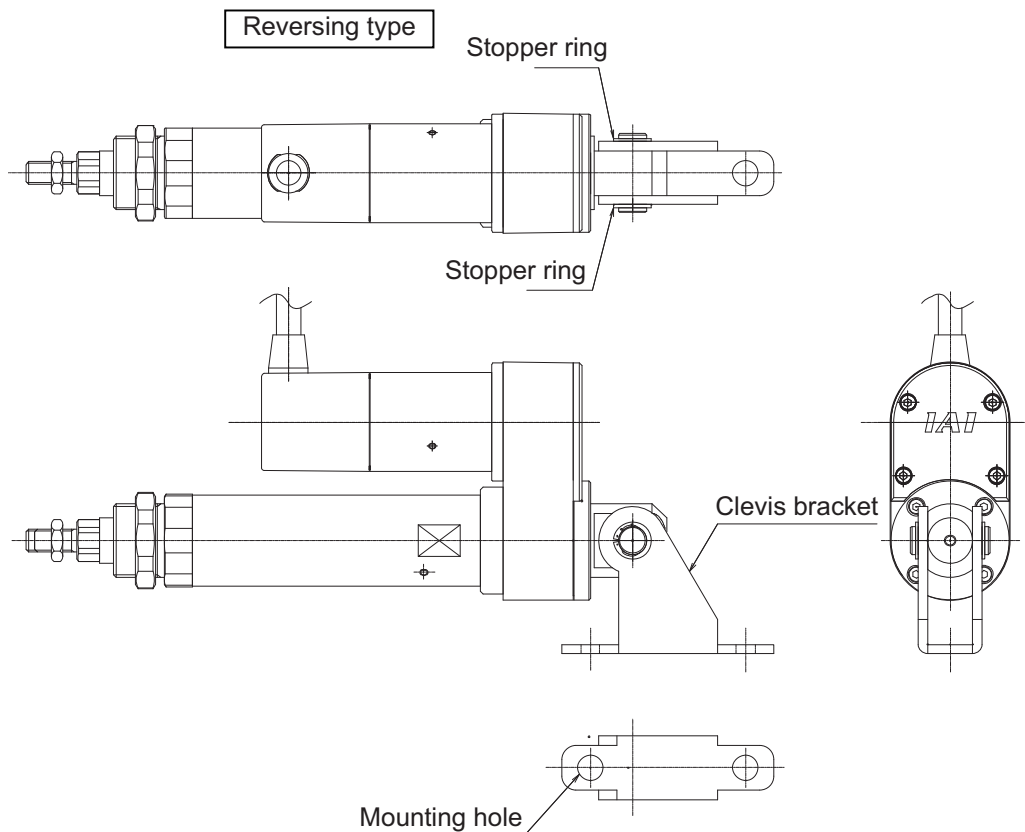
**Caution:** The optional clevis and trunnion are designed so that the fulcrum shaft can only receive radial load. In a condition where play is not permitted or thrust load is received, the customer must design a separate bearing structure.

**Caution:** The optional clevis and trunnion provide structures whereby the bearing supports the fulcrum shaft. Apply grease to the fulcrum shaft.

(5) Using screws on a clevis (optional)

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

- Applicable models: Motor reversing type RCA-RA3R, RCA-RA4R



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

**Caution:** Exercise caution when installing the actuator horizontally using the optional clevis or trunnion or any commercially available free joint, because the rod will receive the actuator weight. As a result, the bush may wear quickly or internal mechanical parts may be damaged.  
If the actuator is installed horizontally using any of the aforementioned means, add a guide or other appropriate mechanism to prevent the rod from receiving the actuator weight.

**Caution:** The optional clevis and trunnion are designed so that the fulcrum shaft can only receive radial load. In a condition where play is not permitted or thrust load is received, the customer must design a separate bearing structure.

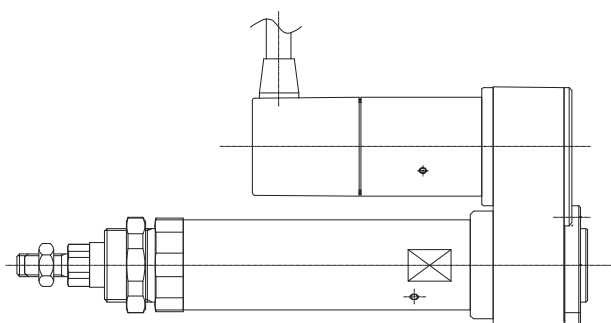
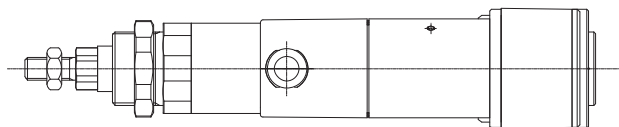
**Caution:** The optional clevis and trunnion provide structures whereby the bearing supports the fulcrum shaft. Apply grease to the fulcrum shaft.

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

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

- Applicable models: Motor reversing type RCA-RA3R, RCA-RA4R

Reversing type



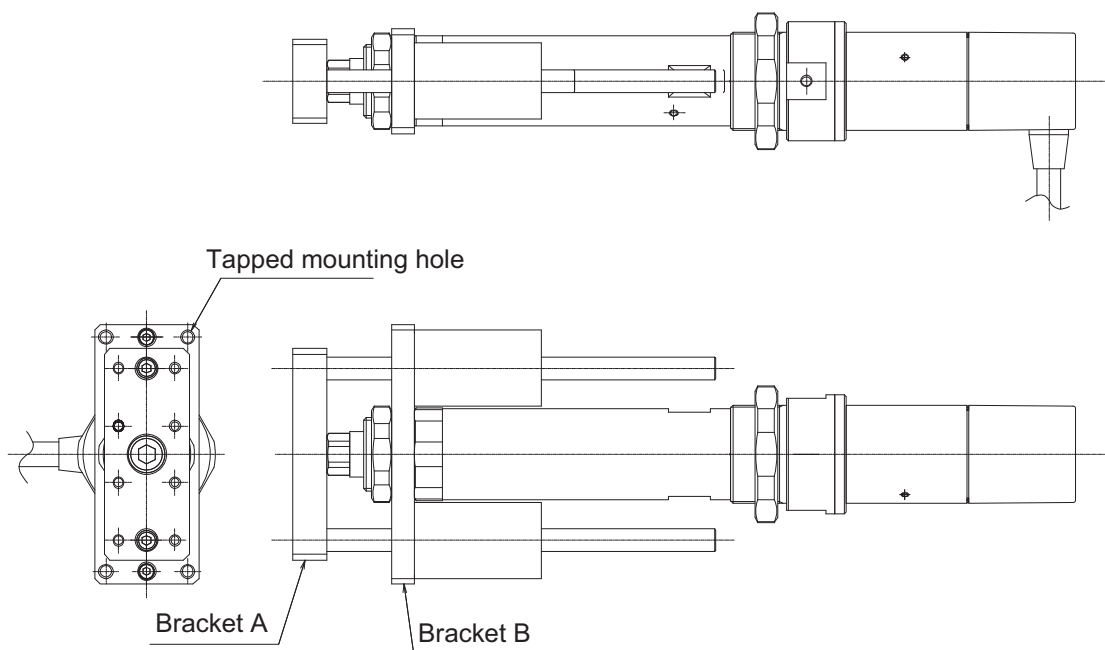
Tapped mounting hole

Type	Tapped hole diameter	Tapped depth	Tightening torque
RA3 type	M4	6 mm	1.8 N-m
RA4 type	M4	7 mm	1.8 N-m

## (7) Double-guide type

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

- Applicable models: Double-guide type RGD3, RGD4

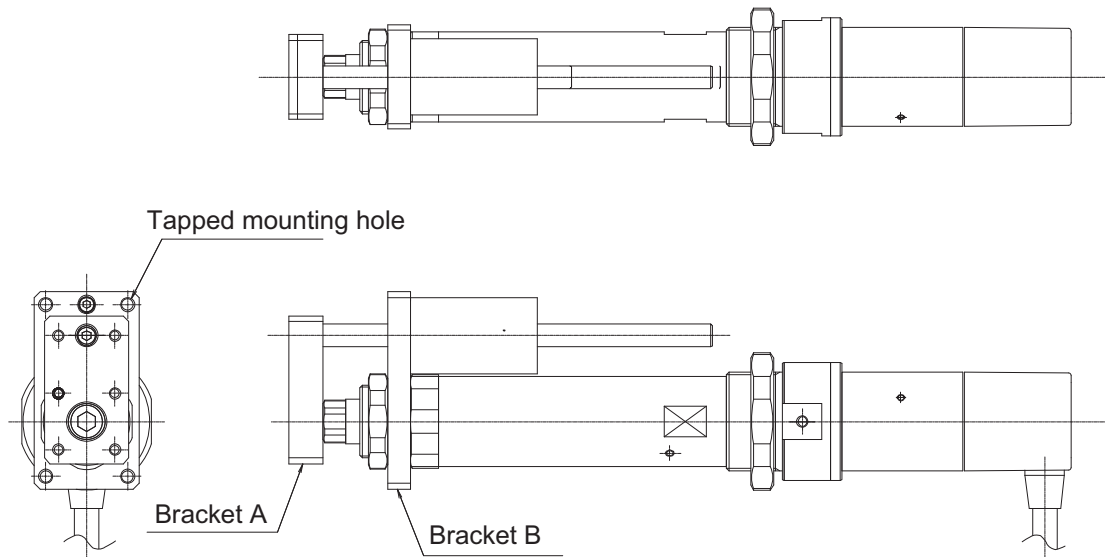


Type	Tapped hole diameter	Tapped depth	Tightening torque
RA3 type	M5	8 mm	3.4 N-m
RA4 type	M5	8 mm	3.4 N-m

(8) Single-guide type

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

- Applicable models: Double-guide type RGD3, RGD4



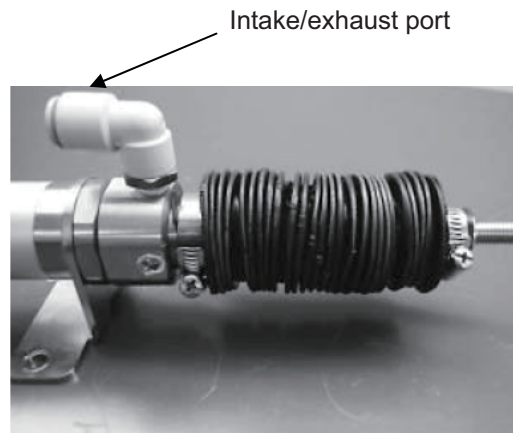
Type	Tapped hole diameter	Tapped depth	Tightening torque
RA3 type	M5	8 mm	3.4 N-m
RA4 type	M5	8 mm	3.4 N-m

## 8. Wiring Cable

- In an application where the cable cannot be anchored, try to place the cable so that it sags only under its own weight or use self-standing type cable as large radial wire duct to limit the load on the cable.
- Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length.
- The cables supplied with the actuator offer excellent flexibility, but they are not robot cables. If the cables are to be stored in a movable cable duct (cable bearer, etc.), use robot cables.

For cable modification, please contact your IAI sales representative.

## 9. Connecting the Air Tube of the RCAW Dustproof/Splash-proof Type



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

(Applicable tube)

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

- TU1065: Polyurethane tube (Manufacturer: SMC)

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



## 10. Maximum Speed

The maximum speed of the actuator is limited to prevent resonance of the ball screw shaft and also in consideration of the restrictions on motor speed.  
Observe the maximum speed limits specified below.

Maximum speed limits

Type	Lead	Maximum speed
RA4 type	3 mm	150 mm/sec
	6 mm	300 mm/sec
	12 mm	600 mm/sec
RA3 type	2.5 mm	125 mm/sec
	5 mm	250 mm/sec
	10 mm	500 mm/sec

**Caution:** If the maximum speed limit is exceeded, noise may increase or vibration may occur due to resonance of the ball screw shaft, in which case the service life of the actuator may be significantly reduced.  
If multiple actuators are used together, with each actuator operating independently, create programs where each actuator does not exceed the applicable maximum speed (see the table above). If operations of multiple actuators are synchronized, programs should be based on the lowest maximum speed among the combined actuators.  
Create appropriate program by checking the maximum speed of each actuator.

## 11. Load on the Actuator

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

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



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

Tighten the nut at the tip of the rod, while securely holding the rod using a wrench of size 17 (RA4) or 13 (RA3).

## 12. Actuators with a Switch (Optional)

On actuators with a switch, the switch is stored inside the actuator body on the motor side. Do not increase the homing speed beyond the default factory setting. If the homing speed is increased beyond the default, the switch may be damaged.

## 13. High Acceleration/Deceleration and Power-saving Options

### 13.1 Applicable Actuator Models

Actuators that support high acceleration/deceleration and power-saving function are indicated by option codes at the end of the model name. Other applicable options are the same as those available with conventional models.

Series	Model	Encoder type	Motor output	Lead	Stroke	Applicable controller	Cable length	Options
RCA	RA3C	I	20 30	12	50~600	A1	N	HA LA Blank
	RGS3C			10			P	
	RGD3C			6			S	
	RA4C			5			M	
	RGS4C						X□□	
	RGD4C						R□□	

HA: High acceleration/deceleration option (The actuator has a rated acceleration/deceleration of 1 G and is combined with a controller of high acceleration/deceleration specification.)

LA: Power-saving option (The actuator has a rated acceleration/deceleration of 0.3 G, and is combined with a controller of power-saving specification with lower peak current.)

(Blank): Conventional specification (The actuator has a rated acceleration/deceleration of 0.3 G, and is combined with a conventional controller.)

(Example) RCA-RA3C-I-20-10-50-A1-S-HA

High acceleration/deceleration type

RCA-RA4C-I-20-10-50-A1-S-LA

Power-saving type

RCA-RA4C-I-20-10-50-A1-S ..... Conventional specification

### 13.2 Specifications of High Acceleration/Deceleration Actuators

Model	Motor output (W)	Lead (mm)	Maximum loading capacity		Rated thrust (N)	Rated acceleration/deceleration (G)
			Horizontal (kg)	Vertical (kg)		
RA3C	20	10	4	1.5	36.2	1.0
		5	9	3	72.4	1.0
RGS3C		10	4	1.2	36.2	1.0
		5	9	2.7	72.4	1.0
RGD3C	30	10	4	1.2	36.2	1.0
		5	9	2.7	72.4	1.0
RA4C		12	4	1.5	28.3	1.0
		6	9	3	56.6	1.0
RGS4C		12	4	1	28.3	1.0
		6	9	2.5	56.6	1.0
RGD4C		12	4	1	28.3	1.0
		6	9	2.5	56.6	1.0

### 13.3 Notes

Take note of the following points if you are using a high acceleration/deceleration type:

- (1) Keep the duty within 50%. If the duty exceeds 50%, an overload error may occur.
- (2) The maximum loading capacity follows the applicable value specified in the table under "Specifications of High Acceleration/Deceleration Actuators" regardless of the acceleration setting.
- (3) Refer to p. 24 for the maximum speed.

### 13.4 Applicable Controller Models (ACON, ASEL)

The following codes are appended after the encoder type:

HA: High acceleration/deceleration specification

LA: Power-saving specification

(Blank): Conventional specification

(Examples) [1] High acceleration/deceleration specification

ACON-C-20IHA-NP-2-0

[2] Power-saving specification

ACON-C-20ILA-NP-2-0

[3] Conventional specification

ACON-C-20I-NP-2-0

Load current *1	Actuator	Standard specification, high acceleration/deceleration option		Power-saving option	
		Rated	Maximum *2	Rated	Maximum *2
	RA3C	1.7 A	5.1 A	1.7 A	3.4 A
	RGS3C				
	RGD3C				
	RA4C	1.3 A	4.0 A	1.3 A	2.2 A
	RGS4C				
	RGD4C				

\*1 When the power is turned on, rush current corresponding to around 5 to 12 times the rated current will flow for approx. 1 to 2 msec. Take note that the specific level of rush current varies depending on the impedance of the power-supply line.

\*2 The current becomes the greatest during the detection of excited servo-motor phase, which is performed when the servo is turned on for the first time following the power on.  
(Normal: 1 to 2 seconds / Maximum: 10 seconds)

The applicable controllers vary depending on the actuator specification. Check the model of the actuator you will be using.

## 14. Maintenance

### 14.1 Maintenance Schedule

Perform maintenance work according to the schedule below.

The schedule is set assuming eight hours of operation a day. When the operation time is long such as 24-hour operation, shorten the maintenance intervals as needed.

	Visual inspection	Grease supply
Start of operation	○	
After 1 month of operation	○	
After 3 months of operation	○	○ (Sliding surface of the rod) *1
Every 3 months thereafter	○	○ (Sliding surface of the rod) *1
After 3 years of operation, or upon reaching 5,000 km in traveled distance	○	
Every year thereafter	○	

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

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

### 14.2 Visual Inspection of the Machine Exterior

Check the following items visually.

Body	Loose mounting bolts?
Cables	Damage to cables or connection to connector box?
General	Unusual noise or vibrations?

### 14.3 Cleaning

- Clean the exterior as needed.
- Wipe off dirt with a soft cloth.
- Do not use strong compressed air on the actuator as this may force dust into the crevices.
- Do not use petroleum-based solvent on plastic parts or painted surfaces.
- If the unit is badly soiled, apply a neutral detergent or alcohol to a soft cloth, and wipe gently.

## 14.4 Applying Grease to the Sliding Surface of the Rod

### (1) Applicable grease

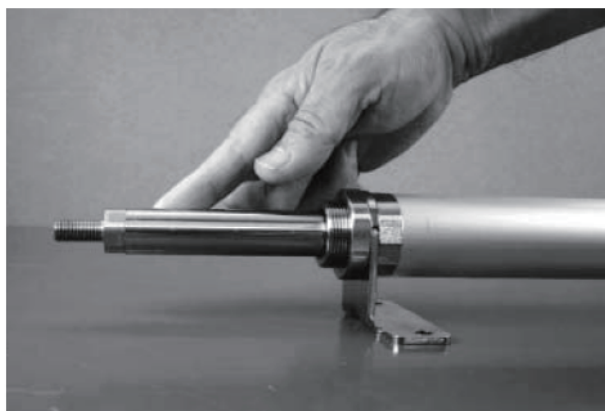
Kyodo Yushi

Multemp LRL3

**Warning:** Never use any fluorine-based grease. It will cause a chemical reaction when mixed with a lithium-based grease and may cause damage to the actuator.

### (2) How to apply grease

Apply grease over the entire surface of the rod.



**Caution:** In case the grease got into your eye, immediately go to see the doctor to get an appropriate care.  
After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease off.

## 14.5 Reduction Belt [Motor Reversing Type]

### 14.5.1 Inspecting the Belt

Remove the pulley cover and visually inspect the belt.

Durability of the reduction belt is affected significantly by the operating condition, and there is no standard guideline as to when the belt should be replaced.

Generally, the belt is designed to withstand several millions of flexing loads.

As a practical guideline, replace the reduction belt when any of the conditions listed below is observed:

- The teeth and end faces of the belt have worn significantly.
- The belt has swollen due to deposits of oil, etc.
- Cracks and other damages are found on the teeth or back of the belt.
- The belt has broken.

### 14.5.2 Applicable Belt

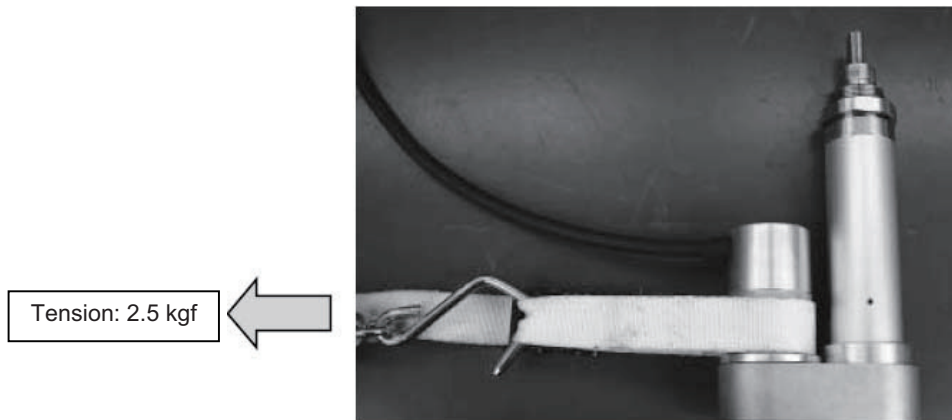
- RA3R - 60S2M124R Rubber, cleanroom type (Bando Chemical Industries) 6 mm wide
- RA4R - 60S2M154R Rubber, cleanroom type (Bando Chemical Industries) 6 mm wide

## 14.5.3 Adjusting the Belt Tension

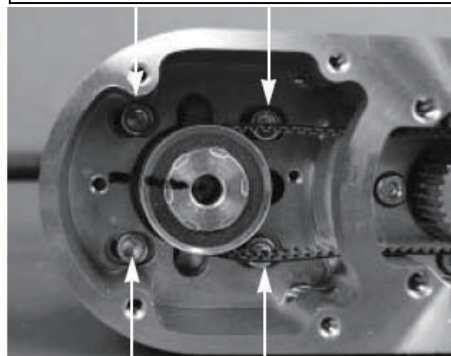
Remove the pulley case cover and loosen the four motor-unit affixing bolts. Pass a looped string (or long tie-band) around the motor unit, and pull the string to the specified tension using a tension gauge. In this condition, uniformly tighten the motor-unit affixing bolts.

[Recommended tightening torque of adjustment bolts]

162 N-cm (16.5 kgf-cm)



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



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



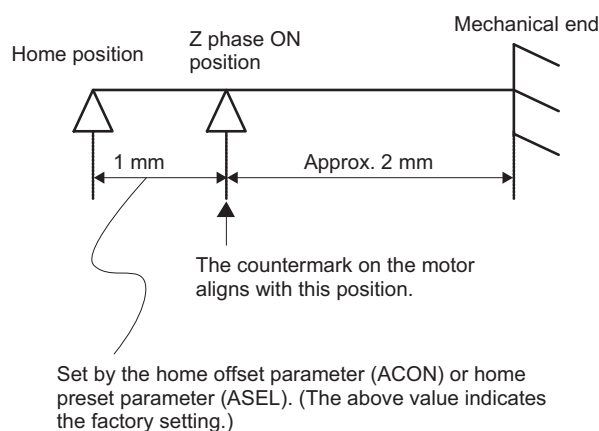
## 14.5.4 Replacing the Belt of the Motor Reversing Type: RA3R/RA4R Types

### [Items Required for Replacement]

- Replacement belt  
RA3R --- 60S2M124R Rubber, cleanroom type (Bando Chemical Industries) 6 mm wide  
RA4R --- 60S2M152R Rubber, cleanroom type (Bando Chemical Industries) 6 mm wide
- Allen wrenches
- Tension gauge (capable of tensioning to 7 kgf or greater)
- Strong string, looped (or long tie-band)
- Scale
- Oil-based marker pen
- PC or teaching pendant

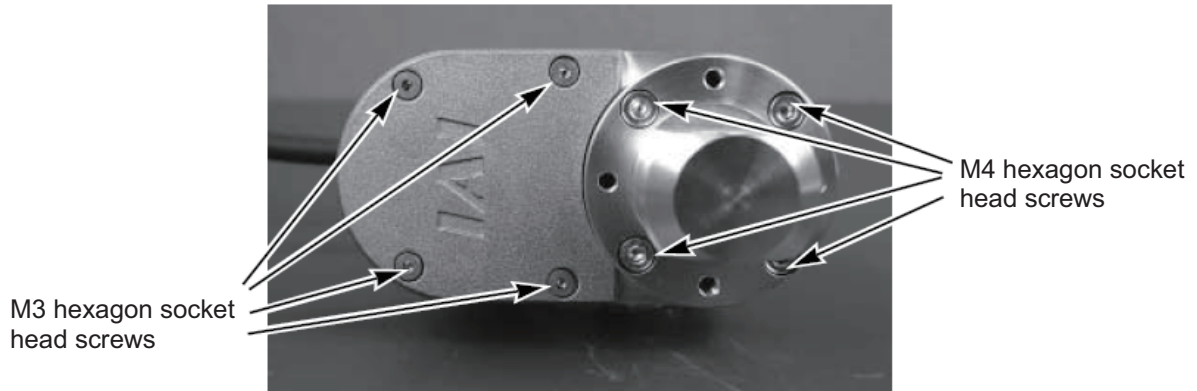
### [Overview of Replacement]

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



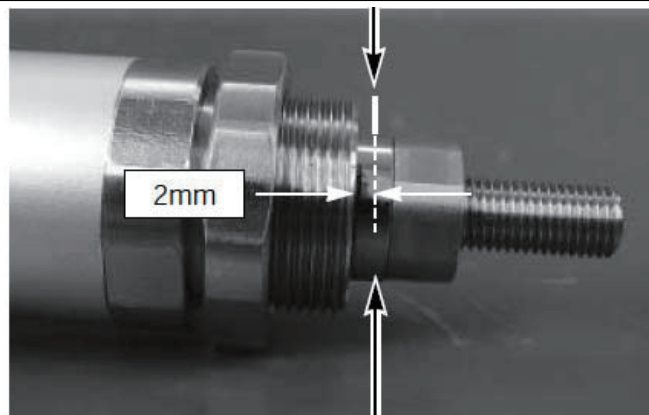
[Procedure]

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



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

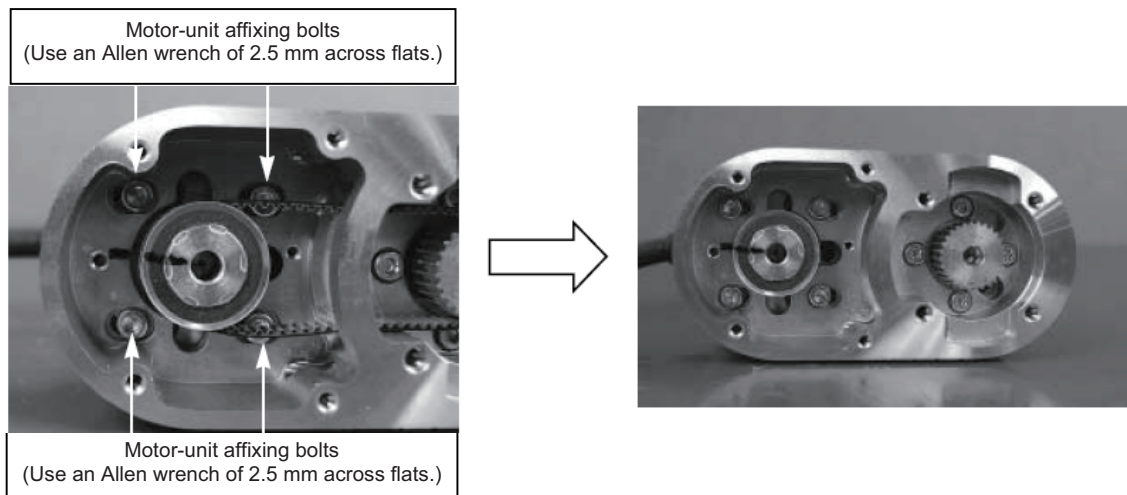
Cause the rod to project 2 mm from the mechanical end.



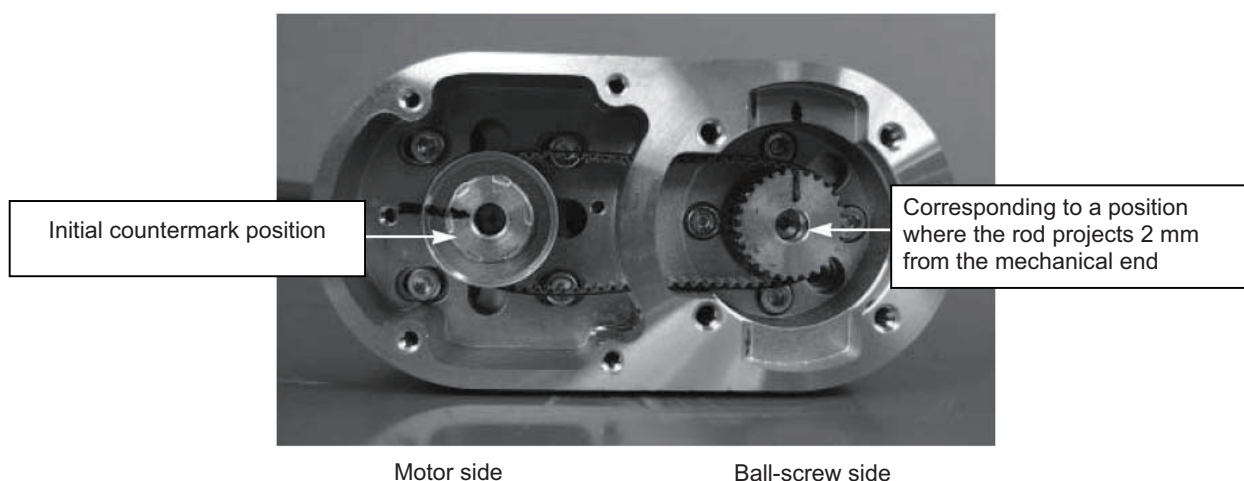
Apply countermarks once the rod has projected 2 mm from the mechanical end.

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

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



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

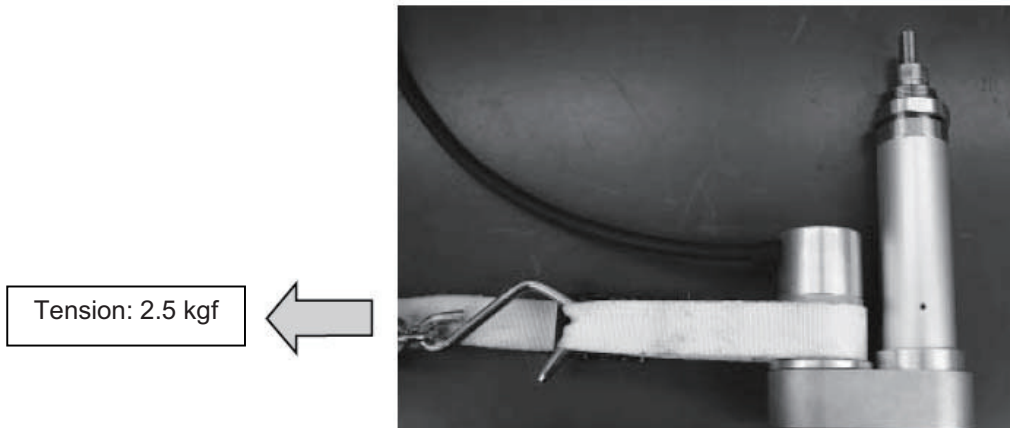


5) Adjust the belt tension.

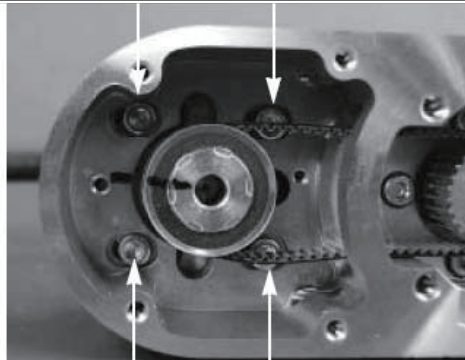
Pass a looped strong string (or long tie-band) around the motor cover and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the motor-unit affixing bolts.

[Recommended tightening torque for adjustment bolts]

162 N·cm (16.5 kgf·cm)

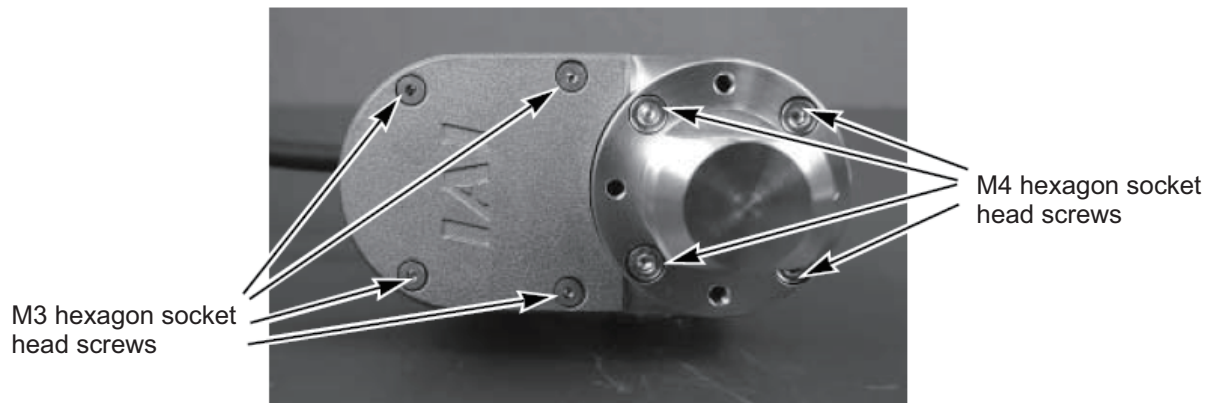


Motor-unit affixing bolts  
(Use an Allen wrench of 2.5 mm across flats.)



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

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



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

## 14.6 Replacing the Motor

### 14.6.1 Replacing the Motor of the Motor Straight Type (Coupling Type): RA3C/RA4C Types

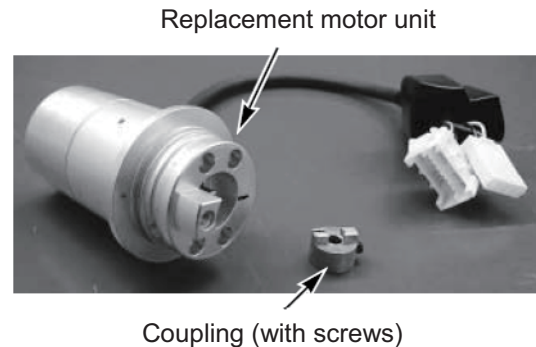
#### [Items Required for Replacement]

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

Idemitsu Kosan

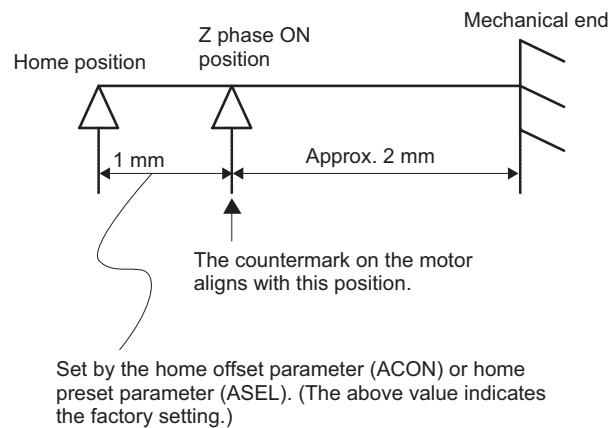
Daphne Eponex Grease No.2

- PC or teaching pendant



#### [Overview of Replacement]

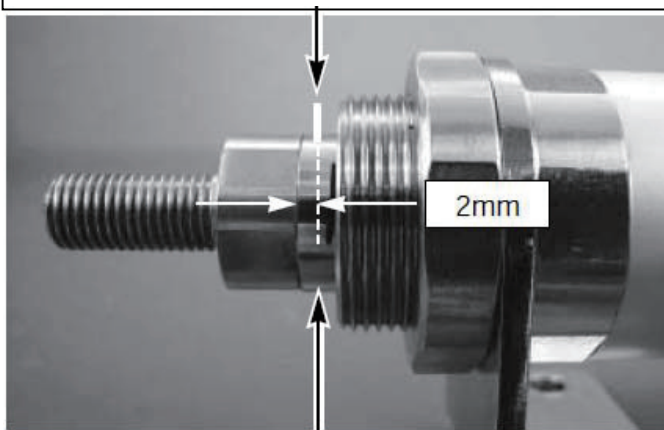
- 1) Move the rod to a position where Z phase turns on (home position) (2 mm from the mechanical end). In this position, replace the motor.
- 2) Perform homing using a PC or teaching pendant and check for deviation from the initial home position. If there is a deviation, adjust the home offset if you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



[Procedure]

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

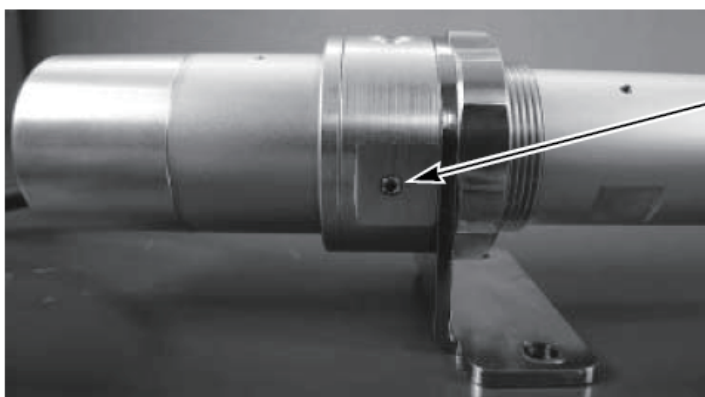
Cause the rod to project 2 mm from the mechanical end.



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

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

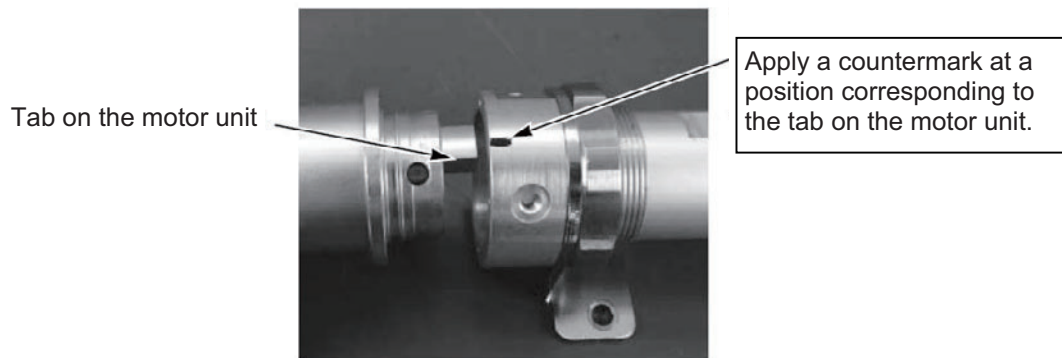
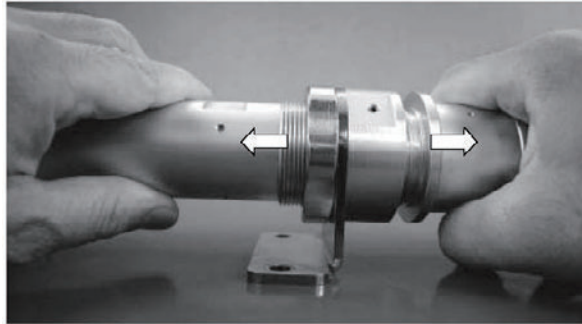
- 2) Using an Allen wrench of 2 mm across flats, remove the two motor-unit affixing bolts on the right and left.



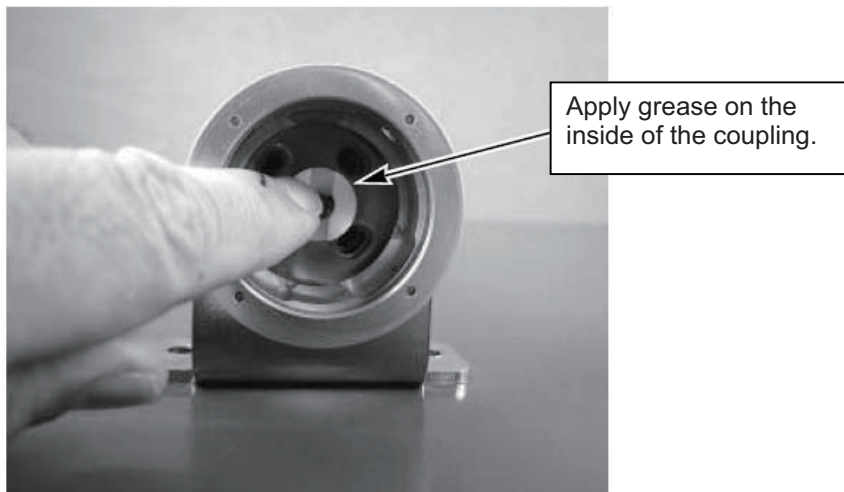
2 affixing bolts on the motor-end cap (right and left) (hexagon socket head setscrews)

3) Pull out the motor unit.

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

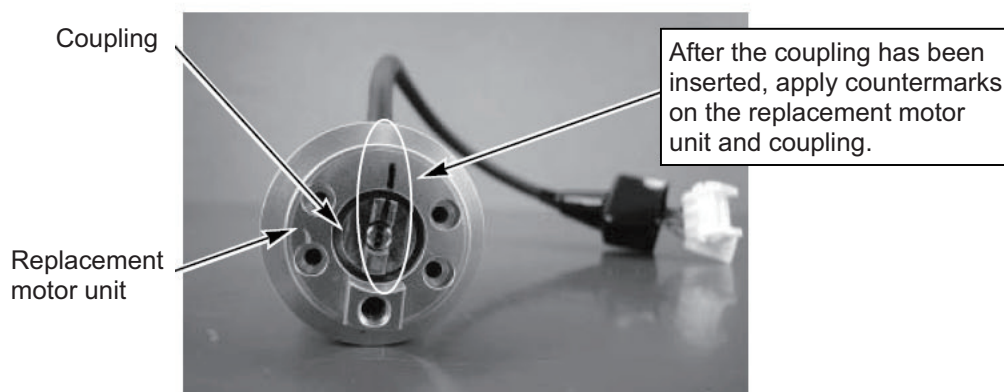
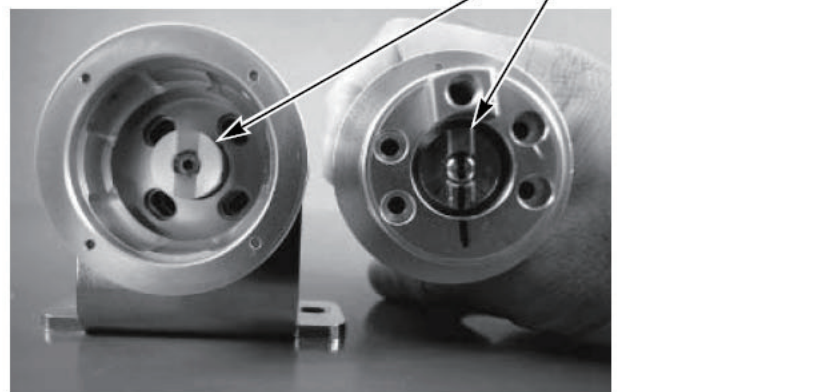
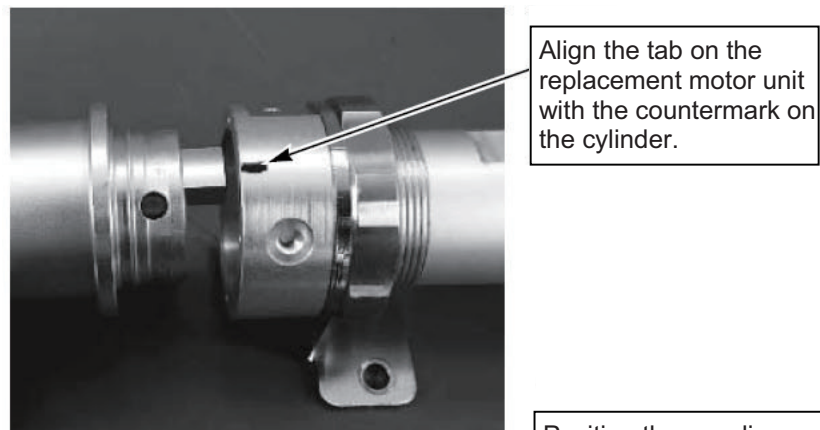


4) Apply grease on the actuator coupling.



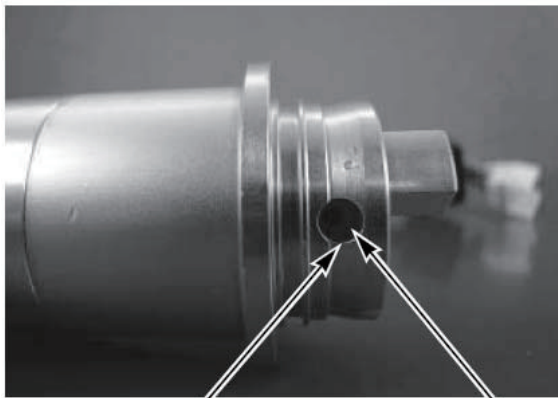


- 5) Align the tab on the replacement motor unit with the countermark on the cylinder.  
With the motor unit and cylinder aligned properly, insert the coupling into the replacement motor unit by aligning the orientation of this coupling with that of the actuator coupling (adjusted to a position corresponding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

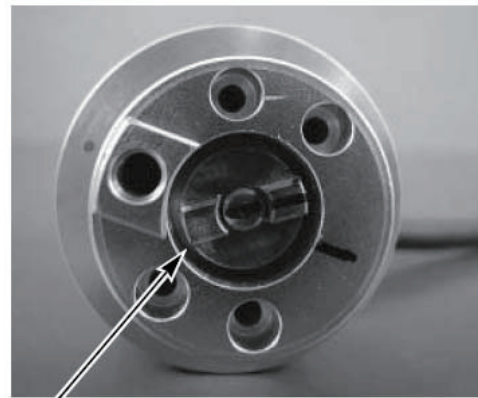


- 6) Turn the coupling and motor shaft simultaneously until a setscrew on the coupling is seen through the hole.

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

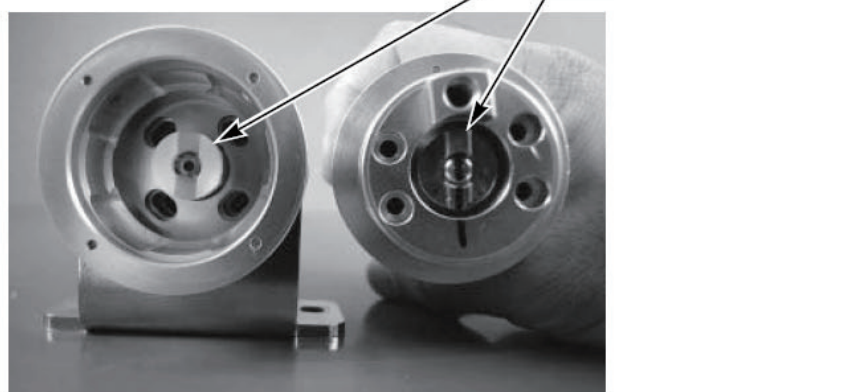
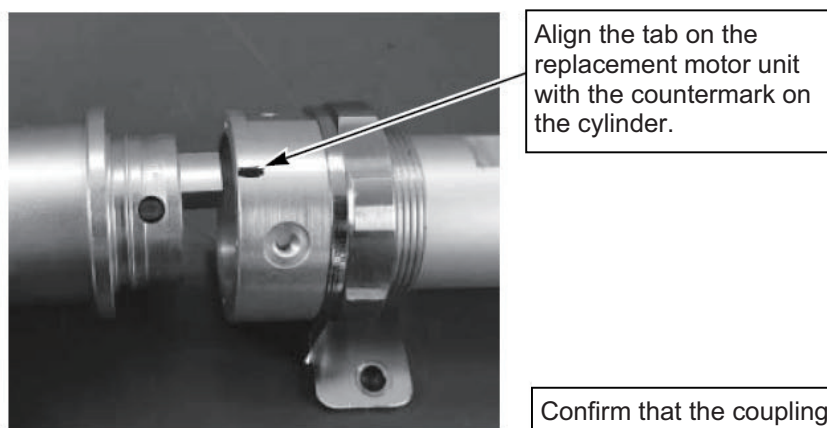
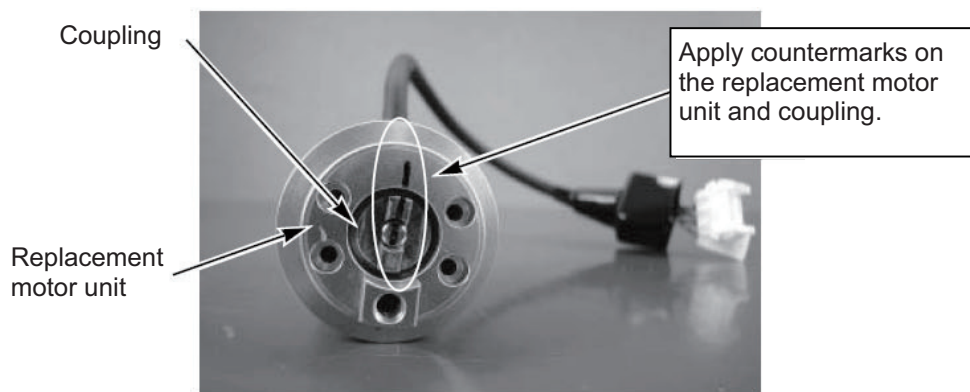


Coupling  
setscrew hole

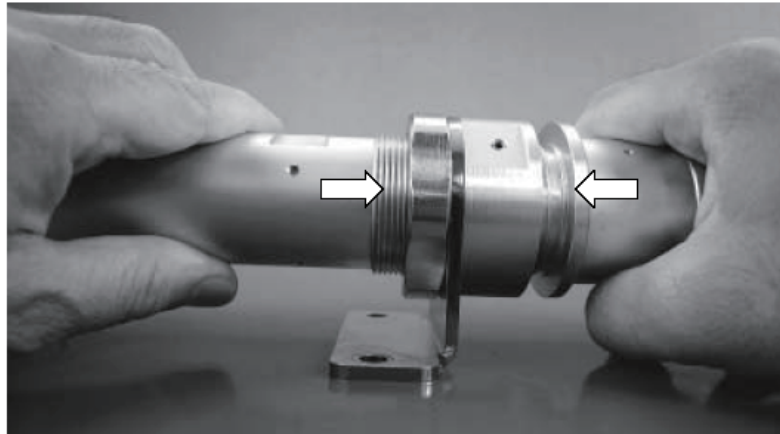


Turn the coupling and motor shaft simultaneously until a setscrew on the coupling is seen through the hole. Thereafter, tighten the hexagon socket head setscrew using an Allen wrench of 2 mm across flats.

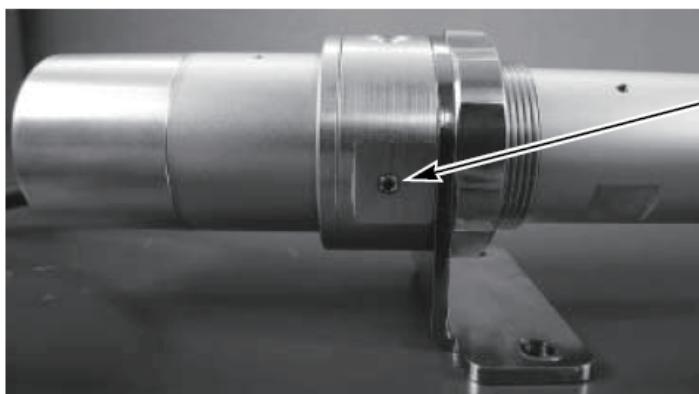
- 7) Return the coupling in the replacement motor unit to the initial motor position (Z phase position). Align the tab on the replacement motor unit with the countermark on the cylinder. With the motor unit and cylinder positioned this way, confirm that the orientation of the actuator coupling (adjusted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



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



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



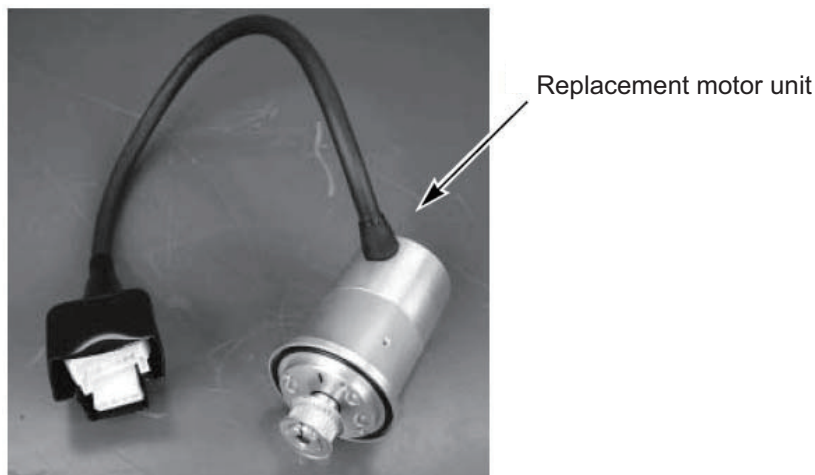
2 affixing bolts on the motor-end cap (right and left) (hexagon socket head setscrews)

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

## 14.6.2 Replacing the Motor of the Motor Reversing Type: RA3R/RA4R Types

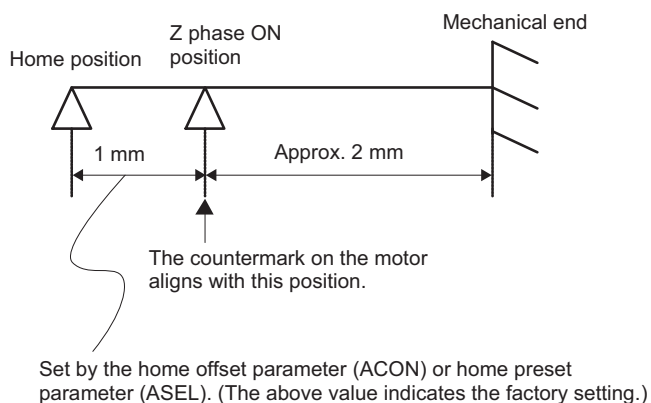
### [Items Required for Replacement]

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



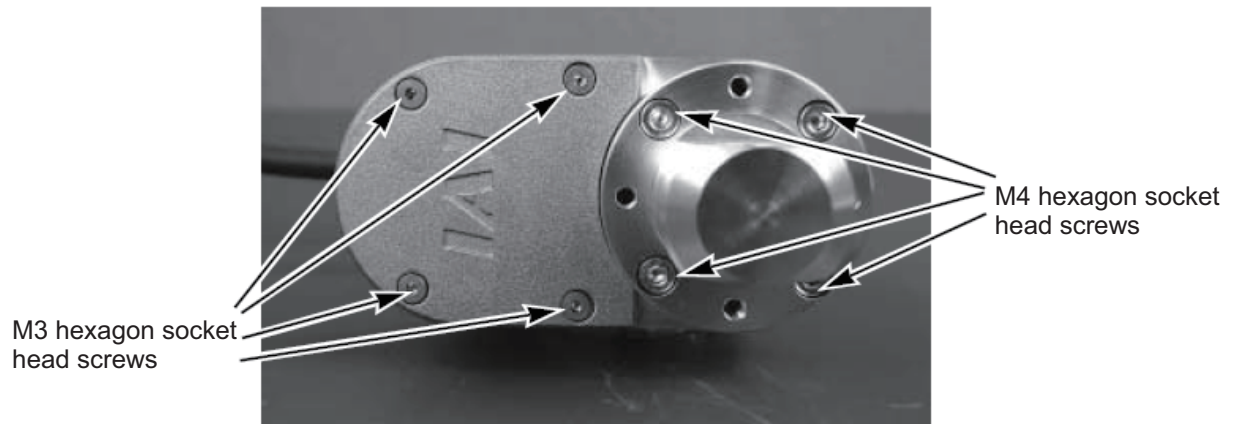
### [Overview of Replacement]

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

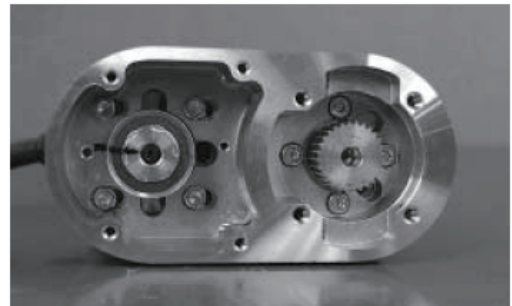
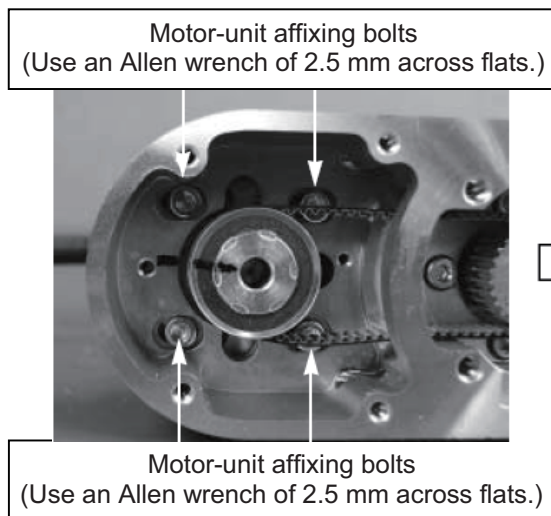


[Procedure]

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

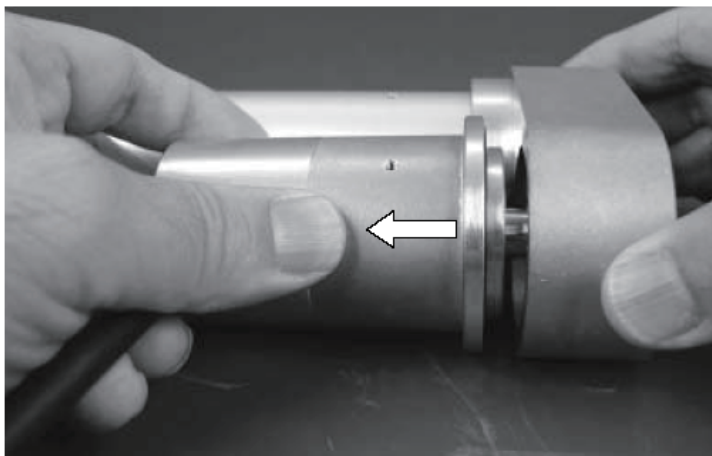


- 2) Loosen the motor-unit affixing bolts using an Allen wrench of 2.5 mm across flats. Slide the motor, and loosen and remove the belt. After the belt has been removed, remove the motor-unit affixing bolts.

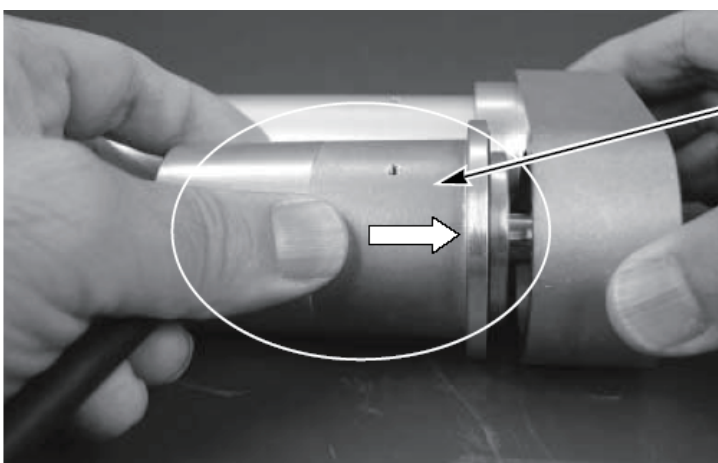




3) Take out the motor.



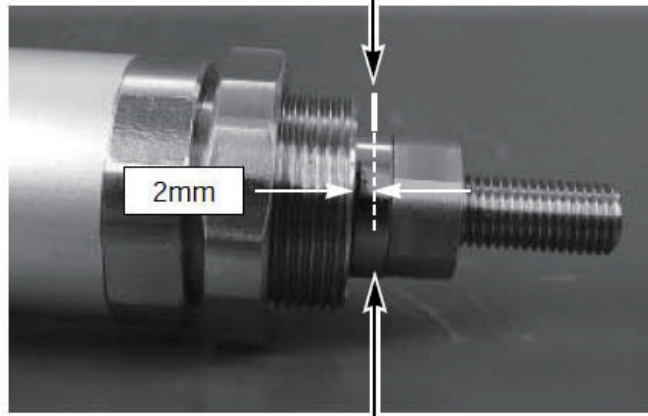
4) Install the replacement motor. Loosely tighten the motor-unit affixing bolts.



Replacement motor

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

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

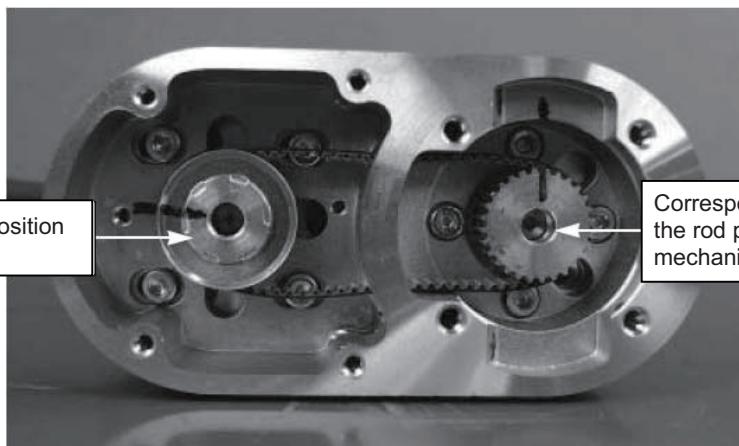


Apply countermarks once the rod has projected 2 mm from the mechanical end.

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

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

Initial countermark position



Corresponding to a position where the rod projects 2 mm from the mechanical end

Motor side

Ball-screw side

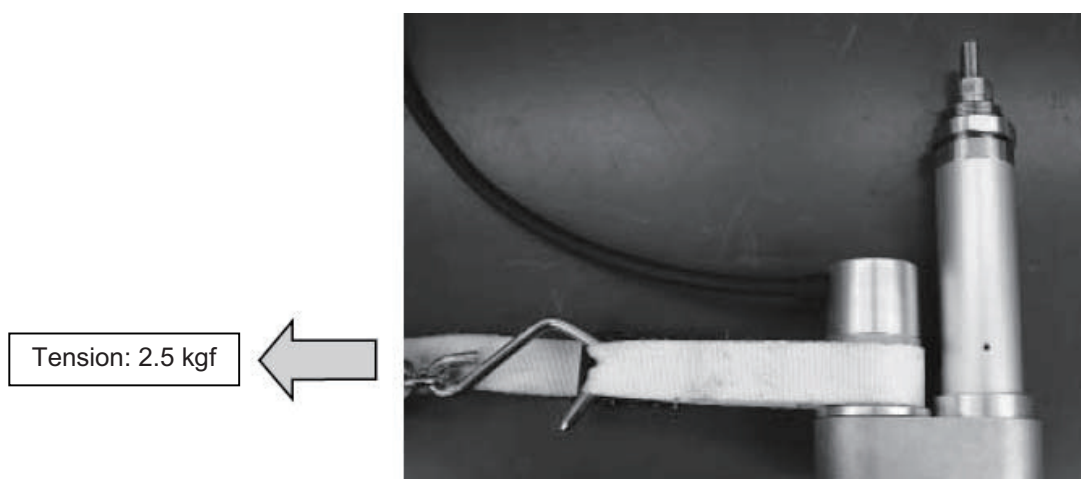


7) Adjust the belt tension.

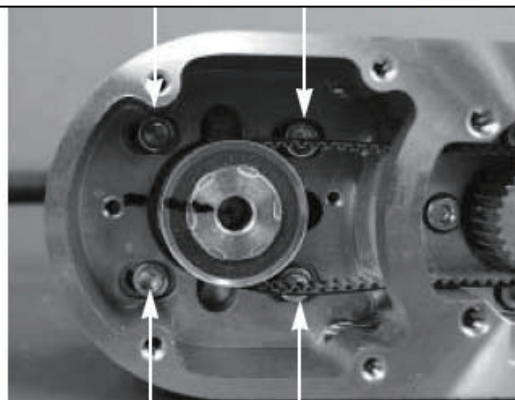
Pass a looped strong string (or long tie-band) around the motor cover and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the motor-unit affixing bolts.

[Recommended tightening torque for adjustment bolts]

162 N·cm (16.5 kgf·cm)

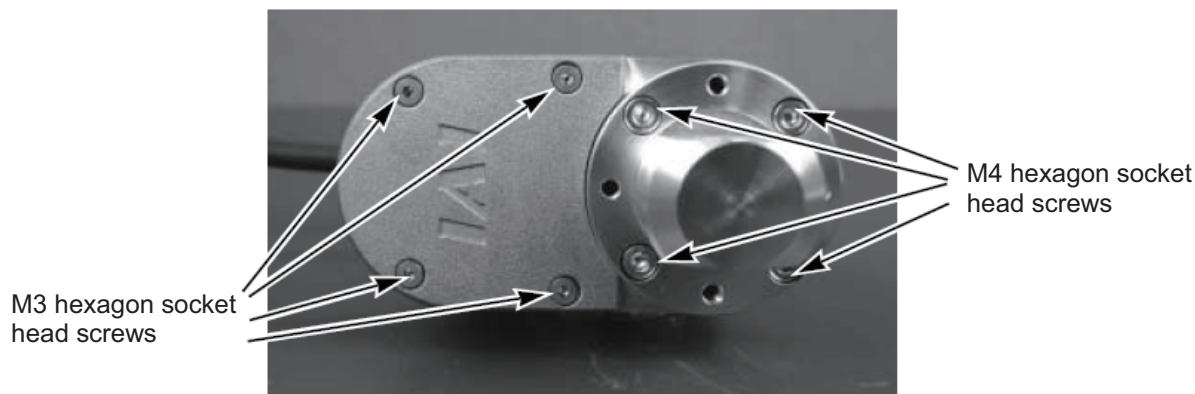


Motor-unit affixing bolts  
(Use an Allen wrench of 2.5 mm across flats.)



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

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



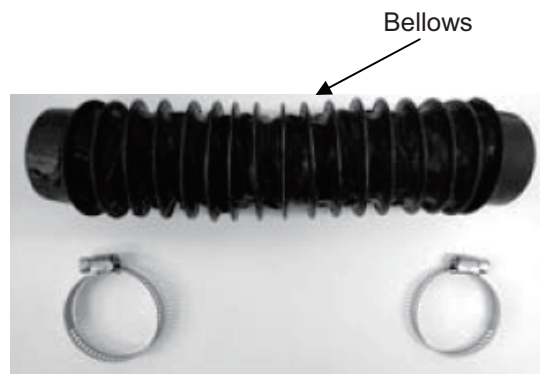
- 9) Connect a PC or teaching pendant to the controller to perform homing. (If the actuator is of absolute encoder specification, an absolute reset must be performed.) Check for deviation from the initial home position.  
If there is a deviation, adjust parameter No. 22, "Home offset" if you are using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

## 14.7 Replacing the Bellows of the RCAW Dustproof/Splash-proof Type

### [Items Required for Replacement]

- Replacement bellows unit  
: RA3 --- JB-RA3- (stroke)  
: RA4 --- JB-RA4- (stroke)
- Phillips screwdriver
- Torque driver
- Grease

Kyodo Yushi	Multemp LRL3
-------------	--------------



### [Procedure]

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



Loosening of front metal fitting



Loosening of rear metal fitting

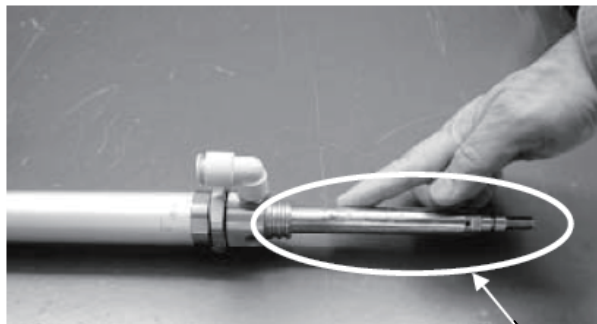


Removal of bellows



Bellows has been removed

- 2) Apply grease evenly over the entire cylinder surface.



Apply grease evenly over the entire surface.

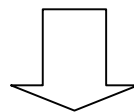
- 3) Install a metal fitting on the bellows.



Bellows



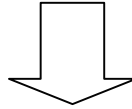
Install a metal fitting on the bellows.



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



Installation of bellows



Tightening of rear metal fitting

Tightening torque: 2 N-m

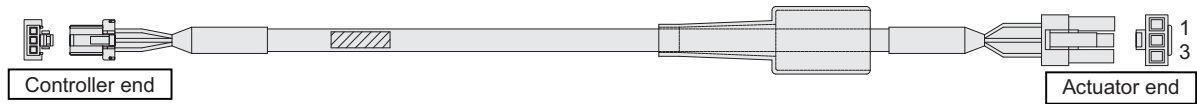


Tightening of front metal fitting

Tightening torque: 2 N-m

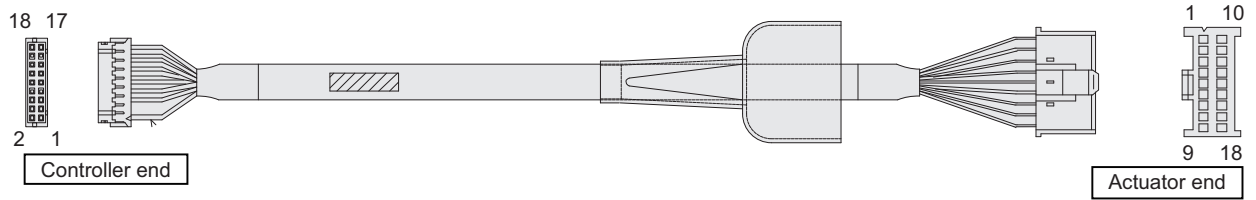
## 15. Cable Drawings

- [1] Motor cable  
Model: CB-ACS-MA □□□



Wire	Color	Signal	No.	No.	Signal	Color	Wire
AWG22 (crimped)	Red	U	1	1	U	Red	AWG22 (crimped)
	White	V	2	2	V	White	
	Black	W	3	3	W	Black	

[2] Encoder cable/robot encoder cable  
Model: CB-ACS-PA □□□/CB-ACS-PA □□□-RB



Wire	Color	Signal	No.		No.	Signal		Color	Wire
						ABZ	Serial		
AWG26 (crimped)	White/purple	LS +	18		1	A +	-	White/blue	AWG26 (crimped)
	White/gray	LS -	17		2	A -	-	White/yellow	
	Yellow	BK +	16		3	B +	-	White/red	
	Blue	BK -	15		4	B -	-	White/black	
	White/blue	A +	14		5	-	-	-	
	White/yellow	A -	13		6	-	-	-	
	White/red	B +	12		7	LS +	LS +	White/purple	
	White/black	B -	11		8	-	-	-	
	Orange	SD/Z +	10		9	FG	FG	Ground	
	Green	SD/Z -	9		10	Z +	SD +	Orange	
	Purple	BAT +	8		11	Z -	SD -	Green	
	Gray	BAT -	7		12	-	BAT +	Purple	
	Red	VCC	6		13	/PS	BAT -	Gray	
	Black	GND	5		14	VCC	VCC	Red	
	-	-	4		15	GND	GND	Black	
	-	-	3		16	LS -	LS -	White/gray	
	-	-	2		17	BK -	BK -	Blue	
	Ground	FG	1		18	BK +	BK +	Yellow	

("White/blue" in the wire color field  
indicates the band color/insulator color.)

### 16.1.1 RCA-RA3C

Technical drawing of the cable joint assembly, showing side and end views with dimensions and labels.

**Top View (Side View):**

- Assembly length:  $L$
- Dimensions from left to right: 18, 18, 20.
- Labels: M8  $\times$  1.25 (Effective screw range 16), M26  $\times$  1.5 (Effective screw range 15.5), M35  $\times$  1.5 (Effective screw range 17.5).

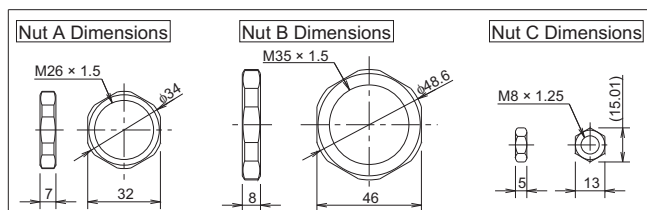
**Bottom View (End View):**

- Overall length:  $L$
- Dimensions from left to right: 49,  $\ell$ , 17, 85.5.
- Labels: ME, SE Home, ME, Nut A, Nut B, Nut C, Cable joint.
- Dimensions from left to right: 3, 3, 3, 14 (between 2 flat faces), 8, 10, 32 (between 2 flat faces), 14, 40 (between 2 flat faces).
- Dimensions from left to right:  $\phi 48.6$ ,  $\phi 32$ ,  $\phi 42$ ,  $\phi 35$ .
- Label: Secure at least 100.

Technical drawing of a shaft assembly. The drawing shows a shaft with various components and dimensions. Key dimensions include:

- Overall length: 124.5
- Distance from left end to Nut A: 49
- Distance from Nut A to Nut B: 17
- Distance from Nut B to right end: 43
- Distance from left end to Nut C: 14 (between 2 flat faces)
- Distance from Nut C to Nut A: 8
- Distance from Nut A to Nut B: 10
- Distance from Nut B to right end: 40 (between 2 flat faces)
- Distance from left end to Nut C: 14 (between 2 flat faces)
- Distance from Nut C to Nut A: 8
- Distance from Nut A to Nut B: 10
- Distance from Nut B to right end: 40 (between 2 flat faces)
- Distance from left end to Nut C: 14 (between 2 flat faces)
- Distance from Nut C to Nut A: 8
- Distance from Nut A to Nut B: 10
- Distance from Nut B to right end: 40 (between 2 flat faces)

Labels include: ME, SE, Home, Nut A, Nut B, Nut C, Connector, and various diameters ( $\phi 32$ ,  $\phi 42$ ,  $\phi 35$ ).



## RCA-RA3C (Without brake)

Stroke	50	100	150	200
L	283.5	333.5	383.5	433.5
$\ell$	132	182	232	282
Weight [kg]	0.7	0.8	0.9	1.0

## RCA-RA3C (With brake)

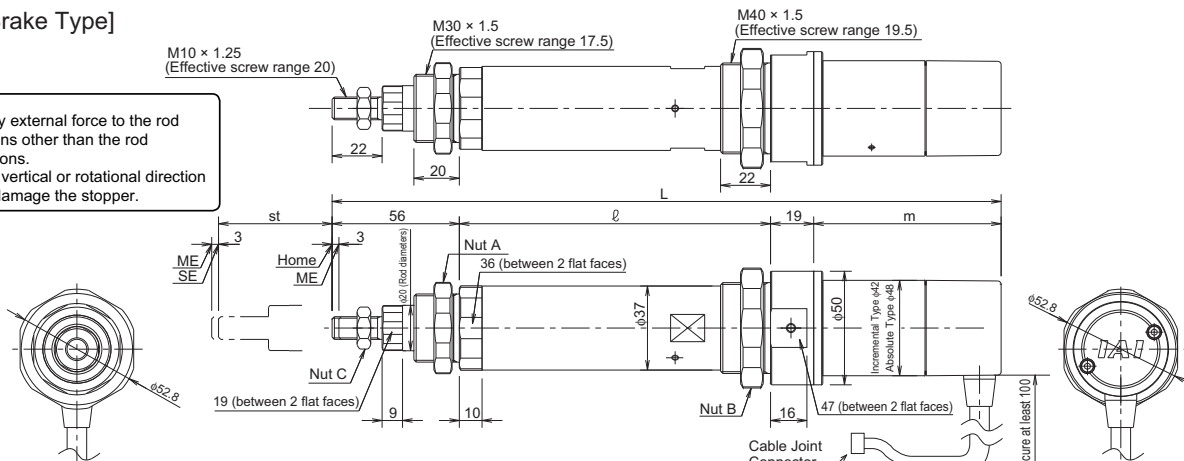
Stroke	50	100	150	200
L	322.5	372.5	422.5	472.5
$\ell$	132	182	232	282
Weight [kg]	0.9	1.0	1.1	1.2



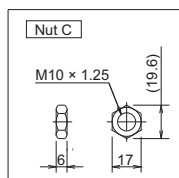
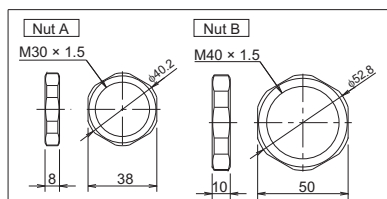
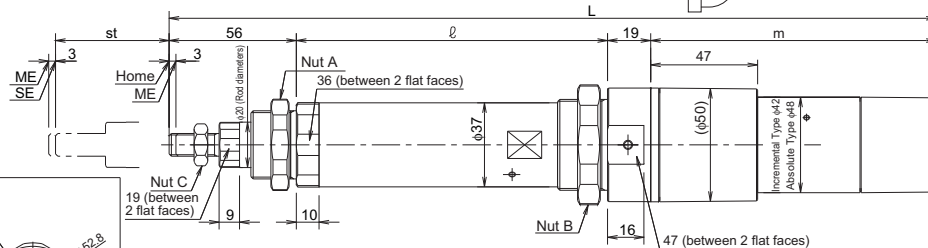
## 16.1.2 RCA-RA4C

### [Without Brake Type]

**Caution**  
Do not apply any external force to the rod from the directions other than the rod operating directions.  
The force in the vertical or rotational direction of the rod may damage the stopper.



### [With Brake Type]



### ■ Dimensions and Weight by Stroke

#### RCA-RA4C (Without brake)

Stroke		50	100	150	200	250	300	
L	20W	Incremental	279.5	329.5	379.5	429.5	479.5	529.5
		Absolute	292.5	342.5	392.5	442.5	492.5	542.5
	30W	Incremental	294.5	344.5	394.5	444.5	494.5	544.5
		Absolute	307.5	357.5	407.5	457.5	507.5	557.5
ℓ		137	187	237	287	337	387	
m	20W	Incremental	67.5					
		Absolute	80.5					
	30W	Incremental	82.5					
		Absolute	95.5					
Weight [kg]		1.1	1.2	1.4	1.5	1.7	1.8	

#### RCA-RA4C (With brake)

Stroke		50	100	150	200	250	300	
L	20W	Incremental	322.5	372.5	422.5	472.5	522.5	572.5
		Absolute	335.5	385.5	435.5	485.5	535.5	585.5
	30W	Incremental	337.5	387.5	437.5	487.5	537.5	587.5
		Absolute	350.5	400.5	450.5	500.5	550.5	600.5
Ø		137	187	237	287	337	387	
m	20W	Incremental	110.5					
		Absolute	123.5					
	30W	Incremental	125.5					
		Absolute	138.5					
Weight [kg]		1.3	1.4	1.6	1.7	1.9	2.0	

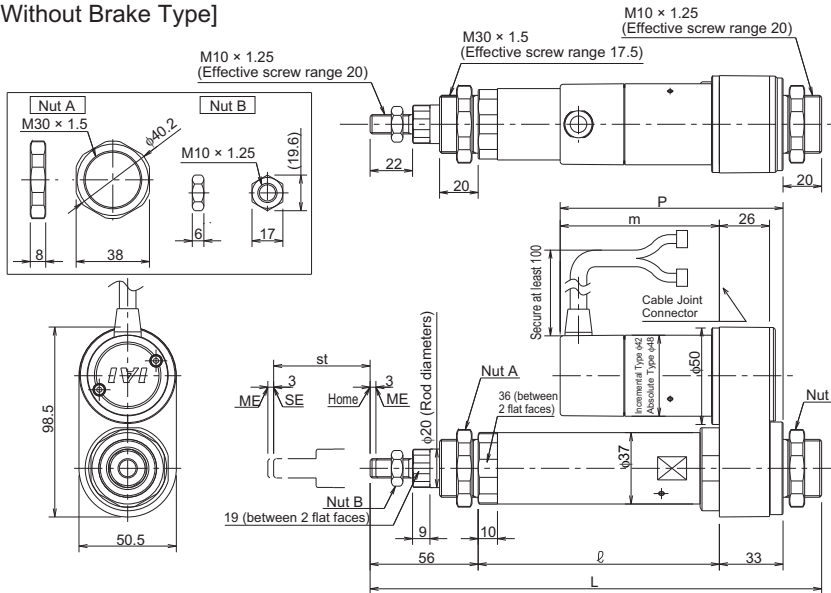




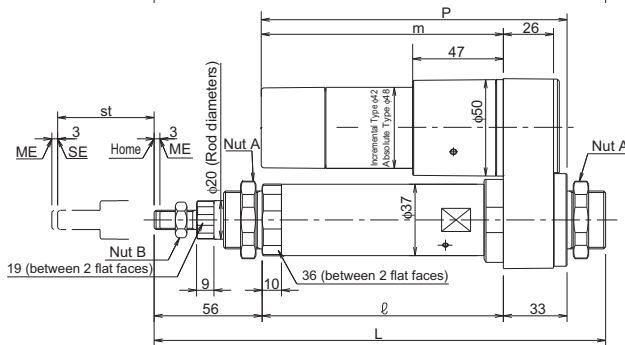


## 16.1.6 RCA-RA4R

### [Without Brake Type]



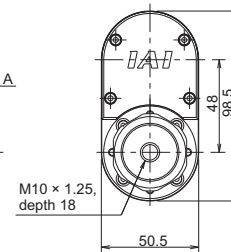
### [With Brake Type]



### ■ Dimensions and Weight by Stroke

#### RCA-RA4R (Without brake)

Stroke		50	100	150	200	250	300	
L	20W	Incremental	234	284	334	384	434	484
		Absolute	234	284	334	384	434	484
	30W	Incremental	234	284	334	384	434	484
		Absolute	234	284	334	384	434	484
$\ell$		125	175	225	275	325	375	
m	20W	Incremental	67.5					
		Absolute	80.5					
	30W	Incremental	82.5					
		Absolute	95.5					
P	20W	Incremental	100.5					
		Absolute	113.5					
	30W	Incremental	115.5					
		Absolute	128.5					
Weight [kg]		1.2	1.4	1.5	1.7	1.8	2.0	



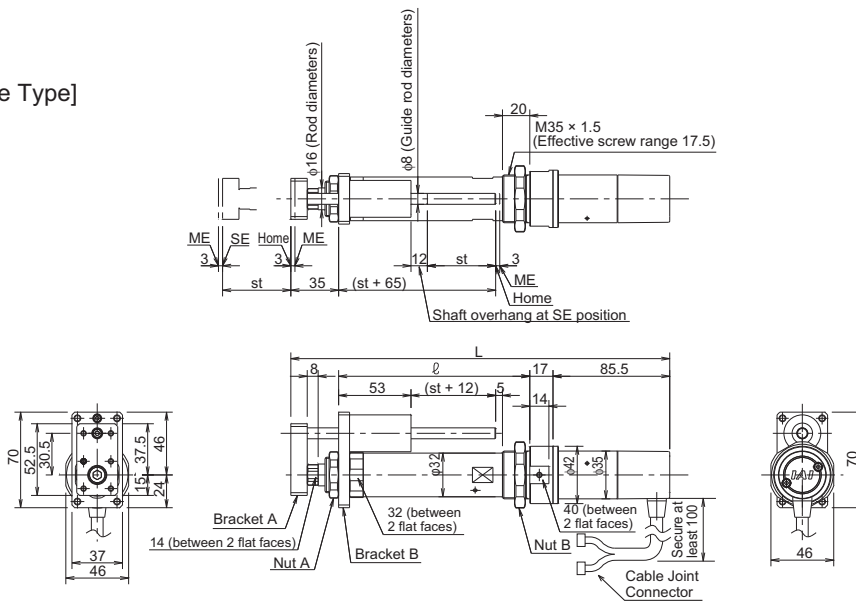
**Caution**  
Do not apply any external force to the rod from the directions other than the rod operating directions. The force in the vertical or rotational direction of the rod may damage the stopper.

#### RCA-RA4R (With brake)

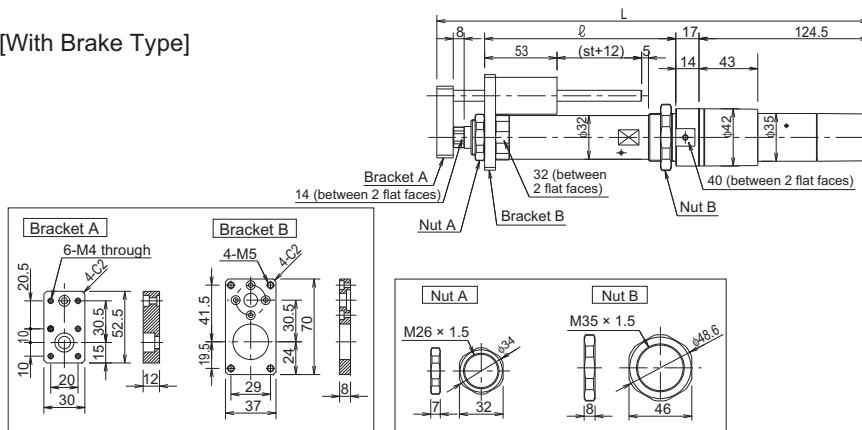
Stroke		50	100	150	200	250	300	
L	20W	Incremental	234	284	334	384	434	484
		Absolute	234	284	334	384	434	484
	30W	Incremental	234	284	334	384	434	484
		Absolute	234	284	334	384	434	484
$\ell$		125	175	225	275	325	375	
m	20W	Incremental	110.5					
		Absolute	123.5					
	30W	Incremental	125.5					
		Absolute	138.5					
P	20W	Incremental	143.5					
		Absolute	156.5					
	30W	Incremental	158.5					
		Absolute	171.5					
Weight [kg]		1.4	1.6	1.7	1.9	2.0	2.2	

## 16.1.7 RCA-RGS3C

[Without Brake Type]



[With Brake Type]



### ■ Dimensions and Weight by Stroke

RCA-RGS3C (Without brake)

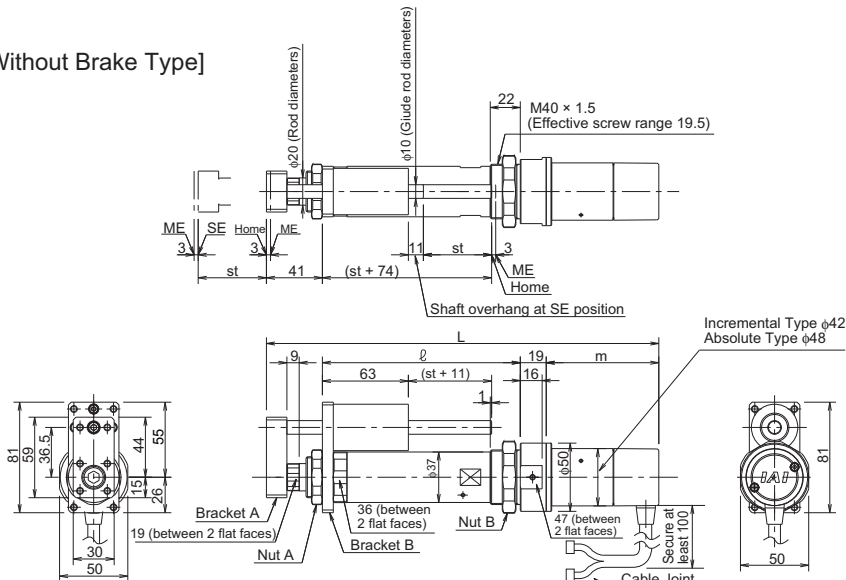
Stroke	50	100	150	200
L	277.5	327.5	377.5	427.5
ℓ	140	190	240	290
Weight [kg]	0.9	1.1	1.2	1.3

RCA-RGS3C (With brake)

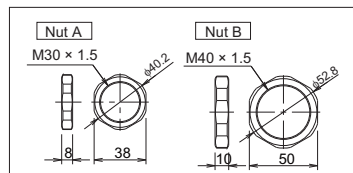
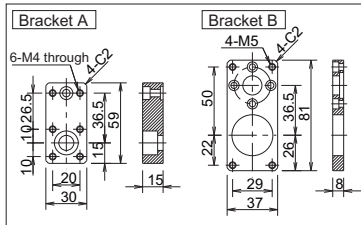
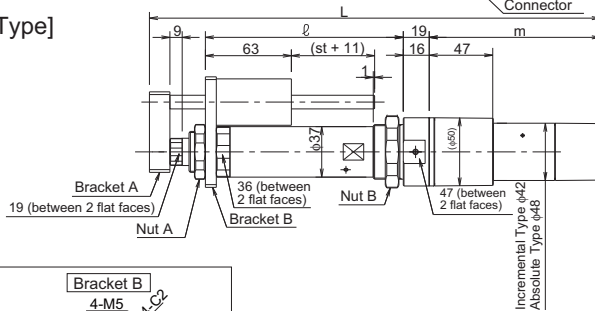
Stroke	50	100	150	200
L	316.5	366.5	416.5	466.5
ℓ	140	190	240	290
Weight [kg]	1.1	1.3	1.4	1.5

## 16.1.8 RCA-RGS4C

[Without Brake Type]



[With Brake Type]



### Caution

Do not apply any external force to the rod from the directions other than the rod operating directions.  
The force in the vertical or rotational direction of the rod may damage the stopper.

### ■ Dimensions and Weight by Stroke

RCA-RGS4C (Without brake)

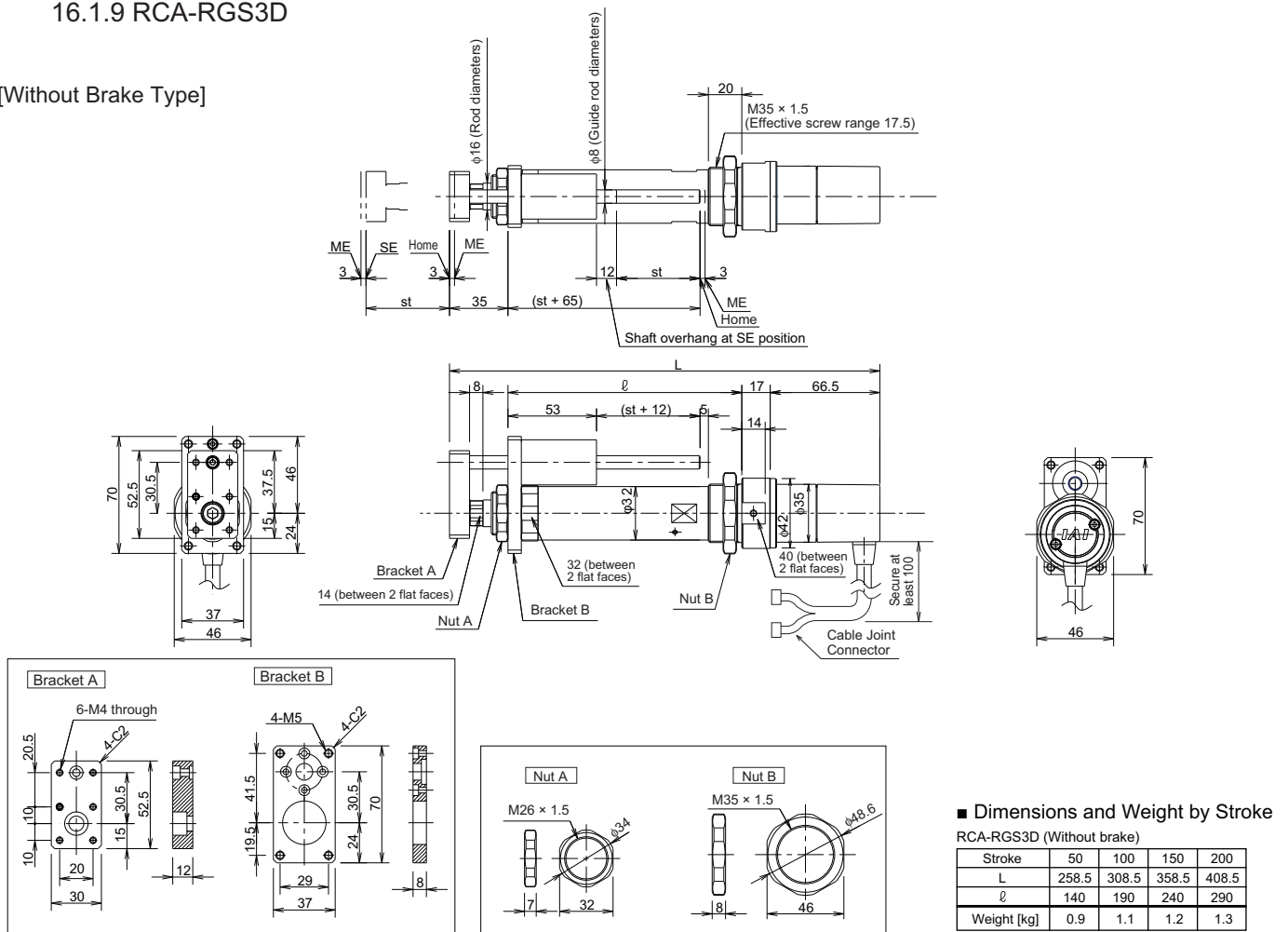
		Stroke		50	100	150	200	250	300
L	20W	Incremental	272.5	322.5	372.5	422.5	472.5	522.5	
		Absolute	285.5	335.5	385.5	435.5	485.5	535.5	
	30W	Incremental	287.5	337.5	387.5	437.5	487.5	537.5	
		Absolute	300.5	350.5	400.5	450.5	500.5	550.5	
ℓ			145	195	245	295	345	395	
m	20W	Incremental	67.5						
		Absolute	80.5						
	30W	Incremental	82.5						
		Absolute	95.5						
Weight [kg]			1.5	1.6	1.8	2.0	2.2	2.4	

RCA-RGS4C (With brake)

		Stroke		50	100	150	200	250	300
L	20W	Incremental	315.5	365.5	415.5	465.5	515.5	565.5	
		Absolute	328.5	378.5	428.5	478.5	528.5	578.5	
	30W	Incremental	330.5	380.5	430.5	480.5	530.5	580.5	
		Absolute	343.5	393.5	443.5	493.5	543.5	593.5	
$\ell$			145	195	245	295	345	395	
m	20W	Incremental	110.5						
		Absolute	123.5						
	30W	Incremental	125.5						
		Absolute	138.5						
Weight [kg]			1.7	1.8	2.0	2.2	2.4	2.6	

## 16.1.9 RCA-RGS3D

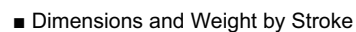
[Without Brake Type]







[Without Brake Type]



RCA-RGD3C (Without brake)

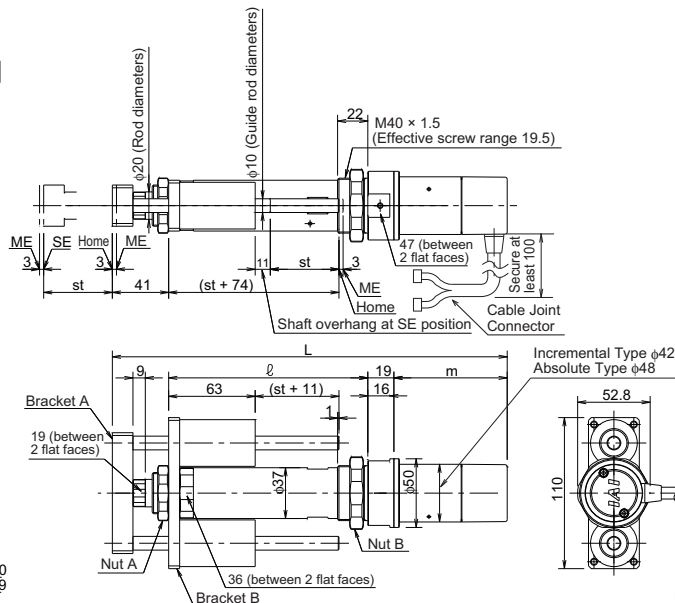
Stroke	50	100	150	200
L	277.5	327.5	377.5	427.5
$\ell$	140	190	240	290
Weight [kg]	1.1	1.2	1.4	1.5

RCA-RGD3C (With brake)

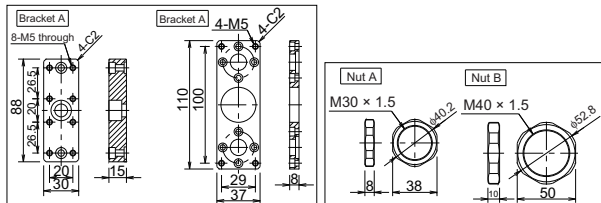
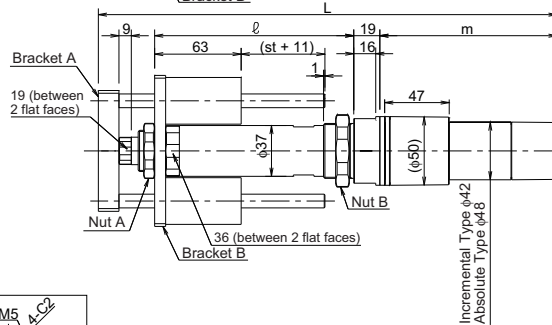
Stroke	50	100	150	200
L	316.5	366.5	416.5	466.5
<i>l</i>	140	190	240	290
Weight [kg]	1.3	1.4	1.6	1.7

## 16.1.12 RCA-RGD4C

[Without Brake Type]



[With Brake Type]



### ■ Dimensions and Weight by Stroke

#### RCA-RGD4C (Without brake)

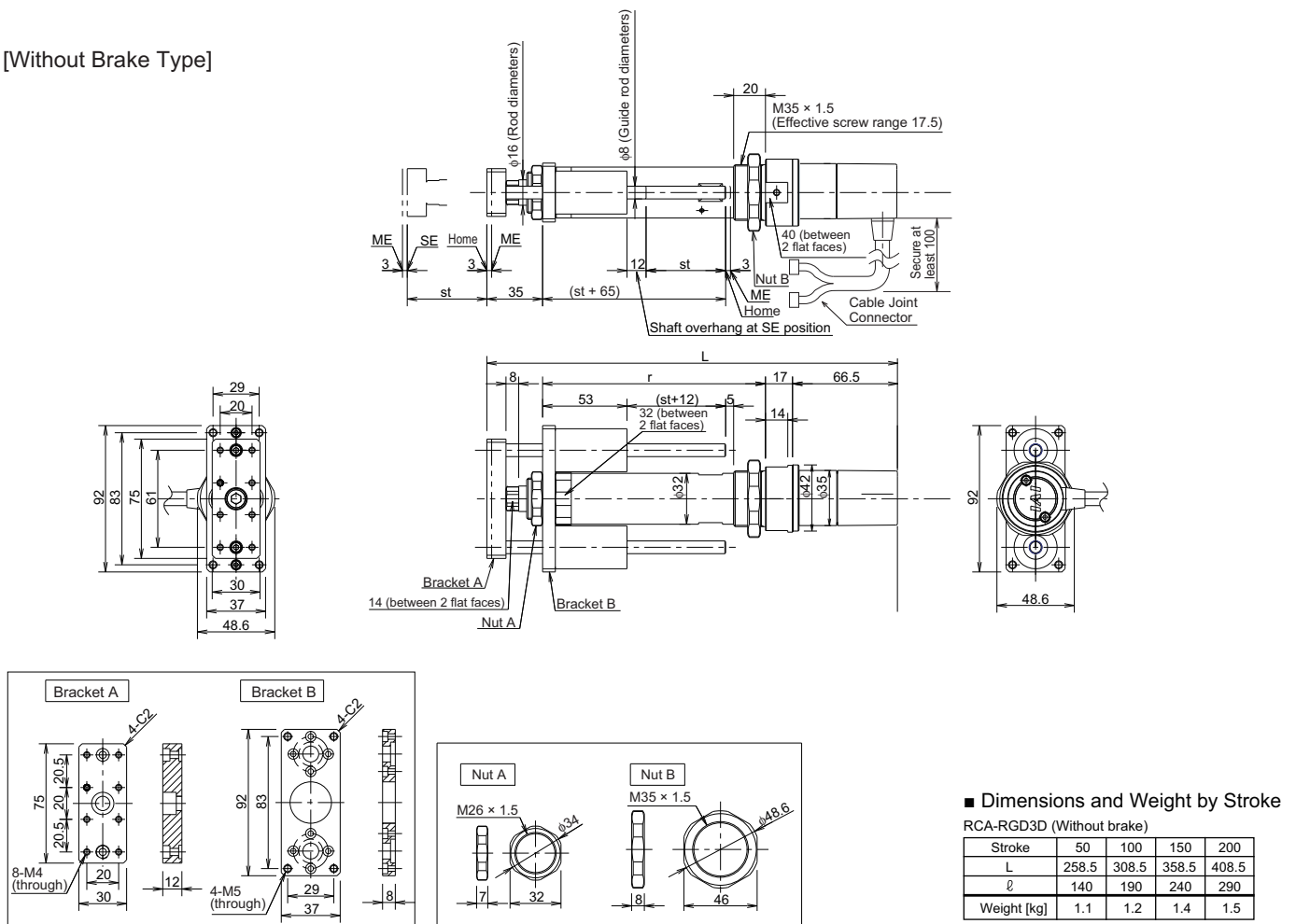
Stroke		50	100	150	200	250	300	
L	20W	Incremental	272.5	322.5	372.5	422.5	472.5	522.5
		Absolute	285.5	335.5	385.5	435.5	485.5	535.5
	30W	Incremental	287.5	337.5	387.5	437.5	487.5	537.5
		Absolute	300.5	350.5	400.5	450.5	500.5	550.5
Ø		145	195	245	295	345	395	
m	20W	67.5						
		80.5						
	30W	82.5						
		95.5						
Weight [kg]		1.8	2.0	2.2	2.4	2.6	2.8	

#### RCA-RGD4C (With brake)

Stroke		50	100	150	200	250	300	
L	20W	Incremental	315.5	365.5	415.5	465.5	515.5	565.5
		Absolute	328.5	378.5	428.5	478.5	528.5	578.5
	30W	Incremental	330.5	380.5	430.5	480.5	530.5	580.5
		Absolute	343.5	393.5	443.5	493.5	543.5	593.5
ℓ		145	195	245	295	345	395	
m	20W	Incremental	110.5					
		Absolute	123.5					
	30W	Incremental	125.5					
		Absolute	138.5					
Weight [kg]		2.0	2.2	2.4	2.6	2.8	3.0	

## 16.1.13 RCA-RGD3D

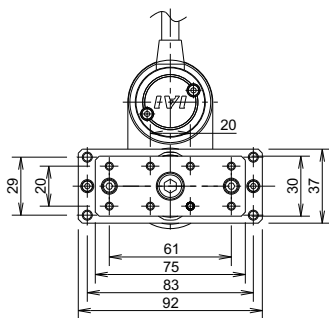
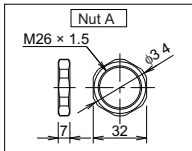
[Without Brake Type]



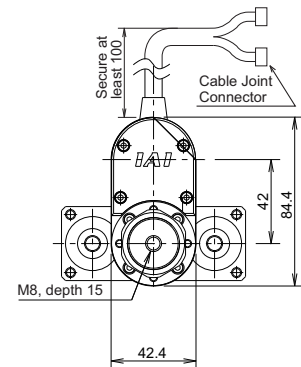
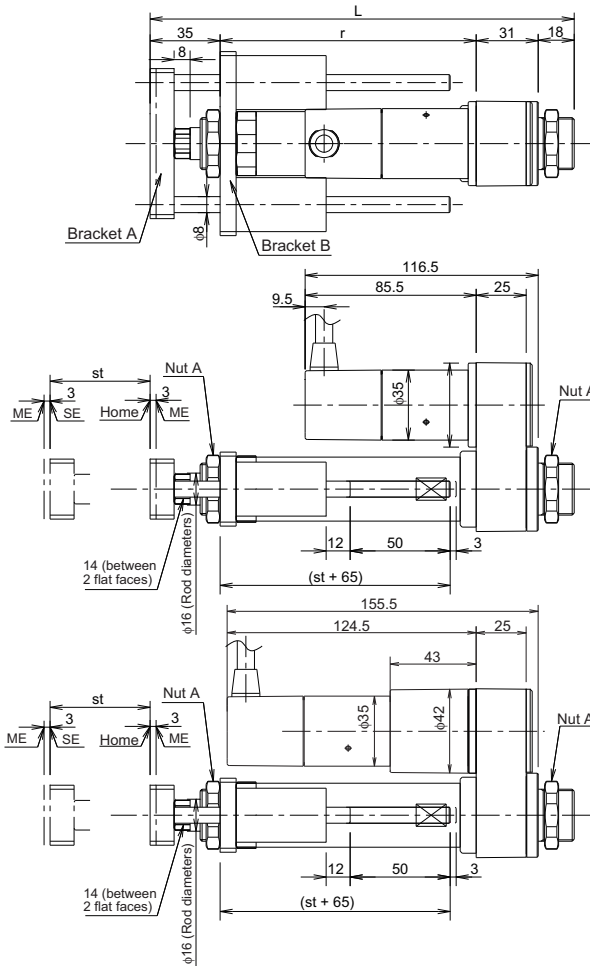
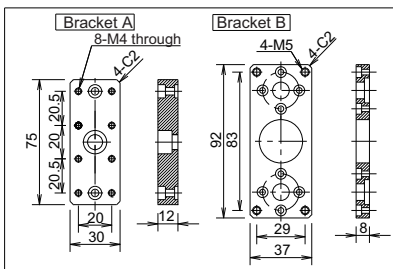


## 16.1.15 RCA-RGD3R

[Without Brake Type]



[With Brake Type]



### ■ Dimensions and Weight by Stroke

RCA-RGD3R (Without brake)

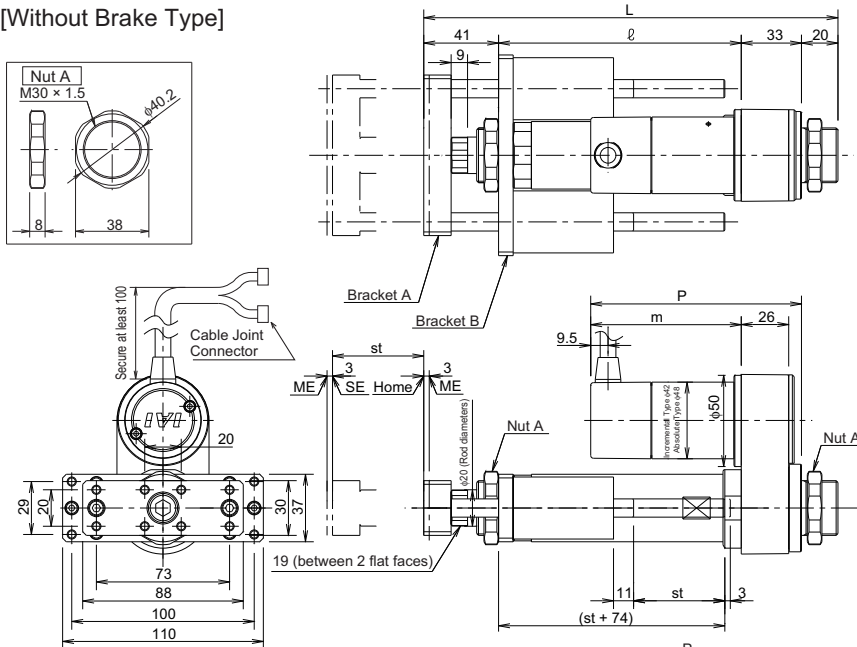
Stroke	50	100	150	200
L	212	262	312	362
ℓ	128	178	228	278
Weight [kg]	1.2	1.3	1.5	1.6

RCA-RGD3R (With brake)

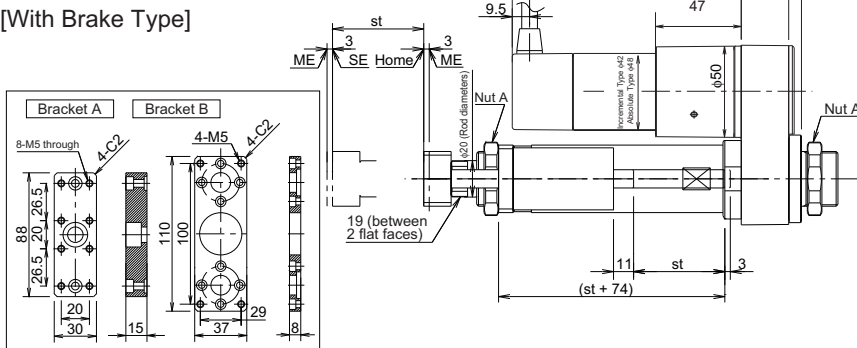
Stroke	50	100	150	200
L	212	262	312	362
ℓ	128	178	228	278
Weight [kg]	1.4	1.5	1.7	1.8

## 16.1.16 RCA-RGD4R

[Without Brake Type]



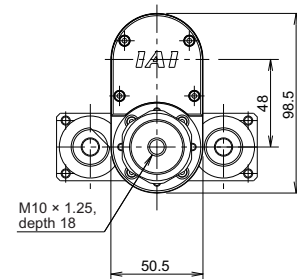
[With Brake Type]



■ Dimensions and Weight by Stroke

RCA-RGD4R (Without brake)

Stroke	50	100	150	200	250	300
L	Incremental	227	277	327	377	427
	Absolute	227	277	327	377	427
	Incremental	227	277	327	377	427
	Absolute	227	277	327	377	427
m	Incremental	133	183	233	283	333
	Absolute	133	183	233	283	333
	Incremental	133	183	233	283	333
	Absolute	133	183	233	283	333
P	Incremental	67.5	80.5	95.5	100.5	113.5
	Absolute	67.5	80.5	95.5	100.5	113.5
	Incremental	67.5	80.5	95.5	100.5	113.5
	Absolute	67.5	80.5	95.5	100.5	113.5
Weight [kg]		1.9	2.2	2.3	2.6	2.7



RCA-RGD4R (With brake)

Stroke	50	100	150	200	250	300
L	Incremental	227	277	327	377	427
	Absolute	227	277	327	377	427
	Incremental	227	277	327	377	427
	Absolute	227	277	327	377	427
m	Incremental	133	183	233	283	333
	Absolute	133	183	233	283	333
	Incremental	133	183	233	283	333
	Absolute	133	183	233	283	333
P	Incremental	110.5	123.5	138.5	143.5	156.5
	Absolute	110.5	123.5	138.5	143.5	156.5
	Incremental	110.5	123.5	138.5	143.5	156.5
	Absolute	110.5	123.5	138.5	143.5	156.5
Weight [kg]		2.1	2.4	2.5	2.8	2.9

[illegible]

### ■ Dimensions and Weight by Stroke

RCAW-RA3C/RA3D/RA3R (Without brake)

Stroke		50	100	150	200
L	RA3C	348.9	408.9	468.9	528.9
	RA3D	329.9	389.9	449.9	509.9
	RA3R	283.4	343.4	403.4	463.4
ℓ	RA3C	132	182	232	282
	RA3D	132	182	232	282
	RA3R	120	170	220	270
m	RA3C	85.5			
	RA3D	66.5			
	RA3R	85.5			
n	RA3C	114.4	124.4	134.4	144.4
	RA3D	114.4	124.4	134.4	144.4
	RA3R	114.4	124.4	134.4	144.4
Weight [kg]	RA3C	1.0	1.1	1.2	1.3
	RA3D	1.0	1.1	1.2	1.3
	RA3R	1.1	1.2	1.3	1.4

RCAW-RA3C/RA3D/RA3R (With brake)

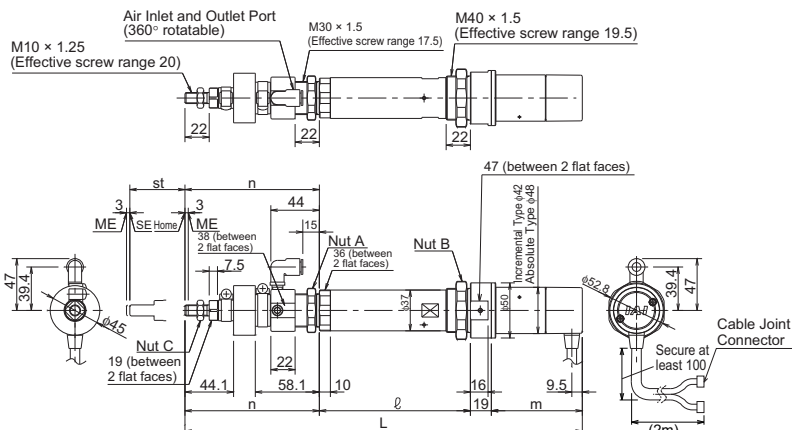
Stroke		50	100	150	200
L	RA3C	387.9	447.9	507.9	567.9
	RA3D	There is no brake-equipped type.			
	RA3R	283.4	343.4	403.4	463.4
ℓ	RA3C	132	182	232	282
	RA3D	There is no brake-equipped type.			
	RA3R	120	170	220	270
m	RA3C	124.5			
	RA3D	There is no brake-equipped type.			
	RA3R	124.5			
n	RA3C	114.4	124.4	134.4	144.4
	RA3D	There is no brake-equipped type.			
	RA3R	114.4	124.4	134.4	144.4
Weight [kg]	RA3C	1.2	1.3	1.4	1.5
	RA3D	1.2	1.3	1.4	1.5
	RA3R	1.3	1.4	1.5	1.6



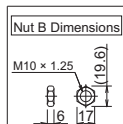
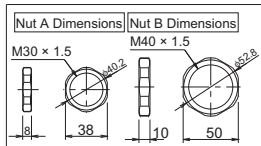
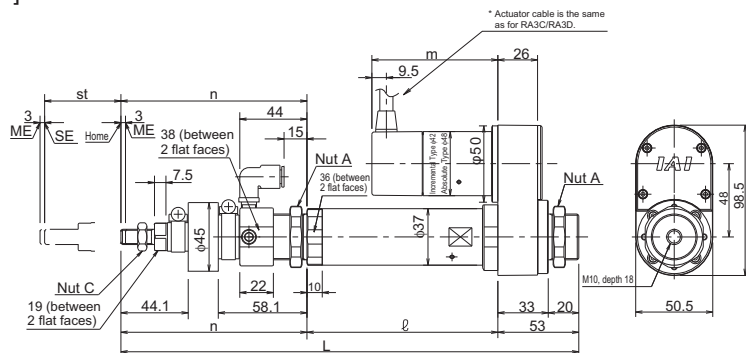
## 16.1.18 RCAW-RA4C/RA4D/RA4R

ME: Mechanical end SE: Stroke end

### [RA4C/RA4D]



### [RA4R]



#### Caution

Do not apply any external force to the rod from the directions other than the rod operating directions.  
The force in the vertical or rotational direction of the rod may damage the stopper.

### ■ Dimensions and Weight by Stroke

RCAW-RA4C/RA4D/RA4R (Without brake)

	Stroke			50	100	150	200	250	300	
L	RA4C	20W	Incremental	345.4	405.4	465.4	525.4	586.4	647.4	
			Absolute	358.4	418.4	478.4	538.4	599.4	660.4	
		30W	Incremental	360.4	420.4	480.4	540.4	601.4	662.4	
			Absolute	373.4	433.4	493.4	553.4	614.4	675.4	
	RA4D	20W	Incremental	323.4	383.4	443.4	503.4	564.4	625.4	
			Absolute	336.4	396.4	456.4	516.4	577.4	638.4	
		30W	Incremental	338.4	398.4	458.4	518.4	579.4	640.4	
			Absolute	351.4	411.4	471.4	531.4	592.4	653.4	
	RA4R	20W	Incremental	299.9	359.9	419.9	479.9	540.9	601.9	
			Absolute	299.9	359.9	419.9	479.9	540.9	601.9	
		30W	Incremental	299.9	359.9	419.9	479.9	540.9	601.9	
			Absolute	299.9	359.9	419.9	479.9	540.9	601.9	
ℓ	RA4C	20W	Common to RA4C RA4D RA4R	137	187	237	287	337	387	
		30W		137	187	237	287	337	387	
	RA4D	20W		137	187	237	287	337	387	
		30W		137	187	237	287	337	387	
	RA4R	20W		125	175	225	275	325	375	
		30W		125	175	225	275	325	375	
m	RA4C	20W	Incremental	67.5						
			Absolute	80.5						
		30W	Incremental	82.5						
			Absolute	95.5						
		RA4D	20W	Incremental	45.5					
				Absolute	58.5					
	30W		Incremental	60.5						
			Absolute	73.5						
	RA4R	20W	Incremental	67.5						
			Absolute	80.5						
		30W	Incremental	82.5						
			Absolute	95.5						
n	RA4C	20W	Common to RA4C RA4D RA4R	121.9	131.9	141.9	151.9	162.9	173.9	
		30W		121.9	131.9	141.9	151.9	162.9	173.9	
	RA4D	20W		121.9	131.9	141.9	151.9	162.9	173.9	
		30W		121.9	131.9	141.9	151.9	162.9	173.9	
	RA4R	20W		121.9	131.9	141.9	151.9	162.9	173.9	
		30W		121.9	131.9	141.9	151.9	162.9	173.9	
Weight [kg]	RA4C	20W/30W		1.4	1.5	1.7	1.8	2.0	2.1	
	RA4D	20W/30W		1.3	1.5	1.6	1.8	1.9	2.1	
	RA4R	20W/30W		1.5	1.7	1.8	2.0	2.1	2.3	

\* The total length of RA4C Type is extended to 43mm if it is equipped with a brake. Although the motor part is extended to 43mm also for RA4R Type, since it is the reversed type, the total length does not change. Also, the weight increases in 0.2kg for all the models.

## Change History

Revision Date	Description of Revision
April 2011	Fifth edition A page for CE Marking added
March 2012	Sixth edition CAUTION deleted Pg. 1 to 7 Contents added and changed in Safety Guide Pg. 8 Caution in Handling added Pg. 10, 11 Contents changed in 3. Warranty Pg. 38 Warning notes added such as in case the grease got into your eye, immediately go to see the doctor for an appropriate care. Pg. 64 to 81 External Dimensions added





## ***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: 1261 Hamilton Parkway, Itasca, IL 60143  
TEL (630) 467-9900 FAX (630) 467-9912  
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)