



ROBO Cylinder Rod Type RCS2 Actuators

Motor Straight Type (Coupling Type):	RA4C, RA5C, RGS4C, RGS5C, RGD4C and RGD5C
Motor Straight Type (Built-in Type):	RA4D, RA7AD, RA7BD, RGS4D and RGS7AD RGS7BD, RGD4D, RGD7AD and RGD7BD
Motor Reversing Type: Flat Type	RA4R and RA5R F5D

RCS2W Actuators, Dustproof/Splash-proof Specification

Motor Straight Type (Coupling Type):	RA4C
Motor Straight Type (Built-in Type):	RA4D
Motor Reversing Type:	RA4R

Operating Manual

===== **Third Edition** =====









IAI America, Inc.

Safety Precautions (Please read before using the product.)

Before installing, operating, maintaining or inspecting this product, please peruse this operating manual as well as the operating manuals and other related documentations for all equipment and peripheral devices connected to this product in order to ensure the correct use of this product and connected equipment/devices. Those performing installation, operation, maintenance and inspection of the product must have sufficient knowledge of the relevant equipment and their safety. The precautions provided below are designed to help you use the product safely and avoid bodily injury and/or property damage.

In this operating manual, safety precautions are classified as “Danger,” “Warning,” “Caution” and “Note,” according to the degree of risk.

 Danger	Failure to observe the instruction will result in an imminent danger leading to death or serious injury.
 Warning	Failure to observe the instruction may result in death or serious injury.
 Caution	Failure to observe the instruction may result in injury or property damage.
 Note	The user should take heed of this information to ensure the proper use of the product, although failure to do so will not result in injury.

It should be noted that the instructions under the  **Caution** and  **Note** headings may also lead to serious consequences, if unheeded, depending on the situation.

All instructions contained herein provide vital information for ensuring safety. Please read the contents carefully and handle the product with due caution.

Please keep this operating manual in a convenient place for quick reference whenever needed, and also make sure that the manual will get to the end-user.

Danger

[General]

- Do not use this product for the following applications:
 1. Medical equipment used to maintain, control or otherwise affect human life or physical health
 2. Mechanisms and machinery designed for the purpose of moving or transporting people
 3. Important safety parts of machineryThis product has not been planned or designed for applications requiring high levels of safety. Use of this product in such applications may jeopardize the safety of human life. The warranty covers only the product as it is delivered.

[Installation]

- Do not use this product in a place exposed to ignitable, inflammable or explosive substances. The product may ignite, burn or explode.
- When installing the product, be sure to securely support and affix it (including the work). Failure to do so may cause the product to tip over, drop or malfunction, resulting in injury.

- Avoid using the product in a place where the main unit or controller may come in contact with water or oil droplets.
- Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Doing so may result in fire.

[Operation]

- Do not enter the machine's range of operation while the product is operating or standing by. The actuator may move suddenly, causing injury.
- Do not pour water onto the product. Spraying water over the product, washing it with water or using it in water may cause the product to malfunction, resulting in injury, electric shock, fire, etc.

[Maintenance, Inspection, Repair]

- Never modify the product. Unauthorized modification may cause the product to malfunction, resulting in injury, electric shock, fire, etc.
- Do not disassemble and reassemble the components relating to the basic structure of the product or its performance and function. Doing so may result in injury, electric shock, fire, etc.



Warning

[General]

- Do not use the product outside the specifications. Using the product outside the specifications may cause it to fail, stop functioning or sustain damage. It may also significantly reduce the service life of the product. In particular, observe the maximum loading capacity and speed.

[Installation]

- If the machine will stop in the case of system problem such as emergency stop or power failure, design a safety circuit or other device that will prevent equipment damage or injury.
- Before supplying power to and operating the product, always check the operation area of the equipment to ensure safety. Supplying power to the product carelessly may cause electric shock or injury due to contact with the moving parts.
- Wire the product correctly by referring to the operation manual. Securely connect the cables and connectors so that they will not be disconnected or come loose. Failure to do so may cause the product to malfunction or cause fire.

[Operation]

- Before operating the moving parts of the product by hand (for the purpose of manual positioning, etc.), confirm that the servo is turned off (using the teaching pendant). Failure to observe this instruction may result in injury.
- Do not scratch the cables. Scratching, forcibly bending, pulling, winding, crushing with heavy object or pinching a cable may cause it to leak current or lose continuity, resulting in fire, electric shock, malfunction, etc.
- Turn off the power to the product in the event of power failure. Failure to do so may cause the product to suddenly start moving when the power is restored, thus resulting in injury or product damage.
- If the product is generating heat, smoke or a strange smell, turn off the power immediately. Continuing to use the product may result in product damage or fire.
- If noise or abnormally high vibration is detected, stop the operation immediately. Continuing to use the product may result in product damage, malfunction due to damage, runaway machine, etc.
- If any of the product's protective functions (alarms) has actuated, turn off the power immediately. Continuing to use the product may result in injury due to product malfunction, or cause product breakdown or damage. After the power has been cut off, identify and remove the cause of the problem, and then reconnect the power.

- Do not step on the product, use it as a footstool or place any object on it. You may slip and fall or the product may tip over or drop, resulting in injury. Malfunction, runaway product, etc., may also result due to product breakdown or damage.

[Maintenance, Inspection, Repair]

- Before commencing maintenance/inspection, servicing, replacement or any other work on the product, be sure to completely cut off the power supply to the product. Also take heed of the following precautions:
 1. Put up a sign bearing “WORK IN PROGRESS. DO NOT TURN ON POWER” or other warning statement to that effect, to prevent a bystander from accidentally turning on the power.
 2. If multiple operators work together to perform maintenance/inspection work, the operators should always give verbal cues to one another to ensure safety before turning on/off the power or moving any axis.

[Disposal]

- Do not throw the product into flames. The product may explode or toxic gases may generate.



[Installation]

- Do not use the product in a place exposed to direct sunlight (ultraviolet ray), dusty place or place where air contains salt or iron powder, humid place, or in any ambience where the product may come in contact with organic solvent, hydraulic oil containing phosphate ester, etc. If used in these places/ambiences, the product may lose its function over a short period of time or suffer rapid performance deterioration, or the service life of the product may be reduced.
- Do not use the product in an ambience where it may come in contact with corrosive gases (sulfuric acid, hydrochloric acid, etc.). The product may lose its strength due to rust.
- Provide sufficient shielding measures if the product is used in any of the following places. If proper measures are not taken, the product may malfunction:
 1. Place where large current or strong magnetic field generates
 2. Place where arc discharge occurs due to welding work, etc.
 3. Place where noise generates due to electrostatic, etc.
 4. Place where the product may come in contact with radiation
- Do not install the product in a place subject to vibration or shock.
- Provide an emergency stop device in an easily accessible position so the device can be immediately actuated should danger occur during operation. Failure to do so may result in injury.
- Provide sufficient maintenance space when installing the product. If sufficient space is not available, daily inspection, maintenance and other necessary work cannot be carried out, resulting in system shutdown or product damage.
- When transporting or installing the product, support the product using a lift or suspension equipment or carry it with multiple operators working together, and exercise due caution to ensure safety.
- When installing the product, do not hold the moving parts or cables of the product. Doing so may result in injury.
- Use IAI's genuine cables to connect the actuator and controller. Also use IAI's genuine components for the actuator, controller, teaching pendant, etc.
- The brake mechanism is designed to prevent the slider from dropping upon turning off the power when the actuator is installed vertically. Do not use the brake mechanism as a safety brake.
- When installing, adjusting or carrying out any other work on the actuator, put up a sign bearing “WORK IN PROGRESS. DO NOT TURN ON POWER” or other warning statement to that effect, to prevent the product from being powered on accidentally. If the power is turned on accidentally, injury may result due to electric shock or sudden movement of the actuator.

[Operation]

- Turn on the power to individual equipment one by one, starting from the equipment at the highest level in the system hierarchy. Failure to do so may cause the product to start suddenly, resulting in injury or product damage.
- Do not insert a finger or object in the openings in the product. It may cause fire, electric shock or injury.
- Do not step on the product, use it as a footstool or place any object on it. It may cause scoring, dents or deformation of the driving part, resulting in product damage, unintended stopping due to damage, or performance drop.

[Maintenance, Inspection, Repair]

- Wear protective goggles when applying grease to the actuator. Failure to do so may result in eye inflammation due to spattered grease.



Note

[Installation]

- If the product is used in a vertical setup, be sure to use the vertical specification (with brake).
- Protection covers or other guards must be provided for the moving parts of the equipment to avoid direct contact with the operators.
- Do not configure a control circuit that will cause the work to drop in case of power failure. Configure a control circuit that will prevent the table or work from dropping when the power to the machine is cut off or an emergency stop is actuated.
- The following conditions must be met in order to improve the straightness of the table movement and ensure the smooth movement of the ball screw and linear guides:
 1. Flatness of the mounting surface must be within 0.05 mm.
 2. The mounting surface area must be large enough to ensure the rigidity of the actuator.

[Installation, Operation, Maintenance]

- When handling the product, wear protective gloves, protective goggles, safety shoes or other necessary gear to ensure safety.

[Maintenance, Inspection, Repair]

- When performing maintenance, apply the specified grease to the guides and ball screw. Pay special attention not to let fluoride grease mix with lithium grease. The machine may be damaged due to poor lubrication, increased resistance, etc.

[Disposal]

- When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste.

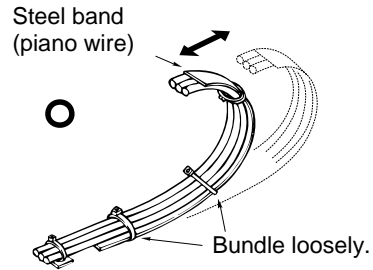
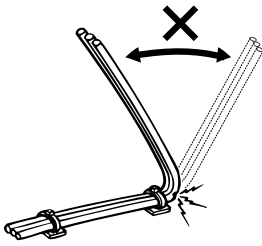
Others

- IAI shall not be liable whatsoever for any loss or damage arising from a failure to observe the items specified in "Safety Precautions."

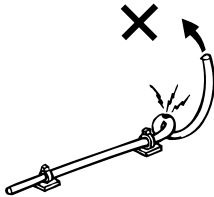
Prohibited Handling of Cables

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.

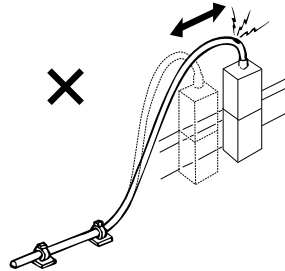
1. Do not let the cable flex at a single point.



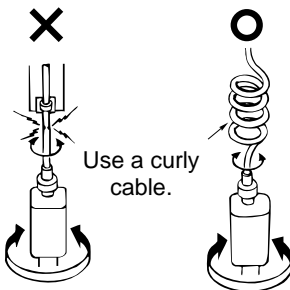
2. Do not let the cable bend, kink or twist.



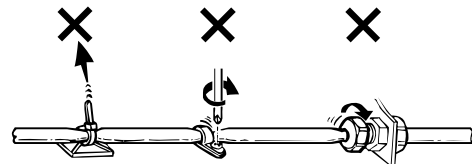
3. Do not pull the cable with a strong force.



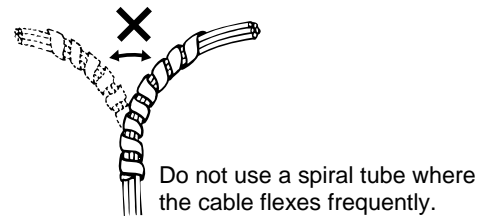
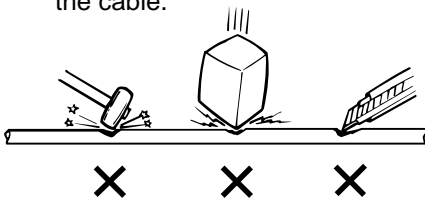
4. Do not let the cable receive a turning force at a single point.



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

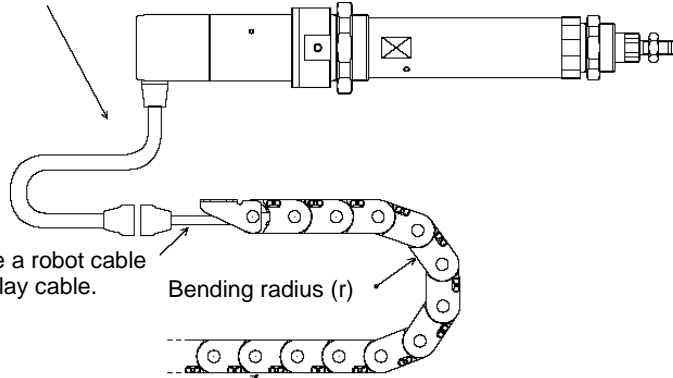


6. Do not pinch, drop a heavy object onto or cut the cable.



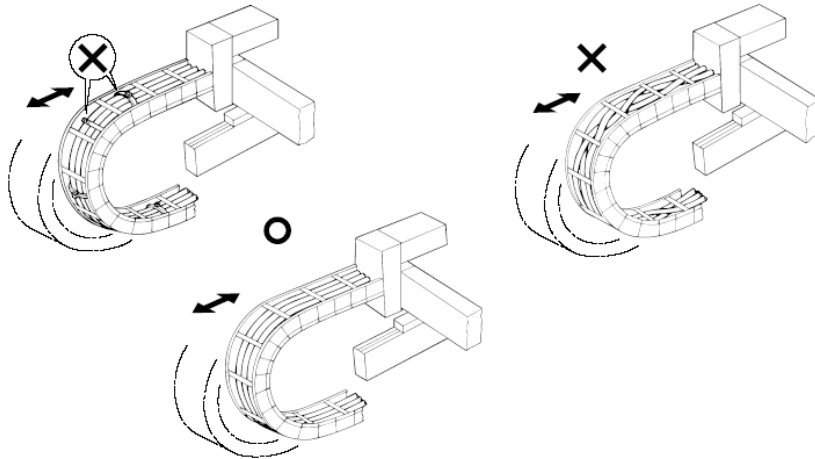
7. Notes on using cable bearers

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

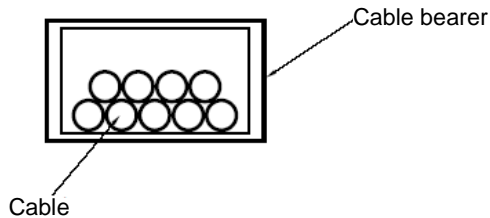


- Use a cable bearer with a bending radius (r) of 50 mm or greater.

- 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.

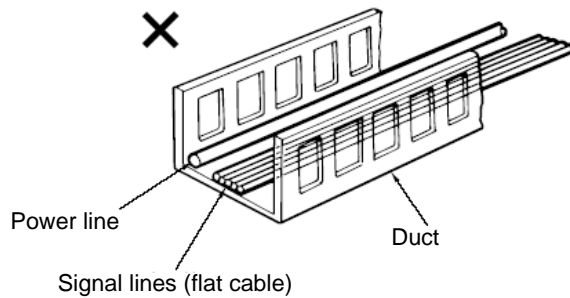


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1. Foreword

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

Warranty period shall be either of the following periods whichever ends first:

- 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

If a breakdown occurs within the period specified above and is due to the manufacturer's error, we will repair the unit at no cost. However, the following items are not covered by this warranty.

- Faded paint or other changes that occur naturally over time.
- Consumable components that wear out with use (stainless sheet, etc.).
- Unit seems to be noisy or similar impressions that do not affect machinery performance.
- Damage resulting from improper handling by the user or lack of proper maintenance.
- Any alterations made by other than IAI or its representatives.
- Breakdowns caused by using controllers made by other manufacturers.
- Any damages caused by fire and other natural disasters or accidents.

The warranty pertains to the purchased product itself and does not cover any damages that might arise from a breakdown of the supplied product.

Any repairs will be done at our factory. Even if the product is still covered under the warranty period, we will assess a separate charge for sending technicians to the customer's site.

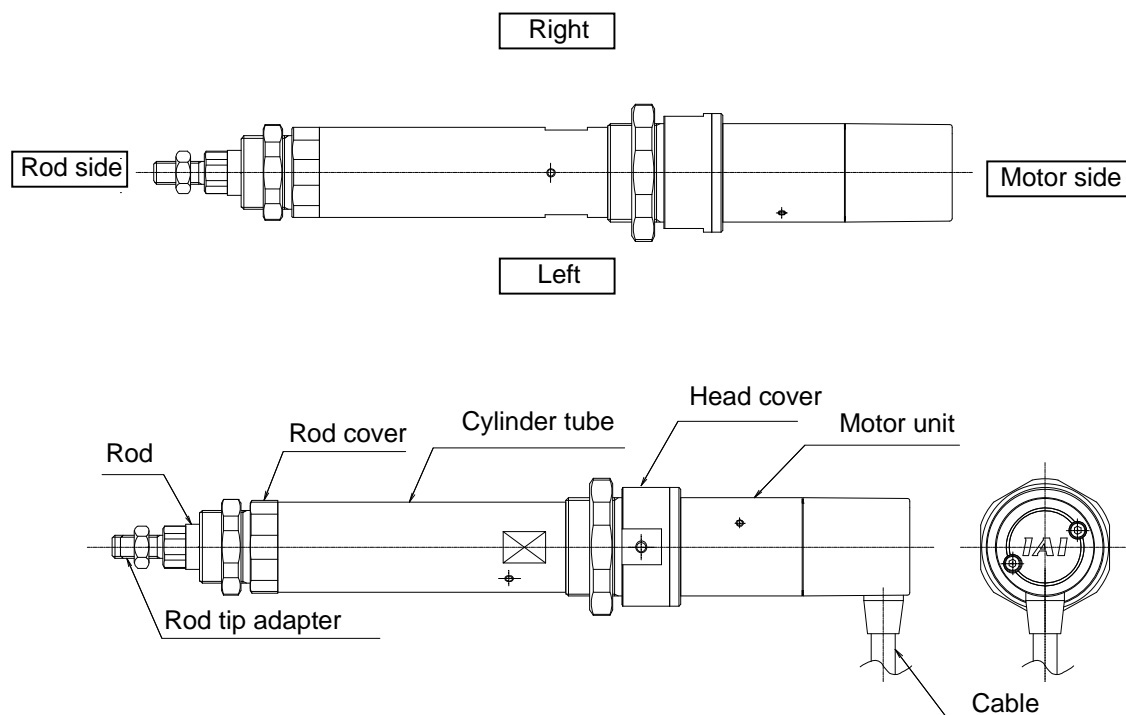
4. Names of the Parts

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 Motor Straight Type (Coupling Type): No Guide

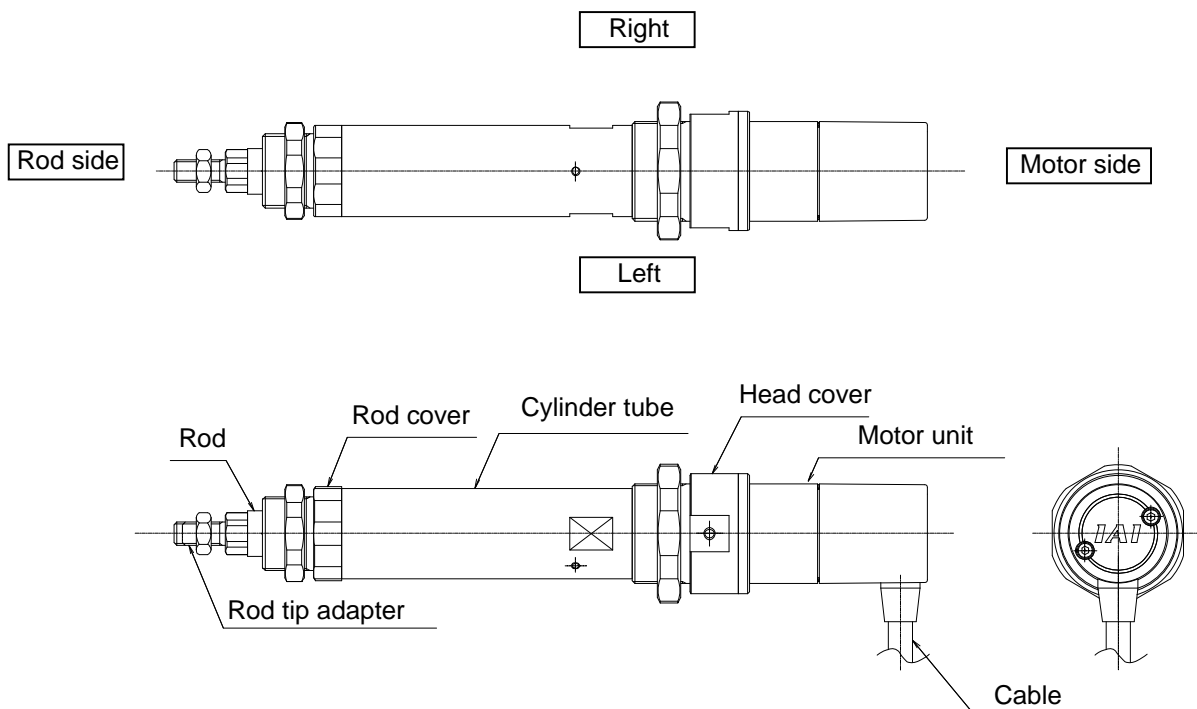
- RCS2-RA4C



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

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

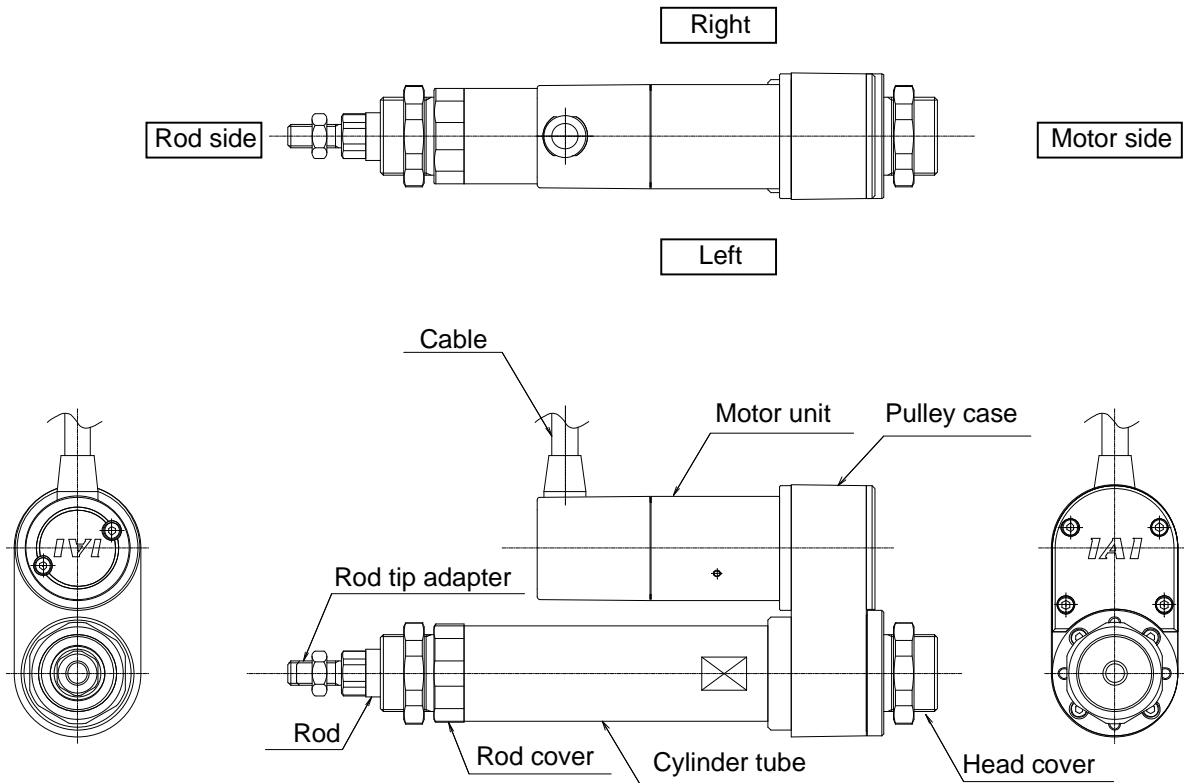
- RCS2-RA4D



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

4.3 Motor Reversing Type: No Guide

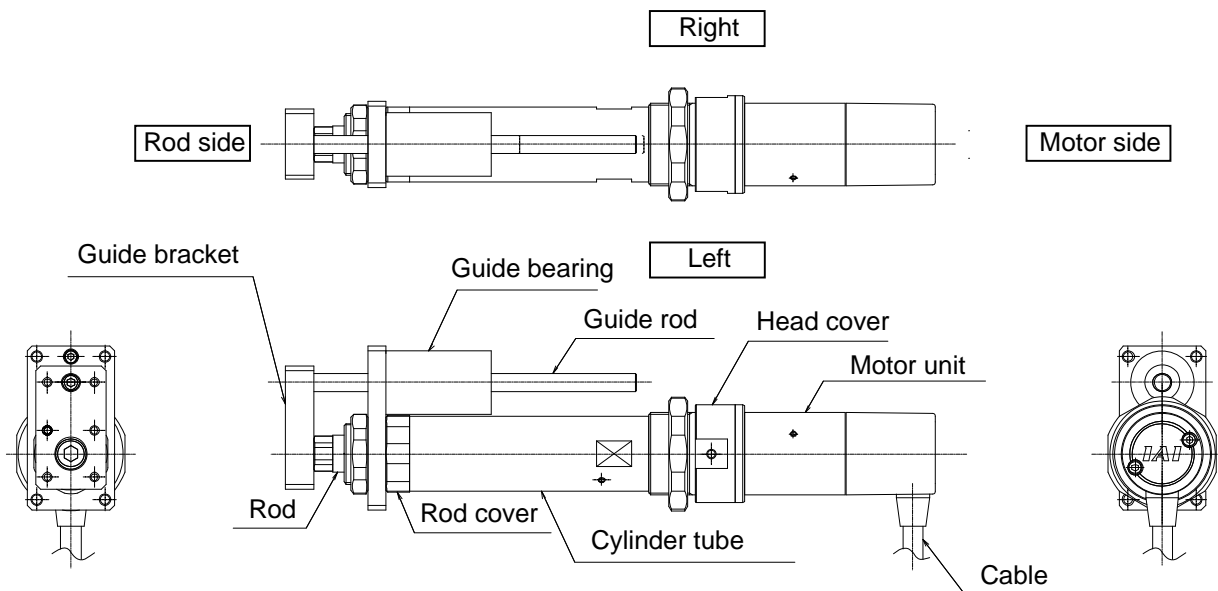
- RCS2-RA4R



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

4.4 Motor Straight Type (Coupling Type): Single-guide Type

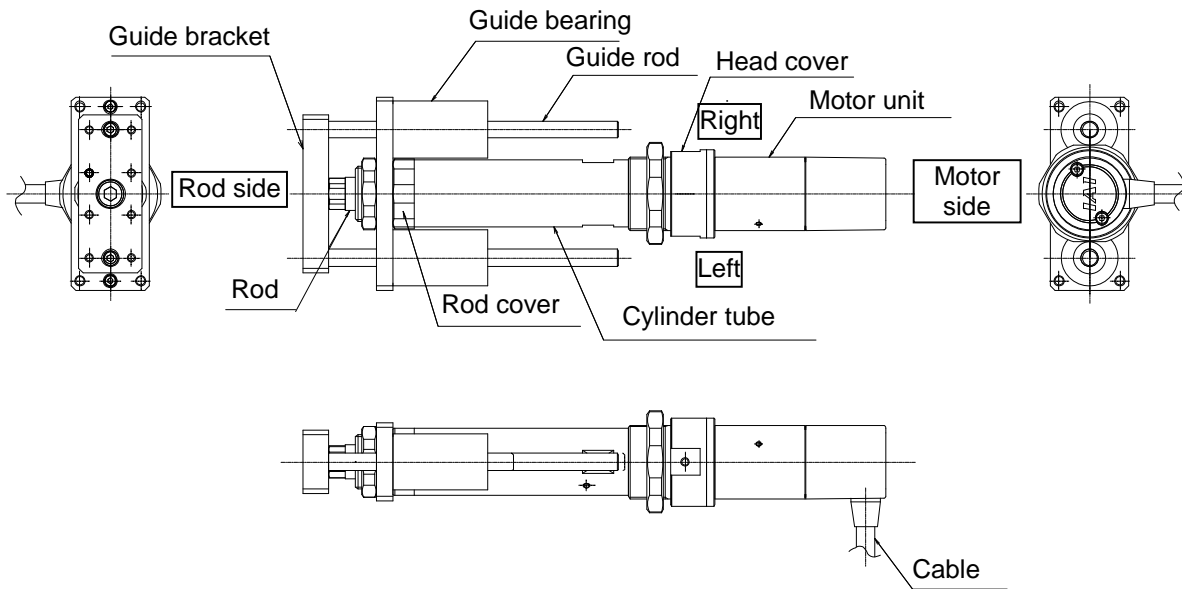
- RCS2-RGS4C



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

4.5 Motor Straight Type (Coupling Type): Double-guide Type

- RCS2-RGD4C

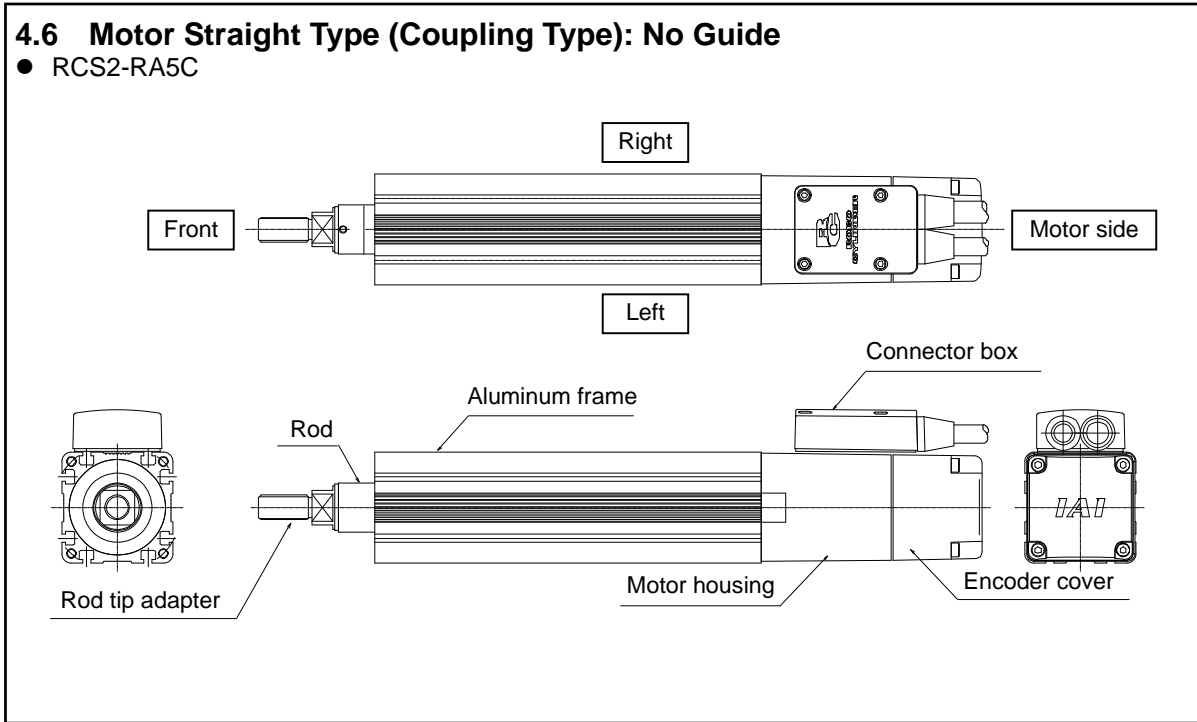


Caution: The cable directly connected to the actuator is not robot cable even when ordered with robot cable option. When designing, please be sure not to give repeated bending loads to this cable. The robot cable is applicable only to the connecting cables.

The names of respective 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 when the actuator is placed horizontally. "Front" indicates the opposite side of the motor.

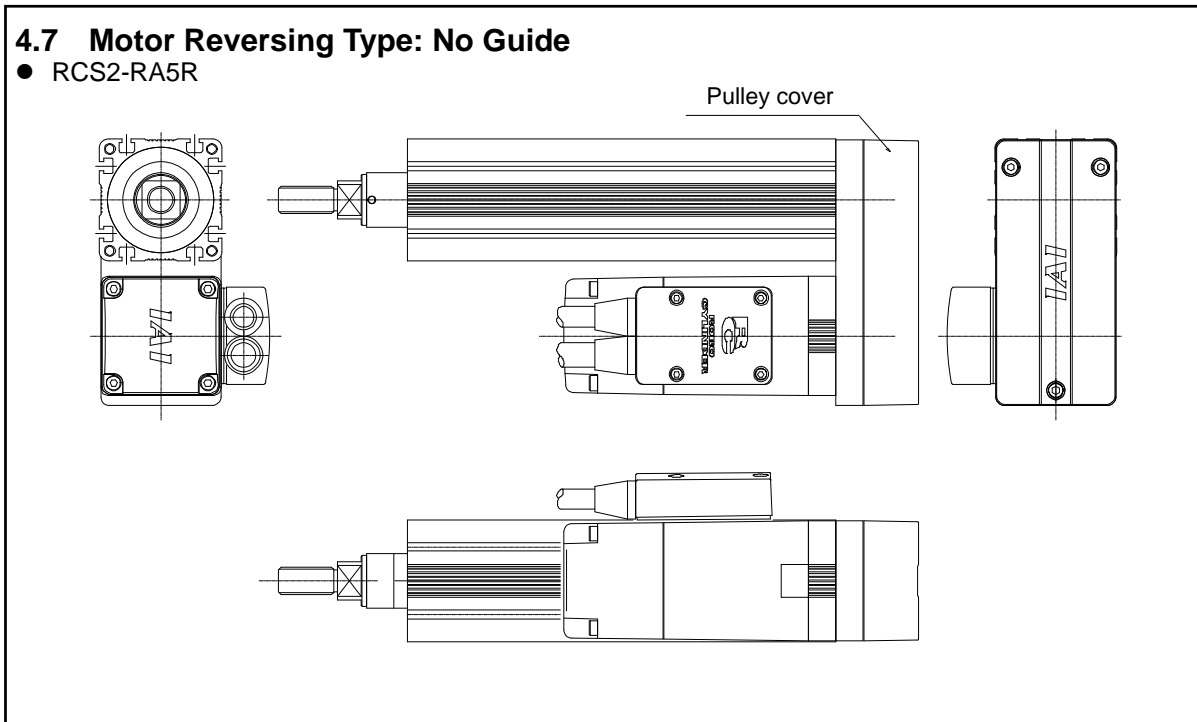
4.6 Motor Straight Type (Coupling Type): No Guide

- RCS2-RA5C



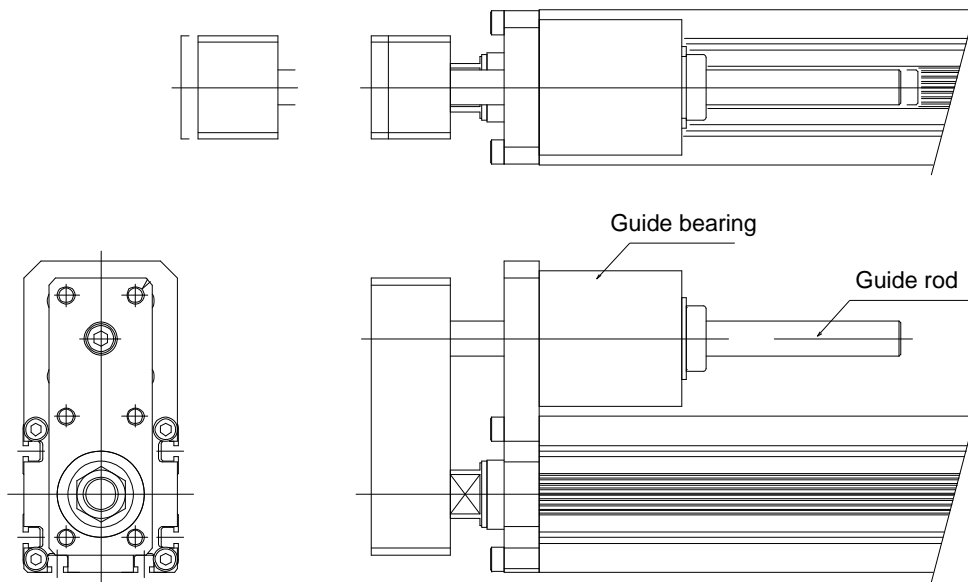
4.7 Motor Reversing Type: No Guide

- RCS2-RA5R



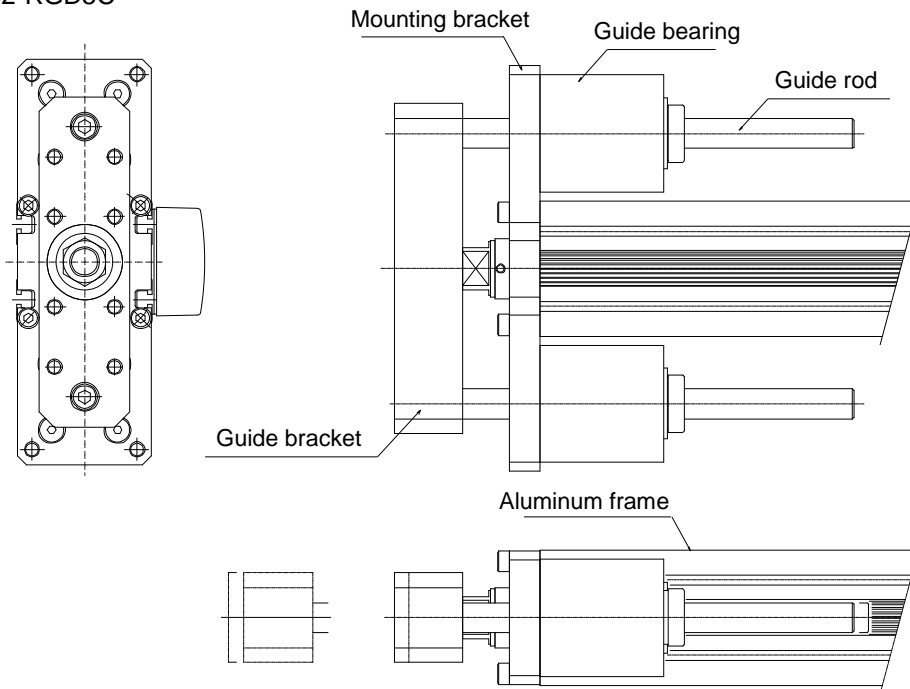
4.8 Motor Straight Type (Coupling Type): Single-guide Type

- RCS2-RGS5C



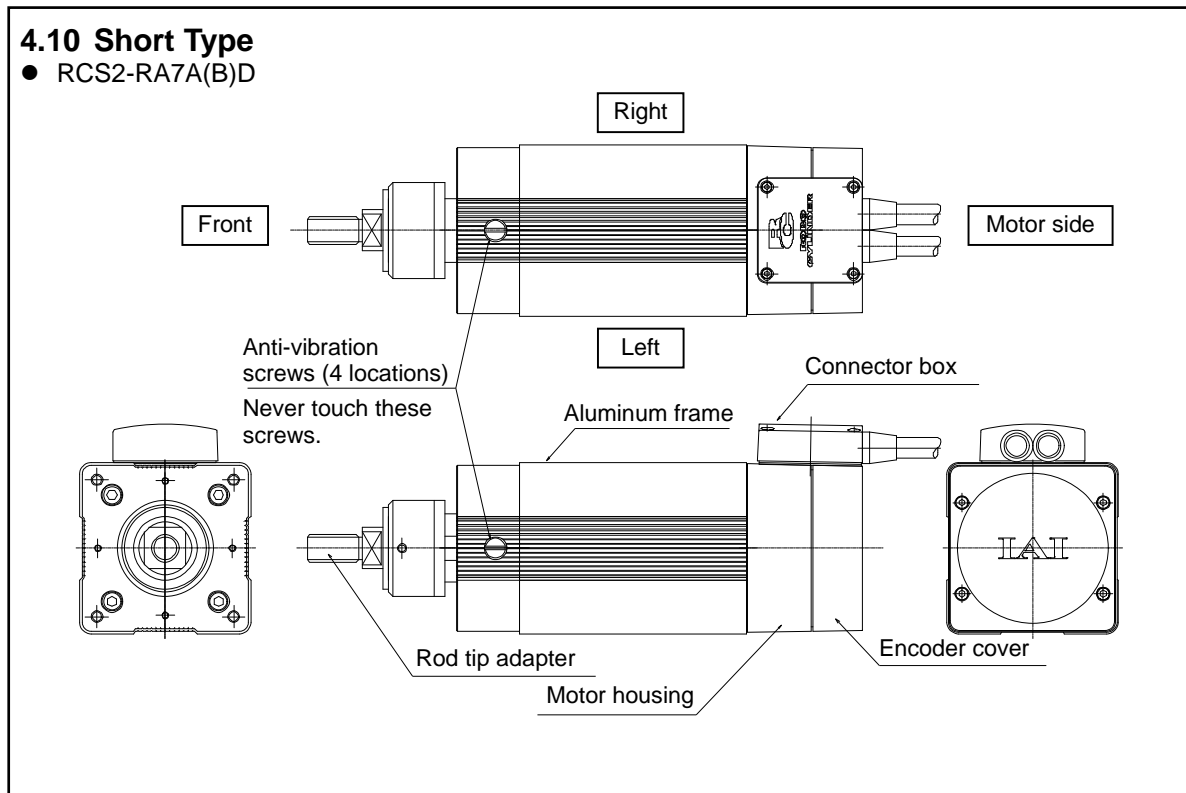
4.9 Motor Straight Type (Coupling Type): Double-guide Type

- RCS2-RGD5C



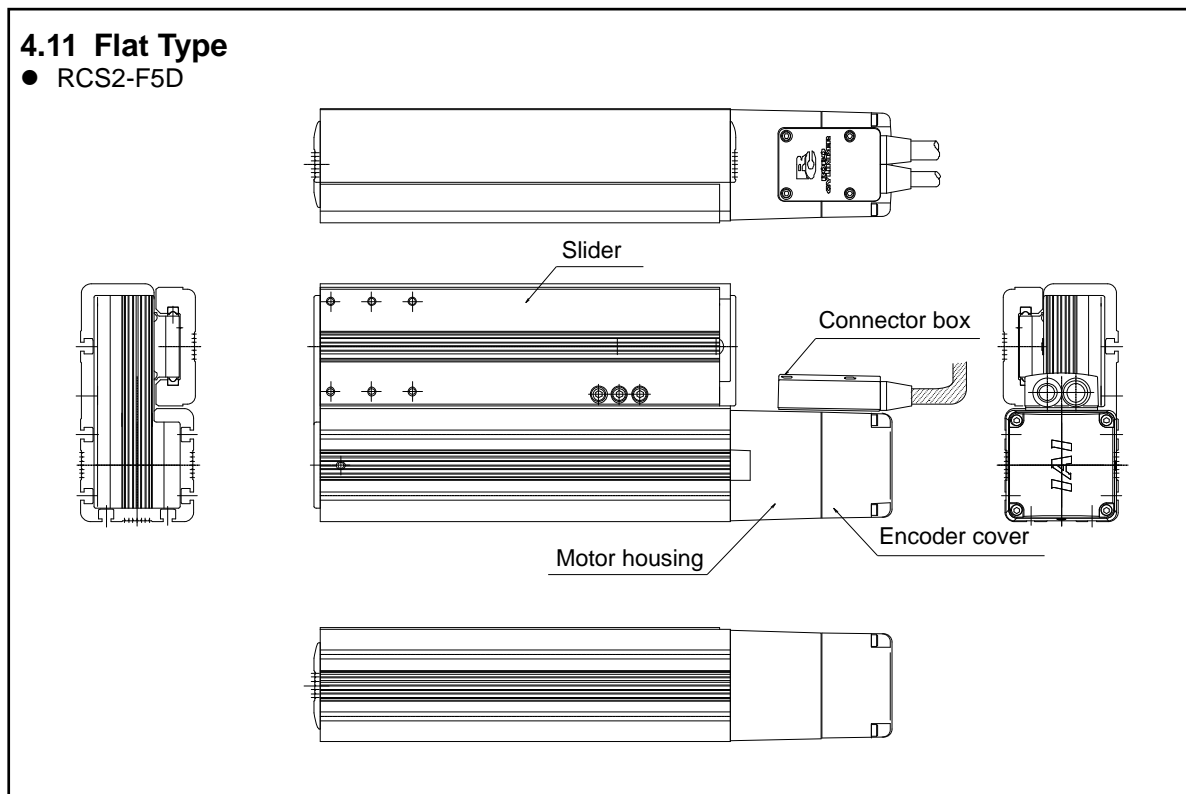
4.10 Short Type

- RCS2-RA7A(B)D



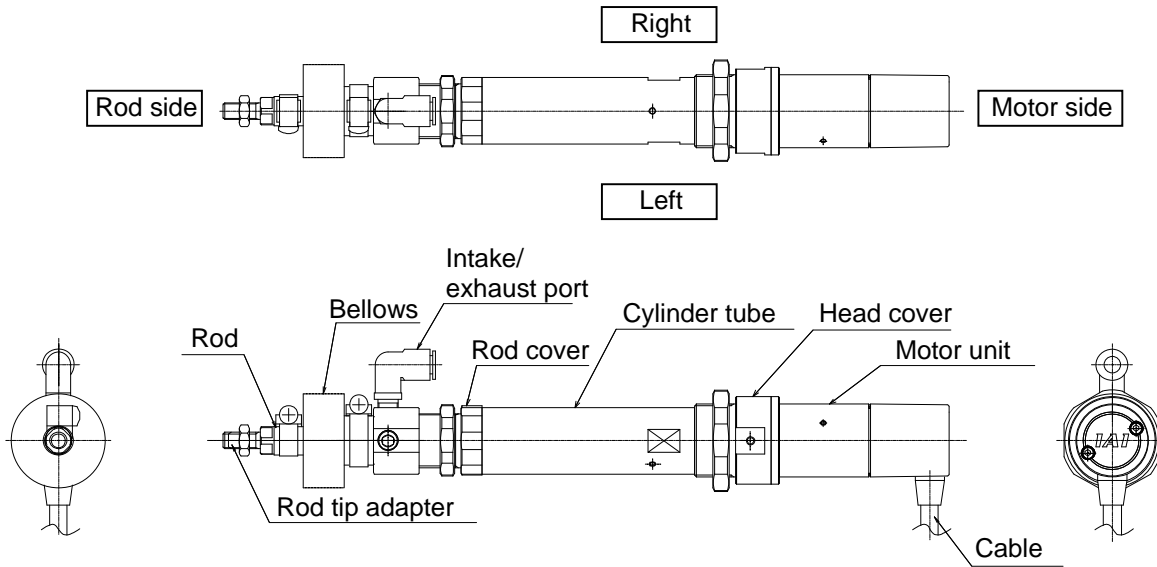
4.11 Flat Type

- RCS2-F5D



4.12 Dustproof/Splash-proof Motor Straight Type (Coupling Type)

- RCS2W-RA4C



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

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.

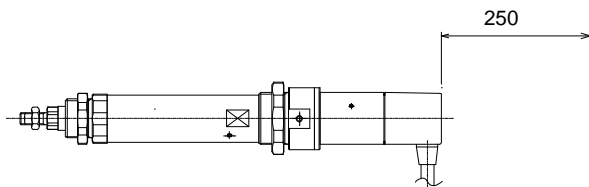
6. Operating and Storage Environment

6.1 Operating Environment

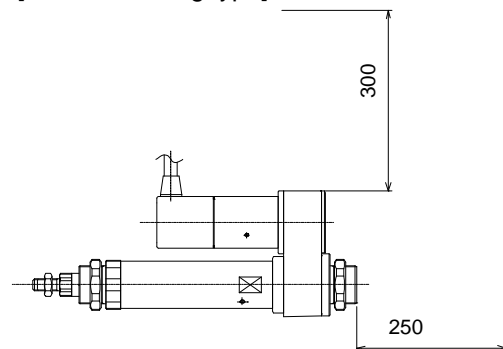
The actuator should be set up in an environment, which meets the following criteria:

- 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. (RCS2)
- Avoid exposure to oil mist or fluids used in cutting. (RCS2)
- 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.
- The installation environment should be such that the operator can work without wearing protective gears or clothes. (RCS2)

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



[Motor reversing type]



- * If you are using the dustproof/splash-proof type (RCS2W type), consult IAI beforehand. This product is not designed by considering chemical resistance. Contact IAI for splash-proof resistance to liquids other than water.

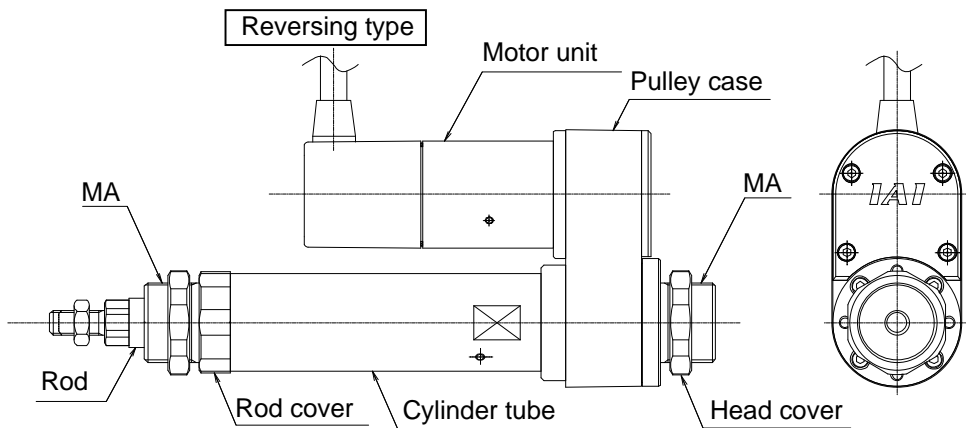
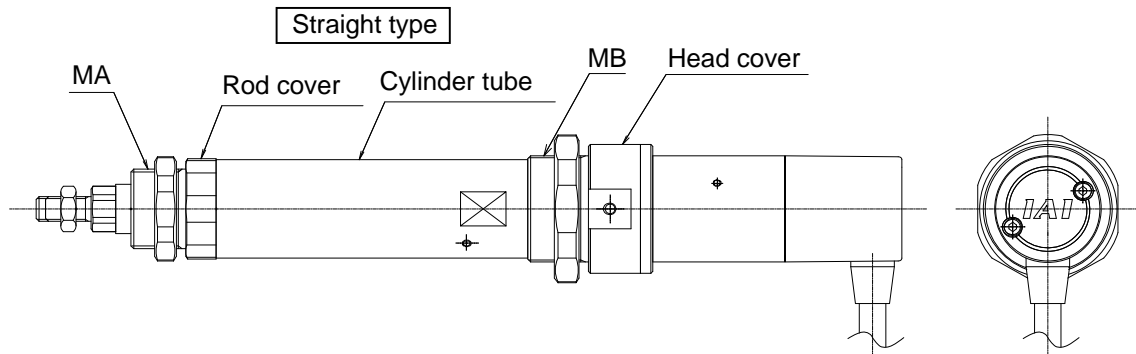
6.2 Storage Environment

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 model: RCS2-RA4

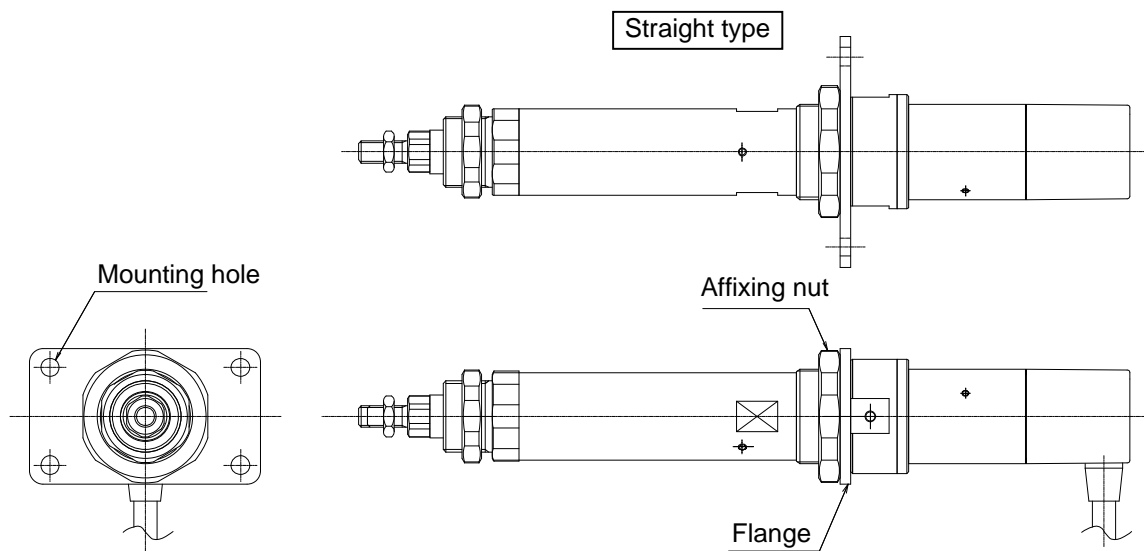
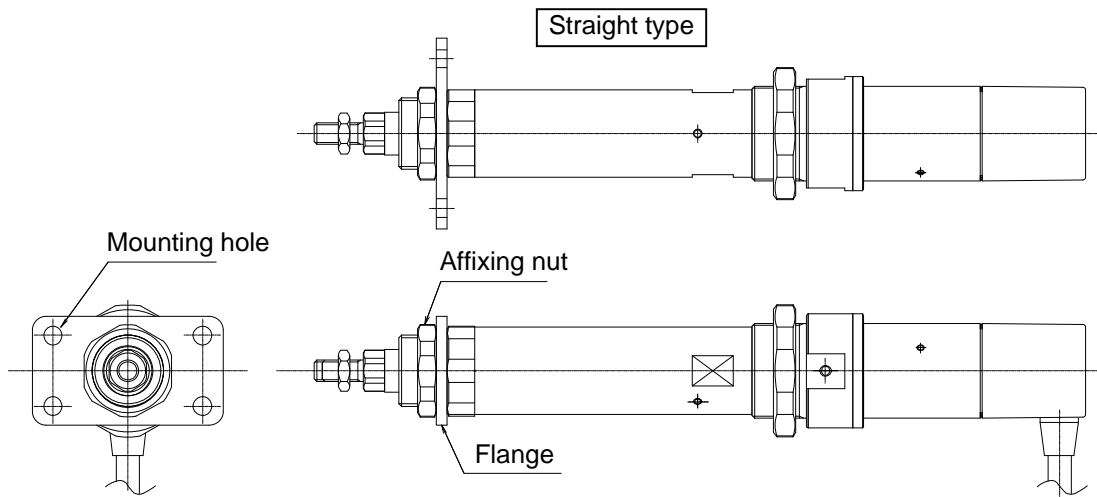


Type	MA	MB
RA4 type	M30 x 1.5	M40 x 1.5

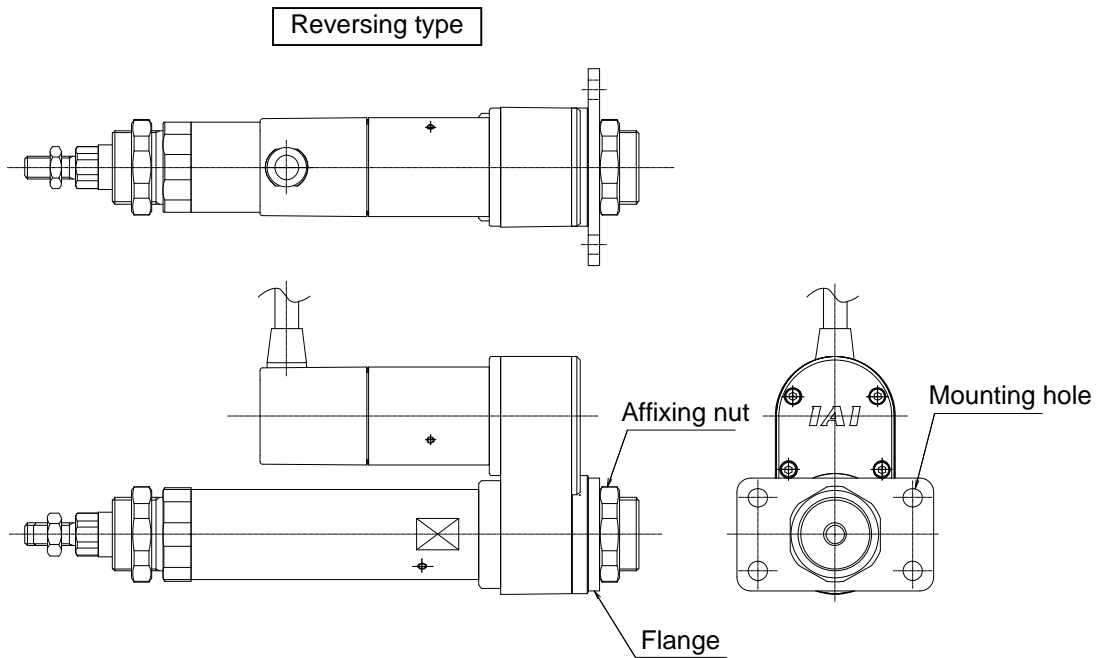
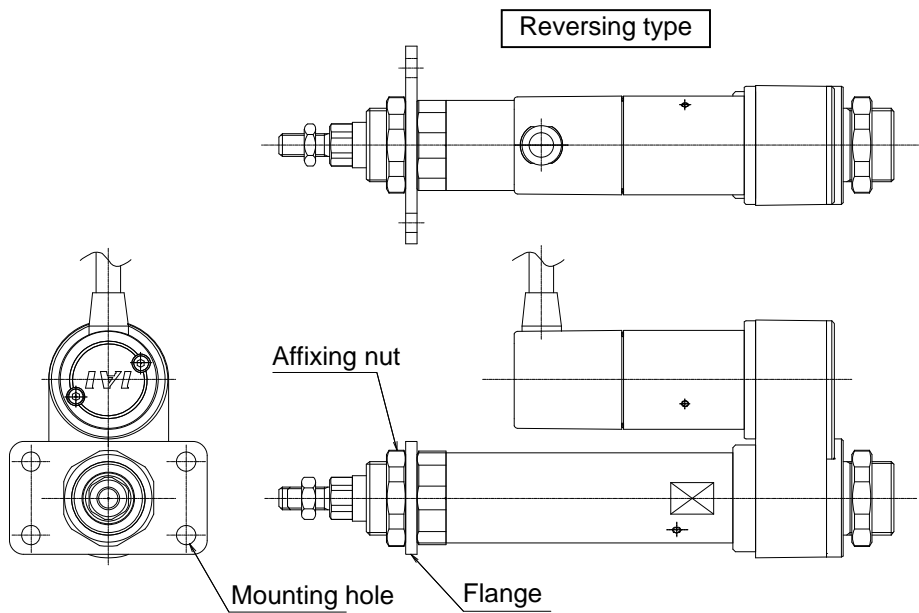
(2) Using screws on a flange (optional)

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

- Applicable model: RCS2-RA4

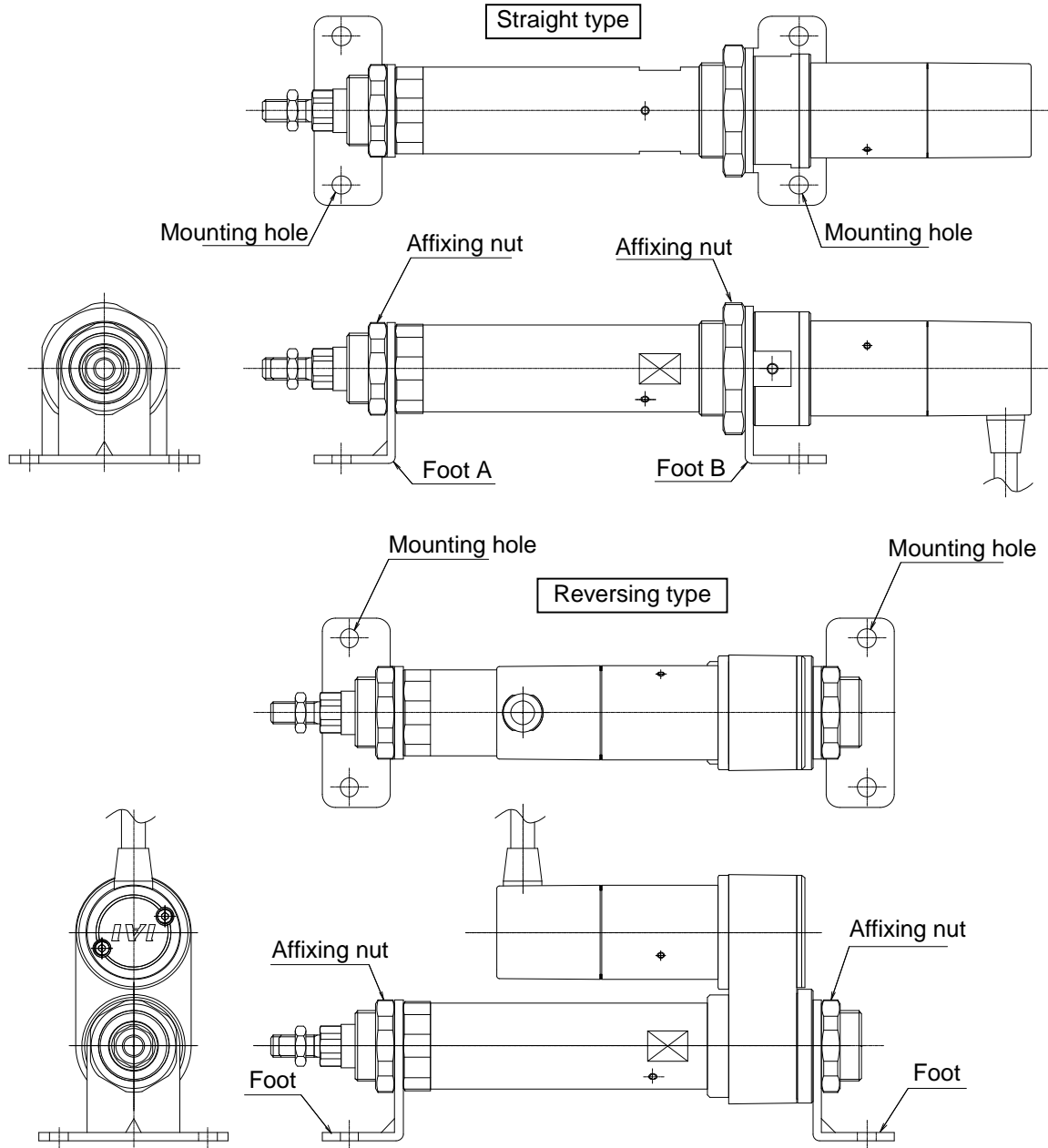


	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N-m	5.4 N-m



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

- (3) Using screws on feet (optional)
 Optional feet are available for installing the actuator. Use these feet, if necessary.
 ● Applicable model: RCS2-RA4



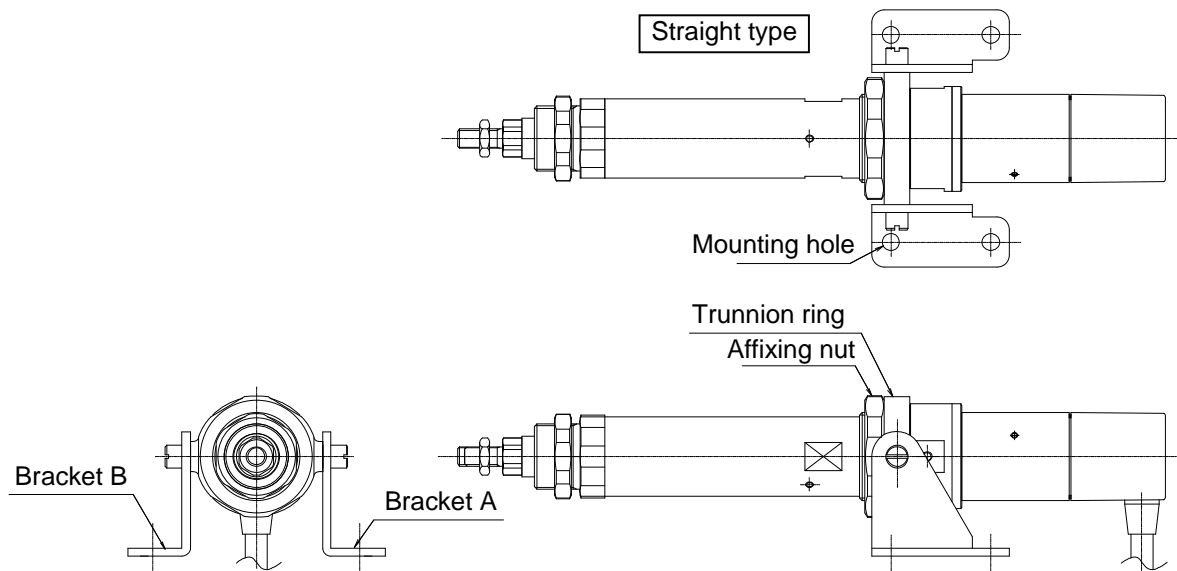
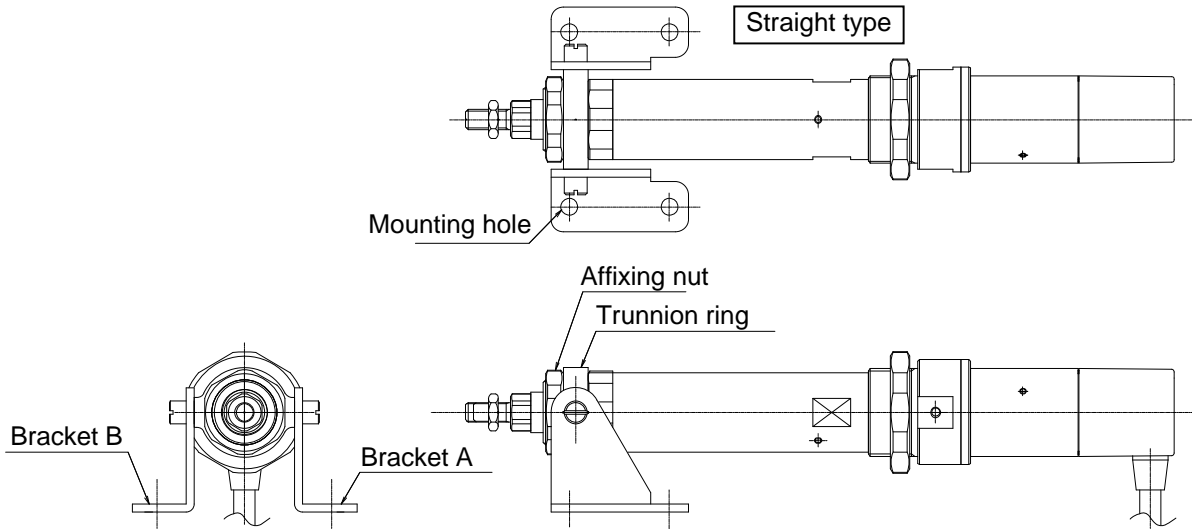
	Mating material is steel	Mating material is aluminum
Screw size	M6	M6
Tightening torque	12.3 N-m	5.4 N-m

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

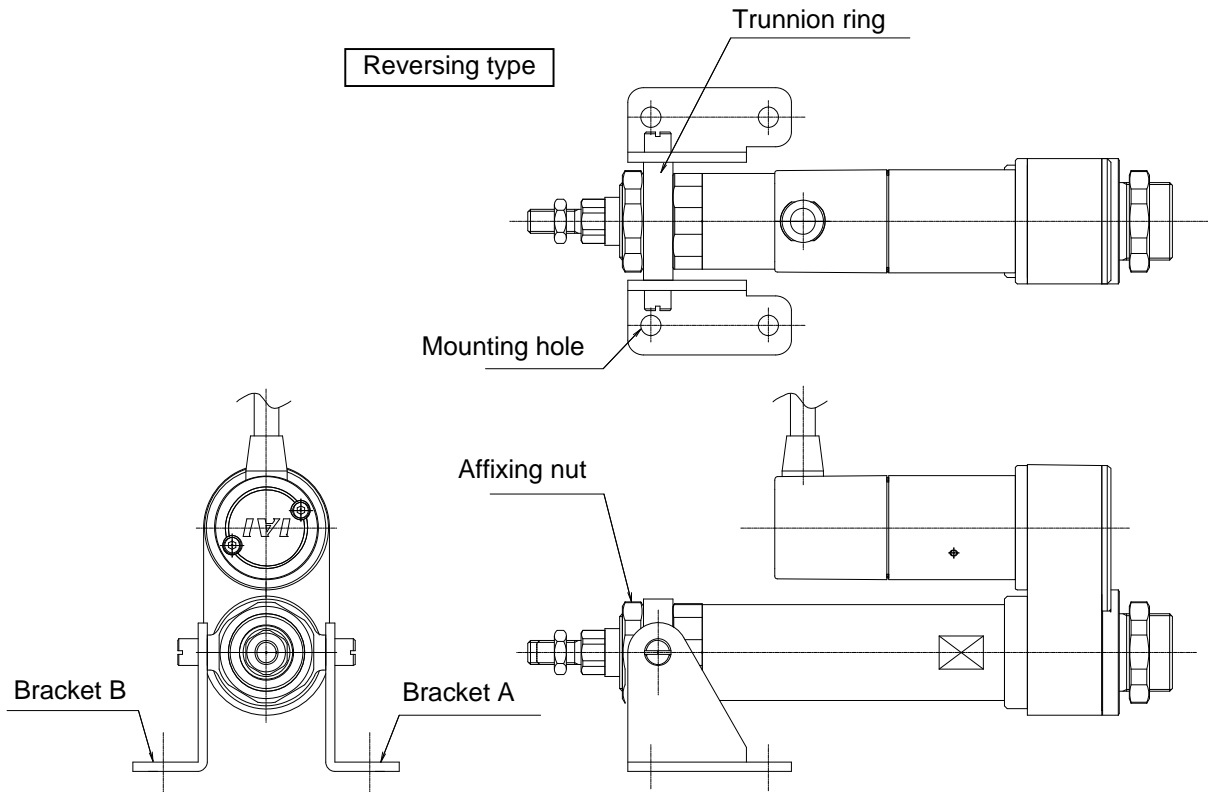
(4) Using screws on a trunnion (optional)

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

- Applicable model: RCS2-RA4



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



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

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

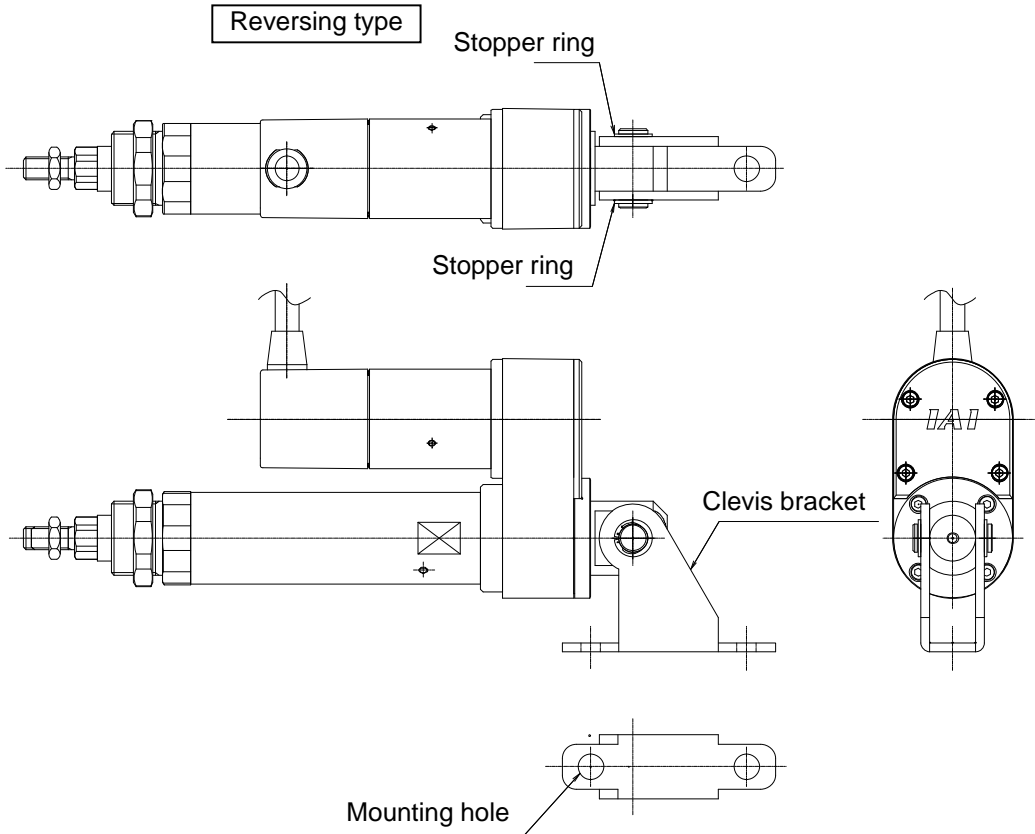
Caution: The optional clevis and trunnion are designed so that the fulcrum shaft can only receive radial load. In a condition where play is not permitted or thrust load is received, the customer must design a separate bearing structure.

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 model: Motor reversing type RCS2-RA4R



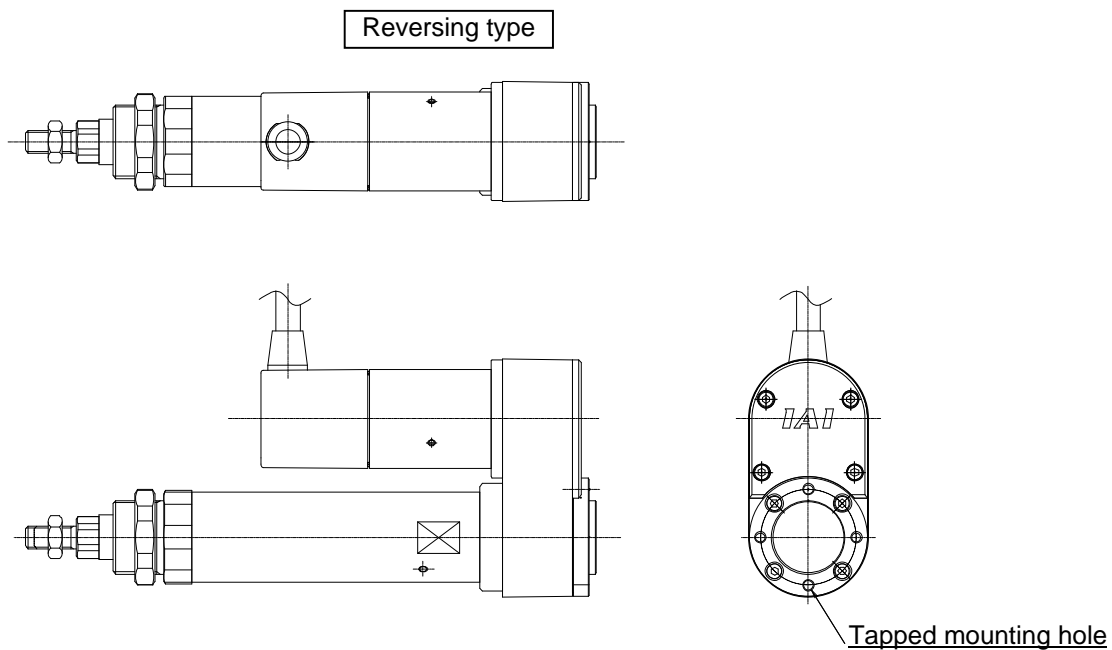
	Mating material is steel	Mating material is aluminum
Screw size	M8	M8
Tightening torque	30 N-m	12 N-m

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

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 model: Motor reversing type RA4R

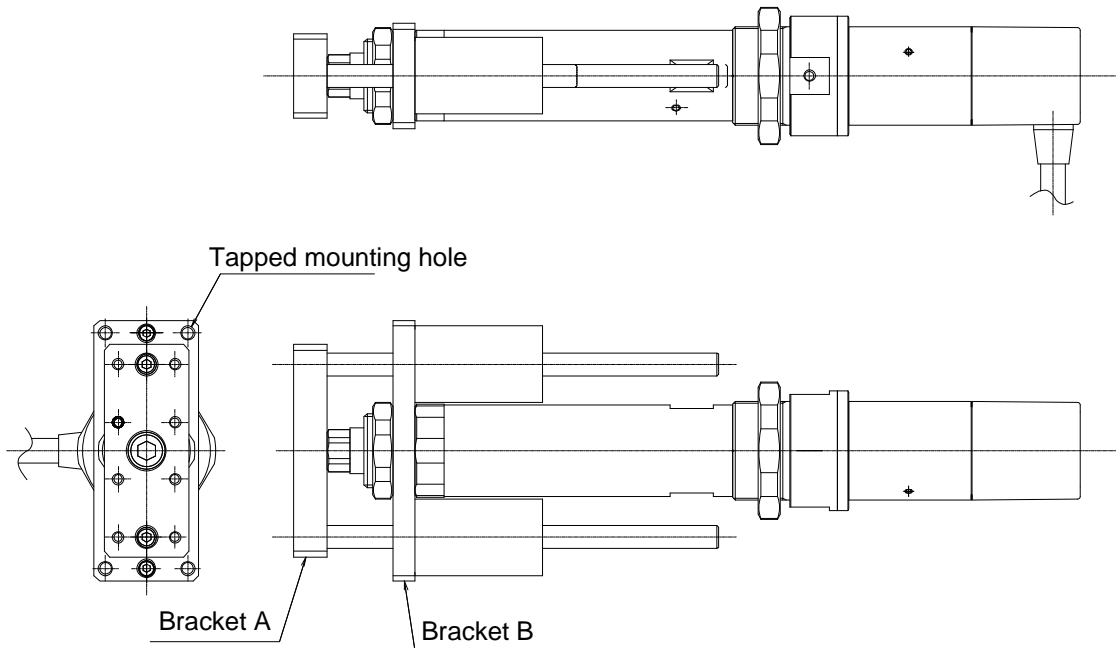


Type	Tapped hole diameter	Tapped depth	Tightening torque
RA4 type	M4	7 mm	1.8 N-m

(7) Double-guide type

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

- Applicable model: Double-guide type RGD4

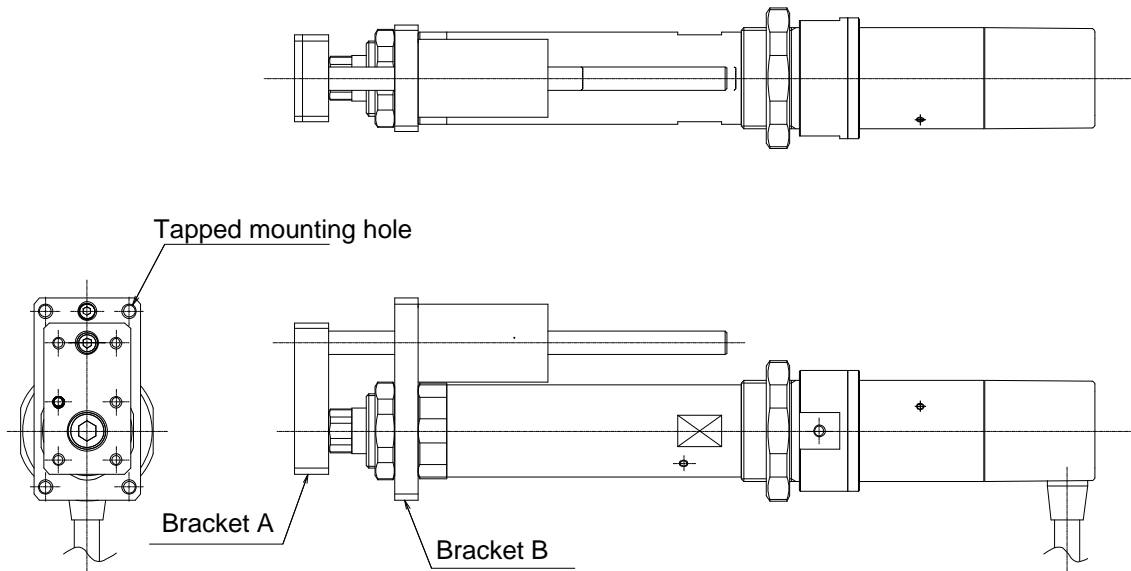


Type	Tapped hole diameter	Tapped depth	Tightening torque
RA4 type	M5	8 mm	3.4 N-m

(8) Single-guide type

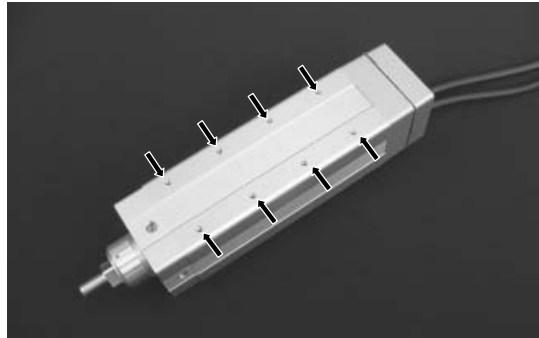
Use the tapped holes in the bracket for installing an actuator of the single-guide type.

- Applicable model: Double-guide type RGD4



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

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

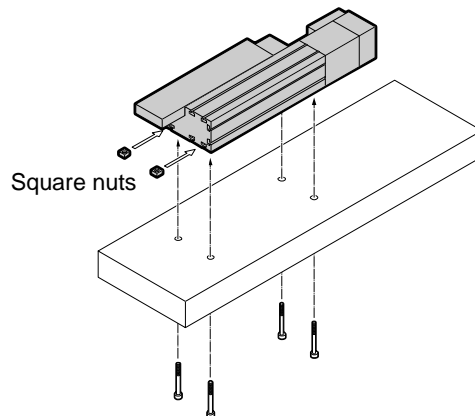


RA7

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

Type	Tapped hole diameter	Maximum screw-in depth
RA7	M5	15 mm

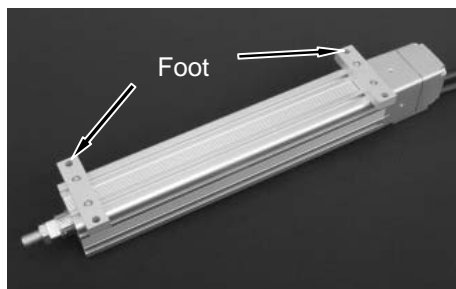
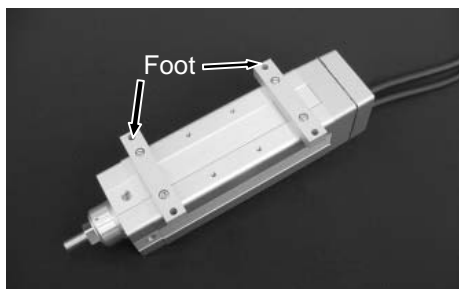
- (10) Using T-grooves and square nuts
 Applicable models: RA5C, RA5R, F5D
 The RA5 and F5 types have T-grooves. Insert square nuts in these T-grooves and install the actuator to the frame.



(11) Using feet

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

- [1] On the RA7 type, attach feet using the tapped [2] On the RA5 type, attach feet using square nuts inserted into the T-grooves.

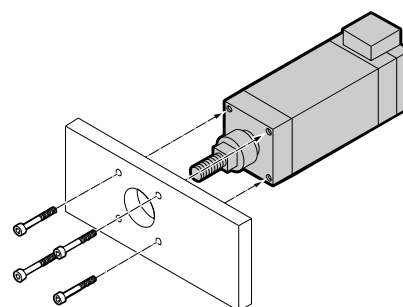
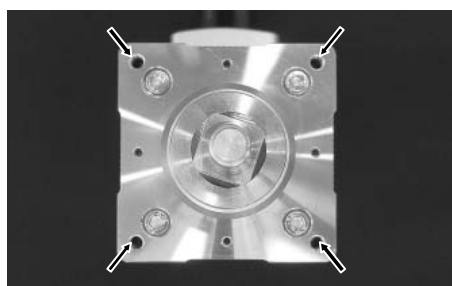


Install the feet to the frame using bolts.



(12) Using tapped holes on the reference surface

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



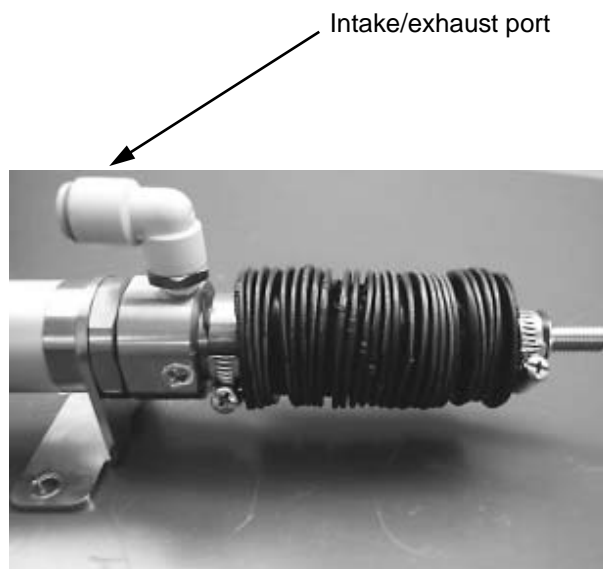
Type	Tapped hole diameter	Effective thread depth
RA5 / RA5R	M6	12 mm
RA7	M5	15 mm

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 RCS2W Dustproof/Splash-proof Type



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

(Applicable tube)

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

- TU1065: Polyurethane tube (Manufacturer: SMC)

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

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 \ Stroke	Maximum speed	
		50 to 250 mm	300 mm
RA4 type	3 mm	150 mm/sec	
	6 mm	300 mm/sec	
	12 mm	600 mm/sec	
RA5 type	4 mm	200 mm/sec	188 mm/sec
	8 mm	400 mm/sec	377 mm/sec
	16 mm	800 mm/sec	755 mm/sec
RA7AD type	3 mm	150 mm/sec	125 mm/sec
	6 mm	300 mm/sec	250 mm/sec
	12 mm	600 mm/sec	505 mm/sec
RA7BD type	4 mm	200 mm/sec	
	8 mm	400 mm/sec	
	16 mm	800 mm/sec	
F5D type	3 mm	200 mm/sec	
	6 mm	400 mm/sec	
	12 mm	800 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 22 (RA5).

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 Option

13.1 Applicable Actuator Models

Actuators that support high acceleration/deceleration are indicated by an option code 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
RCS2	RA4C	IA	20	16	50~800	T1 T2	N	HA Blank
	RGS4C			12			P	
	RGD4C			8			S	
	RA5C			6			M	
	RGS5C			100			X□□	
	RGD5C			100			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.)

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

(Example) RCS2-RA4C-I-20-10-50-T1-S-HA

High acceleration/deceleration type

RCS2-RA4C-I-20-10-50-T1-SConventional 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)		
RA4C	30	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
RA5C	100	16	15	3.5	105.8	1.0
		8	30	9	212.7	1.0
RGS5C		16	15	2.8	105.8	1.0
		8	30	8.3	212.7	1.0
RGD5C		16	15	2.8	105.8	1.0
		8	30	8.3	212.7	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. 29 for the maximum speed.

13.4 Applicable Controller Models (SCON, SSEL, X-SEL)

The following code is appended after the encoder type:

HA: High acceleration/deceleration specification

(Blank): Conventional specification

(Examples) [1] High acceleration/deceleration specification

SCON-C-20IHA-NP-2-0

[2] Conventional specification

SCON-C-20I-NP-2-0

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 RCS2W 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.



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

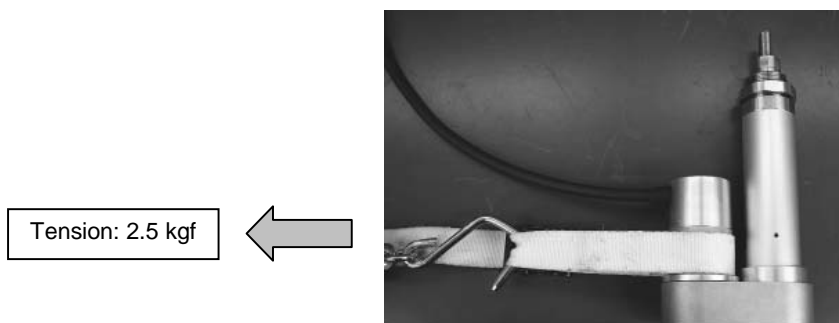
- RA4R - 60S2M152R Rubber, cleanroom type (Bando Chemical Industries) 6 mm wide
- RA5R - 100S3M219R Rubber, cleanroom type (Bando Chemical Industries) 10 mm wide

14.5.3 Adjusting the Belt Tension (RA4R Type)

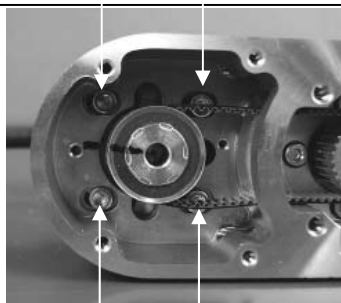
Remove the pulley case cover and loosen the four motor-unit affixing bolts. Pass a looped string (or long tie-band) around the motor unit, and pull the string to the specified tension using a tension gauge. In this condition, uniformly tighten the motor-unit affixing bolts.

[Recommended tightening torque of adjustment bolts]

162 N-cm (16.5 kgf-cm)



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

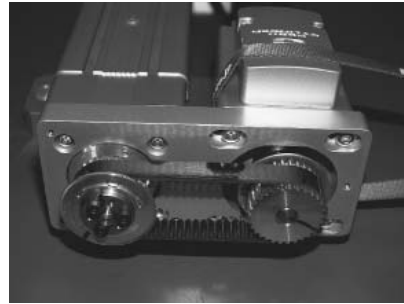


Motor-unit affixing bolts
(Use an Allen wrench of 2.5 mm across flats.)

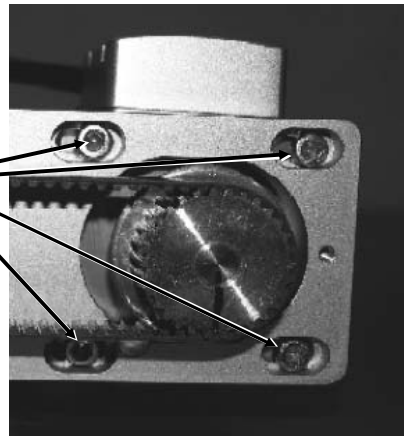
14.5.4 Adjusting the Belt Tension (RA5R)

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

Tension: 6 ± 0.2 kgf



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



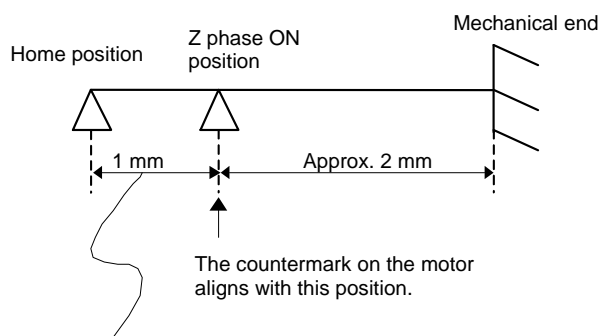
14.5.5 Replacing the Belt of the Motor Reversing Type: RA4R Type

[Items Required for Replacement]

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

[Overview of Replacement]

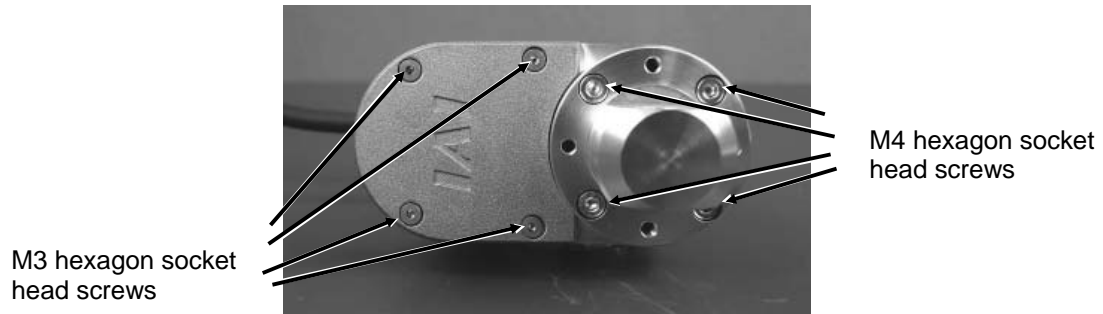
- 1) Move the rod to a position where Z phase turns on (home position) (2 mm from the mechanical end). In this position, loosen the motor-unit affixing bolts and replace the belt.
- 2) Restore the home position.
Affix the rod at a position 2 mm from the mechanical end on the home side, pass the belt,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



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

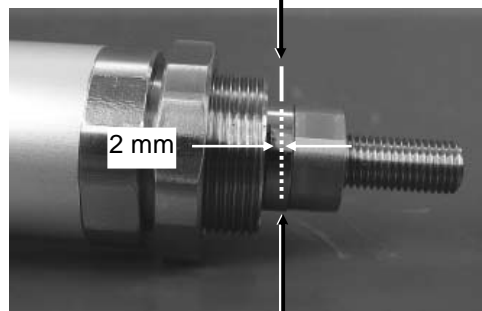
[Procedure]

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



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

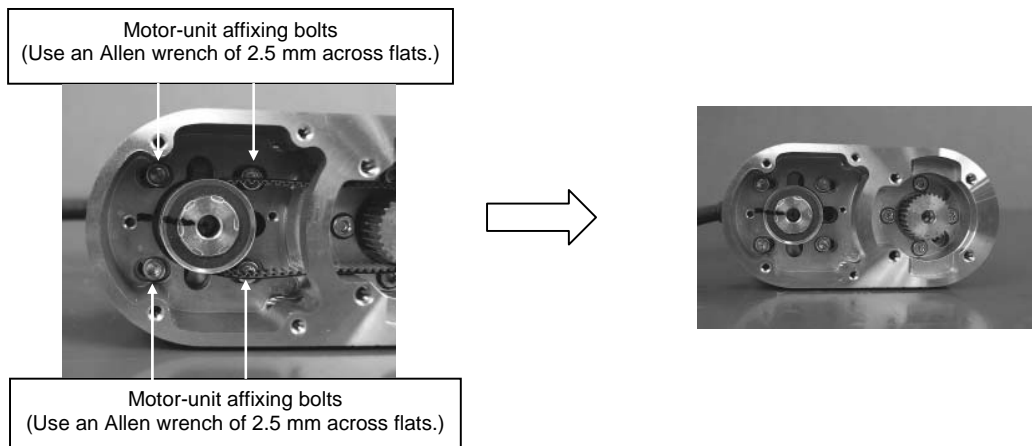
Cause the rod to project 2 mm from the mechanical end.



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

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

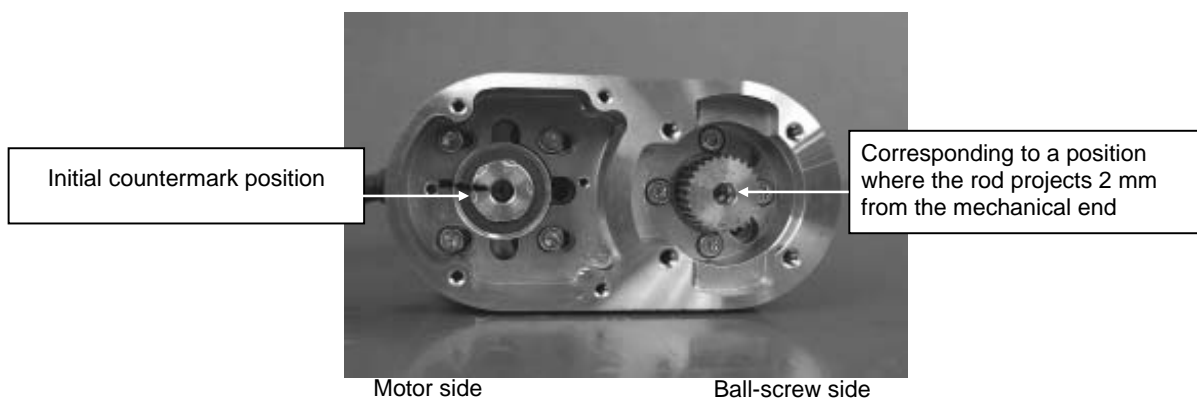
3) Loosen the motor-unit affixing bolts using an Allen wrench of 2.5 mm across flats. Slide the motor, and loosen and remove the belt.



4) Check the following points before restoring the home position:

- The motor side should be aligned with the initial countermark. If the position is offset, adjust it to achieve proper alignment.
- The ball-screw side should be at a position where the rod projects 2 mm from the mechanical end.

After the check, attach a new belt while holding the pulleys on both sides in position.



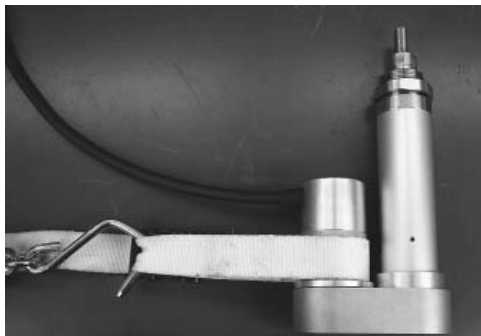
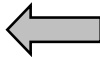
5) Adjust the belt tension.

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

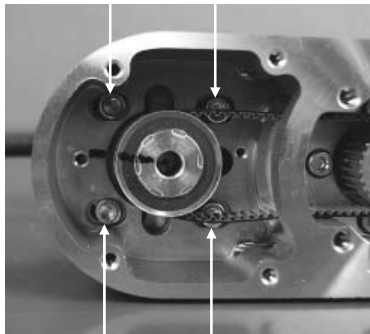
[Recommended tightening torque for adjustment bolts]

162 N-cm (16.5 kgf-cm)

Tension: 2.5 kgf

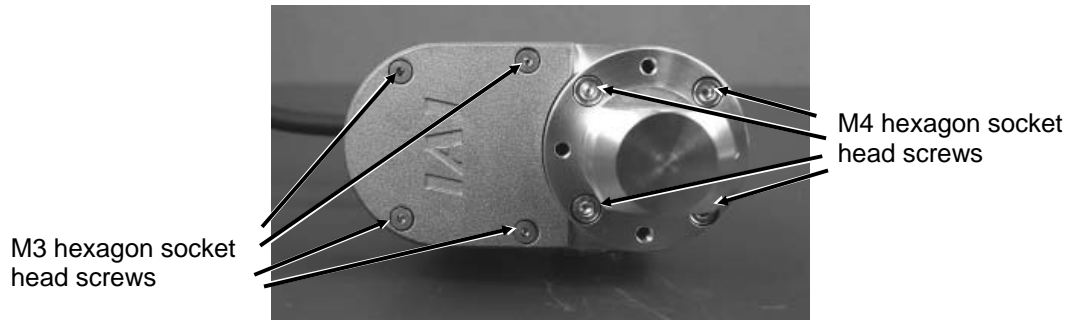


Motor-unit affixing bolts
(Use an Allen wrench of 2.5 mm across flats.)



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

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



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

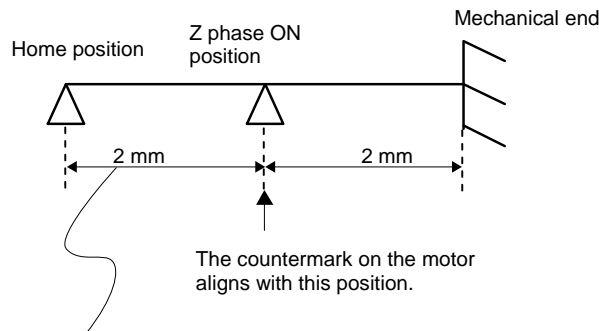
14.5.6 Replacing the Belt of the Motor Reversing Type: RA5R Type

[Items Required for Replacement]

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

[Overview of Replacement]

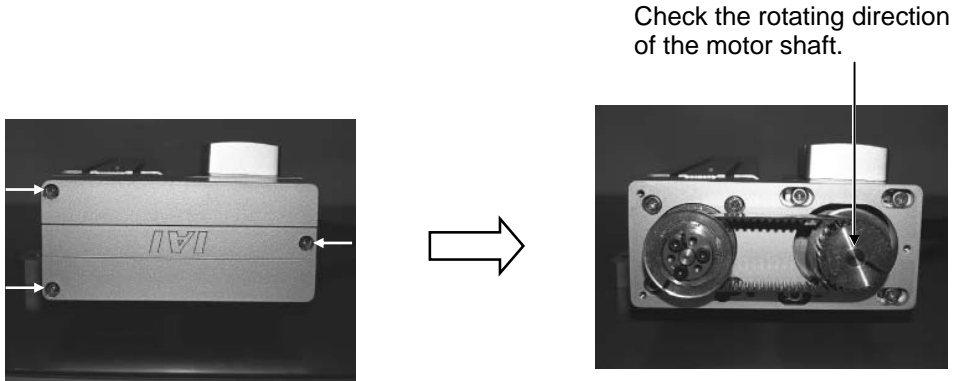
- 1) Move the rod to a position where Z phase turns on (home position) (2 mm from the mechanical end). In this position, loosen the motor-unit affixing bolts and replace the belt.
- 2) Restore the home position.
Affix the rod at a position 4 mm from the mechanical end on the home side, pass the belt,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



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

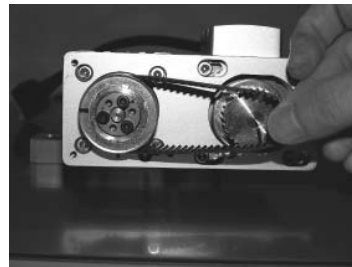
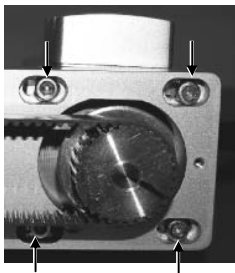
[Procedure]

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



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

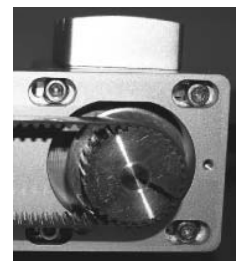
- 3) Remove the belt from the pulleys.



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

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

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



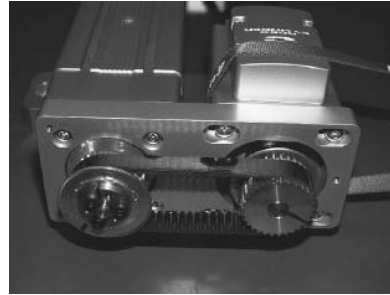
4) Adjust the belt tension.

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

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

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

Tension: 6 ± 0.2 kgf



5) Install the pulley cover.

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

6) Perform homing using a PC or teaching pendant.

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

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

14.6 Replacing the Motor

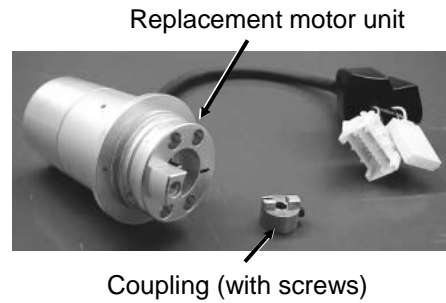
14.6.1 Replacing the Motor of the Motor Straight Type (Coupling Type): RA4C Type

[Items Required for Replacement]

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

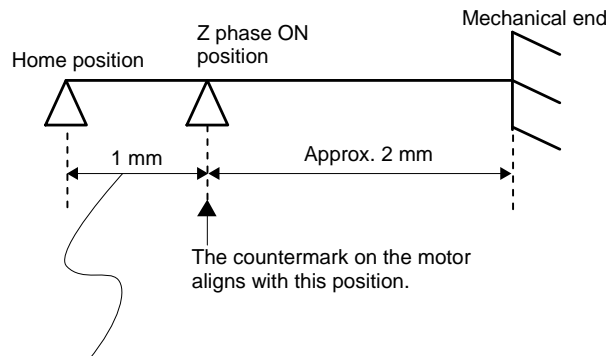
Idemitsu Kosan	Daphne Eponex Grease No.2
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- PC or teaching pendant



[Overview of Replacement]

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

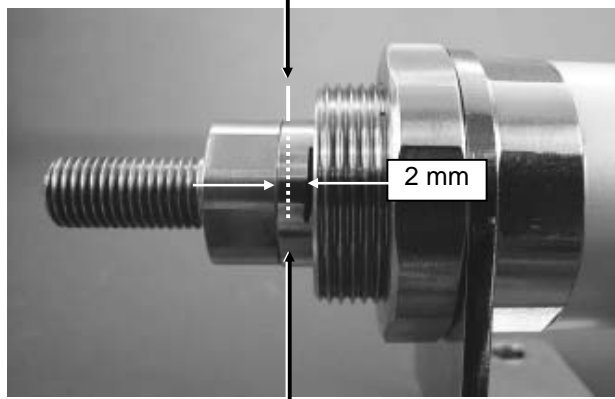


Set by the home offset parameter (SCON) or home preset parameter (SSEL, X-SEL). (The above value indicates the factory setting.)

[Procedure]

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

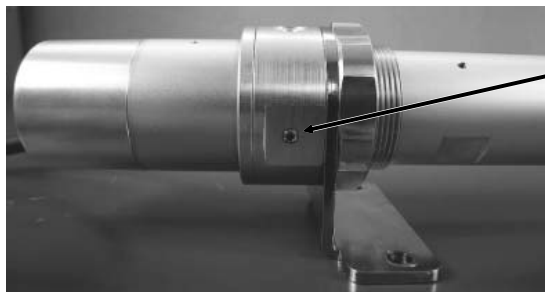
Cause the rod to project 2 mm from the mechanical end.



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

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

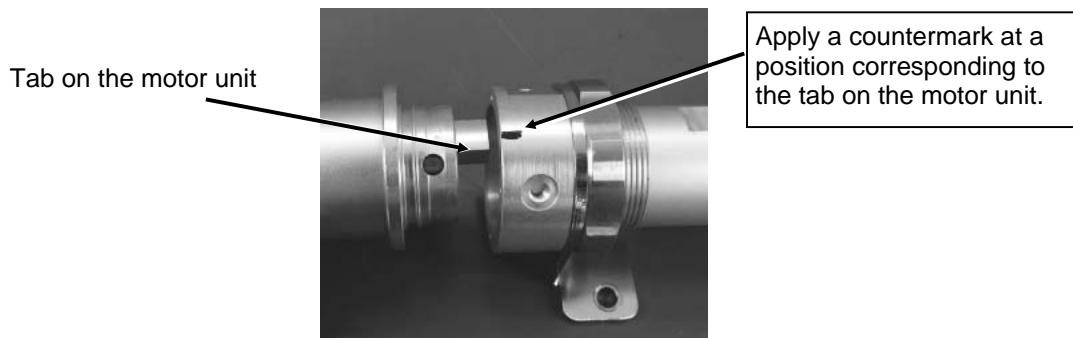
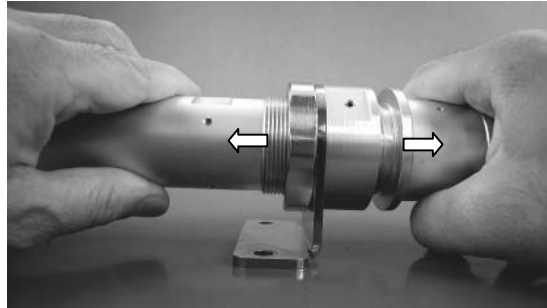
- 2) Using an Allen wrench of 2 mm across flats, remove the two motor-unit affixing bolts on the right and left.



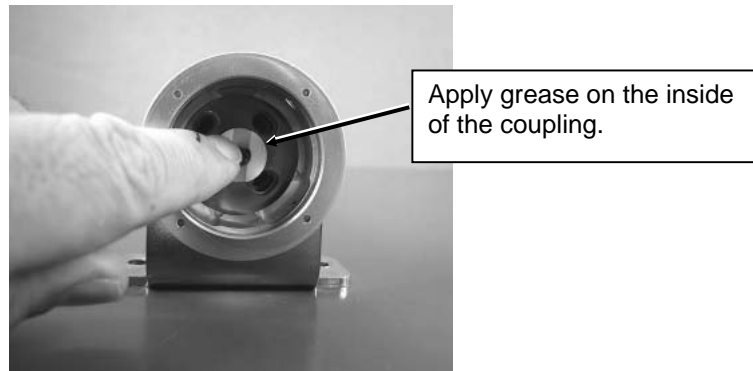
2 affixing bolts on the motor-end cap (right and left) (hexagon socket head setscrews)

3) Pull out the motor unit.

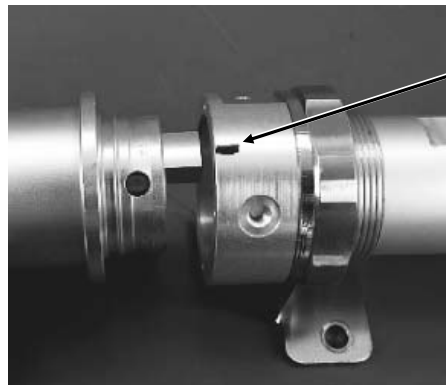
Before pulling out the motor unit, apply a countermark on the cylinder tube at a position corresponding to the tab on the motor unit, so that the motor unit and cylinder can be aligned in the correct position later on.



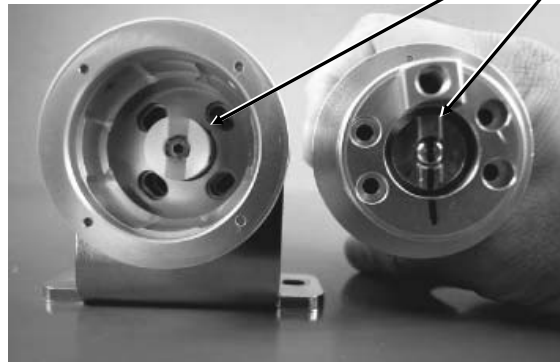
4) Apply grease on the actuator coupling.



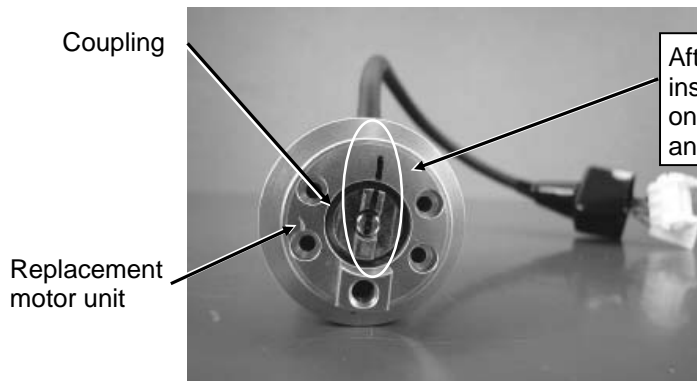
- 5) Align the tab on the replacement motor unit with the countermark on the cylinder.
With the motor unit and cylinder aligned properly, insert the coupling into the replacement motor unit by aligning the orientation of this coupling with that of the actuator coupling (adjusted to a position corresponding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



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



Position the couplings.

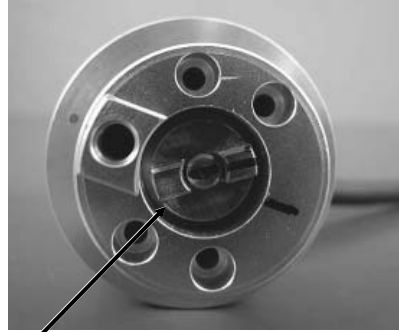


After the coupling has been inserted, apply countermarks on the replacement motor unit and coupling.

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

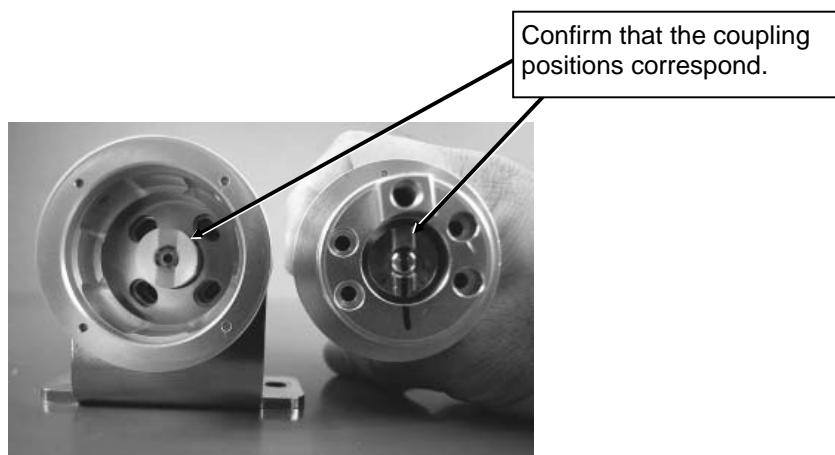
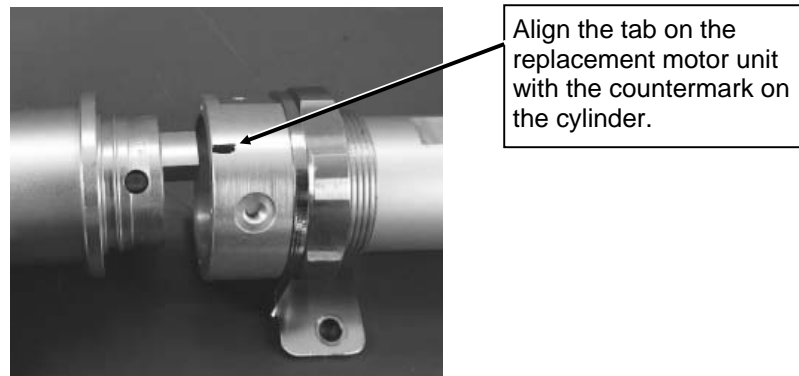
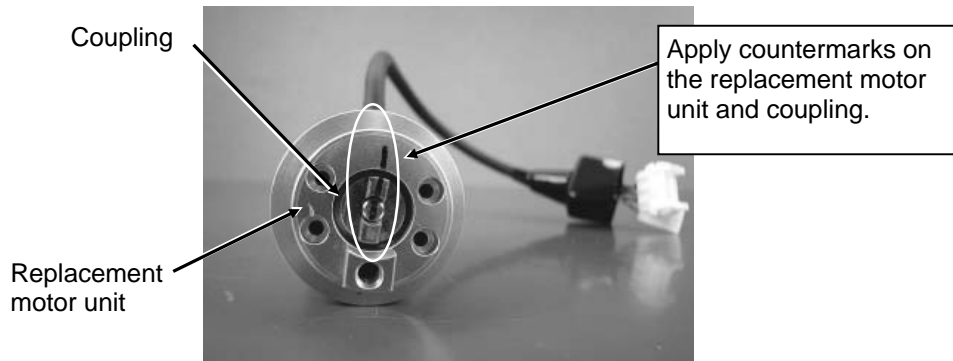


Coupling
setscrew hole

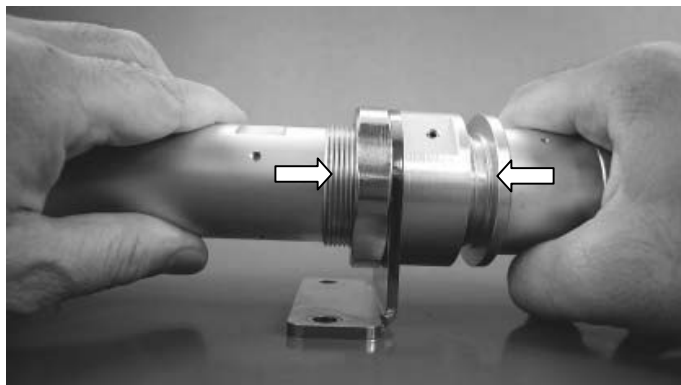


Turn the coupling and motor shaft simultaneously until a setscrew on the coupling is seen through the hole.
Thereafter, tighten the hexagon socket head setscrew using an Allen wrench of 2 mm across flats.

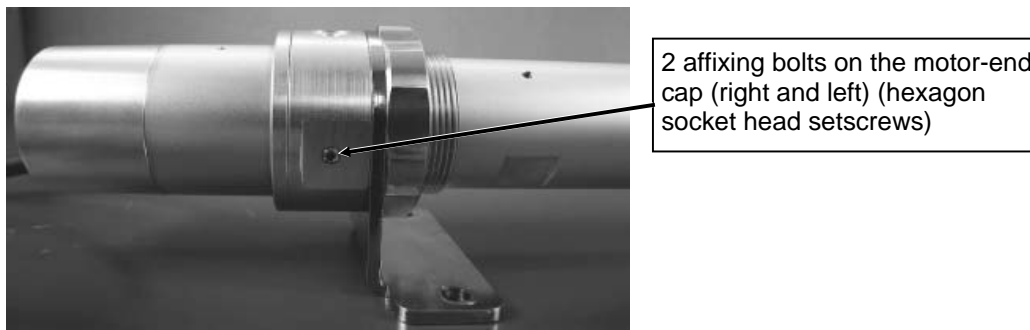
- 7) Return the coupling in the replacement motor unit to the initial motor position (Z phase position). Align the tab on the replacement motor unit with the countermark on the cylinder. With the motor unit and cylinder positioned this way, confirm that the orientation of the actuator coupling (adjusted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



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



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

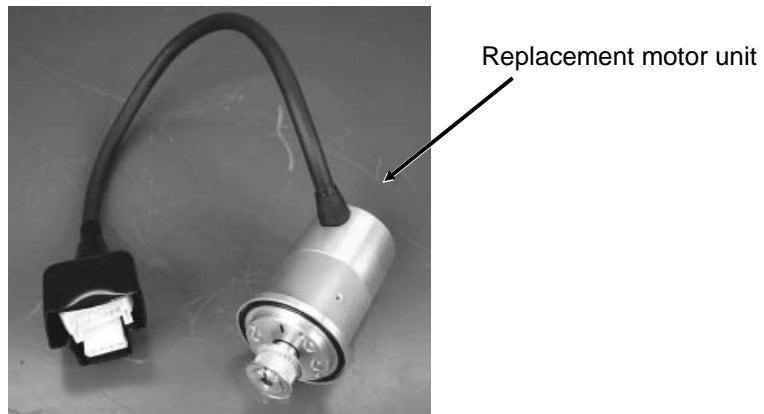


- 10) Connect a PC or teaching pendant to the controller to perform homing. (If the actuator is of absolute encoder specification, an absolute reset must be performed).
Check for deviation from the initial home position.
If there is a deviation, adjust parameter No. 22, "Home offset" if you are using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

14.6.2 Replacing the Motor of the Motor Reversing Type: RA4R Type

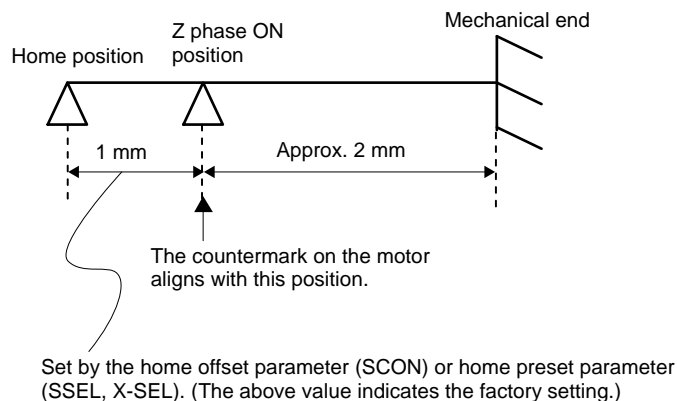
[Items Required for Replacement]

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



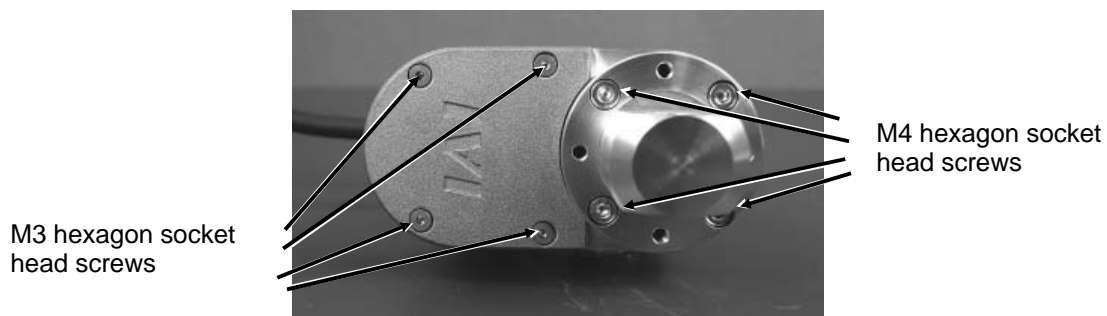
[Overview of Replacement]

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



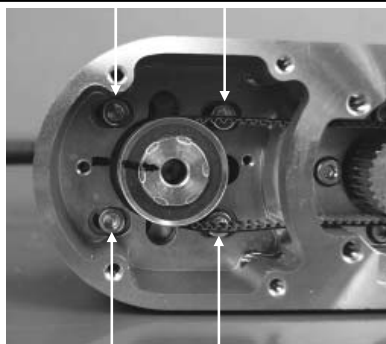
[Procedure]

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



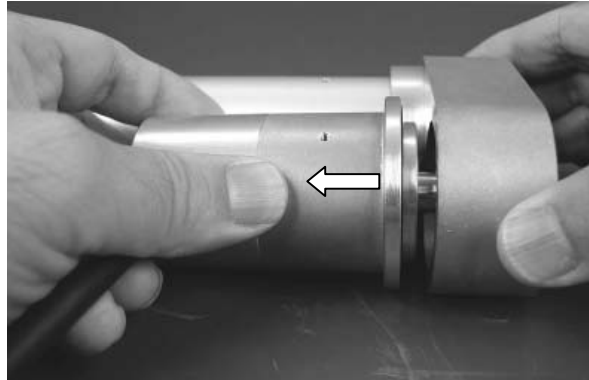
- 2) Loosen the motor-unit affixing bolts using an Allen wrench of 2.5 mm across flats. Slide the motor, and loosen and remove the belt. After the belt has been removed, remove the motor-unit affixing bolts.

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

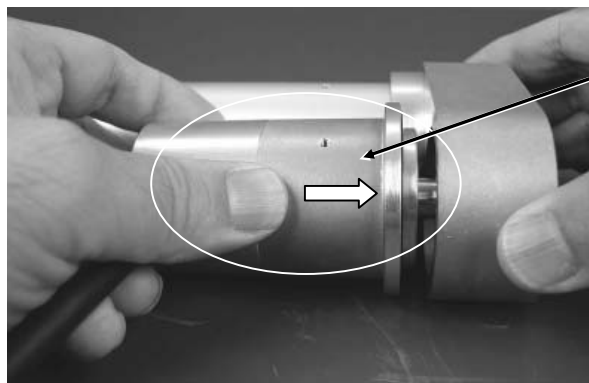


Motor-unit affixing bolts
(Use an Allen wrench of 2.5 mm across flats.)

3) Take out the motor.



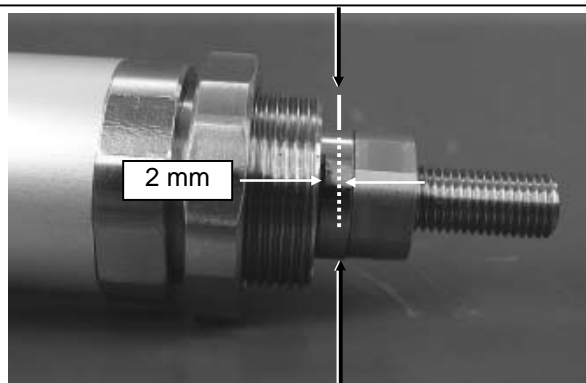
4) Install the replacement motor. Loosely tighten the motor-unit affixing bolts.



Replacement motor

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

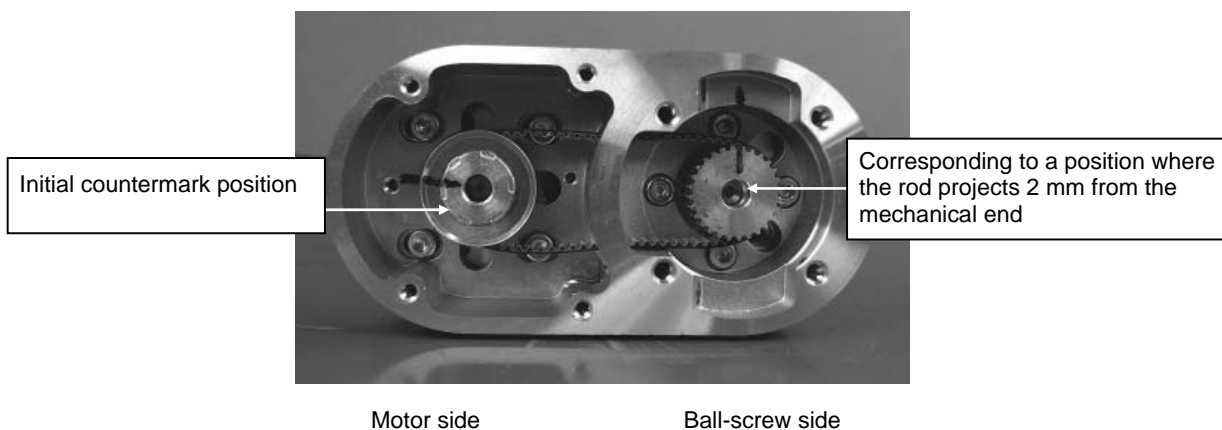
Cause the rod to project 2 mm from the mechanical end.



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.
 - The ball-screw side should be at a position where the rod projects 2 mm from the mechanical end.
- After the check, attach a new belt while holding the pulleys on both sides in position.

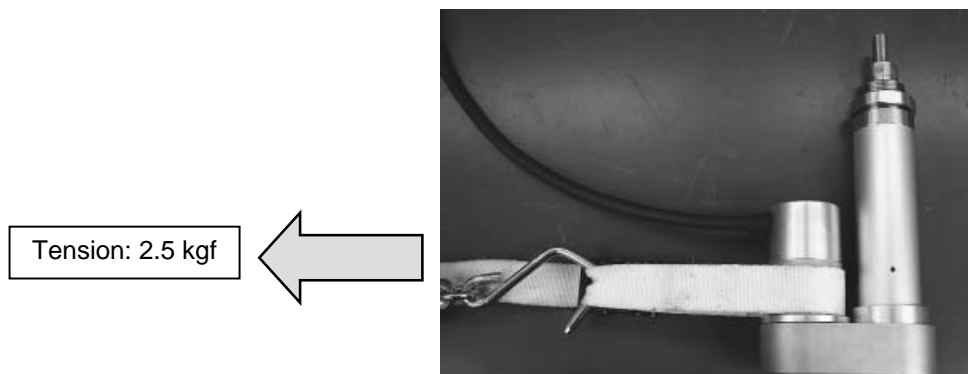


7) Adjust the belt tension.

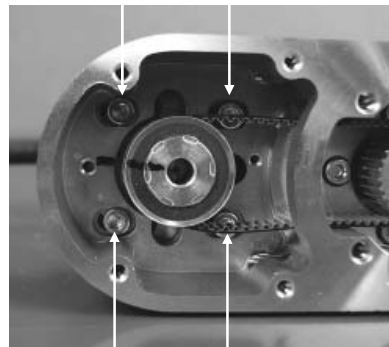
Pass a looped strong string (or long tie-band) around the motor cover and pull it with a tension gauge to the specified tension. In this condition, uniformly tighten the motor-unit affixing bolts.

[Recommended tightening torque for adjustment bolts]

162 N-cm (16.5 kgf-cm)



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



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

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



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

14.6.3 Replacing the Motor of the Motor Reversing Type: RA5R Type

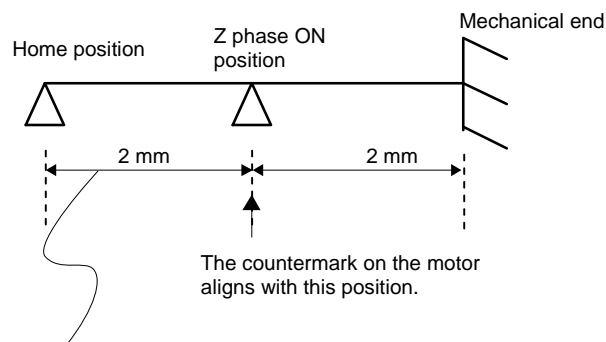
[Items Required for Replacement]

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



[Overview of Replacement]

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



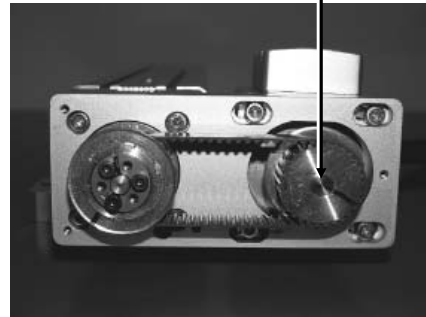
Set by the home offset parameter (SCON) or home preset parameter (SSEL, X-SEL). (The above value indicates the factory setting.)

[Procedure]

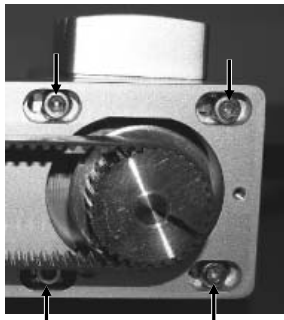
- 1) Move the slider from the home position toward the mechanical end and check the rotating direction of the motor shaft. (If the actuator has its home located on the opposite side to the standard specification, this check is always required because the motor shaft rotates in the different direction.)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



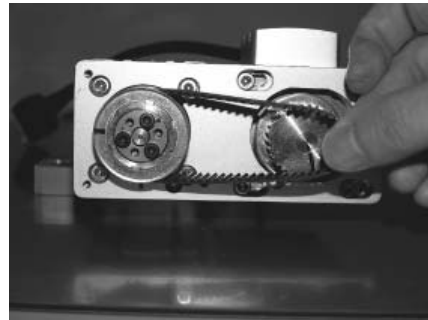
Check the rotating direction of the motor shaft.



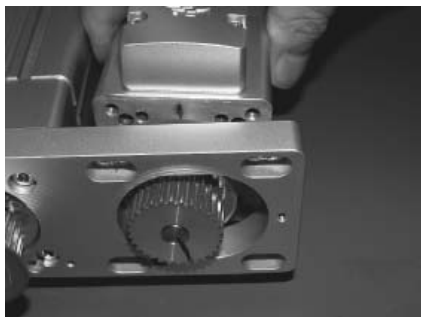
- 2) Loosen the four tension adjustment bolts to slacken the belt.
(Allen wrench of 3 mm across flats)



- 3) Remove the belt from the pulleys.



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

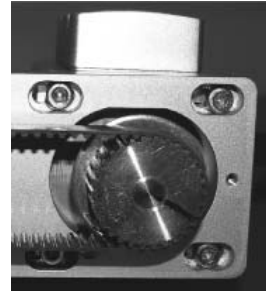


- 4) Install the new motor.
Uniformly tighten the four hexagon socket head bolts (M4x15) using the Allen wrench of 3 mm across flats.

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

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

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



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

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

Tension: 6 ± 0.2 kgf



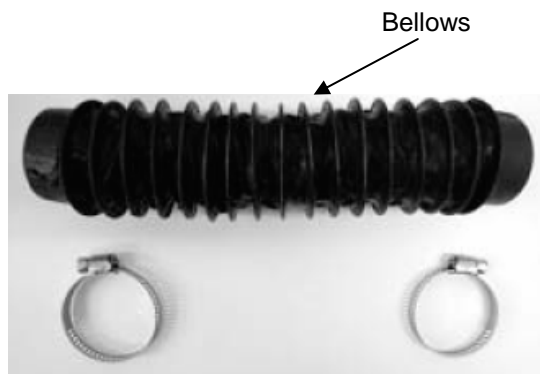
- 7) Install the pulley cover.
 Tighten the three hexagon socket head bolts (M3x22) using an Allen wrench of 2.5 mm across flats.
- 8) Perform homing using a PC or teaching pendant.
 (If the actuator is of absolute encoder specification, an absolute reset must be performed). Check for deviation from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

14.7 Replacing the Bellows of the RCS2W Dustproof/Splash-proof Type

[Items Required for Replacement]

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

Kyodo Yushi	Multemp LRL3
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[Procedure]

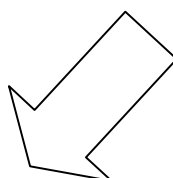
- 1) Loosen the front and rear metal fittings affixing the bellows and remove the bellows.



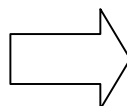
Loosening of front metal fitting



Loosening of rear metal fitting

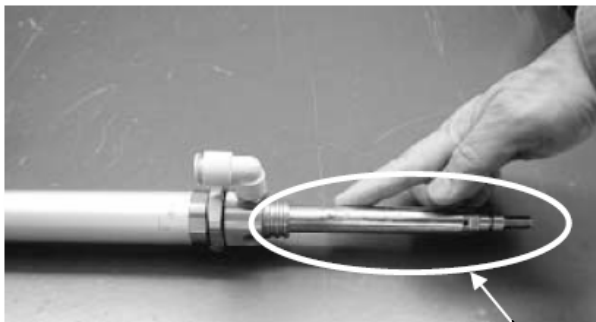


Removal of bellows



Bellows has been removed

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



Apply grease evenly over the entire surface.

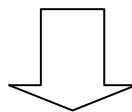
- 3) Install a metal fitting on the bellows.



Bellows



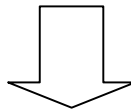
Install a metal fitting on the bellows.



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



Installation of bellows



Tightening of rear metal fitting

Tightening torque: 2 N-m



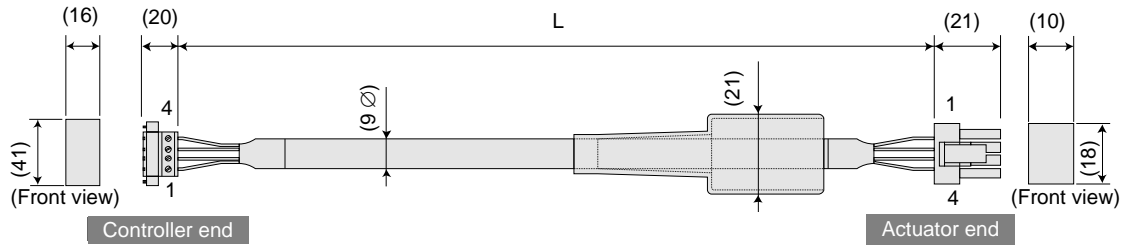
Tightening of front metal fitting

Tightening torque: 2 N-m

15. Cable Drawings

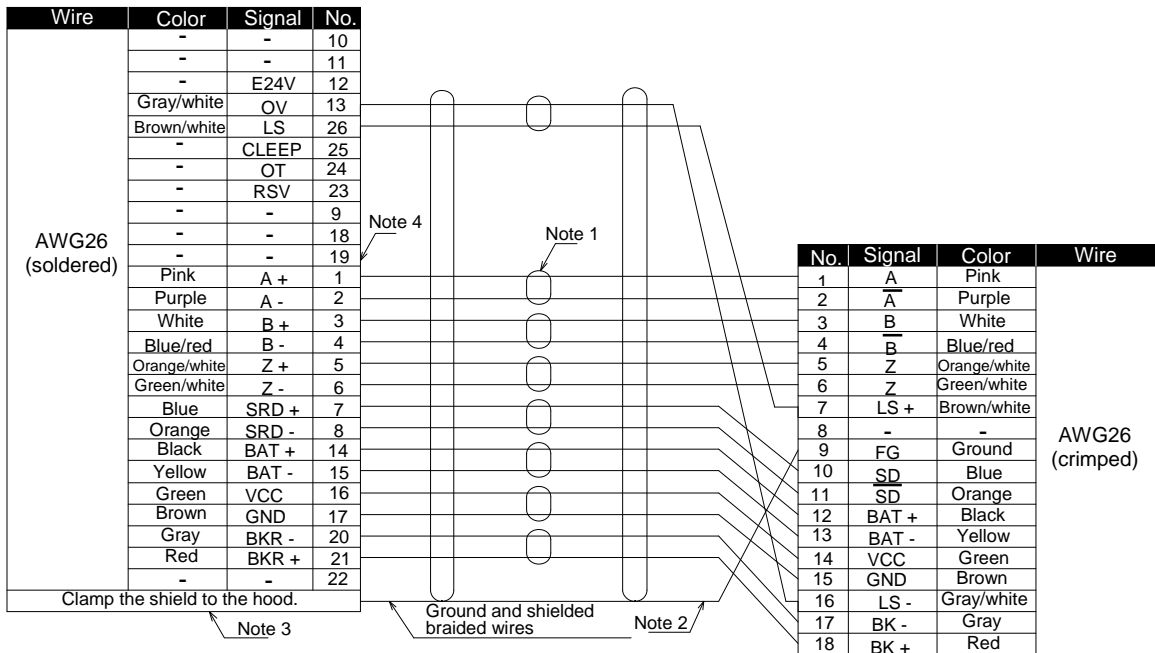
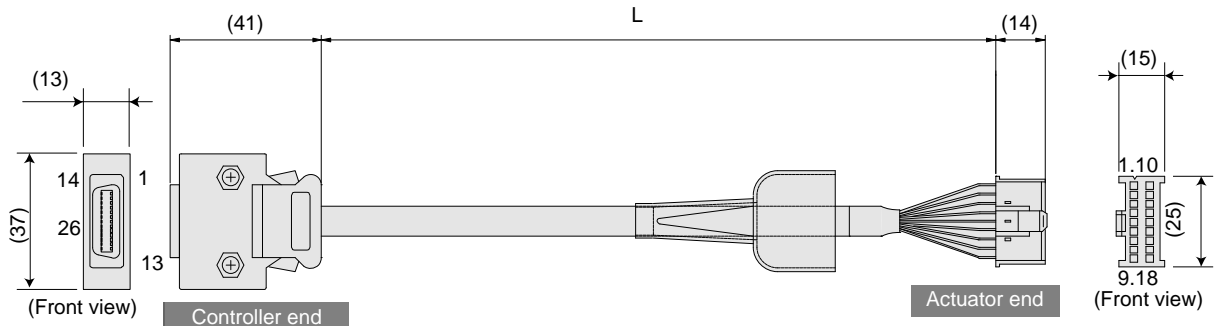
[1] Motor cable/robot motor cable

Model: CB-RCC-MA □□□/CB-RCC-MA □□□-RB



Wire	Signal	No.	No.	Signal	Wire
0.75 sq	PE	1	1	U	0.75 sq (crimped)
	U	2	2	V	
	V	3	3	W	
	W	4	4	PE	

[3] Encoder cable/robot encoder cable
 Model: CB-RCS2-PA □□□/CB- X2-PA □□□-RB



MEMO

Catalog No.: MJ3656-3A



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