



# ROBO Cylinder RCA2 Actuator Rod Type Instruction Manual

Tenth Edition

Slim types	[Slim Small ROBO Cylinders] RC2AC, RA2AR
Short types (nut affixing types)	[Slim Small ROBO Cylinders] RN3NA, RN4NA RN3N, RN4N
Short types (tapped-hole mounting types)	[Slim Small ROBO Cylinders] RP3NA, RP4NA RP3N, RP4N
Single guide types	[Slim Small ROBO Cylinders] GS3NA, GS4NA GS3N, GS4N
Double guide types	[Slim Small ROBO Cylinders] GD3NA, GD4NA GD3N, GD4N
Slide unit types	[Slim Small ROBO Cylinders] SD3NA, SD4NA SD3N, SD4N

***IAI America, Inc.***





## Please Read Before Use

Thank you for purchasing our product.

This Instruction Manual describes all necessary information items to operate this product safely such as the operation procedure, structure and maintenance procedure.

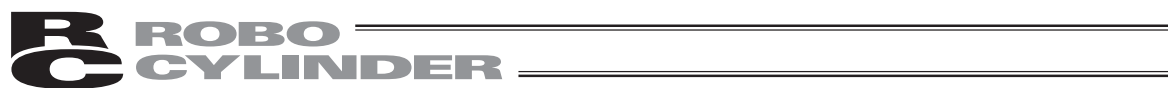
Before the operation, read this manual carefully and fully understand it to operate this product safely. The enclosed CD or DVD in this product package includes the Instruction Manual for this product.

For the operation of this product, print out the necessary sections in the Instruction Manual or display them using the personal computer.

After reading through this manual, keep this Instruction Manual at hand so that the operator of this product can read it whenever necessary.

### [Important]

- This Instruction Manual is original.
- The product cannot be operated in any way unless expressly specified in this Instruction Manual. IAI shall assume no responsibility for the outcome of any operation not specified herein.
- Information contained in this Instruction 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 Instruction 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

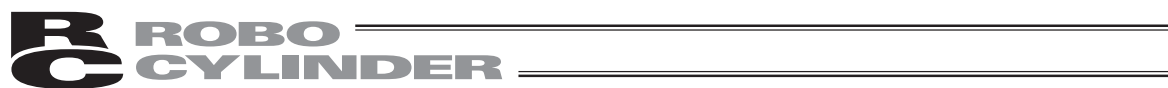
If a compliance with the CE Marking is required, please follow Overseas Standards Compliance Manual (ME0287) that is provided separately.

## Table of Contents

Safety Guide .....	1
Handling Precautions .....	8
1. Part Names .....	11
1.1 Slim Types	
RA2AC (Motor coupling types), RA2AR (Motor reversing types) .....	11
1.2 Short Types (Nut Affixing Types)	
RN3NA, RN3N (Lead screw, Ball screw), RN4NA, RN4N (Lead screw, Ball screw) .....	12
1.3 Short Types (Tapped-hole Mounting Types)	
RP3NA, RP3N (Lead screw, Ball screw), RP4NA, RP4N (Lead screw, Ball screw) .....	12
1.4 Single Guide Types	
GS3NA, GS3N (Lead screw, Ball screw), GS4NA, GS4N (Lead screw, Ball screw) .....	13
1.5 Double Guide Types	
GD3NA, GD3N (Lead screw, Ball screw), GD4NA, GD4N (Lead screw, Ball screw) .....	13
1.6 Slide Unit Types	
SD3NA, SD3N (Lead screw, Ball screw), SD4NA, SD4N (Lead screw, Ball screw) .....	14
2. External Diagrams .....	15
2.1 Slim Type (Motor coupling type) RA2AC .....	15
2.2 Slim Type (Motor reversing type) RA2AR .....	15
2.3 Short Types (Nut rotating types) RN3NA, RN3N (Lead screw, Ball screw) .....	16
2.4 Short Types (Nut rotating types) RN4NA, RN4N (Lead screw, Ball screw) .....	16
2.5 Short Types (Tapped-hole mounting types) RP3NA, RP3N (Lead screw, Ball screw) ..	17
2.6 Short Types (Tapped-hole mounting types) RP4NA, RP4N (Lead screw, Ball screw) ..	17
2.7 Single Guide Types GS3NA, GS3N (Lead screw, Ball screw) .....	18
2.8 Single Guide Types GS4NA, GS4N (Lead screw, Ball screw) .....	18
2.9 Double Guide Types GD3NA, GD3N (Lead screw, Ball screw) .....	19
2.10 Double Guide Types GD4NA, GD4N (Lead screw, Ball screw) .....	19
2.11 Slide Unit Types SD3NA, SD3N (Lead screw, Ball screw) .....	20
2.12 Slide Unit Types SD4NA, SD4N (Lead screw, Ball screw) .....	20
3. Cable Drawings .....	21
3.1 ASEP Controller Cables .....	21
3.2 ACON, ASEL Controller Cables .....	22
4. Options .....	24
4.1 Connector Cable Exit Direction Changed .....	24
4.2 Low Power Consumption Type .....	24
5. Checking after Unpacking .....	25
5.1 Included Items .....	25
5.2 Instruction Manuals Relating to This Product .....	25
5.3 How to Read Model Nameplate .....	26
5.4 How to Read Model .....	26
6. Specifications .....	27

7. Installation and Storage/Preservation Environment .....	36
7.1 Installation Environment .....	36
7.2 Storage/Preservation Environment .....	37
8. Installation .....	38
8.1 Slim Types	
RA2AC (Motor coupling types), RA2AR (Motor reversing types) .....	38
8.1.1 Installation of Actuator .....	38
8.2 Short Types (Nut affixing types)	
RN3NA, RN3N (Lead screw, ball screw), RN4NA, RN4N (Lead screw, ball screw) .....	39
8.2.1 Installation of Actuator .....	39
8.2.2 Installation of Detent .....	40
8.2.3 Installation of Flange .....	49
8.2.4 Installation from Rear Side .....	50
8.3 Short Types (Tapped-hole mounting types)	
RP3NA, RP3N (Lead screw, ball screw), RP4NA, RP4N (Lead screw, ball screw) .....	51
8.3.1 Installation of Actuator .....	51
8.3.2 Installation of Detent .....	53
8.3.3 Installation of Flange .....	62
8.3.4 Installation from Rear Side .....	63
8.4 Single Guide Types	
GS3NA, GS3N (Lead screw, ball screw), GS4NA, GS4N (Lead screw, ball screw) .....	64
8.5 Double Guide Types	
GD3NA, GD3N (Lead screw, ball screw), GD4NA, GD4N (Lead screw, ball screw) .....	66
8.6 Slide Unit Types	
SD3NA, SD3N (Lead screw, ball screw), SD4NA, SD4N (Lead screw, ball screw) .....	68
9. Connecting with Controller .....	71
10. Notes on Operation .....	75
10.1 Placing a Load on the Actuator .....	75
10.2 How to Move Rod by Hand .....	75
10.3 Home Return .....	76
10.3.1 Home Return Operation .....	76
11. Life .....	78
11.1 Life of Actuator Using Ball Screws .....	78
11.2 Life of Actuator Using Lead Screws .....	78
11.2.1 Relationship of Cycle Time and Product Life .....	78
12. Maintenance and Inspection .....	81
12.1 Inspection Items and Timings .....	81
12.2 Visual Inspection of Exterior .....	81
12.3 Cleaning .....	81
12.4 Inspection of Interior .....	82
12.5 Internal Cleaning .....	83
12.6 Greasing .....	83
12.6.1 Applicable Grease .....	83
12.6.2 Greasing Method .....	84
12.7 How to Replace Spiral Cover .....	85

13. Warranty	88
13.1 Warranty Period	88
13.2 Scope of Warranty	88
13.3 Honoring the Warranty	88
13.4 Limited Liability	88
13.5 Conditions of Conformance with Applicable Standards/Regulations, Etc., and Applications	89
13.6 Other Items Excluded from Warranty	89
Change History	90





## 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>Medical equipment used to maintain, control or otherwise affect human life or physical health.</li> <li>Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility)</li> <li>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>Location where there is any inflammable gas, inflammable object or explosive</li> <li>Place with potential exposure to radiation</li> <li>Location with the ambient temperature or relative humidity exceeding the specification range</li> <li>Location where radiant heat is added from direct sunlight or other large heat source</li> <li>Location where condensation occurs due to abrupt temperature changes</li> <li>Location where there is any corrosive gas (sulfuric acid or hydrochloric acid)</li> <li>Location exposed to significant amount of dust, salt or iron powder</li> <li>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 instruction manual for each model.</li> <li>• Do not step or sit on the package.</li> <li>• Do not put any heavy thing that can deform the package, on it.</li> <li>• When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work.</li> <li>• When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit.</li> <li>• Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength.</li> <li>• Do not get on the load that is hung on a crane.</li> <li>• Do not leave a load hung up with a crane.</li> <li>• Do not stand under the load that is hung up with a crane.</li> </ul>
3	Storage and Preservation	<ul style="list-style-type: none"> <li>• The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation.</li> <li>• Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.</li> </ul>
4	Installation and Start	<p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> <li>• Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. Also, be equipped for a fall-over or drop due to an act of God such as earthquake.</li> <li>• Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life.</li> <li>• When using the product in any of the places specified below, provide a sufficient shield.             <ol style="list-style-type: none"> <li>1) Location where electric noise is generated</li> <li>2) Location where high electrical or magnetic field is present</li> <li>3) Location with the mains or power lines passing nearby</li> <li>4) Location where the product may come in contact with water, oil or chemical droplets</li> </ol> </li> </ul>

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





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

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

No.	Operation Description	Description
8	Maintenance and Inspection	<ul style="list-style-type: none"> <li>• When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.</li> <li>• Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well.</li> <li>• When the work is to be performed inside the safety protection fence, basically turn OFF the power switch.</li> <li>• When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency.</li> <li>• When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly.</li> <li>• Place a sign "Under Operation" at the position easy to see.</li> <li>• For the grease for the guide or ball screw, use appropriate grease according to the Instruction 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 instruction 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 Instruction 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

## Handling Precautions

1. Do not set a speed or acceleration/deceleration exceeding the applicable rating.

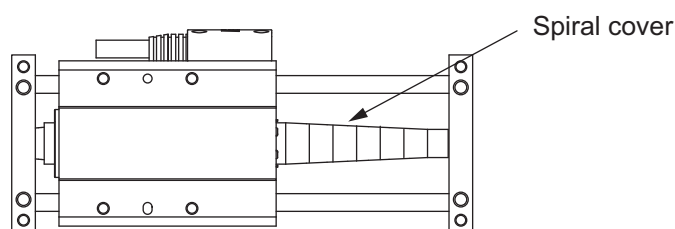
Do not set a speed or acceleration/deceleration exceeding the applicable rating. Doing so may result in vibration, failure or shorter life. Setting the acceleration/deceleration exceeding the applicable rating may also cause creep.

2. Grease film may run out after back-and-forth operations over a short distance.

Grease film may run out if the actuator is moved back and forth continuously over a distance of 20 mm or less. For reference, have 5 cycles of back and forth operation in full-stroke range after 5,000 to 10,000 cycles of short-distanced back and forth operation.

3. Do not apply impact to the spiral cover with tools or push it hard with fingers.

Spiral cover is a thin plate rolled in spiral form. Hitting it with tools or pushing it with fingers may deform the cover. Do not attempt to do so.



4. Do not apply any external force to the rod from the directions other than the rod operating directions.

Please do not apply any external force from other than rod moving direction (radial load) to the rod. Any perpendicular or radial force to the rod may cause damage to the actuator or operation problem. Equip an actuator with a guide or an external guide if any external force from other direction than the rod moving direction is applied.

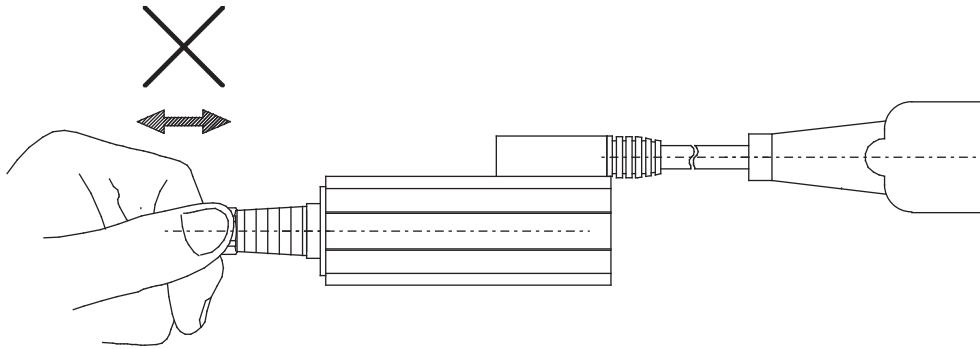
5. Make sure to attach the actuator properly by following this instruction manual.

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



6. For Short Type (RP\*N/RN\*N), do not attempt to operate the rod back and forth without the guide.

Operating back and forth from the rod side without the guide would apply unbalanced load to the feed screw shaft, which may result in a bend of the screw shaft or damage to the internal mechanism.



**Warning :** Do not attempt to move the rod back and forth only with the actuator itself. Unbalanced load onto the feed screw may damage the actuator.

7. Even after attaching the guide, do not move back and forth from the load side for the low lead types (Lead 1 and 2mm).

The low lead type actuator has a high resistance to the operation from the rod side. Moving it forcefully would apply too much load to the feed screw and may result in the cause of operational failure or destruction of the product. Twist the rotation shaft with a screwdriver from the back side to move the actuator.

**Caution :** Do not move back and forth from the load side for the low lead types (Lead 1 and 2). Moving it forcefully would apply too much load to the feed screw and may result in the cause of operational failure or destruction of the product.

## 8. Transportation

### 8.1 Handling a Single Actuator

Please adhere to the following when handling a single actuator.

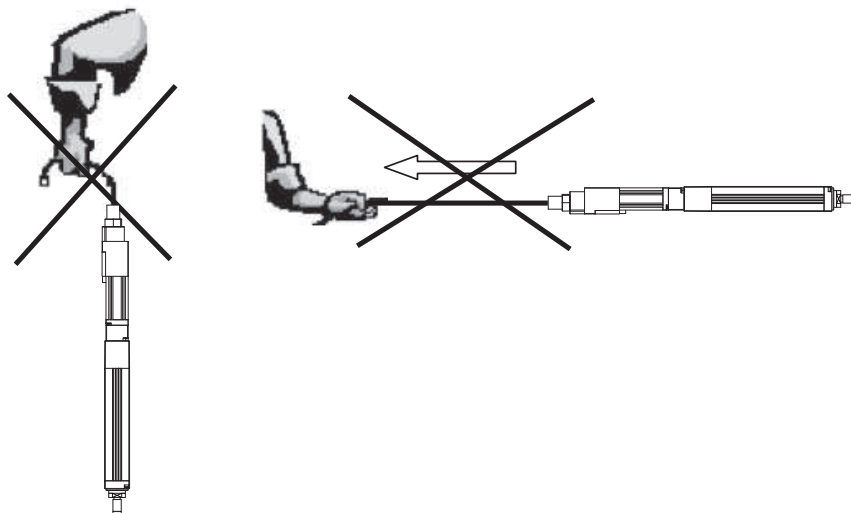
#### 8.1.1 Handling the Packed Unit

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

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

#### 8.1.2 Handling the Actuator After Unpacking

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



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

Supplement) For the names of each part of the actuator, refer to 1, "Part Names".

### 8.2 Handling the Actuator Assembly

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

## 1. Part Names

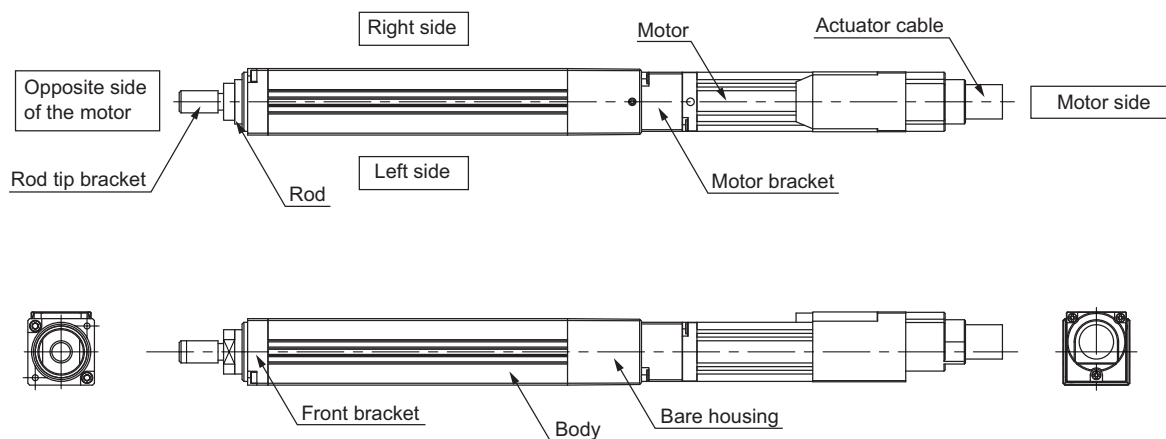
The names of the actuator parts are indicated below.

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

### 1.1 Slim Types

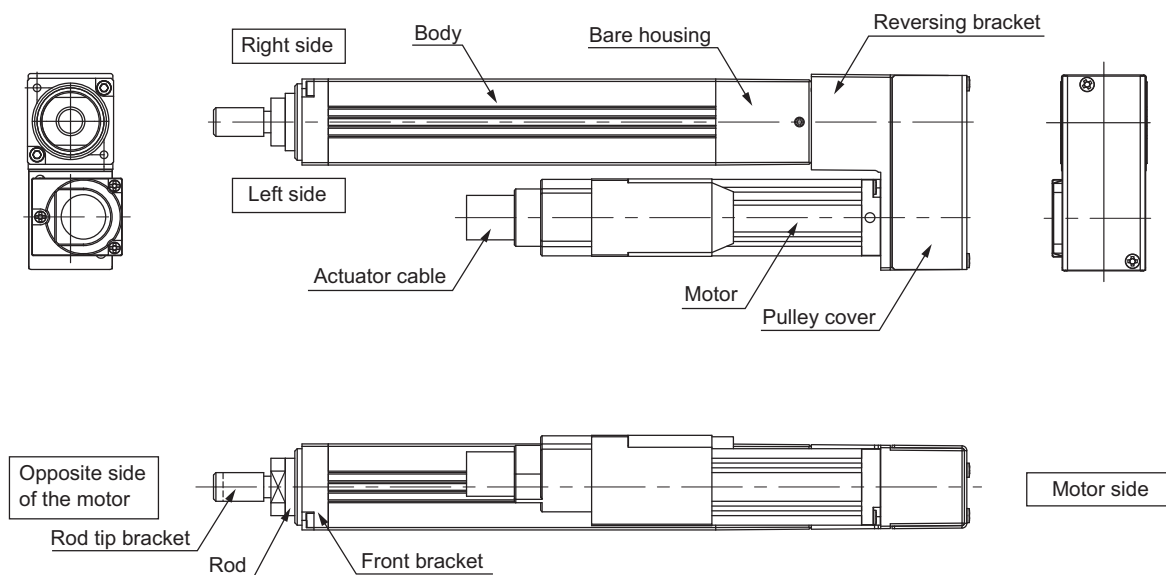
RA2AC (Motor coupling types), RA2AR (Motor reversing types)

#### • RA2AC



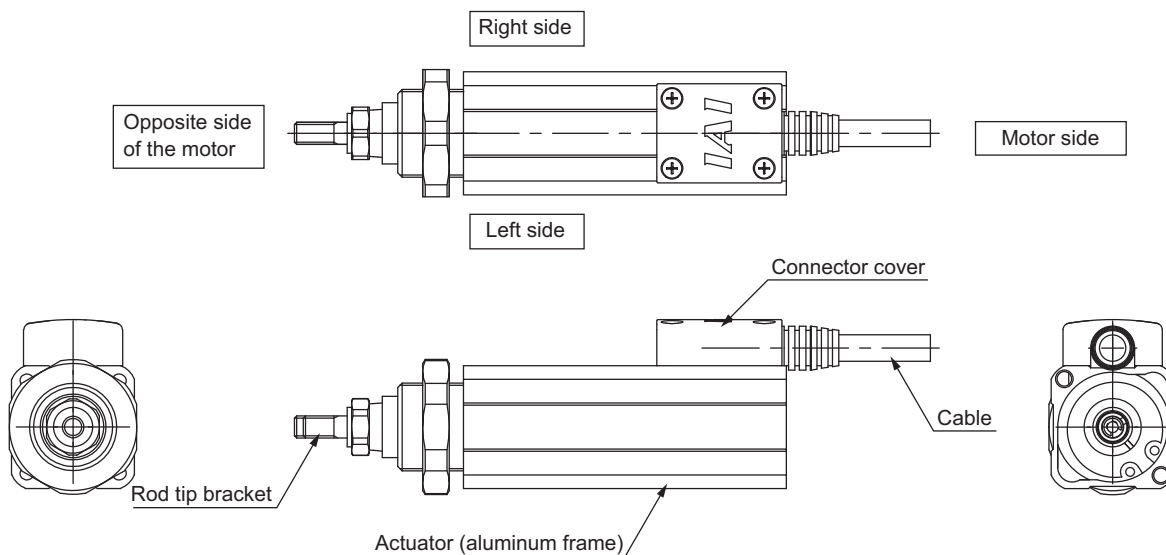
\* Refer to 2, "External Dimensions" for details.

#### • RA2AR



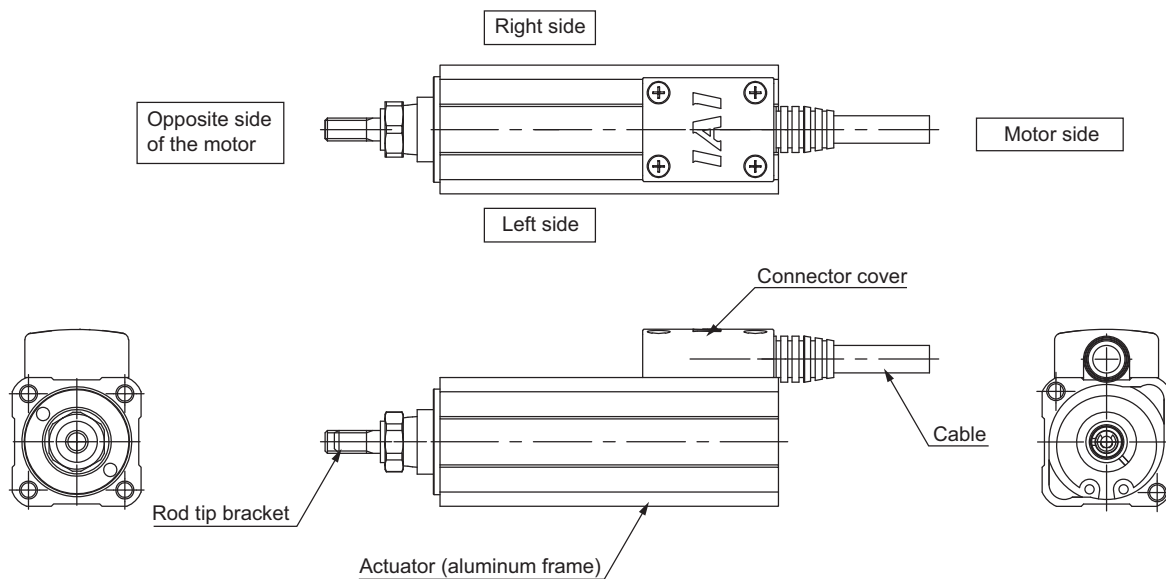
\* Refer to 2, "External Dimensions" for details.

## 1.2 Short Types (Nut Affixing Types) RN3NA, RN3N (Lead screw, Ball screw), RN4NA, RN4N (Lead screw, Ball screw)



\* Refer to 2, "External Dimensions" for details.

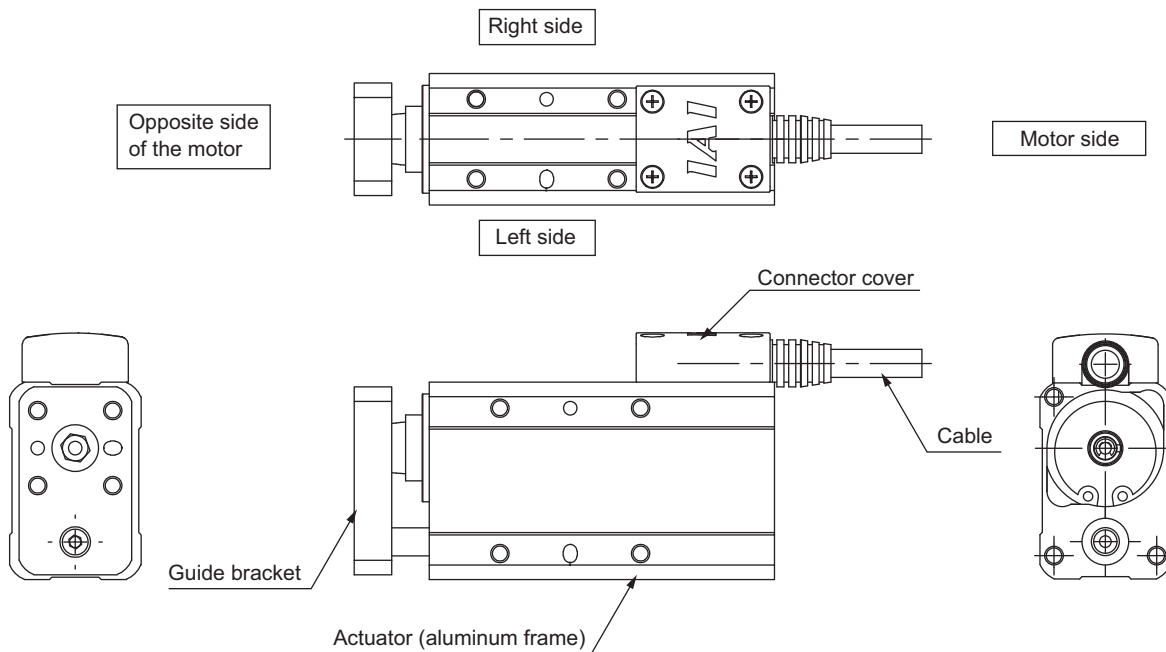
## 1.3 Short Types (Tapped-hole Mounting Types) RP3NA, RP3N (Lead screw, Ball screw), RP4NA, RP4N (Lead screw, Ball screw)



\* Refer to 2, "External Dimensions" for details.

## 1.4 Single Guide Types

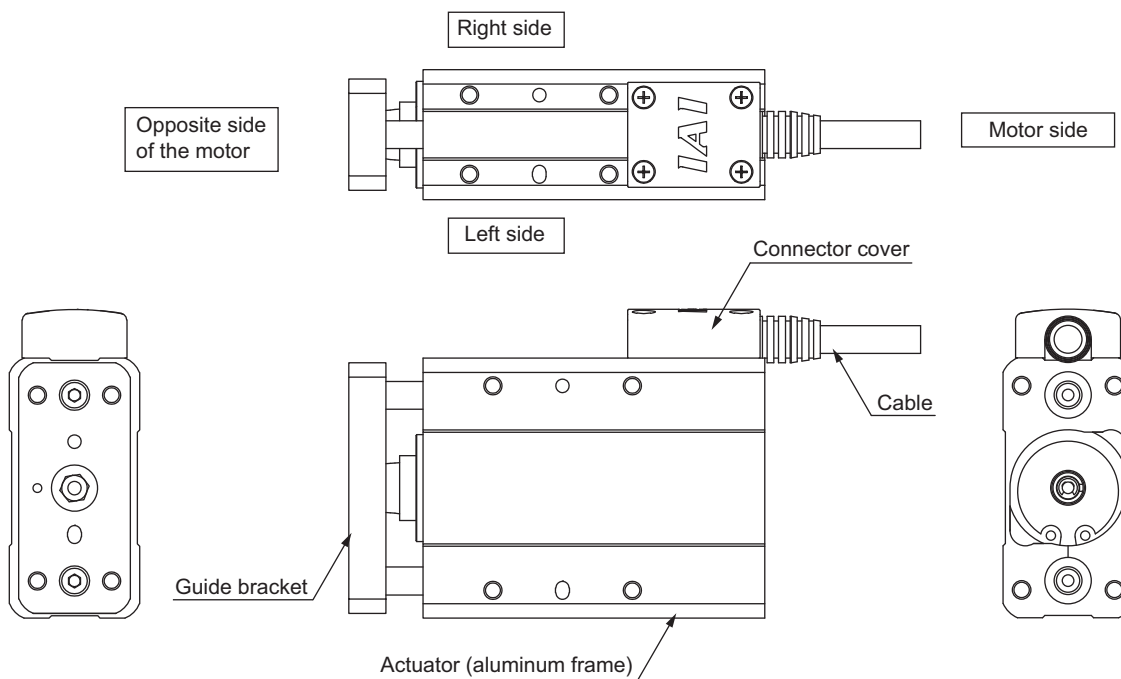
GS3NA, GS3N (Lead screw, Ball screw), GS4NA, GS4N (Lead screw, Ball screw)



\* Refer to 2, "External Dimensions" for details.

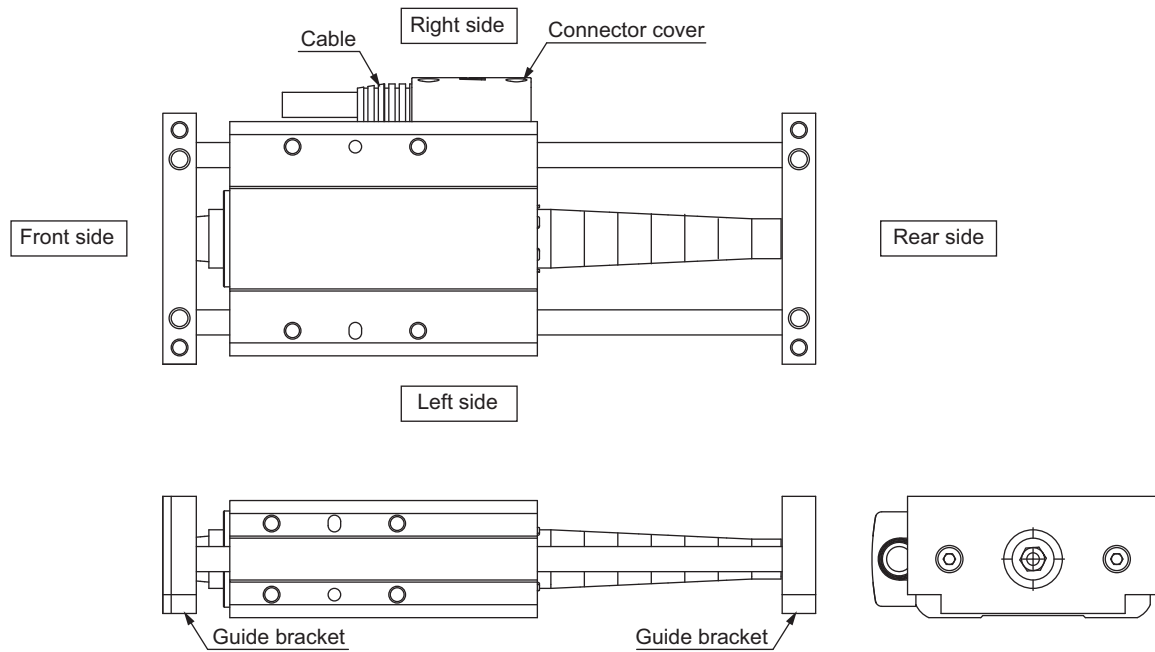
## 1.5 Double Guide Types

GD3NA, GD3N (Lead screw, Ball screw), GD4NA, GD4N (Lead screw, Ball screw)



\* Refer to 2, "External Dimensions" for details.

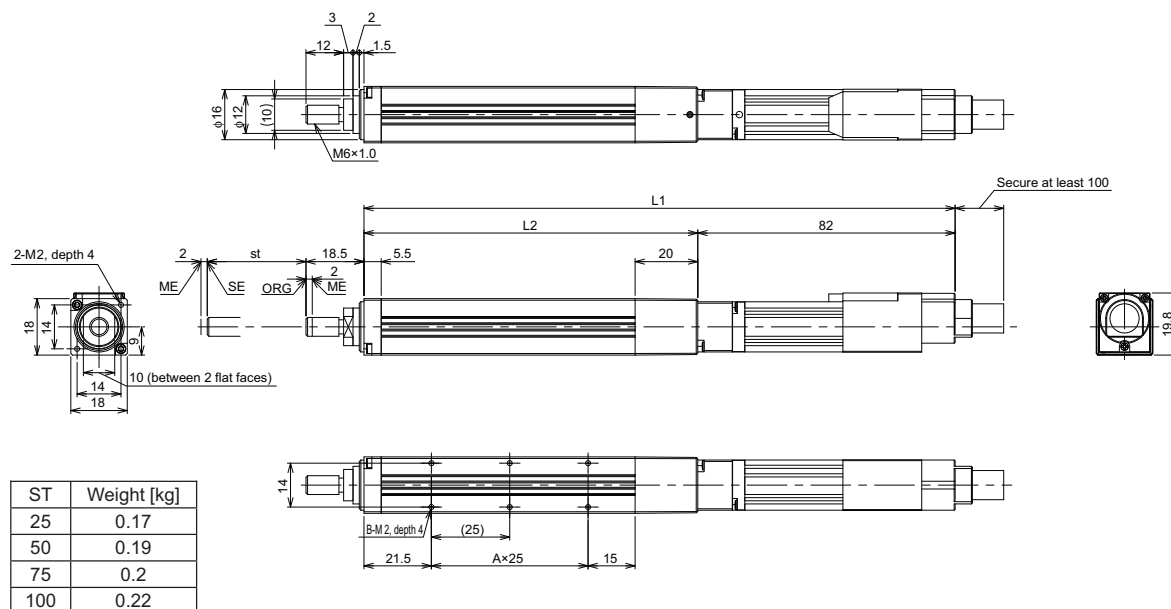
## 1.6 Slide Unit Types SD3NA, SD3N (Lead screw, Ball screw), SD4NA, SD4N (Lead screw, Ball screw)



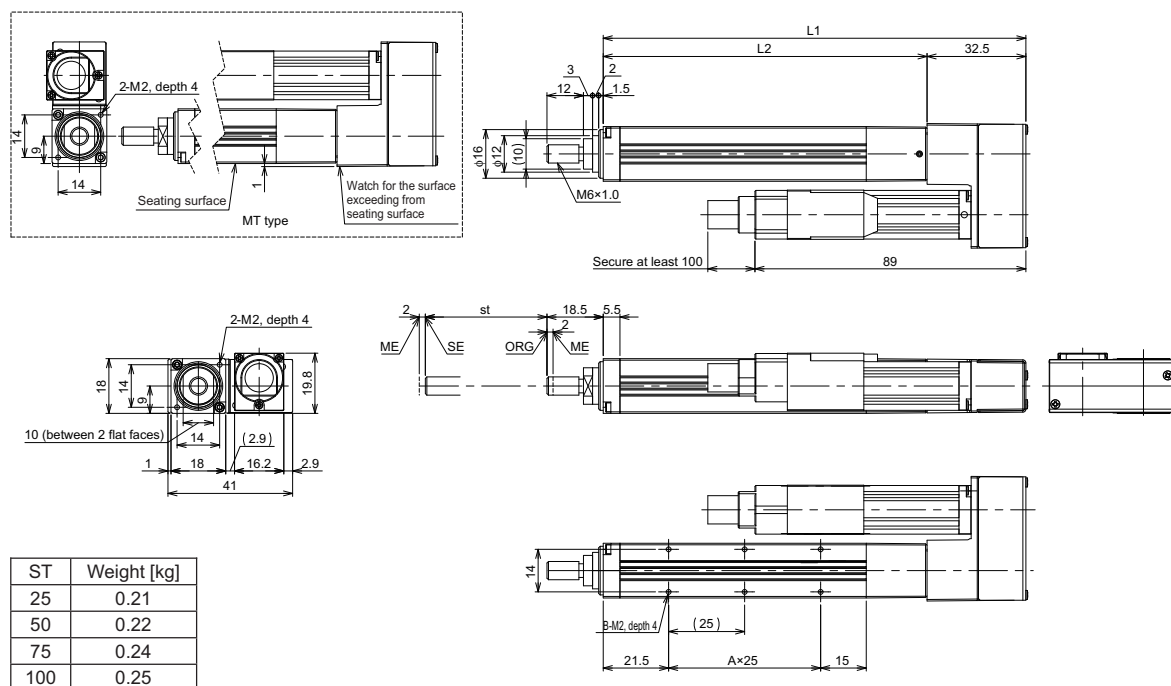
\* Refer to 2, "External Dimensions" for details.

## 2. External Diagrams

## 2.1 Slim Type (Motor coupling type) RA2AC



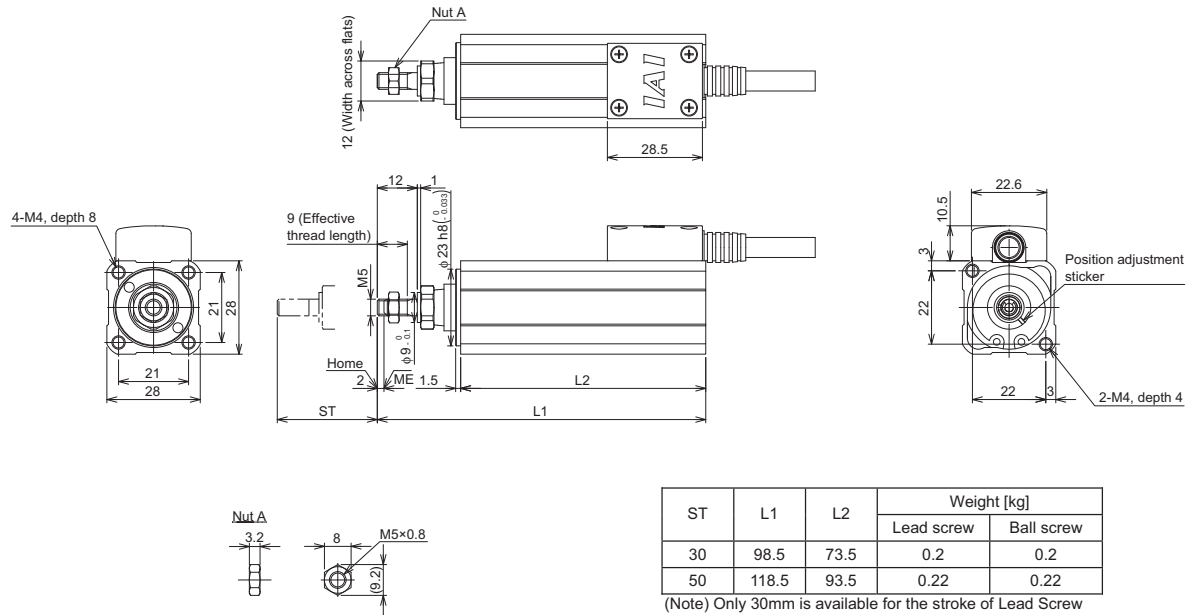
## 2.2 Slim Type (Motor reversing type) RA2AR



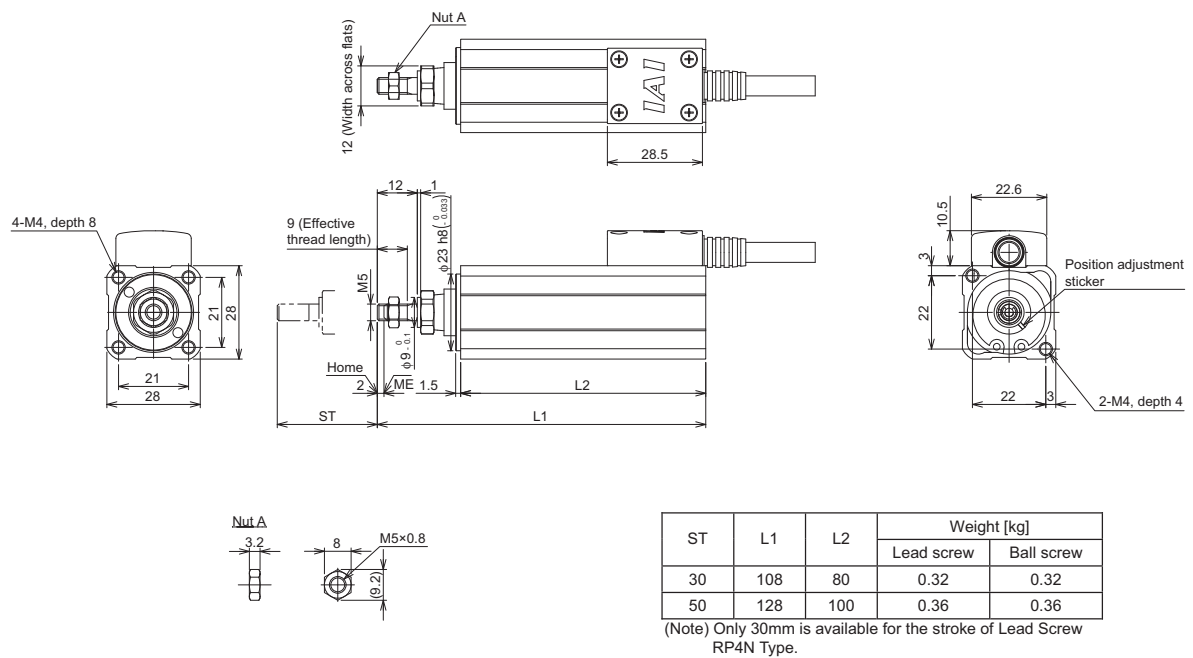




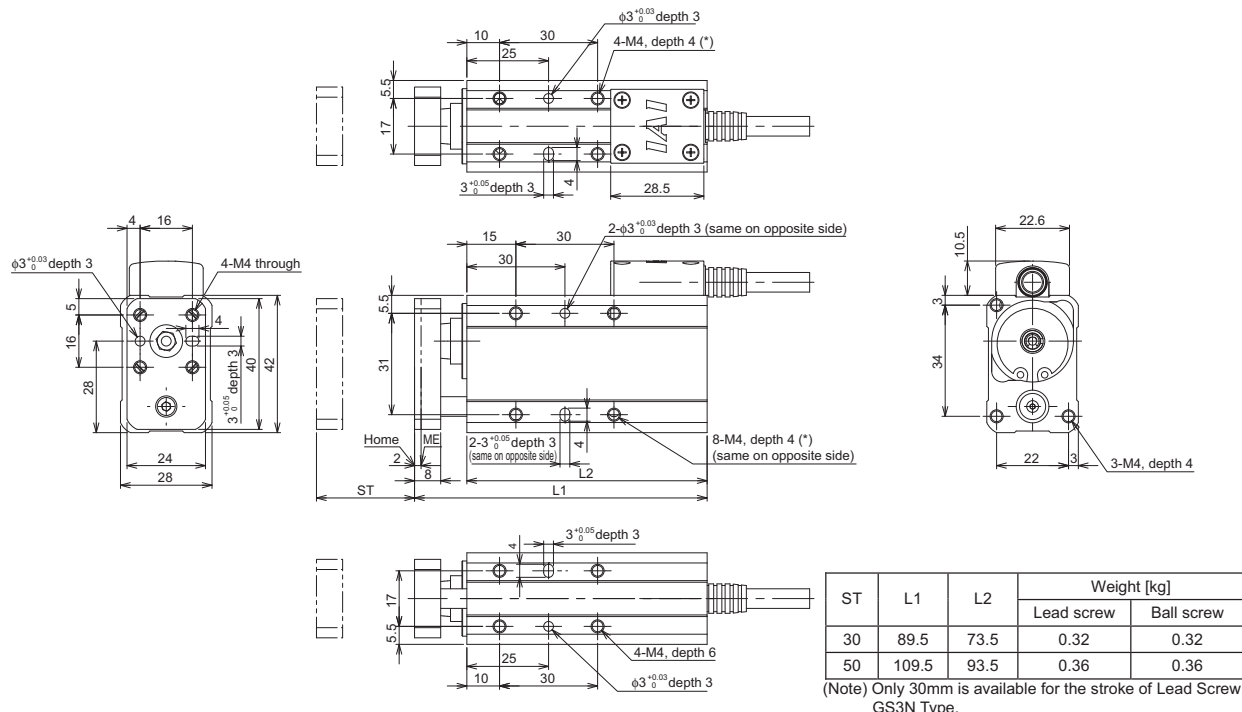
## 2.5 Short Types (Tapped-hole mounting types) RP3NA, RP3N (Lead screw, Ball screw)



## 2.6 Short Types (Tapped-hole mounting types) RP4NA, RP4N (Lead screw, Ball screw)

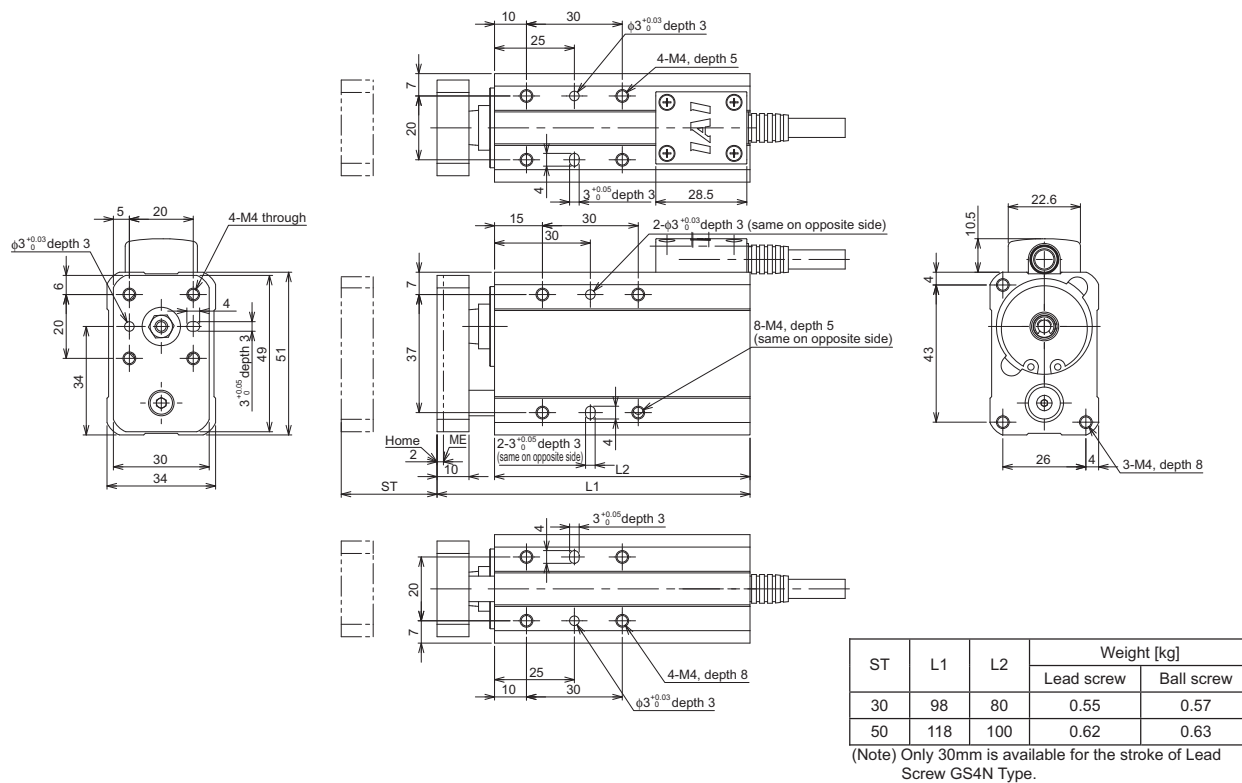


## 2.7 Single Guide Types GS3NA, GS3N (Lead screw, Ball screw)

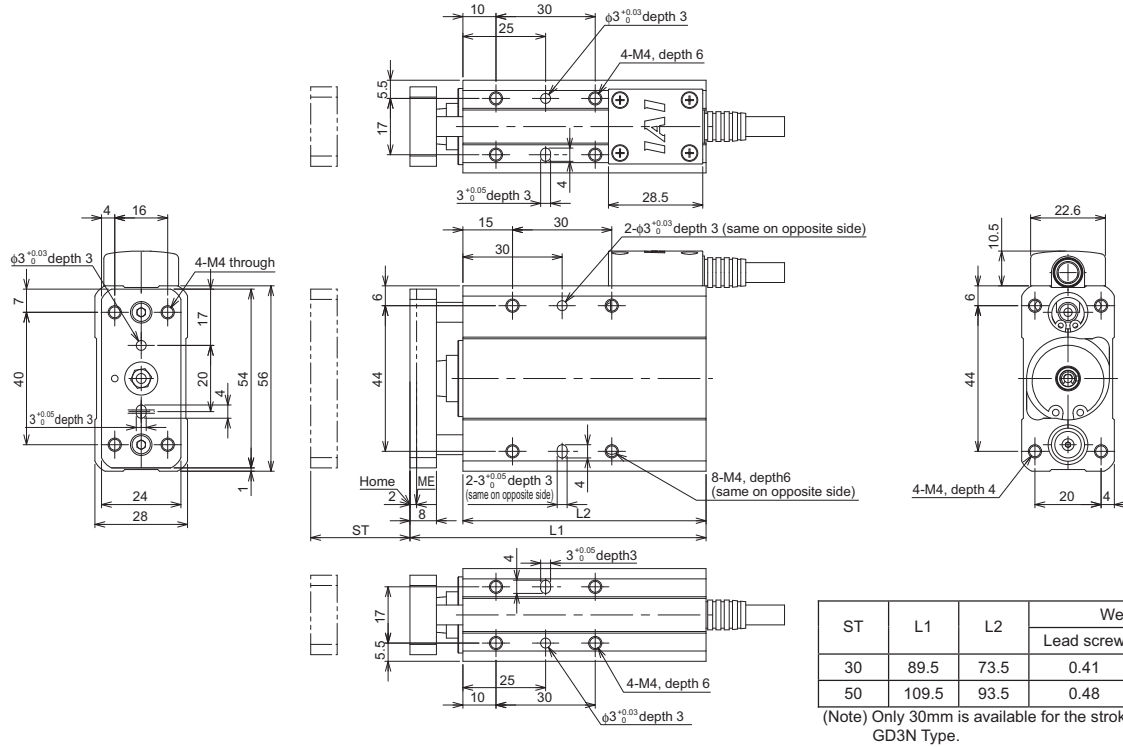


\* Screw-in depths shall not exceed the dimensions shown above.

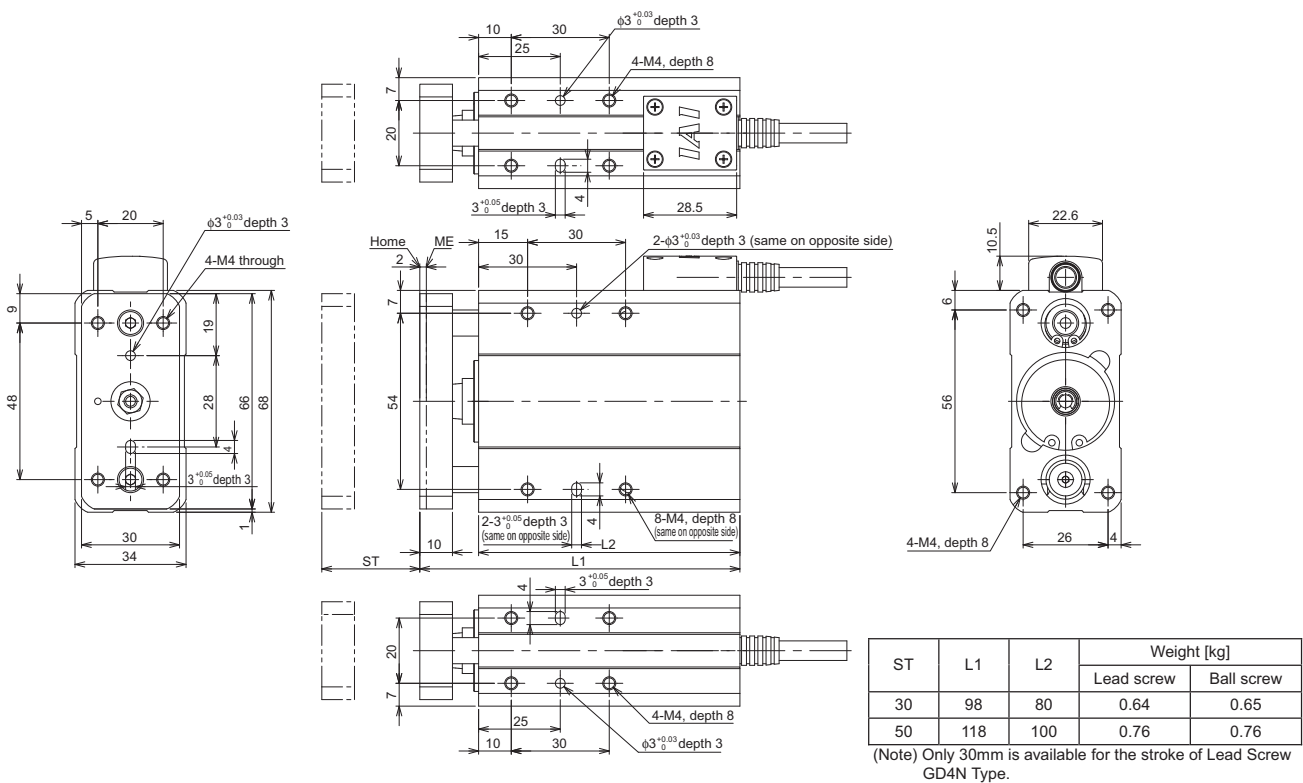
## 2.8 Single Guide Types GS4NA, GS4N (Lead screw, Ball screw)



## 2.9 Double Guide Types GD3NA, GD3N (Lead screw, Ball screw)



## 2.10 Double Guide Types GD4NA, GD4N (Lead screw, Ball screw)



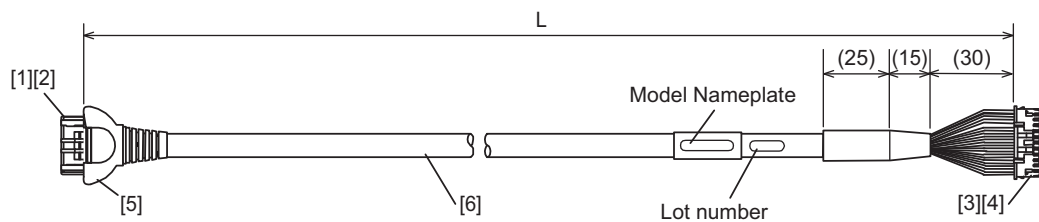


### 3. Cable Drawings

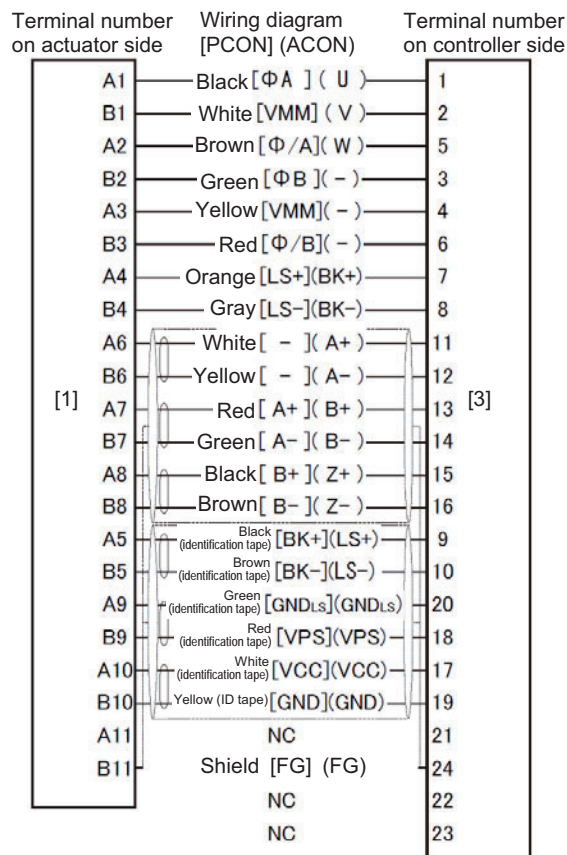
#### 3.1 ASEP Controller Cables

RCA2 Integrated motor/encoder cable  
(CB-APSEP-MPA<sup>\*\*\*</sup>)

<sup>\*\*\*</sup> indicates the cable length (L). Up to 10 m can be specified.  
Example) 080 = 8 m



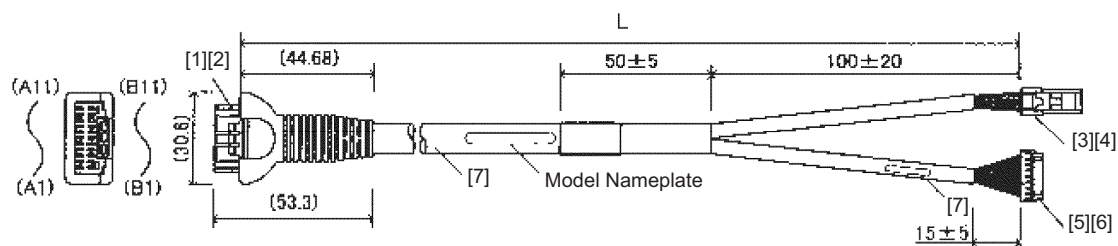
No.	Item	Model number	Manufacturer
1	Housing	D-1100D 1-1827863-1 (black, 2.0-mm pitch, 22 poles)	AMP
2	Contact	D-1 1827570-2 (AWG 22 to 18, 1.08 to 1.6 φ)	
3	Housing	PADP-24V-1-S (white, 2.0-mm pitch, 24 poles)	JST
4	Contact	SPND-001T-C0.5 (AWG 26 to 22, 1.0 to 1.5 φ)	
5	Coupler cover	TMS-4ZB008	TATSUTA ELECTRIC WIRE & CABLE
6	ZUL2854-OHFRPCVVS	25AWG x 6P + 25AWG x 2C + 22AWG x 6C, TS08V0350	TATSUTA ELECTRIC WIRE & CABLE



## 3.2 ACON, ASEL Controller Cables

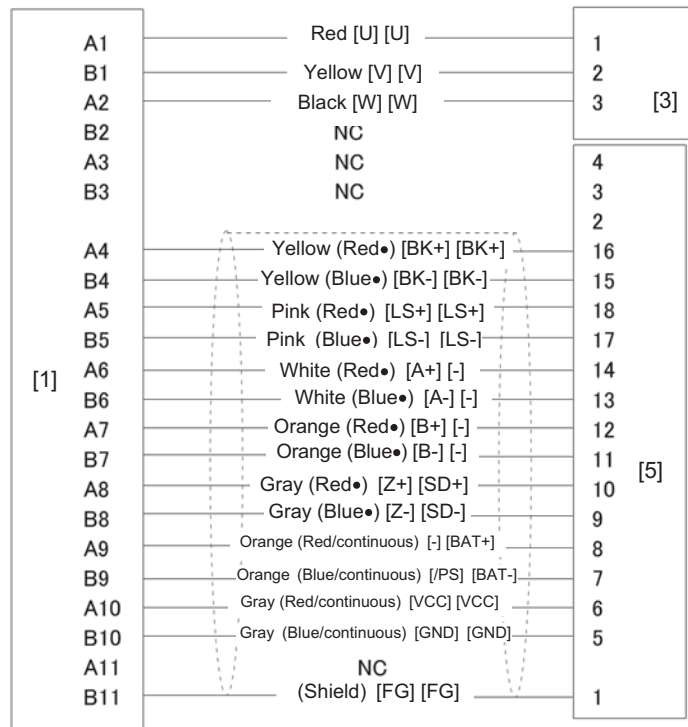
RCA2 Integrated motor/encoder cable  
(CB-ACS-MPA\*\*\*)

\*\*\* indicates the cable length (L). Up to 10 m can be specified.  
Example) 080 = 8 m



No.	Item	Model number	Manufacturer
[1]	Receptacle housing	D-1100D 1-1827863-1	AMP
[2]	Receptacle contact	D-1 1827570-2	AMP
[3]	Socket	DF1E-3S-2.5C	Hirose
[4]	Socket contact	DF1E-2022SCF	Hirose
[5]	Housing	PHDR-18VR	JST
[6]	Contact	SPHD-001T-P0.5	JST
[7]	UL2854-VVSWKA	TS06V1200 (25AWG x 7P + 22AWG x 6C)	TATSUTA ELECTRIC WIRE & CABLE

Terminal number on actuator side      Wiring diagram [ABZ][Serial]      Terminal number on controller side



## 4. Options

### 4.1 Connector Cable Exit Direction Changed

The standard specification is to take out the cable from the opposite side of the rod and guide bracket. On all models other than the slide unit types SD3N and SD4N, however, you can specify an option (Model : K2) to reverse the cable take-out direction if you wish to take out the cable from the rod/guide bracket side due to the layout of the system, etc.

### 4.2 Low Power Consumption Type

This type of actuator decreases the maximum current consumption of the controller compared with the standard actuator.

For the details, refer to the power capacity described in the catalog or the instruction manuals of ACON/ASEL/ASEP/AMEC Controllers. The applicable model number for this option is "LA".

Model Name	Standard specification / High acceleration/deceleration specification Maximum load current	Energy-saving measure Maximum load current
RN3NA, RP3NA, GS3NA, GD3NA, SD3NA, RN3N, RP3N, GS3N, GD3N, SD3N	4.4A	2.5A
RN4NA, RP4NA, GS4NA, GD4NA, SD4NA, RN4N, RP4N, GS4N, GD4N, SD4N	4.4A	2.5A



## 5. Checking after Unpacking

After unpacking, check the condition of the product and the included items.

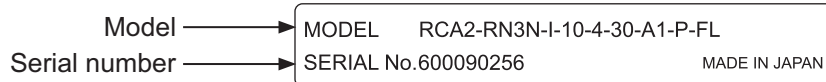
### 5.1 Included Items

No.	Item	Remarks
1	Actuator	Refer to "How to Read Model Nameplate" and "How to Read Model".
Accessories		
2	RCA integrated motor/encoder cable	CB-APSEP-MPA□□□: ASEP type CB-ACS-MPA□□□: ACON, ASEL type
3	First Step Guide	
4	Instruction Manual (CD/DVD)	
5	Safety Guide	

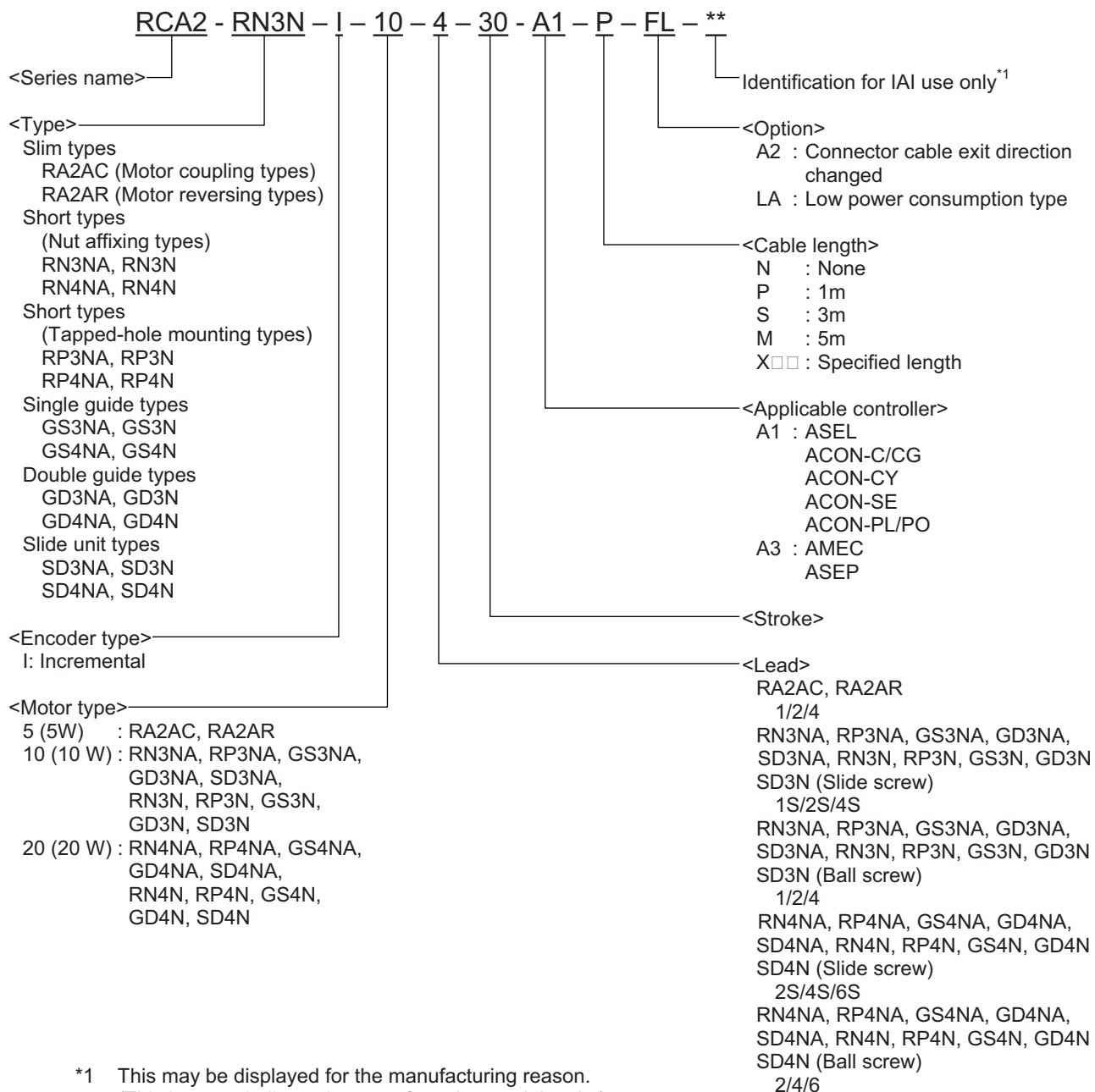
### 5.2 Instruction Manuals Relating to This Product

No.	Name	Manual No.
1	Instruction Manual for ASEL Controller	ME0165
2	Instruction Manual for ACON-C/CG Controller	ME0176
3	Instruction Manual for ACON-CY Controller	ME0167
4	Instruction Manual for ACON-SE Controller	ME0171
5	Instruction Manual for ACON-PL/PO Controller	ME0166
6	Instruction Manual for AMEC Controller	ME0245
7	Instruction Manual for ASEP/PSEP Controller	ME0216
8	Instruction Manual for PC Software IA-101-X-MX/IA-101-X-USBMW	ME0154
9	Instruction Manual for PC Software RCM-101MW/RCM-101-USB	ME0155
10	Instruction Manual for MEC PC Software	ME0248
11	Instruction Manual for Teaching Pendant SEL-T/TD	ME0183
12	Instruction Manual for Teaching Pendant CON-T/TG	ME0178
13	Instruction Manual for Touch Panel Teaching CON-PT/PD/PG	ME0227
14	Instruction Manual for Touch Panel Teaching SEP-PT	ME0217
15	Instruction Manual for Simple Teaching Pendant RCM-E	ME0174
16	Instruction Manual for Data Setter RCM-P	ME0175
17	Instruction Manual for Data Setter RCM-PM-01	ME0182

### 5.3 How to Read Model Nameplate



### 5.4 How to Read Model



## 6. Specifications

### (1) Maximum speed

The maximum speed of this ROBO Cylinder is limited to prevent resonance of the ball screw shaft and also due to limitation of the motor speed. Observe the maximum speed limits specified in the table.

Strokes and Maximum Speed Limits [Unit: mm/s]

Model	Motor Type	Lead [mm]	Stroke [mm]				
			25	30	50	75	100
RA2AC	5W	1	50	-	50		
		2	100	-	100		
		4	180	-	200		
RA2AR	5W	1	50	-	50		
		2	100	-	100		
		4	180	-	200		
RN3NA (Lead screw)	10W	1	—	50	—	—	—
		2	—	100	—	—	—
		4	—	200	—	—	—
RN3NA (Ball screw)	10W	1	—	50	50	—	—
		2	—	100	100	—	—
		4	—	200	200	—	—
RN4NA (Lead screw)	20W	2	—	100	—	—	—
		4	—	200	—	—	—
		6	—	220	—	—	—
RN4NA (Ball screw)	20W	2	—	100	100	—	—
		4	—	200	200	—	—
		6	—	270<220>	300	—	—
RP3NA (Lead screw)	10W	1	—	50	—	—	—
		2	—	100	—	—	—
		4	—	200	—	—	—
RP3NA (Ball screw)	10W	1	—	50	50	—	—
		2	—	100	100	—	—
		4	—	200	200	—	—
PR4NA (Lead screw)	20W	2	—	100	—	—	—
		4	—	200	—	—	—
		6	—	220	—	—	—
RP4NA (Ball screw)	20W	2	—	100	100	—	—
		4	—	200	200	—	—
		6	—	270<220>	300	—	—
GS3NA (Lead screw)	10W	1	—	50	—	—	—
		2	—	100	—	—	—
		4	—	200	—	—	—
GS3NA (Ball screw)	10W	1	—	50	50	—	—
		2	—	100	100	—	—
		4	—	200	200	—	—
GS4NA (Lead screw)	20W	2	—	100	—	—	—
		4	—	200	—	—	—
		6	—	220	—	—	—
GS4NA (Ball screw)	20W	2	—	100	100	—	—
		4	—	200	200	—	—
		6	—	270<220>	300	—	—
GD3NA (Lead screw)	10W	1	—	50	—	—	—
		2	—	100	—	—	—
		4	—	200	—	—	—


(Note) The maximum speed may not be reached depending on the acceleration/deceleration setting.  
Values in < > are for when mounted vertically.

Model	Motor Type	Lead [mm]	Stroke [mm]				
			25	30	50	75	100
GD3NA (Ball screw)	10W	1	—	50	50	—	—
		2	—	100	100	—	—
		4	—	200	200	—	—
GD4NA (Lead screw)	20W	2	—	100	—	—	—
		4	—	200	—	—	—
		6	—	220	—	—	—
GD4NA (Ball screw)	20W	2	—	100	100	—	—
		4	-	200	200	-	-
		6	-	270<220>	300	-	-
RN3N (Lead screw)	10W	1	-	50	-	-	-
		2	-	100	-	-	-
		4	-	200	-	-	-
RN3N (Ball screw)	10W	1	-	50	-	-	-
		2	-	100	-	-	-
		4	-	200	-	-	-
RN4N (Lead screw)	20W	2	-	100	-	-	-
		4	-	200	-	-	-
		6	-	220	-	-	-
RN4N (Ball screw)	20W	2	-	100	-	-	-
		4	-	200	-	-	-
		6	-	270<220>	-	-	-
RP3N (Lead screw)	10W	1	-	50	-	-	-
		2	-	100	-	-	-
		4	-	200	-	-	-
RP3N (Ball screw)	10W	1	-	50	-	-	-
		2	-	100	-	-	-
		4	-	200	-	-	-
RP4N (Lead screw)	20W	2	-	100	-	-	-
		4	-	200	-	-	-
		6	-	220	-	-	-
RP4N (Ball screw)	20W	2	-	100	-	-	-
		4	-	200	-	-	-
		6	-	270<220>	-	-	-
GS3N (Lead screw)	10W	1	-	50	-	-	-
		2	-	100	-	-	-
		4	-	200	-	-	-
GS3N (Ball screw)	10W	1	-	50	-	-	-
		2	-	100	-	-	-
		4	-	200	-	-	-
GS4N (Lead screw)	20W	2	-	100	-	-	-
		4	-	200	-	-	-
		6	-	220	-	-	-
GS4N (Ball screw)	20W	2	-	100	-	-	-
		4	-	200	-	-	-
		6	-	270<220>	-	-	-
GD3N (Lead screw)	10W	1	-	50	-	-	-
		2	-	100	-	-	-
		4	-	200	-	-	-
GD3N (Ball screw)	10W	1	-	50	-	-	-
		2	-	100	-	-	-
		4	-	200	-	-	-

(Note) The maximum speed may not be reached depending on the acceleration/deceleration setting.  
Values in < > are for when mounted vertically.

Model	Motor Type	Lead [mm]	Stroke [mm]				
			25	30	50	75	100
GD4N (Lead screw)	20W	2	-	100	-	-	-
		4	-	200	-	-	-
		6	-	220	-	-	-
GD4N (Ball screw)	20W	2	-	100	-	-	-
		4	-	200	-	-	-
		6	-	270<220>	-	-	-
SD3NA SD3N (Lead screw)	10W	1	50	-	50	-	-
		2	100	-	100	-	-
		4	200	-	200	-	-
SD3NA SD3N (Ball screw)	10W	1	50	-	50	-	-
		2	100	-	100	-	-
		4	200	-	200	-	-
SD4NA SD4N (Lead screw)	20W	2	100	-	100	100	-
		4	200	-	200	200	-
		6	200	-	300	300	-
SD4NA SD4N (Ball screw)	20W	2	100	-	100	100	-
		4	200	-	200	200	-
		6	240<200>	-	300	300	-

(Note) The maximum speed may not be reached depending on the acceleration/deceleration setting.  
Values in < > are for when mounted vertically.

 **Caution :** Do not set a speed or acceleration/deceleration exceeding the applicable rating.  
Doing so may result in vibration, failure or shorter life.  
Setting the acceleration/deceleration exceeding the applicable rating may also cause creep.

## (2) Acceleration and payloads

Model	Motor Type	Lead [mm]	Rated acceleration [G]		Payload [kg]
			Horizontal	Vertical	
RA2AC	5W	1	Horizontal	0.3	2
			Vertical	0.3	1
		2	Horizontal	0.3	1
			Vertical	0.3	0.5
		4	Horizontal	0.3	0.5
			Vertical	0.3	0.25
RA2AR	5W	1	Horizontal	0.3	2
			Vertical	0.3	1
		2	Horizontal	0.3	1
			Vertical	0.3	0.5
		4	Horizontal	0.3	0.5
			Vertical	0.3	0.25
RN3NA RN3N (Lead screw)	10W	1	Horizontal	0.2	1
			Vertical	0.2	0.5
		2	Horizontal	0.2	0.5
			Vertical	0.2	0.25
		4	Horizontal	0.2	0.25
			Vertical	0.2	0.125
RN3NA RN3N (Ball screw)	10W	1	Horizontal	0.2	3
			Vertical	0.2	1
		2	Horizontal	0.3	1.5
			Vertical	0.2	0.5
		4	Horizontal	0.3	0.75
			Vertical	0.2	0.25
RN4NA RN4N (Lead screw)	20W	2	Horizontal	0.2	1
			Vertical	0.2	0.5
		4	Horizontal	0.2	0.5
			Vertical	0.2	0.25
		6	Horizontal	0.2	0.25
			Vertical	0.2	0.125
RN4NA RN4N (Ball screw)	20W	2	Horizontal	0.2	6
			Vertical	0.2	1.5
		4	Horizontal	0.3	3
			Vertical	0.2	0.75
		6	Horizontal	0.3	2
			Vertical	0.2	0.5

(Note) Maximum speed may not be reached on all strokes.

The maximum speed of each model with a longer stroke will be less than the applicable maximum speed shown in the table.

[Refer to (1), "Maximum speed".]

Model	Motor Type	Lead [mm]	Rated acceleration [G]		Payload [kg]
RP3NA RP3N (Lead screw)	10W	1	Horizontal	0.2	1
			Vertical	0.2	0.5
		2	Horizontal	0.2	0.5
			Vertical	0.2	0.25
		4	Horizontal	0.2	0.25
			Vertical	0.2	0.125
RP3NA RP3N (Ball screw)	10W	1	Horizontal	0.2	3
			Vertical	0.2	1
		2	Horizontal	0.3	1.5
			Vertical	0.2	0.5
		4	Horizontal	0.3	0.75
			Vertical	0.2	0.25
RP4NA RP4N (Lead screw)	20W	2	Horizontal	0.2	1
			Vertical	0.2	0.5
		4	Horizontal	0.2	0.5
			Vertical	0.2	0.25
		6	Horizontal	0.2	0.25
			Vertical	0.2	0.125
RP4NA RP4N (Ball screw)	20W	2	Horizontal	0.2	6
			Vertical	0.2	1.5
		4	Horizontal	0.3	3
			Vertical	0.2	0.75
		6	Horizontal	0.3	2
			Vertical	0.2	0.5
GS3NA GS3N (Lead screw)	10W	1	Horizontal	0.2	1
			Vertical	0.2	0.5
		2	Horizontal	0.2	0.5
			Vertical	0.2	0.25
		4	Horizontal	0.2	0.25
			Vertical	0.2	0.125
GS3NA GS3N (Ball screw)	10W	1	Horizontal	0.2	3
			Vertical	0.2	1
		2	Horizontal	0.3	1.5
			Vertical	0.2	0.5
		4	Horizontal	0.3	0.75
			Vertical	0.2	0.25
GS4NA GS4N (Lead screw)	20W	2	Horizontal	0.2	1
			Vertical	0.2	0.5
		4	Horizontal	0.2	0.5
			Vertical	0.2	0.25
		6	Horizontal	0.2	0.25
			Vertical	0.2	0.125
GS4NA GS4N (Ball screw)	20W	2	Horizontal	0.2	6
			Vertical	0.2	1.5
		4	Horizontal	0.3	3
			Vertical	0.2	0.75
		6	Horizontal	0.3	2
			Vertical	0.2	0.5

(Note) Maximum speed may not be reached on all strokes.

The maximum speed of each model with a longer stroke will be less than the applicable maximum speed shown in the table.

[Refer to (1), "Maximum speed".]

Model	Motor Type	Lead [mm]	Rated acceleration [G]		Payload [kg]
GD3NA GD3N (Lead screw)	10W	1	Horizontal	0.2	1
			Vertical	0.2	0.5
		2	Horizontal	0.2	0.5
			Vertical	0.2	0.25
		4	Horizontal	0.2	0.25
			Vertical	0.2	0.125
GD3NA GD3N (Ball screw)	10W	1	Horizontal	0.2	3
			Vertical	0.2	1
		2	Horizontal	0.3	1.5
			Vertical	0.2	0.5
		4	Horizontal	0.3	0.75
			Vertical	0.2	0.25
GD4NA GD4N (Lead screw)	20W	2	Horizontal	0.2	1
			Vertical	0.2	0.5
		4	Horizontal	0.2	0.5
			Vertical	0.2	0.25
		6	Horizontal	0.2	0.25
			Vertical	0.2	0.125
GD4NA GD4N (Ball screw)	20W	2	Horizontal	0.2	6
			Vertical	0.2	1.5
		4	Horizontal	0.3	3
			Vertical	0.2	0.75
		6	Horizontal	0.3	2
			Vertical	0.2	0.5
SD3NA SD3N (Lead screw)	10W	1	Horizontal	0.2	1
			Vertical	0.2	0.5
		2	Horizontal	0.2	0.5
			Vertical	0.2	0.25
		4	Horizontal	0.2	0.25
			Vertical	0.2	0.125
SD3NA SD3N (Ball screw)	10W	1	Horizontal	0.2	3
			Vertical	0.2	1
		2	Horizontal	0.3	1.5
			Vertical	0.2	0.5
		4	Horizontal	0.3	0.75
			Vertical	0.2	0.25
SD4NA SD4N (Lead screw)	20W	2	Horizontal	0.2	1
			Vertical	0.2	0.5
		4	Horizontal	0.2	0.5
			Vertical	0.2	0.25
		6	Horizontal	0.2	0.25
			Vertical	0.2	0.125
SD4NA SD4N (Ball screw)	20W	2	Horizontal	0.2	6
			Vertical	0.2	1.5
		4	Horizontal	0.3	3
			Vertical	0.2	0.75
		6	Horizontal	0.3	2
			Vertical	0.2	0.5

(Note) Maximum speed may not be reached on all strokes.

The maximum speed of each model with a longer stroke will be less than the applicable maximum speed shown in the table.

[Refer to (1), "Maximum speed".]



### (3) Rated thrust

Model	Motor Type	Lead [mm]	Rated thrust [N]
RA2AC	5W	1	85.5
		2	42.3
		4	21.4
RA2AR	5W	1	85.5
		2	42.3
		4	21.4
RN3NA RN3N (Lead screw)	10W	1	100.5
		2	50.3
		4	25.1
RN3NA RN3N (Ball screw)	10W	1	170.9
		2	85.5
		4	42.7
RN4NA RN4N (Lead screw)	20W	2	59.7
		4	29.8
		6	19.9
RN4NA RN4N (Ball screw)	20W	2	101.5
		4	50.7
		6	33.8
RP3NA RP3N (Lead screw)	10W	1	100.5
		2	50.3
		4	25.1
RP3NA RP3N (Ball screw)	10W	1	170.9
		2	85.5
		4	42.7
RP4NA RP4N (Lead screw)	20W	2	59.7
		4	29.8
		6	19.9
RP4NA RP4N (Ball screw)	20W	2	101.5
		4	50.7
		6	33.8

Model	Motor Type	Lead [mm]	Rated thrust [N]
GS3NA GS3N (Lead screw)	10W	1	100.5
		2	50.3
		4	25.1
GS3NA GS3N (Ball screw)	10W	1	170.9
		2	85.5
		4	42.7
GS4NA GS4N (Lead screw)	20W	2	59.7
		4	29.8
		6	19.9
GS4NA GS4N (Ball screw)	20W	2	101.5
		4	50.7
		6	33.8
GD3NA GD3N (Lead screw)	10W	1	100.5
		2	50.3
		4	25.1
GD3NA GD3N (Ball screw)	10W	1	170.9
		2	85.5
		4	42.7
GD4NA GD4N (Lead screw)	20W	2	59.7
		4	29.8
		6	19.9
GD4NA GD4N (Ball screw)	20W	2	101.5
		4	50.7
		6	33.8
SD3NA SD3N (Lead screw)	10W	1	100.5
		2	50.3
		4	25.1
SD3NA SD3N (Ball screw)	10W	1	170.9
		2	85.5
		4	42.7
SD4NA SD4N (Lead screw)	20W	2	59.7
		4	29.8
		6	19.9
SD4NA SD4N (Ball screw)	20W	2	101.5
		4	50.7
		6	33.8

#### (4) Drive method

Model	Motor Type	Lead	Encoder pulses <sup>*1</sup>	Drive method	
RA2AC	5W	1	800	Ball screw φ4mm	Rolled, C10
		2			
		4			
RA2AR	10W	1	800	Ball screw φ6mm	Rolled, C10
		2			
		4			
RN3NA RN3N (Lead screw)	10W	1	800	Lead screw φ4mm	Rolled, C10
		2			
		4			
RN3NA RN3N (Ball screw)	10W	1	800	Ball screw φ4mm	Rolled, C10
		2			
		4			
RN4NA RN4N (Lead screw)	20W	2	800	Lead screw φ6mm	Rolled, C10
		4			
		6			
RN4NA RN4N (Ball screw)	20W	2	800	Ball screw φ6mm	Rolled, C10
		4			
		6			
RP3NA RP3N (Lead screw)	10W	1	800	Lead screw φ4mm	Rolled, C10
		2			
		4			
RP3NA RP3N (Ball screw)	10W	1	800	Ball screw φ4mm	Rolled, C10
		2			
		4			
RP4NA RP4N (Lead screw)	20W	2	800	Lead screw φ6mm	Rolled, C10
		4			
		6			
RP4NA RP4N (Ball screw)	20W	2	800	Ball screw φ6mm	Rolled, C10
		4			
		6			
GS3NA GS3N (Lead screw)	10W	1	1048	Lead screw φ4mm	Rolled, C10
		2			
		4			
GS3NA GS3N (Ball screw)	10W	1	1048	Ball screw φ4mm	Rolled, C10
		2			
		4			
GS4NA GS4N (Lead screw)	20W	2	1048	Lead screw φ6mm	Rolled, C10
		4			
		6			
GS4NA GS4N (Ball screw)	20W	2	1048	Ball screw φ6mm	Rolled, C10
		4			
		6			
GD3NA GD3N (Lead screw)	10W	1	1048	Lead screw φ4mm	Rolled, C10
		2			
		4			
GD3NA GD3N (Ball screw)	10W	1	1048	Ball screw φ4mm	Rolled, C10
		2			
		4			
GD4NA GD4N (Lead screw)	20W	2	1048	Lead screw φ6mm	Rolled, C10
		4			
		6			
GD4NA GD4N (Ball screw)	20W	2	1048	Ball screw φ6mm	Rolled, C10
		4			
		6			

\*1 Number of pulses input to the controller.

Model	Motor Type	Lead	Encoder pulses <sup>*1</sup>	Drive method	
SD3NA SD3N (Lead screw)	10W	1 2 4	1048	Lead screw φ4mm	Rolled, C10
SD3NA SD3N (Ball screw)	10W	1 2 4		Ball screw φ4mm	Rolled, C10
SD4NA SD4N (Lead screw)	20W	2 4 6		Lead screw φ6mm	Rolled, C10
SD4NA SD4N (Ball screw)	20W	2 4 6		Ball screw φ6mm	Rolled, C10

\*1 Number of pulses input to the controller.

#### (5) Common specifications

Item	Specification	
	Lead screw	Ball screw
Positioning repeatability <sup>*1</sup>	±0.05mm	±0.02mm
Backlash <sup>*1</sup>	0.3mm or less	0.1mm or less
Base	Material: Aluminum with special alumite treatment	

\* Default value

## 7. Installation and Storage/Preservation Environment

### 7.1 Installation Environment

Do not use this product in the following environment

It is generally the environment where a worker can work without any protection gear.

Also make sure to keep enough work space necessary for maintenance.

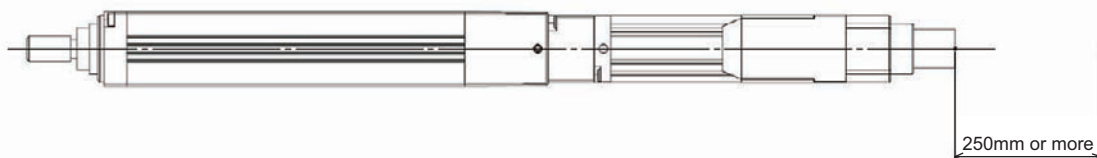
- Location exposed to radiant heat from a huge heat source such as the heat treatment
- Location where the surrounding air temperature exceeds the range of 0 to 40°C
- Location where condensation occurs due to abrupt temperature changes
- Location where relative humidity exceeds 85%RH
- Location exposed to direct sunlight
- Location exposed to corrosive gases or combustible gases
- Location exposed to significant amount of dust, salt or iron powder (Outside of ordinary assembly plant)
- Location where water, oil (includes oil mist and cutting fluid) or chemical is splashed
- Location where the product main body receives vibration or hit impact

When using the product in any of the locations specified below, provide a sufficient shield.

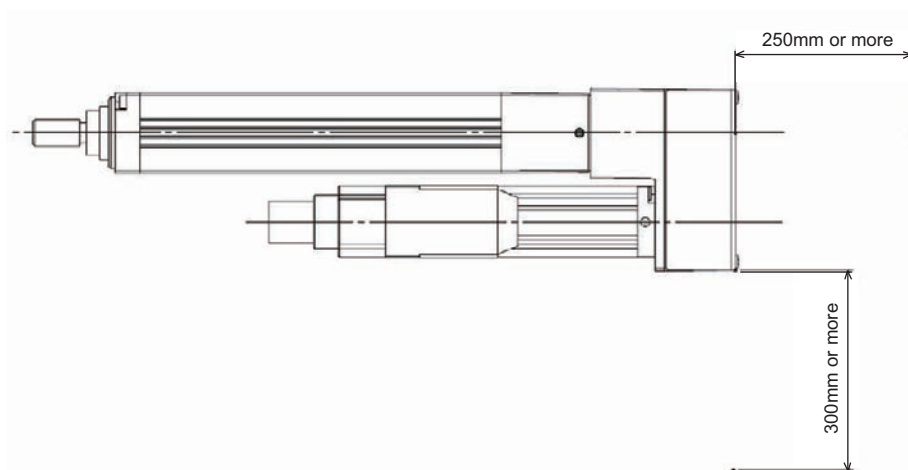
- Location subject to electrostatic noise
- Location where exposed to the influence of strong electric or magnetic field
- Location where exposed to the influence of ultraviolet or radiant rays

Open space required for maintenance inspection

- Motor coupling types



- Motor reversing types



## 7.2 Storage/Preservation Environment

The storage and preservation environment should comply with the same standards as those for the installation environment. In particular, when the machine is to be stored for a long time, pay close attention to environmental conditions so that no dew condensation forms.

Unless specially specified, moisture absorbency protection is not included in the package when the machine is delivered. In the case that the machine is to be stored and preserved in an environment where dew condensation is anticipated, take the condensation preventive measures from outside of the entire package, or directly after opening the package.

For storage and preservation temperature, the machine withstands temperatures up to 60°C for a short time, but in the case of the storage and preservation period of 1 month or more, control the temperature to 50°C or less.

Storage and preservation should be performed in the horizontal condition. In the case it is stored in the packaged condition, follow the posture instruction if any displayed on the package.

## 8. Installation

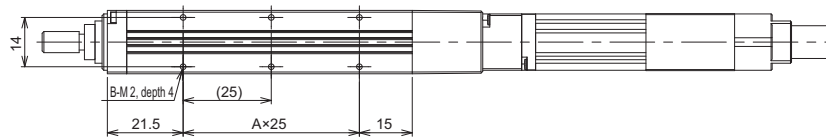
### 8.1 Slim Types

RA2AC (Motor coupling types), RA2AR (Motor reversing types)

#### 8.1.1 Installation of Actuator

At the back, there are tapped holes and a reamed hole provided for positioning. The locations of these holes are as shown in the figure below.

(In common for coupling type and reversed type)



ST	L1	L2	A	B
25	163.5	81.5	1	4
50	188.5	106.5	2	6
75	213.5	131.5	3	8
100	238.5	156.5	4	10

The recommended tightening torque is as indicated below:

Mounting bolt	Tightening torque	
	Bolt bearing surface is steel	Bolt bearing surface is aluminum
M2	0.42N·m (0.043kgf·m)	0.25N·m (0.026kgf·m)

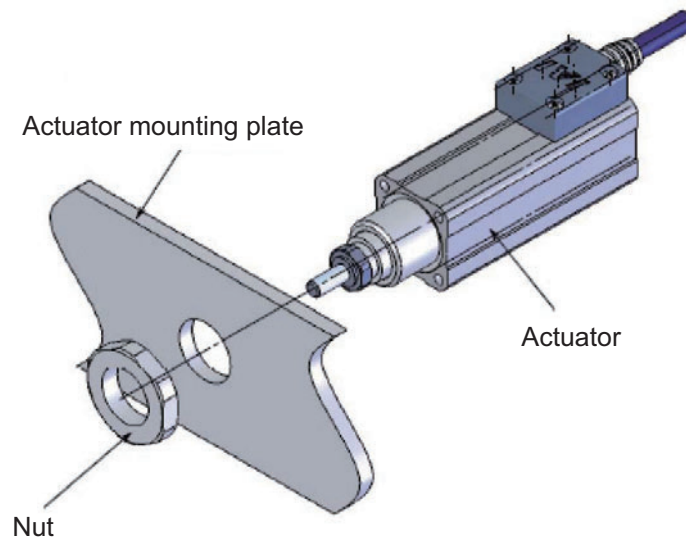
## 8.2 Short Types (Nut affixing types)

RN3NA, RN3N (Lead screw, ball screw), RN4NA, RN4N (Lead screw, ball screw)

### 8.2.1 Installation of Actuator

Install the actuator by guiding it through a hole of approx. 5 to 10 mm provided in a smooth plate.

- Use the nut on the actuator rod to install the actuator onto the actuator mounting plate.
- The base of the male thread on the actuator side has a tolerance of h8. Use this part as a pilot section.



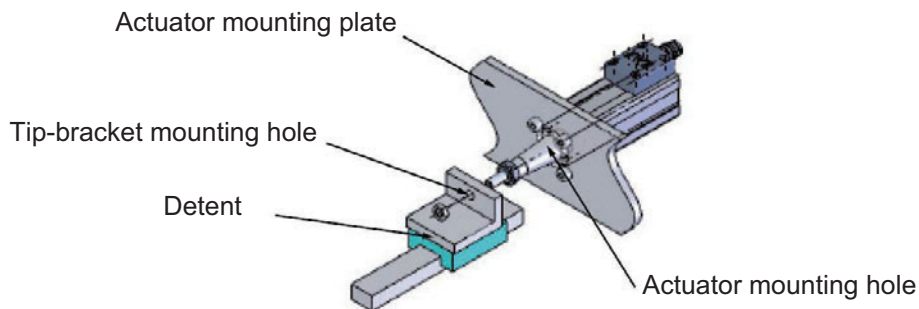
Type	M	Width across flats	Maximum tightening torque
RN3NA, RN3N (Lead screw, ball screw)	M20 × 1.0	29	49.4N·m
RN4NA, RN4N (Lead screw, ball screw)	M24 × 1.0	32	76.8N·m

**Caution :** Do not tighten excessively beyond the maximum tightening torque.  
The actuator may be damaged.

## 8.2.2 Installation of Detent

The short types (nut affixing types) have no detent on the rod.

If you are using the RN3NA, RN3N (Lead screw, ball screw), RN4NA, RN4N (Lead screw, ball screw) without guide, install a detent, if necessary, by referring to the figure below.



**Caution :** If you hear any abnormal noise from the actuator or find the grease on the screw darker within several weeks after the start of operation, the coaxiality or parallelism between the actuator mounting hole in the actuator mounting plate and tip-bracket mounting hole in the guide-side bracket may not be appropriate. Make sure the coaxiality is within 0.05 and parallelism, within 0.02. Wipe off darkened grease and apply new grease. [Refer to 12.6, "Greasing".]

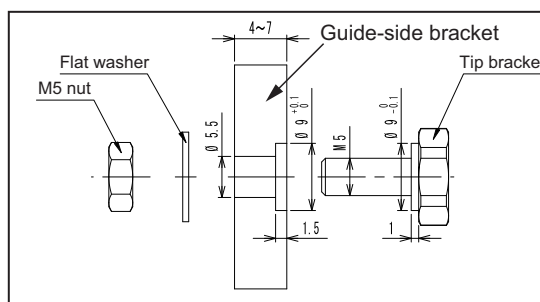


Diagram illustrating the assembly of the actuator mounting plate. The assembly includes the following components and labels:

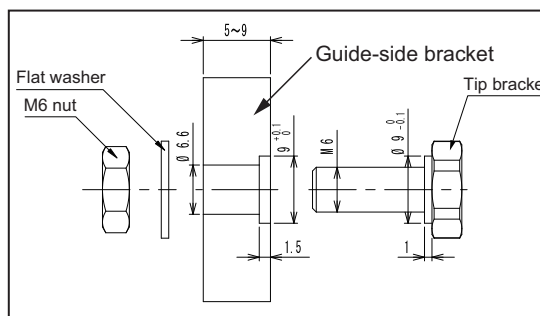
- Guide-side bracket** (Please prepare separately)
- Front side**
- Detent guide** (Please prepare separately)
- Fixing Nut**
- Actuator mounting plate**
- Tip bracket (12mm between 2 flat faces)**
- Rear side**

Dimensions and tolerances are indicated:

- A tolerance of  $0.02$  is specified for the distance  $L$ .
- The distance  $L$  is the length of the actuator mounting plate.



RN3 Guide-side bracket (with counterbore)



RN4 Guide-side bracket (with counterbore)

Type	Lead	Guide-side bracket	L
RN3NA, RN3N (Lead screw, ball screw)	1	Without counterbore	25.0 ±0.1
		With counterbore	24.0 ±0.1
	2, 4	Without counterbore	25.3 ±0.1
		With counterbore	24.3 ±0.1
RN4NA, RN4N (Lead screw, ball screw)	1	Without counterbore	27.0 ±0.1
		With counterbore	26.0 ±0.1
	2, 4, 6	Without counterbore	27.3 ±0.1
		With counterbore	26.3 ±0.1

## Tightening torque for tip clasp

Type	Tightening torque
RN3NA, RN3N (Lead screw, ball screw)	2.8N·m
RN4NA, RN4N (Lead screw, ball screw)	4.2N·m

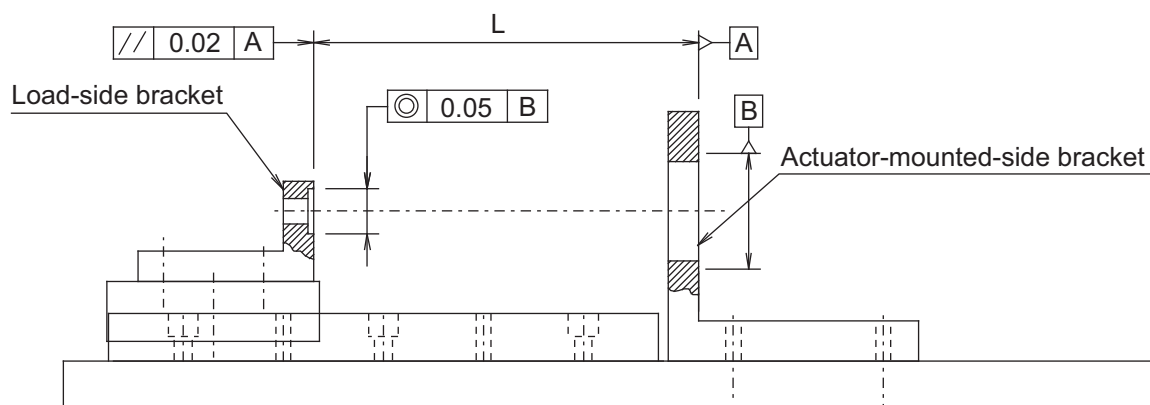


Caution : Do not join the actuator detent using a floating joint.  
A radial load will be applied due to an eccentricity of the screw shaft, resulting in  
actuator malfunction or premature damage.

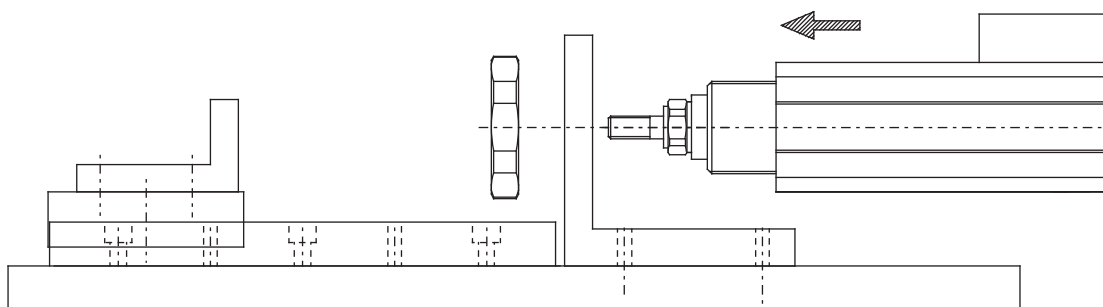
## [Mounting procedure]

- 1) Check the accuracy on the actuator side and load side.

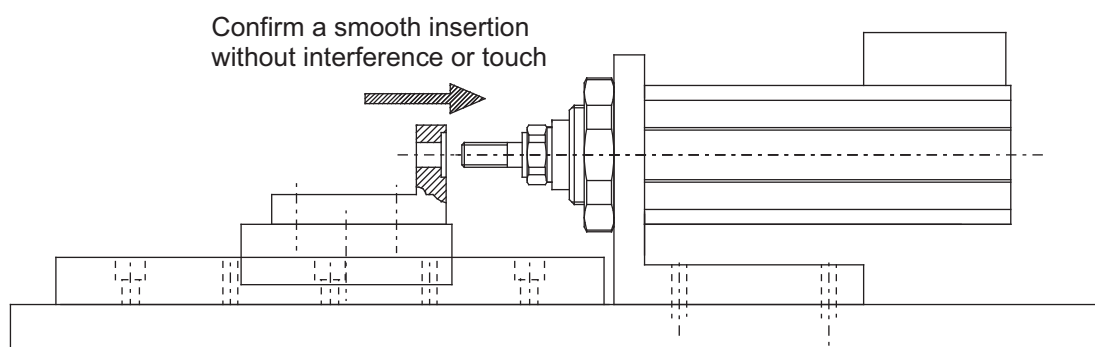
Adjust the position so the accuracy can be maintained at the value shown below or less in the whole range of the load side movement.



- 2) Mount the main unit of the actuator.

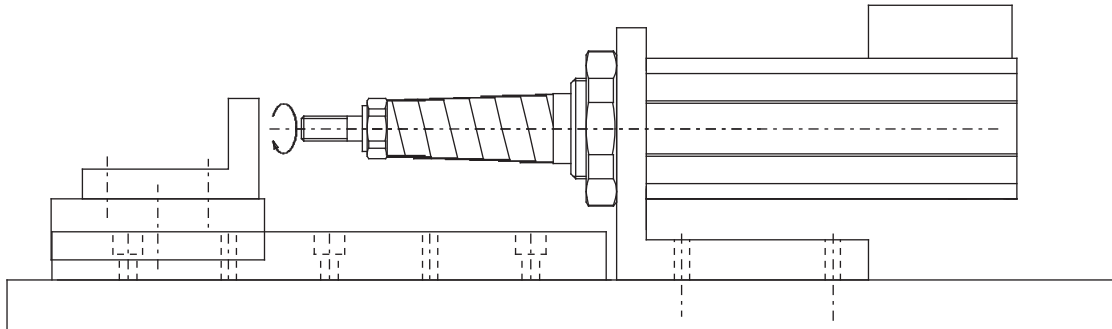


- 3) Move the load-side bracket to confirm that there is no problem in the precision of the position to the shaft of the rod.  
Confirm that the shaft of the rod can be inserted without a touch to the inside face of the mating hole on the bracket.

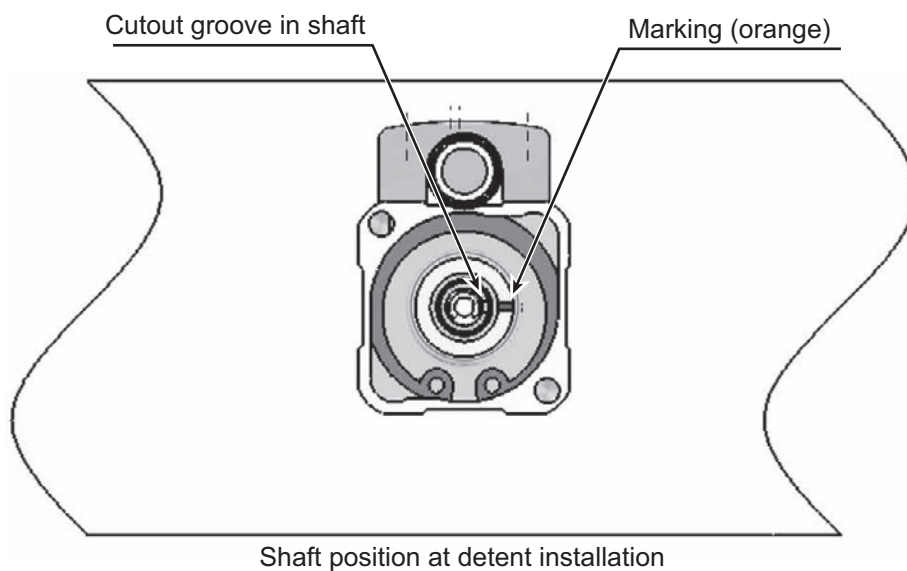
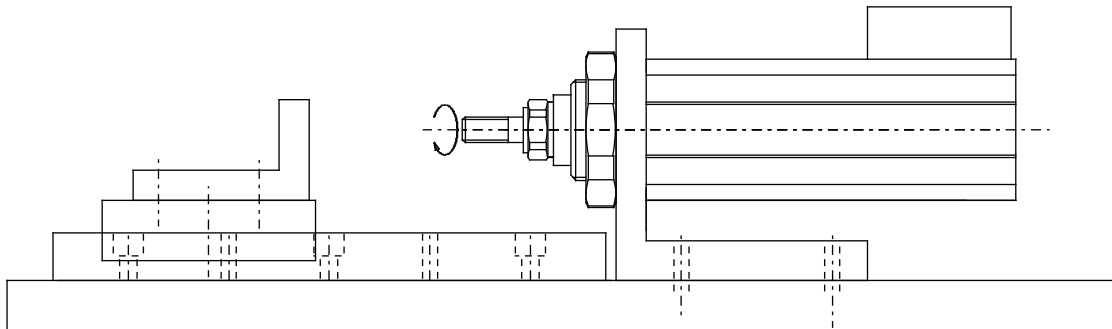


**Caution :** Make sure to have the position accuracy for the actuator and the load side as indicated.  
Failure to do so may cause abnormal noise, vibration, operational failure or shorter product life.

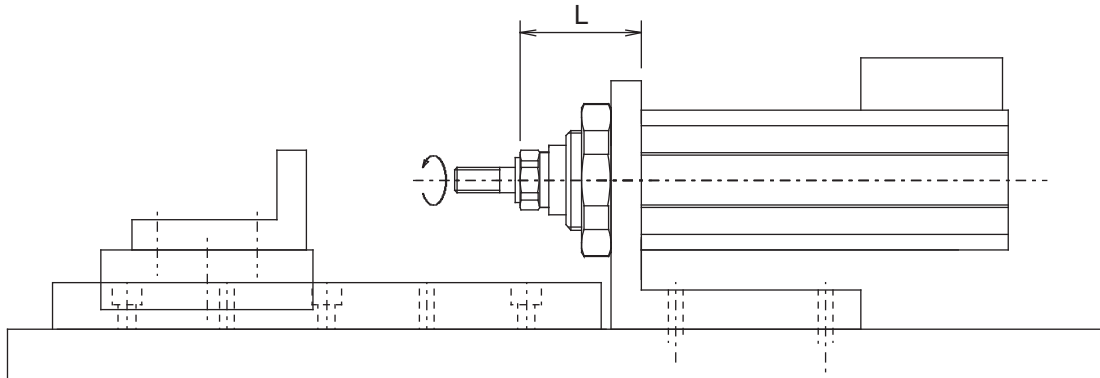
- 4) Turn the shaft clockwise until the overall actuator dimension becomes the shortest and the mechanical stopper is contacted. When the shaft is turned at the mechanical end, the cutout groove provided in the shaft on the rear side also turns.



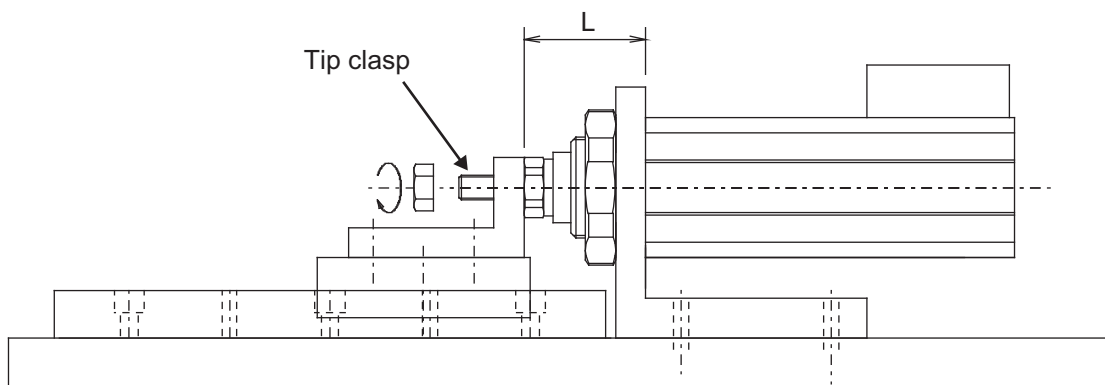
- 5) Turn the shaft clockwise until the cutout groove provided in the shaft on the rear side aligns with the marking (positioning) sticker.



- 6) While keeping this positioning relationship (= the cutout groove provided in the shaft on the rear side is aligned with the marking sticker), turn the shaft counterclockwise to adjust L to the specified dimension.



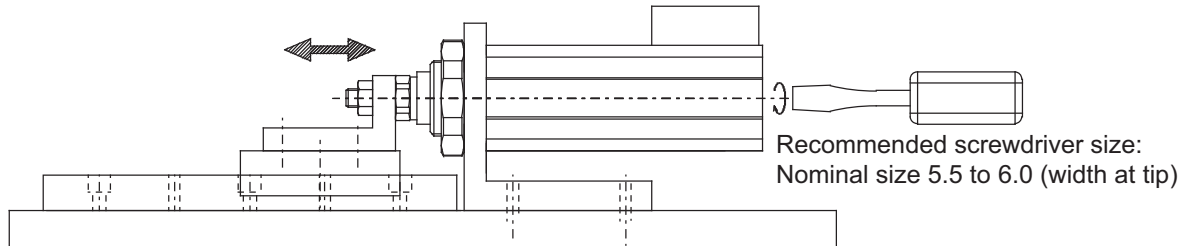
- 7) Use a spanner, etc., to hold the width across flats of the tip clasp in place and affix it with the guide-side bracket. (When affixing with the bracket, turn the nut while locking the spanner applied to the tip clasp. If the tip clasp turns, the home position becomes offset.)



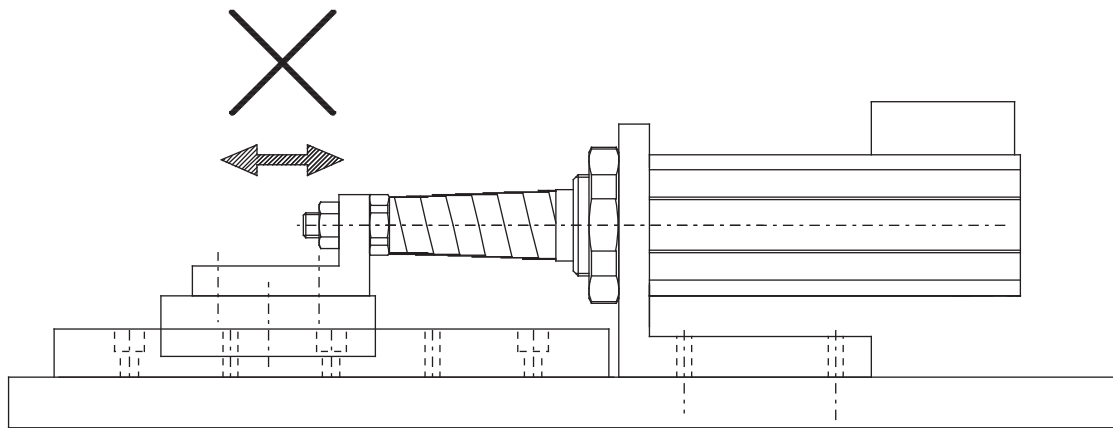
Tightening torque for tip clasp

Type	Tightening torque
RN3NA, RN3N (Lead screw, ball screw)	2.8N·m
RN4NA, RN4N (Lead screw, ball screw)	4.2N·m

- 8) Confirm that the bracket moves smoothly in the whole range of its stroke. Readjust the position if it is confirmed the bracket gets heavy or stuck at any point in the stroke range. (For the low lead types (Lead 1 and 2), twist the rotation shaft with a screwdriver to move the bracket.)



**Caution :** Do not attempt to move back and forth from the load side (rod side) for the low lead types (Lead 1 and 2).  
Moving it forcefully would apply too much load to the feed screw and may result in the cause of operational failure or destruction of the product.

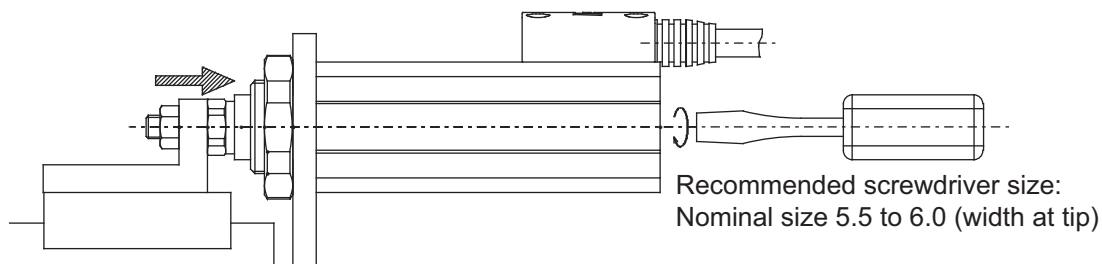


[How to check and adjust the position of encoder phase Z]

Follow the procedures below to check if encoder phase Z is at an appropriate position. This is required only for RN3NA, RN3N (slip screw) actuators with a lead of 1 mm.

[Procedure 1] Checking the position of encoder phase Z

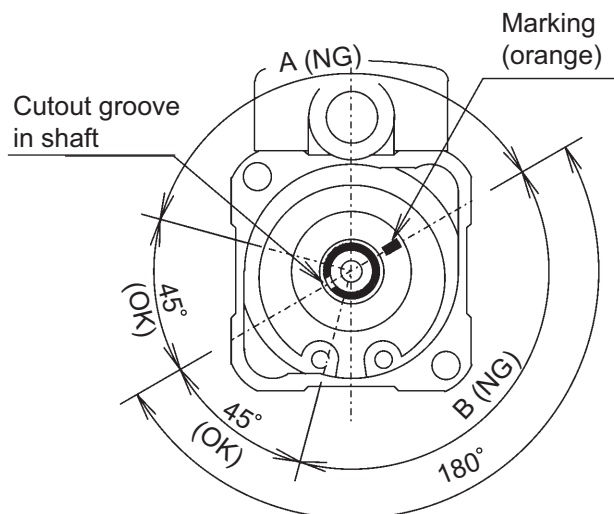
[1] Turn the shaft clockwise from the rear until the rod contacts the rear end.



[2] In rear view, confirm that the cutout groove in the shaft is located within  $\pm 45$  degrees of the line extending from the marking in the 180-degree opposite direction.

If the cutout groove is within the allowable angle, the position of encoder phase Z is appropriate.

If the cutout groove is outside the allowable angle, the position of encoder phase Z must be readjusted. Correct the position as specified on the next page [procedure 2].

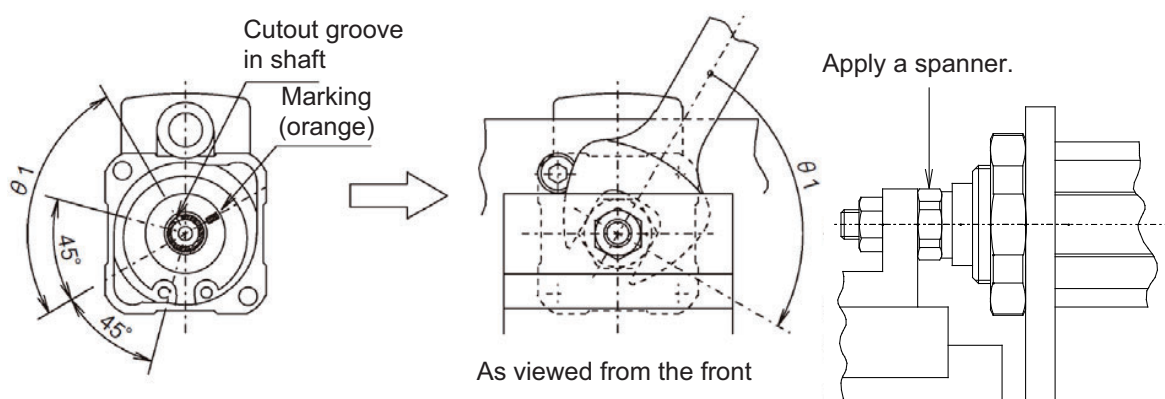


\* The marking position varies depending on the actuator.

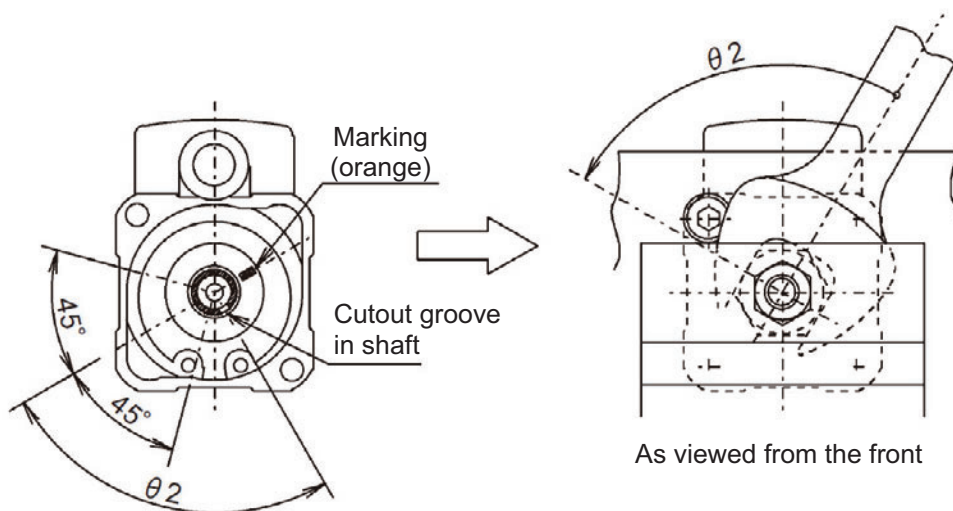
## [Procedure 2] Correcting the position of encoder phase Z

If the cutout groove in the shaft is outside the allowable angle range, make correction by following the procedure below:

- [1] Use a spanner to hold the width across flats on the clasp at the tip to keep it in position, and loosen the lock nut slightly.
- [2] Move the clasp at the tip slightly in the rotating direction to correct the position.
  - If the cutout groove in the shaft is deviated in the A (NG) direction: Move the clasp at the tip clockwise roughly by the correction angle  $\theta_1$  (as viewed from the front).



- If the cutout groove in the shaft is deviated in the B (NG) direction: Move the clasp at the tip counterclockwise roughly by the correction angle  $\theta_2$  (as viewed from the front).



- [3] After the correction, tighten the lock nut with the clasp at the tip still held in position.

## [Procedure 3] Confirming the phase Z position again

Finally, repeat [Procedure 1] to confirm the position of phase Z again.

If the position is inside the allowable angle, phase Z has been corrected properly.



## 8.2.3 Installation of Flange

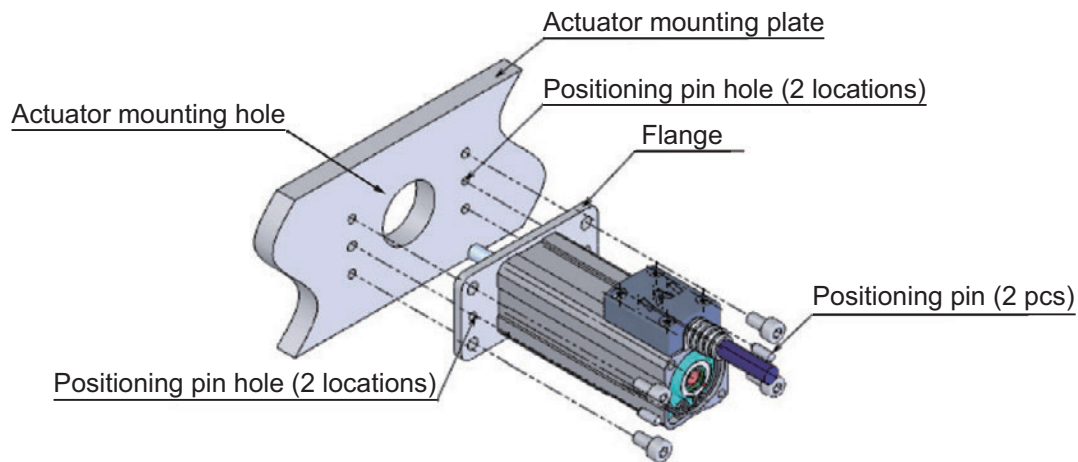
Provide a flange-shaped sheet and install the actuator onto this sheet from the back.

- Use the nut on the actuator rod to install the actuator onto the flange.
- Secure the flange with the actuator mounting plate using screws.

If positioning is required, insert positioning pins.

(Note) For the actuator mounting hole in the actuator mounting plate, provide a hole larger than the dimension of the nut so as to provide a clearance for the nut.

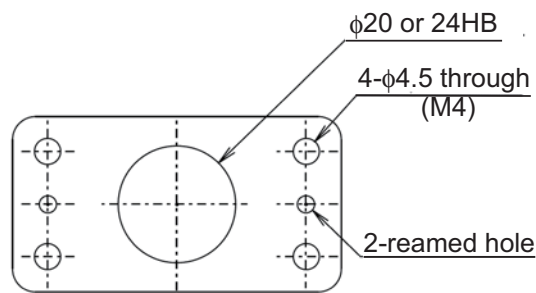
Type	Nut diameter
RN3NA, RN3N (Lead screw, ball screw)	$\phi 34$
RN4NA, RN4N (Lead screw, ball screw)	$\phi 30.8$



Installation of actuator and flange

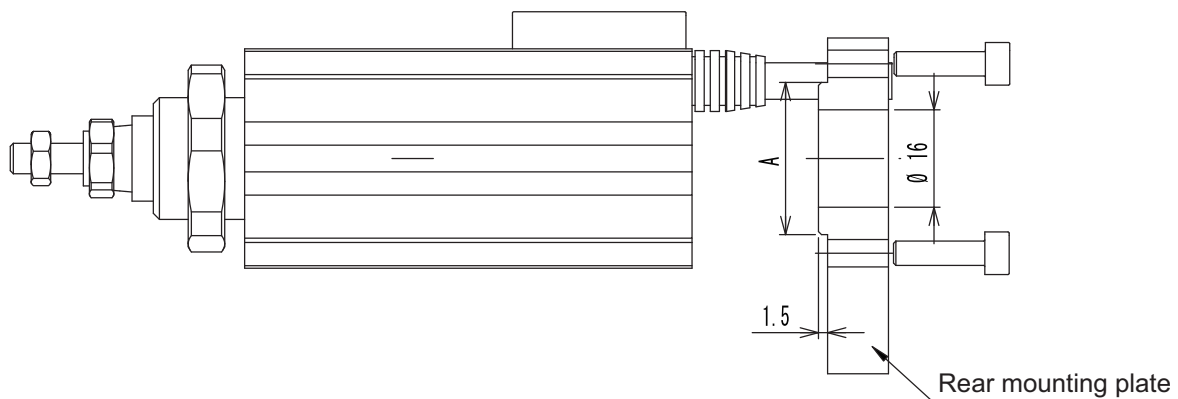
Type	M	Width across flats	Maximum tightening torque
RN3NA, RN3N (Lead screw, ball screw)	M20 × 1.0	29	49.4N·m
RN4NA, RN4N (Lead screw, ball screw)	M24 × 1.0	32	76.8N·m

(Reference drawing of flange)



### 8.2.4 Installation from Rear Side

When installing the actuator from the rear side, provide a rear mounting plate of a slightly-projected circular column shape as shown below, to facilitate the positioning.



	RN3NA, RN3N (Lead screw, ball screw)	RN4NA, RN4N (Lead screw, ball screw)
A	<div> <div>φ25</div> <div>-0.2</div> <div>-0.3</div> </div>	<div> <div>φ30</div> <div>-0.2</div> <div>-0.3</div> </div>

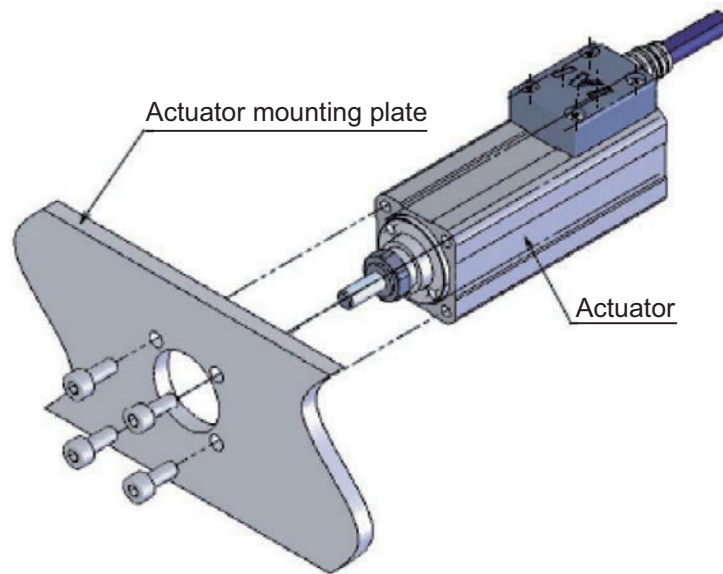
## 8.3 Short Types (Tapped-hole mounting types)

RP3NA, RP3N (Lead screw, ball screw), RP4NA, RP4N (Lead screw, ball screw)

### 8.3.1 Installation of Actuator

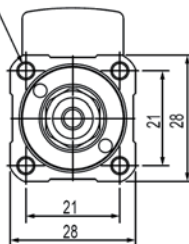
Install the actuator by guiding it through a hole of approx. 5 to 10 mm provided in a smooth plate.

- Use the tapped hole on the actuator to install the actuator onto the actuator mounting plate.
- The base of the male thread on the actuator side has a tolerance of h8. Use this part as a pilot section.



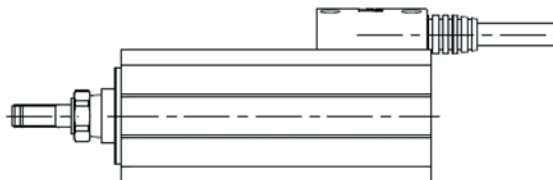
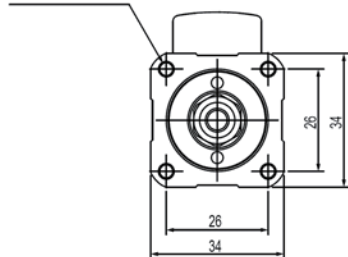
- RP3N (Lead screw, ball screw)

Tapped  
mounting hole



- RP4N (Lead screw, ball screw)

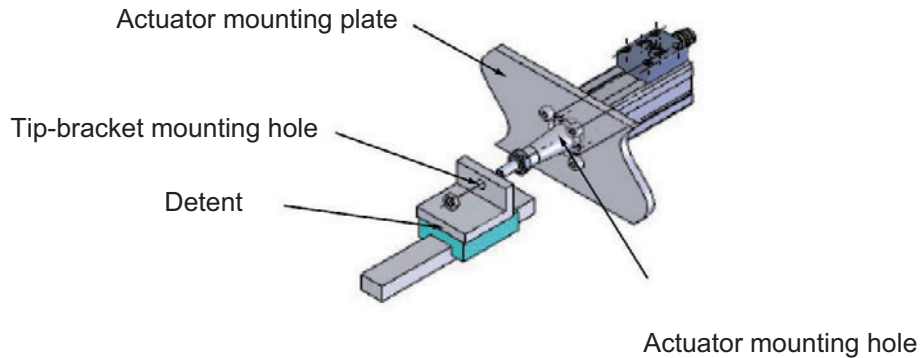
Tapped mounting hole



Type	Tapped hole size	Tightening torque	
		Plate is made of steel material	Plate is made of aluminum material
RP3NA, RP3N (Lead screw, ball screw)	M4, depth 8	3.6N·m	1.8N·m
RP4NA, RP4N (Lead screw, ball screw)			

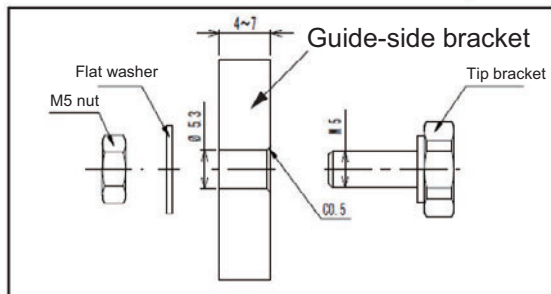
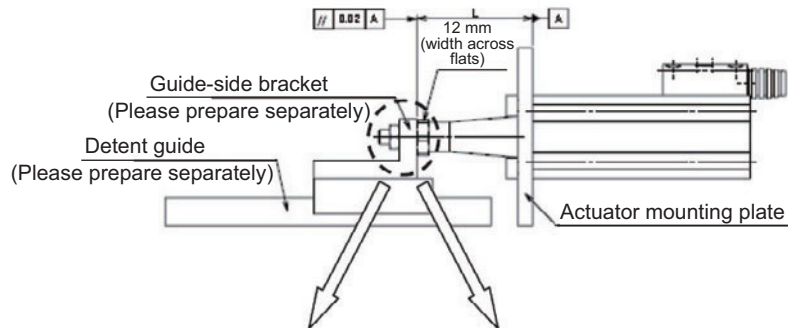
## 8.3.2 Installation of Detent

The short types (nut affixing types) have no detent on the rod.  
If you are using the RP3NA, RP3N (Lead screw, ball screw), RP4NA, RP4N (Lead screw, ball screw) without guide, install a detent, if necessary, by referring to the figure below.

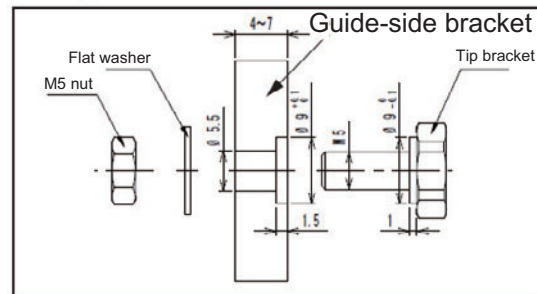


**Caution :** If you hear any abnormal noise from the actuator or find the grease on the screw darker within several weeks after the start of operation, the coaxiality or parallelism between the actuator mounting hole in the actuator mounting plate and tip-bracket mounting hole in the guide-side bracket may not be appropriate. Make sure the coaxiality is within 0.05 and parallelism, within 0.02. Wipe off darkened grease and apply new grease. [Refer to 12.6, “Greasing”.]

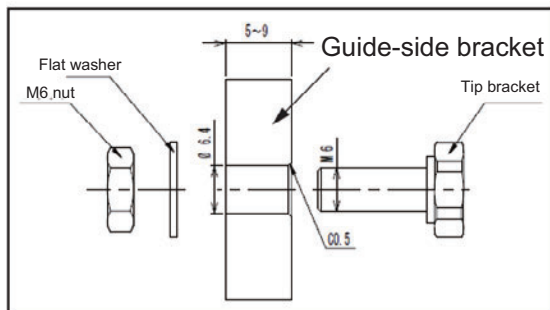
Keep the coaxiality between the actuator mounting hole in the actuator mounting hole and tip-bracket mounting hole in the guide-side bracket, to within 0.05. Also keep the parallelism to within 0.02.



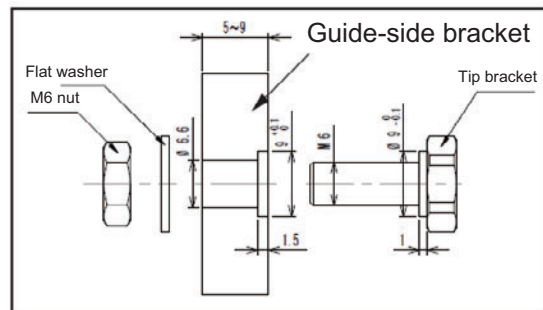
RP3 Guide-side bracket (without counterbore)



RP3 Guide-side bracket (with counterbore)



RP4 Guide-side bracket (without counterbore)



RP4 Guide-side bracket (with counterbore)

Type	Lead	Guide-side bracket	L
RP3NA, RP3N (Lead screw, ball screw)	1	Without counterbore	11.5 ±0.1
RP4NA, RP4N (Lead screw, ball screw)		With counterbore	10.5 ±0.1
RP3NA, RP3N (Lead screw, ball screw)	2, 4, 6	Without counterbore	11.8 ±0.1
RP4NA, RP4N (Lead screw, ball screw)		With counterbore	10.8 ±0.1

## Tightening torque for tip clasp

Type	Tightening torque
RP3NA, RP3N (Lead screw, ball screw)	2.8N·m
RP4NA, RP4N (Lead screw, ball screw)	4.2N·m

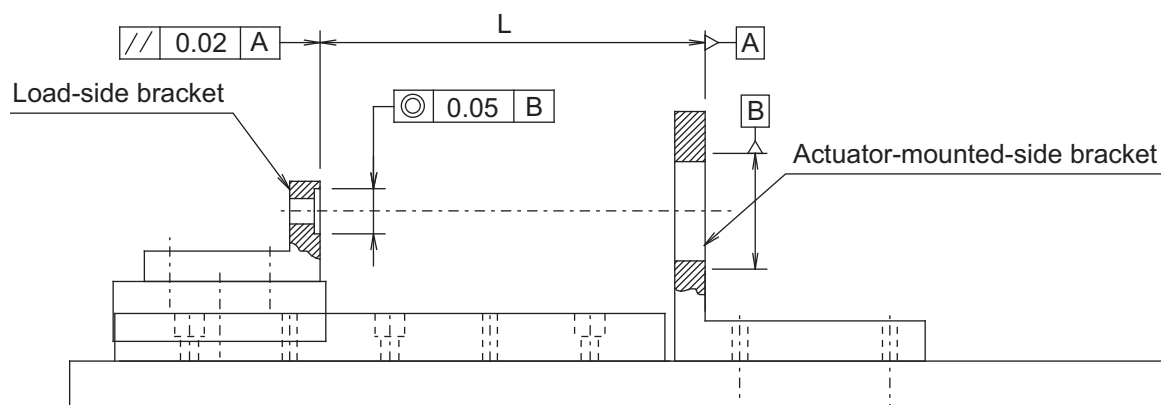


Caution : Do not join the actuator detent using a floating joint.  
A radial load will be applied due to an eccentricity of the screw shaft, resulting in actuator malfunction or premature damage.

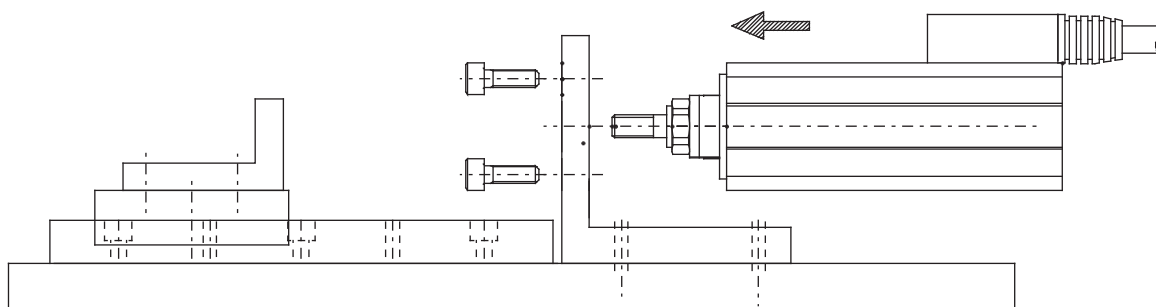
[Mounting procedure]

- 1) Check the accuracy on the actuator side and load side.

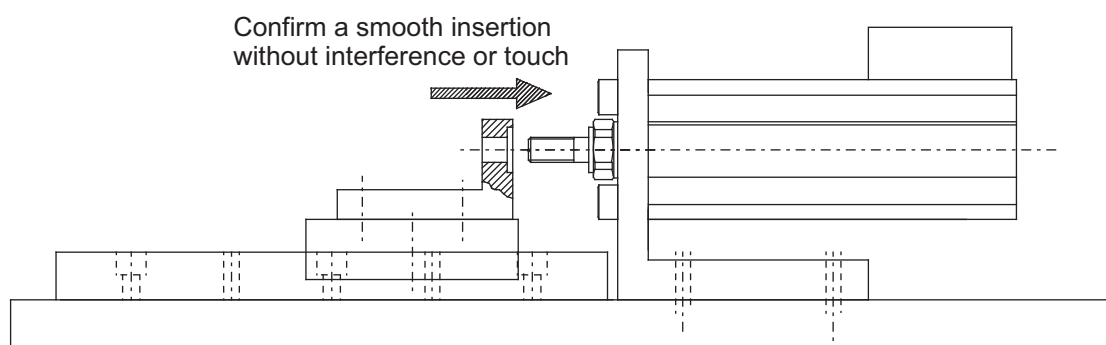
Adjust the position so the accuracy can be maintained at the value shown below or less in the whole range of the load side movement.



- 2) Mount the main unit of the actuator.



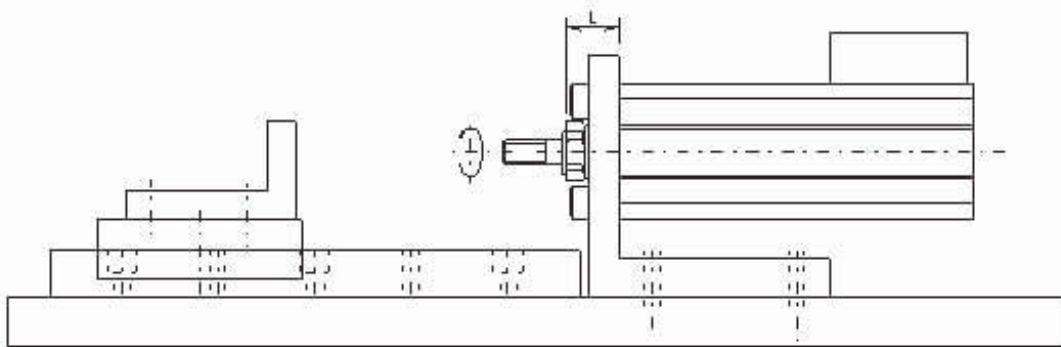
- 3) Move the load-side bracket to confirm that there is no problem in the precision of the position to the shaft of the rod.  
Confirm that the shaft of the rod can be inserted without a touch to the inside face of the mating hole on the bracket.



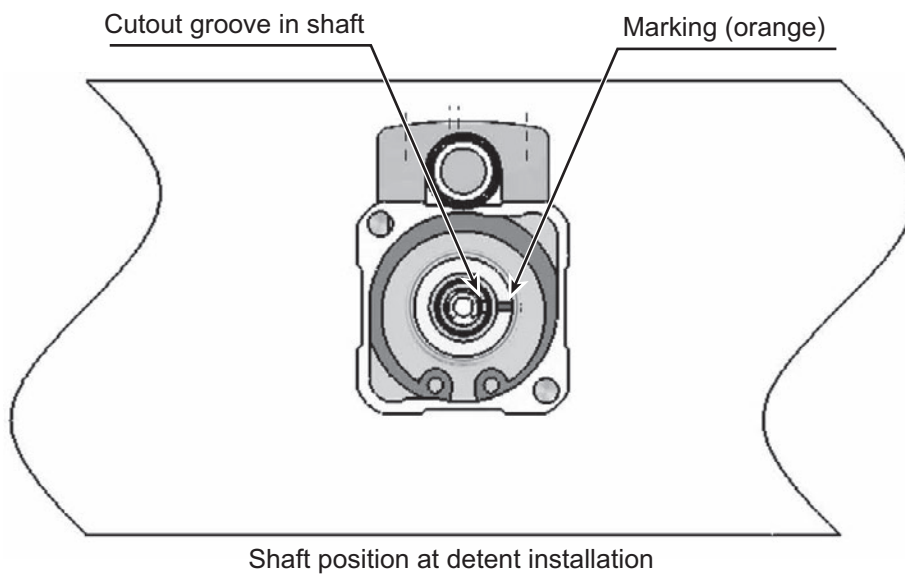
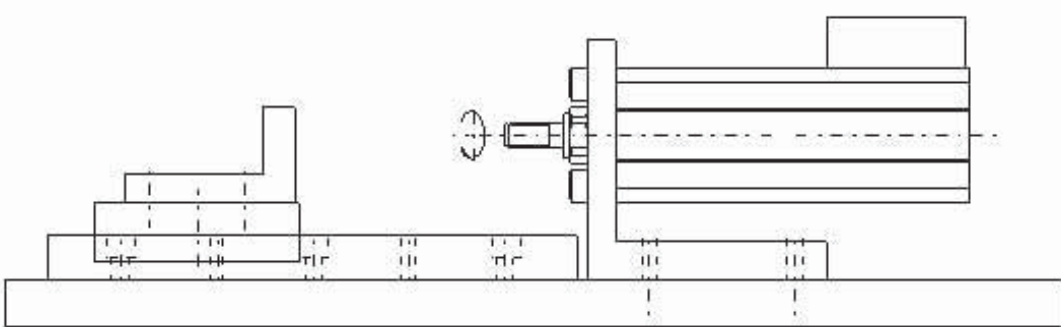
**Caution :** Make sure to have the position accuracy for the actuator and the load side as indicated.  
Failure to do so may cause abnormal noise, vibration, operational failure or shorter product life.



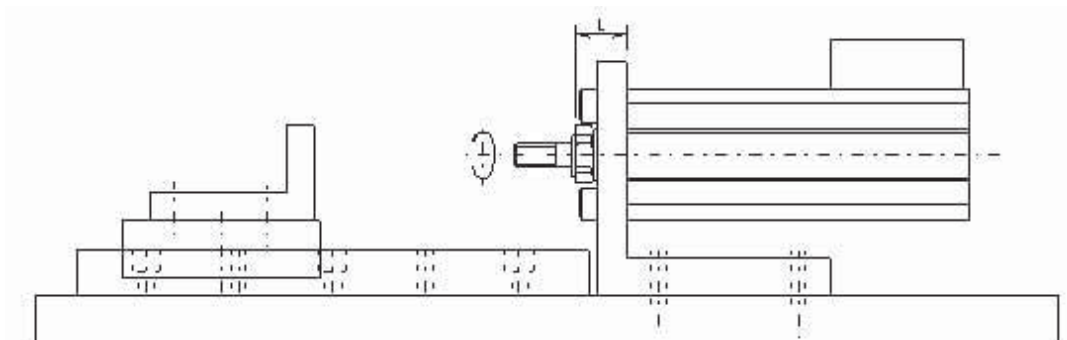
- 4) Turn the shaft clockwise until the overall actuator dimension becomes the shortest and the mechanical stopper is contacted. When the shaft is turned at the mechanical end, the cutout groove provided in the shaft on the rear side also turns.



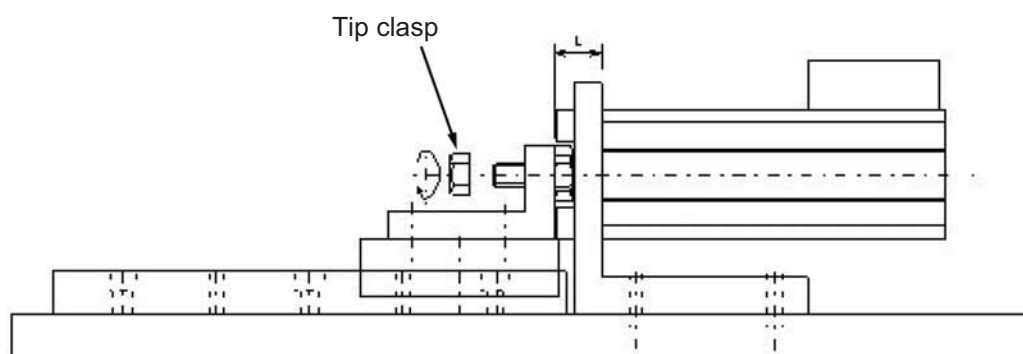
- 5) Turn the shaft clockwise until the cutout groove provided in the shaft on the rear side aligns with the marking (positioning) sticker.



- 6) While keeping this positioning relationship (= the cutout groove provided in the shaft on the rear side is aligned with the marking sticker), turn the shaft counterclockwise to adjust L to the specified dimension.



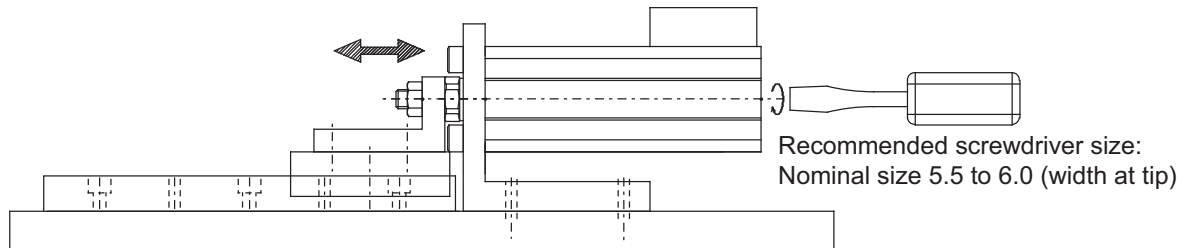
- 7) Use a spanner, etc., to hold the width across flats of the tip clasp in place and affix it with the guide-side bracket. (When affixing with the bracket, turn the nut while locking the spanner applied to the tip clasp. If the tip clasp turns, the home position becomes offset.)



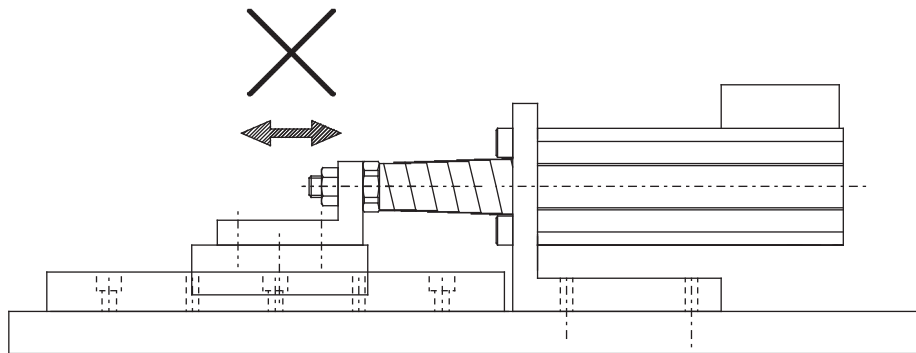
Tightening torque for tip clasp

Type	Tightening torque
RP3NA, RP3N (Lead screw, ball screw)	2.8N·m
RP4NA, RP4N (Lead screw, ball screw)	4.2N·m

- 8) Confirm that the bracket moves smoothly in the whole range of its stroke. Readjust the position if it is confirmed the bracket gets heavy or stuck at any point in the stroke range. (For the low lead types (Lead 1 and 2), twist the rotation shaft with a screwdriver to move the bracket.)



**Caution :** Do not attempt to move back and forth from the load side (rod side) for the low lead types (Lead 1 and 2).  
Moving it forcefully would apply too much load to the feed screw and may result in the cause of operational failure or destruction of the product.

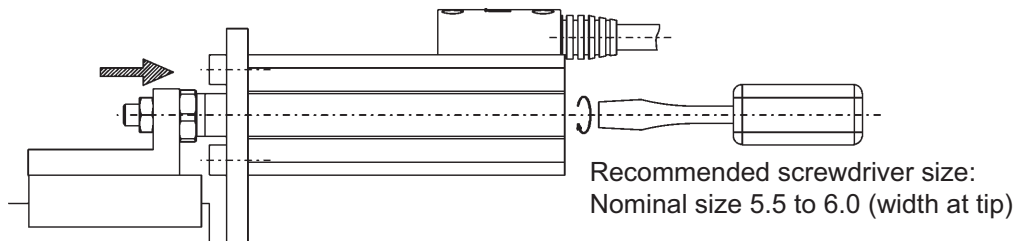


[How to check and adjust the position of encoder phase Z]

Follow the procedures below to check if encoder phase Z is at an appropriate position. This is required only for RP3NA, RP3N (slip screw) actuators with a lead of 1 mm.

[Procedure 1] Checking the position of encoder phase Z

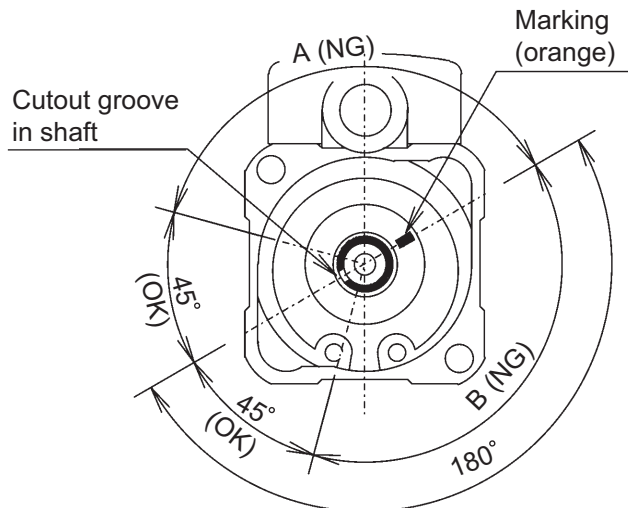
[1] Turn the shaft clockwise from the rear until the rod contacts the rear end.



[2] In rear view, confirm that the cutout groove in the shaft is located within  $\pm 45$  degrees of the line extending from the marking in the 180-degree opposite direction.

If the cutout groove is within the allowable angle, the position of encoder phase Z is appropriate.

If the cutout groove is outside the allowable angle, the position of encoder phase Z must be readjusted. Correct the position as specified on the next page [procedure 2].

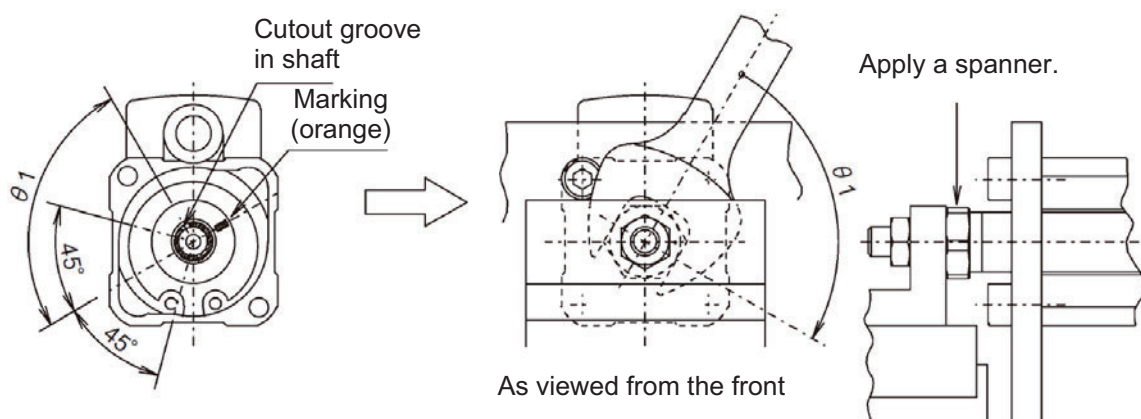


\* The marking position varies depending on the actuator.

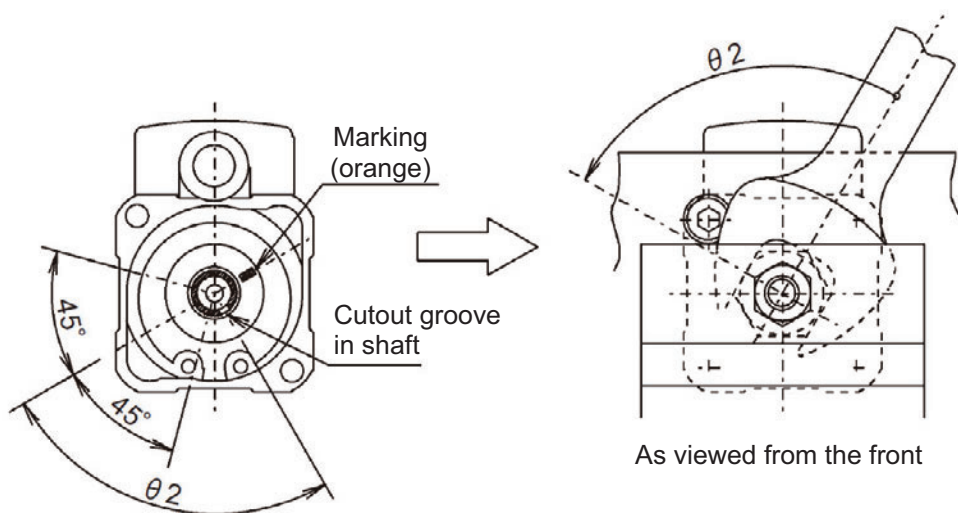
## [Procedure 2] Correcting the position of encoder phase Z

If the cutout groove in the shaft is outside the allowable angle range, make correction by following the procedure below:

- [1] Use a spanner to hold the width across flats on the clasp at the tip to keep it in position, and loosen the lock nut slightly.
- [2] Move the clasp at the tip slightly in the rotating direction to correct the position.
  - If the cutout groove in the shaft is deviated in the A (NG) direction:  
Move the clasp at the tip clockwise roughly by the correction angle  $\theta_1$  (as viewed from the front).



- If the cutout groove in the shaft is deviated in the B (NG) direction:  
Move the clasp at the tip counterclockwise roughly by the correction angle  $\theta_2$  (as viewed from the front).



- [3] After the correction, tighten the lock nut with the clasp at the tip still held in position.

## [Procedure 3] Confirming the phase Z position again

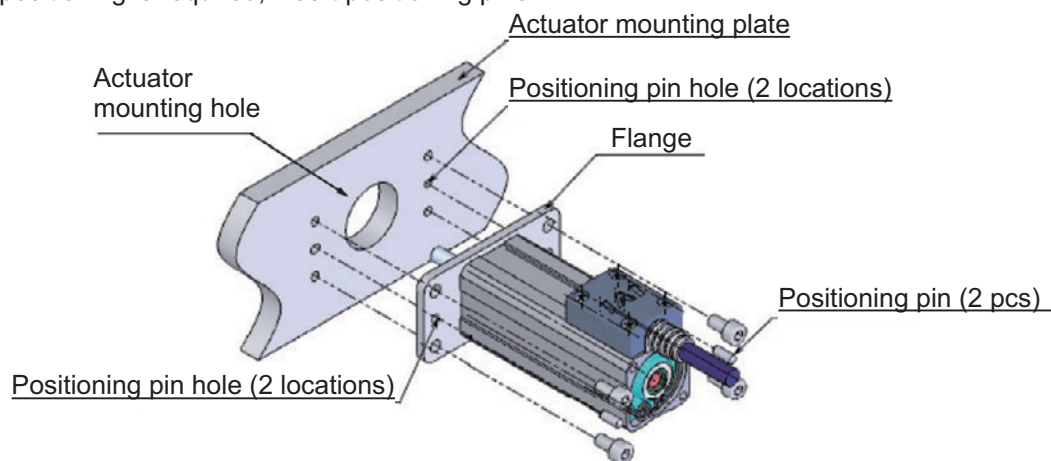
Finally, repeat [Procedure 1] to confirm the position of phase Z again.

If the position is inside the allowable angle, phase Z has been corrected properly.

## 8.3.3 Installation of Flange

Provide a flange-shaped sheet and install the actuator onto this sheet from the back.

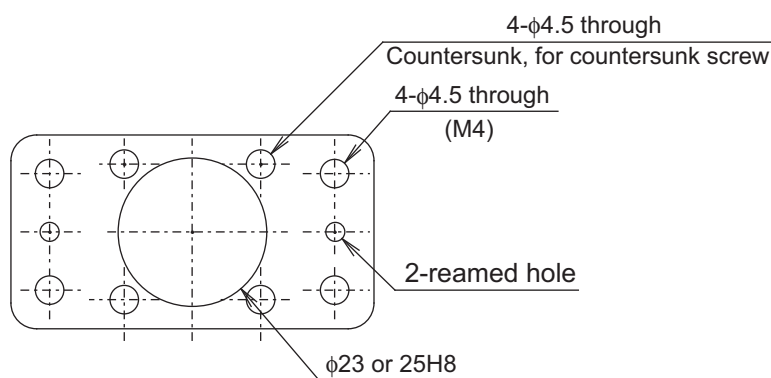
- Use the tapped hole on the actuator to install the actuator onto the flange using the M4 countersunk screw.
  - Secure the flange with the actuator mounting plate using screws.
- If positioning is required, insert positioning pins.



Installation of actuator and flange

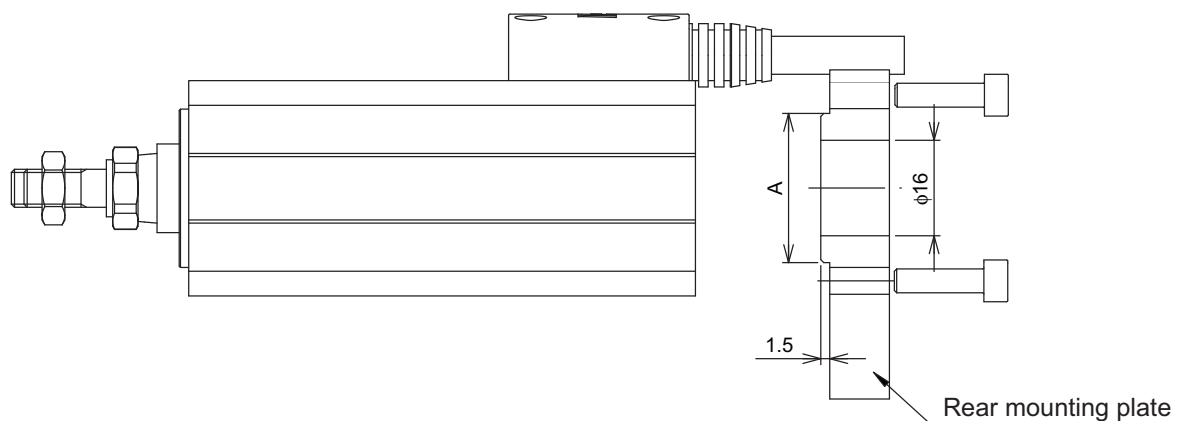
Type	Tapped hole size	Tightening torque	
		Plate is made of steel material	Plate is made of aluminum material
RP3NA, RP3N (Lead screw, ball screw) RP4NA, RP4N (Lead screw, ball screw)	M4, depth 8	3.6N·m	1.8N·m

(Reference drawing of flange)



## 8.3.4 Installation from Rear Side

When installing the actuator from the rear side, provide a rear mounting plate of a slightly-projected circular column shape as shown below, to facilitate the positioning.



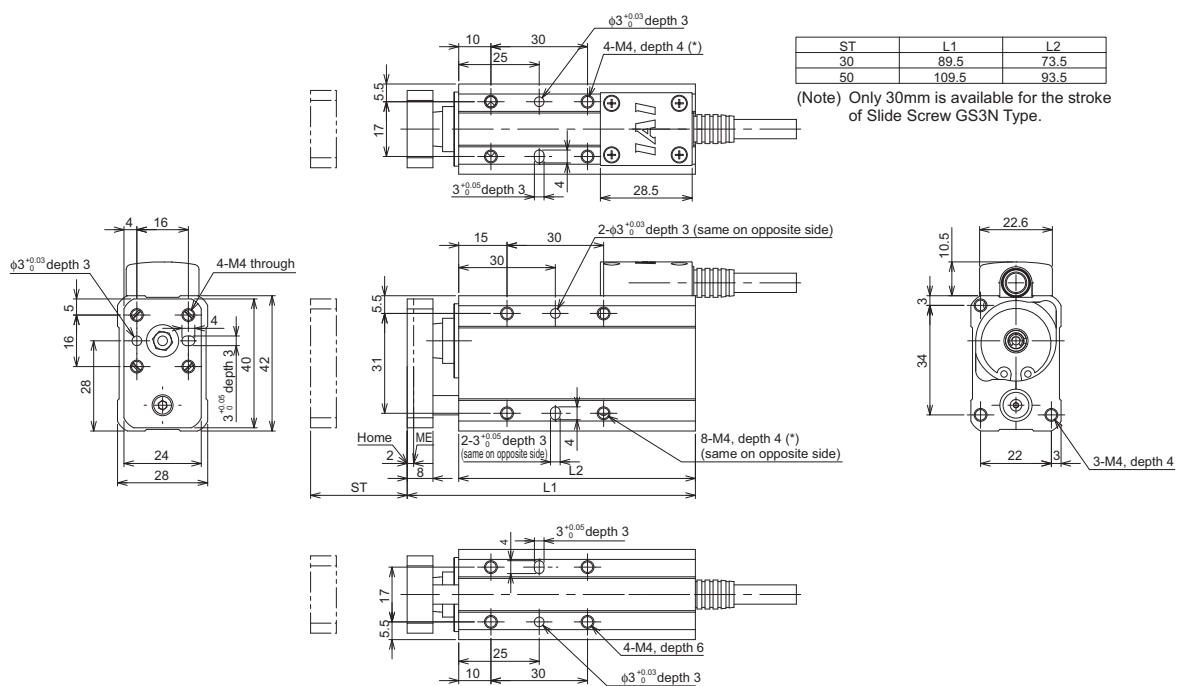
	RP3NA, RP3N (Lead screw, ball screw)	RP4NA, RP4N (Lead screw, ball screw)
A	$\phi 25$ -0.2 -0.3	$\phi 30$ -0.2 -0.3

## 8.4 Single Guide Types

GS3NA, GS3N (Lead screw, ball screw), GS4NA, GS4N (Lead screw, ball screw)

The actuator mounting surface should be machined or otherwise processed to a smooth surface of equivalent precision.

- The effective depth varies depending on the actuator model and mounting surface. Determine an appropriate length for the screws to be used by referring to the figure below.
- Circular and long positioning pin holes are provided in each mounting surface. Use these holes if necessary.
- GS3NA, GS3N (Lead screw, ball screw)  
The actuator is structured in such a way that it can be affixed on any of its four sides. The load can be installed only one side.

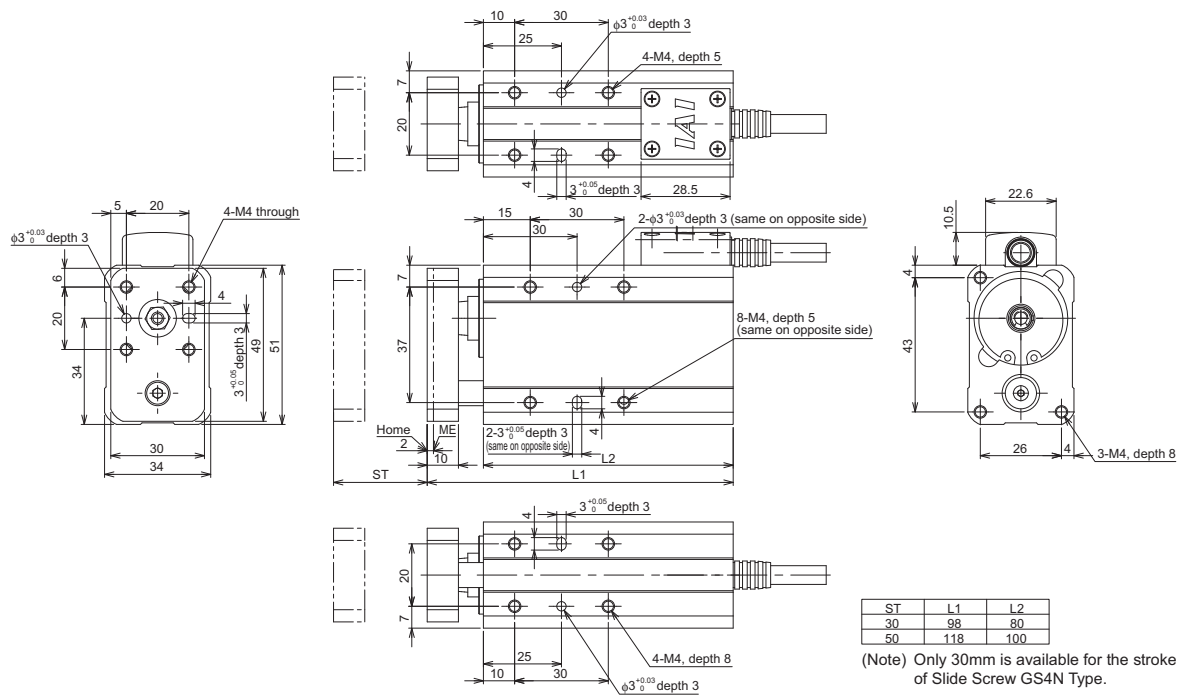


**Caution :** Some tapped mounting holes are through holes. Never use long screws exceeding the effective thread length. Such long screws may damage the internal mechanism or electrical parts.



- GS4NA, GS4N (Lead screw, ball screw)

The actuator is structured in such a way that it can be affixed on any of its four sides. The load can be installed only one side.



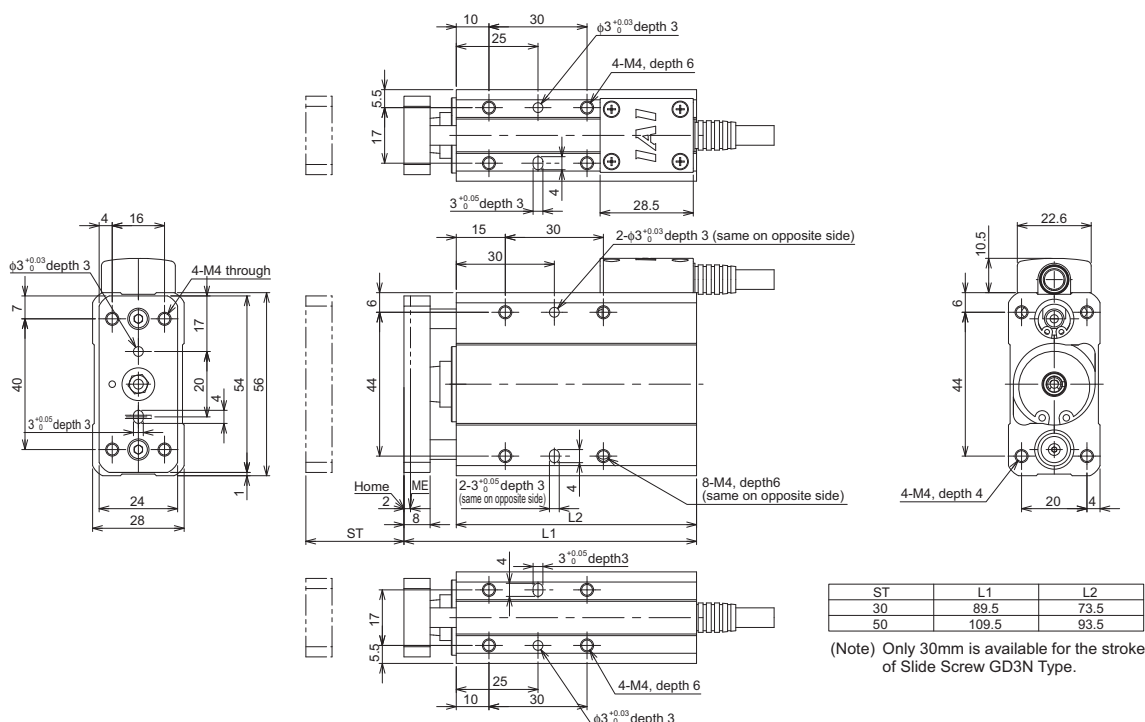
**Caution :** Some tapped mounting holes are through holes. Never use long screws exceeding the effective thread length. Such long screws may damage the internal mechanism or electrical parts.

## 8.5 Double Guide Types

GD3NA, GD3N (Lead screw, ball screw), GD4NA, GD4N (Lead screw, ball screw)

The actuator mounting surface should be machined or otherwise processed to a smooth surface of equivalent precision.

- The effective depth varies depending on the actuator model and mounting surface. Determine an appropriate length for the screws to be used by referring to the figure below.
- Circular and long positioning pin holes are provided in each mounting surface. Use these holes if necessary.
- GD3NA, GD3N (Lead screw, ball screw)  
The actuator is structured in such a way that it can be affixed on any of its four sides. The load can be installed only one side.



**Caution :** Some tapped mounting holes are through holes. Never use long screws exceeding the effective thread length. Such long screws may damage the internal mechanism or electrical parts.



## 8.6 Slide Unit Types

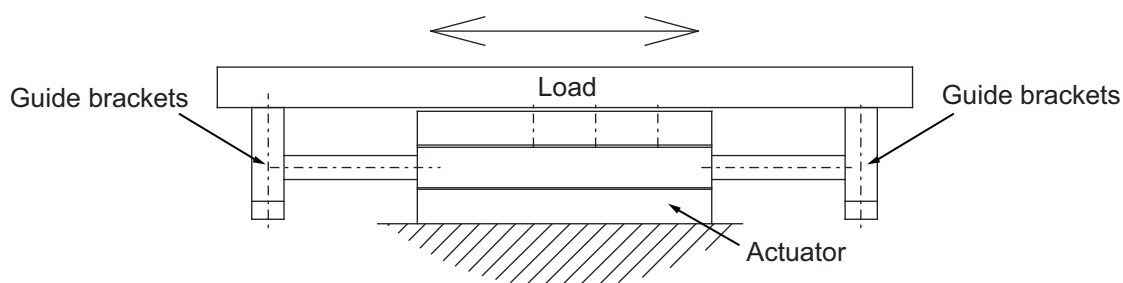
SD3NA, SD3N (Lead screw, ball screw), SD4NA, SD4N (Lead screw, ball screw)

The actuator or guide bracket mounting surface should be machined or otherwise processed to a smooth surface of equivalent precision.

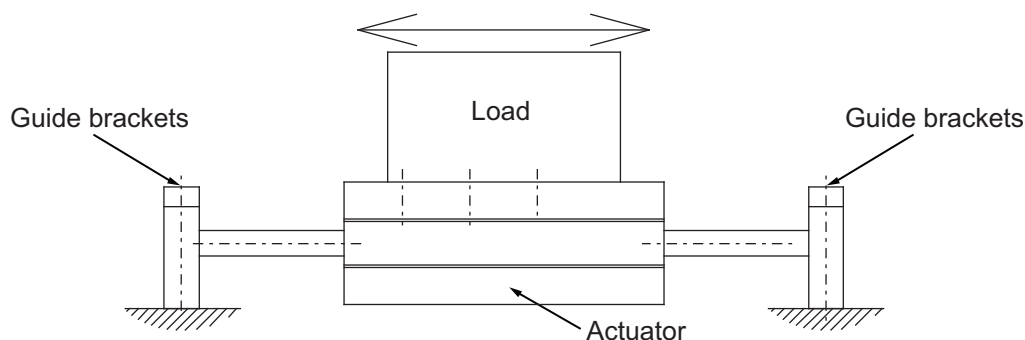
- The effective depth varies depending on the actuator model and mounting surface. Determine an appropriate length for the screws to be used by referring to the figure below.
- Circular and long positioning pin holes are provided in each mounting surface. Use these holes if necessary.

The slide unit types can be installed in one of two ways: by affixing the actuator or affixing the guide brackets.

[Affixing the actuator]



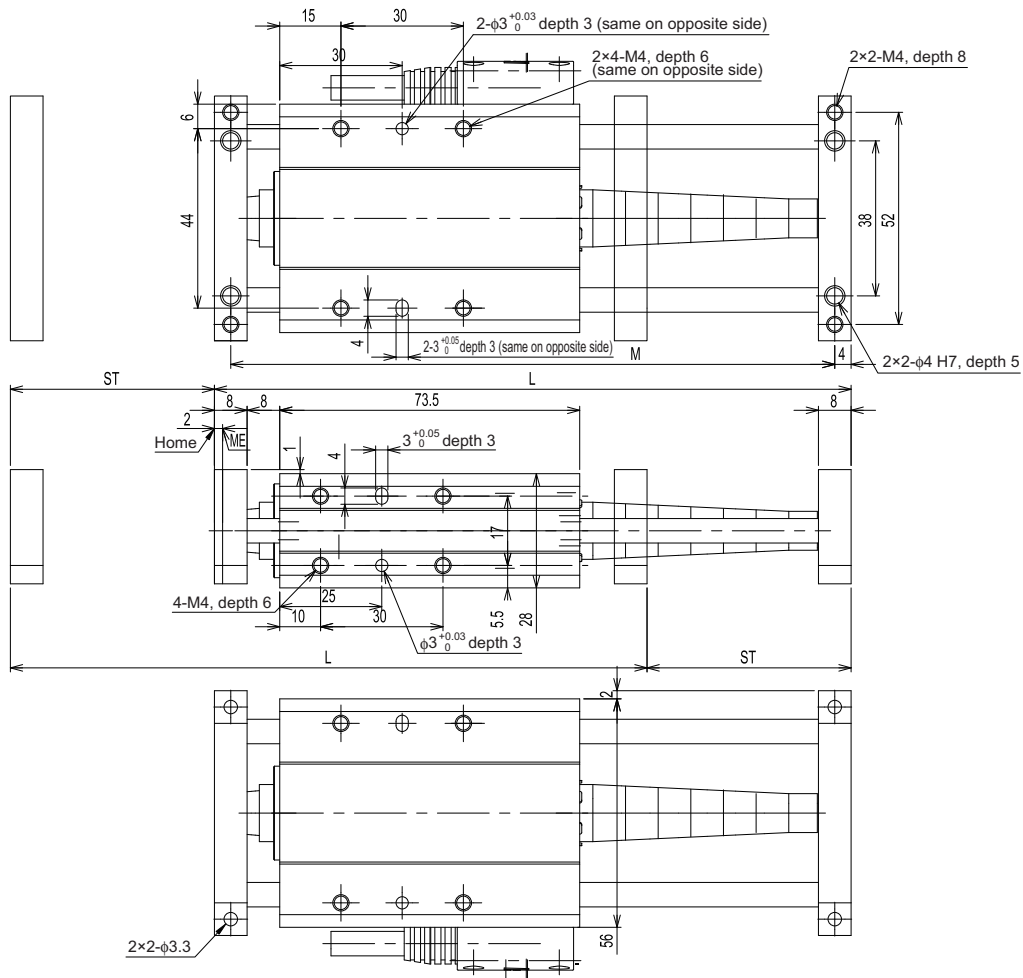
[Affixing the brackets]



**Caution :** If the brackets are to be affixed, the actuator cannot be installed vertically.

- SD3NA, SD3N (Lead screw, ball screw)

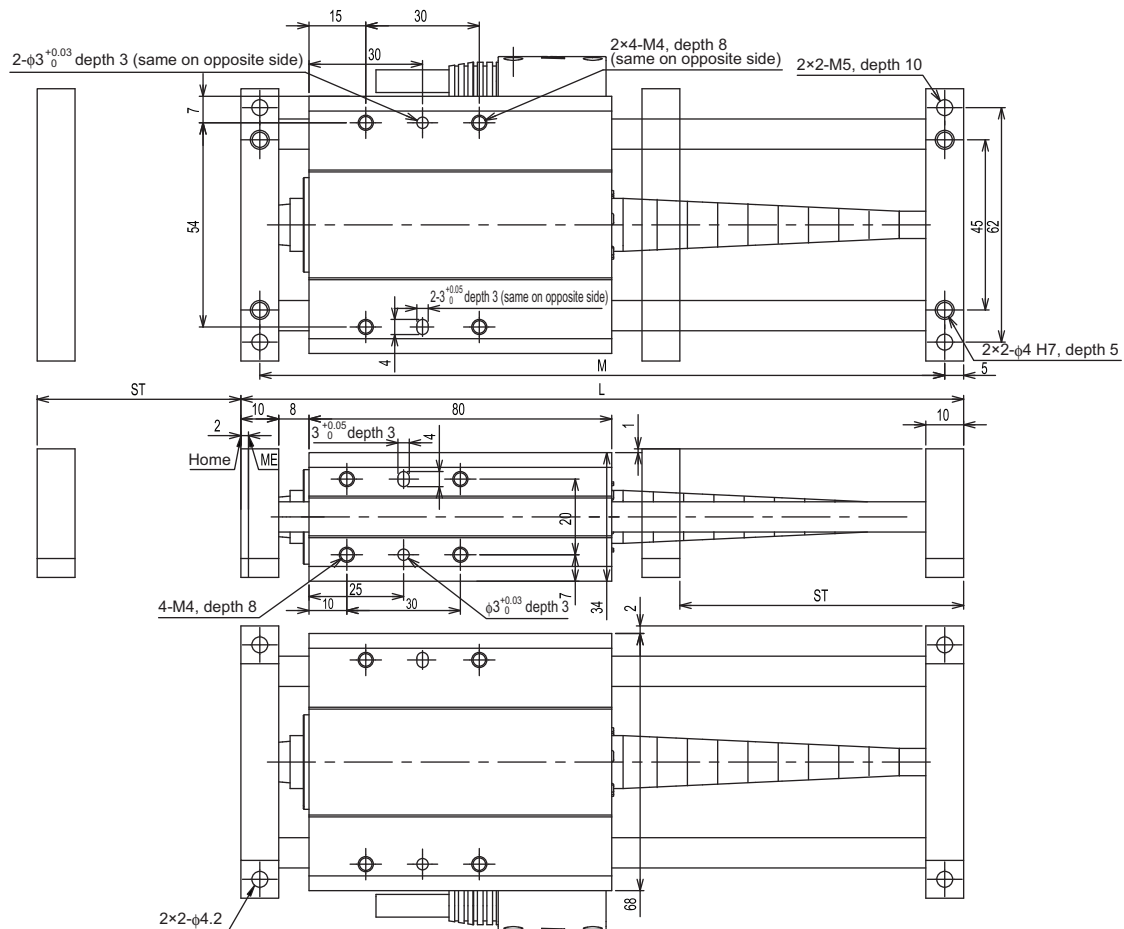
The actuator is structured in such a way that it can be affixed on any of its three sides.



ST	L	M
25	131	123
50	156	148

**Caution :** Some tapped mounting holes are through holes. Never use long screws exceeding the effective thread length. Such long screws may damage the internal mechanism or electrical parts.

- SD4NA, SD4N (Lead screw, ball screw),  
The actuator is structured in such a way that it can be affixed on any of its three sides.



ST	L	M
25	141	131
50	166	156
75	191	181

**Caution :** Some tapped mounting holes are through holes. Never use long screws exceeding the effective thread length. Such long screws may damage the internal mechanism or electrical parts.

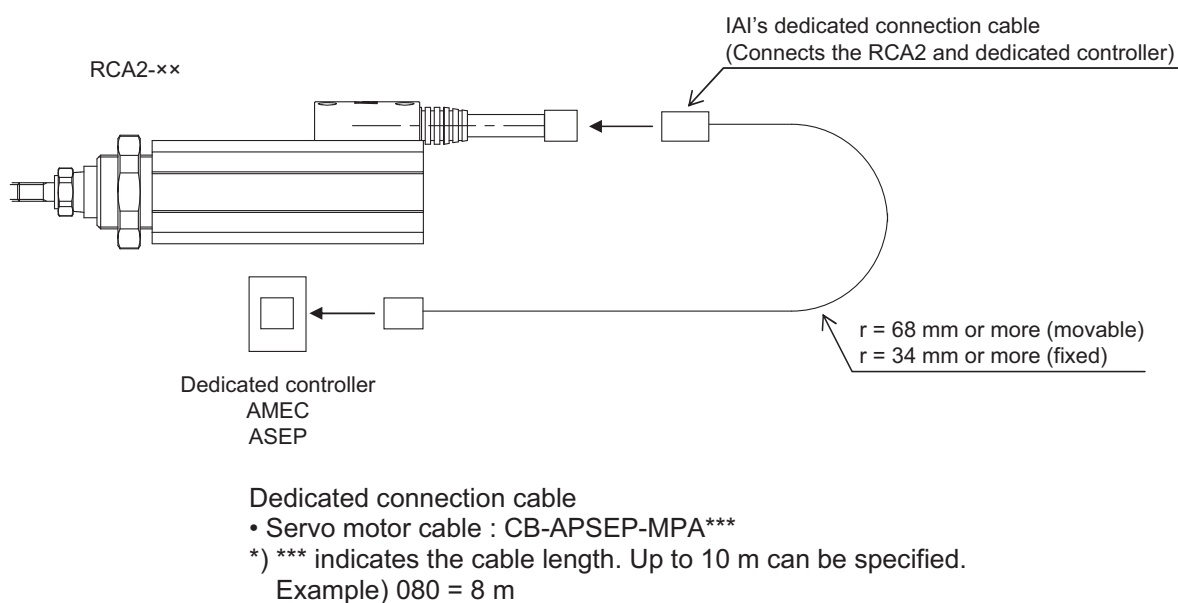
## 9. Connecting with Controller

Both for the controller itself and for the connection cable between the controller and RCA2 (actuator), use a dedicated IAI controller and dedicated connection cable.

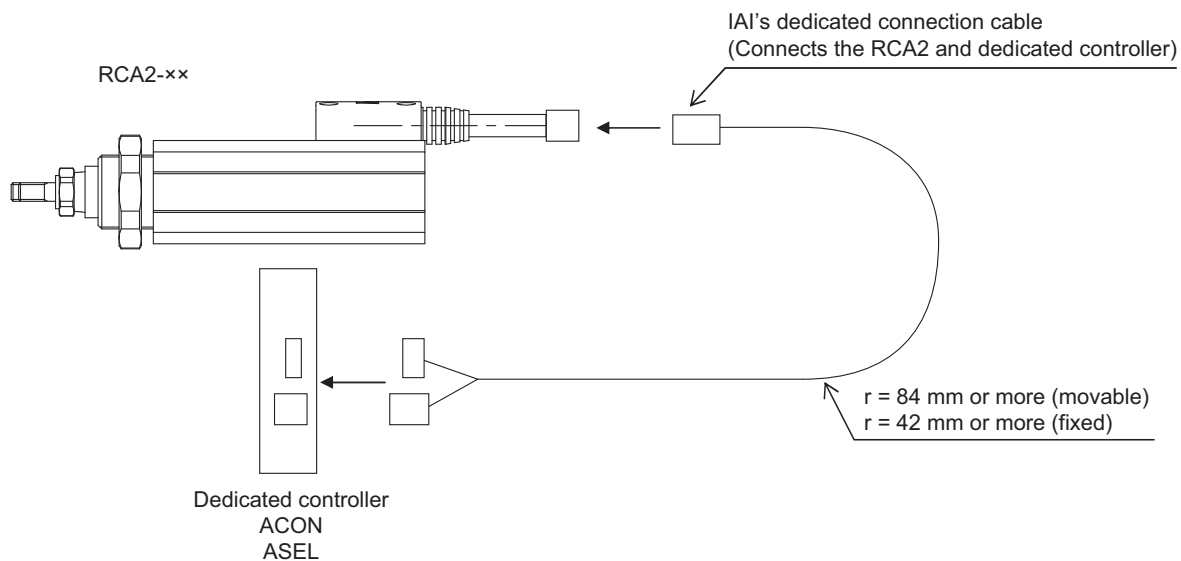
This section explains the wiring method for a single axis.

- If the dedicated connection cable cannot be secured, reduce the load on the cable by allowing it to deflect only by the weight of the cable or wire it in a self-standing cable hose, etc., having a large radius.
- Do not cut and reconnect the dedicated connection cable for extension or shorten the cable.
- Do not pull on the dedicated connection cable or bend it forcibly.

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



(Note) RCA2-SA2AC and SA2AR cannot be run with AMEC controller.



## Dedicated connection cable

- Servo motor cable : CB-ACS-MPA\*\*\*

\*) \*\*\* indicates the cable length. Up to 10 m can be specified.

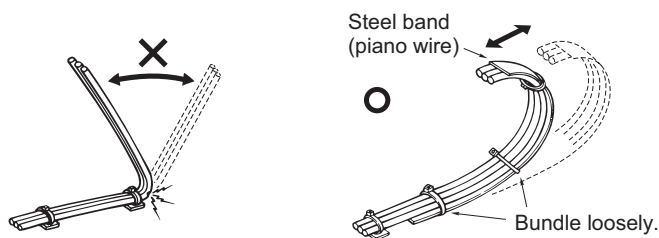
Example) 080 = 8 m

(Note) RCA2-SA2AC and SA2AR cannot be run with ASEL or ACON controller.

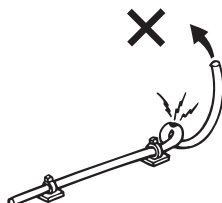


When building an application system using the actuator and controller, incorrect wiring or connection of each cable may cause broken wire, poor contact or other unexpected problem. The prohibited items relating to cable wiring are explained below.

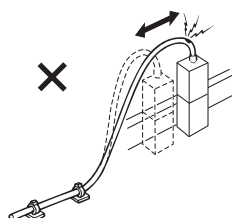
- Do not cut and reconnect the cable to extend or shorten the cable.
- If the cable cannot be secured, reduce the load on the cable by allowing it to deflect only by the weight of the cable or wire it in a self-standing cable hose, etc., having a large radius.
- Prevent the cable from bending at the same point.



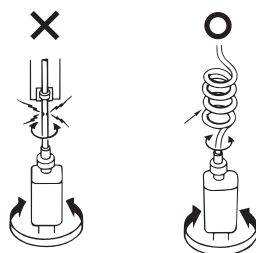
- Do not let the cable bend, kink or twist.



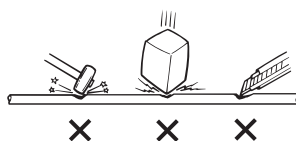
- Do not pull the cable with a strong force.



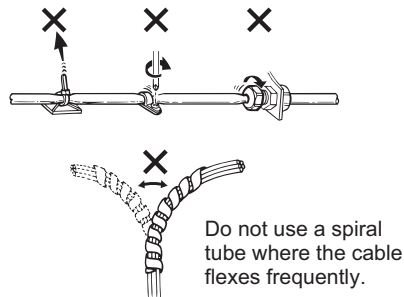
- Do not let the cable receive a turning force at a single point.



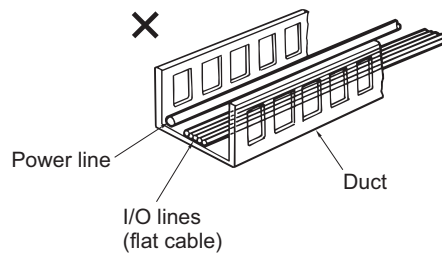
- Do not pinch, drop a heavy object onto or cut the cable.



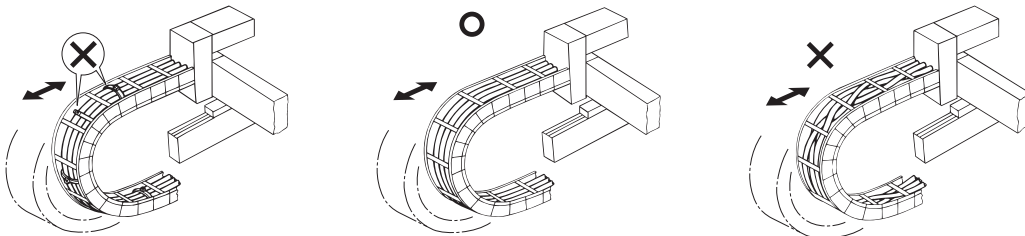
- When fixing the cable, provide a moderate slack and do not tension it too tight.



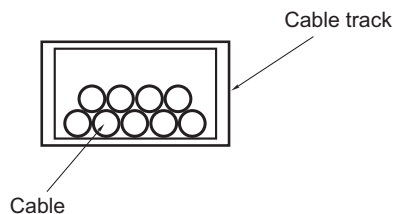
- Separate the I/O and communication lines from the power and drive lines. Do not wire them together in the same duct.



- Pay attention to the following points when using a cable track.
- Do not let the cable get tangled or kinked in a cable track 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 track.



## Warning

- Always turn off the controller power before connecting/disconnecting cables. If cables are connected/disconnected while the power is still supplied, the actuator may malfunction and a serious injury or equipment damage may occur.
- Loose connectors may cause the actuator to malfunction and create a dangerous situation. Be sure to confirm that all connectors are securely connected.

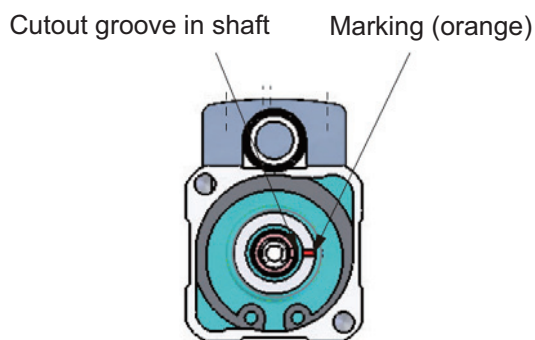
## 10. Notes on Operation

### 10.1 Placing a Load on the Actuator

- Do not exceed the load ratings given in the specification table below.
- Align the shaft center of the rod with the moving direction of the load.

### 10.2 How to Move Rod by Hand

In the case of the low lead types such as Lead 1 and 2 of RN3NA, RN3N, RN4NA, RN4N, RP3NA, RP3N, RP4NA, RP4N, GS3NA, GS3N, GS4NA, GS4N, GD3NA, GD3N, GD4NA, GD4N, SD3NA, SD3N, SD4NA and SD4N, the rod would not move even if trying to move manually because it is heavy. To move the rod on these models, insert a slotted screwdriver, etc., into the cutout groove provided in the shaft on the rear side and turn the groove.



(Note) The slide unit types have no cutout groove in the shaft. On these models, connect a controller to move the rod.

**Caution :** Do not attempt to move back and forth from the load side (rod side) for the low lead types (Lead 1 and 2).  
Moving it forcefully would apply too much load to the feed screw and may result in the cause of operational failure or destruction of the product.

## 10.3 Home Return

### 10.3.1 Home Return Operation

#### (1) RA2AC, RA2AR

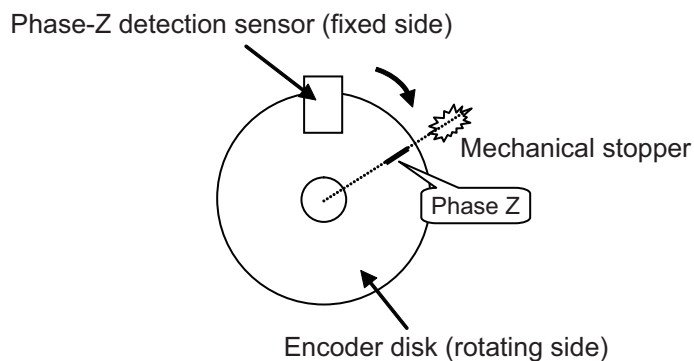
- [1] The actuator moves to the parameter direction set as the operational direction in the home return command.
- [2] It detects the mechanical end with the software in the home return operation.
- [3] After reversed at the end point, determines the point where Z-phase signal is detected as the datum point.
- [4] Furthermore, it moves in the offset amount set in the parameter and this point becomes the origin point.

The number of motor revolutions after the actuator hits the stopper till Z-phase signal is generated is already adjusted before the shipment.

The distance where it stops at the origin point after the slider hit the stopper then start reversing is 2mm in standard.

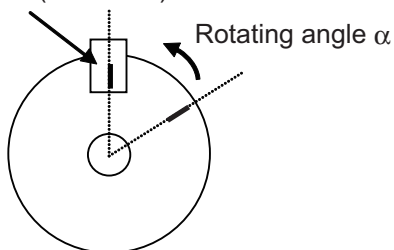
#### (2) RN3NA, RN3N, RN4NA, RN4N, RP3NA, RP3N, RP4NA, RP4N, GS3NA, GS3N, GS4NA, GS4N, GD3NA, GD3N, GD4NA, GD4N, SD3NA, SD3N, SD4NA, SD4N

- [1] As the motor turns, the rod returns to the negative side (actuator frame side) and contacts the mechanical stopper.



- [2] The rod reverses and turns by rotating angle  $\alpha$  to find encoder phase Z.

#### Phase-Z detection sensor (fixed side)

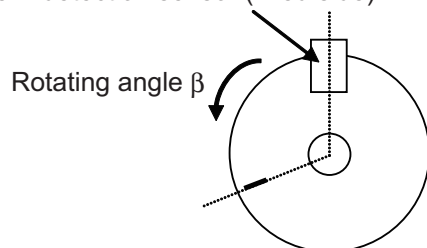


The distance from the mechanical stopper to the position where phase Z is detected is as follows.

Lead	1mm	2mm, 4mm, 6mm
Distance	0.5mm	0.8mm

- [3] The rod turns by rotating angle  $\beta$  from the position where phase Z was detected, and the attained offset position (the offset conform to an applicable parameter value) is set as the home (points zero).

Phase-Z detection sensor (fixed side)



The offset from the position where phase Z is detected to the home is 1.2 mm.

## 11. Life

### 11.1 Life of Actuator Using Ball Screws

Refer to the following for the product life of the ball screw type actuator assuming it was operated under the condition of maximum transportable weight, maximum acceleration and deceleration.

Model		Product Life (Reference)
RA2AC, RA2AR		5000km
RN3NA, RP3NA, GS3NA, GD3NA, SD3NA, RN3N, RP3N, GS3N, GD3N, SD3N	Lead 1mm	3000km
RN3NA, RP3NA, GS3NA, GD3NA, SD3NA, RN3N, RP3N, GS3N, GD3N, SD3N	Lead 2mm, 4mm	5000km
RN4NA, RP4NA, GS4NA, GD4NA, SD4NA, RN4N, RP4N, GS4N, GD4N, SD4N		5000km

### 11.2 Life of Actuator Using Lead Screws

The lead screw actuators adopt a lead screw and their nut wears over time. A reference for product life is presented based on the wear amount of the nut. The positioning precision of this product, such as lost motion, will drop as the wear of the nut progresses.

(Reference product life of lead screw types)

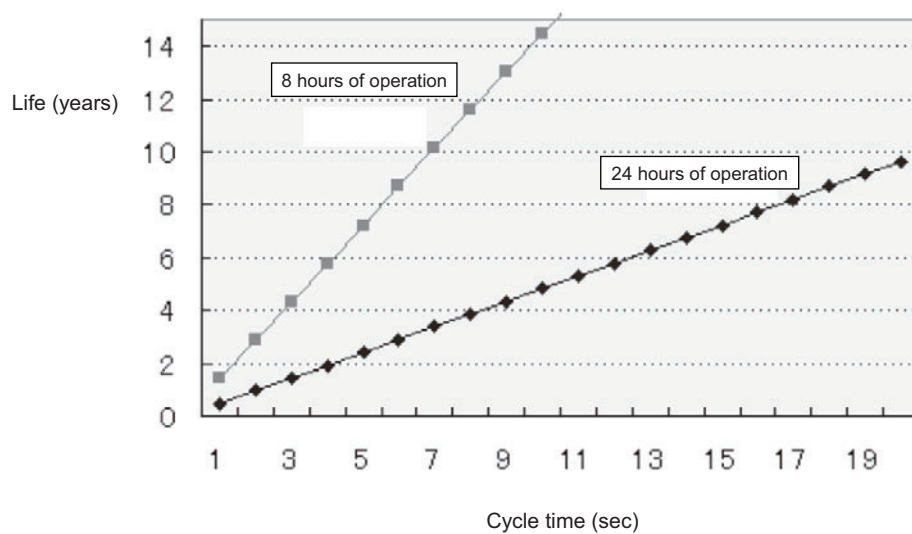
Horizontal application	10 million back-and-forth operations
Vertical application	5 million back-and-forth operations

#### 11.2.1 Relationship of Cycle Time and Product Life

##### (1) Horizontal application

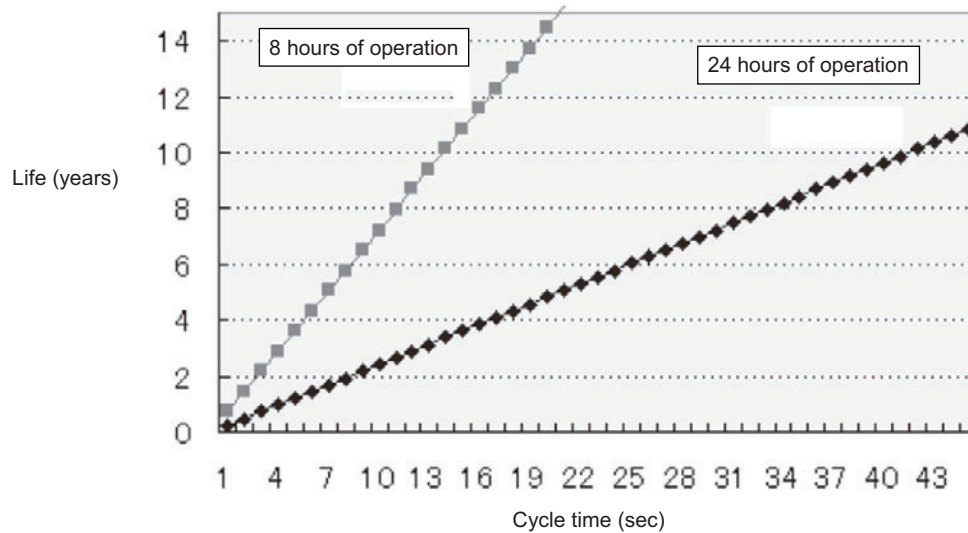
The graph below shows the relationship between the cycle time for one back-and-forth operation and the life of the product in a horizontal application (product life: 10 million back-and-forth operations).

The lines based on 8 hours of operation and 24 hours operations a day, for 240 days a year, are shown. Use this graph as a reference when determining the product life.



## (2) Vertical application

The graph below shows the relationship between the cycle time for one back-and-forth operation and the life of the product in a vertical application (product life: 5 million back-and-forth operations). The lines based on 8 hours of operation and 24 hours operations a day, for 240 days a year, are shown. Use this graph as a reference when determining the product life.





## 12. Maintenance and Inspection

### 12.1 Inspection Items and Timings

Perform maintenance and inspection at the timings specified below.

This schedule assumes 8 hours of operation a day.

If the actuator is operated continuously day and night or at a higher utilization rate, shorten the inspection intervals according to the situation.

(Lead screw types)

	Visual inspection of exterior	Inspection of interior	Greasing
Startup inspection	○		
1 month after startup	○		
3 months after startup	○	○	
6 months after startup	○	○	○
Every 6 months thereafter	○	○	○

(Ball screw types)

	Visual inspection of exterior	Inspection of interior	Greasing
Startup inspection	○		
1 month after startup	○		
6 months after startup	○	○	
12 months after startup	○	○	○
Every 6 months thereafter	○		
Every 12 months	○	○	○

### 12.2 Visual Inspection of Exterior

In the visual inspection of exterior, check the following items.

Actuator	Loose actuator mounting bolts, etc.
Cables	Scratches, connection at connectors
Spiral Cover	Scratches, dents, foreign object attached on cover
Overall	Abnormal noise, vibration

- The spiral cover is a consumable part. Its life is 2,000,000 cycles of back and forth operation as a reference.

Refer to 12.7 How to Replace Spiral Cover when replacing the spiral cover.

(Note) The life of the spiral cover varies due to the environment of use. Foreign object (dust, high-viscosity oil) attached on the surface could disturb the expansion and contraction operation, which leads to a shorter life. To obtain a longer life, clean the surface regularly.

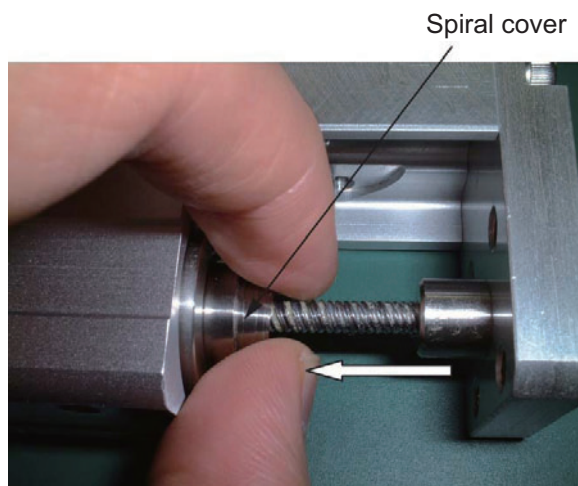
### 12.3 Cleaning

- Clean exterior surfaces as necessary.
- Use a soft cloth to wipe away dirt and buildup.
- To clean the spiral cover, use a soft cloth, etc., to wipe off soiling by working from the large diameter side toward the small diameter side.
- Do not blow too hard with compressed air as it may cause dust to get in through the gaps.
- Do not use oil-based solvents as they can harm lacquered and painted surfaces.
- To remove severe buildup, wipe gently with a soft cloth soaked in a neutral detergent or alcohol.

## 12.4 Inspection of Interior

When inspecting the interior, check the items specified below.

Main unit	Loose actuator mounting bolts, other loose items
Lead screw	Lubrication, buildup



To check the Lead screw or ball screw, turn off the power, extend the rod, and pull the narrower end of the spiral cover toward the wider end (in the direction of the arrow) to expose the screw shaft and inspect the shaft visually.

If the lead is too small and the rod does not move, insert a slotted screwdriver, etc., into the cutout groove provided in the shaft on the rear side and turn. [Refer to 10.2, "How to Move Rod by Hand."]

Visually check the lubrication condition of the Lead screw or ball screw.

Even when the grease is brown, the screw is lubricated properly as long as the traveling surface looks wet and shining. If the grease is mixed with dust and dirty or has no shiny appearance, or if the grease has lost its efficacy due to prolonged use, clean the applicable area and then replenish grease.

## 12.5 Internal Cleaning

- Use a soft cloth to wipe away dirt and buildup.
- Do not blow too hard with compressed air as it may cause dust to get in through the gaps.
- Do not use oil-based solvents, neutral detergent or alcohol.

## 12.6 Greasing

### 12.6.1 Applicable Grease

[Lead screw types]

All Lead screw products have been shipped with synthetic poly- $\alpha$  olefin grease applied to the Lead screw.

IAI uses the following grease in our plant.

Location	Manufacturer	Model number
Lead screw	Sumico Lubricant Co., Ltd.	Sumitec 308

Equivalent greases are also available from other manufacturers, but exercise caution when selecting the grease because the life of the product may be affected.

**⚠ Warning :**

Never use anything other than synthetic poly- $\alpha$  olefin grease. Mixing poly- $\alpha$  grease with other grease not only reduces the performance of the grease, it may even cause damage to the actuator.

[Ball screw types]

All ball screw products have been shipped with lithium grease applied to the ball screw.

IAI uses the following grease in our plant.

Location	Manufacturer	Model number
Ball screw	Idemitsu Kosan Co., Ltd.	Daphne Eponex Grease No. 2

**⚠ Warning :**

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

## 12.6.2 Greasing Method

For the ball screws of RA2AC and RA2AR, apply grease directly. For those equipped with spiral cover, follow the instruction below to apply grease.

- [1] Turn off the power and check the surface of the spiral cover for shavings, powder dust, etc. Use a waste cloth, etc., to wipe off shavings, powder dust, if any.
- [2] Extend the rod and pull the narrower end of the spiral cover toward the wider end (in the direction of the arrow) to expose the screw shaft. If the lead is too small and the rod does not move, insert a slotted screwdriver, etc., into the cutout groove provided in the shaft on the rear side and turn. [Refer to 10.2, "How to Move Rod by Hand".]



- [3] Wipe off grease attached to the Lead screw or ball screw and then apply the specified grease.
- [4] Install the spiral cover in the original condition and move the rod to spread the grease evenly.

⚠ 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.

## 12.7 How to Replace Spiral Cover

[Item required for replacement]

- Replacement spiral cover

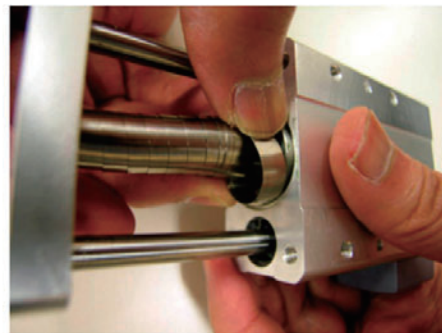
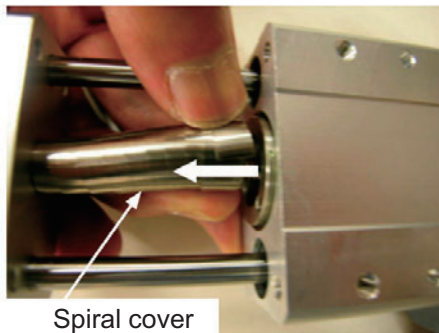
Stroke	Model
25mm, 30mm	RCA-SPC-30
50mm	RCA-SPC-50
75mm	RCA-SPC-75



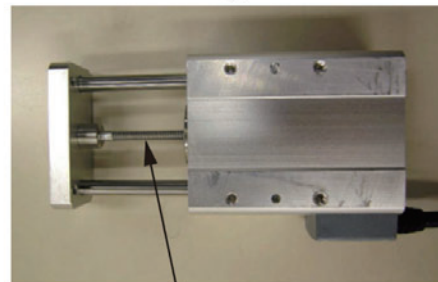
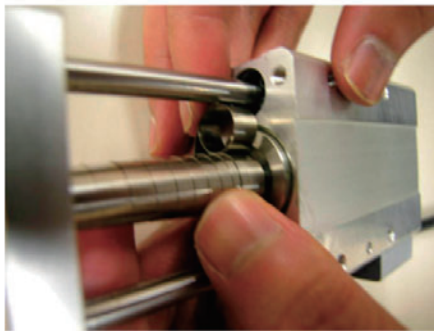
[Procedure]

[1] Remove the spiral cover.

Pull out the base of the spiral cover toward you and roll the edge of the cover.

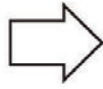


[2] Gradually roll the spiral cover to remove it.

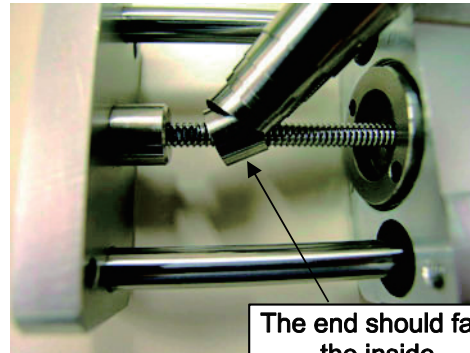


Screw shaft  
Wipe off old grease on the screw shaft.

[3] Pull out the thin side of the replacement spiral cover and take out the end hidden inside.

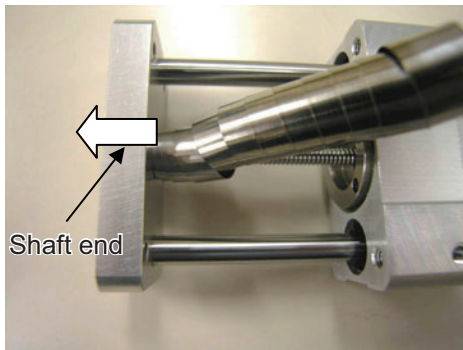


[4] Install the replacement spiral cover.  
Hook the end of the replacement spiral cover you have taken out. Once the end is hooked, orient the cover so that the end faces the inside.



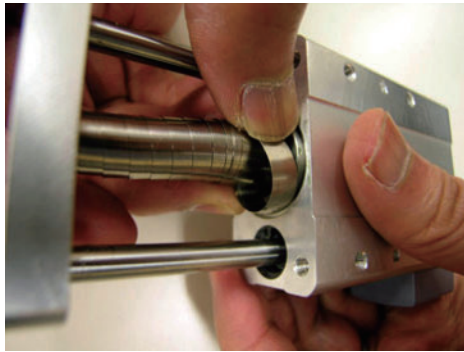
The end should face the inside.

[5] Push the end toward the shaft end while winding the cover a little.

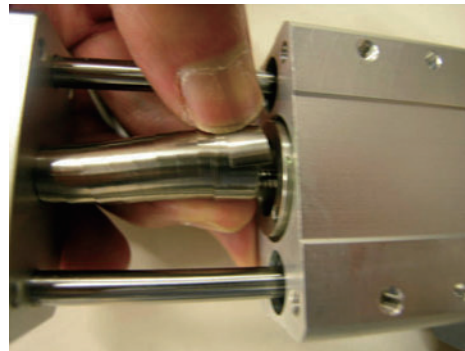
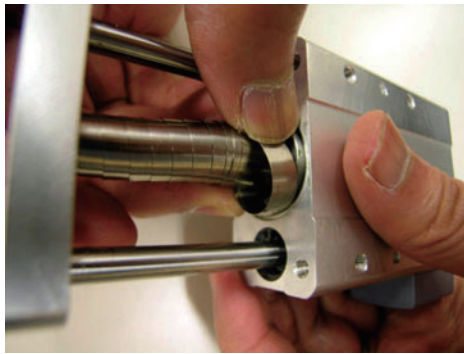




[6] Continue to wind the replacement spiral cover.



[7] Finally, orient the cover so that the end faces the outside, and push the cover into the actuator groove.



[8] Grease the screw shaft. [Refer to 12.6.2, "Greasing Method".]

## 13. Warranty

### 13.1 Warranty Period

One of the following periods, whichever is shorter:

- 18 months after shipment from IAI
- 12 months after delivery to the specified location
- 1,500 hours of operation
  - RN3NA, RN3N (Lead screw), RN4NA, RN4N (Lead screw)
  - RP3NA, RP3N (Lead screw), RP4NA, RP4N (Lead screw)
  - GS3NA, GS3N (Lead screw), GS4NA, GS4N (Lead screw)
  - GD3NA, GD3N (Lead screw), GD4NA, GD4N (Lead screw)
  - SD3NA, SD3N (Lead screw), SD4NA, SD4N (Lead screw)
- 2,500 hours of operation
  - RN3NA, RN3N (Ball screw), RN4NA, RN4N (Ball screw)
  - RP3NA, RP3N (Ball screw), RP4NA, RP4N (Ball screw)
  - GS3NA, GS3N (Ball screw), GS4NA, GS4N (Ball screw)
  - GD3NA, GD3N (Ball screw), GD4NA, GD4N (Ball screw)
  - SD3NA, SD3N (Ball screw), SD4NA, SD4N (Ball screw)

### 13.2 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 instruction manual and catalog.
- (4) The breakdown or problem in question was caused by a specification defect or problem, or by the poor quality of our product.

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

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

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

### 13.3 Honoring the Warranty

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

### 13.4 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.



### 13.5 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 instruction manual.

### 13.6 Other Items Excluded from Warranty

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

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

## Change History

Revision Date	Description of Revision	
May 2009	First edition	
October 2009	Second edition	Added 12.7, "How to Replace Spiral Cover"
March 2010	Third edition	Added [How to check and adjust the position of encoder phase Z] on p. 39 and 40. Added [How to check and adjust the position of encoder phase Z] on p. 49 and 50.
March 2010	Fourth edition	Changed the tolerance of dimension L to 0.1 mm on p. 36 and 46.
April 2011	Fifth edition	A page for CE Marking added Slim Type RA2A added
July 2011	Sixth edition	Contents changed in 7. Transportation in p. 9 to p. 10 Added RN3N (ball screw), RP3N (ball screw), GS3N (ball screw), and SD3N (ball screw) to Type on p. 31, Specification on p. 32 to 39, and Warranty on p. 91 p. 84 Spiral Cover added to 12.2 Visual Inspection of Exterior Contents changed in 13. Warranty in p. 89 to p. 90
August 2011	Seventh edition	Load capacity changed : RN3N (Ball screw) in p. 32 RP3N (Ball screw) and GS3N (Ball screw) in p. 33 GD3N (Ball screw) and SD3N (Ball screw) in p. 34 Lead 1     4kg → 3kg Lead 2     2kg → 1.5kg Lead 4     1kg → 0.75kg
January 2012	Eighth edition	Contents changed in Safety Guide in p. 1 to p. 5. Caution notes added for when working with two or more persons Weight added to external diagrams in p. 15 to p. 20 Change made to Dimension L for RN4N in p. 41
March 2012	Ninth edition	Model codes RN3NA, RN4NA, RP3NA, RP4NA, GS3NA, GS4NA, GD3NA, GD4NA, SD3NA, and SD4NA are added 50mm stroke ball screw type added to short type and single-guided type.
March 2012	Tenth edition	Contents added and changed in Safety Guide on p. 1 to p. 7 Note "Make sure to attach the actuator properly by following this instruction manual." added in Handling Precautions in p. 8 Warning notes added such as in case the grease got into your eye, immediately go to see the doctor for an appropriate care in p. 84





## ***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)