



ROBO Cylinder RCA2/RCA2CR/RCA2W Actuator Rod Type Instruction Manual

===== Nineteenth Edition =====

Standard type RCA2

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, GD4ND GD3N, GD4N
Slide unit types:	[Slim Small ROBO Cylinders] SD3NA, SD4NA SD3N, SD4N

Cleanroom type RCA2CR Dust-proof type RCA2W

Short types (nut affixing types):	[Slim Small ROBO Cylinders] RN3NB, RN4NB, RN3NA, RN4NA
Short types (tapped-hole mounting types):	[Slim Small ROBO Cylinders] RP3NB, RP4NB, RP3NA, RP4NA
Single guide types:	[Slim Small ROBO Cylinders] GS3NB, GS4NB, GS3NA, GS4NA
Double guide types:	[Slim Small ROBO Cylinders] GD3NB, GD4NB, GD3NA, GD4NA
Slide unit types:	[Slim Small ROBO Cylinders] SD3NB, SD4NB, SD3NA, SD4NA



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 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.
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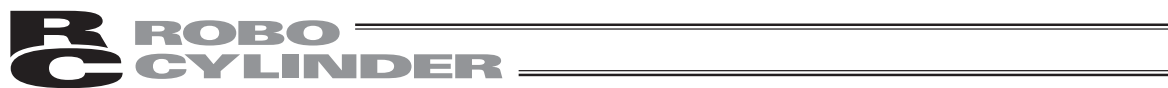
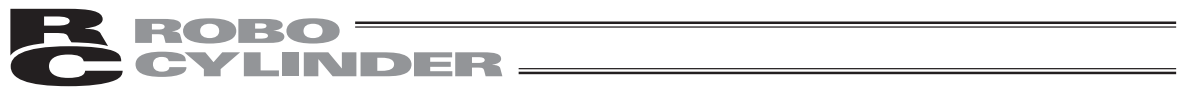


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Safety Guide

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

Safety Precautions for Our Products

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

No.	Operation Description	Description
1	Model Selection	<ul style="list-style-type: none">• 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">1) Medical equipment used to maintain, control or otherwise affect human life or physical health.2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility)3) Important safety parts of machinery (Safety device, etc.)• Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product.• Do not use it in any of the following environments.<ol style="list-style-type: none">1) Location where there is any inflammable gas, inflammable object or explosive2) Place with potential exposure to radiation3) Location with the ambient temperature or relative humidity exceeding the specification range4) Location where radiant heat is added from direct sunlight or other large heat source5) Location where condensation occurs due to abrupt temperature changes6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid)7) Location exposed to significant amount of dust, salt or iron powder8) Location subject to direct vibration or impact• 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.

No.	Operation Description	Description
2	Transportation	<ul style="list-style-type: none"> • When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane. • 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. • 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. • 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. • Do not step or sit on the package. • Do not put any heavy thing that can deform the package, on it. • When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work. • When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit. • Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. • Do not get on the load that is hung on a crane. • Do not leave a load hung up with a crane. • Do not stand under the load that is hung up with a crane.
3	Storage and Preservation	<ul style="list-style-type: none"> • The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation. • Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.
4	Installation and Start	<p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> • 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. • 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. • When using the product in any of the places specified below, provide a sufficient shield. <ol style="list-style-type: none"> 1) Location where electric noise is generated 2) Location where high electrical or magnetic field is present 3) Location with the mains or power lines passing nearby 4) Location where the product may come in contact with water, oil or chemical droplets

No.	Operation Description	Description
4	Installation and Start	<p>(2) Cable Wiring</p> <ul style="list-style-type: none"> ● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. ● 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. ● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. ● 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. ● 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. ● 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. <p>(3) Grounding</p> <ul style="list-style-type: none"> ● 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. ● 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 0.5mm² (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). ● Perform Class D Grounding (former Class 3 Grounding with ground resistance 100Ω or below).





No.	Operation Description	Description
4	Installation and Start	<p>(4) Safety Measures</p> <ul style="list-style-type: none"> • 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. • 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. • Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation. • 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. • 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. • 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. • Take the measure so that the work part is not dropped in power failure or emergency stop. • Wear protection gloves, goggle or safety shoes, as necessary, to secure safety. • 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. • 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.
5	Teaching	<ul style="list-style-type: none"> • 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. • 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. • 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. • 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. • Place a sign "Under Operation" at the position easy to see. • 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. <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"> • 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. • After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation. • 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. • 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. • 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.
7	Automatic Operation	<ul style="list-style-type: none"> • Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence. • Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication. • Make sure to operate automatic operation start from outside of the safety protection fence. • 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. • 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.

No.	Operation Description	Description
8	Maintenance and Inspection	<ul style="list-style-type: none"> • 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. • 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. • When the work is to be performed inside the safety protection fence, basically turn OFF the power switch. • 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. • 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. • Place a sign “Under Operation” at the position easy to see. • For the grease for the guide or ball screw, use appropriate grease according to the Instruction Manual for each model. • Do not perform the dielectric strength test. Failure to do so may result in a damage to the product. • 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. • 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. • 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. Use in incomplete condition may cause damage to the product or an injury. <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"> • Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.
10	Disposal	<ul style="list-style-type: none"> • When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste. • When removing the actuator for disposal, pay attention to drop of components when detaching screws. • Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.
11	Other	<ul style="list-style-type: none"> • 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. • See Overseas Specifications Compliance Manual to check whether complies if necessary. • For the handling of actuators and controllers, follow the dedicated instruction manual of each unit to ensure the safety.

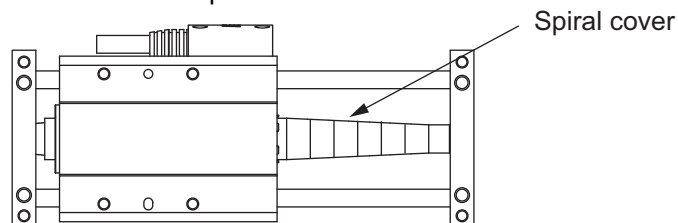
Alert Indication

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.

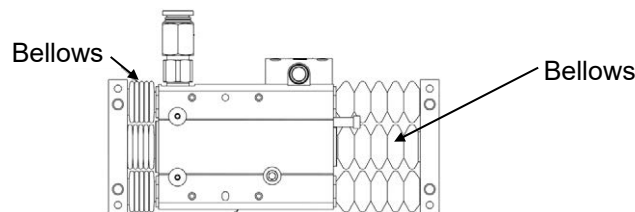
Level	Degree of Danger and Damage	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	 Danger
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could 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

Caution in Handling

1. Make sure to follow the usage condition, environment and specification range of the product.
In case it is not secured, it may cause a drop in performance or malfunction of the product.
2. Do not conduct any treatment or operation that is not stated in this instruction manual.
3. It is recommended to apply our products for the wiring between the actuator and the controller.
4. Do not attempt to establish the settings for the speed and acceleration/deceleration above the maximum specification.
An operation with speed and acceleration/deceleration beyond the allowable range may cause an abnormal noise, vibration, malfunction or shortened life.
Setting the acceleration/deceleration exceeding the applicable rating may also cause creep.
5. 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.
6. Do not apply impact to the spiral cover with tools or push it hard with fingers.
Do not apply high load on the bellows.
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.




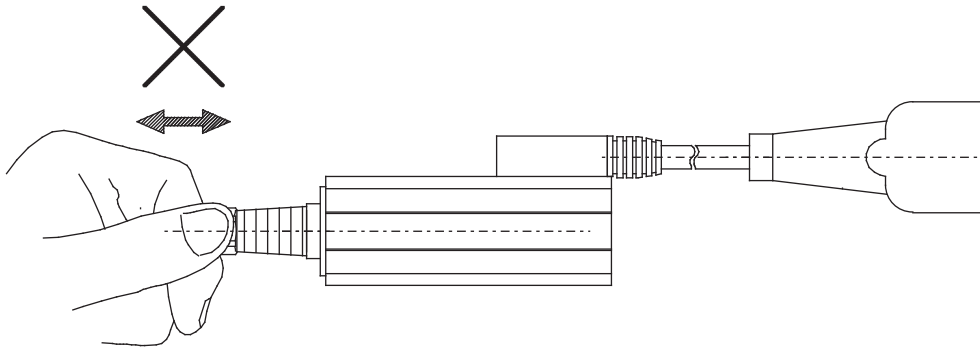
The bellows are made of rubber. High load on them may cause breakage.




7. 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.

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

 **Caution:** 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.




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

 **Caution:** You will feel high resistance if you hold the rod and try to slide it with hand for Low Lead Type. 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. For the types with no brake, twist the rotation shaft with a screwdriver from the back side to move the actuator.
[Refer to 4.4 "How to Move Rod by Hand"]
For the standard type equipped with a brake, cleanroom type and dust-proof type there is no slit on the shaft. Connect the controller and move the table.

10. For the brake-equipped (option), there is a risk of the body temperature getting high during operation.

The surface temperature on the aluminum frame rises in approximately 30degC to the ambient temperature.

 **Caution:** Be careful not to get burnt when touching the actuator.

11. If it is necessary to change the orientation of cable ejection of the connector after the product has already been delivered, please contact IAI.

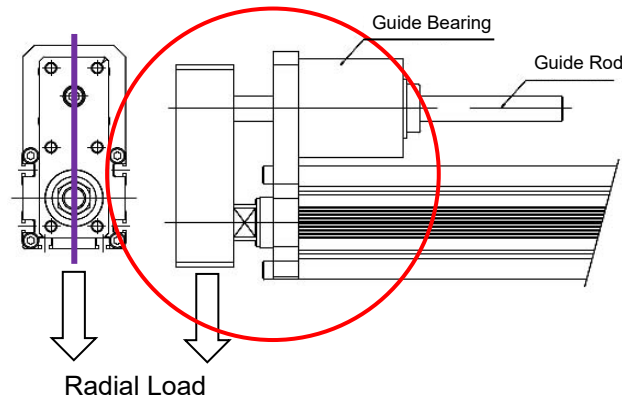
In case that you change the orientation of cable ejection by your own, we will not be able to guarantee the product as there is a concern of malfunction due to a reason such as pinching of wire inside the motor unit.

12. 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.

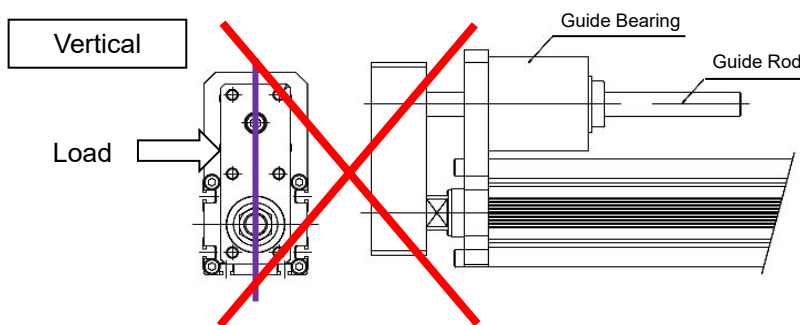
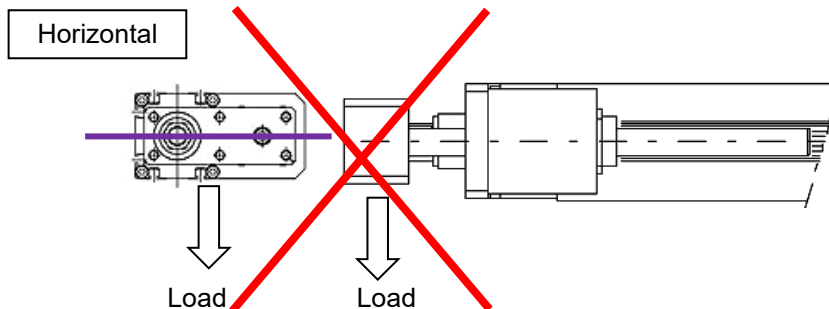
13. Make sure to attach the guides on cleanroom type and dust-proof type with short length specification (RP*NA/RP*NB/RN*NA/RN*NB).
Make sure to attach the guides when using cleanroom type and dust-proof type with short length specification (RP*NA/RP*NB/RN*NA/RN*NB) even though the bellows function as a simple guides and operation can be conducted without attaching the guides. Performing operation without guides has to be limited to the first operation check only, and should be restricted to 10 times at maximum of home-return operation and 100 times at maximum of back and forth operation. Keeping operation can cause looseness to the bellows attachment.
14. Do not attempt to conduct air purging for dust-proof type.
Conducting air purging may cause to break the bellows or drop the life of them remarkably.

15. Do not attempt to apply any force except for the radial load to actuators equipped with the single guide. Applying force other than radial load could cause a failure on the actuator.

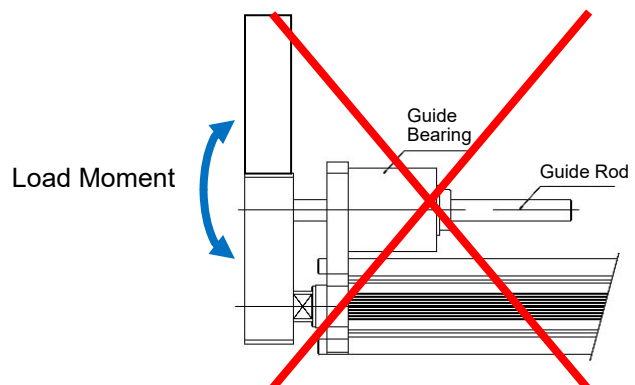
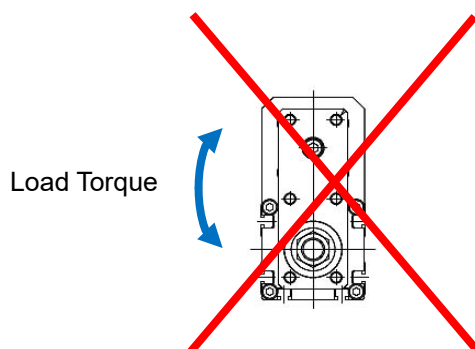
Single guide can receive load only to the vertical direction shown in the figure below (the direction of a line that the rod tip and guide rod tip are joined).



[Direction Unacceptable to Receive Load]



Do not attempt to use the unit in an environment that load torque or load moment can be applied as shown in the figures below.



International Standards Compliances

This actuator complies with the following overseas standard.
Refer to Overseas Standard Compliance Manual (ME0287) for more detailed information.

RoHS Directive	CE Marking
<input type="radio"/>	<input type="radio"/>

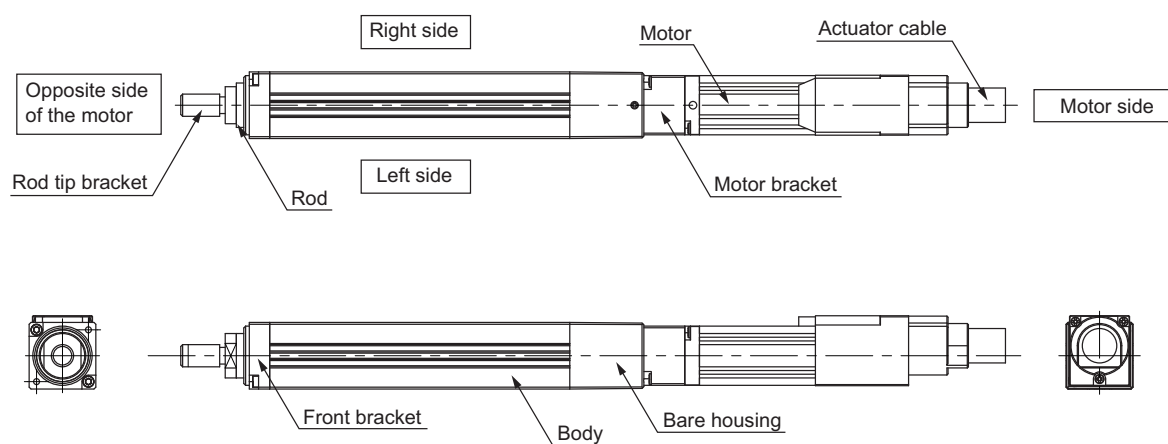
Names of the Parts

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

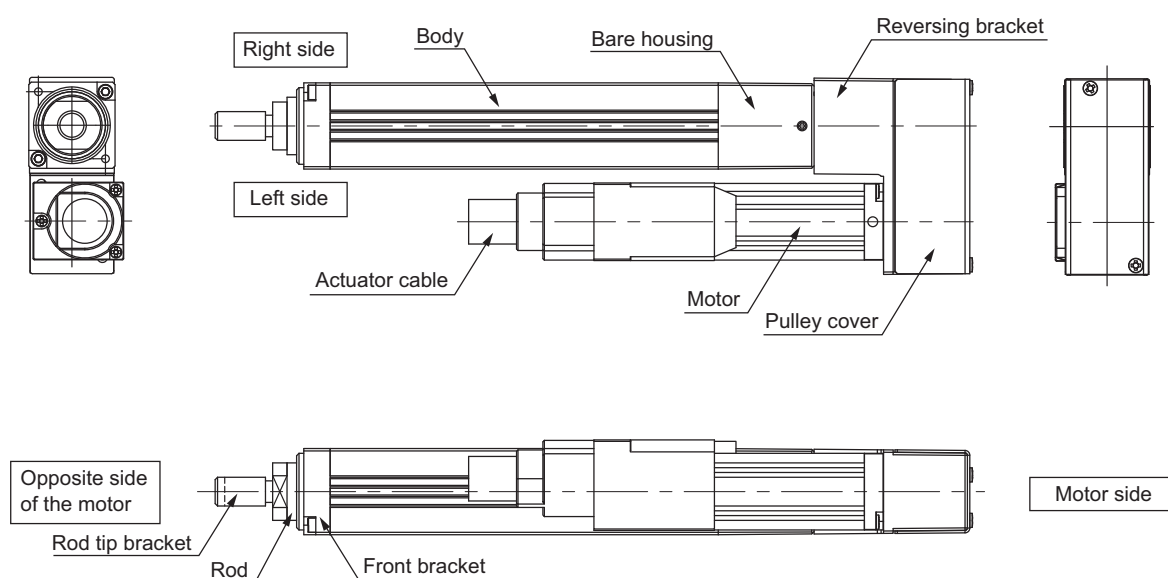
1. Slim Types

RCA2-RA2AC (Motor coupling types),
RA2AR (Motor reversing types)

• RA2AC

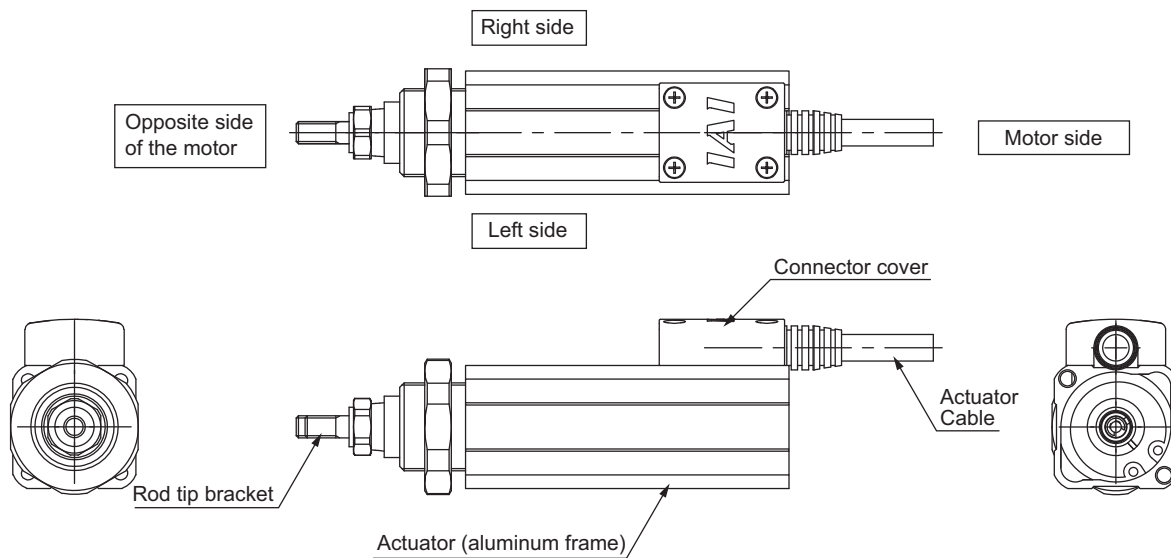


• RA2AR

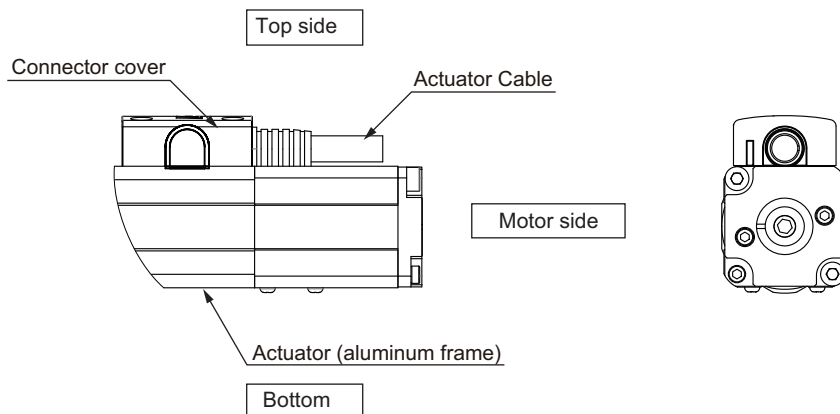


2. Short Types (Nut Affixing Types)

- Without brake
 RCA2-RN3NA/RN3N (Lead screw, ball screw),
 RCA2-RN4NA/RN4N (Lead screw, ball screw)

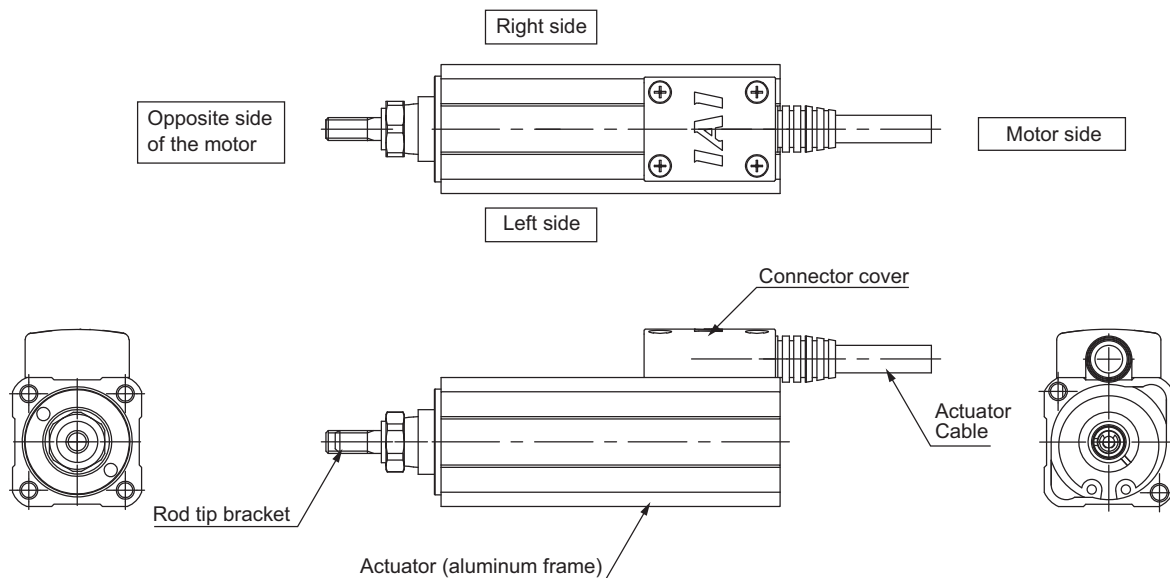


- Brake-equipped type
 RCA2-RN3NA (Lead screw, ball screw)
 RCA2-RN4NA (Lead screw, ball screw)

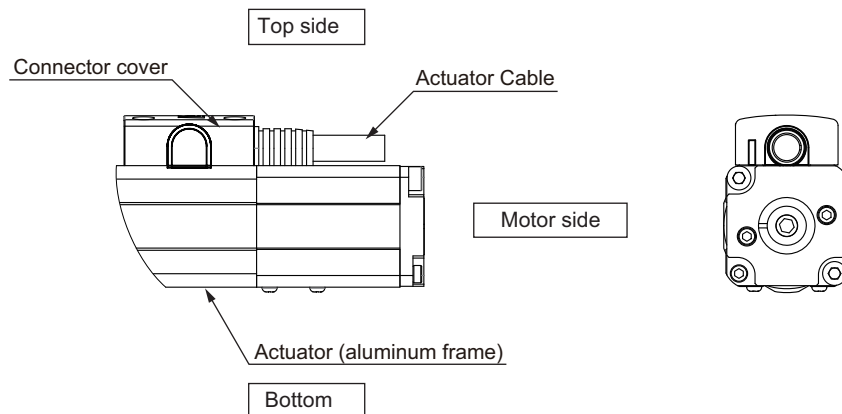


3. Short Types (Tapped-hole Mounting Types)

- Without brake
 RCA2-RP3NA/RP3N (Lead screw, ball screw),
 RCA2-RP4NA/RP4N (Lead screw, ball screw)

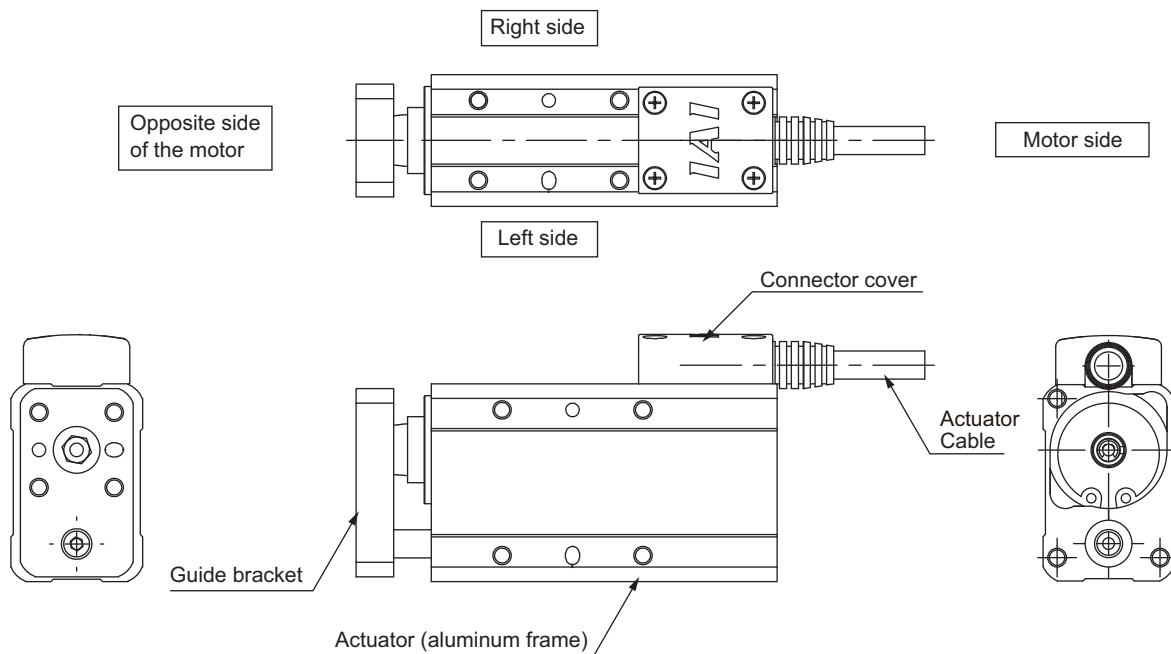


- Brake-equipped type
 RCA2-RP3NA (Lead screw, ball screw),
 RCA2-RP4NA (Lead screw, ball screw)

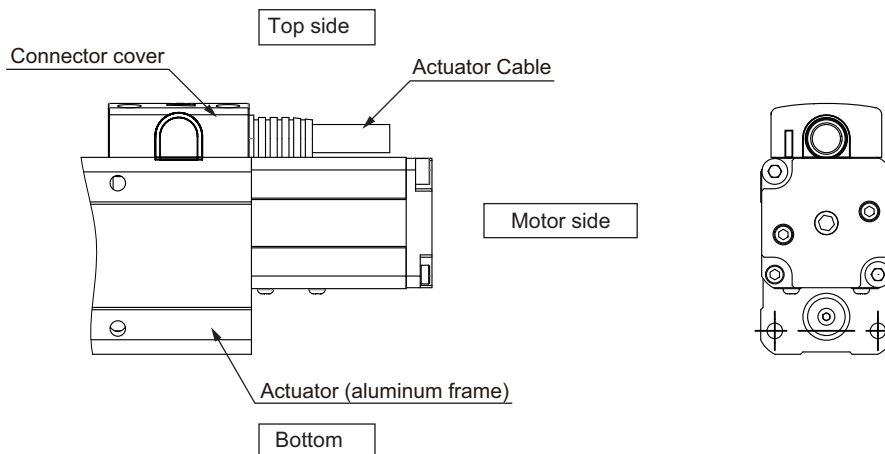


4. Single Guide Types

- Without brake
 RCA2-GS3NA/GS3N (Lead screw, ball screw),
 RCA2-GS4NA/GS4N (Lead screw, ball screw)

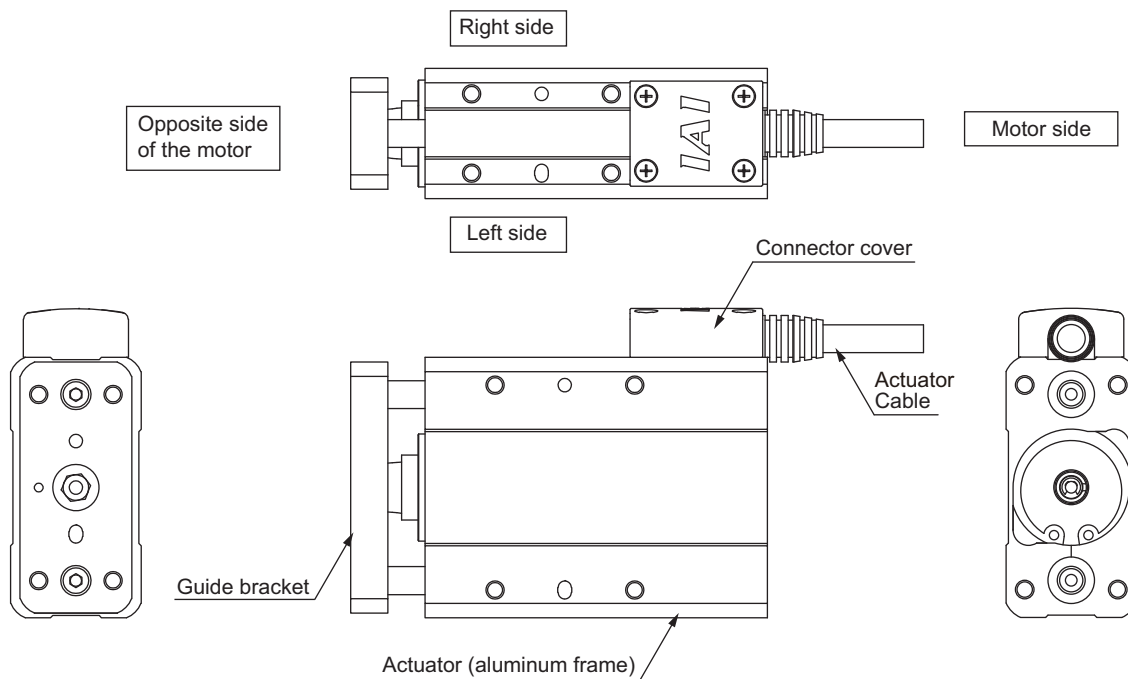


- Brake-equipped type
 RCA2-GS3NA (Lead screw, ball screw),
 RCA2-GS4NA (Lead screw, ball screw)

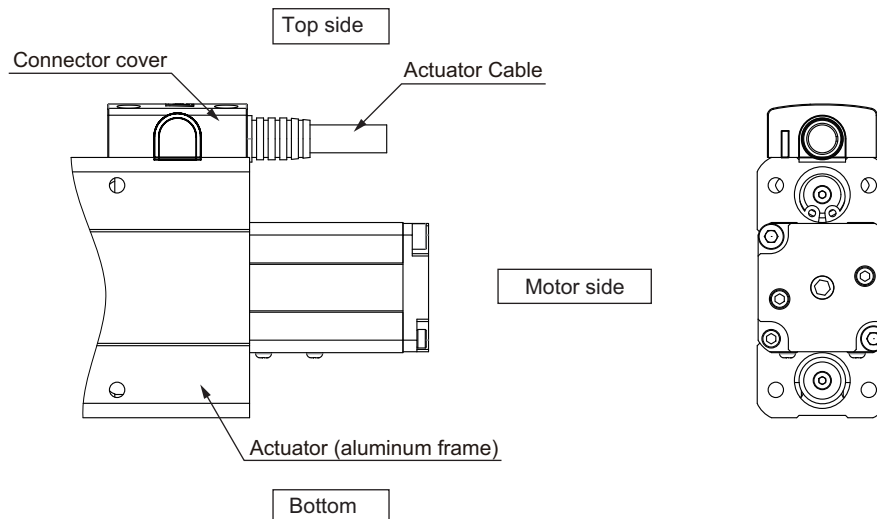


5. Double Guide Types

- Without brake
RCA2-GD3NA/GD3N (Lead screw, ball screw),
RCA2-GD4NA/GD4N (Lead screw, ball screw)

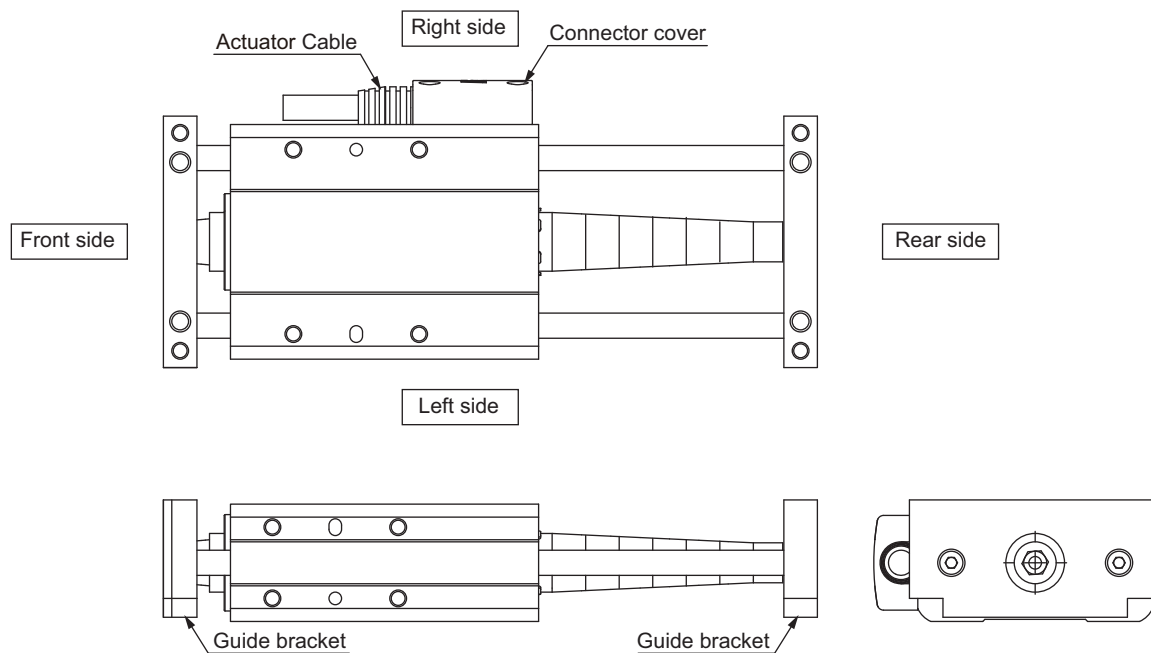


- Brake-equipped type
RCA2-GD3NA (Lead screw, ball screw),
RCA2-GD4NA (Lead screw, ball screw)



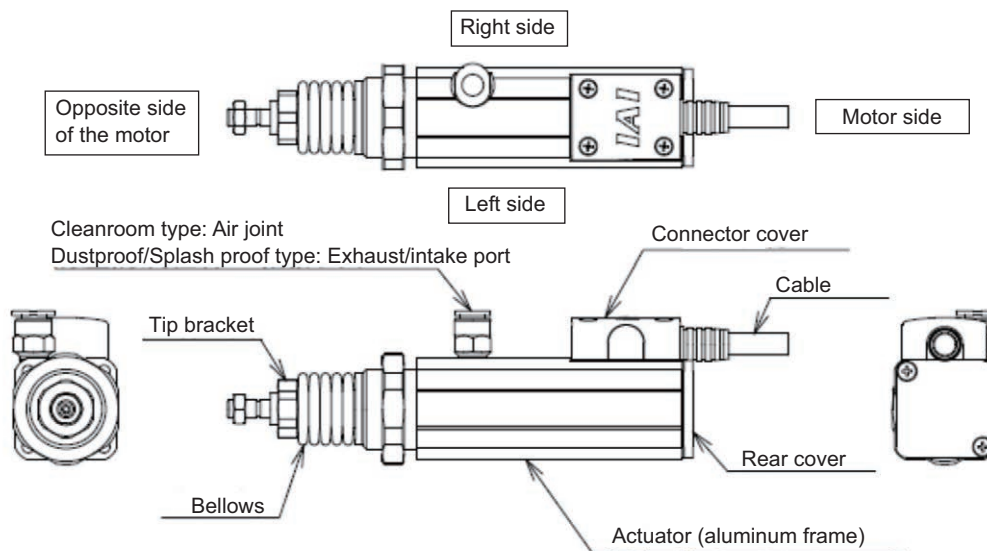
6. Slide Unit Types

- Without brake
RCA2-SD3NA/SD3N (Lead screw, ball screw),
RCA2-SD4NA/SD4N (Lead screw, ball screw)

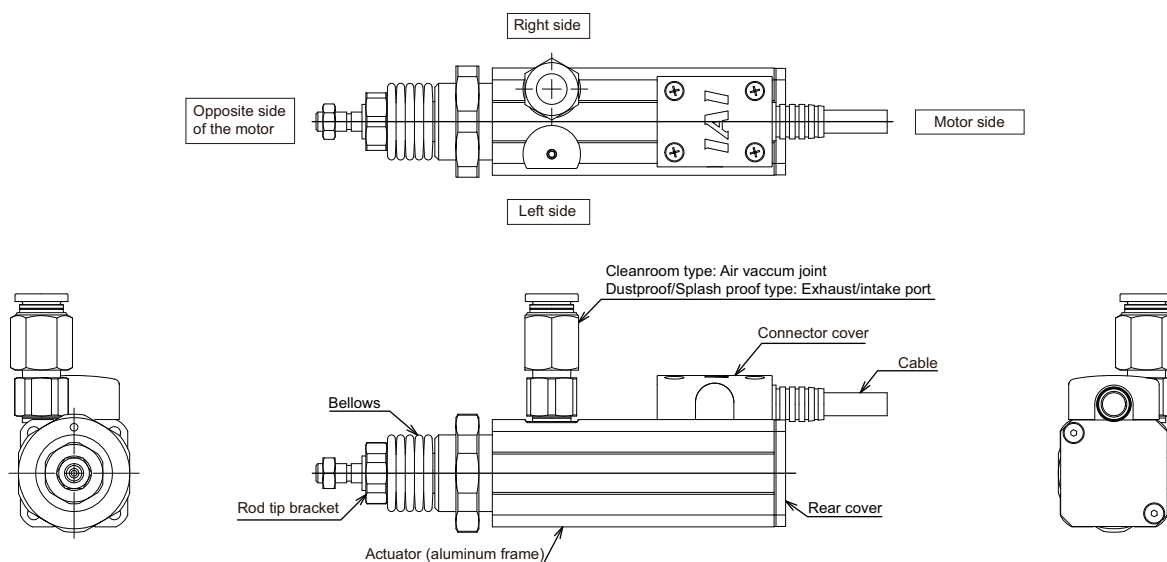


7. Cleanroom Type, Dust-proof Type Short Types (Nut Affixing Types)

- Without brake
RCA2CR, RCA2W-RN3NB (Ball screw),
RN4NB (Ball screw)

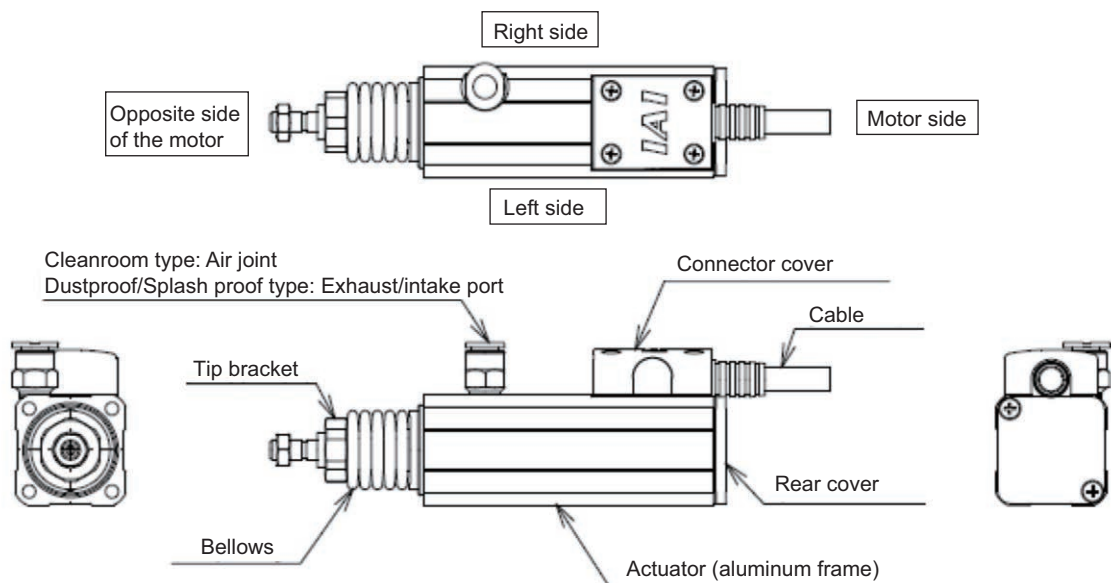


- Without brake
RCA2CR, RCA2W-RN3NA (Ball screw),
RN4NA (Ball screw)

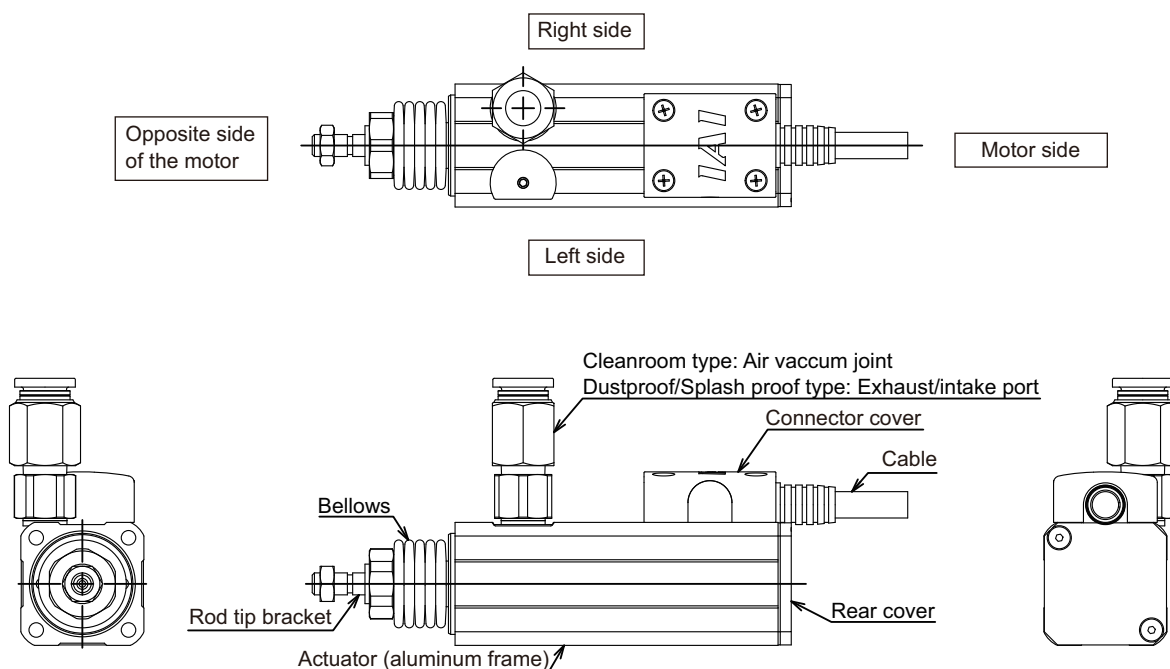


8. Cleanroom Type, Dust-proof Type Short Types (Tapped-hole Mounting Types)

- Without brake
RCA2CR, RCA2W-RP3NB (Ball screw),
RP4NB (Ball screw)

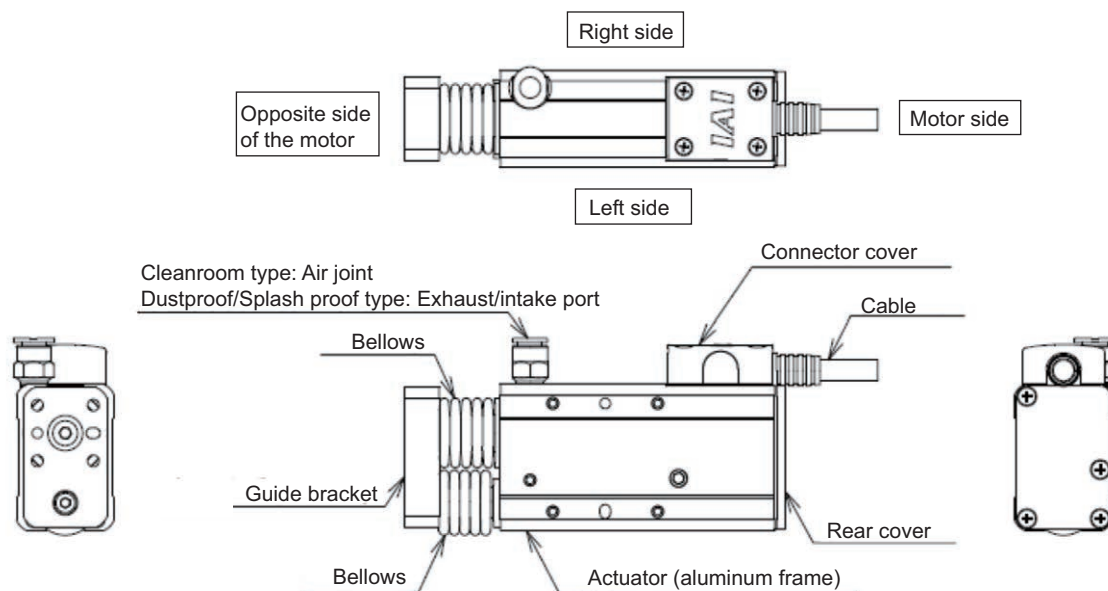


- Without brake
RCA2CR, RCA2W-RP3NA (Ball screw),
RP4NA (Ball screw)

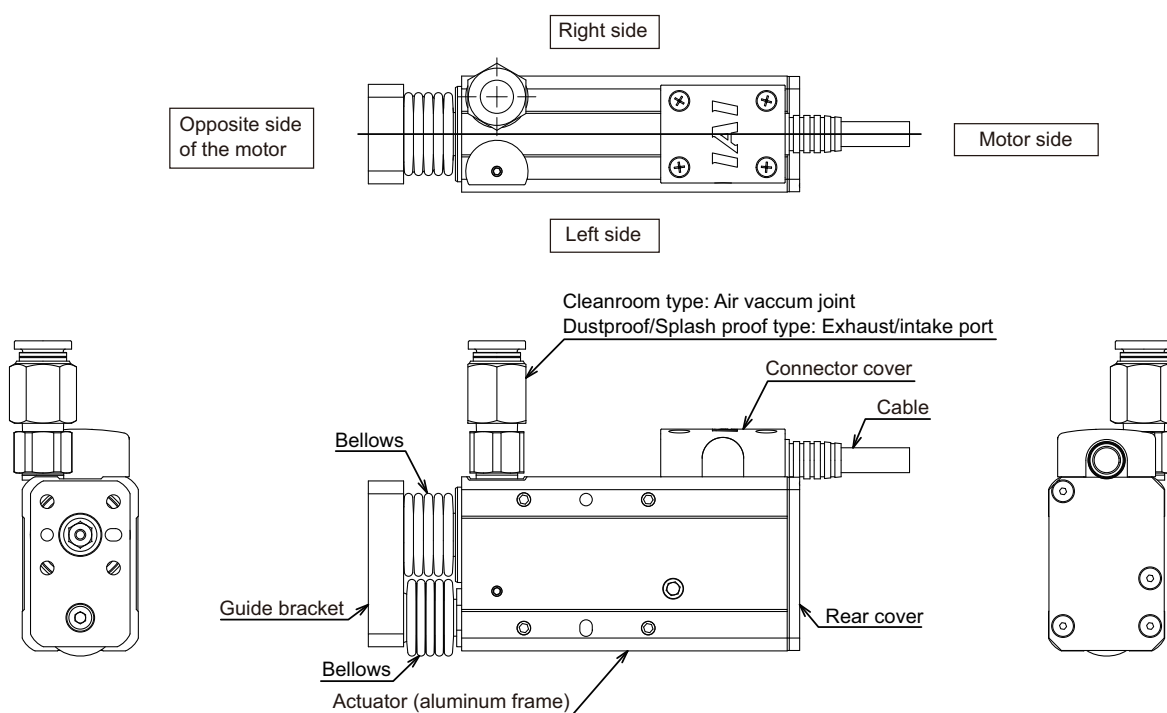


9. Cleanroom Type, Dust-proof Type Single Guide Types

- Without brake
RCA2CR, RCA2W-GS3NB (Ball screw),
GS4NB (Ball screw)

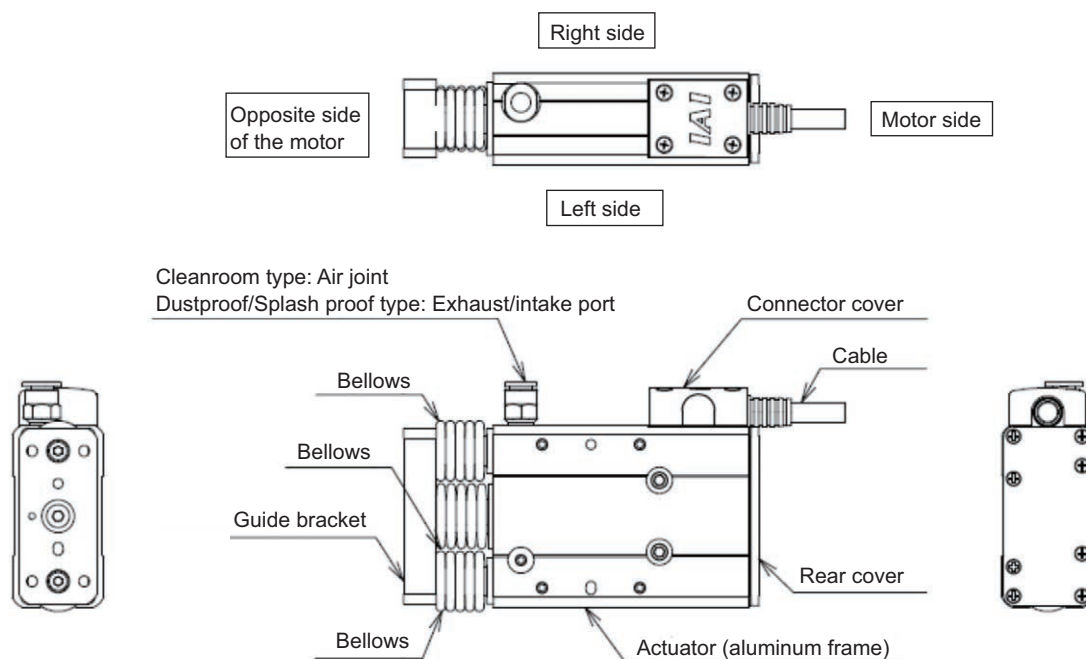


- Without brake
RCA2CR, RCA2W-GS3NA (Ball screw),
GS4NA (Ball screw)

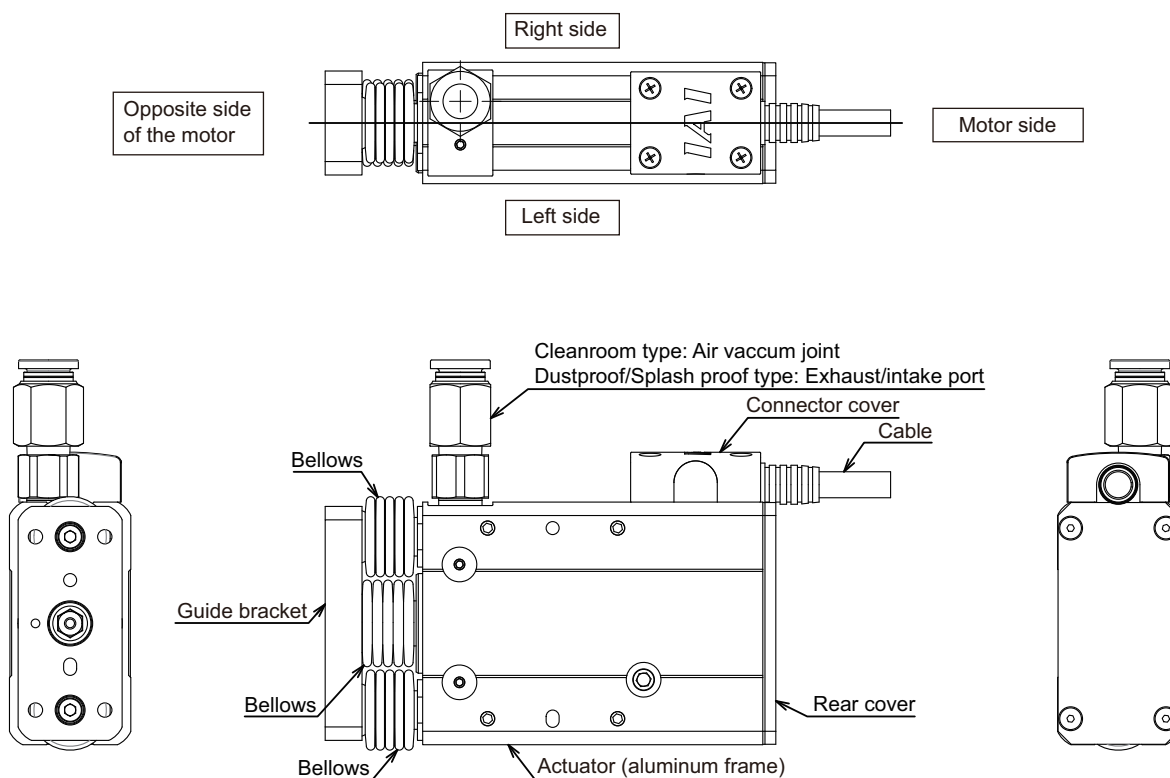


10. Cleanroom Type, Dust-proof Type Double Guide Types

- Without brake
RCA2CR, RCA2W-GD3NB (Ball screw),
GD4NB (Ball screw)

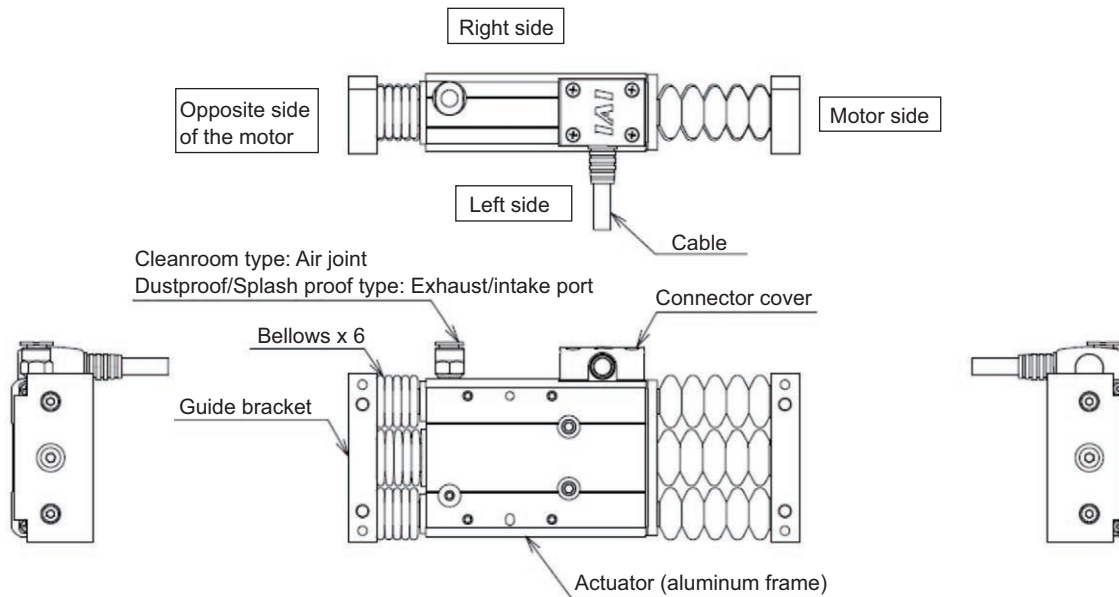


- Without brake
RCA2CR, RCA2W-GD3NA (Ball screw),
GD4NA (Ball screw)

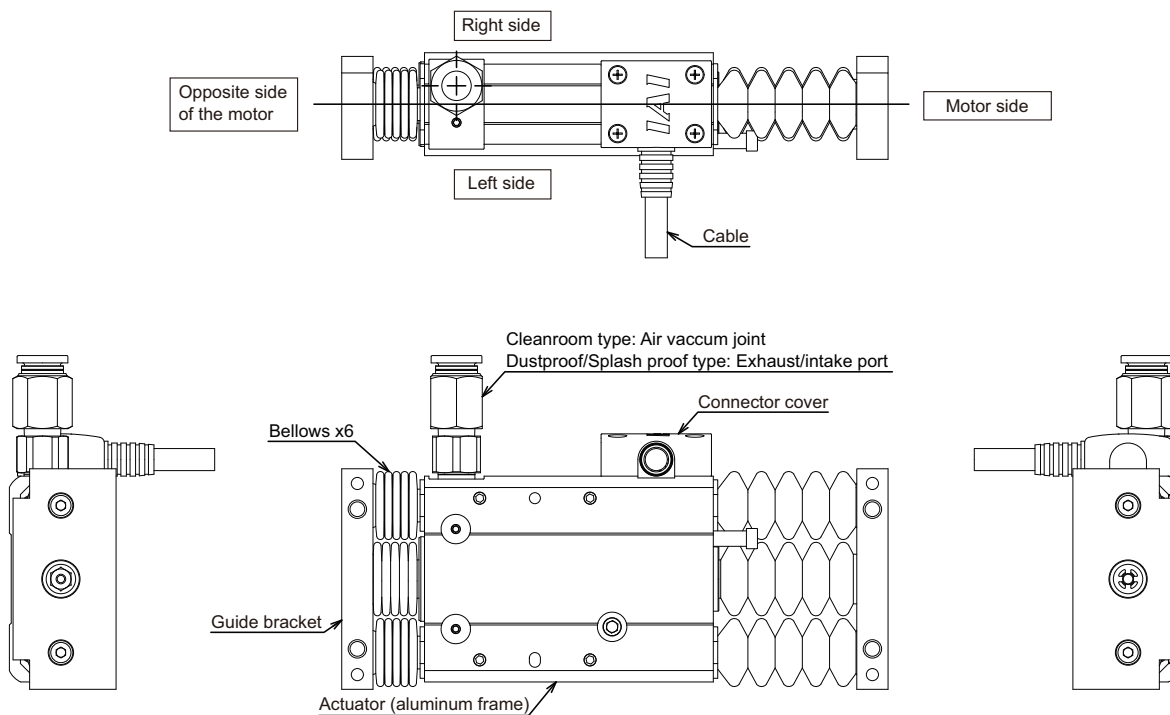


11. Cleanroom Type, Dust-proof Type Slide Unit Types

- Without brake
RCA2CR, RCA2W-SD3NB (Ball screw),
RCA2CR, RCA2W-SD4NB (Ball screw)



- Without brake
RCA2CR, RCA2W-SD3NA (Ball screw),
RCA2CR, RCA2W-SD4NA (Ball screw)



1. Specifications Check

1.1 Checking the Product

The standard configuration of this product is comprised of the following parts.
See the component list for the details of the enclosed components. If you find any faulty or missing parts, contact your local IAI distributor.

1.1.1 Parts

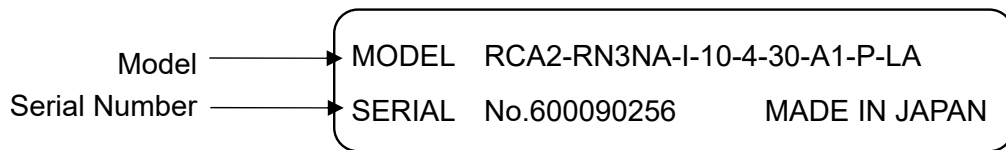
No.	Name	Model number	Quantity	Remarks
1	Actuator	Refer to "How to Read the Model Nameplate" and "How to Read the Model Number."	1	
Accessories				
2	Motor • encoder cables (Note1)		1	
3	First Step Guide		1	
4	Instruction Manual (DVD)		1	
5	Safety Guide		1	

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

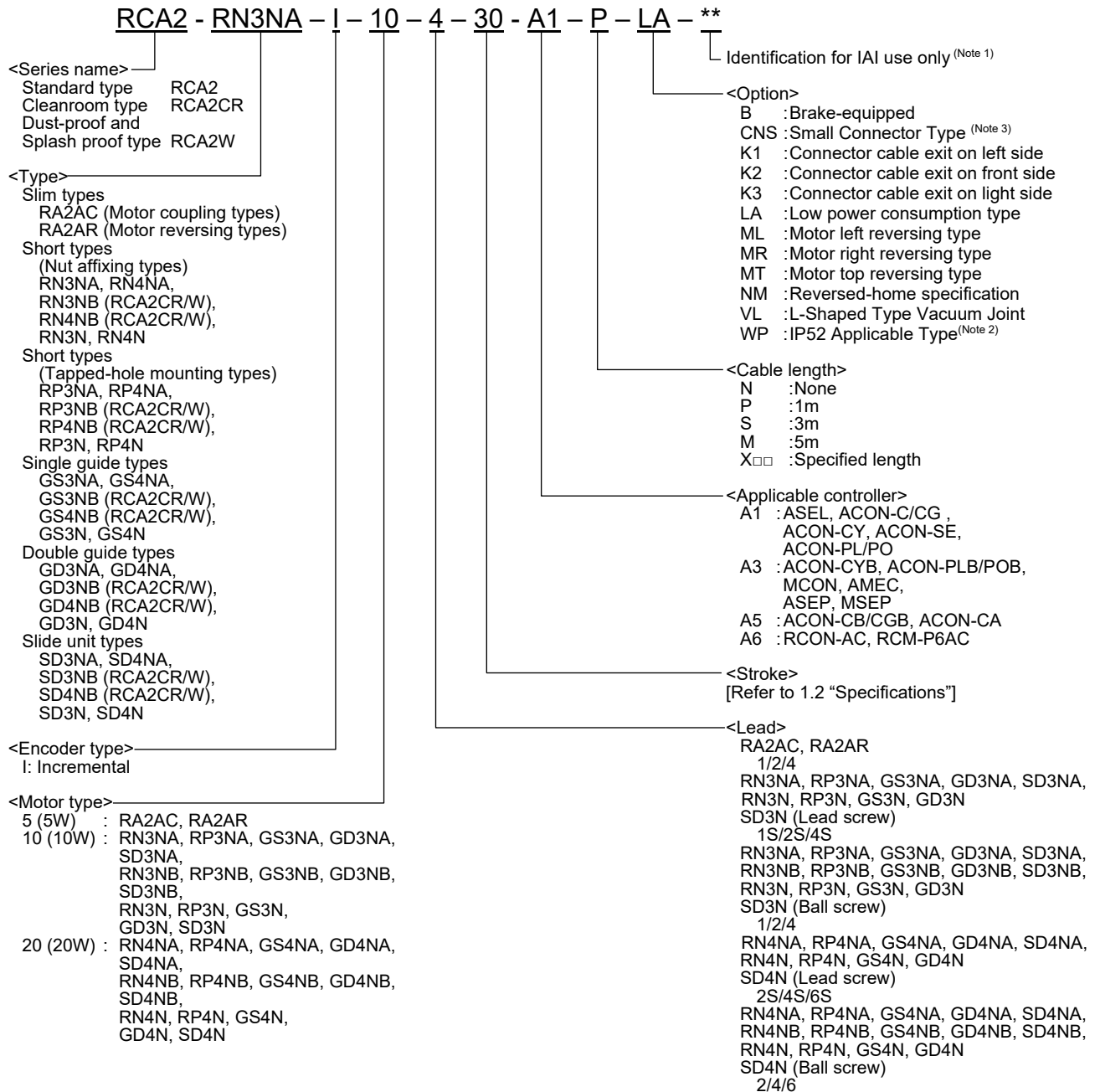
1.1.2 Instruction Manuals for the Controllers Related to this Product

No.	Name	Control No.
1	Instruction Manual for ASEL Controller	ME0165
2	Instruction Manual for ACON-CB/CGB Controller	ME0343
3	Instruction Manual for ACON-CA Controller	ME0326
4	Instruction Manual for ACON-CYB/PLB/POB Controller	ME0354
5	Instruction Manual for ACON-C/CG/CF Controller	ME0176
6	Instruction Manual for ACON-CY Controller	ME0167
7	Instruction Manual for ACON-SE Controller	ME0171
8	Instruction Manual for ACON-PL/PO Controller	ME0166
9	Instruction Manual for MCON Controller	ME0341
10	Instruction Manual for MEC Controller	ME0245
11	Instruction Manual for PSEP/ASEP/DSEP Controller	ME0267
12	Instruction Manual for MSEP Controller	ME0299
13	Instruction Manual for ROBONET	ME0208
14	Instruction Manual for PC Software IA-101-X-MW/IA-101-X-USBMW	ME0154
15	Instruction Manual for Software RCM-101-MW/RCM-101-USB	ME0155
16	Instruction Manual for MEC PC Software	ME0248
17	Instruction Manual for Teaching Pendant SEL-T/TD	ME0183
18	Instruction Manual for Teaching Pendant CON-T/TG	ME0178
19	Instruction Manual for Touch Panel Teaching Pendant CON-PT/PD/PG	ME 0227
20	Instruction Manual for Touch Panel Teaching CON-PTA/PDA/PGA	ME0295
21	Instruction Manual for Touch Panel Teaching Pendant TB-02/02D Applicable for Program Controller	ME0356
22	Instruction Manual for Touch Panel Teaching Pendant TB-02/02D Applicable for Position Controller	ME0355
23	Instruction Manual for Touch Panel Teaching TB-01, TB-01D, TB-01DR Applicable for Program Controller	ME0325
24	Instruction Manual for Touch Panel Teaching TB-01, TB-01D, TB-01DR Applicable for Position Controller	ME0324
25	Instruction Manual for Dedicated ASEP/PSEP Touch Panel Teaching SEP-PT	ME0217
26	Instruction Manual for Touch Panel Display RCM-PM-01	ME0182

1.1.3 How to Read Model Nameplate



1.1.4 How to Read Model



Note 1 This may be displayed for the manufacturing reason.
(This is not to indicate the manufacturing model code.)

Note 2 As RCA2W-RN3NB, RN4NB, RP3NB, RP4NB, GS3NB, GS4NB, GD3NB, GD4NB, SD3NB and SD4NB are applicable for IP52, it is not necessary to indicate Option WP.

Note 3 It is available for setting only when applicable controller A3, A5 or A6 is selected.

1.2 Specification

1.2.1 Speed

Speed limits (Unit: mm/s)

Model	Motor Type	Lead [mm]	Minimum Speed	Stroke [mm]				
				25	30	50	75	100
RA2AC	5W	1	1.25	50	-	50		
		2	2.5	100	-	100		
		4	5	180	-	200		
RA2AR	5W	1	1.25	50	-	50		
		2	2.5	100	-	100		
		4	5	180	-	200		
RN3NA (Lead screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
RN3NA RN3NB (Ball screw)	10W	1	0.95	-	50	50	-	-
		2	1.90	-	100	100	-	-
		4	3.81	-	200	200	-	-
RN4NA (Lead screw)	20W	2	0.95	-	100	-	-	-
		4	1.90	-	200	-	-	-
		6	3.81	-	220	-	-	-
RN4NA RN4NB (Ball screw)	20W	2	0.95	-	100	100	-	-
		4	1.90	-	200	200	-	-
		6	3.81	-	270<220>	300	-	-
RP3NA (Lead screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
RP3NA RP3NB (Ball screw)	10W	1	1.90	-	50	50	-	-
		2	3.81	-	100	100	-	-
		4	3.81	-	200	200	-	-
PR4NA (Lead screw)	20W	2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
		6	5.72	-	220	-	-	-
RP4NA RP4NB (Ball screw)	20W	2	1.90	-	100	100	-	-
		4	3.81	-	200	200	-	-
		6	5.72	-	270<220>	300	-	-
GS3NA (Lead screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
GS3NA GS3NB (Ball screw)	10W	1	0.95	-	50	50	-	-
		2	1.90	-	100	100	-	-
		4	3.81	-	200	200	-	-
GS4NA (Lead screw)	20W	2	0.95	-	100	-	-	-
		4	1.90	-	200	-	-	-
		6	3.81	-	220	-	-	-
GS4NA GS4NB (Ball screw)	20W	2	0.95	-	100	100	-	-
		4	1.90	-	200	200	-	-
		6	3.81	-	270<220>	300	-	-
GD3NA (Lead screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
GD3NA GD3NB (Ball screw)	10W	1	0.95	-	50	50	-	-
		2	1.90	-	100	100	-	-
		4	3.81	-	200	200	-	-

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]	Minimum Speed	Stroke [mm]				
				25	30	50	75	100
GD4NA (Lead screw)	20W	2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
		6	5.72	-	220	-	-	-
GD4NA GD4NB (Ball screw)	20W	2	1.90	-	100	100	-	-
		4	3.81	-	200	200	-	-
		6	5.72	-	270<220>	300	-	-
RN3N (Lead screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
RN3N (Ball screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
RN4N (Lead screw)	20W	2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
		6	5.72	-	220	-	-	-
RN4N (Ball screw)	20W	2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
		6	5.72	-	270<220>	-	-	-
RP3N (Lead screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
RP3N (Ball screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
RP4N (Lead screw)	20W	2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
		6	5.72	-	220	-	-	-
RP4N (Ball screw)	20W	2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
		6	5.72	-	270<220>	-	-	-
GS3N (Lead screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
GS3N (Ball screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
GS4N (Lead screw)	20W	2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
		6	5.72	-	220	-	-	-
GS4N (Ball screw)	20W	2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
		6	5.72	-	270<220>	-	-	-
GD3N (Lead screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
GD3N (Ball screw)	10W	1	0.95	-	50	-	-	-
		2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-

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]	Minimum Speed	Stroke [mm]				
				25	30	50	75	100
GD4N (Lead screw)	20W	2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
		6	5.72	-	220	-	-	-
GD4N (Ball screw)	20W	2	1.90	-	100	-	-	-
		4	3.81	-	200	-	-	-
		6	5.72	-	270<220>	-	-	-
SD3NA SD3N (Lead screw)	10W	1	0.95	50	-	50	-	-
		2	1.90	100	-	100	-	-
		4	3.81	200	-	200	-	-
SD3NA SD3NB SD3N (Ball screw)	10W	1	0.95	50	-	50	-	-
		2	1.90	100	-	100	-	-
		4	3.81	200	-	200	-	-
SD4NA SD4N (Lead screw)	20W	2	0.95	100	-	100	100	-
		4	1.90	200	-	200	200	-
		6	3.81	200	-	300	300	-
SD4NA SD4NB SD4N (Ball screw)	20W	2	0.95	100	-	100	100	-
		4	1.90	200	-	200	200	-
		6	3.81	240<200>	-	300	300	-

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.

1.2.2 Acceleration and Payloads

Model	Motor type	Lead [mm]	Rated acceleration [G]		Payload [kg]	Rated thrust [N]
RA2AC	5W	1	Horizontal	0.3	2	85.5
			Vertical	0.3	1	
		2	Horizontal	0.3	1	42.3
			Vertical	0.3	0.5	
		4	Horizontal	0.3	0.5	21.4
			Vertical	0.3	0.25	
RA2AR	5W	1	Horizontal	0.3	2	85.5
			Vertical	0.3	1	
		2	Horizontal	0.3	1	42.3
			Vertical	0.3	0.5	
		4	Horizontal	0.3	0.5	21.4
			Vertical	0.3	0.25	
RN3NA RN3N (Lead screw)	10W	1	Horizontal	0.2	1	100.5
			Vertical	0.2	0.5	
		2	Horizontal	0.2	0.5	50.3
			Vertical	0.2	0.25	
		4	Horizontal	0.2	0.25	25.1
			Vertical	0.2	0.125	
RN3NA RN3NB RN3N (Ball screw)	10W	1	Horizontal	0.2	3	170.9
			Vertical	0.2	1	
		2	Horizontal	0.3	1.5	85.5
			Vertical	0.2	0.5	
		4	Horizontal	0.3	0.75	42.7
			Vertical	0.2	0.25	
RN4NA RN4N (Lead screw)	20W	2	Horizontal	0.2	1	59.7
			Vertical	0.2	0.5	
		4	Horizontal	0.2	0.5	29.8
			Vertical	0.2	0.25	
		6	Horizontal	0.2	0.25	19.9
			Vertical	0.2	0.125	
RN4NA RN4NB RN4N (Ball screw)	20W	2	Horizontal	0.2	6	101.5
			Vertical	0.2	1.5	
		4	Horizontal	0.3	3	50.7
			Vertical	0.2	0.75	
		6	Horizontal	0.3	2	33.8
			Vertical	0.2	0.5	

Model	Motor type	Lead [mm]	Rated acceleration [G]		Payload [kg]	Rated thrust [N]
RP3NA RP3N (Lead screw)	10W	1	Horizontal	0.2	1	100.5
			Vertical	0.2	0.5	
		2	Horizontal	0.2	0.5	50.3
			Vertical	0.2	0.25	
		4	Horizontal	0.2	0.25	25.1
			Vertical	0.2	0.125	
RP3NA RP3NB RP3N (Ball screw)	10W	1	Horizontal	0.2	3	170.9
			Vertical	0.2	1	
		2	Horizontal	0.3	1.5	85.5
			Vertical	0.2	0.5	
		4	Horizontal	0.3	0.75	42.7
			Vertical	0.2	0.25	
RP4NA RP4N (Lead screw)	20W	2	Horizontal	0.2	1	59.7
			Vertical	0.2	0.5	
		4	Horizontal	0.2	0.5	29.8
			Vertical	0.2	0.25	
		6	Horizontal	0.2	0.25	19.9
			Vertical	0.2	0.125	
RP4NA RP4NB RP4N (Ball screw)	20W	2	Horizontal	0.2	6	101.5
			Vertical	0.2	1.5	
		4	Horizontal	0.3	3	50.7
			Vertical	0.2	0.75	
		6	Horizontal	0.3	2	33.8
			Vertical	0.2	0.5	
GS3NA GS3N (Lead screw)	10W	1	Horizontal	0.2	1	100.5
			Vertical	0.2	0.5	
		2	Horizontal	0.2	0.5	50.3
			Vertical	0.2	0.25	
		4	Horizontal	0.2	0.25	25.1
			Vertical	0.2	0.125	
GS3NA GS3NB GS3N (Ball screw)	10W	1	Horizontal	0.2	3	170.9
			Vertical	0.2	1	
		2	Horizontal	0.3	1.5	85.5
			Vertical	0.2	0.5	
		4	Horizontal	0.3	0.75	42.7
			Vertical	0.2	0.25	
GS4NA GS4N (Lead screw)	20W	2	Horizontal	0.2	1	59.7
			Vertical	0.2	0.5	
		4	Horizontal	0.2	0.5	29.8
			Vertical	0.2	0.25	
		6	Horizontal	0.2	0.25	19.9
			Vertical	0.2	0.125	
GS4NA GS4NB GS4N (Ball screw)	20W	2	Horizontal	0.2	6	101.5
			Vertical	0.2	1.5	
		4	Horizontal	0.3	3	50.7
			Vertical	0.2	0.75	
		6	Horizontal	0.3	2	33.8
			Vertical	0.2	0.5	

Model	Motor type	Lead [mm]	Rated acceleration [G]		Payload [kg]	Rated thrust [N]
GD3NA GD3N (Lead screw)	10W	1	Horizontal	0.2	1	100.5
			Vertical	0.2	0.5	
		2	Horizontal	0.2	0.5	50.3
			Vertical	0.2	0.25	
		4	Horizontal	0.2	0.25	25.1
			Vertical	0.2	0.125	
GD3NA GD3NB GD3N (Ball screw)	10W	1	Horizontal	0.2	3	170.9
			Vertical	0.2	1	
		2	Horizontal	0.3	1.5	85.5
			Vertical	0.2	0.5	
		4	Horizontal	0.3	0.75	42.7
			Vertical	0.2	0.25	
GD4NA GD4N (Lead screw)	20W	2	Horizontal	0.2	1	59.7
			Vertical	0.2	0.5	
		4	Horizontal	0.2	0.5	29.8
			Vertical	0.2	0.25	
		6	Horizontal	0.2	0.25	19.9
			Vertical	0.2	0.125	
GD4NA GD4NB GD4N (Ball screw)	20W	2	Horizontal	0.2	6	101.5
			Vertical	0.2	1.5	
		4	Horizontal	0.3	3	50.7
			Vertical	0.2	0.75	
		6	Horizontal	0.3	2	33.8
			Vertical	0.2	0.5	
SD3NA SD3N (Lead screw)	10W	1	Horizontal	0.2	1	100.5
			Vertical	0.2	0.5	
		2	Horizontal	0.2	0.5	50.3
			Vertical	0.2	0.25	
		4	Horizontal	0.2	0.25	25.1
			Vertical	0.2	0.125	
SD3NA SD3NB SD3N (Ball screw)	10W	1	Horizontal	0.2	3	170.9
			Vertical	0.2	1	
		2	Horizontal	0.3	1.5	85.5
			Vertical	0.2	0.5	
		4	Horizontal	0.3	0.75	42.7
			Vertical	0.2	0.25	
SD4NA SD4N (Lead screw)	20W	2	Horizontal	0.2	1	59.7
			Vertical	0.2	0.5	
		4	Horizontal	0.2	0.5	29.8
			Vertical	0.2	0.25	
		6	Horizontal	0.2	0.25	19.9
			Vertical	0.2	0.125	
SD4NA SD4NB SD4N (Ball screw)	20W	2	Horizontal	0.2	6	101.5
			Vertical	0.2	1.5	
		4	Horizontal	0.3	3	50.7
			Vertical	0.2	0.75	
		6	Horizontal	0.3	2	33.8
			Vertical	0.2	0.5	

1.2.3 Driving System • Position Detector

Model	Motor type	Lead	Encoder pulses	Boll screw and lead screw type		
				Type	Diameter	Accuracy
RA2AC	5W	1	800	Ball screw Rolled	φ4mm	C10
		2				
		4				
RA2AR	10W	1		Ball screw Rolled	φ6mm	C10
		2				
		4				
RN3NA RN3N (Lead screw)	10W	1	1048	Lead screw Rolled	φ4mm	C10
		2				
		4				
RN3NA RN3NB RN3N (Ball screw)	10W	1		Ball screw Rolled	φ4mm	C10
		2				
		4				
RN4NA RN4N (Lead screw)	20W	2		Lead screw Rolled	φ6mm	C10
		4				
		6				
RN4NA RN4NB RN4N (Ball screw)	20W	2		Ball screw Rolled	φ6mm	C10
		4				
		6				
RP3NA RP3N (Lead screw)	10W	1		Lead screw Rolled	φ4mm	C10
		2				
		4				
RP3NA RP3NB RP3N (Ball screw)	10W	1		Ball screw Rolled	φ4mm	C10
		2				
		4				
RP4NA RP4N (Lead screw)	20W	2		Lead screw Rolled	φ6mm	C10
		4				
		6				
RP4NA RP4NB RP4N (Ball screw)	20W	2		Ball screw Rolled	φ6mm	C10
		4				
		6				
GS3NA GS3N (Lead screw)	10W	1		Lead screw Rolled	φ4mm	C10
		2				
		4				
GS3NA GS3NB GS3N (Ball screw)	10W	1		Ball screw Rolled	φ4mm	C10
		2				
		4				
GS4NA GS4N (Lead screw)	20W	2		Lead screw Rolled	φ6mm	C10
		4				
		6				
GS4NA GS4NB GS4N (Ball screw)	20W	2		Ball screw Rolled	φ6mm	C10
		4				
		6				
GD3NA GD3N (Lead screw)	10W	1		Lead screw Rolled	φ4mm	C10
		2				
		4				
GD3NA GD3NB GD3N (Ball screw)	10W	1		Ball screw Rolled	φ4mm	C10
		2				
		4				
GD4NA GD4N (Lead screw)	20W	2		Lead screw Rolled	φ6mm	C10
		4				
		6				
GD4NA GD4NB GD4N (Ball screw)	20W	2		Ball screw Rolled	φ6mm	C10
		4				
		6				

Model	Motor type	Lead	Encoder pulses	Boll screw and lead screw type		
				Type	Diameter	Accuracy
SD3NA SD3N (Lead screw)	10W	1 2 4	1048	Lead screw Rolled	φ4mm	C10
SD3NA SD3NB SD3N (Ball screw)	10W	1 2 4		Ball screw Rolled	φ4mm	C10
SD4NA SD4N (Lead screw)	20W	2 4 6		Lead screw Rolled	φ6mm	C10
SD4NA SD4NB SD4N (Ball screw)	20W	2 4 6		Ball screw Rolled	φ6mm	C10

1.2.4 Common Specifications

Item	Specification	
	Lead screw	Ball screw
Positioning repeatability ^(Note1) [mm]	±0.05	±0.02
Backlash ^(Note1) [mm]	0.3 or less	0.1 or less
Base	Material: Aluminum with white alumite treatment	

Note 1 The values shown above are the accuracy at the delivery from the factory.
It does not include the consideration of time-dependent change as it is used.

1.2.5 Duty in Continuous Operation

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

The duty may differ depending on the load ratio and the acceleration/deceleration time ratio.
[Refer to 4.1 "Duty in Continuous Operation"]

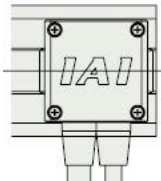
1.3 Options

1.3.1 Connector Cable Exit Direction Changed (Model: K1, K2 and K3)

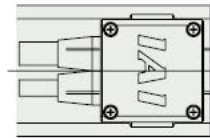
The standard specification is to take out the cable from the opposite side of the rod and guide bracket. If a change in the cable ejection direction is made, the direction of cable ejection will be changed.

There are three types for the direction change, left side (model: K1), front side (model: K2) and right side (model: K3).

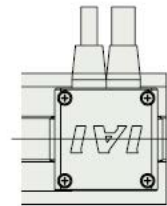
Note that selection of front side (Model: K2) cannot be made for the cleanroom type and dust-proof type. Selection of front side (Model: K2) cannot be made for the standard slide unit types RCA2-SD3N, SD3NA, SD4N and SD4NA. Also, the cleanroom and dust-proof slide unit types RCA2CR, RCA2W- SD3NA, SD3NB, SD4NA and SD4NB are left oriented ejection in standard.



Model: K1
(Left oriented
ejection)



Model: K2
(Front oriented
ejection)



Model: K3
(Right oriented
ejection)

1.3.2 Low Power Consumption Type (Model: LA)

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/MSEP Controllers.

Model Name	Standard specification / High acceleration/deceleration specification Maximum load current	Energy-saving measure Maximum load current
RN3NA, RP3NA, GS3NA, GD3NA, SD3NA, RN3NB, RP3NB, GS3NB, GD3NB, SD3NB, RN3N, RP3N, GS3N, GD3N, SD3N	4.4A	2.5A
RN4NA, RP4NA, GS4NA, GD4NA, SD4NA, RN4NB, RP4NB, GS4NB, GD4NB, SD4NB, RN4N, RP4N, GS4N, GD4N, SD4N	4.4A	2.5A

1.3.3 Brake-equipped (Model: B)

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

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

Applicable Unit: RN3NA, RN4NA, RP3NA, RP4NA, GS3NA, GS4NA, GD3NA, GD4NA

(Brake-equipped type cannot be selected for the cleanroom type and dust-proof type.)

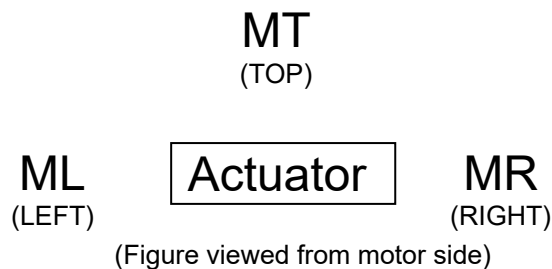
1.3.4 Reversed-home Specification (Model: NM)

The home position is set on the motor side in standard for Slim Types RA2AC and RA2AR. However, the motor position will be reversed if it is desirable in view of the layout of the system, etc.

(Note) The home position is adjusted at the factory before shipment. If you wish to change the home after the delivery of your actuator, you must return the actuator to IAI for adjustment.

1.3.5 Reversed-home Specification (Model: ML, MR, MT)

For Slim Type RA2AR, the reverse to the left side from the view of motor end is ML, reverse to the right is MR, and to the upper side is MT.



1.3.6 L-Shaped Type Vacuum Joint (Model: VL)

The vacuum joint for Cleanroom Type has changed from straight type to L-shaped type.

1.3.7 IP52 Applicable Type (Model: WP)

Applicable Unit: RCA2W- RN3NA, RN4NA, RP3NA, RP4NA, GS3NA, GS4NA, GD3NA, GD4NA, SD3NA and SD4NA

Waterproof type applicable for IP52 is added in the lineup.

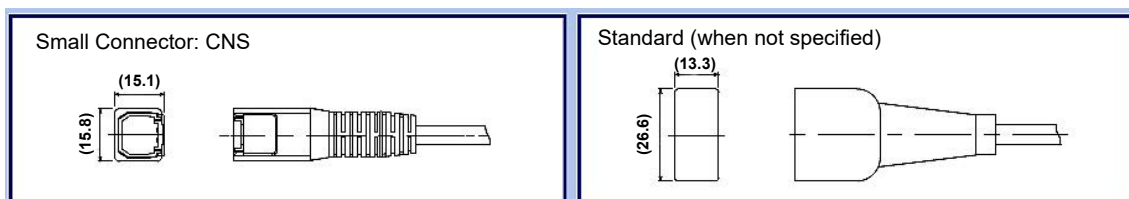
*2: JIS Standards Waterproof Type II -Vertically dripping water shall have no harmful effect when the enclosure is tilted at an angle up to 15deg from its normal position.

(Note) As RCA2W-RN3NB, RN4NB, RP3NB, RP4NB, GS3NB, GS4NB, GD3NB, GD4NB, SD3NB and SD4NB are applicable for IP52, it is not necessary to indicate Option WP.

1.3.8 Small Connector Type (Model: CNS)

Applicable Unit: RCA2-RN3NA, RP3NA, GS3NA, GD3NA, SD3NA
 RCA2-RN4NA, RP4NA, GS4NA, GD4NA, SD4NA
 RCA2W-RN3NB, RP3NB, GS3NB, GD3NB, SD3NB
 RCA2W-RN4NB, RP4NB, GS4NB, GD4NB, SD4NB
 RCA2CR-RN3NB, RP3NB, GS3NB, GD3NB, SD3NB
 RCA2CR-RN4NB, RP4NB, GS4NB, GD4NB, SD4NB

It is available to change the cable joint connector on the actuator cable to a small type.

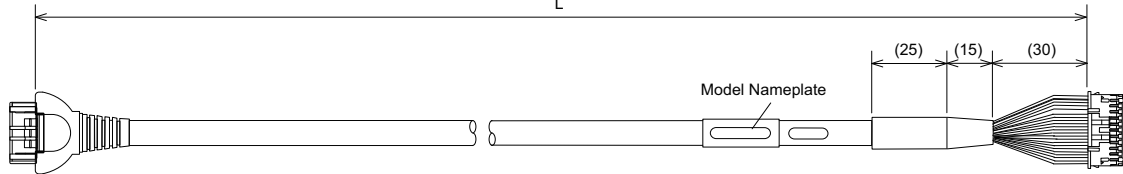


1.4 Motor • Encoder Cables

1.4.1 ACON-CB/CGB, ACON-CA, ACON-CYB/PLB/POB, MCON, AMEC, ASEP and MSEP Controller Cables When Standard Connector

Motor • Encoder Integrated Cables (CB-APSEP-MPA□□□)

□□□ indicates the cable length L. Up to 20m can be specified.
(Example: 080=8m)



Actuator Side			Controller Side		
Electric Wire Color	Symbol	Pin No.	Pin No.	Symbol	Electric Wire Color
Black	U	A1	1	U	Black
White	V	B1	2	V	White
Brown	W	A2	5	W	Brown
Green	-	B2	3	-	Green
Yellow	-	A3	4	-	Yellow
Red	-	B3	6	-	Red
Orange	BK+	A4	7	BK+	Orange
Gray	BK-	B4	8	BK-	Gray
White	A+	A6	11	A+	White
Yellow	A-	B6	12	A-	Yellow
Red	B+	A7	13	B+	Red
Green	B-	B7	14	B-	Green
Black	Z+	A8	15	Z+	Black
Brown	Z-	B8	16	Z-	Brown
Black (Identification tape)	LS+	A5	9	LS+	Black (Identification tape)
Brown (Identification tape)	LS-	B5	10	LS-	Brown (Identification tape)
Green (Identification tape)	GND _{LS}	A9	20	GND _{LS}	Green (Identification tape)
Red (Identification tape)	VPS	B9	18	VPS	Red (Identification tape)
White (Identification tape)	VCC	A10	17	VCC	White (Identification tape)
Yellow (Identification tape)	GND	B10	19	GND	Yellow (Identification tape)
-	NC	A11	21	NC	-
-	Shield, FG	B11	24	Shield, FG	-
			22	-	-
			23	-	-

Motor • Encoder Integrated Cables (CB-ACS-MPA□□□)

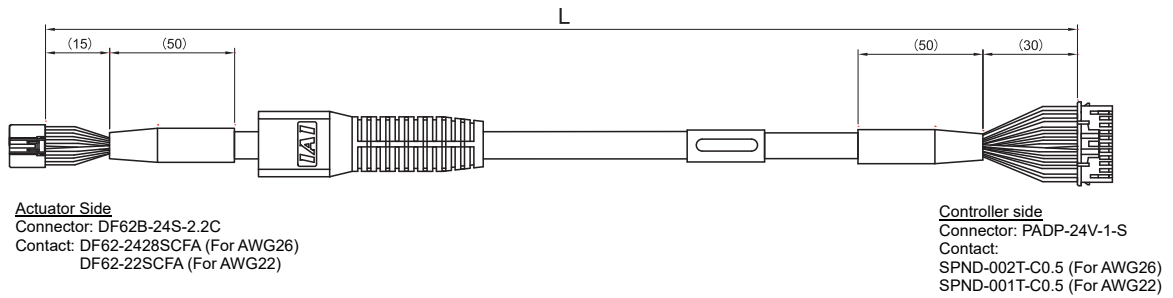
Actuator Side			Controller Side		
Electric Wire Color	Symbol	Pin No.	Pin No.	Symbol	Electric Wire Color
Red	U	A1	1	U	Red
Yellow	V	B1	2	V	Yellow
Black	W	A2	3	W	Black
-	NC	B2	4	NC	-
-	NC	A3	3	NC	-
-	NC	B3	2	NC	-
Orange	BK+	A4	16	BK+	Orange
Gray	BK-	B4	15	BK-	Gray
Black	LS+	A5	18	LS+	Black
Brown	LS-	B5	17	LS-	Brown
White	A+	A6	14	A+	White
Yellow	A-	B6	13	A-	Yellow
Red	B+	A7	12	B+	Red
Green	B-	B7	11	B-	Green
Black (Identification tape)	Z+	A8	10	Z+	Black (Identification tape)
Brown (Identification tape)	Z-	B8	9	Z-	Brown (Identification tape)
White (Identification tape)	-	A9	8	-	White (Identification tape)
Yellow (Identification tape)	/PS	B9	7	/PS	Yellow (Identification tape)
Red (Identification tape)	VCC	A10	6	VCC	Red (Identification tape)
Green (Identification tape)	GND	B10	5	GND	Green (Identification tape)
-	NC	A11		NC	-
-	Shield, FG	B11	1	Shield, FG	-

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1.4.3 ACON-CB/CGB, ACON-CA, ACON-CYB/PLB/POB, MCON, AMEC, ASEP and MSEP Controller Cables When Option CNS Specified Connector

(1) Motor • Encoder Integrated Cables (CB-CAN-MPA□□□)

□□□ indicates the cable length L. Up to 20m can be specified.
(Example: 080=8m)



Connection diagram

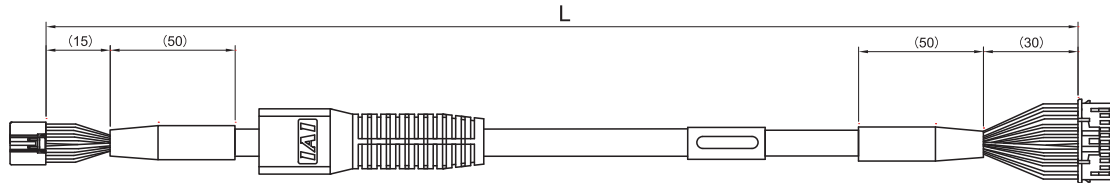
Actuator Side				Controller Side			
Thickness	Electric Wire Color	Symbol	Pin No.	Pin No.	Symbol	Electric Wire Color	Thickness
AWG22/19	Blue	U	3	1	U	Blue	AWG22/19
AWG22/19	Orange	V	5	2	V	Orange	AWG22/19
AWG22/19	Brown	-	10	3	-	Brown	AWG22/19
AWG22/19	Gray	-	9	4	-	Gray	AWG22/19
AWG22/19	Green	W	4	5	W	Green	AWG22/19
AWG22/19	Red	-	15	6	-	Red	AWG22/19
AWG26	Light blue	A+	12	11	A+	Light blue	AWG26
AWG26	Orange	A-	17	12	A-	Orange	AWG26
AWG26	Green	B+	1	13	B+	Green	AWG26
AWG26	Brown	B-	6	14	B-	Brown	AWG26
AWG26	Gray	Z+/SA[mABS]	11	15	Z+/SA[mABS]	Gray	AWG26
AWG26	Red	Z-/SB[mABS]	16	16	Z-/SB[mABS]	Red	AWG26
AWG26	Black	VPS/BAT-	18	18	VPS/BAT-	Black	AWG26
AWG26	Yellow	BK+	8	7	BK+	Yellow	AWG26
AWG26	Light blue	LS+	20	9	LS+	Light blue	AWG26
AWG26	Orange	LS-	2	10	LS-	Orange	AWG26
AWG26	Gray	VCC	21	17	VCC	Gray	AWG26
AWG26	Red	GND	7	19	GND	Red	AWG26
AWG26	Brown	BK-	14	8	BK-	Brown	AWG26
AWG26	Green	LS GND	13	20	LS GND	Green	AWG26
-	-	-	19	22	-	-	-
AWG26	Pink	BAT+	22	21	BAT+	Pink	AWG26
-	-	-	23	23	-	-	-
AWG26	Black	FG	24	24	FG	Black	AWG26

(Note) About thickness AWG22/19

The thickness is AWG22 when the cable length is 5m or less, and AWG19 when longer than 5m.

(2) Motor • Encoder Integrated Robot Cables (CB-CAN-MPA□□□-RB)

□□□ indicates the cable length L. Up to 20m can be specified.
(Example: 080=8m)



Actuator Side
Connector: DF62B-24S-2.2C
Contact: DF62-2428SCFA (For AWG26)
DF62-22SCFA (For AWG22)

Controller side
Connector: PADP-24V-1-S
Contact: SPND-002T-C0.5 (For AWG26)
SPND-001T-C0.5 (For AWG22)

Connection diagram

Actuator Side				Controller Side				
Thickness	Electric Wire Color	Symbol	Pin No.		Pin No.	Symbol	Electric Wire Color	Thickness
AWG22/19	Blue	U	3		1	U	Blue	AWG22/19
AWG22/19	Orange	V	5		2	V	Orange	AWG22/19
AWG22/19	Brown	-	10		3	-	Brown	AWG22/19
AWG22/19	Gray	-	9		4	-	Gray	AWG22/19
AWG22/19	Green	W	4		5	W	Green	AWG22/19
AWG22/19	Red	-	15		6	-	Red	AWG22/19
AWG26	Light blue	A+	12		11	A+	Light blue	AWG26
AWG26	Orange	A-	17		12	A-	Orange	AWG26
AWG26	Green	B+	1		13	B+	Green	AWG26
AWG26	Brown	B-	6		14	B-	Brown	AWG26
AWG26	Gray	Z+/SA[mABS]	11		15	Z+/SA[mABS]	Gray	AWG26
AWG26	Red	Z-/SB[mABS]	16		16	Z-/SB[mABS]	Red	AWG26
AWG26	Black	VPS/BAT-	18		18	VPS/BAT-	Black	AWG26
AWG26	Yellow	BK+	8		7	BK+	Yellow	AWG26
AWG26	Light blue	LS+	20		9	LS+	Light blue	AWG26
AWG26	Orange	LS-	2		10	LS-	Orange	AWG26
AWG26	Gray	VCC	21		17	VCC	Gray	AWG26
AWG26	Red	GND	7		19	GND	Red	AWG26
AWG26	Brown	BK-	14		8	BK-	Brown	AWG26
AWG26	Green	LS_GND	13		20	LS_GND	Green	AWG26
-	-	-	19		22	-	-	-
AWG26	Pink	BAT+	22		21	BAT+	Pink	AWG26
-	-	-	23	23	-	-	-	
AWG26	Green	FG	24	24	FG	Green	AWG26	

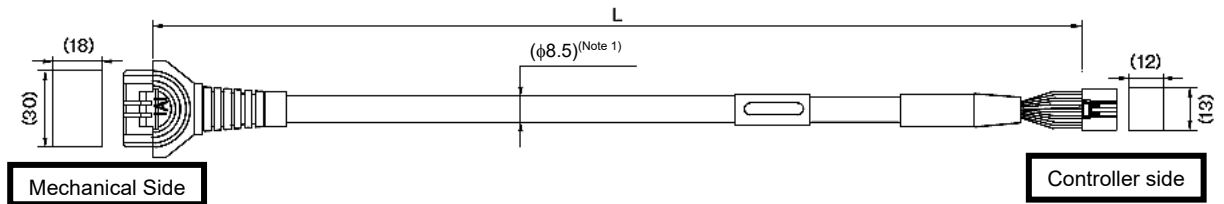
(Note) About thickness AWG22/19

The thickness is AWG22 when the cable length is 5m or less, and AWG19 when longer than 5m.

1.4.4 RCON-AC and RCM-P6AC Controller Cables When Standard

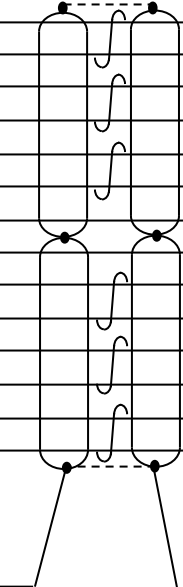
(1) Motor • Encoder Integrated Cables
(CB-RCAPC-MPA□□□)

□□ indicates the cable length L. Up to 20m can be specified.
(Example: 080=8m)



(Note 1) The thickness is φ9.1 when the cable length is longer than 3m.

Connection diagram

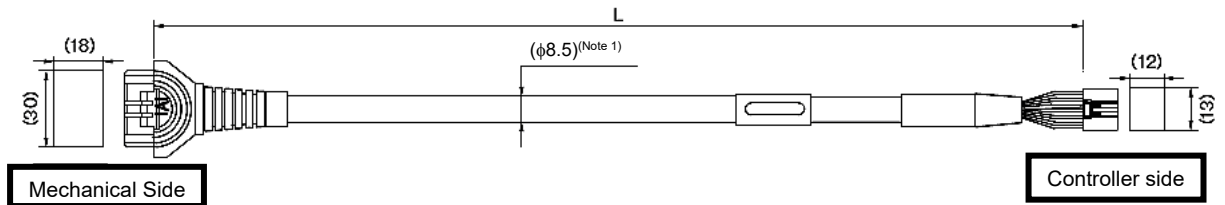
Actuator Side				Controller Side				
Thickness	Electric Wire Color	Symbol	Pin No.		Pin No.	Symbol	Electric Wire Color	Thickness
AWG22/19	Blue	U	A1		3	U	Blue	AWG22/19
AWG22/19	Orange	V	B1		5	V	Orange	AWG22/19
AWG22/19	Brown	-	B2		10	-	Brown	AWG22/19
AWG22/19	Gray	-	A3		9	-	Gray	AWG22/19
AWG22/19	Green	W	A2		4	W	Green	AWG22/19
AWG22/19	Red	-	B3		15	-	Red	AWG22/19
AWG26	Light blue	A+	A6		12	A+	Light blue	AWG26
AWG26	Orange	A-	B6		17	A-	Orange	AWG26
AWG26	Green	B+	A7		1	B+	Green	AWG26
AWG26	Brown	B-	B7		6	B-	Brown	AWG26
AWG26	Gray	Z+/SA[mABS]	A8		11	Z+/SA[mABS]	Gray	AWG26
AWG26	Red	Z-/SB[mABS]	B8		16	Z-/SB[mABS]	Red	AWG26
AWG26	Black	VPS/BAT-	B9		18	VPS/BAT-	Black	AWG26
AWG26	Yellow	BK+	A4		8	BK+	Yellow	AWG26
AWG26	Light blue	LS+	A5		20	LS+	Light blue	AWG26
AWG26	Orange	LS-	B5		2	LS-	Orange	AWG26
AWG26	Gray	VCC	A10		21	VCC	Gray	AWG26
AWG26	Red	GND	B10		7	GND	Red	AWG26
AWG26	Brown	BK-	B4		14	BK-	Brown	AWG26
AWG26	Green	LS_GND	A9		13	LS_GND	Green	AWG26
-	-	-	A11		19	-	-	-
-	-	-	-		22	BAT+	Pink	AWG26
-	-	-	-		23	-	-	-
AWG26	Black	FG	B11		24	FG	Black	AWG26

(Note) About thickness AWG22/19

The thickness is AWG22 when the cable length is 3m or less, and AWG19 when longer than 3m.

(2) Motor • Encoder Integrated Robot Cables (CB-RCAPC-MPA□□□-RB)

□□ indicates the cable length L. Up to 20m can be specified.
(Example: 080=8m)



(Note 1) The thickness is $\phi 9.1$ when the cable length is longer than 3m.

Connection diagram

Actuator Side				Controller Side			
Thickness	Electric Wire Color	Symbol	Pin No.	Pin No.	Symbol	Electric Wire Color	Thickness
AWG22/19	Blue	U	A1	3	U	Blue	AWG22/19
AWG22/19	Orange	V	B1	5	V	Orange	AWG22/19
AWG22/19	Brown	-	B2	10	-	Brown	AWG22/19
AWG22/19	Gray	-	A3	9	-	Gray	AWG22/19
AWG22/19	Green	W	A2	4	W	Green	AWG22/19
AWG22/19	Red	-	B3	15	-	Red	AWG22/19
AWG26	Light blue	A+	A6	12	A+	Light blue	AWG26
AWG26	Orange	A-	B6	17	A-	Orange	AWG26
AWG26	Green	B+	A7	1	B+	Green	AWG26
AWG26	Brown	B-	B7	6	B-	Brown	AWG26
AWG26	Gray	Z+/SA[mABS]	A8	11	Z+/SA[mABS]	Gray	AWG26
AWG26	Red	Z-/SB[mABS]	B8	16	Z-/SB[mABS]	Red	AWG26
AWG26	Black	VPS/BAT-	B9	18	VPS/BAT-	Black	AWG26
AWG26	Yellow	BK+	A4	8	BK+	Yellow	AWG26
AWG26	Light blue	LS+	A5	20	LS+	Light blue	AWG26
AWG26	Orange	LS-	B5	2	LS-	Orange	AWG26
AWG26	Gray	VCC	A10	21	VCC	Gray	AWG26
AWG26	Red	GND	B10	7	GND	Red	AWG26
AWG26	Brown	BK-	B4	14	BK-	Brown	AWG26
AWG26	Green	LS_GND	A9	13	LS_GND	Green	AWG26
-	-	-	A11	19	-	-	-
-	-	-	-	22	BAT+	Pink	AWG26
-	-	-	-	23	-	-	-
AWG26	Green	FG	B11	24	FG	Green	AWG26

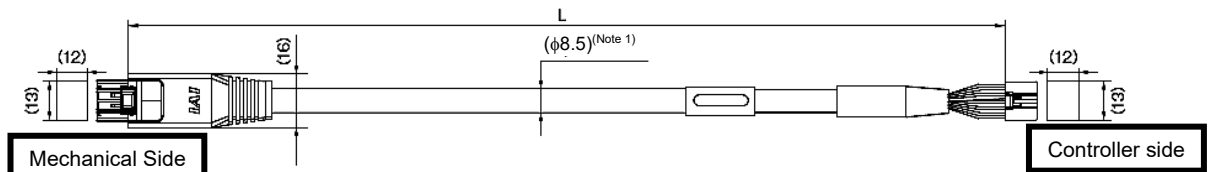
(Note) About thickness AWG22/19

The thickness is AWG22 when the cable length is 3m or less, and AWG19 when longer than 3m.

1.4.5 RCON-AC and RCM-P6AC Controller Cables When Option CNS Specified Connector

(1) Motor • Encoder Integrated Cables (CB-ADPC-MPA□□□)

□□□ indicates the cable length L. Up to 20m can be specified.
(Example: 080=8m)



Connection diagram

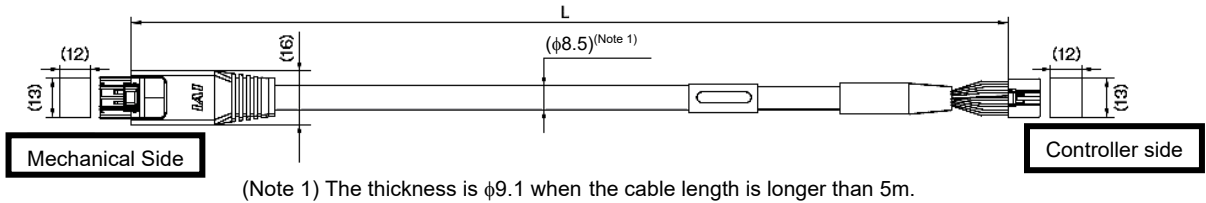
Actuator Side				Controller Side				
Thickness	Electric Wire Color	Symbol	Pin No.		Pin No.	Symbol	Electric Wire Color	Thickness
AWG22/19	Blue	U	3		3	U	Blue	AWG22/19
AWG22/19	Orange	V	5		5	V	Orange	AWG22/19
AWG22/19	Brown	-	10		10	-	Brown	AWG22/19
AWG22/19	Gray	-	9		9	-	Gray	AWG22/19
AWG22/19	Green	W	4		4	W	Green	AWG22/19
AWG22/19	Red	-	15		15	-	Red	AWG22/19
AWG26	Light blue	A+	12		12	A+	Light blue	AWG26
AWG26	Orange	A-	17		17	A-	Orange	AWG26
AWG26	Green	B+	1		1	B+	Green	AWG26
AWG26	Brown	B-	6		6	B-	Brown	AWG26
AWG26	Gray	Z+/SA[mABS]	11		11	Z+/SA[mABS]	Gray	AWG26
AWG26	Red	Z-/SB[mABS]	16		16	Z-/SB[mABS]	Red	AWG26
AWG26	Black	VPS/BAT-	18		18	VPS/BAT-	Black	AWG26
AWG26	Yellow	BK+	8		8	BK+	Yellow	AWG26
AWG26	Light blue	LS+	20		20	LS+	Light blue	AWG26
AWG26	Orange	LS-	2		2	LS-	Orange	AWG26
AWG26	Gray	VCC	21		21	VCC	Gray	AWG26
AWG26	Red	GND	7		7	GND	Red	AWG26
AWG26	Brown	BK-	14		14	BK-	Brown	AWG26
AWG26	Green	LS_GND	13		13	LS_GND	Green	AWG26
-	-	-	19		19	-	-	-
AWG26	Pink	BAT+	22		22	BAT+	Pink	AWG26
-	-	-	23	23	-	-	-	
AWG26	Black	FG	24	24	FG	Black	AWG26	

(Note) About thickness AWG22/19

The thickness is AWG22 when the cable length is 5m or less, and AWG19 when longer than 5m.

(2) Motor • Encoder Integrated Robot Cables (CB-ADPC-MPA□□□-RB)

□□□ indicates the cable length L. Up to 20m can be specified.
(Example: 080=8m)



Connection diagram

Actuator Side				Controller Side				
Thickness	Electric Wire Color	Symbol	Pin No.		Pin No.	Symbol	Electric Wire Color	Thickness
AWG22/19	Blue	U	3		3	U	Blue	AWG22/19
AWG22/19	Orange	V	5		5	V	Orange	AWG22/19
AWG22/19	Brown	-	10		10	-	Brown	AWG22/19
AWG22/19	Gray	-	9		9	-	Gray	AWG22/19
AWG22/19	Green	W	4		4	W	Green	AWG22/19
AWG22/19	Red	-	15		15	-	Red	AWG22/19
AWG26	Light blue	A+	12		12	A+	Light blue	AWG26
AWG26	Orange	A-	17		17	A-	Orange	AWG26
AWG26	Green	B+	1		1	B+	Green	AWG26
AWG26	Brown	B-	6		6	B-	Brown	AWG26
AWG26	Gray	Z+/SA[mABS]	11		11	Z+/SA[mABS]	Gray	AWG26
AWG26	Red	Z-/SB[mABS]	16		16	Z-/SB[mABS]	Red	AWG26
AWG26	Black	VPS/BAT-	18		18	VPS/BAT-	Black	AWG26
AWG26	Yellow	BK+	8		8	BK+	Yellow	AWG26
AWG26	Light blue	LS+	20		20	LS+	Light blue	AWG26
AWG26	Orange	LS-	2		2	LS-	Orange	AWG26
AWG26	Gray	VCC	21		21	VCC	Gray	AWG26
AWG26	Red	GND	7		7	GND	Red	AWG26
AWG26	Brown	BK-	14		14	BK-	Brown	AWG26
AWG26	Green	LS_GND	13		13	LS_GND	Green	AWG26
-	-	-	19		19	-	-	-
AWG26	Pink	BAT+	22		22	BAT+	Pink	AWG26
-	-	-	23		23	-	-	-
AWG26	Green	FG	24		24	FG	Green	AWG26

(Note) About thickness AWG22/19

The thickness is AWG22 when the cable length is 5m or less, and AWG19 when longer than 5m.

2. Installation

2.1 Transportation

[1] Handling of the Actuator

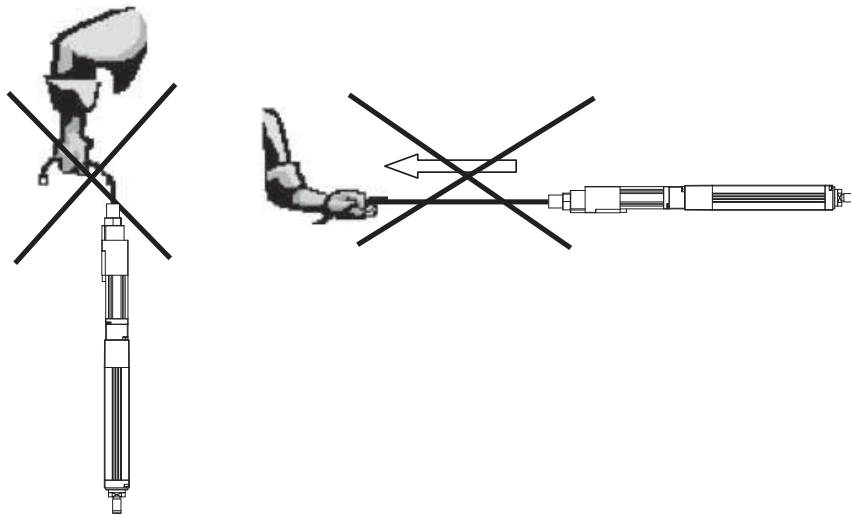
Unless otherwise specified, the actuator is shipped with 1 axis unit packaged separately.

(1) Handling the Packed Unit

- 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 a horizontal orientation when placing it on the ground or transporting. Follow the instruction if there is any for the packaging condition.
- Do not step or sit on the package.
- Do not put any load that may cause a deformation or breakage of the package.

(2) Handling the Actuator After Unpacking

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



- Hold the base part or bracket part of the body when transporting the actuator main body.
- Do not hit or drop the actuator during transportation.
- Do not attempt to force any part of the actuator.

[2] Handling in the Assembled Condition

This is the case when the product is delivered from our factory under a condition that it is assembled with other actuators. The combined axes are delivered in a package that the frame is nailed on the lumber base. The rods are fixed so they would not accidentally move. The actuators are also fixed so the tip of it would not shake due to the external vibration.

(1) How to Handle the Package

- Do not hit or drop the package. No special treatment is conducted on this package to endure a drop or impact on it.
- Do not attempt to carry a heavy package with only one worker. Also, have an appropriate method for transportation.
- When hanging up with ropes, support on the reinforcement frame on the bottom of the lumber base. When bringing up the package with a forklift, also support on the bottom of the lumber base.
- Handle with care when putting the package down to avoid impact or bounce.
- Do not step on the package.
- Do not put anything on the package that could deform or damage it.

(2) How to Handle after Unpackaged

- Fix the rod so they would not accidentally move during transportation.
- If the tip of an actuator is overhanging, have an appropriate way to fix it to avoid shake due to the external vibration. In the transportation without the tip being fixed, do not apply any impact with 0.3G or more.
- When hanging up with ropes, have appropriate cushioning to avoid any deformation of the actuator body. Also keep it in stable horizontal orientation. Make a fixture utilizing the attachment holes and the tapped holes on the actuator body if necessary.
- Do not attempt to apply load on the actuators. Also pay attention not to pinch cables and bend or deform them forcefully.

[3] Handling in Condition of being Assembled in Machinery Equipment (System)

There are some caution notes for when transporting the actuator being assembled in the machinery equipment (system):

- Fix the rod so it would not move during transportation.
- If the tip of an actuator is overhanging, have an appropriate way to fix it to avoid shake due to the external vibration. In the transportation without the tip being fixed, do not apply any impact with 0.3G or more.
- When hanging up the machinery equipment (system) with ropes, do not attempt to apply load on the actuators. Also pay attention not to pinch cables and bend or deform them forcefully.

2.2 Installation and Storage • Preservation Environment

[1] Installation Environment

The actuator should be installed in a location other than those specified below.
Also provide sufficient work space required for maintenance inspection.

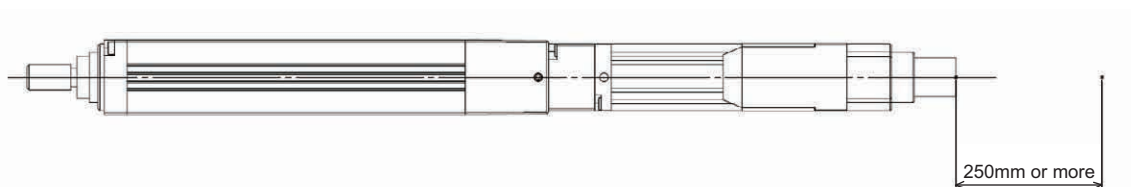
- Where the actuator receives radiant heat from strong heat sources such as heat treatment furnaces
- Where the ambient temperature exceeds the range of 0 to 40°C
- Where the temperature changes rapidly and condensation occurs
- Where the relative humidity exceeds 85% RH
- The product possesses dust proof and splash proof performances of a protection structure of IP52. (Dust and Splash proof type: Models with B at the end of model code)
- It possesses the dust-proof performance of IP50 protection structure. (Dust proof type: Models with A at the end of model code)
- Where the actuator receives direct sunlight
- Where the actuator is exposed to corrosive or combustible gases
- Where the ambient air contains a large amount of powder dust, salt or iron (at level exceeding what is normally expected in an assembly plant) (excludes dust for Dust-proof type)
- Where the actuator is subject to splashed water, oil (including oil mist or cutting fluid) or chemical solutions
- Where the actuator receives impact or vibration

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

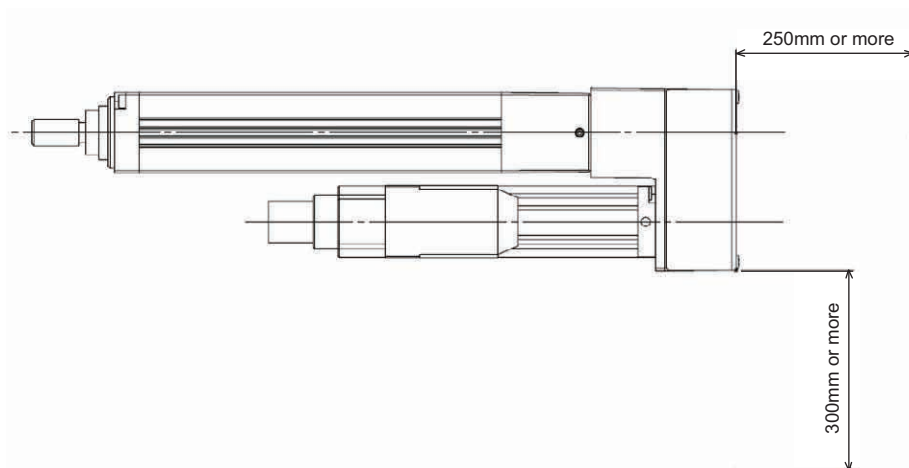
- Where noise generates due to static electricity, etc.
- Where the actuator is subject to a strong electric or magnetic field
- Where the actuator is subject to ultraviolet ray or radiation

Open space required for maintenance inspection

- Motor coupling types



- Motor reversing types



[2] Storage • Preservation Environment

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

2.3 How to Install

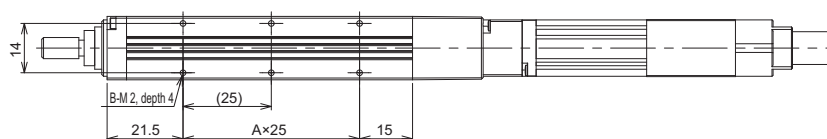
2.3.1 How to Attach Slim Types

RA2AC (Motor Coupling Types), RA2AR (Motor Reversing Types)

[1] Installation of the 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 reversing 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	
	In the case that steel is used for the bolt seating surface:	In the case that aluminum is used for the bolt seating surface:
M2	0.42N·m (0.043kgf·m)	0.25N·m (0.026kgf·m)

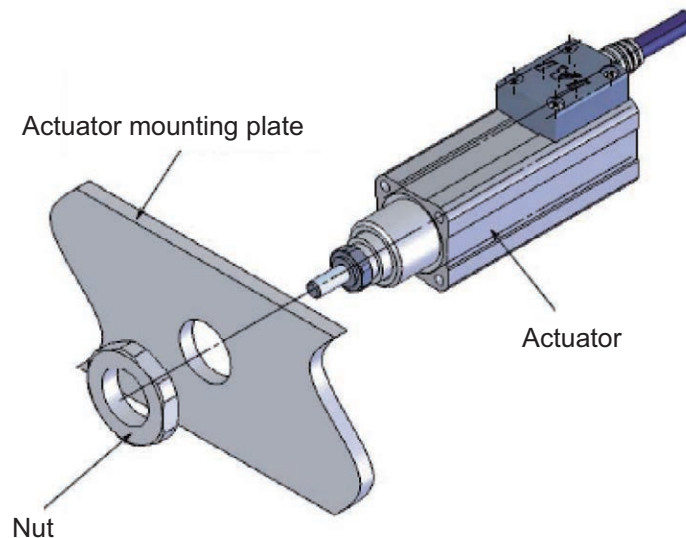
2.3.2 How to Attach Short Types (Nut Affixing Types)

RN3NA, RN3N (Lead Screw, Ball Screw), RN3NB (Ball Screw),
RN4NA, RN4N (Lead Screw, Ball Screw), RN4NB (Ball Screw)

[1] Installation of the Actuator

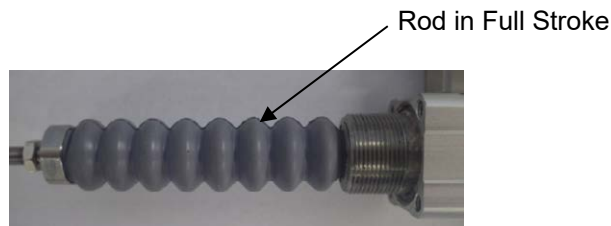
Install the actuator by guiding it through a hole of approx. 5 to 10mm provided in a smooth plate.

- 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), RN3NB (ball screw)	M20 × 1.0	29	49.4N·m
RN4NA, RN4N (Lead screw, ball screw), RN4NB (ball screw)	M24 × 1.0	32	76.8N·m

- ⚠ Caution:
- Do not tighten excessively beyond the maximum tightening torque. The actuator may be damaged.
 - For Cleanroom Type and Dust-Proof Type RN3NB and RN3NA, pull out the rod to the maximum stroke before inserting to the through hole on the plate. Pull it out in full stroke or the bellows would not go through the hole as they could interfere at the hole.

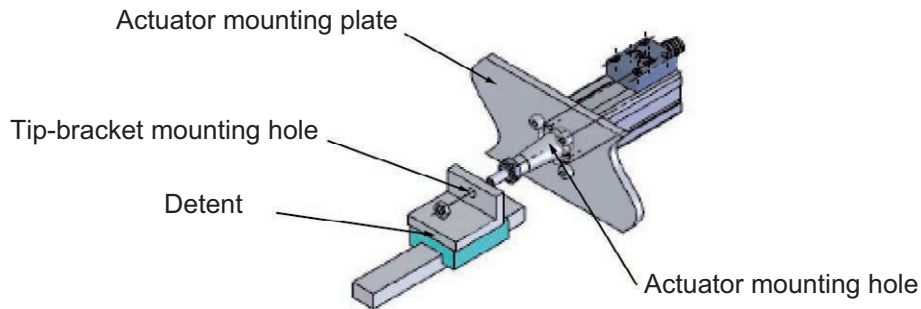


[2] Installation of the Detent

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

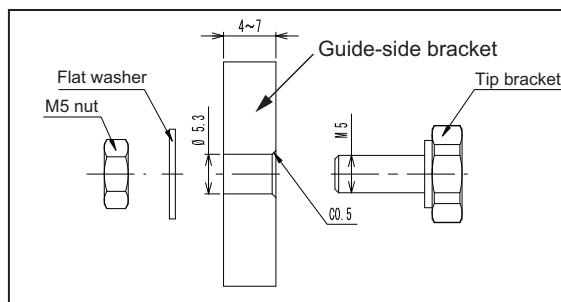
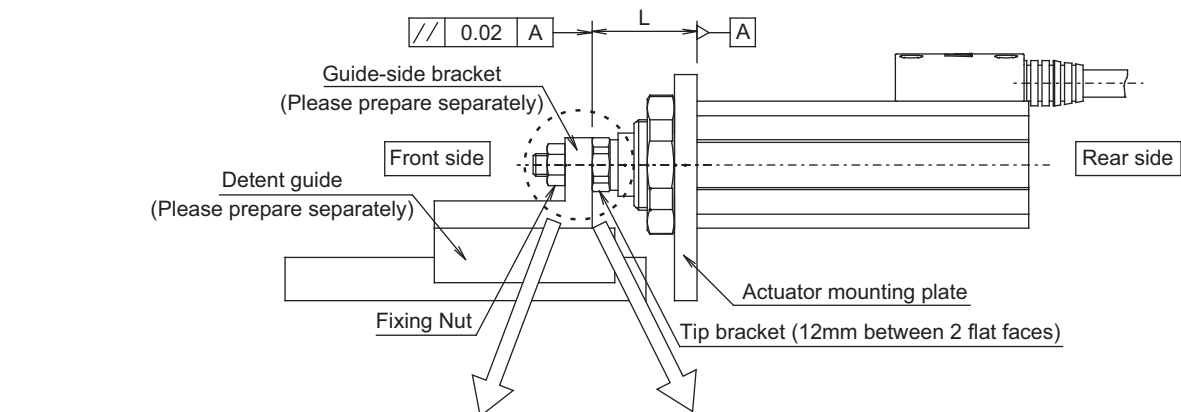
Make sure to prepare detent for RN3NA, RN3N (Lead screw, ball screw), RN3NB (ball screw), RN4NA, RN4N (Lead screw, ball screw) and RN4NB (ball screw) with no guide, and attach it referring to the figure below.

Without the detent, the motor can slip and the rod would not run back and forth properly.

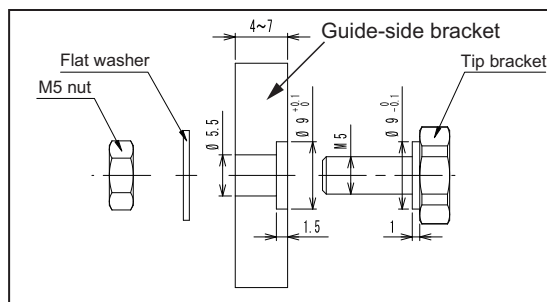


Caution: If you hear any abnormal noise from the actuator or find the grease on the screw darker within several weeks after the start of operation, the coaxiality or parallelism between the actuator mounting hole in the actuator mounting plate and tip-bracket mounting hole in the guide-side bracket may 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 5.5, "Greasing".]

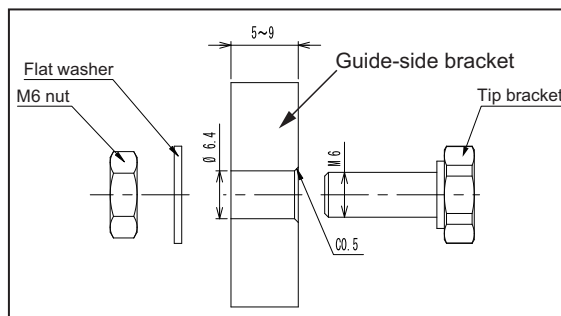
Keep the coaxiality between the actuator mounting hole in the actuator mounting hole and tip-bracket mounting hole in the guide-side bracket, to within 0.05. Also keep the parallelism to within 0.02.



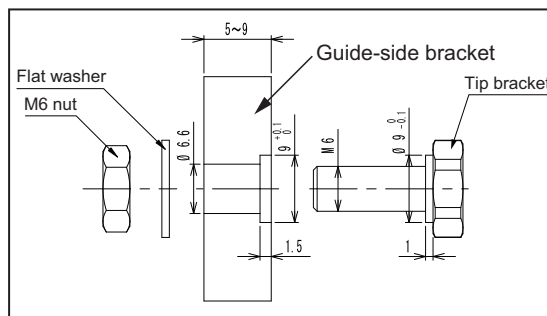
RN3 Guide-side bracket (without counterbore)



RN3 Guide-side bracket (with counterbore)



RN4 Guide-side bracket (without counterbore)



RN4 Guide-side bracket (with counterbore)


The dimensions of Position L to attach the guide-side bracket for the standard type are as shown below.

The position to attach the guide-side bracket for Cleanroom Type and Dust-proof Type is approximately 1mm from the mechanical end. (It should be the home position when moving by using the controller)

Type	Lead	Guide-side bracket	L
Standard type RCA2-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
Standard type RCA2-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) RN3NA, RN3NB, RN3N (ball screw)	2.8N·m
RN4NA, RN4N (lead screw) RN4NA, RN4NB, RN4N (ball screw)	4.2N·m

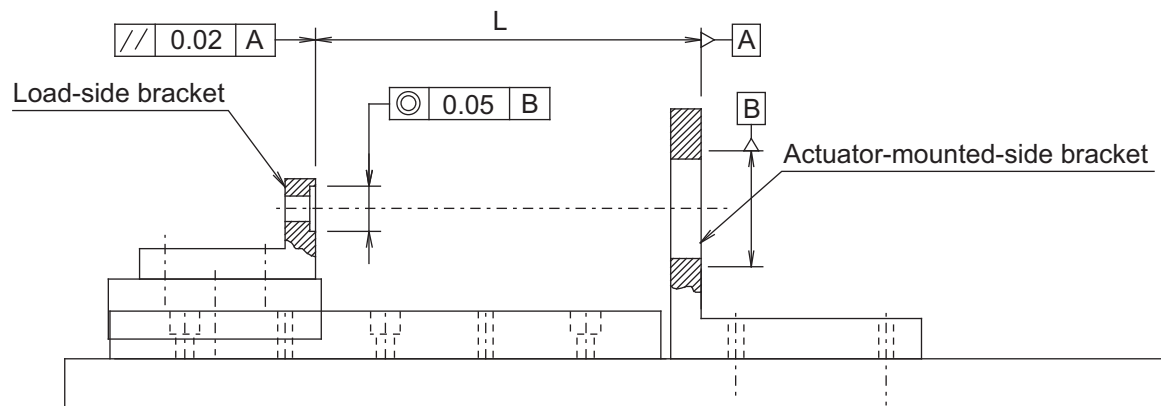

Caution: Do not join the actuator detent using a floating joint.
 A radial load will be applied due to an eccentricity of the screw shaft, resulting in
 actuator malfunction or premature damage.

[Mounting procedure]

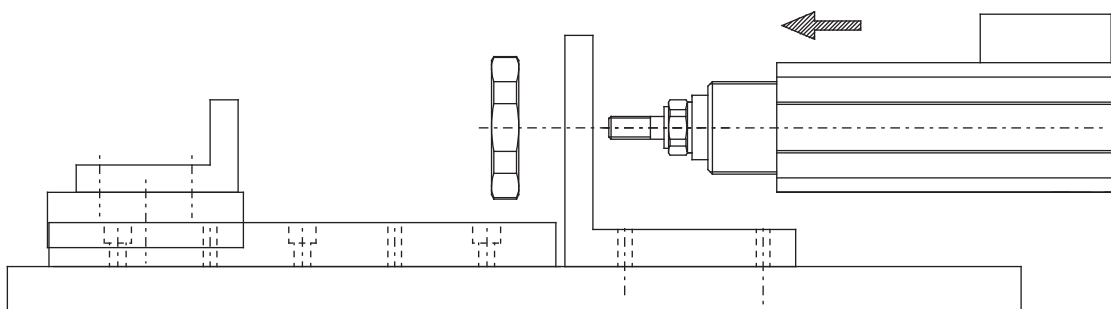
- 1) Check the accuracy on the actuator side and load side.

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.

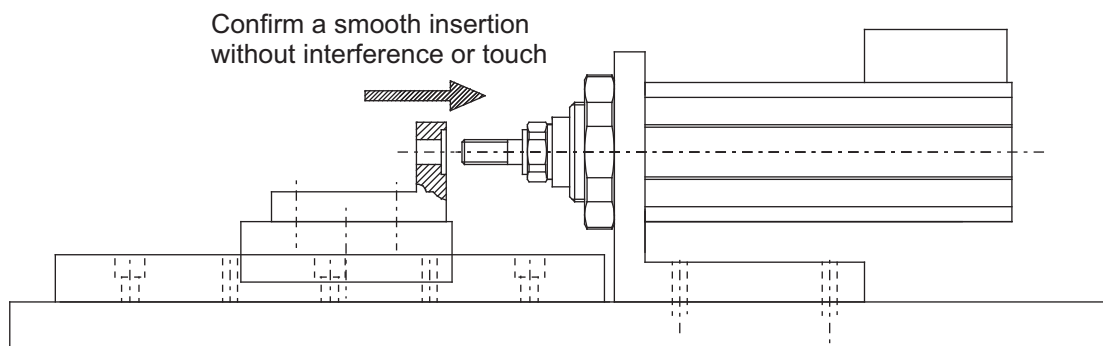
For the brake-equipped types, connect a controller and release the brake before start working.



- 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.

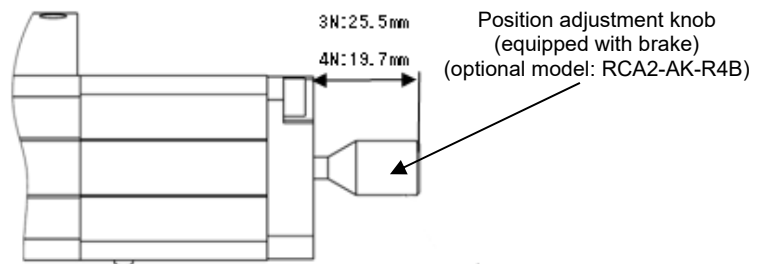
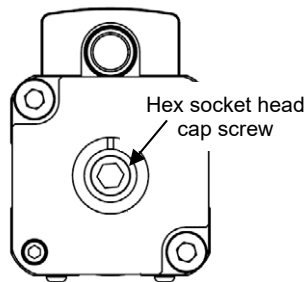


Caution: Make sure to have the position accuracy for the actuator and the load side as indicated.
Failure to do so may cause abnormal noise, vibration, operational failure or shorter product life.

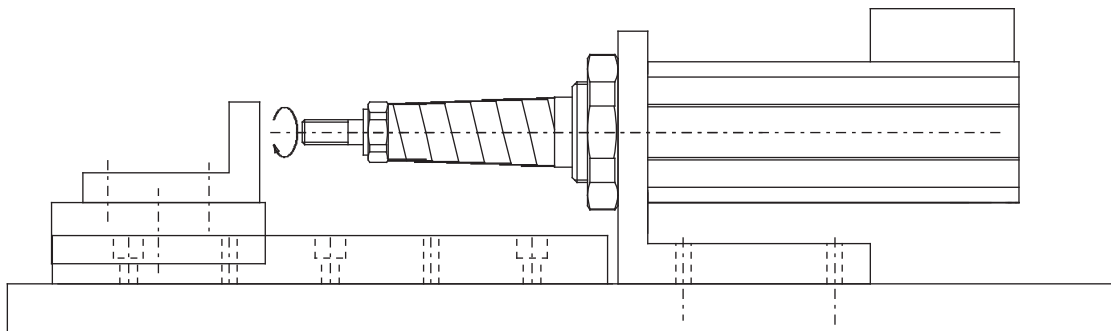
- 4) For the standard types with no brake, turn the shaft clockwise until the overall actuator dimension becomes the shortest and the mechanical stopper is contacted. When the shaft is turned at the mechanical end, the cutout groove provided in the shaft on the rear side also turns. For the standard types equipped with a brake, remove the hex socket head cap screw (3N: M6 (width between two parallel faces = 3.0), 4N: M8 (width between two parallel faces = 4.0)) at the back side, and insert the optional "Position Adjustment Knob (for brake-equipped type)" until the shaft can be turned. After inserting the knob, turn the shaft clockwise until it hits the mechanical stopper. If you turn the shaft at the mechanical end, the knob also turns. For Cleanroom Type and Dust-proof Type, the axis will not rotate. For Lead 4, push the rod by hand to hit to the mechanical stopper, and then pull out for approximately 1mm. For Lead 1 and 2, connect the controller to perform the home-return operation.

Caution: Do not attempt to push the rod by hand for the low load type (Lead 1 and 2). Pushing it forcefully could allow applying load on the feed screw, which may cause operation error or malfunction.

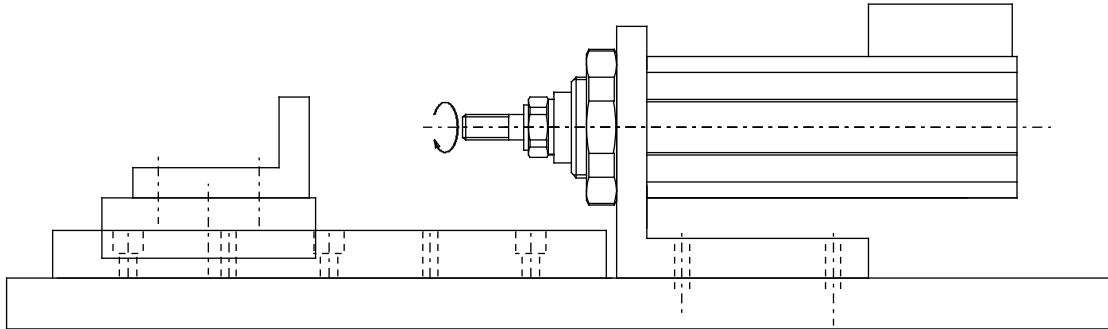
It is not necessary to conduct 5) and 6) work processes for Cleanroom Type and Dust-proof Type. Proceed to Step (7) and fix the guide-side bracket.



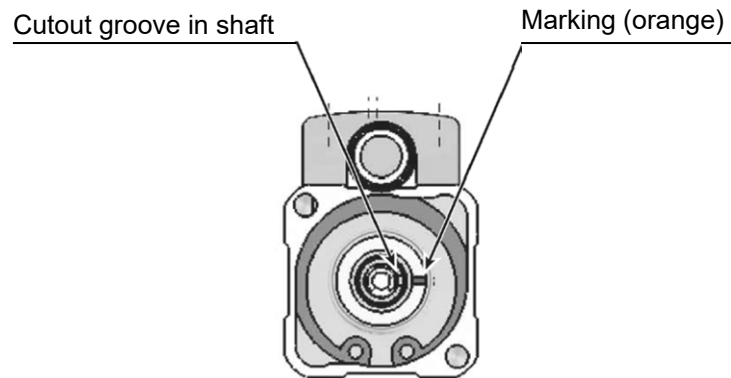
Brake-equipped type



- 5) For the types with no brake, turn the shaft clockwise until the cutout groove provided in the shaft on the rear side aligns with the marking (positioning) sticker.
For the brake-equipped types, make the cutout groove provided in the position adjustment knob aligned with the marking sticker.

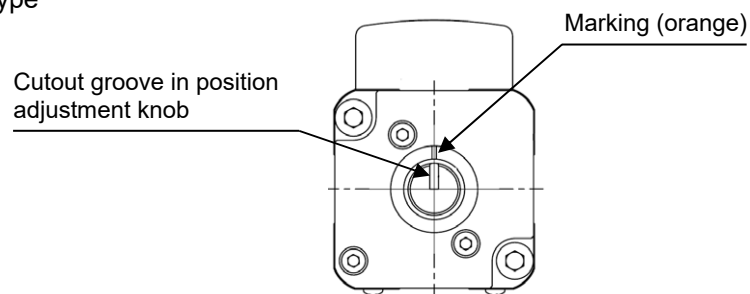


- Without Brake



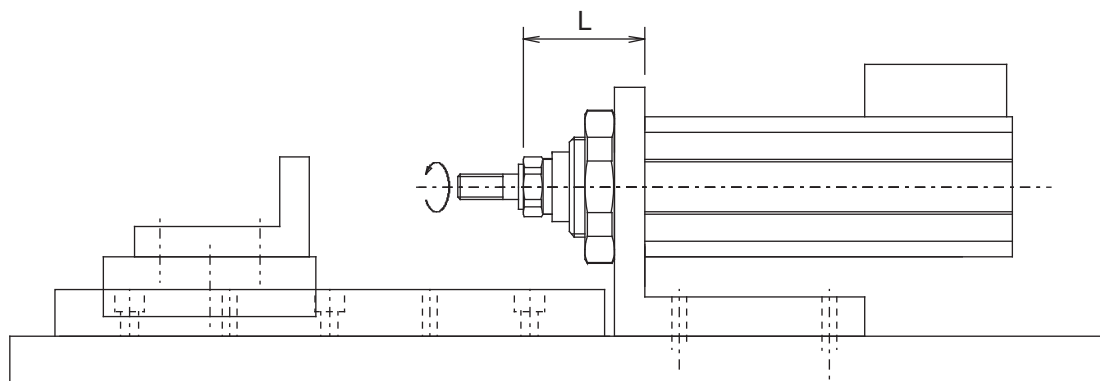
Shaft position at detent installation

- Brake-equipped Type

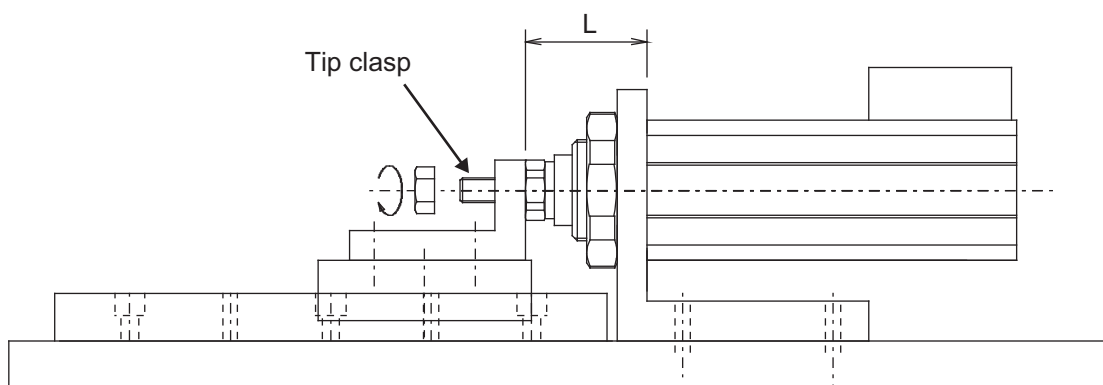


Shaft Position When Stopper Attached

- 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

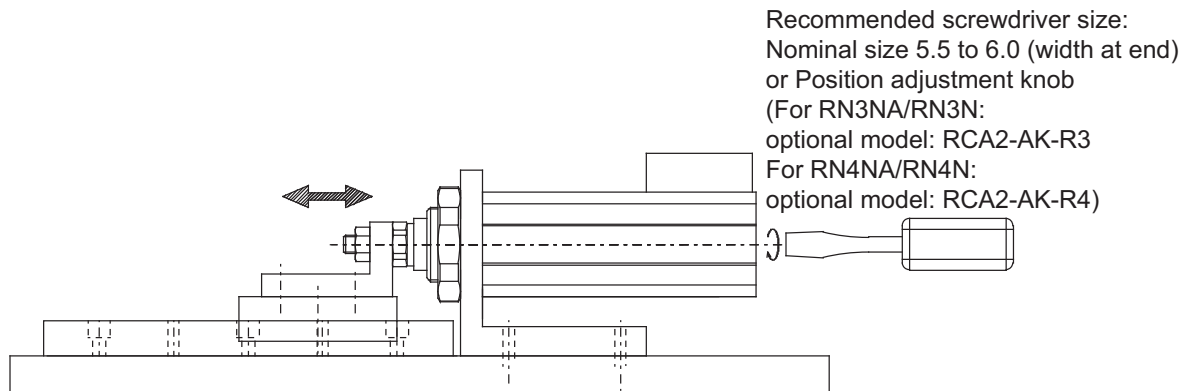
Type	Tightening torque
RN3NA, RN3N (lead screw) RN3NA, RN3NB, RN3N (ball screw)	2.8N·m
RN4NA, RN4N (lead screw) RN4NA, RN4NB, RN4N (ball screw)	4.2N·m

Caution: Pay attention not to get the bellows twisted for Cleanroom Type and Dust-proof Type. Bellows being twisted may cause misalignment of the home position or drop of production life.

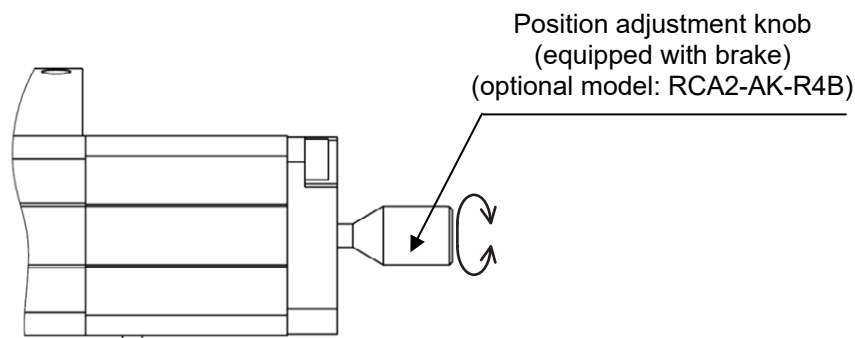
8) Confirm that the bracket moves smoothly in the whole range of its stroke. Readjust the position if it is confirmed the bracket gets heavy or stuck at any point in the stroke range.

- For the low lead types (Lead 1 and 2) in the standard type, move the bracket by turning the rear of the rotary shaft with a screwdriver or position adjustment knob for the types with no brake, or the position adjustment knob (dedicated for brake-equipped types) for the brake-equipped types.
- For Cleanroom Type and Dust-proof Type, the axis will not rotate. Move the rod by hand for Lead 4. For the low lead types (Lead 1 and 2), connect a controller to move it by JOG operation.

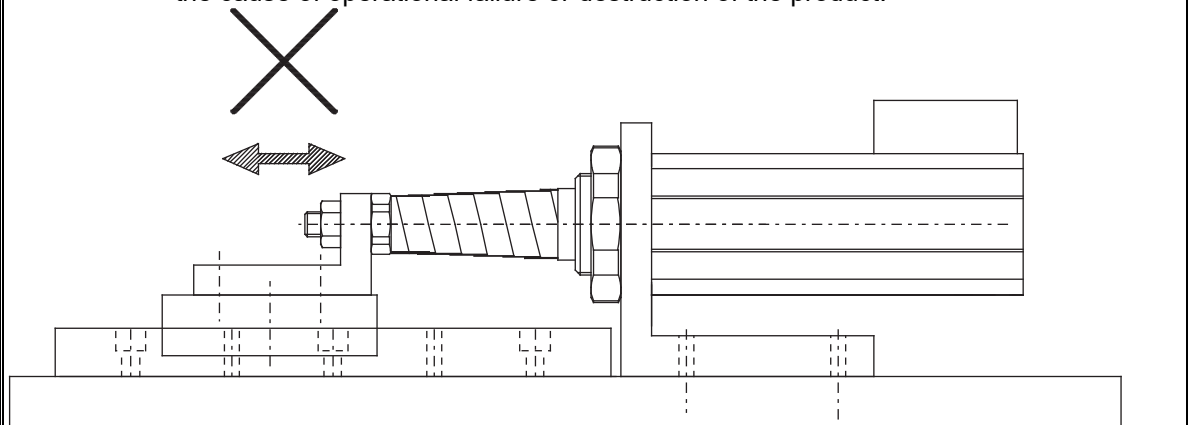
• Without Brake



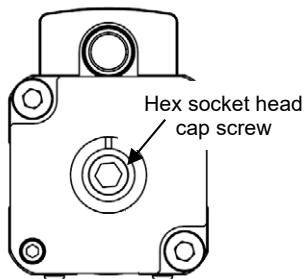
• Brake-equipped Type



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.



- 9) For the standard types equipped with a brake, attach the hex socket head cap screw (3N: M6, 4N: M8) so it faces to the actuator.



Tightening torque (reference): RN3NA 0.2N·m
RN4NA 0.4N·m



Caution: Do not push in too much. If the screw is turned with it hitting the brake, it may damage the brake.

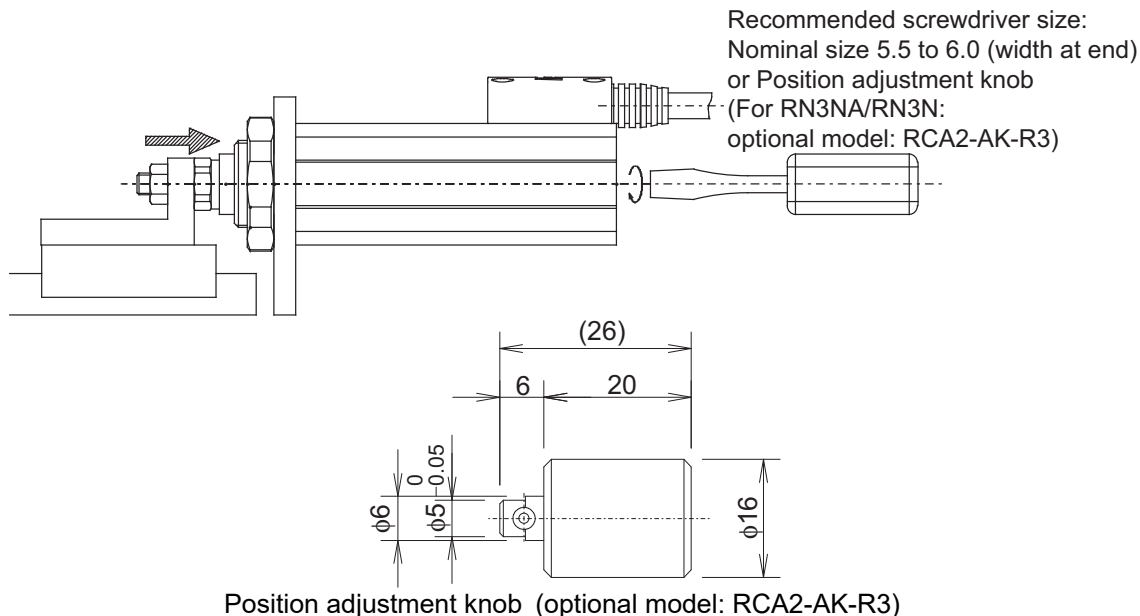
[How to check and adjust the position of encoder phase Z]

It is required only for the standard type RCA2-RP3NA/RP3N (slide screw) actuators with a lead of 1mm to confirm that the encoder Z-phase is in the appropriate position by the following procedures.

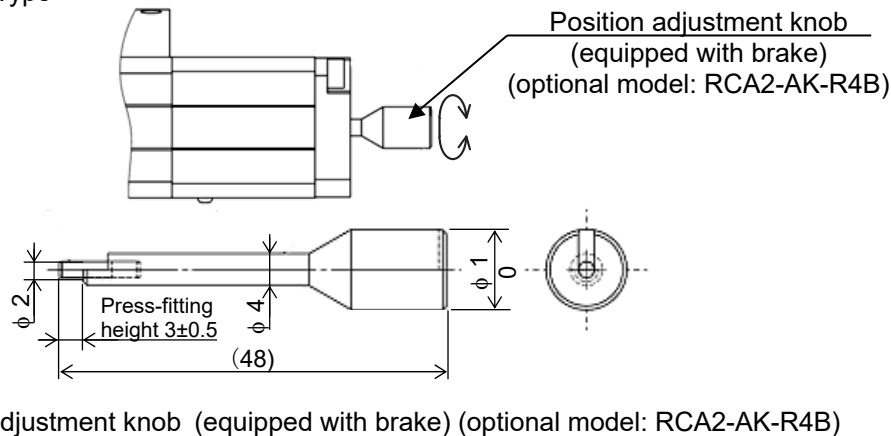
[Procedure 1] Checking the position of encoder phase Z

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

• Without Brake

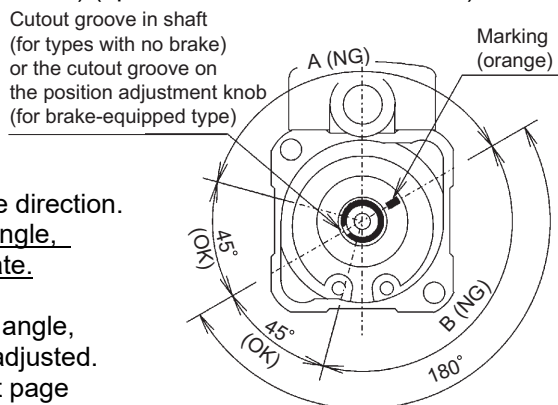


• Brake-equipped Type



- 2) In rear view, confirm that the cutout groove in the shaft (for types with no brake) or the cutout groove on the position adjustment knob (for brake-equipped type) is located within ± 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].

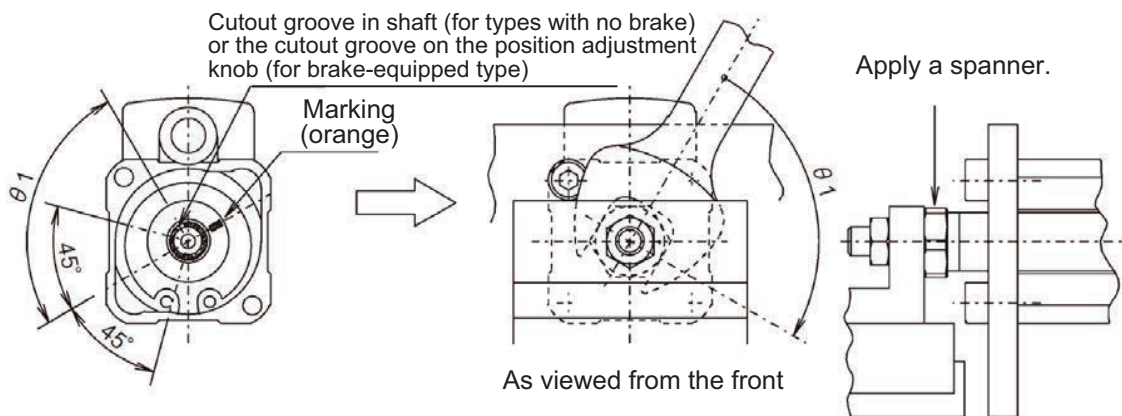


* The marking position varies depending on the actuator.

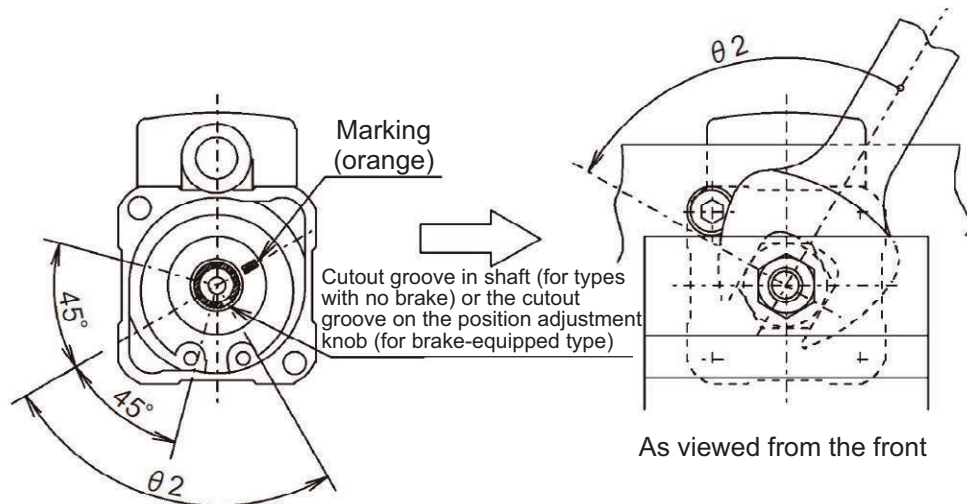
[Procedure 2] Correcting the position of encoder phase Z

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 θ_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 θ_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.

[3] Installation of the Flange

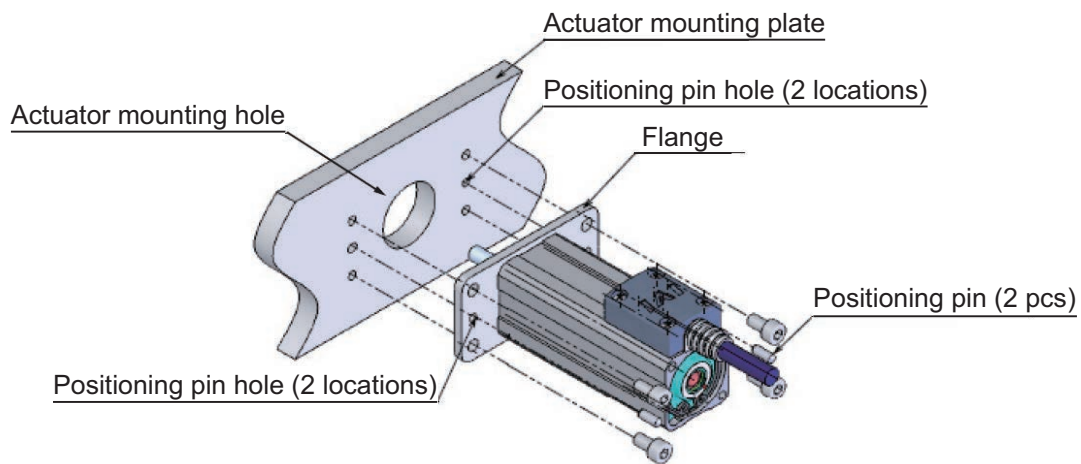
Provide a flange-shaped sheet and install the actuator onto this sheet from the back.

- 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.

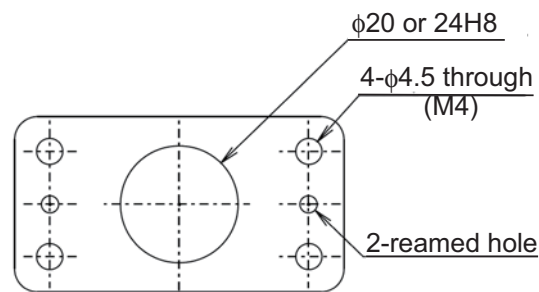
Type	Nut diameter
RN3NA, RN3N (Lead screw, ball screw), RN3NB (ball screw)	$\phi 34$
RN4NA, RN4N (Lead screw, ball screw), RN4NB (ball screw)	$\phi 30.8$



Installation of actuator and flange

Type	M	Width across flats	Maximum tightening torque
RN3NA, RN3N (Lead screw, ball screw), RN3NB (ball screw)	M20 × 1.0	29	49.4N·m
RN4NA, RN4N (Lead screw, ball screw), RN4NB (ball screw)	M24 × 1.0	32	76.8N·m

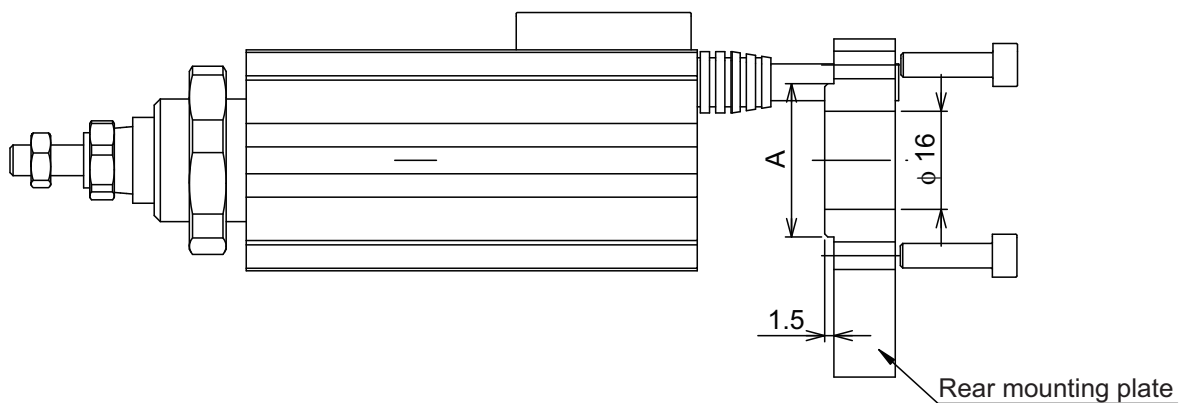
(Reference drawing of flange)



[4] Installation from the Rear Side

For the types with no brake, 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.

(Note) For the standard types equipped with a brake, Cleanroom Type and Dust-proof Type, it is not available to attach from the rear side.



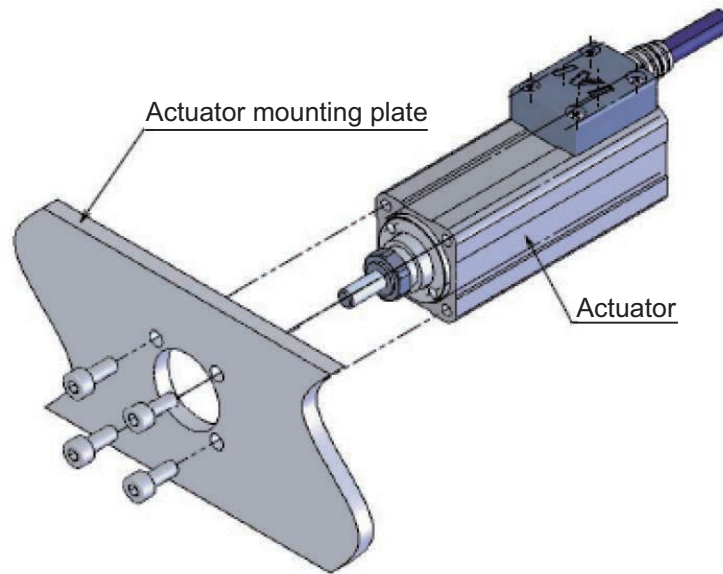
	RN3NA, RN3N (Lead screw, ball screw)	RN4NA, RN4N (Lead screw, ball screw)
A	φ25 -0.2 -0.3	φ30 -0.2 -0.3

2.3.3 How to Attach Short Types (Tapped-hole Mounting Types) RP3NA, RP3N (Lead Screw, Ball Screw), RP3NB (Ball Screw), RP4NA, RP4N (Lead Screw, Ball Screw), RP4NB (Ball Screw)

[1] Installation of the Actuator

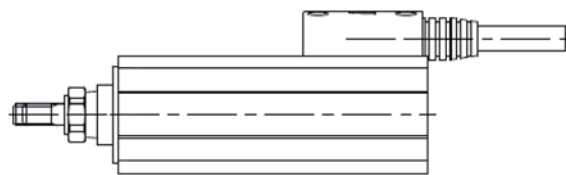
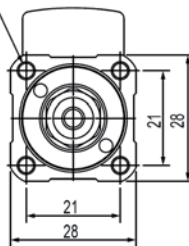
Install the actuator by guiding it through a hole of approx. 5 to 10mm provided in a smooth plate.

- 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.



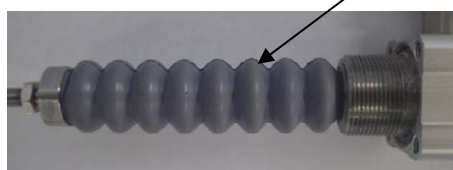
- RP3NA, RP3N (Lead screw, ball screw), RP3NB (ball screw)

Tapped
mounting hole

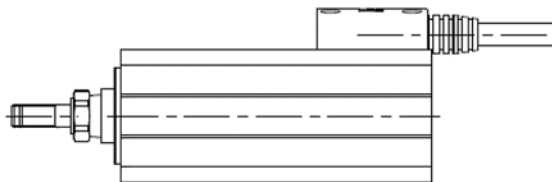
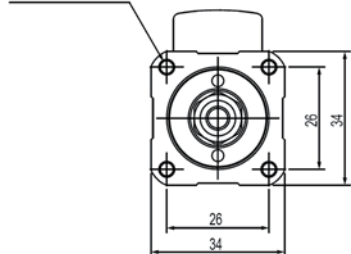


Caution: For Cleanroom Type and Dust-Proof Type RP3NB and RP3NA, pull out the rod to the maximum stroke before inserting to the through hole on the plate. Pull it out in full stroke or the bellows would not go through the hole as they could interfere at the hole.

Rod in Full Stroke



- ## 2. Installation

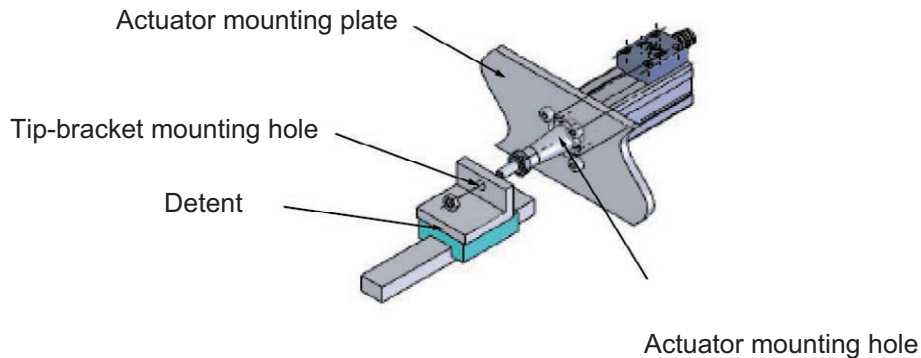
65

[2] Installation of the Detent

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

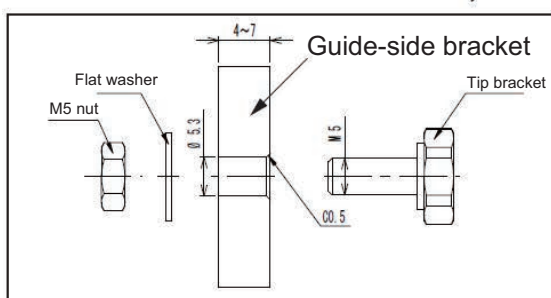
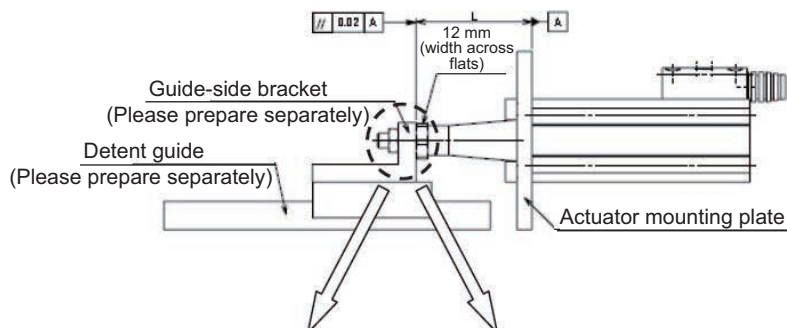
Make sure to prepare detent for RP3NA, RP3N (Lead screw, ball screw), RP3NB (ball screw), RP4NA, RP4N (Lead screw, ball screw) and RP4NB (ball screw) with no guide, and attach it referring to the figure below.

Without the detent, the motor can slip and the rod would not run back and forth properly.

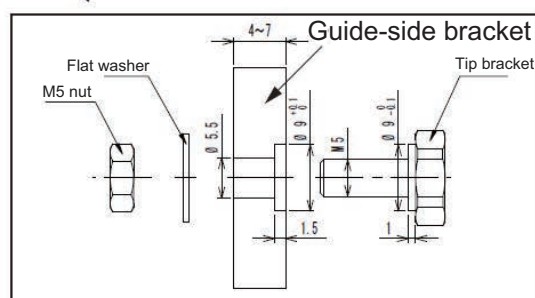


Caution: If you hear any abnormal noise from the actuator or find the grease on the screw darker within several weeks after the start of operation, the coaxiality or parallelism between the actuator mounting hole in the actuator mounting plate and tip-bracket mounting hole in the guide-side bracket may 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 5.5, "Greasing".]

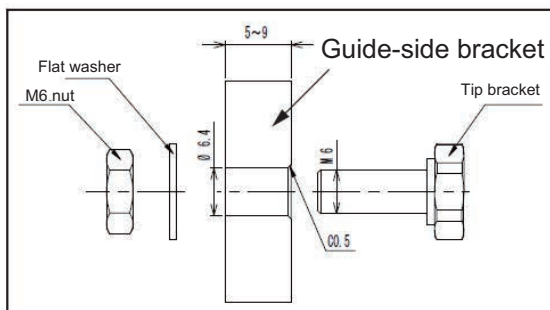
Keep the coaxiality between the actuator mounting hole in the actuator mounting hole and tip-bracket mounting hole in the guide-side bracket, to within 0.05. Also keep the parallelism to within 0.02.



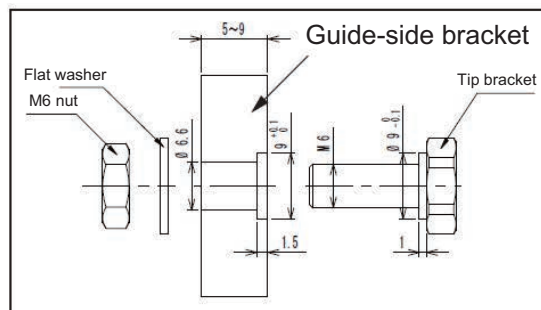
RP3 Guide-side bracket (without counterbore)



RP3 Guide-side bracket (with counterbore)



RP4 Guide-side bracket (without counterbore)



RP4 Guide-side bracket (with counterbore)


The dimensions of Position L to attach the guide-side bracket for the standard type are as shown below.

The position to attach the guide-side bracket for Cleanroom Type and Dust-proof Type is approximately 1mm from the mechanical end. (It should be the home position when moving by using the controller)

Type	Lead	Guide-side bracket	L
Standard type RCA2-RP3NA, RP3N (Lead screw, ball screw) RCA2-RP4NA, RP4N (Lead screw, ball screw)	1	Without counterbore	11.5 ±0.1
		With counterbore	10.5 ±0.1
Standard type RCA2-RP3NA, RP3N (Lead screw, ball screw) RCA2-RP4NA, RP4N (Lead screw, ball screw)	2, 4, 6	Without counterbore	11.8 ±0.1
		With counterbore	10.8 ±0.1

Tightening torque for tip clasp

Type	Tightening torque
RP3NA, RP3N (lead screw) RP3NA, RP3NB, RP3N (ball screw)	2.8N·m
RP4NA, RP4N (lead screw, RP4NA, RP4NB, RP4N (ball screw)	4.2N·m

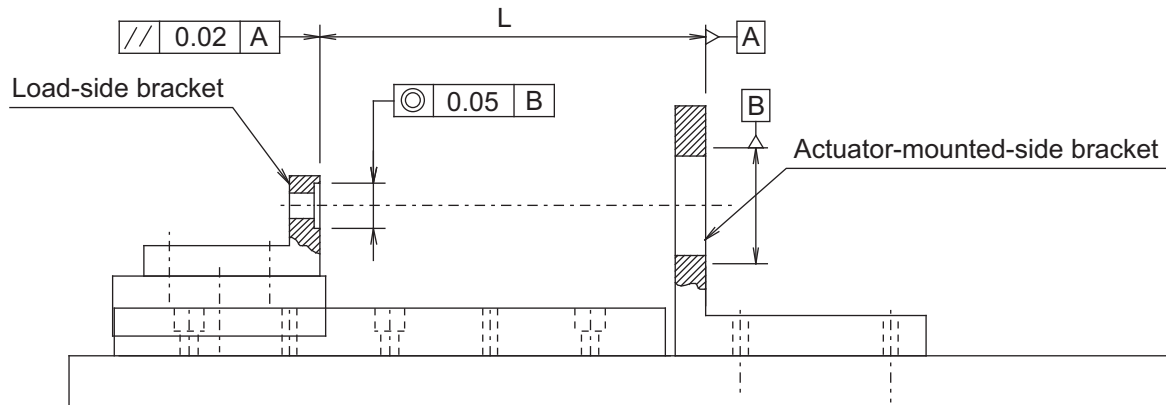
 **Caution:** Do not join the actuator detent using a floating joint.
A radial load will be applied due to an eccentricity of the screw shaft, resulting in actuator malfunction or premature damage.

[Mounting procedure]

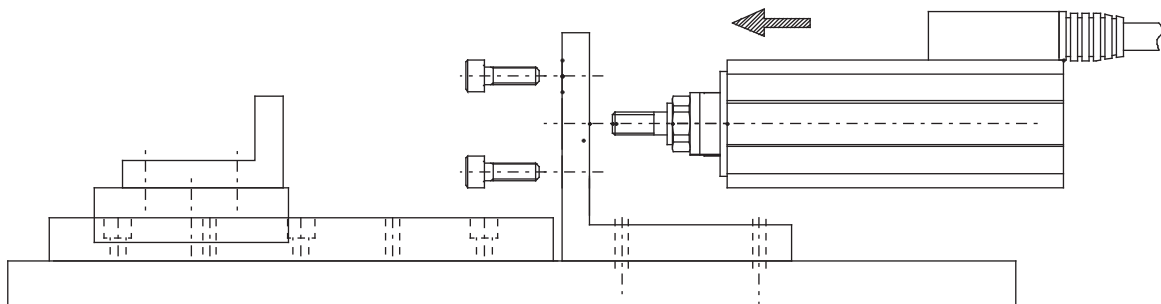
- 1) Check the accuracy on the actuator side and load side.

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.

For the brake-equipped types, connect a controller and release the brake before start working.

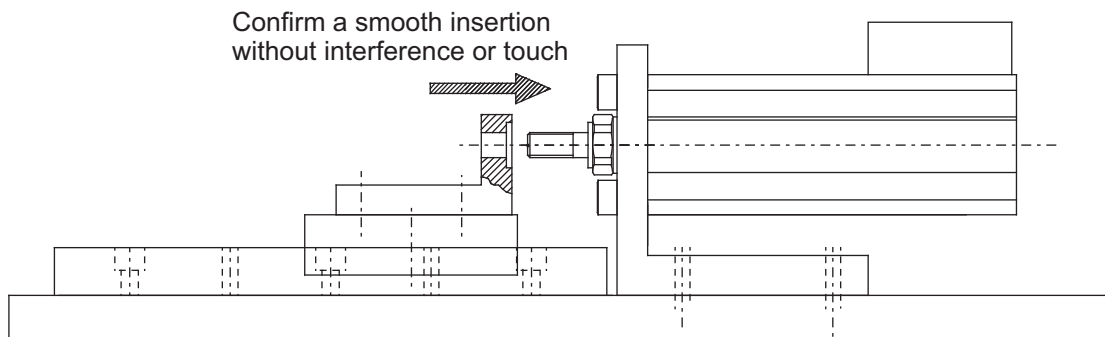


- 2) Mount the main unit of the actuator.



- 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.

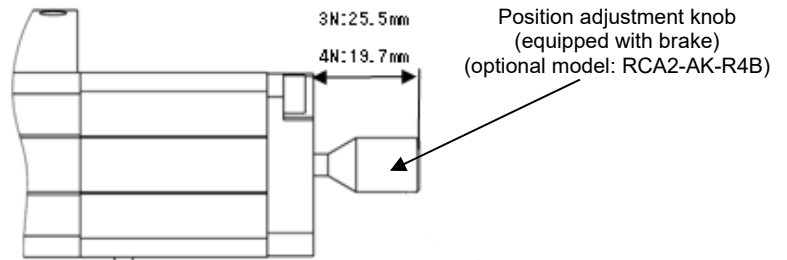
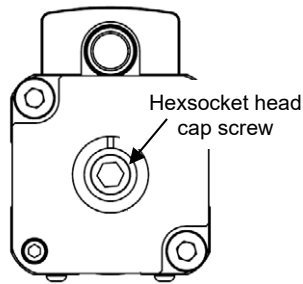


Caution: Make sure to have the position accuracy for the actuator and the load side as indicated. Failure to do so may cause abnormal noise, vibration, operational failure or shorter product life.

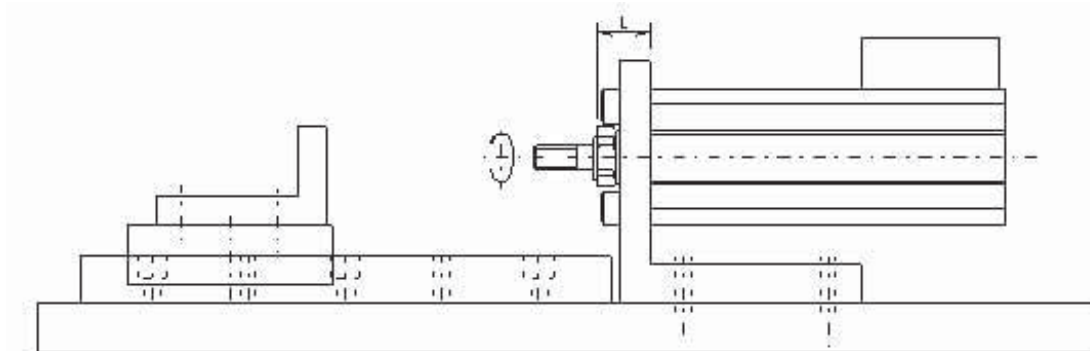
- 4) For the standard types with no brake, turn the shaft clockwise until the overall actuator dimension becomes the shortest and the mechanical stopper is contacted. When the shaft is turned at the mechanical end, the cutout groove provided in the shaft on the rear side also turns. For the standard types equipped with a brake, remove the hex socket head cap screw (3N: M6 (width between two parallel faces = 3.0), 4N: M8 (width between two parallel faces = 4.0)) at the back side, and insert the optional "Position Adjustment Knob (for brake-equipped type)" until the shaft can be turned. After inserting the knob, turn the shaft clockwise until it hits the mechanical stopper. If you turn the shaft at the mechanical end, the knob also turns. For Cleanroom Type and Dust-proof Type, the axis will not rotate. For Lead 4, push the rod by hand to hit to the mechanical stopper, and then pull out for approximately 1mm. For Lead 1 and 2, connect the controller to perform the home-return operation.

Caution: Do not attempt to push the rod by hand for the low load type (Lead 1 and 2). Pushing it forcefully could allow applying load on the feed screw, which may cause operation error or malfunction.

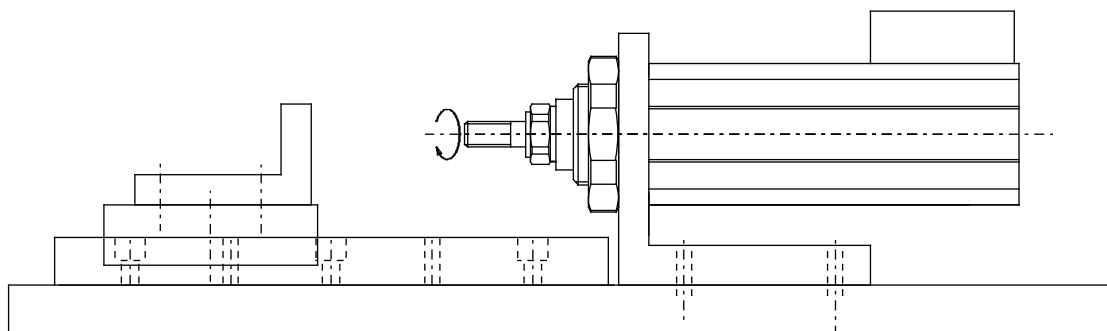
It is not necessary to conduct (5) and (6) work processes for Cleanroom Type and Dust-proof Type. Proceed to Step (7) and fix the guide-side bracket.



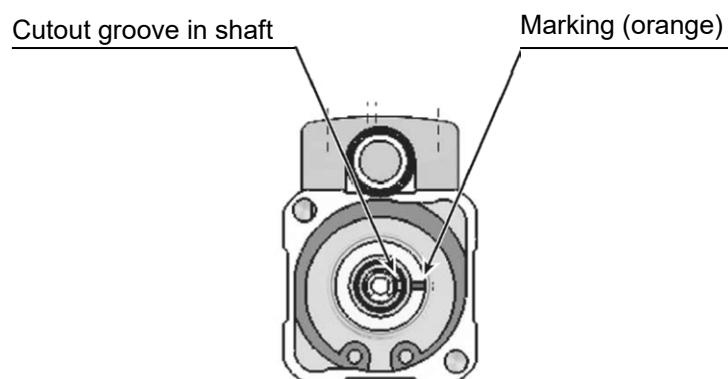
Brake-equipped type



- 5) For the types with no brake, turn the shaft clockwise until the cutout groove provided in the shaft on the rear side aligns with the marking (positioning) sticker.
For the brake-equipped types, make the cutout groove provided in the position adjustment knob aligned with the marking sticker.

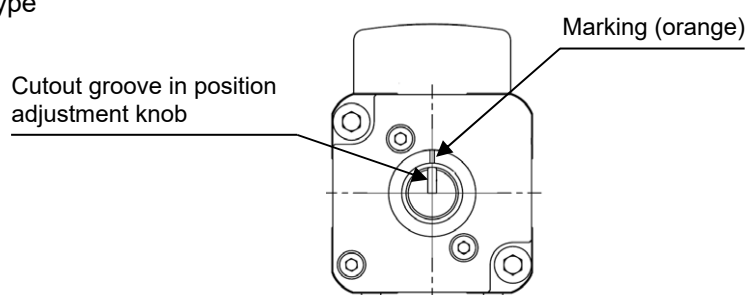


- Without Brake



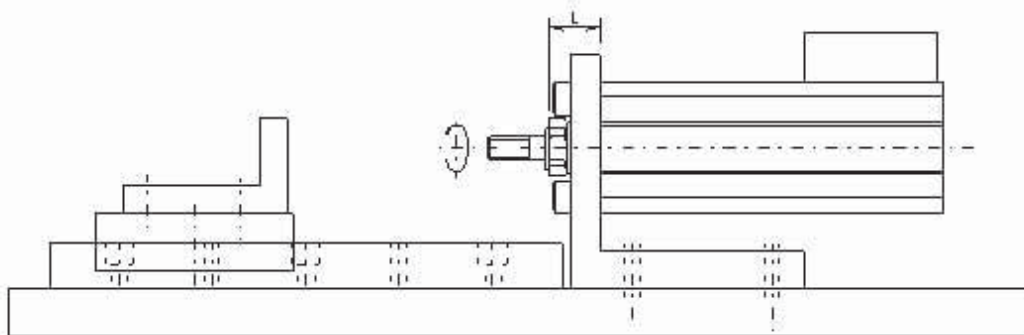
Shaft position at detent installation

- Brake-equipped Type

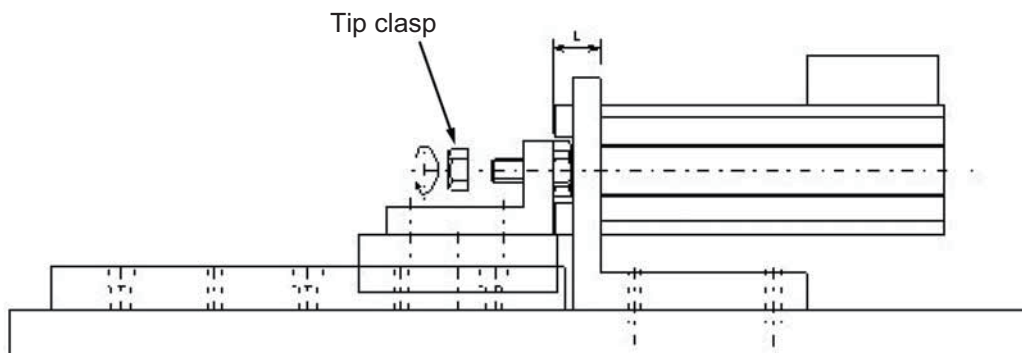


Shaft Position When Stopper Attached

- 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

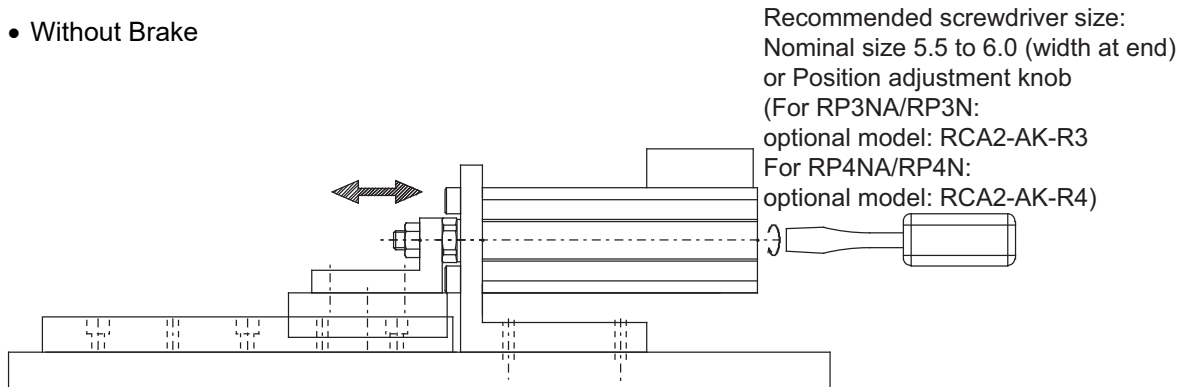
Type	Tightening torque
RP3NA, RP3N (lead screw) RP3NA, RP3NB, RP3N (ball screw)	2.8N·m
RP4NA, RP4N (lead screw, RP4NA, RP4NB, RP4N (ball screw)	4.2N·m

Caution: Pay attention not to get the bellows twisted for Cleanroom Type and Dust-proof Type. Bellows being twisted may cause misalignment of the home position or drop of production life.

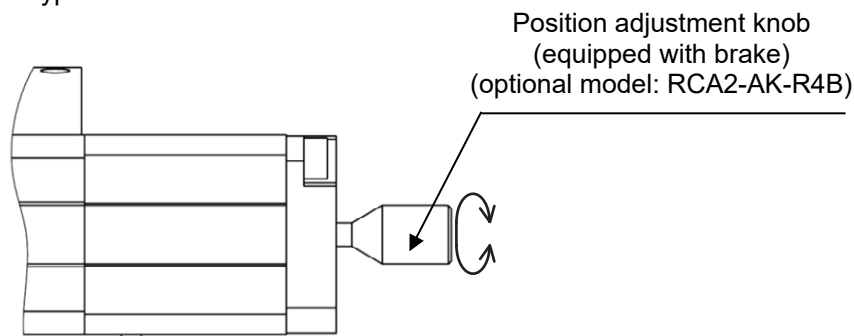
8) Confirm that the bracket moves smoothly in the whole range of its stroke. Readjust the position if it is confirmed the bracket gets heavy or stuck at any point in the stroke range.

- For the low lead types (Lead 1 and 2) in the standard type, move the bracket by turning the rear of the rotary shaft with a screwdriver or position adjustment knob for the types with no brake, or the position adjustment knob (dedicated for brake-equipped types) for the brake-equipped types.
- For Cleanroom Type and Dust-proof Type, the axis will not rotate. Move the rod by hand for Lead 4. For the low lead types (Lead 1 and 2), connect a controller to move it by JOG operation.

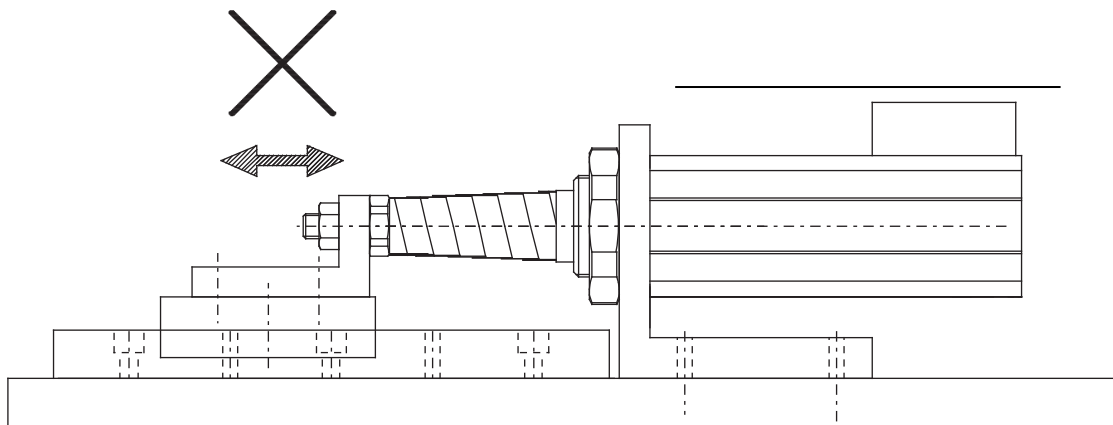
• Without Brake



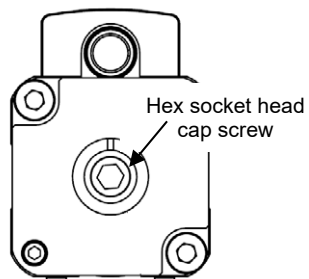
• Brake-equipped Type



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.



- 9) For the standard types equipped with a brake, attach the hex socket head cap screw (3N: M6, 4N: M8) so it faces to the actuator.



Tightening torque (reference): RN3NA 0.2N·m
RN4NA 0.4N·m



Caution: Do not push in too much. If the screw is turned with it hitting the brake, it may damage the brake.

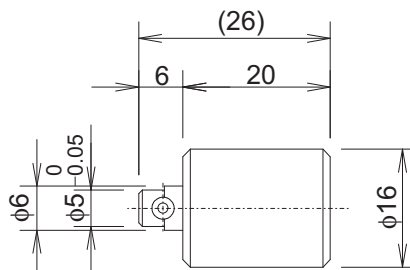
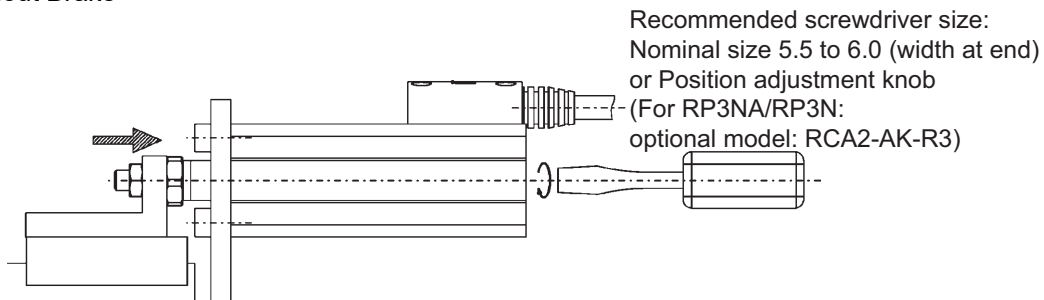
[How to check and adjust the position of encoder phase Z]

Follow the procedures below to check if encoder phase Z is at an appropriate position. It is required only for the standard type RCA2-RP3NA/RP3N (slide screw) actuators with a lead of 1mm to confirm that the encoder Z-phase is in the appropriate position by the following procedures.

[Procedure 1] Checking the position of encoder phase Z

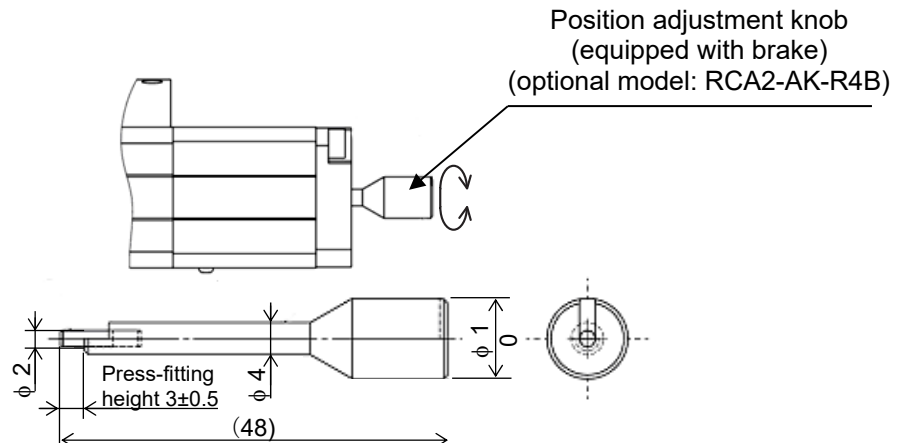
- 1) Turn the shaft clockwise from the rear until the rod contacts the rear end.

• Without Brake



Position adjustment knob (optional model: RCA2-AK-R3)

• Brake-equipped Type

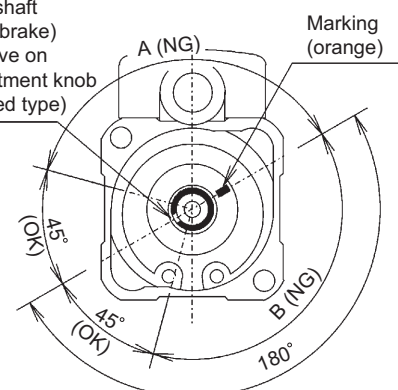


Position adjustment knob (equipped with brake) (optional model: RCA2-AK-R4B)

- 2) In rear view, confirm that the cutout groove in the shaft (for types with no brake) or the cutout groove on the position adjustment knob (for brake-equipped type) is located within ± 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].

Cutout groove in shaft
(for types with no brake)
or the cutout groove on
the position adjustment knob
(for brake-equipped type)

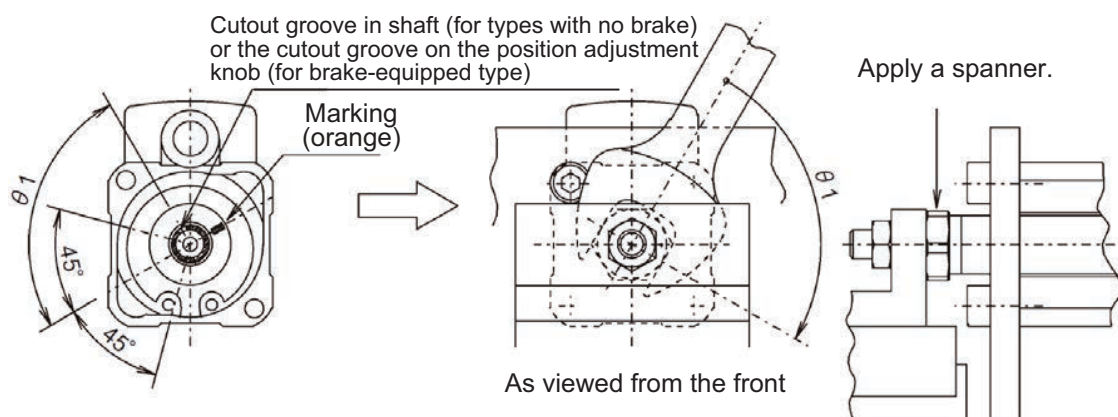


* The marking position varies depending on the actuator.

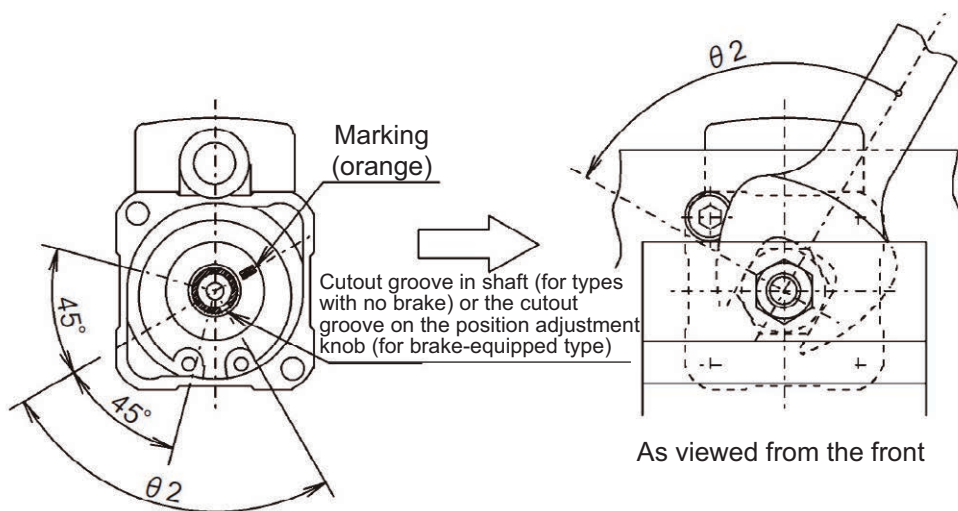
[Procedure 2] Correcting the position of encoder phase Z

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 θ_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 θ_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

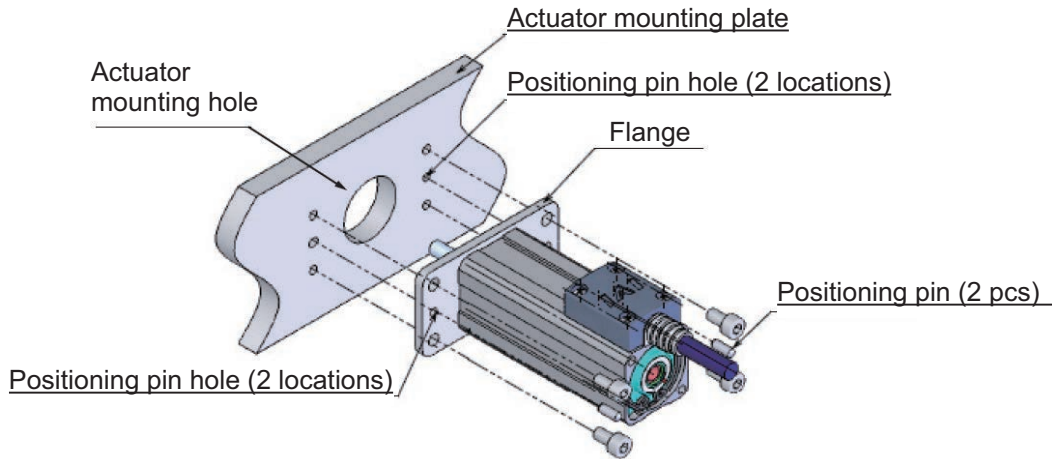
Finally, repeat [Procedure 1] to confirm the position of phase Z again.

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

[3] Installation of the Flange

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

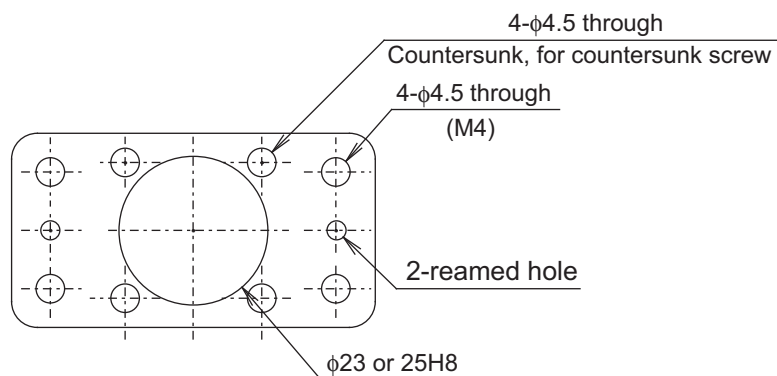
- Use the tapped hole on the actuator to install the actuator onto the flange using the M4 countersunk screw.
- Secure the flange with the actuator mounting plate using screws.
- If positioning is required, insert positioning pins.



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), RP3NB (ball screw) RP4NA, RP4N (Lead screw, ball screw), RP4NB (ball screw)	M4, depth 8	3.6N·m	1.8N·m

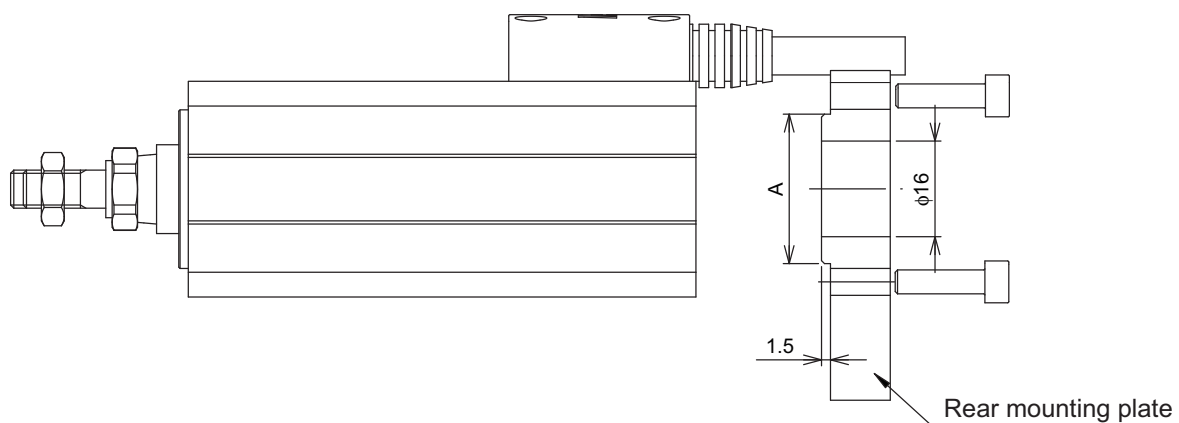
(Reference drawing of flange)



[4] Installation from the Rear Side

For the types with no brake, 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.

(Note) For the standard types equipped with a brake, Cleanroom Type and Dust-proof Type, it is not available to attach from the rear side.



	RP3NA, RP3N (Lead screw, ball screw)	RP4NA, RP4N (Lead screw, ball screw)
A	φ25 -0.2 -0.3	φ30 -0.2 -0.3

2.3.4 How to Attach Single Guide Types

GS3NA, GS3N (Lead Screw, Ball Screw), GS3NB (Ball Screw),
GS4NA, GS4N (Lead Screw, Ball Screw), GS4NB (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.

(Note) In the tapped holes of Cleanroom Type and Dust-proof Type, there are set screws attached. Remove the set screw when attaching.

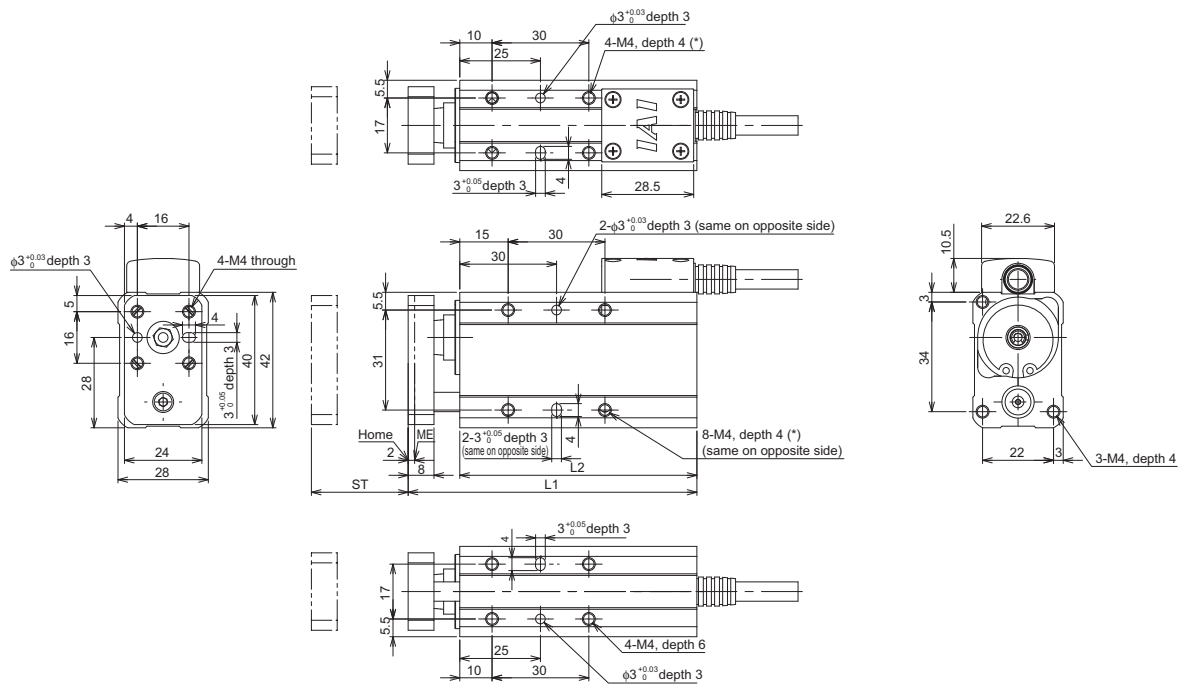
Caulking treatment is conducted on the set screws. If the caulking agent is remained on the body after the screw is removed, make sure to clean up to get rid of it.

(Note) When installing Dust-proof Type (IP52 applicable specification), apply either caulking agent or sealing tape on the thread of the screws to be used.

- Recommended caulking agent: KE-4898 (Shin-Ethi Silicone)

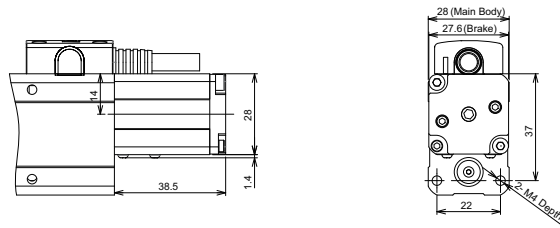
• RCA2-GS3NA/GS3N (Lead screw, ball screw)

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.



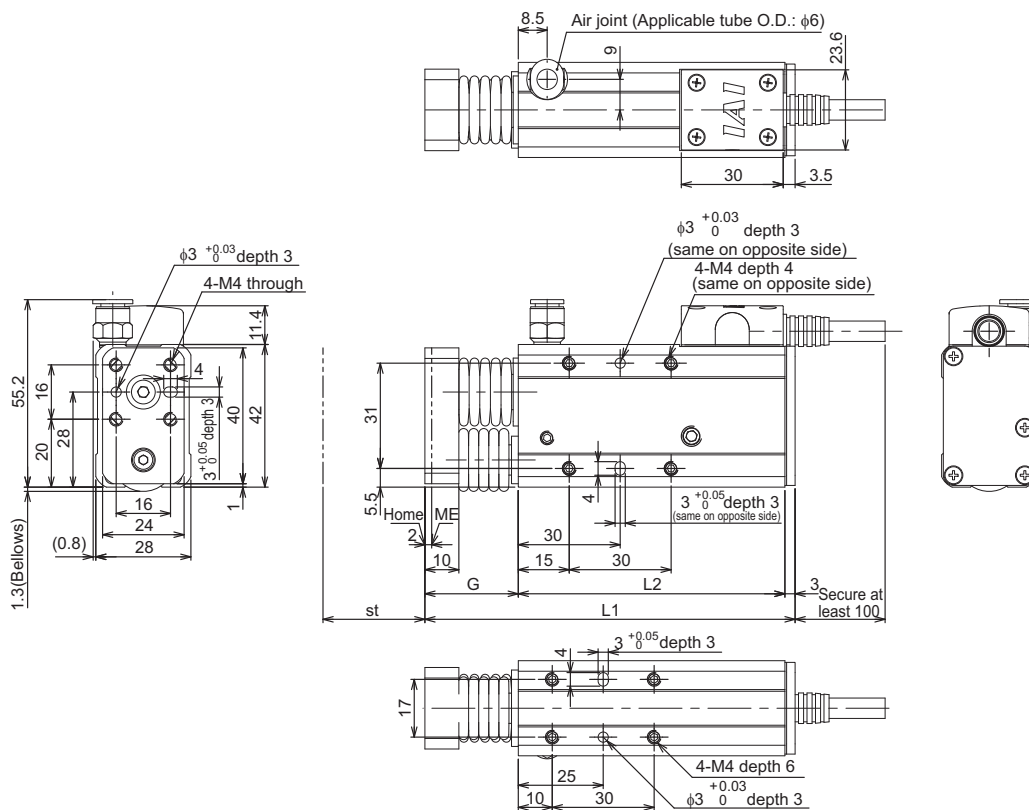
ST	L1	L2
30	89.5	73.5
50	109.5	93.5

Brake-equipped type (GS3NA (lead screw, ball screw)) external diagrams (reference)



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.

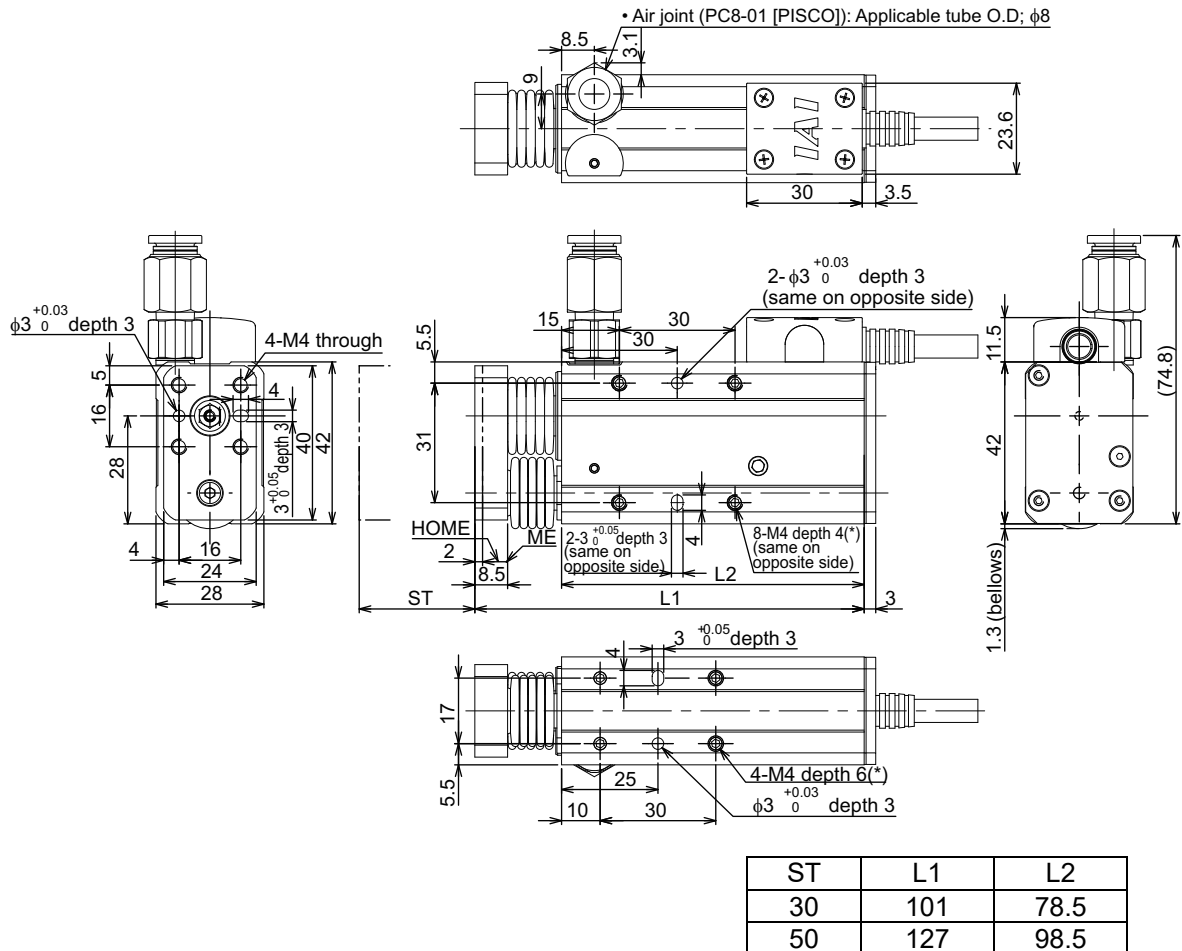
- RCA2CR, RCA2W-GS3NB (Ball screw) Cleanroom type, Dust-proof type
The actuator is structured in such a way that it can be affixed on any of its three sides. The load can be installed only one side.



st	L1	L2	G
30	109	78.5	27.5
50	135	98.5	33.5

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.

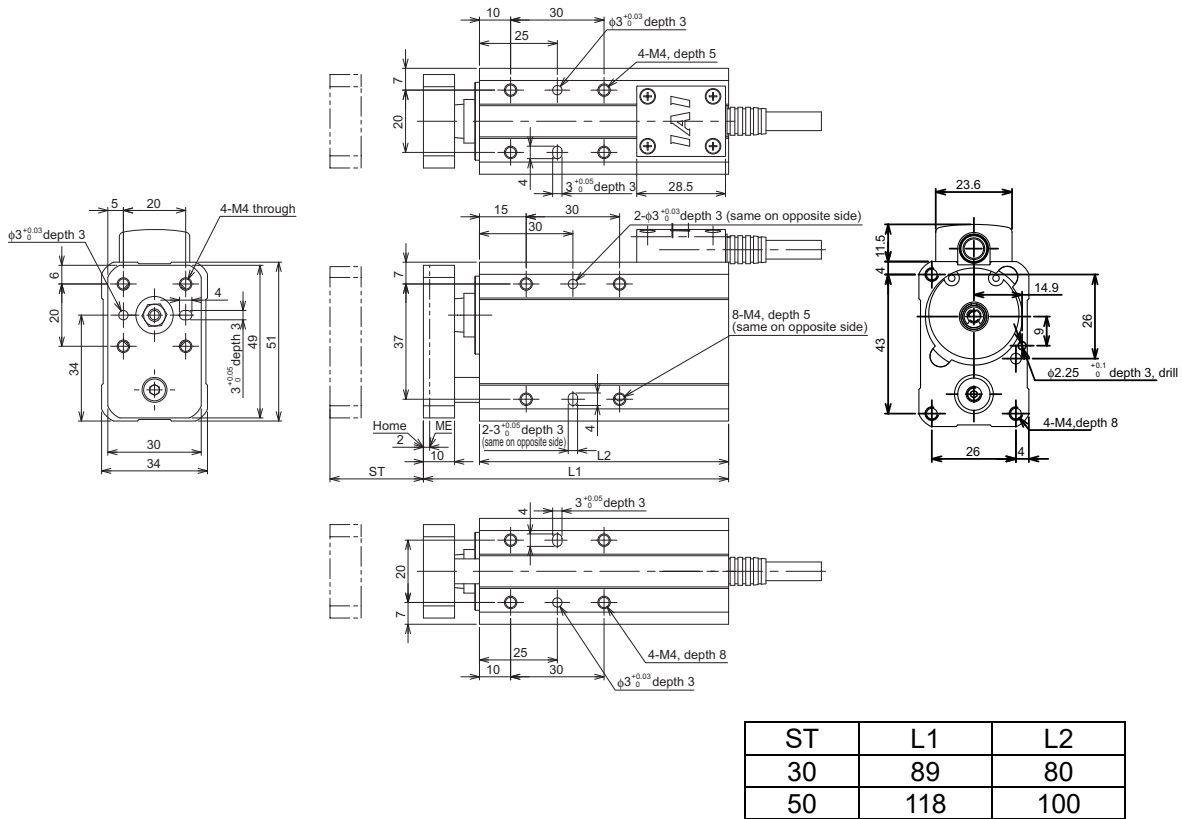
- RCA2CR, RCA2W-GS3NA (Ball screw) Cleanroom type, Dust-proof type
The actuator is structured in such a way that it can be affixed on any of its three sides. The load can be installed only one side.



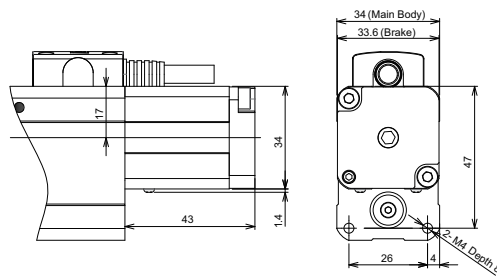
Caution: Some tapped mounting holes are through holes. Never use long screws exceeding the effective thread length. Such long screws may damage the internal mechanism or electrical parts.

• RCA2-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.

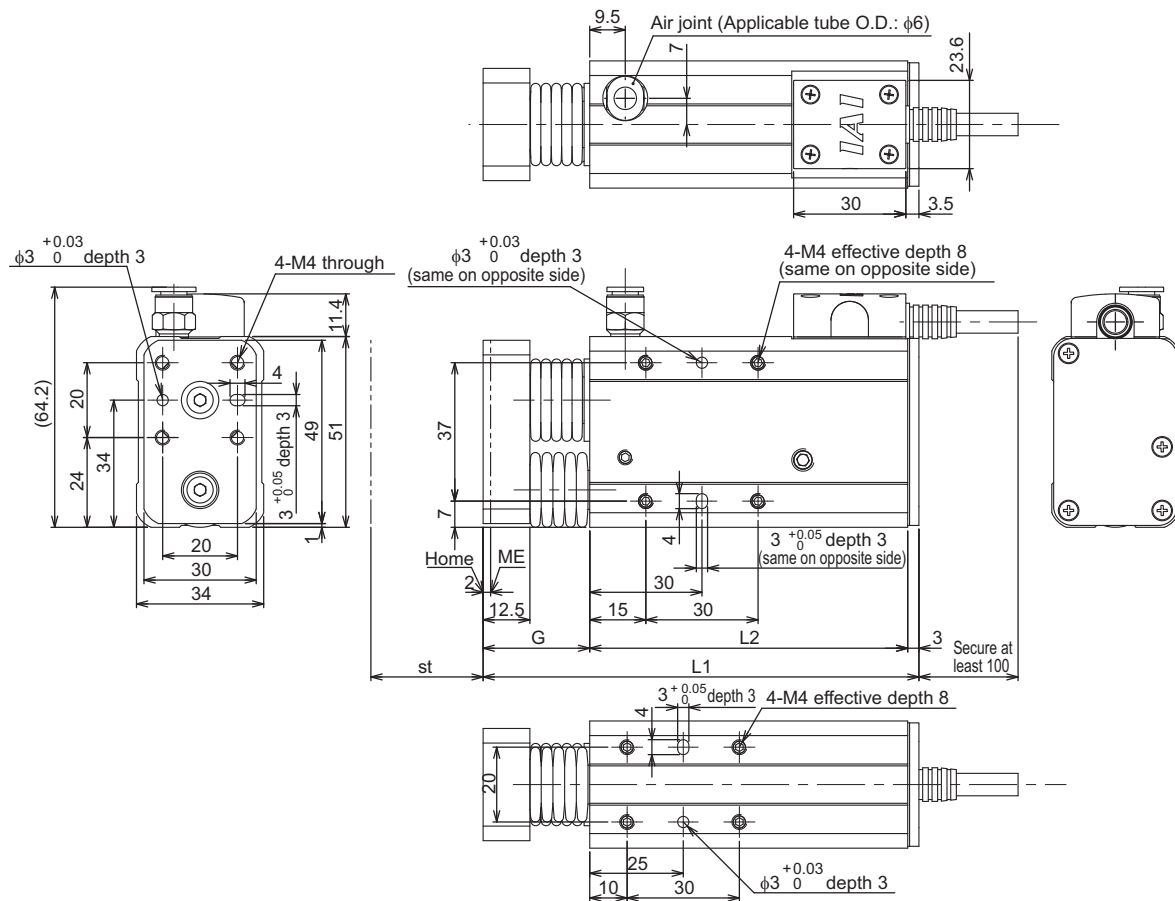


Brake-equipped type (GS4NA (lead screw, ball screw)) external diagrams (reference)



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.

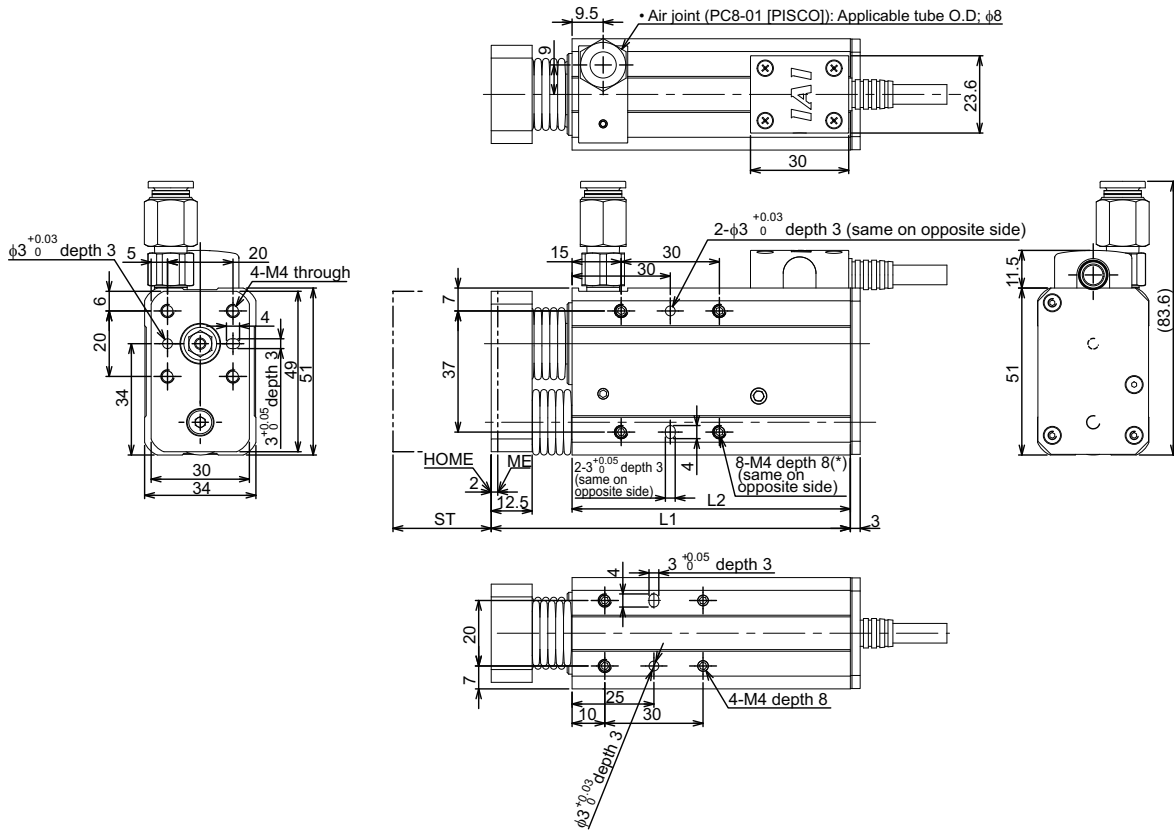
- RCA2CR, RCA2W-GS4NB (Ball screw) Cleanroom type, Dust-proof type
The actuator is structured in such a way that it can be affixed on any of its three sides. The load can be installed only one side.



st	L1	L2	G
30	116.5	85	28.5
50	142.5	105	34.5

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.

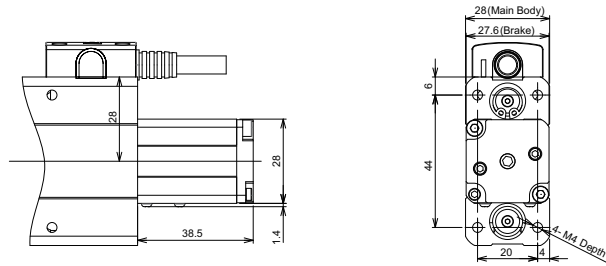
- RCA2CR, RCA2W-GS4NA (Ball screw) Cleanroom type, Dust-proof type
The actuator is structured in such a way that it can be affixed on any of its three sides. The load can be installed only one side.




ST	L1	L2
30	132	80
50	158	100

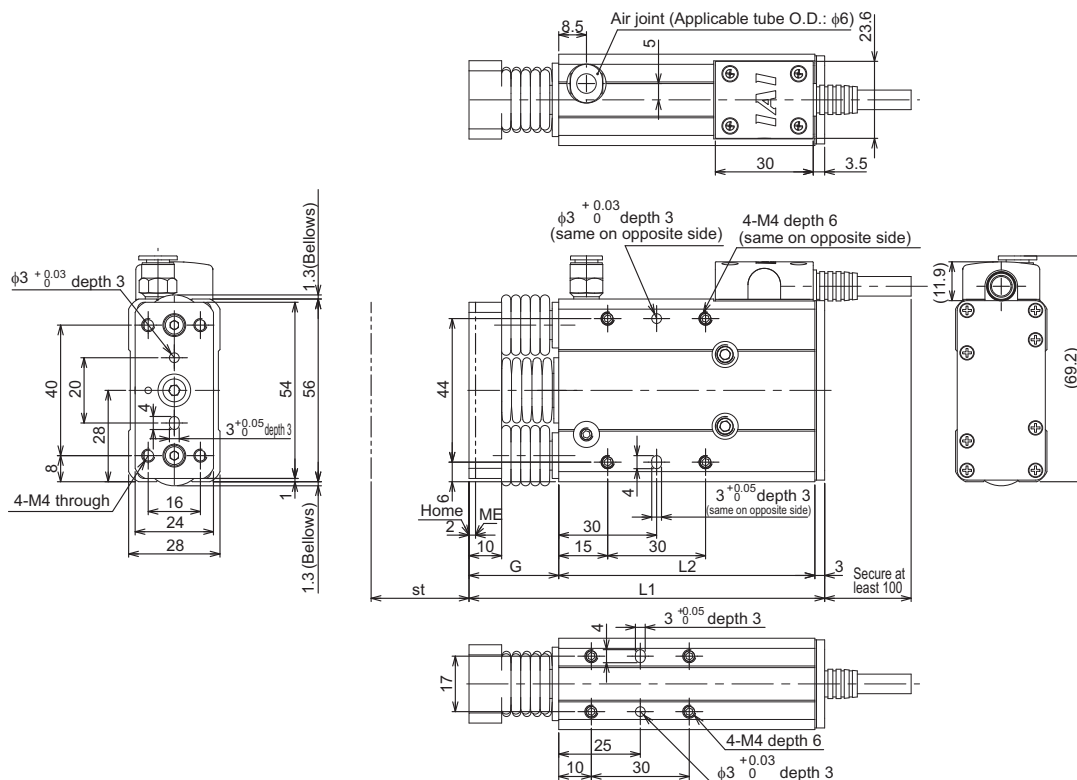
Caution: Some tapped mounting holes are through holes. Never use long screws exceeding the effective thread length. Such long screws may damage the internal mechanism or electrical parts.

Brake-equipped type (GD3NA (lead screw, ball screw)) external diagrams (reference)




 **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.

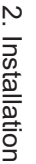
- **RCA2CR, RCA2W-GD3NB (Ball screw) Cleanroom type, Dust-proof type**
The actuator is structured in such a way that it can be affixed on any of its three sides. The load can be installed only one side.



st	L1	L2	G
30	109	78.5	27.5
50	135	98.5	33.5

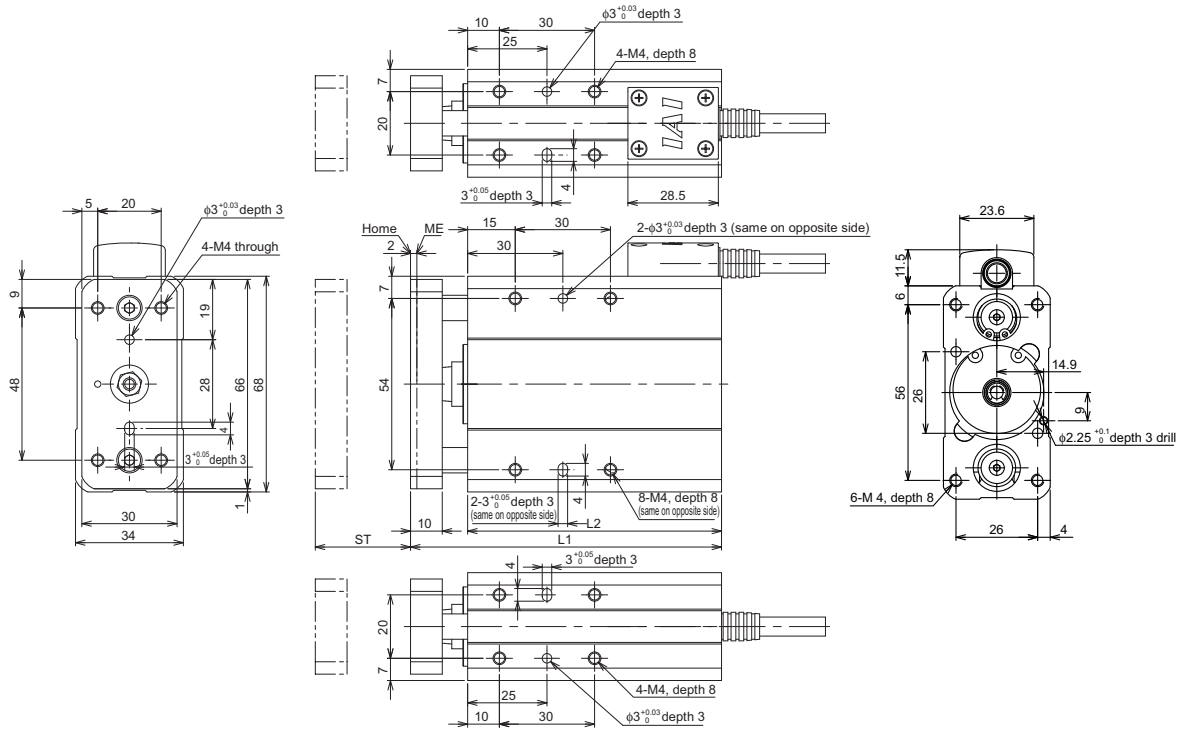
 **Caution:** Some tapped mounting holes are through holes. Never use long screws exceeding the effective thread length. Such long screws may damage the internal mechanism or electrical parts.

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



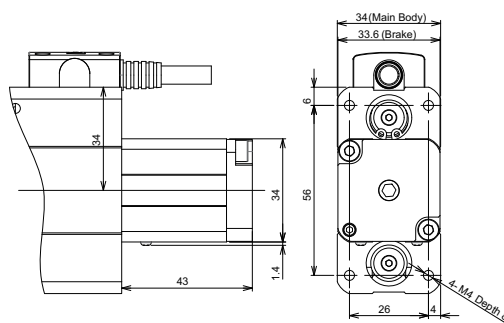
- RCA2-GD4NA/GD4N (Lead screw, ball screw)


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.



ST	L1	L2
30	98	80
50	118	100

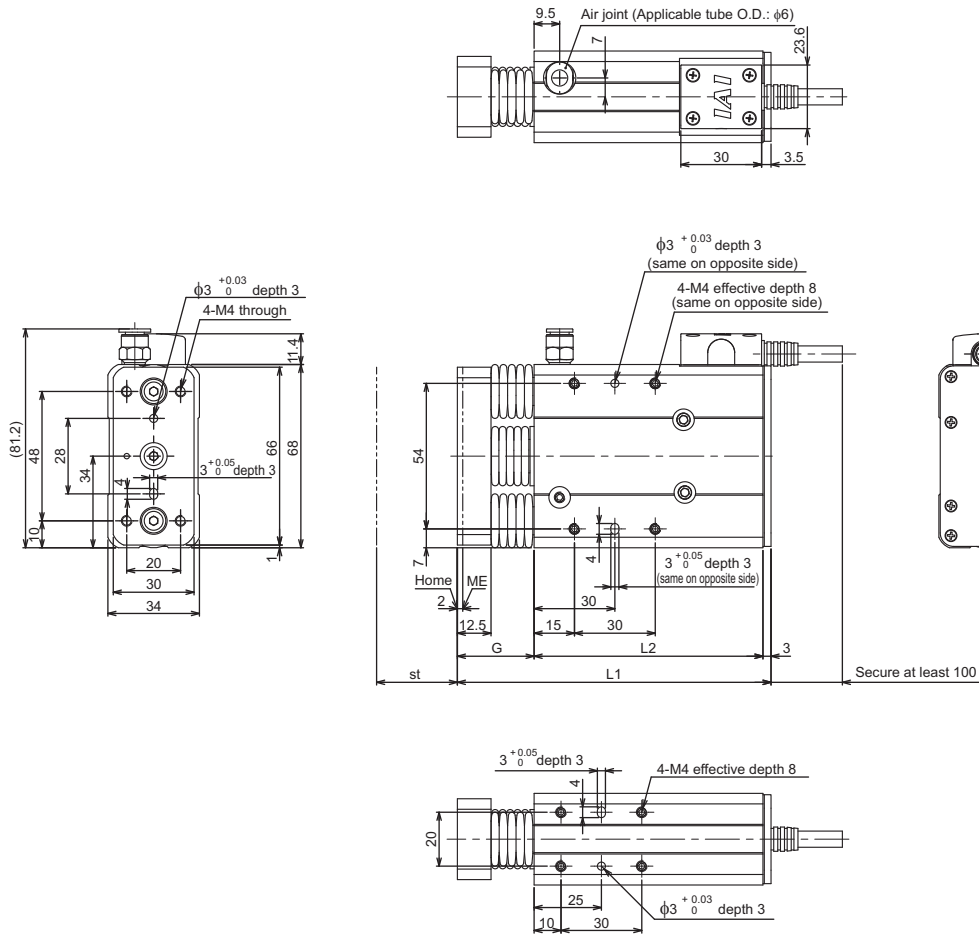
Brake-equipped type (GD4NA (lead screw, ball screw)) external diagrams (reference)



 **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.


- RCA2CR, RCA2W-GD4NB (Ball screw) Cleanroom type, Dust-proof type

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

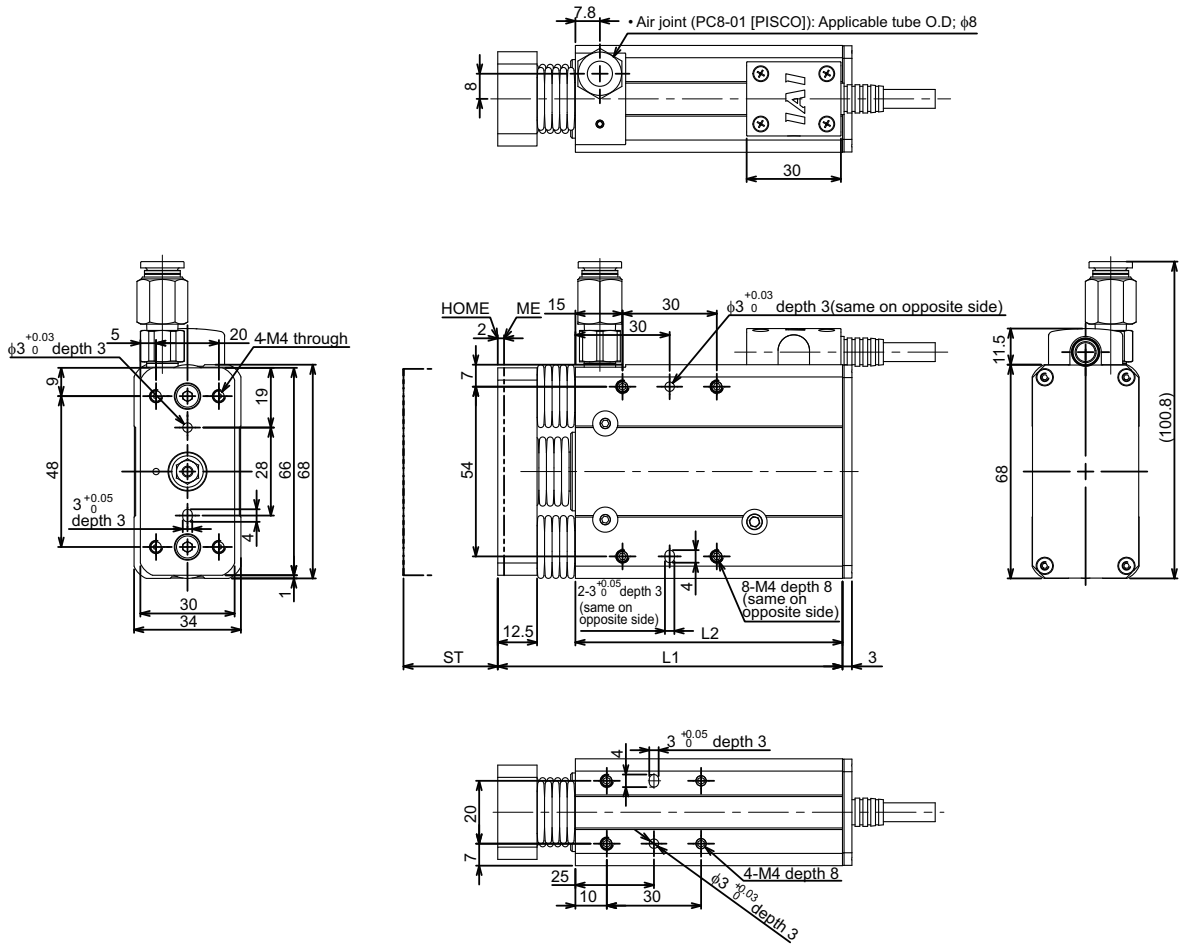


st	L1	L2	G
30	116.5	85	28.5
50	142.5	105	34.5




 **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.

- RCA2CR, RCA2W-GD4NA (Ball screw) Cleanroom type, Dust-proof type
The actuator is structured in such a way that it can be affixed on any of its three sides. The load can be installed only one side.



ST	L1	L2
30	109.7	85
50	135.7	105

 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.

2.3.6 How to Attach Slide Unit Types

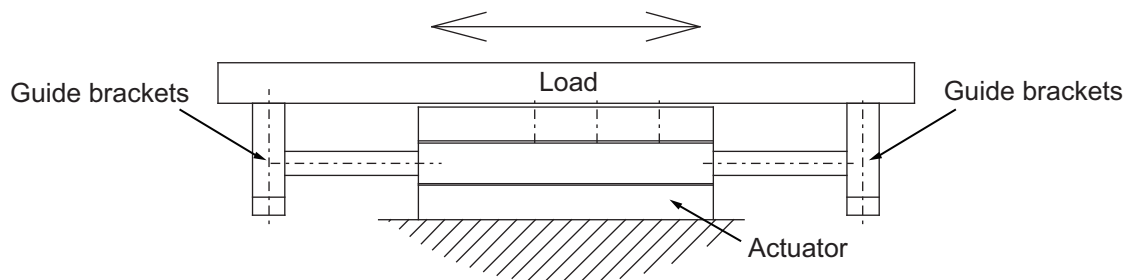
SD3NA/SD3N (Lead Screw, Ball Screw), SD3NB (Ball Screw),
SD4NA/SD4N (Lead Screw, Ball Screw), SD4NB (Ball Screw)

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

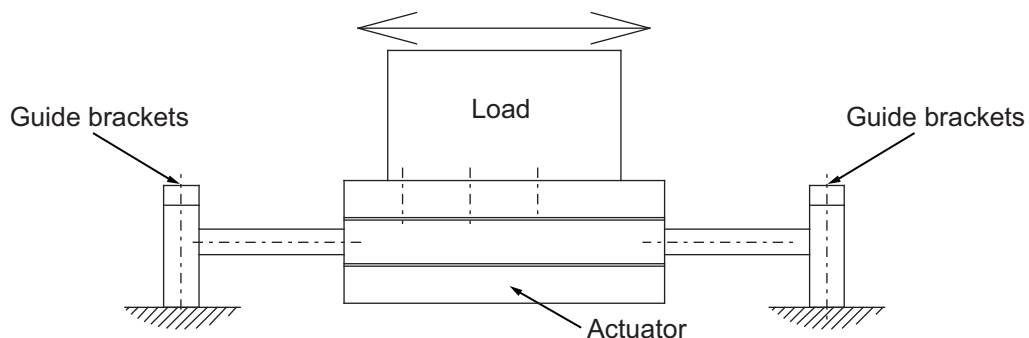
- The effective depth varies depending on the actuator model and mounting surface. Determine an appropriate length for the screws to be used by referring to the figure below.
 - Circular and long positioning pin holes are provided in each mounting surface. Use these holes if necessary.
- (Note) In the tapped holes of Cleanroom Type and Dust-proof Type, there are set screws attached. Remove the set screw when attaching.
Caulking treatment is conducted on the set screws. If the caulking agent is remained on the body after the screw is removed, make sure to clean up to get rid of it.
- (Note) When installing Dust-proof Type with IP52 applicable specification (Model: WP), apply either caulking agent or sealing tape on the thread of the screws to be used.
- Recommended caulking agent: KE-4898 (Shin-Ethu Silicone)


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

[Affixing the actuator]

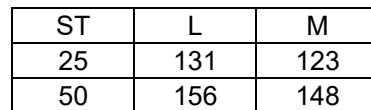


[Affixing the brackets]



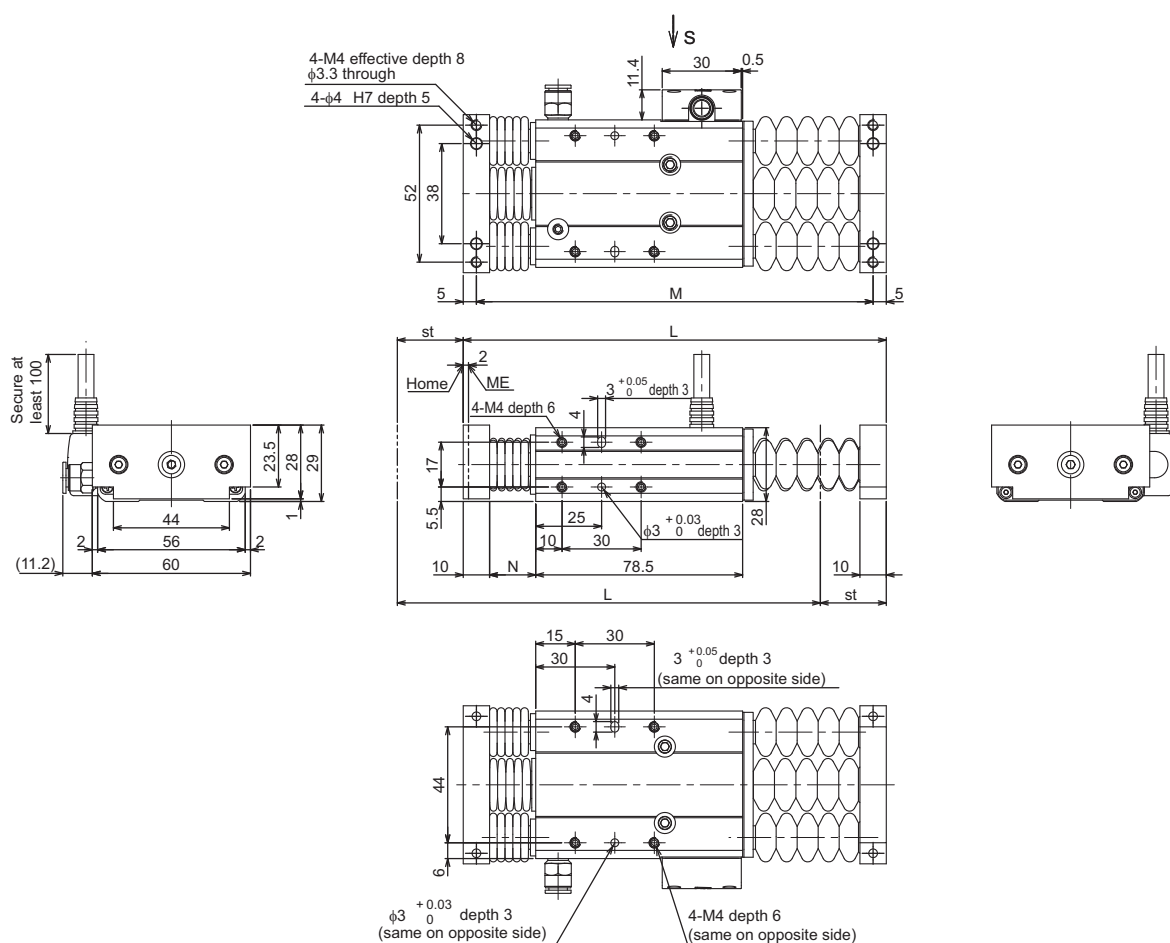
 **Caution:** If the brackets are to be affixed, the actuator cannot be installed vertically.

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




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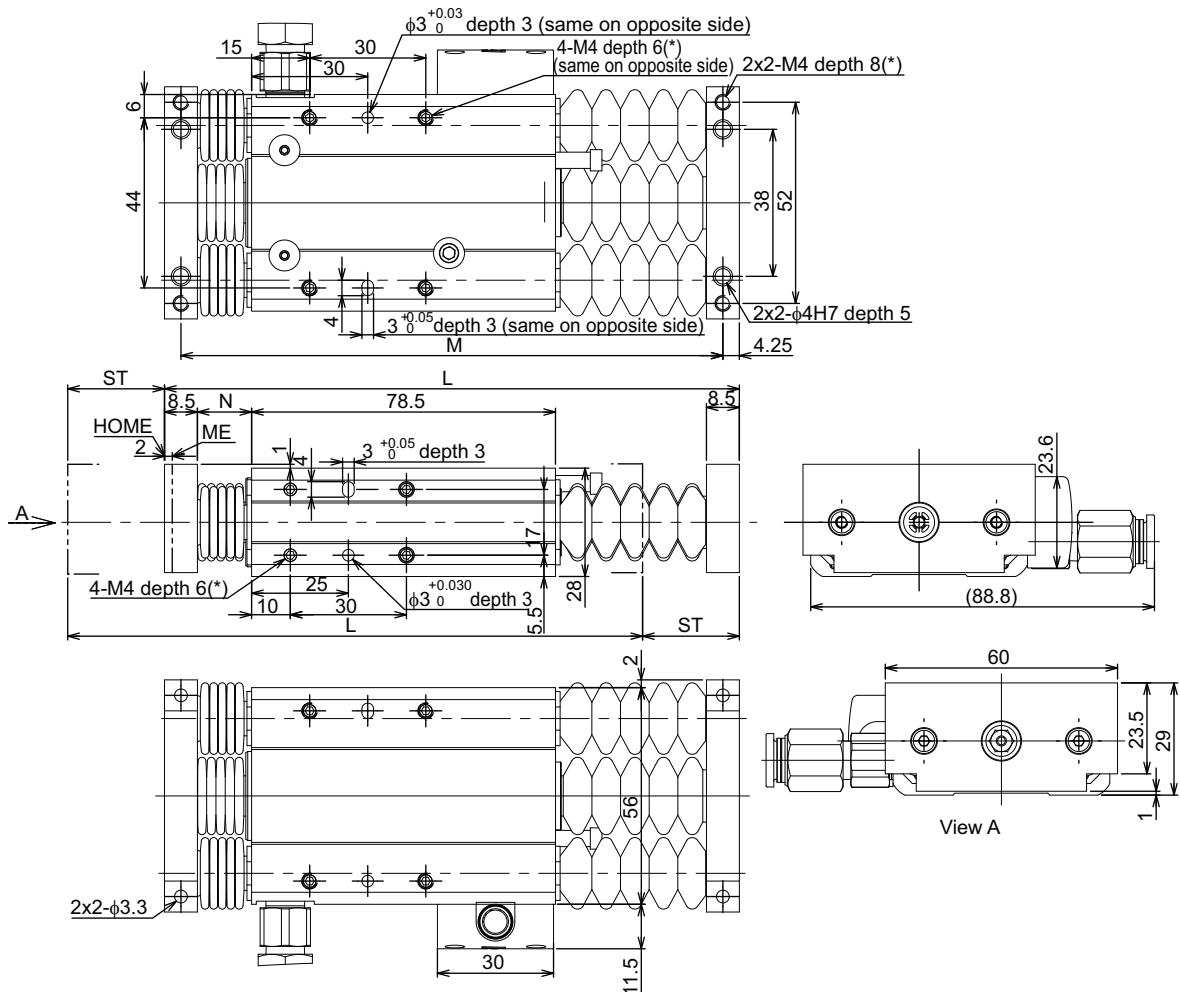
- **RCA2CR、RCA2W-SD3NB (Ball screw) Cleanroom type, Dust-proof type**
The actuator is structured in such a way that it can be affixed on any of its three sides.



st	L	M	N
25	160.5	150.5	17.5
50	197.5	187.5	23.5

 **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.

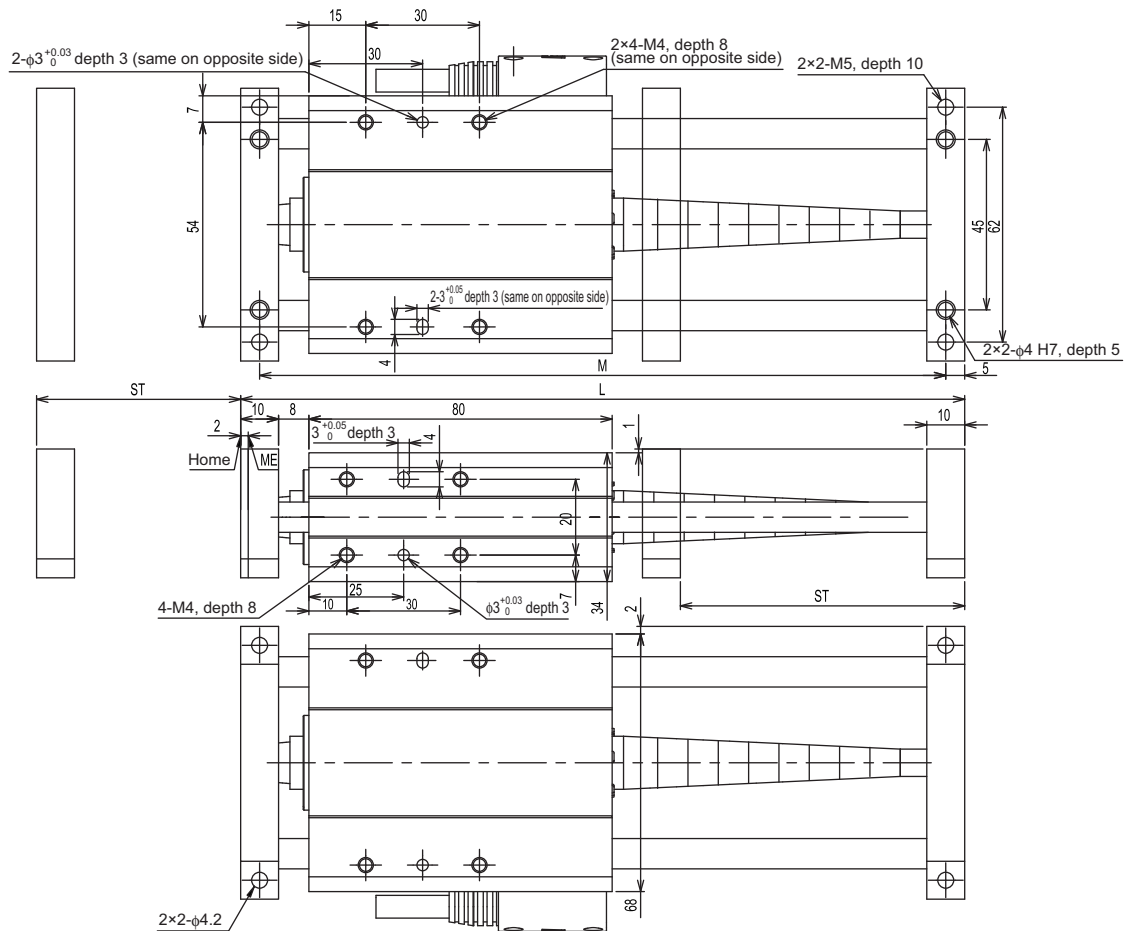
- RCA2CR, RCA2W-SD3NA (Ball screw) Cleanroom type, Dust-proof type
The actuator is structured in such a way that it can be affixed on any of its three sides.



ST	L	M	N
25	148.5	140	14
50	185.5	177	20

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.

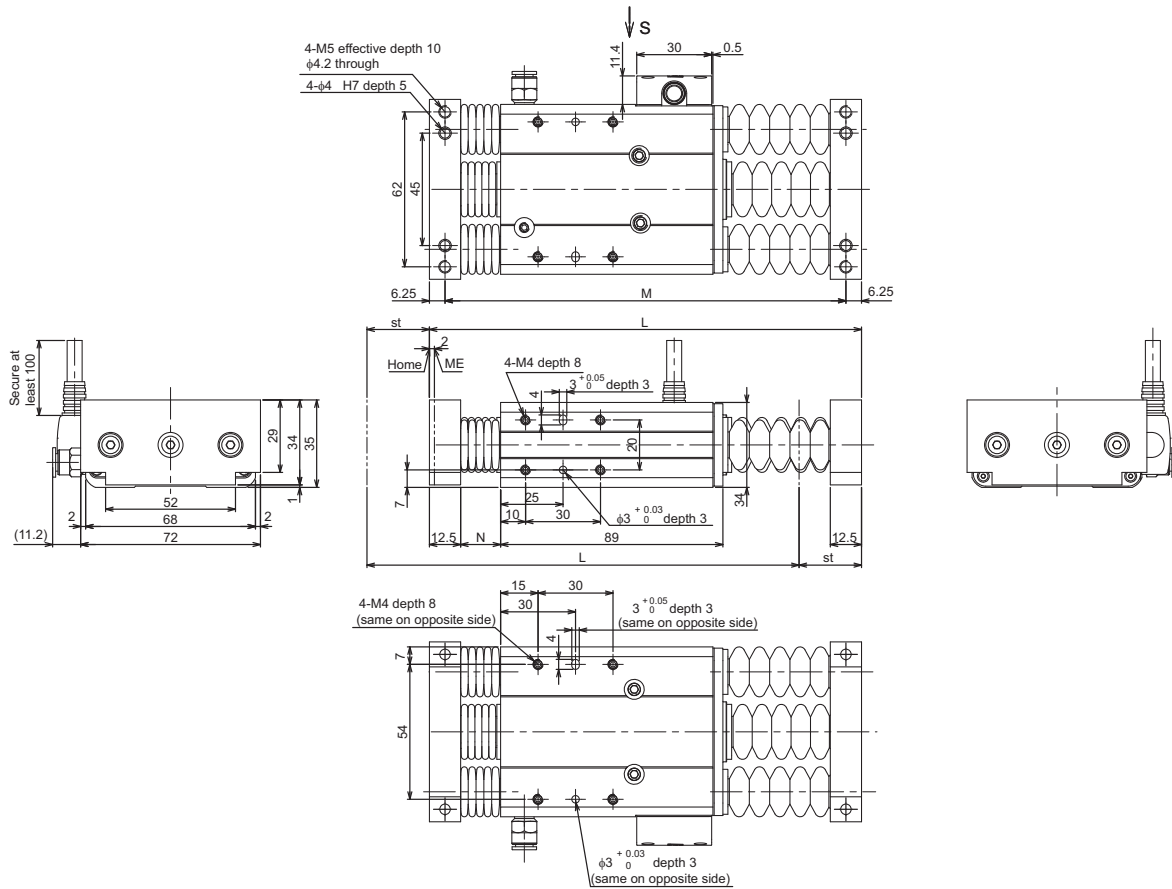
- **RCA2-SD4NA/SD4N (Lead screw, ball screw),**
The actuator is structured in such a way that it can be affixed on any of its three sides.



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.

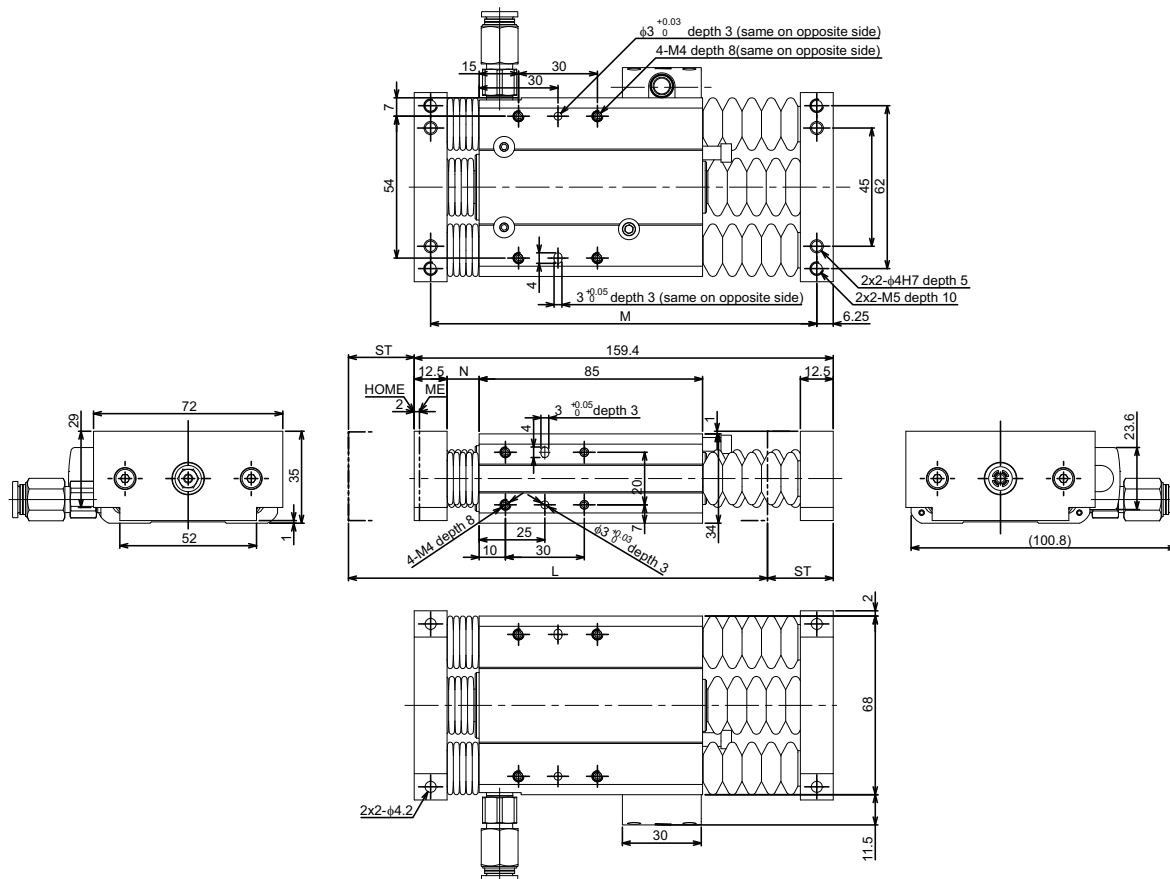
- RCA2CR, RCA2W-SD4NB (Ball screw) Cleanroom type, Dust-proof type
The actuator is structured in such a way that it can be affixed on any of its three sides.



st	L	M	N
25	173	160.5	16
50	210	197.5	22

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.

- RCA2CR, RCA2W-SD4NA (Ball screw) Cleanroom type, Dust-proof type
The actuator is structured in such a way that it can be affixed on any of its three sides.



ST	L	M	N
25	159.4	146.9	12.2
50	196.4	183.9	18.2

⚠ 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.

2.4 About the Cleanroom Specification

2.4.1 About Vacuuming Flow

It is mandatory to perform vacuuming inside the body when using as Cleanliness Class 100. Connect an air tube that you have prepared to the quick joint on the outer diameter $\phi 6$ equipped on the vacuum and perform vacuuming with a vacuum pump, blower, ejector and so on so the inside gets negative pressure.

Suction pressure should be as shown below.

[3N type]

Suction pressure should be the same no matter of the lead or stroke.

Model	Suction pressure [kPa]
RCA2CR-RN3NB RCA2CR-RP3NB RCA2CR-GS3NB RCA2CR-GD3NB RCA2CR-SD3NB	8

(Note) Be aware that the values are reference. Make sure the bellows pipe would not get collapsed at suction.

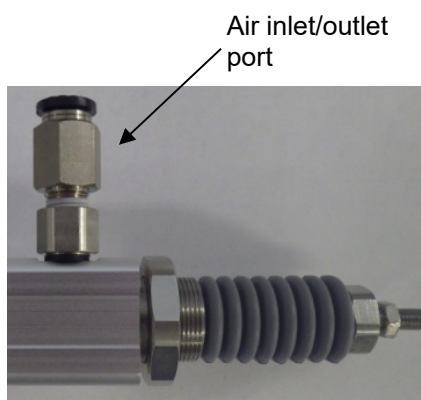
[4N type]

Suction pressure should be the same no matter of the lead or stroke.

Model	Suction pressure [kPa]
RCA2CR-RN4NB RCA2CR-RP4NB RCA2CR-GS4NB RCA2CR-GD4NB RCA2CR-SD4NB	4

(Note) Be aware that the values are reference. Make sure the bellows pipe would not get collapsed at suction.

2.5 Connection of Air Tube on Dust-proof Type



Attach an air tube (O.D.: 6mm for models with B at the last digit and 8mm for models with A at the last digit) at the suction and discharge port and lay out the air pipe to an external environment that is free from dust and water. Do not attempt to conduct air purging.

(Applicable Tube)

Shown below is a model code of an air tube representative to be applicable.

- TU0805: Material polyurethane (Manufacturer: SMC)



Caution:

- Keep the air tube 3m or less.
- Do not attempt to lay out the pipes to accept excess bend or fold on the air tube.
- Do not attempt to conduct air purging.
Conducting air purging may cause to break the bellows or drop the life of them remarkably.

3. Connecting with the Controller

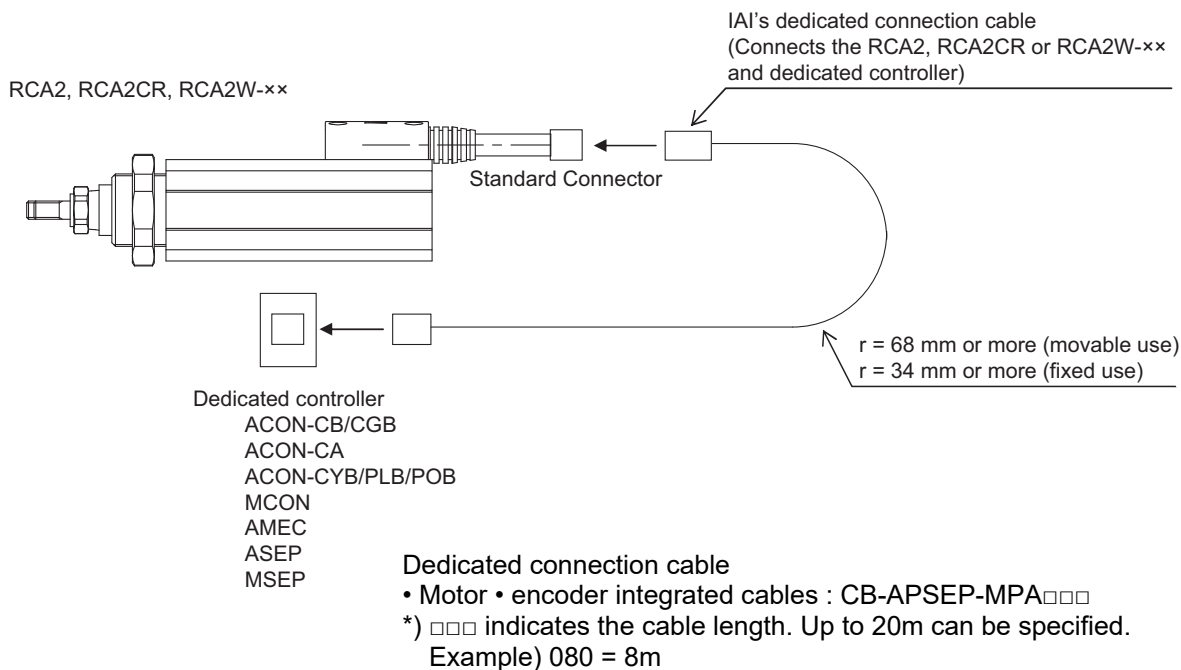
Use the IAI dedicated connection cable for the connection of the actuator to the controller.

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

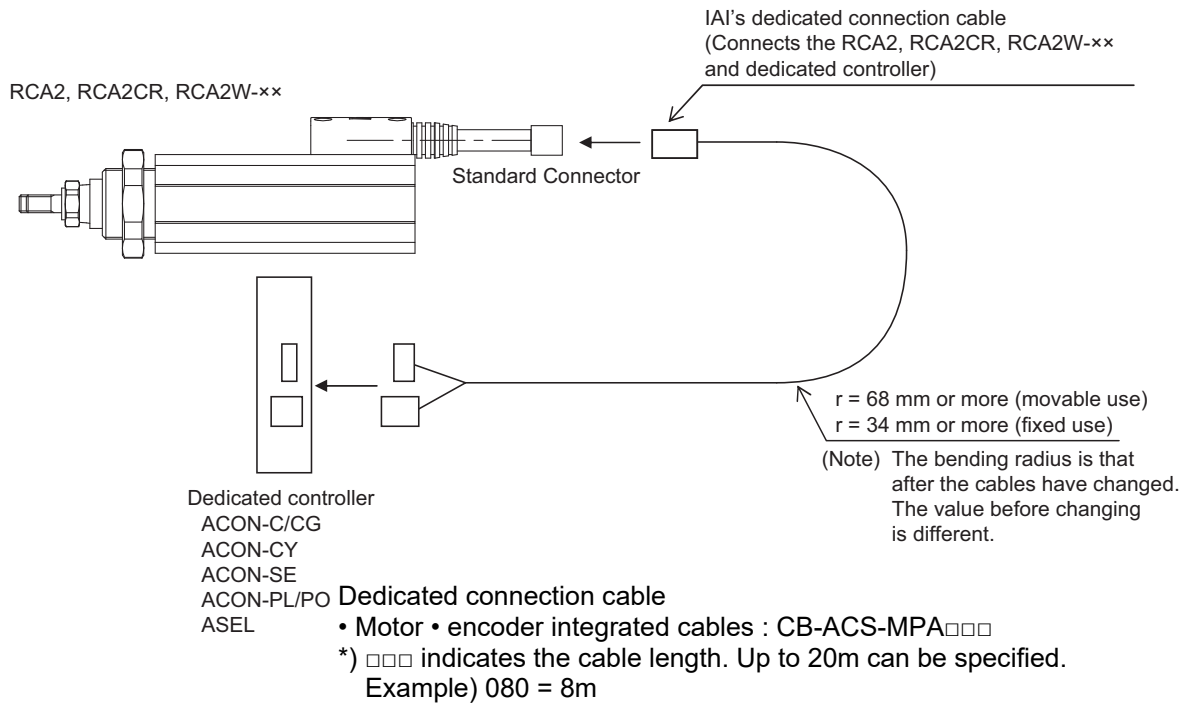
Caution: The connector on the actuator cable for Dust-proof Type is not treated for dust and water-proof. Conduct the connection of the connectors to the motor/encoder cables in an environment with no dust or water. (Actuator cable length of Dust-proof Type: 2m)

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

[ACON-CB/CGB/CYB/PLB/POB, MCON, AMEC, ASEP, MSEP]

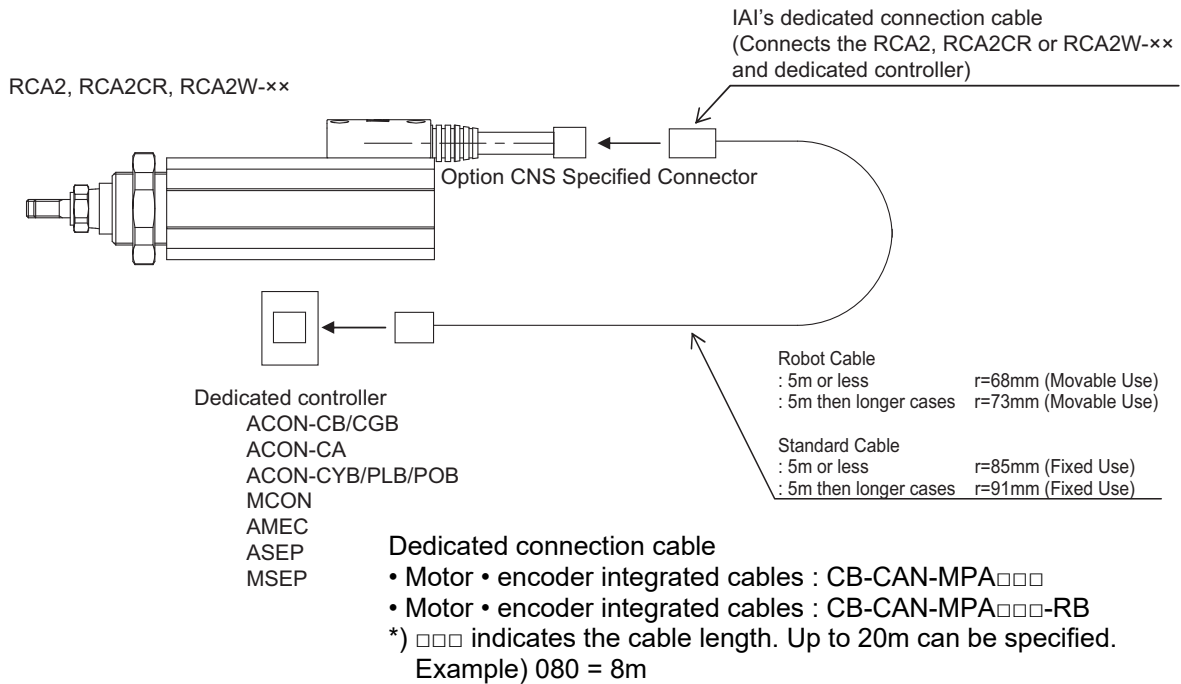


[ACON-C/CG, ACON-CY, ACON-SE, ACON-PL/PO, ASEL]

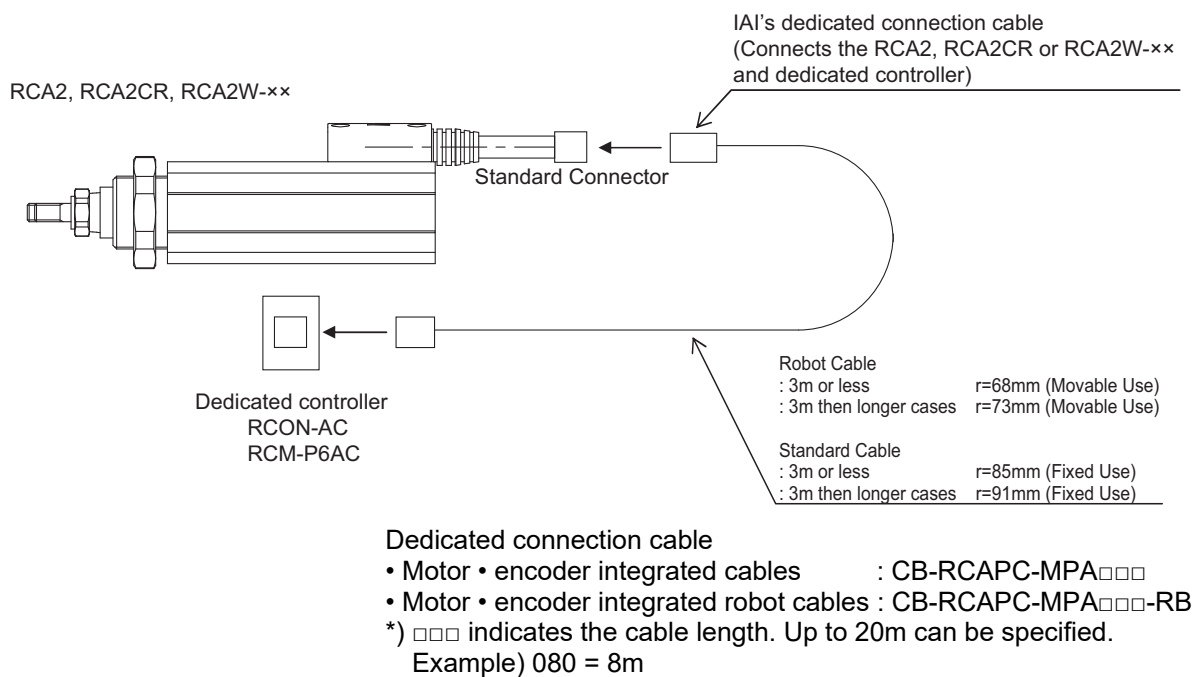


(Note) RA2AC and RA2AR cannot be operated with ACON-C/CG, ACON-CY, ACON-SE and ACON-PL/PO Controllers.

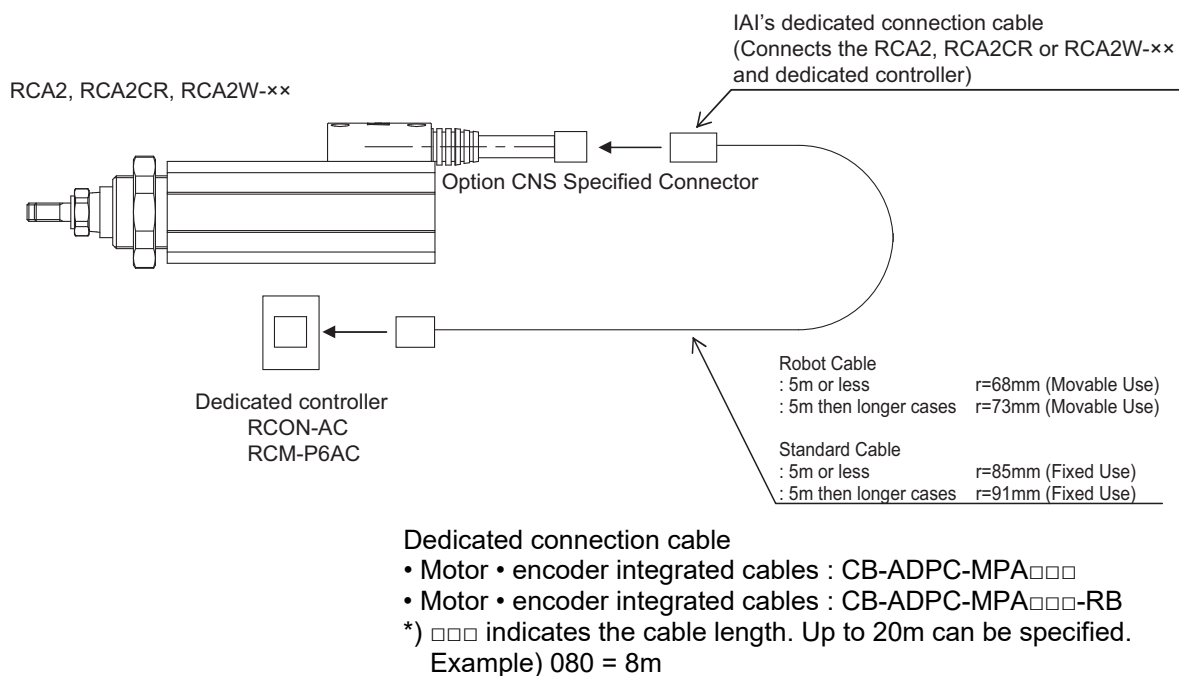
[ACON-CB/CGB, ACON-CA, ACON-CYB/PLB/POB, MCON, AMEC, ASEP, MSEP]



[RCON-AC and RCM-P6AC]



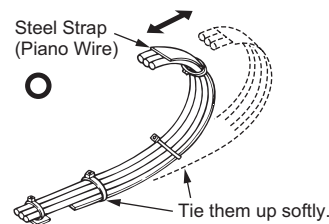
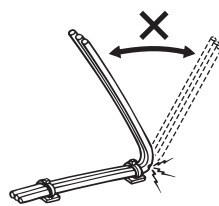
[RCON-AC and RCM-P6AC]



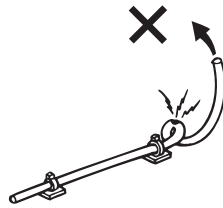


Warning: For wiring, please follow the warnings stated below. When constructing a system as the machinery equipment, pay attention to the wiring and connection of each cable so they are conducted properly. Not following them may cause not only a malfunction such as cable breakage or connection failure,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

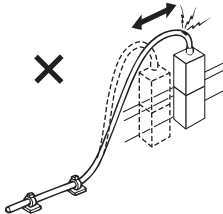
- Use dedicated cables of IAI indicated in this Instruction manual. Contact us if you wish to have a change to the specifications of the dedicated cables.
- Make sure to turn the power off in the process of power line or cable connection or disconnection.
- Do not attempt to cut a dedicated cable with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



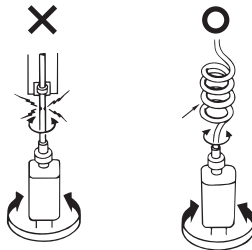
- Do not let the cable bend, kink or twist.



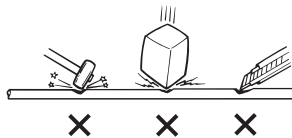
- Do not pull the cable with a strong force.



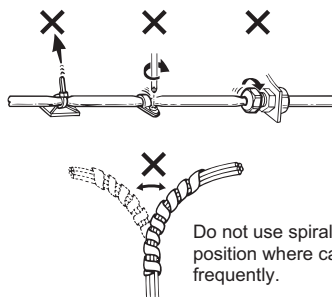
- Pay attention not to concentrate the twisting force to one point on a cable.



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

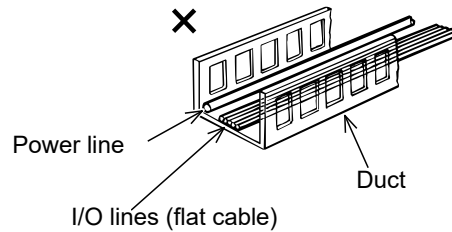


- When a cable is fastened to affix, make sure to have an appropriate force and do not tighten too much.



Do not use spiral tube in any position where cables are bent frequently.

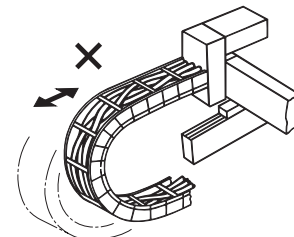
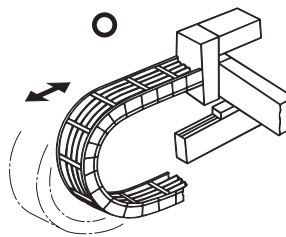
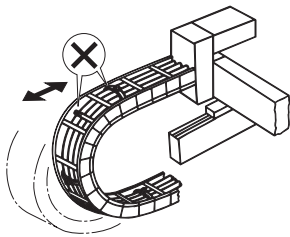
- PIO line, communication line, power and driving lines are to be put separately from each other and do not tie them together. Arrange so that such lines are independently routed in the duct.



Follow the instructions below when using a cable track.

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

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



4. Operation

4.1 Duty in Continuous Operation

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

Perform an operation with the duty below the allowable range.



Caution: If the overload error occurs, try either to reduce the duty by extending the stop time or to reduce the acceleration/deceleration speed.

[How to Calculation Duty]

Figure out the load ratio and acceleration/deceleration time ratio, and read the duty from the graph. If the load ratio is less than 50%, operation with 100% of the duty (continuous operation) is available.

1) Duty ratio LF

The maximum transportable weight at the rated acceleration and the rated acceleration/deceleration speed are described in 1.2 "Specifications."

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

Max. Transportable Weight at Rated Acceleration : M_r [kg]

Rated Acceleration/Deceleration Speed : α_r [G]

Transported Weight during Operation : M [kg]

Acceleration/Deceleration Speed during Operation : α [G]

2) Acceleration/Deceleration Time Ratio t_{od}

Acceleration/Deceleration Time Ratio $t_{od} =$

$$\frac{\text{Acceleration Time during Operation} + \text{Deceleration Time during Operation}}{\text{Deceleration time}} \quad [\%]$$

$$\text{Acceleration time} = \frac{\text{Speed during Operation} [\text{mm/s}]}{\text{Acceleration during Operation} [\text{mm/s}^2]} \quad [\text{Sec}]$$

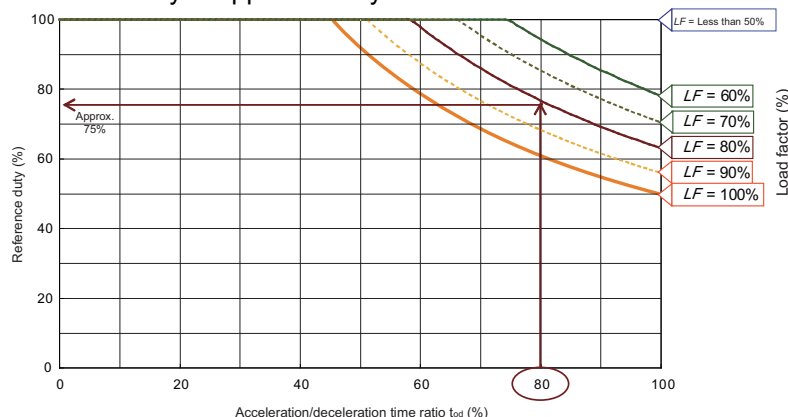
$$\text{Deceleration time} = \frac{\text{Speed during Operation} [\text{mm/s}]}{\text{Deceleration during Operation} [\text{mm/s}^2]} \quad [\text{Sec}]$$

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

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

3) Duty: It is read out from the load ratio LF and the acceleration time ratio t_{od} that were used to figure it out.

e.g.) When the load ratio $LF = 80\%$ and the acceleration/deceleration time ratio $t_{od} = 80\%$, the reference for the duty is approximately 75%.



4.2 Home Return

4.2.1 Home Return Operation

[1] RA2AC, RA2AR

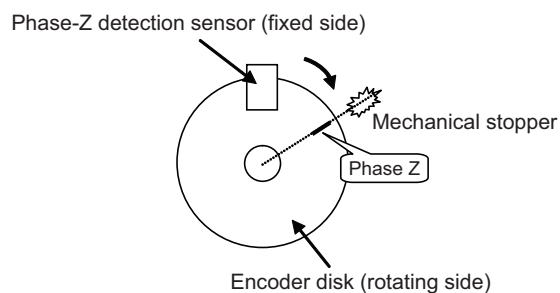
- 1) The actuator moves to the parameter direction set as the operational direction in the home return command.
- 2) It detects the mechanical end with the software in the home return operation.
- 3) After reversed at the end point, determines the point where Z-phase signal is detected as the datum point.
- 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.

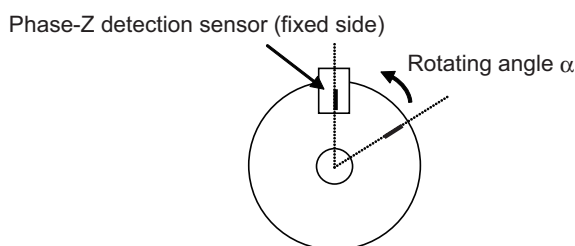
The distance where it stops at the origin point after the rod hit the stopper then start reversing is 2mm in standard.

[2] RN3NA, RN3NB, RN3N, RN4NA, RN4NB, RN4N, RP3NA, RP3NB, RP3N, RP4NA, RP4NB, RP4N, GS3NA, GS3NB, GS3N, GS4NA, GS4NB, GS4N, GD3NA, GD3NB, GD3N, GD4NA, GD4NB, GD4N, SD3NA, SD3NB, SD3N, SD4NA, SD4NB and SD4N

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



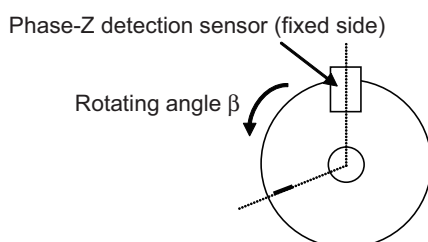
- 2) The rod reverses and turns by rotating angle α to find encoder phase Z.



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 β 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).



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

4.3 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.

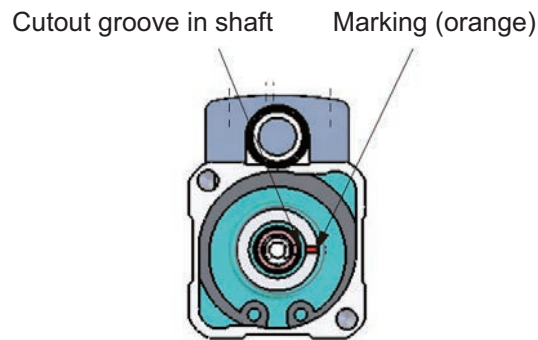
4.4 How to Move Rod (Bracket) by Hand

[1] Standard Type with Without Brake (Other than Slide Unit Type)

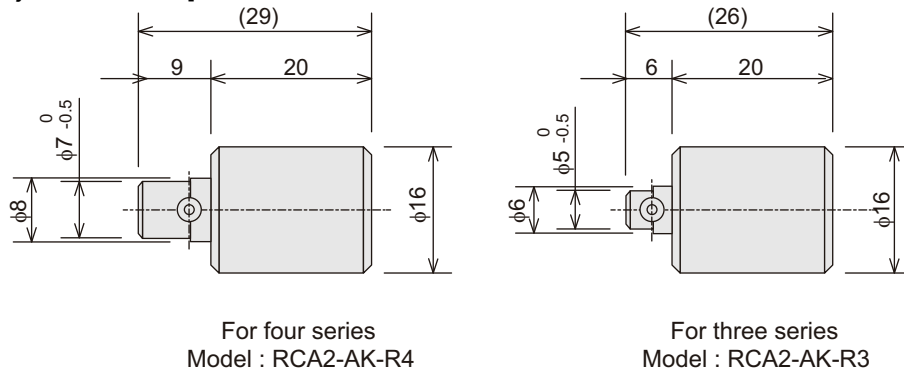
In the case of the low lead types such as Lead 1 and 2 of RN3NA, RN3N, RN4NA, RN4N, RP3NA, RP3N, RP4NA, RP4N, GS3NA, GS3N, GS4NA, GS4N, GD3NA, GD3N, GD4NA and GD4N the rod (Bracket) would not move even if trying to move manually because it is heavy.

When moving the rod (Bracket), make sure to insert the position adjustment knob to the slit groove on the shaft on the rear end no matter of the lead.

A slotted screw is also available when you do not have a position adjustment knob.



[Position Adjustment Knob]



[2] Slide Unit Type, Standard Types Equipped with a Brake, Cleanroom Type, Dust-proof Type

For the slide unit type SD3NA, SD3N, SD4NA, SD4N, standard types equipped with a brake, cleanroom Type and dust-proof Type there is no cutout groove in the shaft.

The connect the controller and move the actuator.

If the actuator is moved forcibly with hand, the brake might be worn out and its life might be shortened.

Caution : Do not attempt to have a back and forth operation by hand from the rod (Bracket) end. 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.

5. Maintenance and Inspection

5.1 Inspection Items and Schedule

Perform maintenance and inspection at the intervals specified below.
This schedule assumes that the actuator is operated eight hours a day.

If the actuator is operated at a higher utilization, such as when the machine is used continuously day and night, reduce the inspection intervals accordingly.

(Standard Lead Screw Type)

	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	○	○	○

(Standard Ball Screw Type)

	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	○	○	○

(Cleanroom Type, Dust-proof Type)

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

(Note) For cleanroom type and dust proof type, supply grease when replacing the bellows.
Replacement of the bellows cannot be conducted by the user. Please contact IAI.

5.2 Visually Inspecting the Exterior

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

Actuator	Loose actuator mounting bolts, etc.
Cables	Scratches, connection at connectors
Spiral Cover (Standard type)	Scratches, dents, foreign object attached on cover
Bellows (Cleanroom type, Dust-proof type)	Scratches, foreign object attached on cover
Caulking (Dust-proof type)	Existence of damage and peeling
Overall	Abnormal noise, vibration

- If the actuator is installed vertically, certain conditions may cause grease to drip from the guide. Please ensure that proper cleaning is performed and grease is replenished.
- The spiral cover is a consumable part. Its life is 2,000,000 cycles of back and forth operation as a reference.
Refer to 5.6, "How to Replace Spiral Cover" when replacing the spiral cover.
- Bellows are expendable part. The life of the bellows may vary due to the environment of use and operational conditions, however, it is around several million times of back and forth operation (reference) in standard. Contact IAI if you confirmed any damage. IAI will apply grease and replace.
- Apply additional caulking agent when any damage or peeling is confirmed on the caulking areas.
 - Recommended caulking agent: KE-4898 (Shin-Etsu Silicone) Shin

(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.

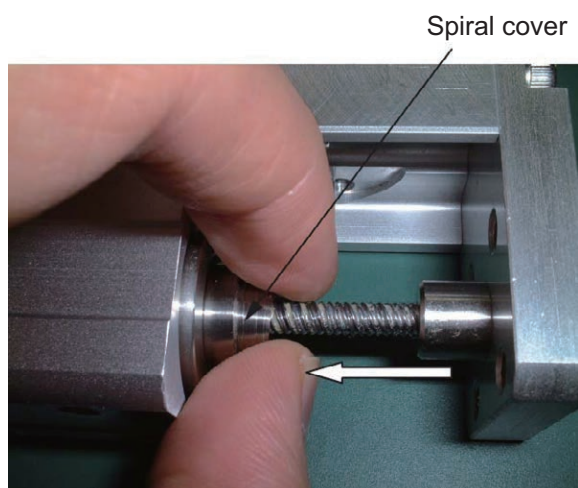
5.3 Cleaning

- 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.

5.4 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 4.4, "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.

5.5 Greasing

5.5.1 Applicable Grease

[Lead screw types]

All Lead screw products have been shipped with synthetic poly- α 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- α olefin grease. Mixing poly- α 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 Grease MP 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.


5.5.2 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 4.4, "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.

5.6 How to Replace Spiral Cover

[Item required for replacement]

- Replacement spiral cover

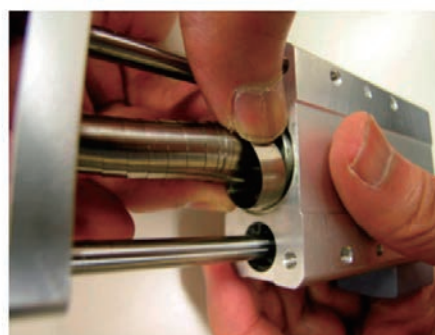
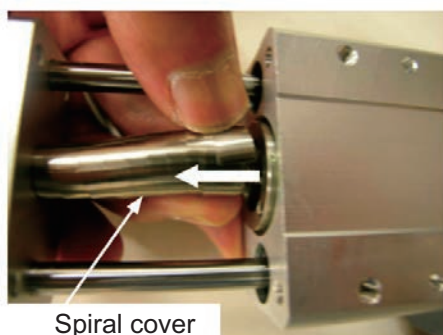
Stroke	Model
25mm, 30mm	RCA-SPC-30
50mm	RCA-SPC-50
75mm	RCA-SPC-75



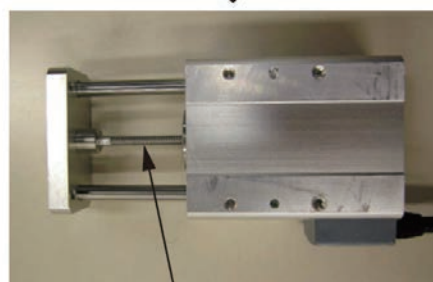
[Procedure]

- 1) Remove the spiral cover.

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

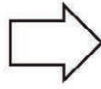


- 2) Gradually roll the spiral cover to remove it.

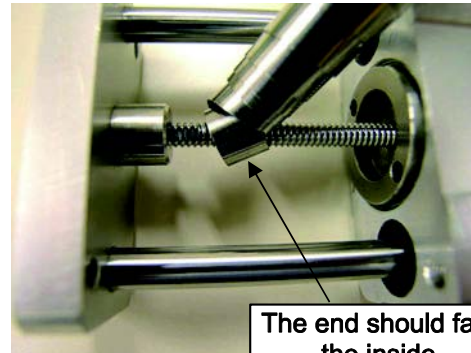
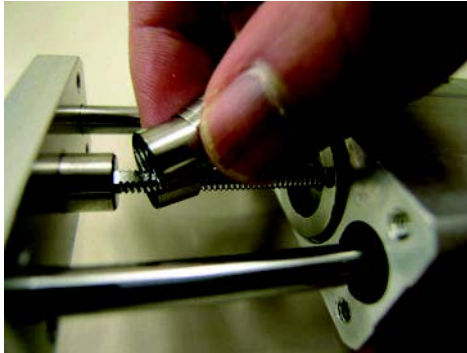


Wipe off old grease on the screw shaft.

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

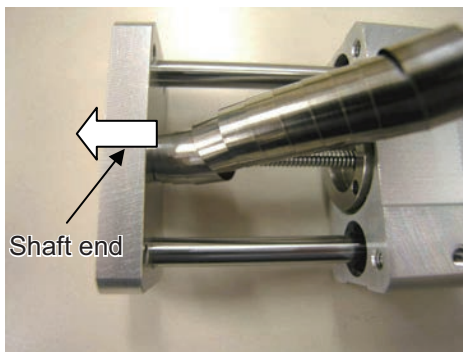


- 4) Install the replacement spiral cover.
Hook the end of the replacement spiral cover you have taken out. Once the end is hooked, orient the cover so that the end faces the inside.

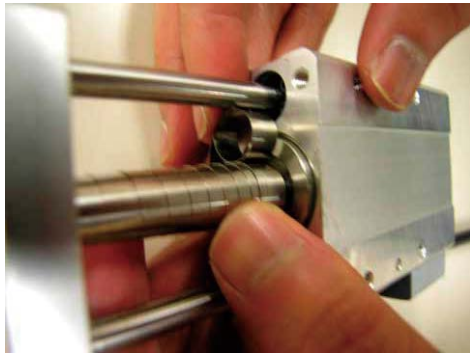


The end should face the inside.

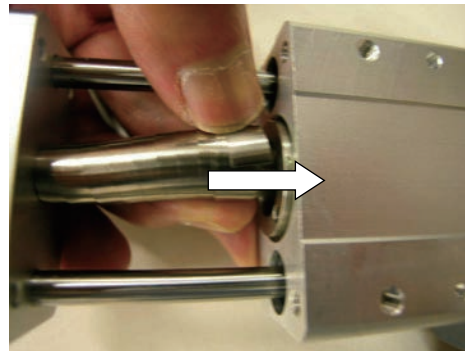
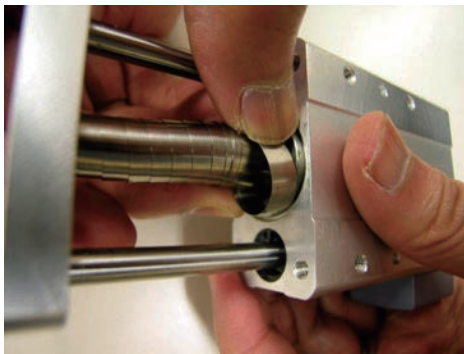
- 5) Push the end toward the shaft end while winding the cover a little.



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 5.5.2, "Greasing Method".]

5.7 Procedures for Replacement of Motor

5.7.1 SA2AC

[Required Items]

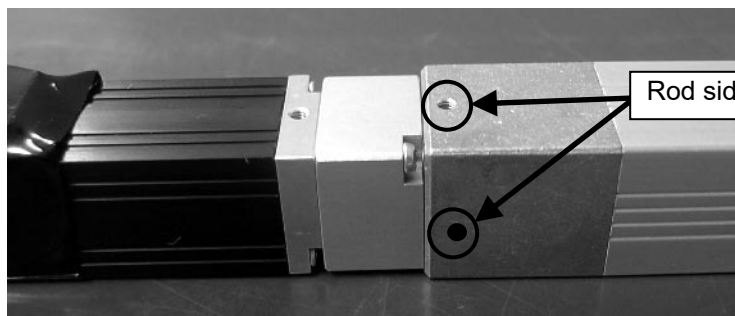
- Replacement motor unit



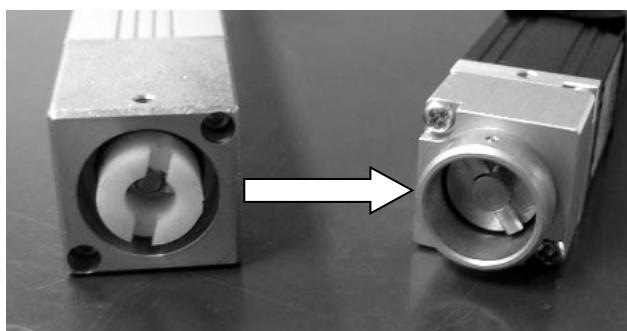
- Phillips Screwdriver No. 0 and No. 1
- Hex wrench Across flats 0.89mm, 1.5mm

[Procedure]

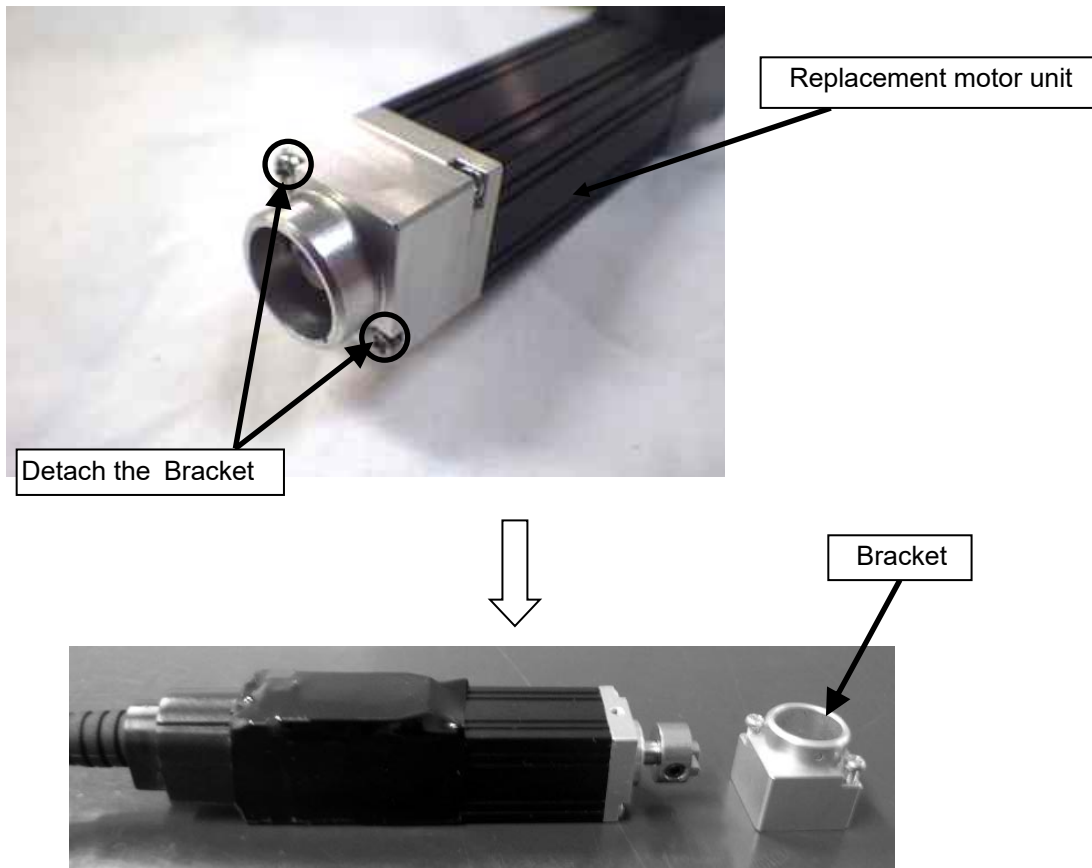
- 1) Remove the $M2 \times 2$ set screws holding on the rod side of the actuator and the motor unit with a hex wrench. (2 places)



- 2) Detach the motor unit.



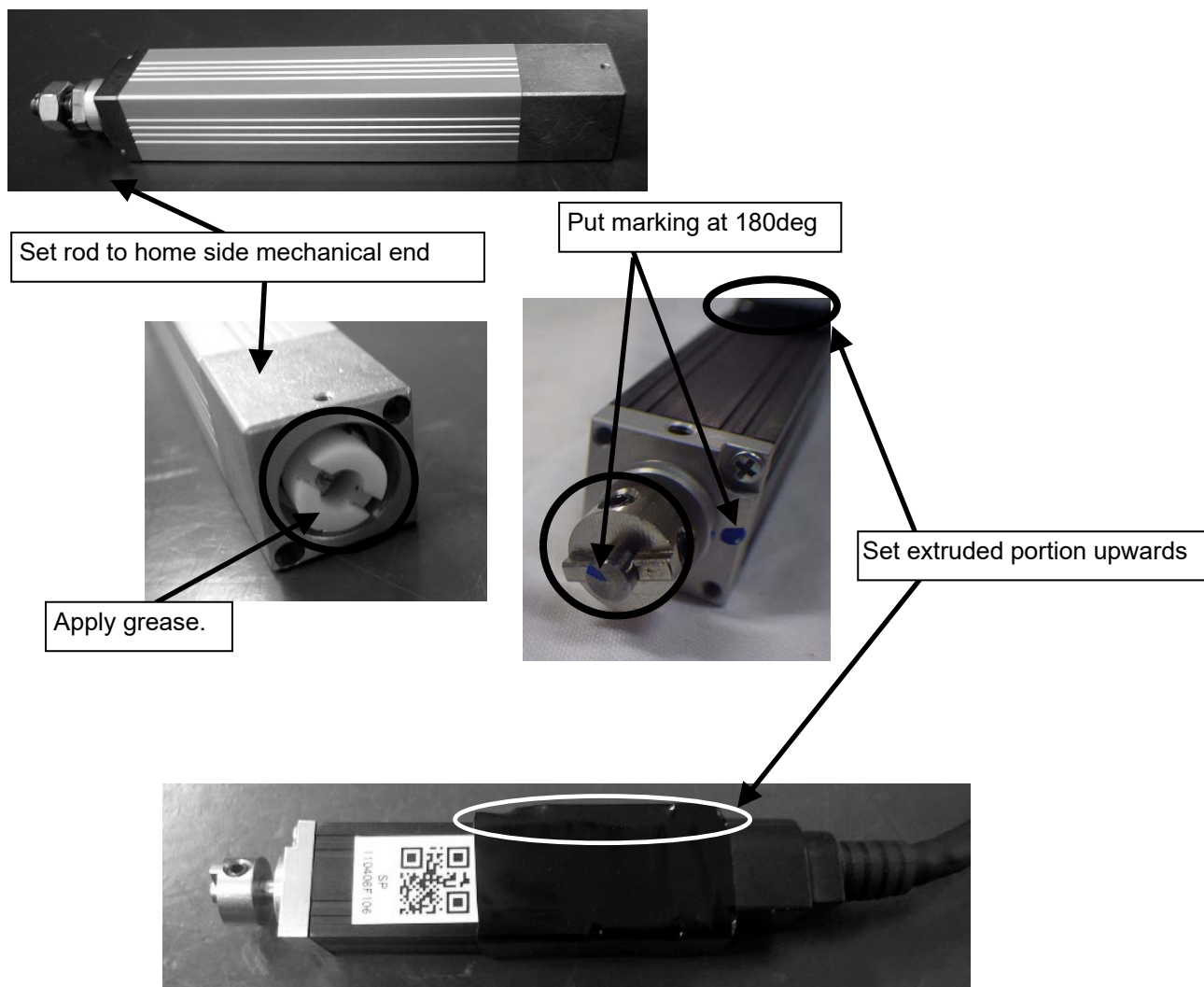
- 3) Remove the M2 × 12 screws with a Philips screwdriver to take off the bracket attached on the replacement motor.



- 4) Put the extruded portion on the replacement motor unit upwards with the following procedure to align the coupling orientations.

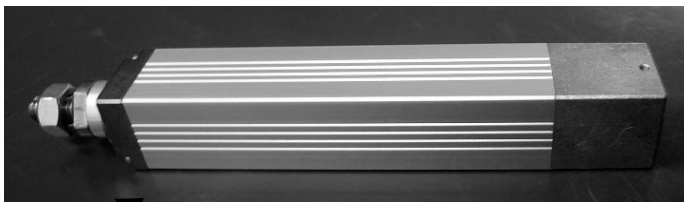
[For Lead 1 and Lead 2]

- Set the marking on the motor 180deg away from the marking on the motor and motor shaft.
- Apply grease on the coupling on the rod side.
Manufactured by Idemitsu Kosan Daphne Grease MP No. 2
- Push the rod against the mechanical end.



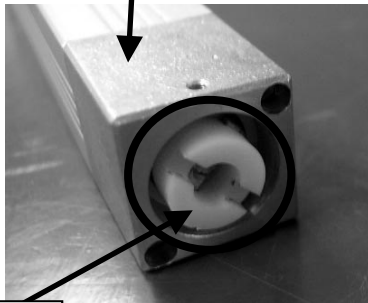
[For Lead 4]

- Rotate the motor shaft counterclockwise so the marking on it is placed at 90deg to the marking on the motor.
(Note) Rotate it clockwise to set the marking at 90deg (reversed direction to the figures below) for the home reversed type.
- Apply grease on the coupling on the rod side.
Manufactured by Idemitsu Kosan Daphne Grease MP No. 2
- Push the rod against the mechanical end.



Markings are to be set motor shaft at 90deg counterclockwise

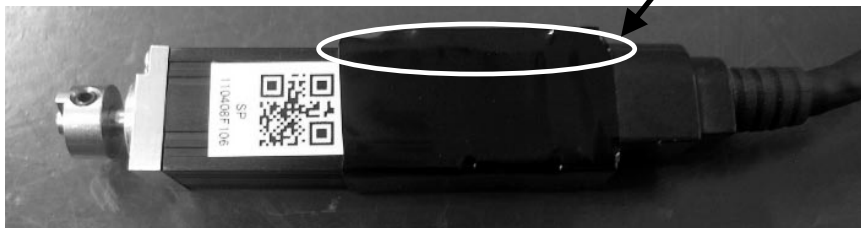
Set rod to home side mechanical end



Apply grease.

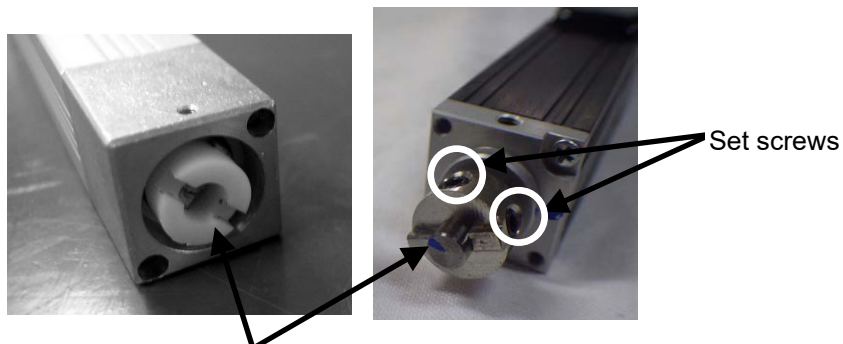


Set extruded portion upwards



[Common procedure for Lead 1, Lead 2 and Lead 4]

Keeping the markings on the motor and the motor shaft at the positions set in Procedure 4), loosen the set screws with a 1.5mm hex wrench to align the orientation of the couplings.



Loosen set screws to align orientation of couplings.

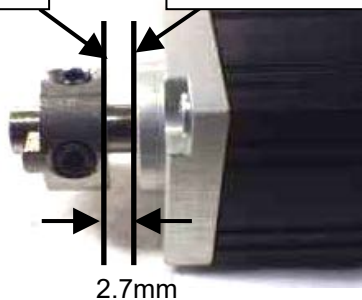
Set the end of the coupling to the position shown in the figure below, and tighten the set screws.

Tightening Torque

69N • cm

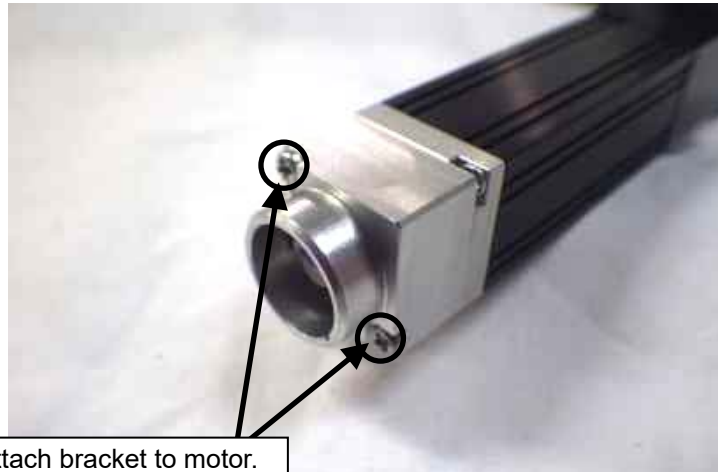
End of Coupling

Shaft Extruded Surface



2.7mm

- 5) Attach the bracket to the motor with the M2 × 12 screws. (2 places).

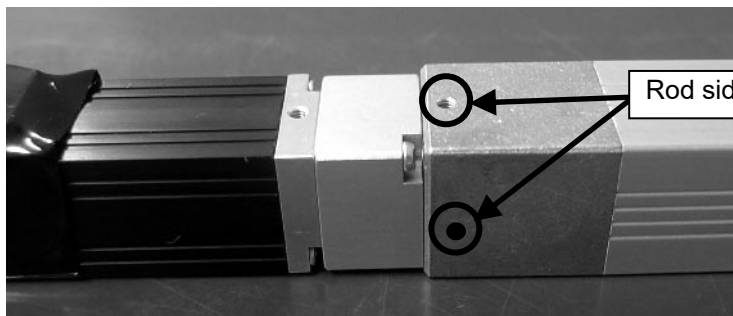


Attach bracket to motor.

Tightening Torque

17N • cm

- 6) Keeping the markings on the motor and the motor shaft at the positions set in Procedure 4), attach the motor unit on the rod side, and affix it with the M2 × 2 set screws. (2 places)



Rod side and motor unit fixing screws

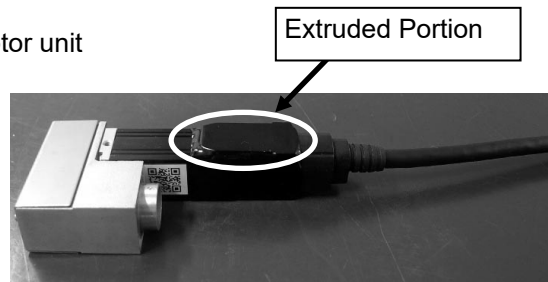
- 7) Connect a PC or teaching pendant to the controller and perform a home return. Check for displacement with the original home position and if there is a displacement, make correction using the following parameter:
- ACON controller : No.22, home return offset distance
 - ASEL controller : Parameter No.12 for each axis, home preset value
 - ASEP controller : No.16, home return offset distance
 - AMEC controller : No.16, home return offset distance
 - MSEP controller : No.16, home return offset distance

If your actuator is of the absolute encoder specification, perform a home return after the parameter has been changed, and then execute an absolute reset.

5.7.2 SA2AR

[Required Items]

- Replacement motor unit

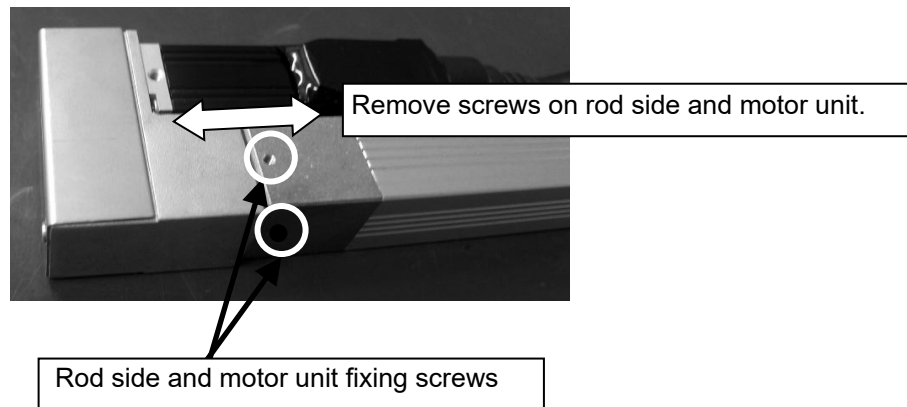


(Note) For the rod type, when attaching a motor unit for replacement, make sure to set the extruded portion upwards. This is the reason the motor unit for replacement differs depending on the direction to reverse. Pay attention to this difference. [Refer to Procedure 2]]

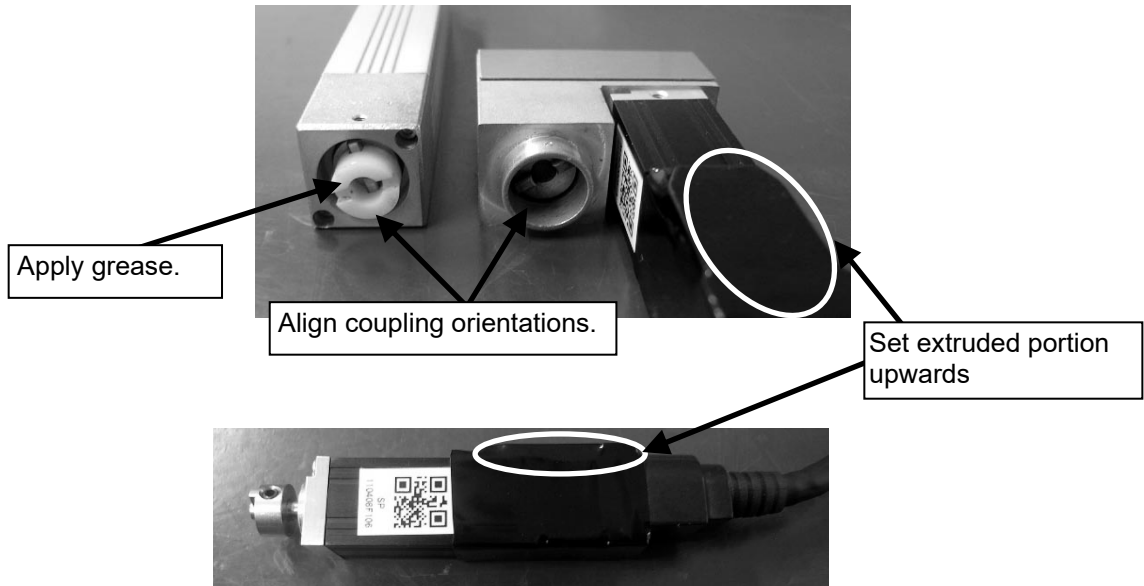
- Tension gauge
- Strong string shaped in a ring (or a long tie-band)
- Phillips Screwdriver No. 0 and No. 1
- Hex wrench Across flats 0.89mm

[Procedure]

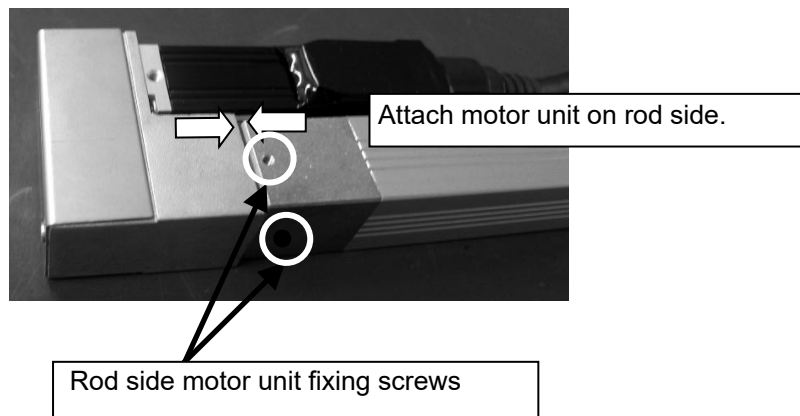
- 1) Remove the M2 × 2 set screws holding on the rod side of the actuator and the motor unit with a hex wrench. (2 places)
After removing the set screws, detach the motor unit off the actuator.



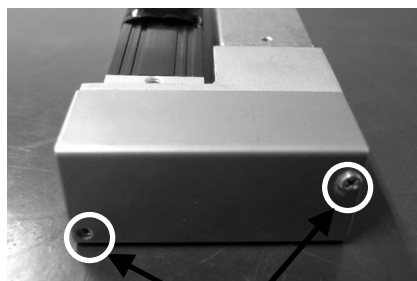
- 2) Apply grease on the coupling on the rod side.
 Manufactured by Idemitsu Kosan Daphne Grease MP No. 2
 Put the extruded portion on the replacement motor unit upwards to align the orientation of the couplings on the rod side and the motor unit for replacement.



- 3) Attach the motor unit for replacement on the rod side, and affix it with the M2 × 2 set screws.

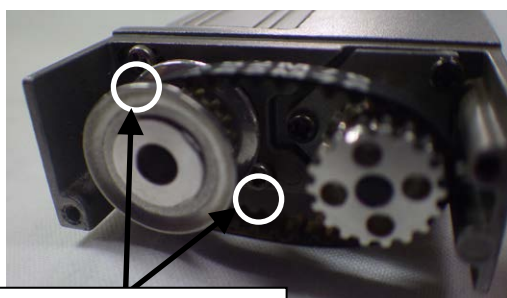


- 4) Detach the pulley cover.
Remove the screws (M2 × 2). (2 places)



Detach pulley cover.

- 5) Loosen the screws (M2 × 8) holding the motor on the reversing unit to loosen the belt.
(2 places)

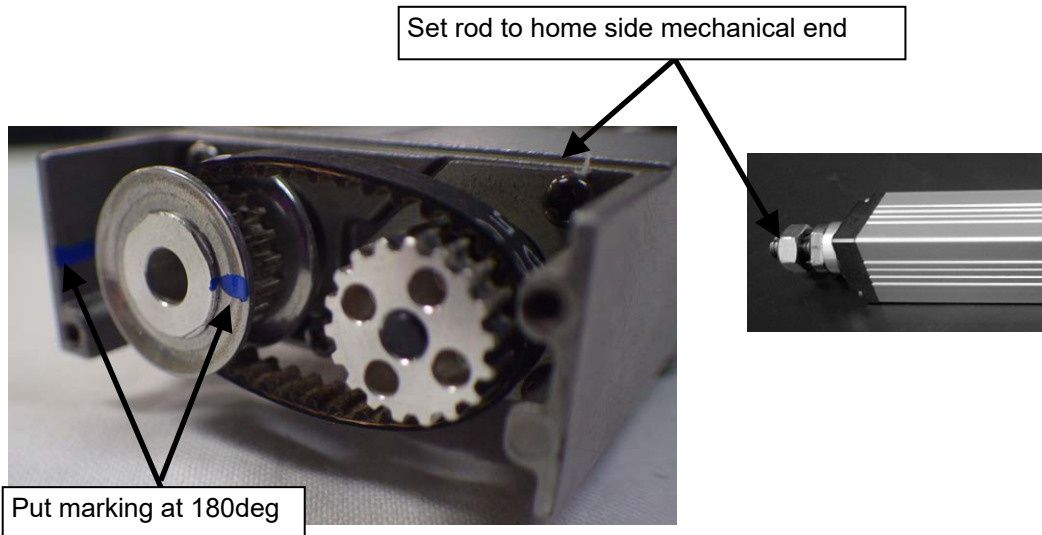


Loosen screws holding motor.

6) Adjust the pulley position following the process below.

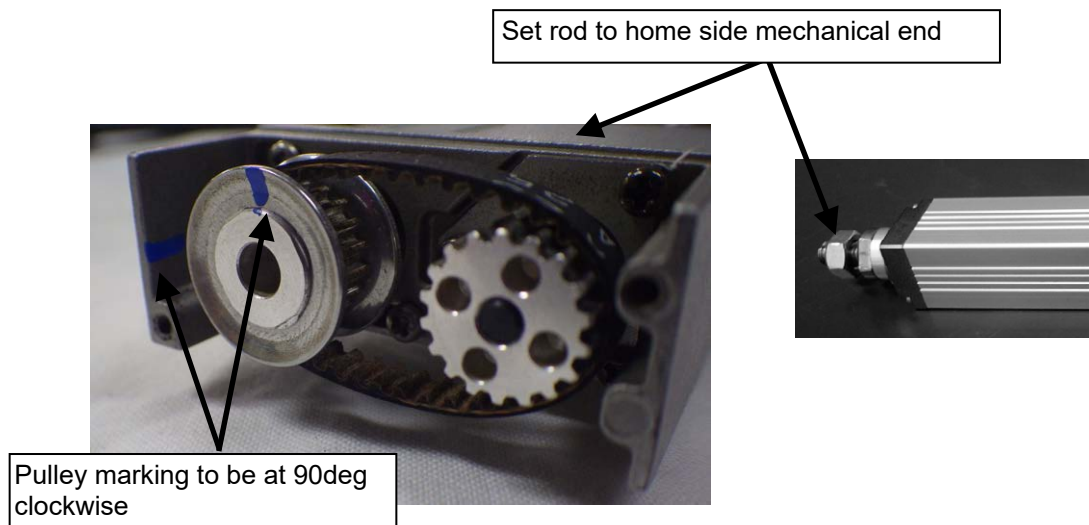
[For Lead 1 and Lead 2]

- Set the marking on the motor 180deg away from the marking on the motor and motor shaft.
- Push the rod against the mechanical end.
- Adjust the belt hang.

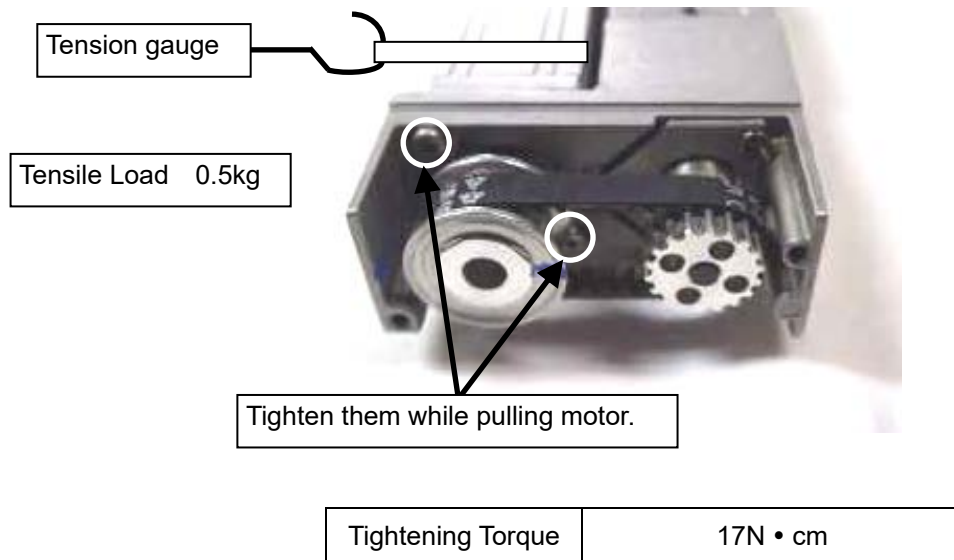


[For Lead 4]

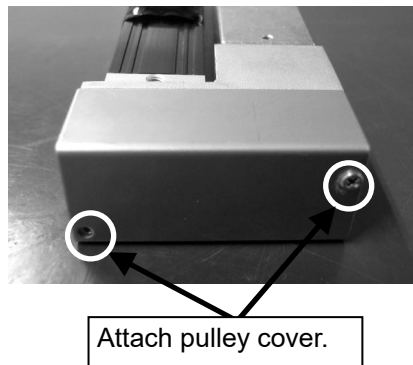
- Rotate the pulley to set the marking at 90deg clockwise to the marking on the motor bracket.
(Note) Rotate it counterclockwise to set the marking at 90deg (reversed direction to the figures below) for the home reversed type.
- Push the rod against the mechanical end.
- Adjust the belt hang.



- 7) Keeping the pulley and the rod at the positions set in Procedure 6), have a strong string (or a long cable band) in loop hanged at the root of the motor unit, and pull the motor unit with a tension gauge to maintain the tensile at the specified to tighten screws (M2 × 8) evenly. (2 places)



- 8) Attach the pulley cover with the attachment screws (M2 × 2). (2 places)



- 9) Connect a PC or teaching pendant to the controller and perform a home return. Check for displacement with the original home position and if there is a displacement, make correction using the following parameter:
- ACON controller : No.22, home return offset distance
 - ASEL controller : Parameter No.12 for each axis, home preset value
 - ASEP controller : No.16, home return offset distance
 - AMEC controller : No.16, home return offset distance
 - MSEP controller : No.16, home return offset distance

If your actuator is of the absolute encoder specification, perform a home return after the parameter has been changed, and then execute an absolute reset.

6. Life

6.1 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, RN3NB, RP3NB, GS3NB, GD3NB, SD3NB, RN3N, RP3N, GS3N, GD3N, SD3N	Lead 1mm	3000km
RN3NA, RP3NA, GS3NA, GD3NA, SD3NA, RN3NB, RP3NB, GS3NB, GD3NB, SD3NB, RN3N, RP3N, GS3N, GD3N, SD3N	Lead 2mm, 4mm	5000km
RN4NA, RP4NA, GS4NA, GD4NA, SD4NA, RN4NB, RP4NB, GS4NB, GD4NB, SD4NB, RN4N, RP4N, GS4N, GD4N, SD4N		5000km

6.2 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)

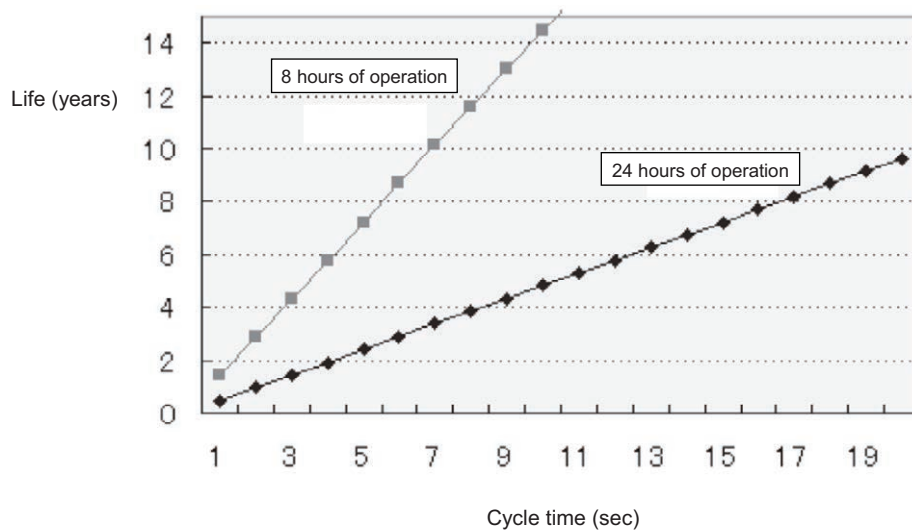
Horizontal application	10 million back-and-forth operations
Vertical application	5 million back-and-forth operations

6.3 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).

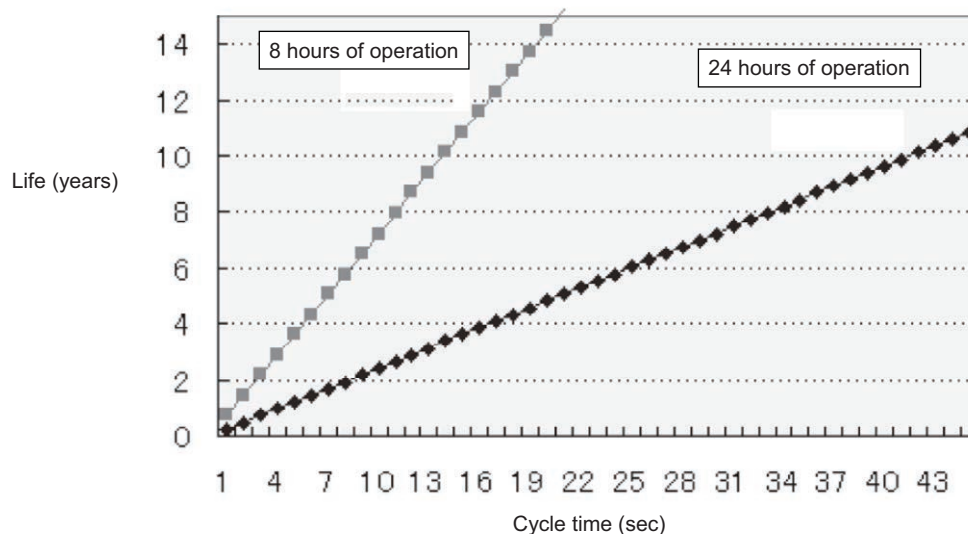
The lines based on 8 hours of operation and 24 hours operations a day, for 240 days a year, are shown. Use this graph as a reference when determining the product life.



[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.



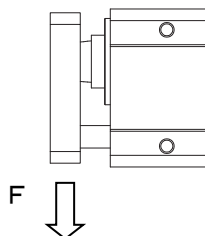
6.4 Correlation between Tip Radial Load and Operation Life

As the radial load on the tip gets larger, the more the operation life will decrease.

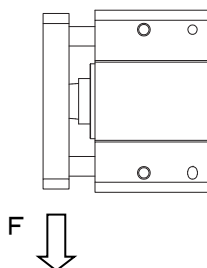
[Load Direction]

Single guide

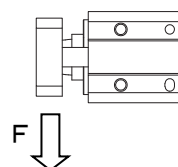
Double guide



View from Side

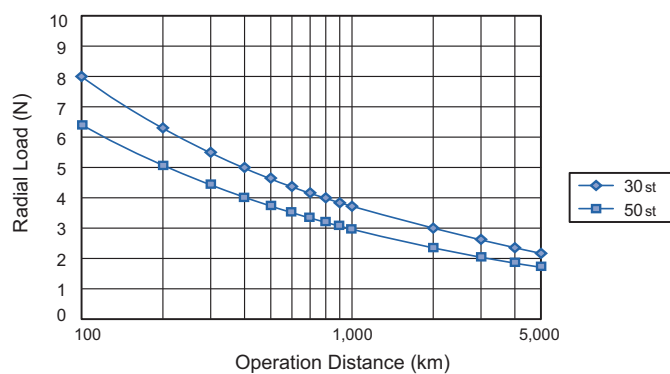


View from Top

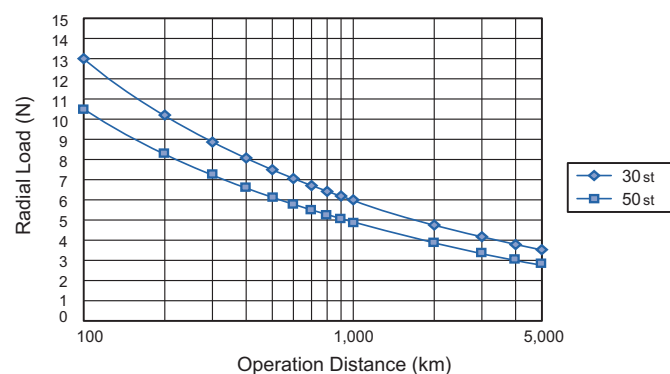


(Note) Single guide type is not capable for any load except for those from the top and bottom

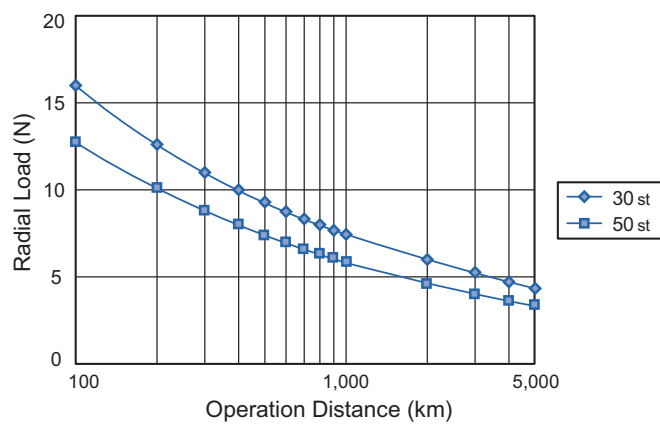
●RCA2-GS3NA



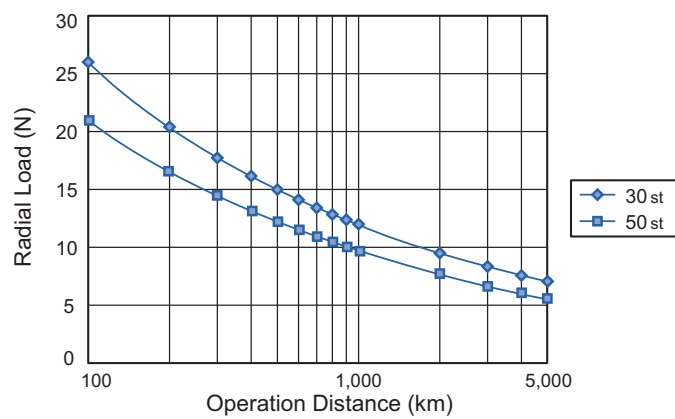
●RCA2-GS4NA



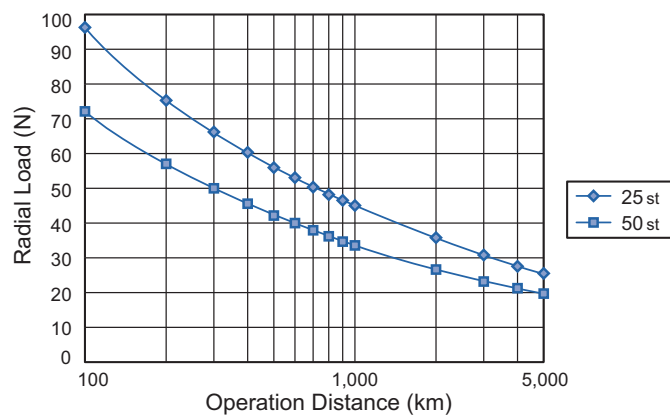
●RCA2-GD3NA



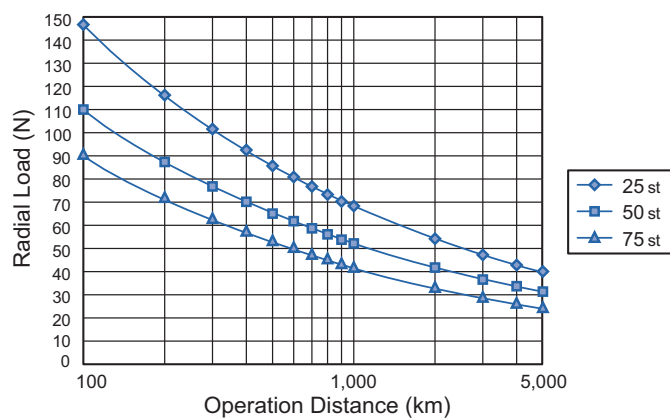
●RCA2-GD4NA



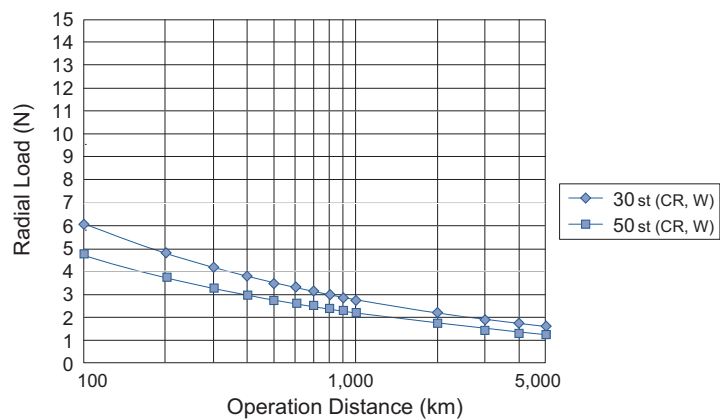
●RCA2-SD3NA



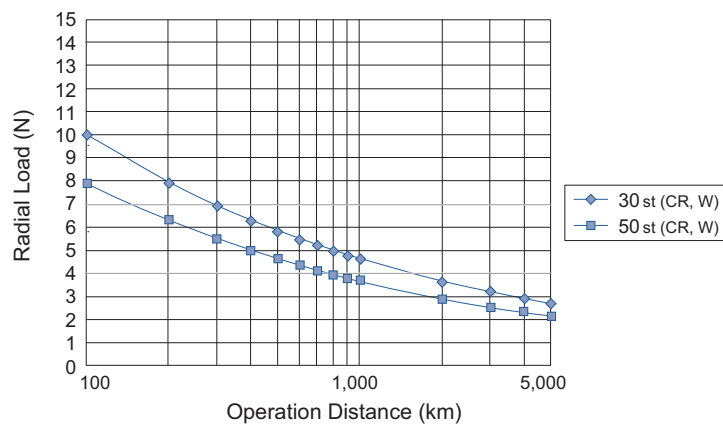
●RCA2-SD4NA



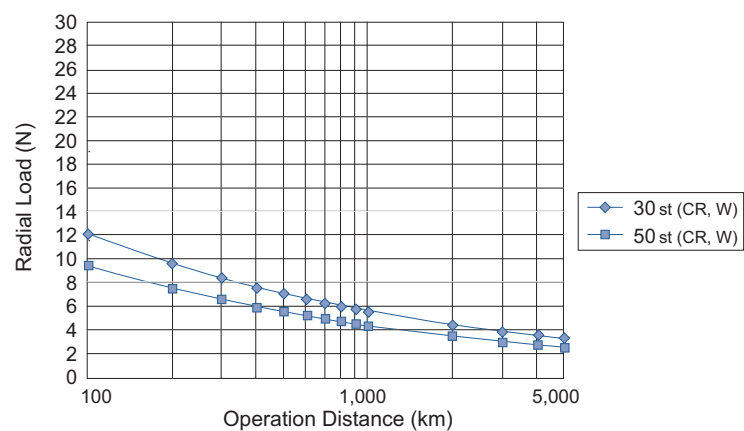
●RCA2CR, RCA2W-GS3NA, GS3NB (Cleanroom Type, Dustproof Type)



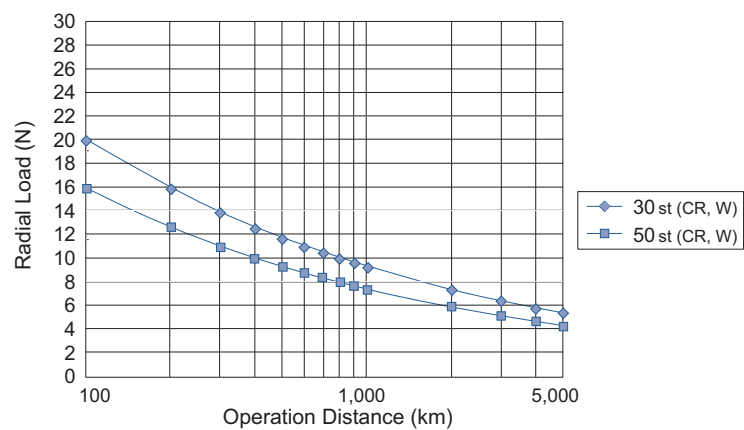
●RCA2CR, RCA2W-GS4NA, GS4NB (Cleanroom Type, Dustproof Type)



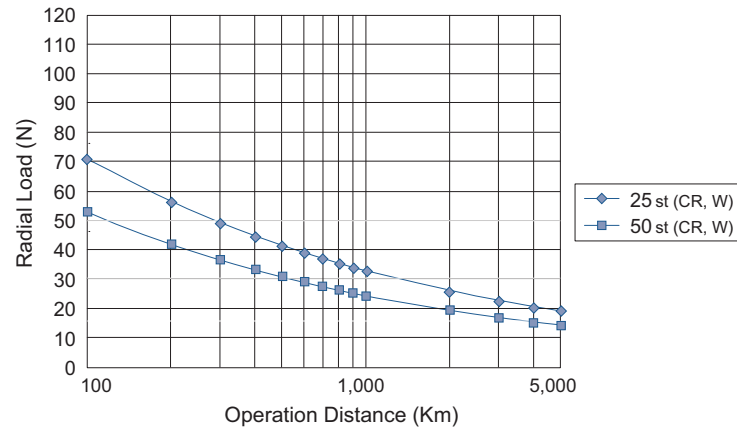
●RCA2CR, RCA2W-GD3NA, GD3NB (Cleanroom Type, Dustproof Type)



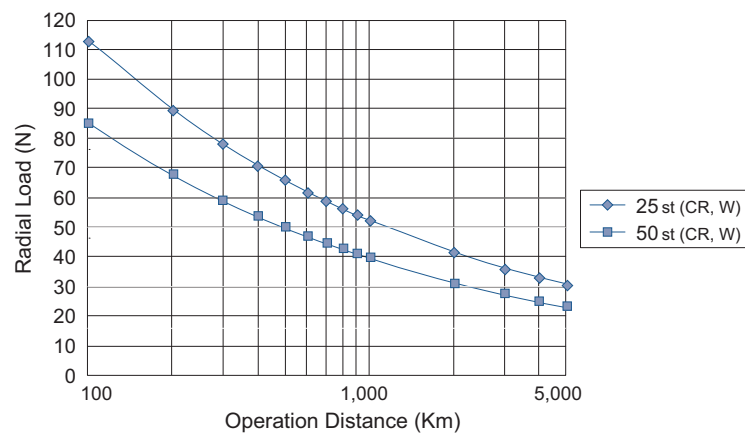
●RCA2CR, RCA2W-GD4NA, GD4NB (Cleanroom Type, Dustproof Type)



●RCA2CR, RCA2W-SD3NA, SD3NB (Cleanroom Type, Dustproof Type)



●RCA2CR, RCA2W-SD4NA, SD4NB (Cleanroom Type, Dustproof Type)

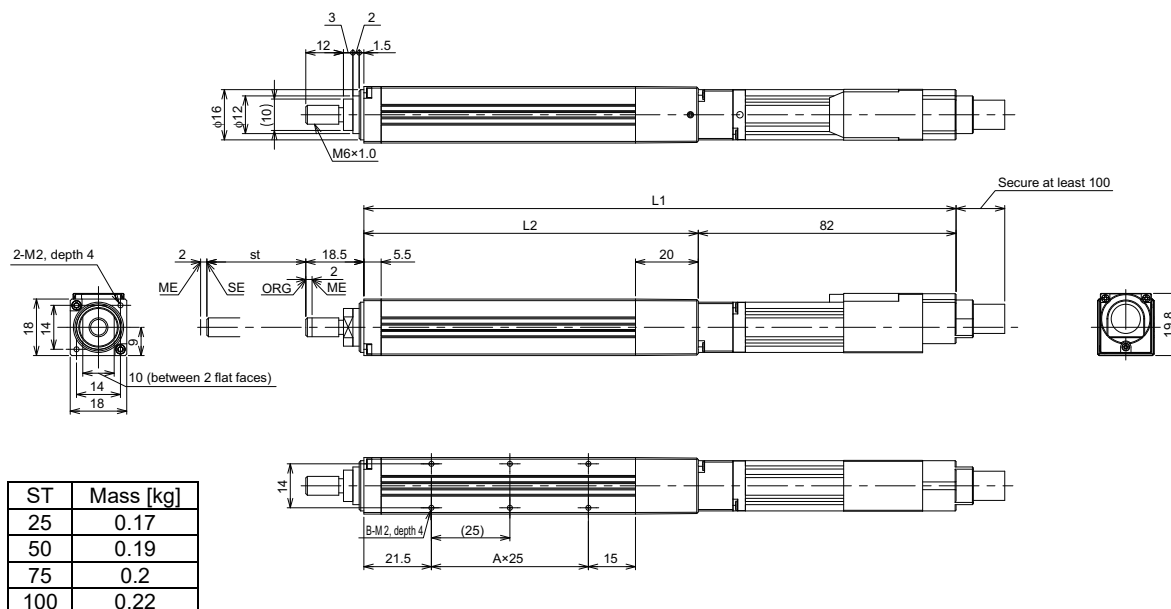


6.5 Life of Bellows on Cleanroom Type and Dust Proof Type

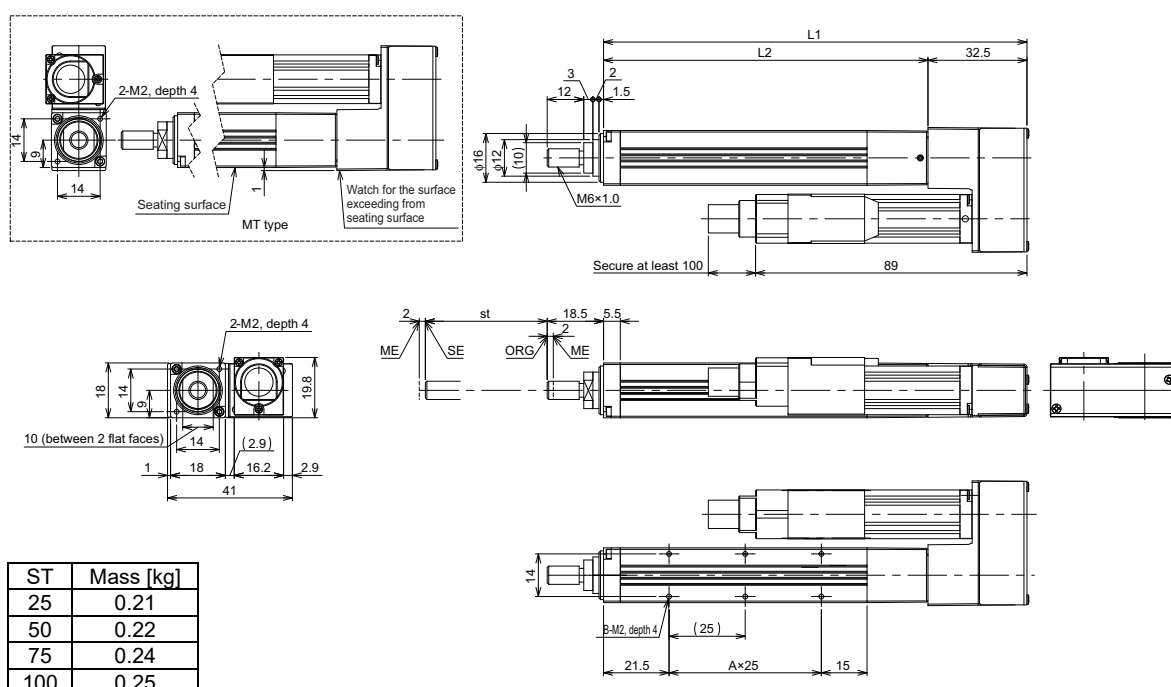
It may vary due to the environment of use and operational conditions, however, it is around several million times of back and forth operation (reference) in standard.

7. External Diagrams

7.1 Slim Type (Motor Coupling Type) RCA2-RA2AC

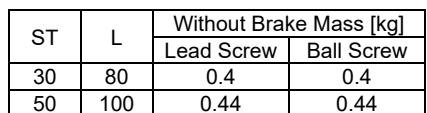


7.2 Slim Type (Motor Reversing Type) RCA2-RA2AR



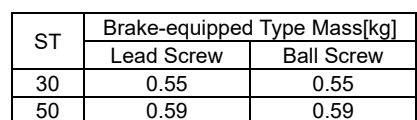
ST	Brake-equipped Type Mass [kg]	
	Lead Screw	Ball Screw
30	0.35	0.35
50	0.37	0.37

- Without Brake



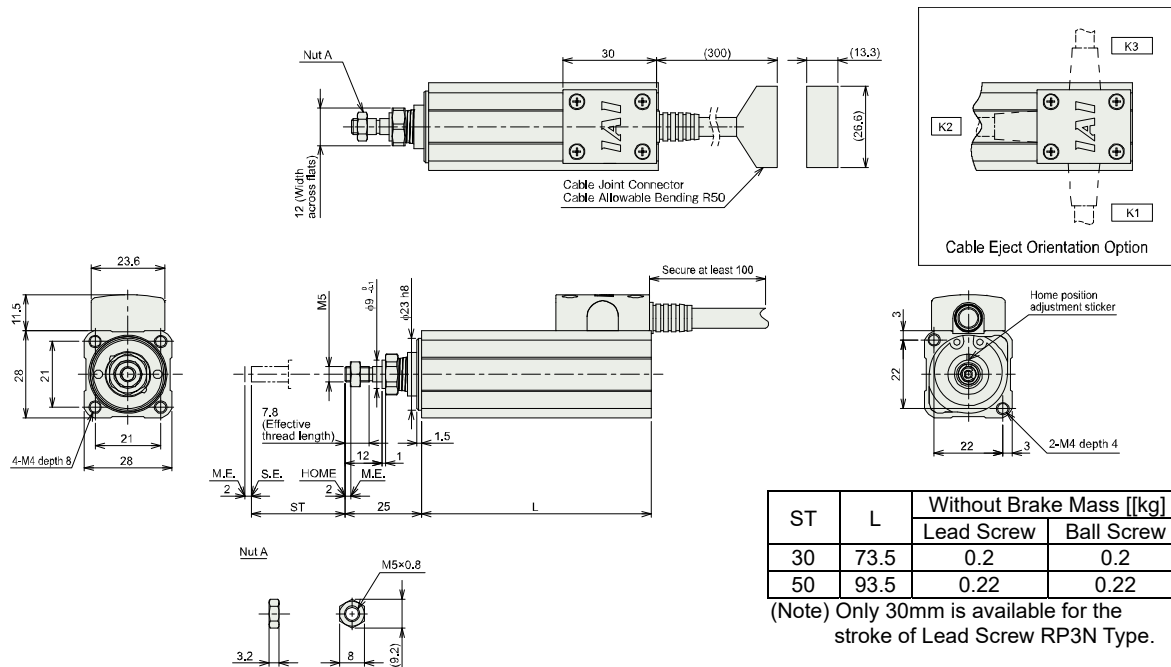
(Note) Only 30mm is available for the stroke of Lead Screw RN4N Type.

- Brake-equipped Type

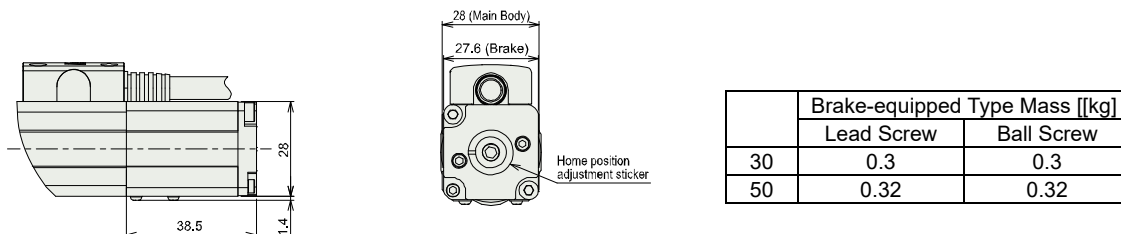


7.5 Short Types (Tapped-hole Mounting Types) RCA2-RP3NA/RP3N (Lead Screw, Ball Screw)

• Without Brake

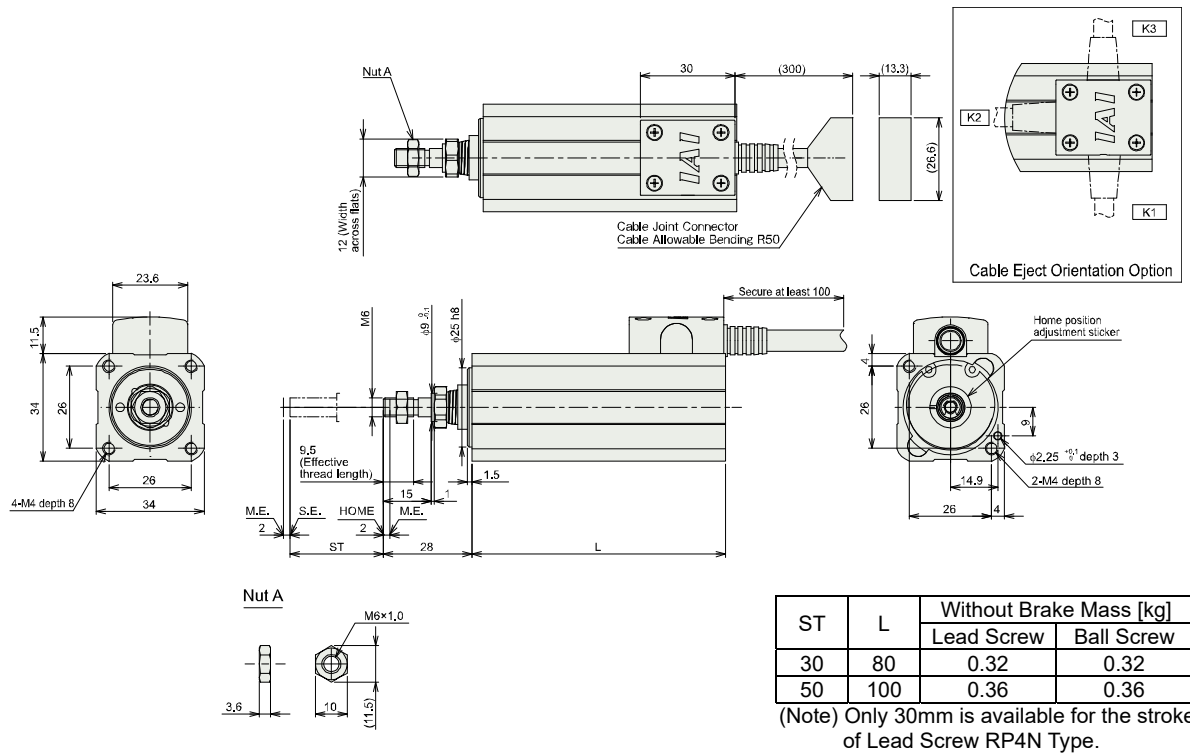


• Brake-equipped Type

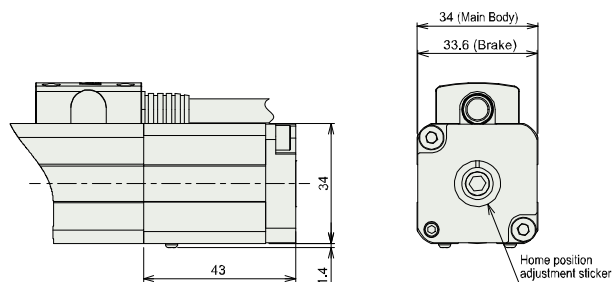


7.6 Short Types (Tapped-hole Mounting Types) RCA2-RP4NA/RP4N (Lead Screw, Ball Screw)

- Without Brake



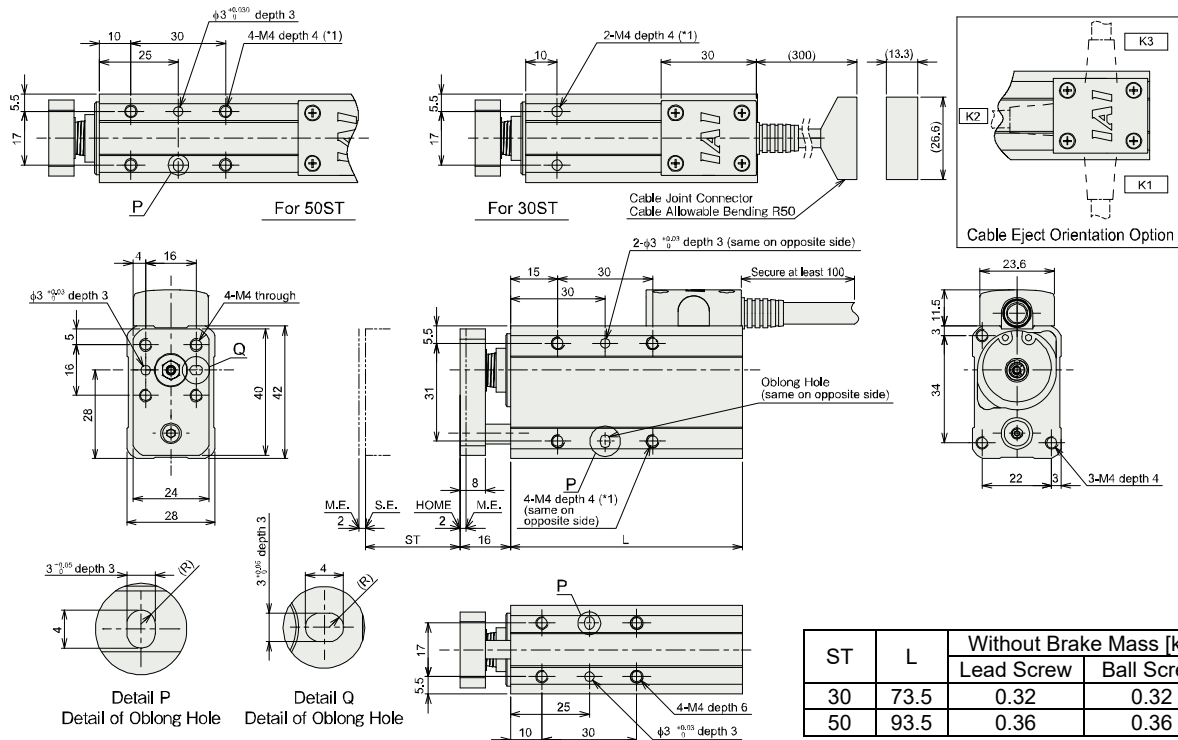
- Brake-equipped Type



ST	Brake-equipped Type Mass [kg]	
	Lead Screw	Ball Screw
30	0.47	0.47
50	0.51	0.51

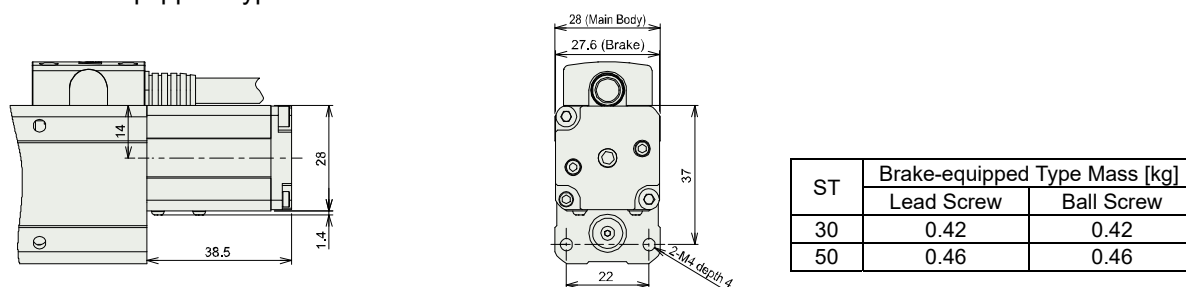
7.7 Single Guide Types RCA2-GS3NA/GS3N (Lead Screw, Ball Screw)

• Without Brake

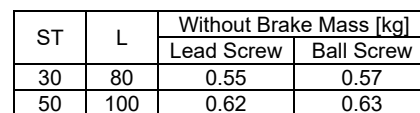


* Screw-in depths shall not exceed the dimensions shown above.

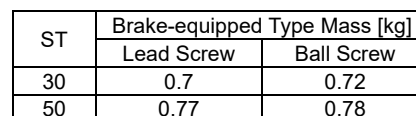
• Brake-equipped Type



- Without Brake

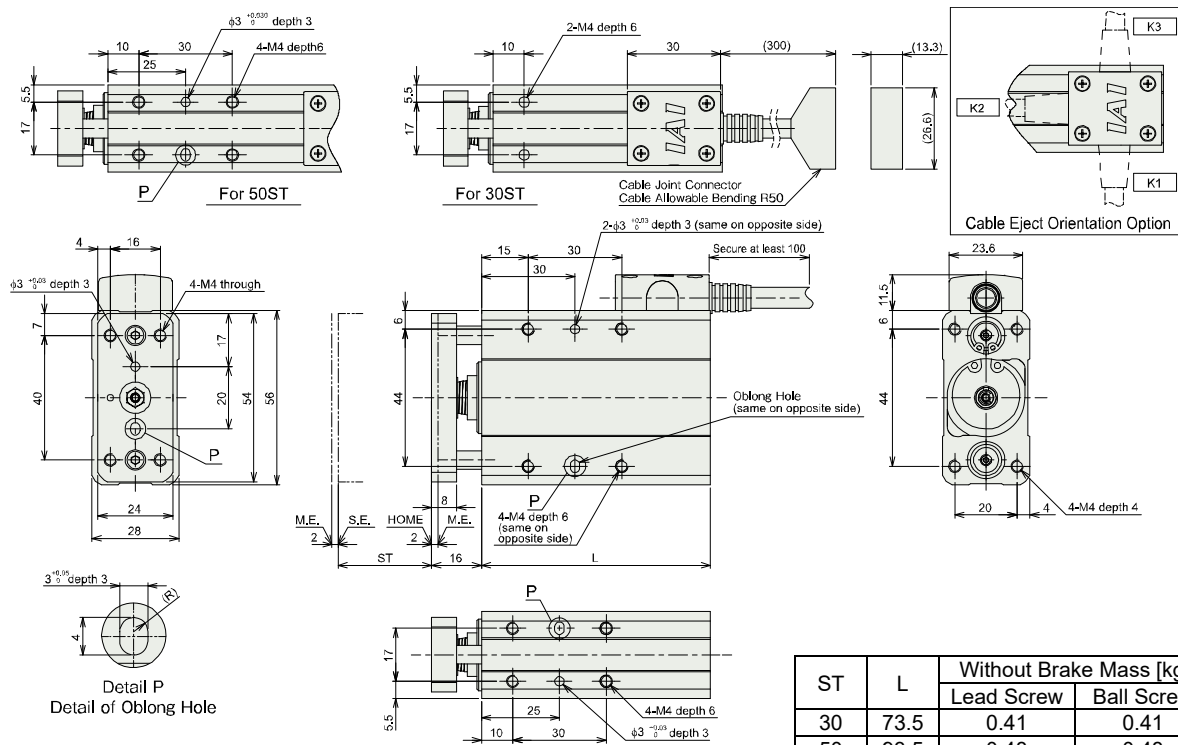


- Brake-equipped Type



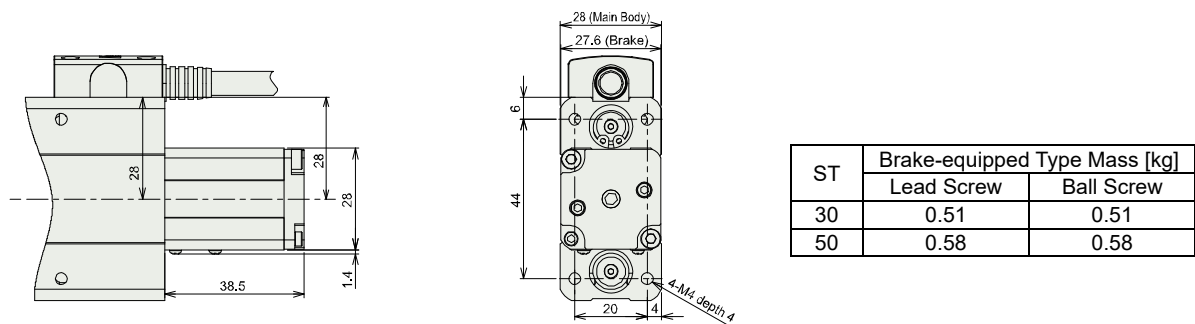
7.9 Double Guide Types RCA2-GD3NA/GD3N (Lead Screw, Ball Screw)

• Without Brake

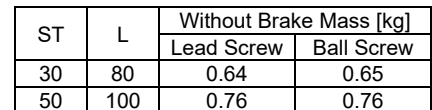


(Note) Only 30mm is available for the stroke of Lead Screw GD3N Type.

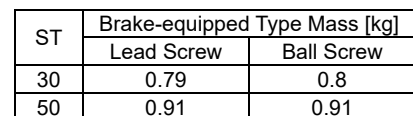
• Brake-equipped Type



- Without Brake



- Brake-equipped Type



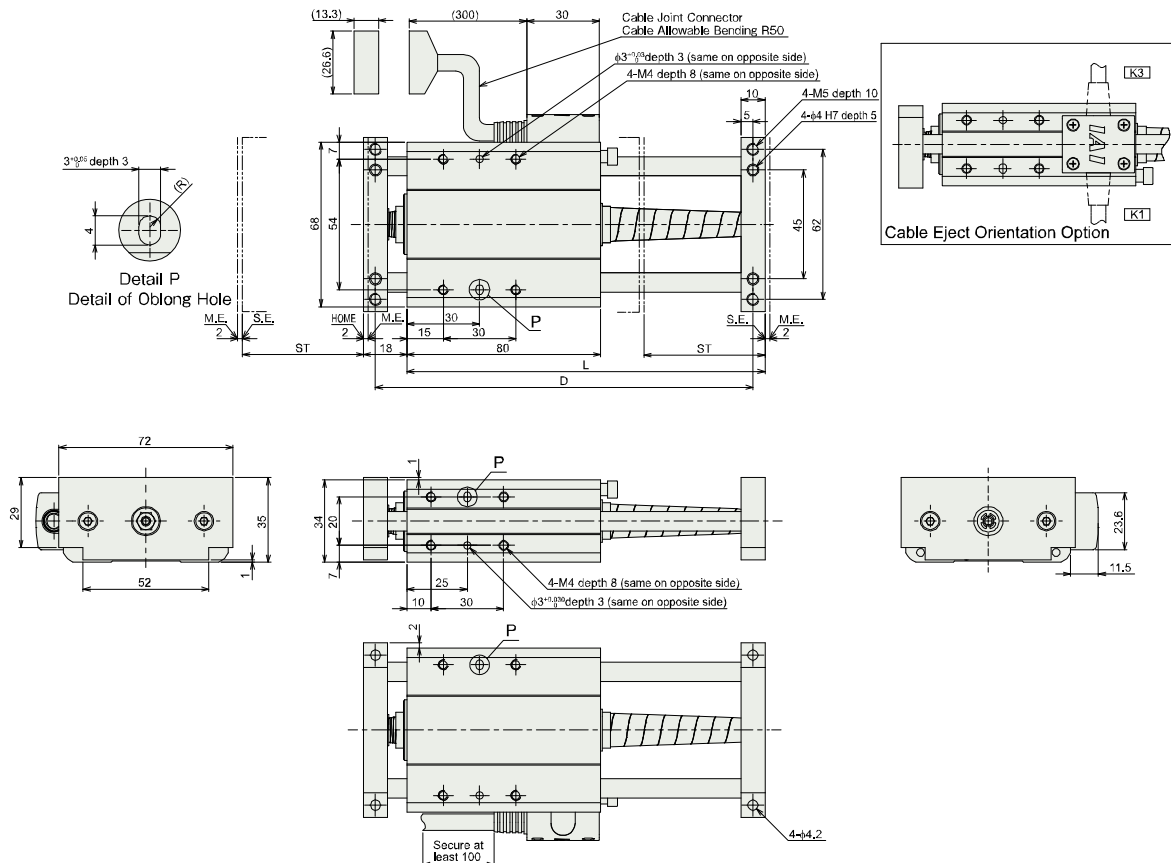
RCA2-SD3NA/SD3N (Lead Screw, Ball Screw)



ST	L	D	Mass [kg]	
			Lead Screw	Ball Screw
25	115	123	0.48	0.48
50	140	148	0.5	0.5

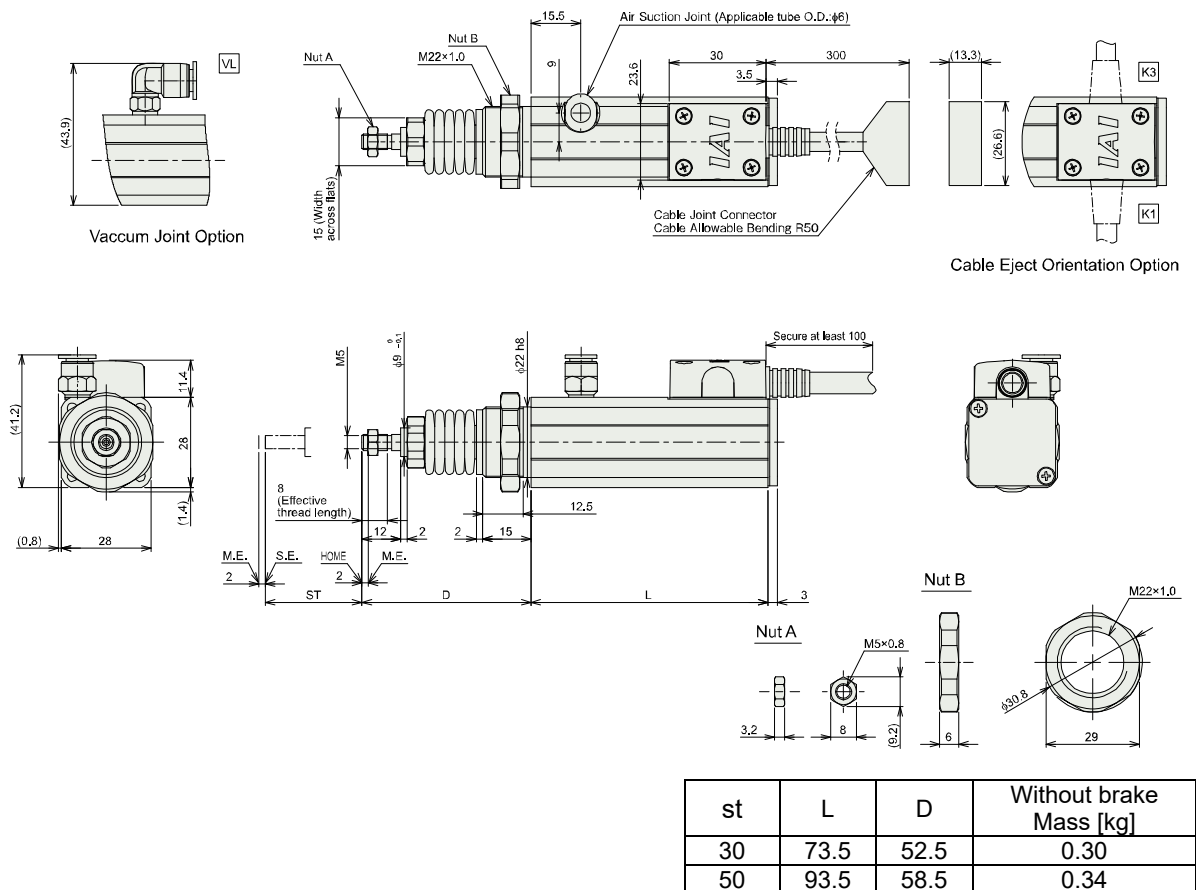
7.12 Slide Unit Types

RCA2-SD4NA/SD4N (Lead Screw, Ball Screw)

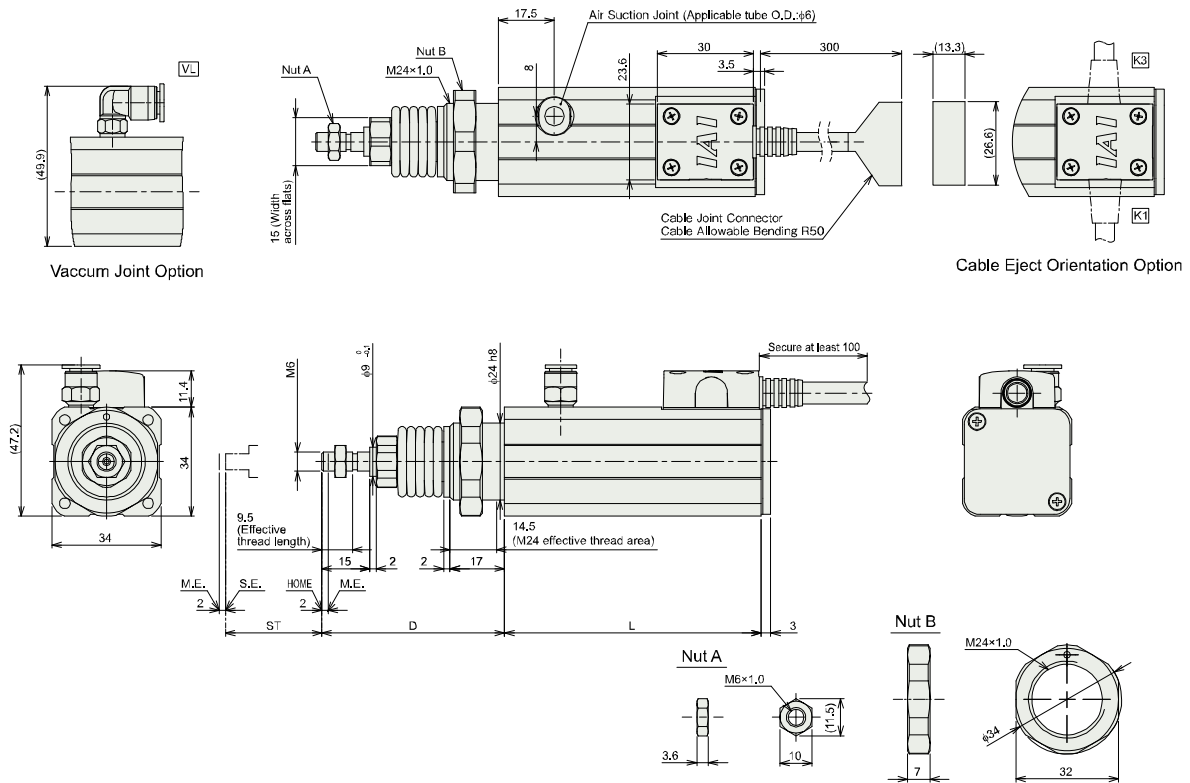


ST	L	D	Mass [kg]	
			Lead Screw	Ball Screw
25	141	131	0.71	0.73
50	166	156	0.73	0.75
75	191	181	0.75	0.77

7.13 Short Types (Nut Affixing Types) (Cleanroom Type) RCA2CR-RN3NB (Ball Screw)



7.14 Short Types (Nut Affixing Types) (Cleanroom Type) RCA2CR-RN4NB (Ball Screw)

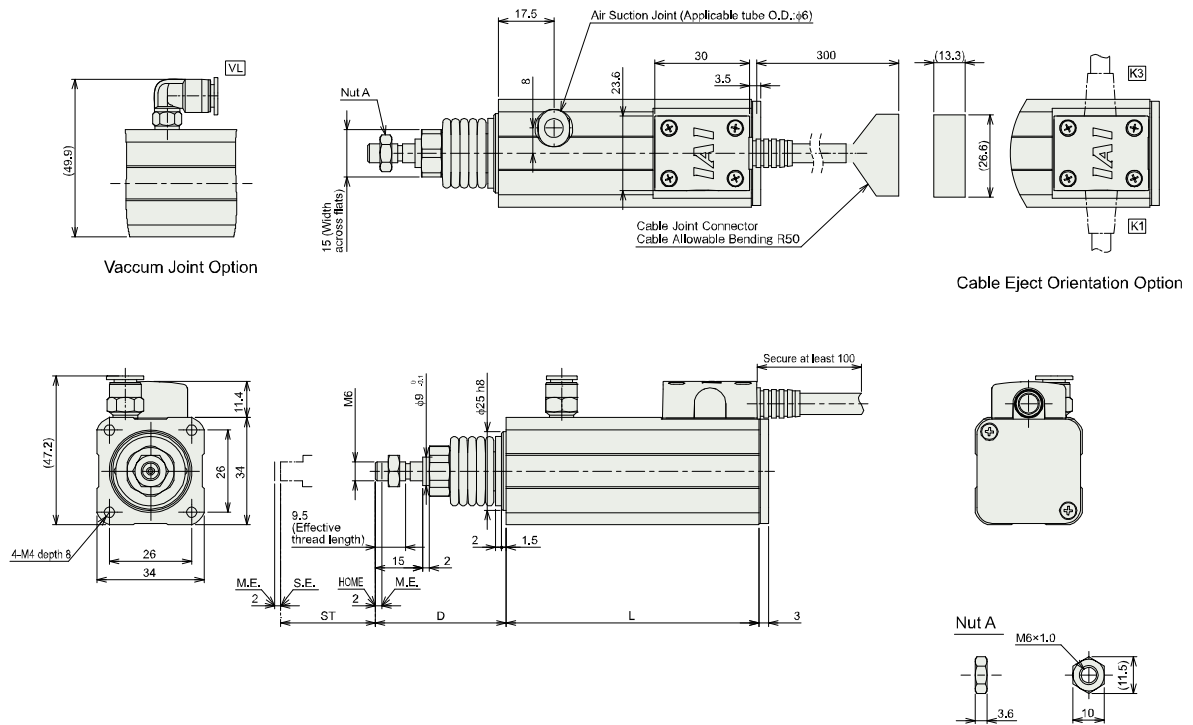


st	L	D	Without brake Mass [kg]
30	80	57	0.44
50	100	63	0.50

RCA2CR-RP3NB (Ball Screw)

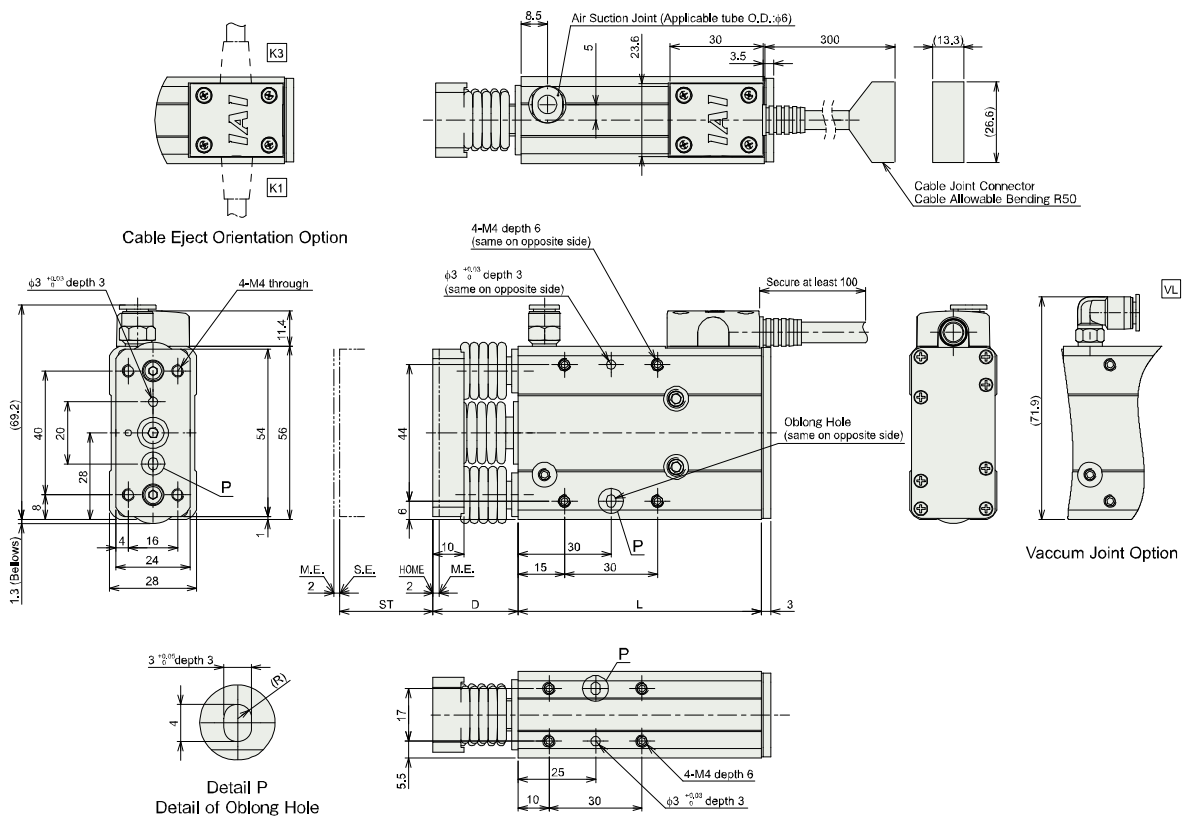


7.16 Short Types (Tapped-hole Mounting Types) (Cleanroom Type) RCA2CR-RP4NB (Ball Screw)



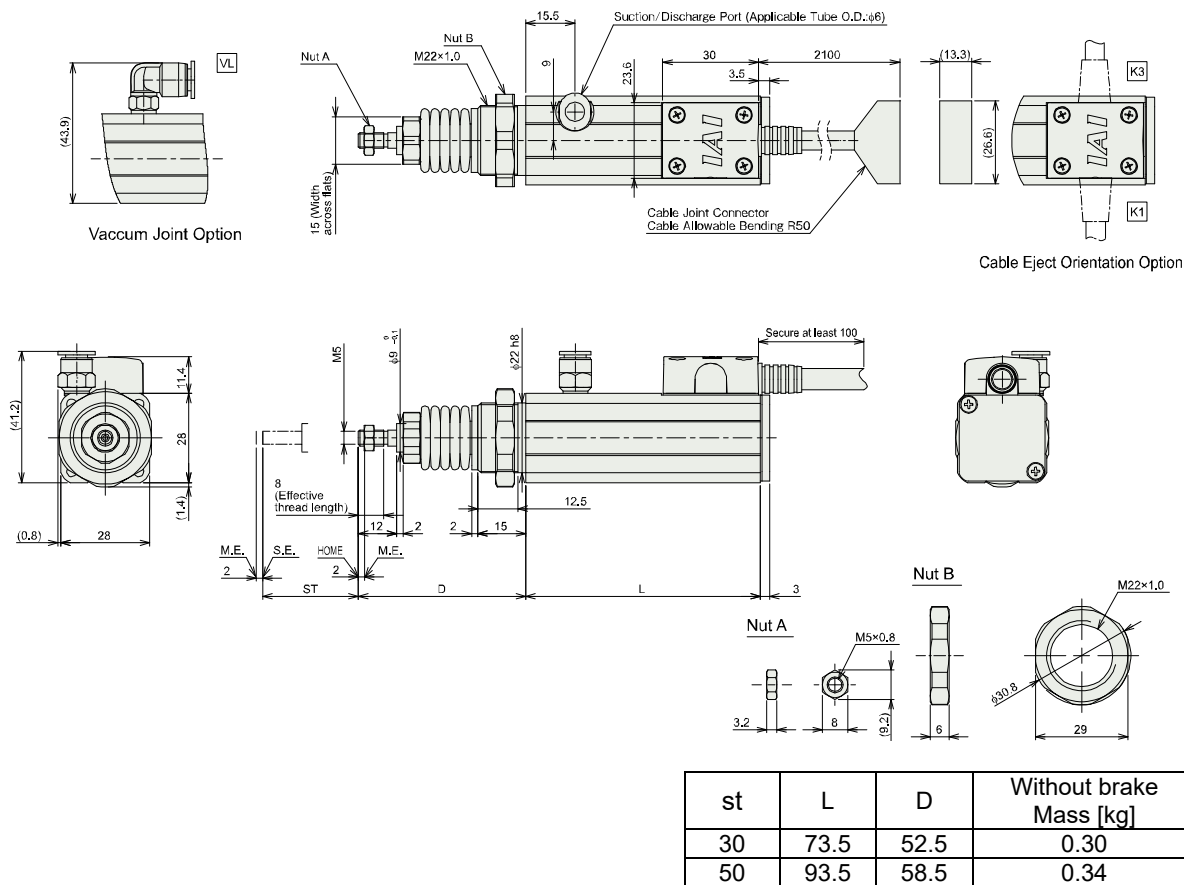
st	L	D	Without brake Mass [kg]
30	80	41.5	0.36
50	100	47.5	0.42

7.19 Double Guide Types (Cleanroom Type) RCA2CR-GD3NB (Ball Screw)

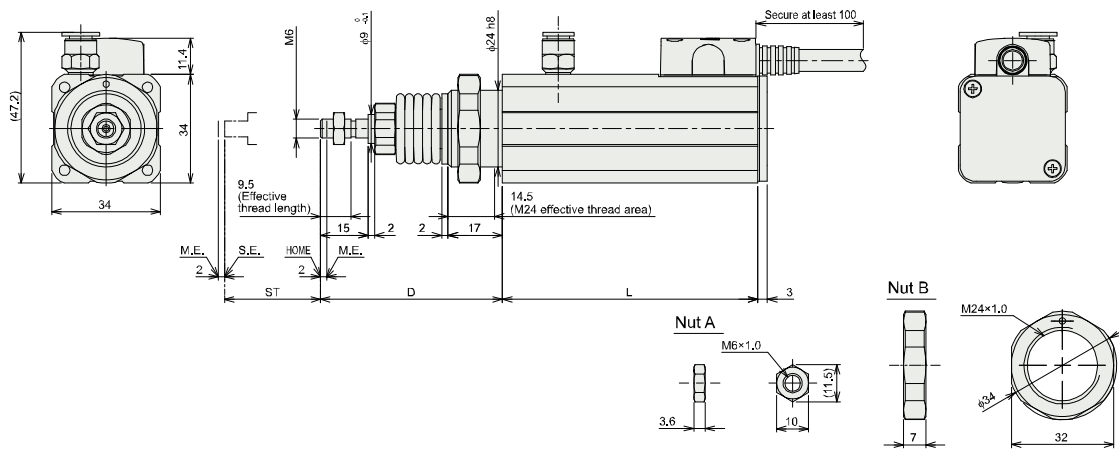
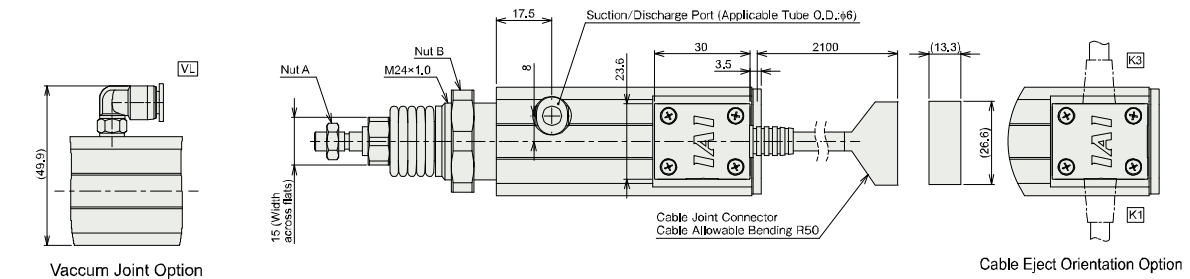


st	L	D	Without brake Mass [kg]
30	78.5	27.5	0.44
50	98.5	33.5	0.54

7.23 Short Types (Nut Affixing Types) (Dustproof and Splash proof Type) RCA2W-RN3NB (Ball Screw)

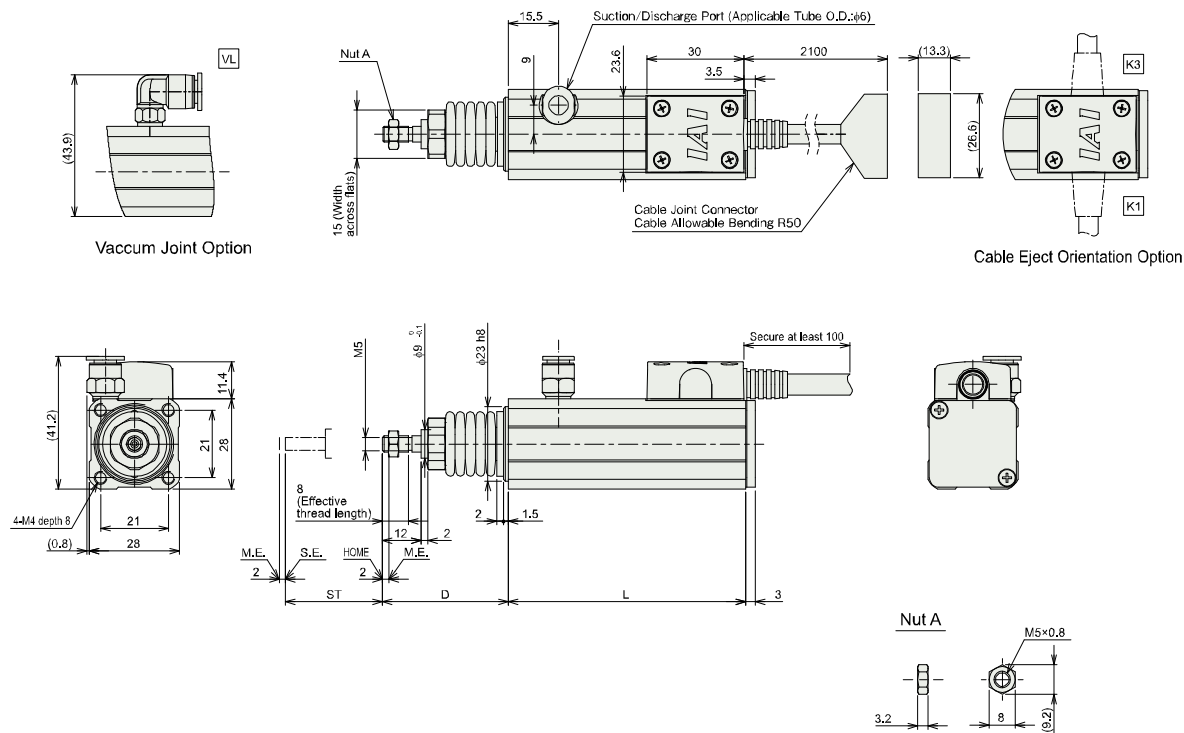


7.24 Short Types (Nut Affixing Types) (Dustproof and Splash proof Type) RCA2W-RN4NB (Ball Screw)



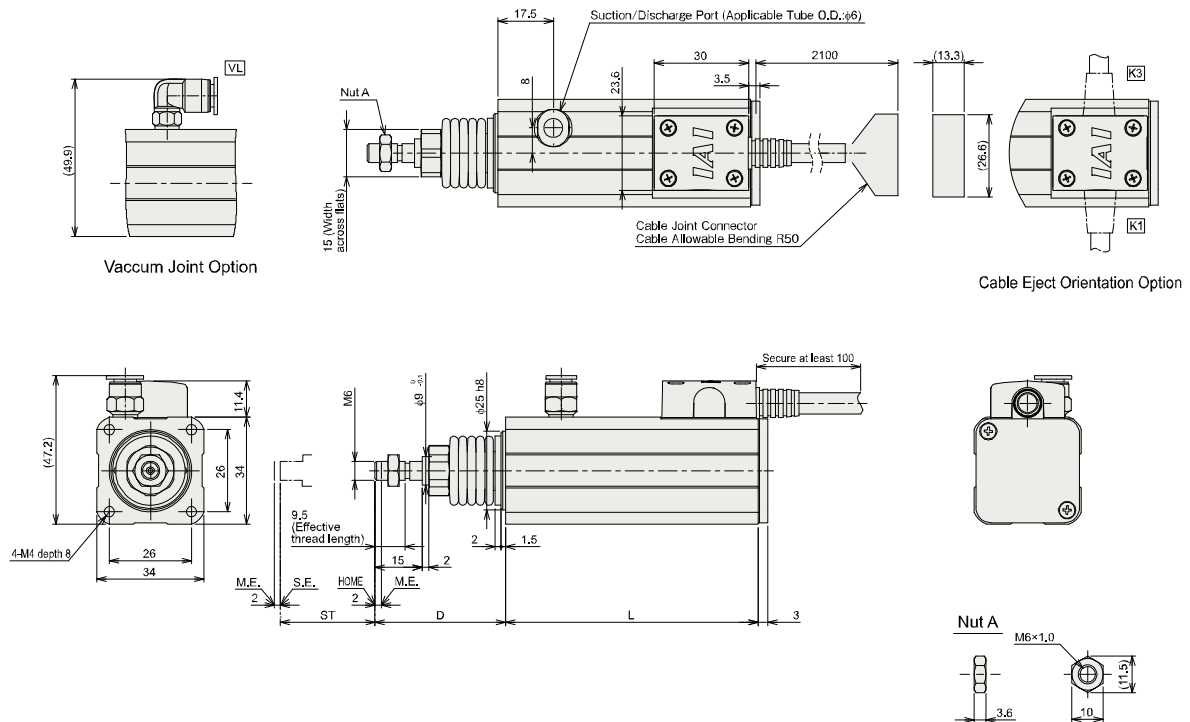
st	L	D	Without brake Mass [kg]
30	80	57	0.44
50	100	63	0.50

7.25 Short Types (Tapped-hole Mounting Types) (Dustproof and Splash proof Type) RCA2W-RP3NB (Ball Screw)



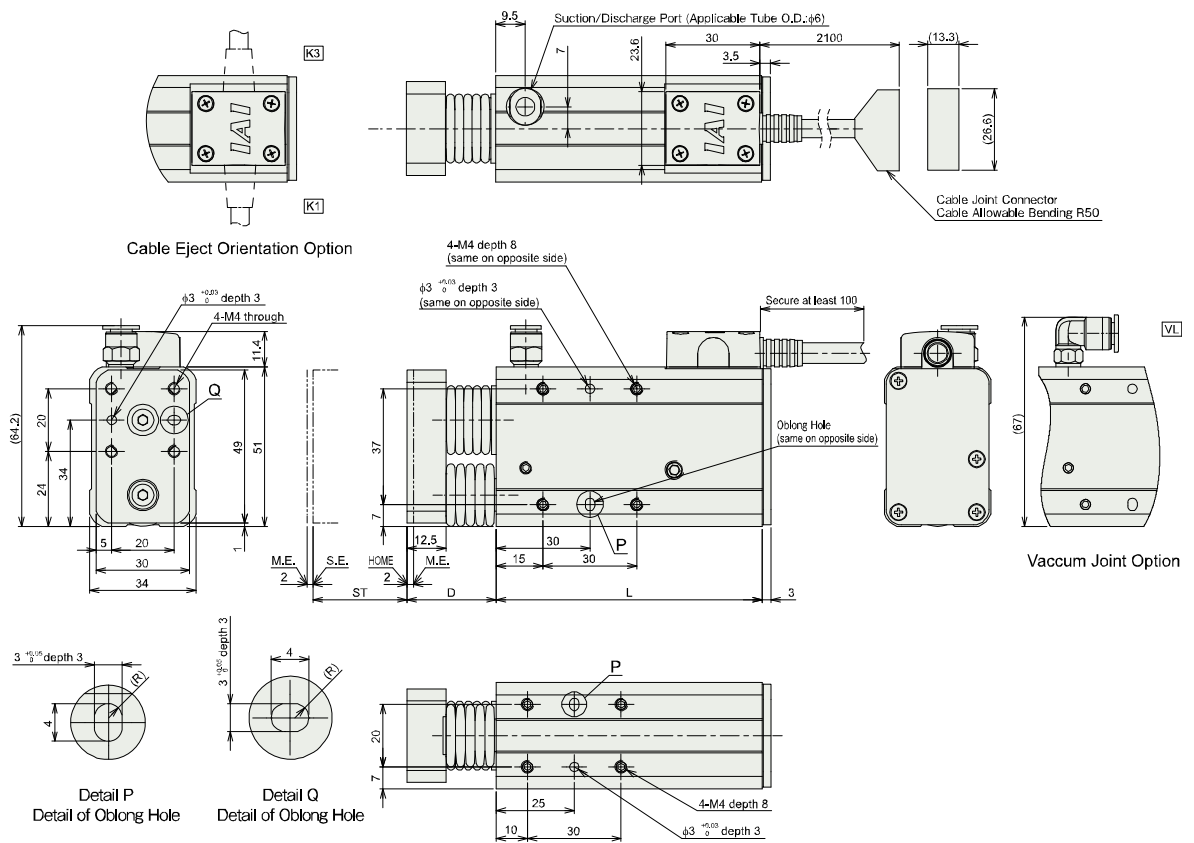
st	L	D	Without brake Mass [kg]
30	73.5	39	0.25
50	93.5	45	0.29

7.26 Short Types (Tapped-hole Mounting Types) (Dustproof and Splash proof Type) RCA2W-RP4NB (Ball Screw)



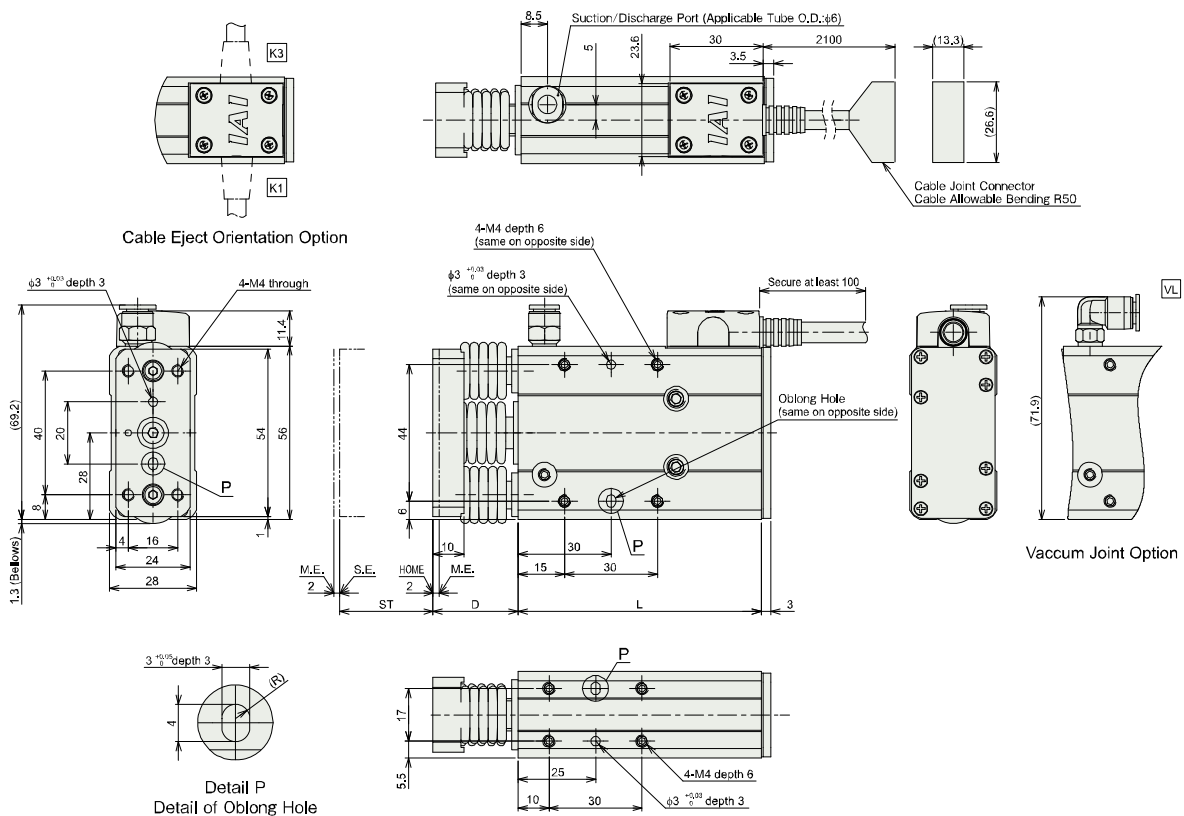
st	L	D	Without brake Mass [kg]
30	80	41.5	0.36
50	100	47.5	0.42

7.28 Single Guide Types (Dustproof and Splash proof Type) RCA2W-GS4NB (Ball Screw)



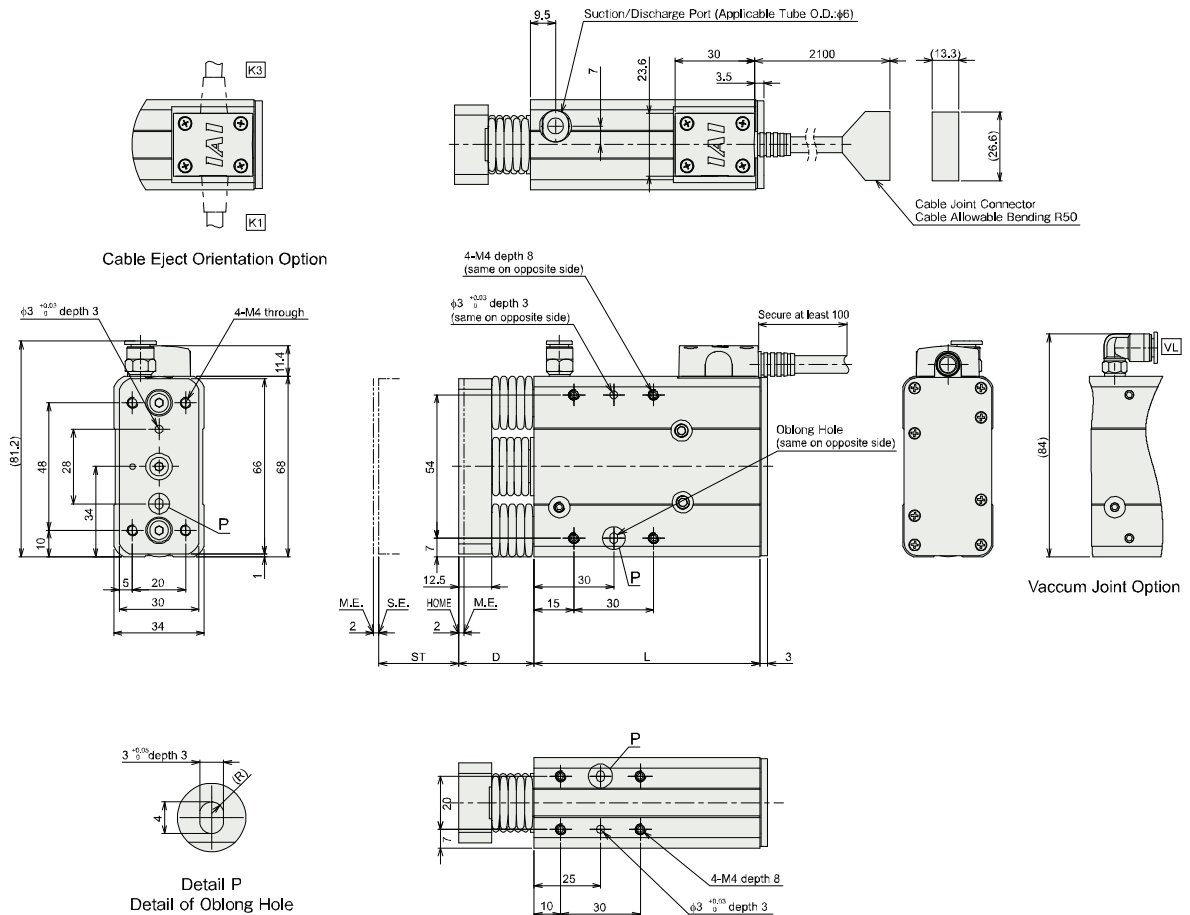
st	L	D	Without brake Mass [kg]
30	85	28.5	0.64
50	105	34.5	0.70

7.29 Double Guide Types (Dustproof and Splash proof Type) RCA2W-GD3NB (Ball Screw)



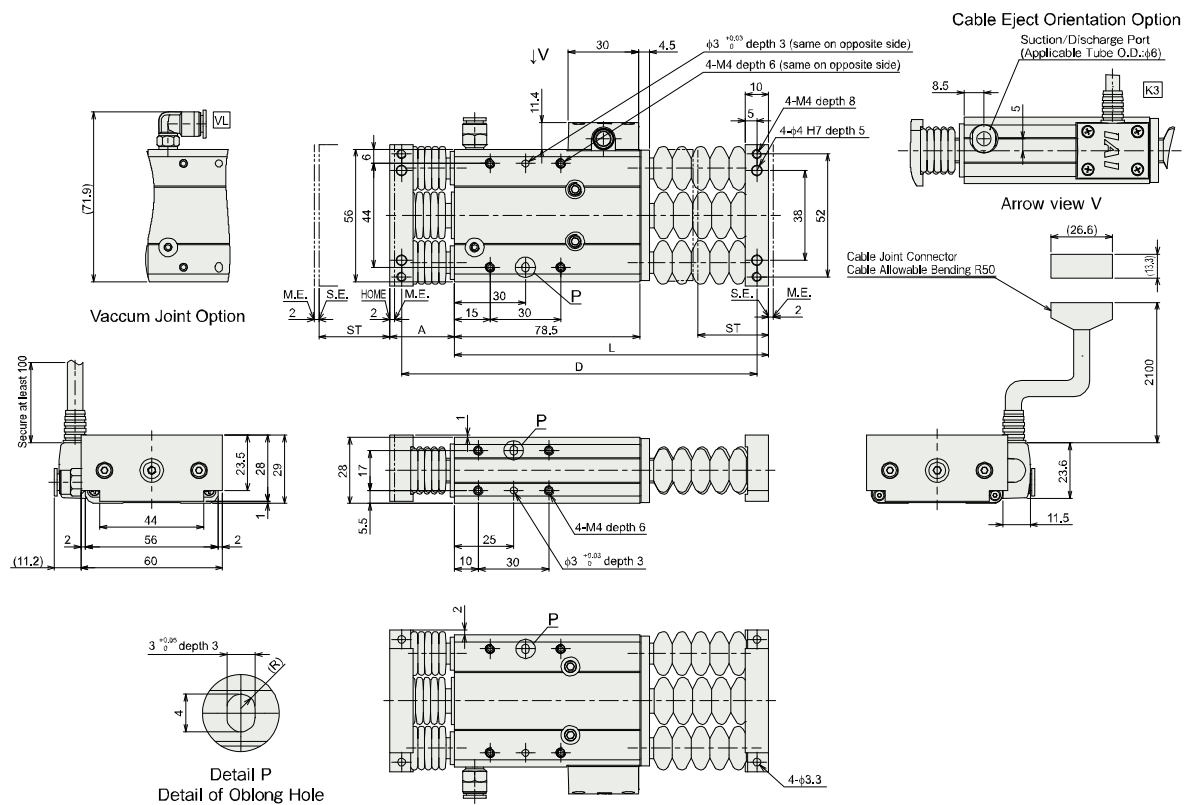
st	L	D	Without brake Mass [kg]
30	78.5	27.5	0.44
50	98.5	33.5	0.54

7.30 Double Guide Types (Dustproof and Splash proof Type) RCA2W-GD4NB (Ball Screw)



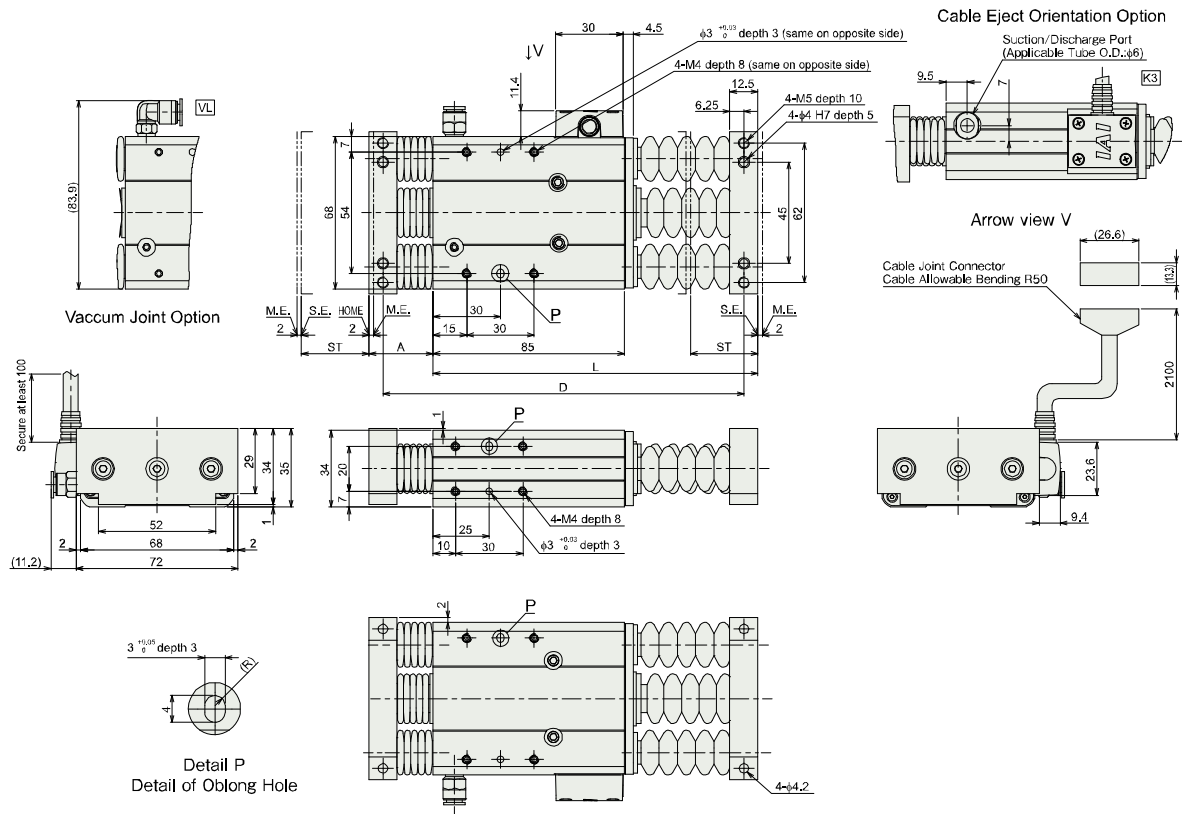
st	L	D	Without brake Mass [kg]
30	85	28.5	0.72
50	105	34.5	0.86

7.31 Slide Unit Types (Dustproof and Splash proof Type) RCA2W-SD3NB (Ball Screw)



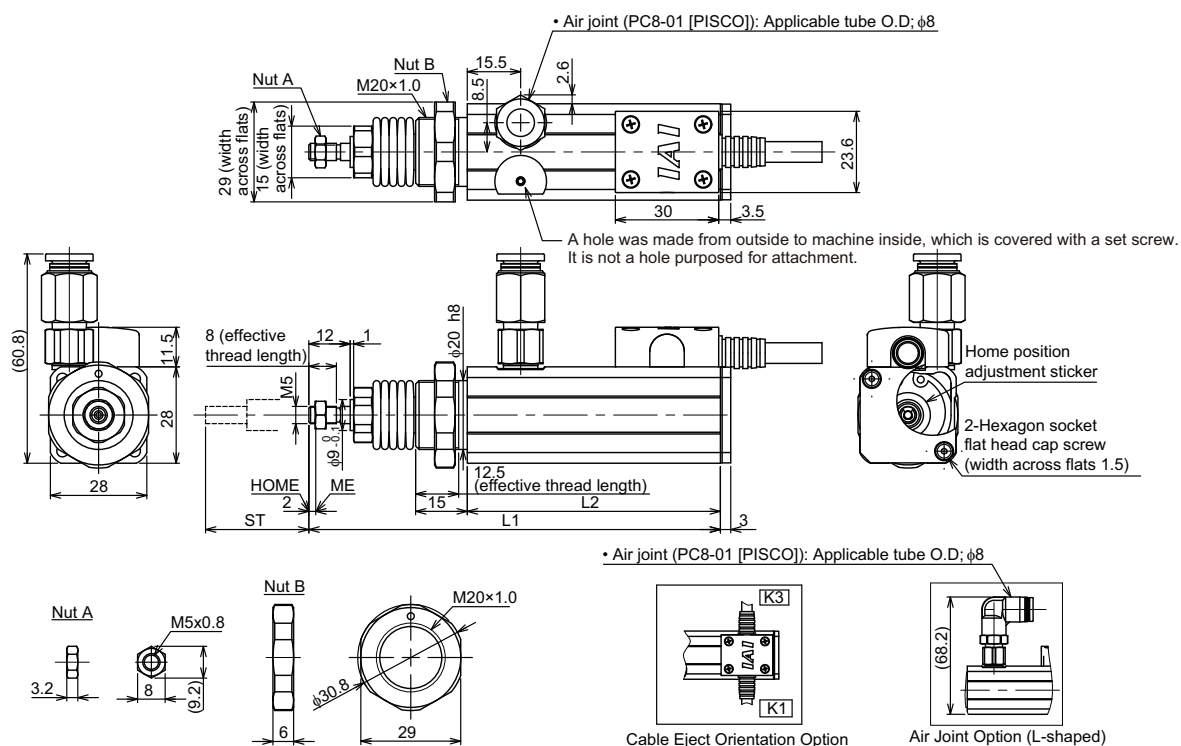
st	L	A	D	Without brake Mass [kg]
25	133	27.5	150.5	0.52
50	164	33.5	187.5	0.54

7.32 Slide Unit Types (Dustproof and Splash proof Type) RCA2W-SD4NB (Ball Screw)



st	L	A	D	Without brake Mass [kg]
25	144.5	28.5	160.5	0.86
50	175.5	34.5	197.5	0.88

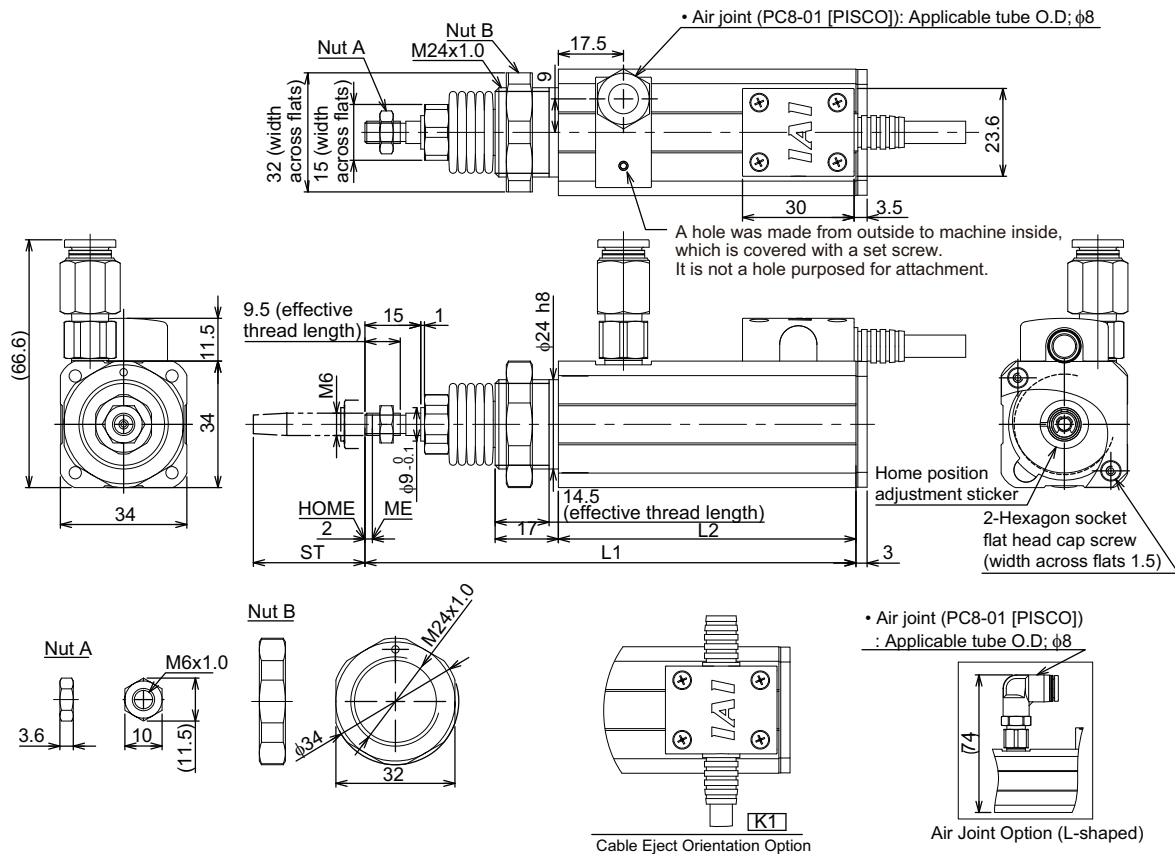
7.33 Short Types (Nut Affixing Types) (Cleanroom Type, Dustproof Type) RCA2CR, CA2W-RN3NA (Ball Screw)



ST	L1	L2	Without brake
			Mass [kg]
30	119.5	73.5	0.3
50	145.5	93.5	0.34

(Note) The length of dust-proof type actuator cable is 2m. Cleanroom Type RCA2CR is 300mm.

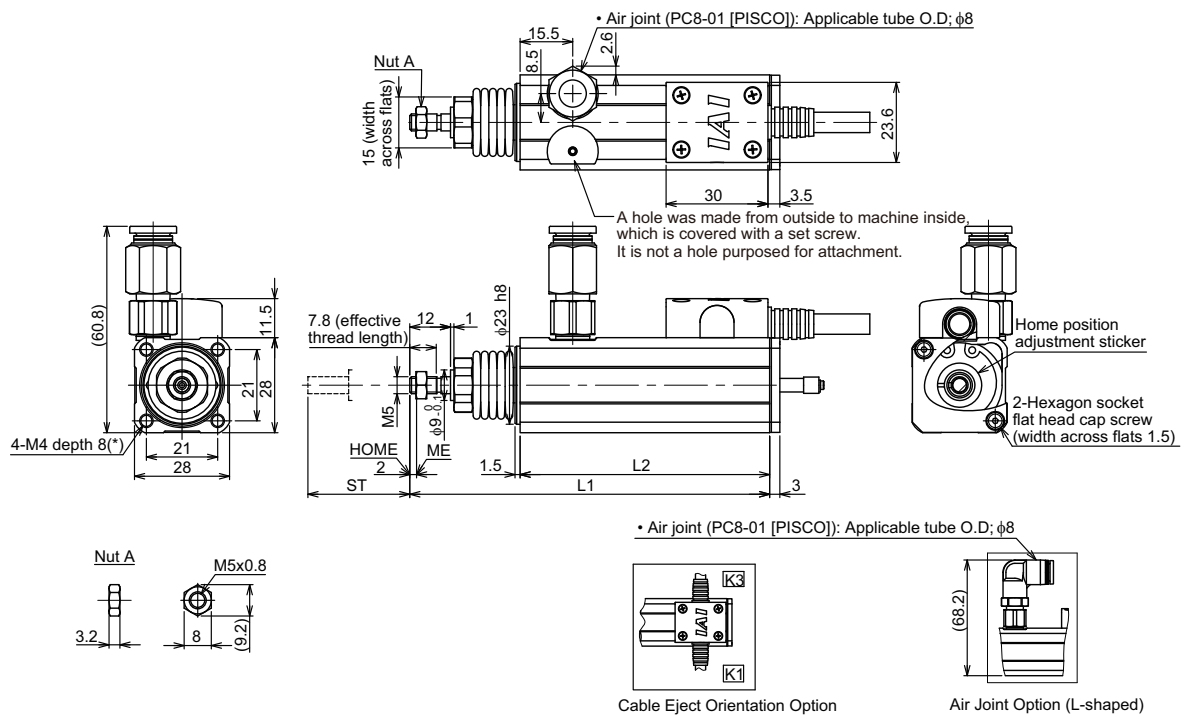
7.34 Short Types (Nut Affixing Types) (Cleanroom Type, Dustproof Type) RCA2CR, RCA2W-RN4NA (Ball Screw)



ST	L1	L2	Without brake
			Mass [kg]
30	132	80	0.44
50	158	100	0.50

(Note) The length of dust-proof type actuator cable is 2m. Cleanroom Type RCA2CR is 300mm.

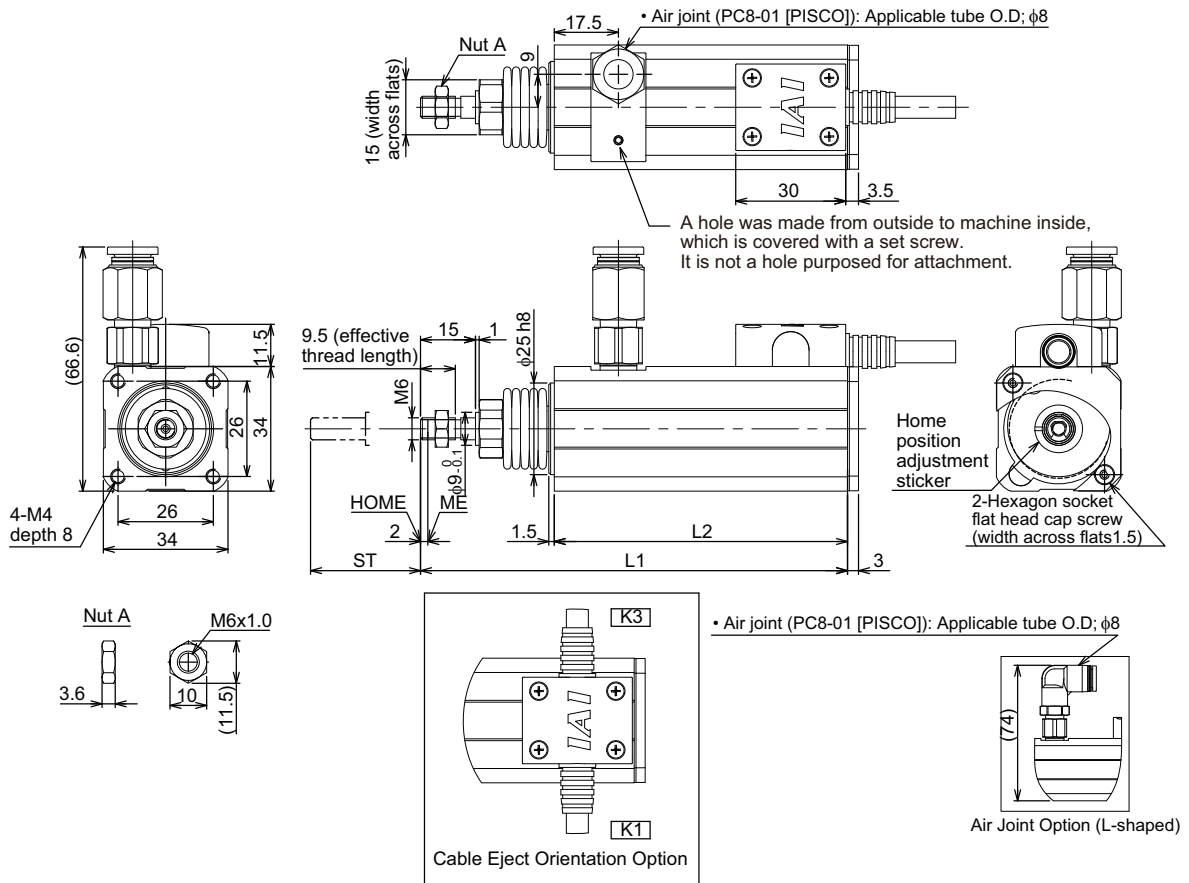
7.35 Short Types (Tapped-hole Mounting Types) (Cleanroom Type, Dustproof Type) RCA2CR, RCA2W-RP3NA (Ball Screw)



ST	L1	L2	Without brake
			Mass [kg]
30	106	73.5	0.25
50	132	93.5	0.29

(Note) The length of dust-proof type actuator cable is 2m. Cleanroom Type RCA2CR is 300mm.

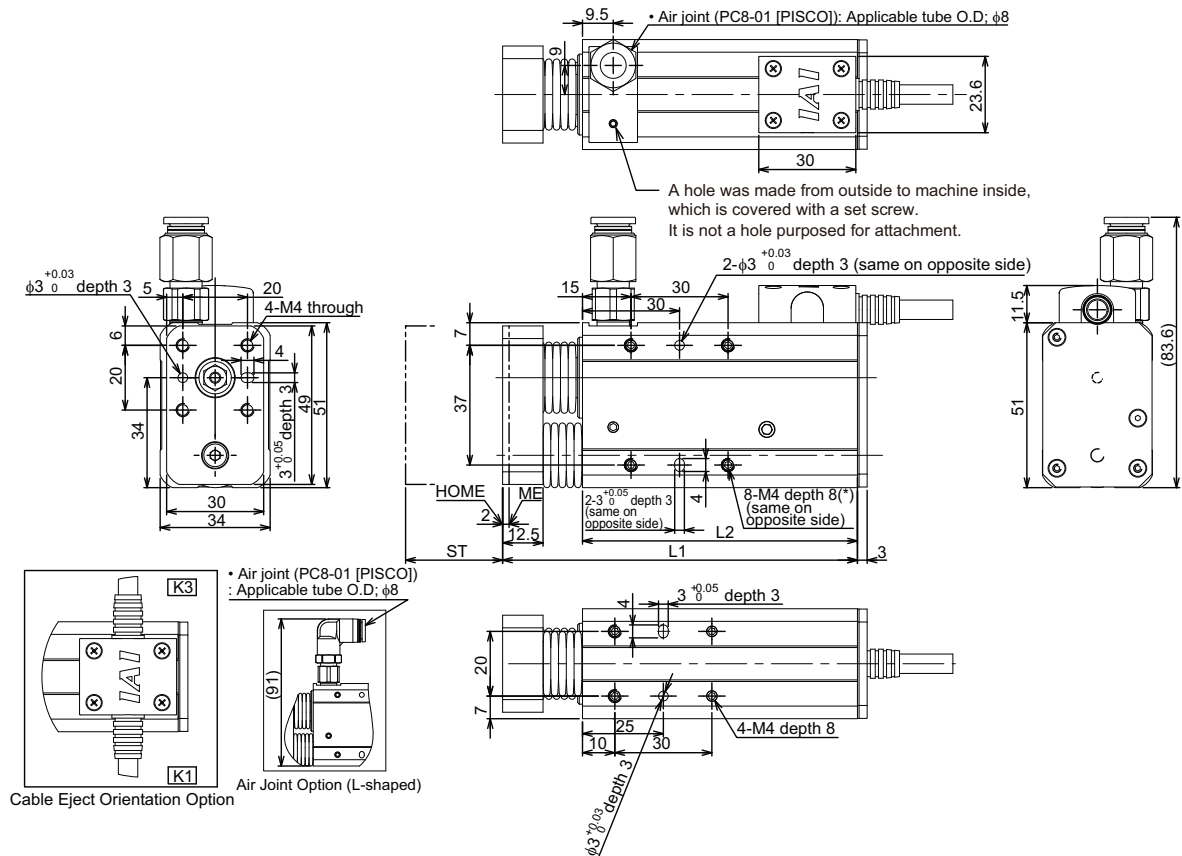
7.36 Short Types (Tapped-hole Mounting Types) (Cleanroom Type, Dustproof Type) RCA2CR, RCA2W-RP4NA (Ball Screw)



ST	L1	L2	Without brake
			Mass [kg]
30	116.5	80	0.36
50	142.5	100	0.42

(Note) The length of dust-proof type actuator cable is 2m. Cleanroom Type RCA2CR is 300mm.

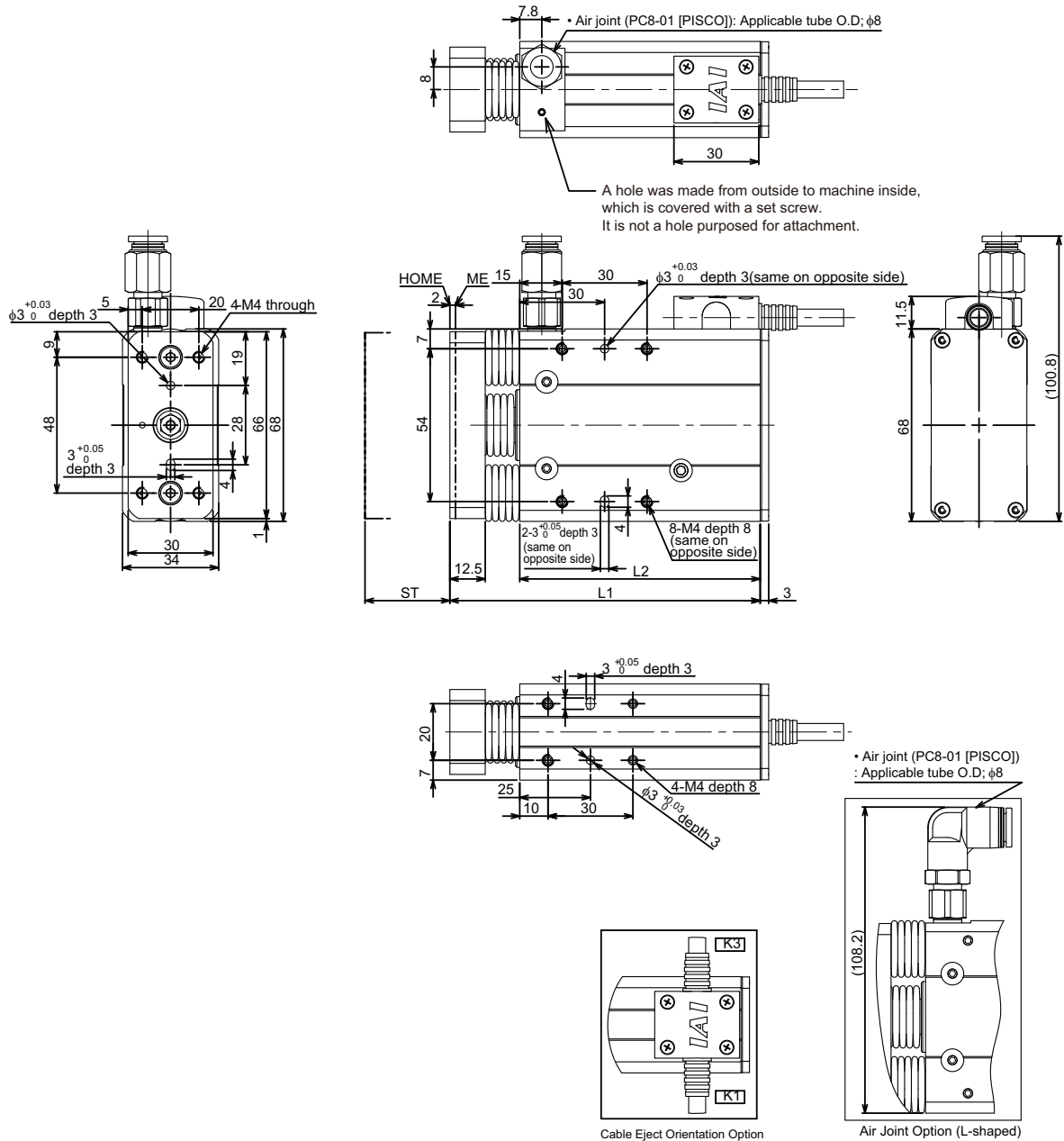
7.38 Single Guide Types (Cleanroom Type, Dustproof Type) RCA2CR, RCA2W-GS4NA (Ball Screw)



ST	L1	L2	Without brake
			Mass [kg]
30	109.7	85	0.64
50	135.7	105	0.70

(Note) The length of dust-proof type actuator cable is 2m. Cleanroom Type RCA2CR is 300mm.

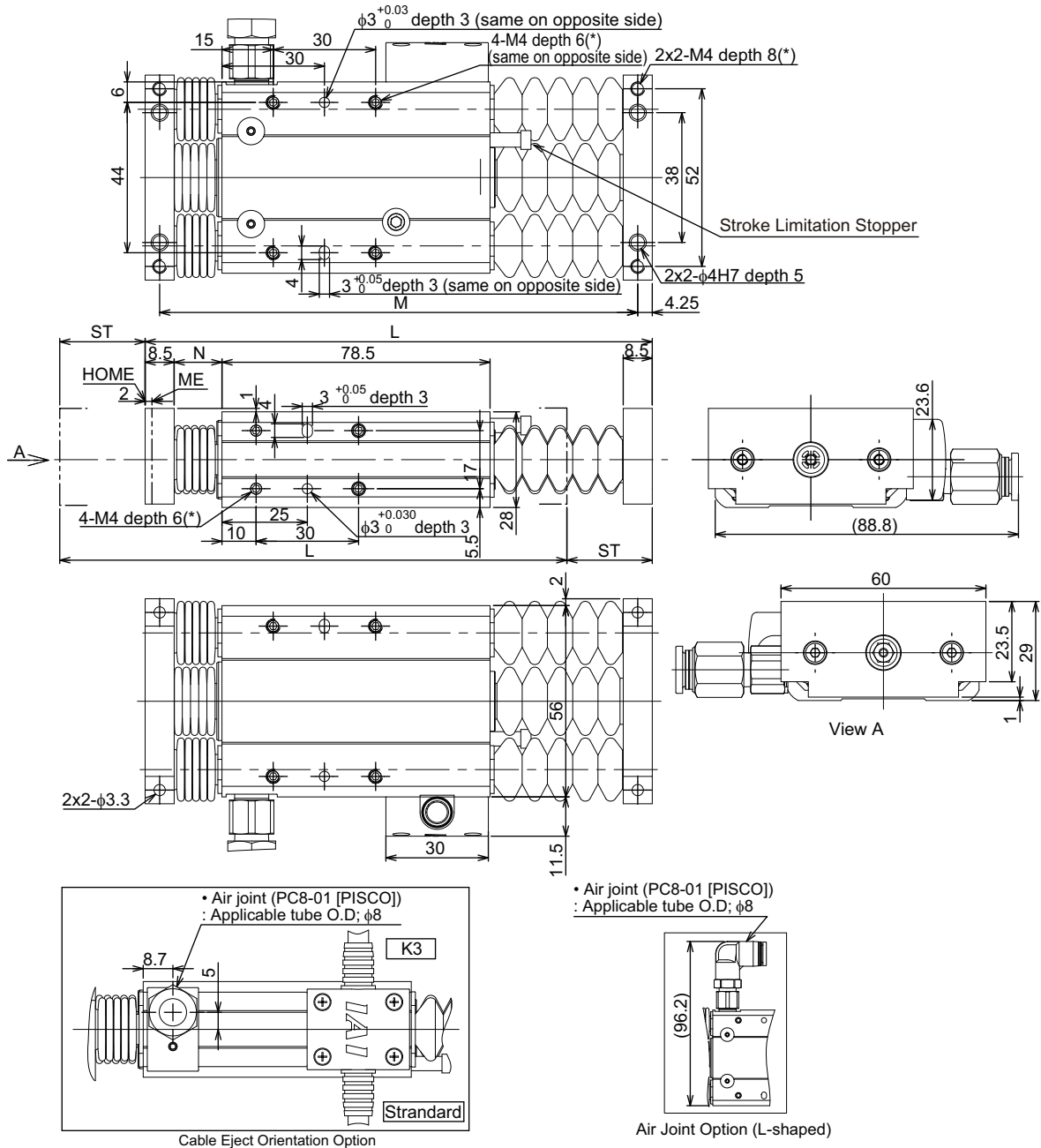
7.40 Double Guide Types (Cleanroom Type, Dustproof Type) RCA2CR, RCA2W-GD4NA (Ball Screw)



ST	L1	L2	Without brake
			Mass [kg]
30	109.7	85	0.72
50	135.7	105	0.86

(Note) The length of dust-proof type actuator cable is 2m. Cleanroom Type RCA2CR is 300mm.

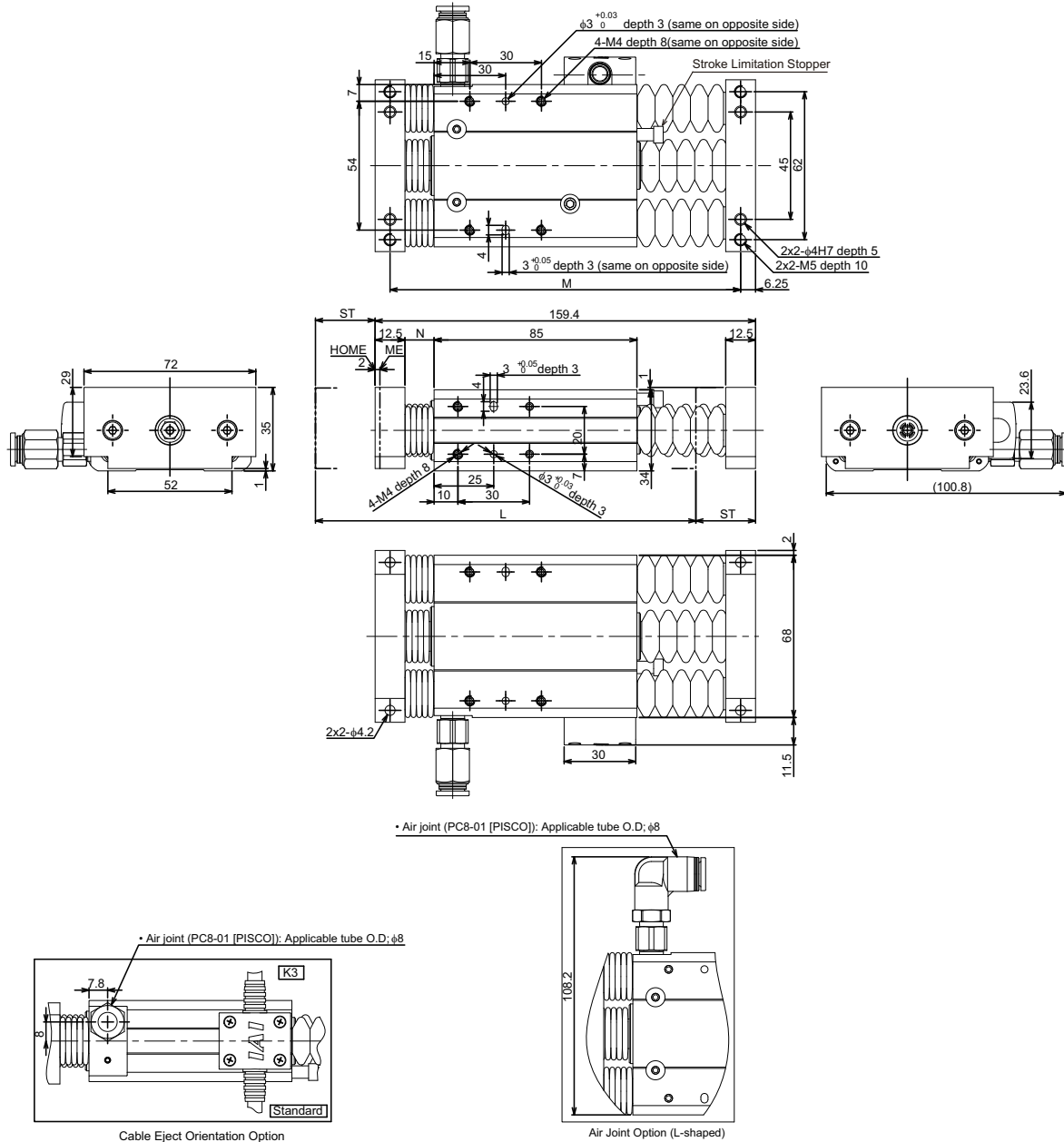
7.41 Slide Unit Types(Cleanroom Type, Dustproof Type) RCA2CR, RCA2W-SD3NA (Ball Screw)



ST	L	M	N	Without brake
				Mass [kg] Ball Screw
25	148.5	140	14	0.52
50	185.5	177	20	0.54

(Note) The length of dust-proof type actuator cable is 2m. Cleanroom Type RCA2CR is 300mm.

7.42 Slide Unit Types(Cleanroom Type, Dustproof Type) RCA2CR, RCA2W-SD4NA (Ball Screw)



ST	L	M	N	Without brake
				Mass [kg]
				Ball Screw
25	159.4	146.9	12.2	0.86
50	196.4	183.9	18.2	0.88

(Note) The length of dust-proof type actuator cable is 2m. Cleanroom Type RCA2CR is 300mm.

8. Warranty

8.1 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, RN3NB, RN3N (Ball screw),
 - RN4NA, RN4NB, RN4N (Ball screw)
 - RP3NA, RP3NB, RP3N (Ball screw),
 - RP4NA, RP4NB, RP4N (Ball screw)
 - GS3NA, GS3NB, GS3N (Ball screw),
 - GS4NA, GS4NB, GS4N (Ball screw)
 - GD3NA, GD3NB, GD3N (Ball screw),
 - GD4NA, GD4NB, GD4N (Ball screw)
 - SD3NA, SD3NB, SD3N (Ball screw),
 - SD4NA, SD4NB, SD4N (Ball screw)

8.2 Scope of the Warranty

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

- (1) The breakdown or problem in question pertains to our product as delivered by us or our authorized dealer.
- (2) The breakdown or problem in question occurred during the warranty period.
- (3) The breakdown or problem in question occurred while the product was in use for an appropriate purpose under the conditions and environment of use specified in the 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.

8.3 Honoring the Warranty

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

8.4 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.

8.5 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.

8.6 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

Revision Date	Description of Revision	
May 2013	Eleventh edition	Revised overall
July 2013	Twelfth edition	Equipped with brake type added
April 2014	Thirteenth edition	SA2AC and SA2AR of procedures for replacement of Motor added
October 2014	Fourteenth edition	Caution note added for when changing orientation of cable ejection of connector in P. 13
December 2014	Fifteenth edition	Contents corrected as RCA2-RA2AC and RA2AR are applicable for AMEC and ACON-CA in P. 22 and P. 75 to P. 76
January 2015	Sixteenth edition	Cleanroom type and Dust-proof type added
March 2015	16B edition	Correction made Pin number of controller side signal name W changed from 3 to 5 in P. 35
May 2015	Seventeenth edition	Note added to state that grease supply is to be conducted when replacing bellows for Cleanroom Type and Dust Proof Type in P. 94 Life of bellows added in P. 95, 120 Explanation added for hole near joint in P. 132 to 139 Projection deleted at the back of main body on P. 134 Note added to state that the projection between main body and rear slider is a stroke limitation stopper in P. 140, 141
June 2015	Eighteenth edition	Contents changed for how to move rod (Bracket) manually on P. 93
August 2015	18B edition	Change made to cable color in P. 36 Change made to bending radius in P. 87
October 2016	18C edition	Caution in Handling Note added stating "Do not attempt to apply any force except for the radial load to actuators equipped with the single guide."
December 2016	18D edition	Note added stating detent is necessary in P. 43, 58
February 2017	18E edition	Figures added showing directions unacceptable to receive load on single guide in P. 11
May 2017	18F edition	"Do not attempt to conduct air purging." added in P. 87
August 2017	Nineteenth edition	RCP2CR, RCP2W- RN3NB, RN4NB, RP3NB, RP4NB, GS3NB, GS4NB, GD3NB, GD4NB, SD3NB and SD4NB added.

Revision Date	Description of Revision	
May 2019	19B edition	Contents added for option CNS small connector
July 2019	19C edition	Grease changed from Daphne Eponex Grease No. 2 to Daphne Grease MP No. 2 in P.112, 119, 120 and 124
October 2020	19C edition	External Diagrams changed in P.137 to P.156 External Diagrams added in P.157 to P.166



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