



# **ROBO Cylinder RCA2 Actuator Slider Type Operating Manual**

**Eleventh Edition**

Motor coupling types	SA2AC · SA3C · SA4C · SA5C · SA6C
Motor reversing types	SA2AR · SA3R · SA4R · SA5R · SA6R

***IAI America, Inc.***



## **Please Read Before Use**

Thank you for purchasing our product.

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

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

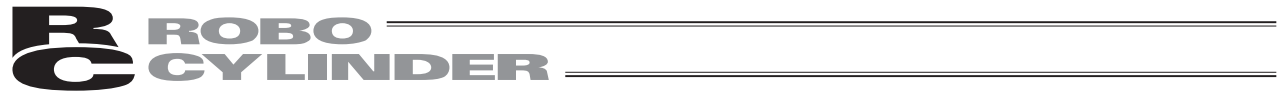
The CD or DVD that comes with the product contains operation manuals for IAI products.

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

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

### **[Important]**

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



## **CE Marking**

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

## Table of Contents

Safety Guide.....	1
Handling Precautions .....	8
1. Part Names .....	11
2. External Dimensions .....	13
2.1 RCA2-SA2AC.....	13
2.2 RCA2-SA3C.....	14
2.3 RCA2-SA3C- with Side Cover .....	15
2.4 RCA2-SA4C.....	16
2.5 RCA2-SA4C- with Side Cover .....	17
2.6 RCA2-SA5C.....	18
2.7 RCA2-SA5C- with Side Cover .....	19
2.8 RCA2-SA6C.....	20
2.9 RCA2-SA6C- with Side Cover .....	21
2.10 RCA2-SA2AR.....	22
2.11 RCA2-SA3R, Reversing to Left (Right) .....	23
2.12 RCA2-SA3R- with Side Cover, Reversing to Left (Right).....	24
2.13 RCA2-SA4R, Reversing to Left (Right) .....	25
2.14 RCA2-SA4R- with Side Cover, Reversing to Left (Right).....	26
2.15 RCA2-SA5R, Reversing to Left (Right) .....	27
2.16 RCA2-SA5R- with Side Cover, Reversing to Left (Right).....	28
2.17 RCA2-SA6R, Reversing to Left (Right) .....	29
2.18 RCA2-SA6R- with Side Cover, Reversing to Left (Right) .....	30
3. Cable Drawings .....	31
3.1 AMEC, ASEP Controller Cables.....	31
3.2 ACON, ASEL Controller Cables .....	32
4. Options .....	33
4.1 Brake Type .....	33
4.2 Power-saving Measure .....	33
4.3 No-cover Specification.....	33
4.4 Reversed-home Specification.....	33
4.5 Changing the Cable Exit Direction .....	34
4.6 Motor Reversing to Left, Motor Reversing to Right .....	34
5. Checking after Unpacking .....	35
5.1 Included Items .....	35
5.2 Operation Manuals Relating to This Product.....	35
5.3 How to Read Model Nameplate .....	36
5.4 How to Read Model Number .....	36
6. Specifications .....	37
7. Notes on Use Regarding Maximum Speed and Loading Mass.....	41

8.	Installation and Storage/Preservation .....	43
8.1	Installation Environment .....	43
8.2	Storage/preservation Environment.....	43
9.	Installation .....	44
9.1	General Rules on Installation .....	44
9.2	Installation of Actuator .....	45
9.2.1	Installation of RCA2-SA2AC and SA2AR .....	45
9.2.2	Installation of RCA2-SA3C, SA4C, SA5C, SA6C, SA3R, SA4R, SA5R and SA6R....	46
9.3	Mounting Surface .....	48
9.4	Installation of the Load .....	49
10.	Connecting with Controller .....	50
11.	Notes on Operation .....	54
11.1	Placing a Load on the Actuator .....	54
11.1.1	Allowable moment .....	54
11.1.2	External force in axial direction.....	57
11.2	Adjusting the Home Position .....	58
11.3	Changing the Home Position Direction .....	58
11.4	Stainless Sheet Section.....	59
12.	Life.....	60
13.	Maintenance Inspection .....	61
13.1	Inspection Items and Schedule .....	61
13.2	External Visual Inspection .....	61
13.3	Cleaning.....	62
13.4	Adjusting the Stainless Sheet.....	62
13.5	Internal Inspections .....	63
13.6	Internal Cleaning .....	64
13.7	Greasing Guides.....	64
13.7.1	Applicable greases for guide .....	64
13.7.2	Applicable greases for ball screw .....	64
13.7.3	How to apply grease .....	65
13.8	Belt.....	67
13.8.1	Inspection of belt.....	67
13.8.2	Applicable belt.....	67
13.8.3	Adjustment of belt tension .....	67
13.9	Stainless Sheet Replacement (for models with slider cover) .....	68
13.10	Replacement of Motor (AC Servo Motor: RCA2) .....	70
13.11	Replacement of Belt and Motor for Reversing Type (AC Servo Motor: RCA2) .....	74

14. Warranty.....	78
14.1 Warranty Period.....	78
14.2 Scope of Warranty.....	78
14.3 Honoring the Warranty.....	78
14.4 Limited Liability.....	78
14.5 Conditions of Conformance with Applicable Standards/Regulations, Etc., and Applications ....	79
14.6 Other Items Excluded from Warranty.....	79
Appendix Using the home position marks .....	80
Change History.....	81





## Safety Guide

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

### Safety Precautions for Our Products

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

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

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

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





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

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

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

## Alert Indication

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

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

## Handling Precautions

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

Do not set a speed or acceleration/deceleration exceeding the applicable rating. Doing so may result in vibration, failure or shorter life. If an acceleration/deceleration exceeding the rating is set, creep may occur or the coupling may slip.

2. Keep the load moments to within the allowable value.

Keep the load moments to within the allowable value. If a load exceeding the allowable load moment is applied, the life of the actuator may be reduced. In an extreme case, even flaking may occur.

3. Keep the overhang length to within the allowable value.

Keep the overhang length of the load to within the allowable value. If the overhang length exceeds the allowable value, vibration or noise may occur.

4. 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 30 mm or less. As a guide, perform a back-and-forth operation five times or over a distance of 50 mm or more after a back-and-forth operation over such short distance has been repeated 5,000 to 10,000 times. This will restore oil film.

5. Turn on the servo after confirming that the slider or rod is away from the mechanical end.

If the servo is turned on when the slider or rod is near the mechanical end, pole phase detection may not be performed correctly and an pole non-confirmation error or excitation detection error may occur. Move the slider or rod away from the mechanical end before turning on the servo.

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

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



## 7. Transportation

### 7.1 Handling the Unassembled Actuator

When transporting the unassembled actuator alone, pay attention to the items specified below.

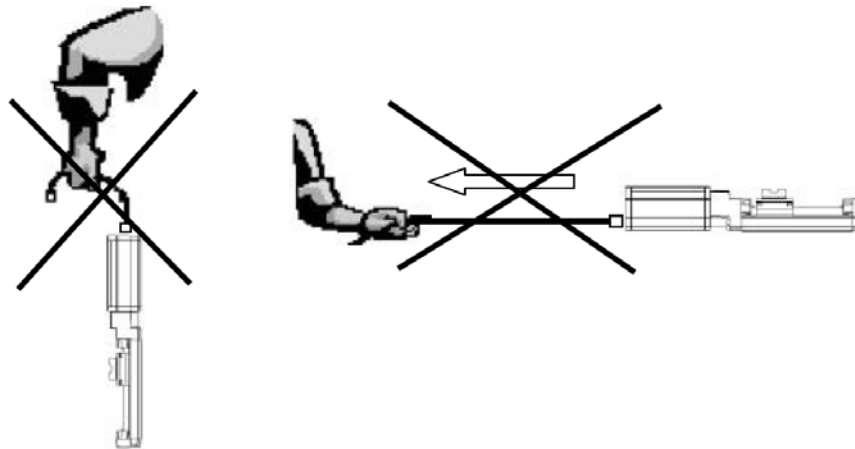
#### 7.1.1 Handling the Packed Unit

Unless otherwise specified, single-axis actuators are shipped in individual packaging. Please handle packages carefully during transport to ensure that product is not damaged by bumping or dropping.

- Never attempt to move heavy packages by yourself.
- Always set packages down on a level surface.
- Never climb on top of packages.
- Never place heavy objects or objects where the load is concentrated in one place on top of packages, as this may cause deformation.

#### 7.1.2 Handling the Actuator After Unpacking

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



When transporting the unassembled actuator, pay attention to the items specified below.

When unpacking the actuator and handling it thereafter, always hold it by the base.

Never hold an actuator by the stainless sheet.

- Be careful not to bump the actuator into anything when moving it, paying particular care to the side covers.
- Do not attempt to force any part of the actuator. Take particular care not to force the stainless sheet.



Warning: Never hold the actuator by the stainless sheet.

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



## 7.2 Handling the Actuator Assembly

When transporting the actuator with its axes already assembled, take note of the following items.

### 7.2.1 Shipping from IAI Already Assembled

After assembly at IAI, your machine undergoes a shipping inspection, is packed in a crate with skids, and finally shipped.

If any of the combined actuators is a slider, the slider is securely fastened in place to prevent unexpected movement during shipping. Combined units have the ends of their actuators fastened so as to prevent them from moving significantly due to external vibration.

- The crate is not designed to withstand dropping or collision. Please handle it carefully. It is also not built to have items stacked on it, so please avoid placing heavy objects on top of the crate.
- When lifting the package using belts or the like, be sure to pass the belts around the reinforcement frames under the skids. The same applies for lifting the package with a forklift; please ensure that the forks are placed under the skids.
- When setting the package down, do not let the package receive an impact upon contacting the floor.

### 7.2.2 Handling After Unpacking

Please adhere to the following instructions when handling the assembled unit, whether it was shipped pre-assembled at IAI or assembled on your site.

- Secure the slider so that it does not move unexpectedly during transport.
- If the end of the actuator is protruding, fasten it down properly so that it does not move significantly due to external vibration. When transporting the assembly without the ends of the actuators fastened, do not subject the assembly to an impact of 0.3 G or more.
- When using belts or the like to lift an assembly consisting of an actuator and peripheral equipment, make sure the belts are not passed around the actuator itself or otherwise do not touch the actuator.
- Make sure the belts support the actuator load by its base by using appropriate cushioning materials.
- Lift the end of the Y-axis with a separate belt, ensuring that the assembly remains level. At this time, also make sure the load is not placed on the screw cover.
- Make sure the load is not placed on the brackets, covers, or connector box.  
Also make sure the cables are not pinched or deformed excessively.

## 7.3 Handling after Assembly with Peripheral Equipment

When the machine assembled at IAI is transported as an assembly, also follow the handling precautions in 5.2.2, "Handling after Unpacking."

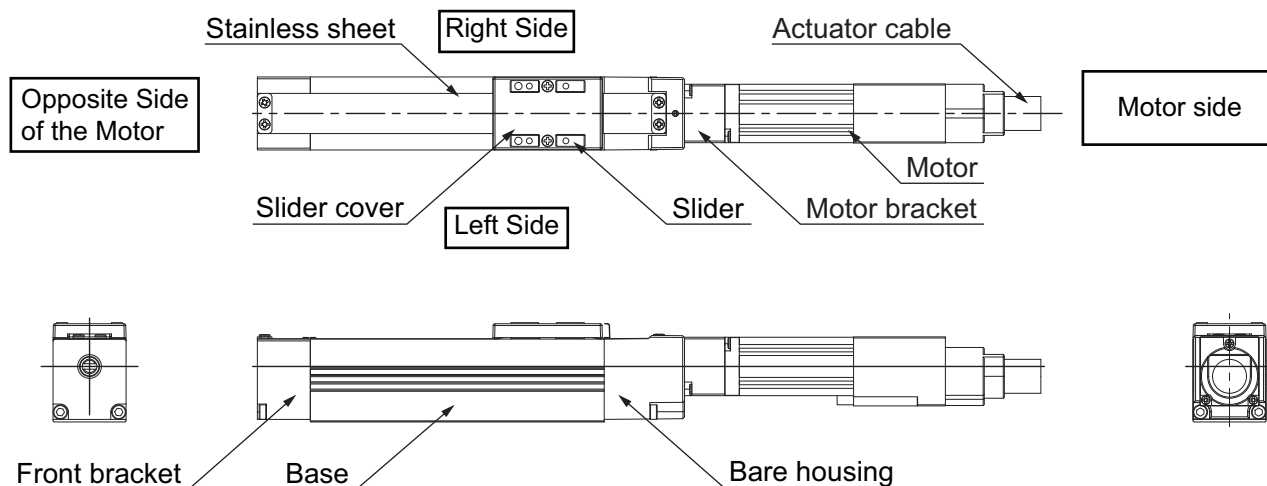
## 1. Part Names

The names of the actuator parts are indicated below.

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

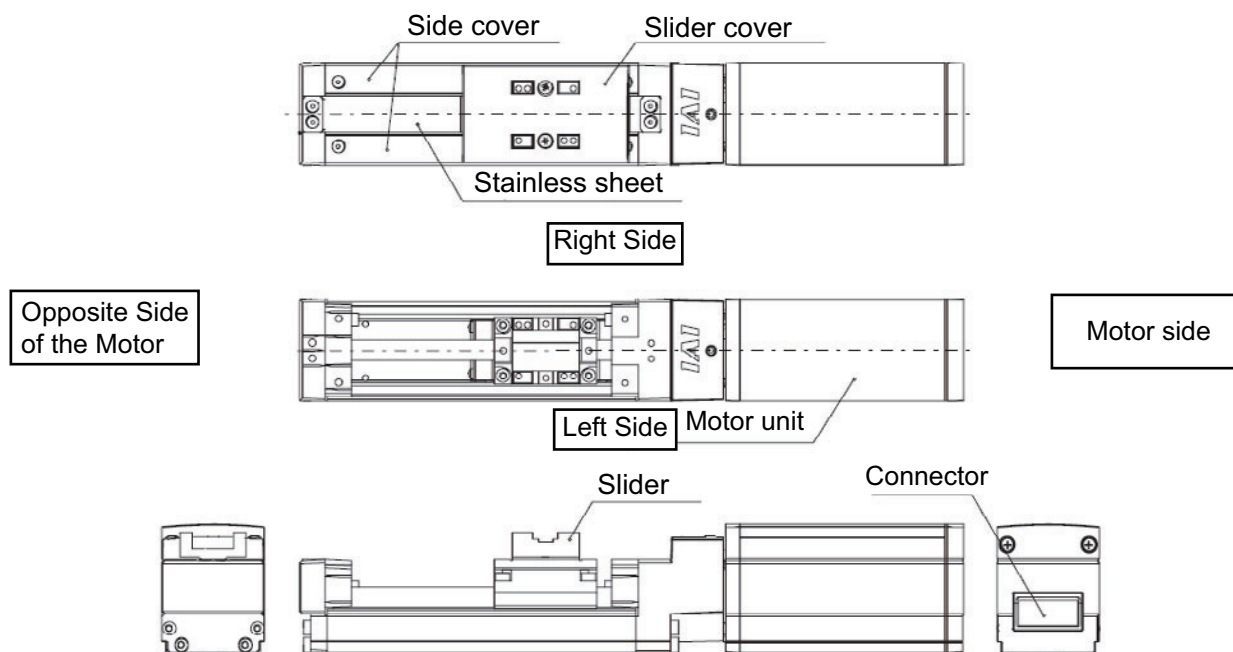
Also, the front side means the side opposite from the motor.

### ● “Motor coupling types” : RCA2-SA2AC



\* Refer to 2, “External Dimensions” for details.

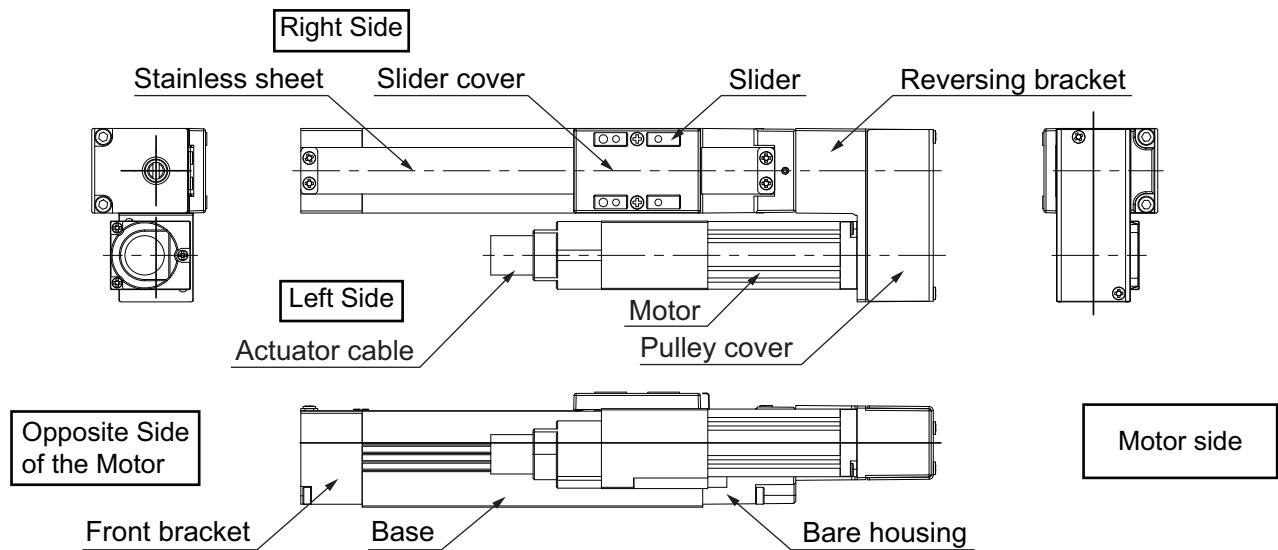
### ● “Motor coupling types” : RCA2-SA3C/SA4C/SA5C/SA6C



\* Refer to 2, “External Dimensions” for details.

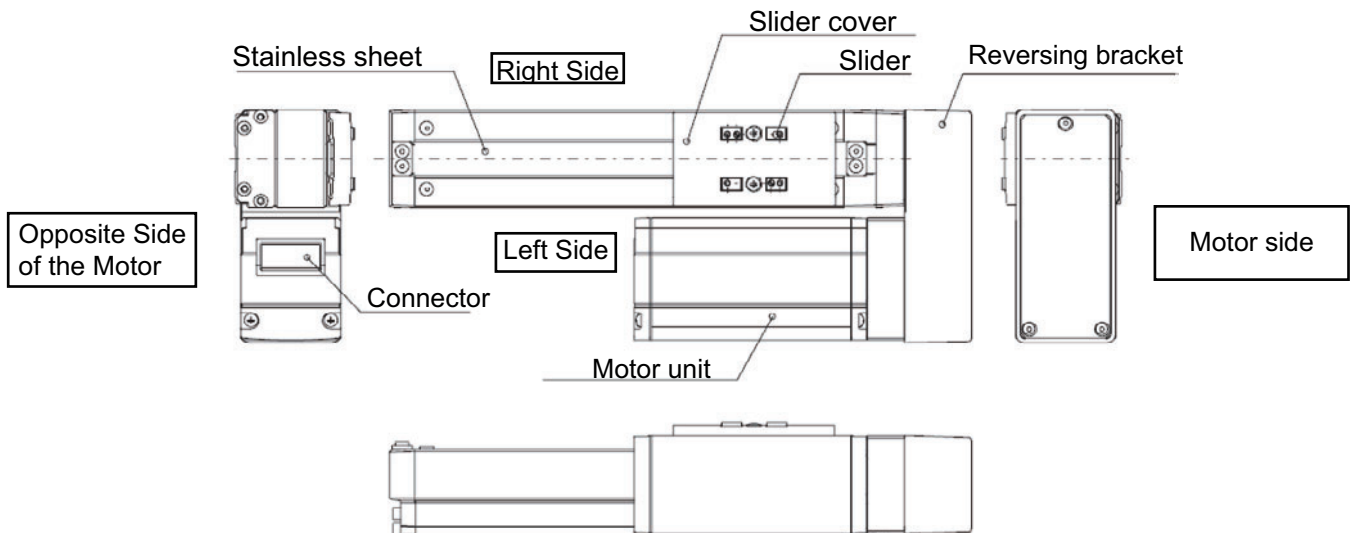
\* The connector position shown above assumes that the cable exit direction has not been changed.

- “Motor reversing types” : RCA2-SA2AR



\* Refer to 2, “External Dimensions” for details.

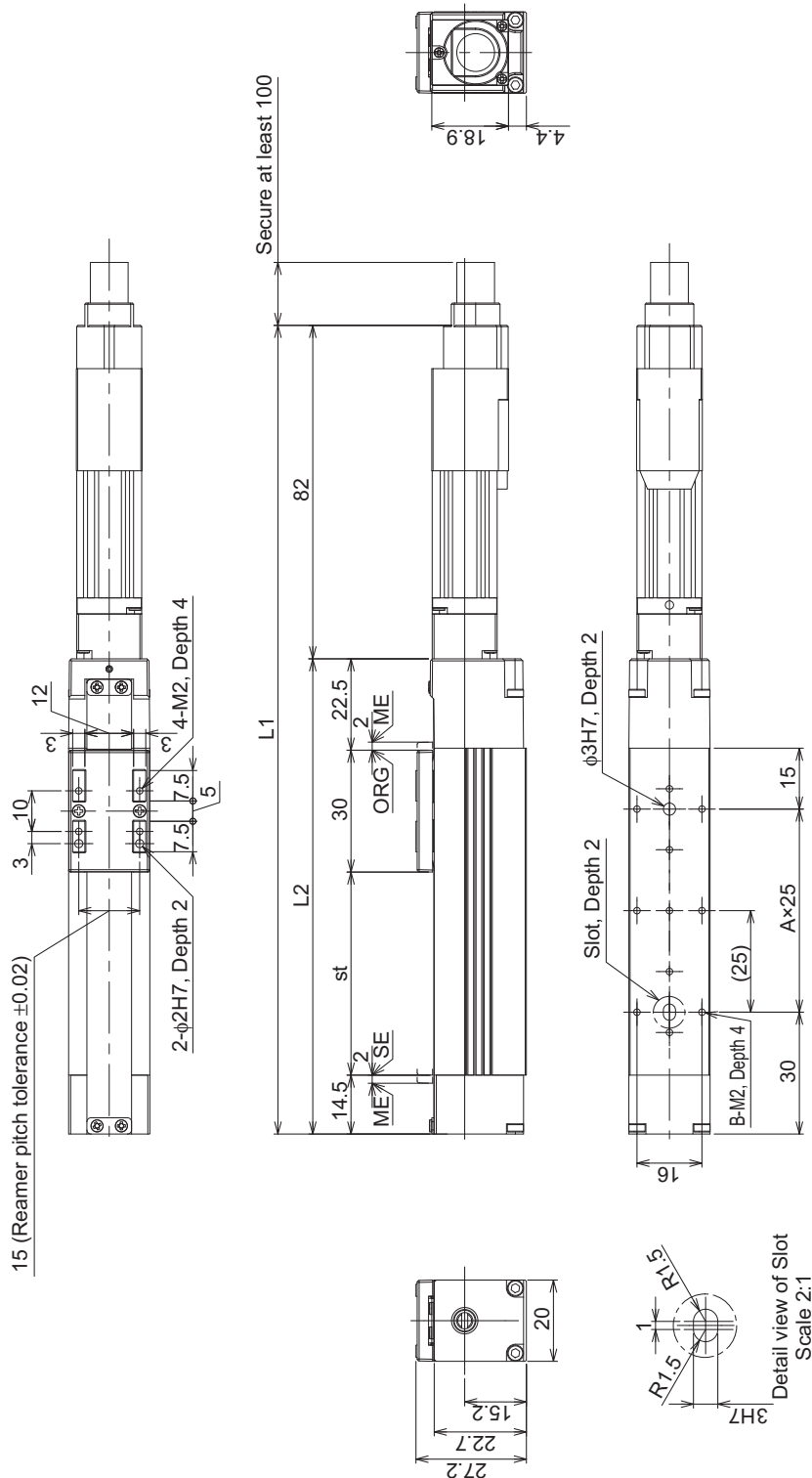
- “Motor reversing types” : RCA2-SA3R/SA4R/SA5R/SA6R



\* Refer to 2, “External Dimensions” for details.

## 2. External Dimensions

### 2.1 RCA2-SA2AC

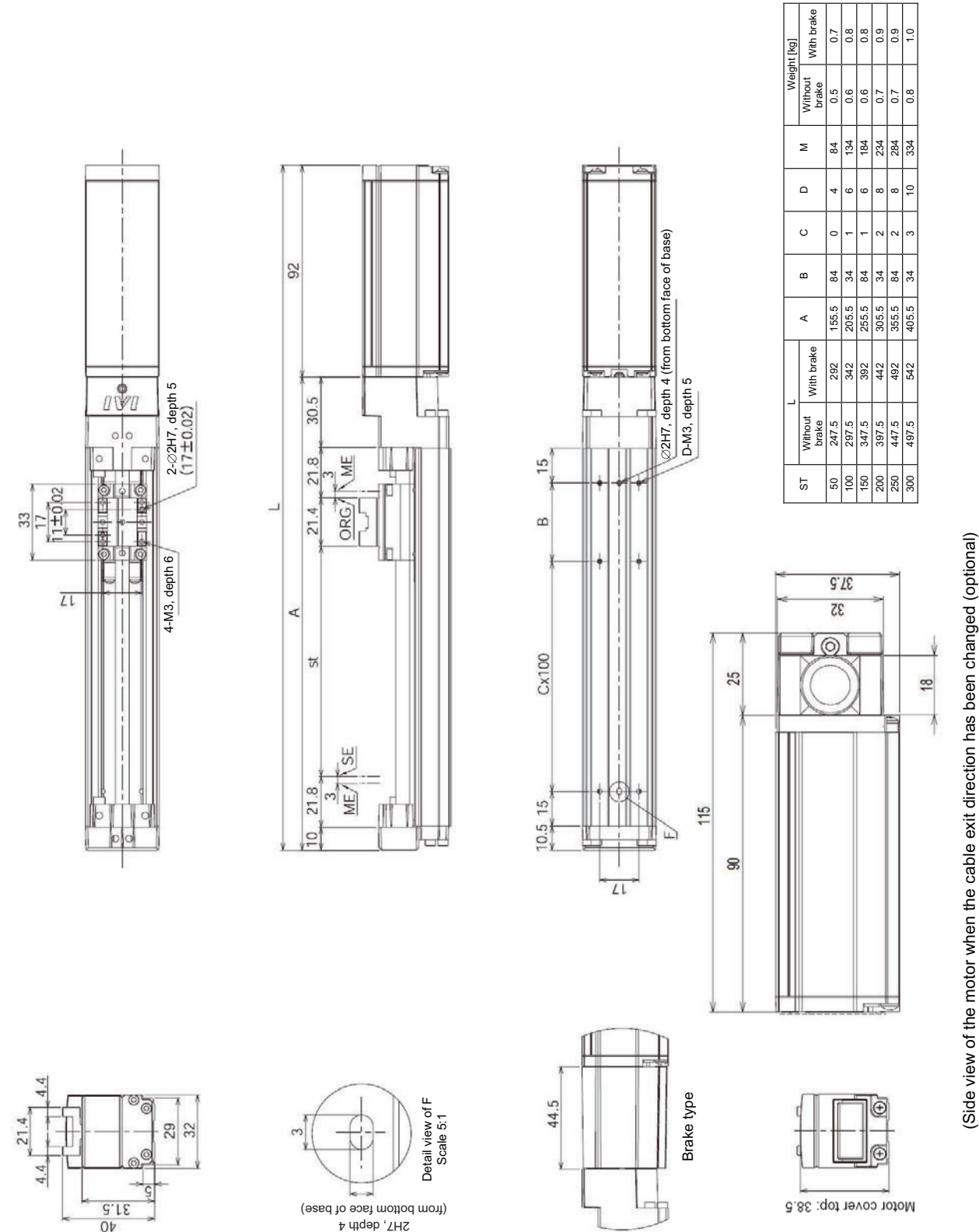


ST	L1	L2	A	B	Weight [kg]
25	174	92	1	4	0.2
50	199	117	2	6	0.22
75	224	142	3	8	0.23
100	249	167	4	10	0.25

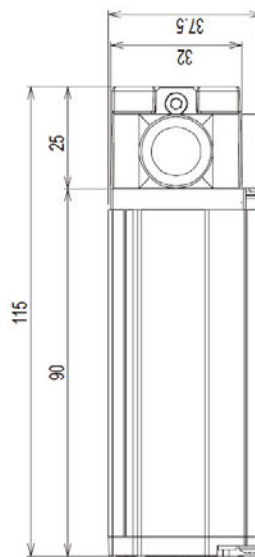
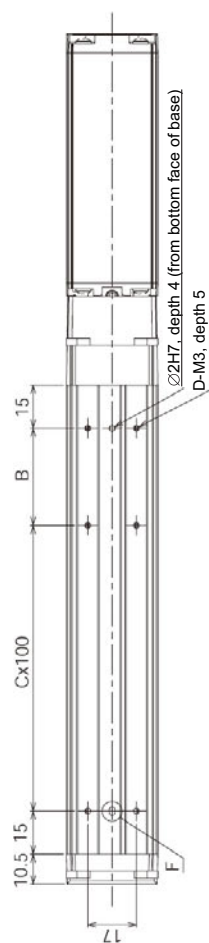
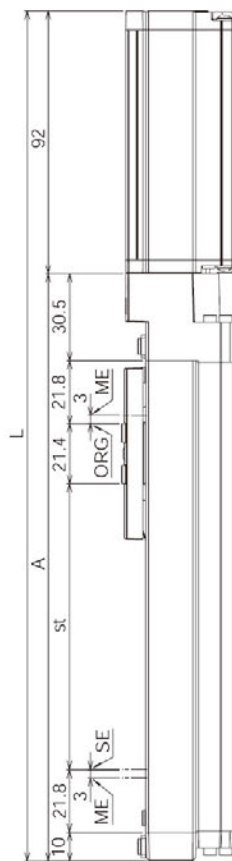
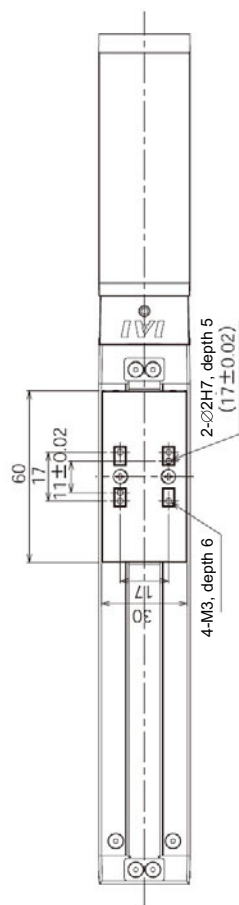
2.2

RCA2-SA3C

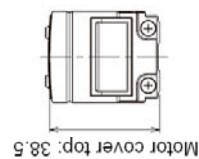
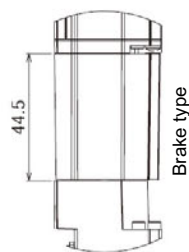
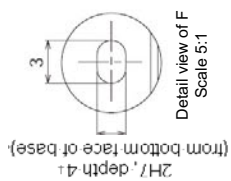
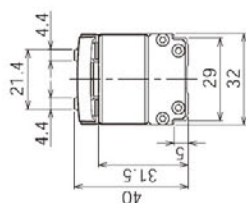
2. External Dimensions



## 2.3 RCA2-SA3C- with Side Cover

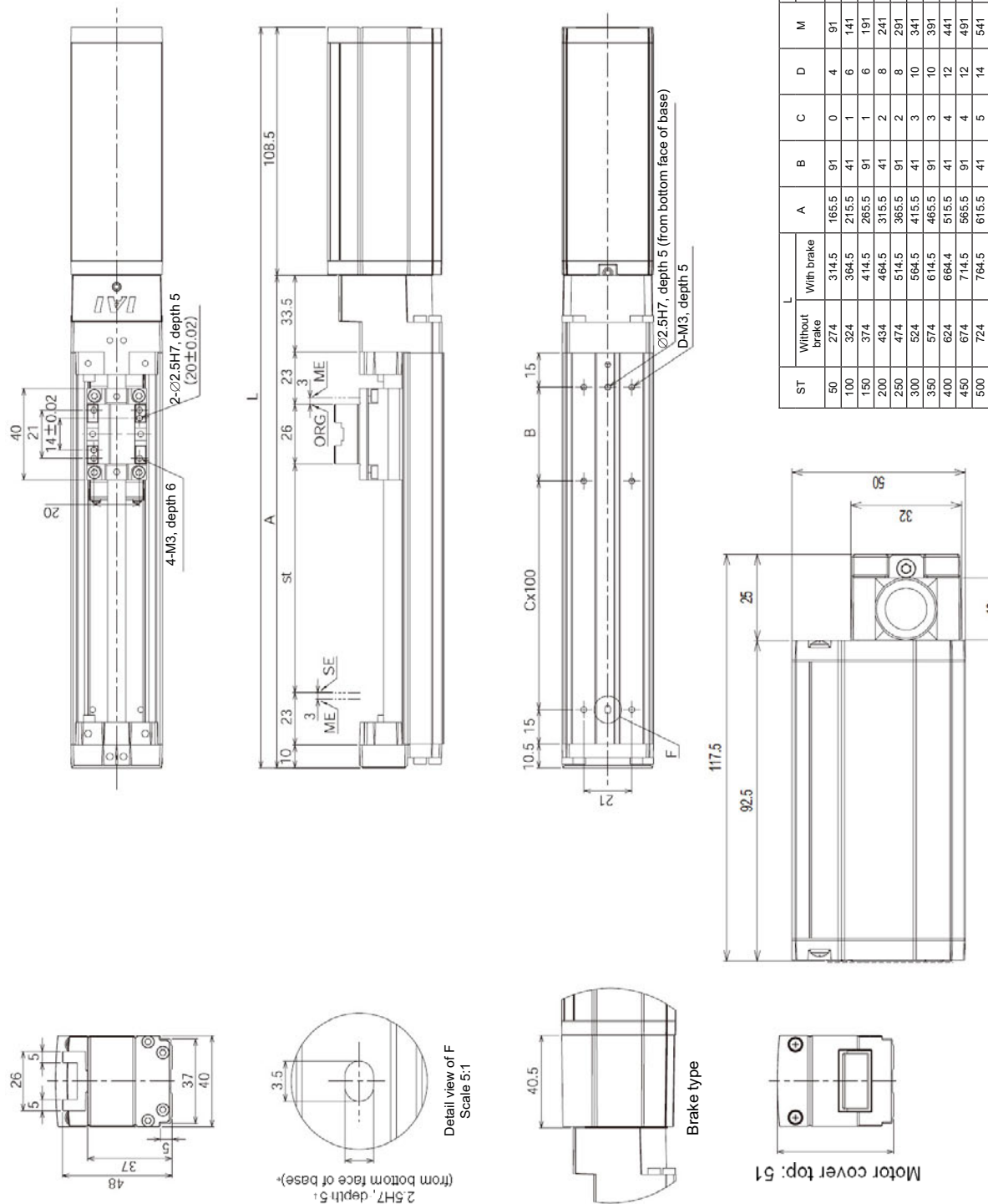


ST	L		A	B	C	D	M	Weight [kg]	
	Without brake	With brake						Without brake	With brake
50	247.5	292	155.5	84	0	4	84	0.6	0.8
100	297.5	342	205.5	34	1	6	134	0.6	0.8
150	347.5	392	255.5	84	1	6	184	0.7	0.9
200	397.5	442	305.5	34	2	8	234	0.8	1.0
250	447.5	492	355.5	84	2	8	284	0.8	1.0
300	497.5	542	405.5	34	3	10	334	0.9	1.1



(Side view of the motor when the cable exit direction has been changed (optional))

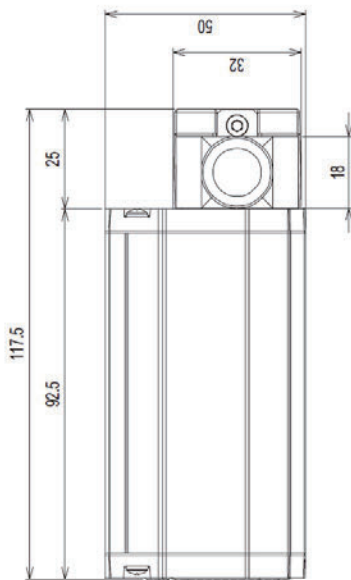
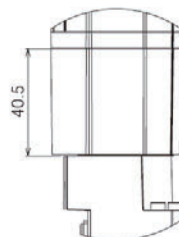
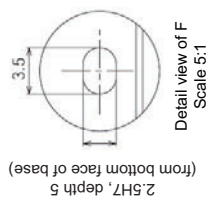
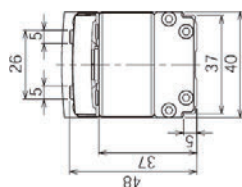
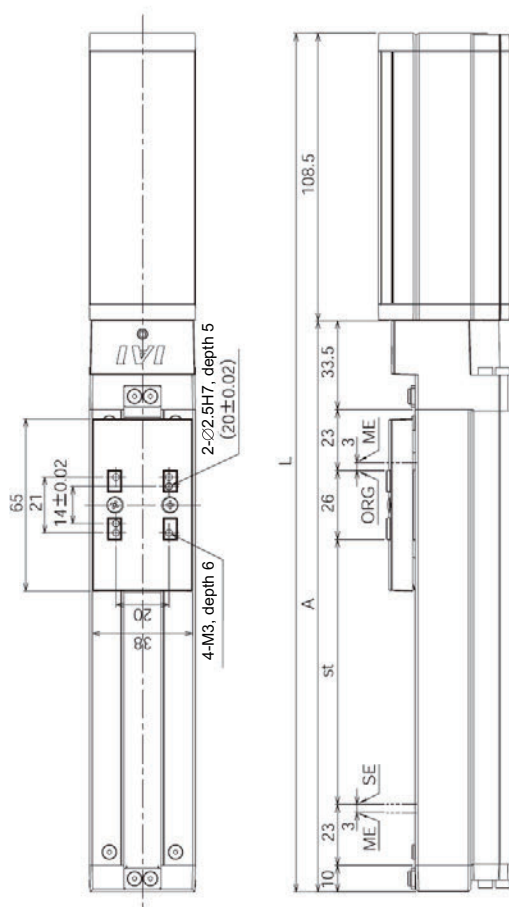
## 2.4 RCA2-SA4C



(Side view of the motor when the cable exit direction has been changed (optional))



## 2.5 RCA2-SA4C- with Side Cover

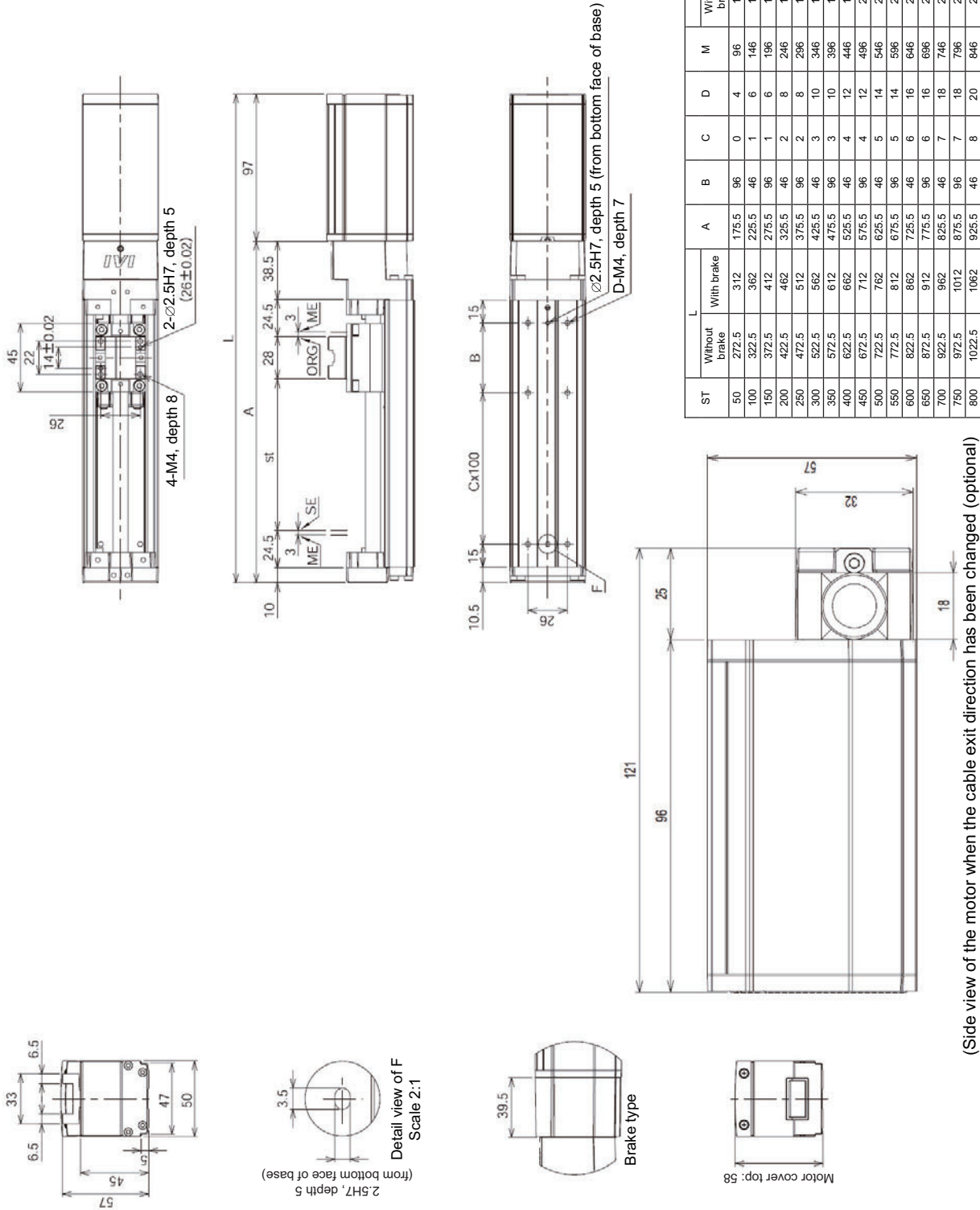


ST	L		A	B	C	D	M	Weight [kg]	
	Without brake	With brake						Without brake	With brake
50	274	314.5	165.5	91	0	4	91	0.9	1.2
100	324	364.5	215.5	41	1	6	141	1	1.3
150	374	414.5	265.5	91	1	6	191	1.1	1.4
200	424	464.5	315.5	41	2	8	241	1.1	1.4
250	474	514.5	365.5	91	2	8	291	1.2	1.5
300	524	564.5	415.5	41	3	10	341	1.3	1.6
350	574	614.5	465.5	91	3	10	391	1.4	1.7
400	624	664.4	515.5	41	4	12	441	1.5	1.8
450	674	714.5	565.5	91	4	12	491	1.5	1.8
500	724	764.5	615.5	41	5	14	541	1.6	1.9

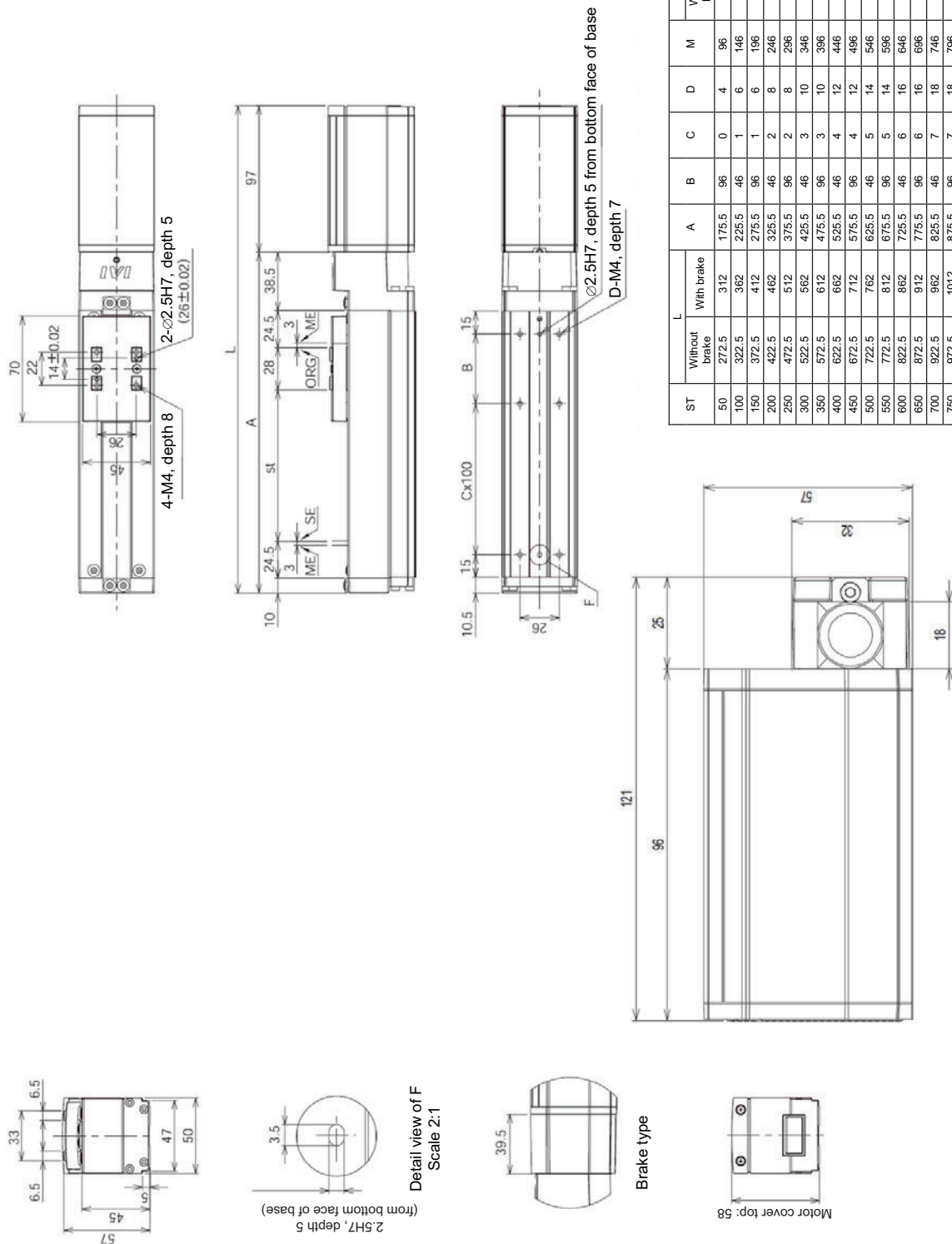
(Side view of the motor when the cable exit direction has been changed (optional))

## 2.6 RCA2-SA5C

### 2. External Dimensions

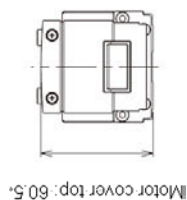


## 2.7 RCA2-SA5C- with Side Cover



(Side view of the motor when the cable exit direction has been changed (optional))

## 2. External Dimensions



(Side view of the motor when the cable exit direction has been changed (optional))

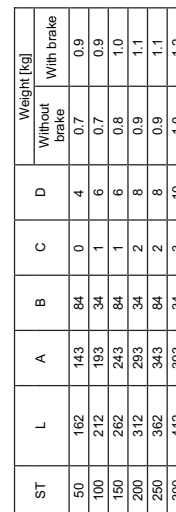
ST	L		A	B	C	D	M	Weight [kg]	
	Without brake	With brake						Without brake	With brake
50	292.5	332	230.5	101	0	4	101	1.5	1.9
100	342.5	382	280.5	51	1	6	151	1.6	2.0
150	392.5	432	280.5	101	1	6	201	1.8	2.2
200	442.5	482	330.5	51	2	8	251	1.9	2.3
250	492.5	532	380.5	101	2	8	301	2.1	2.5
300	542.5	582	430.5	51	3	10	351	2.2	2.6
350	592.5	632	480.5	101	3	10	401	2.3	2.7
400	642.5	682	530.5	51	4	12	451	2.5	2.9
450	692.5	732	580.5	101	4	12	501	2.6	3.0
500	742.5	782	630.5	51	5	14	551	2.8	3.2
550	792.5	832	680.5	101	5	14	601	2.9	3.3
600	842.5	882	730.5	51	6	16	651	3.1	3.5
650	892.5	932	780.5	101	6	16	701	3.2	3.6
700	942.5	982	830.5	51	7	18	751	3.4	3.8
750	992.5	1032	880.5	101	7	18	801	3.5	3.9
800	1042.5	1082	930.5	51	8	20	851	3.7	4.1

(Side view of the motor when the cable exit direction has been changed (optional))



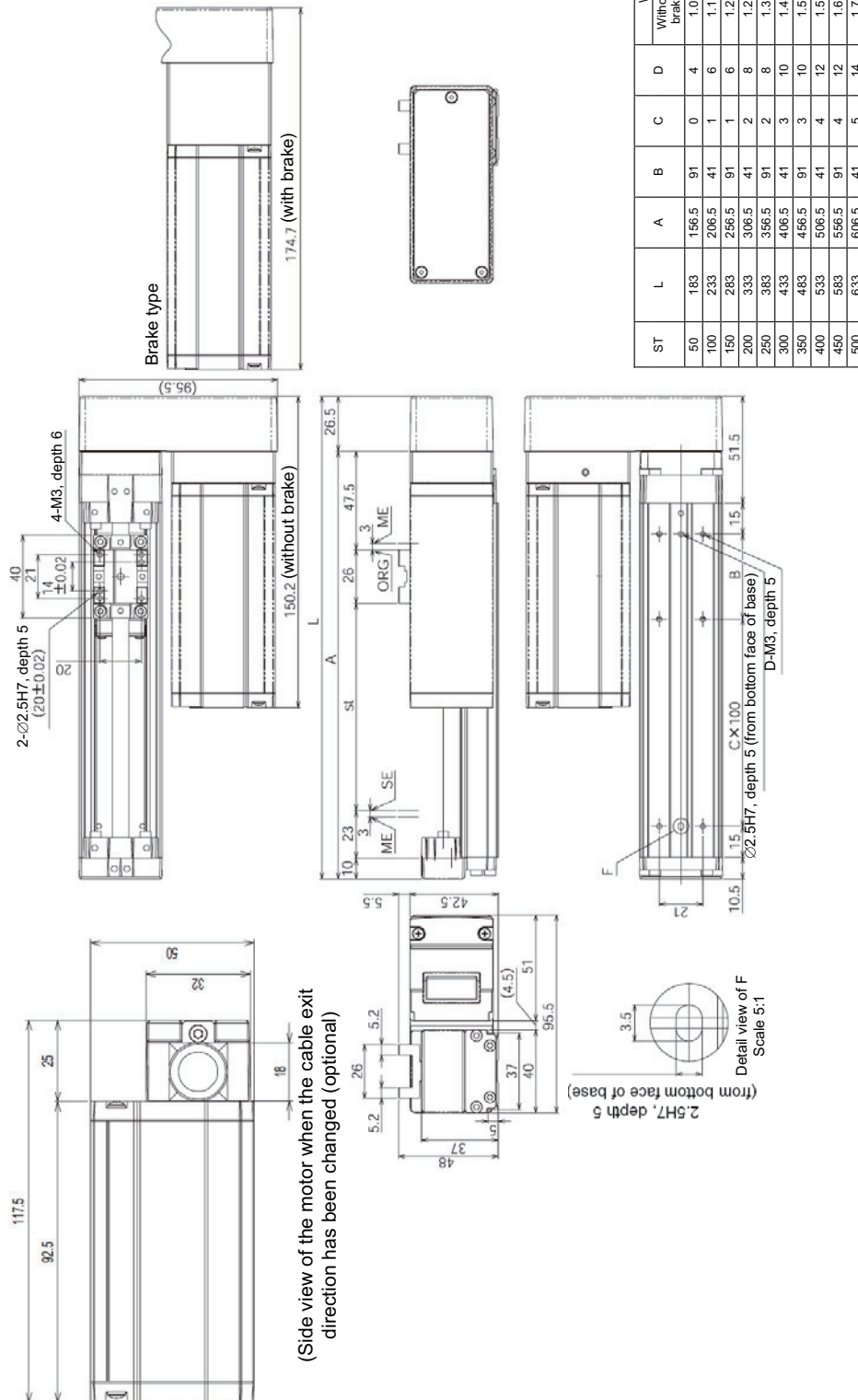


## 24



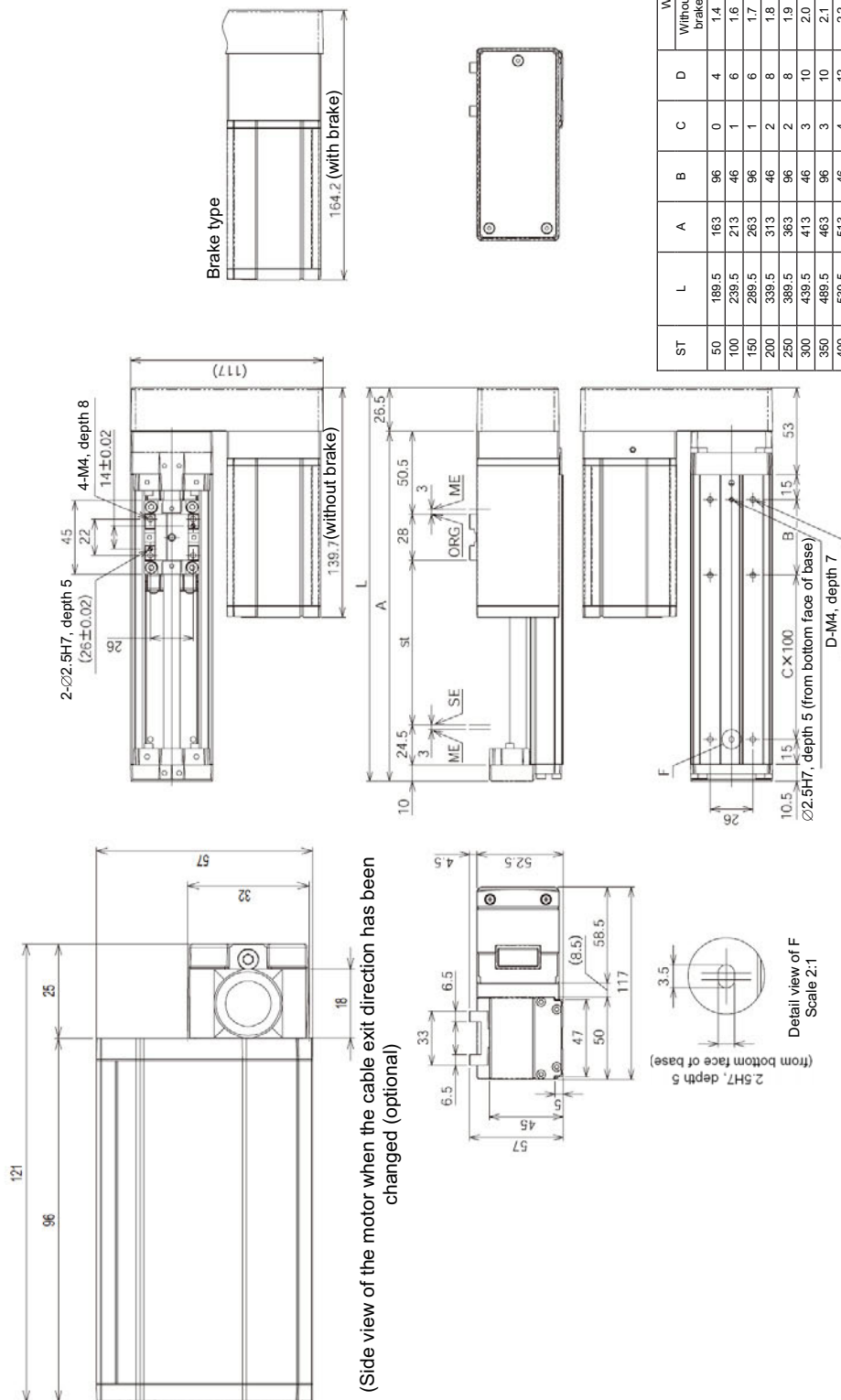


## 2.13 RCA2-SA4R, Reversing to Left (Right)



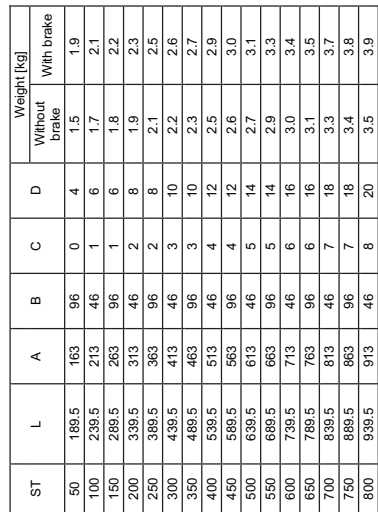
ST	L	A	B	C	D	Weight [kg]	
						Without brake	With brake
50	183	156.5	91	0	4	1.1	1.4
100	233	206.5	41	1	6	1.2	1.5
150	283	256.5	91	1	6	1.3	1.6
200	333	306.5	41	2	8	1.3	1.6
250	383	356.5	91	2	8	1.4	1.7
300	433	406.5	41	3	10	1.5	1.8
350	483	456.5	91	3	10	1.6	1.9
400	533	506.5	41	4	12	1.7	2.0
450	583	556.5	91	4	12	1.8	2.1
500	633	606.5	41	5	14	1.9	2.2

### 2.15 RCA2-SA5R, Reversing to Left (Right)

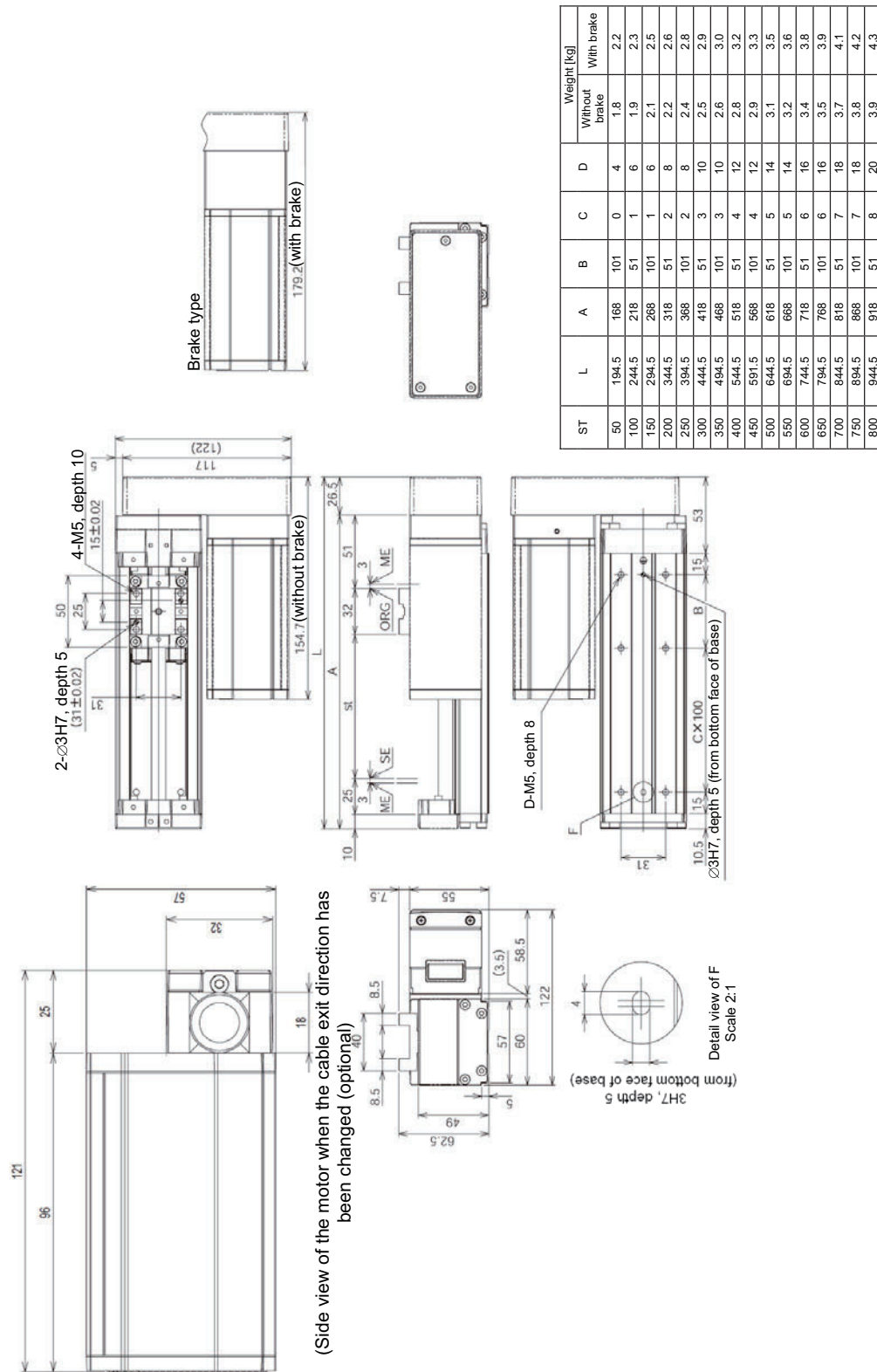


ST	L	A	B	C	D	Weight [kg]	
						Without brake	With brake
50	189.5	163	96	0	4	1.4	1.8
100	239.5	213	46	1	6	1.6	2.0
150	289.5	263	96	1	6	1.7	2.1
200	339.5	313	46	2	8	1.8	2.2
250	389.5	363	96	2	8	1.9	2.3
300	439.5	413	46	3	10	2.0	2.4
350	489.5	463	96	3	10	2.1	2.5
400	539.5	513	46	4	12	2.2	2.6
450	589.5	563	96	4	12	2.3	2.7
500	639.5	613	46	5	14	2.4	2.8
550	689.5	663	96	5	14	2.5	2.9
600	739.5	713	46	6	16	2.6	3.0
650	789.5	763	96	6	16	2.7	3.1
700	839.5	813	46	7	18	2.8	3.2
750	889.5	863	96	7	18	2.9	3.3
800	939.5	913	46	8	20	3.0	3.4

## 28



## 2.17 RCA2-SA6R, Reversing to Left (Right)



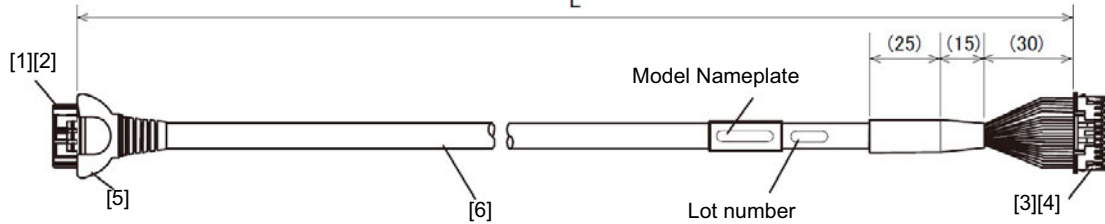
ST	L	A	B	C	D	Without brake	With brake
50	194.5	168	101	0	4	1.9	2.3
100	244.5	218	51	1	6	2.0	2.4
150	294.5	268	101	1	8	2.2	2.6
200	344.5	318	51	2	8	2.4	2.8
250	394.5	368	101	2	8	2.6	3.0
300	444.5	418	51	3	10	2.7	3.1
350	494.5	468	101	3	10	2.9	3.3
400	544.5	518	51	4	12	3.1	3.5
450	594.5	568	101	4	12	3.2	3.6
500	644.5	618	51	5	14	3.4	3.8
550	694.5	668	101	5	14	3.6	4.0
600	744.5	718	51	6	16	3.8	4.2
650	794.5	768	101	6	16	3.9	4.3
700	844.5	818	51	7	18	4.1	4.5
750	894.5	868	101	7	18	4.3	4.7
800	944.5	918	51	8	20	4.5	4.9

## 3. Cable Drawings

### 3.1 AMEC, ASEP Controller Cables

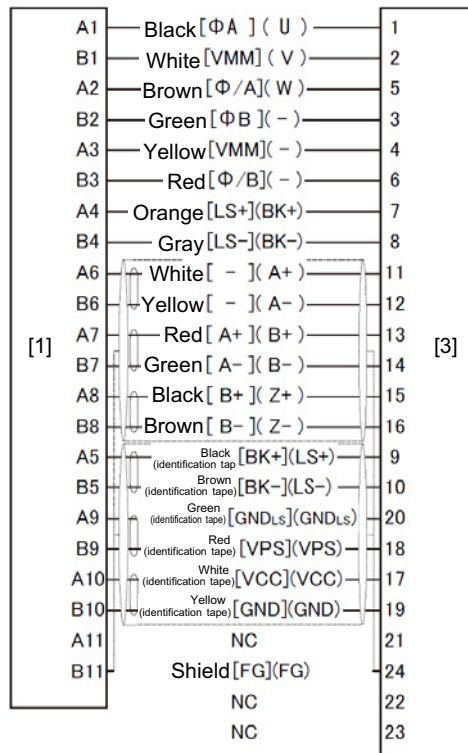
Integrated motor/encoder cable  
(CB-APSEP-MPA\*\*\*)

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



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

Terminal number on actuator side    Wiring diagram [PCON](ACON)    Terminal number on controller side

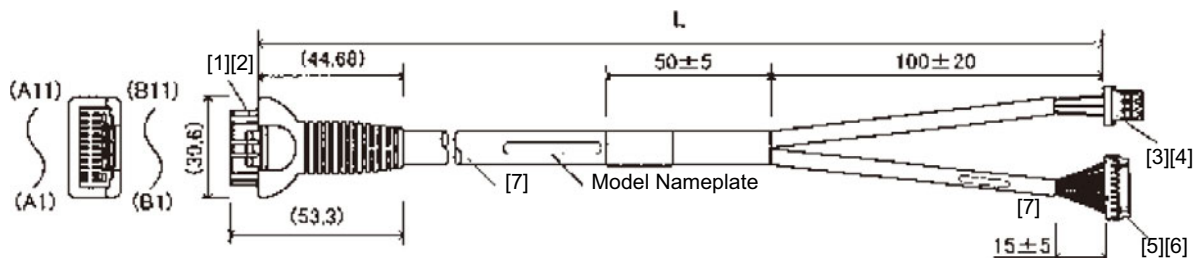




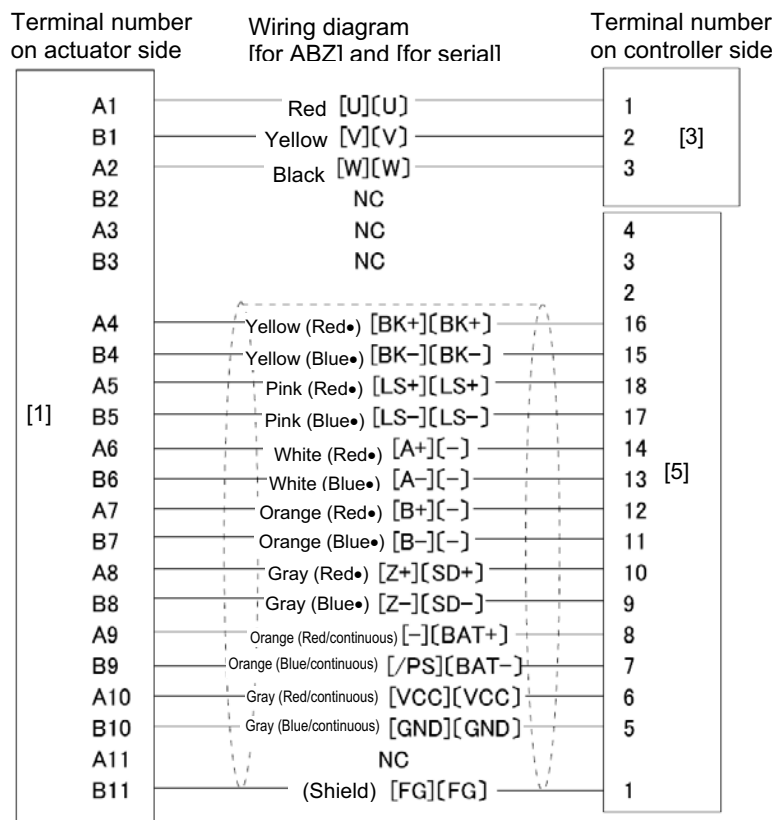
## 3.2 ACON, ASEL Controller Cables

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

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



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





## 4. Options

### 4.1 Brake Type

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.

The applicable model number for this option is "B."

### 4.2 Power-saving Measure

As shown in the table below, the maximum load current of the standard specification and high acceleration/deceleration specification can be lowered.

The applicable model number for this option is "LA."

For details, refer to the section on power capacity in the manual for your ACON/ASEL controller.

Model	Standard specification / High acceleration/deceleration specification Maximum load current	Energy-saving measure Maximum load current
SA3, SA5	4.4 A	2.5 A
SA6	4.0 A	2.2 A
SA4	5.1 A	3.4 A

### 4.3 No-cover Specification

Actuators of the no-cover specification have no side covers.

The applicable model number for this option is "NCO."

(For the external dimensions of actuators with/without side covers, refer to 2, "External Dimensions.")

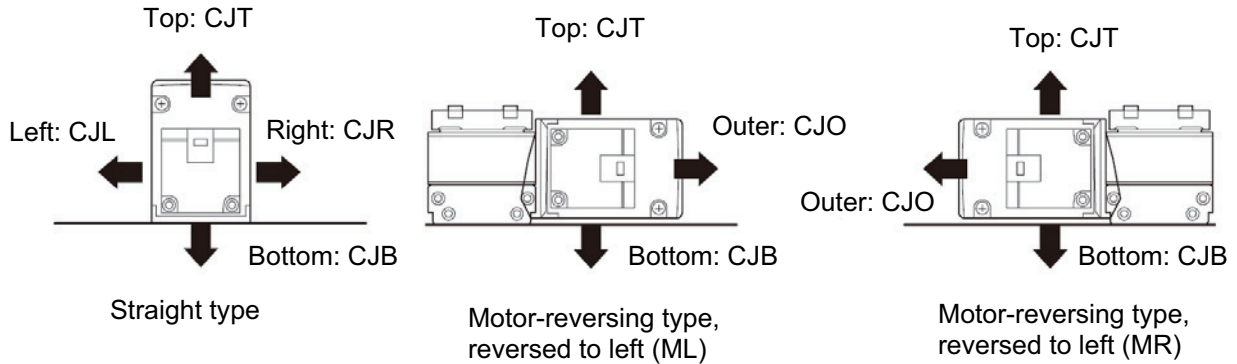
### 4.4 Reversed-home Specification

The standard home position is on the motor side. 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.

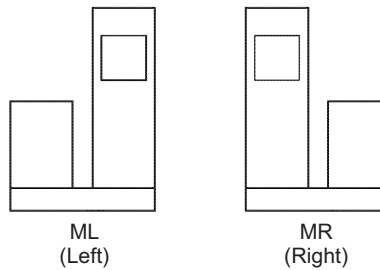
## 4.5 Changing the Cable Exit Direction

If the cable exit direction is changed, the applicable part of the model number must also be changed. A desired direction can be selected from among the five options of top (CJT in the model number), right (CJR), left (CJL), bottom (CJB) and outer (CJO).



## 4.6 Motor Reversing to Left, Motor Reversing to Right

This option can be specified for the motor reversing types SA2AR, SA2BR, SA3R, SA4R, SA5R and SA6R, "ML" indicates reversing to the left, while "MR" indicates reversing to the right, as viewed from the motor side.



## 5. Checking after Unpacking

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

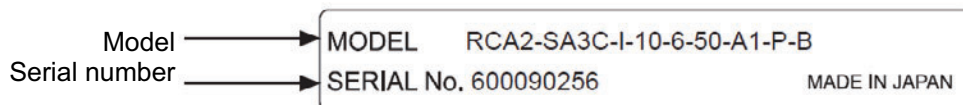
### 5.1 Included Items

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

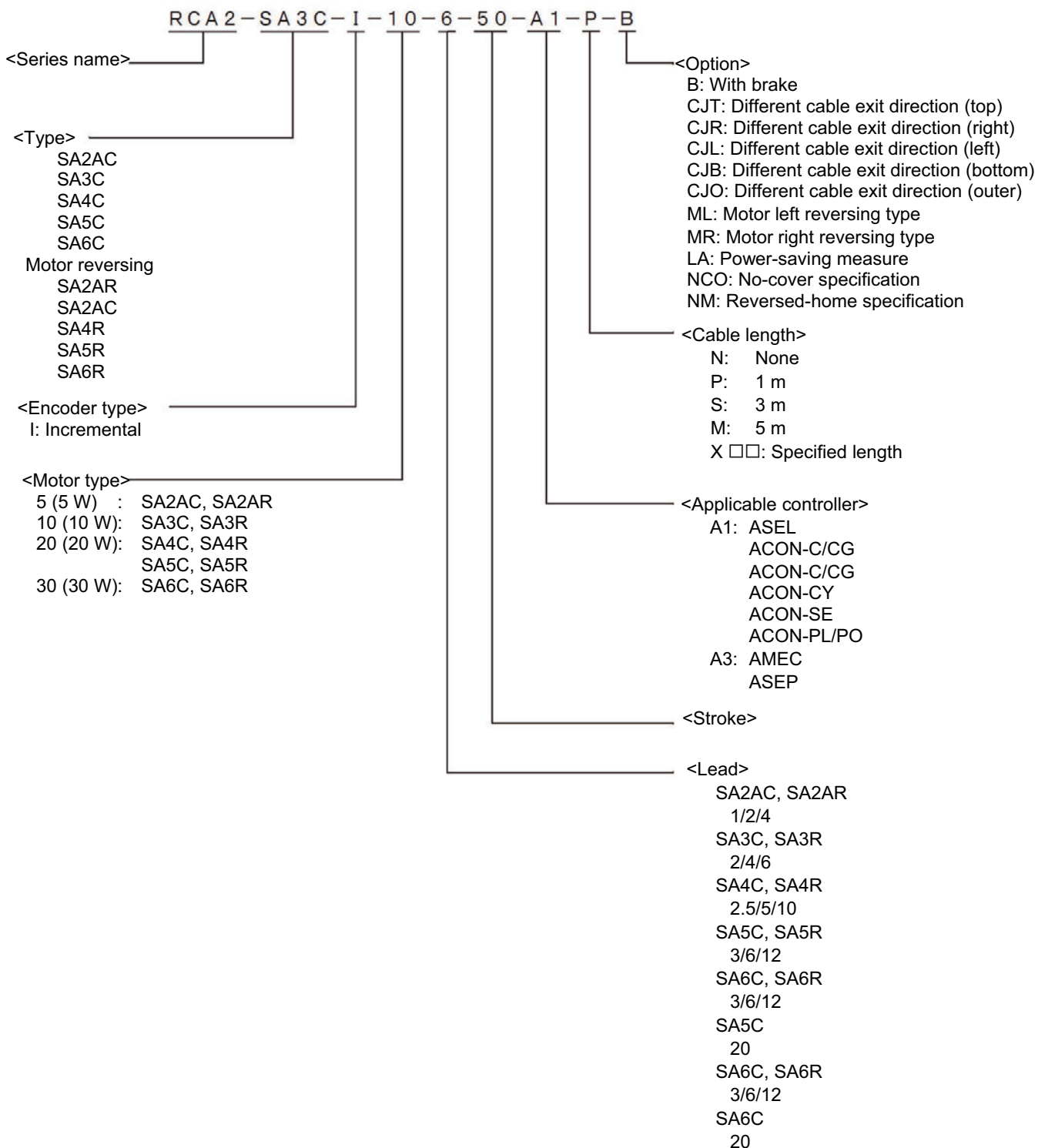
### 5.2 Operation Manuals Relating to This Product

No.	Name	Control No.
1	Operation Manual for ASEL Controller	MJ0165
2	Operation Manual for ACON-C/CG/CF Controller	MJ0176
3	Operation Manual for ACON-CY Controller	MJ0167
4	Operation Manual for ACON-SE Controller	MJ0171
5	Operation Manual for ACON-PL/PO Controller	MJ0166
6	Operation Manual for MEC Controller	MJ0245
7	Operation Manual for PSSEP/ASEP Controller	MJ0216
8	Operation Manual for PC Software IA-101-X-X-MW/IA-101-X-USBMW	MJ0154
9	Operation Manual for PC Software RCM-101MW/RCM-101-USB	MJ0155
10	Operation Manual for MEC PC Software	MJ0248
11	Operation Manual for Teaching Pendant SEL-T/TD	MJ0183
12	Operation Manual for Teaching Pendant CON-T/TG	MJ0178
13	Operation Manual for Touch Panel Teaching Pendant CON-PT/PD/PG	MJ0227
14	Operation Manual for Dedicated ASEP/PSEP Touch Panel Teaching SEP-PT	MJ0217
15	Operation Manual for Simple Teaching Pendant RCM-E	MJ0174
16	Operation Manual for Data Setter RCM-P	MJ0175
17	Operation Manual for Touch Panel Display RCM-PM-01	MJ0182

## 5.3 How to Read Model Nameplate



## 5.4 How to Read Model Number



## 6. Specifications

### (1) Maximum speed

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

Strokes and Maximum Speed Limits (Unit: mm/s)

Mode	Motor Type	Lead (mm)	Stroke (mm)																			
			25	50	75	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800		
SA2A	5W	1	50				—	—	—	—	—	—	—	—	—	—	—	—	—	—		
		2	100				—	—	—	—	—	—	—	—	—	—	—	—	—			
		4	180	200			—	—	—	—	—	—	—	—	—	—	—	—	—	—		
SA3	10W	2	—	100	—	100				—	—	—	—	—	—	—	—	—	—	—		
		4	—	200	—	200				—	—	—	—	—	—	—	—	—	—	—		
		6	—	300	—	300				—	—	—	—	—	—	—	—	—	—	—		
SA4	20W	2.5	—	125	—	125								—	—	—	—	—	—	—	—	—
		5	—	250	—	250								—	—	—	—	—	—	—	—	—
		10	—	380	—	500								—	—	—	—	—	—	—	—	—
SA5	20W	3	—	150	—	150									140	120	105	90	80			
		6	—	300	—	300									285	245	210	185	165			
		12	—	380	—	540	600								570	490	425	370	330			
SA5C	20W	20	—	380	—	540	660	770	860	940	1000						910	790	690	610		
			—	380	—	540	660	770	800 (stroke 250 to 650, installed vertically)								790	690	610			
SA6	30W	3	—	150	—	150									140	120	105	90	80			
		6	—	300	—	300									285	245	210	185	165			
		12	—	380	—	540	600								570	490	425	370	330			
SA6C	30W	20	—	380	—	540	660	770	860	940	1000						910	790	690	610		
			—	380	—	540	660	770	800 (stroke 250 to 650, installed vertically)								790	690	610			

(Note) The maximum speed may not be reached depending on the acceleration/deceleration setting.

**⚠ Caution:** Do not set a speed or acceleration/deceleration exceeding the applicable rating. Doing so may result in vibration, failure or shorter life.  
If an acceleration/deceleration exceeding the rating is set, creep may occur or the coupling may slip.

(2) Acceleration and payloads

Model	Motor type	Lead (mm)	Rated acceleration (G)		Maximum speed (mm/s)	Payload
SA2A	10 W	1	Horizontal	0.3	50	2
			Vertical	0.3		1
		2	Horizontal	0.3	100	1
			Vertical	0.3		0.5
		4	Horizontal	0.3	200	0.5
			Vertical	0.3		0.25
SA3	10 W	2	Horizontal	0.2	100	3
			Vertical	0.2		1.5
		4	Horizontal	0.3	200	2
			Vertical	0.2		1
		6	Horizontal	0.3	300	1
			Vertical	0.2		0.5
SA4	20 W	2.5	Horizontal	0.3	125	6
			Vertical	0.2		3
		5	Horizontal	0.3	250	4
			Vertical	0.2		1.5
		10	Horizontal	0.3	500	2
			Vertical	0.2		1
SA5	20 W	3	Horizontal	0.3	150	9
			Vertical	0.2		3
		6	Horizontal	0.3	300	6
			Vertical	0.2		1.5
		12	Horizontal	0.3	600	3
			Vertical	0.2		1
SA5C	20 W		Horizontal		1000	2
			Vertical	0.2	800 (stroke 250 to 650, installed vertically)	0.5
SA6	30 W	3	Horizontal	0.3	150	10
			Vertical	0.2		4
		6	Horizontal	0.3	300	7
			Vertical	0.2		2
		12	Horizontal	0.3	600	4
			Vertical	0.2		1.5
SA6C	30 W	20	Horizontal	0.3	1000	2
			Vertical	0.2	800 (stroke 250 to 650, installed vertically)	0.5

Note) Maximum speed may not be reached on all strokes.  
The maximum speed of each model with a longer stroke will be less than the applicable maximum speed shown in the table.  
[Refer to (1), "Maximum speed." ]

### (3) Rated thrust

Model	Motor type	Lead (mm)	Rated thrust (N)
SA2A	5 W	1	85.5
		2	42.3
		4	21.4
SA3	10 W	2	85
		4	43
		6	28
SA4	20 W	2.5	136
		5	68
		10	34
SA5	20 W	3	68
		6	34
		12	17
SA5C		20	10.1
SA6	30 W	3	105
		6	53
		12	26
SA6C		20	16

### (4) Drive method

Model	Motor type	Lead	Encoder pulses <sup>*1</sup>	Drive method	
SA2A	5 W	1	800	Ball screw Ø4 mm	Rolled, C10
		2			
		4			
SA3	10 W	2		Ball screw Ø6 mm	Rolled, C10
		4			
		6			
SA4	20 W	2.5		Ball screw Ø8 mm	Rolled, C10
		5			
		10			
SA5	20 W	3		Ball screw Ø10 mm	Rolled, C10
		6			
		12			
SA5C		20			
SA6	30 W	3		Ball screw Ø10 mm	Rolled, C10
		6			
		12			
SA6C		20			

\*1 Number of pulses input to the controller.

(5) Common specifications

Item	Specification	
	SA5C, SA6C – Lead other than 20 mm	SA5C, SA6C – Lead 20 mm
Positioning repeatability <sup>*1</sup>	±0.02 mm	±0.03 mm
Backlash <sup>*1</sup>	0.1 mm or less	
Base	Material: Aluminum with special alumite treatment	

<sup>\*1</sup> Default value



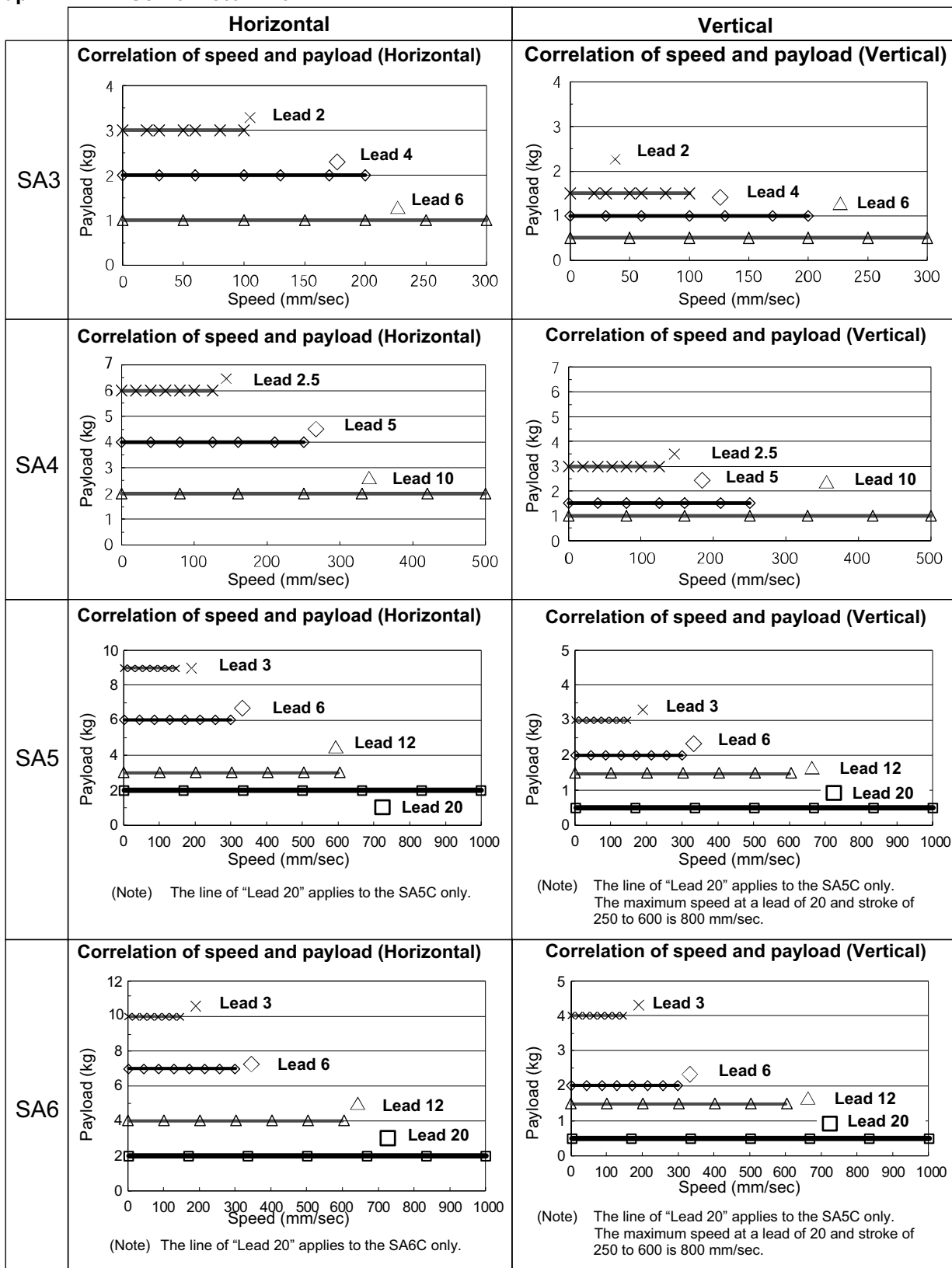
## 7. Notes on Use Regarding Maximum Speed and Loading Mass

### [1] Maximum speed, loading mass

Determine which models you can choose from by the maximum speed and payload capacity.

- AC servo motor (Graph 1)  
How to decide: If your maximum speed and payload capacity are within the usage range in the graph, you can use the model.

Graph 1 Servo Motor: RCA2



## 8. Installation and Storage/Preservation

### 8.1 Installation Environment

Do not use this product in the following environment

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

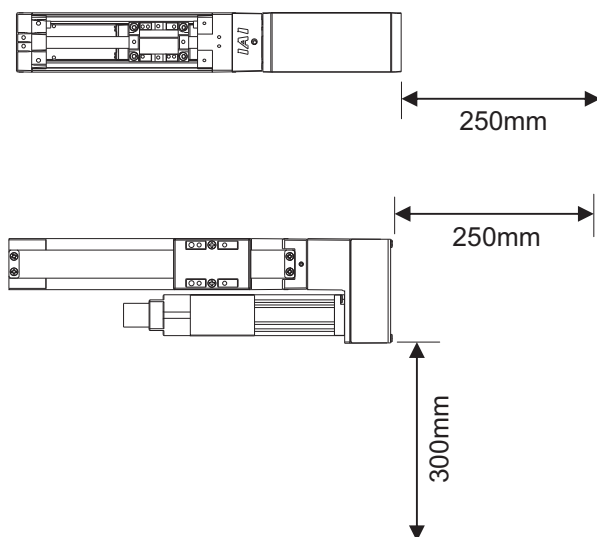
Also make sure to keep enough work space necessary for maintenance.

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

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

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

Open space required for maintenance inspection



### 8.2 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.

## 9. Installation

This chapter explains how to install the actuator on your mechanical system.

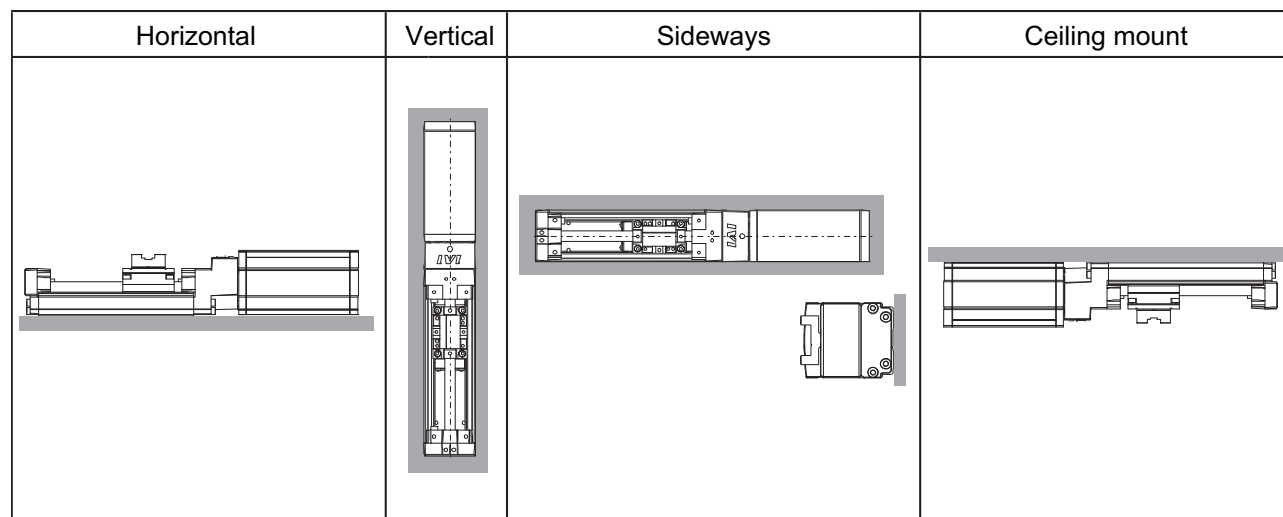
### 9.1 General Rules on Installation

Follow the information below when installing the actuator, as a rule.  
Do pay attention to these items (except when custom-order models).

○: Possible    △: Daily inspection is required    x: Not possible

Model	Horizontal installation	Vertical installation	Sideway installation	Ceiling mount installation
SA3	○	○	○	△
SA4	○	○	△	△
SA5	○	○	△	△
SA6	○	○	△	△

Installation posture

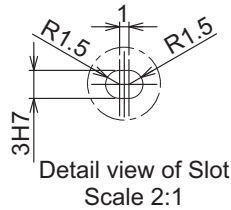
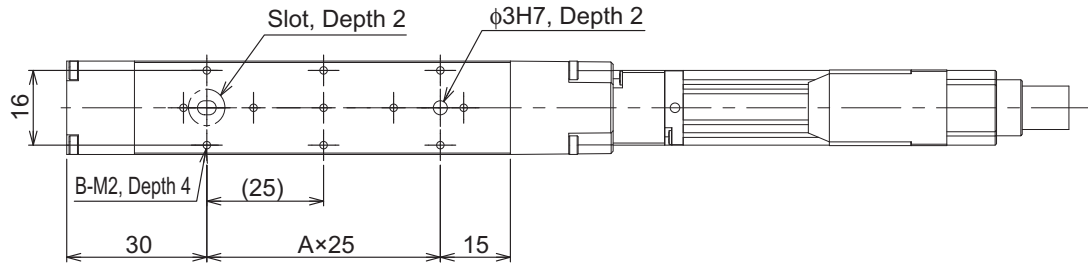


- ⚠ Caution:**
- When the unit is installed vertically oriented, attempt to put the motor up unless there is a special reason. Putting the motor on the lower side would not cause a problem in an ordinary operation. However, it may rarely cause a problem, when it is not operated for a long period, depending on the surrounding environment (especially high temperature), caused by the grease being separated and the base oil flowing into the motor unit.
  - Can be installed sideways or ceiling mount, but the actuators must be checked daily. If the actuator is installed sideways or ceiling mount, the stainless sheet may be slacked or displaced. If the actuator is used continuously while the stainless sheet is slacked or displaced, the stainless sheet may break or other problems may occur. Check the actuator daily and if the stainless sheet is found slacked or displaced, make installation adjustment of the stainless sheet. [Refer to 13.9 Replacement (for models with slider cover).]

## 9.2 Installation of Actuator

### 9.2.1 Installation of RCA2-SA2AC and SA2AR

This actuator has the screw holes for mounting so it can be fixed from the rear side.  
Also, there are a reamed hole and a slotted hole for positioning pins.



ST	L1	L2	A	B
25	174	92	1	4
50	199	117	2	6
75	224	142	3	8
100	249	167	4	10

Screw diameter and max. screw mating depth	Mounting bolt	Tightening torque		Reamed hole (mm)	Slot
		Bolt bearing surface is steel	Bolt bearing surface is aluminum		
M2, depth 4	M2	0.42 N-m (0.043 kgf-m)	0.25 N-m (0.026 kgf-m)	φ3H7, depth 2 from bottom face of base	Refer to the diagram

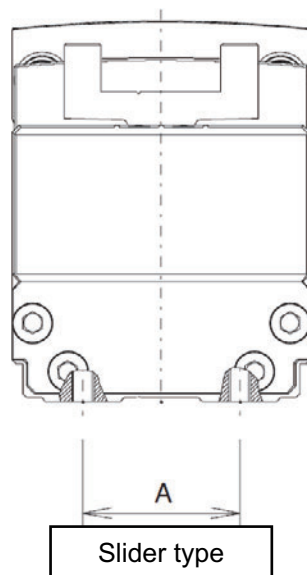
## 9.2.2 Installation of RCA2-SA3C, SA4C, SA5C, SA6C, SA3R, SA4R, SA5R and SA6R

The surface to mount the main unit should be a machined surface or a plane that possesses an equivalent accuracy and the flatness should be within 0.05mm. Also, the platform should have a structure stiff enough to install the unit so it would not generate vibration or other abnormality.

This actuator has the screw holes for mounting so it can be fixed from the rear side.

(Note that tap hole size depends on model. Please see diagrams below and 2, "External Dimensions.")


The actuator also contains reamed holes for use with positioning pins.



Model	Screw diameter and max. screw mating depth	Mounting bolt	Tightening torque		A (mm)	Reamed hole (mm)
			Bolt bearing surface is steel	Bolt bearing surface is aluminum		
SA3	M3, depth 5	M3	1.54 N-m (0.16 kgf-m)	0.83 N-m (0.085 kgf-m)	17	Ø2H7, depth 4 from bottom face of base
SA4	M3, depth 5	M3	1.54 N-m (0.16 kgf-m)	0.83 N-m (0.085 kgf-m)	21	Ø2.5H7, depth 5 from bottom face of base
SA5	M4, depth 7	M4	3.59 N-m (0.37 kgf-m)	1.76 N-m (0.18 kgf-m)	26	Ø2.5H7, depth 5 from bottom face of base
SA6	M5, depth 8	M5	7.27 N-m (0.74 kgf-m)	3.42 N-m (0.35 kgf-m)	31	Ø3H7, depth 5 from bottom face of base

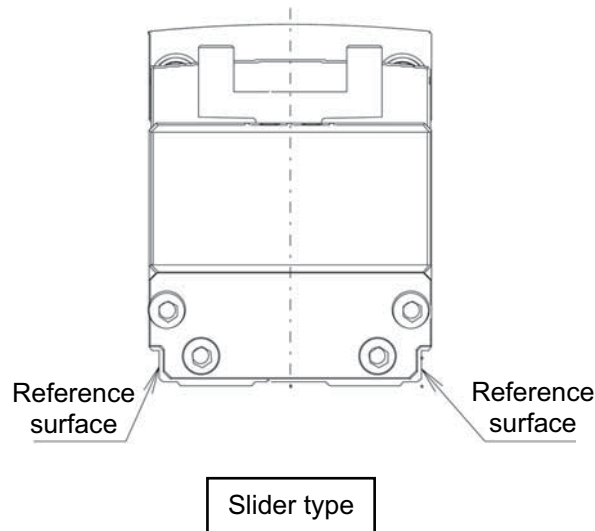
## Tightening screws

- Use hexagonal socket head bolts for the male threads for installing the base.
- Use of high-tension bolts meeting at least ISO 10.9 is recommended.
- The length of thread engagement should be 1.8 times more than the nominal diameter, and pay attention not to stick the screw out inside the actuator.

 **Caution:** Be careful when selecting the bolt length. If bolts of inappropriate lengths are used, the tapped holes may be damaged, actuator mounting strength may become insufficient, or contact with driving parts may occur, resulting in lower precision or unexpected accidents.

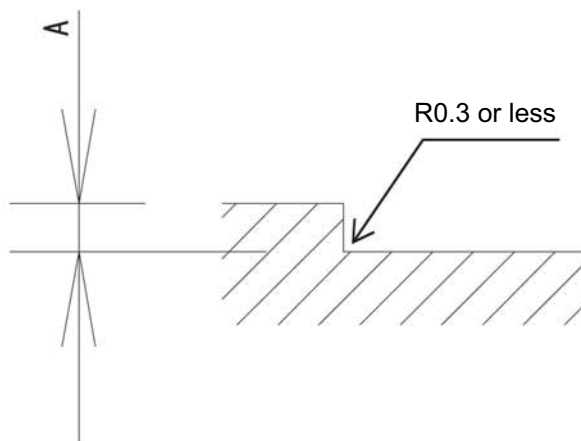
## 9.3 Mounting Surface

- The platform to install the actuator should possess a structure that ensures enough stiffness, and should be free from vibration.
- RCA2-SA3C, SA4C, SA5C, SA6C, SA3R, SA4R, SA5R, SA6R  
The side and bottom faces of the base provide reference surfaces for slider travel. When it is necessary that the slider moves in a highly precise fashion, ensure that the device is installed at the direction that is based on the position of these surfaces.



**⚠ Caution:** Because the side and bottom faces of the base provide reference surfaces for slider travel as shown in the above diagram, conduct installation based on the position of this side when precision is required.

Follow the diagram below when installing the device using the reference surface.



Model	Length of A (mm)
Slider type	2 to 4 or less



## 9.4 Installation of the Load

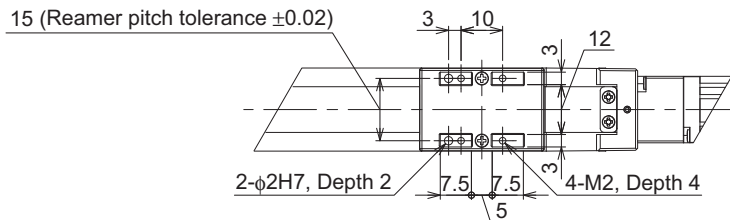
- Please attach the load to the device using the tap holes in the slider.
- The process for attaching these to the main unit is similar to the installation process of the main unit. Use of high-tension bolts meeting at least ISO-10.9 standard is recommended for mounting. The table below shows the recommended tightening torque.
- There are two reamed holes on the slider, so if you need to be able to secure and detach the load multiple times, please use these holes. Also, if you require precision in your attachment, such as a right angle, use one of the reamed holes to make fine adjustments.

\* When using reamed holes, we recommend using an H7 pin. Also, do not force the pin into the hole. Instead, press it gently in until it fits.

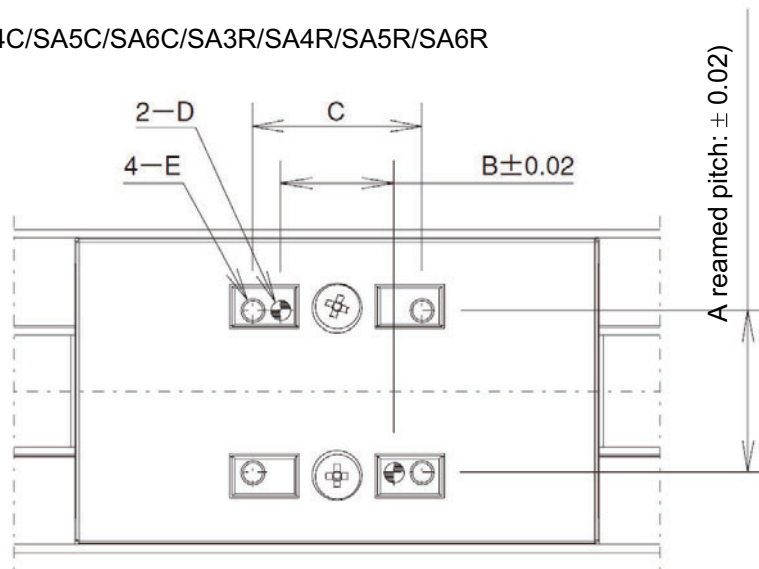
- For exact thread depth and reamed hole depth, please see the table below.

Do not tighten the mounting screws to a torque beyond the applicable torque specified in the table below. Doing so may damage the tapped holes.

### ● RCA2-SA2AC/SA2AR



### ● RCA2-SA3C/SA4C/SA5C/SA6C/SA3R/SA4R/SA5R/SA6R



Model	A	B	C	D	E	Mounting bolt	
						Nominal thread size	Tightening torque
SA3	17	11	17	$\phi 2H7$ , depth 5	M3 D6	M3	0.83 N-m (0.085 kgf-m)
SA4	20	14	21	$\phi 2.5H7$ , depth 5	M3 D6	M3	0.83 N-m (0.085 kgf-m)
SA5	26	14	22	$\phi 2.5H7$ , depth 5	M4 D8	M4	1.76 N-m (0.18 kgf-m)
SA6	31	15	25	$\phi 3H7$ , depth 5	M5 D10	M5	3.42 N-m (0.35 kgf-m)

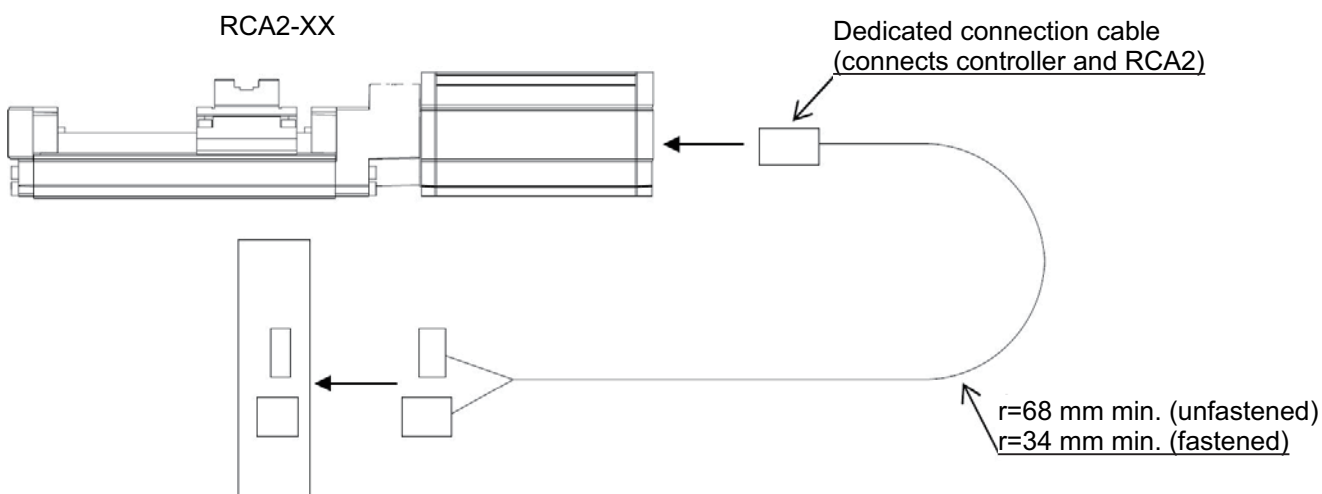
## 10. Connecting with Controller

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

This section explains the wiring method for a single axis.

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

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



Dedicated controller

- AMEC
- ASEP

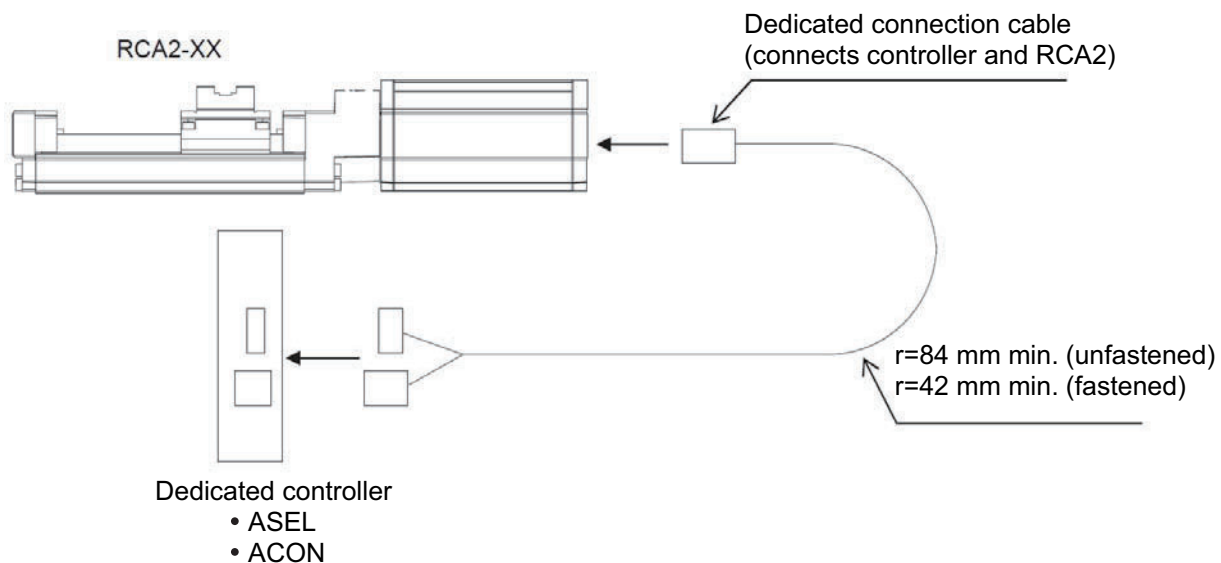
Dedicated connection cable

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

\*) \*\*\* indicates the cable length. Up to 20m can be specified.

Example) 080 = 8 m

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



Dedicated connection cable

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

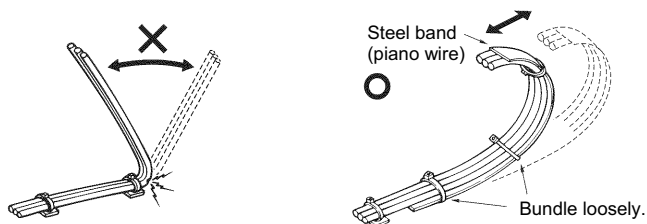
\*) \*\*\* indicates the cable length. Up to 20m can be specified.

Example) 080 = 8 m

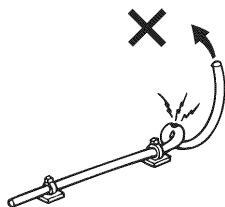
(Note) RCA2-SA2AC and SA2AR cannot be run with ASEL or ACON controller.

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

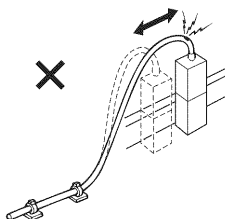
- Do not cut and reconnect the cable to extend or shorten the cable.
- If the cable cannot be secured, reduce the load on the cable by allowing it to deflect only by the weight of the cable or wire it in a self-standing cable hose, etc., having a large radius.
- Prevent the cable from bending at the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



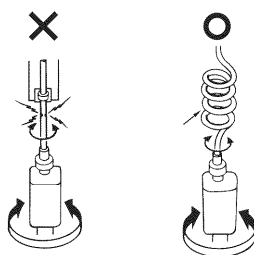
- Do not let the cable bend, kink or twist.



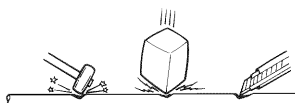
- Do not pull the cable with a strong force.



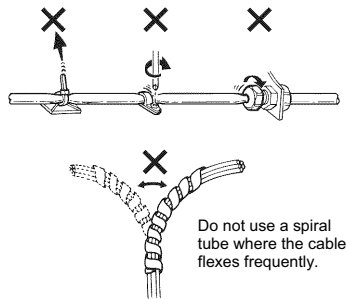
- Do not let the cable receive a turning force at a single point.



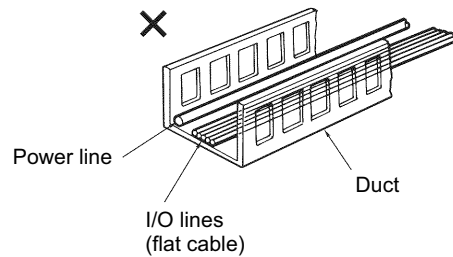
- Do not pinch, drop a heavy object onto or cut the cable.



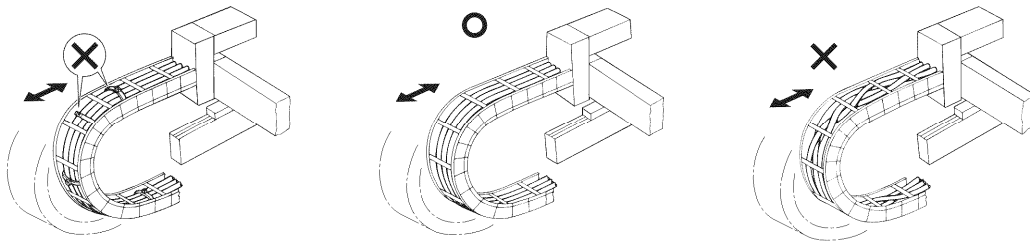
- When fixing the cable, provide a moderate slack and do not tension it too tight.



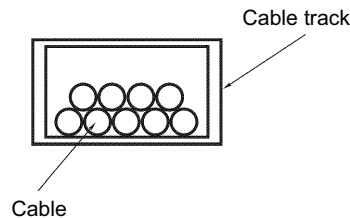
- Separate the IO and communication lines from the power and drive lines. Do not wire them together in the same duct.



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



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



## Warning

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

## 11. Notes on Operation

### 11.1 Placing a Load on the Actuator

#### 11.1.1 Allowable moment

- Do not exceed the load ratings given in the specification table below.  
In particular, be careful not to exceed the load moment, overhang load length, and maximum payload capacity for the slider.  
(See diagram below.)

- Allowable dynamic load moment Unit: N·m (kgf·m)

	Ma	Mb	Mc
SA2A	0.18 (0.018)	0.16 (0.016)	0.23 (0.023)
SA3	1.96 (0.2)	2.84 (0.29)	3.14 (0.32)
SA4	3.04 (0.31)	4.31 (0.44)	5.00 (0.51)
SA5	3.92 (0.40)	5.58 (0.57)	8.53 (0.87)
SA6	4.31 (0.44)	6.17 (0.63)	10.98 (1.12)

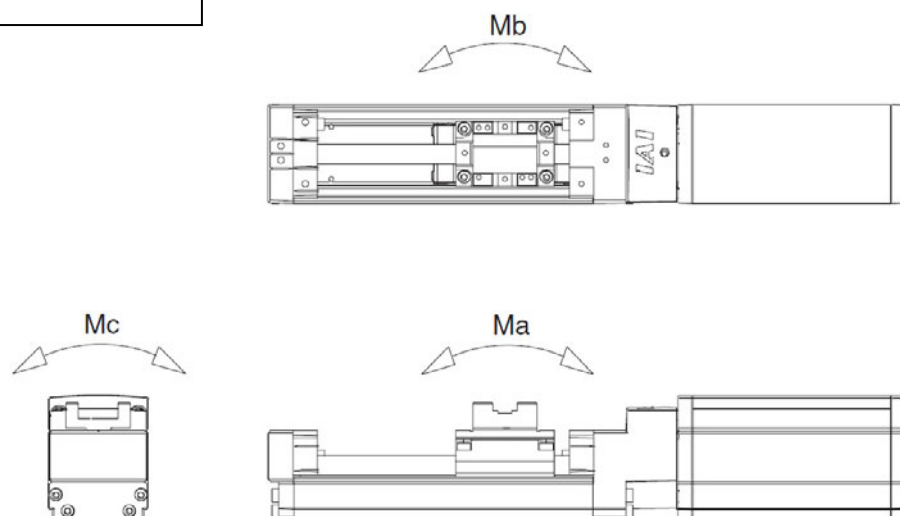
- Allowable static load moment Unit: N·m (kgf·m)

	Ma	Mb	Mc
SA2A	2.3 (0.23)	1.9 (0.19)	2.9 (0.30)
SA3	5.0 (0.51)	7.1 (0.72)	7.9 (0.81)
SA4	6.8 (0.69)	9.7 (0.99)	13.3 (1.36)
SA5	10.2 (1.04)	14.6 (1.49)	22.4 (2.29)
SA6	17.6 (1.80)	25.2 (2.57)	44.5 (4.54)

Make sure that the load on the table front plate does not exceed the moment Ma if operating a slider type. When calculating the load moment, see 11.1.1, "Positioning the guide to calculate the load moment" below.

Load moment direction

"Slider type"

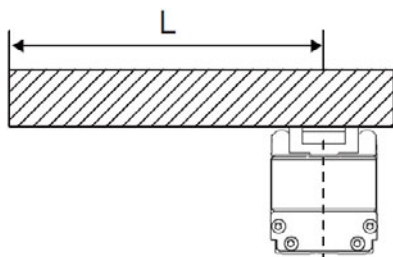


## Allowable overhang lengths

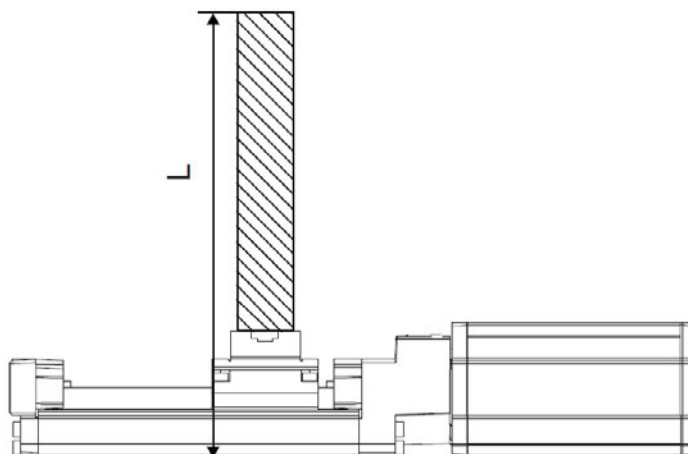
Model	Ma direction	Mb direction	Mc direction
SA2A	40 mm or less	40 mm or less	40 mm or less
SA3	100 mm or less	100 mm or less	100 mm or less
SA4	120 mm or less	120 mm or less	120 mm or less
SA5	130 mm or less	130 mm or less	130 mm or less
SA6	150 mm or less	150 mm or less	150 mm or less

Overhang load length direction

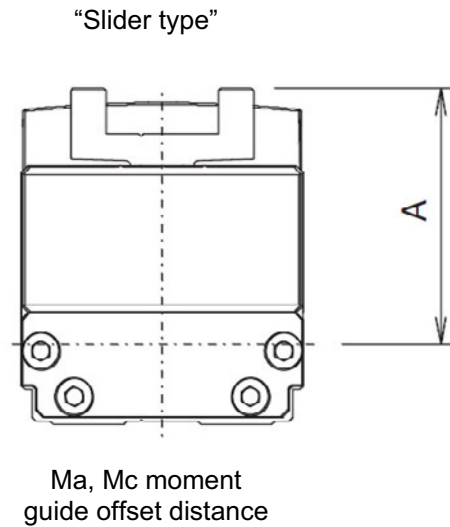
Mb, Mc direction



Ma direction



(Note) When calculating the moment in  $M_a$  or  $M_c$  direction, offset the reference position by 1 mm from the top surface of the slider, as shown in the figure below.



Model	SA2A	SA3	SA4	SA5	SA6
A (mm)	23.5	29.5	36.5	43.5	47



**Caution:** Make sure the load installed on the actuator does not exceed the allowable overhang load length (L). If the load exceeds the allowable overhang load length, vibration may occur or the settling time may become longer.

Also note that if the allowable load moment is exceeded, not only the life of the guide will become shorter but other problems may also occur such as vibration and longer settling time.



## 11.1.2 External force in axial direction

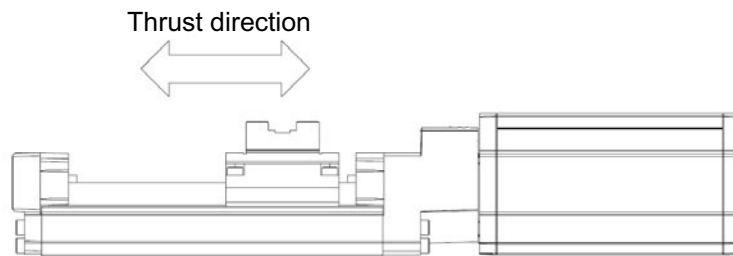
Be careful not to subject the actuator to an external force or an impact load in the axial or thrust direction in excess of allowable capacity.

Subjecting the actuator to an external force or an impact load at levels above the allowable capacity may damage or destroy internal components.

Allowable external force in thrust direction

	Unit: N (kgf)
SA3	50 (5.1)
SA4	160 (16.3)
SA5	220 (22.4)
SA6	220 (22.4)


“Motor unit type”



Move the slider by observing the cautionary information below.

[Low-lead type]

Sometimes the slider may not move even when an external force is applied. In this case, do not forcibly move the slider, but use the PC software or teaching pendant to jog the slider.

 **Caution:** If the slider does not move, do not move it forcibly. If an excessive force is applied, actuator damage may occur such as broken nut.

## 11.2 Adjusting the Home Position

The actuator home position can be adjusted by changing parameter <sup>\*1</sup>. In order to make adjustments, please do the following.

- [1] Verify the home position by performing a home return operation.
- [2] Move the actuator to the desired position, verify the distance between the old and new positions, and adjust the parameter accordingly. The parameter can be set to a positive value in the direction of movement. (It cannot be set to a negative value.)
- [3] Increasing the offset amount restricts the movement range by the amount of the increase. If you set an offset greater than 1 mm, please reset the stroke soft limit.

<sup>\*1</sup> 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 preset value  
AMEC controller: No. 16, home return preset value

## 11.3 Changing the Home Position Direction

To change the home position direction after delivery, it is necessary to change the movement direction parameter. Please contact with IAI if you need to do this.



### Warning:

The encoder serves not only to detect the actuator's position and the home position signal, it also plays a crucial role in phase switching for the AC servo power line, and its phase is adjusted precisely. Never touch the encoder in order to change the home position.

## 11.4 Stainless Sheet Section

- The stainless sheet is attached by absorption to the side cover. If the environment contains high levels of iron filings or other magnetic matter, this may become absorbed between the stainless sheet and the rubber and cause malfunction. For that reason, avoid usage in such an environment.
- Keep adhesive, paint, and other viscous material off the stainless sheet. Such material sticking to the stainless sheet can lead to defective slider operation and stainless sheet damage.
- Be careful to avoid localized force on the stainless sheet. Such force could deform the stainless sheet and cause malfunctions.  
Also, during installation and transport, do not hold on to or press on the stainless sheet. Doing so could damage the stainless sheet.

## 12. Life

One factor that affects the traveling life of an actuator is "Rated Load."

There are two types of rated loads: "Static Rated Load" and "Dynamic Rated Load."

- "Static Rated Load": Load applied while the actuator is stopped, as a result of which minor pressure marks are left on the contact surface
- "Dynamic Rated Load": Load under which the actuator can travel for a specified distance and still meet a specified probability of survival defined by no damage to its guide.

Manufacturers of guides indicate the life of each guide by a dynamic rated load based on a probability of survival (no damage to the guide) of 90% after 50 km of traveling.

With industrial equipment, however, dynamic rated loads must be defined based on longer traveling distance of 5,000 km to 10,000 km given the moving speed, operating ratios and other operating conditions of these equipment.

Also note that guides are generally designed with a sufficient life against radial loads. Moment loads that are applied at positions away from the guide center are most damaging to guides.

The traveling life is calculated by assuming that the actuator travels 5,000 km while receiving the allowable load moment, based on a load coefficient of 1.2.

[For the allowable dynamic load moment, refer to 6, "Specifications."]

The formula for calculating the allowable dynamic load moment corresponding to a traveling life of 5,000 km is shown below.

$$C_{IA} = \frac{M_{50}}{fW} \times \left( \frac{50 \text{ km}}{5000 \text{ km}} \right)^{\frac{1}{3}}$$

C<sub>IA</sub>: Allowable dynamic load moment  
 :fW: Load factor (= 1.2)  
 :M<sub>50</sub>: Rated dynamic moment based on a survival probability of 50% after 50 km of traveling

Calculate the life at the applicable moment using the formula below:

$$L = \left( \frac{C_{IA}}{P} \right)^3 \times 5000 \text{ km}$$

L: Traveling life (survival probability of 90%)  
 C<sub>IA</sub>: Allowable dynamic moment  
 P: Applicable moment

## 13. Maintenance Inspection

### 13.1 Inspection Items and Schedule

Follow the maintenance inspection schedule below.

It is assumed that the equipment is operating 8 hours per day.

If the equipment is running continuously night and day or otherwise running at a high operating rate, inspect more often as needed.

	External visual inspection	Internal inspection	Greasing*2
Start of work inspection	○		
1-month inspection	○		
6-month inspection	○	○	
12-month inspection	○	○	○
Every 6 months thereafter	○		
Every 12 months thereafter	○	○	○

\*1 If grease is found degraded as a result of interior check, add grease

\*2 Grease film may run out if the actuator is moved back and forth continuously over a distance of 30 mm or less. As a guide, perform a back-and-forth operation five times or so over a distance of 50 mm or more after a back-and-forth operation over such short distance has been repeated 5,000 to 10,000 times. This will restore oil film.

### 13.2 External Visual Inspection

An external visual inspection should check the following things.

Main unit	Loose actuator mounting bolts, other loose items, buildup
Cables	Scratches, proper connections
Stainless sheet	Scratches, slacked
Overall	Irregular noise, vibration

- If the stainless sheet is slacked, make adjustment to remove the slack as necessary.
- As a rule of thumb, the stainless sheet should last for about 5000 km of slider motion. However, under certain conditions, the stainless sheet may need to be replaced earlier.  
Generally, replacing the stainless sheet will require that you bring the unit to our plant or have one of our technicians come to your plant to perform the replacement.
- 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.

### **13.3 Cleaning**

- Clean exterior surfaces as necessary.
- Use a soft cloth to wipe away dirt and buildup.
- Do not blow too hard with compressed air as it may cause dust to get in through the gaps.
- Do not use oil-based solvents 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.

### **13.4 Adjusting the Stainless Sheet**

If the actuator stroke is 400 mm or more, check the stainless sheet for slacking, etc., as necessary. If the stainless sheet is found slacked, adjust the stainless sheet.  
[For the stainless sheet adjustment procedure, refer to 13.9, “Replacing/Adjusting the Stainless Sheet.”]

### 13.5 Internal Inspections

Turn off the power and inspect visually after turning up or removing the stainless sheet in the case of stainless sheet types. With reversing types, inspect visually after removing the reversing bracket. When inspecting the interior, check the following items.

Main unit	Loose mounting bolts, other loose items
Guide section	Lubrication, buildup
Belt (Reversing type)	Belt wear, damage

Visually inspect the interior of the equipment. Check whether dust or other foreign matter has gotten inside and check the lubrication state.

The lubrication may have turned brown. This is not a problem as long as the travel surfaces shine as though they are wet.

If the grease is mixed with dust and does not have a shiny appearance, or if the grease has lost its efficacy due to prolonged use, then clean each section and reapply grease.

The procedure for internal inspections is outlined below. Refer to 13.8 for inspection and adjustment of the belt.

"Slider type" --- Steps [2] through [5] are only necessary if the cover is attached. If you do not have a cover, only do step [1].

[1] Move the slider to the home position side.

[2] Remove the cover.

[3] Remove the sheet retainer screws.

[4] Peek under the stainless sheet and check the interior.

[5] When the checks are completed, reassemble the parts by following the same procedure in reverse.

#### **Cautions for attached cover:**

When checking inside the equipment, be careful not to forcibly bend the stainless sheet or scratch it. Do not tug on the stainless sheet or in any way attempt to reposition it.

If the sheet is repositioned, it may not be even which may shorten its service life. Should this happen, adjust the stainless sheet by referring to the replacement instructions.

Keep in mind that the edges of the stainless sheet can cause injuries. Always wear gloves when working on it.

## 13.6 Internal Cleaning

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

## 13.7 Greasing Guides

### 13.7.1 Applicable greases for guide

The grease initially used is lithium-based grease.  
IAI uses the following grease in our plant.

Idemitsu Kosan	Daphne Eponex Grease No. 2
----------------	----------------------------

Other companies also sell similar types of grease. For details, give the above grease name to the manufacturer you want to purchase from and ask what corresponding product they have available. Here are some examples of similar products.

Showa Shell Oil	Albania Grease No. 2
Mobil Oil	Mobilax 2



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

### 13.7.2 Applicable greases for ball screw

The grease initially used is lithium-based grease.  
IAI uses the following grease in our plant. (Excludes SA3C type)

Kyodo Yushi	Multitemp LRL 3
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\* RCA2-SA2AC, SA2AR, SA3C type uses the following grease.

Idemitsu Kosan	Daphne Eponex Grease No. 2
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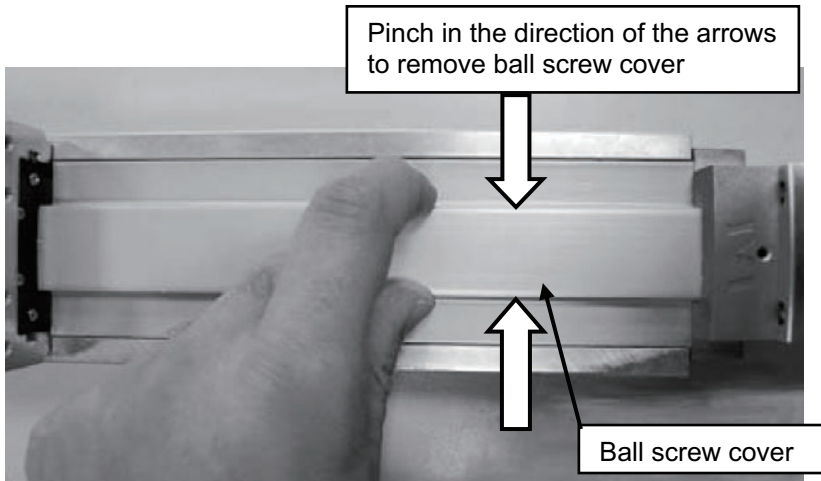


**Caution:** In case the grease got into your eye, immediately go to see the doctor to get an appropriate care.  
After finishing the grease supply work, wash your hands carefully with water and soap to rinse the grease off.

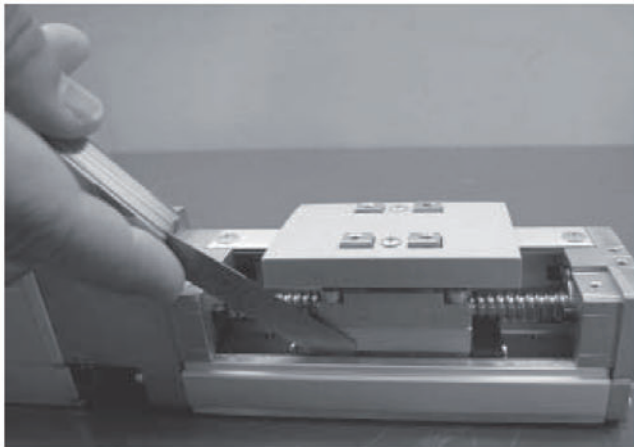


## 13.7.3 How to apply grease

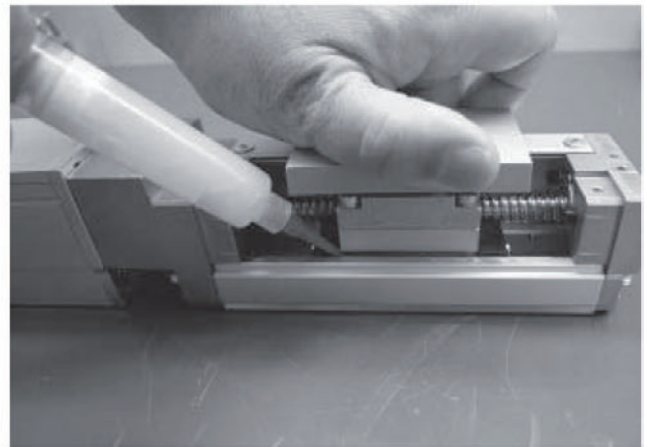
When side cover and stainless sheet are present, remove these before beginning.



- (1) For the guide section, apply the grease by moving the slider back and forth and spreading it out, either by pushing a scraper between the slider and base or by lubricating with a grease injector. Grease the guides on both sides. When complete, wipe away any excess grease.  
 (Note) There is no side cover for RA2AC and RA2AR.  
 Remove the stainless steel sheet and apply grease to the guide from upper side.



Slider type



Slider type

**⚠ 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.

- (2) To grease ball screws, first clean, then put some grease on your finger and apply while moving the slider back and forth.

When finished, wipe off excess grease.

(Note) There is no side cover for RA2AC and RA2AR.

Remove the stainless steel sheet and apply grease to the guide from upper side.



If the side cover and stainless sheet are present, put them back on.

⚠ Caution: When moving the slider back and forth by hand, be certain never to apply force in excess of the thrust direction external force capacity (see 11.1.2). (If the slider will not move, operate it using a jog function.)

⚠ 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.

## 13.8 Belt

### 13.8.1 Inspection of belt

When inspecting the belt, remove the pulley cover and check the belt visually.

Although the durability of the belt is affected significantly by the operating conditions, generally a belt has a flex line of several million times.

As a reference for determining when to actually replace the belt, replace the belt if any of the following conditions is found:

- Significant wear of the teeth or end face of the belt
- Swelling of the belt due to attached oil, etc.
- Cracking or other damage of the teeth or back of the belt
- Breaking of the belt

### 13.8.2 Applicable belt

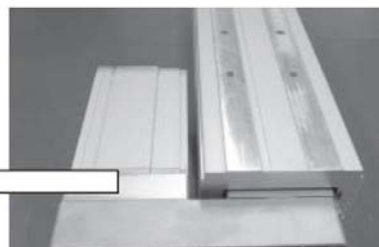
Manufacturer: Bando Chemical Industries, Ltd.

Belt model (type)	Model
40S2M138R, 4-mm wide (clean rubber type)	SA3R
60S2M152R, 6-mm wide (clean rubber type)	SA4R
60S2M180R, 6-mm wide (clean rubber type)	SA5R
60S2M180R, 6-mm wide (clean rubber type)	SA6R

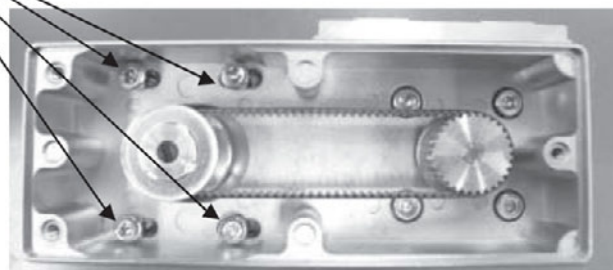
### 13.8.3 Adjustment of belt tension

Remove the pulley cover, loosen the tension adjustment bolts (4 locations), and shift the motor as shown below to tension the belt. When finished, tighten the tension adjustment bolts.

Tension  
SA3R:  $1.5 \pm 0.1$  kgf  
Other than SA3R:  $2.5 \pm 0.1$  kgf



Tension adjustment bolt		
Model	Nominal thread size	Tightening torque
SA3R	M2.6	0.46 N-m (0.047 kgf-m)
SA4R	M3	0.83 N-m (0.085 kgf-m)
SA5R/SA6R	M4	1.76 N-m (0.18 kgf-m)



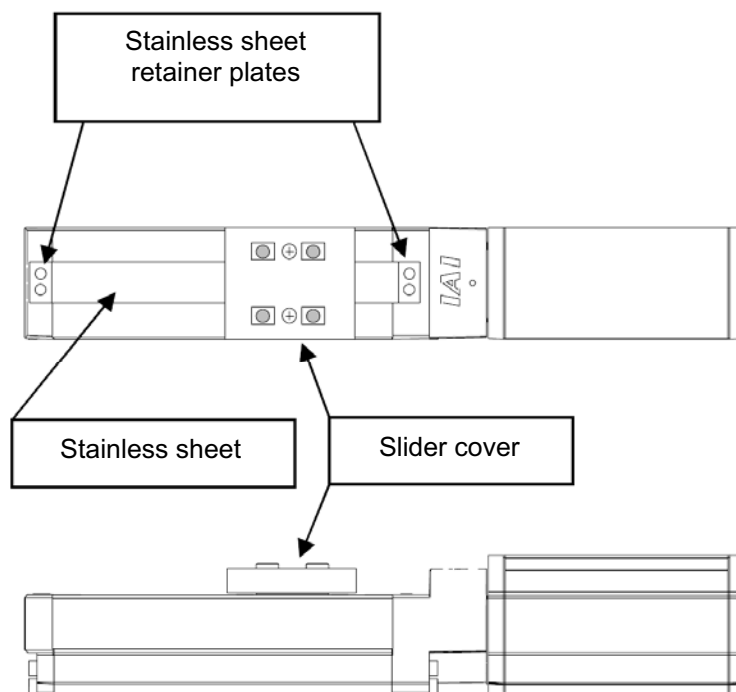
## 13.9 Stainless Sheet Replacement (for models with slider cover)

It is possible to replace the stainless sheet without removing the slider cover.

[Items required for replacing the stainless sheet]

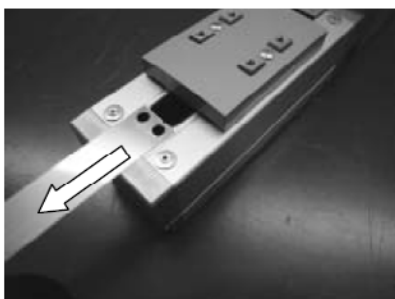
- Replacement stainless sheet
- Hex wrench set
- Cellophane tape

[Part names]

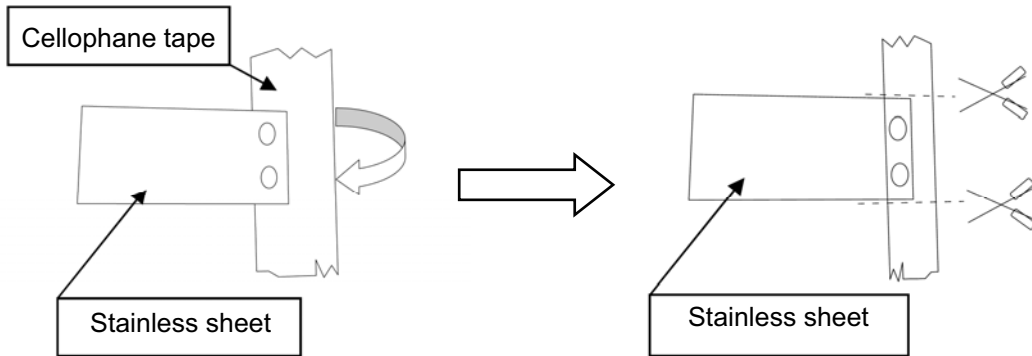


[Procedure]

- [1] With a 1.5 mm hex wrench, remove the four screws securing the stainless sheet and the two stainless sheet retainer plates.
- [2] Pull out the old stainless sheet.

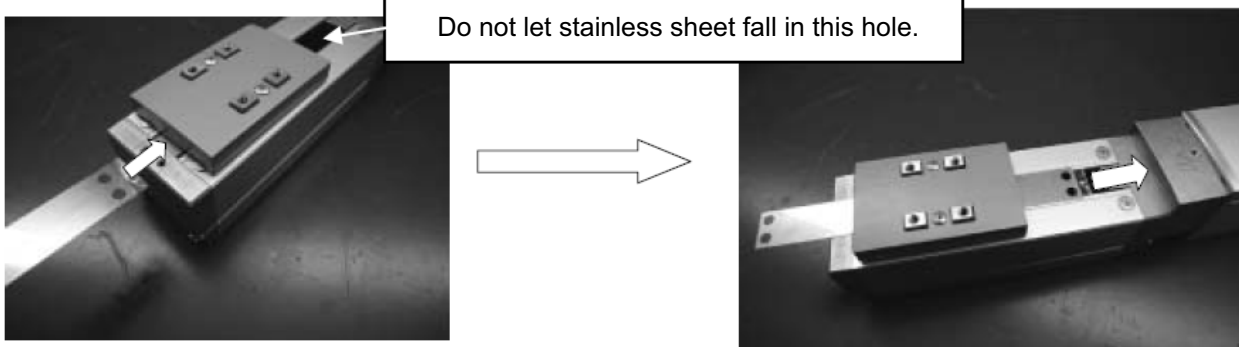


- [3] Apply cellophane tape to one side of the new stainless sheet.

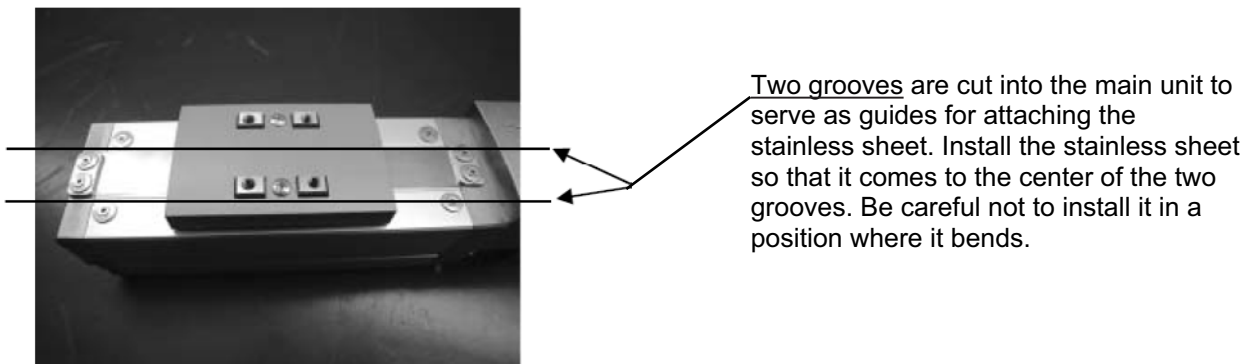


Apply the cellophane tape as though sandwiching the stainless sheet, leaving about 3 mm of tape sticking out from the stainless sheet. Cut off the excess tape.

- [4] Slide the stainless sheet, taped end first, in through the gap under the slider cover.



- [5] Fasten the two stainless sheet retainer plates with the four screws. Use a 1.5 mm hex wrench.



- [6] After fastening the stainless sheet retainer plate, move the slider by hand a full stroke and ensure that the stainless sheet neither floats up nor is warped. If there is a problem, go back to step [5].

**⚠ Caution:** When moving the slider back and forth by hand, be certain never to apply force in excess of the thrust direction external force capacity (see 11.1.2). (If the slider will not move, operate it using a jog function.)

## 13.10 Replacement of Motor (AC Servo Motor: RCA2)

\* Refer to 12.10 for the reversing type.

[Items required for replacing the motor]

- Replacement motor unit

Axis type			Model number	
			Without brake	With brake
RCA2 (brown encoder cable connector)	Slider type	SA3C	RCA2-MU1A	RCA2-MU1A-B
		SA4C	RCA2-MU2A	RCA2-MU2A-B
		SA5C	RCA2-MU3A	RCA2-MU3A-B
		SA6C	RCA2-MU4A	RCA2-MU4A-B



- Hex wrench set

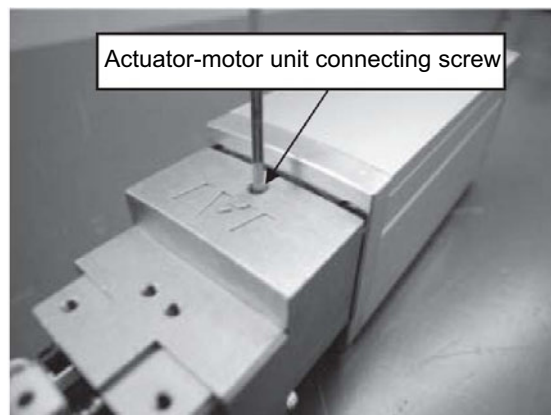
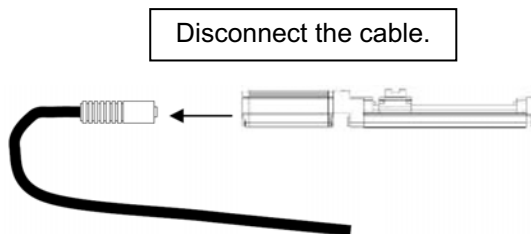
- Dedicated replacement jig (Optional)



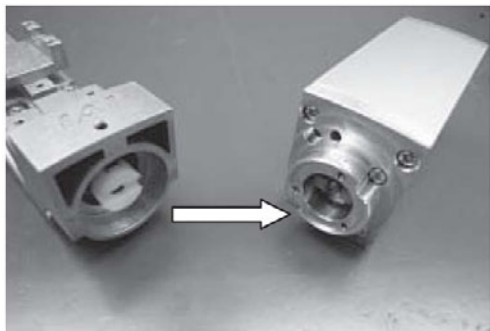
Model number	Applicable model
RCA2-JG-1	RCA2-SA3
RCA2-JG-2	RCA2-SA4
RCA2-JG-3	RCA2-SA5/SA6

[Procedure]

- Disconnect the cable from the motor unit, then use a 2 mm hex wrench to remove the screw which holds together the actuator unit and the motor unit.



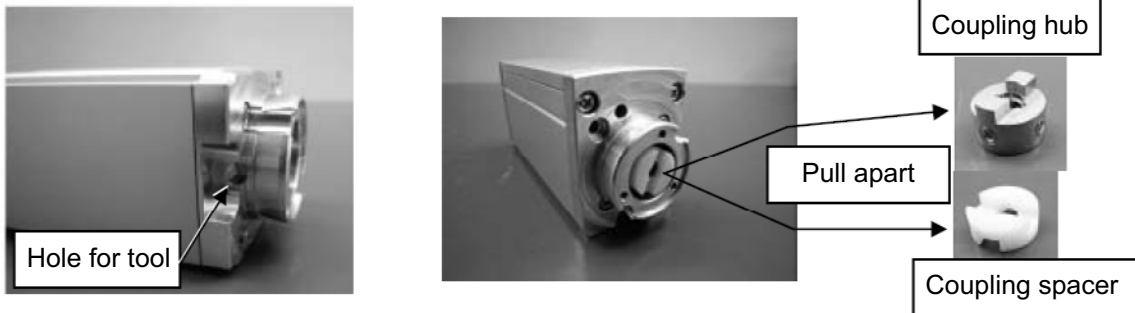
- Detach the motor unit.



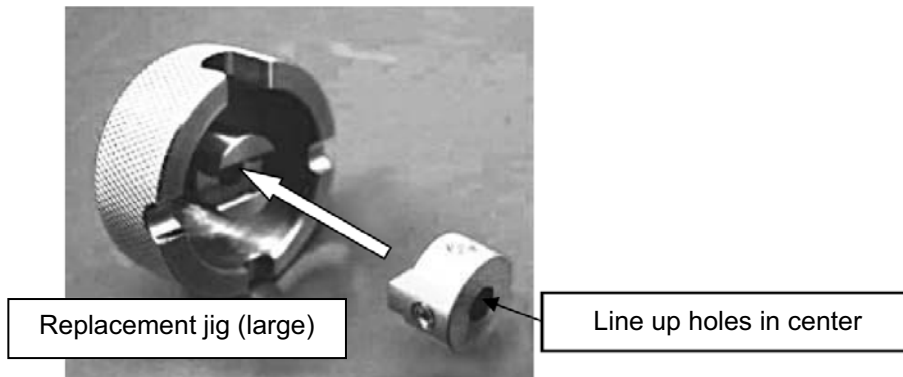
- [3] Take out the coupling hub and coupling spacer from the detached motor unit. Twist the coupling hub or coupling spacer on the motor side to align the screw holes with the hole for the tool to go through. Then remove two screws with a 2 mm hex wrench.

\* If there is only a coupling hub on the motor unit side, then there is a coupling spacer on the actuator side which can be removed by pulling.

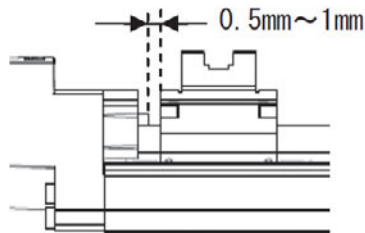
\* If both coupling hub and coupling spacer are present, pull them apart.  
(They should separate with a gentle pull.)



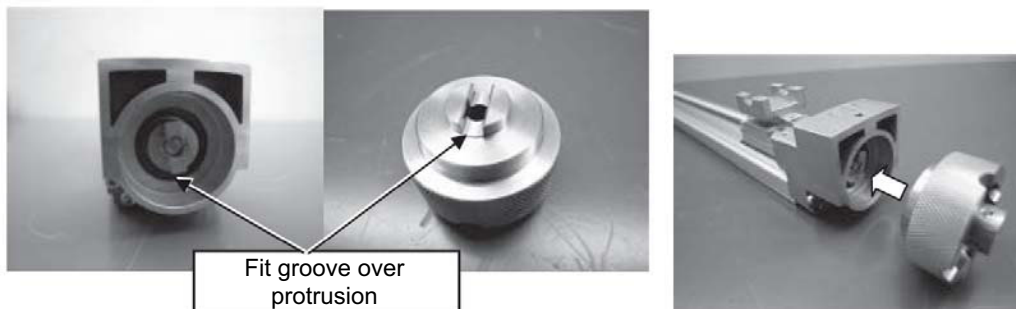
- [4] Fit the protruding part of the coupling hub into the groove of the replacement jig (large), and temporarily hold them together with two M 3x3 Allen screws (tighten just enough so that the coupling hub does not fall off).



- [5] Turn the shaft to move the slider about 0.5 mm to 1 mm from the mechanical end on the home position side.

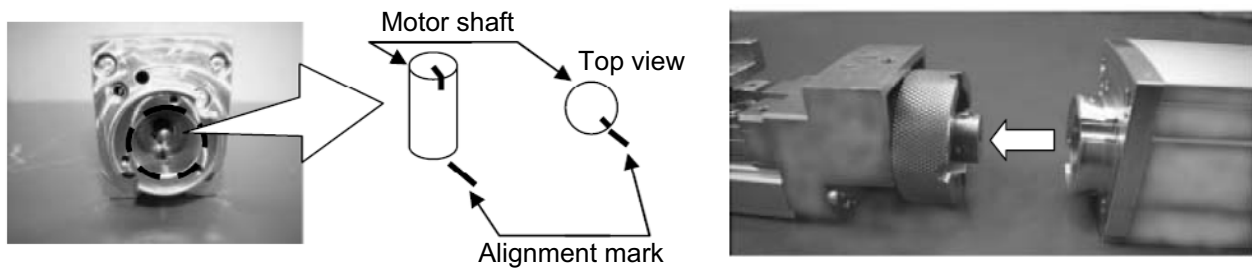


- [6] Fit the groove of the replacement jig (large) assembled in [4] over the protrusion of the actuator.

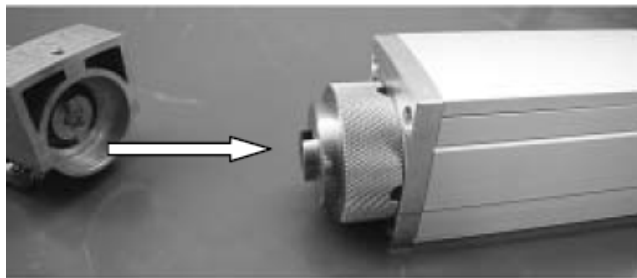




- [7] Align the marking on the motor shaft with the point indicated and insert the replacement motor unit into the actuator.



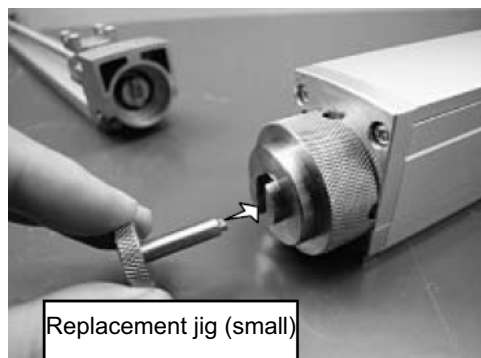
- [8] Take out the motor unit and the replacement jig (large). (Do not allow the jig to turn.)



- [9] In order to keep the jig from turning, draw a mark using a pen or marker.

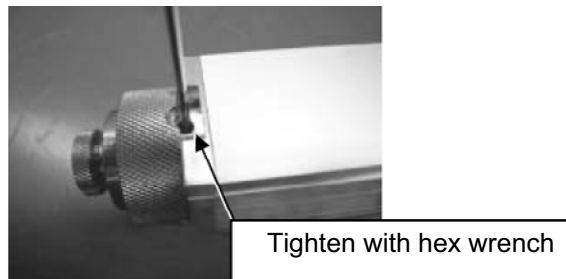
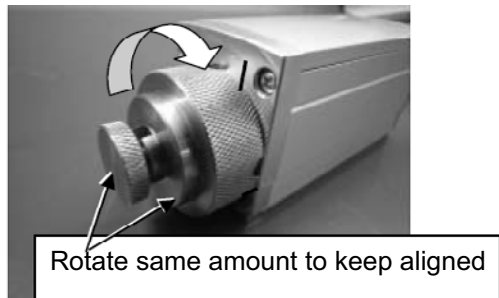


- [10] Insert the replacement jig (small) in such a way that its protrusion is aligned with the groove in the motor shaft.





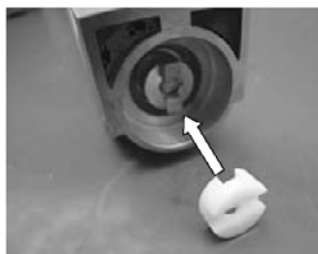
- [11] Turn the replacement jig (large) and the replacement jig (small) by the same amount. When the coupling fastening screws appear through the tool holes, tighten them with a 2 mm hex wrench. (There are two fastening screws.)



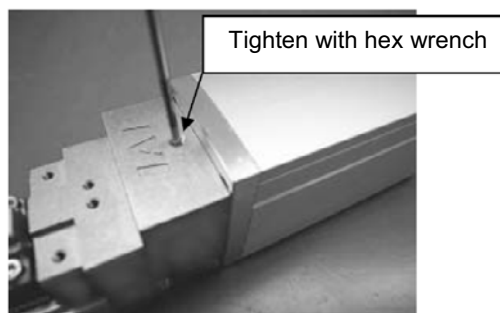
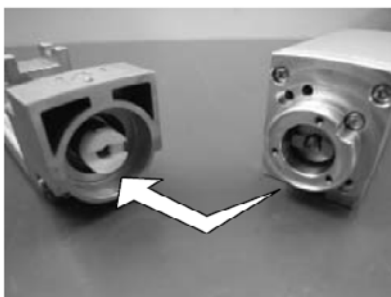
- [12] Align the marks made in [9]. After the marks are aligned, remove the replacement jig (large) and the replacement jig (small).



- [13] Apply the specified grease (TL101Y grease made by NOK) to the coupling spacer (front and rear), then install the coupling spacer on the actuator side.



- [14] Install the replacement motor unit on the actuator side, then tighten the fastening screws with a 2 mm hex wrench. (The actuator side groove and replacement motor unit protrusion should have been aligned in [12], but if not, align them here.)



## 13.11 Replacement of Belt and Motor for Reversing Type (AC Servo Motor: RCA2)

[Items required for replacing the motor]

- Replacement motor unit of reversing type

Axis type			Model number	
			Without brake	With brake
RCA2 (brown encoder cable connector)	Slider type	SA3R	RCA2-MU1B	RCA2-MU1B-B
		SA4R	RCA2-MU2B	RCA2-MU2B-B
		SA5R	RCA2-MU3B	RCA2-MU3B-B
		SA6R	RCA2-MU4B	RCA2-MU4B-B



- Belt

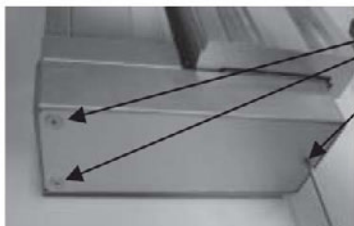
Manufacturer: Bando Chemical Industries, Ltd.

Belt model (type)	Model number
40S2M138R, 4-mm wide(clean rubber type)	SA3R
60S2M152R, 6-mm wide (clean rubber type)	SA4R
60S2M180R, 6-mm wide (clean rubber type)	SA5R
60S2M180R, 6-mm wide (clean rubber type)	SA6R

- Tension gauge
- Hex wrench set

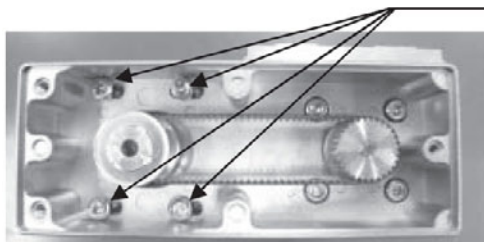
[Procedure]

- [1] Remove the pulley cover.  
Remove the mounting screws. (2 pcs for the SA3R, 3 pcs for other models)



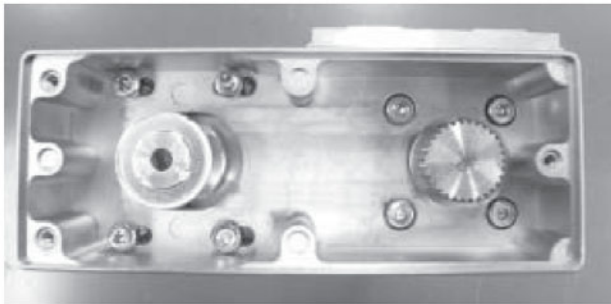
Mounting screw		
Model	Nominal thread size	Applicable Allen wrench
SA3R/SA4R	M2.5	1.5 mm across flats
SA5R/SA6R	M3	2 mm across flats

- [2] Loosen the tension adjustment bolts (4 pcs) and slack the belt.

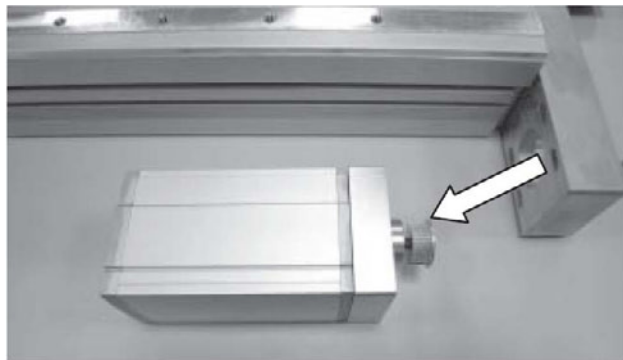


Tightening adjustment bolt		
Model	Nominal thread size	Applicable hex wrench
SA3R	M2.6	2 mm across flats
SA4R	M3	2.5 mm across flats
SA5R/SA6R	M4	3 mm across flats

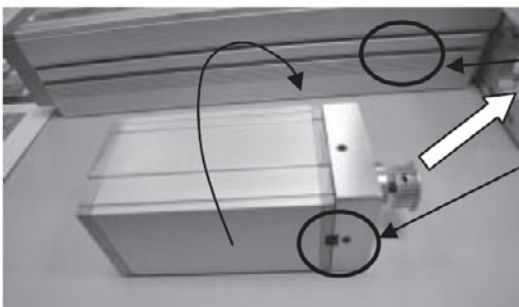
- [3] Remove the belt from the pulleys. When replacing the belt, proceed to step [7].



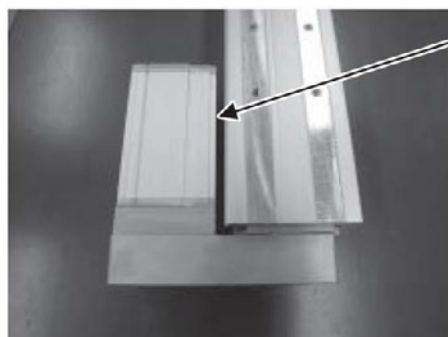
- [4] Remove the tension adjustment bolts and pull out the motor unit.



- [5] Install the replacement motor unit.  
As shown below, install the motor unit by making sure its specified surface faces the actuator base. Loosely secure the motor unit using the tension adjustment bolts.

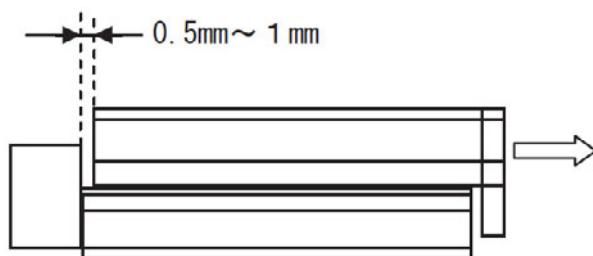


Install the motor unit by making sure the base surface of the actuator faces the motor unit surface with two holes.

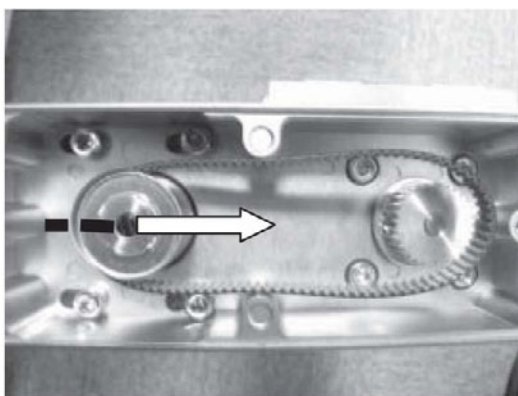


The surface with no gaps should face the motor unit surface with two holes.

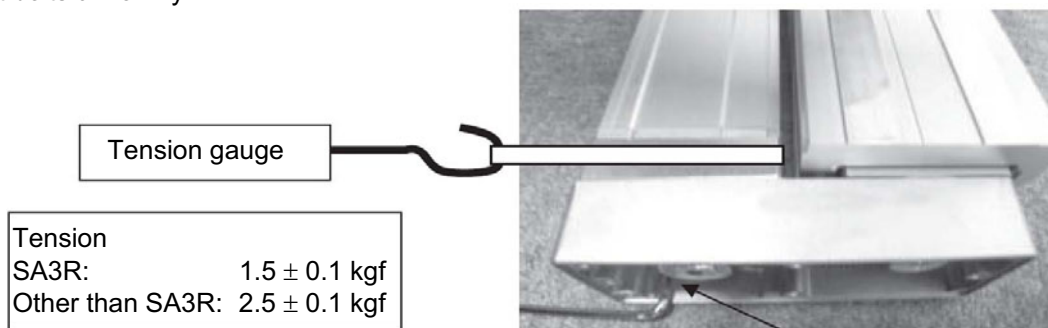
- [6] Move the slider or table by 0.5 to 1 mm from the mechanical end on the home side.



- [7] Move the motor unit in the direction of the arrow shown below, and then install the belt. Align the motor unit with the countermark on the actuator. When replacing the belt, install the replacement belt.

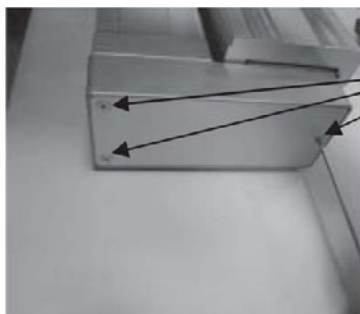


- [8] Pass around the base of the motor unit a strong string (or long tie band) that has been looped, and pull the loop with a tension gauge. When the specified tension is achieved, tighten the tension adjustment bolts uniformly.



Tension adjustment bolt		
Model	Nominal thread size	Tightening torque
SA3R	M2.6	0.46 N·m (0.047 kgf·m)
SA4R	M3	0.83 N·m (0.085 kgf·m)
SA5R/SA6R	M4	1.76 N·m (0.18 kgf·m)

- [9] Install the pulley cover.



Mounting screws  
(2 pcs for the SA3R, 3 pcs for other models)

- [10] 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    Parameter No. 22: Home return offset distance
  - ASEL    Parameter No. 12: Home preset value
- 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.

## 14. Warranty

### 14.1 Warranty Period

One of the following periods, whichever is shorter:

- 18 months after shipment from IAI
- 12 months after delivery to the specified location
- 2,500 hours of operation

### 14.2 Scope of Warranty

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

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

### 14.3 Honoring the Warranty

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

### 14.4 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.

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

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

## **14.6 Other Items Excluded from Warranty**

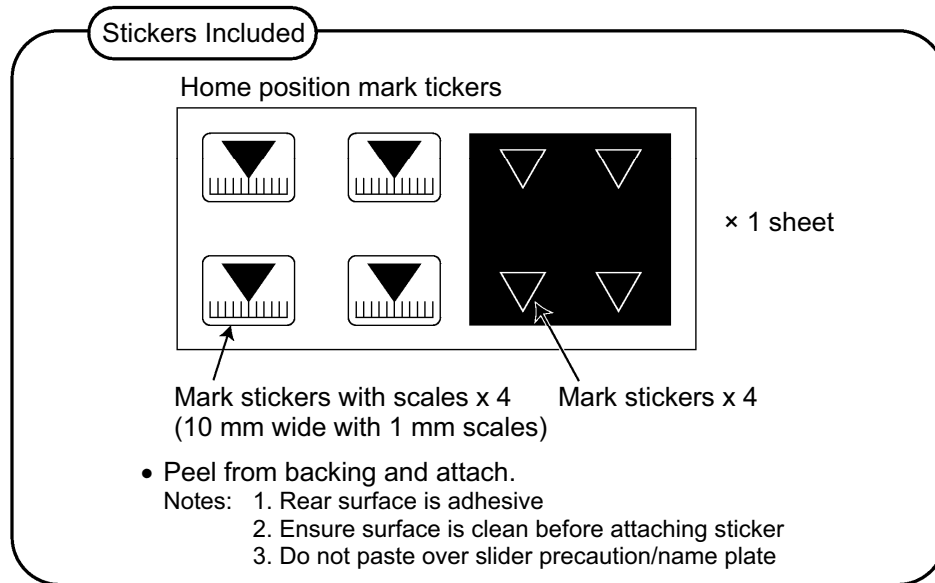
The price of the product delivered to you does not include expenses associated with programming, the dispatch of engineers, etc. Accordingly, a separate fee will be charged in the following cases even during the warranty period:

- [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

## Appendix

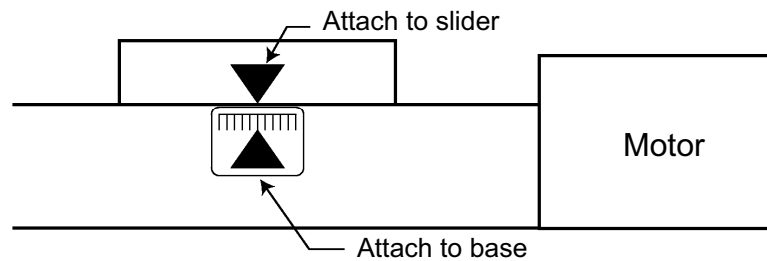
### Using the home position marks

- ◆ As necessary, affix these marks to the product to mark the home position of the actuator.



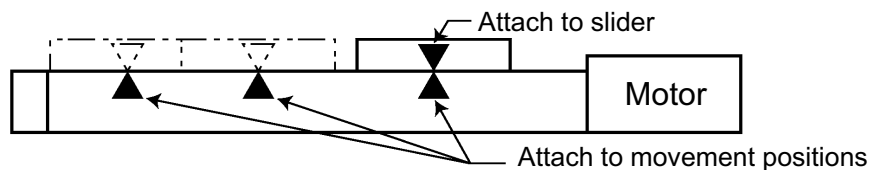
### Example

[1] To mark the home position



- Attach both stickers when actuator is stopped in home position

[2] To show different movement positions





## Change History

Revision Date	Description of Revision		
	First edition		
March 2007	Second edition	Corrected clerical errors.	
March 2010	Third edition	P. 25, 26:	Added "High-acceleration/deceleration specification."
September 2010	Forth edition	P. 9:	Added an "item to note regarding the position when the servo is turned on" under "Handling Precautions."
November 2010	Fifth edition	P. 30~31: P. 34:	Longest cable length: 10 m → 20 m Added "Operation Manual for MEC Controller" and "Operation Manual for MEC PC Software" under "Operation Manuals Relating to This Product."
		P. 35~39:	Added "SA5C, SA6C – Lead 20 mm" under 5.4, "How to Read the Model Number" and 6, Specifications."
		P. 41:	Added lines for SA5C/SA6C of lead 20 mm to the graphs under 7, "Notes on Use Regarding Maximum Speed and Loading Mass."
		P. 43:	Changed the text of "Caution."
		P. 56:	Added 11.2, "Fine-tuning the Home Position" and "AMEC Controller."
		P. 58:	Added 12, "Life."
		P. 60:	Added 13.4, "Adjusting the Stainless Sheet."
April 2011	Sixth edition	A page for CE Marking added	
June 2011	Seventh edition	P.43:	Contents of caution for vertically oriented mount changed.
July 2011	Eighth edition	P.46:	Change in ceiling installation availability (×: Not possible → △: Daily inspection is required)
		P.76~77:	Contents changed. in 14. Warranty
July 2011	Ninth edition	Added SA2AC and SA2AR	
March 2012	Tenth edition	Contents changed in Safety Guide Caution notes added for when working with two or more persons	
		P.46:	Note added to tell platform should have a structure with enough stiffness
		P.47:	Note changed to 1.8 times more of the nominal diameter for the length of thread engagement on aluminum

Revision Date	Description of Revision
March 2012	<p>Eleventh edition</p> <p>P.1~7: Contents added and changed in Safety Guide</p> <p>P.8: Note "Make sure to attach the actuator properly by following this operation manual." added in Caution in Handling</p> <p>P.13~30: Weight added to external dimensions</p> <p>P.64~66: Warning notes added such as in case the grease got into your eye, immediately go to see the doctor for an appropriate care.</p>





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